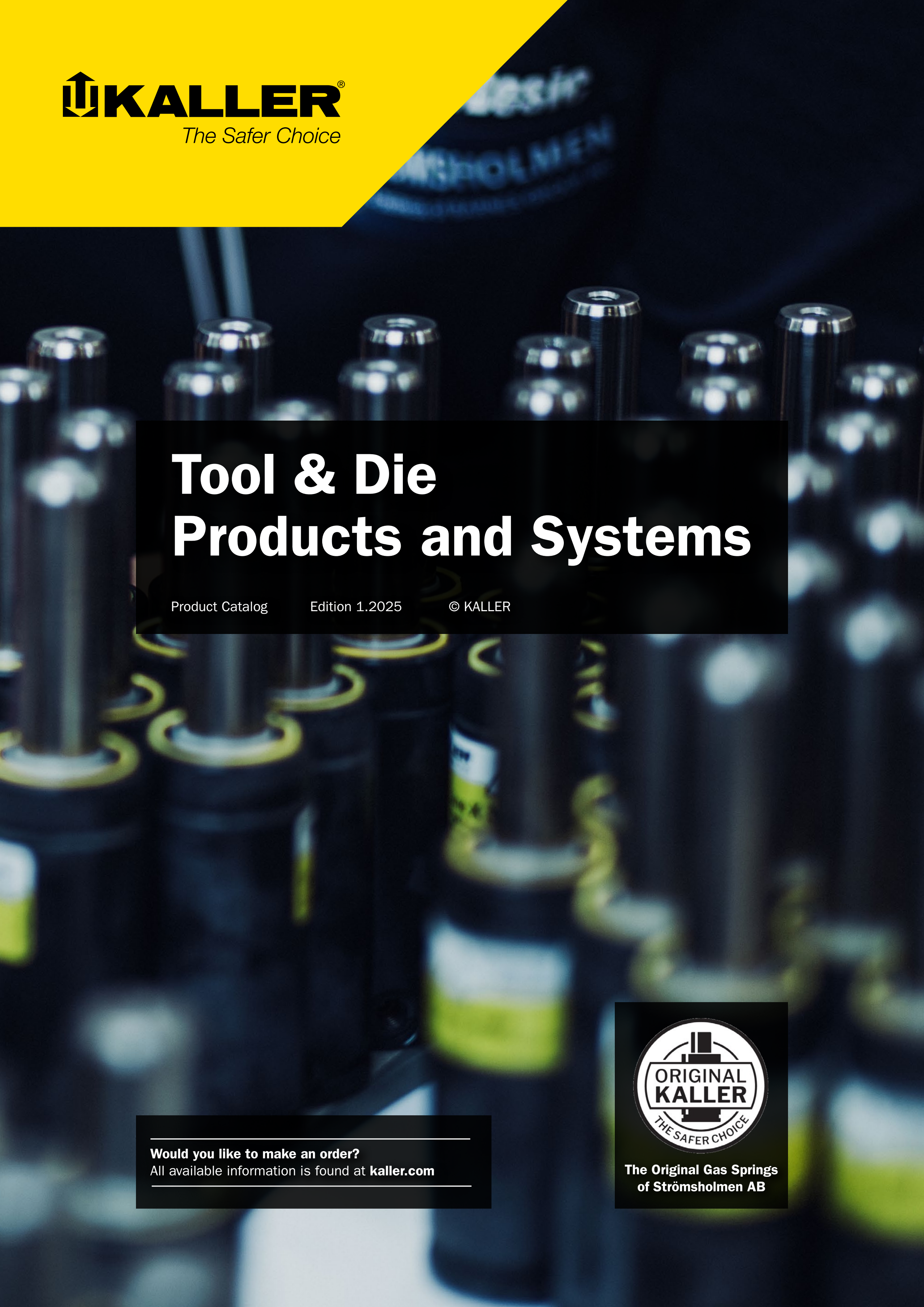


KALLER®
The Safer Choice

Tool & Die Products and Systems

Product Catalog   Edition 1.2025

Would you like to make an order?
All available information is found at **kaller.com**

ORIGINAL KALLER
THE SAFER CHOICE

The Original Gas Springs of Strömsholmen AB

CONTENT

THE SAFER CHOICE

Introduced in early 80s, 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.

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 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.

KALLER® Academy

TRAINING. KALLER offers online courses on several topics related to force and motion technology. Work your way through the basics of Gas Spring Techonology.

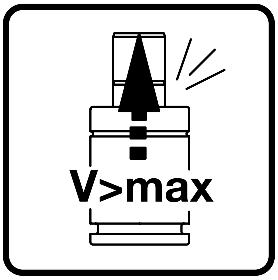
KALLER® safety features reduce the risk of damage and injuries

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.

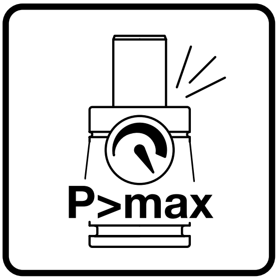


Overload Protection System

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.

Overstroke Protection - Case

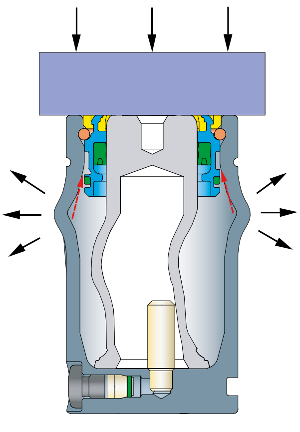
A KALLER® gas spring equipped with the Overstroke Protection System introduced in 2002, suffered an overstroke in a customer's tool.

The customer thought he had a longer stroke set, and as the press moved downwards making its stroke, the spring eventually was overstroked.

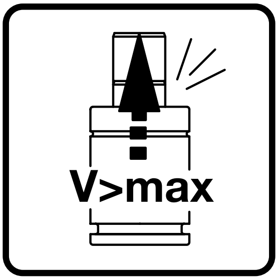
When opening the tool, the customer expected to find a totally damaged tool and worried about the cost for complicated repairs. Instead he faced a deformed gas spring where the gas had simply leaked out in a controlled way.

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."

Overstroke Protection System



Overload Protection - Case

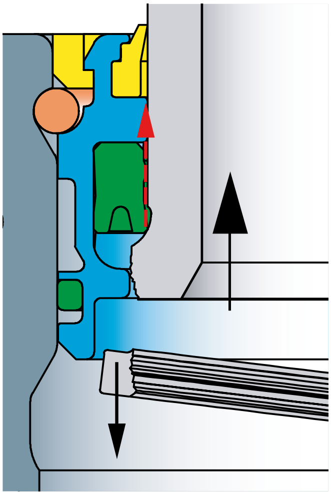


Due to malfunction in a customer’s tool a gas spring equipped with the Overload Protection System stopped in the compressed position.

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.”


Overload Protection System

Overpressure Protection - Case

P>max

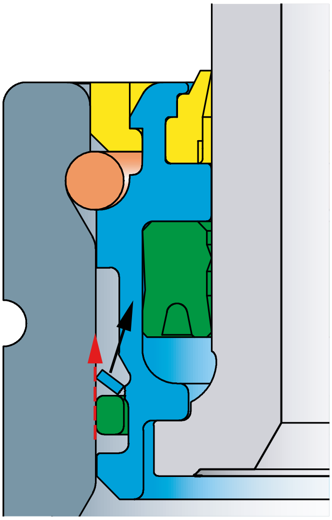
The guide in a gas spring equipped with the Overpressure Protection System was subjected to overpressure in a tool.

Drawing fluid had entered the gas spring, causing a dramatic increase in the gas pressure.

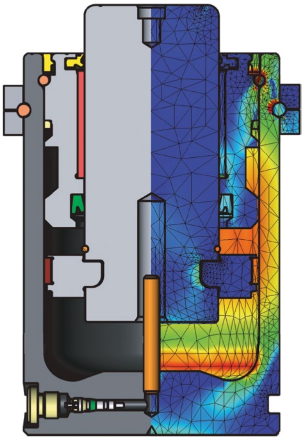
After a brief moment, the safety lip in the guide deformed due to abnormal pressure allowing the gas to leak out in a controlled and safe manner.

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.”

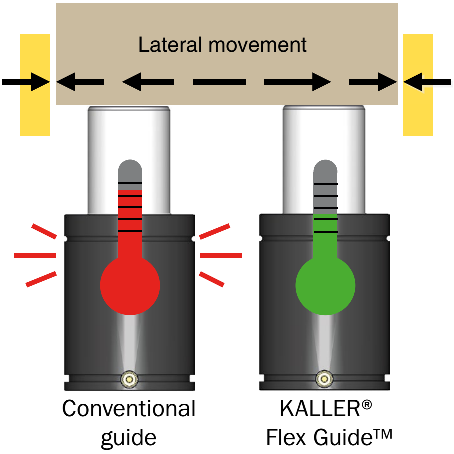
Overpressure Protection System

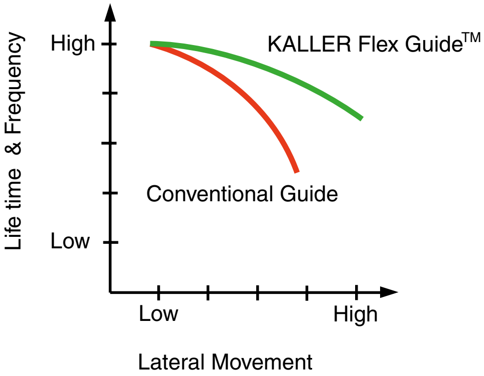


PED approved for a minimum of 2 million strokes

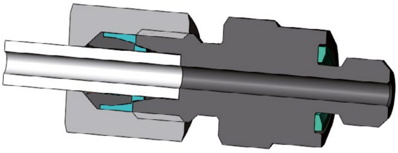


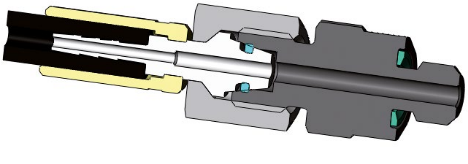
Flex Guide™ System





Dual Seal™ Link System





KALLER® reliability features for your safer performance

APPROVED PED 2014/68/EU

2 million

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 2014/68/EU at max charging pressure, max operating temperature and for all approved mounting methods.

Your benefits

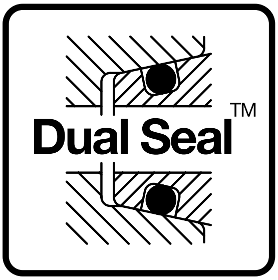
The KALLER® 2 million stroke PED approval ensures safer component cycle life at maximum operating conditions.

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.

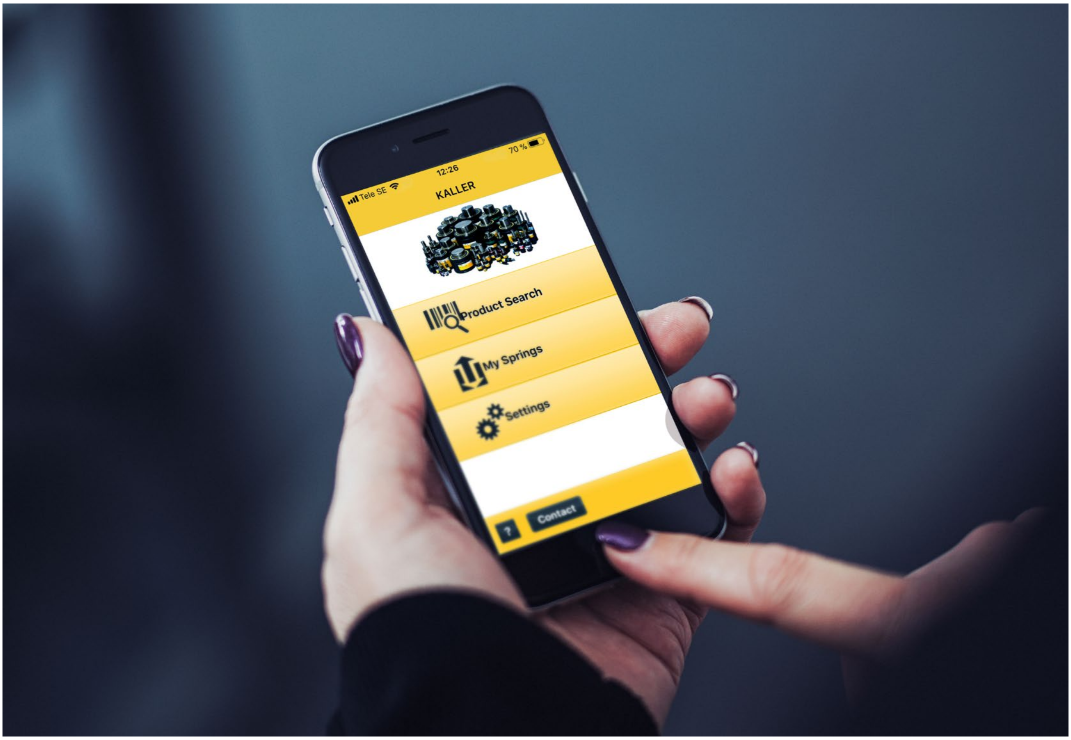


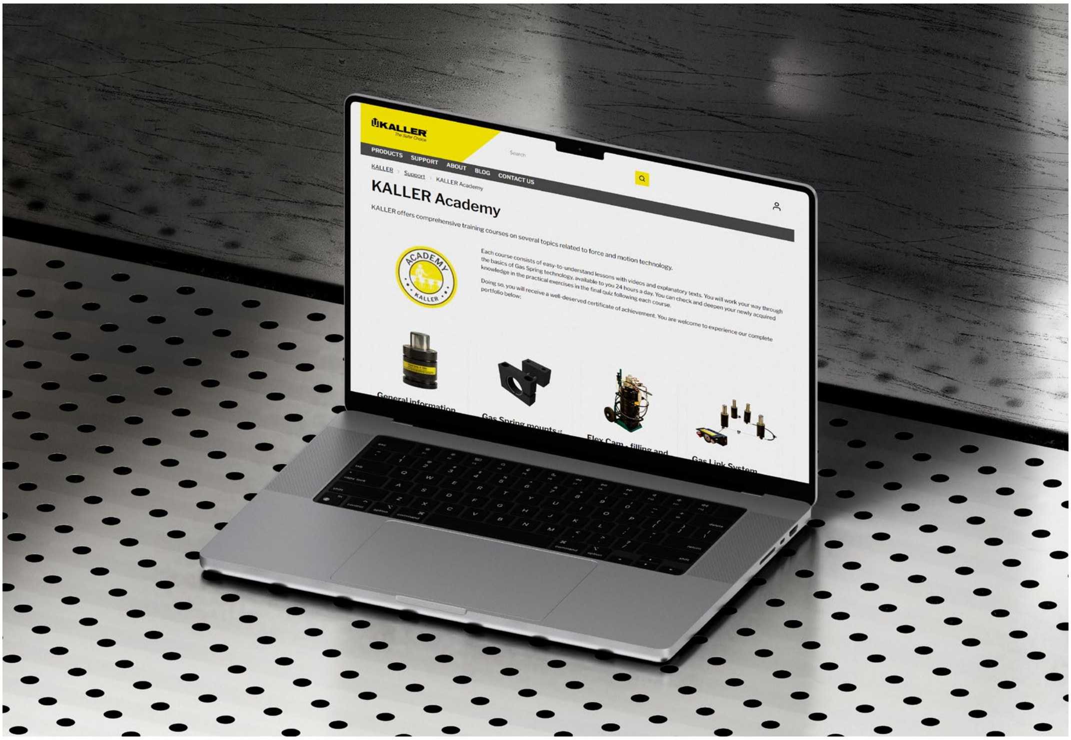
Dual Seal™ Link System

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 offers comprehensive training courses on several topics related to force and motion technology.

Services and Support

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.

KALLER® Academy

KALLER offers comprehensive training courses on several topics related to force and motion technology. Each course consists of easy-to-understand lessons with videos and explanatory texts.

Your benefits

You will work your way through the basics of Gas Spring technology, available to you 24 hours a day. You can check and deepen your newly acquired knowledge in the practical exercises in the final quiz following each course. Doing so, you will receive a well-deserved certificate of achievement.

For more information, see KALLER.com

GENERAL INFORMATION

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 (2014/68/EU).

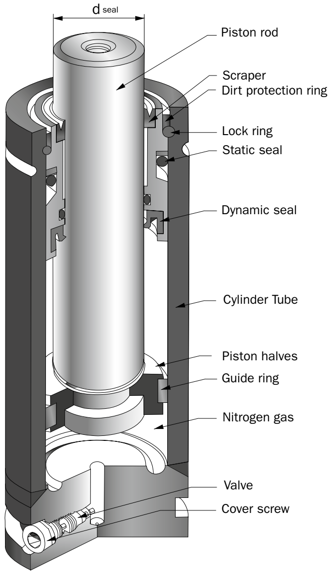
The Pressure Equipment Directive (PED) replaces all previous European legislation governing the design, manufacture and testing of pressure vessels. Manufacturing relies on the very latest production methods and equipment at our modern facilities in Tranås, Sweden. Strömsholmen AB, the designers and 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

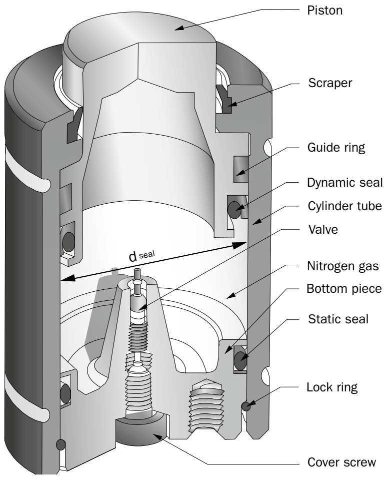
Strömsholmen AB, which develops, manufactures and markets KALLER® gas springs, guarantees that each gas spring manufactured by Strömsholmen AB is free of defects in materials and workmanship. The KALLER® Worldwide Guarantee applies to gas springs used up to 2,000,000 strokes from 0 mm to 80 mm per stroke 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 User Guides (www.kaller.com/en-us/support/documents). 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



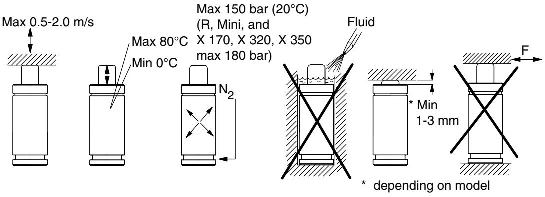
Bore Sealed gas spring

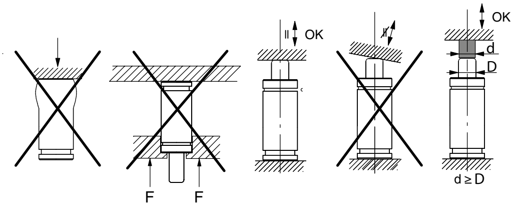
USER INFORMATION

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.

- Always secure the gas spring to the tool/machine, 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 stroke.
- Ensure the contact surface hitting 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 top/ piston is used.

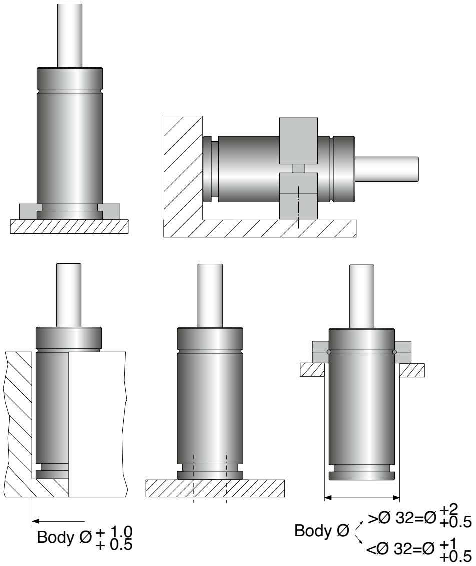




Mounting of gas springs

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 1.5 × the thread diameter in steel and 2 × 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.
- Only use mounts manufactured or approved by KALLER® .

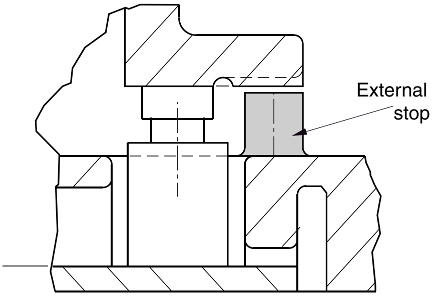


CAUTION!

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

Stroke length

The nominal stroke (defined as S in the catalog tables) may be utilized fully in all KALLER® gas springs. However, in normal operations the recommendation is not to use the full nominal 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 must not be exceeded as it may affect the safety of the product.

Operating temperature

Exceeding the gas spring’s recommended max. operating temperature (measured on the cylinder surface) 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 (provided that the maximum operating temperature is not exceeded).

For further information, please contact your local distributor.

Maximum piston rod velocity

The maximum piston rod velocity must 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.
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.

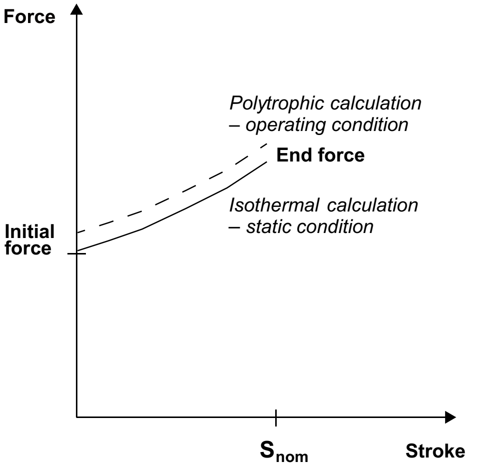
Instructional service videos are also available at www.kaller.com.

Force calculations

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

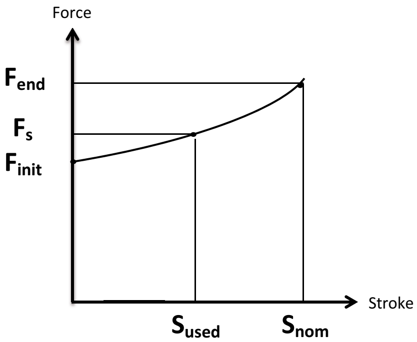
Generally isothermal calculation is sufficient for choosing gas springs, but during operation, true end forces may vary depending on operating conditions.

For more detailed information, please consult our ***KALLER Basic Gas spring Theory*** brochure or utilize our ***Force and Temperature Calculator*** on **kaller.com found under Support > Calculators and Tools**.



Isothermal force as a function of stroke

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



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

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 charging pressure of 150 bar?

The table for the TU 1500 (see page 138) will give the following values:

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

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

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 as a function of stroke

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:

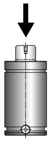
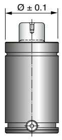
Stroke length and used stroke, gas volume, press velocity and strokes per minute (SPM), operating temperature and environment, internal frictions etc.

GAS SPRINGS SELECTION GUIDE

Series	Description	Gas spring model	Available stroke lengths	Initial force at max. pressure		Total length	Cylinder diameter
			(mm)	(N)	(lbf)	(mm)	(mm)
EP3 16 EPS3 16 EP2 24 EPS2 24	Color coded gas Ejector-Pins, interchangeable with mechanical spring plungers.	EP3 16	10 - 125	420	95	45 + (2 x Stroke)	M16x1.5/M16x2
		EPS3 16	10 - 125	420	95	45 + (2 x Stroke)	M16x1.5
		EP2 24	10 - 125	1,700	382	45 + (2 x Stroke)	M24x1.5
		EPS2 24	10 - 125	1,700	382	45 + (2 x Stroke)	M24x1.5
R12 R15 R19	Rod sealed and color coded gas springs – compact and fully adjustable.	R12	7 - 125	500	112	56 - 295	Ø 12
		R15	7 - 125	700	160	56 - 295	Ø 15
		R19	7 - 125	900	202	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 providing extreme initial forces with minimal cylinder diameters.	CU4 420	6 - 50	4,250	955	56 - 195	Ø 25
		CU4 740	6 - 50	7,400	1,660	63 - 195	Ø 32
		CU4 1000	6 - 50	10,600	2,400	61 - 230	Ø 38
		CU4 1800	6 - 65	18,000	4,050	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 - 323	Ø 150
CX	Compact Xtreme CX gas springs provide extreme forces by enabling high charge 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	382	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	2,068	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	5,396	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	810	40 + (2 x Stroke)	Ø 32
		XG 500	10 - 125	4,700	1,055	40 + (2 x Stroke)	Ø 38
		XG 750	10 - 125	7,400	1,665	47 + (2 x Stroke)	Ø 45
		XG 1000	13 - 125	9,200	2,068	52 + (2 x Stroke)	Ø 50
		XG 1500	13 - 125	15,000	3,375	52 + (2 x Stroke)	Ø 63
		XG 2400	16 - 125	24,000	5,396	59 + (2 x Stroke)	Ø 75
		XG 4200	16 - 125	42,000	9,440	62 + (2 x Stroke)	Ø 95
		XG 6600	16 - 125	66,300	14,905	72 + (2 x Stroke)	Ø 120
XF	The Power Line XF series is based on the X series with the same features but additional 10 mm total length providing a larger G 1/8" charge port.	XF 750	10 - 125	7,400	1,665	42 + (2 x Stroke)	Ø 45
		XF 1000	13 - 125	9,200	2,068	48 + (2 x Stroke)	Ø 50
		XF 1500	13 - 125	15,000	3,375	54 + (2 x Stroke)	Ø 63
		XF 2400	16 - 125	24,000	5,396	55 + (2 x Stroke)	Ø 75

Series	Description	Gas spring model	Available stroke lengths	Initial force at max. pressure		Total length	Cylinder diameter
			(mm)	(N)	(lbf)	(mm)	(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	1,665	85 + (2 x Stroke)	Ø 45
		TX 1000	13 - 300	9,200	2,068	95 + (2 x Stroke)	Ø 50
		TX 1500	13 - 300	15,000	3,375	95 + (2 x Stroke)	Ø 63
		TX 2400	25 - 300	24,000	5,396	110 + (2 x Stroke)	Ø 75
		TX 4200	25 - 300	42,000	9,440	120 + (2 x Stroke)	Ø 95
		TX 6600	25 - 300	66,300	14,905	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	45,000	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	6,750	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	600	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	6,750	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	6,750	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. 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	6,750	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
		LCF 10000	25 - 200	106,000	23,830	160 + (2 x Stroke)	Ø 195
SPC	Speed Control^{TM} 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	11,240	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	382	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	2,068	38 + (2 x Stroke)	Ø 50

Gas Spring - contents

Initial force N 	Cylinder diameter mm 	Models 	Page
$F_{INIT} < 2,500$	ø 12 ø 32	EP3 16, EP2 24, EPS2 24 R12, R15, R19 M2, MM2, MC3, MC3-SP X 170 MT 16, MT 24	24
$2,500 \leq F_{INIT} < 5,000$	ø 25 ø 38	CU4 420 X 320, X 350, XG 350 TU 250, TM 250, TI 250, TMS 250 MT 300	52
$5,000 \leq F_{INIT} < 7,500$	ø 38 ø 45	CU4 740 CX 500, X 500, XG 500 K 500 TU 500 MT 500	70
$7,500 \leq F_{INIT} < 10,000$	ø 45 ø 75	X 750, XG 750, TL 750, TX 750 K 750, TU 750, TUS 750, LCF 750, SPC 750 MT 750	86
$10,000 \leq F_{INIT} < 25,000$	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	110
$25,000 \leq F_{INIT} < 50,000$	ø 75 ø 120	CU4 2900, CU4 4700 X 4200, XG 4200, TX 4200 TL 3000, TU 3000, TUS 3000, LCF 3000 SPC 3000	158
$50,000 \leq F_{INIT} < 75,000$	ø 120 ø 150	X 6600, XG 6600, TX 6600 TL 5000, TU 5000, TUS 5000, LCF 5000 SPC 5000	180
$75,000 \leq F_{INIT} < 100,000$	ø 95 ø 150	CU4 7500 X 9500, TX 9500 TL 7500, TU 7500, TUS 7500, LCF 7500	198
$F_{INIT} \geq 100,000$	ø 120 ø 195	CU4 11800, CU4 18300 TU 10000, TUR 10000 X 20000, TX 20000	214

KALLER Limited Warranty

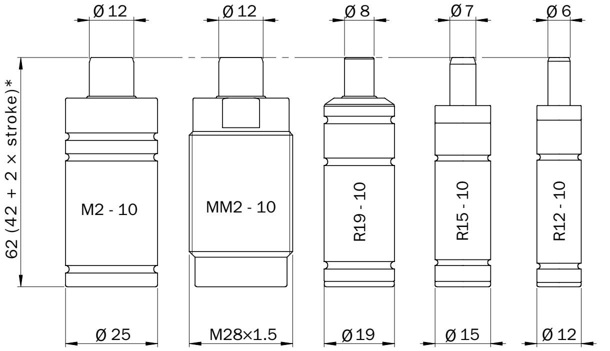
The warranties contained herein supersede all other warranties, expressed or implied, including those concerning the merchantability or suitability for a specific use or performance of the gas spring including its components.

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.

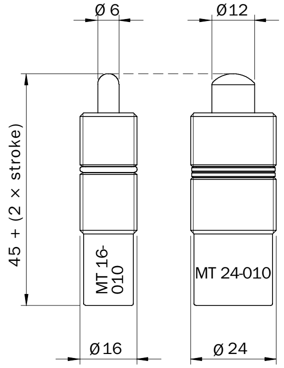
The customer shall notify KALLER® of all information pertaining to the defective gas spring including but not limited to serial number and date of installation so that KALLER® may determine the number of strokes incurred by the gas spring alleged to be defective. The customer shall be responsible for 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.

kaller.com



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

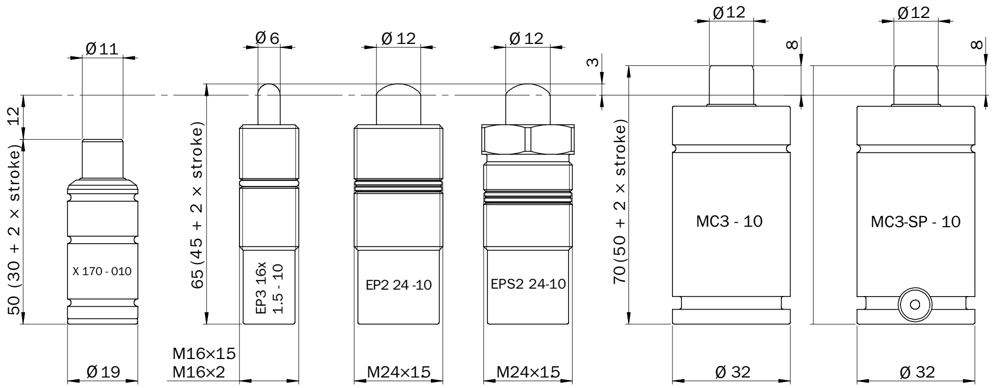


Initial force (at 20° C) 330 - 420 N 74 - 95 lbf	Initial force (at 20° C) 1,300 - 1,700 N 292 - 382 lbf

* 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

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. Four preset models (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.

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 10 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C)......................... ~ 100
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black Oxide
Repair kit .... Non-repairable

Automotive standard: VDI 3004, ISO 20928, WDX35-60-3016xxx,
GMGDS 90.25.97, 39-670-005x, GMGDS 90.80.46

How to order

EP3 16x1.5 - 10 - Blue

Model:

Force: Green, Blue, Red, Yellow, Black

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

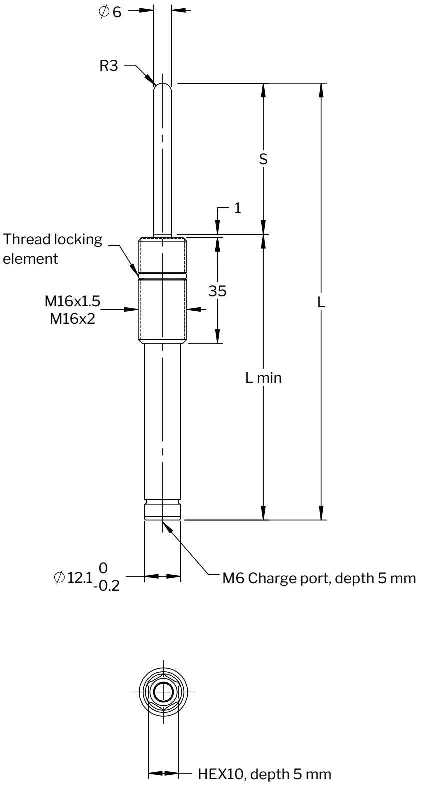
Stroke length: (mm)
(10, 20, 30, 40, 50, 60, 70, 80, 100, 125)

Model	Initial force at +20°C		Color	Charging pressure (bar)	Isothermal 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

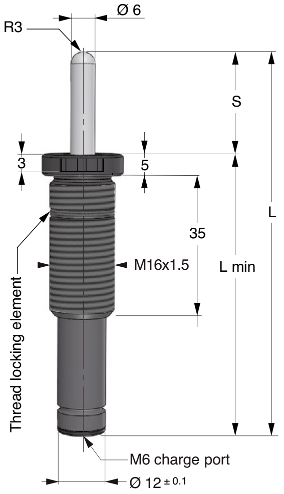
■ Recommended stroke length for optimal delivery.



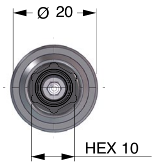
Installation tool

Order No. 3021000

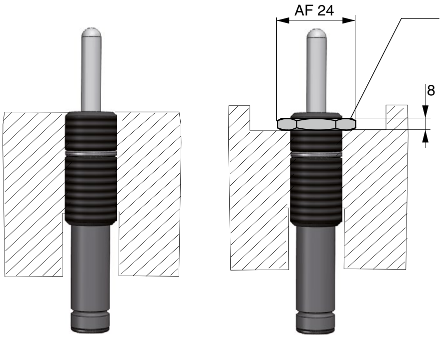
EPS3 16



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



Mounting possibilities



Lock nut

Order No.	Thread
503681	M16x1.5
503722	M16x2

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 precharge of 5 to 10 bar, is also available and is intended for adjustment to the desired force.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	10 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-80
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	Non-repairable

Automotive standard: VDI 3004, ISO 20928, WDX35-60-3024080, GMGDS 90.25.95, 39-670-005x, 39-67-0061, WDX35-60-3024110, WDX35-60-3024140

How to order

EP2 24 - 10 - Red

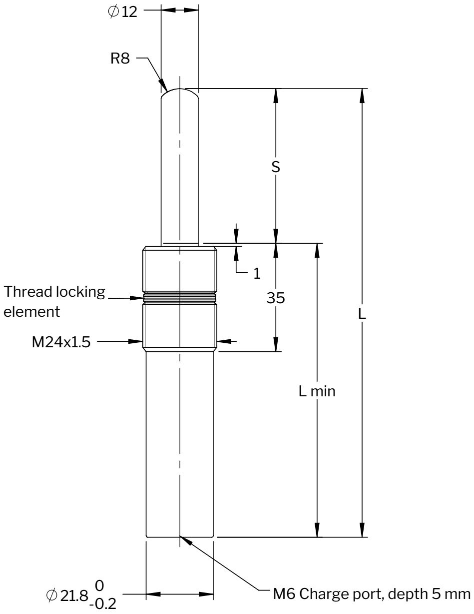
Model: EP2 24

Force: Green, Blue, Red, Yellow, Black

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

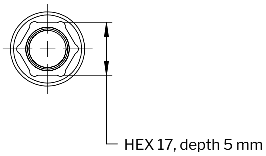
Model	Initial force at +20°C		Color	Charging pressure (bar)	Isothermal end force at + 20°C, at full stroke	
	in N	in lbf			in N	in lbf
EP2 24	230	52	Green	20	390	90
EP2 24	450	101	Blue	40	800	180
EP2 24	850	191	Red	75	1,500	340
EP2 24	1,700	382	Yellow	150	2,900	650
EP2 24 XX*	113-1,700	25-382	Black	10-150	110-2,900	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

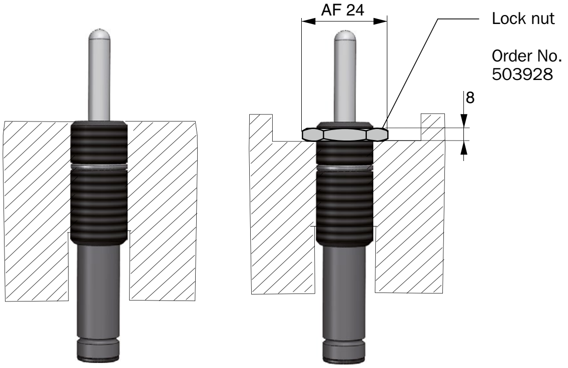
■ Recommended stroke length for optimal delivery.



Installation tool

Order No. 3021000

Mounting possibilities



EPS2 24 (Ejector Pin Special with an M24 thread). It is available with four 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.

Basic information

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

Automotive standard: WDX35-80-19xxxx10, WDX35-80-19xxxx15, WDX35-80-19xxxx25, WDX35-80-19xxxx38, WDX35-80-19xxxx50, WDX35-80-19xxxx80

How to order

EPS2 24 - 10 - Green

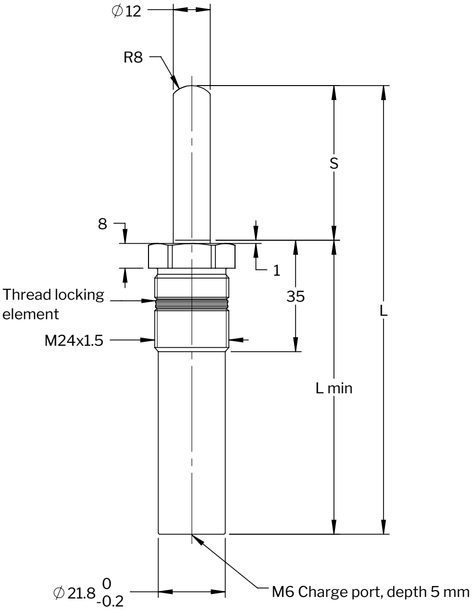
Model: EPS2 24

Force: Green, Blue, Red, Yellow, Black

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

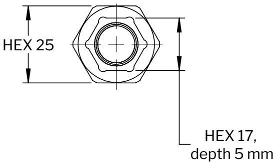
Model	Initial force at +20°C		Color	Charging pressure (bar)	Isothermal end force at + 20°C, at full stroke	
	in N	in lbf			in N	in lbf
EPS2 24	230	52	Green	20	390	90
EPS2 24	450	101	Blue	40	800	180
EPS2 24	850	191	Red	75	1,500	340
EPS2 24	1,700	382	Yellow	150	2,900	650
EPS2 24 XX*	65-1,700	15-382	Black	6-150	110-2,900	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	0.005	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

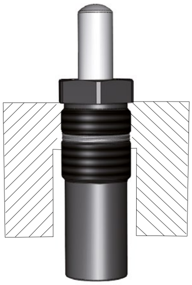
■ Recommended stroke length for optimal delivery.



Installation tool

Order No. 3021000

Mounting possibilities



The R series was named because the tube is Rollformed 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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	20 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3 %/°C
Recommended max. strokes/min (at 20°C)	~40 – 100
Max. piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair Kit	Non-repairable

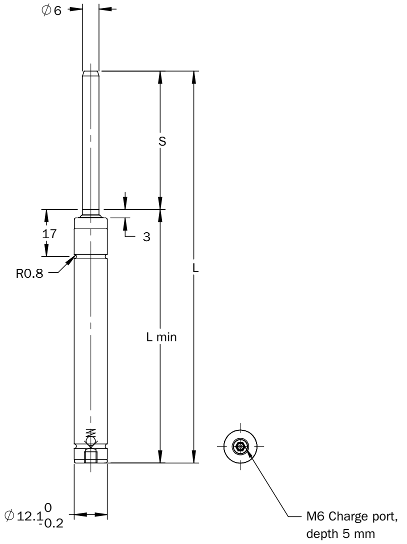
How to order

R12 - 7 - Blue

Model:

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

Stroke length: (mm) (7, 10, 12.7, 15, 19, 25, 38, 50, 63.5, 75, 80, 100, 125)



Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	in N	in lbf		
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 customer. Delivered with a pre-charge of 5-10 bar.

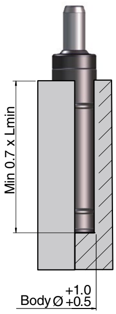
S stroke	Isothermal end force in N at +20°C **				Isothermal end force in lbf at +20°C **				L ±0.25	L min.	Gas vol. (l)	Weight (kg)
	R12	R12	R12	R12	R12	R12	R12	R12				
7	149	299	448	597	34	67	101	134	56	49	0.001	0.03
10	158	317	475	634	36	71	107	143	62	52	0.001	0.03
12.7	164	329	493	657	37	74	111	148	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 ■	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.

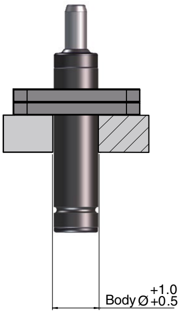
Mounting possibilities

Base mount

only to be used for
strokes 7-25 mm



Drop - in



Top mount
FCR-12

Recommended mounts

FCR-12

📄 233

Additional mounts

FC-12

📄 232

Note!

For dimensions on all mount options, refer to "Mounts" in chapter 3.

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.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	20 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3 %/°C
Recommended max. strokes/min (at 20°C)	~100 – 150
Max. piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair Kit	Non-repairable

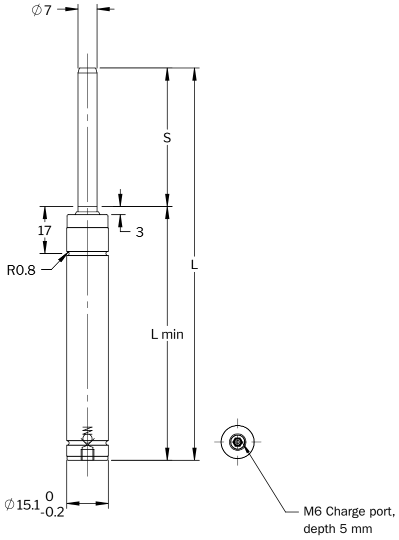
How to order

R15 - 10 - Green

Model:

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

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



Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	in N	in lbf		
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 customer. Delivered with a pre-charge of 5-10 bar.

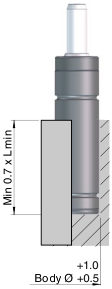
S stroke	Isothermal end force in N at +20°C **				Isothermal end force in lbf at +20°C **				L ±0.25	L min.	Gas vol. (l)	Weight (kg)
	R15	R15	R15	R15	R15	R15	R15	R15				
7	216	432	648	865	49	97	146	195	56	49	0.001	0.05
10	224	447	671	895	50	101	151	201	62	52	0.001	0.05
12.7	228	457	685	914	51	103	154	206	67.4	54.7	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	1,982	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

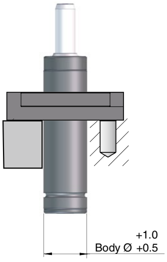
Mounting possibilities

Base mount

only to be used for
strokes 7-25 mm



Drop-in



Top mount
FCR-15

Recommended mounts

FCR-15

233

Additional mounts

FC-15

232

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 100-150
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	Non-repairable

Automotive standard: VDI 3003-Blatt 2, ISO 11901-1-900, WDX35-80-3607xxxx, WDX35-80-3615xxxx, WDX35-80-3625xxxx, WDX35-80-3638xxxx, WDX35-80-3650xxxx, 39D878xx, B2 4005 21712xx, B2 4005 21680xx, B2 4005, 21729xx, 03326xx, 0529565, 0332739, 05755xx, 39-670-67xx, WDX35-80-19xxxx

How to order

R19 - 7 - Yellow

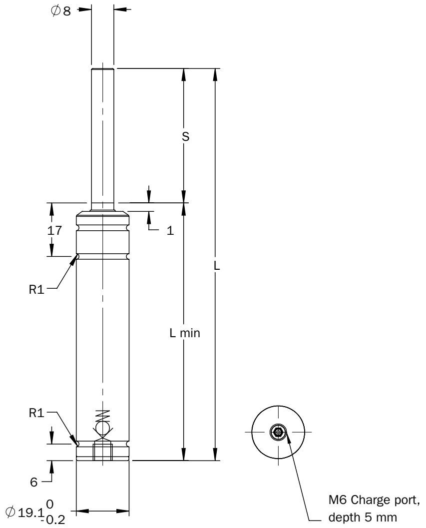
Model:

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

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

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	in N	in lbf		
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

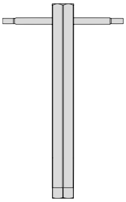
* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.



S stroke	Isothermal end force in N at +20°C **				Isothermal 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	√

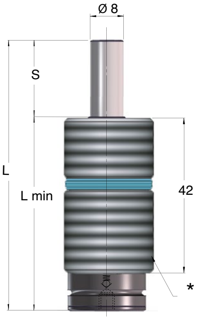
** at full stroke ■ Recommended stroke length for optimal delivery.

Installation tool



Installation Tool
for threaded sleeve
Order No. 3020618

R19



Also available with
threaded sleeve -TM or -TI

Order no. example
R19-Stroke-Color-TM
R19-Stroke-Color-TI

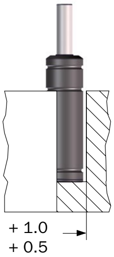
TM = M24 x 1,5
or TI = 1" - 8 UNC

* 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.

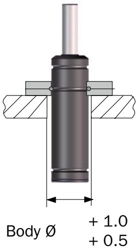
Mounting possibilities

Base mount

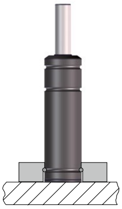
only to be used for
strokes 7-25 mm



Drop - in



Top mount
FCR



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

Recommended mounts

BF-19

228

FCR-90

234

FCR-19 VDI2

233

Additional mounts

FC-19

232

Note!

For dimensions on all mount options, refer to "Mounts" in chapter 3.

The M2 is available in four preset models, with initial forces from 500 to 2000 N. The gas spring is 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. This gas spring is also available with adjustable force (black) that can be customized to meet individual force requirements.

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S>max

V>max

P>max

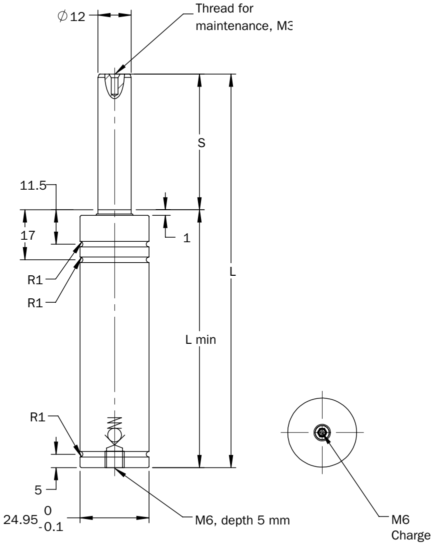
The adjustable model may be set to desired pressure when ordered. The M2 spring can in many cases directly replace mechanical die springs of 25 mm (1 inch) diameter. All M2 springs can be repaired and recharged. The spring can be attached to the tool, using a mount (FCR or SM). The M6 thread in the base of the spring is used for charging and is also a mounting option.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3016385

Automotive standard: VDI 3003-Blatt 2, ISO 11901-1-2000, 39D878xx, B2 4005 2172962, B2 4005 21680xx, 03326xx, 0529566, 0332740, 05295xx, Z000351514, Z000213263, Z000260312, N000739808, 39-670-18xx, 304502x, 304503x



How to order

M2 - 10 - Green

Model:

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

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

Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	in N	in lbf		
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

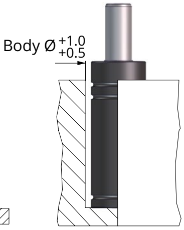
* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

S stroke	Isothermal end force in N at +20°C **				Isothermal 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	√

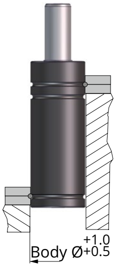
** at full stroke

Mounting possibilities

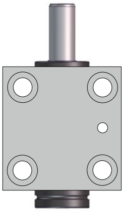
Base mount



Drop - In



Top mount
FC, FCR



Body mount
SM-150

Recommended mounts

FC-150	FCR-150	FCR-25
📄 231	📄 234	📄 233

Additional mounts

FCN-150	SM-150
📄 231	📄 254

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

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V>max

P>max

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 desired pressure when ordered. All MM2 springs can be repaired and recharged. For locking the spring in the tool the FRM-150 lock nut is available.

Basic information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 180 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 80-100
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3016385

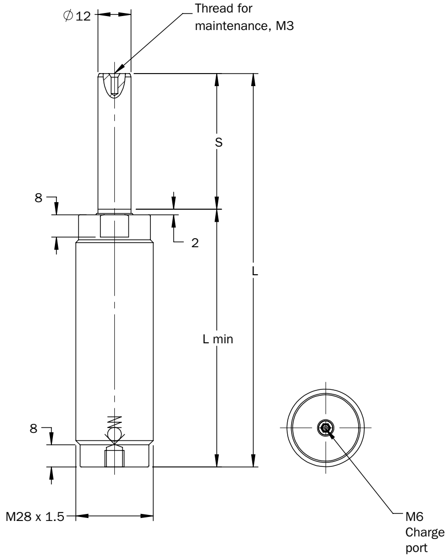
How to order

MM2 - 10 - Black

Model: MM2

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

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



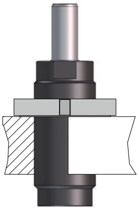
Model	Force in N at +20°C	Force in lbf at +20°C	Color	Charging pressure (bar)
	in N	in lbf		
MM2	500	110	Green	45
MM2	1,000	225	Blue	90
MM2	1,500	340	Red	135
MM2	2,000	450	Yellow	180
MM2 XX*	280-2,000	63-450	Black	25-180

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

S stroke	Isothermal end force in N at +20°C**				Isothermal 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

Mounting possibilities



Thread mount
FRM

Recommended mounts

FRM-150

📄 240

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

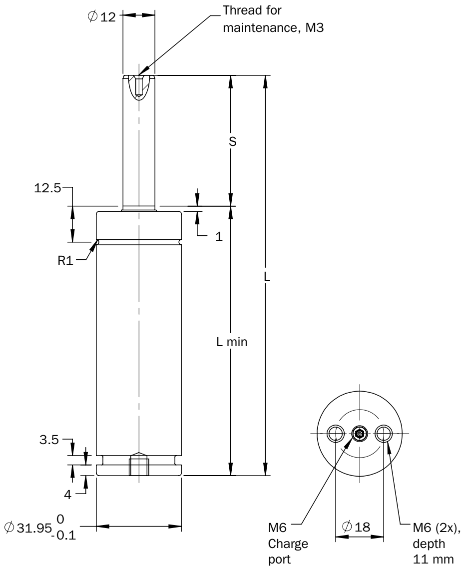
Each spring is color-coded for easy identification of force rating. We also offer a model with adjustable force (black) that can be customized to meet individual force requirements. The adjustable model may be set to the desired pressure when ordered. The spring can be attached to the tool, using an FCS or FFC mount. The M6 thread in the base of the spring is used for charging and is also a mounting option.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3016385

Automotive standard: VDI 3003, ISO 11901-1-1500, GMGDS 90.25.00-1.5, 39D878xx, B2 4005 21712xx, 03322xx, Z000332028, Z000299476, Z000332029, N000382204, Z000347117, Z000174638, Z000295927, R100036114, X346590726, X346590651, R100036118, 39-673-563x, 39-673-564x



How to order

MC3 - 10 - Green

Model: MC3

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

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

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

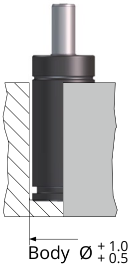
* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

S stroke	Isothermal end force in N at +20°C**				Isothermal 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	√

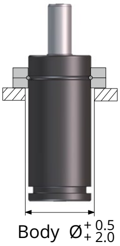
** at full stroke

Mounting possibilities

Base mount



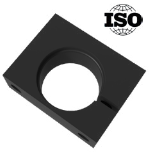
Drop -in



Top mount
FC, FCS

Foot mount
FFC-MC

Recommended mounts



FC-MC-150	FCS-32	FFC–MC-150	HMF-150	S-MC
231	235	237	246	252

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The MC3-SP spring is equipped with a M6 side charge port. 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 or black for easy identification of force rating. The adjustable force (black) 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.

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S>max

V>max

P>max

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3016385

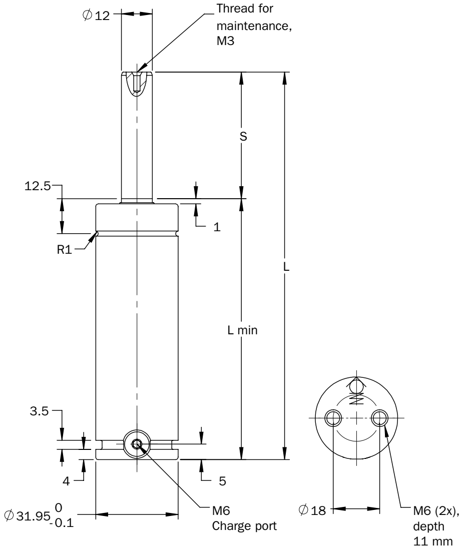
How to order

MC3-SP - 10 - Red

Model:

Force: Red, Black, state desire force in N

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



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

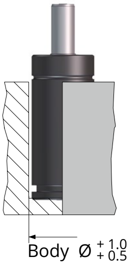
* Force to be set by the customer. Delivered with a pre-charge of 5-10 bar.

S stroke	Isothermal end force in N at +20°C **	Isothermal end force in lbf at +20°C **	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
	MC3-SP	MC3-SP					
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	√

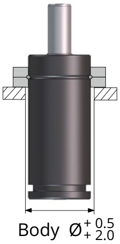
** at full stroke

Mounting possibilities

Base mount



Drop -in

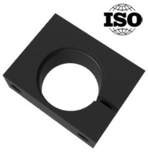


Top mount
FC, FCS

Foot mount
FFC-MC

Recommended mounts




FC-MC-150	FCS-32	FFC-MC-150	HMF-150	S-MC
🗎 231	🗎 235	🗎 237	🗎 246	🗎 252

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact profile.

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

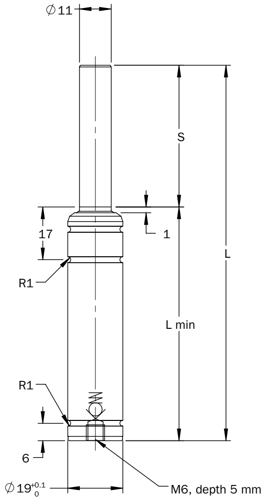
Flex Guide™

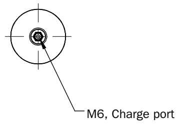
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 40-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	Non-repairable

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-1700, 39D997x,
B2 4005 21723xx, 04584xx, 39-673-020x, 90201401941,

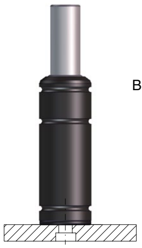




Order No.	S stroke	Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 170-007	7	1,700	2,800	382	630	44	37	0.002	0.06	
X 170-010	10					50	40	0.002	0.06	√
X 170-015	15					60	45	0.004	0.07	√
X 170-019	19					68	49	0.005	0.07	
X 170-025	25 ■					80	55	0.006	0.08	√
X 170-032	32					94	62	0.008	0.08	
X 170-038	38 ■					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	√

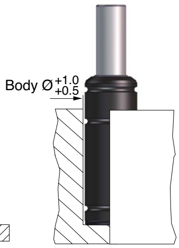
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

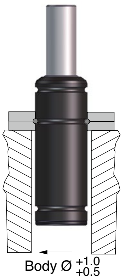


Base mount

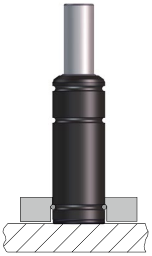
only to be used for strokes 7-25 mm



Drop - in
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

Recommended mounts

BF-19	FCR-90	FCR-19 VD12
🗎 228	🗎 234	🗎 233

Additional mounts

FC-19
🗎 232

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | MT 16

Mould Temp gas springs have been engineered to withstand higher operating 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 operating temperatures up to 120°C.

Features

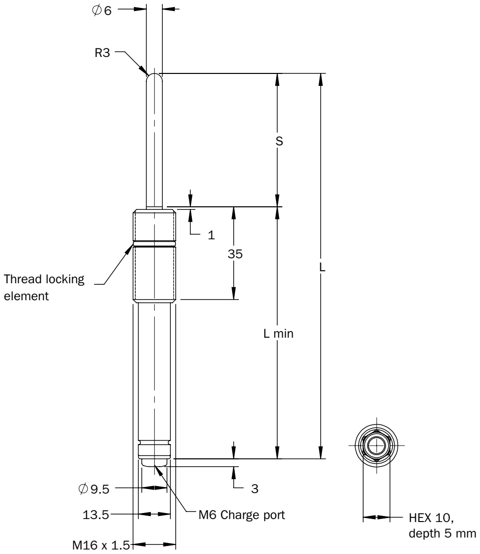
- For applications up to 120°C
- Fully adjustable charge pressure
- Various mounting possibilities using our standard mounts as well as bottom threaded holes
- MT 16 and MT 24 have threaded upper cylinders for easy and adjustable mounting
- M6 gas ports that can be connected to the special high temp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

Basic information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... See table below
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +120°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min .... See table below
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

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

* Isothermal end force at full stroke.

Installation tool

Order No. 3021000

Mounting possibilities

Thread mount
Lock nut available
M16x1.5   503681

Additional mounts

FRM-16
🗎 240

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Mould Temp gas springs have been engineered to withstand higher operating 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 operating temperatures up to 120°C.

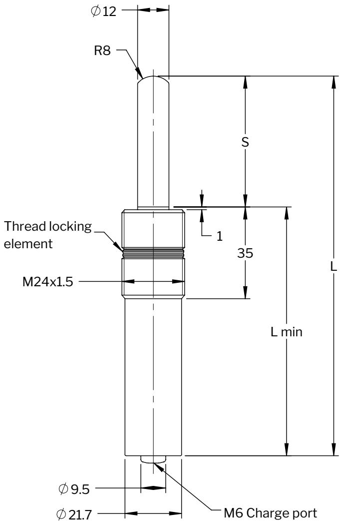
Features

- 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

Basic information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... See table below
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +120°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min .... See table below
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
Repair kit ....Non-repairable



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)	2,040 (1,700)	3,250 (2,700)
80 - 100°C	15	125	100°C (20°C)	1,800 (1,415)	2,880 (2,250)
100 - 120°C	10	115	120°C (20°C)	1,750 (1,300)	2,800 (2,080)

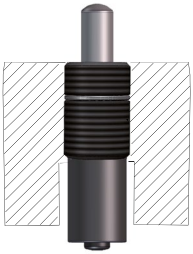
Order No.	S stroke	Initial force in N at 150 bar/+20°C	Initial force in lbf at 150 bar/+20°C	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
MT 24-010	10	1,700	382	65	55	0.003	0.13
MT 24-020	20			85	65	0.006	0.15
MT 24-030	30			105	75	0.008	0.17
MT 24-040	40			125	85	0.011	0.19
MT 24-050	50			145	95	0.012	0.21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

* Isothermal end force at full stroke.

Installation tool

Order No. 3021000

Mounting possibilities



Thread mount
Lock nut available
M24x1.5 503928

Additional mounts

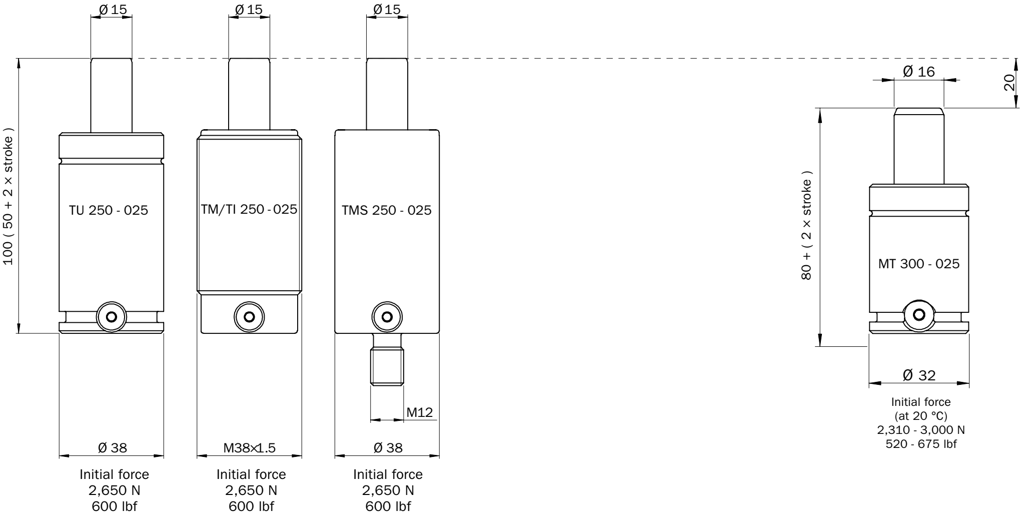
FRM-19

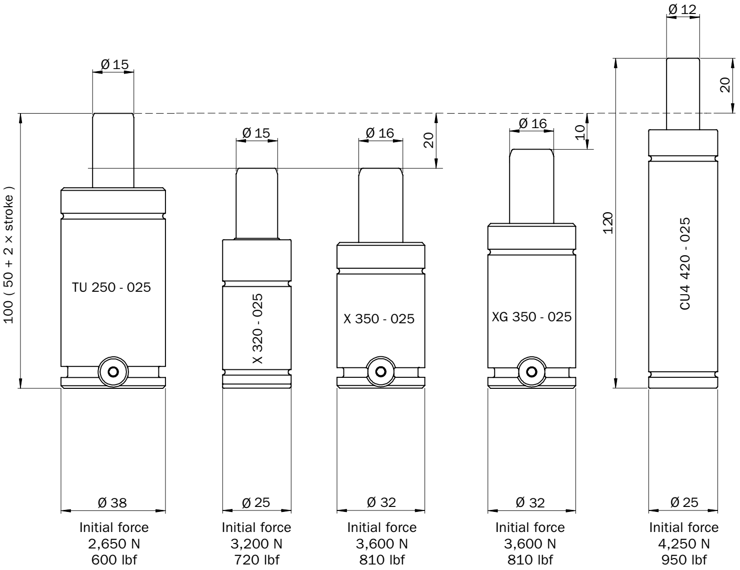
📄 240

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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





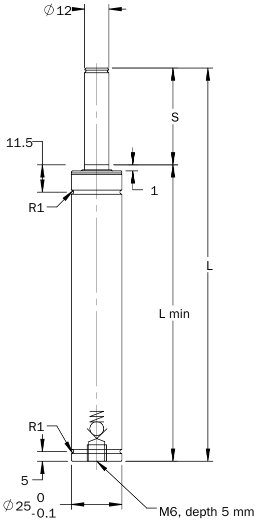
This is the smallest member of the CU4 family. As with the rest of the CU4 springs it has a very high force compared to its outer diameter.

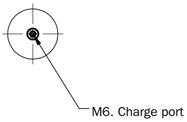
Basic information

For general information see “About gas springs”.

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

Automotive standard: 5937643, 5937644, 5937645, 5937646, 5937647, 5937648





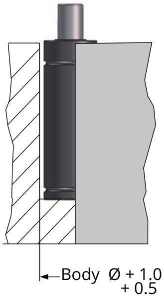
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
CU4 420-006	6	4,250	7,300	955	1,641	56	50	0.003	0.13
CU4 420-010	10 ■		7,300		1,416	70	60	0.005	0.15
CU4 420-016	16 ■		7,300		1,416	91	75	0.008	0.18
CU4 420-025	25 ■		7,400		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

* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

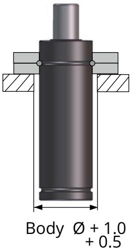
Mounting possibilities

Base mount

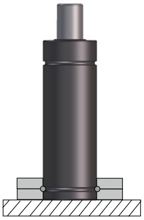
only to be used for
strokes 7-25 mm



Drop - in



**Top mount
FCR, FC**



**Foot mount
FCR**

Recommended mounts

FC-150	FCR-150	FCR-25
🗎 231	🗎 234	🗎 233

Additional mounts

FCN-150
🗎 231

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

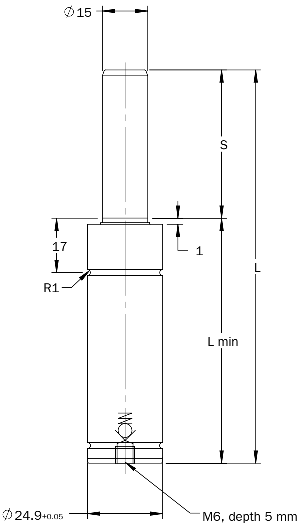
The Power Line springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm. The X 320 has a bottom port for gas charging that can also be used to connect to a gas link system. The X 320 has an upper ISO Standard C-groove that together with a threaded bottom hole offers various mounting possibilities using our standard mounts.

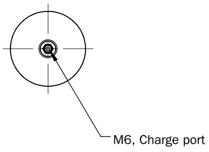
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	Non-repairable

Automotive standard: 39D99710x, 90201407353

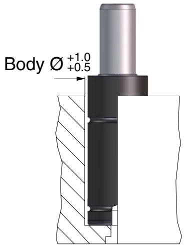




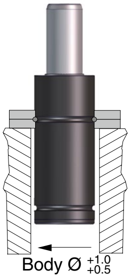
Order No.	S Stroke	Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 320-007	7	3,200	4,800	720	1,080	44	37	0.004	0.10	
X 320-010	10		4,900		1,100	50	40	0.005	0.11	√
X 320-015	15		5,100		1,150	60	45	0.007	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 320-032	32		5,300		1,190	94	62	0.014	0.15	
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	√

* Isothermal end force at full stroke.   ■ Recommended stroke length for optimal delivery.

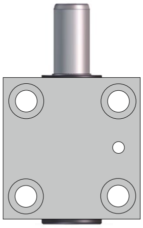
Mounting possibilities



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



Top mount
FCR, FC



Body mount
SM

Recommended mounts

FC-150	FCR-150	FCR-25
📄 231	📄 234	📄 233

Additional mounts

FCN-150	SM-150
📄 231	📄 254

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

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S>max

V>max

P>max

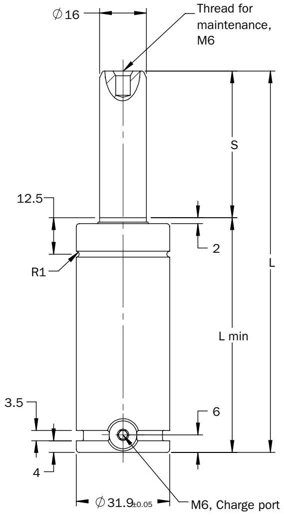
Flex Guide™

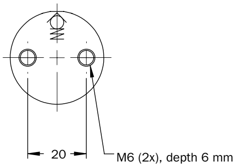
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018845

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-3500, WDX356204-03xxDMS, GMGDS 90.25.08-3.5, 39D99xx, B2 4005 21723xx, 04584xx, 39-673-021x, 39-673-0220, 304503x, 305074x



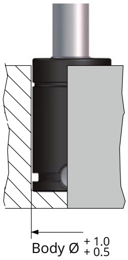


Order No.	S stroke	Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 350-010	10	3,600	5,900	810	1,330	50	40	0.01	0.17	√
X 350-013	13		5,200		1,190	56	43	0.01	0.18	√
X 350-016	16		5,300		1,210	62	46	0.01	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 ■		5,500		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	√

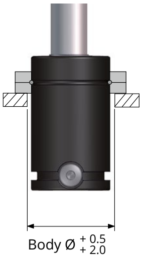
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



Drop - in

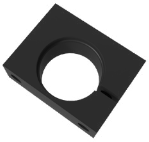


Top mount FC, FCS

Foot mount FFC

Recommended mounts




FC-MC-150	FCS-32	FFC-MC-150	HMF-150	S-MC
🗎 231	🗎 235	🗎 237	🗎 246	🗎 252

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

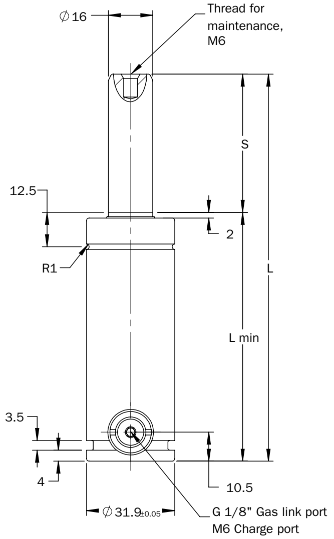
These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm. There is a side port for gas charging that can also be used to connect to a hose system. An upper C-groove, lower U-groove together with two M6 threaded holes allows for various mounting possibilities using our standard mounts.

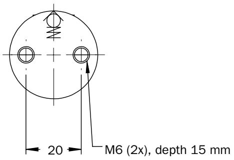
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	180 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018845

Automotive standard: MES E7231 PG230-PG24D-03, M-2404-TD-1-350



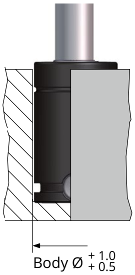


Order No.	S stroke	Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 350-010	10	3,600	5,900	810	1,330	60	50	0.01	0.23
XG 350-013	13		5,200		1,190	66	53	0.01	0.23
XG 350-016	16		5,300		1,210	72	56	0.01	0.24
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 ■		5,500		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

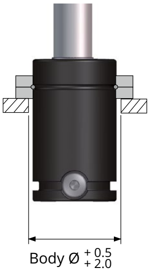
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



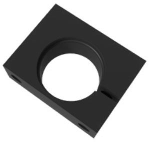
Drop - in



Top mount
FC, FCS

Foot mount
FFC

Recommended mounts

			
FC-MC-150	FCS-32	FFC-XG-350	HMF-150
📄 231	📄 235	📄 237	📄 246

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TU 250

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.

APPROVED PED 2014/68/EU

S>max

V>max

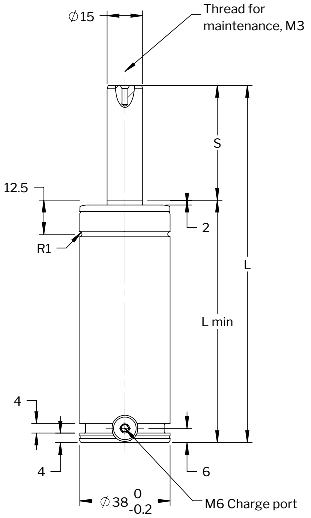
P>max

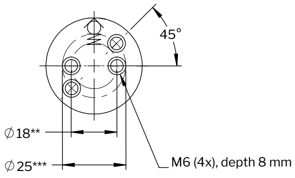
Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 80-100
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3026638

Automotive standard: VDI 3003, ISO 11901-1-5000 WDX356203-0202DMS GMGDS 90.25.00-2.5 39D878xx, B2 4005 21680xx, B2 4006 33834xx, B2 4006 21710xx. B2 4006 33834xx, 03322xx, N00135992x, N001374093, X346590500, R100287063, X346590823, 39-673-564x, 39-673-565x, N03020x, K32S0-0250-25, 304417x, M-2401-TD-01-250



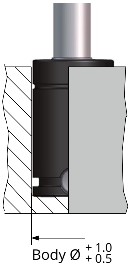


Order No.	S stroke	Force in N at 180 bar/+20°C		Force in lbf at 180 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 250-010	10	2,650	3,500	600	790	70	60	0.011	0.40	√
TU 250-013	12.7		3,500			75.4	62.7	0.013	0.42	
TU 250-016	16		3,500			82	66	0.016	0.43	√
TU 250-025	25 ■		3,500			100	75	0.023	0.48	√
TU 250-038	38.1		3,500			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	√

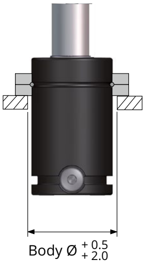
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



Drop - in

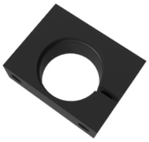


Top mount
FC, FCS

Foot mount
FFC

Recommended mounts




FC–250	FCS-250	FFC-250	HMF-250	S-250
🗎 231	🗎 235	🗎 237	🗎 246	🗎 252

Additional mounts

FCN-250	HM-250	K-250	L-250
🗎 231	🗎 245	🗎 247	🗎 248

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

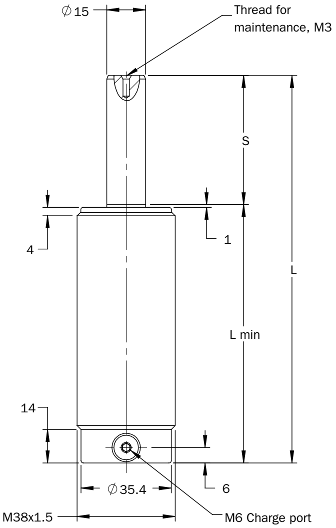
2 | TM/TI 250

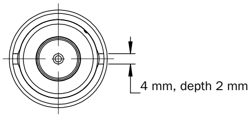
The TM 250 and TI 250 are threaded cylinders with the same length as the TU 250. The TM spring has an M38 × 1.5 metric thread. The TI spring has a UNF 1½-12 inch thread.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3016873

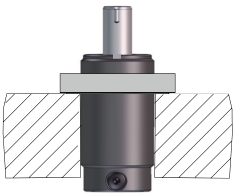




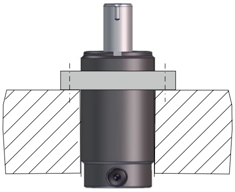
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TM/TI 250-013	12.7	2,650	3,400	600	765	75.4	62.7	0.015	0.37
TM/TI 250-025	25		3,400		765	100	75	0.024	0.42
TM/TI 250-038	38.1		3,400		765	126.2	88.1	0.033	0.47
TM/TI 250-050	50		3,400		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	0.88

* Isothermal end force at full stroke.

Mounting possibilities



Lock nut
FRM



Top mount
FTM

Recommended mounts

FRM–250	FTM-250
🗎 240	🗎 244

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TMS 250

The TMS are springs equipped with a threaded stud for mounting. The TMS (Tube Metric Stud) has a M12 thread.

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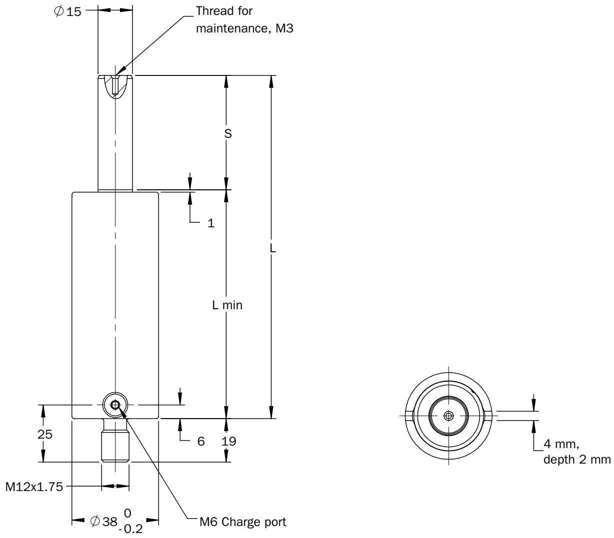
V>max

Flex Guide™

Basic information

For general information see “About gas springs”.

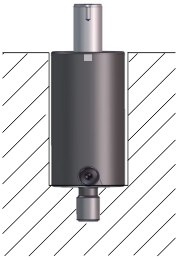
Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3016873



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

* Isothermal end force at full stroke.

Mounting possibilities



Thread mount
M12x1.75

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 operating temperatures up to 120°C.

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S>max

V>max

P>max

Flex Guide™

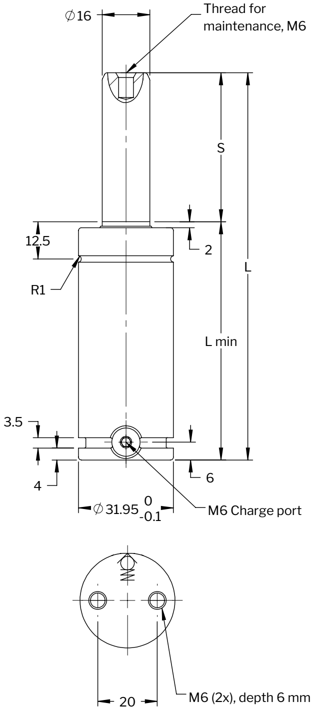
Features

- 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

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	Se table below
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +120°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min	See table below
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
Repair kit	3022687



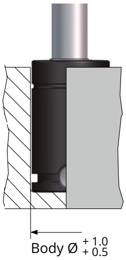
Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 - 80°C	20	150	80°C (20°C)	3,630 (3,000)	5,550 (4,600)
80 - 100°C	15	125	100°C (20°C)	3,200 (2,510)	4,900 (3,850)
100 - 120°C	10	115	120°C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

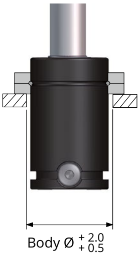
* Isothermal end force at full stroke.

Mounting possibilities

Base mount



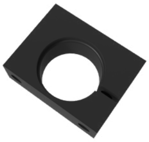
Drop - in



Top mount
FC, FCS

Foot mount
FFC, MC

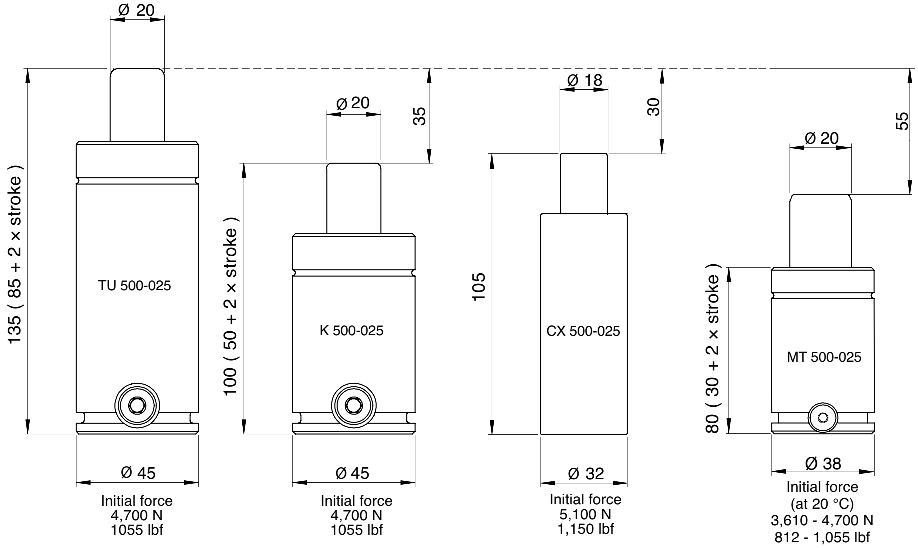
Recommended mounts

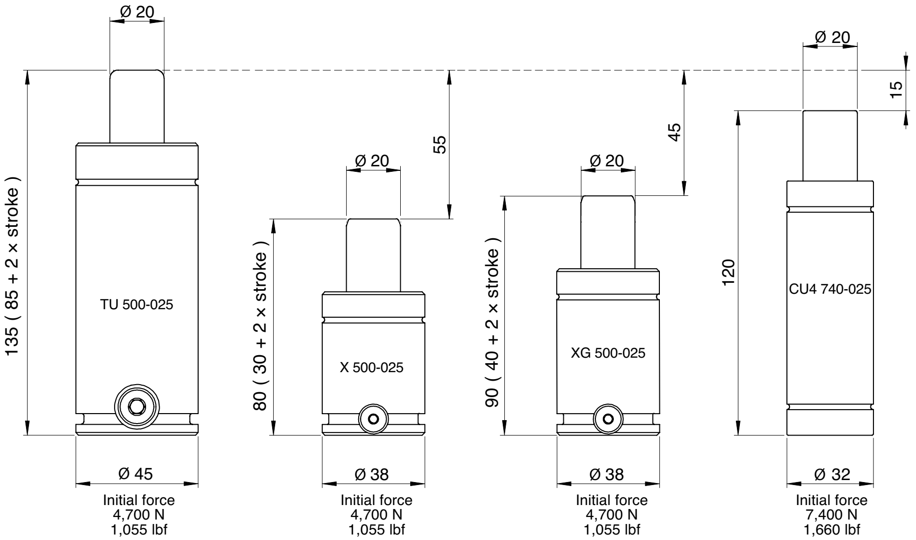
				
FC–MC-150	FCS-32	FFC-MC-150	HMF-150	S-MC
🗎 231	🗎 235	🗎 237	🗎 246	🗎 252

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Overview - 5000 ≤ F_{INIT} < 7500





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.

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S>max

V>max

P>max

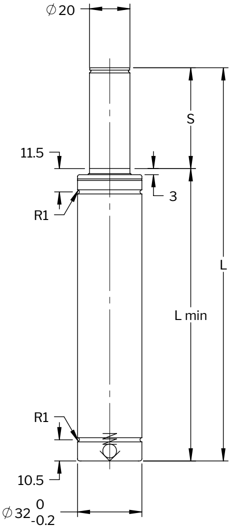
Flex Guide™

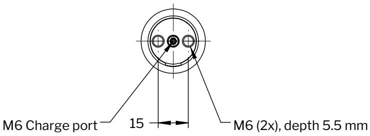
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3025048

Automotive standard: WDX35-62-06007xxDM, 5937649. 5937650. 5937651. 5937652. 5937653.5937654. 5937655



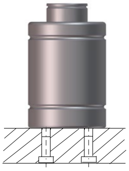


		Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C					
Order No.	S stroke	Initial	End force**	Initial	End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 740-006	6	7,400	10,000	1,660	2,200	63	57	0.012	0.20
CU4 740-010	10 ■		10,000		2,250	75	65	0.017	0.24
CU4 740-016	16 ■		11,000		2,475	93	77	0.024	0.28
CU4 740-025	25 ■		12,000		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

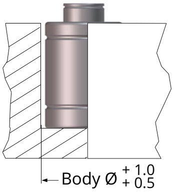
* Should always be attached to the tool using the tapped holes in the bottom or a flange. ** Isothermal end force at full stroke.

■ Recommended stroke length for optimal delivery.

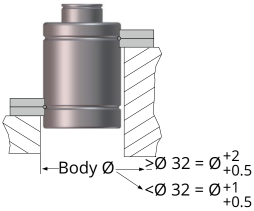
Mounting possibilities



Base mount



Drop-in



Top mount
FC, FCS

Recommended mounts

FC–MC-150	FCS-32
📄 231	📄 235

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 Power Line X series and provide extreme forces comparable to the bore sealed Super Compact CU4 series. In addition, the CX gas spring can handle higher stroke frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate.

APPROVED PED 2014/68/EU

S>max

V>max

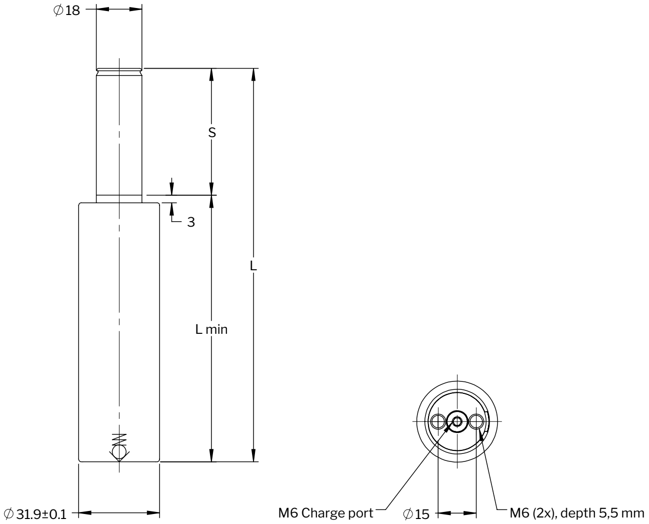
P>max

Flex Guide™

Basic information

For general information see “About gas springs”.

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



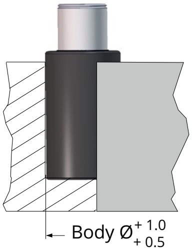
		Force in N at 200 bar/+20°C		Force in lbf at 200 bar/+20°C					
Order No.	S stroke	Initial	End force**	Initial	End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CX 500-010	10 ■	5,100	6,600	1,150	1,490	75	65	0.01	0.27
CX 500-015	15 ■		7,100		1,610	85	70	0.02	0.29
CX 500-025	25 ■		7,900		1,780	105	80	0.02	0.33
CX 500-038	38* ■		8,700		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

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

** Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

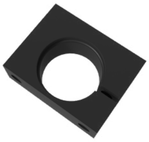
Base mount



Drop - in

Side port
SPCX

Recommended mounts



HMF-150	SPCX-500
246	256

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

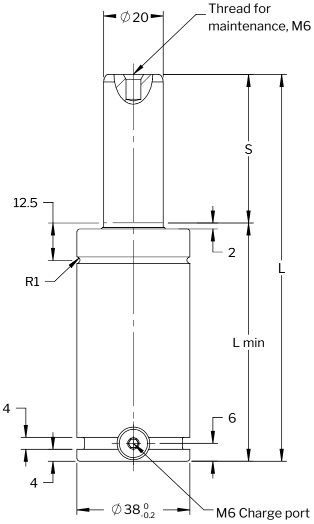
These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths between 7 and 125 mm. There is a side port for gas charging that can also be used to connect to a hose system. An upper C-groove, lower U-groove together with two sets of M6 threaded holes patterns allowing various mounting possibilities using our standard mounts.

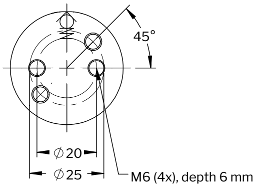
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018846

Automotive standard: VDI 3003-Blatt 3 ISO 11901-3-5000 WDX356204-05xxDMS GMGDS 90.25.08-5 39D997xx B2 4005 21723xx 04584xx, Z0004590xx, N000491555 , Z000504472, Z000416026, 39-673-022x, 39-673-023x, 305074x



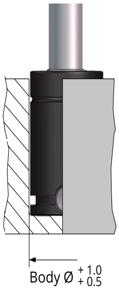


Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 500-010	10	4,700	7,200	1,055	1,620	50	40	0.01	0.25	√
X 500-013	13		7,100		1,600	56	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 ■		7,200		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	√

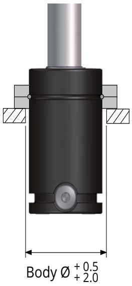
* Isothermal end force at full stroke.   ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



Drop - in

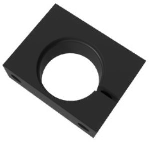


Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–250	FCS-250	FFC-250	HMF-250
🗎 231	🗎 235	🗎 237	🗎 246

Additional mounts

FCN-250	K-250	L-250
🗎 231	🗎 247	🗎 248

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

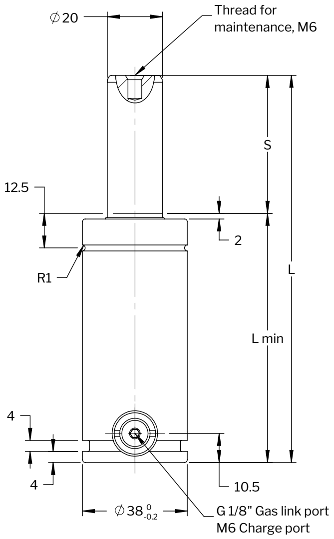
Flex Guide™

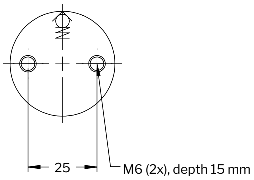
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018846

Automotive standard: MES E7231 PG230-PG24D-05, M-2404-TD-8-500





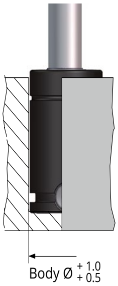
	S	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L	L	Gas vol.	Weight
Order No.	stroke	Initial	End force*	Initial	End force*	±0.25	min.	(l)	(kg)
XG 500-010	10	4,700	7,200	1,055	1,620	60	50	0.01	0.33
XG 500-013	13		7,100		1,600	66	53	0.01	0.34
XG 500-016	16		7,200		1,620	72	56	0.02	0.36
XG 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 ■		7,200		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

* Isothermal end force at full stroke.

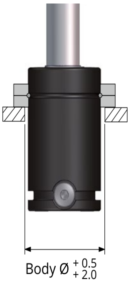
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



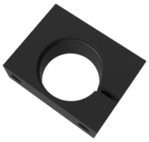
Drop - in



Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–250	FCS-250	FFC-250	HMF-250
🗎 231	🗎 235	🗎 237	🗎 246

Additional mounts

FCN-250	K-250	L-250
🗎 231	🗎 247	🗎 248

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

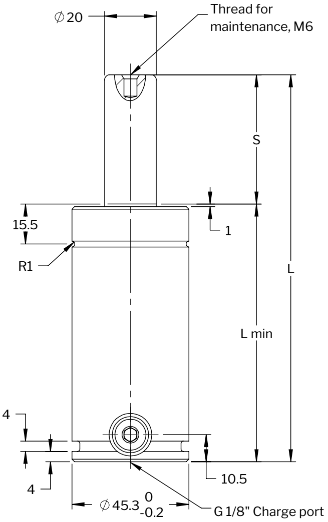
This is a short height spring with an initial force of 4,700 N. This spring is 35 mm shorter than the TU 500. Mounting options are the same as for the TU 500.

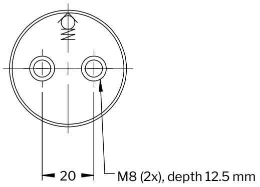
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 40-80
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3017230-0500

Automotive standard: R100278271, X346590506, R100288377, R100288378



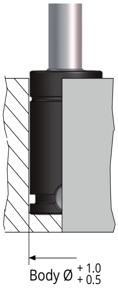


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
K 500-006	6	4,700	5,600	1,055	1,260	62	56	0.02	0.50
K 500-013	12.7		5,900		1,330	75.4	62.7	0.03	0.54
K 500-019	19		6,100		1,370	88.1	69.05	0.04	0.59
K 500-025	25		6,100		1,370	100	75	0.04	0.62
K 500-038	38.1		6,200		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

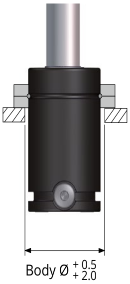
* Isothermal end force at full stroke.

Mounting possibilities

Base mount



Drop - in

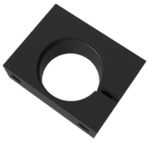
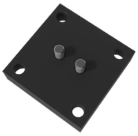


Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC-500	FCS-500	FFC-500	HMF-500	MP-500
📄 231	📄 235	📄 237	📄 246	📄 249

Additional mounts

FCSC-500	K-500	L-500
📄 236	📄 247	📄 248

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TU 500

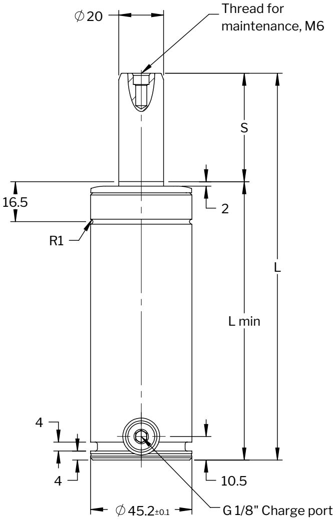
The TU line constitutes our standard line of gas springs. Sizes 250 to 10000 conform to the ISO 11901 gas spring standard.

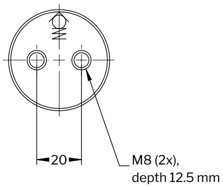
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 40-80
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	2026637-0500

Automotive standard: VDI 3003, ISO 11901-1-5000, GMGDS 90.25.00-5, 39D878xx, B2 4006 21710xx, B2 4005 21680xx, B2 4006 2171243, 03322xx, X34659033x, Z000307844, X34659033x, Z000234960, X34659033x, Z000287855, N000539337, X346590829, R10003612x, 39-673-500x, 39-673-501x, MES E7231 PG230-PG23D-05, K32S0-0500, 304417x, 304418x, SD116322-500, M-2401-TD-06-500



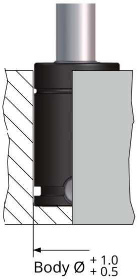


Order No.	S stroke	Force in N at 180 bar/+20°C Initial	Force in N at 180 bar/+20°C End force*	Force in lbf at 180 bar/+20°C Initial	Force in lbf at 180 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
TU 500-010	10	4,700	6,000	1,055	1,350	105	95	0.023	0.93	
TU 500-013	12.7		6,100		1,370	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	√

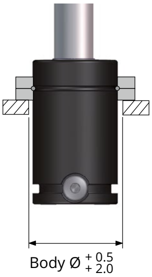
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



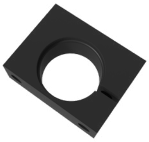
Drop - in

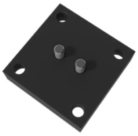


Top mount
FC, FCS

Foot mount
FFC

Recommended mounts





FC–500	FCS-500	FFC-500	HMF-500	MP-500	S-500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-500	K-500	L-500	NMP-750
🗎 236	🗎 247	🗎 248	🗎 250

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 operating temperatures up to 120°C.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

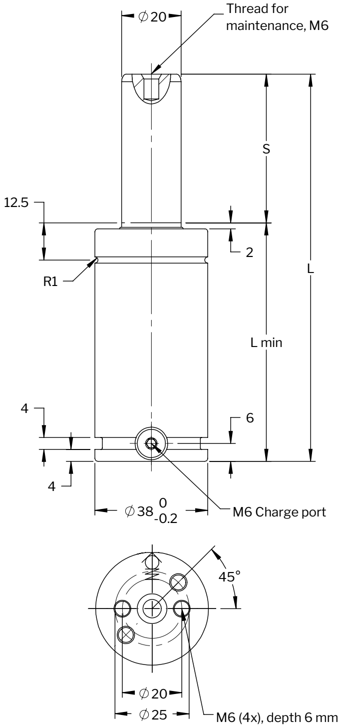
Features

- 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.

Basic information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... Se table below
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +120°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min .... See table below
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
Repair kit 3022687



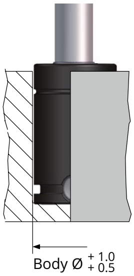
Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 - 80°C	20	150	80°C (20°C)	5,680 (4,700)	8,690 (7,200)
80 - 100°C	15	125	100°C (20°C)	5,000 (3,930)	7,650 (6,010)
100 - 120°C	10	115	120°C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

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

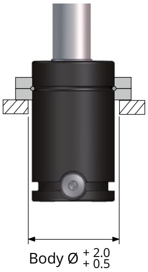
* Isothermal end force at full stroke.

Mounting possibilities

Base mount



Drop - in

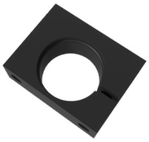


Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–250	FCS-250	FFC-250	HMF-250
📄 231	📄 235	📄 237	📄 246

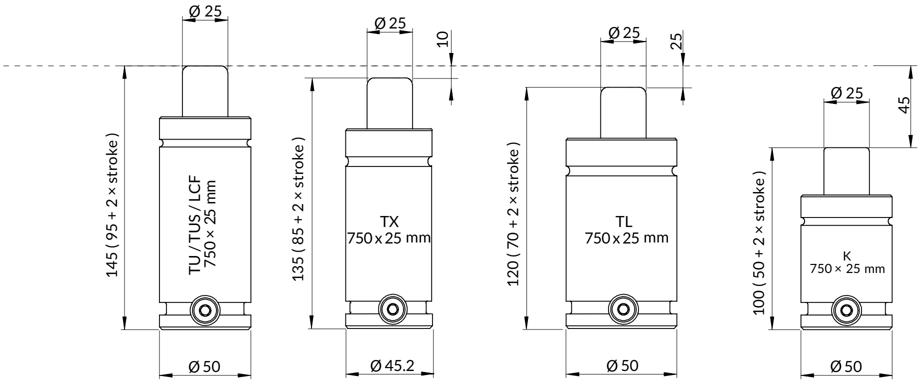
Additional mounts

FCN-250	K-250	L-250
📄 231	📄 247	📄 248

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | Overview - 7500 ≤ F_{INIT} < 10000

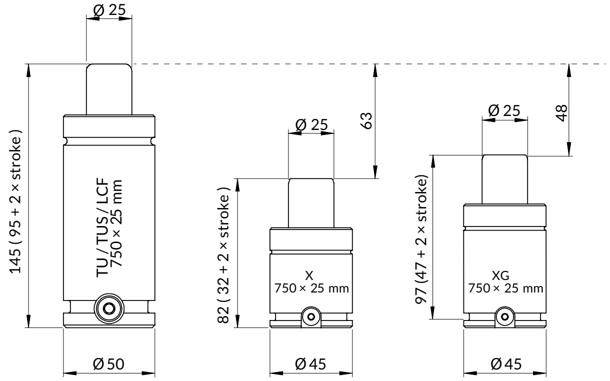


Initial force
7,400 N
1,665 lbf

Initial force
7,400 N
1,665 lbf

Initial force
7,400 N
1,665 lbf

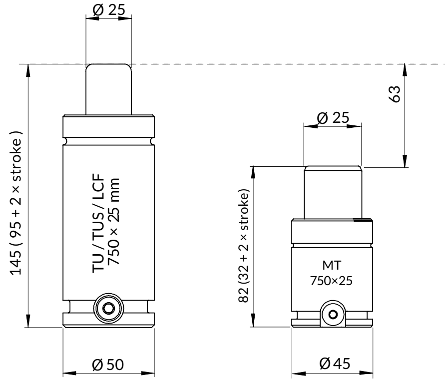
Initial force
7,400 N
1,665 lbf



Initial force
7,400 N
1,665 lbf

Initial force
7,400 N
1,665 lbf

Initial force
7,400 N
1,686 lbf



Initial force
7,400 N
1,665 lbf

Initial force
(at 20 °C)
5,650 - 7,400 N
1,270 - 1,665 lbf

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

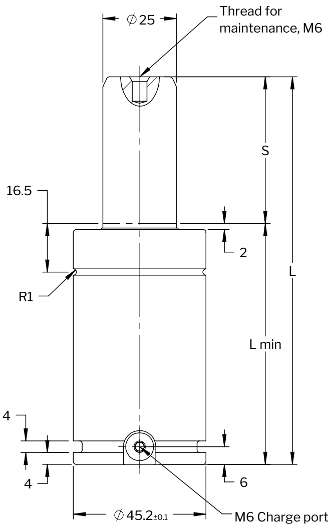
Flex Guide™

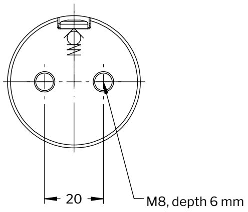
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019903

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-7500, WDX356204-07xxDMS, GMGDS 90.25.08-7.5, 39D997xx, B2 4005 21749xx, 04585xx, N000491556, Z0004590xx



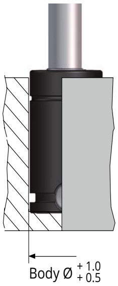


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 750-010	10	7,400	12,100	1,665	2,720	52	42	0.02	0.37	
X 750-013	13		12,100		2,720	58	45	0.02	0.39	√
X 750-016	16		12,100		2,720	64	48	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 ■		11,800		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	√

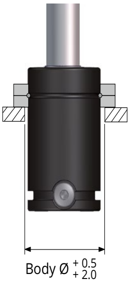
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount



Drop - in

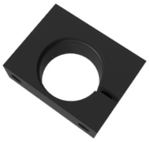


Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–500	FCS-500	FFC-500	HMF-500
🗎 231	🗎 235	🗎 237	🗎 246

Additional mounts

FCSC-500	K-500	L-500	NMP-750
🗎 236	🗎 247	🗎 248	🗎 250

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 XF series conforms with the FCA Fiat-Chrysler standard 075.90.60. There is a G 1/8” side port for charging or to connect to a gas link system. The upper ISO Standard C-groove and the threaded bottom hole offer various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

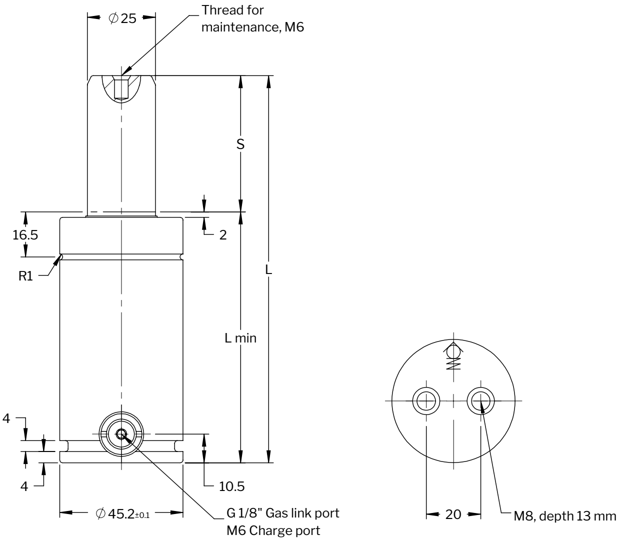
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019903

Automotive standard: GMGDS 90.25.08-7.5G, 39-673-023x, 39-673-024x

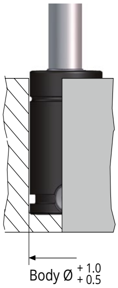


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XF 750-010	10	7,400	12,100	1,665	2,720	62	52	0.02	0.47
XF 750-013	13		12,100		2,720	68	55	0.02	0.49
XF 750-016	16		12,100		2,720	74	52	0.03	0.51
XF 750-019	19		11,700		2,630	80	61	0.03	0.51
XF 750-025	25		11,800		2,650	92	67	0.04	0.55
XF 750-032	32		11,800		2,650	106	74	0.05	0.60
XF 750-038	38		11,800		2,650	118	80	0.05	0.64
XF 750-050	50		11,800		2,650	142	92	0.07	0.71
XF 750-063	63		11,800		2,650	168	105	0.09	0.79
XF 750-075	75		11,900		2,675	192	117	0.10	0.87
XF 750-080	80		11,900		2,675	202	122	0.11	0.90
XF 750-100	100		11,900		2,675	242	142	0.13	1.03
XF 750-125	125		11,900		2,675	292	167	0.17	1.19

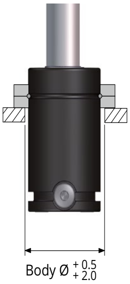
* Isothermal end force at full stroke.

Mounting possibilities

Base mount



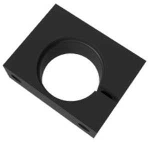
Drop - in



Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–500	FCS-500	FFC-500	HMF-500
📄 231	📄 235	📄 237	📄 246

Additional mounts

FCSC-500	K-500	L-500	NMP-750
📄 236	📄 247	📄 248	📄 250

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

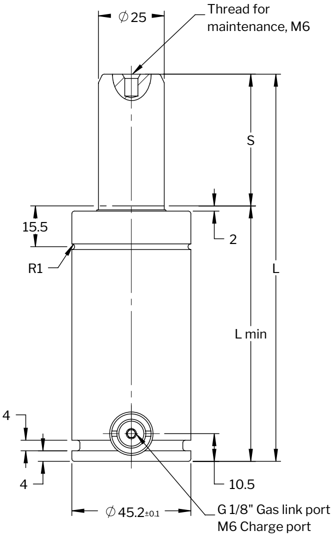
These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 10 and 125 mm. There is a side port for gas charging that can also be used to connect to a hose system. An upper C-groove, lower U-groove together with two M8 threaded holes allows for various mounting possibilities using our standard mounts.

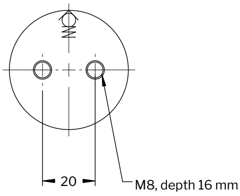
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019903

Automotive standard: R90344047x, MES E7231 PG230-PG24D-07, K32R0-0750-050, M-2404-TD-15-750





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*				
XG 750-010	10	7,400	12,100	1,665	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 ■		11,800		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

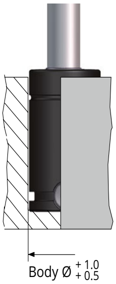
* Isothermal end force at full stroke.

Installation tool

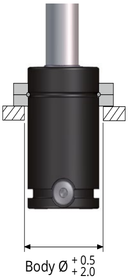
Valve Plug
Installation Tool,
XG 350 - XG 750
Order No. 3022974

Mounting possibilities

Base mount



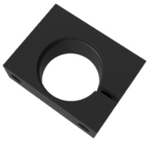
Drop - in



Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts

			
FC–500	FCS-500	FFC-500	HMF-500
📄 231	📄 235	📄 237	📄 246

Additional mounts

FCSC-500	K-500	L-500	NMP-750	RMX-750
📄 236	📄 247	📄 248	📄 250	📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

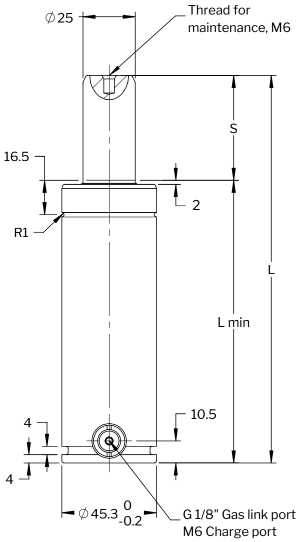
Flex Guide™

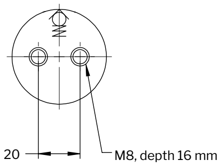
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3026200

Automotive standard: GMGDS 90.25.05-05, ISO 11901-4-7500



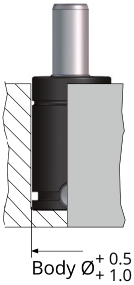


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 750-013	13	7,400	12,000	1,665	2,700	111	98	0.04	0.85	
TX 750-025	25		12,000		2,700	135	110	0.06	0.93	√
TX 750-038	38		12,000		2,700	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		12,000		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	√

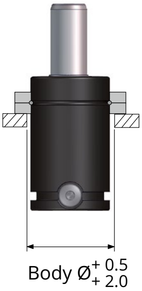
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP



Drop - in

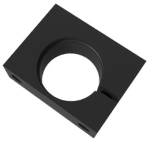
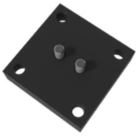


Top mount
FC, FCS,
FCSC

Foot mount
K, FFC

Recommended mounts




FC–500	FCS-500	FFC-500	HMF-500	MP-500	S-500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-500	K-500	L-500	NMP-750
🗎 236	🗎 247	🗎 248	🗎 250

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

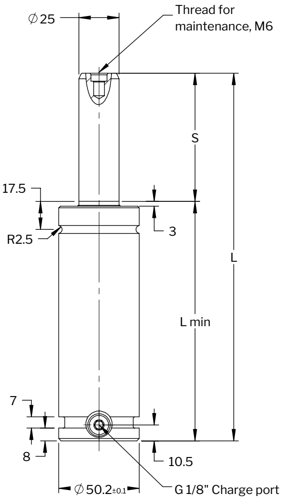
V>max

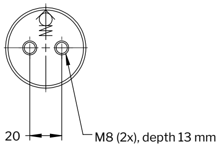
P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3024118



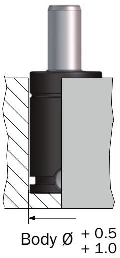


Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TL 750-013	12.5	7,400	11,400	1,660	2,560	95	82.5	0.03	0.97
TL 750-025	25		11,700		2,630	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

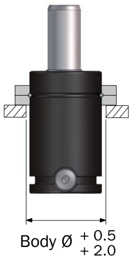
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

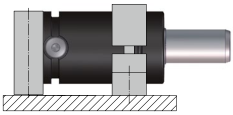


Drop - in



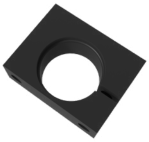
Top mount
FC, FCS,
FCSC

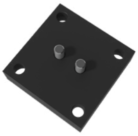
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts





FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–750	FCSC-750	FFL-750	FSL-750	FSS-750	HM-750
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–750	L-750	NMP-1000	RM-750	SA-750
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

V>max

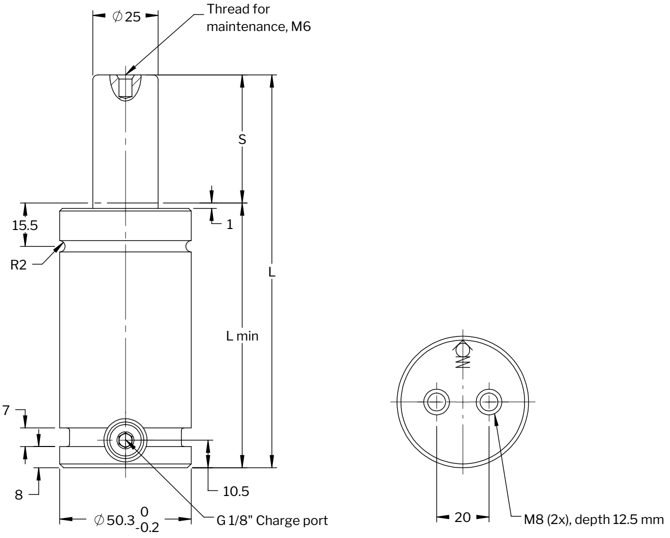
P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3017230-0750

Automotive standard: R100278277, R100288380. R100288377. R100288378

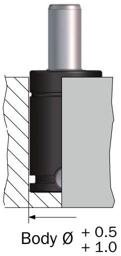


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
K 750-006	6	7,400	15,000	1,665	3,370	62	56	0.01	0.68
K 750-013	12.7		13,000		2,920	75.4	62.7	0.02	0.73
K 750-019	19		12,000		2,700	88.1	69.05	0.03	0.80
K 750-025	25		11,000		2,470	100	75	0.04	0.82
K 750-038	38.1		11,000		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

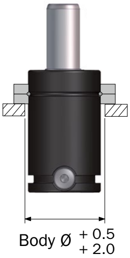
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

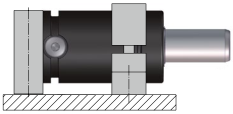


Drop - in



Top mount
FC, FCS,
FCSC

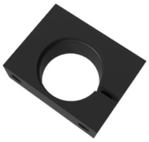
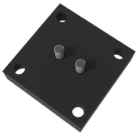
Foot mount
K, FFC



Body mount
FAC, SA, S

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-750	FFL-750	FSS-750	K–750	L-750	RM-750
🗎 236	🗎 238	🗎 243	🗎 247	🗎 248	🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

V>max

P>max

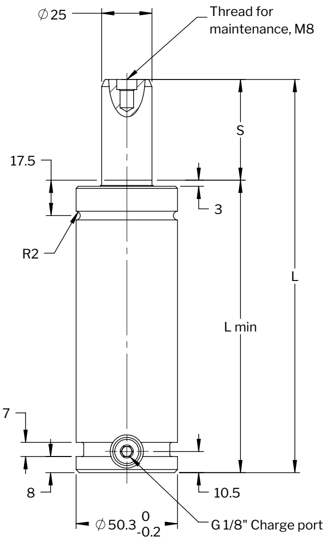
Flex Guide™

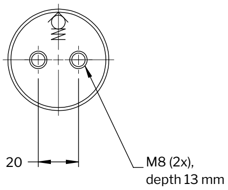
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019817

Automotive standard: ISO 11901-1-7500, WDX356203-07xxDMS, GMGDS 90.25.00-7.5, 39D878xx, B2 4006 21710xx, B2 4006 32521xx, B2 4006 32841xx, B2 4006 0996826, B2 4006 3273512, B2 4006 3344894, 03322xx, X34659033x, Z000304414, X346590260, X346590253, R10003620x, X3465906xx, R100036210, 39-673-510x, 39-673-511x, 39-673-512x, 39-673-5130, N03070x, N03071x, N030720, MES E7231 PG230-PG23D-07, K32S0-0750, 304418x, 997594x, 997595x, SD116322-750, M-2401-TD-1-750





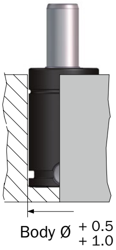
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 750-013	12.7	7,400	12,000	1,665	2,700	120.4	107.7	0.03	1.33	
TU 750-025	25 ■		12,000		2,700	145	120	0.04	1.44	√
TU 750-038	38.1		12,000		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		12,100		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	√

* Isothermal end force at full stroke.

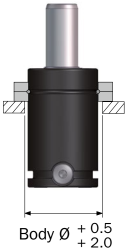
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

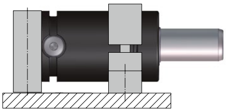


Drop - in



Top mount
FC, FCS,
FCSC

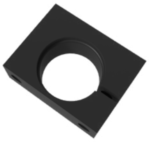
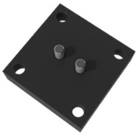
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–750	FCSC-750	FFL-750	FSL-750	FSS-750	HM-750
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–750	L-750	NMP-1000	RM-750	SA-750
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The TUS High Speed gas springs have been engineeredto 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.

APPROVED PED 2014/68/EU

S>max

V>max

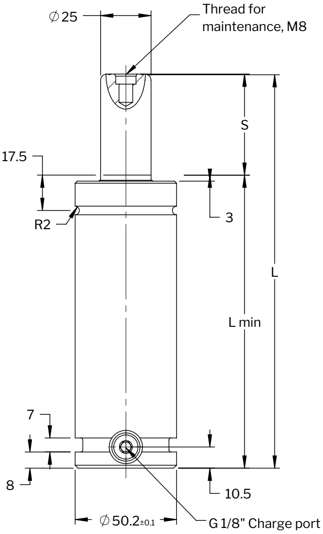
P>max

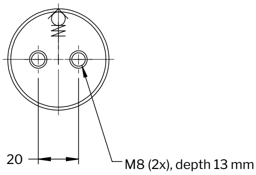
Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 2.0 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3019277

Automotive standard: R903636001, R903636002, R903636003, R903636004, R903636005, R903636006



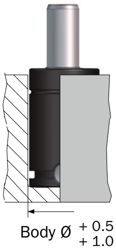


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUS 750-025	25	7,400	12,000	1,665	2,700	145	120	0.04	1.44
TUS 750-038	38.1		12,000		2,700	171.2	133.1	0.06	1.57
TUS 750-050	50		12,000		2,700	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		12,000		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

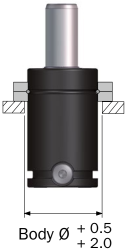
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

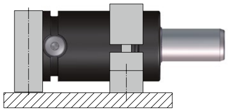


Drop - in



Top mount
FC, FCS,
FCSC

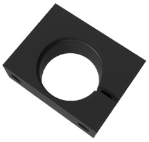
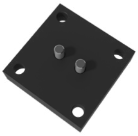
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FAC–750	FFL-750	FSL-750	FSS-750	HM-750	K–750
📄 230	📄 238	📄 241	📄 243	📄 245	📄 247

L-750	NMP-1000	RM-750	SA-750
📄 248	📄 250	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

S>max

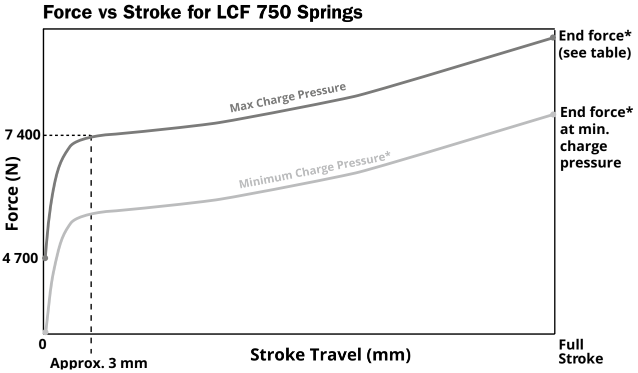
V>max

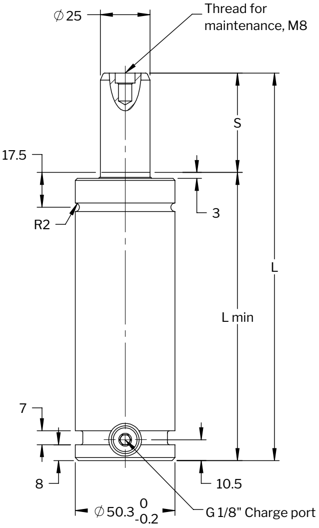
P>max

Flex Guide™

Basic information

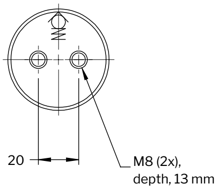
For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 70 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recom max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
*Repair kit.. 3019377





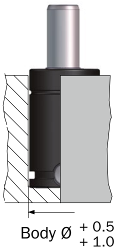
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
LCF 750-013	12.7	7,400	12,000	1,665	2,700	120.4	107.7	0.03	1.30
LCF 750-025	25					145	120	0.04	1.45
LCF 750-038	38.1					171.2	133.1	0.06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

* Isothermal end force at full stroke.

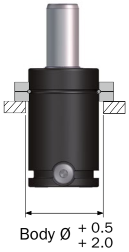


Mounting possibilities

Base mount
MP

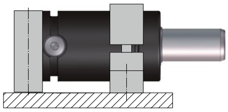


Drop - in



Top mount
FC, FCS, FCSC

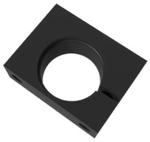
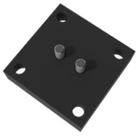
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC-750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC-750	FCSC-750	FFL-750	FSS-750	K-750	L-750	RM-750	SA-750
🗎 230	🗎 236	🗎 238	🗎 243	🗎 247	🗎 248	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Speed Control™ – SPC gas springs have been engineered to reduce or 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.

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S>max

V>max

P>max

Flex Guide™

Features

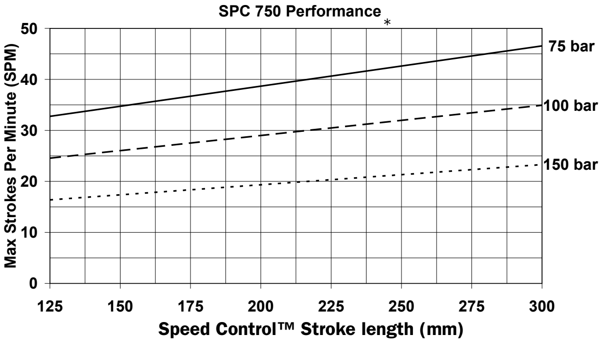
- Reduces or eliminates blank holder bounce
- Increases productivity by enabling high transfer speeds
- Easily retrofitted to existing dies
- Stroke lengths from 80 to 300 mm
- Linkable using a hose system

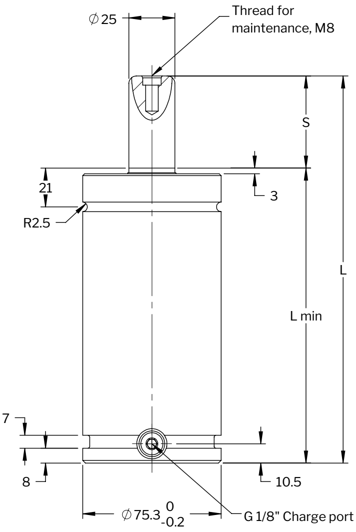
Basic information

For general information see “About gas springs”.

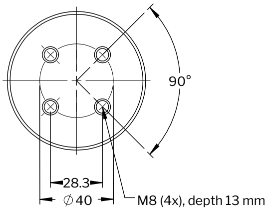
Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	See chart below
Max piston rod velocity	1.6 m/s
Dampening length	≈30 mm
End stop speed	0.4 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3421490

Automotive standard: 5934868, 5937351, 5937387, 5937821, 5937824





*At 20°C ambient room temperatures with free convection

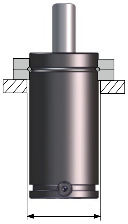


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
SPC 750-080	80	7,400	8,700	1,665	2,700	270	190	0.30	5.50
SPC 750-100	100					310	210	0.36	5.80
SPC 750-125	125					360	235	0.44	6.10
SPC 750-160	160					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

* Isothermal end force at full stroke.

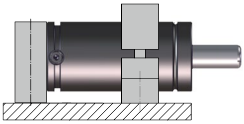
Mounting possibilities

Base mount
MP



Top mount
FC, FCS,
FCSC

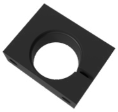
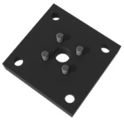
Foot mount
K, FFC



Body mount
FAC, SA, S

Recommended mounts




FC-1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FAC–1500	FCSC-1500	FFL-1500	FSS-1500	HM–1500	K-1500
📄 230	📄 236	📄 238	📄 243	📄 245	📄 247

L-1500	NMP-2400	RM-1500	SA-1500
📄 248	📄 250	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 operating temperatures up to 120°C.

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S>max

V>max

P>max

Flex Guide™

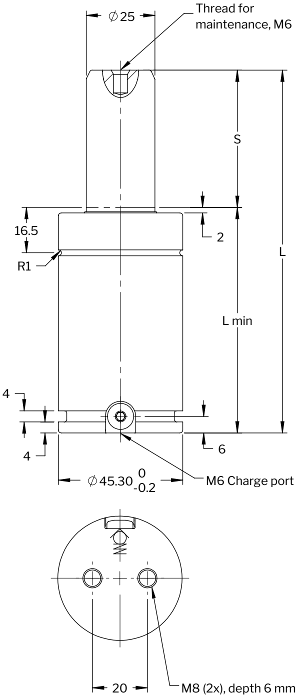
Features

- 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.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	Se table below
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +120°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min	See table below
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
Repair kit	3022686



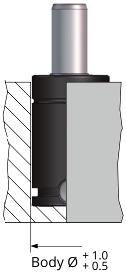
Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C (20°C)	8,870 (7,400)	14,100 (11,760)
80 – 100°C	15	125	100°C (20°C)	7,810 (6,140)	12,420 (9,750)
100 – 120°C	10	115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

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	7,400	1,665	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			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

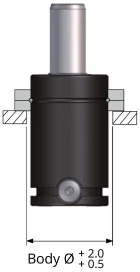
* Isothermal end force at full stroke.

Mounting possibilities

Base mount



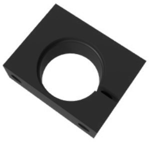
Drop - in



Top mount
FC, FCS

Foot mount
K, FFC

Recommended mounts



FC–500	FCS-500	FFC-500	HMF-500
📄 231	📄 235	📄 237	📄 246

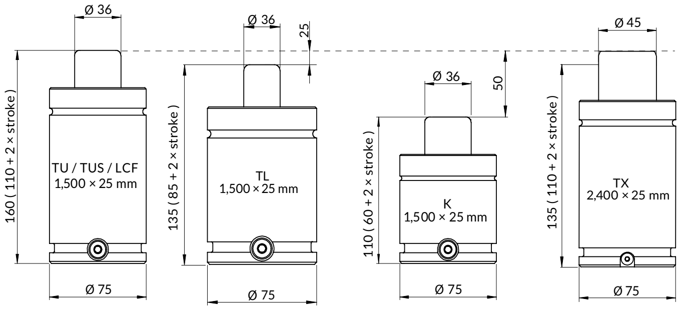
Additional mounts

FCSC-500	K-500	L-500	RMX-750
📄 236	📄 247	📄 248	📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Overview - 10000 ≤ F_{INIT} < 25000

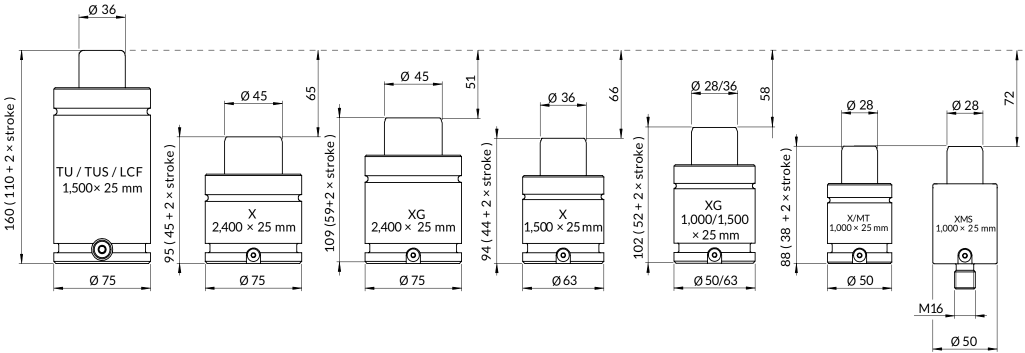


Initial force
15,000 N
3,375 lbf

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
24,000 N
5,396 lbf

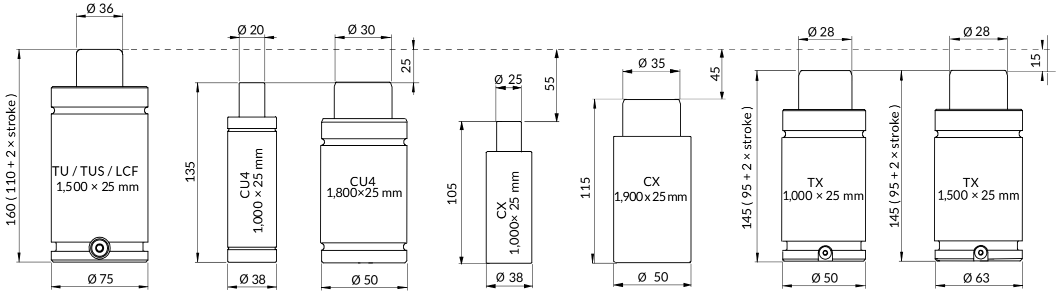
Initial force
24,000 N
5,396 lbf

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

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).

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S>max

V>max

P>max

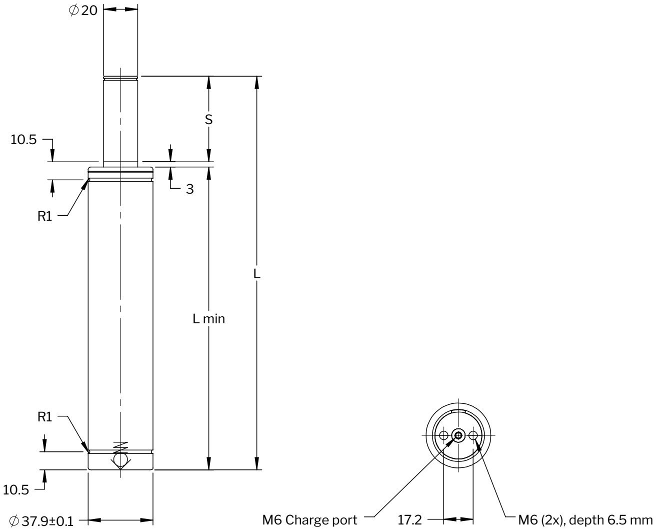
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024835

Automotive standard: WDX35-62-06010xxDM, Z000336576, Z000235618, Z000346352, Z000459185, 5937656, 5937657, 5937658, 5937659, 5937660



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 1000-006	6	10,600	16,000	2,400	3,595	61	55	0.014	0.33
CU4 1000-010	10 ■					78	68	0.024	0.38
CU4 1000-016	16 ■					100	84	0.036	0.44
CU4 1000-025	25 ■					135	110	0.056	0.54
CU4 1000-032	32*					167	135	0.074	0.65
CU4 1000-040	40*					195	155	0.092	0.73
CU4 1000-050	50*					230	180	0.110	0.83

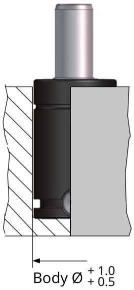
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

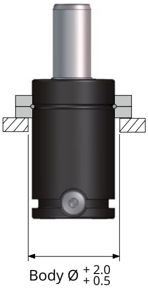
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP



Drop - in



Top mount
FC, FCS

Foot mount
BFCU

Recommended mounts

BFCU–1000	FC-250	FCS-250	SP-1000
📄 229	📄 231	📄 235	📄 255

Additional mounts

FCN-250
📄 231

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | CU4 1800

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).

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S>max

V>max

P>max

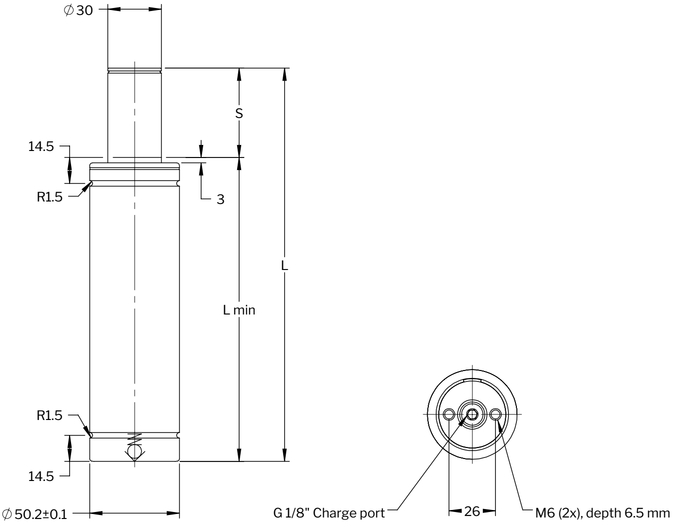
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024836

Automotive standard: WDX35-62-07018xxDM, Z000283147, Z000236719, Z000367232, 5937661, 5937662, 5937663, 5937664, 5937665, 5937666, 5937702



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	18,000	24,000	4,050	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 ■		26,000		5,845	135	110	0.100	0.93
CU4 1800-032	32*		26,000		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

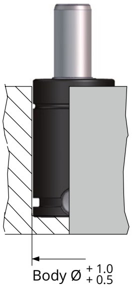
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

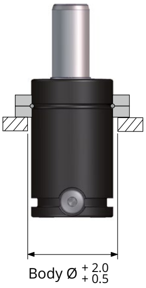
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP



Drop - in



Top mount
FK

Foot mount
BFCU

Recommended mounts

BFCU4–1800	FK-1800	SP-1800
229	239	255

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

With its unique safety and reliability features, 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.

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S>max

V>max

P>max

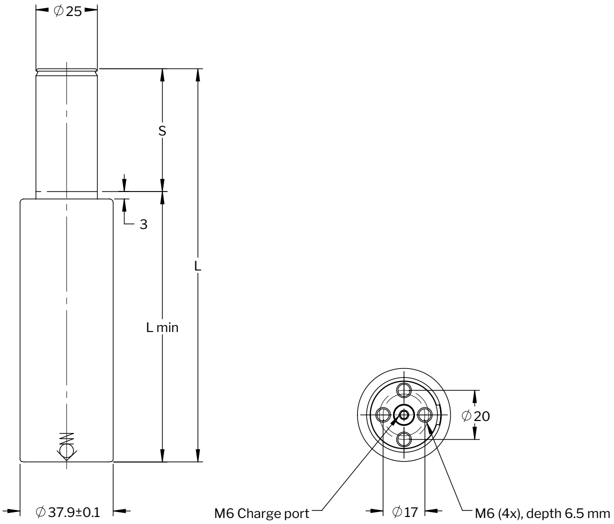
Flex Guide™

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 stroke frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate.

Basic information

For general information see "About gas springs".

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



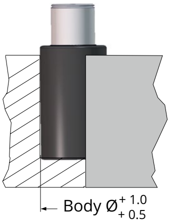
Order No.	S stroke	Force in N at 200 bar/+20°C		Force in lbf at 200 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force**	Initial	End force**				
CX 1000-010	10 ■	9,800	13,300	2,200	2,980	75	65	0.03	0.36
CX 1000-015	15 ■		14,400		3,240	85	70	0.03	0.39
CX 1000-025	25 ■		16,100		3,620	105	80	0.04	0.43
CX 1000-038	38* ■		16,900		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

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

** Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

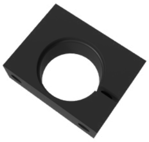
Base mount



Drop - in

Side port
SPCX

Recommended mounts



HMF-250	SPCX-1000
246	256

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

With its unique safety and reliability features, 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 stroke frequencies (SPM) compared to similar gas springs on the market, which leads to a higher production rate.

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S>max

V>max

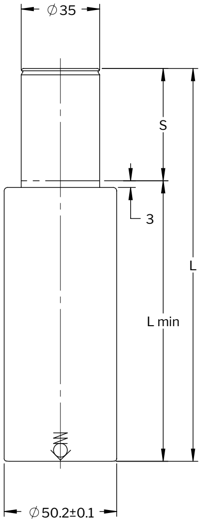
P>max

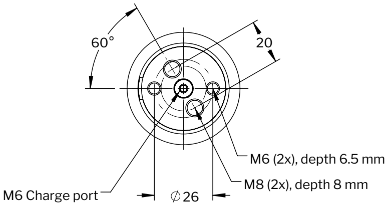
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	200 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-130
Max piston rod velocity	1.6 m/s
Repair kit	3022844





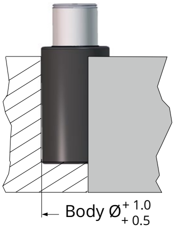
Order No.	S stroke	Force in N at 200 bar/+20°C		Force in lbf at 200 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force**	Initial	End force**				
CX 1900-010	10 ■	19,200	26,300	4,320	5,920	80	70	0.05	0.69
CX 1900-015	15 ■		31,800		7,140	95	80	0.05	0.76
CX 1900-025	25 ■		30,900		6,950	115	90	0.08	0.84
CX 1900-038	38* ■		31,900		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

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

** Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

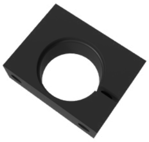
Base mount



Drop - in

Side port
SPCX

Recommended mounts



HMF-500	SPCX-1900
🗎 246	🗎 256

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | X 1000 and XMS 1000

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 allows for 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.

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S>max

V>max

P>max

Flex Guide™

Basic information

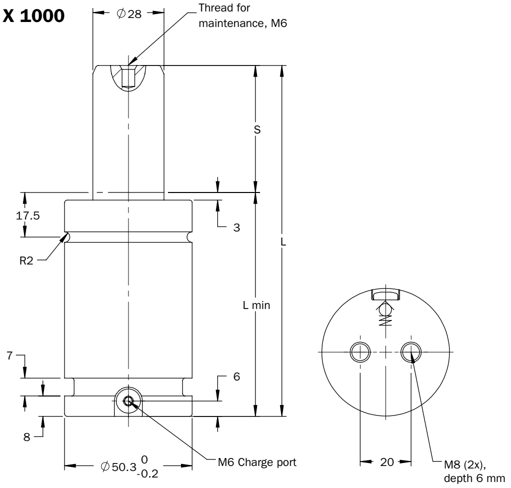
For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018847

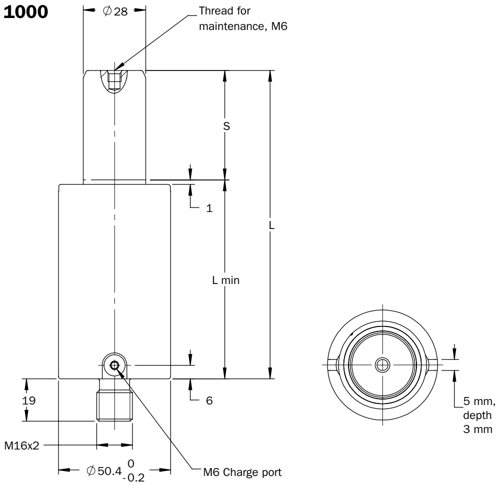
Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-10000, WDX356204-10xxDMS, GMGDS 90.25.08-10, 39D997xx, B2 4005 21749xx, 04585xx, Z0004591xx, Z000438717, Z000376302, 305075x, 305076x, 90201405890, 90201407787

X 1000 **XMS 1000**

X 1000



XMS 1000

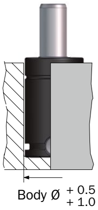


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X/XMS 1000-013	13	9,200	13,800	2,068	3,103	64	51	0.03	0.50	√
X/XMS 1000-016	16		13,800		3,103	70	54	0.04	0.52	
X/XMS 1000-019	19		14,000		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 ■		14,500		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	√

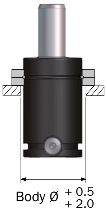
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

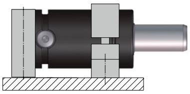


Drop - in

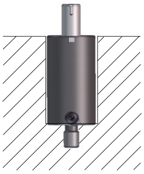


Top mount
FC, FCS,
FCSC

Foot mount
K, FFC



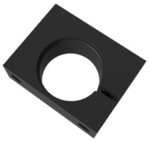
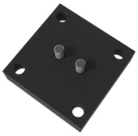
Body mount
FAC, SA, S, HM



Thread mount
M16x2

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-750	FFL-750	FSL-750	FSS-750	HM-750	K–750
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247

L-750	RMX-1000
🗎 248	🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 XF series conforms with the FCA Fiat-Chrysler standard 075.90.60. There is a G 1/8” side port for charging or to connect to a gas link system. The upper ISO Standard C-groove and the threaded bottom hole offer various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

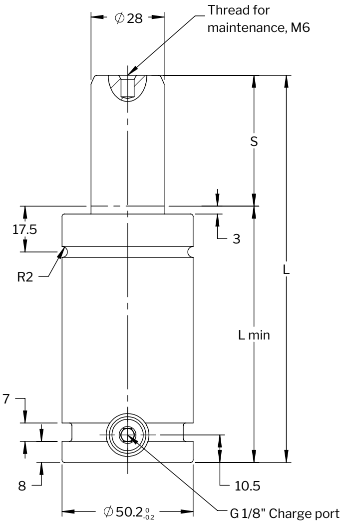
Flex Guide™

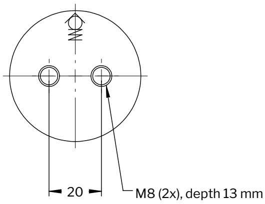
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018847

Automotive standard: GMGDS 90.25.08-10G, 39-673-0242, 39-673-0243, 39-673-0244, 39-673-0245, 39-673-0246, 39-673-0247, 39-673-0248, 39-673-0249



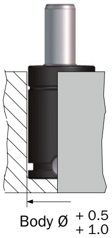


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XF 1000-013	13	9,200	13,800	2,068	3,103	74	61	0.03	0.70
XF 1000-016	16		13,800		3,103	80	64	0.04	0.72
XF 1000-019	19		14,000		3,147	86	67	0.04	0.74
XF 1000-025	25		14,200		3,192	98	73	0.05	0.79
XF 1000-032	32		14,300		3,215	112	80	0.06	0.84
XF 1000-038	38		14,500		3,260	124	86	0.07	0.89
XF 1000-050	50		14,600		3,282	148	98	0.09	0.98
XF 1000-063	63		14,700		3,305	174	111	0.11	1.09
XF 1000-075	75		14,700		3,305	198	123	0.13	1.18
XF 1000-080	80		14,800		3,327	208	128	0.14	1.22
XF 1000-100	100		14,800		3,327	248	148	0.17	1.41
XF 1000-125	125		14,800		3,327	298	173	0.21	1.60

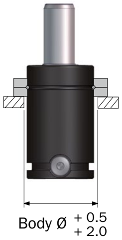
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP, NMP ,RM

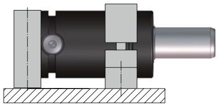


Drop - in



Top mount
FC, FCS, FCSC

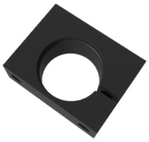
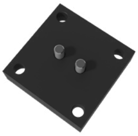
Foot mount
FFC, FFL, FSL,
FSS, K-lug, L



Body mount
HM, HMF, S, SA

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FCSC-750	FFL-750	FSL-750	FSS-750	HM-750	K–750
📄 236	📄 238	📄 241	📄 243	📄 245	📄 247

L-750	NMP-1000	RM-750	SA-750
📄 248	📄 250	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

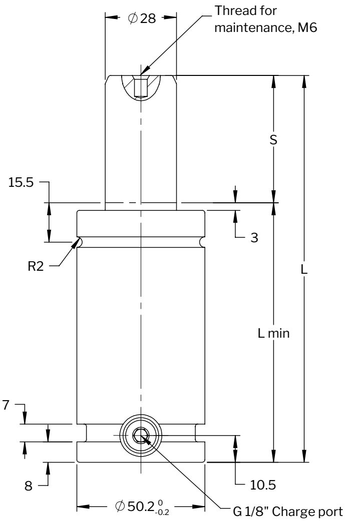
These gas springs are available with forces from 3500 N up to 66000 N and stroke lengths between 13 and 125 mm. There is a side port for gas charging that can also be used to connect to a hose system. An upper C-groove, lower U-groove together with two M8 threaded holes allows for various mounting possibilities using our standard mounts.

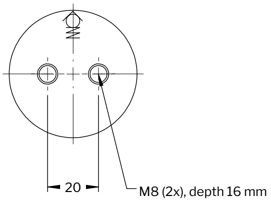
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018847

Automotive standard: R9034405xx, MES E7231 PG230-PG24D-10, K32R0-1000, SD116391-1000, M-2404-TD-22-1000



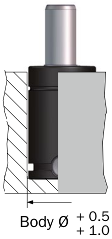


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 1000-013	13	9,200	13,800	2,068	3,103	78	65	0.03	0.70
XG 1000-016	16		13,800		3,103	84	68	0.04	0.72
XG 1000-019	19		14,000		3,147	90	71	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 ■		14,500		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

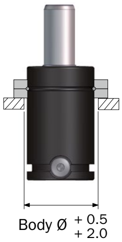
* Isothermal end force at full stroke.   ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount

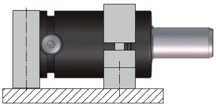


Drop - in



Top mount
FC, FCS

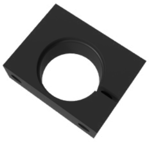
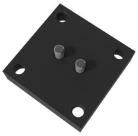
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-750	FFL-750	FSL-750	FSS-750	HM-750	K–750
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247

L-750	NMP-1000	RM-750	SA-750
🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

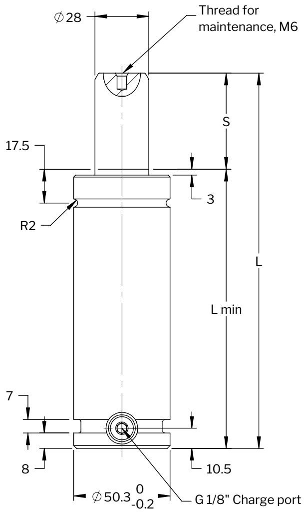
Flex Guide™

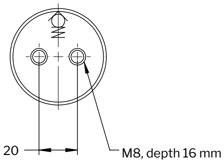
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3023788

Automotive standard: VDI 3003-Blatt 4, ISO 11901-4-10000, GMGDS 90.25.05-7.5, 39D838xx, B2 4008 21750xx, 39-673-82xx, 305468x, 305469x



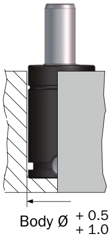


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 1000-013	13	9,200	11,200	2,075	2,525	121	108	0.06	1.17	
TX 1000-025	25		12,100		2,725	145	120	0.07	1.27	√
TX 1000-038	38		12,800		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		14,100		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	√

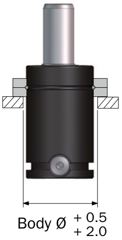
* Isothermal end force at full stroke.   ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount

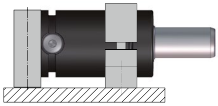


Drop - in



Top mount
FC, FCS

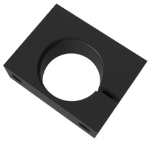
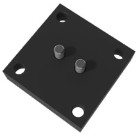
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FAC–750	FCSC-750	FFL-750	FSL-750	FSS-750	HM-750
📄 230	📄 236	📄 238	📄 241	📄 243	📄 245

K–750	L-750	NMP-1000	RM-750	SA-750
📄 247	📄 248	📄 250	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 sets M8 threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

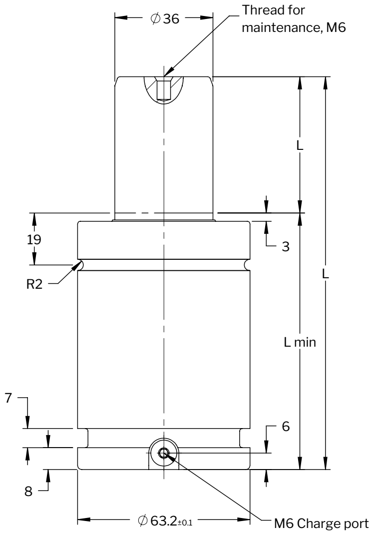
Flex Guide™

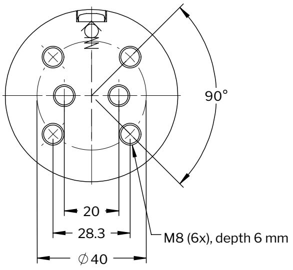
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3020434

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-15000, WDX356204-15xxDMS, 39D997xx, B2 4005 21723xx, 04585xx, 1028888



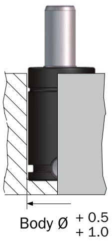


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 1500-013	13	15,000	24,000	3,375	5,395	70	57	0.05	0.89	√
X 1500-016	16		24,100		5,420	76	60	0.06	0.93	
X 1500-019	19		24,200		5,440	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 ■		23,900		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	√

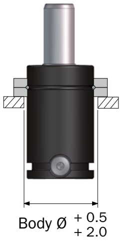
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MPX



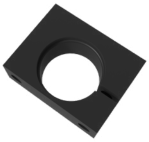
Drop - in

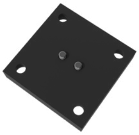


Top mount
FCX, FCSX,
XFC

Foot mount
KX, FFCX, FFX

Recommended mounts





FCSX-1500	XFC–1500	FFX-1500	HMF-X1500	MPX-1500	FFCX-1500
235	231	237	246	249	237

Additional mounts

FCX–1500	FCSCX-1500	FSLT-1500	KX-1500	LX-1500	RMX-1500
235	236	241	247	248	251

XFCJ-1500
231

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 XF series conforms with the FCA Fiat-Chrysler standard 075.90.60. There is a G 1/8” side port for charging or to connect to a gas link system. The upper ISO Standard C-groove and the threaded bottom holes offer various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

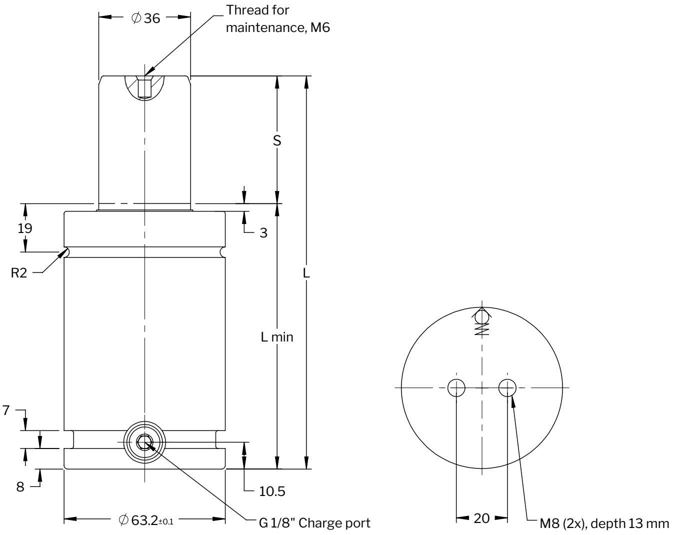
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3020434

Automotive standard: 39-673-0251, 39-673-0252, 39-673-0253, 39-673-0254, 39-673-0255, 39-673-0256, 39-673-0257, 39-673-0258

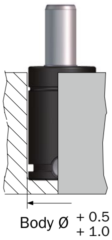


	S	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L	L	Gas vol.	Weight
Order No.	stroke	Initial	End force*	Initial	End force*	±0.25	min.	(l)	(kg)
XF 1500-013	13	15,000	24,000	3,375	5,395	80	67	0.05	1.14
XF 1500-016	16		24,100		5,420	86	70	0.06	1.27
XF 1500-019	19		24,200		5,440	92	73	0.07	1.28
XF 1500-025	25		24,300		5,365	104	79	0.08	1.28
XF 1500-032	32		23,800		5,355	118	86	0.11	1.33
XF 1500-038	38		23,900		5,375	130	92	0.12	1.35
XF 1500-050	50		24,000		5,395	154	104	0.15	1.39
XF 1500-063	63		24,100		5,420	180	117	0.19	1.43
XF 1500-075	75		24,200		5,440	204	129	0.22	1.48
XF 1500-080	80		24,200		5,440	214	134	0.24	1.49
XF 1500-100	100		24,300		5,465	254	154	0.29	2.12
XF 1500-125	125		24,300		5,465	304	179	0.36	2.39

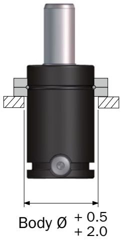
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
RMX, MPX

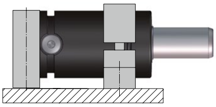


Drop - in



Top mount
FCSCX, FCSX,
FCX

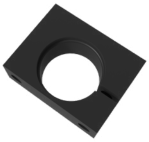
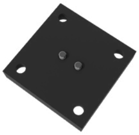
Foot mount
FFX, FFCX, KX,
K-lug, L



Body mount
HMF

Recommended mounts




FFCX-1500	FCSX–1500	FFX-1500	HMF-X1500	MPX-1500	XFC-1500
🗎 237	🗎 235	🗎 237	🗎 246	🗎 249	🗎 231

Additional mounts

FCX–1500	FCSCX-1500	FSLT-1500	KX-1500	LX-1500	RMX-1500
🗎 235	🗎 236	🗎 241	🗎 247	🗎 248	🗎 251

XFCJ-1500
🗎 231

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

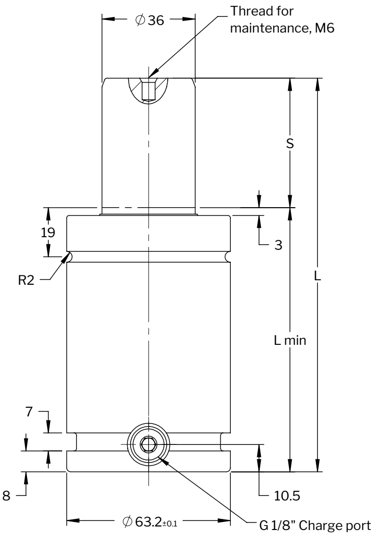
These gas springs are available with forces from 3,500 N up to 66,000 N and stroke lengths between 13 and 125 mm. There is a side port for gas charging that can also be used to connect to a hose system.
An upper C-groove, lower U-groove together with two M8 threaded holes allows for various mounting possibilities using our standard mounts.

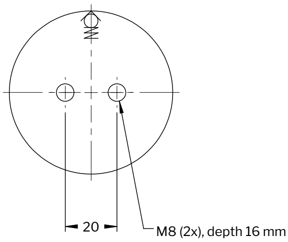
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 50-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3020434

Automotive standard: MES E7231 PG230-PG24D-15, M-2404-TD-29-2400





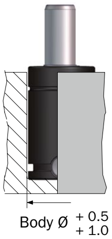
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 1500-013	13	15,000	24,000	3,375	5,395	78	65	0.05	0.9
XG 1500-016	16		24,100		5,420	84	68	0.06	0.9
XG 1500-019	19		24,200		5,440	90	71	0.07	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 ■		23,900		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

* Isothermal end force at full stroke.

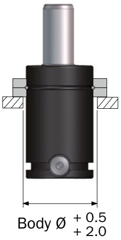
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount, MPX



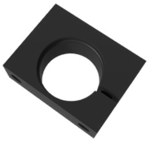
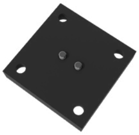
Drop - in



Top mount FCX, FCSX

Foot mount KX, FFCX, FFX

Recommended mounts

					
FCSX–1500	XFC-1500	FFX-1500	HMF-X1500	MPX-1500	FFCX-1500
🗎 235	🗎 231	🗎 237	🗎 246	🗎 249	🗎 237

Additional mounts

FCSCX-1500	FSLT-1500	KX-1500	LX-1500	RMX-1500	FCX–1500
🗎 236	🗎 241	🗎 247	🗎 248	🗎 251	🗎 235
XFCJ-1500					
🗎 231					

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TX 1500

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 up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

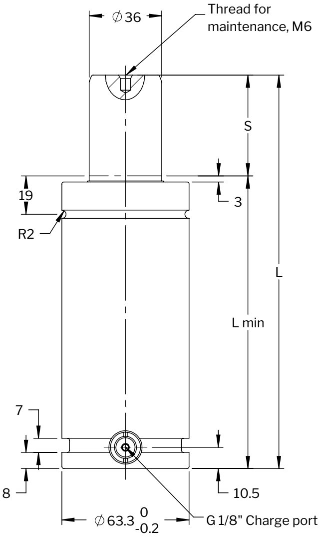
Flex Guide™

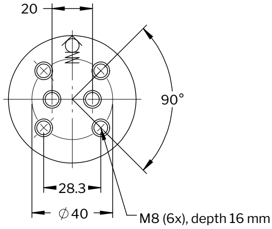
Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3026202

Automotive standards: ISO 11901-4-15000, GMGDS 90.25.05-15



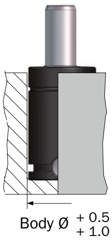


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 1500-013	13	15,000	17,700	3,372	3,979	121	108	0.10	1.76	
TX 1500-025	25		19,100		4,294	145	120	0.13	1.89	√
TX 1500-038	38		20,000		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		21,700		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	√

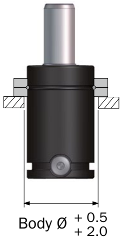
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MPX



Drop - in

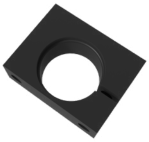
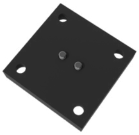


Top mount
FCX, FCSX,
XFC

Foot mount
KX, FFC

Recommended mounts




FCSX–1500	XFC-1500	FFX-1500	HMF-X1500	MPX-1500	FFCX-1500
235	231	237	246	249	237

Additional mounts

FCSCX-1500	FSLT-1500	KX-1500	LX-1500	RMX-1500	FCX–1500
236	241	247	248	251	235

XFCJ-1500
231

Note!

For dimensions on all mount options, refer to "Mounts" in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

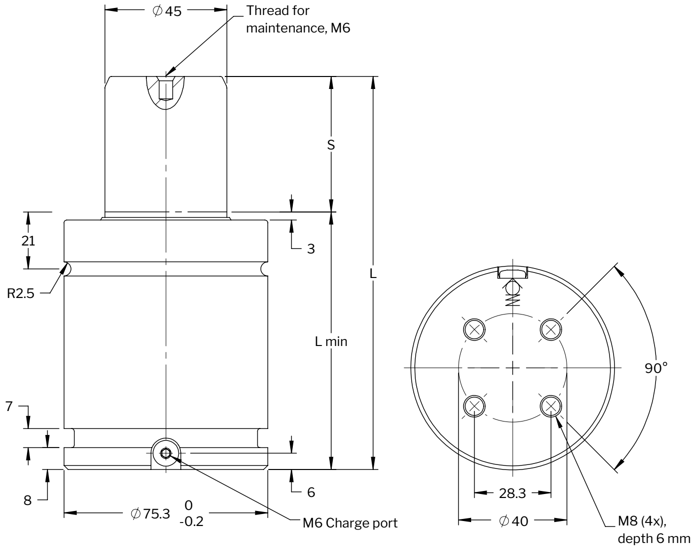
Basic information

For general information see “About gas springs”.

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

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-24000, WDX356204-24xxDMS, GMGDS 90.25.08-24, 39D997xx, B2 4005 21723xx, 04585xx, Z000410552, Z000479498, Z0004591xx, Z000365402

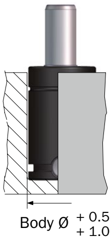


Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
X 2400-016	16	24,000	38,300	5,396	8,611	77	61	0.09	1.34	
X 2400-019	19		38,500		8,656	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 ■		39,200		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	√

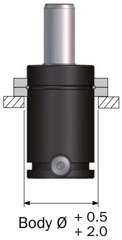
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

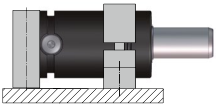


Drop - in



Top mount
FC, FCS

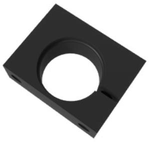
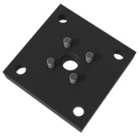
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500	K–1500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247

L-1500	RMX-2400
🗎 248	🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 XF series conforms with the FCA Fiat-Chrysler standard 075.90.60. There is a G 1/8” side port for charging or to connect to a gas link system. The upper ISO Standard C-groove and the threaded bottom hole offer various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

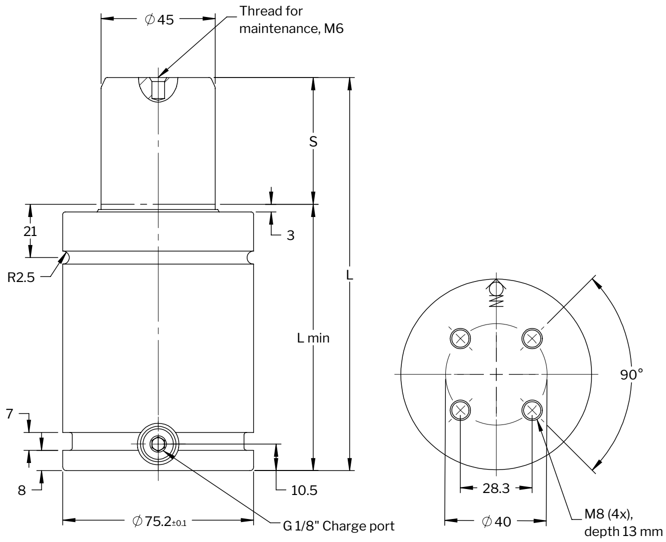
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 40-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018848

Automotive standard: GMGDS 90.25.08-24G, 39-673-0260, 39-673-0261, 39-673-0262, 39-673-0263, 39-673-0264, 39-673-0265, 39-673-0266

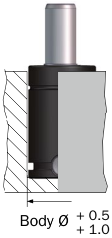


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XF 2400-016	16	24,000	38,300	5,396	8,611	87	71	0.09	1.66
XF 2400-019	19		38,500		8,656	93	74	0.10	1.71
XF 2400-025	25		38,700		8,701	105	80	0.13	1.81
XF 2400-032	32		38,600		8,678	119	87	0.16	1.93
XF 2400-038	38		38,400		8,633	131	93	0.18	2.03
XF 2400-050	50		39,200		8,813	155	105	0.23	2.23
XF 2400-063	63		39,200		8,813	181	118	0.28	2.44
XF 2400-075	75		39,200		8,813	205	130	0.33	2.64
XF 2400-080	80		39,200		8,813	215	135	0.35	2.72
XF 2400-100	100		39,300		8,835	255	155	0.43	3.05
XF 2400-125	125		39,300		8,835	305	180	0.54	3.47

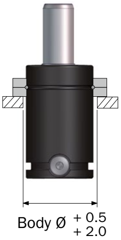
* Isothermal end force at full stroke.

Mounting possibilities

Base mount

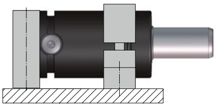


Drop - in



Top mount
FC, FCS

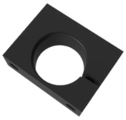
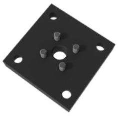
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500	K–1500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247

L-1500	NMP-2400	RM-1500	SA-1500
🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

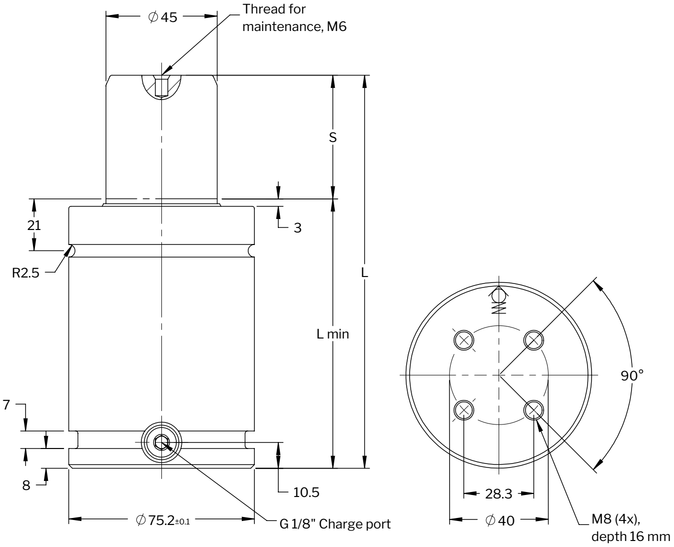
Basic information

For general information see "About gas springs".

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

Automotive standard: R9034405xx, MES E7231 PG230-PG24D-2A, K32R0-2400, SD116391-2400, M-2404-TD-36-4200

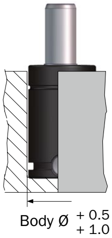


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 2400-016	16	24,000	38,300	5,396	8,611	91	75	0.09	1.77
XG 2400-019	19		38,500		8,656	97	78	0.10	1.82
XG 2400-025	25		38,700		8,701	109	84	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 ■		39,200		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

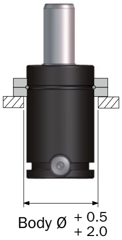
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount

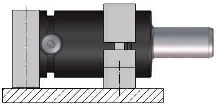


Drop - in



Top mount
FC, FCS

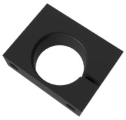
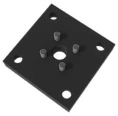
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500	K–1500	L-1500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247	🗎 248

NMP-2400	RM-1500	SA-1500
🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

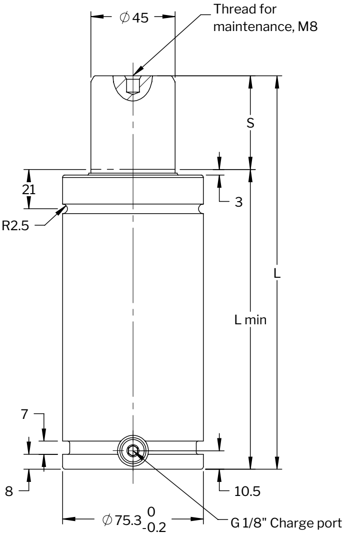
The Power Line – Heavy Duty series is a crossover between the standard TU Series and the Power Line X Series.

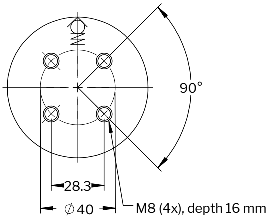
These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

Basic information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 40-100
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3022952

Automotive standard: VDI 3003-Blatt 4, ISO 11901-4-24000, GMGDS 90.25.05-15, 39D838xx, B2 4008 21750xx, 39-673-829x, 39-673-830x, 305469x



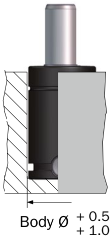


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 2400-025	25	24,000	37,100	5,400	8,350	160	135	0.23	3.1	√
TX 2400-038	38		37,600		8,450	186	148	0.28	3.31	
TX 2400-050	50		37,900		8,525	210	160	0.33	3.5	√
TX 2400-063	63		38,100		8,575	236	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		38,500		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	√

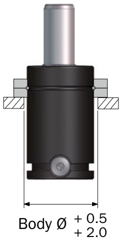
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

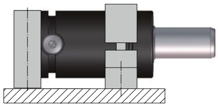


Drop - in



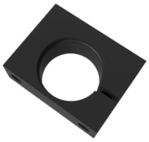
Top mount
FC, FCS

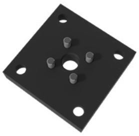
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts





FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–1500	FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–1500	L-1500	NMP-2400	RM-1500	SA-1500
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

V>max

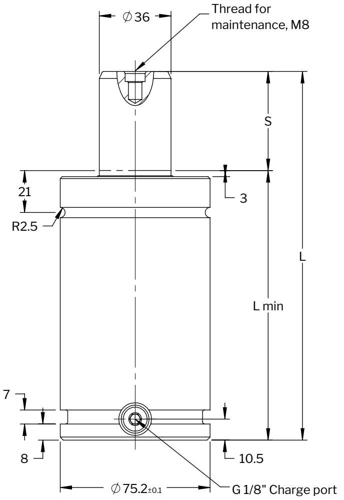
P>max

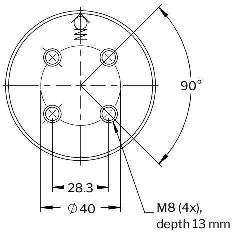
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3024144



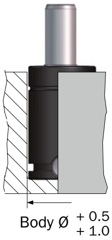


Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force*	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
TL 1500-013	12.5	15,000	18,000	3,370	4,050	110	97.5	0.11	2.65
TL 1500-025	25		19,200		4,320	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		21,400		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

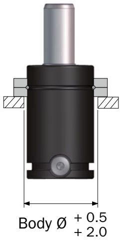
* Isothermal end force at full stroke.

Mounting possibilities

Base mount

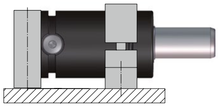


Drop - in



Top mount
FC, FCS

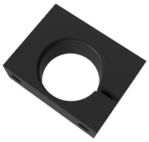
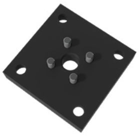
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–1500	FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–1500	L-1500	NMP-2400	RM-1500	SA-1500
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

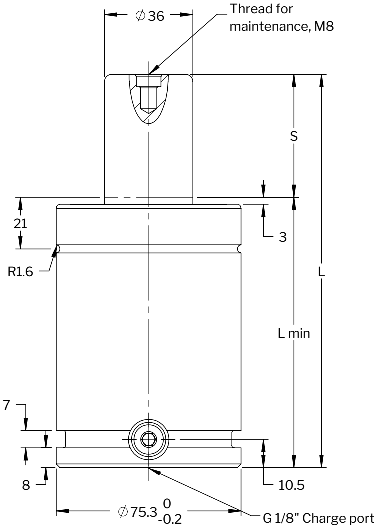
Flex Guide™

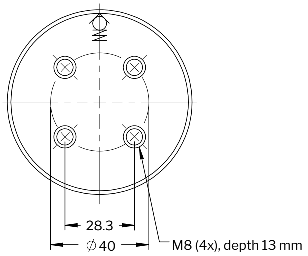
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3017230-1500

Automotive standard: R100288379. R100288383. R100288384. R100288385



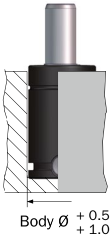


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
K 1500-025	25	15,000	24,000	3,375	5,400	110	85	0.10	2.05
K 1500-038	38.1		23,000		5,170	136.2	98.1	0.14	2.35
K 1500-050	50		23,000		5,170	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

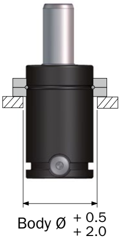
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

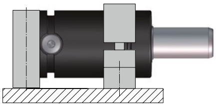


Drop - in



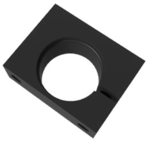
Top mount
FK

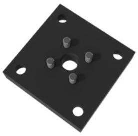
Foot mount
K, FFC



Body mount
SA, S

Recommended mounts





FFC-1500	FK-1500	HMF-1500	MP-1500	S-1500
📄 237	📄 239	📄 246	📄 249	📄 252

Additional mounts

FFL-1500	FSS-1500	K–1500	L-1500	RM-1500
📄 238	📄 243	📄 247	📄 248	📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

V>max

P>max

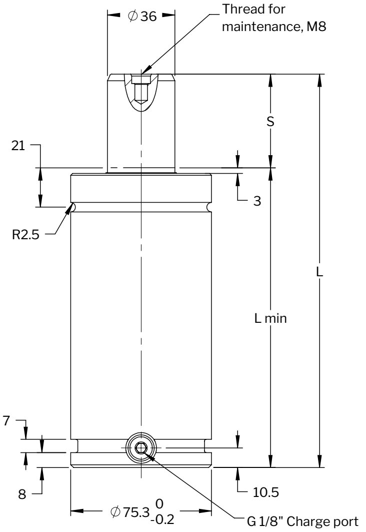
Flex Guide™

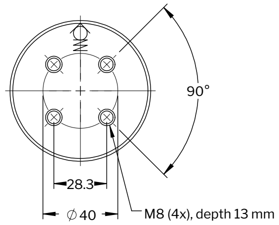
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	2014068-02

Automotive standard: VDI 3003, ISO 11901-1-15000, WDX356203-15xxDMS, GMGDS 90.25.00-15, 39D878xx, B2 4006 0998614, B2 4006 21710xx, B2 4006 3273508, B2 4006 3860208, B2 4006 3352603, B2 4006 09677xx, 03323xx, X3465902xx, X3465900xx, Z000296562, X346590618, X346590004, R1000362xx, R1002297xx, 39-673-52xx, N0315xx, MES E7231 PG230-PG23D-15, K32S0-1500, 997595x, 304418x, 997595x, 997596x, SD116322-1500, M-2401-TD-7-1500, 90201402297



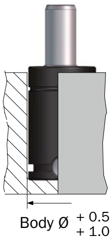


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 1500-025	25 ■	15,000	23,000	3,375	5,170	160	135	0.10	3.65	√
TU 1500-038	38.1					186.2	148.1	0.15	3.89	
TU 1500-050	50 ■					210	160	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					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	√

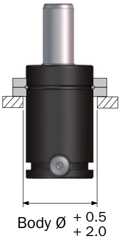
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities


Base mount
MP

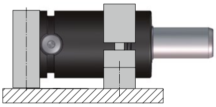


Drop - in



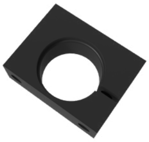
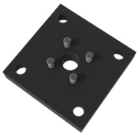
Top mount
FC, FCS


Foot mount
K, FFC


Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–1500	FCSC-1500	FFL-1500	FSL-1500	FSS-1500	HM-1500
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–1500	L-1500	NMP-2400	RM-1500	SA-1500
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

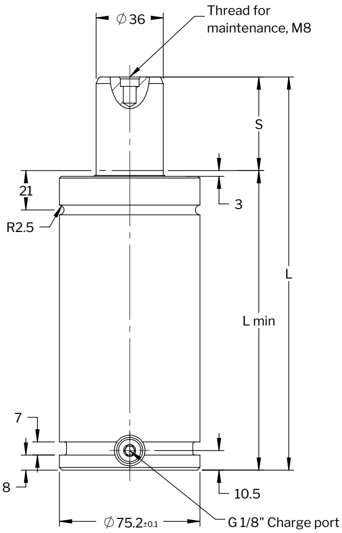
Flex Guide™

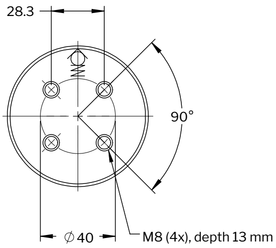
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	2.0 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019278

Automotive standard: R903636007, R903636008, R903636009, R903636010, R903636011, R903636012, R903636013, R903636014, R903636015



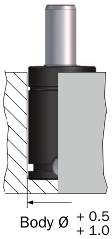


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUS 1500-025	25	15,000	23,000	3,375	5,170	160	135	0.10	3.75
TUS 1500-038	38.1		23,000			186.2	148.1	0.15	3.95
TUS 1500-050	50		23,000			210	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		23,000			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

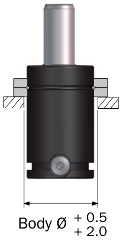
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

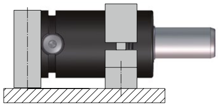


Drop - in



Top mount
FC, FCS, FCSC

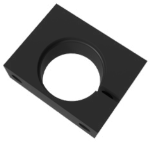
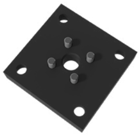
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–1500	FCSC–1500	FFL-1500	FSL-1500	FSS-1500	HM-1500
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–1500	L-1500	NMP-2400	RM-1500	SA-1500
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | LCF 1500

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.

APPROVED PED 2014/68/EU

S>max

V>max

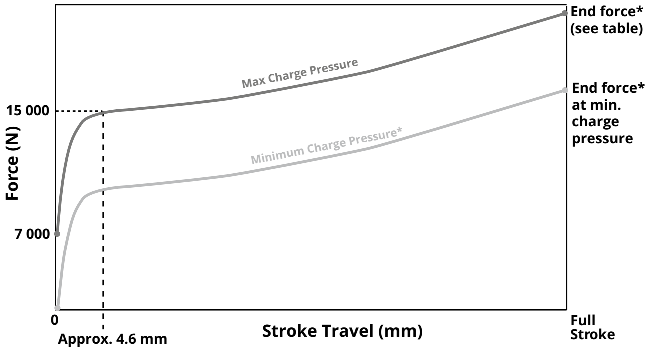
P>max

Flex Guide™

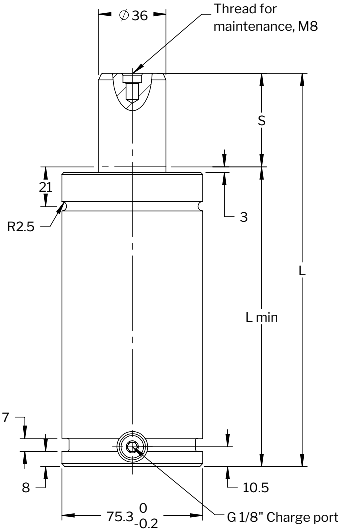
Basic information

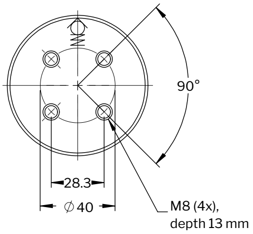
For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	105 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recom max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019378



Force vs Stroke for LCF 1500 Springs



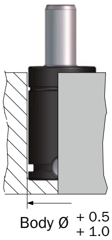


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
LCF 1500-025	25	15,000	23,000	3,375	5,170	160	135	0.10	3.75
LCF 1500-038	38.1		23,000			186.2	148.1	0.15	3.95
LCF 1500-050	50		23,000			210	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		23,000			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

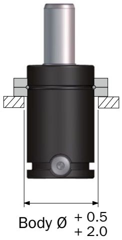
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

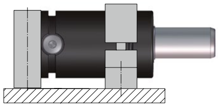


Drop - in



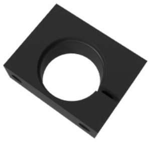
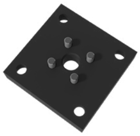
Top mount
FC, FCS, FCSC

Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts

					
FC-1500	FCS-1500	FFC-1500	HMF-1500	MP-1500	S-1500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–1500	FCSC–1500	FFL-1500	FSS-1500	HM-1500	K–1500
🗎 230	🗎 236	🗎 238	🗎 243	🗎 245	🗎 247

L-1500	RM-1500	SA-1500
🗎 248	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Speed Control™ – SPC gas springs have been engineered to reduce or 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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

Features

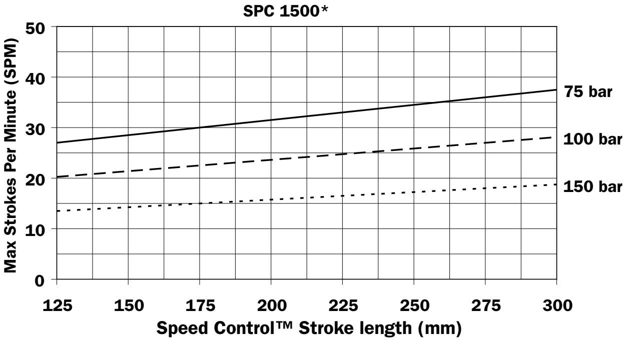
- Reduces or eliminates blank holder bounce
- Increases productivity by enabling high transfer speeds
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system

Basic information

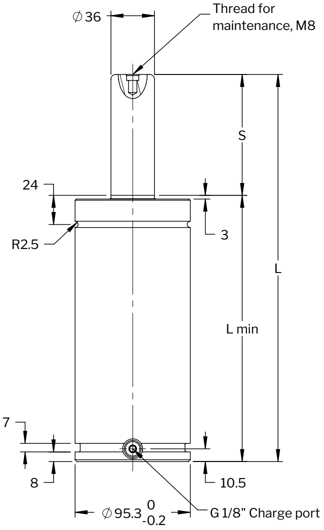
For general information see “About gas springs”.

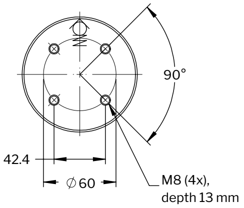
Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	See chart
Max piston rod velocity	1.6 m/s
Dampening length	≈ 30 mm
End stop speed	0.4 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3421494

Automotive standard: 5937839, 5937840, 5937841, 5937842, 5937843



*At 20°C room temperatures with free convection



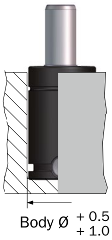


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
SPC 1500-125	125	15,000	19,000	3,375	4,275	370	245	0.73	7.60
SPC 1500-160	160					440	280	0.91	8.45
SPC 1500-200	200					520	320	1.11	9.43
SPC 1500-250	250					620	370	1.36	10.64
SPC 1500-300	300					720	420	1.62	11.86

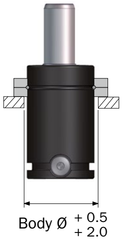
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP



Drop - in

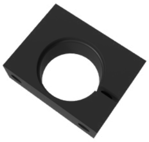
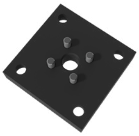


Top mount
FC, FCS, FCSC

Foot mount
K, FFC

Recommended mounts




FC-3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FAC–3000	FCSC-3000	FFL-3000	FSS-3000	HM–3000	K-3000
📄 230	📄 236	📄 238	📄 243	📄 245	📄 247

L-3000	NMP-4200	RM-3000	SA-3000
📄 248	📄 250	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

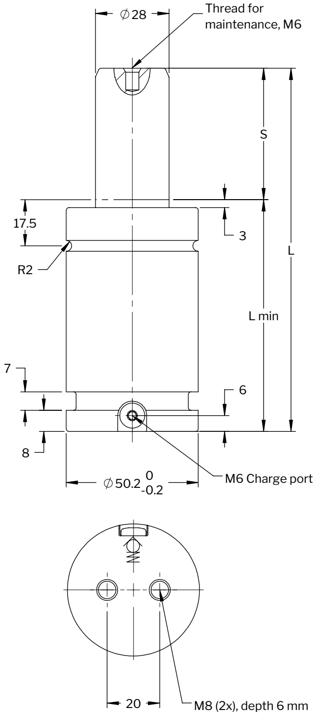
Mould Temp gas springs have been engineered to withstand higher working temperatures, like those commonly associated with plastic molding tools. Mould Temp gas springs are compact and powerful piston rod sealed gas springs, which can be used at operating temperatures up to 120°C.

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.

Basic information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... Se table below
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +120°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min .... See table below
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
Repair kit 3022690



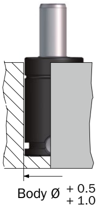
Max. working temp. interval	Max. strokes per minute (spm)	Max. charge pressure at 20°C (bar)	Force per temperature		
			Spring temp.	Initial force (N)	End force* (N)
0 – 80°C	20	150	80°C (20°C)	11,130 (9,200)	17,500 (14,500)
80 – 100°C	15	125	100°C (20°C)	9,800 (7,700)	15,400 (12,100)
100 – 120°C	10	115	120°C (20°C)	9,500 (7,080)	14,900 (11,100)

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

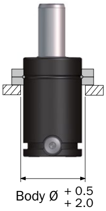
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

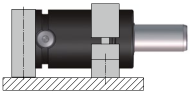


Drop - in

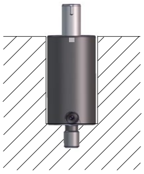


Top mount
FC, FCS,
FCSC

Foot mount
K, FFC



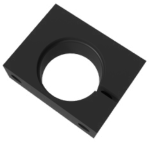
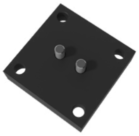
Body mount
FAC, SA, S, HM



Thread mount
M16x2

Recommended mounts




FC–750	FCS-750	FFC-750	HMF-750	MP-750	S-750
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

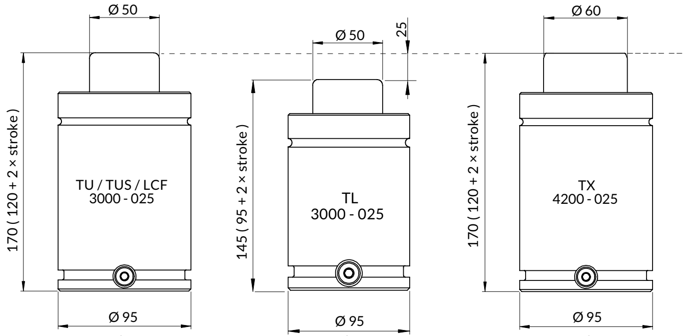
Additional mounts

FCSC-750	FFL-750	FSS-750	K-750	L-750	RMX–1000
🗎 236	🗎 238	🗎 243	🗎 247	🗎 248	🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

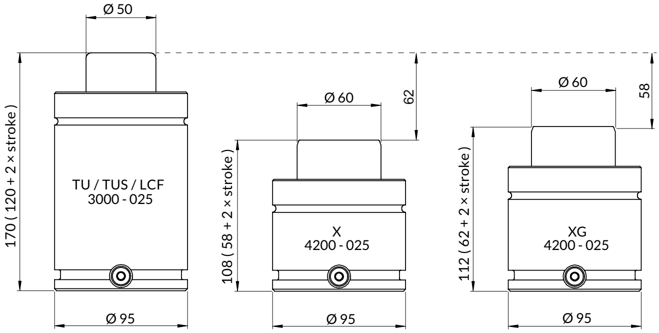
Overview - 25000 ≤ F_{INIT} < 50000



Initial force
30,000 N
6,750 lbf

Initial force
30,000 N
6,750 lbf

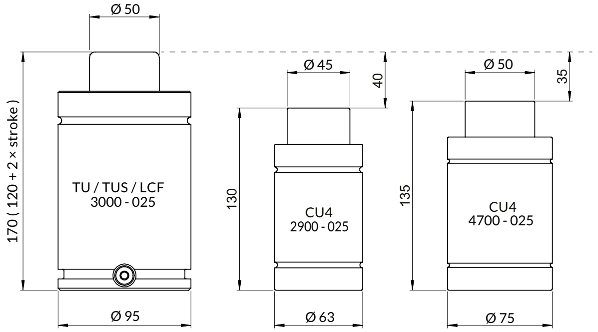
Initial force
42,000 N
9,440 lbf



Initial force
30,000 N
6,750 lbf

Initial force
42,000 N
9,440 lbf

Initial force
42,000 N
9,440 lbf



Initial force
30,000 N
6,750 lbf

Initial force
29,500 N
6,530 lbf

Initial force
47,000 N
10,570 lbf

2 | CU4 2900

The CU4 gas spring is a very compact bore sealed gas spring with impressive force in a compact body.

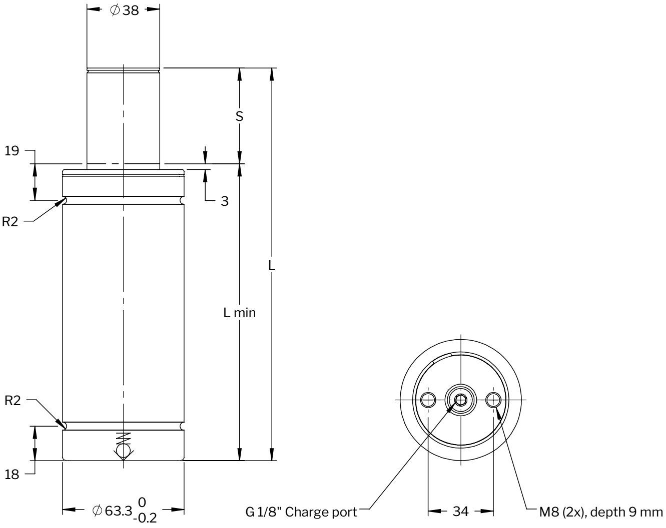
Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life. As an option, this CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024837

Automotive standard: WDX35-62-07029xxDM, 5937667, 5937668, 5937669, 5937670, 5937671, 5937672, 5937401



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 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

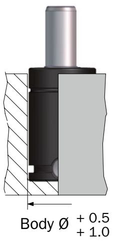
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

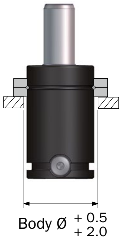
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP



Drop - in



Top mount
FCSC, FCS, FC

Recommended mounts

FCSX–1500	XFC-1500	SP-2900
🗎 235	🗎 231	🗎 255

Additional mounts

FCSCX-1500	FCX-1500	XFCJ-1500
🗎 236	🗎 235	🗎 231

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The CU4 gas spring is a very compact bore sealed gas spring with impressive force in a compact body.

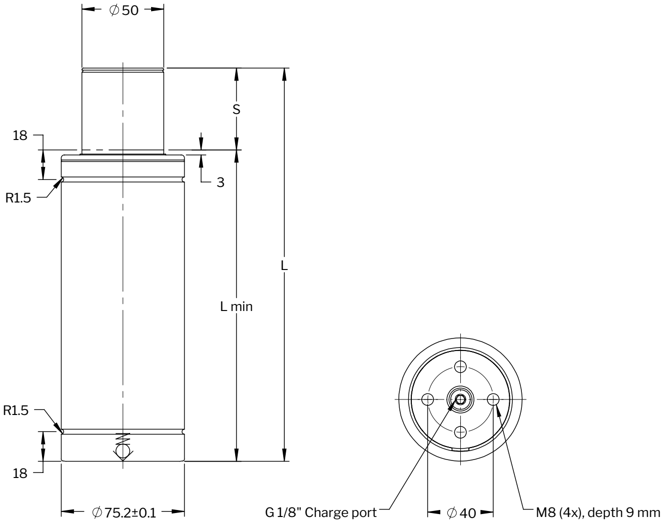
Springs with stroke lengths over 25 mm should always be attached to the tool, using a flange or the tapped holes in the bottom of the spring. We also recommend fixing of shorter stroke springs for optimal service life. As an option, this CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024838

Automotive standard: WDX35-62-08047xxDM, Z000332033, Z000283148, Z000294883, Z000459186, 5937673, 5937674, 5937675, 5937676, 5937677, 5937678, 5937700



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 ■	47,000	67,000	10,570	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*		67,000		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

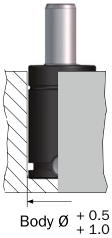
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

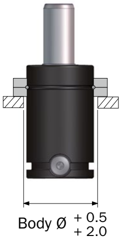
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP, SPRM



Drop - in



Top mount
FK

Foot mount
BFCU

Recommended mounts

BFP–4700	FK-1500	SP-4700
🗎 229	🗎 239	🗎 255

Additional mounts

SPRM-75
🗎 257

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

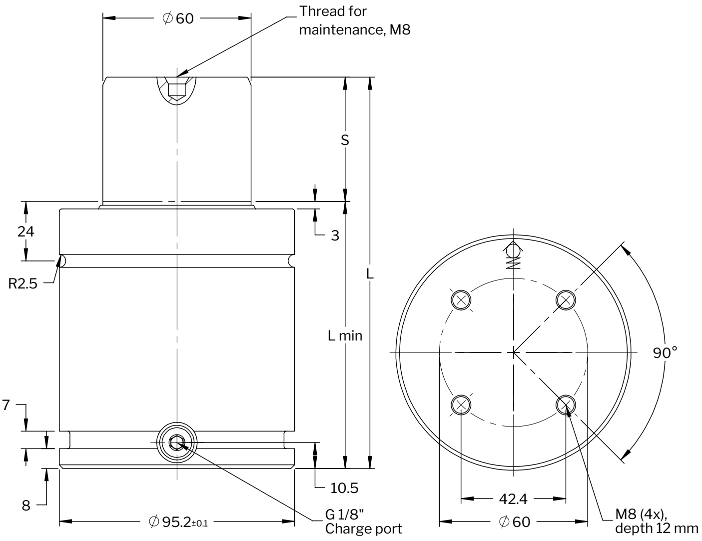
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018849

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-42000, WDX356204-42xxDMS, GMGDS 90.25.08-42, 39D997xx, B2 4005 21723xx, 04585xx, Z000414099, Z0004591xx, Z00044337x, 39-673-026x, 39-673-027x, 305077x, 305078x, 90201404397, 90201404443, 90201405563

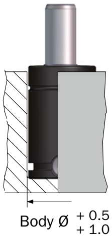


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 4200-016	16	42,000	61,700	9,440	13,870	90	74	0.15	2.81	
X 4200-019	19		63,700		14,320	96	77	0.18	2.88	
X 4200-025	25		64,800		13,670	108	83	0.26	2.96	√
X 4200-032	32		65,300		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 ■		67,000		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	√

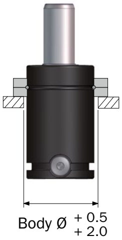
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

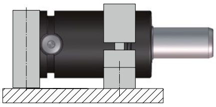


Drop - in



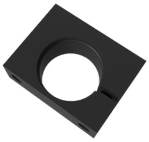
Top mount
FC, FCS, FCSC

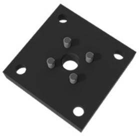
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts





FC–3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-3000	FFL-3000	FSL-3000	FSS-3000	HM-3000	K–3000
🗎 236	🗎 238	🗎 241	🗎 243	🗎 245	🗎 247

L-3000	RM-3000
🗎 248	🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

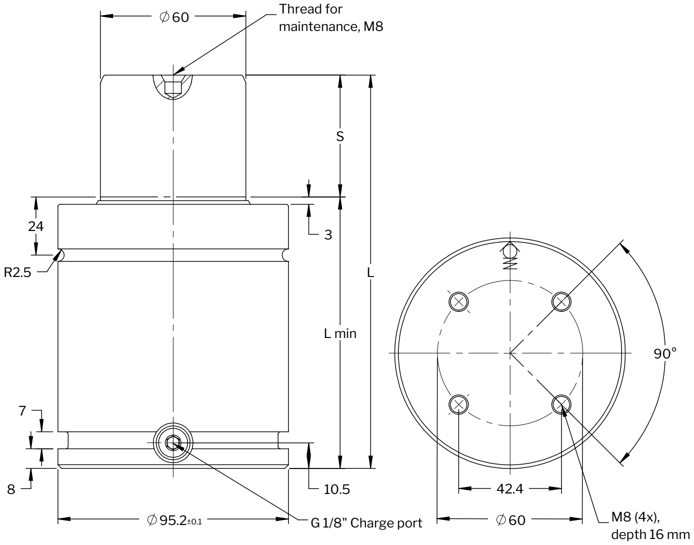
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018849

Automotive standard: R90344053x, MES E7231 PG230-PG24D-4A, K32R0-4200, SD116391-4200

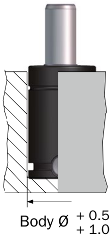


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 4200-016	16	42,000	61,700	9,440	13,870	94	78	0.15	2.81
XG 4200-019	19		63,700		14,320	100	81	0.18	2.88
XG 4200-025	25		64,800		13,670	112	87	0.26	2.96
XG 4200-032	32		65,300		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 ■		67,000		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

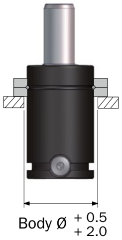
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount

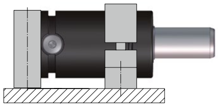


Drop - in



Top mount
FC, FCS, FCSC

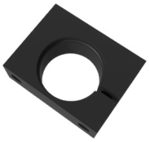
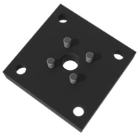
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–3000	FCS-3000	HMF-3000	MP-3000	S-3000
231	235	246	249	252

Additional mounts

FCSC-3000	FFL-3000	FSL-3000	FSS-3000	HM-3000	K–3000
236	238	241	243	245	247

L-3000	NMP-4200	RM-3000	SA-3000
248	250	251	253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

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S>max

V>max

P>max

Flex Guide™

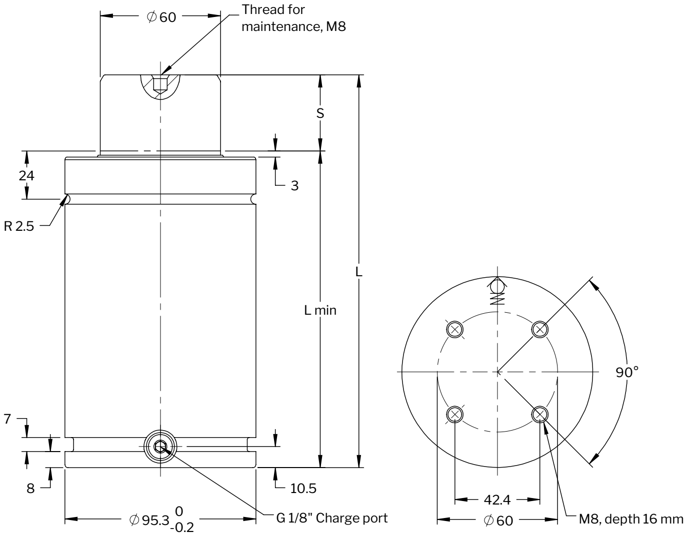
These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 40-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3022953

Automotive standard: VDI 3003-Blatt 4, ISO 11901-4-42000, GMGDS 90.25.05-30, 39D838xx, B2 4008 21750xx, 39-673-84xx, 305470x

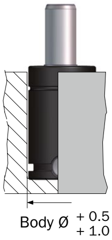


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 4200-025	25	42,000	52,100	9,440	11,725	170	145	0.43	5.08	√
TX 4200-038	38		55,100		12,400	196	158	0.52	5.41	
TX 4200-050	50		57,200		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		62,500		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	√

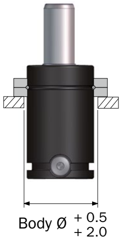
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

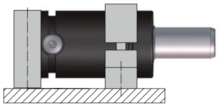


Drop - in



Top mount
FC, FCS, FCSC

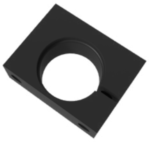
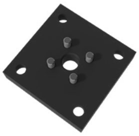
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
231	235	237	246	249	252

Additional mounts

FAC–3000	FCSC-3000	FFL-3000	FSL-3000	FSS-3000	HM-3000
230	236	238	241	243	245

K–3000	L-3000	NMP-4200	RM-3000	SA-3000
247	248	250	251	253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

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S>max

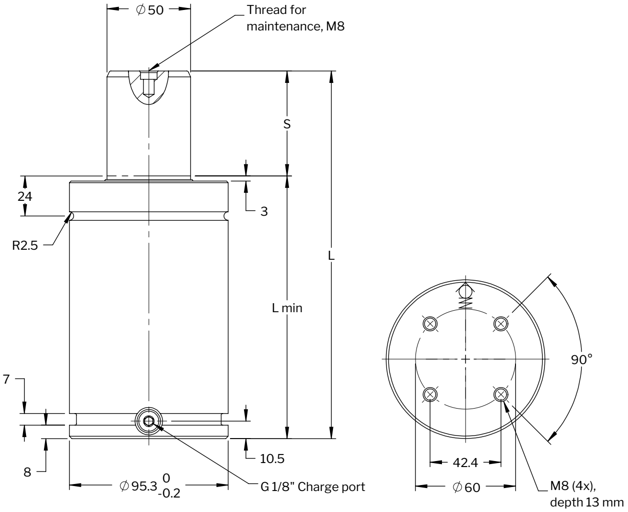
V>max

P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3024171

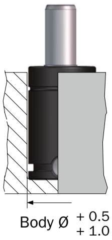


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TL 3000-013	12.5	30,000	38,700	6,750	8,710	120	107.5	0.14	4.84
TL 3000-025	25		41,800		9,400	145	120	0.21	5.24
TL 3000-038	37.5		43,500		9,770	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		46,100		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

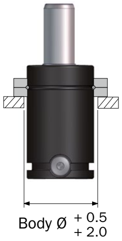
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

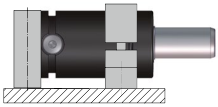


Drop - in



Top mount
FC, FCS, FCSC

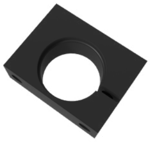
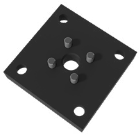
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–3000	FCSC-3000	FFL-3000	FSL-3000	FSS-3000	HM-3000
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–3000	L-3000	NMP-4200	RM-3000	SA-3000
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

V>max

P>max

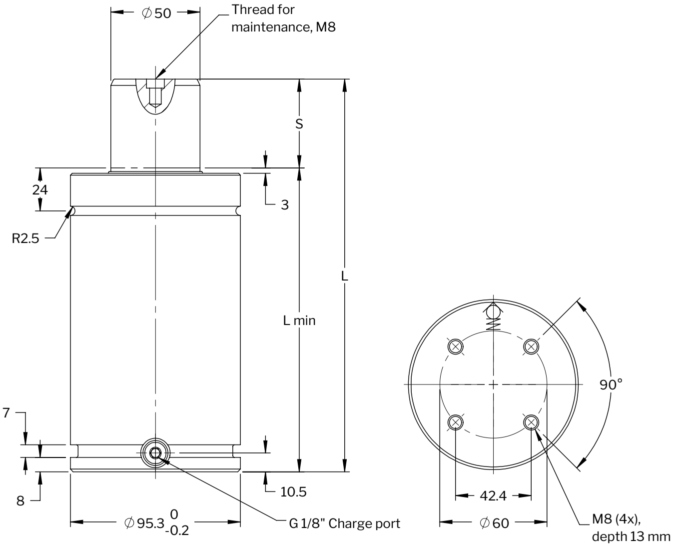
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019025

Automotive standard: VDI 3003, ISO 11901-1-30000, WDX356203-30xxDMS, GMGDS 90.25.00-30, 39D878xx, B2 4006 3881189, B2 4006 21710xx, B2 4006 33834xx, B2 4006 3286139, B2 4006 3373105, X3465900xx, X3465902xx, Z0004590xx, X3465903xx, R1000362xx, R100229769, R100229773, 39-673-53xx, N03300x, N03301x, N033020, MES E7231 PG230-PG23D-30, K32S0-3000, 99759xx, 3044189, 99759xx, 304419x, SD116322-3000, M-2401-TD-13-3000

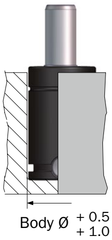


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 3000-025	25 ■	30,000	42,000	6,750	9,440	170	145	0.20	6.45	√
TU 3000-038	38.1		43,000		9,670	196.2	158.1	0.26	6.87	
TU 3000-050	50 ■		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		47,000		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	√

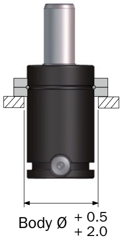
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

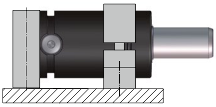


Drop - in



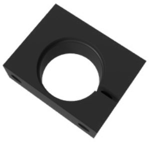
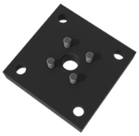
Top mount
FC, FCS

Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts

					
FC–3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–3000	FCSC-3000	FFL-3000	FSL-3000	FSS-3000	HM-3000
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–3000	L-3000	NMP-4200	RM-3000	SA-3000
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to "Mounts" in chapter 3.

2 | TUS 3000

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

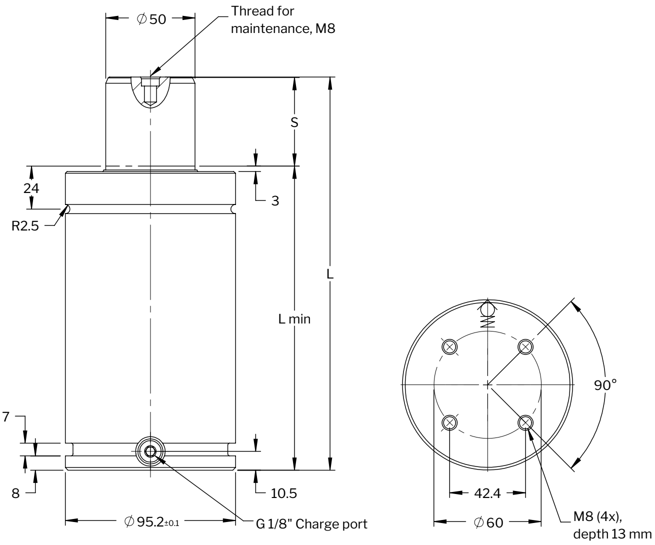
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	2.0 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019279

Automotive standard: R903636016, R903636017, R903636018, R903636019, R903636020, R903636021, R903636022, R903636023, R903636024

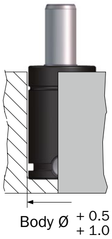


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUS 3000-025	25	30,000	42,000	6,750	9,440	170	145	0.20	6.35
TUS 3000-038	38.1		43,000		9,670	196.2	158.1	0.26	6.75
TUS 3000-050	50		44,000		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		47,000		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

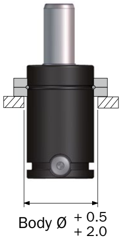
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

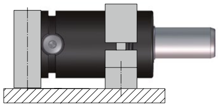


Drop - in



Top mount
FC, FCS, FCSC

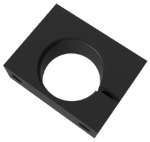
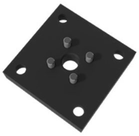
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–3000	FCSC–3000	FFL-3000	FSL-3000	FSS-3000	HM-3000
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–3000	L-3000	NMP-4200	RM-3000	SA-3000
🗎 247	🗎 248	🗎 250	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

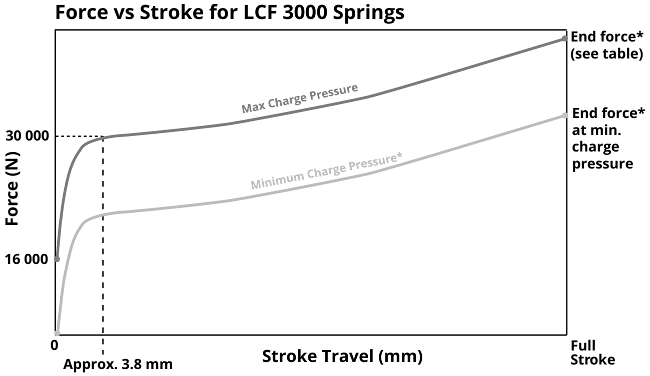
Flex Guide™

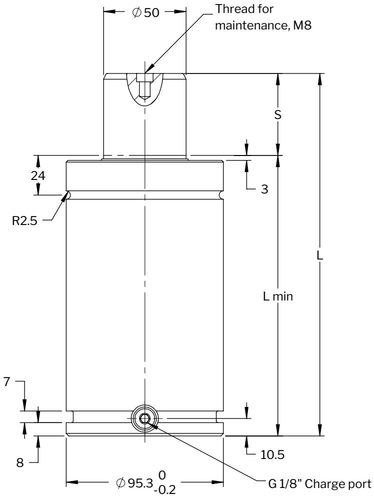
Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	70 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recom max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019379

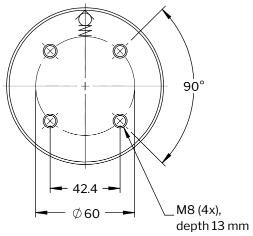
Automotive standard: WDX358037-30xxDMS





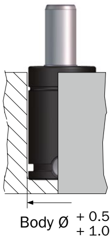
		Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C					
Order No.	S stroke	Initial	End force*	Initial	End force*	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
LCF 3000-025	25	30,000	42,000	6,740	9,440	170	145	0.20	6.35
LCF 3000-038	38.1		43,000		9,670	196.2	158.1	0.26	6.75
LCF 3000-050	50		44,000		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		47,000		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

* Isothermal end force at full stroke.

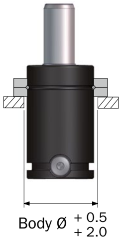


Mounting possibilities

Base mount
MP

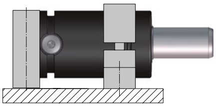


Drop - in



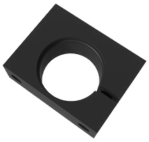
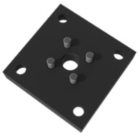
Top mount
FC, FCS, FCSC

Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts

					
FC-3000	FCS-3000	FFC-3000	HMF-3000	MP-3000	S-3000
231	235	237	246	249	252

Additional mounts

FAC–3000	FCSC–3000	FFL-3000	FSS-3000	HM-3000	K–3000
230	236	238	243	245	247

L-3000	RM-3000	SA-3000
248	251	253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | SPC 3000

Speed Control™ – SPC gas springs have been engineered to reduce or 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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

Flex Guide™

Features

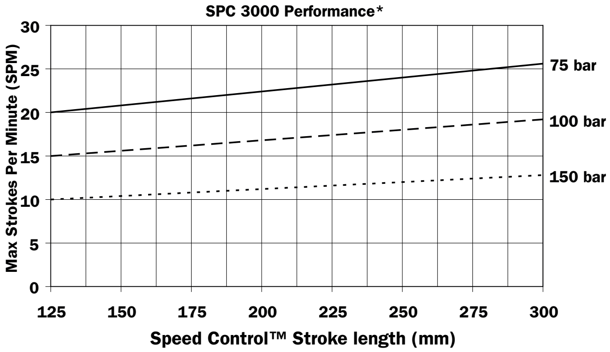
- Reduces or eliminates blank holder bounce
- Increases productivity by enabling high transfer speeds
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system

Basic information

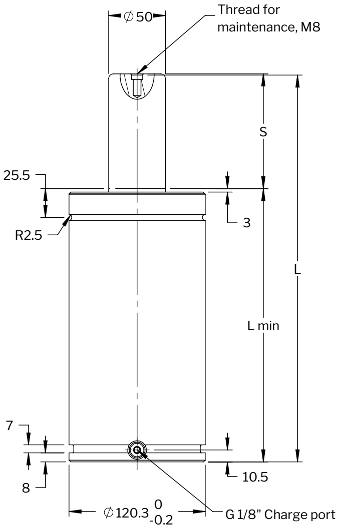
For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recom max strokes/min (at 20°C)	See chart
Max piston rod velocity	1.6 m/s
Dampening length	≈ 30 mm
End stop speed	0.4 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3421496

Automotive standard: 5937844, 5937845, 5937846, 5937847, 5937848

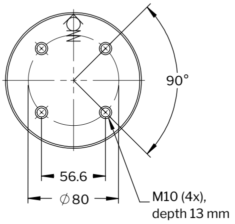


*At 20°C ambient room temperatures with convection



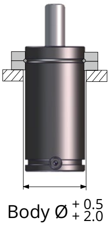
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
SPC 3000-125	125	30,000	38,000	6,750	8,550	390	265	1.15	10.64
SPC 3000-160	160		38,000		8,550	460	300	1.43	11.30
SPC 3000-200	200		38,000		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

* Isothermal end force at full stroke.



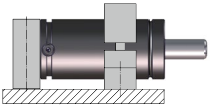
Mounting possibilities

Base Mount
MP



Top Mount
FC, FCS, FCSC

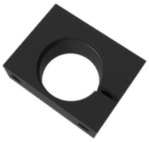
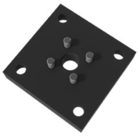
Foot Mount
K, FFC



Body Mount
FAC, SA, S

Recommended mounts




FC-5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

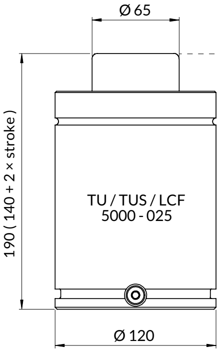
FAC–5000	FCSC-5000	FFL-5000	FSS-5000	HM–5000	K-5000
📄 230	📄 236	📄 238	📄 243	📄 245	📄 247

L-5000	RM-5000	SA-5000
📄 248	📄 251	📄 253

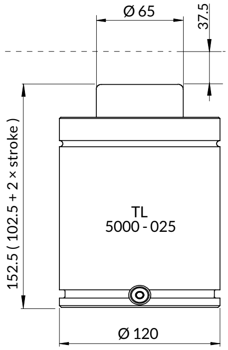
Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

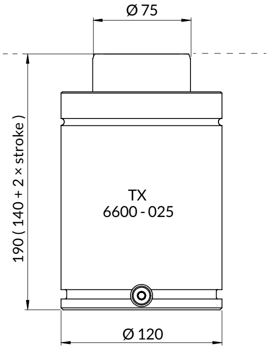
2 | Overview - $50000 \leq F_{INIT} < 75000$



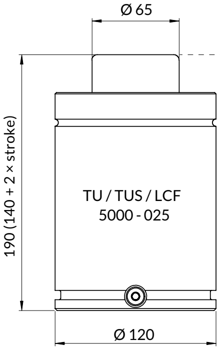
Initial force
50,000 N
11,240 lbf



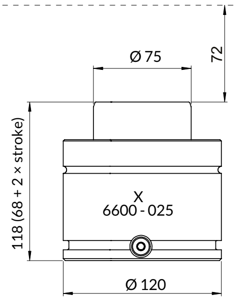
Initial force
50,000 N
11,240 lbf



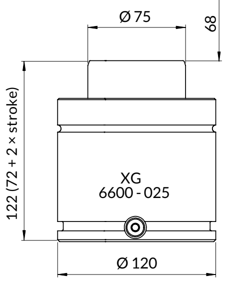
Initial force
66,300 N
14,925 lbf



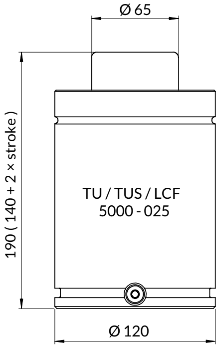
Initial force
50,000 N
11,240 lbf



Initial force
66,300 N
14,905 lbf



Initial force
66,300 N
14,905 lbf



Initial force
50,000 N
11,240 lbf

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

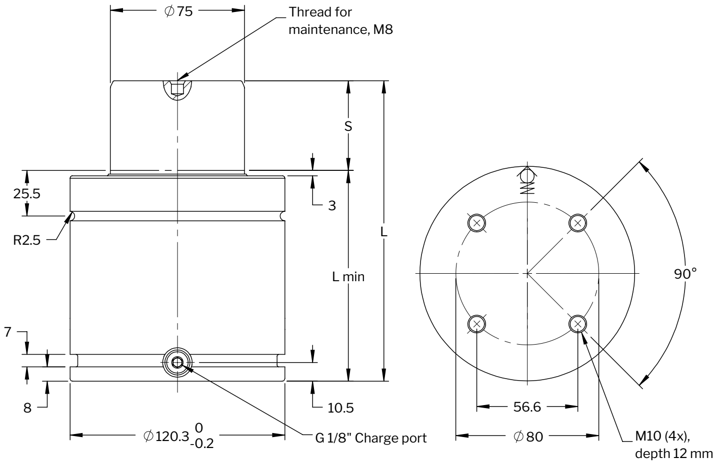
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019912

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-66000, WDX356204-66xxDMS, GMGDS 90.25.08-66, 39D9977x, B2 4005 21723xx, B2 4005 21724xx, 04585xx, 39-673-027x, 39-673-028x, 305397x, 305398x, 90201404320, 90201405687, 90201405211, 90201406012

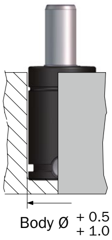


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 6600-016	16	66,300	89,000	14,905	20,010	100	84	0.32	5.00	
X 6600-019	19		91,000		20,460	106	87	0.35	5.11	
X 6600-025	25		93,900		21,110	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 ■		100,600		22,615	168	118	0.69	6.31	√
X 6600-063	63 ■		102,400		23,020	194	131	0.83	6.81	√
X 6600-075	75		103,400		23,245	218	143	0.90	7.27	
X 6600-080	80 ■		104,100		23,400	228	148	1.01	7.46	√
X 6600-100	100 ■		105,400		23,700	268	168	1.23	8.23	√
X 6600-125	125		106,500		23,940	318	193	1.50	9.19	√

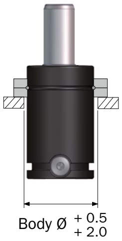
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

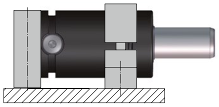


Drop - in



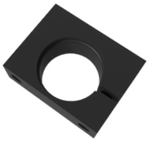
Top mount
FC, FCS, FCSC

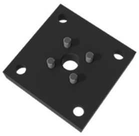
Foot mount
K, FFC



Body mount
FAC, SA, S

Recommended mounts





FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000	L-5000
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

RM-5000
🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

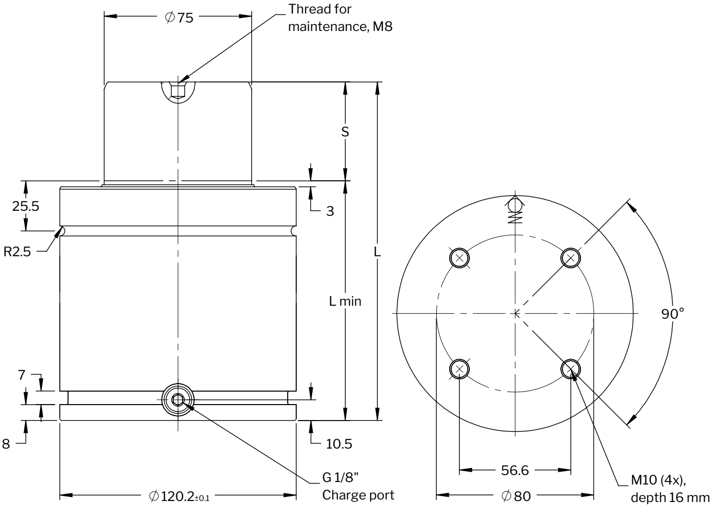
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019912

Automotive standard: R9034405xx, R100679839, R100674470, MES E7231 PG230-PG24D-6A, K32E1-6600, SD116391-6600

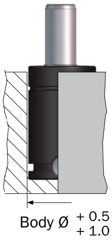


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
XG 6600-016	16	66,300	89,000	14,905	20,010	104	88	0.32	5.00
XG 6600-019	19		91,000		20,460	110	91	0.35	5.11
XG 6600-025	25		93,900		21,110	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 ■		100,600		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

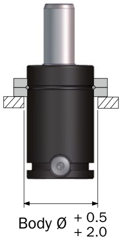
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

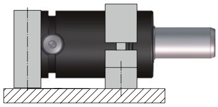


Drop - in



Top mount
FC, FCS, FCSC

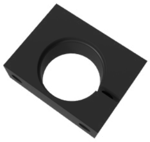
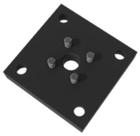
Foot mount
K, FFC



Body mount
FAC, SA, S

Recommended mounts




FC-5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000	L-5000
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

RM-5000	SA-5000
🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TX 6600

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

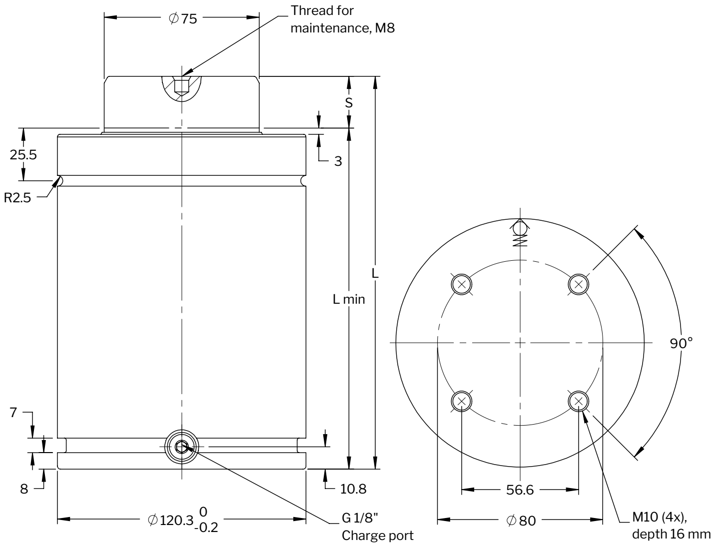
These gas springs are available with forces from 7,400 N up to 200,000 N and stroke lengths up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3022954

Automotive standard: VDI 3003-Blatt 4, ISO 11901-4-66000, GMGDS 90.25.05-50, 39D838xx, B2 4008 21750xx, 39-673-85xx, 305470x, 305471x,

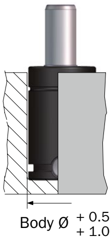


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 6600-025	25	66,300	79,500	14,925	17,900	190	165	0.73	9.28	√
TX 6600-038	38		83,900		18,875	216	178	0.87	9.81	
TX 6600-050	50		87,000		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	√

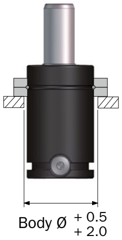
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

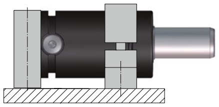


Drop - in



Top mount
FC, FCS, FCSC

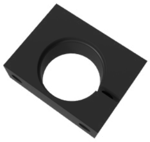
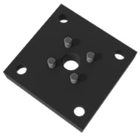
Foot mount
K, FFC



Body mount
FAC, SA, S

Recommended mounts




FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FAC–5000	FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000
📄 230	📄 236	📄 238	📄 241	📄 243	📄 247

L-5000	RM-5000	SA-5000
📄 248	📄 251	📄 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The TL Series ranges from model sizes 750 to 7500, with similar features and technology as the TU series.

APPROVED PED 2014/68/EU

S>max

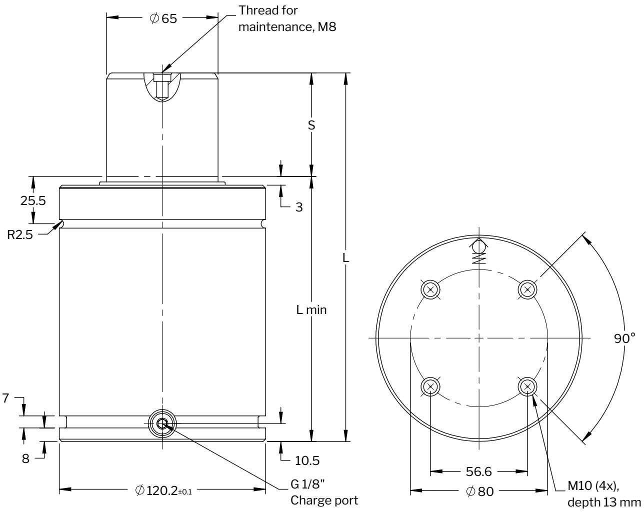
V>max

P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3024178

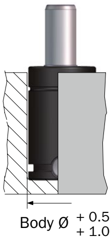


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TL 5000-025	25	50,000	80,100	11,200	18,000	152.5	127.5	0.2	9.04
TL 5000-038	37.5		81,900		18,410	177.5	140	0.3	9.70
TL 5000-050	50		82,800		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		84,500		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

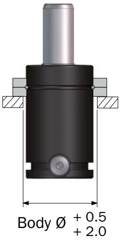
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

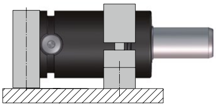


Drop - in



Top mount
FC, FCS, FCSC

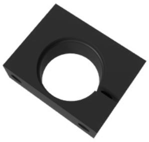
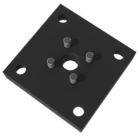
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
231	235	237	246	249	252

Additional mounts

FAC–5000	FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000
230	236	238	241	243	247

L-5000	RM-5000	SA-5000
248	251	253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

APPROVED PED 2014/68/EU

S>max

V>max

P>max

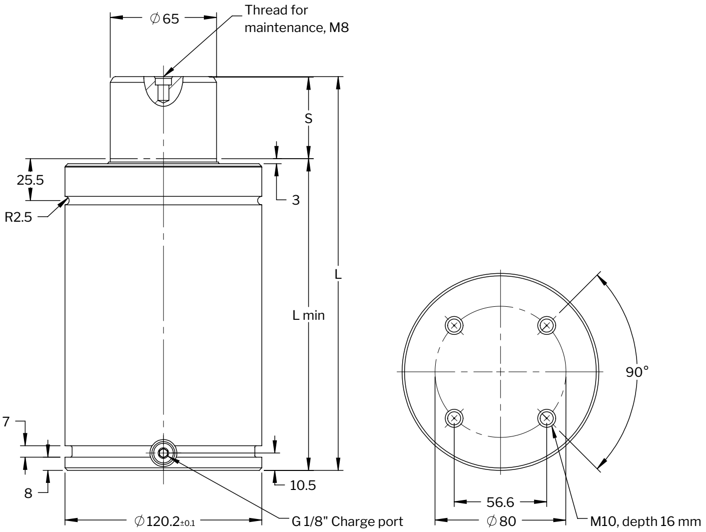
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3018876

Automotive standard: VDI 3003, ISO 11901-1-50000, WDX356203-50xxDMS, GMGDS 90.25.00-50, 39D878xx, B2 4005 21680xx, B2 4006 21710xx, 03323xx, Z000410553, X346590027, Z00049215x, Z000301877, Z000239128, Z000134786, R1000362xx, X346590834, R100229774, R100228812, 39-673-54xx, N03500x, N03501x, N03501x, N03501x, N035020, MES E7231 PG230-PG23D-5A, K32S0-5000, 304419x, 997597x, 9975980, SD116322-5000, M-2401-TD-19-5000

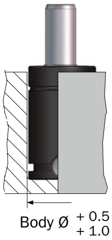


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 5000-025	25	50,000	71,000	11,240	15,960	190	165	0.32	12.40	√
TU 5000-038	38.1		75,000		16,860	216.2	178.1	0.42	13.10	
TU 5000-050	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 ■		82,000		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	√

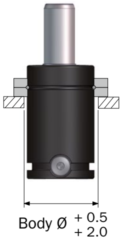
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

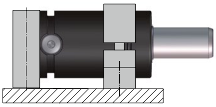


Drop - in



Top mount
FC, FCS, FCSC

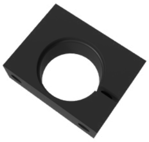
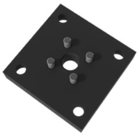
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–5000	FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 247

L-5000	RM-5000	SA-5000
🗎 248	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 7500 and dimensions that conform to the ISO 11901 gas spring standard.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

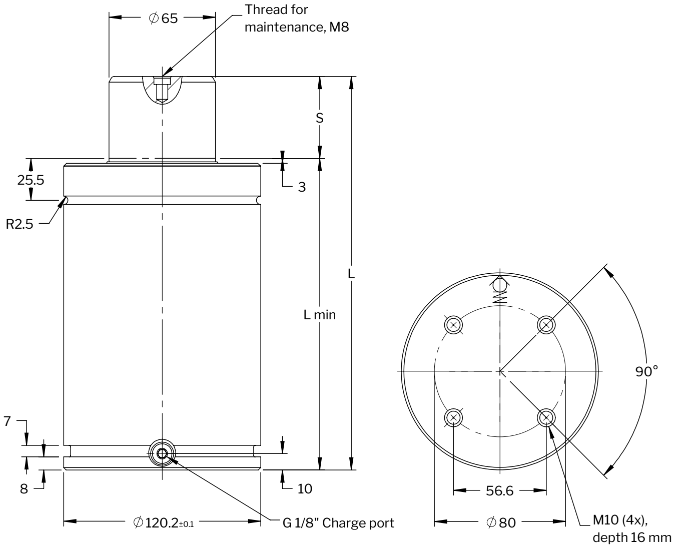
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	2.0 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019280

Automotive standard: R903636025, R903636026, R903636027, R903636028, R903636029, R903636030, R903636031, R903636032, R903636033

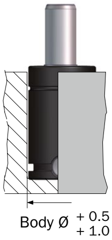


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUS 5000-025	25	50,000	71,000	11,240	15,960	190	165	0.32	12.00
TUS 5000-038	38.1		75,000		16,860	216.2	178.1	0.42	12.65
TUS 5000-050	50		77,000		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		82,000		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

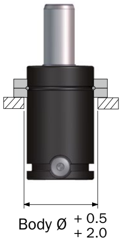
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

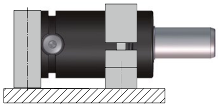


Drop - in



Top mount
FC, FCS, FCSC

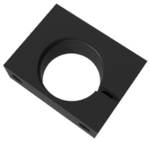
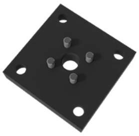
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–5000	FCSC-5000	FFL-5000	FSL-5000	FSS-5000	K–5000
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 247

L-5000	RM-5000	SA-5000
🗎 248	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

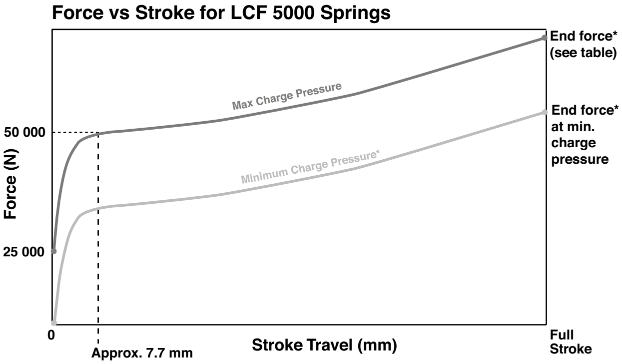
Flex Guide™

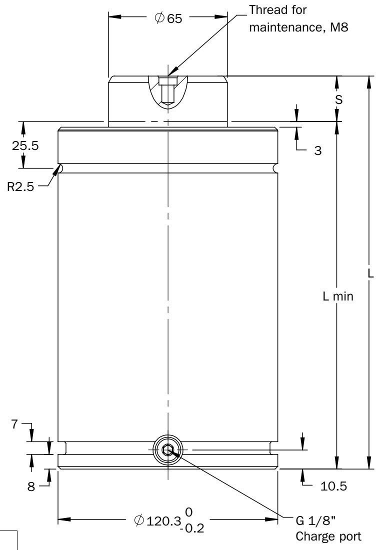
Basic information

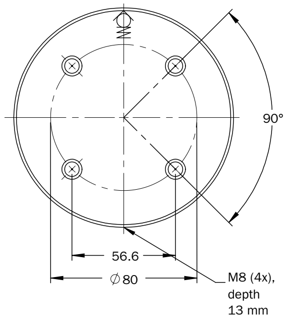
For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	75 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recom max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019380

Automotive standard: WDX358037-50xxDMS







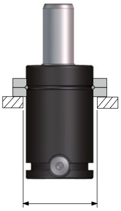
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
LCF 5000-025	25	50,000	71,000	11,240	15,960	190	165	0.32	12.00
LCF 5000-038	38.1		75,000		16,860	216.2	178.1	0.42	12.65
LCF 5000-050	50		77,000		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		82,000		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

* Isothermal end force at full stroke.

Mounting possibilities

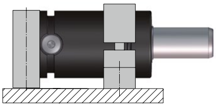
Base mount
MP

Drop - in



Top mount
FC, FCS, FCSC

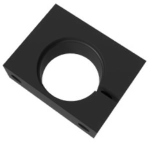
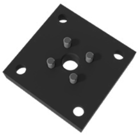
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts




FC–5000	FCS-5000	FFC-5000	HMF-5000	MP-5000	S-5000
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FAC–5000	FCSC-5000	FFL-5000	FSL-5000	FSS-5000	HM–750
🗎 230	🗎 236	🗎 238	🗎 241	🗎 243	🗎 245

K–5000	L-5000	RM-5000	SA-5000
🗎 247	🗎 248	🗎 251	🗎 253

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

Speed Control™ – SPC gas springs have been engineered to reduce or 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.

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S>max

V>max

P>max

Flex Guide™

Features

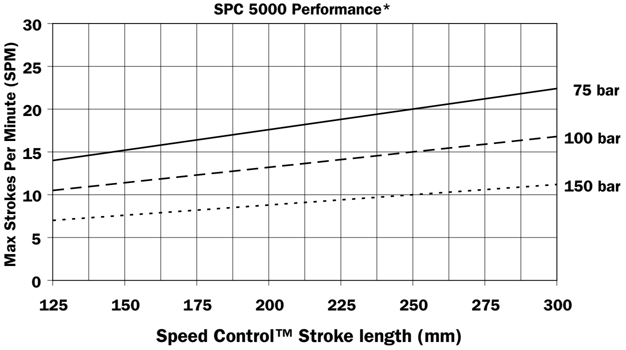
- Reduces or eliminates blank holder bounce
- Increases productivity by enabling high transfer speeds
- Easily retrofitted to existing dies
- Stroke lengths from 125 to 300 mm
- Linkable using a hose system

Basic information

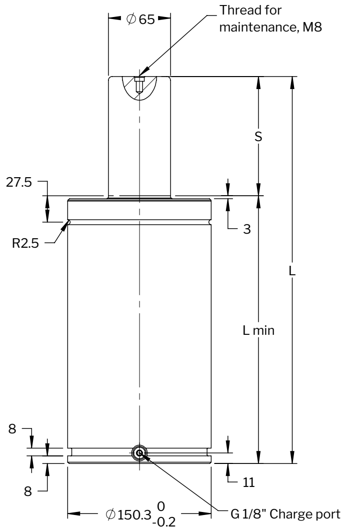
For general information see “About gas springs”.

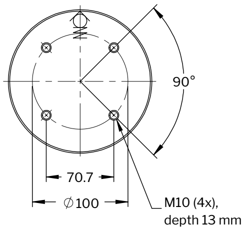
Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recom max strokes/min (at 20°C)	See chart
Max piston rod velocity	1.6 m/s
Dampening length	≈ 30 mm
End stop speed	0.4 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3421497

Automotive standard: 5937849, 5937850, 5937851, 5937852, 5937853



*At 20°C ambient room temperatures with free convection



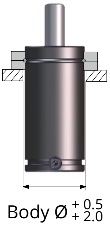


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
SPC 5000-125	125	50,000	64,000	11,250	14,400	405	280	1.90	26.35
SPC 5000-160	160		65,000		14,625	475	315	2.33	28.75
SPC 5000-200	200		66,000		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

* Isothermal end force at full stroke.

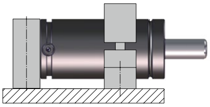
Mounting possibilities

Base Mount
MP



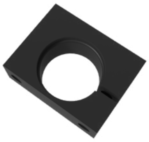
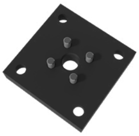
Top Mount
FC, FCS, FCSC

Foot Mount
K, FFC



Body Mount
FAC, SA, S

Recommended mounts

					
FC-7500	FCS-75000	FFC-7500	HMF-7500	MP-7500	S-7500
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

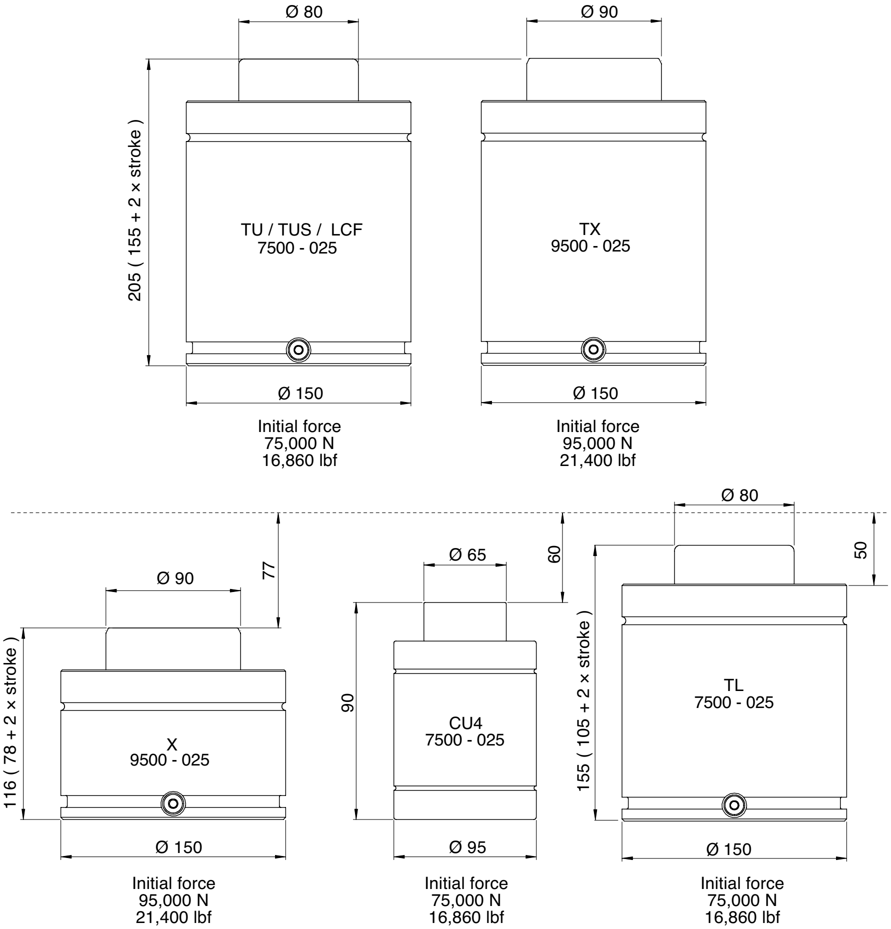
Additional mounts

FFL-7500	FSS-7500	K-7500	L-7500	RM-7500
📄 238	📄 243	📄 247	📄 248	📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | Overview - 75000 ≤ F_{INIT} < 100000



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.

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).

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S>max

V>max

P>max

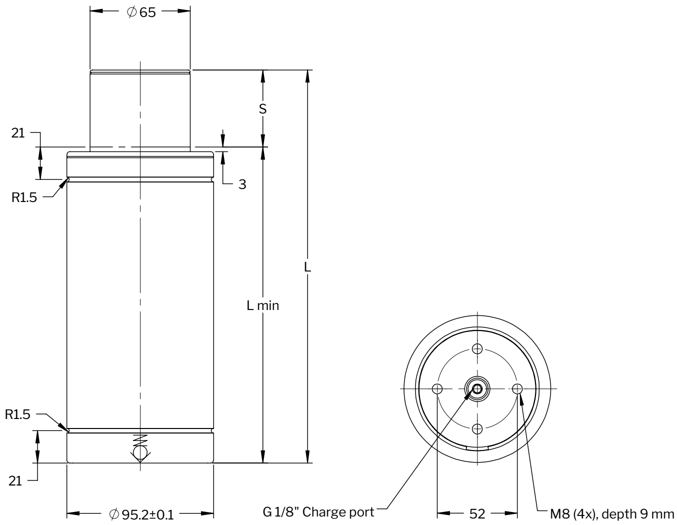
Flex Guide™

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024839

Automotive standard: WDX35-62-08075xxDM, Z000459187, 5937679, 5937680, 5937681, 5937682, 5937683, 5937684, 5937685



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 ■	75,000	98,500	16,860	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*		102,000		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

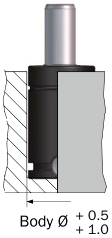
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

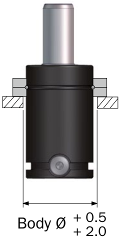
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP, SPRM



Drop - in



Top mount
FK

Foot mount
BFP

Recommended mounts

BFP–7500	FK-3000	SP-7500
229	239	255

Additional mounts

SPRM-95
257

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

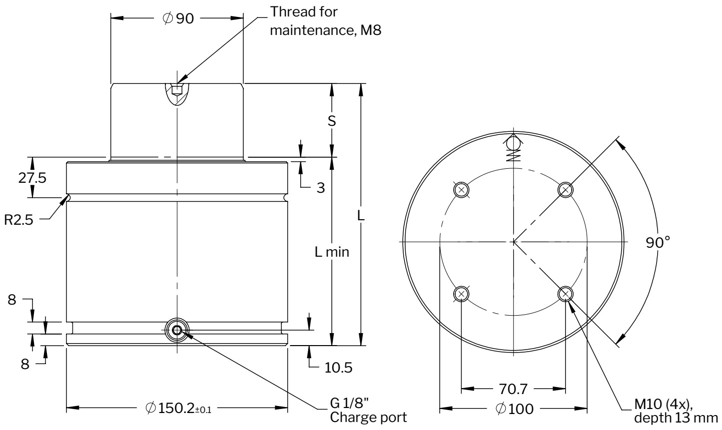
P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 30-100
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3020614

Automotive standard: VDI 3003-Blatt 3, ISO 11901-3-95000, WDX356204-95xxDMS, GMGDS 90.25.08-95, 39D997xx, B2 4005 21724xx, 04585xx, 39-673-028x, 39-673-0290, MES E7231 PG230-PG24D-9A, 305398x, 305399x, SD116391-9500

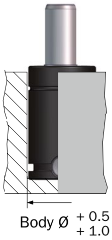


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 9500-019	19	95,000	135,000	21,400	30,370	116	97	0.49	9.86	
X 9500-025	25		139,000		31,270	128	103	0.58	10.23	√
X 9500-032	32		142,000		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	√

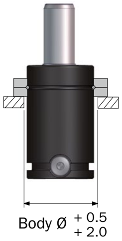
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

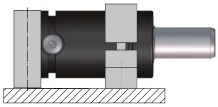


Drop - in



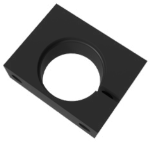
Top mount
FC, FCS, FCSC

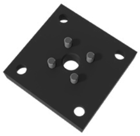
Foot mount
K, FFC



Body mount
S

Recommended mounts





FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-7500	FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

RM-7500
🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

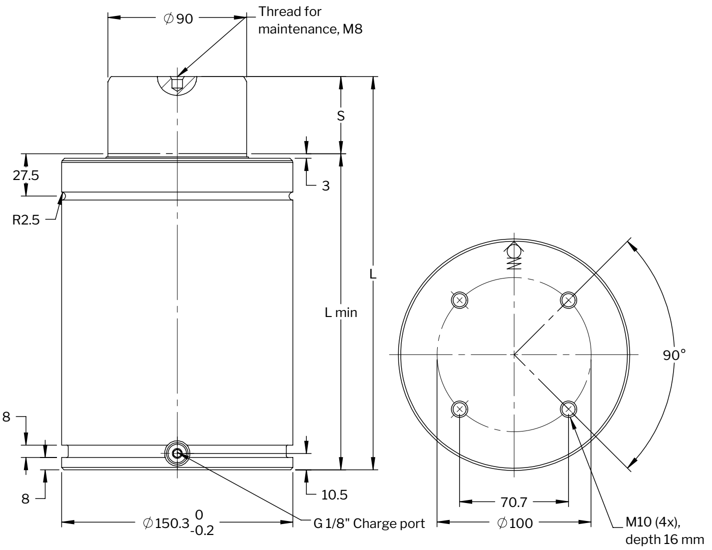
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 30-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3022901

Automotive standard: VDI 3003-Blatt 4, ISO 11901-4-95000, GMGDS 90.25.05-75, 39D838xx, B2 4008 21750xx, 39-673-86xx, 305471x, 305472x

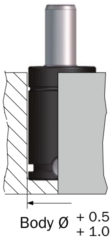


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 9500-025	25 ■	95,000	113,200	21,400	25,500	205	180	1.09	16.86	√
TX 9500-038	38 ■		119,000		26,800	231	193	1.30	17.70	
TX 9500-050	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 ■		134,300		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	√

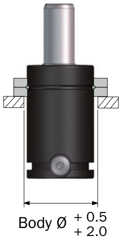
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

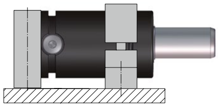


Drop - in



Top mount
FC, FCS, FCSC

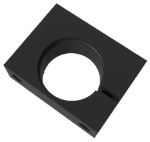
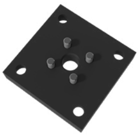
Foot mount
K, FFC



Body mount
S

Recommended mounts




FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-7500	FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

RM-7500
🗎 251

Note!

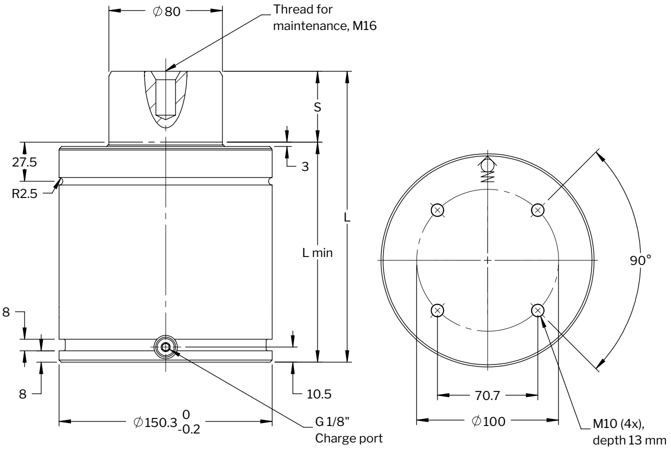
For dimensions on all mount options, refer to “Mounts” in chapter 3.

The TL Series ranges from model sizes 750 to 7500, with the same features and technology as the TU series.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3025027

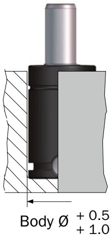


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TL 7500-025	25	75,000	99,900	16,900	22,450	155	130	0.6	13.6
TL 7500-038	37.5		104,100		23,400	180	142.5	0.7	14.5
TL 7500-050	50		106,800		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		112,700		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	455	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

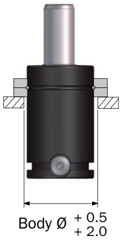
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

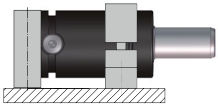


Drop - in



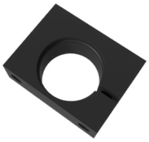
Top mount
FC, FCS, FCSC

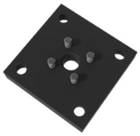
Foot mount
K, FFC



Body mount
FAC, SA, S, HM

Recommended mounts





FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500	RM-750
📄 238	📄 241	📄 243	📄 247	📄 248	📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

2 | TU 7500

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

APPROVED PED 2014/68/EU

S>max

V>max

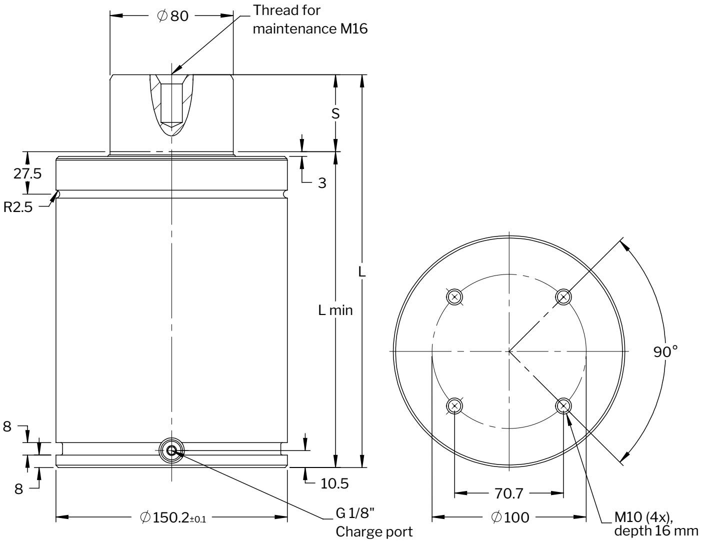
P>max

Flex Guide™

Basic information

For general information see "About gas springs".
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3018877

Automotive standard: VDI 3003, ISO 11901-1-75000, WDX356203-75xxDMS, GMGDS 90.25.00-75, 39D878xx, B2 4005 21680xx, B2 4006 21710xx, 03323xx, Z00049238x, Z000487363, N000741822, N000701263, R1001753xx, R1001607xx, R10022977x, 39-673-55xx, N03750x, N03751x, N037520, MES E7231 PG230-PG23D-7A, 304419x, 3044200, SD116322-7500

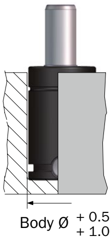


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 7500-025	25	75,000	105,000	16,860	23,600	205	180	0.51	20.30	√
TU 7500-038	38.1		110,000		24,730	231.2	193.1	0.67	21.40	
TU 7500-050	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 ■		121,000		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	√

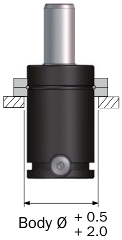
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP

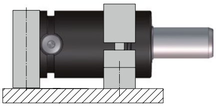


Drop - in



Top mount
FC, FCS, FCSC

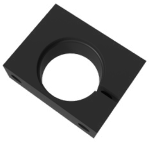
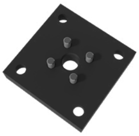
Foot mount
K, FFC



Body mount
S

Recommended mounts




FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

Additional mounts

FCSC-7500	FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

RM-7500
🗎 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

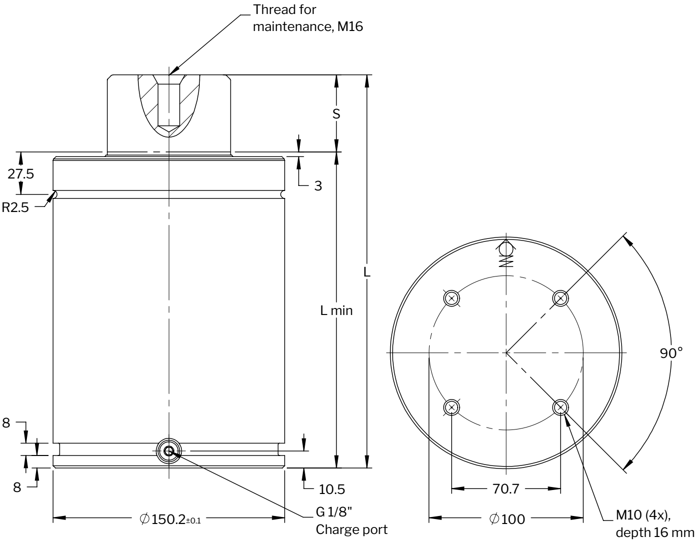
These gas springs are available in sizes from 750 to 7500 and dimensions that conform to the ISO 11901 gas spring standard.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	2.0 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019281

Automotive standard: R903636034, R903636035, R903636036, R903636037, R903636038, R903636039, R903636040, R903636041, R903636042

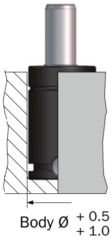


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUS 7500-025	25	75,000	105,000	16,860	23,600	205	180	0.51	19.40
TUS 7500-038	38.1		110,000		24,730	231.2	193.1	0.67	20.47
TUS 7500-050	50		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		119,000		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

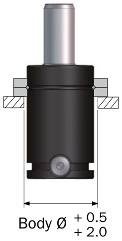
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP

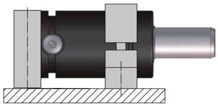


Drop - in



Top mount
FC, FCS, FCSC

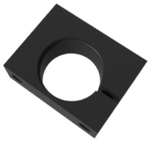
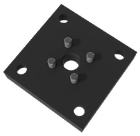
Foot mount
K, FFC



Body mount
S

Recommended mounts




FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
📄 231	📄 235	📄 237	📄 246	📄 249	📄 252

Additional mounts

FCSC-7500	FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500
📄 236	📄 238	📄 241	📄 243	📄 247	📄 248

RM-7500
📄 251

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

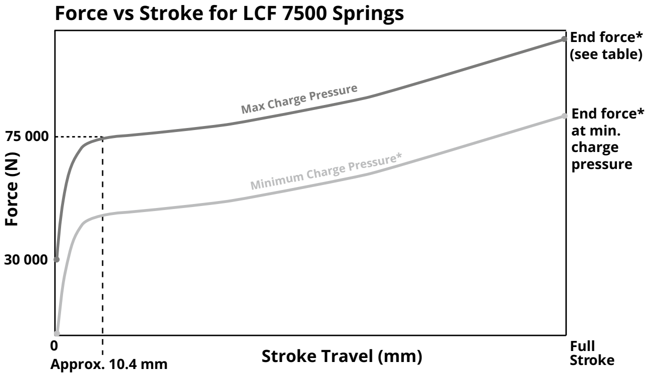
Low Contact Force (LCF) gas springs are designed to reduce excessive shock loads, high noise levels and extreme pad bounce, all factors that lead to high press maintenance costs and noise pollution.

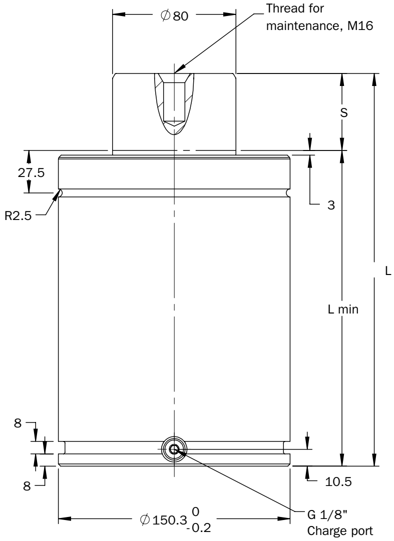
Basic information

For general information see “About gas springs”.

Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 85 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recom max strokes/min (at 20°C) .... ~ 15-40
Max piston rod velocity .... 1.6 m/s
Rod surface .... Nitrided
Tube surface .... Black oxide
Repair kit 3019381

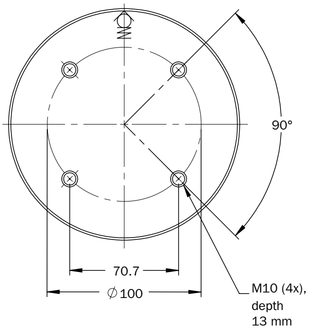
Automotive standard: WDX358037-75xxDMS





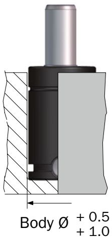
Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
LCF 7500-025	25	75,000	105,000	16,860	23,600	205	180	0.51	19.40
LCF 7500-038	38.1		110,000		24,730	231.2	193.1	0.67	20.47
LCF 7500-050	50		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		119,000		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

* Isothermal end force at full stroke.

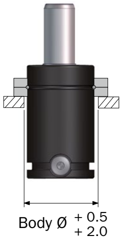


Mounting possibilities

Base mount
MP

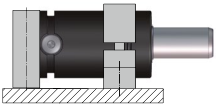


Drop - in



Top mount
FC, FCS, FCSC

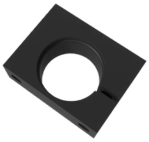
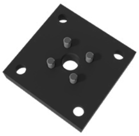
Foot mount
K, FFC



Body mount
S

Recommended mounts




FC–7500	FCS-7500	FFC-7500	HMF-7500	MP-7500	S-7500
🗎 231	🗎 235	🗎 237	🗎 246	🗎 249	🗎 252

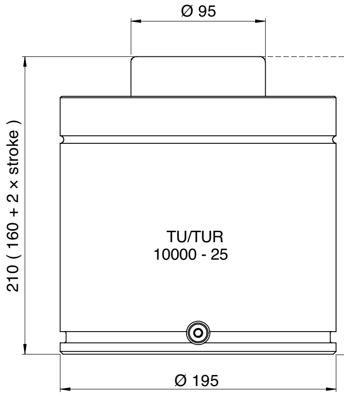
Additional mounts

FCSC-7500	FFL-7500	FSL-7500	FSS-7500	K–7500	L-7500
🗎 236	🗎 238	🗎 241	🗎 243	🗎 247	🗎 248

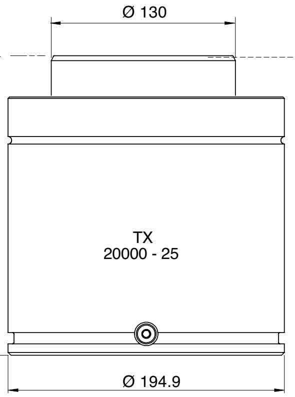
RM-5000
🗎 251

Note!

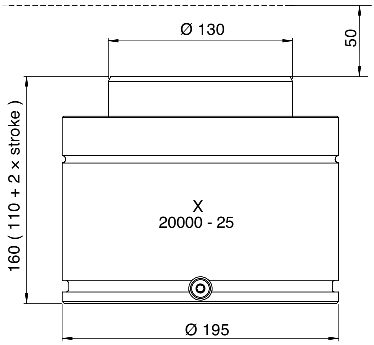
For dimensions on all mount options, refer to “Mounts” in chapter 3.



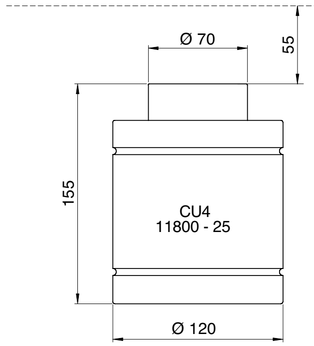
Initial force
106,000 N
23,830 lbf



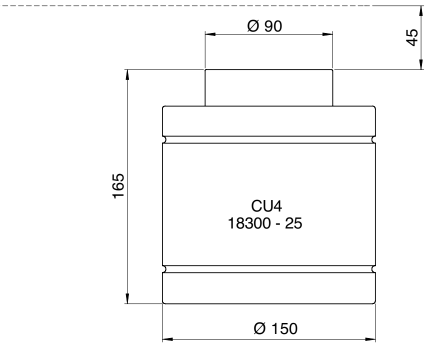
Initial force
200,000 N
44,960 lbf



Initial force
200,000 N
45,000 lbf



Initial force
118,000 N
26,530 lbf



Initial force
183,000 N
41,140 lbf

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.

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).

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S>max

V>max

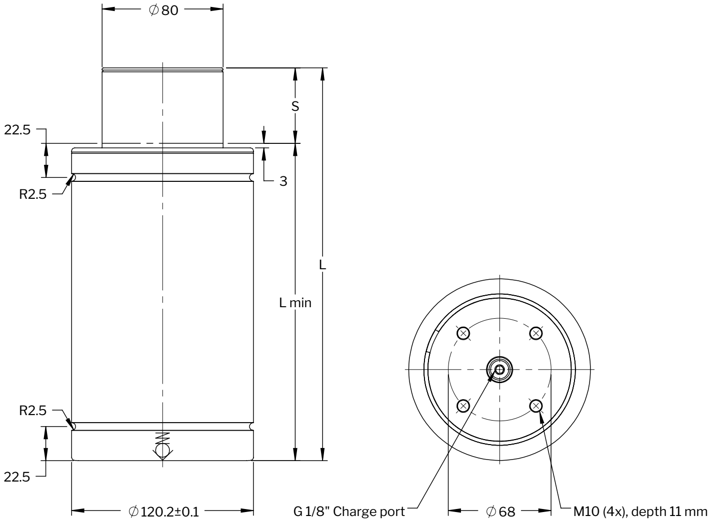
P>max

Flex Guide™

Basic information

For general information see “About gas springs”.
Pressure medium .... Nitrogen
Max. charging pressure (at 20°C) .... 150 bar
Min. charging pressure (at 20°C) .... 25 bar
Operating temperature .... 0 to +80°C
Force increase by temperature .... 0.3%/°C
Recommended max strokes/min (at 20°C) .... ~ 80-100
Max piston rod velocity .... 0.8 m/s
Rod surface .... Nitrided
Tube surface .... Nitrided
Repair kit 3024840

Automotive standard: WDX35-62-09118xxDM, 5937686, 5937687, 5937688, 5937689, 5937690, 5937691, 5937692



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 11800-010	10 ■	118,000	150,000	26,530	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*		165,000		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 11800-065	65*		163,000		36,600	320	255	1.90	9.56

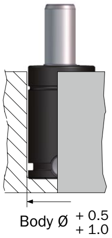
* Should always be attached to the tool using the tapped holes in the bottom or a flange.

** Isothermal end force at full stroke.

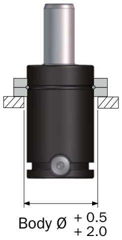
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP, SPRM



Drop - in



Top mount
FC, FCS, FCSC

Foot mount
BFCU

Recommended mounts

BFCU–11800	FC-5000	FCS-5000	SP-11800
📄 229	📄 231	📄 235	📄 255

Additional mounts

FCSC-5000	SPRM-120
📄 236	📄 257

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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.

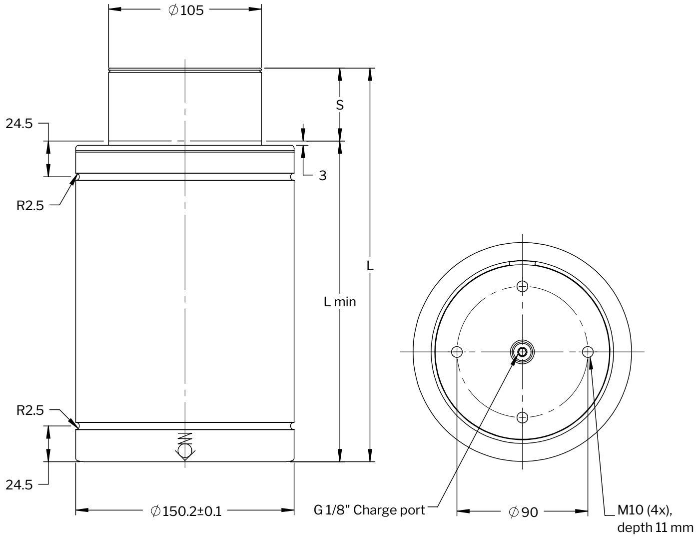
As an option, the CU4 spring can be delivered with a Side Port plate (SP) for applications where a sideport is needed (e.g., for use in hose systems).

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 80-100
Max piston rod velocity	0.8 m/s
Rod surface	Nitrided
Tube surface	Nitrided
Repair kit	3024841

Automotive standard: WDX35-62-09183xxDM, 5937693, 5937694, 5937695, 5937696, 5937697, 5937698, 5937699



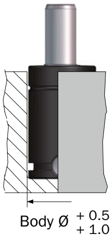
Order No.	S stroke	Force in N at 150 bar/+20°C Initial	Force in N at 150 bar/+20°C End force**	Force in lbf at 150 bar/+20°C Initial	Force in lbf at 150 bar/+20°C End force**	L ±0.25	L min.	Gas vol. (l)	Weight (kg)
CU4 18300-010	10 ■	183,000	227,000	41,140	51,000	110	100	0.56	8.78
CU4 18300-016	16 ■		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*		244,000		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.

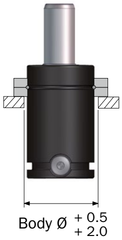
■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
SP, SPRM



Drop - in



Top mount
FC, FCS, FCSC

Foot mount
BFCU

Recommended mounts




BFCU–18300	FC-7500	FCS-7500	SP-18300
🗎 229	🗎 231	🗎 235	🗎 255

Additional mounts

FCSC-7500	SPRM-150
🗎 236	🗎 257

Note!

For dimensions on all mount options, refer to "Mounts" in chapter 3.

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

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S>max

V>max

P>max

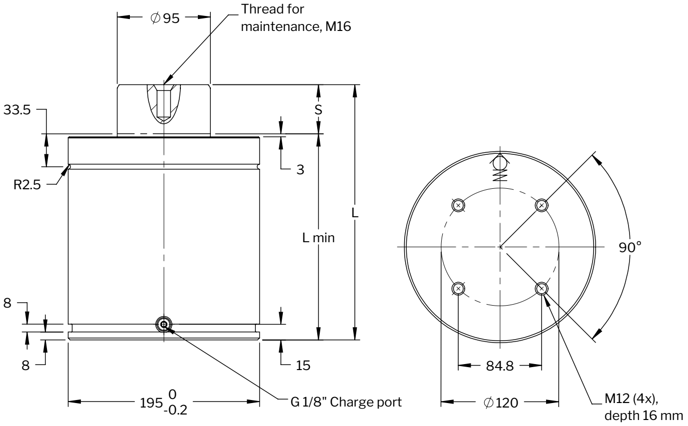
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019037

Automotive standard: VDI 3003, ISO 11901-1-100000, GMGDS 90.25.00-100, 39D878xx, 03441xx, R1001607xx, R10022977x, 39-673-56xx, N03990x, N03991x, N039920, 305396x, 305397x

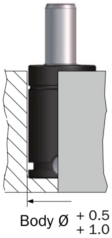


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TU 10000-025	25	106,000	138,000	23,830	31,020	210	185	0.87	35.90	
TU 10000-038	38.1		143,000		32,150	236.2	198.1	1.13	37.60	
TU 10000-050	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 ■		156,000		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	√

* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP



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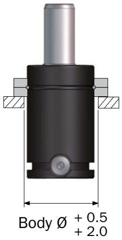
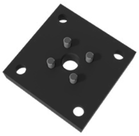


Top mount
FCS

Foot mount
K, FFC

Recommended mounts



FCS-10000	FFC-10000	MP-10000
📄 235	📄 237	📄 249

Additional mounts

K–10000
📄 247

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 over-stroke protection system.

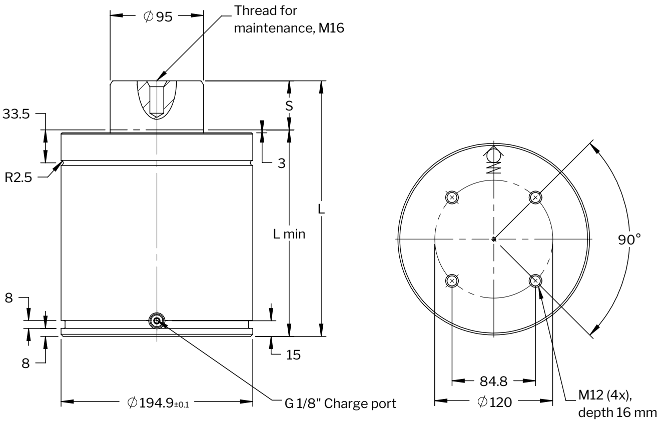
For sizes 750 up to 7500, please refer to the TUS High Speed gas springs.

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3019282

Automotive standard: GMGDS 90.50.11, R100160733, R100160734, R100160735, R100160736, R100160738, R100160739, R100160741, R100229777, R100229778

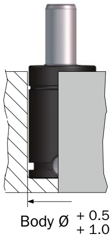


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)
		Initial	End force*	Initial	End force*				
TUR 10000-025	25	106,000	138,000	23,830	31,020	210	185	1.0	34.7
TUR 10000-038	38.1		143,000		32,150	236.2	198.1	1.2	36.4
TUR 10000-050	50		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		156,000		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

* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP



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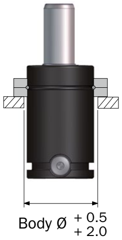


Top mount
FCS

Foot mount
K, FFC

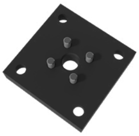
Recommended mounts

FCS-10000

235

FFC-10000

237



MP-10000

249

Additional mounts

K–10000

247

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

The Power Line Series includes our shortest and most powerful piston rod sealed gas springs, offering impressive force in a very compact format.

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S>max

V>max

P>max

Flex Guide™

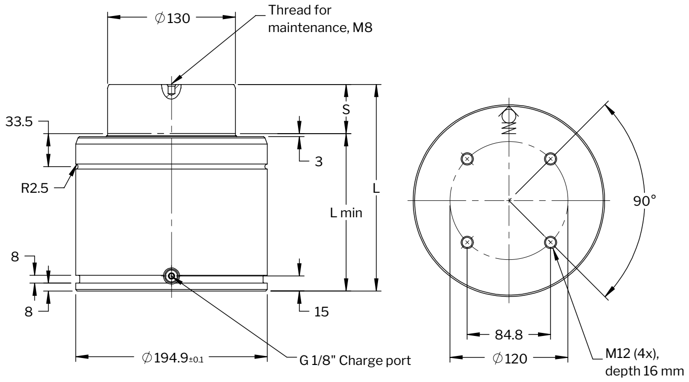
These gas springs are available with forces from 1,700 N up to 200,000 N and stroke lengths up to 125 mm. There is a side port for gas charging that can also be used to connect to a hose system. An upper C-groove, lower U-groove together with four M12 threaded holes allows for various mounting possibilities using our standard mounts.

Basic information

For general information see "About gas springs".

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-40
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3022902

Automotive standard: ISO 11901-3-200000, GMGDS 90.25.08-199, 39-673-029x, 305467x, 305468x

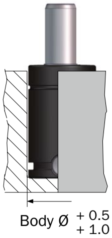


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
X 20000-019	19	200,000	259,000	45,000	58,200	148	129	1.21	21.50	
X 20000-025	25		270,000		60,750	160	135	1.38	22.16	√
X 20000-032	32		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	√

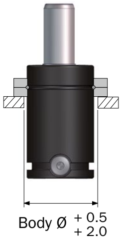
* Isothermal end force at full stroke. ■ Recommended stroke length for optimal delivery.

Mounting possibilities

Base mount
MP



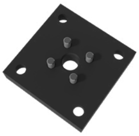
Drop - in



Top mount
FCS

Foot mount
K, FFC

Recommended mounts



FCS-10000	FFC-10000	MP-10000
🗎 235	🗎 237	🗎 249

Additional mounts

K–10000
🗎 247

Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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 up to 300 mm. There is an optional bottom port model for hose/base plate connection available upon request, contact us for more details. An upper C-groove, lower U-groove and bottom threaded holes allows for various mounting possibilities using our standard mounts.

APPROVED PED 2014/68/EU

S>max

V>max

P>max

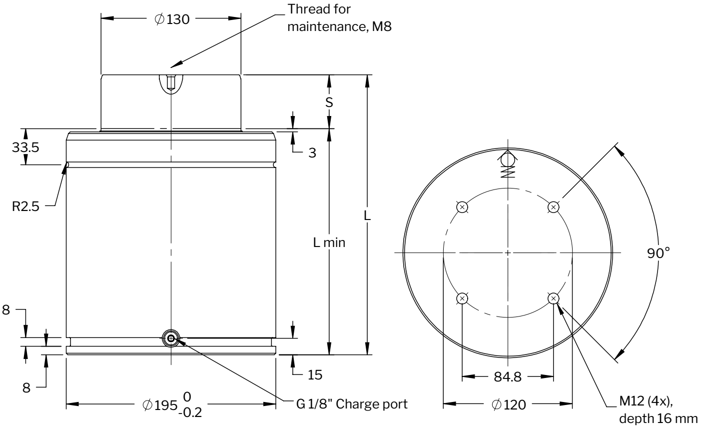
Flex Guide™

Basic information

For general information see “About gas springs”.

Pressure medium	Nitrogen
Max. charging pressure (at 20°C)	150 bar
Min. charging pressure (at 20°C)	25 bar
Operating temperature	0 to +80°C
Force increase by temperature	0.3%/°C
Recommended max strokes/min (at 20°C)	~ 15-100
Max piston rod velocity	1.6 m/s
Rod surface	Nitrided
Tube surface	Black oxide
Repair kit	3026204

Automotive standard: GMGDS 90.25.05-100, 39-673-87xx, ISO 11901-4-200000

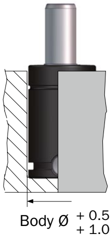


Order No.	S stroke	Force in N at 150 bar/+20°C		Force in lbf at 150 bar/+20°C		L ±0.25	L min.	Gas vol. (l)	Weight (kg)	ISO
		Initial	End force*	Initial	End force*					
TX 20000-025	25	200,000	242,000	44,960	54,404	210	185	2.03	28.20	
TX 20000-038	38		256,400		57,640	236	198	2.41	29.57	
TX 20000-050	50		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	√

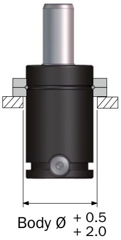
* Isothermal end force at full stroke.

Mounting possibilities

Base mount
MP



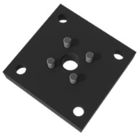
Drop - in



Top mount
FCS

Foot mount
K, FFC

Recommended mounts



FCS-10000	FFC-10000	MP-10000
📄 235	📄 237	📄 249

Additional mounts

K–10000
📄 247

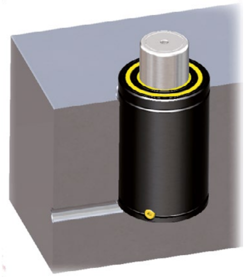
Note!

For dimensions on all mount options, refer to “Mounts” in chapter 3.

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

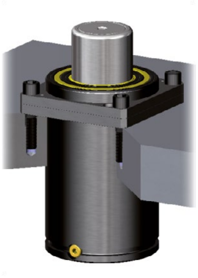
The gas spring is dropped into a flat bottomed pocket within the die.

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.

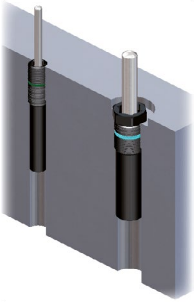
Foot mount

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.



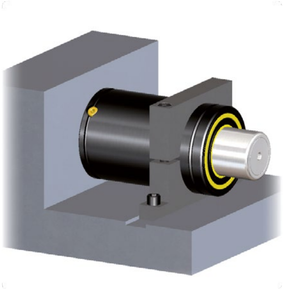
Top mount

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.

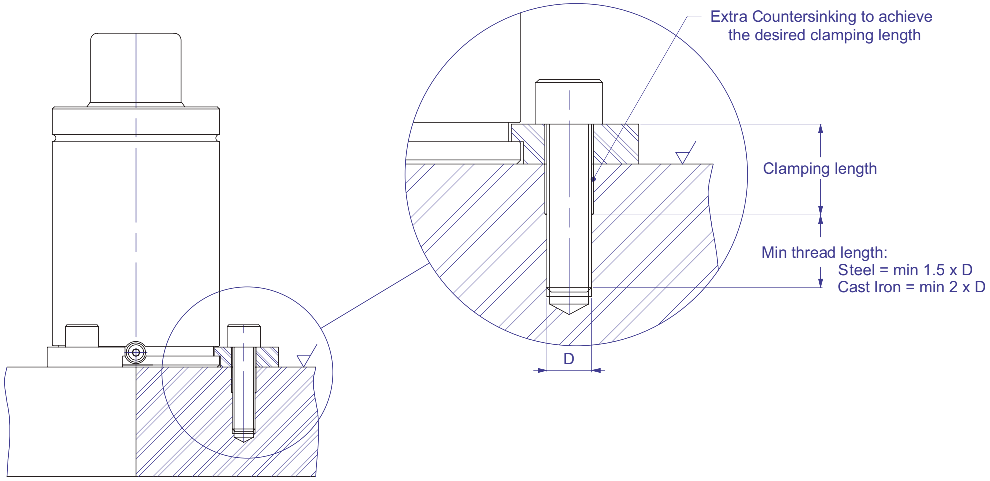
Recommendations:

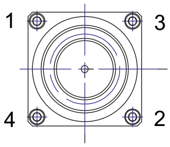
Screws should have a free length (clamping length) of 2 to 4 times their thread diameter and a thread depth of at least 1.5 times their thread diameter in steel and 2 times their thread diameter in cast iron If the free length cannot be achieved in any other way, the screw holes should be countersunk (see below). Please note that the specifications in automotive 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

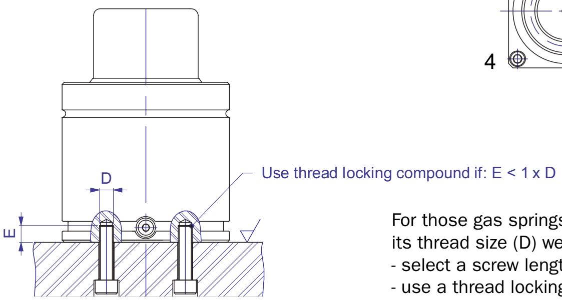
*Screws of material grade better than or equal to grade 8.8 according to ISO 898-1 must be used.

For all types of flange mounting using mounting screws:





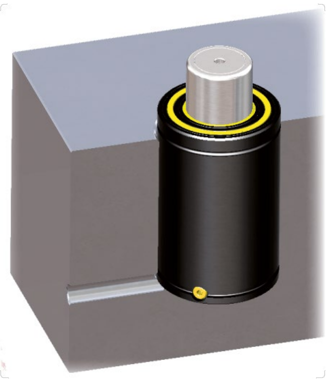
When tightening the mounting screws in the tool, apply an evenly cross like pattern according to the picture (1-2-3-4). Otherwise there is a risk for the mount to tilt.



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 (with the exception of the R Series Models).

Gas spring orientations: only vertically upright installations are recommended (see ***Warning!***).

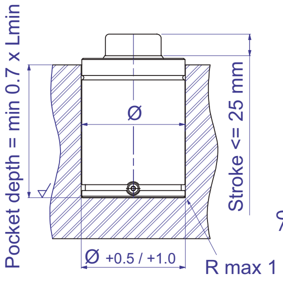
Hole depth: min 70% of the spring's Lmin length to ensure sufficient support and reduce the risk of side loading.

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.

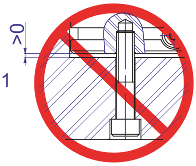
Link systems: Not recommended for stroke lengths < 25 mm.

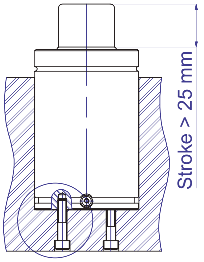
Warning! Never drop a gas spring into a pocket upside down as this may lead to excessive wear on the outside of the tube.



Always observe pocket dimension recommendations

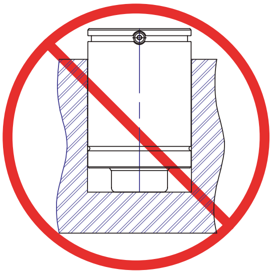
Use correct screw length





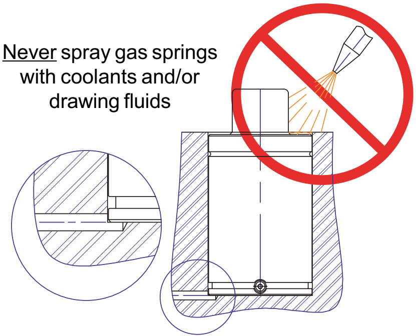
Use Drop-In and Base Thread together for longer stroke lengths

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 (MP, MPX)

Stroke length suitability:

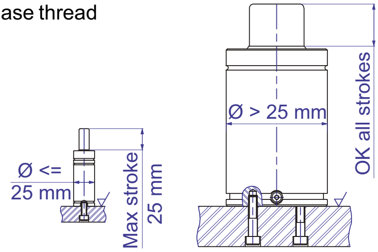
For cylinder diameters < Ø25 = Max stroke 25 mm
For cylinder diameters > Ø25 = OK for all stroke lengths

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

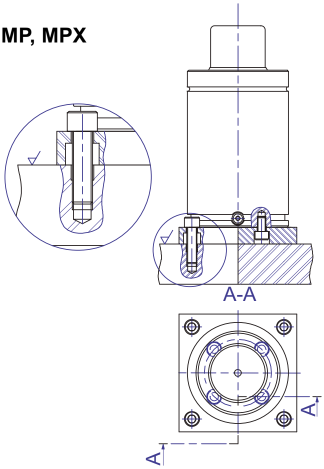
*For thread depths less than 1 times its thread size use a screw length that engages all thread depth, use a thread locking compound (middle strength or higher) and apply correct screw torque setting.

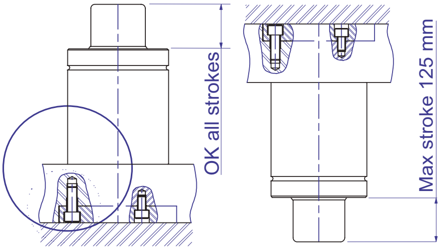
For: Base thread

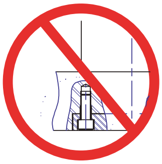


If the gas spring has only a single base threaded hole, then the max stroke length for this mounting method should not exceed 25 mm with the exception of M2 model springs

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)

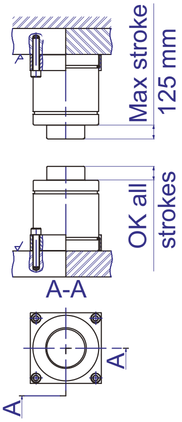
Gas spring orientations: Vertically upright = OK for all stroke lengths
Vertically upside down = OK up to 125 mm stroke (see ***Warning!*** below)

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.

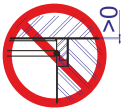
Note! A small gap between Foot Mount and mounting surface is normal before the gas spring is clamped to the die using the mounting screws.

Warning! K Foot Mounts are not allowed 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.

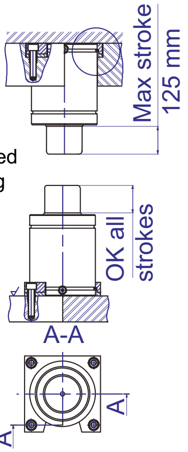
For: BF, FCR



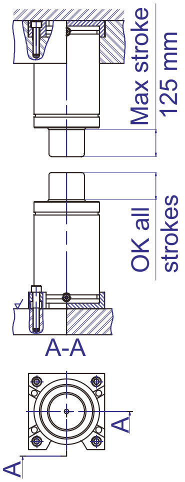
For: FSL



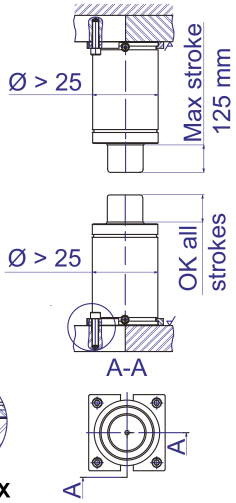
Avoid compressive loads being transferred through to mounting screws (use shims)

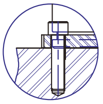


For: RM



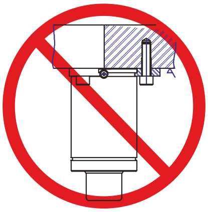
For: FFC, FFX



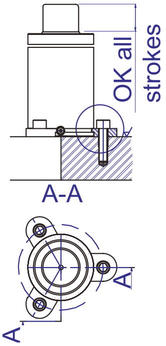


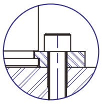
FFC, FFX

For: K



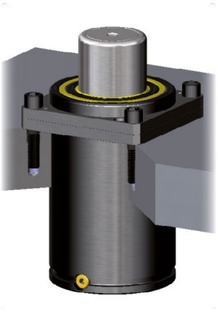
Do not mount upside down using K lugs





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

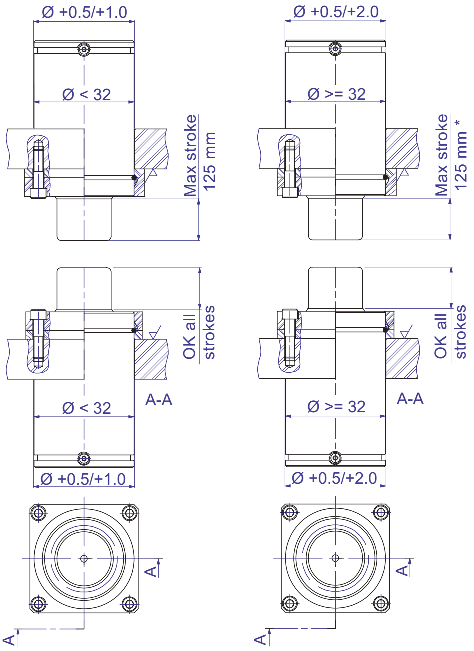
Link systems: FCSC is the preferred flange mount for linked systems as the gas spring is unable to rotate in the flange (see Note below).

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.

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 used such that the mounting screws are required to support the full compression force of the gas spring when stroked (see below).

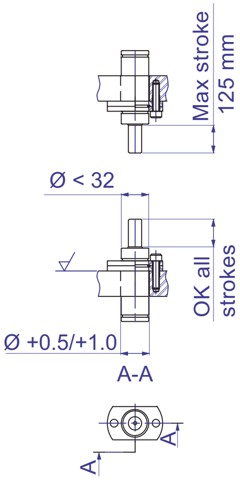
Note! Stroke lengths over 125 mm are not allowed for upside down installations unless FCSC flange mount is used.

For: FC, FCS, FCX, FK, FCSC, FCSX

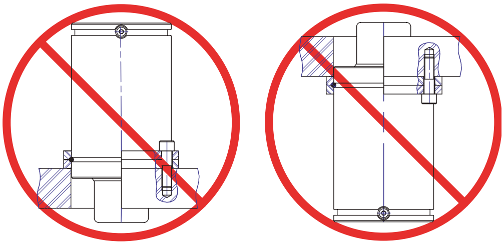


*** Note:** for the FCSC flange, upside down installation is OK for all stroke lengths

For: FCR

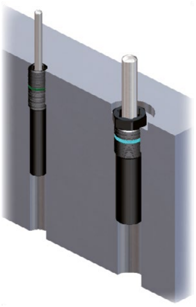


For: all Top mounts



Never let the mounting screws support gas spring compression forces

Mounting method:
Thread mount (including FRM, FTM)

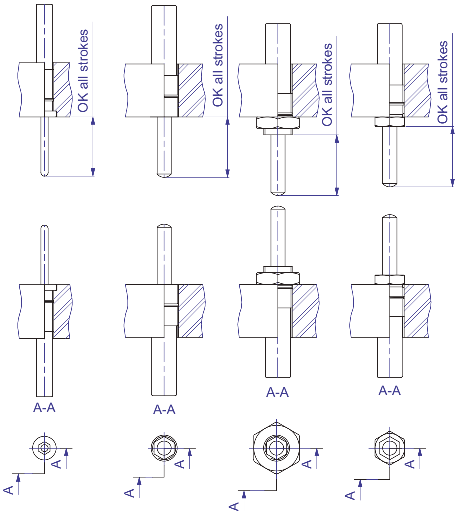


Gas spring orientations: Vertically upright = OK for all stroke lengths
Vertically upside down = OK for all stroke lengths

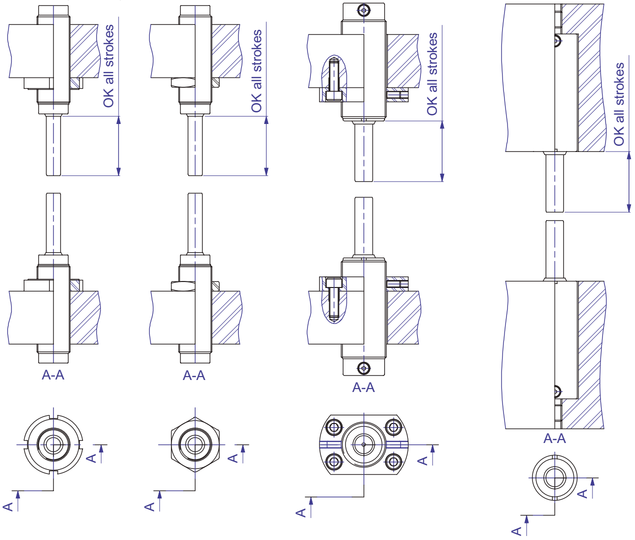
Link systems: it is possible to link thread mounted gas springs if there is sufficient access to the spring's charge port.

Use a removable thread locking compound and ensure that the compound does not touch the piston rod.

For: EP, EPS

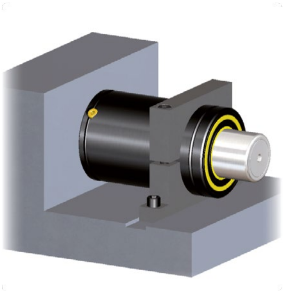


For: FRM, FTM, TMS/XMS



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).



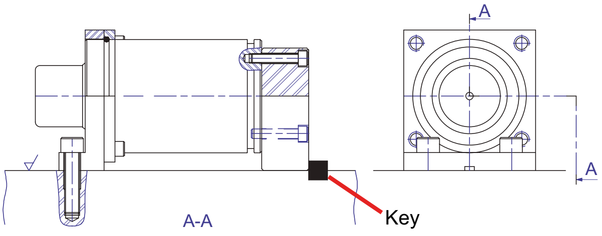
Key grooves: Key-grooves should be used to either recess the Body Mount or to back up the Body Mount with an additional key, thus preventing gas spring compression forces exerting a shear stress on the mounting screws.

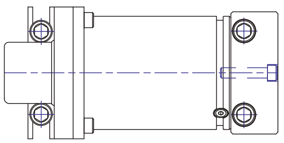
Link systems: this mounting method is very suitable for gas link systems, since the gas spring is unable to rotate.

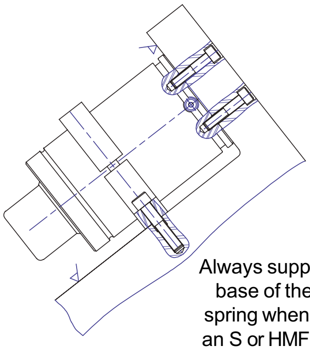
Warning!

Always ensure the gas spring is mounted such that no side loading occurs.

For: FAC with SA

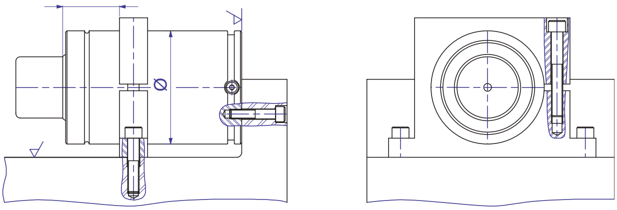




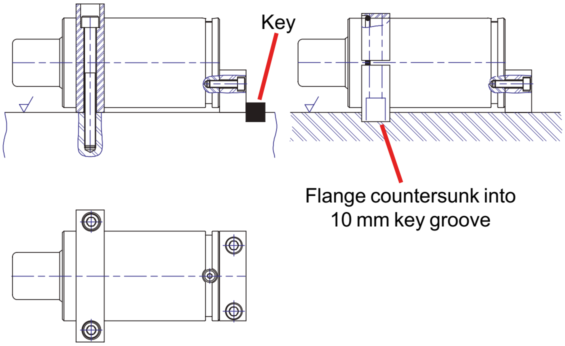


Always support the base of the gas spring when using an S or HMF mount

For: S, SM, HMF



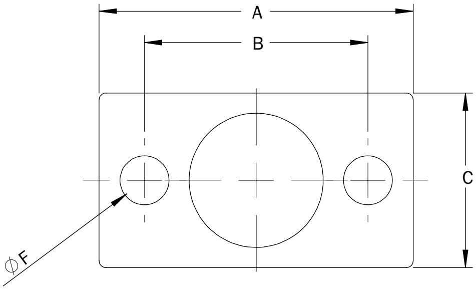
For: HM, HMF

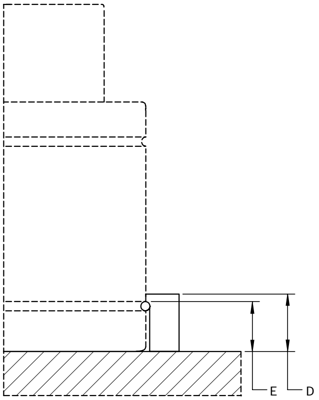


BF

BF is a flange mount used to clamp the base of the gas spring to the tool by using the lower C-groove of the gas spring.

Order No.	A	B	C	D	E	F
BF-19	45	32	25	10	7	7

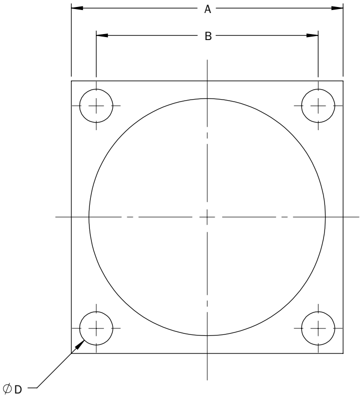


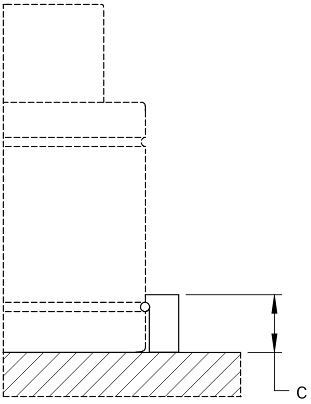


BFCU

BFCU is a flange mount used to clamp the base of the gas spring to the tool by using the lower C-groove of the gas spring.

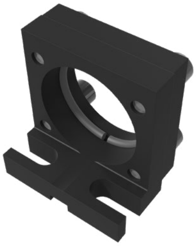
Order No.	A	B	C	D
BFCU-1000	52	40	14.5	7
BFCU4-1800	70	56.5	19.5	9
BFP-4700	90	73.5	24.5	11
BFP-7500	110	92	27.5	13
BFCU-11800	130	109.5	29.5	13
BFCU-18300	162	138	34.5	17.5



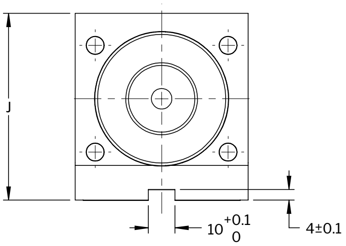


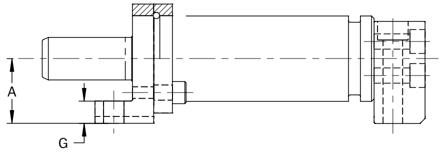
FAC

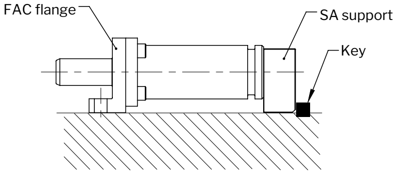
The FAC is a 90° angled, 2-piece flange for TU 750 – 5000. The flange is only to be used together with the SA support. It is recommended to back the SA mount with a key.

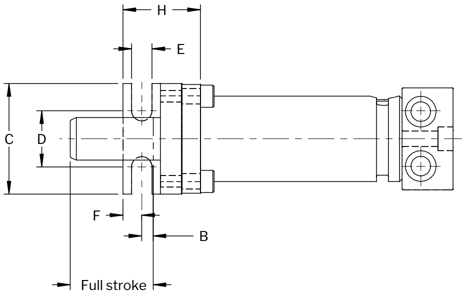


Order No.	A	B	C	D	E	F	G	H	J
FAC-750	38	8	65	33	12	11	13	45.5	70
FAC-1500	57	11	90	37	15	14	19	53.5	101
FAC-3000	66.5	11	110	63	15	14	19	57.5	121
FAC-5000	79	11	140	88	18	14	19	59.5	149







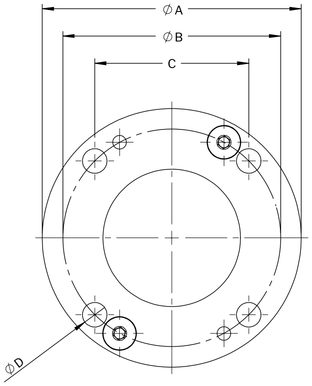


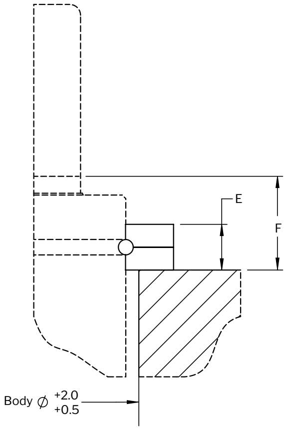
FC

FC is a round flange used to mount the gas spring in the upper C-groove.

Order No.	Spring size	A	B	C	D	E	F
FC-150		50	38	26.9	7	9	16 (CU4 420)* 21.5 (M2, X 320)*
FCN-150	M2, X 320	56	42	29.7	9	9	16 (CU4 420)* 21.5 (M2, X 320)*
FC-MC-150		60	49.5	35	7	9	16 (CU4 740)* 17 (MC3, MC3-SP, MT 300, X350, XG 350)*
FC-250		68	56.5	40	7	9	15 (CU4 1000)* 17 (MT 500, TU 250, X500, XG 500)*
FCN-250	TU 250, X/XG 50,0	70	56.6	40	9	9	15 (CU4 1000)* 17 (MT 500, TU 250, X500, XG 500)*
FC-500		86	70.7	50	9	13	22 (K 500)* 23 (MT 750, TU 500, TX 750, X750, XG 750, XF 750)*
FC-750		95	80	56.5	9	13	22 (K 750)* 24 (MT 1000, X 1000, XG 1000, XF 1000, LCF 750, TL 750, TU 750, TUS 750, TX 1000)*
XFC-1500	X/XG 1500	105	85	60	11	16	27
XFCJ-1500	X /XG 1500	122	104	73.5	11	16	27
FC-1500		122	104	73.5	11	16	29
FC-3000		150	130	92	13.5	18	33
FC-5000		175	155	109.5	13.5	21	33 (CU4 11800)* 36 (X 6600, XG 6600, LCF 5000, SPC 3000, TL 5000, TU 5000, TUS 5000, TX 6600)*
FC-7500		220	195	138	17.5	27	38 (CU4 18300)* 41 (LCF 7500, SPC 5000, TL 7500, TU 7500, TUS 7500, TX 9500, X 9500)*

*Mounts to this model/models

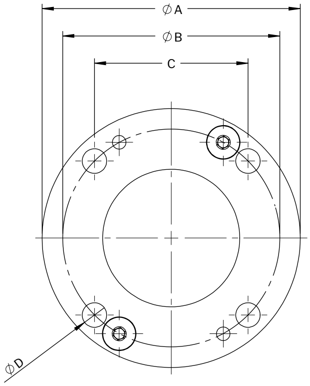


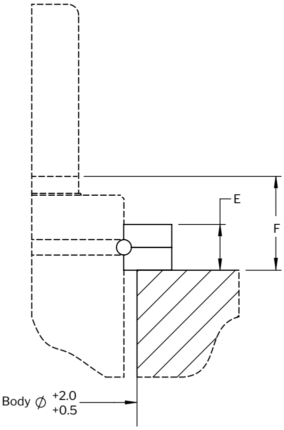


FC (R)

FC is a round flange used to mount the gas spring in the upper C-groove.

Order No.	A	B	C	E	F
FC-12	25	36	6.6	9	21.5
FC-15	27	37	6.6	9	21.5
FC-19	32	44	6.6	9	21.5





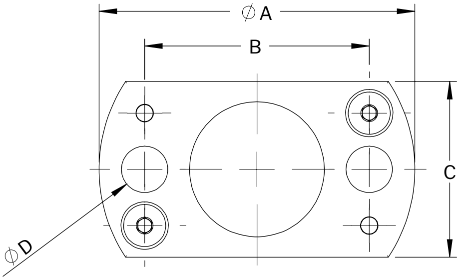
FCR

FCR is a rectangular flange mount used to mount the gas spring in the upper C-groove. FCR meets ISO 11901-2, VDI 3003, GM 90.25 and other standards

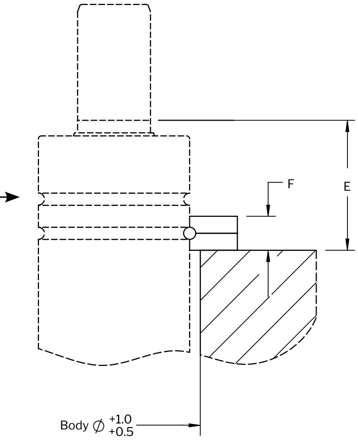
Order No.	**A**	**B**	**C**	**D**	**E**	**F**
FCR-12	34	24	21	6.6	21.5	9
FCR-15	37	27	24	6.6	21.5	9
FCR-19 VDI2	45	32	25	7	21.5	9
FCR-25	50	38	30	7	16/21.5*	9

*depending on gas spring model

Note! Ensure the correct groove is used - see note below on using the correct groove.



Note! This groove is not to be used for mounting for gas springs R19 and X170.

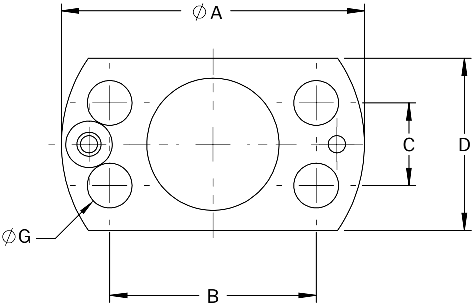


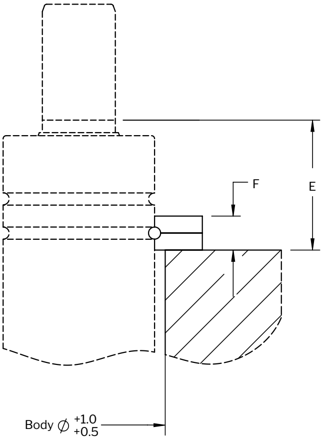
FCR ISO

FCR is a rectangular flange mount used to mount the gas spring in the upper C-groove. FCR meets ISO 11901-2, VDI 3003, GM 90.25 and other standards

Order No.	A	B	C	D	E	F	G
FCR-90	45	30	12	25	21.5	9	7
FCR-150	50	34	18	30	16 (CU4 420)* 21,5 (M2, X 320)*	9	7

*Mounts to this model/models



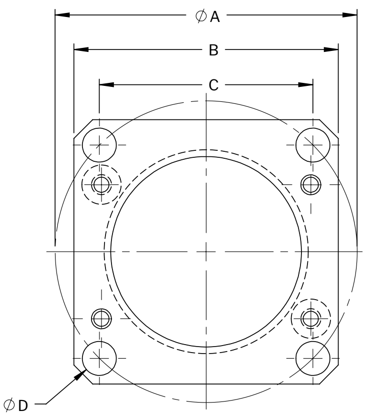


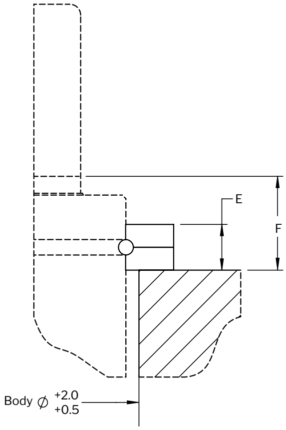
FCS

FCS is a square flange mount used to mount the gas spring in the upper C-groove. FCS meets the ISO 11901-2, VDI 3003, Ford WDX35-62, GM 90.25 and other standards.

Order No.	A	B	C	D	E	F
FCS-32	49.5	45	35	7	9	16 (CU4 740)* 17 (MC3, MC3-SP, MT 300, X 350, XG 350)*
FCS-250	56.5	52	40	7	9	15 (CU4 1000)* 17 (MT 500, TU 250, X 500, XG 500)*
FCS-500	70.7	64	50	9	13	22 (K 500)* 23 (MT 750, TU 500, TX 750, X 750, XG 750, XF 750)*
FCS-750	80	70	56.5	9	13	22 (K 750)* 24 (MT 1000, X1000, XG 1000, XF 1000, LCF 750, TL 750, TU 750, TUS 750, TX 1000)*
FCSX-1500	90.5	80	64	11	16	27
FCS-1500	104	90	73.5	11	16	29
FCX-1500	104	90	73.5	11	16	27
FCS-3000	130	110	92	13.5	18	33
FCS-5000	155	130	109.5	13.5	21	33 (CU4 11800)* 36 (X 6600, XG 6600, LCF 5000, SPC 3000, TL 5000, TU 5000, TUS 5000, TX 6600)*
FCS-7500	195	162	138	17.5	27	38 (CU4 18300)* 41 (LCF 7500, SPC 5000, TL 7500, TU 7500, TUS 7500, TX 9500, X 9500)*
FCS-10000	240.4	210	170	17.5	27	47

*Mounts to this model/models





FCSC

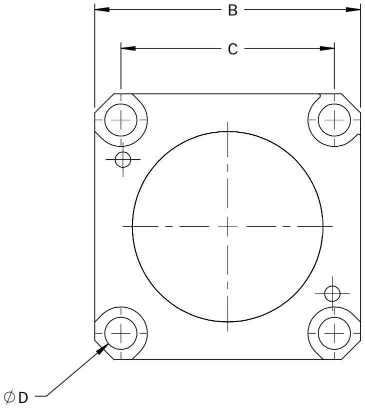
Patent No. SE 521 352, EP 1 565 670, US 7,544,008

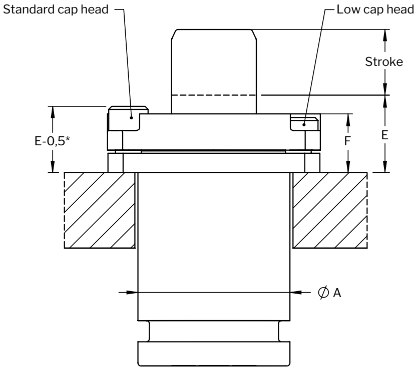
The FCSC Clamp Flange has a unique patented design that offers a very robust clearance free connection between the gas spring and the mount. This play-free connection also prevents rotation of the gas spring. The FCSC Clamp Flange is especially suitable for gas springs that will be linked together by a hosed system 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.

Order No.	Spring size	A	B	C	D	E	F
FCSC-500	X 750, TU 500, TX 750, K 500	45	64	50	9	22 (K 500)* 23 (X 750, TU 500, TX 750)*	18.4
FCSC-750	X 1000, TU 750, TX 1000, K 750	50	70	56.5	9	22 (K750)* 24 (X 1000, TU 750, TX 1000)*	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 (CU4 11800)* 36 (X 6600, XG 6600, LCF 5000, SPC 3000, TL 5000, TU 5000, TUS 5000, TX 6600)*	32.4
FCSC-7500	CU4 18300, X 9500, TU 7500, TX 9500	150	162	138	16.5	38 (CU4 18300)* 41 (LCF 7500, SPC 5000, TL 7500, TU 7500, TUS 7500, TX 9500, X 9500)*	38

*Mounts to this model/models

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.



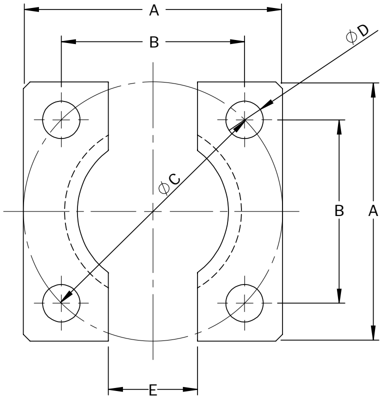


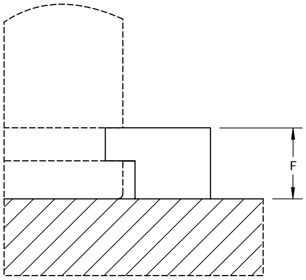
Low cap head screws are recommended
* If standard screws are used

FFC

FFC is a foot mount used to clamp the base of the gas spring to the tool by using U-groove of the gas spring. FFC meets the ISO 11901-2, VDI 3003, Ford WDX35-62, GM 90.25 and other standards.

Order No.	A	B	C	D	E	F
FFC-MC-150	50	35	49.5	7	12	6.5
FFC-250	55	40	56.6	7	12	6.5
FFC-500	70	50	70.7	9	20	6.5
FFC-750	75	56.5	80	9	24	12
FFX-1500	100	73.5	104	11	24	12
FFCX-1500	85	60	84.85	11	23	12
FFC-1500	100	73.5	104	11	24	12
FFC-3000	120	92	130	13.5	24	12
FFC-5000	140	109.5	155	13.5	24	12
FFC-7500	190	138	195.2	17.5	24	12
FFC-10000	210	170	240.4	17.5	24	13
FFC-XG-350	50	35	49.5	7	18	6.5
FFC-XG-500	55	40	56.6	7	18	6.5

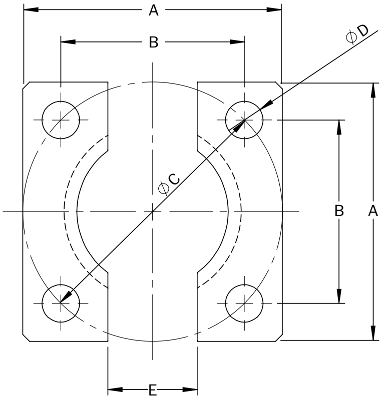


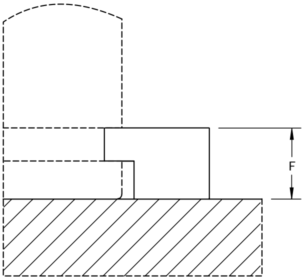


FFL

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	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	161.7	13.5	24	12
FFL-7500	177.8	139.7	197.6	18	24	12



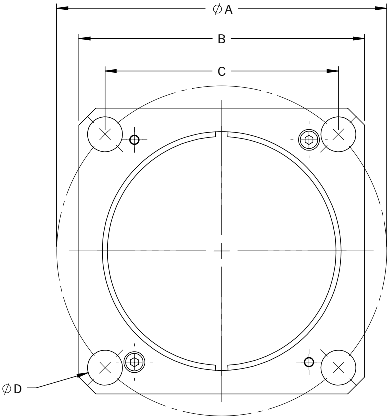


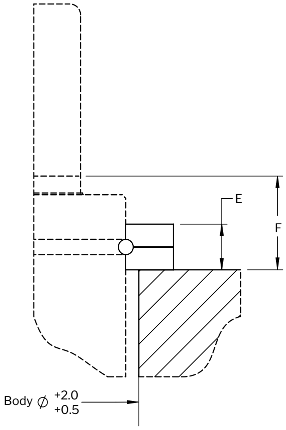
FK

FK is a square flange used to mount the gas spring in the upper C-groove.

Order No.	A	B	C	D	E	F
FK-1500	104	90	73.5	11	16	26 (CU4 4700)* 29 (K 1500)*
FK-1800	80	70	56.5	9	13	21
FK-3000	130	110	92	13.5	18	30

*Mounts to this model/models

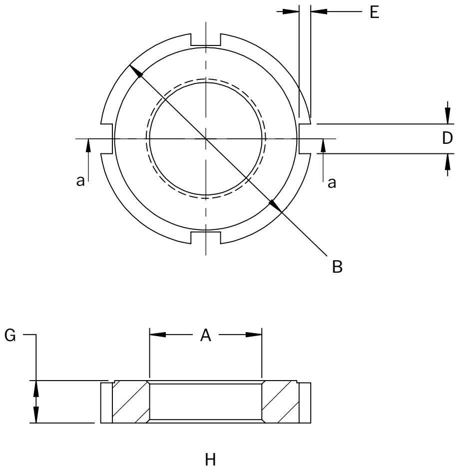


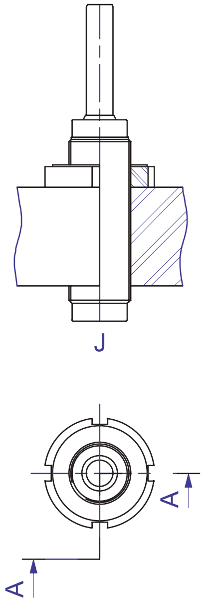


FRM

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 metric thread on the tube.

Order No.	A	B	D	E	G
FRM-16	M16x1.5	32	5	2	7
FRM-19	M24x1.5	42	6	2.5	9
FRM-150	M28x1.5	50	7	3	10
FRM-250	M38x1.5	58	8	3.5	11



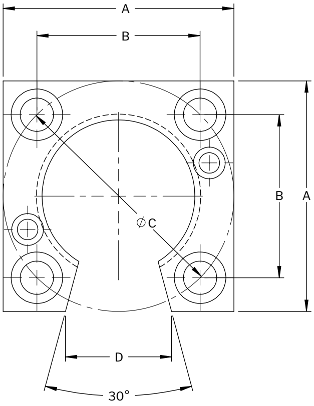


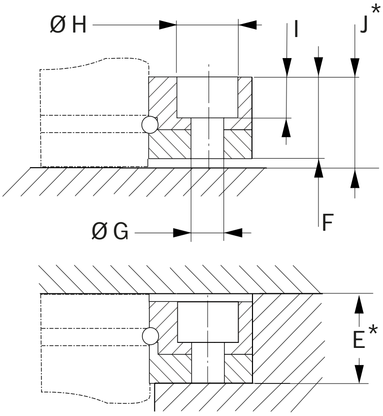
FSL

- **The FSL flange type was originally developed to fit gas springs with a lower C-groove and consists of two flange 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 FSL adapter ring accessory (see page 242).**
- **The FSL adapter ring is ordered separately and, when used, replaces the standard lock ring included in the FSL flange.**

Order No.	Spring size	A	B	C	D	E	F	G	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	25.5*	24	11	18	10	25*
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



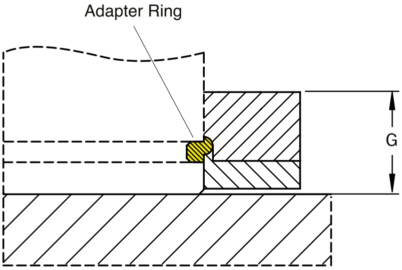


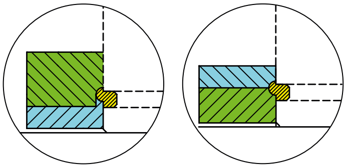
FSL Adapter ring

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, when used, replaces the standard lock ring included in the FSL flange.

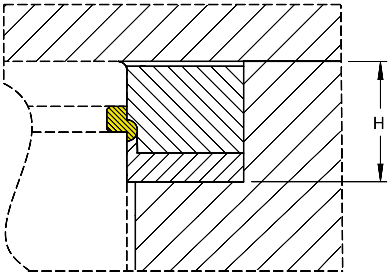
Order No.	FSL Adapter Ring size	Spring size	G*	H*
3020946	750	TU 750, X 1000	26	26
3027144	X 1500	X 1500	25.8	25.4
3020947	1500	TU 1500, X 2400	26	25.9
3020948	3000	TU 3000, X 4200	26	25.9
3020949	5000	TU 5000, X 6600	26	25.9
3020950	7500	TU 7500, X 9500	26.6	26.4

* approximate value





Important! FSL-Adapter Ring location
The orientation of the FSL-Adapter Ring should always be the same regardless of the position of the flange halves (standing upright or upside-down). Only the flange halves change position.

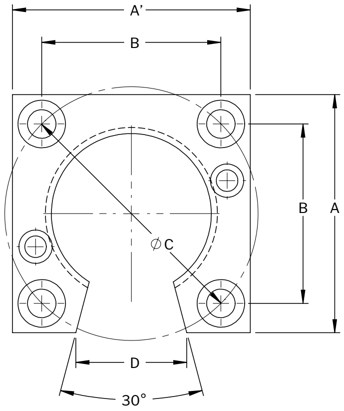


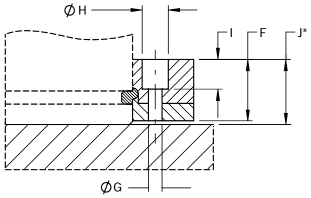
FSS

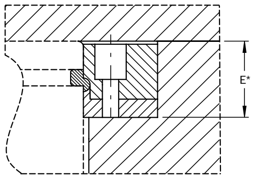
The FSS mount is of the same type as the FSL mount, but with external dimensions and hole pattern as the FFC mount. The FSS mount fits on gas springs with a lower U-groove. The FSL adapter ring is included in the FSS mount and does not need to be ordered separately. The FSS mount can be used for both upright and upside down installation.
The FSS mount meets the Subaru standard SD116401.

Order No.	Spring size	A	B	C	D	E	F	G	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	175**	138	195.2	84	26.4*	26.2	21	21	16	26.6*

*approximate value
** For FSS-7500: A’=190, all others: A=A’



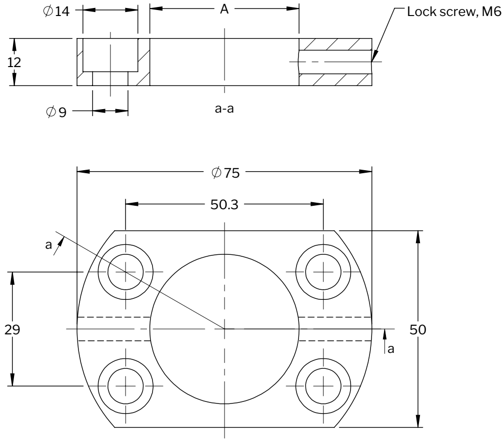




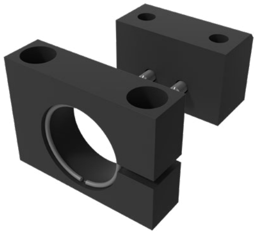
FTM

FTM is rectangular lock nut with lock screw. The FTM lock nut is to be used on gas springs with an outer metric thread on the tube.

Order No.	A
FTM-250	M38x1.5



HM



HM (Horizontal Mount) is a mount for TU 750-3000 springs. This mount meets FORD WDX35-62-standard. If the front support is not mounted in a key groove, make sure that the rear mount is backed up using a key (see Fig. A and B). Screws for attaching the spring to the mount are included in the delivery.

Order No.	A	B	C	D	E	F	G	H	J	K	L	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	32	20	13.5	13.5	30	15	45
HM-3000	140	115	48	15	70	95	115	52.5	33	20	13.5	13.5	30	15	45

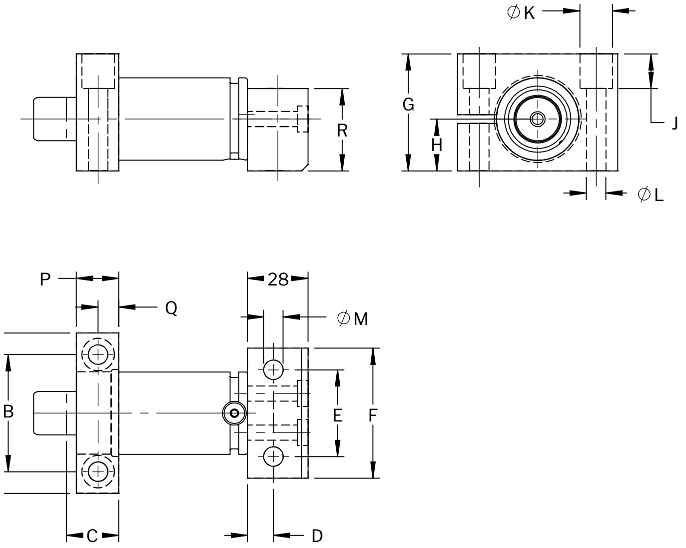


Fig. A

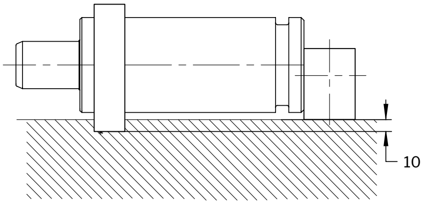
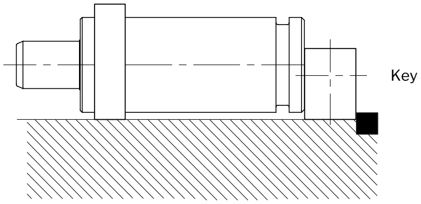
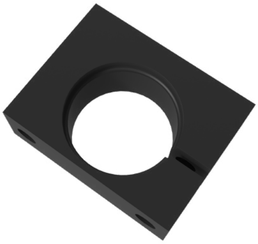


Fig. B



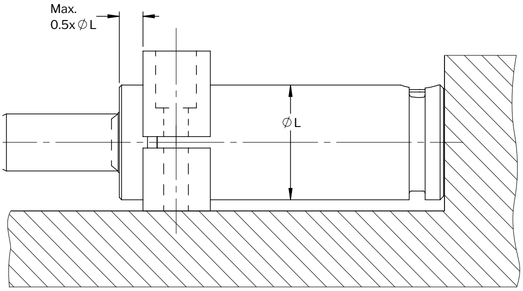
HMF

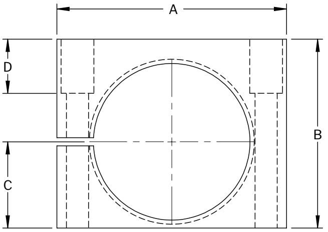
The HMF mount is a symmetric horizontal body mount similar to the S mount. The HMF mount meets the VDI 3003, Ford WD-X35-62 and GMDS 90.25.455 standard.

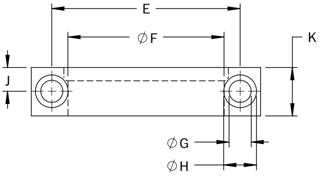


Order No.	A	B	C	D	E	F	G	H	J	K	L
HMF-150	68	48	20.9	10	50	32.1	9	15	10	20	31.9
HMF-250	74	54	23.9	16	54	38.1	9	15	10	20	38
HMF-500	80	60	27.5	22	60	45.4	9	15	10	20	45.2
HMF-750	90	70	30	25	68	50.4	11	18	15	30	50.2
HMF-X1500	108	82	36.5	27	84	63.4	11	18	15	30	63.2
HMF-1500	125	94	42	32	100	75.4	13.5	20	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

Note! The base of the gas spring must always be supported when using the HMF mount.





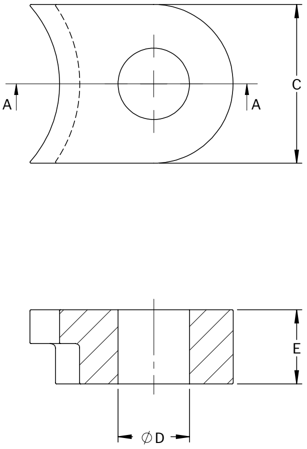


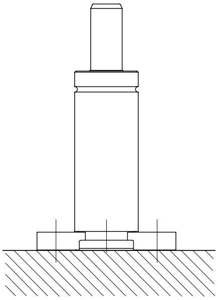
K-LUG

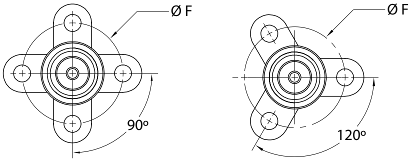
The K-lug is used to clamp the gas spring vertically upright to the tool. The gas spring can be clamped down using 2, 3 or 4 K-lugs. If only 2 lugs are used, then locking plate L must also be used to fix the gas spring. Note: When using locking plate L together with K-lugs, the spring cannot be hosed 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.

Order No.	Spring size	C	D	E	F
K-250	250 (X 500)	20	7	7	56.6
K-500	500 (X, TX 750)	25	9	7	70.7
K-750	750 (X, TX 1000)	30	13.5	14	80
KX-1500	X, TX 1500	30	13.5	14	92
K-1500	1500 (X,TX 2400)	30	13.5	14	104
K-3000	3000 (X, TX 4200)	40	17.5	14	130
K-5000	5000 (X, TX 6600)	50	17.5	14	155
K-7500	7500 (X, TX 9500)	50	21.5	14	195
K-10000	10000 (X, TX 20 000)	58	21.5	15	240

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.



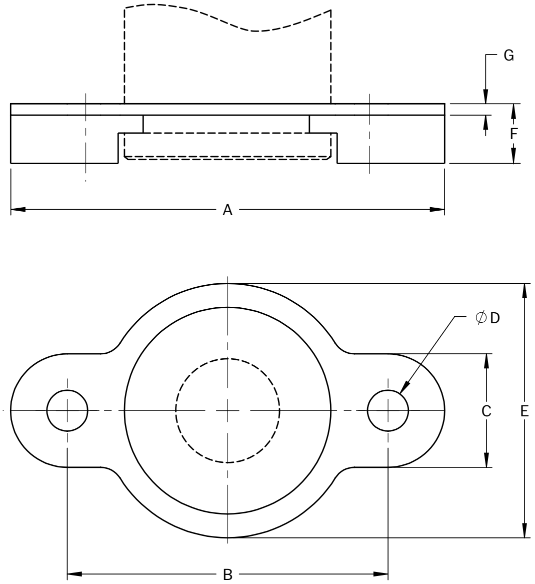




L

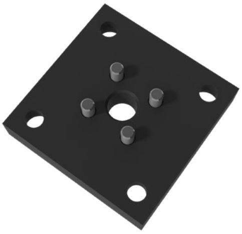
When fixing gas springs vertically using 2 K-lugs, locking plate L must be used to ensure that the spring will be fixed radially.

Order No.	A	B	C	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
LX-1500	122	92	30	13.5	74	16.5	2.5
L-1500	134	104	30	13	86	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



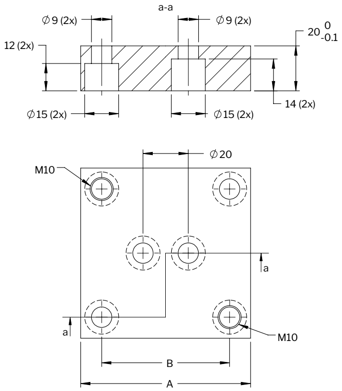
MP

MP is a square base mount to mount the gas spring to the tool by using the bottom threads of the gas spring into the tool. MP meets the ISO 11901-2, GM 90.25 and other standards.

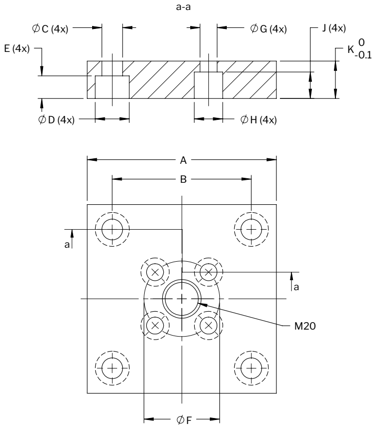


Order No.	A	B	C	D	E	F	G	H	J	K
MP-500	70	50	9	15	12	20	9	15	14	20
MP-750	75	56.5	9	15	12	20	9	15	14	20
MPX-1500	100	73.5	10.5	18	13	20	9	15	12	20
MP-1500	100	73.5	11	18	12	40	9	15	14	20
MP-3000	120	92	13.5	20	13	60	9	15	14	20
MP-5000	140	109.5	13.5	20	13	80	11	18	15	20
MP-7500	190	138	17.5	26	17	100	11	18	20	25
MP-10000	210	170	17.5	26	17	120	13.5	20	13	25

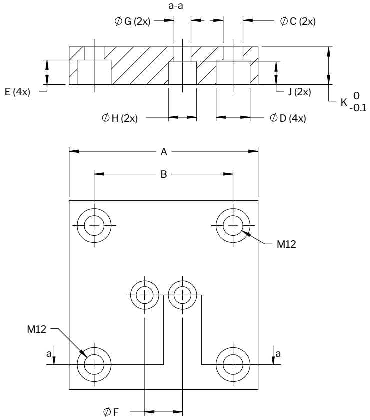
MP-500 MP-750



MP-1500 MP-3000 MP-5000 MP-7500 MP-10000



MPX-1500

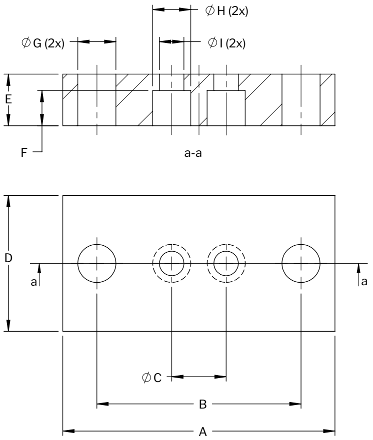


NMP

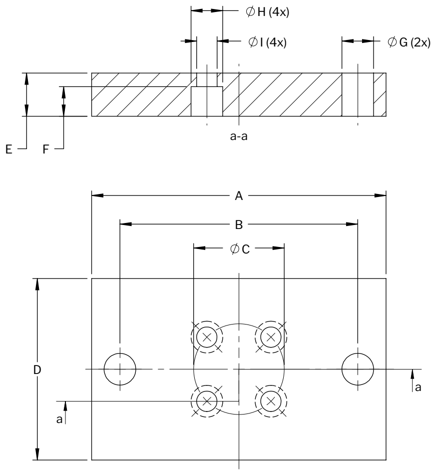
The NMP is a rectangular base mount, which meets the Nissan standard K32P0.

Order No.	Spring size	A	B	C	D	E	F	G	H	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

NMP-750 NMP-1000

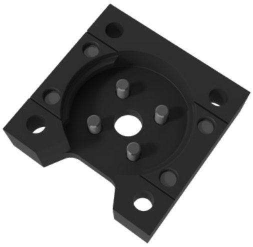


NMP-2400 NMP-4200

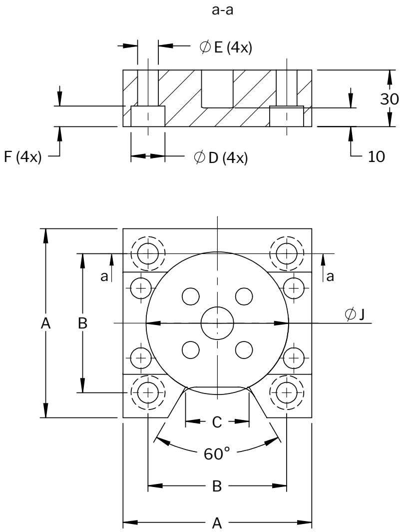


RM

The RM mount is a removable square mount for mounting the gas spring in the base. The RM mount meets the Ford W-DX35-80 North America standard.



Order No.	A	B	C	D	E	F	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	120.2
RM-7500	190	138	70.7	26	18	17	150.2
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

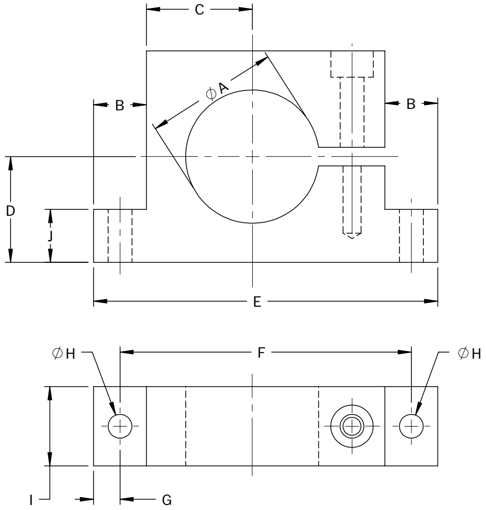


S

The S mount is a horizontal body mount allowing the gas spring to be installed in any orientation within the die.

Order No.	A	B	C	D	E	F	G	H	I	J
S-MC	32.1	18	22	22.5	90	72	9	8.5	20	15
S-250	38.1	18	24	27.5	95	77	8	9	20	15
S-500	45.4	17	29	30	100	82	9	9	20	15
S-750	50.4	20	40	40	130	110	10	9	30	20
S-1500	75.4	22.5	52.5	52.5	160	137	11.5	11	30	20
S-3000	95.4	25	67.5	62.5	195	170	12.5	13	30	20
S-5000	120.4	27.5	77.5	74	220	195	12.5	13	30	20
S-7500	150.4	30	95	100	260	230	15	13	30	20

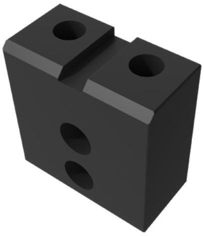
Note! The base of the gas spring must always be supported when using the S mount.



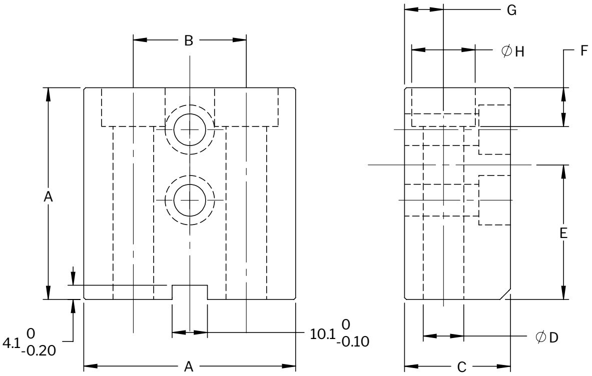
SA

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 required to back the SA mount with a key.

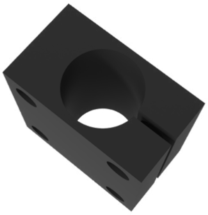


Order No.	A	B	C	D	E	F	G	H
SA-750	60	32	30	11.5	38	11	11	18
SA-1500	90	38	35	14.5	57	13	14	20.5
SA-3000	110	63.5	40	14.5	66.5	13	14	20.5
SA-5000	130	88.9	50	17.5	79	16	14	25

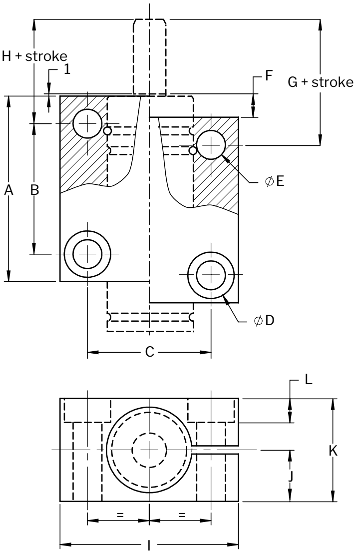


SM

SM is a body mount for the M2 gas spring.



Order No.	A	B	C	D	E	F	G	H	I	J	K	L
SM-150	54	38	37	13.5	9	6.5	14.5	9	52	15	30	7

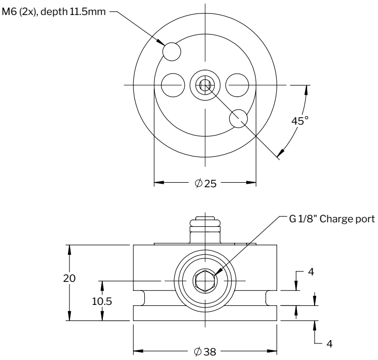


SP

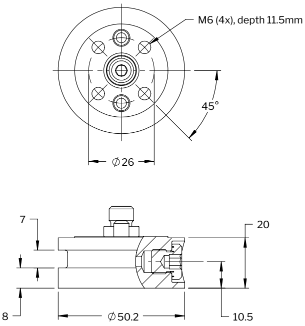
SP is a Side Port plate for the CU4 spring used for connecting into a hosed or linked system.

Order No.	B	C
SP-1000	25	38
SP-1800	26	50.2
SP-2900	34	63.2
SP-4700	40	75.2
SP-7500	52	95.2
SP-11800	68	120.2
SP-18300	90	150.2

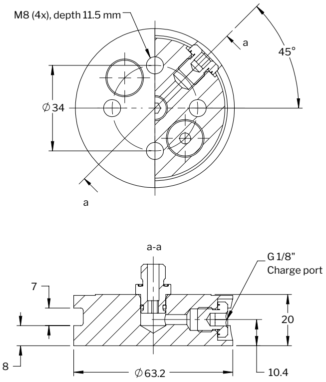
SP-1000



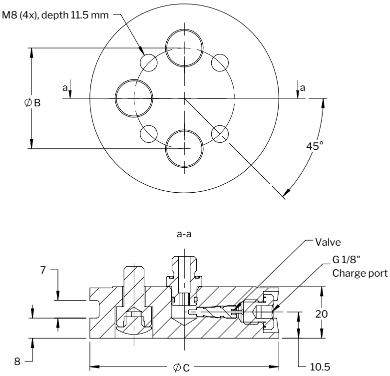
SP-1800



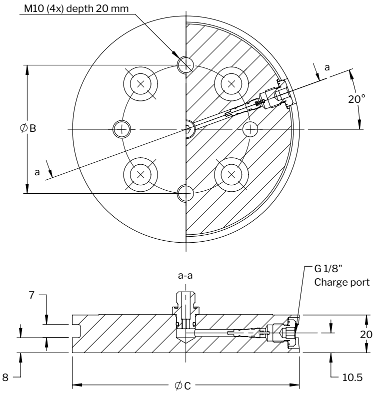
SP-2900



SP-4700, SP-7500



SP-1180, SP-18300

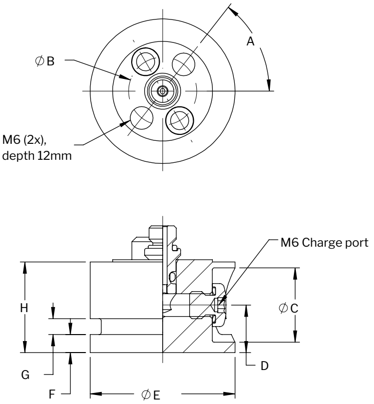


SPCX

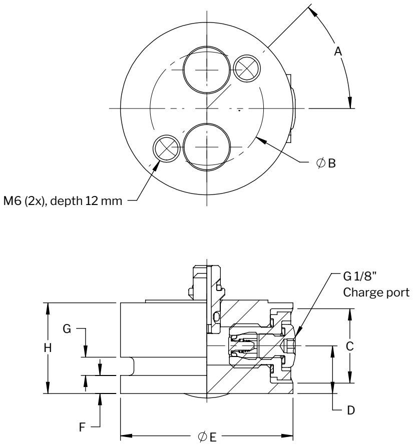
SPCX is a Side Port plate for the CX spring used for connecting into a hosed or linked system

Order No.	A	B	C	D	E	F	G	H
SPCX-500	52	15	16.4	10.5	31.9	4	3.5	20
SPCX-1000	45	25	16.4	10.5	38	4	4	20
SPCX-1900	45	26	16.4	10.5	50.2	8	7	20

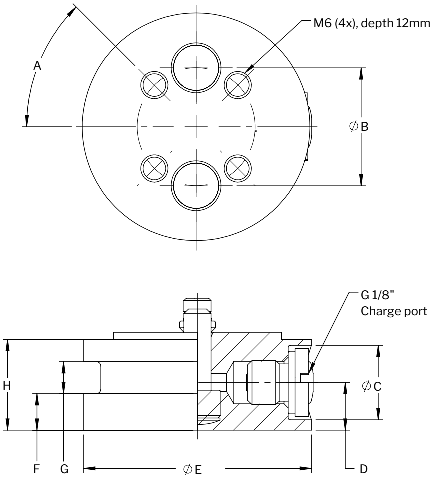
SPCX-500



SP-1000



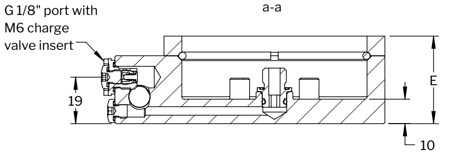
SPCX-1900

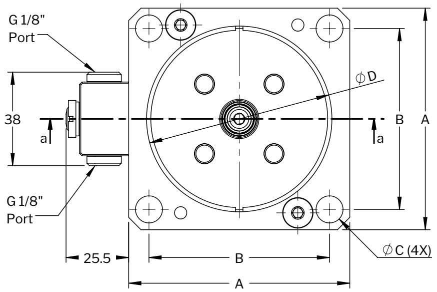


SPRM

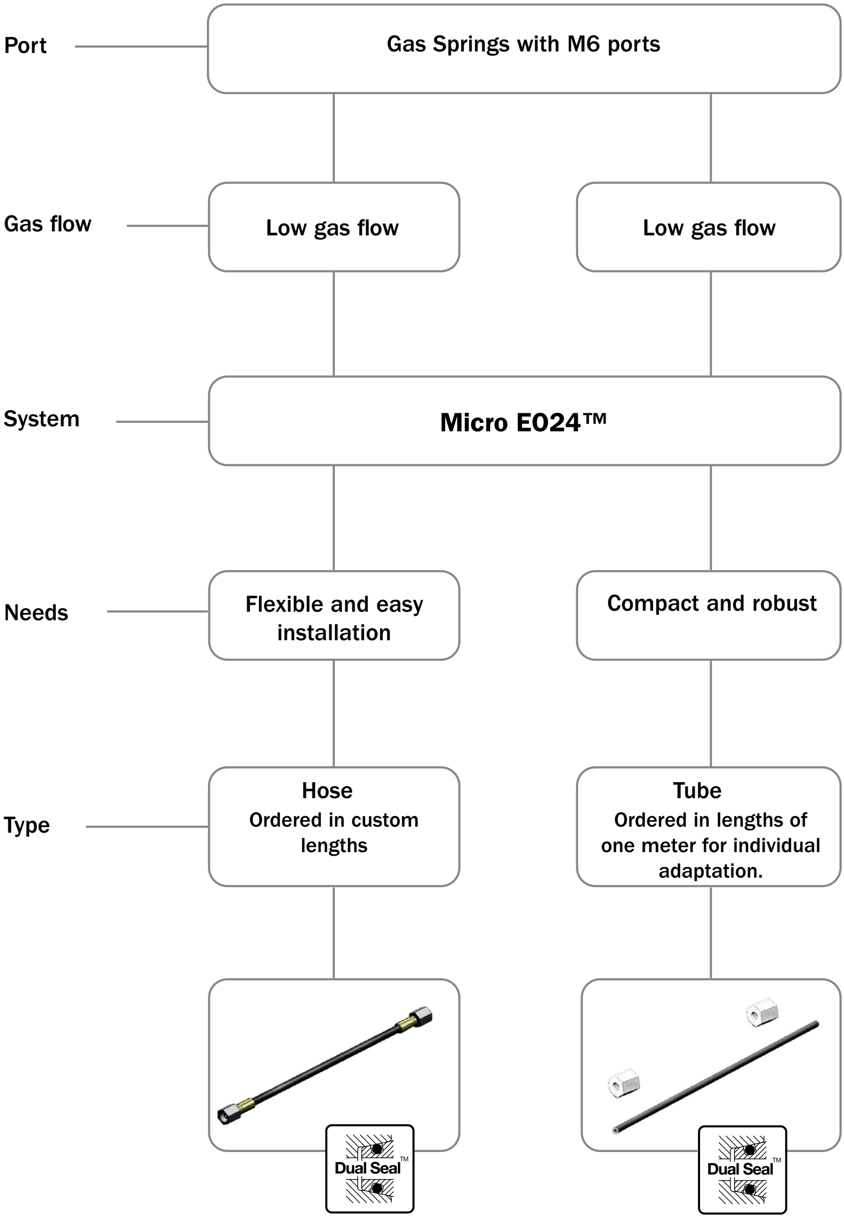
SPRM is a Side Port Rear Mount for the CU4 spring (CU4 4700 - 18300) used for connecting into a hosed or linked system. The SPRM mount is included the Ford W-DX35-62 global standard.

Order No.	A	B	C	D	E
SPRM-75	90	73.5	11	75.2	36
SPRM-95	110	92	13.5	95.2	40
SPRM-120	130	109.5	13.5	120.2	43
SPRM-150	162	138	17.5	150.2	48

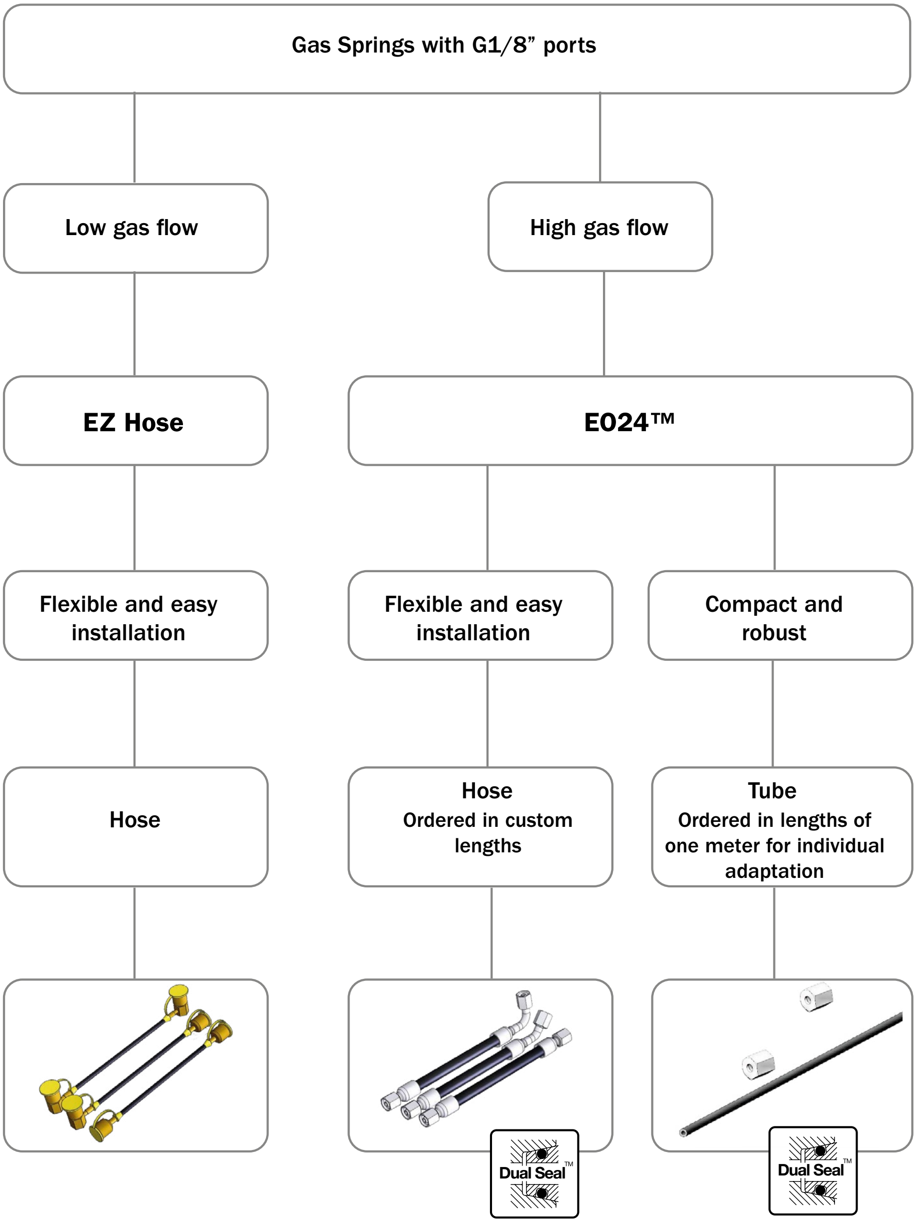




Linking System Selection



Linking System Selection

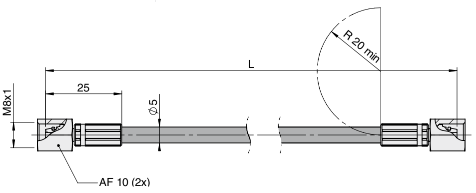
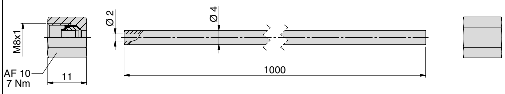
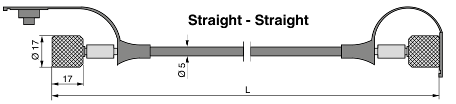
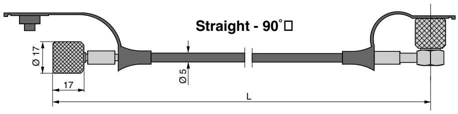
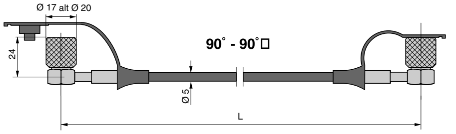


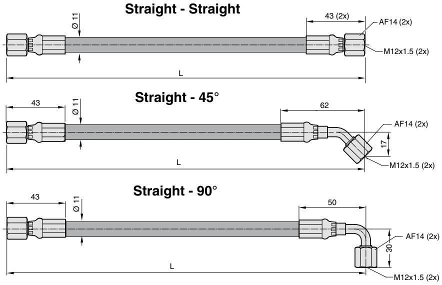
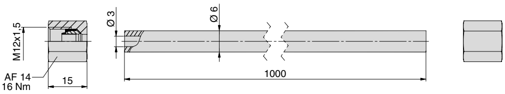
GENERAL INFORMATION

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 E024™** Hose and Tube system, **EZ Hose** and **E024™-Hose** systems. Please note: Micro-Hose system has now been replaced by the Micro E024™ 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 E024™ Hose and Tube System Dual Seal™		The Micro E024™ 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 E024™ 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**	
E024™-Hose and Tube System Dual Seal™		The E024™ system is mainly for larger gas springs with G 1/8” ports. The E024™ hose is recommended whenever high gas flows are required, for example when using the Passive Spring KP in a Controllable Gas Spring system.
		When using larger gas springs with G1/8” ports for the need of higher gas flow, we recommend use of the E024™ 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 277).

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 329).

CAUTION!

Do not modify the product in any way.

For more information on hosed/linked systems, please contact KALLER® (www.KALLER.com) or your local KALLER® distributor.

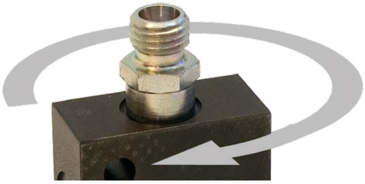
General precautions

For reasons of performance and safety, when designing a Hose System it is important the following points are considered:

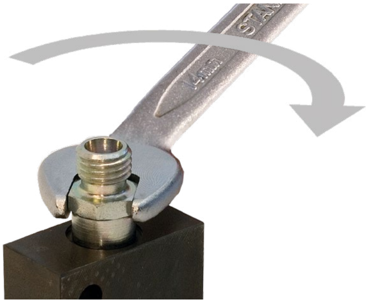
- When one or more gas springs are connected to a hosed/linked system, the discharge valve in each spring must first be removed.
- Position the Control Block in the tool where it will be protected from mechanical damage and on a level higher than the gas springs in the system to minimize the loss of 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

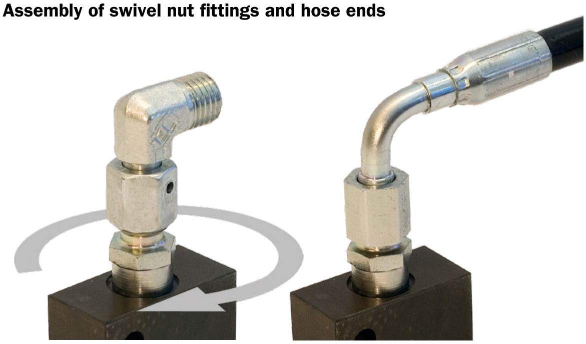


1. Screw until hand-tight

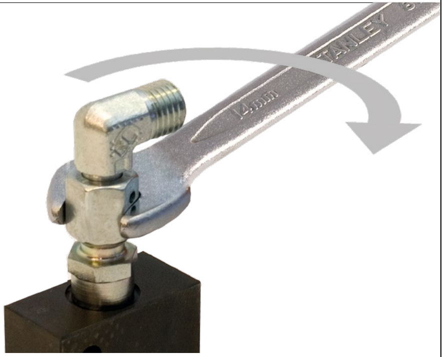


2. Then tighten wrench-tight
(if possible apply a torque according to next page)

Assembly of swivel nut fittings and hose ends

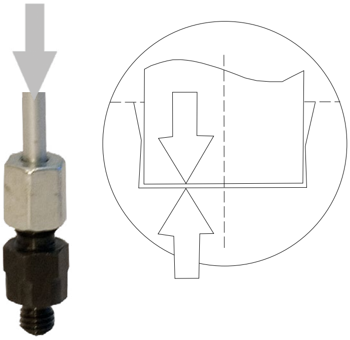


1. Screw on nut until the O-ring is fully compressed (hand-tight)

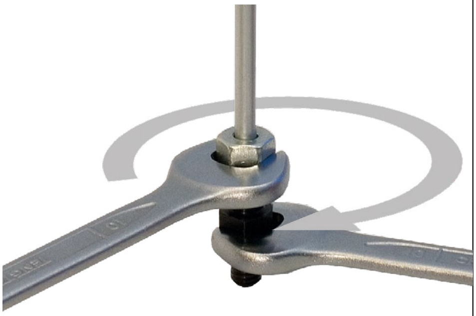


2. Then tighten until sharp increase of resistance, ¼ to ½ turn (if possible use a torque according to next page)

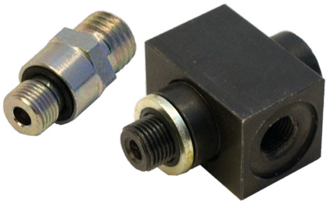
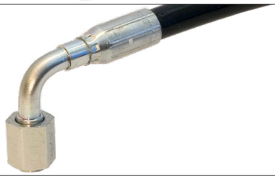
Assembly of steel Functional nut 504589/504047 (see also page 292 or page 314 for more information)



1. Press tube end firmly into the assembly cone



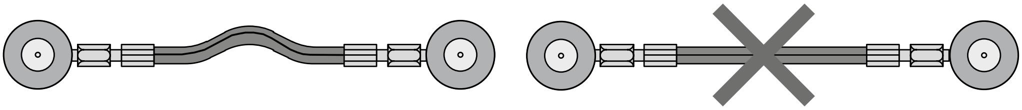
2. Then tighten until sharp increase of resistance, approximately 1 turn (if possible apply a torque according to next page)

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

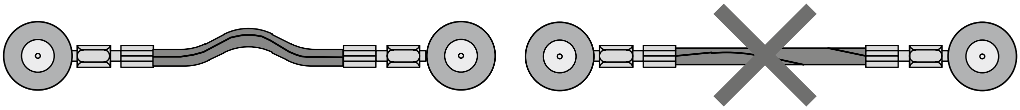
Hose installation guidelines

Never exceed the maximum values given for pressure and temperature for the hoses. Make sure all hoses and couplings are perfectly clean before fitting.

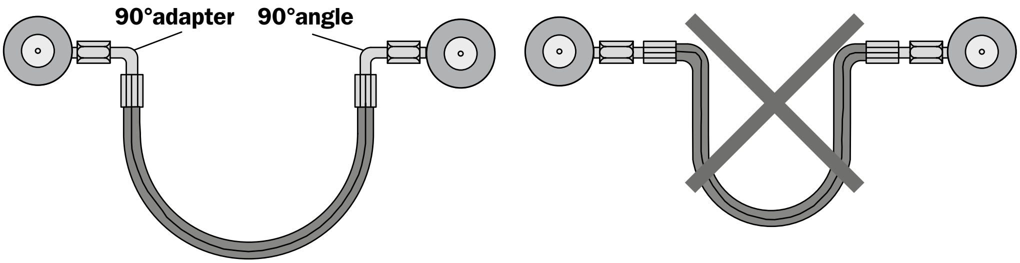
Correct **Incorrect**



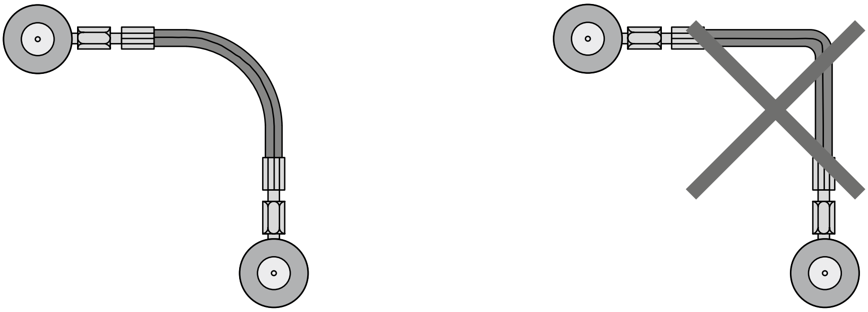
Select a hose length that will allow for a certain amount of play.



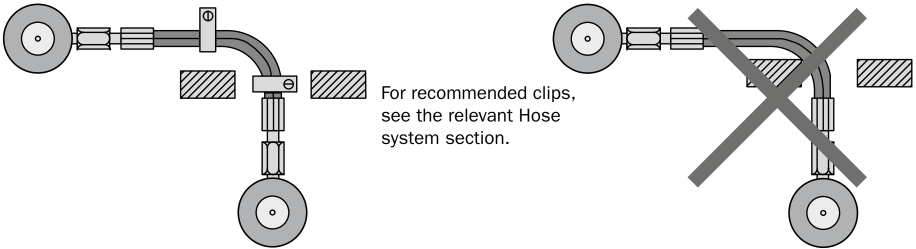
The longitudinal marking on the hose must not be twisted after fitting.



Select hose couplings that avoid sharp bends in the hose.



Never go below the recommended minimum bend radius of the hose.



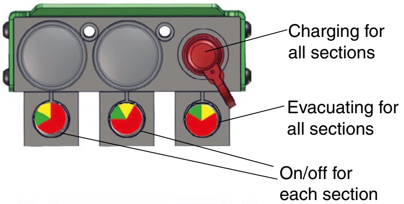
For recommended clips, see the relevant Hose system section.

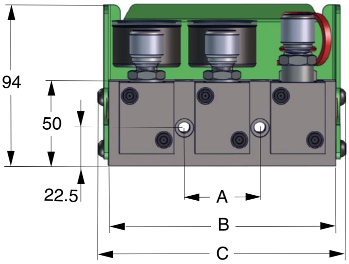
Fix the hose correctly to avoid mechanical damage.

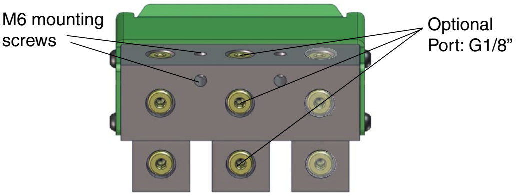
Multi Control Block, MCB

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, 3, 4, 5, 6, 8 and 10 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.

The MCB block is replacing the previous Section Control Block.

Basic information

Pressure medium	Nitrogen
Max. charging pressure	180 bar
Min. charging pressure	25 bar
Connections	G1/8

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)

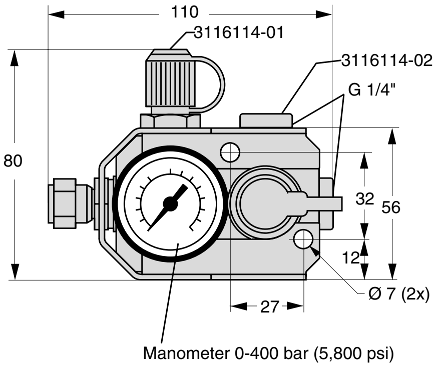
3116114-02 (with all ports plugged)

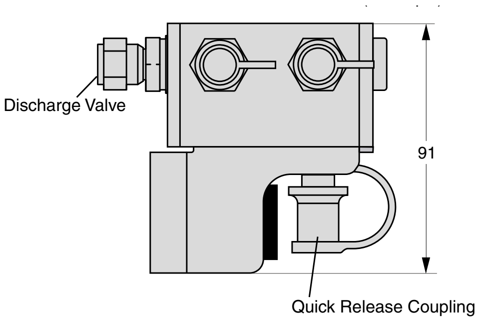
The 3116114 Control Block is a very compact aluminum block with protective stainless steel cover that complies with the CNOMO standard.

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.

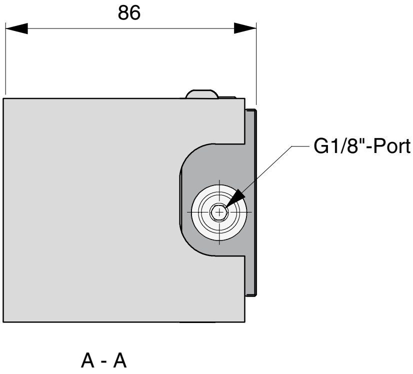
The block has three G1/4” connection ports, one of which can be used to connect a Pressure Relief Safety Screw or a Pressure Switch.





Control Block

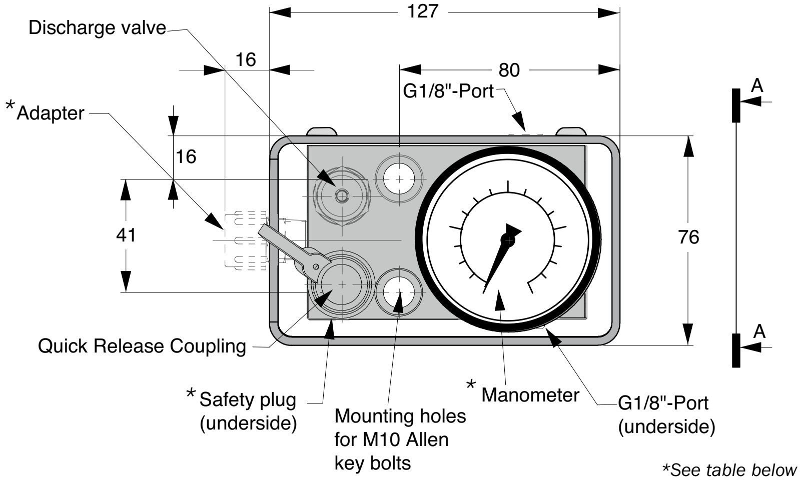
Order No. 1x32979



The 1x32979 Control Block is a compact 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, and a vibration resistant Discharge Valve for gas evacuation.

The block has five G1/8” connection ports. It can be configured in several different ways. Different manometers, with safety plug and for hose systems such as EO24™, EZ-hose and 9/16 ”-18 UNF o-ring faced sealed systems. Can be configured according to below table.



See table below

Order No.	Model	Manometer Scale	Adapter	Rupture screw
1032979	Control block with KALLER® manometer CP-100	bar 0-400	No	Yes
1132979	Control block with manometer CP-100	bar / psi 0-400	No	Yes
1232979	Control block with KALLER® manometer CP-100	bar 0-400	9/16”-18 UNF	Yes
1332979	Control block with manometer CP-100	bar / psi 0-400	EZ-Hose	Yes
1432979	Control block with manometer CP-100	bar / Mpa 0-400	9/16”-18 UNF	Yes
1532979	Control block with high pressure manometer	bar / psi 0-600	No	No
1632979	Control block with manometer and HEX valve	bar 0-400	No	Yes

Control Block

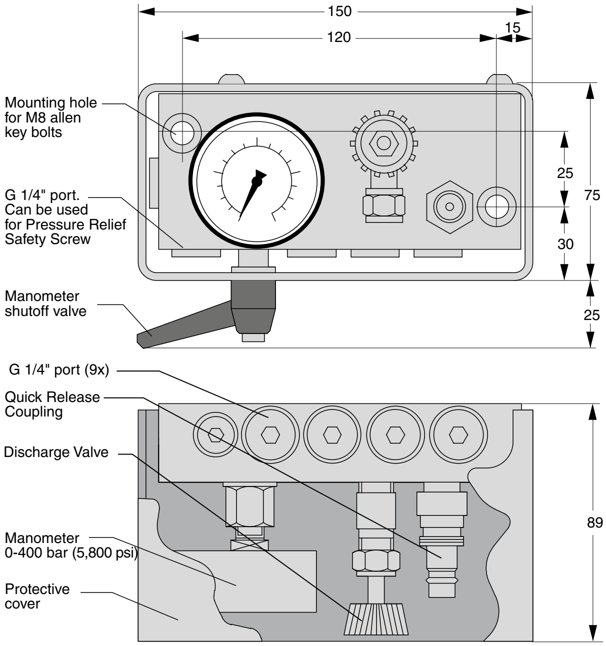
Order No. 2014325

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.

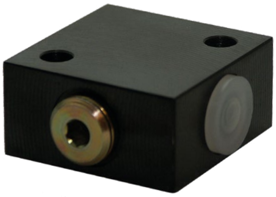
The Control Block is fitted with a manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging and a Discharge Valve for gas evacuation.

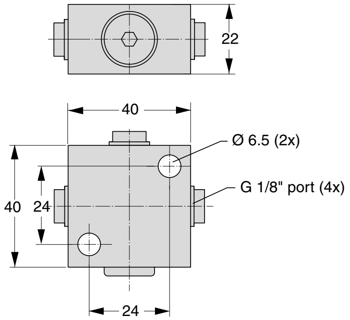
The block has nine G1/4” connection ports, four on the top, four on the bottom and one on the right-hand side.



Multi-Coupling Blocks

Order No. 4017032

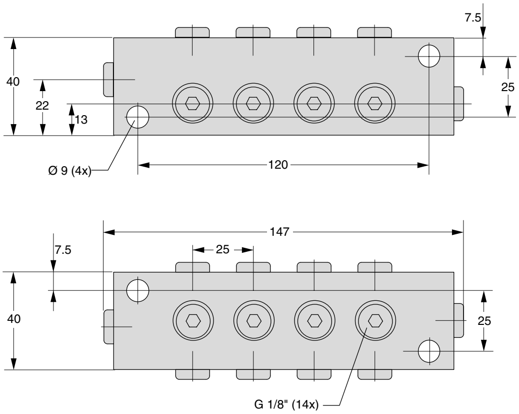




This is a small and compact block for linking hoses. The block has four G1/8” connection ports.

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



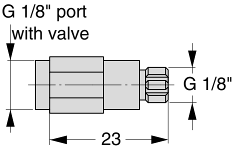
The Multi-Coupling Block 3015044 is manufactured in steel and has fourteen G1/8” connection ports.

On delivery, all ports are fitted with sealing plugs.

Order No. 3015303-01

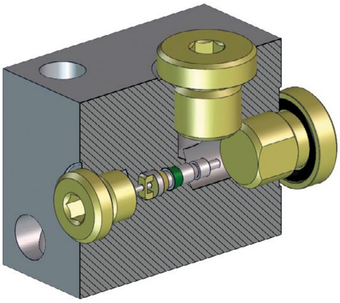
This Valve Adapter is available as an accessory and can be fitted to one of the G1/8” connection ports. The adapter has the same G1/8” valve port as found on standard gas springs.

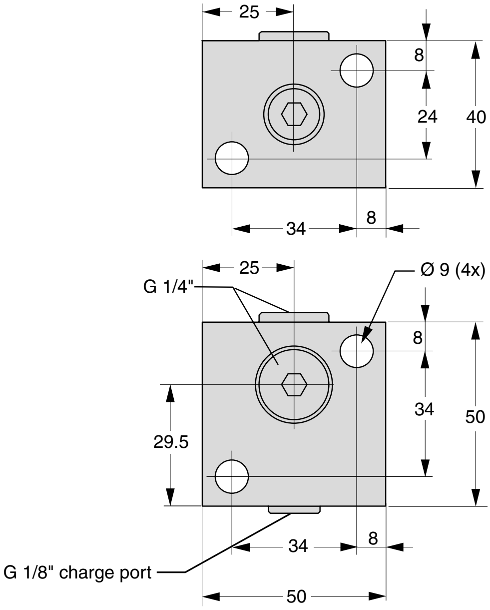
The Multi-Coupling Block can then be used as a charging block to enable gas charging and evacuation using gas spring charging equipment.



Charging Block

Order No. 3014206



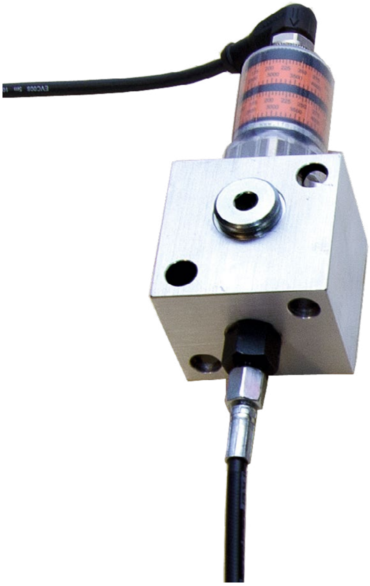


The 3014206 Charging Block comes with two G1/4" connection ports and a G1/8" charge port, identical to that found on standard gas springs.

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

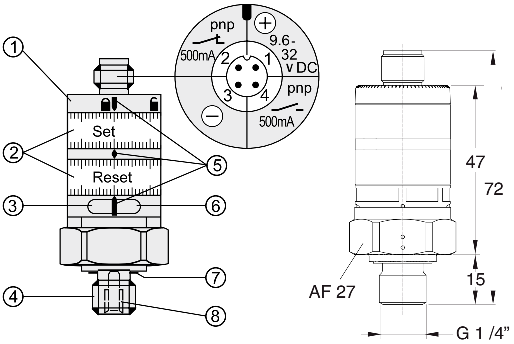
Order No. 504320

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

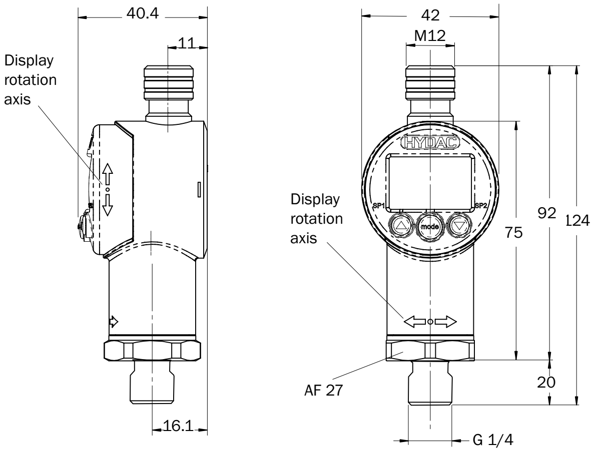
Order No. 504107

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:

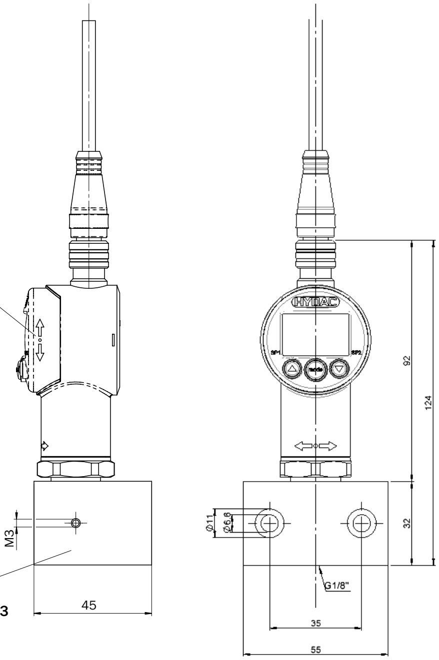
Set-points	2 PNP transistor switching outputs
Electrical connection	M12x1 (4-pin)
Pressure connection	G1/4”
Protection class	IP67
Working range	0 - 400 bar
Max. pressure	800 bar
Burst pressure	2000 bar
Voltage	9 - 35 VDC
Switching current	max. 1.2 A
Current consumption	≤ 35 mA (inactive switching outputs)
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

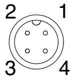
In accordance with GM standard 90.25.225, a Digital Monitoring Kit is available, supplied with a block (3022143) and a 5 m cable with a straight or 90° angled cable contact.



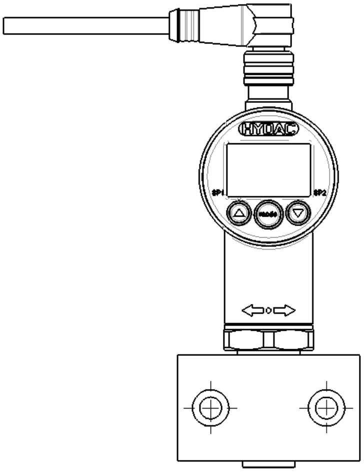
Display rotation axis

Connection Block can be ordered separately
Order No. 3022143

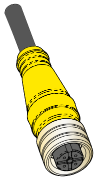
Order No.	Pressure (Bar)	Type of cable contact
3021172	0-400	Straight
3221172	0-400	Angled 90˚



1. + Current feed 9 - 35 VDC	Brown
2. Set-point 1	White
3. - Current feed (0V)	Blue
4. Set-point 2	Black

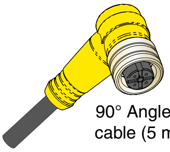


Cable (5 m) with straight cable contact
Order No. 504105



Straight cable (5 m)

Cable (5 m) with 90° angled cable contact
Order No. 504161



90° Angled cable (5 m)

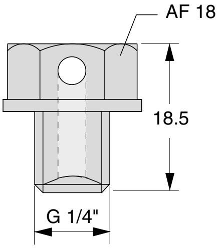
Pressure Relief Safety Screw

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

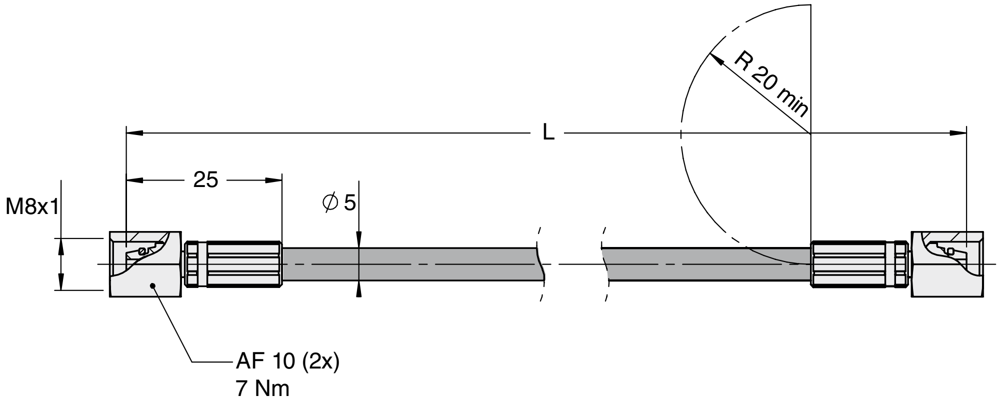
The Micro EO24™ Hose and Tube System is our most compact, soft sealed gas link system. It is a flexible system, including both a dual seal hose system and a soft sealed tube system using the same adapters.

Micro EO24™ Hose and Tube can now be combined in the same gas link system.

Micro E024™ Hose

The Micro E024™ 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 E024™ Tube System, resulting in a wide range of flexible installation possibilities. G1/8” and G1/4” ports can also be connected to the Micro E024™ 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.



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/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**

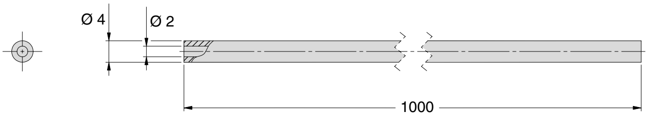
**For customer specified lengths.
* Minimum recommended L = 75 mm

Micro E024™ Tube

The Micro E024™ Tube is a system for linking gas springs together. As the name suggests, Micro E024™ 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.

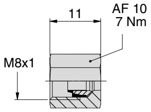
There are numerous options for connecting tubes to gas springs and Control Blocks. Various adapters are available allowing the Micro E024™ Tube to connect to almost all KALLER® gas springs and Control Blocks. All adapters and their dimensions are presented on the following pages.

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 E024™ Tube

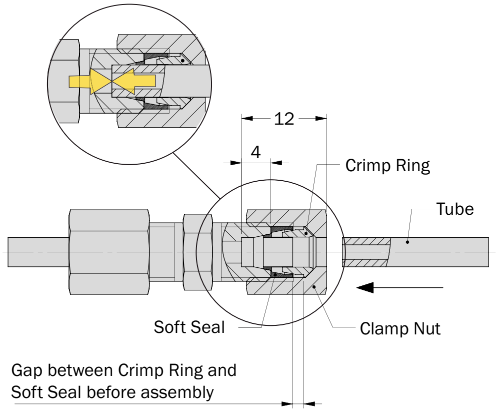
To cut the tube, a hacksaw can be used.
Note: Cutting angle 90° ±1°. If a regular tube cutter or cutting pliers are used, the tube might become clogged resulting in zero or limited gas flow. After cutting, de-burr the tube both inside and outside (max. 0.3 × 45° or R0.3) using the Tube De-burring Tool 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 E024™ 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

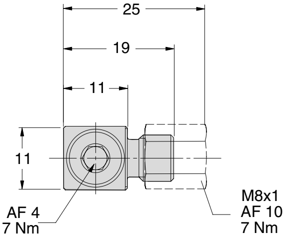
Adapters for Gas Spring Charge Ports

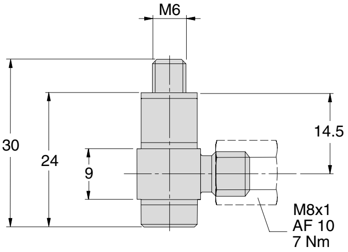
Following adapters are used to connect Micro EO24™ hoses and tubes to gas springs with M6 charging port.

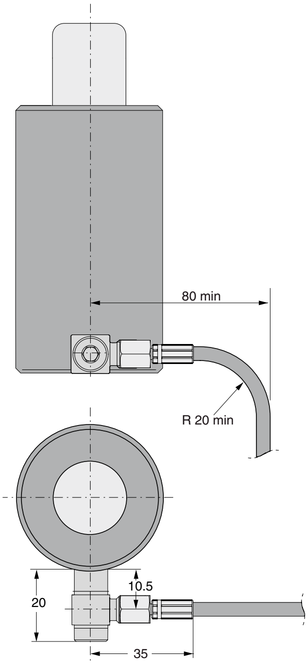
Using G1/8 adapters the M6 adapters can be connected (retrofitted) to springs with G 1/8 ports. All gas springs charge ports adapters fit into our standard mounts.

Note! When using tubes,
please order Functional nut No. 504589 separately.

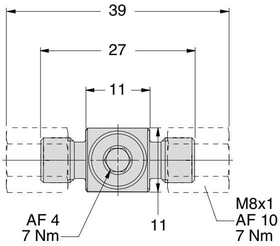
Banjo Elbow M6 **Order No. 4022059**

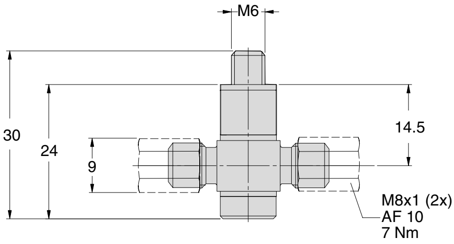


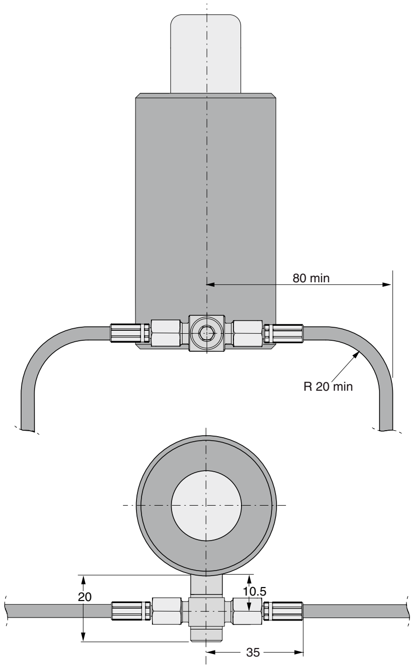




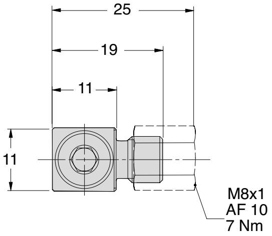
Banjo Tee M6 **Order No. 4022061**

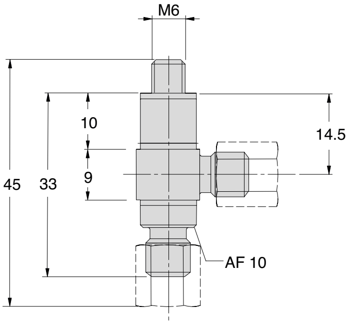




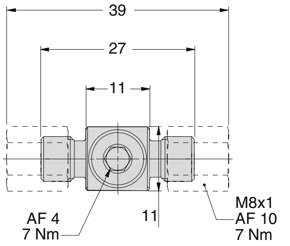


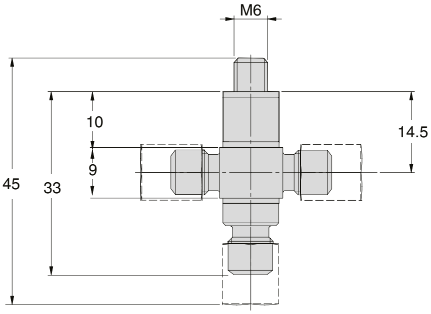
Banjo Run Elbow M6 **Order No. 4024092**

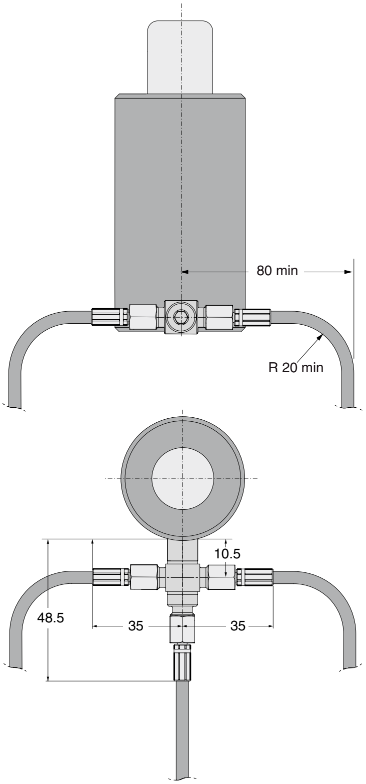




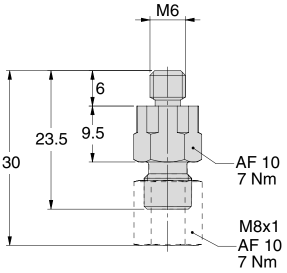
Banjo Run Tee M6 **Order No. 4024348**

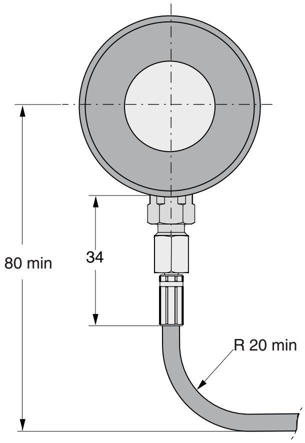




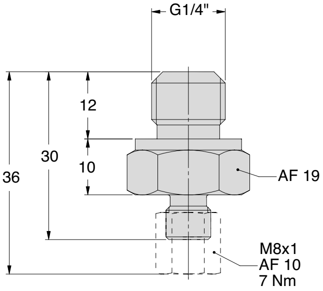


Straight Adapter M6 **Order No. 4022057**

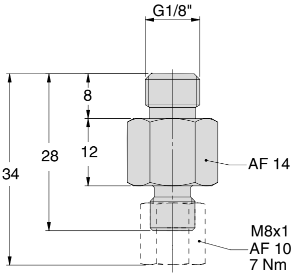




Straight Adapter G1/4” **Order No. 4022063**



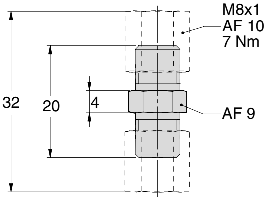
Straight Adapter G1/8” **Order No. 4022058**



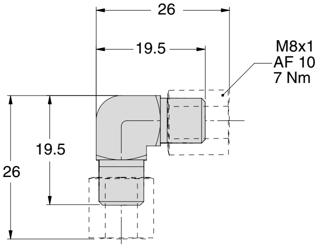
Hose to Hose, Tube to Tube or Hose to Tube Couplings

Note! When using tubes, order Functional nut No. 504589 separately.

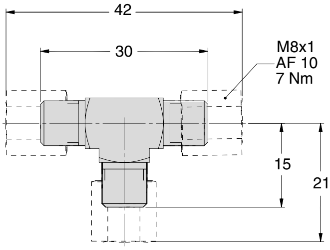
Union Straight **Order No. 504590**



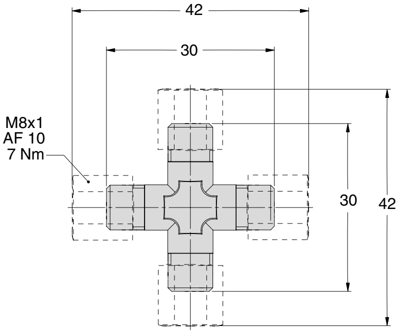
Union Elbow **Order No. 504591**



Union Tee **Order No. 504592**

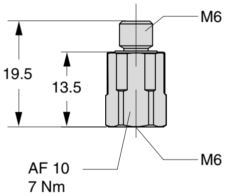


Union Cross **Order No. 504593**

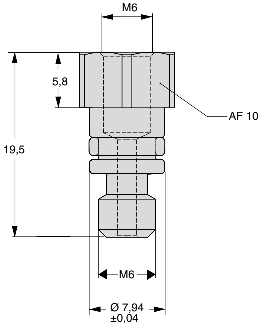


M6 charge port to Micro EO24™ Hose and Tube Adapters

Male/Female Connector M6
Order No. 503762
Extension for gas springs using foot mounts



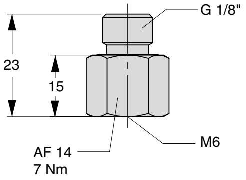
Male/Female Connector M6/M6 for CU4 1000
Order No.4027146



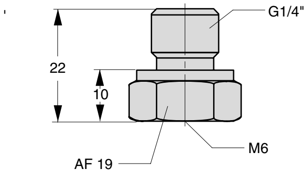
Micro EO24™ Hose and Tube Adapters for G1/8” and G1/4” Connection Ports

Note! When using tubes, order Functional nut No. 504589 separately.

Thread Reducer G 1/8” to M6 **Order No. 503764**



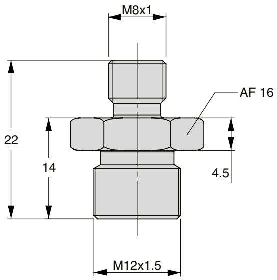
Thread Reducer G 1/4” to M6 **Order No. 503966**



For connection to angled Micro EO24™ Hose Adapters

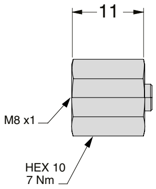
Micro EO24™ Hose and Tube Adapter for EO24™ M12 hose

Male Stud Connector M8 to M12
Order No. 4024351



Micro EO24™ Cap/Plug

Order No. 4024353



Micro E024™ Control Block

Order No. 3023888 (without Safety plug)

Order No. 3123888 (with Safety plug)

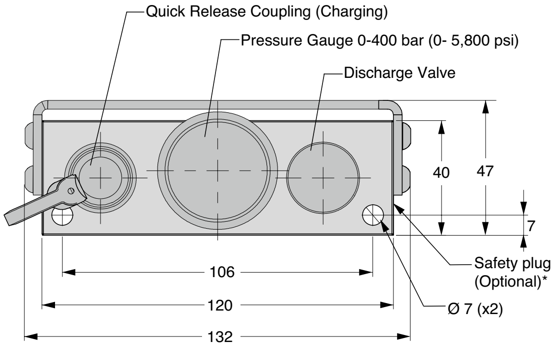
The Micro E024™ Control Block is a very compact block with protective stainless steel cover specially designed for the Micro E024™ System.

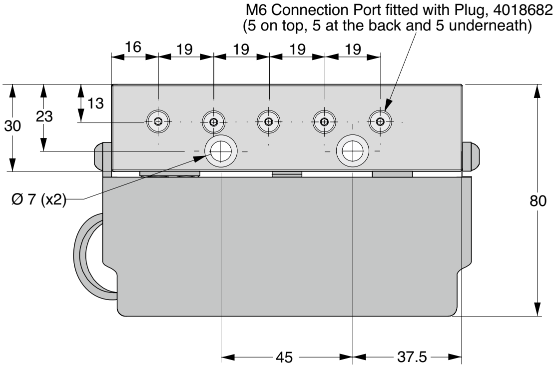
This block is intended for continuous monitoring of the gas pressure in the Hose and Tube System.

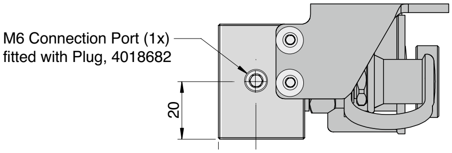
It is fitted with a manometer (0 – 400 bar/5,800 psi), a Quick Release Coupling for gas charging and a Vibration Resistant Discharge Valve for gas evacuation.

The block has sixteen M6 connection ports, which are plugged upon delivery, and it is available in two versions:
3023888 (without Safety plug)
3123888 (with Safety plug*)

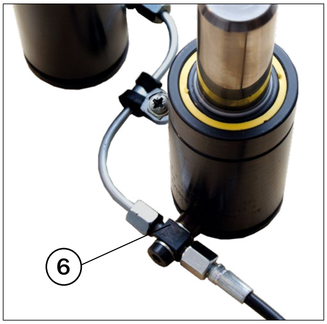
***Please note** that Safety plug are not recommended where the initial gas charging pressure at 20°C exceeds 150 bar.

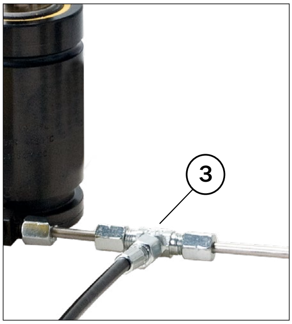


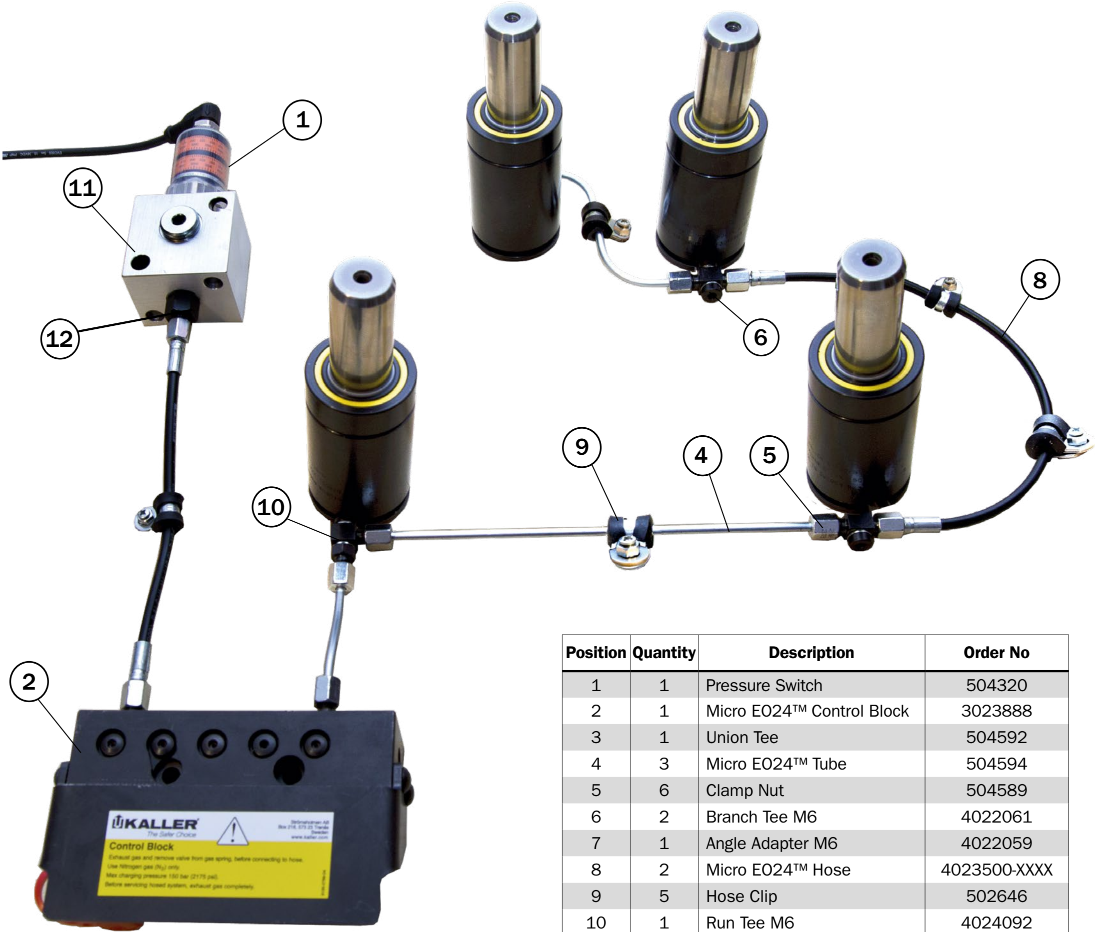




Micro EO24™ Hose and Tube System, installation example







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

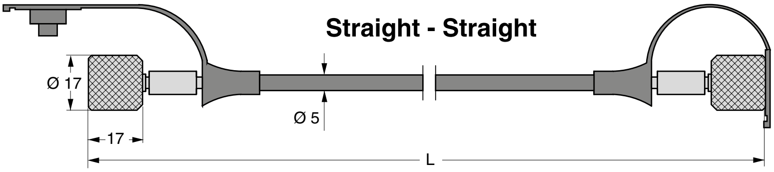
The EZ Hose System is our most popular Hose System. It is a very compact and versatile O-ring sealed Hose System that allows connections to be tightened by hand. G1/8” and G1/4” connection ports can be connected to the EZ Hose System with the use of an appropriate adapter.

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

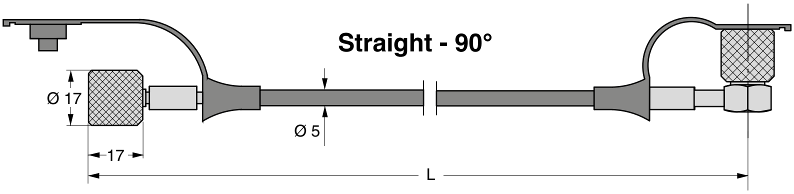
Micro/EZ Hose clip, **Order No. 502646**
(Can be used to secure hoses using an M5 screw.)

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

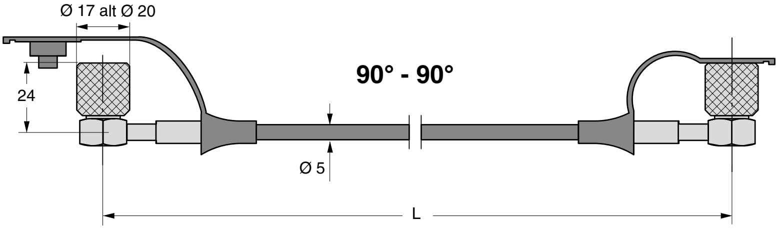
Order No. 4017568-XXXX



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.)



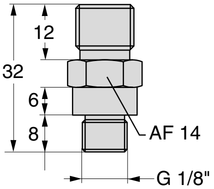
Order No.	L (mm)*
4117568-0200	200
4117568-0300	300
4117568-0400	400
4117568-0630	630
4117568-0800	800
4117568-1000	1000
4117568-1500	1500
4117568-2000	2000
4117568-XXXX**	XXXX

* Minimum recommended L=75

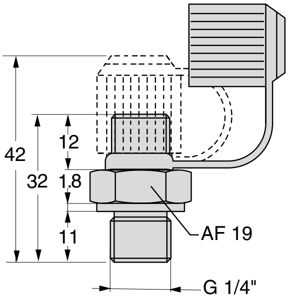
** For customer specified lengths.

EZ Hose Adapters

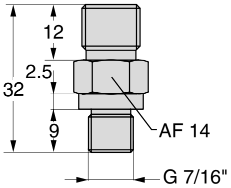
Hose adapters are available with three different connecting threads:



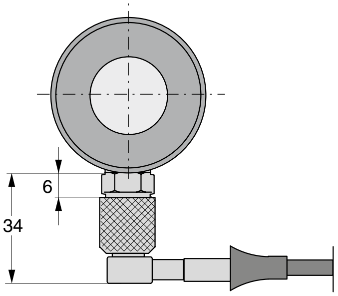
G 1/8” without non-return valve to be used for gas springs, multi-coupling blocks and control blocks.
Order No. 4114973-G1/8

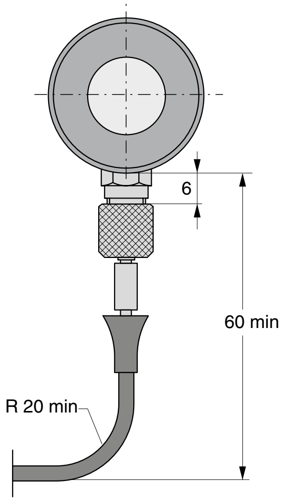


G 1/4” with non-return valve to be used only for control blocks.
Order No. 4014973-G1/4



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

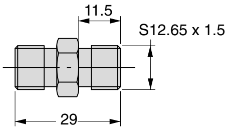


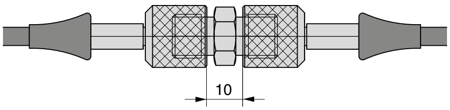


Installation dimensions for hose adapter, with straight and 90° hose

Joining Coupling

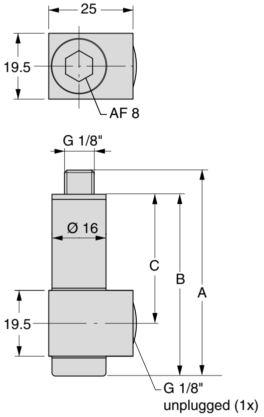
Coupling for joining of EZ Hoses, Order No. 503674.

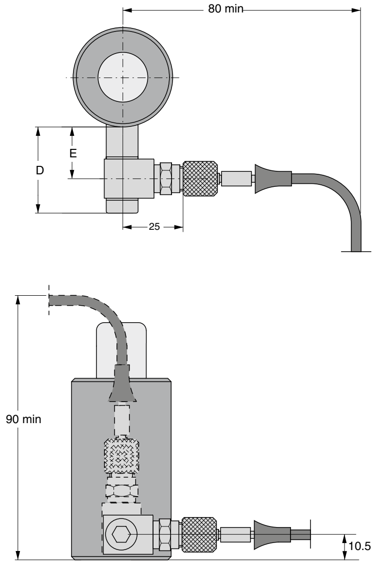




Angle Adapter

Order No. 4016050-XX

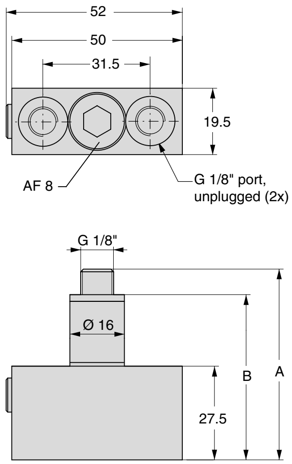


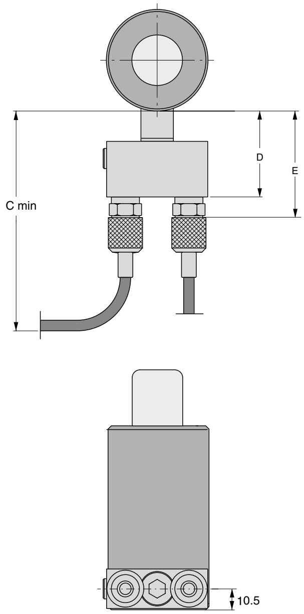


Order No	A	B	C	D	E	Suitable together with mounts
4016050-01	40	32,5	17	26	11	All applicable mounts, except those mentioned below
4016050-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4016050-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Front Adapter

Order No. 4017314-XX

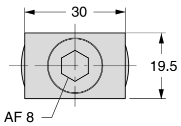


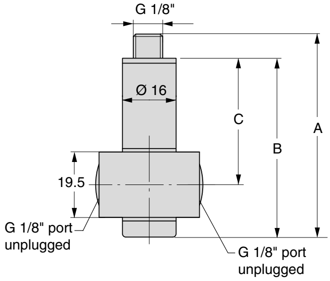


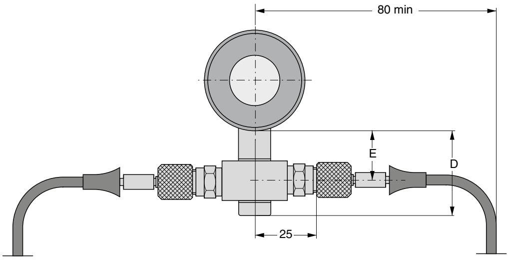
Order No	A	B	C	D	E	Suitable together with mounts
4017314-01	42	34.5	95	28.5	40	All applicable mounts, except those mentioned below
4017314-02	56	48.5	110	42.5	54	FFC 500, 750, 1500, 3000 + K
4017314-03	63	55.5	115	49.5	61	FFC 5000, 7500, 10000 + K

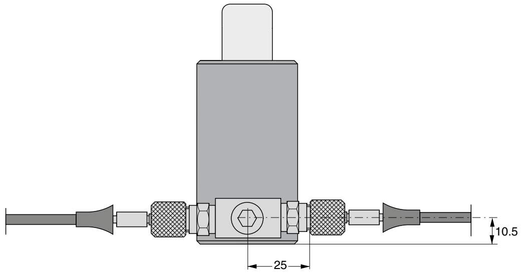
Two-way Adapter

Order No. 4016051-XX





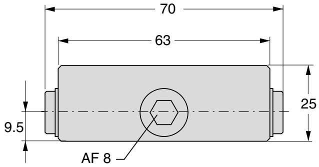


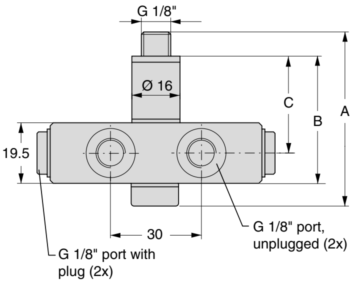


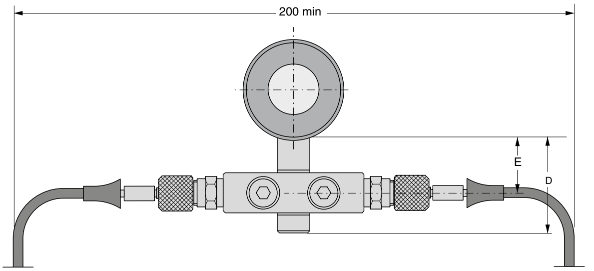
Order No	A	B	C	D	E	Suitable together with mounts
4016051-01	40	32.5	17	26.5	11	All applicable mounts except those mentioned below
4016051-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4016051-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

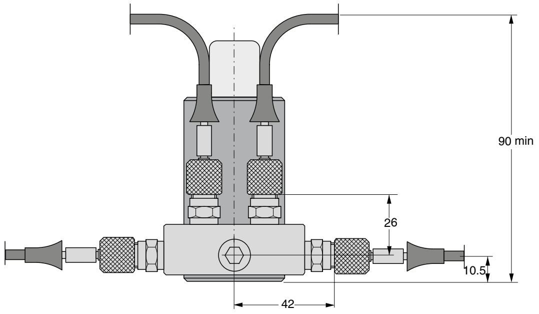
Four-way Adapter

Order No. 4015035-XX





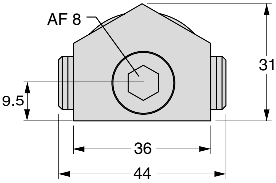


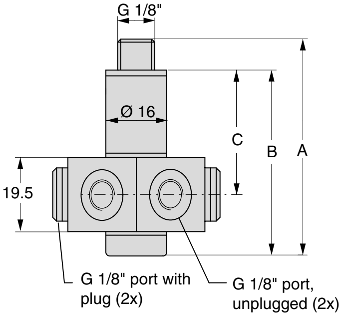


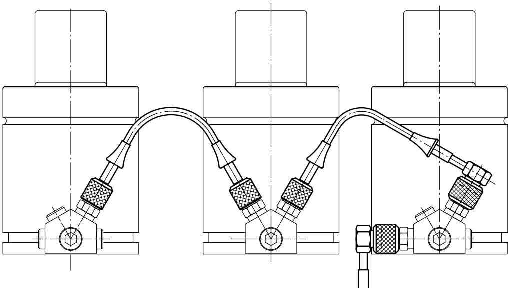
Order No.	A	B	C	D	E	Suitable together with Mounts
4015035-01	40	32.5	17	26.5	11	All applicable mounts, except those mentioned below
4015035-02	54	46.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
4015035-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Multi-way Adapter

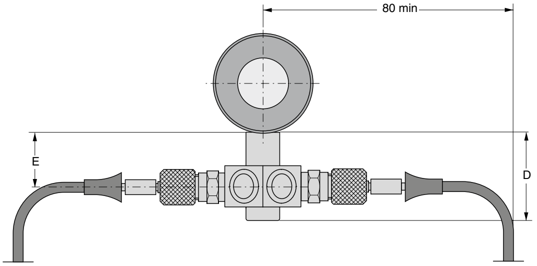
Order No. 3017191-XX

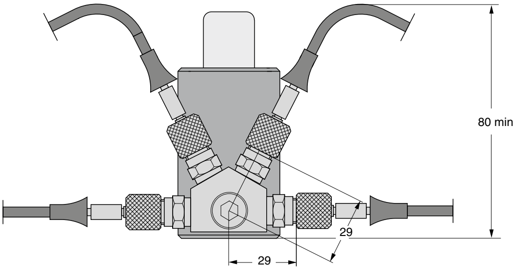






This adapter is highly suitable when the distance between gas springs is short.



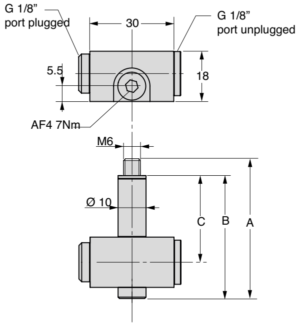


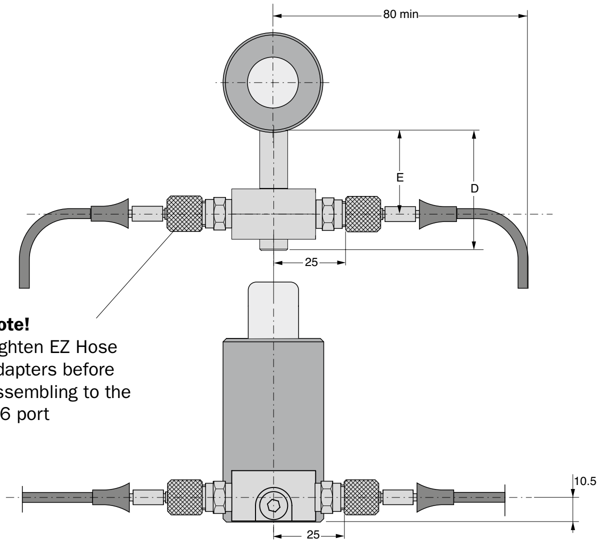
Order No	A	B	C	D	E	Suitable together with mounts
3017191-01	40	32.5	17	26.5	11	All applicable mounts, except those mentioned below
3017191-02	54	45.5	31	40.5	25	FFC 500, 750, 1500, 3000 + K
3017191-03	61	53.5	38	47.5	32	FFC 5000, 7500, 10000 + K

Two-way Adapter for gas springs with M6 port

Order No. 4023519

Order No. 4023506





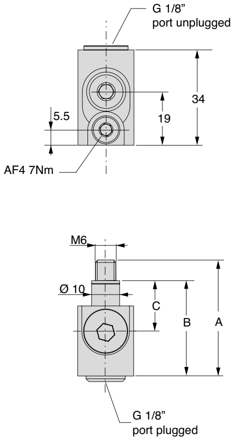
Note!
Tighten EZ Hose
Adapters before
assembling to the
M6 port

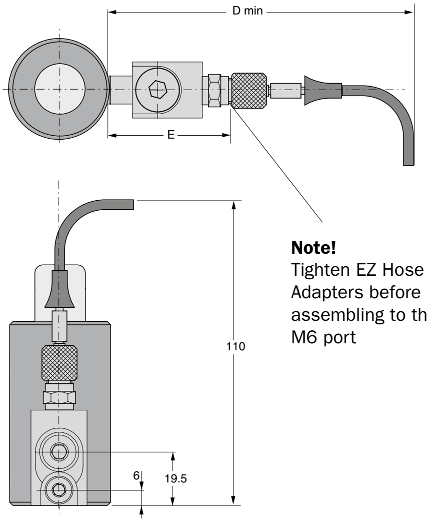
Order No	A	B	C	D	E	Suitable together with mounts
4023519	36	30	17	25.5	12.5	All applicable mounts, except those mentioned below
4023506	49	44	31	39.5	26.5	FFC 500, 750, 1500 + K

Angle Adapter for gas springs with M6 ports

Order No. 4023520

Order No. 4023518

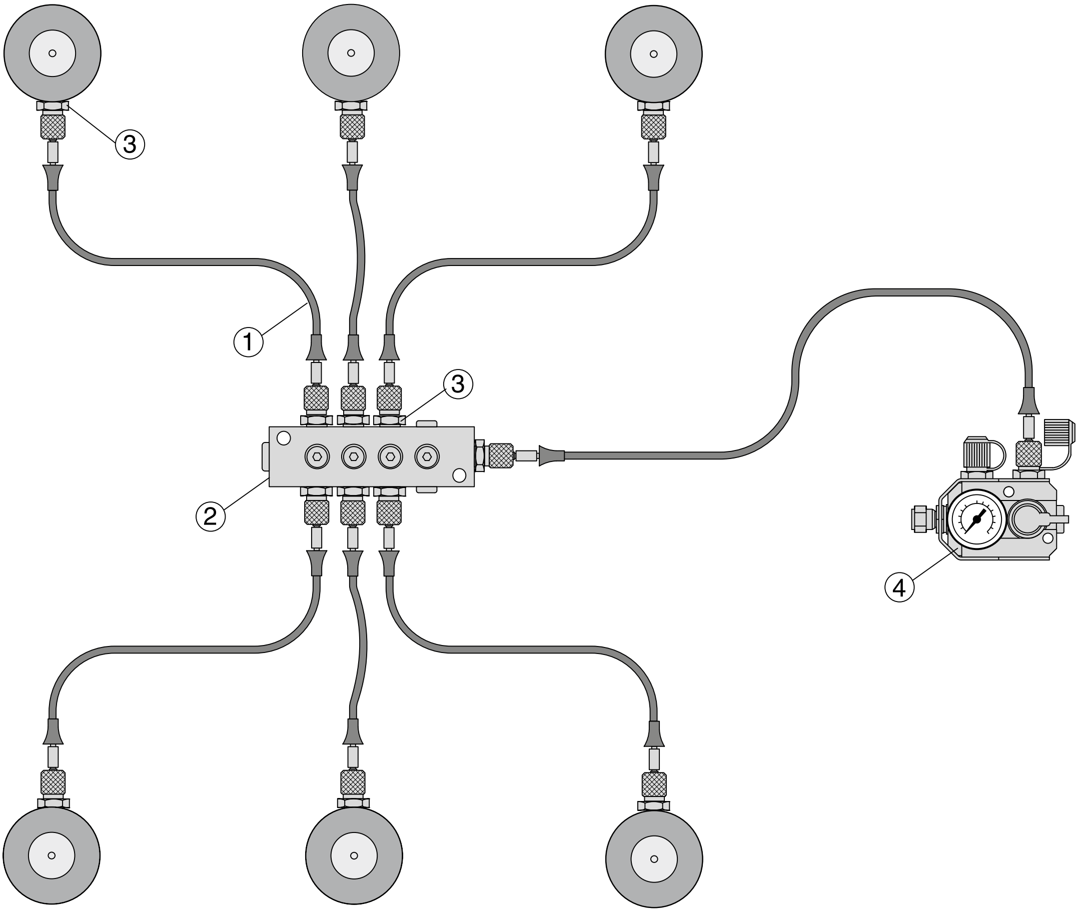




Note!
Tighten EZ Hose
Adapters before
assembling to the
M6 port

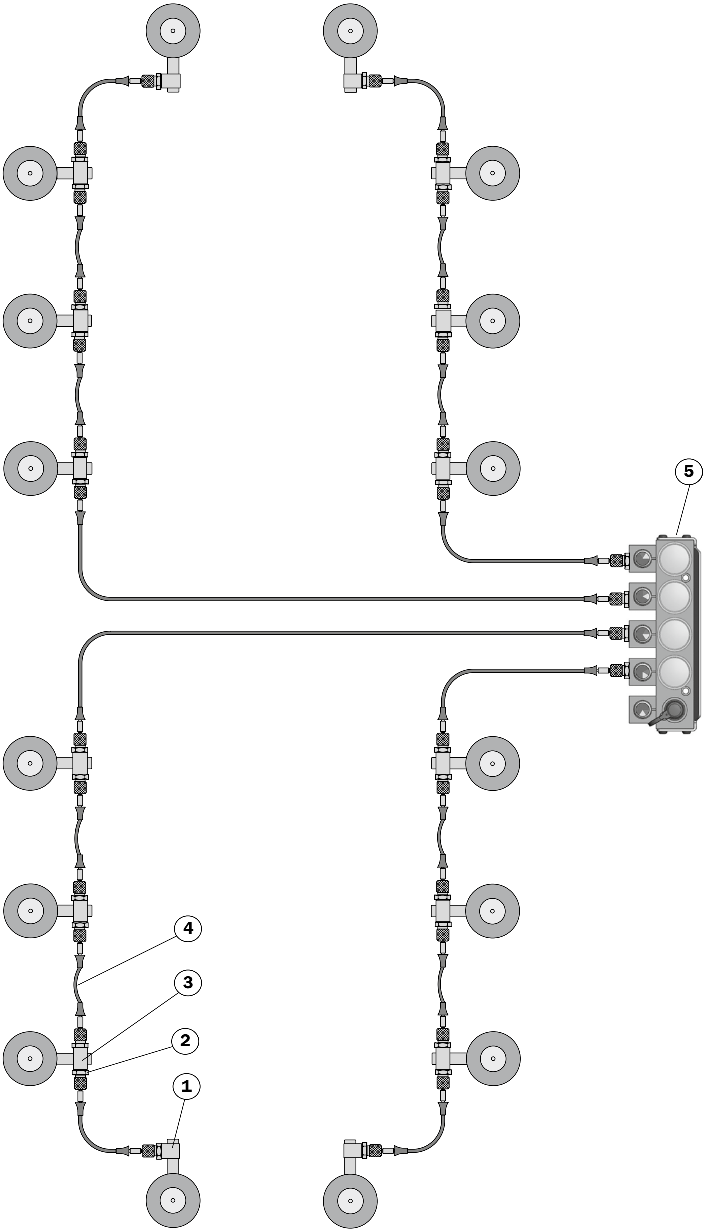
Order No	A	B	C	D	E	Suitable together with mounts
4023520	39	34	18	110	45	All applicable mounts, except those mentioned below
4023518	51	46	30	120	57	FFC 500, 750, 1500 + K

Installation Examples, EZ Hose System



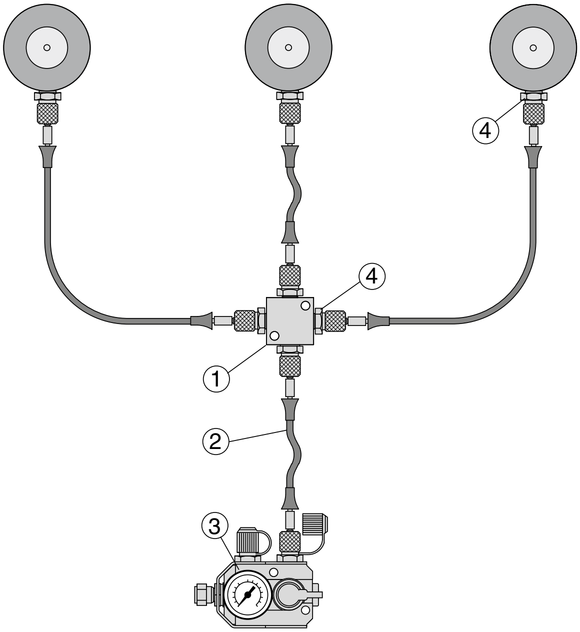
Position	Quantity	Description	Order No
1	7	EZ Hose	4014974-XXXX
2	1	Multi-Coupling Block	3015044
3	13	G1/8” EZ Hose Adapter	4114973-G1/8
4	1	Control Block	3116114-01

Installation Examples, EZ Hose system



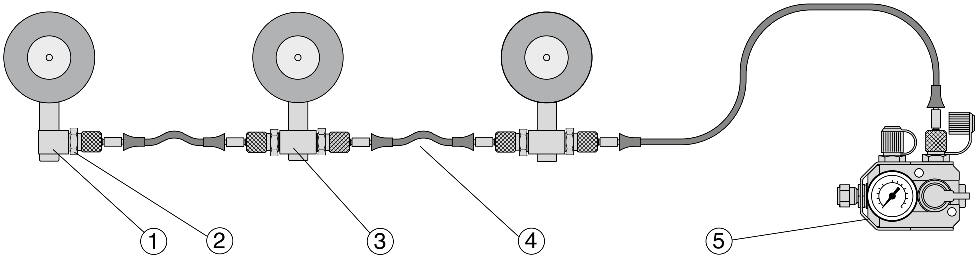
Position	Quantity	Description	Order No
1	4	Angle Adapter	4016050-xx
2	32	G1/8” EZ Hose Adapter	4114973-G1/8
3	12	Two-way Adapter	4016051-xx
4	16	EZ Hose	4014974-xxxx
5	1	Multi Control Block	2022677-04

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

Installation Examples, EZ Hose system



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

E024™ Hose System

The E024™ Hose System is our largest Hose System available. G1/8” and G1/4” connection ports can be connected to the E024™ Hose System with the use of an appropriate adapter.

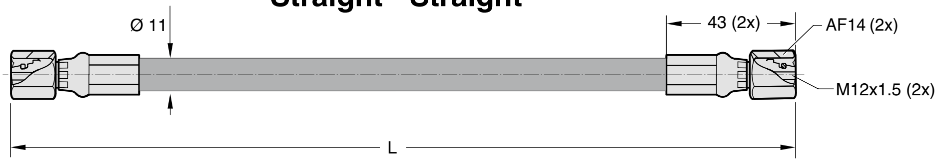
Dual Seal™

Custom hose lengths can be ordered **from 120 mm upwards**. Subsequent numbers are added to the order number according to the length required, e.g. hose length 2500 mm = Order No. 3**X**20857-2500.

E024™ Hose and E024™ Hose Couplings for crimping are also sold separately; for information on hose crimping, see Hose Crimping equipment on page 329.

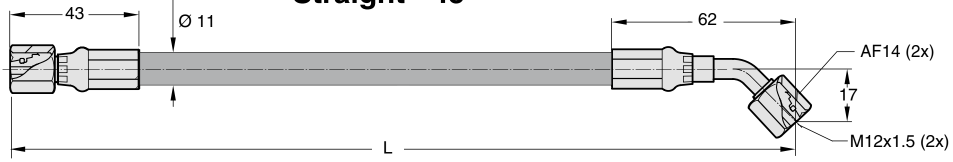
Order No. 3020857-XXXX

Straight - Straight



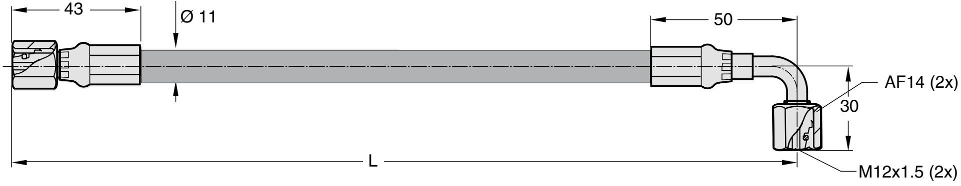
Order No. 3120857-XXXX

Straight - 45°



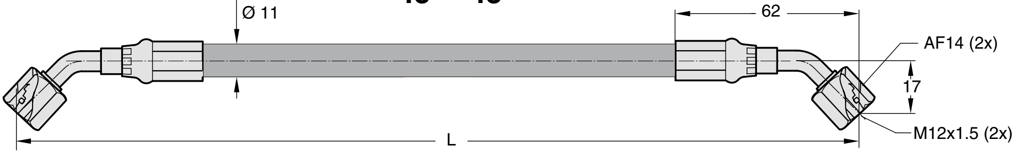
Order No. 3220857-XXXX

Straight - 90°

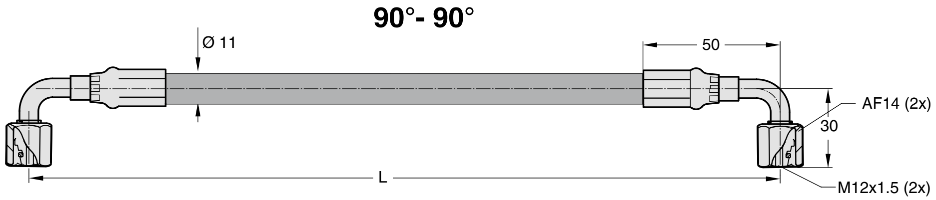


Order No. 3320857-XXXX

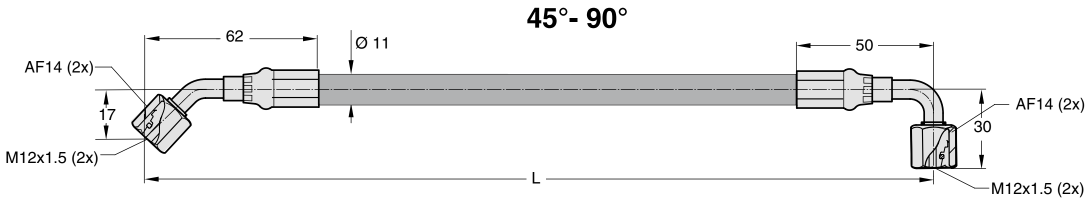
45° - 45°

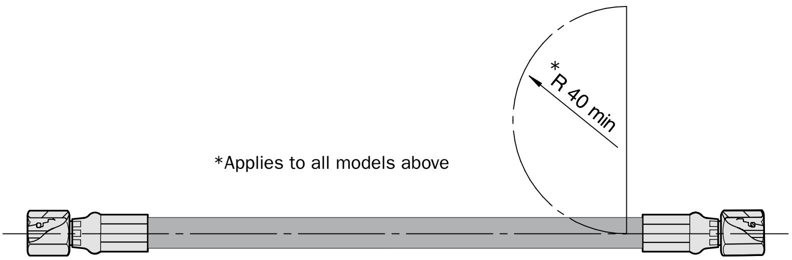


Order No. 3420857-XXXX



Order No. 3520857-XXXX





*Applies to all models above

Order No. 502319 - XX Meters

EO24™ hose clip, **Order No. 502322.** Can be used to secure hoses using an M6 screw.

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	120 mm

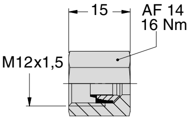
EO24™ Tube

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

Functional nut
Order No. 504047



EO24™ clip,
Order No. 502322
(Can be used to secure hoses using an M6 screw)

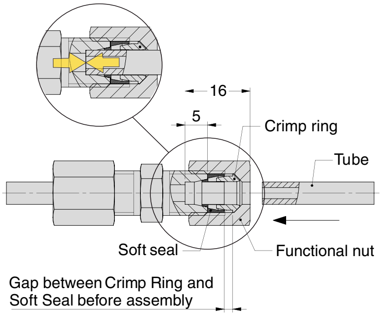
Using EO24™ Tube

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

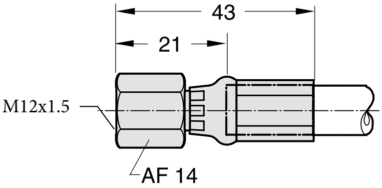


Note: Do not tighten! Run the tube through the nut until it stops (~16 mm from the top surface of the nut). When tightening the nut, use a torque of 16 Nm. Recommended tools to have available: hacksaw, tube cutting fixture, tube bending tool, de-burring tool, compressed air and a torque wrench (AF 14 mm, 16 Nm).

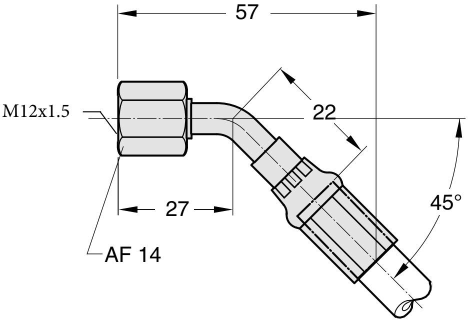
Tube De-burring Tool
Order No. 505096

Tube Bending Tool (bend radius 20 mm)
Order No. 504711

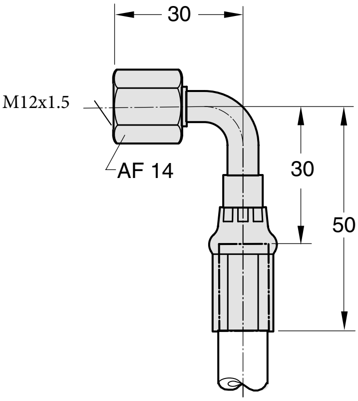
E024™ Straight
Order No. 504141



E024™ 45° Elbow
Order No. 504142



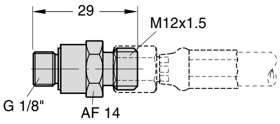
E024™ 90° Elbow
Order No. 504143



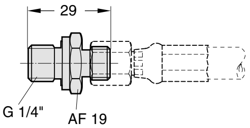
Adapter to Hose Couplings

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.

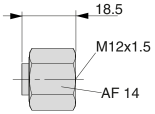
EO24™-Hose Adapters



Male Stud Connector G1/8”
(For gas springs and Coupling Blocks)
Order No. 503593

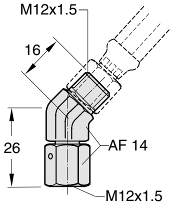


Male Stud Connector G1/4”
(For Control Blocks)
Order No. 504144

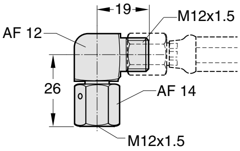


Cap/Plug
Order No. 504913

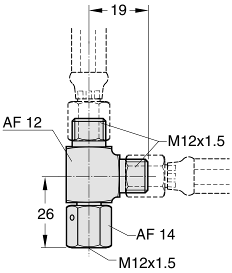
Adapter to Hose Couplings



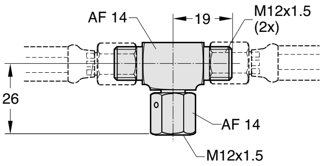
Swivel Nut Elbow 45°
Order No. 504145



Swivel Nut Elbow 90°
Order No. 504146

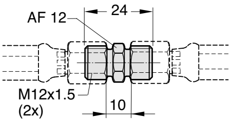


Swivel Nut Run Tee
Order No. 504147

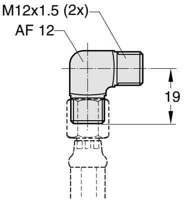


Swivel Nut Branch Tee
Order No. 504148

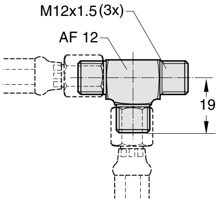
Hose to Hose Couplings



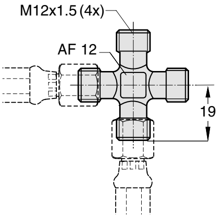
Union Straight
Order No. 504149



Union Elbow
Order No. 504150



Union Tee
Order No. 504151

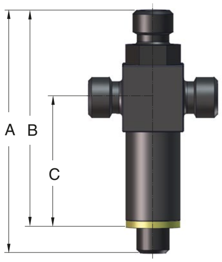


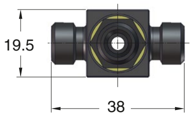
Union Cross
Order No. 504152

Adapter to Hose Couplings

According to GM standard 90.25.

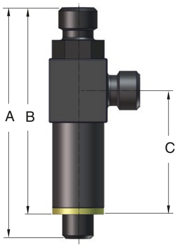
Banjo Run Tee G1/8”
Order No. 3025594

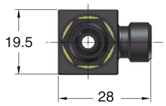




Order No.	A	B	C	Weight
3025594-01	50	42.5	17	0.09
3025594-02	64	56.5	31	0.11
3025594-03	71	63.5	38	0.12

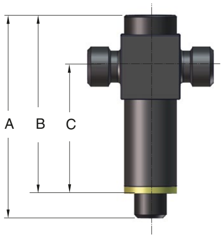
Banjo Run Tee G1/8”
Order No. 3025599

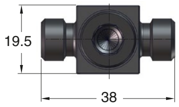




Order No.	A	B	C	Weight
3025599-01	50	42.5	17	0.08
3025599-02	64	56.5	31	0.10
3025599-03	71	63.5	38	0.11

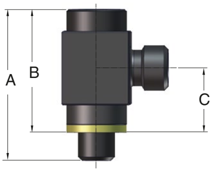
Banjo Tee G1/8”
Order No. 3025551

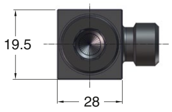




Order No.	A	B	C	Weight
3025551-01	40	32.5	17	0.09
3025551-02	54	46.5	31	0.11
3025551-03	61	53.5	38	0.12

Banjo Elbow G1/8”
Order No. 3025562

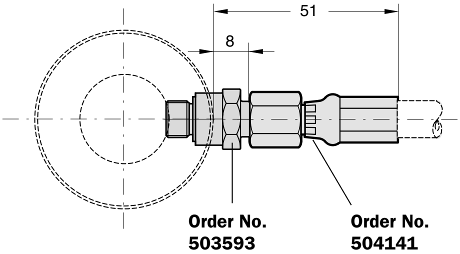




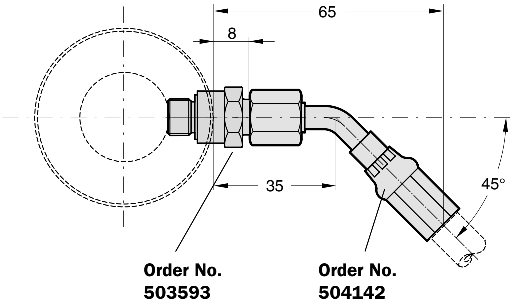
Order No.	A	B	C	Weight
3025562-01	40	32.5	17	0.08
3025562-02	54	46.5	31	0.10
3025562-03	61	53.5	38	0.11

Installation Examples, EO24™-Hose System

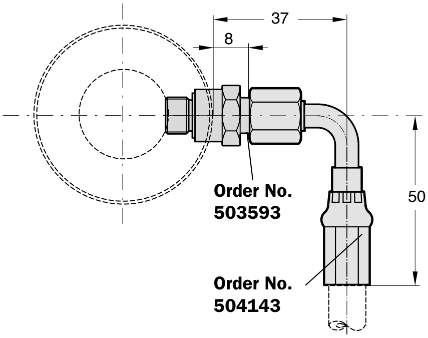
Straight hose coupling



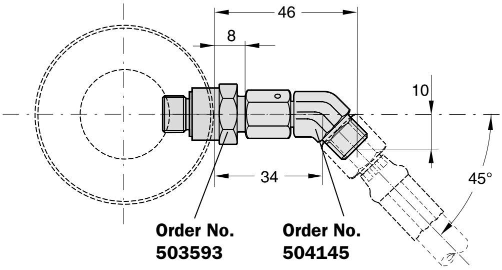
45° hose coupling



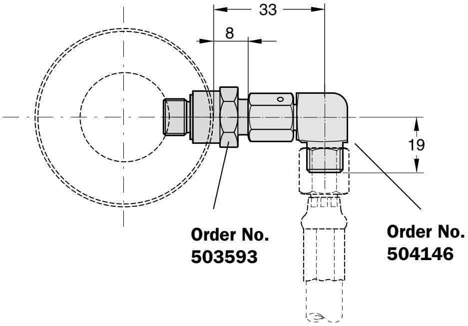
90° hose coupling



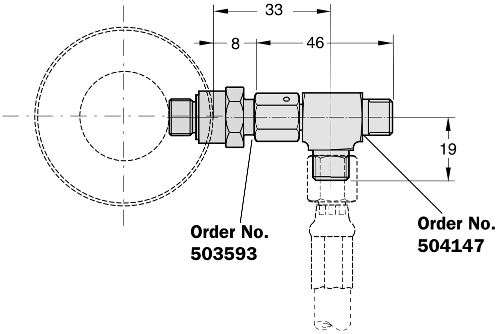
45° angle coupling



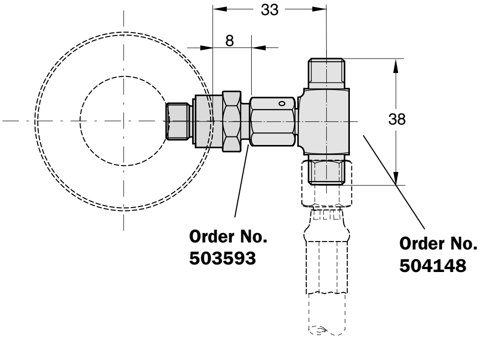
90° angle coupling



L-coupling



T-coupling



Gas charging equipment

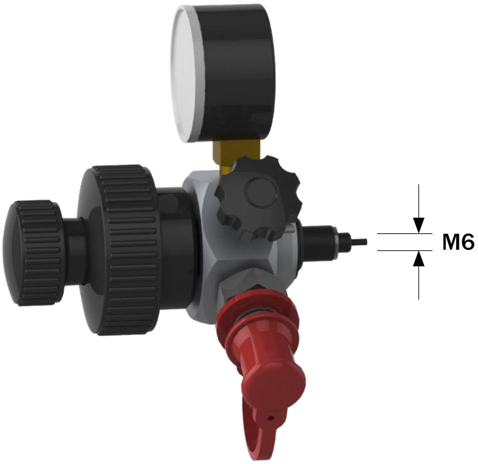
One of the strongest benefits of gas springs in general is the possibility to change the blank holding force by simply altering the charging pressure of the gas spring. With KALLER® 's Gas Charging Equipment you can do this very easily, not only in self-contained gas springs but in linked systems as well.
A complete set of Gas Charging Equipment, including everything you need, consists of a Pressure Regulator connected to a gas bottle, a Charging Hose with (QRC) connections, and a Control Armature with port adapters – preferably contained in a protective carry case.

Control Armature

Control Armature M6

A Control Armature, which is connected to the port of the gas spring, is used to change the nitrogen gas pressure in the spring. The Control Armature M6 is designed to fit the KALLER® M6 standard gas ports. By attaching the right adapter, however, it can be used for any KALLER® gas springs.

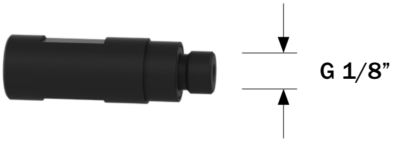
Order No. 1029335



Charge Port Adapters

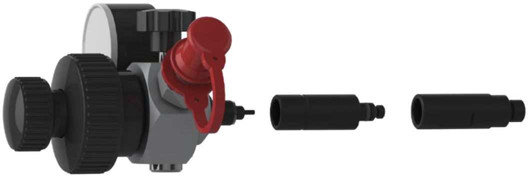
As mentioned above, by attaching a suitable charge port adapter, the Control Armature M6 can be connected to KALLER® G1/8" standard gas ports or other special gas ports. Adapters can be ordered separately, according to the table beside, or as part of a complete set including the control armature.

Charging Port Adapter G1/8" standard gas port
Order No. 3014016



Charging Port Adapter M6 special gas port Special gas port example CU4-1000, CX
Order No. 3014021

Complete set:
Control Armature with charge port adapters
Order No. 1229335

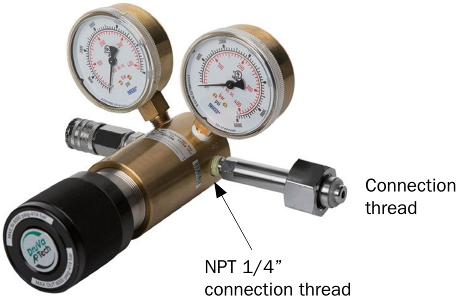


Attached charge port

Pressure Regulator

To avoid overcharging, and to keep the charging pressure at a constant level, it is important to use a Pressure Regulator when charging gas springs. Due to different gas bottle connections for nitrogen cylinders worldwide, a Pressure Regulator with the right adapter must be chosen. As different countries have different bottle connections, make sure you select the correct connection code according to the table below.

Order No.	Connection thread	Standard
1028343-001	W24.32 x 1/14” RH	DIN 477 No. 10
1028343-002	G 5/8	BS 341 No. 3
1028343-003	G 5/8	ISO 228 (China)
1028343-004	SI 21.7 x 1.814	AFNOR NF C
1028343-005	1.040” - 14 NGO	CGA 680
1028343-006	W 21.7 x 1/14”	UNI 4409



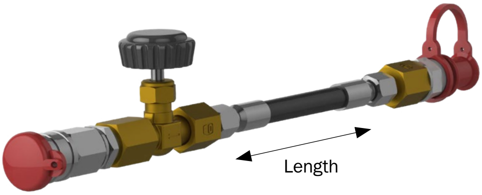
If the right thread cannot be defined, you can order a Pressure Regulator without a connection adapter. In this case, the right connection adapter must of course be fitted at the ¼ NPT thread before use.

Order No. 1028343-000

Charging Hose with Shut-Off Valve and (QRC) Connections

To avoid overcharging, and to keep the charging pressure at a constant level, it is important to use a Pressure Regulator when charging gas springs. Due to different gas bottle connections for nitrogen cylinders worldwide, a Pressure Regulator with the right adapter must be chosen. As different countries have different bottle connections, make sure you select the correct connection code according to the table below.

Order No.	Length (m)
4027471-2000	2
4027471-4000	4
4027471-6000	6



Carry case

With a protective carry case you have everything right where you need it.

Order No. 1028607

How to order the complete set

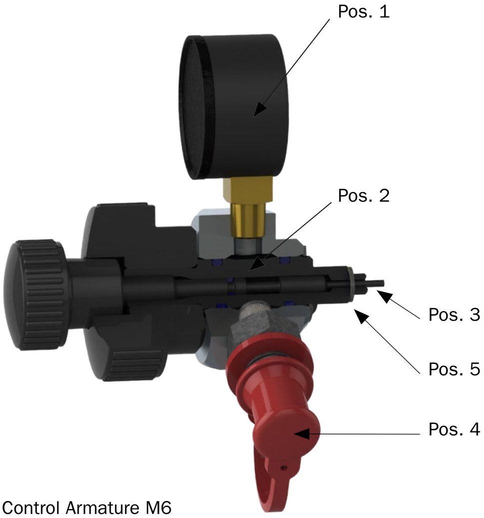
For a complete set of Gas Charging Equipment, including the carry case, order the following items – just make sure to choose the right adapters, and a suitable length for the Charging Hose.

Description	Order No.	Note
Control Armature with Charge Port	1229335	
Pressure Regulator	1028343-003	Ex. ISO std. Choose right std for your site
Charging Hose	4027471-4000	Choose a suitable length
Carry case	1028607	

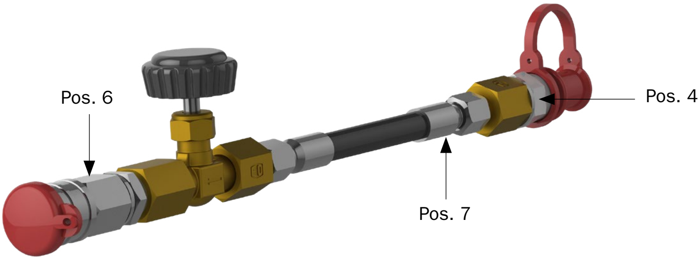
Spare parts for Charging Equipment

KALLER® offers Spare Parts for all your repair needs, according to the table below.

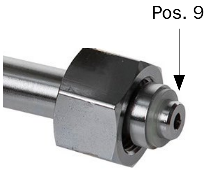
Description	Order No.	Pos.
Gauge	40 502467	1
M6 Connection rod	1029006	2
Valve opener rod	1028977	3
QRC coupling – male	502386	4
Washer M6	501023	5
QRC coupling – female	502176	6
Hose – 2 m	3020857-2000	7
Hose – 4 m	3020857-4000	7
Hose – 6 m	3020857-6000	7
Regulator Gauge	63 506130	8
Sealings tray DIN477	506354	9
Sealings tray UNI4409	506355	9
Washer	500435	10

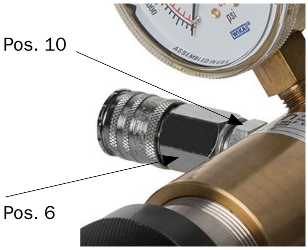


Control Armature M6



Hose





Pressure Regulator

Force Measurement Equipment

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.

Digital version daN
Order No. 1016713-1330

Features:
- Quick height adjustment
- Digital or analog force indication
- Force displayed in kg or lbf, digital version
- Accuracy: ± 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 kg or lbf
- Accuracy: ± 0.5%
- Max. capacity: 2,000 kg (4,500 lbf)
  Max. spring height: 488 mm (19”)
  Dimensions: w=275 mm, d=255 mm, h=930 mm

Service Equipment

KALLER® gas spring tool kits

Are available in various sets and all
come with a protective carry case.

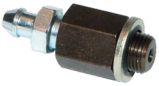
Order No. 1014779

Link System & Charging Spare Parts

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

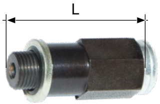
Order No.	Component	
4018112	M6 valve	
501243	VG5 valve	
4014007	Oil bleeding valve	

Link System & Charging Spare Parts

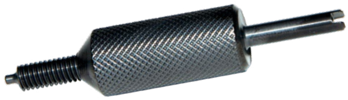
Washers

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	
4027047	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

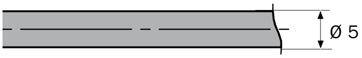
Pneumatic operated crimping press.
Order No. 3121381
(Crimping die not included)

Stop Tool (for Micro EO24™ hose end assembly)
Order No. 4024183

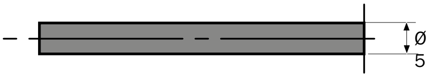
Hose cutting plier
Order No. 502839

Below is a list of the order numbers of the various couplings and hoses that can be ordered from us:

Micro E024™ Hose system

Order No.	**Component**	
Straight Hose Connector Micro E024™	505082	
45° Hose Connector Micro E024™	N/A	—
90° Hose Connector Micro E024™	N/A	—
Separate Micro E024™ 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	

E024™ Hose system

Order No.	**Component**	
Straight Hose Connector E024™	504141	
45° Hose Connector E024™	504142	
90° Hose Connector E024™	504143	
Separate E024™ 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

KALLER® Nitrogen Gas Booster

Part No. 1028845-XX, 1028846-XX

Technical facts

The KALLER® compact nitrogen booster was developed for compressing nitrogen gas. Using the booster, a high charging pressure can be achieved and the N_2 gas bottles can be used down to a residual pressure of 30 bar.

The nitrogen booster works according to the principle of a pressure relay valve, where compressed air is used as the driving force. Low pressure is applied to a large surface, which in turns applies high pressure to a small surface.

The booster is mounted on a holding plate and can easily be hung over the nitrogen bottle neck with the mounting straps.

Advantages

- Increase in utilization capacity of the bottles
- Time-saving: significantly less gas bottle replacements needed
- Cost-saving: minimizing the number of gas bottles needed
- Lightweight
- Suitable for all KALLER® gas springs

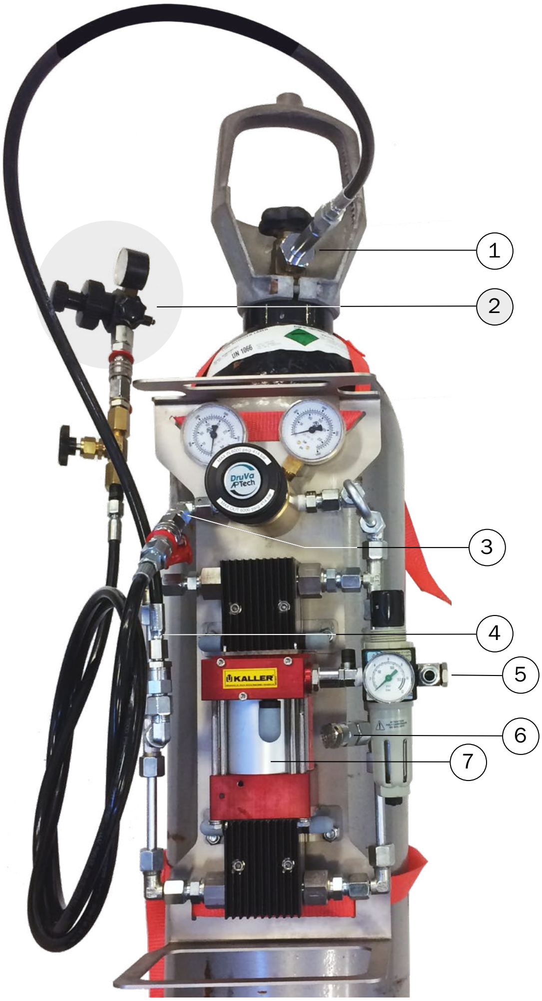
Nitrogen GAS booster

① Gas bottle connection for the nitrogen cylinder
② Gas Charging Equipment (ordered separately, see KALLER® page 322)
③ Nitrogen N2 outlet
④ Nitrogen N2 inlet
⑤ Compressed air inlet G 1/4" max. 10 bar
⑥ Overpressure protection 360 bar
⑦ Stationary Nitrogen Booster

Basic information

Pressure medium	Pure Nitrogen gas N2, cleanliness class min. 4.5
Max outlet pressure	300 bar (~ 4350 psi)
Inlet nitrogen pressure	30-300 bar / 435 - 4350 psi
Formula for outlet pressure	32 x driving supply + inlet Nitrogen pressure
Pressure ratio	1:32
Driving supply medium*	Compressed air (max. particle size 5µm)
Driving supply medium pressure	0,5 – 8 bar (~ 7,25 – 116 psi)
Air connection thread	G 1/4"
Operating temperature	Maximum +60° C
Interim storage*	+5 - +40° C at maximum humidity 60%
Weight	Approx. 11.5 kg.

*For more details see the Nitrogen Gas Booster manual at KALLER.COM



KALLER® Nitrogen Gas Booster

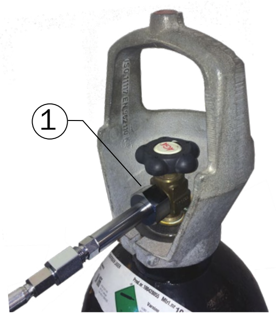
Models and gas bottle connection

Depending on your needs, KALLER® provides gas boosters for both stationary and mobile use.

Due to different gas bottle connections for the nitrogen cylinders worldwide, a suitable adapter (pos 1) must be chosen for both booster setups.

KALLER® supports the following gas bottle connection standards:

Order No. Version	Thread	Standard
-01	W24.32 x 1/14" RH	DIN 477 No. 10
-02	G 5/8"	BS 341 No. 3
-03	G 5/8"	ISO 228
-04	SI 21.7 x 1.814	AFNOR NF C
-05	1.040” - 14” NGO	CGA 680
-06	W 21.7 x 1/14"	UNI 4409



Stationary gas booster

For a permanent usage in a workshop or maintenance department, a stationary variant is the most cost-efficient. A stationary gas booster is designed for being mounted or used hanging on a nitrogen gas bottle. Order the suitable gas bottle adapter for a stationary gas booster as below:

Order No.	Thread	Standard
1028845-01	W24.32 x 1/14" RH	DIN 477 No. 10
1028845-02	G 5/8"	BS 341 No. 3
1028845-03	G 5/8"	ISO 228
1028845-04	SI 21.7 x 1.814	AFNOR NF C
1028845-05	1.040" - 14" NGO	CGA 680
1028845-06	W 21.7 x 1/14"	UNI 4409

Mobile gas booster

The mobile KALLER® gas booster is delivered in a special protective carry case, convenient for transport. It does not need to be removed from the protective case before use – on the contrary, using it directly from the protective case is recommended.

Order No.	Thread	Standard
1028846-01	W24.32 x 1/14" RH	DIN 477 No. 10
1028846-02	G 5/8"	BS 341 No. 3
1028846-03	G 5/8"	ISO 228
1028846-04	SI 21.7 x 1.814	AFNOR NF C
1028846-05	1.040" - 14" NGO	CGA 680
1028846-06	W 21.7 x 1/14"	UNI 4409

Recommended Tool

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,
www.crceurope.com


KALLER

Heavy Duty Protection

Heavy Duty Protection covers are designed to significantly prolong the lifetime of the gas springs – regardless of how dirty or contaminated the application environment is.

Although gas springs are designed primarily for sheet metal forming, over the years they have been installed in other applications as well. In many of these applications the environment is very dusty – resulting in lower performance and a shorter lifespan of the gas springs. Fortunately, there is a simple solution: the KALLER® Heavy Duty Protection covers.

Features and Benefits

- Significantly increases the lifetime of the gas spring in highly contaminated environments
- The first piston rod cover in the world without open breathing holes
- Fits most standard gas springs (see tables below)
- Fits most mounting options
- Adds 10 mm additional length
- Available for gas springs with threaded piston rod and cylinder sizes Ø 45 mm, Ø 50 mm, Ø 63 mm, Ø 75 mm, Ø 95 mm, Ø 120 mm, Ø 150 mm, and Ø 195 mm.

Technical Performance

Operating temperature	0 – 80 C°
Temperature resistance	-35 – 150 C°
SPM according to the gas spring	

Models and Dimensions

The HDP Heavy Duty Protection fabric covers are produced to fit a stroke length between 10 - 250 mm, and are available for the gas spring models found in the tables below.

***Note:** If the gas spring is flange assembled, an additional item called a flange adapter HDPF must be used.
See details on the next page.

How to order

To identify the correct HDP model and Order Number (Order No:) for your gas spring you can refer the tables below. As an example, to order a HDP for KF2-A 1500-80-85, order the HDP-1-95.

HDP-1	-95
Model	Cylinder size

Cylinder size Ø 45 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	X 750 TX 750 XG 750 XF 750	HDP-1-45

Cylinder size Ø 50 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 750 LCF 750	HDP-1-50

Stroke length (mm)	For gas spring models	Order No:
10-250	X 1000 TX 1000 XG 1000 XF 1000	HDP-2-50

Cylinder size Ø 63 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	X 1500 TX 1500 XG 1500 XF 1500	HDP-1-63

Cylinder size Ø 75 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 1500 LCF 1500	HDP-1-75

Stroke length (mm)	For gas spring models	Order No:
10-250	TX 2400	HDP-2-75

Stroke length (mm)	For gas spring models	Order No:
10-250	X 2400 XG 2400 XF 2400	HDP-3-75

Cylinder size Ø 95 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 3000 LCF 3000 KF2/KF2-A 1500 KP 1500	HDP-1-95

Stroke length (mm)	For gas spring models	Order No:
10-250	X 4200 TX 4200 XG 4200	HDP-2-95

Cylinder size Ø 120 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 5000 LCF 5000 KF2/ KF2-A 3000 KP 3000	HDP-1-120

Stroke length (mm)	For gas spring models	Order No:
10-250	X 6600 TX 6600 XG 6600	HDP-2-120

Cylinder size Ø 150 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 7500 LCF 7500	HDP-1-150

Stroke length (mm)	For gas spring models	Order No:
10-250	X 9500 TX 9500	HDP-2-150

Stroke length (mm)	For gas spring models	Order No:
10-250	KF2 / KF2-A 5000 KP 5000	HDP-3-150

Cylinder size Ø 195 mm

Stroke length (mm)	For gas spring models	Order No:
10-250	TU 10000 KF2/ KF2-A 7500	HDP-1-195

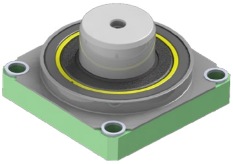
Stroke length (mm)	For gas spring models	Order No:
10-250	X 20000 TX 20000	HDP-2-195

Flange Adapter

If the gas spring is flange assembled, an additional item – called a flange adapter HDPF – must be used. The flange adapter must be assembled at the top of the flange with the flange assembly screws. Make sure to use the right flange adapter model for the cylinder size, according to the table below.

***Note:** The Flange Adapter can only be combined with the flanges in the table below.

Cylinder size (mm)	For Flange	Order No:
Ø 45	FCS 500	HDPF-45
Ø 50	FCS 750	HDPF-50
Ø 63	**FCSX 1500**	HDPF-63
Ø 75	FCS 1500	HDPF-75
Ø 95	FCS 3000	HDPF-95
Ø 120	FCS 5000	HDPF-120
Ø 150	FCS 7500	HDPF-150
Ø 195	FCS 10000	HDPF-195



Accessories

If you require, you can order a cable tie tightening tool for metal cable ties as an accessory.

Item	Order No:
Cable Tie Tightening Tool	1031124

Spare Parts

The items listed in the table below are available as spare parts for the HDP and can be ordered individually if needed. For more details on identifying the correct spare part for you, please refer the **HDP User Manual** found on KALLER.com.

Spare Part	Order No:
M6 Shoulder Screw	1034847
M8 Short Shoulder Screw	1034848
M8 Long Shoulder Screw	1034849
M16 Screw	1034850
Metal Cable ties (10 pieces)	1032103

Assembly Instructions

For full assembly instructions please refer to our **HDP User Manual** which can be found on our website at www.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 111 and 113.

For further information contact your local distributor or KALLER® at www.kaller.com or
Phone: +46 140 571 00.

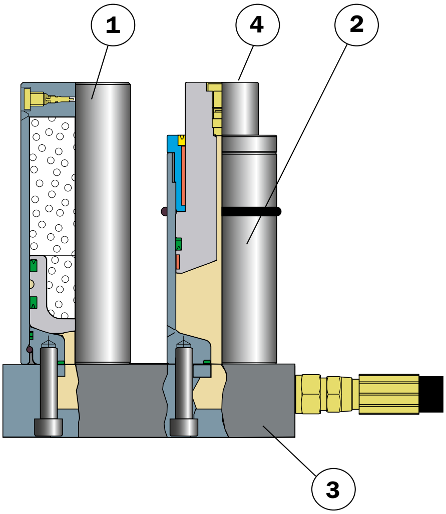
Power Unit (HCP)

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 pressurization 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.

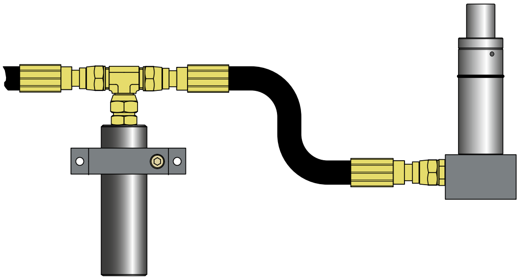
Note that the piston (4) of the Power Cylinder is at the same height as the Accumulator when this system is completely filled with oil.

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 "Dimensions for Power and Cam Units" starting at page 363 .

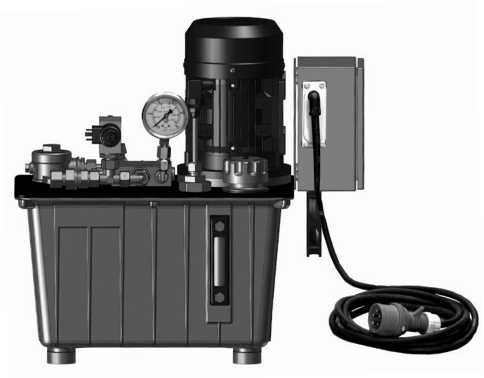


Mounting orientation

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 417.



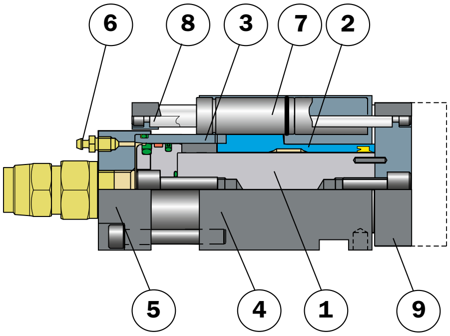
Compact Cam (CC)

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.

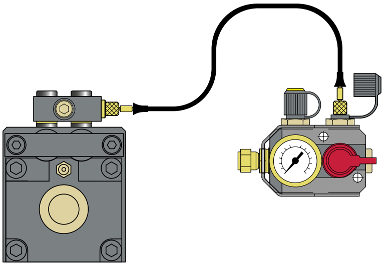
The Power Unit (HCP) or Hydraulic Pump Unit (EHC) can be used to actuate the Compact Cam. The Cam return force is provided by one or two internally installed gas springs. The punch adapter plate is prevented from rotating by the two anti-rotation rods.

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.



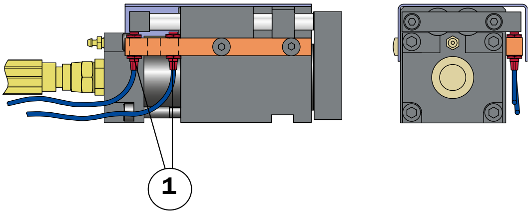
Compact Cam (CC-H) for Hosed System

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 "Dimensions for Power and Cam Units/ Force Cylinders" starting on page 113.



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 "Dimensions for Power and Cam Units/ Force Cylinders" starting on page 113.

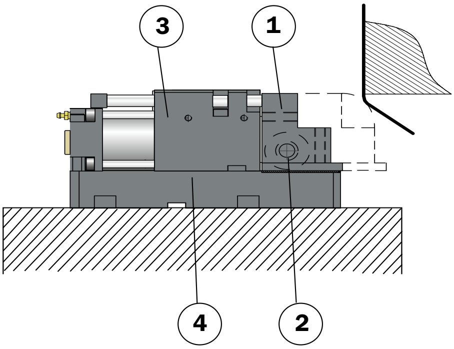


Flange Cam (CCF)

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.

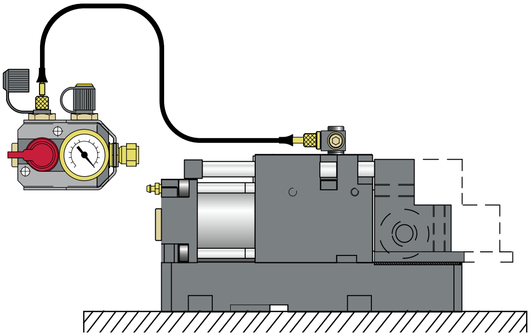
The Power Unit will actuate the Flange Cam and the return movement is provided by two internally installed gas springs. The front adapter plate is prepared with threaded holes to mount any customized flanging tool etc.



Flange Cam (CCF - H) for Hose System

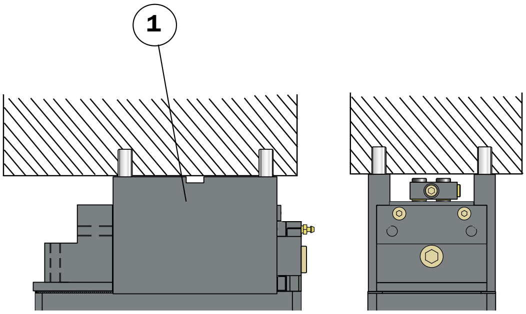
The Flange Cam is also available in a version where the gas springs in the unit can be hosed to a control armature. This way the gas pressure in the spring can be monitored from outside the tool.

See section "Dimensions for Power and Cam Units/ Force Cylinders" starting on page 113.



Flange Cam spacers (optional)

The spacers (1) are required when mounting the Flange Cam from above (top mount) as shown here.

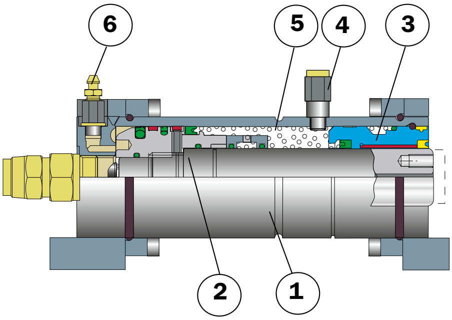


Force Cylinder (HCF)

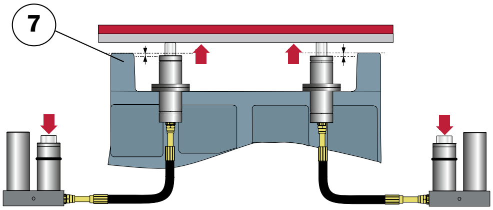
The Force Cylinder is suitable for forward and return motion of, for example, a flanging steel or forming punch used for various operations in the tool. Note that it is not possible to mount a punch directly onto the piston rod without a guide in the tool.

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.



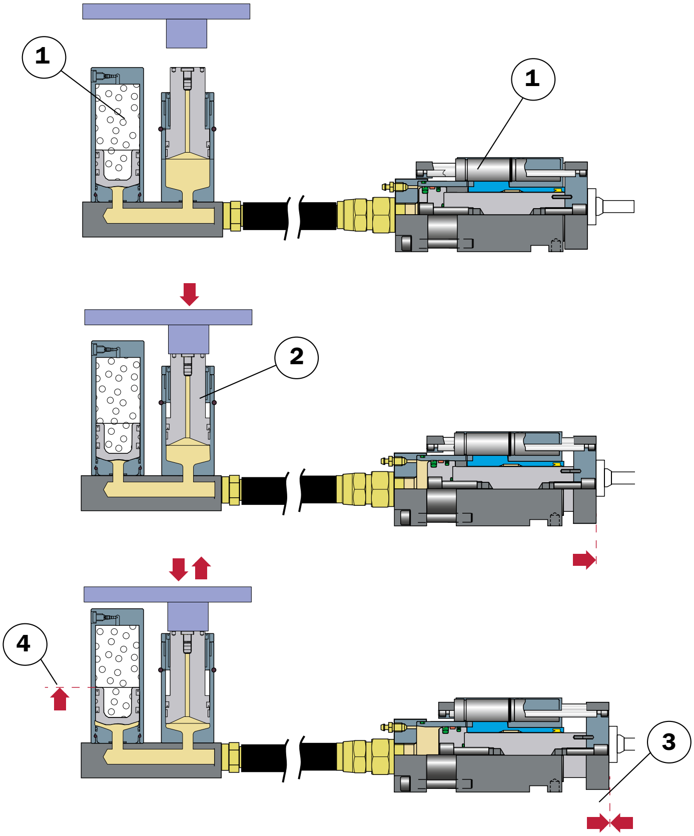
Function Description

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.

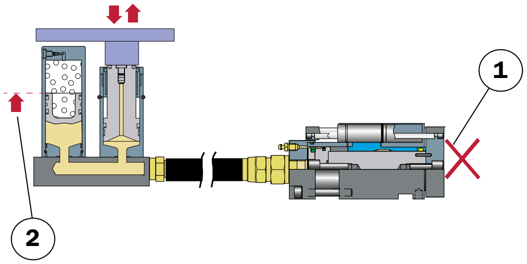
When the press returns upwards the movable parts will return to their original positions due to the return Gas Springs in the Cam (or nitrogen pressure in the Force Cylinder) and Accumulator.



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 pressurization 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

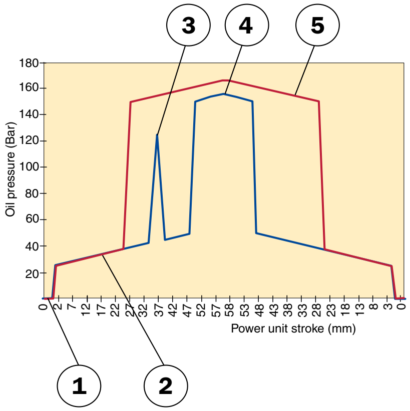
Before the Power Unit is activated the oil pressure is 0 bar (1).

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.

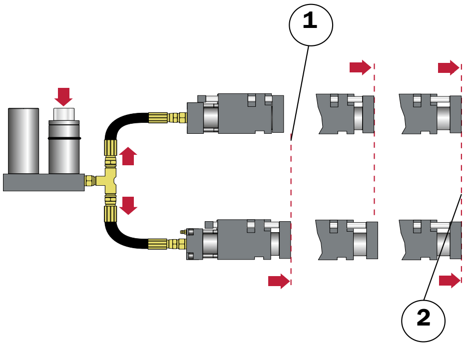
If the movement of the Cam is restricted the oil pressure will follow curve (5).



Connection of two or more Cam Units to one Power Unit

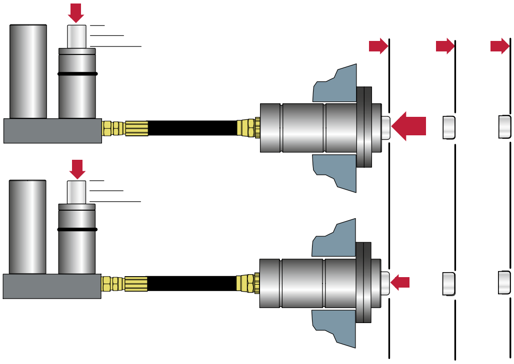
It is possible to connect up to three Cam Units to one Power Unit. Note that the movement of the Cams during the stroke are not synchronized (1) until the Cams are in the fully extended position (2).

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 synchronized regardless of the individual force required by each Force Cylinder.



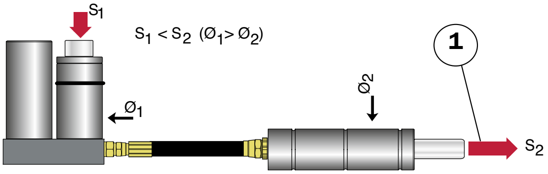
Adapting Cam stroke ratios

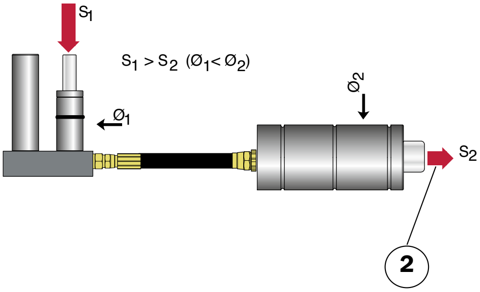
If you use a large Power Unit (eg. HCP 040)
connected to a small Cam Unit (eg. CC 015)
the stroke of the Cam Unit will increase in relation to the stroke of the press.

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 361 "Technical data" See also page 357 "Component selection" step 5.





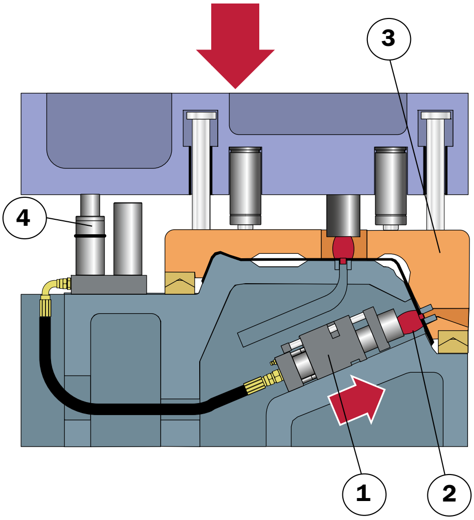
Installation Examples

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.

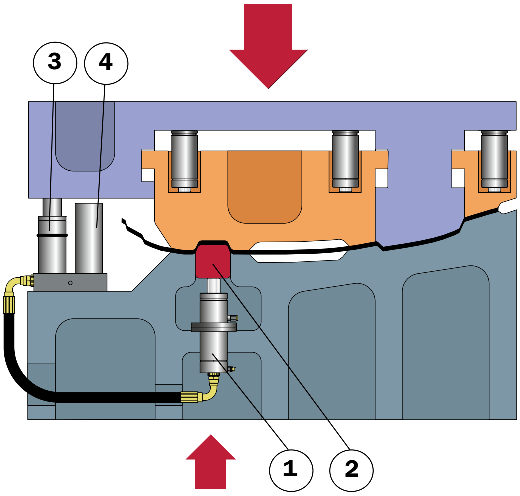
Note that the Power Unit can be mounted at any location and orientation to the Cam Unit/Force Cylinder and not just as is depicted in these examples.



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).



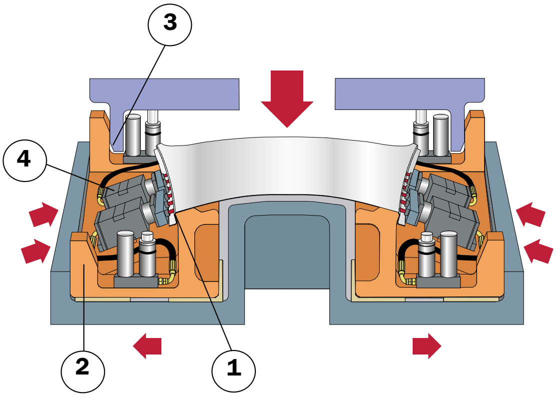
Installations currently in operation

The following examples are of installations now running in production and illustrates some 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).

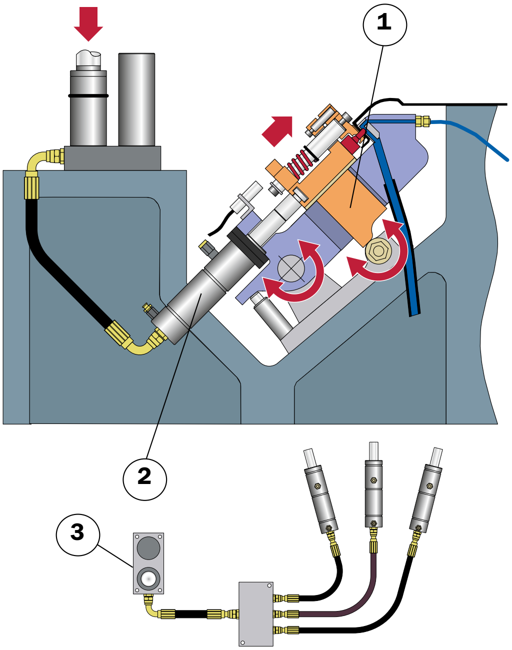
Using this solution there is no longer the need for drivers at the punching position and therefore punching operations can easily be carried out perpendicularly to the blank.



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 center). 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.

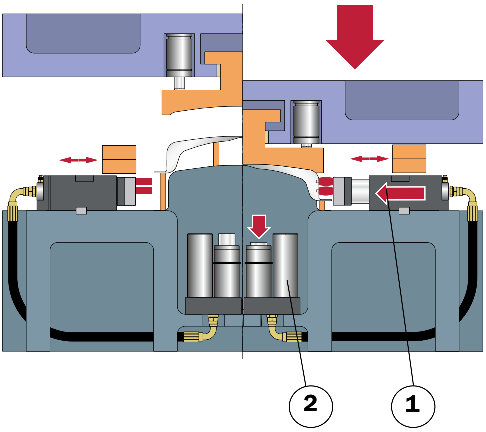
There are two systems in the tool, one on the left side, one on the right. Each system consists of one Power Unit (3) driving three Force Cylinders.



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)

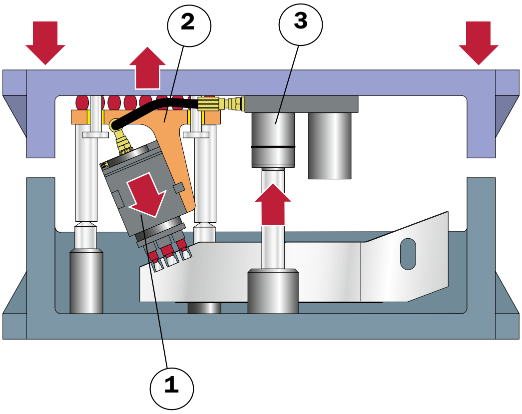
Two versions of the same part are produced, one with holes and one without. For the part without holes, the Power Unit is simply removed from the tool, thus disabling the Cam Units from making the holes.



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 centered 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.

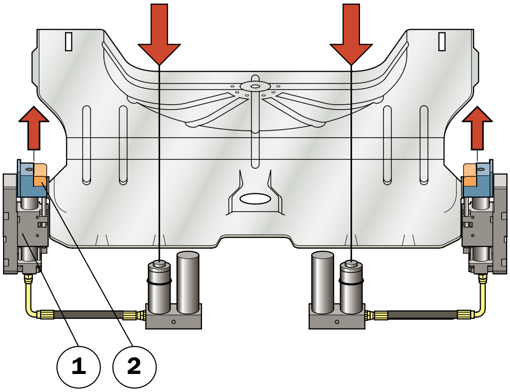
Prior to the installation of the hydraulic cam system, the holes were being punched at a vertical angle using oval shaped punches.

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.

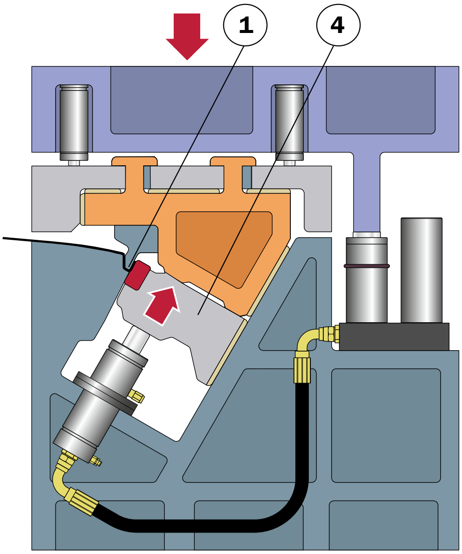


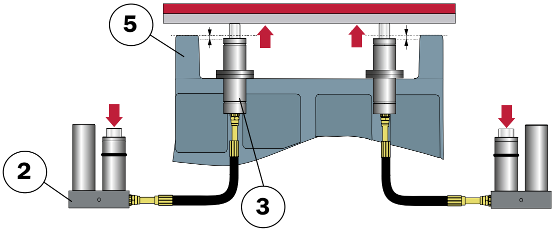
Example 6. Flanging a wide edge
In this tool two Force Cylinders are being used to drive a 800 mm wide flanging steel. As seen in the picture the flanging (1) is carried out at an angle opposite to the direction of the press motion.

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.





Advantage and Possibilities of Using Flex Cam

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 pressurization 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

Component Selection

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/mm^2

Shearing strength (= x 0.8) .... : = _____________ N/mm^2

Diameter of punch .... : d = _____________ mm

(or)

Total cut length .... : 1 = _____________ mm

Piercing force Fp

Piercing a round hole

$\mathrm{Fp} = t \times \tau \times d \times \pi$

Piercing or cutting

$\mathrm{Fp} = t \times \pi \times l$

Example
Calculate force needed to pierce a Ø 10.5 mm hole in a 1.2 mm thick panel. Tensile strength is 400 N/mm^2.
(Normally between 270 - 400 N/mm^2).

$\mathrm{Fp} = 1.2 \times 400 \times 0.8 \times 10.5 \times \pi$
$\mathrm{Fp} = 12667$
$\mathrm{Fp} \approx 12.7$ kN

Stripping force Fs
Fs = Fp x 0.11 (roughly 11% of the required piercing force)

Example

$\mathrm{Fs} = 12667 \times 0.11$
$\mathrm{Fs} = 1393$

$\mathrm{Fs} \approx 1.4$ 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)	Cam Unit/Force Cylinder
0-15	015
15-40	040
40-60	060
60-90	090
90-150	150

Example
Choose a Cam Unit 040 if the required force is 22 kN.

Required force:

______________________ **kN**

Size Cam Unit/ Force Cylinder:

____

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

* 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

Stroke length Cam Unit/ Force Cylinder:

______________________ **mm**

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 343, 349 and 363.

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 ________ - ________

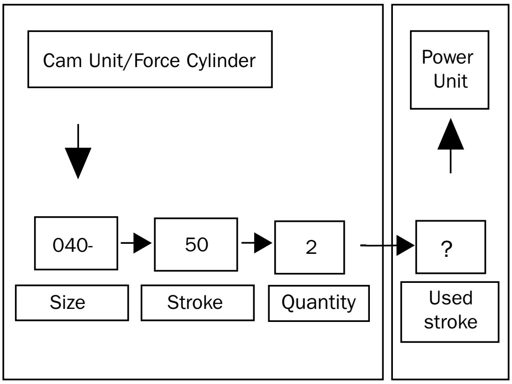
Step 5a Size and stroke of Power Unit

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 361.

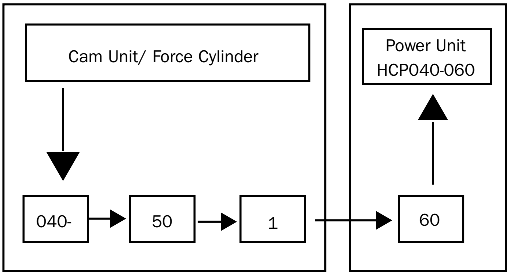


CAM UNIT / FORCE CYL.			POWER UNIT / Used stroke / Ratio CAM UNIT or FORCE CYL.-POWER UNIT														
Size	**Stroke**	**Qty**	**015-**	**Stroke**	**Ratio**	**040-**	**Stroke**	**Ratio**	**060-**	**Stroke**	**Ratio**	**090-**	**Stroke**	**Ratio**	**150-**	**Stroke**	**Ratio**
015-	25	1	35	35	1.0	35	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

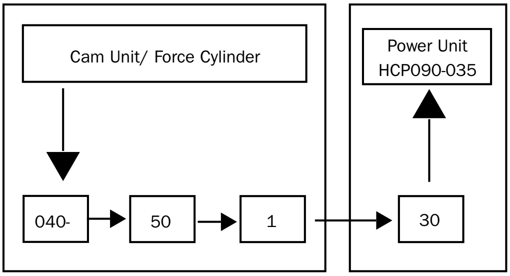
Combinations of Cam Units and Power Unit marked ▨ are normally not recommended as maximum Cam velocities can be exceeded if Power Unit is stroked too quickly. See also the following examples.

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).

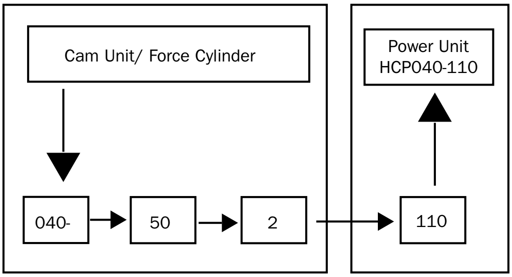


Example 2.
If it is possible to use only 30 mm of stroke from the press to perform an operation, choose a larger Power Unit HCP 090-035 connected to one Cam Unit CC 040-049. The used stroke of the Power Unit will be 30 mm and the ratio 2.5. If the press speed is 0.3 m/s the Cam speed will be 2.5 x 0.3 = 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 optimized 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:

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 Vc for the Cam Units/ Force Cylinders = minimum oil volume for the Power Unit in dm3. An is the piston area in the Cam Units in dm^2 as shown in Table 1.

$V_c = ((A_1 \text{ x } S_1) + (A_2 \text{ x } S_2).....(A_n \text{ x } S_n))/100$

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 Sp of the Power Unit using the formula below:

$S_p = ((V_c \text{ / } V_{HCP}) * S_{HCP}) + 10$

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 page 346 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

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.

$V_c = ((A_{cc} \text{ x } S_{cc}) + (A_{HCF} \text{ x } S_{HCF}))/100$

$V_c = ((0.13 \text{ x } 49) + (0.31 \text{ x } 40))/100$

(See Table 1)

$V_c = 0.189$

Used stroke Power Unit:

S_P = ____________ mm

Choose a Power Unit with more than 0.189 dm3 oil volume for example HCP 060-60 which has 0.251 dm3. (Another alternative HCP 040-110.) Calculate used stroke of the Power Unit:
$S_p = ((V_c / V_p) \times S_{HCP}) + 10$
$S_p = ((0.189 / 0.251) \times 50) + 10$
$S_p = 48$ *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 361 "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 399 "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 361 "Technical data".

If you need a smaller hose than our normal specifications, check your press velocity and refer to Table 1 or page 149.
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

Power Unit	Hose size - Press velocity			
	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”

Technical Data

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

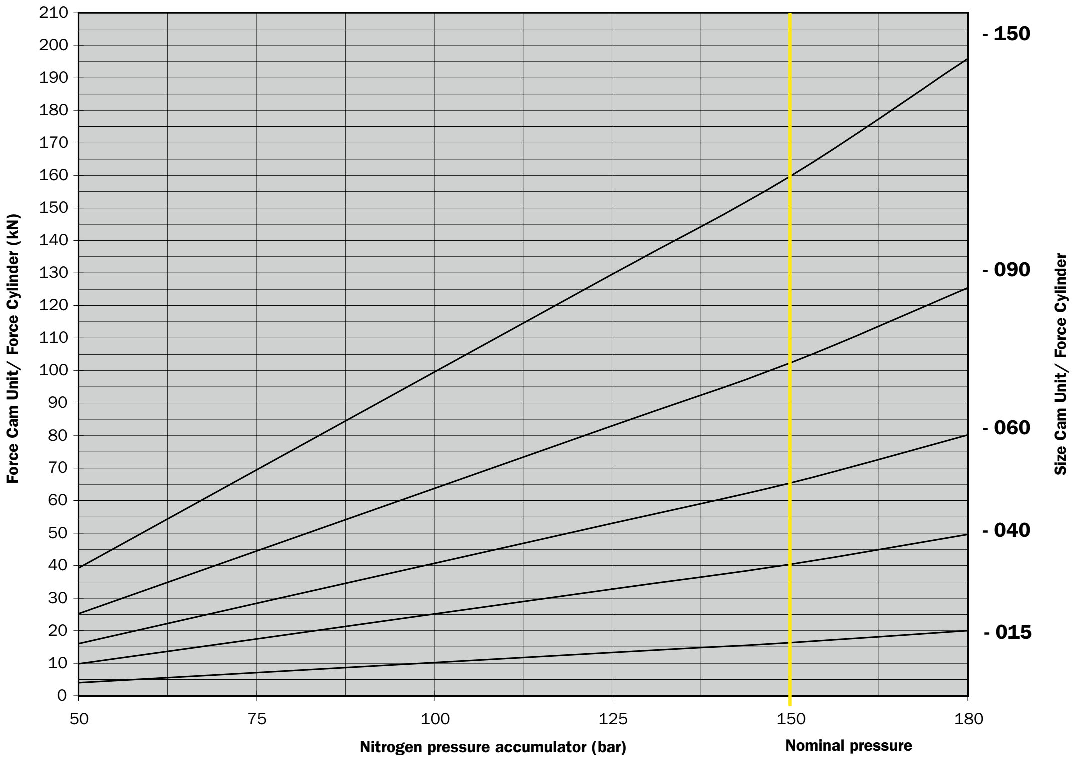
Cam Unit/ Force Cylinder force as a function of nitrogen pressure in the Accumulator

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.

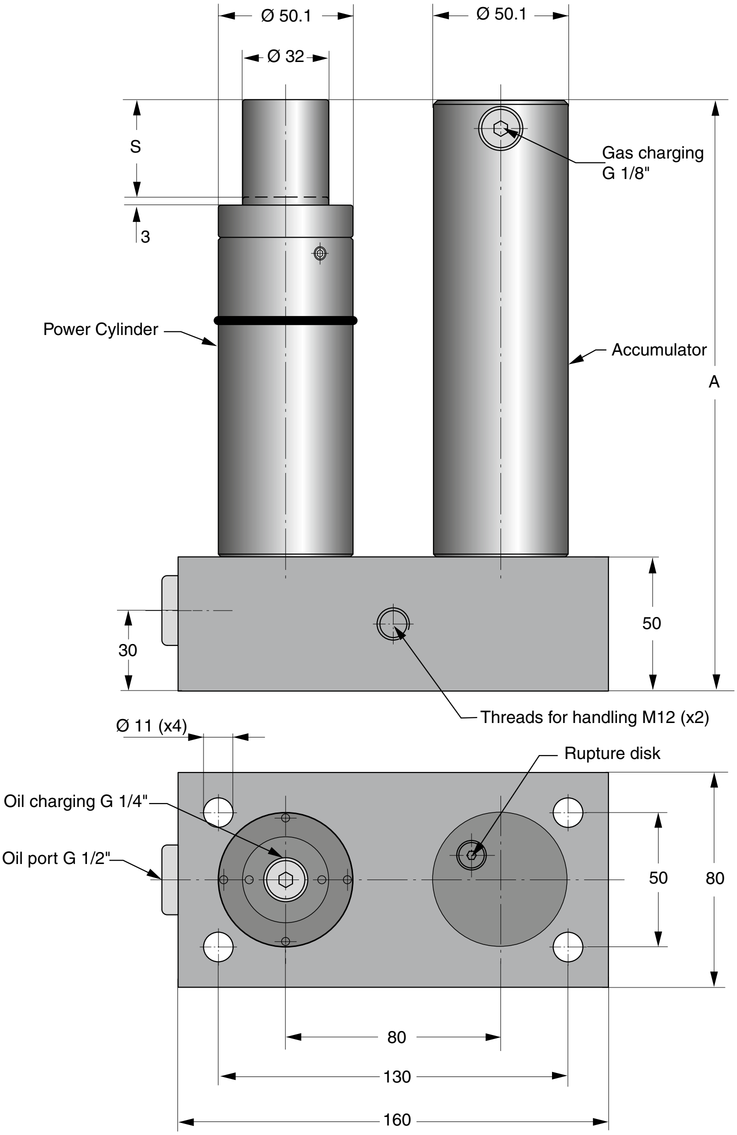
Force Cam Unit/ Force Cylinder - Nitrogen Pressure Accumulator



Dimensions

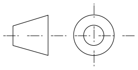
Power and Cam Units/ Force Cylinder

HCP 015 Power Unit

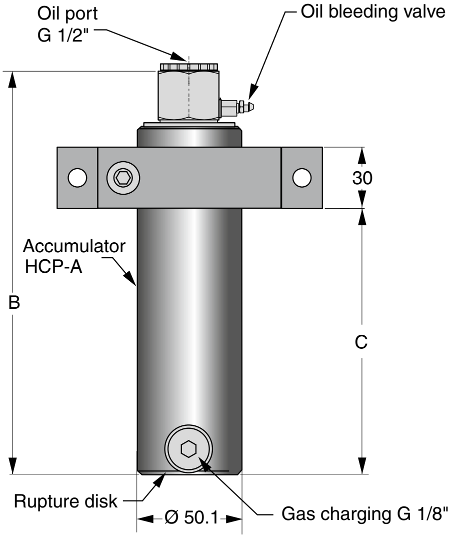


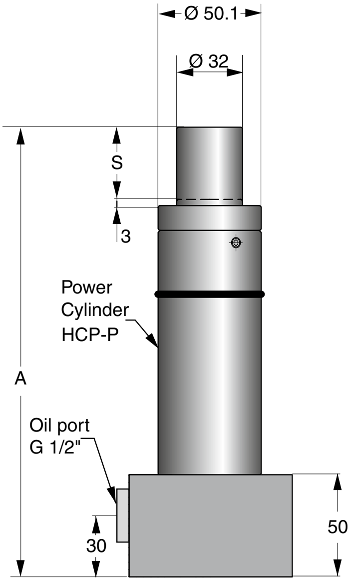
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 015-035	15	35	220	8.2
HCP 015-060	15	60	270	9.1
HCP 015-110	15	110	370	10.5
HCP 015-160	15	160	470	11.3

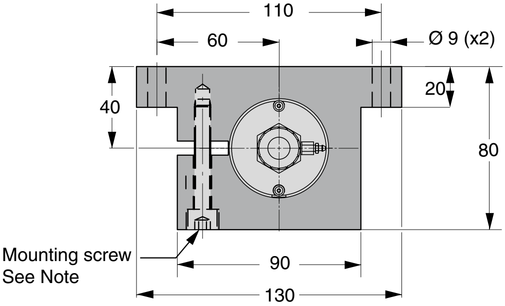
View

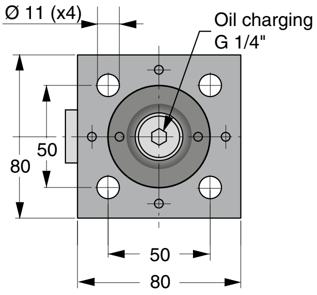


HCP-S 015 Power Unit, with Separate Accumulator



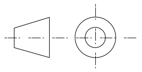






Note! The Mounting screw (M8) should be tightened with torque 25Nm

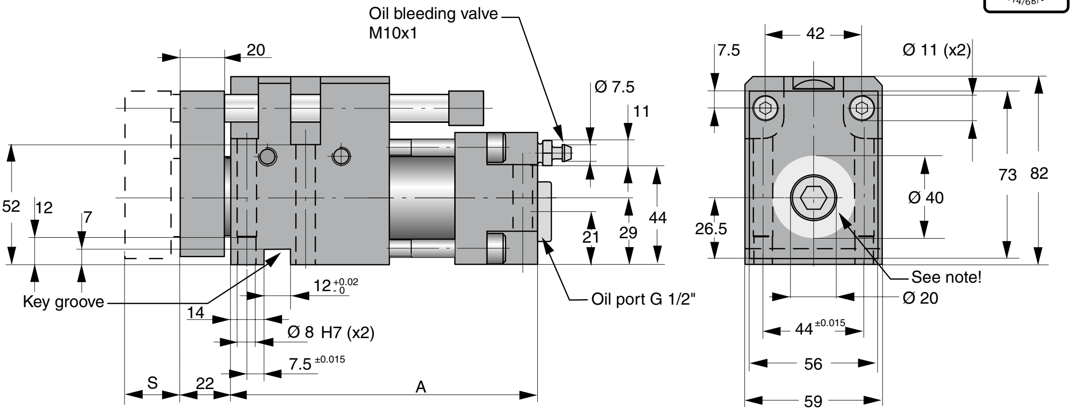
View

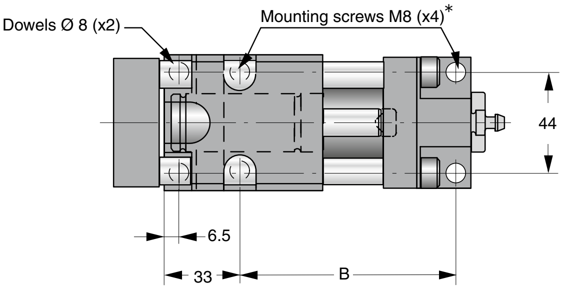


Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 015 - 035	7.3	15	35	220	213	130	HCP-P 015 - 035	4.3	HCP-A 015 - 035	3.0
HCP-S 015 - 060	8.1	15	60	270	264	180	HCP-P 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





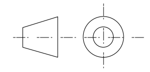
* 4 pcs mounting screws are included

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 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 side load.

View

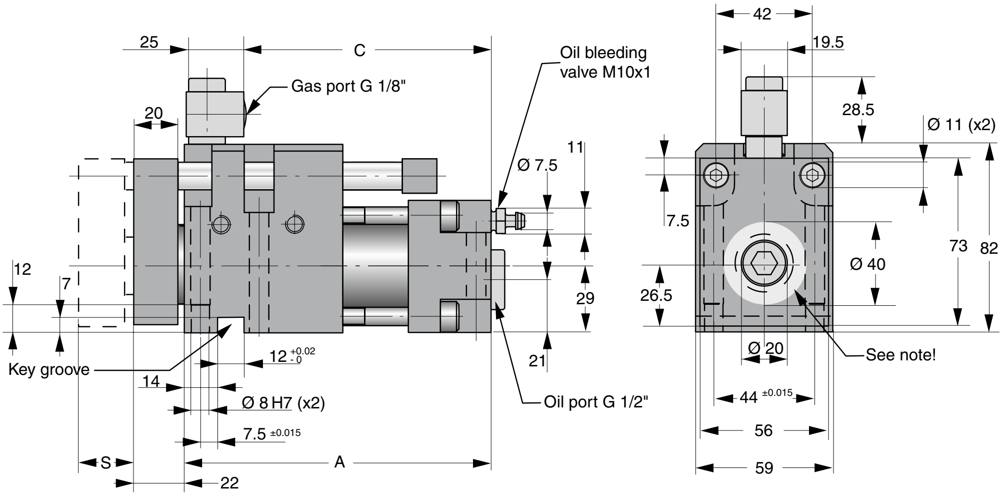


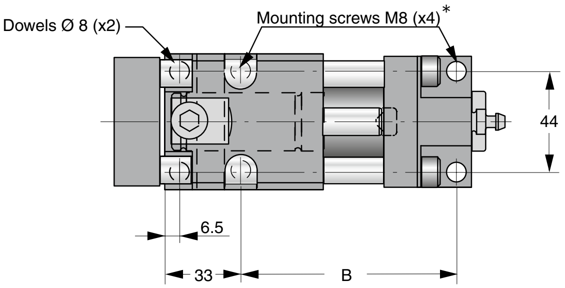
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 015-024	15	2	24	133.5	94	4.2
CC 015-049	15	2	49	158.5	119	4.6

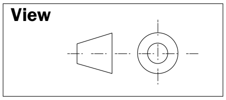
* = Nominal force available for the operation

CC-H 015 Compact Cam for pressure control

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:

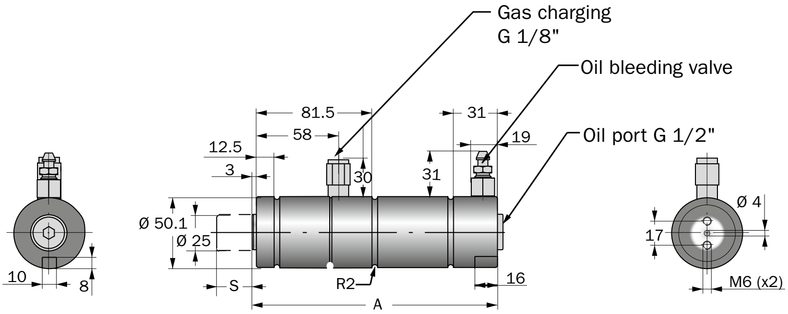
We recommend locating the punch in the center of the piston rod, but it is also possible to locate the force which the punch or punches will create during the operations within the area marked ▨ .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.

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

HCF 015 Force Cylinder



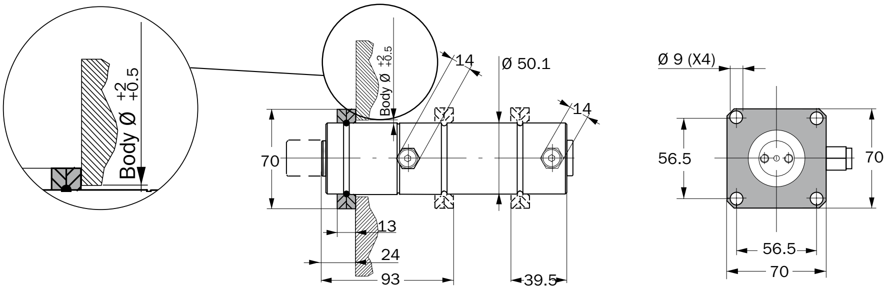
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 015-025	15	1.5	25	173	2.0
HCF 015-050	15	1.5	50	223	2.5
HCF 015-100	15	1.5	100	323	3.6
HCF 015-150	15	1.5	150	423	4.6

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 345.

* = Nominal force for the operation

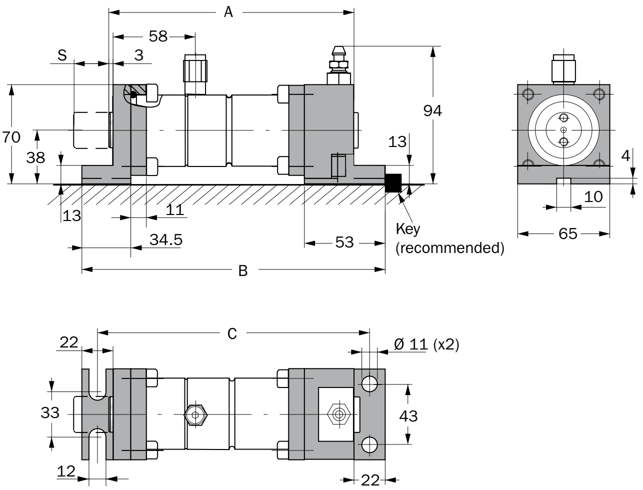
Flange mount HCF 015

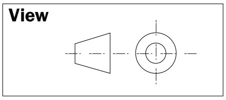
Order No. 2014677-0750 (Mount only)



Foot mount HCF 015

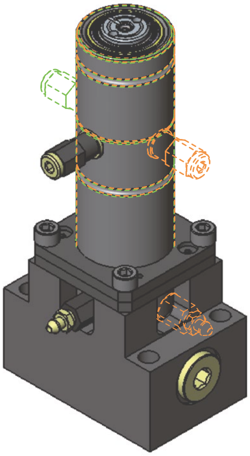
Order No. 3016977-015 (Mounts only)

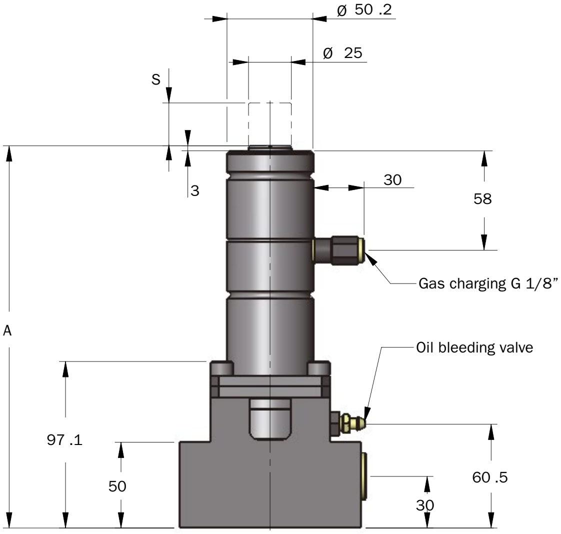


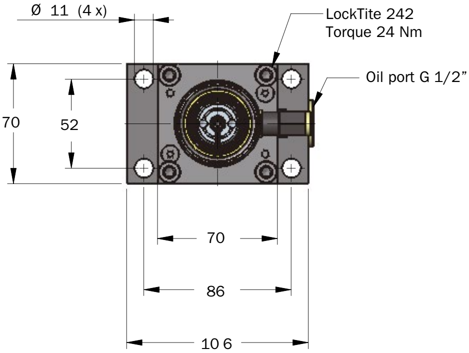


Model	A	B	C
HCF 015-025	173	214	192
HCF 015-050	223	264	242
HCF 015-100	323	364	342
HCF 015-150	423	464	442

HCF-SP 015 Force Cylinder with Side Port Plate





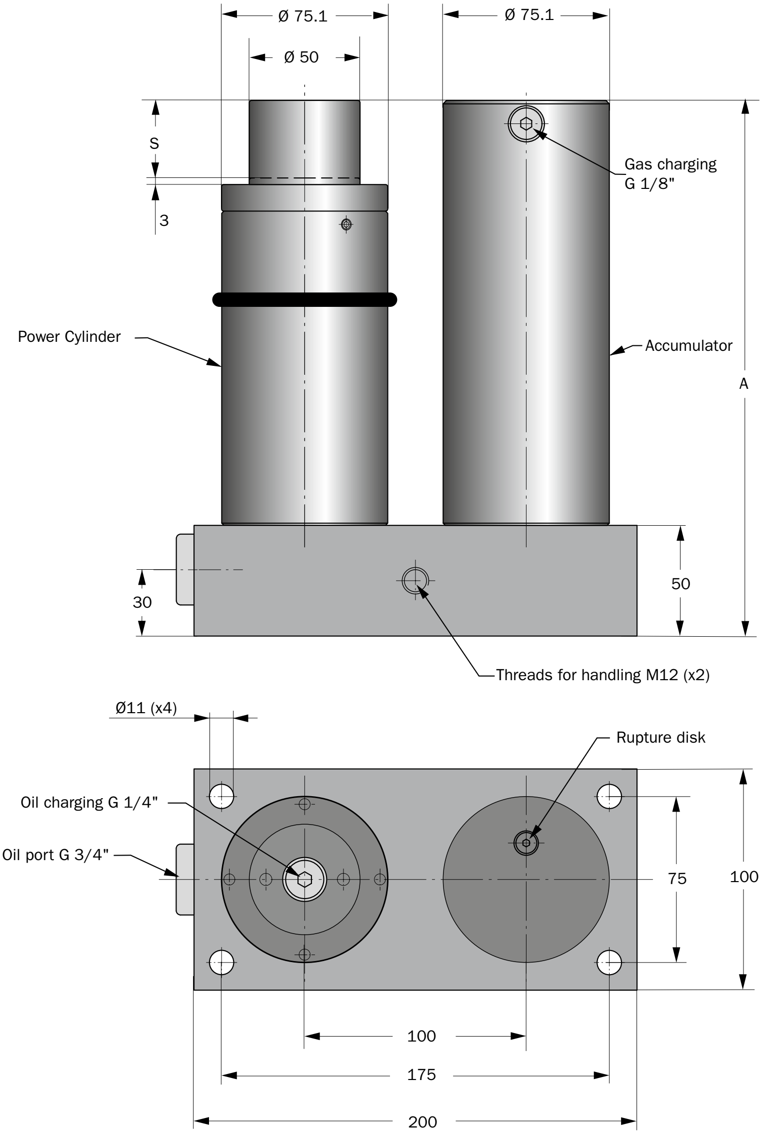


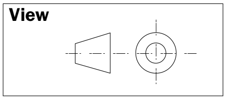
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 345.

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

*= Nominal force for the operation

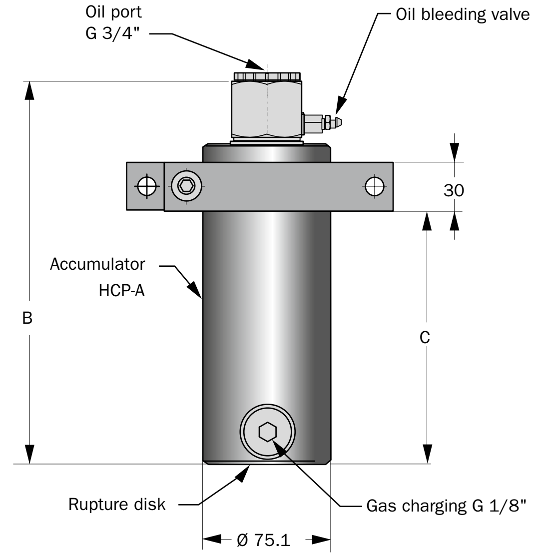
HCP 040 Power Unit

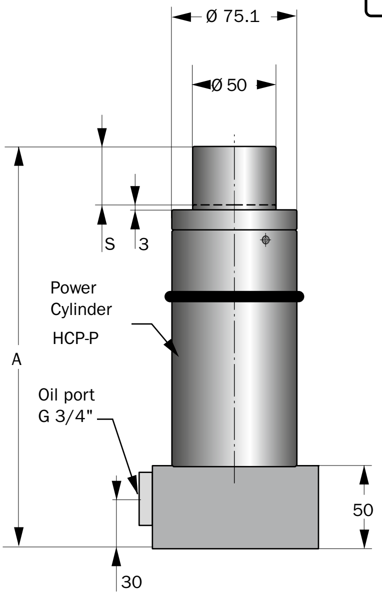


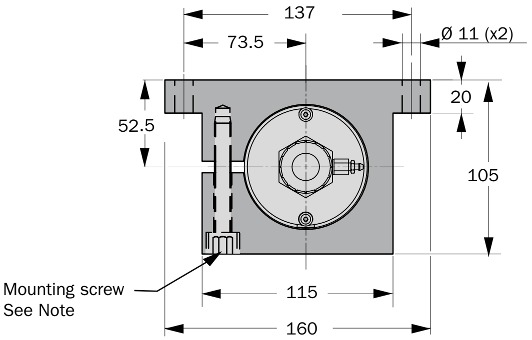


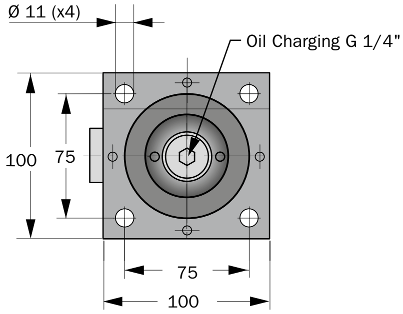
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 040-035	40	35	242	15.7
HCP 040-060	40	60	292	16.8
HCP 040-110	40	110	392	19.1
HCP 040-160	40	160	492	21.3

HCP-S 040 Power Unit, with Separate Accumulator

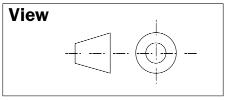








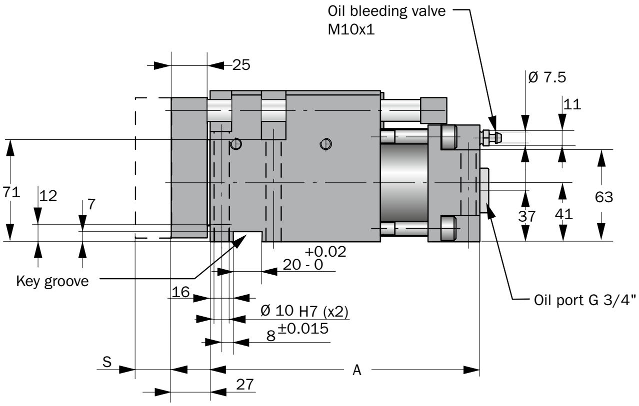
Note! The mounting screw (M10) should be tightened with torque 52 Nm.

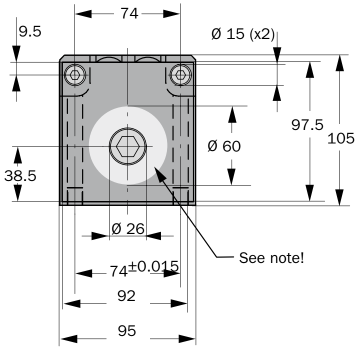


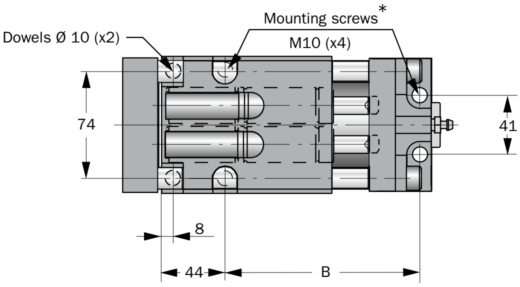
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 040 -035	14.0	40	35	242	231	152	HCP-P 040 -035	8.2	HCP-A 040 -035	5.8
HCP-S 040 -060	15.0	40	60	292	281	202	HCP-P 040 -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.

CC 040 Compact Cam





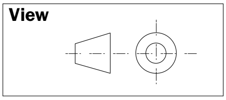


*4 pcs mounting screws are included

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 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 side load.

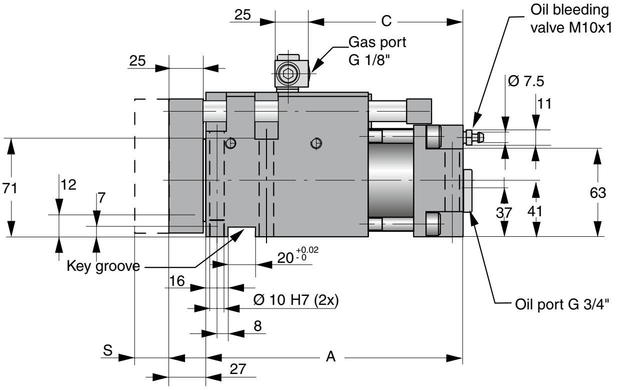


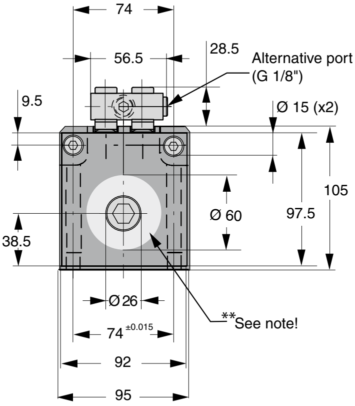
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 040-024	40	4	24	187	135	10.5
CC 040-049	40	4	49	212	160	12.8
CC 040-099	40	4	99	262	210	15.0
CC 040-124	40	4	124	287	235	16.5

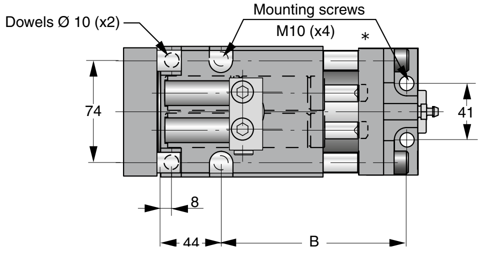
* = Nominal force available for the operation

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!
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 or punches will create during the operations within the area marked ▨ .

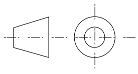
When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.

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.

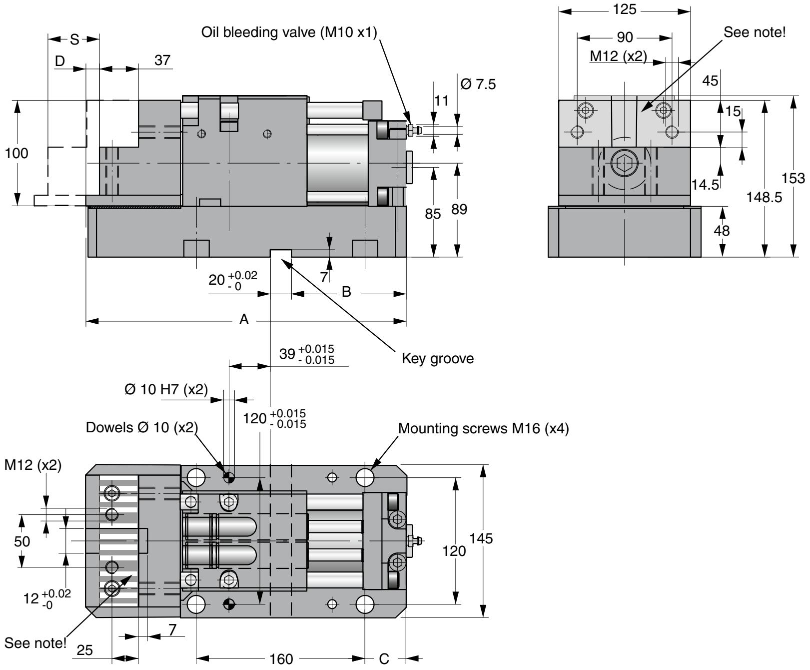
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 040-024	40	4	24	187	135	112	10.7
CC-H 040-049	40	4	49	212	160	162	13.0
CC-H 040-099	40	4	99	262	210	237	15.2
CC-H 040-124	40	4	124	287	235	262	16.7

* = Nominal force available for the operation

View



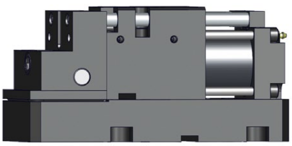
CCF 040 Flange Cam

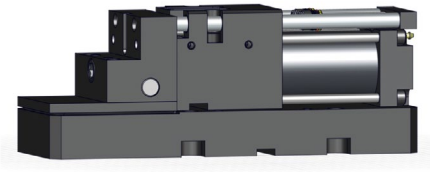


Note!

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.

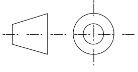




Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	D	Weight (kg)
CCF 040-049	40	4	49	304	109	39	13	35
CCF 040-099	40	4	99	404	159	89	63	43

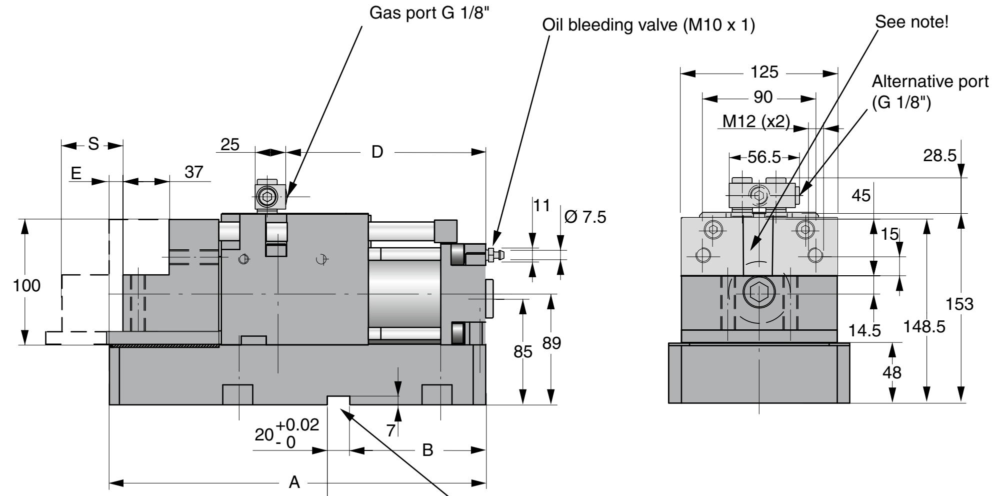
* = Nominal force available for the operation

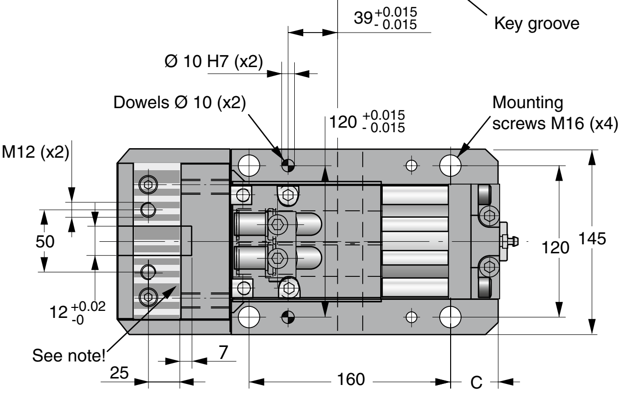
View



CCF-H 040 Flange Cam

This version can only be used together with a hose system as there are no gas charging valves in the springs or adapters



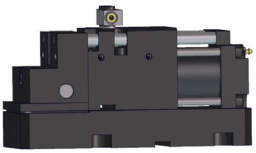


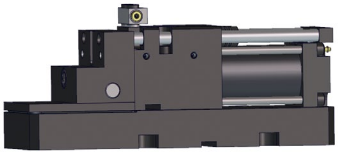
Note!

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.

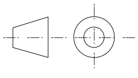




Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	D	E	Weight (kg)
CCF-H 040-049	40	4	49	304	109	39	162	13	35
CCF-H 040-099	40	4	99	404	159	89	237	63	43

* = Nominal force available for the operation

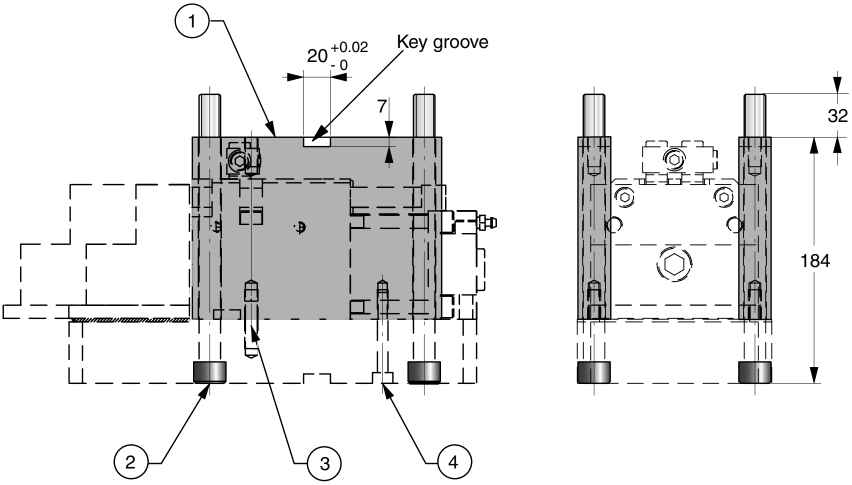
View

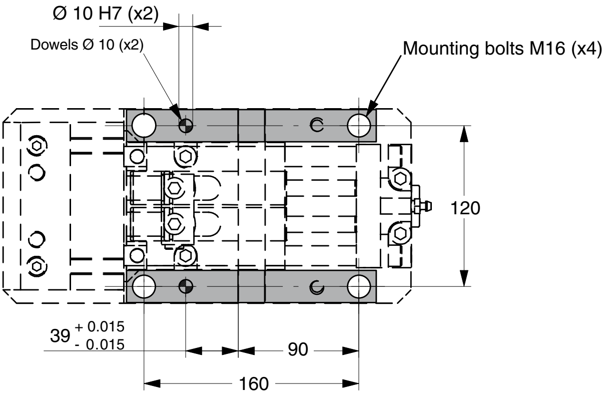


Top mount kit for Flange Cam

CCF 040-049 and CCF-H 040-049
CCF 040-099 and CCF-H 040-099

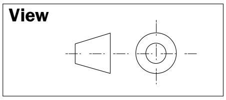
(Order No. 2018393)



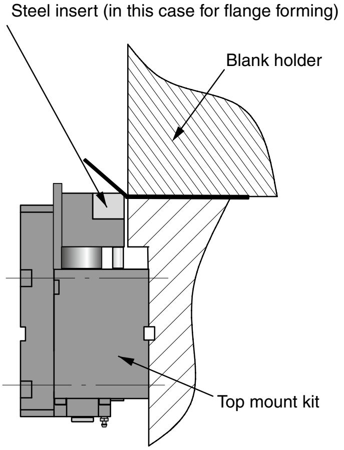


Position	Quantity	Description
1	2	Spacer
2	4	Bolt M16 x 200
3	2	Dowel pin Ø 10 x 40
4	2	Bolt M8 x 60

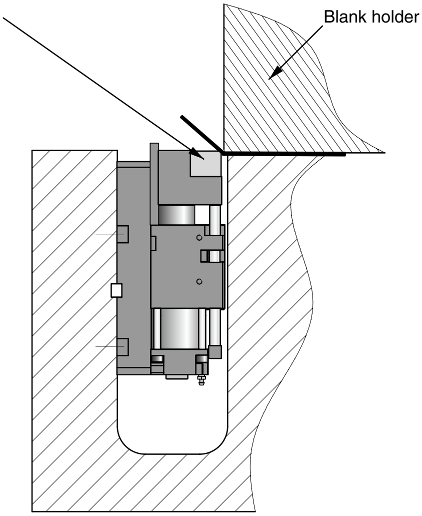
* = Nominal force available for the operation



Flange Cam installation possibilities

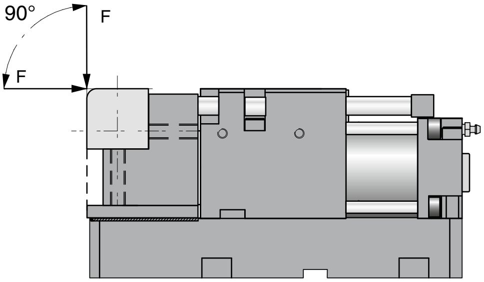


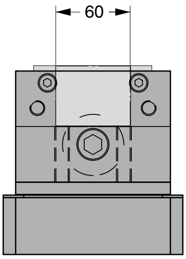
Top mount



Base mount

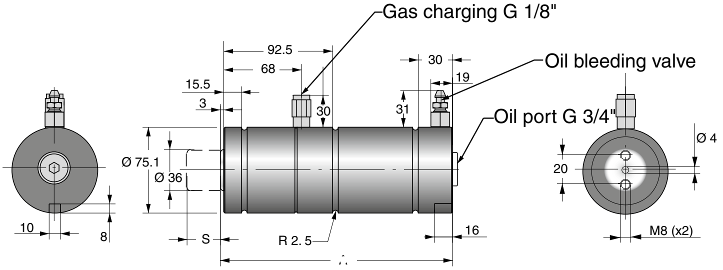
Flange Cam force directions and location





Allowable force directions "F" (within ░) created by the flanging operation.

HCF 040 Force Cylinder

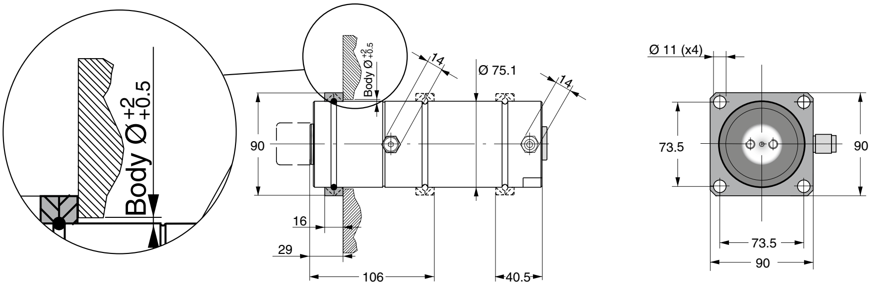


Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 040-025	40	4	25	195	5.5
HCF 040-050	40	4	50	245	6.5
HCF 040-100	40	4	100	345	8.6
HCF 040-150	40	4	150	445	10.7

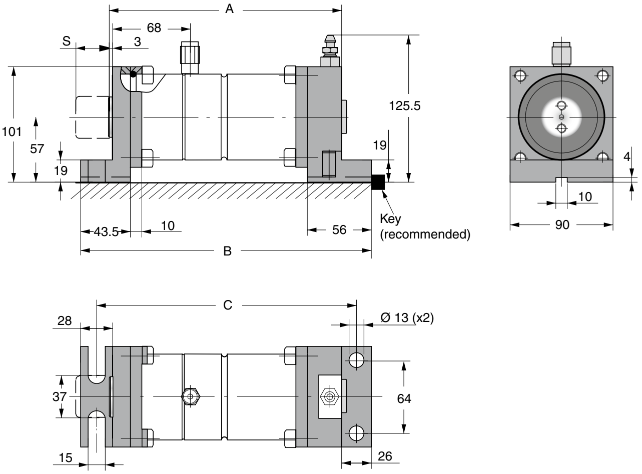
* = Nominal force for the operation

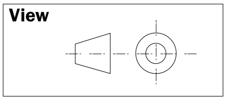
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 345.

Flange mount for HCF 040 **Order No. 2014677-1500 (Mount only)**



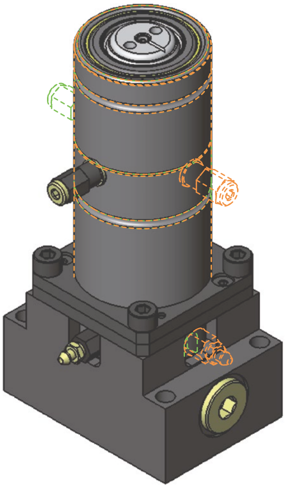
Foot mount for HCF 040 **Order No. 3016977-040 (Mounts only)**

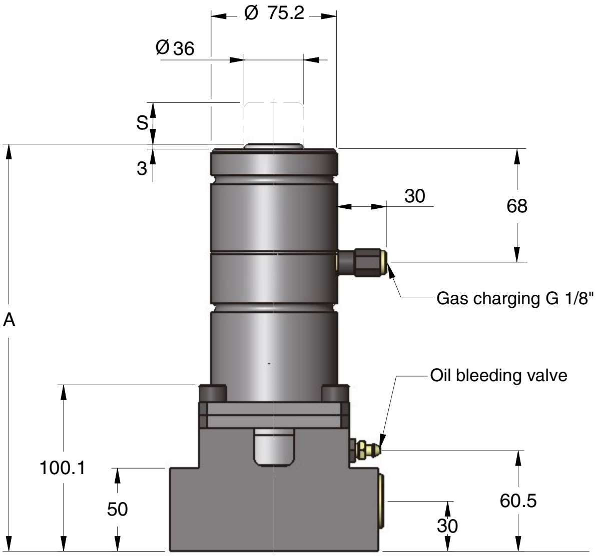


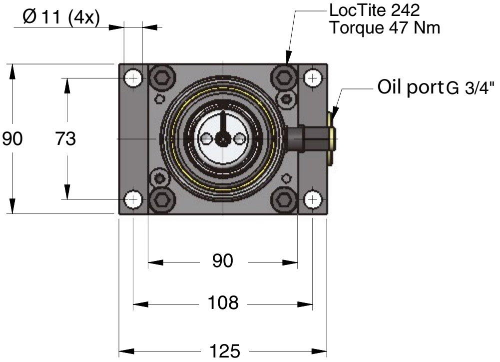


Model	A	B	C
HCF 040-025	195	246	219
HCF 040-050	245	296	269
HCF 040-100	345	396	369
HCF 040-150	445	496	469

HCF-SP 040 Force Cylinder with Side Port Plate





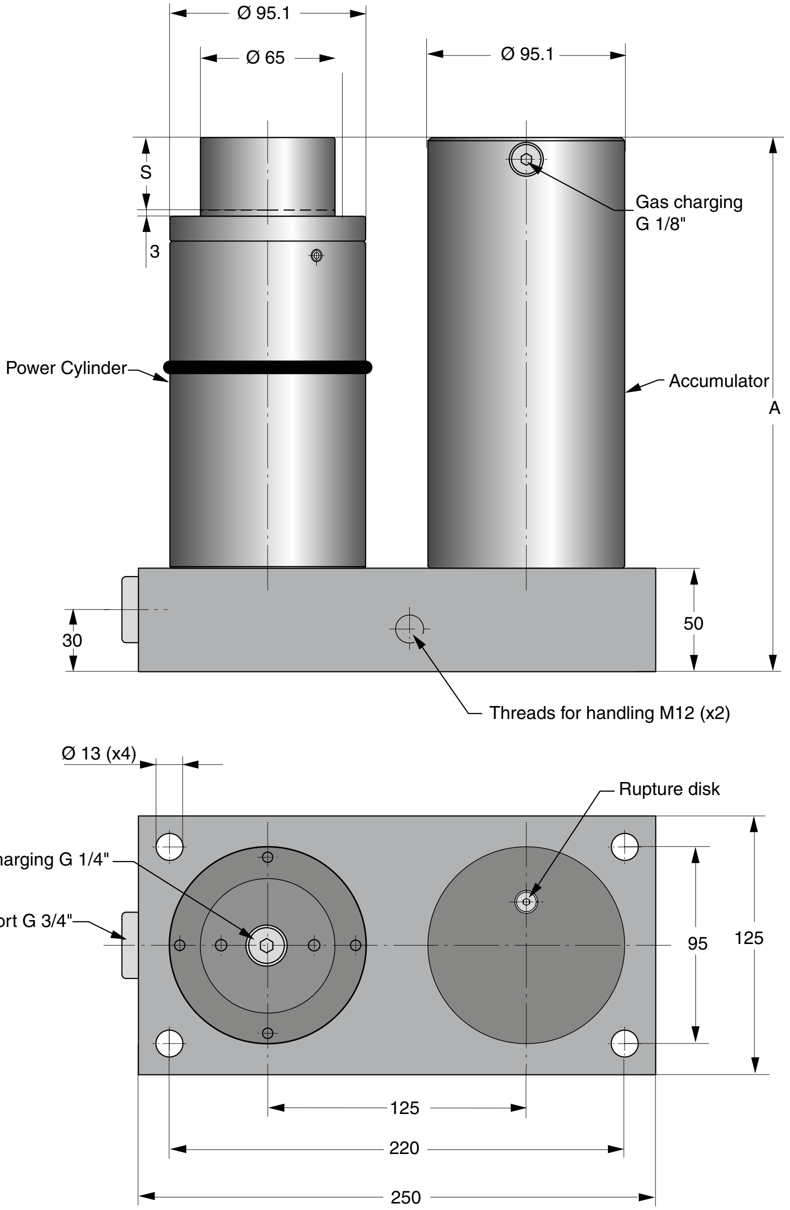


Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF-SP 040-025	40	4	25	245	10.3
HCF-SP 040-050	40	4	50	295	11.3
HCF-SP 040-100	40	4	100	395	13.4
HCF-SP 040-150	40	4	150	495	15.4

*= Nominal force for the operation

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 345.

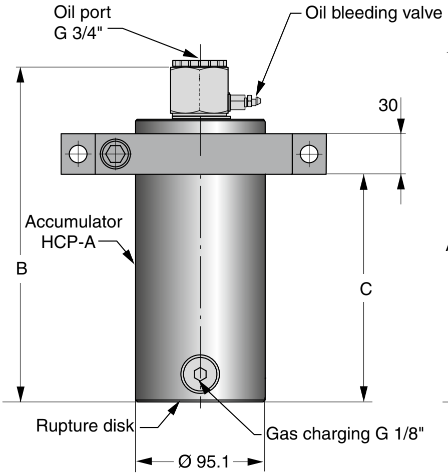
HCP 060 Power Unit

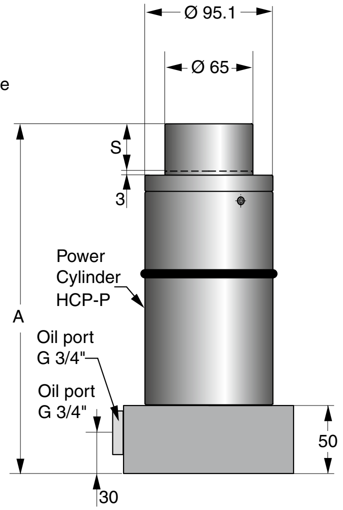


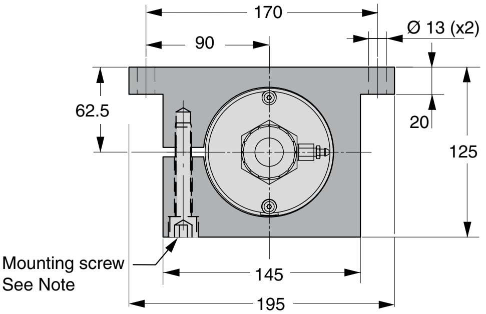
Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 060-035	60	35	258	26.7
HCP 060-060	60	60	308	28.4
HCP 060-110	60	110	408	32.2
HCP 060-160	60	160	508	35.9

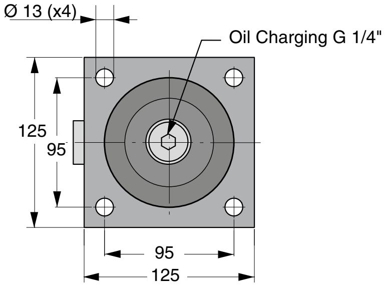
View

HCP-S 060 Power Unit, with Separate Accumulator

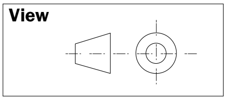








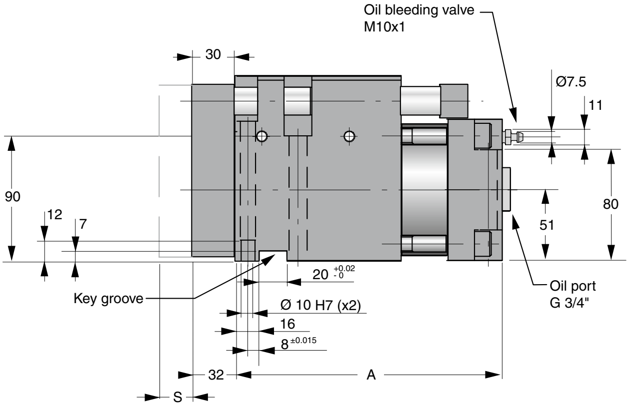
Note! The mounting screw (M12) should be tightened with torque 91Nm

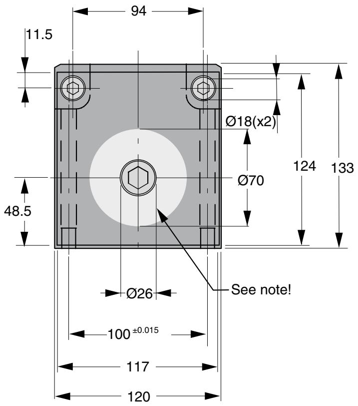


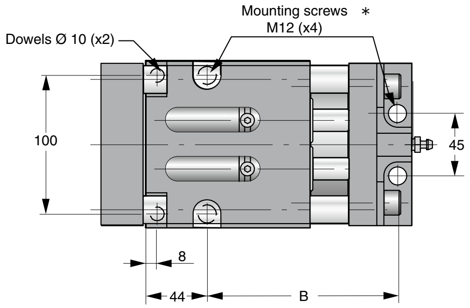
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 060 -035	23.9	60	35	258	247	168	HCP-P 060 -035	13.9	HCP-A 060 -035	10.0
HCP-S 060 -060	25.7	60	60	308	297	218	HCP-P 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





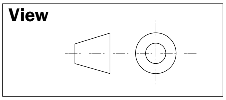


*4 pcs mounting screws are included

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 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 side load.

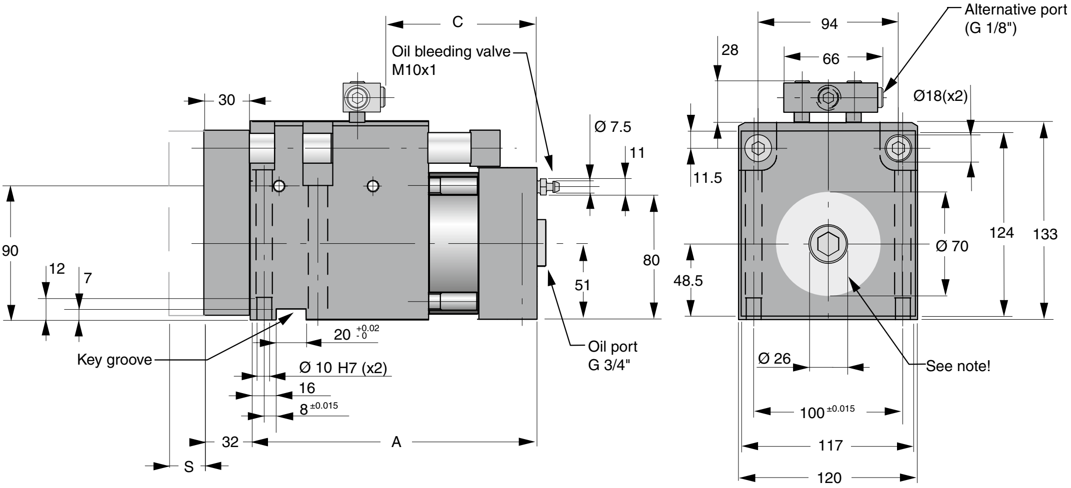


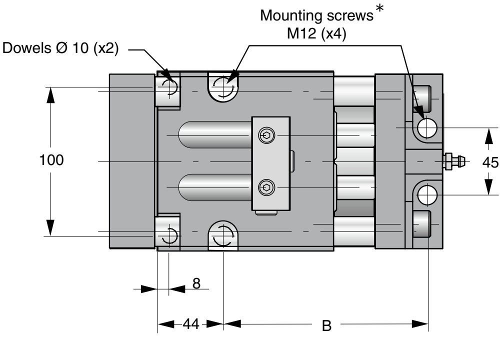
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 060-024	60	7	24	191	137	22.3
CC 060-049	60	7	49	216	162	23.4
CC 060-099	60	7	99	266	212	26.0

* = Nominal force available for the operation

CC-H 060 Compact Cam for pressure control

This version can only be used together with a hose system as there are no gas charging valve in the springs or adapters



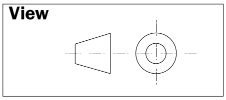


*4 pcs mounting screws are included

Note!
Important installation information:

We recommend locating the punch in the center 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 ▨ .

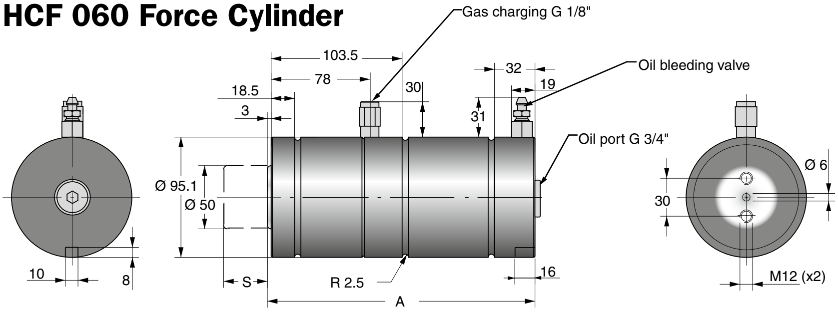
When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.



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

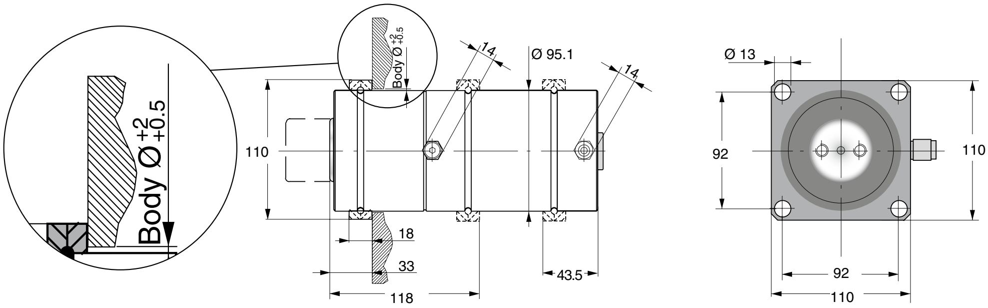


Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF 060-025	60	6	25	211	9.8
HCF 060-050	60	6	50	261	11.6
HCF 060-100	60	6	100	361	15.1
HCF 060-150	60	6	150	461	18.6

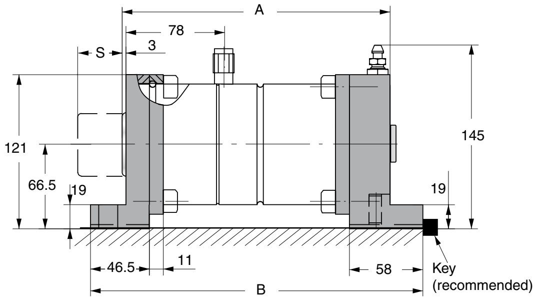
* = Nominal force available for the operation

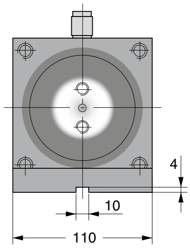
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 345.

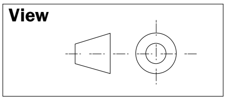
Flange mount for HCF 060 **Order No. 2014677-3000 (Mount only)**

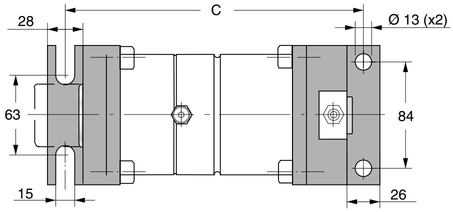


Foot mount for HCF 060 **Order No. 3016977-060 (Mounts only)**



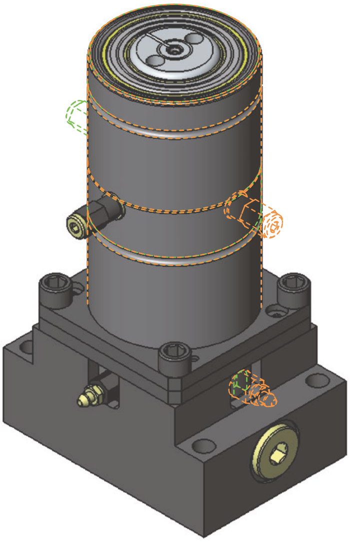


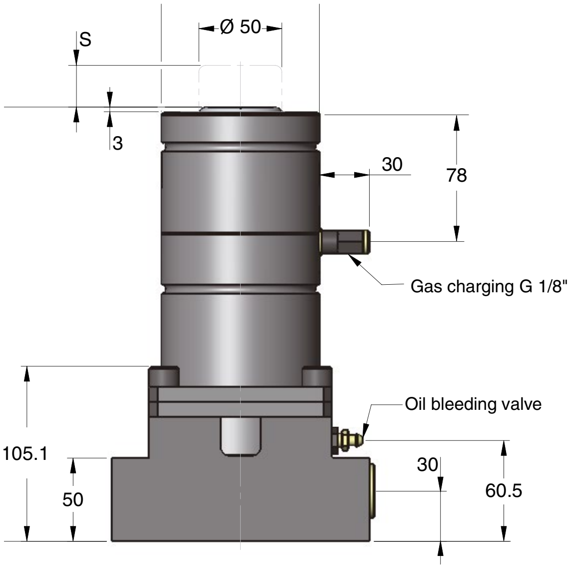


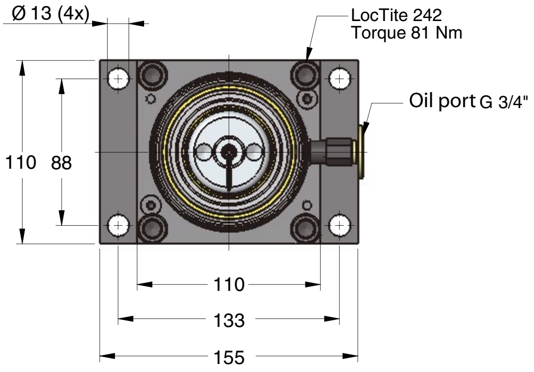


Model	A	B	C
HCF 060-025	211	262	235
HCF 060-050	261	312	285
HCF 060-100	361	412	385
HCF 060-150	461	512	485

HCF-SP 060 Force Cylinder with Side Port Plate





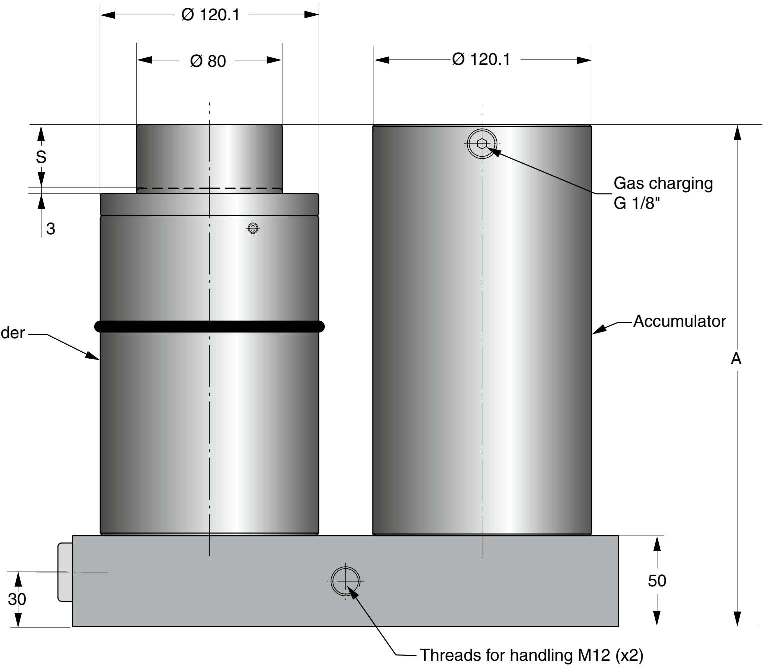


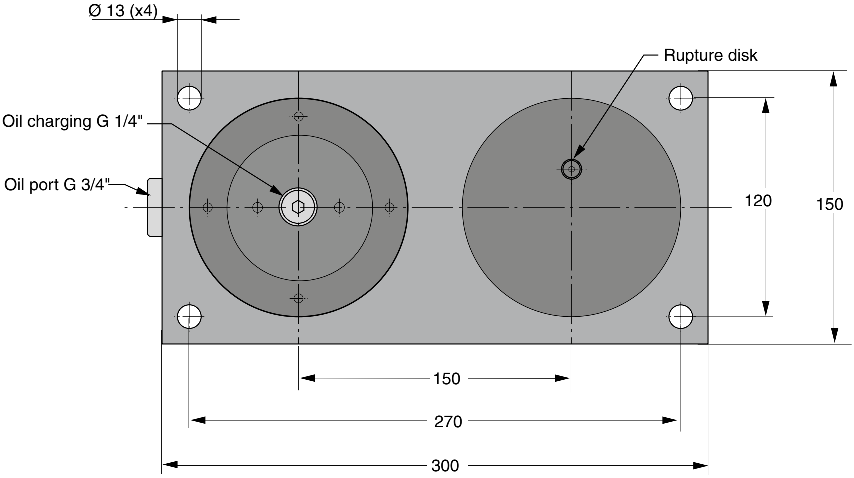
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 060-025	60	6	25	261	17.4
HCF-SP 060-050	60	6	50	311	19.2
HCF-SP 060-100	60	6	100	411	22.7
HCF-SP 060-150	60	6	150	511	26.2

*= Nominal force for the operation

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 345.

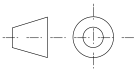
HCP 090 Power Unit



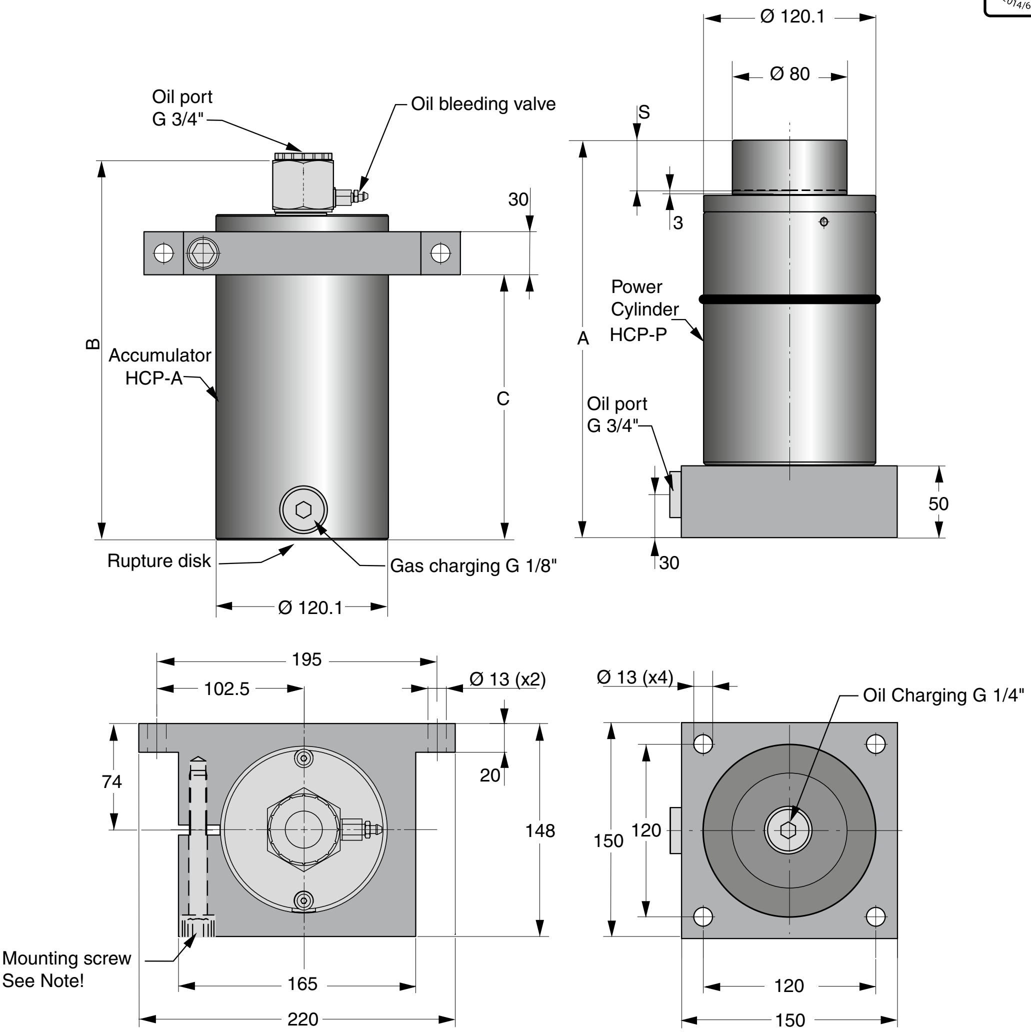


Order No.	Force (kN)	Stroke S (mm)	A	Weight (kg)
HCP 090-035	90	35	276	43.1
HCP 090-060	90	60	326	46.1
HCP 090-110	90	110	426	52.1
HCP 090-160	90	160	526	52.8

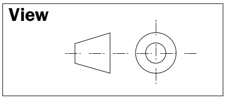
View



HCP-S 090 Power Unit, with Separate Accumulator



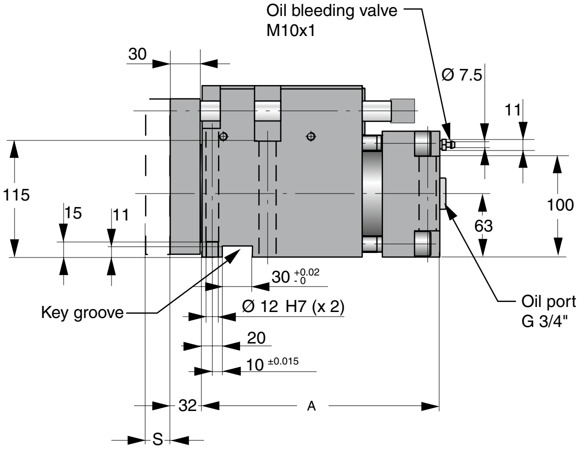
Note! The mounting screw (M12) should be tightened with torque 91Nm

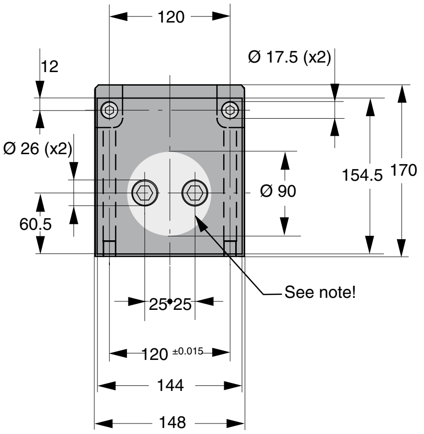


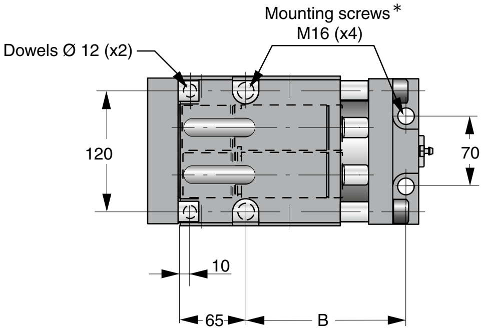
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 090 -035	38.3	90	35	276	265	186	HCP-P 090 -035	22.6	HCP-A 090 -035	15.7
HCP-S 090 -060	41.2	90	60	326	315	236	HCP-P 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

Note! The Accumulator should always be used in the system.

CC 090 Compact Cam







*4 pcs mounting screws are included

Note!
Important installation information:

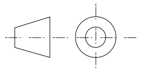
We recommend locating the punch in the center of the piston rod, but it is also possible to locate the force which the punch or punches will create during the operations within the area marked ▨ .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.

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

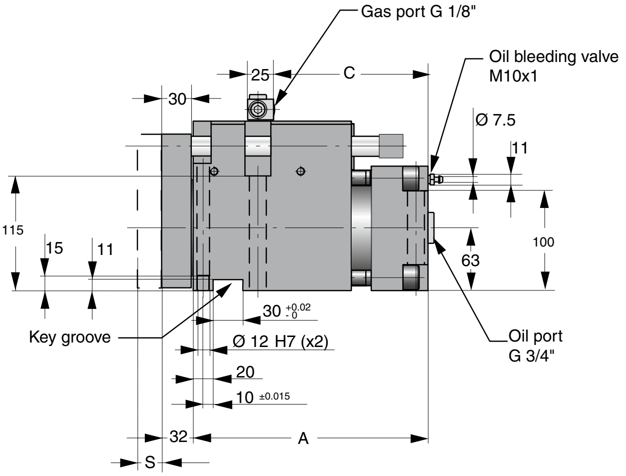
* = Nominal force available for the operation

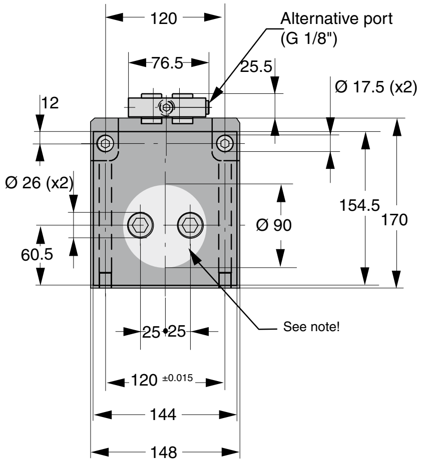
View

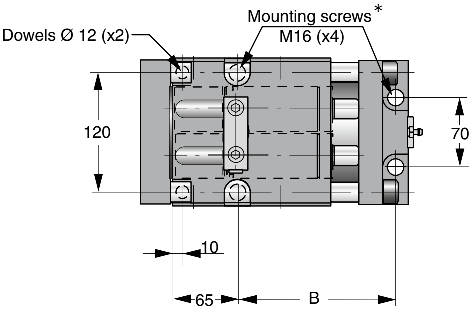


CC-H 090 Compact Cam for pressure control

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!
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 or punches will create during the operations within the area marked ▢ .

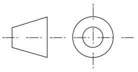
When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.

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.

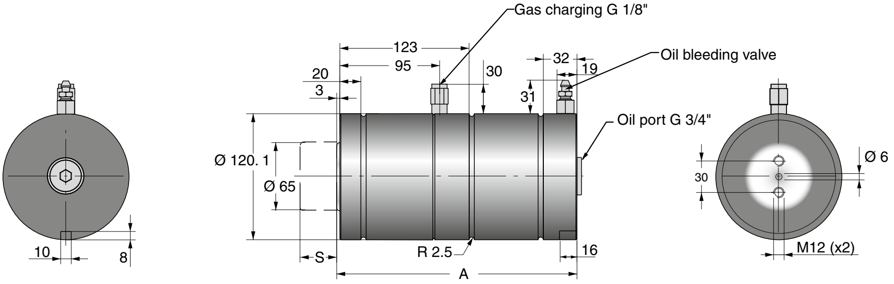
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 090-024	90	10	24	236	159	158	33.7
CC-H 090-049	90	10	49	261	184	208	39.7
CC-H 090-099	90	10	99	311	234	283	44.9

* = Nominal force available for the operation

View



HCF 090 Force Cylinder

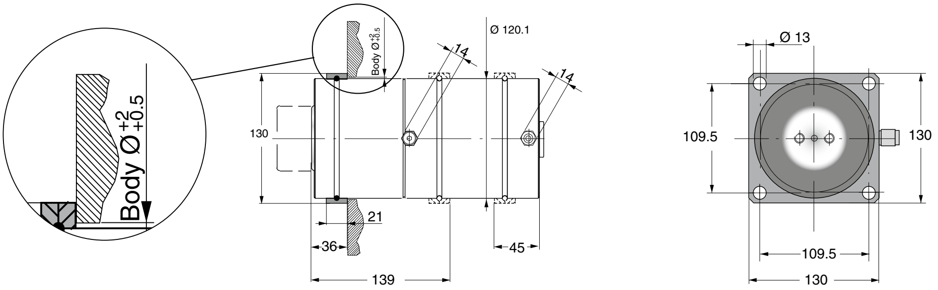


Order No.	Working force* (kN)	Return force* (kN)	Stroke S (mm)	A	Weight (kg)
HCF 090-025	90	9	25	229	15.8
HCF 090-050	90	9	50	279	18.7
HCF 090-100	90	9	100	379	24.5
HCF 090-150	90	9	150	479	30.3

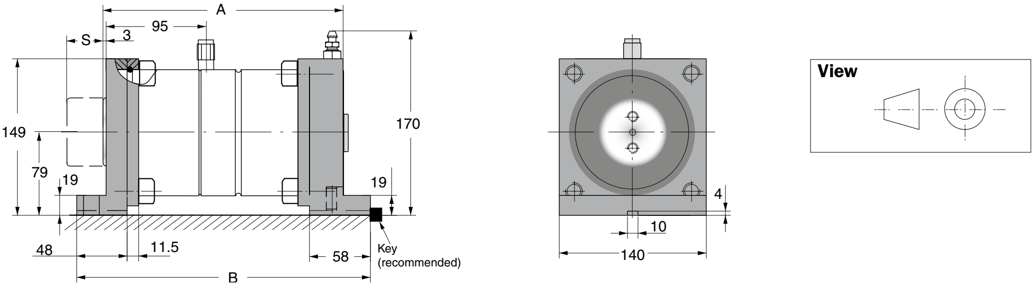
Note: External stop is recommended for the tool (5-10 mm above cylinder) to avoid high load on the cylinder during the return stroke. See picture on page 345.

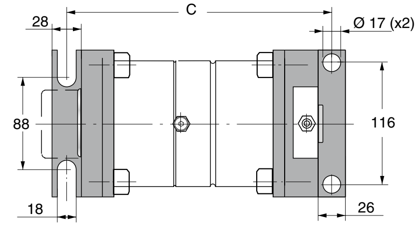
* = Nominal force for the operation

Flange mount for HCF 090 Order No. 2014677-5000 (Mount only)



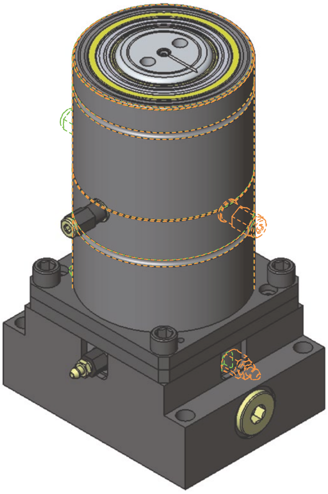
Foot mount for HCF 090 Order No. 3016977-090 (Mounts only)

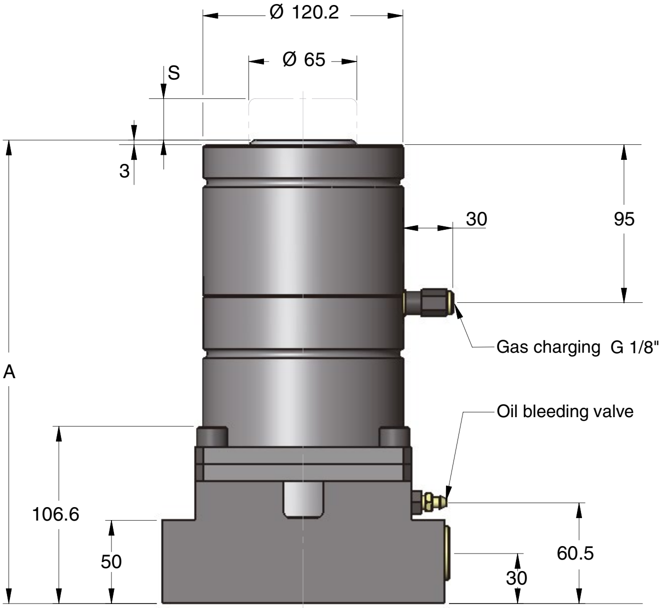


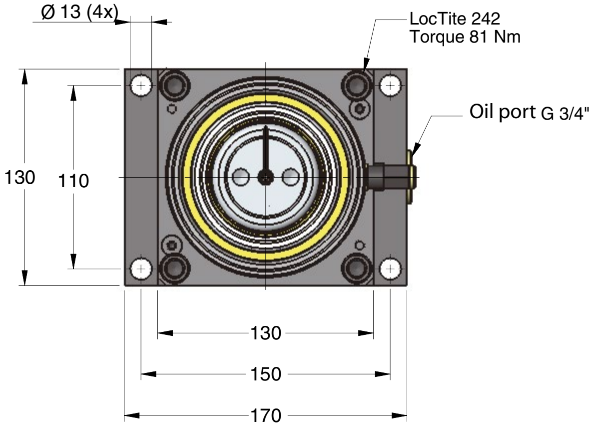


Model	A	B	C
HCF 090-025	229	280	254
HCF 090-050	279	330	304
HCF 090-100	379	430	404
HCF 090-150	479	530	504

HCF-SP 090 Force Cylinder with Side Port Plate





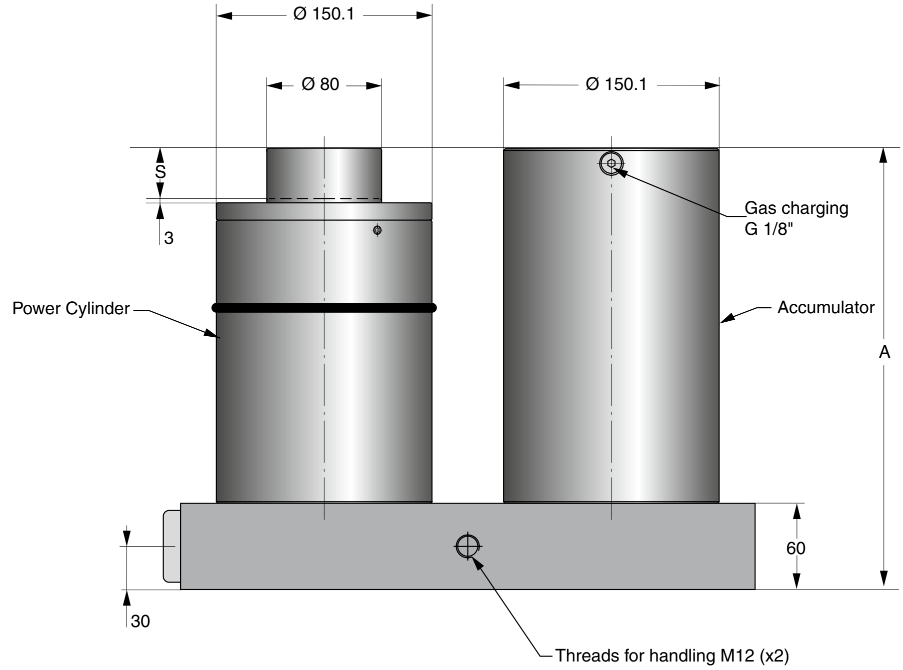


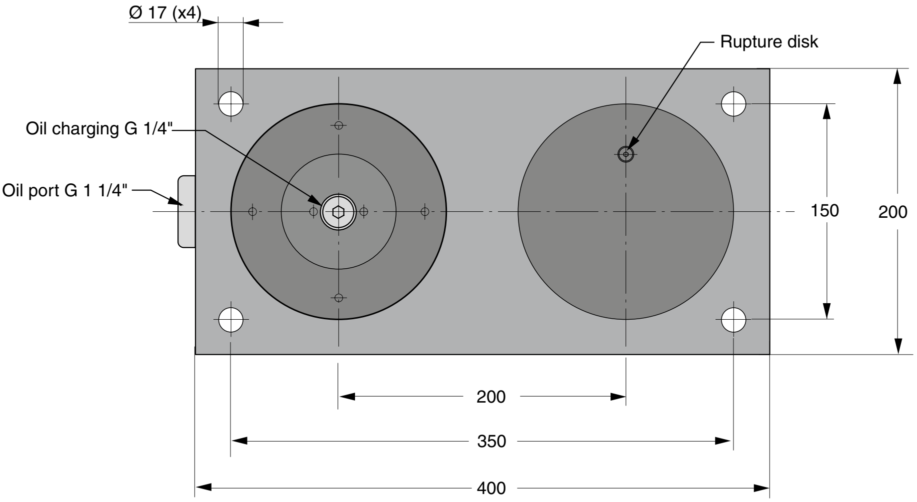
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight (kg)
HCF-SP 090-025	90	9	25	279	28
HCF-SP 090-050	90	9	50	329	30.9
HCF-SP 090-100	90	9	100	429	36.8
HCF-SP 090-150	90	9	150	529	42.6

* = Nominal force for the operation

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 345.

HCP 150 Power Unit

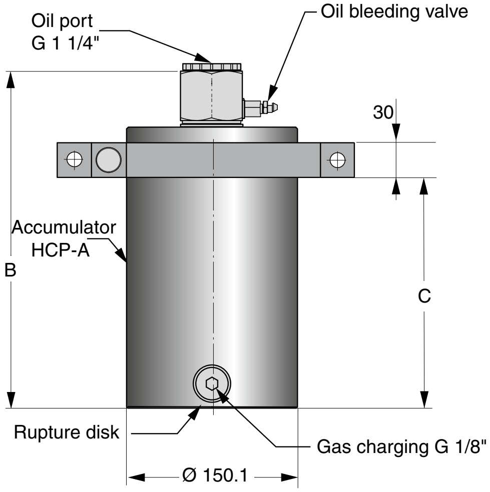


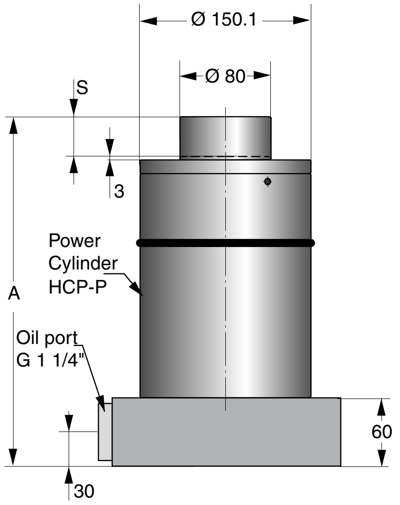


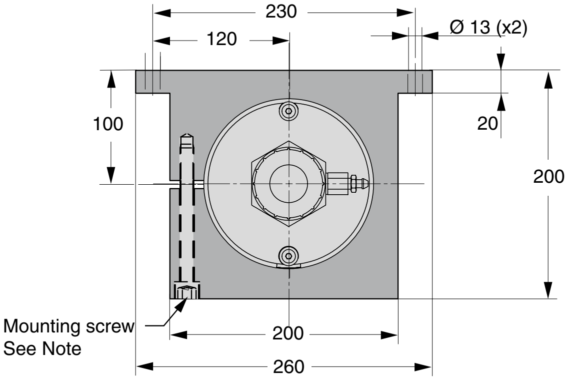
Order No.	Force (kN)	Stroke (mm)	A	Weight (kg)
HCP 150-035	150	35	307	83.1
HCP 150-060	150	60	357	87.7
HCP 150-110	150	110	457	97.0
HCP 150-160	150	160	557	106.3

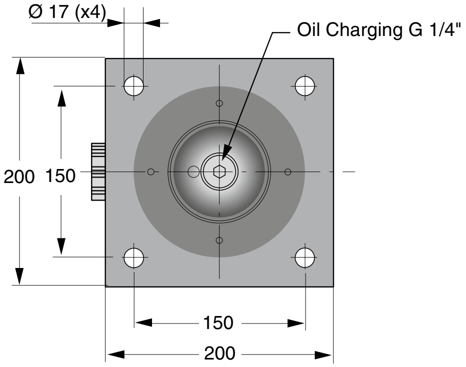
View

HCP-S 150 Power Unit, with Separate Accumulator

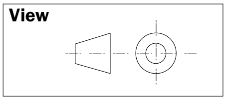








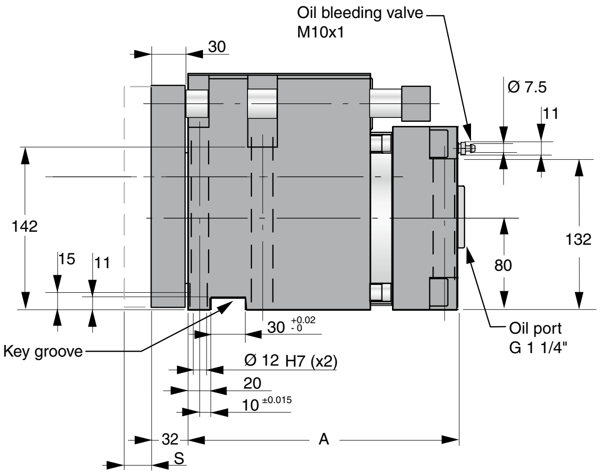
Note!
The mounting screw (M12) should be tightened with torque 91Nm

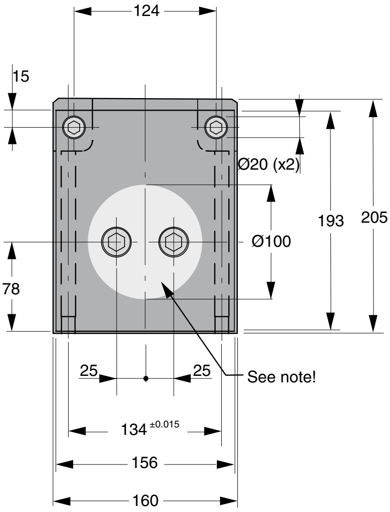


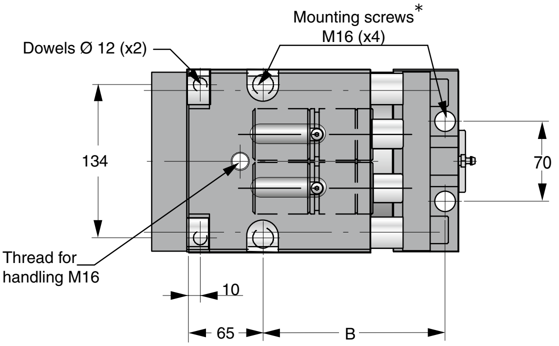
Order No. Complete Power Unit HCP-S	Weight (kg)	Force (kN)	Stroke S (mm)	A	B	C	Order No. Separate Power Cylinder HCP-P	Weight (kg)	Order No. Separate Accumulator HCP-A	Weight (kg)
HCP-S 150 -035	71.1	90	35	307	294	207	HCP-P 150 -035	43.6	HCP-A 150 -035	27.7
HCP-S 150 -060	75.5	90	60	357	344	257	HCP-P 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.

CC 150 Compact Cam





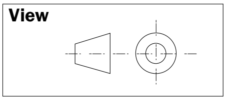


*4 pcs mounting screws are included

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 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 side load.

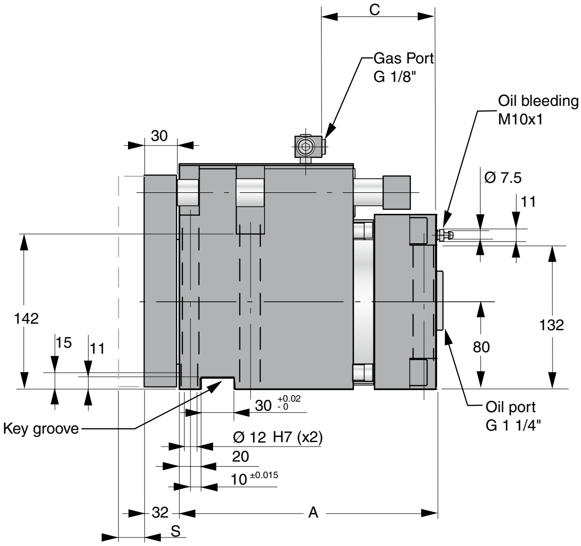


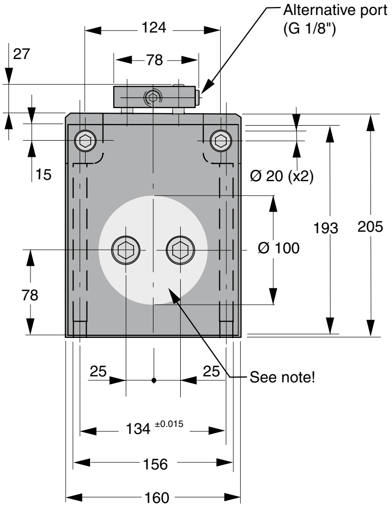
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	Weight (kg)
CC 150-024	150	15	24	236	159	57.7
CC 150-049	150	15	49	261	184	60.0
CC 150-099	150	15	99	311	234	65.6

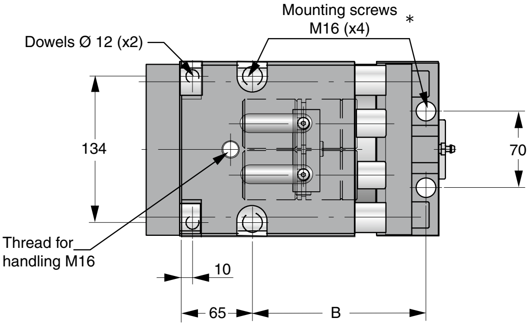
* = Nominal force available for the operation

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







*4 pcs mounting screws are included

Note!
Important installation information:

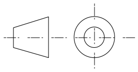
We recommend locating the punch in the center of the piston rod, but it is also possible to locate the force which the punch or punches will create during the operations within the area marked ▨ .

When piercing an opened hole or cutting an edge we recommend that extra guiding is used to prevent the unit against side load.

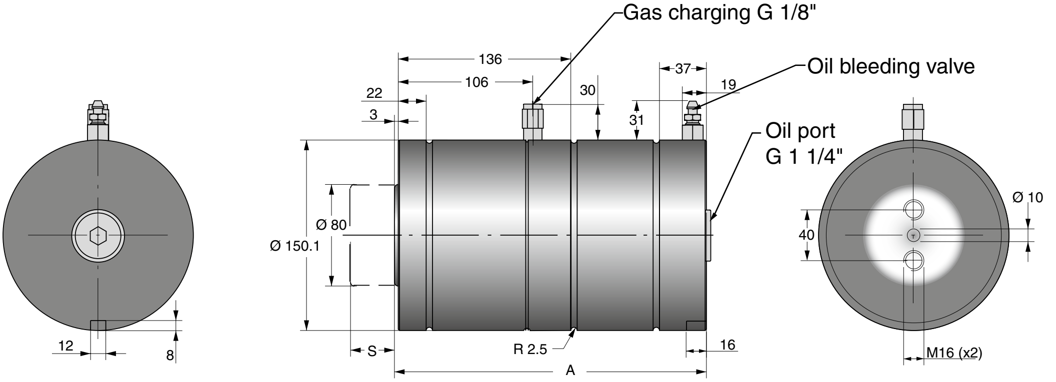
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	B	C	Weight (kg)
CC-H 150-024	150	15	24	236	159	109	57.9
CC-H 150-049	150	15	49	261	184	159	60.2
CC-H 150-099	150	15	99	311	234	234	65.8

* = Nominal force available for the operation

View



HCF 150 Force Cylinder

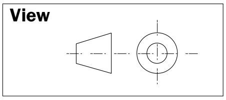


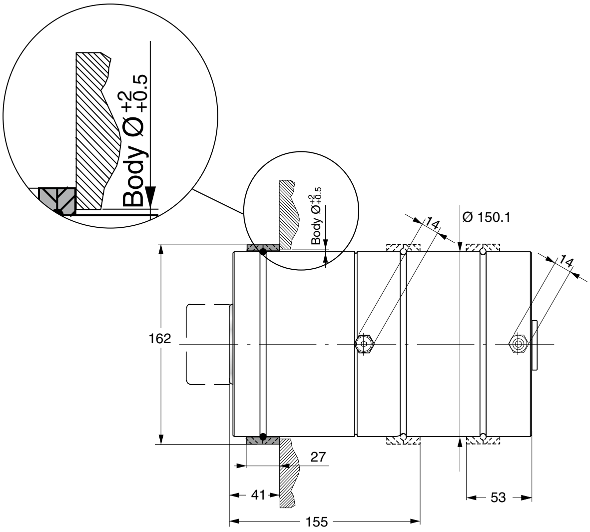
Order No.	Working force* (kN)	Return force* (kN)	Stroke S (mm)	A	Weight (kg)
HCF 150-025	150	30	25	250	30.1
HCF 150-050	150	30	50	300	34.7
HCF 150-100	150	30	100	400	43.7
HCF 150-150	150	30	150	500	52.7

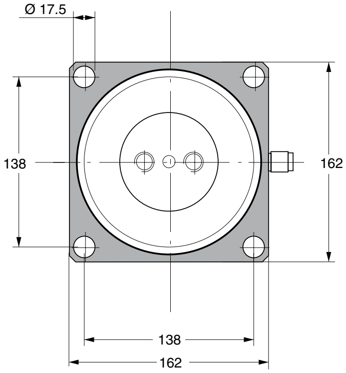
* = Nominal force for the operation

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 345.

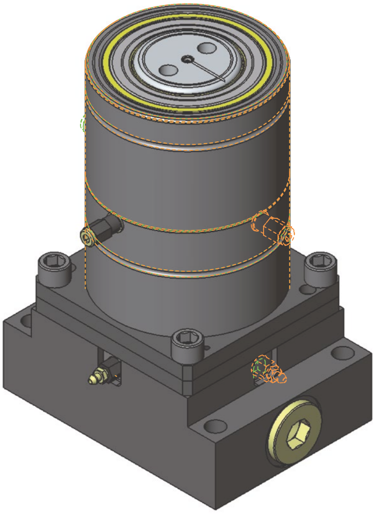
Flange mount for HCF 150 Order No. 2014677-7500

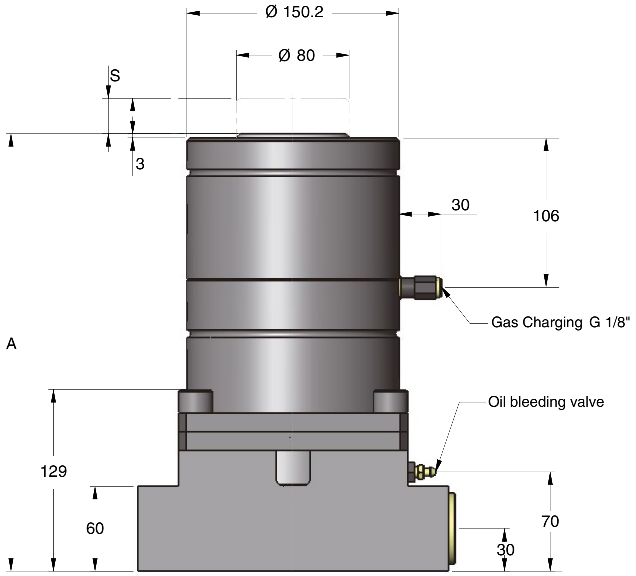


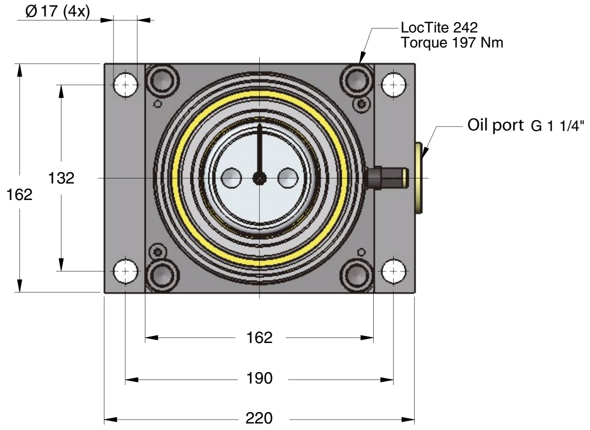




HCF-SP 150 Force Cylinder with Side Port Plate







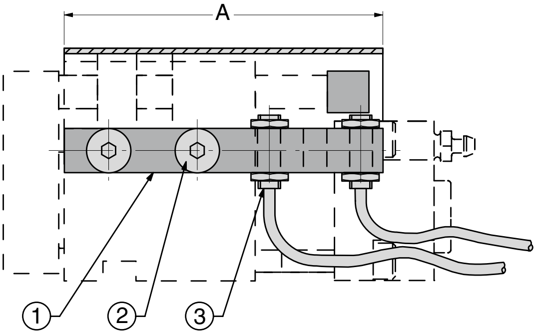
Order No.	Working force* (kN)	Return force (kN)	Stroke S (mm)	A	Weight [kg]
HCF-SP 150-025	150	14	25	310	48.6
HCF-SP 150-050	150	14	50	360	53.2
HCF-SP 150-100	150	14	100	460	62.2
HCF-SP 150-150	150	14	150	560	71.1

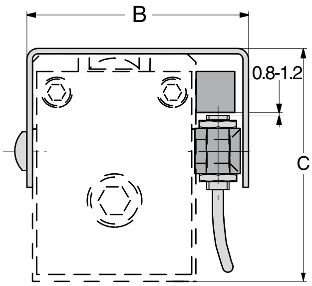
* = Nominal force for the operation

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 345.

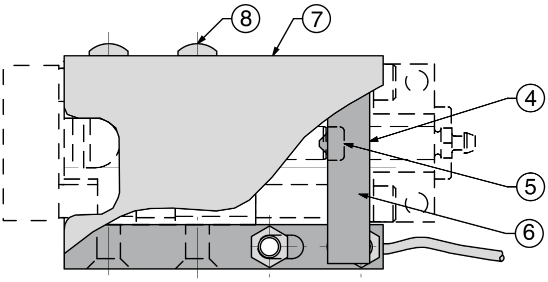
Dimensions for accessories

Sensor kit, option for Compact Cam, CC and CC-H



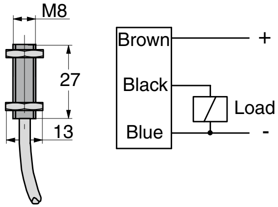


(See note!)



2 pcs Sensors

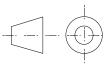
Order No. 503550 (sold separately)



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.

View

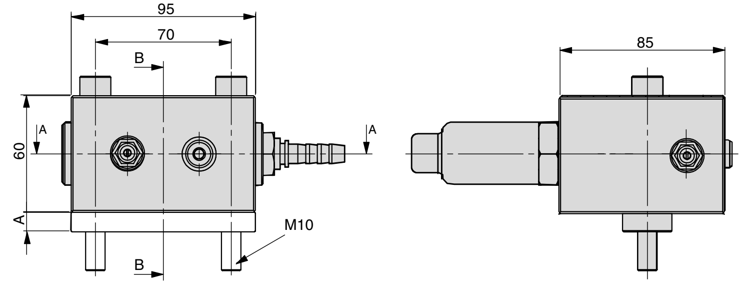


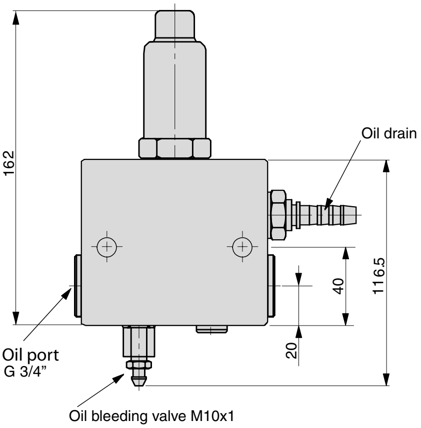
Compact Cam	Sensor kit Order No.	A	B	C
CC 015-024	30 182 08 -01	115	81	84
CC 015-049	30 182 08 -02	165	81	84
CC 040-024	30 182 08 -03	168	117	107
CC 040-049	30 182 08 -04	193	117	107
CC 040-099	30 182 08 -05	271	117	107
CC 040-124	30 182 08 -15	321	117	107
CC 060-024	30 182 08 -09	171	142	135
CC 060-049	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

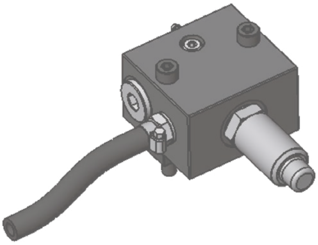
Sensor kit contents list

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

Security Block according to CNOMO-Standard

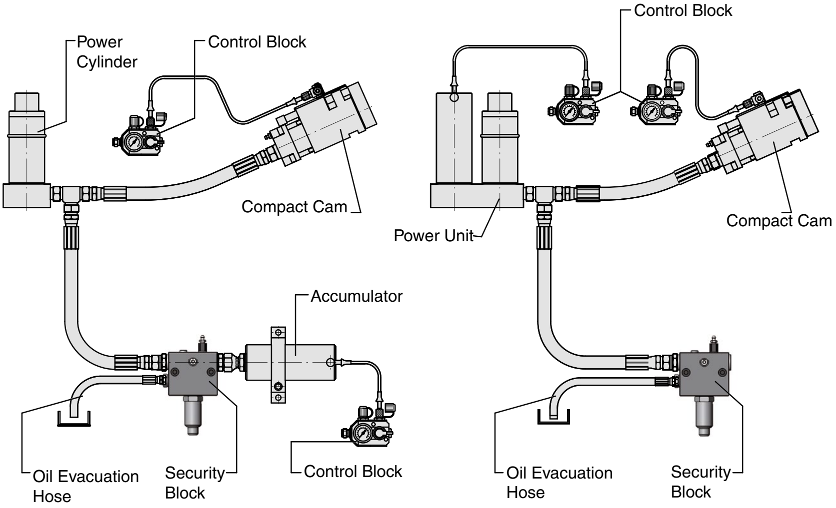






Order No.	Size	A*
3020008-015	015	10
3020008-040	040	22.5
3020008-060	060	32.5
3020008-090	090	44
3020008-150	150	70

*To be used when directly connected to the accumulator, see below.



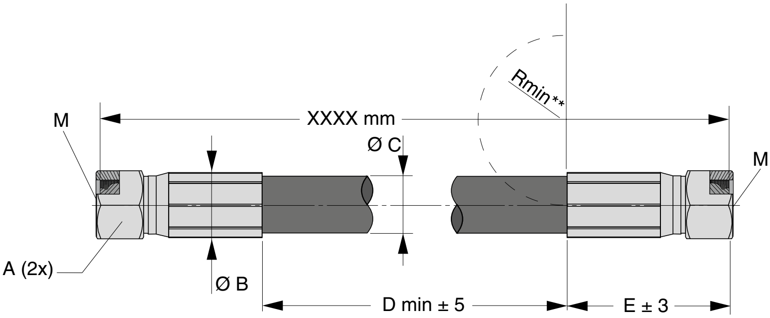
System hoses

E024-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:

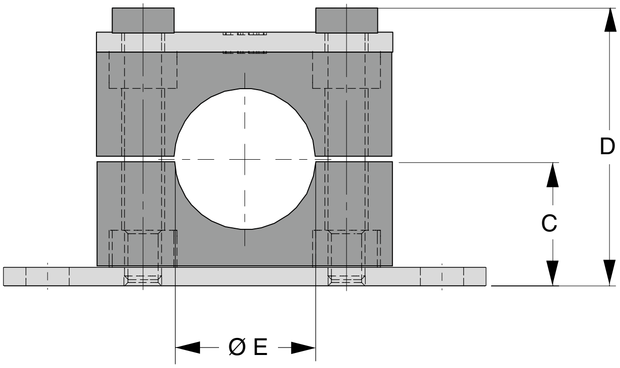
Power Unit	Standard hose size Max velocity 0.8 m/s	0.6 m/s	0.4 m/s	0.2 m/s
HCP 015	1/2”	3/8”	3/8”	3/8”
HCP 040	3/4”	3/4”	1/2”	1/2”
HCP 060	1”	3/4”	3/4”	1/2”
HCP 090	1”	1”	3/4”	1/2”
HCP 150	1 1/4”	1 1/4”	1”	3/4”

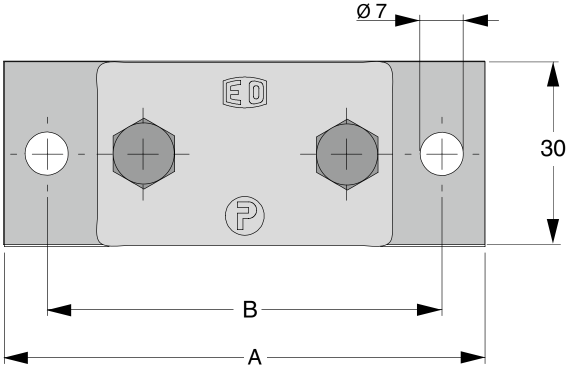
Additional Parker hose info:

Hose size	Inner Ø	Outer Ø	Hose	Max working pressure	Min burst pressure	Hose fitting
3/8”	10	20	722ST-6	280 bar	1120 bar	1C943-12-6
1/2”	12.5	24	722ST-8	280 bar	1120 bar	1C943-16-8
3/4”	19	31	722ST-12	280 bar	1120 bar	1C943-20-12
1”	25	38	722ST-16	280 bar	1120 bar	1C943-25-16
1 1/4””	31.8	47	487ST-20	210 bar	840 bar	1C977-30-20

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® .

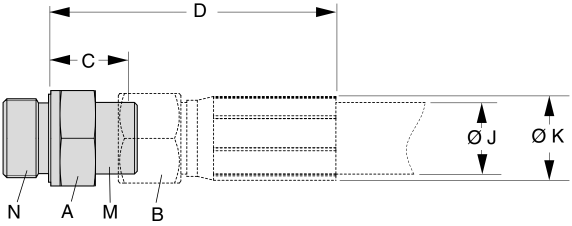
Hose Clamp





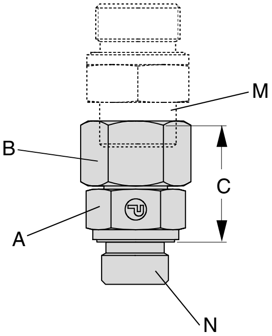
Hose size	Order No.	A	B	C	D	Ø E
3/8”	504613	78	64	20	44	20
1/2”	504614	78	64	20	44	24
3/4””	504615	87	73	24	51	31
1”	504616	100	86	32	67	38
1 1/4””	504617	116	100	36	75	47

Male Stud Connector



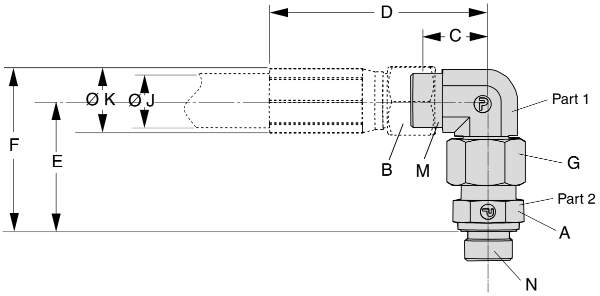
Hose size	Thread M	Thread N	Order No.	A	B	C	D	ØJ	ØK
3/8"	M 20x1.5	G 1/2"	504598	27	24	18	74	20	24.5
1/2"	M 24x1.5	G 1/2"	504321	27	30	19	82	24	30
1/2"	M24x1.5	G 3/4"	504322	32	30	21	84	24	30
3/4"	M30x2	G 1/2"	504323	32	36	21	93	31	37
3/4"	M30x2	G 3/4"	504324	32	36	21	93	31	37
3/4"	M30x2	G 1 1/4"	504325	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



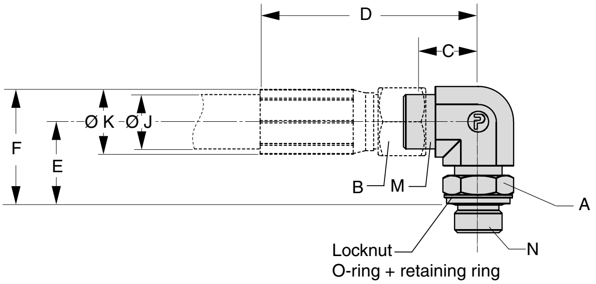
Thread M	Thread N	Order No.	A	B	C
M 20x1.5	G 1/2"	504608	27	24	35
M 24x1.5	G 1/2"	504609	27	30	37
M 30x2	G 3/4"	504610	32	36	43
M 36x2	G 1"	504611	41	46	48
M 42x2	G 1 1/4"	504612	50	50	51

Swivel Nut Elbow and Male Stud Connector



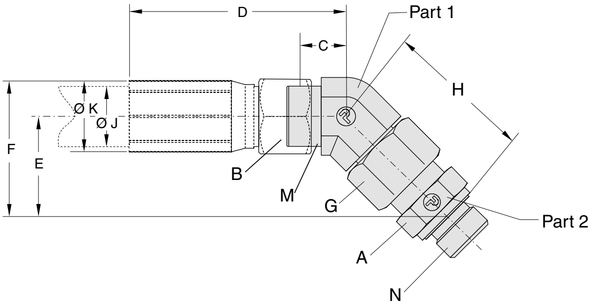
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	ØJ	ØK
3/8”	M20x1.5	G 1/2”	504599	504598	27	24	22	78	49	61	24	20	24,5
1/2”	M24x1.5	G 1/2”	504332	504321	27	30	25	88	55	70	30	24	30
1/2”	M24x1.5	G 3/4”	504332	504322	32	30	25	88	58	73	30	24	30
3/4”	M30x2	G 1/2”	504333	504323	32	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



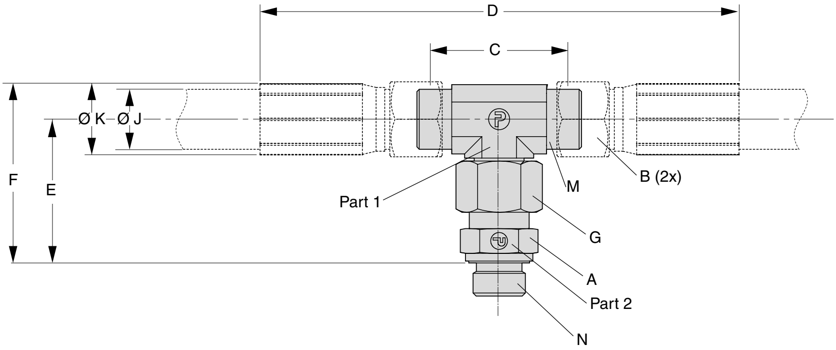
Hose size	Thread M	Thread N	Order No.	A	B	C	D	E	F	ØJ	ØK
3/8”	M20x1.5	G 1/2”	504600	27	24	22	78	36	48	20	24.5
1/2”	M24x1.5	G 1/2”	504336	27	30	25	88	36	51	24	30
3/4”	M30x2	G 3/4”	504337	36	36	28	100	39	58	31	37
1”	M36x2	G 3/4”	504338	41	46	30	118	44	67	38	46
1 1/4”	M42x2	G1 1/4”	–	–	–	–	–	–	–	–	–

Swivel Nut 45°Elbow and Male Stud Connector



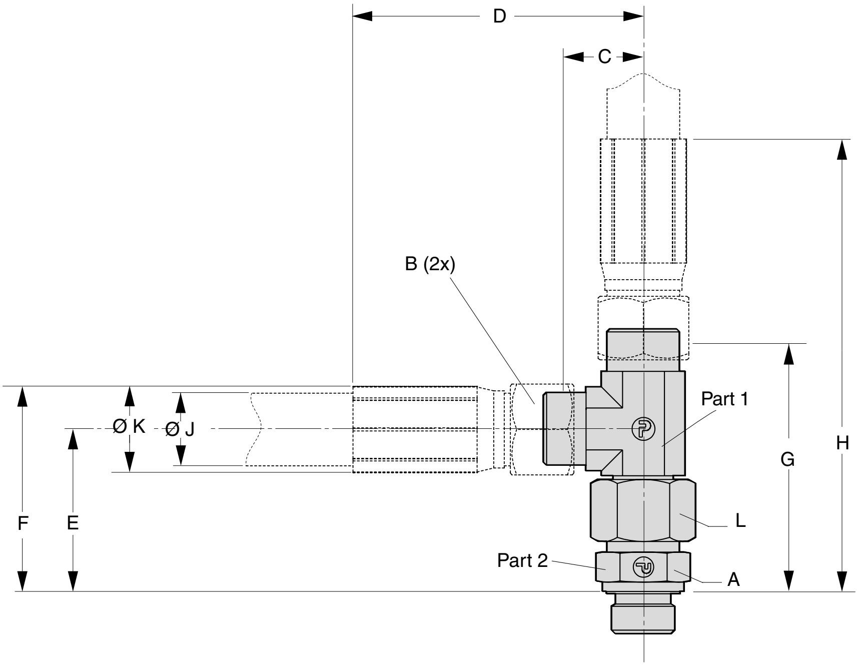
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	H	ØJ	ØK
3/8"	M20x1.5	G 1/2"	504601	504598	27	24	17	73	35	47	24	49	20	24.5
1/2"	M24x1.5	G 1/2"	504339	504321	27	30	16	79	39	54	30	55	24	30
1/2"	M24x1.5	G 3/4"	504339	504322	32	30	16	79	40	55	30	57	24	30
3/4"	M30x2	G 1/2"	504340	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



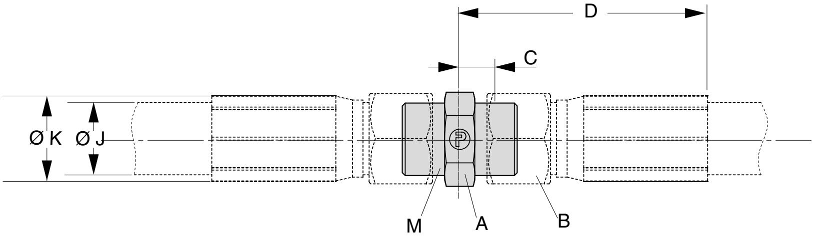
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	ØJ	ØK
3/8"	M20x1.5	G 1/2"	504602	504598	27	24	43	155	49	61	24	20	24.5
1/2"	M24x1.5	G 1/2"	504343	504321	27	30	49	175	55	70	30	24	30
1/2"	M24x1.5	G 3/4"	504343	504322	32	30	49	175	58	73	30	24	30
3/4"	M30x2	G 1/2"	504344	504323	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



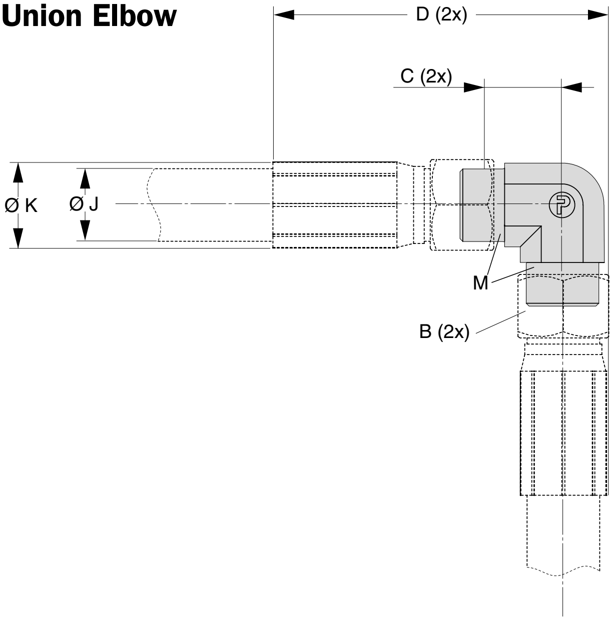
Hose size	Thread M	Thread N	Order No. Part 1	Order No. Part 2	A	B	C	D	E	F	G	H	Ø J	Ø K
3/8”	M20x1.5	G 1/2”	504603	504598	27	24	22	78	49	61	71	127		
1/2”	M24x1.5	G 1/2”	504347	504321	27	30	25	88	55	70	80	143	24	30
1/2”	M24x1.5	G 3/4”	504347	504322	32	30	25	88	58	73	82	145	24	30
3/4”	M30x2	G 1/2”	504348	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



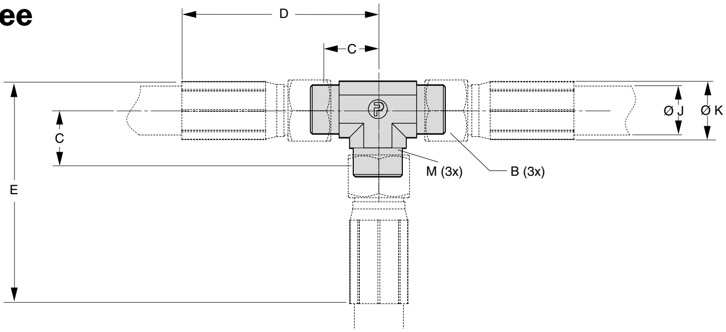
Hose size	Thread M	Order No.	A	B	C	D	Ø J	Ø K
3/8”	M20x1.5	504604	22	24	10	66	20	24.5
1/2”	M24x1.5	504351	27	30	11	74	24	30
3/4”	M30x2	504352	32	36	12	84	31	37
1”	M36x2	504353	41	46	13	101	38	46
1 1/4”	M42X2	504354	46	50	14	128	46	57

Union Elbow



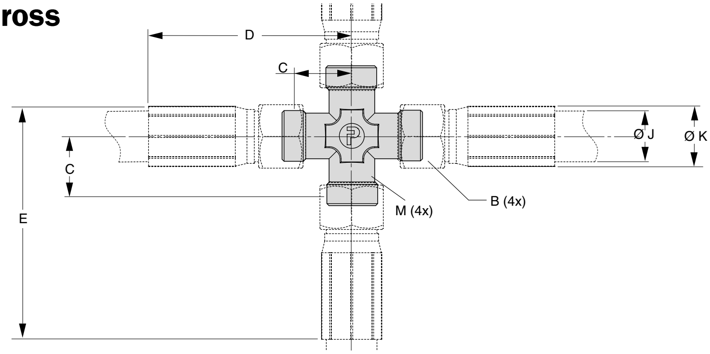
Hose size	Thread M	Order No.	B	C	D	Ø J	Ø K
3/8”	M20x1.5	504605	24	22	90	20	24.5
1/2”	M24x1.5	504355	30	25	102	24	30
3/4”	M30x2	504356	36	27	117	31	37
1”	M36x2	504357	46	30	140	38	46
1 1/4”	M42X2	504358	50	36	178	46	57

Union Tee



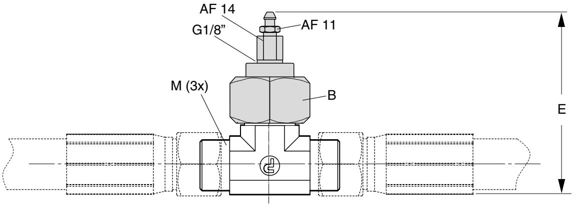
Hose size	Thread M	Order No.	B	C	D	E	Ø J	Ø K
3/8”	M20x1.5	504606	24	22	78	91	20	24.5
1/2”	M24x1.5	504359	30	25	88	103	24	30
3/4”	M30x2	504360	36	27	99	117	31	37
1”	M36x2	504361	46	30	118	140	38	46
1 1/4”	M42X2	504362	50	36	150	178	46	57

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

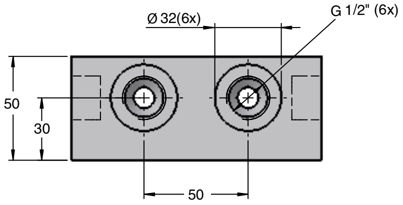
KALLER Order No.	Parker Order No.
504598	GE12SR1/2EDOMD*
504599	EW12SOMD*
504600	WEE12SR1/2OMD*
504601	EV12SOMD*
504602	ET12SOMD*
504603	EL12SOMD*
504604	G12S*X
504605	W12S*X
504606	T12S*X
504607	K12S*X
504608	EGE12SR1/2ED*
504609	EGE16SRED*
504610	EGE20SRED*
504611	EGE25SRED*
504612	EGE30SRED*
504613	RAVG6-319
504614	RAVG6-323
504615	RAVG6-430
504616	RAVG6-538
504617	RAVG6-648

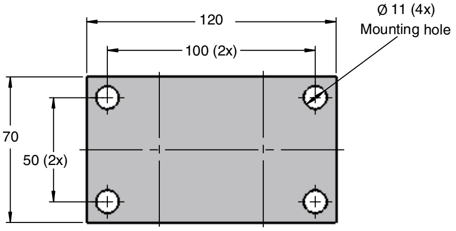
* **CF** version is Chromium6 free.
A3C material is steel, Zink-plated and yellow chromated.

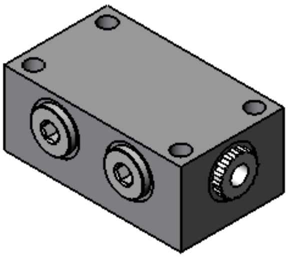
The CF version is recommended when available.
Parker ordering example:
GE16SREDOMD**CF** or GE16SREDOMD**A3C**

Manifold Block

Order No. 3022834

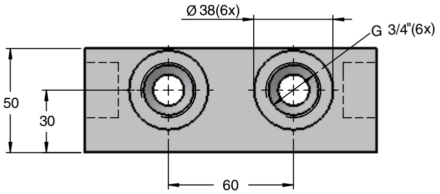


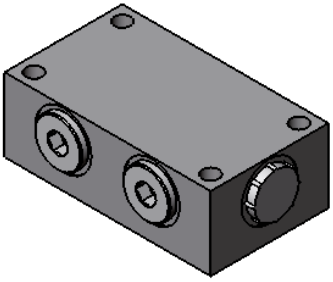




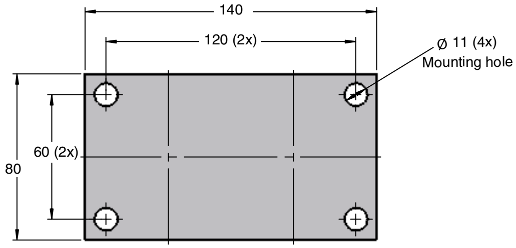
Manifold Block

Order No. 3022835





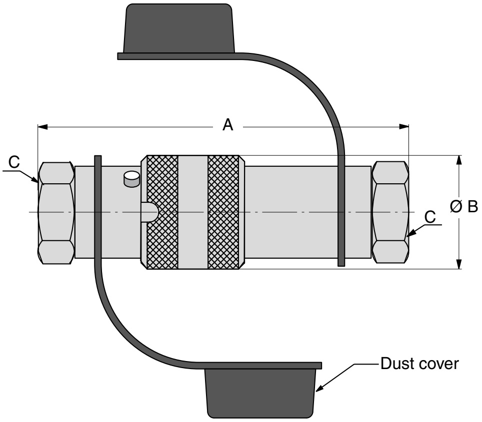
Additional Oil Bleeding Valve



System adapters

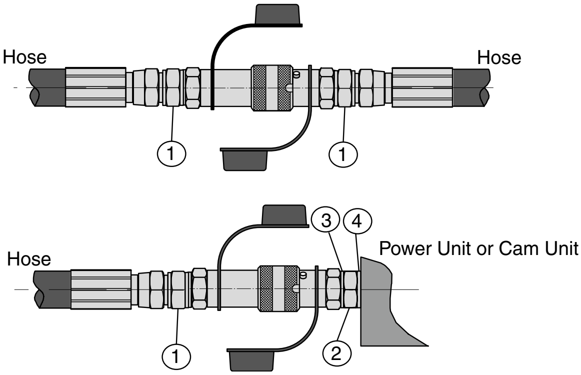
Quick coupling

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 possibilities



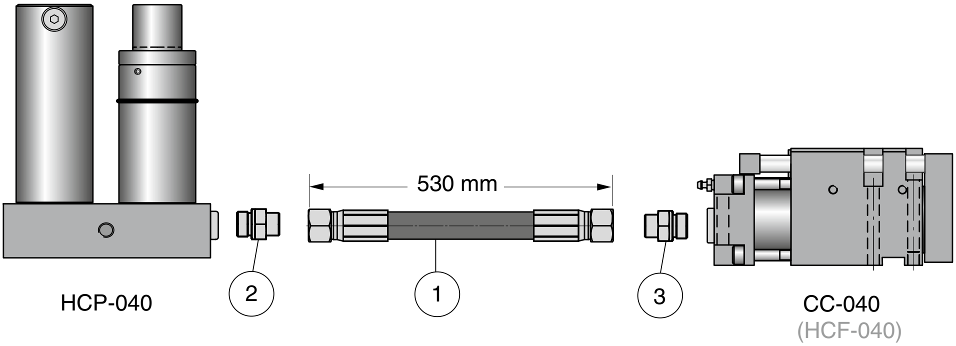
Ordering number adapter and washers				
Quick coupling	Position 1	Position 2	Position 3	Position 4
3018084-01	504321	503551	501271	501271
3018084-02	504324 or 504327*	503552	501270	501270
3018084-03	504330	503553	500282	503554

*for 1" hose size

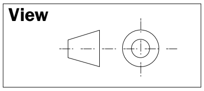
Designing your hosed system

How to design your hosed system

1. Choose the right hose size and style from page 399 (the hose size is always dictated by the Power Unit size).
2. Choose the right size/style adapter between hose and Power Unit using page 401-404. The oil connection is found on the respective Power Unit dimension page.
3. Choose the right size/style adapter between hose and Cam Unit/ Force Cylinder (CC or HCF) using page 401-404. 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 405-406).



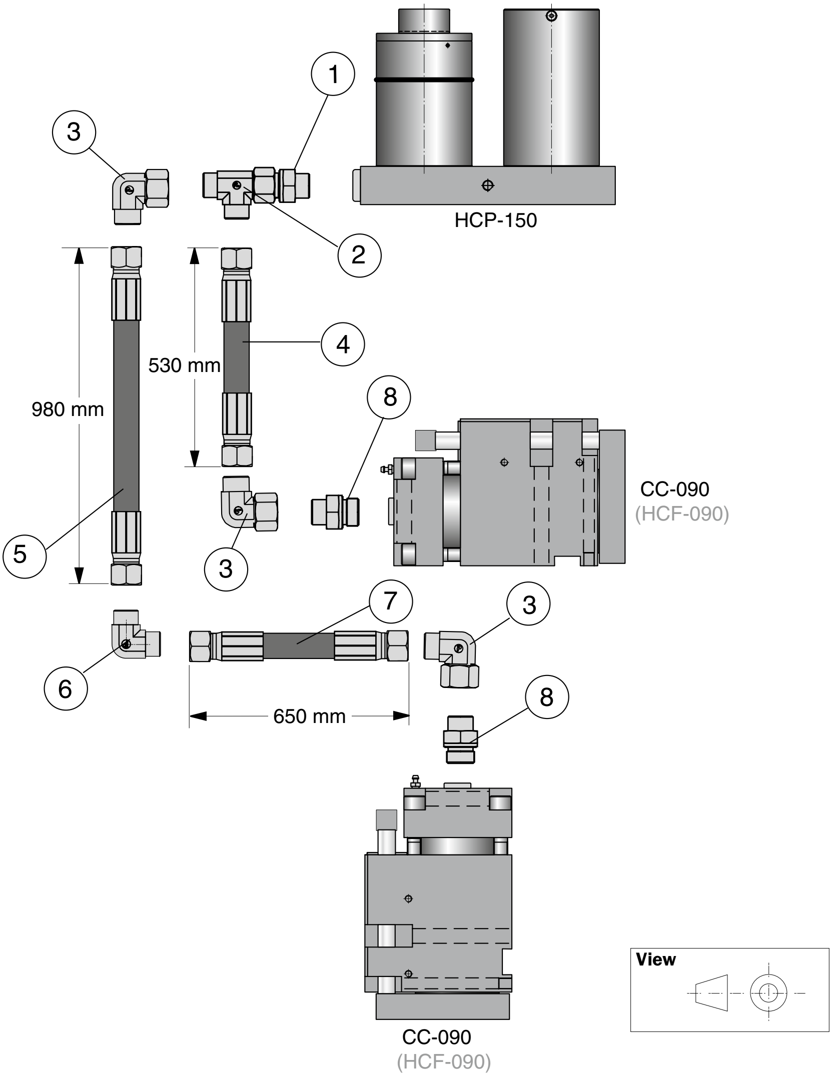
Example above showing how to connect a HCP-040 to a CC-040 (the same principal applies when connecting an HCF).



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).

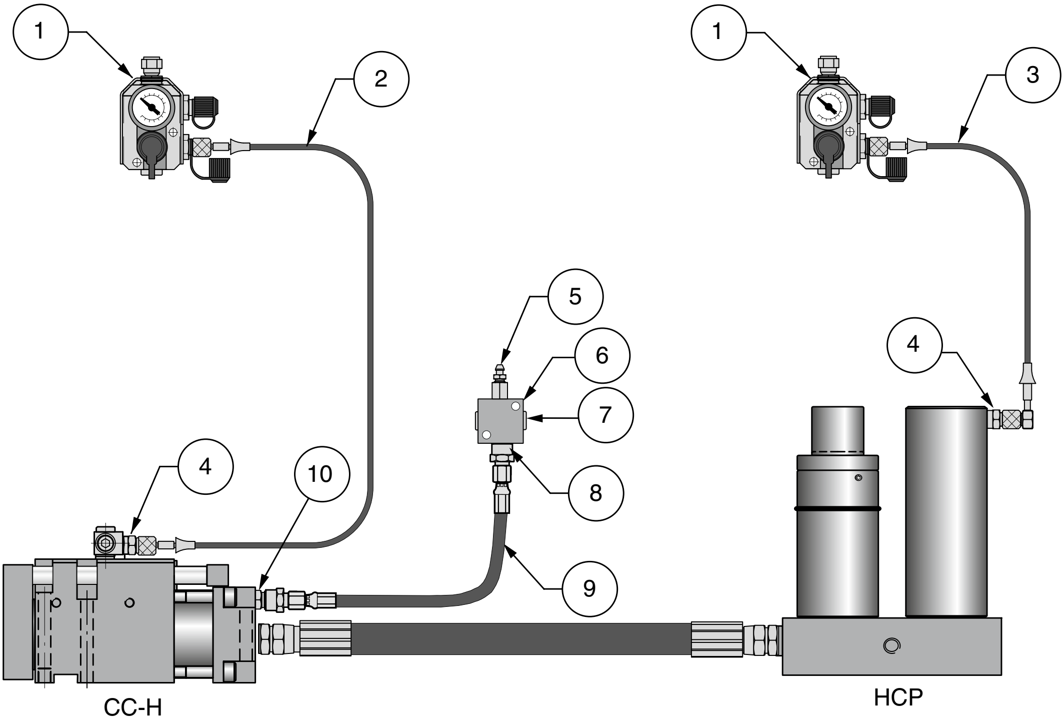


Position	Quantity	Order No.
1	1	504331
2	1	504350
3	3	504335
4	1	3021457-0530
5	1	3021457-0980
6	1	504358
7	1	3021457-0652
8	2	504329

Remember!
For synchronized movement of the Cams, connect only one Cam Unit per Power Unit

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 *

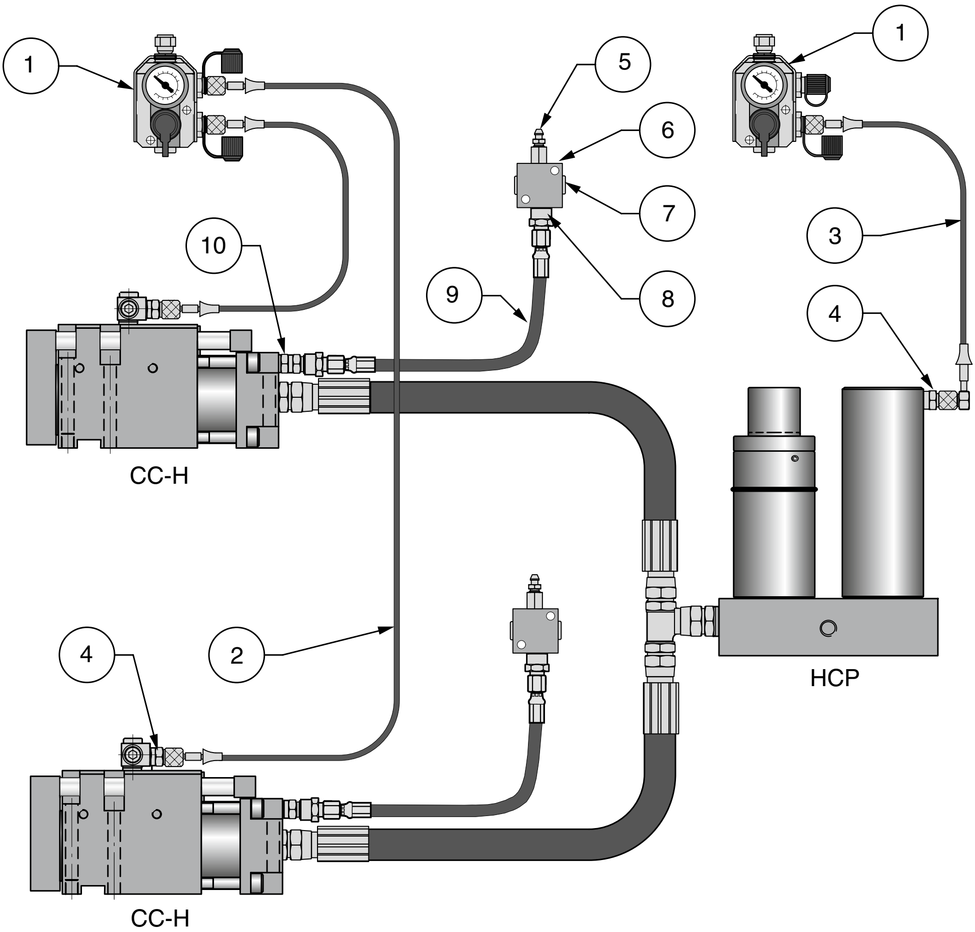
Position	Quantity	Description	Order No.
1	2	Control Unit	3116114
2	1	EZ-hose	4014974-xxxx
3	1	EZ-hose	4017568-xxxx
4	2	Adapter	4114973-G 1/8”

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	E024-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 Control Units *

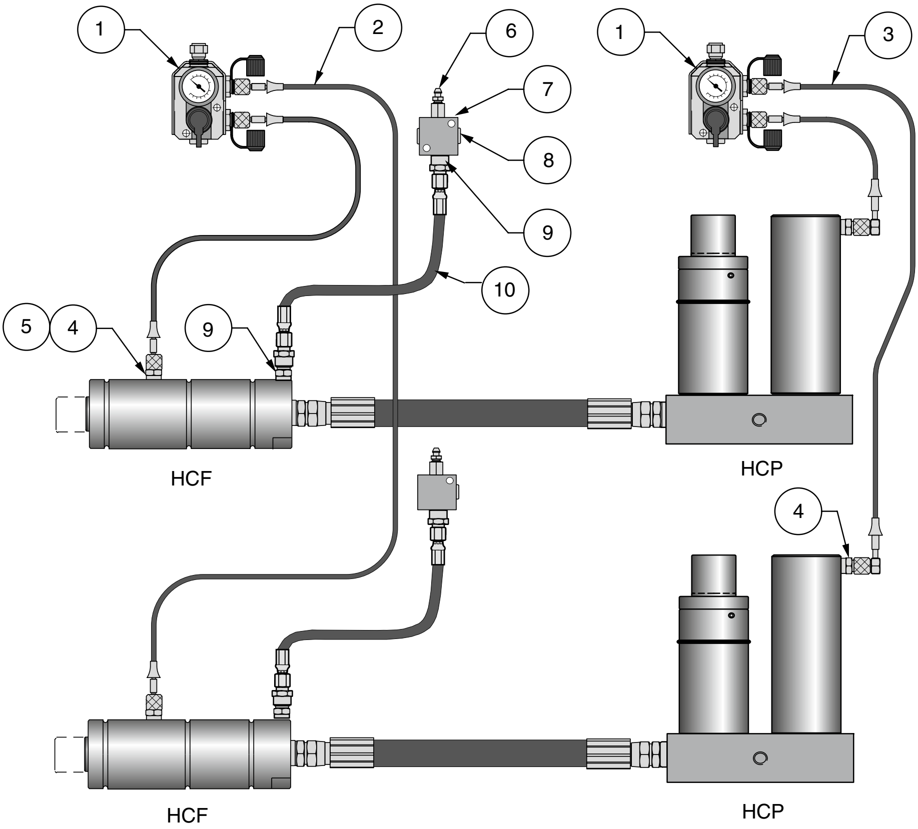
Position	Quantity	Description	Order No.
1	2	Control Unit	3116114
2	2	EZ-hose	4014974-xxxx
3	1	Ez-hose	4017568-xxxx
4	3	Adapter	4114973-G 1/8”

Hosed 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	E024-hose	3020857-xxxx
10	2	Adapter M10x1	504636

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

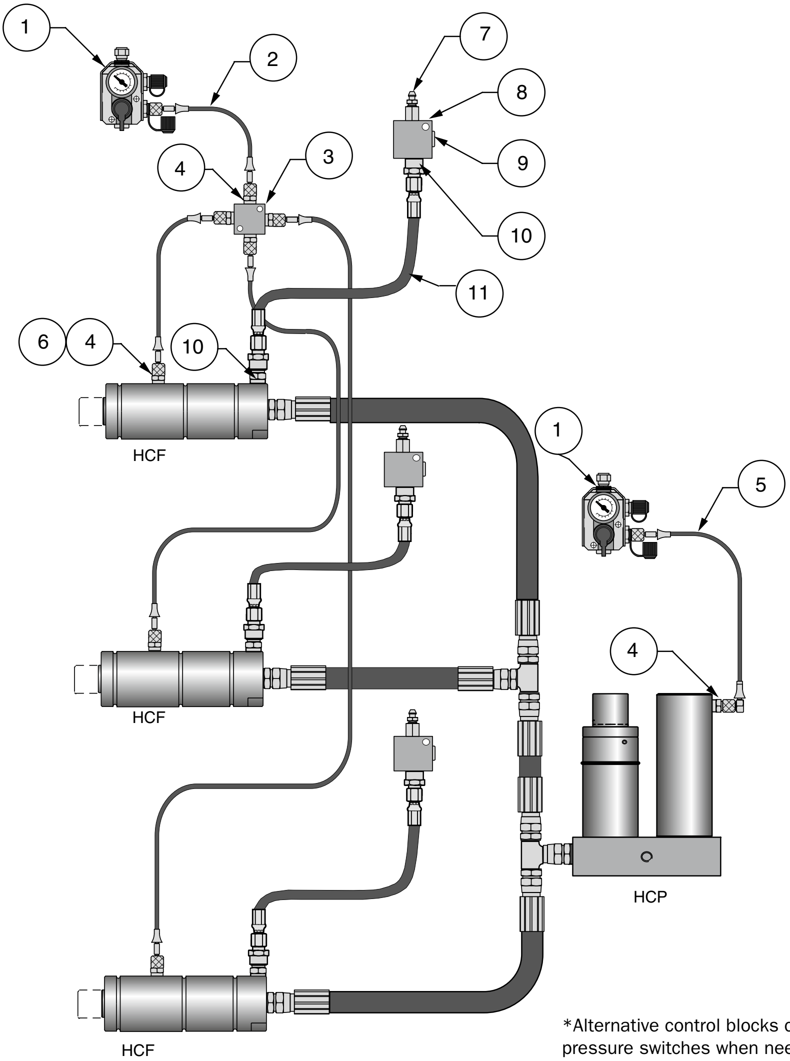
*only needed for HCF 015

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	E024-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.

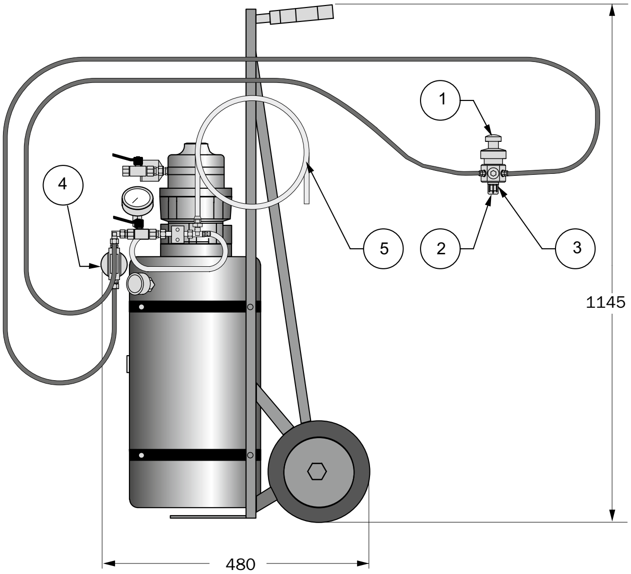
Hosed system for Control Units *			
Position	**Quantity**	**Description**	**Order No.**
1	2	Control Unit	3116114
2	4	EZ-hose	4014974-xxxx
3	1	Coupling Unit	4017032
4	8	Adapter	4114973-G 1/8”
5	1	EZ-hose	4017568-xxxx
6	1*	Washer	500472

*only needed for HCF 015

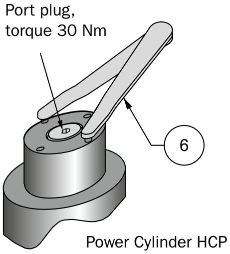
Hosed system for oil bleeding			
Position	**Quantity**	**Description**	**Order No.**
7	3	Bleed nipple	4014007
8	3	Coupling Unit	4017032
9	3	Plug G 1/8”	500343
10	6	Adapter	503593
11	3	E024-hose	3020857-xxxx

Pump Unit

Order No. 3017075



The hook spanner below is used to hold the piston in place when loosening/tightening the port plug.



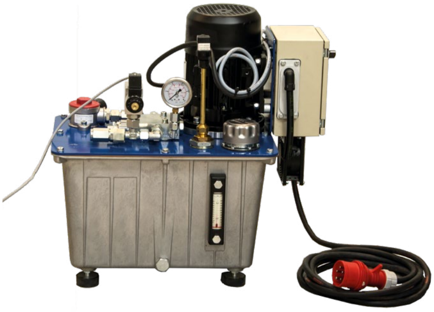
Spare parts etc.		
Position	**Description**	**Order No.**
1	Armature (include position 2 and 3)	3013941
2	Plastic plug	502446
3	Rubber-steel washer	502160
4	Filter	505763
5	Transparent hose	503116
6	Hook spanner (HCP 015)	503417
6	Hook spanner (HCP 040-150)	503418

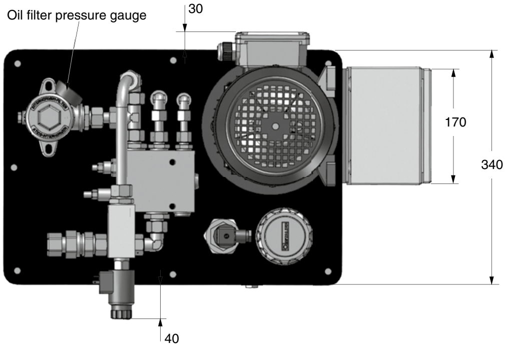
Technical specifications

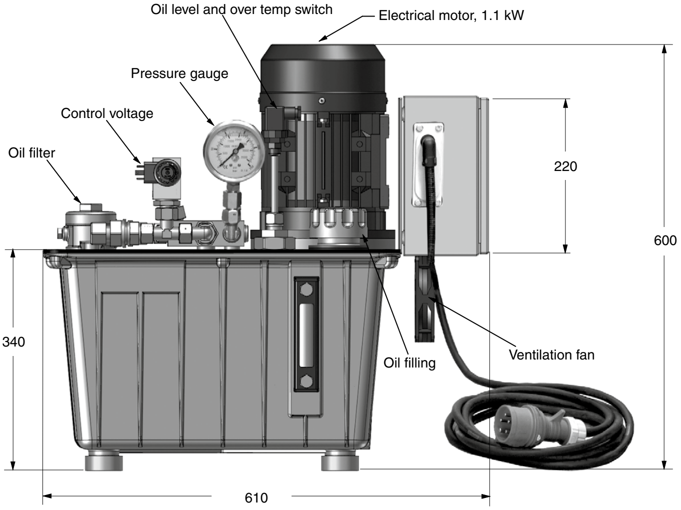
Power	0.7 kW at 7 bar air pressure and 830 l/min
Oil flow	2.4 l/min at 1500 rpm
Max. oil pressure	55 bar
Tank volume	18 liters
Oil filter	10 µm
Air pressure	5-7 bar
Weight	27 kg

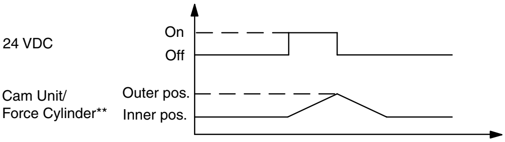
EHC Electrical Pump Unit

Order No. 505776









Technical data - hydraulic system	
Oil tank volume	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

Installation and Service

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

Installation

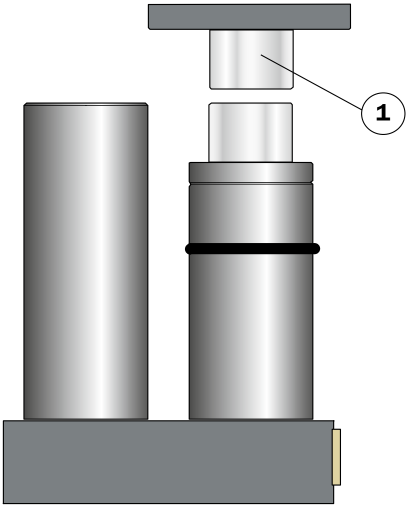
The following information describes only the most important recommendations. If there are any questions about the installation do not hesitate to contact your local distributor or KALLER® .

Tel +46 140 571 00
Fax +46 140 571 98
Web site: www.kaller.com

Power Unit

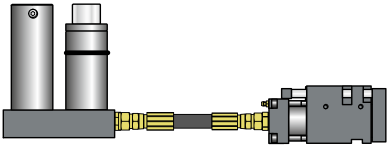
The Power Unit can be mounted in any position in the tool, including upside-down (valid for all units). A driver (1) is often used and adapted to give the right stroke length of the Power Cylinder.

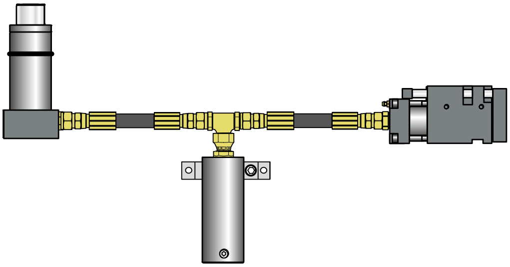
Make sure the surface which makes contact with the piston on the top of the Power Cylinder is parallel and even. Make sure there is enough room for the Accumulator in the tool.

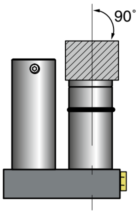


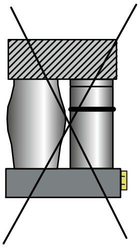
Power Unit Mounting Instructions (HCP, HCP-S)

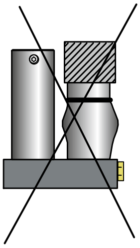
Mount the Power Unit to a flat surface using four screws, either upright or upside down. To ensure the Cam Unit/Force Cylinder always travels the same stroke length it is customary to stroke the Power Unit an extra 10 mm, which also causes the Accumulator´s piston to rise about 10 mm.

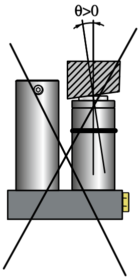












Compact Cam

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).

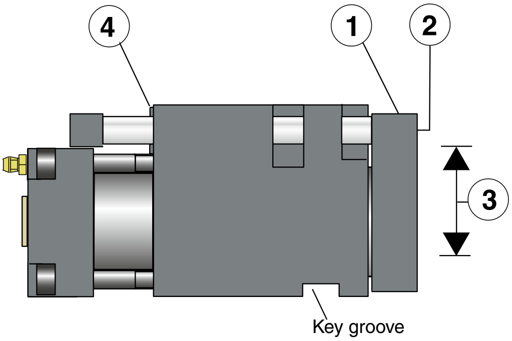
However, it is recommended to position this force directly in the center of the shaded area (3). For more information, see the respective Cam Unit dimensions page.

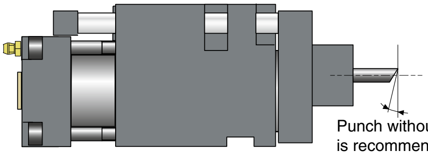
Please note, it is not recommended to put any turning moment on the punch plate (1).

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 416) together with a thin metal plate or thick piece of paper to check the punch is positioned correctly.

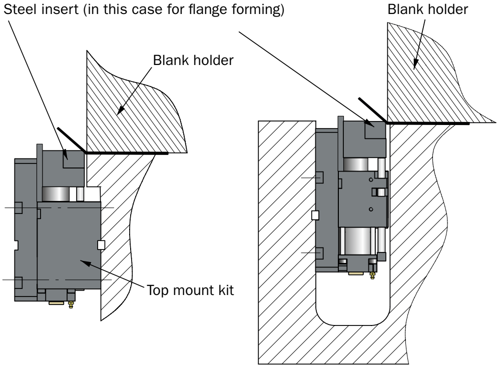
For Installation Examples, please see page 349.




Punch without angle is recommended. If necessary do not exceed 7°.

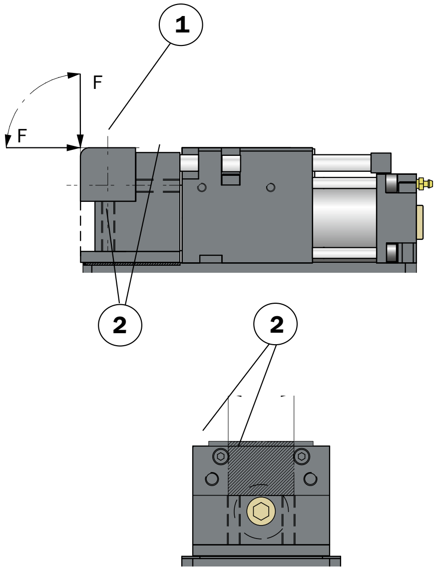
Flange Cam installation possibilities

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

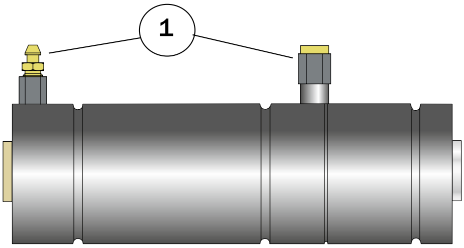
The customized tool (1) (for flanging etc.) should be mounted using two or four bolts (2) within the designated area.
The force created by the flanging is allowed in directions "F" within the area marked ▨ .



Force Cylinder

Use only flanges or fittings intended for the Force Cylinder. See also page 361 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 center 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 414 - 415.



Hydraulic hose and adapters

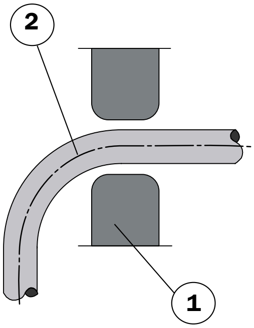
See page 399 to choose the adapters and the hose. Use as few adapters as possible.

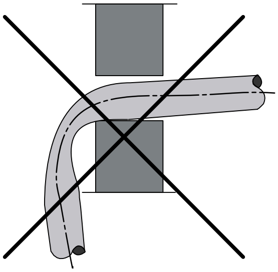
The hoses are washed and plugged to protect them from dust as this could damage the system. Make sure the hoses are protected from sharp edges and external damage. Sharp edges must be rounded (1).

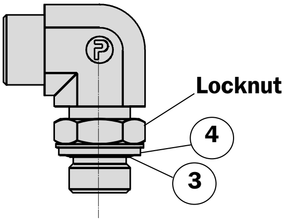
Hoses will move a little depending on the oil pressure pulsation during the operations. Do not use a smaller bending radius than specified (2).

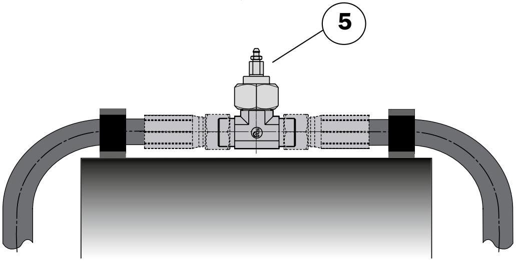
Adapters for the units have an O-ring (3) and a support washer (4) which must always be used. Check also that no movable parts can touch the units or the hoses. See also DIN 20066 for hose installations.

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).







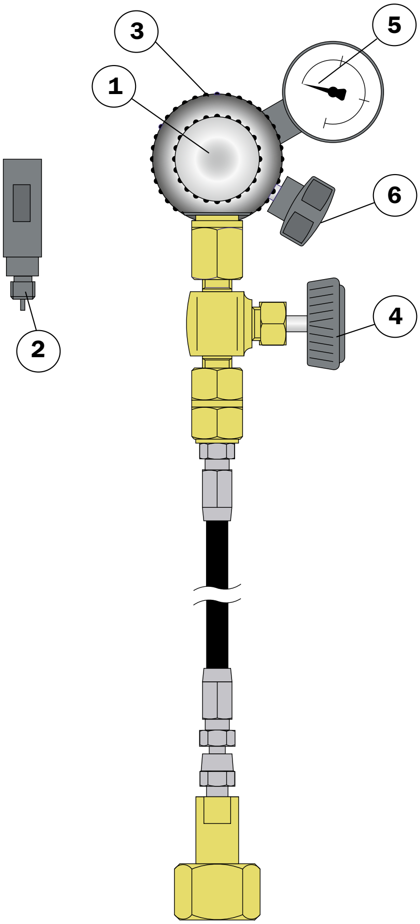


Filling of Gas and Oil

Gas charging for / Force Cylinder and Accumulator

Equipment needed:

Nitrogen bottle with	at least 180 bar
Charging armature	Order nr. 1029335
Charging hose	Order nr. 4027471-2000
Charge port adapter	Order nr. 3014016
Allen key	5 mm



Step 1
Connect the nitrogen bottle

Connect the Charging armature to the nitrogen bottle with the pressure regulator, 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**

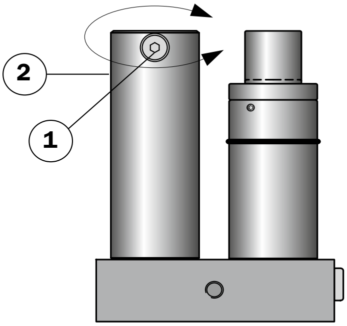
If there is no hose system then, gas charging is not required.

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 361.

It is possible to change the gas port location (1) by first emptying the gas pressure then twisting the accumulator tube to position (2).

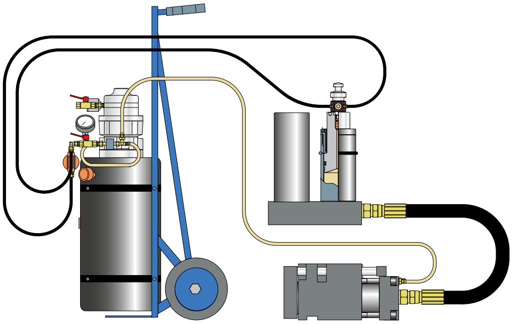
When not using the charging armature empty the gas by closing the nitrogen bottle valve and opening the gas valve (4) anticlockwise. (See page 423).



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 liters of oil as per specification on page 361.



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.

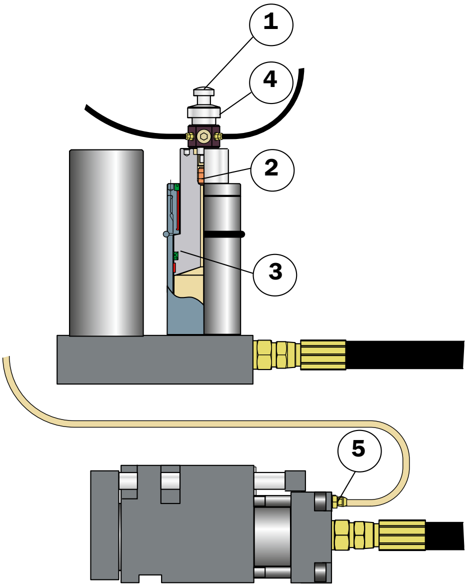
Step 1 Check the nitrogen pressure

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

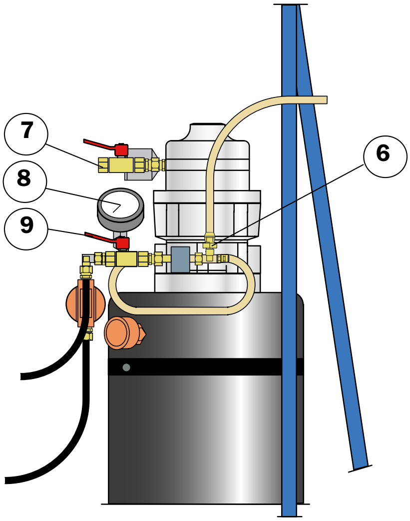
Check the clearance of the Cam Unit/ Force Cylinder and make sure that there is enough room for a full stroke.

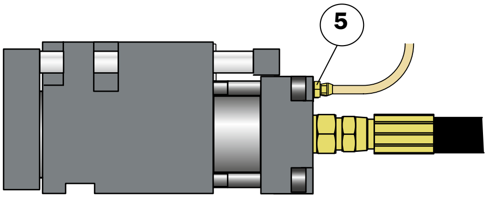
Step 4 Pump oil

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).

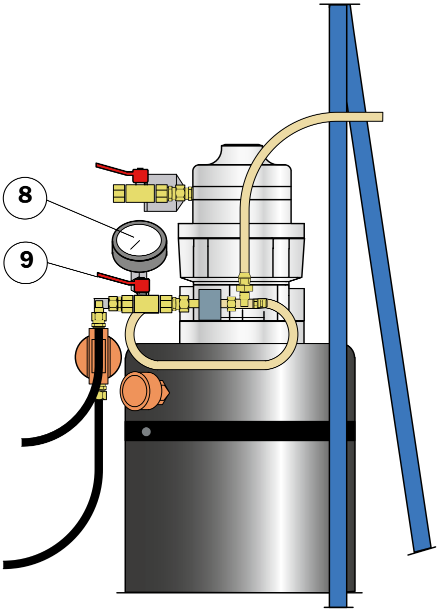
Step 9 Disconnect the Pump Unit

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

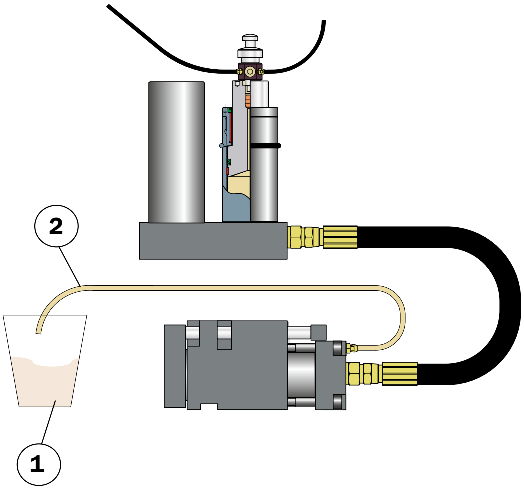
After the oil filling procedure, the Accumulator has to be charged with nitrogen up to 150 bar or to the required gas pressure for the operation. Maximum pressure is 180 bar. See also page 362.

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.



Service and Maintenance

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.

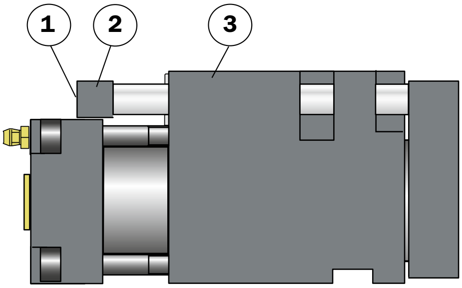
Power Unit and Force Cylinder (HCP, HCP-S, HCF)

Check the nitrogen pressure in the Accumulator and the Force Cylinder every 200,000 strokes or alternatively twice a year. See also page 362 and 423.

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

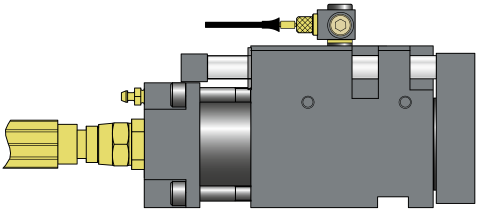
** If the gas spring force is lower than minimum the gas spring has to be replaced*

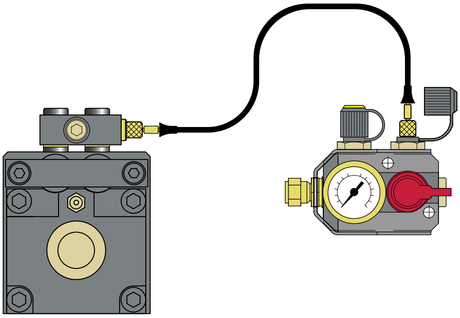
Compact Cam (CC-H) and Flange Cam (CCF-H) for Hose Systems

Check the nitrogen pressure in the Compact Cam every 200,000 strokes or twice a year. See also page 423.

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.*

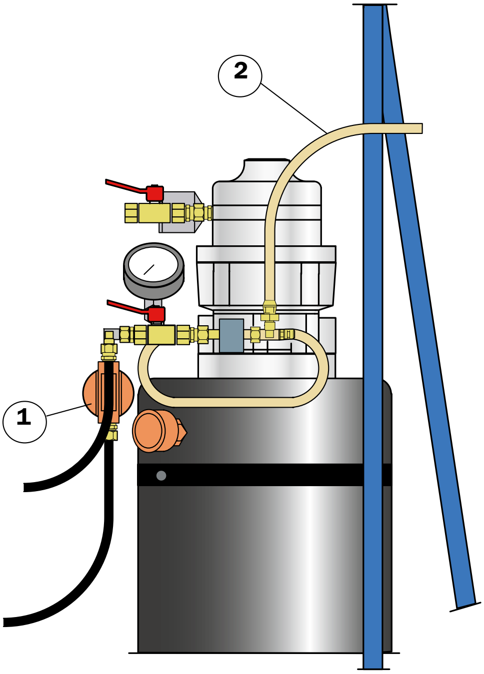
Oil

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 362 and 427.

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.: 505 763**
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 423. (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 423. 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 423. 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 423.

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 423, 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 428. If hose system is used, check and see page 429.
	2:3 Gas leakage in the Accumulator	Bleed the oil, see page 424. 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.

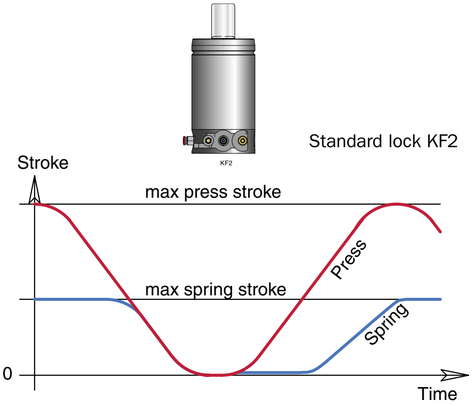
General Introduction

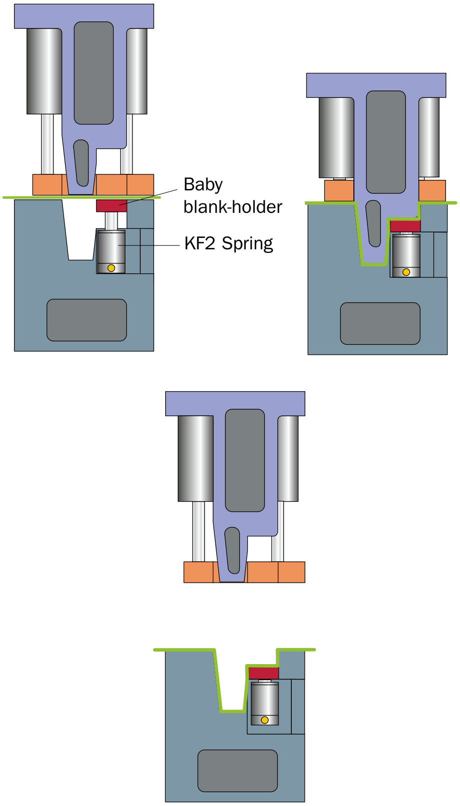
About Controllable Gas Springs

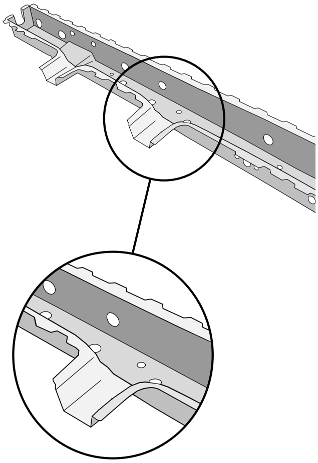
KF2 is the next generation of controllable gas springs, which supersedes the KF springs.

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

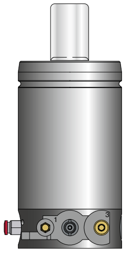
The following is a brief description of these two systems.

Standard Lock, KF2

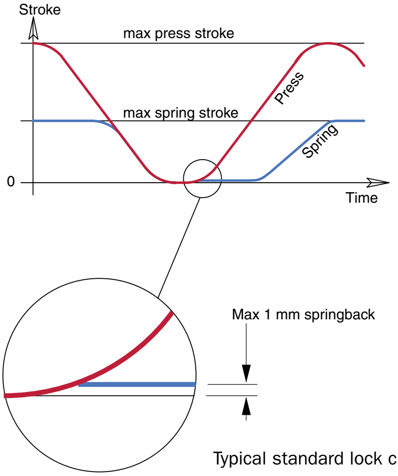
The KF2 is a controllable gas spring whose piston rod can be locked at BDC.

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 443). The springs can either be installed self-contained or connected to a control block through a hose system.



KF2



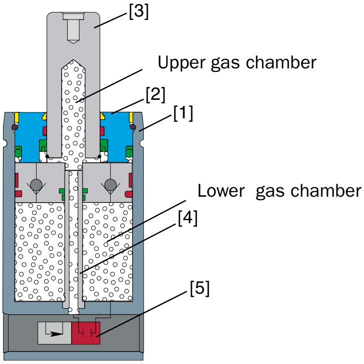
Typical standard lock curve

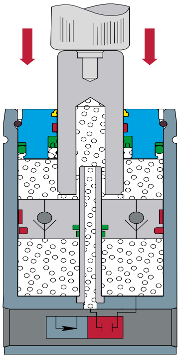
KF2 – how does it work?

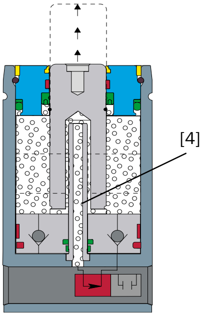
The KF2 controllable gas spring consists of a cylinder [1], guide assembly [2], piston rod assembly containing check valves [3], internal piston rod [4] and normally open (NO) cartridge valve [5] located in the base of the spring.

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.







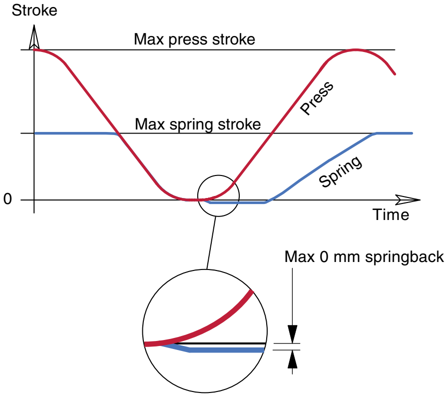
Positive Lock System, KF2 + KP

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.

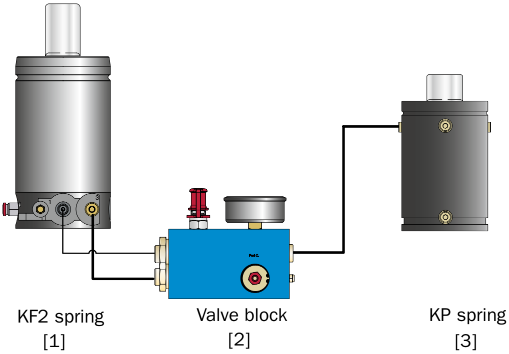


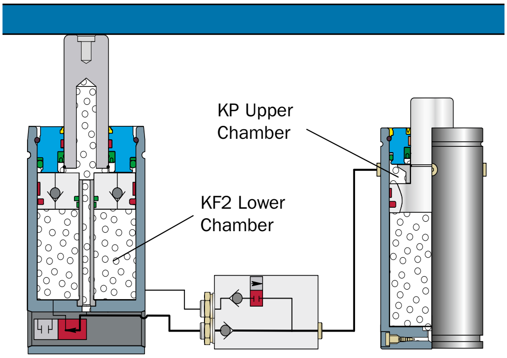
Positive Lock System, how does it work?

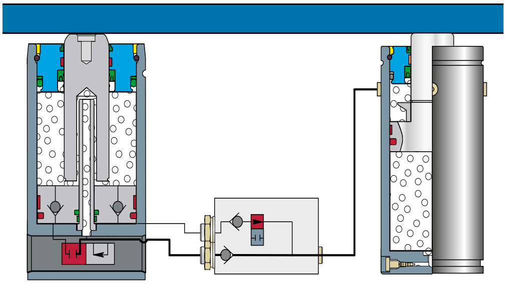
The KF2 is the active spring in the system and provides the required spring force in the tool. The task of the KP passive gas spring is to eliminate the max. 1 mm springback of the KF2 spring(s) at press BDC.

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?

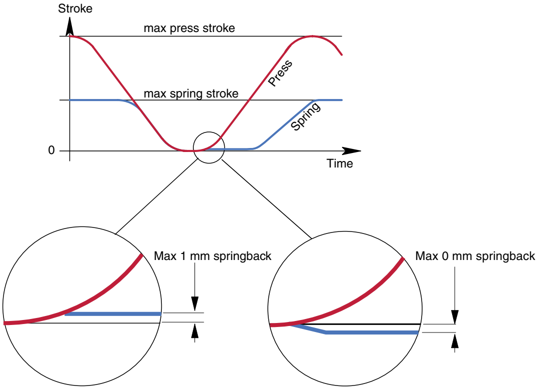
In order to provide optimum locking from the KF2 controllable gas spring, it is important to stroke the spring 100% of the nominal stroke length ±0.5 mm.

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.



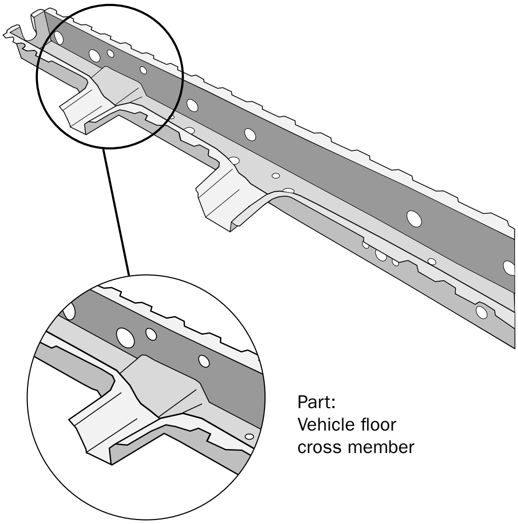
Standard lock KF2

Positive lock KF+KP

Application Examples

Standard Lock, KF2

When forming this cross member, “baby” blank holders are used to form the circled area. The 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.



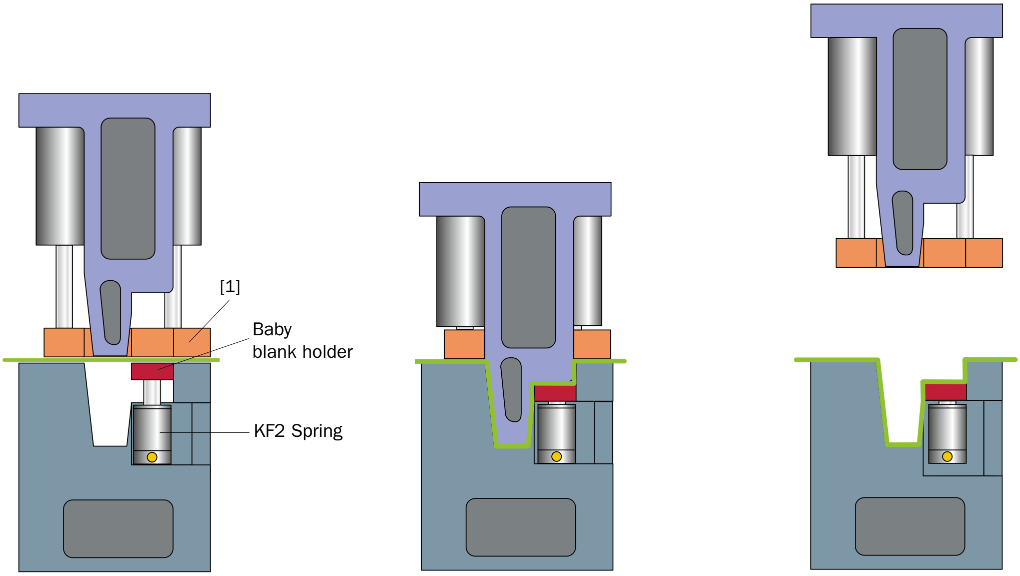
Part:
Vehicle floor
cross member

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

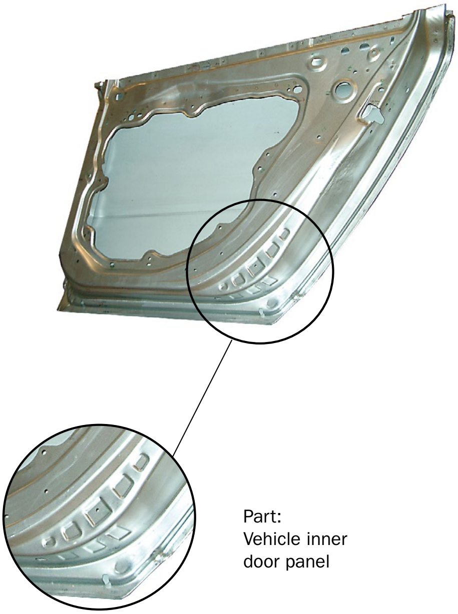
Positive Lock System, KF2 + KP

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.



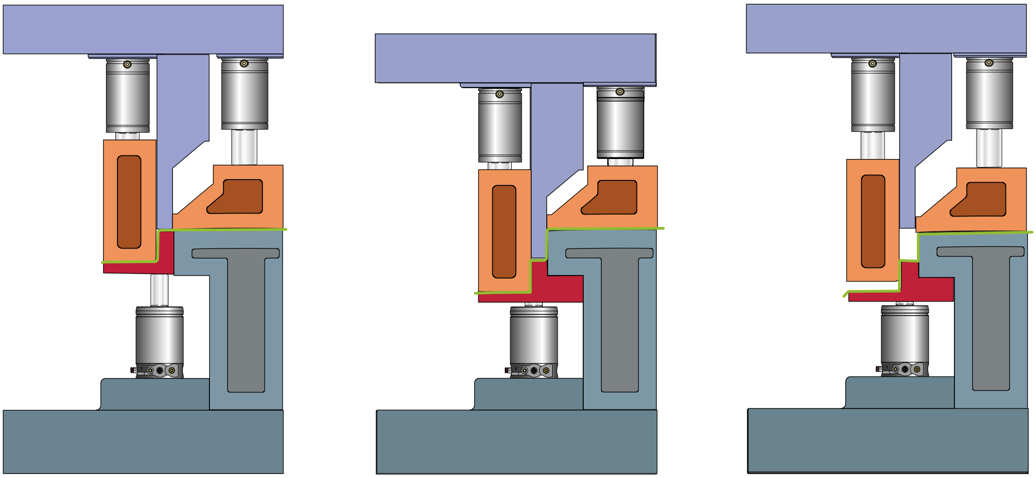
Part:
Vehicle inner
door panel

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

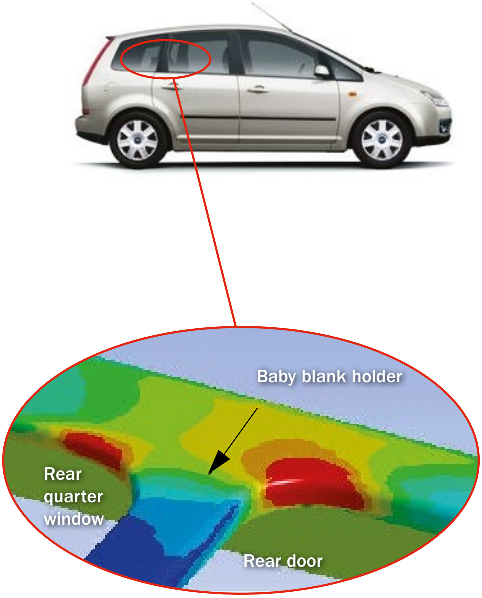
Positive Lock System, KF2 + KP

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.



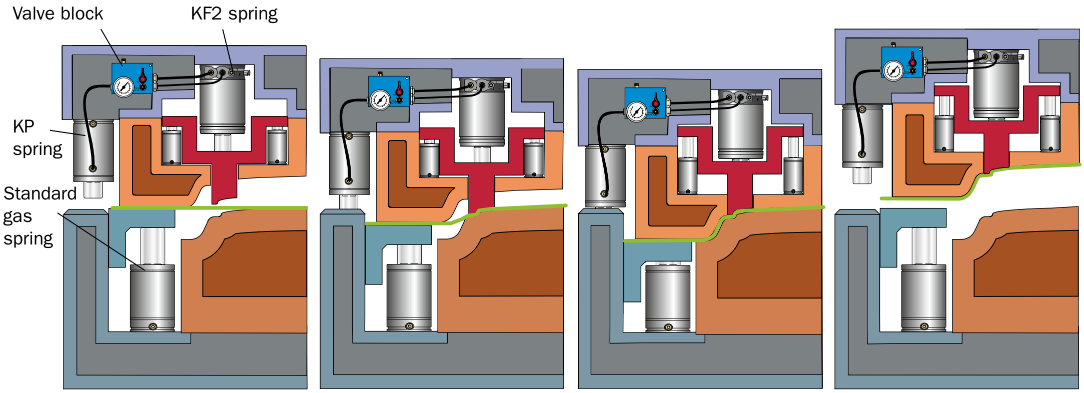
Work cycle

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 springback 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

Application Inquiry Form

To make selection of the right system and components for your particular application easier, please fill in the **Application Inquiry 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: ....

....

....

....

....

....

....

....

System Configuration

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 443 for more information).

Control system – Standard Lock, KF2

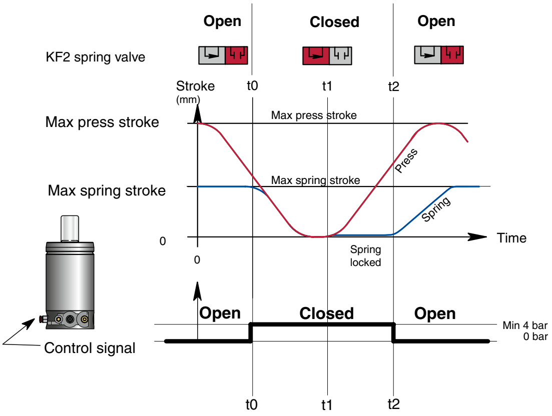
The normally open (NO) valve within the base of the KF2 controllable spring(s) is closed using compressed air (min. 4 bar). With the valve closed at t0-t2 (see diagram), the piston rod of the KF2 spring(s) is prevented from returning to its extended position.

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 466.

- t0 = Die closed
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



Control system – Positive Lock System, KF2+KP

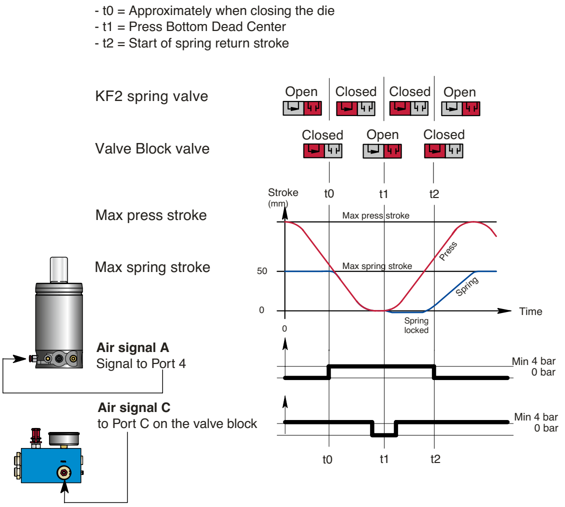
When the KP passive gas spring is connected to the active KF2 spring(s) via the valve block, an additional signal from the press (or separate mechanical pressure switch) is required to control the valve within the valve block.

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 466.



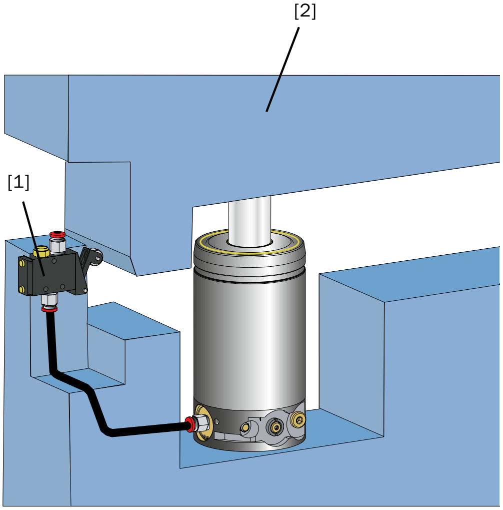
Tool integrated control system

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.

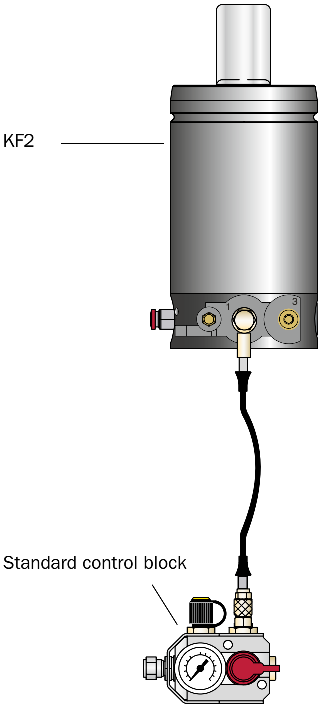
Controllable gas spring system	Recommended hose system
Standard lock	EZ Hose
Positive lock system	EZ Hose and E024 Hose

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 233.

For examples of how to connect KF2 controllable gas springs to a hose system, see the installation examples on page 466.



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 E024 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.

E024 Hose connections

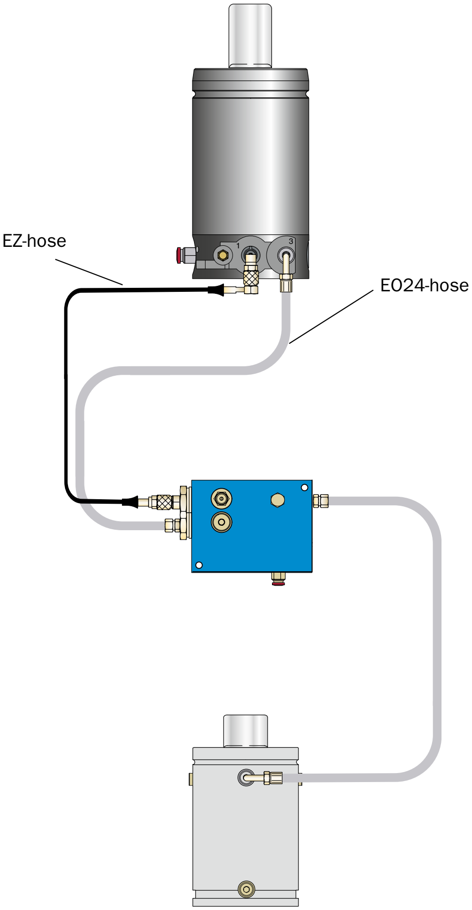
To connect the KF2 controllable gas spring(s) to a KP passive gas spring via the valve block, we recommend using the E024 Hose system (or its equivalent) owing to the large internal diameter of the hose. This is especially important when gas flow in the hoses is required.

Gas port 3, which is marked on each KF2 spring, is connected to gas port 3 on the valve block (also marked) using E024 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 E024 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 233.

For examples of how to connect KF2 + KP controllable gas spring systems to a hose system, see he installation examples on page 466.

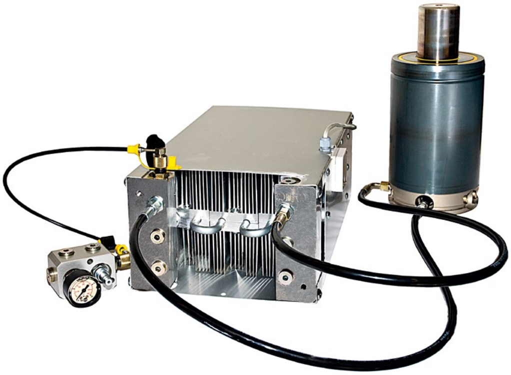


Cooling System (optional)

About cooling

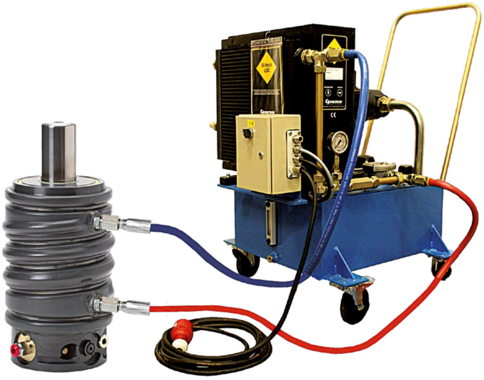
Currently there are two possible KF2 cooling system solutions to choose between when cooling is required for a KF2 gas spring system. Which particular method to choose depends upon the required cooling effect and the number of controllable gas springs to be cooled.

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:

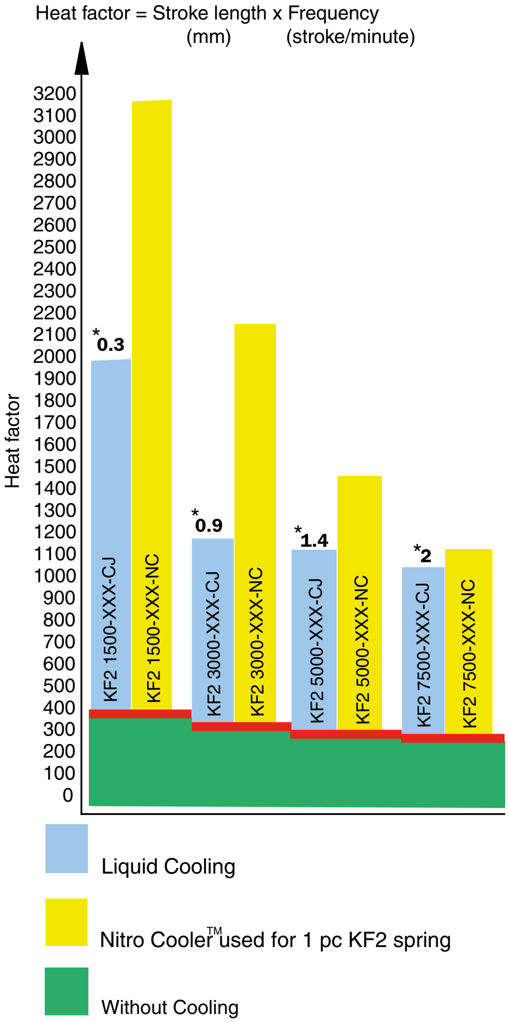
Stroke frequency:	15 spm
KF2 stroke length:	100 mm

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 frequency.

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 on page 450 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.

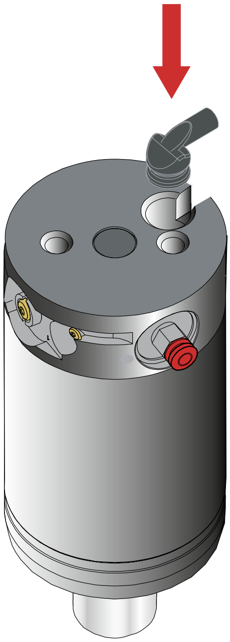
$$\text{New heat factor} = \text{Orginal heat factor x} \frac{\text{Required net force at reduced pressure}}{\text{Net force at 150 bar}}$$

$$= 500 \times (300 / 500)$$

$$= 300$$

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

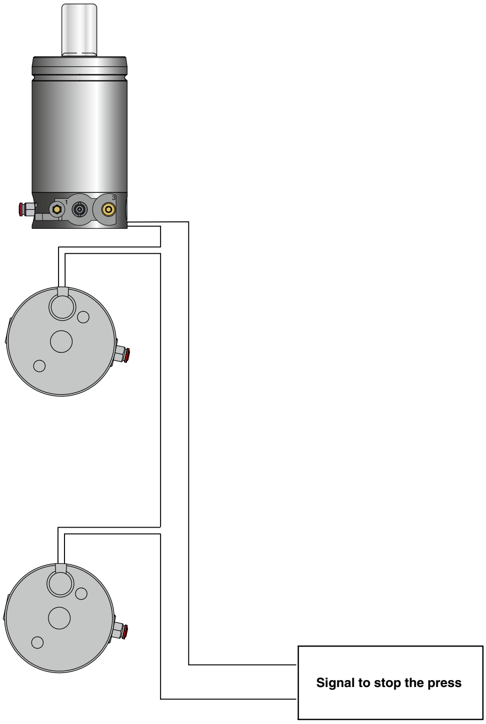
Order No. 503388

Basic information

Normally closed

Trigger temperature	83 ±3°C
Hysteresis	< 7°C
Max. voltage	250 VAC
Max. current	16 A
Min. current	50 mA

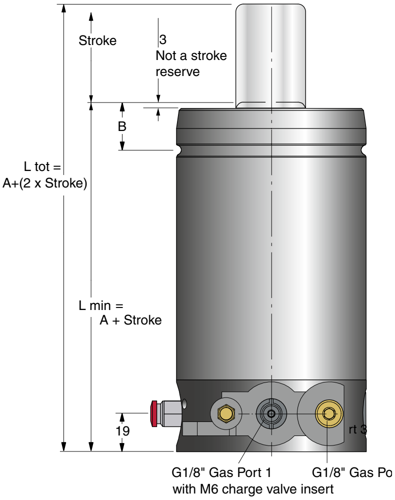
Delivered with 2 m of electric cable



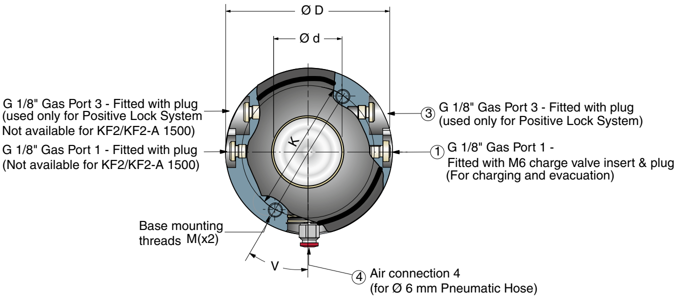
Connection of 3 pcs KF2 (example above)

Technical Data

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 484 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*	≈ 0.08 - 0.065 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).

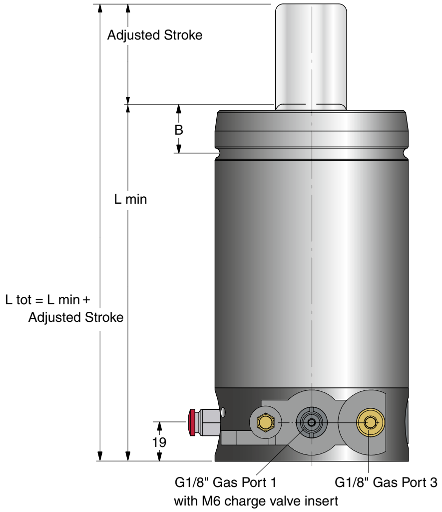
***Please note:**
Increased stroke length reduces the speed. Please contact your local KALLER® distributor for further information.
KF2 springs with even slower return speeds are available on request.

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 481.

How to order:

KF2-A 3000 - 030 - 030

Model:
KF2-A 1500
KF2-A 3000
KF2-A 5000
KF2-A 7500

Nominal Stroke

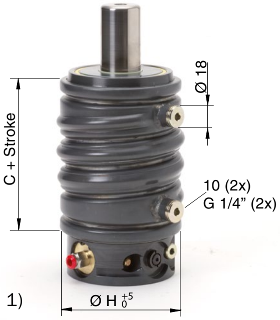
Delivered Stroke

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 446.



(Fig. 1)

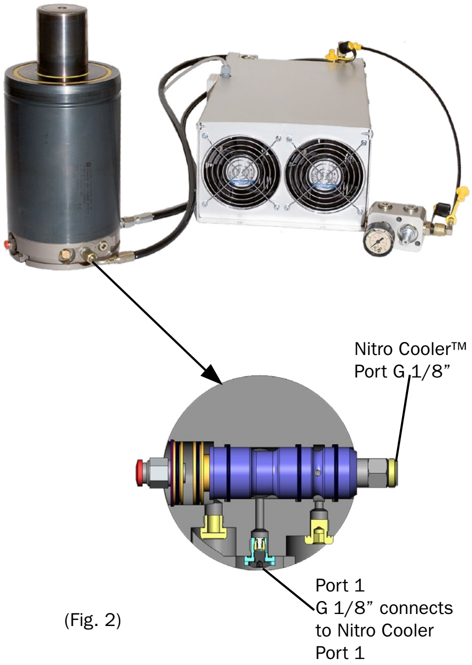
Model	KF2 C	KF2-A C+7	Ø H $^{+5}_{0}$
KF2/KF2-A 1500-XXX-CJ	75	82	110
KF2/KF2-A 3000-XXX-CJ	85	92	135
KF2/KF2-A 5000-XXX-CJ	110	117	165
KF2/KF2-A 7500-XXX-CJ	130	137	210

KF2/(KF2-A) for Nitro Cooler™ (NC)

Gas springs with a special cartridge valve are used with nitrogen coolers (NC) (Fig. 2). See page 461.

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
3121780-01	KF2/KF2-A 1500
3121780-01	KF2/KF2-A 3000
3221780-01	KF2/KF2-A 5000
3321780-01	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]

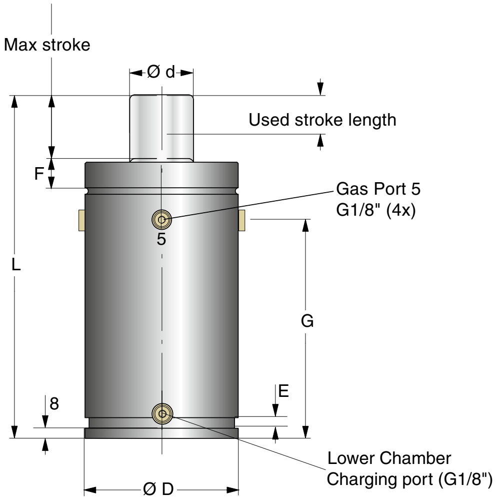
Additional Port for Nitro Cooler™

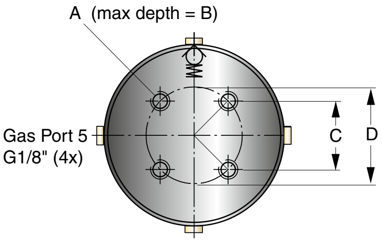
KP – Dimensions

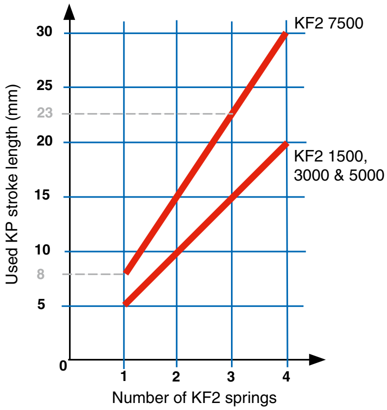
The KP passive gas springs should:

- **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 E024 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

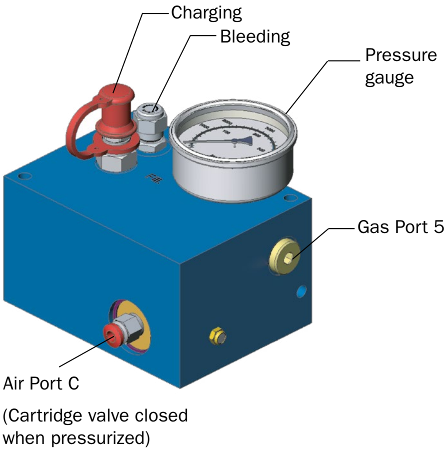
*The forces are calculated based on a charging pressure of 150 bar in the KF2 and the KP spring(s).

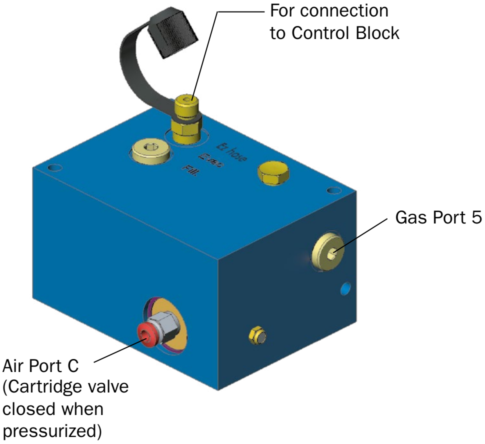
Please note! For more information, see “About Gas Springs” in the KALLER® main catalog.

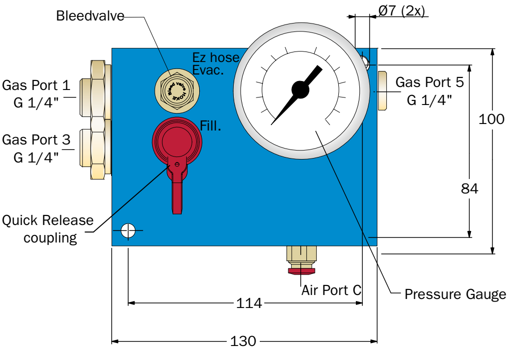
Valve block dimensions

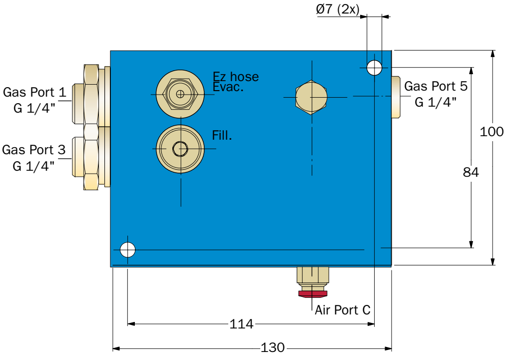
There are two valve block models available:

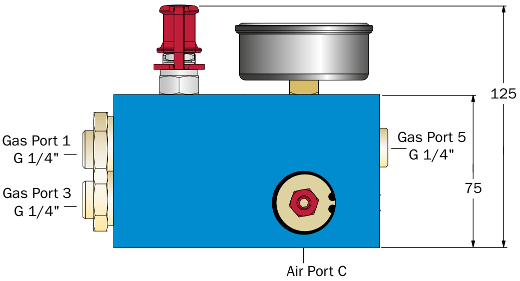
- **All-in-one valve block,**
  with built-in gas charging and
  bleeding equipment plus gauge
  Order No. 2020801
- **Standard valve block,**
  for use with separate control block
  Order No. 2120801

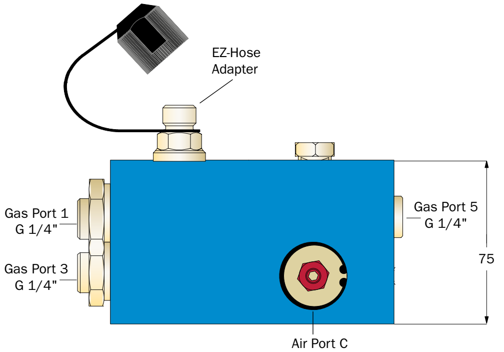










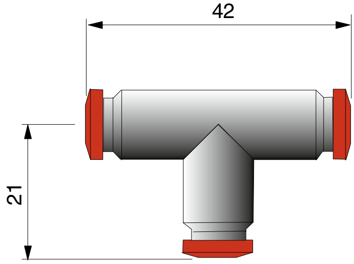


For information about how to connect the different valve blocks to a positive lock system, see the installation examples on pages 467 and 470.

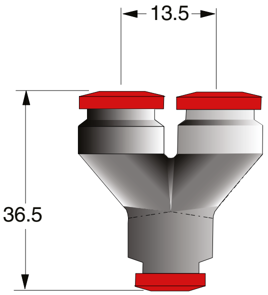
Control system components

Hose and fittings for Ø 6 mm Pneumatic Hose

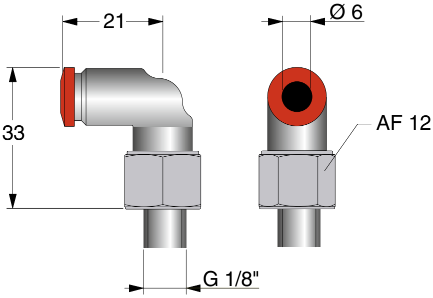
T Connector (hose to hose)
Order No. 503368



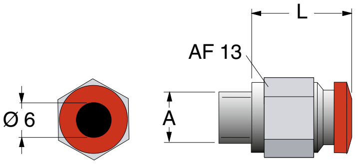
Y Connector (hose to hose)
Order No. 503372



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 506795- XX

Order the length in whole meters

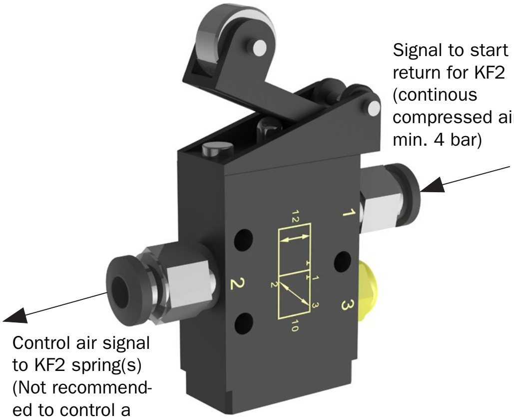
Basic information

Material	Polyamide
Max. temperature	130°C
Max. pressure	27 bar
Color	Blue
Min. bend radius	35 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 443.

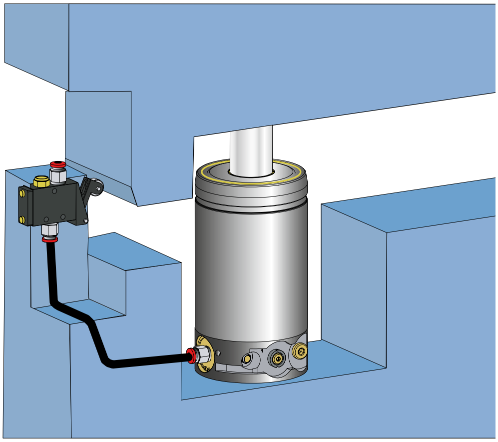


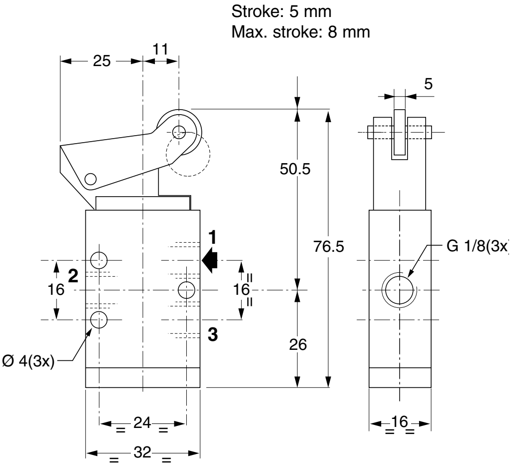
Signal to start return for KF2 (continous compressed air min. 4 bar)

Control air signal to KF2 spring(s) (Not recommended to control a Valve Block)

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

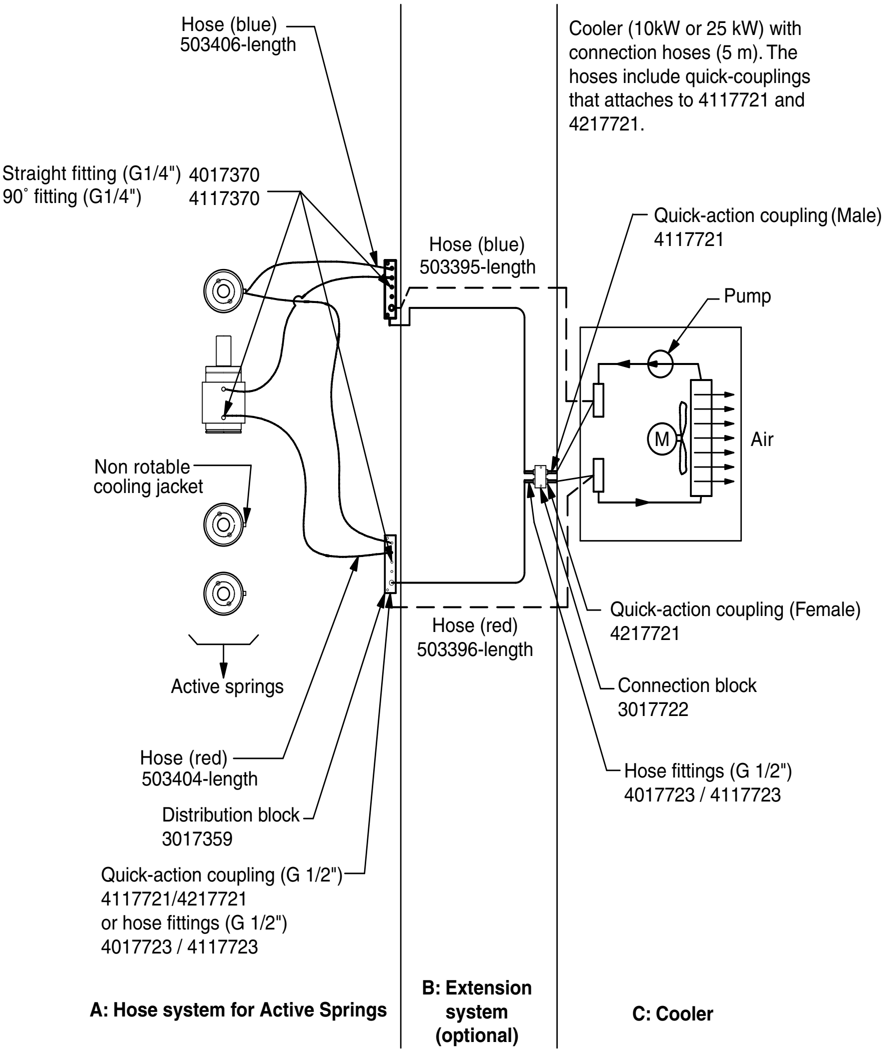
Liquid cooling system components

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* on page 449)
- **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* on page 450.

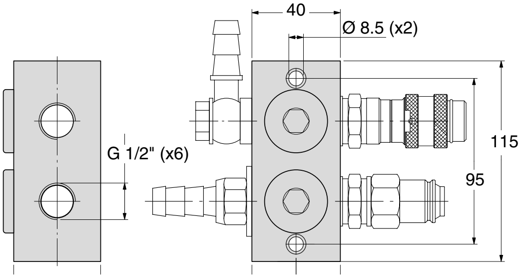


The cooling fluid is circulated within a closed system through the Cooling Jacket(s), to a Cooler Unit (10kW or 25kW), where heat from the KF2 spring(s) is then dissipated.

Cooling System – Hose & Fittings

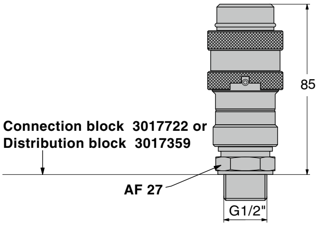
Connection Block

Order No. 3017722



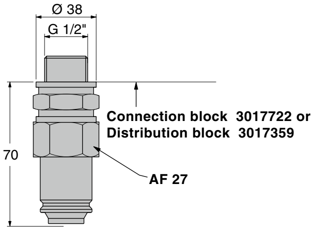
Female Quick Release Coupling

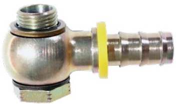
Order No. 4217721



Male Quick Release Coupling

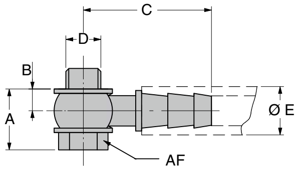
Order No. 4117721





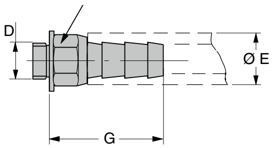
90° Hose Fitting

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



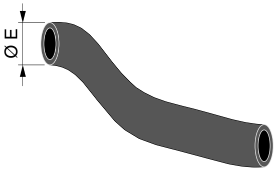
Straight Hose Fitting

Order No.	D	E	G	AF
4017370	G 1/4”	16	28	12
4017723	G 1/2”	23	58	27



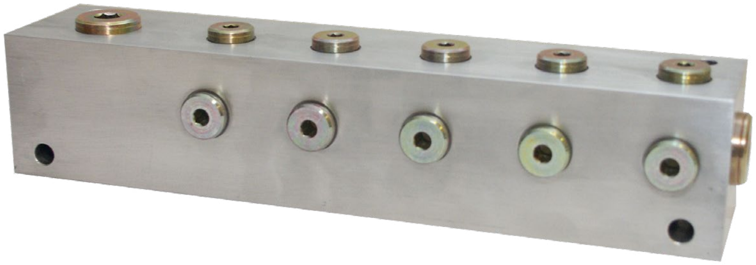
Cooling Hose

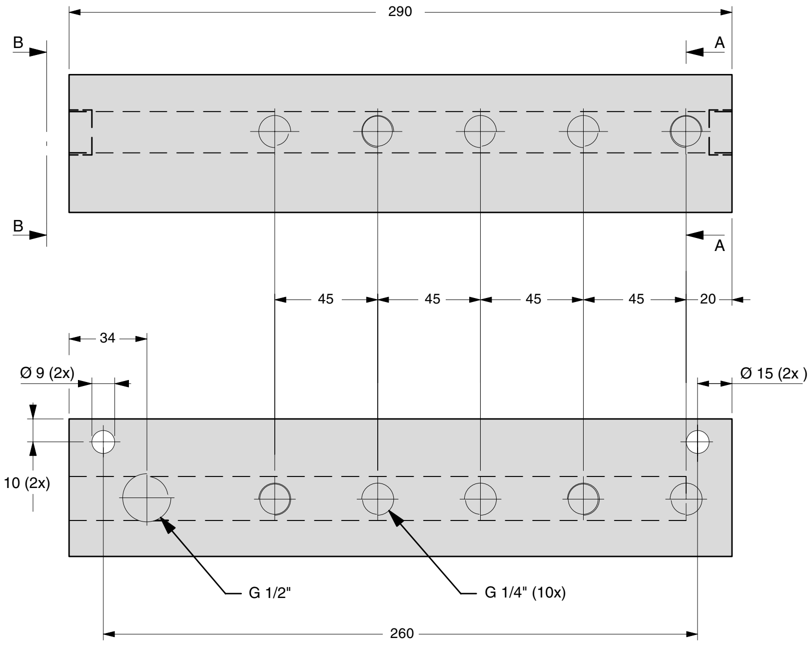
Order No.	E	DN	Color	Min. bend radius
503406	16	10	Blue	75 mm
503404	16	10	Red	75 mm
503395	23	16	Blue	150 mm
503396	23	16	Red	150 mm

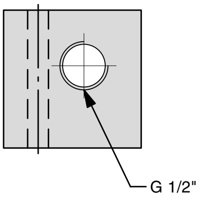


Cooling System – Distribution Block

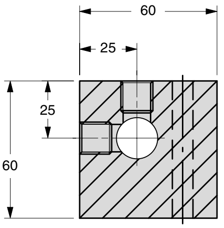
Order No. 3017359







View B-B



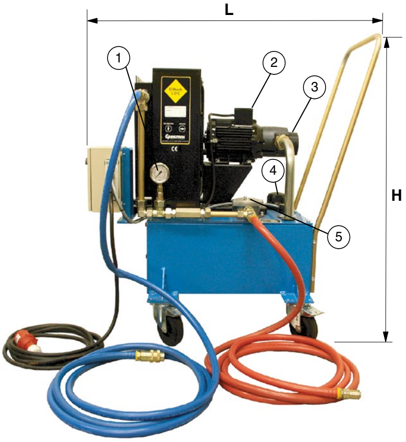
View A-A

Liquid Cooling System – Cooler Unit (LC)

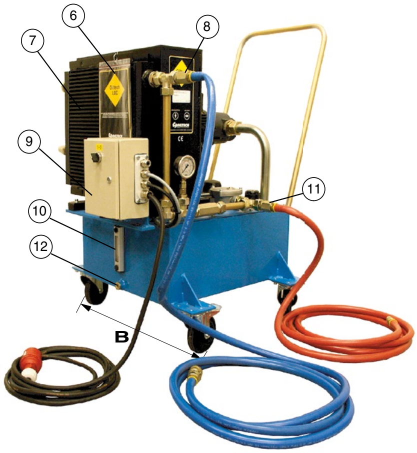
Two cooler unit sizes are available:

- 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 Inquiry Form on page 191 and fax or email it to your local KALLER® distributor or directly to KALLER® .



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. **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:

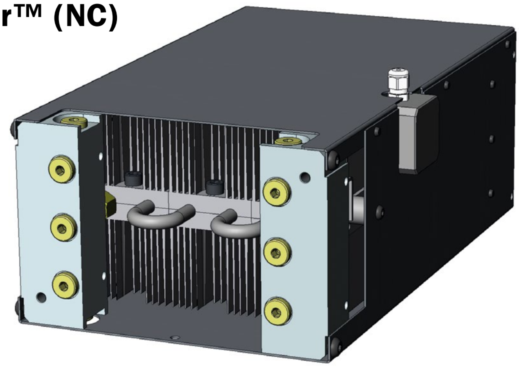
Order No.	**4017360 (10 kW)**
Quick connection	1/2”
H	1,000
L	900
B	700
Pump flow	40 l/min
Tank capacity	60 l
Electric motor	1.5 kW
Power supply	380 V AC
Weight	170 kg

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)

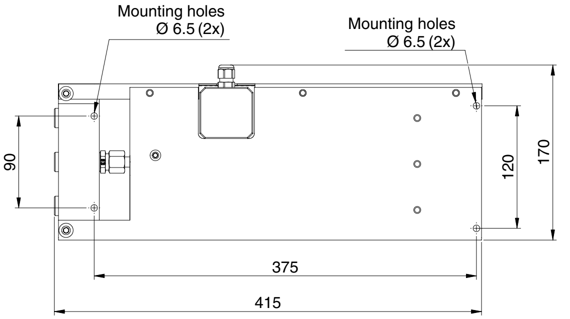


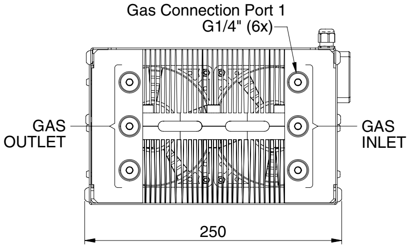
Nitro Cooler™ – Order No. 2021641

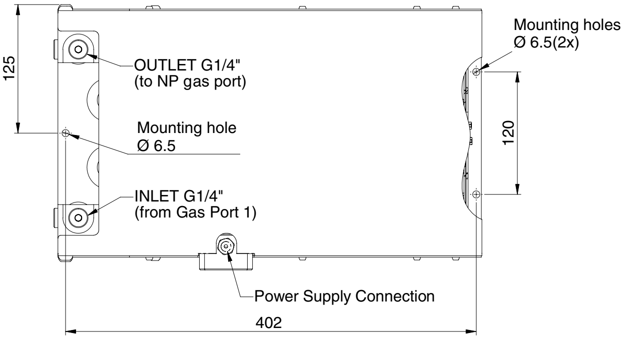
The KALLER® Nitro Cooler™ unit(NC) has been engineered to provide Tool Integrated Cooling for Controllable Gas Springs (KF2 or KF2-A) when operating at high production rates.

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).







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

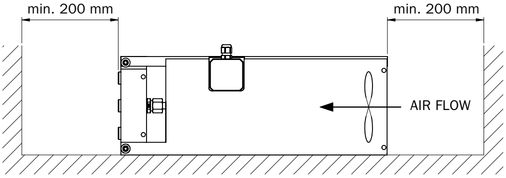
Nitro Cooler™ Unit (NC) dimensions

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.

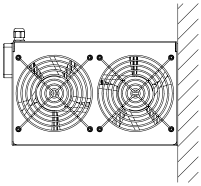
Nitrogen Cooling System – Nitro Cooler™ (NC)

Mounting possibilities

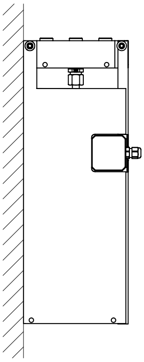
Nitro Coolers can be mounted both vertically and horizontally. When mounting it is important NOT to restrict the air flow through the cooler. If the air flow is restricted through the Nitro Cooler™, this will have a negative effect on the cooler's performance.



Base mount



Horizontal mount



Vertical mount

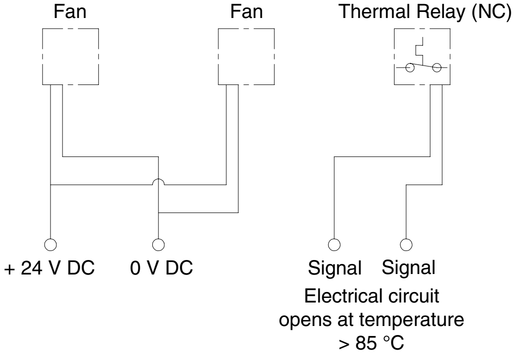
Electrical connections

The wiring diagram for the Nitro Cooler™ is depicted below. This diagram can also be found on the label attached to the side of the Nitro Cooler™ 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.

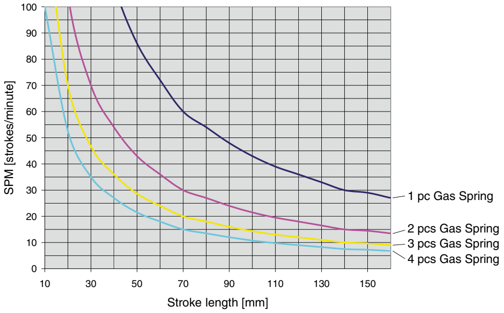
Important! When using the Nitro Cooler™, the return stroke speed of the piston rod decreases by approximately 50%. With a distance of 1 m between the cooler and the gas spring the speeds are as follows:

KF2/KF2-A 1500 – 0.10 m/s.
KF2/KF2-A 3000 – 0.08 m/s.
KF2/KF2-A 5000 – 0.05 m/s.
KF2/KF2-A 7500 – 0.03 m/s

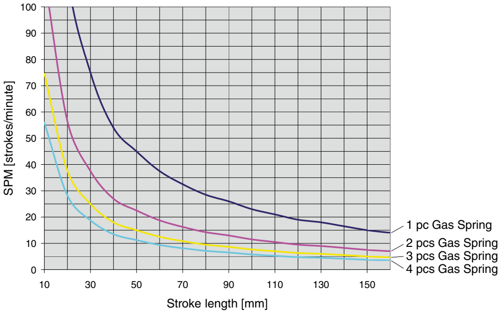
If a higher speed is needed, please contact your local distributor or KALLER® .

See example on the next page:

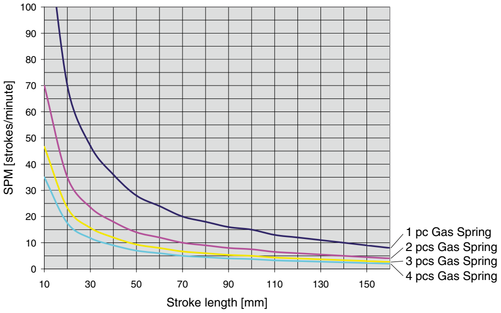
KF2/KF2-A 1500



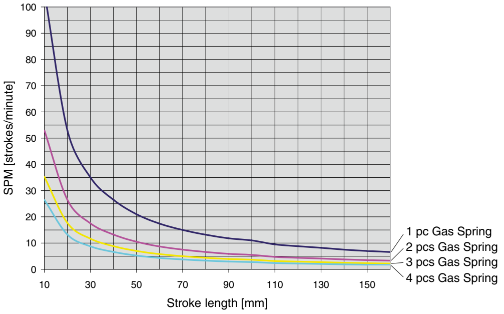
KF2/KF2-A 3000



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)

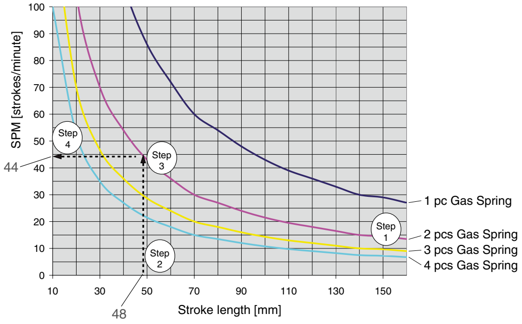
The used number of Gas Springs
(2 Gas Springs in this example)

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.

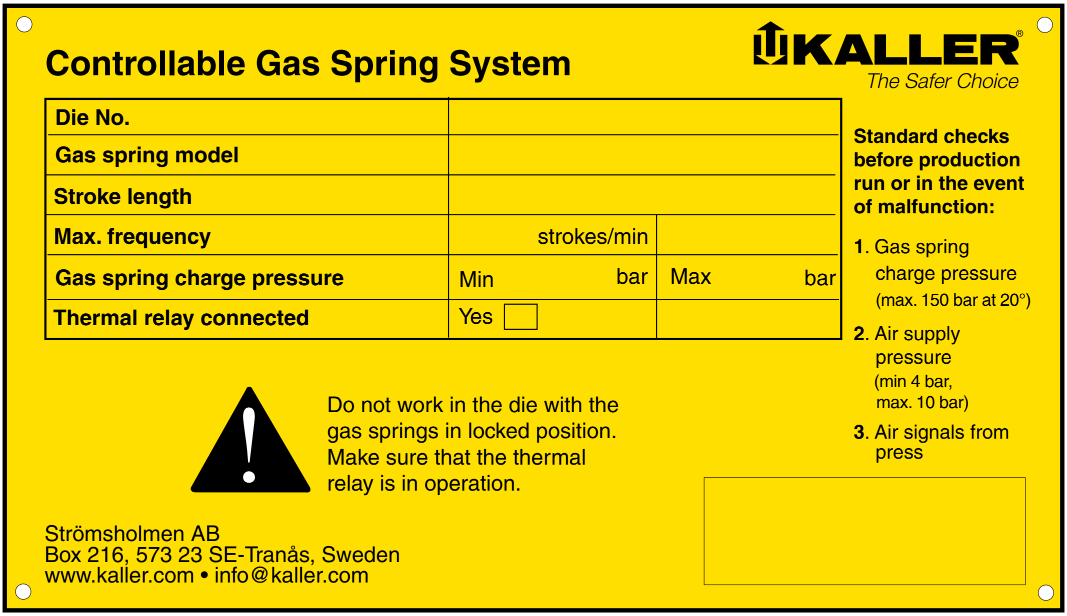
Max SPM for one Gas Spring with one Nitro Cooler



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:

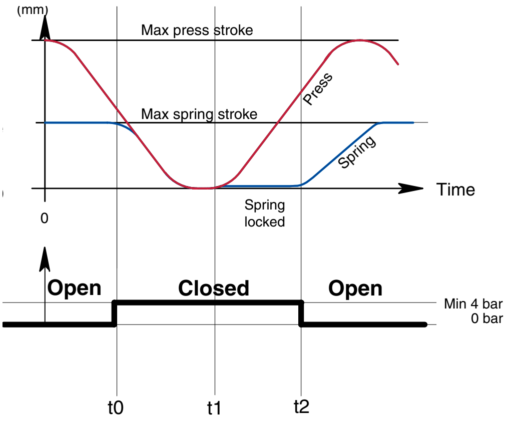
1. Gas spring charge pressure (max. 150 bar at 20°)
2. Air supply pressure (min 4 bar, max. 10 bar)
3. Air signals from press

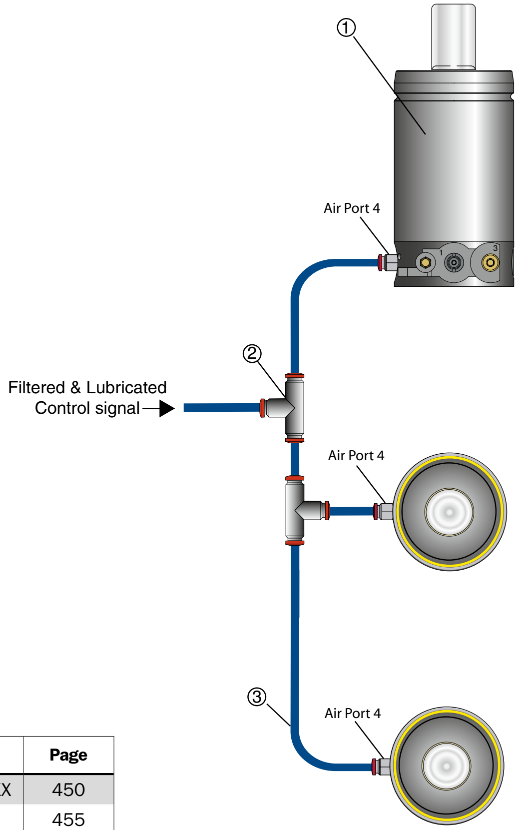
Do not work in the die with the gas springs in locked position. Make sure that the thermal relay is in operation.

Strömsholmen AB
Box 216, 573 23 SE-Tranås, Sweden
www.kaller.com • info@kaller.com

Installation Examples

Control System – Standard Lock, KF2





Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	450
2	2	T - Connector	503368	455
3	1	Pneumatic Hose Ø 6 mm	503377-XX	455

A Standard Lock System requires one control signal.

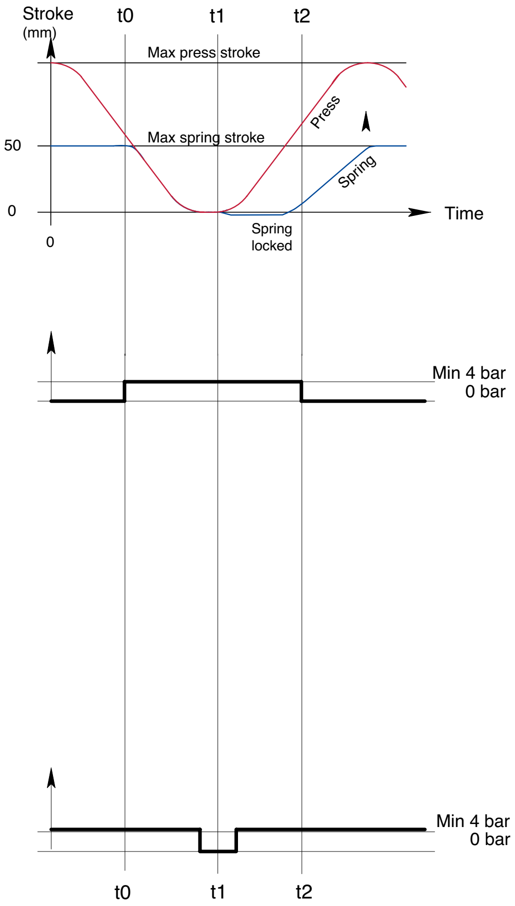
The KF2 gas springs are delivered with air fittings suitable for Ø 6 mm pneumatic hoses.

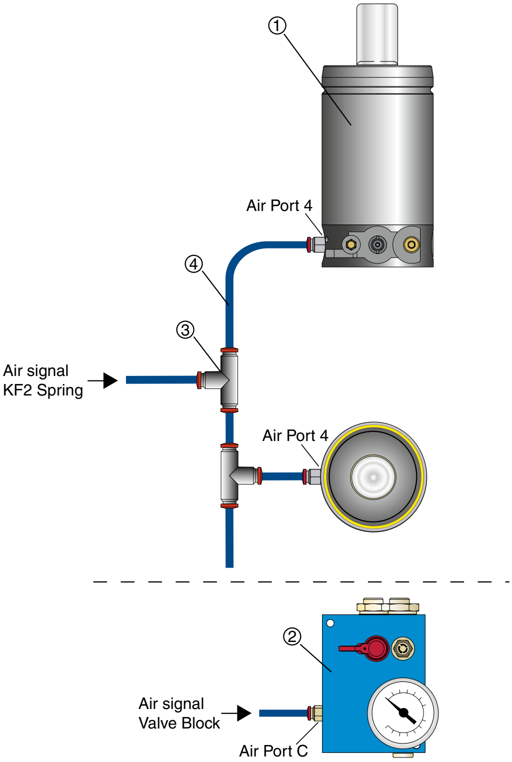
Please note! To lock and unlock all KF2 springs simultaneously, the hose lengths from the different springs to the air inlet should all be the same length.

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	450
2	1	All-in-one Valve Block	2020801	454
3	2	T Connector	503368	455
4	1	Pneumatic Hose Ø 6 mm	503377-XX	455

A Positive Lock System requires two control signals. One to operate the KF2 gas spring(s) and one to operate the Valve Block

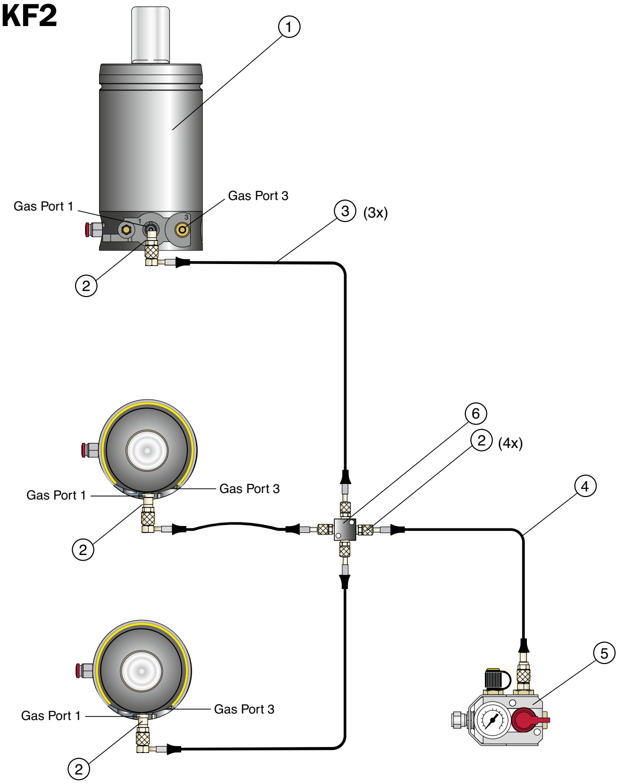
The KF2 gas spring and Valve Block are supplied with air fittings suitable for Ø 6 mm pneumatic hoses.

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 continuous 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	450
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).

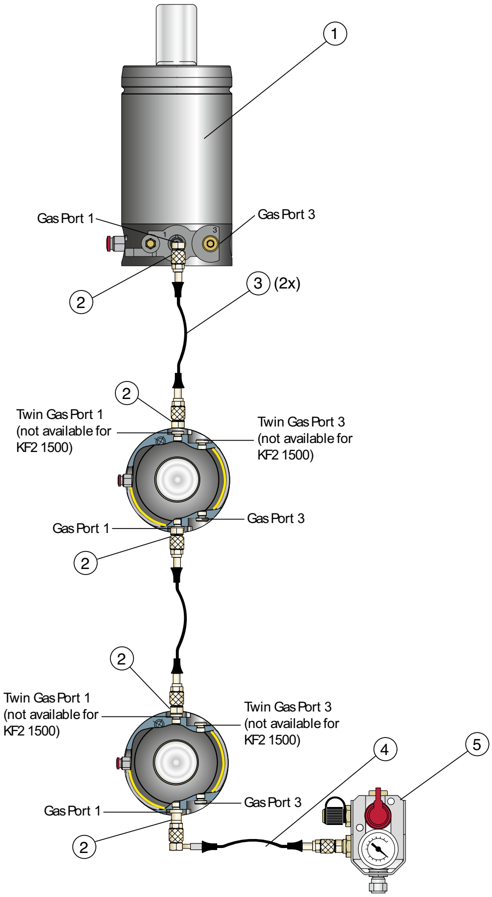
We recommend the EZ Hose system and fittings be used for such systems. The KF2 gas springs are delivered with Gas Ports 1 and 3 plugged. When connecting the EZ Hose system, the charging valve in Port 1 of each KF2 gas spring must first be removed. Each G 1/8” Gas Port, for both the KF2 Gas Spring and 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	450
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

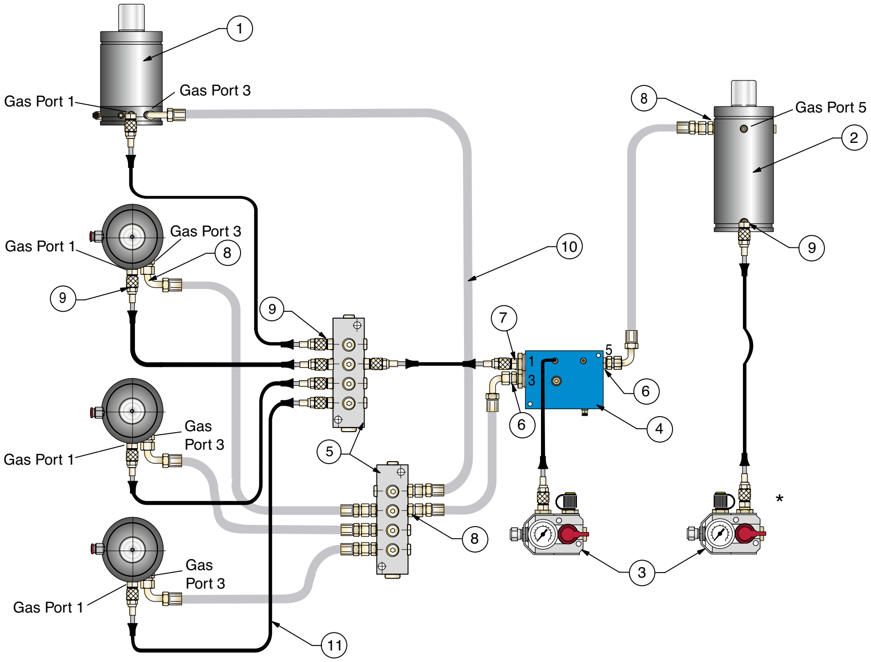
To charge, bleed and check the gas pressure for a Standard Lock in a KF2 gas spring system, all springs should be connected to a standard Control Block. These hoses are connected using the KF2’s twin gas ports to the Control Block.

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 E024 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	450
2	1	KP Passive Spring	KP XXXX	453
3	2	Control Block	3116114-01	Main Catalog
4	1	Standard Valve Block	2120801	454
5	2	Multi-Coupling Block G 1/8”	3015044	Main Catalog
6	2	E024 Adapter G 1/4”	504144	Main Catalog
7	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
8	10	E024 Adapter G 1/8”	503593	Main Catalog
9	10	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
10	6	E024 Hose straight - 90°	3220857-xxxx	Main Catalog
11	7	EZ Hose straight - straight	4014974-xxxx	Main Catalog

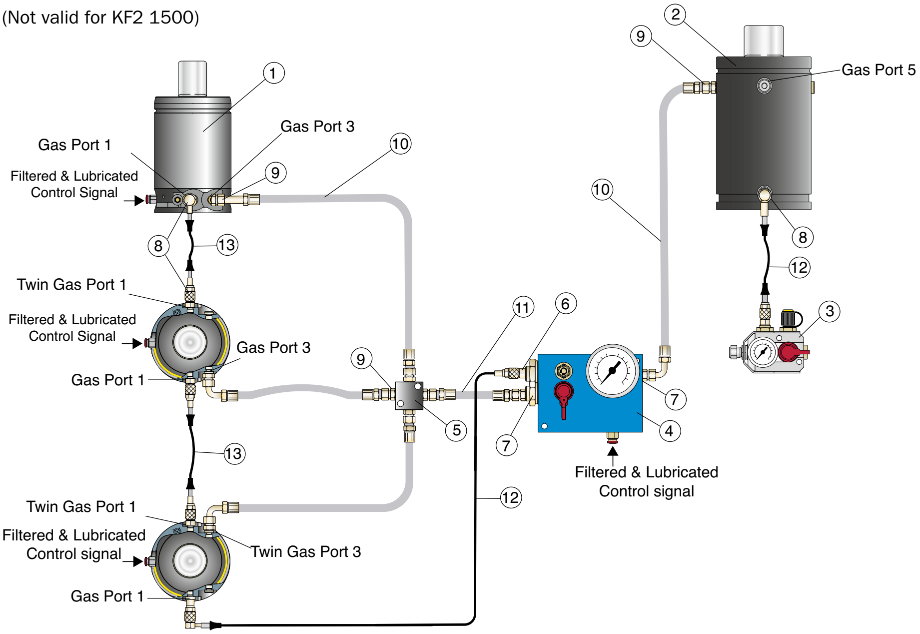
Positive Lock, KF2 + KP
As indicated above, perform gas charging and bleeding as follows:
Step 1
Charge the lower gas chamber in the KP Passive Gas Spring via the Control Block (3)*.

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:

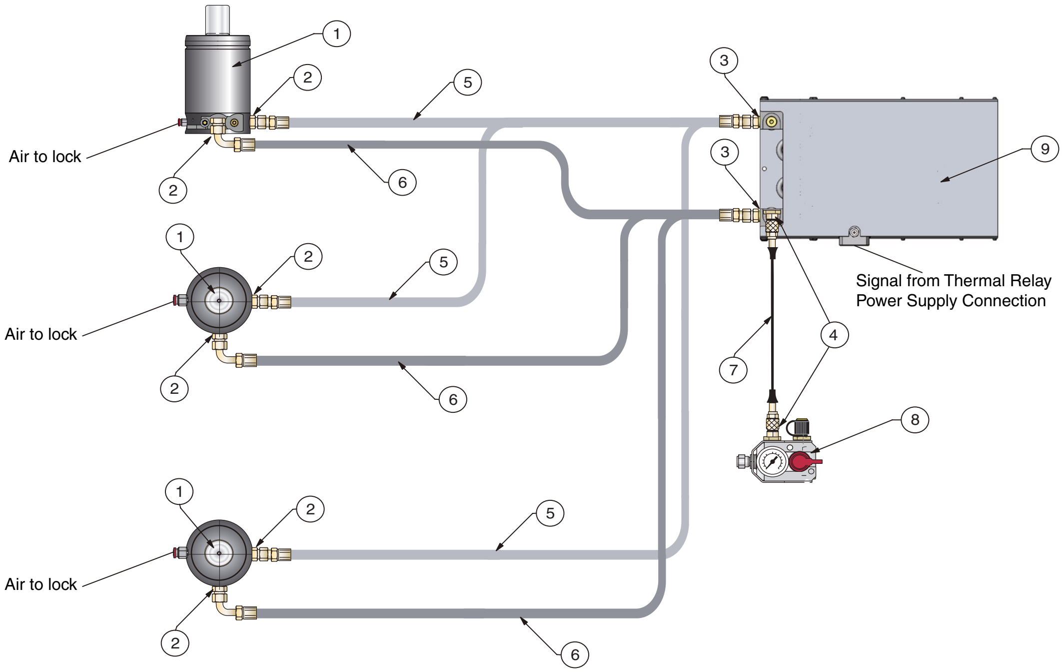
- One EZ Hose connection
- One E024 Hose connection.

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	450
2	1	KP Passive Spring	KP XXXX	453
3	1	Contol Block	3116114-01	Main Catalog
4	1	All-in-One Valve Block	2020801	454
5	1	Coupling Block	4017032	Main Catalog
6	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
7	2	E024 Adapter G 1/4”	504144	Main Catalog
8	6	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
9	8	E024 Adapter G 1/8”	4014019	Main Catalog
10	4	E024 Hose straight – 90°	3220857-xxxx	Main Catalog
11	1	E024 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™



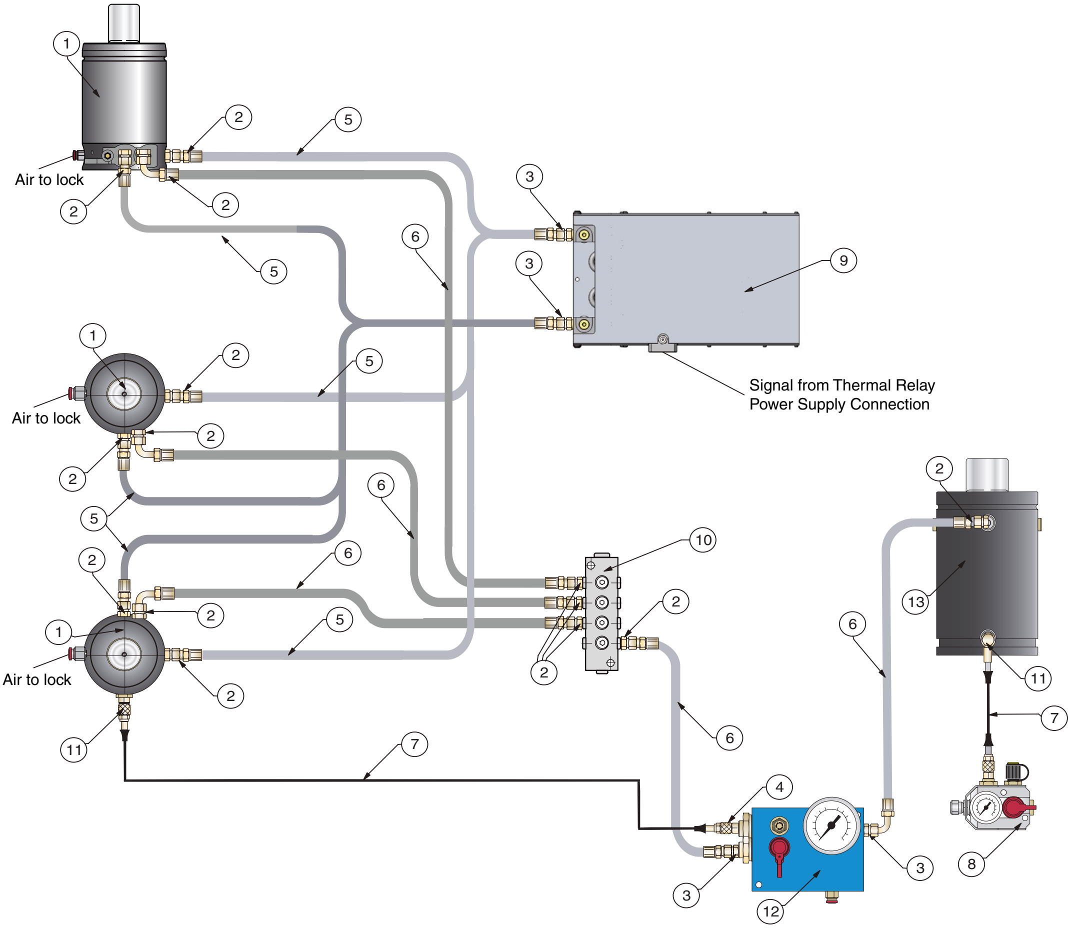
Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas spring	KF2 XXXX-XXXX NC	450
2	6	E024 Adapter G 1/8”	503593	Main Catalog
3	2	E024 Adapter G 1/4”	504144	Main Catalog
4	2	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	3	E024 Hose straight – straight	3020857-xxxx	Main Catalog
6	3	E024 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	461

When using a Nitro Cooler™, only E024 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™.

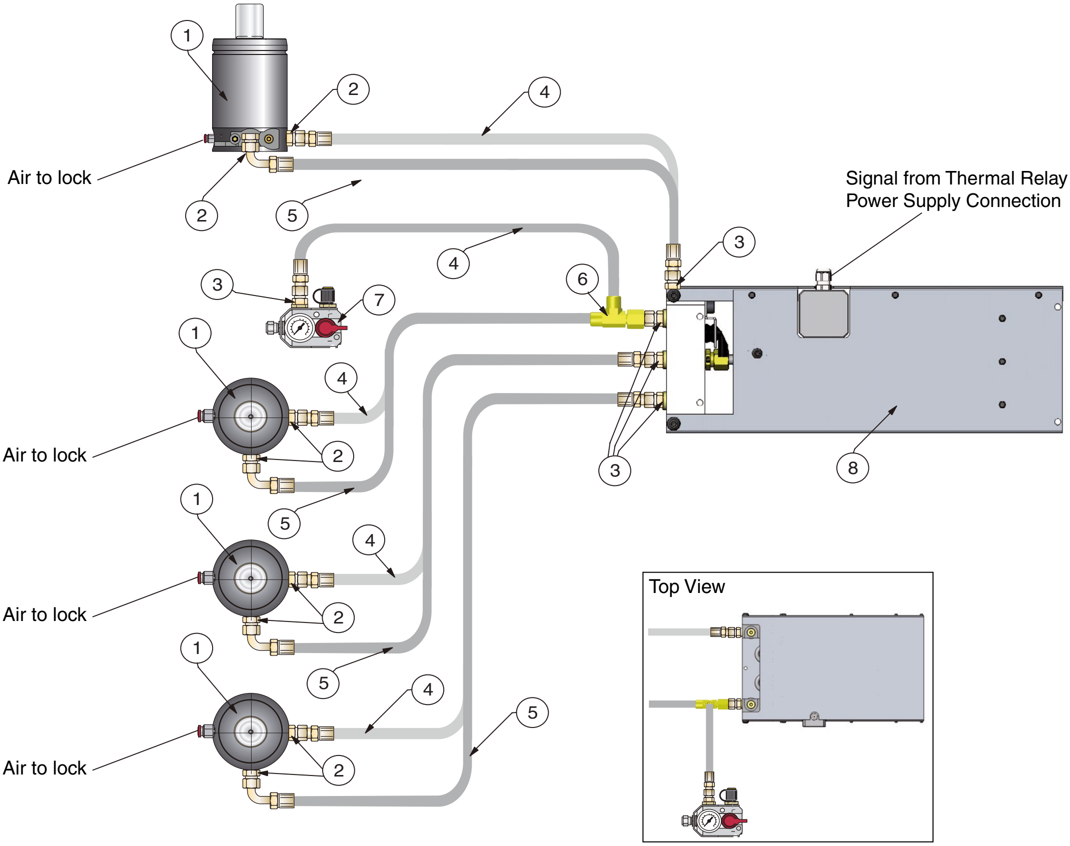
KF2-NC connection – Positive lock with a Nitro Cooler™



Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXXX NC	450
2	14	E024 Adapter G 1/8”	503593	Main Catalog
3	8	E024 Adapter G 1/4”	504144	Main Catalog
4	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	6	E024 Hose straight – straight	3020857-xxxx	Main Catalog
6	5	E024 Hose straight – 90o	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	461
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	454
13	1	KP Passive Spring	KP xxxx	453

When using a Nitro Cooler™ for a positive lock system, the requirement are the same as for a standard lock system. (See previous page.)

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	450
2	8	E024 Adapter G 1/8”	503593	Main Catalog
3	9	E024 Adapter G 1/4”	504144	Main Catalog
4	5	E024 Hose straight – straight	3020857-xxxx	Main Catalog
5	4	E024 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	461

Frequently Asked Questions (FAQ's)

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 KALLER® directly for more information.
Can I combine different KF2 size springs in the same system?	No. Please contact your local KALLER® distributor or KALLER® directly for more information.

Frequently Asked Questions (FAQ's)

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 451.
How fast can the KF2 spring be stroked?	0.8 m/s 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 446 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 KALLER® 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 KALLER® directly for more information.

Frequently Asked Questions (FAQ's)

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.

Frequently Asked Questions (FAQ's)

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 446 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 Cooler™ used for 1pc KF2 spring ” (see page 447), please secure according to the diagrams on page 463.
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 KALLER® cannot be held responsible for poor function.

Frequently Asked Questions (FAQ’s)

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 Cooler™. See table on page 463.
Can we eliminate the decrease in return speed caused by the Nitro Cooler™ ?	No. When using the Nitro Cooler™, 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 – 0.10 m/s. KF2/KF2-A 3000 – 0.08 m/s. KF2/KF2-A 5000 – 0.05 m/s. KF2/KF2-A 7500 – 0.03 m/s. return stroke speed. If a higher speed is needed, please contact your local distributor or KALLER® .
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.

Troubleshooting

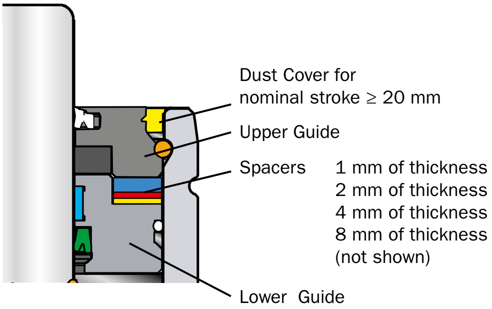
System	Problem	Solution
Standard Lock, KF2	KF2 spring does not lock	Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's springback is greater than 1 mm	Make sure 100% of the KF2 spring's nominal stroke length ±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

Appendix

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.

Table 1

To adjust from nominal stroke length					
		Spacer (mm)			
	Stroke length	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

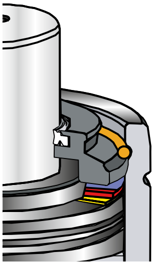
Important!

- **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**

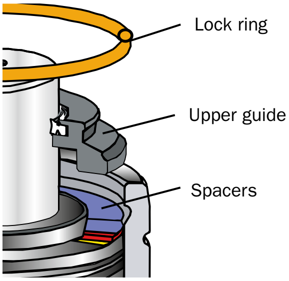
Stroke length adjustment of KF2-A

Work procedure



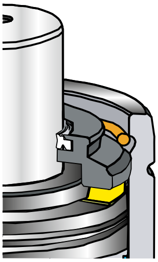
1: Make sure the KF2-A gas spring is degassed and remove the dust cover (if applicable).

2: Knock down the guide and remove the lock ring by using a mounting sleeve and a plastic hammer.

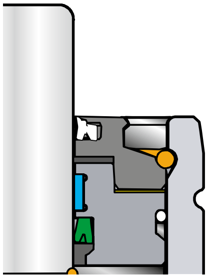


3: Remove the Upper Guide and install the combination of Spacers that will give you the required stroke length.

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.



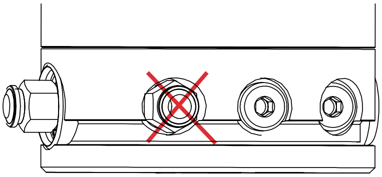
6: Make sure that the guide is flush with the top of the tube. (If not, check the installation of the lock ring.)

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

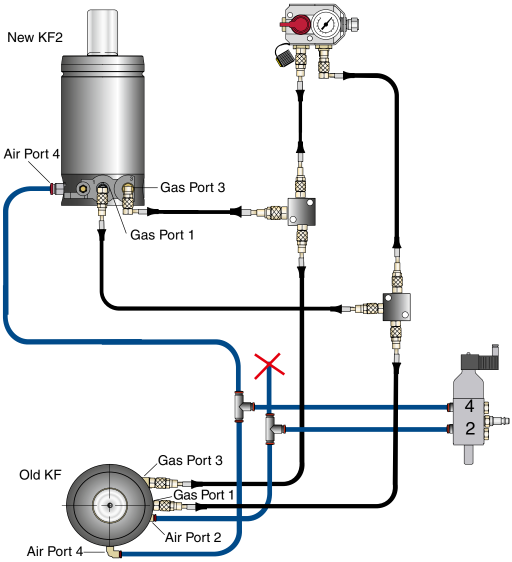


How to fit the new KF2 to existing KF systems

KF2 Controllable Gas Springs are completely interchangeable with existing KF springs.

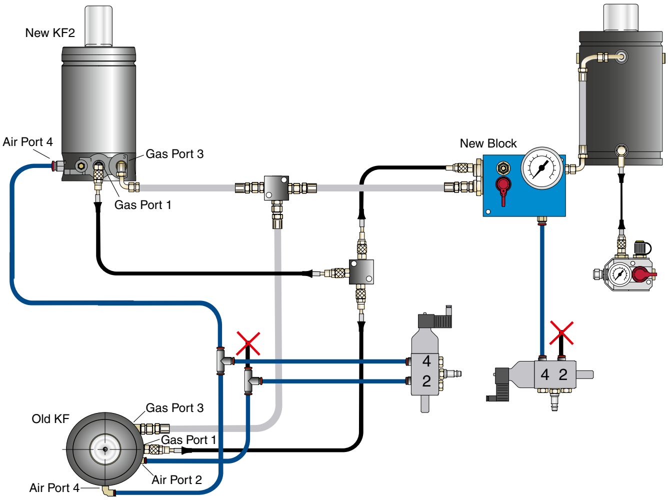
Standard Lock Example:
Replacing an existing KF with a new KF2

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

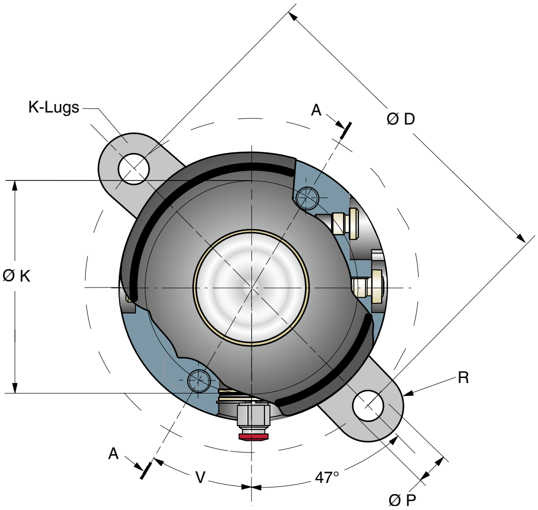
To replace an existing KF spring with a new KF2 spring in a Positive Lock System, simply plug the air signal that went to the KF springs Air Connection Port 2 (shown here by an **X**).

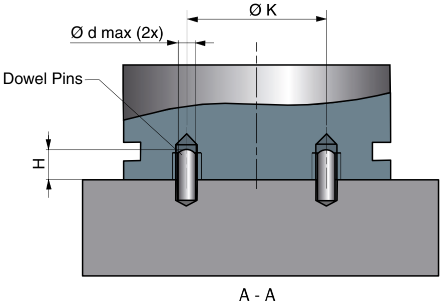


KF2/KF2-A Alternative Mounting

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.

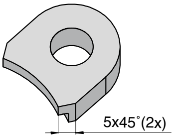
For upright installations, an alternative is to mount the Controllable Gas Springs using two K Lugs in combination with dowel pins, as shown below. The dowel pins will engage the threaded holes in the bottom of the spring (M12 and M16, respectively) and will prevent the spring from moving out of position even if the lugs would come loose. The dowel pins will also ensure that the springs are installed in the correct position.





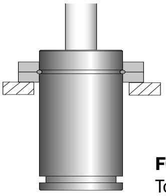
Model	Ø D	Ø d max.	H	Ø K	V	Ø P	R	Order No. K Lug
KF2/KF2-A -1500	130	8	10	50	60	17.5	20	2 pcs K-3000*
KF2/KF2-A -3000	155	8	10	95	30	17.5	25	2 pcs K-5000
KF2/KF2-A -5000	195	12	10	110	30	21.5	25	2 pcs K-7500
KF2/KF2-A -7500	240	12	10	120	30	21.5	29	2 pcs K-10000

***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.

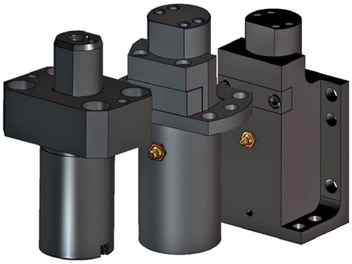


Modification of K-3000 Lug

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 KALLER® .

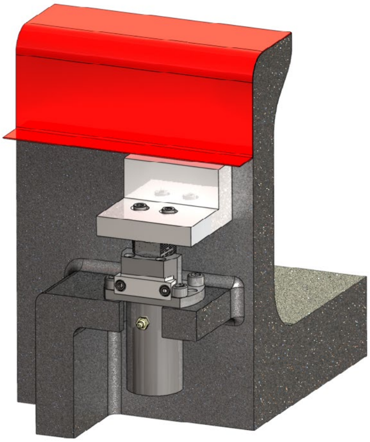


FCSC
Top mount



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.



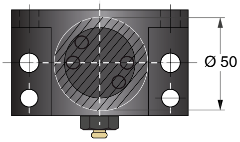
KALLER® - THE SAFER CHOICE

Training **Safety** **Reliability**

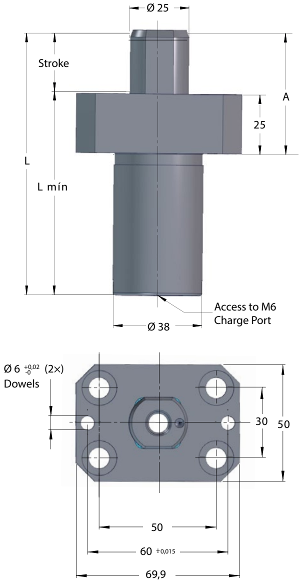
Learn more about KALLER® Training as well as the Safety and Reliability features at kaller.com

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

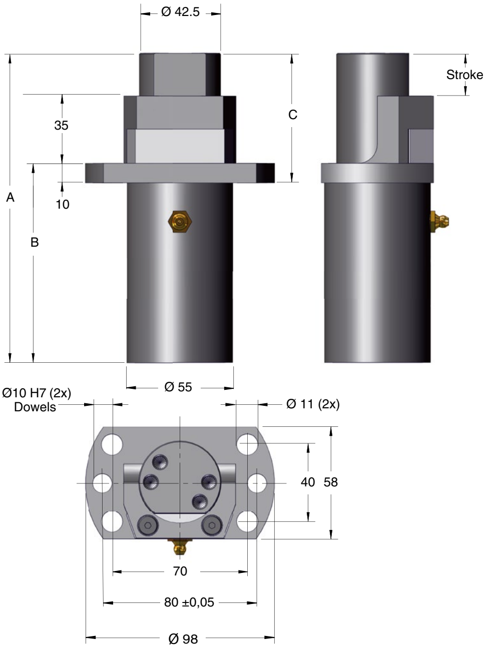


Order No.	Stroke S	Gas Spring	L	A	Weight [kg]
SLMTS 170-025	25	X 170	112	52	0.93
SLMTS 170-038	38	X 170	138	65	1.00
SLMTS 170-050	50	X 170	162	77	1.06
SLMTS 170-080	80	X 170	225	107	1.25
SLMTS 170-100	100	X 170	265	127	1.36
SLMTS 170-125	125	X 170	315	152	1.49

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.

Dimensions LTP - Top mount



Note!
Access to the grease nipple must be provided in the tool.

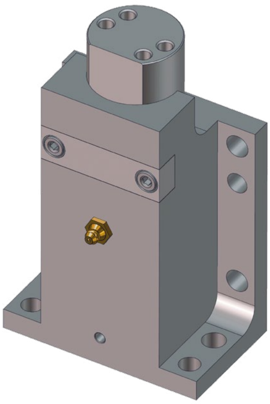
Order No.*	Stroke S	Gas spring	A	B	C
LTP 150-050	50	M2 150-050	200	103	107
LTP 150-080	80	M2 150-080	260	133	137

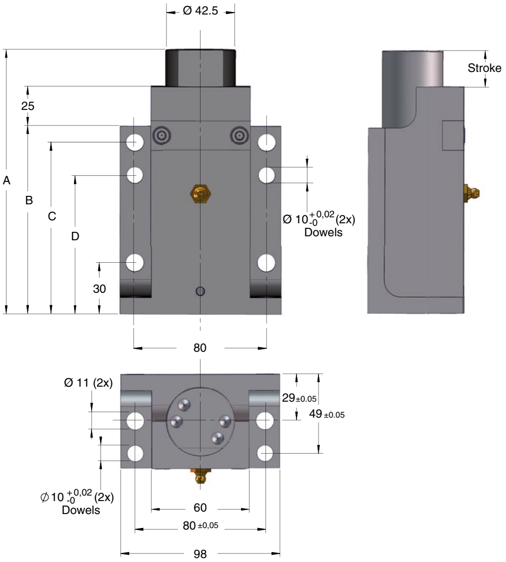
*Available in different forces.

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.

Features and benefits Flange Strippers LT and LW

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.

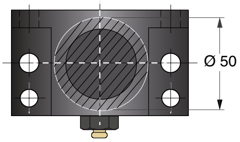
KALLER® - THE SAFER CHOICE

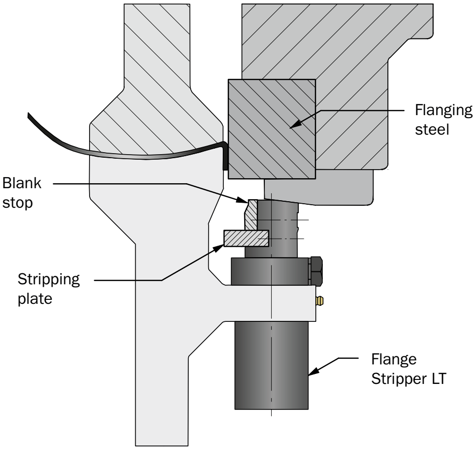
Training	Safety	Reliability
Training	P>max	APPROVED PED 2014/68/EU 2 million

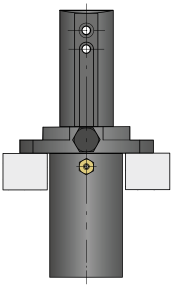
Learn more about KALLER® Training as well as the Safety and Reliability features at kaller.com

Mounting options

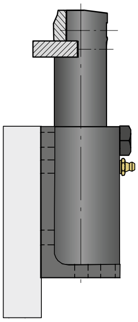
Attachment - Placement
The center of gravity of the attached mass to the Flange Stripper unit is not to be placed with an offset from the center axis greater than according to the picture below.



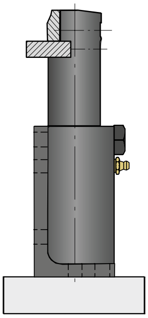




LT - Top mount

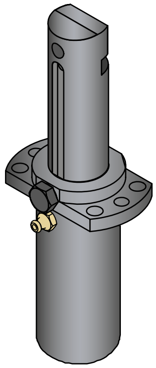


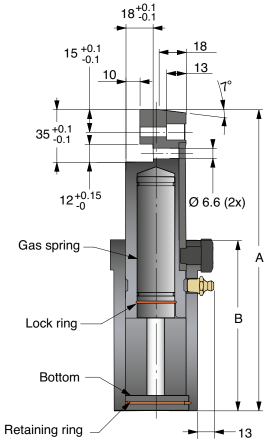
LW - Wall mount

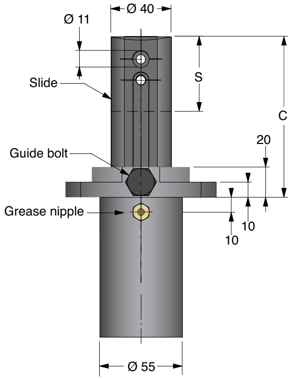


LW - Bottom mount

Dimensions LT - Top mount

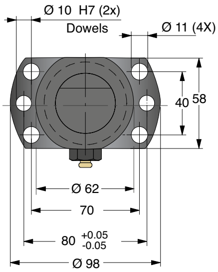






Note!
Access to the grease nipple must be provided in the tool.

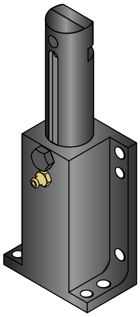
Order No.	Stroke S	Gas spring	A	B	C
LT 050	50	M2 200-050	200	113	107
LT 080	80	M2 200-080	260	143	137

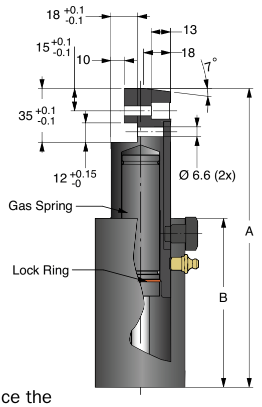


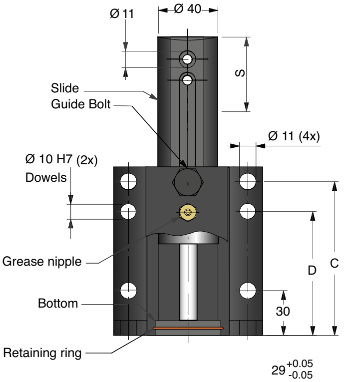
Max. attachment capacity per lifter* Metric	
Ram velocity (m/s)	**Attachment mass (kg)**
0.60	10
0.80	5.6
1.00	3.6
1.20	2.5

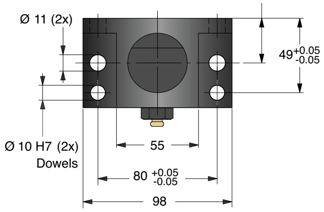
* Determine ram / press max. velocity and reference the recommended attachment mass per stripper. For increased capacity, install external positive stops and guiding to prevent stripper damage.

Dimensions 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

Stock Lifters - SLME 170 • SLMT 170 • SLM 300 • SPC 800

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

KALLER® - THE SAFER CHOICE

Training **Safety** **Reliability**

Training

V>max

APPROVED PED 2014/68/EU

2 million

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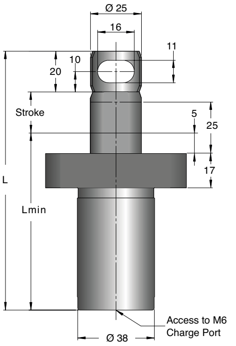
SLME 170

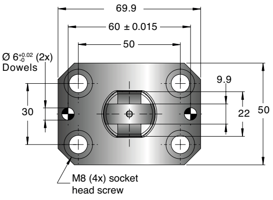
Order No.	S Stroke	Force in N at 180 bar/ + 20°C		L ±0.25	L min	Gas volume (l)	Weight (kg)
		Initial	End force *				
SLME 170-025	25	1700	2800	127	82	0.006	0.81
SLME 170-038	38			153	95	0.009	0.88
SLME 170-050	50			177	107	0.012	0.94
SLME 170-063	63			203	120	0.015	1.01
SLME 170-080	80			240	140	0.019	1.10
SLME 170-100	100			280	160	0.024	1.21
SLME 170-125	125			330	185	0.030	1.35

*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.

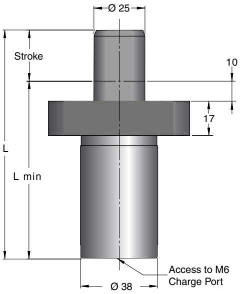


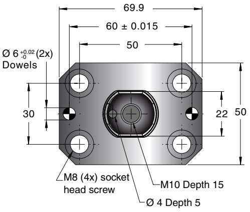


SLMT 170

Order No.	S Stroke	Force in N at 180 bar/ + 20°C		L ±0.25	L min	Gas volume (l)	Weight (kg)
		Initial	End force *				
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



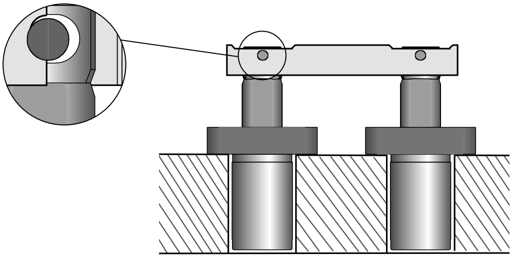


Basic information

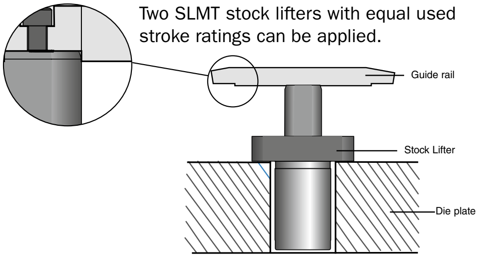
Initial force range	240-1700 N
Pressure medium	Nitrogen
Charging pressure range	25-180 bar
Operating temperature range	0-80° C
Force increase by temperature	±0.3% / °C
Recommended max. strokes/min	40-100 (at 20°C)
Max. piston rod velocity	0.6 m/s
Max. utilized stroke	100%
Internal gas spring	X 170

Mounting examples

Note!
Use Ear Attachment for multi-point lifting.



Note!
Use threaded holes for single point lifting.

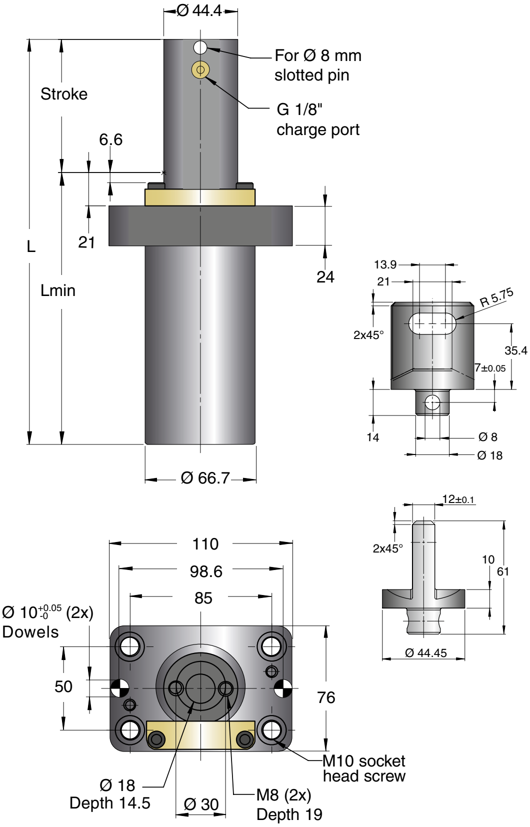


Two SLMT stock lifters with equal used stroke ratings can be applied.

SLM 300

Order No.	S Stroke	Force in N at 180 bar/ + 20°C		L ±0.25	L min	Gas volume (l)	Weight (kg)
		Initial	End force*				
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

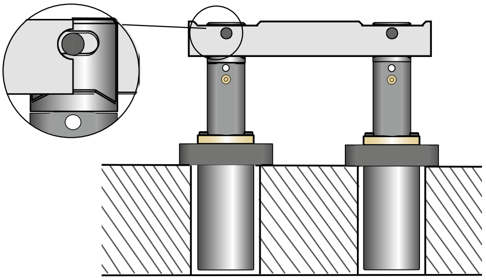
*Attachment mass assumes balanced load and actuation force. For increased capacity, install external positive stops to prevent lifter damage.

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. utilized stroke	100%
Repair kit	3020870

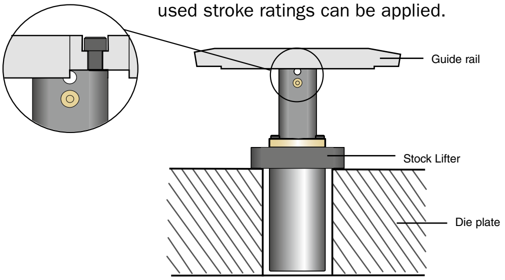
Mounting examples

Note!
Use SLM CAP for multi-point lifting only.



Note!
Use threaded holes for single point lifting.

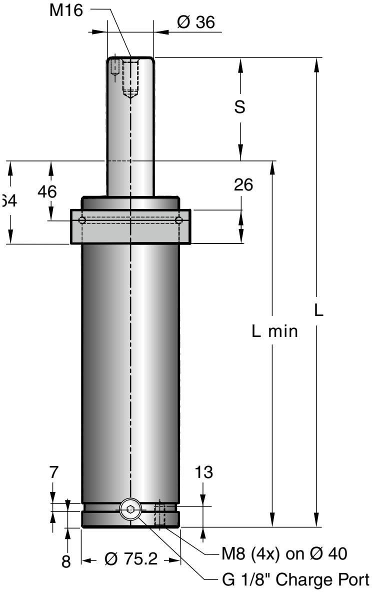
Two SLM 300 stock lifters with equal used stroke ratings can be applied.



SPC 800

Order No.	S Stroke	Force in N at 70 bar/ + 20°C		L ±0.25	L min	Gas volume (l)	Weight (kg)
		Initial	End force*				
SPC 800-050	50	7,100	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		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



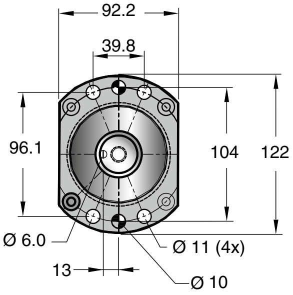
Max. attachment capacity per lifter Metric	
Ram velocity (m/s)	Attachment mass (kg)
0.3	30
0.4	17
0.5	11
0.6	7

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.

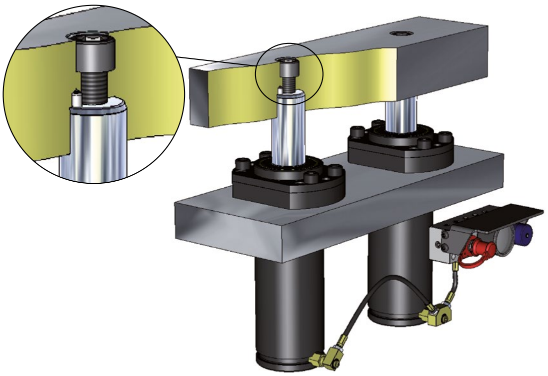
Basic information

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



SPC

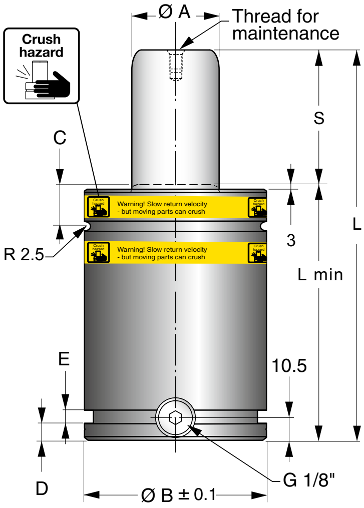
STOCK LIFTER - SPC 800

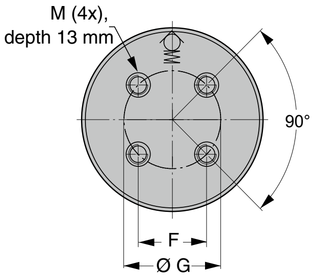
Approved for 2 000 000 full strokes (PED)

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





KALLER® - THE SAFER CHOICE

Training **Safety** **Reliability**

Training | V>max | P>max | S>max | APPROVED PED 2014/68/EU 2 million | Flex Guide™

Learn more about KALLER® Training as well as the Safety and Reliability features at kaller.com

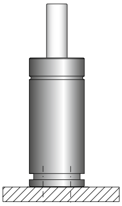
Model	Spring force in N at 150* bar/ + 20°C		Ø A	Ø B	C	D	E	F	Ø G	M
	Initial	End force*								
DS 3000	30,000	48,000	50	95.2	24	8	7	42.4	60	M8
DS 5000	50,000	82,000	65	120.2	25.5	8	7	56.6	80	M10
DS 7500	75,000	124,000	80	150.2	27.5	8	8	70.7	100	M10

* at full stroke

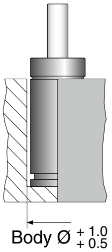
Basic information

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

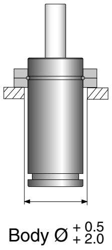
Mounting possibilities



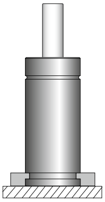
Base mount



Drop-in



Top mount



Foot mount

Stroke [mm]		**50**	**63.5**	**80**	**100**	**125**	**160**	**200**	**250**	**300**
DS 3000	L	220	247	280	320	370	440	520	620	720
	L min	170	183.5	200	220	245	280	320	370	420
DS 5000	L	240	220	300	340	390	460	540	640	740
	L min	190	203.5	220	240	265	300	340	390	440
DS 7500	L	255	282	315	355	405	475	555	655	755
	L min	205	218.5	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.

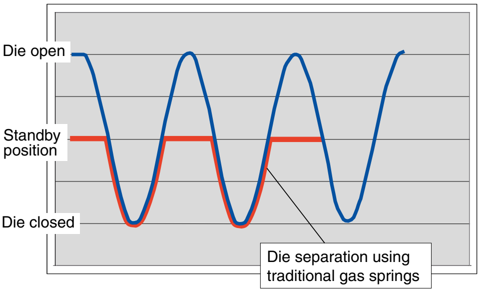


Diagram 1

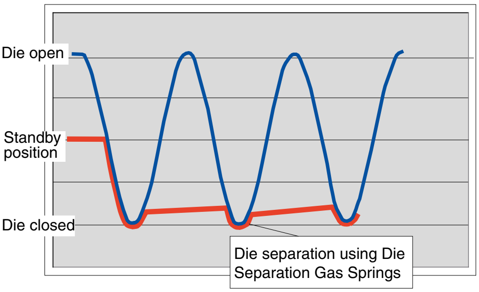
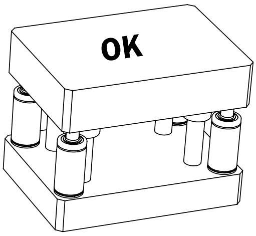
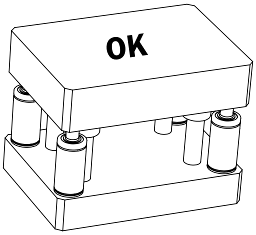
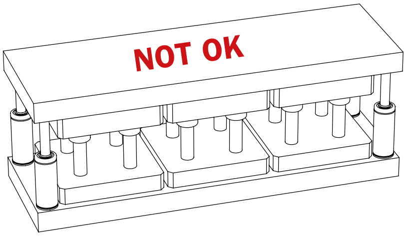


Diagram 2

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.

Roller Cam RC2 and RCP2

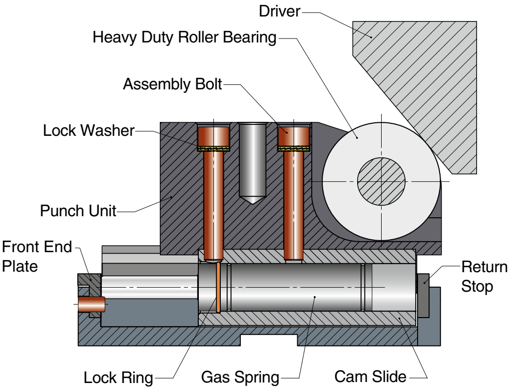
KALLER® Roller Cam has been developed to meet the industry’s increasing demands on standard cam units.

This new generation offers:

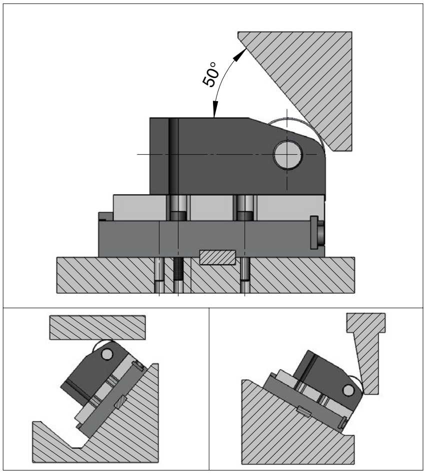
- High precision and maintenance free guiding allowing for more off center loading and upside-down installation
- Long service life
- Built in return stroke dampening
- Easy punch attachment. For other type of application, please contact your local distributor or Strömsholmen AB

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.

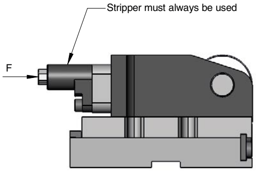
Design

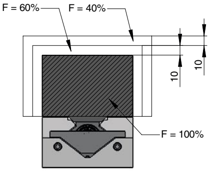


Mounting options

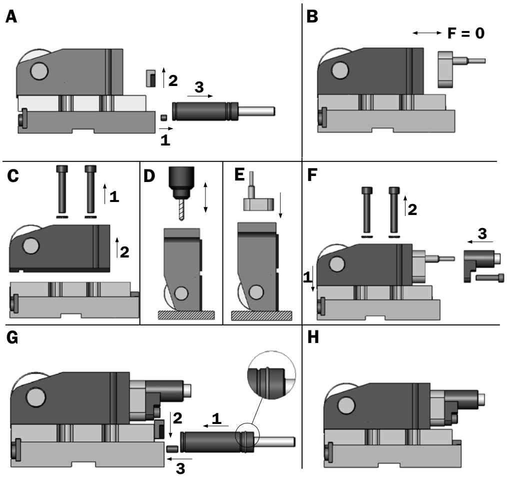


Punch location





Punch attachment



Basic information

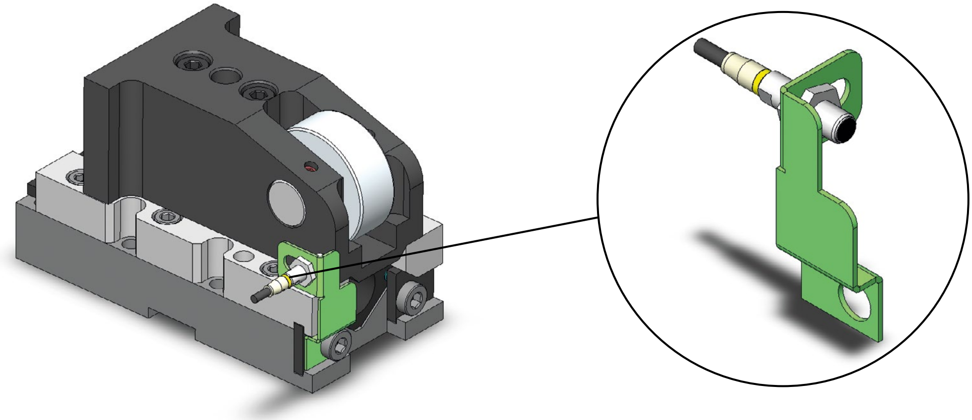
Recommended max. strokes/min	40 spm (at 20°C)
Max. Roller Cam velocity	0.8 m/s
Max. play at face of punch unit	0.02 mm

Note! For information about max. attachment weight, please contact your local distributor or Strömsholmen AB.

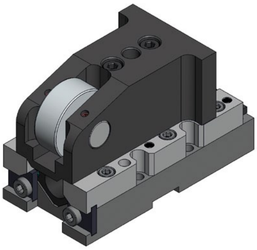
Roller Cam – Sensor Kit

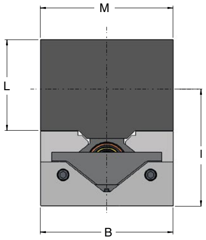
Roller Cam Sensor Kits are an optional accessory to all Roller Cams, providing a signal to the press when the Roller Cam is in start position. The Sensor Kit can easily be attached to the Roller Cam using return stop screw.

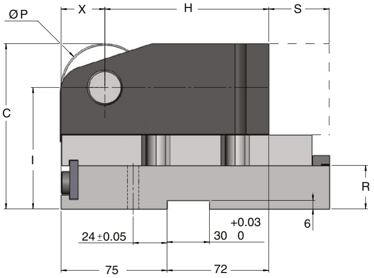
Note! For more information, please contact your local distributor or Strömsholmen AB.

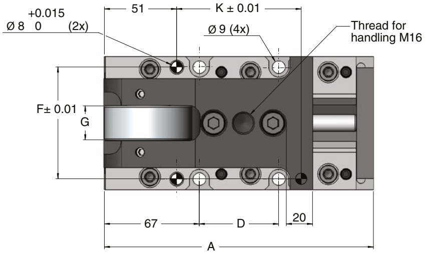


Dimensions RC2 30 & RC2 50







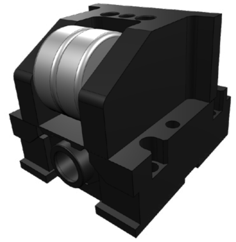


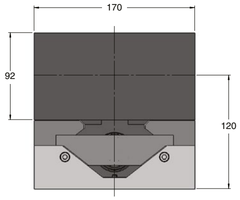
RC2 30 & 50

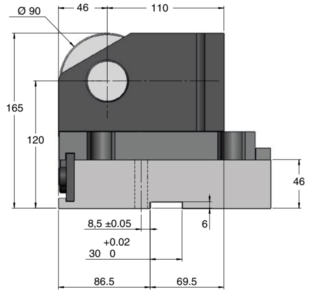
Order No.	Stroke S (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	B	C	D	F	G	H	I	K	L	M	P	R	X	Max. width of the driver
RC2 30-050	50	3,000	200	M2 200	190	94	117	56	79	25	116	86	88	64	94	62	31	31	36
RC2 30-080	80				220			86					118						
RC2 50-050	50	5,000	350	X 350	190	120	140	56	105	29	111	103	88	75	120	72	40	36	
RC2 50-080	80				220			86					118						
RC2 50-100	100				240		157	126				120	158				57		

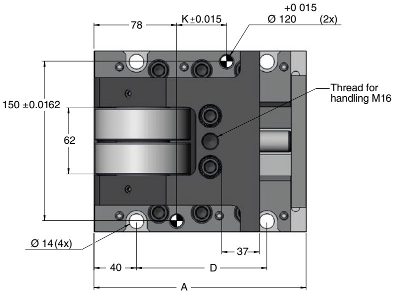
Note! For 2D & 3D CAD downloads, see www.kaller.com.

Dimensions RCP2 150





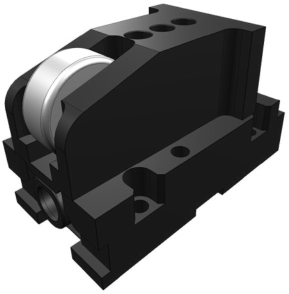


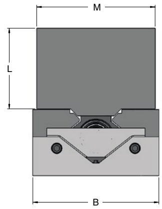


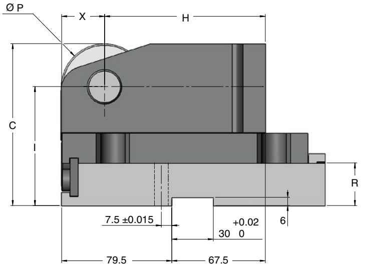
RCP2 150 - Dimensions as per PSA standard

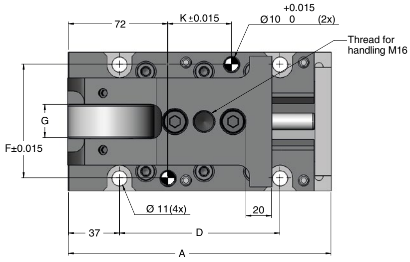
Order No.	Stroke S (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	D	K	Max. width of the driver
RCP2 150-050	50	15,000	500	X 500	200	123	47	65
RCP2 150-080	80				230	153	77	
RCP2 150-100	100				250	173	97	

Dimensions RCP2 30 & RCP2 50









RCP2 30 & 50 - Dimensions as per PSA standard

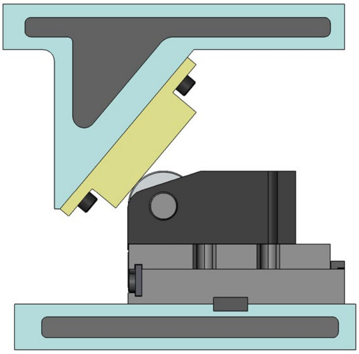
Order No.	S Stroke (mm)	Nominal force (daN)	Initial return force (daN)	Gas spring	A	B	C	D	F	G	H	I	K	L	M	P	R	X	Max. width of the driver
RCP2 30-050	50	3,000	200	M2 200	190	100	117	116	82	25	116	86	46	64	94	62	31	31	36
RCP2 30-080	80				220			146					76						
RCP2 50-050	50	5,000	350	X 350	190	120	140	116	102	29	111	103	46	75	120	72	40	36	
RCP2 50-080	80				220			146					76						
RCP2 50-100	100				240			166					96						

Note! For 2D & 3D CAD downloads, see www.kaller.com

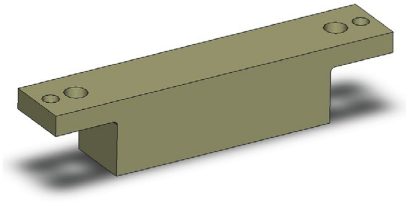
Roller Cam – Driver Plate

KALLER® Roller Cam Driver Plate has been designed to simplify the installation of Roller Cams.

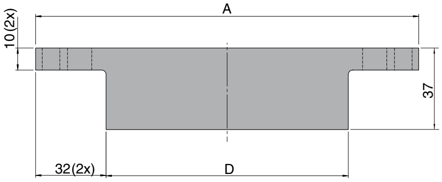
- Ground and hardened contact surface (60 HRC)
- Standardized sizes
- Independent of installation angle

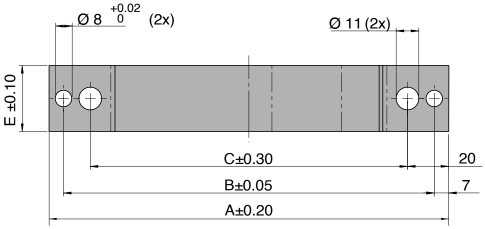


Driver Plate – Flat

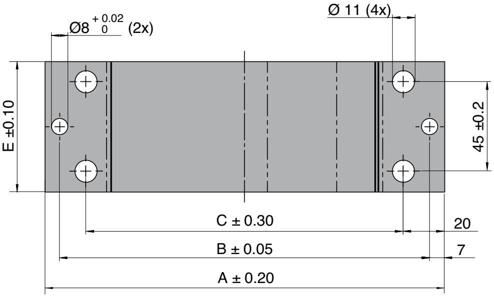


Order No.	A	B	C	D	E	Weight [kg]
3021265-01	174	160	134	110	32	1.16
3021265-02	264	250	224	200	32	2.00
3021265-03	174	160	134	110	65	2.38
3021265-04	264	250	224	200	65	4.08



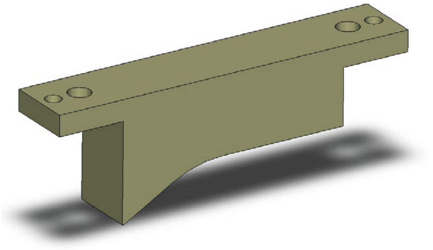


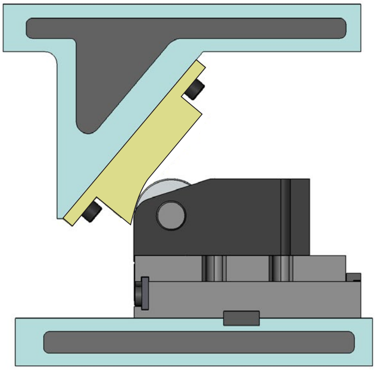
3021265-01
3021265-02



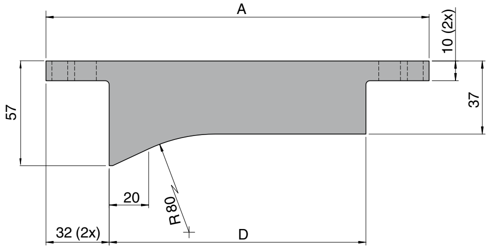
3021265-03
3021265-04

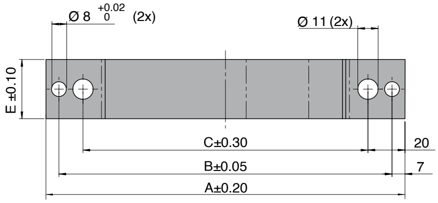
Driver Plate
– Soft Start & Stop



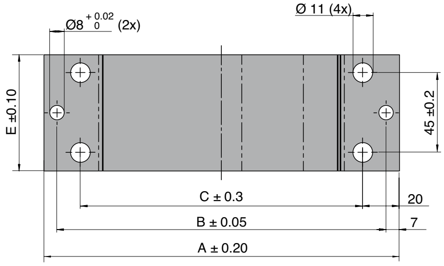


Order No.	A	B	C	D	E	Weight [kg]
3021570-01	194	180	154	130	32	1.43
3021570-02	284	270	244	220	32	2.27
3021570-03	194	180	154	130	65	2.91
3021570-04	284	270	244	220	65	4.61





3021570-01
3021570-02



3021570-03
3021570-04

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.

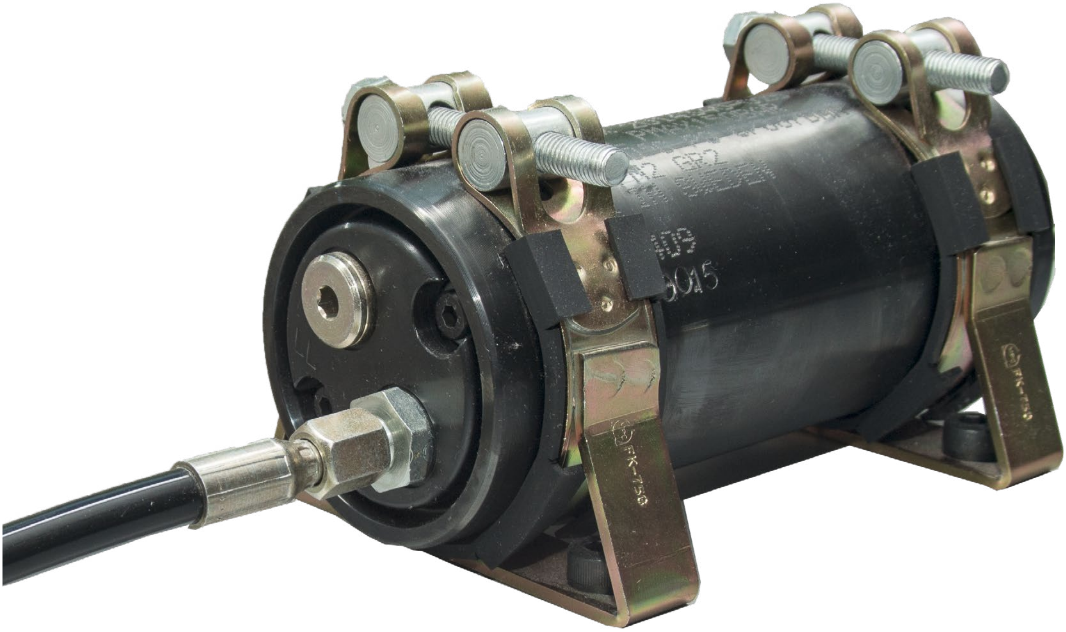
KALLER - THE SAFER CHOICE

Training **Reliability**

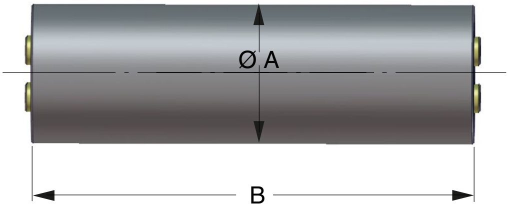
Training

APPROVED PED 2014/68/EU 2 million

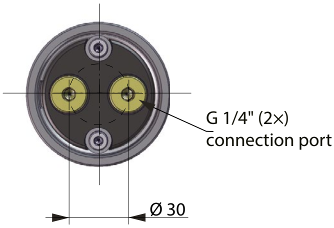
Learn more about KALLER® Training as well as the Reliability features at kaller.com



About Pressure Tanks

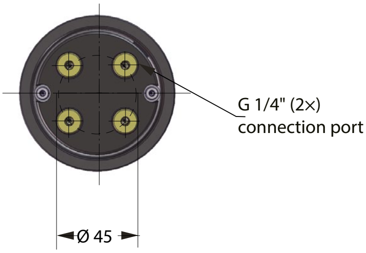


End plate 2014340



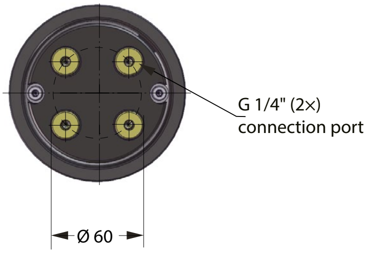
Order No.	Volume L	Ø A	B
2014340-025	0.25	75	170
2014340-050	0.5	75	250
2014340-100	1.0	75	410
2014341-100	1.0	95	300
2014341-200	2.0	95	500
2014341-300	3.0	95	700
2014341-400	4.0	95	900
2014342-200	2.0	120	360
2014342-400	4.0	120	615
2014342-800	8.0	120	1125

End plate 2014341



Max. charging pressure 150 bar (at 20° C)

End plate 2014342



Approximate calculation of isothermal pressure force build-up:

Pressure force build up ≈ $$\frac{VPT_{PT} + (n*VGS_{GS})}{VPT_{PT} + (n*(VGS_{GS} - S*A))}$$

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

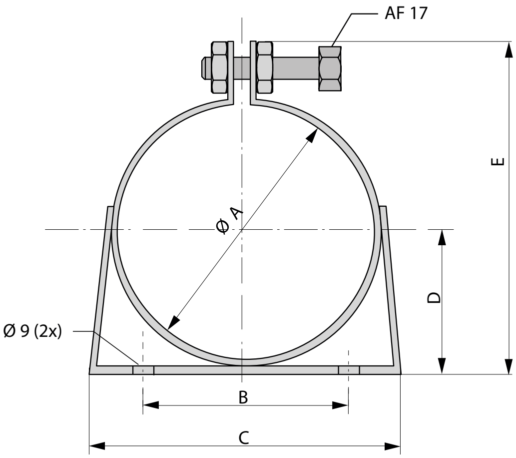
Gas Spring Size	Piston Rod Area (dm²)
500	0.031
750	0.049
1500	0.102
3000	0.196
5000	0.332
7500	0.503
10000	0.709

Example:
Ten TU 5000 gas springs with stroke length 50 mm are connected to a Hose-System with one 8 liter Pressure Tank (2014342-800).

Pressure force build up ≈ $$\frac{8 + (10.0.51)}{8 + (10.(0.51 - 0.5.0.332))} \approx 1.145$$

Bracket fixtures for Pressure Tanks

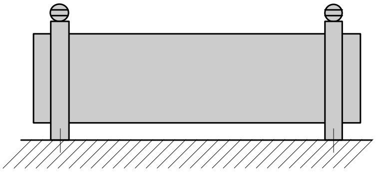
The bracket consists of a rubber-covered ring of galvanized sheet steel and is used to secure the Pressure Tank, preferably with one bracket at each end. If the tank is mounted vertically it should also rest on a solid support, see figures below.



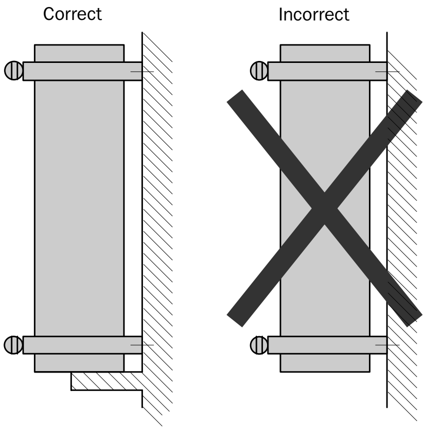
Order No.	Ø A	B	C	D	E
500558	75	80	105	41.5	102
500559	95	100	145	51.5	122
500560	120	100	145	64	147

Fixing bracket assembly

Horizontal



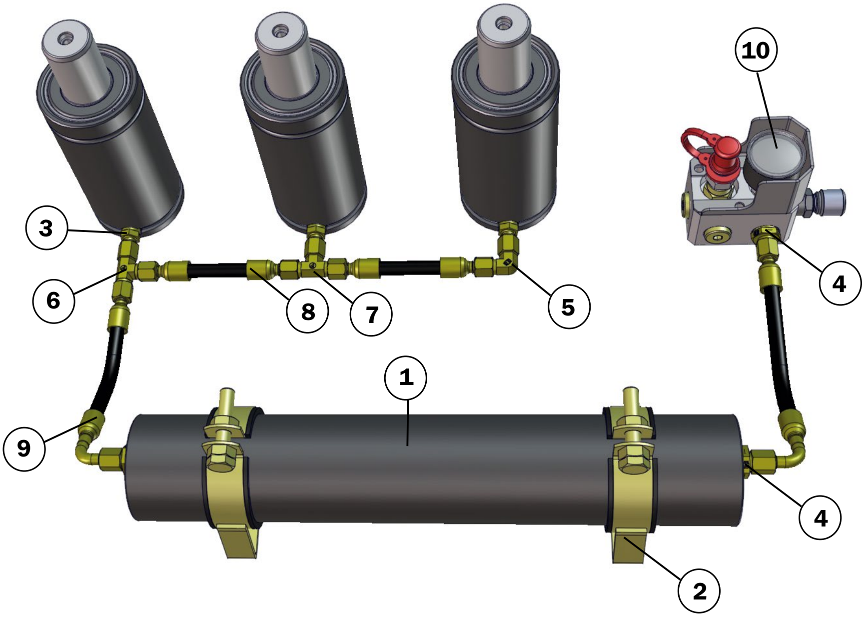
Vertical



Installation Example, Pressure Tank with E024-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 E024-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	E024 Straight - Straight Hose
9	2	3220857-xxxx	E024 Straight - 90° Hose
10	3	4116114-02	Control Block


Soft Hit Striker Plate
SSP 1500
Power Line, X 2400-
Soft Hit Striker Plate
SSP 15 000
Soft Hit Striker plate
SSP 5000

Technical Facts

Soft-Hit Striker Plates (SSP) have been engineered to address three of the major problems that face metal stampers:

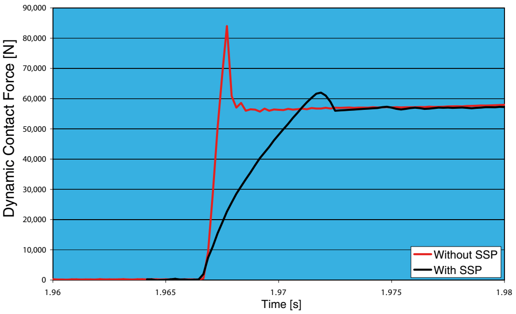
- Excessive shock loads
- High noise levels
- Poor part quality

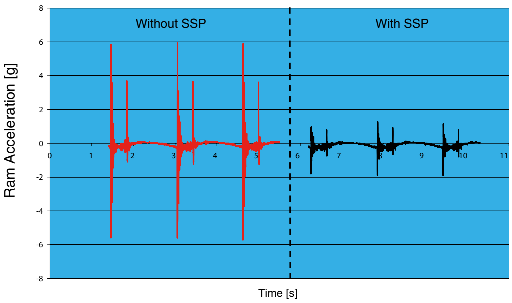
SSP contain a specially developed dampening element that absorbs unwanted shock loads that can lead to high press maintenance, noise pollution and poor part quality.

Features:

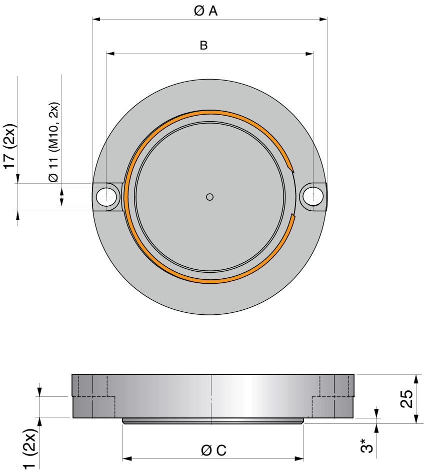
- Suitable for mechanical springs, gas springs and air cushion pins
- For spring forces from 7,500 to 10,0000 N
- 1 million hit service life
- Low build height
- Double countersunk mounting holes (M10)
- Hardened contact surface
- Up to 20 strokes per minute

Function





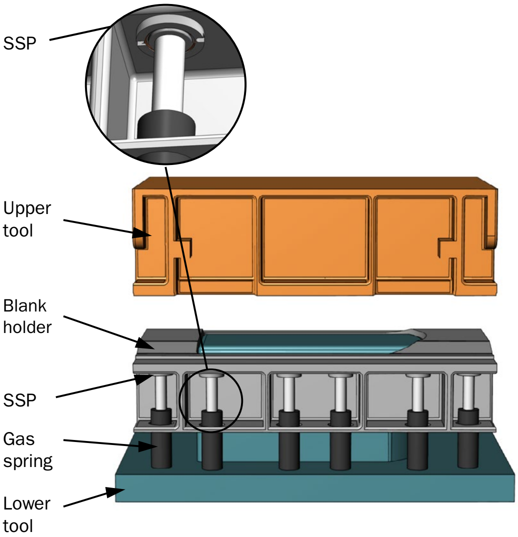
Dimensions



* 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.

15 | KALLER Hose-less Baseplate™

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

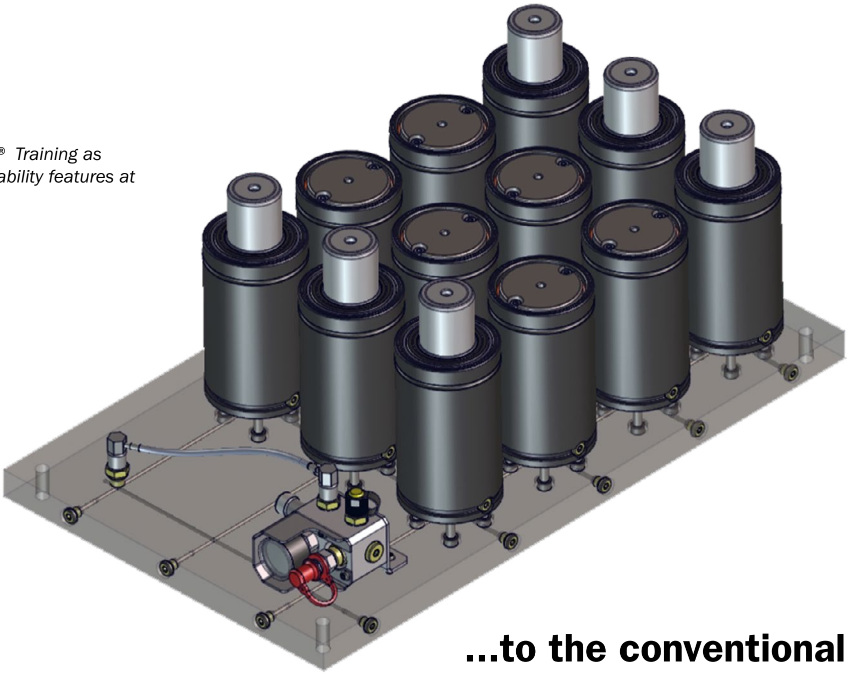
Training **Safety**

Training S>max V>max P>max

Reliability

APPROVED PED 2014/68/EU 2 million Flex Guide™

Learn more about KALLER® Training as well as the Safety and Reliability features at kaller.com



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.

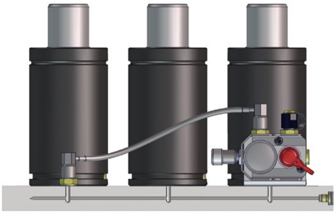
KALLER® Hose-less Baseplate™ provides a cleaner die design with the possibility to place more gas springs close together and also eliminate clearance for hoses and connections. This makes the installation easier to maintain compared to other hose linked systems on the market. Each product is factory tested to assure leak-free operation and is shipped ready to install.

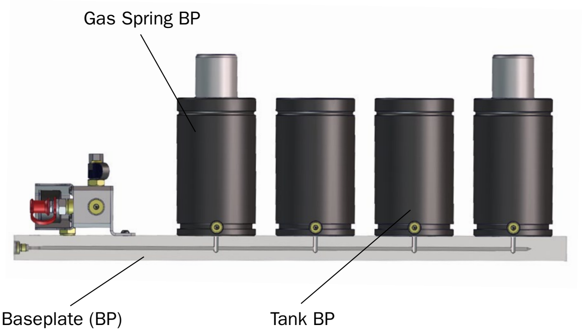
To obtain a complete KALLER® Hose-less Baseplate™ system you will need:

- 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

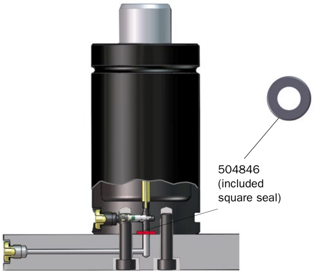
...and it comes with more power in less space !



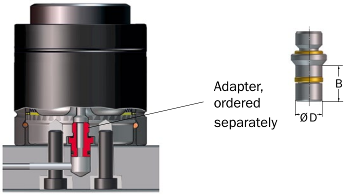


KALLER® gas springs BP adapted to baseplate

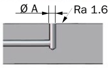
Hose-less Baseplate with square seal

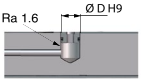


Hose-less Baseplate with adapters



*Note!
Installation layout may
vary between models.*





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".

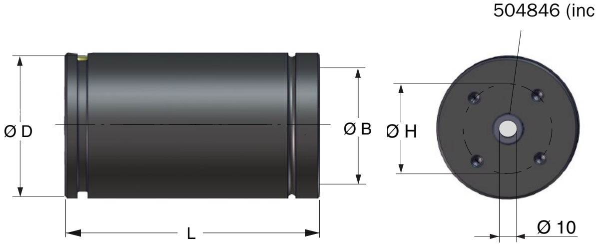
KALLER® gas springs BP and adapters

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		

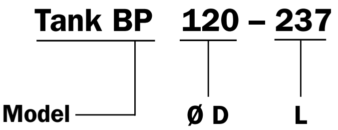
Series	BP adapter
CU4	4025110 **or** 4016253
CX	4026218

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



Model	Ø D [mm]	L [mm]	Volume [l]	Ø B [mm]	Bottom		Torque (Nm) Class 12	Ø H [mm]
					Thread	Depth		
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

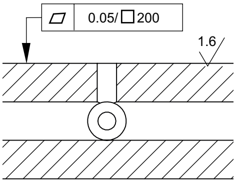
Unless otherwise specified.

A complete customized and factory tested baseplate can be ordered from KALLER® Sales & Service Offices. (To get started, contact us at kaller.com)

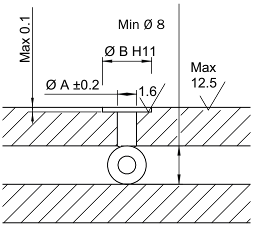
KALLER® Worldwide Guarantee applies to each complete system manufactured by KALLER® .

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

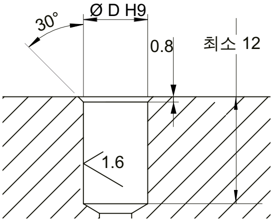


Option 2.
With countersink

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

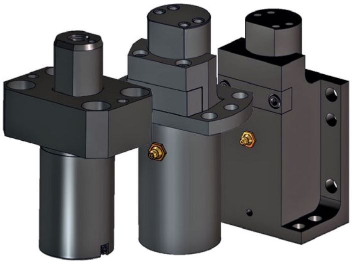
Pressure medium	Nitrogen gas (N2)
Max. charging pressure	150 bar
Min. charging pressure	25 bar**
Operating temperature	0-+80°C
Plate thickness	Min. 25 mm, .98"
Plate edges	Burned out and painted
Fasteners	Metric High Grade Bolts
Drilled holes	see table above
Min. wall thickness	2.5 mm

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 vol.1*

**...for a more simple
and efficient use**



Smart Manufacturing with Toolmind

Industry 4.1 – Manufacturing Efficiency

The emergence of what is called the fourth industrial revolution and smart factories represents a tremendous new opportunity for the manufacturing industry. In particular, the widespread deployment of sensors on factory floors across the globe is generating huge amounts of data. This provides manufacturers visibility into their assets and allows them to leverage tools for predictive maintenance. The result of which is less unplanned downtime, reduced scrap, and greater efficiency.

Edge Computing

One highly effective approach manufacturers employ today is called "edge computing." For industries such as manufacturing, where real-time production takes place, there is a need for data analysis and resulting actions to be nearly instantaneous. Therefore, to reduce lag time between data creation and when a response is generated, manufacturers are placing smart sensors at the "edge" of where data is created, i.e., on the machines themselves. This saves time to send data through the cloud and then back to the factory floor and diminishes network reliability issues. Additionally, edge computing keeps data near the source which reduces security risks.

Toolmind Remote Pressure Monitoring

Toolmind is an edge computing device that monitors the pressure and temperature of gas springs used in manufacturing. It includes customizable triggers to automatically notify and stop production of faulty parts when outside of the proper range.

How It Works: The sensor mounts into any G 1/8 port and monitors pressure and temperature, sending that encrypted signal to the Toolmind™ base station or handheld, where the user can see whether the process or storage of the monitored zone is within specified parameters.

Toolmind Base Station

Our in-house designed base station allows you to remotely monitor your installed Toolmind™ sensors. The base station can display up to 100 tools, with up to 12 sensors monitored per tool, all on a 10” industrial touch screen display, with an easy to use HMI.

Each sensor can be renamed, and all monitored parameters have user adjustable limits (high and/or low). The base station also features an industry standard RS232 port, so you can integrate directly into your PLC, using the built-in relay to shut down your operation if your process strays outside of your limits.

Wireless Features

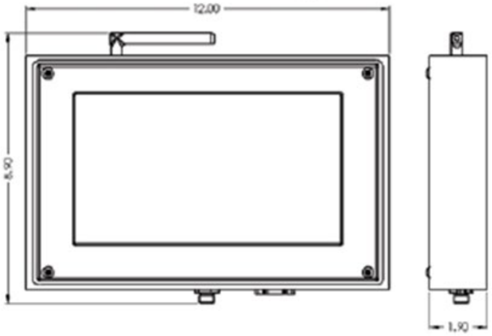
- Bluetooth™ 5.0 Wireless Connection
- Encrypted Data Connection
- Compatible with all of Hyson’s IoT system

Mechanical Features

- Rugged Aluminum Enclosure
- VESA Mounting Pattern
- 10.1” Touchscreen Display
- M12 4 Pin Connector
- Built-in Relay
- PNP Wiring (Standard)
- NPN Wiring (Optional)
- DB9 RS232 Connector, for Local Data Output
- External Antenna for Better Range
- Access Control (Admin Features)

Software Features

- 250 Tool Library
- Capable of Monitoring 12 sensors per Tool
- Sensor and Tool Naming Functions
- Warning and Fault Options
- Adjustable High & Low Pressure Limits
- Adjustable High Temperature Limit
- Fault Options will Trip Relay
- Display Units: F/PSI, C/BAR, or C/MPa



Toolmind Sensor

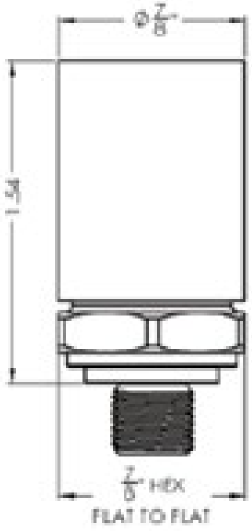
Pressure and temperature data is transmitted every 20 seconds to either the base station or handheld reader via encrypted Bluetooth™. The sensor only reads and transmits, it will not receive any information.

Wireless Features

- Bluetooth™ 5.0 Wireless Connection
- FCC Certified
- Compatible with all of Hyson’s IoT system
- Normal, On Demand, and Low Power Storage modes of operation
- Approximately 50-100 foot range (Range Based on Obstructions)

Mechanical Features

- For use in Liquid and Gas Mediums
- Reads 0-10,000 PSIG (Full Scale =10000)
- Pressure Accuracy ±1% FS @ FS
- Burst Pressure = 5X FS
- Operating Temperature: -20°C – 85°C
- Temperature Accuracy ±3°C
- G1/8 BSPP Thread
- Non-Replaceable Battery Life of 1.5-2 years



Toolmind Handheld Reader

Ever wanted to know your pressure without breaking into the pressure zone? Our handheld, when paired with a Toolmind™ sensor, does just that. Designed to be an accompaniment to our Toolmind™ base sation, the handheld allows portable scanning without having to be in range of the base station. Using either on-demand mode or continuous scanning, you can pinpoint or let the data come to you. Featuring a rugged ABS housing, with a protective boot, the simple interface and user adjustable parameters allow you to check quickly and know that you have the correct pressure, right away.

Wireless Features

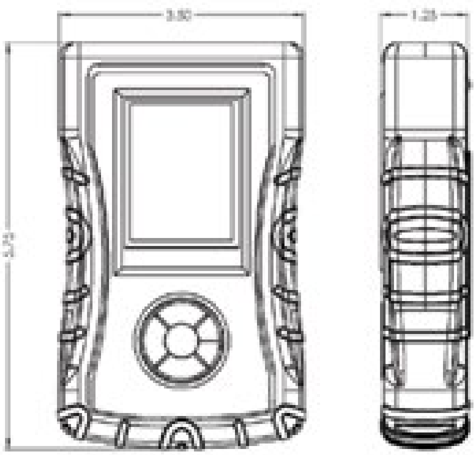
- Bluetooth™ 5.0 Wireless Connection
- Encrypted Data Connection
- Contiuous, On Demand, and Storage modes of operation

Mechanical Features

- USB-C Rechargeable on-board battery
- Silicon protective boot

Software Features

- Basic Sensor Naming Capabilities
- Pressure and Temperature Monitoring
- Display Units: F/PSI, C/BAR, or C/MPa

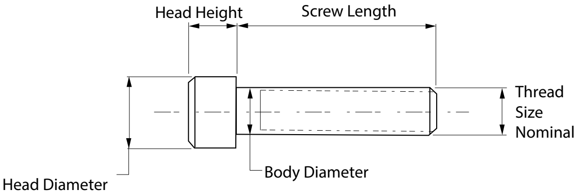


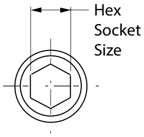
ISO Tolerances For Holes and Shafts

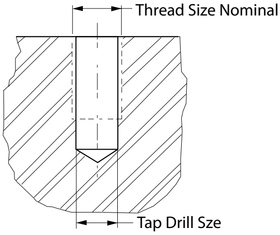
Nominal Dimensons in mm - Tolerances in micrometers (10 -6 meter)

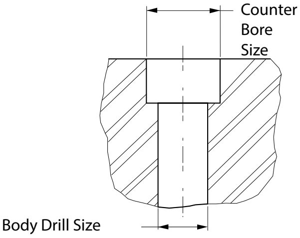
External Dimensions (shafts)							Internal Dimensions (bores)						
Symbol	**1 up to 3**	**over 3 up to 6**	**over 6 up to 10**	**over 10 up to 18**	**over 18 up to 30**	**over 30 up to 50**	**Symbol**	**1 up to 3**	**over 3 up to 6**	**over 6 up to 10**	**over 10 up to 18**	**over 18 up to 30**	**over 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

Metric Socket Head Cap Screws









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	As	Property class according to ISO 898-1				
M	mm	mm	mm2	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
$s_S = R_{eL}$ or $R_{p0.2}$ N/mm² nominal				240	400	640	900	1 080
$\frac{k}{k(1+\frac{S_F}{F_{Fm}})} \cdot s_S$ N/mm²				26.16	43.60	69.76	98.10	117.72

THE SAFER CHOICE

Introduced in early 80s, 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.

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 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.

KALLER® Academy

TRAINING. KALLER offers online courses on several topics related to force and motion technology. Work your way through the basics of Gas Spring Techonology.

kaller.com