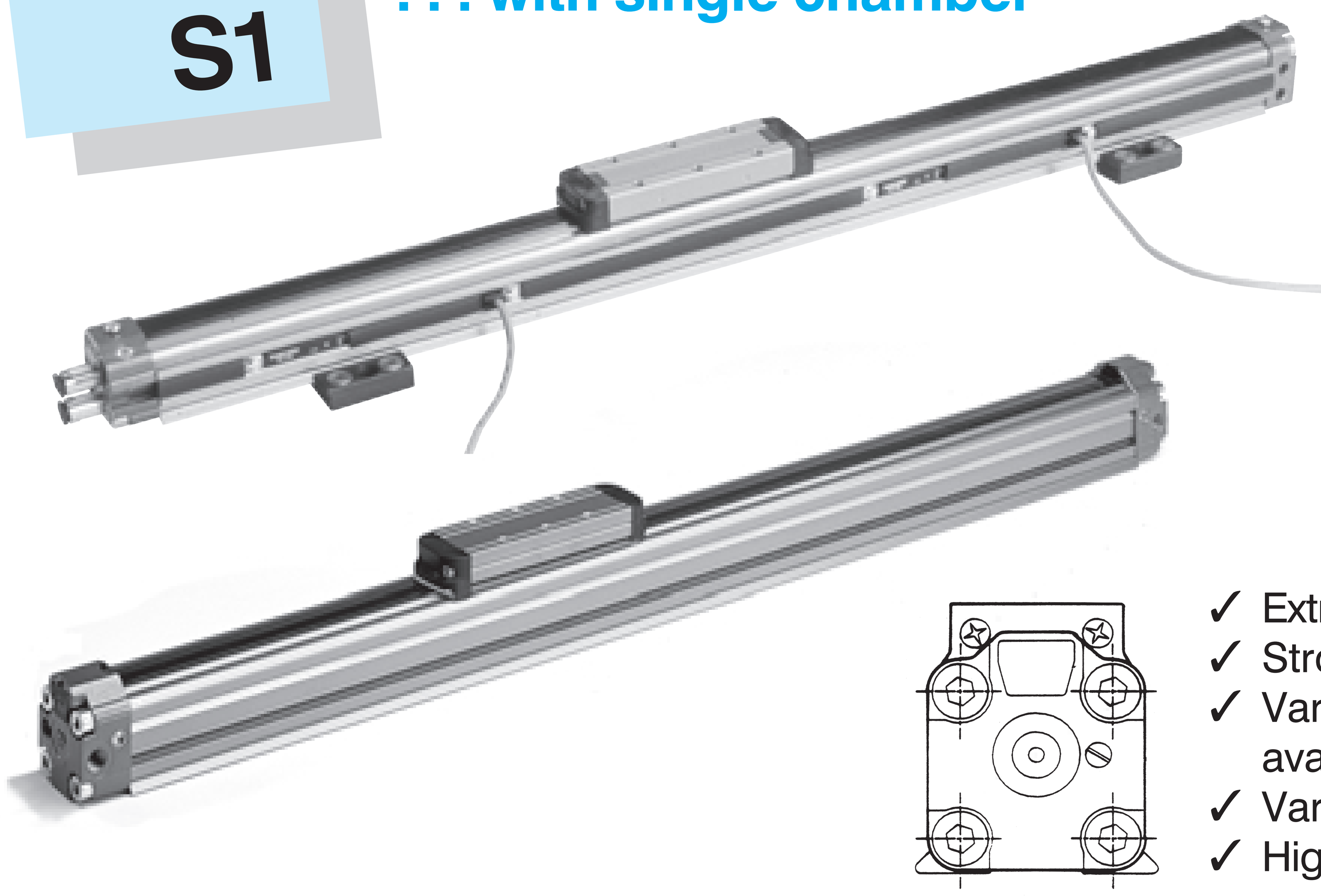
GRANZOW®

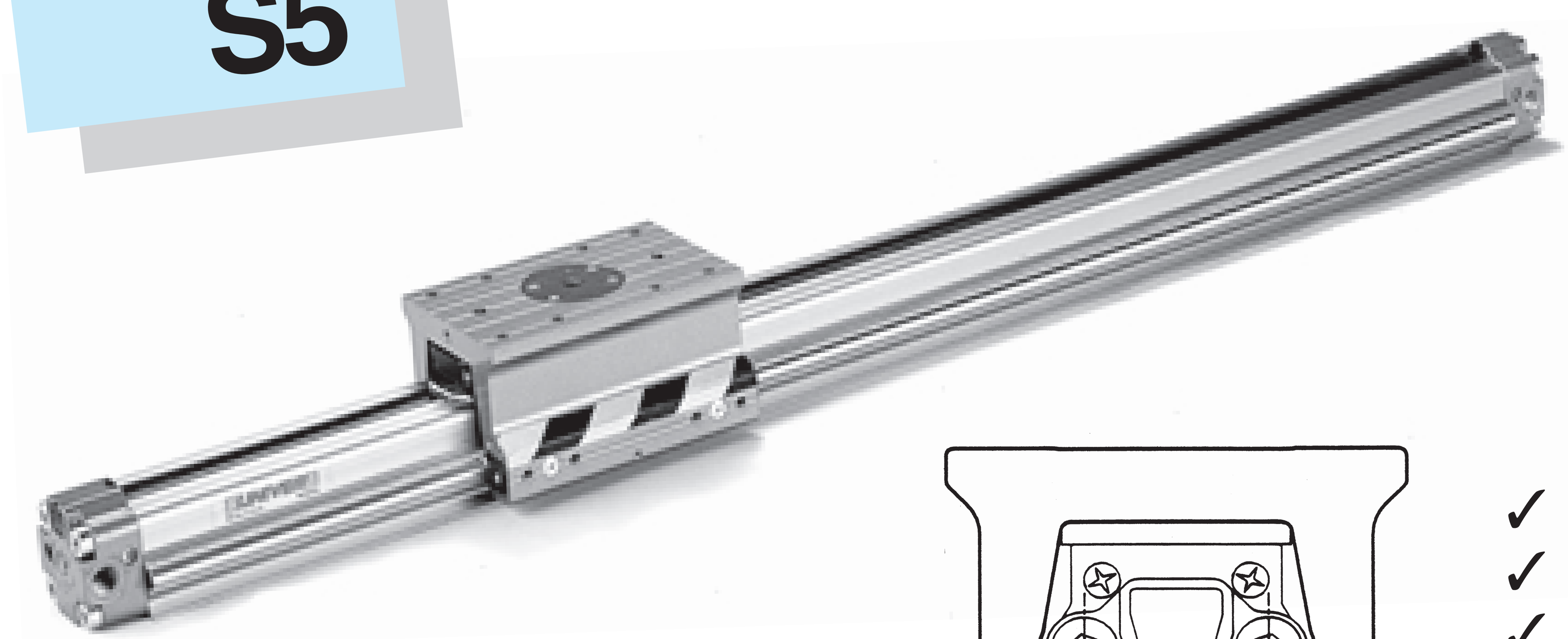
High-Tech

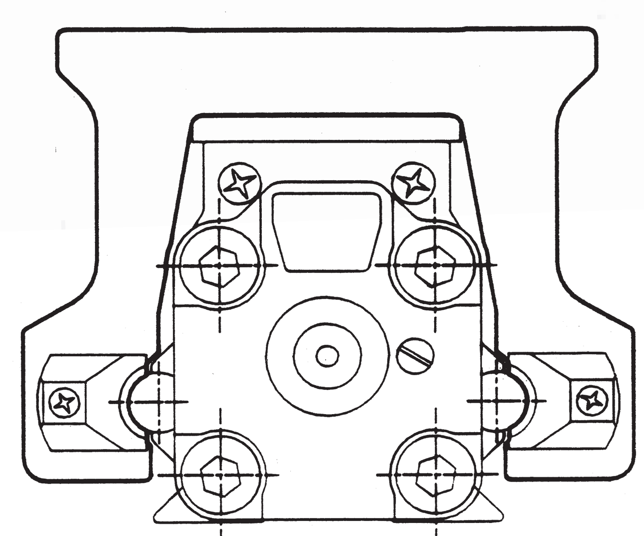
Series S1 . . . with single chamber



- ✓ Extruded profile in aluminium Ø 16 ÷ 50 mm.
- ✓ Stroke to 5 m.
- ✓ Various supply port configurations available.
- ✓ Various carriage types.
- ✓ High translation speed 1 ÷ 3 m/s.

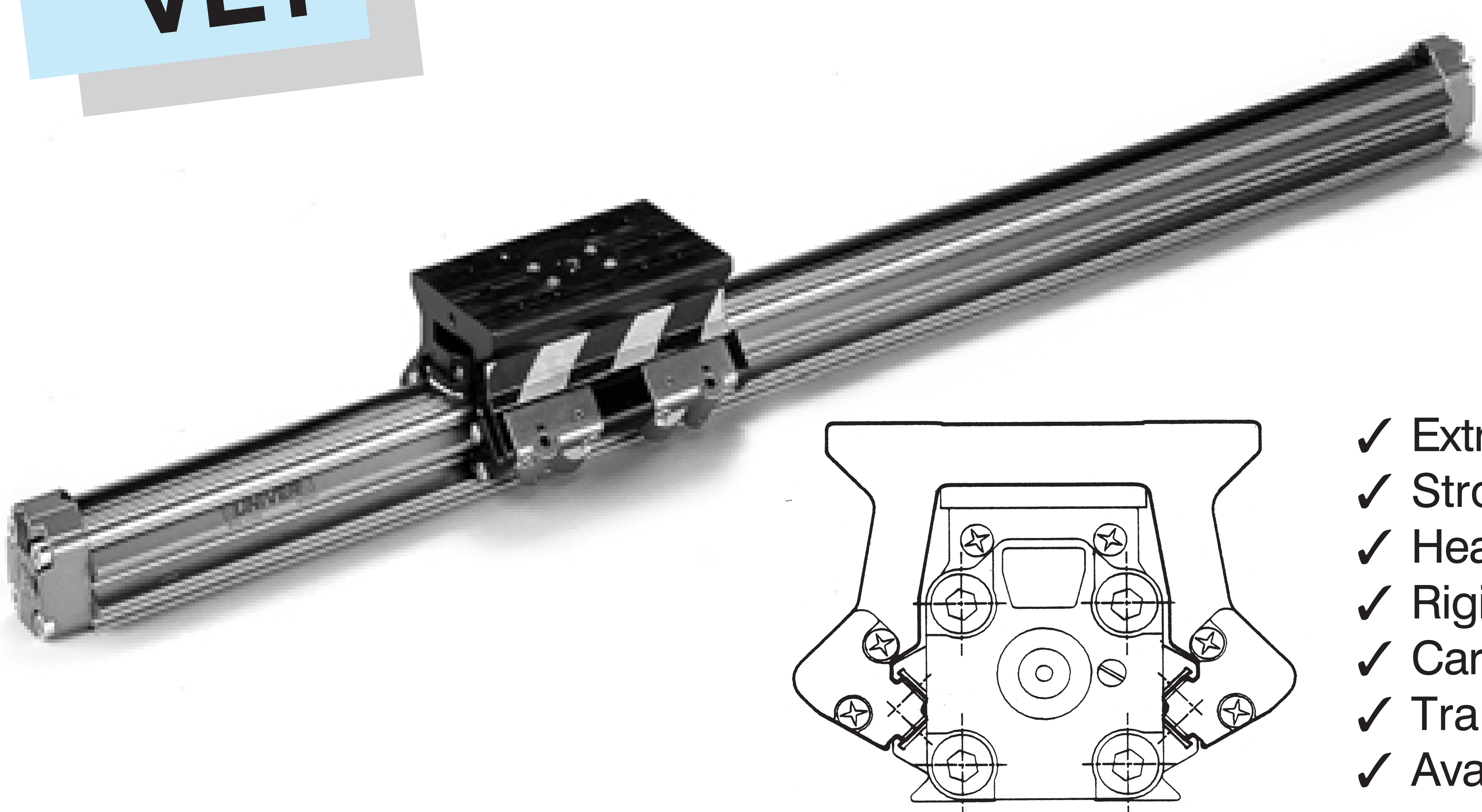
Series S5 . . . with integrated guides





- ✓ Extruded profile in aluminium Ø 25 ÷ 50 mm.
- ✓ Stroke to 6 m.
- ✓ Flexible bearing system.
- ✓ Plastic bearings reduce noise.
- ✓ Translation speed 0,2 ÷ 1,5 m/s.
- ✓ Available with locking unit.

Series VL1 . . . with integrated guides 90°



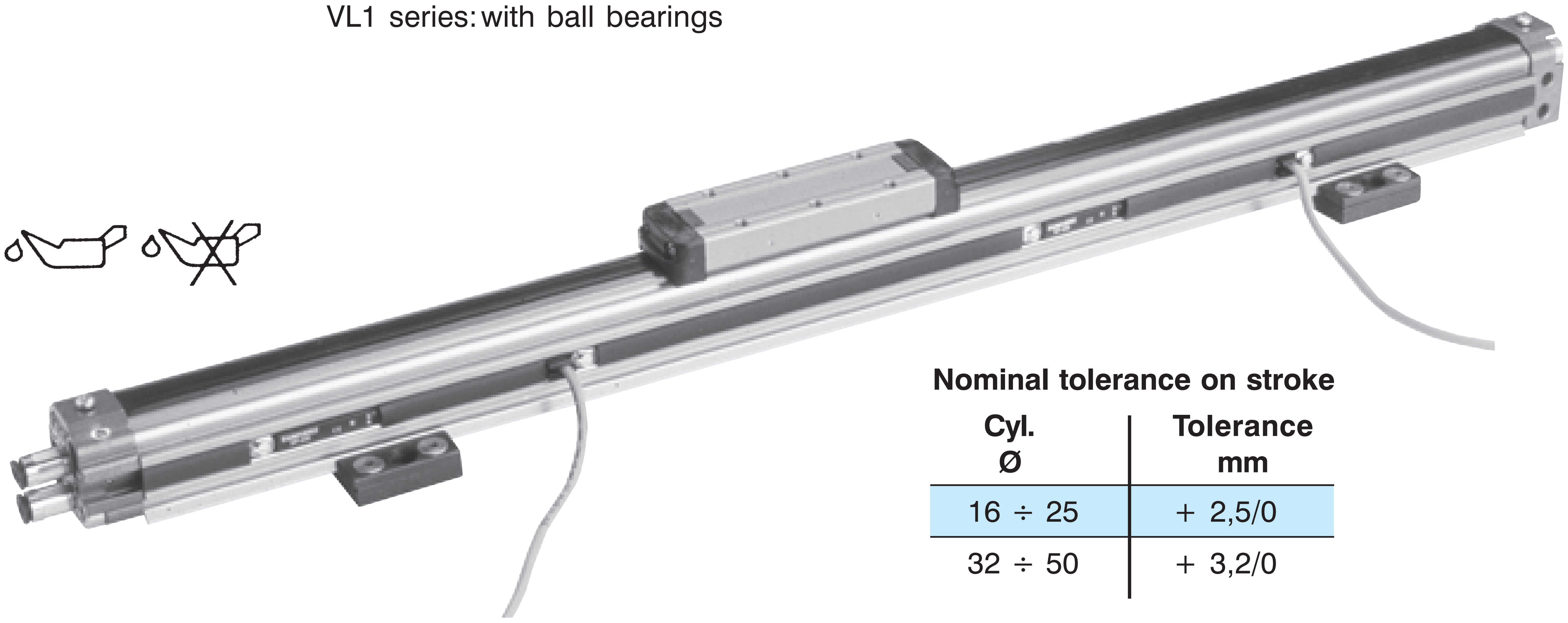
- ✓ Extruded profile in aluminium Ø 25 ÷ 50 mm.
- ✓ Stroke to 6 m.
- ✓ Heavy duty precision series.
- ✓ Rigid ball bearing system.
- ✓ Carriage slide on ball bearings.
- ✓ Translation speed 0,2 ÷ 2 m/s.
- ✓ Available with locking unit.

TECHNICAL CHARACTERISTICS

Working pressure: 3-10 bar
Ambient temperature: -20°C ÷ +80°C
Fluid: filtered air, **with or without lubrication**
up to 500 mm
Bore size: Ø 16-25-32-40-50 mm
Standard strokes: up to 5 meters (Ø 16 mm)
up to 6 meters (Ø 25 ÷ 50 mm)
Min. speed required for regular translation: 7 ÷ 20 mm/s.
Translation speed: 3 m/s max.
Carriage types: standard, medium, long, double medium
Integrated guides: S5 series: round steel shafts
VL1 series: steel foils at 90°
External carriage slide: S5 series: with plastic sliding shoes
VL1 series: with ball bearings

Upon request

- Magnetic version for S1 series (except for Ø 16 magnetic version standard); for S5 series a special magnetic sensor holder extrusion DKS series is foreseen (section accessories page 6-V).
- Magnetic sensor DH-series - DF-series (Ø 16) (section accessories page 2-V).
- Slide units with standard or long carriage for S1 series (J30 - J31 series) page 47.
- Locking unit for S5 - VL1 series (L6 series) page 7.

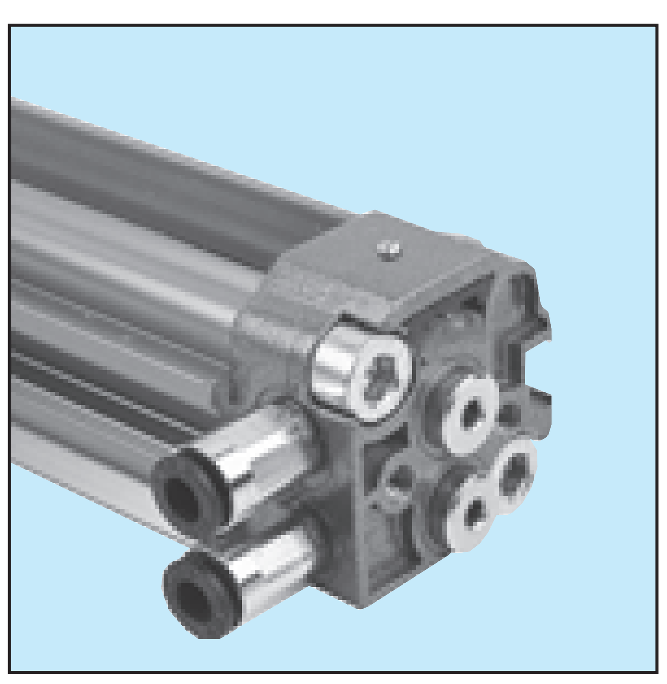


Nominal tolerance on stroke

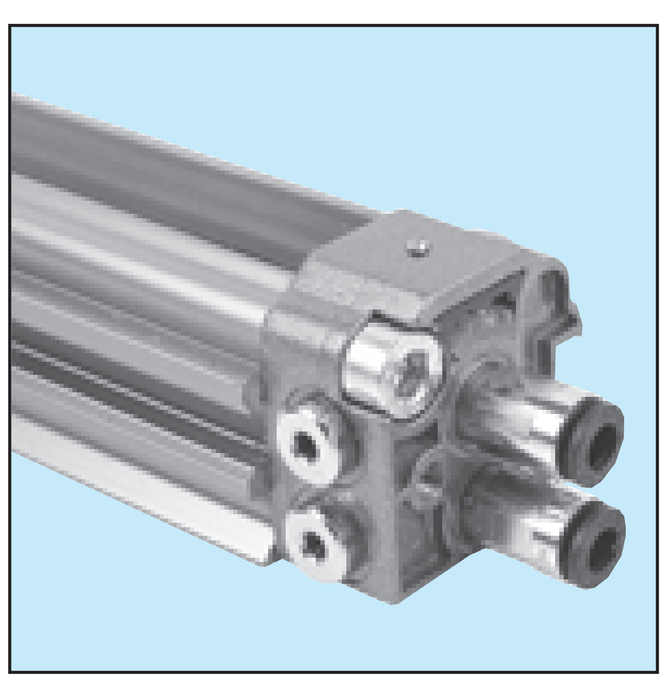
Cyl. Ø	Tolerance mm
16 ÷ 25	+ 2,5/0
32 ÷ 50	+ 3,2/0

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 needing tools or continuous adjustment.

Ø 16 mm

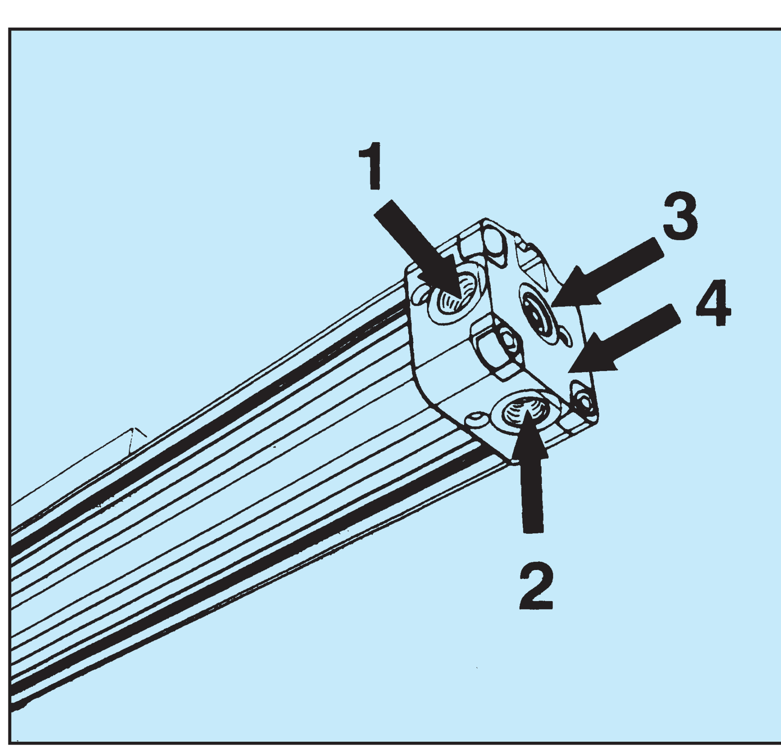


Double side supply



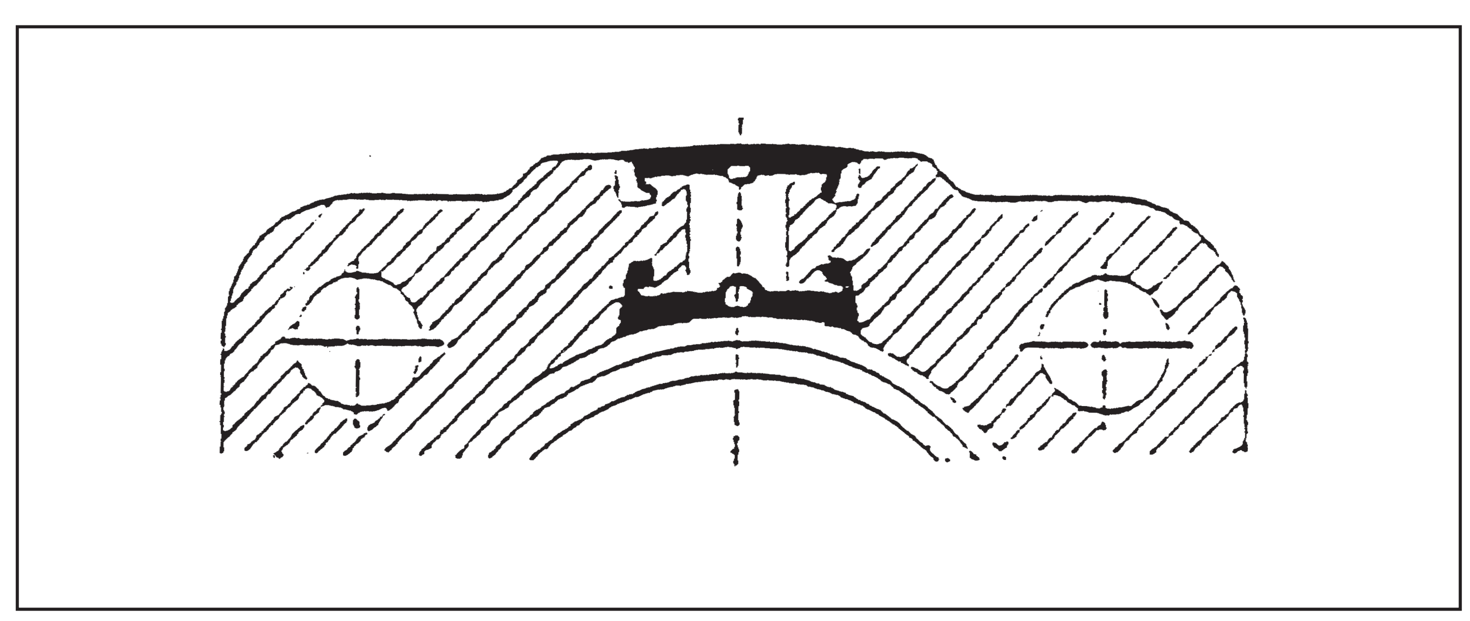
Double rear supply

Ø 25 ÷ 50 mm



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

Slideway sealing. The pneumatic sealing is achieved through an elastomer stripseal reinforced with Kevlar. This system guarantees dimensional stability even with high translation speeds. The external protection seal consists of a thermoplastic stripseal reinforced with Kevlar.

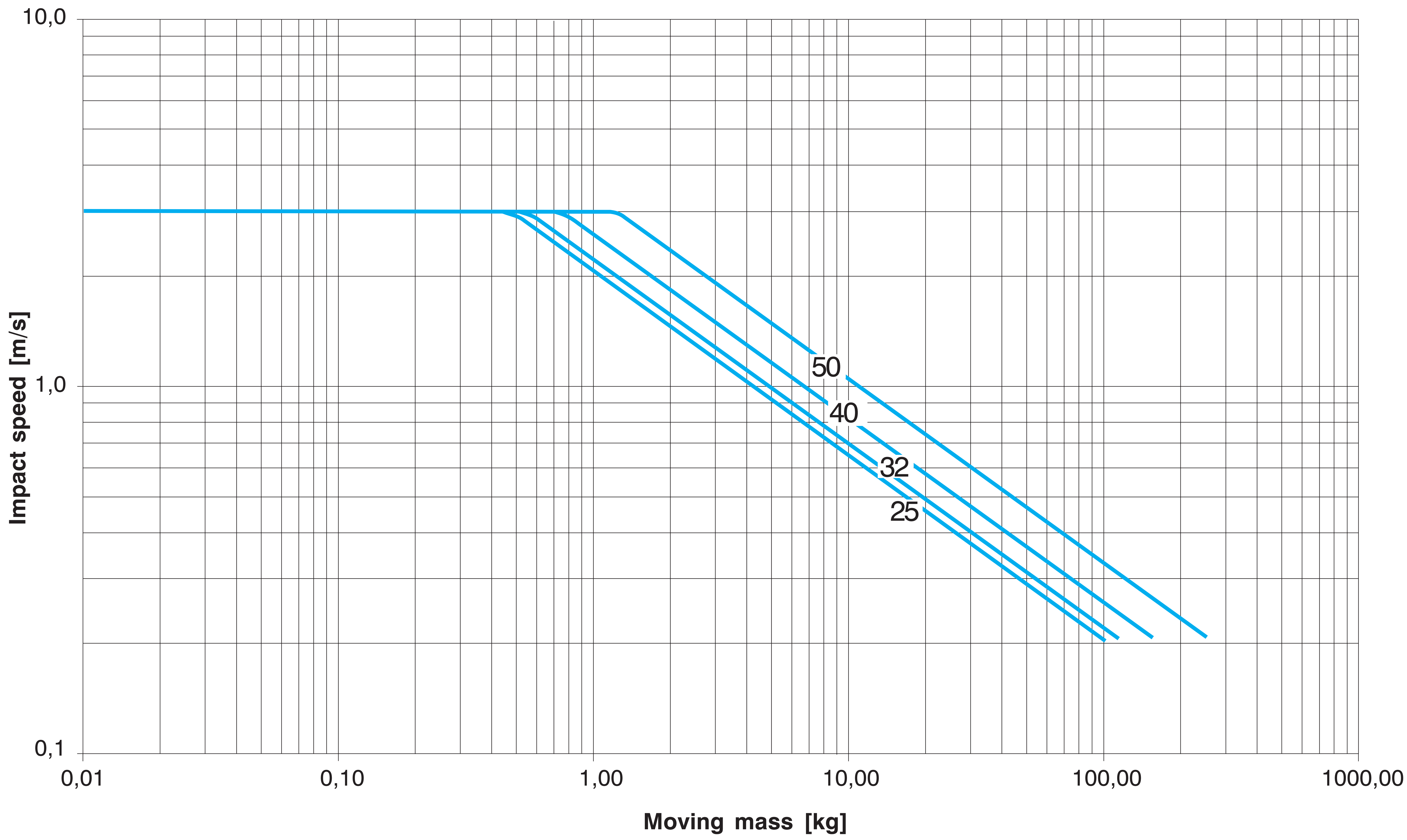


Piston - Carriage assembly in extruded aluminium alloy with thermoplastic guide bearings. The piston is fitted with double lip seals which automatically self-compensate against wear; upon request it is possible to fit it with permanent magnets (S1 series).
Cylinder barrel in extruded aluminium alloy 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).

Examination and verification of the cushioning

In a system with moving masses, as in the case of rodless cylinders, 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 end-caps 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 absorbe 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.

The cushioning capacity is shown in the diagram below, referenced to the final speed as the carriage approaches the end-caps, for S1 - S5 - VL1 series.



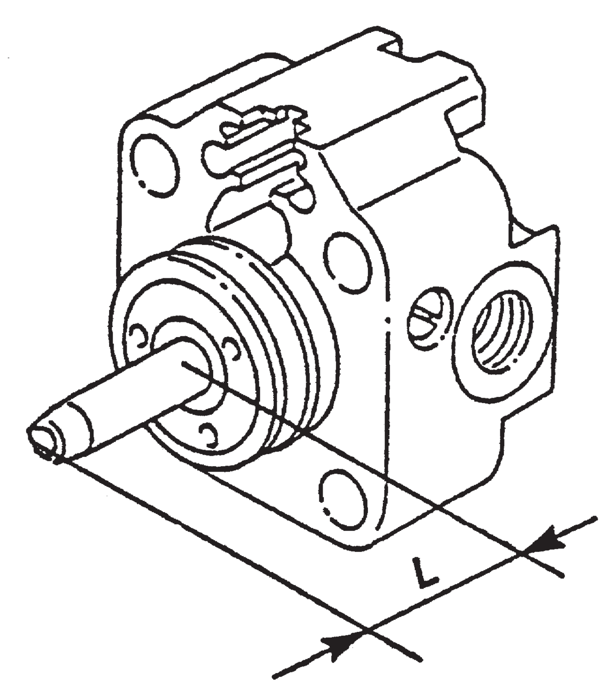
If it is not possible to absorb the kinetic energy with the cushioned end-caps and modify the parameters (a-b-c shown at page 11), an additional cushioning is necessary to reduce the load speed before the cylinder strikes the cushion.
The additional cushion can be:
- a **pneumatic cushion** with electronic control;
- a **hydraulic cushion**, available on the market.

The mass movement generates loads to the cylinder, connected both to the weight forces (load values are constant) and to the inertia forces which originate in the acceleration or deceleration 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 life of the structure. The following acceptable loads refer to a life expectancy of 20000 km.

The indicated values (in the corresponding pages of each series) represent the maximum values of the forces and of the torques which can be developed in acceleration phases. Thus, in order to evaluate if an application is correct, the generated inertia forces and the corresponding torque should be calculated.

To calculate the inertia forces, the length L of the deceleration distance must be known. If the pneumatic cushion of the cylinder head is used, the values are:



Ø (mm)	L (mm)
16	16,5
25	25,0
32	32,5
40	41,5
50	52,0

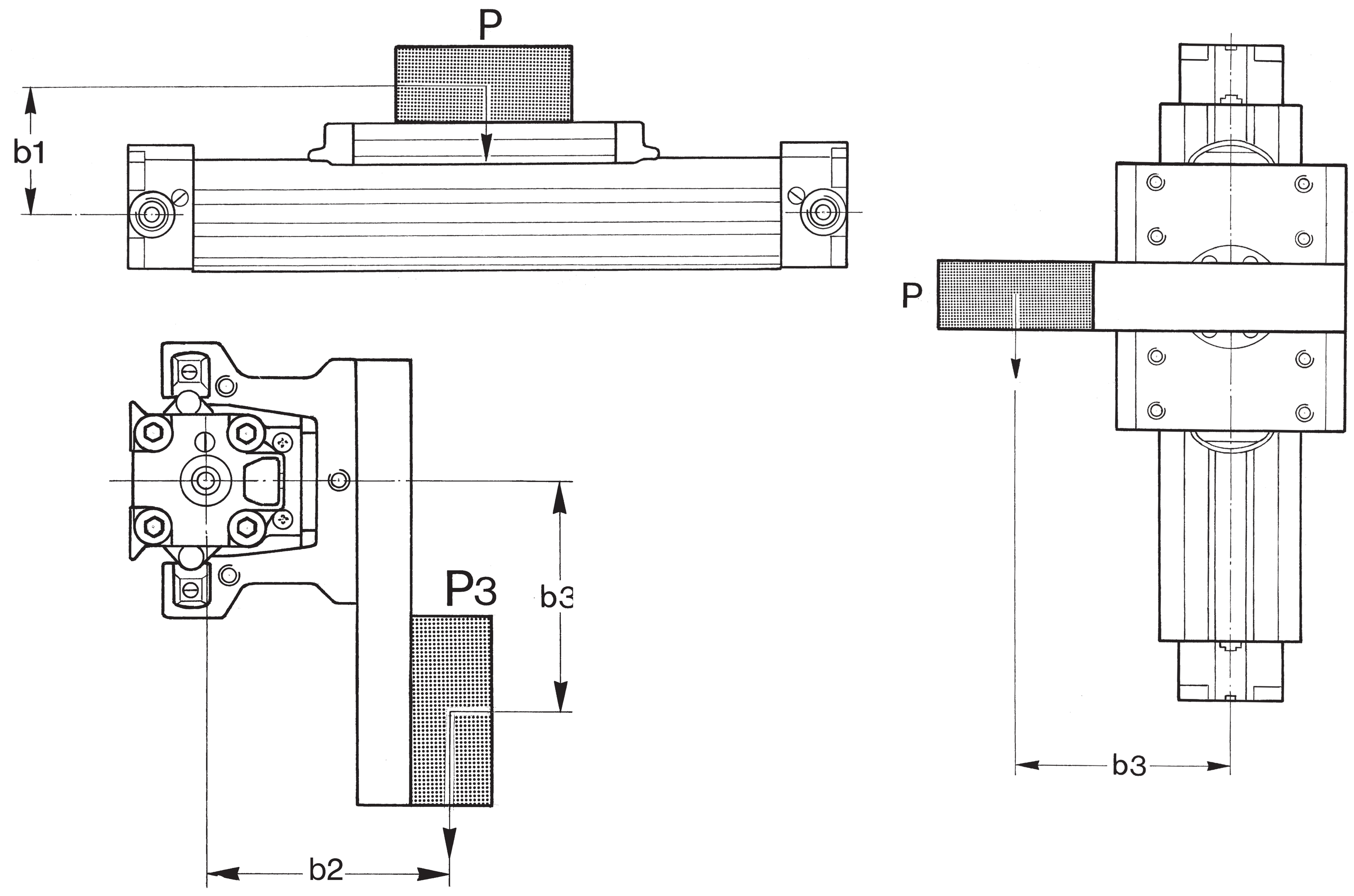
The usual formulas of mechanics are then applied. For instance, when moving a mass M (kg) at an impact speed V (m/s) with b1, b2 and b3 (mm) arms to the longitudinal axis of the piston, the inertia force F, in longitudinal direction and the corresponding torques are calculated as follows:

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

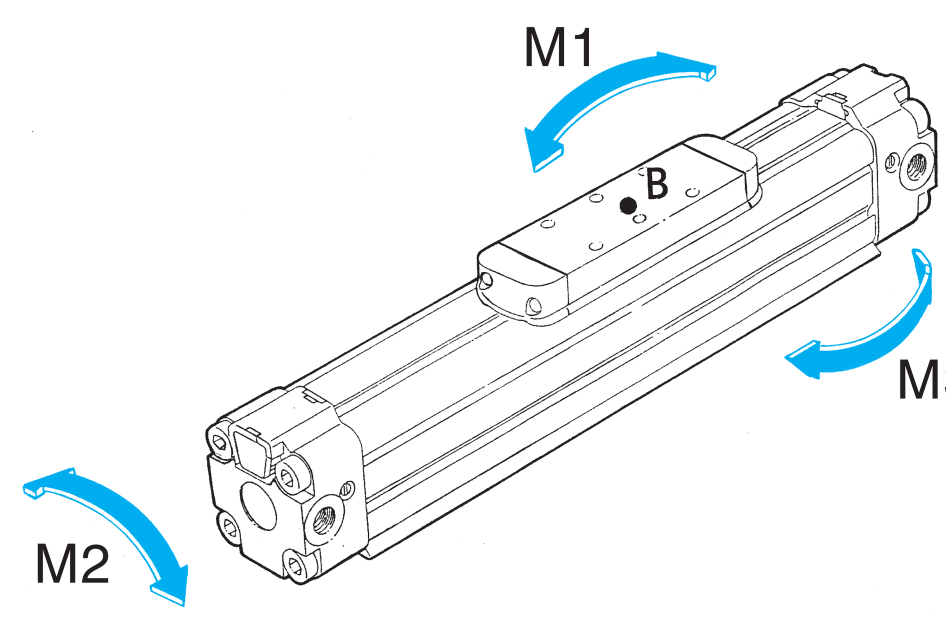
$$M_1 \cdot (Nm) = F \cdot (b_1 \cdot 10^{-3})$$

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

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



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



VL1	2	2	1	1	32	0850
Series	Carriage type	Number of ball bearing pairs	Left end-cap supply port (sx)	Right end-cap supply port (dx)	Bore size (in mm)	Stroke (in mm)

SERIES

VL1 = Integrated guides 90°, ball bearings standard

CARRIAGE TYPE

2 = Medium carriage
3 = Long carriage
4 = Medium twin carriage

NUMBER OF BALL BEARING PAIRS STANDARD SUPPLIED

Cyl. Ø	Carriage Medium	Carriage Long
25	2	3
32	2	3
40	2	3
50	3	4

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

25 - 32 - 40 - 50

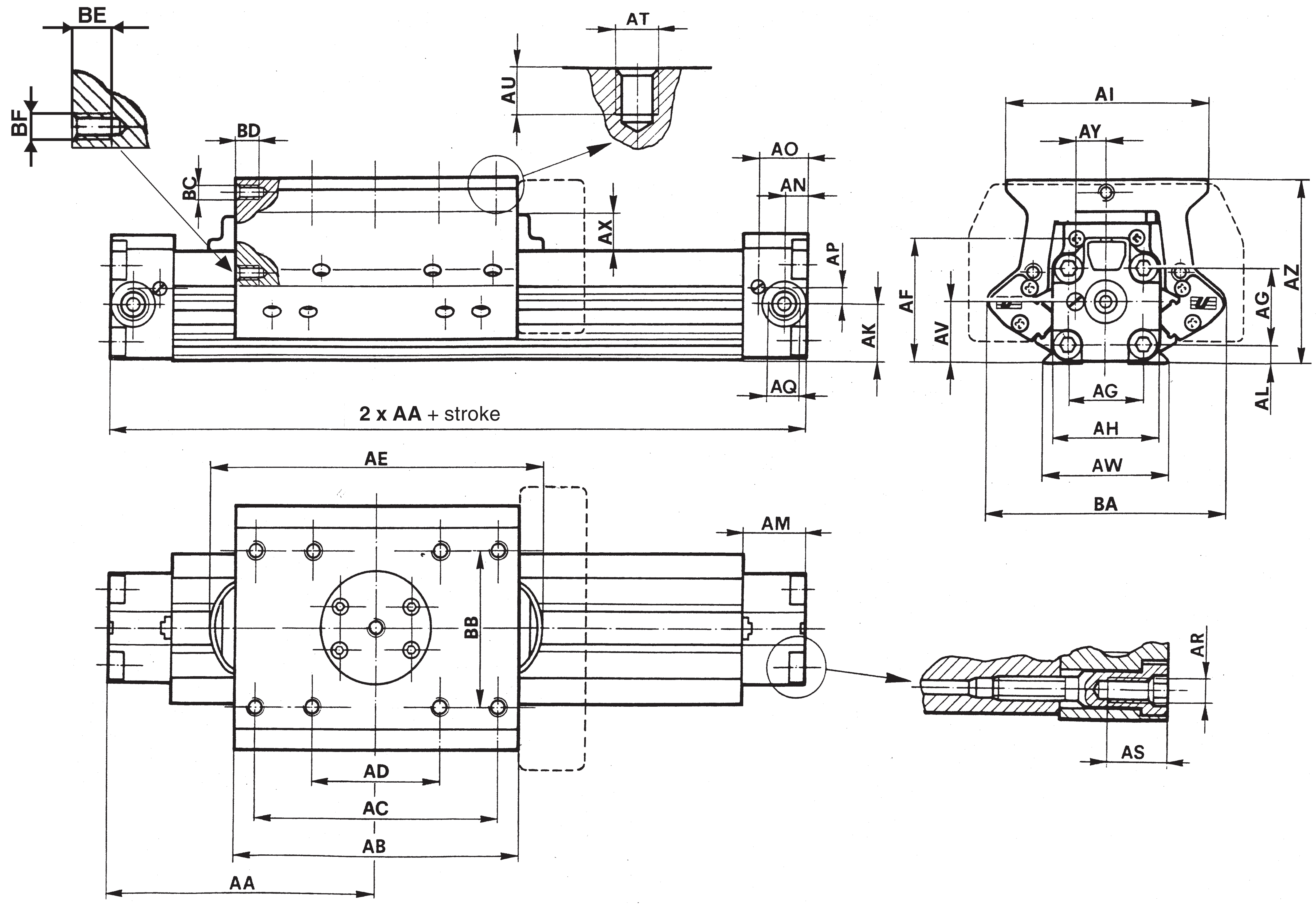
STROKE

Length in mm

Magnetic option is obtained by a magnetic switch mounting rail (DKS Series) to be ordered separately (Section Accessories page 6).

High-Tech

Rodless cylinders with integrated guides 90° and medium carriage - 8 fixing holes



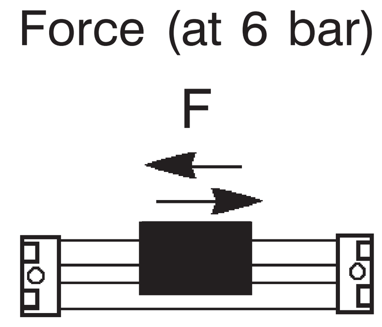
Cyl. Ø	AA	AB	AC	AD	AE	AF	AG	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
25	114,5	136	90	50	160	48,3	28	40,5	83,5	20,2	7	24	7,4	18,2	5,7	G 1/8	M5	12	M6
32	142,5	175	115	55	191	57	35	50	92	25,3	8	29	10,3	22,5	7,3	G 1/4	M6	15,5	M8
40	169	205	180	75	215	74	44	64	125	33,8	11,8	33	12,5	26,5	8,7	G 3/8	M8	20	M8
50	207	258	190	80	271	90,7	55	80	140	41,4	14,7	33	14,2	25,7	11,8	G 3/8	M10	20	M8

Cyl. Ø	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	Mass (kg) at "0" stroke	Weight increase (kg) per additional 100 mm stroke
25	12	22,8	42,8	16	12,2	74,3	111	50	M6	10	M6	10	2,095	0,3
32	12	28	57	16	14,2	82,5	118	67,5	M6	10	M6	10	3,125	0,415
40	14	37	67	19,5	16,5	106	158	65	M6	15	M6	15	6,34	0,67
50	15	47,7	86	20,5	19,1	126,2	173	100	-	-	M6	12	10,85	1,02

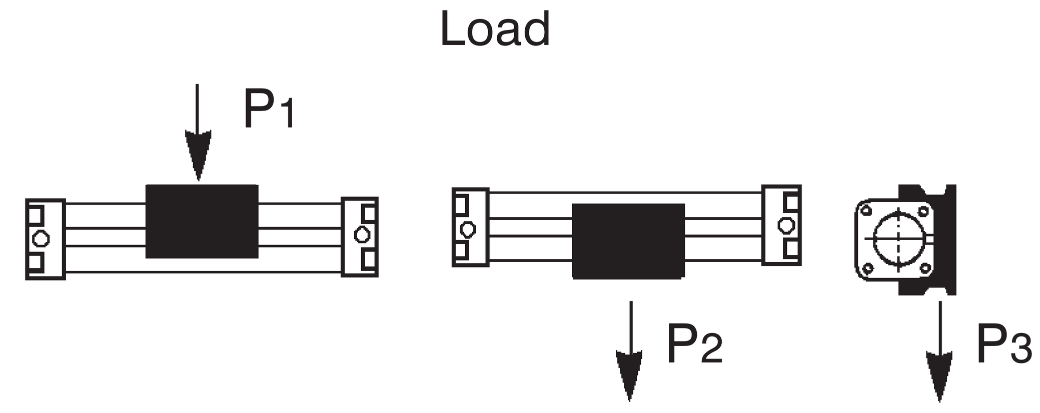
The dotted line indicates the overall dimensions of the locking unit; fixing holes of the locking unit see page 8-II.

Values of the static load; please note that under dynamic conditions the load must be reduced due to the effects associated with the speed. The torque is the product of load (Newton) per arm (meters), i.e. the distance between the center of gravity of the load and the longitudinal axis of the piston (technical characteristics see page 11-12-II).

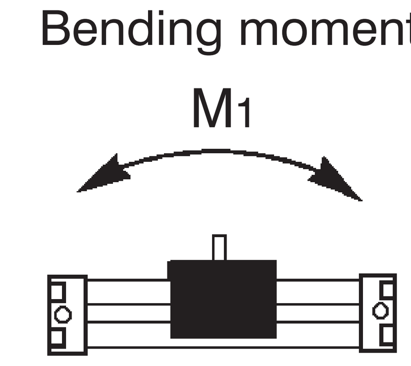
Force (at 6 bar)



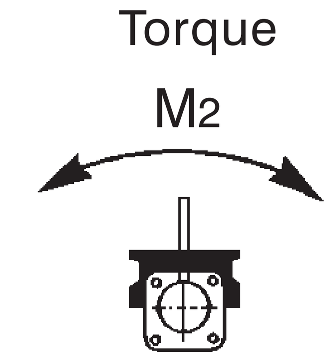
Load



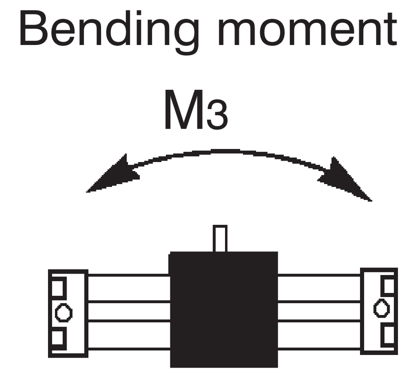
Bending moment



Torque

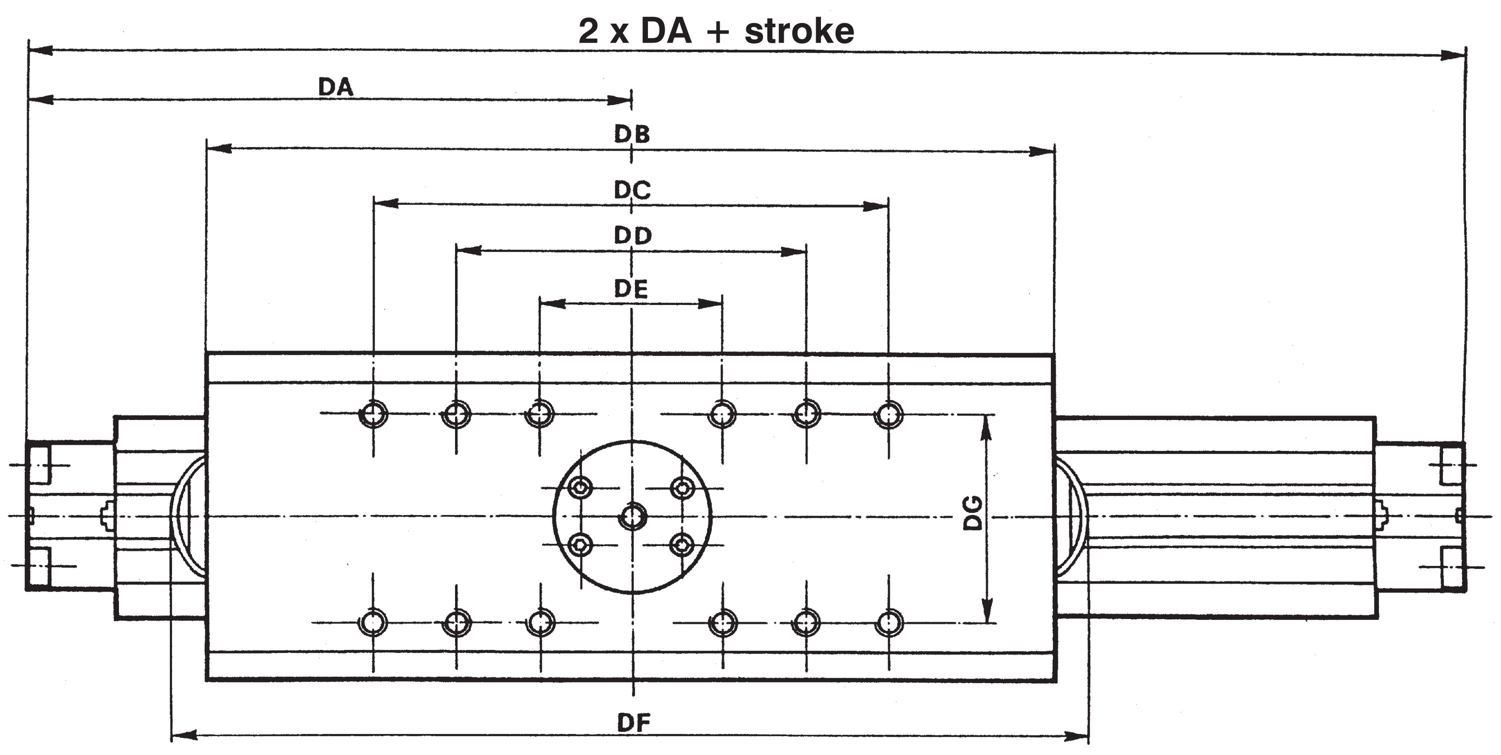


Bending moment



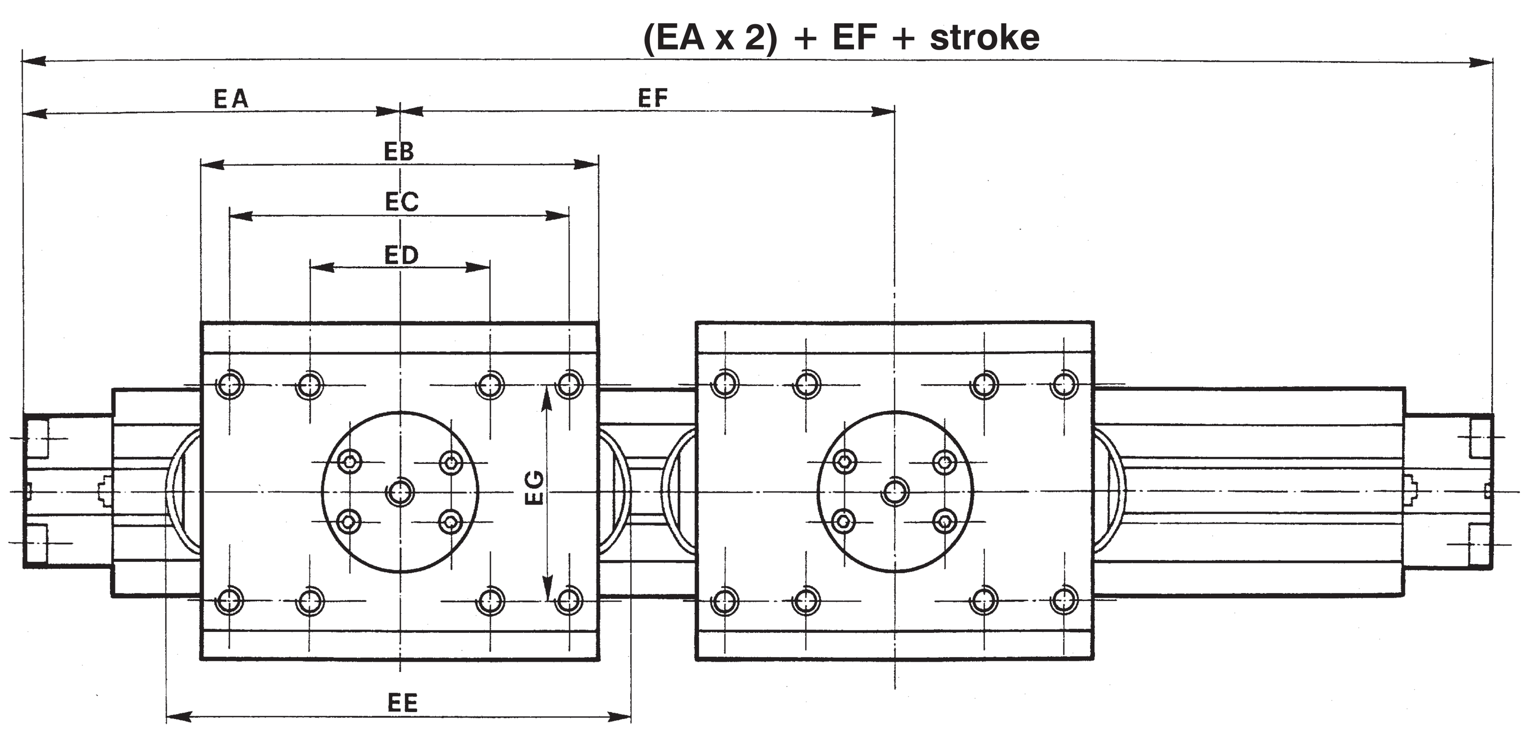
Cyl. Ø		Medium carriage				Long carriage			
	F (N)	P1 P2 P3 (N)	M1 (Nm)	M2 (Nm)	M3 (Nm)	P1 P2 P3 (N)	M1 (Nm)	M2 (Nm)	M3 (Nm)
25	250	700	34	17	34	1000	63	25	63
32	420	700	51	20	51	1000	93	30	93
40	640	1100	120	46	120	1600	230	69	230
50	1050	1500	170	85	170	2000	310	110	310

Long carriage - 12 fixing holes



Cyl. Ø	DA	DB	DC	DD	DE	DF	DG	Mass (kg) at "0" stroke
25	147,5	201	130	90	50	225	50	2,855
32	67,5	270	175	115	55	286	67,5	4,41
40	67,5	317	280	185	75	327	65	8,955
50	277	398	320	200	80	411	100	15,365

Twin medium carriage - 8 fixing holes for each carriage



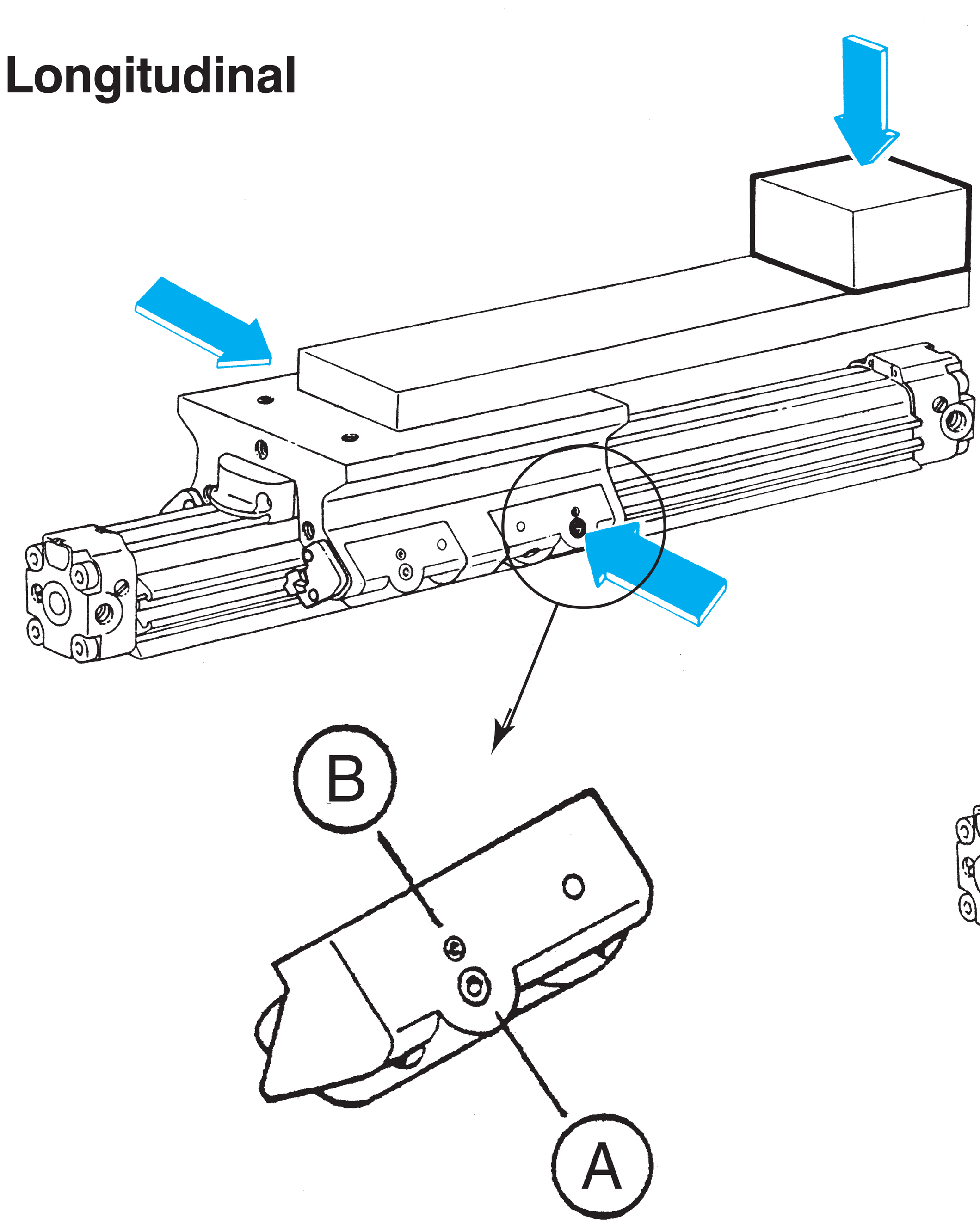
Cyl. Ø	EA	EB	EC	ED	EE	EF	EG	Mass (kg) at "0" stroke
25	114,5	136	90	50	160	164	50	3,88
32	142,5	175	115	55	191	206	67,5	5,75
40	169	205	180	75	215	243	65	11,65
50	207	258	190	80	271	316	100	20,15

The surface of the carriages is ground. It is advisable to prepare accordingly the mounting surfaces of all plates in order not to jeopardize the the correct functioning of the system.
Accessories from page 22-II.

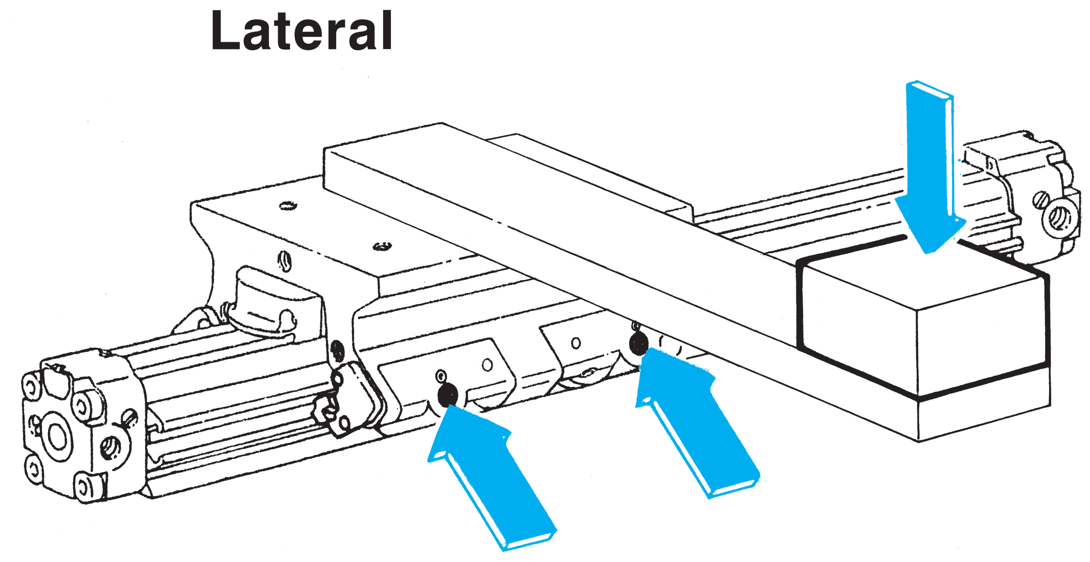
Adjustment of the carriage

In case of off-centred loads it is necessary to adjust the screws A as shown below:

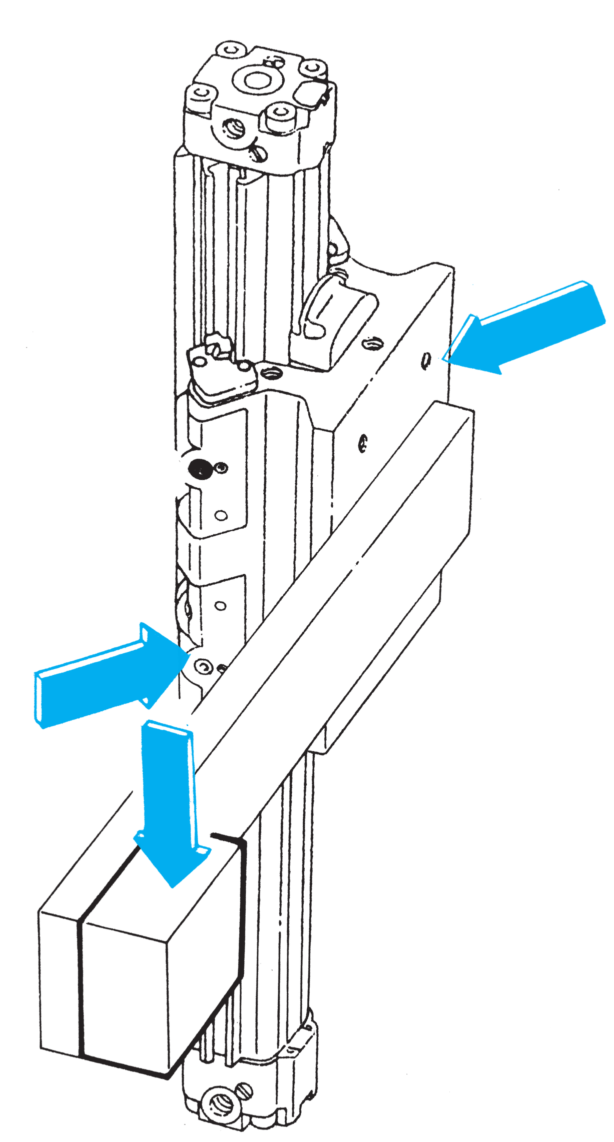
Longitudinal



Lateral



Laterally vertical



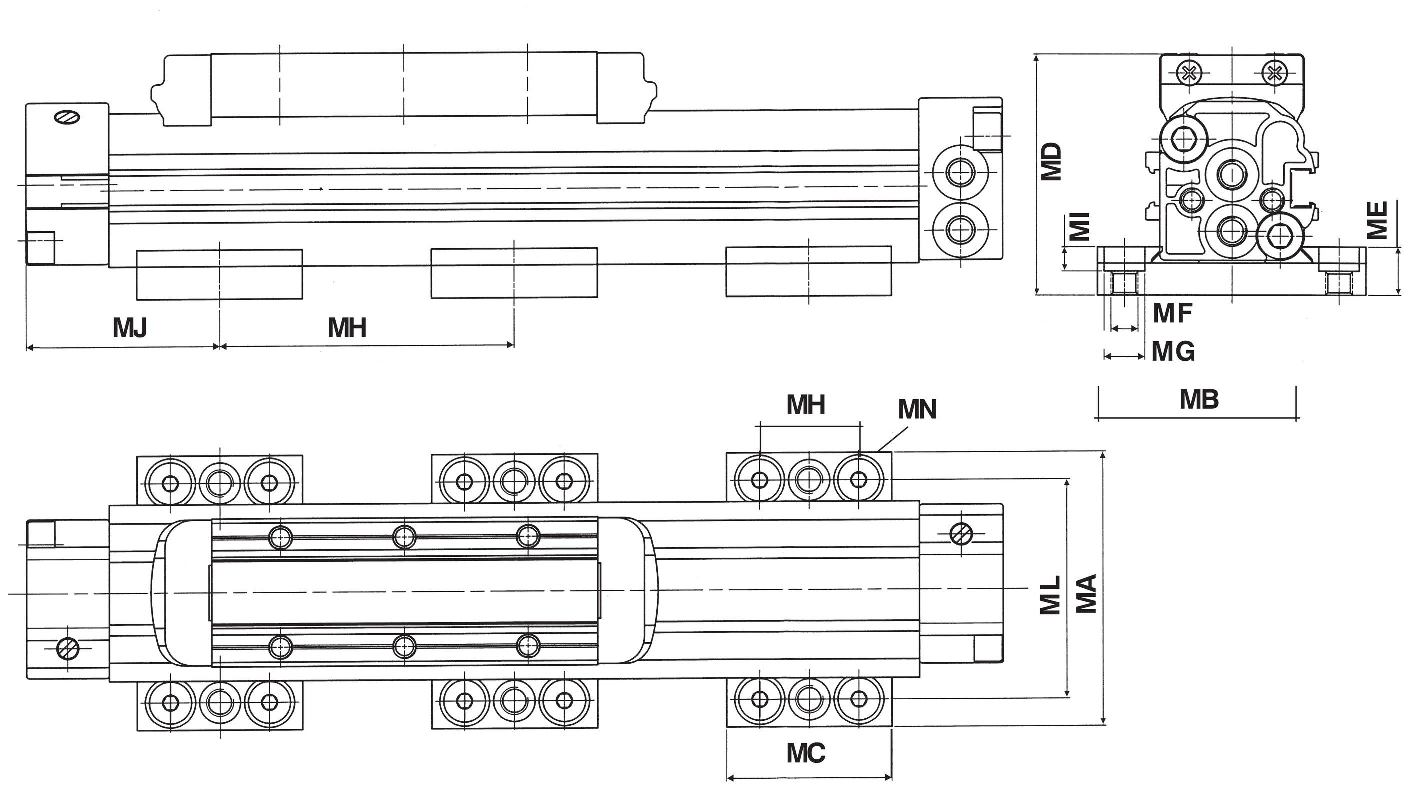
The arrows indicate the screws to be adjusted, in accordance with the position of the load P. Adjust the screw **A** by one turn or more depending on the load. Put a drop of Loctite 242 on the screw **B** and tighten it thoroughly. Finally *loosen* both screws by 90°.

High-Tech

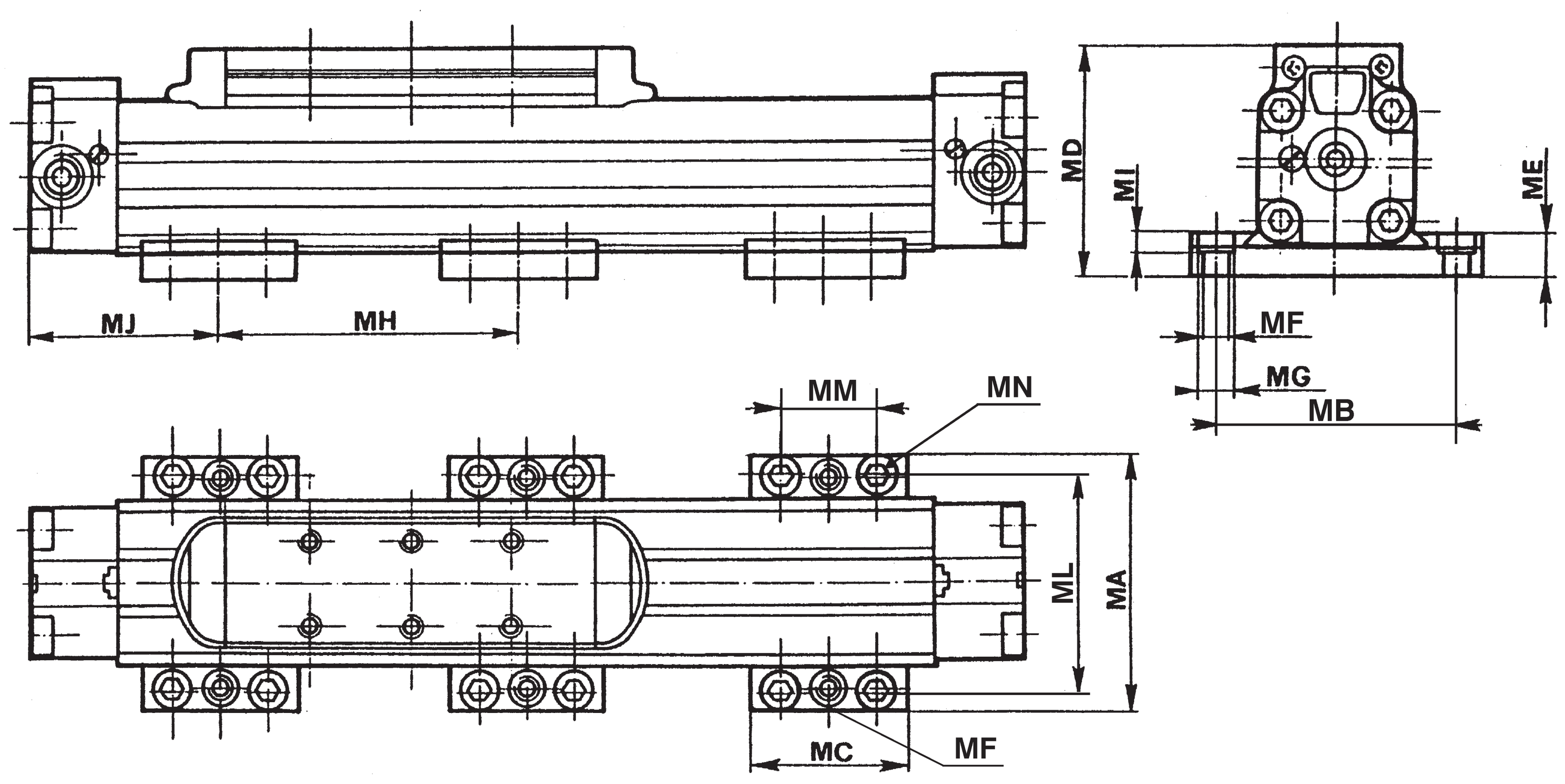
High-Tech

Mounting plate for S1 series

Ø 16 mm



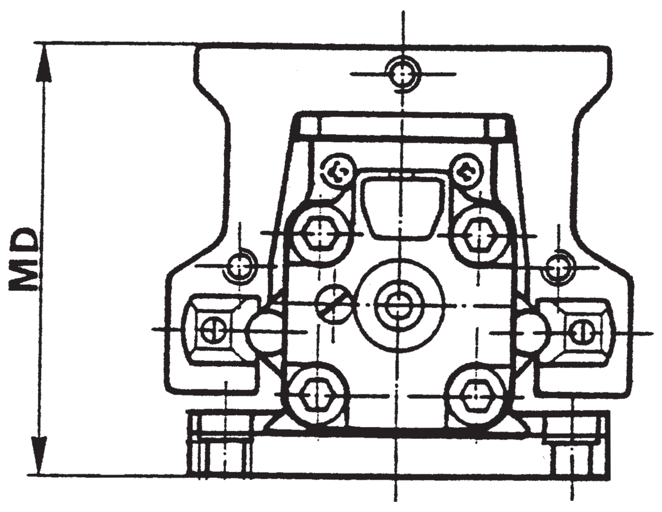
Ø 25 ÷ 50 mm



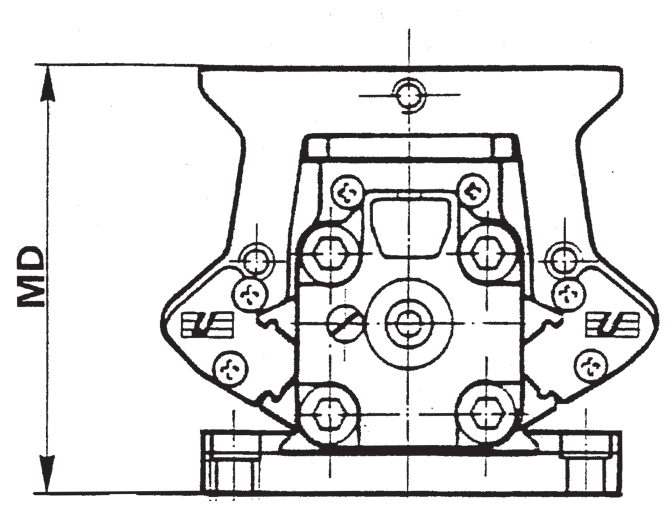
Cyl. Ø	MA	MB	MC	MD S1	MD S5	MD VL1	ME	MF	MG	MH	MI	MJ	ML*	MM	MN	Mass (kg)	Part number
16	50	40	30	44,8	-	-	9	M5	8	400 ✧	4,5	35	40	-	M6	0,083	**SF - 12016**
25	78,5	63,5	50	65,6	79,8	82,3	12	M8	11	500 ✧	6,5	55	65,5	30	M6	0,310	**SF - 12025**
32	92	77,5	50	74,2	90,5	90,5	12	M8	11	600 ✧	5,5	60	79,5	30	M6	0,340	**SF - 12032**
40	117	96	60	95,8	116,6	116	15	M10	14	700 ✧	8	70	96	37,5	M8	0,660	**SF - 12040**
50	136	115	60	113	133,7	136,2	15	M10	14	800 ✧	8	70	115	37,5	M8	0,700	**SF - 12050**

✧ Max. dimensions in order to limit the deflection of the cylinder according to the stroke and in order to ensure a correct fixing.
* For Ø 16-40-50 mm, MB and ML have the same value.

Mounting plate for S5 Series

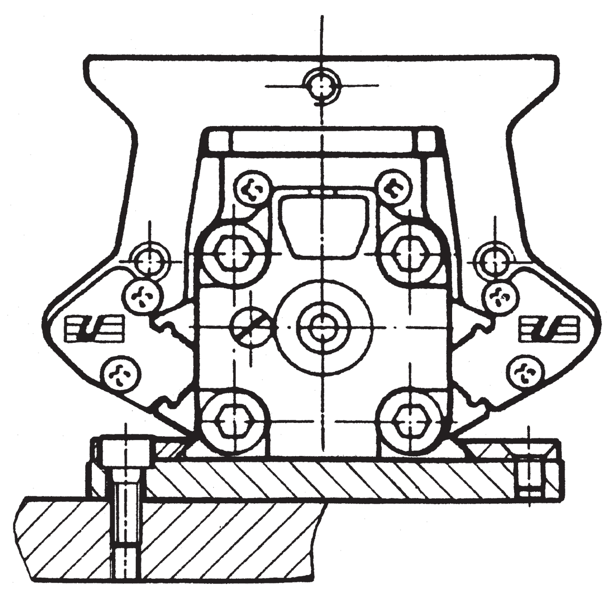


Mounting plate for VL1 Series

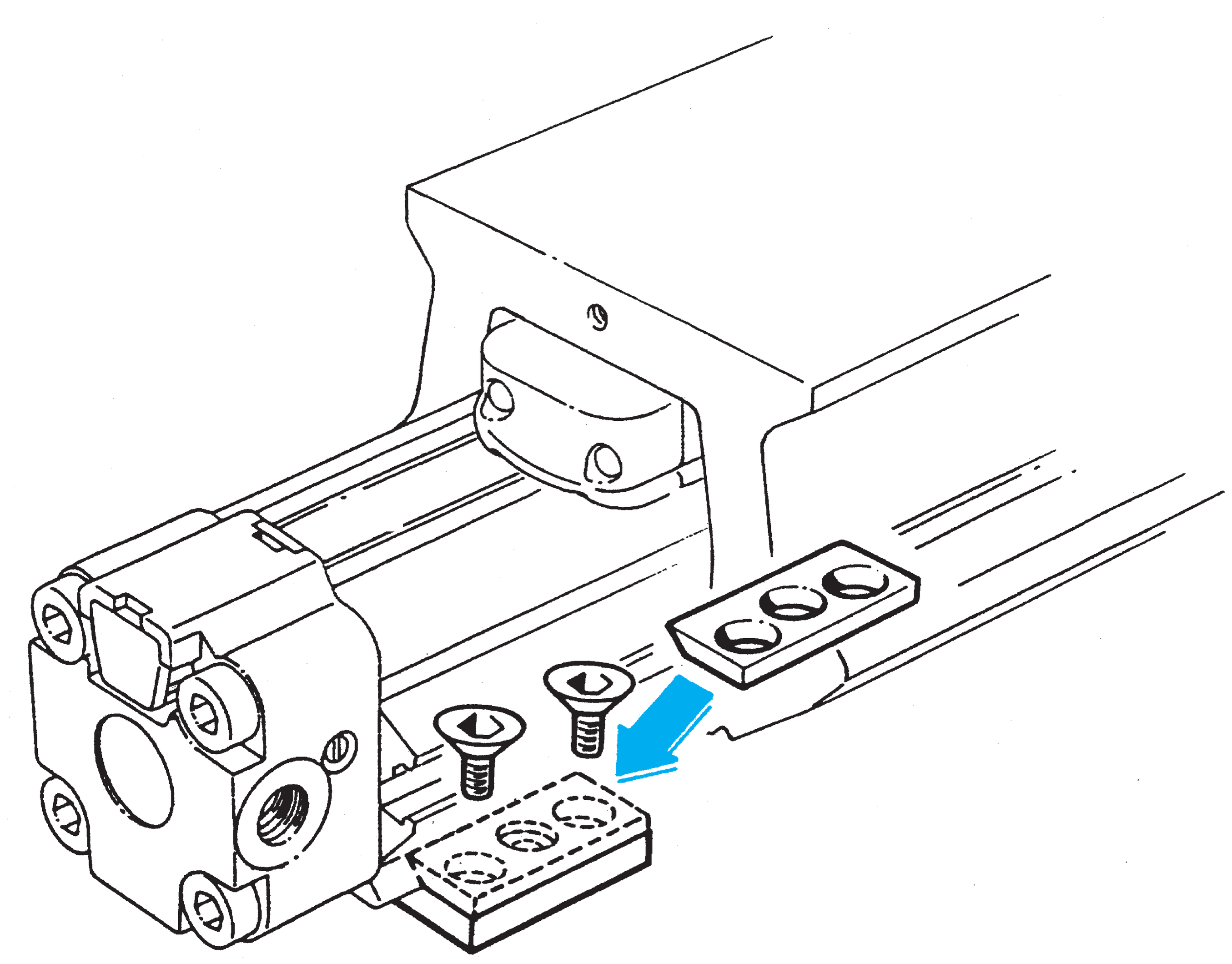


How to mount plates:
Plates are mounted by means of standard screws without disassembling any part of the cylinder (for all series).

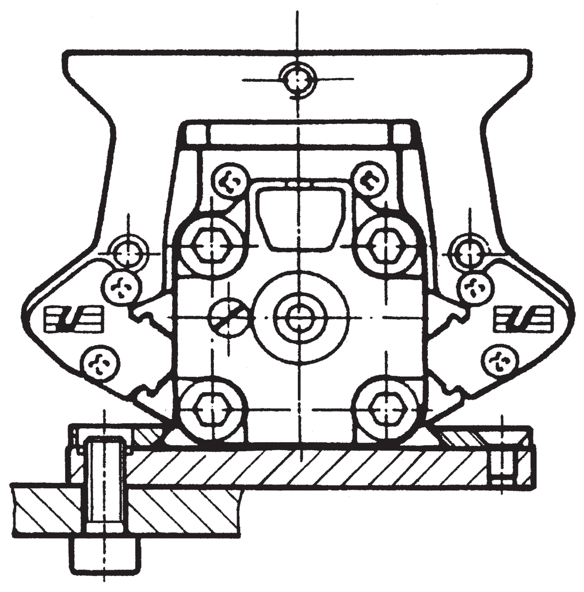
Upper mounting



Cyl. Ø	
25 - 32	M6
40 - 50	M8



Lower mounting



Cyl. Ø	
25 - 32	M8
40 - 50	M10