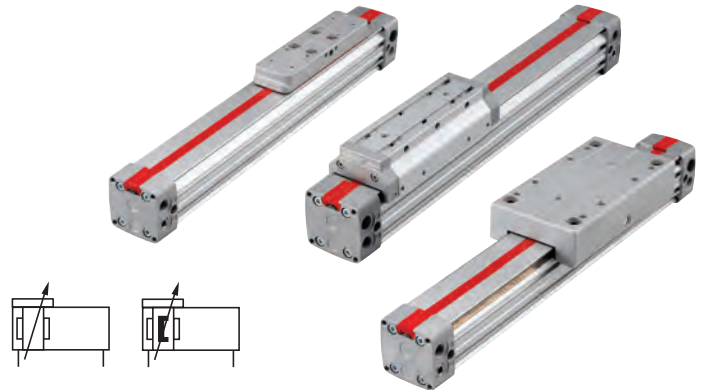


# M/146000, M/146100, M/146200, LINTRA®PLUS rodless cylinder Magnetic & Non-magnetic piston, double acting

- Ø 16 ... 80 mm
- New lightweight design extrusion with universal mounting grooves
- Proved and patented sealing system
- Dust protection as standard (Ø 25 ... 63 mm)
- Interchangeability with series M/46000



## Technical features

**Medium:**  
Compressed air, filtered, lubricated or non-lubricated

**Operation:**  
M/146000, M/146100, M/146200  
Double acting, with adjustable cushioning  
M/146000/M, M/146100/M, M/146200/M  
Double acting with adjustable cushioning and magnetic piston

**Models:**  
M/146000 with internal guide  
M/146100 with external adjustable guide  
M/146200 with precision roller guide

**Operating pressure:**  
1 ... 8 bar (14 ... 116 psi)

**Cylinder diameters:**  
16, 20, 25, 32, 40, 50, 63, 80 mm

**Max strokes:**  
Ø 16 ... 40 mm 8500 mm  
Ø 50 and 63 mm 8000 mm  
Ø 80 mm 5500 mm

**Operating temperature:**

-30 ... +80°C max.  
(-22 ... +176°F)

Air supply must be dry enough to avoid ice formation at temperatures below +2°C (+35°F).

**Materials:**

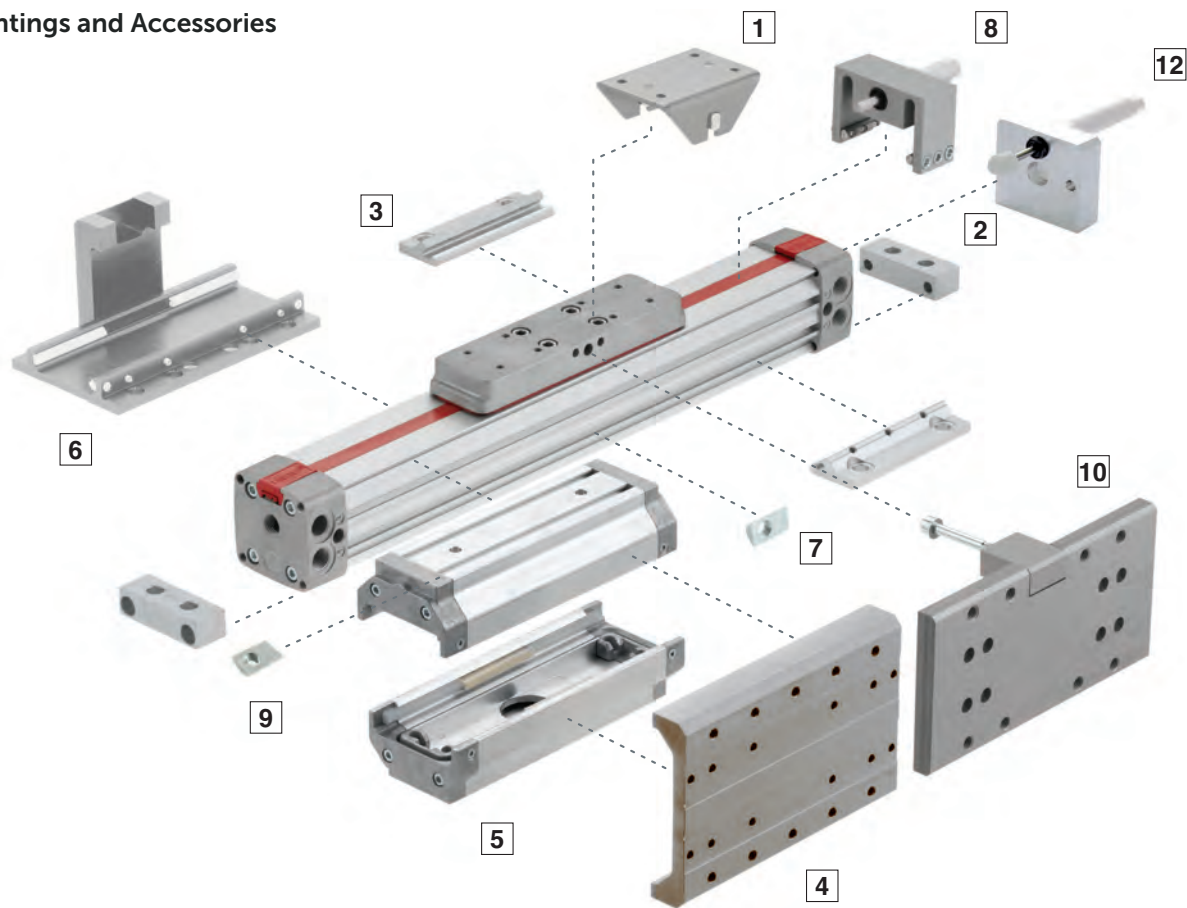
End covers: aluminium diecast, moulded plastic (Ø 16) and anodised aluminium (Ø 20 & 80)  
Yoke: anodised aluminium, moulded plastic (Ø 16 & 20)  
Carriage, closer & cover: aluminium diecast  
Guiding bridge and profile barrel: anodised aluminium  
Seal strip, wiper and piston seal: PUR  
Cover strip: PA  
Other seals: NBR  
Mounting screws: A2E  
Shim ring: stainless steel (A2)



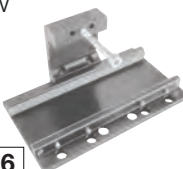









## Technical data

Cylinder Ø (mm)	16	20	25	32	40	50	63	80
Port size	M5	G1/8	G1/8	G1/4	G1/4	G3/8	G1/2	G1/2
Cushion length (mm)	12	26	26	35	50	60	70	75
Theoretical thrusts at 6 bar outstroke (N)	120	188	294	482	754	1178	1870	3016
Air consumption at 6 bar outstroke (l/cm stroke)	0,014	0,022	0,035	0,056	0,088	0,137	0,218	0,35
Holding forces (N) of brake (on dry braking surface)								
Activ (L1 + L3) at 6 bar	–	–	500	900	1500	2500	4000	–
Passive (L2 + L4)	–	–	220	375	630	1000	1650	–



# Mountings and Accessories



	<b>C</b>  <b>2</b> Page 17	<b>S*1)</b>  <b>1</b> Page 18	<b>UV</b>  <b>6</b> Page 17	<b>UW*2)</b>  <b>4</b> Page 18	<b>V</b>  <b>3</b> Page 17	<b>W*2)</b>  <b>5</b> Page 18
<b>Ø mm</b>	<b>Page 17</b>	<b>Page 18</b>	<b>Page 17</b>	<b>Page 18</b>	<b>Page 17</b>	<b>Page 18</b>
16	QM/146016/21	QM/146016/37	QM/146016/34	–	QM/146016/32	QM/146116/35
20	QM/146020/21	QM/146020/37	QM/146020/34	QM/146120/36	QM/146020/32	QM/146120/35
25	QM/146025/21	QM/146025/37	QM/146025/34	QM/146125/36	QM/146025/32	QM/146125/35
32	QM/146032/21	QM/146032/37	QM/146032/34	QM/146132/36	QM/146032/32	QM/146132/35
40	QM/146040/21	QM/146032/37	QM/146040/34	QM/146140/36	QM/146040/32	QM/146140/35
50	QM/146050/21	QM/146050/37	QM/146050/34	QM/146150/36	QM/146050/32	QM/146150/35
63	QM/146063/21	QM/146050/37	QM/146063/34	QM/146163/36	QM/146063/32	QM/146163/35
80	QM/146080/21	QM/146080/37	QM/146080/34	–	QM/146080/32	QM/146180/35
	<b>Assembly kit for caged ball linear motion guide</b>  <b>10</b> Page 11	<b>Adjustable stop</b>  <b>8</b> Page 18	<b>Assembly kit for shock absorbers</b>  <b>12</b> Page 19	<b>Groove key for profile barrel</b>  <b>7</b> Page 17	<b>Groove key for guiding bridge</b>  <b>9</b> Page 17	<b>Magnetically operated switches</b>  <b>Page 20 &amp; 21</b>
16	–	–	–	–	–	–
20	–	QM/146120/75	–	–	–	–
25	QM/146225/P/70	QM/146125/75	QM/146125/67	M/P74065	M/P74065	–
32	QM/146232/P/70	QM/146132/75	QM/146132/67	M/P74065	M/P74065	–
40	QM/146240/P/70	QM/146140/75	QM/146140/67	M/P74065	M/P74066	–
50	QM/146250/P/70	–	QM/146150/67	M/P74065	M/P41858	–
63	QM/146263/P/70	–	QM/146163/67	M/P74065	M/P41858	–
80	–	–	–	M/P74065	–	–

\*1) Suitable for internally guided models only (M/146000), \*2) Suitable for external guided models only (M/146100)

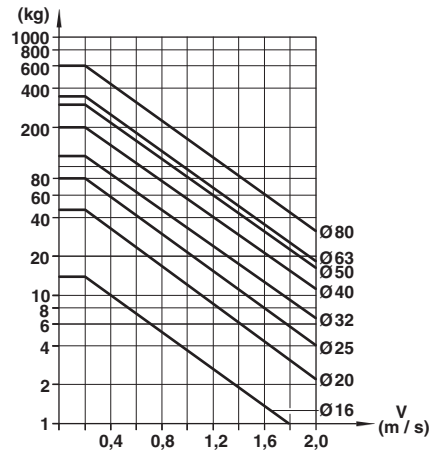
**Service kit (seal and cover strip included)**

Guiding systems	ø 16	ø 20	ø 25	ø 32	ø 40	ø 50	ø 63	ø 80
<b>Internal</b>	M/146016, .../M	M/146020, .../M	M/146025, .../M	M/146032, .../M	M/146040, .../M	M/146050, .../M	M/146063, .../M	M/146080, .../M
	-	-	-	M/146032/F1	M/146040/F1	M/146050/F1	M/146063/F1	-
	-	-	M/146025/L1, .../L2	M/146032/L1, .../L2	M/146040/L1, .../L2	M/146050/L1, .../L2	M/146063/L1, .../L2	-
<b>External</b>	M/146116, .../M	M/146120, .../M	M/146125, .../M	M/146132, .../M	M/146140, .../M	M/146150, .../M	M/146163, .../M	M/146180, .../M
	-	-	M/146125/L3, .../L4	M/146132/L3, .../L4	M/146140/L3, .../L4	M/146150/L3, .../L4	M/146163/L3, .../L4	-
	-	-	-	M/146132/F1	M/146140/F1	M/146150/F1	M/146163/F1	-
<b>Roller guide</b>	-	-	M/146225/M	M/146232/M	M/146240/M	M/146250/M	M/146263/M	-
	-	-	-	M/146232/F1	M/146240/F1	M/146250/F1	M/146263/F1	-
	-	-	M/146225/P, .../PM	M/146232/P, .../PM	M/146240/P, .../PM	M/146250/P, .../PM	M/146263/P, .../PM	-

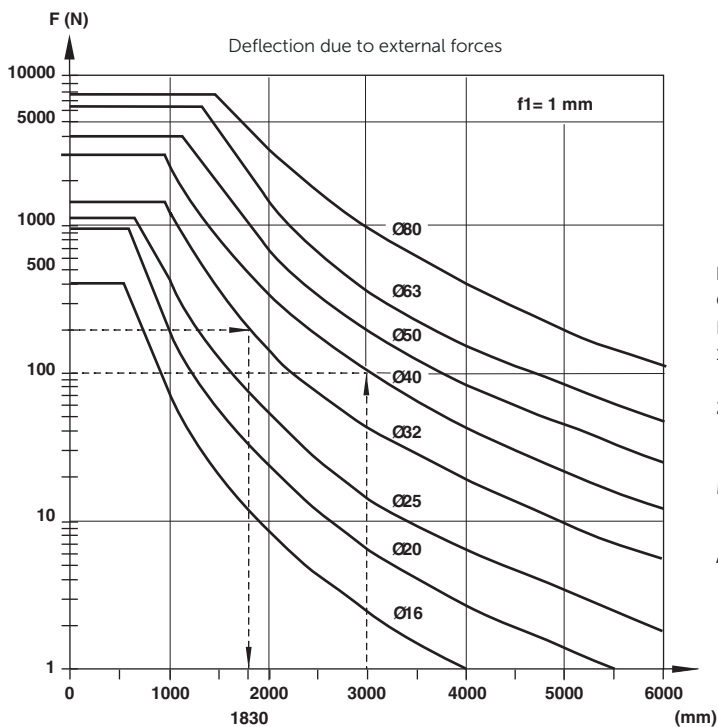
Model	Stroke [mm]	suitable for			Ø							
		internal	external	roller guide	16	20	25	32	40	50	63	80
QA/1460**/88/1000	0 - 1000	x	x	x	x	x	x	x	x	x	x	x
QA/1460**/88/3000	1001 - 3000	x	x	x	x	x	x	x	x	x	x	x
QA/1460**/88/8500	3001 - 8500	x	x	x	x	x	x	x	x			
QA/146050/88/8000	3001 - 8000	x	x	x						x		
QA/146063/88/8000	3001 - 8000	x	x	x							x	
QA/146080/88/5500	3001 - 5500	x	x	x								x

## Cushioning performance

The dynamic energy of a LINTRA® cylinder is caused by direct or partial external loads which must be absorbed by pneumatic cushioning. The cushioning ability depends to a large extent on the pneumatic circuit (e. g. counter pressure, pre-exhaust). The values given in the diagram were tested with an operation pressure of 6 bar using a 5/2 control valve. When installed horizontally, depending upon the speed, dynamic energy can be absorbed by the cylinder. Whenever the values given in the diagram are exceeded, the transported mass must be cushioned by additional shock absorbers. These have to be located at the center of gravity of the mass.

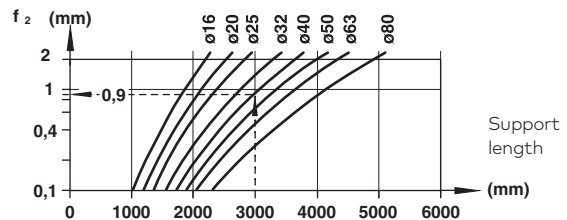


## Cylinder deflection



**Example:**  
 Cylinder ø 32 mm, stroke length 3500 mm,  
 external load 200 N and a deflection about 1 mm  
 Maximum distance between supports = 1830 mm (see diagrams).  
 Therefore an additional support is required.

## Deflection due to cylinder weight



**Example:**

Cylinder ø 40 mm, external force 180 N, distance between supports 3000 mm

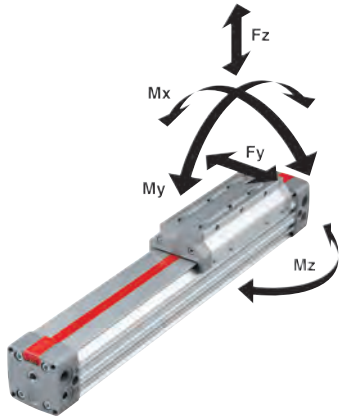
Required: total deflection

1. Deflection due to external force (f1)  
 see Diagram 1 (1 mm/100 N) · 180 N 1,8 mm
2. Deflection due to cylinder weight diagram 2 + 0,9 mm
- Total deflection: 2,7 mm

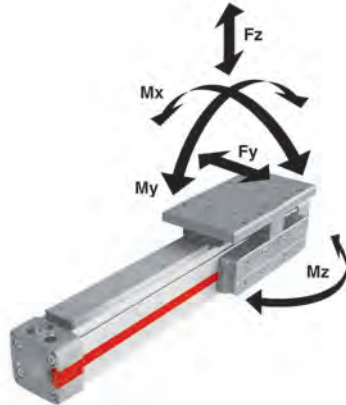
Max. permitted deflection (f1 + f2) < 1 mm  
1000 mm Hub

A deflection of more than 3 mm is not permitted.

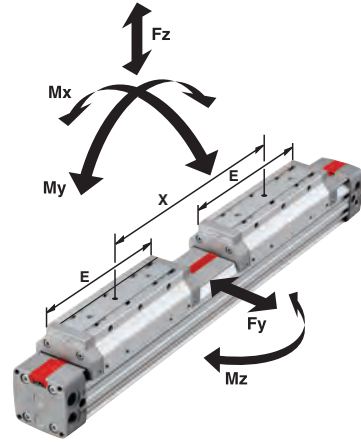
## M/146000, M/146100, M/146200



## M/146200/P



## M/146100/ID, M/146100/MD



Ø mm	Internal guide M/146000					External adjustable guide M/146100			Precision roller guide M/146200				Added caged ball linear motion guide M/146200/P		
	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)	Fy, Fz (N)	Mx (Nm)	My, Mz (Nm)	Fy (N)	Fz (N)	Mx (Nm)	My, Mz (Nm)	Fy, Fz (N)	Mx (Nm)	My, Mz (Nm)
16	40	120	0,3	3,8	1,1	200	2	5,5	-	-	-	-	-	-	-
20	90	280	0,9	12	3,6	470	6	18	-	-	-	-	-	-	-
25	125	385	1,5	19	5,6	590	9	28	590	1180	13	42	2000	15	100
32	165	500	3	33	10	780	17	43	780	1560	25	64	4000	64	250
40	330	990	6,5	84	24	1600	39	110	1500	3000	58	160	4000	64	400
50	440	1320	11	120	35	2000	65	160	2000	4000	97	240	8000	180	800
63	690	2000	20	240	70	3200	120	350	3200	6400	180	520	8000	180	1000
80	780	2300	27	360	100	3900	180	520	-	-	-	-	-	-	-

Ø mm	External adjustable guide, M/146100/ID and M/146100/MD											
	Fy, Fz (N)	Mx (Nm)	x min. = E	x = 100 mm	x = 150 mm	x = 200 mm	x = 250 mm	x = 300 mm	x = 350 mm	x = 400 mm	x = 450 mm	x = 500 mm
16	400	4	14	17	23	29	35	41	48	54	60	66
20	940	12	64	-	80	99	119	139	158	178	197	217
25	1180	18	96	-	106	131	155	180	205	230	255	279
32	1560	34	155	-	-	181	213	246	278	310	343	375
40	3000	78	393	-	-	-	435	496	557	618	679	740
50	4000	130	457	-	-	-	457	518	579	639	700	761
63	6400	240	1280	-	-	-	-	-	1360	1500	1630	1770
80	7800	360	1910	-	-	-	-	-	-	1940	2110	2270

Ø mm	Precision roller guide M/146200/ID and M/146200/MD											
	Fy, Fz (N)	Mx (Nm)	x min. = E	x = 100 mm	x = 150 mm	x = 200 mm	x = 250 mm	x = 300 mm	x = 350 mm	x = 400 mm	x = 450 mm	x = 500 mm
25	1180	26	125	-	138	170	202	234	267	299	332	363
32	1560	50	202	-	-	235	277	320	361	403	446	488
40	3000	116	511	-	-	-	566	645	724	803	883	962
50	4000	194	594	-	-	-	594	673	753	831	910	989
63	6400	360	1664	-	-	-	-	-	1768	1850	2119	2301

### Loading values for LINTRA® cylinders

The values given in the table below show the single forces in the directions

Fy and Fz and the maximum moments Mx, My and Mz.

All values are applicable only for speeds of max. 0,2 m/s.

A requirement for using these values is a constant movement (no jerking) of the mass over the whole stroke length of the cylinder.

The reference point from which the moments for all cylinders should be calculated is the centre line of the pistons.

**For speeds up to 2 m/s please use our calculation programme LINTRA® PNEUCALC. It is available upon request.**

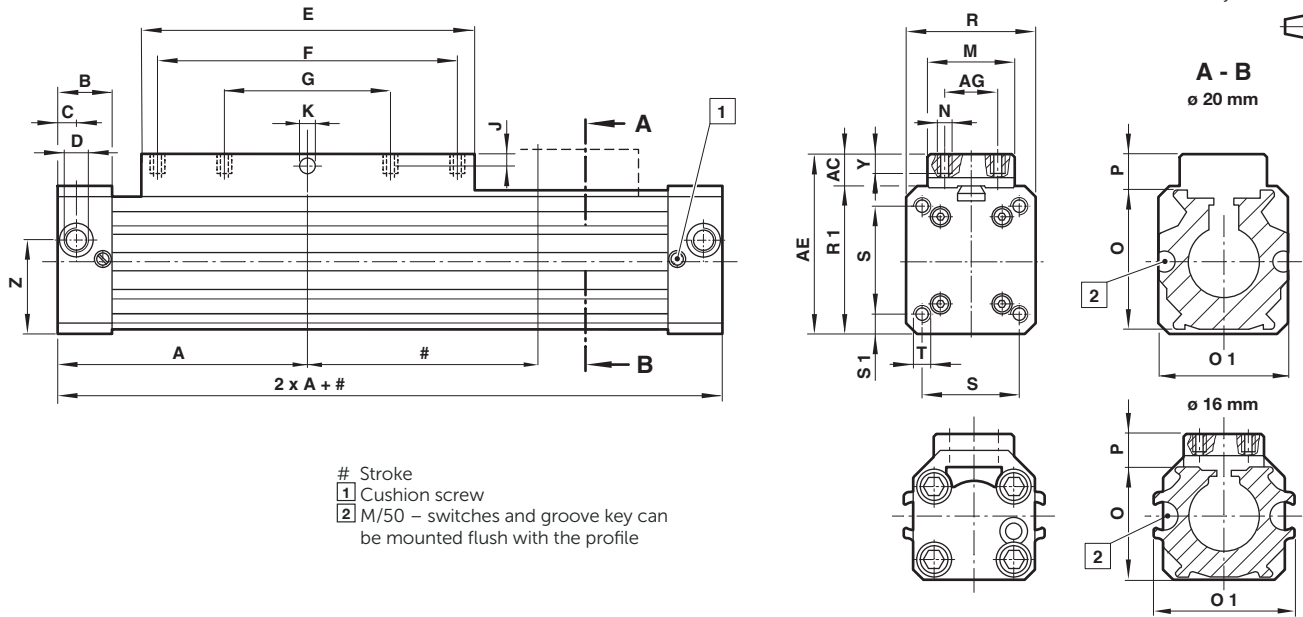
When a LINTRA® cylinder has to take several loads and moments, an additional calculation is necessary using this formula:

$$\frac{M_x}{M_{x \text{ max}}} + \frac{M_y}{M_{y \text{ max}}} + \frac{M_z}{M_{z \text{ max}}} + \frac{F_y}{F_{y \text{ max}}} + \frac{F_z}{F_{z \text{ max}}} \leq 1$$

**M/146000 – cylinder with internal guide, cylinder Ø 16 and 20 mm**

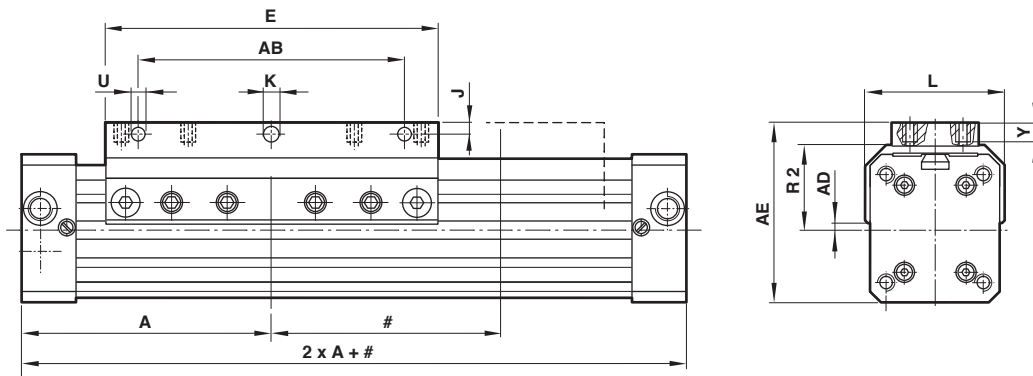
Dimensions in mm

Projection/First angle

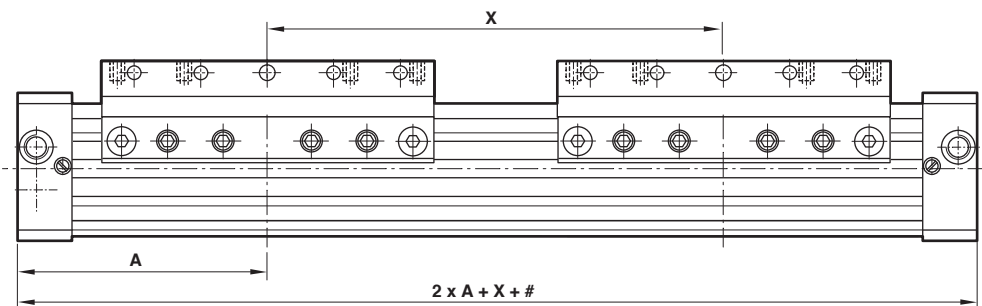


Ø	A	AC	AE	AG	B	C	D	E	F	G	J	Ø K D7	M	N	O
16	62,5	24,5	38	8	17,5	8	M5	80	60	–	2,5	3	18	M3	25
20	85	34,5	54	20	23	8	G1/8	110	80	40	3,5	4,2	27	M5	32
Ø	O1	P	R	R1	S	S1	T	Y	Z	Weight at 0 mm	Weight per 100 mm	Model			
16	32	12	27	31	16	5,5	M3 - 5 *1)	4	16,5	0,16 kg	0,10 kg	M/146016/...			
20	38	18,5	40	40	32	4	M5 - 12 *)	12	20,5	0,50 kg	0,15 kg	M/146020/...			

\*)1) deep

**M/146100 – cylinder with external adjustable guide (Ø 16 & 20 mm)**


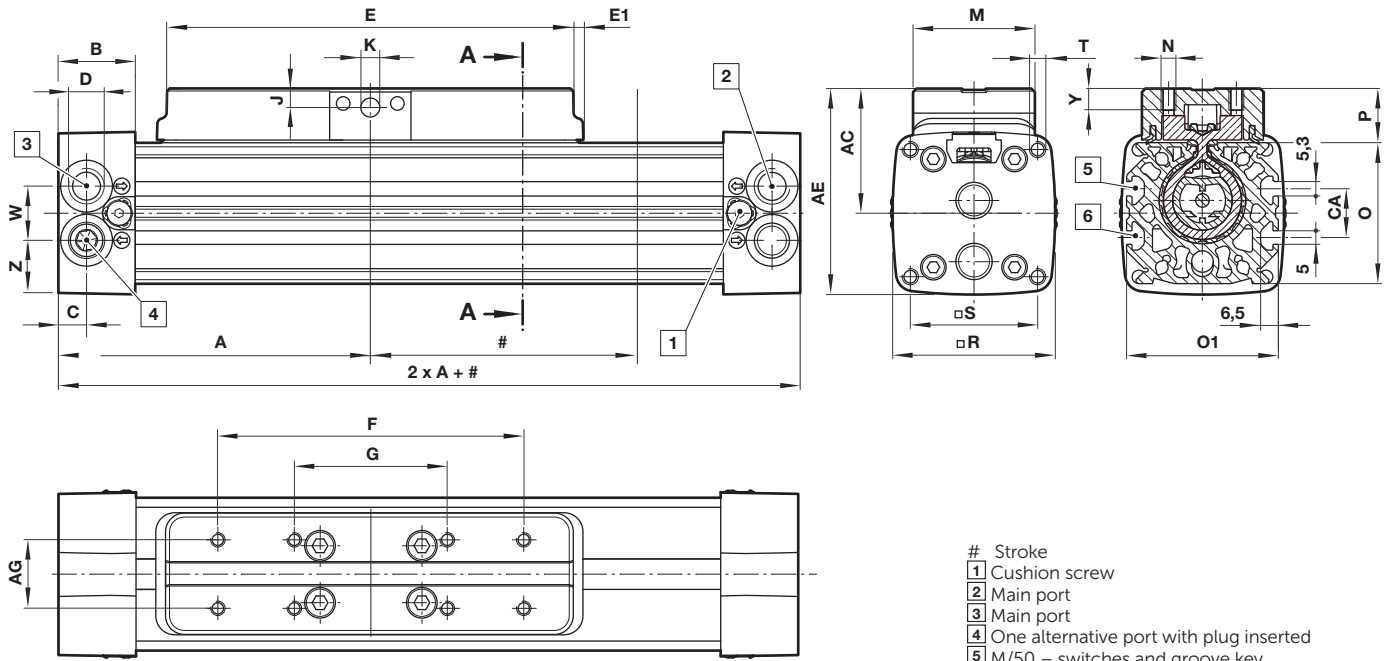
Ø	A	AB	AE	AO	E	ED	J	ØK	L	R2	U	Y	Weight at 0 mm	Weight per 100 mm	Model
16	62,5	-	38	7,5	80	18	-	-	31	18,5	-	5	0,18 kg	0,10 kg	M/146116/...
20	85	60	59	6,5	110	27	7,5	5,5	42	24	5,5	12	0,60 kg	0,15 kg	M/146120/...

**M/146100/D, .../MD – cylinder with external adjustable guide and double carriages (Ø 16 & 20 mm)**


Ø	A	E	X min.	X max.	Weight at 0 mm	Weight per 100 mm	Model
16	62,5	80	80	500	0,20 kg	0,10 kg	M/146116/D/...
20	85	110	110	500	0,80 kg	0,15kg	M/146120/D/...

**M/146000 – cylinder with internal guide (∅ 25 ... 63 mm)**

 Dimensions in mm  
 Projection/First angle

**A-A**


- # Stroke
- 1 Cushion screw
  - 2 Main port
  - 3 Main port
  - 4 One alternative port with plug inserted
  - 5 M/50 – switches and groove key can be mounted flush with the profile
  - 6 For groove key only

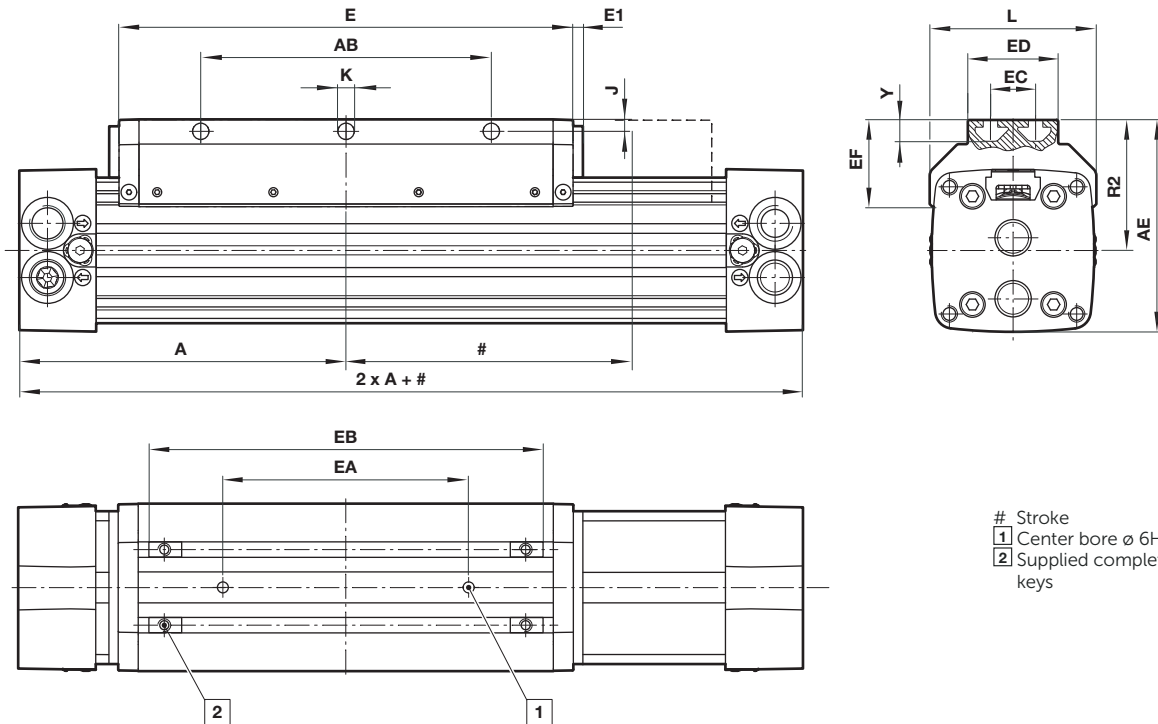
∅	A	AC	AE	AG	B	C	CA	D	E	E1	F	G	J	∅ KD7
25	100	36	60	20	23	8,5	–	G1/8	130	–	90	45	4,7	5
32	120	46	76	25	28,5	10,5	18	G1/4	160	3,5	120	60	7	7
40	150	52,5	90	25	28,5	11,5	18	G1/4	215	–	160	80	7	7
50	180	65,5	110	25	38	15	24	G3/8	250	–	190	95	9,5	9
63	215	82,5	125	25	38	17	24	G1/2	320	–	240	120	9,5	9
∅	M	N	O	O1	P	R	S	T	W	Y	Z	Weight at 0 mm	Weight per 100 mm	Model
25	32	M5	40	46	16	48	37	M5 - 13*1)	16	7	16	0,7 kg	0,25 kg	M/146025/...
32	45	M5	52	56	20	60	47	M6 - 17*1)	20	8	20	1,40 kg	0,30 kg	M/146032/...
40	45	M6	65	68	20	74,5	58	M8 - 20*1)	25	8	25	2,50 kg	0,42 kg	M/146040/...
50	50	M8	80	84	25,5	89	70	M8 - 20*1)	30	11	29,5	4,40 kg	0,62 kg	M/146050/...
63	50	M8	95	97	25	105	84	M10 - 24*1)	35	11	35	6,90 kg	0,9 kg	M/146063/...

\*1) deep



### M/146100 – cylinder with external adjustable guide (Ø 25 ... 63 mm)

Dimensions in mm  
Projection/First angle



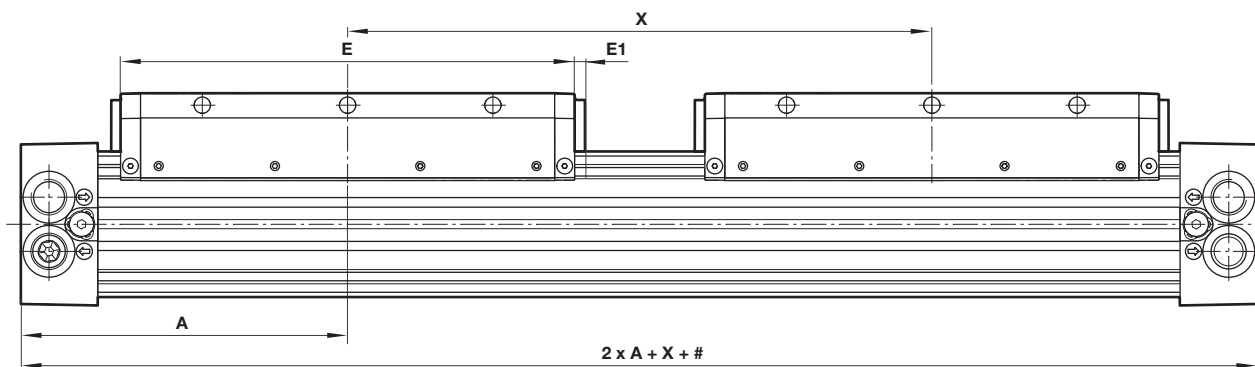
- # Stroke
- 1 Center bore ø 6H7, 4 deep
- 2 Supplied complete with four groove keys

Missing cylinder dimensions, see previous page 8

Ø	A	AB	AE	E	E1	EA ±0,05	EB	ED	EC	EF	J	ØK	L	R2	Y	Weight at 0 mm	Weight per 100 mm	Model
25	100	70	67,5	130	-	50	102	32	20	34	5	5,5	52	-	-9,5	0,75kg	0,20 kg	M/146125/...
32	120	90	82	160	4	70	138	45	25	36,5	5	5,5	64	52	6,5	1,50 kg	0,30 kg	M/146132/...
40	150	120	97,5	215	-	105	193	45	25	43	5	6,6	79	60	9,5	2,60 kg	0,42 kg	M/146140/...
50	180	160	116,5	250	-	135	228	50	25	47,5	6,5	9	92	72	11,5	4,50 kg	0,62 kg	M/146150/...
63	215	190	137	320	-	150	292	50	25	59	7,5	9	110	84,5	11,5	7,20kg	0,90 kg	M/146163/...

\*1) deep

### M/146100/ID, .../MD – cylinder with external adjustable guide and double carriages (ø 25 ... 63 mm)

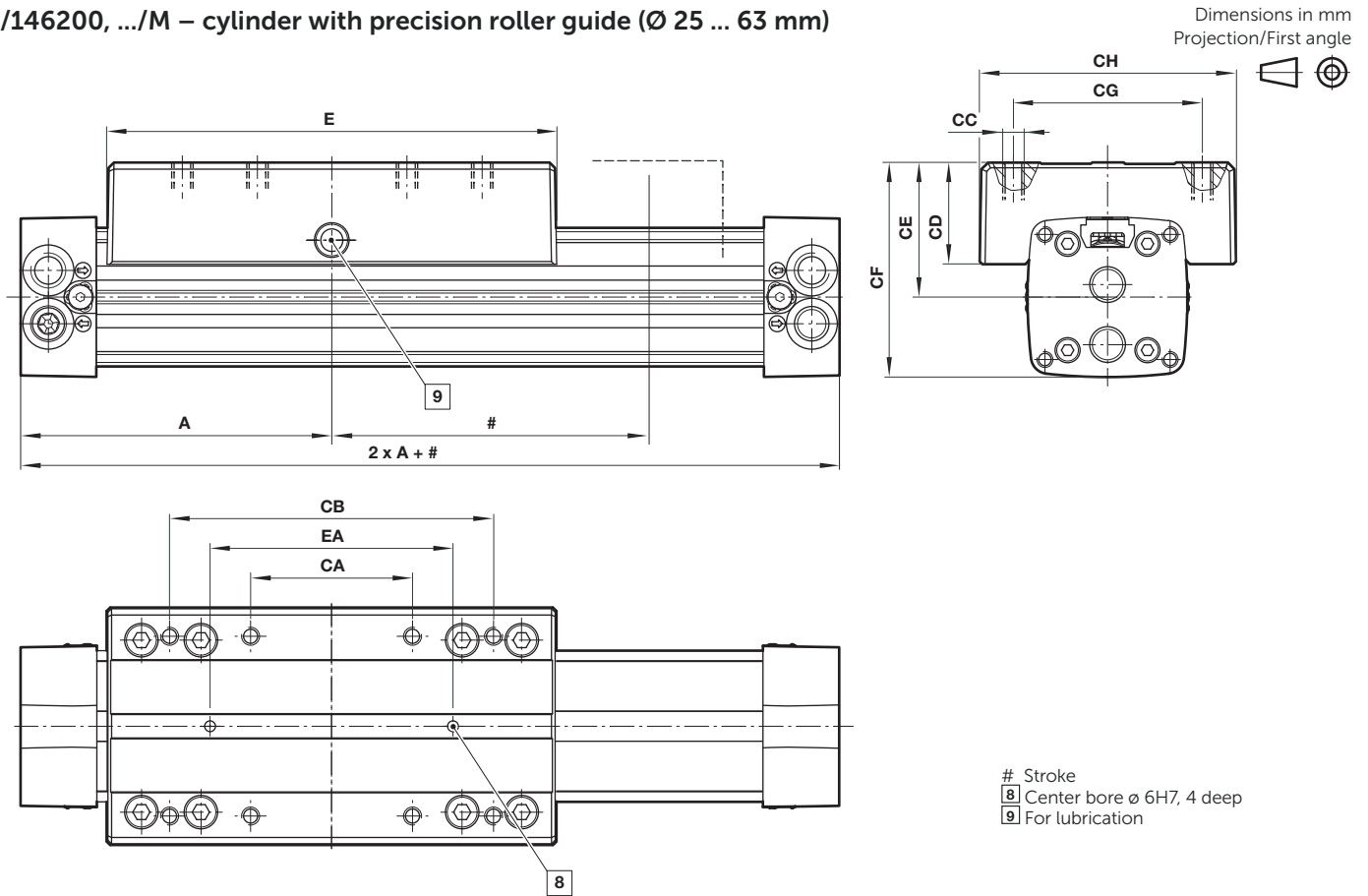


Missing cylinder dimensions, see previous page 8

# Stroke

Ø	A	E	E1	X min.	X max.	Weight at 0 mm	Weight per 100 mm	Model
25	100	130	-	130	500	1,50 kg	0,20 kg	M/146125/D/...
32	120	160	4	168	500	2,00 kg	0,30 kg	M/146132/D/...
40	150	215	-	215	500	3,20 kg	0,42 kg	M/146140/D/...
50	180	250	-	256	500	5,40 kg	0,62 kg	M/146150/D/...
63	215	320	-	320	500	8,40 kg	1,00 kg	M/146163/D/...

### M/146200, .../M – cylinder with precision roller guide (Ø 25 ... 63 mm)

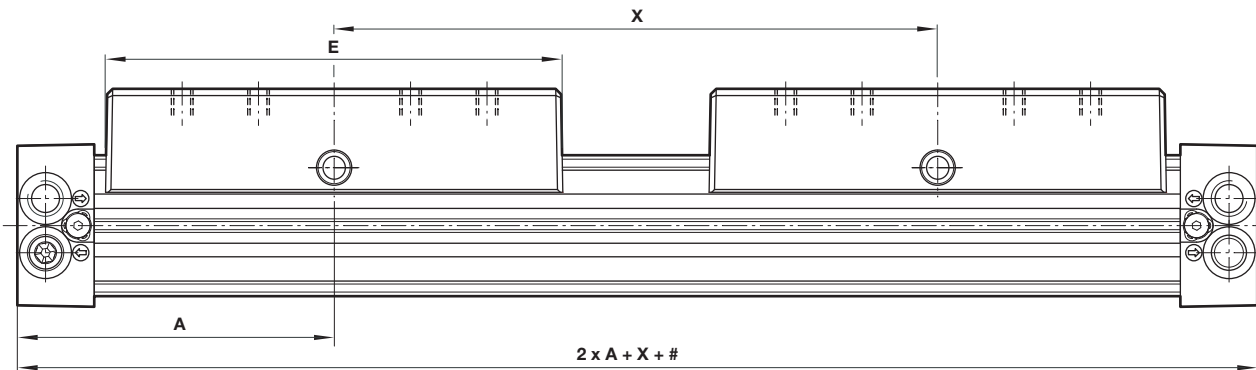


Missing cylinder dimensions, see previous page 8

Ø	A	CA	CB	CC	CD	CE	CF	CG	CH	E	EA ±0,05	Weight at 0 mm	Weight per 100 mm	Model
25	100	45	90	M6-14*1)	36	42	66	60	85	150	70	1,50 kg	0,20 kg	M/146225/...
32	120	60	120	M8-16*1)	38	50	80	75	98	180	90	2,80 kg	0,40 kg	M/146232/...
40	150	80	150	M8-16*1)	42	57,5	95	92	118	215	115	4,50 kg	0,45 kg	M/146240/...
50	180	90	180	M10-20*1)	44	67	111,5	100	132	250	135	8,20 kg	0,90 kg	M/146250/...
63	215	120	240	M10-20*1)	47	74,5	127	110	140	320	200	12,50 kg	1,00 kg	M/146263/...

\*1) deep

### M/146200/ID and .../MD – cylinder with precision roller guide and double carriages (Ø 25 ... 63 mm)



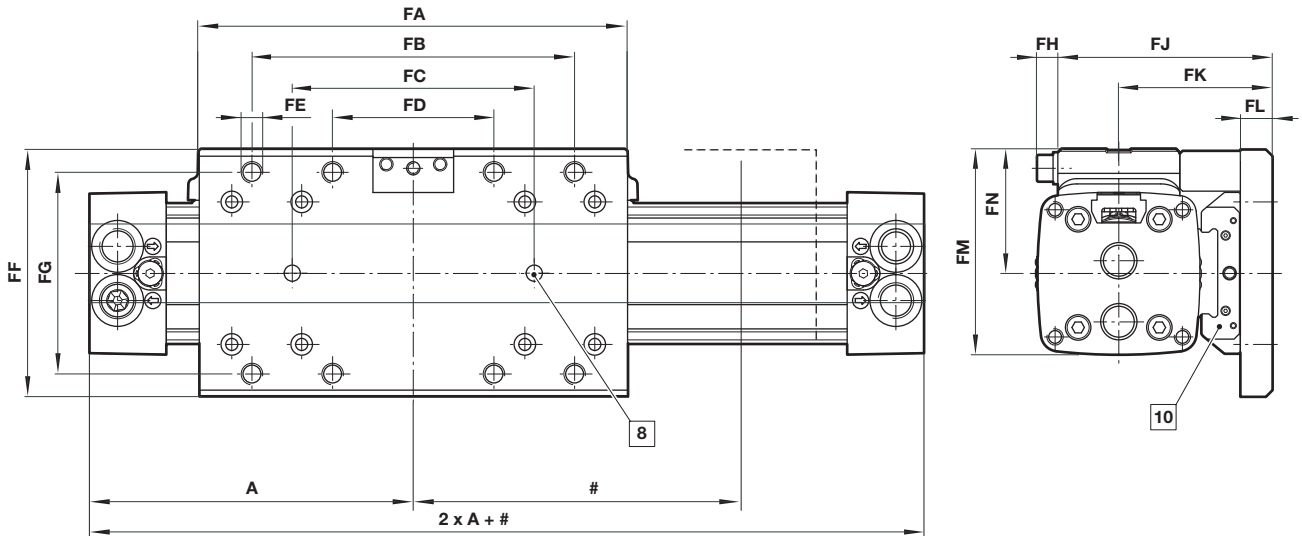
Missing cylinder dimensions, see previous page 8

# Stroke

Ø	A	E	X min.	X max.	Weight at 0 mm	Weight per 100 mm	Model
25	100	150	150	500	2,60 kg	0,20 kg	M/146225/D/...
32	120	180	180	500	4,20 kg	0,40 kg	M/146232/D/...
40	150	215	215	500	7,00 kg	0,45 kg	M/146240/D/...
50	180	250	256	500	11,1 kg	0,90 kg	M/146250/D/...
63	215	320	320	500	20,6 kg	1,00 kg	M/146263/D/...

**M/146200/P and M/146200/PM**  
**cylinder with added caged ball linear motion guide (∅ 25 ... 63 mm)**

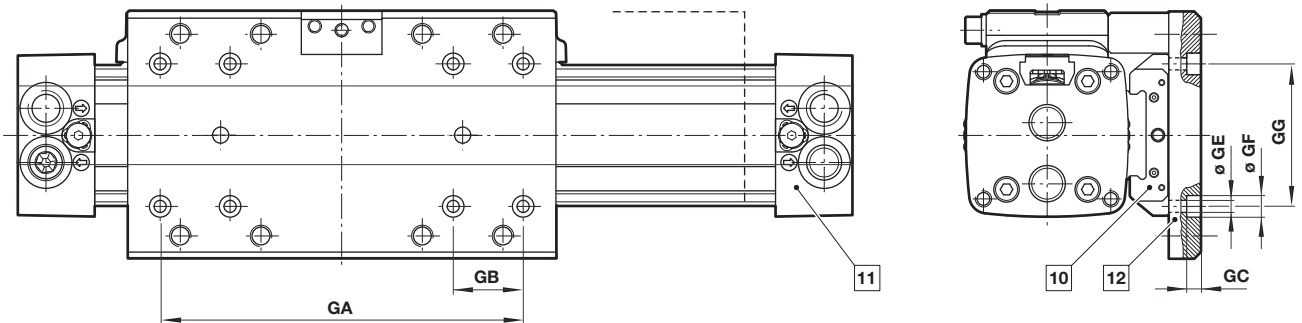
Dimensions in mm  
 Projection/First angle



Missing cylinder dimensions, see previous page 8

∅	A	FA	FB	FC ±0,05	FD	FE	FF	FG	FH	FJ	FK	FL	FM	FN	Weight at 0 mm	Weight per 100 mm	Model
25	100	130	90	70	45	M6	72	60	7	61	45	10	60	36	1,90 kg	0,40 kg	M/146225/P/..
32	120	160	120	90	60	M8	92	75	7,5	79,5	57	12	76	46	2,90 kg	0,50 kg	M/146232/P/..
40	150	215	150	115	80	M8	105	92	7,5	85,5	63	12	89,5	52,5	4,70 kg	0,65 kg	M/146240/P/..
50	180	250	180	135	90	M10	131	100	9,5	109	84	15	110	65,5	8,50 kg	1,10 kg	M/146250/P/..
63	215	320	240	100	120	M10	140	110	9,5	115,5	90,5	15	125	75	11,0 kg	1,40 kg	M/146263/P/..

**QM/146200/P/70 – assembly kit for caged ball linear motion guide (∅ 25 ... 63 mm)**



Missing cylinder dimensions, see previous page 8

**Recommended supplier/series for caged ball  
 linear motion guide**

Cylinder ∅ 25	Cylinder ∅ 32 & 40	Cylinder ∅ 50 & 63
THK/SHW12CAM	IKO/LWFF33	IKO/LWFF42
	NSK/LW17ELZ	NSK/LW27ELZ
	THK/SHW17CAM	THK/SHW27CA

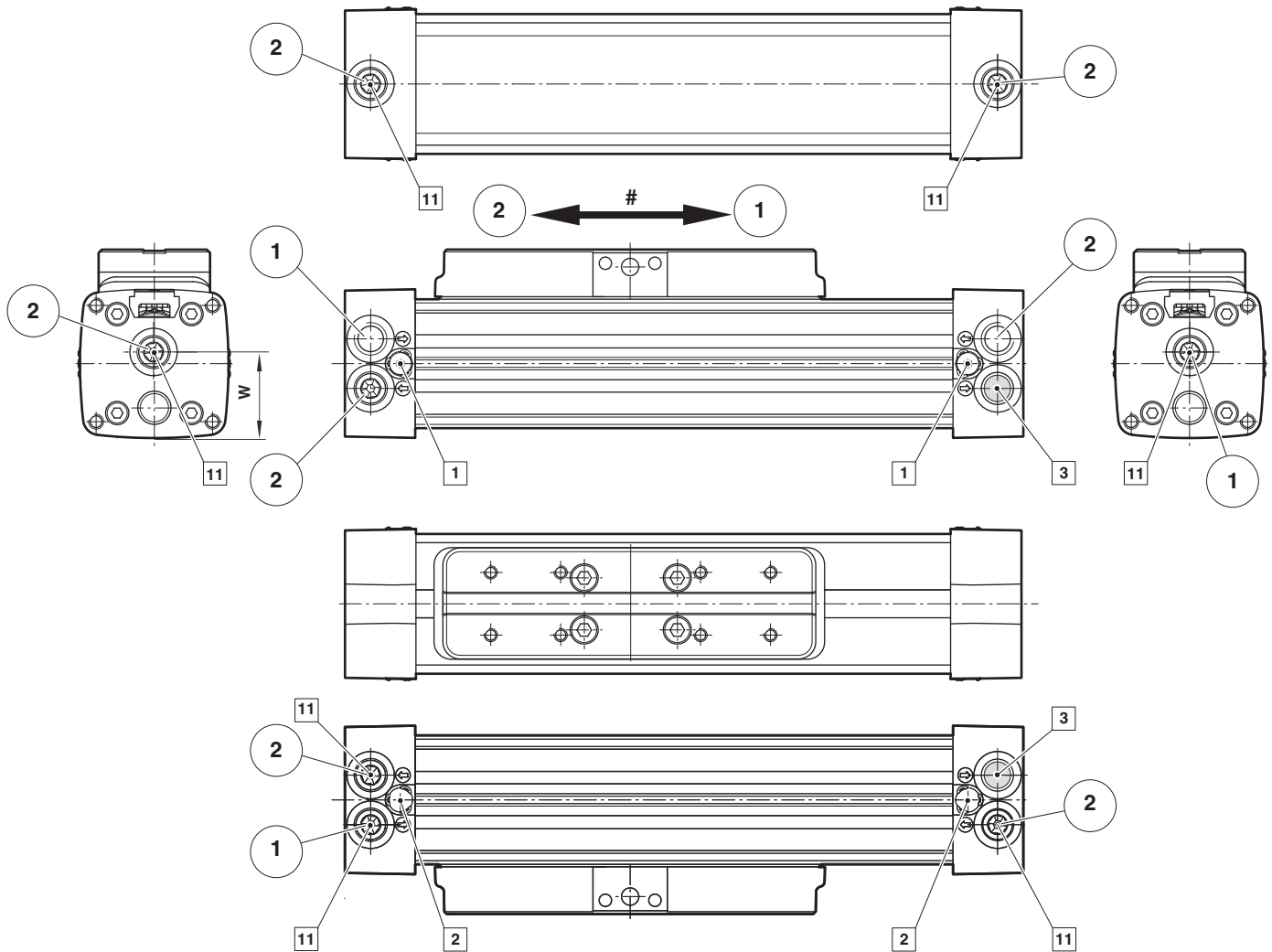
# Stroke

- 8 Center bore ∅ 6H7, 4 deep
- 10 Recommended supplier/series for caged ball linear motion guide
- 11 Standard cylinder M/146000
- 12 Assembly kit for caged ball linear motion guide

∅	GA	GB	GC	∅ GE	∅ GF	GG	Weight	Model
25	111	18	5	3,4	6,5	35	0,28 kg	QM/146225/P/70
32	135	26	4,5	4,5	8	53	0,47 kg	QM/146232/P/70
40	177	26	4,5	4,5	8	53	0,47 kg	QM/146240/P/70
50	215	40	6,5	6,6	11	70	1,32 kg	QM/146250/P/70
63	285	40	6,5	6,6	11	70	1,80 kg	QM/146263/P/70

M/146000/IC, .../MC; M/146100/IC, .../MC; M/146200/IC, .../MC  
 cylinder with alternative ports (Ø 25 ... 63 mm)

Dimensions in mm  
 Projection/First angle



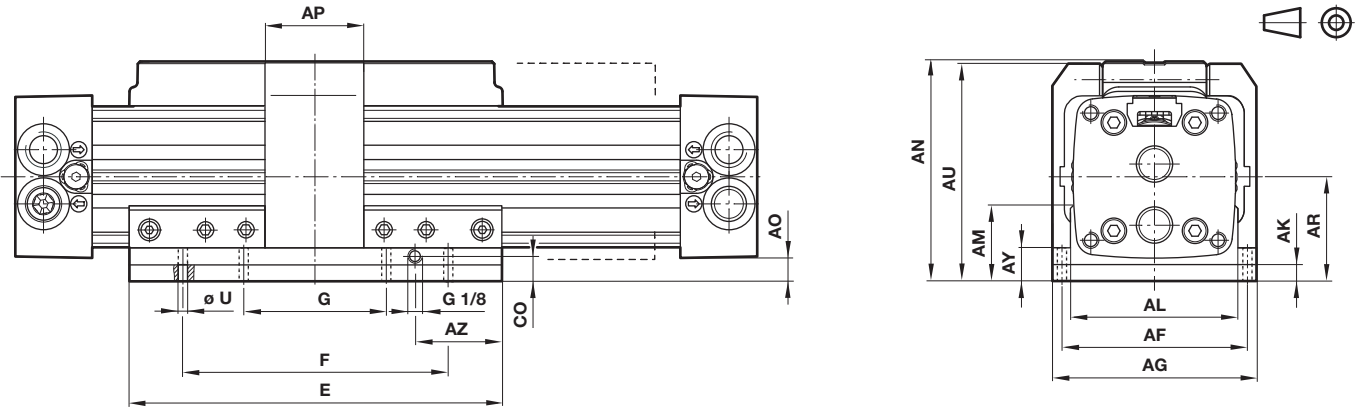
Missing cylinder dimensions and weights, see previous page 8 & 9

Ø	W	Model
25	28	M/146.25/..
32	34,5	M/146.32/..
40	43,5	M/146.40/..
50	53	M/146.50/..
63	59,5	M/146.63/..

- # Moving direction
- 1 Cushion screw
- 2 Hole without thread
- 3 Port without function
- 11 Alternative ports

### M/146000/L1, M/146000/L3 – cylinder with active brake (ø 25 ... 63 mm)

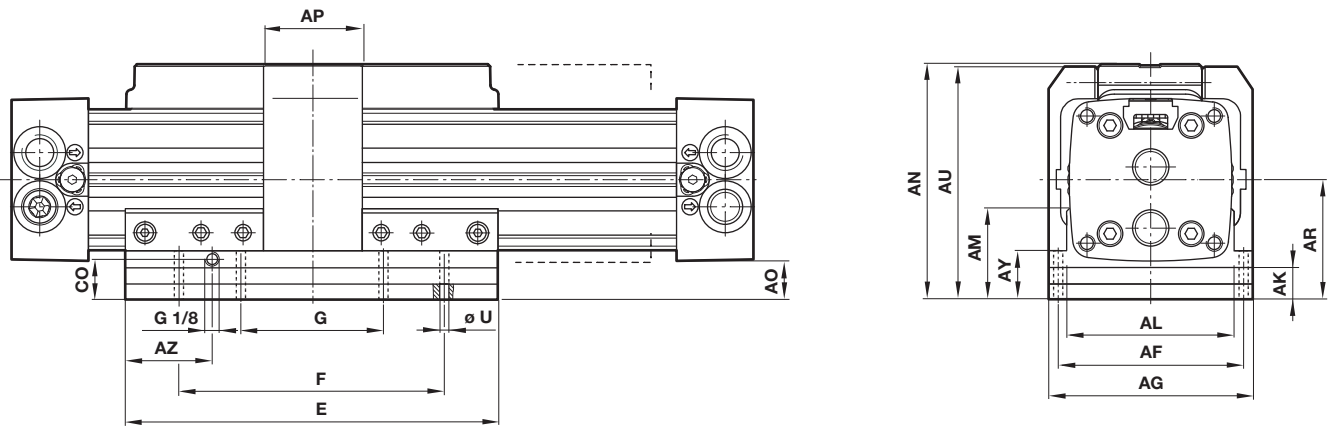
Dimensions in mm  
Projection/First angle



Missing cylinder dimensions, see previous page 8

Ø	AF	AG	AK	AL	AM	AN	AO	AP	AR	AU	AY	AZ	CO	E	F	G	Ø U	Weight at 0 mm	Weight per 100 mm	Model
25	62	75	12	52	28,5	73,5	13,5	45	37,5	73	16,5	30	6	130	90	45	6,6	1,60 kg	0,2 kg	M/146025/L/...
32	78	92	12	64	29	90	14	55	44	89,5	17,5	32,5	6	160	120	60	9	2,50 kg	0,35 kg	M/146032/L/...
40	94	112	12	81	34,5	103,5	13,5	65	51	103	18	52,5	6	215	160	80	9	4,20 kg	0,50 kg	M/146040/L/...
50	112	132	12	94	35,5	124,5	14,5	75	59,5	124	18,5	65	6	250	190	95	11	6,90 kg	0,75 kg	M/146050/L/...
63	113	150	12	112	42,5	140,5	15,5	90	68	140	20,5	115	6	320	240	120	13	11,5 kg	1,0 kg	M/146063/L/...

### M/146000/L2, M/146000/L4 – cylinder with passive brake (ø 25 ... 63 mm)

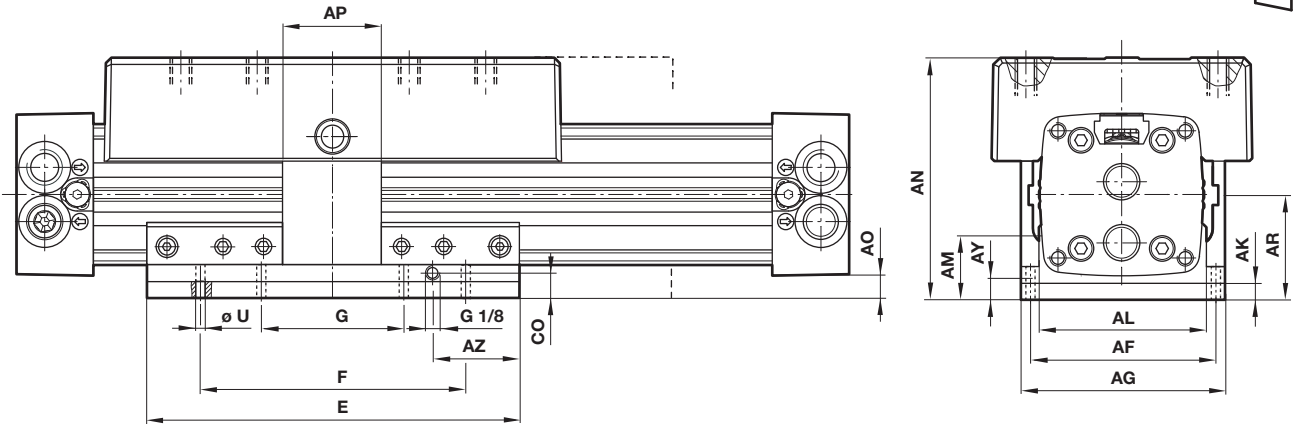


Missing cylinder dimensions, see previous page 8

Ø	AF	AG	AK	AL	AM	AN	AO	AP	AR	AU	AY	AZ	CO	E	F	G	Ø U	Weight at 0 mm	Weight per 100 mm	Model
25	62	75	22	52	38,5	83,5	23,5	45	47,5	83	26,5	30	16	130	90	45	6,6	1,90 kg	0,2 kg	M/146025/L/...
32	78	92	24	64	41	102	26	55	56	101,5	29,5	32,5	18	160	120	60	9	2,60 kg	0,35 kg	M/146032/L/...
40	94	112	24	81	46,5	115,5	25,5	65	63	115	30	52,5	18	215	160	80	9	4,70 kg	0,50 kg	M/146040/L/...
50	112	132	30	94	53,5	142,5	32,5	75	77,5	142	36,5	65	24	250	190	95	11	7,20 kg	0,75 kg	M/146050/L/...
63	132	150	30	112	60,5	158,5	33,5	90	86	158	38,5	115	42	320	240	120	13	12,40 kg	1,0 kg	M/146063/L/...

**M/146200/L1, M/146200/L3 – cylinder with precision roller guide and active brake (Ø 25 ... 63 mm)**

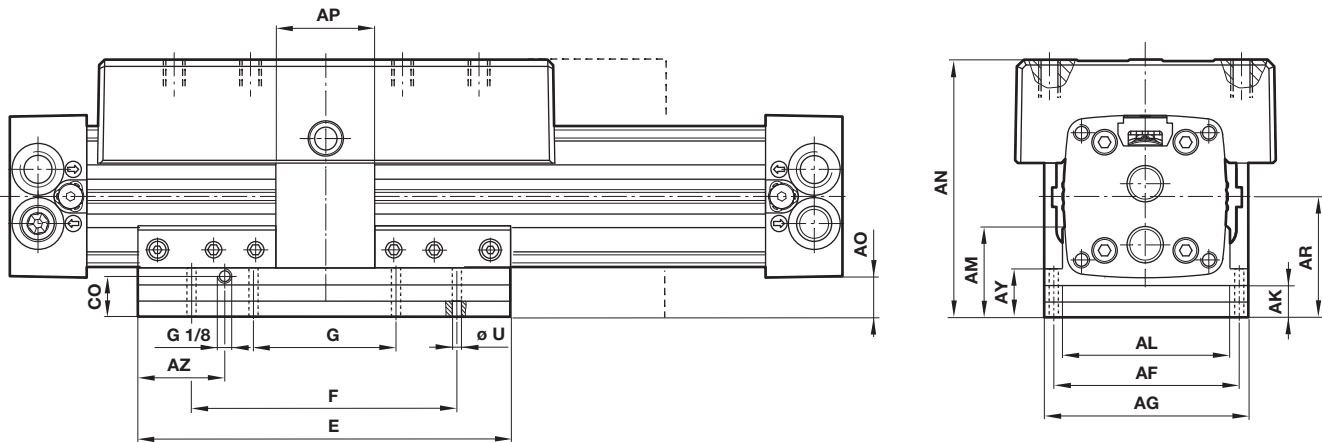
Dimensions in mm  
Projection/First angle



Missing cylinder dimensions, see previous page 8 & 10

Ø	AF	AG	AK	AL	AM	AN	AO	AP	AR	AU	AY	AZ	CO	E	F	G	Ø U	Weight at 0 mm	Weight per 100 mm	Model
25	62	75	12	52	28,5	79,5	13,5	40	37,5	73	16,5	30	6	130	90	45	6,6	1,55 kg	0,2 kg	M/146225/L/...
32	78	92	12	64	29	94	14	55	44	89,5	17,5	32,5	6	160	120	60	9	3,90 kg	0,35 kg	M/146232/L/...
40	94	112	12	81	34,5	108,5	13,5	65	51	103	18	52,5	6	215	160	80	9	6,20 kg	0,50 kg	M/146240/L/...
50	112	132	12	94	35,5	126,5	14,5	75	59,5	124	18,5	65	6	250	190	95	11	10,70 kg	0,75 kg	M/146250/L/...
63	132	150	12	112	42,5	142,5	15,5	80	68	140	20,5	115	6	320	240	120	13	11,50 kg	1,00 kg	M/146263/L/...

**M/146200/L2, M/146200/L4 – cylinder with precision roller guide and passive brake (Ø 25 ... 63 mm)**

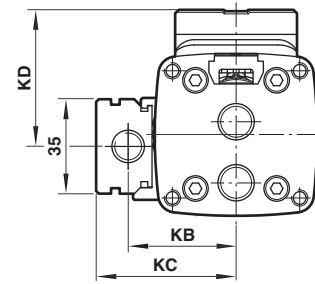
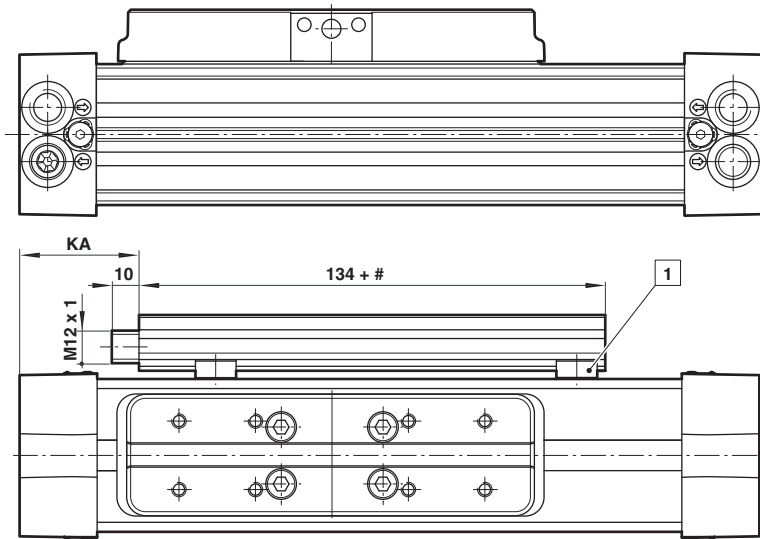


Missing cylinder dimensions, see previous page 8 & 10

Ø	AF	AG	AK	AL	AM	AN	AO	AP	AR	AU	AY	AZ	CO	E	F	G	Ø U	Weight at 0 mm	Weight per 100 mm	Model
25	62	75	22	52	38,5	89,5	23,5	40	47,5	83	26,5	30	16	130	90	45	6,6	1,90 kg	0,20 kg	M/146225/L/...
32	78	92	24	64	41	106	26	55	56	101,5	29,5	32,5	18	160	120	60	9	4,00 kg	0,35 kg	M/146232/L/...
40	94	112	24	81	46,5	120,5	25,5	65	63	115	30	52,5	18	215	160	80	9	6,70 kg	0,50 kg	M/146240/L/...
50	112	132	30	94	53,5	144,5	32,5	75	77,5	142	36,5	65	24	250	190	95	11	11,00 kg	0,75 kg	M/146250/L/...
63	132	150	30	112	60,5	160,5	33,5	80	86	158	38,5	115	24	320	240	120	13	12,40 kg	1,00 kg	M/146263/L/...

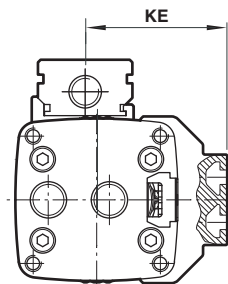
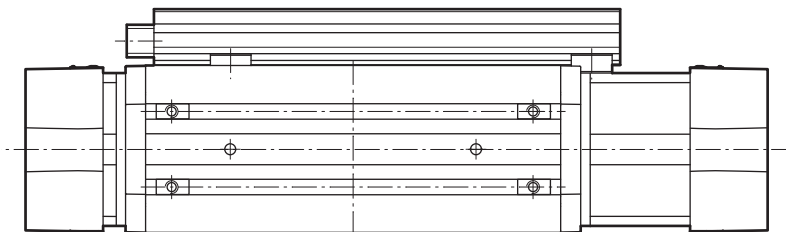
### M/146000/F1 – cylinder with linear sensor and internal guide

Dimensions in mm  
Projection/First angle

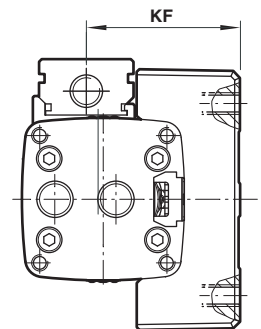
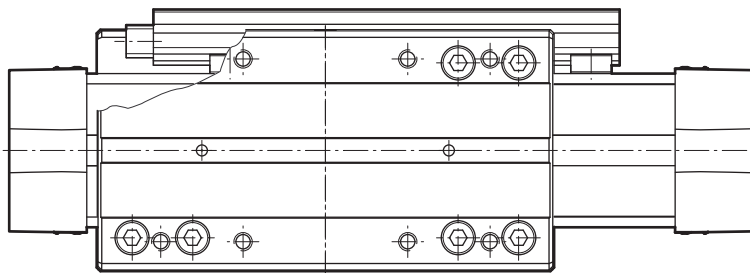


# Stroke  
1 Bracket

### M/146100/F1 – cylinder with linear sensor and external adjustable guide



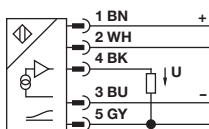
### M/146200/F1 – cylinder with linear sensor and precision roller guide



Missing cylinder dimensions and weights, see previous page 10 & 11  
Electrical features see option selector on page 2

Ø	KA	KB	KC	KD	KE	KF	Model
32	44	40	51,5	50,5	56	56,5	M/146.32/F1/...
40	74	46	57,5	56,5	64	62,5	M/146.40/F1/...
50	104	54	65,5	68,5	75	70	M/146.50/F1/...
63	139	61	72	67,5	79,5	69,5	M/146.63/F1/...

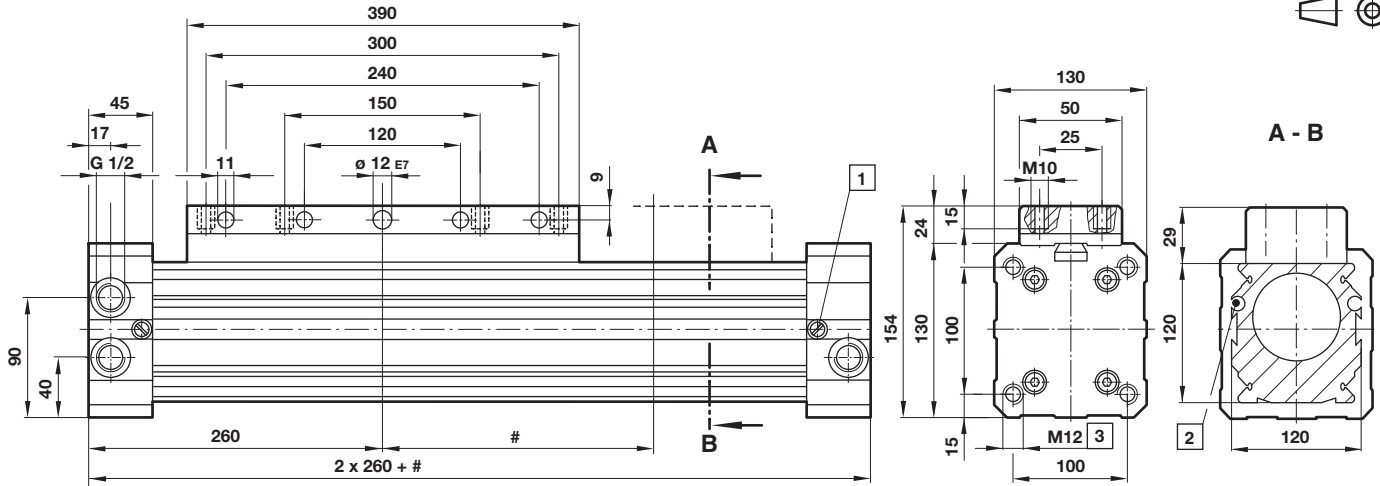
### Connector details



Pin no.	Color	Function
1	Brown (BN)	+
2	White (WH)	Program input
3	Blue (BU)	-
4	Black (BK)	Output +
5	Grey (GY)	Output -

**M/146080 – cylinder with internal guide (ø 80 mm)**

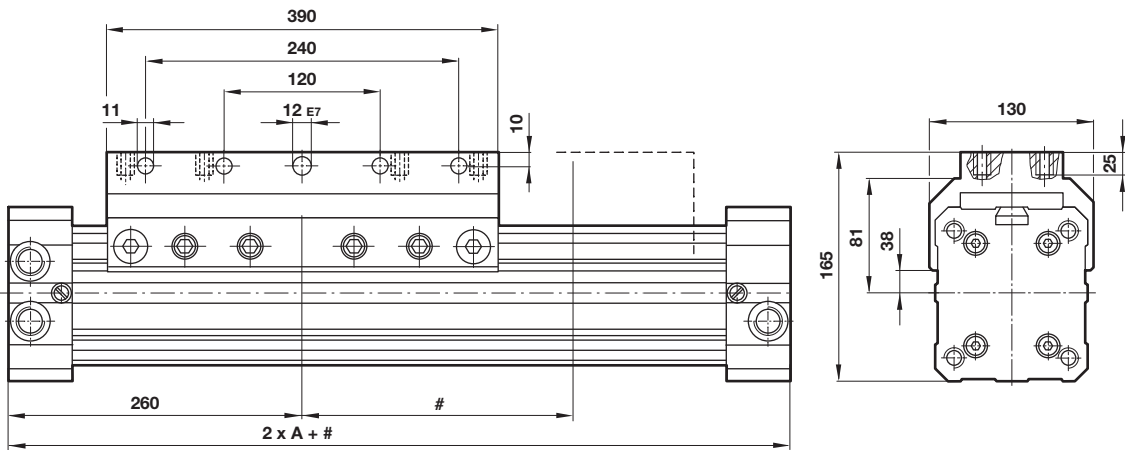
Dimensions in mm  
Projection/First angle



Ø	Weight at 0 mm	Weight per 100 mm	Model
80	13,20 kg	1,50 kg	M/146080/...

- # Stroke
- 1 Cushion screw
- 2 M/50 – switches and groove key can be mounted flush with the profile
- 3 26 deep

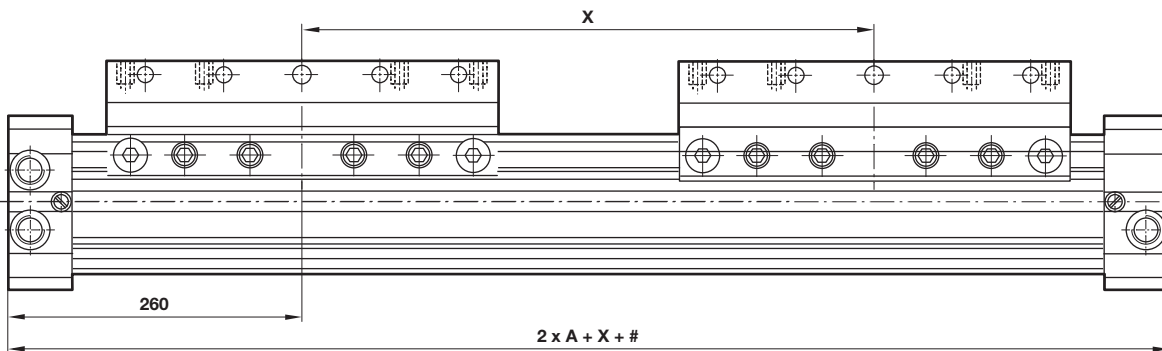
**M/146180 – cylinder with external adjustable guide (ø 80 mm)**



Ø	Weight at 0 mm	Weight per 100 mm	Model
80	13,40 kg	1,50 kg	M/146180/...

# Stroke

**M/146180/ID, .../MD – cylinder with external adjustable guide and double carriages (ø 80 mm)**

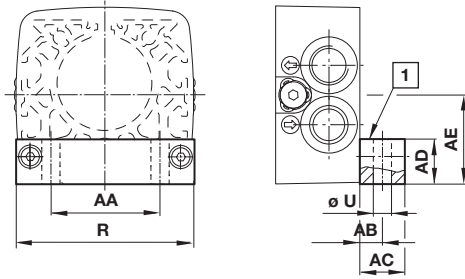


Ø	A	X min.	X max.	Weight at 0 mm	Weight per 100 mm	Model
80	260	390	500	15,90 kg	1,50 kg	M/146180/D/...

# Stroke



### Foot mounting C

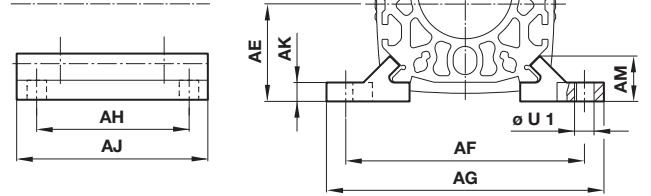


1 TOP

Ø	AA	AB	AC	AD	AE	R	Ø U	(kg)	Model
16	16	10	15	3	16	27	5,5	0,01	QM/146016/21
20	17	5	10	10	21,5	40	5,5	0,03	QM/146020/21
25	18	7	15	13,5	24 (26,5)	48	7	0,1	QM/146025/21
32	26	11	22	16,5	30,5 (33)	60	9	0,1	QM/146032/21
40	30	11	22	19,5	37,5 (40,5)	75	9	0,2	QM/146040/21
50	42	12	25	24	45 (49)	90	11	0,3	QM/146050/21
63	48	13	25	27,5	54 (57,5)	105	13	0,4	QM/146063/21
80	64	12,5	25	35	70	130	14	0,4	QM/146080/21

Attention: Foot mounts can be attached to give different distances AE.  
When used together with a centre support mounting the word TOP should be visible on the top face of the mount.

### Centre support V

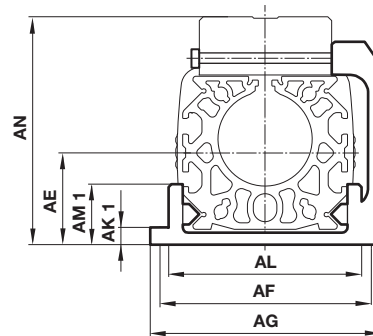
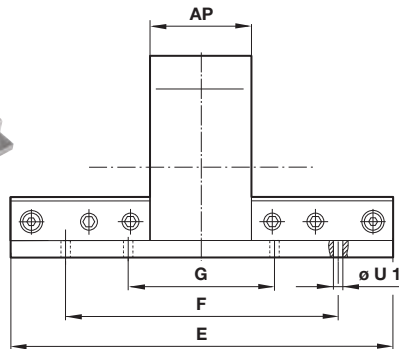
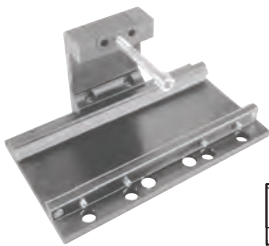


Dimensions in mm  
Projection/First angle



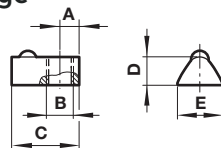
Ø	AE	AF	AG	AH	AJ	AK	AM	Ø U1	(kg)	Model
16	16	40	50	20	30	3,5	9	5,5	0,01	QM/146016/32
20	21,5	52	62	45	60	4,5	12	5,5	0,03	QM/146020/32
25	26,5	60	72	60	80	5,5	13	6,6	0,04	QM/146025/32
32	30,5	76	92	70	100	6,5	13,5	9	0,07	QM/146032/32
40	37,5	92	108	90	120	7,5	18,5	9	0,2	QM/146040/32
50	45	110	128	110	140	7,5	18,5	11	0,2	QM/146050/32
63	54	132	154	120	160	9	25	13	0,3	QM/146063/32
80	70	155	180	140	180	12	28,3	14	0,4	QM/146080/32

### Carriage plate mounting UV



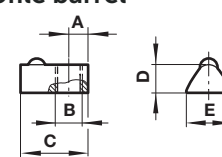
Ø	AE	AF	AG	AK1	AL	AM1	AN	AP	E	F	G	ØU1	(kg)	Model
16	16	40	50	3,5	31	8,5	40,5	30	80	60	-	5,5	0,1	QM/146016/34
20	21,5	52	62	5,5	42	14,5	56	36	110	80	40	5,5	0,2	QM/146020/34
25	26,5	60	75	5,5	52	17,5	62,5	45	130	90	45	6,6	0,3	QM/146025/34
32	33	78	92	6,5	64	18	79	55	160	120	60	9	0,4	QM/146032/34
40	40,5	94	112	7,5	81	24	93	65	215	160	80	9	0,8	QM/146040/34
50	49	112	132	8	94	25	114	75	250	190	95	11	1,2	QM/146050/34
63	57,5	132	150	10	112	32	130	90	320	240	120	13	2,0	QM/146063/34
80	70	155	180	10	132	32	159	100	390	300	150	14	2,9	QM/146080/34

### Groove key for carriage



Ø	A	B	C	D	E	(kg)	Model
25	4	M5	12	4,25	8	0,01	M/P74065
32	4	M5	12	4,25	8	0,01	M/P74065
40	4,5	M6	17	6,25	10,5	0,02	M/P74066
50	7,5	M8	23	7,5	13,5	0,03	M/P41858
63	7,5	M8	23	7,5	13,5	0,03	M/P41858

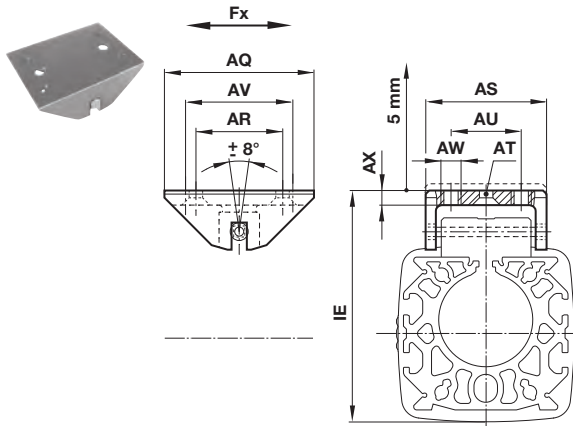
### Groove key for profile barrel



Ø	A	B	C	D	E	(kg)	Model
16 ... 80	4	M5	12	4,25	8	0,01	M/P74065

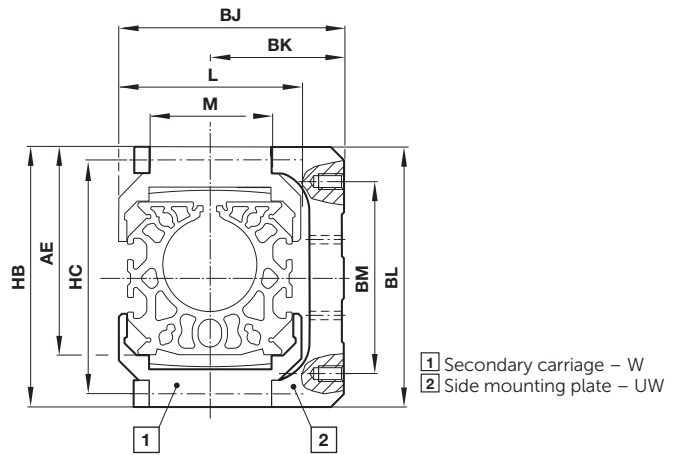
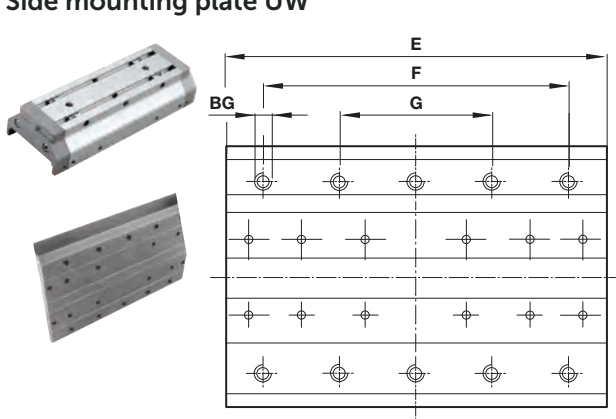
### Swinging bridge S For cylinders with internal guiding only

Dimensions in mm  
Projection/First angle



Ø	AQ	AR	AS	AT	AU	AV	AW	AX	IE	Fx (N)	(kg)	Model
16	40	-	26	-	12	30	M4	4	48 +4	100	0,02	QM/146016/37
20	50	35	38	DIN74-Bm5	20	40	M5	5	65,5 +5	150	0,10	QM/146020/37
25	60	40	44	DIN74-Bm5	20	45	M5	5	70 +5	250	0,20	QM/146025/37
32	80	50	59	DIN74-Bm6	30	60	M6	5,5	88,5 +5	410	0,30	QM/146032/37
40	80	50	59	DIN74-Bm6	30	60	M6	5,5	102,5 +5	640	0,30	QM/146032/37
50	100	60	65	DIN74-Bm8	40	80	M8	6,5	124 +5	1000	0,50	QM/146050/37
63	100	60	65	DIN74-Bm8	40	80	M8	6,5	139 +5	1500	0,50	QM/146050/37
80	100	60	65	DIN74-Bm8	40	80	M8	6,5	168,5 +5	2400	0,50	QM/146080/37

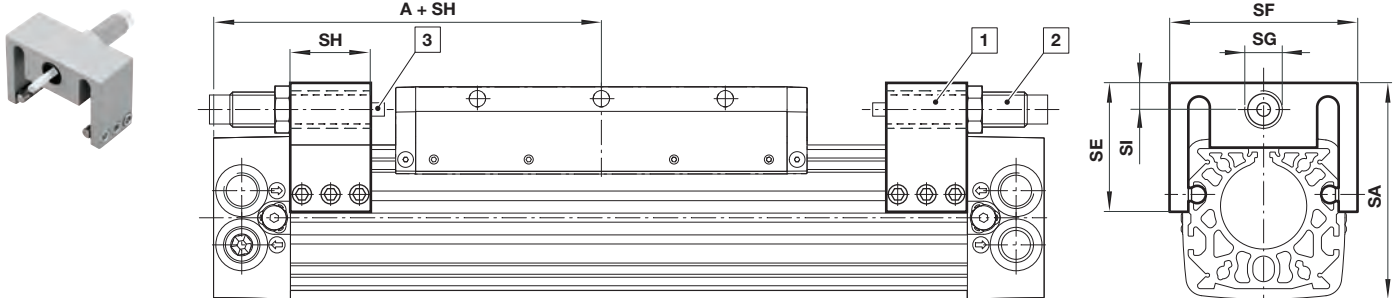
### Secondary carriage W Side mounting plate UW



Ø	AE	BG	BJ	BK	BL	BM	E	F	G	HB	HC	L	M	W (kg)	UW (kg)	Model (W)	Model (UW)
16	38	-	-	-	-	-	80	-	-	49	-	-	18	0,04	-	QM/146116/35	-
20	59	M 5 x 10*1)	54	33	78	55	110	80	40	79	64	42	27	0,19	0,25	QM/146120/35	QM/146120/36
25	67,5	M 5 x 10*1)	63	37	86	65	130	90	45	87	77	52	32	0,27	0,33	QM/146125/35	QM/146125/36
32	82	M 5 x 12*1)	77	45	103	80	160	120	60	104	94	64	45	0,50	0,50	QM/146132/35	QM/146132/36
40	97,5	M 6 x 12*1)	77	58,5	119	90	215	160	80	120	110	79	45	0,65	1,08	QM/146140/35	QM/146140/36
50	117	M 6 x 15*1)	98	71,5	143	120	250	190	95	144	131	92	50	1,10	1,85	QM/146150/35	QM/146150/36
63	137	M 8 x 20*1)	117,5	84,5	168	140	320	240	120	169	154	110	50	1,90	3,46	QM/146163/35	QM/146163/36
80	165	-	-	-	-	-	390	-	-	200	-	-	50	2,50	-	QM/146180/35	-

\*1) deep

### Adjustable stop - for M/146100, /... /.../M, M/146200/... /.../M



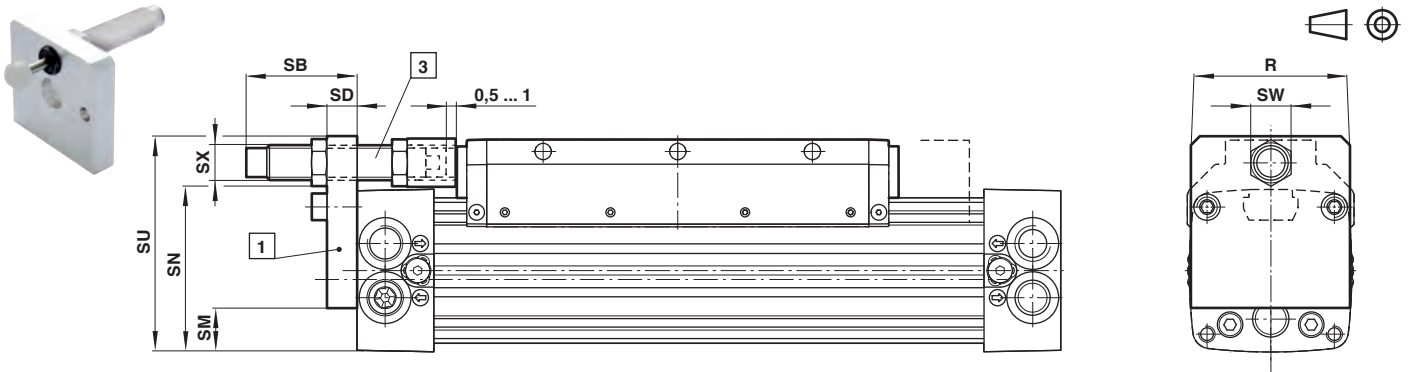
Missing cylinder dimensions and weights see pages 9 & 10

Ø	A	SA	SE	SF	SG	SH	SI	Weight	Model
25	100	67	48	63	M14x1,5	30	10,5	0,12 kg	QM/146125/75
32	120	80	48	70	M14x1,5	30	10,5	0,17 kg	QM/146132/75
40	150	102	62	83	M20x1,5	30	15	0,22 kg	QM/146140/75

- 1) Assembly kit
- 2) Please order shock absorber separately, see ACE program
- 3) Reaction forces (Q max)  
 ø 25 = 1200 N,  
 ø 32 = 1500 N,  
 ø 40 = 1850 N

### Assembly kit for shock absorber - for cylinder series M/146100, M/146100/M

Dimensions in mm  
Projection/First angle

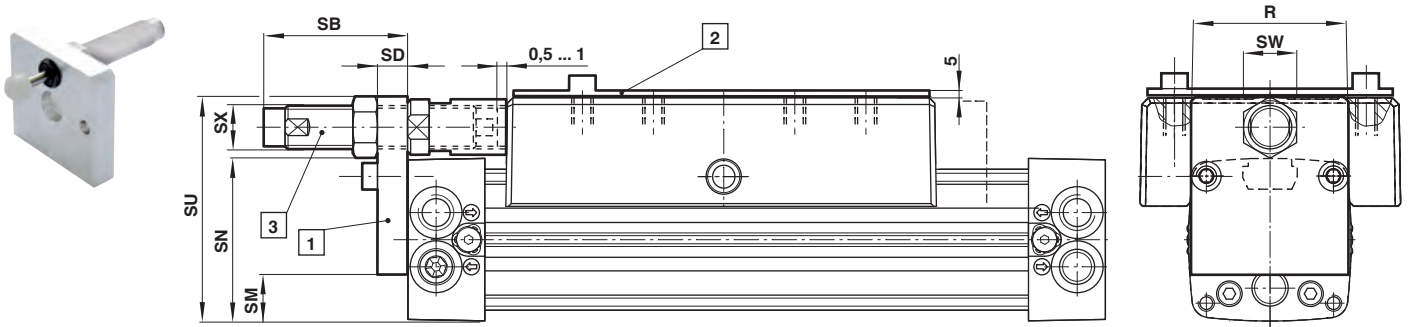


Missing cylinder dimensions, see on page 8 & 9

Ø	Cylinder	R	SB	SD	SC	SM	SN	SU	SW	SX	Assembly kit for shock absorber Position 1	Plate Position 2
25	M/146125	48	45,5	12	-	19	49	69,5	17	M14x1,5	QM/146125/67	-
32	M/146132	60	40,5	12	-	24	61	81,5	17	M14x1,5	QM/146132/67	-
40	M/146140	75	81,5	15	-	29	74	109,5	30	M25x1,5	QM/146140/67	-
50	M/146150	90	69	15	-	33	91	127,5	30	M25x1,5	QM/146150/67	-
63	M/146163	105	69	15	-	41	105,5	141,5	30	M25x1,5	QM/146163/67	-
80	M/146180	130	85	20	-	53	130,5	173,5	Ø 40	M33x1,5	QM/146180/67	-

Please order shock absorber and plate separately.

### For cylinder series M/146200, M/146200/M



Missing cylinder dimensions, see on page 8 & 10

Ø	Cylinder	R	SB	SD	SC	SM	SN	SU	SW	SX	Assembly kit for shock absorber Position 1	Plate Position 2
25	M/146225	48	45,5	12	-	19	49	69,5	17	M14x1,5	QM/146125/67	-
32	M/146232	60	40,5	12	-	24	61	81,5	17	M14x1,5	QM/146132/67	-
40	M/146240	75	81,5	15	31	29	74	109,5	30	M25x1,5	QM/146140/67	M/P41434
50	M/146250	105	69	15	36	33	91	127,5	30	M25x1,5	QM/146150/67	M/P41435
63	M/146263	130	69	15	35	41	105,5	141,5	30	M25x1,5	QM/146163/67	M/P41436

Please order shock absorber and plate separately.

Attention: When using M/146200 cylinders (ø 40 to 63 mm) an extra top plate must be mounted onto the carriage as the centre line of the shock absorbers has to be within the surface of the carriage.

- Magnetically operating reed switch - Round style
- Suitable for all cylinder ranges with magnetic piston
- Switches can be mounted flush with the delivered special adaptor
- LED indicator on LSU models
- Alternative variants allows a wide range of application



### Technical features

**Operation:**

M/50/LSU Normally open with LED (yellow)

**Switching voltage (U<sub>b</sub>):**

10 ... 240 V a.c./170 V d.c.

**Switching voltage output:**

U<sub>b</sub> - 2,7 V

**Switching current**

(see graph overleaf):  
0,18 A max.

**Switching power:**

10 W/10 VA max.

**Contact resistance:**

150 mΩ

**Response time:**

1,8 ms

**Operating temperature:**

-25 ... +80 °C (-13 ... +176 °F)

**High temperature version:**

+150 °C max. (+302 °F)

**Protection rating (EN 60529):**

IP66

**Shock resistance:**

50 g (during 11 ms)

**Vibration resistance:**

35 g (at 2000 Hz)

**Cable type:**

2 x 0,25: PVC, PUR or silikon  
3 x 0,25 PVC

**Cable length:**

2, 5 or 10 m


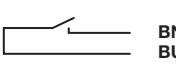
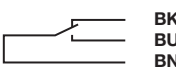

**Electromagnetic compatibility**

according to:  
EN 60947-5-2

**Materials:**

Body: plastic  
Cable: see table below

### Technical data - Reed switches - additional information see data sheet en 4.3.005

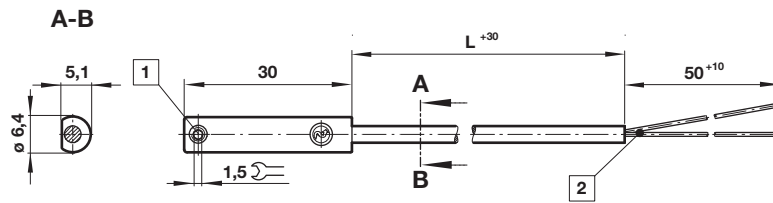
Symbol	Voltage		Current maximum (mA)	Function	Operating temperature (°C)	LED	Protection class	Plug	Cable length (m)	Cable type	Weight (g)	Model	
	(V a.c.)	(V d.c.)											
	± BN	10 ... 240	10 ... 170	180	Normally open	-25 ... +80	•	IP 66	—	2, 5 or 10	PVC 2 x 0,25	37	M/50/LSU/*V
	~ BU	10 ... 240	10 ... 170	180	Normally open	-25 ... +80	•	IP 66	—	5	PUR 2 x 0,25	37	M/50/LSU/5U
	BN	10 ... 240	10 ... 170	180	Normally open	-25 ... +150	—	IP 66	—	2	Silicon 2 x 0,25	37	TM/50/RAU/2S
	BK	10 ... 240	10 ... 170	180	Changeover	-25 ... +80	—	IP 66	—	5	PVC 3 x 0,25	37	M/50/RAC/5V
	± BN	10 ... 60	10 ... 60	180	Normally open	-25 ... +80	•	IP 66	M8 x 1	0,3	PVC 3 x 0,25	16	M/50/LSU/CP *1)
	~ BK	10 ... 60	10 ... 60	180	Normally open	-25 ... +80	•	IP 66	M12 x 1	0,3	PVC 3 x 0,25	16	M/50/LSU/CC *1)

\* Insert cable length; \*1) Plug-in connector see page 12

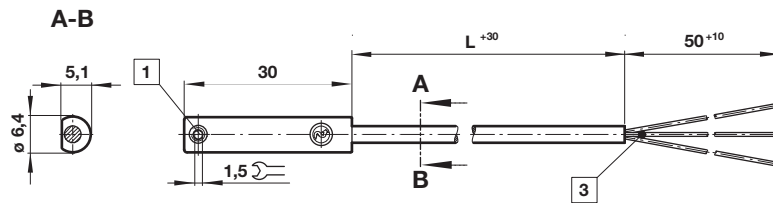
### Dimensions

M/50/LSU/\*V, M/50/LSU/5U,  
TM/50/RAU/2S  
Cable length L = 2, 5 or 10 m

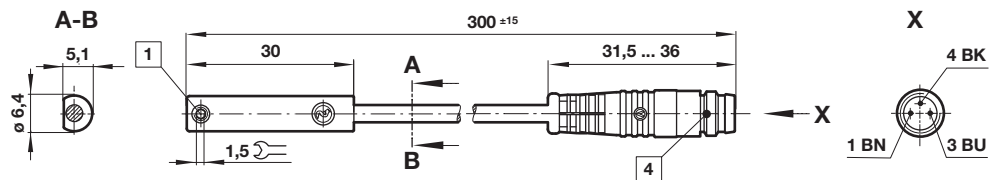
Dimensions in mm  
Projection/First angle



M/50/RAC/5V  
Cable length L = 5 m



M/50/LSU/CP  
M/50/LSU/CC



- 1 Fixing screw
- 2 + BN = brown; - BU = blue (output)
- 3 - BK = black; + BN = brown; - ≠BU = blue

- 4 Version CP: Plug M8 x 1, color code: BK = +; BN = -; BU = output  
Version CC: Plug M12 x 1, color code: BK = +; BN = -; BU = output

### Accessories

Plug-in connector cable with nut



Outer cover	Cable length (m)	Weight (kg)	Connector	Model
PVC 3 x 0,25	5	0,18	M8 x 1	M/P73001/5
PUR 3 x 0,25	5	0,18	M8 x 1	M/P73002/5
PUR 3 x 0,34	5	0,21	M12 x 1	M/P34594/5

- Magnetically operated switch, solid state - round style
- IO-Link version available
- Suitable for all cylinder ranges with magnetic piston
- Switches can be mounted flush in all profile cylinders
- Reliable switching with a very fast reponse time
- Particularly suited for use in high levels of vibration
- LED indicator as standard
- UL listed



### Technical features

<b>Operation:</b> PNP / NPN (see table) Output with LED (yellow) Normally open (standard)	<b>Switching power:</b> 3,0 W max. (standard) 9,0 W max. (M/50/EHP)	<b>Protection rating (EN 60529):</b> IP67 (standard) IP68 (M/50/EAP/5U, M/50/EHP/5U)	<b>Electromagnetic compatibility</b> according to: EN 60947-5-2
<b>Switching voltage (U<sub>b</sub>):</b> 10 ... 30 V d.c. (*supply class 2" acc. to cULus)	<b>Response time:</b> < 0,1 ms (standard) < 5 ms (M/50/IOP)	<b>Operating temperature:</b> -40 ... +80 °C (-40 ... 176 °F) (permanently fixed cable) -25 ... +80 °C (-13 ... 176 °F) (moving cable)	<b>Materials:</b> Housing: plastic Thread insert: brass Set screw: stainless steel Cable: see table below
<b>Voltage drop at output:</b> < 2,5 V	<b>Operating frequency:</b> 1 kHz (standard) 200 Hz (M/50/IOP)	<b>Cable type:</b> PVC 3 x 0,14 mm <sup>2</sup> (standard) PUR 3 x 0,14 mm <sup>2</sup> (M/50/E*P/*U and all variants with connector)	<b>Mounting type:</b> Flush mountable
<b>Residual current:</b> < 0,5 mA	<b>Responsiveness:</b> 2,8 mT	<b>Cable length:</b> 2, 5 and 10 m	
<b>Switching current</b> (see graph): 100 mA max. (standard) 300 mA max. (M/50/EHP)	<b>Hysteresis:</b> 0,5 ... 1,5 mT 0,2 mT (M/50/IOP)		
	<b>Repeatability:</b> < 0,1 mT		

### Technical data - Solid state - additional information see data sheet en 4.3.007

Symbol	Voltage (VDC)	Current maximum (mA)	Function	IO-Link *1)	Operating temperature (°C)	LED	Protection class	Connector	Cable length (m)	Cable type	Weight (g)	Model
	10 ... 30	100	PNP		-40 ... +80	•	IP67	---	2	PVC 3 x 0,14	23	M/50/EAP/2V
	10 ... 30	100	PNP		-40 ... +80	•	IP67	---	5	PVC 3 x 0,14	56	M/50/EAP/5V
	10 ... 30	100	PNP		-40 ... +80	•	IP67	---	10	PVC 3 x 0,14	102	M/50/EAP/10V
	10 ... 30	100	PNP / NPN	•	-40 ... +80	•	IP67	---	5	PVC 3 x 0,14	56	M/50/IOP/5V
	10 ... 30	100	PNP		-40 ... +80	•	IP68	---	5	PUR 3 x 0,14	56	M/50/EAP/5U
	10 ... 30	100	PNP		-40 ... +80	•	IP67	---	10	PUR 3 x 0,14	102	M/50/EAP/10U
	10 ... 30	300	PNP		-40 ... +80	•	IP67	---	2	PVC 3 x 0,14	23	M/50/EHP/2V
	10 ... 30	300	PNP		-40 ... +80	•	IP67	---	5	PVC 3 x 0,14	56	M/50/EHP/5V
	10 ... 30	300	PNP		-40 ... +80	•	IP67	---	10	PVC 3 x 0,14	102	M/50/EHP/10V
	10 ... 30	300	PNP		-40 ... +80	•	IP68	---	5	PUR 3 x 0,14	56	M/50/EHP/5U
	10 ... 30	100	PNP		-40 ... +80	•	IP67	M8 x 1	0,3	PUR 3 x 0,14	7	M/50/EAP/CP
	10 ... 30	100	PNP / NPN	•	-40 ... +80	•	IP67	M8 x 1	0,3	PUR 3 x 0,14	7	M/50/IOP/CP
	10 ... 30	100	PNP		-40 ... +80	•	IP67	M12 x 1	0,3	PUR 3 x 0,14	16	M/50/EAP/CC
	10 ... 30	100	PNP		-40 ... +80	•	IP67	M12 x 1	2	PUR 3 x 0,14	35	M/50/EAP/CC/2
	10 ... 30	100	PNP / NPN	•	-40 ... +80	•	IP67	M12 x 1	0,3	PUR 3 x 0,14	16	M/50/IOP/CC
	10 ... 30	300	PNP		-40 ... +80	•	IP67	M8 x 1	0,3	PUR 3 x 0,14	7	M/50/EHP/CP
	10 ... 30	100	NPN		-40 ... +80	•	IP67	---	2	PVC 3 x 0,14	23	M/50/EAN/2V
	10 ... 30	100	NPN		-40 ... +80	•	IP67	---	5	PVC 3 x 0,14	56	M/50/EAN/5V
	10 ... 30	100	NPN		-40 ... +80	•	IP67	---	10	PVC 3 x 0,14	102	M/50/EAN/10V
	10 ... 30	100	NPN		-40 ... +80	•	IP67	M8 x 1	0,3	PUR 3 x 0,14	7	M/50/EAN/CP

Color code: see next page

\*1) IO-Link functionality: see next page

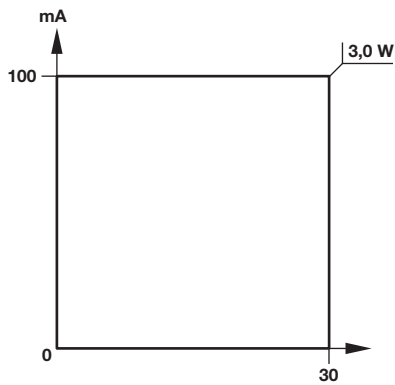
## IO-Link Switch conforming to IEC 61131-9

Properties and Functionality	M/50/EAP, M/50/EAN M/50/EHP		M/50/IOP	
	Standard		Standard	IO-Link
Operating Mode	Standard		Standard	IO-Link
Power LED			•	•
LED sensor signal	•		•	•
Normally open (delivery status)	•		•	•
Normally closed			○	•
Delay mode			○	•
Installation aid			•	•
Temperature measurement				•
Detection counter				•
Teach functionality				•
Responsiveness adjustment				•

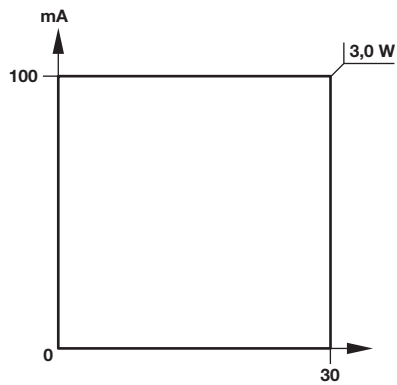
Note: IODD for the M/50/IOP switches available on the Norgren homepage.  
<https://www.norgren.com/uk/en/technical-support/software>

• = included  
 ○ = optional (manufacture pre-setting required)

### Switching current and switching voltage M/50/EAP, M/50/EAN, M/50/IOP



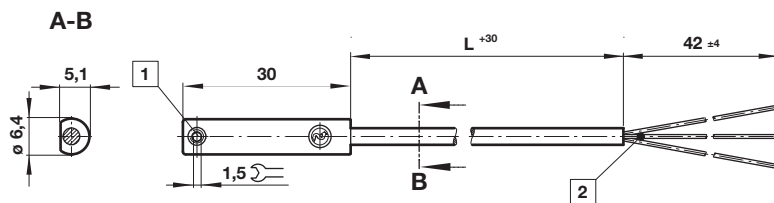
### M/50/EHP



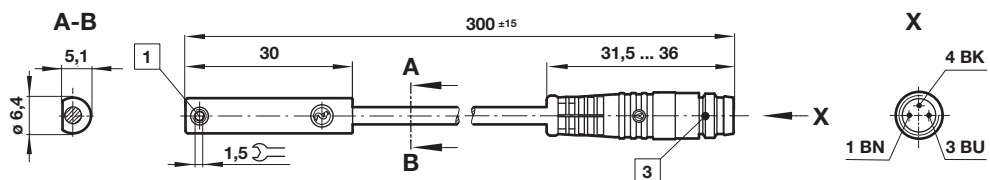
### Dimensions

M/50/EAP/\*V,  
 M/50/EAN/\*U,  
 M/50/IOP/5V,  
 M/50/EHP/\*V,  
 M/50/EHP/5U,  
 M/50/EAN/\*V  
 Cable length L = 2, 5 or 10 m

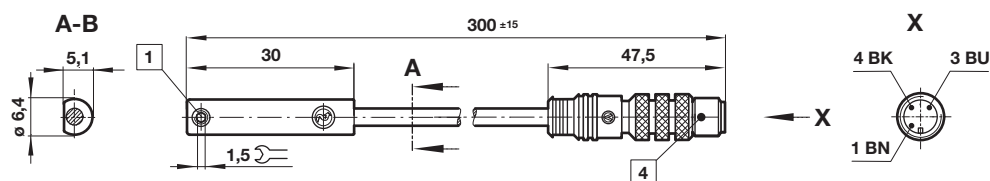
Dimensions in mm  
 Projection/First angle



M/50/EAP/CP,  
 M/50/EAN/CP,  
 M/50/IOP/CP,  
 M/50/EHP/CP



M/50/EAP/CC,  
 M/50/IOP/CC,  
 M/50/EHP/CC



- 1 Fixing screw
- 2 Color code: BK = black (output); BN = brown (+); BU = blue (-)

- 3 Connector M8 x 1; 1 BN = +; 3 BU = -; 4 BK = output
- 4 Connector M12 x 1; 1 BN = +; 3 BU = -; 4 BK = output

## 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 features/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 IMI Precision Engineering, Norgren GmbH.

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.