Product Series
Delayed Return Units

KALLER®
The Safer Choice

Controllable Gas Springs – KF2

Edition 13. 2016

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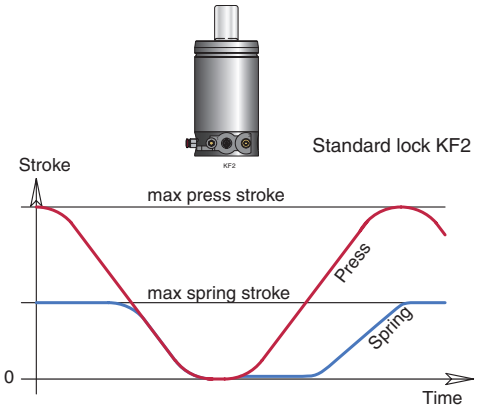
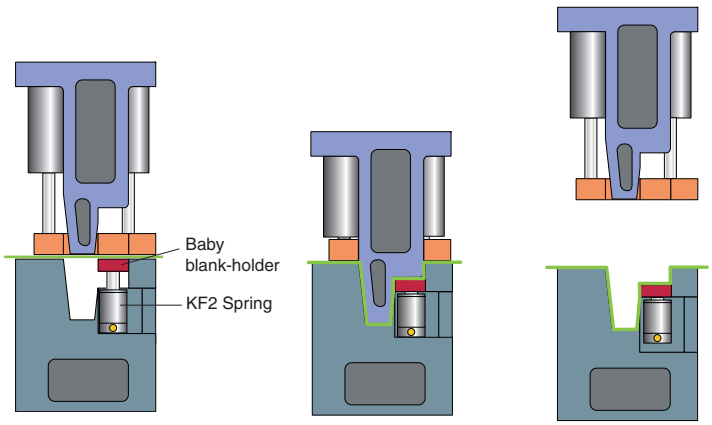
About Controllable Gas Springs

KF2 is the next generation of controllable gas springs, which supersedes the KF springs.

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

One application example is in drawing dies (see below) where two forming stages are performed with a single press stroke.





More examples illustrating the benefits of using controllable gas springs can be found in section *Applications Examples 2/1*.

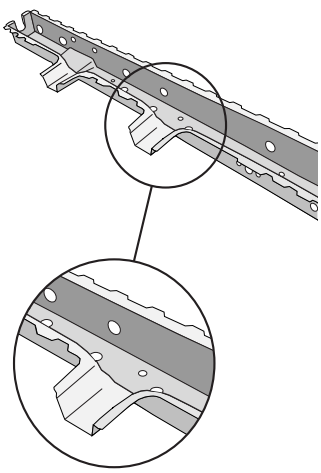
Controllable gas springs are available with:

- Model sizes 1500, 3000, 5000 & 7500 (initial force in daN)
- Stroke lengths from 5 mm to 160 mm

There are two controllable gas spring systems available:

- Standard lock, KF2
- Positive lock system, KF2 + KP

The following is a brief description of these two systems.

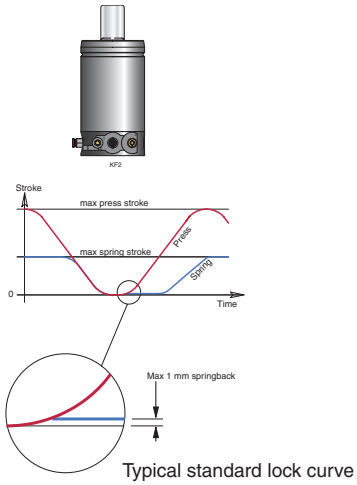


Standard Lock, KF2

The KF2 is a controllable gas spring whose piston rod can be locked at BDC.

The full stroke length of the KF2 spring must be used within ±0.5 mm for optimal locking function to provide maximum springback of 1 mm, which we refer to as standard lock (for zero springback see Positive lock System).

The return stroke of the piston is either controlled by the control system from the press or can be integrated into the tool itself (for more info, see Tool integrated control system, page 4.2). The springs can either be installed self-contained or connected to a control block through a hose system.



Typical standard lock curve

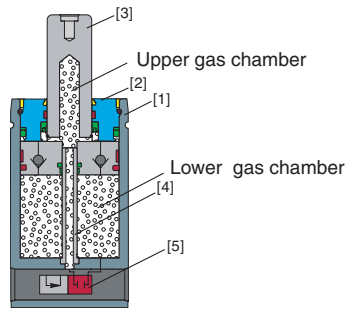
KF2 – how does it work?

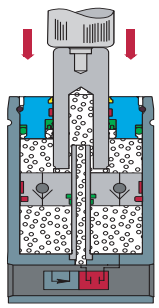
The KF2 controllable gas spring consists of a cylinder [1], guide assembly [2], piston rod assembly containing check valves [3], internal piston rod [4] and normally open (NO) cartridge valve [5] located in the base of the spring.

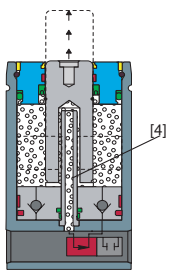
The nitrogen gas within the spring is sealed within an upper and a lower gas chamber. When the spring is stroked, nitrogen gas from the lower chamber passes through the check valves in the piston rod assembly and enters the upper chamber.

The cartridge valve is closed by applying compressed air pressure (min. 4 bar). With the cartridge valve closed, the piston rod is prevented from returning to its extended position.

By opening the cartridge valve again, the gas contained within the upper chamber can now return to the lower chamber via the internal piston rod [4], thus allowing the piston rod to return to its extended position.





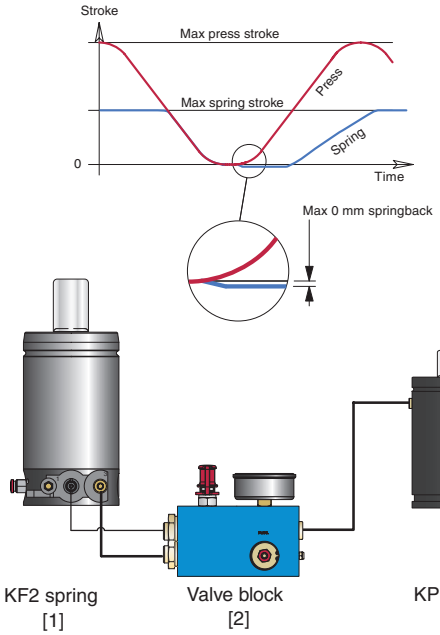


Positive Lock System, KF2 + KP

The KF2 + KP system combines a standard lock, i.e. a KF2 controllable gas spring [1], with a specially designed KP passive gas spring [3] via a valve lock [2], which together forms a positive lock system.

The result is a controllable gas spring system with **zero springback.**

Please note!
The KP passive gas spring is **not** to be used for any operation in the tool other than to eliminate springback in the KF2 spring(s). It can be placed anywhere in the tool and can eliminate springback in up to four KF2 controllable gas springs. How much the KP passive gas spring should be stroked depends on the number of KF2 springs in the system. The cartridge valve in the valve block is identical to the one in the KF2 spring.

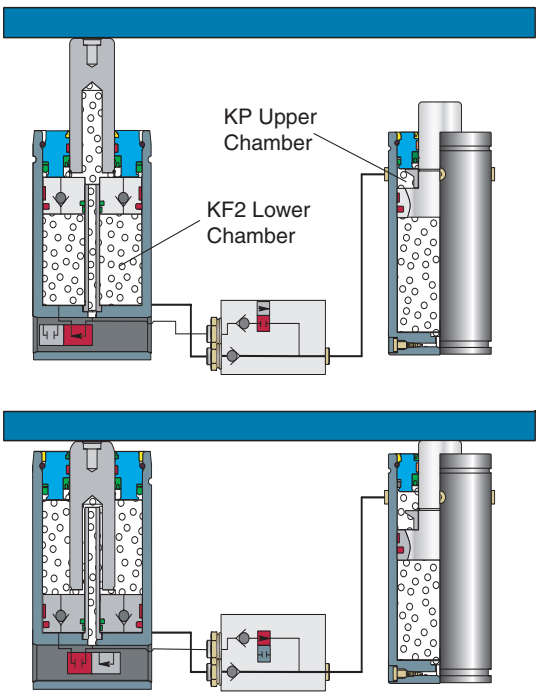


Positive Lock System, how does it work?

The KF2 is the active spring in the system and provides the required spring force in the tool. The task of the KP passive gas spring is to eliminate the max. 1 mm springback of the KF2 spring(s) at press BDC.

The system works by connecting the lower gas chamber in the KF2 controllable gas spring(s) to the upper chamber of the KP passive gas spring via the valve block. By stroking the KP passive gas spring, the pressure in its upper gas chamber is reduced causing a pressure difference between it and the lower gas chamber in the KF2 controllable gas spring(s).

At BDC, the valve in the valve block is opened, using the control system from the press or a mechanical pressure switch, and the remaining gas in the lower chamber of the KF2 spring is drawn into the upper chamber of the KP passive gas spring.



Why 100% nominal stroke ±0.5 mm?

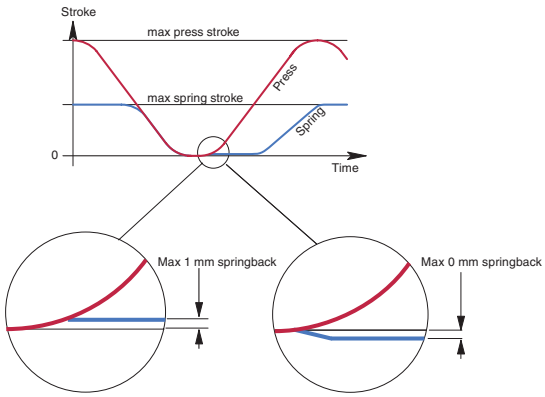
In order to provide optimum locking from the KF2 controllable gas spring, it is important to stroke the spring 100% of the nominal stroke length ±0.5 mm.

This is because it is necessary to reduce the gas volume in the lower gas chamber to a minimum.

For a standard lock, stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm will ensure maximum springback of 1 mm.

An adjustable stroke length version of the controllable gas spring, called the KF2-A, is available for those applications where the exact nominal stroke length ±0.5 mm is not known until after tool try-outs.

For a positive lock system with KF2 + KP, stroking the KF2 spring 100% of the nominal stroke length ±0.5 mm is also important, although this also largely depends on the utilized stroke length of the KP passive gas spring.

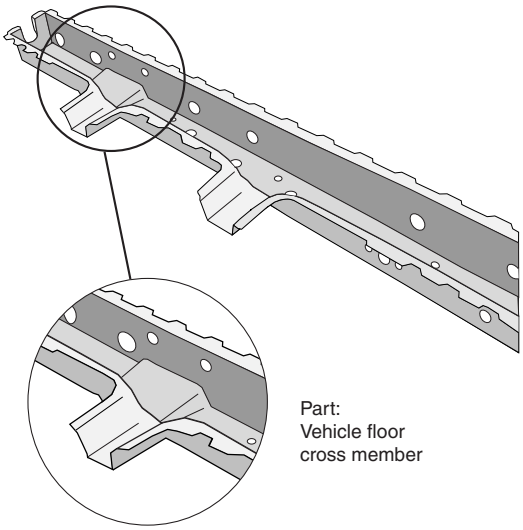


Standard lock KF2

Positive lock KF+KP

Standard Lock, KF2

When forming this cross member, “baby” blank holders are used to form the circled area. TThe tool uses two “baby” blank holders, which during the return stroke must be locked in the bottom position to avoid deformation of the part. In this case, one KF2 spring is used to control each “baby” blank holder.



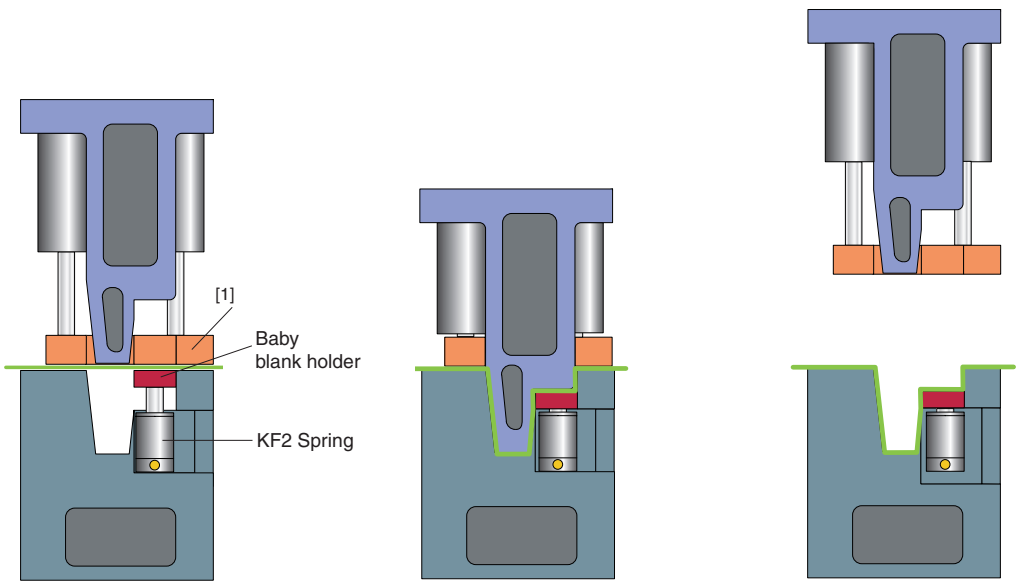
Part:
Vehicle floor
cross member

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

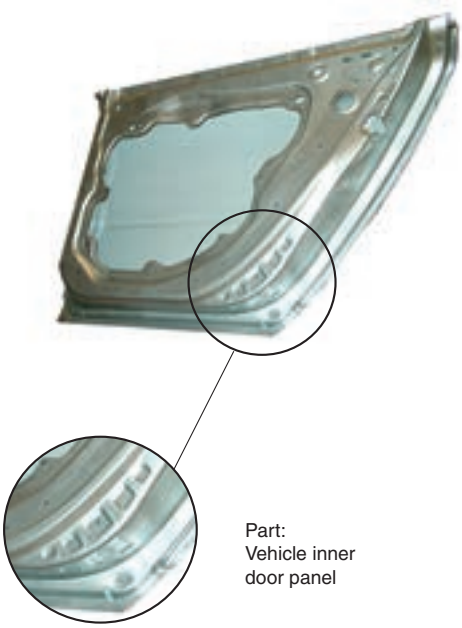
Positive Lock System, KF2 + KP

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.



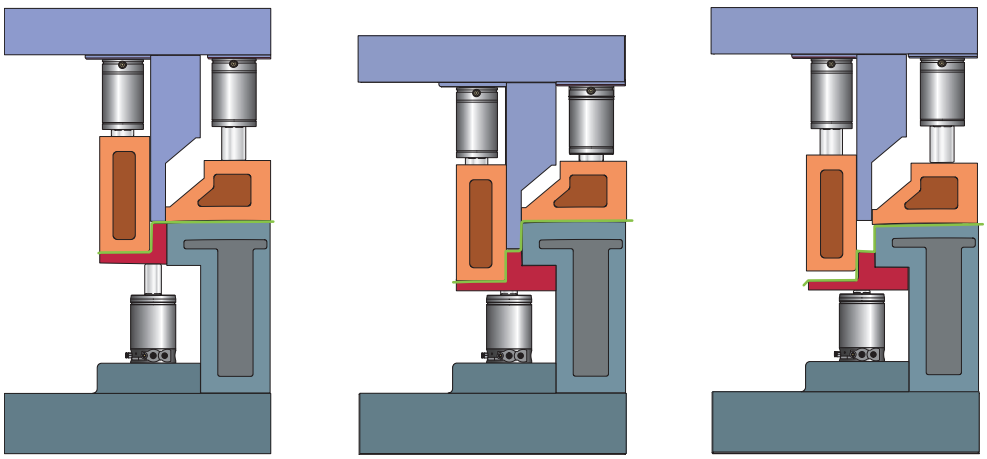
Part:
Vehicle inner door panel

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

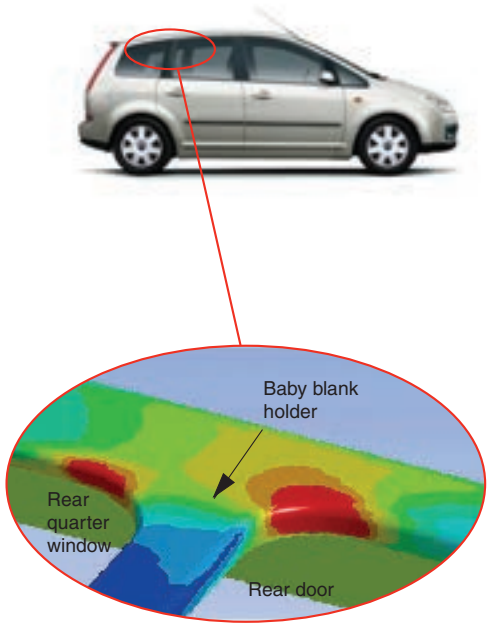
Positive Lock System, KF2 + KP

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.



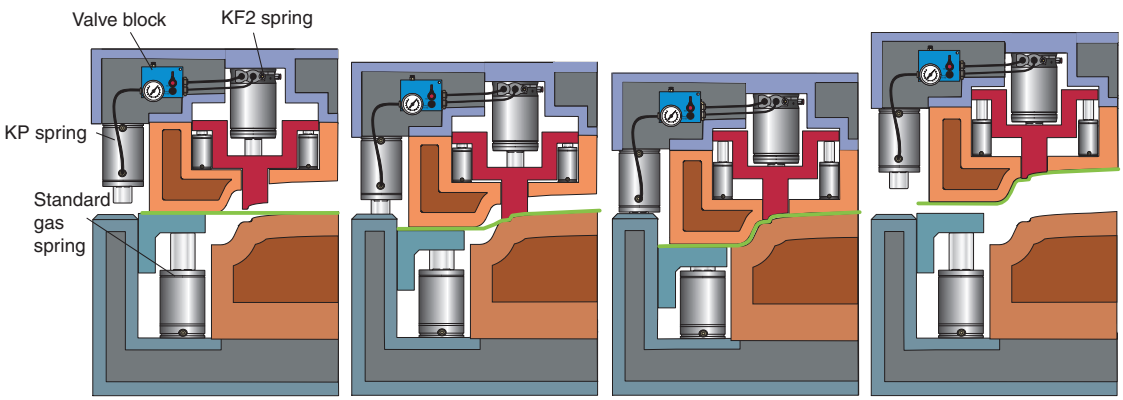
Work cycle

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 spring-back in the KF2 springs.

As the tool opens, the KF2 springs remain locked until a signal from the press is given. The KF2 springs then help eject the finished part from the tool.



Positive Lock System, KF2 + KP

To make selection of the right system and components for your particular application easier, please fill in the *Application Enquiry Form* below.

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

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

General information

Date:…….....(yy/mm/dd)

Your name:…..…….…….....

How do you wish to be contacted?

- Via phone:…….…….....(give details)
- Via fax:…….....….....(give details)
- Via e-mail:…..….....(give details)

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

Application information

1. Does your application require a gas spring with lockable piston rod (Y/N)?…….....
2. If you answered Yes to Question 1, is a max. 1 mm springback acceptable (Y/N)? .....
3. How many gas springs does your application require?…….…….....pcs
4. What initial force is required from each gas spring?……..……..……....….....daN
5. What stroke length is required for each gas spring?……..….....….....mm
6. How many strokes per minute (spm) will your application run at?…….....spm
7. The springs should be connected together using a Hose System .....

Additional comments: ……
……
……
…….....
….....
.....……..…….....
.....….....

Controllable gas springs require at least one of the following systems:

- Control system (mandatory)
- Hose system (optional)
- Cooling system (optional)

Control system (mandatory)

In order to lock and unlock the KF2 controllable gas spring(s), a control system is required to send a pneumatic signal (min. 4 bar) to the normally open (NO) valve in the base of the KF2 spring.

The pneumatic signal can either be provided by the control system from the press, or integrated into the tool itself using mechanical pressure switches (see Tool integrated control system 4.2 for more information).

Control system – Standard Lock, KF2

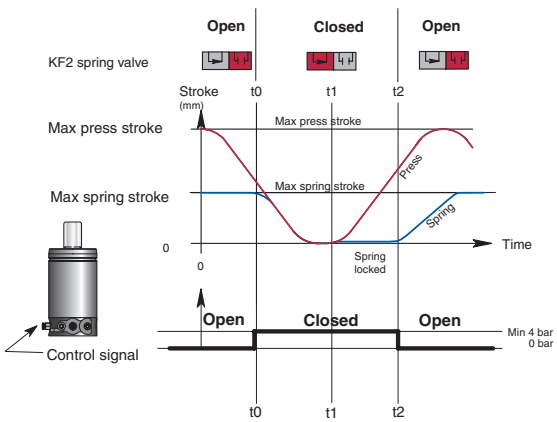
The normally open (NO) valve within the base of the KF2 controllable spring(s) is closed using compressed air (min. 4 bar). With the valve closed at t0-t2 (see diagram), the piston rod of the KF2 spring(s) is prevented from returning to its extended position.

By connecting the valves in the KF2 springs to each other using pneumatic hoses to the control system of the press, the springs can be easily locked and subsequently unlocked.

If only an electrical control signal is available from the press, then a standard electric-pneumatic control valve can be used.

For examples of how to connect the KF2 controllable gas spring(s) to a control system, see the installation examples on page 6.1.

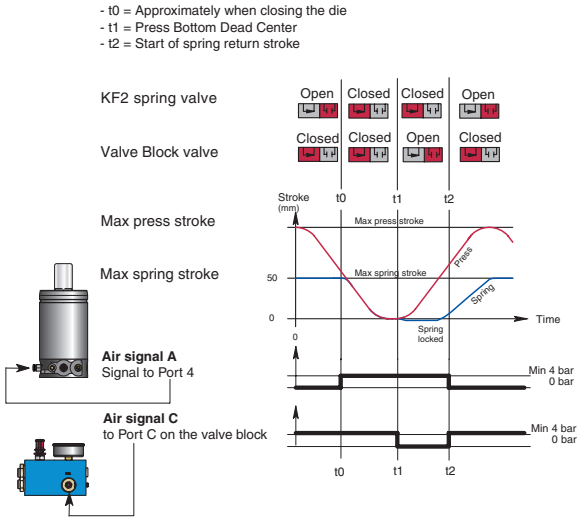
- t0 = Die closed
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



Control system – Positive Lock System, KF2+KP

When the KP passive gas spring is connected to the active KF2 spring(s) via the valve block, an additional signal from the press (or separate mechanical pressure switch) is required to control the valve within the valve block.

As the valve in the valve block is identical to that used in the KF2 springs, it is normally open (NO). Therefore during the down-stroke of the press, it is important the valve block's valve is closed by applying compressed air (min. 4 bar) to air port C.



Please note!
The valve in the valve block should be opened exactly at press BDC.

For examples of how to connect the KF2 + KP controllable gas spring system to a control system, see the installation examples on page 6.1.

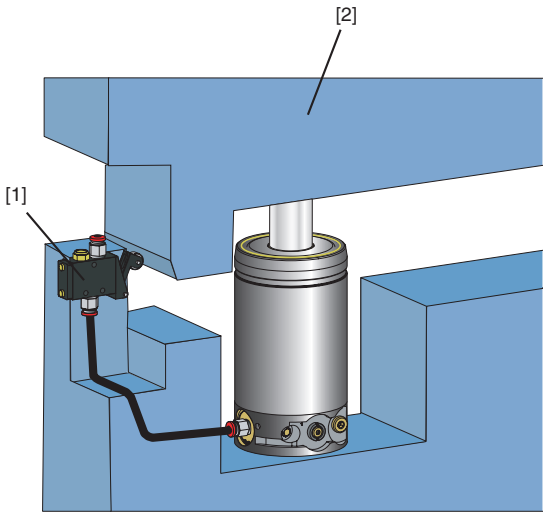
Tool integrated control system

The control system, required to lock the KF2 spring(s), can be integrated into the tool itself by using a mechanical pressure switch. The control system required to lock and unlock the KF2 spring(s) is then becomes independent of the press' own control system.

The KF2 spring(s) remain locked as long as the mechanical pressure switch [1] is activated by the tool [2].

When a positive lock system is used, the mechanical switch is recommended to control only the KF2 gas springs (signal A). To obtain the proper signal (C) to valve block an electric pneumatic 3/2 valve is recommended.

As a result, a tool integrated control system only requires a constant supply of compressed air (min. 4 bar) to the mechanical pressure switch.



Hose system (optional)

KF2 controllable gas springs can be installed in the tool as self-contained units or linked together using a hose system for remote gas charging and evacuation.

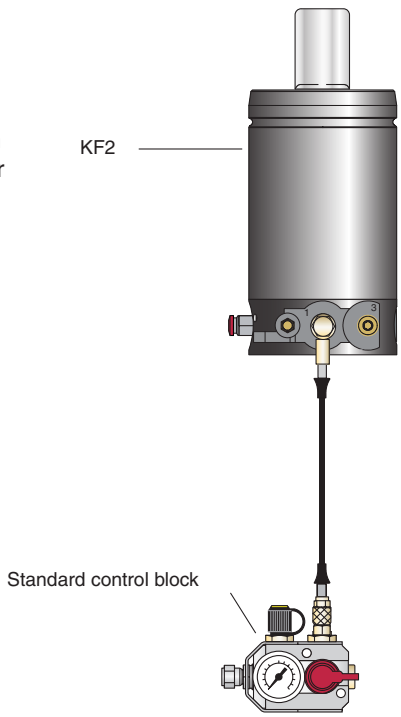
Controllable gas spring system	Recommended hose system
Standard lock	EZ hose
Positive lock system	EZ hose and EO24 hose

Hose system – Standard Lock, KF2

With reference to Chapter 4 of the KALLER main catalog, we recommend use of the EZ hose System.

KF2 controllable gas springs are connected to each other in a hose system in just the same way as standard gas springs. For information on connecting the newer KF2 springs with the older KF controllable gas springs, see Appendix “How to fit the new KF2 to existing KF Systems” on page 8.2.

For examples of how to connect KF2 controllable gas springs to a hose system, see the installation examples on page 6.1.



Hose system – Positive Lock System, KF2+KP

It is possible to connect up to four KF2 springs to one valve block.

With reference to Chapter 4 of the KALLER main catalog, a KF2+KP controllable gas spring system requires two hose connections:

- One EZ hose connection
- One EO24 hose connection

EZ hose connections

Gas port 1, which is marked on each KF2 spring, is connected to gas port 1 on the valve block (also marked) using EZ hose system components.

EO24 hose connections

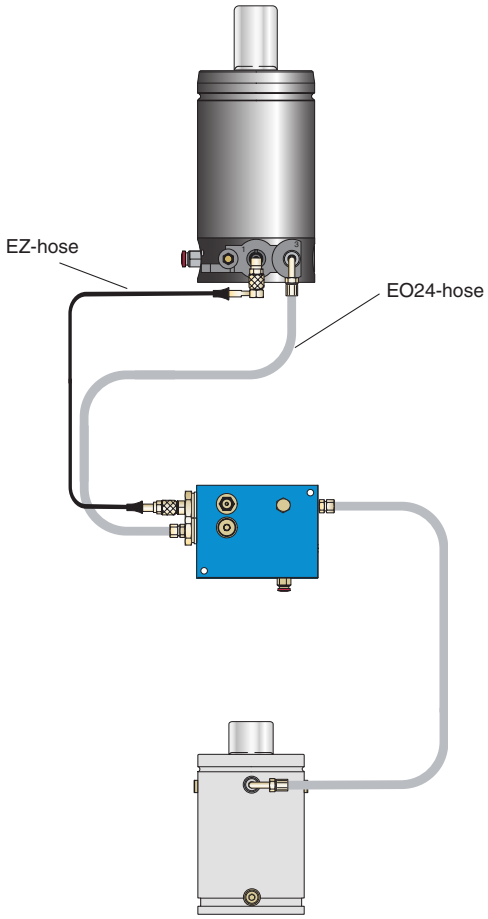
To connect the KF2 controllable gas spring(s) to a KP passive gas spring via the valve block, we recommend using the EO24 hose system (or its equivalent) owing to the large internal diameter of the hose. This is especially important when gas flow in the hoses is required.

Gas port 3, which is marked on each KF2 spring, is connected to gas port 3 on the valve block (also marked) using EO24 hose system components

Gas port 5, which is marked on the valve block, is connected to gas port 5 (also marked) on the KP passive gas spring also using EO24 hose system components.

For information on connecting the newer KF2 springs together with the older KF controllable gas springs, see appendix “How to fit the new KF2 to existing KF systems” on page 8.2.

For examples of how to connect KF2 + KP controllable gas spring systems to a hose system, see he installation examples on page 6.1.



Cooling System (optional)

About cooling
Currently there are two possible KF2 cooling system solutions to choose between when cooling is required for a KF2 gas spring system. Which particular method to choose depends upon the required cooling effect and the number of controllable gas springs to be cooled.

KF2-NC / KF2-A-NC for use with a Nitro cooler™. Nitro coolers are ideal for a small number of springs that operate at higher production rates and as such require cooling. They are also ideal where there is insufficient space for cooling jackets and a liquid cooler unit.

KF2-CJ / KF2-A-CJ for use with a liquid cooler unit. For applications where a larger number of KF2 springs operate at higher production rates requiring cooling of heat build-up, liquid cooler units rated at 10 kW or 25 kW are available. Each KF2 gas spring is fitted with a cooling jacket, thus allowing efficient circulation of cooling liquid around each KF2 gas spring.

Every time a KF2 controllable gas spring is stroked, energy is transferred from the press to the spring. The amount of energy transferred is a function of the spring force multiplied by its stroke length.

With a conventional gas spring, the piston rod follows the press movement on the return stroke. This means that the energy transferred to the gas spring on the compression stroke is transferred back to the press on the return stroke (with the exception of some losses due to friction, etc.). However since the return stroke of a KF2 controllable gas spring does not follow the return stroke of the press, the transferred energy is generated as heat in the KF2 spring.

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

Heat factor

The need for cooling is determined by calculating the KF2 spring's heat factor for the application.

The heat factor is calculated by multiplying the stroke frequency in strokes per minute (spm), with the KF2 spring's stroke length (mm).

Example:

Stroke frequency: 15 spm

KF2 stroke length: 100 mm

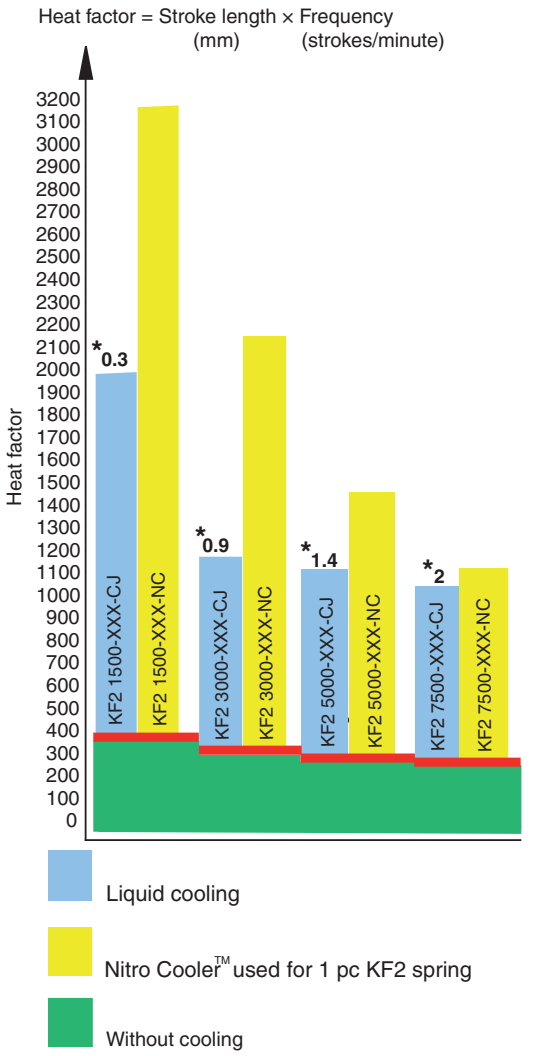
Heat factor = Stroke frequency × Stroke length
= 15 × 100
= 1500

If this heat factor exceeds the maximum frequency without cooling values given for the different KF2 spring sizes in the diagram, then cooling is required.

When deciding on a cooling system, the following should be taken into account:

A liquid cooler should be used for big dies with a large number of springs. The cooling capacity is limited to 25 kW.

The Nitro cooler™ is suitable for small dies with a limited number of springs (1-6 pcs.) The Nitro cooler™ should be placed as close as possible to the springs. The return speed is lower when a Nitro cooler™ is used. Nitro cooler™ is a die-integrated cooler with a limited cooling capacity of 1.5 kW.



*Heat effect (kW) per KF2 gas springs at maximum freqvency

Please note!
The information in the diagram is based on calculations made for KF2 gas springs operating at a 150 bar charge pressure in a well-ventilated area with an ambient temperature of 24°C.

What can be done to eliminate the need for cooling?

For some applications, the need for cooling can be eliminated by considering one of the following:

Method 1: Add more KF2 springs

By adding additional KF2 Controllable gas springs to the system, the charge pressure in each KF2 spring is reduced in order to maintain the same net spring force in the tool. The heat factor reduction for the KF2 spring is directly proportional to the reduction in charge pressure.

For example:

A tool should run at 10 spm and have a stroke length of 50 mm.
The net spring force required from the tool is 300 kN.
Preferred number of springs is 10 pcs.

Solution 1:

The natural choice would be to select 10 pcs of KF2 3000-050 at a 150 bar charge pressure (see Technical data 10.5/1 for more info).
In this case, the Heat Factor would be 10 × 50 = 500
With reference to the heat factor diagram, a heat factor of 500 exceeds the allowable limit for a system without cooling by 120.
Instead, by adding an additional 4 pcs KF2 3000-050 to the system, the total net spring force at 150 bar is 420 kN.
Since the charge pressure and initial force are directly related, by applying the ratio of forces the new heat factor can be calculated.

$$\text{New heat factor} = \text{Original heat factor} \times \frac{\text{Required net force at reduced pressure}}{\text{Net force at 150 bar}}$$

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

$$= 360$$

The new heat factor is now 20 below that required for KF2 3000 cooling.

Method 2: Use larger KF2 springs

By selecting a KF2 Controllable gas spring of a larger size than originally planned, the charge pressure must be reduced in order to maintain the same net spring force from the tool.
The heat factor reduction for the KF2 spring is directly proportional to the reduction in charge pressure.
With reference to the previous example:

Solution 2:

Selecting 10 pcs KF2 5000-050 at 150 bar would provide a total net spring force of 500 kN.
The heat factor at 150 bar would be 10 × 50 = 500 as above.

$$\text{New heat factor} = \text{Orginal heat factor x} \frac{\text{Required net force at reduced pressure}}{\text{Net force at 150 bar}}$$

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

$$= 300$$

The new heat factor is now 60 below that required for KF2 5000 cooling.

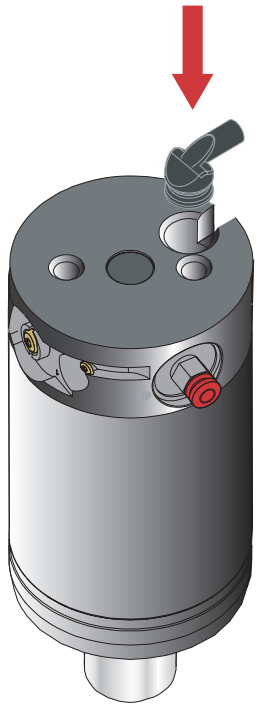
Over Heat Protection

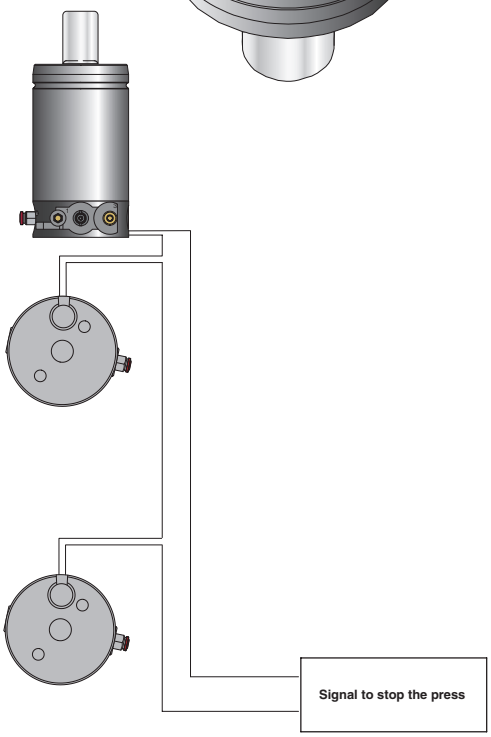
Thermal Relay

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



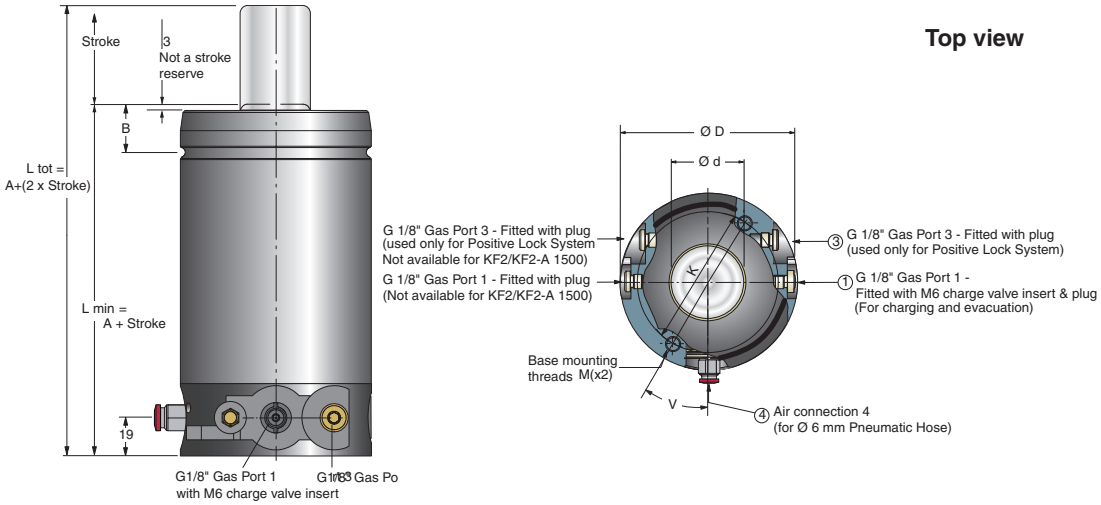


Connection of 3 pcs KF2 (example above)

Basic information

Normally closed
Trigger temperature ..... 83 ±3°C
Hysteresis..... < 7°C
Max. voltage ..... 250 VAC
Max. current..... 16 A
Min. current..... 50 mA
Delivered with 2 m of electric cable

KF2 – Dimensions, standard version



Model	Stroke	Force in N at 150 bar /+20°C		A	B	Ø D	Ø d	K	V	M
		Initial	End force*							
KF2 1500	5–160	15,000	22,000	125	24	95	36	50	60°	M12×15
KF2 3000	6–160	30,000	42,000	135	25.5	120	50	95	30°	M12×15
KF2 5000	6–160	50,000	74,000	160	27.5	150	65	110	30°	M16×18
KF2 7500	8–160	75,000	98,000	180	33.5	195	80	120	30°	M16×18

- Upon delivery, all gas ports are fitted with plugs and the internal gas pressure is zero bar.
- We recommend the threaded holes in the base of the KF2 springs be used for mounting. If mounting from the base is not possible, see the Appendix on page 8.4 for more information.

Basic information

Pressure medium ..... Nitrogen
Max. charge pressure ..... 150 bar
Min. charge pressure ..... 25 bar
Operating temperature ..... 0 – +80°C
Force increase by temperature ..... ±0.3%/°C
Max. piston rod velocity ..... 0.8 m/s
Return speed piston rod 1500*..... ≈ 0.22 m/s
Return speed piston rod 3000*..... ≈ 0.15 m/s
Return speed piston rod 5000*..... ≈ 0.12 - 0.10 m/s
Return speed piston rod 7500*..... ≈ 0.80 - 0.65 m/s
Tube ..... Nitrided
Rod ..... Nitrided

How to order

KF2 3000 - 078

Model

Stroke length [mm] in full mm between 10-160 mm, in increments of 1 mm.
For optimal function the full stroke length of the spring must be used. (Within ± 0.5 mm).

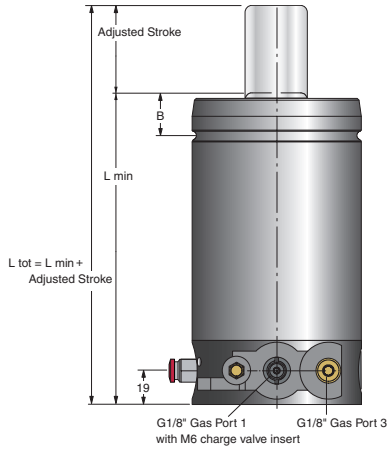
***Please note:**
Increased stroke length reduces the speed. Please contact your local KALLER distributor for further information.
KF2 springs with even slower return speeds are available on request.

KF2-A – Dimensions, adjustable version

For certain applications, it is difficult to know in advance exactly what stroke length will be required.

Therefore, the KF2-A Controllable gas spring models offer adjustable stroke lengths within 15 mm, with the use of 4 specially designed spacers built into the guide of the spring.

KF2-A Adjustable stroke controllable gas springs are available according to the following table:



Order No.	Nominal stroke	Min. stroke length	Max. stroke length	L min.			
				1500	3000	5000	7500
KF2-A XXXX-010	10	5*	17	142	152	177	197
KF2-A XXXX-020	20	12	27	152	162	187	207
KF2-A XXXX-030	30	22	37	162	172	197	217
KF2-A XXXX-040	40	32	47	172	182	207	227
KF2-A XXXX-050	50	42	57	182	192	217	237
KF2-A XXXX-060	60	52	67	192	202	227	247
KF2-A XXXX-070	70	60	77	202	212	237	257
KF2-A XXXX-080	80	72	87	212	222	247	267
KF2-A XXXX-090	90	82	97	222	232	257	277
KF2-A XXXX-100	100	92	107	232	242	267	287
KF2-A XXXX-110	110	102	117	242	252	277	297
KF2-A XXXX-120	120	112	127	252	262	287	307
KF2-A XXXX-130	130	122	137	262	272	297	317
KF2-A XXXX-140	140	132	147	272	282	307	327
KF2-A XXXX-150	150	142	157	282	292	317	337
KF2-A XXXX-160	160	152	167	292	302	327	347

* Min. stroke length	
KF2-A 1500-010	5
KF2-A 3000-010	6
KF2-A 5000-010	6
KF2-A 7500-010	8

For information on how to adjust the stroke length of the KF2 spring, see Appendix “How to adjust the stroke length of a KF2-A”, page 8.1.

How to order:

KF2-A 3000 - 030 - 030

Model:
KF2-A 1500
KF2-A 3000
KF2-A 5000
KF2-A 7500

Nominal Stroke

Delivered Stroke

Gas springs with cooling

KF2/(KF2-A) with Cooling jacket (CJ)

The following springs are available where cooling is required.

Gas springs with cooling jackets are used with the liquid cooler (Fig. 1). The cooling jacket should be connected to the cooler. See page 4.5

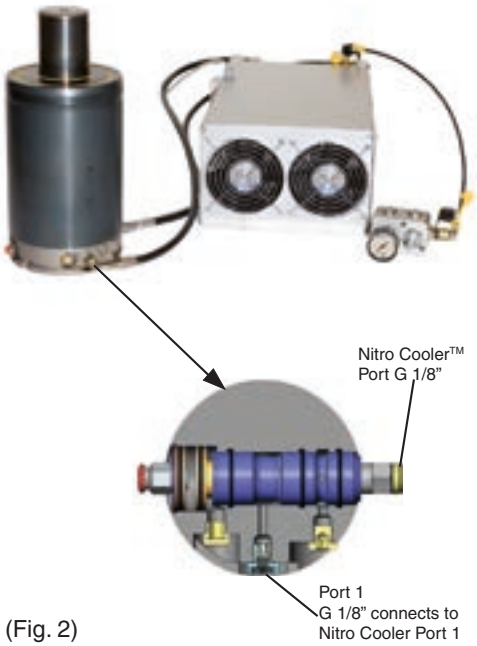
(Fig. 1)

Model	KF2 C	KF2-A C+7	Ø H +5 0
KF2/KF2-A 1500-XXX-CJ	75	82	110
KF2/KF2-A 3000-XXX-CJ	85	92	135
KF2/KF2-A 5000-XXX-CJ	110	117	165
KF2/KF2-A 7500-XXX-CJ	130	137	210

KF2/(KF2-A) for Nitro Cooler™ (NC)

Gas springs with a special cartridge valve are used with nitrogen coolers (NC) (Fig. 2). See page 5.12.

Since nitrogen gas travels from the gas spring through the Nitro Cooler™, the return stroke speed of the piston rod is 40%-50% slower ,compared to a KF2 spring without a Nitro Cooler™ when the Cooler is placed one meter from the springs. If the hose length is longer than 1 meter, a hose with a larger inner diameter may be required.



(Fig. 2)

NC Rebuild Kit Order No.	For gas spring
3021780	KF2/KF2-A 1500
3121780	KF2/KF2-A 3000
3221780	KF2/KF2-A 5000
3321780	KF2/KF2-A 7500

NC Rebuild kits are available for simple modification of existing springs.

How to order KF2/KF2-A with a Cooling Jacket (CJ)

KF2 XXXX - XXX - CJ

- Model size: 1500, 3000, 5000, 7500
- Stroke length [mm]
- Cooling Jacket

How to order KF2/KF2-A with Nitro Cooler™ (NC)

KF2A XXXX - XXX - XXX - NC

- Model size: 1500, 3000, 5000, 7500
- Nominal Stroke length [mm]
- Adjusted Stroke length [mm]
- Additional Port for Nitro Cooler™

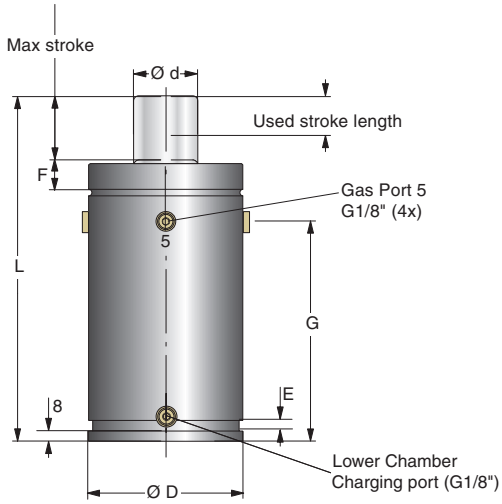
KP – Dimensions

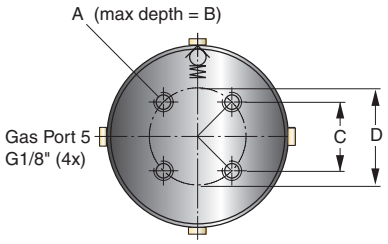
The KP passive gas springs should:

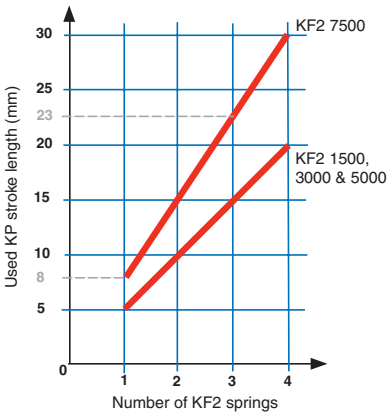
- **not** be used for any operation in the tool other than to eliminate KF2 springback,
- **be** of the same model size as the KF2 spring(s) (except KF2 7500 which uses the KP 5000),
- **be** connected to the Valve Block, using the EO24 Hose System or its equivalent, via one of the four G1/8" Gas Port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

Please note!

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







Order No.	Ø D	Ø d	Max. stroke length	L	A	B	C	D	E	F	G
KP 1500	95	36	30	220	M8	13	42.4	60	7	24	140
KP 3000	120	50	30	220	M10	16	56.6	80	7	25.5	140
KP 5000	150	65	35	300	M10	16	70.7	100	8	27.5	193

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

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

The forces are calculated based on a charging pressure of 150 bar in the KF2 and the KP spring(s).

Please note! For more information, see "About Gas Springs" in the KALLER main catalog.

Valve block dimensions

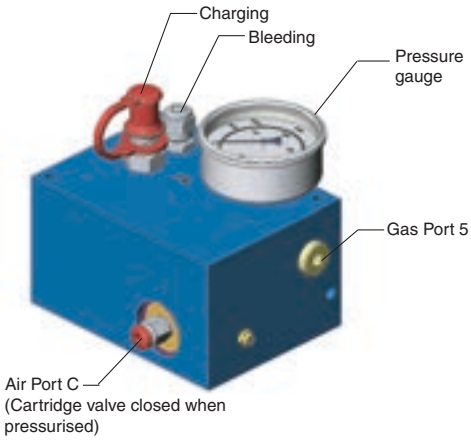
There are two valve block models available:

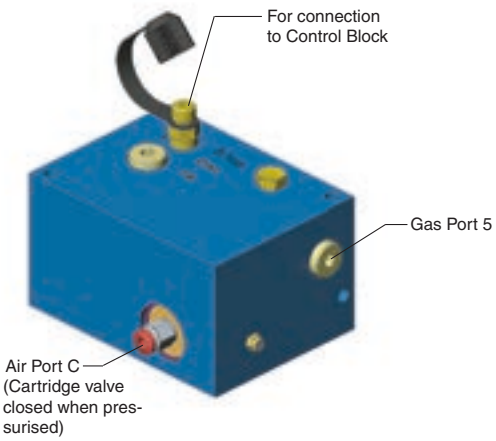
- **All-in-one valve block**,
  with built-in gas charging and bleeding equipment plus gauge

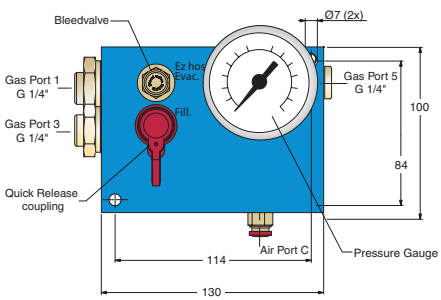
  Order No. 2020801

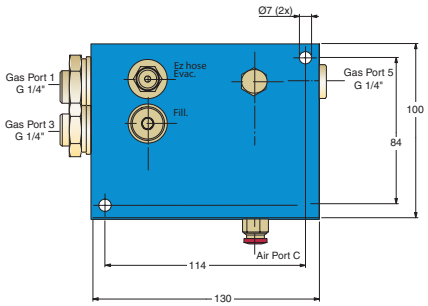
- **Standard valve block**,
  for use with separate control block

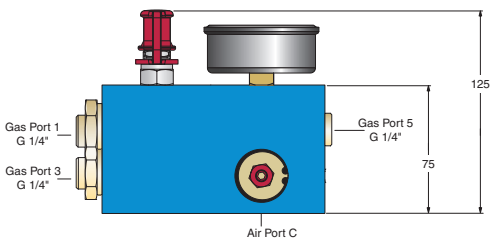
  Order No. 2120801

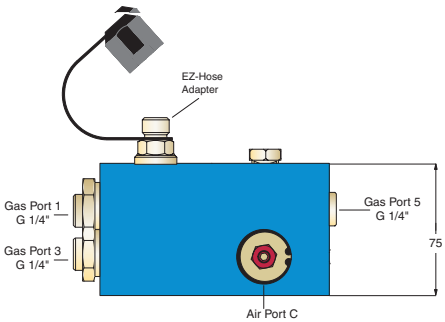










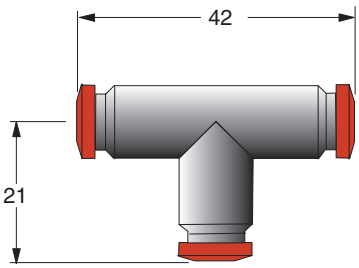


For information about how to connect the different valve blocks to a positive lock system, see the installation examples on pages 6.2 and 6.5.

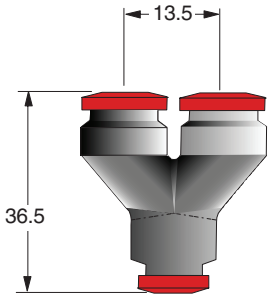
Control system components

Hose and fittings for Ø 6 mm Pneumatic Hose

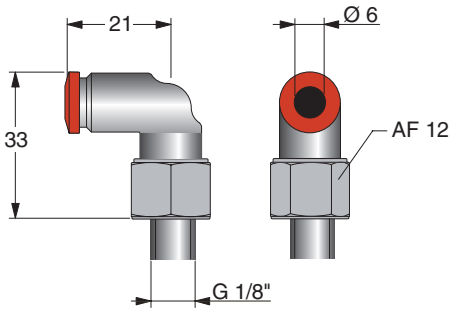
T Connector (hose to hose)
Order No. 503368



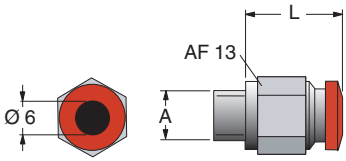
Y Connector (hose to hose)
Order No. 503372



90° – G 1/8”
Order No. 503367



Straight Connector
Order No. (see table)



Order No.	A	L
503299	G 1/8”	15
503426	G 1/4”	13.5

Pneumatic Hose

Ø 6 mm

How to order 503377 - XX

Order the length in whole meters

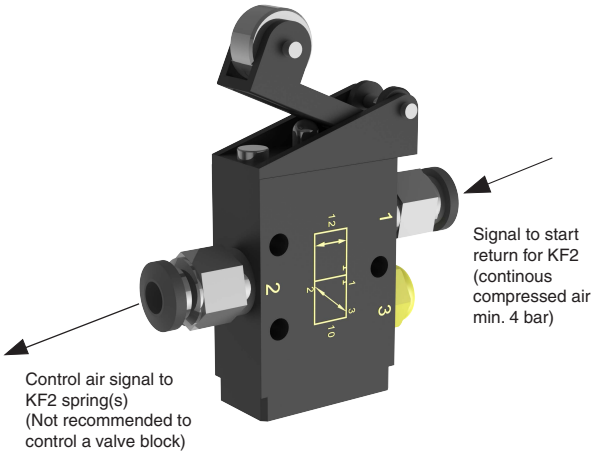
Basic information

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

Mechanical Pressure Switch

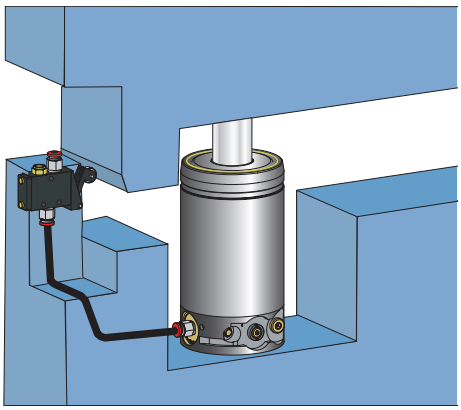
Order No. 503800

For Tool Integrated Control Systems, the Mechanical Pressure Switch can be used to control the valve in the KF2 Controllable Gas Spring(s) or Valve Block, for Tool Integrated Control Systems. For more information on Tool Integrated Control Systems see Page 4.2.

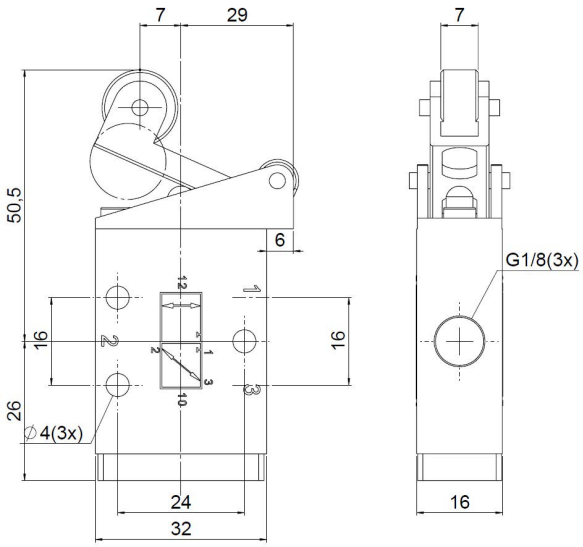


Mechanical pressure switches:

- Can control up to 10 pcs KF2 springs.
- Require a constant compressed air supply (min. 4 bar).
- The direction of the mechanical switch can be changed if needed.



Stroke: 5 mm
Max. stroke: 8 mm



Basic information

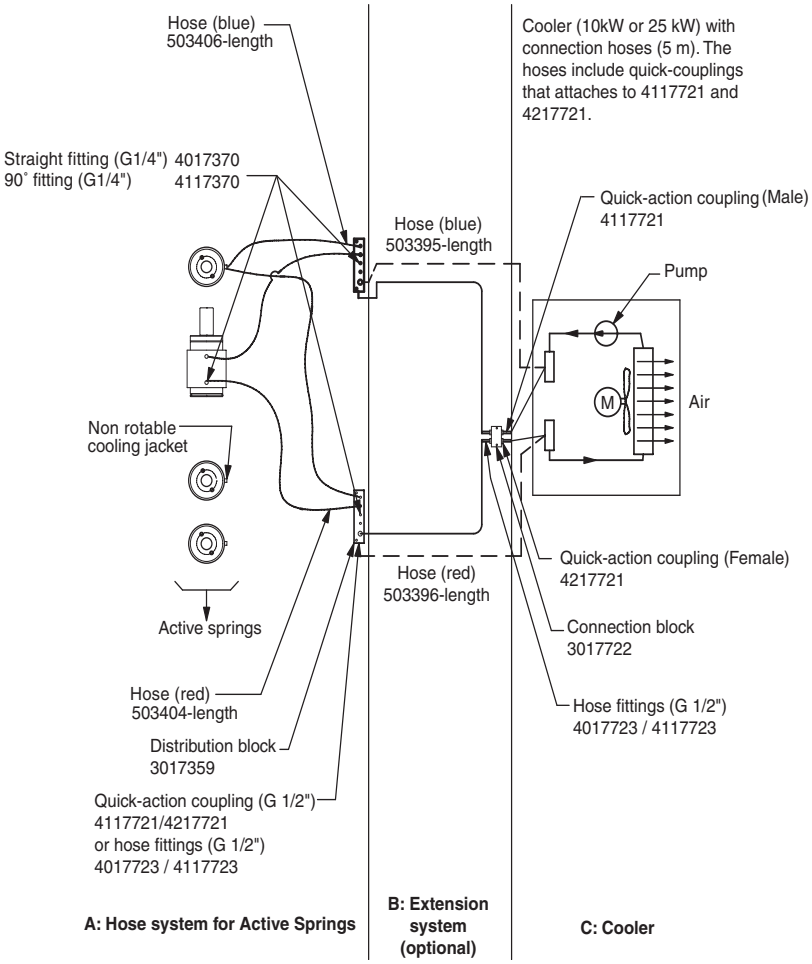
Fluid	Air or inert gas, filtered & lubricated
Pressure	0 to 10 bar
Temperature	–10°C to +60°C
Functions	3/2
Connection ports	G 1/8" (3x)
Flow rate (at 6 bar)	200 l/min

Liquid cooling system components

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

- **Fitted** with a Cooling Jacket (CJ) (see picture),
- **Fitted** with a Thermal Relay (Order No. 503388) (see *Overheat Protection 4.8*),
- **Connected in parallel** to the Cooler Unit as shown below.

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

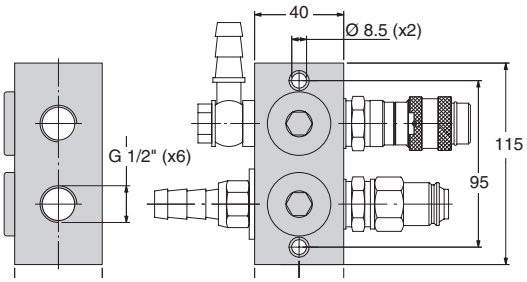


The cooling fluid is circulated within a closed system through the Cooling Jacket(s), to a Cooler Unit (10kW or 25kW), where heat from the KF2 spring(s) is then dissipated.

Cooling System – Hose & Fittings

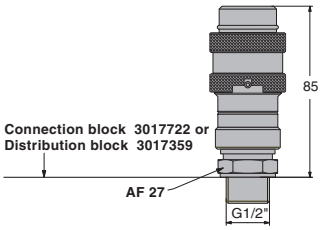
Connection Block

Order No. 3017722



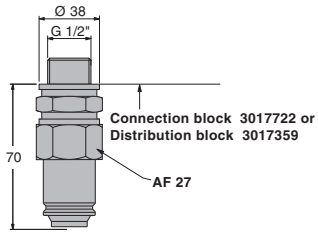
Female Quick Release Coupling

Order No. 4217721



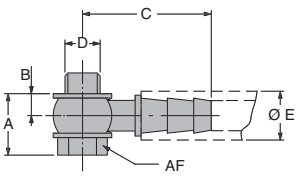
Male Quick Release Coupling

Order No. 4117721



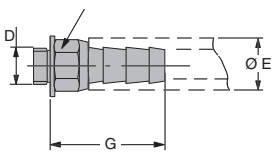
90° Hose Fitting

Order No.	D	A	B	C	E	AF
4117370	G 1/4”	23	8	44	16	17
4117723	G 1/2”	30	12	68	23	27



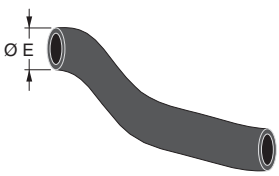
Straight Hose Fitting

Order No.	D	E	G	AF
4017370	G 1/4”	16	28	12
4017723	G 1/2”	23	58	27



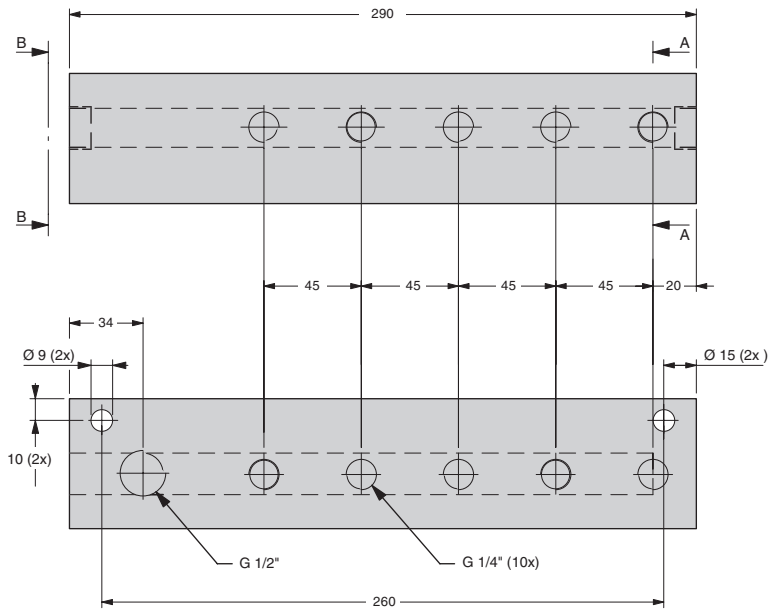
Cooling Hose

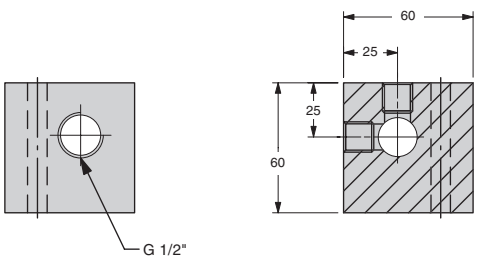
Order No.	E	DN	Color	Min. bend radius
503406	16	10	Blue	75 mm
503404	16	10	Red	75 mm
503395	23	16	Blue	150 mm
503396	23	16	Red	150 mm



Cooling System – Distribution Block

Order No. 3017359





View B-B

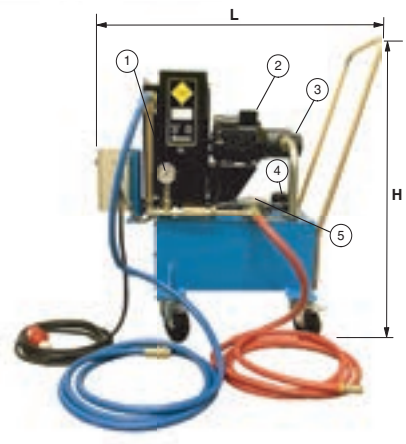
View A-A

Liquid Cooling System – Cooler Unit (LC)

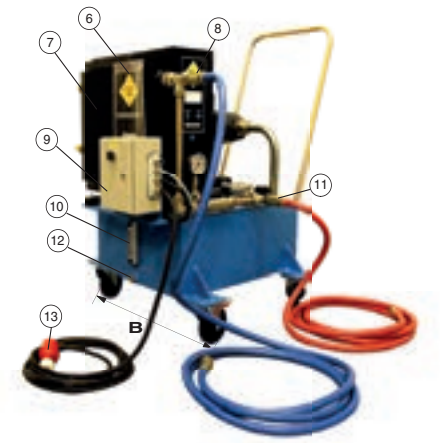
Two cooler unit sizes are available:

- 10 kW – Order No. 4017360
- 25 klW – Order No. 4117360

For information on which Cooler Unit is suitable for your application, please fill in the Application Enquiry Form 3.1 and fax it to your local KALLER distributor or directly to Strömsholmen AB.



1 Pressure gauge
Displays the system pressure (8-10 bar)
2 Electric motor
380 VAC (only)
3 Circulation pump
Check the direction of rotation at start-up
4 Cooling fluid port
5 Filter
6 User's Guide
7 Cooler
8 Cooling fluid outlet
Connect with the supplied 5 m hose and **female** quick release coupling
9 Power switch
On/Off button
10 Fluid level indicator
11 Cooling fluid inlet
Connect with the supplied 5 m hose and **male** quick release coupling
12 Drainage plug
13 Connector 380 V AC, IEC 60309 5 Pin



Cooling fluid

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

For the location of your nearest supplier, please visit www.petrofer.com.

Please Note!
Do not start the Cooler Unit without cooling fluid in the cooler since this will damage the unit. The unit is equipped with a level/temp switch that will shut down the unit if it leaks or overheats.

Basic information

10 kW Cooler Unit:	
Order No.	**4017360 (10 kW)**
Quick connection	1/2"
H	1,000
L	900
B	700
Pump flow	40 l/min
Tank capacity	60 l
Electric motor	1.5 kW
Power supply	380 V AC
Weight	170 kg

Basic information

25 kW Cooler Unit:	
Order No.	**4117360 (25 kW)**
Quick connection	3/4"
H	1,070
L	1,070
B	890
Pump flow	60 l/min
Tank capacity	90 l
Electric motor	3 kW
Power supply	380 V AC, IEC 60309 5 Pin
Weight	220 kg

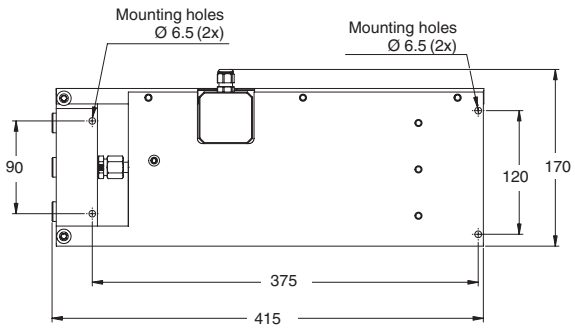
Nitrogen Cooling System – Nitro Cooler™ (NC)

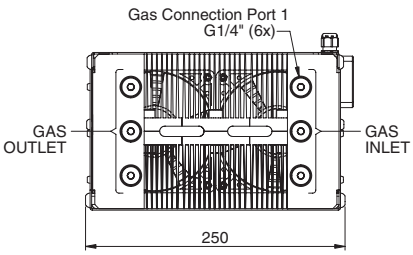
The Kaller Nitro Cooler™ unit(NC) has been engineered to provide Tool Integrated Cooling for Controllable Gas Springs (KF2 or KF2-A) when operating at high production rates.

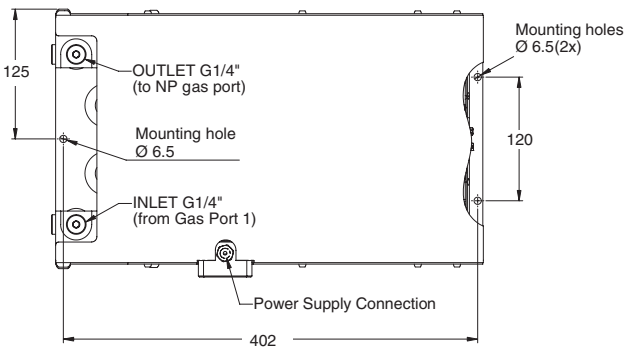
The Nitro Cooler™ unit (NC) is very compact and provides 1.5 kW of cooling power, with each unit being able to cool up to four KF2 or KF2-A springs.

Gas springs with a special cartridge valve are required to be used with the Nitro Cooler™ unit (NC).

Nitro Cooler™ – Order No. 2021641







Nitro Cooler™ Unit (NC) dimensions

One Nitro Cooler™ requires a 24 VDC (22 W) power supply and can be mounted both vertically and horizontally, inside or outside the die. Nitro Cooler™ Units are IP64 classed, which makes them resistant to die cleaning.

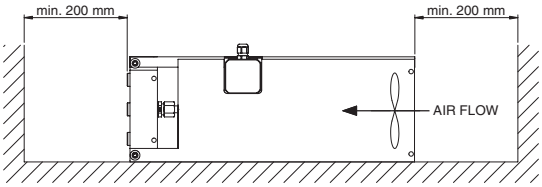
Basic information

Max. cooling capacity..... 1.5 kW
Max. charge pressure..... 150 bar at 20°C
Min. charge pressure..... 25 bar
Operating temperature..... 0 to +80 °C
Weight..... 16 kg
Connection ports..... G 1/4" (8×)
Power supply..... 24 VDC (22 W)
Includes a built-in thermal relay

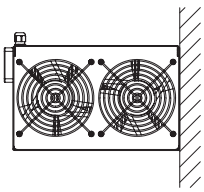
Nitrogen Cooling System – Nitro Cooler™ (NC)

Mounting possibilities

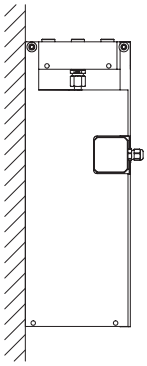
Nitro Coolers can be mounted both vertically and horizontally. When mounting it is important NOT to restrict the air flow through the cooler. If the air flow is restricted through the Nitro CoolerTM, this will have a negative effect on the cooler's performance.



Base mount



Horizontal mount



Vertical mount

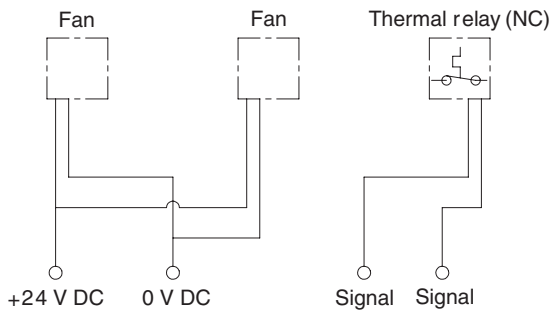
Electrical connections

The wiring diagram for the Nitro CoolerTM is depicted below. This diagram can also be found on the label attached to the side of the Nitro CoolerTM next to the connection box.

Please note! The Nitro Cooler™ contains a built-in thermal relay.

The thermal relay circuit is normally closed and opens if the temperature of the relay exceeds 85°C ±5%.

The thermal relay should be connected to the PLC of the press to prevent overheating of the KF2-NC gas spring(s).



Electrical circuit opens at temperature of > 85 °C

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

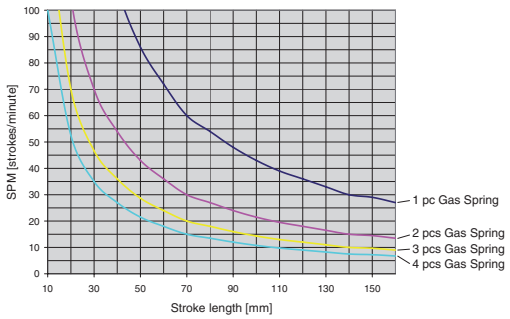
KF2/KF2-A 5000 – 0.05 m/s

KF2/KF2-A 7500 – 0.03 m/s

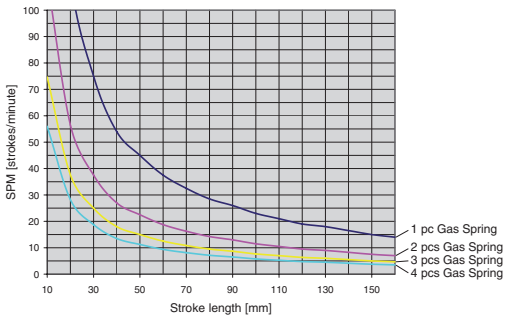
If a higher speed is needed, please contact your local distributor or KALLER.

See example on the next page:

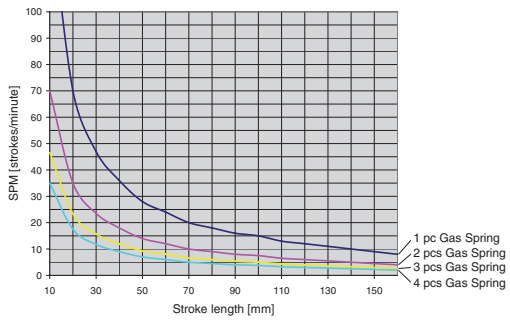
KF2/KF2-A 1500



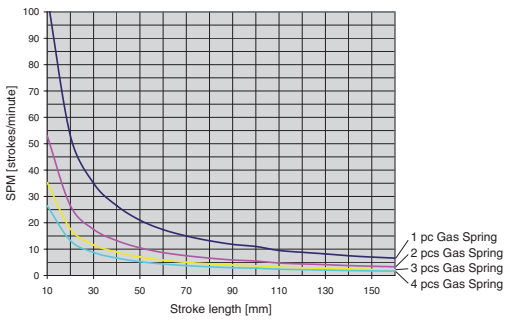
KF2/KF2-A 3000



KF2/KF2-A 5000



KF2/KF2-A 7500



Example:

How to determine the maximum running speed for an application?

We know :

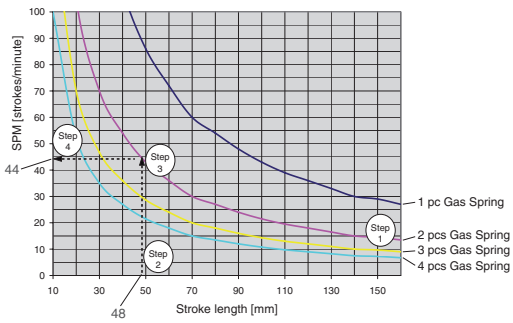
The size used (KF2-1500-048-NC)

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)

Max SPM for one Gas Spring with one Nitro Cooler



Using the diagram:

Step 1 Choose the correct curve line according to the number of springs used (purple line).

Step 2 According to the used stroke length, go up vertically to the interception point in the diagram (from point 2 to 3).

Step 3 From point 3, read the SPM stroke/minute on the vertical axis (point 4).

Step 4 The value for the maximum used SPM is 44 stroke/min.

For a lower charging pressure, this value should be increased proportionally.

Example: A charging pressure of 100 bar increases the maximum used SPM from 44 to 44 × 150/100 = 66 strokes/min.

Free Information Sign

Order No. 503613

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

One Information Sign is included with each KF2 order.

Controllable Gas Spring System

KALLER®
The Safer Choice

Die No.		
Gas spring model		
Stroke length		
Max. frequency	strokes/min	
Gas spring charge pressure	Min bar	Max bar
Thermal relay connected	Yes ☐	

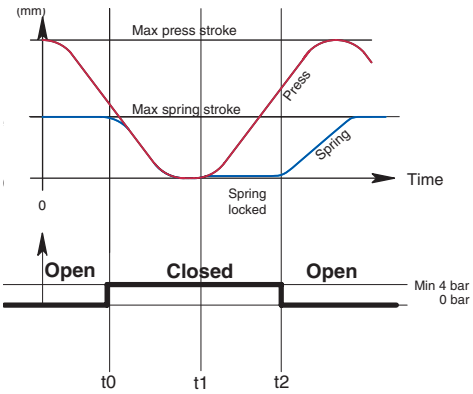
Standard checks before production run or in the event of malfunction:

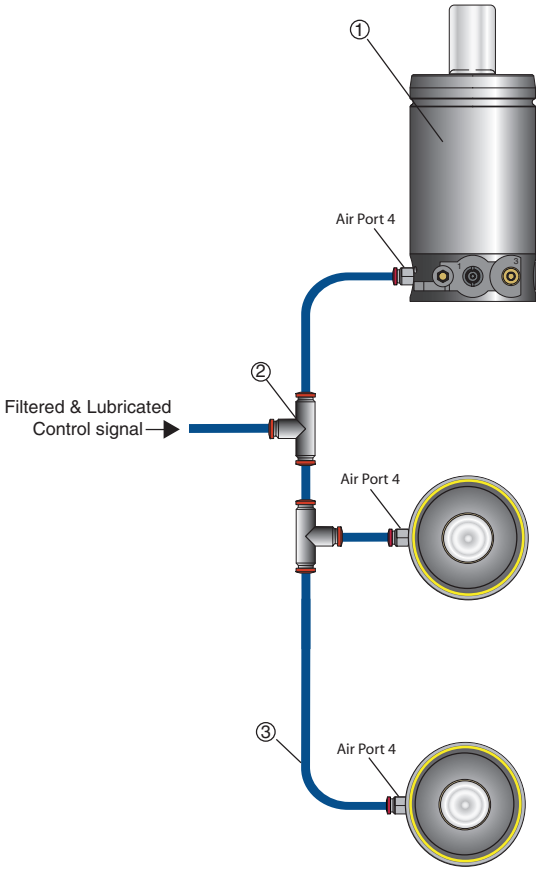
1. Gas spring charge pressure (max. 150 bar at 20°)
2. Air supply pressure (min 4 bar, max. 10 bar)
3. Air signals from press

Do not work in the die with the gas springs in locked position. Make sure that the thermal relay is in operation.

Strömsholmen AB
Box 216, 573 23 SE-Tranås, Sweden
www.kaller.com • info@kaller.com

Control System – Standard Lock, KF2





Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	2	T - Connector	503368	5.6
3	1	Pneumatic Hose Ø 6 mm	503377-XX	5.6

A Standard Lock System requires one control signal.

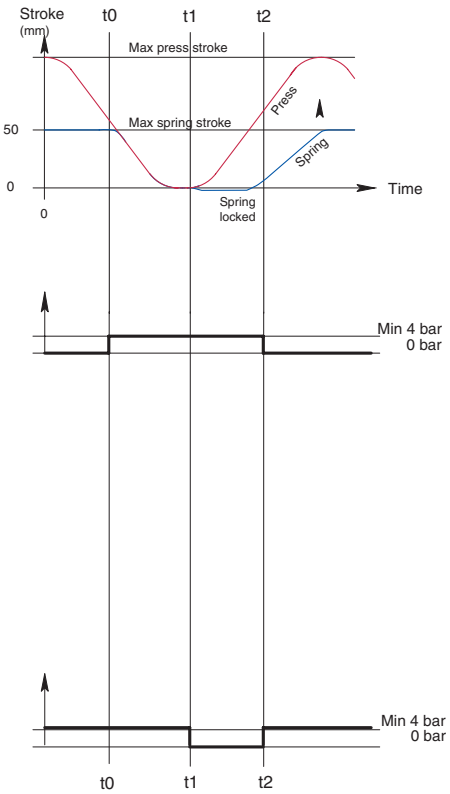
The KF2 gas springs are delivered with air fittings suitable for Ø 6 mm pneumatic hoses.

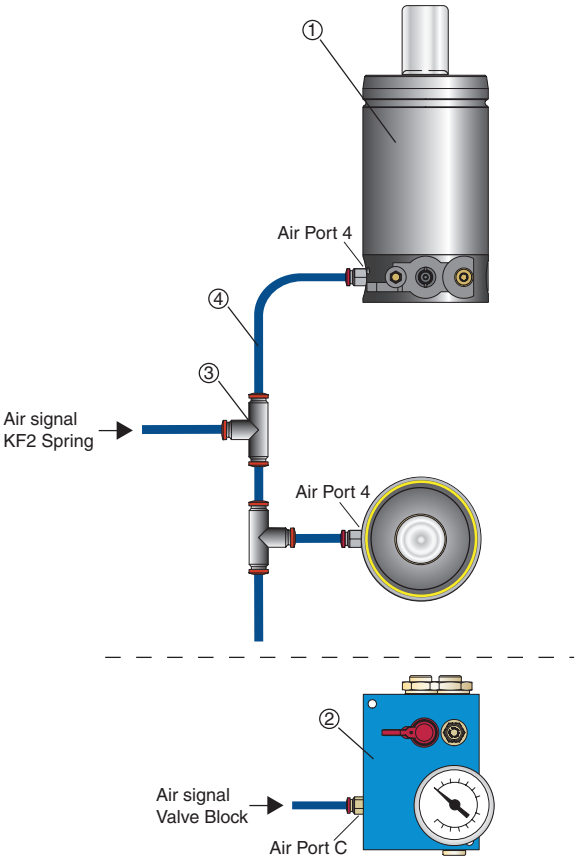
Please note! To lock and unlock all KF2 springs simultaneously, the hose lengths from the different springs to the air inlet should all be the same length.

Cut the air hoses to the right length during installation (push-lock system).

The KF2 spring's control valve should always have a continuous supply of filtered compressed air, with a minimum pressure of 4 bar.

Control System – Positive Lock system, KF2 + KP





Position	Quantity	Description	Order No.	Page
1	2	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	1	All-in-one Valve Block	2020801	5.5
3	2	T Connector	503368	5.6
4	1	Pneumatic Hose Ø 6 mm	503377-XX	5.6

A Positive Lock System requires two control signals. One to operate the KF2 gas spring(s) and one to operate the Valve Block

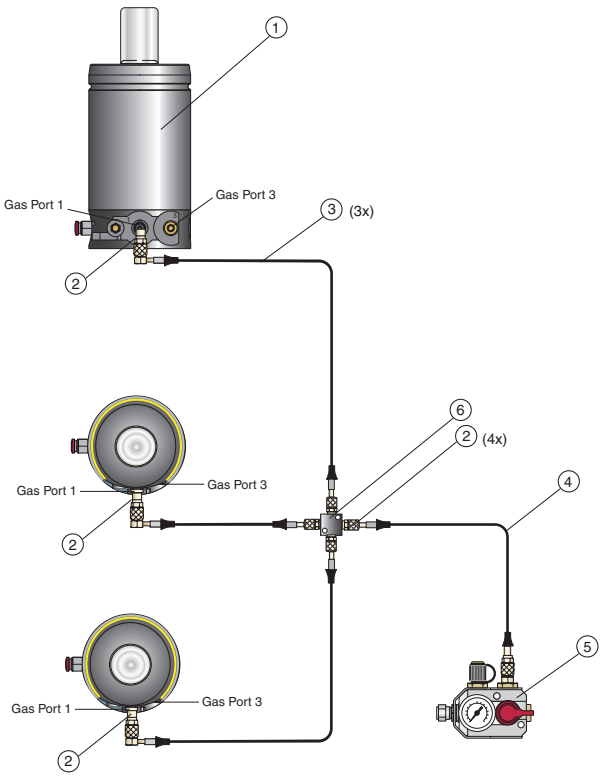
The KF2 gas spring and Valve Block are supplied with air fittings suitable for Ø 6 mm pneumatic hoses.

Please note! To lock and unlock all KF2 springs simultaneously, the hose lengths from the different springs to the air inlet should all be the same length.

Cut the air hoses to the right length during installation (push-lock system). The control valve should always have a continous supply of filtered compressed air, with a minimum pressure of 4 bar.

Hose System – Standard Lock, KF2

Method using Coupling Block(s)



Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	7	Adapter G 1/8”	4114973-G 1/8”	Gas Link Systems in the Main Catalog
3	3	EZ Hose straight – 90°	4017568-XXXX	Gas Link Systems in the Main Catalog
4	1	EZ Hose straight – straight	4014974-XXXX	Gas Link Systems in the Main Catalog
5	1	Control Block	3116114-01	Gas Link Systems in the Main Catalog
6	1	Multi-Coupling Block	4017032	Gas Link Systems in the Main Catalog

To charge, bleed and check the gas pressure for a Standard Lock in a KF2 gas spring system, all springs should be connected to a standard Control Block (here shown connected via a Coupling Block).

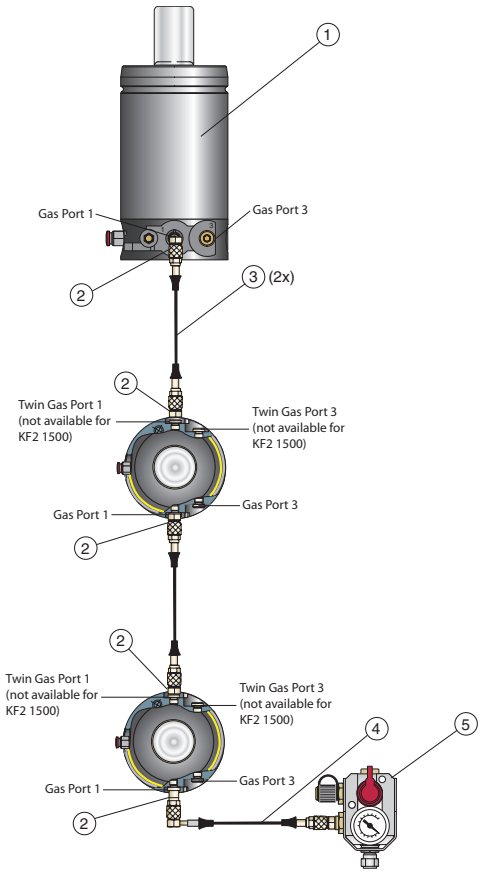
We recommend the EZ Hose system and fittings be used for such systems. The KF2 gas springs are delivered with Gas Ports 1 and 3 plugged. When connecting the EZ Hose system, the charging valve in Port 1 of each KF2 gas spring **must** first be removed. Each G 1/8” Gas Port, for both the KF2 Gas Spring and Coupling Block, requires an adapter (4114973-G 1/8”) for connection to EZ Hose.

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

Hose System – Standard Lock, KF2

Method using Twin Ports

(Not valid for KF2 1500)

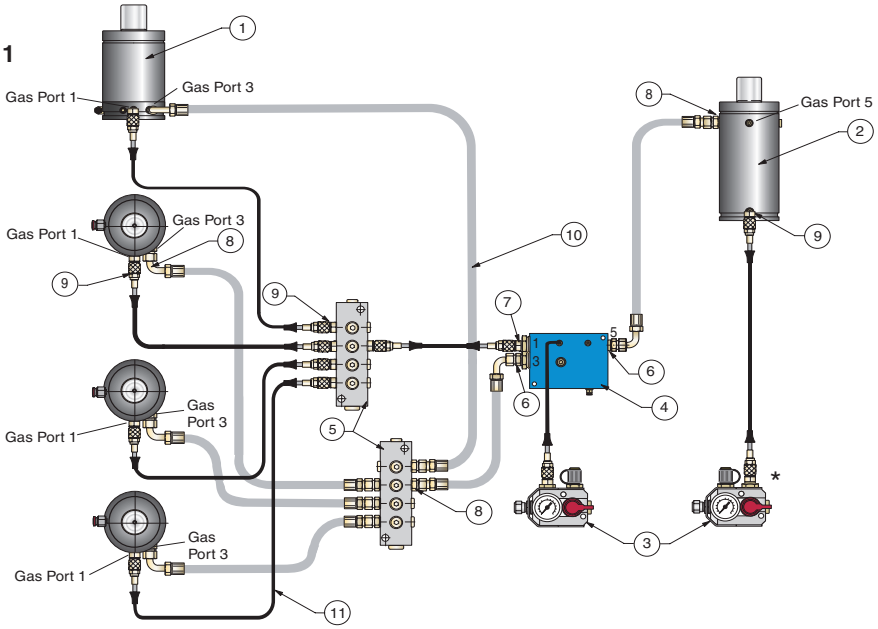


Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	5	Adapter G 1/8”	4114973-G 1/8”	Gas Link Systems in the Main Catalog
3	2	EZ Hose straight – 90°	4017568-XXXX	Gas Link Systems in the Main Catalog
4	1	EZ Hose straight – straight	4014974-XXXX	Gas Link Systems in the Main Catalog
5	1	Control Block	3116114-01	Gas Link Systems in the Main Catalog

To charge, bleed and check the gas pressure for a Standard Lock in a KF2 gas spring system, all springs should be connected to a standard Control Block. These hoses are connected using the KF2’s twin gas ports to the Control Block. We recommend the EZ Hose System and fittings be used for such systems. The KF2 gas springs are delivered with Gas Ports 1 and 3 plugged. When connecting the EZ Hose system, the charging valve in Port 1 of each KF2 gas spring must first be removed. Each G 1/8” Gas Port, for both the KF2 Gas Spring and Coupling Block, requires an adapter (4114973-G 1/8”) for connection to EZ Hose.
The Control Block should be placed higher than the KF2 springs to avoid loss of internal oil when bleeding.

Hose System – Positive Lock system, KF2 + KP

Example 1



To connect KF2 Controllable Gas Spring(s) to a KP – Passive Gas Spring via the Valve Block, two hose connections are needed:

- One EZ Hose connection
- One EO24 Hose connection.

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

Position	Quantity	Description	Order No.	Page
1	4	Controllable Gas Spring	KF2 XXXX-XXX	5.1
2	1	KP Passive Spring	KP XXXX	5.4
3	2	Control Block	3116114-01	Main Catalog
4	1	Standard Valve Block	2120801	5.5
5	2	Multi-Coupling Block G 1/8”	3015044	Main Catalog
6	2	EO24 Adapter G 1/4”	504144	Main Catalog
7	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
8	10	EO24 Adapter G 1/8”	503593	Main Catalog
9	10	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
10	6	EO24 Hose straight - 90°	3220857-xxxx	Main Catalog
11	7	EZ Hose straight - straight	4014974-xxxx	Main Catalog

Positive Lock, KF2 + KP
As indicated above, perform gas charging and bleeding as follows:

Step 1

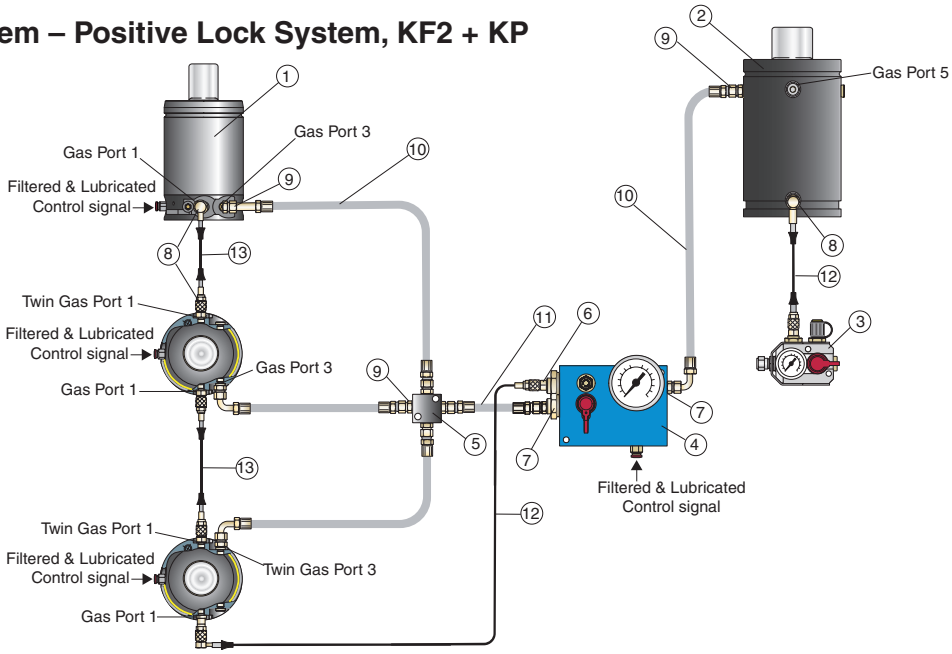
Charge the lower gas chamber in the KP Passive Gas Spring via the Control Block (3)*.

Step 2

Charge the KF2 Standard spring(s) and upper chamber of the KP gas spring via the Control Block (3) connected to the standard Valve Block (4).

Hose System – Positive Lock System, KF2 + KP

Example 2
(Not valid for KF2 1500)



To connect KF2 Controllable Gas Spring(s) to a KP – Passive Gas Spring via the Valve Block, two hose connections are needed:

- One EZ Hose connection
- One EO24 Hose connection.

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

Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XX	5.1
2	1	KP Passive Spring	KP XXXX	5.4
3	1	Contol Block	3116114-01	Main Catalog
4	1	All-in-One Valve Block	2020801	5.5
5	1	Coupling Block	4017032	Main Catalog
6	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
7	2	EO24 Adapter G 1/4”	504144	Main Catalog
8	6	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
9	8	EO24 Adapter G 1/8”	4014019	Main Catalog
10	4	EO24 Hose straight – 90°	3220857-xxxx	Main Catalog
11	1	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
12	2	EZ Hose 90°– straight	4017568-xxxx	Main Catalog
13	2	EZ Hose straight – straight	4014974-xxxx	Main Catalog

Positive Lock, KF2 + KP
As indicated above, perform gas charging and bleeding as follows:

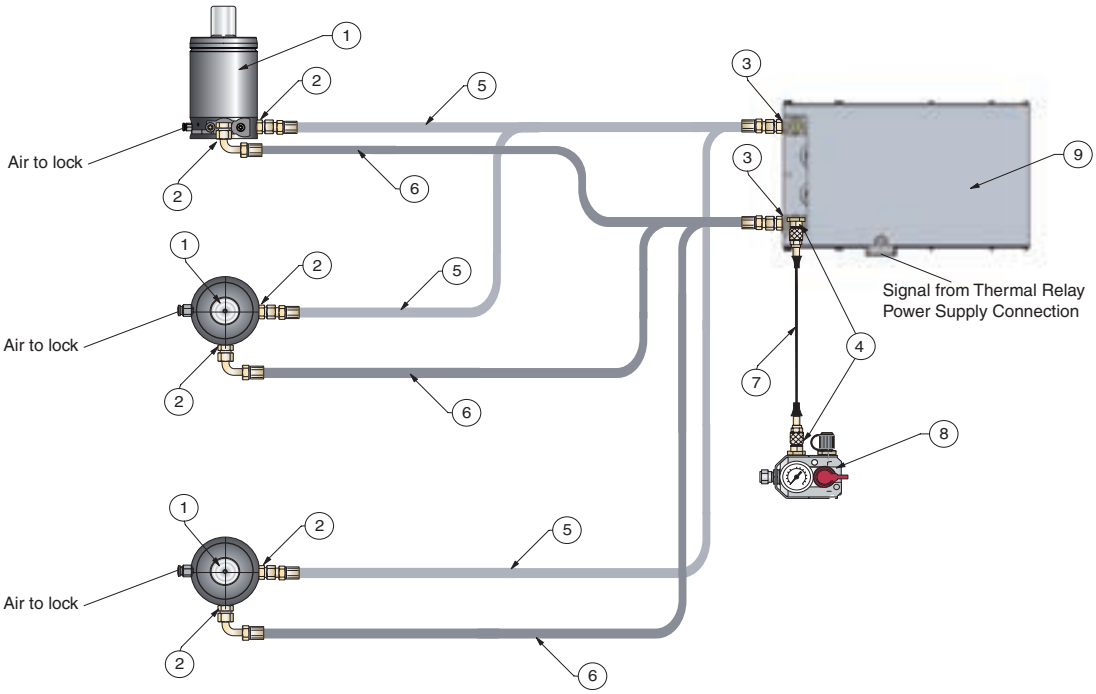
Step 1

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

Step 2

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

KF2 connection – NC Standard lock with a Nitro Cooler™



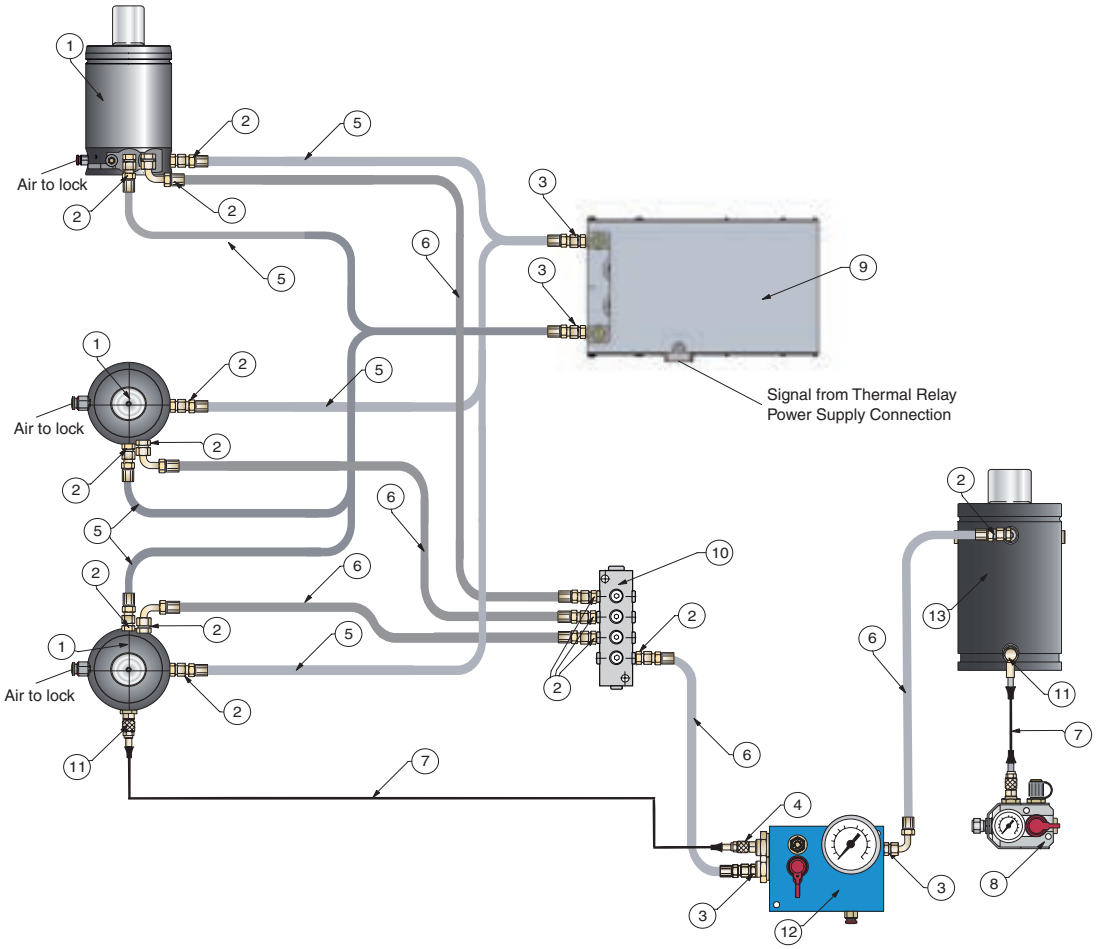
Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas spring	KF2 XXXX-XXXX NC	5.1
2	6	EO24 Adapter G 1/8”	503593	Main Catalog
3	2	EO24 Adapter G 1/4”	504144	Main Catalog
4	2	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	3	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
6	3	EO24 Hose straight – 90°	3020857-xxxx	Main Catalog
7	1	EZ Hose straight – straight	4014974-xxxx	Main Catalog
8	1	Control Block	3116114-01	Main Catalog
9	1	Nitro Cooler Block	2021641	5.12

When using a Nitro Cooler™, only EO24 hoses should be used. There is a gas transport between the cooler and gas springs with every stroke. Therefore the Nitro Cooler™ should be placed as close as possible to the springs to minimize the length of the hoses.

The Nitro Cooler™ includs heat protection, thus eliminating the need for thermal relays at the springs.

The control block for charging and bleeding can be connected optionally to one of the existing port 2 on the springs or tto the Nitro Cooler™.

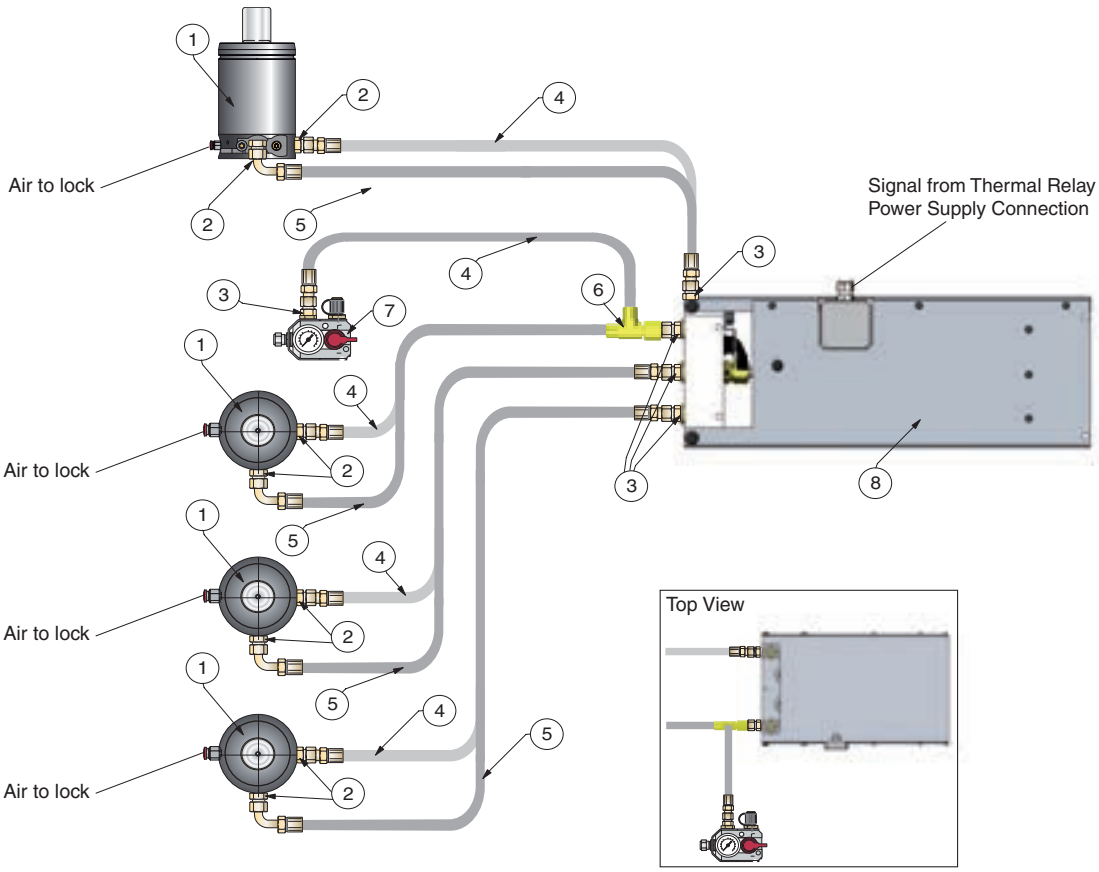
KF2-NC connection – Positive lock with a Nitro Cooler™



When using a Nitro Cooler™ for a positive lock system, the requirement are the same as for a standard lock system. (See previous page.)

Position	Quantity	Description	Order No.	Page
1	3	Controllable Gas Spring	KF2 XXXX-XXXX NC	5.1
2	14	EO24 Adapter G 1/8”	503593	Main Catalog
3	8	EO24 Adapter G 1/4”	504144	Main Catalog
4	1	EZ Adapter G 1/4”	4014973-G 1/4”	Main Catalog
5	6	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
6	5	EO24 Hose straight – 90°	3020857-xxxx	Main Catalog
7	2	EZ Hose straight - straight	4014974-xxxx	Main Catalog
8	1	Control Block	3116114-01	Main Catalog
9	1	Nitro Cooler Block	2021641	5.12
10	1	Multi-Coupling Block G 1/8”	3015044	Main Catalog
11	2	EZ Adapter G 1/8”	4114973-G 1/8”	Main Catalog
12	1	All-in-One Valve Block	2020801	5.5
13	1	KP Passive Spring	KP xxxx	5.4

Connection of four KF2-1500-NC Standard Locks with a Nitro Cooler™



Position	Quantity	Description	Order No.	Page
1	4	Controllable Gas spring	KF2 XXXX-XXXX NC	5.1
2	8	EO24 Adapter G 1/8”	503593	Main Catalog
3	9	EO24 Adapter G 1/4”	504144	Main Catalog
4	5	EO24 Hose straight – straight	3020857-xxxx	Main Catalog
5	4	EO24 Hose straight – 90°	3020857-xxxx	Main Catalog
6	1	L Coupling	504147	Main Catalog
7	1	Control Block	3116114-02	Main Catalog
8	1	Nitro Cooler Block	2021641	5.12

General	
What air pressure is required to operate the cartridge valves?	4 bar minimum air pressure is required to close the normally open (NO) cartridge valves.
What is the maximum air pressure allowed to operate the cartridge valves?	10 bar maximum air pressure is allowed to operate the cartridge valves.
What service life can I expect from a KF2 Controllable Gas Spring?	As long as the thermal relay is used, the following service lifetimes can be expected: For stroke lengths up to 50 mm: 0.5 million strokes. For stroke lengths above 50 mm: 50,000 stroke meters.
Can I use other Hose Systems?	We cannot guarantee the function of the system if Hose Systems other than those mentioned in this manual are used. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I combine different KF2 size springs in the same system?	No. Please contact your local KALLER distributor or Strömsholmen AB directly for more information.

Relating to Standard Lock, KF2	
Is it possible to adjust the stroke length of the KF2 spring, or must I always use 100% of the nominal stroke ±0.5 mm?	There are 2 versions of the KF2 Controllable Gas Spring, the standard model KF2 and an adjustable model KF2-A. For more information on the adjustable model, see Technical Data page 5.2.
How fast can the KF2 spring be stroked?	0.8 m/sec is the maximum allowed compression velocity. The maximum stroke frequency (spm) at which a KF2 spring can operate at depends on the stroke length of the spring and level of cooling. See Cooling (optional) on page 4.5 for more information.
What can I do to eliminate KF2 springback?	If you are using 100% stroke length ±0.5 mm of the KF2 spring, a maximum springback f 1 mm can be expected. It is possible to eliminate this at any time by converting the Standard Lock into a Positive Lock System. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.
Can I lock a KF2 Controllable Gas Spring at any position?	Basically yes, but the less you stroke the KF2 Controllable Gas Spring, the greater the springback will be. Please contact your local Kaller distributor or Strömsholmen AB directly for more information.

Relating to Positive Lock System, KF2+KP	
How many KF2 Controllable Gas Springs can be connected to a single KP Passive Gas Spring?	Up to 4 pcs KF2 can be connected to a single KP spring.
How many Valve Blocks do I need in the system?	One Valve Block is required for each KP Passive Gas Spring in the system.
Can I use the KP spring in the tool for forming?	No. The KP spring is not to be used for any operation in the tool; use it only to eliminate KF2 springback.
Can I use just the EZ Hose System to connect to my Positive Lock System?	No. The EO24 Hose System (or its equivalent) must be used between the KF2 spring(s), Valve Block and KP Passive Gas Spring.
Can I use just the EO24 Hose System to connect to my Positive Lock System?	Yes.

Relating to Liquid Cooling	
Is Cooling always required?	Not always. Generally speaking, longer stroke lengths and faster press stroke frequencies normally require cooling. See Cooling System (optional) on page 4.5 for more information.
How many KF2 controllable springs can be connected to a single Cooler Unit?	The maximum heat effect for all springs combined has to be lower than the cooling effect of the cooler. If a group of springs whose combined heat factor exceeds the maximum heat factor for the "Nitro CoolerTM used for 1pc KF2 spring " (see page 4.6), please secure according to the diagrams on page 5.14.
Can I use my own cooling system?	Yes. It is possible to use the cooling system from the press or other coolers.
What different cooling fluids can we use?	We recommend use of Water-glycol fluid (HFC) ULTRA SAFE 620. ULTRA-SAFE 620 is approved by all major equipment manufacturers and is often used for running in new machines. Equivalents to this water-glycol fluid can be used, but Strömsholmen AB cannot be held responsible for poor function.

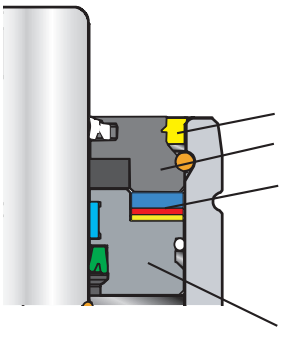
Relating to Nitro Cooler™	
How many KF2 can be connected to one Nitro Cooler™?	Depending on how much heat is generated in a particular application, up to four gas springs can be connected to one Nitro CoolerTM. See table on page 5.14
Can we elminate the decrease in return speed caused by the Nitro Cooler™ ?	No. When using the Nitro CoolerTM, gas is transported between the cooler and gas springs for every press stroke, and consequently the return speed will be affected. With a distance of 1 m between the cooler and gas spring the speeds are as follows: KF2/KF2-A 1500 – 0.12 m/s KF2/KF2-A 3000 – 0.10 m/s KF2/KF2-A 5000 – 0.08 m/s KF2/KF2-A 7500 – 0.05 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.

System	Problem	Solution
Standard Lock, KF2	KF2 spring does not lock	Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's springback is greater than 1 mm	Make sure 100% of the KF2 spring's nominal stroke length ±0.5 mm is used
		Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
	KF2 piston rod does not return	Make sure the KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod return
		Check that there is gas pressure in the KF2 spring

System	Problem	Solution
Positive Lock System, KF2 + KP	KF2 spring does not lock	Make sure the KF2 spring's Air Port 4 has minimum 4 bar air pressure before press BDC
		Check that all hose connections are correct
	KF2 piston rod's spring back is greater than 0 mm	Make sure the cartridge valve in the Valve Block is closed during the press' down-stroke and that the KP-Passive Gas Spring is being stroked sufficiently for this application
		Make sure 100% of the KF2 spring's nominal stroke length ±0.5 mm is used
		Check that the cartridge valve in the Valve Block opens at BDC
	KF2 piston rod does not return	Make sure the KF2 spring's Air Port 4 has zero air pressure when required to open
		Check for any obstructions in the tool preventing piston rod return
		Check that there is gas pressure in the KF2 spring

Stroke length adjustment of KF2-A

The guide in the KF2-A is made up of the following main components:



The guide length and stroke length of the spring can be adjusted by installing and/or removing spacers between the upper and lower guide. To obtain the correct stroke length, install spacers in the guide according to Table 1.

Example 1:

The stroke length should be increased with 4 mm from the nominal stroke length.

Solution: Open the spring and guide, remove the 4 mm thick spacer. The 1 mm and 2 mm thick spacers should be left in the guide/ spring.
The procedure is described on the next page.

To adjust from nominal stroke length

Table1

		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	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!

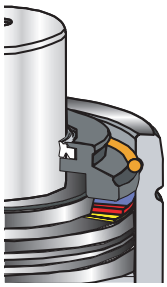
- **Only fully trained personnel with experience in servicing gas springs are allowed to adjust to the stroke length.**
- **Make sure the work surface where you will be working on the KF2-A spring(s) is clean and free from contaminates.**
- **Make sure there is no gas pressure in the KF2-A spring before proceeding.**

Feel free to download an animated guide from our homepage: **www.kaller.com**

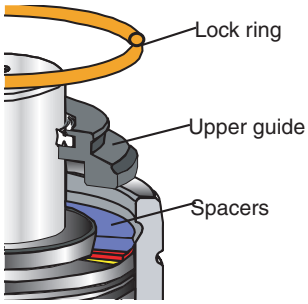
Stroke length adjustment of KF2-A

Work procedure

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

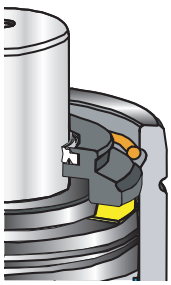


2: Knock down the guide and remove the lock ring by using a mounting sleeve and a plastic hammer.



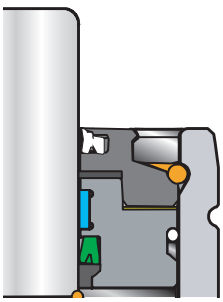
3: Remove the Upper Guide and install the combination of Spacers that will give you the required stroke length.

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.)

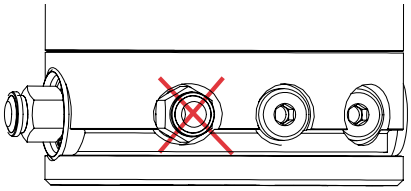


7: Charge the KF2-A spring with nitrogen gas, and fit the dust cover (if applicable).

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

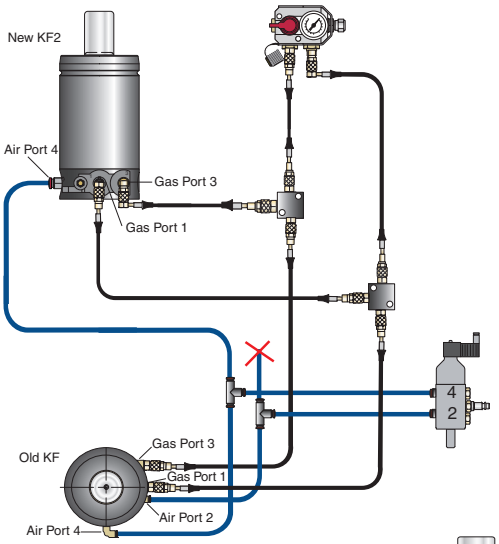


How to fit the new KF2 to existing KF systems

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

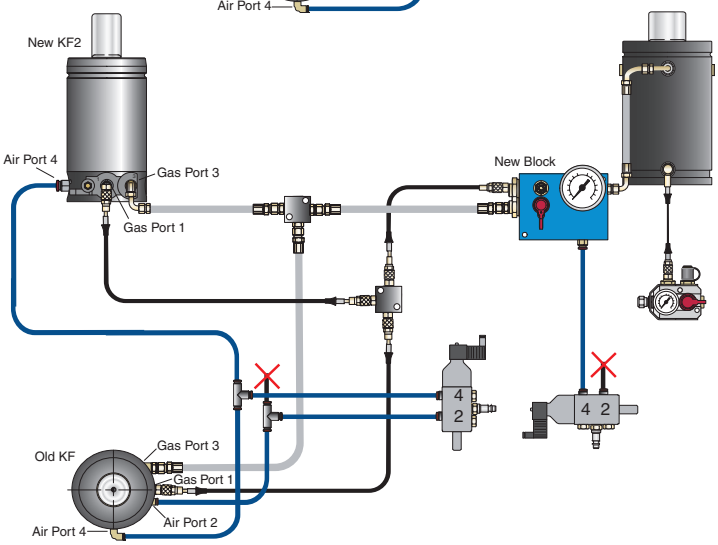
Standard Lock Example: Replacing an existing KF with a new KF2

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

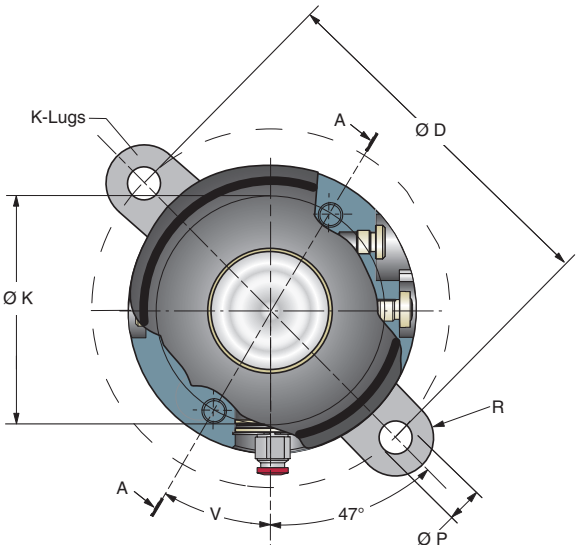
To replace an existing KF spring with a new KF2 spring in a Positive Lock System, simply plug the air signal that went to the KF springs Air Connection Port 2 (shown here by an X).

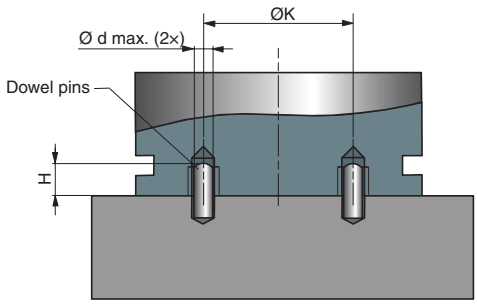


KF2/KF2-A Alternative Mounting

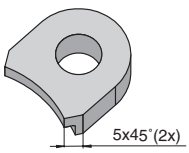
For upside down installations, the threaded holes in the base of the KF2/KF2-A should always be used when mounting the Controllable Gas Springs to the tool.

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.





A - A

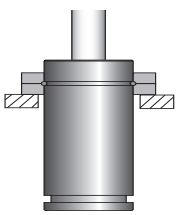


Modification of K-3000 Lug

Model	Ø D	Ø d max.	H	Ø K	V	Ø P	R	Order No. K Lug
KF2/KF2-A -1500	130	8	10	50	60	17.5	20	2 pcs K-3000*
KF2/KF2-A -3000	155	8	10	95	30	17.5	25	2 pcs K-5000
KF2/KF2-A -5000	195	12	10	110	30	21.5	25	2 pcs K-7500
KF2/KF2-A -7500	240	12	10	120	30	21.5	29	2 pcs K-10000

* **Please note**, K-3000 lugs will require a slight modification, according to the sketch before they can be fitted to the KF2/KF2-A 1500.

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



FCSC
Top mount