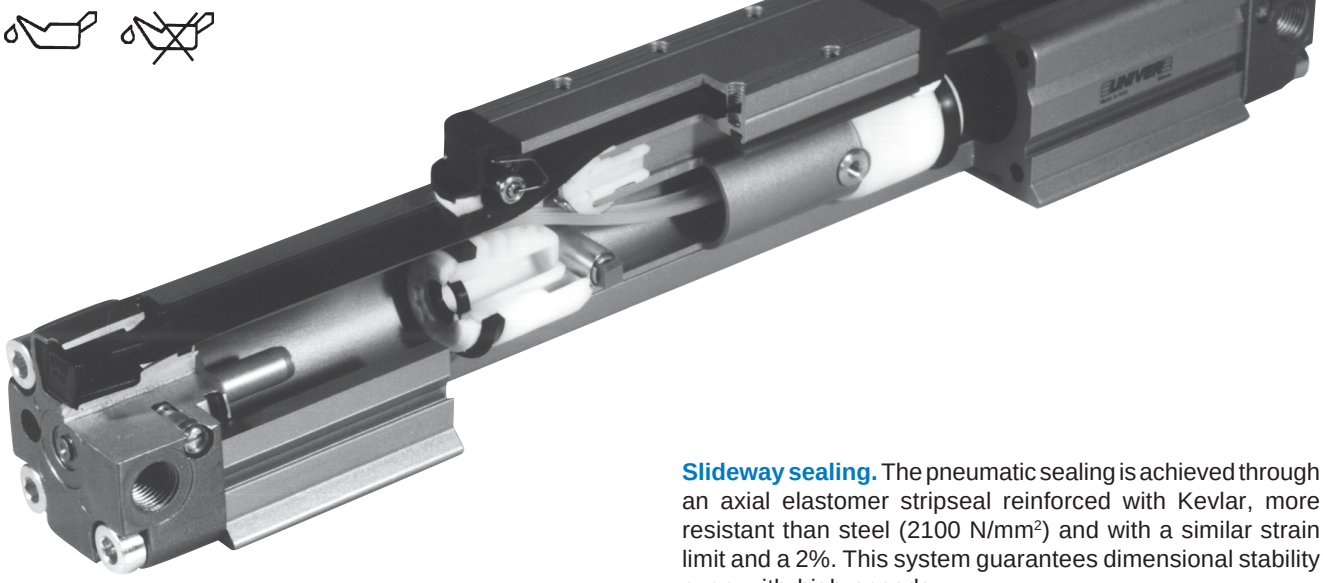
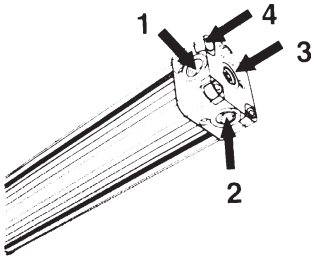
RODLESS CYLINDERS
Series S, VL

Working pressure: 3 ÷ 10 bar
Ambient temperature: -20° ÷ +80°C
Medium: filtered air, **with or without lubrication**
lubricated air is recommended for strokes in excess of 500 mm
Bore size: Ø 25 - 32 - 40 - 50 mm
Standard stroke to 6 m
Min. speed required for even translation: 7 ÷ 20 mm/s
Operating speed: 3 m/s (max)
Carriage options:standard, medium, long and twin standard
Integral guides: sliding on ball bearings or on plastic bearings are available (see technical characteristics of the relevant Series).



End caps in die - cast light alloy with various supply port options (see picture below).
The unique method of stripseal attachment permits easy assembly and disassembly, without the need for tools or the necessity for continous adjustment.

Supply port options



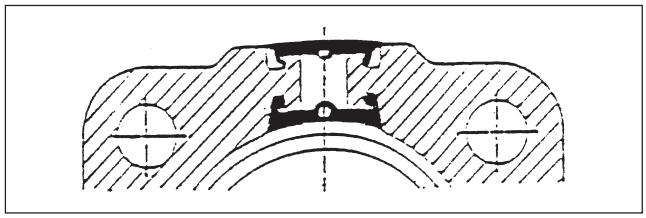
0 = no supply port (left end-cap only when both chambers are supplied from the right end-cap)
1 = side
2 = bottom
3 = rear
4 = both chambers supplied from one end-cap

Upon request
- Side supply port and stroke regulation 0 ÷ 20 mm
- Side supply port and stroke adjustment 0 ÷ 50 mm

Upon request

- Magnetic option for Series S1; for all the other Series the magnetic option is achieved through a magnetic switch mounting rail, (to be ordered separately) Series DK.
See page 2.27
- Slide unit with standard or long carriage for Series S1 (Series J30 - J31).
See page 2.26
- Locking unit for Series S5 - V1 - V2 (Series L6).
See page 2.23.04

Slideway sealing. The pneumatic sealing is achieved through an axial elastomer stripseal reinforced with Kevlar, more resistant than steel (2100 N/mm^2) and with a similar strain limit and a 2%. This system guarantees dimensional stability even with high speeds.
The external protection seal consists of a thermoplastic stripseal reinforced with Kevlar.



Piston - Carriage assembly in extruded aluminium alloy with thermoplastic plane guide bearings.
The piston is fitted with double lip seals which automatically self-compensate against wear. Pistons with permanent magnets are a standard option (S1 series only).
Cylinder barrel in extruded aluminium alloy with internal and external anodisation.
Pneumatic adjustable cushions with two regulation screws in each end-cap allow an improved regulation of piston deceleration.
Mechanical rubber shock absorbers avoid mechanical stress and reduce machinery noise (below 50 dB).

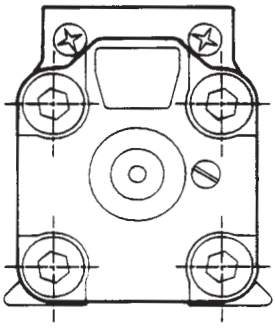
(2016/11)

The original UNIVER rodless cylinder solving the problems of

Series **S1**

. . . with single chamber

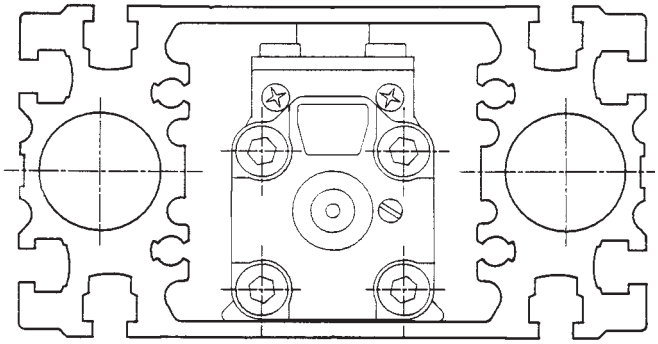
- ✓ Single chamber bore sizes Ø 25 ÷ 50 mm in extruded aluminium alloy.
- ✓ Stroke to 6 m.
- ✓ Various supply port configurations available.
- ✓ Various carriage types.
- ✓ Load capacity 5 ÷ 80 N.
- ✓ High speed 1 ÷ 3 m/sec.



Series **J30** Standard Carriage

Series **J31** Long Carriage

. . . with Slide unit

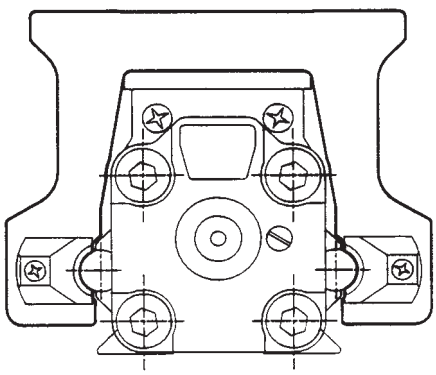


- ✓ Metal on metal bearings.
- ✓ High load bearings capacity.
- ✓ Speed 0,2 ÷ 1 m/sec.
- ✓ Stroke to 800 mm.

Series **S5**

. . . with integral guides

- ✓ Flexible bearing system absorbs shock.
- ✓ Plastic bearings reduce noise.
- ✓ Load capacity to 200 N.
- ✓ Speed 0,2 ÷ 1,5 m/sec.
- ✓ Available with locking unit.



Technical modifications keep in reserve !

(98/05)

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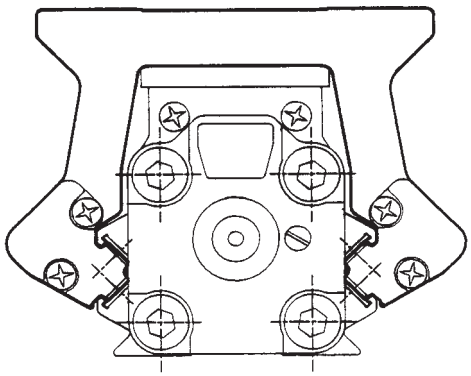
with the most versatile range in the world automation and positional control.

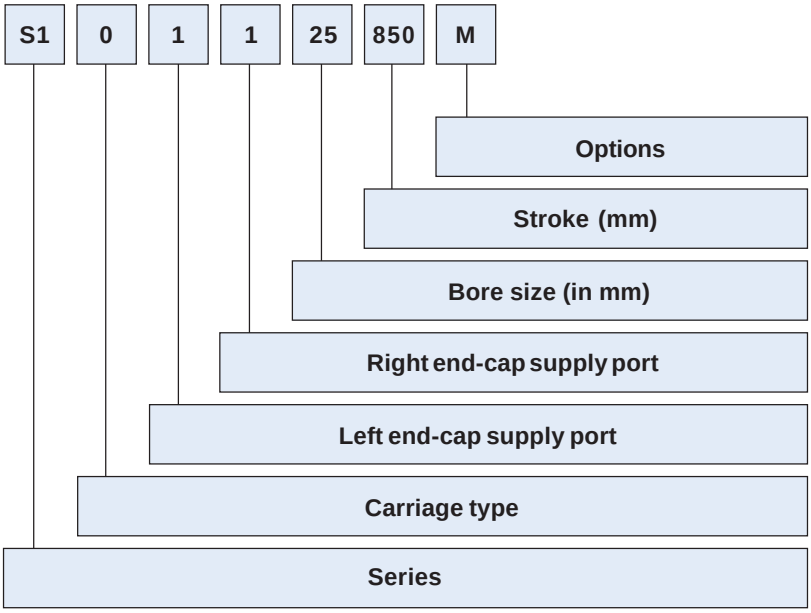
. . . with integral guides at 90°

Series **VL1**



- ✓ Heavy duty series.
- ✓ Rigid bearing system for higher torques.
- ✓ Carriage runs on ball bearings.
- ✓ Load capacity to 400 N.
- ✓ Speed 0,2 ÷ 1 m/sec.
- ✓ Available with locking unit.

(98/05)



SERIES

S1 = Single chamber
S5 = Integrated guides/plastic bearings

CARRIAGE TYPE

0 = Standard Carriage
2 = Medium Carriage
3 = Long Carriage

LEFT END-CAP SUPPLY PORT

0 = No supply port (when both chambers are supplied from the right end-cap)
1 = Side supply port
2 = Bottom supply port
3 = Rear supply port

RIGHT END-CAP SUPPLY PORT

1 = Side supply port
2 = Bottom supply port
3 = Rear supply port
4 = Both chambers supplied from the right end-cap

BORE SIZE

Cylinder bore size:
25 - 32 - 40 - 50

STROKE

Length in mm.

OPTIONS

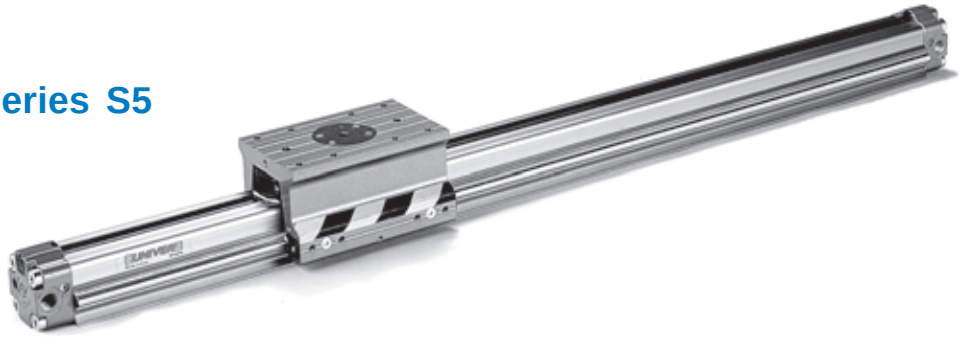
M = Magnetic Carriage (series S1 only).
For Series S5 the magnetic option is achieved through a magnetic switch mounting rail (code DKS) to be ordered separately

Technical modifications keep in reserve !

(98/05)

Series S1

Series S5



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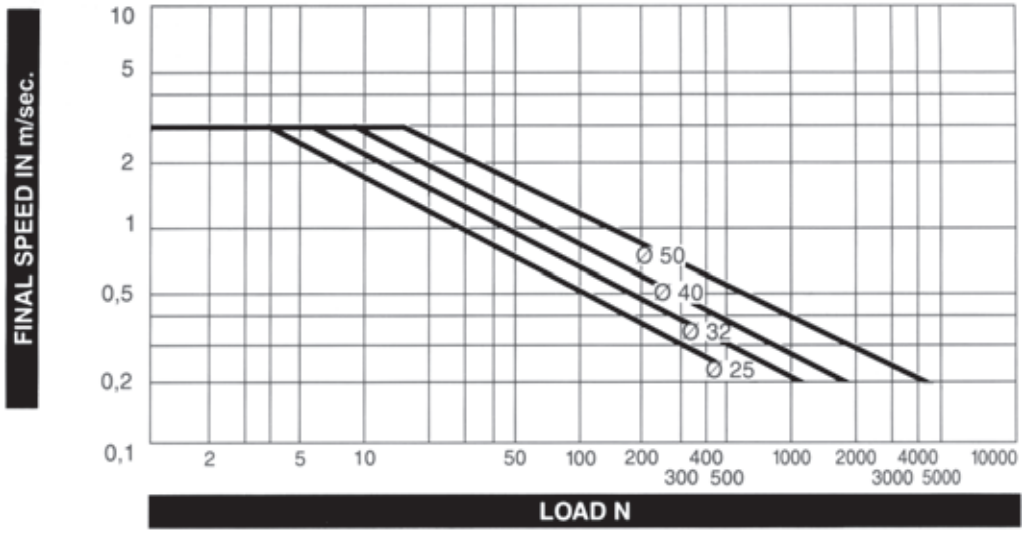
EXAMINATION AND VERIFICATION OF THE CUSHIONING

In a system with moving masses, as in the case of rodless cylinder, it is essential to control the dissipation of the system's kinetic energy as it is brought to a stop.
It is necessary, first of all, to establish and verify the most suitable method of cushioning the system, in order to avoid the moving mass (carriage with load) striking against the endcaps and compromising the life of the cylinder.
If the point corresponding to a given load and speed lies **beneath** the appropriate curve, the cushioning is able to absorb the kinetic energy of the system.
Vice versa if the point lies **above** the curve, the cushioning is not able to absorb the kinetic energy, in which case you must : a) decrease the load and maintain the translation speed
b) decrease the speed and maintain the load
c) select a cylinder with a bigger bore or with twin chambers.

The cushioning capacity is shown in the diagram below, referenced to the final speed as the carriage approaches the endcaps.

Cushioning for Series S1 - S5 - VL1



If it is not possible to absorb the kinetic energy with the cushioned endcaps and it to modify the parameters (A - B - C shown on page above), it is essential to use an additional means of cushioning in order to reduce the load/speed before the cylinder strikes the cushion.
The additional cushion can be:
- a **pneumatic cushion**
- a **hydraulic cushion**

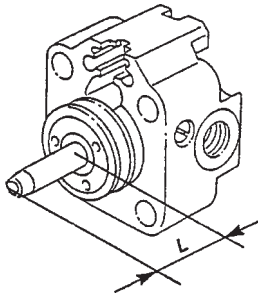
The mass movement causes loads on the cylinder connected both to the weight forces, with constant values, and to the inertia forces which originate in the acceleration phases of the piston at the beginning and at the end of the stroke.

A typical fatigue stress arises in which the load value affects the structure life. The following allowable loads refer to a life expectancy of 20.000 km.

The indicated values (in the corresponding pages of each series) represent the maximum values of the forces and of the momenta which can originate during acceleration phases. Thus, to evaluate the congruity of an application, it is necessary to calculate the generated inertia forces and the corresponding moment.

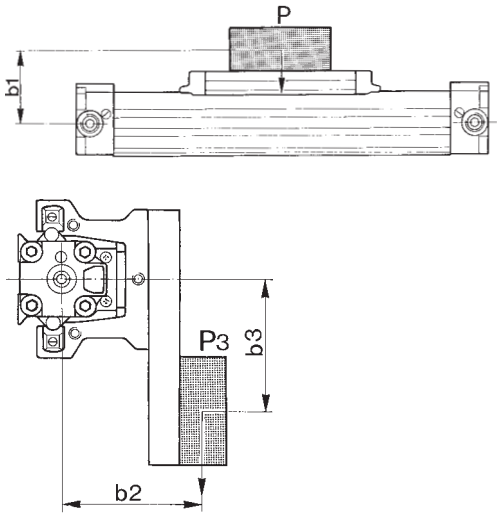
(2000/02)

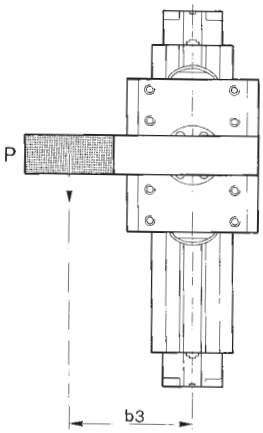
To calculate the inertia forces it is above all necessary to know the L length of the deceleration tract. With the use of the pneumatic cushion of the cylinder head the values are:



Ø (mm)	L (mm)
25	25.0
32	32.5
40	41.5
50	52.0

The usual formula of mechanics are then applied. When moving, for instance, an M mass (kg) at a V impact speed (m/s) with b1, b2 and b3 (mm) arms to the longitudinal axis of the piston, the F inertia force, in longitudinal direction, and the corresponding momenta are calculated as follows:





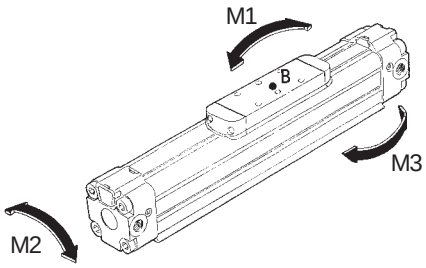
$$F(N)=M \cdot a=M \cdot \frac{V^2}{2\cdot(L\cdot 10^{-3})}$$

$$M_1\cdot(Nm)=F\cdot(b_1\cdot 10^{-3})$$

$$M_2\cdot(Nm)=M\cdot g\cdot(b_2\cdot 10^{-3})$$

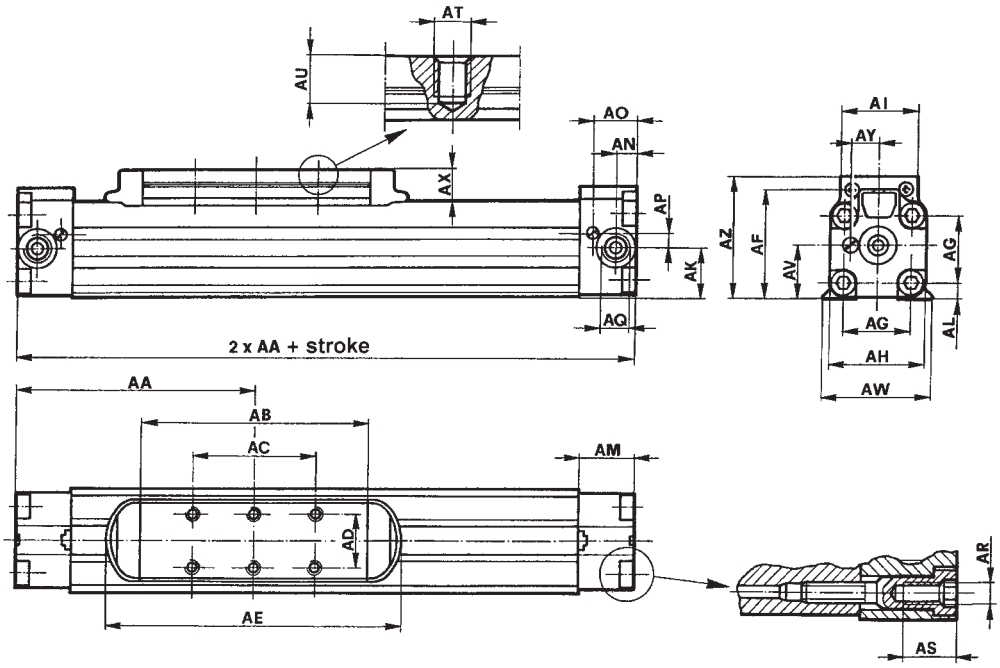
$$M_3\cdot(Nm)=F\cdot(b_3\cdot 10^{-3})$$

While F, M_1 and M_3 can have both static and inertia components, M_2 is only a static component.



RODLESS CYLINDERS SERIES S1

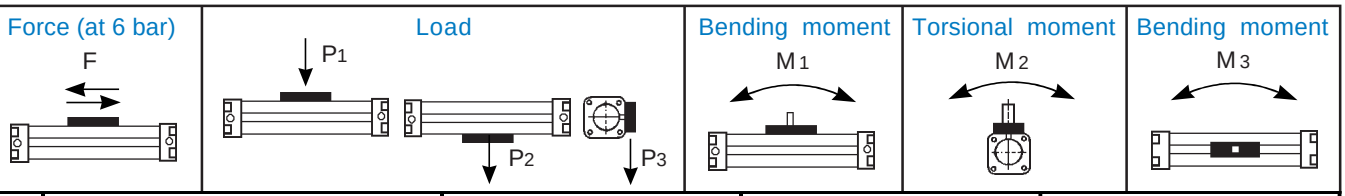
Rodless cylinders with standard carriage (6 fixing holes)



Ø	AA	AB	AC	AD	AE	AF	AG	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
25	100	95	50	24	130	48	28	40.5	33	20	7.5	24	7.45	18.25	5.8	1/8"	M5	12	M5
32	125	120	65	31	157	57	35	50	40	25.3	8.5	29	10.3	22.5	7.35	1/4"	M6	14	M6
40	150	134	65	31	177	74	43.8	64	44	34	13.5	33	12.5	26.5	8.5	3/8"	M8	20	M6
50	175	164	105	39	221	90.5	55	80	53.5	41.2	14.5	33	14.2	25.7	11.8	3/8"	M10	20	M8

Ø	AU	AV	AW	AX	AY	AZ	Weight (g) stroke "0"	Increase in g each 100 mm stroke
25	10	22.5	42.8	15.5	12.2	57.5	707	214
32	10	28	54.5	15.5	14.2	66.2	1298	328
40	11	37	67	18.9	16.5	85.7	2489	554
50	12	47.5	86	19.5	19.1	102	4788	963

Values of the static load; please note that in dynamic conditions, the load must be reduced due to effects associated with the speed. A moment is the product of the load (Newton) and the arm (metres), i.e the distance between the centre of gravity of the load and the longitudinal axis of the piston.

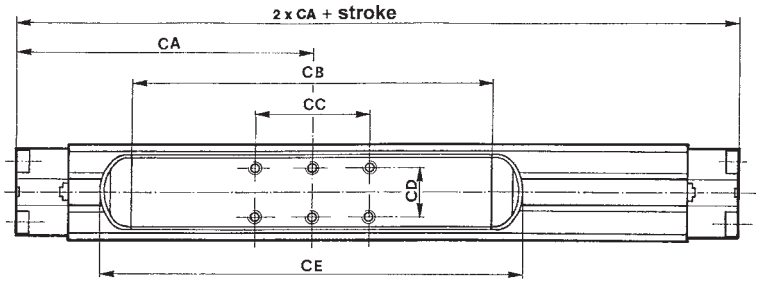


Ø				Standard Carriage			Medium Carriage			Long Carriage		
	F (N)	P1 (N)	P2 (N)	P3 (N)	M1 (Nm)	M2 ◆ (Nm)	M3 (Nm)	M1 (Nm)	M2 ◆ (Nm)	M3 (Nm)	M1 (Nm)	M2 ◆ (Nm)	M3 (Nm)
25	250	200	200	50	8	2	3	14	3	5	25	6	9
32	420	250	250	65	9	3	4	15	4	7	28	8	12
40	640	350	350	90	11	9	14	16	14	20	31	27	39
50	1050	500	500	125	19	13	19	29	20	30	52	36	53

◆ **It is not advised to use this cyl. with heavy stresses.**

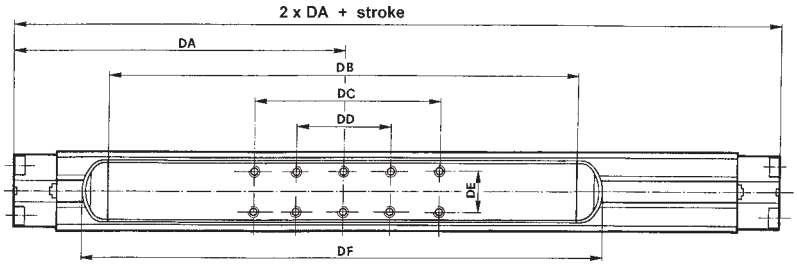
(2001/03)

Medium Carriage - 6 fixing holes



Ø	CA	CB	CC	CD	CE	Weight (g) stroke "0"
25	115	125	50	24	160	805
32	142.5	155	65	31	192	1464
40	169	172	65	31	215	2792
50	205	224	105	39	281	5590

Long Carriage - 10 fixing holes



Ø	DA	DB	DC	DD	DE	DF	Weight (g) stroke "0"
25	147.5	190	100	50	24	225	1020
32	190	250	130	65	31	287	1914
40	225	284	130	65	31	327	3685
50	275	364	315	105	39	421	7406

N.B. In cases where the rodless cylinder is mounted onto external rigid guides, **it is necessary** to fit the floating mounting bracket to the carriage (Series SF - 24 . . .), in order to isolate the cylinder from the rigid structure.

(98/05)

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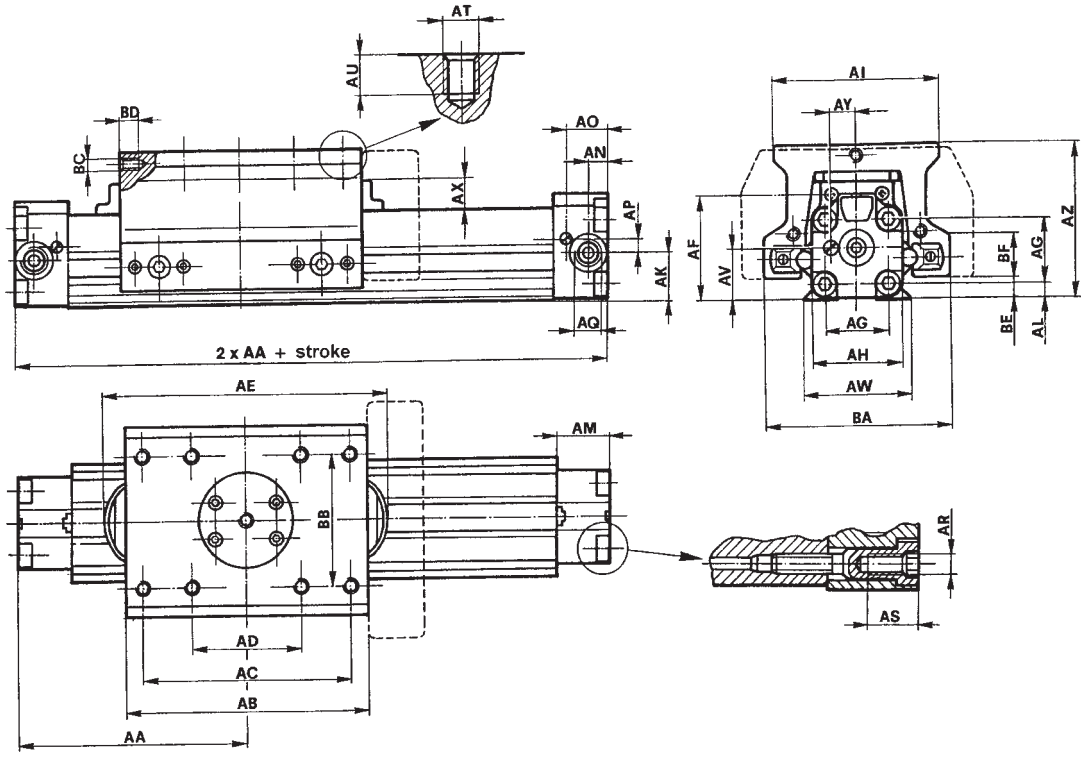
FULLY GUIDED RODLESS CYLINDERS SERIES S5

Fully guided rodless cylinders with standard carriage (8 fixing holes)

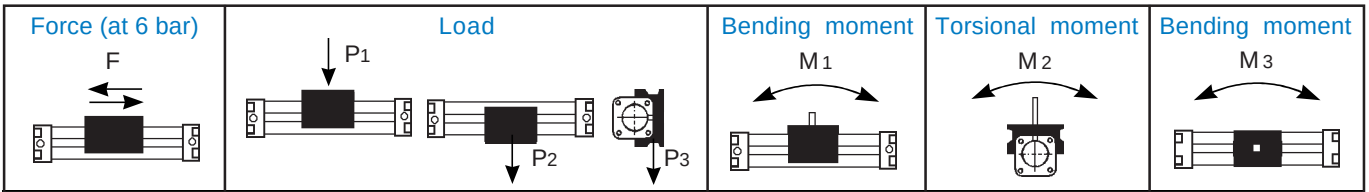


Ø	AA	AB	AC	AD	AE	AF	AG	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
25	100	106	90	50	130	48	28	40.5	70	20	7.5	24	7.45	18.25	5.8	1/8"	M5	12	M6
32	125	140	115	55	157	57	35	50	88	25.3	8.5	29	10.3	22.5	7.35	1/4"	M6	14	M8
40							43.8	64	90	34	13.5	33	12.5	26.5	8.5	3/8"	M8	20	M8
50							55	80	100	41.2	14.5	33	14.2	25.7	11.8	3/8"	M10	20	M8

Ø	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	Weight (g) stroke "0"	Increase in g each 100 mm stroke
25	10	22.5	42.8	15.5	12.2	71.8	85	50	M6	15	5.7	24	1628	367
32	12	28	54.5	15.5	14.2	82.5	99.6	67.5	M6	15	7	25	2830	493
40	14	37	67	18.9	16.5	106.	135	65	M6	15	7	39		
50	16	47.5	86	19.5	19.1	123.	149	76.5	M8	16	7.2	48		

Dotted line indicates location of locking unit.

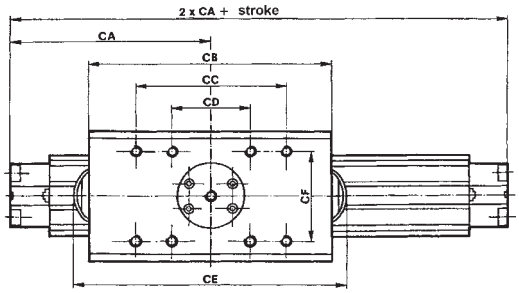
Values of the static load; please note that in dynamic conditions, the load must be reduced due to effects associated with the speed. A moment is the product of the load (Newton) and the arm (metres), i.e. the distance between the centre of gravity of the load and the longitudinal axis of the piston.



Ø				Standard Carriage			Medium Carriage			Long Carriage		
	F (N)	P1 (N)	P2 (N)	P3 (N)	M1 (Nm)	M2 (Nm)	M3 (Nm)	M1 (Nm)	M2 (Nm)	M3 (Nm)	M1 (Nm)	M2 (Nm)	M3 (Nm)
25	250	400	400	400	13	8	16	20	10	25	40	15	50
32	420	400	400	400	20	9	27	30	12	40	55	18	75
40	640	600	600	600	not foreseen			60	30	80	110	45	150
50	1050	800	800	800	not foreseen			85	50	110	150	75	210

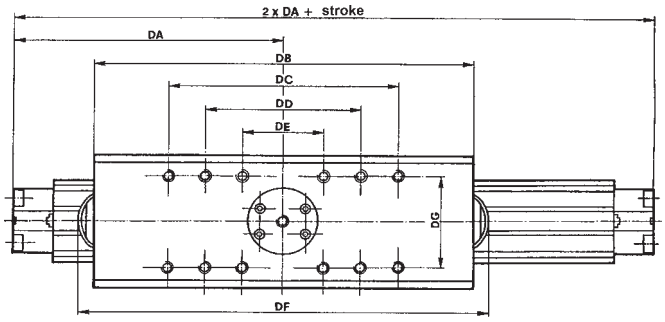
(2001/03)

Medium carriage - 8 fixing holes



Ø	CA	CB	CC	CD	CE	CF	Weight (g) stroke "0"
25	115	136	90	50	160	50	1800
32	142.5	175	115	55	192	67.5	3332
40	169	205	180	75	215	65	6000
50	205	258	190	80	281	76.5	9948

Long carriage - 12 fixing holes



Ø	DA	DB	DC	DD	DE	DF	DG	Weight (g) stroke "0"
25	147.5	201	130	90	50	225	50	2620
32	190	270	175	115	55	287	67.5	4696
40	225	317	280	185	75	327	65	8437
50	275	398	320	200	80	421	76.5	13904

(98/05)

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