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10

The Next Generation!

APPROVED PED 97/23/EC

Controllable Gas Springs - KF2

KF2 Springs

KF2 Springs

Controllable Gas Springs - KF2

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General Introduction

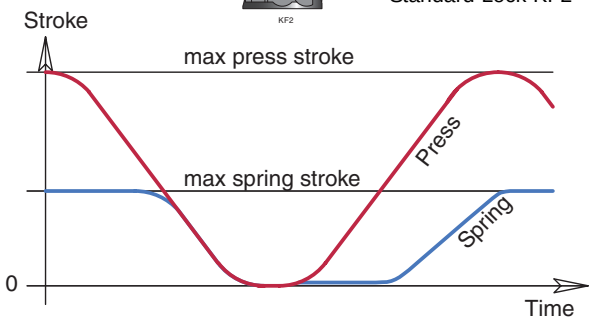
1

About Controllable Gas Springs

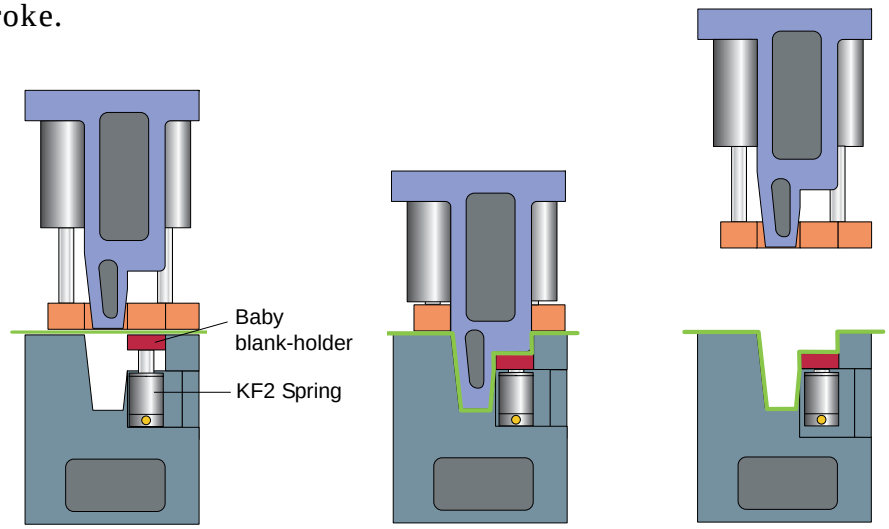
KF2 is the next generation of Controllable Gas Spring, which superceeds the KF spring.

The Controllable Gas Spring series (KF2) are a family of gas springs for use in metal forming dies, whose piston rods can be locked at bottom dead centre (BDC). The return stroke of the piston rod is controlled via the valve contained within the base of the spring.

Standard Lock KF2



For example (below), in drawing dies 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 10.2/1*.

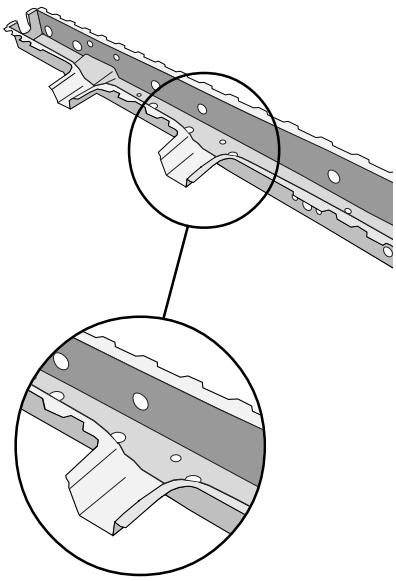
Controllable Gas Springs are available with:

- Model sizes 1500, 3000, 5000 & 7500 (initial force in daN)
- Stroke lengths from 10 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.



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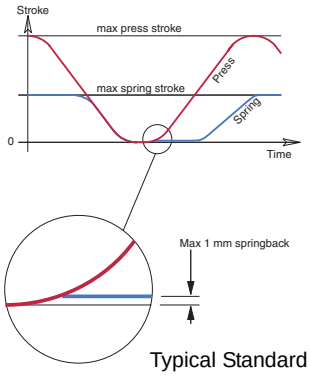
Standard Lock, KF2

KF2 are Controllable Gas Springs whose piston rods can be locked at BDC.

The full stroke length of the KF2 spring must be used within ± 0.5 mm for optimal locking function giving a maximum spring back 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 10.4/2). The springs can either be installed self-contained or connected to a Control Block through a hose system.



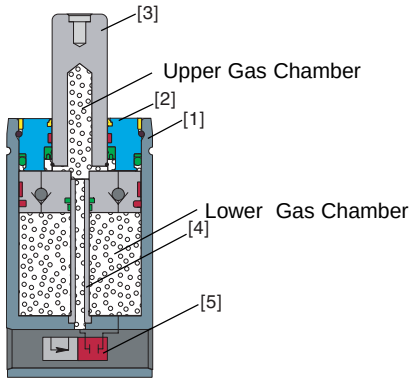
Typical Standard Lock Curve

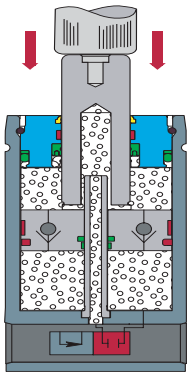
KF2, how does it work?

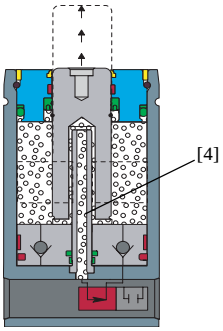
The KF2 Controllable Gas Springs consists of a cylinder [1], guide assembly [2], piston rod assembly containing non-return valves [3], internal piston rod [4] and normally open (NO) cartridge valve [5] located in the base of the spring.

The nitrogen gas within the spring is sealed within two gas chambers, an upper and a lower. When the spring is stroked, nitrogen gas from the lower chamber passes through the non-return valves in the piston rod assembly and into the upper chamber.

The cartridge valve is closed by applying compressed air pressure (min 4 bar) pressure. With the cartridge valve closed, the piston rod is prevented from returning to its outer position. By opening the cartridge valve again, the gas contained within the upper chamber can now flow to the lower chamber via the internal piston rod [4], thus allowing the piston rod to return to its outer position.







Controllable Gas Springs - KF2

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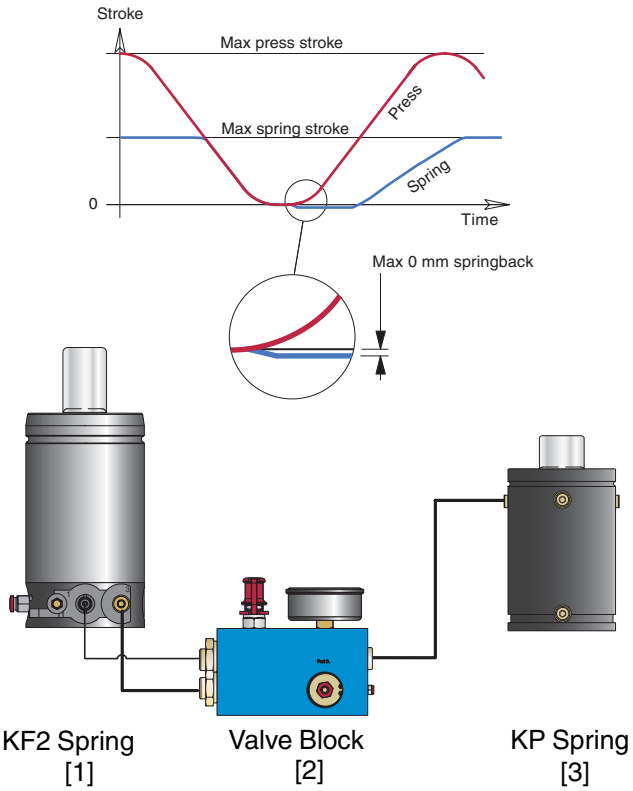
Positive Lock System, KF2 + KP

1

KF2 + KP System combines a Standard Lock, KF2 Controllable Gas Spring [1] with a specially designed KP - Passive Gas Spring [3] via a Valve Block [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.

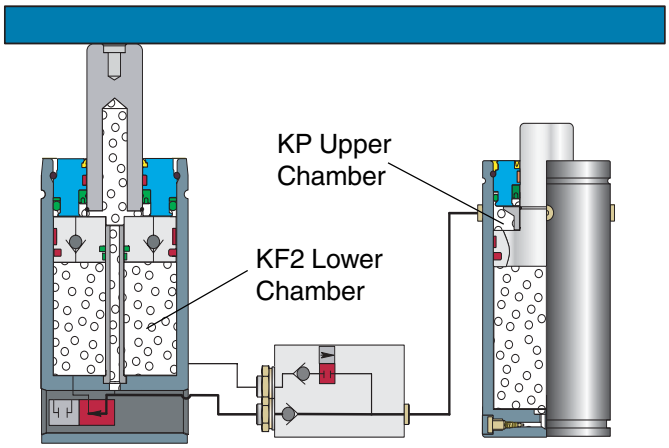


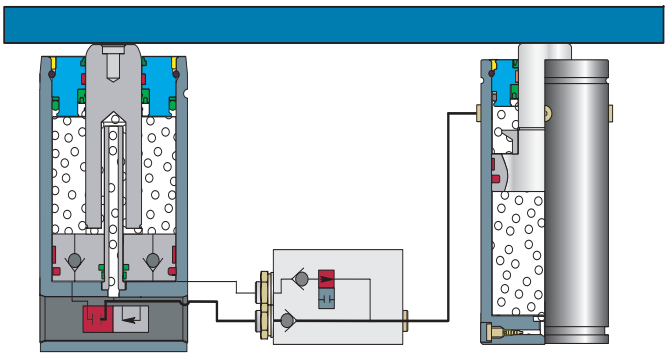
Positive Lock System, how does it work?

The KF2 is the active spring in the system and provides the required spring force in the tool. The KP - Passive Gas Spring's function 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.





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Why 100% nominal stroke ± 0.5 mm?

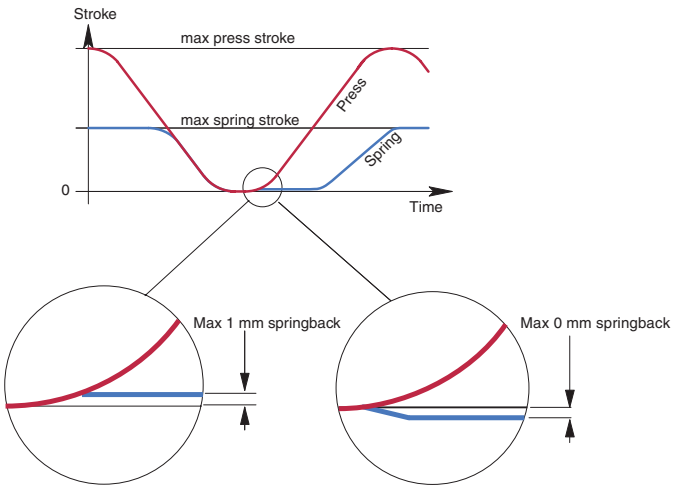
In order to provide the best locking function from the KF2 Controllable Gas Spring, it is important to stroke the spring 100% of the nominal stroke length ±0.5 mm.

The reason why, is to reduce the gas volume in the lower gas chamber to a minimum.

For a Standard Lock, KF2 system stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm will ensure a max springback of 1 mm.

An adjustable stroke length version of 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 tryouts.

For a Positive Lock System KF2 + KP, stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm is also important, although much also depends on the KP-Passive Gas Spring's utilised stroke length.



Standard Lock KF2

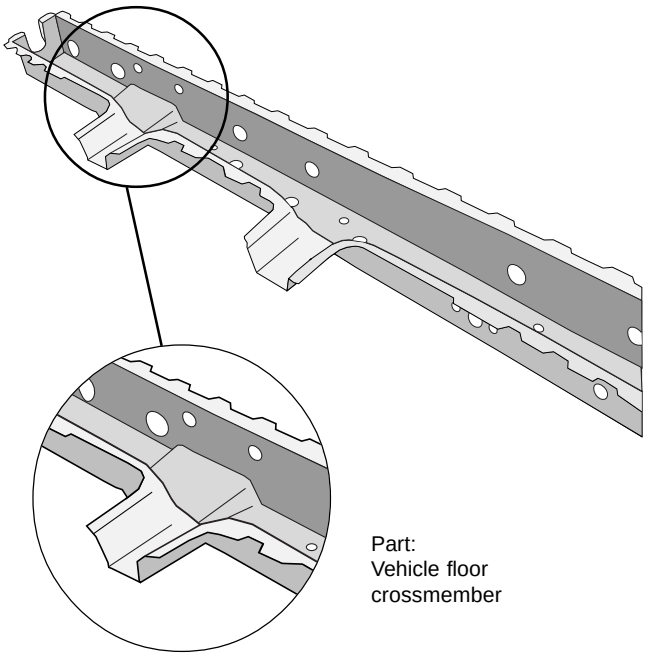
Positive Lock KF+KP

Application Examples

Standard Lock, KF2

When forming this beam, 'baby' blank-holders are used to form the circled area. There are two 'baby' blank-holders in the tool. These 'baby' blank-holders have to be locked in the bottom position to avoid deformation of the part during the return stroke.

In this case, one KF2 spring is used to control each 'baby' blank-holder.



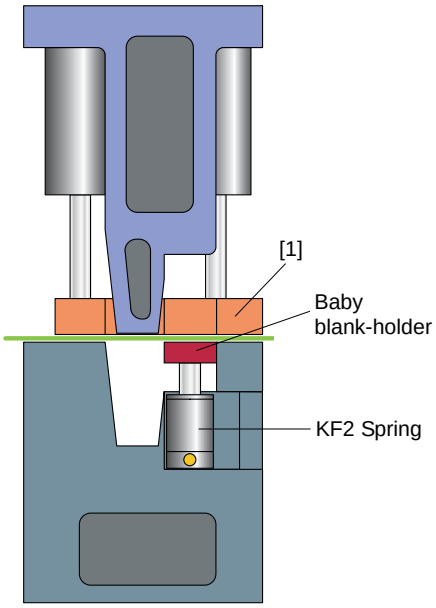
Part:
Vehicle floor
crossmember

Work cycle

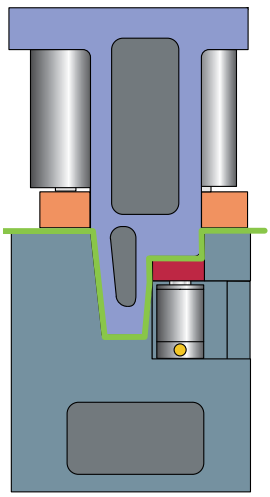
As the upper tool moves downwards the blank holder [1] will be activated and control the flow of the blank in the tool.

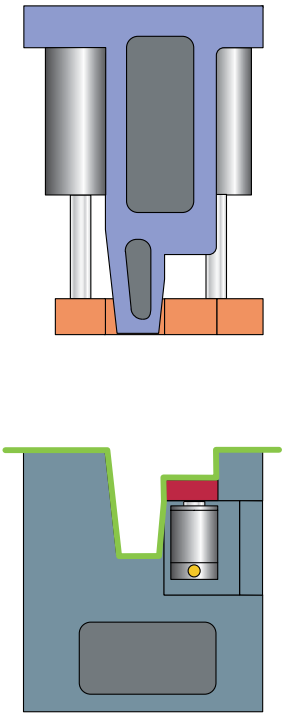
At Bottom Dead Centre the KF2 springs will lock. A small springback will, for this application, not damage the formed part.

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





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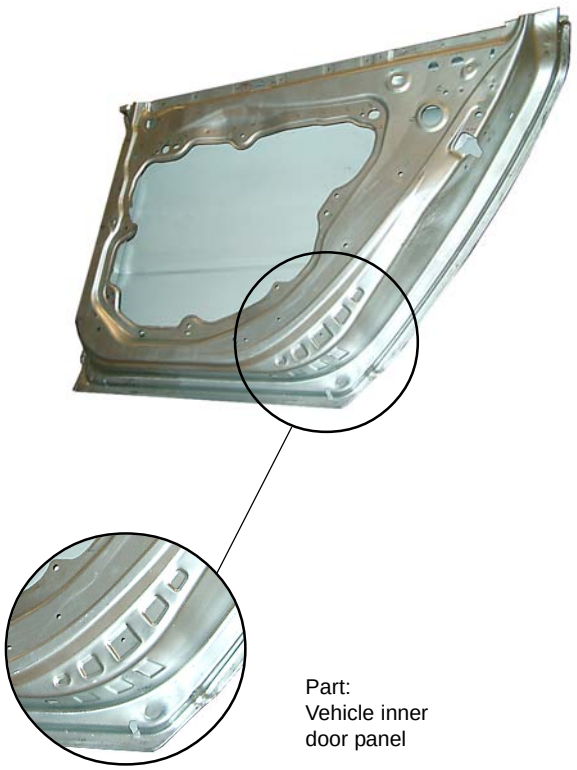
Positive Lock System, KF2 + KP

For parts where Controllable Gas Springs are required with zero springback, 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.



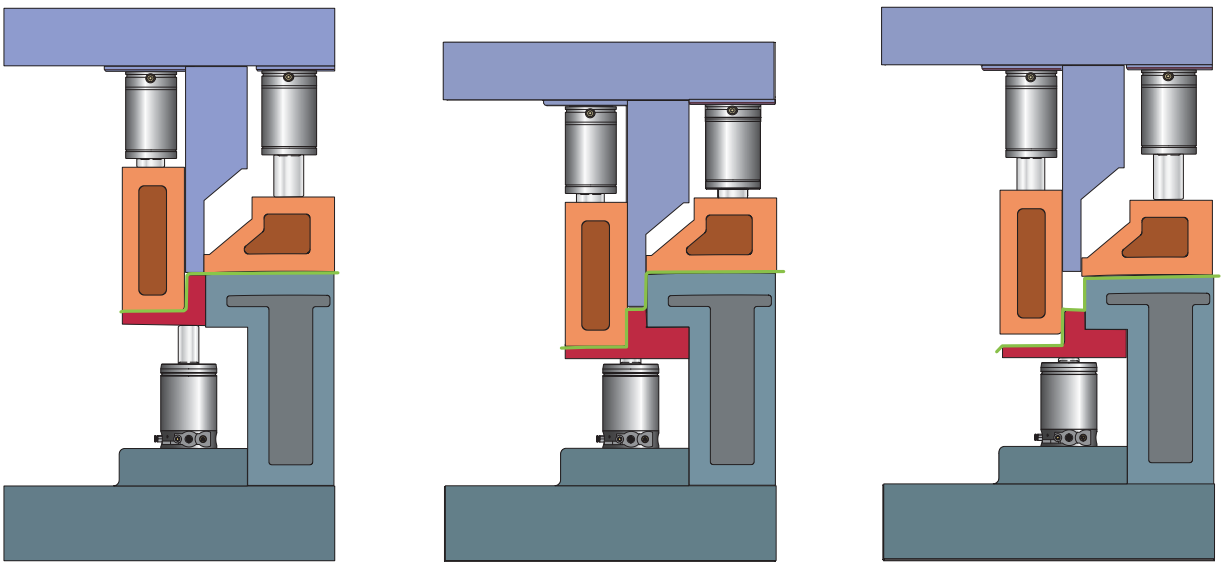
Part:
Vehicle inner door panel

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. Thereafter, the KF2 springs help eject the undamaged part from the tool.



Positive Lock System, KF2 + KP

Controllable Gas Springs - KF2

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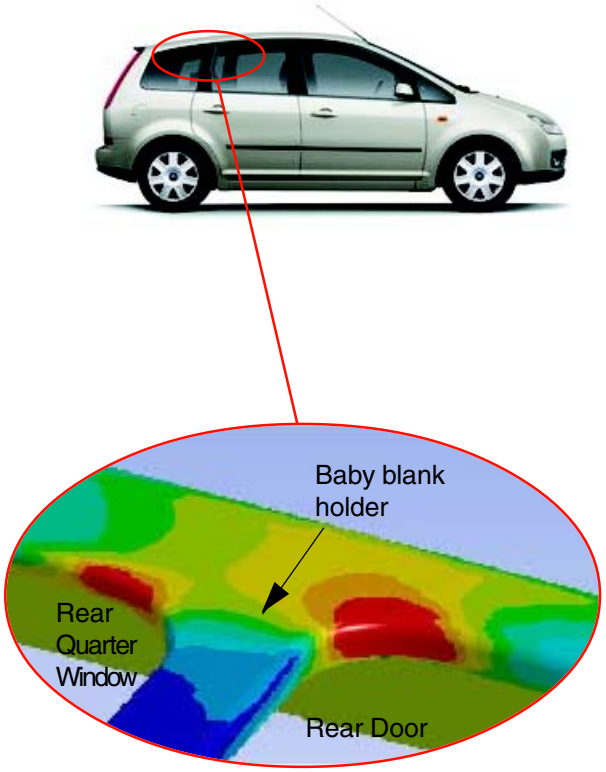
Positive Lock System, KF2 + KP

Producing side body panels to a high quality often provides challanges to the tool maker. Of particular difficulty are the regions where the side posts meet the outer frame.

Too much blank-holding force and the part can split, too little and the part can wrinkle.

One solution to this problem now being applied, is to use individual ”baby” blank holders at these problem areas, whose spring force are controlled by KF2 Controllable Gas Springs.

The result is improved part quality, increased forming control and reduction in scrapped parts.



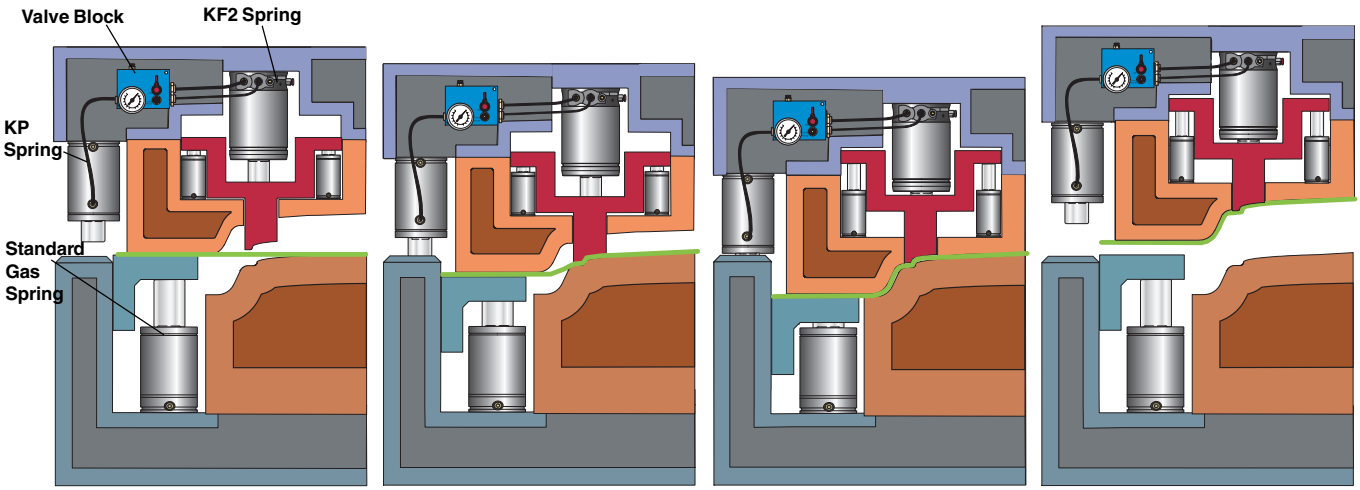
Work cycle

The upper tool contains the KF2 Controllable Gas Springs that provide the active blank holding force for the locally situated ”baby” blank holders.

The “baby” blank holders are the first to hold the blank at the problem regions as the tool starts to close.

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. Thereafter, the KF2 springs help eject the finished part from the tool.



Positive Lock System, KF2 + KP

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Application Enquiry Form

To make it easier to for you to select the right system and components for your particular application, please fill in the *Application Enquiry Form* below.

We recommend you make a photocopy of this page, complete the following questions and send it to your local Kaller distributor or us directly at Strömsholmen for further assistance.

If possible, please send us the following information together with a rough sketch of your application.

General Info

Today's date:.....(yy/mm/dd)

Your name:.....

How you wish to be contacted?

- Via phone:.....(give details)
- Via fax:.....(give details)
- Via email:.....(give details)

Country you are contacting us from: .....

Application Info

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. Should the springs be connected together using a Hose-System (Y/N)?.....

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, which provides a pneumatic signal (min 4 bar) to the normally open (NO) valve in the base of the KF2 spring.

The pneumatic signal can be either provided by the control system from the press, or integrated into the tool itself using mechanical pressure switches (see Tool Integrated Control System 10.4/2 for more information).

Control System – Standard Lock, KF2

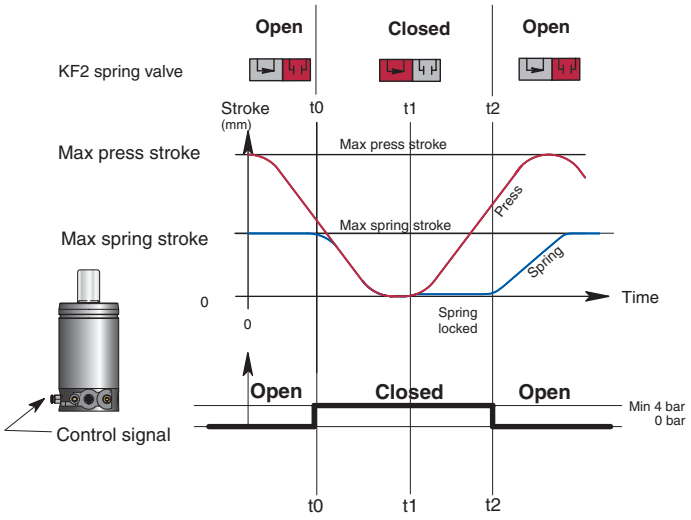
The normally open (NO) valve within the base of the KF2 controllable spring(s) is closed using compressed air (min 4 bar). With the valve closed, t0-t2 (see diagram opposite), the piston rod of the KF2 spring(s) is prevented from returning to its extended position.

By connecting the valves in the KF2 springs together 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 showing how to connect the KF2 controllable gas spring(s) to a Control System, see Installation Examples 10.6/1.

- t0 = Die closed
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



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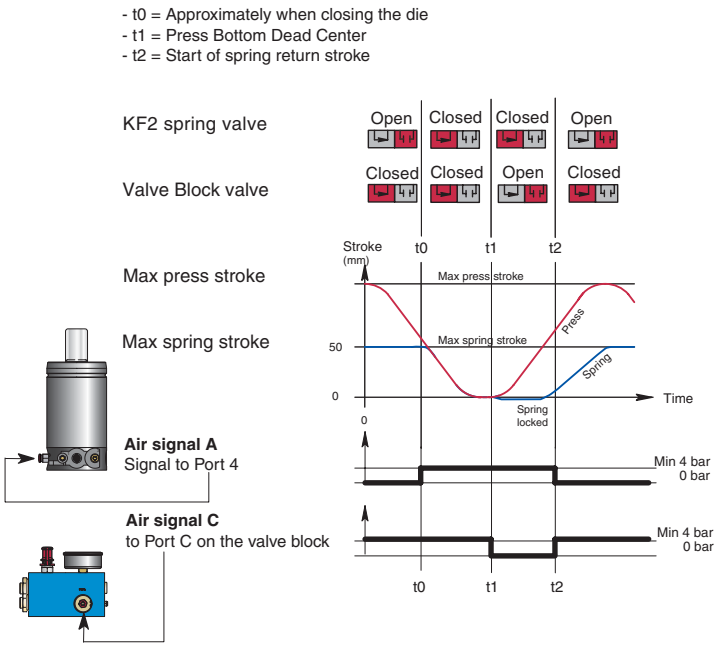
Control System – Positive Lock System, KF2+KP

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 is to be opened exactly at press BDC.

For examples showing how to connect the KF2+KP Controllable Gas Spring system to a Control System, see Installation Examples 10.6/1.

Tool Integrated Control System

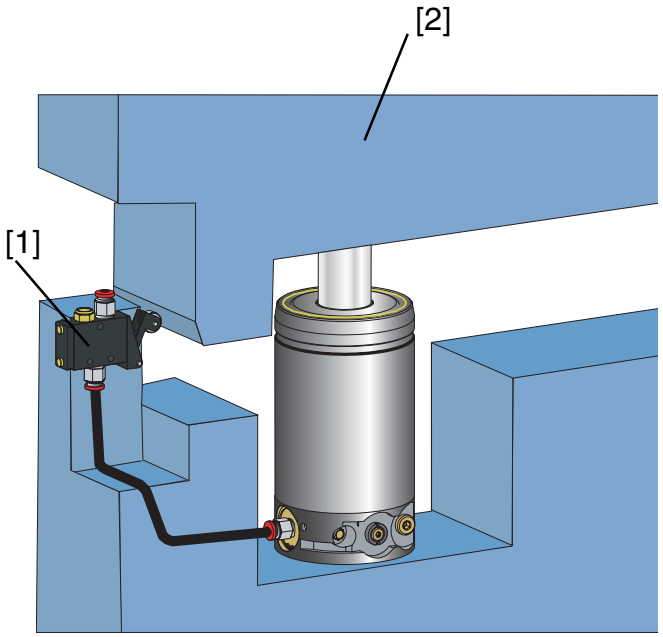
The control system, required to lock the KF2 spring(s), can be integrated into the tool itself by using a Mechanical Pressure Switch. The control system required to lock and unlock the KF2 spring(s) is therefore independent of the press's own control system.

The KF2 spring(s) remain locked as long as the Mechanical Pressure Switch [1] is activated by the tool [2].

A Tool Integrated Control System therefore only requires a constant supply of compressed air (min 4 bar) to the Mechanical Pressure Switch.

Please note!

Can also be used to control the Valve Blocks valve for Positive Lock Systems.



Controllable Gas Springs - KF2

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Hose System (optional)

KF2 Controllable Gas Springs can be installed in the tool as self-contained units or linked together using a Hose-System for remote gas charging and evacuation.

Controllable Gas Spring System	Recommended Hose System
Standard Lock	EZ-Hose
Positive Lock System	EZ-Hose and EO24-Hose

Hose System - Standard Lock, KF2

With reference to Chapter 4 of our main Kaller catalogue, we recommend you use the EZ-Hose System.

KF2 Controllable Gas Springs are connected together in a Hose-System in just the same way as standard gas springs. 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” 10.8/2.

For examples showing how to connect KF2 Controllable Gas Springs to a Hose System, see Installation Examples 10.6/1.

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Hose System –

Positive Lock System, KF2+KP

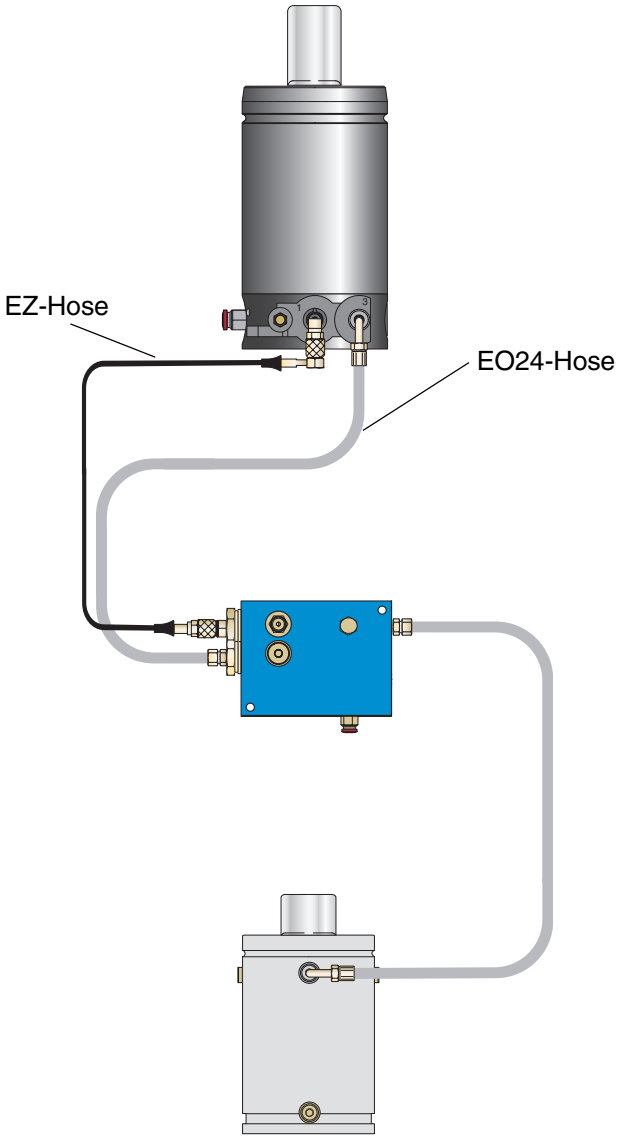
It is possible to connect up to four KF2 springs to one Valve Block.

With reference to Chapter 4 of our main Kaller catalogue, a KF2+KP Controllable Gas Spring system requires two hose connections:

- One EZ-Hose connection
- One EO24-Hose connection

EZ-Hose connections

Gas Port 1, which is marked on each KF2 spring, is connected to Gas Port 1 on the Valve Block (also marked) using EZ-Hose System components.



EO24-Hose connections

To connect the KF2 Controllable Gas Spring(s) to a KP – Passive Gas Spring via the Valve Block we recommend using the EO24-Hose System (or its equivalent) owing to the large internal diameter of the hose, important when gas flow in the hoses is required.
Gas Port 3, which is marked on each KF2 spring, is connected to Gas Port 3 on the Valve Block (also marked) using EO24-Hose System components.

Gas Port 5, which is marked on the Valve Block, is connected to Gas Port 5 (also marked) on the KP-Passive Gas Spring using EO24-Hose System components also.

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” 10.8/2.

For examples showing how to connect KF2+KP Controllable Gas Spring systems to a Hose System, see Installation Examples 10.6/1.

Controllable Gas Springs - KF2

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Cooling System (optional)

About Cooling

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 times its stroke length.

4

With a conventional gas spring, the piston rod follows the press movement on the return stroke. Therefore 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 however does not follow the press's return stroke, the transferred energy is
generated as heat in the KF2 spring.

Therefore, in order to avoid overheating in some applications cooling of the KF2 spring(s) is required.

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).

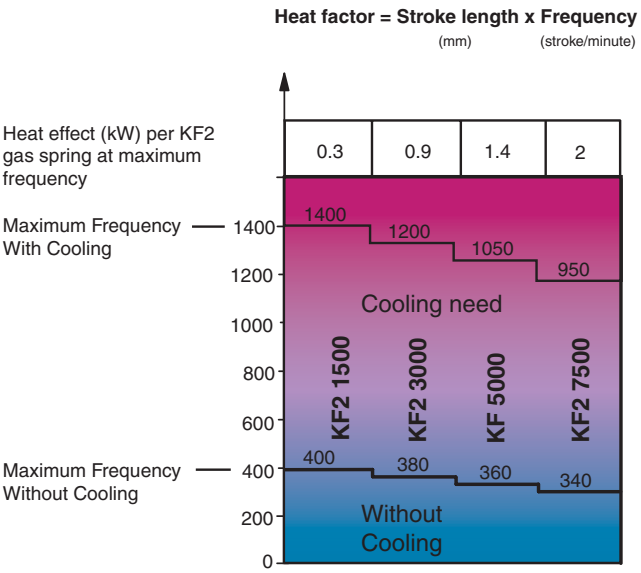
For example:

Stroke frequency: 15 spm

KF2 stroke length: 100 mm

Heat Factor = Stroke frequency x Stroke length
= 15 x 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.



Please note!
Information in the diagram is based on calculations made for KF2 gas springs with 150 bar charge pressure.

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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 is to 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 therefore would be to select 10 pcs of KF2 3000-050 at 150 bar charge pressure (see **Technical Data 10.5/1** for more info).
In this case, the Heat Factor would be 10 x 50 = 500
With reference to the Heat Factor Diagram, a Heat Factor of 500 is 120 greater than is allowed for a system without cooling.
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 charge pressure and initial force are directly related, we can take the ratio of forces to calculate the new Heat Factor.

$$\text{New Heat Factor} = \text{Original Heat Factor} \times \frac{\text{Required Net Force at Reduced Pressure}}{\text{Net Force at 150 bar}}$$

$$= 500 \times (300 / 420)$$

$$= 360$$

The new Heat Factor is now 20 below that required for KF2 3000 cooling.

Method 2. Use larger KF2 springs

By selecting a larger size of KF2 Controllable Gas Spring 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 500 kN total net spring force.
The Heat Factor at 150 bar would be 10 x 50 = 500 as before.

$$\text{New Heat Factor} = \text{Orginal Heat Factor} \times \frac{\text{Required Net Froce at Reduced Pressure}}{\text{Net Force at 150 bar}}$$

$$= 500 \times (300 / 500)$$

$$= 300$$

The new Heat Factor is now 60 below that required for KF2 5000 cooling.

Controllable Gas Springs - KF2

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Over Heat Protection

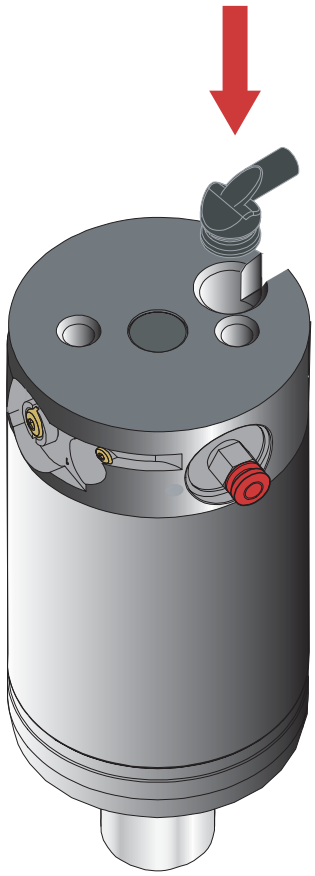
Thermal Relay

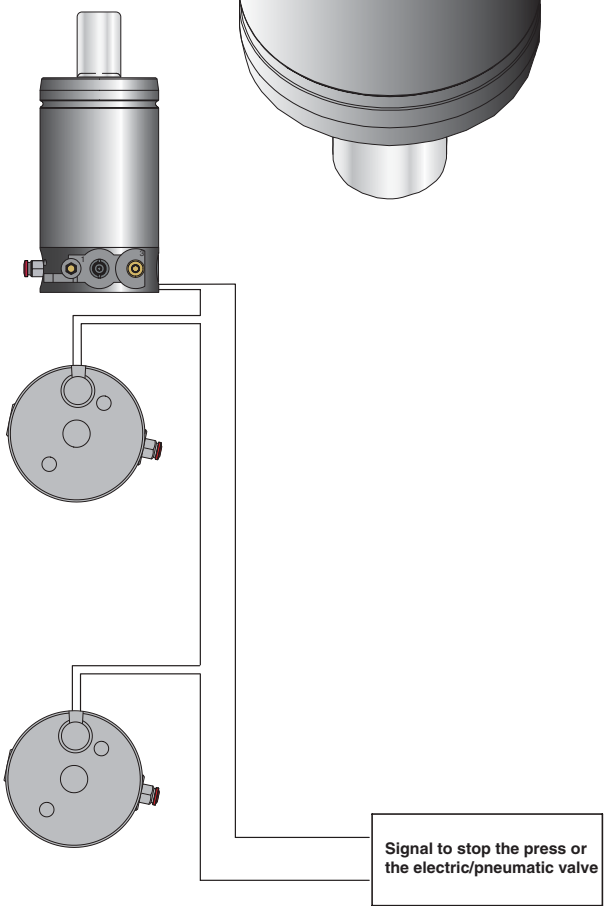
To avoid overheating the KF2 gas spring, a Thermal Relay (bimetallic) should be used to stop the press or prevent the KF2 Controllable Gas Spring(s) from locking.

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!
For systems without cooling, it is enough to have just one spring fitted with a Thermal Relay. For systems with cooling, each spring should be fitted with a Thermal Relay, which should be connected in series.





Thermal Relay
Order No. 503388

Basic Information

Normally closed
Break temp ..... 85±3°
Hysteresis ..... < 7°C
Max voltage ..... 110 V
Delivered with 1500 mm of electric wire

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Controllable Gas Springs - KF2

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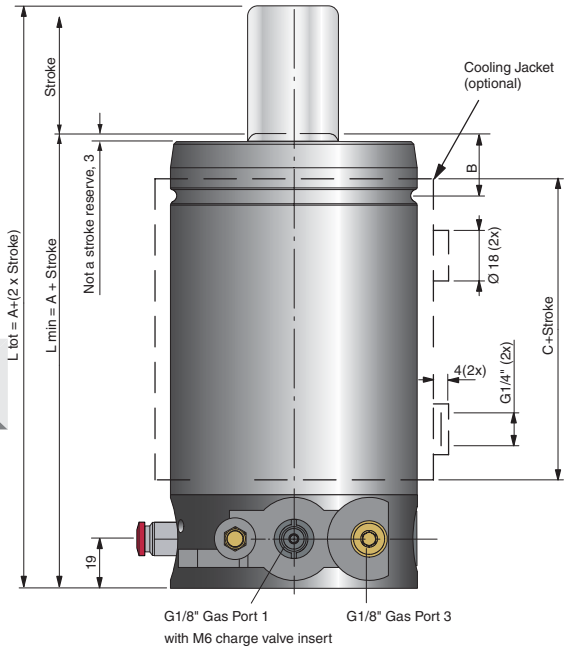
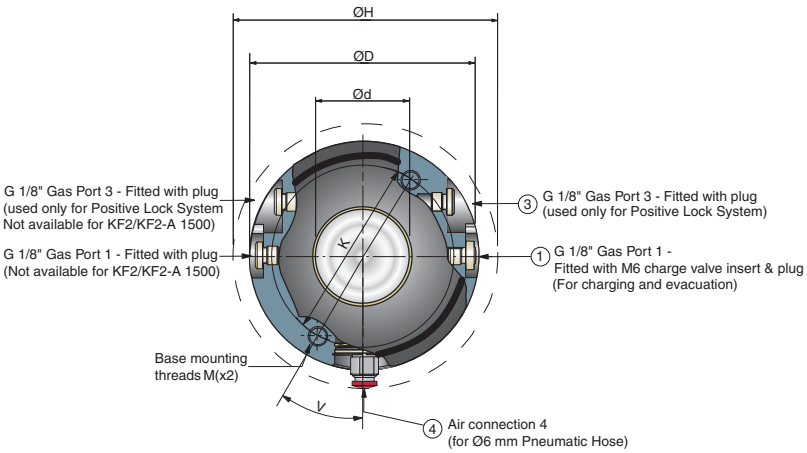
Technical Data

KF2 - Dimensions Standard Version



Top view



Model	Stroke	Force in N at 150 bar /+20°C		A	B	C	ØD	Ød	ØH	K	V	M
		Initial	End force*									
KF2 1500	10-160	15000	22000	125	25.5	75	95	36	110	50	60°	M12x15
KF2 3000	10-160	30000	42000	135	25.5	85	120	50	135	95	30°	M12x15
KF2 5000	10-160	50000	74000	160	27.5	110	150	65	180	110	30°	M16x18
KF2 7500	10-160	75000	98000	180	33.5	130	195	80	210	120	30°	M16x18

*= at full stroke

- On delivery all gas ports are fitted with plugs and 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 Appendix page 10.8/4 for more information.

BASIC INFORMATION

Pressure medium ..... Nitrogen
Max. charge pressure ..... 150 bar
Min. charge pressure ..... 25 bar
Operating temperature ..... 0+80°C
Force increase by temperature ..... ±0.3%/°C
Max. piston rod velocity ..... 0.8 m/s
Return speed piston rod*..... 0.15 m/s for KF2 5000 & 7500
Return speed piston rod*..... 0.2 m/s for KF2 1500 & 3000
Tube ..... Nitrided
Rod ..... Nitrided

How to order

KF2 3000 - 78 - CJ

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).

Only if Cooling Jacket is required

*Please note: KF2 springs with even slower return speeds are available on request.

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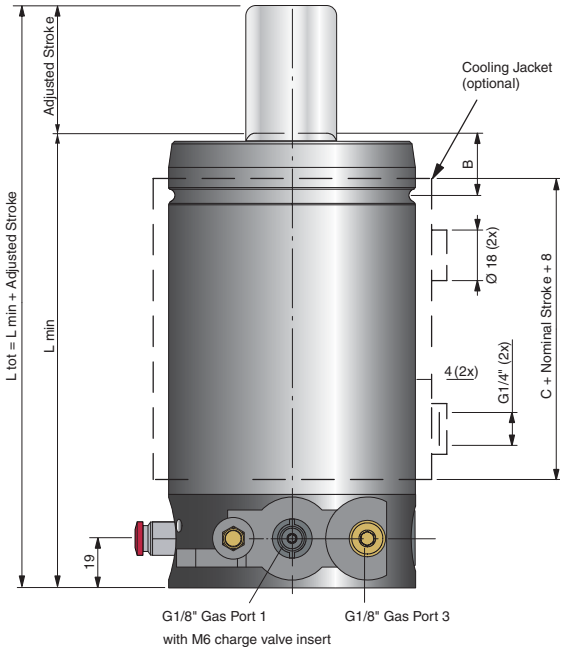
KALLER® Controllable Gas Springs - KF2

KF2-A - Dimension 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 that are 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	Lmin			
				1500	3000	5000	7500
KF2-A XXXX-10	10	4	17	142	152	177	197
KF2-A XXXX-20	20	12	27	152	162	187	207
KF2-A XXXX-30	30	22	37	162	172	197	217
KF2-A XXXX-40	40	32	47	172	182	207	227
KF2-A XXXX-50	50	42	57	182	192	217	237
KF2-A XXXX-60	60	52	67	192	202	227	247
KF2-A XXXX-70	70	62	77	202	212	237	257
KF2-A XXXX-80	80	72	87	212	222	247	267
KF2-A XXXX-90	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

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, 10.8/1.

How to order: KF2-A 3000 - 30 - 30 - CJ

- Model: KF2-A 1500, KF2-A 3000, KF2-A 5000, KF2-A 7500
- Nominal Stroke
- Delivered Stroke
- Only if Cooling Jacket is required

Controllable Gas Springs - KF2

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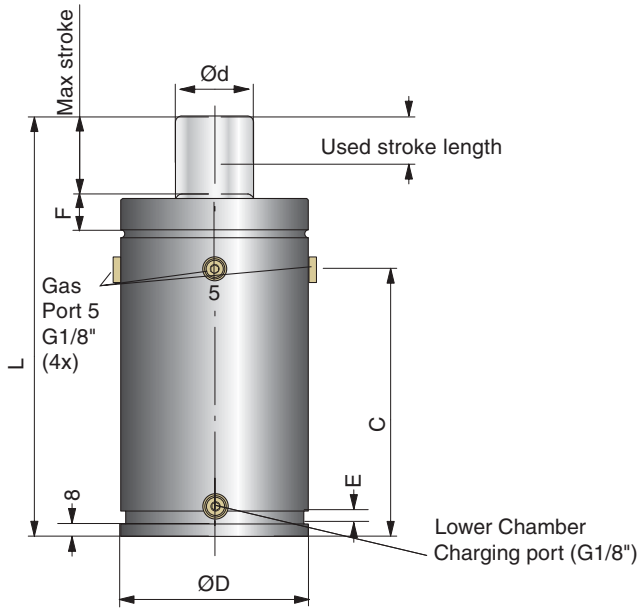
KP - Dimensions

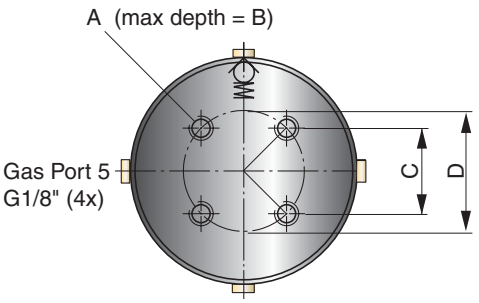
KP-Passive Gas Springs should:

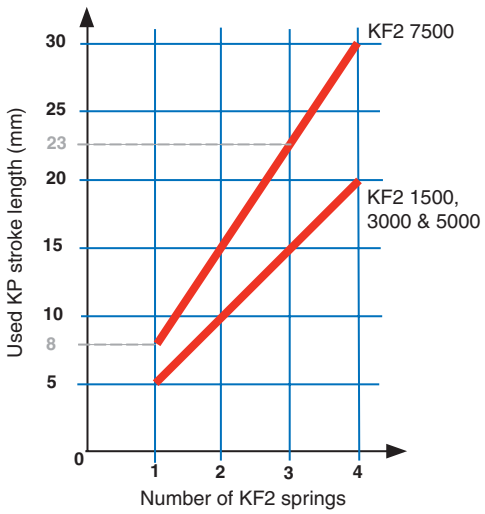
- **not** be used for any operation in the tool other than to eliminate KF2 springback,
- **be** of the same model size as the KF2 spring(s) (except KF2 7500 which uses the KP 5000),
- **be** connected to the Valve Block, using the EO24-Hose System or its equivalent, via one of the four G1/8" Gas Port 5 connection ports,
- **be** stroked according to the table below.



Please note!

The KP-Passive Gas Spring does not require cooling. The G1/8" charge port at the base of the spring is for gas charging and bleeding the KP spring's lower gas chamber. The KP spring's charge pressure should be the same as the KF2 spring(s).





Order No	ØD	Ød	F	E	L	C	A	B	C	D	Max. Stroke Length
KP 1500	95	36	24	7	220	140	M8	13	42.4	60	30
KP 3000	120	50	25.5	7	220	140	M10	16	56.6	80	30
KP 5000	150	65	27.5	8	300	182	M10	16	70.7	100	35

Force in [daN] at used stroke length [mm] *							
Model	5	10	15	20	25	30	35
KP 1500	3600	5200	6700	8200	9900	11900	-
KP 3000	6000	8300	10400	12300	14400	16800	-
KP 5000	7800	10200	12500	14700	16800	19000	21300

*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" Chapter 2.1 in the main Kaller catalogue.

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

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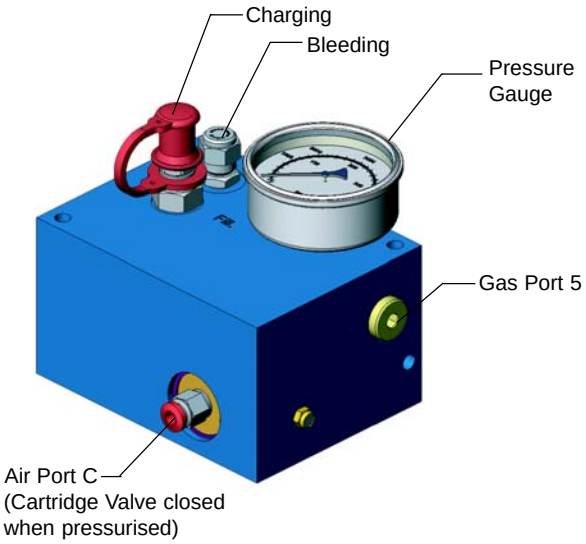
Valve Block Dimensions

There are two Valve Block models available:

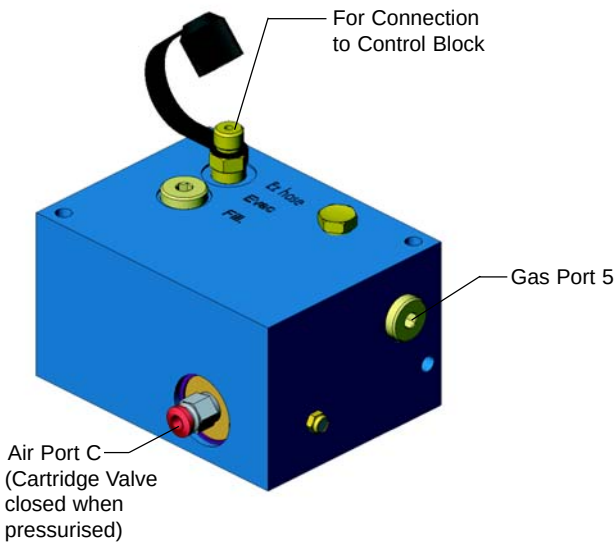
- **All-in-One Valve Block**, with built-in gas charging and bleeding equipment, plus gauge

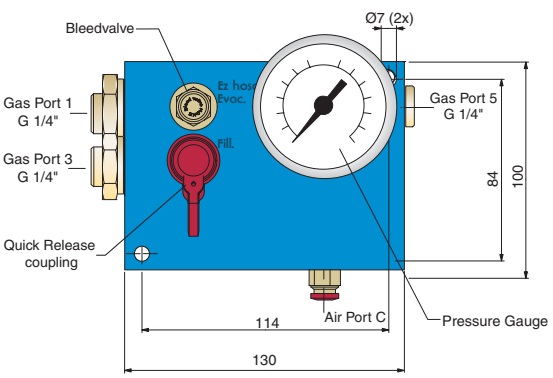
  Order No. 2020801

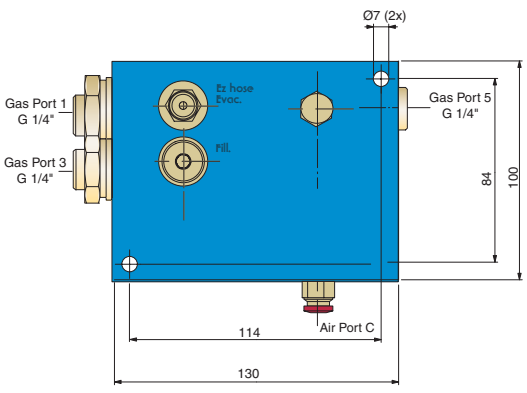


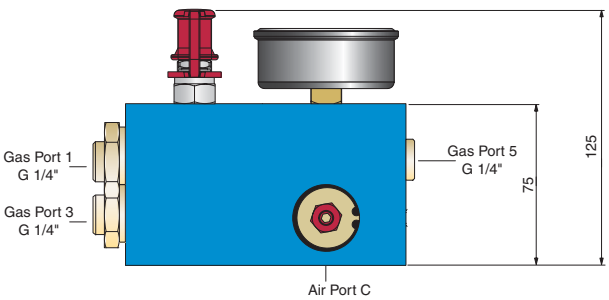
- **Standard Valve Block**, for use with separate Control Block

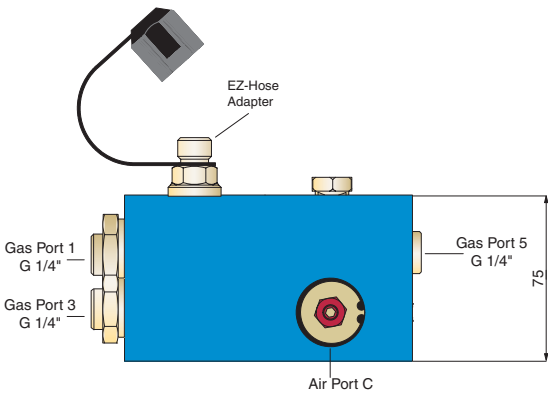
  Order No. 2120801











For information showing how to connect the different Valve Blocks to a Positive Lock System, see Installation Examples 10.6/2 and 10.6/5.

Controllable Gas Springs - KF2

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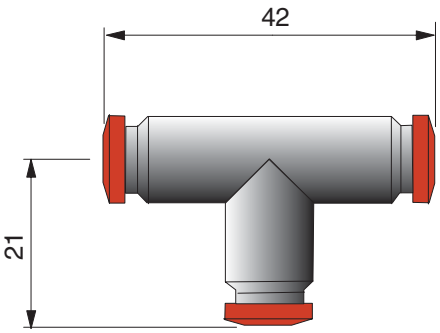
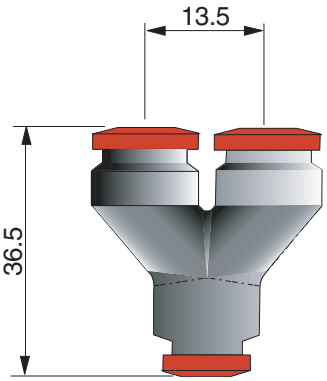
Control System Components

Hose and fittings for Ø6 mm pneumatic hose

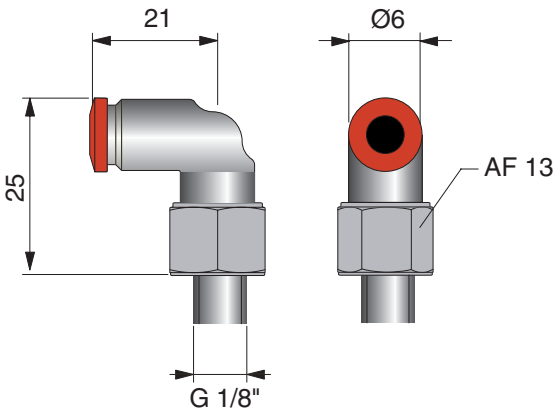
T - Connector (hose to hose)
Order No. 503368



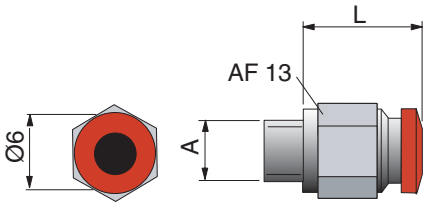
Y - Connector (hose to hose)
Order No. 503372



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

Pneutamic hose

Ø 6 mm

How to order 503377 - XX

Order the length in whole meters

BASIC INFORMATION

Material: ..... Polyurethane
Max. temperature ..... 60°C
Max. pressure ..... 16 bar
Colour ..... Blue
Min. bend radius 20

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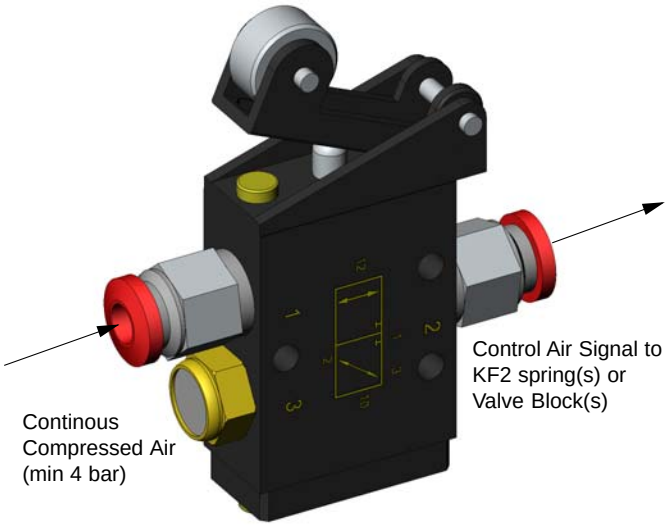
Mechanical Pressure Switch

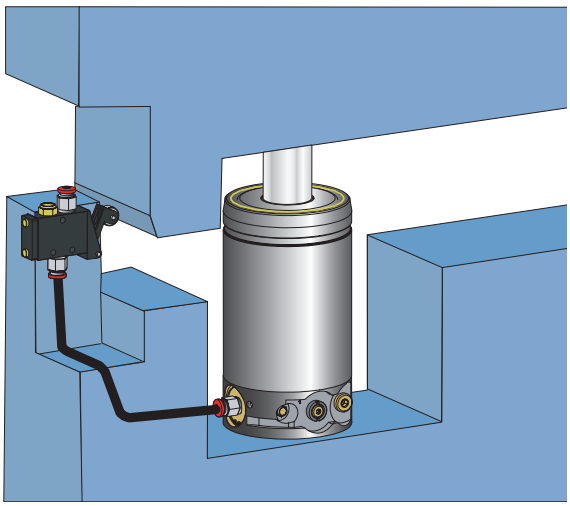
Order No. 503800

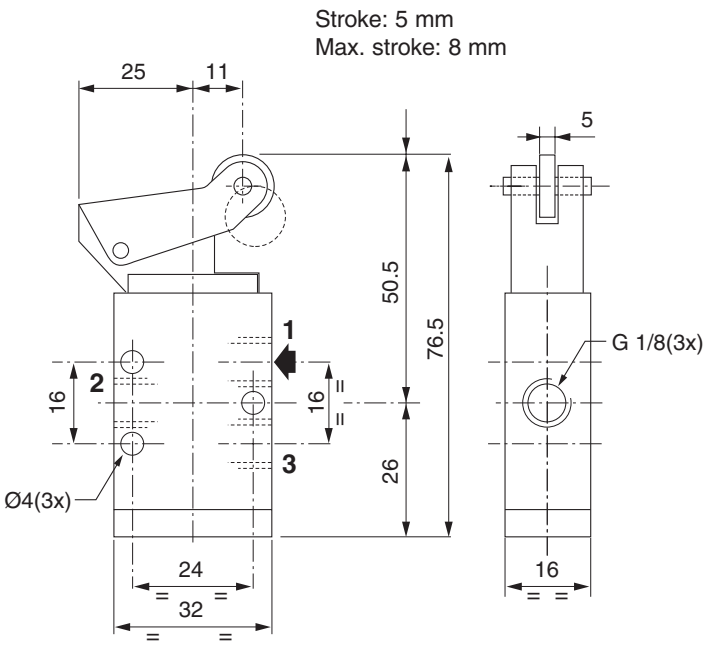
The Mechanical Pressure Switch can be used to control the valve in the KF2 Controllable Gas Spring(s) or Valve Block, for Tool Integrated Control Systems. For more information on Tool Integrated Control Systems see Page 10.4/2.



Mechanical Pressure Switches:

- **can** control up to 6 pcs KF2 springs or Valve Blocks,
- **require** a constant compressed air supply (min 4 bar).





BASIC INFORMATION

Fluid:……	Air or inert gas, filtered & lubricated
Pressure:	0 to 10 bar
Temperarture:	- 10°C to + 60°C
Functions:	3/2
Connection ports:	G 1/8" (3x)
Flow rate (at 6 bar):……	200 l/min

Controllable Gas Springs - KF2

KALLER®

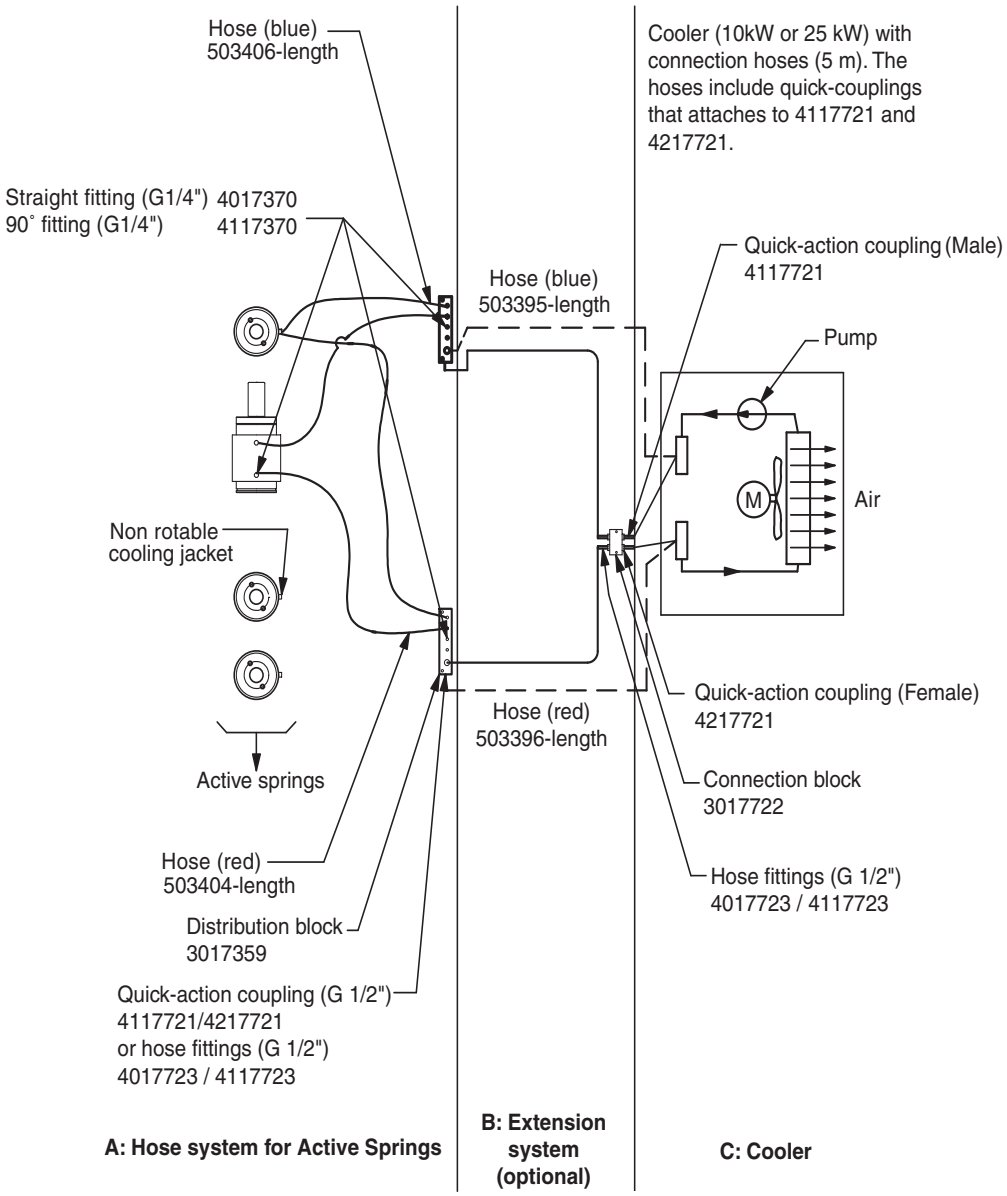
Cooling System Components

For applications where cooling is required, each KF2 Controllable Gas Spring must be:

- **fitted** with a Cooling Jacket (CJ) (see opposite),
- **fitted** with a Thermal Relay (Order No. 503388) (see *Over Heat Protection 10.4/8*),
- **connected in parallel** to the Cooler Unit as shown below.

KF2 spring fitted with Cooling Jacket (CJ)
For *How To Order* information see KF2 Dimensions 10.5/1.

5



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 radiated to the surroundings.

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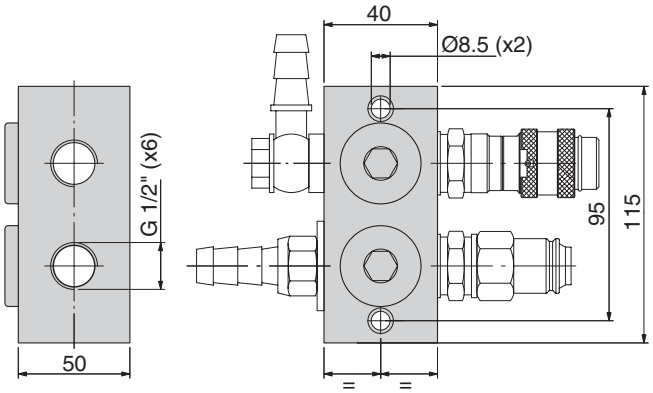
Cooling System - Hose & Fittings

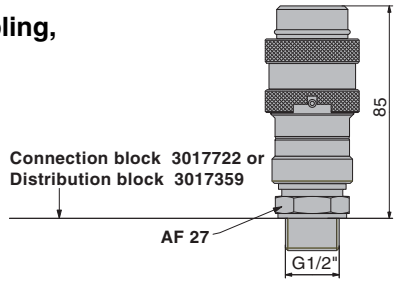
Connection block

Order No. 3017722



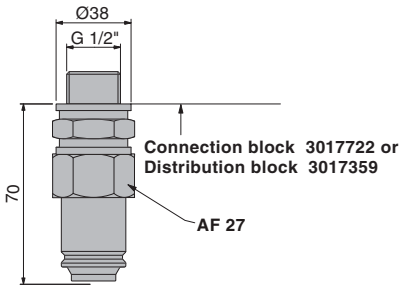
Female Quick Release Coupling,

Order No. 4217721



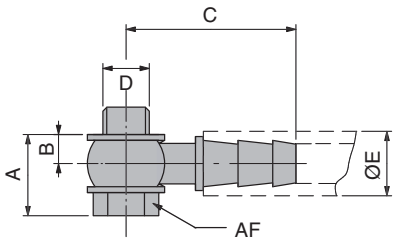
Male Quick Release Coupling

Order No. 4117721



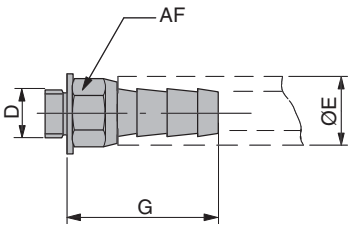
90° Hose Fitting

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



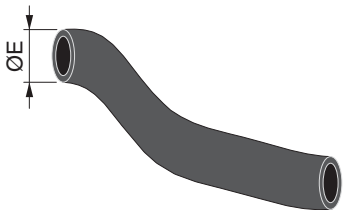
Straight Hose Fitting

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	Colour	Min. bend. radius
503406	16	10	Blue	75
503404	16	10	Red	75
503395	23	16	Blue	150
503396	23	16	Red	150

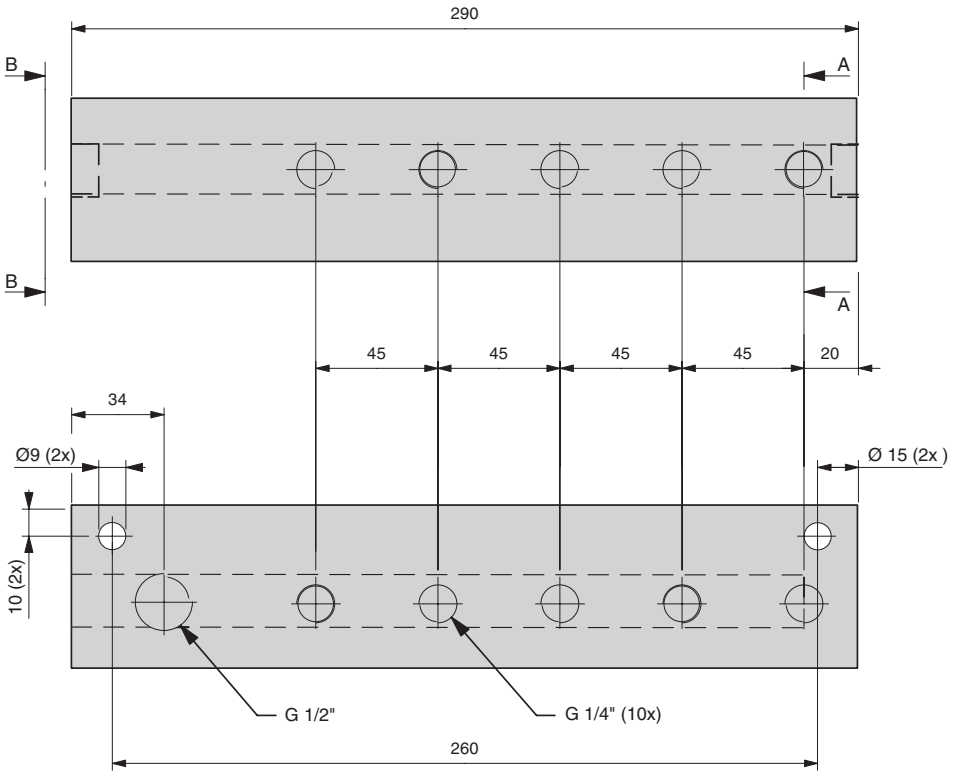


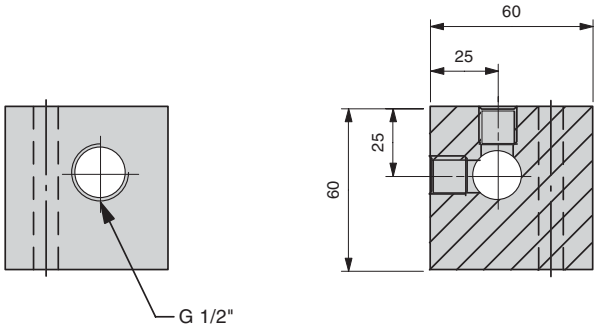
Controllable Gas Springs - KF2

KALLER®

Cooling System - Distribution Block

Order No. 3017359





View B-B

View A-A

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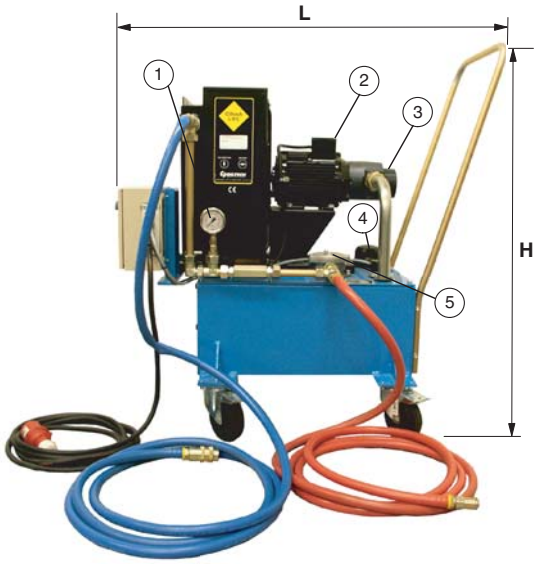
KALLER® Controllable Gas Springs - KF2

Cooling System - Cooler Unit

There are 2 sizes of Cooler Unit available:

- 10 KW - Order No. 4017360
- 25 KW - Order No. 4117360

For information on which Cooler Unit is suitable for your application, fill in the Application Enquiry Form 10.3/1 and fax it to your local Kaller Distributor or Strömsholmen AB directly.



1 Pressure Gauge
to monitor system pressure (8-10 bar)
2 Electric Motor
380V AC
3 Circulation Pump
Check the direction of rotation at start up
4 Cooling Fluid Port
5 Filter
6 User's Guide
7 Cooler
8 Outlet-cooling fluid
delivered with 5 m hose and **female** quick release coupling
9 Power Switch
On/Off button
10 Fluid level indicator
11 Inlet-cooling fluid
Delivered with 5 m hose and **male** quick release coupling
12 Drainage plug

Cooling Fluid

The Cooler Unit is not delivered with Cooling Fluid. We recommend using only ULTRA Safe 620 Cooling Fluid.

To locate your nearest supplier check: www.petrofer.com

Please Note!
The Cooler Unit is not to be started without cooling fluid in the cooler as it would 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 (10KW)**
H	1000
L	900
B	700
Pumpflow	40 l/min
Tank capacity	60 l
Electric motor	1.5 KW
Power supply	380 V AC
Weight	170 kg

25 KW Cooler Unit:	
Order No.	**4117360 (25KW)**
H	1070
L	1070
B	890
Pumpflow	60 l/min
Tank capacity	90 l
Electric motor	3 KW
Power supply	380 V AC
Weight	220 kg

Controllable Gas Springs - KF2

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Free Information Sign

Order No. 503613

The following Information Sign should be fitted to all tools containing Controllable Gas Springs.

One Information Sign will be included with each KF2 order.

KALLER® Controllable Gas Spring System

Die No:		
Gas Spring Model		
Stroke length		
Max frequency	strokes/min	
Gas spring charge pressure	Min bar	Max bar
Thermal Relay Connected	Yes ☐ No ☐	

Warning
Do not work in the die with the gas springs in locked position.

Note
- Make sure that the thermal relay is in operation.

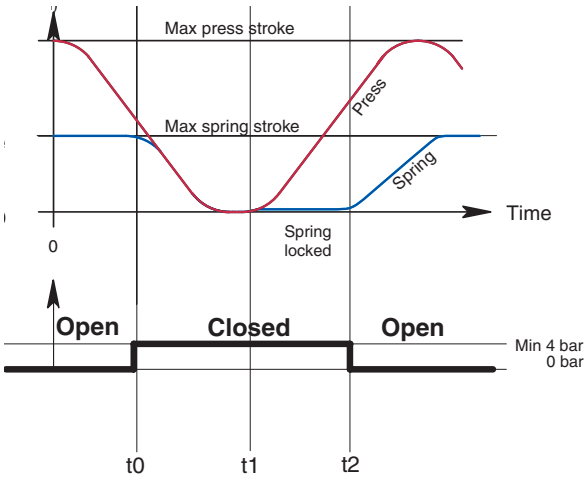
STRÖMSHOLMEN
Box 216, 573 23 Tranås, Sweden
www.kaller.com • info@kaller.com
Tel: +46 140 571 00 • Fax: +46 140 571 99

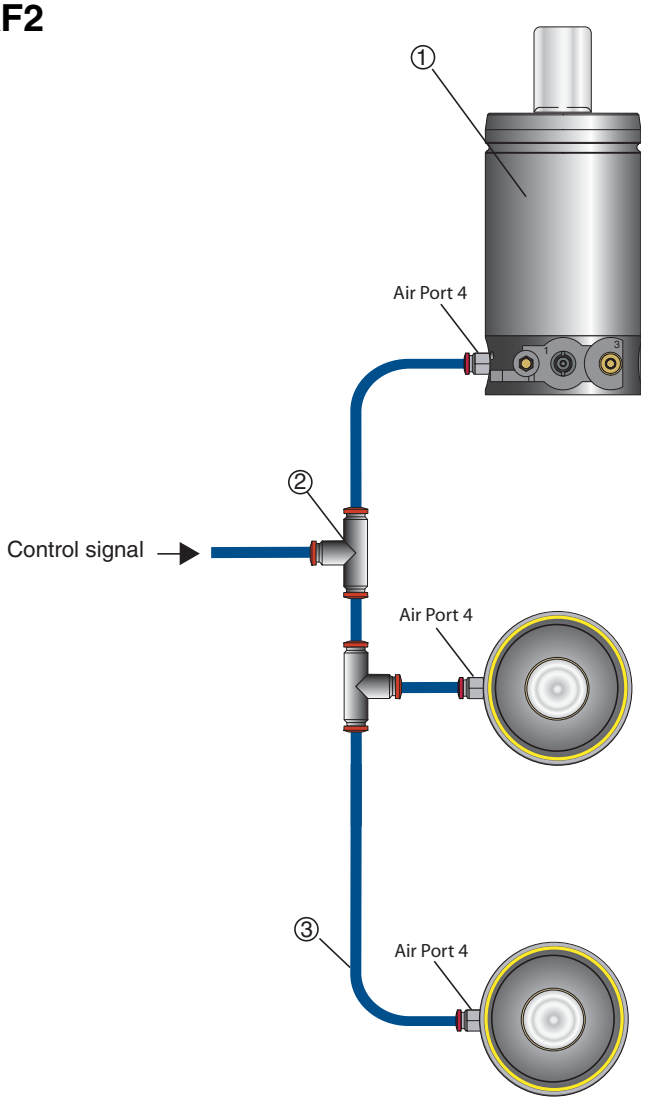
Standard checks before production run or in the event of a malfunction

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

Installation Examples

Control System - Standard Lock, KF2





Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	10.5/1
2	2	T - Connector	503368	10.5/5
3	1	Pneumatic Hose Ø6 mm	503377-XX	10.5/5

A Standard Lock System requires one control signal.

The KF2 gas springs are delivered with air fittings suitable for Ø6 mm air 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 the 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.

Controllable Gas Springs - KF2

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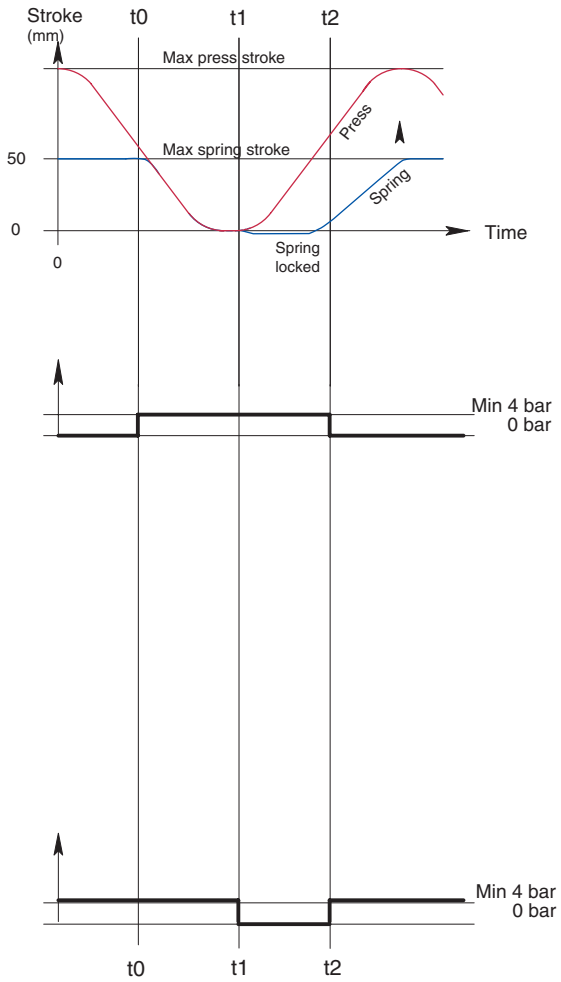
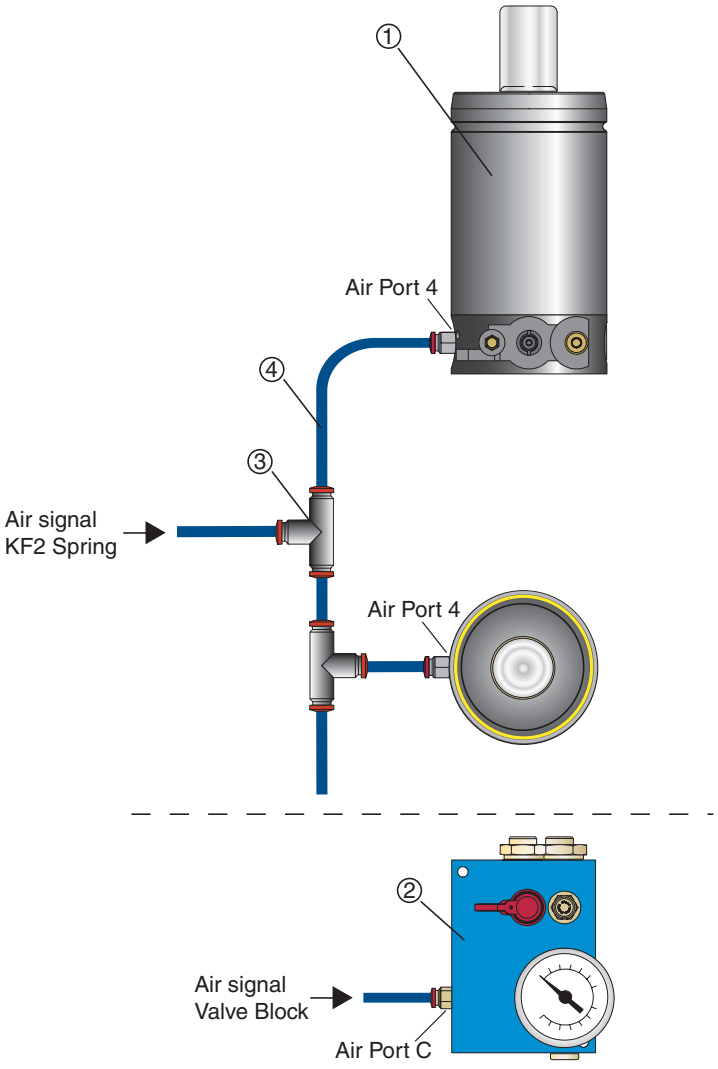
Control System - Positive Lock System, KF2 + KP





Position	Quantity	Description	Order No.	Page
1	2	Controllable Gas Spring	KF2 XXXX-XXX	10.5/1
2	1	All-In-One Valve Block	2020801	10.5/4
3	2	T - Connector	503368	10.5/5
4	1	Pneumatic Hose Ø6 mm	503377-XX	10.5/5

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's and Valve Block are delivered with air fittings suitable for Ø6 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 the installation (push-lock system). The control valve should always have a continous supply of filtered compressed air, with a minimum pressure of 4 bar.

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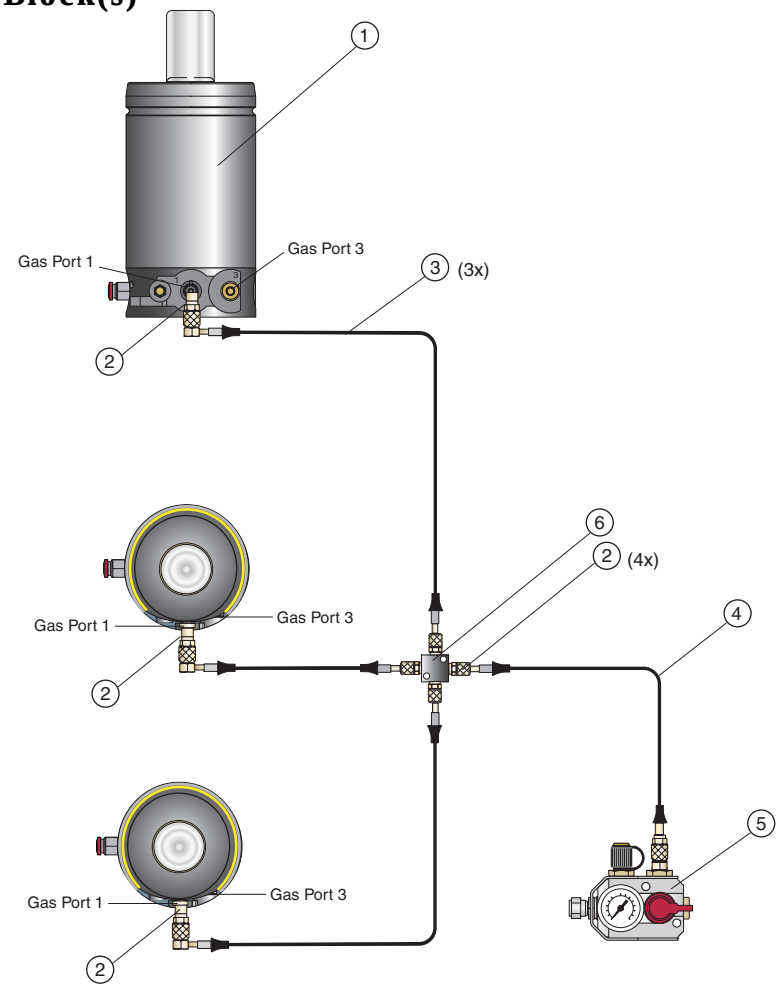
Hose System - Standard Lock, KF2

Method using Coupling Block(s)



Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	10.5/1
2	7	Adapter G 1/8"	4014973-G 1/8"	Chapter 4, Main Catalogue
3	3	EZ-Hose straight - 90°	4017568-XXXX	Chapter 4, Main Catalogue
4	1	EZ-Hose straight - straight	4014974-XXXX	Chapter 4, Main Catalogue
5	1	Control Block	3116114-01	Chapter 4, Main Catalogue
6	1	Multi - Coupling Block	4017032	Chapter 4, Main Catalogue

To charge, bleed and check the gas pressure for a Standard Lock, 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 (4014973-G 1/8") for connection to an EZ-Hose.

The Control Block should be placed higher than the KF2 springs to avoid loss of internal oil when bleeding.

Controllable Gas Springs - KF2

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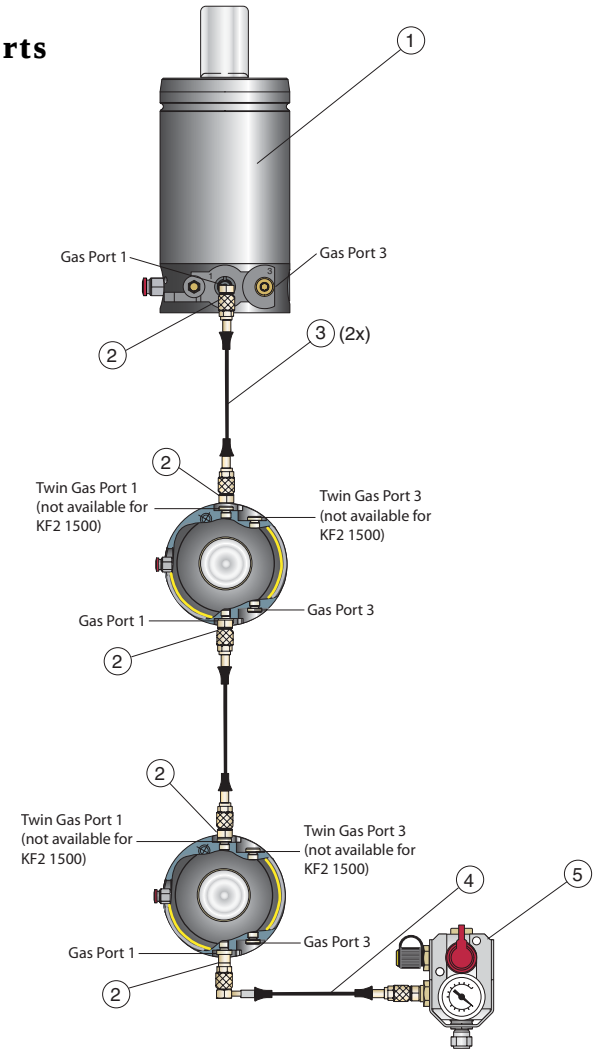
Hose System - Standard Lock, KF2

Method using Twin Ports

(Not valid for KF2 1500)

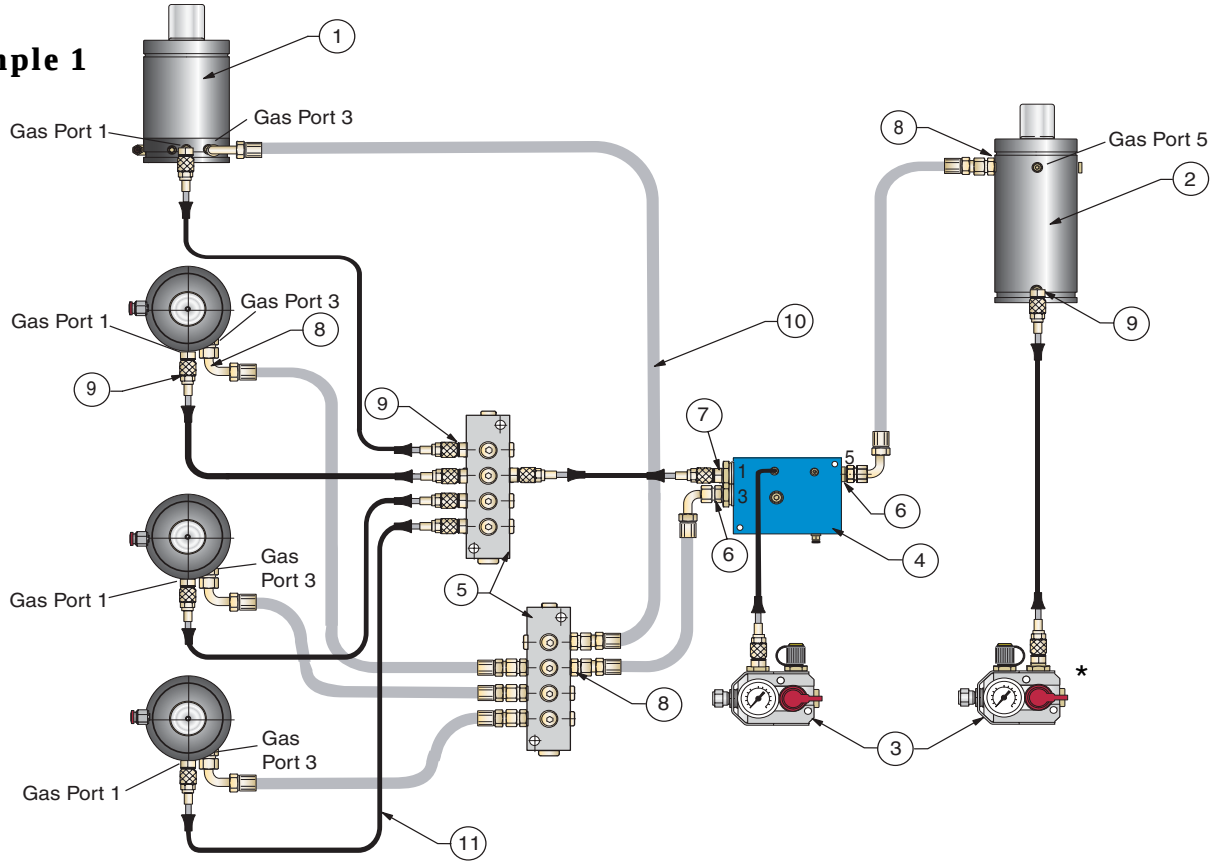


Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	10.5/1
2	5	Adapter G 1/8"	4014973-G 1/8"	Chapter 4, Main Catalogue
3	2	EZ-Hose straight - straight	4014974-XXXX	Chapter 4, Main Catalogue
4	1	EZ-Hose straight - 90°	4017568-XXXX	Chapter 4, Main Catalogue
5	1	Control Block	3116114-01	Chapter 4, Main Catalogue

To charge, bleed and check the gas pressure for a Standard Lock, 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 (4014973-G 1/8") for connection to an 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 needs two hose connections:

- One EZ-Hose connection
- One EO24–Hose connection.

The Control Block should be placed higher than the springs to avoid loss of internal oil when bleeding.

Position	Quantity	Description	Order No.	Page
1	4	Controllable Gas Spring	KF2 XXXX-XXX	10.5/1
2	1	KP Passive Spring	KP XXXX	10.5/3
3	2	Contol Block	3116114-01	Main Catalogue
4	1	Standard Valve Block	2120801	10.5/4
5	2	Multi Coupling Block G 1/8"	3015044	Main Catalogue
6	2	EO24 Adapter G 1/4"	504144	Main Catalogue
7	1	EZ Adapter G 1/4"	4014973-G 1/4"	Main Catalogue
8	10	EO24 Adapter G 1/8"	4014019	Main Catalogue
9	10	EZ Adapter G 1/8"	4014973-G 1/8"	Main Catalogue
10	6	EO24 Hose straight - 90°	3220857-xxxx	Main Catalogue
11	7	EZ Hose straight - straight	4014974-xxxx	Main Catalogue

Positive Lock, KF2 + KP
as per above gas charging and bleeding is carried out as follows;

Stage1

Charge the lower gas chamber in the KP-Passive Gas Spring. Through Control Block (3)*.

Stage 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).

Controllable Gas Springs - KF2

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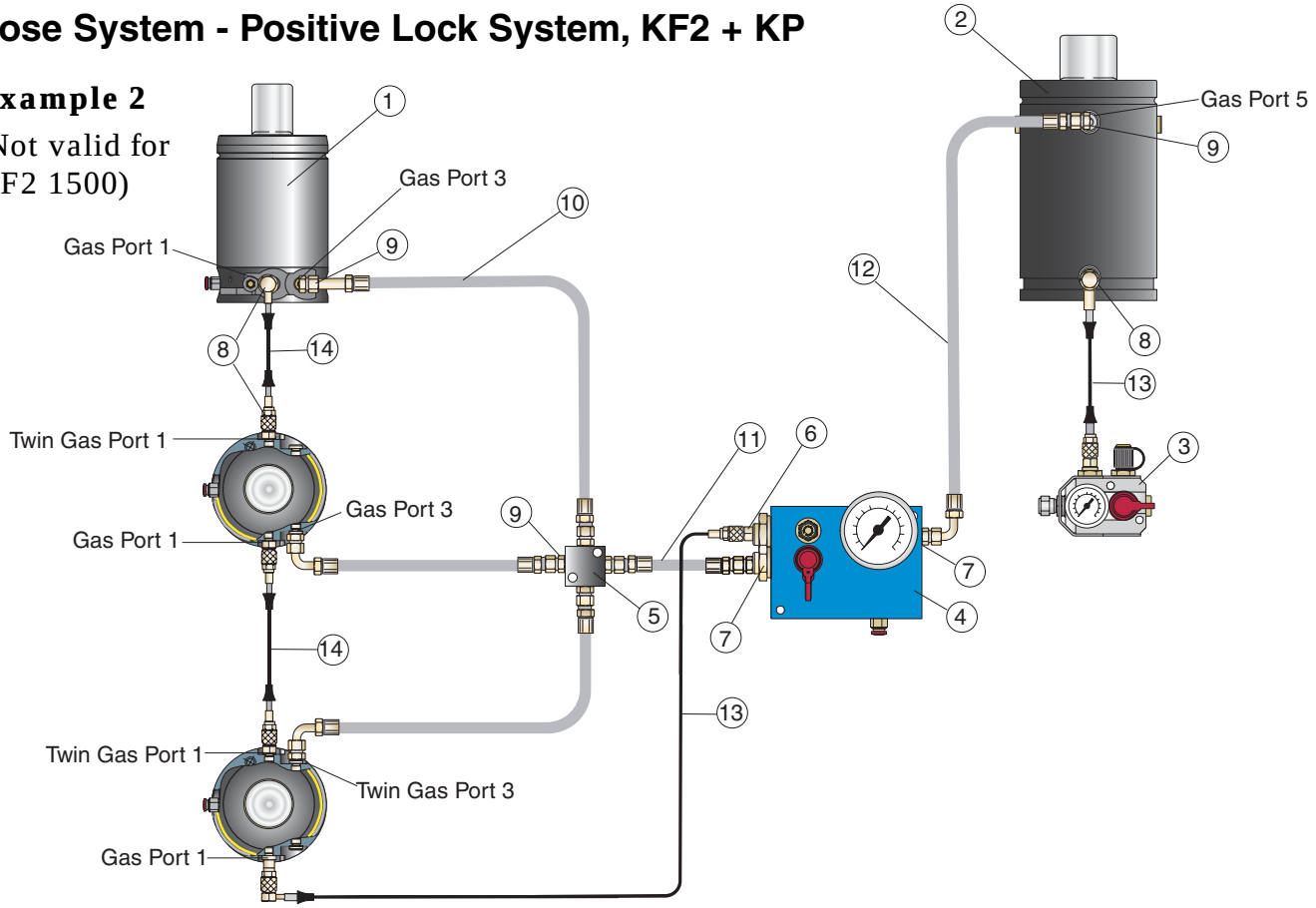
Hose System - Positive Lock System, KF2 + KP

Example 2

(Not valid for KF2 1500)



To connect KF2 controllable gas spring(s) to a KP – Passive Gas Spring via the Valve Block needs two hose connections:

- One EZ-Hose connection
- One EO24–Hose connection.

The Control Block should be placed higher than the springs to avoid loss of internal oil when bleeding.

Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XX	10.5/1
2	1	KP Passive Spring	KP XXXX	10.5/3
3	1	Contol Block	3116114-01	Main Catalogue
4	1	All-in-One Valve Block	2020801	10.5/4
5	1	Coupling Block	4017032	Main Catalogue
6	1	EZ Adapter G 1/4"	4014973-G 1/4"	Main Catalogue
7	2	EO24 Adapter G 1/4"	504144	Main Catalogue
8	6	EZ Adapter G 1/8"	4014973-G 1/8"	Main Catalogue
9	8	EO24 Adapter G 1/8"	4014019	Main Catalogue
10	4	EO24 Hose straight - 90°	3220857-xxxx	Main Catalogue
11	1	EO24 Hose straight - straight	3020857-xxxx	Main Catalogue
13	2	EZ Hose 90°- straight	4017568-xxxx	Main Catalogue
14	2	EZ Hose straight - straight	4014974-xxxx	Main Catalogue

Positive Lock, KF2 + KP
as per above gas charging and bleeding is carried out as follows:

Stage1

Charge the lower gas chamber in the KP-Passive Gas Spring. Through the standard Control Block (3).

Stage 2

Charge the KF2 Standard spring(s) and upper chamber of the KP gas spring via the All-In-One Valve Block (4).

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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 you use the Thermal Relay 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 strokemeters.
Can I use other Hose-Systems?	We cannot guarantee the function of the system if Hose-Systems other than those mentioned in this manual are used. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I mix different KF2 size springs in the same system?	No. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.

Relating to Standard Lock, KF2	
Is it possible to adjust the stroke length of the KF2 spring, or must I always use 100% of the nominal stroke ±0.5 mm?	There are 2 versions of the KF2 Controllable Gas Spring, the standard model KF2 and an adjustable model KF2-A. For more information on the adjustable model, see Technical Data 10.5/2.
How fast can the KF2 spring be stroked?	0.8 m/sec is the max allowed compression velocity. The maximum stroke frequency (spm) at which a KF2 spring can run at depends on the stroke length of the spring and level of cooling. See Cooling (optional) 10.4/5 for more information.
What can I do to eliminate KF2 springback?	If you are using 100% stroke length ±0.5 mm of the KF2 spring, a max 1 mm of spring back can be expected. It is possible to eliminate this at anytime by converting the Standard Lock into a Positive Lock System. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I lock a KF2 Controllable Gas Spring at any position?	Basically yes, but the less you stroke the KF2 controllable gas spring, the greater the springback will be. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.

Controllable Gas Springs - KF2

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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, other than to eliminate KF2 springback.
Can I use just the EZ-Hose System to connect up 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 up my Positive Lock System?	Yes.

Relating to Cooling	
Is Cooling always required?	Not always. Generally speaking, longer stroke lengths and faster press stroke frequencies normally require Cooling. See Cooling System (optional) 10.4/5 for more information.
How many KF2 controllable springs can be connected to a single Cooler Unit?	The maximum heat effect for all springs together have to be lower athan the cooling effect of the cooler. See table on page 10.4/5 and 10.5/10 for more information.
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 you use Water-glycol fluid (HFC) ULTRA SAFE 620. ULTRA-SAFE 620 is approved by all major manufacturers of equipment, and is often used for running-in new machines. Equivalents to this water-glycol fluid can be used, but Strömsholmen AB cannot be held responsible for poor function.

Troubleshooting

System	Problem	Solution
Standard Lock, KF2	KF2 spring does not lock	Make sure KF2 spring's Air Port 4 has min 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 KF2 spring's Air Port 4 has min 4 bar air pressure before press BDC
	KF2 piston rod does not return	Make sure KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod returning
		Check that there is gas pressure in the KF2 spring

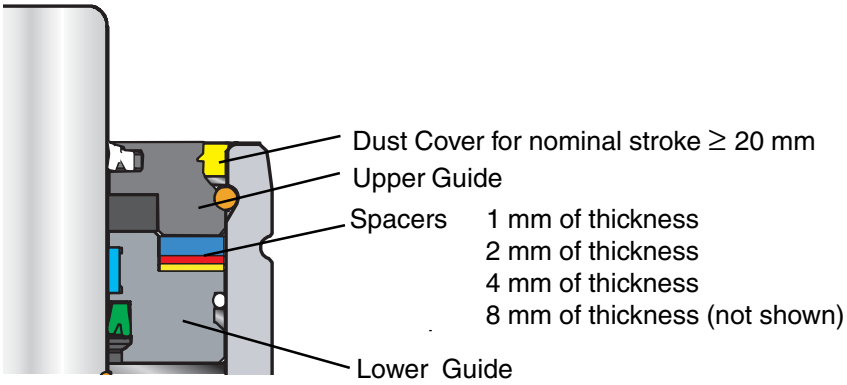
System	Problem	Solution
Positive Lock System, KF2 + KP	KF2 spring does not lock	Make sure KF2 spring's Air Port 4 has min 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's spring back is greater than 0 mm	Make sure the cartridge valve in the Valve Block is closed during the press's down-stroke and that the KP-Passive Gas Spring is being stroked enough 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 is opened at BDC
	KF2 piston rod does not return	Make sure KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod returning
		Check that there is gas pressure in the KF2 spring

KF2 Springs - Appendix

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 is adjusted by installing and/or removing spacers between the upper and lower guide. To get the correct stroke length spacers according to Table 1, should be installed in the guide.

Example 1:

The stroke length is to 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 are to be left in the guide/spring.
The working procedure is described in the opposite.

Table1.

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
Ex.1	+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

* The nominal stroke length is always marked on the tube

Important!

- **Only fully trained personnel with experience servicing gas springs are allowed to make adjustments 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.**

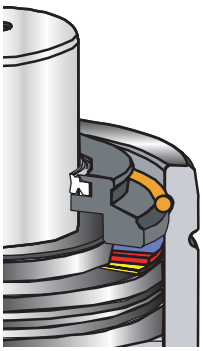
You are welcomed to download an animated guide from our homepage:
www.kaller.com

KF2 Springs - Appendix

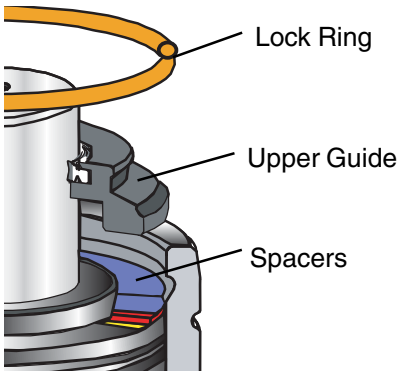
Stroke length adjustment of KF2-A

Working procedure

1: Make sure the KF2-A gas spring is degassed and remove dust cover (if applicable).

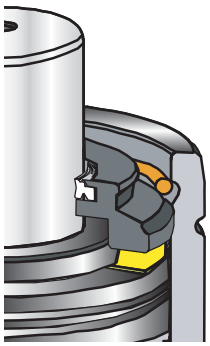


2: Knock down the guide and remove the lock ring by using a mounting sleeve and a plastic hammer.



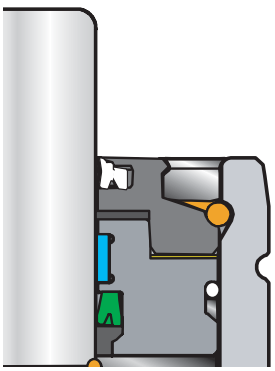
3: Remove the Upper Guide and install the combination of Spacers that will give you the required stroke length.

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 dust cover (if applicable).

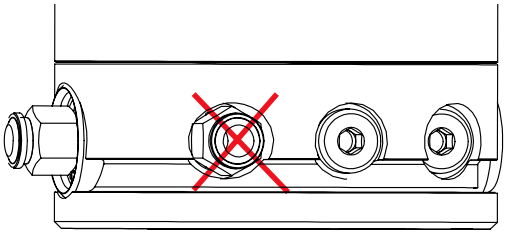
8

KF2 Springs - Appendix

How does the new KF2 differ from an existing KF

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

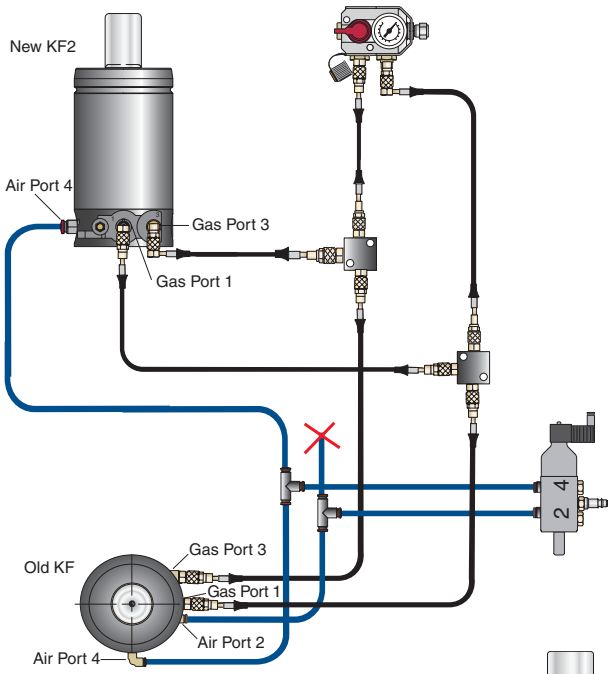


How to fit the new KF2 to existing KF systems

KF2 Controllable Gas Springs are completely interchangeable with existing KF springs.

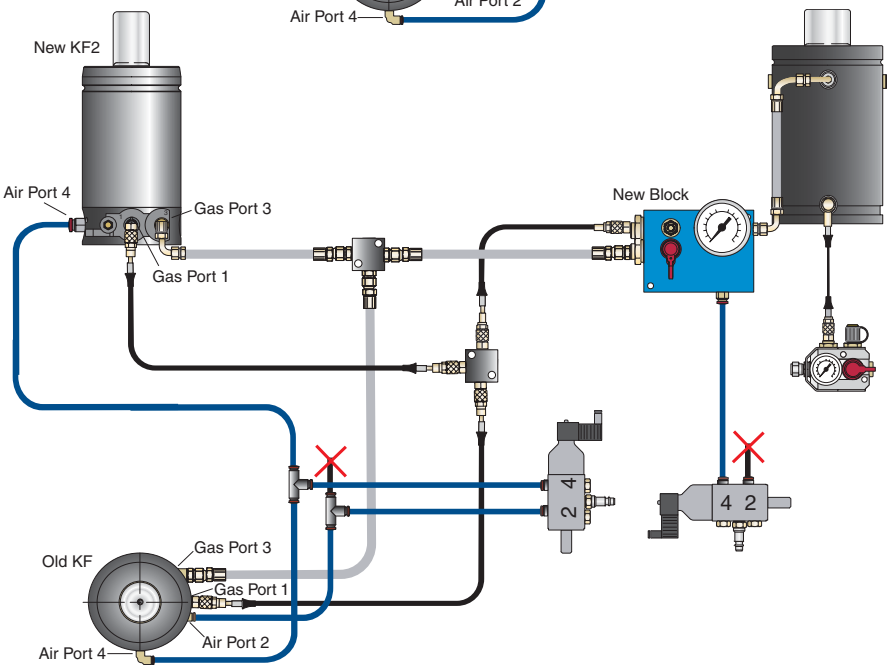
Standard Lock Example: Replacing an existing KF with a new KF2

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 marked 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 marked X).



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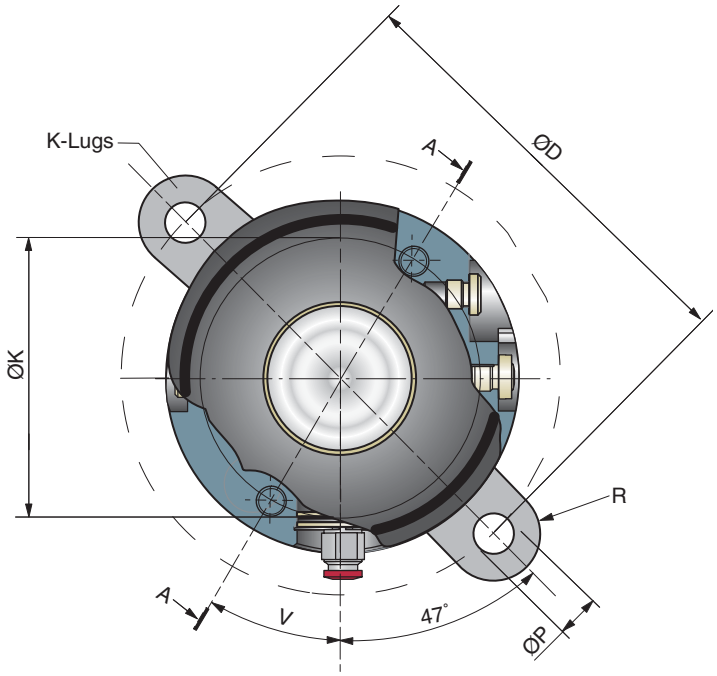
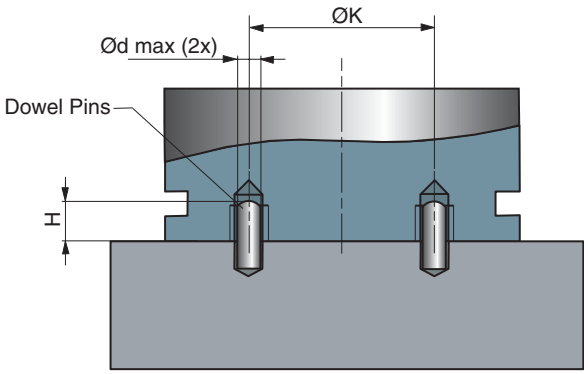
KF2 Springs - Appendix

KF2/KF2-A Alternative Mounting

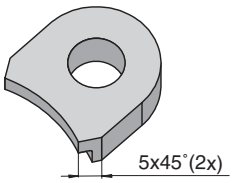
For upside down installations the threaded holes in the base of the KF2/KF2-A should always be used when mounting the Controllable Gas Springs to the tool.

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 (M 12 respective M 16) 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.





A - A

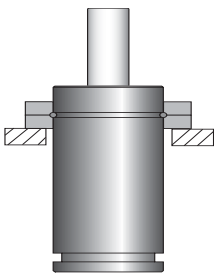


Modification of K-3000 Lug

Model	ØD	Ød max.	H	ØK	V	ØP	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 opposite, before they can be fitted to the KF2/KF2-A 1500.

It is also possible to mount the KF2/KF2-A Controllable Gas Springs using an FCSC flange mount if cooling is not required. For more information contact your local distributor or Strömsholmen AB.



FCSC
Top Mount