KALLER®

The Safer Choice

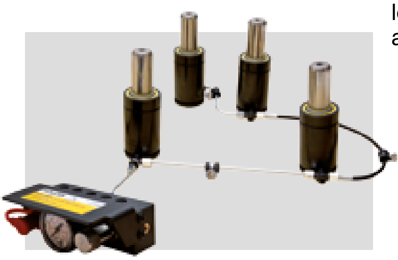
KALLER products with unique safety features

Die Separation Gas Springs - DS
Using the DS springs is an excellent way to avoid unnecessary wear of die, press and gas springs. A 70-80 % energy saving compared to using traditional springs is an additional benefit.

Hose-less Baseplate™
the increasingly popular easy-accessible alternative to the conventional manifold systems on the market.

Controllable Gas Springs - KF2
a family of gas springs for use in press tools, can be locked in their bottom position and the return stroke of the spring can be controlled.

Flex Cam®
used for piercing, cutting, forming and flanging operations. The system allows for a flexible distribution of forces with optimal direction and velocity. By using a Flex Cam, fewer tools are required in production.



The Micro EO24™ Hose and Tube
system is our most compact, soft sealed gas linking system.

Stock Lifters & Flange Strippers
used in transfer and progression dies to provide self-guiding, non-rotating and easily adjustable lifting or stripping forces.

Dual Post Lifters
can be used in progressive dies for lifting the stock when it progresses through the die.

Flex Form™
offers an excellent control system both for movement and forces. KALLER can offer a lockable return function or an adjustable slow return.

Roller Cam - RC2, RCP2
used for piercing, trimming, flanging and restriking. The Roller Cam can be mounted in both vertical and horizontal planes.

Soft-hit Striker Plate - SSP
engineered to address three of the major problems that face metal stampers:

- Excessive shock loads
- High noise levels
- Poor part quality

Edition 2016

KALLER® The Safer Choice

Edition 2016 © KALLER	Gas Spring Selection Guide
KALLER The Safer Choice	**Gas Springs & Standard Mounts** **Problem Solvers**
Special Mounts	**Mounts**
Gas Link Systems Tolerance Tables Metric Socket Head Cap Screws Hose-less Baseplate Pressure Tank	**Gas Link Systems**
Flex Cam® Roller Cam	**Piercing and Forming Units/Cams**
Controllable Gas Springs Die Separation Gas Springs Flex Form™	**Delayed Return Units**
Dual Post Lifters Stock Lifters Flange Strippers	**Lifters**
Reduce risk with The Safer Choice Save money and time with The Safer Choice	**KALLER – The Safer Choice**

GAS SPRING SELECTION GUIDE 2016

Series	Description	Gas spring model	Available stroke lengths (mm)	Initial force at max. pressure (N)	Initial force at max. pressure (lbf)	Total length (mm)	Cylinder diameter (mm)
EP2 24 EPS2 24 EP3 16	Color coded gas Ejector-Pins, interchangeable with mechanical spring plungers	EP3 16	10 - 125	420	95	45 + (2 x Stroke)	M16x1.5/M16x2
		EP2 24	10 - 125	1,700	380	45 + (2 x Stroke)	M24x1.5
		EPS2 24	10 - 125	1,700	380	45 + (2 x Stroke)	M24x1.5
R12 R15 R19	Rod sealed and color coded gas springs – compact and fully adjustable	R12	7 - 125	500	110	56 - 295	Ø 12
		R15	7 - 125	700	160	56 - 295	Ø 15
		R19	7 - 125	900	200	56 - 295	Ø 19
M2 MM2 MC3 MC3-SP	Repairable, color coded and fully adjustable gas springs available with or without threaded cylinders	M2	10 - 125	2,000	450	62 - 295	Ø 25
		MM2	10 - 125	2,000	450	42 + (2 x Stroke)	M28x1.5
		MC3	10 - 125	2,000	450	50 + (2 x Stroke)	Ø 32
		MC3-SP	10 - 125	2,000	450	50 + (2 x Stroke)	Ø 32
CU4	Super compact gas springs provide extreme forces with minimal cylinder diameters	CU4 420	6 - 50	4,250	960	56 - 195	Ø 25
		CU4 740	6 - 50	7,400	1,660	63 - 195	Ø 32
		CU4 1000	6 - 50	10,600	2,380	61 - 230	Ø 38
		CU4 1800	6 - 65	18,000	4,045	66 - 271	Ø 50
		CU4 2900	10 - 65	29,500	6,630	85 - 256	Ø 63
		CU4 4700	10 - 65	47,000	10,570	80 - 273	Ø 75
		CU4 7500	10 - 65	75,000	16,860	90 - 279	Ø 95
		CU4 11800	10 - 65	118,000	26,530	100 - 320	Ø 120
		CU4 18300	10 - 65	183,000	41,140	110 - 223	Ø 150
CX	Compact Xtreme CX gas springs provide extreme forces and allow for higher pressures	CX 500	10 - 80	5,100	1,150	75-145	Ø 32
		CX 1000	10 - 80	9,800	2,200	75-240	Ø 38
		CX 1900	10 - 80	19,200	4,320	80-245	Ø 50
X	The world's shortest, strongest and most advanced rod sealed gas springs	X 170	7 - 125	1,700	380	44 - 285	Ø 19
		X 320	7 - 125	3,200	720	44 - 285	Ø 25
		X 350	10 - 125	3,600	810	30 + (2 x Stroke)	Ø 32
		X 500	10 - 125	4,700	1,055	30 + (2 x Stroke)	Ø 38
		X 750	10 - 125	7,400	1,665	32 + (2 x Stroke)	Ø 45
		X 1000	13 - 125	9,200	2,070	38 + (2 x Stroke)	Ø 50
		X 1500	13 - 125	15,000	3,375	44 + (2 x Stroke)	Ø 63
		X 2400	16 - 125	24,000	5,400	45 + (2 x Stroke)	Ø 75
		X 4200	16 - 125	42,000	9,440	58 + (2 x Stroke)	Ø 95
		X 6600	16 - 125	66,300	14,905	68 + (2 x Stroke)	Ø 120
		X 9500	19 - 125	95,000	21,400	78 + (2 x Stroke)	Ø 150
		X 20000	19 - 125	200,000	45,000	110+ (2 x Stroke)	Ø 195
XG	The Power Line XG series is based on the X series with the same features but additional total length providing a larger G 1/8" charge port and longer bottom threads.	XG 350	10 - 125	3,600	1,663	40 + (2 x Stroke)	Ø 32
		XG 500	10 - 125	4,700	2,075	40 + (2 x Stroke)	Ø 38
		XG 750	10 - 125	7,400	3,372	47 + (2 x Stroke)	Ø 45
		XG 1000	13 - 125	9,200	5,400	52 + (2 x Stroke)	Ø 50
		XG 1500	13 - 125	15,000	9,450	52 + (2 x Stroke)	Ø 63
		XG 2400	16 - 125	24,000	14,925	59 + (2 x Stroke)	Ø 75
		XG 4200	16 - 125	42,000	21,400	62 + (2 x Stroke)	Ø 95
		XG 6600	16 - 125	66,300	44,961	72 + (2 x Stroke)	Ø 120

Series	Description	Gas spring model	Available stroke lengths (mm)	Initial force at max. pressure (N)	(lbf)	Total length (mm)	Cylinder diameter (mm)
TX	The Power Line Heavy Duty series, a crossover between the standard TU series and the Power Line X series. Total length same as TU, force same as X.	TX 750	13 - 200	7,400	1,663	85 + (2 x Stroke)	Ø 45
		TX 1000	13 - 300	9,200	2,075	95 + (2 x Stroke)	Ø 50
		TX 1500	13 - 300	15,000	3,372	95 + (2 x Stroke)	Ø 63
		TX 2400	25 - 300	24,000	5,400	110 + (2 x Stroke)	Ø 75
		TX 4200	25 - 300	42,000	9,450	120 + (2 x Stroke)	Ø 95
		TX 6600	25 - 300	66,300	14,925	140 + (2 x Stroke)	Ø 120
		TX 9500	25 - 300	95,000	21,400	155 + (2 x Stroke)	Ø 150
		TX 20000	25 - 300	200,000	44,961	160 + 2 x Stroke)	Ø 195
TL	The TL gas spring is shorter than the corresponding TU by 25 mm, except TL 5000 and TL 7500, which are 37.5 and 50 mm shorter respectively	TL 750	12.5 - 250	7,400	1,665	70 + (2 x Stroke)	Ø 50
		TL 1500	12.5 - 250	15,000	3,375	85 + (2 x Stroke)	Ø 75
		TL 3000	12.5 - 250	30,000	6,740	95 + (2 x Stroke)	Ø 95
		TL 5000	25 - 250	50,000	11,240	102,5 + (2 x Stroke)	Ø 120
		TL 7500	25 - 250	75,000	16,860	105 + (2 x Stroke)	Ø 150
TU	The TU gas springs' dimensions are the basis of the ISO 11901 standard for gas springs as well as the Ford WDX and GM gas spring standards	TU 250	10 - 125	2,650	790	50 + (2 x Stroke)	Ø 38
		TU 500	10 - 160	4,700	1,055	85 + (2 x Stroke)	Ø 45
		TU 750	12.7 - 300	7,400	1,665	95 + (2 x Stroke)	Ø 50
		TU 1500	25 - 300	15,000	3,375	110 + (2 x Stroke)	Ø 75
		TU 3000	25 - 300	30,000	6,740	120 + (2 x Stroke)	Ø 95
		TU 5000	25 - 300	50,000	11,240	140 + (2 x Stroke)	Ø 120
		TU 7500	25 - 300	75,000	16,860	155 + (2 x Stroke)	Ø 150
		TU 10000	25 - 300	106,000	23,830	160 + (2 x Stroke)	Ø 195
TUS	The High Speed gas springs (TUS) have been engineered to withstand press stroke speeds to a maximum of 2 m/s.	TUS 750	25 - 300	7,400	1,665	95 + (2 x Stroke)	Ø 50
		TUS 1500	25 - 300	15,000	3,375	110 + (2 x Stroke)	Ø 75
		TUS 3000	25 - 300	30,000	6,740	120 + (2 x Stroke)	Ø 95
		TUS 5000	25 - 300	50,000	11,240	140 + (2 x Stroke)	Ø 120
		TUS 7500	25 - 300	75,000	16,860	155 + (2 x Stroke)	Ø 150
LCF	These innovative Low Contact Force gas spring are 100% interchangeable with ISO gas springs (i.e. KALLER TU series) and reduce shock loads, noise levels and pad bounce problems	LCF 750	12.7 - 300	7,400	1,665	95 + (2 x Stroke)	Ø 50
		LCF 1500	25 - 300	15,000	3,375	110 + (2 x Stroke)	Ø 75
		LCF 3000	25 - 300	30,000	6,740	120 + (2 x Stroke)	Ø 95
		LCF 5000	25 - 300	50,000	11,240	140 + (2 x Stroke)	Ø 120
		LCF 7500	25 - 300	75,000	16,860	155 + (2 x Stroke)	Ø 150
SPC	Speed Control™ reduce or eliminate blank holder bounce; commonly associated with increased return stroke speeds from new generation of presses	SPC 750	80 - 300	7,400	1,665	110 + (2 x Stroke)	Ø 75
		SPC 1500	125 - 300	15,000	3,375	120 + (2 x Stroke)	Ø 95
		SPC 3000	125 - 300	30,000	6,750	140 + (2 x Stroke)	Ø 120
		SPC 5000	125 - 300	50,000	11,250	155 + (2 x Stroke)	Ø 150
MT	Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used up to 120°C	MT 16	10 - 80	420	95	48 + (2 x Stroke)	M16x1.5
		MT 24	10 - 80	1,700	380	48 + (2 x Stroke)	M24x1.5
		MT 300	10 - 80	3,000	675	30 + (2 x Stroke)	Ø 32
		MT 500	10 - 80	4,700	1,055	30 + (2 x Stroke)	Ø 38
		MT 750	10 - 80	7,440	1,665	32 + (2 x Stroke)	Ø 45
		MT 1000	13 - 80	9,200	2,070	38 + (2 x Stroke)	Ø 50

Note: **1" = 25.4 mm** **1 daN ≈ 1 kgf** **1 daN ≈ 2.25 lbf** **1 bar = 14.5 psi**

KALLER Limited Warranty

The warranties contained herein supersede all other warranties, expressed or implied, including those concerning the merchantability or suitability for a specific use or performance of the gas spring including its components.

The warranty period for replacement and or repaired gas springs shall not exceed the warranty period of the original defective gas spring. The warranty does not apply to any gas spring which has been damaged or misused or repaired by anyone other than KALLER or its authorized representatives, or to any gas spring that has been altered by anyone other than KALLER or its authorized representatives.

The customer shall notify KALLER of all information pertaining to the defective gas spring including but not limited to serial number and date of installation so that KALLER may determine the number of strokes incurred by the gas spring alleged to be defective. The customer shall be responsible for freight charges incurred in connection with the repair and/or replacement of any gas spring found to be defective.

KALLER is not liable for injury, property damage, or other loss related to the inability to use the gas spring or failure of the gas spring, nor is KALLER liable for any costs incurred relating to the removal and/or replacement of the gas spring. In no event is KALLER's liability to exceed the selling price of the gas spring. This warranty is void with respect to any gas spring damaged as a result of misuse, alteration, accident or neglect; failure to follow operating, maintenance and environmental instructions; repair by anyone other than KALLER, its authorized representatives or trained service technicians acting in accordance with KALLER's service instructions and using components and supplies specified by KALLER.

Product Series
Gas Springs

KALLER®
The Safer Choice

Gas Springs & Standard Mounts

Edition 15.2016

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All available information at www.kaller.com.

Gas Spring - contents

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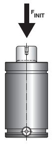
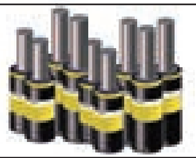
Initial force N 	Cylinder diameter mm 	Models 	
$F_{INIT} < 2,500$	Ø 12 Ø 32	EP3 16, EP2 24, EPS2 24 R12, R15, R19 M2, MM2, MC3, MC3-SP X 170 MT 16, MT 24	2
$2,500 \leq F_{INIT} < 5,000$	Ø 25 Ø 38	CU4 420 X 320, X 350, XG 350 TU 250, TM 250, TI 250, TMS 250 MT 300	3
$5,000 \leq F_{INIT} < 7,500$	Ø 38 Ø 45	CU4 740 CX 500, X 500, XG 500 K 500 TU 500 MT 500	4
$7,500 \leq F_{INIT} < 10,000$	Ø 45 Ø 75	X 750, XG 750, TL 750, TX 750 K 750, TU 750, TUS 750, LCF 750, SPC 750 MT 750	5
$10,000 \leq F_{INIT} < 25,000$	Ø 38 Ø 95	CU4 1000, CU4 1800, CX 1000, CX 1900 X 1000, XMS 1000, XG 1000, TX 1000, TL 1500, X 1500, XG 1500, TX 1500 X 2400, XG 2400, TX 2400 K 1500, TU 1500, TUS 1500, LCF 1500, SPC 1500 MT 1000	6
$25,000 \leq F_{INIT} < 50,000$	Ø 75 Ø 120	CU4 2900, CU4 4700 X 4200, XG 4200, TX 4200 TL 3000, TU 3000, TUS 3000, LCF 3000 SPC 3000	7
$50,000 \leq F_{INIT} < 75,000$	Ø 120 Ø 150	X 6600, XG 6600, TX 6600 TL 5000, TU 5000, TUS 5000, LCF 5000 SPC 5000	8
$75,000 \leq F_{INIT} < 100,000$	Ø 95 Ø 150	CU4 7500 X 9500, TX 9500 TL 7500, TU 7500, TUS 7500, LCF 7500	9
$F_{INIT} \geq 100,000$	Ø 120 Ø 195	CU4 11800, CU4 18300 TU 10000, TUR 10000 X 20000, TX 20000	10

Notes

GENERAL

KALLER gas springs are designed to meet customer expectations for reliability, safety and service lifetime. The design, manufacture and testing of KALLER gas springs has been approved according to the European Pressure Equipment Directive (97/23/EC).

APPROVED PED 97/23/EC
2 million

The Pressure Equipment Directive (PED) replaces all previous European legislation governing the design, manufacture and testing of pressure vessels. Manufacturing relies on the very latest production methods and equipment at our modern facilities in Tranås, Sweden.
Strömsholmen AB, the designers and manufacturers of KALLER gas springs, has been ISO 9001 approved since 1994 and ISO 9000:2000 and PED (97/23/EC) approved since 2002. The company is the world's premiere and leading manufacturer of nitrogen gas springs for the metal stamping industry.

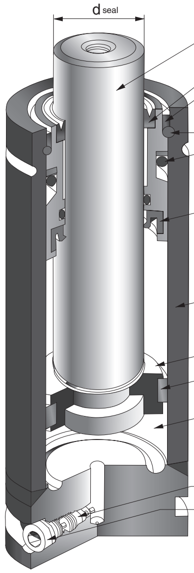
KALLER Worldwide Guarantee

Strömsholmen AB, which develops, manufactures and markets KALLER gas springs, guarantees that each gas spring manufactured by Strömsholmen AB is free of defects in materials and workmanship. The KALLER Worldwide Guarantee applies to gas springs used for 2,000,000 strokes from 0 mm to 80 mm per stroke or 1,000,000 strokes above 80 mm per stroke* or two years from the date of purchase, whichever occurs first. The KALLER Worldwide Guarantee only applies to gas springs used in accordance with the KALLER gas springs installation and usage guidelines. Strömsholmen AB's liability is limited solely to the authorized repair or replacement of any gas spring that is returned to Strömsholmen AB and is reasonably determined by Strömsholmen AB to be found defective. KALLER Limited Warranty details are available upon request.

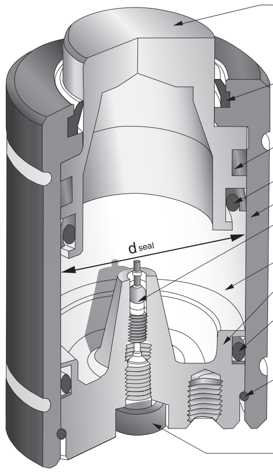
*Exceptions include gas springs with initial force less than 5 kN, MT and Controllable gas springs which are guaranteed for a maximum of 500,000 strokes or 50,000 stroke meters, whichever occurs first.

Main groups of gas springs

KALLER gas springs can be divided into two main groups, namely Piston Rod Sealed and Bore Sealed. The two basic designs are depicted below:



Piston Rod Sealed gas spring



Bore Sealed gas spring

Overview of models
The following is an overview of our Tool & Die family of gas springs:

EP Series:
Non-repairable. These Ejector Pin gas springs are color coded and fully adjustable with either an M16 or M24 threaded body.

Forces:	40 N to 1,700 N 9 lbf to 382 lbf
Stroke lengths:	10 mm to 125 mm
Max. strokes/min.:	~100 (at 20°C)

R Series:
Non-repairable, color coded and fully adjustable gas springs with Ø12, Ø15 and Ø19 mm outer body diameters.

Forces:	60 N to 900 N 13 lbf – 202 lbf
Stroke lengths:	7 mm to 125 mm
Max. strokes/min.:	~100 – 150 (at 20°C)

Mini Series:
Color coded and fully adjustable gas springs with Ø25, Ø32 and M28×1.5 small outer body diameters.

Forces:	280 N to 2,000 N 63 lbf to 450 lbf
Stroke lengths:	10 mm to 125 mm
Max. strokes/min.:	~80 – 100 (at 20°C)

CU4 Series:
These Super Compact gas springs are bore sealed, providing a high amount of force while having small outer body diameters.

Forces:	4,250 N to 183,000 N 950 lbf to 41,140 lbf
Stroke lengths:	6 mm to 65 mm
Max. strokes/min.:	~100 (at 20°C)

CX Series:
Extremely compact and powerful piston rod sealed gas spring series, handle higher running frequencies (SPM) compared to similar gas springs

Forces:	4,100 N to 92,200 N 1,150 lbf to 4,320 lbf
Stroke lengths:	10 mm to 80 mm
Max. strokes/min.:	~70-200 (at 20°C)

Power Line – XG Series:
Our short and most powerful Rod Sealed gas springs offer a great deal of force in a very compact body.

Forces:	3,600 N to 66,300 N 810 lbf to 14,905 lbf
Stroke lengths:	10 mm to 125 mm
Max. strokes/min.	~15 – 100 (at 20°C)
Max. strokes/min.	~15-100 (at 20°C)

Power Line – X Series:
A short and strong Rod Sealed gas spring with tapped base mounting holes and side charging port for hose system connection.

Forces:	1,700 N to 200,000 N 382 lbf to 44,960 lbf
Stroke lengths:	7 mm to 125 mm
Max. strokes/min.	~15 – 100 (at 20°C)

Power Line – TX Series:
A crossover between our standard TU Series and our Power Line X Series.

Forces:	7,400 N to 200,000 N 1,574 lbf to 44,960 lbf
Stroke lengths:	13 mm to 300 mm
Max. strokes/min.	~15 – 100 (at 20°C)

TL Series:
KALLER's TL Series ranges from model sizes 750 to 7500, with the same features and technology as the TU Series.

Forces:	7,400 N to 75,000 N 1,665 lbf to 16,860 lbf
Stroke lengths:	25 mm to 300 mm
Max. strokes/min.:	~15 – 40 (at 20°C)

TU Series:
KALLER's standard series and the world's first gas spring range. Dimensions conform to the ISO 11901 gas spring standard.

Forces:	2,650 N to 100,000 N 600 lbf to 23,830 lbf
Stroke lengths:	10 mm to 300 mm
Max. strokes/min.:	~15 – 40 (at 20°C)

TUS Series:
KALLER's TUS Series was designed for increasing press speeds. Dimensions conform to the ISO 11901 gas spring standard.

Forces:	7,500 N to 75,000 N 1,665 lbf to 16,860 lbf
Stroke lengths:	25 mm to 300 mm
Max. strokes/min.:	~15 – 40 (at 20°C)

K Series:
Short height version of the TU Series with tapped base mounting holes and side charging port for hose system connection.

Forces:	5,000 N to 15,000 N 1,124 lbf to 3,372 lbf
Stroke lengths:	6 mm to 125 mm
Max. strokes/min.	~30 (at 20°C)

MT Series
Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used in temperatures up to 120°C.

Forces:	420 N to 10,000 N 94 lbf to 2,090 lbf
Stroke lengths:	10 mm to 80 mm
Max. strokes/min.:	~20 (up to 80°C)

LCF (Low Contact Force) gas spring information

The LCF Series makes up the future generation of nitrogen gas springs. This innovative gas spring series is engineered to address the major problems facing metal stampers today: excessive shock loads, high noise levels and extreme pad/blank-holder bounce, all factors that lead to high press maintenance costs and noise pollution. The LCF series reduces shock loads by as much as 50 % compared to standard gas springs. They deliver a gradual force build-up and smooth acceleration so there's less impact on gears and bearings and less wear on drive components.
The payoff is reduced press maintenance.

The LCF Series lowers noise levels significantly, with a higher reduction in sound pressure level compared to standard gas springs. Its lesser impact force results in these lower noise levels and makes these springs a cost effective alternative to erecting noise enclosures.
The payoff is a quieter, safer and healthier working environment.

The LCF Series decreases pad/blank-holder bounce, allowing improved part transfer efficiency, increased production rates and reduced scrap. A gradual force increase and return result in smoother pad/blank-holder operation.
The payoff is higher production rates.

Because LCF gas springs mount directly to the die and are independent from the press, all benefits travel with the tool.
Standard features:

- 100 % interchangeable with standard ISO gas springs (i.e. our TU Series)
- Retrofits in existing dies
- Charged and rebuilt like standard gas springs
- Drop-in, flange mount, or base plate mounting
- Can be hosed together
- Can be incorporated into press cushions

Speed Control™ – SPC gas spring information

Speed Control™ gas springs have been designed to reduce or eliminate blank holder bounce and are the latest addition to our range of problem-solving Kaller products.

Speed Control™ gas springs work by slowing down the speed at which the blank holder travels just before it reaches its start position.
This is achieved by damping the Speed Control's piston rod return speed to 0.4 m/s during the last 30 mm of piston rod travel.

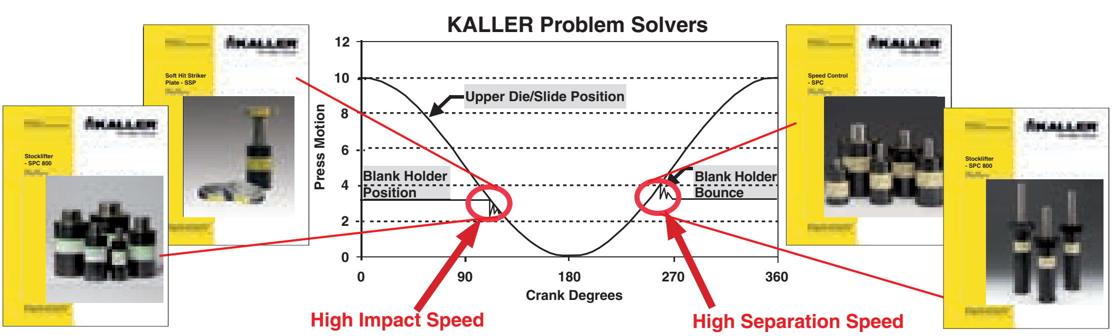
Blank holder bounce often occurs as a result of an excessive press stroke return speed, commonly associated with special link-drive presses.

The height of the blank holder lift depends on the speed that the blank holder is traveling at when its supporting gas springs reach their fully extended positions. At this point, the inertia of the blank holder causes it to lift up from its supporting gas springs.

If we assume that at this separation point the only force acting on the blank holder is gravity, then we can calculate the theoretical height the blank holder will lift, at various separation speeds:

Separation speed [m/s]	Theoretical lift [mm]
0.5	13
0.8	33
1.0	50
1.6	130

In reality, however, there are other factors that affect the blank holder causing these theoretical lift heights to either increase or decrease.



USER INFORMATION

Mounting instructions

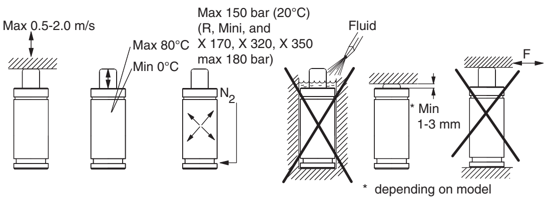
To achieve the best possible service life and safety from the gas spring, the following instructions must be followed. The gas spring is intended for use in tool and machine applications.

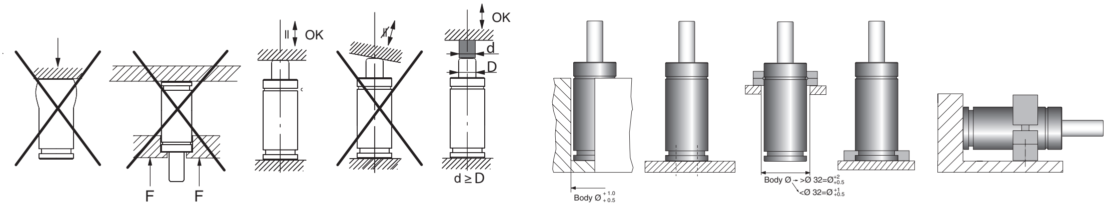
- Secure the gas spring to the tool/machine whenever possible, using the threaded hole(s) in the base of the gas spring or a suitable flange.
- Do not use the threaded hole in the piston rod top for mounting purposes. It is only to be used when servicing the gas spring.
- Do not use the gas spring in such a way that the piston rod is released freely from its compressed position, as this could cause internal damage to the gas spring.
- Depending on the model, the maximum allowed stroke speed is from 0.5 to 2.0 m/s (see catalogue).
- Make sure the gas spring is mounted parallel to the direction of the compression stroke.
- Ensure the contact surface of the piston rod top is perpendicular to the direction of the compression stroke and is sufficiently hardened.
- Do not subject the gas spring to side loads.
- Protect the piston rod against mechanical damage and contact with fluids.
- Ensure the entire contact surface of the piston rod/piston is used.

Mounting of gas springs

When mounting the gas spring in the tool/machine, certain specifications must be adhered to in order to assure that the mount/flange does not come loose:

- Screws must have a free length (clamping length) of 2 to 4 × the thread diameter and a thread depth of at least 1 × the thread diameter in steel and 1.5 × the thread diameter in cast iron.
- If the free length cannot be achieved in any other way, the screw holes must be countersunk.
- Always use a torque wrench to tighten to the correct torque.
- Make sure the bottom of the spring is always supported.
- Only use mounts manufactured or approved by KALLER.





CAUTION!
Do not modify the product in any way. For more information, please contact Strömsholmen (www.kaller.com) or your local KALLER distributor.

Mounting screws

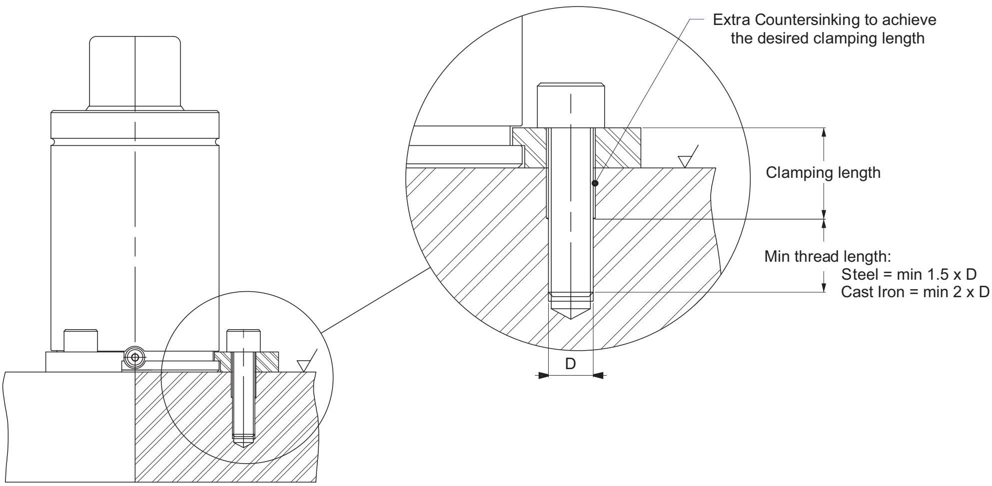
When mounting the gas spring directly to the tool or via a flange mount, it is important to observe the following recommendations in order to prevent the gas spring or its mounting accessories from working loose into the tool.

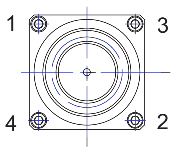
Recommendations:

Screws should have a free length (clamping length) of 2 to 4 times their thread diameter and a thread depth of at least 1.5 times their thread diameter in steel and 2 times their thread diameter in cast iron If the free length cannot be achieved in any other way, the screw holes should be countersunk (see below). Please note that the specifications in automative standards may differ. Always use a torque wrench to apply the appropriate torque for the class of screws used.

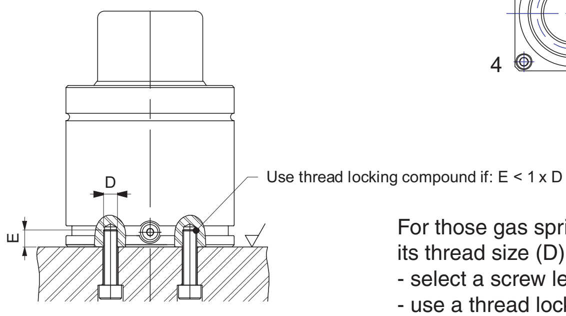
Thread	**Torque (for screw class 8.8 according to ISO 898-1)**
M6	10 Nm
M8	24 Nm
M10	45 Nm
M12	80 Nm
M16	160-200 Nm

For all types of flange mounting using mounting screws:





When tightening the mounting screws in the tool, apply an evenly cross like pattern according to the picture (1-2-3-4). Otherwise there is a risk for the mount to tilt.



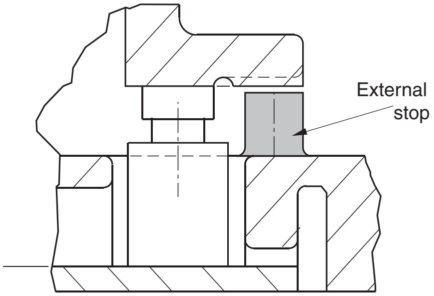
For example: X 2400

For those gas springs whose thread depth (E) is less than 1 times its thread size (D) we recommend the following:

- select a screw length to engage all available thread depth
- use a thread locking compound (middle strength or higher)
- ensure the correct screw torque setting is applied

Stroke length

The nominal stroke (defined as S in the catalog tables) that may be utilized fully in all KALLER gas springs. However, in normal operation the recommendation is not to use the full stroke length. This is to prevent the spring from being "over-stroked" as a result of changes to the tool or mishaps in the tool.
An external stop for the tool is recommended.
We do not recommend utilizing the last 5 mm or 10 % of the nominal stroke length.



Maximum charging pressure

The maximum charging pressure (at 20°C) stated for the different gas springs should not be exceeded as it may affect the safety of the product.

Operating temperature

Exceeding the gas spring's recommended max. operating temperature will shorten the service life of the gas spring.

Recommended maximum strokes/ minute

The values given for each gas spring in the catalog apply for "normal" press tool applications. The lower limits given apply to the longer stroke lengths, while the higher values apply to short stroke springs. These values are based on a fully utilized stroke. If only a portion of the stroke is used, the number of strokes per minute can be increased.
For further information, please contact your local distributor.

Maximum piston rod velocity

The maximum piston rod velocity is not to be exceeded because it may infringe on safety and can affect gas spring performance.

Service interval

If correctly installed and used, the following minimum service interval of the KALLER gas springs, except model MT, is recommended.

Stroke lengths up to and including 50 mm:
after 1 million strokes.
Stroke lengths above 50 mm:
after 100,000 stroke meters.

The number of stroke meters is calculated as:
Used stroke (in meters) × 2 × number of strokes.

Service information

All KALLER gas springs can be serviced except the following models: EP3 16, EP2 24, EPS2 24, R12, R15, R19, CU4 420, X 170, X 320, X 2400-16 and MT 16, MT 24 Series.

Repair Kits and Tool Kits are available for all other models. Service instructions are included in the Repair Kits.

Caution! Only specially trained personnel with thorough knowledge about the products should perform maintenance. Mistakes made during assembly and charging may infringe on safety and/or have a detrimental effect on the service life of the product.

Your local distributor can help you with training. (Instructional service videos on CD-ROM and DVD are also available.)

CAD files

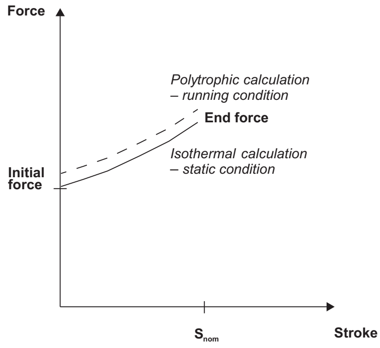
To make it easier for tool designers to design with our gas springs, KALLER products are available as both 2D and 3D CAD files/models. These are available for download on our web site (www.kaller.com) or can be ordered from your local distributor on CD.

Force calculations

All end forces, stated in the catalog are the isothermal end forces.

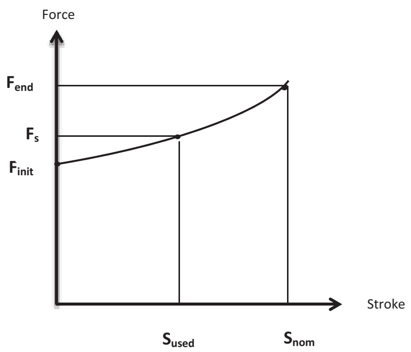
For normal use, the isothermal calculation is sufficient. Only for special requirements should a polytrophic calculation be considered, to be decided case by case.

For more detailed information, please consult our *KALLER Basic Gas spring Theory* brochure.



Isothermal force increase

When calculating the force at any position of the stroke the following equation can be used:



$$F_s = F_{init} \bullet \left[\frac{S_{nom}}{S_{nom} - S_{used} \bullet \left[1 - \frac{F_{init}}{F_{end}} \right]} \right]$$

F_{init}	= Initial force
F_{end}	= End force at nom.stroke
S_{nom}	= Nom. stroke length (mm)
S_{used}	= Used stroke length (mm)

Example:
What is the spring force of a TU 1500-100 when compressing the spring 80 mm at a normal charging pressure of 150 bar?

The table for the TU 1500 (see page 2.6/24) will give the following values:

F_{init}	= 15,000 N
S_{nom}	= 100 mm
F_{init}	= 15,000 N
F_{end}	= 23,000 N

$$F_s = 15{,}000 \bullet \left[\frac{100}{100 - 80 \bullet \left[1 - \frac{15{,}000}{23{,}000} \right]} \right]$$

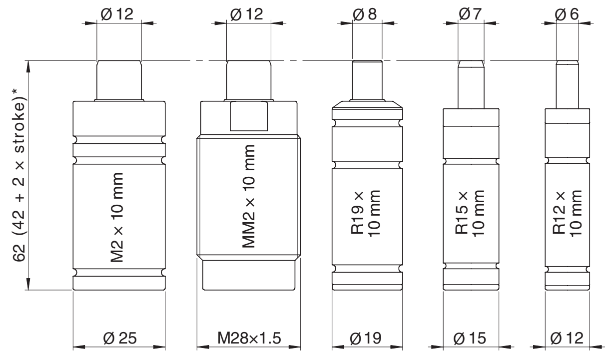
F_s (80 mm) = 20,800 N

If the temperature of the gas spring is kept constant, (isothermal process), the spring will give a force of 20,800 N when compressed 80 mm.

Polytrophic force increase

For most applications the temperature inside the gas spring will not stay constant during the stroke. Therefore the real force is different from application to application depending on:

Stroke length and used stroke, gas volume, press velocity and strokes per minute (SPM), operating temperature and environment, internal frictions etc.



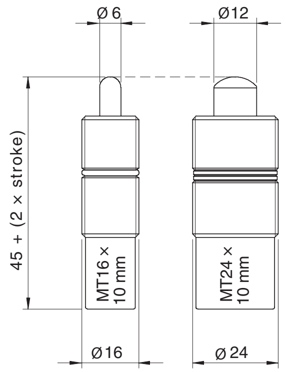
Initial force 280 - 2,000 N 63 - 450 lbf

Initial force 280 - 2,000 N 63 - 450 lbf

Initial force 125 - 900 N 67 - 202 lbf

Initial force 80 - 700 N 18 - 160 lbf

Initial force 60 - 500 N 13 - 112 lbf



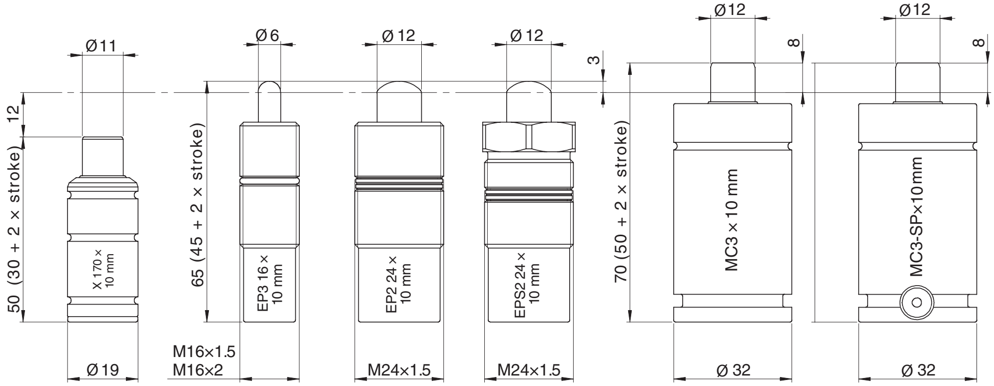
Initial force (at 20° C) 330 - 420 N 74 - 95 lbf

Initial force (at 20° C) 1,300 - 1,700 N 292 - 382 lbf

* Total length for M2 stroke length 63.5 mm and longer is 45 + (2×Stroke)

* Total length for R12, R15 and R19 stroke length 63.5 mm and longer is 45 + (2×Stroke)

* Total length for X 170 stroke length 75 mm and longer is 35 + (2×Stroke)



Initial force 1,700 N 382 lbf

Initial force 40 - 420 N 9 - 95 lbf

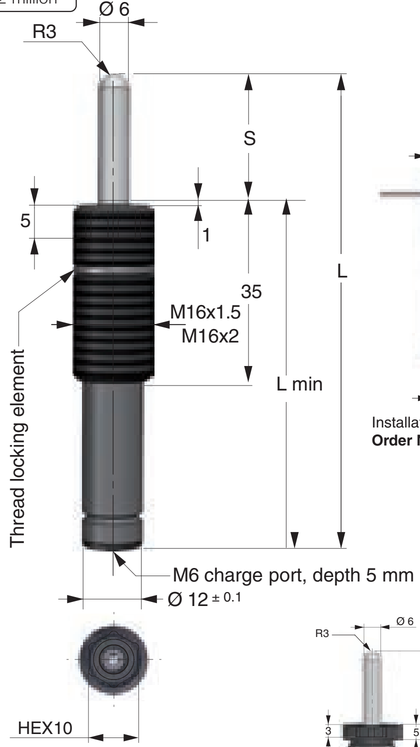
Initial force 65 - 1,700 N 15 - 382 lbf

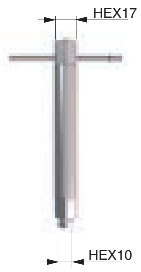
Initial force 65 - 1,700 N 15 - 382 lbf

Initial force 280 - 2,000 N 63 - 450 lbf

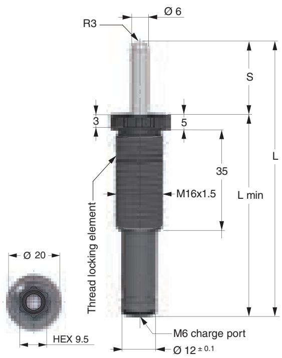
Initial force 280 - 2,000 N 63 - 450 lbf

2 million





Installation Tool,
Order No. 3021000



Also available with shoulder as per GM-Standard 90.80.45.
Contact your local distributor or Strömsholmen AB for more information.

EP3 16 gas springs (Ejector Pin with an M16 thread) are available in M16x1.5 and M16x2 thread size.

For each thread size, six models are available. Five preset models (Purple, Green, Blue, Red & Yellow) and one adjustable model (Black), whose pre-charging pressure is 5-10 bar, intended for the customer to adjust the gas charge pressure.

They are all color-coded to help identify the force rating and can be adjusted and re-charged to meet individual force requirements.

How to order

EP3 16x1.5 - 10 - Blue

Model:

Thread: x1.5 = M16x1.5
x2 = M16x2

Force: Purple, Green, Blue, Red, Yellow, Black

Stroke Length (mm)
(10, 20, 30, 40, 50, 60, 70, 80, 100, 125)

Model	Initial force at +20°C		Color	Charging pressure (bar)	End force at + 20°C, at full stroke	
	in N	in lbf			in N	in lbf
EP3 16x1.5/x2	57	13	Green	20	95	21
EP3 16x1.5/x2	110	25	Blue	40	190	43
EP3 16x1.5/x2	210	47	Red	75	360	81
EP3 16x1.5/x2	420	95	Yellow	150	715	160
EP3 16x1.5/x2 XX*	28-420	9-95	Black	10-150	64-715	14-160

* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

S Stroke		L ±0.25	L min	Gas vol. (l)	Weight (kg)
**	10	65	55	0.002	0.06
**	20	85	65	0.003	0.07
**	30	105	75	0.003	0.07
**	40	125	85	0.004	0.08
**	50	145	95	0.005	0.08
**	60	165	105	0.005	0.09
**	70	185	115	0.006	0.10
**	80	205	125	0.006	0.11
**	100	245	145	0.008	0.11
	125	295	170	0.010	0.13

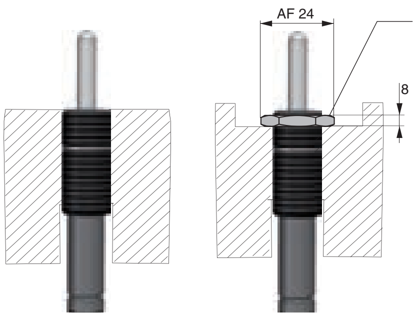
**Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 12 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ± 0.3%/°C
Recommended max strokes/min .... ~ 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

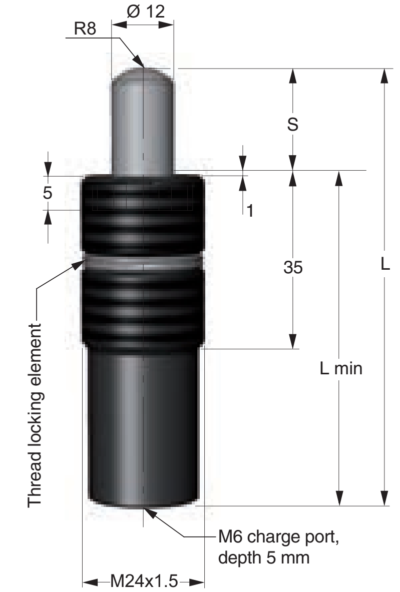
Rod surface.................................... Nitrided
Tube surface .... Black Oxide
Repair kit.. Non-repairable

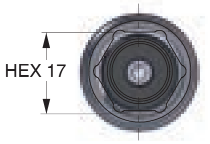
Mounting Possibilities



Order No.	Thread
503681	M16x1.5
503722	M16x2

2 million





EP2 24 (Ejector Pin with an M24 thread). Four preset models are available. Each model is color-coded for easy identification of force rating. If needed, these models can be re-charged or adjusted to meet individual force requirements.

A special model (black), which is delivered with a pre-charge of 5 to 10 bar, is also available and is intended for adjustment to the desired force.

Installation Tool,
Order No. 3021000

Model	Initial force at +20°C		Color	Charging pressure (bar)	End force at + 20°C, at full stroke	
	in N	in lbf			in N	in lbf
EP2 24	230	52	Green	20	390	90
EP2 24	450	101	Blue	40	800	180
EP2 24	850	191	Red	75	1,500	340
EP2 24	1,700	382	Yellow	150	2,900	650
EP2 24 XX*	65-1700	15-382	Black	6-150	110-2900	25-650

* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

S Stroke		L ±0.25	L min	Gas vol. (l)	Weight (kg)
**	10	65	55	0.003	0.13
**	20	85	65	0.006	0.15
**	30	105	75	0.008	0.17
**	40	125	85	0.011	0.19
**	50	145	95	0.012	0.21
**	60	165	105	0.014	0.23
**	70	185	115	0.017	0.25
**	80	205	125	0.019	0.27
**	100	245	145	0.024	0.31
	125	295	170	0.030	0.35

** Recommended stroke length for optimal delivery

How to order

EP2 24 -10 -Red

Model:

Force: Green, Blue, Red, Yellow, Black

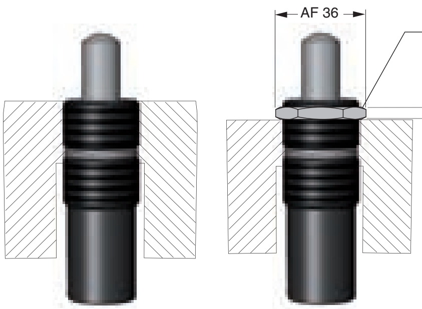
Stroke Length (mm)
(10, 20, 30, 40, 50, 60, 70, 80, 100, 125)

Basic Information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 6 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ± 0.3%/°C
Recommended max. strokes/min.... ~ 30-80 (at 20°C)
Max. piston rod velocity................... 1.6 m/s

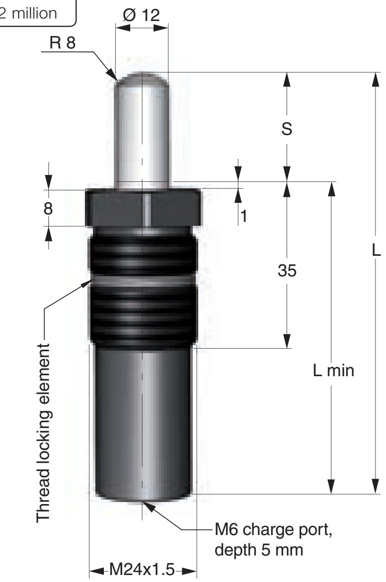
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit.. Non-repairable

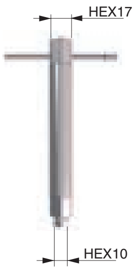
Mounting Possibilities



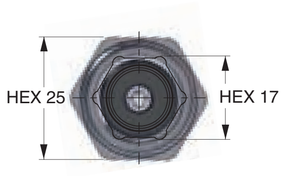
Lock nut
Order No. 503928

2 million





Installation Tool,
Order No. 3021000



EPS2 24 (<u>E</u>jector <u>P</u>in <u>S</u>pecial with an M<u>24</u> thread). It is available with six pre-set models. Each model is color-coded for easy identification of force rating. If needed, these models can be re-charged or adjusted to meet individual force requirements.

Also available is a model (black) which is delivered with a pre-charge of 5 to 10 bar, intended to be adjusted to the desired force.

Model	Initial force at + 20°C in N	Initial force at + 20°C in lbf	Color	Charging pressure (bar)	End force at + 20°C, at full stroke in N	End force at + 20°C, at full stroke in lbf
EPS2 24	230	52	Green	20	390	90
EPS2 24	450	101	Blue	40	800	180
EPS2 24	850	191	Red	75	1,500	340
EPS2 24	1,700	382	Yellow	150	2,900	650
EPS2 24 XX*	65-1700	15-382	Black	6-150	110-2900	25-650

* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

How to order

<u>EPS2 24-10-Green</u>

Model:

Force: Orange, Purple, Green, Blue, Red, Yellow, Black

Stroke Length (mm)
(10, 16, 20, 25, 30, 38, 40, 50, 60, 70, 80, 100, 125)

	S Stroke	L ±0.25	L min	Gas vol. (l)	Weight (kg)
**	10	65	55	0.005	0.14
**	16	77	61	0.006	0.15
**	20	85	65	0.007	0.16
**	25	95	70	0.008	0.17
	30	105	75	0.010	0.18
**	38	121	83	0.011	0.19
	40	125	85	0.012	0.20
**	50	145	95	0.014	0.21
	60	165	105	0.017	0.23
	70	185	115	0.019	0.25
**	80	205	125	0.022	0.27
	100	245	145	0.026	0.31
	125	295	170	0.032	0.36

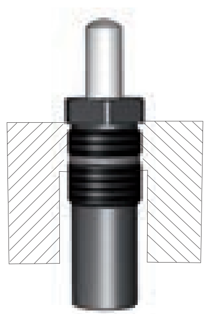
**Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 6 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ± 0.3%/°C
Recommended max strokes/min .... ~ 30-80 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit.. Non-repairable

Mounting Possibilities



The R series was named because the tube is Roll-formed and therefore permanently closed, making these springs non-repairable.

R series springs are available with Ø12, Ø15, and Ø19 mm tube diameters and with stroke lengths up to 125 mm.

There are 4 color-coded models, all with preset forces. An adjustable model (black) is also available. It can be ordered either set to a specific charge pressure or it can be adjusted by customers with the appropriate charging equipment and training.

How to order

R12 - 7- Blue

Model: R12

Stroke Length (mm)
(7, 10, 12.7, 15, 19, 25, 38.1, 50, 63.5, 75, 80, 100, 125)

Force: Green
Blue
Red
Yellow
Black, state desired force in N

Model	Force in N at +20°C Initial	Force in lbf at +20°C Initial	Color	Charging pressure (bar)
R12	130	29	Green	45
R12	250	56	Blue	90
R12	380	85	Red	135
R12	500	112	Yellow	180
R12 XX*	60-500	13-112	Black	20-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

S Stroke	End force in N at + 20°C*				End force in lbf at + 20°C*				L ±0.25	L min	Gas vol. [l]	Weight [kg]
	R12	R12	R12	R12	R12	R12	R12	R12				
** 7	149	299	448	597	34	67	101	134	56	49	0.001	0.03
10	158	317	475	634	36	71	107	143	62	52	0.001	0.03
12.7	164	329	493	657	37	74	111	148	67.4	54.7	0.001	0.03
** 15	168	335	503	670	38	75	113	151	72	57	0.002	0.03
19	172	344	517	689	39	77	116	155	80	61	0.002	0.04
** 25	177	354	530	707	40	80	119	159	92	67	0.002	0.04
** 38.1	183	365	548	730	41	82	123	164	118	80	0.003	0.04
** 50	185	371	556	742	42	83	125	167	142	92	0.004	0.05
63.5	197	395	592	789	44	89	133	178	172	108.5	0.005	0.06
75	197	394	591	788	44	89	133	178	195	120	0.006	0.06
80	207	414	620	827	47	93	139	186	205	125	0.006	0.07
100	204	409	613	817	46	92	138	184	245	145	0.008	0.07
125	202	405	607	810	45	91	137	182	295	170	0.010	0.09

*= at full stroke.

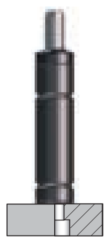
** Recommended stroke length for optimal delivery

Basic Information

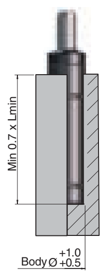
For general information, see “About gas springs”.
Pressure medium................................ Nitrogen
Max. charging pressure........................ 180 bar (at 20°C)
Min. charging pressure......................... 20 bar (at 20°C)
Operating temperature......................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min......... ~40 – 100 (at 20°C)
Max. piston rod velocity....................... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair Kit .... Non-repairable

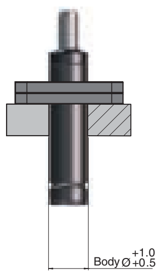
Mounting Possibilities



Base mount B
only to be used for strokes 7-25 mm

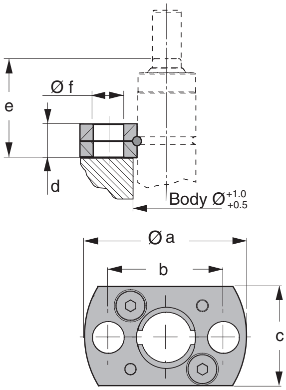


Drop - in

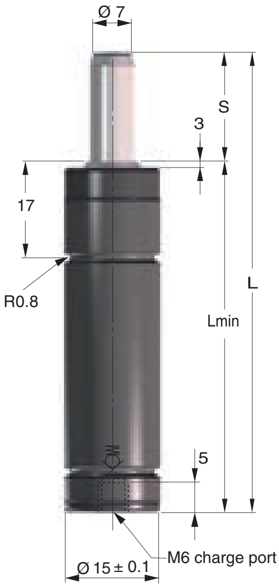


Top mount FCR-12

FCR



Order No.	Ø a	b	c	d	e	Ø f
FCR-12	34	24	21	9	21.5	6.6



The R series was named because the tube is Roll-formed and therefore permanently closed, making these springs non-repairable.

R series springs are available with Ø12, Ø15, and Ø19 mm tube diameters and with stroke lengths up to 125 mm.

There are 4 color-coded models, all with preset forces. An adjustable model (black) is also available. It can be ordered either set to a specific charge pressure or it can be adjusted by customers with the appropriate charging equipment and training.

How to order

R15 - 7 - Red

Model: R15

Stroke Length (mm)
(7, 10, 12.7, 15, 19, 25, 38.1, 50, 63.5, 75, 80, 100, 125)

Force: Green
Blue
Red
Yellow
Black, state desired force in N

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
R15	180	40	Green	45
R15	350	80	Blue	90
R15	500	115	Red	135
R15	700	160	Yellow	180
R15 XX*	80-700	18-160	Black	20-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

S stroke	End force in N at + 20°C*				End force in lbf at + 20°C*				L ±0.25	L min.	Gas vol. (l)	Weight (kg)
	R15	R15	R15	R15	R15	R15	R15	R15				
7	216	432	648	865	49	97	146	195	56	49	0.001	0.05
10	224	447	671	895	50	101	151	201	62	52	0.001	0.05
12.7	228	457	685	914	51	103	154	206	68	55	0.001	0.05
15	232	463	695	927	52	104	156	209	72	57	0.002	0.05
19	236	471	707	943	53	106	159	212	80	61	0.002	0.05
25	240	480	720	961	54	108	162	216	92	67	0.002	0.06
38.1	258	516	774	1,032	58	116	174	232	118.2	80.1	0.003	0.07
50	258	516	774	1,033	58	116	174	232	142	92	0.004	0.08
63.5	273	546	819	1,092	61	123	184	246	172	108.5	0.005	0.09
75	270	541	811	1,082	61	122	182	243	195	120	0.006	0.10
80	270	539	809	1,079	61	121	182	243	205	125	0.006	0.11
100	267	534	802	1,069	60	120	180	240	245	145	0.008	0.12
125	265	531	796	1,062	60	119	179	239	295	170	0.010	0.14

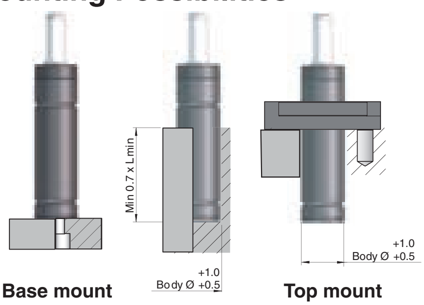
*= at full stroke.

Basic Information

For more information, see “About gas springs”.
Pressure medium ....Nitrogen
Max. charging pressure ....180 bar
Min. charging pressure ....20 bar
Operating temperature ....0 to +80°C
Force increase by temperature............±0.3 %/°C
Recommended max. strokes/min. .... ~100 – 150 (at 20°C)
Max. piston rod velocity ....1.6 m/s

Rod surface ....Nitrided
Tube surface ....Black oxide
Repair Kit...Non-repairable

Mounting Possibilities

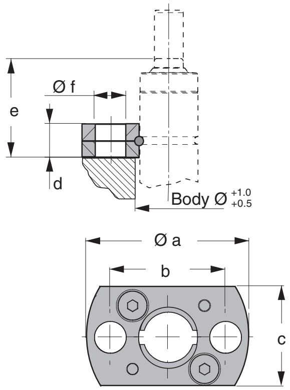


Base mount B
only to be used for strokes 7-25 mm

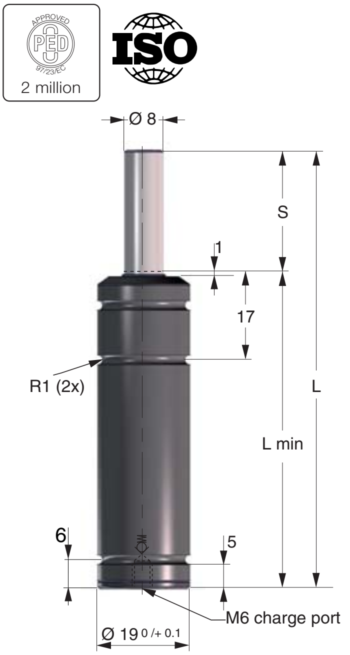
Drop-in

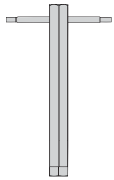
Top mount FCR-15

FCR



Order No.	Ø a	b	c	d	e	Ø f
FCR-15	37	27	24	9	21.5	6.6





Installation Tool
for threaded sleeve
Order No. 3020618

The R series get their name from the fact their tube is roll formed and therefore permanently closed, making them non-repairable.
R series springs are available with Ø 12, Ø 15, and Ø 19 mm tube diameters and with stroke lengths up to 125 mm.
There are 4 color-coded models, whose forces are preset.
An adjustable model (black) is also available, that can be ordered to a specific charge pressure or adjusted by customers with the appropriate charging equipment and training.

How to order

R19 - 7 -Yellow

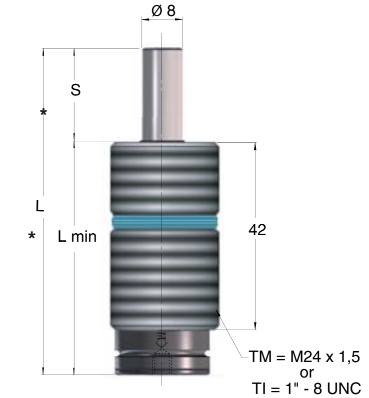
Model: R19

Stroke Length (mm)
(7, 10, 15, 25, 38.1, 50, 63.5, 80, 100, 125)

Force: Green
Blue
Red
Yellow
Black, state desired force in N

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
R19	300	67	Green	60
R19	500	112	Blue	100
R19	700	157	Red	140
R19	900	202	Yellow	180
R19 XX *	125-900	67-202	Black	25-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.



	S stroke	End force in N at + 20°C*				End force in lbf at +20°C*				L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		R19	R19	R19	R19	R19	R19	R19	R19					
**	7	530	880	1,200	1,600	119	199	270	360	56	49	0.003	0.07	
**	10	470	780	1,100	1,400	105	175	247	315	62	52	0.003	0.08	
**	12	444	740	1,040	1,330	100	166	233	299	66	54	0.004	0.08	
**	15	440	730	1,000	1,300	99	164	225	292	72	57	0.004	0.08	✓
**	25	420	700	980	1,300	94	157	220	292	92	67	0.006	0.08	✓
**	38.1	410	690	970	1,200	92	155	218	270	118.2	80.1	0.009	0.10	✓
**	50	410	680	960	1,200	92	152	216	270	142	92	0.011	0.12	✓
	63.5	410	680	950	1,200	92	152	214	270	172	108.5	0.014	0.13	✓
**	80	410	680	950	1,200	92	152	214	270	205	125	0.018	0.14	✓
	100	410	670	940	1,200	92	152	214	270	245	145	0.022	0.17	
	125	410	670	940	1,200	92	152	214	270	295	170	0.027	0.20	

*at full stroke
** Recommended stroke length for optimal delivery

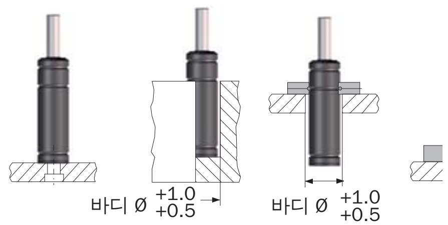
* Please note that when the threaded sleeve is used, the max stroke length is reduced by 3 mm and Lmin is increased by 3 mm.

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ± 0.3%/°C
Recommended max strokes/min .... ~ 100-150 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. Non-repairable

Mounting Possibilities



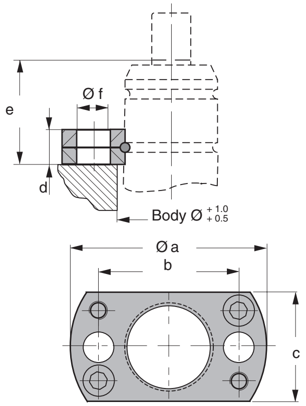
Base mount
B
only to be used for strokes 7-25 mm

Drop - in

Top mount
FCR

Foot mount
BF-19
only to be used for strokes 7-25 mm

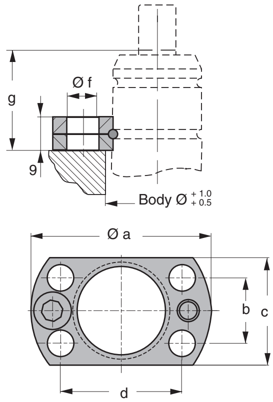
FCR



Order No.	Ø a	b	c	d	e	Ø f	g	h	i	j	k	l
FCR-19 VDI2	45	32	25	9	21.5	7	9	16	1	9	21.5	9

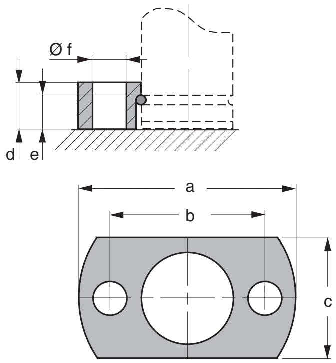
FCR

ISO



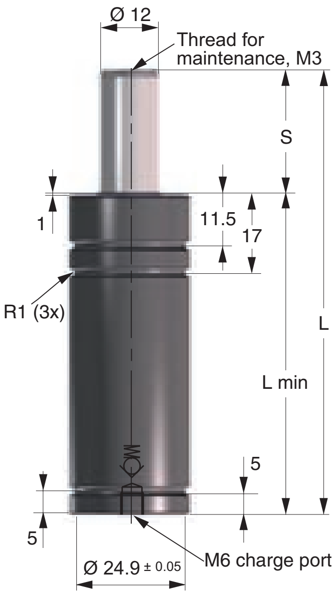
Order No.	Ø a	b	c	d	e	Ø f	g
FCR-90 (ISO)	45	12	25	30	9	7	21.5

BF



Order No.	a	b	c	d	e	Ø f
BF-19	45	32	25	10	7	7

2 million



The M2 is available in four preset models, with initial forces from 500 to 2000 N. The body of the spring and the mount are designed to meet the ISO-dimension found in ISO 11901 as well as in VDI 3003. Each spring is color-coded for easy identification of force rating.

We also offer a model with adjustable force (black) that can be customised to meet individual force requirements. The adjustable model may be set to desired pressure when ordered from us or by customers with charging equipment.

The M2 spring can in many cases directly replace mechanical die springs of 25 mm (1 inch) diameter.

All M2 springs can be repaired and recharged. The spring can be attached to the tool, using a mount (FCR or SM). The M6 thread in the base of the spring is used for charging and is also a mounting option.

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
M2	500	110	Green	45
M2	1,000	225	Blue	90
M2	1,500	340	Red	135
M2	2,000	450	Yellow	180
M2 XX*	280-2,000	63-450	Black	25-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

	S stroke	End force in N at + 20°C*				End force in lbf at + 20°C*				L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		M2	M2	M2	M2	M2	M2	M2	M2					
	10	770	1,530	2,300	3,060	173	344	689	689	62	52	0.005	0.14	
	12.7	770	1,530	2,300	3,070	173	344	690	690	67.4	54.7	0.006	0.15	
**	15	770	1,540	2,310	3,070	173	346	690	690	72	57	0.007	0.16	✓
	16	770	1,540	2,310	3,070	173	346	690	690	74	58	0.007	0.16	
**	25	770	1,540	2,310	3,080	173	346	692	692	92	67	0.010	0.18	✓
**	38.1	770	1,540	2,320	3,090	173	346	695	695	118.2	80.1	0.015	0.20	✓
**	50	770	1,540	2,320	3,090	173	346	695	695	142	92	0.019	0.22	✓
**	63.5	760	1,520	2,270	3,020	171	342	679	679	172	108.5	0.024	0.26	✓
**	80	760	1,520	2,280	3,040	171	342	683	683	205	125	0.029	0.30	✓
**	100	760	1,520	2,290	3,050	171	342	686	686	245	145	0.036	0.33	✓
**	125	760	1,530	2,290	3,060	171	344	689	689	295	170	0.044	0.39	✓

*at full stroke ** Recommended stroke length for optimal delivery

How to order

M2 -10 - Green

Model

Stroke Length (mm)
(10, 12.7, 15, 16, 25, 38.1, 50, 63.5, 80, 100, 125)

Force:
Green
Blue
Red
Yellow
Black, state desired force in N

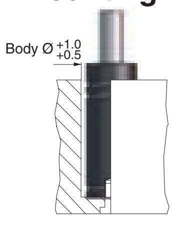
Basic Information

For general information see "About gas springs".

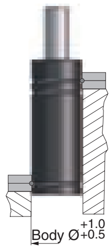
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................. Nitrided
Tube surface .... Black oxide
Repair kit 3016385

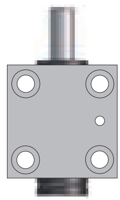
Mounting Possibilities



Base mount
Drop - In, B

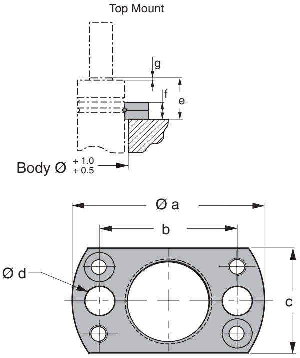


Top mount
FCR



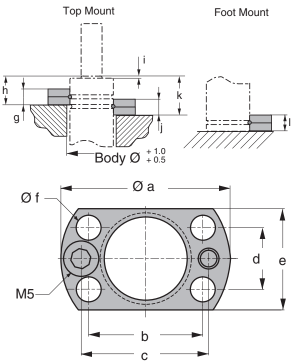
Body mount
SM-150

FCR



Order No.	Ø a	b	c	Ø d	e	f	g
FCR-25 (VDI)	50	38	30	7	21.5	9	1

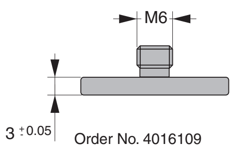
FCR



Order No.	Ø a	b	c	d	e	Ø f	g	h	i	j	k	l
FCR-150 (VDI)	50	34	38	18	30	7	9	16	1	9	21.5	9

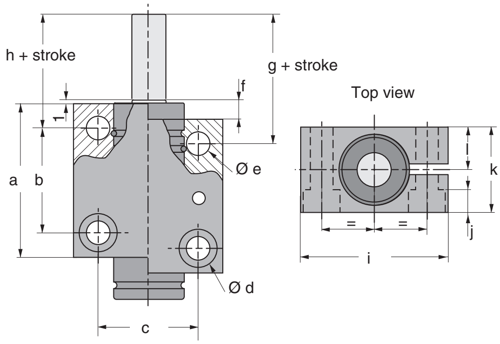
Note! For M2 L and L min are 3 mm shorter for 10 to 50 mm stroke compared to older version of Mini Spring (called M).

To obtain the correct total length when replacing the older version (M) when using Drop in, or FCR as foot mount, a 3 mm distance should be used (Order No. 4016109, see picture below).



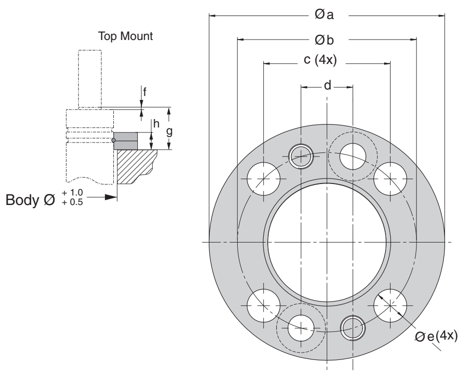
Order No. 4016109

SM



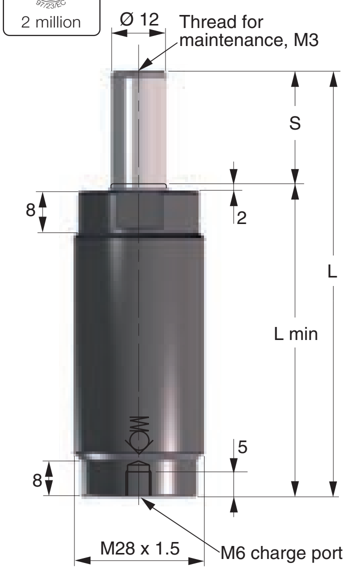
Order No.	a	b	c	Ø d	Ø e	f	g	h	i	j	k	l
SM-150	54	38	36	13.5	8.4	6.5	14.5	9	52	7	30	15

FC



Order No.	Ø a	Ø b	c	d	Ø e	f	g	h
FC-150	50	38	26.9 ± 0.25	11 ± 0.1	7	1	21.5	9

2 million



The MM2 is a version of the M2 spring with a threaded body, (M28 x 1.5). All internal parts and technical data are the same as for M2 springs (with the exception of strokes 63.5 to 125 whose total lenghts are 3 mm shorter). Each spring is color-coded for easy identification of force rating.

We also offer a model with adjustable force (black) that can be customised to meet individual force requirements. The adjustable model may be set to desired pressure when ordered from us or by customers with charging equipment.

All MM2 springs can be repaired and recharged.

For locking the spring in the tool a lock nut is available.

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
MM2	500	110	Green	45
MM2	1,000	225	Blue	90
MM2	1,500	340	Red	135
MM2	2,000	450	Yellow	180
MM2 XX *	280-2,000	63-450	Black	25-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

S stroke	End force in N at + 20°C*				End force in lbf at + 20°C*				L ±0.25	L min.	Gas vol. (l)	Weight (kg)
	MM2	MM2	MM2	MM2	MM2	MM2	MM2	MM2				
10	770	1,530	2,300	3,060	173	344	517	689	62	52	0.005	0.14
12.7	770	1,530	2,300	3,070	173	344	517	690	67.4	54.7	0.006	0.15
15	770	1,540	2,310	3,070	173	346	519	690	72	57	0.007	0.16
16	770	1,540	2,310	3,070	173	346	519	690	74	58	0.007	0.16
25	770	1,540	2,310	3,080	173	346	519	692	92	67	0.010	0.18
38.1	770	1,540	2,320	3,090	173	346	522	695	118.2	80.1	0.015	0.20
50	770	1,540	2,320	3,090	173	346	522	695	142	92	0.019	0.22
63.5	760	1,520	2,270	3,020	171	342	510	679	169	105.5	0.024	0.26
80	760	1,520	2,280	3,040	171	342	513	683	202	122	0.029	0.30
100	760	1,520	2,290	3,050	171	342	515	686	242	142	0.036	0.33
125	760	1,530	2,290	3,060	171	344	515	689	292	167	0.044	0.39

*at full stroke

How to order

MM2 -10 - Black

Model

Stroke Length (mm)
(10, 12.7, 15, 16, 25, 38.1, 50, 63.5, 80, 100, 125)

Force:
Green
Blue
Red
Yellow
Black, state desired force in N

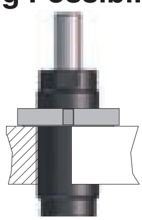
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

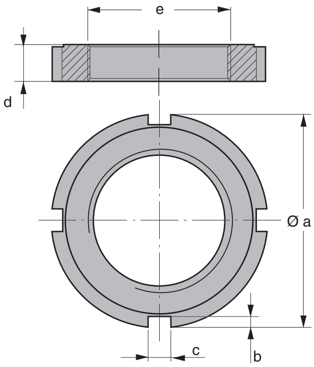
Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3016385

Mounting Possibilities



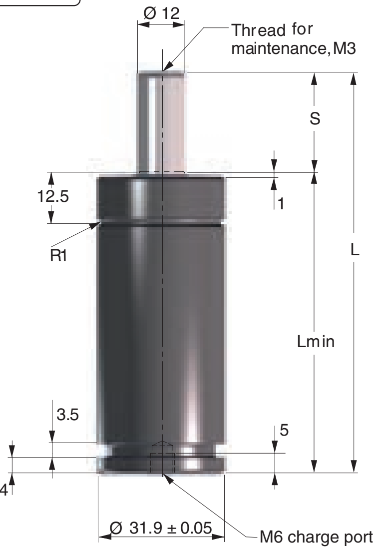
Thread mount
FRM

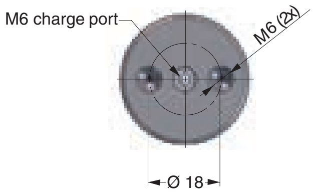
FRM



Order No.	Ø a	b	c	d	e
FRM-150	50	3	7	10	M28 x 1.5

2 million





The MC3 spring is based on the M2 spring, using the same piston rod and internal components. The body of the spring and the mount are designed to meet the ISO dimension found in ISO 11901 as well as in VDI 3003.

Each spring is color-coded for easy identification of force rating. We also offer a model with adjustable force (black) that can be customized to meet individual force requirements. The adjustable model may be set to the desired pressure when ordered from us or by customers with charging equipment.

The spring can be attached to the tool, using an FC-MC or FFC-MC mount. The M6 thread in the base of the spring is used for charging and is also a mounting option.

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
MC3	500	110	Green	45
MC3	1,000	225	Blue	90
MC3	1,500	340	Red	135
MC3	2,000	450	Yellow	180
MC3 *	280-2,000	63-450	Black	25-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

S stroke		End force in N at + 20°C*				End force in lbf at + 20°C*				L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		MC3	MC3	MC3	MC3	MC3	MC3	MC3	MC3					
**	10	770	1,530	2,300	3,060	173	344	517	688	70	60	0.005	0.30	✓
**	12.7	770	1,530	2,300	3,070	173	344	517	690	75.4	62.7	0.006	0.31	
**	16	770	1,540	2,310	3,070	173	340	519	690	82	66	0.007	0.33	✓
**	25	770	1,540	2,310	3,080	173	340	519	692	100	75	0.010	0.38	✓
**	38.1	770	1,540	2,320	3,090	173	340	522	695	126.2	88.1	0.015	0.43	
**	50	770	1,540	2,320	3,090	173	340	522	695	150	100	0.019	0.48	✓
**	63.5	760	1,520	2,270	3,020	171	342	510	679	177	113.5	0.024	0.54	
**	80	760	1,520	2,280	3,040	171	342	513	683	210	130	0.029	0.62	✓
**	100	760	1,520	2,290	3,050	171	342	515	686	250	150	0.036	0.71	
**	125	760	1,530	2,290	3,060	171	342	515	688	300	175	0.044	0.83	

*at full stroke

** Recommended stroke length for optimal delivery

How to order

MC3 -10 - Red

Model

Stroke Length (mm)
(10, 12.7, 16, 25, 38.1, 50, 63.5, 80, 100, 125)

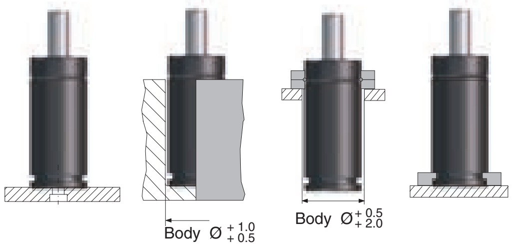
Force:
Green
Blue
Red
Yellow
Black, state desired force in N

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

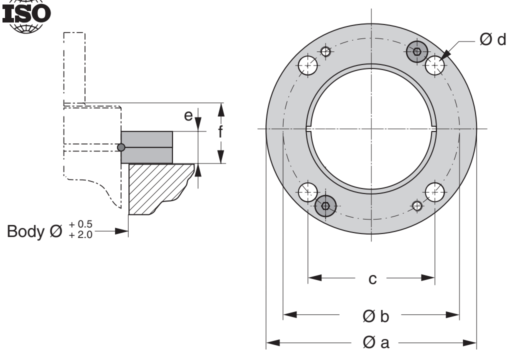
Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3016385

Mounting Possibilities



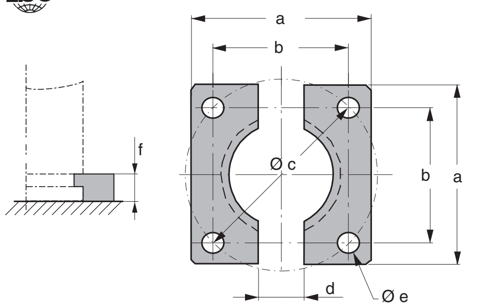
Base mount B | **Drop -in** | **Top mount FC-FCS** | **Foot mount FFC-MC**

FC



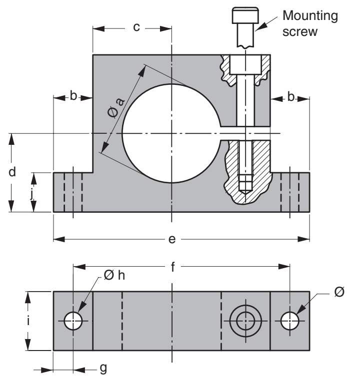
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-MC-150	60	49.5	35	7	9	17

FFC



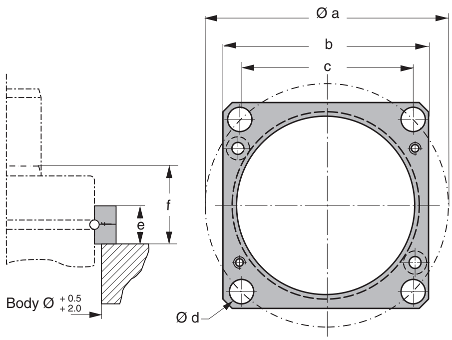
Order No.	a	b	Ø c	d	Ø e	f
FFC-MC-150	50	35	49.5	12	7	6.5

S



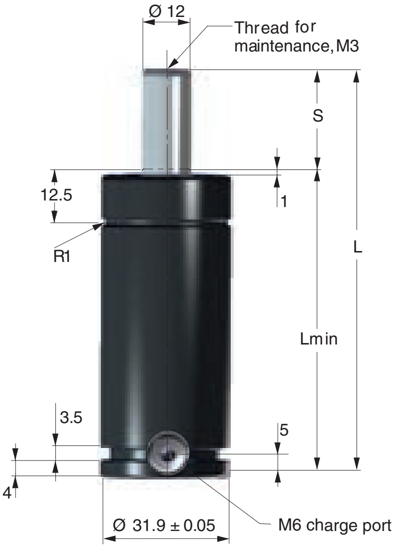
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-MC	32.1	18	22	22.5	90	72	9	8.5	20	15

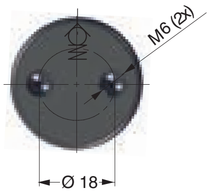
FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-32	49.5	45	35	7	9	16

2 million





The MC3-SP spring s equipped with a M6 side charge port compared to the M6 bottom charge port on the MC3.
The body of the spring and the mount are designed to meet the ISO dimension found in ISO 11901 as well as in VDI 3003 and the current GM standard, GMGDS 90.25.00-1.5-XXX.

Each spring is color-coded in red and black for easy identification of force rating. The adjustable force (black) that can be customized to meet individual force requirements. The adjustable model may be set to the desired pressure when ordered from us or by customers with charging equipment.

The spring can be attached to the tool, using an FC-MC or FFC-MC mount. The M6 thread in the base of the spring is used for charging and is also a mounting option.

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	Initial	Initial		
MC3-SP	1,500	340	Red	135
MC3-SP*	280-2,000	63-450	Black	25-180

*Force to be set by the end user. Delivered with a pre-charge of 5-10 bar.

S stroke	End force in N at +20°C*	End force in lbf at +20°C*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
	MC3	MC3					
10	2,300	517	70	60	0.005	0.30	✓
12.7	2,300	517	75.4	62.7	0.006	0.31	
16	2,310	519	82	66	0.007	0.33	✓
25	2,310	519	100	75	0.010	0.38	✓
38.1	2,320	522	126.2	88.1	0.015	0.43	
50	2,320	522	150	100	0.019	0.48	✓
63.5	2,270	510	177	113.5	0.024	0.54	
80	2,280	513	210	130	0.029	0.62	✓
100	2,290	515	250	150	0.036	0.71	
125	2,290	515	300	175	0.044	0.83	

*at full stroke

How to order

MC3-SP -10 - Red

Model

Stroke Length (mm)

Force: Red

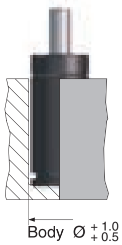
Basic Information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

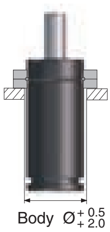
Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3016385

Mounting Possibilities

Base mount B



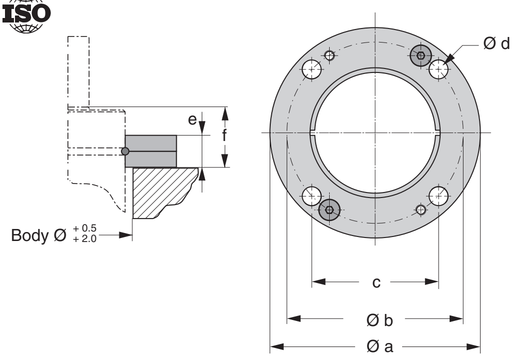
Drop -in



Top mount FC-FCS

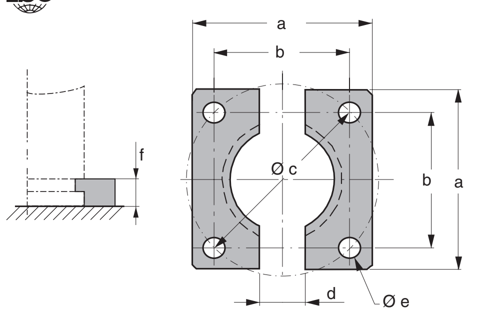
Foot mount FFC-MC

FC



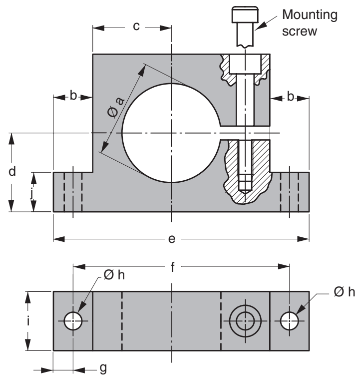
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-MC-150	60	49.5	35	7	9	17

FFC



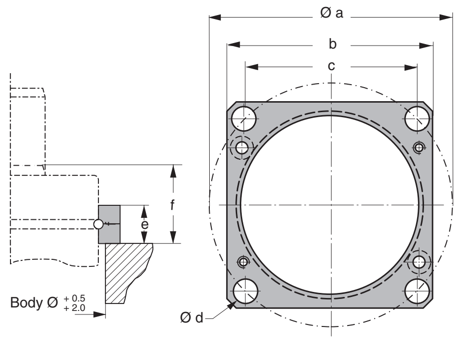
Order No.	a	b	Ø c	d	Ø e	f
FFC-MC-150	50	35	49.5	12	7	6.5

S



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-MC	32.1	18	22	22.5	90	72	9	8.5	20	15

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-32	49.5	45	35	7	9	17

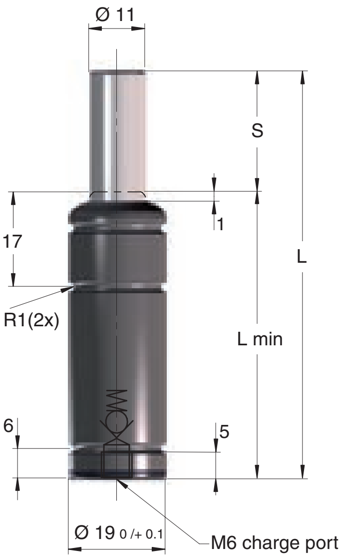
2 million

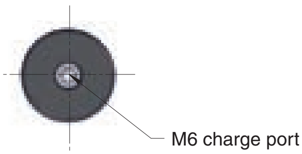
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

The Power Line springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

The X 170 has a bottom port for gas charging that can also be used to connect to a gas link system.

The X 170 has an upper ISO Standard C-groove and a lower C-groove, which together with a threaded bottom hole offer various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 180 bar/+20°C Initial	Force in N at 180 bar/+20°C End force*	Force in lbf at 180 bar/+20°C Initial	Force in lbf at 180 bar/+20°C End force*	L ±0.25	L min	Gas vol. (l)	Weight (kg)	ISO
X 170-007		7					44	37	0.002	0.06	
X 170-010	**	10					50	40	0.002	0.06	✓
X 170-015	**	15					60	45	0.004	0.07	✓
X 170-019		19					68	49	0.005	0.07	
X 170-025	**	25					80	55	0.006	0.08	✓
X 170-038	**	38	1,700	2,800	382	630	106	68	0.009	0.09	✓
X 170-050	**	50					130	80	0.012	0.10	✓
X 170-063	**	63					156	93	0.015	0.12	✓
X 170-075		75					185	110	0.018	0.14	
X 170-080	**	80					195	115	0.019	0.14	✓
X 170-100	**	100					235	135	0.024	0.16	✓
X 170-125	**	125					285	160	0.030	0.19	✓

* = at full stroke

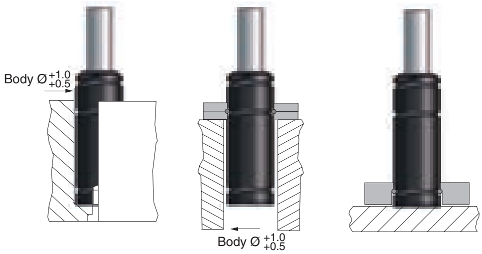
** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar (at 20° C)
Min. charging pressure .... 25 bar (at 20° C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit .... Non-repairable

Mounting Possibilities

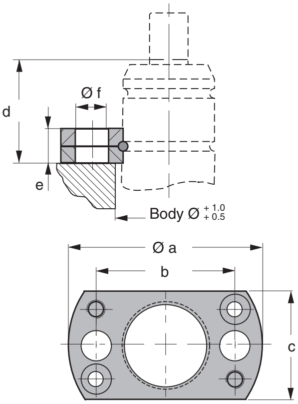


Base mount
Drop - in, B
only to be used for strokes 7-25 mm

Top mount
FCR

Foot mount
BF-19
only to be used for strokes 7-25 mm

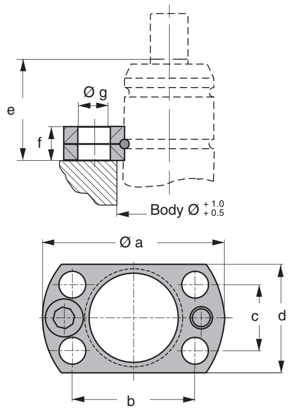
FCR-19



Order No.	Ø a	b	c	d	e	Ø f
FCR-19 VDI2	45	32	25	21.5	9	7

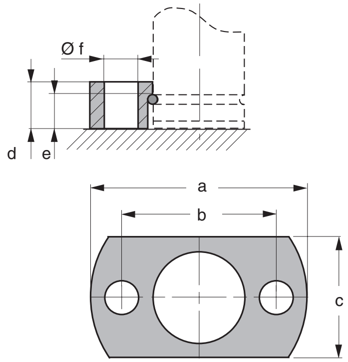
FCR-90

ISO



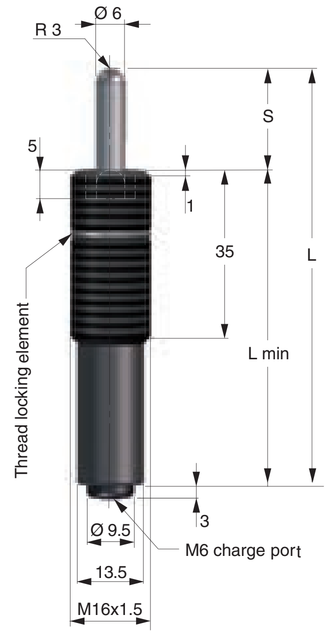
Order No.	Ø a	b	c	d	e	f	Ø g
FCR-90 (ISO)	45	30	12	25	21.5	9	7

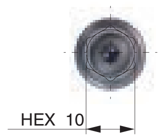
BF-19



Order No.	a	b	c	d	e	Ø f
BF-19	45	32	25	10	7	7

2 million





Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic molding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:

- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- MT 16 and MT 24 have threaded upper cylinders for easy and adjustable mounting
- M6 gas ports that can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 - 80°C	20	150	80°C (20°C)	510 (420)	810 (670)
80 - 100°C	15	125	100°C (20°C)	450 (355)	720 (570)
100 - 120°C	10	115	120°C (20°C)	435 (325)	700 (520)

Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 16-010	10	420	95	65	55	0.002	0.06
MT 16-020	20			85	65	0.003	0.07
MT 16-030	30			105	75	0.003	0.07
MT 16-040	40			125	85	0.004	0.08
MT 16-050	50			145	95	0.005	0.09
MT 16-060	60			165	105	0.006	0.10
MT 16-070	70			185	115	0.007	0.11
MT 16-080	80			205	125	0.008	0.11

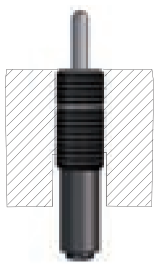
* = at full stroke

Basic Information

For general information, see “About Gas Springs”.

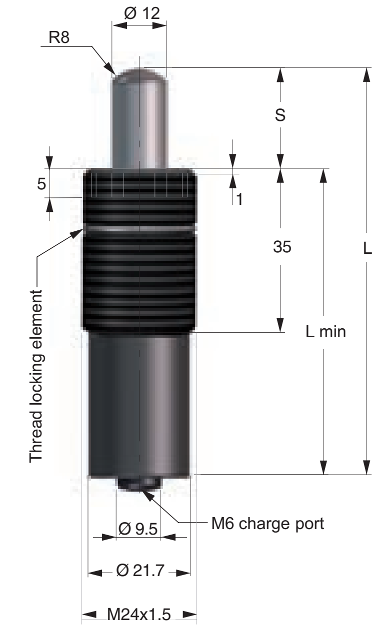
Pressure medium .... Nitrogen
Max. charging pressure .... See table above
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 - +120°C
Force increase by temperature................... ±0.3 %/°C
Recommended max. strokes/min. .... See table above
Max. piston rod velocity .... 1.0 m/s
Service life (0 to 80°C)................................ 1,000,000 strokes
or .... 100,000 stroke meters*
Service life (80 to 120°C)............................ 500,000 strokes
or .... 50,000 stroke meters*
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit .... Non-repairable

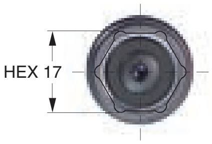
Mounting Possibilities



Thread mount
Lock nut available
M16x1.5 503681

2 million





Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic moulding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:
- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- MT 16 and MT 24 have threaded upper cylinders for easy and adjustable mounting
- M6 gas ports can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working Temp. Interval	Max strokes per Minute (spm)	Max charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 - 80°C	20	150	80°C (20°C)	2040 (1700)	3250 (2700)
80 - 100°C	15	125	100°C (20°C)	1800 (1415)	2880 (2250)
100 - 120°C	10	115	120°C (20°C)	1750 (1300)	2800 (2080)

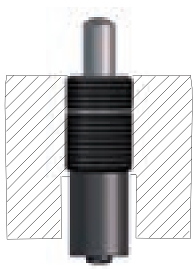
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 24-010	10			65	55	0.003	0.13
MT 24-020	20			85	65	0.006	0.15
MT 24-030	30			105	75	0.008	0.17
MT 24-040	40	1,700	382	125	85	0.011	0.19
MT 24-050	50			145	95	0.012	0.21
MT 24-060	60			165	105	0.014	0.23
MT 24-070	70			185	115	0.017	0.25
MT 24-080	80			205	125	0.019	0.27

* = at full stroke

Basic Information

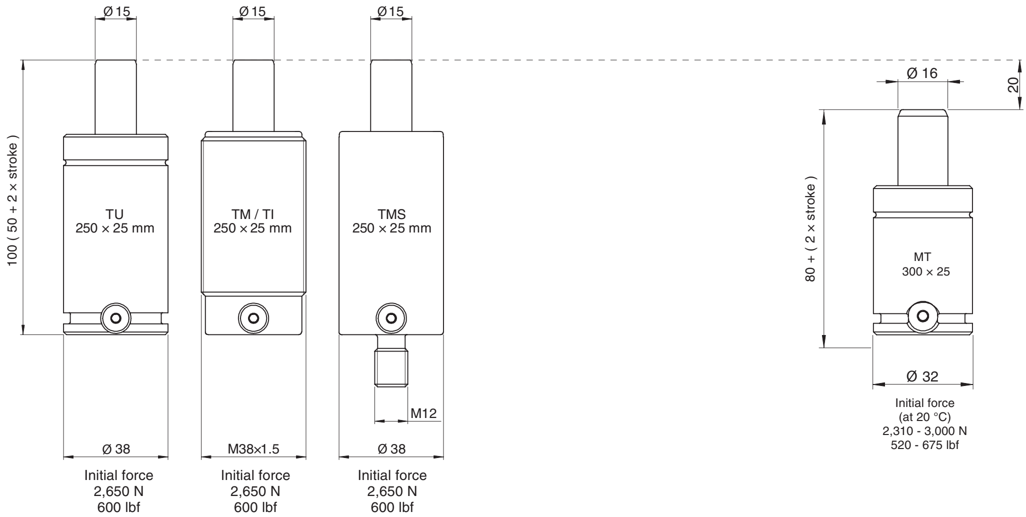
For general information, see “About Gas Springs”.
Pressure medium ....Nitrogen
Max. charging pressure ....See table above
Min. charging pressure ....25 bar (at 20°C)
Operating temperature ....0 – +120°C
Force increase by temperature..................±0.3 %/°C
Recommended max. strokes/min. ....See table above
Max. piston rod velocity ....1.0 m/s
Service life (0 to 80°C)...............................1,000,000 strokes
or ....100,000 stroke meters*
Service life (80 to 120°C)...........................500,000 strokes
or ....50,000 stroke meters*
Rod & tube surface....................................Nitrided
Repair kit ....Non-repairable

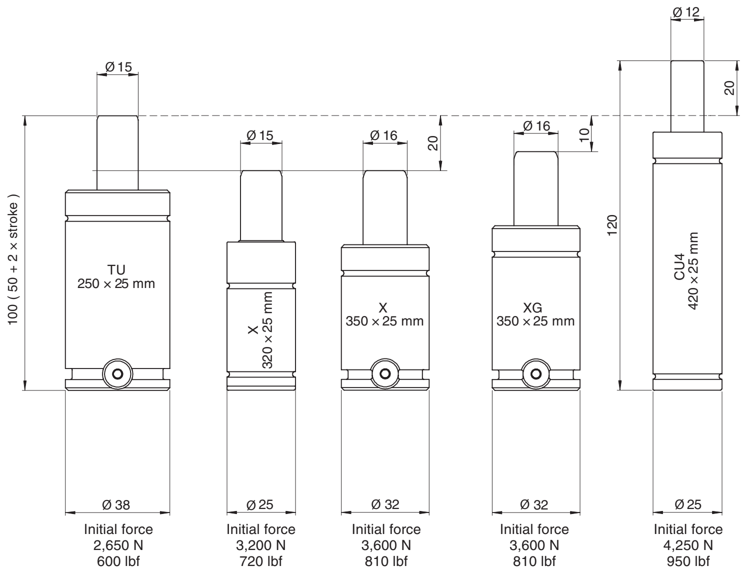
Mounting Possibilities



Thread mount
Lock nut available
M24x1.5 503928

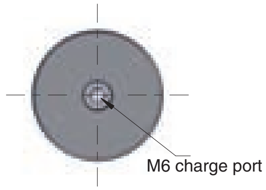
Overview - $2500 \leq F_{INIT} < 5000$





2 million

This is the smallest member of the CU4 family. As with the rest of the CU4 springs it has a very high force compared to its outer diameter.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 420-006	6		7,300		1,641	56	50	0.003	0.13
CU4 420-010	10		7,300		1,416	70	60	0.005	0.15
CU4 420-016	16		7,300		1,416	91	75	0.008	0.18
CU4 420-025	25	4,250	7,400	955	1,439	120	95	0.011	0.22
CU4 420-032	32		7,900		1,776	140	108	0.021	0.24
CU4 420-040	40		8,000		1,800	165	125	0.026	0.27
CU4 420-050	50		8,000		1,800	195	145	0.032	0.31

* = at full stroke

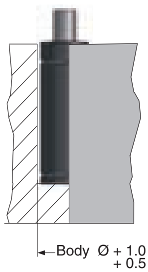
Basic Information

For general information, see “About gas springs”.
Pressure medium........................... Nitrogen
Max. charging pressure.................. 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature.................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min.... 50 ~ 100 (at 20°C)
Max. piston rod velocity.................. 0.8 m/s

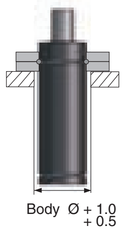
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit.. Non-repairable

Mounting Possibilities

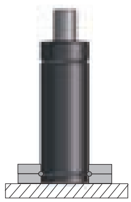
Base mount B
only to be used for strokes 7-25 mm



Drop - in

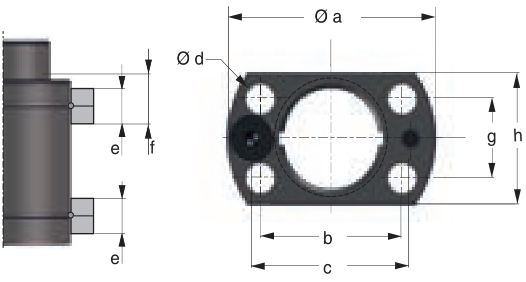


Top mount FCR, FC



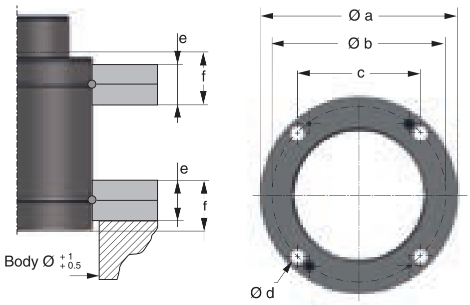
Foot mount FCR

FCR



For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 420	FCR-150	50	34	38	7	9	16

FC



For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 420	FC-150	50	38	35	7	9	16

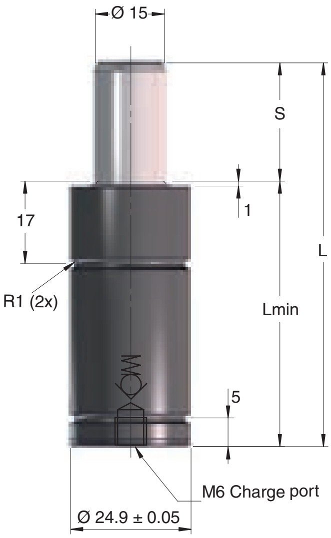
2 million

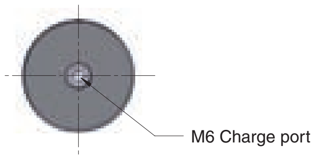
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

The Power Line springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

The X 320 has a bottom port for gas charging that can also be used to connect to a gas link system.

The X 320 has an upper ISO Standard C-groove that together with a threaded bottom hole offers various mounting possibilities using our standard mounts.





Order No.	Stroke	Force in N at 180 bar/+20°C Initial	Force in N at 180 bar/+20°C End force*	Force in lbf at 180 bar/+20°C Initial	Force in lbf at 180 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 320-007	7	3,200	4,800	720	1,080	44	37	0.004	0.10	
X 320-010	10		4,900		1,100	50	40	0.005	0.11	√
X 320-015	15		5,100		1,150	60	45	0.007	0.12	√
X 320-019	19		5,100		1,150	68	49	0.009	0.13	
X 320-025	25		5,200		1,170	80	55	0.011	0.14	√
X 320-038	38		5,300		1,190	106	68	0.017	0.16	√
X 320-050	50		5,300		1,190	130	80	0.022	0.19	√
X 320-063	63		5,300		1,190	156	93	0.028	0.21	√
X 320-075	75		5,300		1,190	185	110	0.034	0.24	
X 320-080	80		5,300		1,190	195	115	0.036	0.25	√
X 320-100	100		5,300		1,190	235	135	0.044	0.29	√
X 320-125	125		5,300		1,190	285	160	0.055	0.33	√

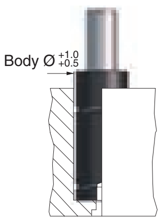
*= at full stroke.

Basic Information

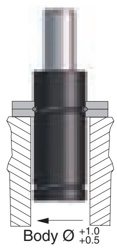
For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar (at 20° C)
Min. charging pressure .... 25 bar (at 20° C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit .... Non-repairable

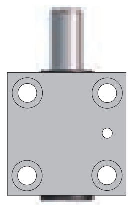
Mounting Possibilities



Base mount
Drop - in, B
only to be used for strokes 7-25

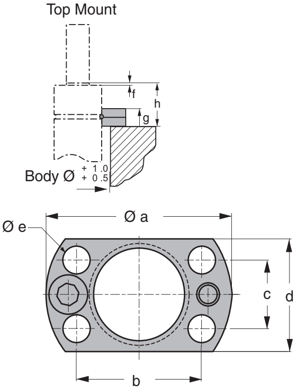


Top mount
FCR, FC



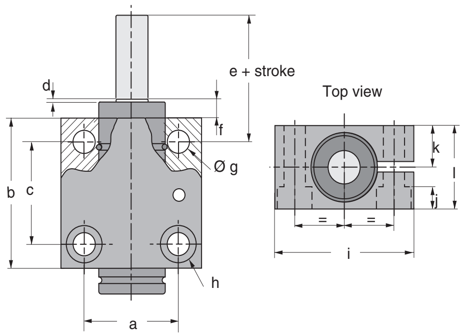
Body mount
SM

FCR



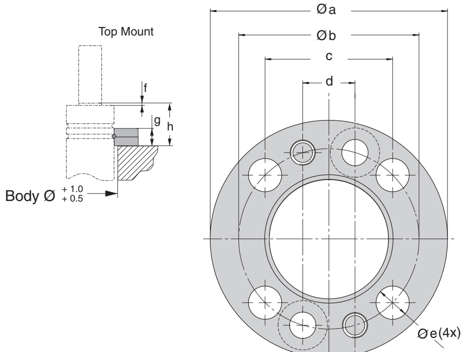
Order No.	Ø a	b	c	d	Ø e	f	g	h
FCR-150	50	34	18	30	7	1	9	21.5

SM



Order No.	a	b	c	d	e	f	Ø g	h	i	j	k	l
SM-150	36	54	38	1	14.5	6.5	8.4	13.5	52	7	15	30

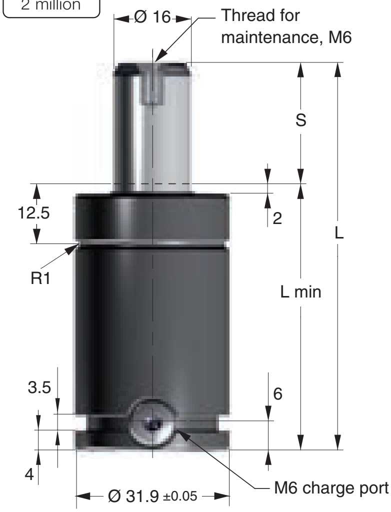
FC

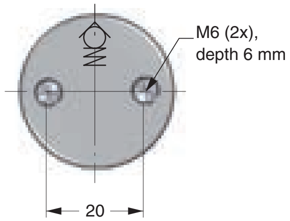


Order No.	Ø a	Ø b	c	d	Ø e	f	g	h
FC-150	50	38	26.9±0.25(4x)	11±0.1	7(4x)	1	9	21.5

X 350

2 million





The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a gas link system.

An upper C-groove, lower U-groove together with two M6 threaded holes allow various mounting possibilities using our standard mounts.

			Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C						
Order No.	S stroke		Initial	End force*	Ini-tial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 350-010	**	10		5,900		1,330	50	40	0.01	0.17	√
X 350-013	**	13		5,200		1,190	56	43	0.01	0.18	√
X 350-016	**	16		5,300		1,210	62	46	0.01	0.19	√
X 350-019		19		5,600		1,260	68	49	0.01	0.20	
X 350-025	**	25		5,500		1,260	80	55	0.02	0.22	√
X 350-032		32		5,500		1,260	94	62	0.02	0.24	
X 350-038	**	38	3,600	5,500	810	1,240	106	68	0.03	0.26	√
X 350-050	**	50		5,600		1,260	130	80	0.03	0.29	√
X 350-063	**	63		5,500		1,260	156	93	0.04	0.33	√
X 350-075		75		5,500		1,260	180	105	0.05	0.37	
X 350-080	**	80		5,500		1,240	190	110	0.05	0.39	√
X 350-100	**	100		5,500		1,240	230	130	0.06	0.45	√
X 350-125	**	125		5,500		1,240	280	155	0.08	0.53	√

* = at full stroke

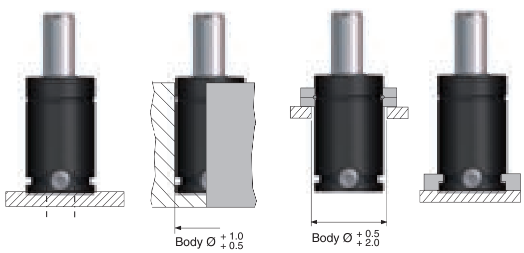
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

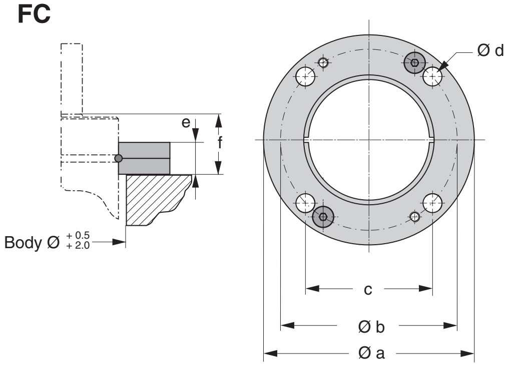
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018845

Mounting Possibilities



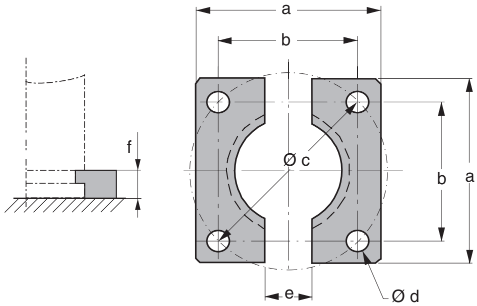
Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount FFC**

FC



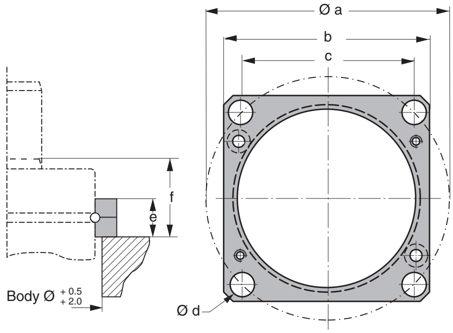
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-MC-150	60	49.5	35	7	9	17

FFC



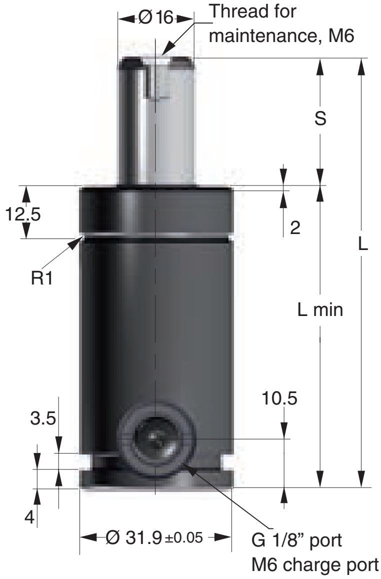
Order No.	a	b	Ø c	Ø d	e	f
FFC-MC-150	50	35	49.5	7	12	6.5

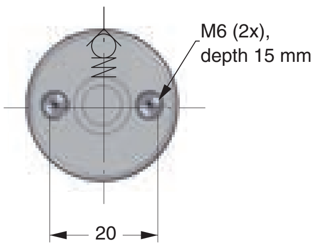
FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-32	49.5	45	35	7	9	17

2 million



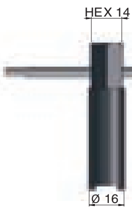


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm.

There is a side and a bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M6 threaded holes allow various mounting possibilities using our standard mounts.



Valve Plug
Installation Tool,
XG 350 - XG 750
Order No. 3022974

Order No.		S stroke	Force in N at 180 bar/+20°C Initial	Force in N at 180 bar/+20°C End force*	Force in lbf at 180 bar/+20°C Initial	Force in lbf at 180 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 350-010		10		5,900		1,330	60	50	0.01	0.23
XG 350-013		13		5,200		1,190	66	53	0.01	0.23
XG 350-016		16		5,300		1,210	72	56	0.01	0.24
XG 350-019		19		5,600		1,260	78	59	0.01	0.25
XG 350-025	**	25		5,500		1,260	90	65	0.02	0.27
XG 350-032		32		5,500		1,260	104	72	0.02	0.29
XG 350-038	**	38	3,600	5,500	810	1,240	116	78	0.03	0.31
XG 350-050	**	50		5,600		1,260	140	90	0.03	0.35
XG 350-063	**	63		5,500		1,260	166	103	0.04	0.39
XG 350-075	**	75		5,500		1,260	190	115	0.05	0.43
XG 350-080	**	80		5,500		1,240	200	120	0.05	0.44
XG 350-100	**	100		5,500		1,240	240	140	0.06	0.50
XG 350-125	**	125		5,500		1,240	290	165	0.08	0.58

* = at full stroke

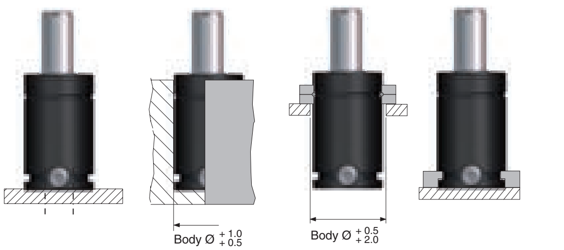
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

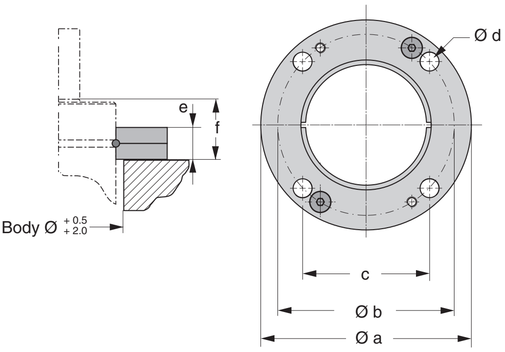
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018845

Mounting Possibilities



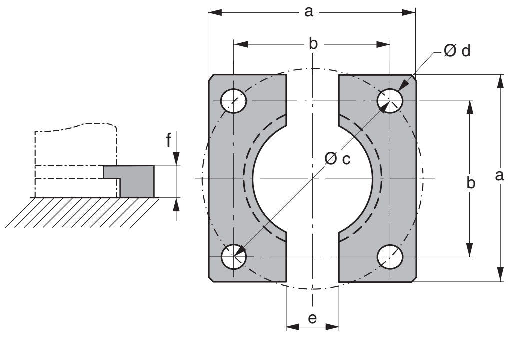
Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount FFC**

FC



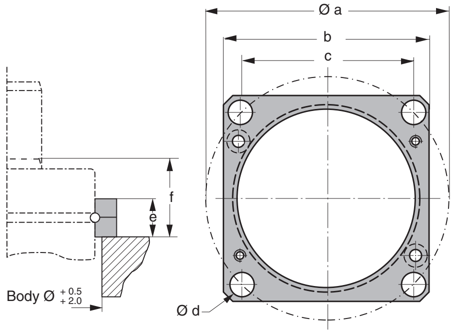
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-MC-150	60	49.5	35	7	9	17

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-XG-350	50	35	49.5	7	18	6.5

FCS



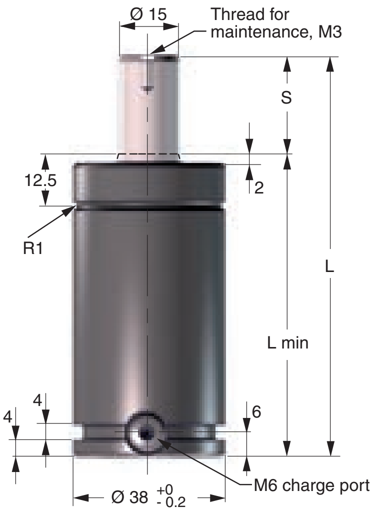
Order No.	Ø a	b	c	Ø d	e	f
FCS-32	49.5	45	35	7	9	17

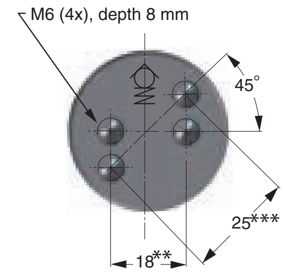
2 million

ISO

The TU line constitutes our standard line of gas springs. Sizes 250 to 10000 conform to the ISO 11901 gas spring standard as well as VDI 3003.

The total length L is 50 mm + (2 × stroke).





** = VDI mounting holes

*** = KALLER mounting holes

Order No.	S stroke		Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 250-010	**	10		3,500			70	60	0.011	0.40	√
TU 250-013	**	12.7		3,500			75.4	62.7	0.013	0.42	
TU 250-016	**	16		3,500			82	66	0.016	0.43	√
TU 250-025	**	25		3,500			100	75	0.023	0.48	√
TU 250-038	**	38.1	2,650	3,500	600	790	126.2	88.1	0.032	0.54	
TU 250-050	**	50		3,500			150	100	0.041	0.60	√
TU 250-064	**	63.5		3,500			177	113.5	0.051	0.67	
TU 250-080	**	80		3,500			210	130	0.062	0.75	√
TU 250-100	**	100		3,500			250	150	0.077	0.85	
TU 250-125	**	125		3,500			300	175	0.096	0.97	

* = at full stroke

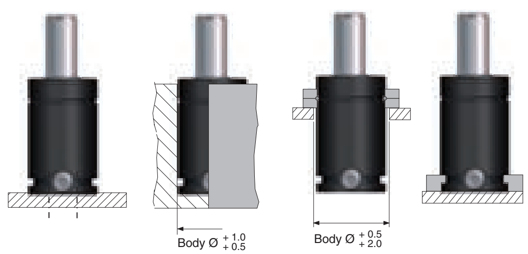
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 50 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3026638

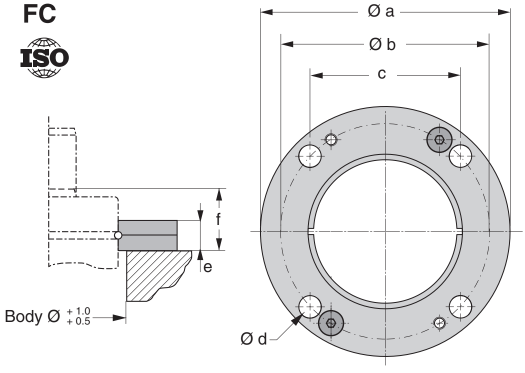
Mounting Possibilities



Base mount B | **Drop -in** | **Top mount FC, FCS** | **Foot mount K, FFC**

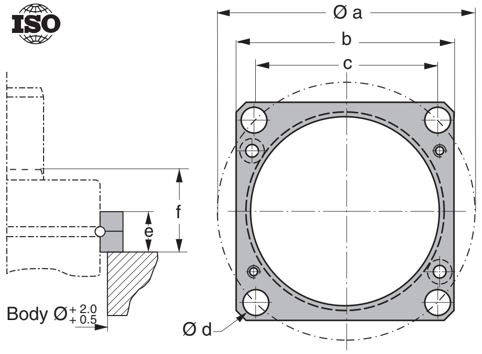
Note! For dimensions on mounting possibilities K-250 refer to “Special Mounts”.

FC



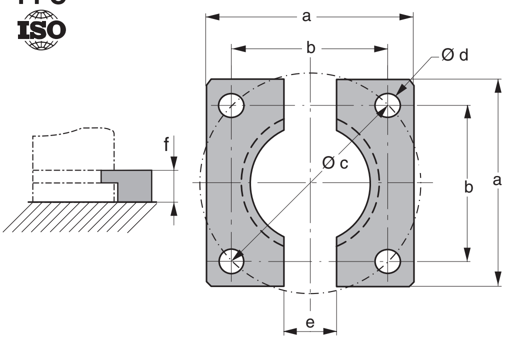
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-250	68	56.5	40	7	9	17

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-250	56.5	52	40	7	9	17

FFC

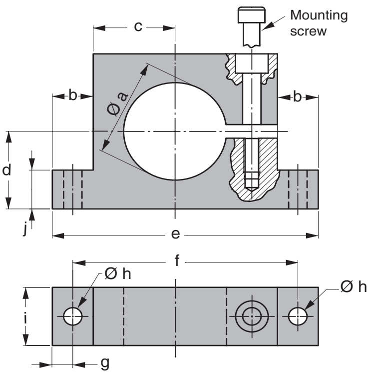


Order No.	a	b	Ø c	Ø d	e	f
FFC-250	55	40	56.6	7	12	6.5

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M6) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-250	38.1	18	24	27.5	95	77	8	9	20	15

Note! For dimensions on mounting possibilities K-250 refer to “Special Mounts”.

2 million

The TM and TI are threaded body 250 springs with the same length as the TU 250.

The TM spring has an M38 × 1.5 metric thread.

The TI spring has a UNF 1½-12 inch thread.

Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TM/TI 250-013	12.7		3,400		765	75.4	62.7	0.015	0.37
TM/TI 250-025	25		3,400		765	100	75	0.024	0.42
TM/TI 250-038	38.1		3,400		765	126.2	88.1	0.033	0.47
TM/TI 250-050	50	2,650	3,400	600	765	150	100	0.042	0.52
TM/TI 250-064	63.5		3,500		790	177	113.5	0.052	0.57
TM/TI 250-080	80		3,500		790	210	130	0.063	0.64
TM/TI 250-100	100		3,500		790	250	150	0.078	0.72
TM/TI 250-125	125		3,500		790	300	175	0.096	0.085

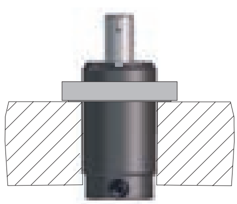
* = at full stroke

Basic Information

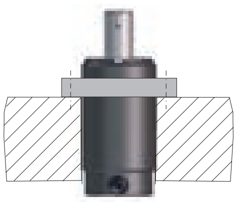
For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 50 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 2013691-0250

Mounting Possibilities

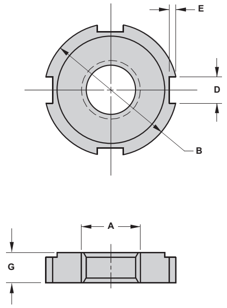


Lock nut
FRM, FRI



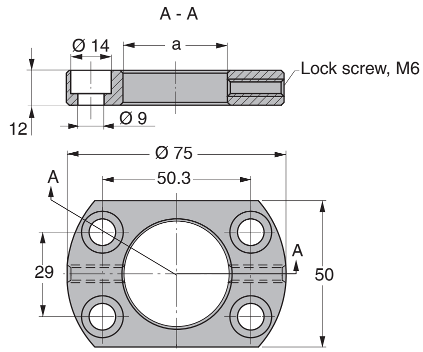
Top mount
FTM

FRM/FRI



Order No.	Ø a	b	c	d	e
FRM-250	58	3.5	8	11	M38 x 1.5
FRI-250	58	3.5	8	11	UNF 1 ½-12

FTM



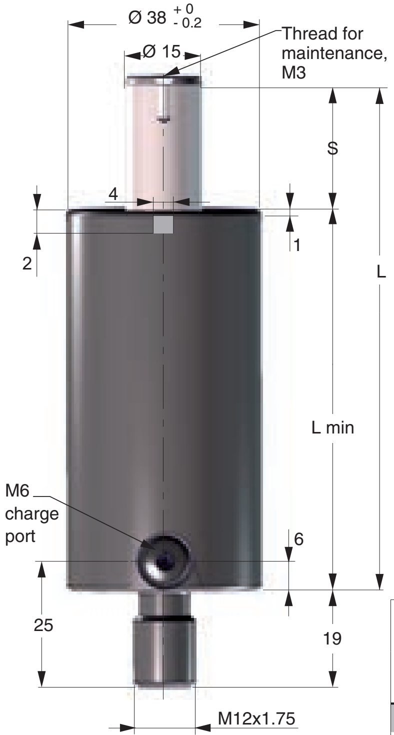
Order No.	a
FTM-250	M38 x 1.5

2 million

The TMS are 250 springs equipped with a threaded stud for mounting.

The TMS (Tube Metric Stud) has a M12 thread.

It has the same basic length as the TU 250 spring.



Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TMS 250-013	12.7	2,650	3,400	600	765	75.4	62.7	0015	0.45
TMS 250-025	25		3,400		765	100	75	0.024	0.50
TMS 250-038	38.1		3,400		765	126.2	88.1	0.033	0.55
TMS 250-050	50		3,400		765	150	100	0.042	0.60
TMS 250-064	63.5		3,500		790	177	113.5	0.052	0.65
TMS 250-080	80		3,500		790	210	130	0.063	0.70
TMS 250-100	100		3,500		790	250	150	0.078	0.80

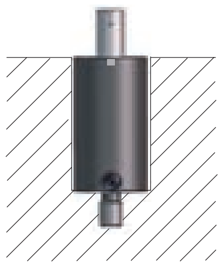
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 50 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

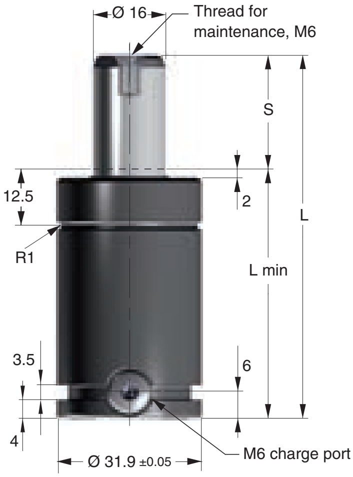
Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 2013691-0250

Mounting Possibilities



Thread mount M12x1.75

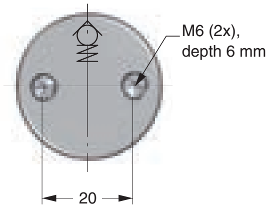
2 million



Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic molding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:
- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- M6 gas ports can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C (20°C)	3,630 (3,000)	5,550 (4,600)
80 – 100°C	15	125	100°C (20°C)	3,200 (2,510)	4,900 (3,850)
100 – 120°C	10	115	120°C (20°C)	3,100 (2,310)	4,750 (3,540)



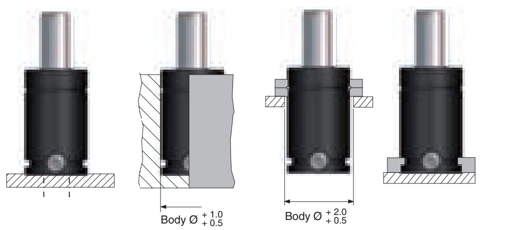
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 300-010	10	3,000	675	50	40	0.01	0.17
MT 300-013	13			56	43	0.01	0.17
MT 300-016	16			62	46	0.01	0.19
MT 300-019	19			68	49	0.01	0.20
MT 300-025	25			80	55	0.02	0.21
MT 300-032	32			94	62	0.02	0.23
MT 300-038	38			106	68	0.03	0.25
MT 300-050	50			130	80	0.03	0.29
MT 300-063	63			156	93	0.04	0.33
MT 300-075	75			180	105	0.05	0.36
MT 300-080	80			190	110	0.05	0.38

Basic Information

For general information, see “About Gas Springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... See table above
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 – +120°C
Force increase by temperature.................. ±0.3 %/°C
Recommended max. strokes/min. .... See table above
Max. piston rod velocity .... 1.0 m/s
Service life (0 to 80°C)............................... 1,000,000 strokes
or .... 100,000 stroke meters*
Service life (80 to 120°C)............................ 500,000 strokes
or .... 50,000 stroke meters*

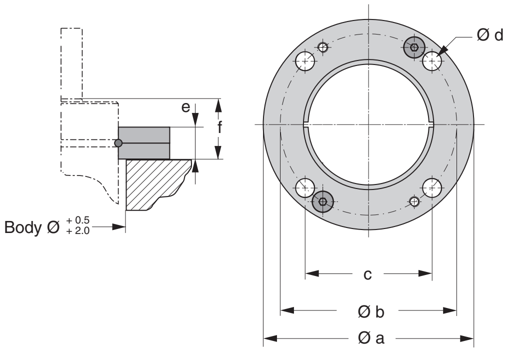
Rod & tube surface.................................... Nitrided
Repair kit 3022687

Mounting Possibilities



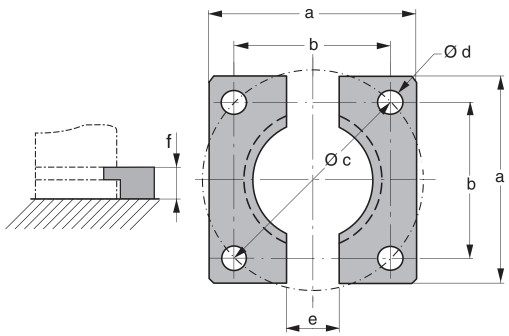
Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount FFC, MC**

FC



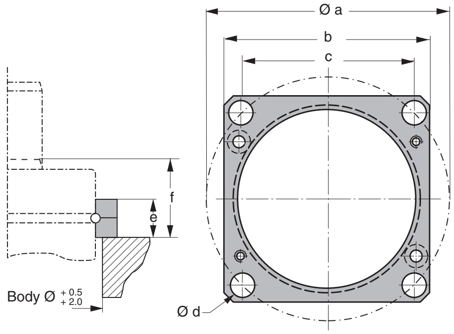
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-MC-150	60	49.5	35	7	9	17

FFC



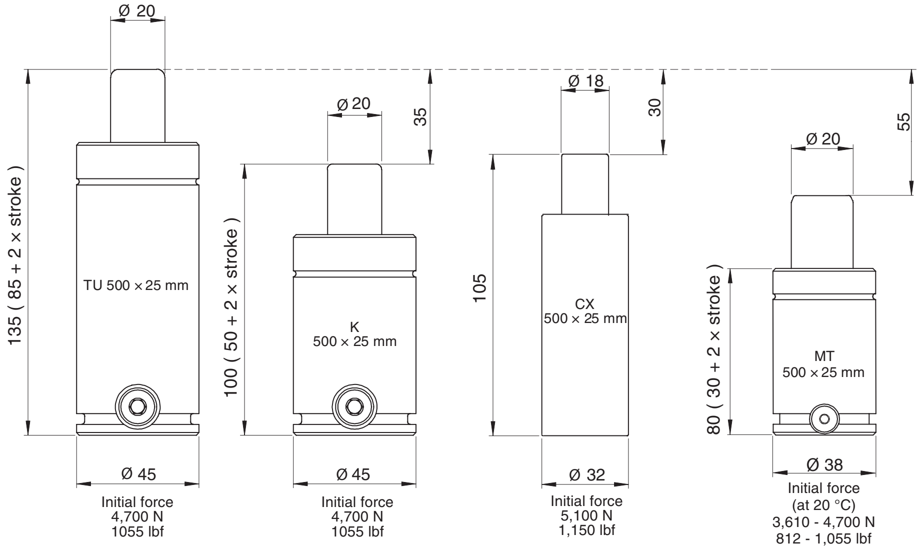
Order No.	a	b	Ø c	Ø d	e	f
FFC-MC-150	50	35	49.5	7	12	6.5

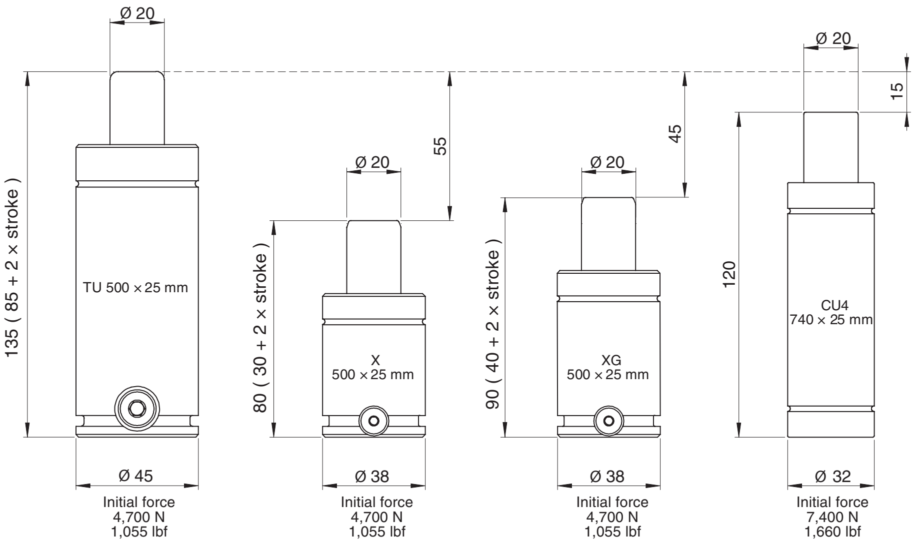
FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-32	49.5	45	35	7	9	17

Overview - $5000 \leq F_{INIT} < 7500$

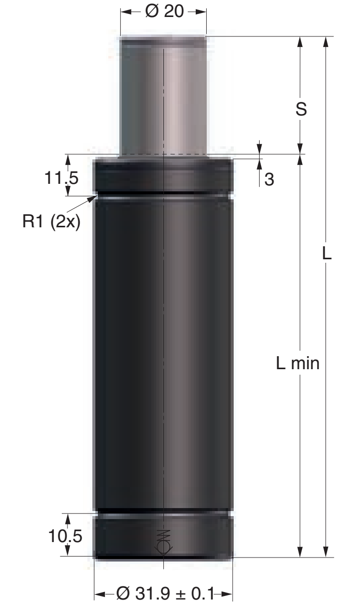


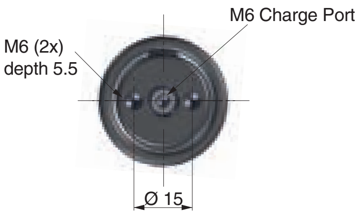


2 million

The CU4 gas springs are a very compact Bore Sealed gas springs, offering impressive force in a compact body.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 740-006	6		10,000		2,200	63	57	0.012	0.20
CU4 740-010	10		10,000		2,250	75	65	0.017	0.24
CU4 740-016	16		11,000		2,475	93	77	0.024	0.28
CU4 740-025	25	7,400	12,000	1,660	2,700	120	95	0.034	0.33
CU4 740-032	32*		12,000		2,700	140	108	0.042	0.37
CU4 740-040	40*		12,000		2,700	165	125	0.052	0.42
CU4 740-050	50*		12,000		2,700	195	145	0.063	0.48

* = Should always be attached to the tool using the tapped holes in the bottom or a flange

** = at full stroke

Basic Information

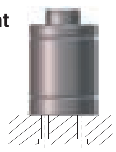
For general information see "About gas springs".

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20° C)
Min. charging pressure .... 25 bar (at 20° C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50-100 (at 20°C)
Max piston rod velocity .... 0.8 m/s

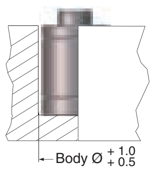
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit .... Non-repairable

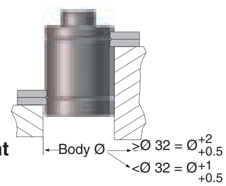
Mounting Possibilities

Base mount B



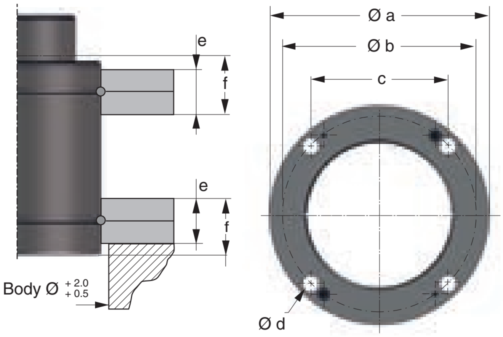
Drop-in





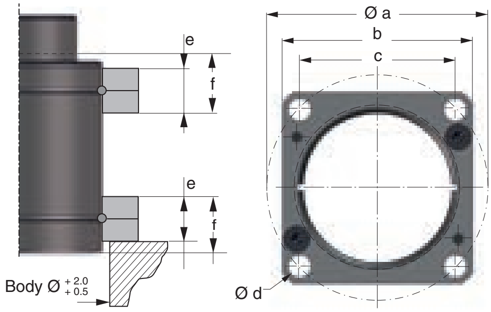
Top mount FC, FCS

FC



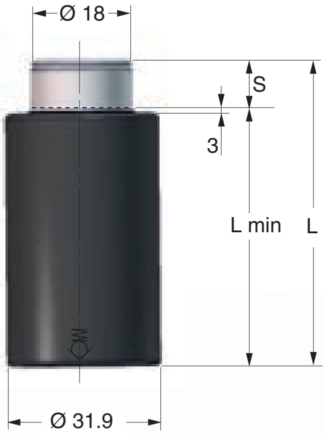
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 740	FC-MC-150	60	49.5	35	7	9	16

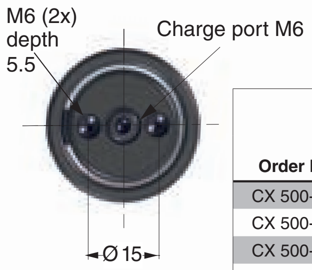
FCS



For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 740	FCS-32	49.5	45	35	7	9	16

2 million





With its unique safety and reliability features, KALLER Compact Xtreme CX is a extremely compact and powerful piston rod sealed gas spring series. Using the CX gas spring is an excellent way to achieve more cost efficient dies due to lower die height. With its extremely compact build height and cylinder diameters, the CX gas spring can reach extreme initial forces, ranging from 5,100 N to 19,200 N with stroke lengths up to 80 mm. The CX gas spring series is similar to the KALLER Power Line X series and provide extreme forces comparable to the bore sealed KALLER Super Compact CU4 series. In addition, the CX gas spring can handle higher running frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate. Additional high force in a small area when baseplate mounted.

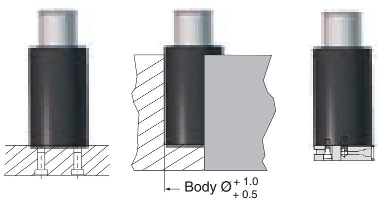
Order No.	S stroke	Force in N at 200 bar/+20°C Initial	End force**	Force in lbf at 200 bar/+20°C Initial	End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CX 500-010	10		6,600		1,490	75	65	0.01	0.27
CX 500-015	15		7,100		1,610	85	70	0.02	0.29
CX 500-025	25		7,900		1,780	105	80	0.02	0.33
CX 500-038	38*	5,100	8,700	1,150	1,960	130	92	0.03	0.37
CX 500-050	50*		9,100		2,040	155	105	0.04	0.42
CX 500-063	63*		8,800		1,990	190	127	0.05	0.50
CX 500-080	80*		9,200		2,060	225	145	0.06	0.56

Note! For stroke lengths over 25 mm, the spring should be attached to the tool using the threaded holes in the bottom.
** At full stroke.

Basic Information

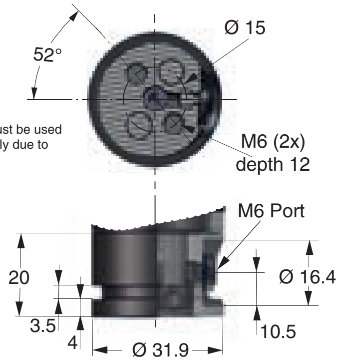
Pressure medium............................ Nitrogen
Max. charging pressure................... 200 bar
Min. charging pressure.................... 25 bar
Operating temperature.................... 0 - +80°C
Force increase by temperature........ ±0.3%/°C
Recommended max. strokes/min.... ~70-200 (at 20°C)
Max. piston rod velocity................... 1.6 m/s

Mounting Possibilities



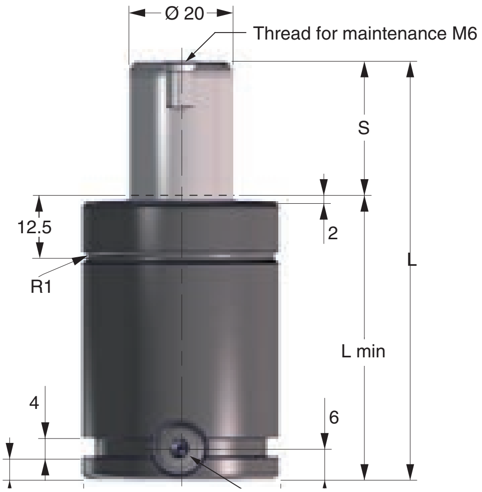
Base mount B | **Drop - in** | **Side port SPCX**

SPCX



Note! SPCX-500 must be used in linked systems only due to lack of valve.

For model	Order No.	For U-groove mounts on SPCX
CX-500	SPCX-500	U-groove mount is equal to X 350

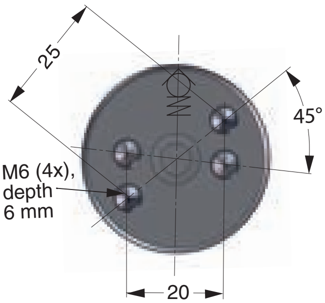


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M6 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 500-010	**	10		7,200		1,620	50	40	0.01	0.25	√
X 500-013	**	13		7,100		1,600	56	43	0.01	0.26	√
X 500-016	**	16		7,200		1,620	62	46	0.02	0.27	√
X 500-019		19		7,400		1,660	68	49	0.02	0.29	
X 500-025	**	25		7,300		1,640	80	55	0.03	0.31	√
X 500-032		32		7,200		1,620	94	62	0.03	0.34	
X 500-038	**	38	4,700	7,200	1,055	1,620	106	68	0.04	0.36	√
X 500-050	**	50		7,200		1,620	130	80	0.05	0.41	√
X 500-063	**	63		7,200		1,620	156	93	0.06	0.46	√
X 500-075		75		7,100		1,600	180	105	0.07	0.50	
X 500-080	**	80		7,100		1,600	190	110	0.08	0.52	√
X 500-100	**	100		7,100		1,600	230	130	0.10	0.60	√
X 500-125	**	125		7,100		1,600	280	155	0.12	0.69	√

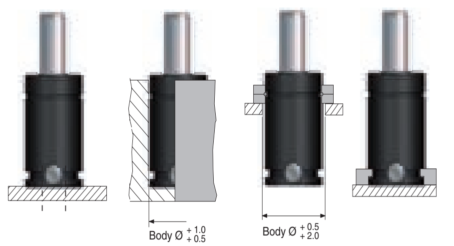
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018846

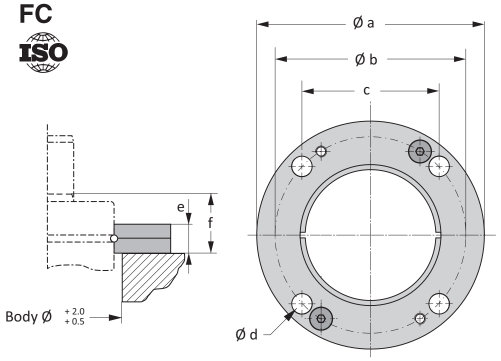
Mounting Possibilities



Base mount B **Drop - in** **Top mount FC, FCS** **Foot mount K, FFC**

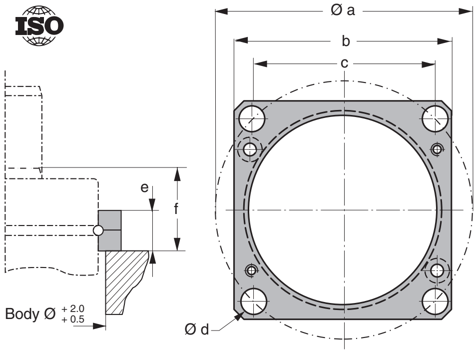
Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

FC



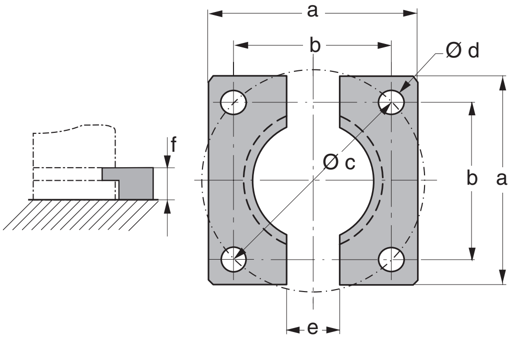
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-250	68	56.5	40	7	9	17

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-250	56.5	52	40	7	9	17

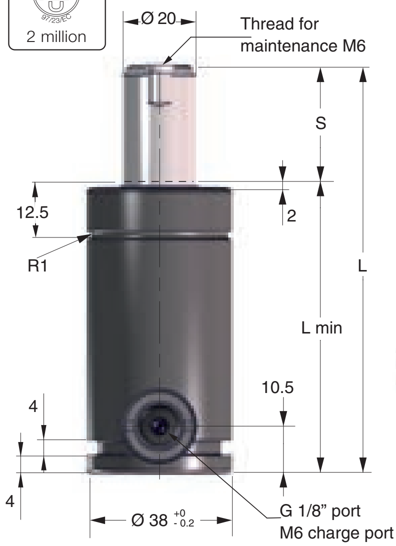
FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-250	55	40	56.6	7	12	6.5

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

APPROVED PED 97/23/EC
2 million

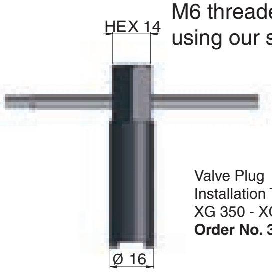


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

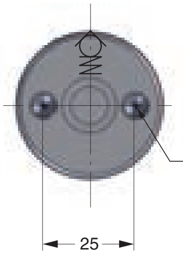
These gas springs are available with forces from 3500 N up to 66000 N and stroke lengths between 10 and 125 mm.

There is a side port for gas charging that also can be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M6 threaded holes allow various mounting possibilities using our standard mounts.



Valve Plug
Installation Tool,
XG 350 - XG 750
Order No. 3022974



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 500-010		10		7,200		1,620	60	50	0.01	0.33
XG 500-013		13		7,100		1,600	66	53	0.01	0.34
XG 500-016		16		7,200		1,620	72	56	0.02	0.36
XG 500-019		19		7,400		1,660	78	59	0.02	0.37
XG 500-025	**	25		7,300		1,640	90	65	0.03	0.39
XG 500-032		32		7,200		1,620	104	72	0.03	0.42
XG 500-038	**	38	4,700	7,200	1,055	1,620	116	78	0.04	0.44
XG 500-050	**	50		7,200		1,620	140	90	0.05	0.49
XG 500-063	**	63		7,200		1,620	166	103	0.06	0.54
XG 500-075	**	75		7,100		1,600	190	115	0.07	0.58
XG 500-080	**	80		7,100		1,600	200	120	0.08	0.60
XG 500-100	**	100		7,100		1,600	240	140	0.10	0.68
XG 500-125	**	125		7,100		1,600	290	165	0.12	0.77

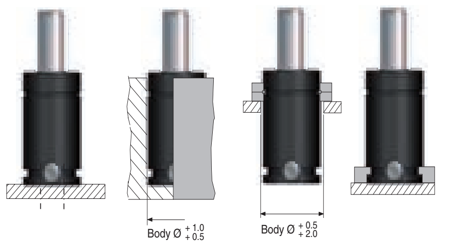
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

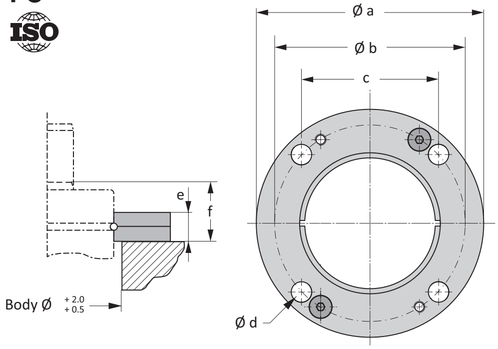
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018846

Mounting Possibilities



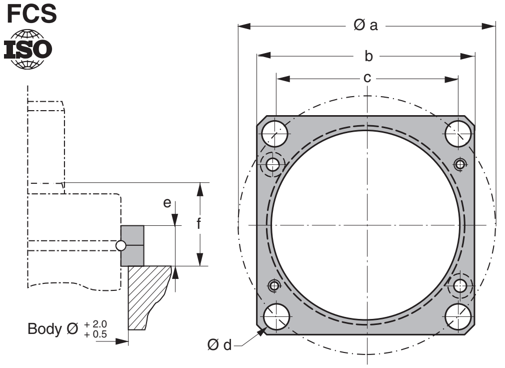
Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount K, FFC**

FC



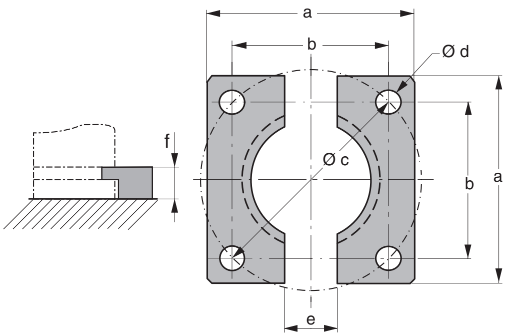
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-250	68	56.5	40	7	9	17

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-250	56.5	52	40	7	9	17

FFC



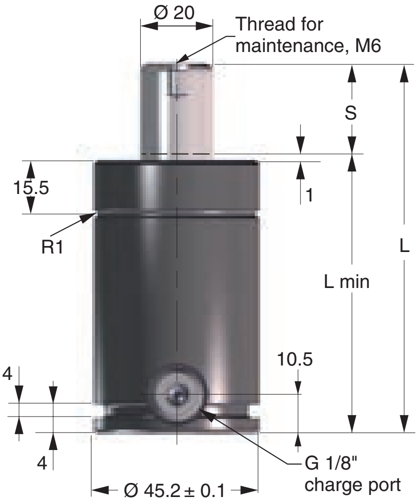
Order No.	a	b	Ø c	Ø d	e	f
FFC-XG-500	55	40	56.6	7	18	6.5

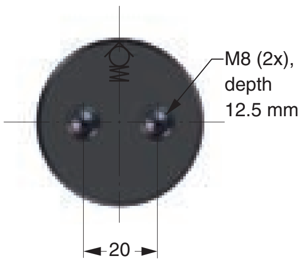
Note! For dimensions on mounting possibility K refer to "Special Mounts".

2 million

This is a short height hoseable spring with an initial force of 4,700 N.

The K 500 has a total length of 50 mm + (2 × stroke). This spring is 35 mm shorter than the TU 500. Mounting options are the same as for the TU 500.





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
K 500-006	6		5,600		1,260	62	56	0.02	0.50
K 500-013	12.7		5,900		1,330	75.4	62.7	0.03	0.54
K 500-019	19		6,100		1,370	88.1	69.05	0.04	0.59
K 500-025	25		6,100		1,370	100	75	0.04	0.62
K 500-038	38.1	4,700	6,200	1,055	1,390	126.2	88.1	0.06	0.71
K 500-050	50		6,300		1,420	150	100	0.07	0.78
K 500-064	63.5		6,300		1,420	177	113.5	0.09	0.88
K 500-080	80		6,600		1,480	210	130	0.11	0.98
K 500-100	100		6,600		1,480	250	150	0.12	1.12
K 500-125	125		6,600		1,480	300	175	0.15	1.28

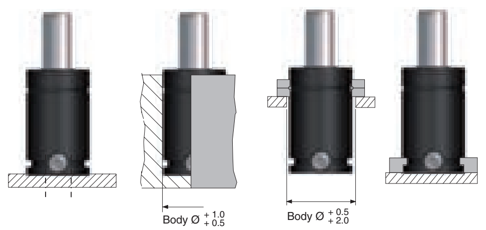
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3t 20°C)
Recommended max strokes/min ... ~ 40 - 80 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3017230-0500

Mounting Possibilities

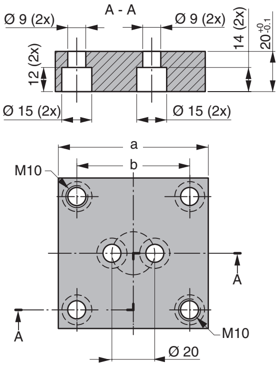


Base mount B, MP | **Drop -in** | **Top mount FC, FCS** | **Foot mount K, FFC**

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

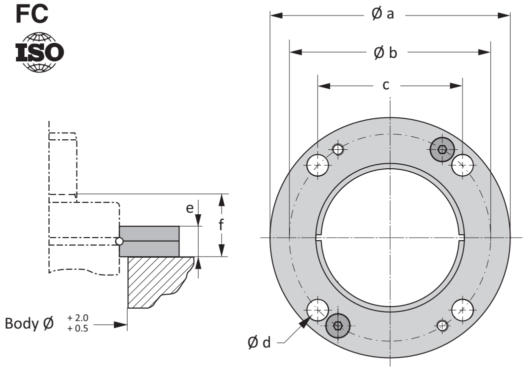
MP

Note! Comes complete with screws to mount gas spring.



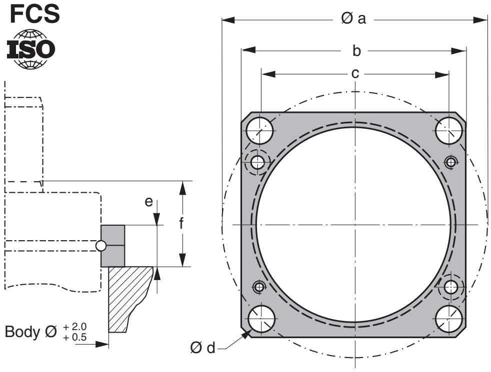
Order No.	a	b
MP-500	70	50

FC



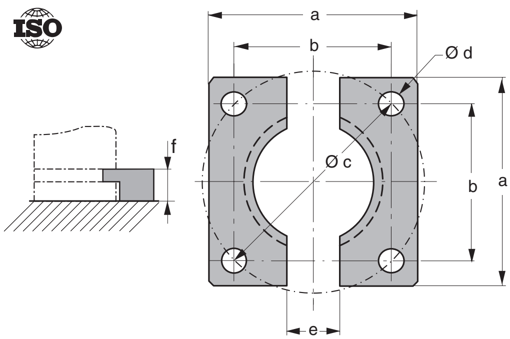
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	22

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	22

FFC



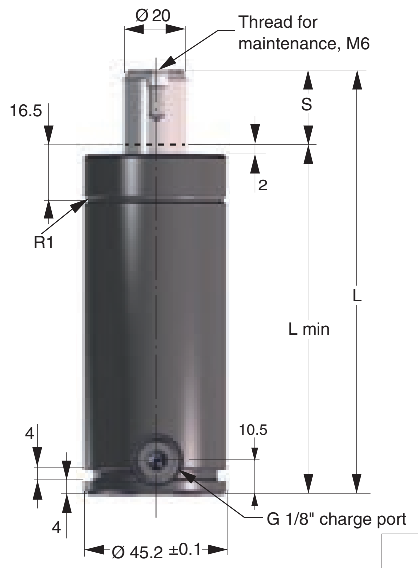
Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

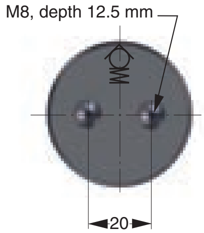
Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

2 million

The TU line constitutes our standard line of gas springs. Sizes 250 to 10000 conform to the ISO 11901 gas spring standard.

The TU 500 has a total length of 85 mm + (2 × stroke).





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 500-010		10	4,700	6,000	1,055	1,350	105	95	0.023	0.93	
TU 500-013	**	12.7		6,100		1,370	110.4	97.7	0.025	0.95	
TU 500-025	**	25		6,400		1,440	135	110	0.038	1.04	√
TU 500-038	**	38.1		6,500		1,460	161.2	123.1	0.051	1.13	
TU 500-050	**	50		6,600		1,480	185	135	0.063	1.21	√
TU 500-064	**	63.5		6,600		1,480	212	148.5	0.077	1.31	
TU 500-080	**	80		6,700		1,510	245	165	0.093	1.43	√
TU 500-100	**	100		6,700		1,510	285	185	0.114	1.57	
TU 500-125	**	125		6,700		1,510	335	210	0.139	1.74	
TU 500-160	**	160		6,700		1,510	405	245	0.175	1.99	

* = at full stroke

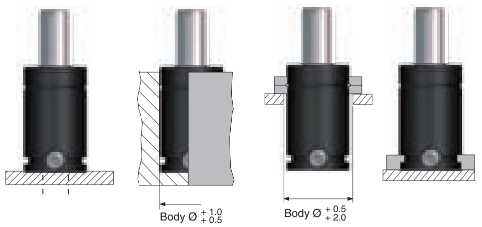
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40-80 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 2026637-0500

Mounting Possibilities



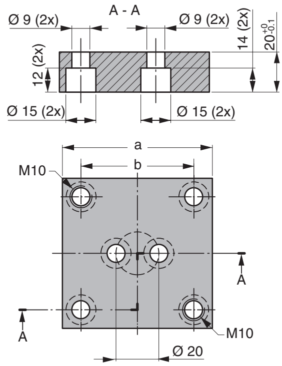
Base mount **B, MP** | **Drop -in** | **Top mount** **FC, FCS** | **Foot mount** **K, FFC**

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

MP

ISO

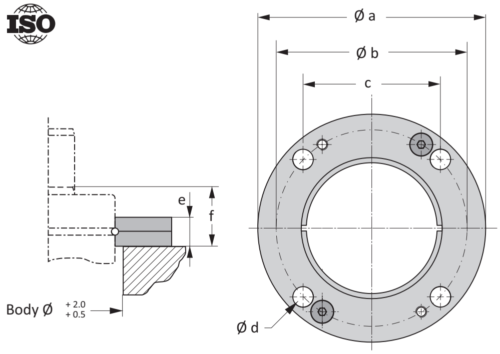
Note! Comes complete with screws to mount gas spring.



Order No.	a	b
MP-500	70	50

FC

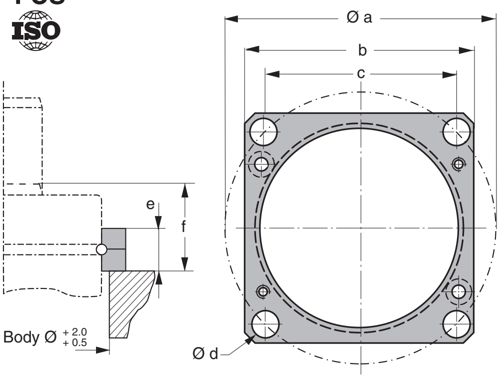
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	23

FCS

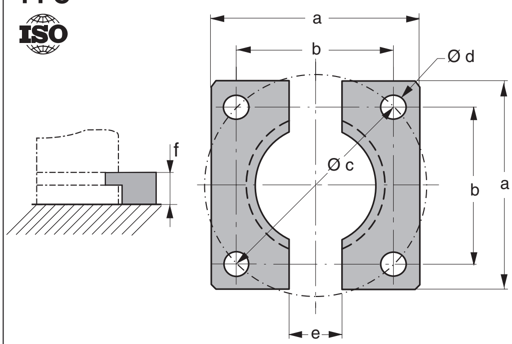
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	23

FFC

ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

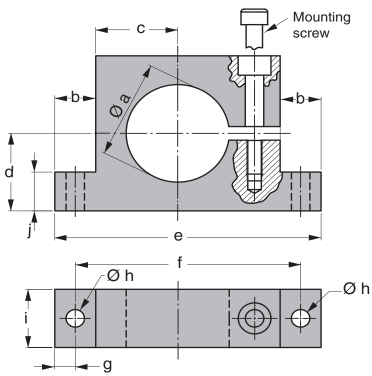
Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

S

ISO

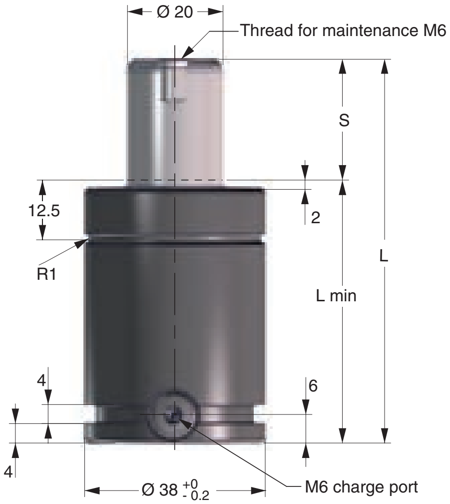
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M8) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-500	45.4	17	29	30	100	82	9	9	20	15

2 million



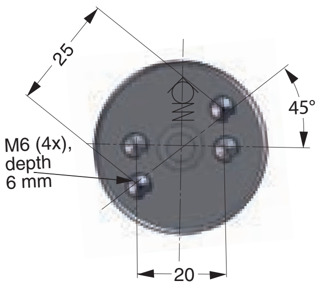
Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic moulding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:

- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- M6 gas ports can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C (20°C)	5,680 (4,700)	8,690 (7,200)
80 – 100°C	15	125	100°C (20°C)	5,000 (3,930)	7,650 (6,010)
100 – 120°C	10	115	120°C (20°C)	4,850 (3,610)	7,420 (5,520)

* = at full stroke



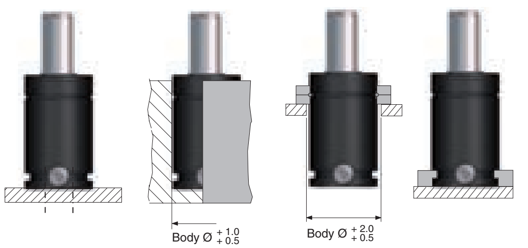
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 500-010	10	4,700	1,055	50	40	0.01	0.25
MT 500-013	13			56	43	0.01	0.26
MT 500-016	16			62	46	0.02	0.27
MT 500-019	19			68	49	0.02	0.28
MT 500-025	25			80	55	0.03	0.31
MT 500-032	32			94	62	0.03	0.34
MT 500-038	38			106	68	0.04	0.36
MT 500-050	50			130	80	0.05	0.40
MT 500-063	63			156	93	0.06	0.45
MT 500-075	75			180	105	0.07	0.50
MT 500-080	80			190	110	0.08	0.52

Basic Information

For general information, see "About Gas Springs".
Pressure medium .... Nitrogen
Max. charging pressure .... See table above
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 – +120°C
Force increase by temperature.................... ±0.3 %/°C
Recommended max. strokes/min. .... See table above
Max. piston rod velocity .... 1.0 m/s
Service life (0 to 80°C)................................ 1,000,000 strokes
or .... 100,000 stroke meters*
Service life (80 to 120°C)............................ 500,000 strokes
or .... 50,000 stroke meters*

Rod & tube surface..................................... Nitrided
Repair kit 3022688

Mounting Possibilities

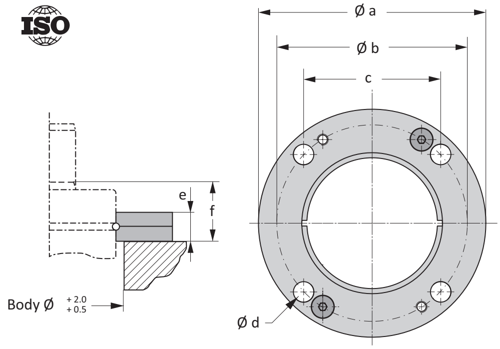


Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount K, FFC**

Note! For dimensions on mounting possibility K-500 refer to "Special Mounts".

FC

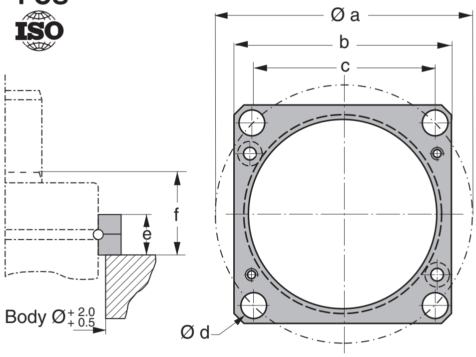
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-250	68	56.5	40	7	9	17

FCS

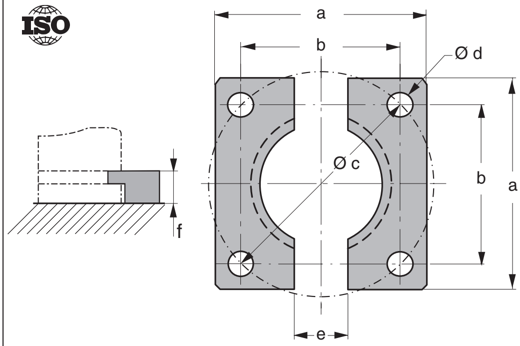
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-250	56.5	52	40	7	9	17

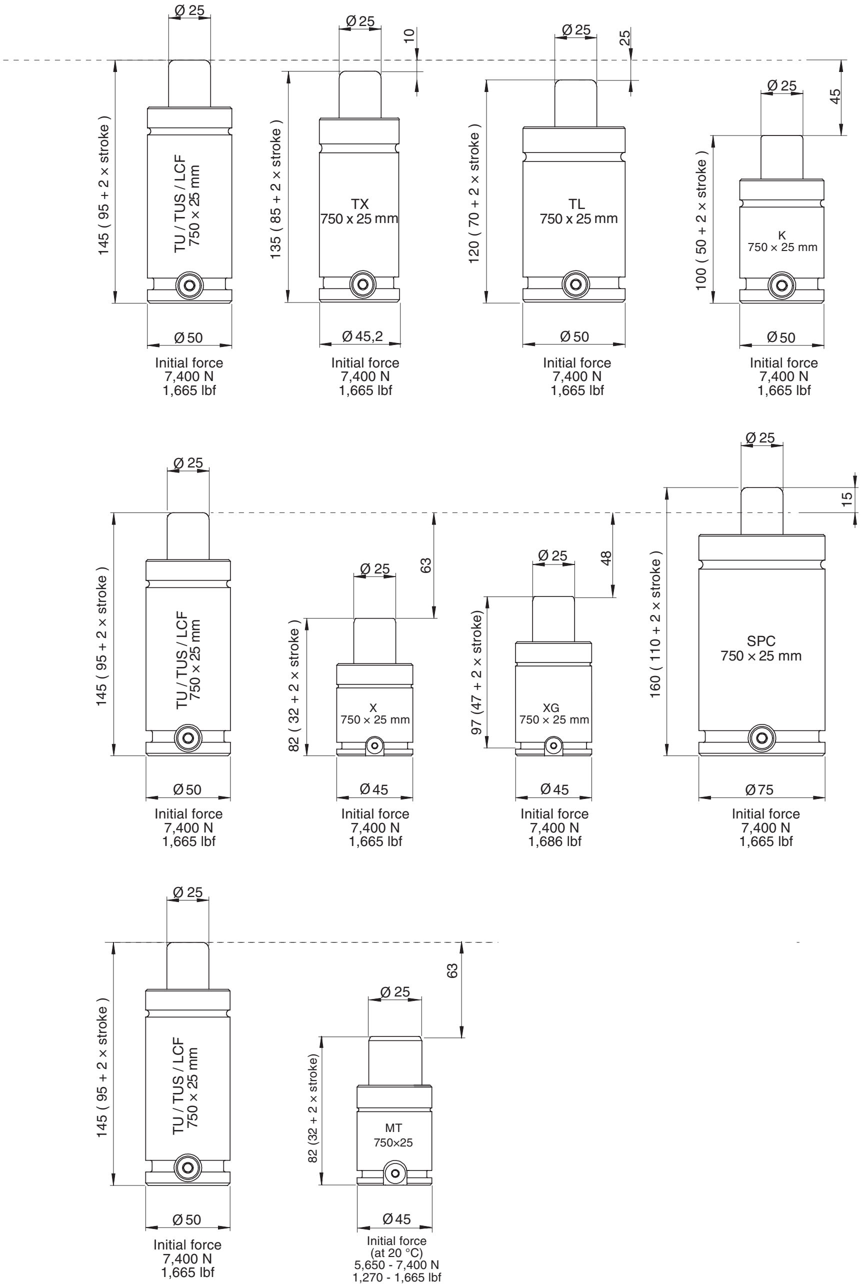
FFC

ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-250	55	40	56.6	7	12	6.5

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.


Ø 25
145 (95 + 2 × stroke)
TU / TUS / LCF
750 × 25 mm
Ø 50
Initial force
7,400 N
1,665 lbf
Ø 25
10
135 (85 + 2 × stroke)
TX
750 x 25 mm
Ø 45,2
Initial force
7,400 N
1,665 lbf
Ø 25
25
120 (70 + 2 × stroke)
TL
750 x 25 mm
Ø 50
Initial force
7,400 N
1,665 lbf
Ø 25
45
100 (50 + 2 × stroke)
K
750 × 25 mm
Ø 50
Initial force
7,400 N
1,665 lbf
Ø 25
145 (95 + 2 × stroke)
TU / TUS / LCF
750 × 25 mm
Ø 50
Initial force
7,400 N
1,665 lbf
Ø 25
63
82 (32 + 2 × stroke)
X
750 × 25 mm
Ø 45
Initial force
7,400 N
1,665 lbf
Ø 25
48
97 (47 + 2 × stroke)
XG
750 × 25 mm
Ø 45
Initial force
7,400 N
1,686 lbf
Ø 25
15
160 (110 + 2 × stroke)
SPC
750 × 25 mm
Ø 75
Initial force
7,400 N
1,665 lbf
Ø 25
145 (95 + 2 × stroke)
TU / TUS / LCF
750 × 25 mm
Ø 50
Initial force
7,400 N
1,665 lbf
Ø 25
63
82 (32 + 2 × stroke)
MT
750×25
Ø 45
Initial force
(at 20 °C)
5,650 - 7,400 N
1,270 - 1,665 lbf

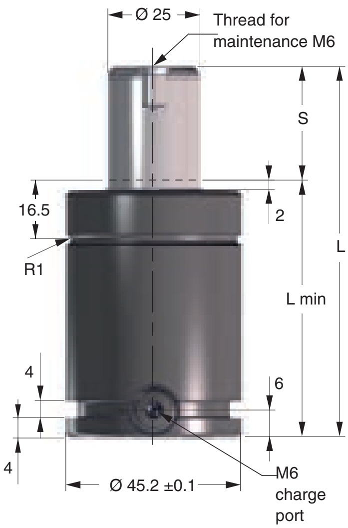
2 million

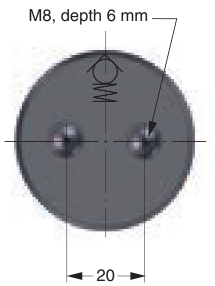
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.





Order No.	S stroke		Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 750-010	**	10		12,100		2,720	52	42	0.02	0.37	
X 750-013	**	13		12,100		2,720	58	45	0.02	0.39	√
X 750-016	**	16		12,100		2,720	64	48	0.03	0.41	
X 750-019		19		11,700		2,630	70	51	0.03	0.41	
X 750-025	**	25		11,800		2,650	82	57	0.04	0.45	√
X 750-032		32		11,800		2,650	96	64	0.05	0.50	
X 750-038	**	38	7,400	11,800	1,665	2,650	108	70	0.05	0.53	√
X 750-050	**	50		11,800		2,650	132	82	0.07	0.61	√
X 750-063	**	63		11,800		2,650	158	95	0.09	0.69	√
X 750-075		75		11,900		2,675	182	107	0.10	0.77	
X 750-080	**	80		11,900		2,675	192	112	0.11	0.80	√
X 750-100	**	100		11,900		2,675	232	132	0.13	0.93	√
X 750-125	**	125		11,900		2,675	282	157	0.17	1.09	√

* = at full stroke ** Recommended stroke length for optimal delivery

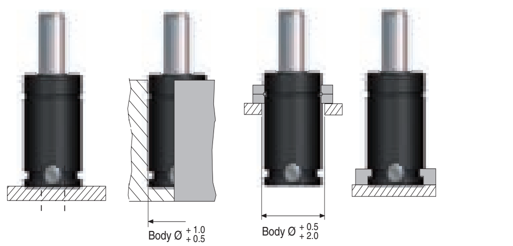
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3019903

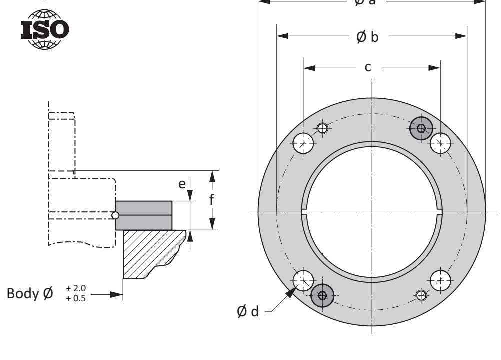
Mounting Possibilities



Base mount B **Drop - in** **Top mount FC, FCS** **Foot mount K, FFC**

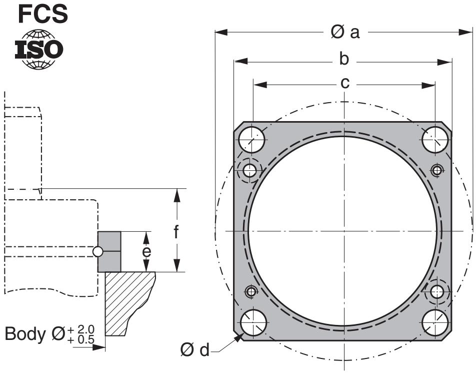
Note! For dimensions on mounting possibility K-750 refer to “Special Mounts”.

FC



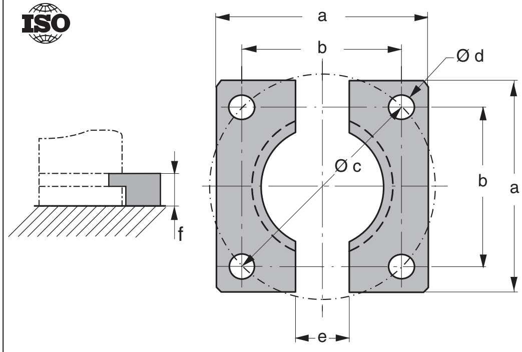
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	23

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	23

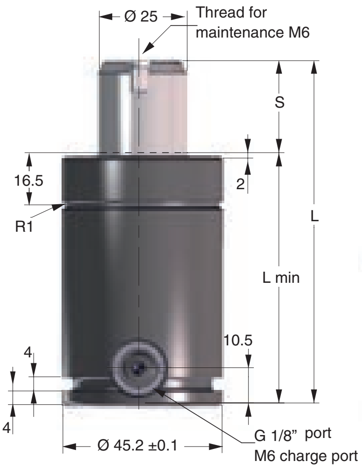
FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.

2 million

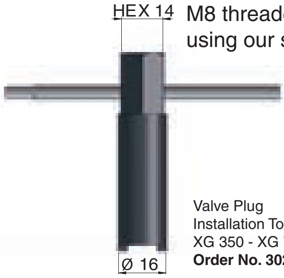


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

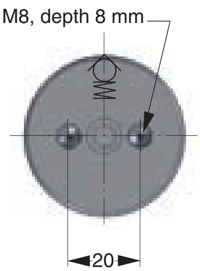
These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm.

There is a side and a bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.



Valve Plug
Installation Tool,
XG 350 - XG 750
Order No. 3022974



Order No.	S stroke		Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 750-010		10		12,100		2,720	67	57	0.02	0.55
XG 750-013		13		12,100		2,720	73	60	0.02	0.55
XG 750-016		16		12,100		2,720	79	63	0.03	0.57
XG 750-019		19		11,700		2,630	85	66	0.03	0.58
XG 750-025	**	25		11,800		2,650	97	72	0.04	0.62
XG 750-032		32		11,800		2,650	111	79	0.05	0.66
XG 750-038	**	38	7,400	11,800	1,665	2,650	123	85	0.05	0.70
XG 750-050	**	50		11,800		2,650	147	97	0.07	0.78
XG 750-063	**	63		11,800		2,650	173	110	0.09	0.86
XG 750-075	**	75		11,900		2,675	197	122	0.10	0.93
XG 750-080	**	80		11,900		2,675	207	127	0.11	0.97
XG 750-100	**	100		11,900		2,675	247	147	0.13	1.09
XG 750-125	**	125		11,900		2,675	297	172	0.17	1.25

* = at full stroke

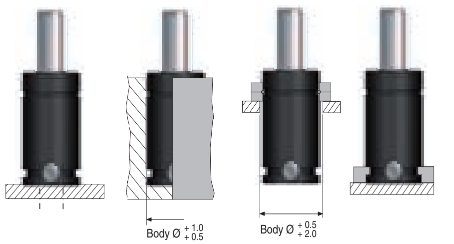
** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3019903

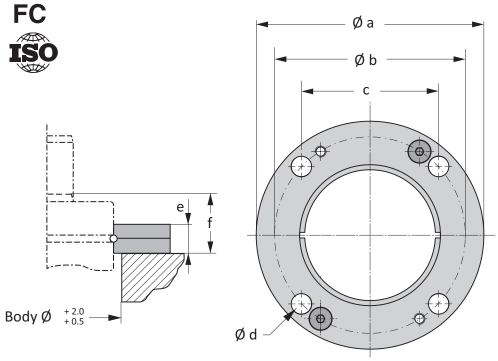
Mounting Possibilities



Base mount B | **Drop - in** | **Top mount FC, FCS** | **Foot mount K, FFC**

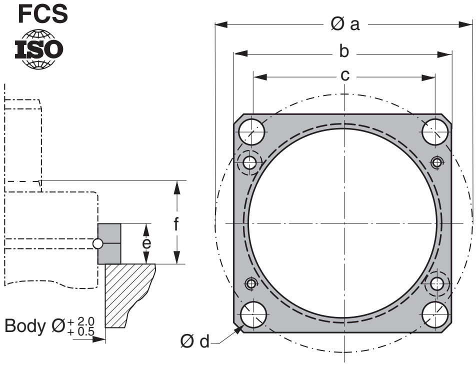
Note!
For dimensions on mounting possibility K refer to "Special Mounts".

FC



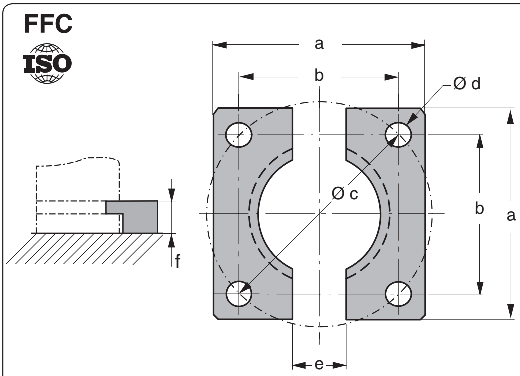
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	22

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	22

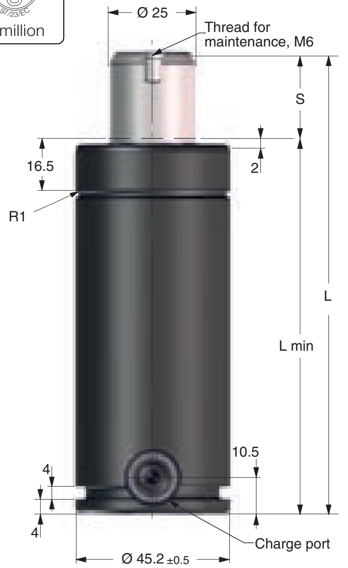
FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

Note! For dimensions on mounting possibility K refer to "Special Mounts".

2 million

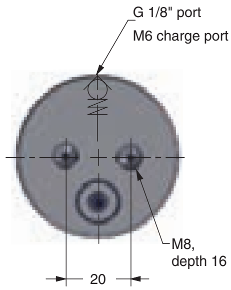


The Power Line – Heavy Duty Series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TX 750-013	13		12,000		2,700	111	98	0.04	0.85
TX 750-025	25		12,000		2,700	135	110	0.06	0.93
TX 750-038	38		12,000		2,700	161	123	0.07	1.01
TX 750-050	50		12,000		2,700	185	135	0.09	1.09
TX 750-063	63		12,000		2,700	211	148	0.11	1.17
TX 750-075	75		12,000		2,700	235	160	0,12	1.25
TX 750-080	80	7,400	12,000	1,665	2,700	245	165	0.13	1.28
TX 750-100	100		12,000		2,700	285	185	0.15	1.41
TX 750-125	125		12,100		2,720	335	210	0.19	1.56
TX 750-150	150		12,100		2,720	385	235	0.22	1.72
TX 750-160	160		12,100		2,720	405	245	0.23	1.79
TX 750-175	175		12,000		2,720	435	260	0.25	1.88
TX 750-200	200		12,100		2,720	485	285	0.28	2.04

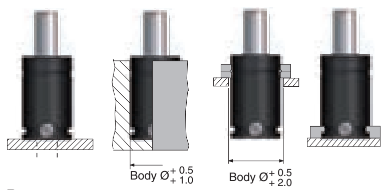
* = at full stroke

Basic Information

For general information see “About gas springs”
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure........................ 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3026200

Mounting Possibilities

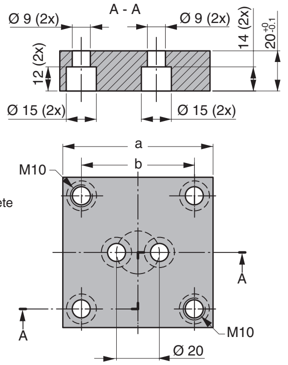


Base mount **B, MP** | **Drop - in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC**

Note! For dimensions on mounting possibilities K-500 and FCSC-500 refer to “Special Mounts”.

MP

ISO

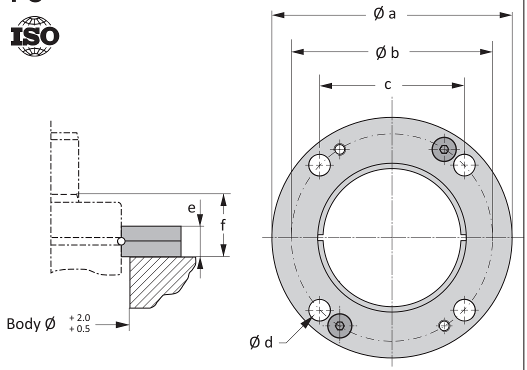


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-500	70	50

FC

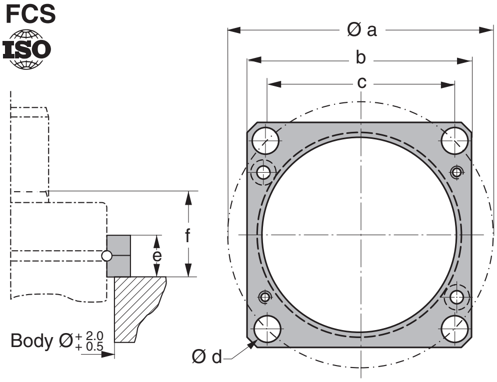
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	23

FCS

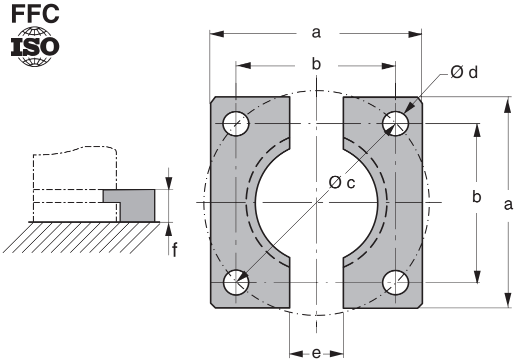
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	23

FFC

ISO



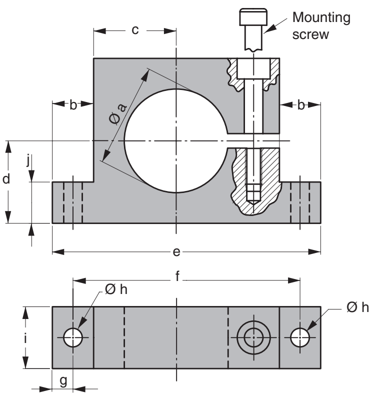
Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M8) should be tightened with torque 25 Nm.



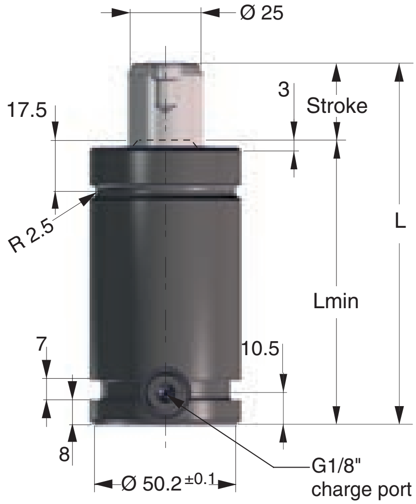
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-500	45.4	17	29	30	100	82	9	9	20	15

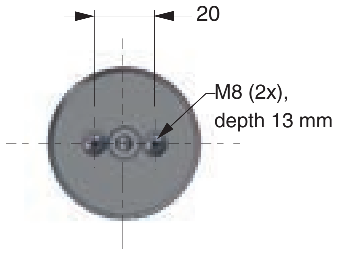
Note! For dimensions on mounting possibilitiy K-500 refer to “Special Mounts”.

2 million

The TL series ranges from model sizes 750 to 7,500, with the same features and technology as the TU series.

At the same time, the TL gas spring is shorter than the corresponding TU gas spring by 25 mm, except TL 5000 and TL 7500, which are 37.5 mm and 50 mm shorter respectively. TL springs share the same TU mounting possibilities and stroke lengths, with exception of strokes 12.5, 37.5 and 62.5.





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TL 750-013	12.5	7,400	11,400	1,660	2,560	95	82.5	0.03	0.97
TL 750-025	25		11,700		2,630	120	95	0.04	1.08
TL 750-038	37.5		11,800		2,650	145	107.5	0.06	1.20
TL 750-050	50		11,900		2,670	170	120	0.08	1.32
TL 750-063	62.5		11,900		2,670	195	132.5	0.09	1.42
TL 750-075	75		11,900		2,675	220	145	0.11	1.53
TL 750-080	80		11,900		2,670	230	150	0.11	1.58
TL 750-088	87.5		11,900		2,670	245	157.5	0.11	1.65
TL 750-100	100		11,900		2,670	270	170	0.14	1.77
TL 750-113	112.5		12,000		2,700	295	182,5	0.15	1.89
TL 750-125	125		12,000		2,700	320	195	0.15	2.01
TL 750-138	137.5		12,000		2,700	345	207.5	0.17	2.13
TL 750-150	150		12,000		2,700	370	220	0.19	2.25
TL 750-160	160		12,000		2,700	390	230	0.20	2.34
TL 750-175	175		12,000		2,700	420	245	0.23	2.48
TL 750-200	200		12,000		2,700	470	270	0.26	2.72
TL 750-225	225		12,000		2,700	520	295	0.30	2.96
TL 750-250	250		12,000		2,700	570	320	0.33	3.19

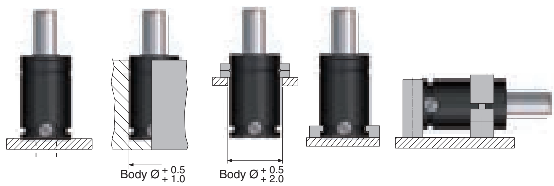
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit 3024118

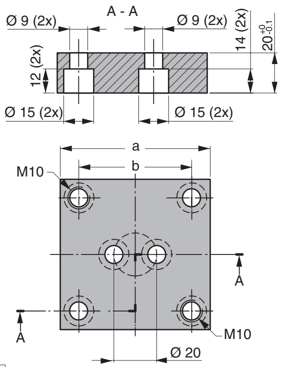
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750 refer to “Special Mounts”.

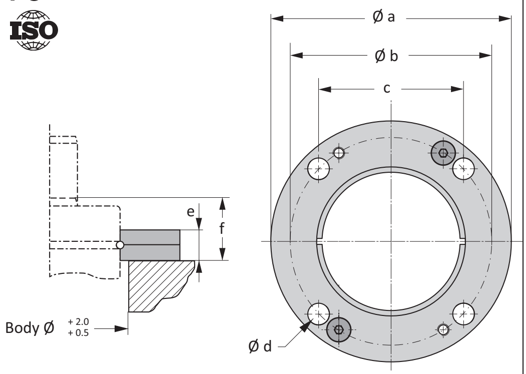
MP



Note! Comes complete with screws to mount gas spring.

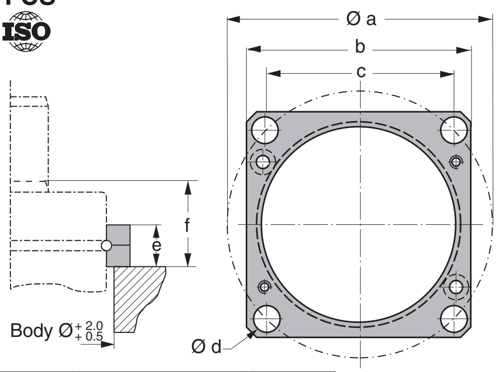
Order No.	a	b
MP-750	75	56.5

FC



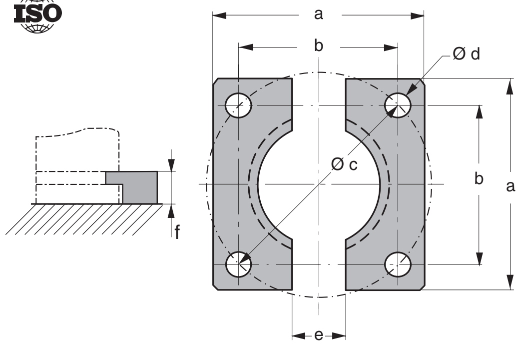
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS



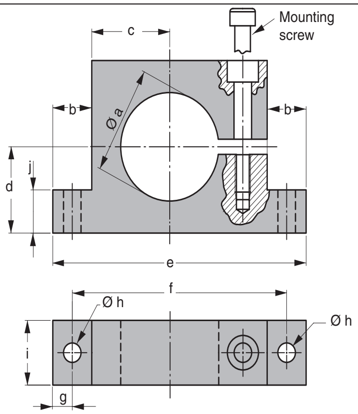
Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S



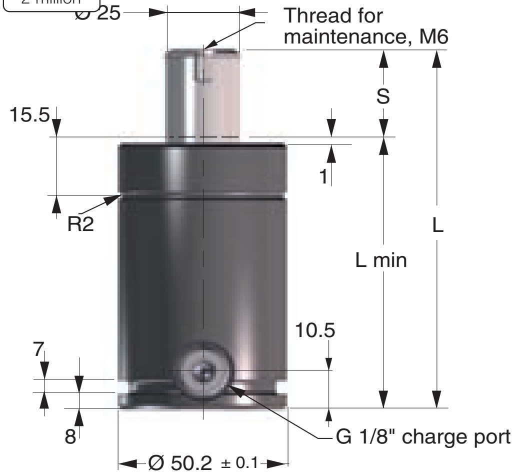
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M8) should be tightened with torque 25 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

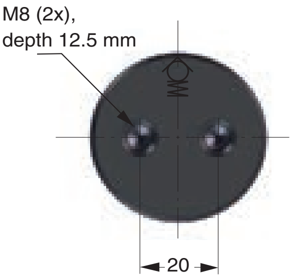
Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750, refer to “Special Mounts”.

2 million



This is a short height hoseable spring with an initial force of 7,400 N.

The K 750 has a total length of 50 mm + (2 × stroke). This spring is 45 mm shorter than the TU 750. Mounting options are the same as for the TU 750.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
K 750-006	6		15,000		3,370	62	56	0.01	0.68
K 750-013	12.7		13,000		2,920	75.4	62.7	0.02	0.73
K 750-019	19		12,000		2,700	88.1	69.05	0.03	0.80
K 750-025	25		11,000		2,470	100	75	0.04	0.82
K 750-038	38.1	7,400	11,000	1,665	2,470	126.2	88.1	0.06	0.92
K 750-050	50		11,000		2,470	150	100	0.08	1.06
K 750-064	63.5		11,000		2,470	177	113.5	0.10	1.12
K 750-080	80		11,000		2,470	210	130	0.12	1.26
K 750-100	100		11,000		2,470	250	150	0.15	1.39
K 750-125	125		11,000		2,470	300	175	0.19	1.57

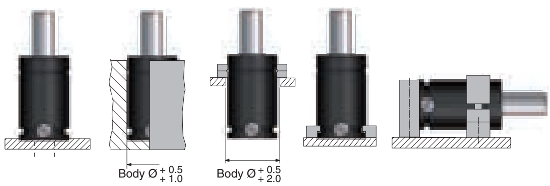
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3017230-0750

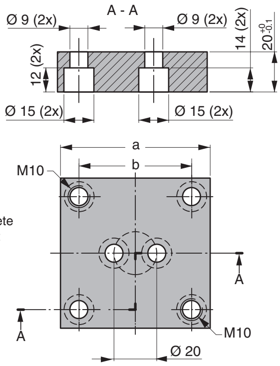
Mounting Possibilities



Base mount **B, MP** — **Drop - in** — **Top mount** **FC, FCS, FCSC** — **Foot mount** **K, FFC** — **Body mount** **FAC, SA, S**

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750 refer to “Special Mounts”.

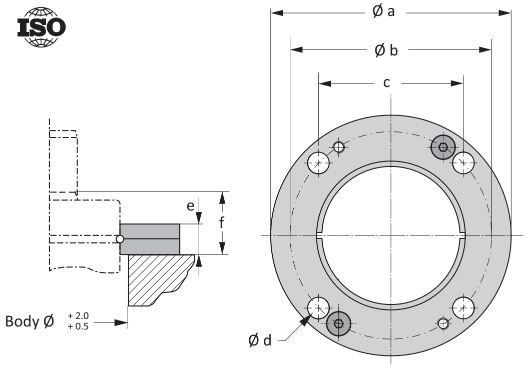
MP



Note! Comes complete with screws to mount gas spring.

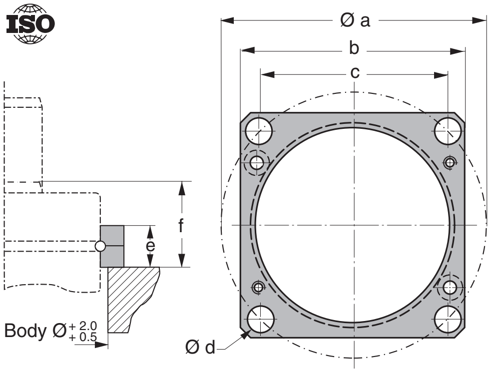
Order No.	a	b
MP-750	75	56.5

FC



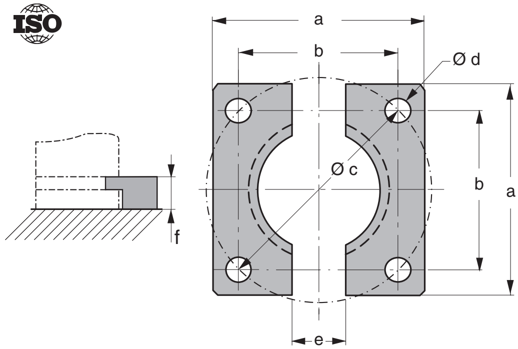
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	22

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	22

FFC



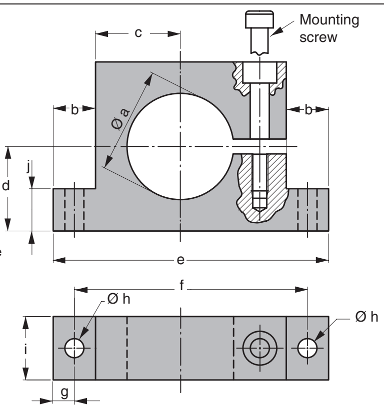
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750, refer to “Special Mounts”.

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

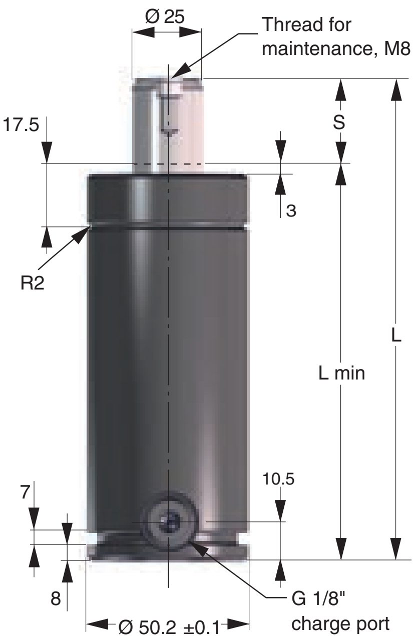
The mounting screw (M8) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

2 million

The standard line of gas springs is the TU line.
Sizes 250 to 10 000 correspond to the ISO 11901 standard for gas springs.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 750-013	**	12.7		12,000		2,700	120.4	107.7	0.03	1.33	
TU 750-025	**	25		12,000		2,700	145	120	0.04	1.44	√
TU 750-038	**	38.1		12,000		2,700	171.2	133.1	0.06	1.57	
TU 750-050	**	50		12,000		2,700	195	145	0.07	1.68	√
TU 750-064	**	63.5		12,000		2,700	222	158.5	0.09	1.78	
TU 750-080	**	80		12,000		2,700	255	175	0.11	1.94	√
TU 750-100	**	100		12,000		2,700	295	195	0.14	2.13	√
TU 750-125	**	125	7,400	12,100	1,665	2,720	345	220	0.17	2.37	√
TU 750-160	**	160		12,100		2,720	415	255	0.21	2.70	√
TU 750-175		175		12,100		2,720	445	270	0.23	2.84	
TU 750-200		200		12,100		2,720	495	295	0.26	3.08	
TU 750-225	**	225		12,100		2,720	545	320	0.29	3.32	
TU 750-250	**	250		12,100		2,720	595	345	0.33	3.55	
TU 750-300	**	300		12,100		2,720	695	395	0.39	4.03	

* = at full stroke

** Recommended stroke length for optimal delivery

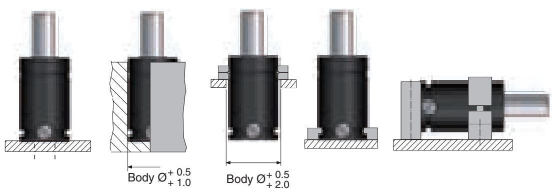
Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
*Repair kit 3019817

*Identified by circular rings on the top of tube, guide and rod.

Mounting Possibilities

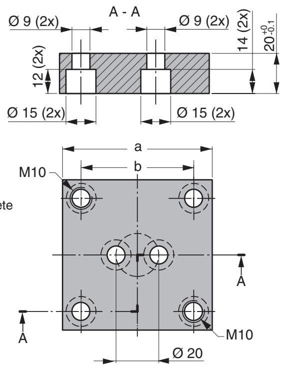


Base mount B, MP | **Drop - in** | **Top mount** FC, FCS, FCSC | **Foot mount** K, FFC | **Body mount** FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750 refer to “Special Mounts”.

MP

ISO

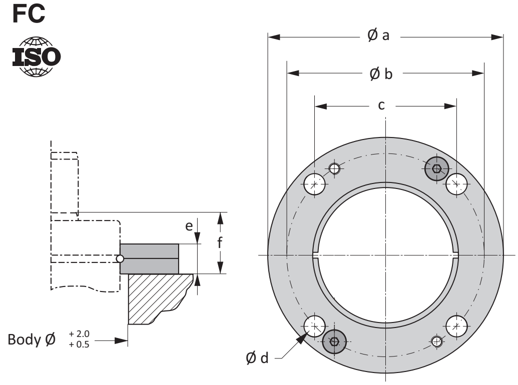


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-750	75	56.5

FC

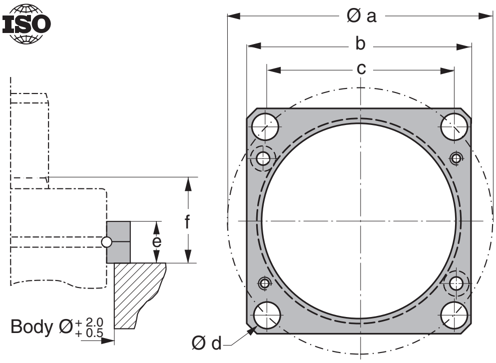
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS

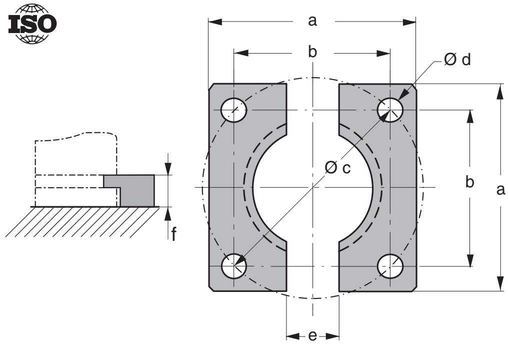
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC

ISO



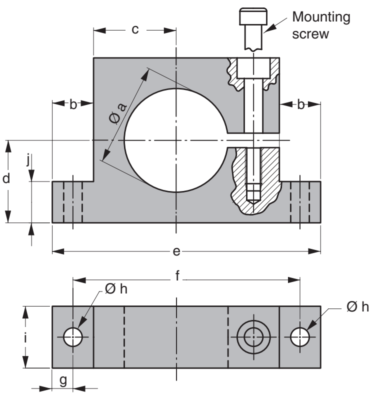
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

ISO

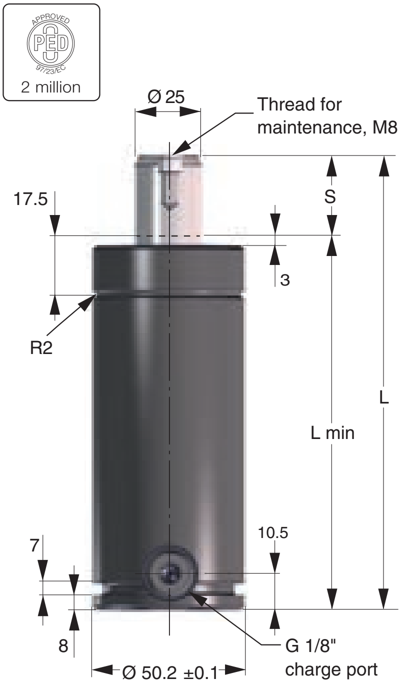
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M8) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

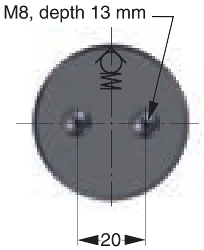
Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750, refer to "Special Mounts".



The TUS High Speed gas springs have been engineered to withstand press stroke speeds to a maximum of 2 m/s, which meets the safety requirements from the French automotive manufacturer Renault.

These gas springs are available in sizes from 750 to 7,500 and dimensions that conform to the ISO 11901 gas spring standard.

The TUS gas spring replaces TUR spring that has been phased out.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUS 750-025	25		12,000		2,700	145	120	0.04	1.44
TUS 750-038	38.1		12,000		2,700	171.2	133.1	0.06	1.57
TUS 750-050	50		12,000		2,700	195	145	0.07	1.68
TUS 750-064	63.5		12,000		2,700	222	158.5	0.09	1.78
TUS 750-080	80		12,000		2,700	255	175	0.11	1.94
TUS 750-100	100	7,400	12,000	1,665	2,700	295	195	0.14	2.13
TUS 750-125	125		12,100		2,720	345	220	0.17	2.37
TUS 750-160	160		12,100		2,720	415	255	0.21	2.70
TUS 750-200	200		12,100		2,720	495	295	0.26	3.08
TUS 750-250	250		12,100		2,720	595	345	0.33	3.55
TUS 750-300	300		12,100		2,720	695	395	0.39	4.03

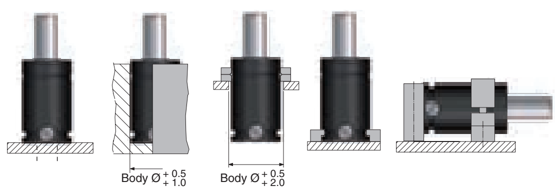
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 2 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit 3019277

Mounting Possibilities

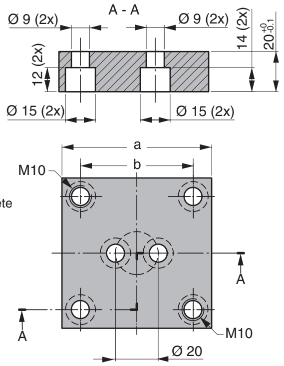


Base mount **B, MP** | **Drop -in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750 refer to “Special Mounts”.

MP

ISO

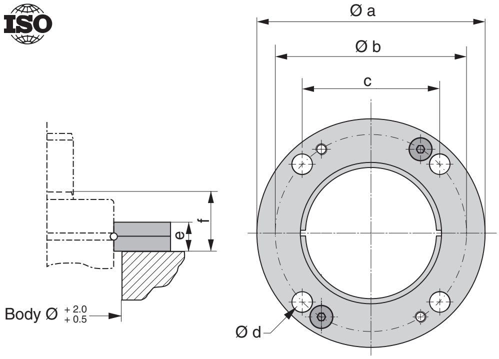


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-750	75	56.5

FC

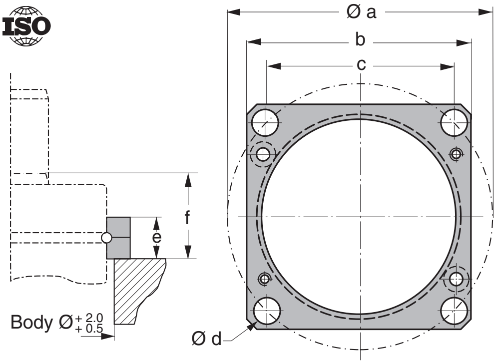
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS

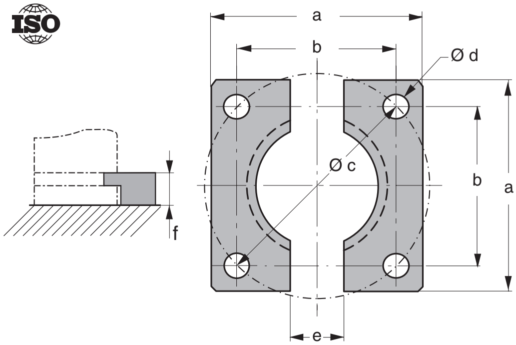
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC

ISO



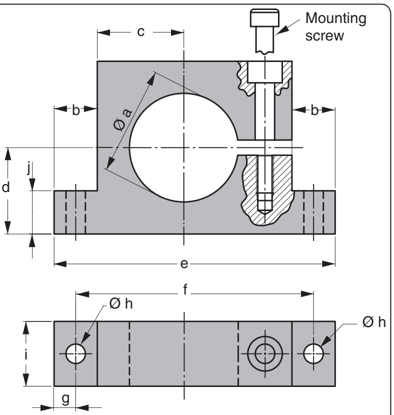
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

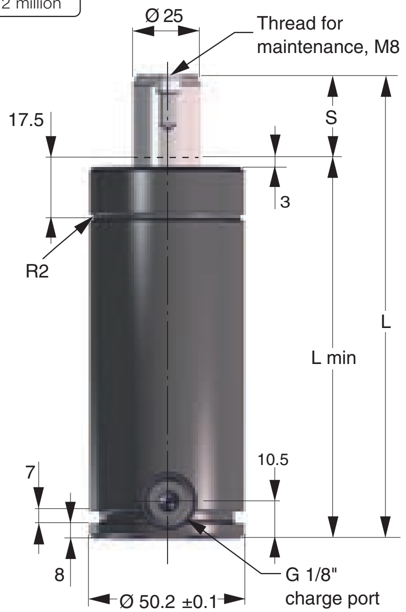
The mounting screw (M8) should be tightened with torque 25 Nm.

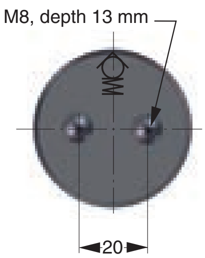


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

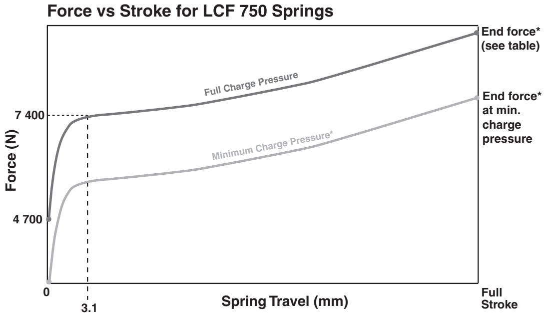
Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750, refer to “Special Mounts”.

2 million





Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.
For more information, see “About Gas Springs”.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 750-013	12.7		12,000			120.4	107.7	0.03	1.30
LCF 750-025	25		12,000			145	120	0.04	1.45
LCF 750-038	38.1		12,000			171.2	133.1	0.06	1.50
LCF 750-050	50		12,000		2,700	195	145	0.07	1.70
LCF 750-064	63.5		12,000			222	158.5	0.09	1.75
LCF 750-080	80	7,400	12,000	1,665		255	175	0.11	1.95
LCF 750-100	100		12,000			295	195	0.14	2.15
LCF 750-125	125		12,100			345	220	0.17	2.40
LCF 750-160	160		12,100			415	255	0.21	2.70
LCF 750-200	200		12,100		2,725	495	295	0.26	3.10
LCF 750-250	250		12,100			595	345	0.33	3.60
LCF 750-300	300		12,100			695	395	0.39	4.10

* = at full stroke

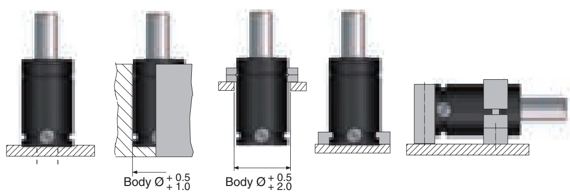
Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 70 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
*Repair kit 3019377

*Identified by circular rings on the top of tube, guide and rod.

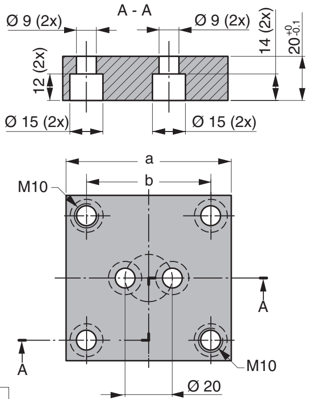
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount** FC, FCS, FCSC | **Foot mount** K, FFC, | **Body mount** FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750 refer to “Special Mounts”.

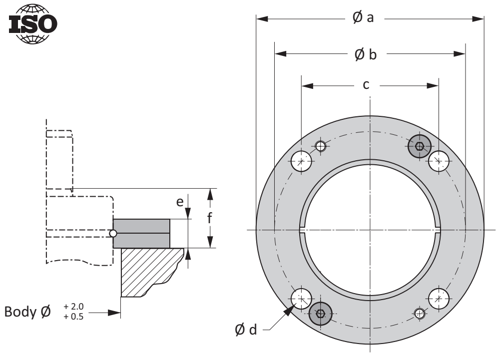
MP



Note! Comes complete with screws to mount gas spring.

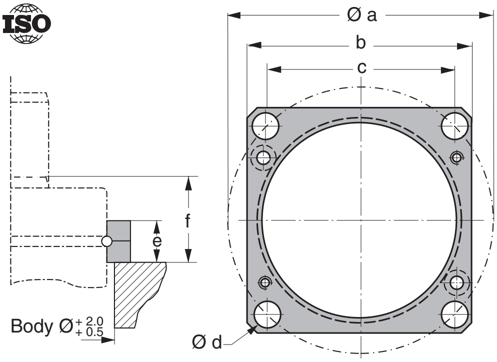
Order No.	a	b
MP-750	75	56.5

FC



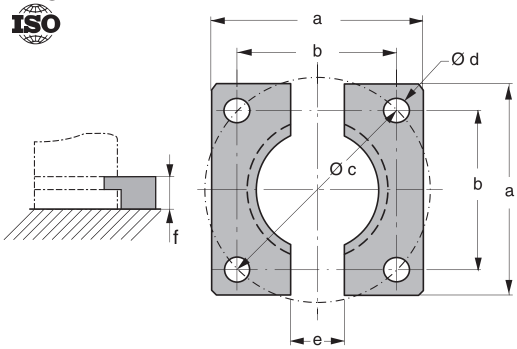
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC



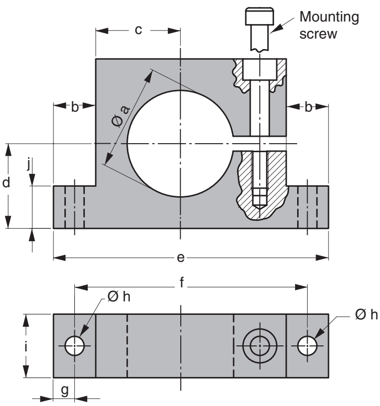
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and FCSC-750, refer to “Special Mounts”.

S

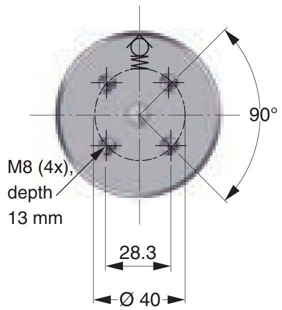
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mount option B.

The mounting screw (M8) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

2 million



Speed Control™ – SPC gas springs have been engineered to eliminate blank holder bounce, commonly associated with increased return stroke speeds from link drive presses.

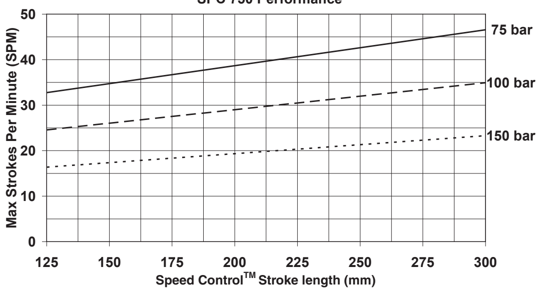
SPC gas springs have inbuilt return stroke **speed dampening**, which decelerates the last 30 mm of the piston rod stroke to 0.4 m/s, helping to bring the blank holder to a smooth stop.

Speed Control™ – SPC features:

- Eliminates blank holder bounce
- Increases productivity by increasing part transfer efficiency
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system

For more information, see “About Gas Springs”.

SPC 750 Performance*



*At ambient room temperatures with free air flow

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
SPC 750-080	80					270	190	0.30	5.50
SPC 750-100	100					310	210	0.36	5.80
SPC 750-125	125					360	235	0.44	6.10
SPC 750-160	160	7,400	8,700	1,665	2,700	430	270	0.55	6.60
SPC 750-200	200					510	310	0.67	7.15
SPC 750-250	250					610	360	0.83	7.85
SPC 750-300	300					710	410	0.98	8.60

*at full stroke

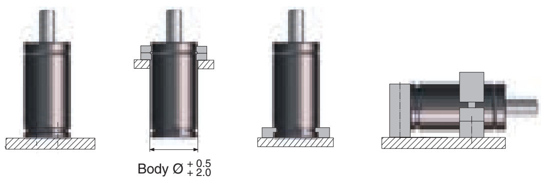
Basic Information

For general information see “About gas springs”.

Pressure medium ....Nitrogen
Max. charging pressure ....150 bar (at 20°C)
Min. charging pressure ....25 bar (at 20°C)
Operating temperature ....0 to +80°C
Force increase by temperature......................±0.3%/°C
Recommended max strokes/min ....See chart
Dampening length ....≈ 30 mm
Dampening speed ....0.4 m/s

Rod surface ....Nitrided
Tube surface ....Black oxide
Repair kit 3021490

Mounting Possibilities

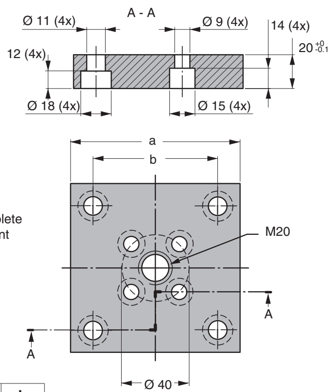


Base mount B, MP | **Top mount** FC, FCS, FCSC | **Foot mount** K, FFC, | **Body mount** FAC, SA, S

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500 and FCSC-1500 refer to “Special Mounts”.

MP

ISO

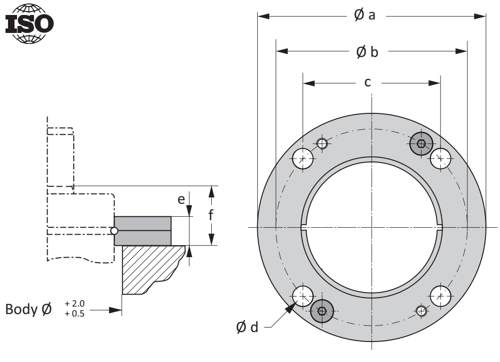


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-1500	100	73.5

FC

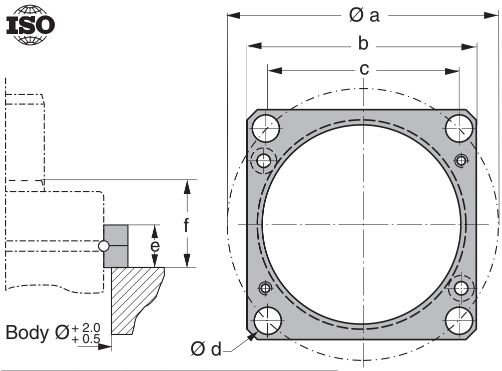
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS

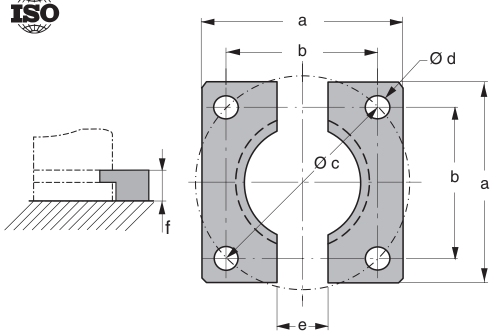
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

ISO



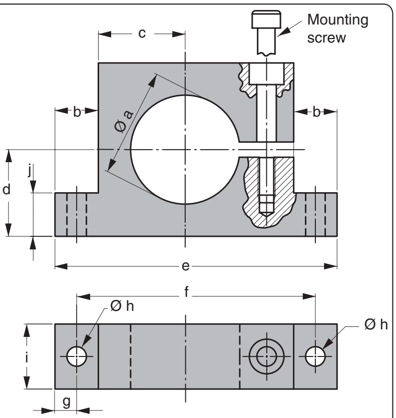
Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

ISO

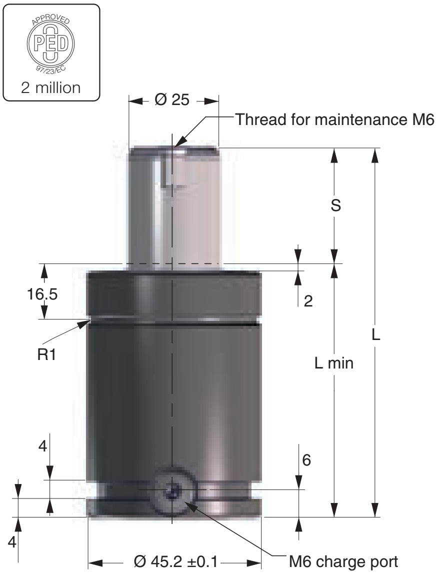
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500 and FCSC-1500 refer to “Special Mounts”.



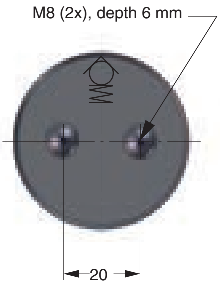
Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic molding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:

- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- M6 gas ports can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C (20°C)	8,870 (7,400)	14,100 (11,760)
80 – 100°C	15	125	100°C (20°C)	7,810 (6,140)	12,420 (9,750)
100 – 120°C	10	115	120°C (20°C)	7,570 (5,650)	12,050 (9,000)

* = at full stroke



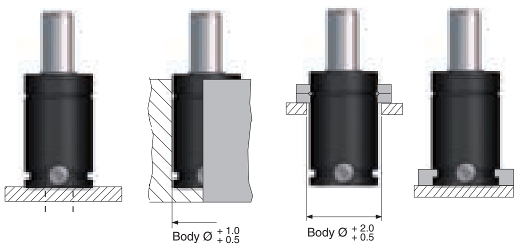
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 750-010	10			52	42	0.02	0.37
MT 750-013	13			58	45	0.02	0.39
MT 750-016	16			64	48	0.03	0.41
MT 750-019	19			70	51	0.03	0.41
MT 750-025	25			82	57	0.04	0.45
MT 750-032	32	7,400	1,665	96	64	0.05	0.50
MT 750-038	38			108	70	0.05	0.53
MT 750-050	50			132	82	0.07	0.61
MT 750-063	63			158	95	0.09	0.69
MT 750-075	75			182	107	0.10	0.77
MT 750-080	80			192	112	0.11	0.80

Basic Information

For general information, see "About Gas Springs".
Pressure medium .... Nitrogen
Max. charging pressure .... See table above
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 – +120°C
Force increase by temperature.................. ±0.3 %/°C
Recommended max. strokes/min. .... See table above
Max. piston rod velocity .... 1.0 m/s
Service life (0 to 80°C)............................... 1,000,000 strokes
or .... 100,000 stroke meters*
Service life (80 to 120°C)........................... 500,000 strokes
or .... 50,000 stroke meters*

Tube & rod surface..................................... Nitrided
Repair kit 3022686

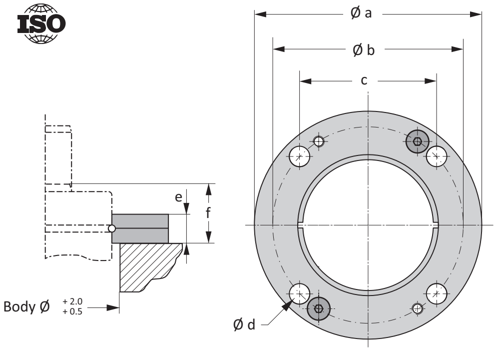
Mounting Possibilities



Base mount B **Drop - in** **Top mount FC, FCS** **Foot mount K, FFC**

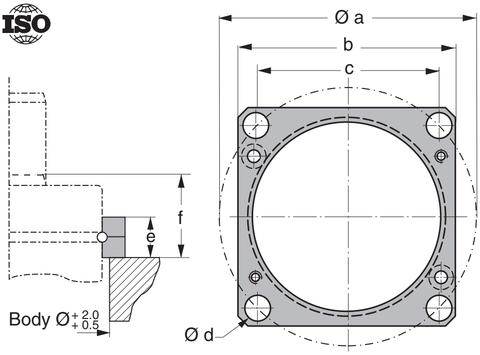
Note! For dimensions on mounting possibility K-500 refer to "Special Mounts".

FC



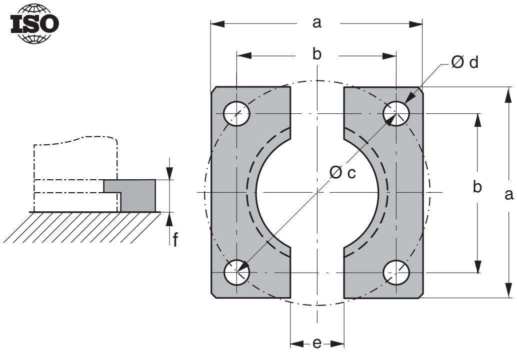
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-500	86	70.7	50	9	13	23

FCS



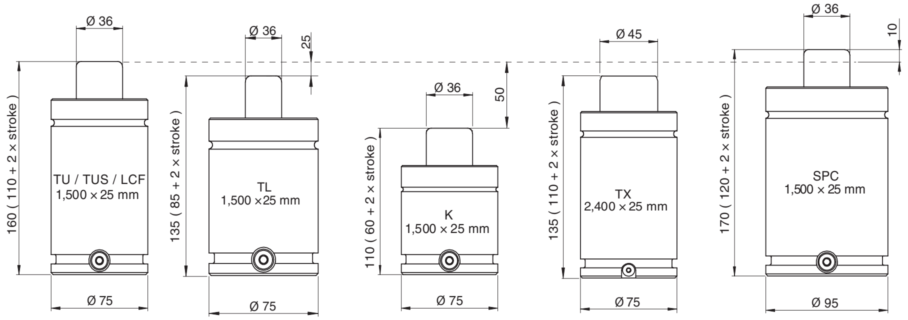
Order No.	Ø a	b	c	Ø d	e	f
FCS-500	70.7	64	50	9	13	23

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-500	70	50	70.7	9	20	6.5

Note! For dimensions on mounting possibility K-500 refer to “Special Mounts”.



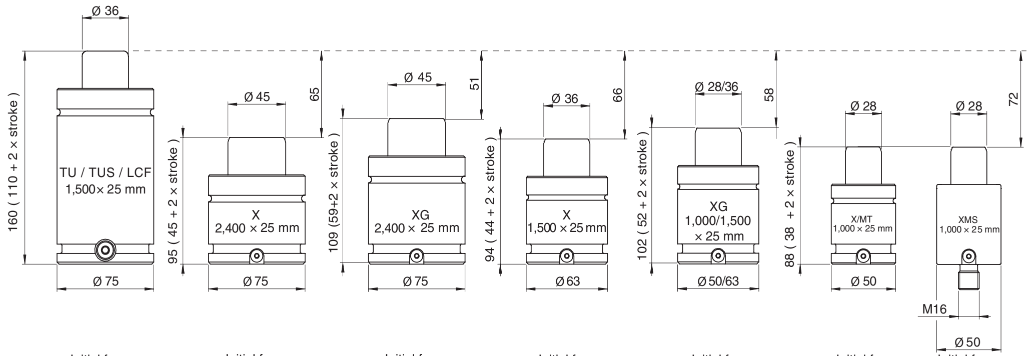
Initial force
15,000 N
3,375 lbf

Initial force
15,000 N
3,375 lbf

Initial force
15,000 N
3,375 lbf

Initial force
24,000 N
5,400 lbf

Initial force
15,000 N
3,375 lbf



Initial force
15,000 N
3,375 lbf

Initial force
24,000 N
5,396 lbf

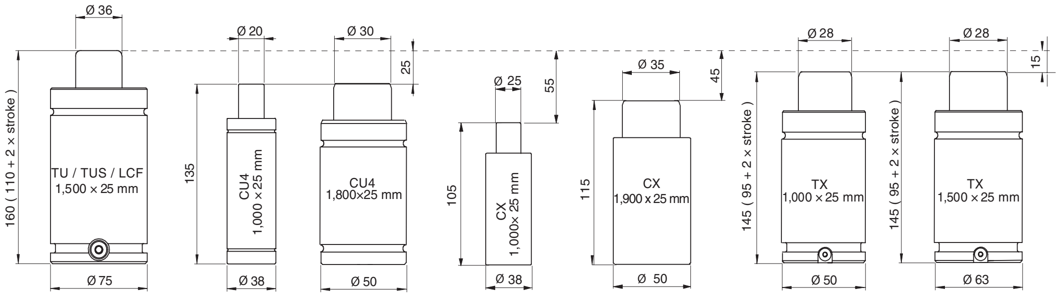
Initial force
24,000 N
5,396 lbf

Initial force
15,000 N
3,375 lbf

Initial force
9,200/15,000 N
2,068/3,375 lbf

Initial force
9,200 N
2,068 lbf

Initial force
9,200 N
2,068 lbf



Initial force
15,000 N
3,372 lbf

Initial force
10,600 N
2,380 lbf

Initial force
18,000 N
4,045 lbf

Initial force
9,800 N
2,200 lbf

Initial force
19,200 N
4,300 lbf

Initial force
9,200 N
2,075 lbf

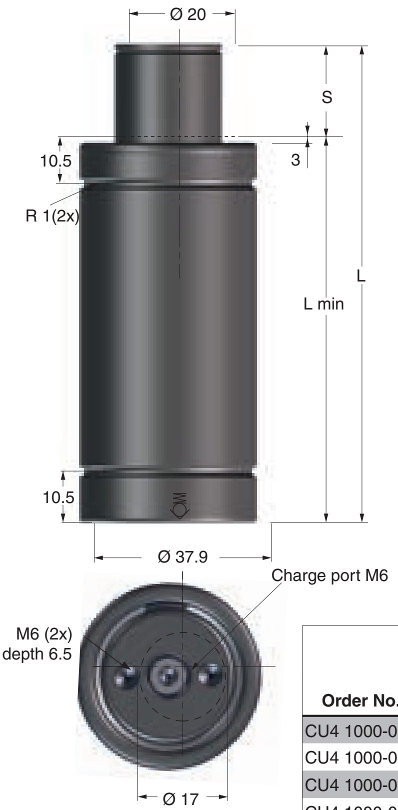
Initial force
9,200 N
2,075 lbf

2 million

The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 springs can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).



Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force**	Initial	End force**				
CU4 1000-006	6		16,000			61	55	0.014	0.33
CU4 1000-010	10		16,000			78	68	0.024	0.38
CU4 1000-016	16		16,000			100	84	0.036	0.44
CU4 1000-025	25	10,600	16,000	2,400	3,595	135	110	0.056	0.54
CU4 1000-032	32*		16,000			167	135	0.074	0.65
CU4 1000-040	40*		16,000			195	155	0.092	0.73
CU4 1000-050	50*		16,000			230	180	0.110	0.83

* = Should always be attached to the tool using the tapped holes in the bottom or a flange
** = at full stroke

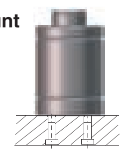
Basic Information

For general information, see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature.................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min.... ~100 (at 20°C)
Max. piston rod velocity................... 0.8 m/s

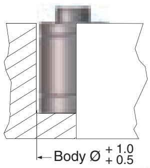
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair Kit CU4 1000....................... 3024835

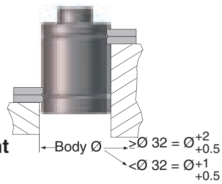
Mounting Possibilities

Base mount B

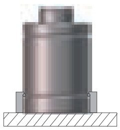


Drop-in

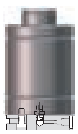




Top mount FK

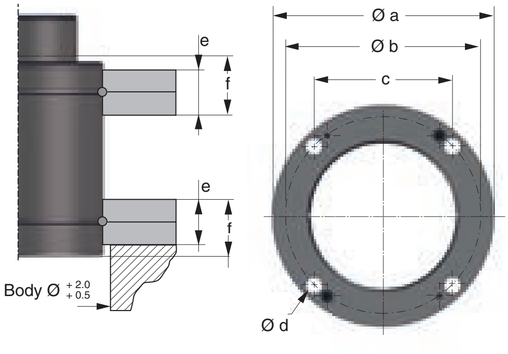


Foot mount BFP



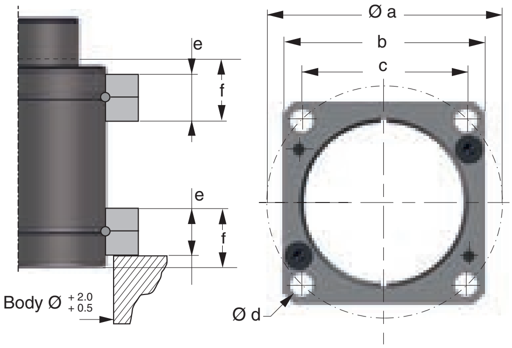
Side port SP

FC



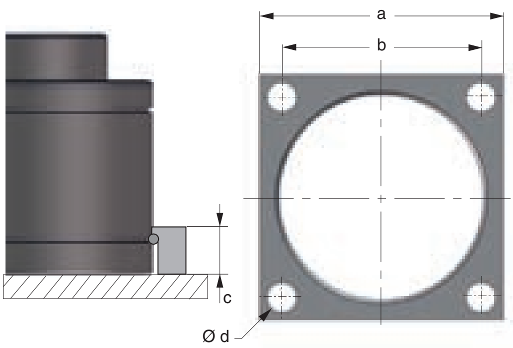
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 1000	FC-250	68	56.5	40	7	9	15

FCS



For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 1000	FCS-250	56.5	52	40	7	9	15

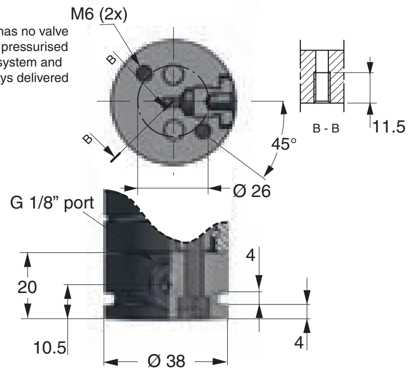
BFCU



For model	Order N0.	a	b	c	Ø d
CU4 1000	BFCU-1000	52	40	14.5	7

SP

Note! SP-1000 has no valve and can only be pressurised through a hose system and is therefore always delivered uncharged.



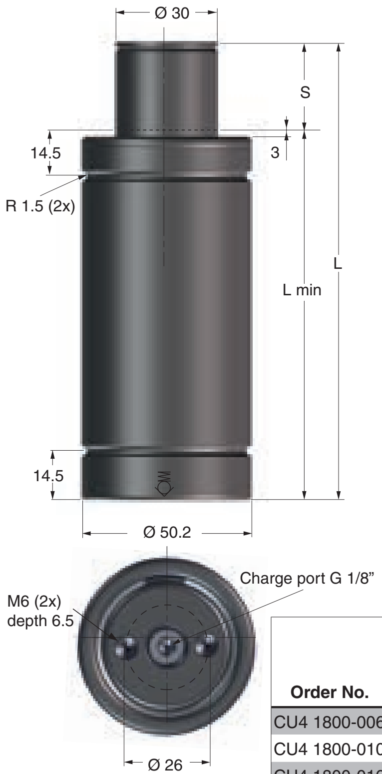
For model	Order No.	For U-groove mounts on SP
CU4 1000	SP-1000	Refer to TU 250

2 million

The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 springs can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).



Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force**	Initial	End force**				
CU4 1800-006	6		24,000		5,395	66	60	0.030	0.60
CU4 1800-010	10		25,000		5,620	80	70	0.044	0.66
CU4 1800-016	16		25,000		5,620	106	90	0.072	0.79
CU4 1800-025	25	18,000	26,000		5,845	135	110	0.100	0.93
CU4 1800-032	32*		26,000	4,050	5,845	162	130	0.126	1.06
CU4 1800-040	40*		26,000		5,845	190	150	0.150	1.19
CU4 1800-050	50*		27,000		6,070	220	170	0.179	1.32
CU4 1800-065	65*		28,000		6,294	271	206	0.240	1.52

* = Should always be attached to the tool using the tapped holes in the bottom or a flange
** = at full stroke

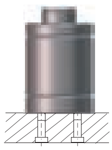
Basic Information

For general information, see "About gas springs".
Pressure medium............................ Nitrogen
Max. charging pressure.................. 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature.................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min.... ~100 (at 20°C)
Max. piston rod velocity.................. 0.8 m/s

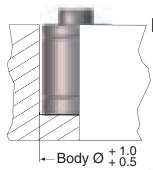
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair Kit CU4 1800....................... 3024836

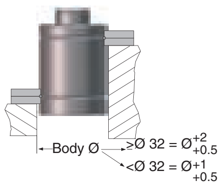
Mounting Possibilities

Base mount B

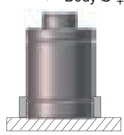


Drop-in

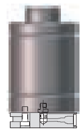




Top mount FC/FCS/FK

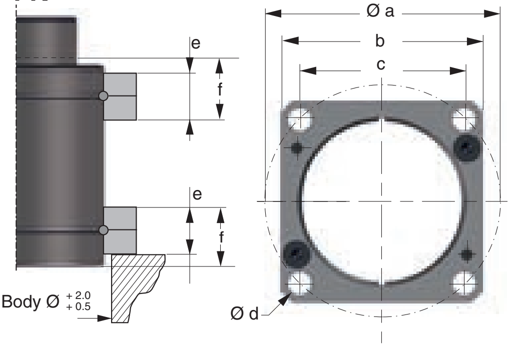


Foot mount BFCU



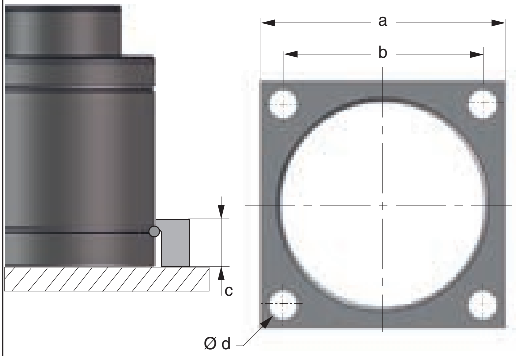
Side port SP

FK



For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 1800	FK-1800	80	70	56.5	9	13	21

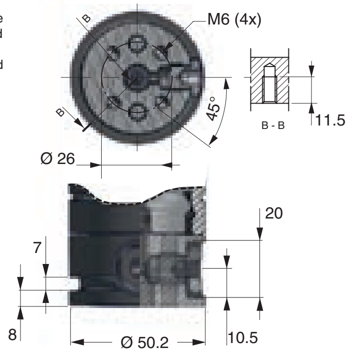
BFCU



For model	Order N0.	a	b	Ø c	d
CU4 1800	BFCU4-1800	70	56.5	9	19.5

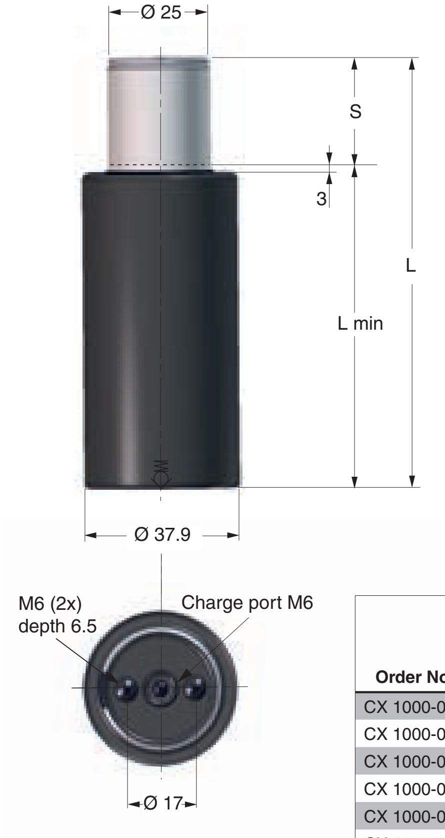
SP

Note! SP-1800 has no valve and can only be pressurised through a hose system and is therefore always delivered uncharged.



For model	Order No.	For U-groove mounts on SP
CU4 1800	SP-1800	Refer to TU 750

2 million



With its unique safety and reliability features, KALLER Compact Xtreme CX is a extremely compact and powerful piston rod sealed gas spring series. Using the CX gas spring is an excellent way to achieve more cost efficient dies due to lower die height. With its extremely compact build height and cylinder diameters, the CX gas spring can reach extreme initial forces, ranging from 5,100 N to 19,200 N with stroke lengths up to 80 mm. The CX gas spring series is similar to the KALLER Power Line X series and provide extreme forces comparable to the bore sealed KALLER Super Compact CU4 series. In addition, the CX gas spring can handle higher running frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate. Additional high force in a small area when baseplate mounted.

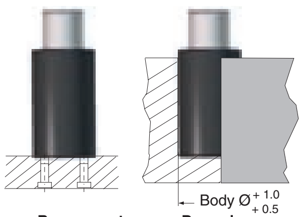
Order No.	S stroke	Force in N at 200 bar/+20°C Initial	Force in N at 200 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CX 1000-010	10		13,300		2,980	75	65	0.03	0.36
CX 1000-015	15		14,400		3,240	85	70	0.03	0.39
CX 1000-025	25		16,100		3,620	105	80	0.04	0.43
CX 1000-038	38*	9,800	16,900	2,200	3,800	135	97	0.06	0.50
CX 1000-050	50*		17,700		3,990	160	110	0.07	0.56
CX 1000-063	63*		16,500		3,710	205	142	0.10	0.67
CX 1000-080	80*		17,300		3,880	240	160	0.12	0.75

Note! * For stroke lengths over 25 mm, the spring should be attached to the tool using the threaded holes in the bottom.
** At full stroke.

Basic Information

Pressure medium........................... Nitrogen
Max. charging pressure.................. 200 bar
Min. charging pressure................... 25 bar
Operating temperature................... 0 - +80°C
Force increase by temperature........ ±0.3%/°C
Recommended max. strokes/min.... ~70-200 (at 20°C)
Max. piston rod velocity.................. 1.6 m/s
Repair kit.. 3022836

Mounting Possibilities

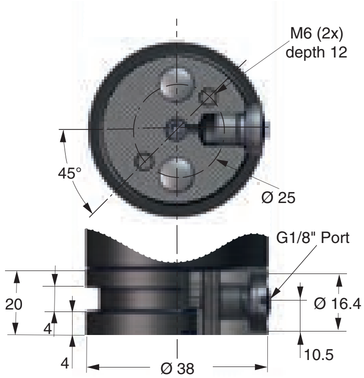


Base mount
B

Drop - in

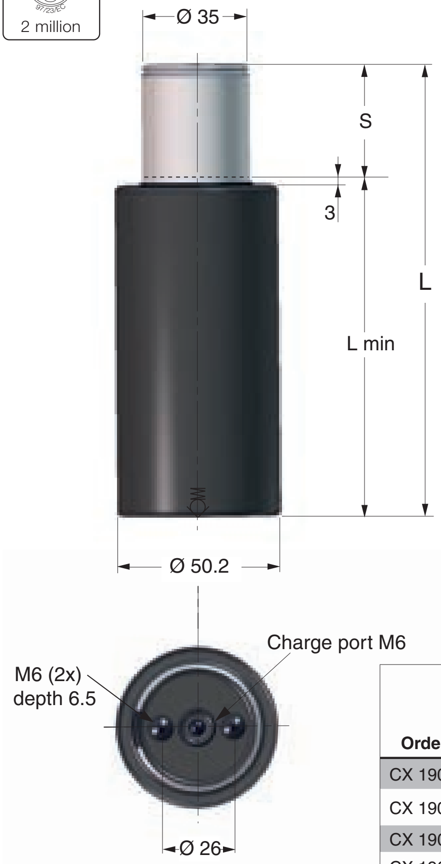
Side Port
SPCX

SPCX



For model	Order No.	For U-groove mounts on SP
CX 1000	SPCX-1000	U-groove mount is equal to X 500

2 million



With its unique safety and reliability features, KALLER Compact Xtreme CX is a extremely compact and powerful piston rod sealed gas spring series. Using the CX gas spring is an excellent way to achieve more cost efficient dies due to lower die height. With its extremely compact build height and cylinder diameters, the CX gas spring can reach extreme initial forces, ranging from 5,100 N to 19,200 N with stroke lengths up to 80 mm. The CX gas spring series is similar to the KALLER Power Line X series and provide extreme forces comparable to the bore sealed KALLER Super Compact CU4 series. In addition, the CX gas spring can handle higher running frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate. Additional high force in a small area when baseplate mounted.

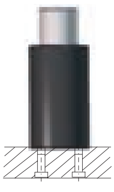
Order No.	S stroke	Force in N at 200 bar/+20°C Initial	Force in N at 200 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CX 1900-010	10		26,300		5,920	80	70	0.05	0.69
CX 1900-015	15		31,800		7,140	95	80	0.05	0.76
CX 1900-025	25		30,900		6,950	115	90	0.08	0.84
CX 1900-038	38*	19,200	31,900	4,320	7,160	150	112	0.12	0.98
CX 1900-050	50*		33,800		7,600	175	125	0.14	1.08
CX 1900-063	63*		34,800		7,820	205	142	0.17	1.21
CX 1900-080	80*		35,600		8,000	245	165	0.21	1.37

Note! * For stroke lengths over 25 mm, the spring should be attached to the tool using the threaded holes in the bottom.
** At full stroke.

Basic Information

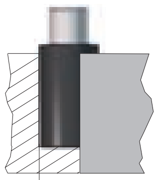
Pressure medium............................ Nitrogen
Max. charging pressure................... 200 bar
Min. charging pressure.................... 25 bar
Operating temperature.................... 0 - +80°C
Force increase by temperature........ ±0.3%/°C
Recommended max. strokes/min.... ~50-130 (at 20°C)
Max. piston rod velocity.................. 1.6 m/s
Repair kit... 3022836

Mounting Possibilities

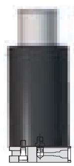


Base mount

B



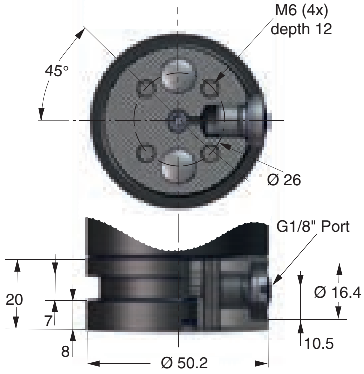
Drop - in



Side Port

SPCX

SPCX



For model	Order No.	For U-groove mounts on SP
CX 1900	SPCX-1900	U-groove mount is equal to X 750

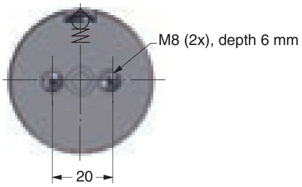
2 million

The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

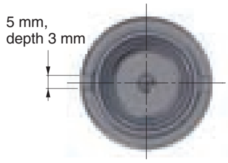
These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.

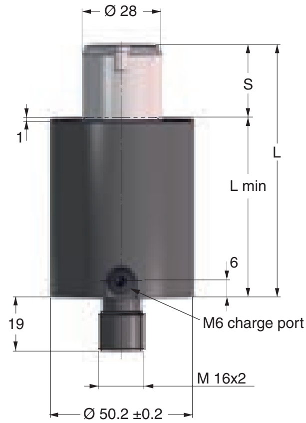


The X 1000 model is also available equipped with an M16 threaded tap for mounting. When ordering this version **XMS 1000-xxx** must be stated on the order



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X/XMS 1000-013	**	13		13,800		3,103	64	51	0.03	0.50	√
X/XMS 1000-016	**	16		13,800		3,103	70	54	0.04	0.52	
X/XMS 1000-019		19		14,000		3,147	76	57	0.04	0.54	
X/XMS 1000-025	**	25		14,200		3,192	88	63	0.05	0.59	√
X/XMS 1000-032		32		14,300		3,215	102	70	0.06	0.64	
X/XMS 1000-038	**	38	9,200	14,500	2,068	3,260	114	76	0.07	0.70	√
X/XMS 1000-050	**	50		14,600		3,282	138	88	0.09	0.79	√
X/XMS 1000-063	**	63		14,700		3,305	164	101	0.11	0.89	√
X/XMS 1000-075		75		14,700		3,305	188	113	0.13	0.99	
X/XMS 1000-080	**	80		14,800		3,327	198	118	0.14	1.03	√
X/XMS 1000-100	**	100		14,800		3,327	238	138	0.17	1.19	√
X/XMS 1000-125	**	125		14,800		3,327	288	163	0.21	1.39	√

* = at full stroke ** Recommended stroke length for optimal delivery

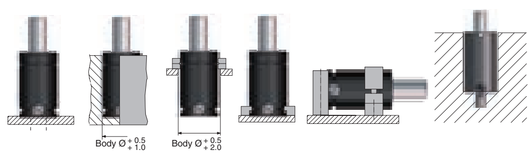


Basic Information

For general information, see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature.................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min.... ~50 to 100 (at 20°C)
Max. piston rod velocity.................. 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. 3018847

Mounting Possibilities

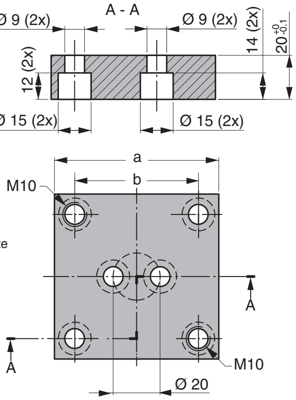


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S, HM | Thread mount M16x2

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750, HM-750 and FCSC-750 refer to “Special Mounts”.

MP

ISO

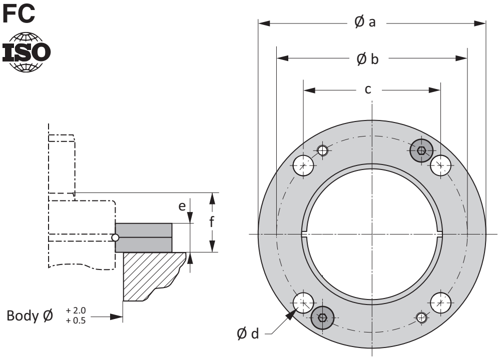


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-750	75	56.5

FC

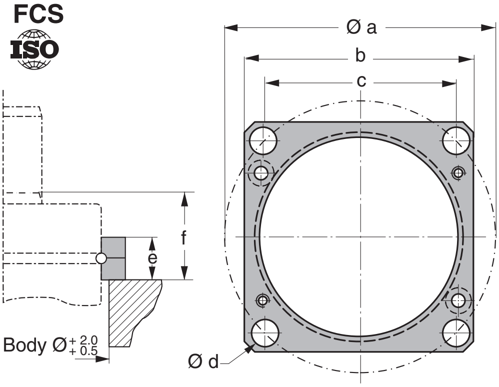
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS

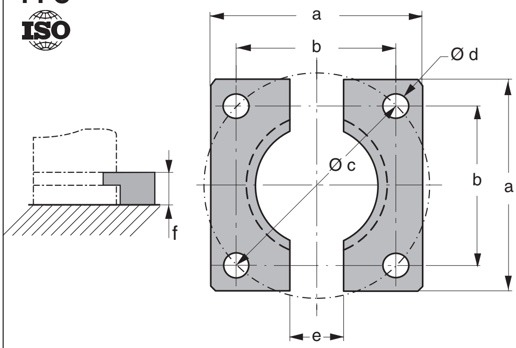
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC

ISO



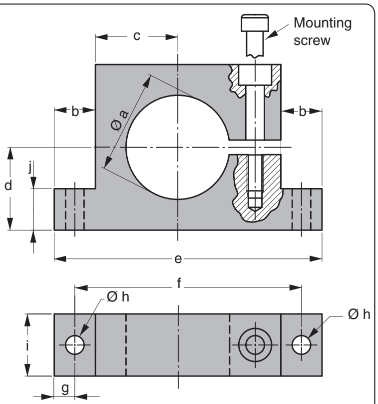
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

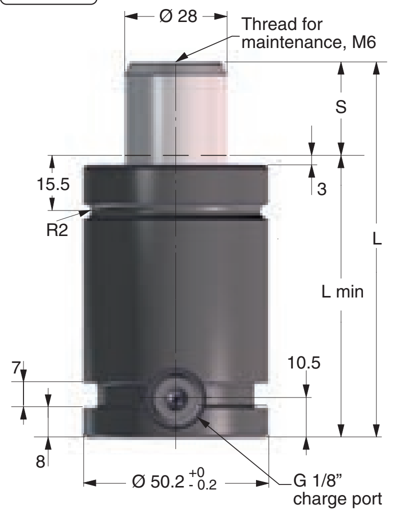
The mounting screw (M8) should be tightened with torque 25 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

Note! For dimensions o n mounting possibilities K-750, FAC-750, SA-750, HM-750 and FCSC-750 refer to “Special Mounts”.

2 million

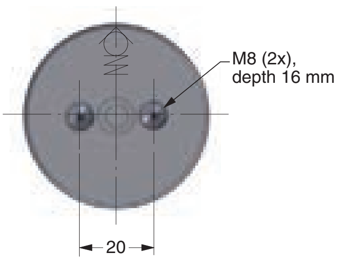


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3500 N up to 66000 N and stroke lengths between 13 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 1000-013		13		13,800		3,103	78	65	0.03	0.70
XG 1000-016		16		13,800		3,103	84	68	0.04	0.72
XG 1000-019		19		14,000		3,147	90	71	0.04	0.74
XG 1000-025	**	25		14,200		3,192	102	77	0.05	0.79
XG 1000-032		32		14,300		3,215	116	84	0.06	0.84
XG 1000-038	**	38	9,200	14,500	2,068	3,260	128	90	0.07	0.89
XG 1000-050	**	50		14,600		3,282	152	102	0.09	0.98
XG 1000-063	**	63		14,700		3,305	178	115	0.11	1.09
XG 1000-075	**	75		14,700		3,305	202	127	0.13	1.18
XG 1000-080	**	80		14,800		3,327	212	132	0.14	1.22
XG 1000-100	**	100		14,800		3,327	252	152	0.17	1.41
XG 1000-125	**	125		14,800		3,327	302	177	0.21	1.60

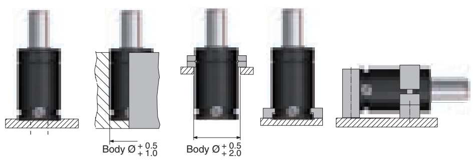
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs"
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018847

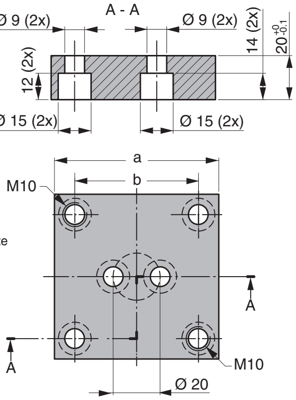
Mounting Possibilities



Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and HM-750 refer to "Special Mounts".

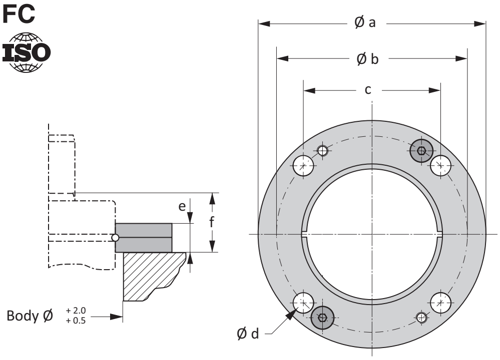
MP



Note! Comes complete with screws to mount gas spring.

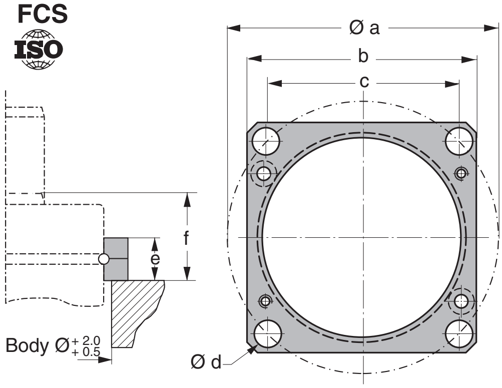
Order No.	a	b
MP-750	75	56.5

FC



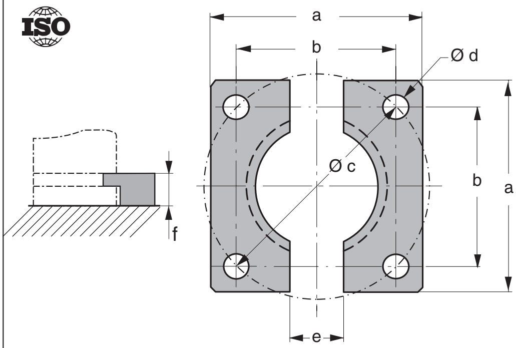
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	22

FCS



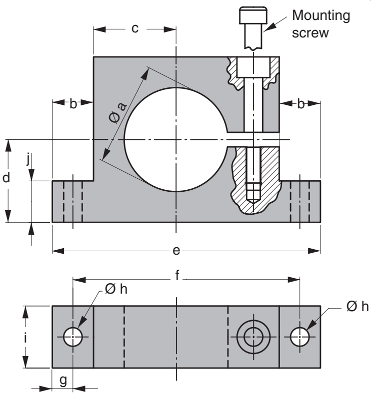
Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	22

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

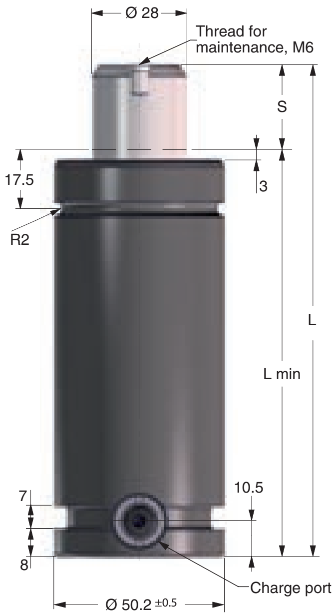


Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M8) should be tightened with torque 25 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and HM-750 refer to “Special Mounts”.

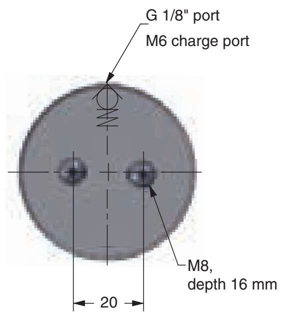


The Power Line – Heavy Duty Series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.



Order No.	S stroke		Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TX 1000-013	**	13		11,200		2,525	121	108	0.06	1.17	
TX 1000-025	**	25		12,100		2,725	145	120	0.07	1.27	√
TX 1000-038	*'	38		12,800		2,875	171	133	0.09	1.32	
TX 1000-050	**	50		13,200		2,975	195	145	0.11	1.37	√
TX 1000-063	**	63		13,500		3,050	221	158	0.13	1.58	
TX 1000-075		75		13,700		3,075	245	170	0.15	1.71	
TX 1000-080	**	80		13,800		3,100	255	175	0.16	1.73	√
TX 1000-100	**	100	9,200	14,100	2,075	3,175	295	195	0.19	1.90	√
TX 1000-125	**	125		14,300		3,225	345	220	0.23	2.11	√
TX 1000-150		150		14,500		3,250	395	245	0.27	2.32	
TX 1000-160	**	160		14,500		3,250	415	255	0.28	2.40	√
TX 1000-175		175		14,600		3,275	445	270	0.30	2.53	
TX 1000-200	**	200		14,700		3,300	495	295	0.34	2.74	√
TX 1000-250	**	250		14,800		3,325	595	345	0.42	3.16	√
TX 1000-300	**	300		14,900		3,350	695	395	0.49	3.58	√

* = at full stroke

** Recommended stroke length for optimal delivery

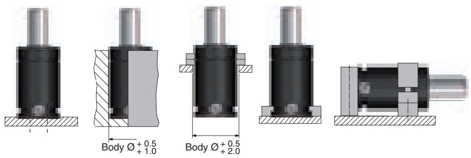
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3023788

Mounting Possibilities

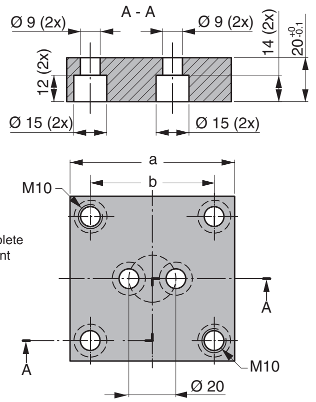


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and HM-750 refer to “Special Mounts”.

MP

ISO

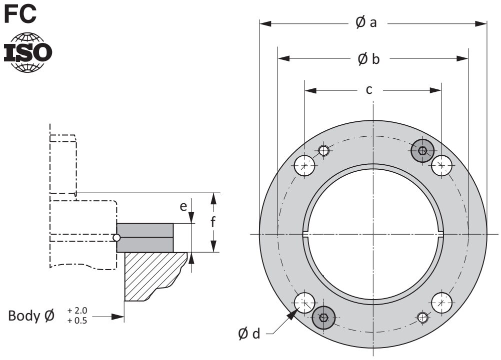


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-750	75	56.5

FC

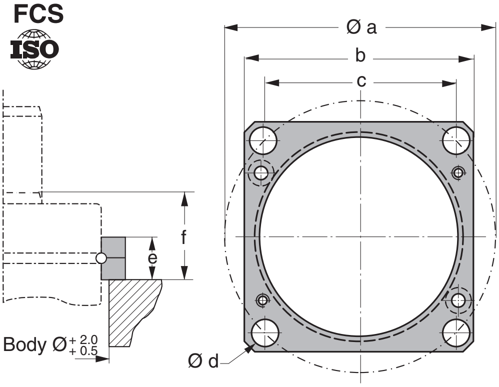
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	22

FCS

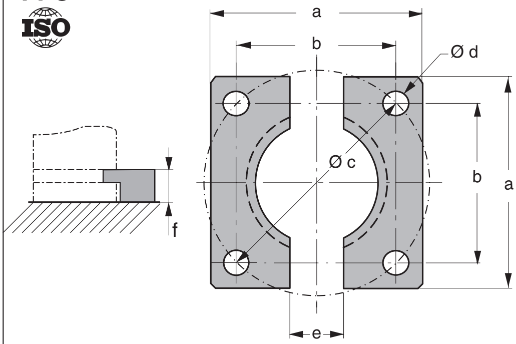
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	22

FFC

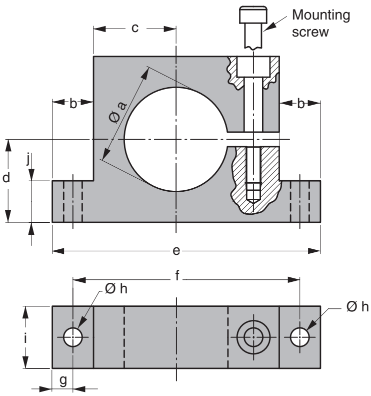
ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

ISO



Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M8) should be tightened with torque 25 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

Note! For dimensions on mounting possibilities K-750, FAC-750, SA-750 and HM-750 refer to “Special Mounts”.

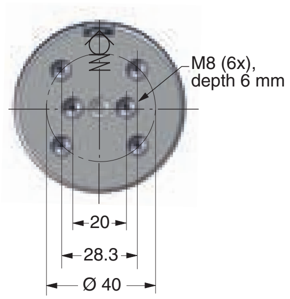
2 million

The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.



Order No.	S stroke		Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 1500-013	**	13		24,000		5,395	70	57	0.05	0.89	√
X 1500-016		16		24,100		5,420	76	60	0.06	0.93	
X 1500-019		19		24,200		5,440	82	63	0.07	0.96	
X 1500-025	**	25		24,300		5,365	94	69	0.08	1.03	√
X 1500-032		32		23,800		5,355	108	76	0.11	1.08	
X 1500-038	**	38	15,000	23,900	3,375	5,375	120	82	0.12	1.15	√
X 1500-050	**	50		24,000		5,395	144	94	0.15	1.28	√
X 1500-063	**	63		24,100		5,420	170	107	0.19	1.43	√
X 1500-075		75		24,200		5,440	194	119	0.22	1.57	
X 1500-080	**	80		24,200		5,440	204	124	0.24	1.63	√
X 1500-100	**	100		24,300		5,465	244	144	0.29	1.86	√
X 1500-125	**	125		24,300		5,465	294	169	0.36	2.15	√

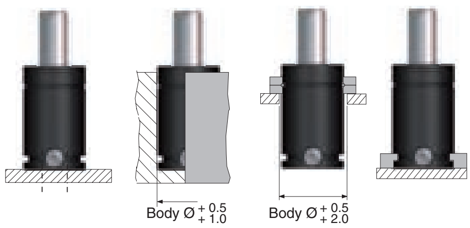
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3020434

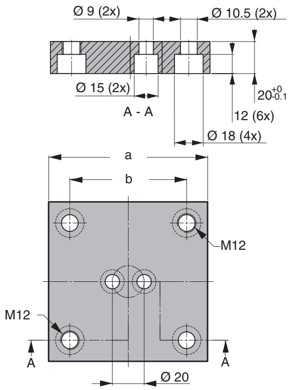
Mounting Possibilities



Base mount B, MPX | **Drop -in** | **Top mount** FCX, FCSX | **Foot mount** KX, FFX

Note!
For dimensions on mounting possibility KX-1500 refer to "Special Mounts"

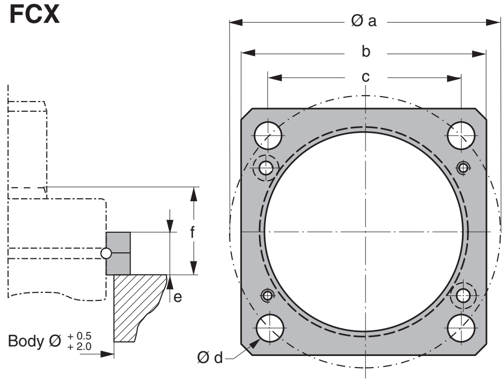
MPX



Note! Comes complete with screws to mount gas spring.

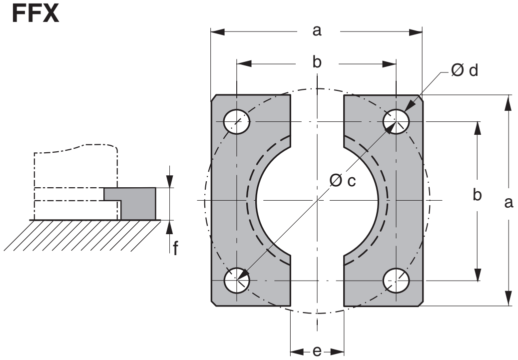
Order No.	a	b
MPX-1500	100	73.5

FCX



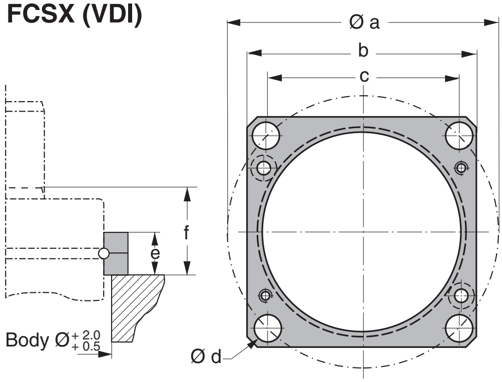
Order No.	Ø a	b	c	Ø d	e	f
FCX-1500	104	90	73.5	11	16	27

FFX



Order No.	a	b	Ø c	Ø d	e	f
FFX-1500	100	73.5	104	11	24	12

FCSX (VDI)



Order No.	Ø a	b	c	Ø d	e	f
FCSX-1500	90.5	80	64	11	16	27

Note! For dimensions on mounting possibility KX-1500 refer to “Special Mounts”.

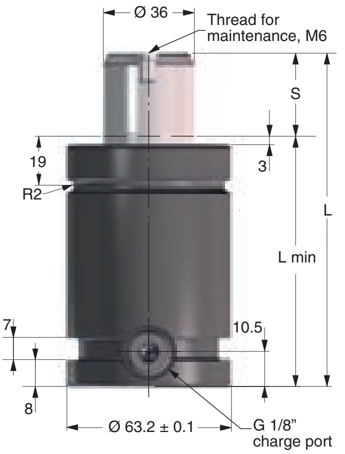
2 million

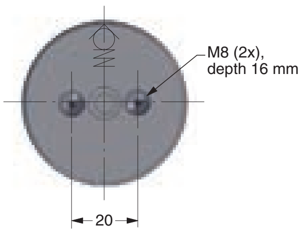
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 13 and 125 mm.

There is a side and a bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with two M8 threaded holes allow various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 1500-013		13		24,000		5,395	78	65	0.05	0.9
XG 1500-016		16		24,100		5,420	84	68	0.06	0.9
XG 1500-019		19		24,200		5,440	90	71	0.07	1.0
XG 1500-025	**	25		24,300		5,365	102	77	0.08	1.0
XG 1500-032		32		23,800		5,355	116	84	0.11	1.1
XG 1500-038	**	38	15,000	23,900	3,375	5,375	128	90	0.12	1.2
XG 1500-050	**	50		24,000		5,395	152	102	0.15	1.3
XG 1500-063	**	63		24,100		5,420	178	115	0.19	1.4
XG 1500-075	**	75		24,200		5,440	202	127	0.22	1.4
XG 1500-080	**	80		24,200		5,440	212	132	0.24	1.4
XG 1500-100	**	100		24,300		5,465	252	152	0.29	1.9
XG 1500-125	**	125		24,300		5,465	302	177	0.36	2.2

* = at full stroke

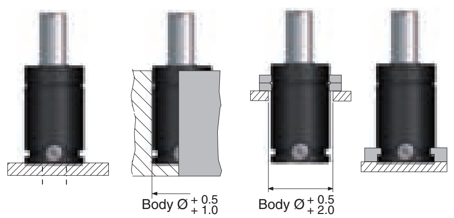
** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs"
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 50 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3020434

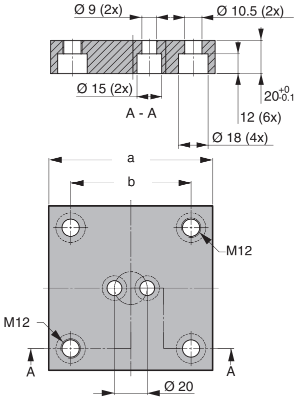
Mounting Possibilities



Base mount B, MPX | **Drop -in** | **Top mount FCX, FCSX** | **Foot mount KX, FFX**

Note!
For dimensions on mounting possibility KX-1500 refer to "Special Mounts".

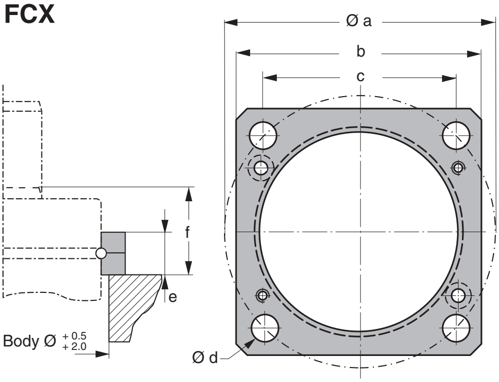
MPX



Note! Comes complete with screws to mount gas spring.

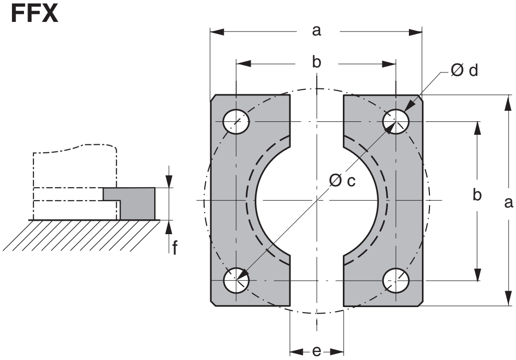
Order No.	a	b
MPX-1500	100	73.5

FCX



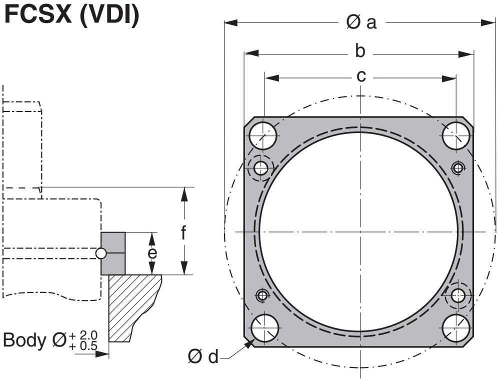
Order No.	Ø a	b	c	Ø d	e	f
FCX-1500	104	90	73.5	11	16	27

FFX



Order No.	a	b	Ø c	Ø d	e	f
FFX-1500	100	73.5	104	11	24	12

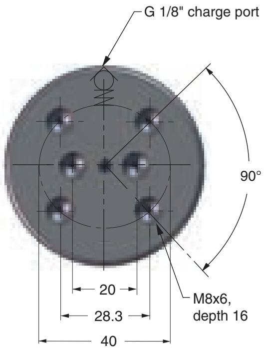
FCSX (VDI)



Order No.	Ø a	b	c	Ø d	e	f
FCSX-1500	90.5	80	64	11	16	27

Note! For dimensions on mounting possibility KX-1500 refer to “Special Mounts”.

2 million



The Power Line – Heavy Duty Series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TX 1500-013	13		17,700		3,979	121	108	0.10	1.76
TX 1500-025	25		19,100		4,294	145	120	0.13	1.89
TX 1500-038	38		20,000		4,496	171	133	0.17	2.04
TX 1500-050	50		20,600		4,631	195	145	0.20	2.18
TX 1500-063	63		21,100		4,743	221	158	0.23	2.33
TX 1500-075	75		21,500		4,833	245	170	0.27	2.47
TX 1500-080	80		21,600		4,856	255	175	0.28	2.52
TX 1500-100	100	15,000	21,700	3,372	4,878	295	195	0.33	2.76
TX 1500-125	125		22,400		4,968	345	220	0.40	3.04
TX 1500-150	150		22,500		5,036	395	245	0.47	3.33
TX 1500-160	160		22,600		5,058	415	255	0.50	3.44
TX 1500-175	175		22,600		5,081	445	270	0.54	3.61
TX 1500-200	200		22,800		5,126	495	295	0.60	3.90
TX 1500-250	250		23,000		5,171	595	345	0.74	4.47
TX 1500-300	300		23,200		5,216	695	395	0.87	5.05

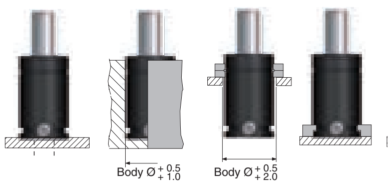
* = at full stroke

Basic Information

For general information see “About gas springs”
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3026202

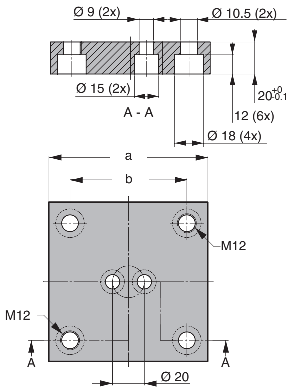
Mounting Possibilities



Base mount **B, MPX** | **Drop - in** | **Top mount** **FCX, FCSX,** | **Foot mount** **KX, FFX,**

Note! For dimensions on mounting possibilities KX-1500, HMF-X1500 and FCSCX-1500 refer to “Special Mounts”.

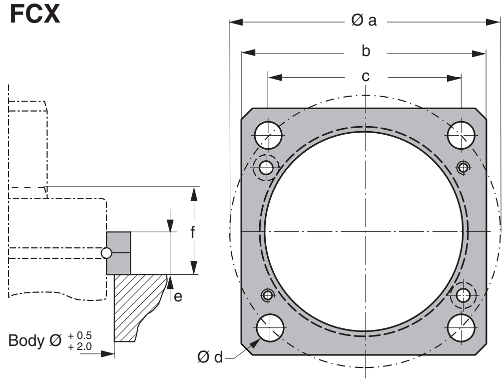
MPX



Note! Comes complete with screws to mount gas spring.

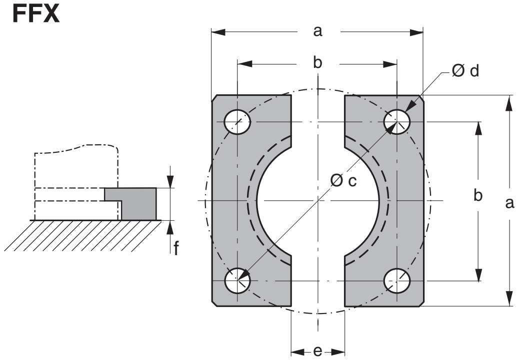
Order No.	a	b
MPX-1500	100	73.5

FCX



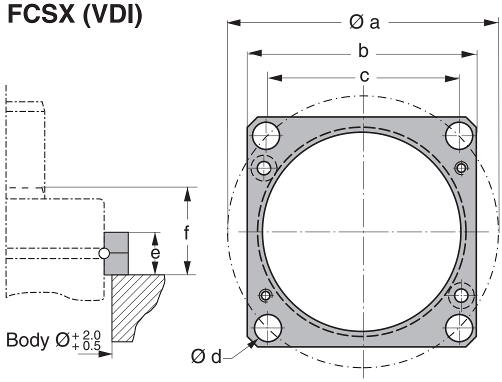
Order No.	Ø a	b	c	Ø d	e	f
FCX-1500	104	90	73.5	11	16	27

FFX



Order No.	a	b	Ø c	Ø d	e	f
FFX-1500	100	73.5	104	11	24	12

FCSX (VDI)



Order No.	Ø a	b	c	Ø d	e	f
FCSX-1500	90.5	80	64	11	16	27

Note! For dimensions on mounting possibility KX-1500 refer to “Special Mounts”.

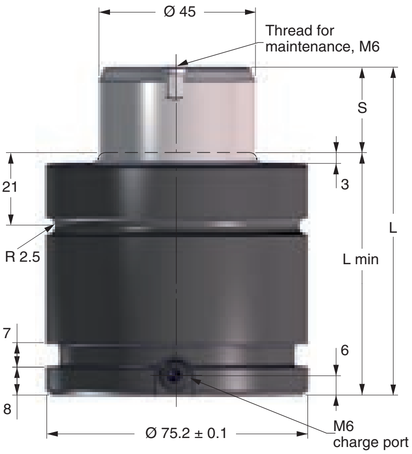
2 million

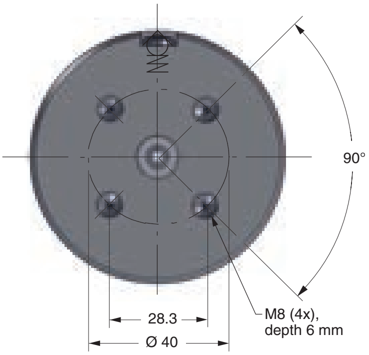
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M8 threaded holes allow various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 2400-016	**	16		38,300		8,611	77	61	0.09	1.34	
X 2400-019		19		38,500		8,656	83	64	0.10	1.38	
X 2400-025	**	25		38,700		8,701	95	70	0.13	1.45	√
X 2400-032		32		38,600		8,678	109	77	0.16	1.56	
X 2400-038	**	38		38,400		8,633	121	83	0.18	1.65	√
X 2400-050	**	50	24,000	39,200	5,396	8,813	145	95	0.23	1.84	√
X 2400-063	**	63		39,200		8,813	171	108	0.28	2.20	√
X 2400-075		75		39,200		8,813	195	120	0.33	2.26	
X 2400-080	**	80		39,200		8,813	205	125	0.35	2.32	√
X 2400-100	**	100		39,300		8,835	245	145	0.43	2.66	√
X 2400-125	**	125		39,300		8,835	295	170	0.54	3.05	√

* = at full stroke

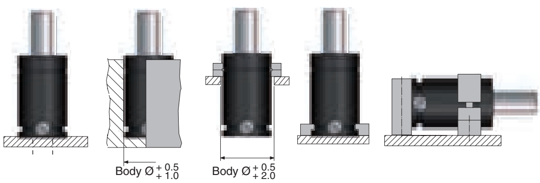
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018848
The X 2400-016 and X 2400-019 are not possible to repair.

Mounting Possibilities

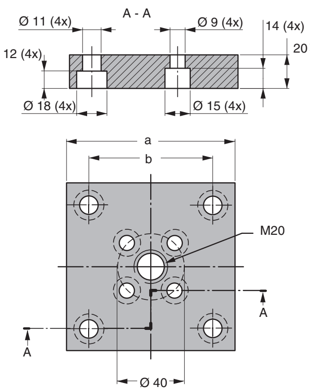


Base mount B, MP — Drop - in — Top mount FC, FCS, FCSC — Foot mount K, FFC — Body mount FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

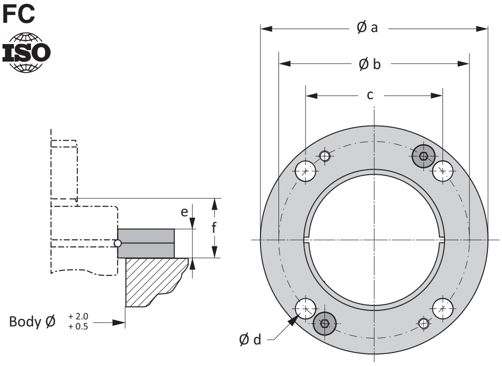
MP

Note! Comes complete with screws to mount gas spring.



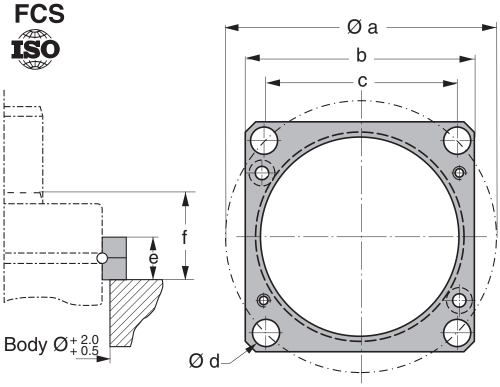
Order No.	a	b
MP-1500	100	73.5

FC



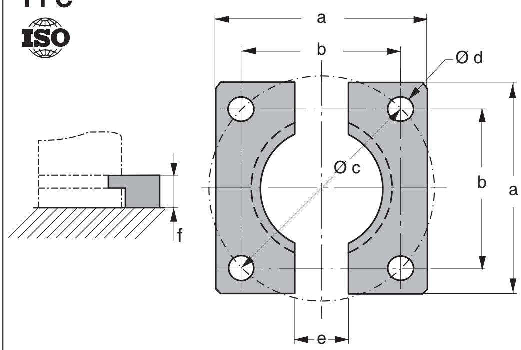
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC



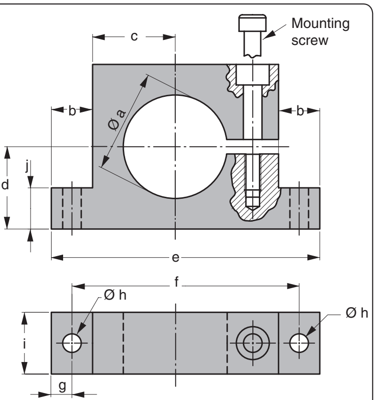
Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

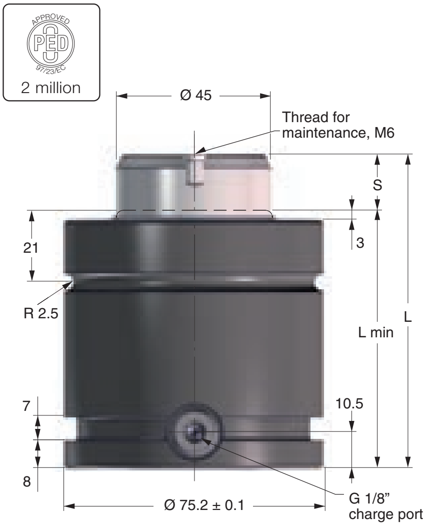
S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

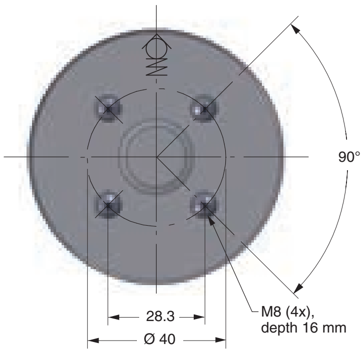


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm.

There is a side and bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M8 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 2400-016		16		38,300		8,611	91	75	0.09	1.77
XG 2400-019		19		38,500		8,656	97	78	0.10	1.82
XG 2400-025	**	25		38,700		8,701	109	84	0.13	1.89
XG 2400-032		32		38,600		8,678	123	91	0.16	2.00
XG 2400-038	**	38		38,400		8,633	135	97	0.18	2.10
XG 2400-050	**	50	24,000	39,200	5,396	8,813	159	109	0.23	2.28
XG 2400-063	**	63		39,200		8,813	185	122	0.28	2.56
XG 2400-075	**	75		39,200		8,813	209	134	0.33	2.75
XG 2400-080	**	80		39,200		8,813	219	139	0.35	2.83
XG 2400-100	**	100		39,300		8,835	259	159	0.43	3.15
XG 2400-125	**	125		39,300		8,835	309	184	0.54	3.54

* = at full stroke

** Recommended stroke length for optimal delivery

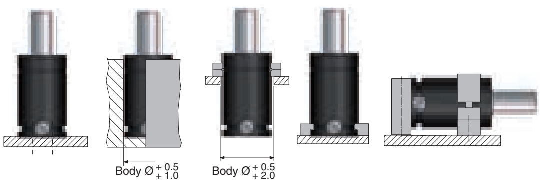
Basic Information

For general information see "About gas springs".

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018848
The XG 2400-16 and XG 2400-19 are not possible to repair. ....

Mounting Possibilities



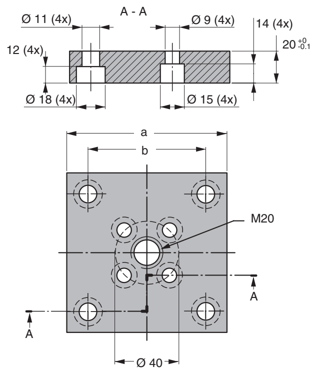
Base mount	Drop - in	Top mount	Foot mount	Body mount
B, MP		FC, FCS, FCSC	K, FFC	FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, FCSC-1500 and HM-1500 refer to "Special Mounts".

MP

ISO

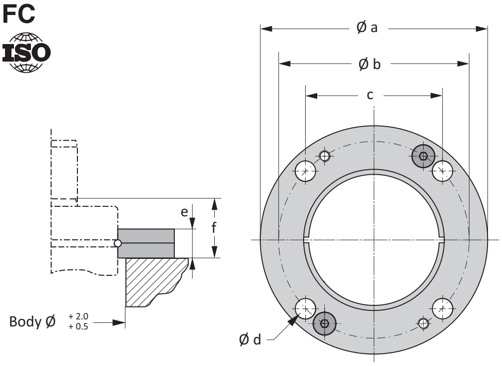
Note! Comes complete with screws to mount gas spring.



Order No.	a	b
MP-1500	100	73.5

FC

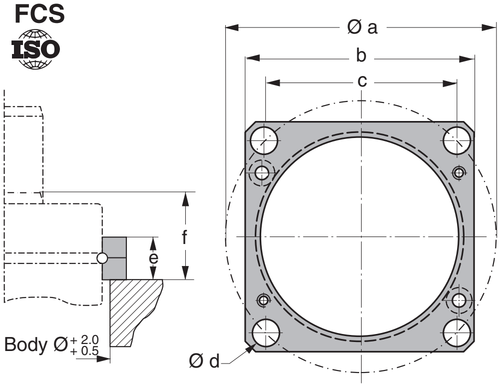
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS

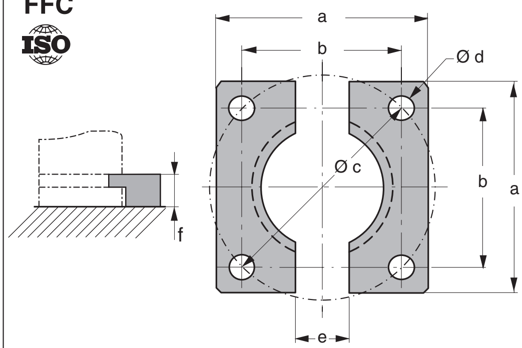
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

ISO



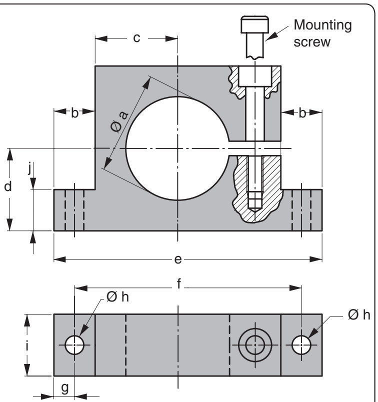
Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, FCSC-1500 and HM-1500 refer to “Special Mounts”.

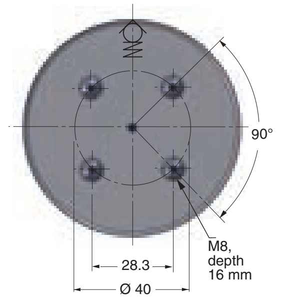
2 million

The Power Line – Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 9,200 N up to 95,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TX 2400-025	**	25		37,100		8,350	160	135	0.23	3.1	√
TX 2400-038	**	38		37,600		8,450	186	148	0.28	3.31	
TX 2400-050	**	50		37,900		8,525	210	160	0.33	3.5	√
TX 2400-063	**	63		38,100		8,575	237	173	0.38	3.7	
TX 2400-075	**	75		38,300		8,625	260	185	0.43	3.89	
TX 2400-080	**	80		38,300		8,625	270	190	0.45	3.97	√
TX 2400-100	**	100	24,000	38,500	5,400	8,650	310	210	0.53	4.29	√
TX 2400-125	**	125		38,700		8,700	360	235	0.63	4.68	√
TX 2400-150		150		38,800		8,725	410	260	0.73	5.07	
TX 2400-160	**	160		38,800		8,725	430	270	0.77	5.23	√
TX 2400-175		175		38,900		8,750	460	285	0.83	5.47	
TX 2400-200	**	200		38,900		8,750	510	310	0.93	5.86	√
TX 2400-250	**	250		39,000		8,775	610	360	1.17	6.65	√
TX 2400-300	**	300		39,100		8,800	710	410	1.33	7.44	√

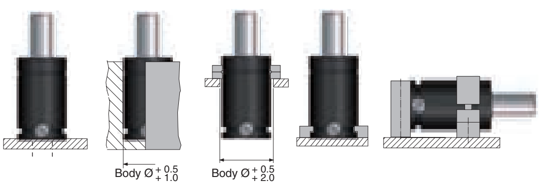
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022952

Mounting Possibilities

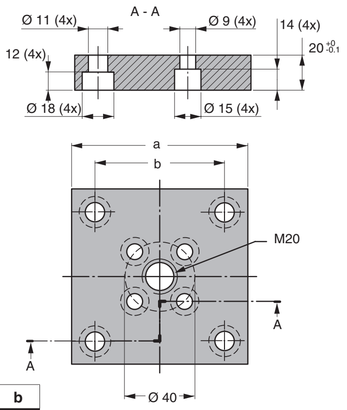


Base mount **B, MP** | **Drop - in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC** | **Body mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, FCSC-1500 and HM-1500 refer to “Special Mounts”.

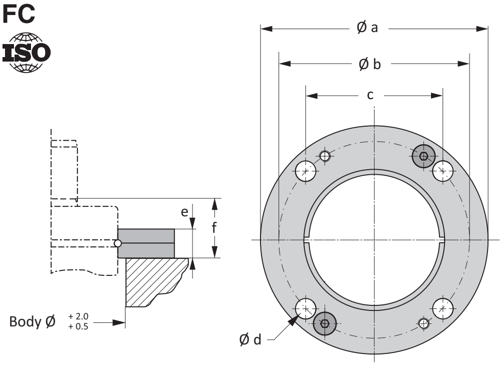
MP

Note!
Comes complete with screws to mount gas spring.



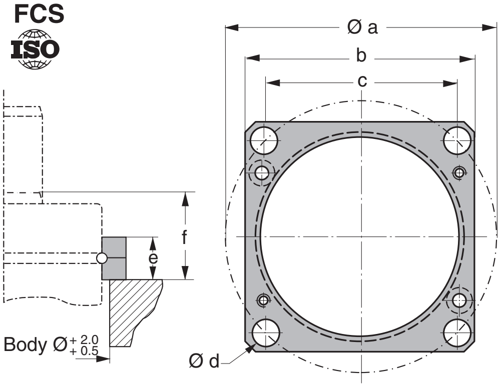
Order No.	a	b
MP-1500	100	73.5

FC



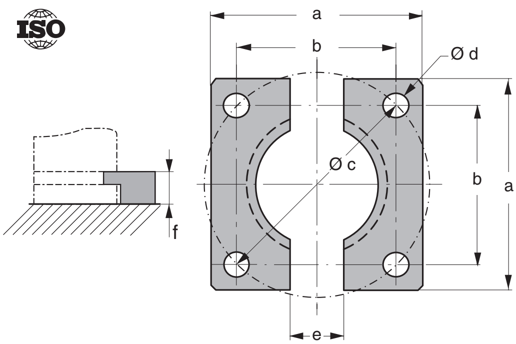
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

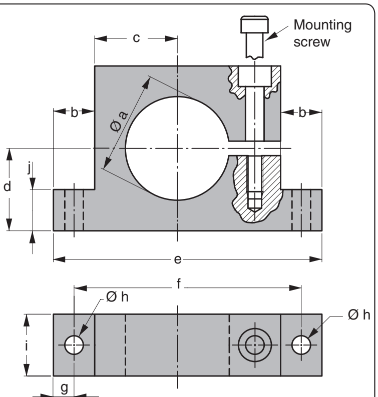


Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, FCSC-1500 and HM-1500 refer to “Special Mounts”.

2 million

The TL Series ranges from model sizes 750 to 7,500, with the same features and technology as the TU series.

At the same time, the TL gas spring is shorter than the corresponding TU gas spring by 25 mm, except TL 5000 and TL 7500, which are 37.5 mm and 50 mm shorter respectively. TL springs share the same TU mounting possibilities and stroke lengths, with exception of strokes 12.5, 37.5 and 62.5.

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TL 1500-013	12.5		18,000		4,050	110	97.5	0.11	2.65
TL 1500-025	25		19,200		4,320	135	110	0.15	2.88
TL 1500-038	37.5		20,000		4,500	160	122.5	0.19	3.11
TL 1500-050	50		20,400		4,590	185	135	0.23	3.34
TL 1500-063	62.5		20,700		4,650	210	147.5	0.27	3.57
TL 1500-075	75		20,900		4,700	235	160	0.31	3.88
TL 1500-080	80		21,000		4,720	245	165	0.33	3.89
TL 1500-088	87.5		21,100		4,740	260	172.5	0.35	4.03
TL 1500-100	100		21,200		4,770	285	185	0.39	4.26
TL 1500-113	112.5	15,000	21,400	3,370	4,810	310	197.5	0.43	4.49
TL 1500-125	125		21,500		4,830	335	210	0.47	4.71
TL 1500-138	137.5		22,000		4,950	360	222.5	0.49	4.94
TL 1500-150	150		22,000		4,950	385	235	0.52	5.17
TL 1500-160	160		22,100		4,970	405	245	0.56	5.36
TL 1500-175	175		22,100		4,970	435	260	0.60	5.63
TL 1500-200	200		22,100		4,970	485	285	0.68	6.09
TL 1500-225	225		22,200		4,990	535	310	0.76	6.55
TL 1500-250	250		22,200		4,990	585	335	0.84	7.01

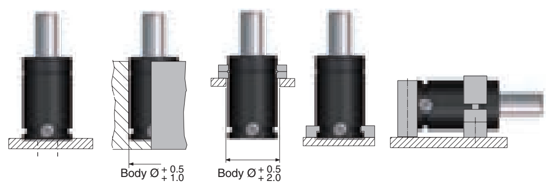
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit... 3024144

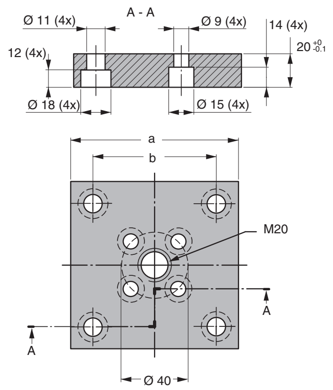
Mounting Possibilities



Base mount B, MP | **Drop -in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC,** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

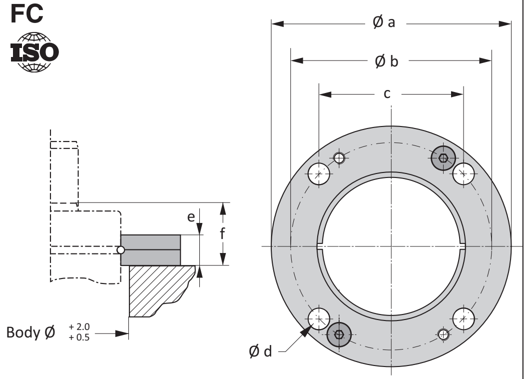
MP



Note!
Comes complete with screws to mount gas spring.

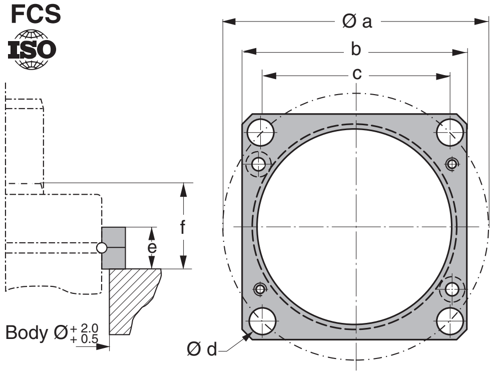
Order No.	a	b
MP-1500	100	73.5

FC



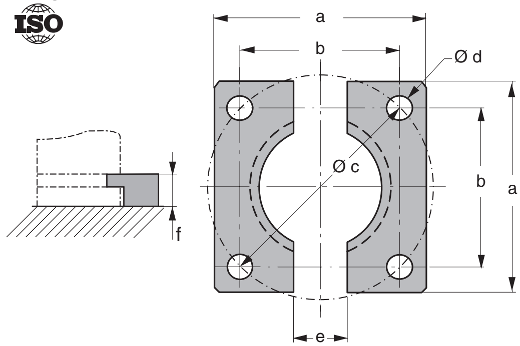
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS



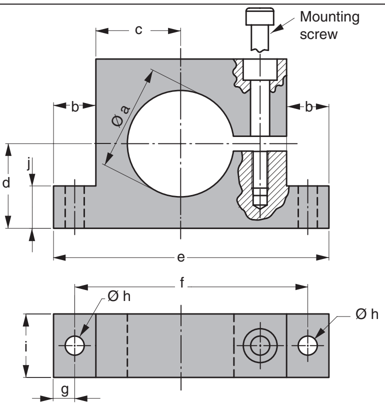
Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S



Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M10) should be tightened with torque 52 Nm.

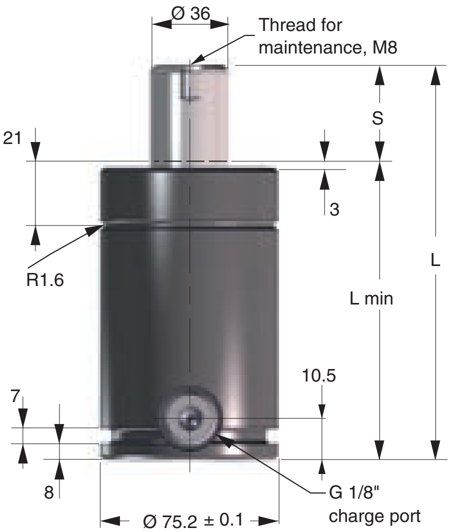
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

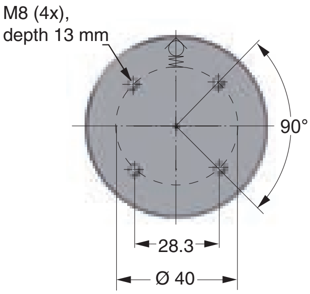
Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

2 million

This is a short height hoseable spring with an initial force of 15,000 N.

The K 1500 has a total length of 60 mm + (2 × stroke). This spring is 50 mm shorter than the TU 1500.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
K 1500-025		25	15,000	24,000	3,375	5,400	110	85	0.10	2.05
K 1500-038		38.1		23,000		5,170	136.2	98.1	0.14	2.35
K 1500-050	**	50		23,000		5,170	160	110	0.18	2.50
K 1500-064	**	63.5		23,000		5,170	187	123.5	0.22	2.75
K 1500-080		80		23,000		5,170	220	140	0.27	3.05
K 1500-100		100		23,000		5,170	260	160	0.34	3.40

* = at full stroke

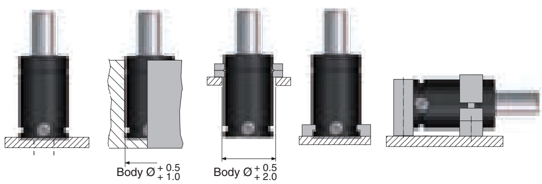
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit 3017230-1500

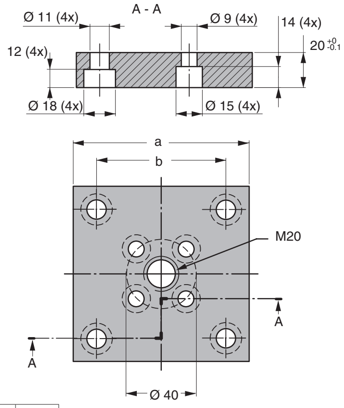
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount FK,** | **Foot mount K, FFC** | **Body mount SA, S**

Note! For dimensions on mounting possibilities K-1500 and SA-1500 refer to “Special Mounts”.

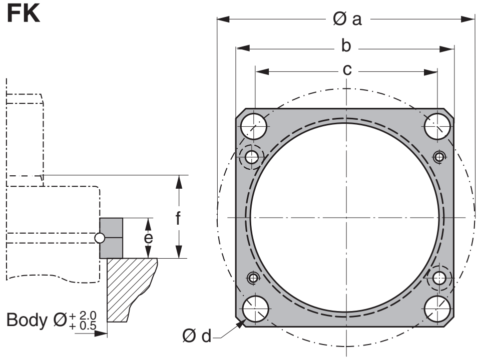
MP



Note! Comes complete with screws to mount gas spring.

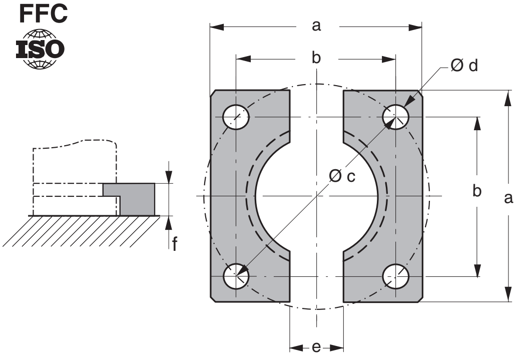
Order No.	a	b
MP-1500	100	73.5

FK



Order No.	Ø a	b	c	Ø d	e	f
FK-1500	104	90	73.5	11	16	29

FFC

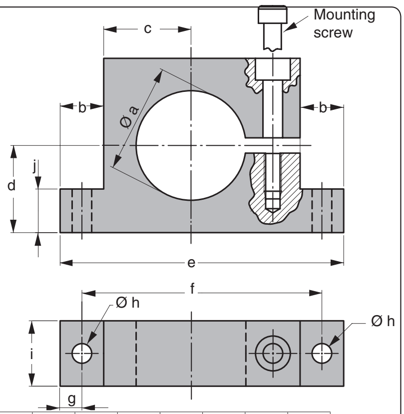


Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

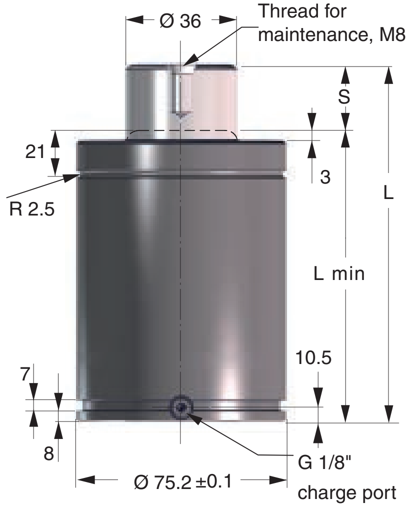
The mounting screw (M10) should be tightened with torque 52 Nm.



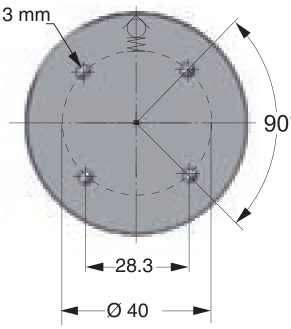
Order No.	Ø a	b	c	d	e	f	g	Ø h
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500 and FCSC-1500 refer to “Special Mounts”.

2 million



The TU line constitutes our standard line of gas springs. Sizes 250 to 10,000 conform to the ISO 11901 gas spring standard.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 1500-025	**	25					160	135	0.10	3.65	√
TU 1500-038	**	38.1					186.2	148.1	0.15	3.89	
TU 1500-050	**	50					210	160	0.18	4.11	√
TU 1500-064	**	63.5					237	173.5	0.22	4.35	
TU 1500-080	**	80					270	190	0.28	4.66	√
TU 1500-100	**	100					310	210	0.34	5.02	√
TU 1500-125	**	125	15,000	23,000	3,375	5,170	360	235	0.42	5.48	√
TU 1500-160	**	160					430	270	0.53	6.12	√
TU 1500-175		175					460	285	0.60	6.34	
TU 1500-200	**	200					510	310	0.68	6.86	
TU 1500-225		225					560	335	0.76	7.26	
TU 1500-250	**	250					610	360	0.81	7.77	
TU 1500-300	**	300					710	410	0.96	8.69	

* = at full stroke

** Recommended stroke length for optimal delivery

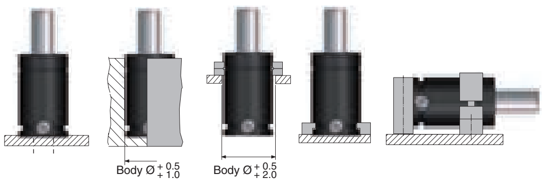
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 2014068-02

Mounting Possibilities



Base mount
B, MP

Drop - in

Top mount
FC, FCS, FCSC

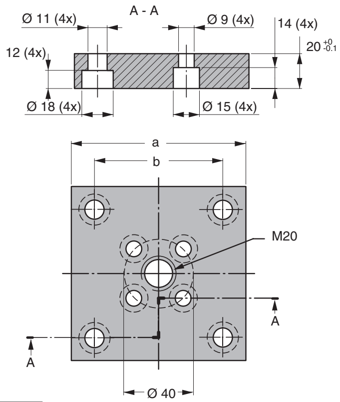
Foot mount
K, FFC,

Body mount
FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

MP

ISO

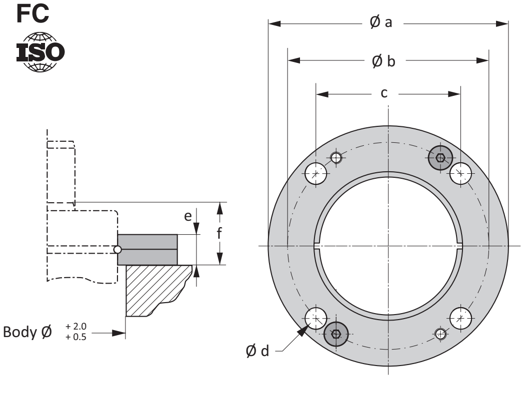


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-1500	100	73.5

FC

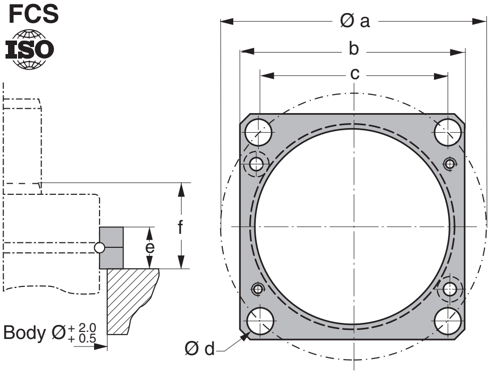
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS

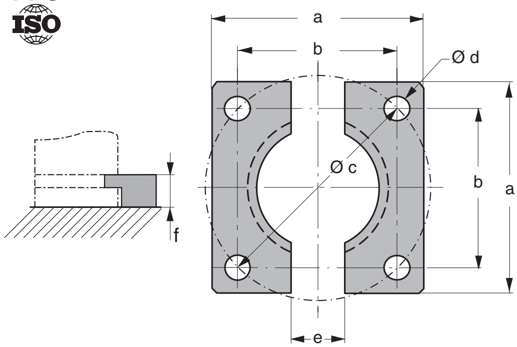
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

ISO



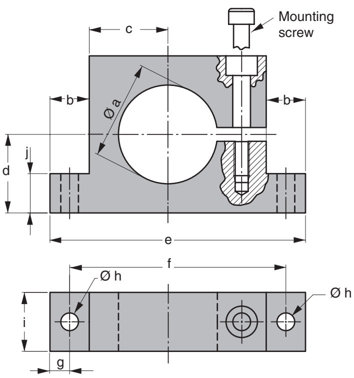
Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

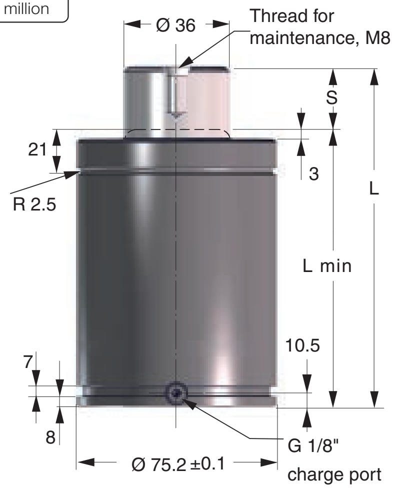
The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to "Special Mounts".

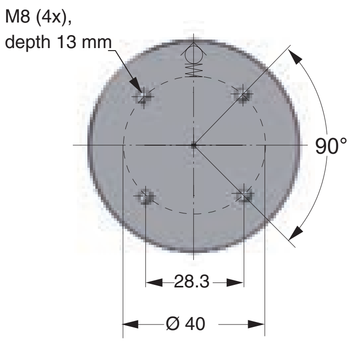
2 million



The High Speed gas springs (TUS) have been engineered to withstand press stroke speeds to a maximum of 2 m/s, which meet the safety requirements from the French automotive manufacturer Renault.

These gas springs are available in sizes from 750 to 7,500 and dimensions that conform to the ISO 11901 gas spring standard.

The TUS gas spring replaces the TUR spring that has been phased out.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUS 1500-025	25		23,000			160	135	0.10	3.75
TUS 1500-038	38.1		23,000			186.2	148.1	0.15	3.95
TUS 1500-050	50		23,000			210	160	0.18	4.15
TUS 1500-064	63.5		23,000			237	173.5	0.22	4.40
TUS 1500-080	80		23,000			270	190	0.28	4.70
TUS 1500-100	100	15,000	23,000	3,375	5,170	310	210	0.34	5.10
TUS 1500-125	125		23,000			360	235	0.42	5.55
TUS 1500-160	160		23,000			430	270	0.53	6.25
TUS 1500-200	200		23,000			510	310	0.68	6.90
TUS 1500-250	250		23,000			610	360	0.81	7.80
TUS 1500-300	300		23,000			710	410	0.96	8.90

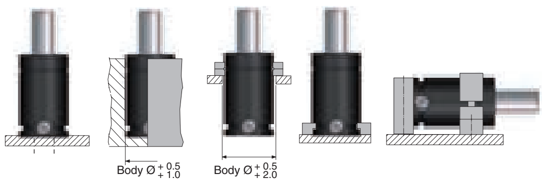
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 2 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019278

Mounting Possibilities

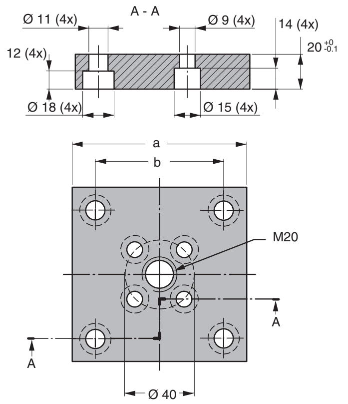


Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC,** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

MP

ISO

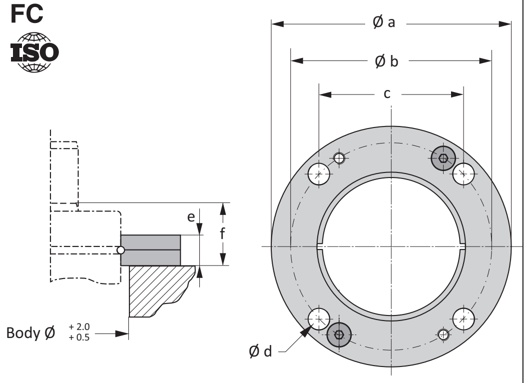


Note!
Comes complete with screws to mount gas spring.

Order No.	a	b
MP-1500	100	73.5

FC

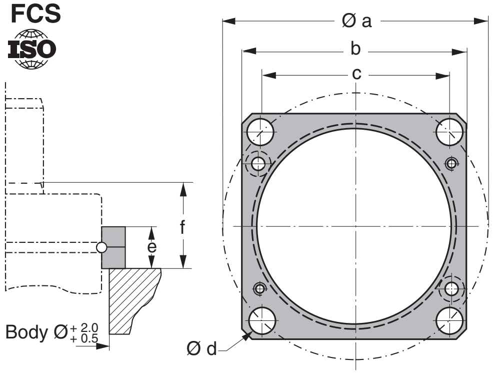
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS

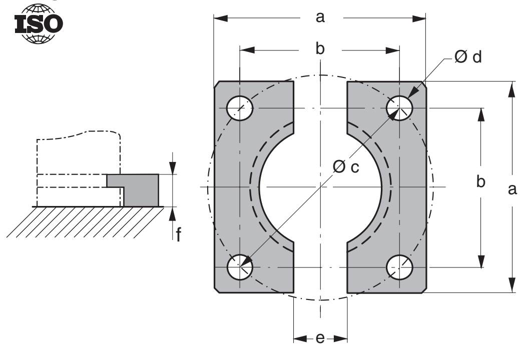
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

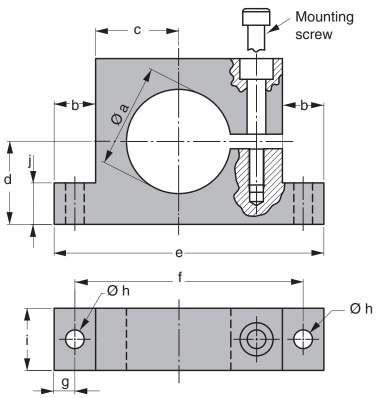
Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

S

ISO

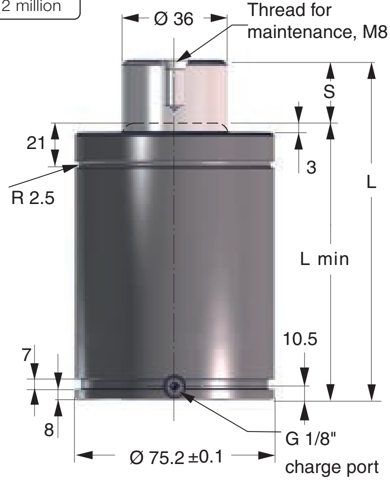
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M10) should be tightened with torque 52 Nm.

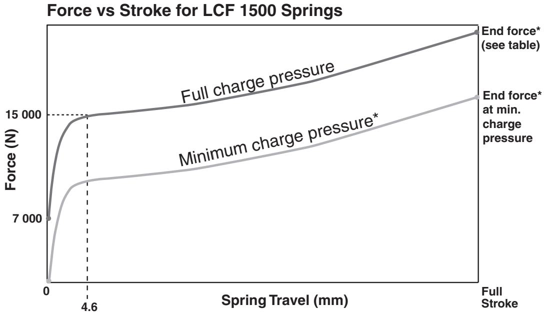


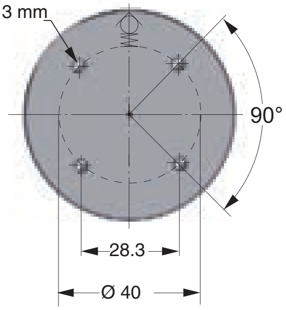
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

2 million



Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.
For more information, see “About Gas Springs”.





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 1500-025	25		23,000			160	135	0.10	3.75
LCF 1500-038	38.1		23,000			186.2	148.1	0.15	3.95
LCF 1500-050	50		23,000			210	160	0.18	4.15
LCF 1500-064	63.5		23,000			237	173.5	0.22	4.40
LCF 1500-080	80		23,000			270	190	0.28	4.70
LCF 1500-100	100	15,000	23,000	3,375	5,170	310	210	0.34	5.10
LCF 1500-125	125		23,000			360	235	0.42	5.55
LCF 1500-160	160		23,000			430	270	0.53	6.25
LCF 1500-200	200		23,000			510	310	0.68	6.90
LCF 1500-250	250		23,000			610	360	0.81	7.80
LCF 1500-300	300		23,000			710	410	0.96	8.90

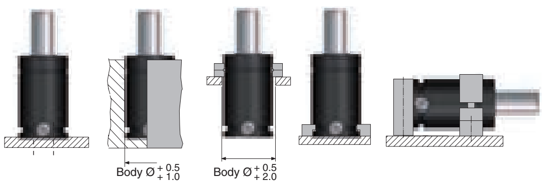
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure........................ 105 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019378

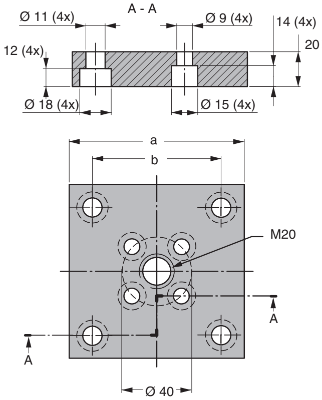
Mounting Possibilities



Base mount	Drop - in	Top mount	Foot mount	Body mount
B, MP		FC, FCS, FCSC	K, FFC,	FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

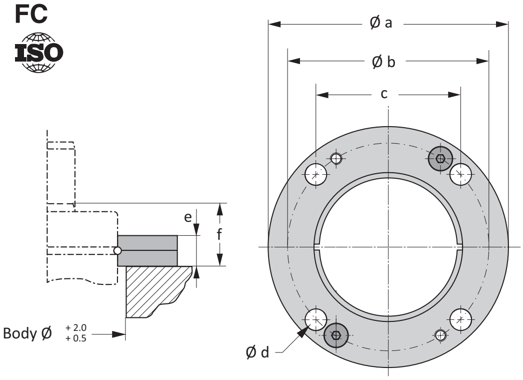
MP



Note!
Comes complete with screws to mount gas spring.

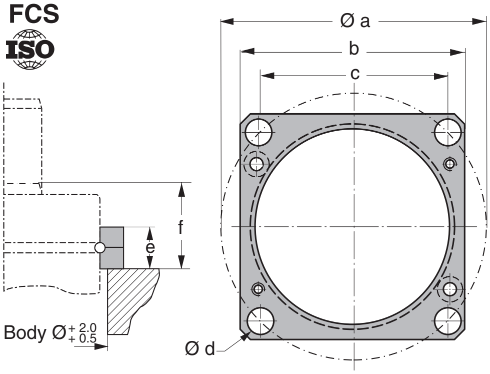
Order No.	a	b
MP-1500	100	73.5

FC



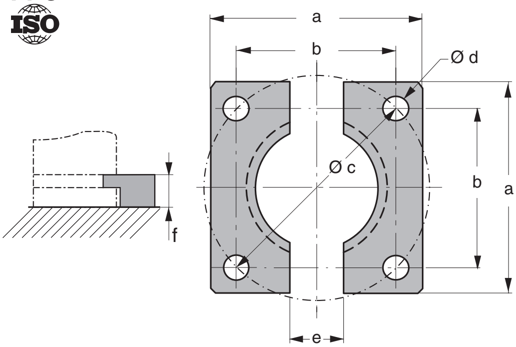
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-1500	122	104	73.5	11	16	29

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-1500	104	90	73.5	11	16	29

FFC

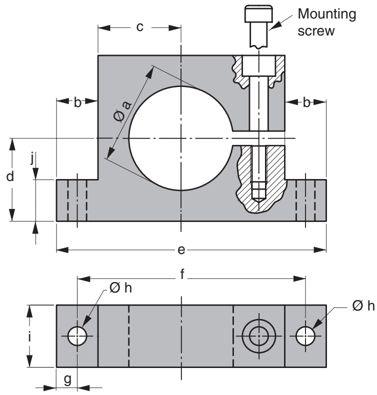


Order No.	a	b	Ø c	Ø d	e	f
FFC-1500	100	73.5	104	11	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

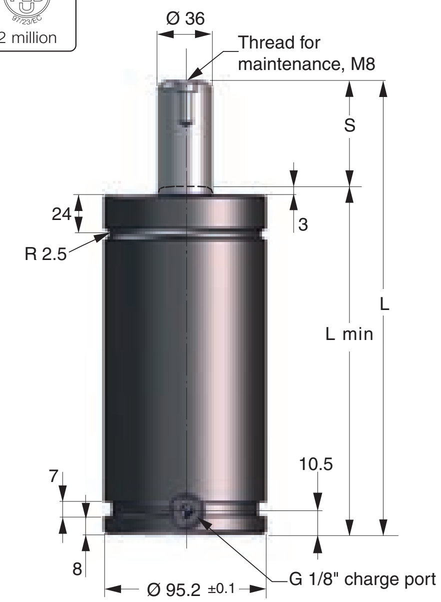
The mounting screw (M10) should be tightened with torque 52 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20

Note! For dimensions on mounting possibilities K-1500, FAC-1500, SA-1500, HM-1500 and FCSC-1500 refer to “Special Mounts”.

2 million

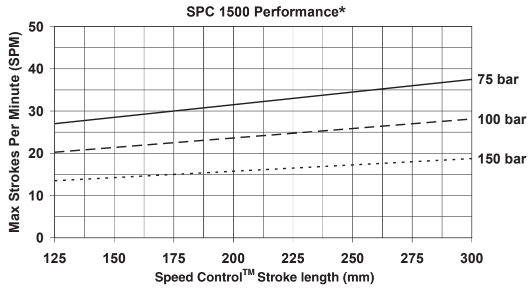


Speed Control™ – SPC gas springs have been engineered to eliminate blank holder bounce, commonly associated with increased return stroke speeds from link drive presses.

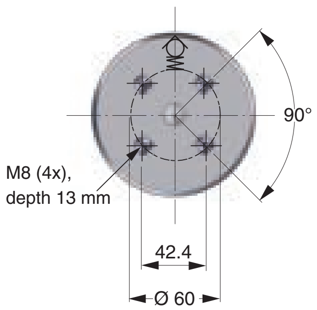
SPC gas springs have inbuilt return stroke **speed dampening**, which decelerates the last 30 mm of the piston rod stroke to 0.4 m/s, helping to bring the blank holder to a smooth stop.

Speed Control™ – SPC features:

- Eliminates blank holder bounce
- Increases productivity by increasing part transfer efficiency
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system



*At ambient room temperatures with free air flow



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
SPC 1500-125	125	15,000	19,000	3,375	4,275	370	245	0.73	7.60
SPC 1500-160	160					440	280	0.91	8.45
SPC 1500-200	200					520	320	1.11	9.43
SPC 1500-250	250					620	370	1.36	10.64
SPC 1500-300	300					720	420	1.62	11.86

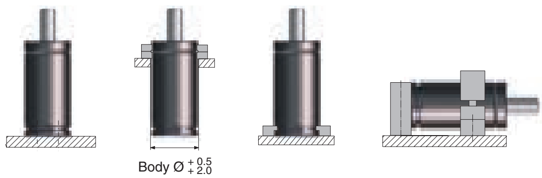
*at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... See chart
Dampening length .... ≈ 30 mm
Dampening speed .... 0.4 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3021494

Mounting Possibilities

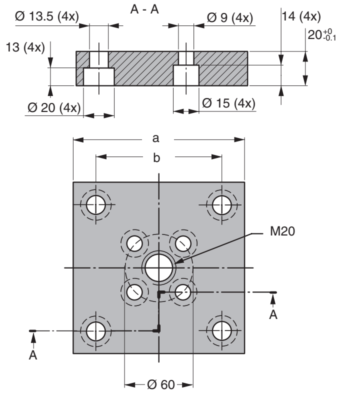


Base mount	Top mount	Foot mount	Body mount
B, MP	FC, FCS, FCSC	K, FFC	FAC, SA, S

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000 and FCSC-3000 refer to “Special Mounts”.

MP

ISO

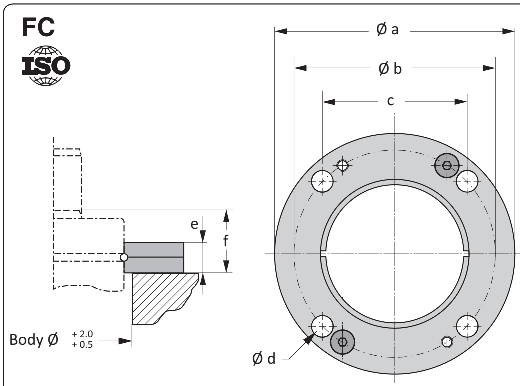


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-3000	120	92

FC

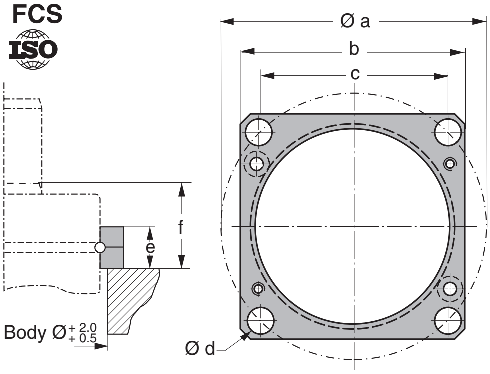
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS

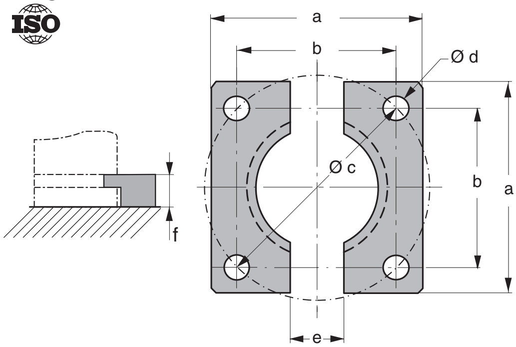
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

ISO



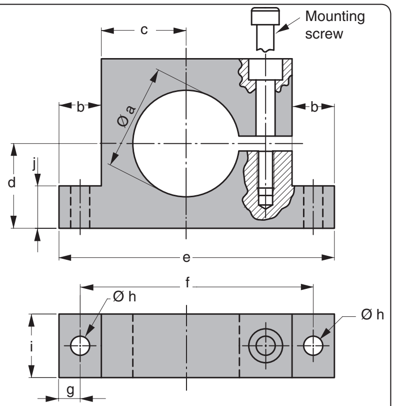
Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

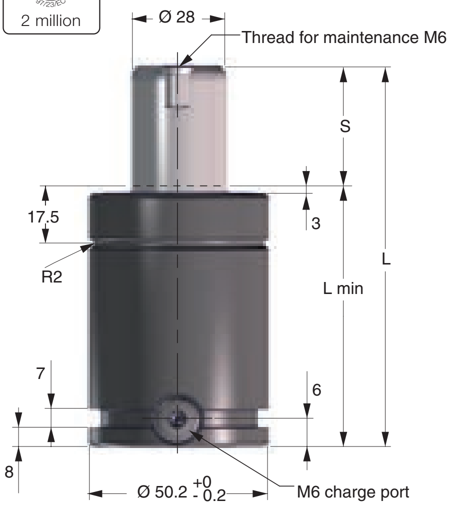
The mounting screw (M12) should be tightened with torque 91 Nm.

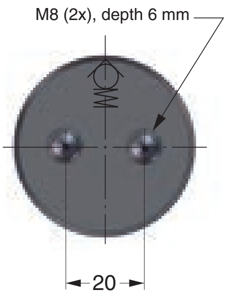


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	11.5	13	30	20

Note! For dimension on mounting possibilities K-3000, FAC-3000, SA-3000 and FCSC-3000 refer to “Special Mounts”.

2 million





Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic molding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at working temperatures up to 120°C.

Features:

- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- M6 gas ports can be connected to the special high temp version of our Micro EO24™ Hose and Tube system for remote pressure control

Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C	11,130	17,500
			(20°C)	(9,200)	(14,500)
80 – 100°C	15	125	100°C	9,800	15,400
			(20°C)	(7,700)	(12,100)
100 – 120°C	10	115	120°C	9,500	14,900
			(20°C)	(7,080)	(11,100)

* = at full stroke

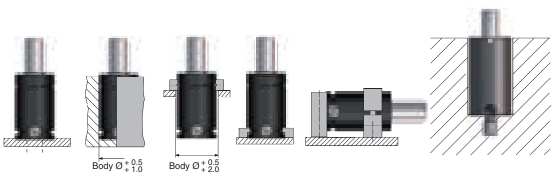
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 1000-013	13	9,200	2,068	64	51	0.03	0.52
MT 1000-016	16			70	54	0.04	0.54
MT 1000-019	19			76	57	0.04	0.56
MT 1000-025	25			88	63	0.05	0.61
MT 1000-032	32			102	70	0.06	0.66
MT 1000-038	38			114	76	0.07	0.71
MT 1000-050	50			138	88	0.09	0.81
MT 1000-063	63			164	101	0.11	0.91
MT 1000-075	75			188	113	0.13	1.02
MT 1000-080	80			198	118	0.14	1.05

Basic Information

For general information, see “About Gas Springs”
Pressure medium ....Nitrogen
Max. charging pressure ....See table above
Min. charging pressure ....25 bar (at 20°C)
Operating temperature ....0 – +120°C
Force increase by temperature....................±0.3 %/°C
Recommended max. strokes/min. ....See table above
Max. piston rod velocity ....1.0 m/s
Service life (0 to 80°C)................................1,000,000 strokes
or ....100,000 stroke meters*
Service life (80 to 120°C)............................500,000 strokes
or ....50,000 stroke meters*

Tube & rod surface......................................Nitrided
Repair kit 3022690

Mounting Possibilities



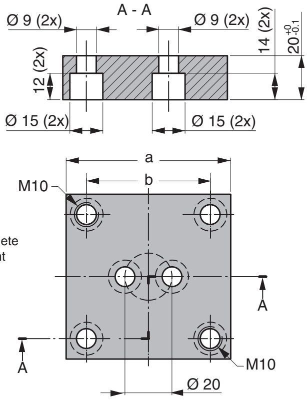
Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S, HM | Threaded stud

Note! For dimensions on mounting possibilities FCSC-750, K-750, FAC-750, SA-750 and HM-750 refer to “Special Mounts”.

MP

ISO

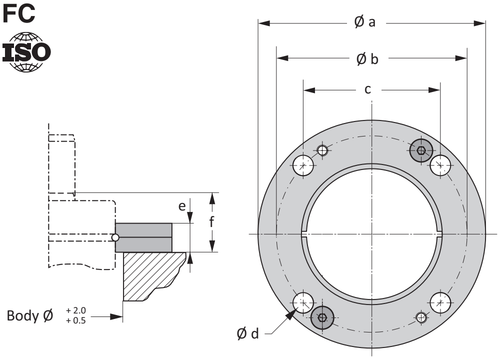
Note! Comes complete with screws to mount gas spring.



Order No.	a	b
MP-750	75	56.5

FC

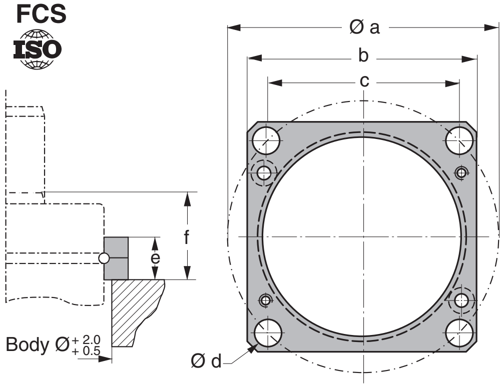
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-750	95	80	56.5	9	13	24

FCS

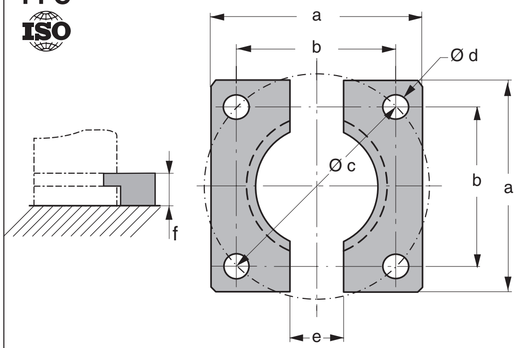
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-750	80	70	56.5	9	13	24

FFC

ISO



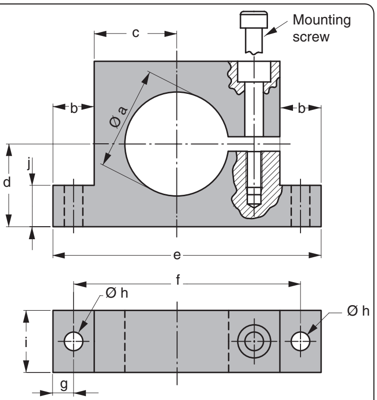
Order No.	a	b	Ø c	Ø d	e	f
FFC-750	75	56.5	80	9	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

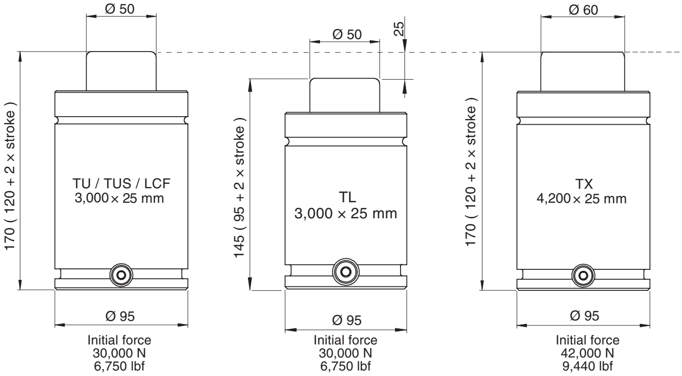
The mounting screw (M8) should be tightened with torque 25 Nm.

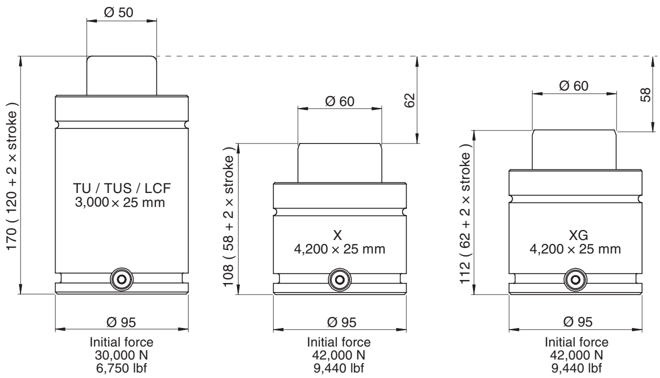


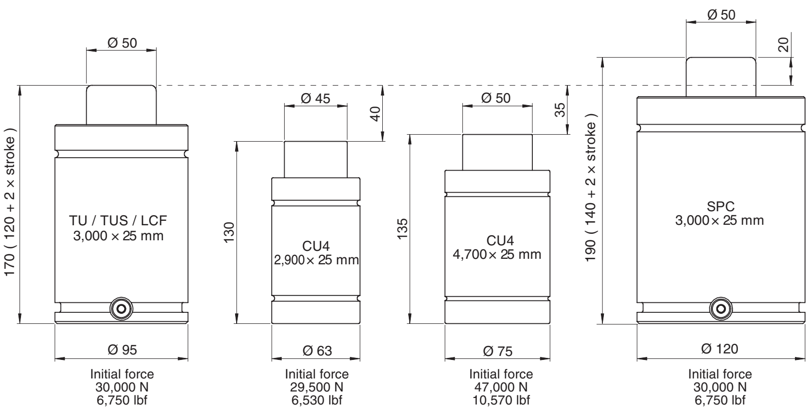
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-750	50.4	20	40	40	130	110	10	9	30	20

Note! For dimensions on mounting possibilities FCSC-750, K-750, FAC-750, SA-750 and HM-750 refer to “Special Mounts”.

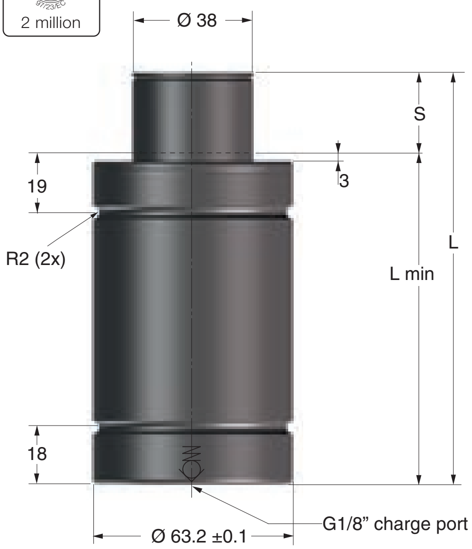
Overview - $25000 \leq F_{INIT} < 50000$







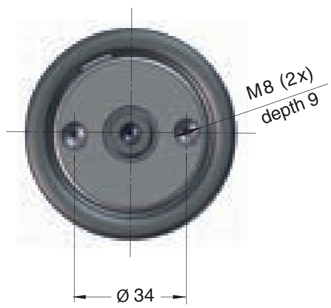
2 million



The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, this CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 2900-010	10	29,500	40,000	6,630	8,990	85	75	0.08	1.14
CU4 2900-016	16		42,000		8,440	103	87	0.12	1.28
CU4 2900-025	25		45,000		10,120	130	105	0.16	1.49
CU4 2900-032	32*		46,200		10,340	150	118	0.20	1.64
CU4 2900-040	40*		47,200		10,570	175	135	0.24	1.83
CU4 2900-050	50*		45,000		10,120	205	155	0.29	2.06
CU4 2900-065	65*		47,000		10,570	256	191	0.35	2.39

* = Should always be attached to the tool using the tapped holes in the bottom or a flange

** = at full stroke

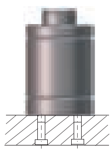
Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20° C)
Min. charging pressure .... 25 bar (at 20° C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 80-100 (at 20°C)
Max piston rod velocity .... 0.8 m/s

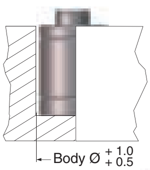
Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit CU4 2900 3024837

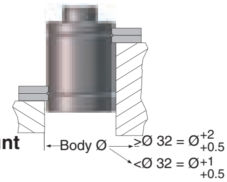
Mounting Possibilities

Base mount B

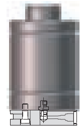


Drop-in



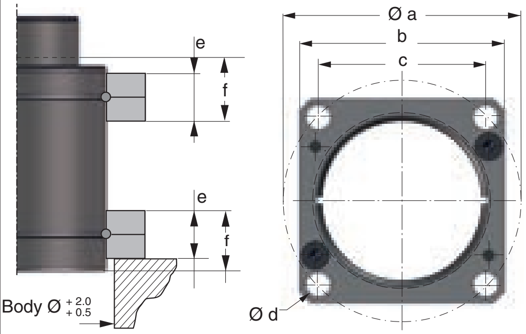


Top mount FCX



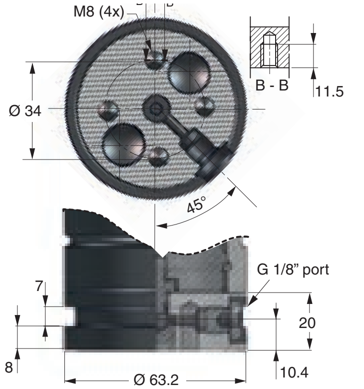
Side port SP

FCX



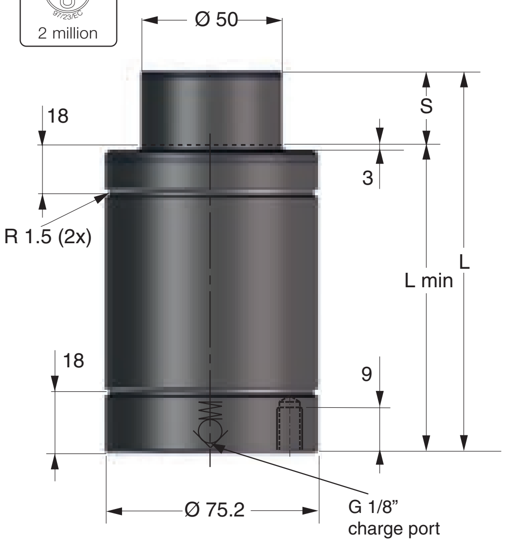
For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 2900	FCX-1500	104	90	73.5	11	16	27

SP



For model	Order No.	For U-groove mounts on SP
CU4 2900	SP-2900	Refer to X 1500

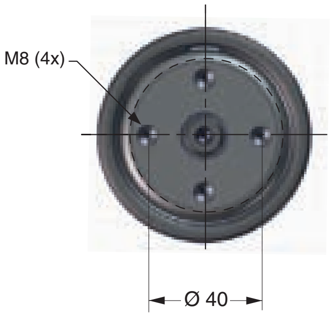
2 million



The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 4700-010	10		67,000		15,100	80	70	0.10	1.55
CU4 4700-016	16		66,000		14,800	106	90	0.17	1.79
CU4 4700-025	25		68,000		15,300	135	110	0.24	2.05
CU4 4700-032	32*	47,000	67,000	10,570	15,100	167	135	0.32	2.34
CU4 4700-040	40*		67,000		15,100	200	160	0.41	2.65
CU4 4700-050	50*		67,000		15,100	240	190	0.52	3.01
CU4 4700-065	65*		71,000		15,200	273	208	0.62	3.12

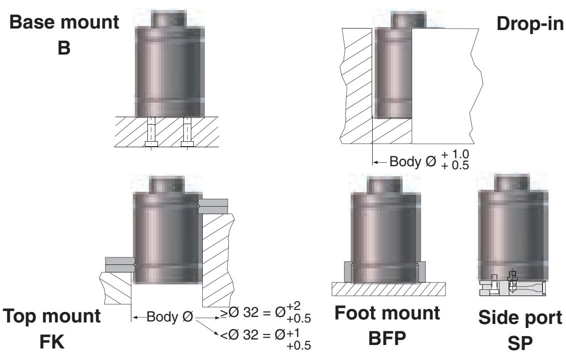
* Should always be attached to the tool using the tapped holes in the bottom or a flange
** at full stroke

Basic Information

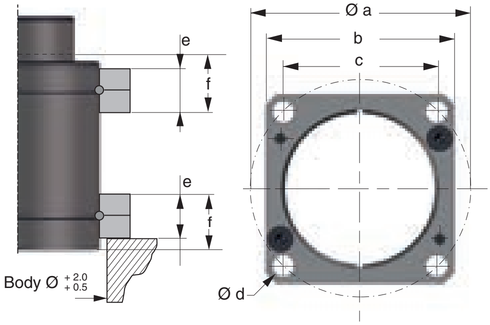
For general information see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~80 to 100 (at 20° C)
Max piston rod velocity .... 0.8 m/s

Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit CU4 4700........................ 3024838

Mounting Possibilities

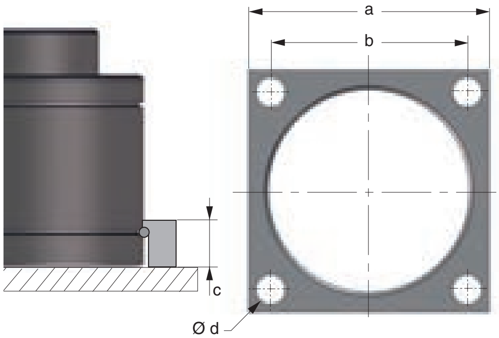


FK



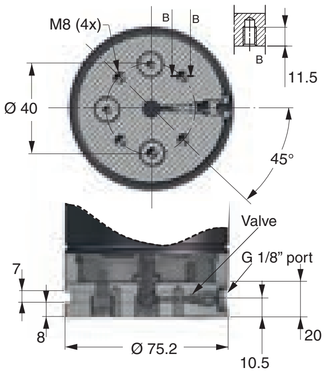
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 4700	FK-1500	104	90	73.5	11	16	26

BFP



For model	Order No.	a	b	Ø c	d
CU4 4700	BFP-4700	90	73.5	24.5	11

SP



For model	Order No.	For U-groove mounts on SP
CU4 4700	SP-4700	Refer to TU 1500

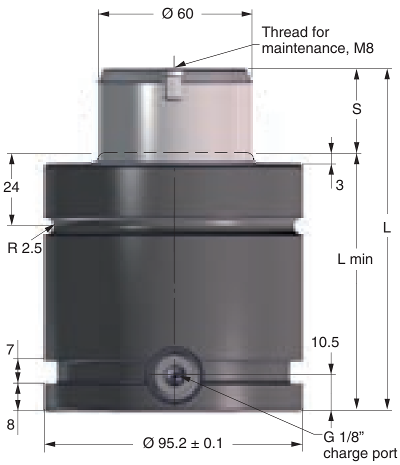
2 million

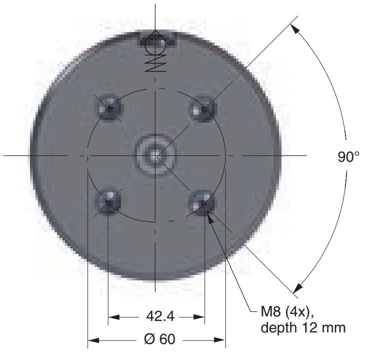
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a sideport for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M8 threaded holes allow various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 4200-016	**	16		61,700		13,870	90	74	0.15	2.81	
X 4200-019		19		63,700		14,320	96	77	0.18	2.88	
X 4200-025	**	25		60,800		13,670	108	83	0.26	2.96	√
X 4200-032		32		64,300		14,455	122	90	0.30	3.13	
X 4200-038	**	38		65,800		14,790	134	96	0.32	3.28	√
X 4200-050	**	50	42,000	67,000	9,440	15,060	158	108	0.40	3.57	√
X 4200-063	**	63		67,800		15,240	184	121	0.49	4.10	√
X 4200-075		75		68,000		15,285	208	133	0.58	4.20	
X 4200-080	**	80		68,600		15,420	218	138	0.61	4.32	√
X 4200-100	**	100		69,100		15,535	258	158	0.74	4.81	√
X 4200-125	**	125		69,600		15,645	308	183	0.91	5.42	√

* = at full stroke

** Recommended stroke length for optimal delivery

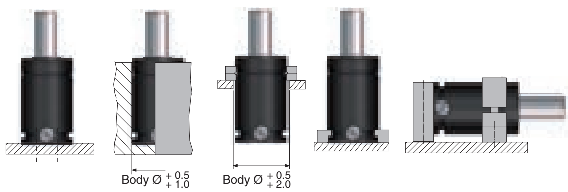
Basic Information

For general information see "About gas springs".

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018849

Mounting Possibilities

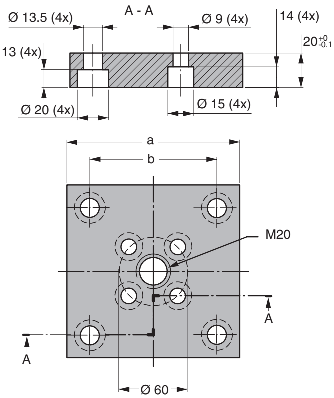


Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to "Special Mounts".

MP

ISO

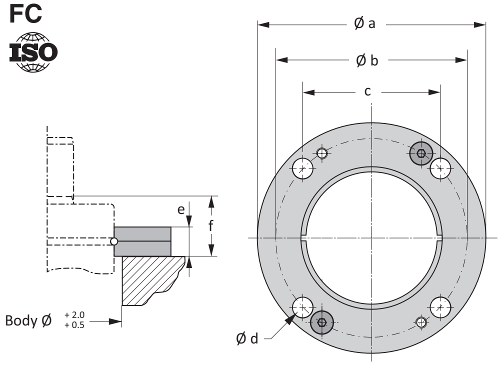


Note!
Comes complete with screws to mount gas spring.

Order No.	a	b
MP-3000	120	92

FC

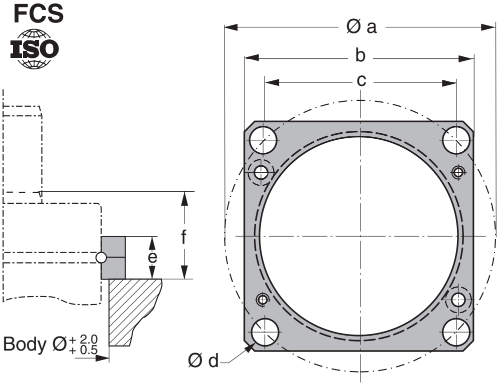
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS

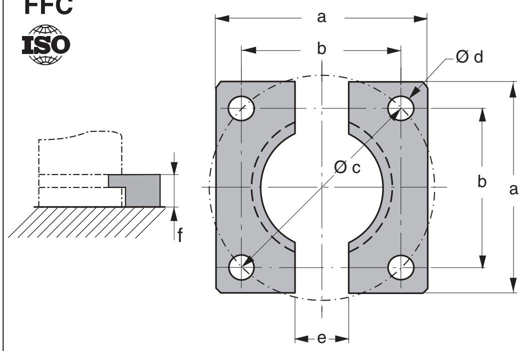
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

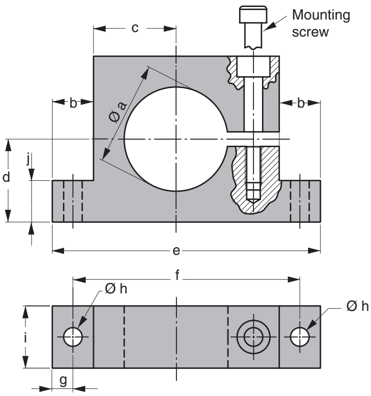
ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S

ISO



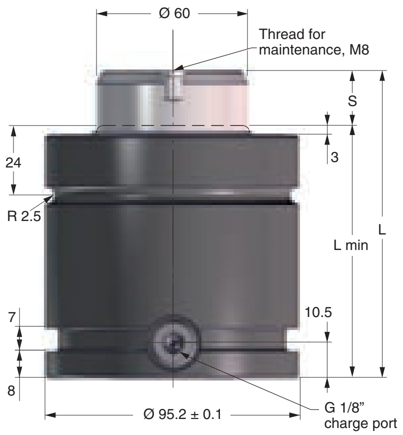
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M12) should be tightened with torque 91 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

2 million

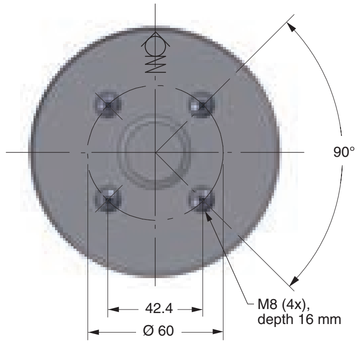


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm.

There is a side and bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M8 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 4200-016		16		61,700		13,870	94	78	0.15	2.81
XG 4200-019		19		63,700		14,320	100	81	0.18	2.88
XG 4200-025	**	25		60,800		13,670	112	87	0.26	2.96
XG 4200-032		32		64,300		14,455	126	94	0.30	3.13
XG 4200-038	**	38		65,800		14,790	138	100	0.32	3.28
XG 4200-050	**	50	42,000	67,000	9,440	15,060	162	112	0.40	3.57
XG 4200-063	**	63		67,800		15,240	188	125	0.49	4.10
XG 4200-075	**	75		68,000		15,285	212	137	0.58	4.20
XG 4200-080	**	80		68,600		15,420	222	142	0.61	4.32
XG 4200-100	**	100		69,100		15,535	262	162	0.74	4.81
XG 4200-125	**	125		69,600		15,645	312	187	0.91	5.42

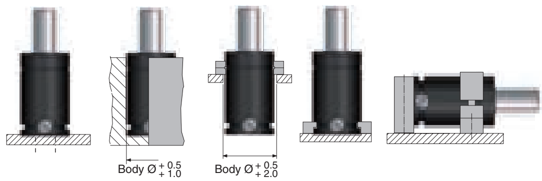
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018849

Mounting Possibilities

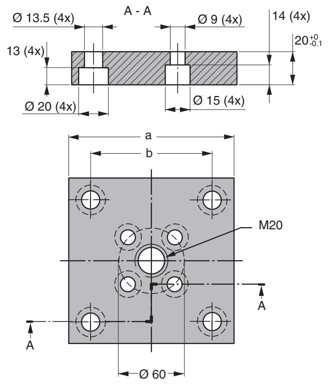


Base mount B, MP **Drop - in** **Top mount FC, FCS, FCSC** **Foot mount K, FFC** **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

MP

ISO

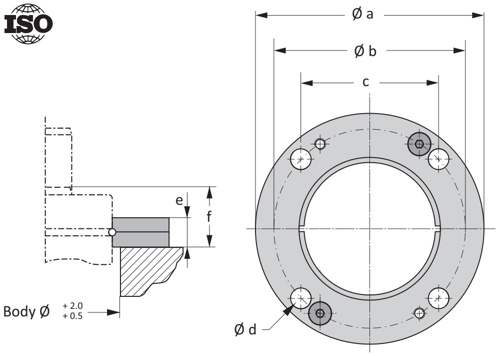


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-3000	120	92

FC

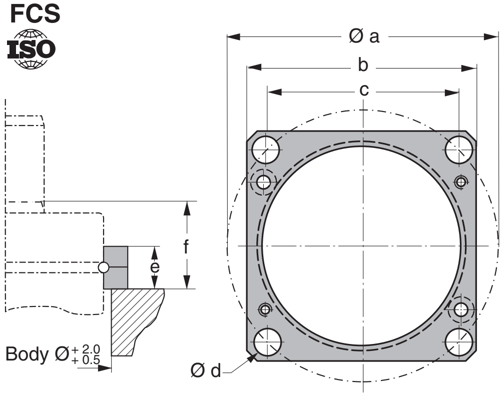
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS

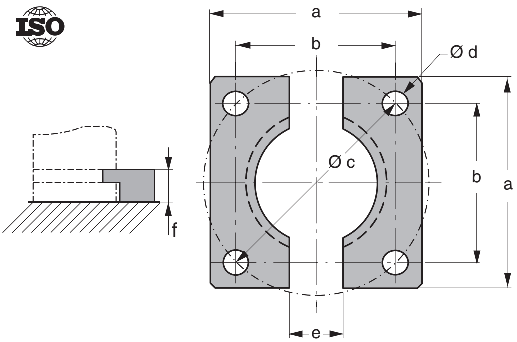
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

ISO



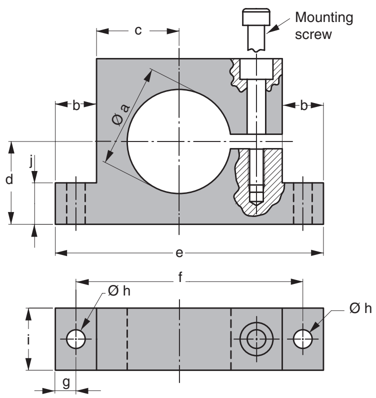
Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

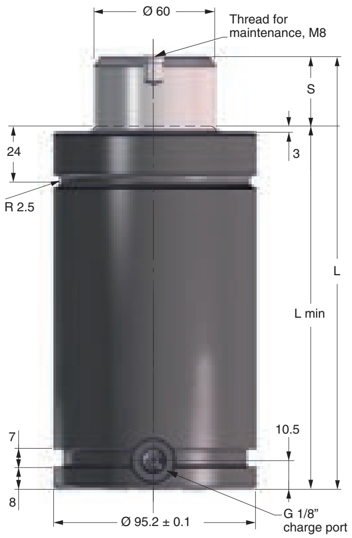
The mounting screw (M12) should be tightened with torque 91 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

2 million

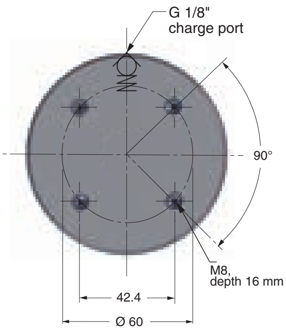


The Power Line - Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 9,200 N up to 95,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.



Order No.	S stroke		Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TX 4200-025	**	25		52,100		11,725	170	145	0.43	5.08	√
TX4200-038	**	38		55,100		12,400	196	158	0.52	5.41	
TX 4200-050	**	50		57,200		12,875	220	170	0.60	5.71	√
TX 4200-063	**	63		59,000		13,275	246	183	0.68	6.05	
TX 4200-075	**	75		60,300		13,575	270	195	0.76	6.35	
TX 4200-080	**	80		60,800		13,700	280	200	0.80	6.48	√
TX 4200-100	**	100	42,000	62,500	9,440	14,050	320	220	0.93	6.99	√
TX 4200-125	**	125		64,000		14,400	370	245	1.10	7.63	√
TX 4200-150	**	150		65,100		14,650	420	270	1.27	8.27	
TX 4200-160	**	160		65,500		14,750	440	280	1.33	8.53	√
TX 4200-175		175		66,000		14,850	470	295	1.43	8.91	
TX 4200-200	**	200		66,800		15,025	520	320	1.60	9.55	√
TX 4200-250	**	250		67,900		15,275	620	370	1.93	11.08	√
TX 4200-300	**	300		68,700		15,450	720	420	2.27	12.11	√

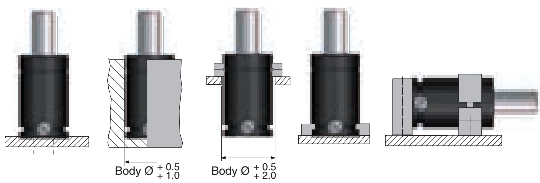
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 40 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022953

Mounting Possibilities

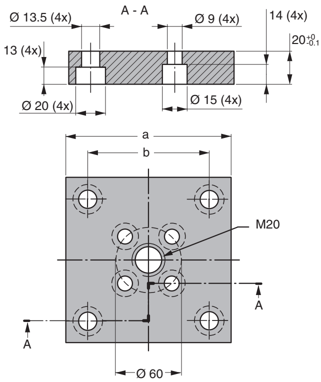


Base mount **B, MP** | **Drop - in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC** | **Body mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

MP

ISO

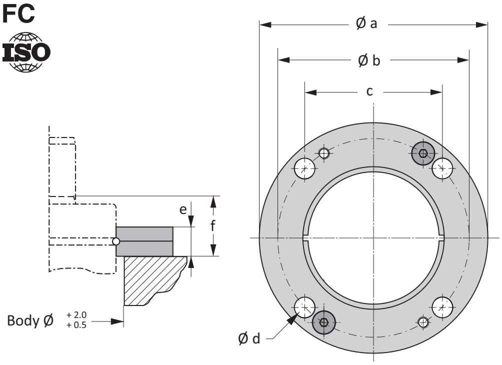


Note!
Comes complete with screws to mount gas spring.

Order No.	a	b
MP-3000	120	92

FC

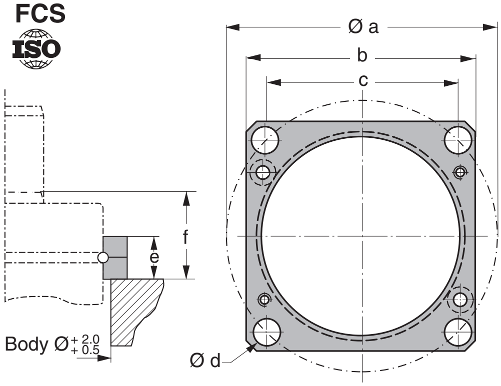
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS

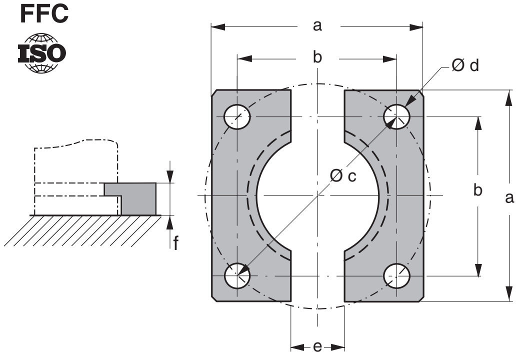
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

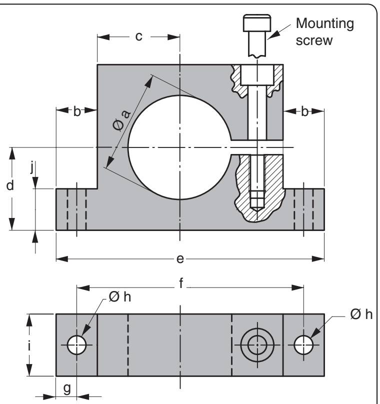
ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S

ISO



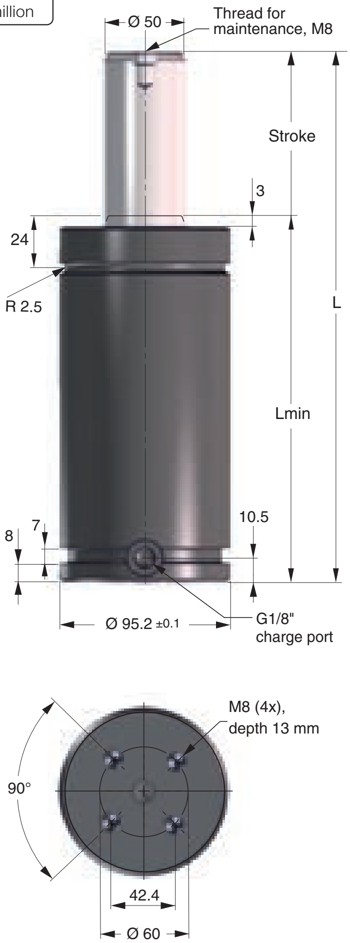
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or attachment B.

The mounting screw (M12) should be tightened with torque 91 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

2 million



The TL Series ranges from model sizes 750 to 7,500, with the same features and technology as the TU series.

At the same time, the TL gas spring is shorter than the corresponding TU gas spring by 25 mm, except TL 5000 and TL 7500, which are 37.5 mm and 50 mm shorter respectively. TL springs share the same TU mounting possibilities and stroke lengths, with the exception of strokes 12.5, 37.5 and 62.5.

Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TL 3000-013	12.5		38,700		8,710	120	107.5	0.14	4.84
TL 3000-025	25		41,800		9,400	145	120	0.21	5.24
TL 3000-038	37.5		43,500		9,770	170	132.5	0.27	5.64
TL 3000-050	50		44,400		9,980	195	145	0.33	6.03
TL 3000-063	62.5		45,100		10,130	220	157.5	0.40	6.44
TL 3000-075	75		45,500		10,230	245	170	0.46	6.83
TL 3000-080	80		45,600		10,260	255	175	0.48	7.12
TL 3000-088	87.5		45,800		10,300	270	182.5	0.52	7.24
TL 3000-100	100	30,000	46,100	6,750	10,360	295	195	0.58	7.62
TL 3000-113	112.5		46,300		10,410	320	207.5	0.65	8.02
TL 3000-125	125		46,500		10,450	345	220	0.71	8.41
TL 3000-138	137.5		46,600		10,490	370	232.5	0.77	8.84
TL 3000-150	150		46,800		10,510	395	245	0.84	9.21
TL 3000-160	160		46,900		10,530	415	255	0.89	9.53
TL 3000-175	175		47,000		10,560	445	270	0.96	10.00
TL 3000-200	200		47,100		10,590	495	295	1.09	10.79
TL 3000-225	225		47,200		10,620	545	320	1.21	11.59
TL 3000-250	250		47,300		10,640	595	345	1.34	12.38

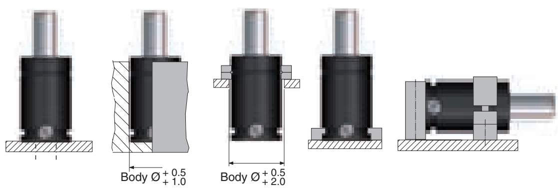
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3024171

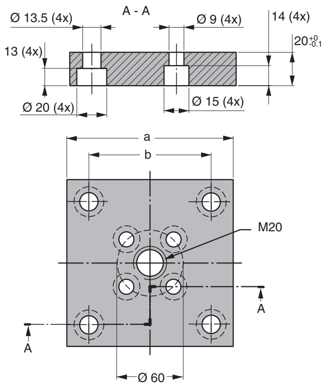
Mounting Possibilities



Base mount **B, MP** | **Drop -in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC** | **Body mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

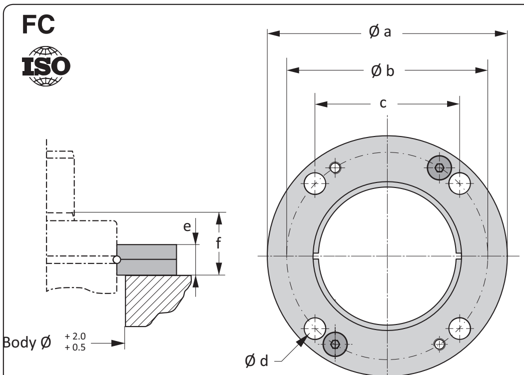
MP



Note!
Comes complete with screws to mount gas spring.

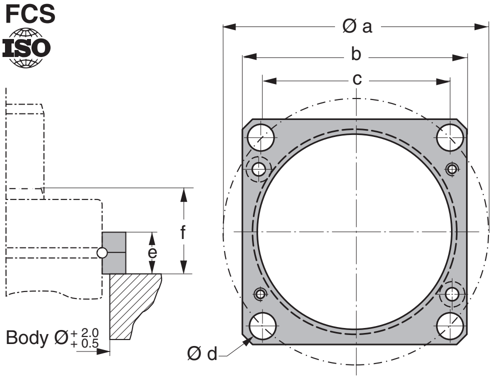
Order No.	a	b
MP-3000	120	92

FC



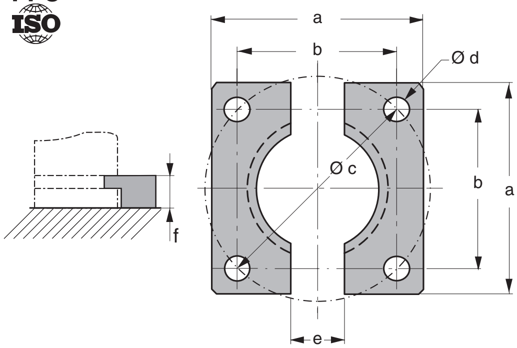
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

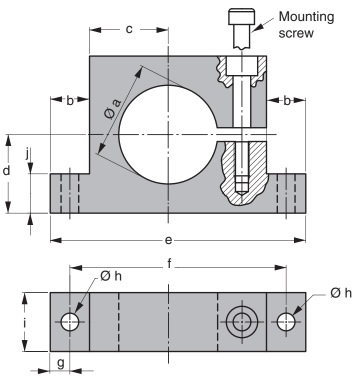


Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

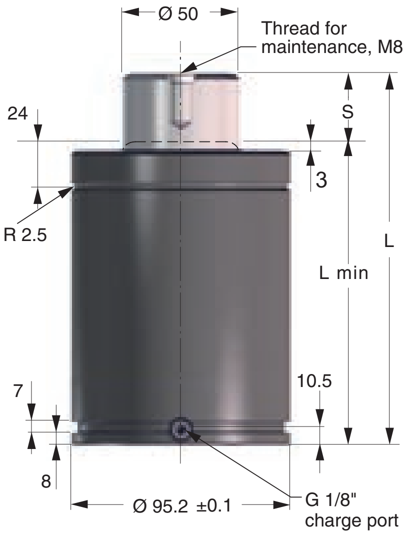


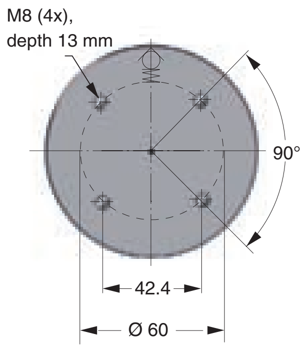
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

2 million

The TU line constitutes our standard line of gas springs. Sizes 250 to 10,000 conform to the ISO 11901 gas spring standard.





Order No.	S stroke		Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 3000-025	**	25		42,000		9,440	170	145	0.20	6.45	√
TU 3000-038	**	38.1		43,000		9,670	196.2	158.1	0.26	6.87	
TU 3000-050	**	50		44,000		9,890	220	170	0.32	7.25	√
TU 3000-064	**	63.5		45,000		10,100	247	183.5	0.38	7.67	
TU 3000-080	**	80		46,000		10,340	280	200	0.46	8.20	√
TU 3000-100	**	100		47,000		10,570	320	220	0.56	8.83	√
TU 3000-125	**	125	30,000	47,000	6,750	10,570	370	245	0.69	9.63	√
TU 3000-160	**	160		47,000		10,570	440	280	0.87	10.74	√
TU 3000-175		175		48,000		10,790	470	295	0.95	11.20	
TU 3000-200	**	200		48,000		10,790	520	320	1.07	12.00	
TU 3000-225		225		48,000		10,790	570	345	1.20	12.80	
TU 3000-250	**	250		48,000		10,790	620	370	1.32	13.59	
TU 3000-300	**	300		48,000		10,790	720	420	1.57	15.18	

* = at full stroke

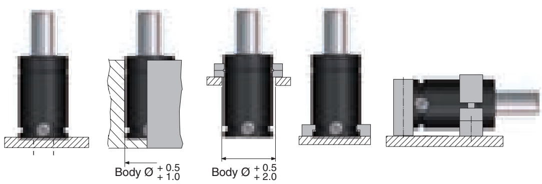
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3019025

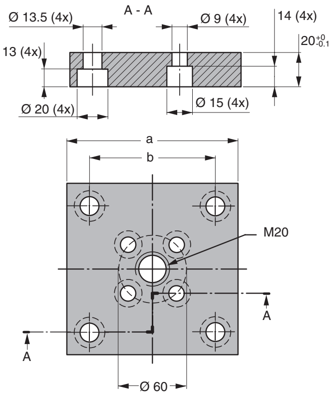
Mounting Possibilities



Base Mount **B, MP** | **Drop - In** | **Top Mount** **FC, FCS, FCSC** | **Foot Mount** **K, FFC,** | **Body Mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

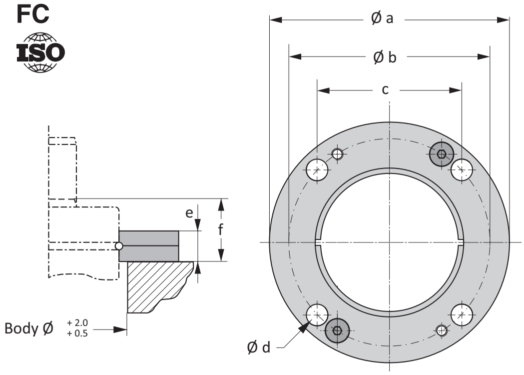
MP



Note!
Comes complete with screws to mount gas spring.

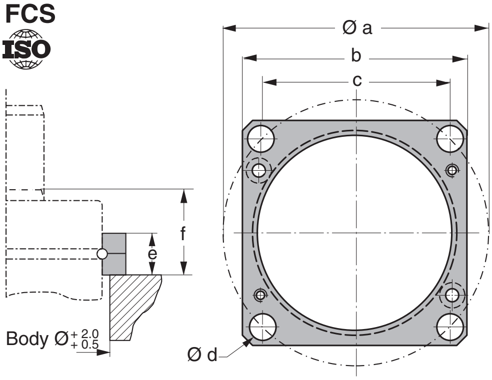
Order No.	a	b
MP-3000	120	92

FC



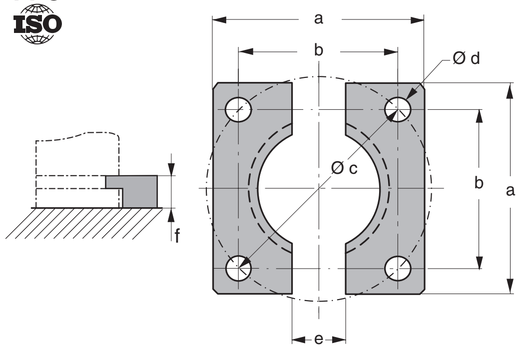
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS



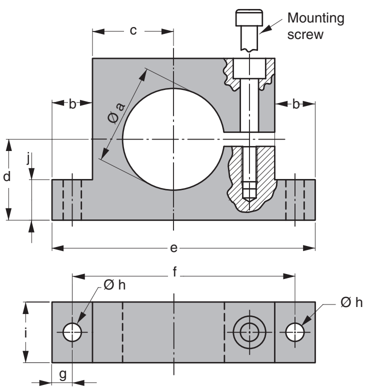
Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S



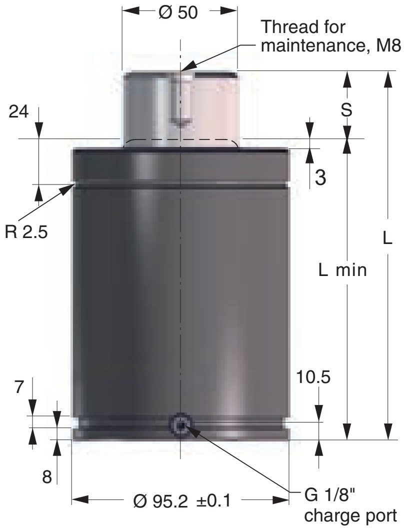
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

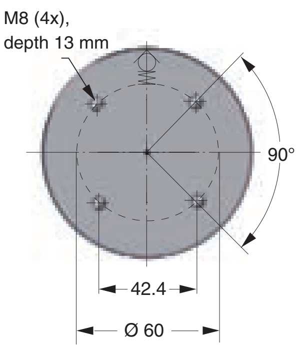
2 million



The High Speed gas springs (TUS) have been engineered to withstand press stroke speeds to a maximum of 2 m/s, which meet the safety requirements from the French automotive manufacturer Renault.

These gas springs are available in sizes from 750 to 7,500 and dimensions that conform to the ISO 11901 gas spring standard.

The TUS gas spring replaces the TUR spring that has been phased out.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUS 3000-025	25		42,000		9,440	170	145	0.20	6.35
TUS 3000-038	38.1		43,000		9,670	196.2	158.1	0.26	6.75
TUS 3000-050	50		44,000		9,890	220	170	0.32	7.50
TUS 3000-064	63.5		45,000		10,100	247	183.5	0.38	7.70
TUS 3000-080	80		46,000		10,340	280	200	0.46	8.10
TUS 3000-100	100	30,000	47,000	6,750	10,570	320	220	0.56	8.85
TUS 3000-125	125		47,000		10,570	370	245	0.69	9.90
TUS 3000-160	160		47,000		10,570	440	280	0.87	10.80
TUS 3000-200	200		48,000		10,790	520	320	1.07	12.20
TUS 3000-250	250		48,000		10,790	620	370	1.32	13.70
TUS 3000-300	300		48,000		10,790	720	420	1.57	15.30

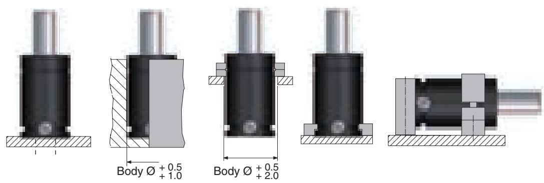
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 2 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit... 3019279

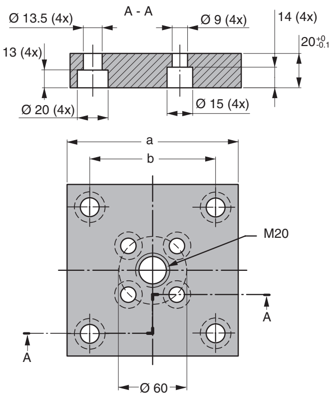
Mounting Possibilities



Base mount **B, MP** | **Drop - in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC,** | **Body mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

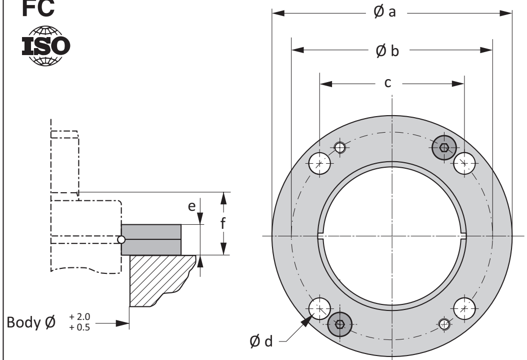
MP



Note! Comes complete with screws to mount gas spring.

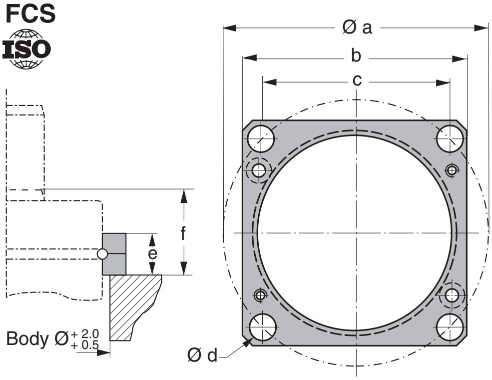
Order No.	a	b
MP-3000	120	92

FC



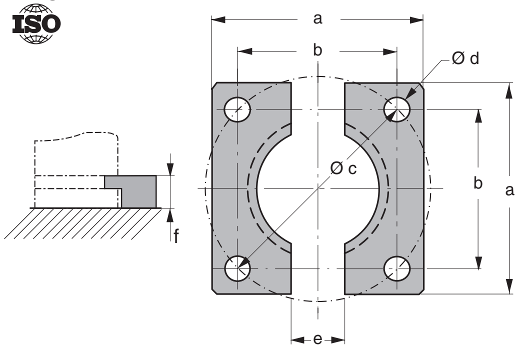
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS



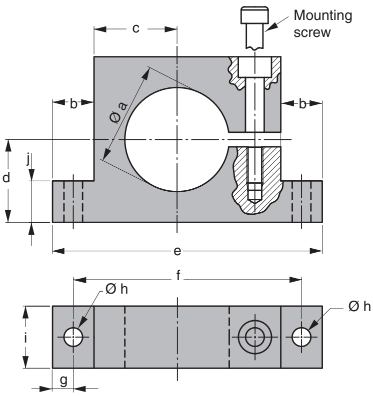
Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

S



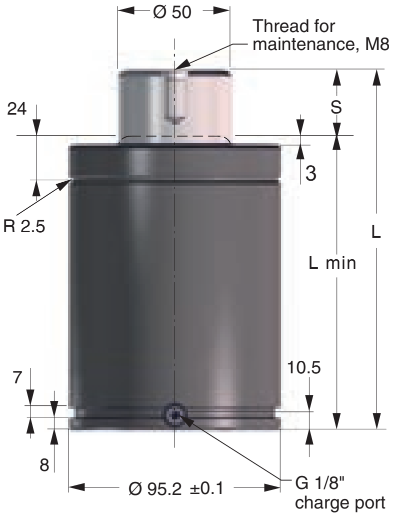
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

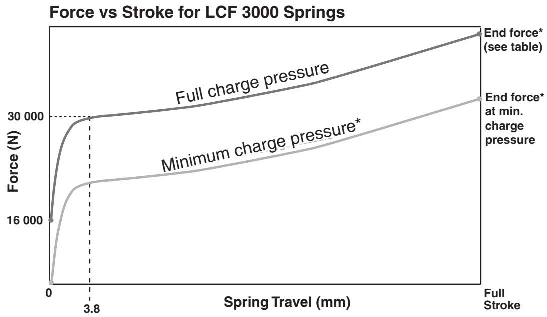
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

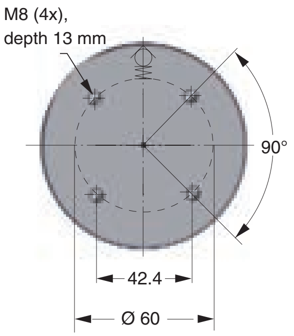
Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

2 million



Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.
For more information, see “About Gas Springs”.





Order No.	S stroke		Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 3000-025	**	25		42,000		9,440	170	145	0.20	6.35
LCF 3000-038	**	38.1		43,000		9,670	196.2	158.1	0.26	6.75
LCF 3000-050	**	50		44,000		9,890	220	170	0.32	7.50
LCF 3000-064	**	63.5		45,000		10,100	247	183.5	0.38	7.70
LCF 3000-080	**	80		46,000		10,340	280	200	0.46	8.10
LCF 3000-100	**	100	30,000	47,000	6,740	10,570	320	220	0.56	8.85
LCF 3000-125	**	125		47,000		10,570	370	245	0.69	9.90
LCF 3000-160	**	160		47,000		10,570	440	280	0.87	10.80
LCF 3000-200	**	200		48,000		10,790	520	320	1.07	12.20
LCF 3000-250		250		48,000		10,790	620	370	1.32	13.70
LCF 3000-300		300		48,000		10,790	720	420	1.57	15.30

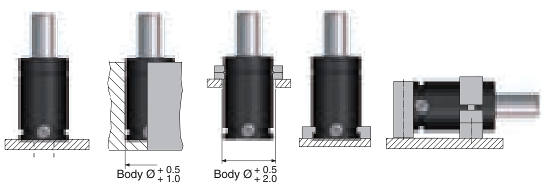
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 70 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit.. 3019379

Mounting Possibilities

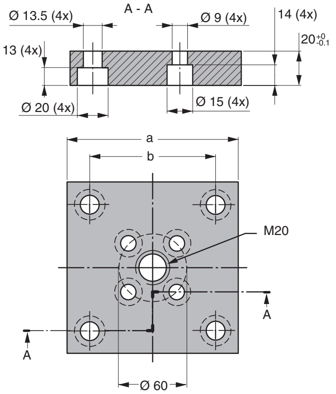


Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC,** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

MP

ISO

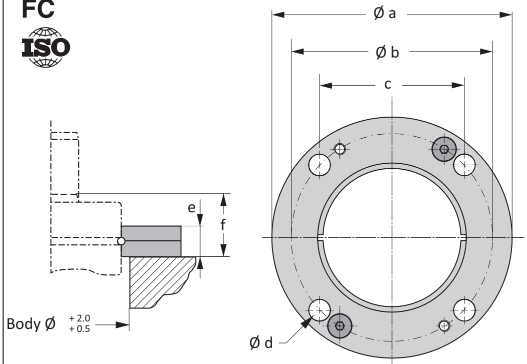


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-3000	120	92

FC

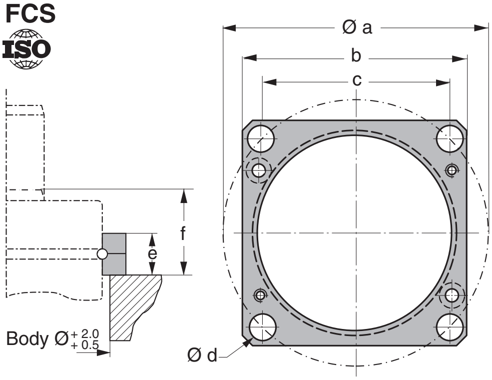
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-3000	150	130	92	13.5	18	33

FCS

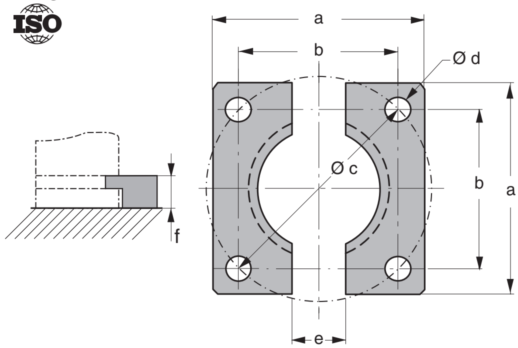
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-3000	130	110	92	13.5	18	33

FFC

ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-3000	120	92	130	13.5	24	12

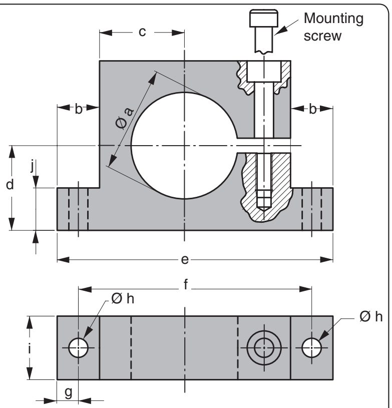
Note! For dimensions on mounting possibilities K-3000, FAC-3000, SA-3000, HM-3000 and FCSC-3000 refer to “Special Mounts”.

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

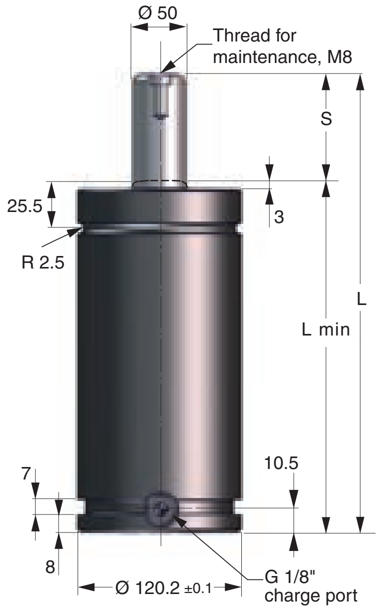
The mounting screw (M12) should be tightened with torque 91 Nm.

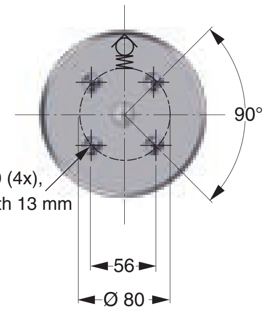


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20

SPC 3000

2 million



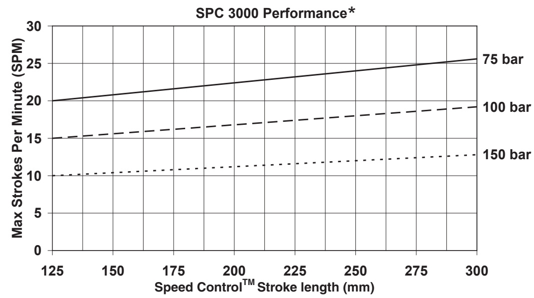


Speed Control™ – SPC gas springs have been engineered to eliminate blank holder bounce, commonly associated with increased return stroke speeds from link drive presses.

SPC gas springs have inbuilt return stroke **speed dampening**, which decelerates the last 30 mm of the piston rod stroke to 0.4 m/s, helping to bring the blank holder to a smooth stop.

Speed Control™ – SPC features:

- Eliminates blank holder bounce
- Increases productivity by increasing part transfer efficiency
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system



*At ambient room temperatures with free air flow

Order No.	S stroke	Force in N at 150 bar/+20°C: Initial	Force in N at 150 bar/+20°C: End force*	Force in lbf at 150 bar/+20°C: Initial	Force in lbf at 150 bar/+20°C: End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
SPC 3000-125	125	30,000	38,000	6,750	8,550	390	265	1.15	10.64
SPC 3000-160	160		38,000		8,550	460	300	1.43	11.30
SPC 3000-200	200		38,000		8,550	540	340	1.74	12.06
SPC 3000-250	250		39,000		8,775	640	390	2.14	13.00
SPC 3000-300	300		39,000		8,775	740	440	2.53	13.95

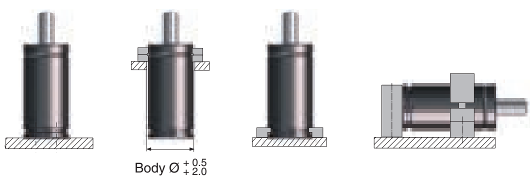
*at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature................ ±0.3%/°C
Recommended max strokes/min .... See chart
Dampening length .... ≈ 30 mm
Dampening speed .... 0.4 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3021496

Mounting Possibilities



Base Mount B, MP

Top Mount FC, FCS, FCSC

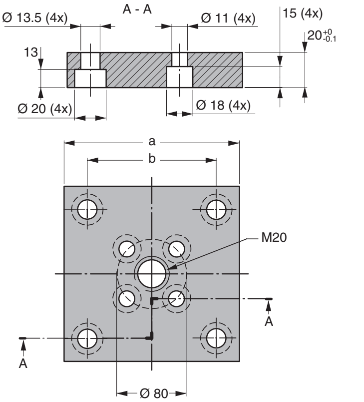
Foot Mount K, FFC

Body Mount FAC, SA, S

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

MP

ISO

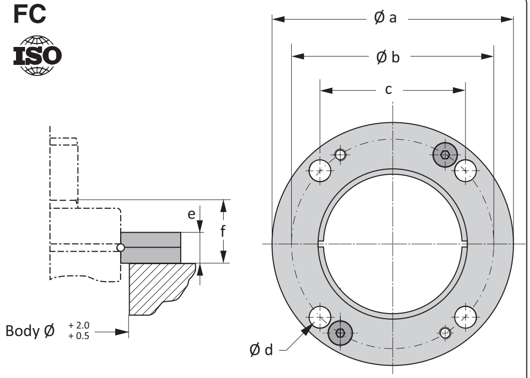


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

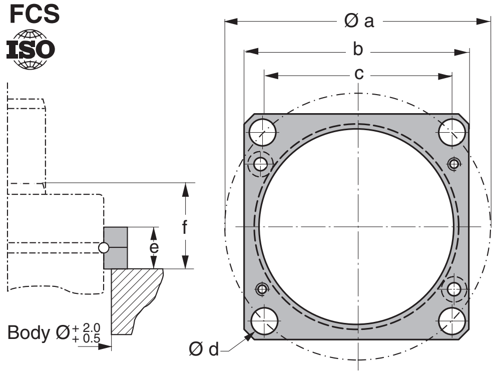
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

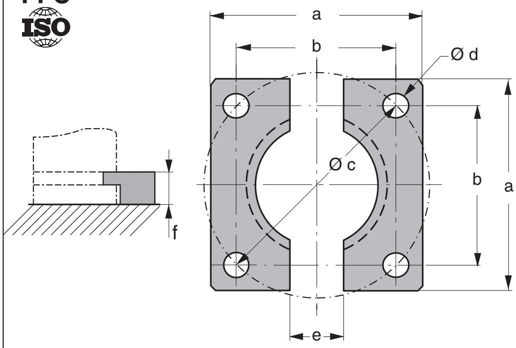
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



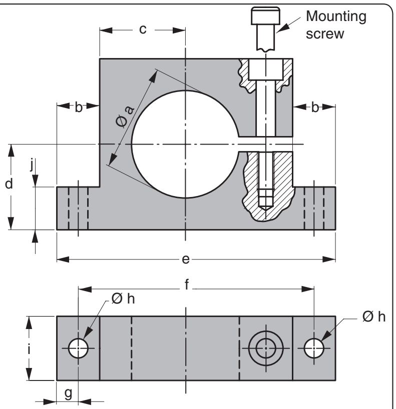
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

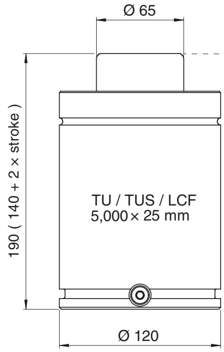
The mounting screw (M12) should be tightened with torque 91 Nm.



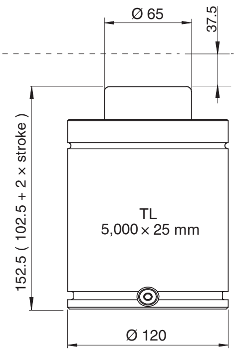
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

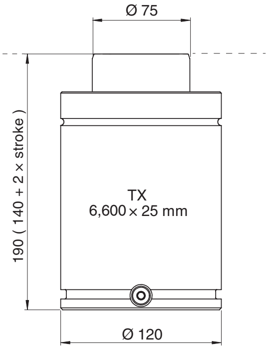
Overview - $50000 \leq F_{INIT} < 75000$



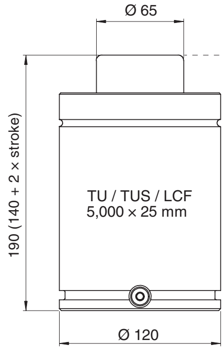
Initial force
50,000 N
11,240 lbf



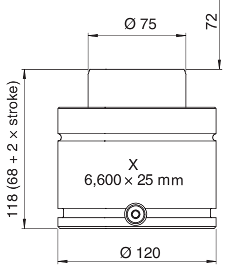
Initial force
50,000 N
11,240 lbf



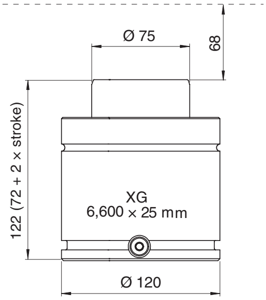
Initial force
66,300 N
14,925 lbf



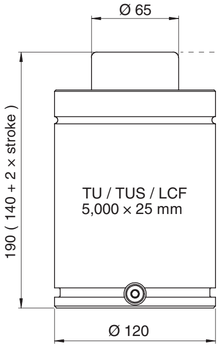
Initial force
50,000 N
11,240 lbf



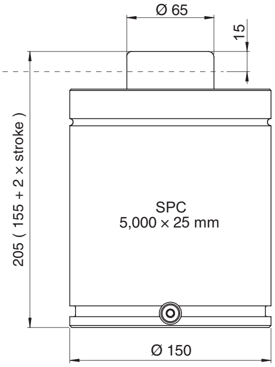
Initial force
66,300 N
14,905 lbf



Initial force
66,300 N
14,905 lbf

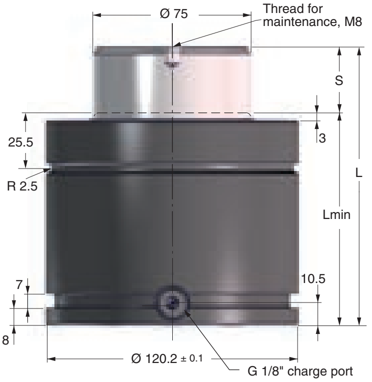


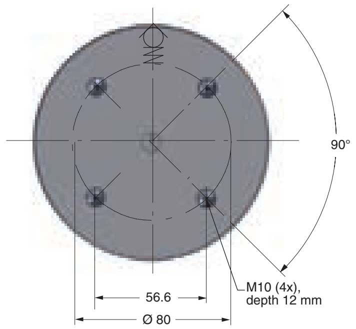
Initial force
50,000 N
11,240 lbf



Initial force
50,000 N
11,240 lbf

2 million





The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M10 threaded holes allow various mounting possibilities using our standard mounts.

Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 6600-016	**	16		89,000		20,010	100	84	0.32	5.00	
X 6600-019		19		91,000		20,460	106	87	0.35	5.11	
X 6600-025	**	25		93,900		21,110	118	93	0.42	5.34	√
X 6600-032		32		96,100		21,605	132	100	0.49	5.61	
X 6600-038	**	38		98,200		22,075	144	106	0.56	5.84	√
X 6600-050	**	50	66,300	10,0600	14,905	22,615	168	118	0.69	6.31	√
X 6600-063	**	63		10,2400		23,020	194	131	0.83	6.81	√
X 6600-075		75		10,3400		23,245	218	143	0.90	7.27	
X 6600-080	**	80		10,4100		23,400	228	148	1.01	7.46	√
X 6600-100	**	100		10,5400		23,700	268	168	1.23	8.23	√
X 6600-125	**	125		10,6500		23,940	318	193	1.50	9.19	√

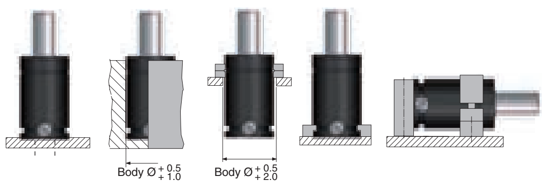
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information, see “About gas springs”.
Pressure medium........................... Nitrogen
Max. charging pressure.................. 150 bar (at 20°C)
Min. charging pressure................... 25 bar (at 20°C)
Operating temperature................... 0 to +80°C
Force increase by temperature .... ±0.3 %/°C
Recommended max. strokes/min.... ≈ 30 to 100 (at 20°C)
Max. piston rod velocity.................. 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019912

Mounting Possibilities

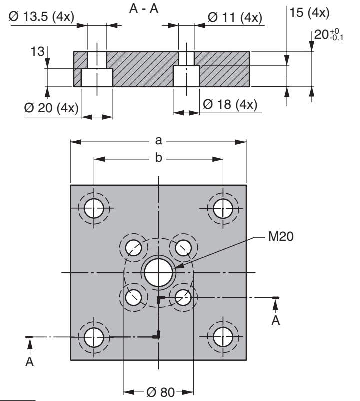


Base mount B, MP **Drop - in** **Top mount FC, FCS, FCSC** **Foot mount K, FFC** **Body mount FAC, SA, S**

Note! For dimensions on mounting possibilities K-5000, and FCSC-5000 refer to “Special Mounts”..

MP

ISO

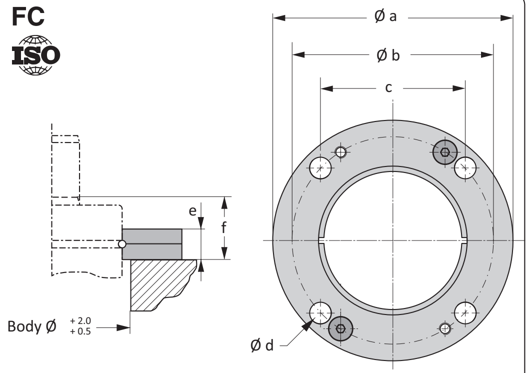


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

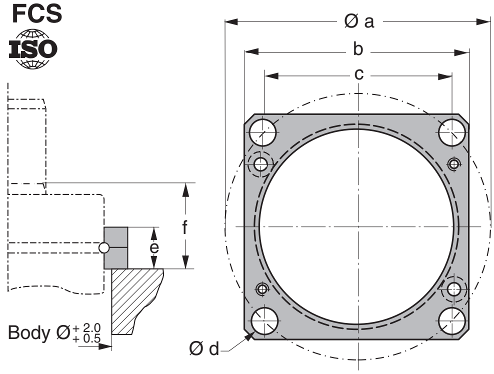
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

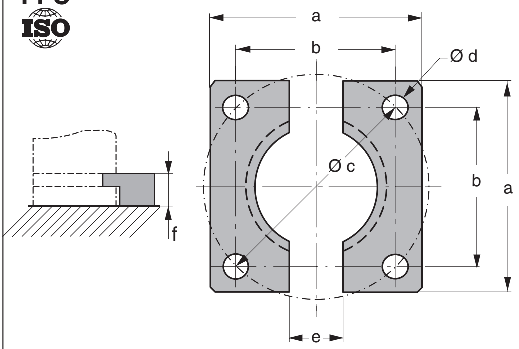
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



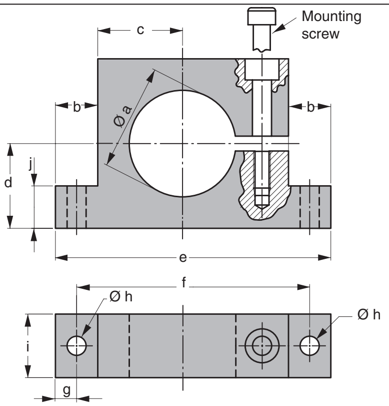
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

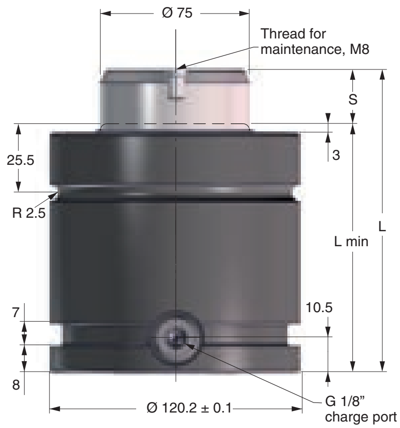
The mounting screw (M12) should be tightened with torque 91 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000, and FCSC-5000 refer to “Special Mounts”..

2 million

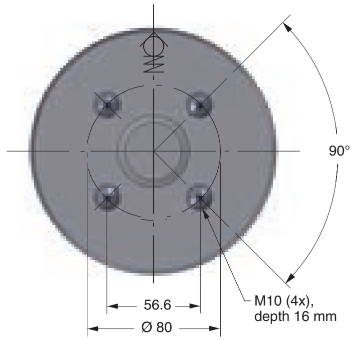


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm.

There is a side and a bottom port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M10 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
XG 6600-016		16		89,000		20,010	104	88	0.32	5.00
XG 6600-019		19		91,000		20,460	110	91	0.35	5.11
XG 6600-025	**	25		93,900		21,110	122	97	0.42	5.34
XG 6600-032		32		96,100		21,605	136	104	0.49	5.61
XG 6600-038	**	38		98,200		22,075	148	110	0.56	5.84
XG 6600-050	**	50	66,300	100,600	14,905	22,615	172	122	0.69	6.31
XG 6600-063	**	63		102,400		23,020	198	135	0.83	6.81
XG 6600-075	**	75		103,400		23,245	222	147	0.90	7.27
XG 6600-080	**	80		104,100		23,400	232	152	1.01	7.46
XG 6600-100	**	100		105,400		23,700	272	172	1.23	8.23
XG 6600-125	**	125		106,500		23,940	322	197	1.50	9.19

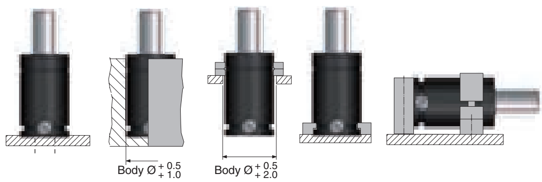
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3019912

Mounting Possibilities

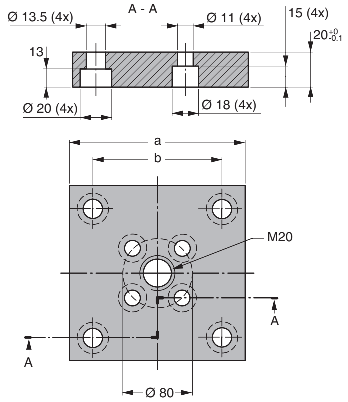


Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S**

Note! For dimensions on mounting possibilities K, FCSC, refer to “Special Mounts”.

MP

ISO

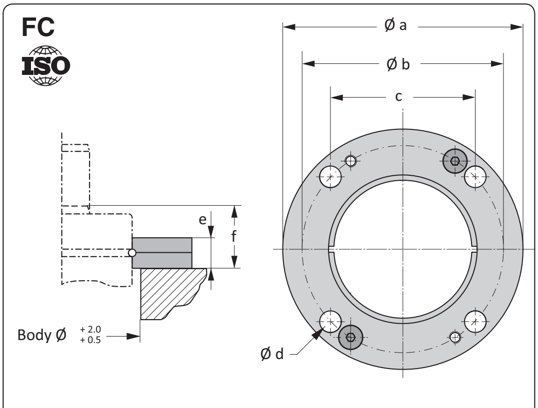


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

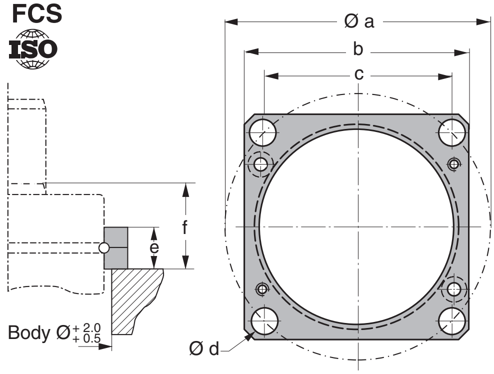
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

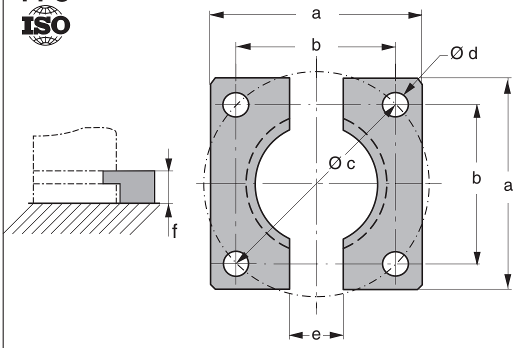
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



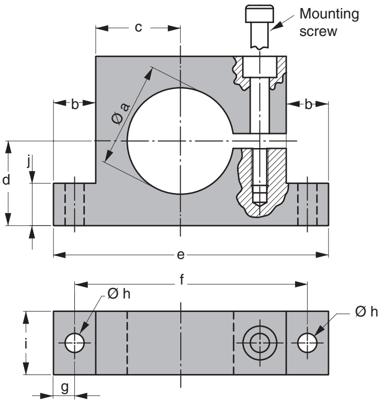
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

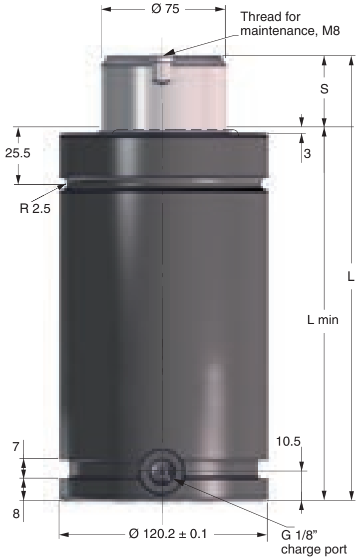
The mounting screw (M12) should be tightened with torque 91 Nm.

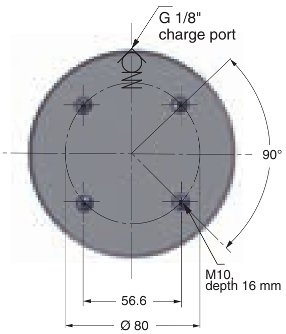


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K and FCSC, refer to “Special Mounts”.

2 million





The Power Line - Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 9,200 N up to 95,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.

Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TX 6600-025	**	25	66,300	79,500	14,925	17,900	190	165	0.73	9.28	√
TX 6600-038	**	38		83,900		18,875	216	178	0.87	9.81	
TX 6600-050	**	50		87,000		19,600	240	190	1.00	10.30	√
TX 6600-063	**	63		89,700		20,200	266	203	1.13	10.83	
TX 6600-075	**	75		91,800		20,650	290	215	1.26	11.32	
TX 6600-080	**	80		92,600		20,825	300	220	1.31	11.52	√
TX 6600-100	**	100		95,100		21,500	340	240	1.53	12.33	√
TX 6600-125	**	125		97,600		21,950	390	265	1.79	13.35	√
TX 6600-150		150		99,500		22,400	440	290	2.05	14.36	
TX 6600-160	**	160		100,100		22,525	460	300	2.16	14.77	√
TX 6600-175		175		101,000		22,725	490	315	2.32	15.38	
TX 6600-200	**	200		102,200		23,000	540	340	2.58	16.40	√
TX 6600-250	**	250		104,000		23,400	640	390	3.11	18.43	√
TX 6600-300	**	300		105,300		23,700	740	440	3.64	20.46	√

* = at full stroke

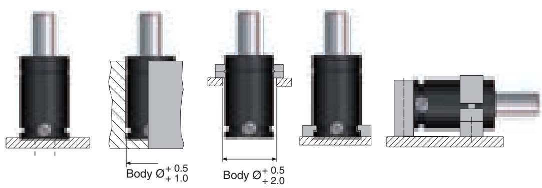
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022954

Mounting Possibilities

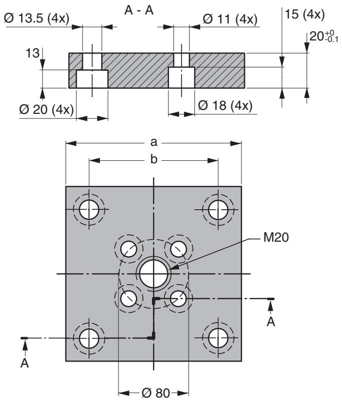


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S

Note! For dimensions on mounting possibilities K-5000 and FCSC-5000, refer to “Special Mounts”.

MP

ISO

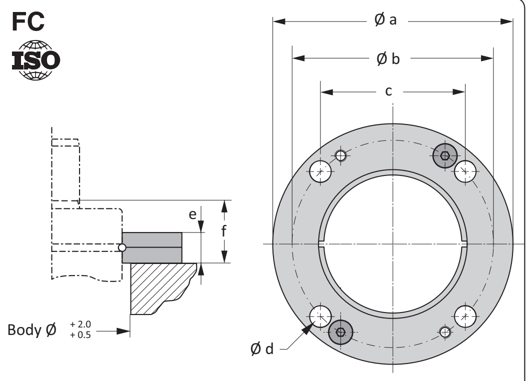


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

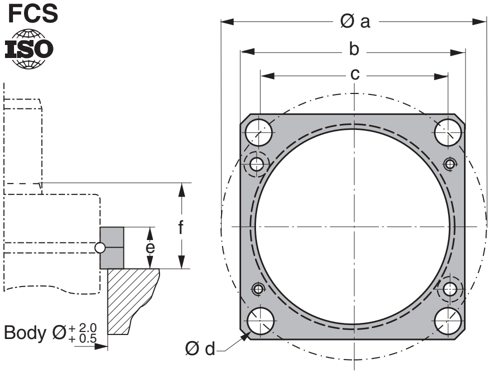
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

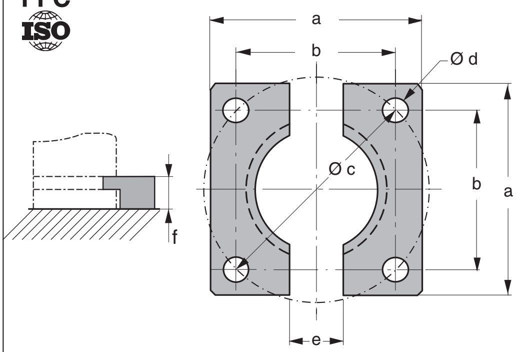
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



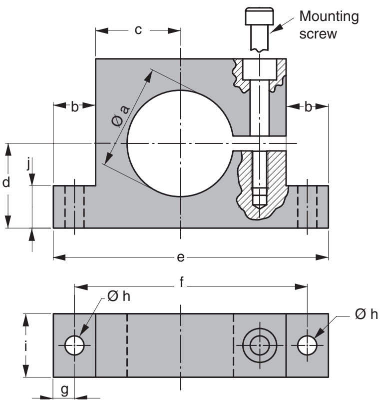
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

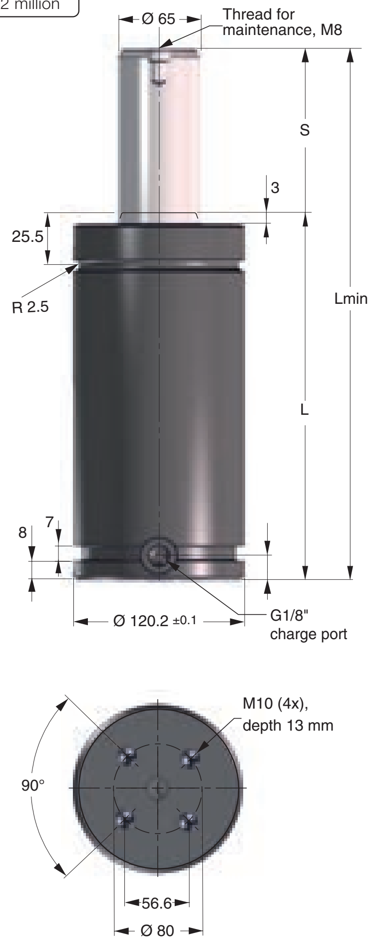
The mounting screw (M12) should be tightened with torque 91 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000 and FCSC-5000, refer to "Special Mounts".

2 million



The TL Series ranges from model sizes 750 to 7,500, with the same features and technology as the TU series.

At the same time, the TL gas spring is shorter than the corresponding TU gas spring by 25 mm, except TL 5000 and TL 7500, which are 37.5 mm and 50 mm shorter respectively. TL springs share the same TU mounting possibilities and stroke lengths, with the exception of strokes 12.5, 37.5 and 62.5.

Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TL 5000-025	25		80,100		18,000	152.5	127.5	0.2	9.04
TL 5000-038	37.5		81,900		18,410	177.5	140	0.3	9.70
TL 5000-050	50		82,800		18,620	202.5	152.5	0.4	10.35
TL 5000-063	62.5		83,500		18,760	227.5	165	0.5	11.01
TL 5000-075	75		83,800		18,850	252.5	177.5	0.6	11.67
TL 5000-080	80		84,000		18,870	2625	182.5	0.7	11.93
TL 5000-088	87.5		84,100		18,920	277.5	190	0.7	12.32
TL 5000-100	100		84,400		18,970	302.5	202.5	0.8	12.98
TL 5000-113	112.5	50,000	84,500	11,200	19,000	327.5	215	0.9	13.64
TL 5000-125	125		84,700		19,040	352.5	227.5	1.0	14.30
TL 5000-138	137.5		84,800		19,070	377.5	240	1.1	14.96
TL 5000-150	150		84,900		19,090	402.5	252.5	1.2	15.62
TL 5000-160	160		85,000		19,100	422.5	262.5	1.3	16.14
TL 5000-175	175		85,100		19,130	452.5	277.5	1.4	16.94
TL 5000-200	200		85,200		19,160	502.5	302.5	1.6	18.25
TL 5000-225	225		85,300		19,180	552.5	327.5	1.8	19.57
TL 5000-250	250		85,400		19,190	602.5	352.5	2.0	20.89

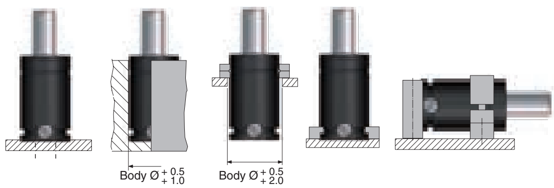
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit.. 3024178

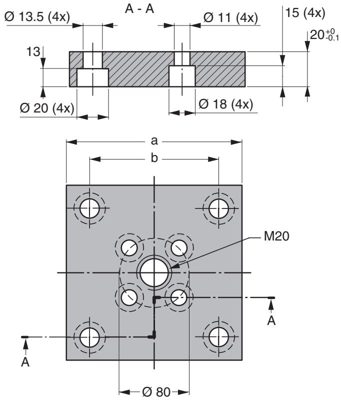
Mounting Possibilities



Base mount B, MP | **Drop -in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

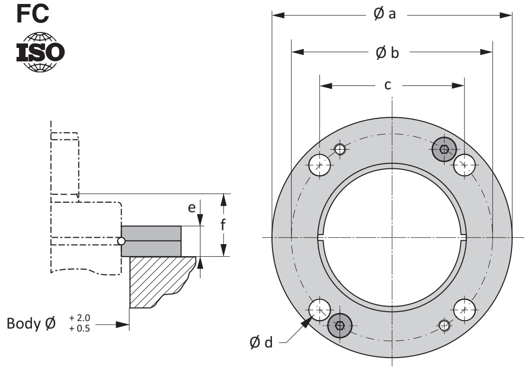
MP



Note!
Comes complete with screws to mount gas spring.

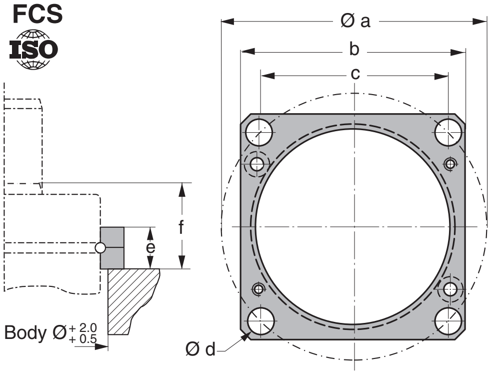
Order No.	a	b
MP-5000	140	109.5

FC



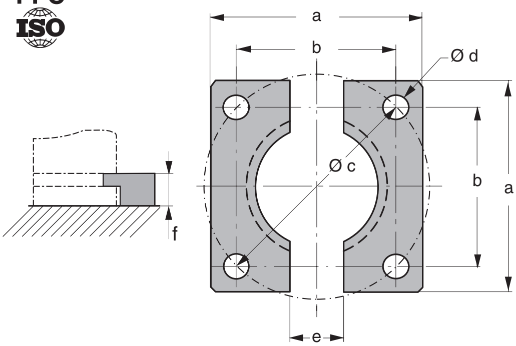
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS



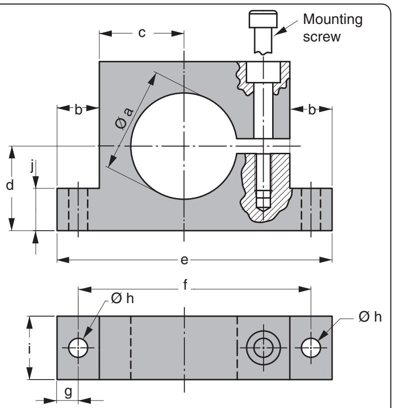
Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S



Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

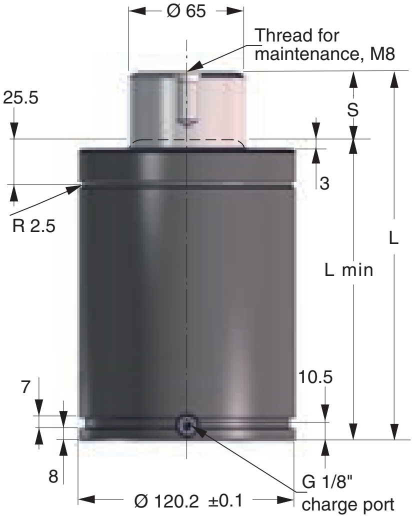
The mounting screw (M12) should be tightened with torque 91 Nm.

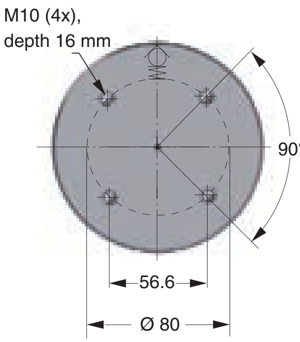
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

2 million

The TU line constitutes our standard line of gas springs. Sizes 250 to 10,000 conform to the ISO 11901 gas spring standard.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 5000-025	**	25		71,000		15,960	190	165	0.32	12.40	√
TU 5000-038	**	38.1		75,000		16,860	216.2	178.1	0.42	13.10	
TU 5000-050	**	50		77,000		17,310	240	190	0.51	13.70	√
TU 5000-064	**	63.5		80,000		17,990	267	203.5	0.60	14.40	
TU 5000-080	**	80		81,000		18,210	300	220	0.73	15.30	√
TU 5000-100	**	100		82,000		18,430	340	240	0.89	16.40	√
TU 5000-125	**	125	50,000	82,000	11,240	18,430	390	265	1.09	17.70	√
TU 5000-160	**	160		83,000		18,660	460	300	1.36	19.60	√
TU 5000-175		175		84,000		18,880	490	315	1.49	20.40	
TU 5000-200	**	200		84,000		18,880	540	340	1.68	21.70	
TU 5000-225		225		84,000		18,880	590	365	1.88	22.10	
TU 5000-250	**	250		84,000		18,880	640	390	2.07	22.40	
TU 5000-300	**	300		84,000		18,880	740	440	2.46	27.10	

* = at full stroke

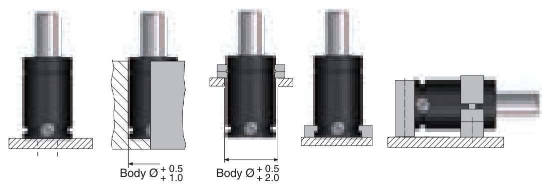
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3018876

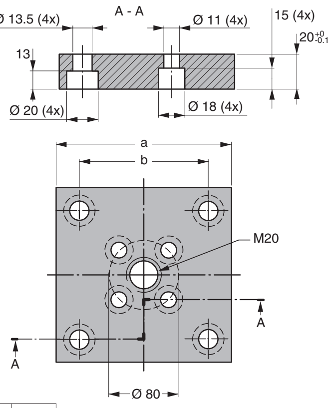
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount FC, FCS, FCSC** | **Foot mount K, FFC** | **Body mount FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

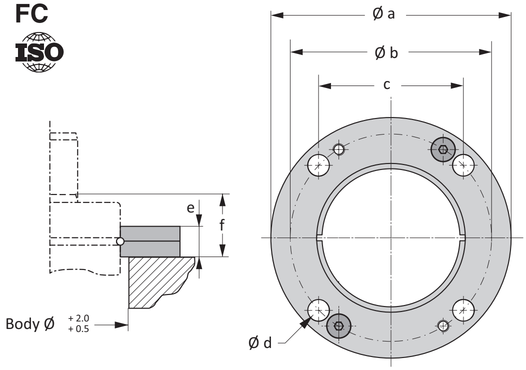
MP



Note! Comes complete with screws to mount gas spring.

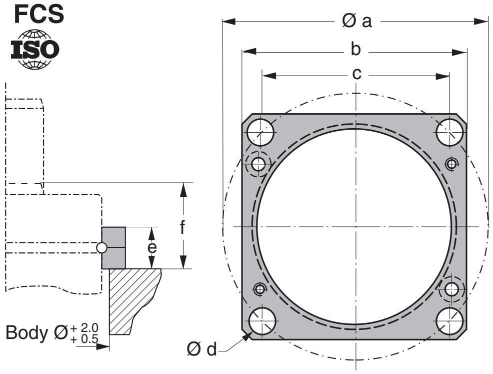
Order No.	a	b
MP-5000	140	109.5

FC



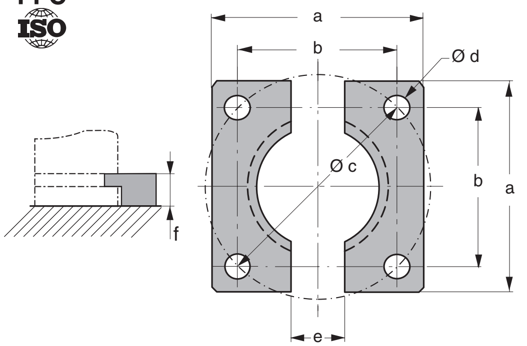
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS



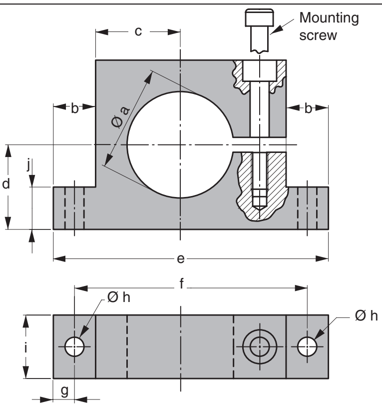
Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S



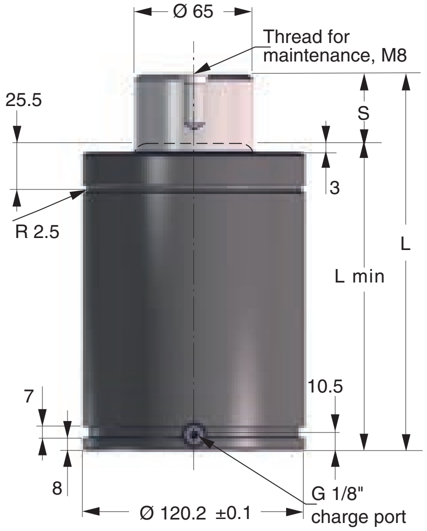
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

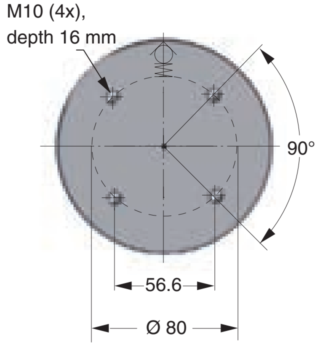
The mounting screw (M12) should be tightened with torque 91 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to "Special Mounts".

2 million





The High Speed gas springs (TUS) have been engineered to withstand press stroke speeds to a maximum of 2 m/s, which meet the safety requirements from the French automotive manufacturer Renault.

These gas springs are available in sizes from 750 to 7,500 and dimensions that conform to the ISO 11901 gas spring standard.

The TUS gas spring replaces the TUR spring that has been phased out.

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUS 5000-025	25		71,000		15,960	190	165	0.32	12.00
TUS 5000-038	38.1		75,000		16,860	216.2	178.1	0.42	12.65
TUS 5000-050	50		77,000		17,310	240	190	0.51	13.30
TUS 5000-064	63.5		80,000		17,990	267	203.5	0.60	14.46
TUS 5000-080	80		81,000		18,210	300	220	0.73	15.05
TUS 5000-100	100	50,000	82,000	11,240	18,430	340	240	0.89	16.15
TUS 5000-125	125		82,000		18,430	390	265	1.09	16.96
TUS 5000-160	160		83,000		18,660	460	300	1.36	19.40
TUS 5000-200	200		84,000		18,880	540	340	1.68	20.70
TUS 5000-250	250		84,000		18,880	640	390	2.07	22.40
TUS 5000-300	300		84,000		18,880	740	440	2.46	24.66

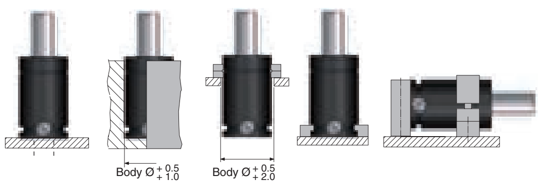
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 2 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3019280

Mounting Possibilities

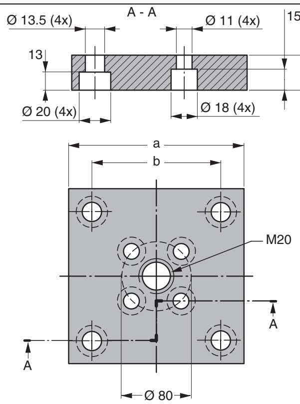


Base mount **B, MP** | **Drop -in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC,** | **Body mount** **FAC, SA, S, HM**

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

MP

ISO

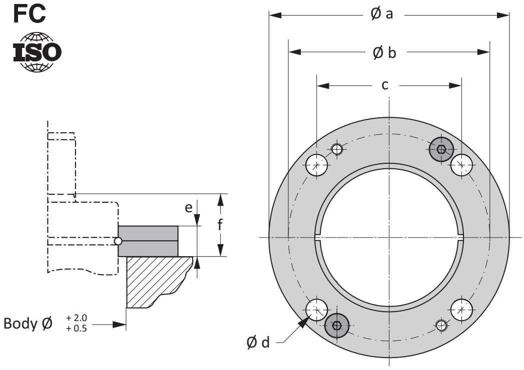


Note!
Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

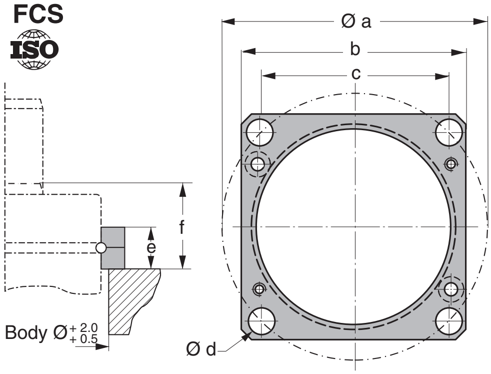
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

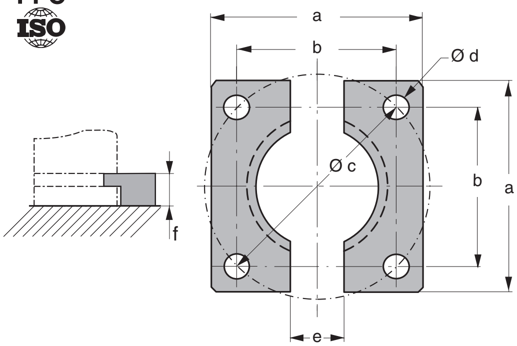
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



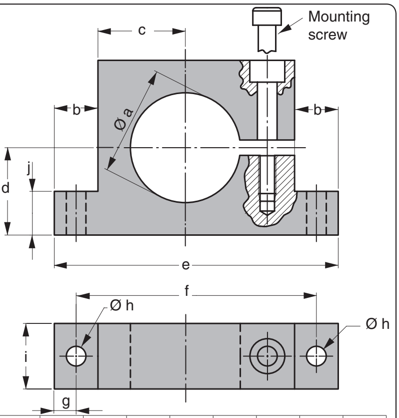
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

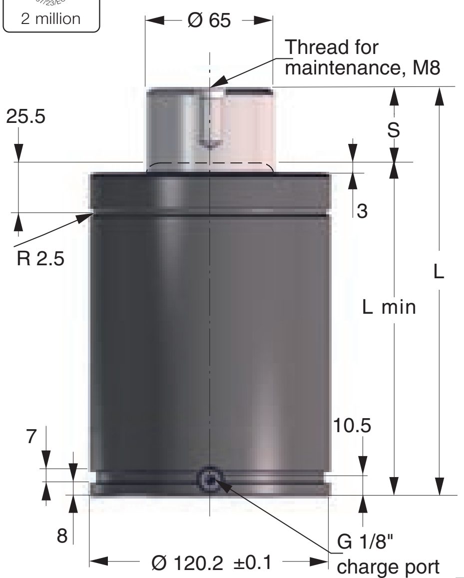
The mounting screw (M12) should be tightened with torque 91 Nm.

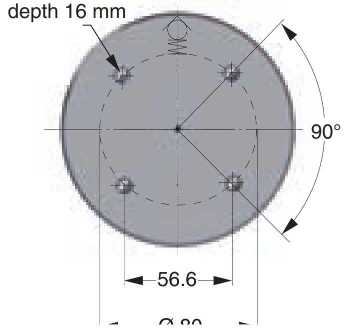


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

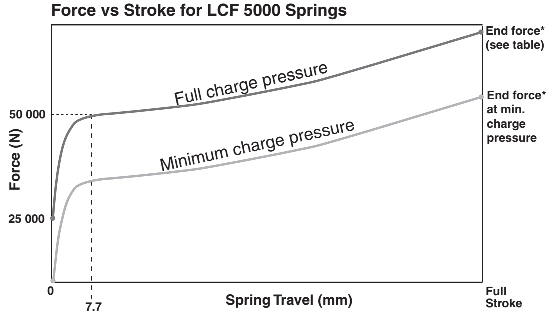
Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

2 million





Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.
For more information, see “About Gas Springs”.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 5000-025	** 25		71,000		15,960	190	165	0.32	12.00
LCF 5000-038	** 38.1		75,000		16,860	216.2	178.1	0.42	12.65
LCF 5000-050	** 50		77,000		17,310	240	190	0.51	13.30
LCF 5000-064	** 63.5		80,000		17,990	267	203.5	0.60	14.46
LCF 5000-080	** 80		81,000		18,210	300	220	0.73	15.05
LCF 5000-100	** 100	50,000	82,000	11,240	18,430	340	240	0.89	16.15
LCF 5000-125	** 125		82,000		18,430	390	265	1.09	16.96
LCF 5000-160	** 160		83,000		18,660	460	300	1.36	19.40
LCF 5000-200	** 200		84,000		18,880	540	340	1.68	20.70
LCF 5000-250	250		84,000		18,880	640	390	2.07	22.40
LCF 5000-300	300		84,000		18,880	740	440	2.46	24.66

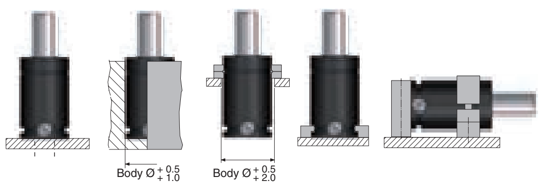
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure........................ 75 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019380

Mounting Possibilities

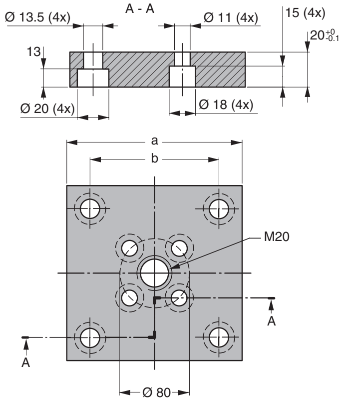


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to “Special Mounts”.

MP

ISO

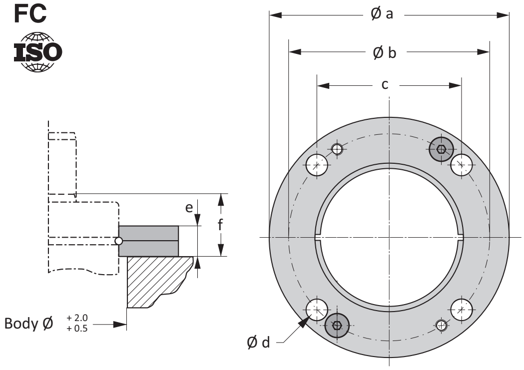


Note!
Comes complete with screws to mount gas spring.

Order No.	a	b
MP-5000	140	109.5

FC

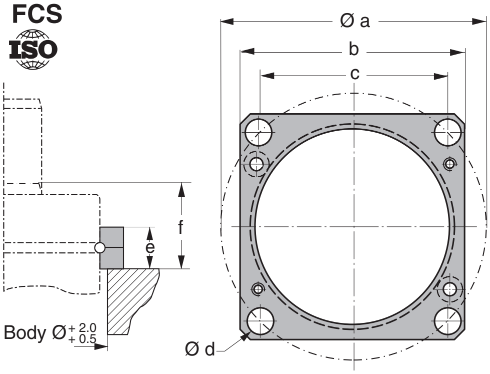
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-5000	175	155	109.5	13.5	21	36

FCS

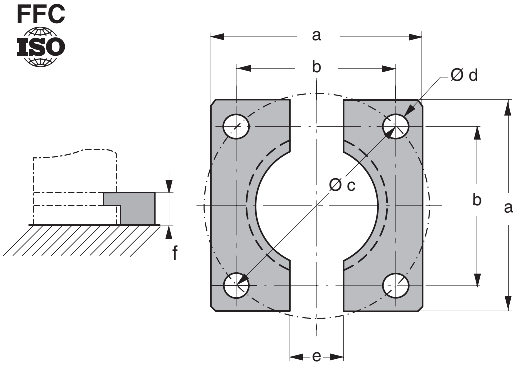
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-5000	155	130	109.5	13.5	21	36

FFC

ISO



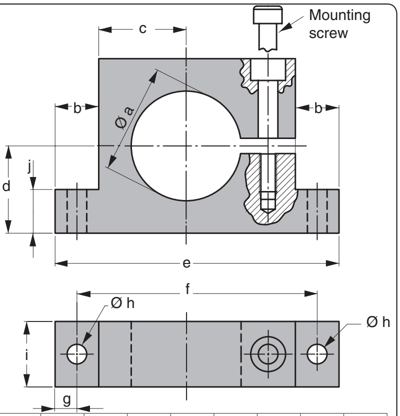
Order No.	a	b	Ø c	Ø d	e	f
FFC-5000	140	109.5	155	13.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

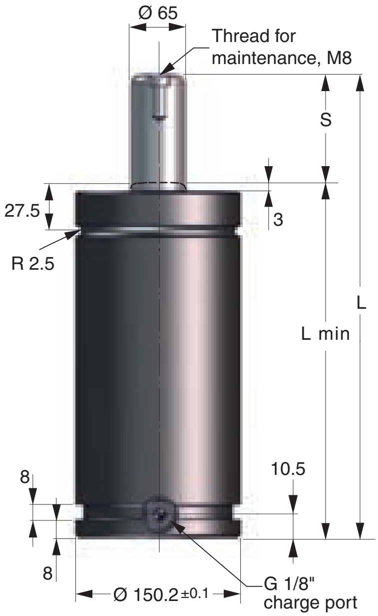
The mounting screw (M12) should be tightened with torque 91 Nm.

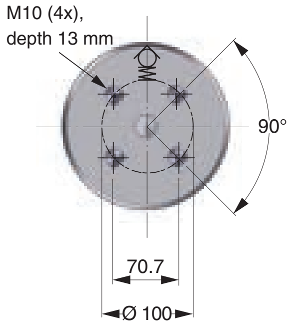


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20

Note! For dimensions on mounting possibilities K-5000, FAC-5000, SA-5000 and FCSC-5000 refer to "Special Mounts".

2 million



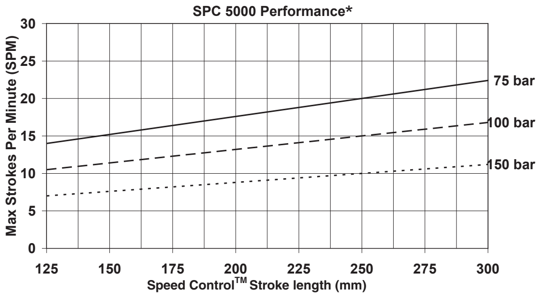


Speed Control™ – SPC gas springs have been engineered to eliminate blank holder bounce, commonly associated with increased return stroke speeds from link drive presses.

SPC gas springs have inbuilt return stroke **speed dampening**, which decelerates the last 30 mm of the piston rod stroke to 0.4 m/s, helping to bring the blank holder to a smooth stop.

Speed Control™ – SPC features:

- Eliminates blank holder bounce
- Increases productivity by increasing part transfer efficiency
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system



*At ambient room temperatures with free air flow

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
SPC 5000-125	125		64,000		14,400	405	280	1.90	26.35
SPC 5000-160	160		65,000		14,625	475	315	2.33	28.75
SPC 5000-200	200	50,000	66,000	11,250	14,850	555	355	2.82	31.50
SPC 5000-250	250		66,000		14,850	655	405	3.43	34.93
SPC 5000-300	300		66,000		14,850	755	455	4.05	38.37

*at full stroke

Basic Information

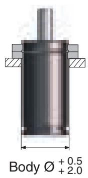
For general information see "About gas springs".

Pressure medium ....Nitrogen
Max. charging pressure ....150 bar (at 20°C)
Min. charging pressure ....25 bar (at 20°C)
Operating temperature ....0 to +80°C
Force increase by temperature...............±0.3%/°C
Recommended max strokes/min ....See chart
Dampening length ....≈ 30 mm
Dampening speed ....0.4 m/s

Rod surface ....Nitrided
Tube surface ....Black oxide
Repair kit 3021497

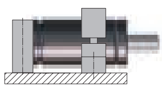
Mounting Possibilities

Base mount
B, MP



Top mount
FC, FCS, FCSC

Foot mount
K, FFC

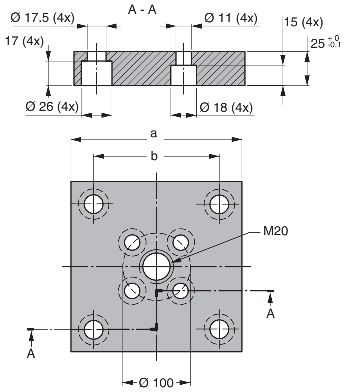


Body mount
FAC, SA, S

Note! For dimensions on mounting possibilities K-7500, FAC-7500, SA-7500 and FCSC-7500 refer to "Special Mounts".

MP

ISO

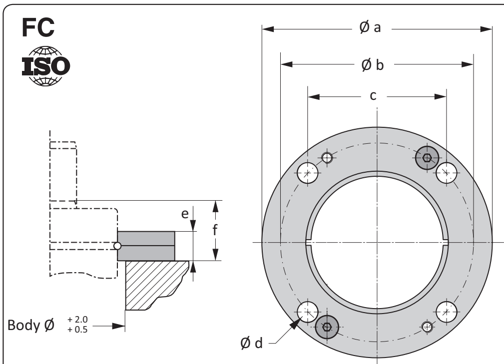


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-7500	190	138

FC

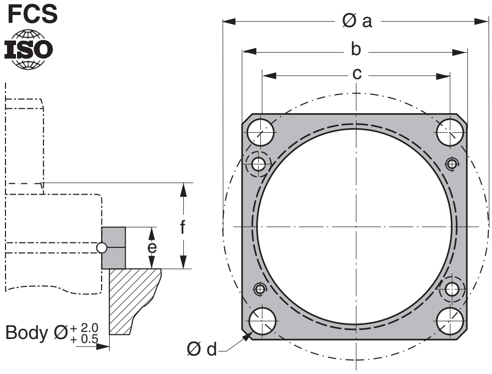
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS

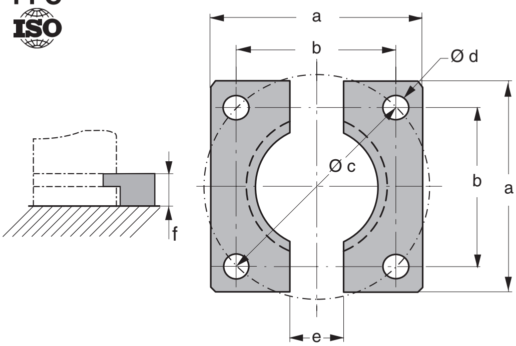
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

ISO



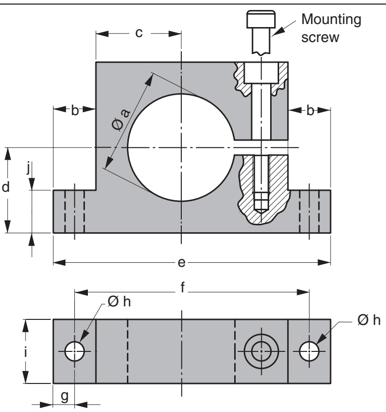
Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

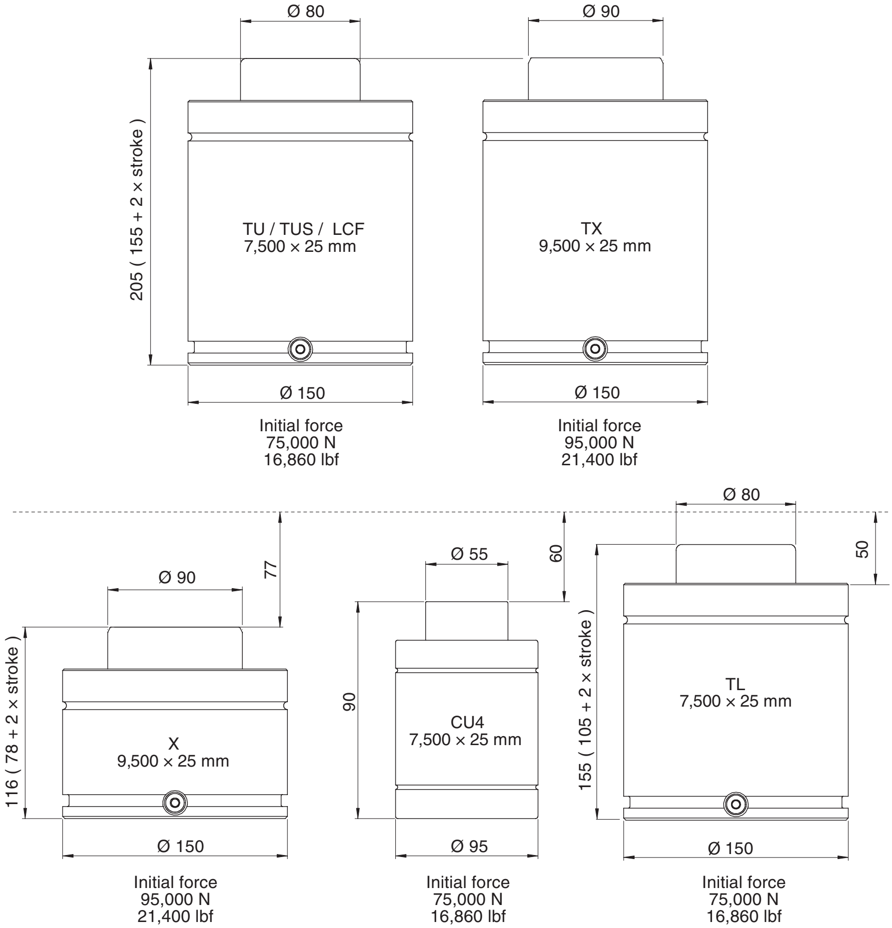
The mounting screw (M12) should be tightened with torque 91 Nm.



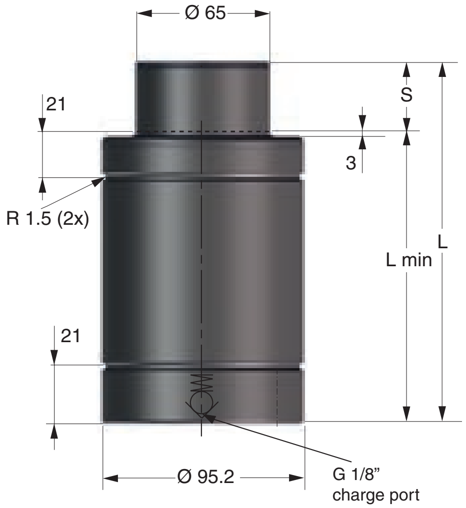
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

Note! For dimensions on mounting possibilities K-7500, FAC-7500, SA-7500 and FCSC-7500 refer to “Special Mounts”.

Overview - 75000 $\leq F_{INIT} <$ 100000



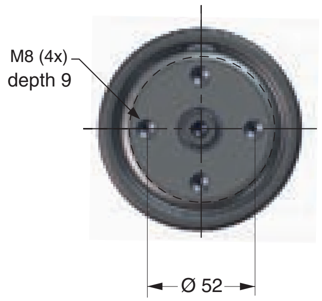
2 million



The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).



Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force**	Initial	End force**				
CU4 7500-010	10		98,500		22,143	90	80	0.18	2.86
CU4 7500-016	16		100,000		22,480	116	100	0.30	3.22
CU4 7500-025	25		104,000		23,380	145	120	0.41	3.61
CU4 7500-032	32*	75,000	102,000	16,860	22,930	182	150	0.57	4.14
CU4 7500-040	40*		104,000		23,380	210	170	0.68	4.52
CU4 7500-050	50*		103,000		23,155	255	205	0.87	5.15
CU4 7500-065	65*		111,000		24,953	279	214	1.00	5.23

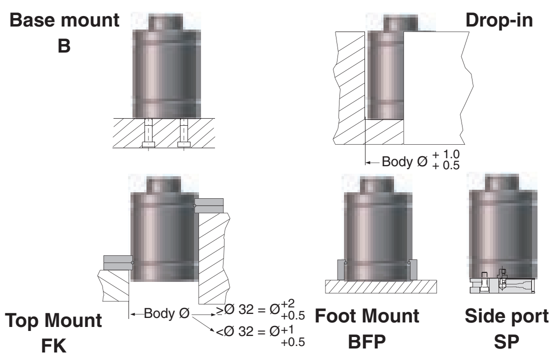
* Should always be attached to the tool using the tapped holes in the bottom or a flange
** at full stroke

Basic Information

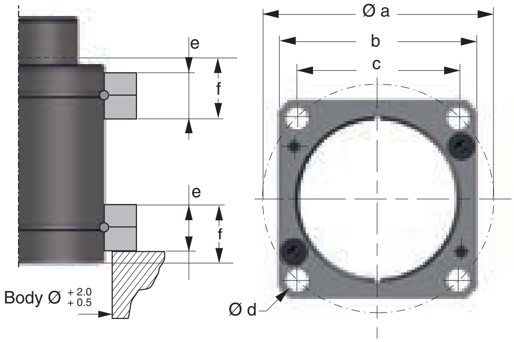
For general information see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~80 to 100 (at 20° C)
Max piston rod velocity .... 0.8 m/s

Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit CU4 7500....................... 3024839

Mounting Possibilities

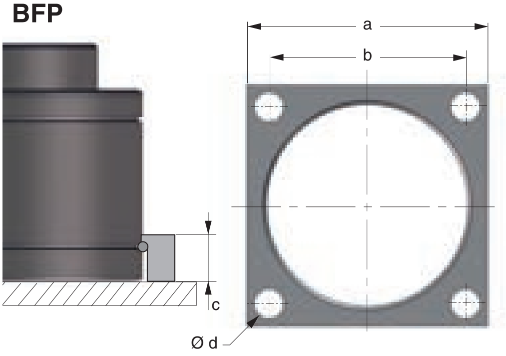


FK



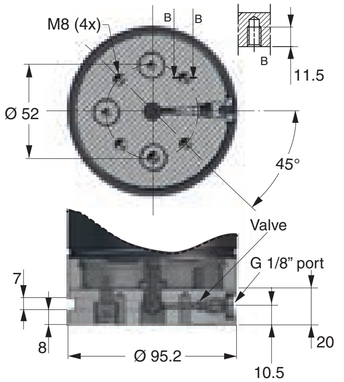
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 7500	FK-3000	130	110	92	13.5	18	30

BFP



For model	Order No.	a	b	c	Ø d
CU4 7500	BFP-7500	110	92	27.5	13

SP



For model	Order No.	For U-groove mounts on SP
CU4 7500	SP-7500	Refer to TU 3000

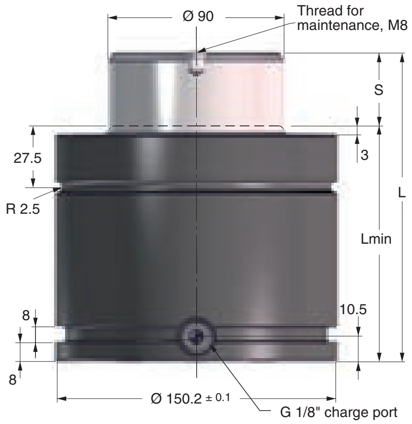
2 million

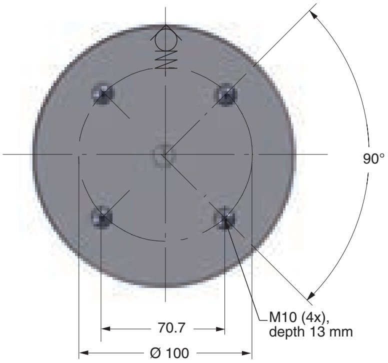
The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M10 threaded holes allow various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 9500-019		19	95,000	135,000	21,400	30,370	116	97	0.49	9.86	
X 9500-025	**	25		139,000		31,270	128	103	0.58	10.23	√
X 9500-032		32		142,000		31,945	142	110	0.70	10.67	
X 9500-038	**	38		143,000		32,170	154	116	0.80	11.04	√
X 9500-050	**	50		146,000		32,845	178	128	0.99	11.79	√
X 9500-063	**	63		148,000		33,295	204	141	1.20	12.60	√
X 9500-075	**	75		149,000		33,520	228	153	1.39	13.35	
X 9500-080	**	80		150,000		33,745	238	158	1.47	13.66	√
X 9500-100	**	100		151,000		33,970	278	178	1.79	14.91	√
X 9500-125	**	125		152,000		34,195	328	203	2.20	16.47	√

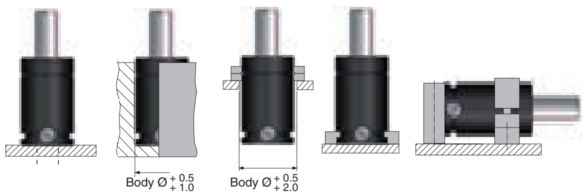
* = at full stroke ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3020614

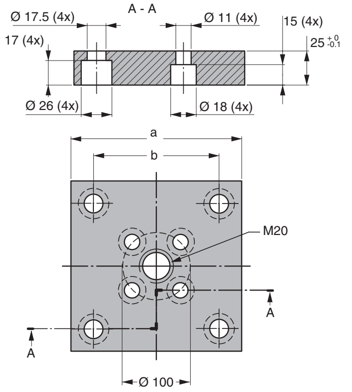
Mounting Possibilities



Base mount	Drop - in	Top mount	Foot mount	Body mount
B, MP		FC, FCS, FCSC	K, FFC	S

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

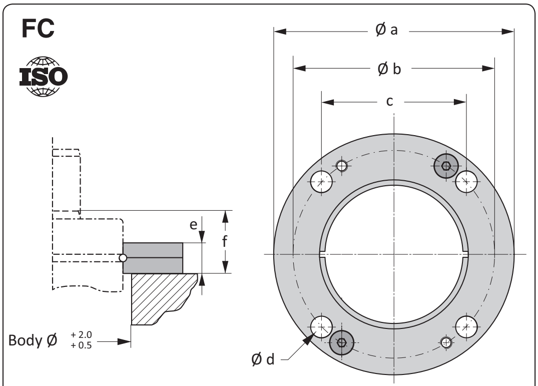
MP



Note! Comes complete with screws to mount gas spring.

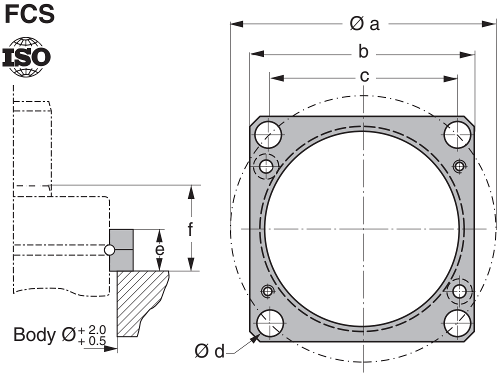
Order No.	a	b
MP-7500	190	138

FC



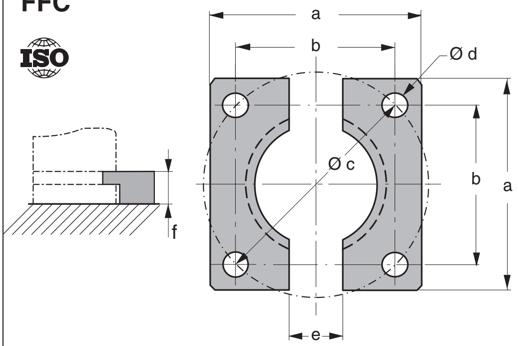
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS



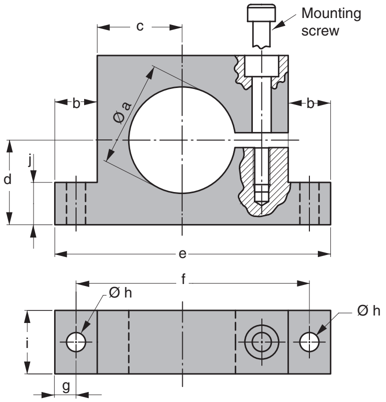
Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S



Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

TX 9500

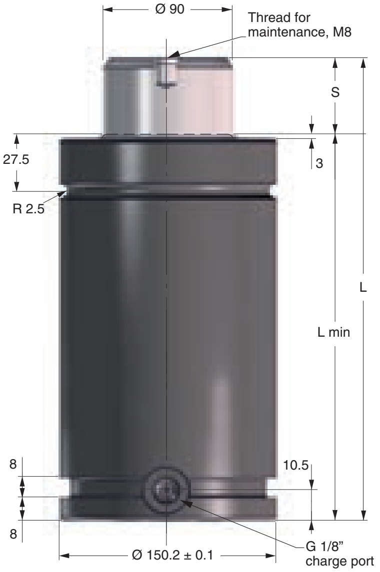
2 million

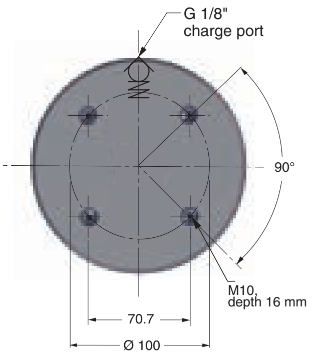
The Power Line - Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TX 9500-025	**	25		113,200		25,500	205	180	1.09	16.86	√
TX 9500-038	**	38		119,000		26,800	231	193	1.30	17.70	
TX 9500-050	**	50		123,300		27,730	255	205	1.49	18.48	√
TX 9500-063	**	63		127,000		28,550	281	218	1.69	19.32	
TX 9500-075	**	75		129,700		29,200	305	230	1.88	20.10	
TX 9500-080	**	80		130,800		29,430	315	235	1.96	20.42	√
TX 9500-100	**	100	95,000	134,300	21,400	30,200	355	255	2.28	31.72	√
TX 9500-125	**	125		137,600		31,000	405	280	2.67	23.35	√
TX 9500-150		150		140,200		31,530	455	305	3.07	24.97	
TX 9500-160	**	160		141,000		31,730	475	315	3.23	25.62	√
TX 9500-175		175		142,200		31,990	505	330	3.47	26.59	
TX 9500-200	**	200		143,800		32,360	555	355	3.86	28.21	√
TX 9500-250	**	250		146,300		32,930	655	405	4.65	31.46	√
TX 9500-300	**	300		148,200		33,340	755	455	5.44	34.70	√

* = at full stroke ** Recommended stroke length for optimal delivery

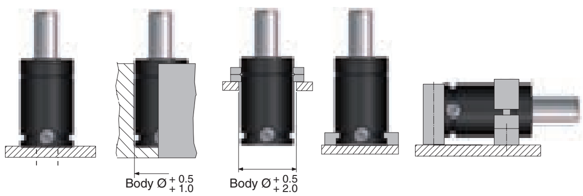
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 30 to 100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022901

Mounting Possibilities

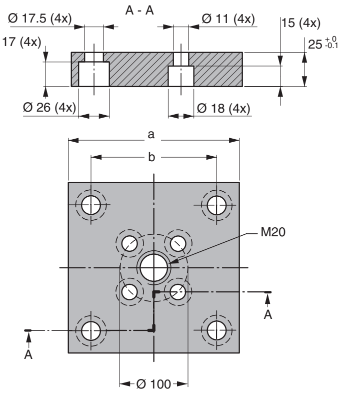


Base mount B, MP | **Drop - in** | **Top mount** FC, FCS, FCSC | **Foot mount** K, FFC | **Body mount** S

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

MP

ISO

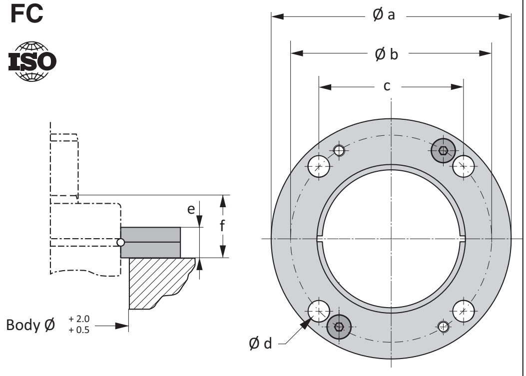


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-7500	190	138

FC

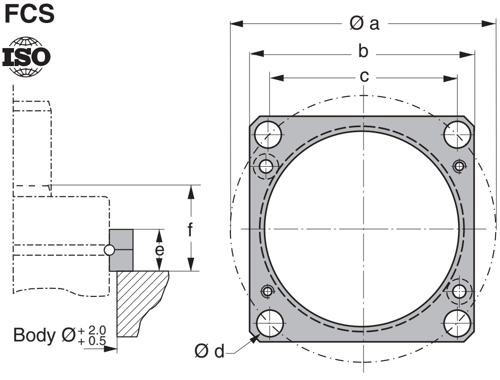
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS

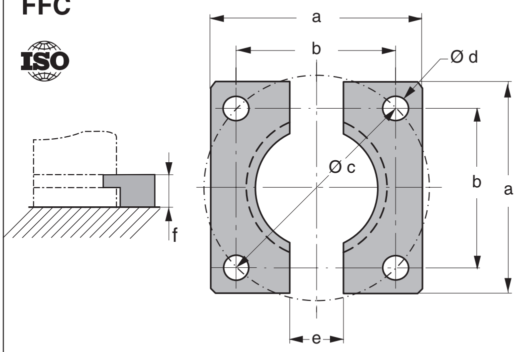
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

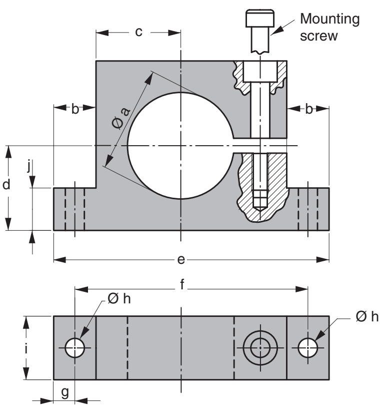
ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

ISO



Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

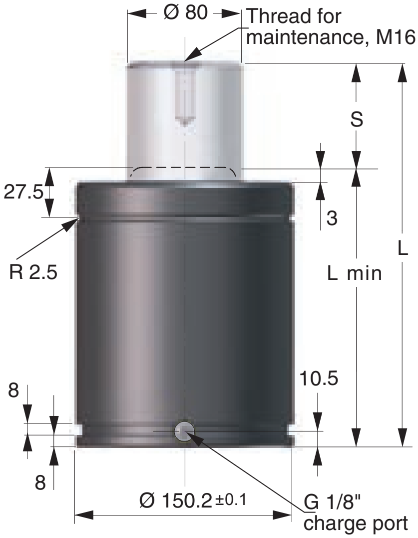
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

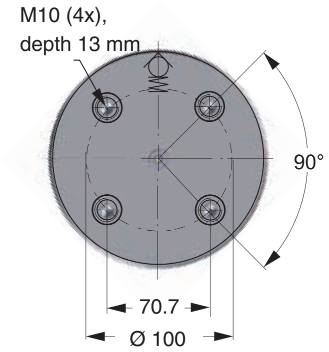
Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

2 million

The TL series ranges from model sizes 750 to 7,500, with the same features and technology as the TU series.

At the same time, the TL gas spring is shorter than the corresponding TU gas spring by 25 mm, except TL 5000 and TL 7500, which are 37.5 mm and 50 mm shorter respectively. TL springs share the same TU mounting possibilities and stroke lengths, with exception of strokes 12.5, 37.5 and 62.5.





Order No.	S Stroke	Force in N at 150 bar/+20°C Initial	End force*	Force in lbf at 150 bar/+20°C Initial	End force*	L ±0.25	L min	Gas vol. (l)	Weight (kg)
TL 7500-025	25		99,900		22,450	155	130	0.6	13.6
TL 7500-038	37.5		104,100		23,400	180	142.5	0.7	14.5
TL 7500-050	50		106,800		24,010	205	155	0.9	15.4
TL 7500-063	62.5		108,700		24,440	230	167.5	1.0	16.3
TL 7500-075	75		110,100		24,750	255	180	1.3	17.2
TL 7500-080	80		115,600		25,990	265	185	1.4	17.5
TL 7500-088	87.5		111,200		25,000	280	192.5	1.6	18.0
TL 7500-100	100		112,000		25,180	305	205	1.8	18.9
TL 7500-113	112.5	75,000	112,700	16,900	25,340	330	217.5	1.9	19.8
TL 7500-125	125		113,300		25,470	355	230	2.1	20.7
TL 7500-138	137.5		113,700		25,560	380	242.5	2.3	21.6
TL 7500-150	150		114,100		25,650	405	255	2.4	22.5
TL 7500-160	160		114,400		25,720	425	265	2.6	23.2
TL 7500-175	175		114,800		25,810	453	280	3.0	24.3
TL 7500-200	200		115,300		25,920	505	305	3.3	26.1
TL 7500-225	225		115,700		26,010	555	330	3.3	27.8
TL 7500-250	250		116,000		26,080	605	355	3.6	29.6

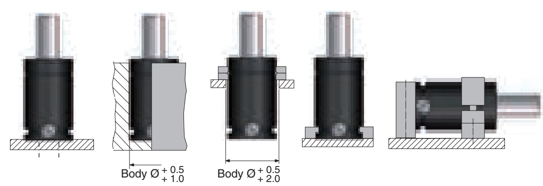
* = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3025027

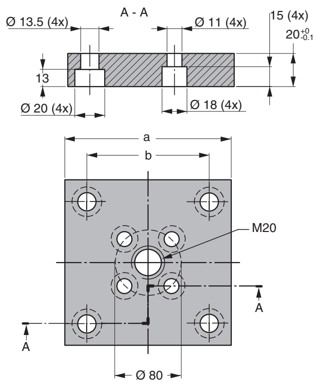
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount** FC, FCS, FCSC | **Foot mount** K, FFC | **Body mount** FAC, SA, S, HM

Note! For dimensions on mounting possibilities K-7500 FAC-7500, SA-7500 and FCSC-7500 refer to “Special Mounts”.

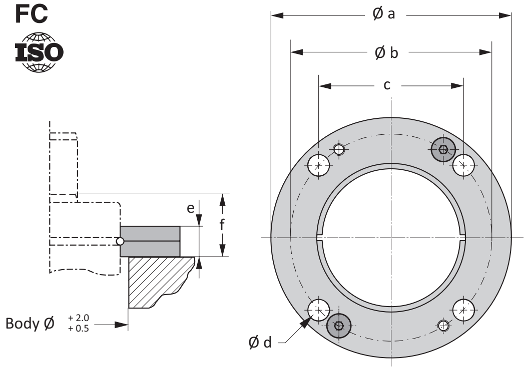
MP



Note! Comes complete with screws to mount gas spring.

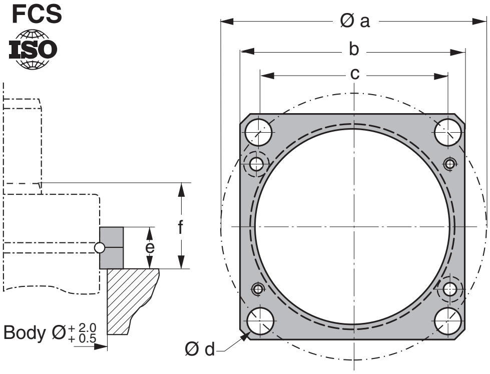
Order No.	a	b
MP-7500	190	138

FC



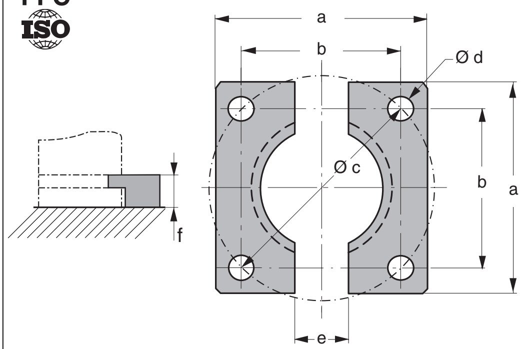
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

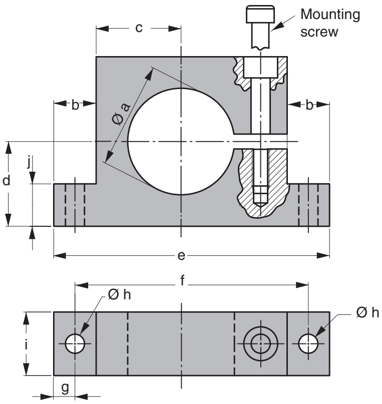


Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

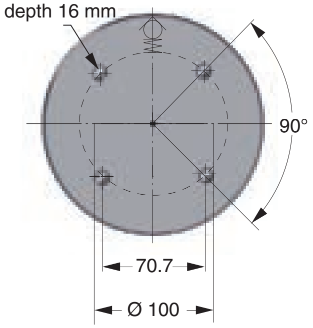


Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

Note! For dimensions on mounting possibilities K-7500, FAC-7500, SA-7500 and FCSC-7500 refer to “Special Mounts”.

2 million

The TU line constitutes our standard line of gas springs. Sizes 250 to 10,000 conform to the ISO 11901 gas spring standard.



Order No.	S stroke		Force in N at 150 bar/+20°C Initial	End Force*	Force in lbf at 150 bar/+20°C Initial	End Force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 7500-025	**	25		105,000		23,600	205	180	0.51	20.30	√
TU 7500-038	**	38.1		110,000		24,730	231.2	193.1	0.67	21.40	
TU 7500-050	**	50		113,000		25,400	255	205	0.81	22.40	√
TU 7500-064	**	63.5		115,000		25,850	282	218.5	0.98	23.50	
TU 7500-080	**	80		117,000		26,300	315	235	1.18	24.80	√
TU 7500-100	**	100		119,000		26,750	355	255	1.43	26.50	√
TU 7500-125	**	125	75,000	121,000	16,860	27,200	405	280	1.74	28.50	√
TU 7500-160	**	160		122,000		27,430	475	315	2.17	31.40	√
TU 7500-175		175		123,000		27,650	505	330	2.06	32.60	
TU 7500-200	**	200		123,000		27,650	555	355	2.66	34.70	
TU 7500-225		225		124,000		27,880	605	380	2.96	36.80	
TU 7500-250	**	250		124,000		27,880	655	405	3.27	38.80	
TU 7500-300	**	300		124,000		27,880	755	455	3.88	42.90	

* = at full stroke

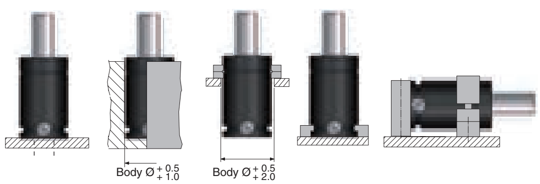
** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure......................... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3018877

Mounting Possibilities

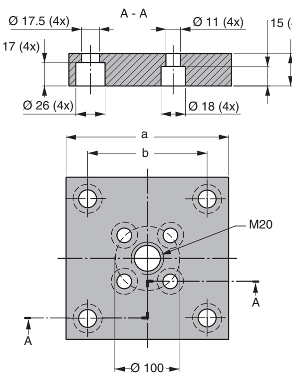


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC, | Body mount S

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

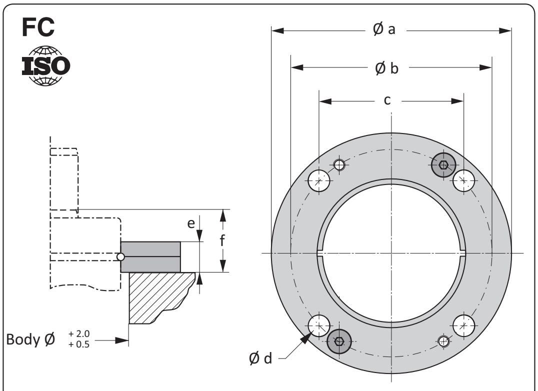
MP

Note! Comes complete with screws to mount gas spring.



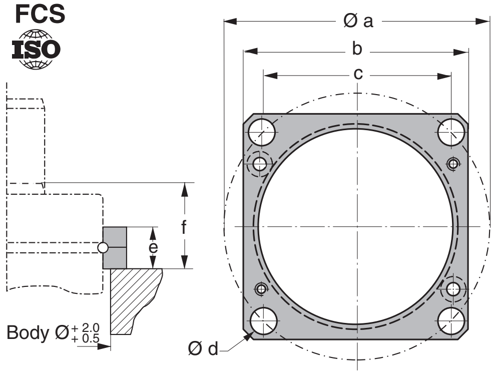
Order No.	a	b
MP-7500	190	138

FC



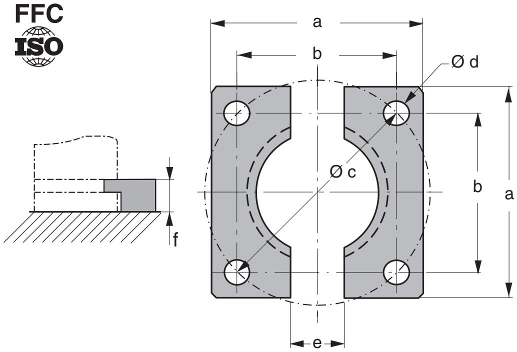
Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

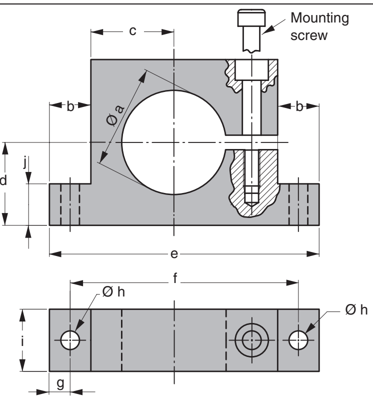


Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.



Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

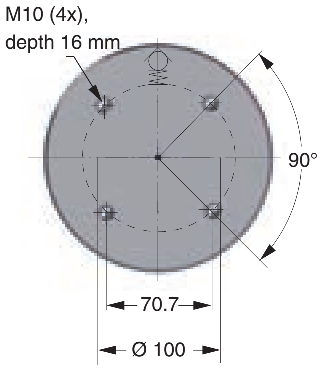
Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to "Special Mounts".

2 million

The High Speed gas springs (TUS) have been engineered to withstand press stroke speeds to a maximum of 2 m/s, which meet the safety requirements from the French automotive manufacturer Renault.

These gas springs are available in sizes from 750 to 7,500 and dimensions that conform to the ISO 11901 gas spring standard.

The TUS gas spring replaces the TUR spring that has been phased out.



Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End Force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End Force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUS 7500-025	25		105,000		23,600	205	180	0.51	19.40
TUS 7500-038	38.1		110,000		24,730	231.2	193.1	0.67	20.47
TUS 7500-050	50		113,000		25,400	255	205	0.81	21.25
TUS 7500-064	63.5		115,000		25,850	282	218.5	0.98	22.56
TUS 7500-080	80		117,000		26,300	315	235	1.18	23.91
TUS 7500-100	100	75,000	119,000	16,860	26,750	355	255	1.43	25.56
TUS 7500-125	125		121,000		27,200	405	280	1.74	27.61
TUS 7500-160	160		122,000		27,430	475	315	2.17	30.48
TUS 7500-200	200		123,000		27,650	555	355	2.66	33.76
TUS 7500-250	250		124,000		27,880	655	405	3.27	37.87
TUS 7500-300	300		124,000		27,880	755	455	3.88	41.97

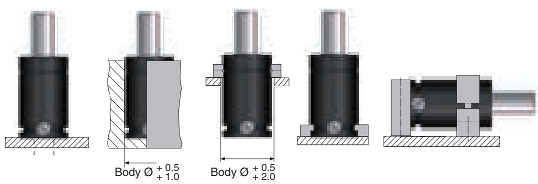
* = at full stroke

Basic Information

For general information see “About gas springs”
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure........................ 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 2 m/s

Rod surface... Nitrided
Tube surface .... Black oxide
Repair kit... 3019281

Mounting Possibilities

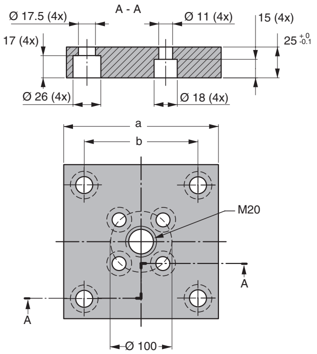


Base mount B, MP | Drop - in | Top mount FC, FCS, FCSC | Foot mount K, FFC | Body mount S

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

MP

ISO

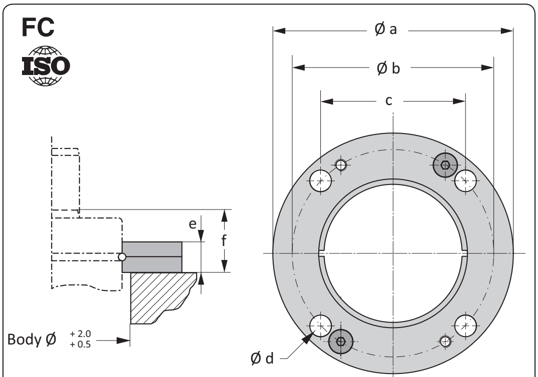


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-7500	190	138

FC

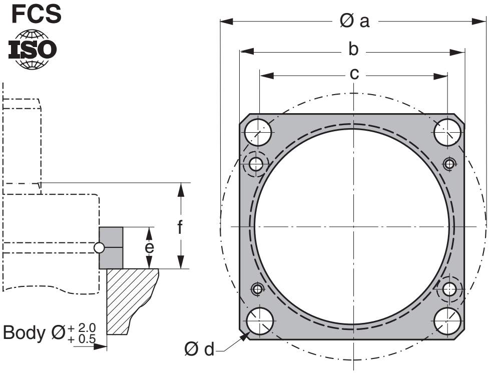
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS

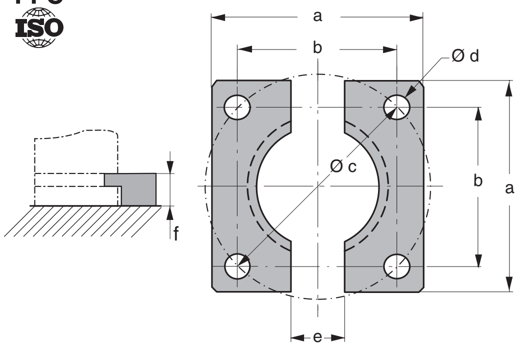
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

ISO



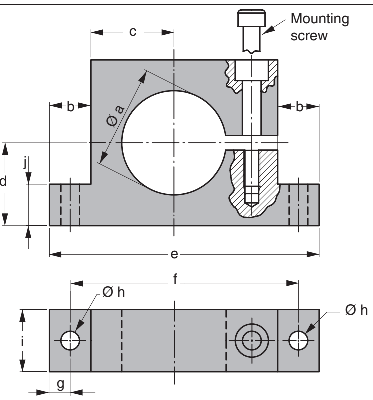
Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

ISO

Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

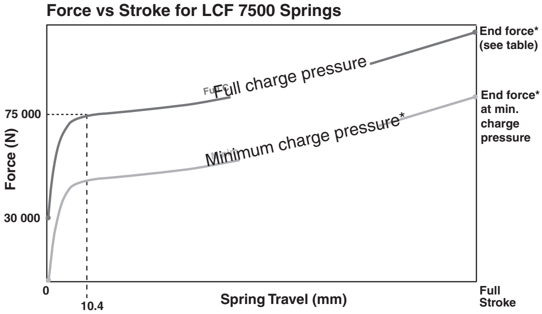


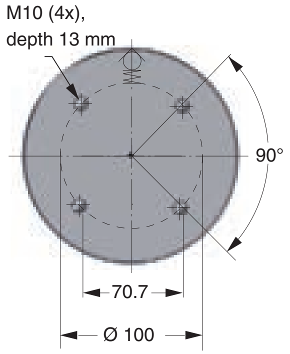
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

2 million

Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.
For more information, see “About Gas Springs”.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End Force*	Force in lbf at 150 bar/+20°C Initial	End Force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 7500-025	**	25		105,000		23,600	205	180	0.51	19.40
LCF 7500-038	**	38.1		110,000		24,730	231.2	193.1	0.67	20.47
LCF 7500-050	**	50		113,000		25,400	255	205	0.81	21.25
LCF 7500-064	**	63.5		115,000		25,850	282	218.5	0.98	22.56
LCF 7500-080	**	80		117,000		26,300	315	235	1.18	23.91
LCF 7500-100	**	100	75,000	119,000	16,860	26,750	355	255	1.43	25.56
LCF 7500-125	**	125		121,000		27,200	405	280	1.74	27.61
LCF 7500-160	**	160		122,000		27,430	475	315	2.17	30.48
LCF 7500-200	**	200		123,000		27,650	555	355	2.66	33.76
LCF 7500-250		250		124,000		27,880	655	405	3.27	37.87
LCF 7500-300		300		124,000		27,880	755	455	3.88	41.97

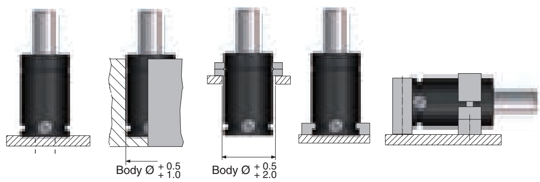
* = at full stroke   ** Recommended stroke length for optimal delivery

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 89 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.. Nitrided
Tube surface .... Black oxide
Repair kit... 3019381

Mounting Possibilities

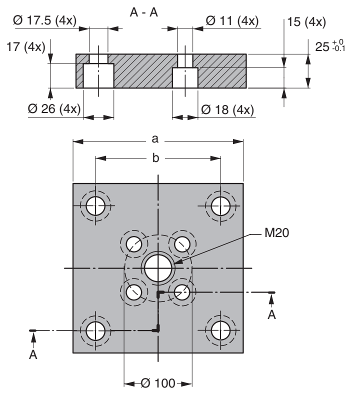


Base mount **B, MP** | **Drop - in** | **Top mount** **FC, FCS, FCSC** | **Foot mount** **K, FFC,** | **Body mount** **S**

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

MP

ISO

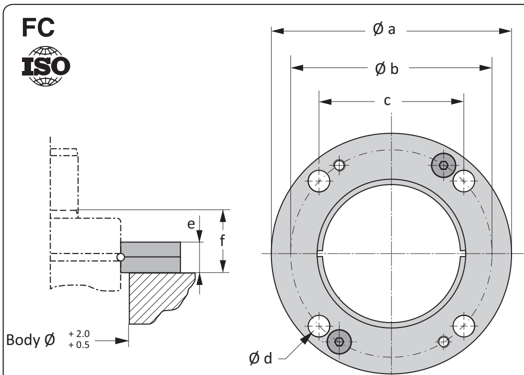


Note! Comes complete with screws to mount gas spring.

Order No.	a	b
MP-7500	190	138

FC

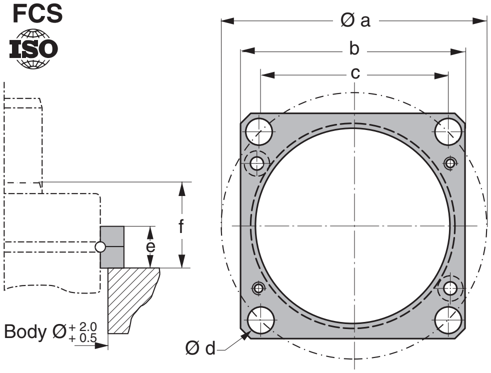
ISO



Order No.	Ø a	Ø b	c	Ø d	e	f
FC-7500	220	195	138	17.5	27	41

FCS

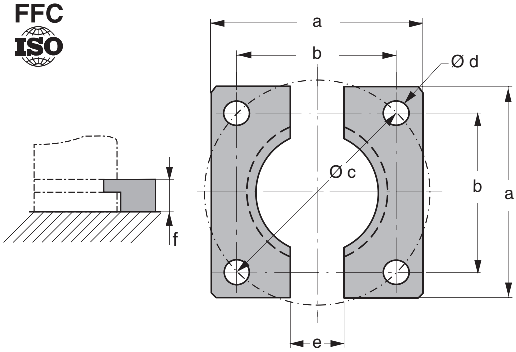
ISO



Order No.	Ø a	b	c	Ø d	e	f
FCS-7500	195	162	138	17.5	27	41

FFC

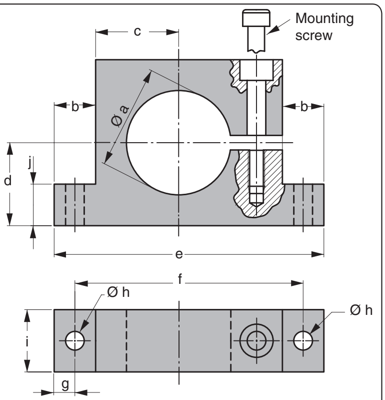
ISO



Order No.	a	b	Ø c	Ø d	e	f
FFC-7500	190	138	195.2	17.5	24	12

S

ISO



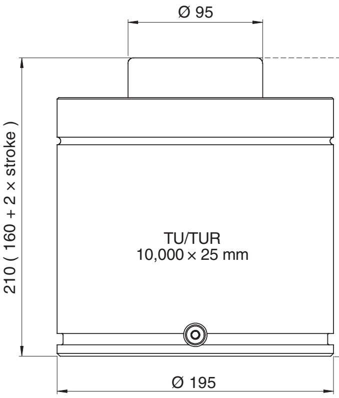
Note! Support S is designed to be used in combination with flanges mounted in the U or C groove or mounting option B.

The mounting screw (M12) should be tightened with torque 91 Nm.

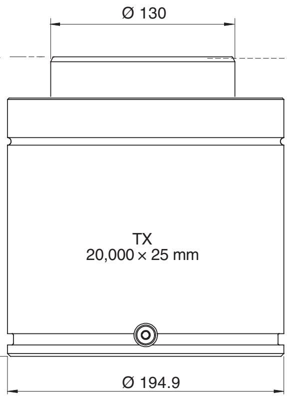
Order No.	Ø a	b	c	d	e	f	g	Ø h	i	j
S-7500	150.4	30	95	100	260	230	15	13	30	20

Note! For dimensions on mounting possibilities K-7500 and FCSC-7500 refer to “Special Mounts”.

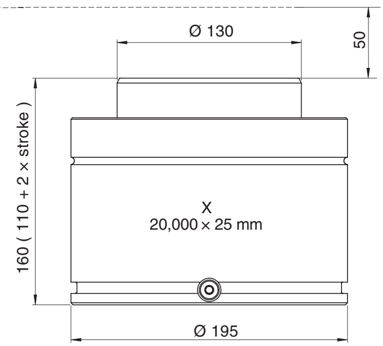
Overview - $F_{INIT} \geq 100000$



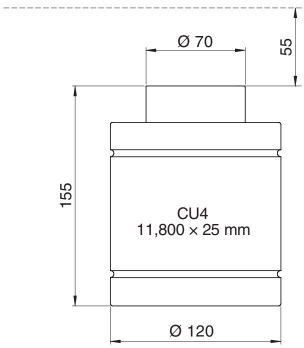
Initial force
10,600 N
23,830 lbf



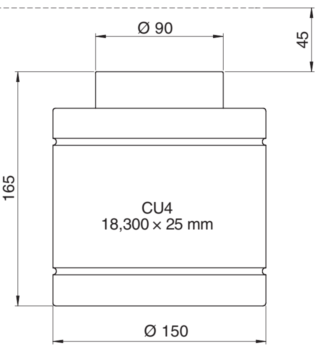
Initial force
200,000 N
44,960 lbf



Initial force
200,000 N
45,000 lbf



Initial force
118,000 N
26,530 lbf



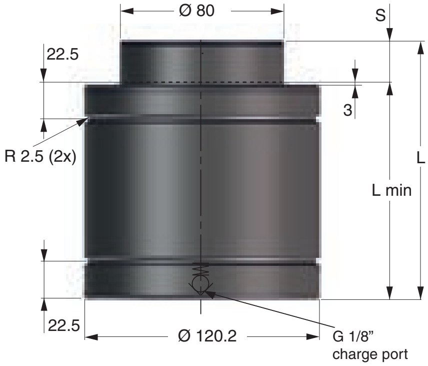
Initial force
183,000 N
41,140 lbf

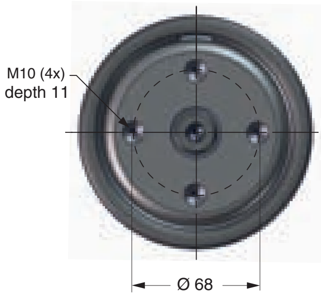
2 million

The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 11800-010	10		150,000		33,700	100	90	0.33	4.95
CU4 11800-016	16		153,000		34,400	126	110	0.50	5.55
CU4 11800-025	25		160,000		36,000	155	130	0.68	6.17
CU4 11800-032	32*	118,000	165,000	26,530	37,100	187	155	0.88	6.90
CU4 11800-040	40*		160,000		36,000	220	180	1.00	7.65
CU4 11800-050	50*		161,000		36,200	260	210	1.35	8.55
CU4 11800-050	65*		163,000		36,600	320	255	1.90	9.56

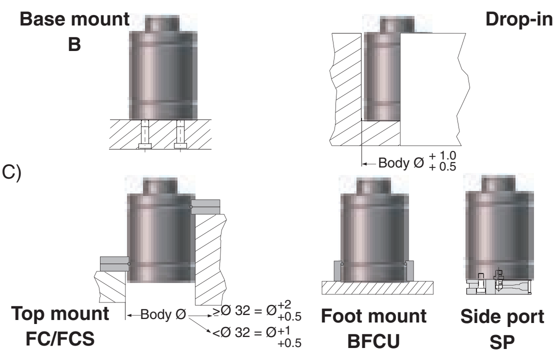
* Should always be attached to the tool using the tapped holes in the bottom or a flange
** at full stroke

Basic Information

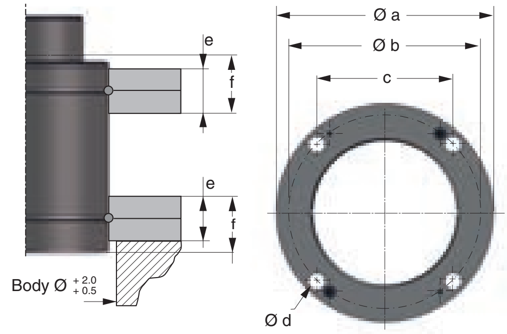
For general information see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~80 to 100 (at 20° C)
Max piston rod velocity .... 0.8 m/s

Rod surface.................................... Nitrided
Tube surface .... Nitrided
Repair kit CU4 11800...................... 3024840

Mounting Possibilities

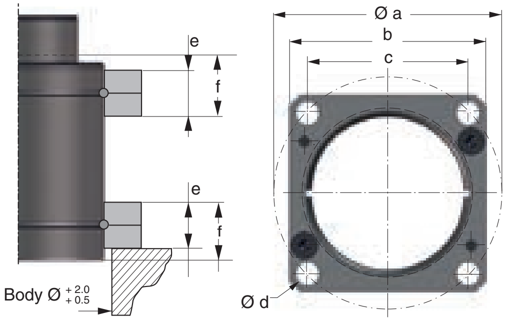


FC



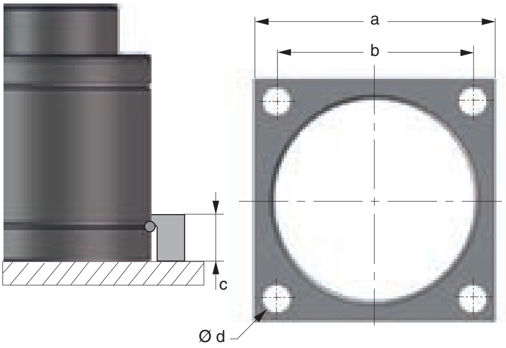
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 11800	FC-5000	175	155	109.5	13.5	21	33

FCS



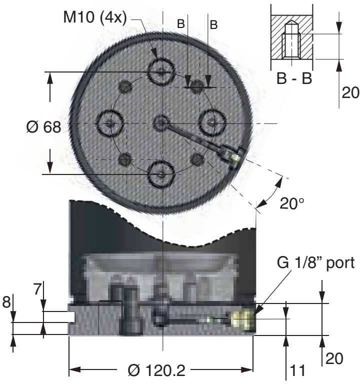
For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 11800	FCS-5000	155	130	109.5	13.5	21	33

BFCU



For model	Order No.	a	b	Ø c	d
CU4 11800	BFCU-11800	130	109.5	29.5	13

SP



For model	Order No.	For U-groove mounts on SP
CU4 11800	SP-11800	Refer to TU 5000

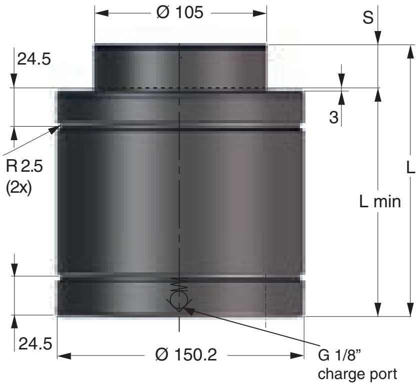
We reserve the right to add, delete or modify components without notification. All dimensions are stated in mm. All dimensions are nominal unless tolerance is stated.

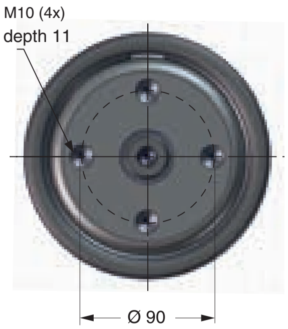
2 million

The CU4 gas spring is a very compact Bore Sealed gas spring with impressive force in a compact body.
The maximum frequency for the spring is 100 strokes/ minute.

Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life.

As an option, the CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 18300-010	10		227,000		51,000	110	100	0.56	8.78
CU4 18300-016	16		233,000		52,400	136	120	0.84	9.72
CU4 18300-025	25		244,000		54,900	165	140	1.13	10.71
CU4 18300-032	32*	183,000	244,000	41,140	54,900	197	165	1.45	11.88
CU4 18300-040	40*		244,000		54,900	235	195	1.86	13.28
CU4 18300-050	50*		248,000		55,800	270	220	2.19	14.50
CU4 18300-065	65*		253,000		56,900	323	258	2.90	16.30

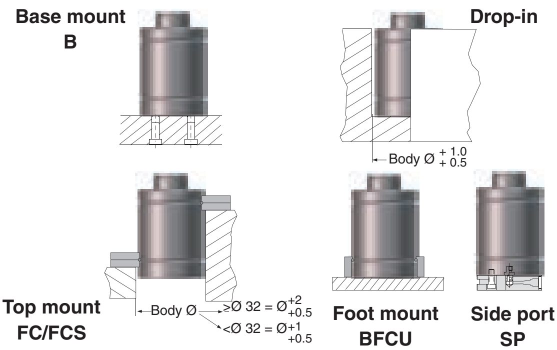
* Should always be attached to the tool using the tapped holes in the bottom or a flange
** at full stroke

Basic Information

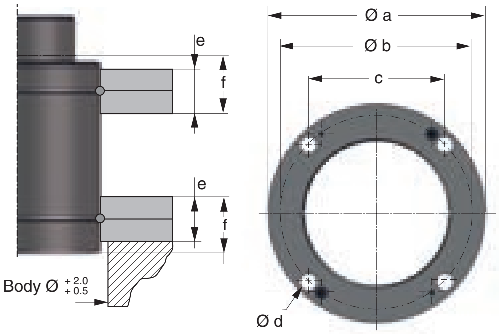
For general information see “About gas springs”.
Pressure medium............................ Nitrogen
Max. charging pressure................... 150 bar (at 20°C)
Min. charging pressure.................... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3%/°C
Recommended max strokes/min .... ~80 to 100 (at 20° C)
Max piston rod velocity .... 0.8 m/s

Rod surface..................................... Nitrided
Tube surface .... Nitrided
Repair kit CU4 18300...................... 3024841

Mounting Possibilities

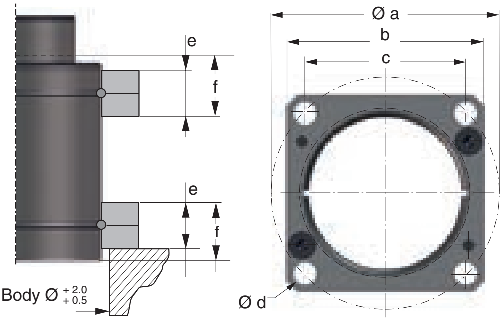


FC



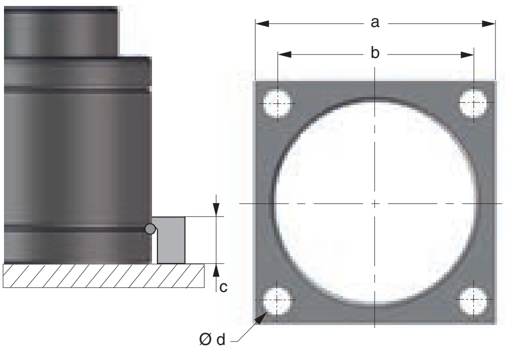
For model	Order No.	Ø a	Ø b	c	Ø d	e	f
CU4 18300	FC-7500	220	195	138	17.5	27	38

FCS



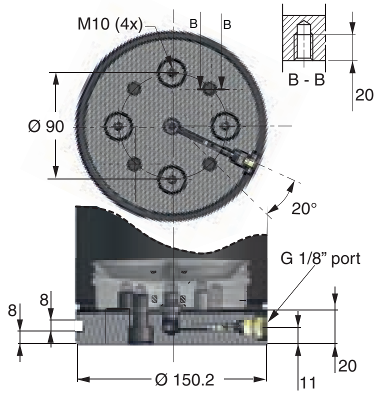
For model	Order No.	Ø a	b	c	Ø d	e	f
CU4 18300	FCS-7500	195	162	138	17.5	27	38

BFCU



For model	Order No.	a	b	Ø c	d
CU4 18300	BFCU-18300	162	138	34.5	17.5

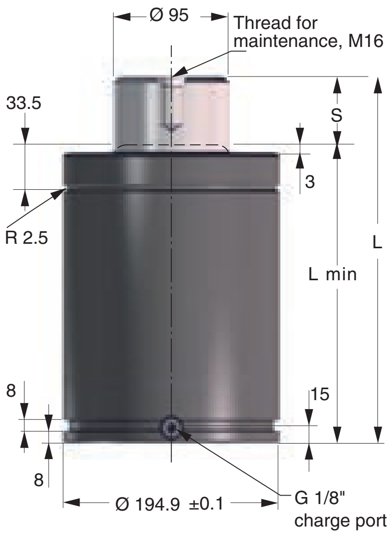
SP

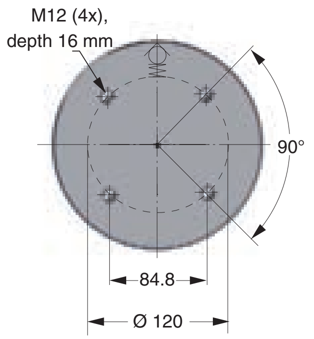


For model	Order No.	For U-groove mounts on SP
CU4 18300	SP-18300	Refer to TU 7500

2 million

The TU line constitutes our standard line of gas springs. Sizes 250 to 10,000 conform to the ISO 11901 gas spring standard.





Order No.		S stroke	Force in N at 150 bar/+20°C Initial	End force**	Force in lbf at 150 bar/+20°C Initial	End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 10000-025	**	25		138,000		31,020	210	185	0.87	35.90	
TU 10000-038	**	38.1		143,000		32,150	236.2	198.1	1.13	37.60	
TU 10000-050	**	50		147,000		33,050	260	210	1.37	39.20	√
TU 10000-064	**	63.5		150,000		33,720	287	223.5	1.64	41.00	
TU 10000-080	**	80		152,000		34,170	320	240	1.98	43.20	√
TU 10000-100	**	100	106,000	156,000	23,830	35,070	360	260	2.38	45.80	√
TU 10000-125	**	125		157,000		35,300	410	285	2.88	49.10	√
TU 10000-160	**	160		158,000		35,520	480	320	3.59	53.70	√
TU 10000-200	**	200		160,000		35,970	560	360	4.39	59.00	√
TU 10000-250	**	250		160,000		35,970	660	410	5.40	65.60	√
TU 10000-300	**	300		160,000		35,970	760	460	6.40	72.20	√

** = at full stroke

** Recommended stroke length for optimal delivery

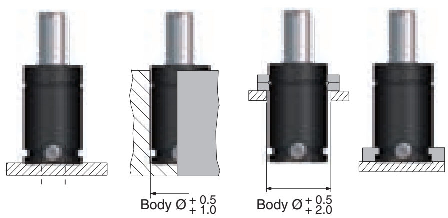
Basic Information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019037

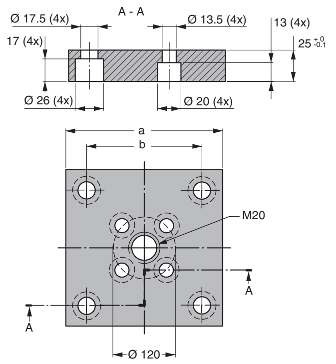
Mounting Possibilities



Base mount **B, MP** | **Drop - in** | **Top mount** **FCS** | **Foot mount** **K, FFC,**

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

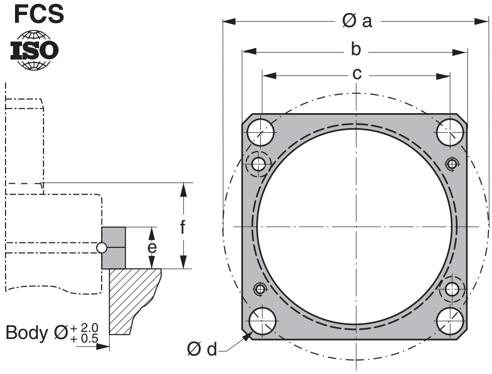
MP



Note! Comes complete with screws to mount gas spring.

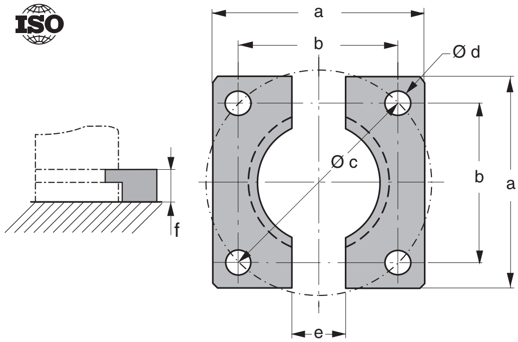
Order No.	a	b
MP-10000	210	170

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-10000	240.4	210	170	17.5	27	47

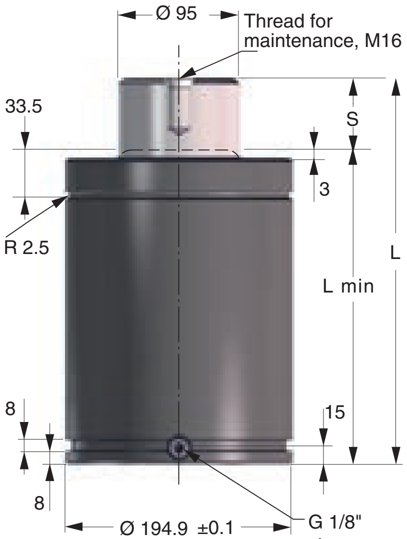
FFC

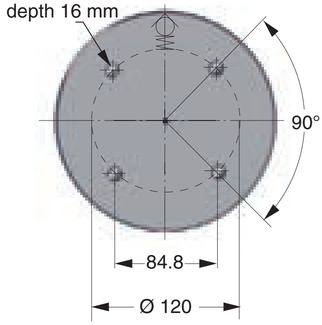


Order No.	a	b	Ø c	Ø d	e	f
FFC-10000	210	170	240.4	17.5	24	13

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

2 million





The TUR 10000 gas spring conforms to the ISO 11901-1 and the Renault automotive gas spring standards. In full compliance with the Renault requirements, it features an overstroke protection system.

For sizes 750 up to 7,500, please refer to the TUS High Speed gas springs.

Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TUR 10000-025	25		138,000		31,020	210	185	1.0	34.7
TUR 10000-038	38.1		143,000		32,150	236.2	198.1	1.2	36.4
TUR 10000-050	50		147,000		33,050	260	210	1.5	39.2
TUR 10000-064	63.5		150,000		33,720	287	223.5	1.8	39.8
TUR 10000-080	80		152,000		34,170	320	240	2.1	41.9
TUR 10000-100	100	106,000	156,000	23,830	35,070	360	260	2.5	44.6
TUR 10000-125	125		157,000		35,300	410	285	3.0	47.9
TUR 10000-160	160		158,000		35,520	480	320	3.7	53.4
TUR 10000-200	200		160,000		35,970	560	360	4.5	59.0
TUR 10000-250	250		160,000		35,970	660	410	5.5	65.5
TUR 10000-300	300		160,000		35,970	760	460	6.5	72.1

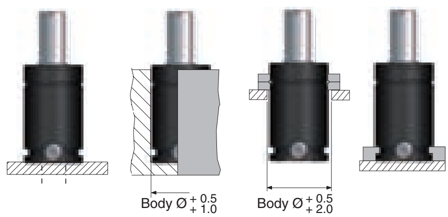
** = at full stroke

Basic Information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15-40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. 3019282

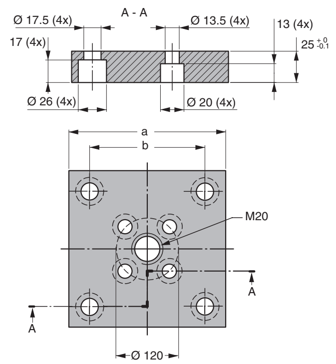
Mounting Possibilities



Base mount B, MP | **Drop - in** | **Top mount FCS** | **Foot mount K, FFC,**

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

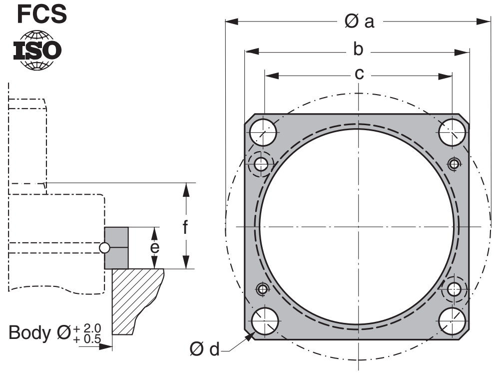
MP



Note! Comes complete with screws to mount gas spring.

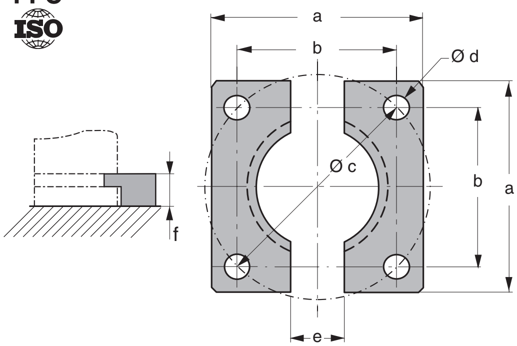
Order No.	a	b
MP-10000	210	170

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-10000	240.4	210	170	17.5	27	47

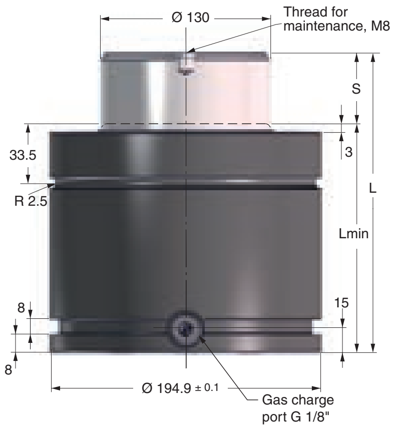
FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-10000	210	170	240.4	17.5	24	13

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

2 million

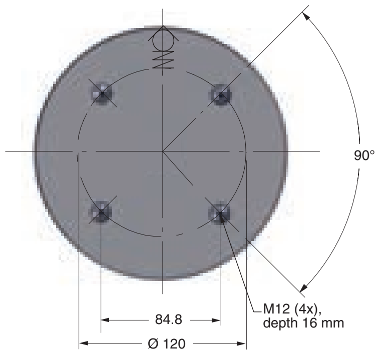


The Power Line Series includes our shortest and most powerful Piston Rod Sealed gas springs, offering impressive force in a very compact format.

These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm.

There is a side port for gas charging that can also be used to connect to a hose system.

An upper C-groove, lower U-groove together with four M12 threaded holes allow various mounting possibilities using our standard mounts.



Order No.		S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 20000-019		19	200,000	259,000	45,000	58,200	148	129	1.21	21.50	
X 20000-025	**	25		270,000		60,750	160	135	1.38	22.16	√
X 20000-032		32		280,000		63,000	174	142	1.59	22.92	
X 20000-038		38		287,000		64,600	186	148	1.77	23.57	√
X 20000-050	**	50		298,000		67,000	210	160	2.12	24.87	√
X 20000-063	**	63		307,000		69,100	236	173	2.50	26.28	√
X 20000-075		75		313,000		70,500	260	185	2.85	27.59	
X 20000-080	**	80		315,000		70,900	270	190	3.00	28.13	√
X 20000-100	**	100		323,000		72,700	310	210	3.58	30.30	√
X 20000-125	**	125		330,000		74,250	360	235	4.31	33.02	√

* = at full stroke

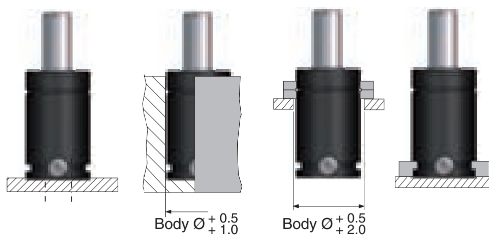
** Recommended stroke length for optimal delivery

Basic Information

For general information see "About gas springs"
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar (at 20°C)
Min. charging pressure .... 25 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15 to 40 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022902

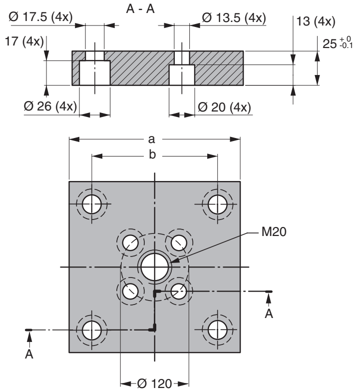
Mounting Possibilities



Base mount **B, MP** | **Drop - in** | **Top mount** **FCS,** | **Foot mount** **K, FFC**

Note!
For dimensions on mounting possibility K-10000 refer to Chapter 3.

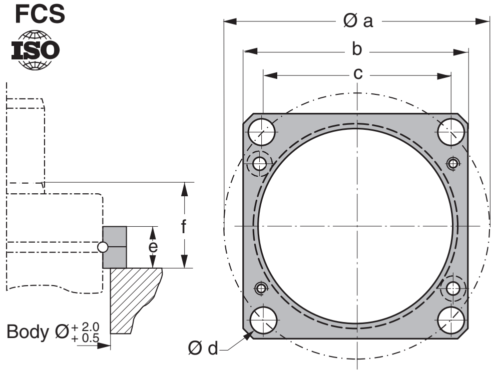
MP



Note! Comes complete with screws to mount gas spring.

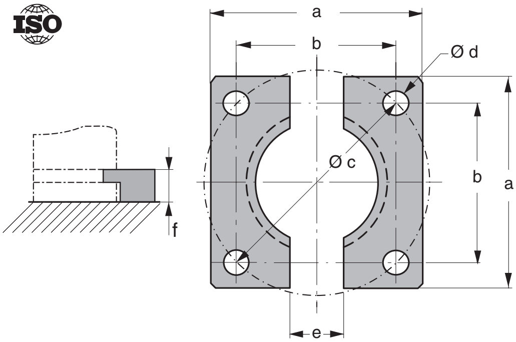
Order No.	a	b
MP-10000	210	170

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-10000	240.4	210	170	17.5	27	47

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-10000	210	170	240.4	17.5	24	13

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

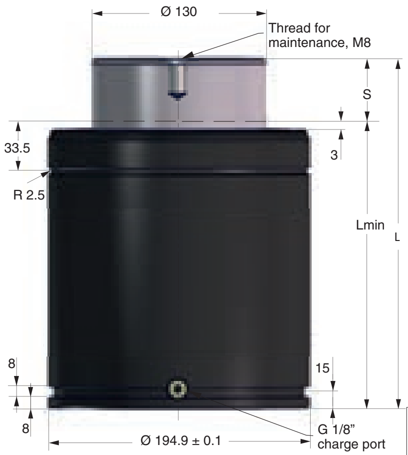
2 million

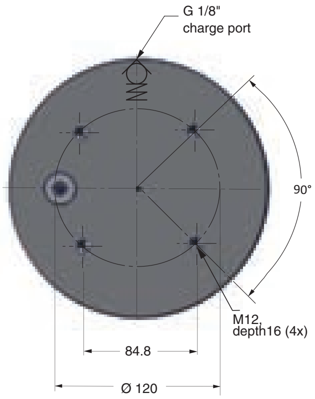
The Power Line - Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths between 13 and 300 mm.

There is an optional bottom port for hose/base plate connection.

An upper C-groove, lower U-groove and bottom threaded holes allow various mounting possibilities using our standard mounts.





Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TX 20000-025	25	200,000	242,000	44,960	54,404	210	185	2.03	28.20
TX 20000-038	38		256,400		57,640	236	198	2.41	29.57
TX 20000-050	50		266,800		59,980	260	210	2.77	30.83
TX 20000-063	63		276,000		62,048	286	223	3.15	32.20
TX 20000-075	75		283,100		63,644	310	235	3.51	33.46
TX 20000-080	80		285,700		64,228	320	240	3.66	33.98
TX 20000-100	100		294,600		66,229	360	260	4.25	36.09
TX 20000-125	125		303,100		68,140	410	285	5.00	38.71
TX 20000-150	150		309,700		69,624	460	310	5.74	41.34
TX 20000-160	160		312,000		70,140	480	320	6.04	42.39
TX 20000-175	175		315,000		70,815	510	335	6.48	43.97
TX 20000-200	200		319,000		71,714	560	360	7.23	46.60
TX 20000-250	250		325,600		73,198	660	410	8.71	51.85
TX 20000-300	300		330,600		72,322	760	460	10.20	57.11

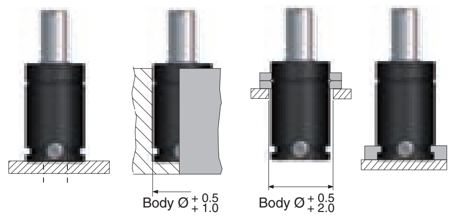
** = at full stroke

Basic Information

For general information see “About gas springs”
Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature ...... ±0.3%/°C
Recommended max strokes/min ... ~ 15-100 (at 20°C)
Max piston rod velocity .... 1.6 m/s

Rod surface.................................... Nitrided
Tube surface .... Black oxide
Repair kit.. 3026204

Mounting Possibilities



Base mount **B, MP**

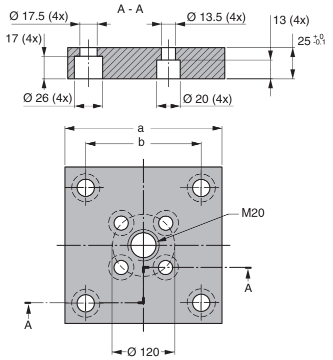
Drop - in

Top mount **FCS**

Foot mount **K, FFC,**

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

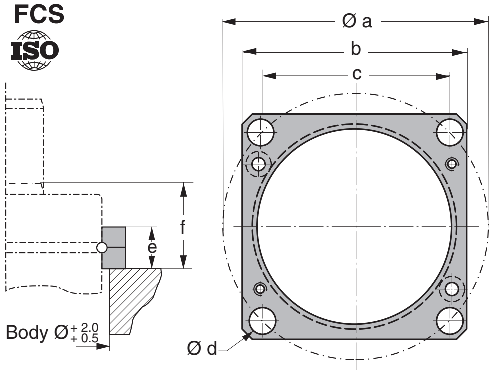
MP



Note! Comes complete with screws to mount gas spring.

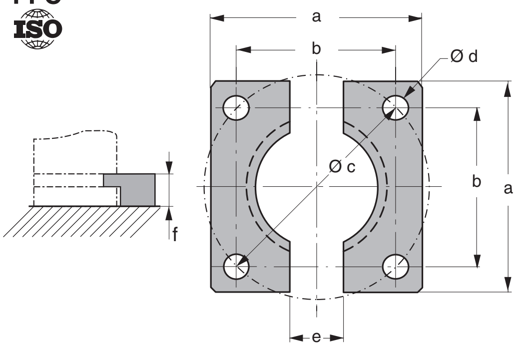
Order No.	a	b
MP-10000	210	170

FCS



Order No.	Ø a	b	c	Ø d	e	f
FCS-10000	240.4	210	170	17.5	27	47

FFC



Order No.	a	b	Ø c	Ø d	e	f
FFC-10000	210	170	240.4	17.5	24	13

Note! For dimensions on mounting possibility K-10000 refer to “Special Mounts”.

Product Series
Problem Solvers and Accessories

KALLER®
The Safer Choice

Soft-Hit Striker Plate - SSP

Edition 5.2013

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All available information at kaller.com.

Soft-Hit Striker Plates (SSP) have been engineered to address three of the major problems that face metal stampers:

- Excessive shock loads
- High noise levels
- Poor part quality

SSP contain a specially developed dampening element that absorbs unwanted shock loads that can lead to high press maintenance, noise pollution and poor part quality.

Features:

- Suitable for mechanical springs, gas springs and air cushion pins
- For spring forces from 7,500 to 10,0000 N
- 1 million hit service life
- Low build height
- Double countersunk mounting holes (M10)
- Hardened contact surface
- Up to 20 strokes per minute

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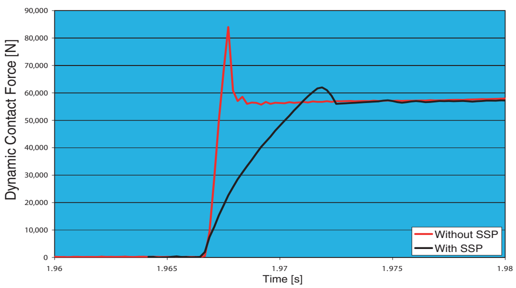
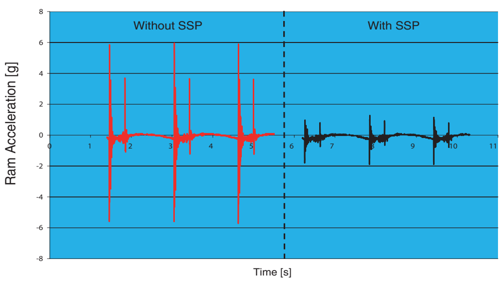
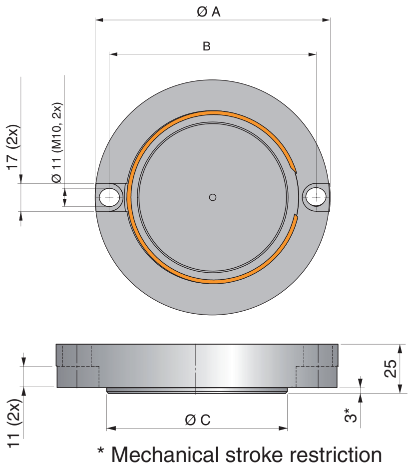
Function





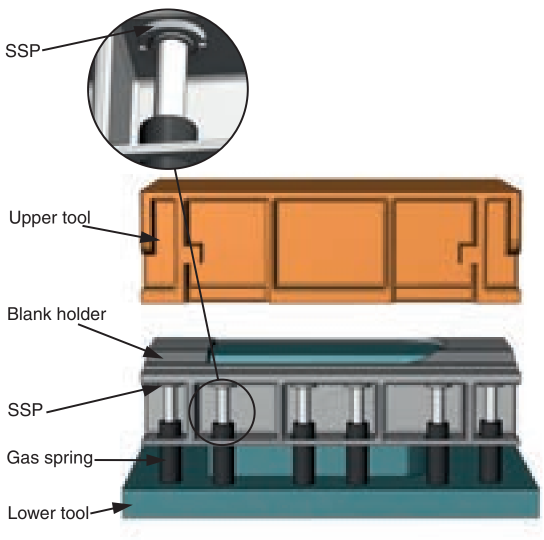
Dimensions



* Mechanical stroke restriction

Model	Gas spring forces	Ø A	B	Ø C
SSP 1500	750 up to and including 1,500	108	91	58
SSP 5000	1,500 up to and including 6,600	143	126	92
SSP 10000	6,600 up to and including 10,000	167	150	112

Application



Patent SE 526 302, US 7,818, 988 and other patents pending.

Product Series
Mounts

KALLER® The Safer Choice

Special Mounts

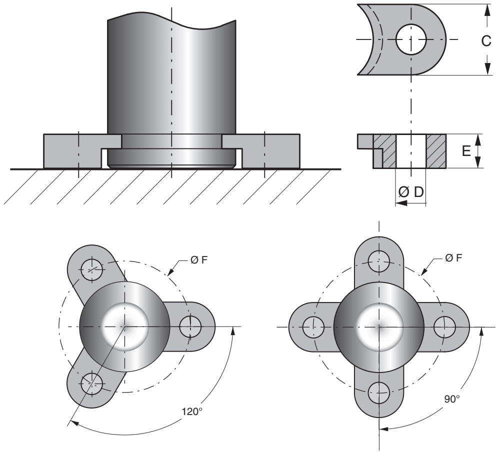
Edition 15.2016

Would you like to order this product?
All available information at www.kaller.com.

K

The K-lug is used to clamp the gas spring vertically upright to the tool. The gas spring can be clamped down using 2, 3 or 4 K-lugs.
If only 2 lugs are used, then locking plate L **must** also be used to fix the gas spring.
Note: When using locking plate L together with K-lugs, the spring cannot be hosed together as the L-plate will cover the gas charge port of the gas spring.

Important! The K-lugs are only to be used to mount the spring vertically upright.



Spring size	Order No.	C	Ø D	E	Ø F
250 (X 500)	K-250	20	7	7	56.6
500 (X, TX 750)	K-500	25	9	7	70.7
750 (X, TX 1000)	K-750	30	13.5	14	80
X, TX 1500	KX-1500	30	13.5	14	92
1,500 (X,TX 2400)	K-1500	30	13.5	14	104
3,000 (X, TX 4200)	K-3000	40	17.5	14	130
5,000 (X, TX 6600)	K-5000	50	17.5	14	155
7,500 (X, TX 9500)	K-7500	50	21.5	14	195
10,000 (X, TX 20 000)	K-10000	58	21.5	15	240

Surface finish = Black oxide.

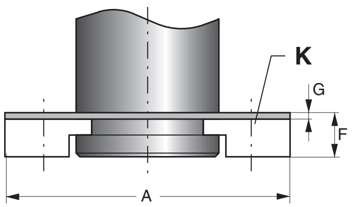
Note:
When ordering K-lugs for X/TX springs, a lug of smaller size than the spring must be used. For example, an X/TX 2400 spring requires lug K-1500.

Screw size	Torque (Nm)*
M6	10-17
M8	25-40
M12	85-136
M16	200-333
M20	390-649

* The torque setting depends on the strength of the screw used!

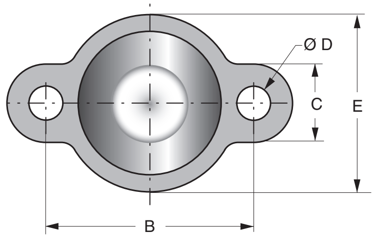
L

When fixing gas springs vertically using 2 K-lugs, locking plate L must be used at the same time to ensure that the spring will be fixed radially.



Order No.	A	B	C	Ø D	E	F	G
L-250	76.6	56.6	20	7	48	9.5	2.5
L-500	95.8	70.7	25	9	56	9.5	2.5
L-750	110	80	30	13	61	16.5	2.5
L-1500	134	104	30	13	86	16.5	2.5
LX-1500	122	92	30	13.5	74	16.5	2.5
L-3000	170	130	40	17	106	16.5	2.5
L-5000	205	155	50	17	131	16.5	2.5
L-7500	245	195	50	21	170	16.5	2.5

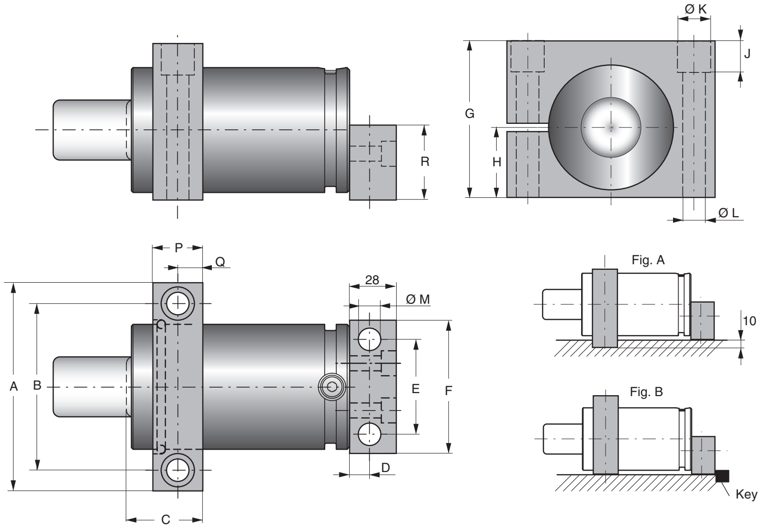
Surface finish = Black oxide.



HM

HM (Horizontal Mount) is a mount for TU 750-3000 springs. This mount meets FORD WD-X35-62-standard. The front support can be rotated 180° allowing it to be mounted in a 10 mm key groove. If the front support is not mounted in a key groove, we recommend that the rear mount is backed up using a key (see Fig. A and B).

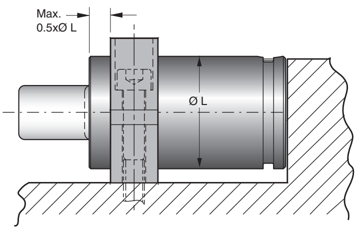
The support is supplied complete with screws for attaching the mount to the spring.

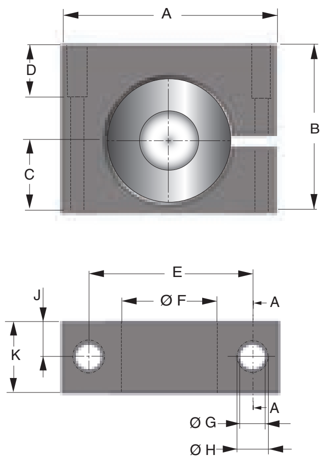


Order No.	A	B	C	D	E	F	G	H	J	Ø K	Ø L	Ø M	P	Q	R
HM-250	74	54	29.5	12	40	60	54	23.9	16	15	9	9	20	10	38
HM-750	90	68	43	13	44	65	70	30	25	18	11	11	30	15	45
HM-1500	125	100	45	12	57	80	94	42	19	20	13.5	13.5	30	15	45
HM-3000	140	115	48	15	70	95	115	52.5	40	20	13.5	13.5	30	15	45

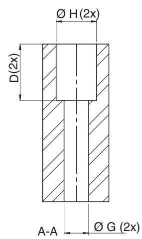
HMF

The HMF mount is a symmetric horizontal body mount similar to the S mount. The HMF mount meets the VDI 3003, Ford WD-X35-62 and GMDS 90.25.455 standard.





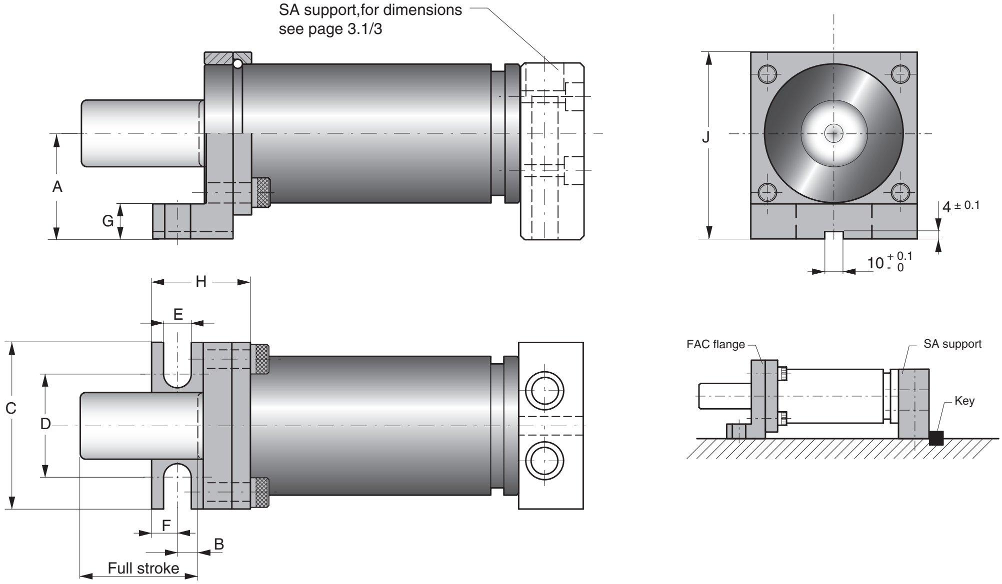
Note! The base of the gas spring must always be supported when using the HMF mount.



Order No.	A	B	C	D	E	Ø F	Ø G	Ø H	J	K	Ø L
HMF-150	68	48	20.9	10	50	32.1	9	15	10	20	31.9
HMF-250	74	54	23.9	16	54	38.1	9	15	10	20	38
HMF-500	80	60	27.5	22	60	45.4	9	15	10	20	45.2
HMF-750	90	70	30	25	68	50.4	11	18	15	30	50.2
HMF-X1500	108	82	36.5	27	84	63.4	11	18	15	30	63.2
HMF-1500	125	94	42	32	100	75.4	13.5	20	15	30	75.2
HMF-3000	140	115	52.5	33	115	95.4	13.5	20	15	30	95.2
HMF-5000	170	140	65	58	145	120.4	13.5	20	15	30	120.2
HMF-7500	200	170	80	68	175	150.4	13.5	20	15	30	150.2

Surface finish = Black oxide.

FAC



The FAC is a 90° angled, 2-piece flange for TU 750 – 5000. The flange is only to be used together with the SA support or any other support that supports the bottom of the spring. It is recommended to back the SA mount with a key, see figure above.

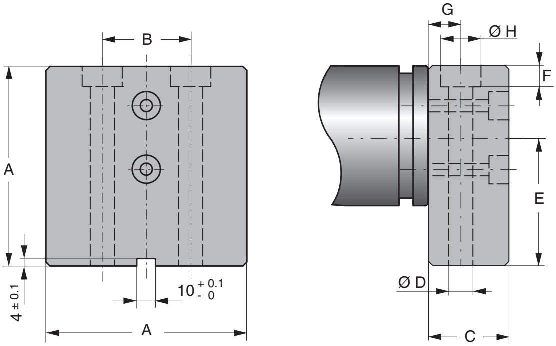
Order No.	A	B	C	D	E	F	G	H	J
FAC-750	38	8	65	33	12	11	13	45.5	70
FAC-1500	57	11	90	37	15	14	19	53.5	101
FAC-3000	66.5	11	110	63	15	14	19	57.5	121
FAC-5000	79	11	140	88	18	14	19	59.5	149

Surface finish = Black oxide.

SA

The SA support can be fitted using the B mount option on TU springs and is normally used together with the FAC flange. The SA support is supplied complete with screws needed to mount the support to the spring.

It is recommended to back the SA mount with a key, see figure above.



Order No.	A	B	C	Ø D	E	F	G	Ø H
SA-750	60	32	30	11.5	38	11	11	18
SA-1500	90	38	35	14.5	57	13	14	20.5
SA-3000	110	63.5	40	14.5	66.5	13	14	20.5
SA-5000	130	88.9	50	17.5	79	16	14	25

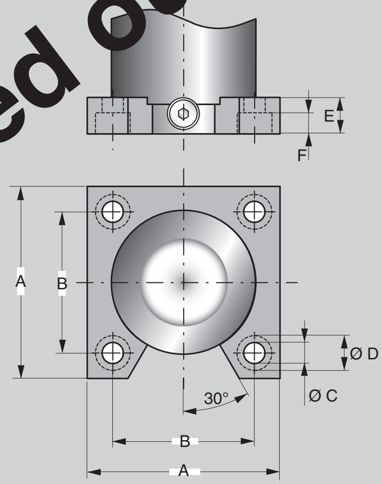
Surface finish = Black oxide.

SW

The SW (Square Welded) is a welded mount for the TU 750 – 7500 springs. This mount must always be ordered together with the gas spring.

For more information about this mount, please contact your distributor.

Being phased out!

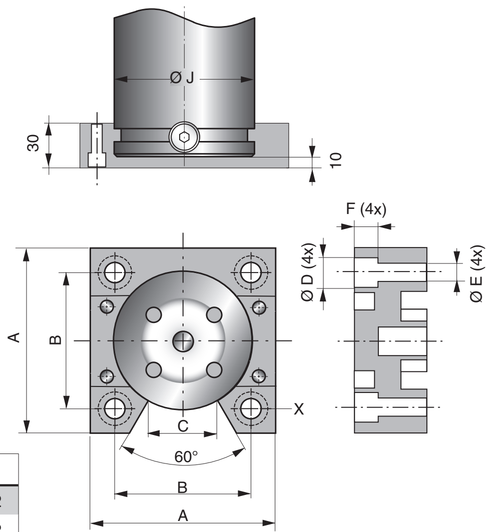


Order No.	A	B	Ø C	Ø D	E	F
SW-750	80	56.5	11	18	19	11
SW-1500	100	73.5	11	18	[illegible]	11
SW-3000	120	92	13.5	[illegible]	[illegible]	13
SW-5000	140	109.5	13.5	20	25	13
SW-7500	190	138	17.5	26	25	17

Surface finish = Black oxide.

RM/RMX

The RM mount is a removable square mount that can be used for mounting onto TU and X springs. The RM mount is an alternative to an SW (Square Welded) mount, making it possible to keep a more flexible inventory of replacement of gas springs and mounts on site. The RM mount is included in the Ford W-DX35-80 North America standard.



Order No.	A	B	C	Ø D	Ø E	F	Ø J
RM-750	80	56.5	21.1	18	11	11	50.2
RM-1500	100	73.5	33.7	18	11	11	75.2
RM-3000	120	92	43.2	20	13.5	13	95.2
RM-5000	140	109.5	55.7	20	13.5	13	102.2
RM-7500	190	138	70.7	26	18	17	150.2

Order No.	A	B	C	Ø D	Ø E	F	Ø J
RMX-750	70	50	21.2	15	9	11	45.2
RMX-1000	80	56.5	21.1	18	11	11	50.2
RMX-1500	100	73.5	33.7	18	11	11	63.2
RMX-2400	100	73.5	33.7	18	11	11	75.2

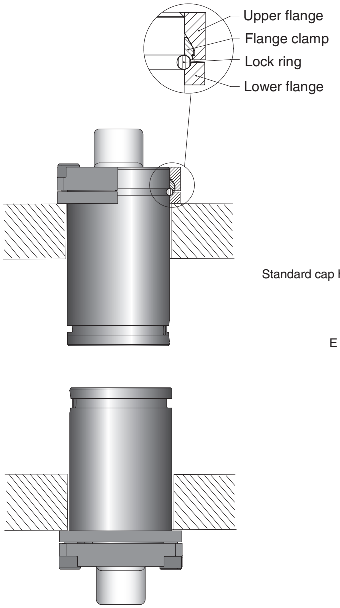
FCSC

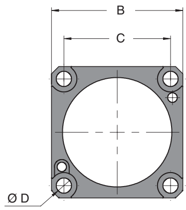
The FCSC Clamp Flange has a unique patented design that offers a very robust play-free connection between the gas spring and the mount. This play-free connection also prevents rotation of the gas spring.

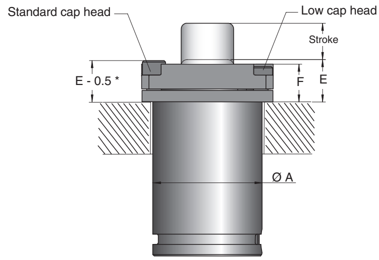
The FCSC Clamp Flange is especially suitable for gas springs that will be hosed together and/or are used in high-speed, long-stroke upside-down installations.

The FCSC Clamp Flange is available for gas springs sizes from 500 up to 7,500.

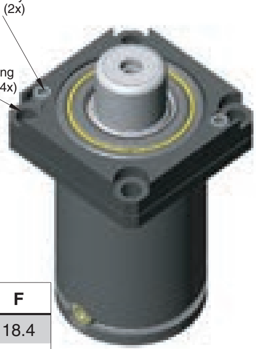
Note: The FCSC and FCS flanges are fully interchangeable if low head cap mounting screws (4x) are used. Using low head cap screws ensures the top of the screw is flush with the top of the flange. If normal head cap screws are used, the top of the screw will protrude from the top of the flange by 3 mm.







Low cap head screws are recommended
* If standard screws are used



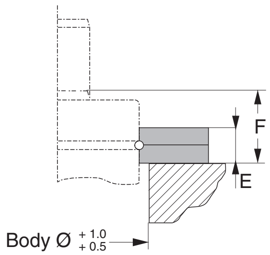
Order No.	Spring size	Ø A	B	C	Ø D	E*	F
FCSC-500	X 750, TU 500, TX 750, K 500	45	64	50	9	23 / 22	18.4
FCSC-750	X 1000, TU 750, TX 1000, K 750	50	70	56.5	9	24 / 22	19.4
FCSCX-1500	CU4 2900, X 1500, TX 1500	63	80	64	10.5	27	23.9
FCSC-1500	X 2400, TU 1500, TX 2400	75	90	73.5	10.5	29	26
FCSC-3000	X 4200, TU 3000, TX 4200	95	110	92	12.5	33	30
FCSC-5000	CU4 11800, X 6600, TU 5000, TX 6600	120	130	109.5	12.5	33/ 36	32.4
FCSC-7500	CU4 18300, X 9500, TU 7500, TX 9500	150	162	138	16.5	38/ 41	38

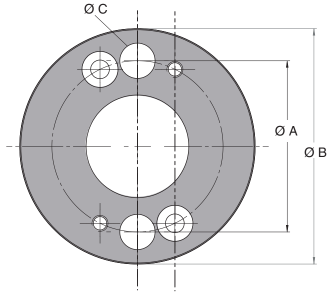
* depending on spring model

Patent No. SE 521 352, EP 1 565 670, US 7,544,008

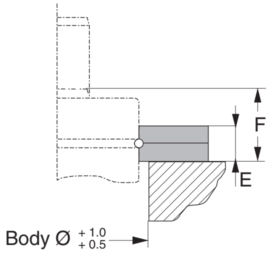
FC

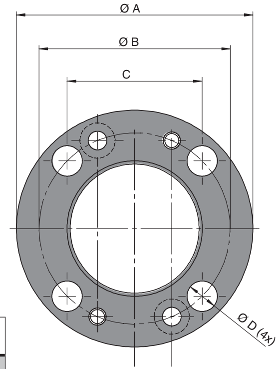
In addition to the standard flanges there is also a round FC flange available for smaller sizes according to below.





Order No.	Spring size	Ø A	Ø B	Ø C	E	F
FC-12	R12	25	36	6.6	9	21.5
FC-15	R15	27	37	6.6	9	21.5
FC-19	R19, X 170	32	44	6.6	9	21.5

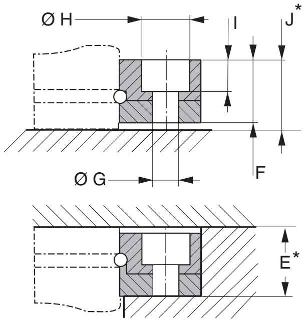


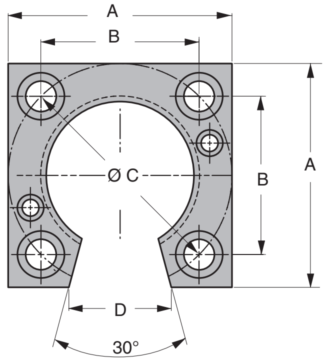


Order No.	Spring size	Ø A	Ø B	C	Ø D	E	F
FCN-150	M2, X 320	56	42	29.7	9	9	21.5
FCN-250	TU 250, X/XG 500	70	56.6	40	9	9	17
XFC-1500	X/XG 1500	105	85	60	11	16	27
XFCJ-1500	X /XG 1500	122	104	73.5	11	16	27

FSL

- The FSL flange type originally was developed to fit gas springs with a lower C-groove and consists of two halves with a lock ring between.
- The FSL flange can be used for both upright and upside-down installations.
- The FSL flange can also be used on gas springs with a lower U-groove by using the additional FSL adapter ring.
- The FSL adapter ring is ordered separately and is to replace the standard lock ring included in the FSL flange.

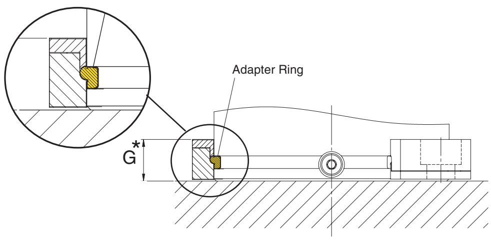




Order No.	Spring size	A	B	Ø C	D	E*	F	Ø G	Ø H	I	J*
FSL-750	TU 750, X 1000	76.2	53.9	76.2	35	25.7	25	11	17	11	25.7
FSLT-1500	X 1500	100	73.5	103.9	49	25.7	25	11	18	10	25.7
FSL-1500	TU 1500, X 2400	101.6	76.2	107.6	49	25.7	25	13	20	13	25.7
FSL-3000	TU 3000, X 4200	127	98.3	139	61	25.7	25	13.5	20	13	25.7
FSL-5000	TU 5000, X 6600	139.7	114.3	161.8	71	25.7	25	13.5	20	13	25.7
FSL-7500	TU 7500, X 9500	177.8	139.7	197.8	88	25.7	25	18	26	17	25.7

* approximate value

Important! FSL-Adapter Ring location
The location of the FSL-Adapter Ring should always be the same regardless of the orientation of the installed gas spring (standing upright or upside-down). Only the flange halves change position.

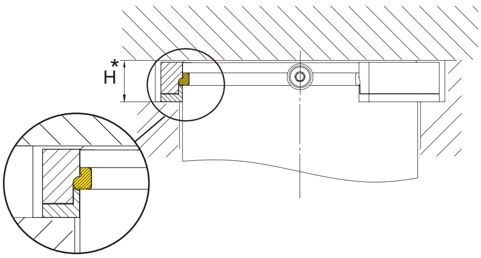


Please note! It is normal for the thin section to break when the ring is repetively opened and closed. This will not cause a problem if the ring is in its correct orientation.

Important! Avoid compressive loads being transferred through to mounting screws (use shims or machine the tool if necessary)

Order No.	FSL Adapter Ring size	Spring Size	G*	H*
3020946	750	TU 750, X 1000	26	26
3027144	X 1500	X 1500	25.8	25.4
3020947	1500	TU 1500, X 2400	26	25.9
3020948	3000	TU 3000, X 4200	26	25.9
3020949	5000	TU 5000, X 6600	26	25.9
3020950	7500	TU 7500, X 9500	26.6	26.4

* approximate value

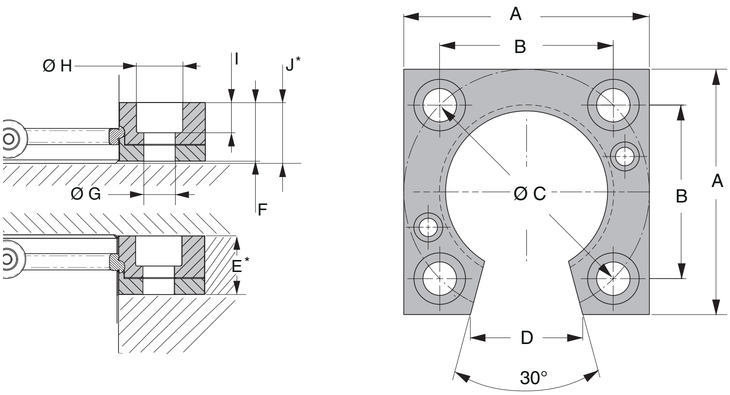


Important! Avoid compressive loads being transferred through to mounting screws (use shims or machine the tool if necessary)

FSS

The FSS mount is of the same type as the FSL mount, but with external dimensions and hole pattern as the FFC mount. The FSS mount fits on gas springs with a lower U-groove. The FSL adapter ring is included in the FSS mount and does not need to be ordered separately. The FSS mount can be used for both upright and upside down installation.

The FSS mount meets the Subaru standard SD116401.



Order No.	Spring size	A	B	Ø C	D	E*	F	Ø G	Ø H	I	J*
FSS-750	TU 750, X/XG 1000	75	56.5	80	35	26	25.5	9	15	10.5	26
FSS-1500	TU 1500, X/XG 2400	100	73.5	104	49	26	25.9	11	18	13	26
FSS-3000	TU 3000, X/XG 4200	120	92	130	61	26	25.9	13.5	20	13	26
FSS-5000	TU 5000, X/XG 6600	140	109.5	155	71	26	25.9	13.5	20	13	26
FSS-7500	TU 7500, X 9500	190	138	195.2	88	26.4	26.2	18	26	16	26.6

* approximate value

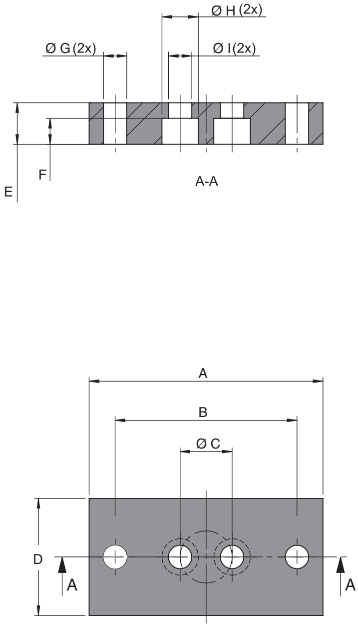
Important! FSS-Adapter Ring location
The location of the FSS-Adapter Ring should always be the same regardless of the orientation of the installed gas spring (standing upright or upside-down). Only the flange halves change position.

Please note! It is normal for the thin section to break when the ring is repetively opened and closed. This will not cause a problem if the ring is in its correct orientation.

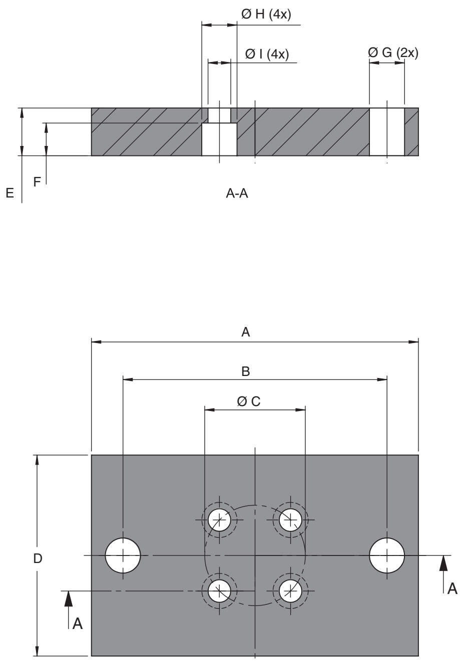
Important! Avoid compressive loads being transferred through to mounting screws (use shims or machine the tool if necessary)

NMP

The NMP mount is a base mount, which meets the Nissan standard K32P0



NMP-750 and NMP-1000

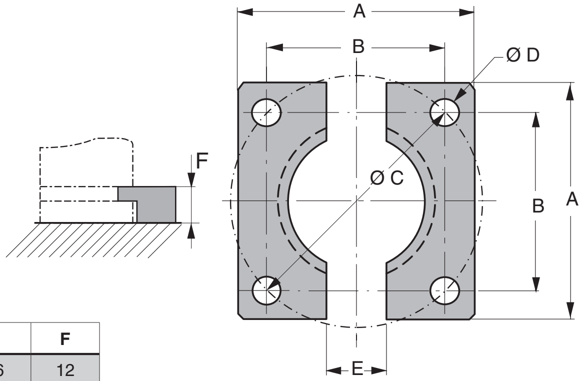


NMP-2400 and NMP-4200

Order No.	Spring size	A	B	Ø C	D	E	F	Ø G	Ø H	Ø I
NMP-750	XG 750	90	70	20	45	16	10	9	14	9
NMP-1000	XG 1000	100	75	20	50	19	13	14	14	9
NMP-2400	XG 2400	130	105	40	80	19	13	14	14	9
NMP-4200	XG 4200	150	125	60	100	19	13	14	14	9

FFL

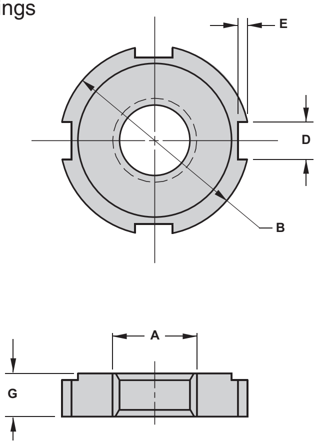
The FFL mount is of the same type as the FFC mount, but with external dimensions and hole pattern as the FSL mount.

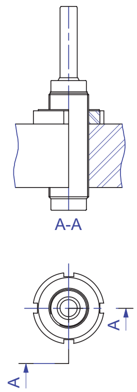


Order No.	A	B	Ø C	D	E	F
FFL-750	76.2	53.9	76.2	11	26	12
FFL-1500	101.6	76.2	107.8	13.5	26	12
FFL-3000	127	98.3	139	13.5	24	12
FFL-5000	139.7	114.3	161.7	13.5	24	12
FFL-7500	177.8	139.7	197.6	18	24	12

FRM

FRM is a slotted round lock nut, which meets the GM standard 90.25.99. The FRM lock nut is to be used on gas springs with an outer thread on the tube.





Order No.	A	Ø B	D	E	G
FRM-16	M16 x 1.5	32	5	2	7
FRM-19	M24 x 1.5	42	6	2.5	9

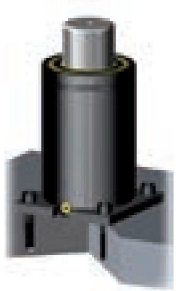
KALLER gas springs are engineered for use in modern day, metal stamping dies and plastic moulding tools. Over the years, KALLER has developed a wide range of mounting methods for the gas springs. The following is intended as a reminder of the correct procedure when using these various mounting methods.

Mounting method overview

Generally speaking, KALLER gas spring cylinders are machined with two external grooves. The C-groove being located towards the cylinder opening and a U-groove or second C-groove located just above its base. These grooves allow various flange mounts to be attached. It is then the flange mount that is clamped to the tool using mounting screws of a suitable length, property class and torque setting (see next page for more details). Only use mounts manufactured or approved by KALLER.

Drop-In
The gas spring is dropped into a flat bottomed pocket within the die.

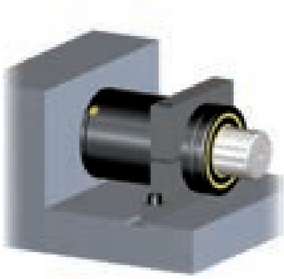
Base mount
The gas spring's base threaded holes are used to mount the gas spring directly to the tool or indirectly via a base mounting plate.



Foot mount
A flange mount is used to clamp the base of the gas spring to the tool using the gas spring's lower U or C groove.

Top mount
A flange mount is first attached to the gas spring's upper C-groove before being mounted into a hole in the die.

Thread mount
A section of the gas spring's cylinder, which has an external thread (either cylinder body or base stud), is used to install the gas spring in the die. In some cases with an additional lock nut or flange mount.



Body mount
The body mounts are attached to the gas spring to allow it to be installed in any orientation within the die, from vertically upright through to vertically upside down.

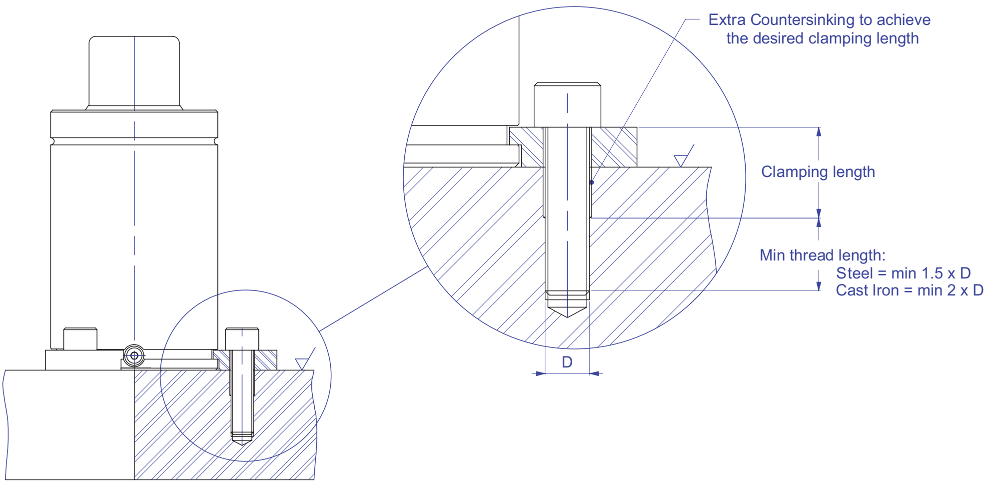
Mounting screws

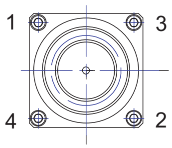
When mounting the gas spring directly to the tool or via a flange mount, it is important to observe the following recommendations in order to prevent the gas spring or its mounting accessories from working loose into the tool.

Recommendations:
Screws should have a free length (clamping length) of 2 to 4 times their thread diameter and a thread depth of at least 1.5 times their thread diameter in steel and 2 times their thread diameter in cast iron If the free length cannot be achieved in any other way, the screw holes should be countersunk (see below). Please note that the specifications in automative standards may differ. Always use a torque wrench to apply the appropriate torque for the class of screws used.

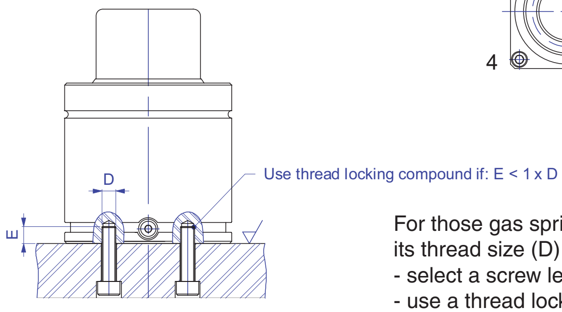
Thread	Torque (for screw class 8.8 according to ISO 898-1)
M6	10 Nm
M8	24 Nm
M10	45 Nm
M12	80 Nm
M16	160-200 Nm

For all types of flange mounting using mounting screws:





When tightening the mounting screws in the tool, apply an evenly cross like pattern according to the picture (1-2-3-4). Otherwise there is a risk for the mount to tilt.



For example: X 2400

For those gas springs whose thread depth (E) is less than 1 times its thread size (D) we recommend the following:
- select a screw length to engage all available thread depth
- use a thread locking compound (middle strength or higher)
- ensure the correct screw torque setting is applied

Mounting method: Drop-In

For stroke lengths < 25 mm: base threaded holes are optional for stroke lengths up to and including 25 mm.

For stroke lengths > 25 mm: base threaded holes should always be used for longer stroke lengths to prevent possible side loads and/or gas spring movement within the pocket.

Gas spring orientations: only vertically upright installations are recommended (see ***Warning!***).

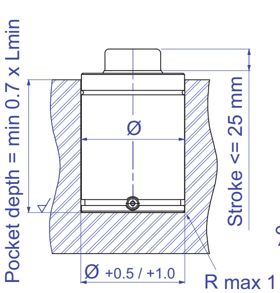
Hole depth: min 70% of the spring's Lmin length to ensure sufficient support and reduce the risk of side loading.

Hole diameter: +0.5 to +1.0 mm greater than the gas spring's cylinder diameter.

Hole drainage: recommended wherever drawing fluids and/or liquid coolants are used in the die.

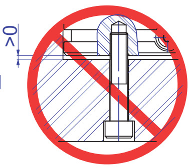
Link systems: Not recommended for stroke lengths < 25 mm.

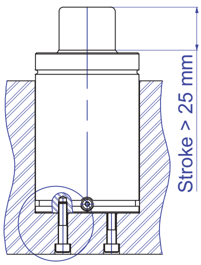
Warning! Never drop a gas spring into a pocket upside down as this may lead to excessive wear on the outside of the tube.



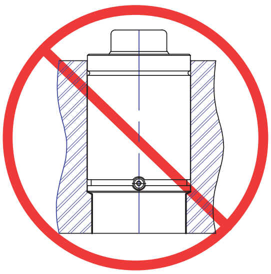
Always observe pocket dimension recommendations

Use correct screw length

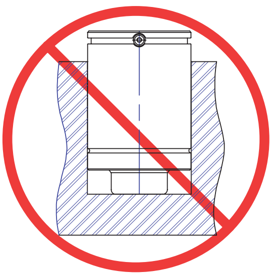




Use Drop-In and Base Thread: B together for longer stroke lengths

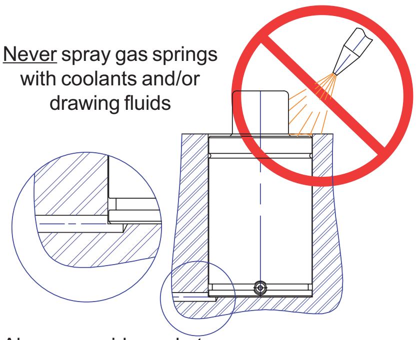


Never mount a gas spring in a pocket that does not fully support its base



Never mount a gas spring in a pocket upside down

Never spray gas springs with coolants and/or drawing fluids



Always provide pocket drainage if coolants are used in the die

Mounting method: Base Mount (B, MP, MPX)

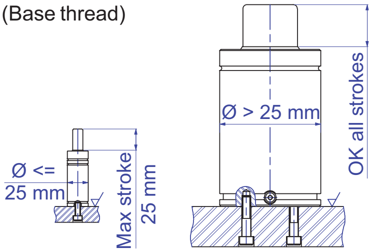
Stroke length suitabilty:
For cylinder diameters < Ø25 = Max stroke 25 mm
For cylinder diameters > Ø25 = OK for all stroke lengths

Gas spring orientations: Vertically upright - OK for all stroke lengths
Vertically upside down - OK up to stroke 125 mm*

Link systems: this mounting method is very suitable for gas link systems

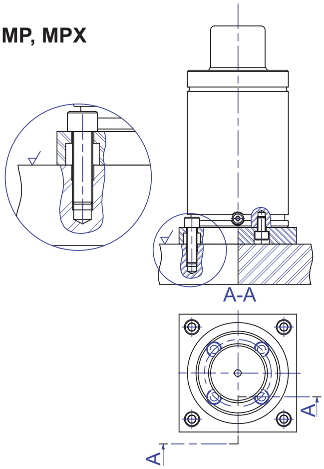
*For thread depths less than 1 times its thread size use a screw length that engages all thread depth, use a thread locking compound (middle strength or higher) and apply correct screw torque setting

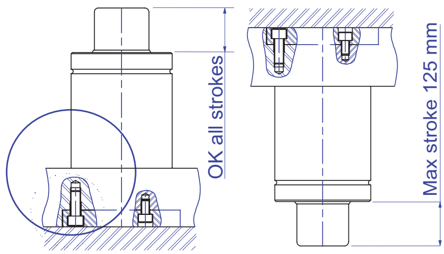
For: B (Base thread)

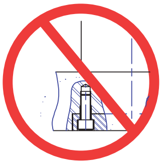


If the gas spring has only a single base threaded hole, then the max stroke length for this mounting method should not exceed 25 mm

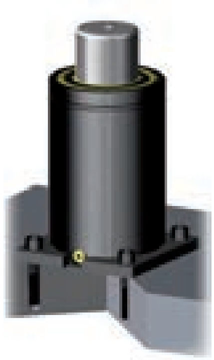
For: MP, MPX







Always support the mount to avoid compression forces being transferred through to the mounting screws.



Mounting method:
Foot mount (BF, FCR, FFC, FFX, FSL, RM)

Gas spring orientations:

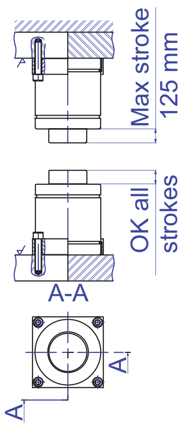
Vertically upright = OK for all stroke lengths
Vertically upside down = OK up to 125 mm stroke (see ***Warning!*** below)

Link systems: this mounting method is generally suitable for gas link systems, with the exception of the BF, FCR and FSL flange mounts that do not fully prevent rotation of the gas spring.

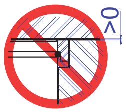
Note! A small gap between Foot Mount and mounting surface is normal before the gas spring is clamped to the die using the mounting screws.

Warning! K Foot Mounts are not recommended for vertically upside down installations. Wherever possible, vertically upside down installations using Foot Mounts should be used in combination with base threaded holes to prevent gas spring rotation within the flange and to provide additional security.

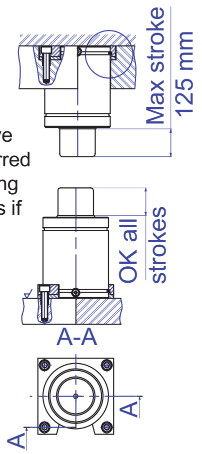
For: BF, FCR



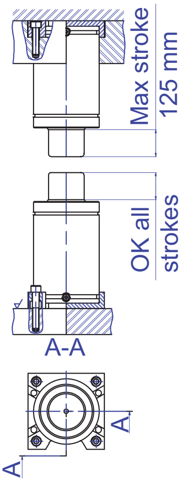
For: FSL



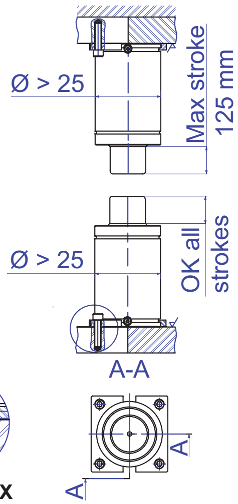
Avoid compressive loads being transferred through to mounting screws (use shims if neccessary)

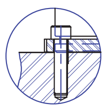


For: RM



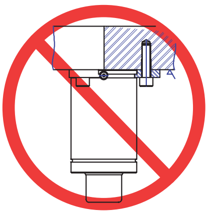
For: FFC, FFX



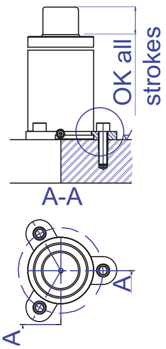


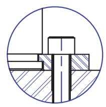
FFC, FFX

For: K



Do <u>not</u> mount upside down using K lugs





K

Mounting method:
Top mount (FC, FCS, FCX, FK, FCSC, FCR, FCSX)

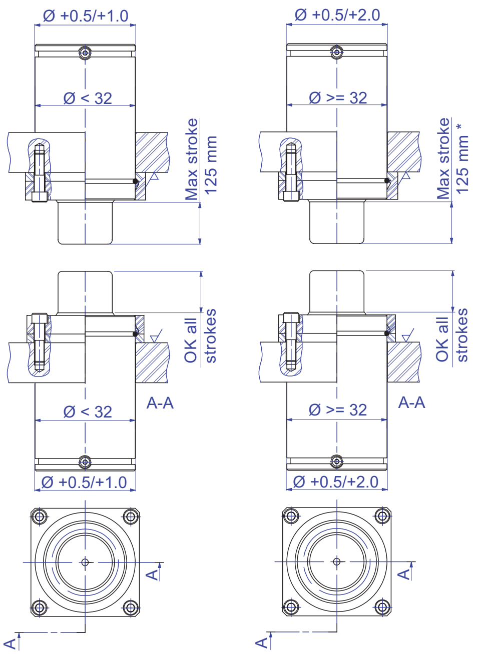
Gas spring orientations:
Vertically upright = OK for all stroke lengths
Vertically upside down = OK up to 125 mm stroke (see ***Warning!*** below)

Cylinder hole clearance for cylinder diameters < Ø32
hole Ø = cylinder Ø + 0.5 to 1.0 mm
Cylinder hole clearance for cylinder diameters > Ø32
hole Ø = cylinder Ø + 0.5 to 2.0 mm
Link systems: FCSC is the preferred flange mount for linked systems as the gas spring is unable to rotate in the flange (see Note below).

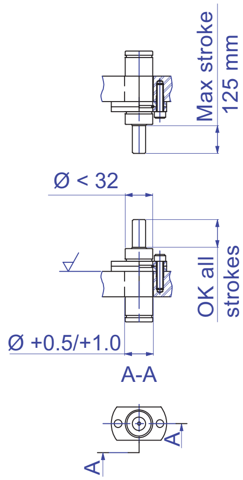
Note! A small gap between flange halves is normal before the gas spring is clamped to the die using the mounting screws. Recent tolerance improvements between gas spring C-grooves and Top Mounts has, in some cases, eliminated the tendency for the gas spring to rotate within the flange. This now makes them more suitable for Link systems.

Warning! Depending on the stroke speed of the press, longer stroke gas springs are not generally recommended for upside down installations unless the FCSC flange mount is used. Top Mounts must never be installed in the die, whereby the mounting screws are required to support the full compression force of the gas spring when stroked (see below).

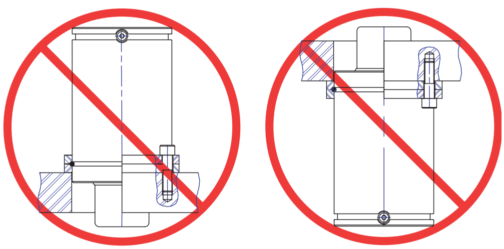
For: FC, FCS, FCX, FK, FCSC, FCSX



For: FCR

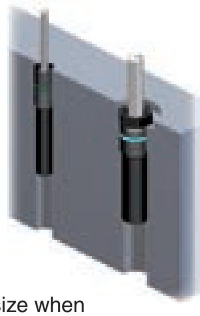


For: all Top mounts



Never let the mounting screws support gas spring compression forces

*** Note:** for the FCSC flange, upside down installation is OK for all stroke lengths



Mounting method:
Thread mount (including FRM, FTM)

Gas spring orientations:

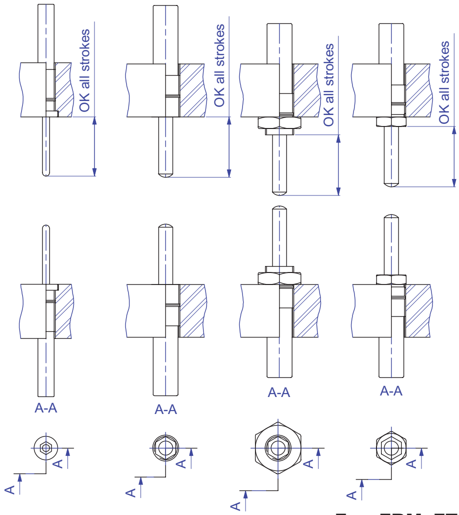
Vertically upright = OK for all stroke lengths
Vertically upside down = OK for all stroke lengths

Link systems: it is possible to link thread mounted gas springs if there is sufficient access to the spring's charge port.

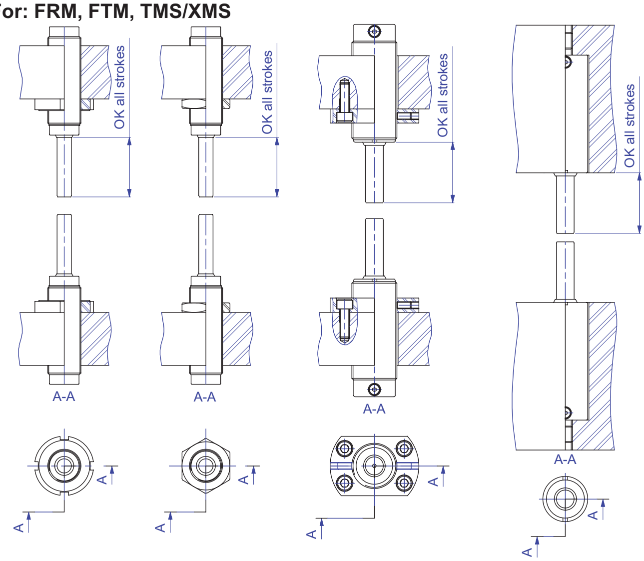
Note! It is important to always use the appropriate torque setting for the springs thread size when mounting the spring to the tool in order to prevent tool vibrations working the spring loose.

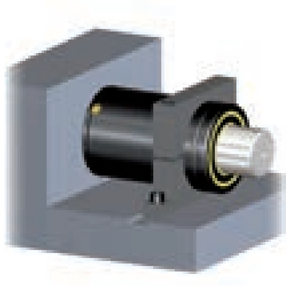
Use a dismountable thread locking compound and ensure that the compound do not touch the piston rod.

For: EP, EPS



For: FRM, FTM, TMS/XMS





Mounting method:
Body mount (S, SM, HM, FAC, SA, HMF)

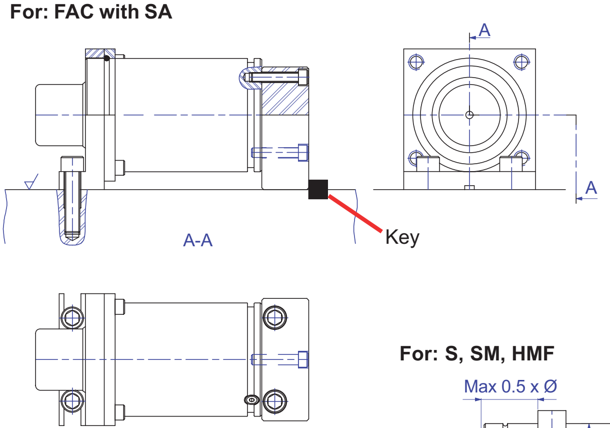
Gas spring orientations: suitable for all stroke lengths and all gas spring orientations from vertically upright through to upside down (see ***Warning!*** below).

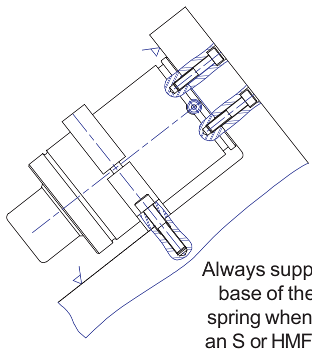
Key grooves: Key-grooves should be used to either recess the Body Mount or to back up the Body Mount with an additional key, thus preventing gas spring compression forces exerting a shear stress on the mounting screws.

Link systems: this mounting method is very suitable for gas link systems, since the gas spring is unable to rotate.

Warning!
Always ensure the gas spring sits parallel with its mounting surface to minimise the risk of side loading.

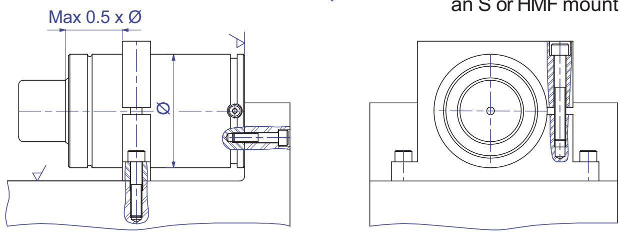
For: FAC with SA



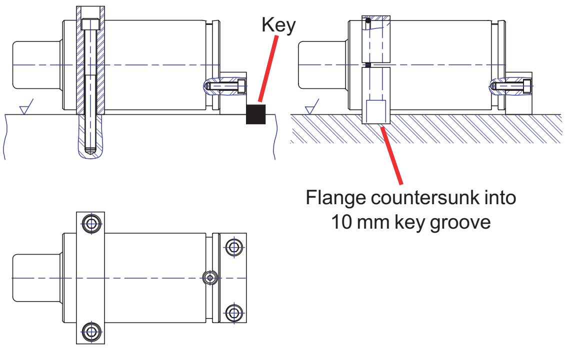


Always support the base of the gas spring when using an S or HMF mount

For: S, SM, HMF



For: HM, HMF



Product Series
Gas Link Systems

KALLER®
The Safer Choice

Gas Link Systems

Edition 15.2016

Would you like to order this product?
All available information at www.kaller.com.

Linking System Selection

Port — Gas Springs with M6 ports

Gas flow — Low gas flow | Low gas flow

System — **Micro EO24**

Needs — Flexible and easy installation | Compact and robust

Type — Hose: Ordered in custom lengths | Tube: Ordered in lengths of one meter for individual adaptation.

Dual Seal™

Dual Seal™

Linking System Selection

Gas Springs with G1/8” ports

Low gas flow

High gas flow

EZ Hose

EO24

Flexible and easy installation

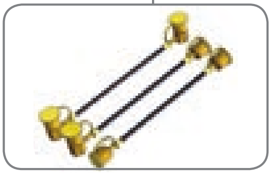
Flexible and easy installation

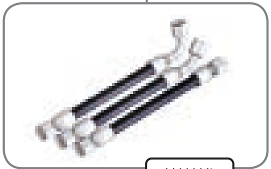
Compact and robust

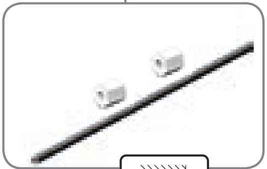
Hose

Hose
Ordered in custom lengths

Tube
Ordered in lengths of one meter for individual adaptation







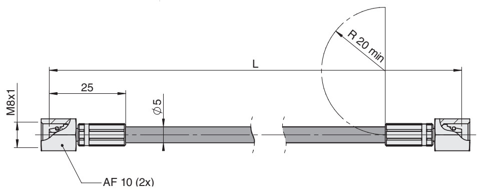
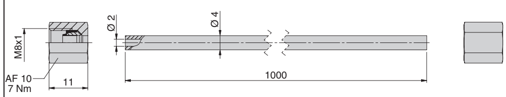
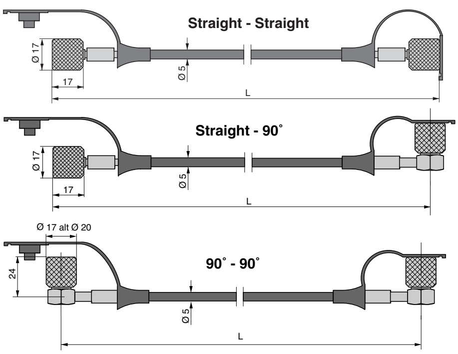
General Information

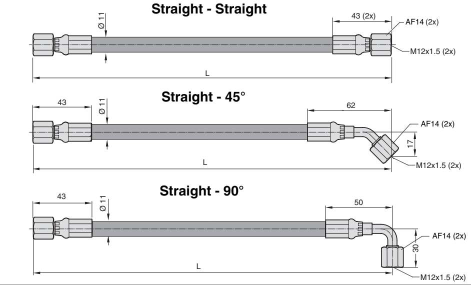
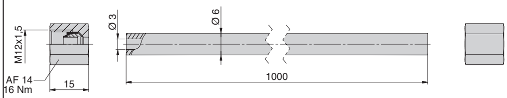
Connecting one or more gas springs to form a Link System with a common gas pressure may often be advantageous from a press technique and/or safety perspective.

Gas springs when connected in a Link System to a single Control Block can be easily charged and discharged without needing to open the press tool and remove the individual gas springs. The system pressure can also be remotely monitored and if need be, easily adjusted via the Quick Release Coupling and Discharge Valve.

KALLER offers three different Systems for linking gas springs, namely the **Micro EO24™** Hose and Tube system, **EZ Hose** and **EO24-Hose** systems. **Please note:** Micro-Hose system has now been replaced by the Micro EO24™ Hose and Tube system. Please contact your local distributor for more details.

KALLER has carefully selected all hoses, couplings and other component parts to ensure that they fully comply with the highest requirement standards. The various components have been subjected to rigorous testing, including endurance tests, static leakage tests and performance tests.

Gas Link System	Description	
Micro EO24™ Hose and Tube System Dual Seal™		The Micro EO24™ is a combined hose and tube system where the Hose System is a Dual Seal System and our most compact hose system, specially designed to allow gas springs with M6 charge ports to be linked together. Please note: Can also be used with G 1/8” charge ports via an adapter. Not interchangeable with old Micro-Hose System.
		The Micro EO24™ Tube is a system where all connections are soft sealed and self-crimping. This ensures leak-proof tube joints. The tubes are easily cut into correct lengths and can be bent into the desired radius with a tube bending tool or even by hand.
EZ Hose		The EZ Hose System is based on components that have couplings with O-ring seals, which allow hoses to be attached using only finger strength. The EZ Hose system is a well-proven, robust system that for many years has been the standard used in the French automotive industry.

Gas Link System	Description	
EO24-Hose and Tube System		The EO24 system is mainly for larger gas springs with G 1/8” ports. The EO24 hose is recommended whenever high gas flows are required, for example when using the Passive Spring KP in a Controllable Gas Spring system.
Dual Seal™		When using larger gas springs with G1/8” ports for the need of higher gas flow, we recommend use of the EO24 system where all connections are soft sealed and self-crimping. This ensures leak-proof tube joints. The tubes are easily cut into correct lengths and can be bent into the desired radius with a tube bending tool.

About Control Blocks

KALLER offers a wide range of Control Blocks for gas pressure monitoring and adjustment.
(For more information, please see page 13.1.)

About Hose Crimping equipment

KALLER offers all the necessary equipment to create your Hose System by press fitting hoses to couplings.
(For more information, please see Hose Crimping equipment, page 17.10.)

CAUTION!
Do not modify the product in any way.
For more information on hosed/linked systems, please contact Strömsholmen (www.kaller.com) or your local KALLER distributor.

General precautions

For reasons of performance and safety, when designing a Hose System it is important the following points are considered:

- When one or more gas springs are connected to a hosed/linked system, the discharge valve in each spring must first be removed.
- Position the Control Block in the tool where it will be protected from mechanical damage and on a level higher than the gas springs in the system to minimize the loss of lubrication oil when discharging the gas.
- Use only nitrogen (N_2) gas. The use of other gas types could result in personal injury or failure of the gas spring/Control Block.
- Never exceed the maximum gas charging pressure, which is marked on the side of the gas spring tube.
- Generally, the maximum charging pressure at 20°C is 150 bar for standard press tool gas springs.
- All the valves on the Control Block should be closed during operation.
- All gas springs that are hosed/linked together should be of the same size and type.
- To avoid gas leakage, use only components that have been tested by KALLER.
- **Do not use Control Blocks that are fitted with a Rupture Screw for gas springs with a charging pressure of 180 bar at 20°C or higher**.

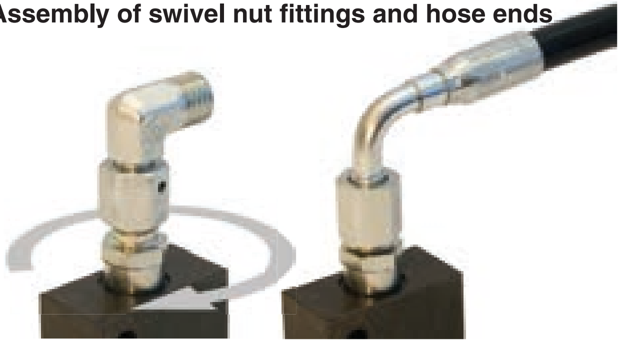
Fitting assembly guidelines EO24 and Micro EO24™

Assembly of straight port connections, two-, three- and four-way adapters and port plugs

1. Screw until hand-tight

2. Then tighten wrench-tight (if possible apply a torque according to next page)

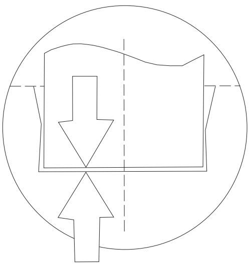
Assembly of swivel nut fittings and hose ends



1. Screw on nut until the O-ring is fully compressed (hand-tight)

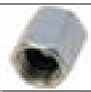
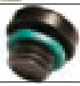
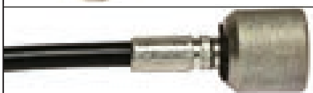
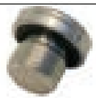
2. Then tighten until sharp increase of resistance, ¼ to ½ turn (if possible use a torque according to next page)

Assembly of steel Functional nut 504589/504047 (see also page 14.4 or page 16.4 for more information)



1. Press tube end firmly into the assembly cone

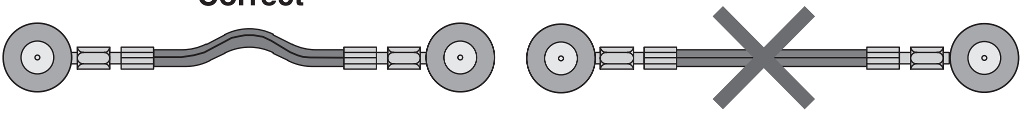
2. Then tighten until sharp increase of resistance, approximately 1 turn (if possible apply a torque according to next page)

Component		Thread Size	Nominal Torque (Nm)
	Micro EO24 Port adapters	M6	7
	Micro EO24 Hose end	M8	7
	Micro EO24 Functional nut	M8	7
	Port plug	M6	2
	EO24/EZ Port adapters	G1/8”	18
		G1/4”	35
	EO24 Functional nut	M12	16
	EO24 Swivel nut fitting	M12	16
	EO24 Hose end	M12	16
	EZ Hose end	S12,65x1.5	Hand-tight
	Port plug	G1/8”	13
		G1/4”	30
	Valve	M6	1
	Valve	Vg5	0.5

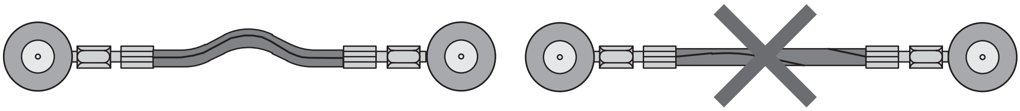
Hose installation guidelines

Never exceed the maximum values given for pressure and temperature for the hoses. Make sure all hoses and couplings are perfectly clean before fitting.

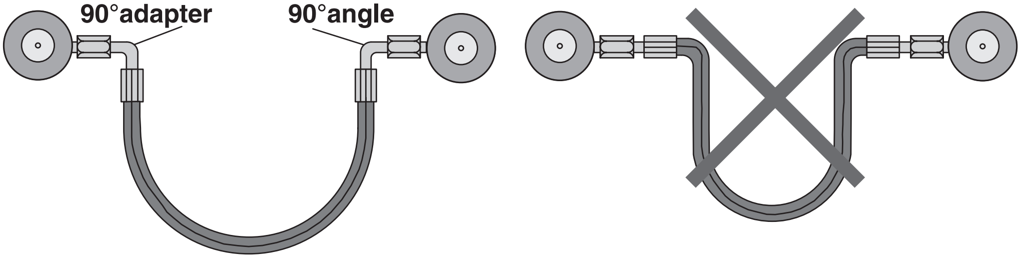
Correct **Incorrect**



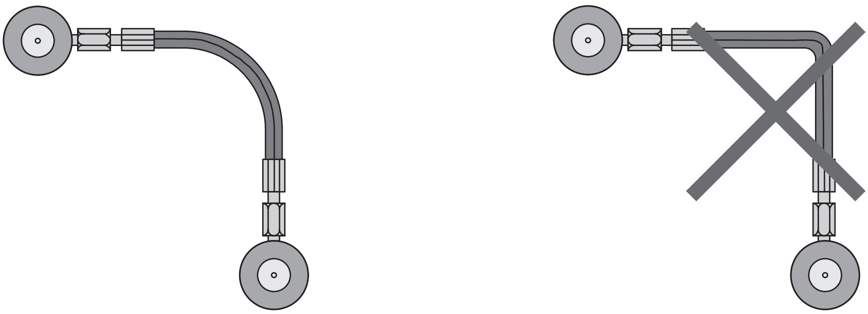
Select a hose length that will allow for a certain amount of play.



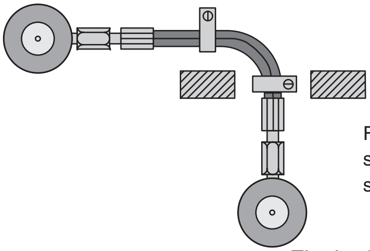
The longitudinal marking on the hose must not be twisted after fitting.



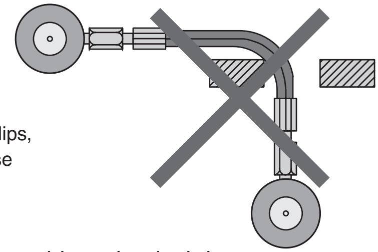
Select hose couplings that avoid sharp bends in the hose.



Never go below the recommended minimum bend radius of the hose.



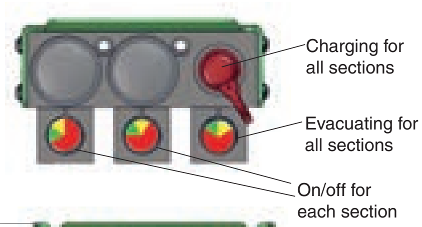
For recommended clips, see the relevant Hose system section.

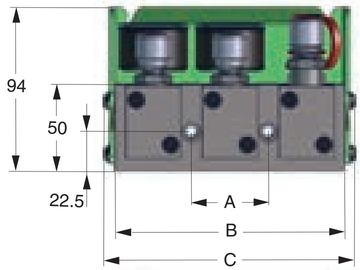


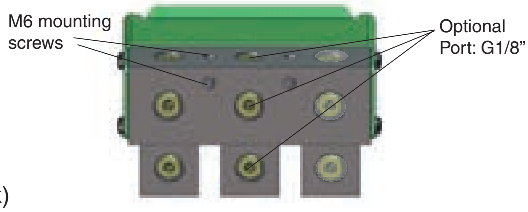
Fix the hose correctly to avoid mechanical damage.

Multi Control Block, MCB

Order No.
2022677-XX







MCB block with two sections.

The new section control block MCB (Multi Control Block) allows the operator to set and check gas pressure in each hose system independently. MCB has a compact design solution which makes it more secure and cost efficient. It is manufactured in steel.
The blocks are available in 2, 4, 5 and 8 modular sections. Each section is provided with three threaded connections (G1/8") for the optional hose connection.
The connection type for the inlet gas is a quick release coupling.

Basic information

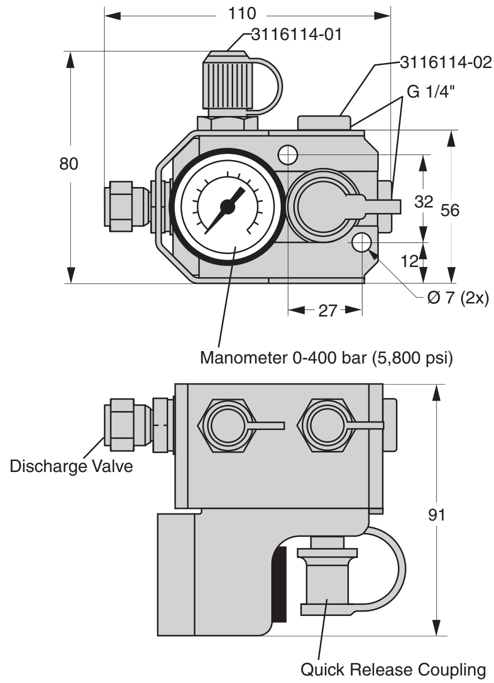
Pressure medium .... Nitrogen
Max. charging pressure .... 180 bar
Min. charging pressure .... 25 bar
Connections G1/8

The MCB block is replacing the previous Section Control Block

Order No.	Model	A	B	C	Weight (kg)
2022677-02	MCB with 2 sections	45	134	146	4.0
2022677-03	MCB with 3 sections	89	178	191	5.4
2022677-04	MCB with 4 sections	134	223	235	6.8
2022677-05	MCB with 5 sections	178	267	280	8.1
2022677-06	MCB with 6 sections	223	312	324	9.5
2022677-08	MCB with 8 sections	312	401	413	12.3
2022677-10	MCB with 10 sections	401	490	502	15.4

Control Block

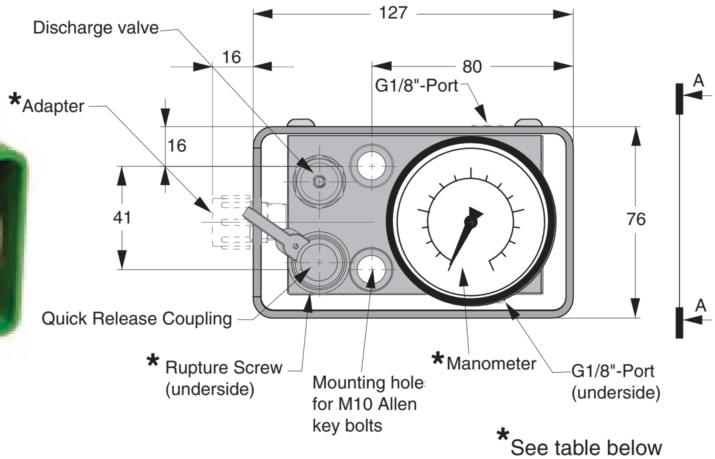
Order No.
3116114-01 (with 2 pcs EZ Hose G1/4" adapters)
3116114-02 (with all ports plugged)



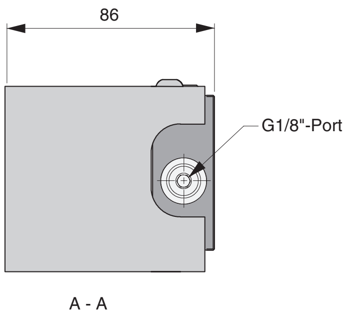
The 3116114 Control Block is a very compact aluminum block with protective stainless steel cover that complies with the CNOMO standard.
This block is intended for continuous monitoring of the gas pressure in the Hose System.
It is fitted with a manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging and a Discharge Valve for gas evacuation.
The block has three G1/4" connection ports, one of which can be used to connect a Pressure Relief Safety Screw or a Pressure Switch.

Control Block

Order No. 4017241



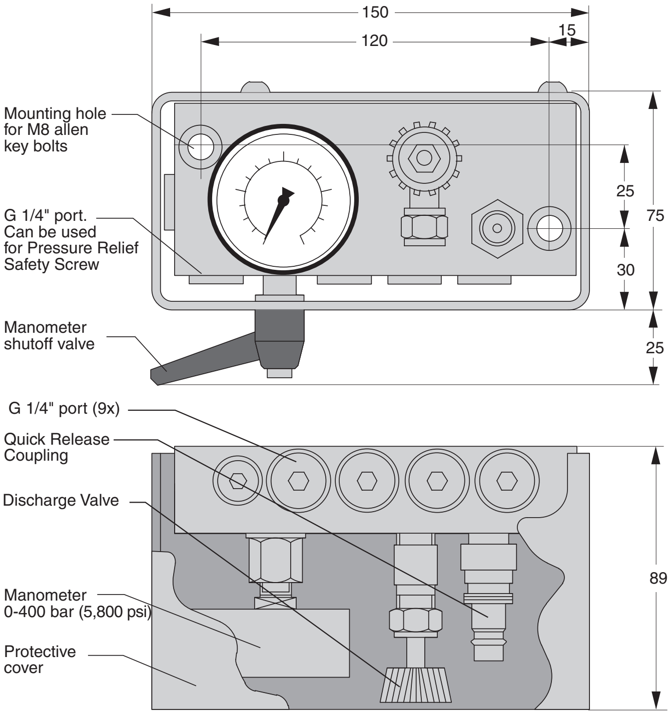
The 4017241 Control Block is a compact aluminum block with protective steel cover that complies with different die standards. See below.
This block is intended for continuous monitoring of the gas pressure in the Hose Linked System. It is fitted with a KALLER manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging, a Discharge Valve for gas evacuation.
The block has five G1/8” connection ports. It can also be used with different manometers, rupture screw for overpressure protection or EO and EZ-Hose or 9/16”-18 UNF O-ring faced sealed systems. Can be configured according to below table.



Order No.	Model	Manometer Scale	Adapter	Rupture screw
4017241	Control block with KALLER manometer CP-100	bar 0-400	9/16”-18 UNF	Yes
4117241	Control block with manometer CP-100	bar / psi 0-400	9/16”-18 UNF	Yes
4217241	Control block with KALLER manometer CP-100	bar 0-400	No	Yes
4317241	Control block with manometer CP-100	bar / psi 0-400	EZ-Hose	Yes
4417241	Control block with manometer CP-100	bar / Mpa 0-400	9/16”-18 UNF	Yes
4717241	Control block with high pressure manometer	bar / psi 0-600	No	No

Control Block

Order No. 2014325



The 2014325 Control Block is a compact aluminum block with protective steel cover and a manometer shutoff valve.

This block is intended for continuous monitoring of the gas pressure in the Hose System when the manometer shutoff valve is open. The shutoff valve can subsequently be closed in order to protect the manometer from pressure pulsations during operation, thus extending its service life.

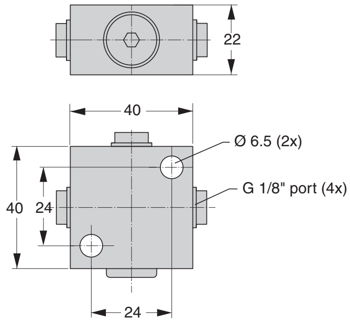
The Control Block is fitted with a manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging and a Discharge Valve for gas evacuation.

The block has nine G1/4” connection ports, four on the top, four on the bottom and one on the right-hand side.

Multi-Coupling Blocks

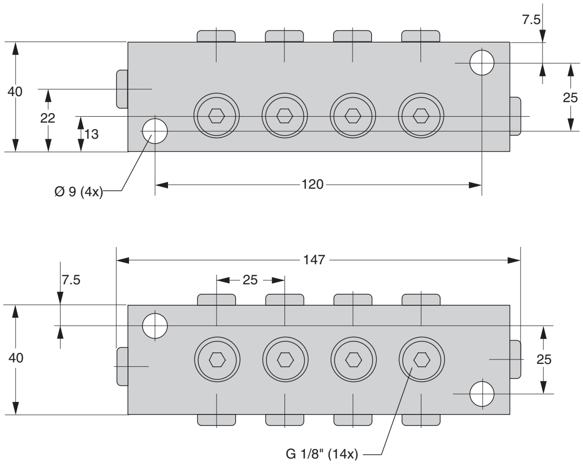
Order No. 4017032

This is a small and compact block for linking hoses. The block has four G1/8” connection ports.
On delivery, one of the ports is fitted with a sealing plug, while the other three ports are fitted with plastic protective covers only.



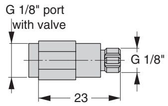
Order No. 3015044

The Multi-Coupling Block 3015044 is manufactured in steel and has fourteen G1/8” connection ports.
On delivery, all ports are fitted with sealing plugs.



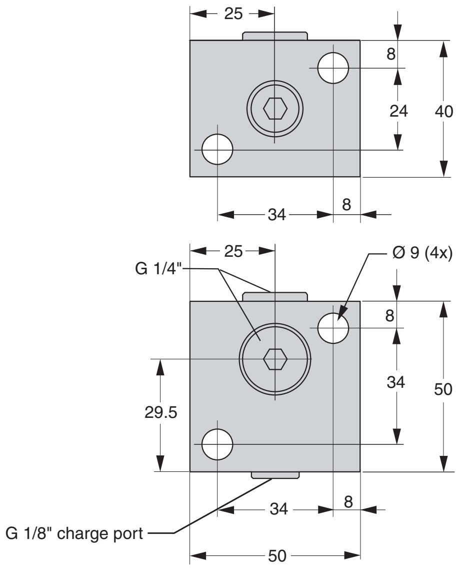
Order No. 3015303-01

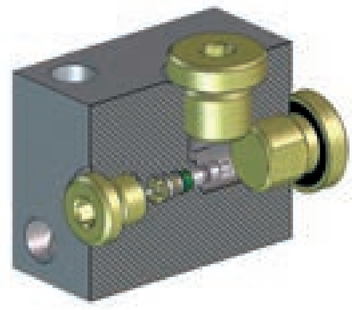
This Valve Adapter is available as an accessory and can be fitted to one of the G1/8” connection ports. The adapter has the same G1/8” valve port as found on standard gas springs. The Multi-Coupling Block can then be used as a charging block to enable gas charging and evacuation using gas spring charging equipment.



Charging Block

Order No. 3014206





The 3014206 Charging Block comes with two G1/4" connection ports and a G1/8" charge port, identical to that found on standard gas springs.
The G1/8" charge port allows gas charging of the Hose System using the gas spring charging armature.

The Charging Block can also be used as a connection block if the valve is removed.

One of the G1/4" connection ports can also be used to connect a Pressure Relief Safety Screw or a Pressure Switch.

Pressure Switch

The Pressure Switch is ideal for gas pressure control and monitoring in hosed/linked systems and can be connected to both control blocks and distribution blocks that have G1/4” connection ports.
If there is no G1/4 port available in the existing hose/tube system, an additional connection block (3022143) with suitable hose/tube has to be connected.
The Pressure Switch contains two separate set-points:
S1 - Normally Open (NO)
S2 - Normally Closed (NC)
These set-points can be easily adjusted to either make or break an electrical circuit if the system pressure should drop below or rise above the set trigger pressures.

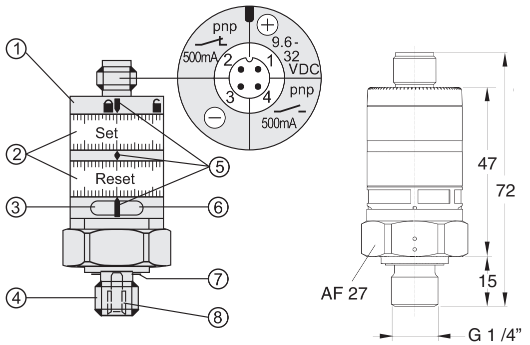
For example:
If S1 is set to 100 bar and S2 is set to 200 bar, then S1 will make a circuit connection if the system pressure falls below 100 bar. S2 will break a circuit connection if the system pressure rises above 200 bar. The set-points can be used simultaneously or individually depending what system pressures require monitoring.

Electronic Pressure Switch

Order No. 504320

The electronic pressure switch has a very compact construction and allows for the control and monitoring of two pressure limits. It is recommended to use this switch when it is necessary to stop the process if the pressure in the gas spring is lower or higher than the decided values.

Note! The unit must be connected by a suitably qualified electrician. The national and international regulations for the installation of electrical equipment must be observed.



Electronic Pressure Switch data:

Electrical connection	M12x1 (4-pin)
Pressure connection	G1/4”
Protection class	IP67
Working range	0 - 400 bar
Max. pressure	600 bar
Burst pressure	1,600 bar
Voltage	9.6 - 32 VDC
Switching current	500 mA
Switching frequency	100 Hz
Current consumption	≤ 25 mA
Temperature range	-25 to +80 °C
Weight	100 g
Max. deviation	≤ ±2.5 %

1. Locking ring
2. Setting rings (manually adjustable after unlocking)
3. Green LED: supply voltage O.K.
4. Process connection G¼ A; tightening torque 25 Nm
5. Setting marks
6. Yellow LED: set value reached, OUT1 = ON / OUT2 = OFF
7. Sealing FPM / DIN 3869-14
8. Internal thread M5

- Minimum distance between Set and Reset = 2% of the final value of the measuring range.
- To obtain the setting accuracy: Set the rings to the minimum value, then set the requested value.

Digital Pressure Switch Monitor

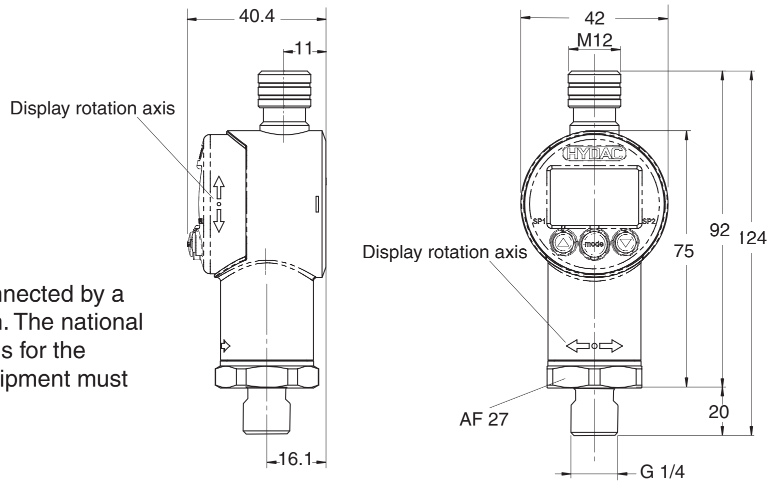
Order No. 504107

The Digital Pressure Switch has a very compact construction and allows for the control and monitoring of two pressure limits. It is recommended to use this switch when it is necessary to stop the process if the pressure in the gas spring is lower or higher than the decided values.

The Digital Pressure Switch is equipped with a 4 digit digital display which can show the pressure in either bar, PSI or MPa. The display can also be rotated in two axis excluding the need for a swivel adapter to get the display in the direction desired. The switch has two switching outputs that are easily programmed by the keys on the front. Pressure working range is 0 up to 400 bar.

Digital Pressure Switch data:

Set-points .... 2 PNP transistor switching outputs
Electrical connection M12x1 (4-pin)
Pressure connection .... G1/4”
Protection class IP67
Working range .... 0 - 400 bar
Max. pressure .... 800 bar
Burst pressure .... 2000 bar
Voltage .... 9 - 35 VDC
Switching current .... max. 1.2 A
Current consumption .... ≤ 35 mA (inactive switching outputs)
Temperature range .... -25 to +80 °C
Weight .... 120 g
Max. deviation .... ≤ ±1 % (relative to full measuring range)

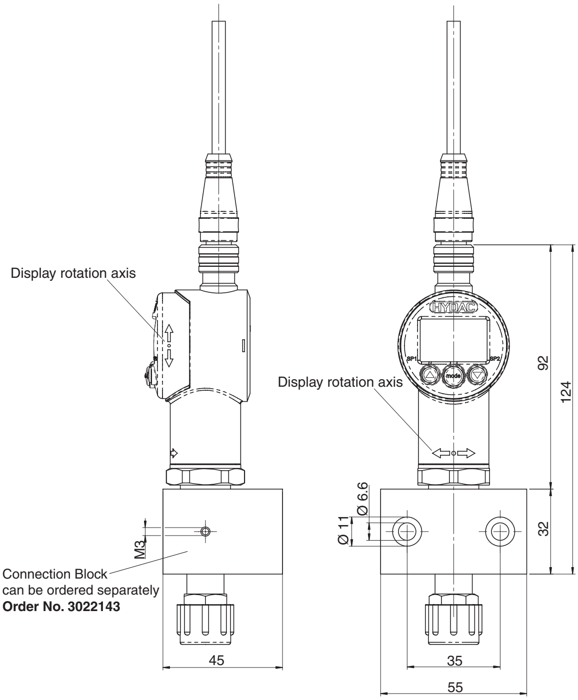


Note! The unit must be connected by a suitably qualified electrician. The national and international regulations for the installation of electrical equipment must be observed.

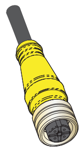
Digital monitoring kit

Order No. 3021172

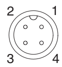
In accordance with GM standard 90.25.225, a Digital Monitoring Kit is available, supplied with a block (3022143) and a 5 m cable with a straight or 90° angled cable contact.



Cable (5 m) with straight cable contact
Order No. 504105

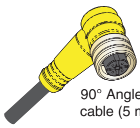


Straight
cable (5 m)



1. + Current feed 9 - 35 VDC	Brown
2. Set-point 1	White
3. - Current feed (0V)	Blue
4. Set-point 2	Black

Cable (5 m) with 90° angled cable contact
Order No. 504161



90° Angled
cable (5 m)

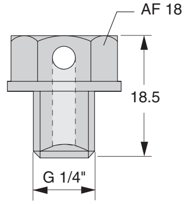
Pressure Relief Safety Screw

Order No. 502179

The G1/4” Pressure Relief Safety Screw can be attached to a Hose System to protect hoses and system components from excessively high gas pressures.

The static rupture pressure is 360 bar ±5 % at +20°C, and to achieve maximum service life, the screw should not be exposed to dynamic pressure pulsations exceeding 275 bar.

Note: The G1/4” Pressure Relief Safety Screw is not recommended for Hose Systems where initial gas charging pressure at 20°C exceeds 150 bar.



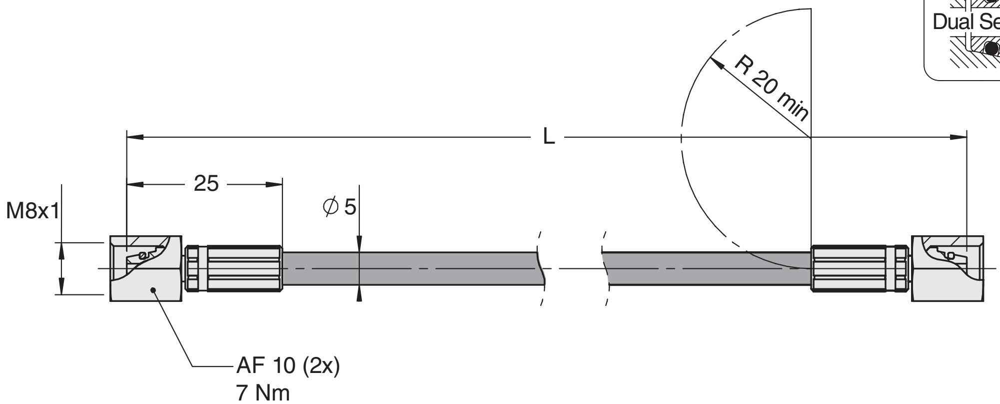
Micro EO24™ Hose and Tube System

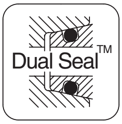
The Micro EO24™ Hose and Tube System is our most compact, soft sealed gas link system. It is a flexible system, including both a dual seal hose system and a soft sealed tube system using the same adapters.

Micro EO24™ Hose and Tube can now be combined in the same gas link system.

Micro EO24™ Hose

The Micro EO24™ Hose is a Dual Seal System and our most compact hose system available and takes full benefit of the two integrated metal and soft sealing systems. This ensures double leak proof joints as well as rotational protection.
The Hose System shares the same adapters and connectors as the Micro EO24™ Tube System, resulting in a wide range of flexible installation possibilities.
G1/8" and G1/4" ports can also be connected to the Micro EO24™ with the use of an appropriate adapter.
A number of different standard hose lengths are available (see table below). Custom hose lengths can also be ordered **from 100 mm upwards.** Subsequent numbers are added to the order number according to the length required, e.g. hose length 2,500 mm = Order No. 4023500-2500.





Micro/EZ Hose Clip, **Order No. 502646**
(Can be used to secure hoses using an M5 screw)

Order No	L (mm)*
4023500-0100	100
4023500-0200	200
4023500-0300	300
4023500-0400	400
4023500-0630	630
4023500-0800	800
4023500-1000	1000
4023500-1500	1500
4023500-2000	2000
4023500-XXXX	XXXX**

**For customer specified lengths.
* Minimum recommended L = 75 mm

Basic Information

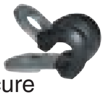
Material .... Polyamide, black
Dimension .... Ø 5 mm exterior (5/64)
Volume .... 3 ml/metre
Outer casing .... Perforated
Min. bend radius .... 20 mm
Max dynamic working pressure .... 475 bar
Min. burst pressure .... 1900 bar at +20° C
Operating temperature .... -20 - +80°C

Micro EO24™ Tube

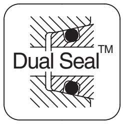
The Micro EO24™ Tube is a system for linking gas springs together. As the name suggests, Micro EO24™ Tube is a tube system where all connections are soft sealed and self-crimping. This ensures leak-proof tube joints. The tubes are easily cut into correct lengths and can be bent into the desired radius with a tube bending tool or even by hand.
There are numerous options for connecting tubes to gas springs and Control Blocks. Various adapters are available allowing the Micro EO24™ Tube to connect to almost all KALLER gas springs and Control Blocks. All adapters and their dimensions are presented on the following pages.

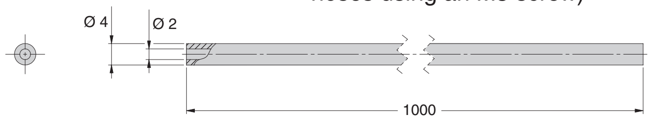
Steel Tube
(supplied in 1 m lengths)
Order No. 504594

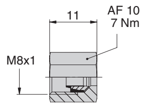
Micro/EZ Hose clip,
Order No. 502646
(Can be used to secure hoses using an M5 screw)



Functional nut
Order No. 504589

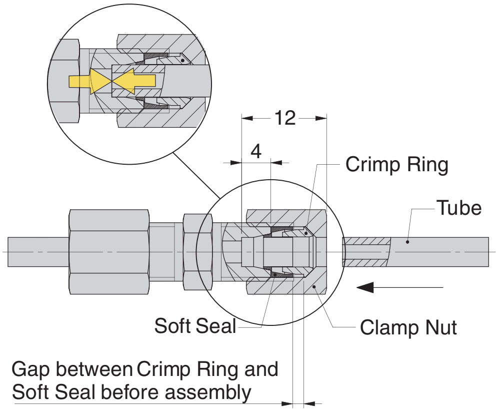






Using Micro EO24™ Tube

To cut the tube, a hacksaw can be used.
Note: Cutting angle 90° ±1°. If a regular tube cutter or cutting pliers are used, the tube might become clogged resulting in zero or limited gas flow. After cutting, de-burr the tube both inside and outside (max. 0.3 × 45° or R0.3) using the Tube De-burring Tool below. Make sure the tube is cleaned after cutting and de-burring. Use compressed air to remove all loose particles. Fit the clamp nut onto the adapter.



Basic Information

Tube external diameter.......................................Ø 4 mm
Tube internal diameter..Ø 2 mm
Min. bend radius...................................12 mm (3 x e.d.)
Tube material.........................Seamless steel tube St. 37.4
(Parker Order No. R04X1CF)
Max. dynamic pressure (system)........................... 430 bar
Min. burst pressure (system)................................1100 bar
Max. working temperature......................................100 °C *
Tube min. recommended length............................ 75 mm

* Micro EO24™ Tube for high temperature applications is available on request.

Note: Do not tighten! Run the tube through the nut until it stops (~12 mm from the top surface of the nut). When tightening the nut, use a torque of 7 Nm. Recommended tools to have available: hacksaw, tube cutting fixture, tube bending tool, de-burring tool, compressed air and a torque wrench (AF 10 mm, 7 Nm).

Tube De-burring Tool
Order No. 505096

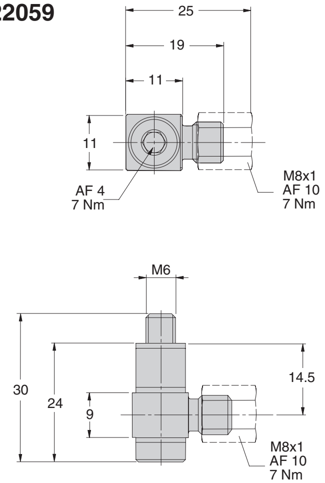
Tube Bending Tool (bend radius 20 mm)
Order No. 504711

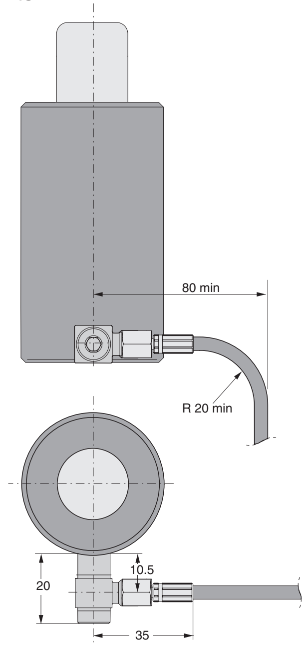
Adapters for Gas Spring Charge Ports

Following adapters are used to connect Micro EO24TM hoses and tubes to gas springs with M6 charging port:
Using G1/8 adapters (see 4.3/7) the M6 adapters can be connected (retrofitted) to springs with G 1/8 ports. All gas springs charge ports adapters fit into our standard mounts.

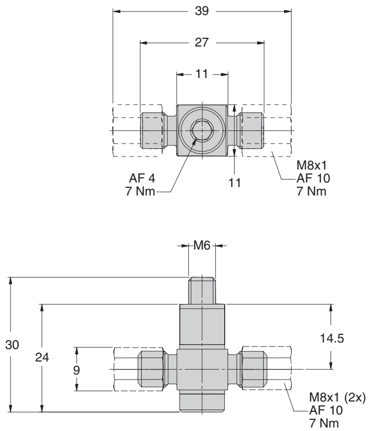
Note! When using tubes, please order Functional nut No. 504589 separately.

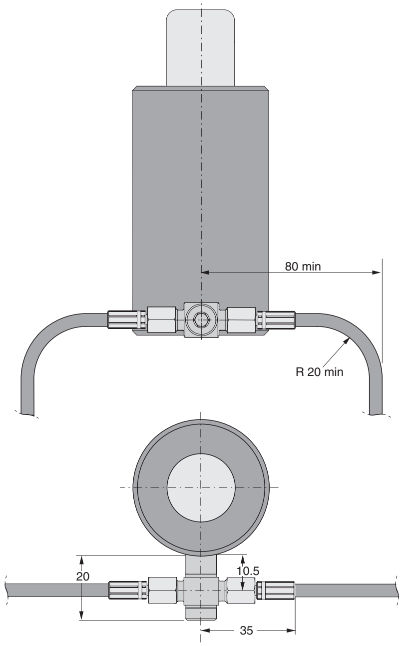
Banjo Elbow M6
Order No. 4022059





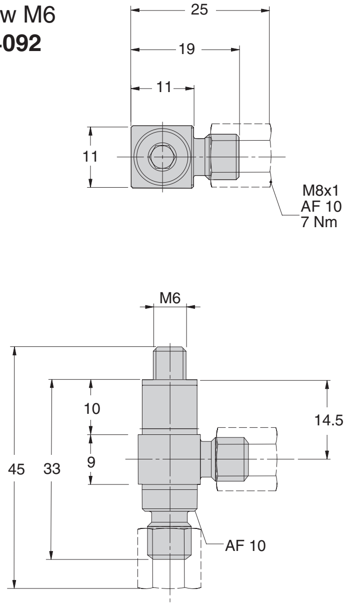
Banjo Tee M6
Order No. 4022061





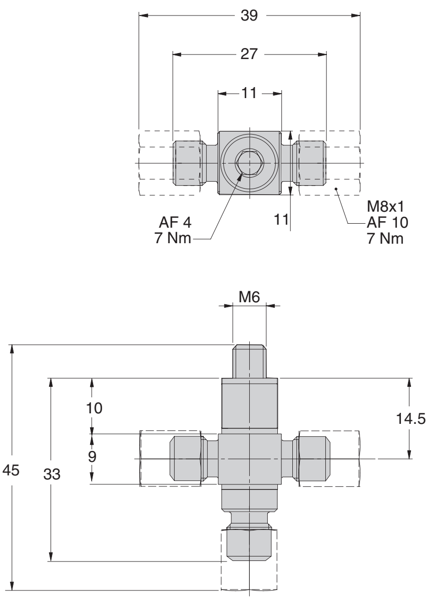
Banjo Run Elbow M6

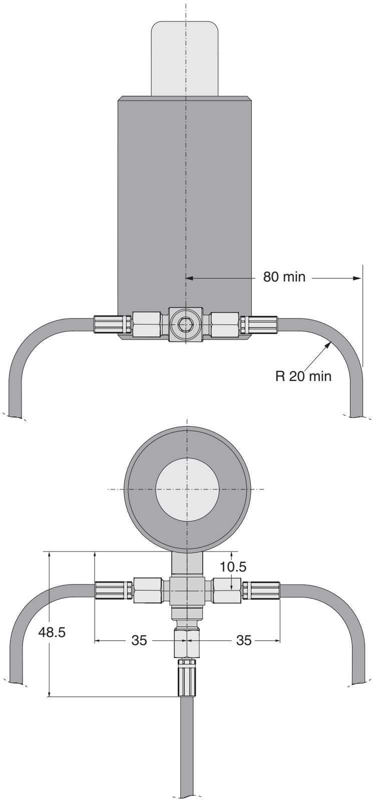
Order No. 4024092



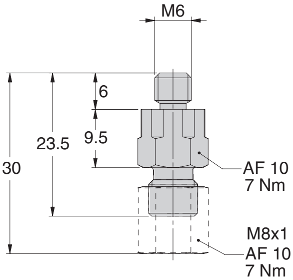
Banjo Run Tee M6

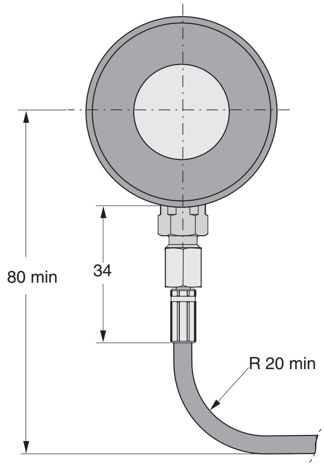
Order No. 4024348



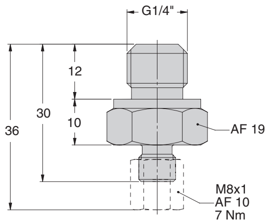


Straight Adapter M6
Order No. 4022057

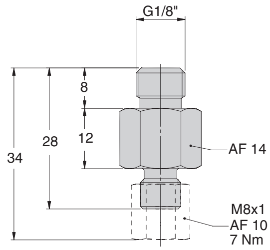




Straight Adapter G1/4”
Order No. 4022063



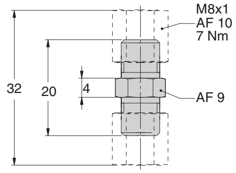
Straight Adapter G1/8”
Order No. 4022058



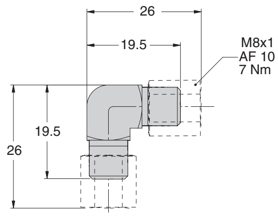
Hose to Hose, Tube to Tube or Hose to Tube Couplings

Note! When using tubes, order Functional nut No. 504589 separately.

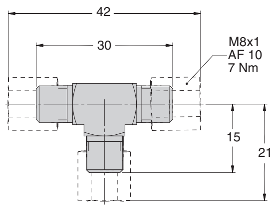
Union Straight
Order No. 504590



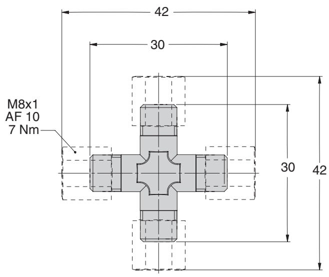
Union Elbow
Order No. 504591



Union Tee
Order No. 504592



Union Cross
Order No. 504593

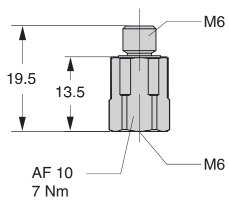


M6 charge port to Micro EO24™ Hose and Tube Adapters

Male/Female Connector M6

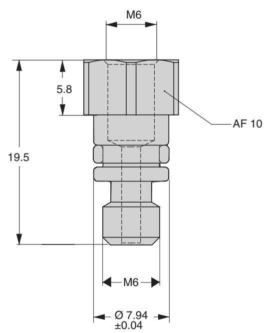
Order No. 503762

Extension for gas springs
using foot mounts



Male/Female Connector M6/M6
for CU4 1000

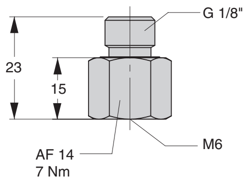
Order No.4027146



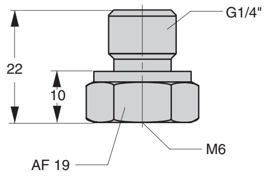
Micro EO24TM Hose and Tube Adapters for G1/8" and G1/4" Connection Ports

Note! When using tubes, order Functional nut No. 504589 separately.

Thread Reducer G 1/8" to M6
Order No. 503764



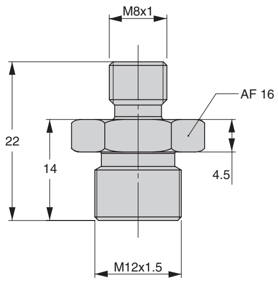
Thread Reducer G 1/4" to M6
Order No. 503966



For connection to angled Micro EO24TM Hose Adapters

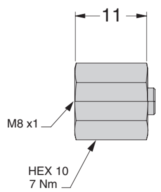
Micro EO24TM Hose and Tube Adapter for EO24 M12 hose

Male Stud Connector M8 to M12
Order No. 4024351



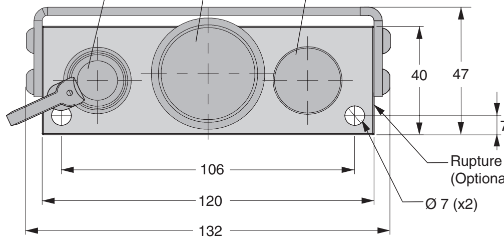
Micro EO24TM Cap/Plug

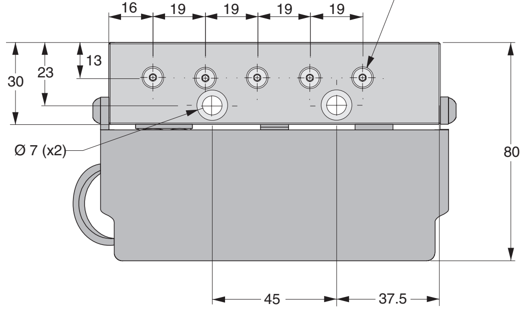
Order No. 4024353



Micro EO24TM Control Block

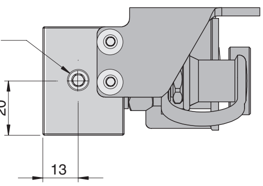
Order No. 3023888 (without Rupture Screw)
Order No. 3123888 (with Rupture Screw)





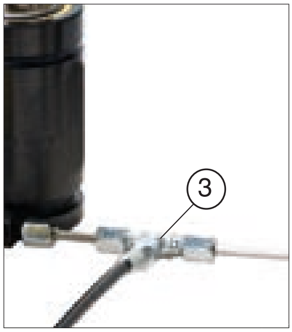
The Micro EO24™ Control Block is a very compact block with protective stainless steel cover specially designed for the Micro EO24™ System.
This block is intended for continuous monitoring of the gas pressure in the Hose and Tube System.
It is fitted with a manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging and a Discharge Valve for gas evacuation.
The block has sixteen M6 connection ports, which are plugged upon delivery, and it is available in two versions:

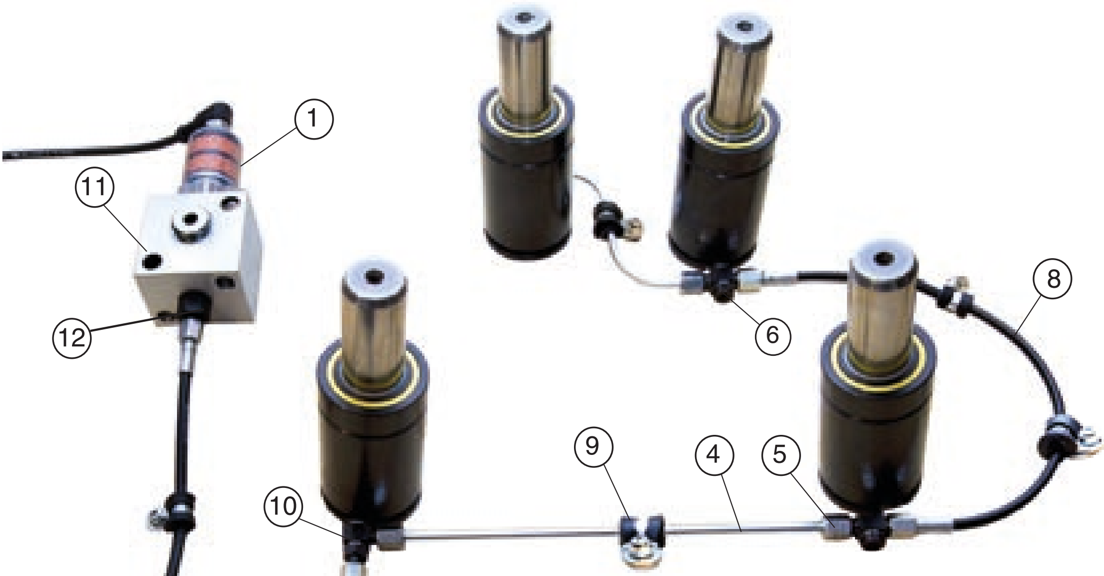
3023888 (without Rupture Screw)
3123888 (with Rupture Screw*)



* Please note that Rupture Screws are not recommended where the initial gas charging pressure at 20°C exceeds 150 bar.

Micro EO24™ Hose and Tube System, installation example





Position	Quantity	Description	Order No
1	1	Pressure Switch	504320
2	1	Micro EO24™ Control Block	3023888
3	1	Union Tee	504592
4	3	Micro EO24™ Tube	504594
5	6	Clamp Nut	504589
6	2	Branch Tee M6	4022061
7	1	Angle Adapter M6	4022059
8	2	Micro EO24™ Hose	4023500-XXXX
9	5	Hose Clip	502646
10	1	Run Tee M6	4024092
11	1	Charging Block	3014206
12	1	Straight Adapter G 1 /8”	4022058

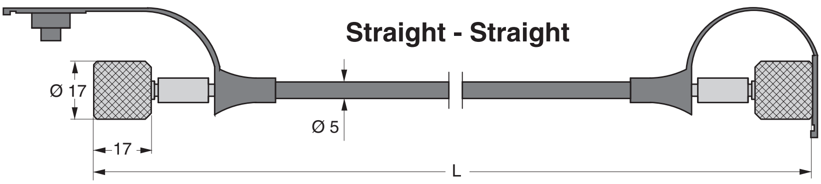
EZ Hose System

The EZ Hose System is our most popular Hose System. It is a very compact and versatile O-ring sealed Hose System that allows connections to be tightened by hand. G1/8" and G1/4" connection ports can be connected to the EZ Hose System with the use of an appropriate adapter. A number of different standard hose lengths are available (see table below). Custom hose lengths can also be ordered **from 150 mm upwards**. Subsequent numbers are added to the order number according to the length required, e.g. hose length 2,500 mm = Order No. 4014974-2500

Min. bend radius	20 mm
Temp. range	–20 to + 80°C
Rupture pressure	2,000 bar
Max. dynamic working pressure	500 bar

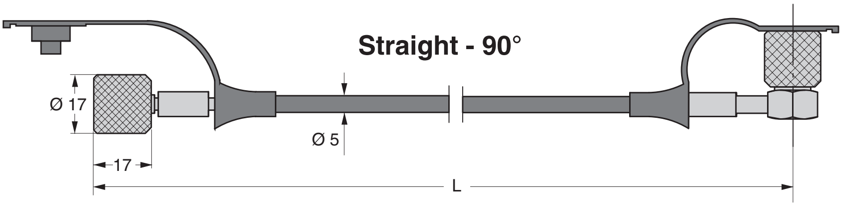
Micro/EZ Hose clip, **Order No. 502646**
(Can be used to secure hoses using an M5 screw.)

Order No. 4014974-XXXX



Order No.	L (mm)*
4014974-0200	200
4014974-0300	300
4014974-0400	400
4014974-0630	630
4014974-0800	800
4014974-1000	1000
4014974-1500	1500
4014974-2000	2000
4014974-XXXX**	XXXX

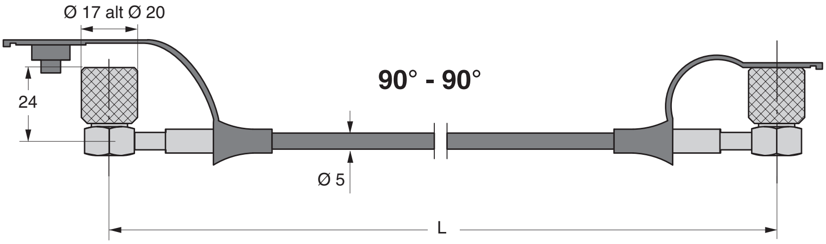
Order No. 4017568-XXXX



Order No.	L (mm)*
4017568-0200	200
4017568-0300	300
4017568-0400	400
4017568-0630	630
4017568-0800	800
4017568-1000	1000
4017568-1500	1500
4017568-2000	2000
4017568-XXXX**	XXXX

Order No. 4117568-XXXX

(To avoid twisting the hose, we recommend hose 4017568-XXXX together with angle adapter.)

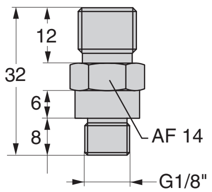


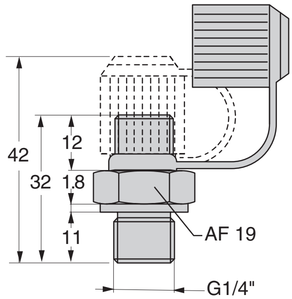
Order No.	L (mm)*
4117568-0200	200
4117568-0300	300
4117568-0400	400
4117568-0630	630
4117568-0800	800
4117568-1000	1000
4117568-1500	1500
4117568-2000	2000
4117568-XXXX**	XXXX

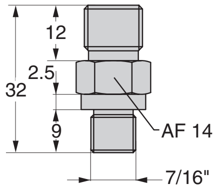
* Minimum recommended L=75
**For customer specified lengths.

EZ Hose Adapters

Hose adapters are available with three different connecting threads:



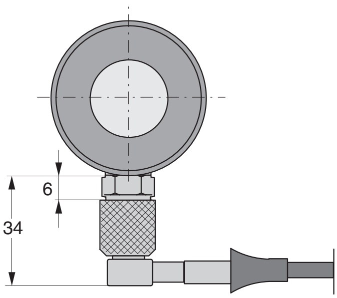


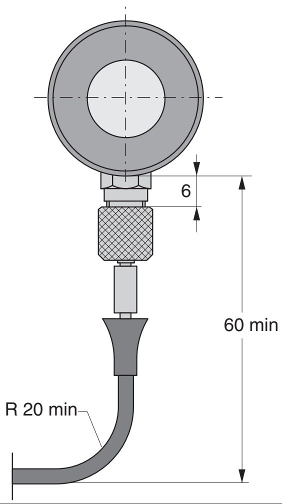


G 1/8” **without** non-return valve to be used for gas springs, multicoupling blocks and control blocks.
Order No. 4114973-G1/8

G 1/4” **with** non-return valve to be used only for control blocks.
Order No. 4014973-G1/4

G 7/16-20 **without** non-return valve to be used only for gas springs with 7/16-20 port.
Order No. 4114973-7/16-20

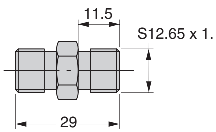


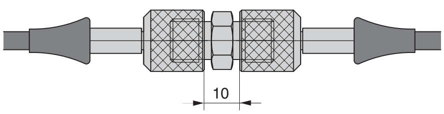


Installation dimensions for hose adapter, with straight and 90° hose

Joining Coupling

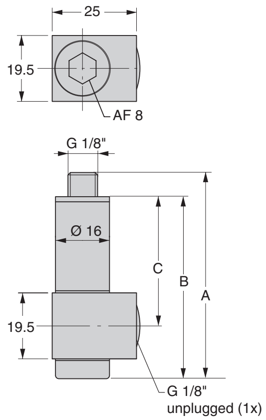
Coupling for joining of EZ Hoses, Order No. 503674.

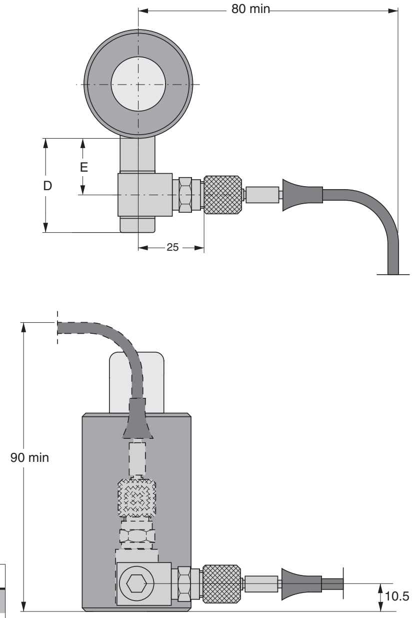




Angle Adapter

Order No. 4016050-XX

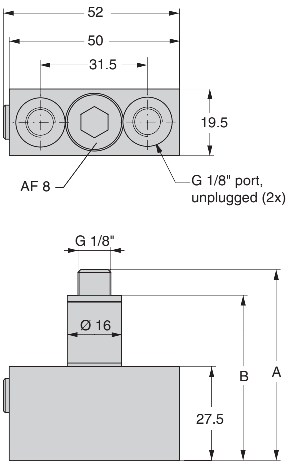


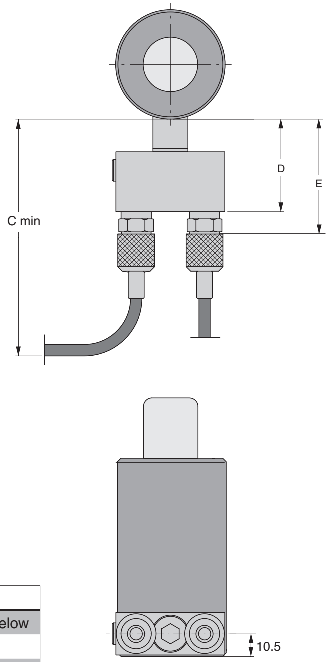


Order No	A	B	C	D	E	Suitable together with mounts
4016050-01	40	32,5	17	26	11	All applicable mounts, except those mentioned below
4016050-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4016050-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Front Adapter

Order No. 4017314-XX

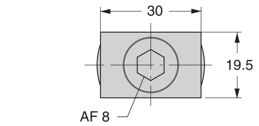


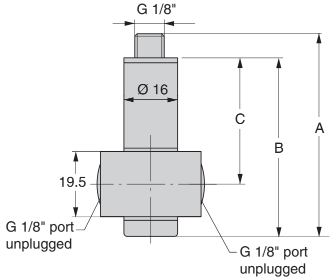


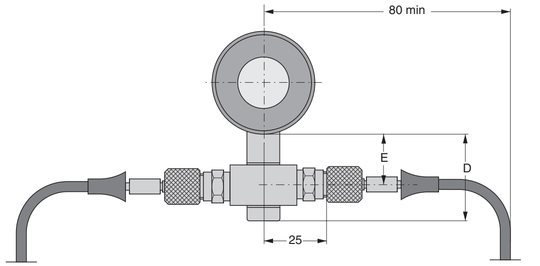
Order No	A	B	C	D	E	Suitable together with mounts
4017314-01	42	34.5	95	28.5	40	All applicable mounts, except those mentioned below
4017314-02	56	48.5	110	42.5	54	FFC 500, 750, 1500, 3000 + K
4017314-03	63	55.5	115	49.5	61	FFC 5000, 7500, 10000 + K

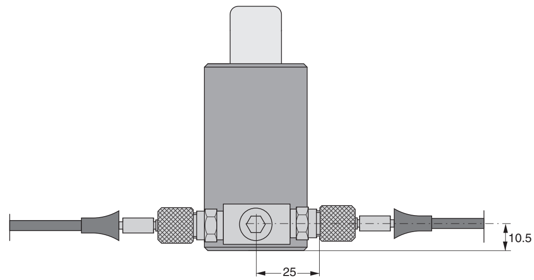
Two-way Adapter

Order No. 4016051-XX





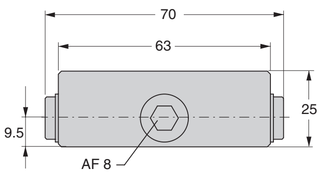


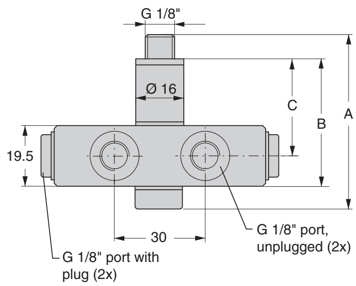


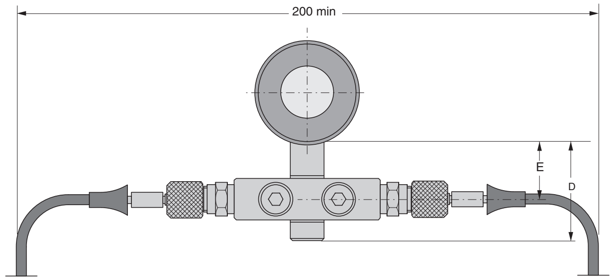
Order No	A	B	C	D	E	Suitable together with mounts
4016051-01	40	32.5	17	26.5	11	All applicable mounts except those mentioned below
4016051-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4016051-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

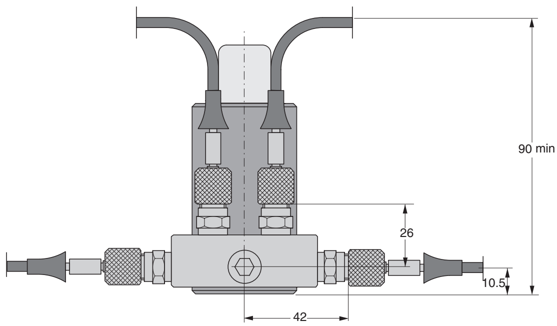
Four-way Adapter

Order No. 4015035-XX





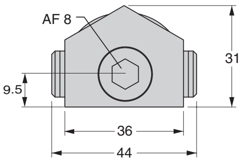


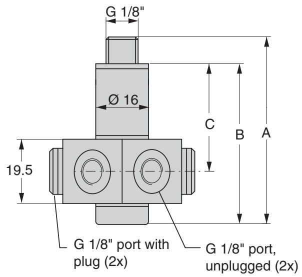


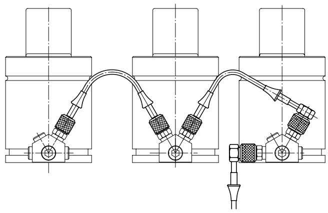
Order No.	A	B	C	D	E	Suitable together with Mounts
4015035-01	40	32.5	17	26.5	11	All applicable mounts, except those mentioned below
4015035-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4015035-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Multi-way Adapter

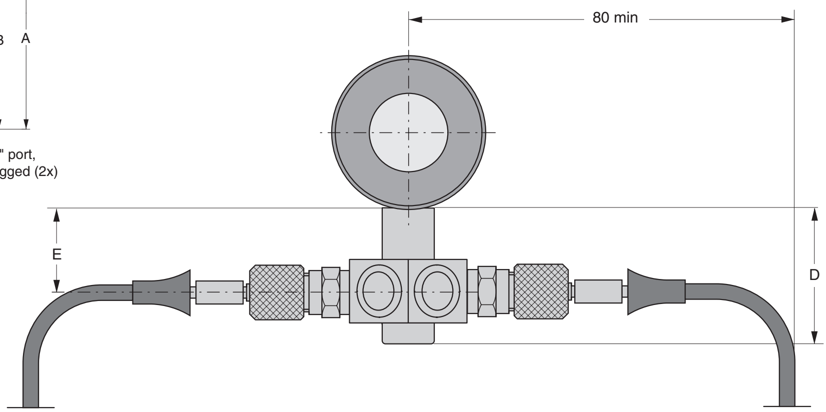
Order No. 3017191-XX

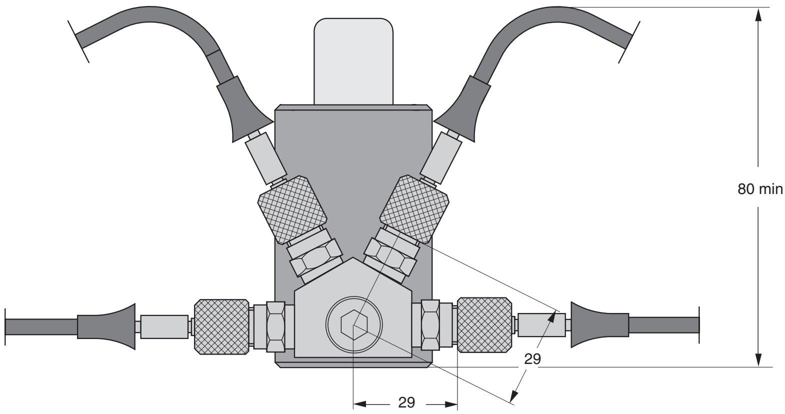






This adapter is highly suitable when the distance between gas springs is short.

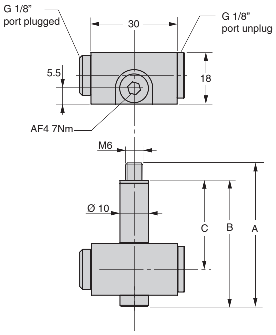


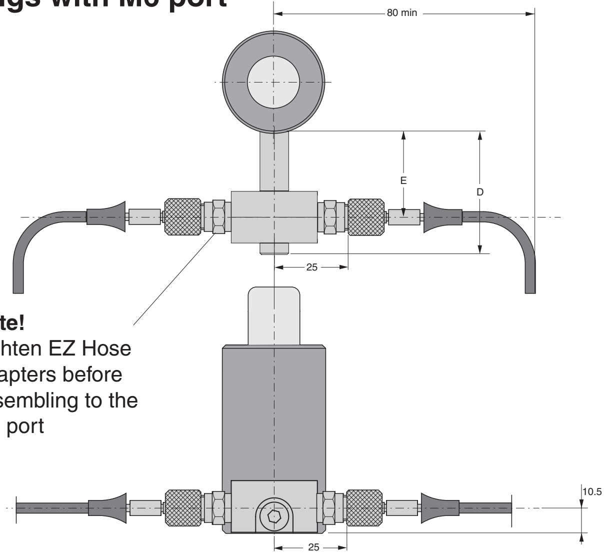


Order No	A	B	C	D	E	Suitable together with mounts
3017191-01	40	32.5	17	26.5	11	All applicable mounts, except those mentioned below
3017191-02	54	45.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
3017191-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Two-way Adapter for gas springs with M6 port

Order No. 4023519
Order No. 4023506



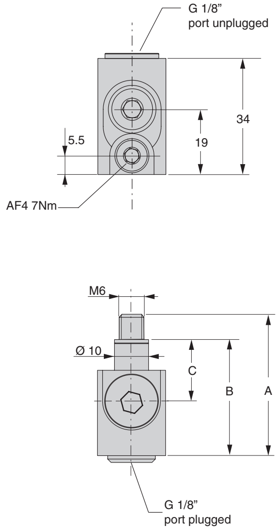


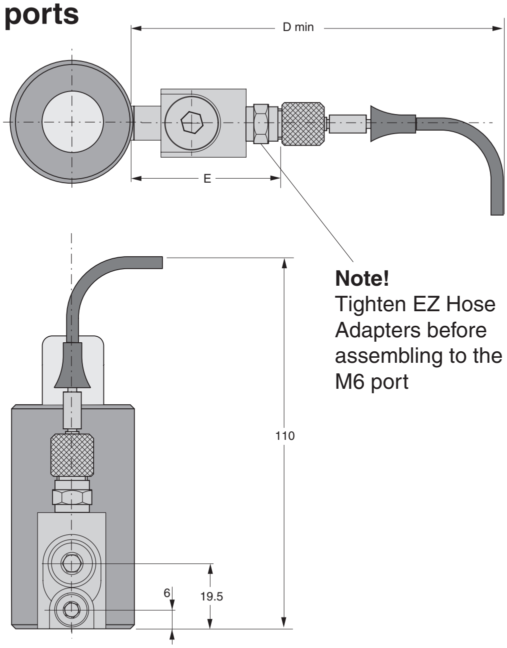
Note!
Tighten EZ Hose Adapters before assembling to the M6 port

Order No	A	B	C	D	E	Suitable together with mounts
4023519	36	30	17	25.5	12.5	All applicable mounts, except those mentioned below
4023506	49	44	31	39.5	26.5	FFC 500, 750, 1500 + K

Angle Adapter for gas springs with M6 ports

Order No. 4023520
Order No. 4023518

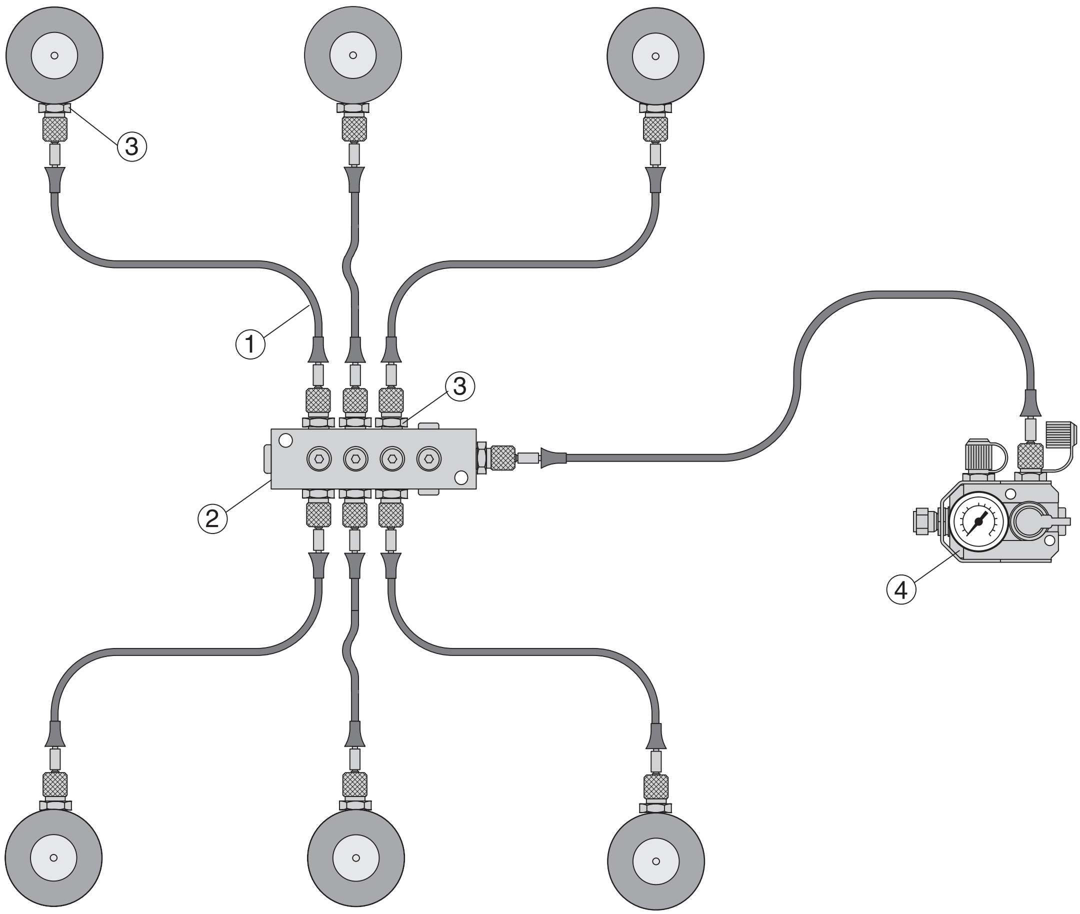




Note!
Tighten EZ Hose Adapters before assembling to the M6 port

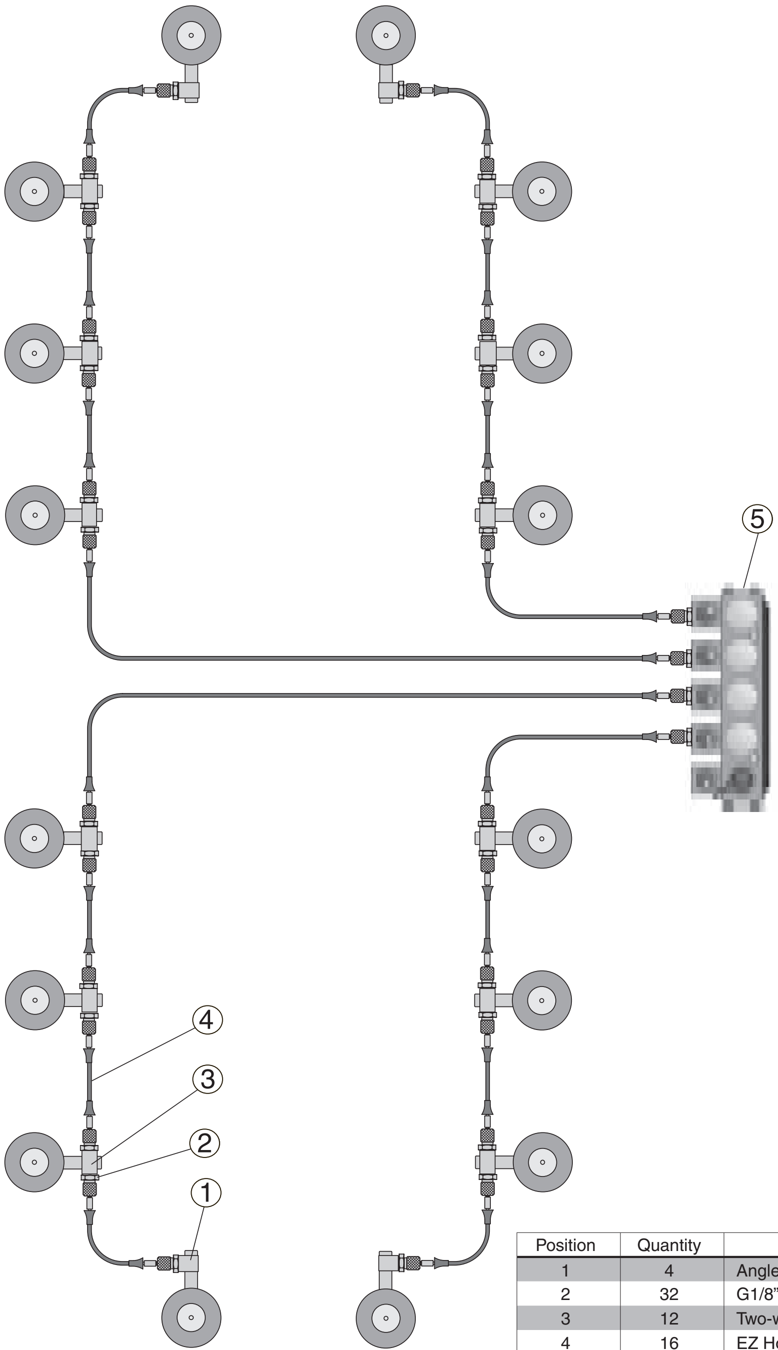
Order No	A	B	C	D	E	Suitable together with mounts
4023520	39	34	18	110	45	All applicable mounts, except those mentioned below
4023518	51	46	30	120	57	FFC 500, 750, 1500 + K

Installation Examples, EZ Hose System



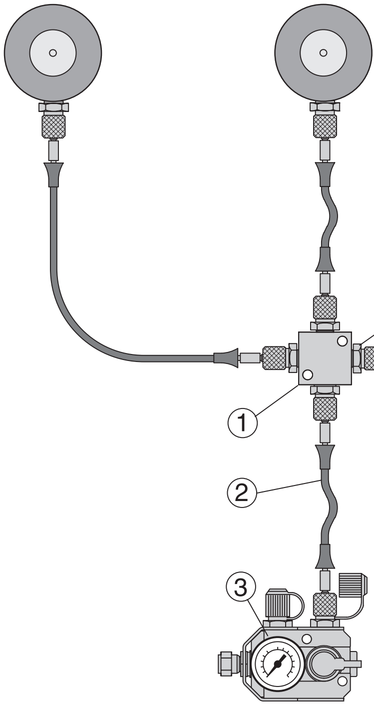
Position	Quantity	Description	Order No
1	7	EZ Hose	4014974-XXXX
2	1	Multi-Coupling Block	3015044
3	13	G1/8" EZ Hose Adapter	4114973-G1/8
4	1	Control Block	3116114-01

Installation Examples, EZ Hose system

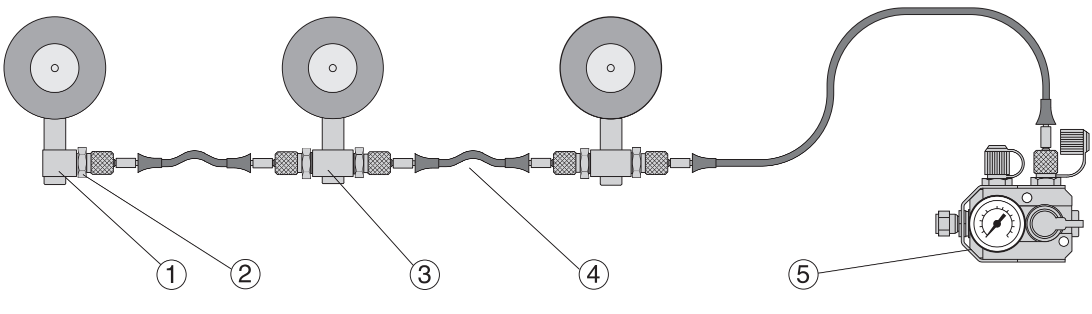


Position	Quantity	Description	Order No
1	4	Angle Adapter	4016050-xx
2	32	G1/8" EZ Hose Adapter	4114973-G1/8
3	12	Two-way Adapter	4016051-xx
4	16	EZ Hose	4014974-xxxx
5	1	Multi Control Block	2022677-04

Installation Examples, EZ Hose system



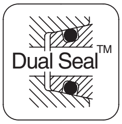
Position	Quantity	Description	Order No.
1	1	Multi-Coupling Block	4017032
2	4	EZ Hose	4014974-XXXX
3	1	Control Block	3116114-01
4	7	G1/8" EZ Hose Adapter	4114973-G1/8



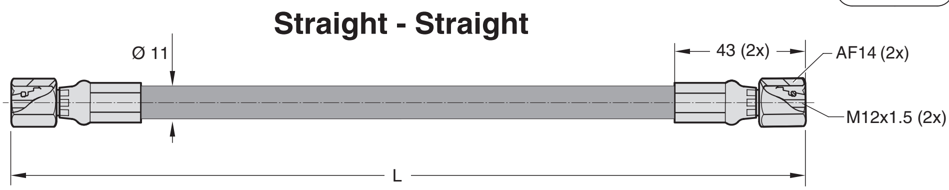
Position	Quantity	Description	Order No.
1	1	Angle Adapter	4016050-xx
2	5	G1/8" EZ Hose Adapter	4114973-G1/8
3	2	Two-way Adapter	4016051-xx
4	3	EZ Hose	4014974-xxxx
5	1	Control Block	3116114-01

EO24 Hose System

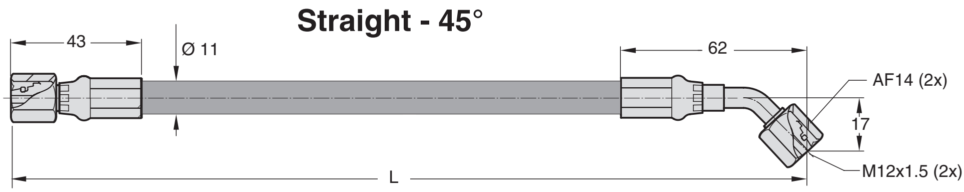
The EO24 Hose System is our largest Hose System available. G1/8” and G1/4” connection ports can be connected to the EO24 Hose System with the use of an appropriate adapter.
Custom hose lengths can be ordered **from 80 mm upwards**. Subsequent numbers are added to the order number according to the length required, e.g. hose length 2500 mm = Order No. 3×20857-2500.
EO24 Hose and EO24 Hose Couplings for crimping are also sold separately; for information on hose crimping, see Hose Crimping equipment on page 4.6/2.



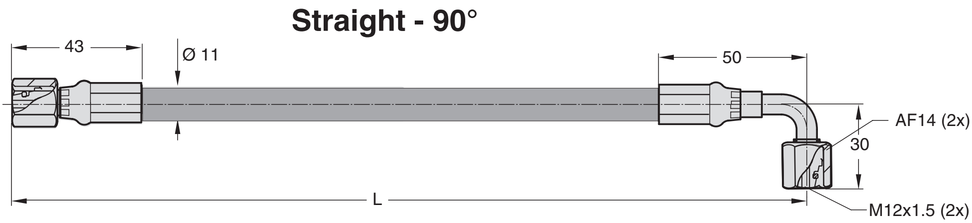
Order No. 3020857-XXXX



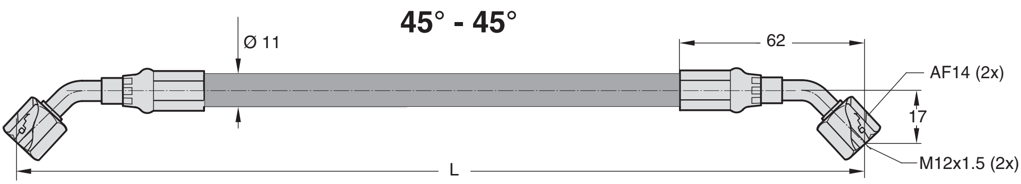
Order No. 3120857-XXXX



Order No. 3220857-XXXX

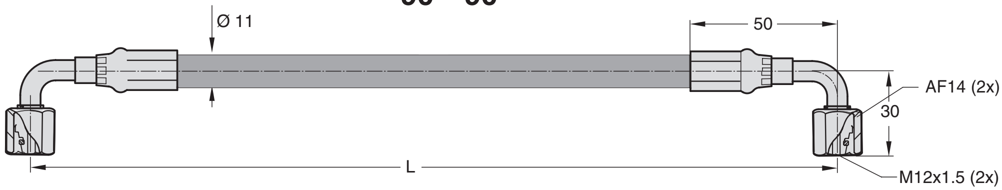


Order No. 3320857-XXXX



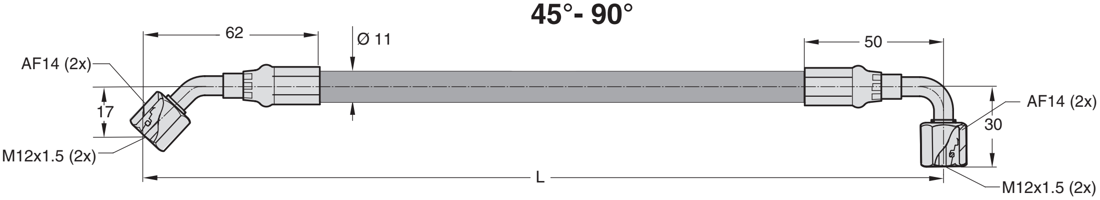
Order No. 3420857-XXXX

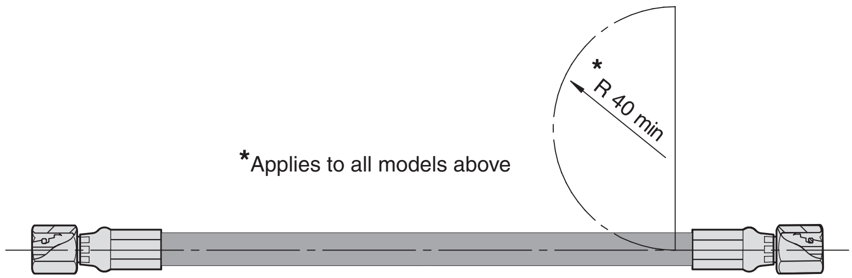
90°- 90°



Order No. 3520857-XXXX

45°- 90°





EO24 Hose

Note! The hose must be cleaned internally after cutting!

Material	Thermoplastic
Dimension	3/16” (exterior 11 mm)
Volume	18 ml/metre
Standard	SAE 100 R8 or ISO 3949 II
Outer casing	Perforated
Min. bend radius	40 mm
Temp. range	-40°C to +93°C
Max. dynamic working pressure	345 bar
Min. rupture pressure	1380 bar at 20°C
Min. recommended length	80 mm

EO24 hose clip, **Order No. 502322**
Can be used to secure hoses using an M6 screw.

Order No. 502319 - XX Meters

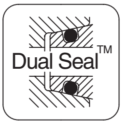
EO24 Tube

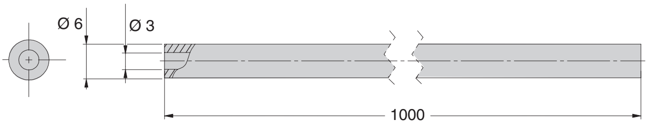
The EO24™ Tube is a system for linking larger gas springs together. Springs with G1/8”, G1/4” connection and high gas flow requires a large tube. As the name suggests, EO24™ Tube is a tube system where all connections are soft sealed and self-crimping. This ensures leak-proof tube joints. The tubes are easily cut into correct lengths and can be bent into the desired radius with a tube bending tool or even by hand. There are numerous options for connecting tubes to gas springs and Control Blocks. Various adapters are available allowing the EO24™ Tube to connect to almost all KALLER large gas springs and Control Blocks. All adapters and their dimensions are presented on the following pages.

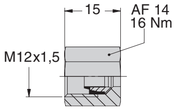
Steel tube
(supplied in 1 m lengths)
Order No. 505393

EO24 clip,
Order No. 502322
(Can be used to secure hoses using an M6 screw)

Functional nut
Order No. 504047

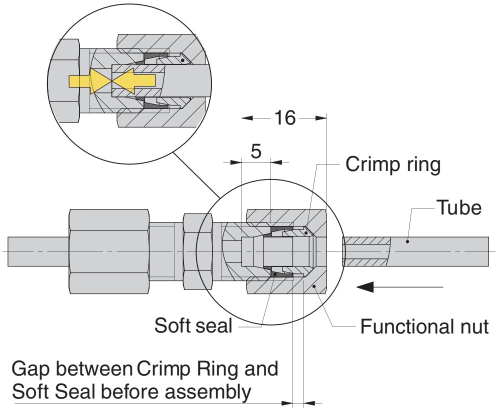






Using EO24 Tube

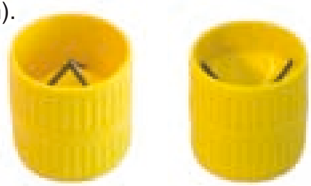
To cut the tube, a hacksaw can be used.
Note: Cutting angle 90° ±1°. If a regular tube cutter or cutting pliers are used, the tube might become clogged resulting in zero or limited gas flow. After cutting, de-burr the tube both inside and outside (max. 0.3 × 45° or R0.3) using the Tube De-burring Tool below. Make sure the tube is cleaned after cutting and de-burring. Use compressed air to remove all loose particles. Fit the clamp nut onto the adapter.



Basic Information

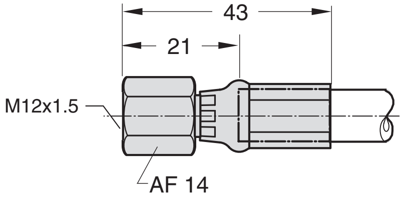
Tube external diameter	Ø 6 mm
Tube internal diameter	Ø 3 mm
Min. bend radius	18 mm (3 x e.d.)
Tube material	Seamless steel tube St. 37.4 (Parker Order No. R06X1,5 CF)
Max. dynamic pressure (system)	400 bar
Min. burst pressure (system)	1400 bar
Max. working temperature	100 °C *
Tube min. recommended length	75 mm

Note: Do not tighten! Run the tube through the nut until it stops (~16 mm from the top surface of the nut). When tightening the nut, use a torque of 16 Nm. Recommended tools to have available: hacksaw, tube cutting fixture, tube bending tool, de-burring tool, compressed air and a torque wrench (AF 14 mm, 16 Nm).

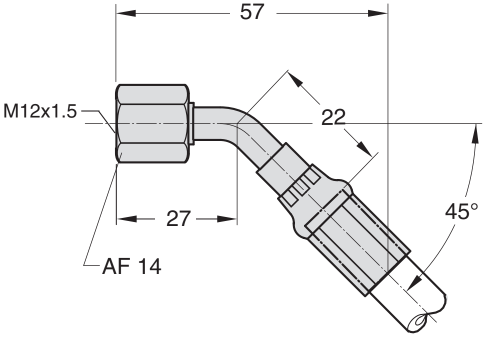


Tube De-burring Tool
Order No. 505096

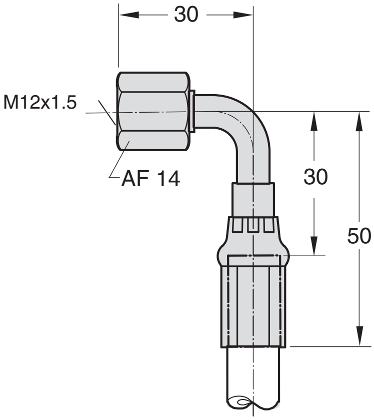
Tube Bending Tool (bend radius 20 mm)
Order No. 504711



EO24 Straight
Order No. 504141



EO24 45° Elbow
Order No. 504142

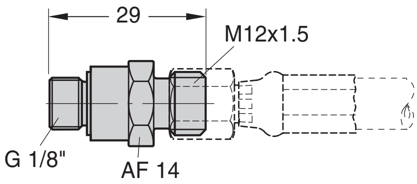


EO24 90° Elbow
Order No. 504143

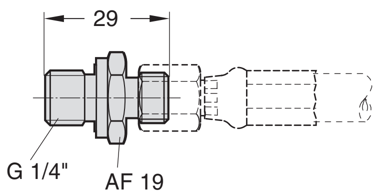
Adapter to Hose Couplings

The EO24-Hose coupling system has M12x1.5 threads for connection between hose and adapter. G1/8" or G1/4" are used for connecting to springs and blocks.

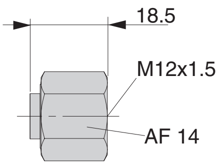
EO24-Hose Adapters



Male Stud Connector G1/8"
(for gas springs and Coupling Blocks)
Order No. 503593

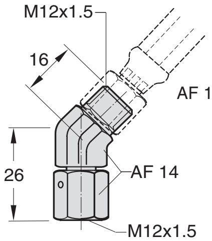


Male Stud Connector G1/4"
(for Control Blocks)
Order No. 504144

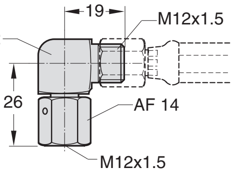


Cap/Plug
Order No. 504913

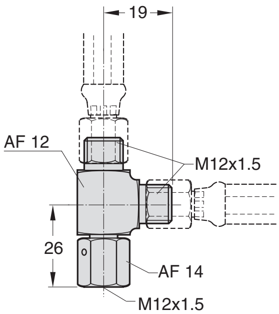
Adapter to Hose Couplings



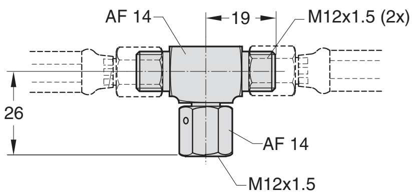
Swivel Nut Elbow 45°
Order No. 504145



Swivel Nut Elbow 90°
Order No. 504146

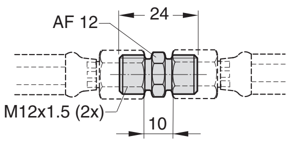


Swivel Nut Run Tee
Order No. 504147

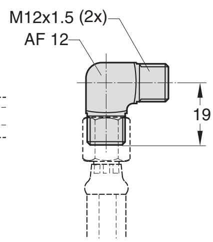


Swivel Nut Branch Tee
Order No. 504148

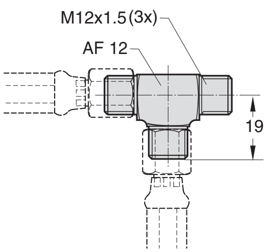
Hose to Hose Couplings



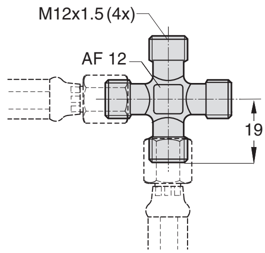
Union Straight
Order No. 504149



Union Elbow
Order No. 504150



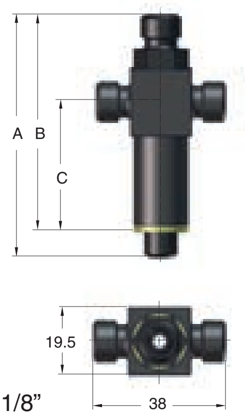
Union Tee
Order No. 504151



Union Cross
Order No. 504152

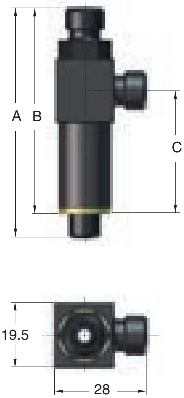
Adapter to Hose Couplings

According to GM standard 90.25.



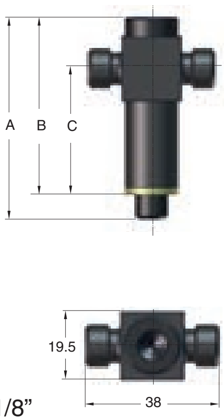
Banjo Run Tee G1/8”
Order No. 3025594

Order No.	A	B	C	Weight
3025594-01	50	42.5	17	0.09
3025594-02	64	56.5	31	0.11
3025594-03	71	63.5	38	0.12



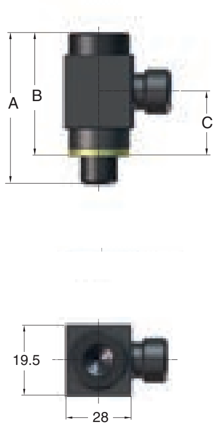
Banjo Run Tee G1/8”
Order No. 3025599

Order No.	A	B	C	Weight
3025599-01	50	42.5	17	0.08
3025599-02	64	56.5	31	0.10
3025599-03	71	63.5	38	0.11



Banjo Tee G1/8”
Order No. 3025551

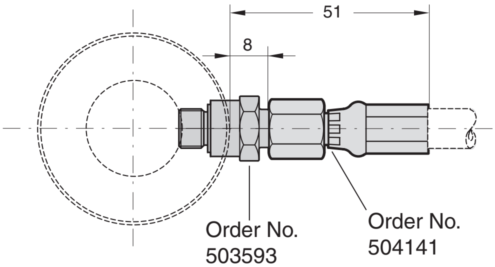
Order No.	A	B	C	Weight
3025551-01	40	32.5	17	0.09
3025551-02	54	46.5	31	0.11
3025551-03	61	53.5	38	0.12



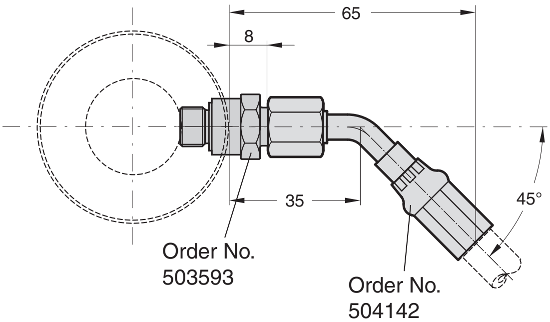
Banjo Elbow G1/8”
Order No. 3025562

Order No.	A	B	C	Weight
3025562-01	40	32.5	17	0.08
3025562-02	54	46.5	31	0.10
3025562-03	61	53.5	38	0.11

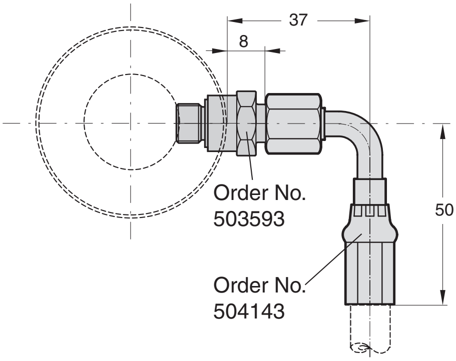
Installation Examples, EO24-Hose System



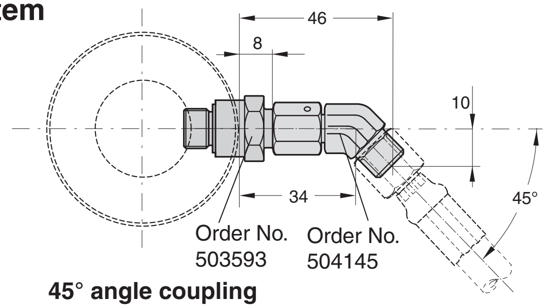
Straight hose coupling



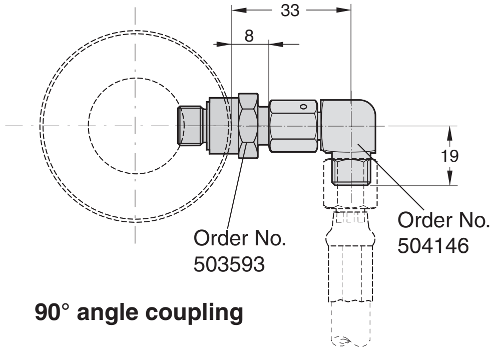
45° hose coupling



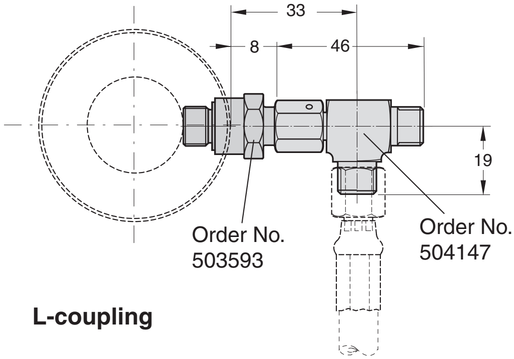
90° hose coupling



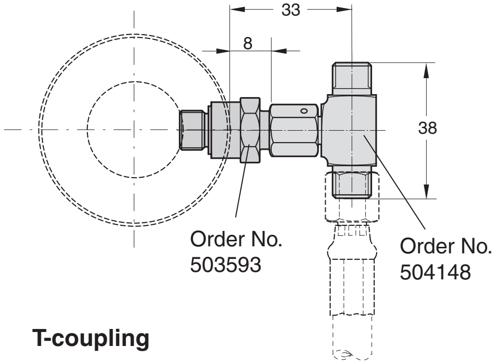
45° angle coupling



90° angle coupling



L-coupling

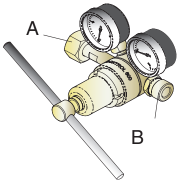
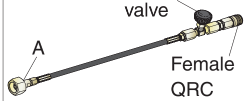
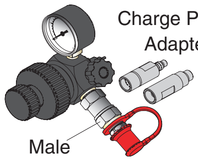


T-coupling

Gas charging equipment

Our gas charging equipment is available with or without a Pressure Regulator (recommended with) for nitrogen gas charging of self-contained gas springs and/or hosed systems and is delivered in a robust and portable plastic case. A charging hose with a length of 2 meters is included as standard.
Different countries have different bottle connections. Make sure the correct connection code is selected according to the table below. When ordering equipment, including a regulator and charging hose, the connection thread is always according to B. If ordered without a regulator, the connection on the hose is according to A.

Hosed systems can be charged via a Control Block using the female quick release coupling (QRC) with shutoff valve. By attaching the Control Armature with male QRC, self contained gas springs can be charged using a suitable Charge Port Adapter.
The following tables indicate the various combinations of Gas Charging Equipment available:

Order No.	Pressure regulator: 	Charging hose 	Control armature: 4215072 	Protective case: 2024238 
3021298 - YYZZ	X	X	X	X
3121298 - YYZZ	--	X	X	X
3221298 - YYZZ	X	X	--	X
3421298 - YYZZ	X	X	X	--
3521298 - YYZZ	--	X	X	--
3621298 - YYZZ	X	X	--	--
3721298 - YYZZ	--	X	--	--

Connection code (YY)	Country example	Threads		Pressure regulator can be ordered separately using Order No.*
		A Bottle connection	B Regulator connection	
01	Sweden	W24.32x1/4"female	W24.32x1/14"	4021296
02	India	G 5/8" male	W24.32x1/14"	4121296
03	China	G 5/8" female	W24.32x1/14"	4221296
04	UK	G 3/8" female	W24.32x1/14"	--
05	North America	.965"-14 NGO-RH-INT	CGA-580	--

How to order:

3x21298 -YYZZ

Model: (See table)

Hose length (dm)
20 = 2m (standard length)
ZZ = Customer specified

Connection code: (See table)

*When connecting a Pressure Regulator to a Charging Hose, the connection must be according to B. Connection B with W24.32×1/14" female for charging hose can be ordered separately, Order No. 4013715.

The 10,000 daN (22.480 lbf) test rig

Can be used for initial
force measurements
of all KALLER gas springs
up to and including the
TU 7500 and CU4 7500.

Analog version
Order No. 1016714-1330

Digital version daN
Order No. 1316713--1330

Features:
Quick height adjustment
Digital or analog force indication
Force displayed in kgf or lbf, digital version
Accurancy: ± 0.5%, digital version
Max. capacity: 10,000 daN (22,480 lbf)
Max. spring height: 760 mm (30”)
Dimensions: w=360 mm, d=260 mm, h=/1,300 mm

The 2,000 daN digital test rig

Can be used for initial force
measurements of all KALLER
gas springs up to and including
the CU4 1800.

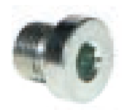
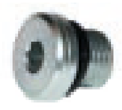
Order No. 1018660

Features:
Quick height adjustment
Digital force and travel indication
Force displayed in kgf or lbf
Accurancy: ± 0.5%
Max. capacity: 2,000 kgf (4,500 lbf)
Max. spring height: 488 mm (19”)
Dimensions: w=275 mm, d=255 mm, h=930 mm

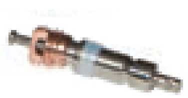
KALLER gas spring tool kits
are available in various
sets and all come with
a protective carry case.

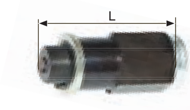
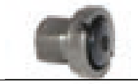
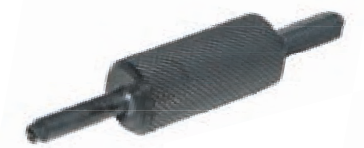
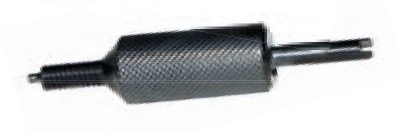
Order No. 1014779

Plugs

Order No.	Component	
4018682	M6 plug standard	
4118682	M6 plug (with leak groove)	
4014331	M6 plug for CU4 1000	
500343	G 1/8” plug	
501866	G 1/4” plug	

Valves

Order No.	Component	
4018112	M6 valve	
501243	VG5 valve	
4014007	Oil bleeding valve	

Washers		
500472	G 1/8” rubber-steel washer	
501023	M6 rubber-steel washer	
Adapters		
Order No.	**Component**	
3015303-01 L=23 3015303-02 L=33	Gas charging adapter	
4024047	Gas charging adapter G 1/8 - M6	
Tools		
Order No.	**Component**	
3018708	Valve tool M6 - M6 valve	
3014172-01	Valve tool M6 - VG5 valve	
3014172-02	Valve tool G1/8”-VG5 valve	
3022974	Gas charging adapter tool	

Crimping equipment for Micro EO24™, EZ Hose, EO24-Hose

Our Hose Crimping Equipment can be used for Micro EO24™, EZ and EO24 Hose systems

- Pneumatically operated hydraulic pump
- Mechanical stop for accurate hose crimping
- Can be used to crimp straight, 45° and 90° fittings
- Lubrication-free crimping
- Crimping force: 300 kN
- Size: 380 × 305 × 685
- Weight: 32 kg
- Press instructions included No. 8200-1288

Crimp die Micro EO24™, EZ Hose
Order No. 3024010

Crimp die EO24
Order No. 504196

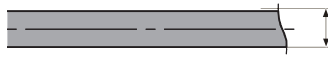
Pneumatic operated crimping press.
Order No. 3121381
(Crimping die not included)

Stop Tool
(for Micro EO24™ hose end assembly)
Order No. 4024183

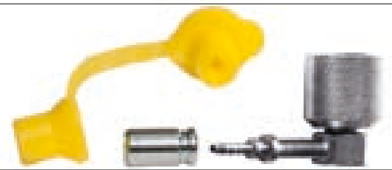
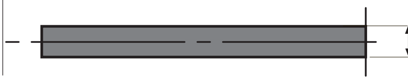
Hose cutting plier
Order No. 502839

Below is a list of the order numbers of the various couplings and hoses that can be ordered from us:

Micro EO24™ Hose system

Order No.	Component	
Straight Hose Connector Micro EO24™	505082	
45° Hose Connector Micro EO24™	N/A	----
90° Hose Connector Micro EO24™	N/A	----
Separate Micro EO24™ Hose (in meters)	505081-XX	

EZ Hose system

Order No.	Component	
Straight Hose Connector EZ hose	503962	
45° Hose Connector EZ hose	N/A	----
90° Hose Connector EZ hose	503963*	
Separate EZ hose Hose (in meters)	503810-XX	

EO24™ Hose system

Order No.	Component	
Straight Hose Connector EO24™	504141	
45° Hose Connector EO24™	504142	
90° Hose Connector EO24™	504143	
Separate EO24™ hose Hose (in meters)	502319-XX	

Where: -XX is no. of meters of hose required (eg. -10 indicates length 10 meters)
* You cannot crimp EZ Hose 90° - 90° using Crimp die 3024010

Part No. 2023932

Technical data

Booster

Weight:	14 kg
Size:	180x510x230 mm

Carry Case

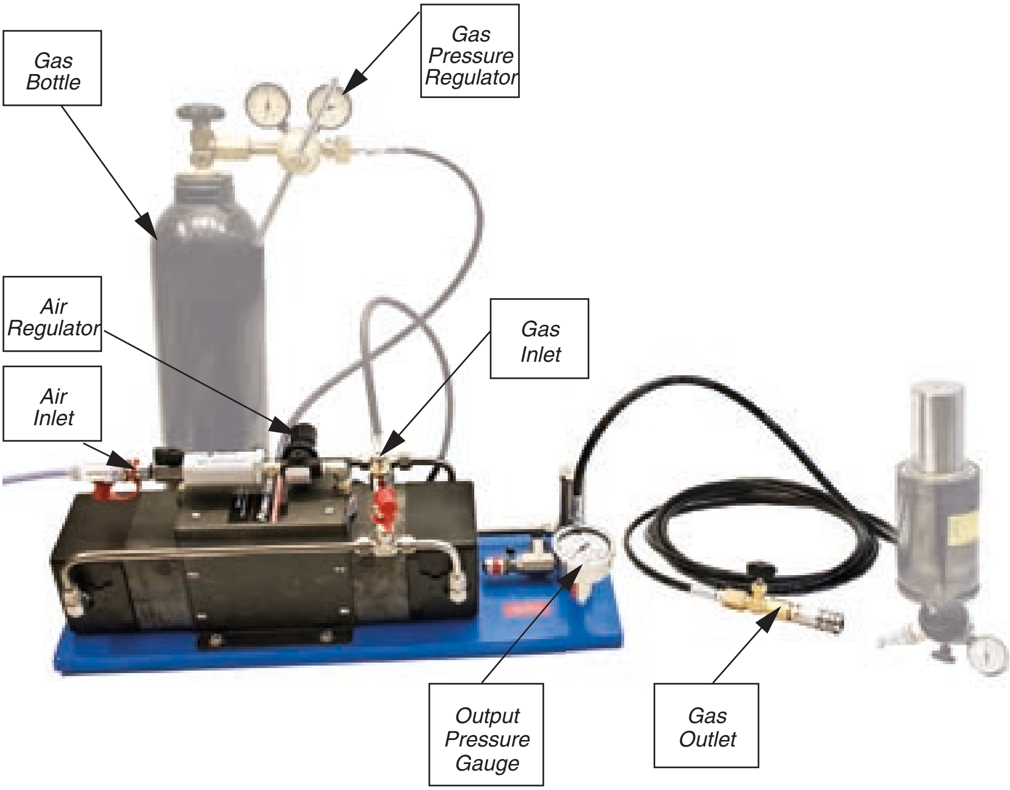
Weight:	2,5 kg
Material:	Plastic

Charging Hose

Length:	4 m
Pressure medium	Nitrogen gas N_2
Supply pressure	Air, max 300 psi ~ 20 bar
Pressure:	Charging up to 207 bar (3,000 psi)

Connection thread

Air: (Into the Booster)	Female ¼ NPT
Nitrogen gas: (Into the Booster)	Male QRC ¼"
Nitrogen gas: (Out of the Booster)	Female QRC ¼"



NCA = Nitrogen Charging Assembly

⚠ **Always wear approved eye protection when handling or using pressurized gas.**

Note!
The Gas Bottle, the Gas Pressure Regulator and the Gas Spring are not included in Order No. 2023932.

For more information about KALLER Nitrogen Gas Booster see User Guide 8200-1263.

The following standard tool can be used to cover all assembling situations.
Please note! This tool is not delivered by KALLER.

Universal torque wrench
Torofix 2 - 25 Nm

Accessories

Sizes mm: 9, 10, 14, 16, 19

Sizes mm: 3, 4, 5, 8

Potential suppliers,
www.toolstore.com

CRC Leak Finder
Water-based gas leak detector, containing surface-active and anti-corrosion agents and stabilizers. Leak Finder detects and locates quickly and reliably gas leaks and pressure losses in pipes, pressurized systems, etc. by forming highly visible bubbles when applied over any leak. Contributes to protect the environment by locating emissions of toxic and/or polluting gases.

Potential suppliers,
http://www.crceurope.com

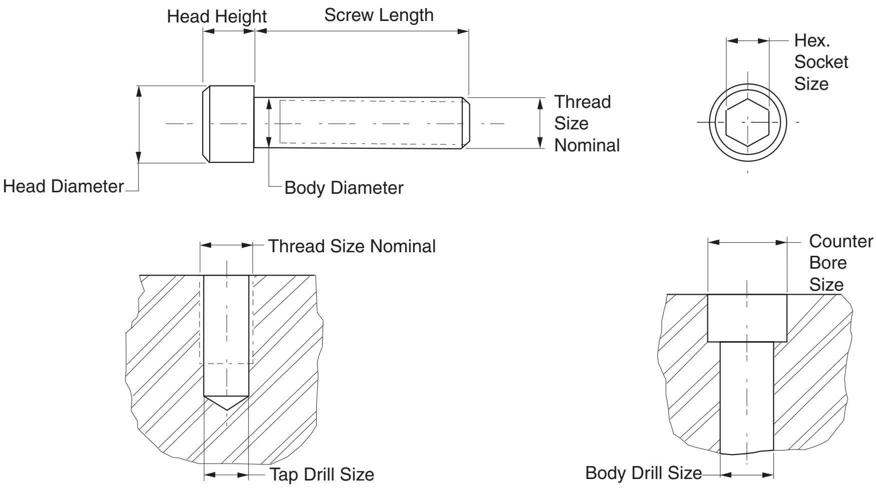
Nominal Dimensons in mm - Tolerances in micrometers (10^{-6}meter)

External Dimensions (shafts)

Symbol	1 up to 3	over 3 up to 6	over 6 up to 10	over 10 up to 18	over 18 up to 30	over 30 up to 50
e 8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89
g 5	-2 -6	-4 -9	-5 -11	-6 -14	-7 -16	-9 -20
g 6	-2 -8	-4 -12	-5 -14	-6 -17	-7 -20	-9 -25
h 3	0 -2	0 -2.5	0 -2.5	0 -3	0 -4	0 -4
h 5	0 -4	0 -5	0 -6	0 -8	0 -9	0 -11
h 6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16
h 8	0 -14	0 -18	0 -22	0 -27	0 -33	0 -39
h 9	0 -25	0 -30	0 -36	0 -43	0 -52	0 -62
h 10	0 -40	0 -48	0 -58	0 -70	0 -84	0 -100
h 11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160
j 6	+4 -2	+6 -2	+7 -2	+8 -3	+9 -4	+11 -5
js 6	+3 -3	+4 -4	+4.5 -4.5	+5.5 -5.5	+6.5 -6.5	+8 -8
js 7	+5 -5	+6 -6	+7.5 -7.5	+9 -9	+10.5 -10.5	+12.5 -12.5
js 8	+7 -7	+9 -9	+11 -11	+13.5 -13.5	+16.5 -16.5	+19.5 -19.5
js 9	+12.5 -12.5	+15 -15	+18 -18	+21.5 -21.5	+26 -26	+31 -31
js 13	+70 -70	+90 -90	+110 -110	+135 -135	+165 -165	+195 -195
js 14	+125 -125	+150 -150	+180 -180	+215 -215	+260 -260	+310 -310
k 6	+6 0	+9 +1	+10 +1	+12 +1	+15 +2	+18 +2
k 7	+10 0	+13 +1	+16 +1	+19 +1	+23 +2	+27 +2
m 4	+5 +2	+8 +4	+10 +6	+12 +7	+14 +8	+16 +9
m 5	+6 +2	+9 +4	+12 +6	+15 +7	+17 +8	+20 +9
n 6	+10 +4	+16 +8	+19 +10	+23 +12	+28 +15	+33 +17

Internal Dimensions (bores)

Symbol	1 up to 3	over 3 up to 6	over 6 up to 10	over 10 up to 18	over 18 up to 30	over 30 up to 50
E 8	+28 +14	+38 +20	+47 +25	+59 +32	+73 +40	+89 +50
F 7	+16 +6	+22 +10	+28 +13	+34 +16	+41 +20	+50 +25
G 6	+8 +2	+12 +4	+14 +5	+17 +6	+20 +7	+25 +9
G 7	+12 +2	+16 +4	+20 +5	+24 +6	+28 +7	+34 +9
H 5	+4 0	+5 0	+6 0	+8 0	+9 0	+11 0
H 6	+6 0	+8 0	+9 0	+11 0	+13 0	+16 0
H 7	+10 0	+12 0	+15 0	+18 0	+21 0	+25 0
H 8	+14 0	+18 0	+22 0	+27 0	+33 0	+39 0
H 9	+25 0	+30 0	+36 0	+43 0	+52 0	+62 0
H 10	+40 0	+48 0	+58 0	+70 0	+84 0	+100 0
H 11	+60 0	+75 0	+90 0	+106 0	+130 0	+160 0
H 12	+100 0	+120 0	+150 0	+180 0	+210 0	+250 0
J 6	+2 -4	+5 -3	+5 -4	+6 -5	+8 -5	+10 -6
J 7	+4 -6	+6 -6	+8 -7	+10 -8	+12 -9	+14 -11
JS 5	+2 -2	+2.5 -2.5	+3 -3	+4 -4	+4.5 -4.5	+5.5 -5.5
K 6	0 -6	+2 -6	+2 -7	+2 -9	+2 -11	+3 -13
K 7	0 -10	+3 -9	+5 -10	+6 -12	+6 -15	+7 -18
K 8	0 -14	+5 -13	+6 -16	+8 -19	+10 -23	+12 -27
M 6	-2 -8	-1 -9	-3 -12	-4 -15	-4 -17	-4 -20
M 7	-2 -62	0 -12	0 -15	0 -18	0 -21	0 -25
N 7	-4 -14	-4 -16	-4 -19	-5 -23	-7 -28	-8 -33
P 7	-6 -16	-8 -20	-9 -24	-11 -29	-14 -35	-17 -42



Thread Size Nominal	Pitch	Body Diameter Max.	Head Diameter Max.	Head Height Max.	Hex. Socket Size	Counter Bore Size	Body Drill Size	Tap Drill Size
M 4	0.7	4.0	7.0	4.0	3.0	8.5	5.0	3.3
M 6	1.0	6.0	10.0	6.0	5.0	11.0	6.6	5.0
M 8	1.25	8.0	13.0	8.0	6.0	15.0	9.0	6.75
M 10	1.5	10.0	16.0	10.0	8.0	18.0	11.0	8.5
M 12	1.75	12.0	18.0	12.0	10.0	20.0	13.5	10.25
M 16	2.0	16.0	24.0	16.0	14.0	26.0	17.5	14.0
M 20	2.5	20.0	30.0	20.0	17.0	33.0	22.0	17.5
M 24	3.0	24.0	36.0	24.0	19.0	40.0	26.0	21.0

Torque wrench settings in Nm for untreated, oiled steel screw fasteners (torque tolerance ±5%)

Metric Coarse Thread M.

Thread	d	P	A_s	Property class according to ISO 898-1				
M	mm	mm	mm^2	4.6	5.8	8.8	10.9	12.9
4	4	0.7	8.78	1.1	1.8	2.9	4.0	4.9
6	6	1.0	20.1	3.7	6.1	9.8	14	17
8	8	1.25	36.6	8.9	15	24	33	40
10	10	1.5	58.0	17	29	47	65	79
12	12	1.75	84.3	30	51	81	114	136
16	16	2.0	157.0	74	123	197	277	333
20	20	2.5	245.0	144	240	385	541	649
24	24	3.0	353.0	249	416	665	935	1120
$\sigma_S = R_{eL}$ or $R_{p0.2}$ N/mm^2 nominal				240	400	640	900	1 080
$\kappa\left(1+S_F\right)\frac{k}{\overline{F_{Fm}}} \bullet \sigma_S$ N/mm^2				26.16	43.60	69.76	98.10	117.72

Product Series Gas Link Systems

The Safer Choice

KALLER Hose-less Baseplate™

Edition 4.2014

Would you like to order this product?
All available information at kaller.com.

KALLER Hose-less Baseplate™ – the easy-accessible alternative

KALLER Hose-less Baseplate™ is the increasingly popular easy-accessible alternative to the conventional hosed plate systems on the market. This KALLER product provides all the benefits of self-contained gas springs in a linked system, yet eliminates external plumbing. In addition, fitted with one or more Hose-less Baseplate Tanks (Tank BP) the pressure increase can be reduced resulting for example in press energy savings and more consistent force. With this possibility to reduce the pressure increase KALLER Hose-less Baseplate™ also fits General Motors (GM) standards requirements.

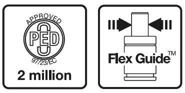
KALLER Hose-less Baseplate™ utilizes KALLER CU4, CX, TL, TU, TX, X and LCF gas springs mounted to a customer specified base plate through a bottom port. The gas springs are attached to the internally drilled base plate with a sealing washer or adapter and standard mounting hardware. All the connecting passages are drilled within the plate, removing the need for external hose and fittings. >>>

KALLER - THE SAFER CHOICE

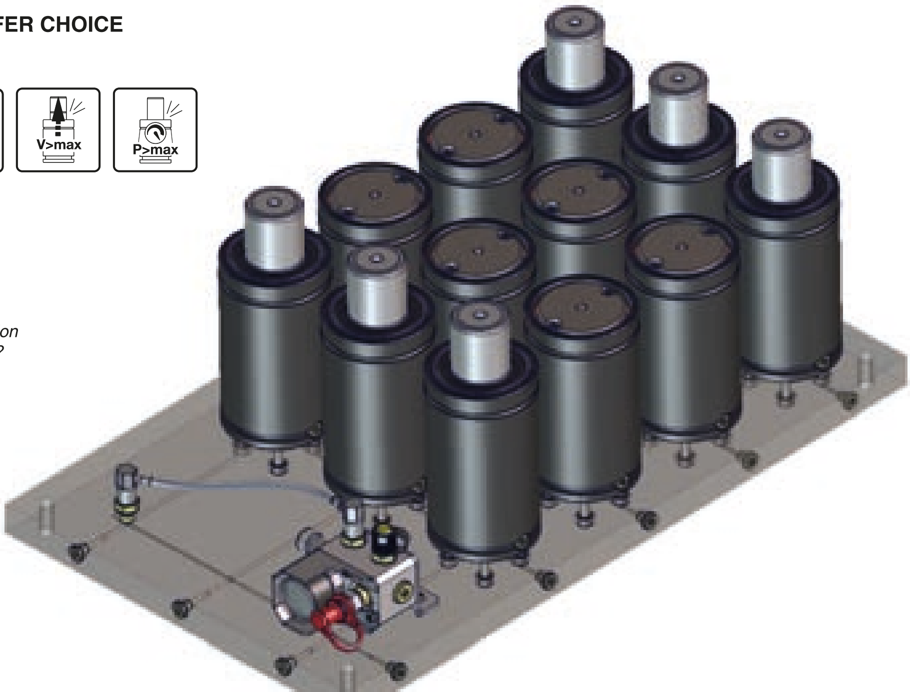
Training **Safety**

Training S>max V>max P>max

Reliability



Need additional information on the KALLER features? Look at the back cover of this brochure or at www.kaller.com/this-is-kaller/the-safer-choice.



Safety features stated for individual KALLER gas springs are valid also when used in a KALLER Hose-less Baseplate™. An external stop for the tool is recommended to prevent overstroke in the springs.

...to the conventional hosed plate systems on the market

KALLER Hose-less Baseplate™ is less expensive, has a better performance and is easier to maintain

>>>
KALLER Hose-less Baseplate™ facilitates filling, draining and monitoring from one control panel mounted directly to the baseplate or from outside the die using a KALLER standard linking system.

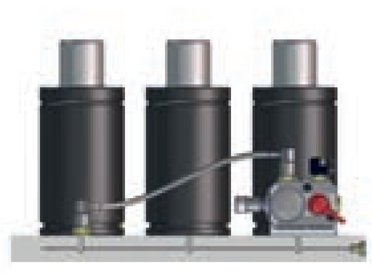
KALLER Hose-less Baseplate™ provides a cleaner die design with the possibility to place more gas springs close together and also eliminate clearance for hoses and connections. This makes the installation easier to maintain compared to other hose linked systems on the market. Each product is factory tested to assure leak-free operation and is shipped ready to install.

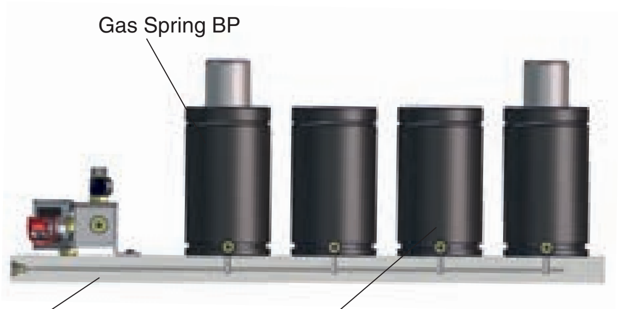
To obtain a complete KALLER Hose-less Baseplate™ system you will need:

- KALLER gas springs CU4, CX, TL, TU, TX, X and LCF adapted with square seal or adapter to base-plate
- One or more KALLER Hose-less Baseplate Tanks (Tank BP) to achieve the demanded pressure increase
- A control block with suitable fittings to link to the baseplate
- A customized baseplate produced by the customer or ordered from KALLER offices

...with the possibility to reduce pressure increase

...and it comes with more power in less space !

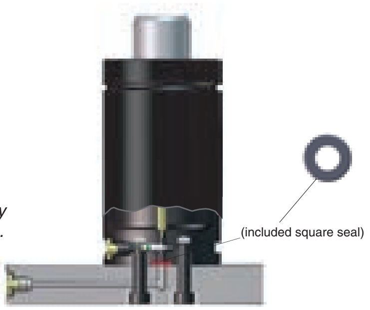




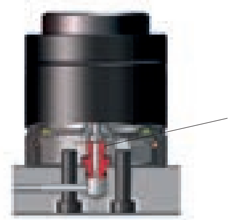
KALLER gas springs BP adapted to baseplate

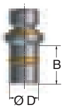
Hose-less Baseplate with square seal

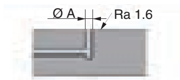
Note!
Installation layout may vary between models.

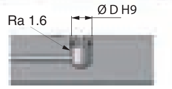


Hose-less Baseplate with adapters









Adapter Model	Order No.	Ø D	B
CU 10	4016253	10	8
CU 11	4025110	11	8
CX 6	4026218	6	9

KALLER gas springs BP with included square seal

Series	Square seal	Ø A [m] Hole size	Model	Thread size	Torque [Nm] 12.9
X	504847	5	X BP 500	M6	15
			X BP 750		
			X BP 1000		
			X BP 1500		
			X BP 2400	M8	35
	504846	8	X BP 4200		
			X BP 6600	M10	70
			X BP 9500		
			X BP 20000	M12	115
TX	504847	5	TX BP 750	M8	40
			TX BP 1000		
			TX BP 1500		
			TX BP 2400		
	504846	8	TX BP 4200		
			TX BP 6600	M10	79
			TX BP 9500		
			TX BP 20000	M12	136

Series	Square seal	Ø A [m] Hole size	Model	Thread size	Torque [Nm] 12.9
TU	504847	5	TU BP 500	M8	40
			TU BP 750		
			TU BP 1500		
			TU BP 3000		
	505978	8	TU BP 5000	M10	79
			TU BP 7500		
	504846	8	TU BP 10000	M12	136
TL	504847	5	TL BP 750	M8	40
			TL BP 1500		
			TL BP 3000		
	505978	8	TL BP 5000	M10	79
			TL BP 7500		
LCF	504847	5	LCF BP 3000	M8	40
	505978	8	LCF BP 5000	M10	79
			LCF BP 7500		

For more information, see KALLER catalog "Gas Spring Systems and Standard Mounts".

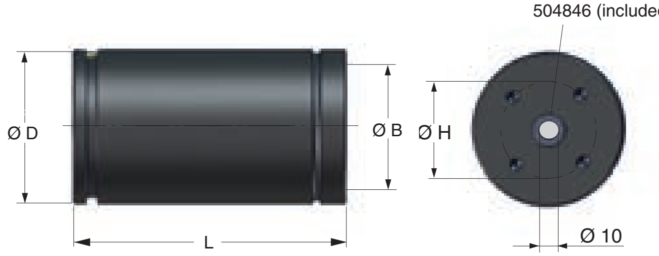
KALLER gas springs BP and adapters

Series	Model	Thread size	Torque [Nm] class 12.9
CU4	CU4 1800	M6	17
	CU4 2900	M8	40
	CU4 4700		
	CU4 7500		
	CU4 11800	M10	79
	CU4 18300		
CX	CX 500	M6	15
	CX 1000		
	CX 1900		

Series	BP adapter
CU4	4025110 or 4016253
CX	4026218

The adapters above have to be ordered separately when CU4 and CX are used.

KALLER Hose-less Baseplate Tanks (Tank BP) suitable for base plate mounting



How to order

Tank BP 120 - 237

Model — **Ø D** — **L**

Model	Ø D [mm]	L [mm]	Volume [l]	Ø B [mm]	Bottom Thread	Bottom Depth	Torque (Nm) Class 12	Ø H [mm]
Tank BP 95-167	95	167	0.6	80	M8	13	40	60
Tank BP 95-217		217	0.8					
Tank BP 95-277		277	1.1					
Tank BP 95-317		317	1.3					
Tank BP 95-367		367	1.6					
Tank BP 95-417		417	1.8					
Tank BP 95-467		467	2.1					
Tank BP 95-517		517	2.3					
Tank BP 120-187	120	187	1	100	M10	13	79	80
Tank BP 120-237		237	1.4					
Tank BP 120-297		297	1.9					
Tank BP 120-337		337	2.2					
Tank BP 120-387		387	2.6					
Tank BP 120-437		437	3.0					
Tank BP 120-487		487	3.4					
Tank BP 120-537		537	3.8					
Tank BP 150-202	150	202	1.6	125	M10	16	79	100
Tank BP 150-252		252	2.2					
Tank BP 150-312		312	3.0					
Tank BP 150-352		352	3.5					
Tank BP 150-402		402	4.1					
Tank BP 150-452		452	4.7					
Tank BP 150-502		502	5.4					
Tank BP 150-552		552	6.0					
Tank BP 195-207	195	207	2.7	160	M12	16	136	120
Tank BP 195-257		257	3.7					
Tank BP 195-317		317	4.9					
Tank BP 195-357		357	5.7					
Tank BP 195-407		407	6.7					
Tank BP 195-457		457	7.7					
Tank BP 195-507		507	8.8					
Tank BP 195-557		557	9.8					

To optimize the installation of a base plate, please contact your KALLER Distributor or use the KALLER Force Calculator at kaller.com.

...offer the possibility to reduce pressure increase

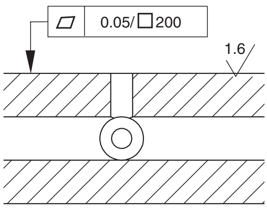
Recommendations for KALLER Hose-less Baseplate™ layouts

Unless otherwise specified.

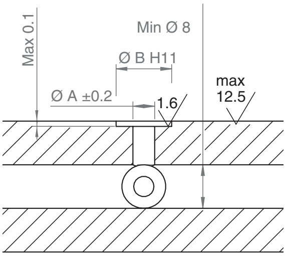
A complete customized and factory tested baseplate can be ordered from KALLER Sales & Service Offices. (See kaller.com/contact/)
KALLER Worldwide Guarantee applies to each complete system manufactured by KALLER.

Baseplate hole pattern

To achieve the most cost efficient machining solution, the following options can be used. The plate thickness depends on the number and size of the gas springs and the gas flow.



Option 1. Without countersink

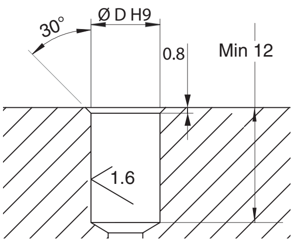


Option 2. With countersink

Square Seal	Ø A [mm]	Ø B H11 [mm]
504847	5	11.1
505978	8	14.3
504846	8 or 10*	19.0

**Ø 10 mm holes are used for all gas tanks. It should be at least two outlets between the gas tank and the gas springs.*

Adapter hole pattern



Adapter Model	Order No.	Ø D H9 [mm]
CU 10	4016253	10
CU 11	4025110	11
CX 6	4026218	6

Basic information

Pressure medium....................Nitrogen gas (N_2)
Max. charging pressure...........150 bar
Min. charging pressure.............25 bar**
Operating temperature.............0-+80°C
Plate thickness*..................... Min. 25 mm, .98"
Plate edges.......................... Burned out and painted
Fasteners............................. Metric High Grade Bolts
Drilled holes............................see table 2
Min. wall thickness..................2.5 mm

Baseplate O-ring repl. kit...... 3025238
Plug G 1/4".............................501866
Plug G 1/8".............................502508
For information about adapters and hoses, please see KALLER catalog "Hose Link Systems".
**Varies by system configuration*
*** for LCF, see KALLER catalog*

...for a more simple and efficient use

Product Series
Gas Link Systems

KALLER®
The Safer Choice

Pressure Tank

Edition 1. 2013

Would you like to order this product?
All available information at kaller.com.

Pressure Tank

Pressure Tanks are used together with the EO24-Hose system (or its equivalent) in applications where a low pressure/force build-up in the Hose System is advantageous (e.g. for deep draw tooling applications). By incorporating a Pressure Tank(s) into your Hose System, the overall gas volume in the Hose System increases, which causes the pressure/force build-up to be kept to a minimum.

Apart from the technical advantage of having a low pressure/force build-up in the Hose System, the service lifetime of the gas springs connected in the Hose System is also improved.

Please note!
Before incorporating pressure tanks into your Hose System, you may want to consider whether it is possible to use a longer nominal stroke gas spring of the same model.

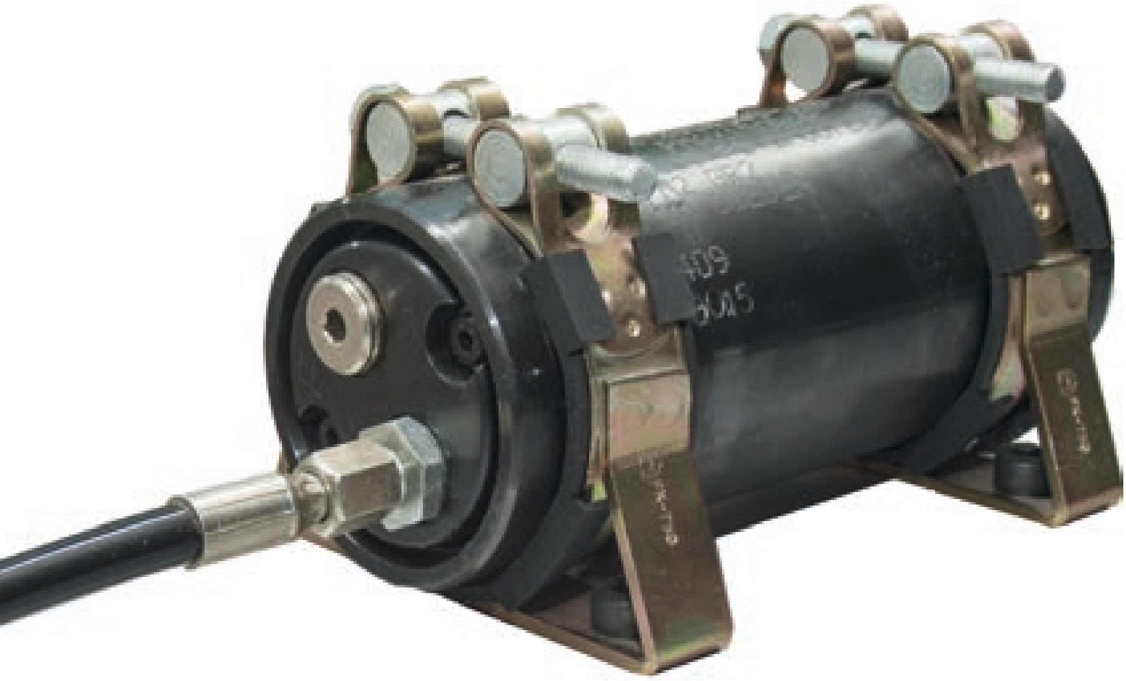
This method will have the effect of increasing the internal gas volume in your Hose System, thus reducing the pressure/force build-up.

KALLER - THE SAFER CHOICE

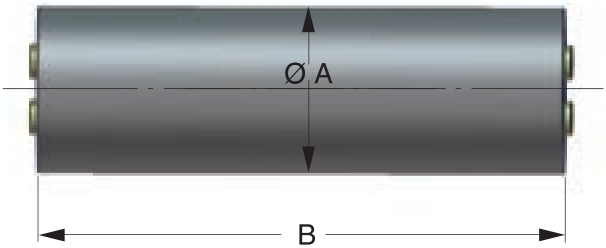
Training | **Reliability**

Training | PED 2 million

Need additional information on the KALLER features? Look at the back cover of this brochure or at www.kaller.com/FAQ

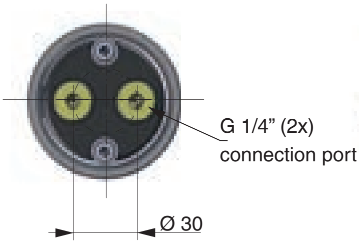


About Pressure Tanks

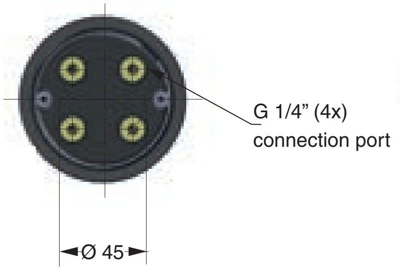


Order No.	Volume L	Ø A	B
2014340-025	0.25	75	170
2014340-050	0.5	75	250
2014340-100	1.0	75	410
2014341-100	1.0	95	300
2014341-200	2.0	95	500
2014341-300	3.0	95	700
2014341-400	4.0	95	900
2014342-200	2.0	120	360
2014342-400	4.0	120	615
2014342-800	8.0	120	1125

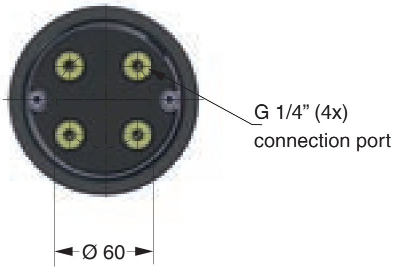
End plate 2014340



End plate 2014341



End plate 2014342



Approximate calculation of isothermal pressure force build-up:

$$\text{Pressure force build up} \approx \frac{VPT_{PT} + (n{*}VGS_{GS})}{VPT_{PT} + \left(n{*}(VGS_{GS} - S{*}A)\right)}$$

VPT = Volume of Pressure Tank (l) (see table above)
VGS = Gas volume of gas spring (l) (see respective spring model)
S = Stroke length of gas spring (dm) (see respective spring model)
A = Piston rod area of gas spring (dm²) (see adjacent table)
n = Number of gas springs

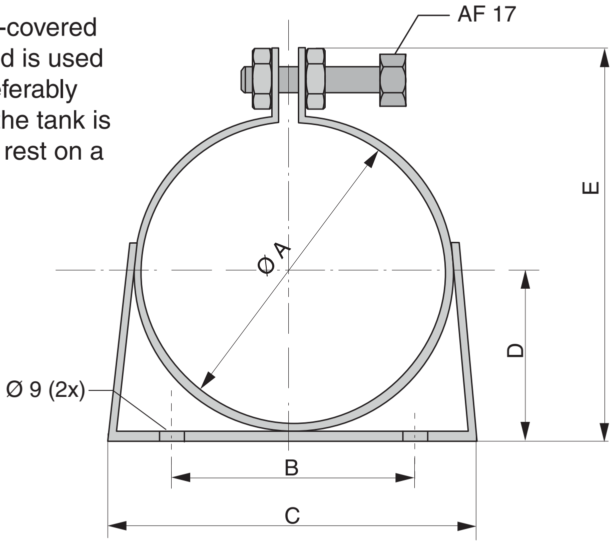
Gas Spring Size	Piston Rod Area (dm²)
500	0.031
750	0.049
1500	0.102
3000	0.196
5000	0.332
7500	0.503
10000	0.709

Example:
Ten TU 5000 gas springs with stroke length 50 mm are connected to a Hose-System with one 8 litre Pressure Tank (2014342-800).

$$\text{Pressure force build up} \approx \frac{8 + (10.0.51)}{8 + \left(10.(0.51 - 0.5.0.332)\right)} \approx 1.145$$

Bracket fixtures for Pressure Tanks

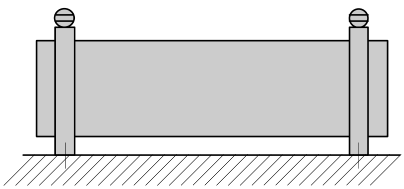
The bracket consists of a rubber-covered ring of galvanised sheet steel and is used to secure the Pressure Tank, preferably with one bracket at each end. If the tank is mounted vertically it should also rest on a solid support, see figures below.



Order No.	Ø A	B	C	D	E
500558	75	80	105	41.5	102
500559	95	100	145	51.5	122
500560	120	100	145	64	147

Fixing bracket assembly

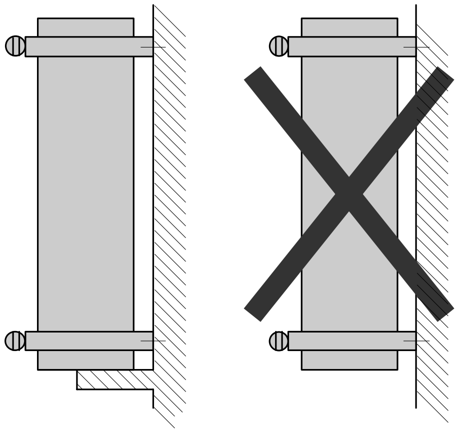
Horizontal



Vertical

Correct

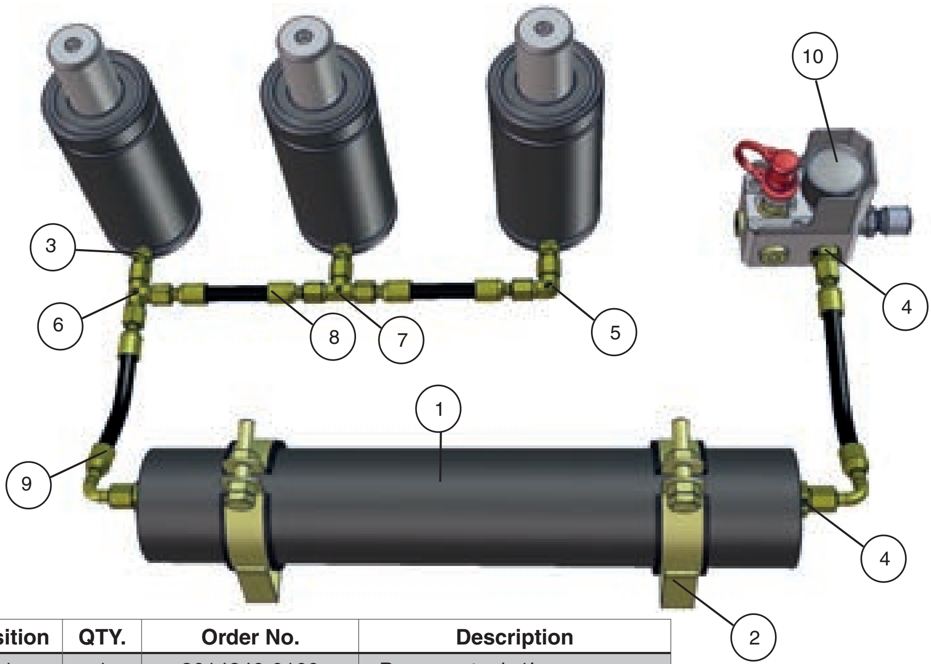
Incorrect



Installation Example, Pressure Tank with EO24-Hose System

Please note the following before installing a Pressure Tank into your Hose System:

- Use only hoses designed to allow for gas flow, such as the EO24-Hose system or its equivalent
- Connect a Control Block to one of the Pressure Tank's connection ports
- For optimal function each gas spring should be directly connected to one of the Pressure Tank's connection ports



Position	QTY.	Order No.	Description
1	1	3014340-0100	Pressure tank 1L
2	2	500558	Bracket Pressure tank
3	3	503593	Male Stud Connector G1/8"
4	3	504144	Male Stud Connector G1/4"
5	1	504146	Swivel Nut Elbow 90°
6	1	504147	Swivel Nut Run Tee
7	1	504148	Swivel Nut Branch Tee
8	6	3020857-xxxx	EO24 Straight - Straight Hose
9	2	3220857-xxxx	EO24 Straight - 90° Hose
10	3	4116114-02	Control Block

Product Series
Piercing and Forming Units / Cams

KALLER®
The Safer Choice

Flex Cam®

Edition 14.2016

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All available information at kaller.com.

The Flex Cam can be used for piercing, cutting, forming and flanging operations.

The system allows for a flexible distribution of forces with optimal direction and velocity during the operation. Cam Units or Force Cylinders can be coupled together to allow for multiple operations within the same tool to be performed simultaneously. Often by using a Flex Cam, fewer tools are required to produce the part.

The system comprises of a Hydraulic Power Unit, Cam Unit/Force Cylinder and interconnecting hoses. Different types of Cam Units/Force Cylinders are available to suit various types of applications. For technical data and dimensions refer to page 7.1 and 8.1.

For further information contact your local distributor or Strömsholmen AB at www.kaller.com or
Phone: +46 140 571 00 and Fax: +46 140 571 98.

Power Unit (HCP)

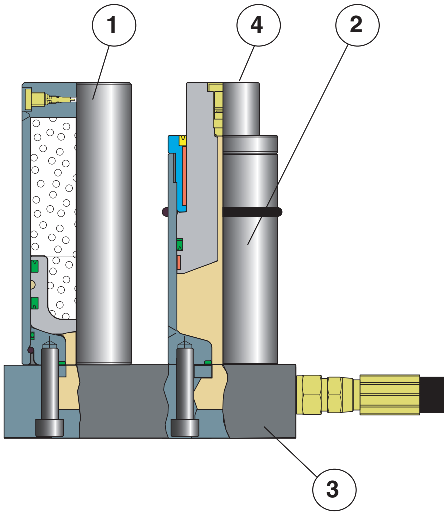
The Power Unit consists of an Accumulator (1), Power Cylinder (2) and a base plate (3). The purpose of the Accumulator is to set the force of the Cam and to prevent over pressurisation of the system. It will also contain some oil once the Cam has reached its stop position.

When the piston of the Power Cylinder is struck by the press (or machine) the Cam Units will then be actuated.

The size of the Power Unit is calculated from the number of Cam Units in the system, their sizes and their length of stroke.

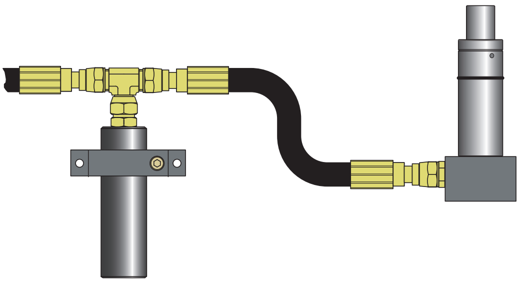
Note that the piston (4) of the Power Cylinder is at the same height as the Accumulator when this system is completely filled with oil.

The strokes specified are -0350, -0600, -1100 and 1600 in the order numbers. 10 mm extra stroke for the Accumulator is included.



Power Unit (HCP-S)

Where there are space restrictions within the tool, then the Power Unit is also available with separated Power Cylinder and Accumulator. See section 9.8 "Dimensions for Power and Cam Units".



Mounting orientation

Both HCP and HCP-S Power Units can be mounted at any angle and orientation which best fits the tool.

Alternative driver

It is also possible to use an electrically powered Hydraulic Pump Unit (EHC) as a driver for the Cam Units. See page 8.55.

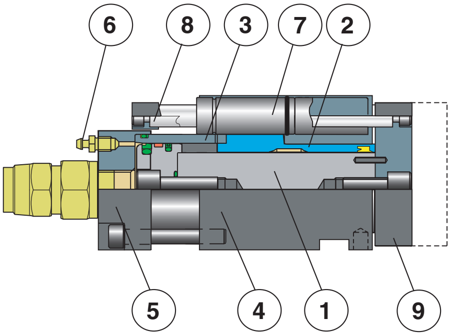
Compact Cam (CC)

The Compact Cam is a well guided unit, suitable for normal piercing operations with or without a small amount of side loading.

It consists of a piston with a piston rod (1), guide (2), sleeve (3), front housing (4), rear housing (5), bleed nipple (6), gas spring (7), anti rotation rods (8) and a punch adapter plate (9) for the punch holder.

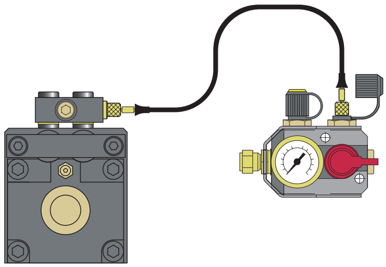
The Power Unit (HCP) or Hydraulic Pump Unit (EHC) can be used to actuate the Compact Cam. The Cam return force is provided by one or two internally installed gas springs. The punch adapter plate is prevented from rotating by the two anti-rotation rods.

The use of a polyurethane stripper is recommended in piercing or cutting operations to hold the panel down and to strip the punch from the panel.



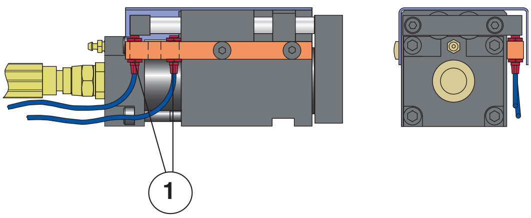
Compact Cam (CC-H) for Hosed System

The Compact Cam is also available in a version where the gas springs in the unit can be hosed to a control armature. This way the gas pressure in the spring can be monitored from outside the tool. See section 8 "Dimensions for Power and Cam Units/ Force Cylinders".



Option for CC and CC-H

A complete kit with proximity sensors (1), fittings, screws etc. can be fitted to the Compact Cams so that extended and retracted positions can be monitored.
See section 8 "Dimensions for Power and Cam Units/ Force Cylinders".



Flange Cam (CCF)

Patent No. SE 513031, EP 1212156

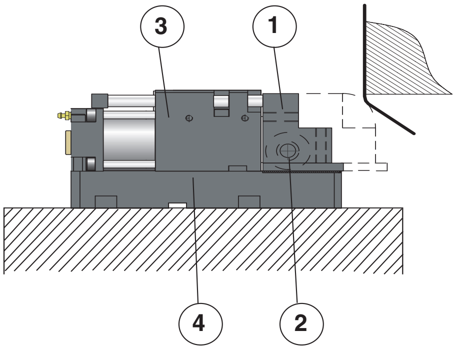
The Flange Cam is suitable for flanging and other operations with large amounts of side load.

No extra guides are required as the front adapter plate (1) is equipped with two roller bearings (2).

A Compact Cam Unit (3) is used as the driver and a bottom plate (4) provides support for the front adapter plate.

The Power Unit will actuate the Flange Cam and the return movement is provided by two internally installed gas springs.

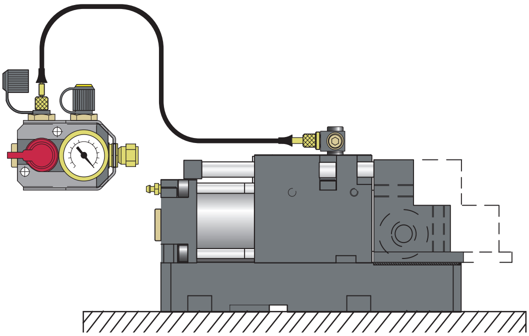
The front adapter plate is prepared with threaded holes to mount any customised flanging tool etc.



Patent No. SE 513031, EP 1212156

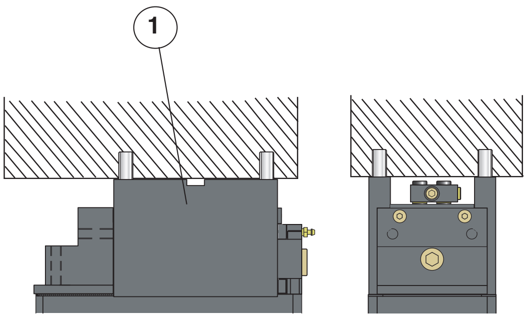
Flange Cam (CCF - H) for Hose System

The Flange Cam is also available in a version where the gas springs in the unit can be hosed to a control armature. This way the gas pressure in the spring can be monitored from outside the tool.
See section 8 "Dimensions for Power and Cam Units/ Force Cylinders".



Flange Cam spacers (optional)

The spacers (1) are required when mounting the Flange Cam from above (top mount) as shown here.

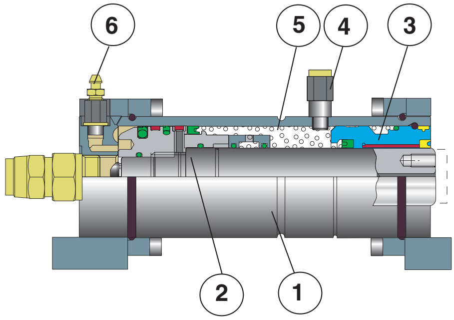


Force Cylinder (HCF)

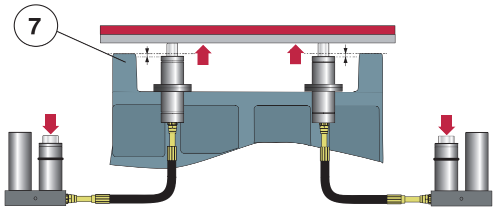
The Force Cylinder is suitable for forward and return motion of, for example, a flanging steel or forming punch used for various operations in the tool. Note that it is not possible to mount a punch directly onto the piston rod without a guide in the tool.

The Force Cylinder consists of a cylinder (1), piston with a piston rod (2), guide (3), gas valve (4), gas for return (5) and a bleed nipple (6).

The Power Unit (HCP) or Electrical Pump Unit (EHC) can be used to actuate the Force Cylinder. The return force is provided by the internal nitrogen pressure within the Force Cylinder. The Force Cylinder can be mounted using different types of flanges.



External stop (7) is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke.



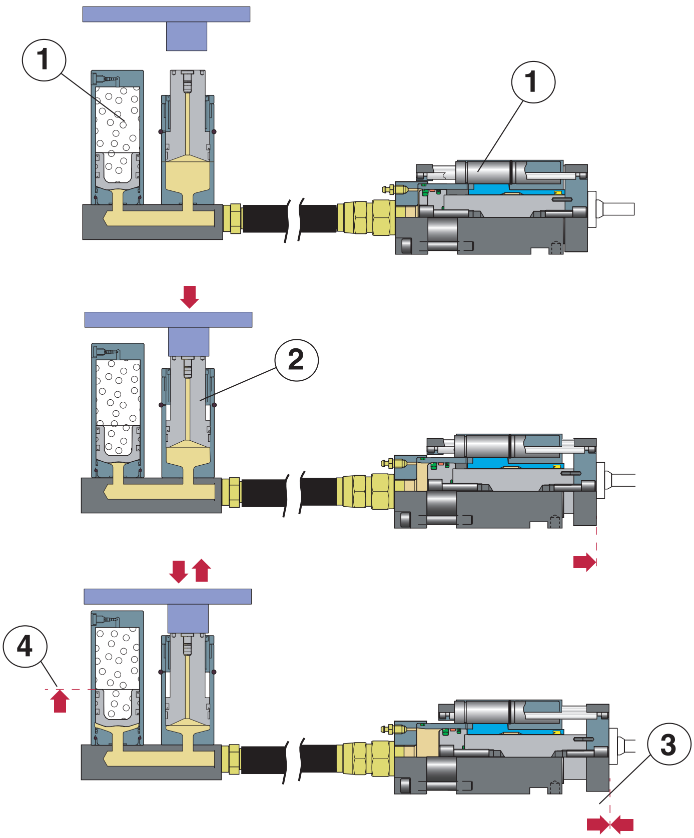
Function description

Normal use

The illustration below shows the Power Unit (HCP) and the Compact Cam (CC). The system works identically for a Compact Cam (CC), Flange Cam (CCF) or a Force Cylinder (HCF).

Before the press (or machine) activates the Power Unit the oil pressure is 0 bar but the Accumulator and the return Gas Springs in the Cam (or Force Cylinder) are charged with nitrogen (1). When the press strikes the piston in the Power Unit (2), the Cam will be actuated and the operation will thus be carried out.

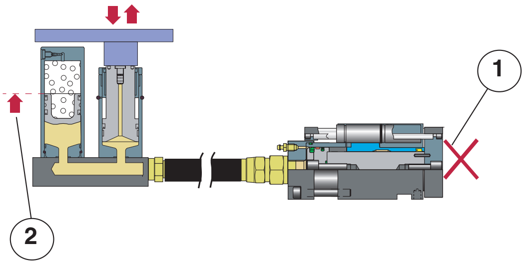
When the press returns upwards the movable parts will return to their original positions due to the return Gas Springs in the Cam (or nitrogen pressure in the Force Cylinder) and Accumulator.



Safety function

If the movement of the Cam is restricted in the tool (1), the piston in the Accumulator will be raised instead (2). The oil moves into the Accumulator to prevent over pressurisation of the system.

When the restriction has been removed the unit will function normally without needing to be refilled with oil.



Pressure build up in the system

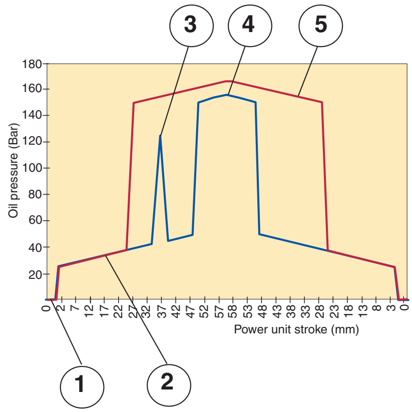
Before the Power Unit is activated the oil pressure is 0 bar (1).

The force from the gas pressure in the Cam Unit causes the oil pressure to increase (2).

The oil pressure will increase to create enough force needed to perform the operation (3).

When the Cam reaches its stop position the oil pressure increases to lift the piston in the Accumulator with a force equal to the nitrogen pressure (4) within the Accumulator.

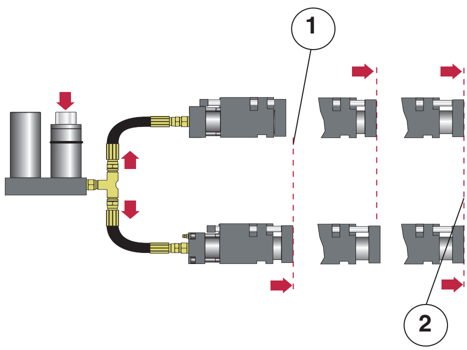
If the movement of the Cam is restricted the oil pressure will follow curve (5).



Connection of two or more Cam Units to one Power Unit

It is possible to connect up to three Cam Units to one Power Unit. Note that the movement of the Cams during the stroke are not synchronised (1) until the Cams are in the fully extended position (2).

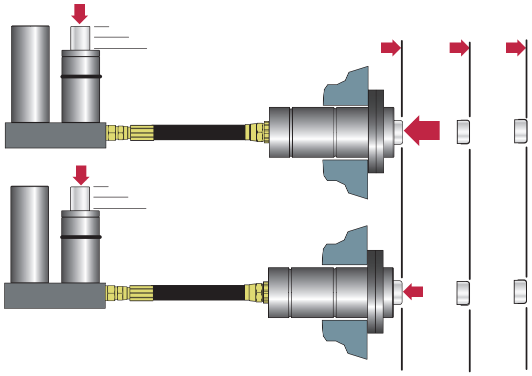
If more than three Cams are connected to one Power Unit the velocity in some of the Cams could be too high. The system could also be difficult to bleed and therefore is not recommended.



Parallel movement with two systems

For parallel movements where different forces may be required, it is recommended that two separate systems are used. For example, in order to move large pads in tools.

Here the movement of each Force Cylinder is synchronised regardless of the individual force required by each Force Cylinder.

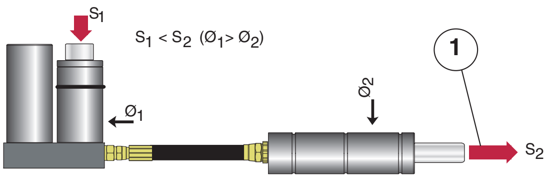


Adapting Cam stroke ratios

If you use a large Power Unit (eg. HCP 040) connected to a small Cam Unit (eg. CC 015) the stroke of the Cam Unit will increase in relation to the stroke of the press.

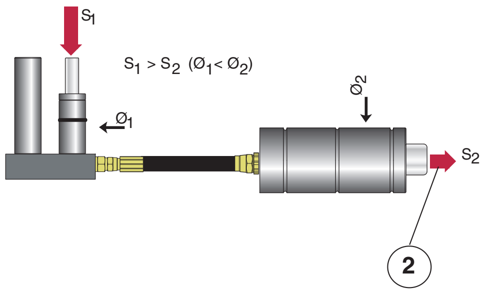
The difference in strokes is related to the stroke difference in piston areas. The stroke of the Cam Units will be faster than the stroke of the press (1).

($S_{Press} < S_{Cam\ Unit}$)



The opposite is also possible, shorter stroke of the Cam in relation to the press stroke (2).

($S_{Press} > S_{Cam\ Unit}$)



It is important that the velocity of the Cam does not exceed the specifications on page 7.1 "Technical data" See also page 6.4 "Component selection" step 5.

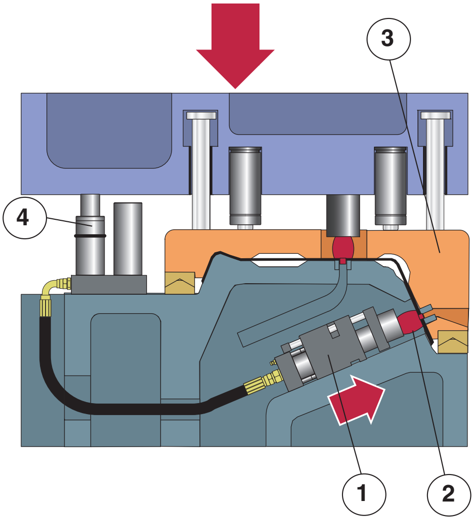
Application example using the Compact Cam

This example shows how a Compact Cam (1) can be used for piercing. The punch can be attached directly to the Cam Unit and no additional guides are required in the tool. As seen in the picture, the Power Unit can be placed remotely from the Cam Unit. This gives increased flexibility compared to a conventional mechanical solution. A stripper (2) on the punch is recommended.

Work cycle

As the upper tool moves downwards the blank holder (3) is activated and will keep the blank in position. The blank holder is guided relative to the lower die using V-blocks. When the blank holder is in position the Power Unit (4) will be activated and the Cam Unit will perform the punch operation.

Note that the Power Unit can be mounted at any location and orientation to the Cam Unit/Force Cylinder and not just as is depicted in these examples.

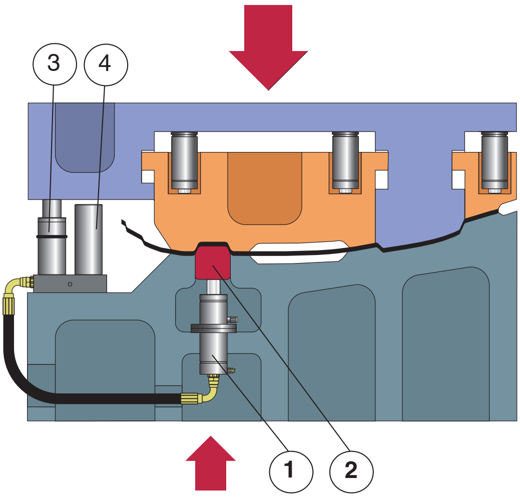


Application example using the Force Cylinder

This example shows how one or more Force Cylinders (1) can be used to drive forming punches (2) (or cam slides) in a tool. The punch (or slide) is guided in the tool. This method of driving tool 'components' allows for high flexibility in tool design. The Force Cylinder supplies the motion and force. Only pulling and pushing forces are possible.

Work cycle

As the upper tool moves downwards the blank holder is activated and will keep the blank in position. When the blank holder is in position the Power Unit (3) is activated thus activating the Force Cylinder. The forming force can be adjusted by simply changing the pressure in the Accumulator (4).



Installations currently in operation

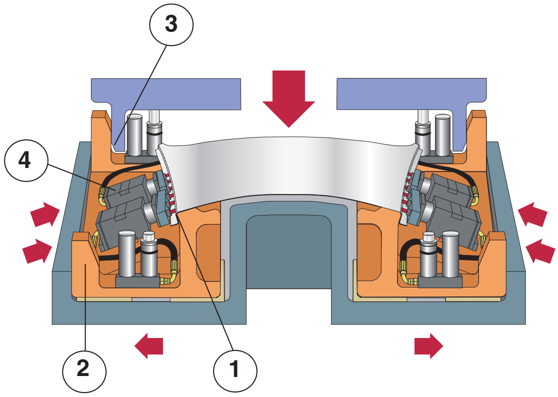
The following examples are of installations now running in production and illustrates som of the different ways the benefits of the Flex Cam are being used.

Example 1. Piercing 4 x 3 holes

12 holes are being pierced at an undercut angle (1). In this tool a mechanically driven pad (2) has been equipped with Flex Cams.

During the first part of the operation the pad is moved into position, using the angled part of the drivers (3). Once the pad is in position, the drivers become inoperative by only sliding on their vertical faces. The Power Units are activated and the holes are punched by the Cams (4).

Using this solution there is no longer the need for drivers at the punching position and therefore punching operations can easily be carried out perpendicularly to the blank.

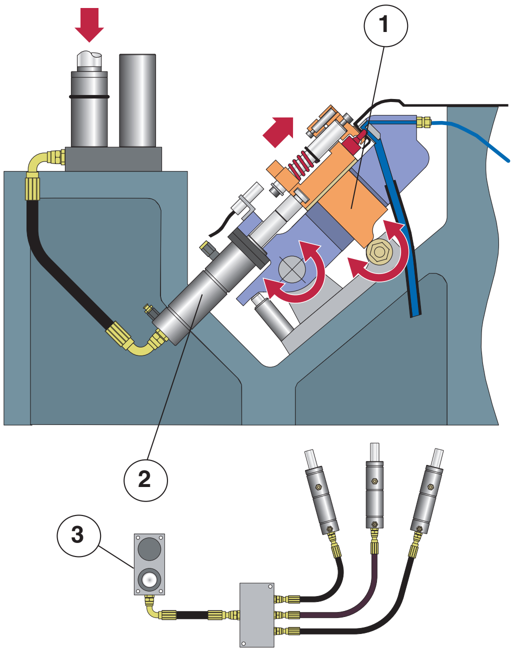


Example 2. Piercing 2 x 3 holes

6 holes are being punched at an undercut angle using Force Cylinders activating a pivoting piercing unit (1).

The picture shows the unit in its extended position (press at bottom dead centre). As the Force Cylinder (2) starts to move backwards, the punch retracts from the hole and thereafter the whole unit will pivot down allowing for the part to be removed. The reverse will happen as the press moves back down.

There are two systems in the tool, one on the left side, one on the right. Each system consists of one Power Unit (3) driving three Force Cylinders.

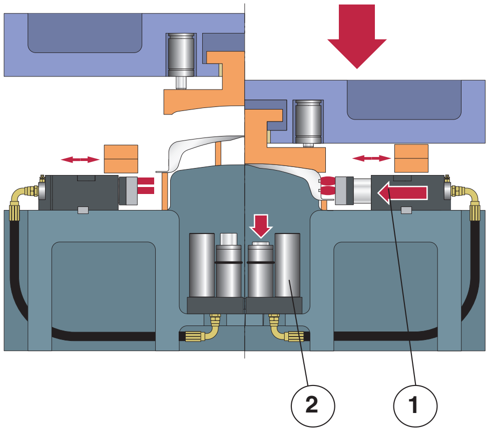


Example 3. Piercing 2 holes in two parts

In this tool two parts are being produced simultaneously. The left part of the picture shows the press at its upper position. The right part shows the press in its bottom position. Shown above the Cam Units are the transfer arms.

To allow the flange of the part to pass the punches, before the Cam Units are activated, a smaller size Cam Unit has been connected to a bigger size Power Unit. In this case a 1.5 tonne Cam 015 (1) connected to a 4 tonne Power Unit HCP 040 (2). This will give a stroke ratio of 2.5. (As the press/ Power Unit moves 10 mm vertically, the Cam Unit will move 25 mm horizontally)

Two versions of the same part are produced, one with holes and one without. For the part without holes, the Power Unit is simply removed from the tool, thus disabling the Cam Units from making the holes.

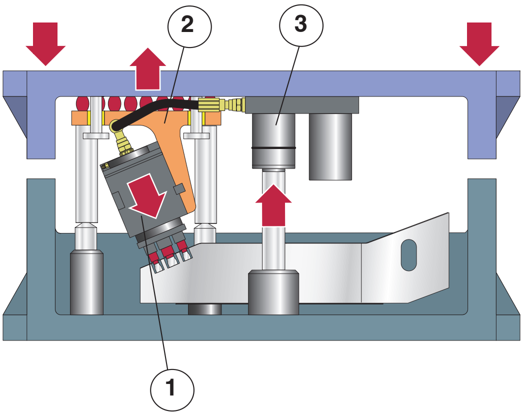


Example 4. Piercing 6 holes

This application uses an hydraulic cam system mounted upside down in the upper tool. The Cam Unit (1) is mounted on a floating die (2). The floating die is centred relative to the lower die using conical pillars and the die is backed up by springs. As the press moves downwards, and the floating die is centered, the Power Unit (3) is activated and the holes are punched.

Prior to the installation of the hydraulic cam system, the holes were being punched at a vertical angle using oval shaped punches.

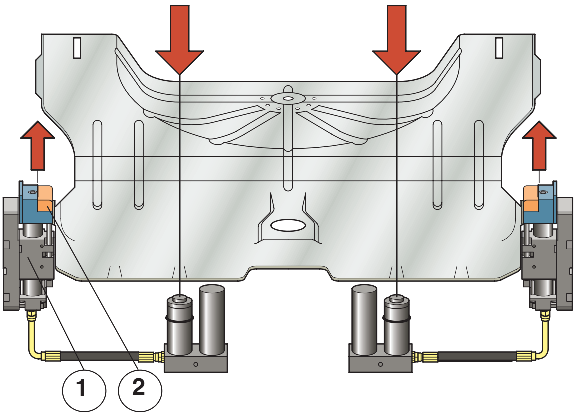
The production and quality enhancements, as a result of the installation of the Flex Cam, resulted in a payback time of three months for the system, including installation.



Example 5. Flanging

The picture shows a floor panel where Flange Cam Units (1) are being used for flanging upwards (2). All side loading forces associated with the flanging operation are taken up within the Flange Cam Units.

In this case the customer saves the cost of one complete tool, by using the Flex Cam, as these operations could be added to an existing tool. The other option would have been to produce a completely new tool with a floating pad.



Example 6. Flanging a wide edge

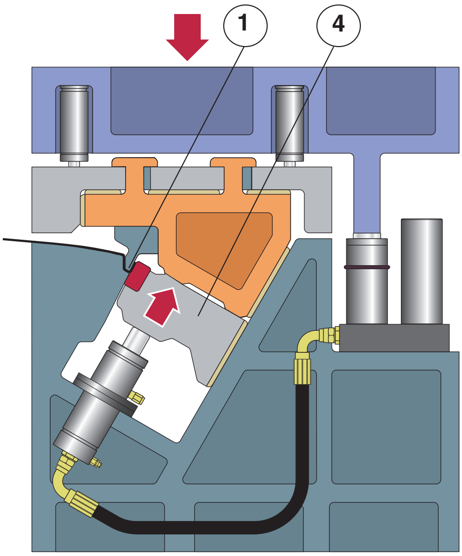
In this tool two Force Cylinders are being used to drive a 800 mm wide flanging steel. As seen in the picture the flanging (1) is carried out at an angle opposite to the direction of the press motion.

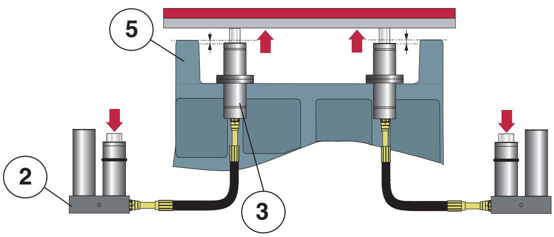
To ensure a parallel movement at both ends of the flanging steel two separate cam systems are being used. Each system containing a Power Unit (2) and a Force Cylinder (3).

The flanging steel (4) is well guided in the tool and the Force Cylinders are only subject to axial forces.

Using the Flex Cam has simplified the design of the tool and therefore also reduced the tooling cost.

External stop (5) is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke.





1. The number of tools required to produce a part can be reduced since flanging and piercing operations can now easily be performed within the same tool

2. The cost of the tool could be reduced due to a more simplified tool design

3. The system “drivers” do not have to be positioned close to the working Cam Units/ Force Cylinders. Drivers can be seated in any position to suit the design of the tool.

4. It is possible to add operations in existing tools to lower the costs of purchasing new tools

5. All units can be installed at any location and orientation to fit an existing tool, even upside-down

6. Built in safety feature against tool damage or over pressurisation of the system through the use of an Accumulator

7. Side load in the tool could be reduced because the Power Unit always works in a vertical direction

8. Even force distribution possible within the tool due to flexibility of Power Unit location

9. Increased quality of the produced parts and longer life of the punches is possible because the piercing is performed perpendicularly to the panel

10. The force of the Cam Unit/ Force Cylinders can be altered to suit an operation by simply adjusting the nitrogen pressure in the Accumulator

The following step by step instruction shows how to select the size of the units when taking into consideration the required forces, stroke length and the number of operations.

Step 1 (For piercing and cutting only)

Shear and stripping force calculations for piercing and cutting operations.

Sheet metal thickness..................................	: t =	____________	mm
Tensile strength..	: =	____________	N/mm²
Shearing strength (= x 0.8)....................	: =	____________	N/mm²
Diameter of punch	: d =	____________	mm
(or)			
Total cut length...	: 1 =	____________	mm

Piercing force F_p

Piercing a round hole

$F_p = t \times \tau \times d \times \pi$

Piercing or cutting

$F_p = t \times \tau \times l$

Example

Calculate force needed to pierce a Ø 10.5 mm hole in a 1.2 mm thick panel. Tensile strength is 400 N/mm². (Normally between 270 - 400 N/mm²).

$Fp = 1.2 \times 400 \times 0.8 \times 10.5 \times \varpi$
$Fp = 12667$
$Fp \approx 12.7$ kN

Stripping force F_s

$F_s = F_p \times 0.11$ (roughly 11% of the required piercing force)

Example

$Fs = 12667 \times 0.11$
$Fs = 1393$
$Fs \approx 1.4$ kN

Step 2 Size of Cam Unit/ Force Cylinder

Calculate the force required for the operation in the tool. Make sure to choose a Cam Unit/ Force Cylinder with enough force to perform the operation. If the amount of force required is a little uncertain it is better to use a larger size of Cam.

Required force:

_______________kN

Required force (kN)	Cam Unit/ Force Cylinder
0-15	015
15-40	040
40-60	060
60-90	090
90-150	150

Size Cam Unit/ Force Cylinder:

____

Example

Choose a Cam Unit 040 if the required force is 22 kN.

Step 3 Stroke length of Cam Unit/Force Cylinder

Check the necessary stroke of the Cam Unit/Force Cylinder to perform the operation in the tool. Choose the shortest stroke length but make sure that there is enough room for the produced part in the tool.

Required stroke length (mm)	Max. stroke length, Cam Unit (mm)	Max. stroke length, force Cylinder (mm)
0-24	24	25
24-49	49	50
49-99	99*	100
99-150	124**	150

Stroke length Cam Unit/ Force Cylinder:

_______________mm

* This stroke length is not available for Compact Cam 015

**This stroke length is only available for Compact Cam 040

Example

If the required stroke is 35 mm choose a Cam Unit/Force Cylinder with 50 mm stroke length

Step 4 Order number for the Cam Unit/Force Cylinder

Choose the Cam Unit/ Force Cylinder depending on the type of the operation.

See also page 2.2, 4.1 and 8.1.

Example

The order number for the 40kN Compact Cam with 49 mm stroke length will be CC 040-049.

Compact Cam:

CC_______-________

Flange Cam:

CCF_______-________

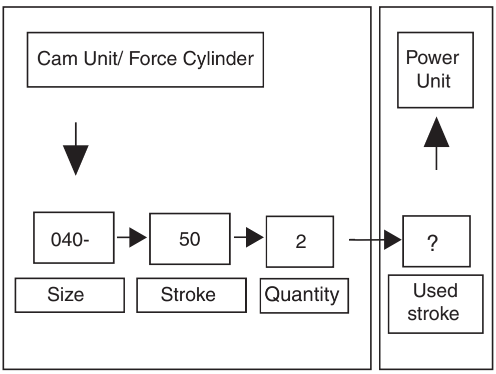
Force Cylinder:

HCF_______-________

Step 5a Size and stroke of Power Unit

Step 5a is valid when using 1-3 Cam Units/ Force Cylinders of equal sizes connected to one Power Unit. Step 5b is valid when different Cam Units/ Force Cylinders are connected to one single Power Unit.

Use the table next page to choose the Power Unit. Read the table in the following order: Cam Unit/ Force Cylinder – Size – Stroke – Quantity – Power Unit. Check always that your available press stroke = used stroke Power Unit.
More than three Cam Units/ Force Cylinders connected to one Power Unit is not recommended.
Do not exceed the maximum Cam velocity, see also page 7.1.



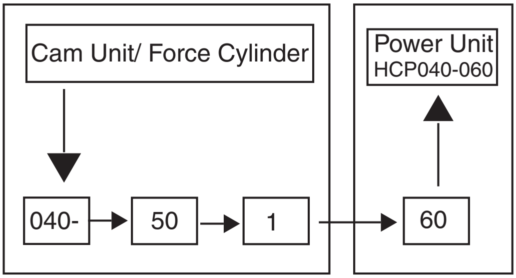
CAM UNIT / FORCE CYL.			POWER UNIT / Used stroke / Ratio CAM UNIT or FORCE CYL.-POWER UNIT														
Size	Stroke	Qty	015-	Stroke	Ratio	040-	Stroke	Ratio	060-	Stroke	Ratio	090-	Stroke	Ratio	150-	Stroke	Ratio
015-	25	1	35	35	1.0	35	20	2.5	35	16	4.0	35	14	6.3	35	13	9.8
	25	2	60	60	0.5	35	30	1.2	35	23	2.0	35	18	3.1	35	15	4.9
	25	3	110	85	0.3	60	40	0.8	35	29	1.3	35	22	2.1	35	18	3.3
	50	1	60	60	1.0	35	30	2.5	35	23	4.0	35	18	6.3	35	15	9.8
	50	2	110	110	0.5	60	50	1.2	35	35	2.0	35	26	3.1	35	20	4.9
	50	3				110	70	0.8	60	48	1.3	35	34	2.1	35	25	3.3
	100	1	110	110	1.0	60	50	2.5	35	35	4.0	35	26	6.3	35	20	9.8
	100	2				110	91	1.2	60	60	2.0	60	42	3.1	35	30	4.9
	100	3				160	131	0.8	110	85	1.3	60	58	2.1	60	41	3.3
	150	1	160	160	1.0	110	70	2.5	60	48	4.0	60	34	6.3	35	25	9.8
	150	2				160	131	1.2	110	85	2.0	60	58	3.1	60	41	4.9
	150	3							160	123	1.3	110	82	2.1	60	56	3.3
040-	25	1	110	72	0.4	35	35	1.0	35	26	1.6	35	20	2.5	35	16	3.9
	25	2				60	60	0.5	60	41	0.8	35	30	1.3	35	23	2.0
	25	3				110	85	0.3	60	57	0.5	60	40	0.8	35	29	1.3
	50	1				60	60	1.0	60	41	1.6	35	30	2.5	35	23	3.9
	50	2				110	110	0.5	110	72	0.8	60	50	1.3	35	35	2.0
	50	3				160	160	0.3	110	103	0.5	110	70	0.8	60	48	1.3
	100	1				110	110	1.0	110	72	1.6	60	50	2.5	35	35	3.9
	100	2							160	134	0.8	110	89	1.3	60	60	2.0
	100	3										160	129	0.8	110	86	1.3
	150	1							110	103	1.6	110	70	2.5	60	48	3.9
	150	2										160	129	1.3	110	86	2.0
	150	3													160	124	1.3
060-	25	1	110	110	0.3	60	50	0.6	35	35	1.0	35	26	1.6	35	20	2.4
	25	2				110	91	0.3	60	60	0.5	60	42	0.8	35	30	1.2
	25	3				160	131	0.2	110	85	0.3	60	58	0.5	60	41	0.8
	50	1				110	91	0.6	60	60	1.0	60	42	1.6	35	30	2.4
	50	2							110	110	0.5	110	74	0.8	60	51	1.2
	50	3							160	160	0.3	110	106	0.5	110	71	0.8
	100	1							110	110	1.0	110	74	1.6	60	51	2.4
	100	2										160	138	0.8	110	92	1.2
	100	3													160	133	0.8
	150	1							160	160	1.6	110	106	1.6	110	71	2.4
	150	2													160	133	1.2
090-	25	1				110	73	0.4	60	49	0.6	35	35	1.0	35	26	1.6
	25	2				160	136	0.2	110	88	0.3	60	60	0.5	60	42	0.8
	25	3							160	127	0.2	110	85	0.3	60	58	0.5
	50	1				160	136	0.4	110	88	0.6	60	60	1.0	60	42	1.6
	50	2										110	110	0.5	110	74	0.8
	50	3										160	160	0.3	110	106	0.5
	100	1										110	110	1.0	110	74	1.6
	100	2													160	138	0.8
	150	1										150	160	1.0	110	106	1.6
150-	25	1				110	108	0.3	110	71	0.4	60	49	0.6	35	35	1.0
	25	2							160	132	0.2	110	88	0.3	60	60	0.5
	25	3										160	127	0.2	110	85	0.3
	50	1							160	132	0.4	110	88	0.6	60	60	1.0
	50	2													110	110	0.5
	50	3													160	160	0.3
	100	1													110	110	1.0
	150	1													160	160	1.0

Combinations of Cam Units and Power Unit marked are normally not recommended as maximum Cam velocities can be exceeded if Power Unit is stroked too quickly. See also the following examples.

See also the following examples:

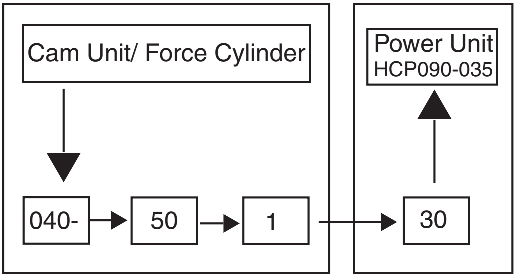
Example 1.

If you have chosen one Compact Cam Unit CC 040-049 the normal Power Unit will be HCP 040-060. The used stroke of the Power Unit is 60 mm. The ratio will be 1.0 which gives the same Compact Cam stroke velocity as the press.
(Press stroke 10 mm - Cam stroke 10 mm).



Example 2.

If it is possible to use only 30 mm of stroke from the press to perform an operation, choose a larger Power Unit HCP 090-035 connected to one Cam Unit CC 040-049. The used stroke of the Power Unit will be 30 mm and the ratio 2.5. If the press speed is 0.3 m/s the Cam speed will be 2.5 x 0.3 = 0.75 m/s.
(Press stroke 10 mm - Cam stroke 25 mm).

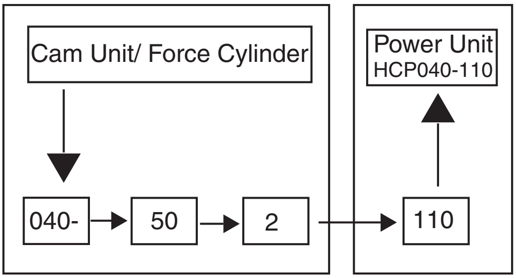


The used stroke of the Power Unit and the Cam Unit/ Force Cylinder can always be optimised to suit the situation in the tool. In some installations it is necessary to increase the velocity of the Cam relative to the press. Note that the movement of the Cams during the stroke is not equal when more than one cam is connected to the Power Unit.

Example 3.

If you choose to use two Cam Units of size CC 040-049 and have a possible 110 mm of the press stroke available then use Power Unit HCP 040-110. The used stroke of the Power Unit will be 110 mm and the ratio 0.5.

If the press speed is 0.3 m/s the medium velocity of the Cams will be 0.5 x 0.3 = 0.15 m/s.
(Press stroke 10 mm - Cam stroke approximately 5 mm).



Power Unit order number:
See also page 4.1 and 8.1.

Power Unit:

HCP______ - ______

Step 5b Size and stroke of Power Unit using different sizes of Cam Units/Force Cylinders

Determine first the total oil volume for the Cam Units/ Force Cylinders using the formula below. The total oil volume is the sum of the volumes of all Cam Units/ Force Cylinders. The volume is the piston area times the used stroke. The total oil volume V_c for the Cam Units/ Force Cylinders = minimum oil volume for the Power Unit in dm^3. A_n is the piston area in the Cam Units in dm^2 as shown in Table 1.

$V_c = ((A_1 \times S_1) + (A_2 \times S_2).....(A_n \times S_n))/100$

A_n = Area, Cam Unit
S_n = Stroke length, Cam Unit

Table 1. Piston area for the Cam Units/ Force Cylinders

CC HCF	015	040	060	090	150
A_n (dm^2)	0.13	0.31	0.50	0.79	1.23

Total oil volume Cam Units/ Force Cylinders:

V_c = ________ dm^3

Choose the appropriate Power Unit from Table 2. The Power Unit has to give at least the minimum volume of oil as calculated above. Calculate the used stroke S_p of the Power Unit using the formula below:

$S_p = ((V_c / V_{HCP}) * S_{HCP}) + 10$

V_c = Total oil volume Cam Units/ Force Cyl.
V_{HCP} = Oil volume Power Unit
S_{HCP} = Stroke Power Unit

Note, the additional 10 mm is required so that a precise Cam stroke is performed. See 3.1 for a Function Description.

Table 2. Oil volume Power Unit V_{HCP}

Stroke length S_{HCP}	HCP				
	015	040	060	090	150
25 mm	0.031	0.078	0.126	0.196	0.307
50 mm	0.063	0.156	0.251	0.393	0.614
100 mm	0.126	0.312	0.502	0.785	1.227
150 mm	0.188	0.468	0.753	1.178	1.841

Used stroke Power Unit:

S_P = ________ mm

See also the following example:

Choose a Power Unit to supply one Compact Cam CC 015-049 and one Force Cylinder HCF 040-050 with only 40 mm used stroke.

$V_c = ((A_{CC} \times S_{CC}) + (A_{HCF} \times S_{HCF}))/100$

$V_c = ((0.13 \times 49) + (0.31 \times 40))/100$

(See Table 1)

$V_c = 0.189$

Choose a Power Unit with more than 0.189 dm^3 oil volume for example HCP 060-60 which has 0.251 dm^3. (Another alternative HCP 040-110.)
Calculate used stroke of the Power Unit:

$$S_p = ((V_c / V_p) \times S_{HCP}) + 10$$

$$S_p = ((0.189 / 0.251) \times 50) + 10$$

$$S_p = 48 \text{ mm}$$

In the above example, a Power Unit HCP 060-060 is recommended with a used stroke of 48 mm. Do not exceed the specified velocity of the Cam Units/ Force Cylinders according to page 7.1 "Technical data".
Remember also that one of the Cams will move slightly before the other one when using two Cams coupled to one Power Unit.

Step 6

Choose hose and adapters according to page 9.8/27 "Dimensions for accessories".
Maximum hose length between Power Unit and Cam Unit is 2 m. The size of the hose is always set by the size of the Power Unit. The size of the hose is adapted for the oil flow according to the velocities in page 7.1 "Technical data".

If you need a smaller hose than our normal specifications, check your press velocity and refer to Table 1 or page 8.37.

It is easiest to choose the correct hose length when the Cam Unit/ Force Cylinder and the Power Unit are installed in the tool.

Make sure that the hose is long enough and is protected against sharp edges and external damage. The hose will flex a little due to the oil pressure pulsation during operation. Make sure the minimum bending radius of the hoses when installed are not below that which is specified.

Table 1

	Hose size - Press velocity			
Power Unit	**Standard size Max. velocity 0.8 m/s**	**0.6 m/s**	**0.4 m/s**	**0.2 m/s**
HCP 015	1/2”	3/8”	3/8”	3/8”
HCP 040	3/4”	3/4”	1/2”	1/2”
HCP 060	1”	3/4”	3/4”	1/2”
HCP 090	1”	1”	3/4”	1/2”
HCP 150	1 1/4”	1 1/4”	1”	3/4”

Capacity and performance

The forces in the table below are valid when the following normal gas pressures are used

Accumulator	150 bar
Force Cylinder	20 bar
CC 015-040, CCF 040 Return spring M2 200	180 bar
CC 060 Return springs X 350	180 bar
CC 090 Return spring TU 500	150 bar
CC 150 Return spring X 750	150 bar

Description	Unit	Force Cylinder					Compact Cam					Flange Cam	Power Unit				
		HCF					CC					CCF	HCP				
Force (size)	kN	15	40	60	90	150	15	40	60	90	150	40	15	40	60	90	150
Working return force (min)	kN	1.5	4	6	9	14	2	4	7	10	15	4	---	---	---	---	---
Max. frequency	op/min	60			30		60			30		60	60			30	
Max. velocity	m/s	1.6					1.6					1.6	1.6				
Min. gas pressure	bar	10					125			105		125	50				
Max. gas pressure	bar	40					180			150		180	180				
Stroke length	mm	25, 50, 100, 150					24, 49, 99*, 124**					49, 99	35, 60, 110, 160				
Expected life time	op.	$1x10^{6}$					$1x10^{6}$					$1x10^{6}$	$1x10^{6}$				
Surrounding temp	°C	10-40					10-40					10-40	10-40				

* not CC 015
** only CC 040

Other values than those specified in the table above could be accepted under special conditions or combinations of stroke length, velocity and frequency.

Other specifications

The hydraulic oil Shell Tellus TX 32 is the recommended oil as defined below:

DIN 51524 HVLP ISO VG 32
Purity ISO 4406 15/12 (with 10μm filter)

Nitrogen:

Nitrogen N_2	>99.95	vol %
Water H_2O	< 40	ppm

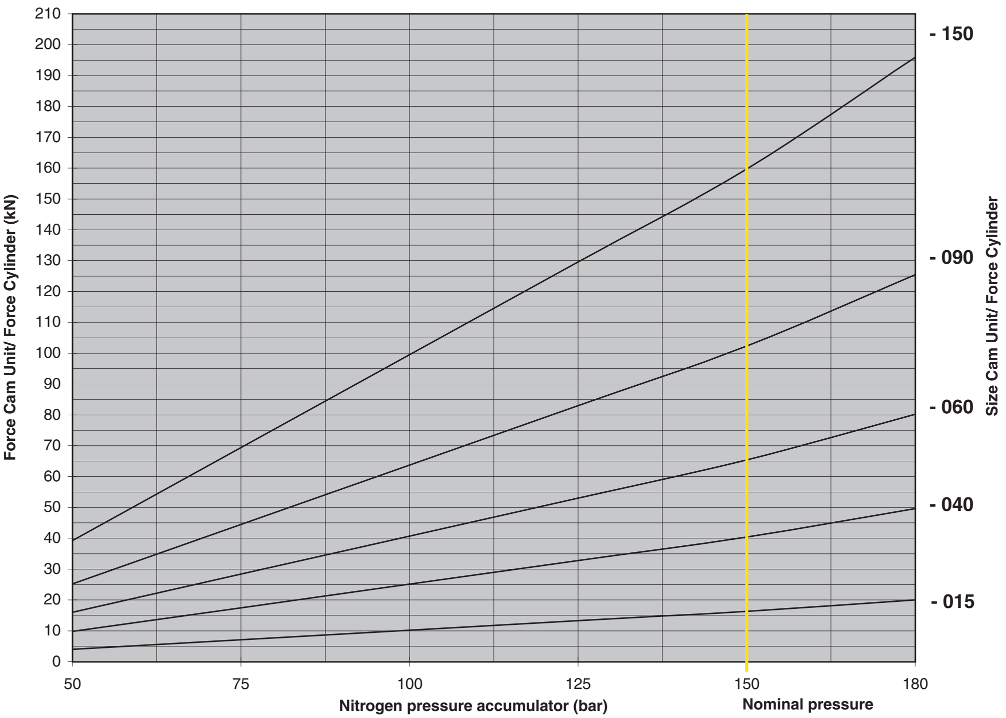
Cam Unit/ Force Cylinder force as a function of nitrogen pressure in the Accumulator

If you need to increase or decrease the force of the Cam Unit/ Force Cylinder, it is possible to change the nitrogen pressure according to the diagram below.

Example.

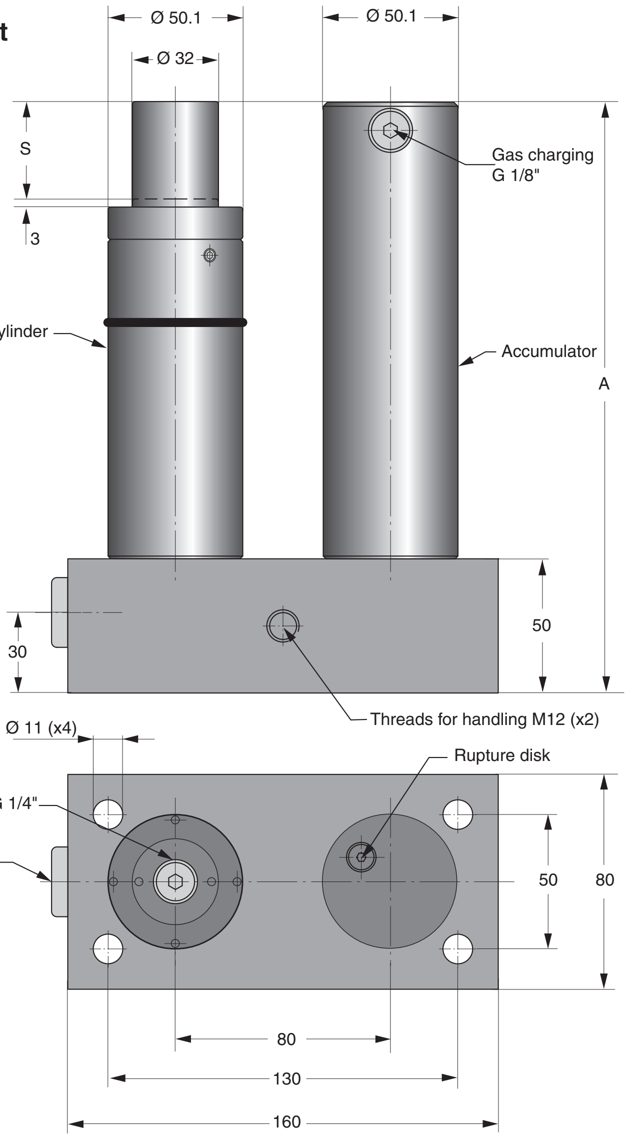
A Force Cylinder size 040 is used to perform a forming operation. With the normal Accumulator charge pressure of 150 bar, this Force Cylinder gives 40 kN. If 25 kN of force is required then the Accumulator charge pressure should be reduced to 100 bar instead.

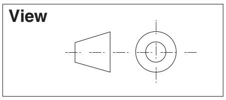
Force Cam Unit/ Force Cylinder - Nitrogen Pressure Accumulator



Power and Cam Units/ Force Cylinder

HCP 015 Power Unit

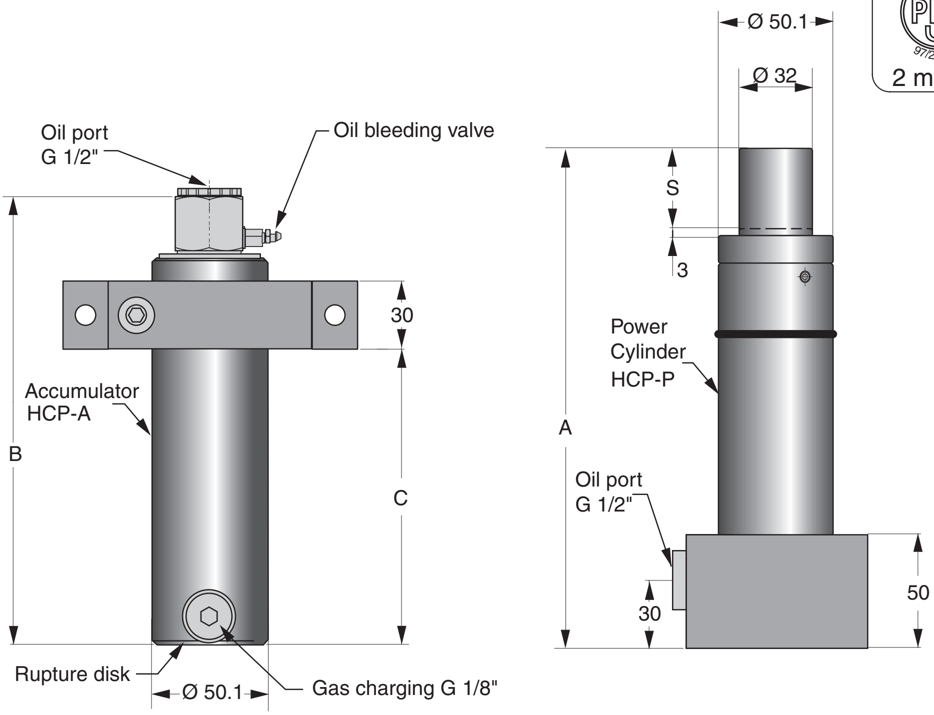


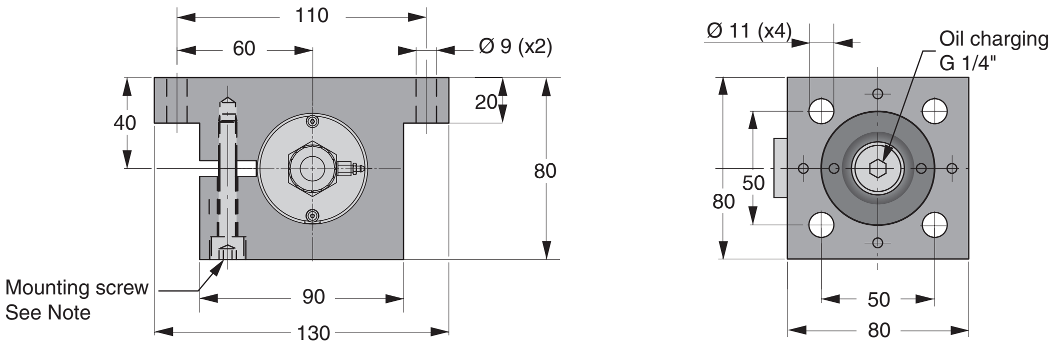


Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 015-035	15	35	220	8.2
HCP 015-060	15	60	270	9.1
HCP 015-110	15	110	370	10.5
HCP 015-160	15	160	470	11.3

HCP-S 015 Power Unit, with Separate Accumulator

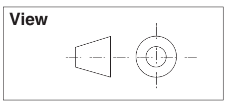
2 million





Note! The Mounting screw (M8) should be tightened with torque 25Nm

Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 015 - 035	7.3	15	35	220	213	130	HCP-P 015 - 035	4.3	HCP-A 015 - 035	3.0
HCP-S 015 - 060	8.1	15	60	270	264	180	HCP-P 015 - 060	4.7	HCP-A 015 - 060	3.4
HCP-S 015 - 110	9.6	15	110	370	364	280	HCP-P 015 -110	5.5	HCP-A 015 - 110	4.1
HCP-S 015 - 160	10.7	15	160	470	464	380	HCP-P 015 - 160	6.0	HCP-A 015 - 160	4.7



Note! The Accumulator should always be used in the system.

CC 015 Compact Cam

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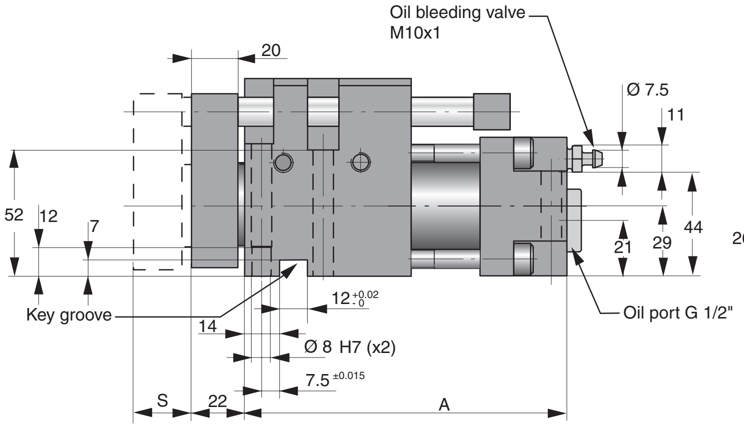
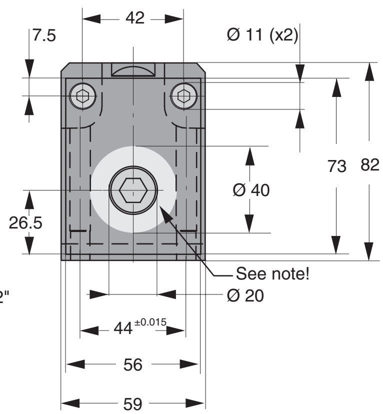
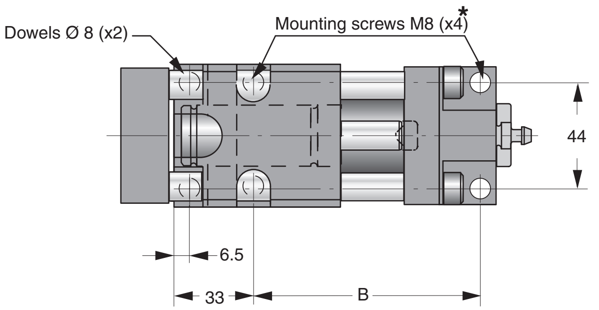
2 million







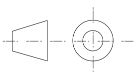
* 4 pcs mounting screws are included

Note!
Important installation information:

We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch or punches will create during the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

View



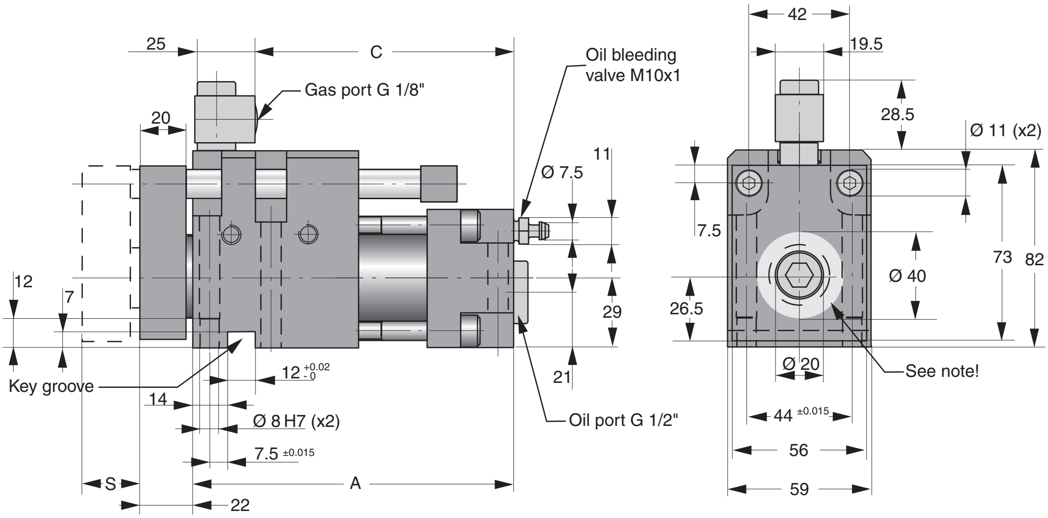
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 015-024	15	2	24	133.5	94	4.2
CC 015-049	15	2	49	158.5	119	4.6

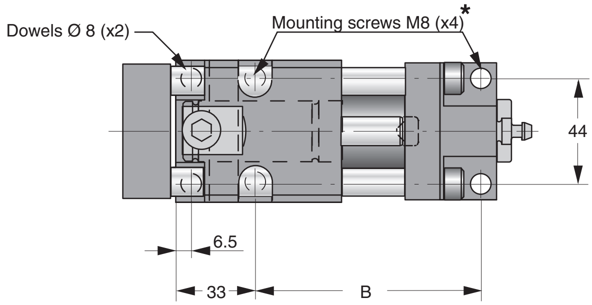
* = Nominal force available for the operation

CC-H 015 Compact Cam for pressure control

APPROVED PED 97/23/EC
2 million

This version can only be used together with a hose system as there are no gas charging valves in the springs or adapters





* 4 pcs mounting screws are included

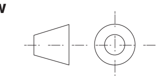
Note!
Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch or punches will create during the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

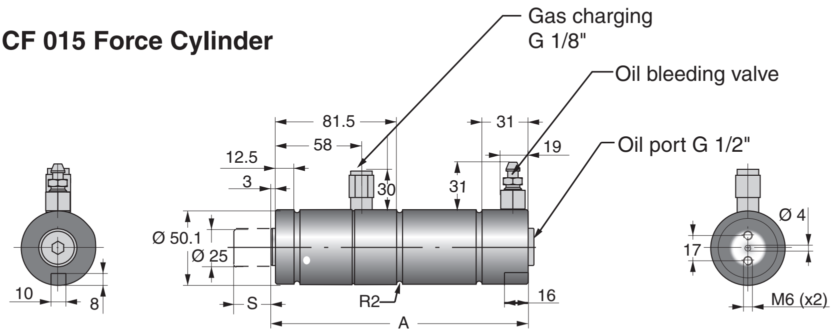
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight
CC-H 015-024	15	2	24	133.5	94	107	4.3
CC-H 015-049	15	2	49	158.5	119	132	4.7

* = Nominal force available for the operation

View



HCF 015 Force Cylinder



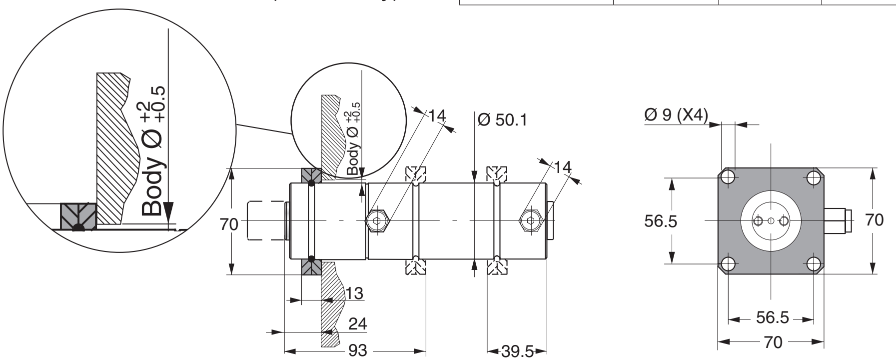
2 million

Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

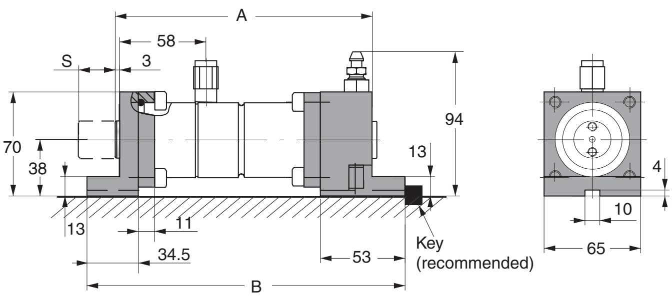
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 015-025	15	1.5	25	173	2.0
HCF 015-050	15	1.5	50	223	2.5
HCF 015-100	15	1.5	100	323	3.6
HCF 015-150	15	1.5	150	423	4.6

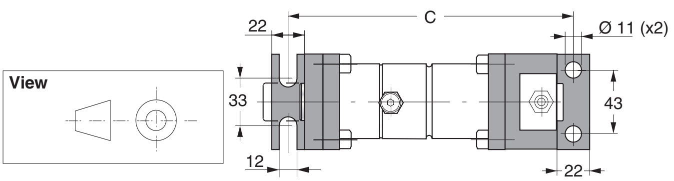
Flange mount HCF 015

Order No. 2014677-0750 (Mount only)



Foot mount HCF 015 Order No. 3016977-015 (Mounts only)

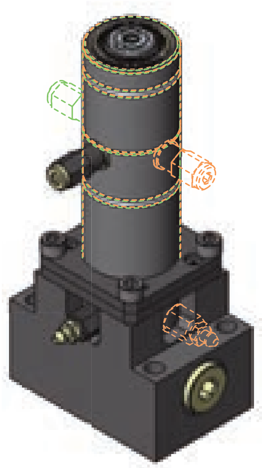




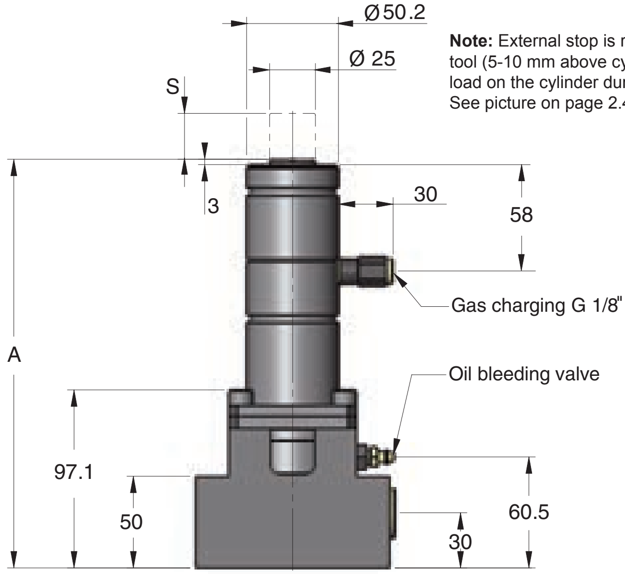
Model	A	B	C
HCF 015-025	173	214	192
HCF 015-050	223	264	242
HCF 015-100	323	364	342
HCF 015-150	423	464	442

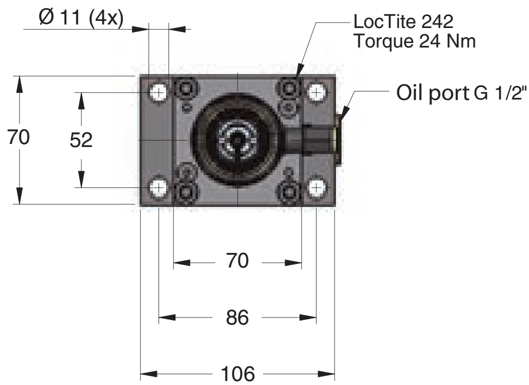
HCF-SP 015 Force Cylinder with Side Port Plate

2 million



Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

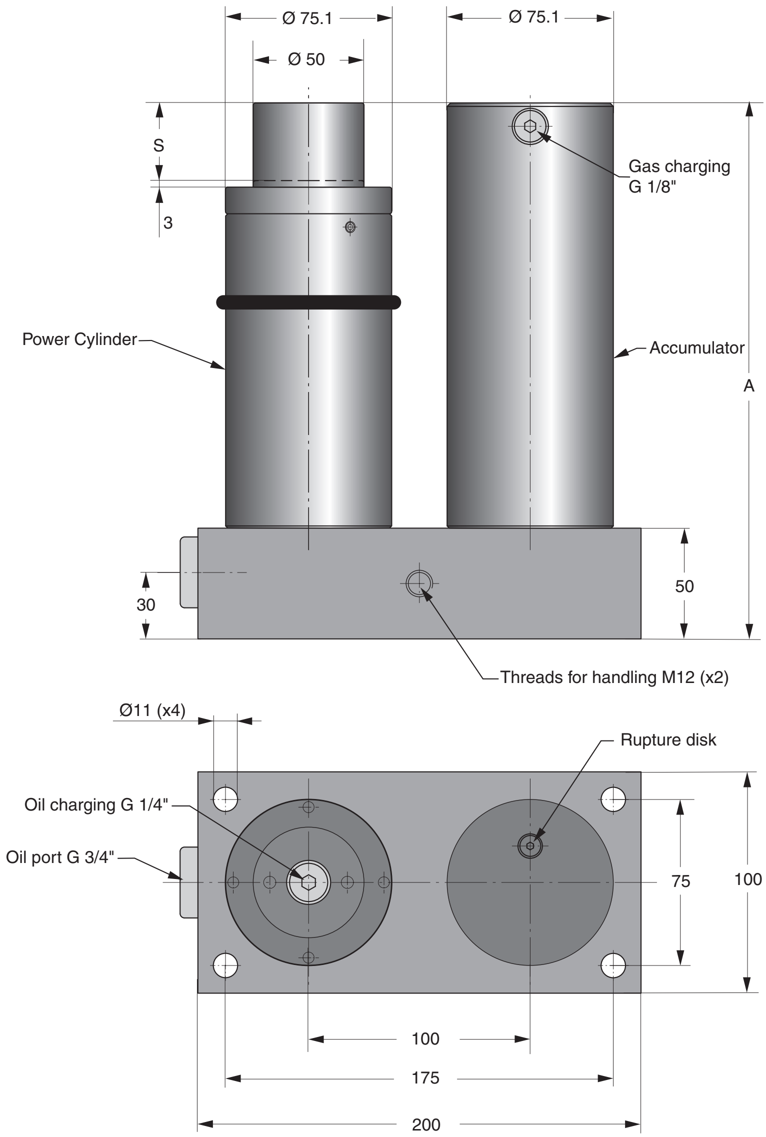




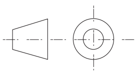
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 015-025	15	1.5	25	223	5.6
HCF-SP 015-050	15	1.5	50	273	6.1
HCF-SP 015-100	15	1.5	100	373	7.1
HCF-SP 015-150	15	1.5	150	473	8.2

HCP 040 Power Unit

2 million



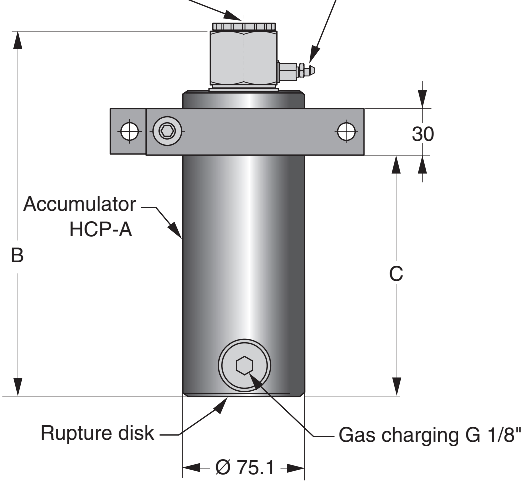
View

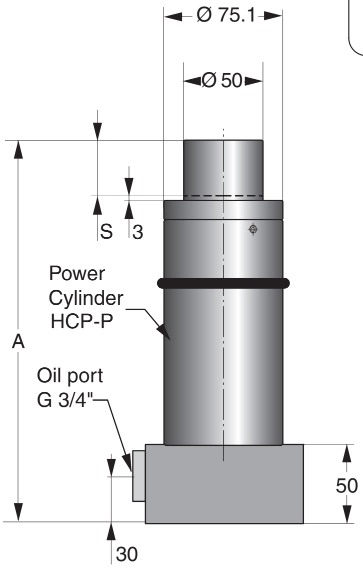


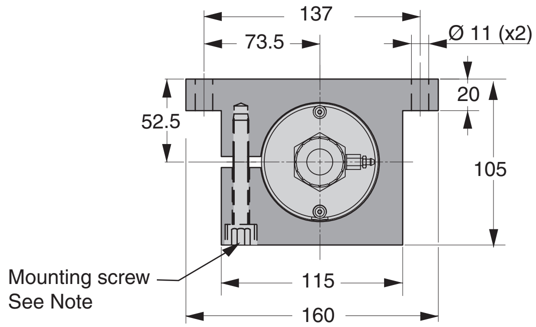
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 040-035	40	35	242	15.7
HCP 040-060	40	60	292	16.8
HCP 040-110	40	110	392	19.1
HCP 040-160	40	160	492	21.3

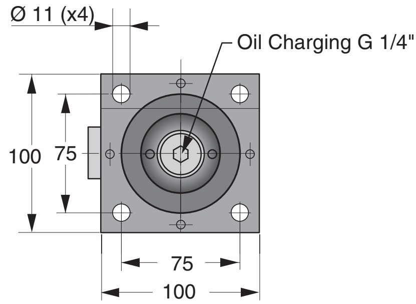
HCP-S 040 Power Unit, with Separate Accumulator

APPROVED PED 97/23/EC
2 million







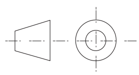


Note! The mounting screw (M10) should be tightened with torque 52 Nm.

Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 040 -035	14.0	40	35	242	231	152	HCP-P 040 -035	8.2	HCP-A 040 -035	5.8
HCP-S 040 -060	15.0	40	60	292	281	202	HCP-P 040 -060	8.7	HCP-A 040 -060	6.3
HCP-S 040 -110	17.4	40	110	392	381	302	HCP-P 040 -110	10.0	HCP-A 040 -110	7.4
HCP-S 040 -160	19.6	40	160	492	481	402	HCP-P 040 -160	11.2	HCP-A 040-160	8.4

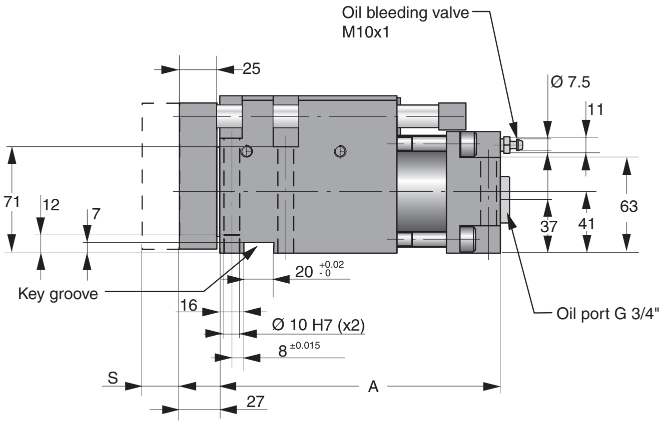
Note! The Accumulator should always be used in the system.

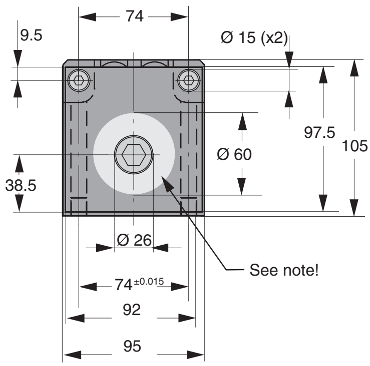
View

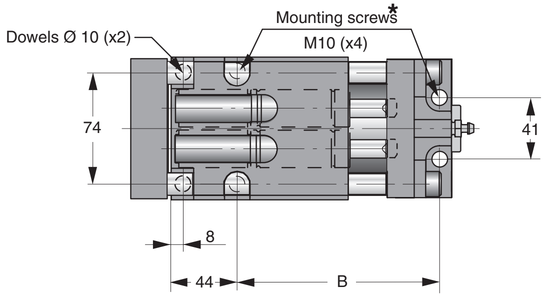


CC 040 Compact Cam

APPROVED PED 97/23/EC
2 million





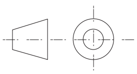


*4 pcs mounting screws are included

Note!
Important installation information:
We recommend locating the punch in the center of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

View

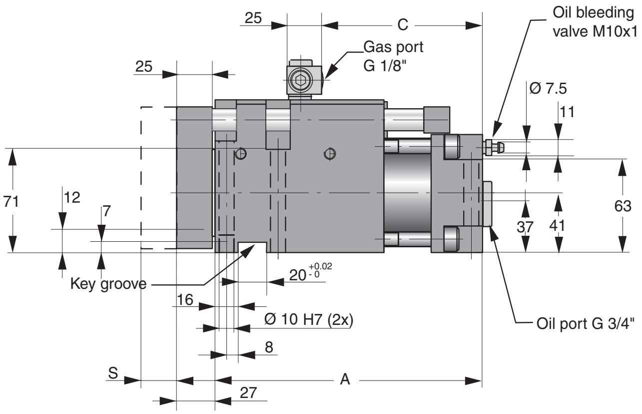


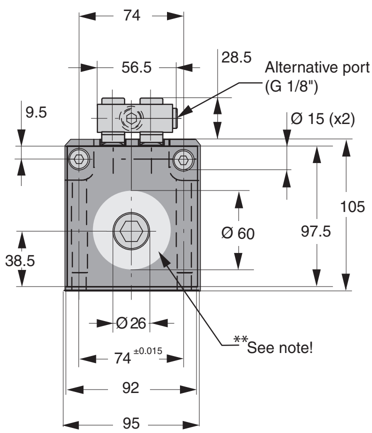
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 040-024	40	4	24	187	135	10.5
CC 040-049	40	4	49	212	160	12.8
CC 040-099	40	4	99	262	210	15.0
CC 040-124	40	4	124	287	235	16.5

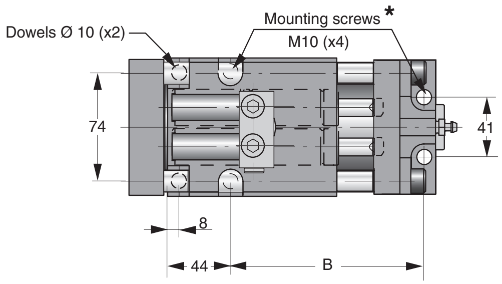
* = Nominal force available for the operation

CC-H 040 Compact Cam for pressure control

This version can only be used together with a hose system as there are no Gas Charging valves in the springs or adapters







* 4 pcs mounting screws are included

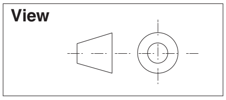
Note! There are two G1/8" gas ports which can be used to couple the hose system to. Use only one of these to connect the hose, the other should remain plugged.

****Note!**
Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

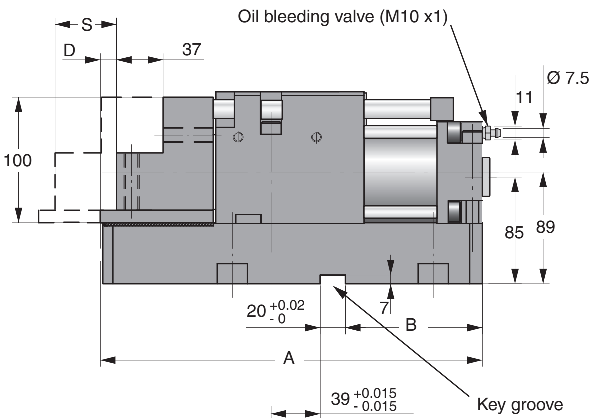
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 040-024	40	4	24	187	135	112	10.7
CC-H 040-049	40	4	49	212	160	162	13.0
CC-H 040-099	40	4	99	262	210	237	15.2
CC-H 040-124	40	4	124	287	235	262	16.7

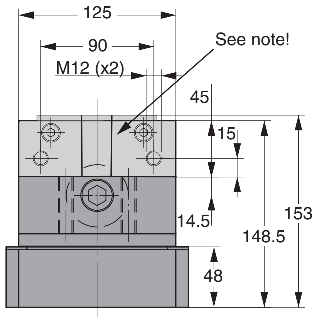
* = Nominal force available for the operation

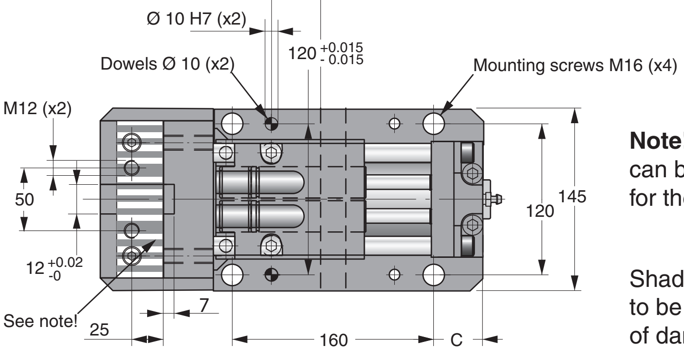


CCF 040 Flange Cam
Patent No. SE 513031, EP 1212156

APPROVED PED 97/23/EC
2 million

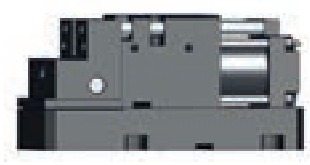


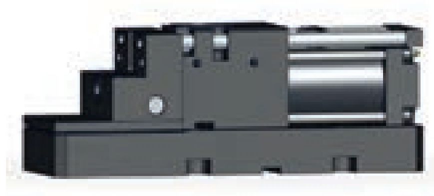


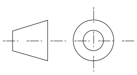


Note! Shaded area marked can be used for dowel location for the steel insert.

Shaded area marked is not to be machined for risk of damage to underlying roller bearings.







Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	D	Weight (kg)
CCF 040-049	40	4	49	304	109	39	13	35
CCF 040-099	40	4	99	404	159	89	63	43

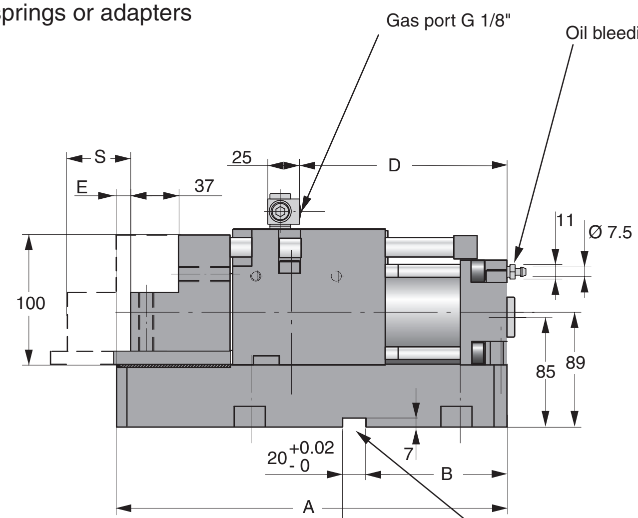
* = Nominal force available for the operation

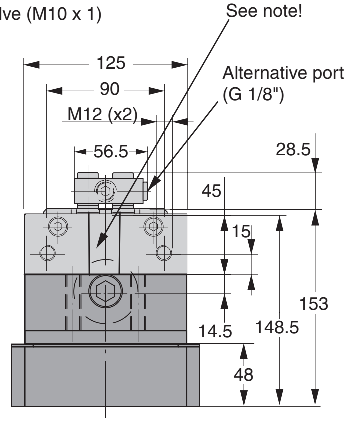
APPROVED PED 97/23/EC
2 million

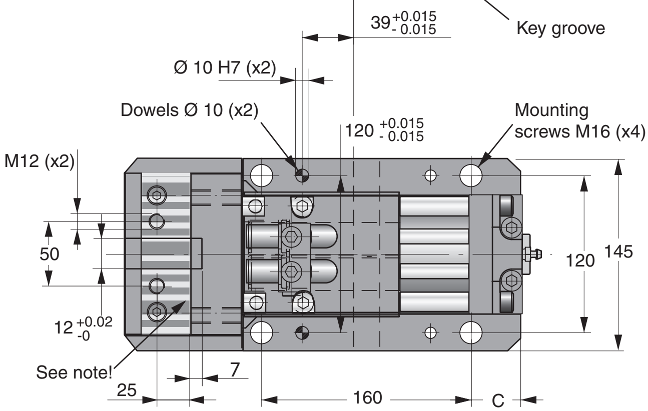
CCF-H 040 Flange Cam

Patent No. SE 513031, EP 1212156

This version can only be used together with a hose system as there are no gas charging valves in the springs or adapters



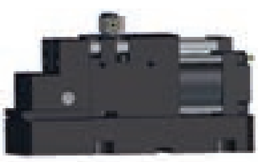


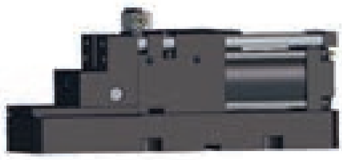


Note! Shaded area marked can be used for dowel location for the steel insert.

Shaded area marked is not to be machined for risk of damage to underlying roller bearings.

There are two G 1/8" gas ports which can be used to couple a hose system to. Use only one of these to connect the hose system, the other should remain plugged.

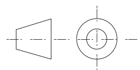




Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	D	E	Weight (kg)
CCF-H 040-049	40	4	49	304	109	39	162	13	35
CCF-H 040-099	40	4	99	404	159	89	237	63	43

* = Nominal force available for the operation

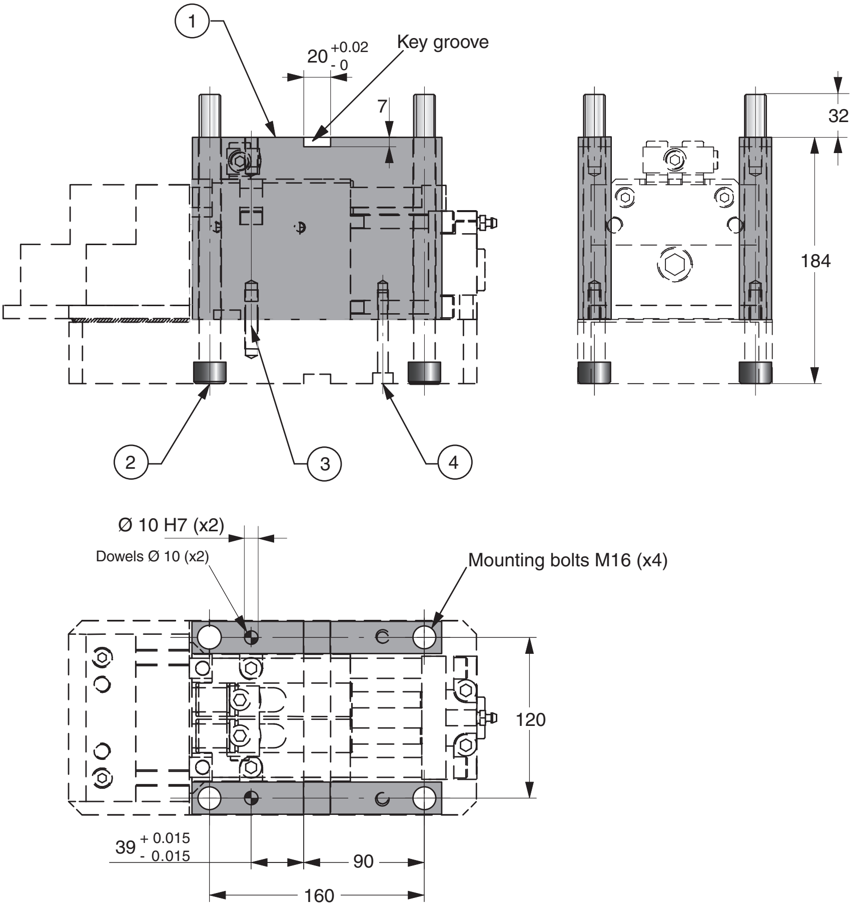
View



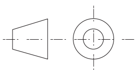
Top mount kit for Flange Cam
CCF 040-049 and CCF-H 040-049
CCF 040-099 and CCF-H 040-099

(Order No. 2018393)

APPROVED PED 97/23/EC
2 million



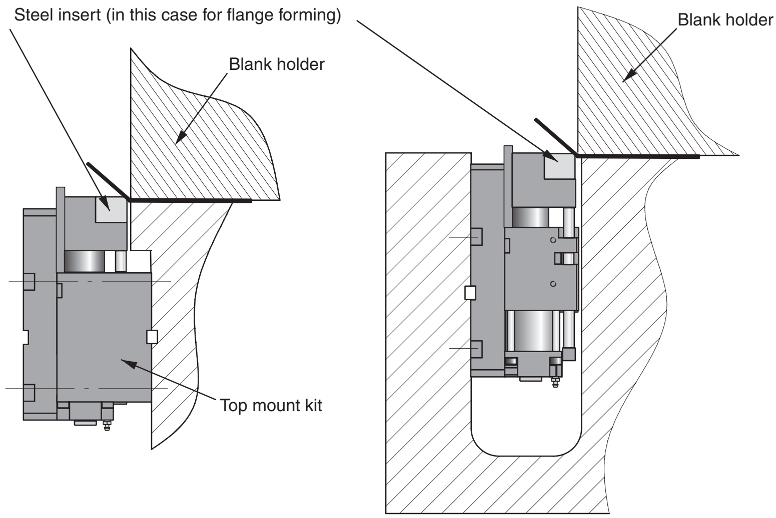
View



Position	Quantity	Description
1	2	Spacer
2	4	Bolt M16 x 200
3	2	Dowel pin Ø 10 x 40
4	2	Bolt M8 x 60

* = Nominal force available for the operation

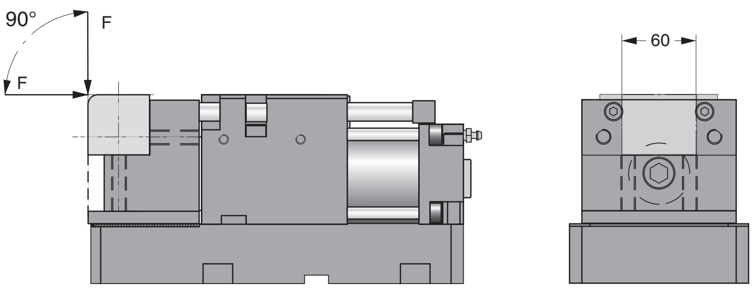
Flange Cam installation possibilities



Top mount

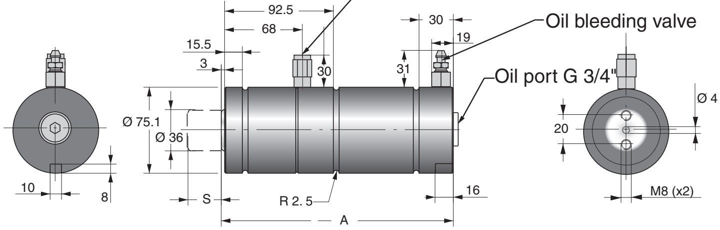
Base mount

Flange Cam force directions and location



Allowable force directions "F" (within) created by the flanging operation.

HCF 040 Force Cylinder

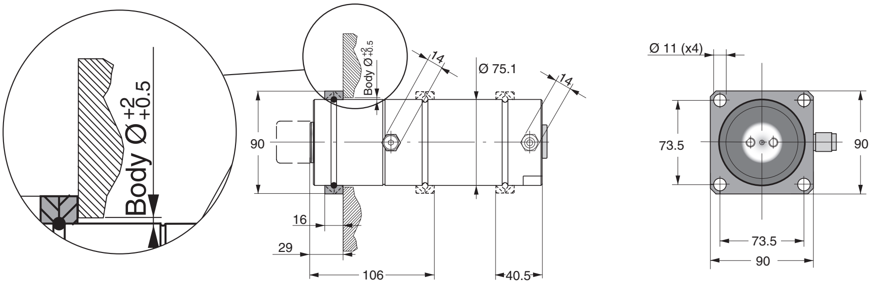


APPROVED PED 97/23/EC
2 million

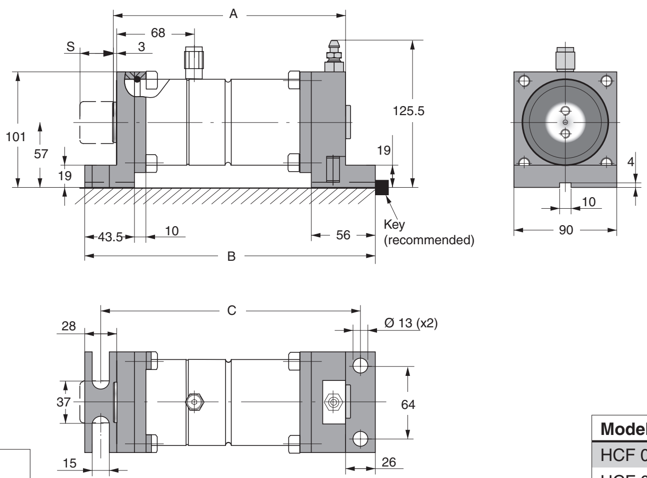
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

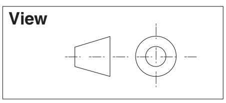
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 040-025	40	4	25	195	5.5
HCF 040-050	40	4	50	245	6.5
HCF 040-100	40	4	100	345	8.6
HCF 040-150	40	4	150	445	10.7

Flange mount for HCF 040 Order No. 2014677-1500 (Mount only)



Foot mount for HCF 040 Order No. 3016977-040 (Mounts only)

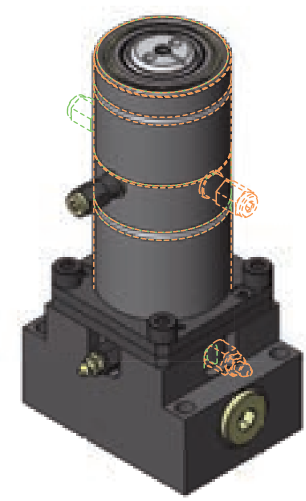


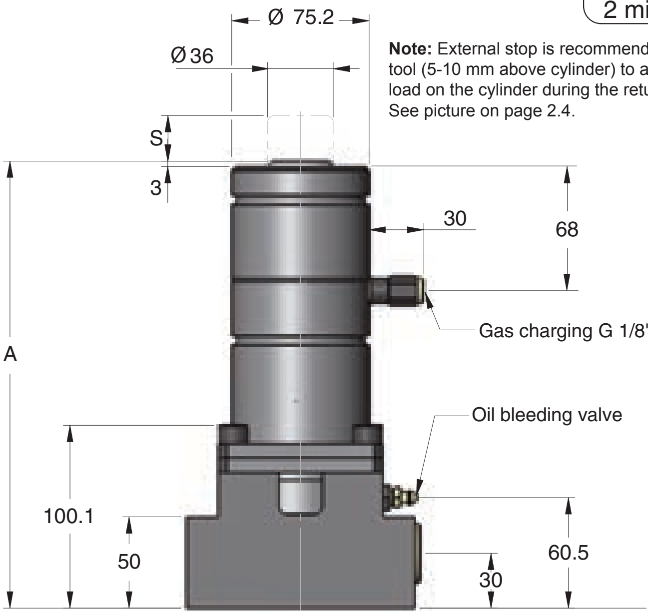


Model	A	B	C
HCF 040-025	195	246	219
HCF 040-050	245	296	269
HCF 040-100	345	396	369
HCF 040-150	445	496	469

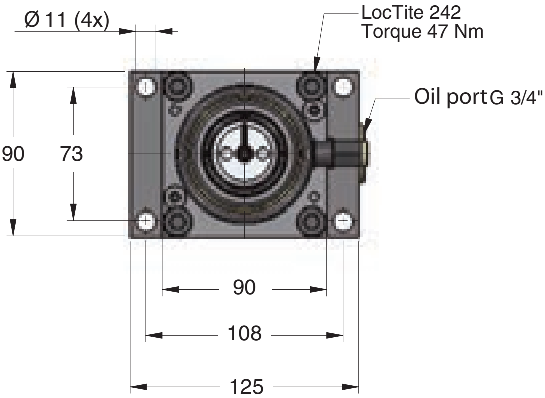
HCF-SP 040 Force Cylinder with Side Port Plate

APPROVED PED 97/23/EC
2 million





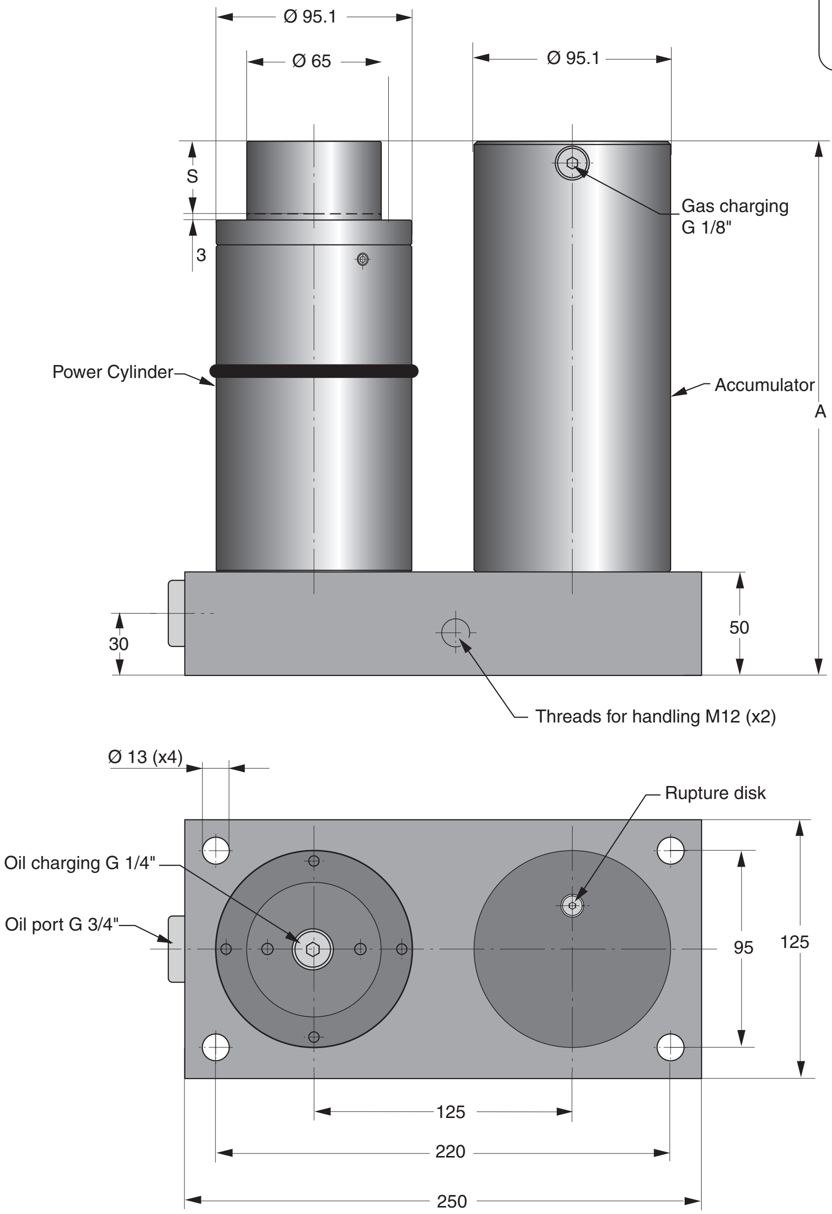
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.



Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 040-025	40	4	25	245	10.3
HCF-SP 040-050	40	4	50	295	11.3
HCF-SP 040-100	40	4	100	395	13.4
HCF-SP 040-150	40	4	150	495	15.4

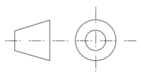
*= Nominal force for the operation

HCP 060 Power Unit



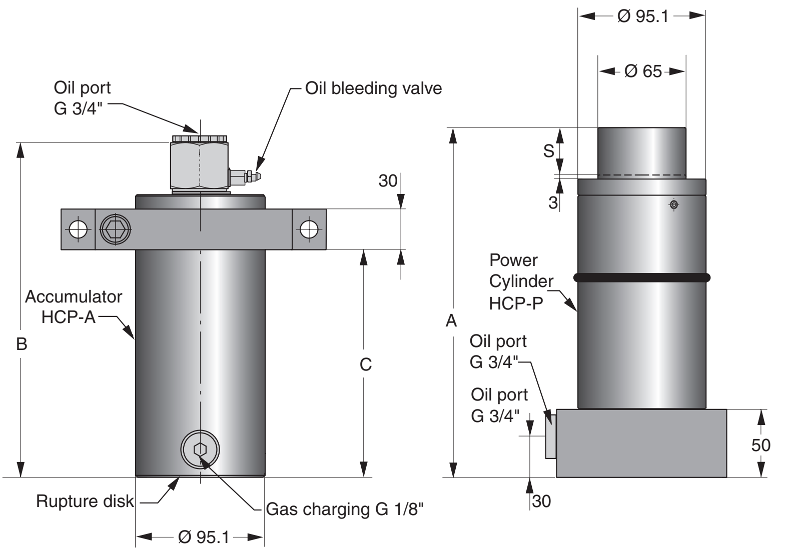
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 060-035	60	35	258	26.7
HCP 060-060	60	60	308	28.4
HCP 060-110	60	110	408	32.2
HCP 060-160	60	160	508	35.9

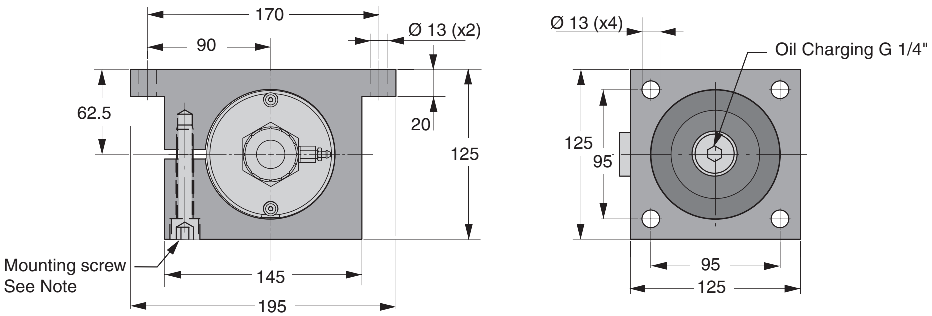
View



HCP-S 060 Power Unit, with Separate Accumulator

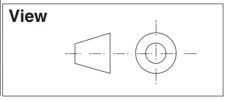
APPROVED PED 97/23/EC
2 million





Note! The mounting screw (M12) should be tightened with torque 91Nm

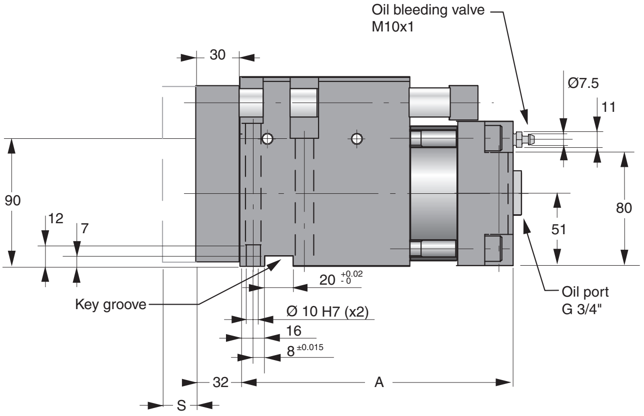
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 060 -035	23.9	60	35	258	247	168	HCP-P 060 -035	13.9	HCP-A 060 -035	10.0
HCP-S 060 -060	25.7	60	60	308	297	218	HCP-P 060 -060	14.8	HCP-A 060 -060	10.9
HCP-S 060 -110	29.4	60	110	408	397	318	HCP-P 060 -110	16.9	HCP-A 060 -110	12.5
HCP-S 060 -160	33.1	60	160	508	497	418	HCP-P 060 -160	19.0	HCP-A 060 -160	14.1

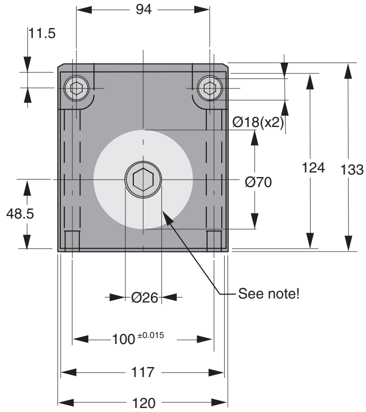


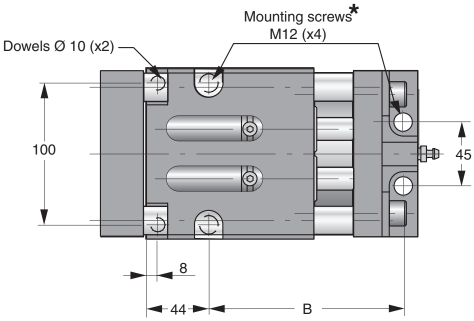
Note! The Accumulator should always be used in the system.

CC 060 Compact Cam

PED 97/23/EC APPROVED
2 million





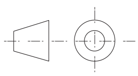


*4 pcs mounting screws are included

Note!
Important installation information:
We recommend locating the punch in the center of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

View



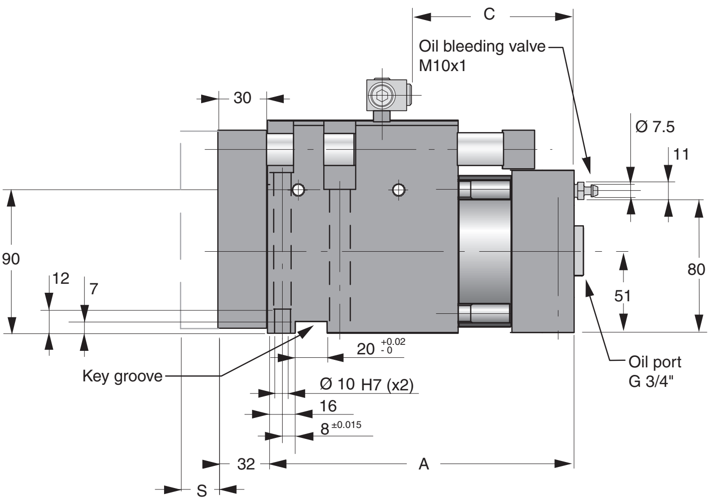
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 060-024	60	7	24	191	137	22.3
CC 060-049	60	7	49	216	162	23.4
CC 060-099	60	7	99	266	212	26.0

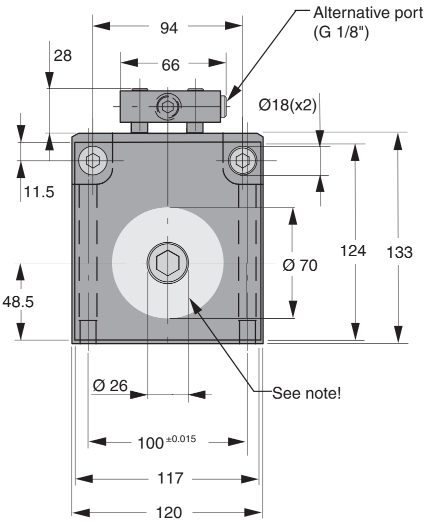
* Nominal force available for the operation

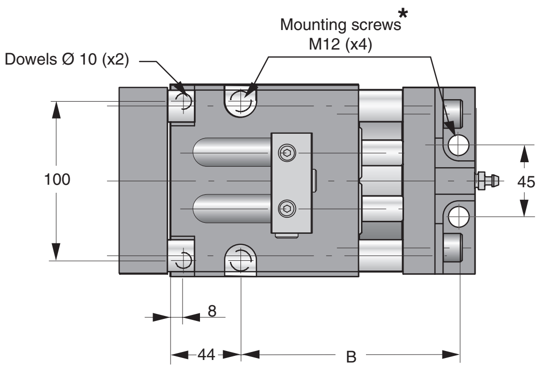
CC-H 060 Compact Cam for pressure control

APPROVED PED 97/23/EC
2 million

This version can only be used together with a hose system as there are no gas charging valve in the springs or adapters







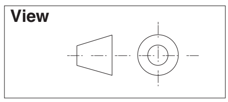
*4 pcs mounting screws are included

Note! Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

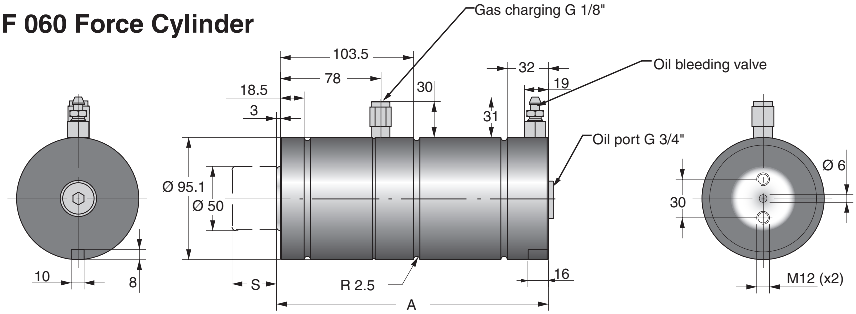
When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 060-024	60	7	24	191	137	103	22.5
CC-H 060-049	60	7	49	216	162	153	23.6
CC-H 060-099	60	7	99	266	212	228	26.2

* = Nominal force available for the operation



HCF 060 Force Cylinder



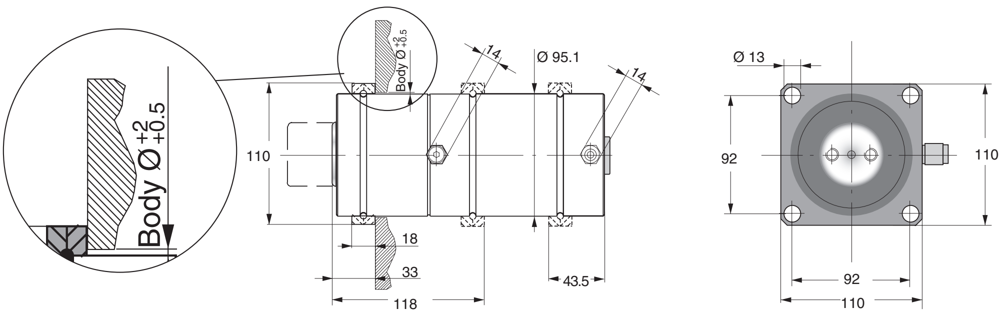
APPROVED PED 97/23/EC
2 million

Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

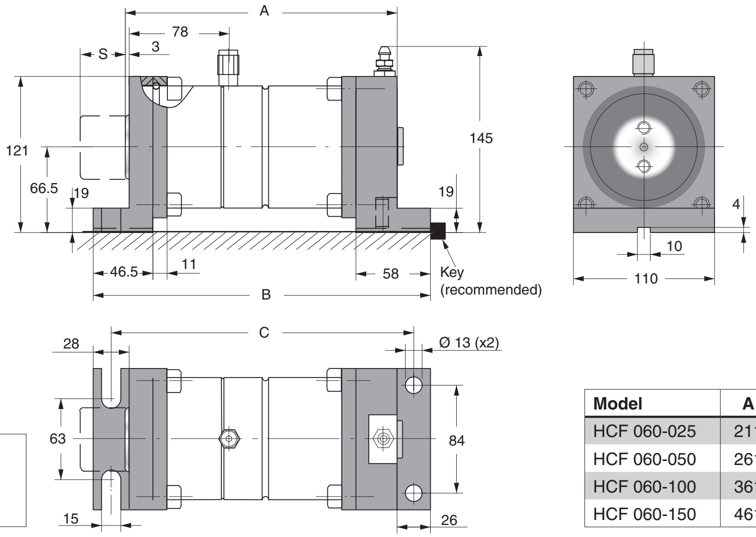
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 060-025	60	6	25	211	9.8
HCF 060-050	60	6	50	261	11.6
HCF 060-100	60	6	100	361	15.1
HCF 060-150	60	6	150	461	18.6

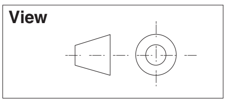
* = Nominal force available for the operation

Flange mount for HCF 060
Order No. 2014677-3000 (Mount only)



Foot mount for HCF 060 Order No. 3016977-060 (Mounts only)

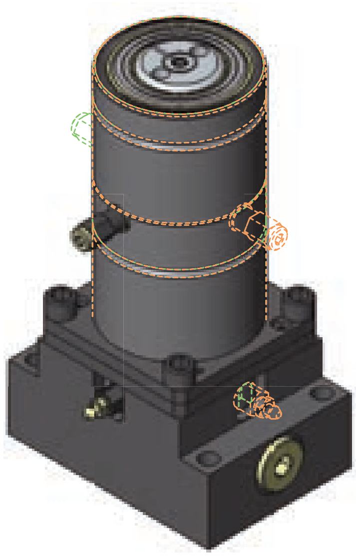




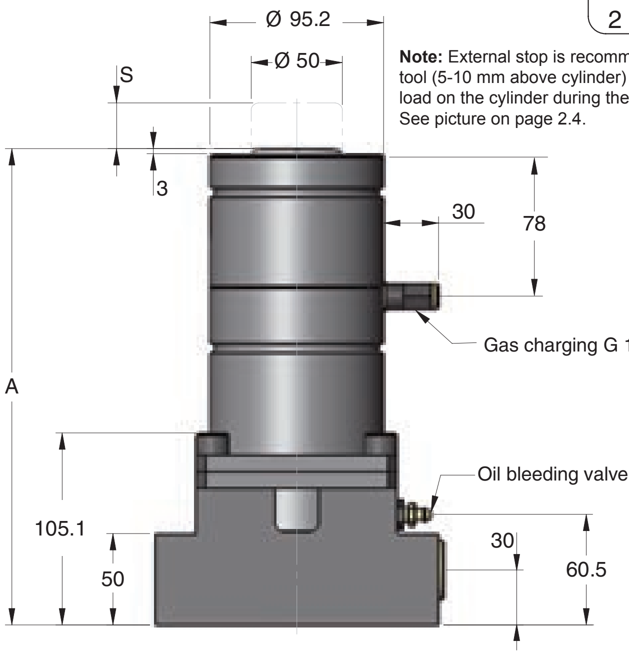
Model	A	B	C
HCF 060-025	211	262	235
HCF 060-050	261	312	285
HCF 060-100	361	412	385
HCF 060-150	461	512	485

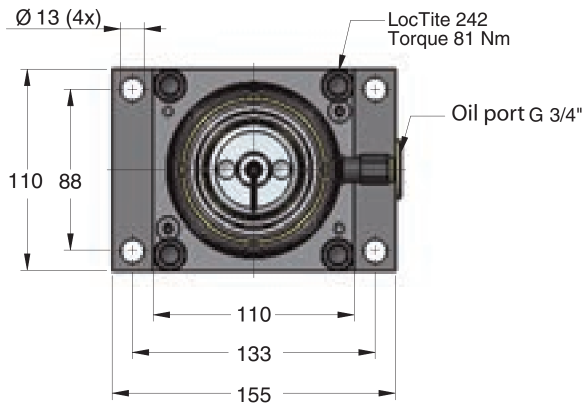
HCF-SP 060 Force Cylinder with Side Port Plate

APPROVED PED 97/23/EC
2 million



Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.



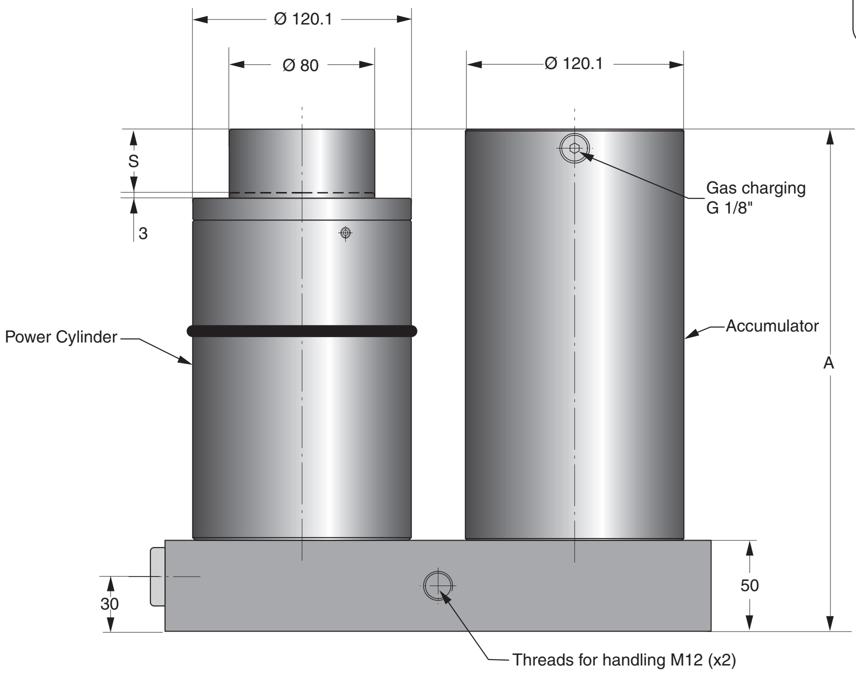


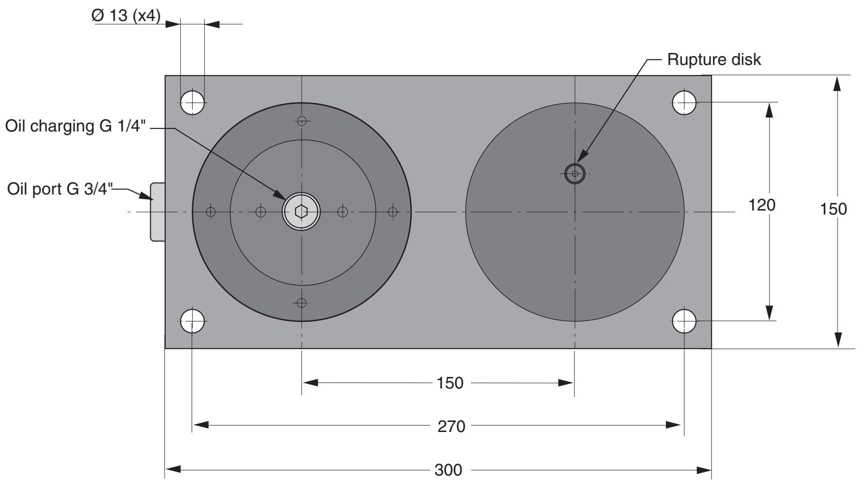
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 060-025	60	6	25	261	17.4
HCF-SP 060-050	60	6	50	311	19.2
HCF-SP 060-100	60	6	100	411	22.7
HCF-SP 060-150	60	6	150	511	26.2

*= Nominal force for the operation

HCP 090 Power Unit

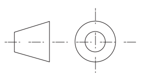
2 million





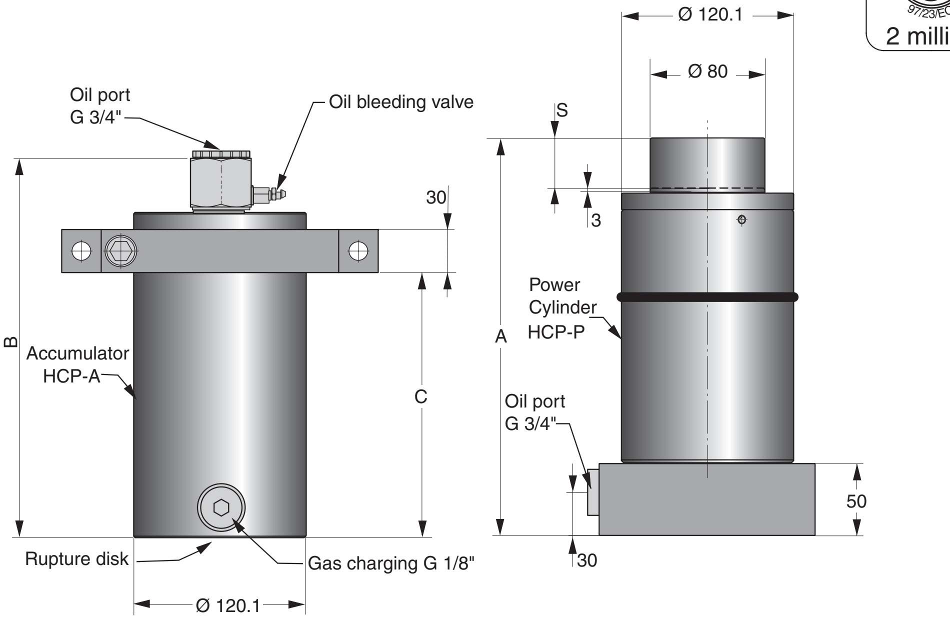
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 090-035	90	35	276	43.1
HCP 090-060	90	60	326	46.1
HCP 090-110	90	110	426	52.1
HCP 090-160	90	160	526	52.8

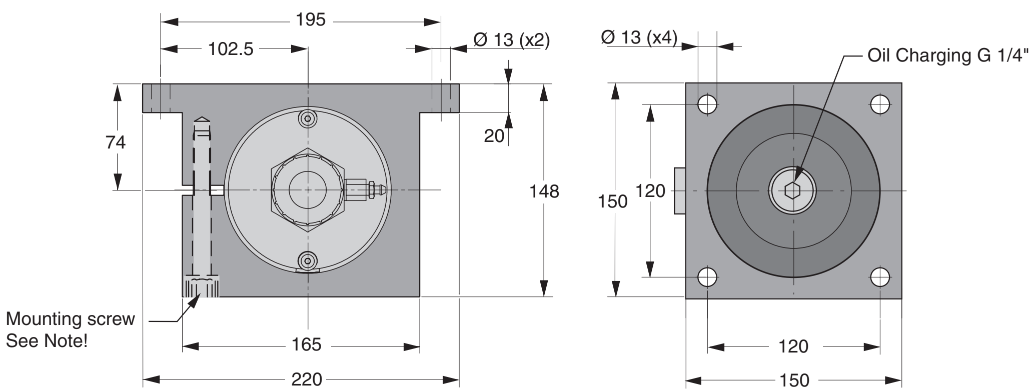
View



HCP-S 090 Power Unit, with Separate Accumulator

APPROVED PED 97/23/EC
2 million

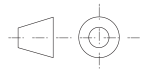




Note! The mounting screw (M12) should be tightened with torque 91Nm

Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 090 -035	38.3	90	35	276	265	186	HCP-P 090 -035	22.6	HCP-A 090 -035	15.7
HCP-S 090 -060	41.2	90	60	326	315	236	HCP-P 090 -060	24.2	HCP-A 090 -060	17.0
HCP-S 090 -110	47.3	90	110	426	415	336	HCP-P 090 -110	27.5	HCP-A 090 -110	19.8
HCP-S 090 -160	53.3	90	160	526	514	436	HCP-P 090-160	30.8	HCP-A 090 -160	22.5

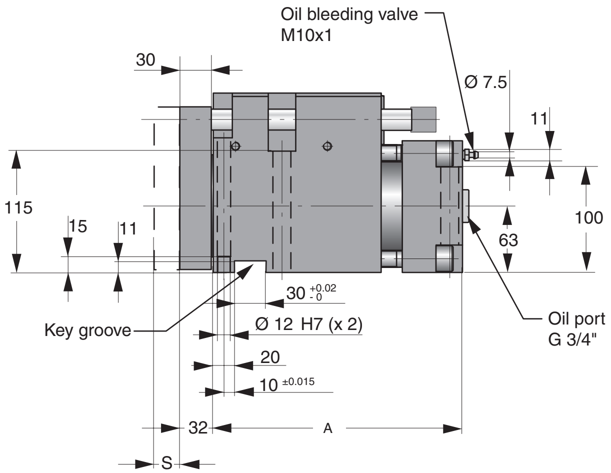
View

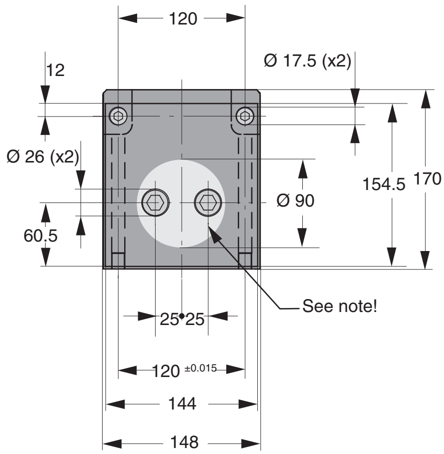


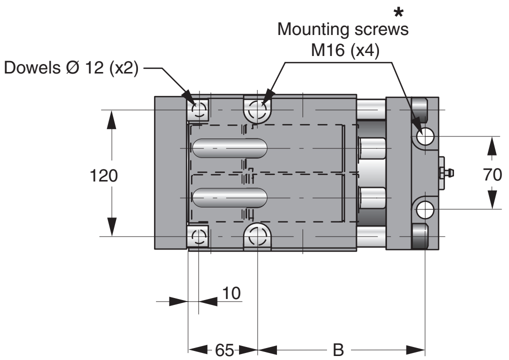
Note! The Accumulator should always be used in the system.

CC 090 Compact Cam

APPROVED PED 97/23/EC
2 million





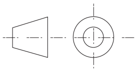


Note! Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

*4 pcs mounting screws are included

View



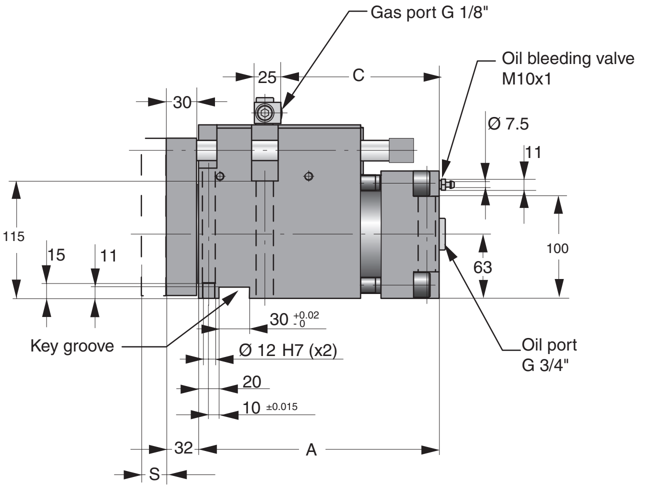
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 090-024	90	10	24	236	159	33.5
CC 090-049	90	10	49	261	184	39.7
CC 090-099	90	10	99	311	234	44.9

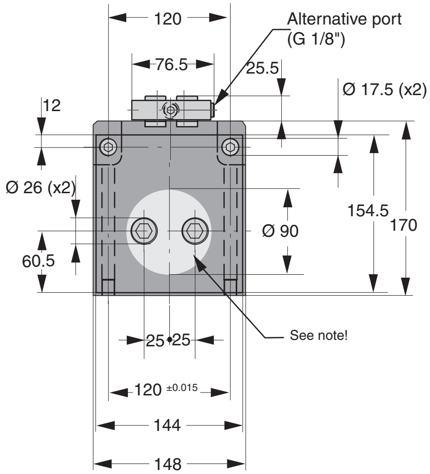
* = Nominal force available for the operation

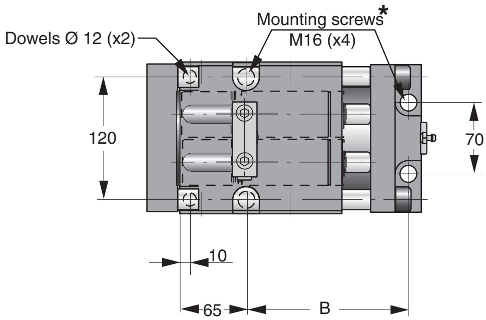
CC-H 090 Compact Cam for pressure control

APPROVED PED 97/23/EC
2 million

This version can only be used together with a hose system as there are no gas charging valves in the springs or adapters







Note! There are two G1/8" gas ports which can be used to couple to a hose system. Use only one of these to connect the hose system, the other should remain plugged.

*4 pcs mounting screws are included

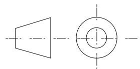
Note!
Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

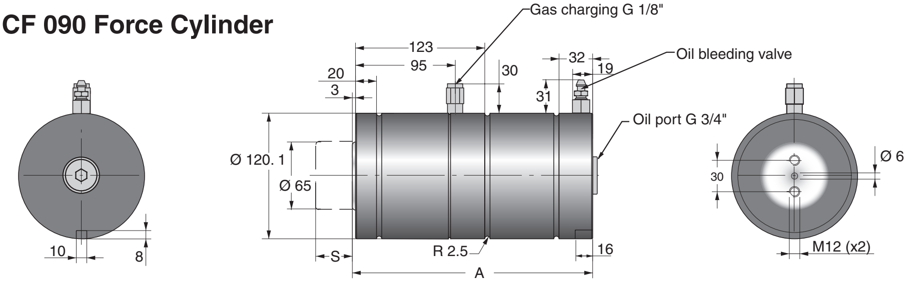
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 090-024	90	10	24	236	159	158	33.7
CC-H 090-049	90	10	49	261	184	208	39.7
CC-H 090-099	90	10	99	311	234	283	44.9

* = Nominal force available for the operation

View



HCF 090 Force Cylinder

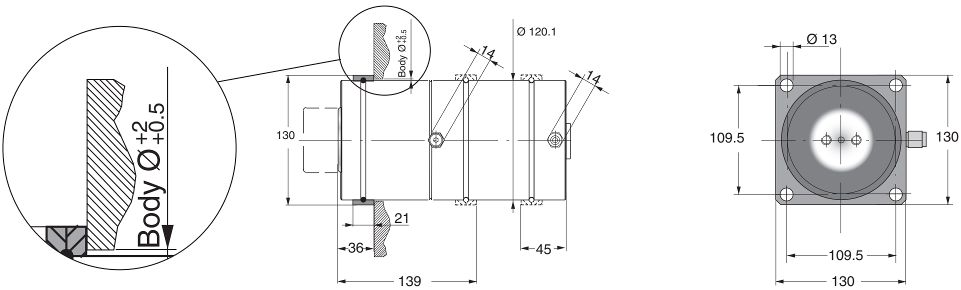


APPROVED PED 97/23/EC
2 million

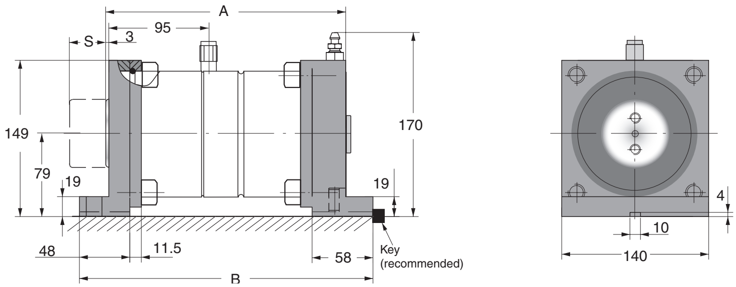
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

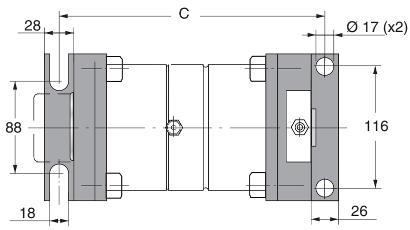
Order No.	Working force* (kN)	Return force* (kN)	Stroke S (mm)	A	Weight (kg)
HCF 090-025	90	9	25	229	15.8
HCF 090-050	90	9	50	279	18.7
HCF 090-100	90	9	100	379	24.5
HCF 090-150	90	9	150	479	30.3

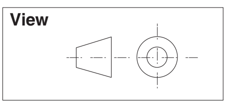
Flange mount for HCF 090 Order No. 2014677-5000 (Mount only)



Foot mount for HCF 090 Order No. 3016977-090 (Mounts only)





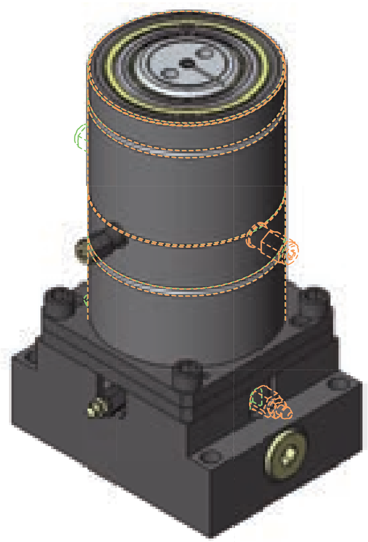


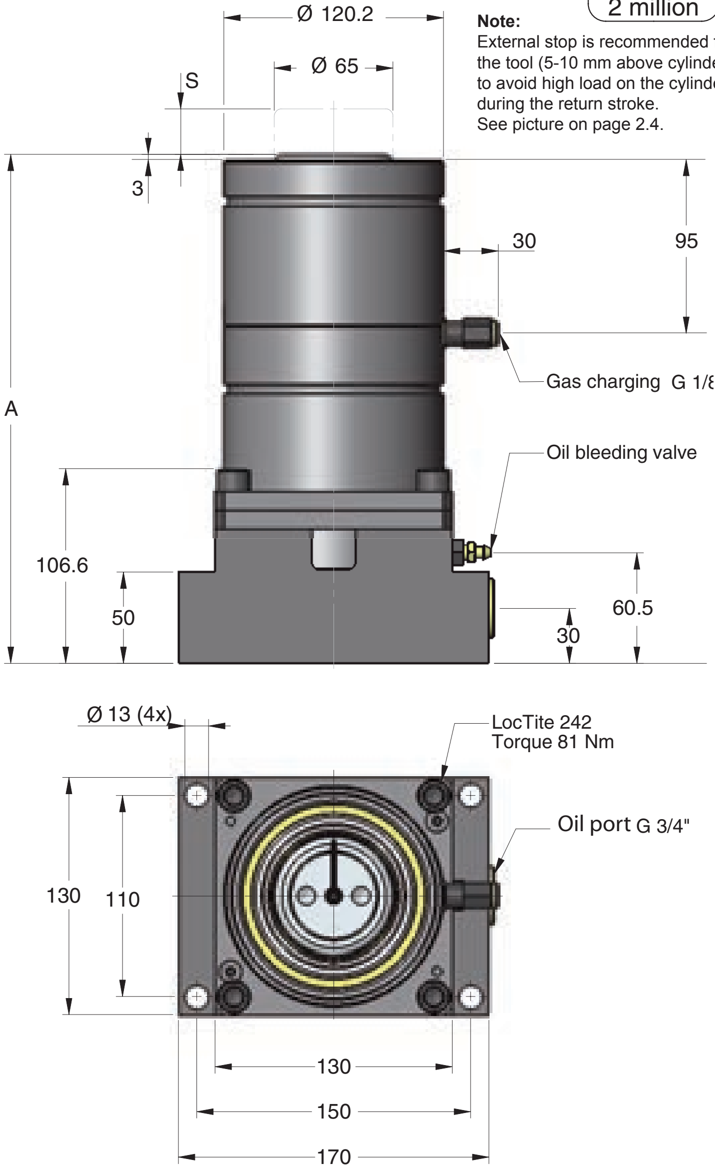
Model	A	B	C
HCF 090-025	229	280	254
HCF 090-050	279	330	304
HCF 090-100	379	430	404
HCF 090-150	479	530	504

HCF-SP 090 Force Cylinder with Side Port Plate

APPROVED PED 97/23/EC
2 million

Note:
External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke.
See picture on page 2.4.

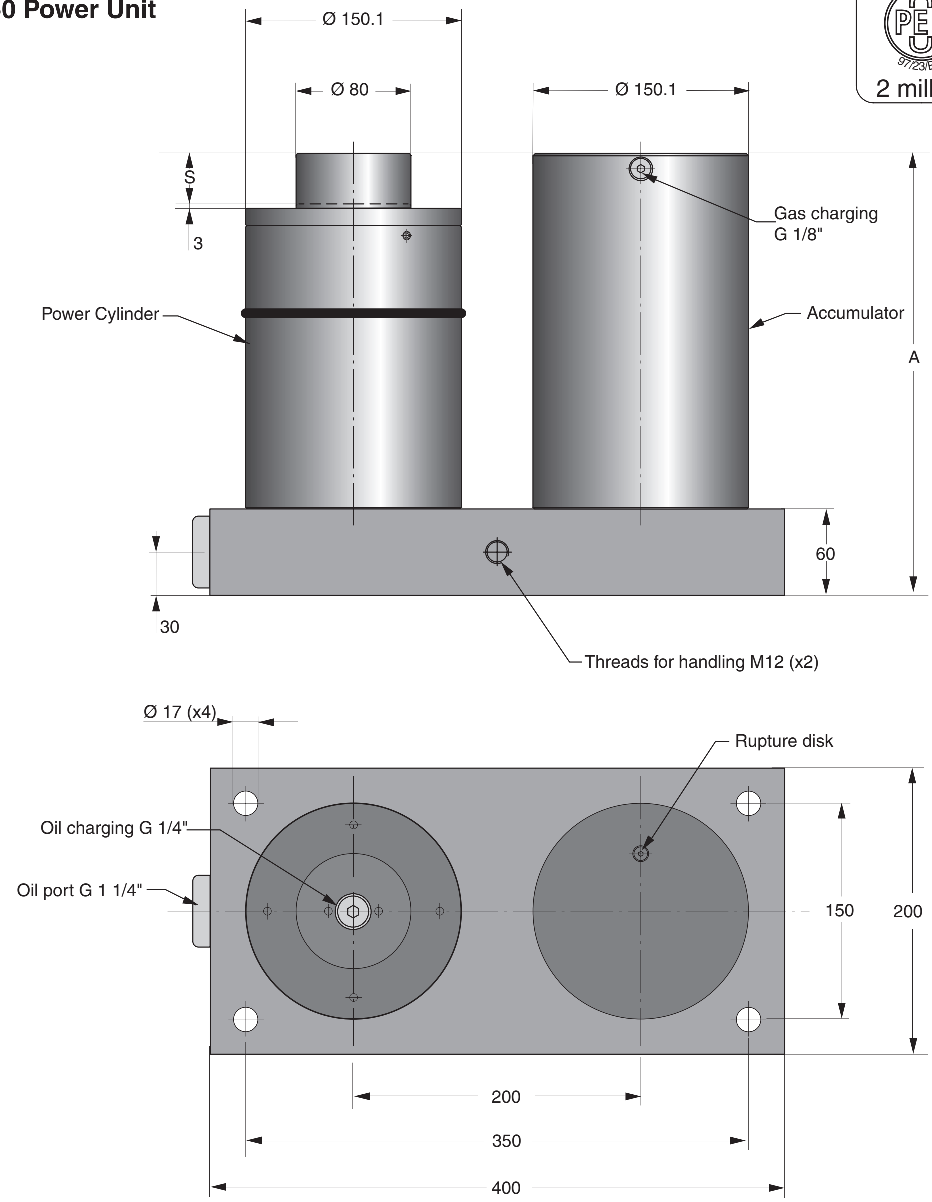


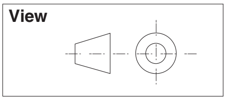


Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 090-025	90	9	25	279	28
HCF-SP 090-050	90	9	50	329	30.9
HCF-SP 090-100	90	9	100	429	36.8
HCF-SP 090-150	90	9	150	529	42.6

*= Nominal force for the operation

HCP 150 Power Unit

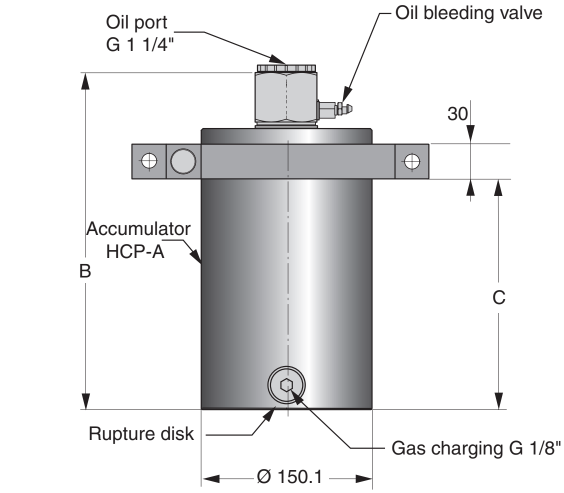


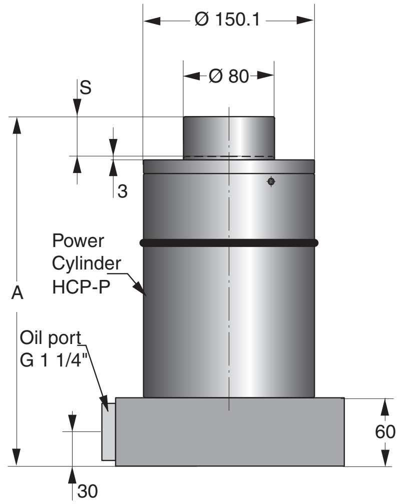


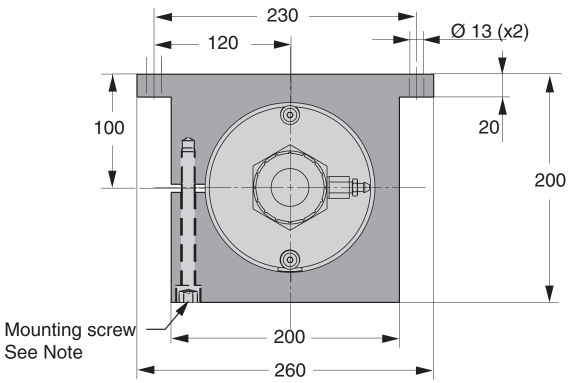
Order No.	Force (kN)	Stroke (mm)	A	Weight (kg)
HCP 150-035	150	35	307	83.1
HCP 150-060	150	60	357	87.7
HCP 150-110	150	110	457	97.0
HCP 150-160	150	160	557	106.3

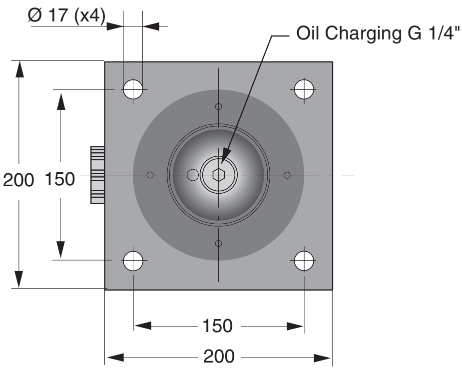
HCP-S 150 Power Unit, with Separate Accumulator

APPROVED PED 97/23/EC
2 million







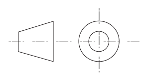


Note! The mounting screw (M12) should be tightened with torque 91Nm

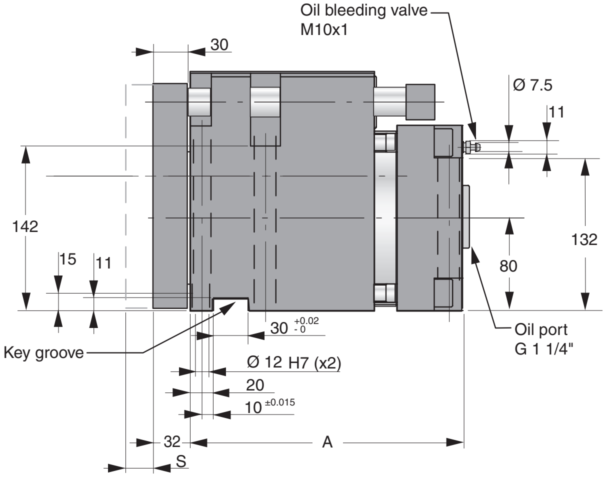
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 150 -035	71.1	90	35	307	294	207	HCP-P 150 -035	43.6	HCP-A 150 -035	27.7
HCP-S 150 -060	75.5	90	60	357	344	257	HCP-P 150 -060	45.9	HCP-A 150 -060	29.8
HCP-S 150 -110	85.0	90	110	457	444	357	HCP-P 150 -110	50.9	HCP-A 150 -110	34.1
HCP-S 150 -160	94.3	90	160	557	544	457	HCP-P 150-160	55.9	HCP-A 150-160	38.4

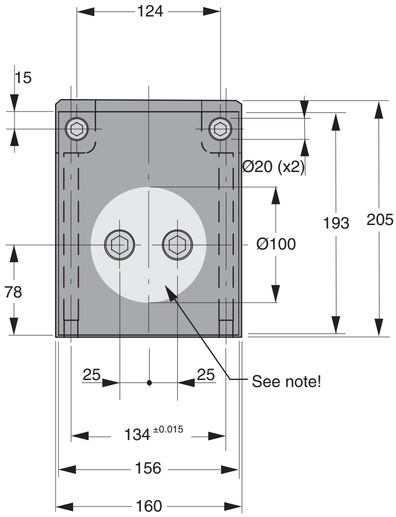
Note! The Accumulator should always be used in the system.

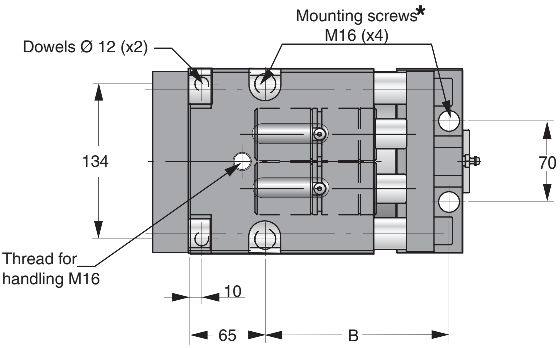
View



CC 150 Compact Cam





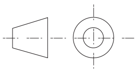


*4 pcs mounting screws are included

Note!
Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge, we recommend that extra guiding is used to prevent the unit against sideload.

View

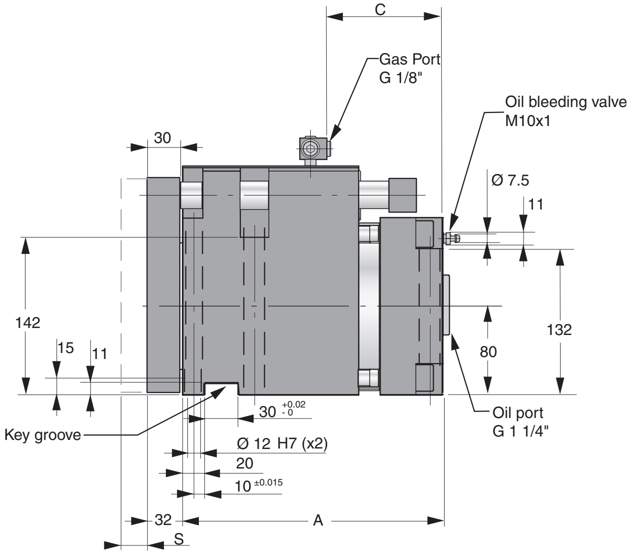


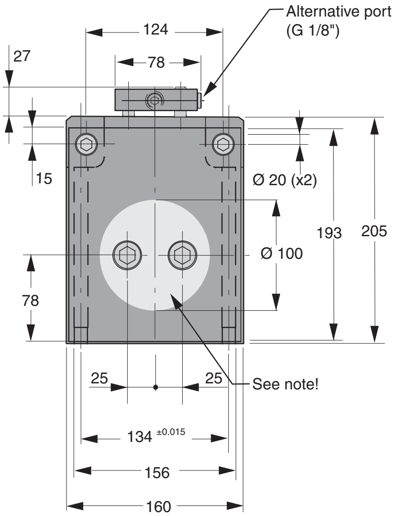
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 150-024	150	15	24	236	159	57.7
CC 150-049	150	15	49	261	184	60.0
CC 150-099	150	15	99	311	234	65.6

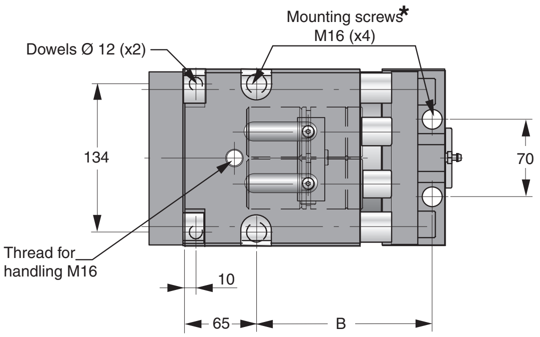
* = Nominal force available for the operation

CC-H 150 Compact Cam for pressure control

This version can only be used together with a hose system as there are no gas charging valves in the springs or adapters







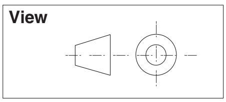
Note!
Important installation information:
We recommend locating the punch in the centre of the piston rod, but it is also possible to locate the force which the punch will create in the operations within the area marked .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against sideload.

*4 pcs mounting screws are included

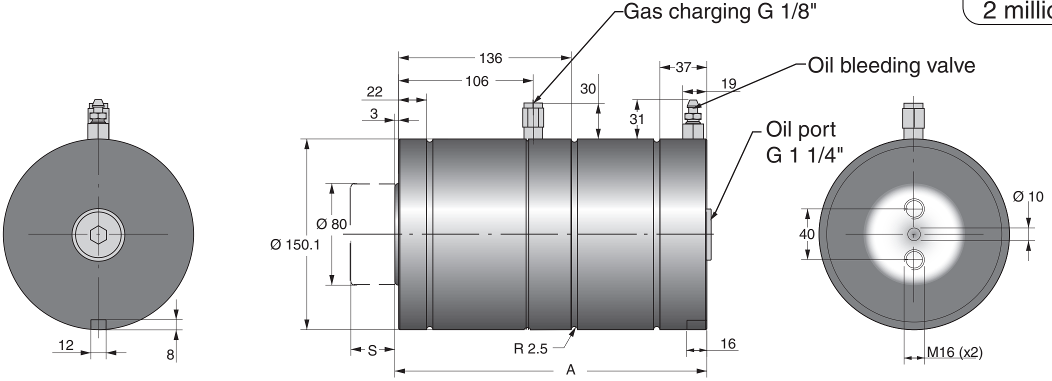
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 150-024	150	15	24	236	159	109	57.9
CC-H 150-049	150	15	49	261	184	159	60.2
CC-H 150-099	150	15	99	311	234	234	65.8

* = Nominal force available for the operation



HCF 150 Force Cylinder

2 million

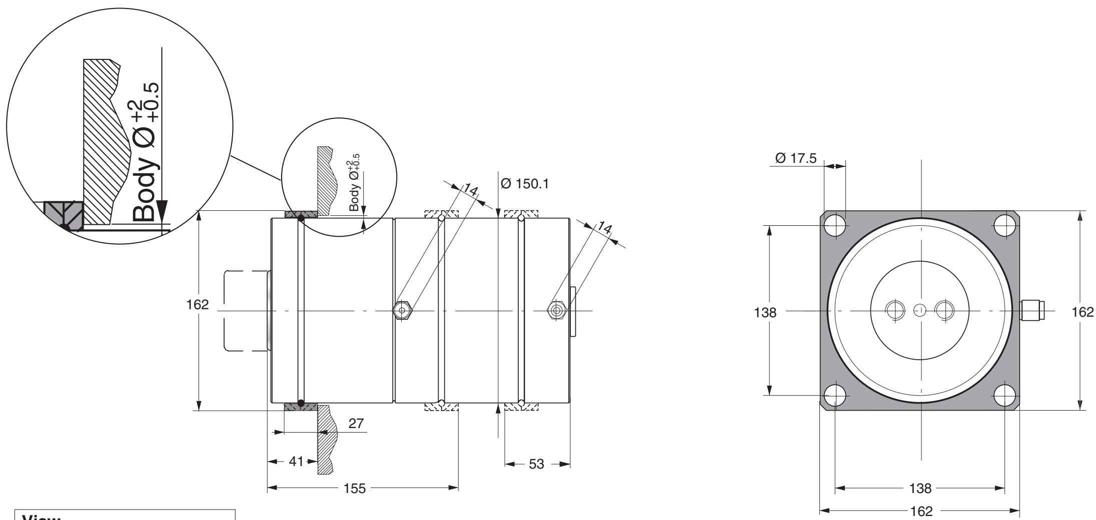


Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.

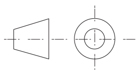
Order No.	Working force* (kN)	Return force* (kN)	Stroke S (mm)	A	Weight (kg)
HCF 150-025	150	30	25	250	30.1
HCF 150-050	150	30	50	300	34.7
HCF 150-100	150	30	100	400	43.7
HCF 150-150	150	30	150	500	52.7

* = Nominal force for the operation

Flange mount for HCF 150 Order No. 2014677-7500



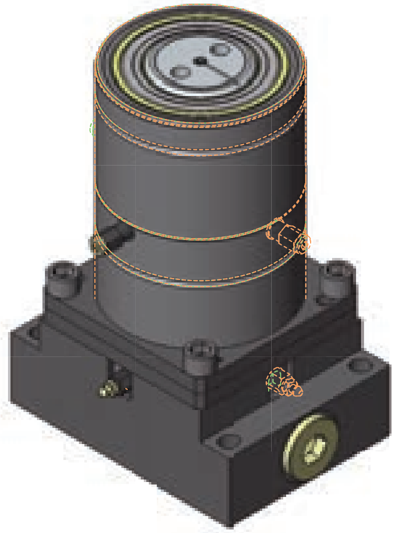
View



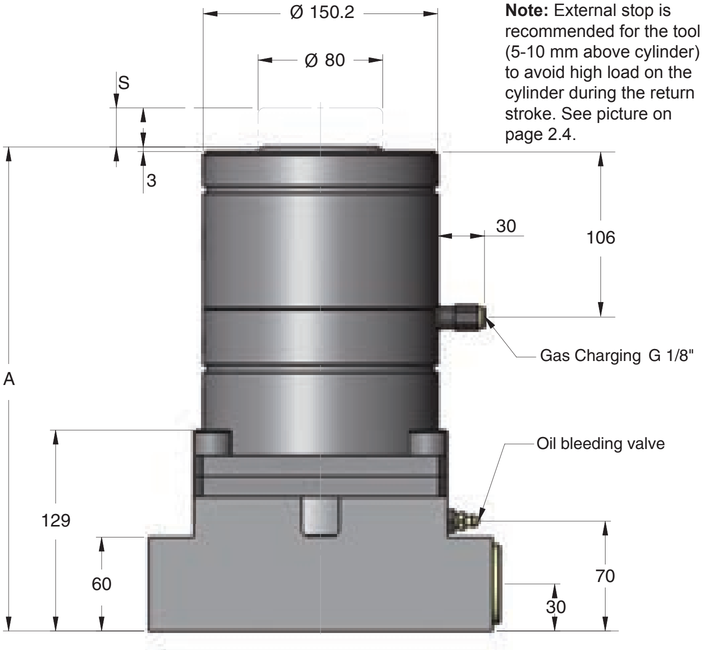
HCF-SP 150 Force Cylinder with Side Port Plate

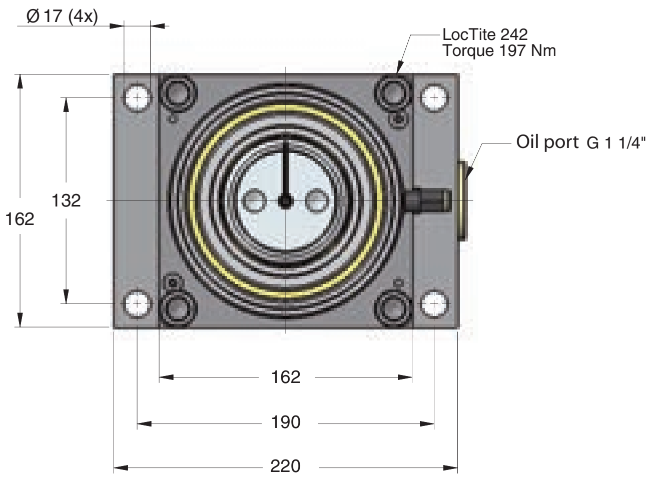
APPROVED PED 97/23/EC

2 million



Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 2.4.



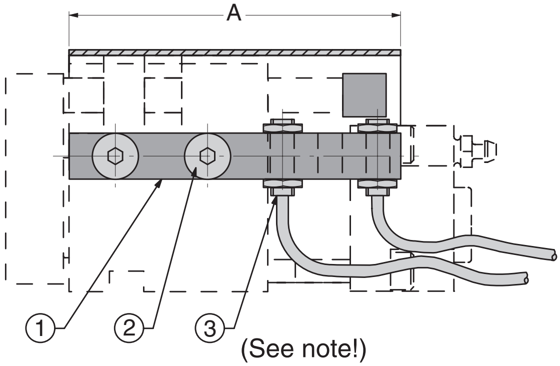


Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 150-025	150	14	25	310	48.6
HCF-SP 150-050	150	14	50	360	53.2
HCF-SP 150-100	150	14	100	460	62.2
HCF-SP 150-150	150	14	150	560	71.1

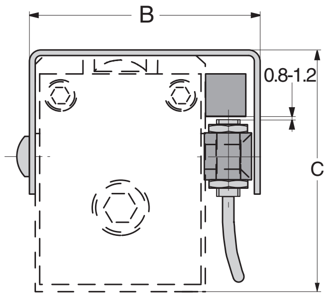
*= Nominal force for the operation

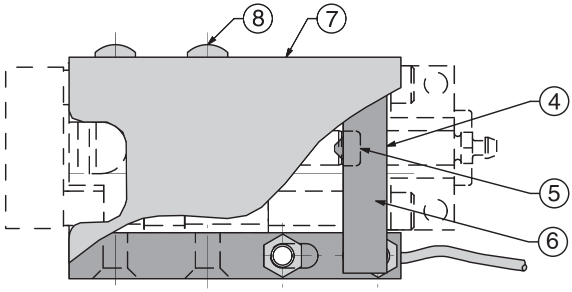
Dimensions for accessories

Sensor kit, option for Compact Cam, CC and CC-H

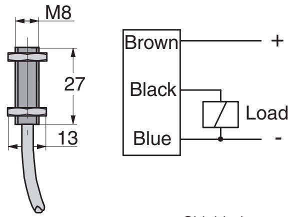


(See note!)





2 pcs Sensors
Order No. 503550 (sold separately)



Sensor type:	Shielded magnetic
Output configuration:	NO (PNP)
Supply voltage:	10-40 V DC
Max control output:	200 mA
Ambient temperature:	-40 - +70°C
Enclosure rating:	IEC IP67
Cable length:	2000 mm
Setting distance:	0.8 - 1.2 mm

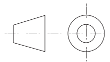
Note!
The 2 pcs Sensors (Order No. 503550) are sold separately and are not included in the Sensor kits themselves.

Compact Cam	Sensor kit Order No.	A	B	C
CC 015-024	30 182 08 -01	115	81	84
CC 015-049	30 182 08 -02	165	81	84
CC 040-024	30 182 08 -03	168	117	107
CC 040-049	30 182 08 -04	193	117	107
CC 040-099	30 182 08 -05	271	117	107
CC 040-124	30 182 08 -15	321	117	107
CC 060-024	30 182 08 -09	171	142	135
CC 060-049	30 182 08 -10	196	142	135
CC 060-099	30 182 08 -11	271	142	135
CC 090-024	30 182 08 -06	216	170	172
CC 090-049	30 182 08 -07	241	170	172
CC 090-099	30 182 08 -08	316	170	172
CC 150-024	30 182 08 -12	216	182	207
CC 150-049	30 182 08 -13	241	182	207
CC 150-099	30 182 08 -14	316	182	207

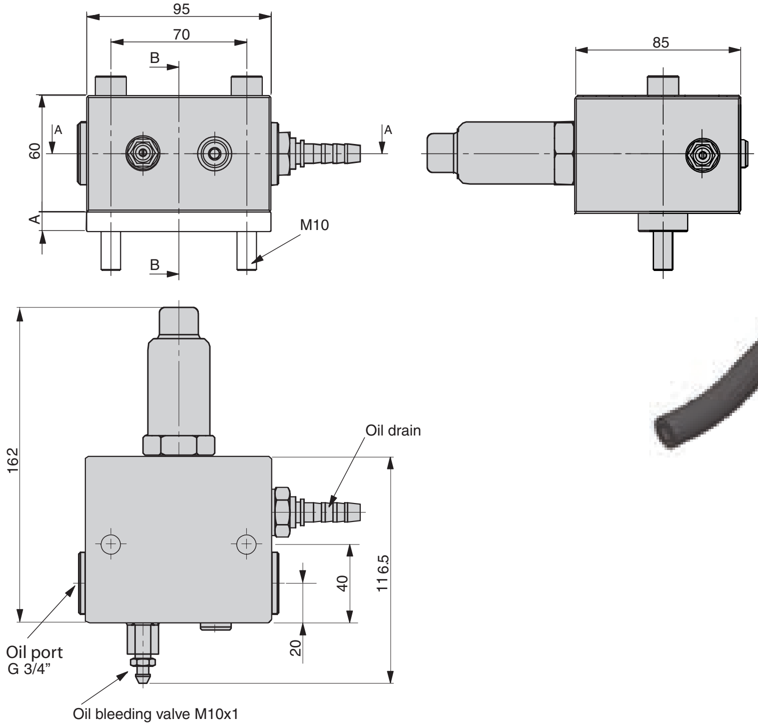
Sensor kit contents list

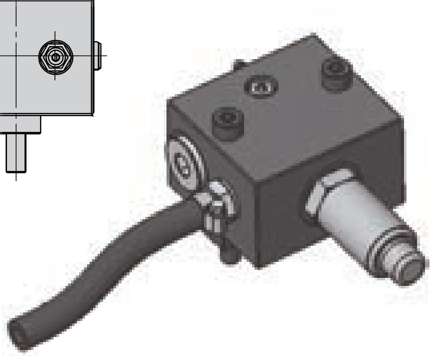
Position	Quantity	Description
1	1	Fixture
2	2	Screws
3	2	Sensors (not incl.)
4	1	Triggering block
5	1 or 2	Centre location pin (except CC 060, 090, 150)
6	2	Screws
7	1	Cover plate
8	2	Screws

View



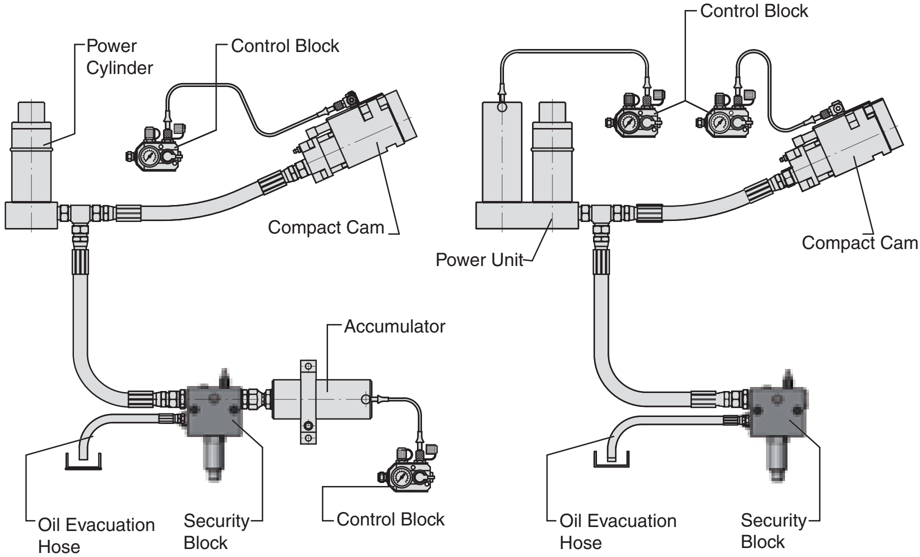
Security Block according to CNOMO-Standard
(Renault and Peugeot/Citroen)





Order No.	Size	A*
3020008-015	015	10
3020008-040	040	22.5
3020008-060	060	32.5
3020008-090	090	44
3020008-150	150	70

*To be used when directly connected to the accumulator, see below.



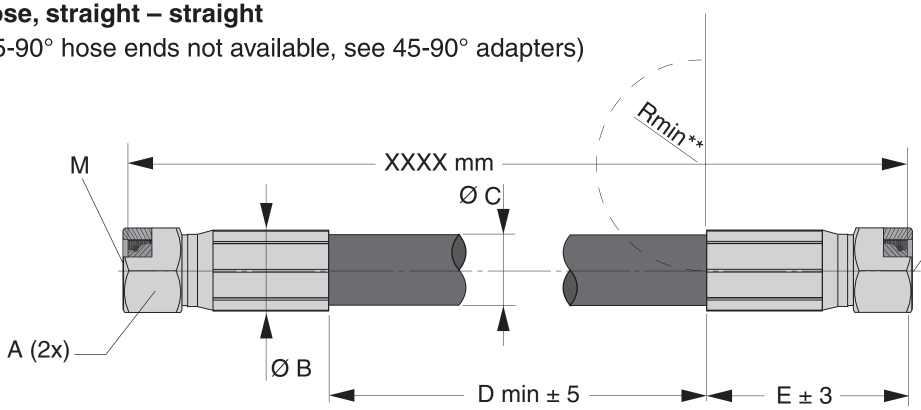
System hoses

EO24-Hose Dimensions

ISO standard: DIN EN ISO 8434

Hose, straight – straight

(45-90° hose ends not available, see 45-90° adapters)



For Power Unit	Hose size	Thread M	Order No.	A	Ø B	Ø C	D min	E	Rmin*
HCP 015 *	3/8" *	M 20x1.5	30 222 15 - xxxx	24	24.5	20	50	56	63
HCP 015	1/2"	M 24x1.5	30 214 54 - xxxx	30	28.5	24	50	63	90
HCP 040	3/4"	M30x2	30 214 55 - xxxx	36	35	31	50	72	120
HCP 060 and 090	1"	M36x2	30 214 56 - xxxx	46	44	38	50	88	150
HCP 150	1 1/4"	M42x2	30 214 57 - xxxx	50	52	47	50	94	210

** = Smallest recommended bending radius for the hydraulic hose

* = Hose size depends on press velocity, see below:

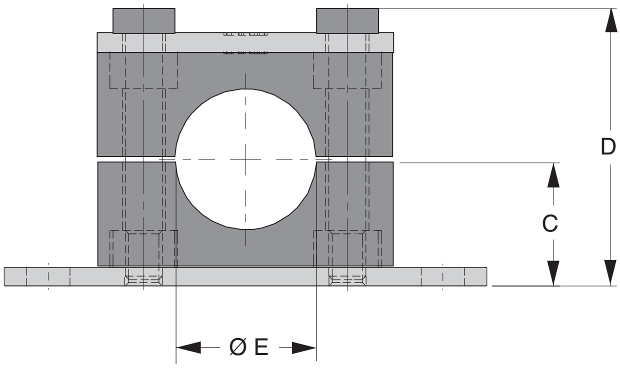
Power Unit	Standard hose size Max velocity 0.8 m/s	0.6 m/s	0.4 m/s	0.2 m/s
HCP 015	1/2"	3/8"	3/8"	3/8"
HCP 040	3/4"	3/4"	1/2"	1/2"
HCP 060	1"	3/4"	3/4"	1/2"
HCP 090	1"	1"	3/4"	1/2"
HCP 150	1 1/4"	1 1/4"	1"	3/4"

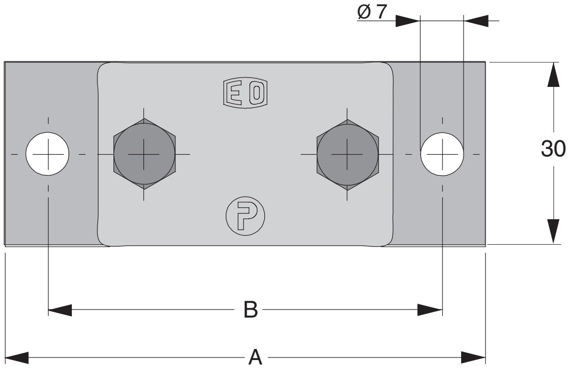
Additional Parker hose info:

Hose size	Inner Ø	Outer Ø	Hose	Max working pressure	Min burst pressure	Hose fitting
3/8"	10	20	721TC-6	280 bar	1120 bar	1C971-12-6
1/2"	12.5	24	721TC-8	280 bar	1120 bar	1C971-16-8
3/4"	19	31	721TC-12	280 bar	1120 bar	1C971-20-12
1"	25	38	721TC-16	280 bar	1120 bar	1C971-25-16
1 1/4""	31.8	47	721TC-20	210 bar	840 bar	1C971-30-20

Note: When ordering hoses direct from Parker make sure to include inside washing and end plugs. This procedure is included when ordering hoses from KALLER.

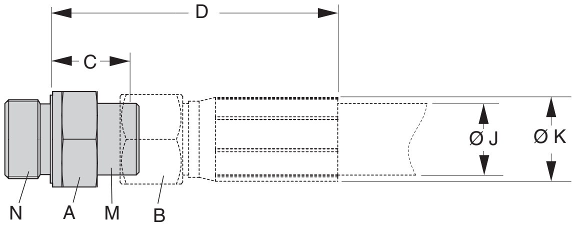
Hose Clamp





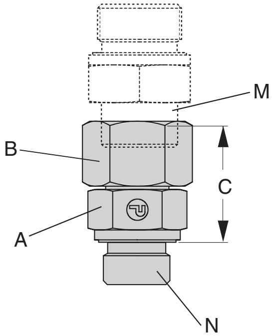
Hose size	Order No.	A	B	C	D	Ø E
3/8”	504613	78	64	20	44	20
1/2”	504614	78	64	20	44	24
3/4””	504615	87	73	24	51	31
1”	504616	100	86	32	67	38
1 1/4””	504617	116	100	36	75	47

Male Stud Connector



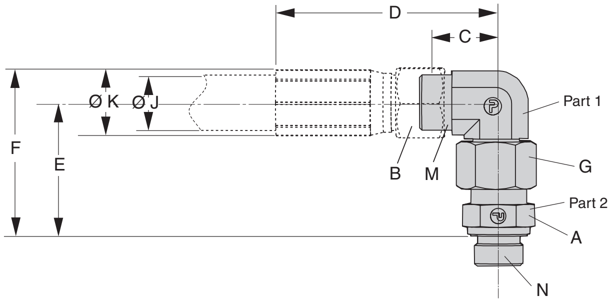
Hose size	Thread M	Thread N	Order No.	A	B	C	D	ØJ	ØK
3/8”	M 20x1.5	G 1/2”	504598	27	24	18	74	20	24.5
1/2”	M 24x1.5	G 1/2”	504321	27	30	19	82	24	30
1/2”	M24x1.5	G 3/4”	504322	32	30	21	84	24	30
3/4”	M30x2	G 1/2”	504323	32	36	21	93	31	37
3/4”	M30x2	G 3/4”	504324	32	36	21	93	31	37
3/4”	M30x2	G 1 1/4”	504325	50	36	23	95	31	37
1”	M36x2	G 1/2”	504326	41	46	23	111	38	46
1”	M36x2	G 3/4”	504327	41	46	23	111	38	46
1”	M36x2	G 1 1/4”	504328	50	46	23	111	38	46
1 1/4”	M42X2	G 3/4”	504329	41	50	24	138	46	57
1 1/4”	M42X2	G 1”	504330	46	50	24	138	46	57
1 1/4”	M42X2	G 1 1/4”	504331	50	50	27	141	46	57

Swivel Connector



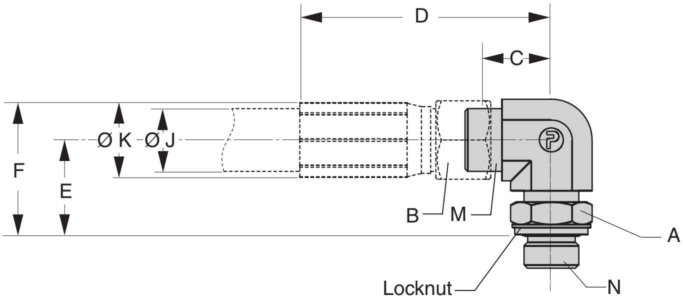
Thread M	Thread N	Order No.	A	B	C
M 20x1.5	G 1/2”	504608	27	24	35
M 24x1.5	G 1/2”	504609	27	30	37
M 30x2	G 3/4”	504610	32	36	43
M 36x2	G 1”	504611	41	46	48
M 42x2	G 1 1/4”	504612	50	50	51

Swivel Nut Elbow and Male Stud Connector



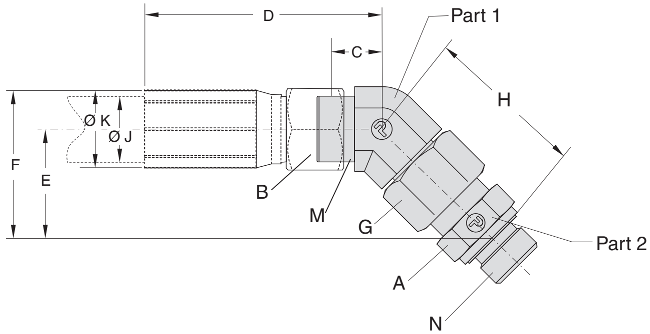
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	ØJ	ØK
3/8"	M20x1.5	G 1/2"	504599	504598	27	24	22	78	49	61	24	20	24,5
1/2"	M24x1.5	G 1/2"	504332	504321	27	30	25	88	55	70	30	24	30
1/2"	M24x1.5	G 3/4"	504332	504322	32	30	25	88	58	73	30	24	30
3/4"	M30x2	G 1/2"	504333	504323	32	36	27	99	65	84	36	31	37
3/4"	M30x2	G 3/4"	504333	504324	32	36	27	99	65	84	36	31	37
3/4"	M30x2	G 1 1/4"	504333	504325	50	36	27	99	67	86	36	31	37
1"	M36x2	G 1/2"	504334	504326	41	46	30	118	73	96	46	38	46
1"	M36x2	G 3/4"	504334	504327	41	46	30	118	73	96	46	38	46
1"	M36x2	G 1 ¼"	504334	504328	50	46	30	118	73	96	46	38	46
1 1/4"	M42x2	G 3/4"	504335	504329	41	50	36	150	79	108	50	46	57
1 1/4"	M42x2	G 1 1/4"	504335	504331	50	50	36	150	79	108	50	46	57

Adjustable Locknut Elbow



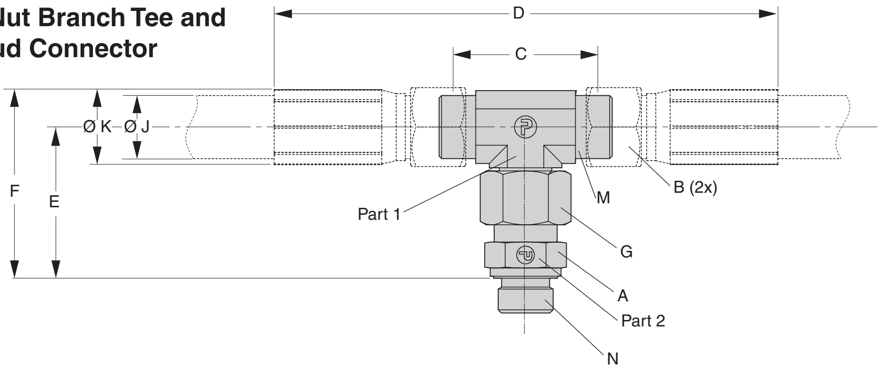
Hose size	Thread M	Thread N	Order No.	A	B	C	D	E	F	ØJ	ØK
3/8"	M20x1.5	G 1/2"	504600	27	24	22	78	36	48	20	24.5
1/2"	M24x1.5	G 1/2"	504336	27	30	25	88	36	51	24	30
3/4"	M30x2	G 3/4"	504337	36	36	28	100	39	58	31	37
1"	M36x2	G 3/4"	504338	41	46	30	118	44	67	38	46
1 1/4"	M42x2	G1 1/4"	--	--	--	--	--	--	--	--	--

Swivel Nut 45°Elbow and Male Stud Connector



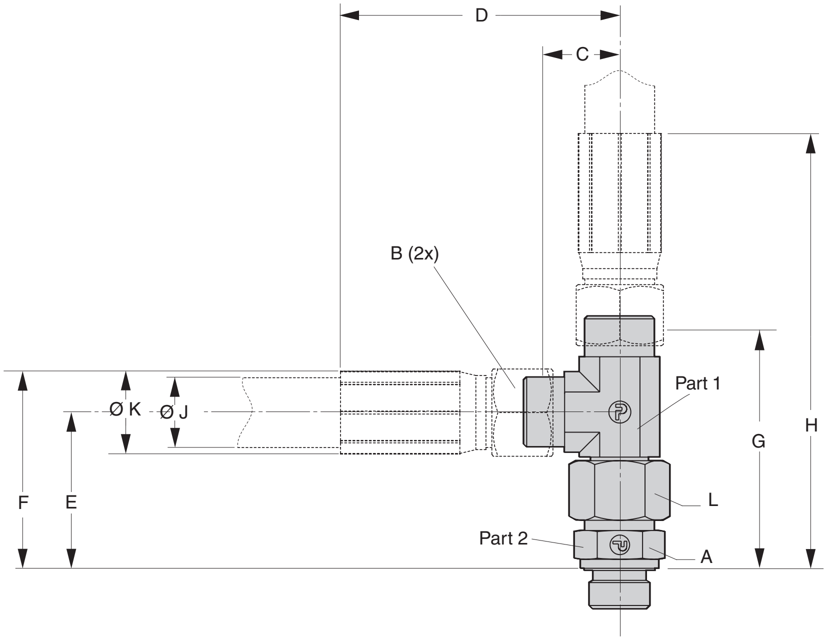
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	H	ØJ	ØK
3/8”	M20x1.5	G 1/2”	504601	504598	27	24	17	73	35	47	24	49	20	24.5
1/2”	M24x1.5	G 1/2”	504339	504321	27	30	16	79	39	54	30	55	24	30
1/2”	M24x1.5	G 3/4”	504339	504322	32	30	16	79	40	55	30	57	24	30
3/4”	M30x2	G 1/2”	504340	504323	32	36	16	88	46	65	36	65	31	37
3/4”	M30x2	G 3/4”	504340	504324	32	36	16	88	46	65	36	65	31	37
3/4”	M30x2	G 1 1/4”	504340	504325	50	36	16	88	47	66	36	67	31	37
1”	M36x2	G 1/2”	504341	504326	41	46	19	107	52	75	46	73	38	46
1”	M36x2	G 3/4”	504341	504327	41	46	19	107	52	75	46	73	38	46
1”	M36x2	G 1 1/4”	504341	504328	50	46	19	107	52	75	46	73	38	46
1 1/4”	M42x2	G 3/4”	504342	504329	41	50	24	138	56	85	50	79	46	57
1 1/4”	M42x2	G 1 1/4”	504342	504331	50	50	24	138	56	85	50	79	46	57

Swivel Nut Branch Tee and Male Stud Connector



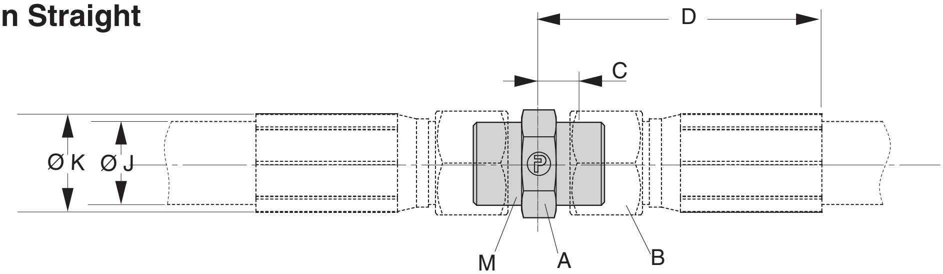
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	ØJ	ØK
3/8”	M20x1.5	G 1/2”	504602	504598	27	24	43	155	49	61	24	20	24.5
1/2”	M24x1.5	G 1/2”	504343	504321	27	30	49	175	55	70	30	24	30
1/2”	M24x1.5	G 3/4”	504343	504322	32	30	49	175	58	73	30	24	30
3/4”	M30x2	G 1/2”	504344	504323	32	36	53	197	65	84	36	31	37
3/4”	M30x2	G 3/4”	504344	504324	32	36	53	197	65	84	36	31	37
3/4”	M30x2	G 1 1/4”	504344	504325	50	36	53	197	67	86	36	31	37
1”	M36x2	G 1/2”	504345	504326	41	46	60	236	73	96	46	38	46
1”	M36x2	G 3/4”	504345	504327	41	46	60	236	73	96	46	38	46
1”	M36x2	G 1 1/4”	504345	504328	50	46	60	236	73	96	46	38	46
1 1/4”	M42X2	G 3/4”	504346	504329	41	50	71	299	79	108	50	46	57
1 1/4”	M42X2	G 1 1/4”	504346	504331	50	50	71	299	79	108	50	46	57

Swivel Nut Run Tee and Male Stud Connector



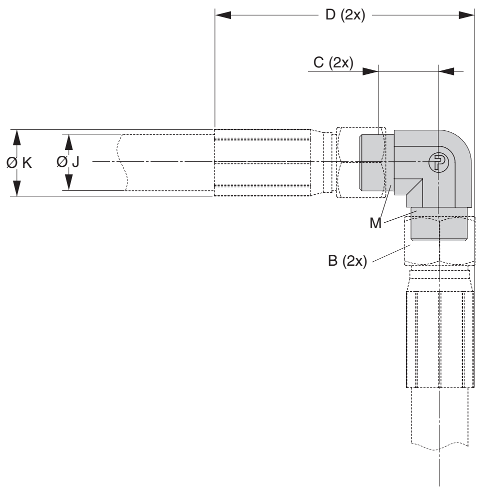
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	H	Ø J	Ø K
3/8”	M20x1.5	G 1/2”	504603	504598	27	24	22	78	49	61	71	127		
1/2”	M24x1.5	G 1/2”	504347	504321	27	30	25	88	55	70	80	143	24	30
1/2”	M24x1.5	G 3/4”	504347	504322	32	30	25	88	58	73	82	145	24	30
3/4”	M30x2	G 1/2”	504348	504323	32	36	27	99	65	84	92	164	31	37
3/4”	M30x2	G 3/4”	504348	504324	32	36	27	99	65	84	92	164	31	37
3/4”	M30x2	G 1 1/4”	504348	504325	50	36	27	99	67	86	94	166	31	37
1”	M36x2	G 1/2”	504349	504326	41	46	30	118	73	96	103	191	38	46
1”	M36x2	G 3/4”	504349	504327	41	46	30	118	73	96	103	191	38	46
1”	M36x2	G 1 1/4”	504349	504328	50	46	30	118	73	96	103	191	38	46
1 1/4”	M42X2	G 3/4”	504350	504329	41	50	36	150	79	108	114	228	46	57
1 1/4”	M42X2	G 1 1/4”	504350	504331	50	50	36	150	79	108	114	228	46	57

Union Straight



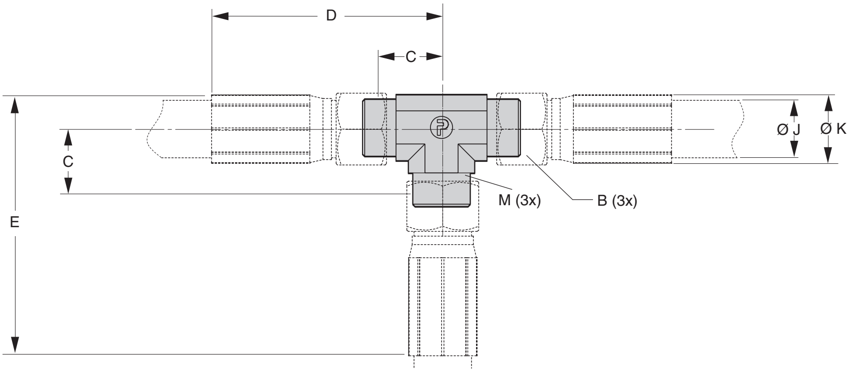
Hose size	Thread M	Order No.	A	B	C	D	Ø J	Ø K
3/8”	M20x1.5	504604	22	24	10	66	20	24.5
1/2”	M24x1.5	504351	27	30	11	74	24	30
3/4”	M30x2	504352	32	36	12	84	31	37
1”	M36x2	504353	41	46	13	101	38	46
1 1/4”	M42X2	504354	46	50	14	128	46	57

Union Elbow



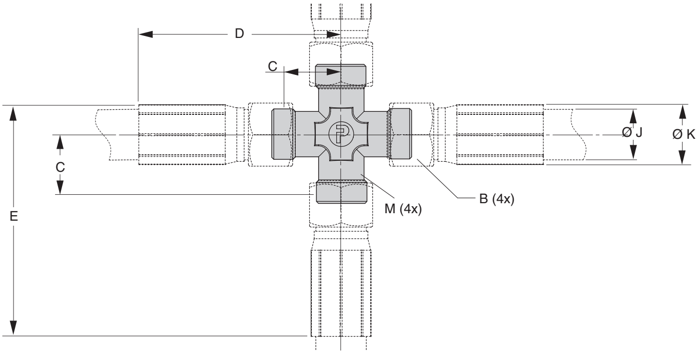
Hose size	Thread M	Order No.	B	C	D	Ø J	Ø K
3/8”	M20x1.5	504605	24	22	90	20	24.5
1/2”	M24x1.5	504355	30	25	102	24	30
3/4”	M30x2	504356	36	27	117	31	37
1”	M36x2	504357	46	30	140	38	46
1 1/4”	M42X2	504358	50	36	178	46	57

Union Tee



Hose size	Thread M	Order No.	B	C	D	E	Ø J	Ø K
3/8”	M20x1.5	504606	24	22	78	91	20	24.5
1/2”	M24x1.5	504359	30	25	88	103	24	30
3/4”	M30x2	504360	36	27	99	117	31	37
1”	M36x2	504361	46	30	118	140	38	46
1 1/4”	M42X2	504362	50	36	150	178	46	57

Union Cross

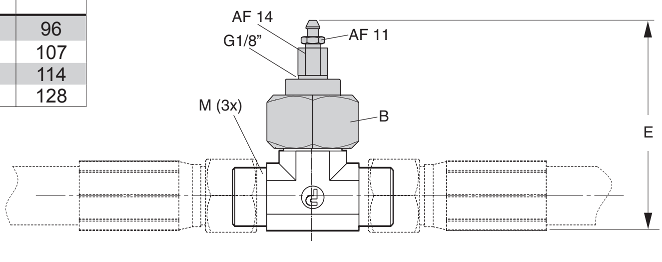


Hose size	Thread M	Order No.	B	C	D	E	Ø J	Ø K
3/8”	M20x1.5	504607	24	22	78	91	20	24.5
1/2”	M24x1.5	504363	30	25	88	103	24	30
3/4”	M30x2	504364	36	27	99	117	31	37
1”	M36x2	504365	46	30	118	140	38	46
1 1/4”	M42x2	504366	50	36	150	178	46	57

Additional Oil Bleeding Valve

Hose size	Thread M	Order No.*	B	E
1/2”	M24x1.5	4026614	30	96
3/4”	M30x2	4126614	36	107
1”	M36x2	4226614	46	114
1 1/4”	M42x2	4326614	50	128

**Union Tee not included.*



Additional KALLER - Parker adapter reference list:

KALLER Order No.	Parker Order No.
504321	GE16SREDOMD*
504322	GE16SR3/4EDOMD*
504323	GE20SR1/2EDOMD*
504324	GE20SREDOMD*
504325	GE20SR11/4EDOMD*
504326	GE25SR1/2EDOMD*
504327	GE25SR3/4EDOMD*
504328	GE25SR11/4EDOMD*
504329	GE30SR3/4EDOMD*
504330	GE30SR1EDOMD*
504331	GE30SREDOMD*
504332	EW16SOMD*
504333	EW20SOMD*
504334	EW25SOMD*
504335	EW30SOMD*
504336	WEE16SROMD*
504337	WEE20SROMD*
504338	WEE25SR3/4OMD*
504339	EV16SOMD*
504340	EV20SOMD*
504341	EV25SOMD*
504342	EV30SOMD*
504343	ET16SOMD*
504344	ET20SOMD*
504345	ET25SOMD*
504346	ET30SOMD*
504347	EL16SOMD*
504348	EL20SOMD*
504349	EL25SOMD*
504350	EL30SOMD*
504351	G16S*X
504352	G20S*X
504353	G25S*X
504354	G30S*X
504355	W16S*X
504356	W20S*X
504357	W25S*X
504358	W30S*X
504359	T16S*X
504360	T20S*X
504361	T25S*X
504362	T30S*X
504363	K16S*X
504364	K20S*X
504365	K25S*X
504366	K30S*X

KALLER Order No.	Parker Order No.
504598	GE12SR1/2EDOMD*
504599	EW12SOMD*
504600	WEE12SR1/2OMD*
504601	EV12SOMD*
504602	ET12SOMD*
504603	EL12SOMD*
504604	G12S*X
504605	W12S*X
504606	T12S*X
504607	K12S*X
504608	EGE12SR1/2ED*
504609	EGE16SRED*
504610	EGE20SRED*
504611	EGE25SRED*
504612	EGE30SRED*
504613	RAVG6-319
504614	RAVG6-323
504615	RAVG6-430
504616	RAVG6-538
504617	RAVG6-648

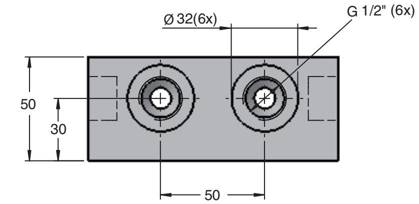
* **CF** version is Chromium^{6} free. **A3C** material is steel, Zink-plated and yellow chromated.

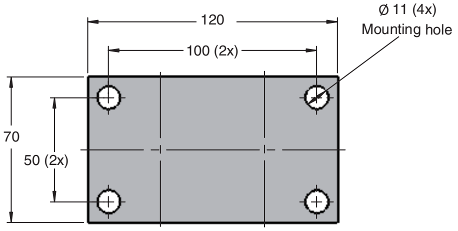
The CF version is recommended when available.

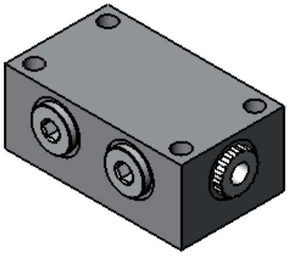
Parker ordering example:
GE16SREDOMD**CF** or GE16SREDOMD**A3C**

Manifold Block

Order No. 3022834

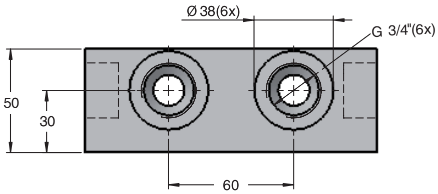


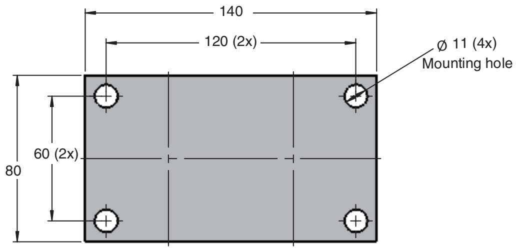


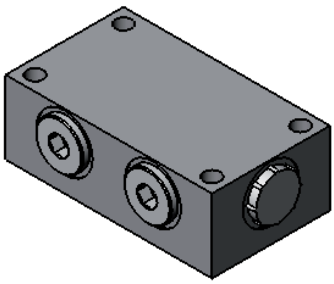


Manifold Block

Order No. 3022835



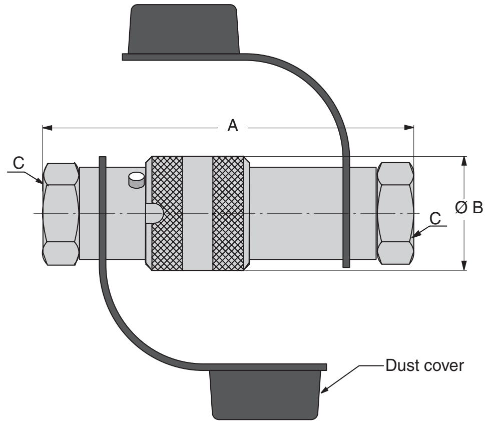




System adapters

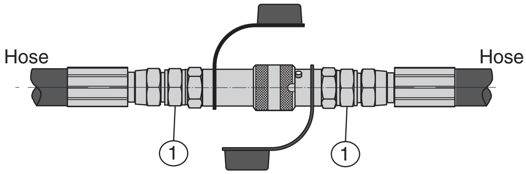
Quick coupling

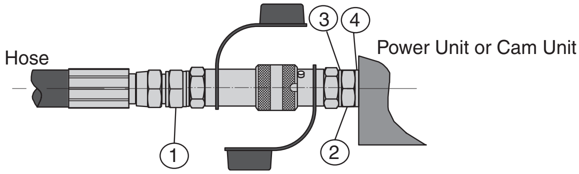
The quick coupling can be used to separate the Power Unit and the Cam Unit/Force Cylinder without refilling and bleeding the system.



Ordering No.	A	ØB	C	Max. oil flow	Power Unit / Cam	Max. velocity Power Unit / Cam
3018084-01	132	40	G 1/2"	100 l/min	015	0.8
3018084-02	162	50	G 3/4"	300 l/min	040, 060, 090	0.8 (090=0.6)
3018084-03	176	57	G 1	500 l/min	150	0.6

Installation possibilites





Ordering number adapter and washers				
Quick coupling	**Position 1**	**Position 2**	**Position 3**	**Position 4**
3018084-01	504321	503551	501271	501271
3018084-02	504324 or 504327*	503552	501270	501270
3018084-03	504330	503553	500282	503554

*for 1" hose size

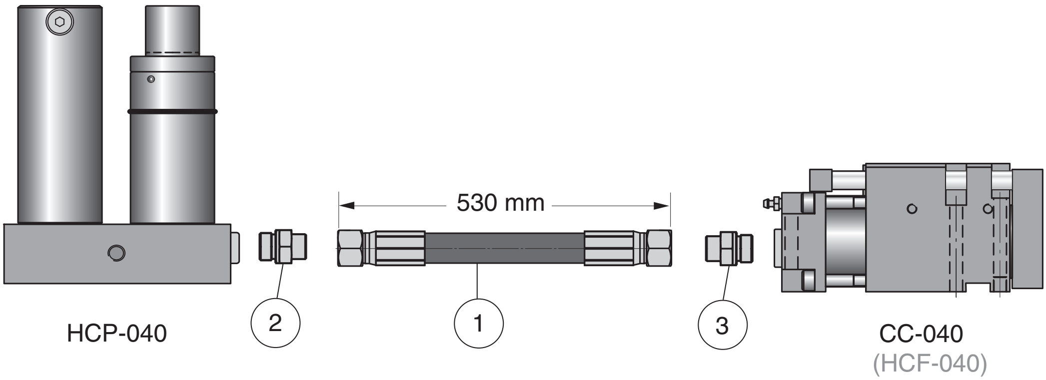
Designing your hosed system

How to design your hosed system

1. Choose the right hose size and style from page8.28 (the hose size is always dictated by the Power Unit size).

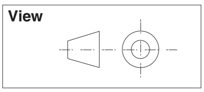
2. Choose the right size/style adaptor between hose and Power Unit using page 8.29-8.30. The oil connection is found on the respective Power Unit dimension page.

3. Choose the right size/style adapter be tween hose and Cam Unit/ Force Cylin der (CC or HCF) using page 8.29-8.30. The oil connection is found on the respective Cam Unit/ Force Cylinder dimension page. You can also connect one hose to an other using adapters (see page 8.31-8.32).



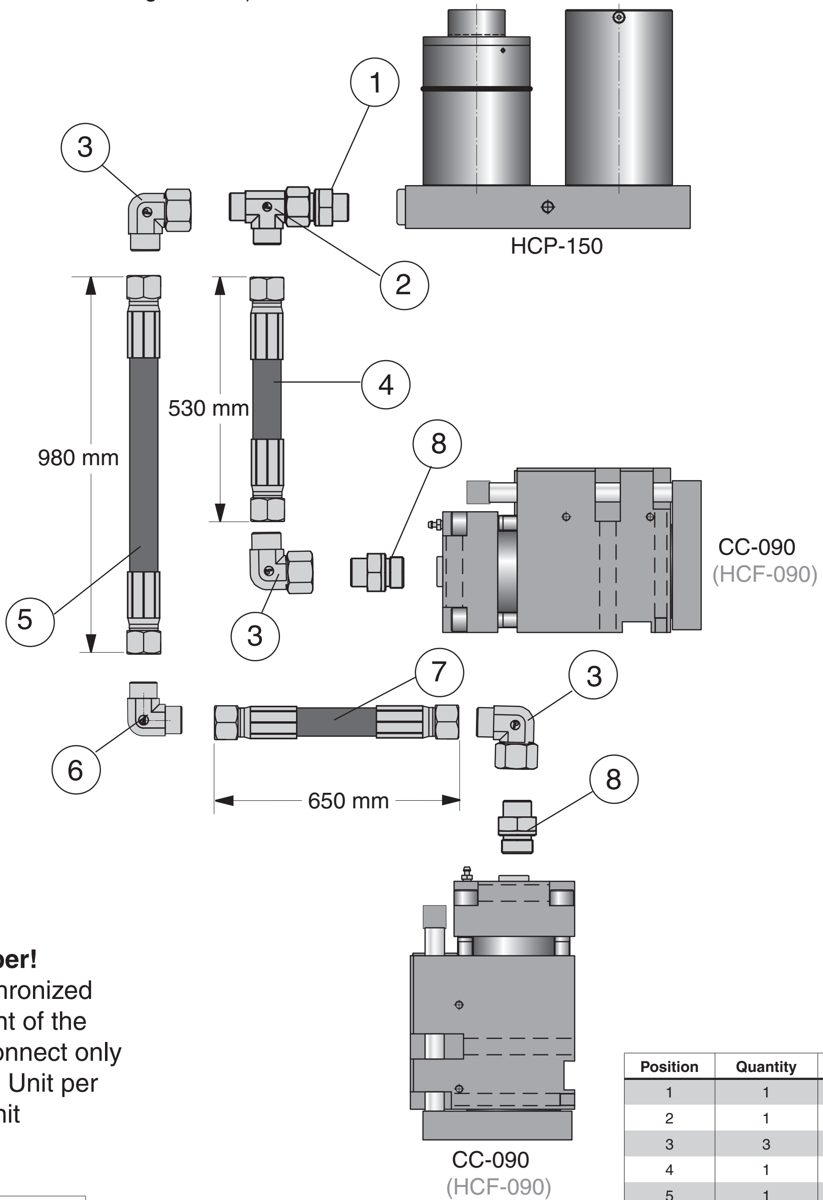
Example above showing how to connect a HCP-040 to a CC-040 (the same principal applies when connecting an HCF).

Position	Order No.
1	3021455-0530
2	504324
3	504324

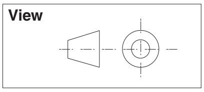


Designing your hosed system

Example above showing how to connect a HCP-040 to a CC-040 (the same principal applies when connecting an HCF).



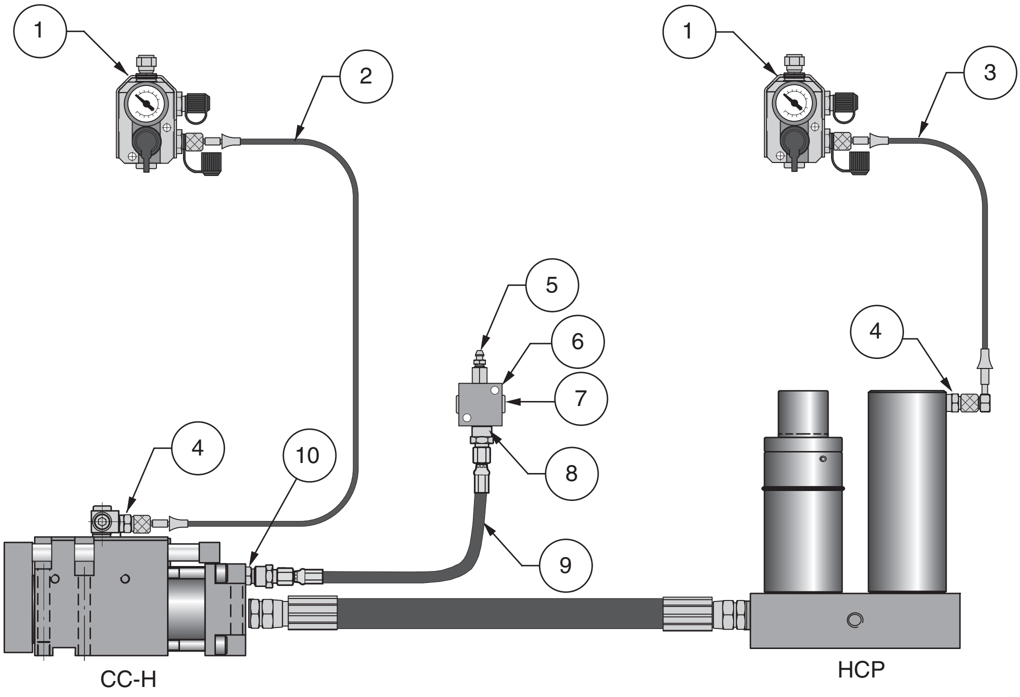
Remember!
For synchronized movement of the Cams, connect only one Cam Unit per Power Unit



Position	Quantity	Order No.
1	1	504331
2	1	504350
3	3	504335
4	1	3021457-0530
5	1	3021457-0980
6	1	504358
7	1	3021457-0652
8	2	504329

Hosed systems for Control Units and oil bleeding

CC-H Compact Cam/HCP Power Unit (example)



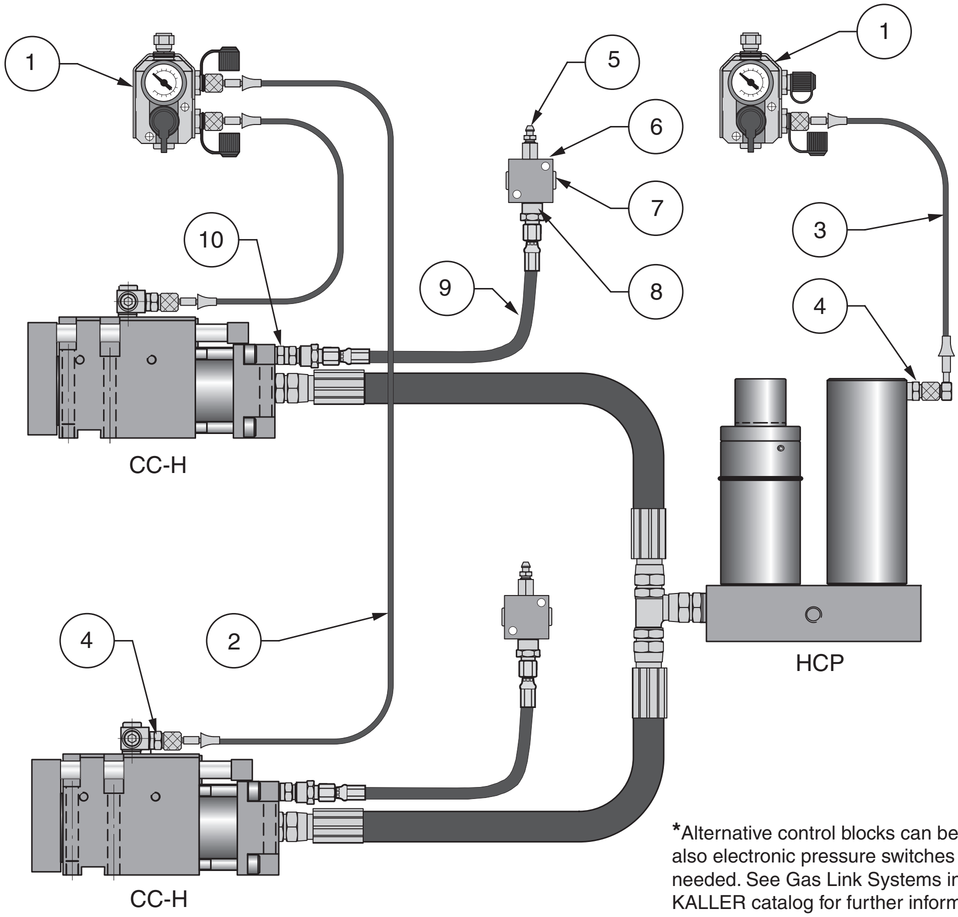
*Alternative control blocks can be used, also electronic pressure switches when needed. See Gas Link Systems in the KALLER catalog for further information.

Hosed system for Control Units *			
Position	**Quantity**	**Description**	**Order No.**
1	2	Control Unit	3116114
2	1	EZ-hose	4014974-xxxx
3	1	EZ-hose	4017568-xxxx
4	2	Adapter	4114973-G 1/8”

Hosed system for oil bleeding			
Position	**Quantity**	**Description**	**Order No.**
5	1	Bleed nipple	4014007
6	1	Coupling Unit	4017032
7	1	Plug G 1/8”	500343
8	1	Adapter	503593
9	1	EO24-hose	3020857-xxxx
10	1	Adapter M10x1	504636

Hosed systems for Control Units and oil bleeding

Two CC-H Compact Cams/HCP Power Unit (example)



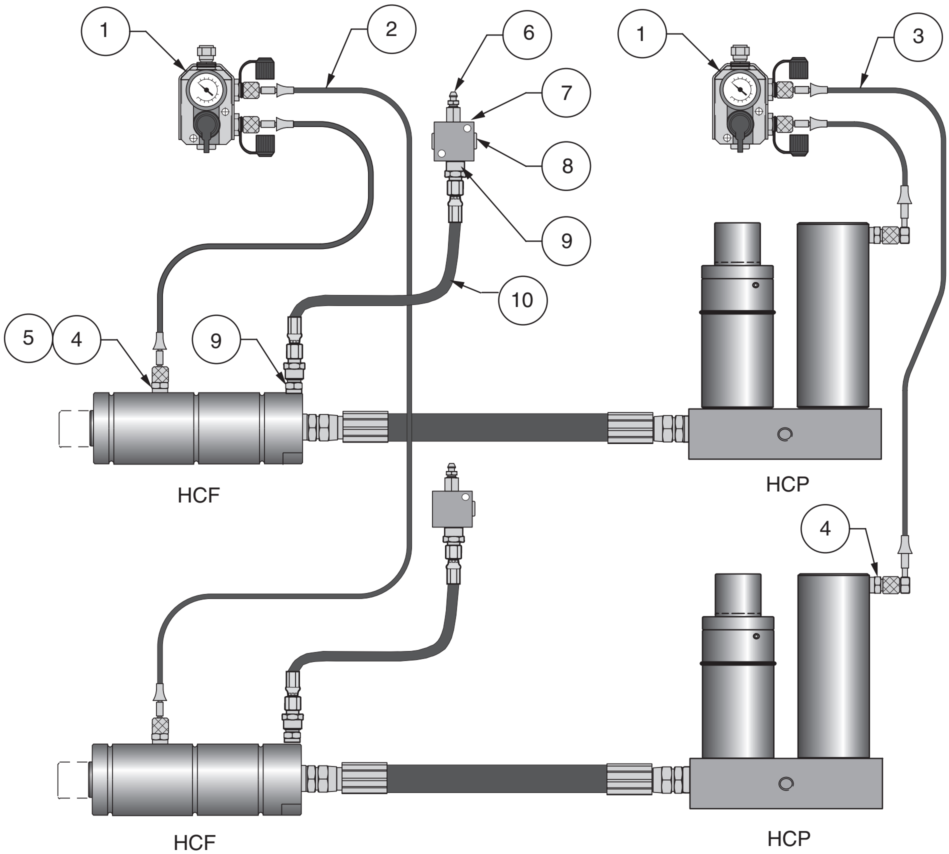
*Alternative control blocks can be used, also electronic pressure switches when needed. See Gas Link Systems in the KALLER catalog for further information.

Hosed system for oil bleeding			
Position	**Quantity**	**Description**	**Order No.**
5	2	Bleed nipple	4014007
6	2	Coupling Unit	4017032
7	2	Plug G 1/8”	500343
8	2	Adapter	503593
9	2	EO24-hose	3020857-xxxx
10	2	Adapter M10x1	504636

Hosed system for Control Units *			
Position	**Quantity**	**Description**	**Order No.**
1	2	Control Unit	3116114
2	2	EZ-hose	4014974-xxxx
3	1	Ez-hose	4017568-xxxx
4	3	Adapter	4114973-G 1/8”

Hosed systems for Control Units and oil bleeding

Two HCF Force Cylinders to two HCP Power Units (example)



*Alternative control blocks can be used, also electronic pressure switches when needed. See Gas Link Systems in the KALLER catalog for further information.

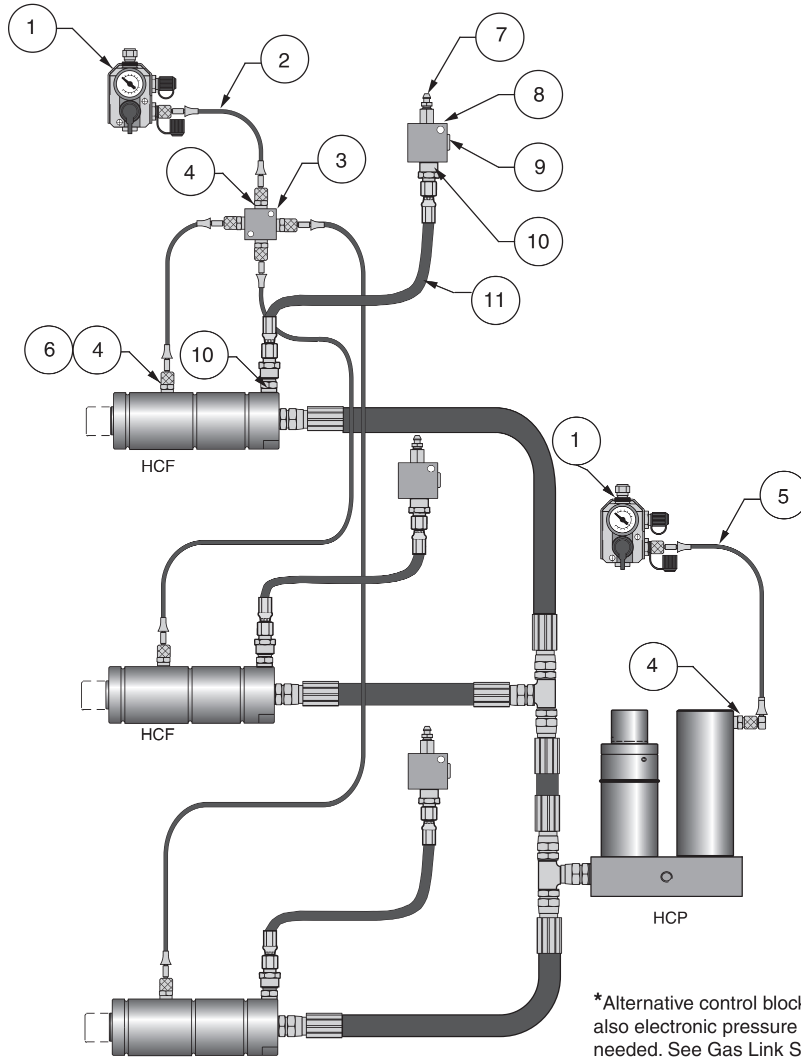
Hosed system for Control Units *			
Detail	**Quantity**	**Desqription**	**Order No.**
1	2	Control Units	3116114
2	2	EZ-hose	4014974-xxxx
3	2	EZ-hose	4017568-xxxx
4	8	Adapter	4114973-G 1/8”
5	1*	Washer	500472

*only needed for HCF 015

Hosed system for oil bleeding			
Detail	**Quantity**	**Description**	**Order No.**
6	2	Bleed nipple	4014007
7	2	Distribution block	4017032
8	2	Plug G 1/8”	500343
9	4	Adapter	503593
10	2	EO24-hose	3020857-xxxx

Hosed systems for Control Units and oil bleeding

Three HCF Force Cylinders to one HCP Power Unit (example)



*Alternative control blocks can be used, also electronic pressure switches when needed. See Gas Link Systems in the KALLER catalog for further information.

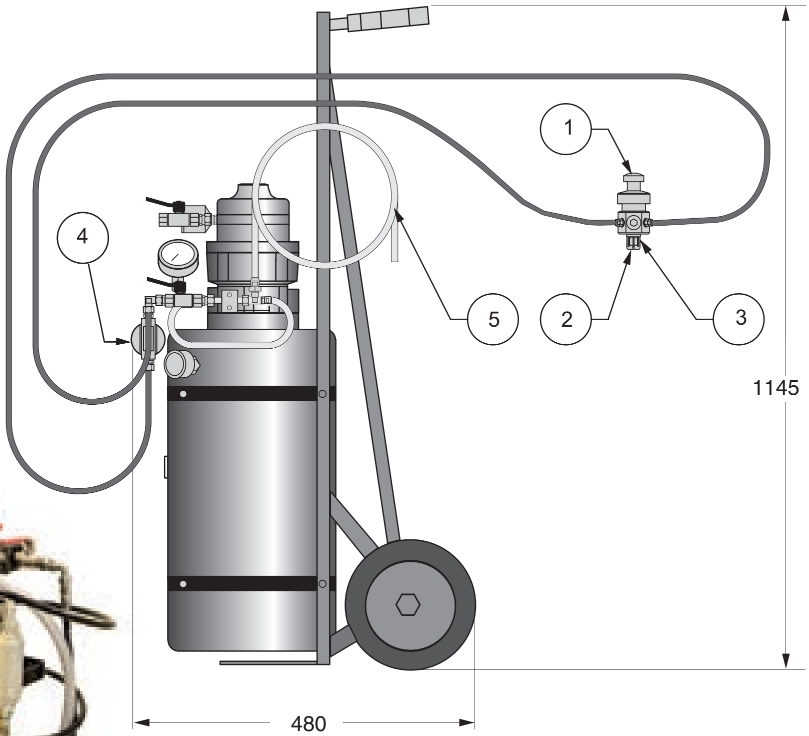
Hosed system for Control Units *			
Position	**Quantity**	**Description**	**Order No.**
1	2	Control Unit	3116114
2	4	EZ-hose	4014974-xxxx
3	1	Coupling Unit	4017032
4	8	Adapter	4114973-G 1/8”
5	1	EZ-hose	4017568-xxxx
6	1*	Washer	500472

*only needed for HCF 015

Hosed system for oil bleeding			
Position	**Quantity**	**Description**	**Order No.**
7	3	Bleed nipple	4014007
8	3	Coupling Unit	4017032
9	3	Plug G 1/8”	500343
10	6	Adapter	503593
11	3	EO24-hose	3020857-xxxx

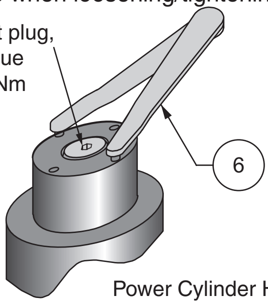
Pump Unit

Order No. 3017075



Technical specifications
Power :...0.7 kW at 7 bar air pressure and 830 l/min
Oil flow:..2.4 l/min at 1500 rpm
Max. oil pressure:............................55 bar
Tank volume:..................................18 liters
Oil filter:...10 µm
Air pressure....................................5-7 bar
Weight:...27 kg

The hook spanner below is used to hold the piston in place when loosening/tightening the port plug.

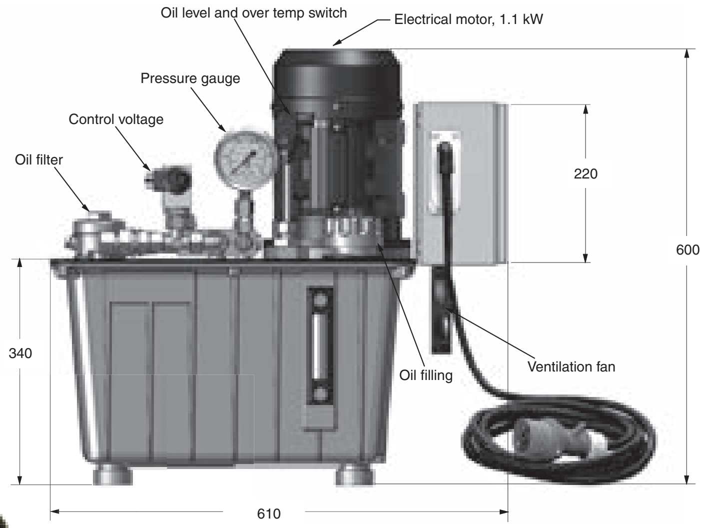


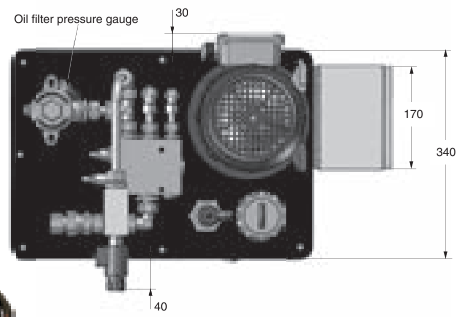
Power Cylinder HCP

Spare parts etc.		
Position	**Description**	**Order No.**
1	Armature (include position 2 and 3)	3013941
2	Plastic plug	502446
3	Rubber-steel washer	502160
4	Filter	505763
5	Transparent hose	503116
6	Hook spanner (HCP 015)	503417
6	Hook spanner (HCP 040-150)	503418

EHC Electrical Pump Unit

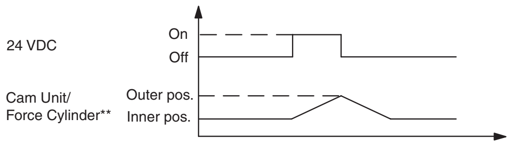
Order No. 505776





Technical data - hydraulic system	
Oil tank volyme	25 l
Hydraulic oil ISO VG 32	DIN 51524 HVLP (or equivalent)
Min. oil flow at 180 bar	1.6 l/min
Max. oil flow at 25 bar	16 l/min
Oil pressure during cam travel	25 bar
Oil pressure during cam operation	Max. 180 bar

Technical data - electrical system	
Main voltage electrical pump	3x220-440 VAC 50-60Hz
Control voltage solenoid valve	24 VDC/22 Watts
Overtemp switch	70° C
Weight	47 kg



	Cam Unit/Force Cylinder velocity*	
	Forward + return	During operation
Cam Unit/Force Cylinder size	(Low pressure)	(High pressure)
015	212 mm/s	21 mm/s
040	86 mm/s	9 mm/s
060	53 mm/s	5 mm/s
090	34 mm/s	3 mm/s
150	22 mm/s	2 mm/s

*The table shows approximate values based on a single Cam Unit/ Force Cylinder connected to a single EHC Electrical Pump Unit. When using more Cam Units/Force Cylinders connected to one EHC Unit divide the velocity by the number of Cam Units/ Force Cylinders. Ex: 212/3 Cam Units/Force Cylinders = 71 mm/s

**Cam Units/Force Cylinders forward:
Activated by the control signal (24 VDC)

**Cam Units/Force Cylinders return:
Activated by the inbuilt gas return in the Cam Unit/Force Cylinder

Safety guidelines

Symbol to observe

This symbol means that special attention is required.

Personnel

All personnel who operate or maintain this equipment must fully understand how it works. Always wash your hands after working with hydraulic systems.

Work place

The work place must be kept absolutely clean during installation or maintenance of the Flex Cam.

Equipment

Use only clean and functional tools and proper protection for your eyes and skin.

Adapters for hoses

Upon delivery, all connections on the units are plugged. To reduce the risk of contamination from foreign bodies, remove the plugs only when absolutely necessary.

Nitrogen products

Be very careful when working with nitrogen products. See special instructions for gas springs, because wrong handling could cause personal injury. Make sure that there is enough room for the Accumulator in the tool.

Hoses

The hoses are washed and plugged to protect them from dirt as this could damage the system. Make sure that the hoses are protected against sharp edges and external damage. The hoses will move a little depending on the oil pressure pulsation during operation.

Torque settings for screws

Always use a torque wrench when tightening screws. See Table 1 which is valid for oiled screws of 12.9 quality.

Screw dim.	Allen key	Torque (Nm)
M 6	5	15
M 8	6	40
M 10	8	75
M 12	10	135
M 16	14	330
M 20	17	640

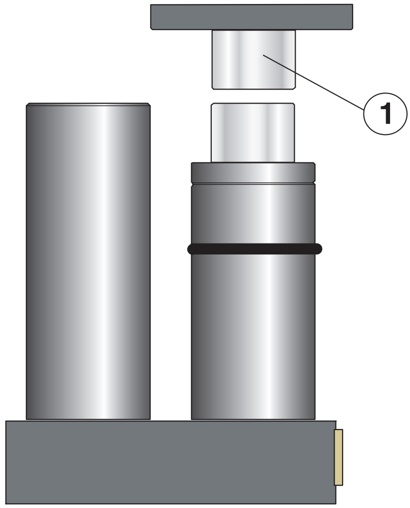
Table 1

The following information describes only the most important recommendations. If there are any questions about the installation do not hesitate to contact your local distributor or Strömsholmen AB.

Tel +46 140 571 00

Fax +46 140 571 98

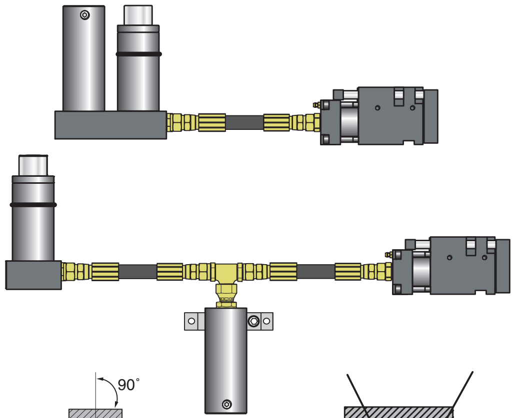
Web site: www.kaller.com



Power Unit

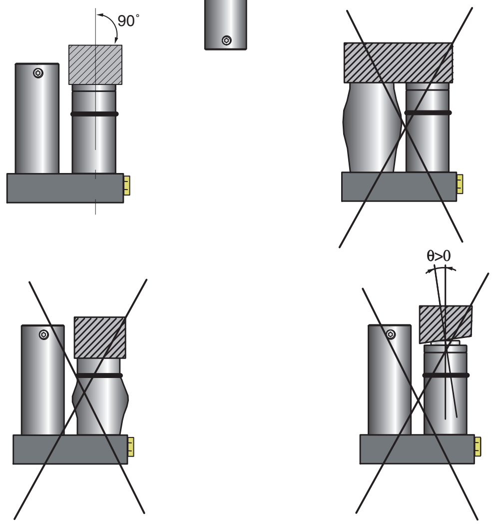
The Power Unit can be mounted in any position in the tool, including upside-down (valid for all units). A driver (1) is often used and adapted to give the right stroke length of the Power Cylinder.

Make sure the surface which makes contact with the piston on the top of the Power Cylinder is parallel and even. Make sure there is enough room for the Accumulator in the tool.



Power Unit Mounting Instructions (HCP, HCP-S)

Mount the Power Unit to a flat surface using four screws, either upright or upside down. To ensure the Cam Unit/Force Cylinder always travels the same stroke length it is customary to stroke the Power Unit an extra 10 mm, which also causes the Accumulator´s piston to rise about 10 mm.



Compact Cam

Use dowel pins and a key to locate the position of the Cam Unit in the tool.

The punch plate (1) can be removed for machining by first removing all three screws (2) from the plate.

The reaction force, created as a result of the forming/piercing operation being performed by the Cam Unit, can be located within any part of the shaded area (3).

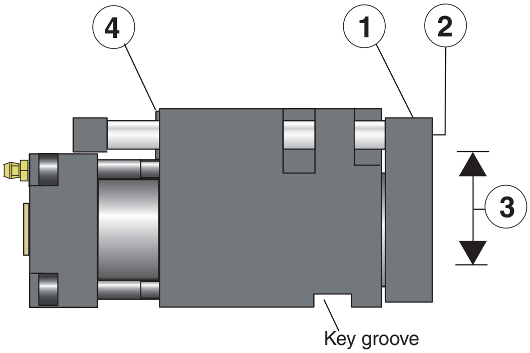
However, it is recommended to position this force directly in the centre of the shaded area (3). For more information, see the respective Cam Unit dimensions page.

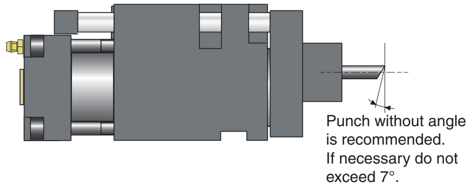
Please note, it is not recommended to put any turning moment on the punch plate (1).

When mounting a punch directly onto the punch plate (1), or via a ball lock punch retainer, the gas spring (4) should be in place before any final adjustments are made.

Use the Pump Unit (see page 8.54) together with a thin metal plate or thick piece of paper to check the punch is positioned correctly.

For Installation Examples, please see page 4.1.

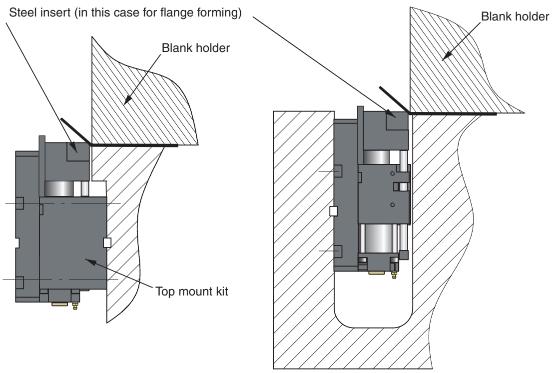




Flange Cam installation possibilities

The Flange Cam can be mounted at any position in the die.

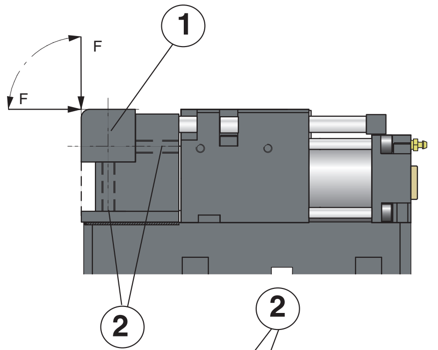
For the top mount, a "top mount kit" is needed but not for the base mount.

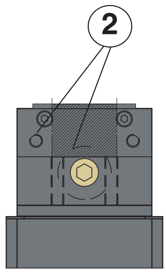


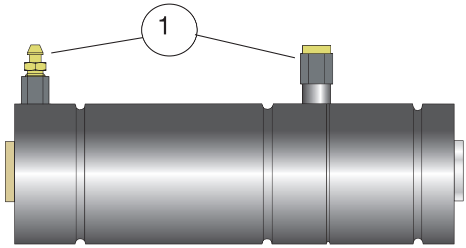
Flange Cam force direction and location

The customized tool (1) (for flanging etc.) should be mounted using two or four bolts (2) within the designated area.

The force created by the flanging is allowed in directions "F" within the area marked ▨.

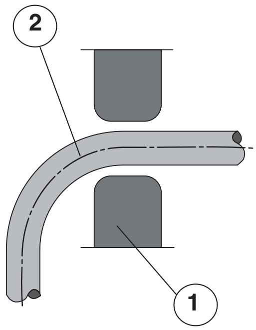






Force Cylinder

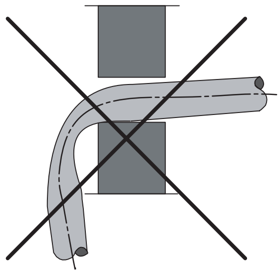
Use only flanges or fittings intended for the Force Cylinder. See also page 7.1 for " Technical data". The threaded holes at the top of the piston rod can be used to mount the fitting for the tool in a pushing- and pulling application. Note that it is not possible to load any force in an off centre position or as a side load.



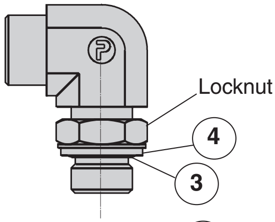
Make sure there is enough room to fill and bleed the force cylinder in the die (1). See also page 8.52-53.

Hydraulic hose and adapters

See page 8.37 to choose the adapters and the hose. Use as few adapters as possible.

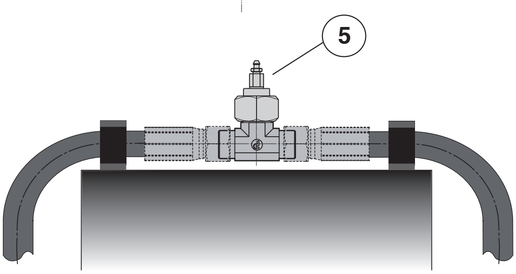


The hoses are washed and plugged to protect them from dust as this could damage the system. Make sure the hoses are protected from sharp edges and external damage. Sharp edges must be rounded (1).



Hoses will move a little depending on the oil pressure pulsation during the operations. Do not use a smaller bending radius than specified (2).

Adapters for the units have an O-ring (3) and a support washer (4) which must always be used. Check also that no movable parts can touch the units or the hoses. See also DIN 20066 for hose installations.

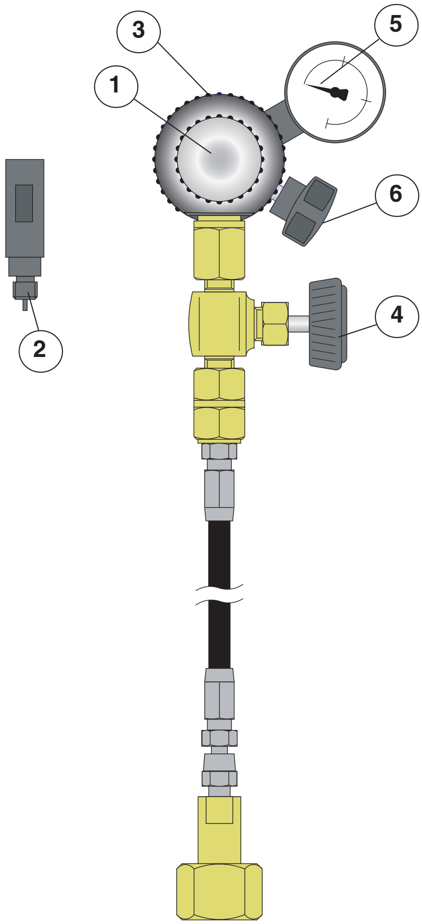


To simplify oil bleeding in case the hose has to be installed as shown in the picture, depending on the tool design it is possible to install an extra bleeding point. This solution may avoid the need to turn the tool around while bleeding (5).

Gas charging for / Force Cylinder and Accumulator

Equipment needed:

Nitrogen bottle with at least 180 bar	
Charging armature	P/N 3015075-2000
Allen key	5 mm



Step 1 Connect the nitrogen bottle

Connect the Charging armature to the nitrogen bottle which should have at least 180 bar pressure.

Step 2 Gas charging of the Force Cylinder (Not valid for Compact Cam)

Turn the small knob (1) counterclockwise until the release pin is inside the thread. Connect the adapter (2) to the armature. Remove the plug on the Force Cylinder and connect the armature by turning knob (3) clockwise. Open the gas valve carefully anticlockwise using knob (4). Charge gas until the manometer (5) shows 20 bar (max 40 bar). To empty, open knob (6) and the gas valve of the Force Cylinder by carefully turning knob (1) clockwise. Remove the armature and fit the plug.

Step 3 Charging of gas in the Compact Cam CC-H.

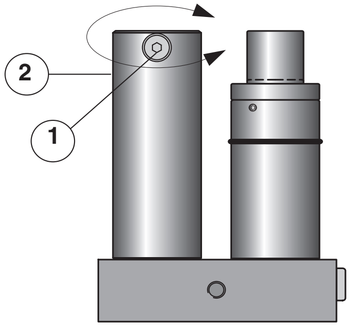
If the Compact Cam is connected to a hose system the filling pressure is:

CC 015 180 bar
CC 040 180 bar
CC 060 180 bar
CC 090 150 bar
CC 150 150 bar

If there is no hose system then, gas charging is not required.

Step 4 Charging of gas in the Accumulator

Charge the Accumulator with 25 bar as per the procedure above. The Accumulator must be charged with 150 bar or to a pressure suitable for the operation after the oil filling procedure.
See also page 7.1.



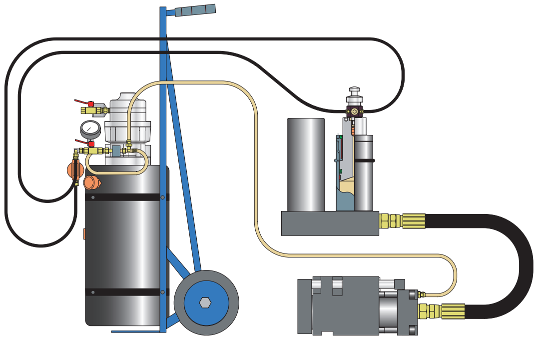
It is possible to change the gas port location (1) by first emptying the gas pressure then twisting the accumulator tube to position (2).

When not using the charging armature empty the gas by closing the nitrogen bottle valve and opening the gas valve (4) anticlockwise.
(See page 11.1)

Oil filling and bleeding

Equipment	Size	Order. no
Pump Unit		30 170 75
Hook spanner (-015)	3 mm	503 417
Hook spanner(-040-150)	5 mm	503 418
Allen key	6 mm	
Open-ended spanner	11 mm	
Open-ended spanner	14 mm	

18 litres of oil as per specification on page 7.1.



Compressed air information

Pressure between 5-7 bars.
Moisture trap, filter and automatic air line lubricator must be installed in the air line to feed the air motor of the pump.

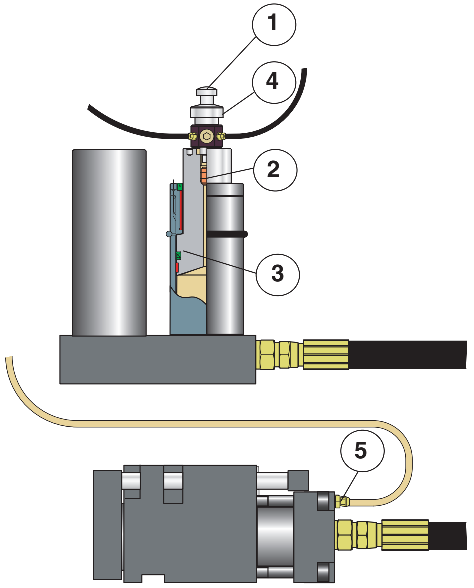
Step 1 Check the nitrogen pressure

Charge the Cam Unit/Force Cylinder and Accumulator according to this table. Make sure that the area around the units is kept clean and dry.

Cam Unit/ Force Cylinder						Accumulator
CC-H					HCF	HCP
015	040	060	090	150		
180 bar			150 bar		20 bar	25 bar

Step 2 Connect the Pump Unit

Turn knob (1) anticlockwise until the release pin for the valve (2) is inside the thread. Remove the plug and connect the oil armature on the top of the piston (3) by turning knob (4) clockwise. Open the valve (2) by turning knob (1) clockwise carefully until the stop is reached. Connect the transparent hose between the bleed nipple (5) and the Pump Unit (6). Connect compressed air to the valve (7) (thread G 1/4").

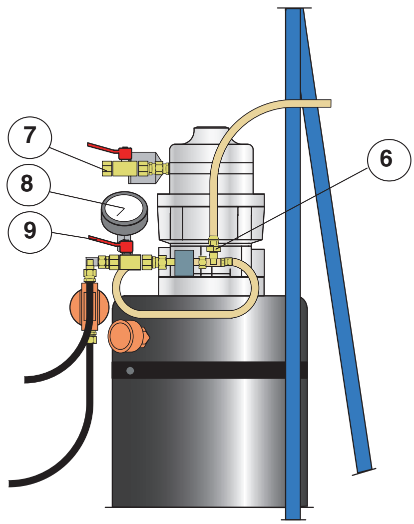


Step 3 Check the clearance of the Cam Unit/ Force Cylinder

Check the clearance of the Cam Unit/ Force Cylinder and make sure that there is enough room for a full stroke.

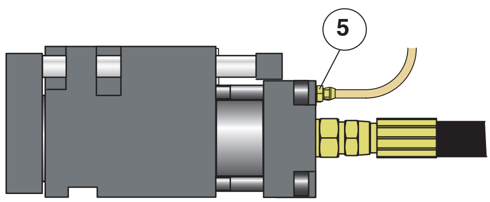
Step 4 Pump oil

Open the bleed nipple (5) and close the valve (9). Pump the oil by opening valve (7) until the oil is free from air bubbles. Close the bleed valve (5).



Step 5 Bleeding the Cam Unit/ Force Cylinder

Pump oil until 50 bar oil pressure (8), open bleed nipple (5) and bleed the Cam Unit/ Force Cylinder. Have a cloth at the ready to collect any oil that may leak out. Note that the Cam Unit/ Force Cylinder will move the full stroke. Close the bleed nipple (5). Repeat this until the oil is free from air bubbles.



Step 6 Bleeding the Power Unit

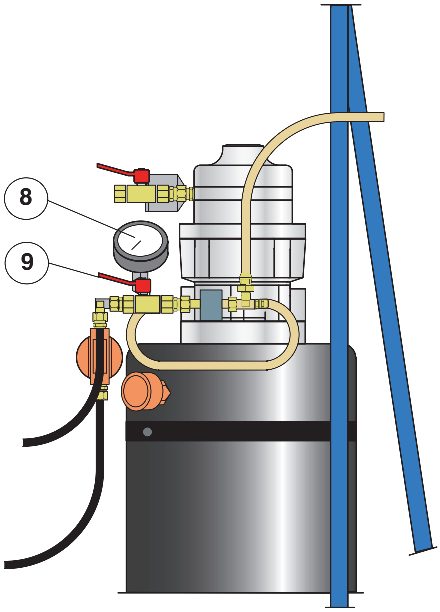
Pump until the oil pressure is 50 bar, open the valve (9) and bleed the Power Unit. Close the valve (9). Repeat this until the oil is free from air bubbles.

Step 7 Check that the oil is free from air

First make sure that the oil pressure is 0 bar, ie. pressureless. Try to push the piston down by hand. If it is possible to push it down a little there is some air left in the system. Repeat step 5 and 6 until the oil is totally free from air or the piston can not be moved.

Step 8 Check for any leakage

Pump until oil pressure is 50 bar and look for any leakage from the adapters and the units. Make sure that the oil pressure is 0 bar by opening the bleed valve (9).



Step 9 Disconnect the Pump Unit

Uncouple the oil filling armature and the transparent hose. Fit the plug on the top of the Power Cylinder by using the hook spanner to hold the piston. Tighten the bleed valve on the Cam Unit/ Force Cylinder and clean the area.

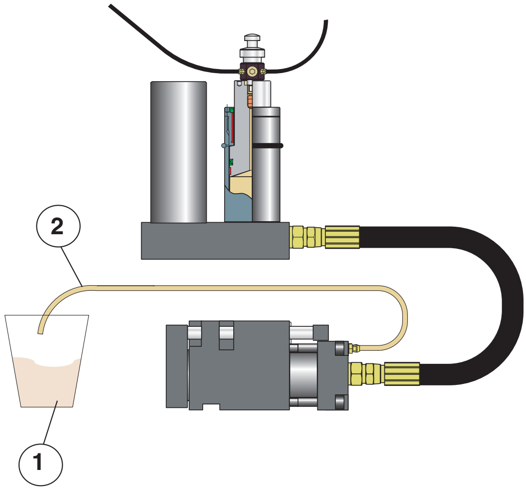
Step 10 Charge the Accumulator with Nitrogen

After the oil filling procedure, the Accumulator has to be charged with nitrogen up to 150 bar or to the required gas pressure for the operation. Maximum pressure is 180 bar. See also page 7.2.

The system is now ready for operation.

Changing the oil

Follow step 1 to 11 as before but connect the transparent hose to a reservoir for used oil, not to the pump unit. Pump oil until new oil comes out through the transparent hose.



The life time of the products is normally 1 million operations provided the installation and maintenance is performed correctly. In special conditions or environments the life time may be shorter or longer.

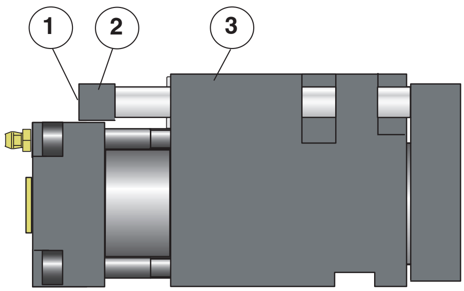
Power Unit and Force Cylinder (HCP, HCP-S, HCF)

Check the nitrogen pressure in the Accumulator and the Force Cylinder every 200,000 strokes or alternatively twice a year.
See also page 7.1 and 11.1.

Compact Cam (CC)/ Flange Cam (CCF)

Check the force of the return springs every 200,000 strokes or twice a year by removing the screws (1) and the spacer (2). Pull out the gas springs and use a test rig to measure the force of the gas springs.

The table below shows the type of gas springs and force for each Cam Unit



Cam Unit	Gas spring for return	Gas spring force	Min. gas spring force*
CC 015	1 X M2 200 - stroke	200 daN	140 daN
CC 040	2 X M2 200 - stroke	200 daN	140 daN
CCF 040	2 X M2 200 - stroke	200 daN	140 daN
CC 060	2 X X 350 - stroke*	350 daN	250 daN
CC 090	2 X TU 500 - stroke*	500 daN	350 daN
CC 150	2 X X 750 - stroke*	750 daN	530 daN

* If the gas spring force is lower than minimum the gas spring has to be replaced

Compact Cam (CC-H) and Flange Cam (CCF-H) for Hose Systems

Check the nitrogen pressure in the Compact Cam every 200,000 strokes or twice a year.
See also page 11.1.

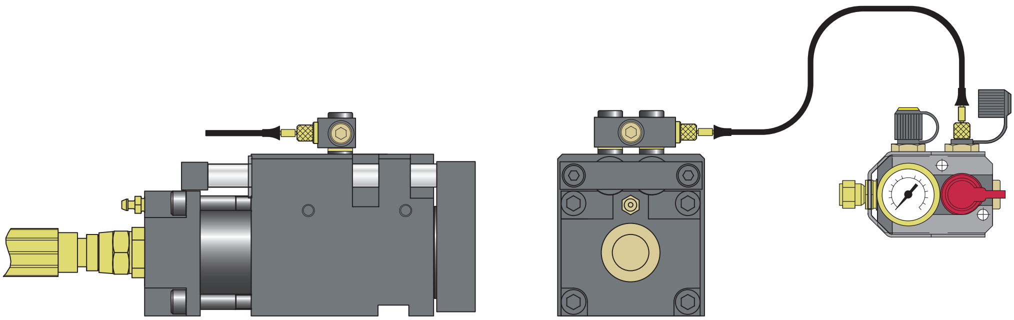
When changing the gas spring, do not allow the oil within the spring to escape.

The table below shows the type of gas springs used for each cam unit.

Cam Unit	Gas spring for return	Gas spring pressure	Min. gas spring pressure**
CC-H 015	1 x MH 200 - stroke	180 bar	125 bar
CC-H 040	2 x MH 200 - stroke	180 bar	125 bar
CCF-H 040	2 x MH 200 - stroke	180 bar	125 bar
CC-H 060	2 x X 350 - stroke*	180 bar	125 bar
CC-H 090	2 x TU 500 - stroke*	150 bar	105 bar
CC-H 150	2 x X 750 - stroke*	150 bar	105 bar

* Be sure to remove the nitrogen charging valve in the springs when connecting to a hose system. The MH has no valve.

** If the pressure is lower than minimum check the hose system and if necessary change the gas springs.



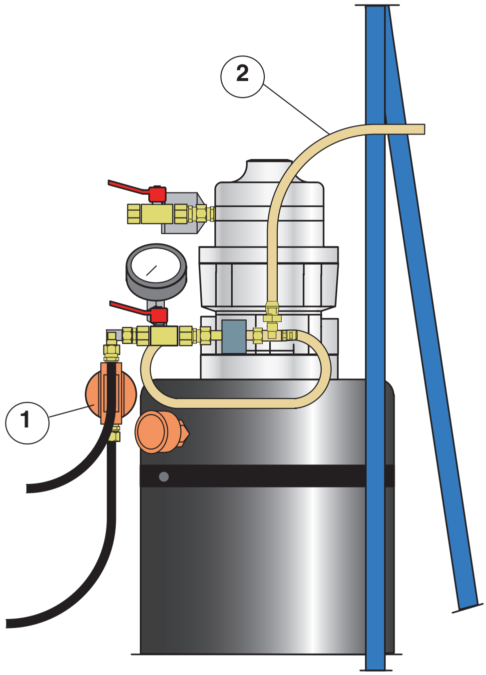
Oil

It is recommended to change the oil after a running-in time of approximately 100-1000 operations. After that the oil is recommended to be changed after 500,000 operations or every two years. When changing the oil, the old oil must be pumped out from the system. See also page 7/1 and 11/5.

Pump Unit

Change the filter (1) and the transparent hose (2) every 200 working hours or every two years. Remove the complete filter by loosening the adapter and the hose. Put the filter in a vice and remove the bottom by turning it counterclockwise. Replace the filter and put the new filter in position together with the washer.

Filter	Order No.: 503 419
Transparent hose	Order No.: 503 116



Service

This high precision equipment containing high pressure nitrogen gas N2 must only be maintained or serviced by authorized fully qualified personnel. For any advice about this equipment contact your local KALLER distributor.

Troubleshooting

Description of fault	Possible cause	Measure taken
1. Cam Unit/Force Cylinder does not perform a full stroke.	1:1 Low gas pressure in the Accumulator	Charge up the gas pressure, see page 11.1. (max 180 bar)
	1:2 Power Cylinder does not perform a full stroke	Adjust the stroke length
	1:3 Oil leakage in Power Cylinder A: The port plug has come loose B: Damage on the seal and/or inside of the Power Cylinder	A: Replace the plug and fill the system, see page 11.1. B: Contact your distributor for service or replacement cylinder
	1:4 Oil leakage in Cam Unit A: The bleeding valve has come loose B: Damage on the seal and/or inside of the Cam Unit	A: Replace the bleed valve and fill the system, see page 11.1. B: Contact your distributor for service or replacement of the Cam Unit.
	1:5 Hose or adapter has come loose or been damaged.	Replace the defective parts and fill the system, see page 11.1.

Description of fault	Possible cause	Measure taken
2. Cam Unit/ Force Cylinder does not retract.	2:1 Low gas pressure in the Force Cylinder (the Force Cylinder has to be in retracted position)	Check if the gas adapter or the plug have become loose. Charge with gas, see page 11/1, max. 40 bar. If the gas quickly leaks out again, contact your distributor for service or replacement of the Force Cylinder.
	2:2 Low gas pressure in the return springs of the Compact Cam.	Replace the gas springs, see page 12.1. If hose system is used, check and see page 12.2.
	2:3 Gas leakage in the Accumulator	Bleed the oil, see page 11.2. Contact your distributor for service or replacement of the Accumulator.
	2:4 The return movement is jammed.	Contact your distributor for service or replacement of the Cam Unit/ Force Cylinder.

Product Series
Piercing and Forming Units / Cams

KALLER®
The Safer Choice

Roller Cam
RC2, RCP2

Edition 7. 2016

Would you like to order this product?
All available information at www.kaller.com.

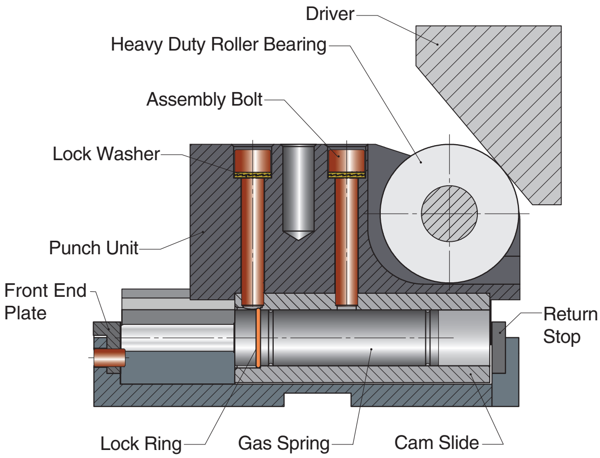
Roller Cam RC2 and RCP2

KALLER Roller Cam has been developed to meet the industry's increasing demands on standard cam units.

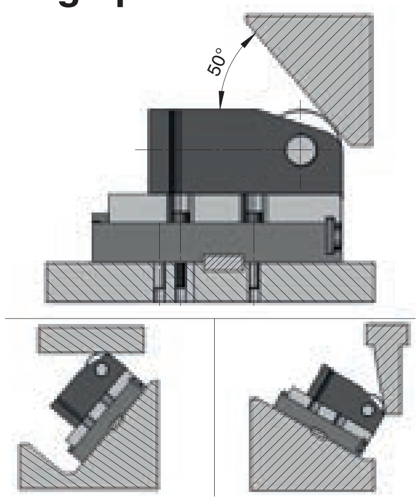
This new generation offers:
- High precision and maintenance free guiding allowing for more off center loading and upside-down installation
- Long service life
- Built in return stroke dampening
- Easy punch attachment. For other type of application, please contact your local distributor or Strömsholmen AB

The KALLER Roller Cam is available for a maximum piercing force of 30 kN, 50 kN and 150 kN. The driver itself is to be designed by the user to give the required displacement profile. The contact surface on the driver should be hardened to approximately 58-60 HRC. We recommend using KALLER Roller Cam driver plates.

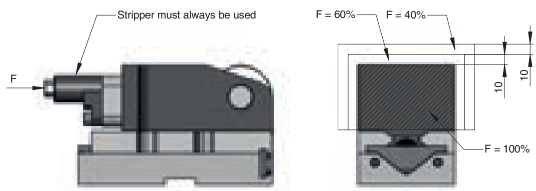
Design



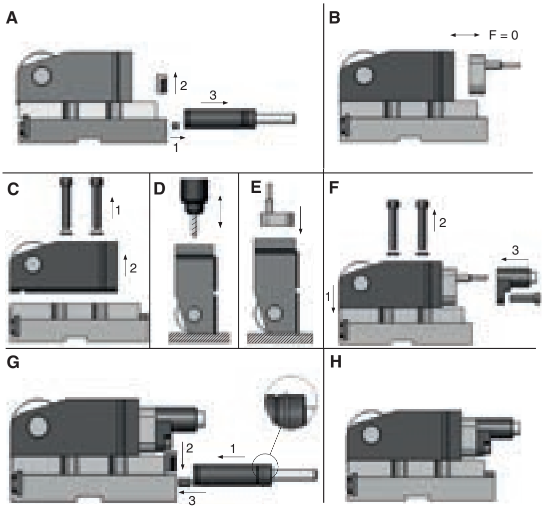
Mounting options



Punch location



Punch attachment



Basic information

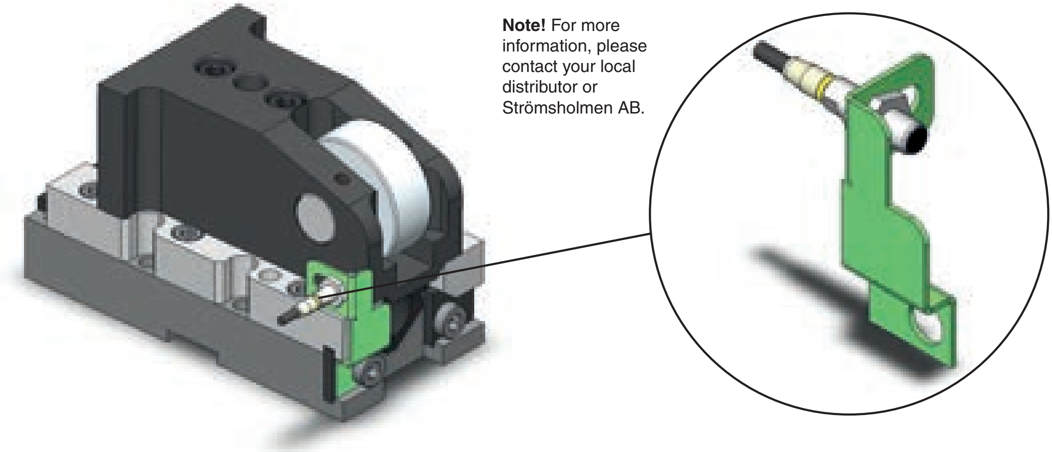
Recommended max. strokes/min .... 40 spm (at 20°C)
Max. Roller Cam velocity .... 0.8 m/s
Max. play at face of punch unit .... 0.02 mm

Note! For information about max. attachment weight, please contact your local distributor or Strömsholmen AB.

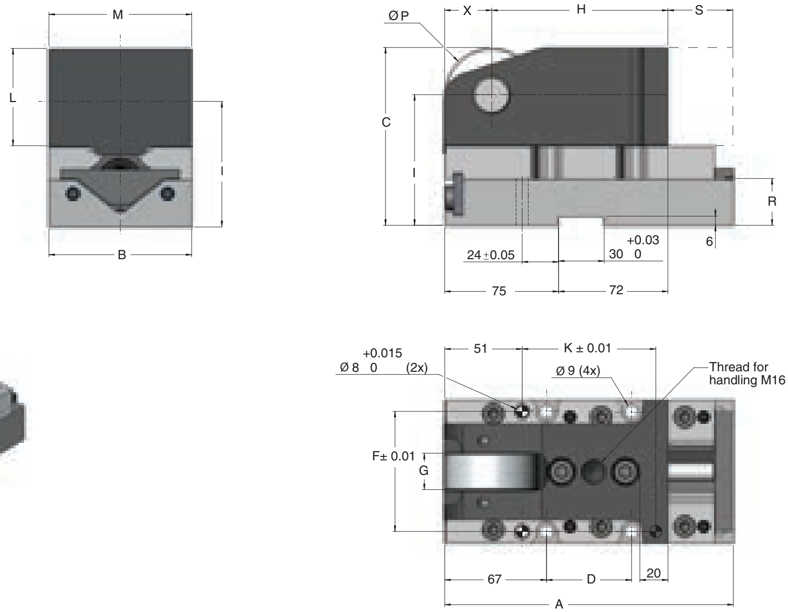
Roller Cam – Sensor Kit

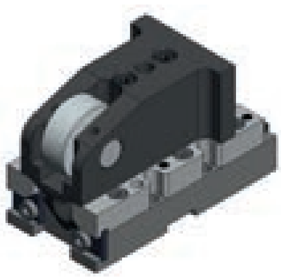
Roller Cam Sensor Kits are an optional accessory to all Roller Cams, providing a signal to the press when the Roller Cam is in start position. The Sensor Kit can easily be attached to the Roller Cam using return stop screw.

Note! For more information, please contact your local distributor or Strömsholmen AB.



Dimensions RC2 30 & RC2 50



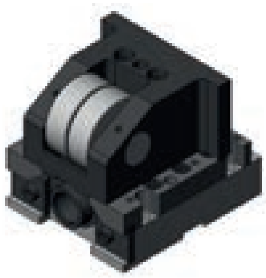


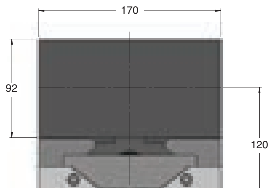
RC2 30 & 50

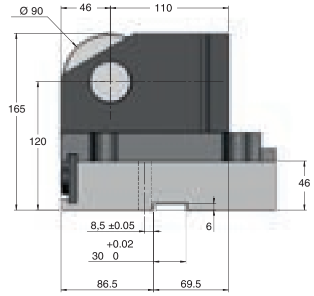
Order No.	Stroke S (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	B	C	D	F	G	H	I	K	L	M	P	R	X	Max. width of the driver

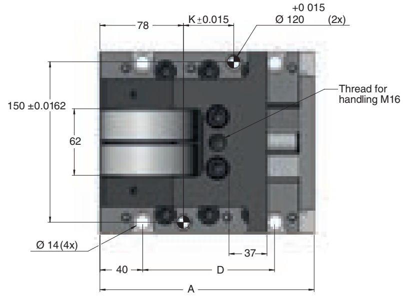
Note! For 2D & 3D CAD downloads, see www.kaller.com.

Dimensions RCP2 150





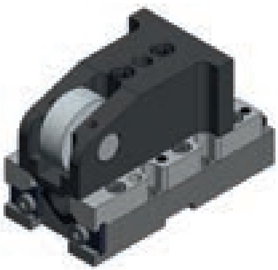


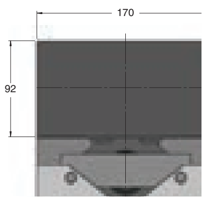


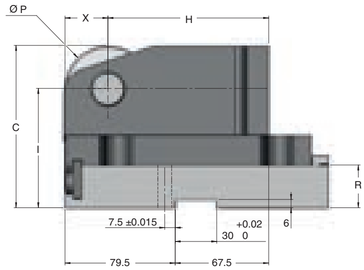
RCP2 150
Dimensions as per PSA standard

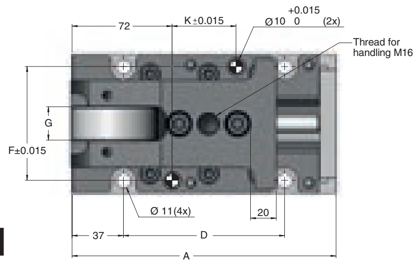
Order No.	Stroke S (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	D	K	Max. width of the driver
RCP2 150-050	50				200	123	47	
RCP2 150-080	80	15,000	500	X 500	230	153	77	65
RCP2 150-100	100				250	173	97	

Dimensions RCP2 30 & RCP2 50









RCP2 30 & 50
Dimensions as per PSA standard

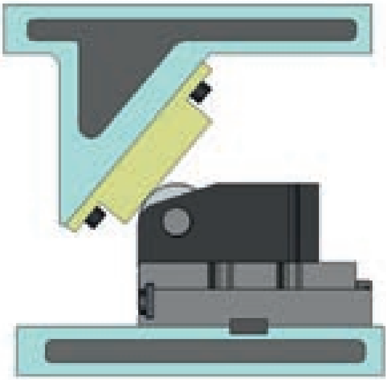
Order No.	S Stroke (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	B	C	D	F	G	H	I	K	L	M	P	R	X	Max. width of the driver
RCP2 30-050	50	3,000	200	M2 200	190	100	117	116	82	25	116	86	46	64	94	62	31	31	36
RCP2 30-080	80				220			146					76						
RCP2 50-050	50				190			116					46						
RCP2 50-080	80	5,000	350	X 350	220	120	140	146	102	29	111	103	76	75	120	72	40	36	
RCP2 50-100	100				240			166					96						

Note! For 2D & 3D CAD downloads, see www.kaller.com

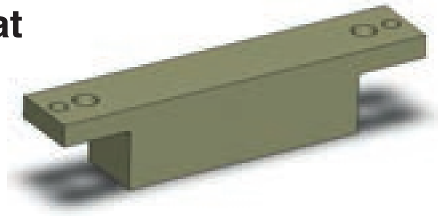
Roller Cam – Driver Plate

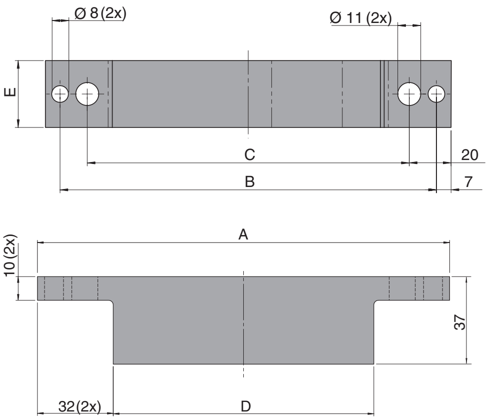
KALLER Roller Cam Driver Plate has been designed to simplify the installation of Roller Cams.

- Ground and hardened contact surface (60 HRC)
- Standardized sizes
- Independent of installation angle



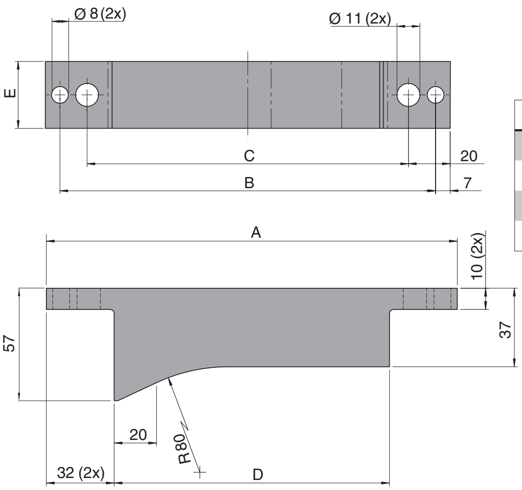
Driver Plate – Flat





Order No.	A	B	C	D	E	Weight [kg]
3021265-01	174	160	134	110	32	1.16
3021265-02	264	250	224	200	32	2.00

Driver Plate – Soft Start & Stop



Order No.	A	B	C	D	E	Weight [kg]
3021570-01	194	180	154	130	32	1.43
3021570-02	284	270	244	220	32	2.27
3021570-03	194	180	154	130	65	2.91
3021570-04	284	270	244	220	65	4.61

Product Series
Delayed Return Units

The Safer Choice

Controllable Gas Springs – KF2

Edition 13. 2016

Would you like to order this product?
All available information at kaller.com.

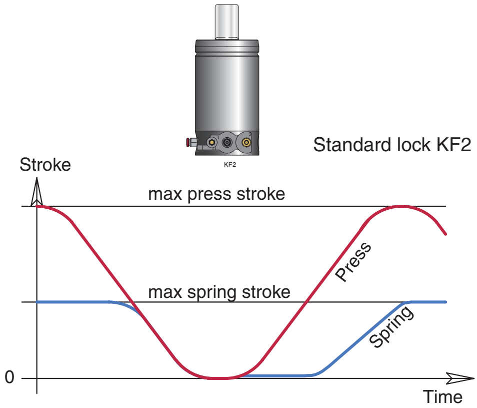
This product is protected by Patent No. US 5,588,641, US 5,435,530, EP 0 581 832, EP 0 830 524.

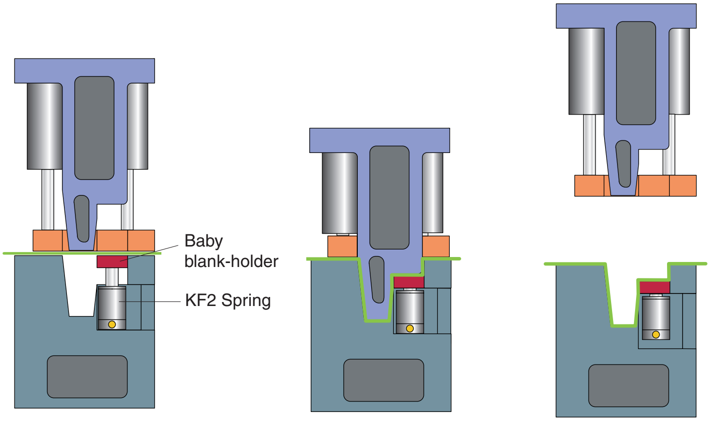
About Controllable Gas Springs

KF2 is the next generation of controllable gas springs, which supersedes the KF springs.

The KF2 controllable gas spring series consists of a family of gas springs for use in metal forming dies, whose piston rods can be locked at bottom dead center (BDC). The return stroke of the piston rod is controlled via the valve contained within the base of the spring.

One application example is in drawing dies (see below) where two forming stages are performed with a single press stroke.





More examples illustrating the benefits of using controllable gas springs can be found in section *Applications Examples 2/1*.

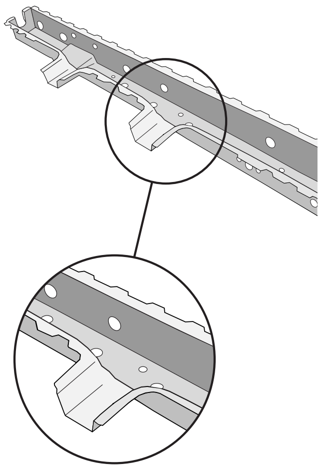
Controllable gas springs are available with:

- Model sizes 1500, 3000, 5000 & 7500 (initial force in daN)
- Stroke lengths from 5 mm to 160 mm

  There are two controllable gas spring systems available:

- Standard lock, KF2
- Positive lock system, KF2 + KP

The following is a brief description of these two systems.

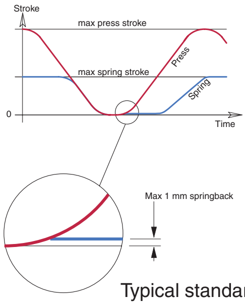


Standard Lock, KF2

The KF2 is a controllable gas spring whose piston rod can be locked at BDC.

The full stroke length of the KF2 spring must be used within ±0.5 mm for optimal locking function to provide maximum springback of 1 mm, which we refer to as standard lock (for zero springback see Positive lock System).

The return stroke of the piston is either controlled by the control system from the press or can be integrated into the tool itself (for more info, see Tool integrated control system, page 4.2). The springs can either be installed self-contained or connected to a control block through a hose system.



Typical standard lock curve

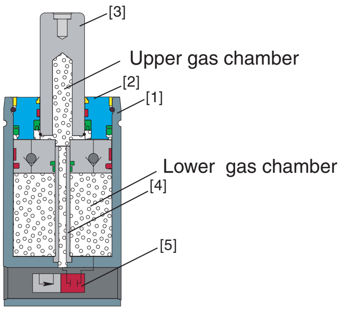
KF2 – how does it work?

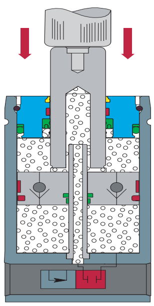
The KF2 controllable gas spring consists of a cylinder [1], guide assembly [2], piston rod assembly containing check valves [3], internal piston rod [4] and normally open (NO) cartridge valve [5] located in the base of the spring.

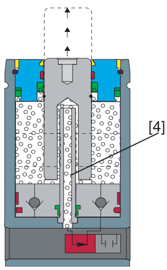
The nitrogen gas within the spring is sealed within an upper and a lower gas chamber. When the spring is stroked, nitrogen gas from the lower chamber passes through the check valves in the piston rod assembly and enters the upper chamber.

The cartridge valve is closed by applying compressed air pressure (min. 4 bar). With the cartridge valve closed, the piston rod is prevented from returning to its extended position.

By opening the cartridge valve again, the gas contained within the upper chamber can now return to the lower chamber via the internal piston rod [4], thus allowing the piston rod to return to its extended position.





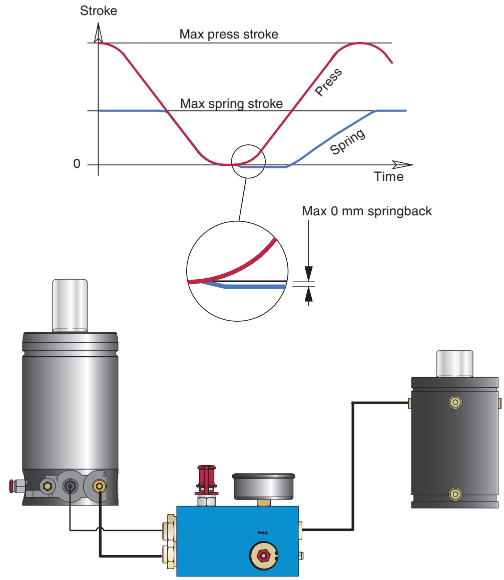


Positive Lock System, KF2 + KP

The KF2 + KP system combines a standard lock, i.e. a KF2 controllable gas spring [1], with a specially designed KP passive gas spring [3] via a valve lock [2], which together forms a positive lock system.

The result is a controllable gas spring system with **zero springback.**

Please note!
The KP passive gas spring is **not** to be used for any operation in the tool other than to eliminate springback in the KF2 spring(s). It can be placed anywhere in the tool and can eliminate springback in up to four KF2 controllable gas springs. How much the KP passive gas spring should be stroked depends on the number of KF2 springs in the system. The cartridge valve in the valve block is identical to the one in the KF2 spring.



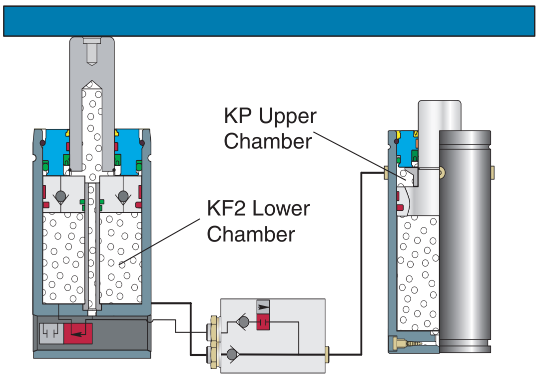
KF2 spring [1] | Valve block [2] | KP spring [3]

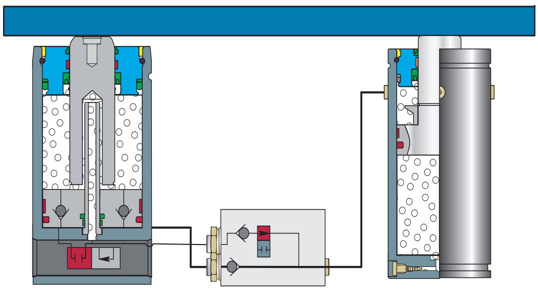
Positive Lock System, how does it work?

The KF2 is the active spring in the system and provides the required spring force in the tool. The task of the KP passive gas spring is to eliminate the max. 1 mm springback of the KF2 spring(s) at press BDC.

The system works by connecting the lower gas chamber in the KF2 controllable gas spring(s) to the upper chamber of the KP passive gas spring via the valve block. By stroking the KP passive gas spring, the pressure in its upper gas chamber is reduced causing a pressure difference between it and the lower gas chamber in the KF2 controllable gas spring(s).

At BDC, the valve in the valve block is opened, using the control system from the press or a mechanical pressure switch, and the remaining gas in the lower chamber of the KF2 spring is drawn into the upper chamber of the KP passive gas spring.





Why 100% nominal stroke ±0.5 mm?

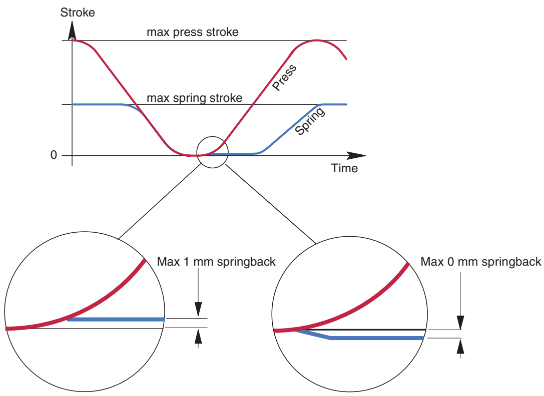
In order to provide optimum locking from the KF2 controllable gas spring, it is important to stroke the spring 100% of the nominal stroke length ±0.5 mm.

This is because it is necessary to reduce the gas volume in the lower gas chamber to a minimum.

For a standard lock, stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm will ensure maximum springback of 1 mm.

An adjustable stroke length version of the controllable gas spring, called the KF2-A, is available for those applications where the exact nominal stroke length ±0.5 mm is not known until after tool try-outs.

For a positive lock system with KF2 + KP, stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm is also important, although this also largely depends on the utilized stroke length of the KP passive gas spring.

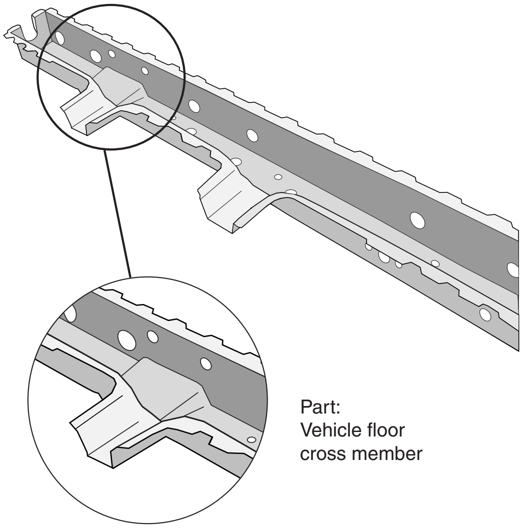


Standard lock KF2

Positive lock KF+KP

Standard Lock, KF2

When forming this cross member, “baby” blank holders are used to form the circled area. TThe tool uses two “baby” blank holders, which during the return stroke must be locked in the bottom position to avoid deformation of the part. In this case, one KF2 spring is used to control each “baby” blank holder.

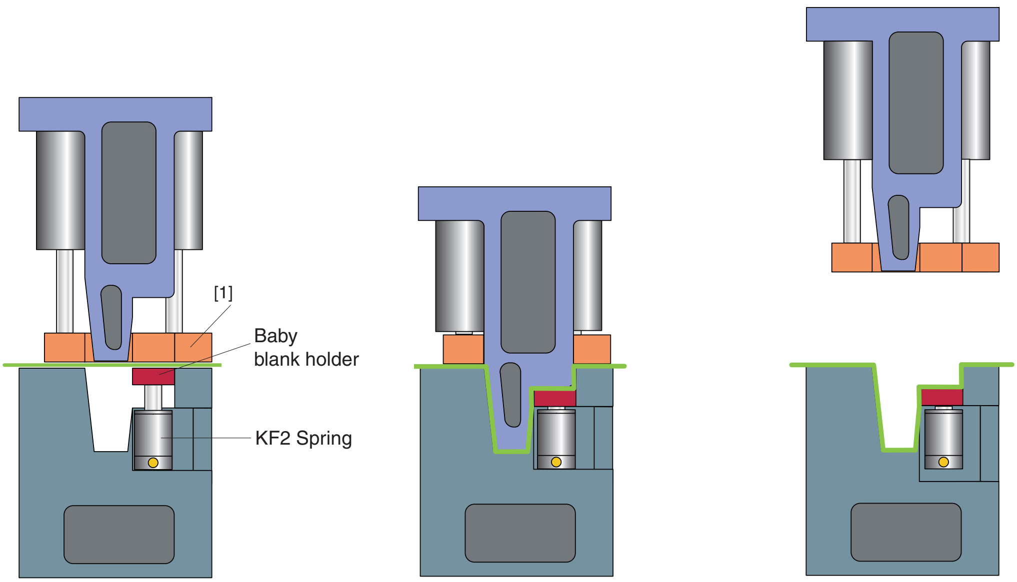


Work cycle

As the upper tool moves downwards, the blank holder [1] is activated to control the flow of the blank in the tool.

At bottom dead center, the KF2 springs will lock. In this application, a small amount of springback will not damage the formed part.

As the press opens, the baby blank holder remains locked until that time when the KF2 spring should be unlocked and eject the part.



Standard Lock, KF2

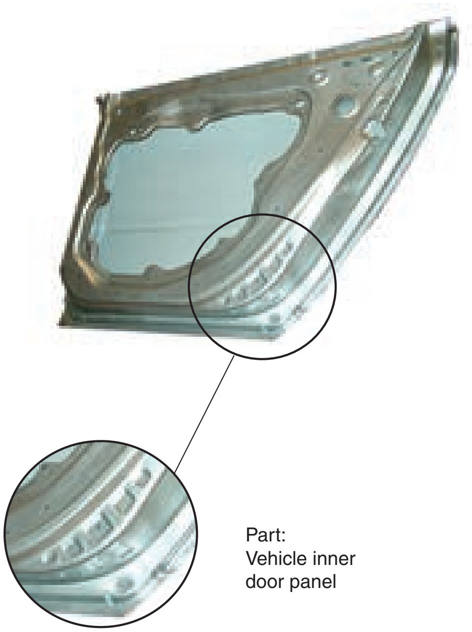
Positive Lock System, KF2 + KP

For parts where controllable gas springs with zero springback are required, the positive lock system is ideal.

Here a double-stage draw forming operation is made with a single stroke from the press.

The positive lock system provides a lockable blank holding force that prevents part deformation during the return stroke of the press.

This large die for an inner door panel uses a total of 12 pcs KF2 connected to 3 pcs KP passive gas springs.



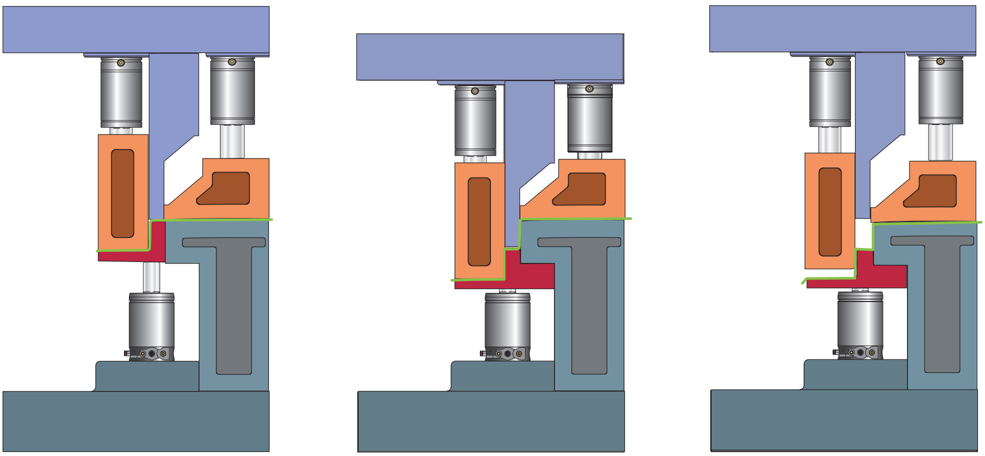
Part:
Vehicle inner
door panel

Work cycle

The lower tool contains the KF2 controllable gas springs that provide the active blank-holding force for the deepest drawn section of the part.

As the tool comes together, the KP passive gas springs (not shown) are stroked, providing the necessary back pressure to lock the KF2 springs at BDC with zero springback.

As the tool opens, the KF2 springs remain locked until a signal from the press is given. The KF2 springs then help eject the undamaged part from the tool.



Positive Lock System, KF2 + KP

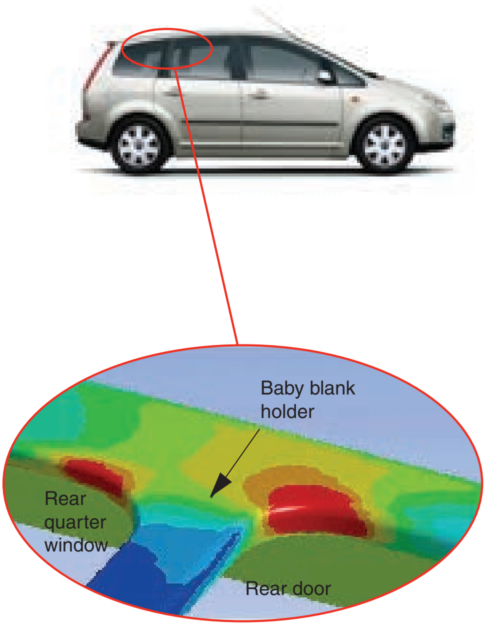
Positive Lock System, KF2 + KP

Producing side body panels to a high quality often pose challenges to the tool maker. Of particular difficulty are the regions where the side posts connect with the outer frame.

Too much blank-holding force can cause the part to split, while too little can make the part wrinkle.

One solution to this problem now being applied, is to use individual "baby" blank holders in these problem spots and control their spring force using KF2 controllable gas springs.

The result is improved part quality, increased forming control and a reduction of scrapped parts.



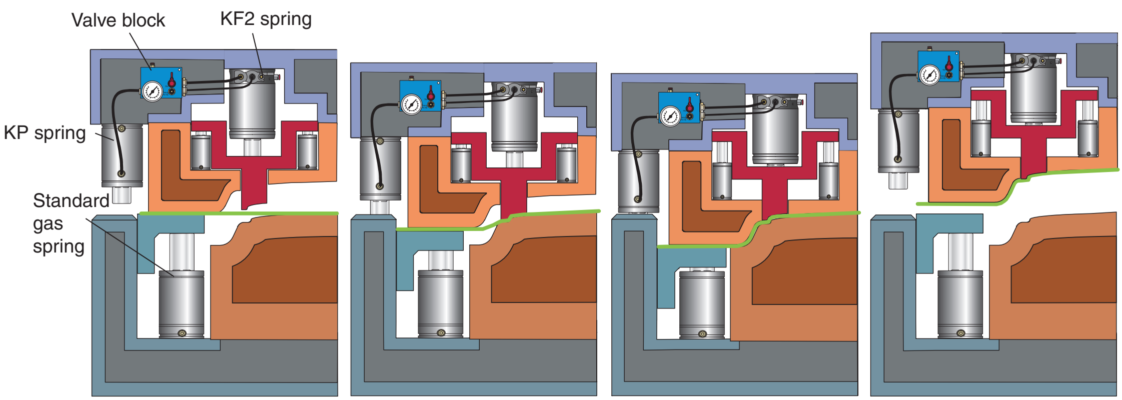
Work cycle

The upper tool contains the KF2 controllable gas springs that provide the active blank holding force for the locally situated "baby" blank holders.

As the tool begins to close, the "baby" blank holders initially hold the blank in place in the problem regions.

At press BDC, the valve in the valve block opens and the KP spring is used to ensure zero spring-back in the KF2 springs.

As the tool opens, the KF2 springs remain locked until a signal from the press is given. The KF2 springs then help eject the finished part from the tool.



Positive Lock System, KF2 + KP

To make selection of the right system and components for your particular application easier, please fill in the *Application Enquiry Form* below.

We recommend you make a photocopy of this page, complete the following questions and send it to your local KALLER distributor or to contact us directly at Strömsholmen for further assistance.

If possible, please provide the following information together with a rough sketch of your application.

General information

Date:…………..(yy/mm/dd)

Your name:…..………………………….………..

How do you wish to be contacted?

- Via phone:…………………..(give details)
- Via fax:…………………...….............(give details)
- Via e-mail:…....…...(give details)

Country you are contacting us from: ……………………………….…………………….................

Application information

1. Does your application require a gas spring with lockable piston rod (Y/N)?……...................
2. If you answered Yes to Question 1, is a max. 1 mm springback acceptable (Y/N)? ....
3. How many gas springs does your application require?……………………….…….............pcs
4. What initial force is required from each gas spring?……...………...……......……...........daN
5. What stroke length is required for each gas spring?…………...…...................…...................mm
6. How many strokes per minute (spm) will your application run at?….……........................spm
7. The springs should be connected together using a Hose System ....

Additional comments: ……………………………………………………………………………………
………
………
……………………………………………………………...
…...
.........………………………………………………………………...
.........…...

Controllable gas springs require at least one of the following systems:

- Control system (mandatory)
- Hose system (optional)
- Cooling system (optional)

Control system (mandatory)

In order to lock and unlock the KF2 controllable gas spring(s), a control system is required to send a pneumatic signal (min. 4 bar) to the normally open (NO) valve in the base of the KF2 spring.

The pneumatic signal can either be provided by the control system from the press, or integrated into the tool itself using mechanical pressure switches (see Tool integrated control system 4.2 for more information).

Control system – Standard Lock, KF2

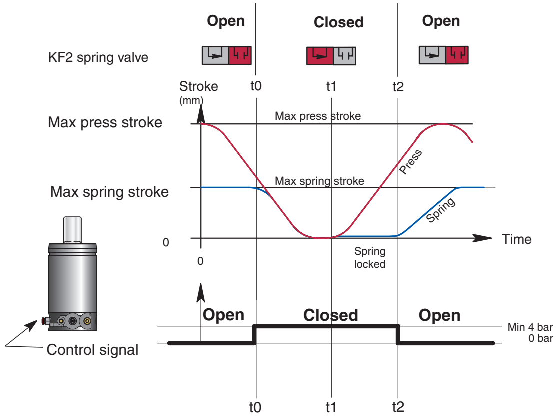
The normally open (NO) valve within the base of the KF2 controllable spring(s) is closed using compressed air (min. 4 bar). With the valve closed at t0-t2 (see diagram), the piston rod of the KF2 spring(s) is prevented from returning to its extended position.

By connecting the valves in the KF2 springs to each other using pneumatic hoses to the control system of the press, the springs can be easily locked and subsequently unlocked.

If only an electrical control signal is available from the press, then a standard electric-pneumatic control valve can be used.

For examples of how to connect the KF2 controllable gas spring(s) to a control system, see the installation examples on page 6.1.

- t0 = Die closed
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



Control system – Positive Lock System, KF2+KP

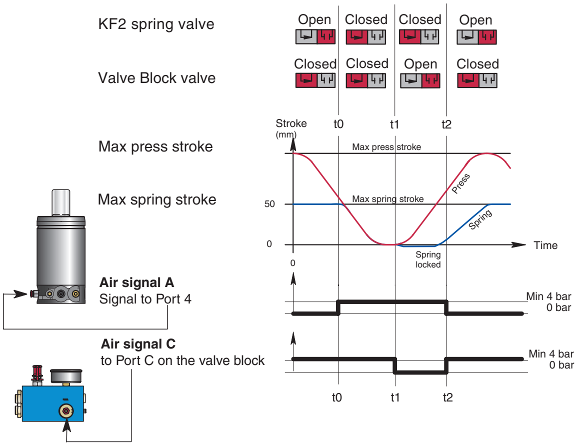
When the KP passive gas spring is connected to the active KF2 spring(s) via the valve block, an additional signal from the press (or separate mechanical pressure switch) is required to control the valve within the valve block.

As the valve in the valve block is identical to that used in the KF2 springs, it is normally open (NO). Therefore during the down-stroke of the press, it is important the valve block's valve is closed by applying compressed air (min. 4 bar) to air port C.

Please note!
The valve in the valve block should be opened exactly at press BDC.

For examples of how to connect the KF2 + KP controllable gas spring system to a control system, see the installation examples on page 6.1.

- t0 = Approximately when closing the die
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



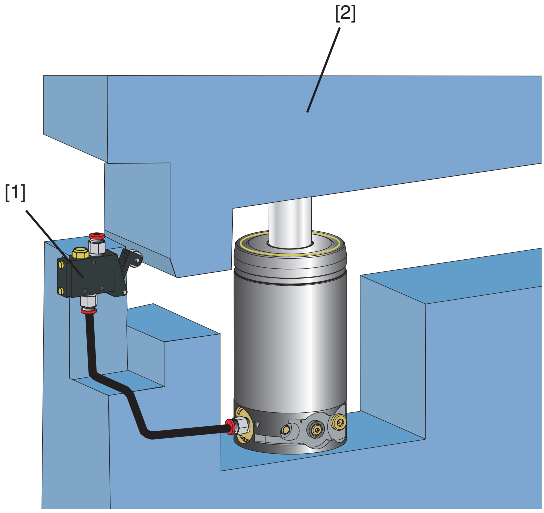
Tool integrated control system

The control system, required to lock the KF2 spring(s), can be integrated into the tool itself by using a mechanical pressure switch. The control system required to lock and unlock the KF2 spring(s) is then becomes independent of the press' own control system.

The KF2 spring(s) remain locked as long as the mechanical pressure switch [1] is activated by the tool [2].

When a positive lock system is used, the mechanical switch is recommended to control only the KF2 gas springs (signal A). To obtain the proper signal (C) to valve block an electric pneumatic 3/2 valve is recommended.

As a result, a tool integrated control system only requires a constant supply of compressed air (min. 4 bar) to the mechanical pressure switch.



Hose system (optional)

KF2 controllable gas springs can be installed in the tool as self-contained units or linked together using a hose system for remote gas charging and evacuation.

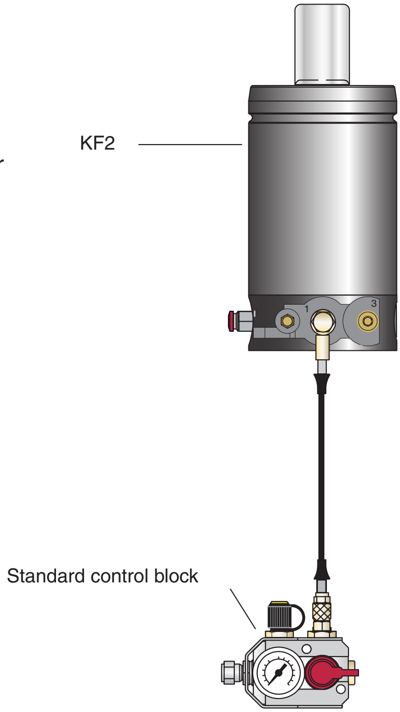
Controllable gas spring system	Recommended hose system
Standard lock	EZ hose
Positive lock system	EZ hose and EO24 hose

Hose system – Standard Lock, KF2

With reference to Chapter 4 of the KALLER main catalog, we recommend use of the EZ hose System.

KF2 controllable gas springs are connected to each other in a hose system in just the same way as standard gas springs. For information on connecting the newer KF2 springs with the older KF controllable gas springs, see Appendix “How to fit the new KF2 to existing KF Systems” on page 8.2.

For examples of how to connect KF2 controllable gas springs to a hose system, see the installation examples on page 6.1.



Hose system – Positive Lock System, KF2+KP

It is possible to connect up to four KF2 springs to one valve block.

With reference to Chapter 4 of the KALLER main catalog, a KF2+KP controllable gas spring system requires two hose connections:

- One EZ hose connection
- One EO24 hose connection

EZ hose connections

Gas port 1, which is marked on each KF2 spring, is connected to gas port 1 on the valve block (also marked) using EZ hose system components.

EO24 hose connections

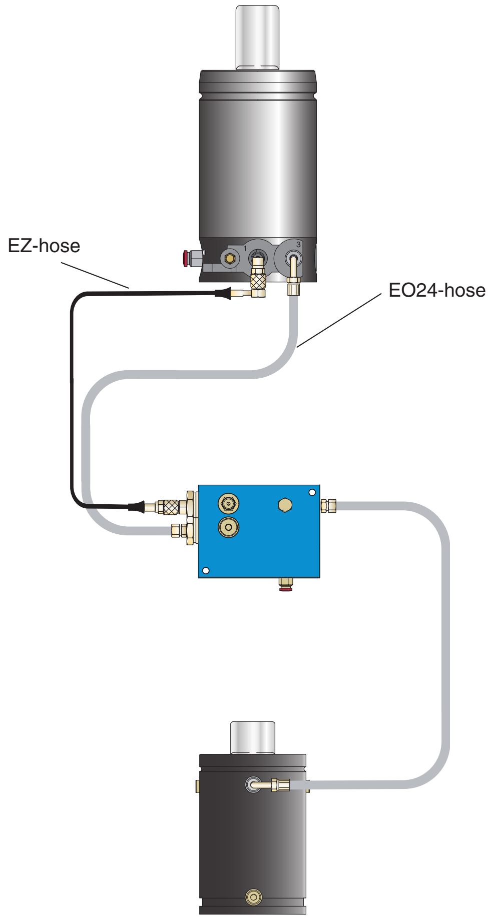
To connect the KF2 controllable gas spring(s) to a KP passive gas spring via the valve block, we recommend using the EO24 hose system (or its equivalent) owing to the large internal diameter of the hose. This is especially important when gas flow in the hoses is required.

Gas port 3, which is marked on each KF2 spring, is connected to gas port 3 on the valve block (also marked) using EO24 hose system components

Gas port 5, which is marked on the valve block, is connected to gas port 5 (also marked) on the KP passive gas spring also using EO24 hose system components.

For information on connecting the newer KF2 springs together with the older KF controllable gas springs, see appendix “How to fit the new KF2 to existing KF systems” on page 8.2.

For examples of how to connect KF2 + KP control-lable gas spring systems to a hose system, see he installation examples on page 6.1.



Cooling System (optional)

About cooling
Currently there are two possible KF2 cooling system solutions to choose between when cooling is required for a KF2 gas spring system. Which particular method to choose depends upon the required cooling effect and the number of controllable gas springs to be cooled.

KF2-NC / KF2-A-NC for use with a Nitro cooler™. Nitro coolers are ideal for a small number of springs that operate at higher production rates and as such require cooling. They are also ideal where there is insufficient space for cooling jackets and a liquid cooler unit.

KF2-CJ / KF2-A-CJ for use with a liquid cooler unit. For applications where a larger number of KF2 springs operate at higher production rates requiring cooling of heat build-up, liquid cooler units rated at 10 kW or 25 kW are available. Each KF2 gas spring is fitted with a cooling jacket, thus allowing efficient circulation of cooling liquid around each KF2 gas spring.

Every time a KF2 controllable gas spring is stroked, energy is transferred from the press to the spring. The amount of energy transferred is a function of the spring force multiplied by its stroke length.

With a conventional gas spring, the piston rod follows the press movement on the return stroke. This means that the energy transferred to the gas spring on the compression stroke is transferred back to the press on the return stroke (with the exception of some losses due to friction, etc.). However since the return stroke of a KF2 controllable gas spring does not follow the return stroke of the press, the transferred energy is generated as heat in the KF2 spring.

Consequently cooling of the KF2 spring(s) is required in some applications to avoid overheating.

Heat factor

The need for cooling is determined by calculating the KF2 spring's heat factor for the application.

The heat factor is calculated by multiplying the stroke frequency in strokes per minute (spm), with the KF2 spring's stroke length (mm).

Example:

Stroke frequency: 15 spm

KF2 stroke length: 100 mm

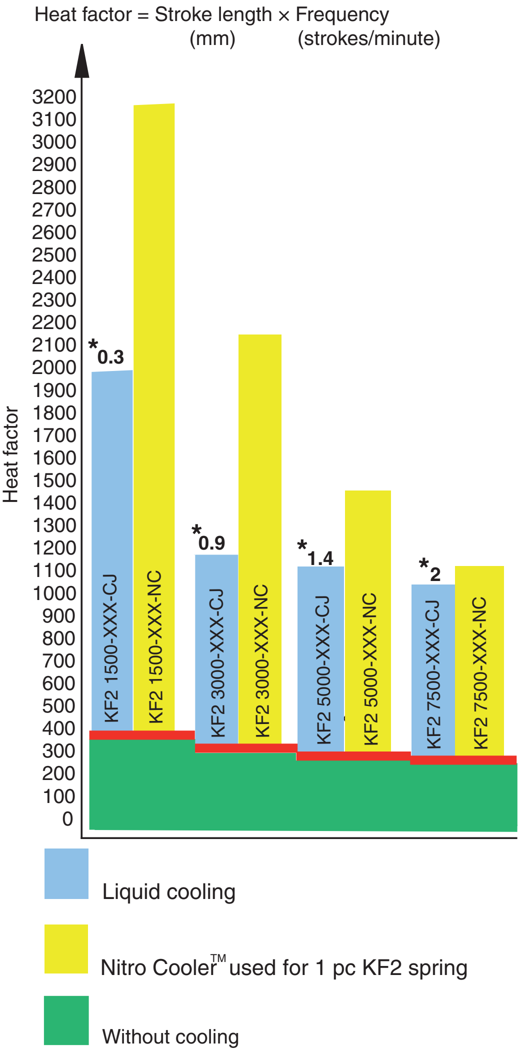
Heat factor = Stroke frequency × Stroke length
= 15 × 100
= 1500

If this heat factor exceeds the maximum frequency without cooling values given for the different KF2 spring sizes in the diagram, then cooling is required.

When deciding on a cooling system, the following should be taken into account:

A liquid cooler should be used for big dies with a large number of springs. The cooling capacity is limited to 25 kW.

The Nitro cooler™ is suitable for small dies with a limited number of springs (1-6 pcs.) The Nitro cooler™ should be placed as close as possible to the springs. The return speed is lower when a Nitro cooler™ is used. Nitro cooler™ is a die-integrated cooler with a limited cooling capacity of 1.5 kW.



*Heat effect (kW) per KF2 gas springs at maximum freqvency

Please note!
The information in the diagram is based on calculations made for KF2 gas springs operating at a 150 bar charge pressure in a well-ventilated area with an ambient temperature of 24°C.

What can be done to eliminate the need for cooling?

For some applications, the need for cooling can be eliminated by considering one of the following:

Method 1: Add more KF2 springs

By adding additional KF2 Controllable gas springs to the system, the charge pressure in each KF2 spring is reduced in order to maintain the same net spring force in the tool. The heat factor reduction for the KF2 spring is directly proportional to the reduction in charge pressure.

For example:

A tool should run at 10 spm and have a stroke length of 50 mm.
The net spring force required from the tool is 300 kN.
Preferred number of springs is 10 pcs.

Solution 1:

The natural choice would be to select 10 pcs of KF2 3000-050 at a 150 bar charge pressure (see Technical data 10.5/1 for more info).
In this case, the Heat Factor would be 10 × 50 = 500
With reference to the heat factor diagram, a heat factor of 500 exceeds the allowable limit for a system without cooling by 120.
Instead, by adding an additional 4 pcs KF2 3000-050 to the system, the total net spring force at 150 bar is 420 kN.
Since the charge pressure and initial force are directly related, by applying the ratio of forces the new heat factor can be calculated.

$$\text{New heat factor} = \text{Original heat factor} \times \frac{\text{Required net force at reduced pressure}}{\text{Net force at 150 bar}}$$

$$= 500 \times (300 / 420)$$

$$= 360$$

The new heat factor is now 20 below that required for KF2 3000 cooling.

Method 2: Use larger KF2 springs

By selecting a KF2 Controllable gas spring of a larger size than originally planned, the charge pressure must be reduced in order to maintain the same net spring force from the tool.
The heat factor reduction for the KF2 spring is directly proportional to the reduction in charge pressure.
With reference to the previous example:

Solution 2:

Selecting 10 pcs KF2 5000-050 at 150 bar would provide a total net spring force of 500 kN.
The heat factor at 150 bar would be 10 × 50 = 500 as above.

$$\text{New heat factor} = \text{Orginal heat factor} \times \frac{\text{Required net force at reduced pressure}}{\text{Net force at 150 bar}}$$

$$= 500 \times (300 / 500)$$

$$= 300$$

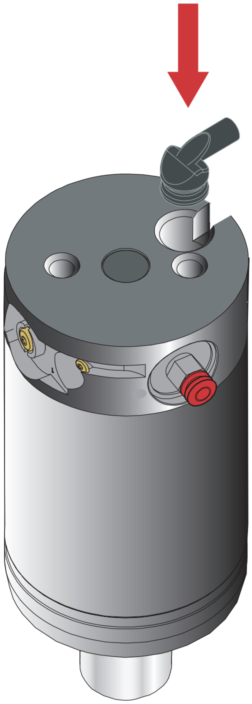
The new heat factor is now 60 below that required for KF2 5000 cooling.

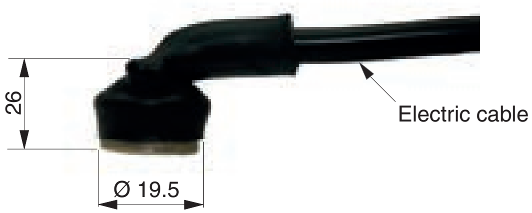
Over Heat Protection

Thermal Relay

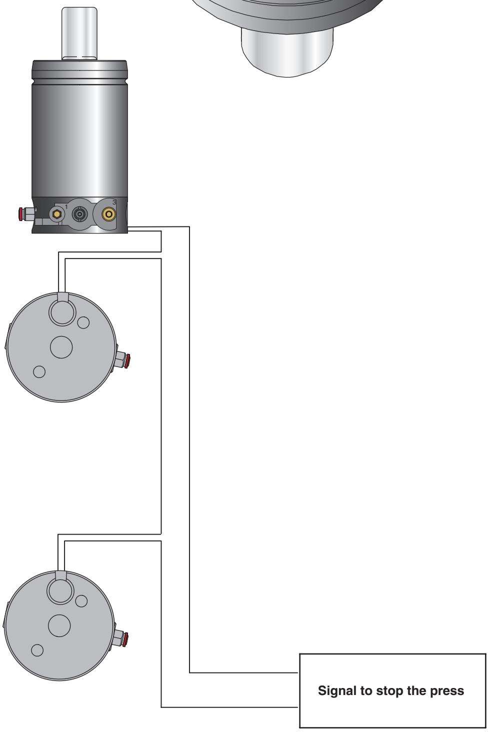
To avoid overheating the KF2 gas spring, a Thermal-Relay (bimetallic) should be used to stop the press. If the KF2 gas spring temperature exceeds 80°C the Thermal Relay will open, sending a signal to the press's control system to say the springs are overheating.The Thermal Relay will automatically close as the KF2 gas spring temperature returns back to normal. Running the KF2 gas spring at higher temperatures will shorten the service life of the spring.

Please Note!
When ordering KF2-NC / KF2-A-NC, for use with a Nitro Cooler™, the thermal Relay are included in the cooler





Thermal Relay
Order No. 503388

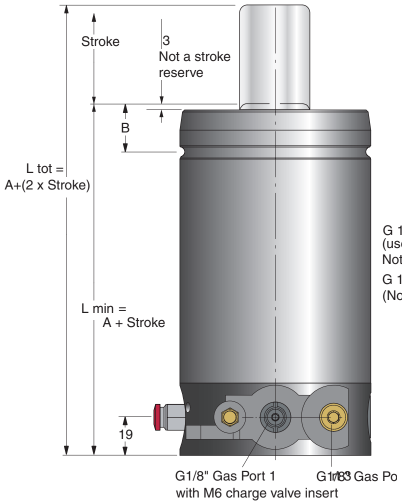


Connection of 3 pcs KF2 (example above)

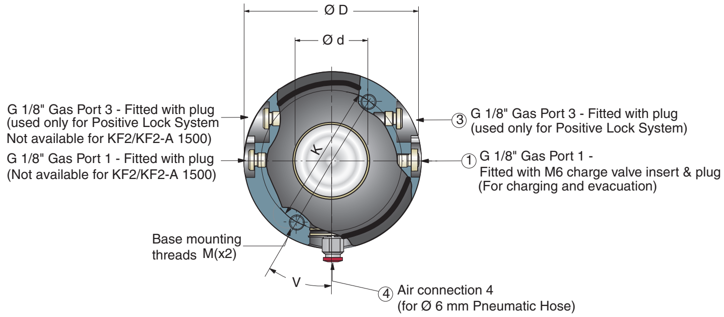
Basic information

Normally closed
Trigger temperature .... 83 ±3°C
Hysteresis... < 7°C
Max. voltage .... 250 VAC
Max. current.. 16 A
Min. current... 50 mA
Delivered with 2 m of electric cable

KF2 – Dimensions, standard version



Top view



Model	Stroke	Force in N at 150 bar /+20°C		A	B	Ø D	Ø d	K	V	M
		Initial	End force*							
KF2 1500	5–160	15,000	22,000	125	24	95	36	50	60°	M12×15
KF2 3000	6–160	30,000	42,000	135	25.5	120	50	95	30°	M12×15
KF2 5000	6–160	50,000	74,000	160	27.5	150	65	110	30°	M16×18
KF2 7500	8–160	75,000	98,000	180	33.5	195	80	120	30°	M16×18

•Upon delivery, all gas ports are fitted with plugs and the internal gas pressure is zero bar.
•We recommend the threaded holes in the base of the KF2 springs be used for mounting.
If mounting from the base is not possible, see the Appendix on page 8.4 for more information.

Basic information

Pressure medium .... Nitrogen
Max. charge pressure.......................... 150 bar
Min. charge pressure........................... 25 bar
Operating temperature .... 0 – +80°C
Force increase by temperature............. ±0.3%/°C
Max. piston rod velocity .... 0.8 m/s
Return speed piston rod 1500*...... ≈ 0.22 m/s
Return speed piston rod 3000*...... ≈ 0.15 m/s
Return speed piston rod 5000*...... ≈ 0.12 - 0.10 m/s
Return speed piston rod 7500*...... ≈ 0.80 - 0.65 m/s
Tube.. Nitrided
Rod... Nitrided

How to order

KF2 3000 - 078

Model

Stroke length [mm] in full mm between 10-160 mm, in increments of 1 mm.
For optimal function the full stroke length of the spring must be used. (Within ± 0.5 mm).

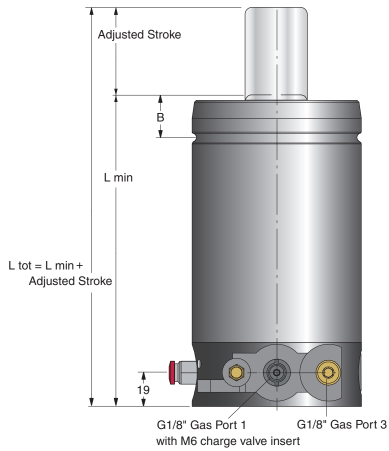
***Please note:**
Increased stroke length reduces the speed. Please contact your local KALLER distributor for further information.
KF2 springs with even slower return speeds are available on request.

KF2-A – Dimensions, adjustable version

For certain applications, it is difficult to know in advance exactly what stroke length will be required.

Therefore, the KF2-A Controllable gas spring models offer adjustable stroke lengths within 15 mm, with the use of 4 specially designed spacers built into the guide of the spring.

KF2-A Adjustable stroke controllable gas springs are available according to the following table:



Order No.	Nominal stroke	Min. stroke length	Max. stroke length	L min.			
				1500	3000	5000	7500
KF2-A XXXX-010	10	5*	17	142	152	177	197
KF2-A XXXX-020	20	12	27	152	162	187	207
KF2-A XXXX-030	30	22	37	162	172	197	217
KF2-A XXXX-040	40	32	47	172	182	207	227
KF2-A XXXX-050	50	42	57	182	192	217	237
KF2-A XXXX-060	60	52	67	192	202	227	247
KF2-A XXXX-070	70	60	77	202	212	237	257
KF2-A XXXX-080	80	72	87	212	222	247	267
KF2-A XXXX-090	90	82	97	222	232	257	277
KF2-A XXXX-100	100	92	107	232	242	267	287
KF2-A XXXX-110	110	102	117	242	252	277	297
KF2-A XXXX-120	120	112	127	252	262	287	307
KF2-A XXXX-130	130	122	137	262	272	297	317
KF2-A XXXX-140	140	132	147	272	282	307	327
KF2-A XXXX-150	150	142	157	282	292	317	337
KF2-A XXXX-160	160	152	167	292	302	327	347

*** Min. stroke length**

KF2-A 1500-010	5
KF2-A 3000-010	6
KF2-A 5000-010	6
KF2-A 7500-010	8

For information on how to adjust the stroke length of the KF2 spring, see Appendix “How to adjust the stroke length of a KF2-A”, page 8.1.

How to order:

KF2-A 3000 - 030 - 030

Model:
KF2-A 1500
KF2-A 3000
KF2-A 5000
KF2-A 7500

Nominal Stroke

Delivered Stroke

Gas springs with cooling

KF2/(KF2-A) with Cooling jacket (CJ)

The following springs are available where cooling is required.

Gas springs with cooling jackets are used with the liquid cooler (Fig. 1). The cooling jacket should be connected to the cooler. See page 4.5

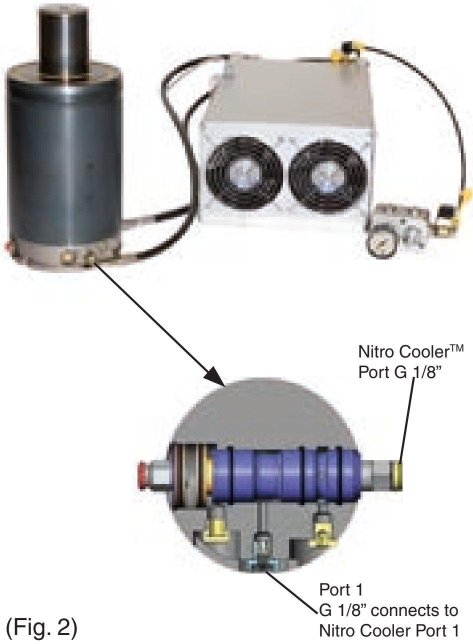
(Fig. 1)

Model	KF2 C	KF2-A C+7	Ø H $^{+5}_{0}$
KF2/KF2-A 1500-XXX-CJ	75	82	110
KF2/KF2-A 3000-XXX-CJ	85	92	135
KF2/KF2-A 5000-XXX-CJ	110	117	165
KF2/KF2-A 7500-XXX-CJ	130	137	210

KF2/(KF2-A) for Nitro Cooler™ (NC)

Gas springs with a special cartridge valve are used with nitrogen coolers (NC) (Fig. 2).
See page 5.12.

Since nitrogen gas travels from the gas spring through the Nitro Cooler™, the return stroke speed of the piston rod is 40%-50% slower ,compared to a KF2 spring without a Nitro Cooler™ when the Cooler is placed one meter from the springs.
If the hose length is longer than 1 meter, a hose with a larger inner diameter may be required.



(Fig. 2)

NC Rebuild Kit Order No.	For gas spring
3021780	KF2/KF2-A 1500
3121780	KF2/KF2-A 3000
3221780	KF2/KF2-A 5000
3321780	KF2/KF2-A 7500

NC Rebuild kits are available for simple modification of existing springs.

How to order KF2/KF2-A with a Cooling Jacket (CJ)

KF2 XXXX - XXX - CJ

Model size
1500
3000
5000
7500

Stroke length [mm]

Cooling Jacket

How to order KF2/KF2-A with Nitro Cooler™ (NC)

KF2A XXXX - XXX - XXX - NC

Model size
1500
3000
5000
7500

Nominal Stroke length [mm]

Adjusted Stroke length [mm]

Additional Port for Nitro Cooler™

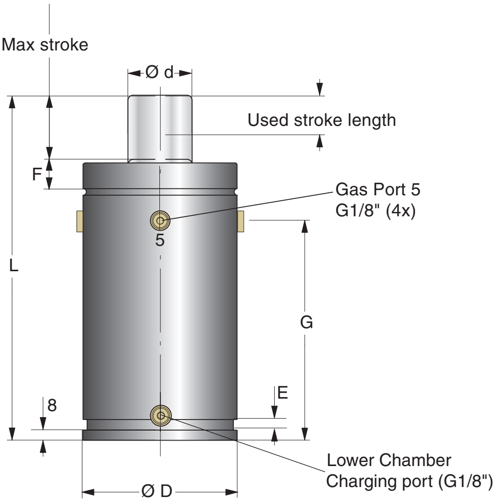
KP – Dimensions

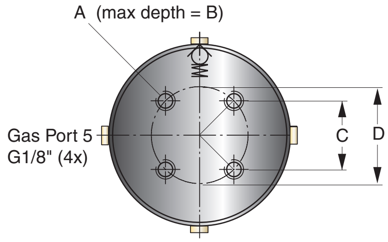
The KP passive gas springs should:

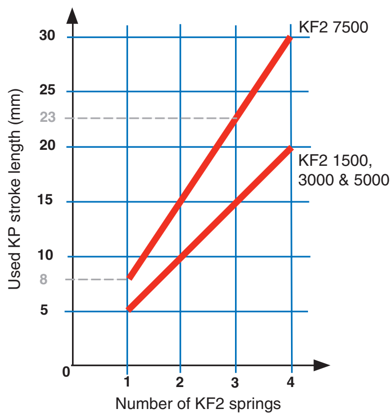
- **not** be used for any operation in the tool other than to eliminate KF2 springback,
- **be** of the same model size as the KF2 spring(s) (except KF2 7500 which uses the KP 5000),
- **be** connected to the Valve Block, using the EO24 Hose System or its equivalent, via one of the four G1/8" Gas Port 5 connection ports,
- **be** stroked according to the table below.

Please note!

The KP Passive Gas Spring does not require cooling. The G1/8" charge port at the base of the spring is for gas charging and bleeding the KP spring's lower gas chamber. The KP spring's charge pressure should be the same as the KF2 spring(s).







Order No.	Ø D	Ø d	Max. stroke length	L	A	B	C	D	E	F	G
KP 1500	95	36	30	220	M8	13	42.4	60	7	24	140
KP 3000	120	50	30	220	M10	16	56.6	80	7	25.5	140
KP 5000	150	65	35	300	M10	16	70.7	100	8	27.5	193

Force in [daN] at used stroke length [mm]*							
Model	**5**	**10**	**15**	**20**	**25**	**30**	**35**
KP 1500	3,600	5,200	6,700	8,200	9,900	11,900	-
KP 3000	6,000	8,300	10,400	12,300	14,400	16,800	-
KP 5000	7,800	10,200	12,500	14,700	16,800	19,000	21,300

Basic information

Pressure medium .... Nitrogen
Max. charging pressure .... 150 bar
Min. charging pressure .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature............ ±0.8%/°C
Max. piston rod velocity .... 0.8 m/s
Tube.. Nitrided
Rod... Nitrided

The forces are calculated based on a charging pressure of 150 bar in the KF2 and the KP spring(s).

Please note! For more information, see "About Gas Springs" in the KALLER main catalog.

Valve block dimensions

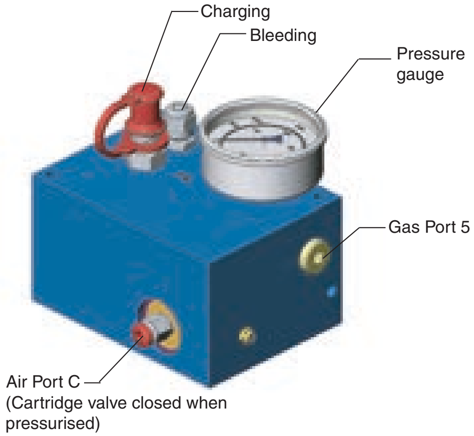
There are two valve block models available:

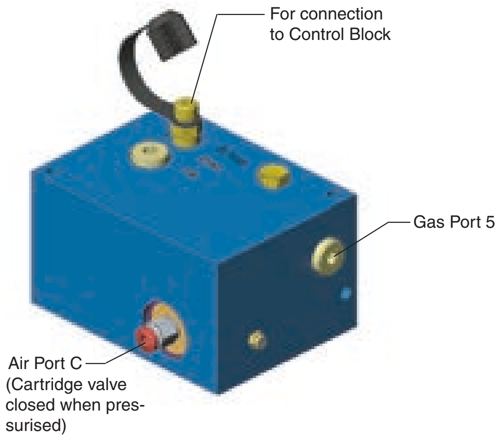
- **All-in-one valve block**, with built-in gas charging and bleeding equipment plus gauge

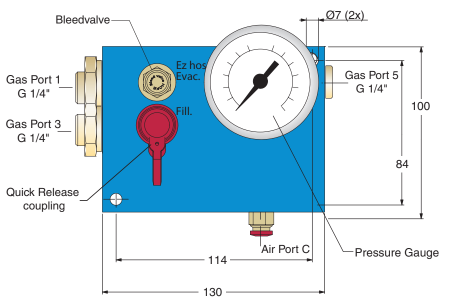
  Order No. 2020801

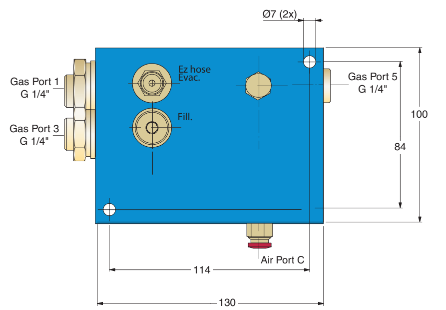
- **Standard valve block**, for use with separate control block

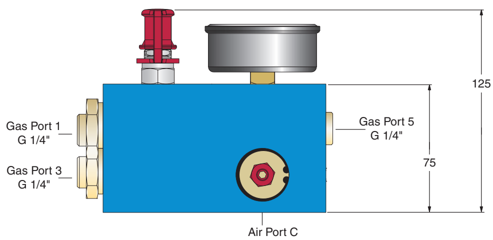
  Order No. 2120801

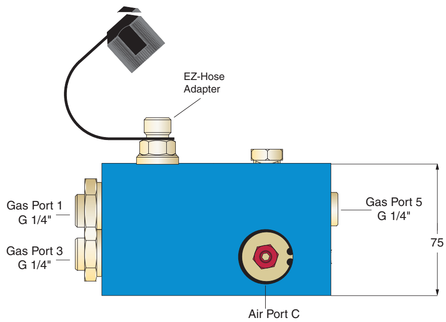










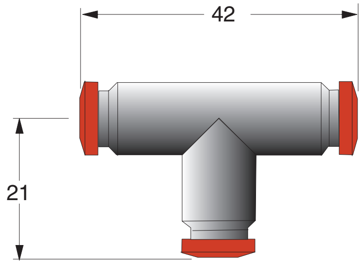


For information about how to connect the different valve blocks to a positive lock system, see the installation examples on pages 6.2 and 6.5.

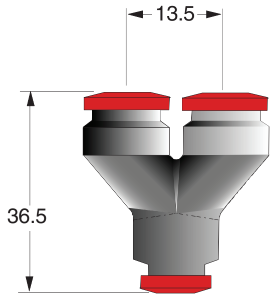
Control system components

Hose and fittings for Ø 6 mm Pneumatic Hose

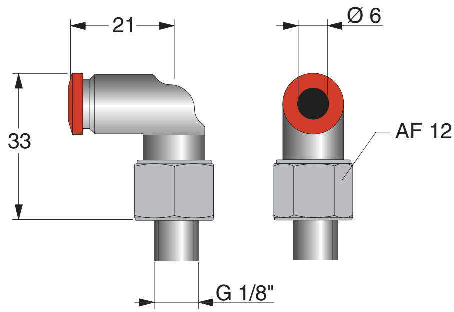
T Connector (hose to hose)
Order No. 503368



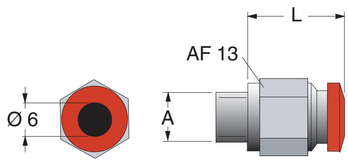
Y Connector (hose to hose)
Order No. 503372



90° – G 1/8”
Order No. 503367



Straight Connector
Order No. (see table)



Order No.	A	L
503299	G 1/8”	15
503426	G 1/4”	13.5

Pneumatic Hose
Ø 6 mm

How to order 503377 - XX

Order the length in whole meters

Basic information

Material.. Polyurethane
Max. temperature................................. 60°C
Max. pressure....................................... 16 bar
Color.. Blue
Min. bend radius .... 20 mm

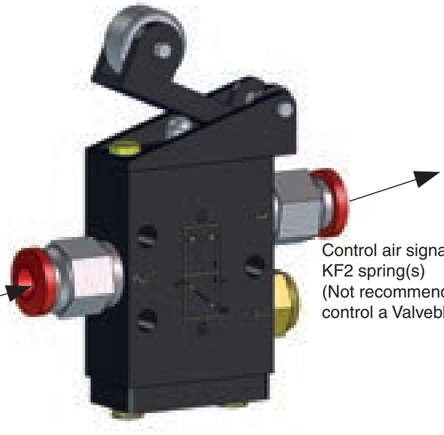
Mechanical Pressure Switch

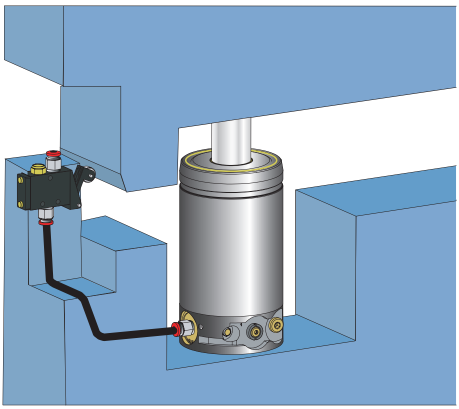
Order No. 503800

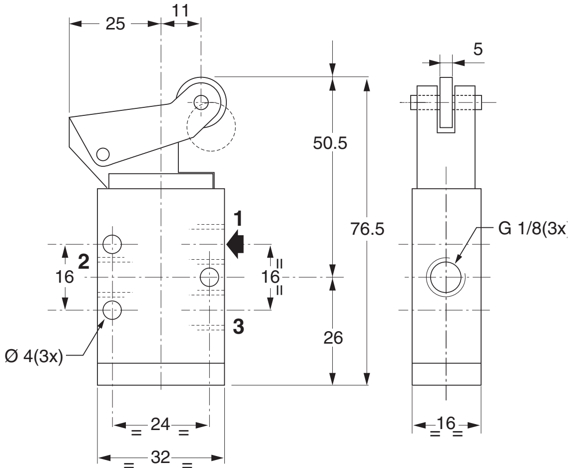
For Tool Integrated Control Systems, the Mechanical Pressure Switch can be used to control the valve in the KF2 Controllable Gas Spring(s) or Valve Block, for Tool Integrated Control Systems. For more information on Tool Integrated Control Systems see Page 4.2.

Mechanical pressure switches:

- **Can** control up to 10 pcs KF2 springs.
- **Require** a constant compressed air supply (min. 4 bar).







Basic information

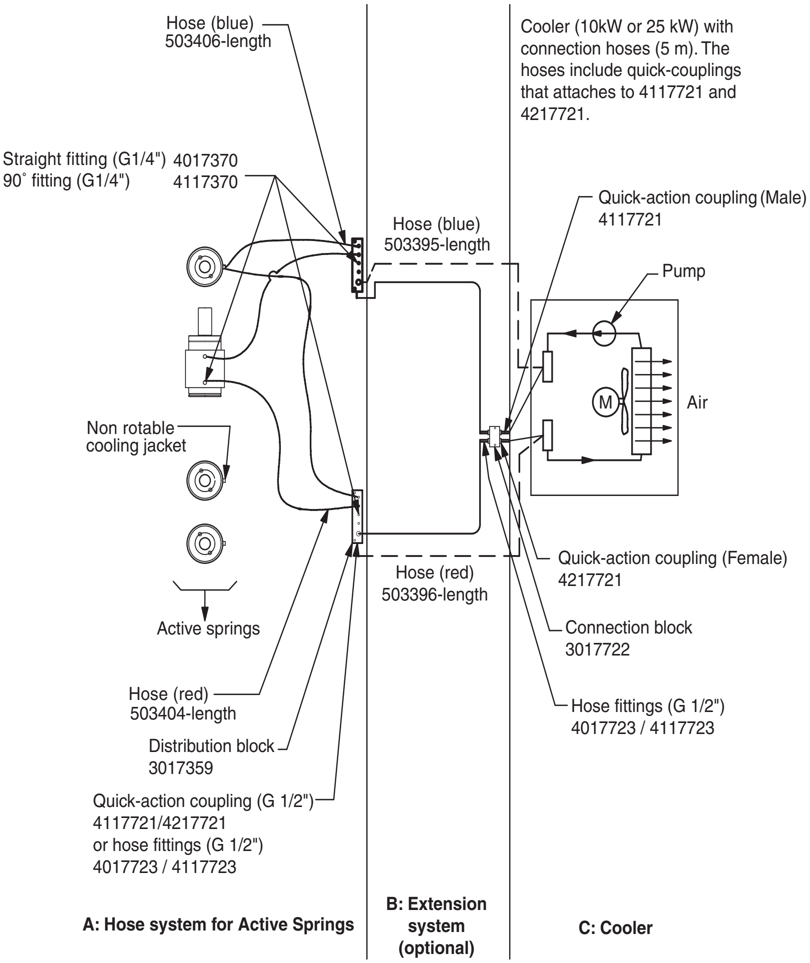
Fluid	Air or inert gas, filtered & lubricated
Pressure	0 to 10 bar
Temperature	–10°C to +60°C
Functions	3/2
Connection ports	G 1/8” (3×)
Flow rate (at 6 bar)	200 l/min

Liquid cooling system components

For applications where cooling is required, each KF2 Controllable Gas Spring must be:

- **Fitted** with a Cooling Jacket (CJ) (see picture),
- **Fitted** with a Thermal Relay (Order No. 503388) (see *Overheat Protection 4.8*),
- **Connected in parallel** to the Cooler Unit as shown below.

KF2 spring fitted with Cooling Jacket (CJ)
For *How To Order* information, see KF2 Dimensions 10.5/1.

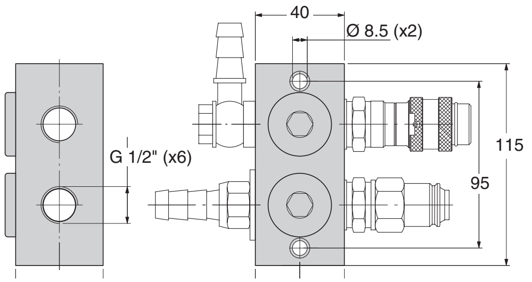


The cooling fluid is circulated within a closed system through the Cooling Jacket(s), to a Cooler Unit (10kW or 25kW), where heat from the KF2 spring(s) is then dissipated.

Cooling System – Hose & Fittings

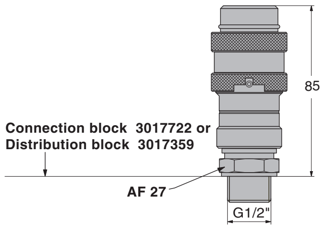
Connection Block

Order No. 3017722



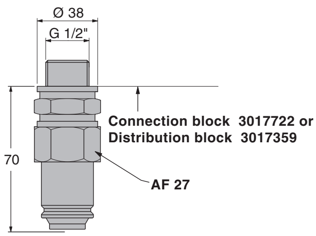
Female Quick Release Coupling

Order No. 4217721



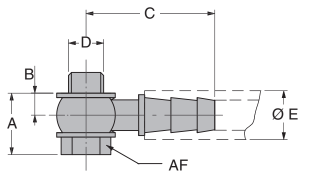
Male Quick Release Coupling

Order No. 4117721



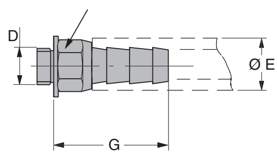
90° Hose Fitting

Order No.	D	A	B	C	E	AF
4117370	G 1/4"	23	8	44	16	17
4117723	G 1/2"	30	12	68	23	27



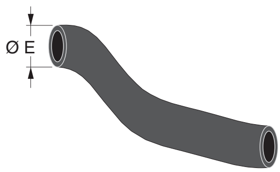
Straight Hose Fitting

Order No.	D	E	G	AF
4017370	G 1/4"	16	28	12
4017723	G 1/2"	23	58	27



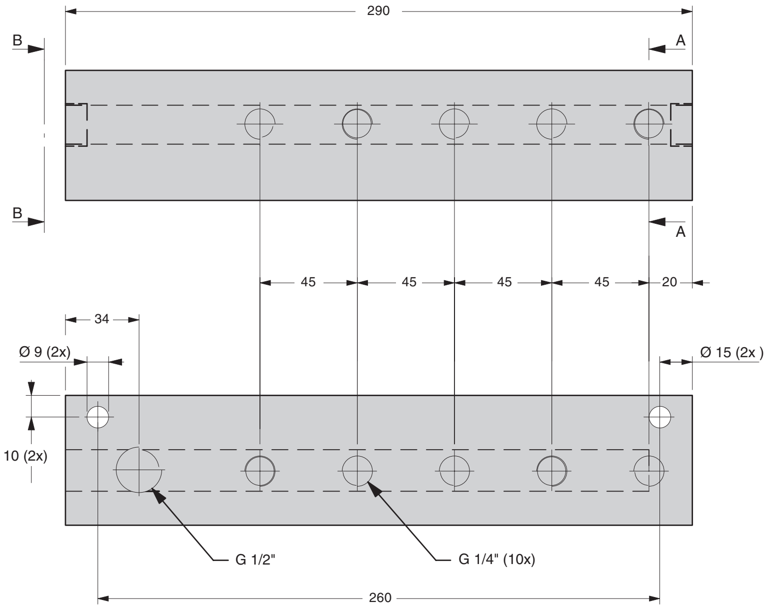
Cooling Hose

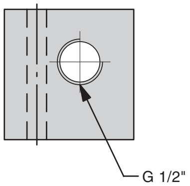
Order No.	E	DN	Color	Min. bend radius
503406	16	10	Blue	75 mm
503404	16	10	Red	75 mm
503395	23	16	Blue	150 mm
503396	23	16	Red	150 mm



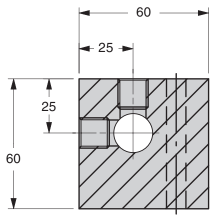
Cooling System – Distribution Block

Order No. 3017359



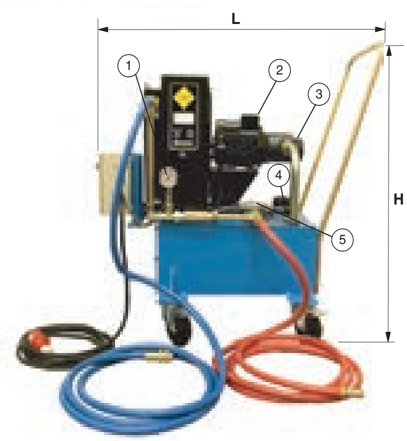


View B-B



View A-A

Liquid Cooling System – Cooler Unit (LC)



Two cooler unit sizes are available:

- 10 kW – Order No. 4017360
- 25 klW – Order No. 4117360

For information on which Cooler Unit is suitable for your application, please fill in the Application Enquiry Form 3.1 and fax it to your local KALLER distributor or directly to Strömsholmen AB.

1 Pressure gauge
Displays the system pressure (8-10 bar)
2 Electric motor
380 VAC (only)
3 Circulation pump
Check the direction of rotation at start-up
4 Cooling fluid port
5 Filter
6 User's Guide
7 Cooler
8 Cooling fluid outlet
Connect with the supplied 5 m hose and **female** quick release coupling
9 Power switch
On/Off button
10 Fluid level indicator
11 Cooling fluid inlet
Connect with the supplied 5 m hose and **male** quick release coupling
12 Drainage plug
13 Connector 380 V AC, IEC 60309 5 Pin

Cooling fluid

The Cooler Unit is not delivered with cooling fluid. We recommend using only ULTRA Safe 620 Cooling Fluid.

For the location of your nearest supplier, please visit www.petrofer.com.

Please Note!
Do not start the Cooler Unit without cooling fluid in the cooler since this will damage the unit. The unit is equipped with a level/temp switch that will shut down the unit if it leaks or overheats.

Basic information

10 kW Cooler Unit:

Order No.	**4017360 (10 kW)**
Quick connection	1/2”
H	1,000
L	900
B	700
Pump flow	40 l/min
Tank capacity	60 l
Electric motor	1.5 kW
Power supply	380 V AC
Weight	170 kg

Basic information

25 kW Cooler Unit:

Order No.	**4117360 (25 kW)**
Quick connection	3/4”
H	1,070
L	1,070
B	890
Pump flow	60 l/min
Tank capacity	90 l
Electric motor	3 kW
Power supply	380 V AC, IEC 60309 5 Pin
Weight	220 kg

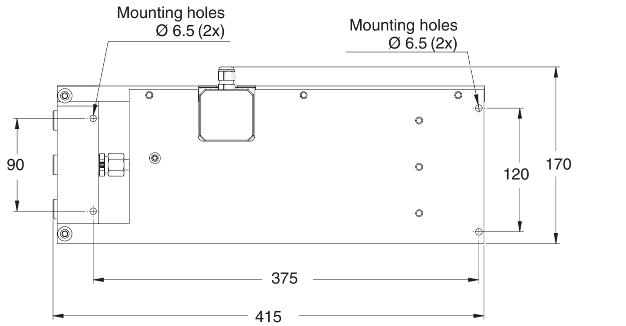
Nitrogen Cooling System – Nitro Cooler™ (NC)

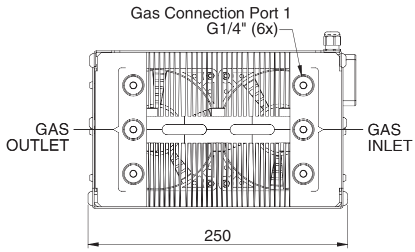
The Kaller Nitro Cooler™ unit(NC) has been engineered to provide Tool Integrated Cooling for Controllable Gas Springs (KF2 or KF2-A) when operating at high production rates.

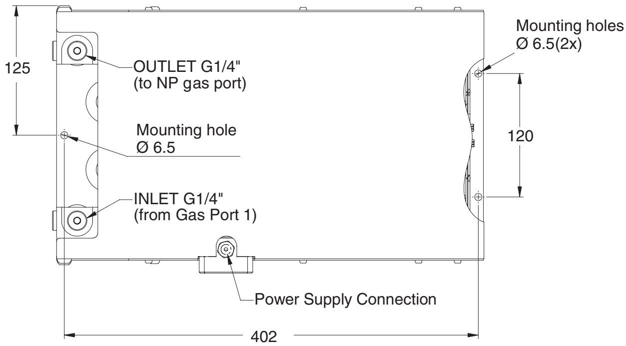
The Nitro Cooler™ unit (NC) is very compact and provides 1.5 kW of cooling power, with each unit being able to cool up to four KF2 or KF2-A springs.

Gas springs with a special cartridge valve are required to be used with the Nitro Cooler™ unit (NC).

Nitro Cooler™ – Order No. 2021641







Nitro Cooler™ Unit (NC) dimensions

One Nitro Cooler™ requires a 24 VDC (22 W) power supply and can be mounted both vertically and horizontally, inside or outside the die. Nitro Cooler™ Units are IP64 classed, which makes them resistant to die cleaning.

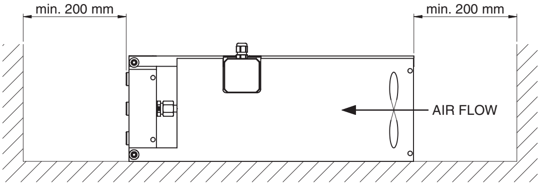
Basic information

Max. cooling capacity.......................... 1.5 kW
Max. charge pressure..... .... 150 bar at 20°C
Min. charge pressure........................ .... 25 bar
Operating temperature.......................... 0 to +80 °C
Weight.. 16 kg
Connection ports..................... .... G 1/4" (8×)
Power supply.................... .... 24 VDC (22 W)
Includes a built-in thermal relay

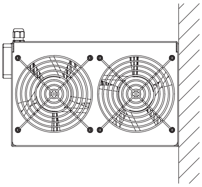
Nitrogen Cooling System – Nitro Cooler™ (NC)

Mounting possibilities

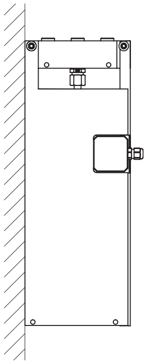
Nitro Coolers can be mounted both vertically and horizontally. When mounting it is important NOT to restrict the air flow through the cooler. If the air flow is restricted through the Nitro CoolerTM, this will have a negative effect on the cooler's performance.



Base mount



Horizontal mount



Vertical mount

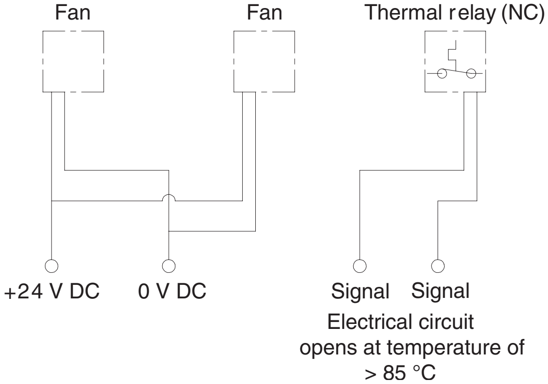
Electrical connections

The wiring diagram for the Nitro CoolerTM is depicted below. This diagram can also be found on the label attached to the side of the Nitro CoolerTM next to the connection box.

Please note! The Nitro Cooler™ contains a built-in thermal relay.

The thermal relay circuit is normally closed and opens if the temperature of the relay exceeds 85°C ±5%.

The thermal relay should be connected to the PLC of the press to prevent overheating of the KF2-NC gas spring(s).



Nitrogen Cooling System – Nitro Cooler™ (NC)

Nitro Cooler™ performance

Depending on how much heat the gas springs in the die generate, it is possible to connect up to four gas springs to one Nitro Cooler™. The charts on the right display the maximum number of strokes per minute (SPM) allowed when 1, 2, 3 or 4 pcs of KF2/KF2A-NC gas springs, with with a charge pressure of 150 bar, are connected to a single Nitro Cooler™. Along the four different gas spring curves, the heat generation of the gas springs is 1.5 kW, which is the maximum cooling effect of the Nitro Cooler™.

Each chart can be used to evaluate how many KF2-NC gas springs can be connected to one Nitro Cooler™. For any given stroke length, the corresponding SPM rate curve for the number of attached KF2-NC springs, must not be exceeded. The time needed for the return stroke also has to be considered when the SPM is determined for an application.

Important! When using the Nitro Cooler™, the return stroke speed of the piston rod decreases by approximately 50%. With a distance of 1 m between the cooler and the gas spring the speeds are as follows:

KF2/KF2-A 1500 – 0.10 m/sec.

KF2/KF2-A 3000 – 0.08 m/sec.

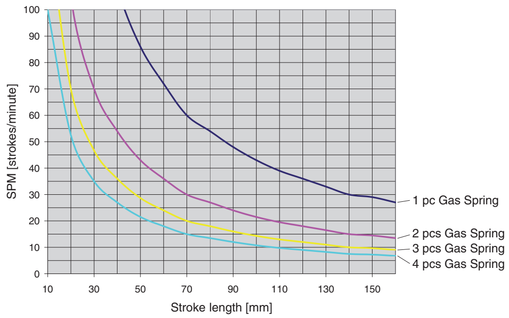
KF2/KF2-A 5000 – 0.05 m/sec.

KF2/KF2-A 7500 – 0.03 m/sec

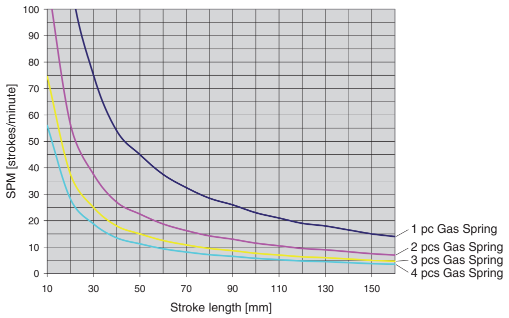
If a higher speed is needed, please contact your local distributor or Strömsholmen AB.

See example on the next page:

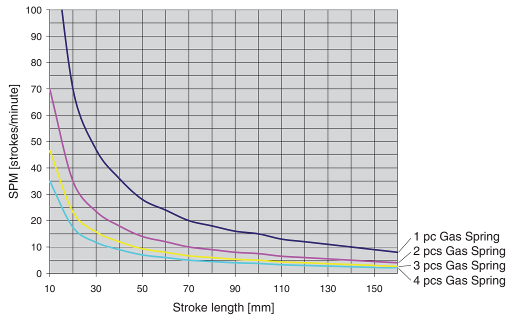
KF2/KF2-A 1500



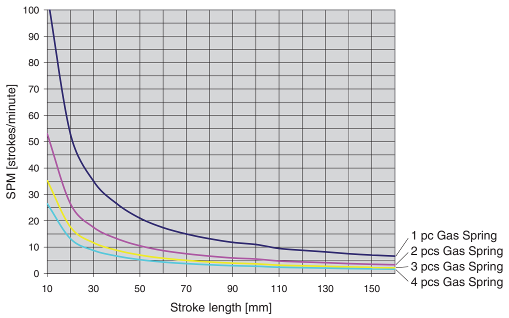
KF2/KF2-A 3000



KF2/KF2-A 5000



KF2/KF2-A 7500



Example:

How to determine the maximum running speed for an application?

We know :

The size used (KF2-1500-048-NC)

The used stroke length (48 mm)

The used pressure (150 bar)
(initial force 1.5 ton)

The used number of Gas Springs
(2 Gas Springs in this example)

Using the diagram:

Step 1 Choose the correct curve line according to the number of springs used (purple line).

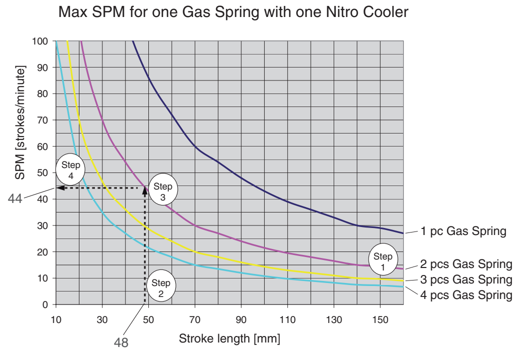
Step 2 According to the used stroke length, go up vertically to the interception point in the diagram (from point 2 to 3).

Step 3 From point 3, read the SPM stroke/minute on the vertical axis (point 4).

Step 4 The value for the maximum used SPM is 44 stroke/min.

For a lower charging pressure, this value should be increased proportionally.

Example: A charging pressure of 100 bar increases the maximum used SPM from 44 to 44 × 150/100 = 66 strokes/min.



Free Information Sign

Order No. 503613

The following Information Sign should be fitted to all tools containing Controllable Gas Springs.

One Information Sign is included with each KF2 order.

Controllable Gas Spring System

KALLER®
The Safer Choice

Die No.		
Gas spring model		
Stroke length		
Max. frequency	strokes/min	
Gas spring charge pressure	Min bar	Max bar
Thermal relay connected	Yes ☐	

Standard checks before production run or in the event of malfunction:

1. Gas spring charge pressure (max. 150 bar at 20°)

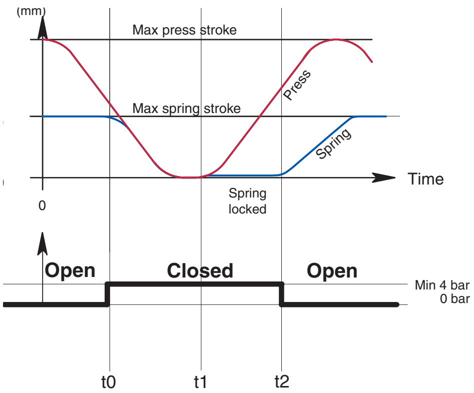
2. Air supply pressure (min 4 bar, max. 10 bar)

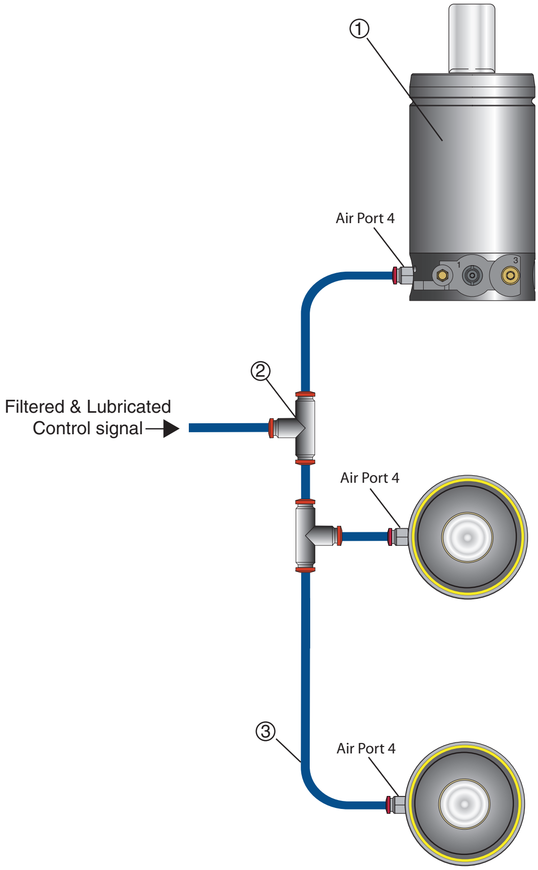
3. Air signals from press

Do not work in the die with the gas springs in locked position. Make sure that the thermal relay is in operation.

Strömsholmen AB
Box 216, 573 23 SE-Tranås, Sweden
www.kaller.com • info@kaller.com

Control System – Standard Lock, KF2





Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	2	T - Connector	503368	5.6
3	1	Pneumatic Hose Ø 6 mm	503377-XX	5.6

A Standard Lock System requires one control signal.

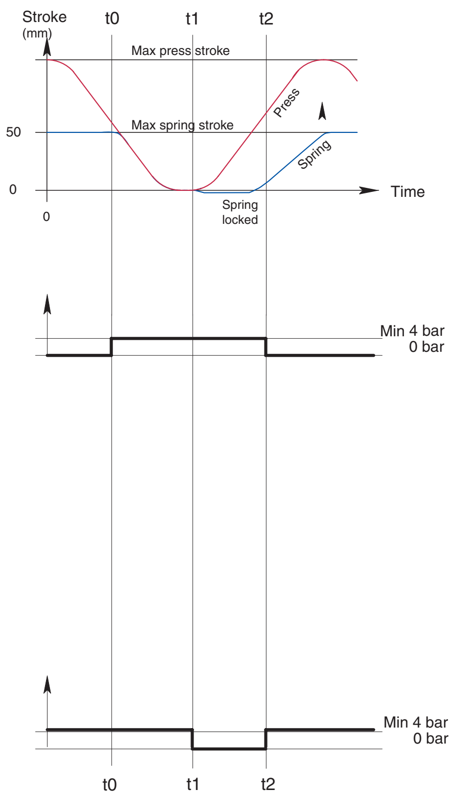
The KF2 gas springs are delivered with air fittings suitable for Ø 6 mm pneumatic hoses.

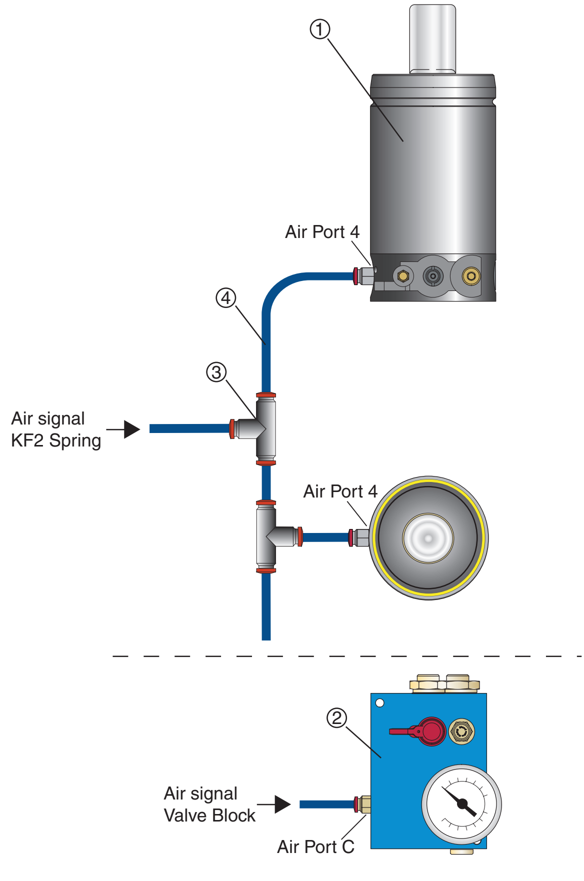
Please note! To lock and unlock all KF2 springs simultaneously, the hose lengths from the different springs to the air inlet should all be the same length.

Cut the air hoses to the right length during installation (push-lock system).

The KF2 spring's control valve should always have a continuous supply of filtered compressed air, with a minimum pressure of 4 bar.

Control System – Positive Lock system, KF2 + KP





Position	Quantity	Description	Order No.	Page
1	2	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	1	All-in-one Valve Block	2020801	5.5
3	2	T Connector	503368	5.6
4	1	Pneumatic Hose Ø 6 mm	503377-XX	5.6

A Positive Lock System requires two control signals. One to operate the KF2 gas spring(s) and one to operate the Valve Block

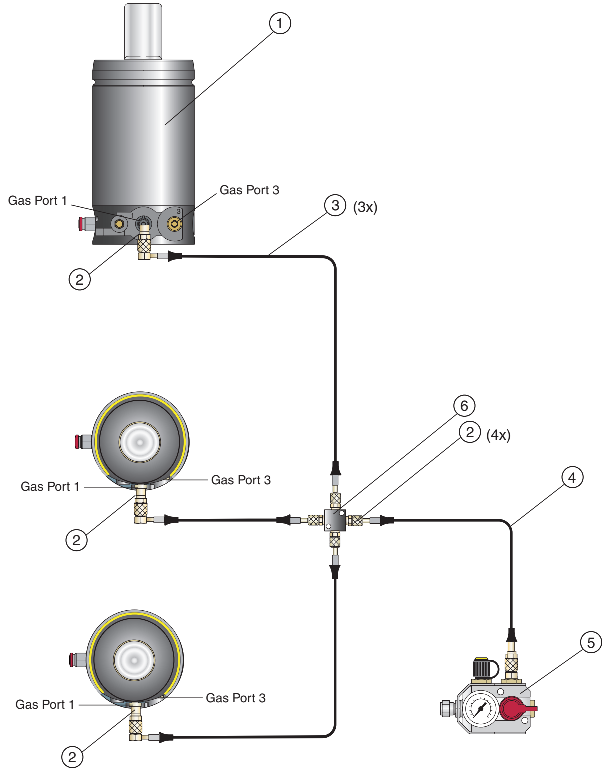
The KF2 gas spring and Valve Block are supplied with air fittings suitable for Ø 6 mm pneumatic hoses.

Please note! To lock and unlock all KF2 springs simultaneously, the hose lengths from the different springs to the air inlet should all be the same length.

Cut the air hoses to the right length during installation (push-lock system). The control valve should always have a continous supply of filtered compressed air, with a minimum pressure of 4 bar.

Hose System – Standard Lock, KF2

Method using Coupling Block(s)



Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	7	Adapter G 1/8”	4114973-G 1/8”	Gas Link Systems in the Main Catalog
3	3	EZ Hose straight – 90°	4017568-XXXX	Gas Link Systems in the Main Catalog
4	1	EZ Hose straight – straight	4014974-XXXX	Gas Link Systems in the Main Catalog
5	1	Control Block	3116114-01	Gas Link Systems in the Main Catalog
6	1	Multi-Coupling Block	4017032	Gas Link Systems in the Main Catalog

To charge, bleed and check the gas pressure for a Standard Lock in a KF2 gas spring system, all springs should be connected to a standard Control Block (here shown connected via a Coupling Block).

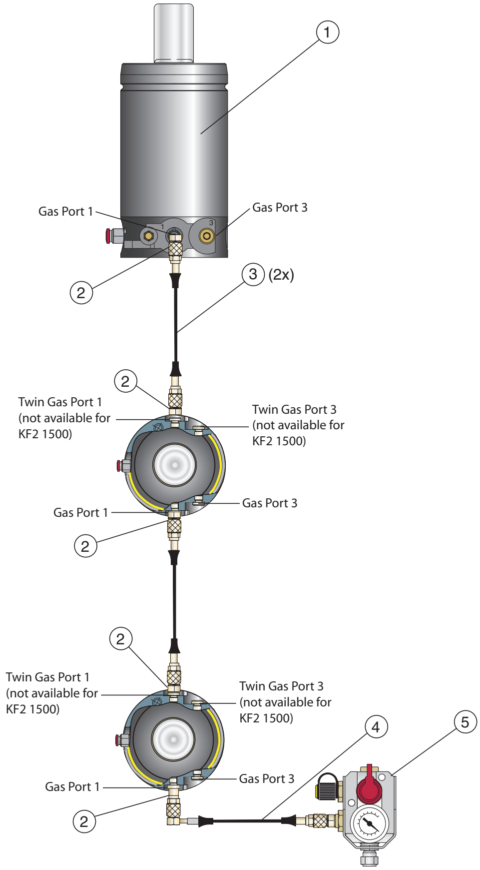
We recommend the EZ Hose system and fittings be used for such systems. The KF2 gas springs are delivered with Gas Ports 1 and 3 plugged. When connecting the EZ Hose system, the charging valve in Port 1 of each KF2 gas spring **must** first be removed. Each G 1/8” Gas Port, for both the KF2 Gas Spring and Coupling Block, requires an adapter (4114973-G 1/8”) for connection to EZ Hose.

The Control Block should be placed higher than the KF2 springs to avoid loss of internal oil when bleeding.

Hose System – Standard Lock, KF2

Method using Twin Ports

(Not valid for KF2 1500)

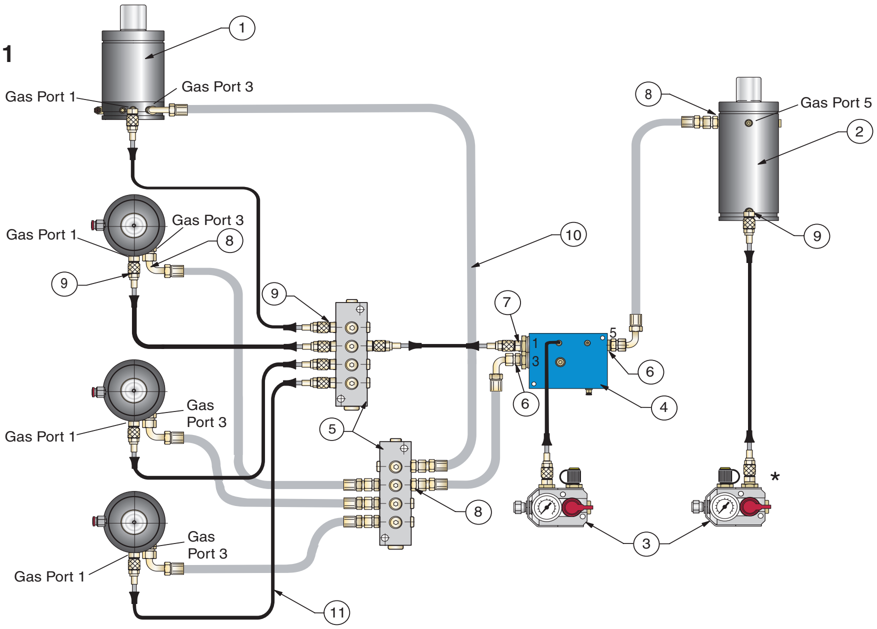


Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	5	Adapter G 1/8"	4114973-G 1/8"	Gas Link Systems in the Main Catalog
3	2	EZ Hose straight – 90°	4017568-XXXX	Gas Link Systems in the Main Catalog
4	1	EZ Hose straight – straight	4014974-XXXX	Gas Link Systems in the Main Catalog
5	1	Control Block	3116114-01	Gas Link Systems in the Main Catalog

To charge, bleed and check the gas pressure for a Standard Lock in a KF2 gas spring system, all springs should be connected to a standard Control Block. These hoses are connected using the KF2's twin gas ports to the Control Block. We recommend the EZ Hose System and fittings be used for such systems. The KF2 gas springs are delivered with Gas Ports 1 and 3 plugged. When connecting the EZ Hose system, the charging valve in Port 1 of each KF2 gas spring must first be removed. Each G 1/8" Gas Port, for both the KF2 Gas Spring and Coupling Block, requires an adapter (4114973-G 1/8") for connection to EZ Hose.
The Control Block should be placed higher than the KF2 springs to avoid loss of internal oil when bleeding.

Hose System – Positive Lock system, KF2 + KP

Example 1



To connect KF2 Controllable Gas Spring(s) to a KP – Passive Gas Spring via the Valve Block, two hose connections are needed:

- One EZ Hose connection
- One EO24 Hose connection.

The Control Block should be placed higher than the springs to avoid loss of internal oil when bleeding.

Position	Quantity	Description	Order No.	Page
1	4	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	1	KP Passive Spring	KP XXXX	5.4
3	2	Control Block	3116114-01	Main Catalog
4	1	Standard Valve Block	2120801	5.5
5	2	Multi-Coupling Block G 1/8”	3015044	Main Catalog
6	2	EO24 Adapter G 1/4”	504144	Main Catalog
7	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
8	10	EO24 Adapter G 1/8”	503593	Main Catalog
9	10	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
10	6	EO24 Hose straight - 90°	3220857-xxxx	Main Catalog
11	7	EZ Hose straight - straight	4014974-xxxx	Main Catalog

Positive Lock, KF2 + KP
As indicated above, perform gas charging and bleeding as follows:

Step 1

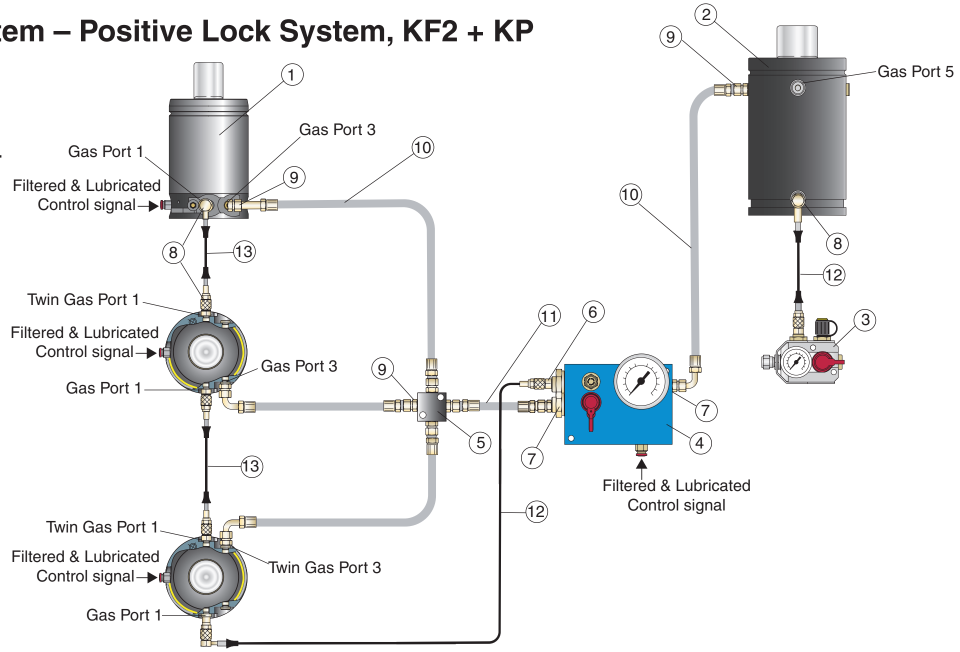
Charge the lower gas chamber in the KP Passive Gas Spring via the Control Block (3)*.

Step 2

Charge the KF2 Standard spring(s) and upper chamber of the KP gas spring via the Control Block (3) connected to the standard Valve Block (4).

Hose System – Positive Lock System, KF2 + KP

Example 2
(Not valid for KF2 1500)



To connect KF2 Controllable Gas Spring(s) to a KP – Passive Gas Spring via the Valve Block, two hose connections are needed:

- One EZ Hose connection
- One EO24 Hose connection.

The Control Block should be placed higher than the springs to avoid loss of internal oil when bleeding.

Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XX	5.1
2	1	KP Passive Spring	KP XXXX	5.4
3	1	Contol Block	3116114-01	Main Catalog
4	1	All-in-One Valve Block	2020801	5.5
5	1	Coupling Block	4017032	Main Catalog
6	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
7	2	EO24 Adapter G 1/4”	504144	Main Catalog
8	6	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
9	8	EO24 Adapter G 1/8”	4014019	Main Catalog
10	4	EO24 Hose straight – 90°	3220857-xxxx	Main Catalog
11	1	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
12	2	EZ Hose 90°– straight	4017568-xxxx	Main Catalog
13	2	EZ Hose straight – straight	4014974-xxxx	Main Catalog

Positive Lock, KF2 + KP
As indicated above, perform gas charging and bleeding as follows:

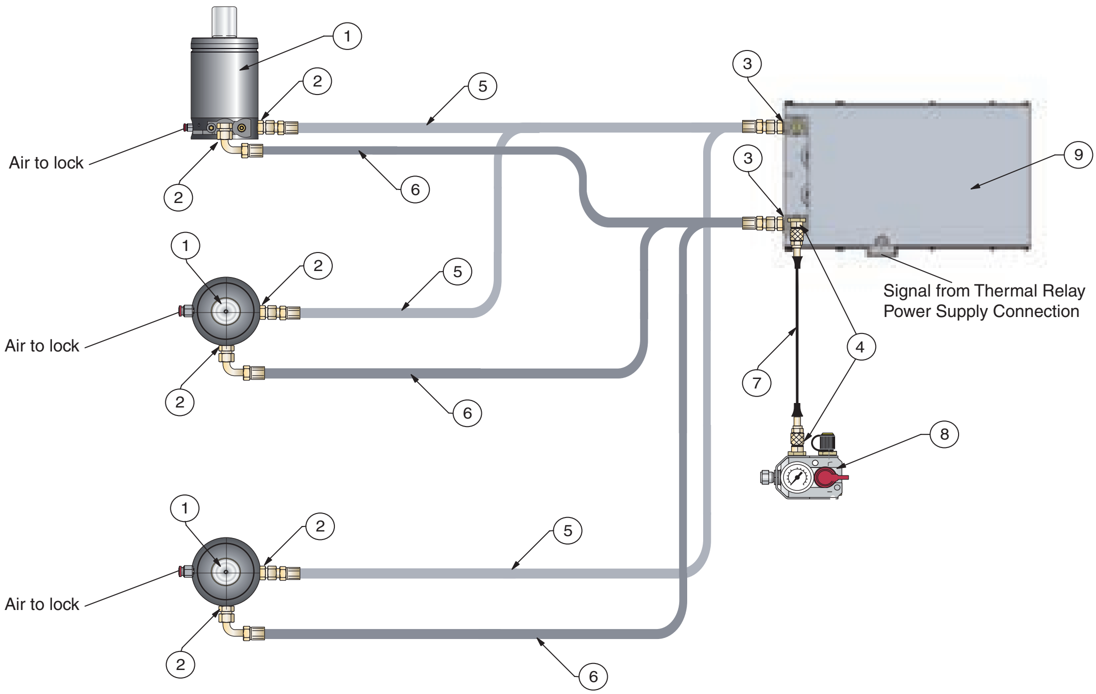
Step 1

Charge the lower gas chamber in the KP Passive Gas Spring via the standard Control Block (3).

Step 2

Charge the KF2 Standard spring(s) and upper chamber of the KP gas spring via the All-In-One Valve Block (4).

KF2 connection – NC Standard lock with a Nitro Cooler™



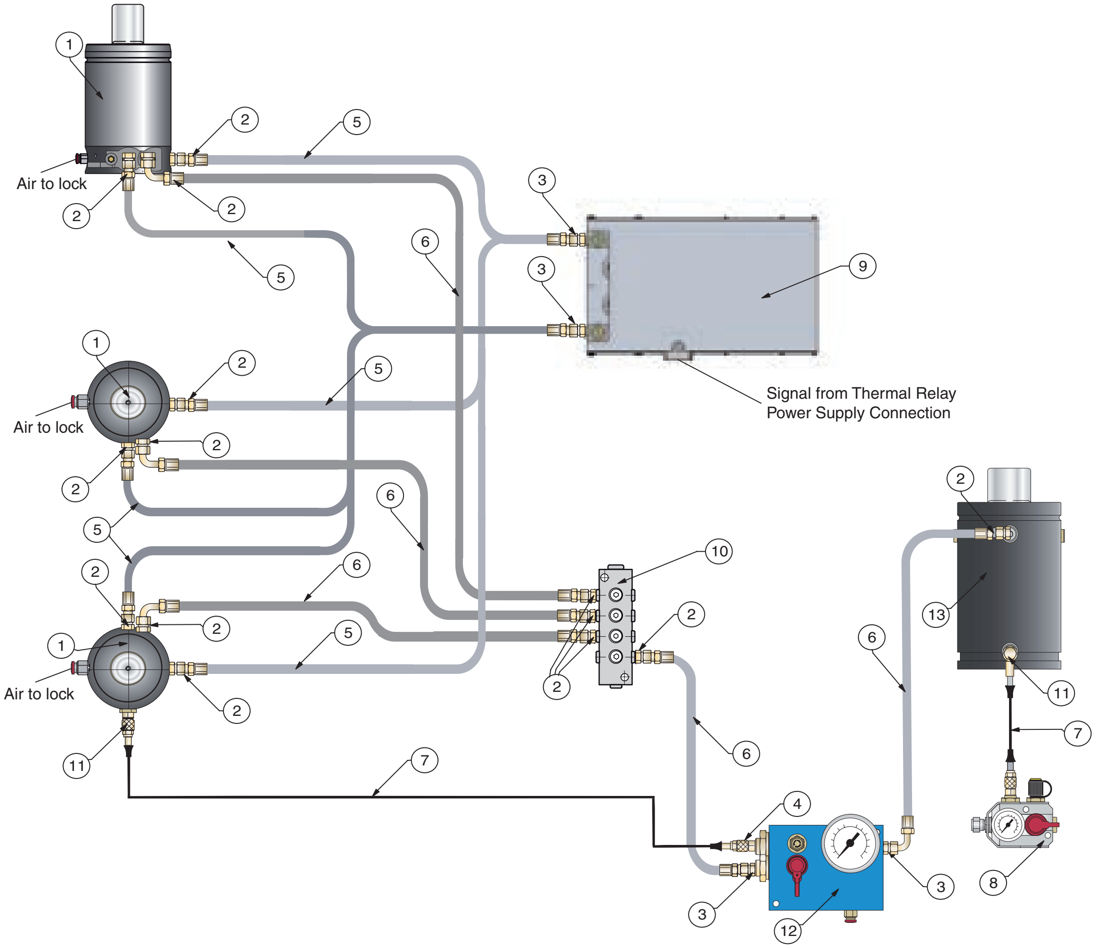
Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas spring	KF2 XXXX-XXXX NC	5.1
2	6	EO24 Adapter G 1/8”	503593	Main Catalog
3	2	EO24 Adapter G 1/4”	504144	Main Catalog
4	2	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	3	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
6	3	EO24 Hose straight – 90º	3020857-xxxx	Main Catalog
7	1	EZ Hose straight – straight	4014974-xxxx	Main Catalog
8	1	Control Block	3116114-01	Main Catalog
9	1	Nitro Cooler Block	2021641	5.12

When using a Nitro Cooler™, only EO24 hoses should be used. There is a gas transport between the cooler and gas springs with every stroke. Therefore the Nitro Cooler™ should be placed as close as possible to the springs to minimize the length of the hoses.

The Nitro Cooler™ includs heat protection, thus eliminating the need for thermal relays at the springs.

The control block for charging and bleeding can be connected optionally to one of the existing port 2 on the springs or tto the Nitro Cooler™.

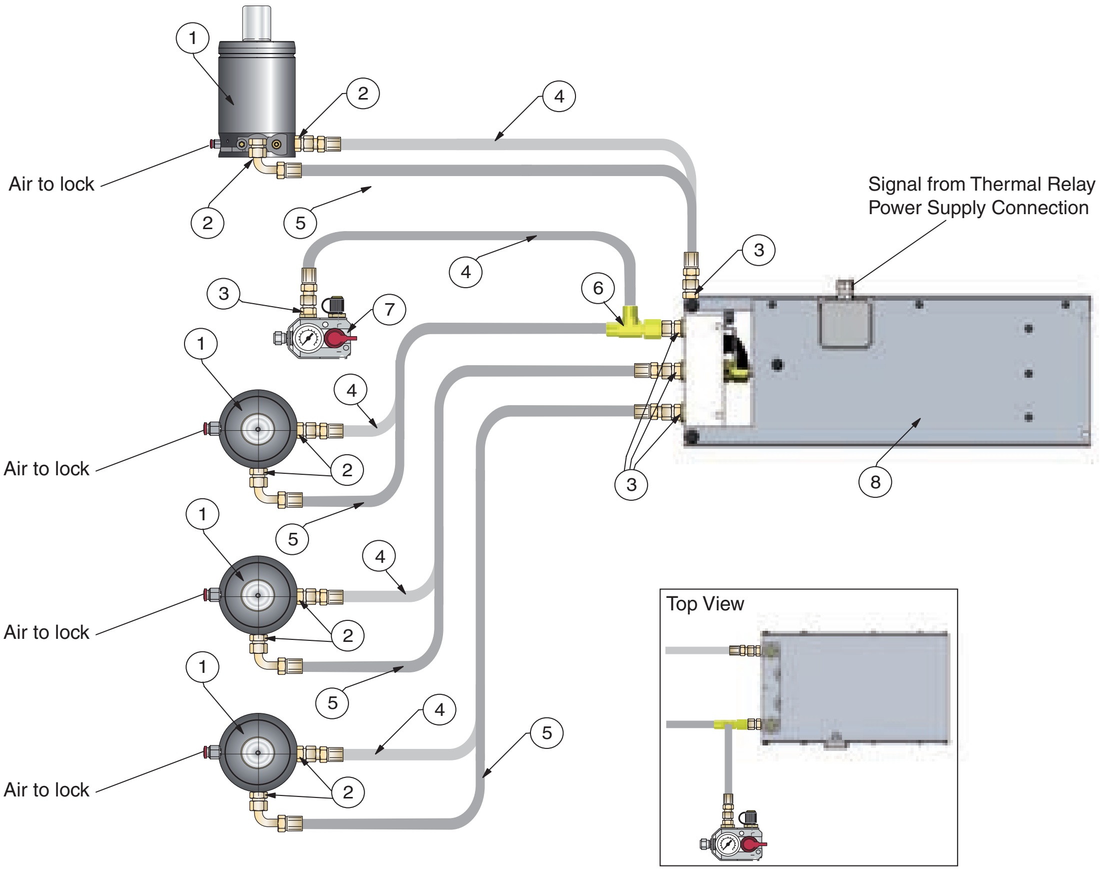
KF2-NC connection – Positive lock with a Nitro Cooler™



When using a Nitro Cooler™ for a positive lock system, the requirement are the same as for a standard lock system. (See previous page.)

Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXXX NC	5.1
2	14	EO24 Adapter G 1/8”	503593	Main Catalog
3	8	EO24 Adapter G 1/4”	504144	Main Catalog
4	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	6	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
6	5	EO24 Hose straight – 90°	3020857-xxxx	Main Catalog
7	2	EZ Hose straight - straight	4014974-xxxx	Main Catalog
8	1	Control Block	3116114-01	Main Catalog
9	1	Nitro Cooler Block	2021641	5.12
10	1	Multi-Coupling Block G 1/8”	3015044	Main Catalog
11	2	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
12	1	All-in-One Valve Block	2020801	5.5
13	1	KP Passive Spring	KP xxxx	5.4

Connection of four KF2-1500-NC Standard Locks with a Nitro Cooler™



Position	Quantity	Description	Order No.	Page
1	4	Controllable Gas spring	KF2 XXXX-XXXX NC	5.1
2	8	EO24 Adapter G 1/8”	503593	Main Catalog
3	9	EO24 Adapter G 1/4”	504144	Main Catalog
4	5	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
5	4	EO24 Hose straight – 90°	3020857-xxxx	Main Catalog
6	1	L Coupling	504147	Main Catalog
7	1	Control Block	3116114-02	Main Catalog
8	1	Nitro Cooler Block	2021641	5.12

General	
What air pressure is required to operate the cartridge valves?	4 bar minimum air pressure is required to close the normally open (NO) cartridge valves.
What is the maximum air pressure allowed to operate the cartridge valves?	10 bar maximum air pressure is allowed to operate the cartridge valves.
What service life can I expect from a KF2 Controllable Gas Spring?	As long as the thermal relay is used, the following service lifetimes can be expected: For stroke lengths up to 50 mm: 0.5 million strokes. For stroke lengths above 50 mm: 50,000 stroke meters.
Can I use other Hose Systems?	We cannot guarantee the function of the system if Hose Systems other than those mentioned in this manual are used. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I combine different KF2 size springs in the same system?	No. Please contact your local KALLER distributor or Strömsholmen AB directly for more information.

Relating to Standard Lock, KF2	
Is it possible to adjust the stroke length of the KF2 spring, or must I always use 100% of the nominal stroke ±0.5 mm?	There are 2 versions of the KF2 Controllable Gas Spring, the standard model KF2 and an adjustable model KF2-A. For more information on the adjustable model, see Technical Data page 5.2.
How fast can the KF2 spring be stroked?	0.8 m/sec is the maximum allowed compression velocity. The maximum stroke frequency (spm) at which a KF2 spring can operate at depends on the stroke length of the spring and level of cooling. See Cooling (optional) on page 4.5 for more information.
What can I do to eliminate KF2 springback?	If you are using 100% stroke length ±0.5 mm of the KF2 spring, a maximum springback f 1 mm can be expected. It is possible to eliminate this at any time by converting the Standard Lock into a Positive Lock System. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I lock a KF2 Controllable Gas Spring at any position?	Basically yes, but the less you stroke the KF2 Controllable Gas Spring, the greater the springback will be. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.

Relating to Positive Lock System, KF2+KP	
How many KF2 Controllable Gas Springs can be connected to a single KP Passive Gas Spring?	Up to 4 pcs KF2 can be connected to a single KP spring.
How many Valve Blocks do I need in the system?	One Valve Block is required for each KP Passive Gas Spring in the system.
Can I use the KP spring in the tool for forming?	No. The KP spring is not to be used for any operation in the tool; use it only to eliminate KF2 springback.
Can I use just the EZ Hose System to connect to my Positive Lock System?	No. The EO24 Hose System (or its equivalent) must be used between the KF2 spring(s), Valve Block and KP Passive Gas Spring.
Can I use just the EO24 Hose System to connect to my Positive Lock System?	Yes.

Relating to Liquid Cooling	
Is Cooling always required?	Not always. Generally speaking, longer stroke lengths and faster press stroke frequencies normally require cooling. See Cooling System (optional) on page 4.5 for more information.
How many KF2 controllable springs can be connected to a single Cooler Unit?	The maximum heat effect for all springs combined has to be lower than the cooling effect of the cooler. If a group of springs whose combined heat factor exceeds the maximum heat factor for the "Nitro CoolerTM used for 1pc KF2 spring " (see page 4.6), please secure according to the diagrams on page 5.14.
Can I use my own cooling system?	Yes. It is possible to use the cooling system from the press or other coolers.
What different cooling fluids can we use?	We recommend use of Water-glycol fluid (HFC) ULTRA SAFE 620. ULTRA-SAFE 620 is approved by all major equipment manufacturers and is often used for running in new machines. Equivalents to this water-glycol fluid can be used, but Strömsholmen AB cannot be held responsible for poor function.

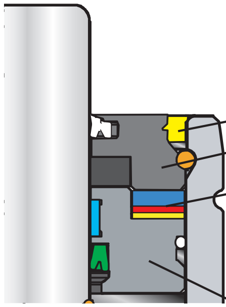
Relating to Nitro Cooler™	
How many KF2 can be connected to one Nitro Cooler™?	Depending on how much heat is generated in a particular application, up to four gas springs can be connected to one Nitro CoolerTM. See table on page 5.14
Can we elminate the decrease in return speed caused by the Nitro Cooler™ ?	No. When using the Nitro CoolerTM, gas is transported between the cooler and gas springs for every press stroke, and consequently the return speed will be affected. With a distance of 1 m between the cooler and gas spring the speeds are as follows: KF2/KF2-A 1500 – 0.12 m/sec. KF2/KF2-A 3000 – 0.10 m/sec. KF2/KF2-A 5000 – 0.08 m/sec. KF2/KF2-A 7500 – 0.05 m/sec. return stroke speed. If a higher speed is needed, please contact your local distributor or Strömsholmen AB.
How many Nitro Coolers™ can be used in one die?	There is no limitation as long as there is sufficiently ventilated places for them in the die.

System	Problem	Solution
Standard Lock, KF2	KF2 spring does not lock	Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's springback is greater than 1 mm	Make sure 100% of the KF2 spring's nominal stroke length ±0.5 mm is used
		Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
	KF2 piston rod does not return	Make sure the KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod return
		Check that there is gas pressure in the KF2 spring

System	Problem	Solution
Positive Lock System, KF2 + KP	KF2 spring does not lock	Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's spring back is greater than 0 mm	Make sure the cartridge valve in the Valve Block is closed during the press' down-stroke and that the KP-Passive Gas Spring is being stroked sufficiently for this application
		Make sure 100% of the KF2 spring's nominal stroke length ±0.5 mm is used
		Check that the cartridge valve in the Valve Block opens at BDC
	KF2 piston rod does not return	Make sure the KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod return
		Check that there is gas pressure in the KF2 spring

Stroke length adjustment of KF2-A

The guide in the KF2-A is made up of the following main components:



The guide length and stroke length of the spring can be adjusted by installing and/or removing spacers between the upper and lower guide. To obtain the correct stroke length, install spacers in the guide according to Table 1.

Example 1:

The stroke length should be increased with 4 mm from the nominal stroke length.

Solution: Open the spring and guide, remove the 4 mm thick spacer. The 1 mm and 2 mm thick spacers should be left in the guide/ spring.
The procedure is described on the next page.

To adjust from nominal stroke length

Table1

	Stroke length	Spacer (mm) 1	2	4	8
Maximum	+7	0	0	0	0
	+6	1	0	0	0
	+5	0	1	0	0
	+4	1	1	0	0
	+3	0	0	1	0
	+2	1	0	1	0
	+1	0	1	1	0
***Nominal**	0	1	1	1	0
	-1	0	0	0	1
	-2	1	0	0	1
	-3	0	1	0	1
	-4	1	1	0	1
	-5	0	0	1	1
	-6	1	0	1	1
	-7	0	1	1	1
Minimum	-8	1	1	1	1

Ex.1

* The nominal stroke length is always marked on the tube

Important!

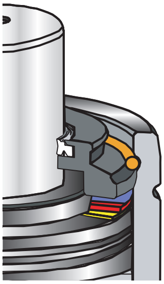
- **Only fully trained personnel with experience in servicing gas springs are allowed to adjust to the stroke length.**
- **Make sure the work surface where you will be working on the KF2-A spring(s) is clean and free from contaminates.**
- **Make sure there is no gas pressure in the KF2-A spring before proceeding.**

Feel free to download an animated guide from our homepage: **www.kaller.com**

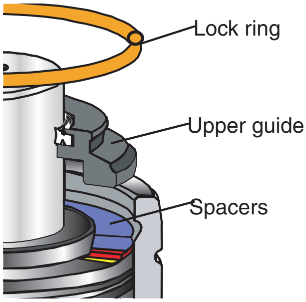
Stroke length adjustment of KF2-A

Work procedure

1: Make sure the KF2-A gas spring is degassed and remove the dust cover (if applicable).

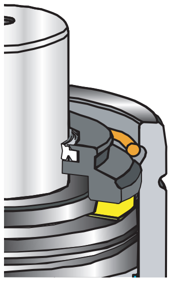


2: Knock down the guide and remove the lock ring by using a mounting sleeve and a plastic hammer.



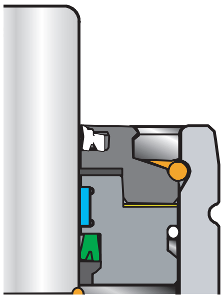
3: Remove the Upper Guide and install the combination of Spacers that will give you the required stroke length.

4: Install the Upper Guide and use the mounting sleeve and plastic hammer again to knock down the guide to expose the lock ring groove.



5: Install the lock ring and pull up the piston rod assembly using a T-handle.

6: Make sure that the guide is flush with the top of the tube. (If not, check the installation of the lock ring.)

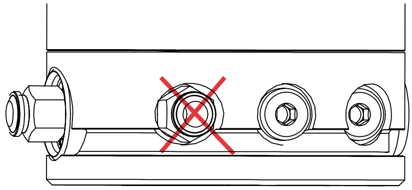


7: Charge the KF2-A spring with nitrogen gas, and fit the dust cover (if applicable).

How does the new KF2 differ from an existing KF

The KF2 is fitted with a normally open (NO) cartridge valve, which has the following advantages:

- Simplified control system
- Combined charge & bleed port
- Low-pressure variant LP is now obsolete
- Only 4 bar air pressure required

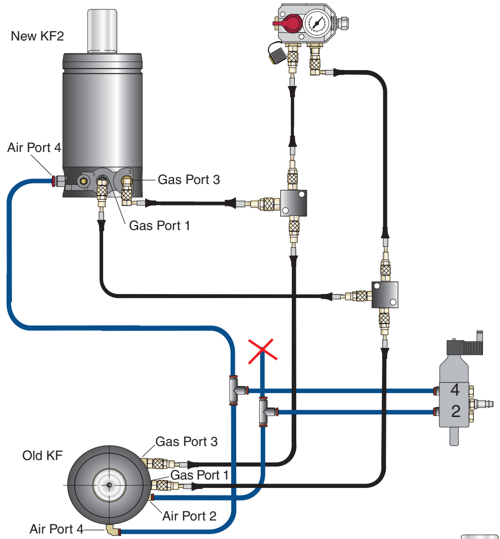


How to fit the new KF2 to existing KF systems

KF2 Controllable Gas Springs are completely interchangeable with existing KF springs.

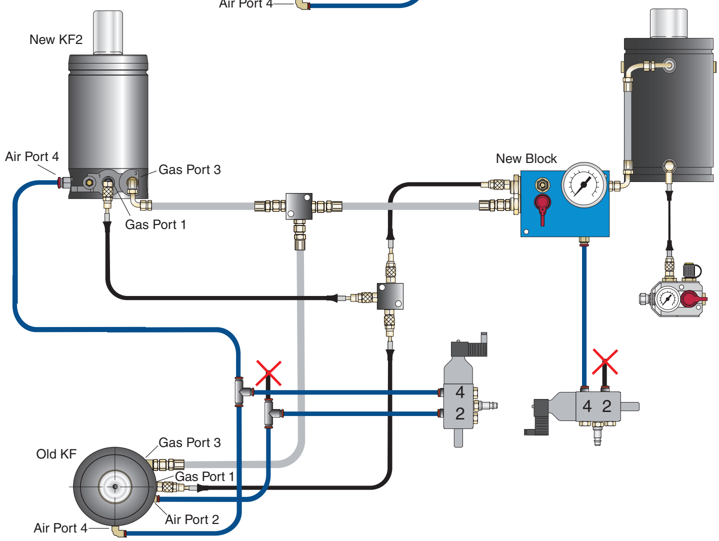
Standard Lock Example: Replacing an existing KF with a new KF2

To replace an existing KF spring with a new KF2 spring in a Standard Lock System, simply plug the air signal that went to the KF springs Air Connection Port 2 (shown here by an X).



Positive Lock System Example: Replacing an existing KF with a new KF2

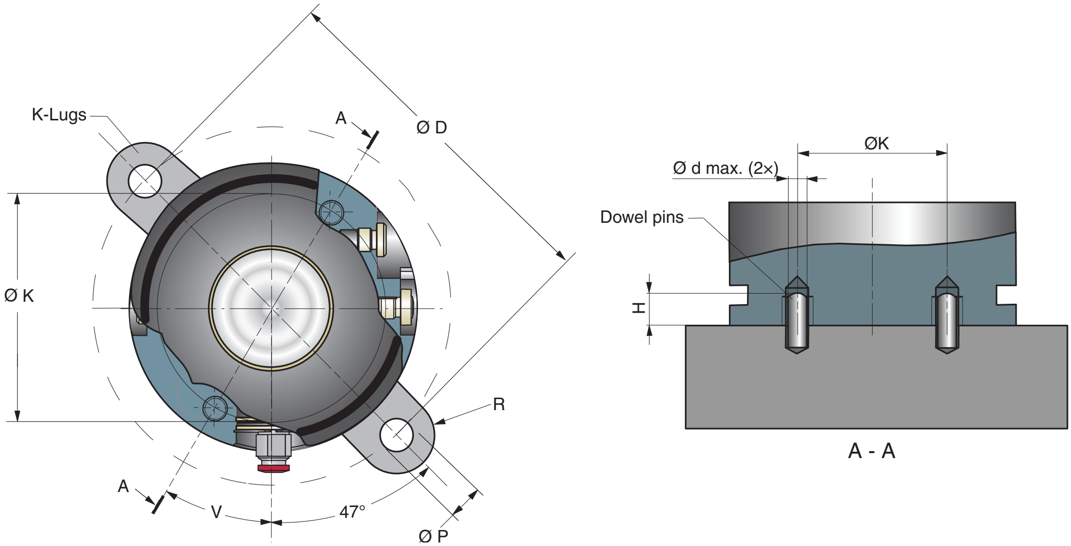
To replace an existing KF spring with a new KF2 spring in a Positive Lock System, simply plug the air signal that went to the KF springs Air Connection Port 2 (shown here by an X).

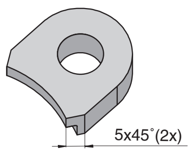


KF2/KF2-A Alternative Mounting

For upside down installations, the threaded holes in the base of the KF2/KF2-A should always be used when mounting the Controllable Gas Springs to the tool.

For upright installations, an alternative is to mount the Controllable Gas Springs using two K Lugs in combination with dowel pins, as shown below. The dowel pins will engage the threaded holes in the bottom of the spring (M12 and M16, respectively) and will prevent the spring from moving out of position even if the lugs would come loose. The dowel pins will also ensure that the springs are installed in the correct position.



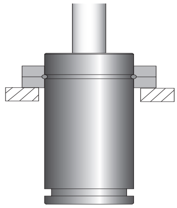


Modification of K-3000 Lug

Model	Ø D	Ø d max.	H	Ø K	V	Ø P	R	Order No. K Lug
KF2/KF2-A -1500	130	8	10	50	60	17.5	20	2 pcs K-3000*
KF2/KF2-A -3000	155	8	10	95	30	17.5	25	2 pcs K-5000
KF2/KF2-A -5000	195	12	10	110	30	21.5	25	2 pcs K-7500
KF2/KF2-A -7500	240	12	10	120	30	21.5	29	2 pcs K-10000

* **Please note**, K-3000 lugs will require a slight modification, according to the sketch before they can be fitted to the KF2/KF2-A 1500.

It is also possible to mount the KF2/KF2-A Controllable Gas Springs using an FCSC flange mount if cooling is not required.
For more information contact your local KALLER distributor or Strömsholmen AB.



FCSC
Top mount

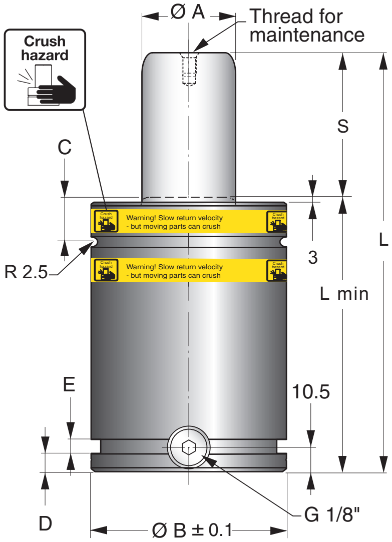
Product Series
Delayed Return Units

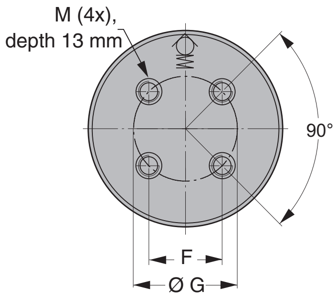
KALLER®
The Safer Choice

Die Separation Gas Springs
DS 3000 - DS 7500

Edition 5.2015

Would you like to order this product?
All available information at www.kaller.com.





KALLER – THE SAFER CHOICE

Training **Safety** **Reliability**

Need additional information on the KALLER features?
Look at the back cover of this brochure or at www.kaller.com/FAQ

Features and benefits of KALLER Die Separation Gas Springs

KALLER Die Separation Gas Springs range from model sizes DS 3000 to DS 7500. Using the new DS springs is an excellent way to avoid unnecessary wear of the die, press and gas springs. A 70-80% energy saving compared to using traditional springs is an additional benefit.

- Initial forces from 30,000 to 75,000 N.
- Stroke lengths of 80 mm up to 300 mm
- Upper C-groove, lower U-groove and bottom threaded holes allow for various standard mounting possibilities.
- Suitable for both top up and bottom up working position in the tool
- A very slow return speed compared to traditional springs
- All KALLER Safety features included

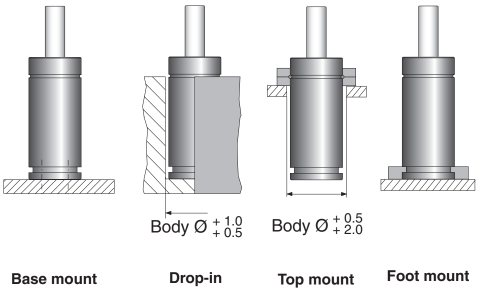
Model	Spring force in N at 150* bar/ + 20°C		Ø A	Ø B	C	D	E	F	Ø G	M
	Inital	End force *								
DS 3000	30,000	48,000	50	95.2	24	8	7	42.4	60	M8
DS 5000	50,000	82,000	65	120.2	25.5	8	7	56.6	80	M10
DS 7500	75,000	124,000	80	150.2	27.5	8	8	70.7	100	M10

* at full stroke

Basic information

Pressure medium ....Nitrogen
Max. charging pressure ....150 bar (at 20°C)
Min. charging pressure ....25 bar (at 20°C)
Operating temperature ....0 - +80°C
Force increase by temperature............±0.3%/°C
Recommended max. strokes/min ....~20 - 50 (at 20°C)
Max. piston rod velocity ....1.6 m/s
Return speed variation ....±3%
Tube surface ....Black oxide
Repair kit DS 3000 3026825
Repair kit DS 5000 3026826
Repair kit DS 7500 3026827

Mounting possibilities



Stroke [mm]		80	100	125	160	200	250	300
DS 3000	L	280	320	370	440	520	620	720
	L min	200	220	245	280	320	370	420
DS 5000	L	300	340	390	460	540	640	740
	L min	220	240	265	300	340	390	440
DS 7500	L	315	355	405	475	555	655	755
	L min	235	255	280	315	355	405	455

Application example

When using traditional springs, for example four TU 5000 with a 250 stroke length for die separation in a die, each stroke applies an initial force of 20 ton ending with a force of 30 ton. *Diagram 1.*
When using Die Separation Gas Springs in the same application, the force of each stroke is merely 10% compared to the TU springs. *Diagram 2.*
The return speed of the DS springs, 1-2 minutes to full return stroke, is very slow. However, this speed does not have a negative impact on the springs to return to the standby position when the production is completed. Depending on the production rate, the piston rod will oscillate approximately 10% of its total stroke length during production.

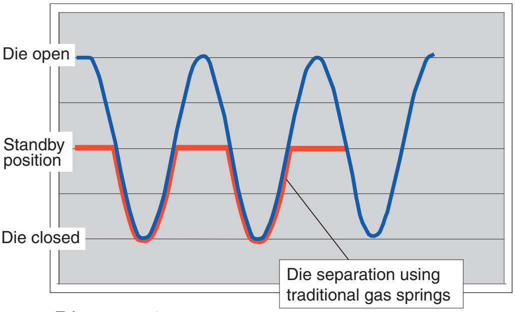


Diagram 1

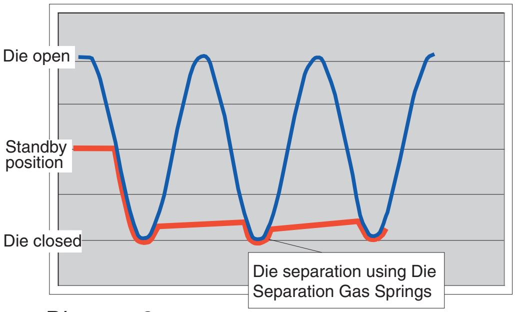
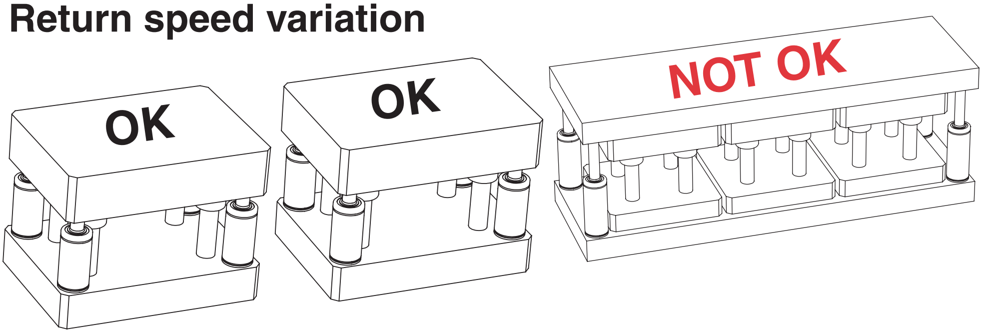


Diagram 2

Return speed variation



Since we can not guarantee an absolute equal return speed, the DS gas springs are suitable for line dies, i.e. dies with not more than four pillars. Some progressive dies with multiple die sets are more sensitive to drawer effects and therefore not suitable for DS gas springs.

Product Series
Delayed Return Units

KALLER®
The Safer Choice

Flex Form™

Edition 4.2013

Would you like to order this product?
All available information at www.kaller.com.

KALLER - THE SAFER CHOICE

Training **Safety** **Reliability**

Need additional information on the KALLER features?
Look at the back cover of this brochure or at www.kaller.com/FAQ

Features and benefits of Flex Form™

High-force gas hydraulic system
Flex Form™ is capable of producing high force in a small area, up to 11.4 SI tons with a single cylinder.

Delayed return option
Cylinders can be delayed in the retracted position to prevent parts from being inverted or interfering with automation.

Low contact and return force
Flex Form™ provides a soft hit and very low reverse force to decrease press wear.

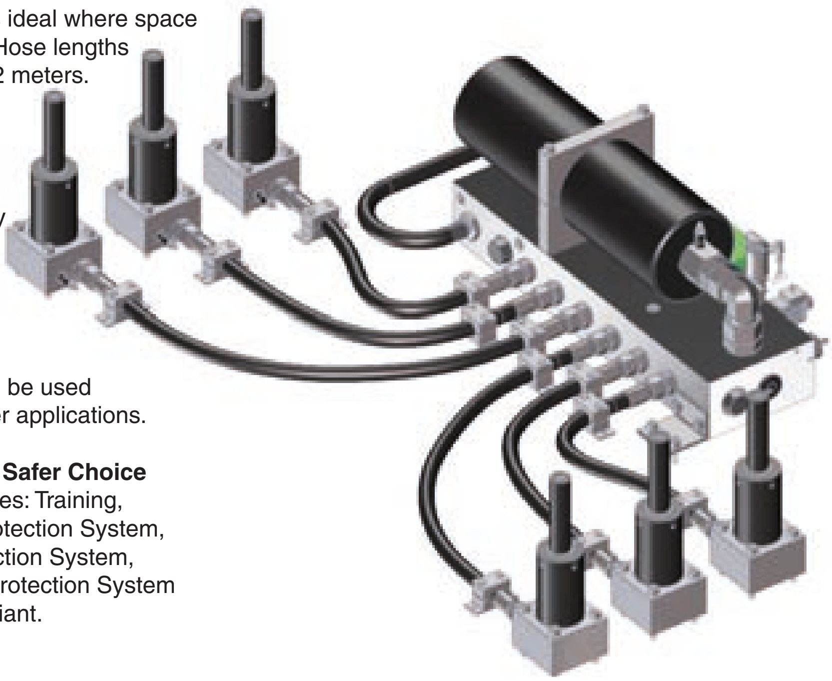
Constant force
The system has no pressure rise which provides constant force through the entire stroke for better control of part quality.

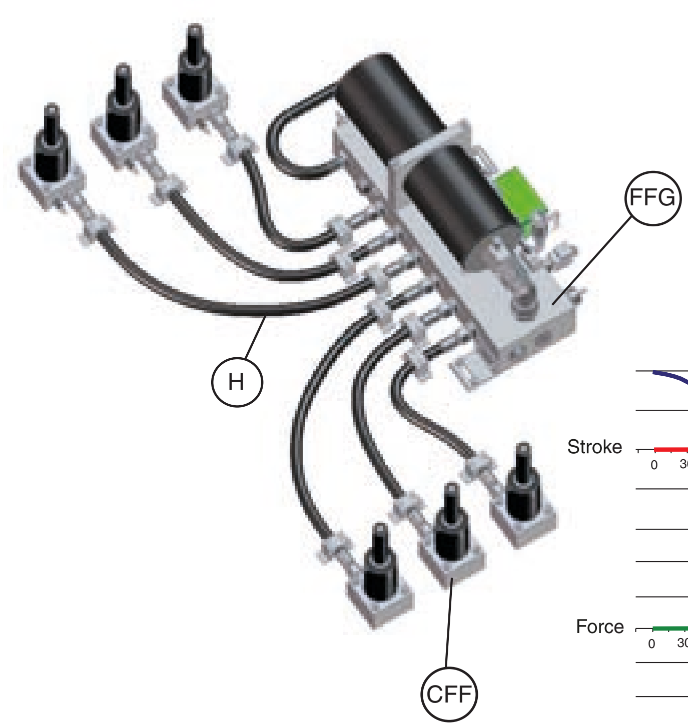
Cylinder flexibility
Cylinders in bases hosed to a control center is ideal where space is a constraint. Hose lengths available up to 2 meters.

Self-contained option
The system can be provided fully filled, bled, and ready to install.

Flexible orientation
The system can be used in upper or lower applications.

KALLER – The Safer Choice
KALLER Features: Training, Over-Stroke Protection System, Overload Protection System, Overpressure Protection System and PED compliant.





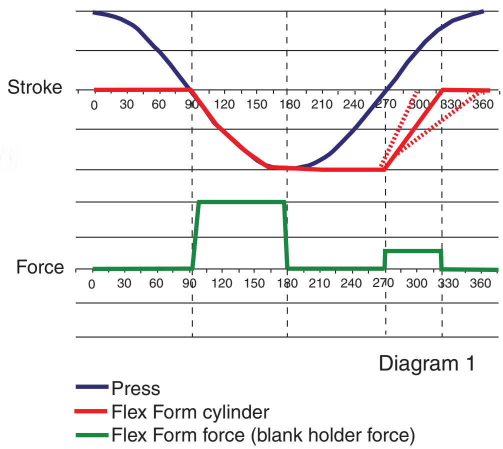


Diagram 1

Flex Form™

Flex Form™ can be used for forming and drawing in metal forming dies, both for the upper and lower die. This KALLER gas-hydraulic system has no pressure increase and a low force upwards (Diagram 1). Flex Form™ offers an excellent control system both for movement and forces. The blank holder force can be changed easily in a continuous process. Optionally, KALLER also offers a lockable return feature and adjustable slow return.

Flex Form™ is made up of a force generator unit (FFG), a number of force cylinders (CFF) and interconnecting hoses (H).

To design an optimal system, the following information is required:
- Number of pressure points (maximum six CFF to one FFG)
- Needed tonnage for the system (ton)
- Strokes per minute (SPM)
- Max. height before stroked (mm)
- Used stroke length (mm)
- Max. press velocity during stroke length (m/s)
- Needed return force (ton)

Need additional information? Please consult your distributor.

Cylinder Flex Form (CFF)

The Flex Form™ cylinders that are used with the Flex Form Generator are available in four sizes.

These compact force cylinders deliver high forces, see table below. The nominal force ($F_{nominal}$) corresponds to an oil pressure of 150 bar. Using the force generator's pressure valve, the force can be increased or decreased.

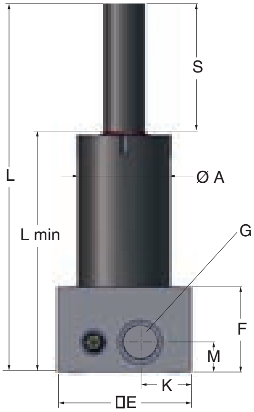
The maximum production rate (SPM) without cooling can be determined by applying a heat factor (H_{factor}). Consider the used force (F_{used}), used stroke length (S_{used}) and number of cylinders (No.) connected to the Flex Form Generator. The maximum production rate without cooling is thus:

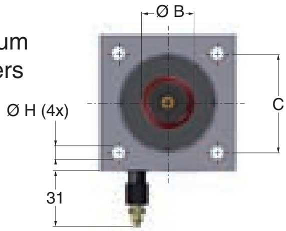
$$SPM = \frac{H_{factor}}{S_{used} \text{ x No.}} \text{ x } \frac{F_{nominal}}{F_{used}}$$

Depending on the press velocity, ½" or ¾" hoses can be used. The maximum flow for a ½" hose is 60 l/min and for a ¾" hose 140 l/min. When all cylinders are operating together, the total oil flow must not exceed 300 l/min.

For interconnecting hoses and fittings, see KALLER Flex Cam catalog.

Need additional information? Please consult your distributor.





Model	Force in N			Ø A	Ø B	C	E	F	Port size G	K	M	Ø H	Piston cm²	H_{factor}
	Nominal 150 bar	Min. 70 bar	Max. 275 bar											
CFF 1000	9,500	4,393	17,190	50.3	19.1	56.5	75	50.8	G 1/2"	28	19	9	6.37	8,500
CFF 2400	23,300	10,718	41,940	69.9	31.8	73.5	100	63.5	G 3/4"	38	22	11	15.54	3,800
CFF 4200	42,390	19,499	76,302	90.5	47.6	92	120	69.9	G 3/4"	40	25	11	28.26	2,000
CFF 6600	68,370	31,450	123,066	109.6	63.5	109.5	140	76.2	G 3/4"	45	30	13.5	45.58	1,300

Stroke	CFF 1000		CFF 2400		CFF 4200		CFF 6600	
S	L min	L	L min	L	L min	L	L min	L
13	63	76	--	--	--	--	--	--
16	63	79	80	96	89	105	104	120
19	63	82	80	99	92	111	107	126
25	63	88	80	105	98	123	113	138
32	70	102	87	119	105	137	120	152
38	76	114	93	131	111	149	126	164
50	88	138	105	155	123	173	138	188
63	101	164	118	181	136	199	151	214
75	113	188	130	205	148	223	163	238
80	118	198	135	215	153	233	168	248
100	138	238	155	255	173	273	188	288
125	163	288	180	305	198	323	213	338
150	201	351	216	366	236	386	251	401
175	226	401	241	416	261	436	276	451
200	251	451	266	266	286	486	301	501
225	--	--	--	--	311	536	326	551

Product specifications
Cylinder Flex Form (CFF)

Pressure medium..................... Hydraulic oil
Max. pressure............................ 275 bar
Min. pressure............................ 70 bar
Max. operating temperature........ 93°C
Max. piston rod velocity............... 0.8 m/s
Max. utilized stroke................... 100%
Max. strokes per minute............. Heat dependent

How to order

CFF 2400 - 100

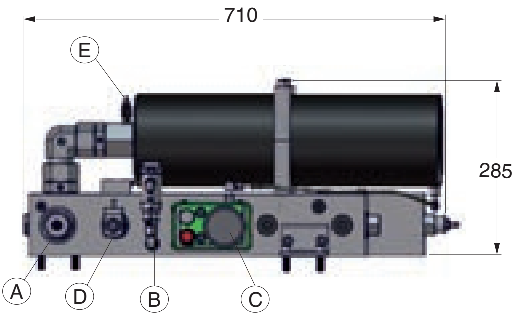
- Model: CFF
- Size: 2400
- Stroke: 100

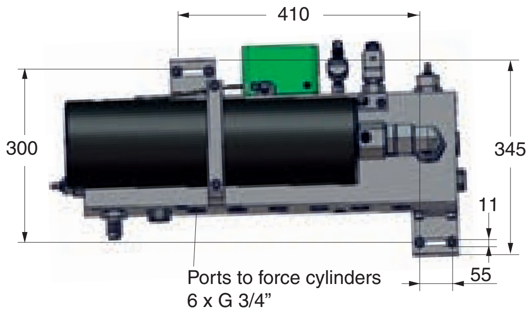
Flex Form Generator (FFG)

The main part of the KALLER Flex Form™ system is the Flex Form Generator, FFG. This unit generates the force in the force cylinders.

The force generator contains all the necessary features for controlling the blank holder force and the return force, together with monitoring completed pressures and overheat protection.

The Flex Form Generator can control up to six force cylinders. When cooling is needed, only the force generator has to be cooled. A special model for cooling is available.





Features and benefits of the Flex Form Generator

A. Force generator pressure valve
Used to increase or decrease the blank holder force within 0.5-1.8 times of the nominal force.

B. Digital pressure gauge (24 VDC)
Monitors the adjusted pressure at the force generator pressure valve.

C. Return force control unit
Enables gas charging and evacuation in the accumulator. This pressure determines the return force of the force cylinders. Normal: 8-10 bar.

D. Return valve (24 VDC)
The return stroke is controlled by opening this valve.

E. Oil bleed plug
Used with pump unit 3017075 (see KALLER catalog 9.8/54 when installing the unit).

Need additional information? Please consult your distributor.

How to order

*FFG-S
**FFG-C

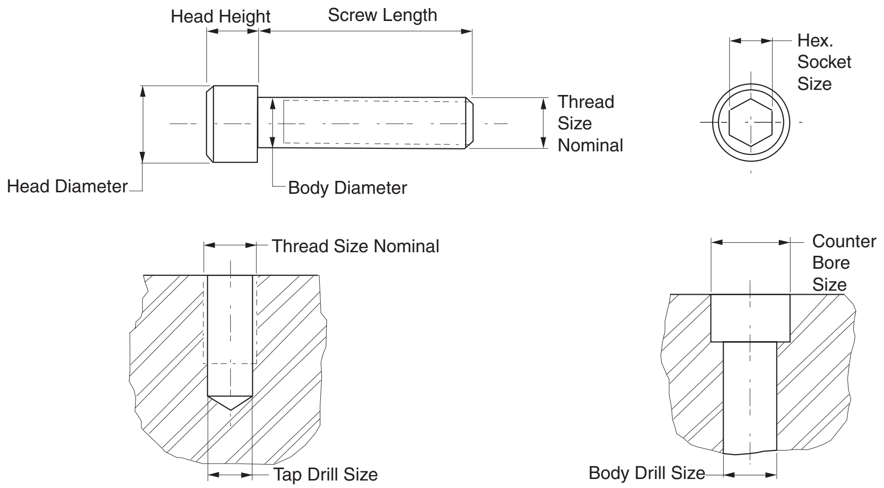
* Standard ** Prepared for cooling

Product specifications Flex Form Generator (FFG)

Pressure medium	Hydraulic oil
Max. oil pressure	275 bar
Min. oil pressure	70 bar
Max. operating temperature	93°C
Max. flow rate	300 l/min
Pressure medium	Nitrogen
Max. charge pressure	100 bar
Min. charge pressure	7 bar
Power supply	24 VDC (3W)
Max. strokes per minute	Heat dependent

Nominal Dimensons in mm - Tolerances in micrometers (10^{-6}meter)

External Dimensions (shafts)							Internal Dimensions (bores)						
Symbol	**1 up to 3**	**over 3 up to 6**	**over 6 up to 10**	**over 10 up to 18**	**over 18 up to 30**	**over 30 up to 50**	**Symbol**	**1 up to 3**	**over 3 up to 6**	**over 6 up to 10**	**over 10 up to 18**	**over 18 up to 30**	**over 30 up to 50**
e 8	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89	**E 8**	+28 +14	+38 +20	+47 +25	+59 +32	+73 +40	+89 +50
g 5	-2 -6	-4 -9	-5 -11	-6 -14	-7 -16	-9 -20	**F 7**	+16 +6	+22 +10	+28 +13	+34 +16	+41 +20	+50 +25
g 6	-2 -8	-4 -12	-5 -14	-6 -17	-7 -20	-9 -25	**G 6**	+8 +2	+12 +4	+14 +5	+17 +6	+20 +7	+25 +9
h 3	0 -2	0 -2.5	0 -2.5	0 -3	0 -4	0 -4	**G 7**	+12 +2	+16 +4	+20 +5	+24 +6	+28 +7	+34 +9
h 5	0 -4	0 -5	0 -6	0 -8	0 -9	0 -11	**H 5**	+4 0	+5 0	+6 0	+8 0	+9 0	+11 0
h 6	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16	**H 6**	+6 0	+8 0	+9 0	+11 0	+13 0	+16 0
h 8	0 -14	0 -18	0 -22	0 -27	0 -33	0 -39	**H 7**	+10 0	+12 0	+15 0	+18 0	+21 0	+25 0
h 9	0 -25	0 -30	0 -36	0 -43	0 -52	0 -62	**H 8**	+14 0	+18 0	+22 0	+27 0	+33 0	+39 0
h 10	0 -40	0 -48	0 -58	0 -70	0 -84	0 -100	**H 9**	+25 0	+30 0	+36 0	+43 0	+52 0	+62 0
h 11	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160	**H 10**	+40 0	+48 0	+58 0	+70 0	+84 0	+100 0
j 6	+4 -2	+6 -2	+7 -2	+8 -3	+9 -4	+11 -5	**H 11**	+60 0	+75 0	+90 0	+106 0	+130 0	+160 0
js 6	+3 -3	+4 -4	+4.5 -4.5	+5.5 -5.5	+6.5 -6.5	+8 -8	**H 12**	+100 0	+120 0	+150 0	+180 0	+210 0	+250 0
js 7	+5 -5	+6 -6	+7.5 -7.5	+9 -9	+10.5 -10.5	+12.5 -12.5	**J 6**	+2 -4	+5 -3	+5 -4	+6 -5	+8 -5	+10 -6
js 8	+7 -7	+9 -9	+11 -11	+13.5 -13.5	+16.5 -16.5	+19.5 -19.5	**J 7**	+4 -6	+6 -6	+8 -7	+10 -8	+12 -9	+14 -11
js 9	+12.5 -12.5	+15 -15	+18 -18	+21.5 -21.5	+26 -26	+31 -31	**JS 5**	+2 -2	+2.5 -2.5	+3 -3	+4 -4	+4.5 -4.5	+5.5 -5.5
js 13	+70 -70	+90 -90	+110 -110	+135 -135	+165 -165	+195 -195	**K 6**	0 -6	+2 -6	+2 -7	+2 -9	+2 -11	+3 -13
js 14	+125 -125	+150 -150	+180 -180	+215 -215	+260 -260	+310 -310	**K 7**	0 -10	+3 -9	+5 -10	+6 -12	+6 -15	+7 -18
k 6	+6 0	+9 +1	+10 +1	+12 +1	+15 +2	+18 +2	**K 8**	0 -14	+5 -13	+6 -16	+8 -19	+10 -23	+12 -27
k 7	+10 0	+13 +1	+16 +1	+19 +1	+23 +2	+27 +2	**M 6**	-2 -8	-1 -9	-3 -12	-4 -15	-4 -17	-4 -20
m 4	+5 +2	+8 +4	+10 +6	+12 +7	+14 +8	+16 +9	**M 7**	-2 -62	0 -12	0 -15	0 -18	0 -21	0 -25
m 5	+6 +2	+9 +4	+12 +6	+15 +7	+17 +8	+20 +9	**N 7**	-4 -14	-4 -16	-4 -19	-5 -23	-7 -28	-8 -33
n 6	+10 +4	+16 +8	+19 +10	+23 +12	+28 +15	+33 +17	**P 7**	-6 -16	-8 -20	-9 -24	-11 -29	-14 -35	-17 -42



Thread Size Nominal	Pitch	Body Diameter Max.	Head Diameter Max.	Head Height Max.	Hex. Socket Size	Counter Bore Size	Body Drill Size	Tap Drill Size
M 4	0.7	4.0	7.0	4.0	3.0	8.5	5.0	3.3
M 6	1.0	6.0	10.0	6.0	5.0	11.0	6.6	5.0
M 8	1.25	8.0	13.0	8.0	6.0	15.0	9.0	6.75
M 10	1.5	10.0	16.0	10.0	8.0	18.0	11.0	8.5
M 12	1.75	12.0	18.0	12.0	10.0	20.0	13.5	10.25
M 16	2.0	16.0	24.0	16.0	14.0	26.0	17.5	14.0
M 20	2.5	20.0	30.0	20.0	17.0	33.0	22.0	17.5
M 24	3.0	24.0	36.0	24.0	19.0	40.0	26.0	21.0

Torque wrench settings in Nm for untreated, oiled steel screw fasteners (torque tolerance ±5%)

Metric Coarse Thread M.

Thread	d	P	A_s	Property class according to ISO 898-1				
M	mm	mm	mm^2	4.6	5.8	8.8	10.9	12.9
4	4	0.7	8.78	1.1	1.8	2.9	4.0	4.9
6	6	1.0	20.1	3.7	6.1	9.8	14	17
8	8	1.25	36.6	8.9	15	24	33	40
10	10	1.5	58.0	17	29	47	65	79
12	12	1.75	84.3	30	51	81	114	136
16	16	2.0	157.0	74	123	197	277	333
20	20	2.5	245.0	144	240	385	541	649
24	24	3.0	353.0	249	416	665	935	1120
$\sigma_S = R_{eL}$ or $R_{p0.2}$ N/mm^2 nominal				240	400	640	900	1 080
$\kappa\left(1+S_F\right)\dfrac{k}{\overline{F_{Fm}}} \cdot \sigma_S\ N/mm^2$				26.16	43.60	69.76	98.10	117.72

Product Series
Lifters

KALLER®
The Safer Choice

Dual Post Lifters
DPL 90 • DPL 200

Edition 2.2015

Would you like to order this product?
All available information at kaller.com.

DPL 90

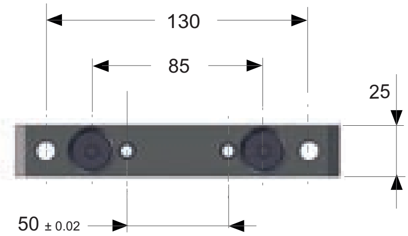
Basic information

Initial force range. .... 240-900 N
Pressure medium.................................. Nitrogen
Charging pressure range........................ 25-180 bar
Operating temperature range .... 0-80° C
Force increase by temperature.............. ±0.3% / °C

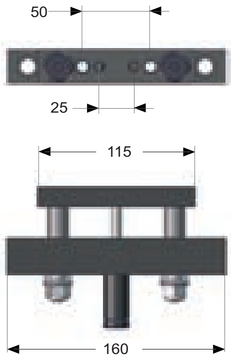
Recommended max. strokes/min .... 40-100 (at 20°C)
Max. velocity .... See table below
Max. utilized stroke .... 95 %
Internal gas spring................................. R19
Repair kit* .... Non repairable

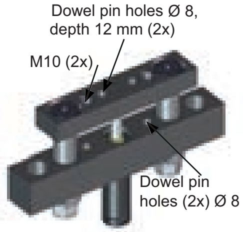
* Replacement gas spring sold separately

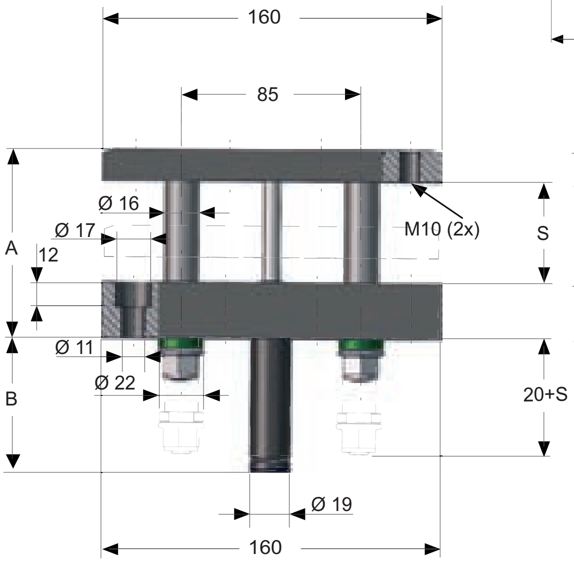
DPL 90-038 to DPL 90-150

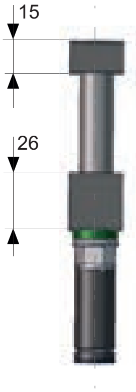


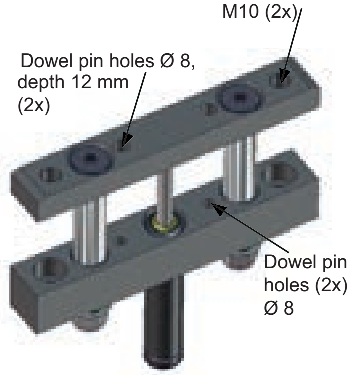
DPL 90-025











Order number	S Stroke	Force in N at +20°C Initial	Force in lbf at +20°C Initial	End force in N at + 20°C*	End force in lbf at +20°C*	A	B	Weight
DPL 90-025	23	240-900	67-202	1,300	292	64	40	1.27
DPL 90-038	36			1,200	270	77	53	1.33
DPL 90-050	48			1,200	270	89	65	1.38
DPL 90-063	61.5			1,200	270	102.5	81.5	1.43
DPL 90-080	78			1,200	270	119	98	1.50
DPL 90-100	98			1,200	270	139	118	1.58
DPL 90-125	123			1,200	270	164	143	1.69
DPL 90-150	148			1,200	270	189	168	1.79

Max. attachment capacity per lifter**Metric	
Ram velocity (m/s)	Attachment mass (kg)
0.30	20
0.40	11
0.50	7.3
0.60	5
0.70	3.7
0.80	2.8

**Determine ram velocity and reference the recommended attachment mass per lifter. For increased capacity, install external positive stops to prevent lifter damage.

DPL 200

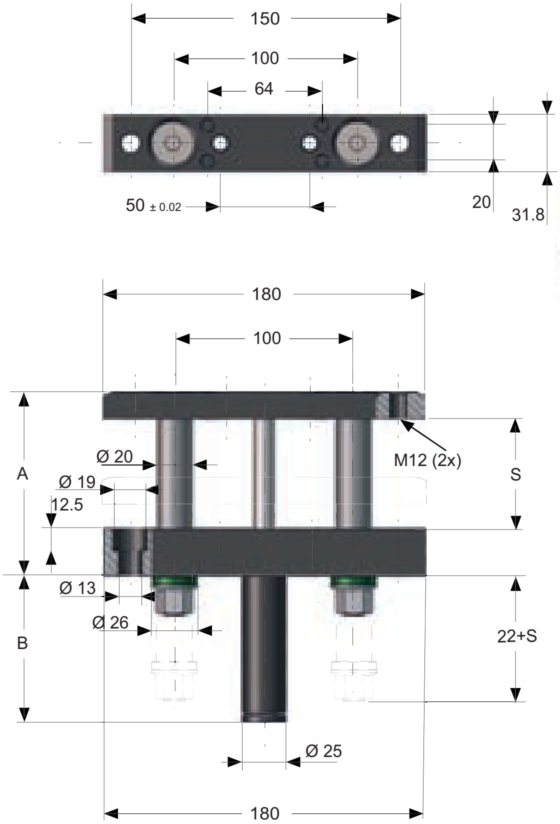
Basic information

Initial force range .... 240-2000 N
Pressure medium .... Nitrogen
Charging pressure range .... 25-180 bar
Operating temperature range .... 0-80° C
Force increase by temperature .... ±0.3%/°C

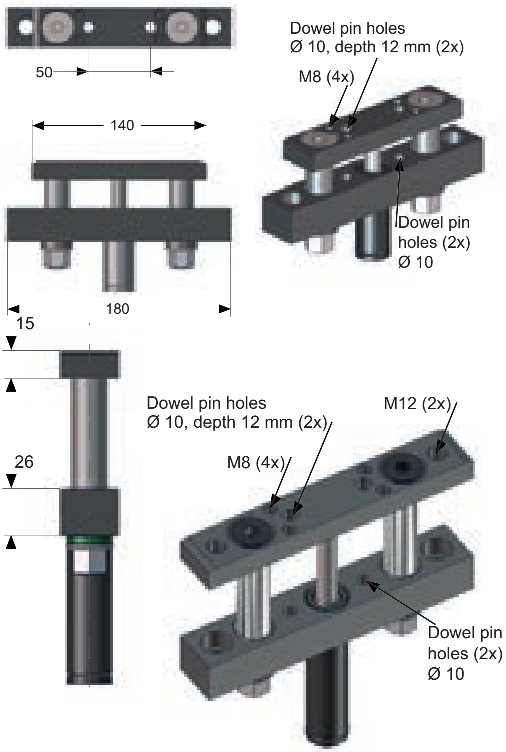
Recommended max. strokes/min .... 80-100 (at 20°C)
Max. velocity .... See table below
Max. utilized stroke 95%
Internal gas spring.................................. M2
Repair kit* .... Non repairable

* Replacement gas spring sold separately

DPL 200-038 to DPL 90-200



DPL 200-025



Order number	S Stroke	Force in N at +20°C Initial	Force in lbf at +20°C Initial	End force in N at + 20°C*	End force in lbf at +20°C*	A	B	Weight
DPL 200-025	23			3,080	692	64	41	1.90
DPL 200-038	36			3,090	695	77	54	1.99
DPL 200-050	48			3,090	695	89	66	2.08
DPL 200-063	61.5			3,020	679	102.5	82.5	2.18
DPL 200-080	78	240-2,000	63-450	3,040	683	119	99	2.30
DPL 200-100	98			3,050	686	139	119	2.44
DPL 200-125	123			3,060	689	164	144	2.61
DPL 200-150	148			3,000	674	189	177	2.80
DPL 200-175	173			2,988	672	214	202	2.98
DPL 200-200	198			2,971	668	239	227	3.15

Max. attachment capacity per lifter**Metric	
Ram velocity (m/s)	Attachment mass (kg)
0.30	31
0.40	17
0.50	11
0.60	7.7
0.70	5.6
0.80	4.3

**Determine ram velocity and reference the recommended attachment mass per lifter. For increased capacity, install external positive stops to prevent lifter damage.

Fig. 1
Rail plate used as direct lift.

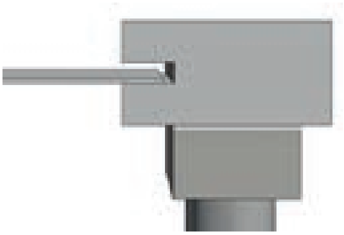


Fig. 2
Rail plate with guide rail attached.

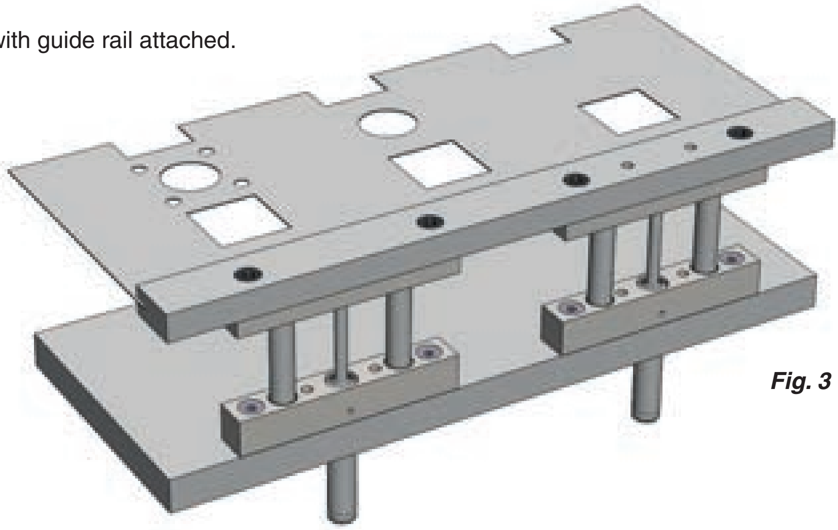


Fig. 3

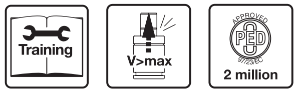
Using the four tapped holes, rails may be attached to the DPL 90 and DPL 200 rail plate. ***Fig. 3*** showing a custom designed guide rail fixed to a rail plate. This arrangement will allow for continuous feed of material in the course of operation.
When using multiple lifters, use dowel pin holes on one lifter only to prevent binding.

Features and benefits
DPL 90 and DPL 200

KALLER Dual Post Lifters, DPL 90 and DPL 200, can be used in progressive dies for lifting the stock when it progresses through the die. It is possible for the DPL's to be connected into a hose system for even force distribution. Contact your KALLER representative for more information.

KALLER – THE SAFER CHOICE

Training **Safety** **Reliability**



Need additional information on KALLER features? Refer to the back cover of this brochure or visit kaller.com/FAQ

- Simplify tool design
- Save cost and space
- Standard dowel pin holes for accurate position
- Easily adjustable force
- Includes maintenance-free bushings
- The gas spring is mounted with drop-in for easy replacement
- The lower plate has drain holes to eliminate fluid build-up above the gas spring
- Up-stroke dampening feature reduce strip feed to bounce

Product Series
Lifters

KALLER®
The Safer Choice

Stock Lifters
SLME 170 • SLMT 170
SLM 300 • SPC 800

Would you like to order this product?
All available information at www.kaller.com.

KALLER - THE SAFER CHOICE

Training **Safety** **Reliability**

Training V>max 2 million

Need additional information on KALLER features? Refer to the back cover of this brochure or visit www.kaller.com/FAQ

Features and benefits

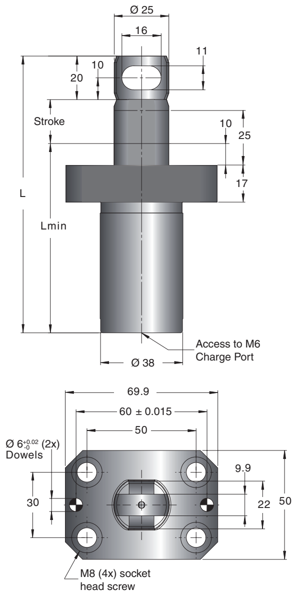
Stocklifters SLME 170, SLMT 170, SLM 300 and SPC 800

KALLER Stocklifters SLME 170, SLMT 170 and SLM 300 gas springs are mainly for use in progressive dies. The extremely robust design can withstand high side loading. SLME 170, SLMT 170 and SLM 300 can also be mounted into upper die and attached directly to stripper plates without additional guide elements.

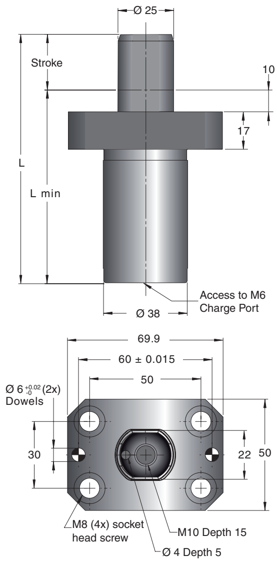
- Simplify tool design
- Save cost and space
- Eliminate need for additional guide bushings or anti-rotation feature
- Easily adjustable force
- Double tube design isolates the gas spring from side load and fluid contamination
- SLME 170 and SLMT 170 are linkable using hose system for uniform lifting force

KALLER Stock Lifter SPC 800 gas springs can be used in progressive dies for multi-point guide rail lifting. These gas springs are engineered with the unique KALLER **Speed Control™ technology**, which dampens the last 20 mm of return stroke speed to 0.2 m/s. This brings the guide rail to a smooth return stop. Use of a hose system is recommended, as this will provide an even distribution of forces.

- Eliminate strip feed bounce
- Simplify tool design, saving cost and space
- Eliminate need for additional guide bushings
- Easily adjustable force
- SPC 800 are linkable using hose system for uniform lifting force
- Other mounting possibilities according to TU 1500



SLME 170



SLMT 170

Order No.	S Stroke	Force in N at 180 bar/ + 20°C Initial	End force*	L ±0.25	L min	Gas volume (l)	Weight (kg)
SLME 170-025	25	1700	2800	127	102	0.006	0.81
SLME 170-038	38			153	115	0.009	0.88
SLME 170-050	50			177	127	0.012	0.94
SLME 170-063	63			203	140	0.015	1.01
SLME 170-080	80			240	160	0.019	1.10
SLME 170-100	100			280	180	0.024	1.21
SLME 170-125	125			330	205	0.030	1.35

*At full stroke

Order No.	S Stroke	Force in N at 180 bar/ + 20°C Initial	End force*	L ±0.25	L min	Gas volume (l)	Weight (kg)
SLMT 170-025	25	1700	2800	112	87	0.006	0.79
SLMT 170-038	38			138	100	0.009	0.86
SLMT 170-050	50			162	112	0.012	0.92
SLMT 170-063	63			188	125	0.015	0.99
SLMT 170-080	80			225	145	0.019	1.09
SLMT 170-100	100			265	165	0.024	1.19
SLMT 170-125	125			315	190	0.030	1.33

*At full stroke

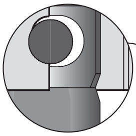
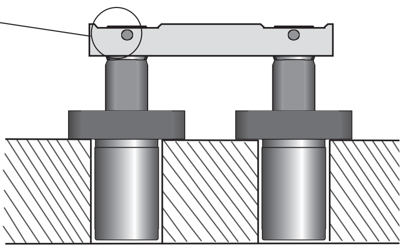
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.15	80
0.30	20
0.40	11
0.50	7
0.60	5

*Determine ram velocity and reference the recommended attachment mass per lifter. For increased capacity, install external positive stops to prevent lifter damage.

Basic information

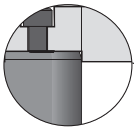
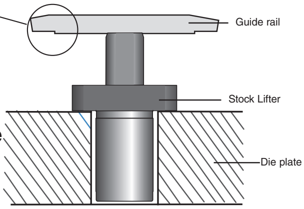
Initial force range.............................. 240-1700 N
Pressure medium............................. Nitrogen
Charging pressure range................. 25-180 bar
Operating temperature range........... 0-80° C
Force increase by temperature........ ±0.3% / °C
Recommended max. strokes/min..... 40-100 (at 20°C)
Max. piston rod velocity.................... 0.6 m/s
Max. utilised stroke......................... 100%
Internal gas spring........................... X 170

Mounting examples

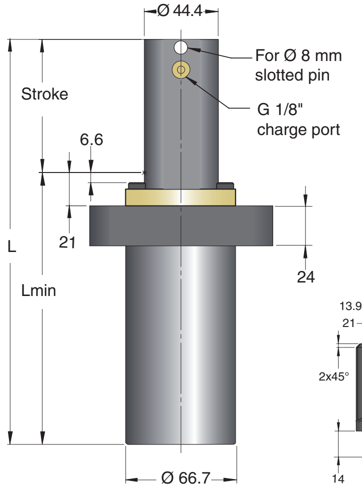



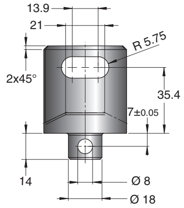
Note!
Use Ear Attachment for multi-point lifting.

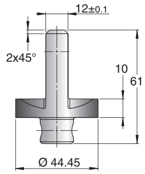
Two SLMT stock lifters with equal used stroke ratings can be applied.

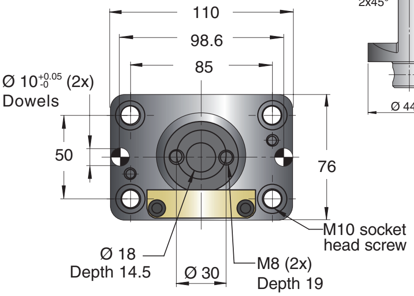



Note!
Use threaded holes for single point lifting.









SLM 300

Order No.	S Stroke	Force in N at 180 bar/ + 20°C Initial	Force in N at 180 bar/ + 20°C End force *	L ±0.25	L min	Gas volume (l)	Weight (kg)
SLM 300-025	25	3,200	4,300	146	121	0.016	2.04
SLM 300-050	50		4,300	196	146	0.033	2.49
SLM 300-080	80		4,350	256	176	0.053	3.31
SLM 300-100	100		4,350	296	196	0.066	3.86
SLM 300-125	125		4,350	346	221	0.083	4.54
SLM 300-150	150		4,350	396	246	0.100	5.22
SLM 300-163	163		4,350	422	259	0.109	5.58
SLM 300-175	175		4,350	446	271	0.117	5.90
SLM 300-200	200		6,350	496	296	0.134	6.58
SLM 300-210	210		6,350	516	306	0.141	6.85

*At full stroke

Order No.
SLM CAP
(Sold separately)

SLM CAP option to be mounted at top of SLM 300 and linked to guide rails of the die with a slotted pin.

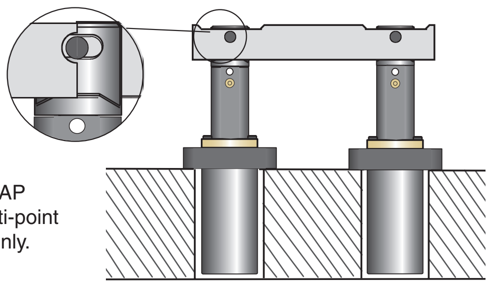
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.30	29
0.40	16
0.50	10
0.70	5.3
0.80	4.1

*Attachment mass assumes balanced load and actuation force. For increased capacity, install external positive stops to prevent lifter damage.

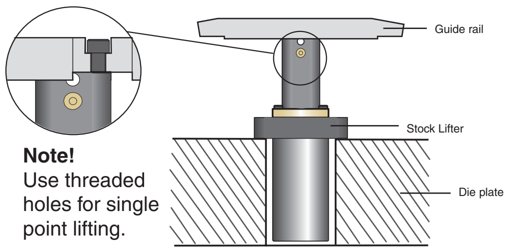
Basic information

Initial force range .... 450-3200 N
Pressure medium .... Nitrogen
Charging pressure range .... 25-180 bar
Operating temperature range .... 0-80° C
Force increase by temperature .... ±0.3%/°C
Recommended max. strokes/min .... 80-100 (at 20°C)
Max. piston rod velocity .... 0.8 m/s
Max. utilised stroke 100%
Repair kit 3020870

Mounting examples

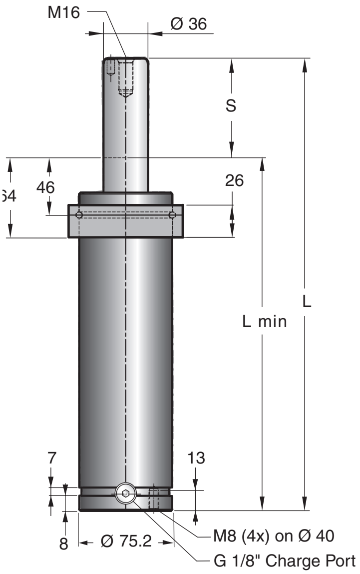


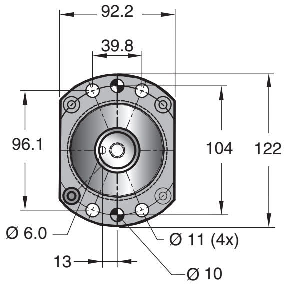
Note!
Use
SLM CAP
for multi-point
lifting only.



Note!
Use threaded holes for single point lifting.

Two SLM 300 stock lifters with equal used stroke ratings can be applied.





SPC 800

Order No.	S Stroke	Force in N at 70 bar/ + 20°C Initial	End force *	L ±0.25	L min	Gas volume (l)	Weight (kg)
SPC 800-050	50		8,800	304	254	0.3	5.3
SPC 800-080	80		9,200	364	284	0.4	5.8
SPC 800-100	100		9,400	404	304	0.5	6.2
SPC 800-125	125	7,100	9,600	454	329	0.5	6.7
SPC 800-150	150		9,700	504	354	0.6	7.1
SPC 800-175	175		9,800	554	379	0.7	7.6
SPC 800-200	200		9,900	604	404	0.8	8.0

*At full stroke

Max. attachment capacity per lifter Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.3	30
0.4	17
0.5	11
0.6	7

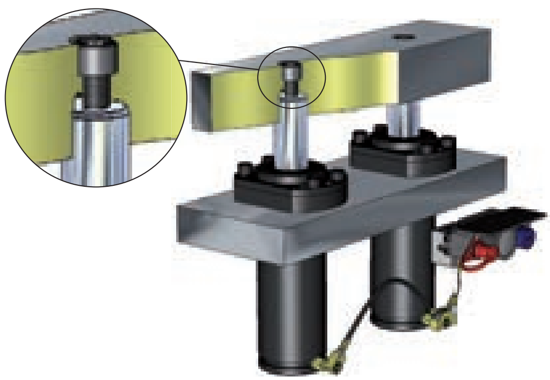
Determine ram velocity and do not exceed recommended attachment mass per lifter. Use multiple lifters to accommodate attachment loads that exceed velocity or mass limits.

Basic information

Pressure medium .... Nitrogen
Charging pressure .... 15-70 bar (at 20°C)
Operating temperature .... 0 to +80°C
Force increase by temperature .... ±0.3% / °C
Recommended max. strokes/min .... ≈ 25 (at 20°C)*
Dampening length .... ≈ 20 mm
Dampening speed .... 0.2 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3026153

***Note!** By halving the initial charge pressure, the number of spm can be doubled.

Mounting example



Product Series
Lifters

KALLER®
The Safer Choice

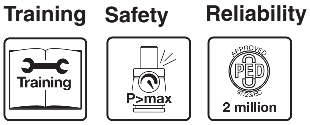
Flange Strippers
LT and LW

Edition 4.2011

Would you like to order this product?
All available information at www.kaller.com.

Features and benefits Flange Strippers LT and LW

KALLER - THE SAFER CHOICE



Need additional information on the KALLER features? Look at the back cover of this brochure or at www.kaller.com/FAQ

KALLER Flange Strippers LT and LW are for use in flanging dies for stripping the part after the flanging operation. They are available for top mount and wall/bottom mount, with stroke lengths of 50 and 80 mm.

The stripping force in Flange Strippers LT and LW is provided by an M2 Gas Spring with an initial force of 2,000 N. The gas spring is inverted and fitted into the Flange Strippers.

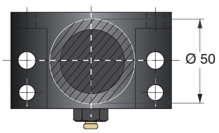
During try-out and maintenance, the Slide and/or gas spring can easily be removed by unscrewing the Guide Bolt. Once the Guide Bolt is unscrewed, the Slide can be lifted up and the gas spring removed. The Slide can now be replaced and operated by hand during try-out.

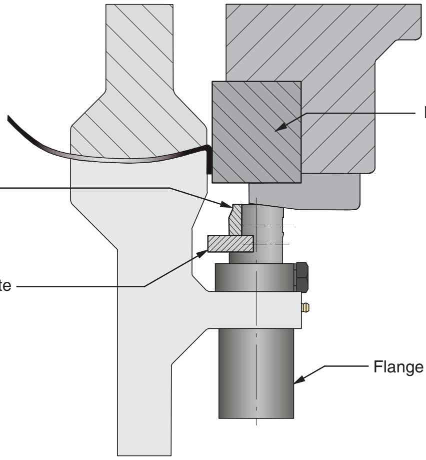
The two KALLER Flange Strippers are equipped with a grease nipple, which after initial greasing should be greased every 100,000 strokes.

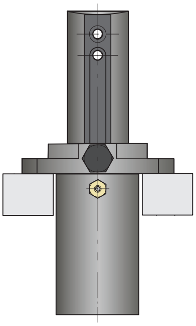
The Stripper Plate and the Blank Stop are to be manufactured to the desired profile by the tool maker and attached to the Flange Strippers using a M6 bolt.

Mounting options

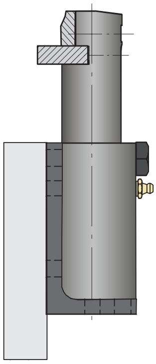
Attachment - Placement
The center of gravity of the attached mass to the Flange Stripper unit is not to be placed with an offset from the center axis greater than according to the picture below.



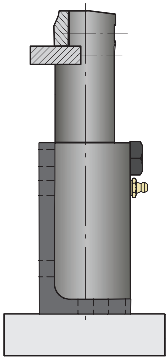




LT - Top mount

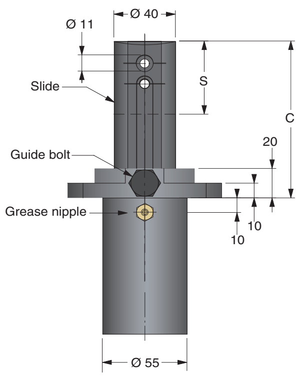


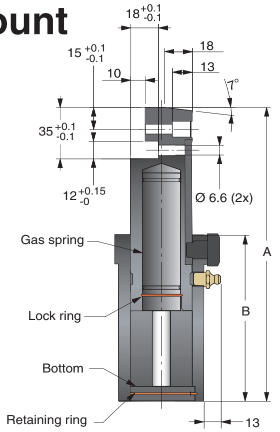
LW - Wall mount

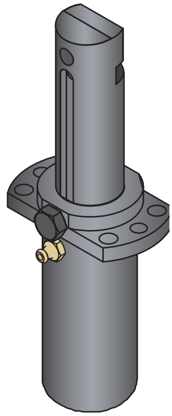


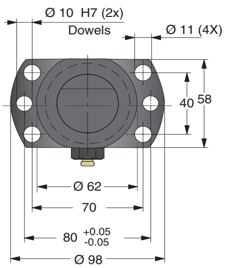
LW - Bottom mount

Dimensions LT - Top mount







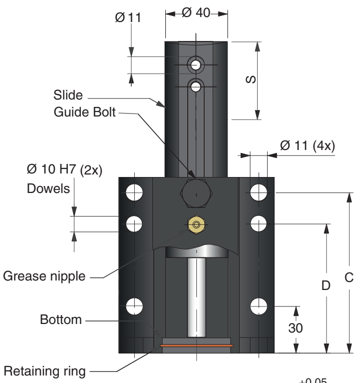


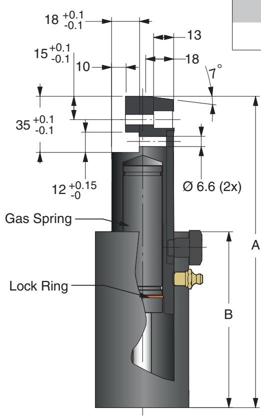
Note!
Access to the grease nipple must be provided in the tool.

Order No.	Stroke S	Gas spring	A	B	C
LT-050	50	M2 200-050	200	113	107
LT-080	80	M2 200-080	260	143	137

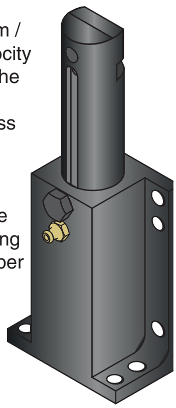
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.60	10
0.80	5.6
1.00	3.6
1.20	2.5

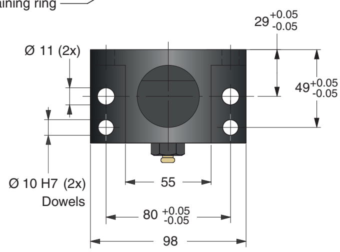
Dimensions LW - Wall bottom mount





* Determine ram / press max. velocity and reference the recommended attachment mass per stripper. For increased capacity, install external positive stops and guiding to prevent stripper damage.





Order No.	Stroke S	Gas spring	A	B	C	D
LW-050	50	M2 200-050	200	113	103	83
LW-080	80	M2 200-080	260	143	133	113

Product Series
Lifters

KALLER®
The Safer Choice

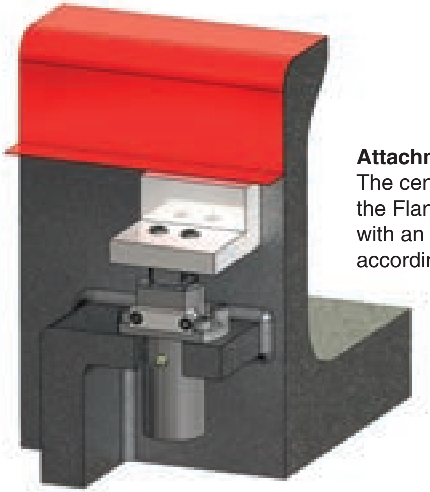
Flange Strippers
LTP, LWP
and SLMTS

Edition 5. 2016

Would you like to order this product?
All available information at kaller.com.

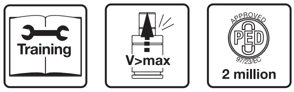
Features and benefits of Flange Stripper SLMTS, LTP and LWP

A Flange Stripper is a stripper that pushes against the bottom edge or surface of a flange to release the part from the tool.



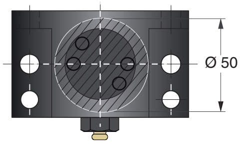
KALLER - THE SAFER CHOICE

Training **Safety** **Reliability**

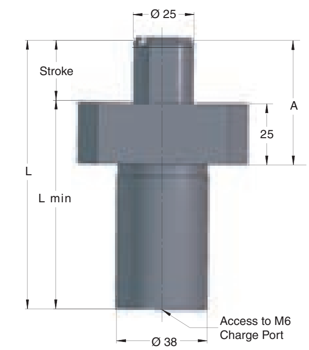


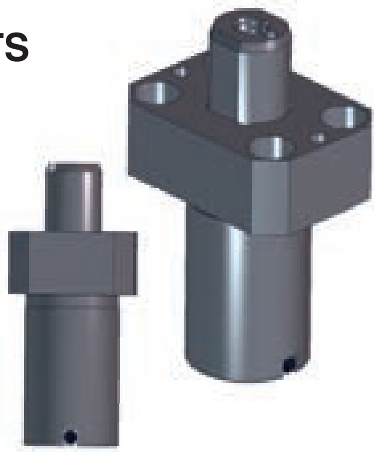
Need additional information on the KALLER features? Look at the back cover of this brochure or at www.kaller.com/FAQ

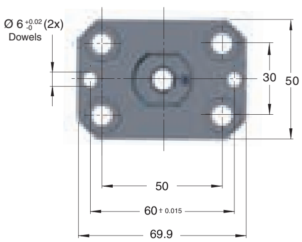
Attachment - Placement
The center of gravity of the attached mass to the Flange Stripper unit is not to be placed with an offset from the center axis greater than according to the picture below.



Dimensions SLMTS





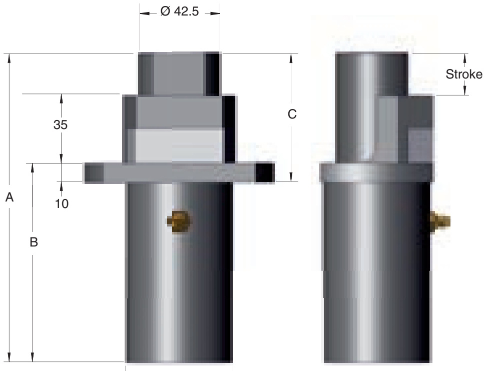


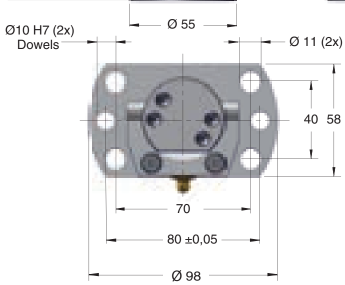
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.15	80
0.30	20
0.40	11
0.50	7
0.60	5

*Determine ram velocity and reference the recommended attachment mass per lifter.
For increased capacity, install external positive stops to prevent lifter damage.

Order No.	Stroke S	Gas Spring	L	A	Weight [kg]
SLMTS 170-025	25	X 170	112	52	0.93
SLMTS 170-038	38	X 170	138	65	1.00
SLMTS 170-050	50	X 170	162	77	1.06
SLMTS 170-080	80	X 170	225	107	1.25
SLMTS 170-100	100	X 170	265	127	1.36
SLMTS 170-125	125	X 170	315	152	1.49

Dimensions LTP - Top mount





Note!
Access to the grease nipple must be provided in the tool.

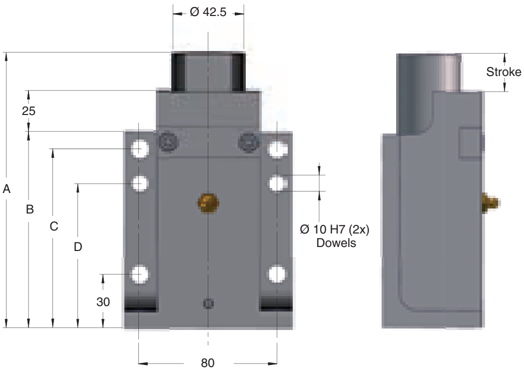
Order No.*	Stroke S	Gas spring	A	B	C
LTP 150-050	50	M2 150-050	200	113	107
LTP 150-080	80	M2 150-080	260	143	137

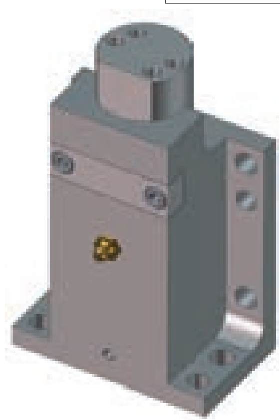
*Available in different forces.

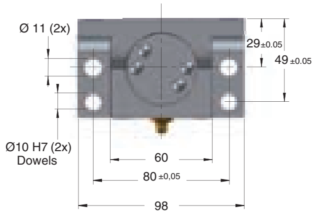
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.60	10
0.80	5.6
1.00	3.6
1.20	2.5

* Determine ram / press max. velocity and reference the recommended attachment mass per stripper. For increased capacity, install external positive stops and guiding to prevent stripper damage.

Dimensions LWP - Wall bottom mount







Order No.*	Stroke S	Gas spring	A	B	C	D
LWP 150-050	50	M2 150-050*	200	113	103	83
LWP 150-080	80	M2 150-080*	260	143	133	113

*Available in different forces.

Providing innovative
solutions for the safer
working environment

KALLER®
The Safer Choice

Reduce risk with ***The Safer Choice***™

Edition 1.2015 © KALLER

kaller.com/
this-is-kaller/
the-safer-choice

In the olden days, vital safety equipment was not an option.

Can we really keep clear of needless safety risks? Yes!
We help you achieve the safer working environment and reduce unnecessary liability.

Today, why compromise...? Reduce risk with The Safer Choice.

For many decades, personal safety has been a top priority in the development of new car models. The same applies to our KALLER gas springs, which we have supplied to the automotive industry since the early 1980s.

As a gas spring manufacturer, we are responsible for the compliance with Pressure Equipment Directive (PED) 97/23/EC. But responsibility also rests with you, the customer. Failure to comply with the regulations may very well result in personal injuries and costly liability claims.

The Association of German Engineers (VDI) has developed specific safety demands for gas springs, which are being implemented in company specific standards. As The Safer Choice, we are helping setting these standards.

We care about safety. Do you? Contact us today.

Reduce risk with KALLER – The Safer Choice.

Providing innovative solutions for the safer working environment

KALLER®

The Safer Choice

Save money and time with ***The Safer Choice***

kaller.com/this-is-kaller/the-safer-choice

"We do our utmost to help our customers achieve the safer working environment," says Johan Runesson, Managing Director at KALLER.

Customers do business with KALLER because they want...

- safer and more reliable products
- worldwide support and service
- compliance with all
  major industry standards

...to save money and time using our innovative gas springs

KALLER developed the first nitrogen gas spring for press tools during the 1970s and we introduced the first gas spring in 1983. With almost 40 years of experience in the field of safety, today KALLER offers a comprehensive selection of innovative high quality gas springs and gas hydraulic systems for use in tool & die applications.

“KALLER customers want to save money through correct handling of our gas springs. Learning the tricks directly from the people who handle the products daily is highly appreciated,” says Zoltan Pap, Product Manager at KALLER.

“KALLER helped us save money and time”

A KALLER gas spring equipped with the Overstroke Protection System introduced in 2002, suffered an overstroke in a customer’s tool.

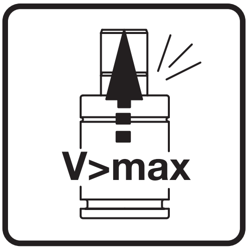
The customer thought he had a longer stroke set, and as the press moved downwards making its stroke, the spring eventually was overstroked.

When opening the tool, the customer expected to find a totally damaged tool and worried about the cost for complicated repairs. Instead he faced a deformed gas spring where the gas had simply leaked out in a controlled way.

CUSTOMER: “This KALLER safety feature helped us to save money and time. We just had to check the tool and then replace the gas spring with the correct stroke length.”

“Due to an incident in the German automotive industry, a discussion about safety in gas springs was triggered. As a result, our safety features are now a standard requirement. For KALLER it has strengthened and confirmed the importance of our work with The Safer Choice,” says Mårten Johansson, Product Manager at KALLER.

“Safer working environment with KALLER”



In 2005, due to malfunction in a customer’s tool a gas spring equipped with the Overload Protection System stopped in the compressed position.

When the press opened, the piston rod suddenly ejected from the compressed position.

The safety system worked as designed to. This allowed the gas to leak out in a controlled manner without any risk of personal injuries.

CUSTOMER: “Damage and injuries indeed can be avoided with The Safer Choice. This is a perfect example of how to provide innovative solutions for the safer working environment.”

"KALLER has been working with safety in gas springs for many years in numerous forms, such as product safety approvals in different countries. But safety is more than approvals. It is also about training and risk awareness," says Sylvia Siljeholm, Quality & Environmental Manager at KALLER.

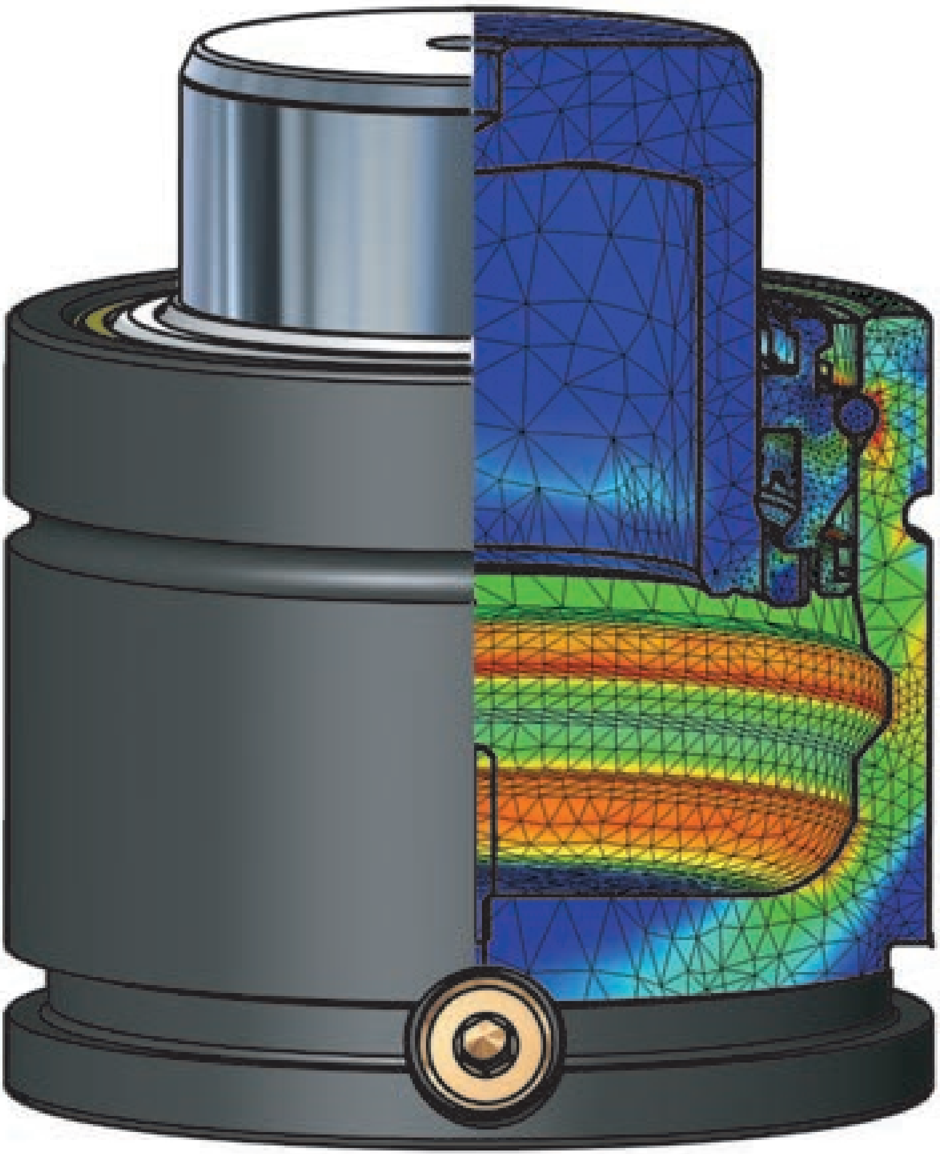
“We feel safer with KALLER gas springs”

In 2006, the guide in a gas spring equipped with the Overpressure Protection System was subjected to overpressure in a tool.

Drawing fluid had entered the gas spring, causing a dramatic increase in the gas pressure.

After a brief moment, the safety lip in the guide deformed due to abnormal pressure allowing the gas to leak out in a controlled and safe manner.

CUSTOMER: “With KALLER gas springs we feel safe. If something should go wrong, and things tend to do that sometimes, The Safer Choice technology is the way to go.”



The advanced FEA (Finite Element Analysis) system is used for the development and validation of our innovative KALLER gas springs.

The Safer Choice – on our minds since 1983

KALLER Training Program

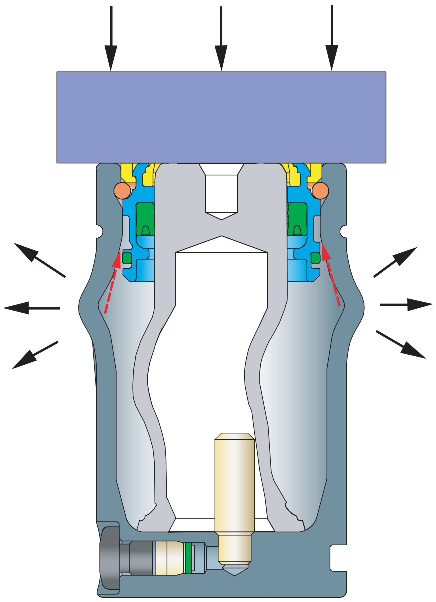
It is of vital importance to have basic gas spring technology knowledge, both in theory and in practice. This combined with training on the more advanced products is the essence of the KALLER Training Program.

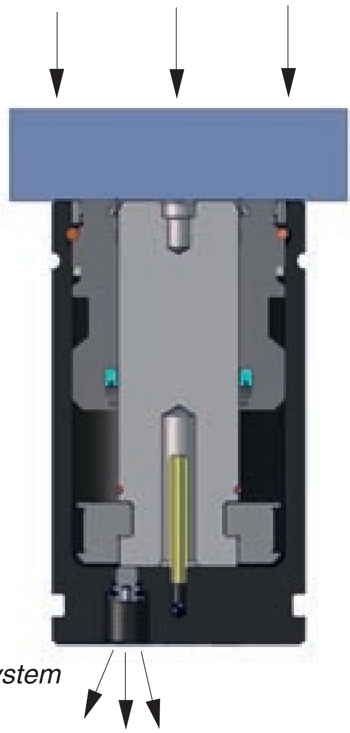
Your benefits
Training is a useful tool for maintaining quality, development and revenues. Without doubt the KALLER Training Program is the best and most creative way to fully understand and appreciate the importance of our safety and reliability features.

KALLER Safety App

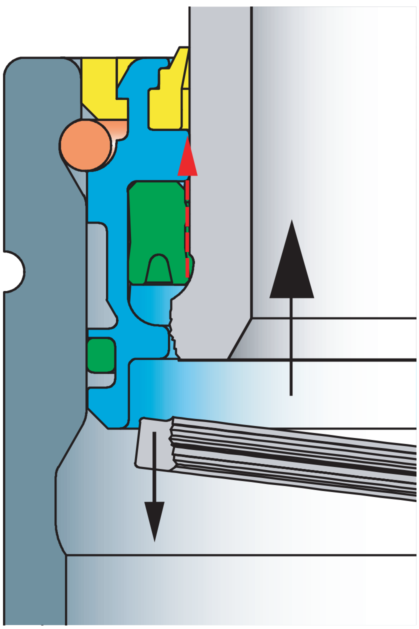
Fake products can be dangerous. With the KALLER Safety App you can identify, verify and manage your KALLER gas springs to avoid unnecessary risks.

Your benefits
Our KALLER Safety App will help you achieve the safer working environment. For more information, see: kaller.com/this-is-kaller/the-safer-choice.

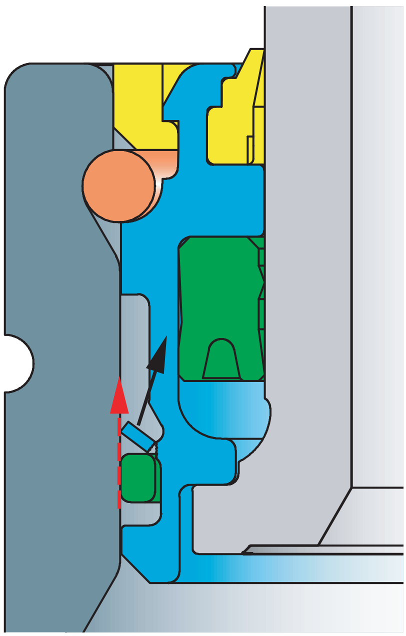




Overstroke Protection System



Overload Protection System



Overpressure Protection System

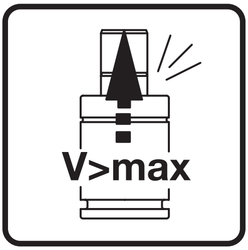
Related Patents:
EP 1 053 410, EP 1 366 308, EP 0 959 263
US 6.086.059, US 6.971.303

KALLER safety features reduce the risk of damage and injuries

Overstroke Protection System

In the event of an overstroke, the gas spring is designed to deform and release pressure in a predefined way.

Your benefits
When a gas spring is overstroked, this feature reduces the risk of tool damage or injuries due to parts separating under high pressure.



Overload Protection System

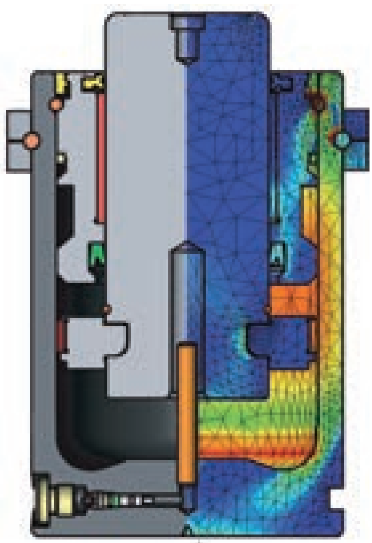
Designed for controlled gas venting between the seal and piston rod with an integral safety stop and a specially designed guide.

Your benefits
In case of a jammed cam or tool part being forced by gas springs, this feature reduces the risk of tool damage or injuries.

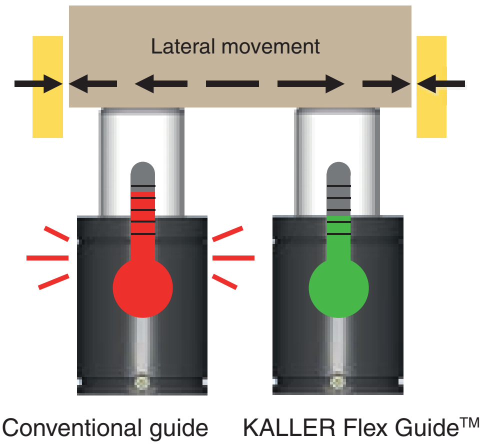
Overpressure Protection System

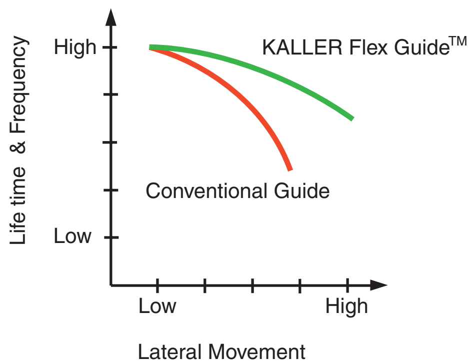
The KALLER Overpressure Protection System is designed to vent excessive gas pressure in a controlled manner.

Your benefits
When internal gas pressure exceeds the maximum allowable limit, this feature reduces the risk of tool damage or injuries.

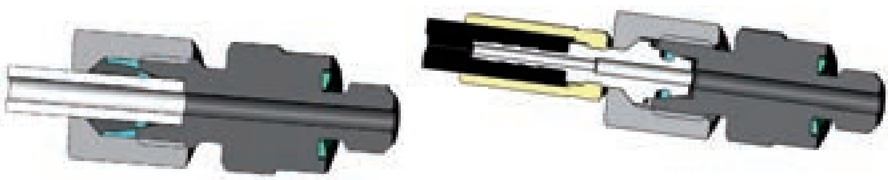


PED approved for a minimum of 2 million strokes





Flex Guide™ System



Dual Seal™ Link System

KALLER reliability features for your safer performance

PED approved for a minimum of 2 million strokes

KALLER gas springs are designed, produced and tested to withstand a minimum of 2,000,000 full cycles according to PED 97/23/EC.

Your benefits
The KALLER 2 million stroke PED approval ensures safer component cycle life at maximum operating conditions.

Flex Guide™ System

Our KALLER Flex Guide™ System absorbs lateral piston rod movement, reduces friction, and lowers the operating temperature.

Your benefits
Prolongs service life, allows more strokes per minute, and offers greater tolerance to lateral tool movements.

Dual Seal™ Link System

Our link system uses the KALLER Dual Seal™ solution technology – connecting gas springs using a combination of metal seal and soft seal.

Your benefits
Fewer production interruptions due to leakage caused by vibration. Simplified installation thanks to the non-rotation feature.

“KALLER training is an excellent way for our customers and their employees to ensure efficient production, which in turn translates into improved profitability. Trained employees know what to do and how to do it,” says Jonas Klang, R&D Manager at KALLER.

Do you want to save money and time with The Safer Choice?

APPROVED PED 97/23/EC

2 million

Our customers regard us as The Safer Choice.

At KALLER, we develop, manufacture and market gas springs and gas hydraulic systems for stamping dies and accessories.

As a top-of-the-line technology developer since 1876, our innovative KALLER gas springs, PED approved for a minimum of 2 million strokes, have been developed and refined over the last 40 years. Today we remain a world leader with support and service all over the industrialized world.

KALLER – The Safer Choice.

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KALLER – The Safer Choice for global support and service

Our employees in eight countries – in-house manufacturing and assembly in Europe and North America – and distributors in 46 countries provide a great base for product development, excellent training, service and support to our customers worldwide.

Please visit your local contact at kaller.com/distributors.

The Safer Choice

Introduced in 1983, the KALLER gas spring technology quickly led to worldwide demand. The Safer Choice – Training, Safety and Reliability – has always been a KALLER top priority for providing innovative solutions for the safer working environment. We recommend looking through all available KALLER features when selecting gas springs and gas or hose linked systems.

KALLER Training Program

TRAINING. Without doubt the KALLER Training Program is the best and most creative way to fully understand and appreciate the importance of the safety and reliability features.

KALLER Safety App

SAFETY. Fake or KALLER original? With the KALLER Safety App you can identify and verify your specific KALLER gas springs.

Overstroke Protection System

SAFETY. When a gas spring is overstroked, this helps reduce the risk of tool damage or injury.

Overload Protection System

SAFETY. Jammed cam or tool part being forced by gas springs? This will help reducing such risks.

Overpressure Protection System

SAFETY. Vents the spring if the internal gas pressure exceeds the maximum allowable limit to prevent accidents.

PED approved for a minimum of 2 million strokes

RELIABILITY. Our 2 million stroke PED approval ensures safer component cycle life.

Flex Guide™ System

RELIABILITY. Prolongs service life, allows more strokes per minute, and offers greater tolerance to lateral tool movements.

Dual Seal™ Link Systems

RELIABILITY. Fewer production interruptions due to leakage caused by vibration. Simplified installation thanks to the non-rotation feature.

kaller.com