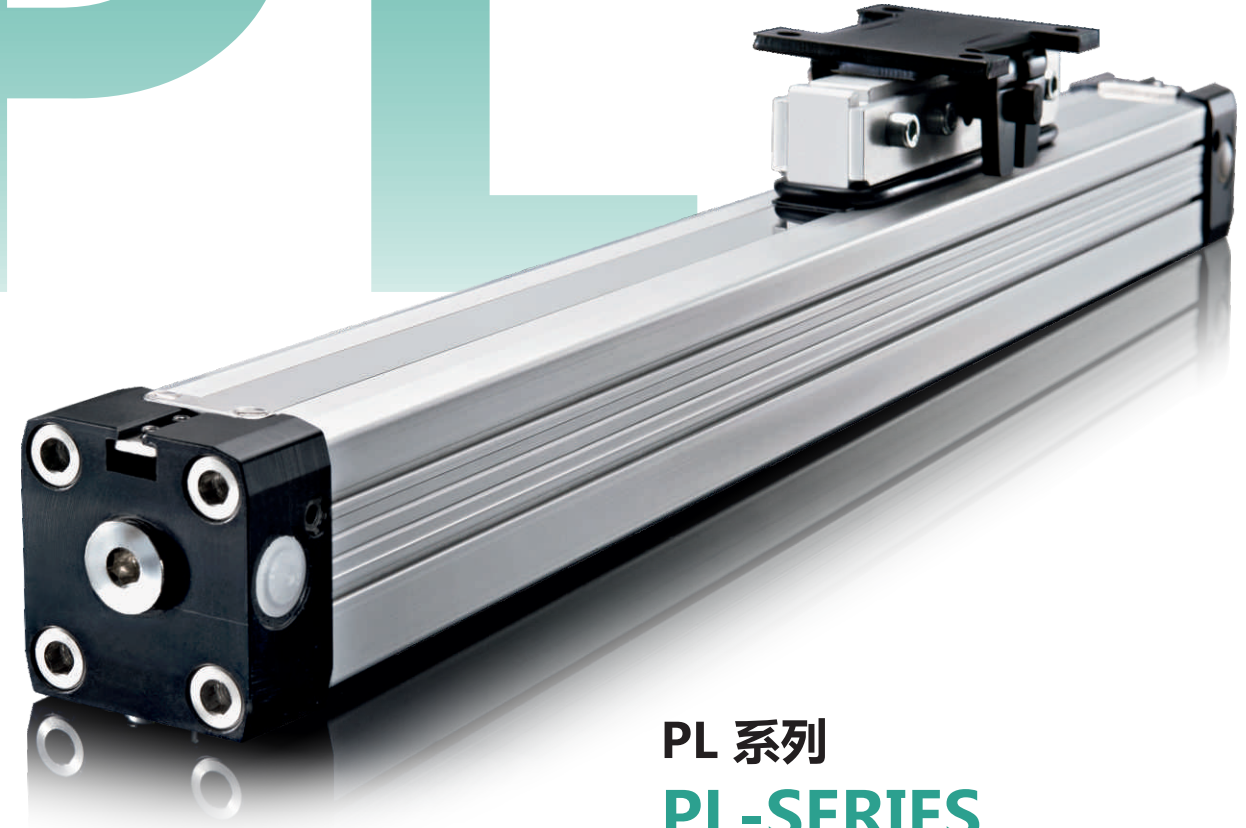


PL-SERIE

PL 系列



PL 系列 PL-SERIES THE CLASSIC

滑块运动的沟槽于轴向贯通整个缸筒，气缸作用力由与活塞成一体的滑块来传递。

推力传递原理如下：

压缩空气推动内部活塞侧面，带动外部滑块做对应方向运动。

气缸内部的沟槽位置由极其光滑的精磨不锈钢带来保证密封，沟槽两侧的磁条保证了内钢带始终处于同一个位置不变。外钢带与防尘刷系统可以防止灰尘进入气缸内部。

活塞与滑块内部具有独特的导向槽，当滑块运动或静止时，内外钢带在活塞内部是分离的，外钢带被拉高，内钢带则低于滑块，而活塞两侧的内外钢带很牢固地附着在沟槽两侧。

The entire tube is slotted throughout its full length. The force is transmitted through the load friction, which is attached to the piston axle.

The design of the piston axle is that way that the inner part of the piston axle is connected through the slot with the outer part of it.

Therefore the force transmission runs as follows:

Air pressure > Piston area > piston axle (inner part) > piston axle (outer part) > load friction > load.

The sealing of the cylinder slot is guaranteed by a most precisely grinded inner steel band. The inner band is kept in position due to magnet stripes which are placed on both sides of the slot. In addition there is an outer steel band covering the slot in order to keep dust out of inner space of the cylinder.

During piston movement as well as during stillstand of it both steelbands are lifted right after the piston seal and led through the piston axle by means of a separate own guiding channel. Before and behind the piston axle both bands are covering the slot permanently again.

优势 / BENEFITS

- 活塞两端作用力相同
- 作用力传递直接，扭矩安全
- 标准活塞附磁，可订购无磁活塞
- 结构独特，节约50%安装空间
- 可达5700mm长行程
- 端盖具有三个不同方向的供气口及可调气缓冲
- 运行反应快，活塞可高速运动
- 可根据用户要求进行灵活设计
- 无润滑压缩空气供给或润滑压缩空气供给**

可接受特殊订货要求

注意：在将润滑压缩空气供给换成无润滑压缩空气供给之前，气缸必须拆卸清洁，重新加入润滑脂，正确组装后方可。

- Equal forces on both ends of the piston
- Force connection direct, torque safe
- Piston with or without magnets
- 50% space-savings
- Long strokes up to 5700mm
- End caps with 3 air connections and adjustable cushioning
- Fast acceleration and high piston velocity
- Very flexible in the user's design
- Non lubricated or lubricated air supply**)

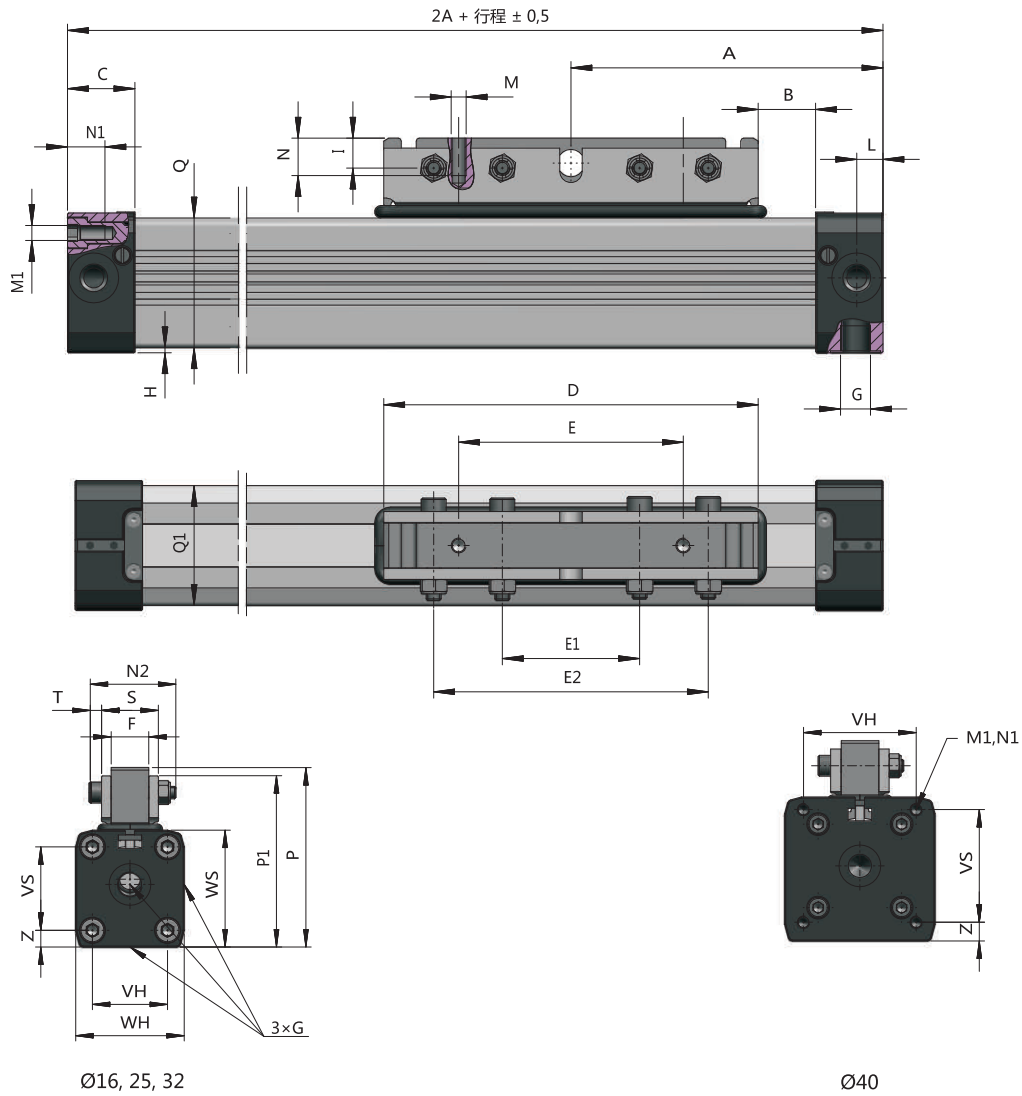
*) Special Version On request

***) Attention: Before changing operation from lubricated to nonlubricated air the cylinder has to be disassembled, cleaned, newly greased and reassembled

技术参数 / TECHNICAL DATA

设计	无杆气缸、双动				Design	Rodless cylinder, double acting			
行程					Strokes				
ø 16 mm	100–4400mm, 1mm的增量				ø 16 mm	100–4400mm, in increments of 1mm			
ø 25–40 mm	100–5700mm, 1mm的增量 (可按要求制作更长的行程)				ø 25–40 mm	100–5700mm, in increments of 1mm (longer strokes on request)			
供气口	Ø16	Ø25	Ø32	Ø40	Air connection	Ø16	Ø25	Ø32	Ø40
	M5	G1/8	G1/4	G1/4		M5	G1/8	G1/4	G1/4
安装位置	自由安装				Mounting	free			
力 + 力矩	见负载，作用力和力矩图表				Forces + moments	see Forces and moments			
支撑力	见中部支撑图表				Support Forces	see Deflection Diagram			
缓冲长度	见缓冲图表				Cushion Length	see Cushion Diagram			
温度	-10°C ~ +80°C (其他温度范围可定制)				Temperatures	-10°C ~ +80°C (other temperatures on request)			
压力范围	0,5–8,0 bar				Pressure range	0,5–8,0 bar			
介质	压缩空气，过滤最大50微米				Medium	compressed air, filtered max. 50µm			
材料					Materials				
缸筒	高强度阳极氧化铝合金				Barrel	High-strength anodized aluminum			
端盖	高强度阳极氧化铝合金				End caps	High-strength anodized aluminum			
活塞轴	高强度阳极氧化铝合金				Piston axle	High-strength anodized aluminum			
密封件	耐油合成材料 (NBR : v < 1m/s, VITON 可选 : v ≥ 1m/s)				Seals	Oilproof synthetic material (NBR: v < 1m/s, VITON: v ≥ 1m/s)			
密封带	不锈钢				Sealing bands	Stainless steel			
活塞	耐磨合成材料				Piston caps	Wear proof synthetic material			
滑动件	耐磨合成材料				Sliding parts	Wear proof synthetic material			

气缸外形尺寸 / CYLINDER DIMENSIONS



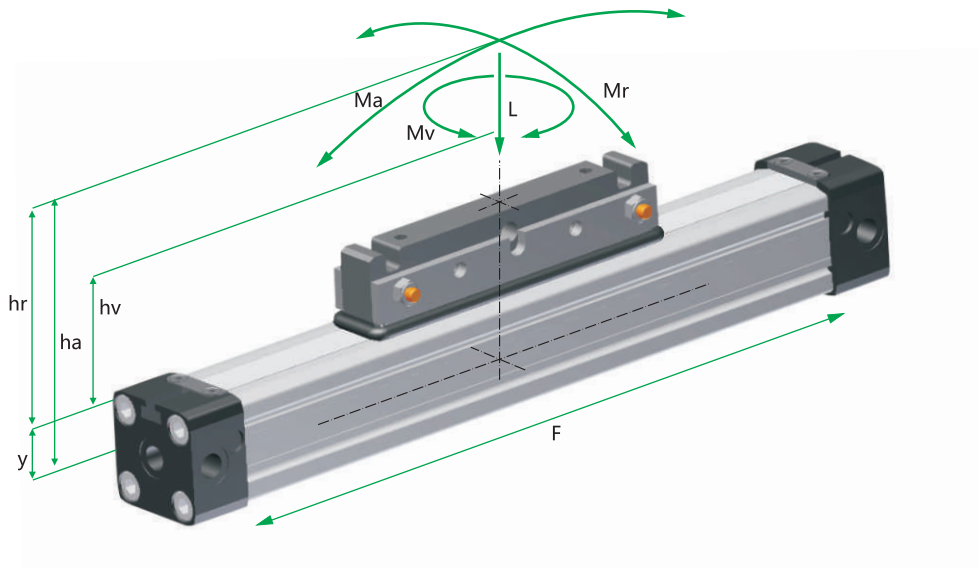
Ø	A	B	C	D	E	E1	F	G	I	L	M	M1	N1	N2	P-P1
16	65	12	15	76	48	32	10	M5	6	5,5	M4	M3	7	27	43,5 - 42,3
16L	90	37	15	76	48	32	10	M5	6	5,5	M4	M3	7	27	43,5 - 42,3
25	100	17	23	120	80	50	15	G1/8'	13	8,5	M5	M5	10	35	66-58
25L	150	67	23	120	80	50	15	G1/8'	13	8,5	M5	M5	10	35	66-58
32	125	23	27	150	90	55	18	G1/4'	12	10,5	M6	M6	14	41	86-82
32L	200	23	27	300	180	120	18	G1/4'	12	10,5	M6	M6	14	41	86-82
40	150	45	30	150	90	55	18	G1/4'	12	15	M6	M6	17	41	97-93
40L	250	70	30	300	180	120	18	G1/4'	12	15	M6	M6	17	41	97-93

Ø	P1	QxQ1	E2	H	S	T	VH	WH	VS	WS	Z
16	37,5	24,5x25	64	1,0	18	4	18	27	18	27	4,5
16L	37,5	24,5x25	64	1,0	18	4	18	27	18	27	4,5
25	53	36x36	100	2	23	5	27	40	27	40	6,5
25L	53	36x36	100	2	23	5	27	40	27	40	6,5
32	74	52x51	110	2	27	6	36	52	40	56	8
32L	74	52x51	240	2	27	6	36	52	40	56	8
40	85	58x58	110	7	28	6	54	72	54	69	9
40L	85	58x58	240	7	28	6	54	72	54	69	9

- 16L-40L长活塞型适用于弯曲力矩大，扭矩大，垂直移动的场所。
- P1：可根据客户要求定制，尺寸表中为标准尺寸。
- Z：可根据客户要求定制，尺寸表中为标准尺寸。

- 16L - 40L : Cylinder with longpiston for heavy bending and torque moments.
- P1: variable on request/details for standard Dimension is mentioned first.
- Z*:variable on request/details for standard performance are in bold letters.

负载，作用力和力矩 / FORCES AND MOMENTS



公式 /
FORMELN
 $M_a = F * h_a$
 $M_r = F * h_r$
 $M_v = F * h_v$

气缸		有效作用力 (N)	缓冲长度	最大允许负载(N)	最大允许弯曲力矩(Nm)		最大允许扭矩(Nm)
		at 6 Bar	(mm)	PL	PL		PL
Ø	Y	F	S	L	Ma 轴向	Mr 径向	Mv 中心
16	9	110	15	120	4	0,3	0,3
25	14	250	21	300	15	1,0	3,0
32	18	420	26	450	30	2,0	4,5
40	22	640	32	750	60	4,0	8,0

Cylinder		Effect Force (N)	Cushioning	Max. allowed load (N)	Max. allowed bending moments (Nm)		Max. allowed torque (Nm)
		at 6 Bar	(mm)	PL	PL		PL
Ø	Y	F	S	L	Ma axial	Mr radial	Mv zentral
16	9	110	15	120	4	0,3	0,3
25	14	250	21	300	15	1,0	3,0
32	18	420	26	450	30	2,0	4,5
40	22	640	32	750	60	4,0	8,0

以上数据显示了在轻负载，无震动操作时的最大值，即使在动态情况下，也不应该超出此值。
 负荷与力矩数据以最大压力6bar，速度 $V \leq 0.2m/sec$ (PL系列)，速度 $V \leq 0.45m/sec$ (PLF系列)为基准。

注意：当气缸作用力时，应该考虑到不同负载和应用所产生的摩擦力，鉴于一些不确定的使用场合，以上数值应减少10-20%。

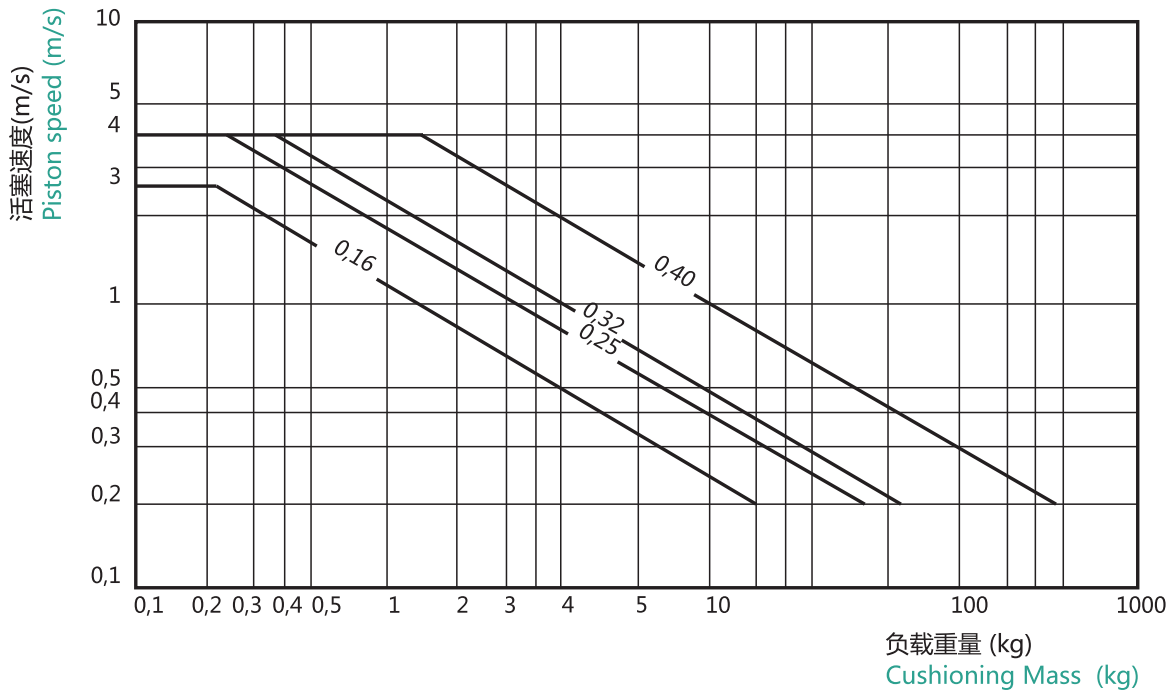
我们将乐于在特殊应用方面给您一些建议。

The figures above are max. values based on light shock free duty and speed of $v \leq 0,2m/sec$ [PL-series] – $v \leq 0,45m/sec$ [PLF-series]. Max. pressure 6 bar.
 An exceeding of the values in dynamic operations, even for short moments, has to be avoided.

Attention: Resulting forces could lead to extreme exceedings of the values. In case of undefinable situations the above max. values have to be underrun by 10–20%.

Please ask our sales representatives

缓冲图表 / CUSHIONING DIAGRAM



请注意以下事项:

- 如果超出以上图标允许范围，必须安装附加的缓冲器。
- 当活塞运动速度大于1m/sec，则建议使用VITON密封圈。
- 当活塞速度 $V \leq 0.1\text{m/sec}$ (NBR)， $V \leq 0.2\text{m/sec}$ (VITON)，需要更换成低速润滑油脂。
- 密封件最长使用寿命是基于活塞运动速度 $V \leq 1\text{m/sec}$ 。

Pay attention to the following points:

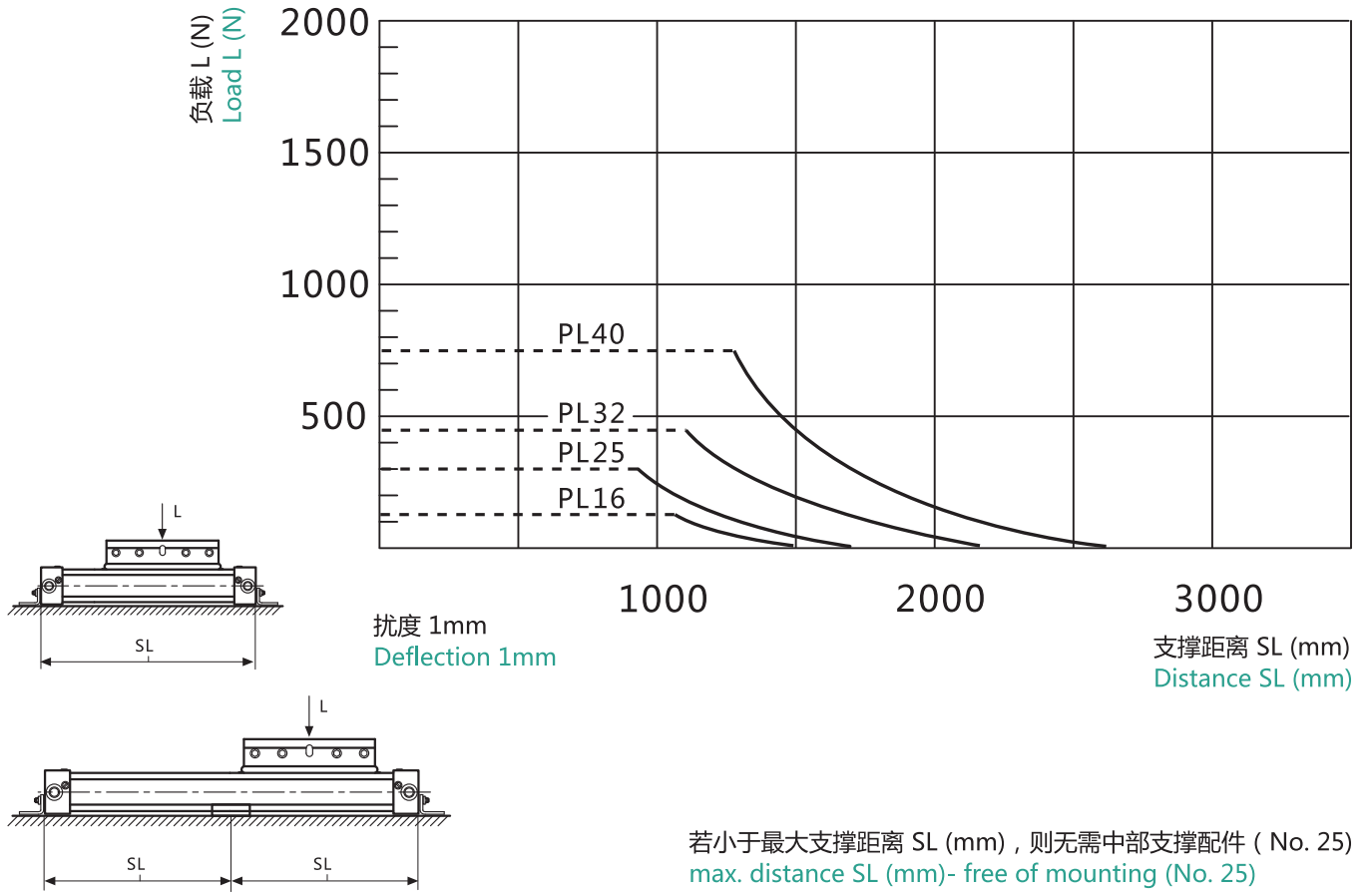
- If the limits above are exceeded additional shock absorbers are necessary.
- For piston speeds of more than $\geq 1\text{m/s}$ viton seals are recommended.
- For piston speeds $\leq 0.1\text{m/s}$ (NBR), $\leq 0.2\text{m/s}$ (VITON) slow speed lubrication is necessary see at sperpart kids
- Maximum duration life will be achieved when piston speeds do not exceed 1m/s .

2000

1500



扰度图表 / DEFLECTION DIAGRAM



中部支撑相关信息：

- 在图表最大负载 (L) 的作用下，支撑之间气缸产生0.5-1mm的扰度是允许的。
- 在图表最大负载 (L) 的作用下，支撑之间气缸产生1-1.5mm的扰度，则必须增加中部支撑配件。

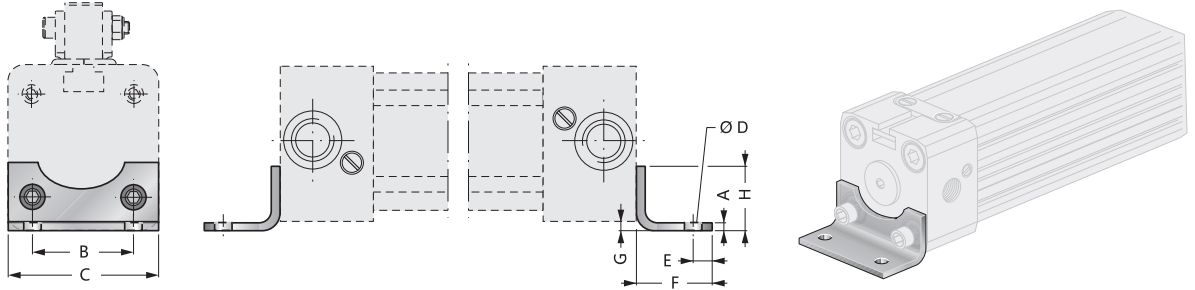
Diagram Information:

- Calculated deflections without support of 0,5 – 1mm allow exceeding of supporting distance.
- Calculated deflections without support of 1mm – max 1,5mm require reduction of the supporting distance.

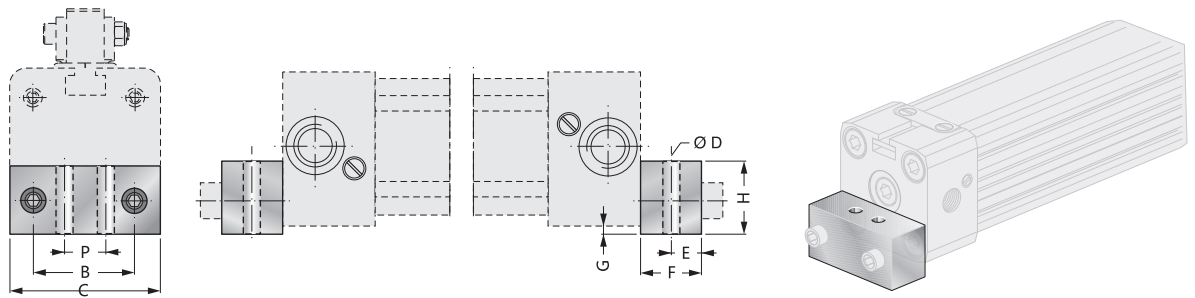
安装配件尺寸 / MOUNTINGS DIMENSIONS

端盖支架 (脚架) / End cover bracket (foot)

24/1.0 - 2.0*

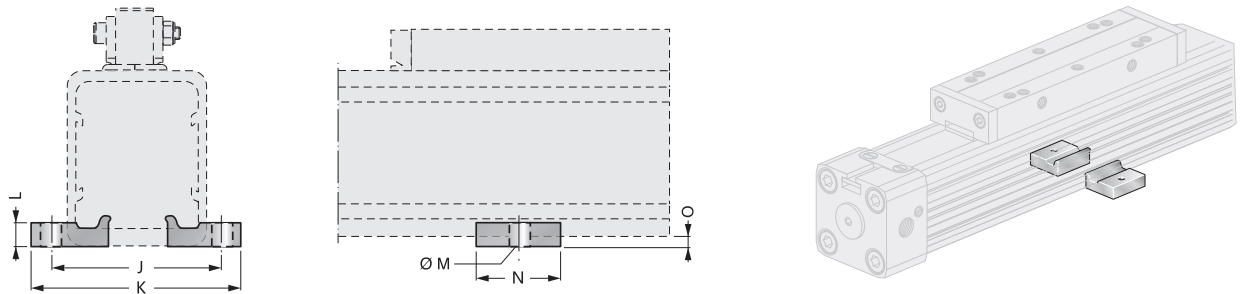


24/3.0 - 4.0*

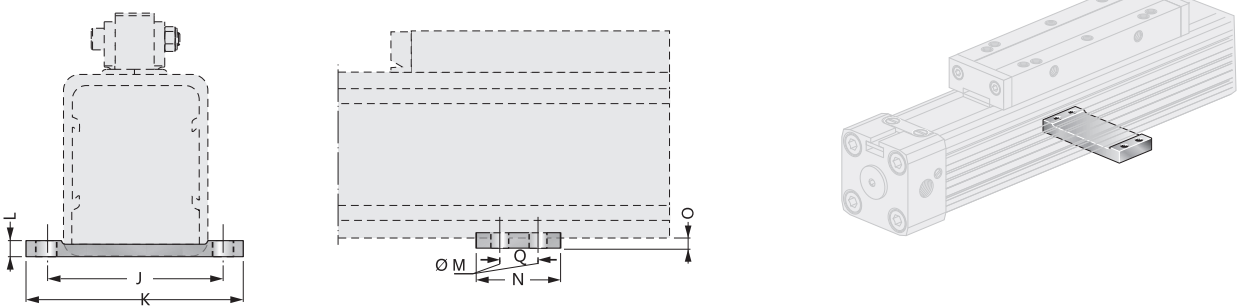


中部支撑座 / Mid section support

25/1.0 - 2.0*



25/3.0 - 4.0*

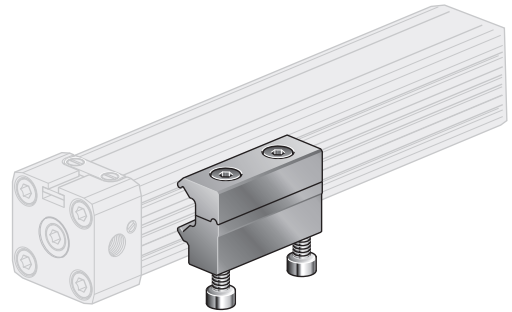
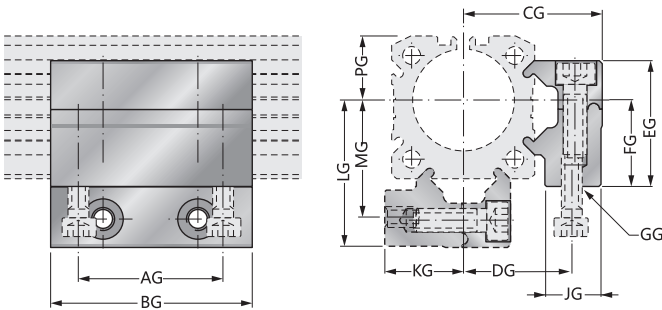


ø	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q
16	1,6	18	26	3,6	4,0	14	1,5	12,5	41	53,5	5	ø5,5	20	3	-	-
25	2,5	27	40	5,5	6,0	22	2	18	48	60	6	ø5,5	20	4	-	-
32	-	36	51	6,6	8,0	24	4	20	61	73	10	ø6,5	55	6	20	40
40	-	54	71	9	11,5	24	2	20	70	85	10	ø6,5	60	7,2	30	45

安装配件尺寸 / MOUNTINGS DIMENSIONS

G型活动中部支撑座，用于气缸Ø16，25，32

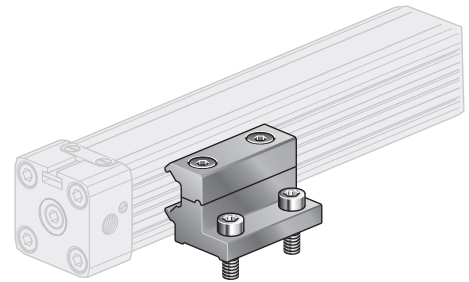
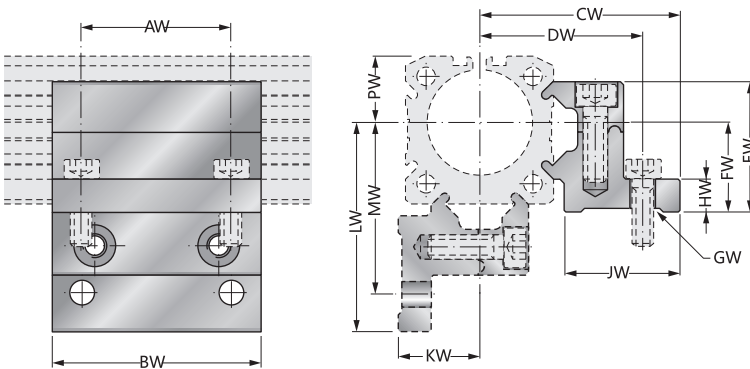
Mobile Mid Section Support, Type G for Cylinder Ø16, 25, 32



ø	AG	BG	CG	DG	EG	FG	GG	JG	KG	LG	MG	PG
16	18,0	30,0	27,5	18,4	21,0	15,0	M4	11,5	13,9	29,0	19,7	10,8
25	36,0	50,0	34,5	27,0	31,3	22,0	M5	14,0	20,0	36,5	29,0	16,0
32	36,0	50,0	41,8	34,2	39,0	30,0	M6	14,0	27,6	47,0	39,5	21,5

W型活动中部支撑座，用于气缸Ø16，25，32

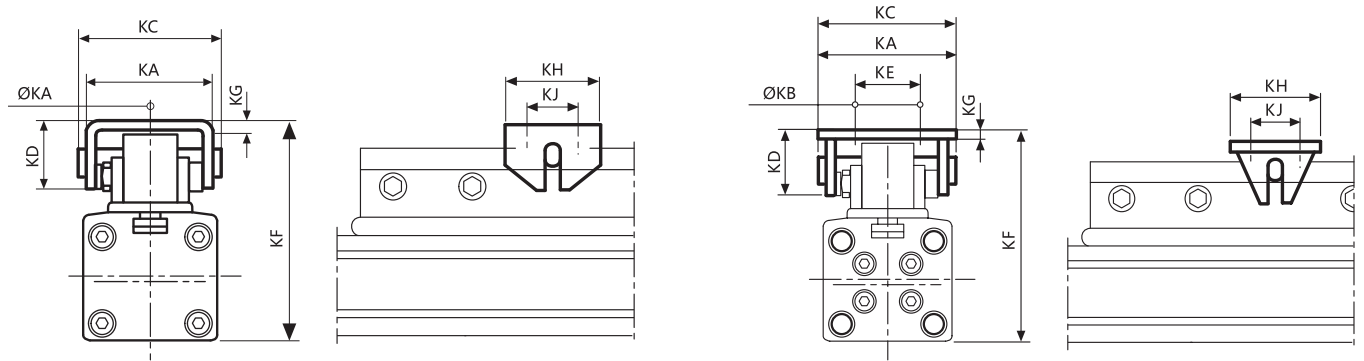
Mobile Mid Section Support, Type W for Cylinder Ø16, 25, 32



ø	AW	BW	CW	DW	EW	FW	GW	HW	JW	KW	LW	MW	PW
16	18,0	30,0	37,0	32,5	21,0	15,0	ø4,5	6,0	22,4	13,9	38,0	32,9	10,8
25	36,0	50,0	47,5	40,0	31,3	22,0	ø5,5	10,0	26,0	20,0	49,5	42,0	16,0
32	36,0	50,0	56,0	47,4	39,0	30,0	ø6,5	10,0	28,5	27,6	61,0	52,5	21,5

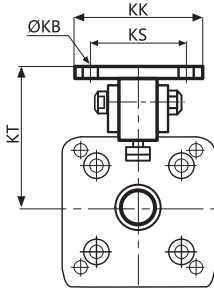
安装配件尺寸 / MOUNTINGS DIMENSIONS

浮动式托架 / Articulated carrier

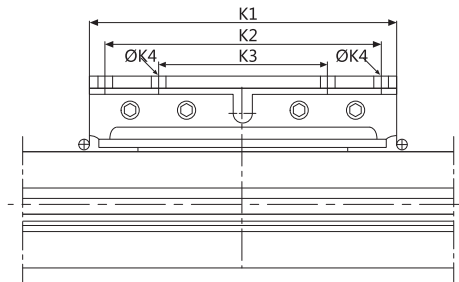


T型托架 / T-load

226 + 227/3-4



No. 226/3-4 为短 T 型托架 (2 孔)
No. 226/3-4 short T-load



No. 227/3-4 为加长 T 型托架 (4 孔)
No. 227/3-4 long T-load

ø	KA	KB	KC	KD	KE	KF*	KG	KH	KJ	KK	KS	KT	K1	K2	K3	K4
16	25	4,5	28	12	-	47-50	2	20	10	-	-	-	-	-	-	-
25	37	5,5	42	20	-	72-75	3	30	16	-	-	-	-	-	-	-
32	70	7,0	70	38	55	91-100	5	90	75	60	45	58,5	150	-	80	7
32L	-	7,0	-	-	-	-	-	-	-	60	45	58,5	300	160	80	7
40	70	7,0	70	38	55	111-120	5	90	75	60	45	63	150	-	80	7
40L	-	7,0	-	-	-	-	-	-	-	60	45	63	300	160	80	7

- KF尺寸在滑块安装槽的范围内是可变的。
- 特殊尺寸可定制，请联系我们的销售代表。

- * KF-Dimensions are variable within the length of the slot of the load friction.
- Extra dimensions on request.

气缸 PL / CYLINDER PL

- 行程尺寸 (0100-5700 mm)
- Ident-figures for stroke definition (0100-5700 mm)

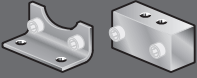
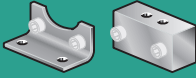
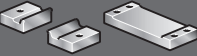
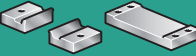
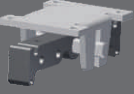


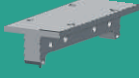
ø 16-40mm - PL 16-40/00-22

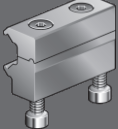
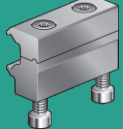
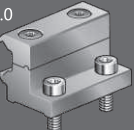
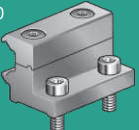
型号	定购码	描述	Types	Ident.-N0.	Description
PL 16/00 PL 25/00 PL 32/00 PL 40/00	11.690. 12.590. 13.190. 14.190.	标准 00: v=1 m/s 标准负载连接滑块 丁腈橡胶密封件 10.9 镀锌螺丝 3 向供气口	PL 16/00 PL 25/00 PL 32/00 PL 40/00	11.690. 12.590. 13.190. 14.190.	Standard 00: v=1 m/s Regid load connection NBR-seals screws 10.9 zinc plated 3-air connections
PL 16/01 PL 25/01 PL 32/01 PL 40/01	11.680. 12.580. 13.180. 14.180.	特殊01: 不锈钢螺丝 其它同标准 00	PL 16/01 PL 25/01 PL 32/01 PL 40/01	11.680. 12.580. 13.180. 14.180.	Special 01: as Standard 00, but screws stainless steel
PL 16/02 PL 25/02 PL 32/02 PL 40/02	11.670. 12.570. 13.170. 14.170.	特殊02: v=1 m/s 氟橡胶密封件 其它同标准 00	PL 16/02 PL 25/02 PL 32/02 PL 40/02	11.670. 12.570. 13.170. 14.170.	Special 02: as Standard 00, but v=1 m/s Viton-seals
PL 16/03 PL 25/03 PL 32/03 PL 40/03	11.660. 12.560. 13.160. 14.160.	特殊03: v=1 m/s 氟橡胶密封件 不锈钢螺丝 其它同标准 00	PL 16/03 PL 25/03 PL 32/03 PL 40/03	11.660. 12.560. 13.160. 14.160.	Special 03: as Standard 00, but v=1 m/s Viton-seals screws stainless steel
PL 32/05 PL 40/05	13.195. 14.195.	特殊05: 短T型托架(2孔) 其它同标准 00	PL 32/05 PL 40/05	13.195. 14.195.	Special 05: as Standard 00, but T-load connection short, with 2 connection bores
PL 32/09 PL 40/09	13.199. 14.199.	特殊09: 长T型托架(4孔) 其它同标准 00	PL 32/09 PL 40/09	13.199. 14.199.	Special 09: as Standard 00, but T-load connection long, with 4 connection bores
PL 16/10 PL 25/10 PL 32/10 PL 40/10	11.698. 12.598. 13.198. 14.198.	标准10: 长活塞 推荐用于垂直运动	PL 16/10 PL 25/10 PL 32/10 PL 40/10	11.698. 12.598. 13.198. 14.198.	Standard 10: long piston recommended for vertical movement

ø 16-40mm - PL 16-40/20-22

型号	定购码	描述	Types	Ident.-N0.	Description
PL 16/20 PL 25/20 PL 32/20 PL 40/20	11.692. 12.592. 13.192. 14.192.	标准20: V=1m/s 浮动式托架 丁腈橡胶密封件 10.9镀锌螺丝 3向供气口	PL 16/20 PL 25/20 PL 32/20 PL 40/20	11.692. 12.592. 13.192. 14.192.	Standard 20: v=1 m/s flexible load connection NBR-seals screws 10.9 zinc plated 3-air connections
PL 16/22 PL 25/22 PL 32/22 PL 40/22	11.672. 12.572. 13.172. 14.172.	特殊22: 浮动式托架 V=1m/s 氟橡胶密封件	PL 16/22 PL 25/22 PL 32/22 PL 40/22	11.672. 12.572. 13.172. 14.172.	Special 22: flexible load connection v=1 m/s VITON-seals

安装配件 / CYLINDER MOUNTINGS

型号	订购码	气缸-ø	描述	Types	Ident.-N0.	Zyl. -ø	Description
端盖支架 (脚架) 24/1.0 24/2.0 24/3.0 24/4.0 24/3.1 	89.581.0001 89.582.0001 89.583.0001 89.584.0001 89.583.2011	PL 25 PL 32 PL 40 PL 32	组装套件 24/: 2 只脚架 4 只 DIN912 标准的 10.9 镀锌螺丝 组装套件用于 PL32 直立安装	Cylinder mounting 24/1.0 24/2.0 24/3.0 24/4.0 24/3.1 	89.581.0001 89.582.0001 89.583.0001 89.584.0001 89.583.2011	PL 25 PL 32 PL 40 PL 32	Connection set 24/: 2 brackets 4 screws 10.9 zinc plated acc. DIN 912 Connection set for PL 32 upright
中部支撑 25/1.0 25/2.0 25/3.0 25/4.0 	89.581.0002 89.582.0002 89.583.0012 89.584.0005	PL 16 PL 25 PL 32 PL 40	组装套件 25/: 中部支撑配件 阳极氧化铝合金	Cylinder mounting Fixation 25/1.0 25/2.0 25/3.0 25/4.0 	89.581.0002 89.582.0002 89.583.0012 89.584.0005	PL 16 PL 25 PL 32 PL 40	Connection Set 25/: body brackets anodised aluminium
浮动式托架 225/1 225/2 225/3 225/4 	89.581.0003 89.582.0003 89.583.0003 89.584.0003	PL 16 PL 25 PL 32 PL 40	组装套件 225/: 1只带衬垫滑块 1只铰接式载体 1只螺栓	Load mounting 225/1 225/2 225/3 225/4 	89.581.0003 89.582.0003 89.583.0003 89.584.0003	PL 16 PL 25 PL 32 PL 40	Connection Set 225/: 1 Load friction with liner 1 articulated carrier 1 bolt
T型托架 226/3 226/4 227/3 227/4 	89.583.0008 89.584.0008 89.583.0009 89.584.0009	PL 32 PL 40 PL 32 PL 40	组装套件 226/: 标准型 T 型负载支架 组装套件 227/: 加长型 T 型负载支架	Load mounting 226/3 226/4 227/3 227/4 	89.583.0008 89.584.0008 89.583.0009 89.584.0009	PL 32 PL 40 PL 32 PL 40	Connection Set 226/: 1 T-mounting SHORT Connection Set 227/: 1 T-mounting LONG

型号	订购码	气缸-ø	描述	Types	Ident.-N0.	Zyl. -ø	Description
G型活动中部支撑座 25/G1.0 25/G2.0 25/G3.0 	89.581.9003 89.582.9003 89.583.9003	PL 16 PL 25 PL 32	颜色: 本色 材质: 阳极氧化铝合金	G- Mobile Mid Section Support 25/G1.0 25/G2.0 25/G3.0 	89.581.9003 89.582.9003 89.583.9003	PL 16 PL 25 PL 32	Colour: natur Material: AL
W型活动中部支撑座 25/W1.0 25/W2.0 25/W3.0 	89.581.9002 89.582.9002 89.583.9002	PL 16 PL 25 PL 32	颜色: 本色 材质: 阳极氧化铝合金	W- Mobile Mid Section Support 25/W1.0 25/W2.0 25/W3.0 	89.581.9002 89.582.9002 89.583.9002	PL 16 PL 25 PL 32	Colour: natur Material: AL

