

- Guiding accuracy $\pm 0,02$ mm**
- Non-rotation accuracy $\pm 0,02^\circ$**
- Integrated strong guide rods**
- Variant with 4 roller bearings for precision linear guiding**
- Easy installation**
- Magnetic piston as standard**
- Buffer pad for noise reduction**



Technical data

- Medium:
- Compressed air, filtered, lubricated or non-lubricated
- Operating pressure:
- 1 to 10 bar
- Operating temperature:
- 10 to +80°C max. (consult our Technical Service for use below +2°C)
- Cylinder diameter:
- 32, 40, 50, 63, 80 (plain bearings)
- 32, 40, 50, 63, 80, 100 (ball bearings)
- Standard strokes:
- 25, 50, 75, 100 mm
- (non-standard strokes <100 mm available.
- They have the dimensions of the next longer standard stroke.

Materials:

- Profile barrel: anodised aluminium
- Piston rod: stainless steel (martensitic)
- Guide rod: stainless steel martensitic (plain bearings), hardened steel, hard-chrome plated (ball bearings)
- Lager: solid bronze (plain bearings), steel roller (ball bearings)
- Mounting plate: stainless steel (austenitic)
- Piston rod seals: polyurethane
- Piston seals: nitrile rubber
- 'O'-ring: nitrile rubber

Ordering information


See page 2

Magnetically operated switches

See page 2



Alternative variants

Symbol	Type	Description	Dimensions see page
	M/61000/M	Cylinder with plain bearings (Ø 32 to 80 mm)	7
	M/61000/MR	Cylinder with ball bearings (Ø 32 to 100 mm)	7
	M/61000/W2R	Cylinder with ball bearings and special wipers (Ø 32 to 100 mm) für Anwendungen in Schweißtechnik	on request

Options selections

M/61****/***/***

Cylinder Ø (mm)	Substitute	Stroke length (mm)	Substitute
32	032	25	25
40	040	50	50
50	050	75	75
63	063	100	100
80	080		
100	100		

Variants (magnetic piston)	Substitute
Plain bearings (Ø 32 to 80 mm)	M
Ball bearings (Ø 32 to 100 mm)	MR
Ball bearings, special wipers (Ø 32 to 100 mm)	W2R

Switches

Type	With cable		With connector		Current max.	Temperature °C	LED	Features	Cable/Connector length	Cable type	Cable with Connector	Datasheet
	Reed	Solid state	Voltage V a.c.	V d.c.								
M/50/LSU/*V	–	–	10 to 240	10 to 170	180 mA	-20 to +80	•	–	2, 5, 10 m	PVC 2 x 0,25	–	N/en 4.3.005
M/50/LSU/5U	–	–	10 to 240	10 to 170	180 mA	-20 to +80	•	–	5 m	PUR 2 x 0,25	–	N/en 4.3.005
TM/50/RAU/2S	–	–	10 to 240	10 to 170	180 mA	-20 to +150	–	–	2 m	Silicone 2 x 0,25	–	N/en 4.3.005
M/50/RAC/5V	–	–	10 to 240	10 to 170	180 mA	-20 to +80	–	Changeover	5 m	PVC 3 x 0,25	–	N/en 4.3.005
M/50/LSU/CP	–	–	10 to 60	10 to 75	180 mA	-20 to +80	•	Plug M8x1	5 m	PVC 3 x 0,25	M/P73001/5	N/en 4.3.005
–	M/50/EAP/*V	–	–	10 to 30	150 mA	-20 to +80	•	PNP	2, 5, 10 m	PVC 3 x 0,25	–	N/en 4.3.007
–	M/50/EAP/CP	–	–	10 to 30	150 mA	-20 to +80	•	PNP, Plug M8x1	5 m	PVC 3 x 0,25	M/P73001/5	N/en 4.3.007
–	M/50/EAP/CC	–	–	10 to 30	150 mA	-20 to +80	•	PNP, Plug M12x1	5 m	PVC 3 x 0,25	M/P34614/5	N/en 4.3.007
–	M/50/EAN/*V	–	–	10 to 30	150 mA	-20 to +80	•	NPN	2, 5, 10 m	PVC 3 x 0,25	–	N/en 4.3.007
–	M/50/EAN/CP	–	–	10 to 30	150 mA	-20 to +80	•	NPN, Plug M8x1	5 m	PVC 3 x 0,25	M/P73001/5	N/en 4.3.007

* Please insert cable length
Further information (technical data, cable material, dimensions) see datasheet.

Ordering information

Cylinder

Cylinder Ø 50 mm, stroke 25 mm, with ball bearings
Quote: **M/61050/MR/25**

Magnetically operated switch

Magnetically operated switch with reed, LED and 2 m cable length
Quote: **M/50/LSU/2V**

Warning

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under 'Technical Data'.

Before using these products with fluids other than those specified, for non-industrial applications, life-support systems, or other applications not within published specifications, consult NORGREN.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes.

The system designer is warned to consider the failure modes of all component parts used in fluid power systems and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure.

System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided.

System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with these products.

Theoretical forces, air consumption

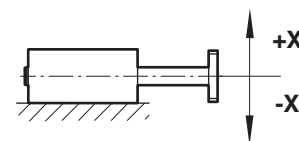
Ø	Theoretical forces (N) at 6 bar		Air consumption (l/cm stroke) at 6 bar	
	outstroke	instroke	outstroke	instroke
32	482	414	0,056	0,048
40	754	633	0,088	0,074
50	1178	990	0,137	0,114
63	1870	1680	0,218	0,195
80	3016	2722	0,35	0,32
100	4710	4416	0,55	0,51

Weight (kg)

Type	Ø	Stroke			
		25 mm	50 mm	75 mm	100 mm
M/61000/M Cylinder with slide bearing	32	1,50	1,99	2,48	2,97
	40	1,70	2,21	2,72	3,23
	50	2,40	3,10	3,80	4,50
	63	3,10	3,91	4,72	5,53
M/61000/MR Cylinder with roller bearing	80	6,45	7,77	9,09	10,40
	32	1,25	1,65	2,05	2,45
	40	1,45	1,87	2,29	2,71
	50	2,10	2,68	3,26	3,84
	63	2,60	3,27	3,94	4,61
80	5,99	7,14	8,29	9,44	
100	9,16	10,75	12,35	13,95	

Guiding accuracy

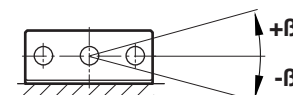
Deflection of the mounting platem at Instroke and outstroke position without load.



Cylinder Ø (mm)	32		40		50		63		80		100	
	Instroke	Outstroke	Instroke	Outstroke	Instroke	Outstroke	Instroke	Outstroke	Instroke	Outstroke	Instroke	Outstroke
Position												
Slide bearing	± 0,06	± 0,11	± 0,06	± 0,11	± 0,06	± 0,11	± 0,06	± 0,11	± 0,07	± 0,11	-	-
Roller bearing	± 0,02	± 0,04	± 0,02	± 0,04	± 0,03	± 0,05	± 0,03	± 0,05	± 0,03	± 0,05	± 0,03	± 0,05

Non-rotation Accuracy

Deflection of the mounting plate β (°) at instroke position without load



Cylinder Ø (mm)	32	40	50	63	80	100
Slide bearing	± 0,06	± 0,06	± 0,05	± 0,05	± 0,04	-
Roller bearing	± 0,03	± 0,03	± 0,03	± 0,03	± 0,02	± 0,02

Load data

General:

The combination of different load cases (e.g. load plus torque or eccentricity in two directions) will reduce the permissible load accordingly.

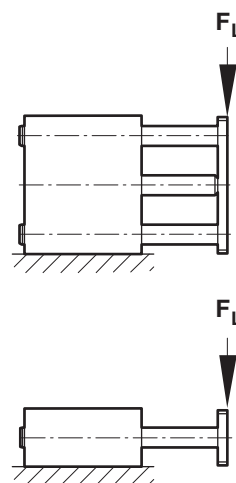
Keep the guide rods free from any pollution.

Maximum load FL (N)

Depending on the stroke

Maximum load FL (N) at the front plate

Cylinder Ø (mm)	Type	Stroke (mm)			
		25	50	75	100
32	M/61032/M	212	214	215	216
	M/61032/MR	163	179	187	191
40	M/61040/M	227	224	223	222
	M/61040/MR	181	191	195	198
50	M/61050/M	324	331	334	337
	M/61050/MR	223	236	242	246
63	M/61063/M	343	343	343	344
	M/61063/MR	251	254	256	257
80	M/61080/M	470	479	484	487
	M/61080/MR	423	459	477	488
100	M/61100/MR	902	761	799	821



Maximum Load F_L' (N) at the distance Δl

A distance Δl between the force and the front plate (e.g. force in the centre of gavity of a load) will reduce the permissible Load as follows:

$$F_L' = F_L \cdot \left(\frac{b}{b + \Delta l} \right)$$

F_L' – Max. load at the distance Δl (N)

F_L – Max. load at the front plate (N)

Δl – Distance (mm)

$b = a + 2 \cdot \text{stroke (mm)}$

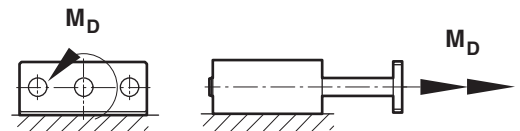
a – Constant (mm)

Cylinder Ø (mm)	32	40	50	63	80	100
a	32	39	41	46	54	59

Maximum torque M_D (Nm)

Depending on the stroke

Cylinder Ø (mm)	Type	Stroke (mm)			
		25	50	75	100
32	M/61032/M	8,5	8,5	8,6	8,6
	M/61032/MR	6,5	7,1	7,5	7,6
40	M/61040/M	10,2	10,1	10,0	10,0
	M/61040/MR	8,1	8,6	8,7	8,9
50	M/61050/M	16,2	16,5	16,7	16,8
	M/61050/MR	11,1	11,8	12,1	12,3
63	M/61063/M	18,8	18,8	18,8	18,9
	M/61063/MR	13,8	14,0	14,1	14,1
80	M/61080/M	32,9	33,5	33,9	34,1
	M/61080/MR	29,6	32,1	33,4	34,1
100	M/61100/MR	76,7	64,7	67,9	69,8



Calculation of permissible Speed or maximum Load

For a cylinder with guiding used as actuator

E_s – Max. kinetic energy (Nm)

m_E – Moved weight (kg)

m_L – Additional load (kg)

v – Speed (m/s)

$$E_s = \frac{1}{2} (m_E + m_L) \cdot v^2$$

Maximum permissible speed v_{max} .

$$v_{max} = \sqrt{\frac{2 E_s}{m_E + m_L}}$$

$v_{Zyl} = 0,6$ m/s for cylinder Ø 32 to 63 mm

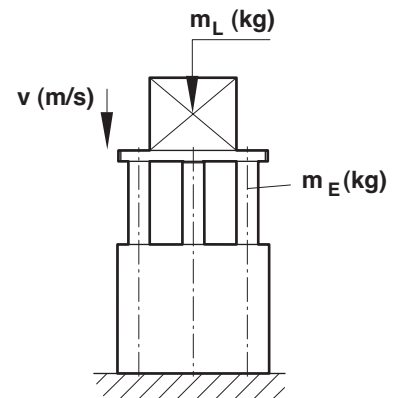
$v_{Zyl} = 0,4$ m/s for cylinder Ø 80 to 100 mm

Maximum additional load $m_{L max}$.

$$m_{L max} = \frac{2 E_s}{v^2} - m_E$$

Maximum kinetic energy E_s (Nm)

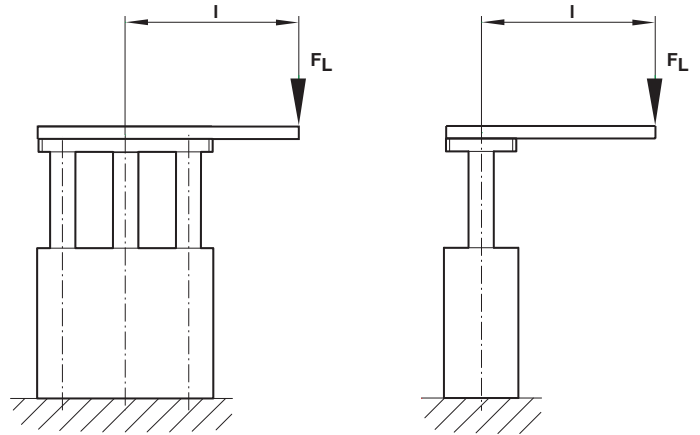
Cylinder Ø (mm)	32	40	50	63	80	100
E_s	0,40	0,58	0,67	0,67	1,33	1,33



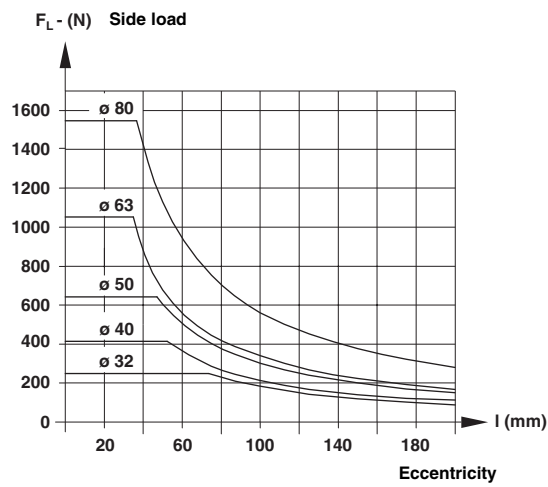
Moved weight m_E (kg)

Type	Ø	Stroke 25 mm	50 mm	75 mm	100 mm
M/61000/M	32	0,92	1,19	1,46	1,73
Cylinder with slide bearing	40	1,01	1,30	1,59	1,88
	50	1,49	1,94	2,39	2,84
	63	1,90	2,35	2,80	3,25
	80	3,73	4,38	5,03	5,68
M/61000/MR	32	0,74	0,92	1,10	1,28
Cylinder with roller bearing	40	0,83	1,03	1,23	1,43
	50	1,21	1,52	1,83	2,14
	63	1,61	1,92	2,23	2,54
	80	3,35	3,83	4,32	4,80
	100	4,90	5,55	6,20	6,85

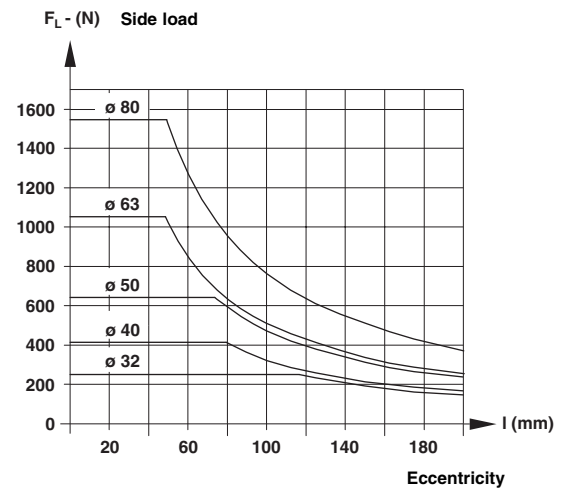
Application: M/61000/M used as lifting cylinder
 Max. side load (F_L) depending on the eccentricity (l),
 cylinder with slide bearings



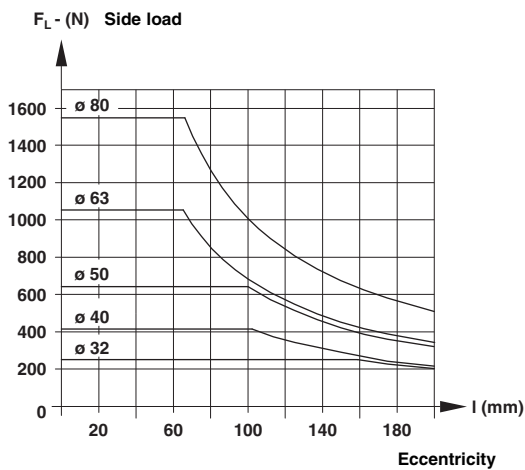
Stroke: 25 mm



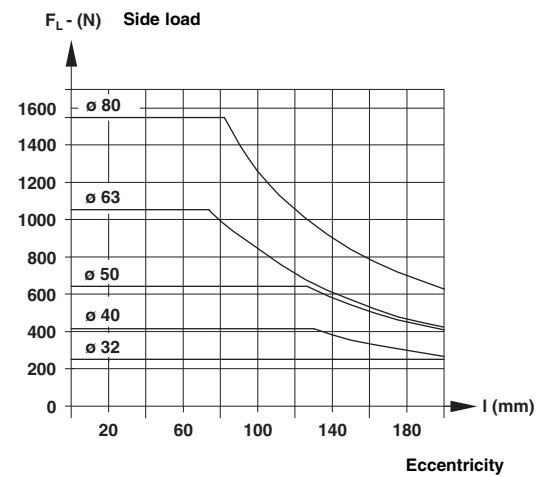
Stroke: 50 mm



Stroke: 75 mm

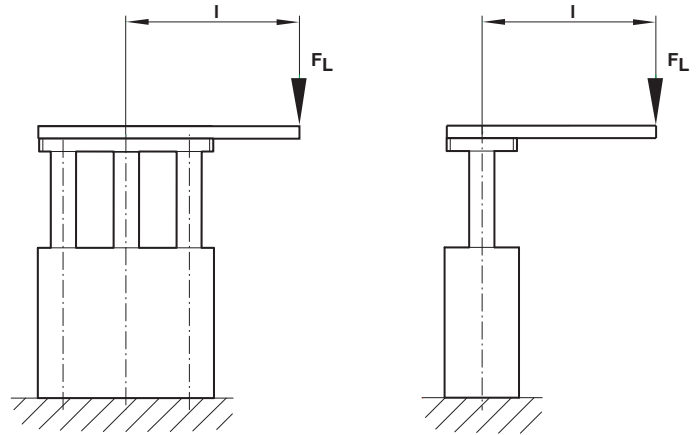


Stroke: 100 mm

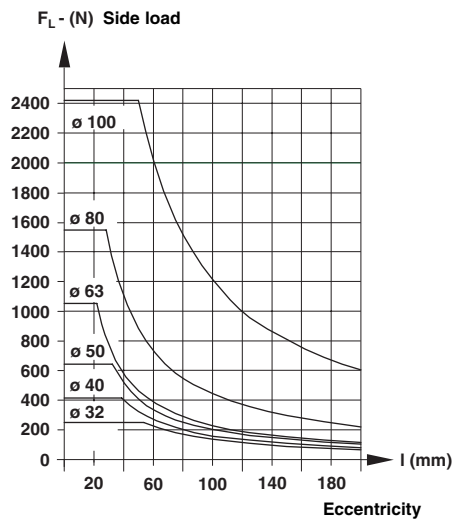


Application: M/61000/MR used as lifting cylinder

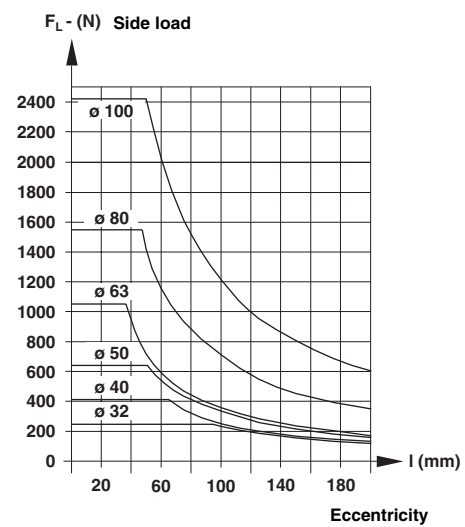
Max. side load (F_L) depending on the eccentricity (l), cylinder with roller bearings



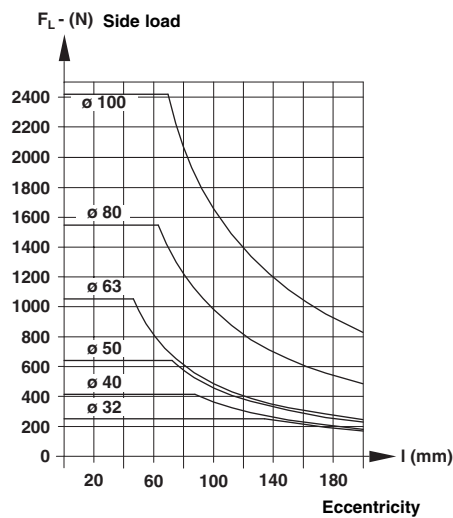
Stroke: 25 mm



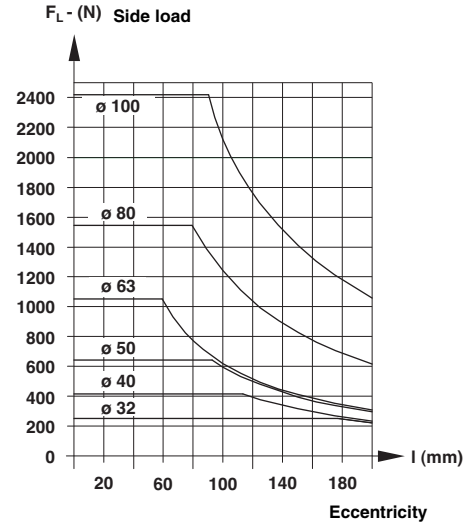
Stroke: 50 mm



Stroke: 75 mm

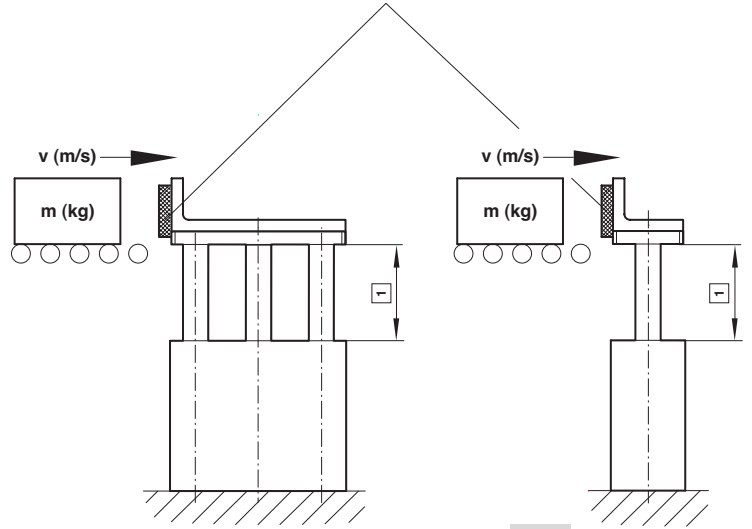
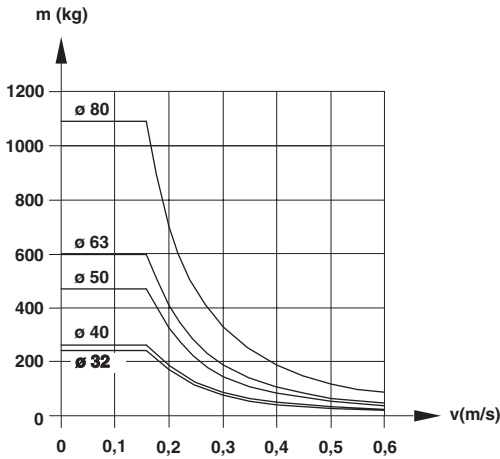


Stroke: 100 mm



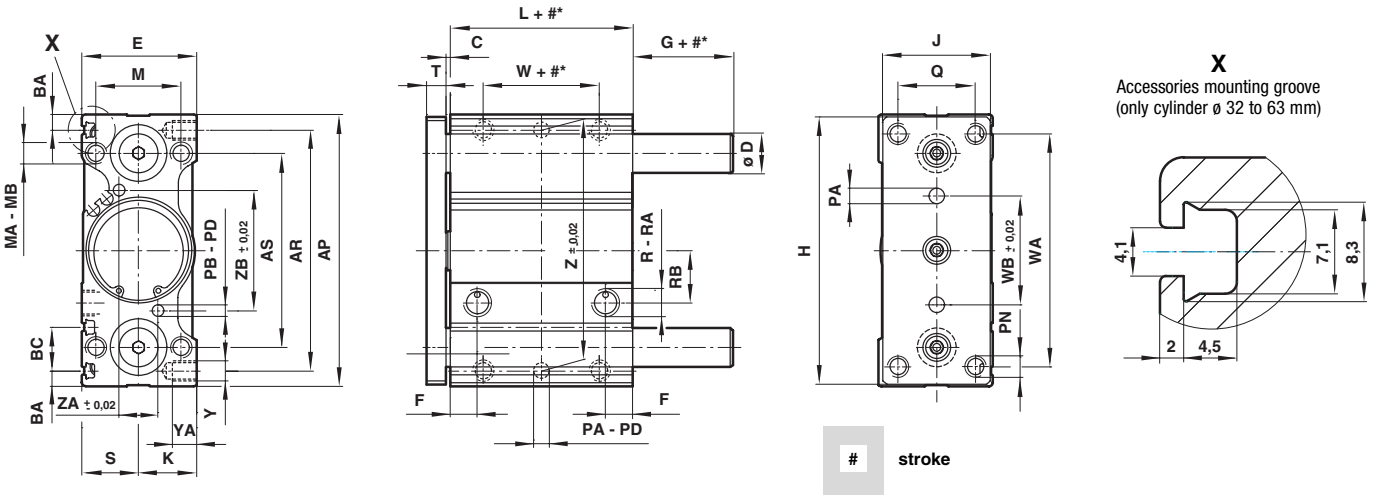
Application: M/61000/M used as Stopper Cylinder
 Max. impact energy (Nm)
 Use only cylinders with plain bearings as stopper
 The diagram mass vs. speed is based on a cushion stroke of 2,5 mm at the front plate provided e.g. by an additional cushion pad.
 Insert mounting screws at the rear side of the cylinder at least 2 x diameter deep.

Additional cushion pad is required



1 50 mm stroke max.

Dimensions (mm)



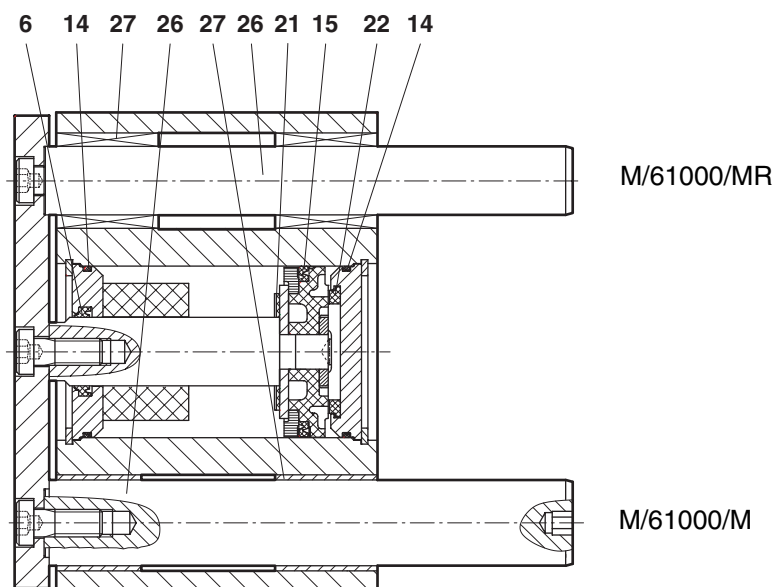
Ø	AP	AR	AS	BA	BC	C	D *1)	D *2)	E	F	G *3)	H	J	K	L *3)	M	MA	MB *4)	PA
32	114	100	80	7	22	1,5	16	20	51	11,5	8,5	112	48	26	38	38	M8 x 1,25	20	6 ^{H7}
40	124	110	90	7	22	2	16	20	51	13,5	2	122	48	26	44	38	M8 x 1,25	20	6 ^{H7}
50	140	124	100	8	22,5	2	20	25	59	14	7	138	56	30	44	44	M10 x 1,5	25	8 ^{H7}
63	150	132	110	8	22,5	2	20	25	72	25	2	148	69	36,5	49	44	M10 x 1,5	25	8 ^{H7}
80	188	166	140	-	-	1,5	25	30	92	17,5	2	185	88	46,5	57	56	M12 x 1,75	30	10 ^{H7}
100	224	200	170	-	-	2	30	-	112	21	2	221	108	56,5	66	62	M14 x 2	35	10 ^{H7}
Ø	PB	PD *4)	PN	Q	R	RA *4)	RB	S	T	W *3)	WA	WB	Z	Y	YA	ZB			
32	6H7	8	M8 x 1,25	30	G1/8	7,5	15	25	8	5	96	46	100	M8 x 1,25	11	14	44		
40	6H7	8	M8 x 1,25	30	G1/8	7,5	21	25	8	10	106	50	110	M8 x 1,25	12,5	14	54		
50	6H7	11	M10 x 1,5	40	G1/4	11	27	29	10	10	120	56	124	M10 x 1,5	12,5	20	62		
63	8H7	11	M10 x 1,5	50	G1/4	11	33	35,5	10	10	130	66	132	M10 x 1,5	15	30	74		
80	10H7	13	M12 x 1,75	60	G1/4	11	37	45,5	16	15	160	84	166	M12 x 1,75	18	36	94		
100	10H7	13	M14 x 2	80	G1/4	11	40	55,5	16	15	190	110	200	M14 x 2	21	40	116		

D *1) = M/61000/MR cylinder ball bearings
 D *2) = M/61000/M cylinder with plain bearings

*3) The dimensions of M/61100 with 25 mm of stroke are identical with 50 mm of stroke!
 Cylinders with non-standard strokes have the dimensions of the cylinder with the next longer standard stroke.

*4) deep

Spares



Cylinder Ø (mm)	Type	Spares kit	Comprising item	Description	Quantity	Guide rod Item 26	Bearing Item 27
32	M/61032/M	QM/61032/00	21	Cushion disc	1	M/P72451/*	M/P72433/1
	M/61032/MR	QM/61032/00	6	Piston rod seal	1	M/P72449/*	M/P72431/1
40	M/61040/M	QM/61040/00	14	'O'-rings	2	M/P72451/*	M/P72433/1
	M/61040/MR	QM/61040/00	22	Cushion disc	1	M/P72449/*	M/P72431/1
50	M/61050/M	QM/61050/00	15	Piston seal	1	M/P72452/*	M/P72433/2
	M/61050/MR	QM/61050/00		Wiper seal	1	M/P72450/*	M/P72431/2
63	M/61063/M	QM/61063/00		Instruction	1	M/P72452/*	M/P72433/2
	M/61063/MR	QM/61063/00				M/P72450/*	M/P72431/2
80	M/61080/M	QM/61080/00				M/P72720/*	M/P72433/3
	M/61080/MR	QM/61080/00				M/P72718/*	M/P72431/3
100	M/61100/MR	QM/61100/00				M/P72719/*	M/P72431/4

* insert stroke length