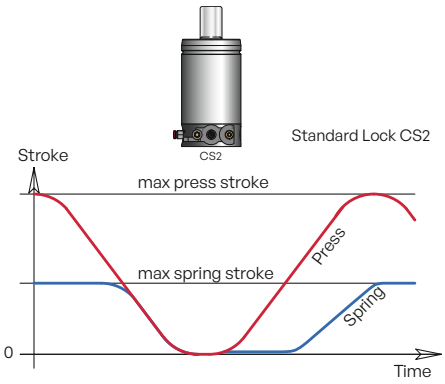
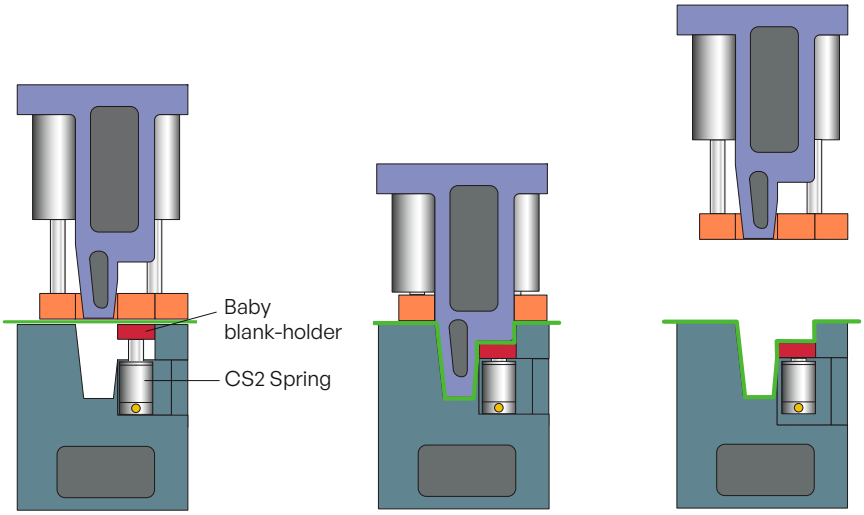
Controllable Gas Springs

Introduction

The CS2 Series is the next generation of the original CS Series. The CS2 Series is a family of Gas Springs used in metal forming dies; its piston rods can be locked at bottom dead center (BDC). The return stroke of the piston rod is controlled pneumatically by a valve in the base of the spring. The example below shows a drawing die where two forming stages are performed with a single press stroke.



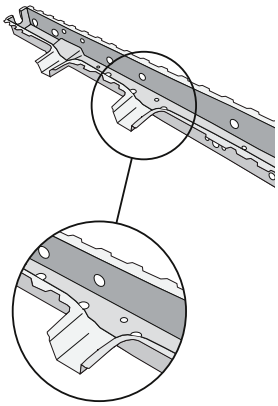


Controllable Gas Springs are available in

- Model sizes 1500, 3000, 5000 & 7500.
- Contact forces from 1.6 to 8.4 tons.
- Stroke lengths from 4 mm to 160 mm.

There are two systems available:

- Standard Lock, CS2
- Positive Lock System, CS2 + PS



Standard Lock, CS2

CS2 Controllable Gas Springs feature piston rods that can be locked at BDC.

The full stroke length of the CS2 spring must be used within 0.5 mm for optimal locking function, giving a maximum springback of 1 mm referred 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. The springs can be self-contained or connected to a control panel through a Hose System.

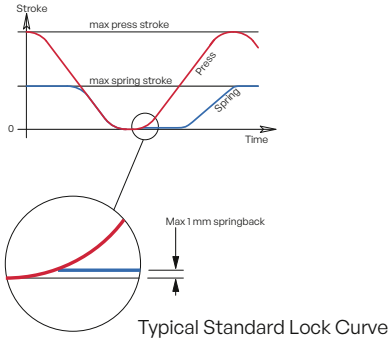
How it works

The CS2 Controllable Gas Spring 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.

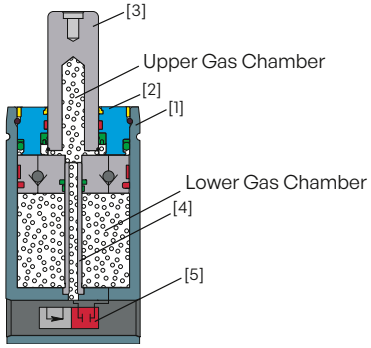
The nitrogen gas within the spring is sealed within two gas chambers, an upper and a lower. When the spring is stroked, nitrogen gas from the lower chamber passes through the non-return valves in the piston rod assembly and into the upper chamber.

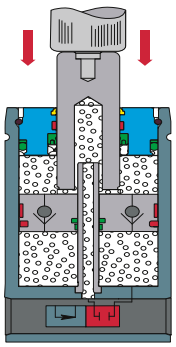
The cartridge valve is closed by applying compressed air pressure (min. 4 bar). With the cartridge valve closed, the piston rod is prevented from returning to its fully extended position. Opening the cartridge valve (taking away min. 4 bar air signal), the gas contained within the upper chamber can flow to the lower chamber via the internal piston rod [4], allowing the piston rod to return to its fully extended position.

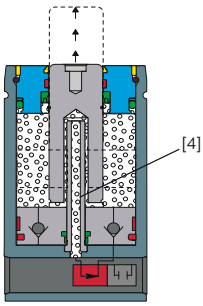
CS 2



Typical Standard Lock Curve







Positive Lock System, CS2 + PS

The CS2 + PS system combines a standard lock CS2 controllable Gas Spring [1] with a specially designed PS Passive Gas Spring [3] via a valve block [2], which together form a Positive Lock System.

The result is a Controllable Gas Spring system with **zero springback**.

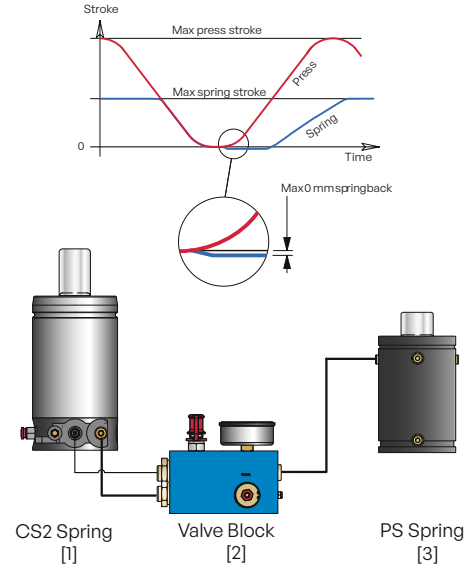
Note: The PS Passive Gas Spring is **not** to be used for any operation in the tool other than to eliminate springback in the CS2 spring(s). It can be placed anywhere in the tool except for the area you wish to lock, and can eliminate springback in up to four CS2 Controllable Gas Spring s. How much the PS Passive Gas Spring should be stroked depends on the number of CS2 springs in the system. The cartridge valve in the valve block is identical to the one in the CS2 spring.

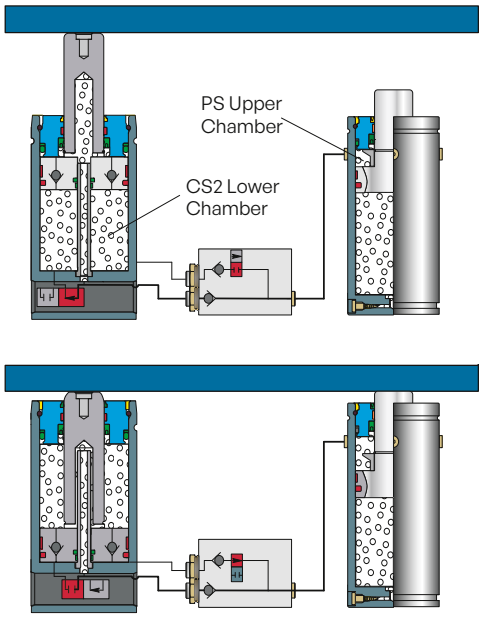
How it works

The CS2 is the active spring in the system and provides the required spring force in the tool. The PS Passive Gas Spring's function is to eliminate the max. 1 mm springback of the CS2 spring(s) at BDC.

The system works by connecting the lower gas chamber in the CS2 Controllable Gas Spring (s) to the upper chamber of the PS Passive Gas Spring via the valve block. By stroking the PS 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 CS2 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 CS2 spring is drawn into the upper chamber of the PS Passive Gas Spring.





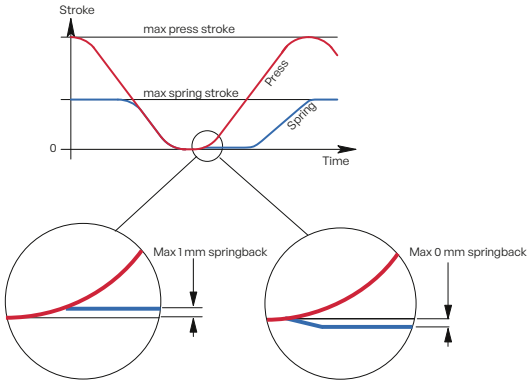
Stroking within 0.5 mm of full stroke

In order to provide the best locking function from the CS2 Controllable Gas Spring, it is important to stroke the spring 100% of the nominal stroke length at minimum, within 0.5 mm. This reduces the gas volume in the lower gas chamber to a minimum.

For a standard lock CS2 system, stroking the CS2 spring 100% of the nominal stroke length, or within 0.5 mm, will ensure a springback of no more than 1 mm.

An adjustable stroke length version of the Controllable Gas Spring, called the CS2A, is available for those applications where the exact nominal stroke length within 0.5 mm is not known until after tool tryouts.

For a positive lock system CS2 + PS, stroking the CS2 spring 100% of the nominal stroke length or within 0.5 mm is also important, although much depends on the PS Passive Gas Spring's used stroke length.



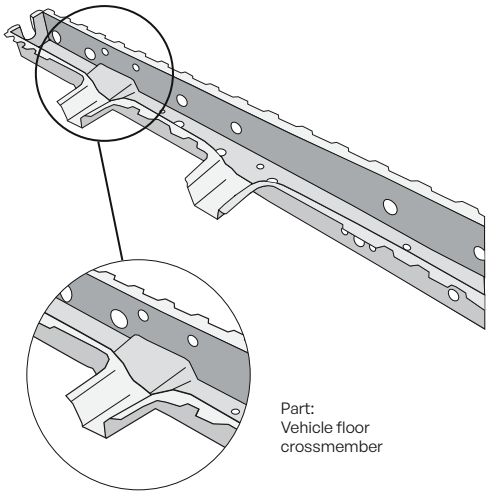
Standard Lock CS2 Positive Lock CS2 + PS

Application

Standard Lock, CS2

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

In this case, one CS2 spring is used to control each baby blank-holder.



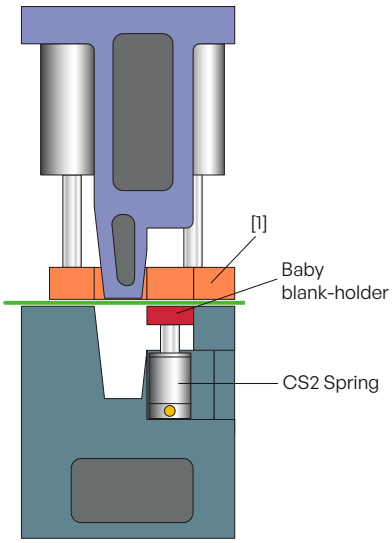
Part:
Vehicle floor
crossmember

Work Cycle

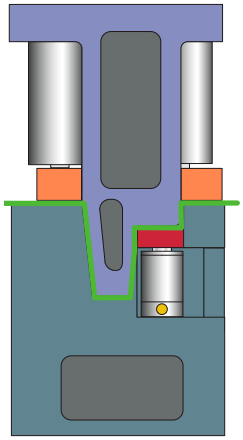
As the upper tool moves downwards, the blank holder [1] will be activated and control the flow of the blank in the tool.

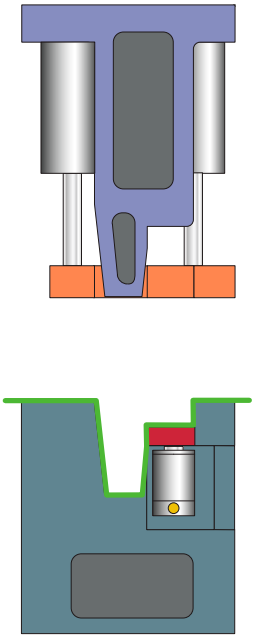
At bottom dead center the CS2 springs will lock. A small springback will, for this application, not damage the formed part.

As the press opens, the baby blank holder remains locked until that time when the CS2 spring should be unlocked and eject the part.



Standard Lock, CS2

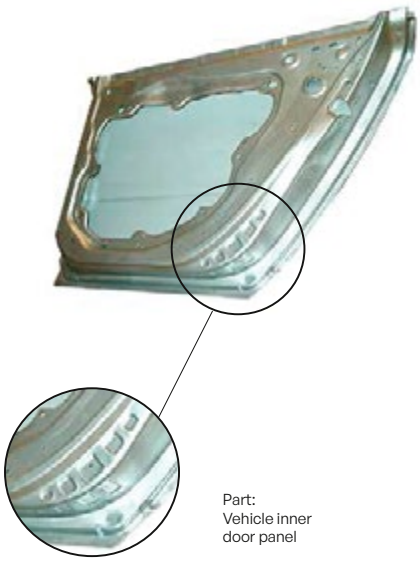




Positive Lock System, CS2 + PS

For the parts where Controllable Gas Springs are required with zero spring, the Positive Lock System is ideal. It provides a lockable blank holding force that prevents part deformation during the return stroke of the press.

The example at right shows a double stage draw forming operation made with a single stroke from the press. This large die for an inner door panel uses a total of 12 pieces CS2 springs connected to three pieces of PS Passive Gas Springs



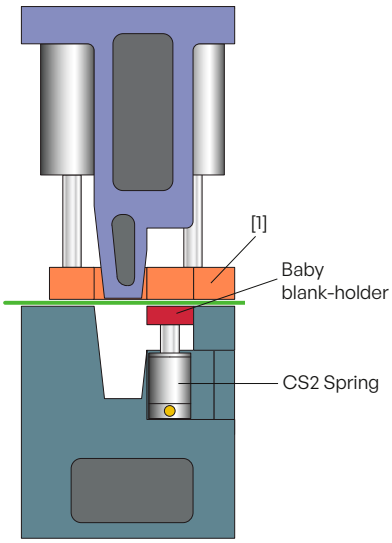
Part:
Vehicle inner door panel

Work Cycle

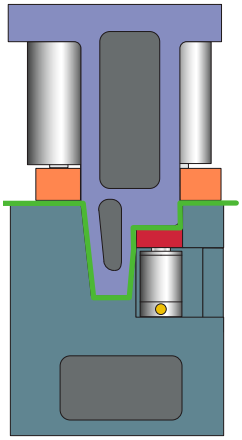
The lower tool contains the CS2 Controllable Gas Springs that provide the active blank-holding force for the deepest drawn section of the part.

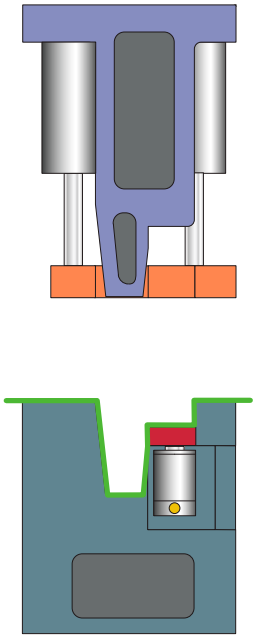
As the tool comes together, the PS Passive Gas Springs (not shown) are stroked, providing the necessary back pressure to lock the CS2 springs at BDC with zero springback.

As the tool opens, the CS2 springs remain locked until a signal from the press is given. Then the CS2 springs help eject the undamaged part from the tool.



Standard Lock, CS2





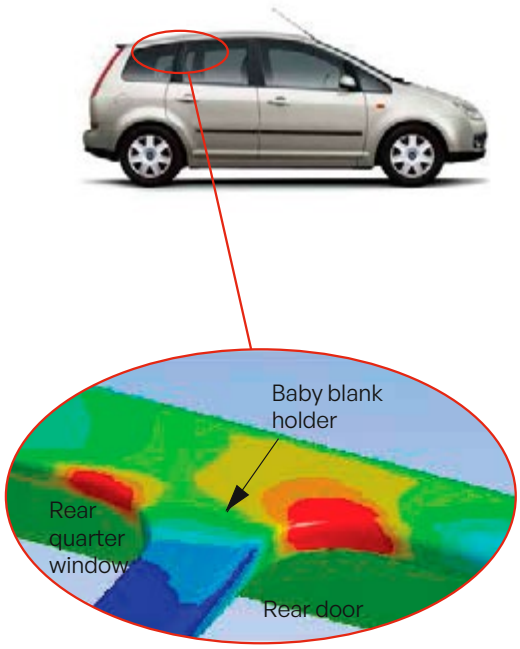
Positive Lock System, CS2 + PS

Producing side body panels of a high quality often provides challenges to the tool maker, especially 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 is to use individual baby blank holders at these areas, whose spring forces are controlled by CS2 Controllable Gas Springs.

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



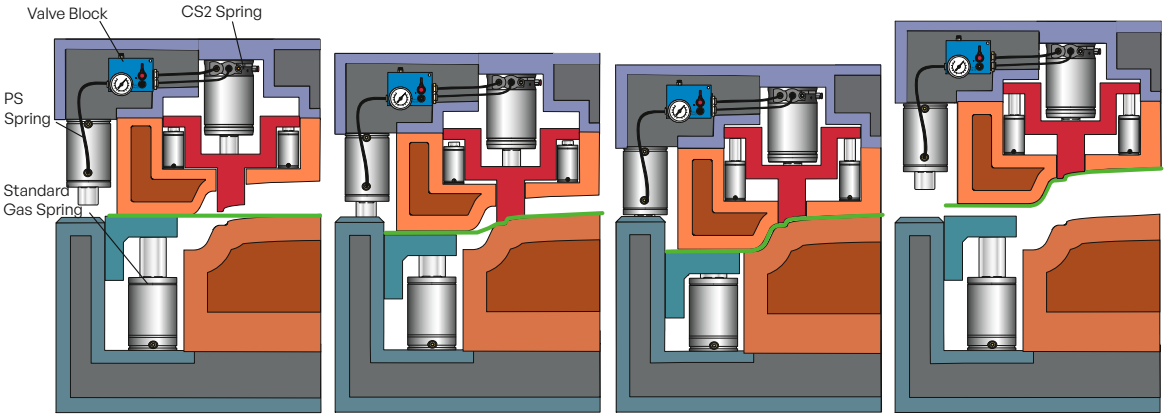
Work Cycle

The upper tool contains the CS2 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 areas as the tool starts to close.

At press BDC, the valve in the valve block opens and the PS spring is used to ensure zero springback in the CS2 springs.

As the tool opens, the CS2 springs remain locked until a signal from the press is given. Then the CS2 springs help eject the finished part from the tool.



Positive Lock System, CS2 + PS

System Configuration

Controllable Gas Springs require at least one of the following systems:

- Control System (required)
- Hose System (optional)
- Cooling System (optional, depending on requirements)

Control System

In order to lock and unlock the CS2 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 CS2 spring.

The pneumatic signal can be provided by the control system from the press, or integrated into the tool itself using mechanical pressure switches.

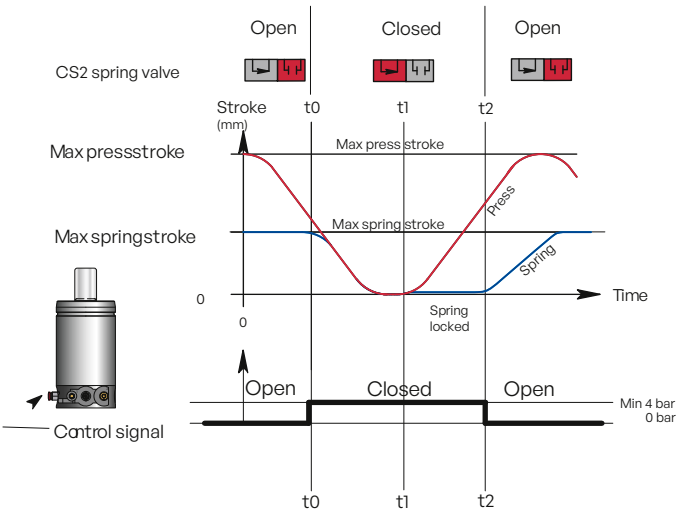
Control System - Standard Lock, CS2

The normally open (NO) valve within the base of the CS2 Controllable spring(s) is closed using compressed air (min. 4 bar). With the valve closed, t0-t2 (see diagram), the piston rod of the CS2 spring(s) is prevented from returning to its extended position.

By connecting the valves in the CS2 springs together, using pneumatic hoses, to the control system of the press, the springs can be easily locked and unlocked.

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

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



Control System - Positive Lock System, CS2 + PS

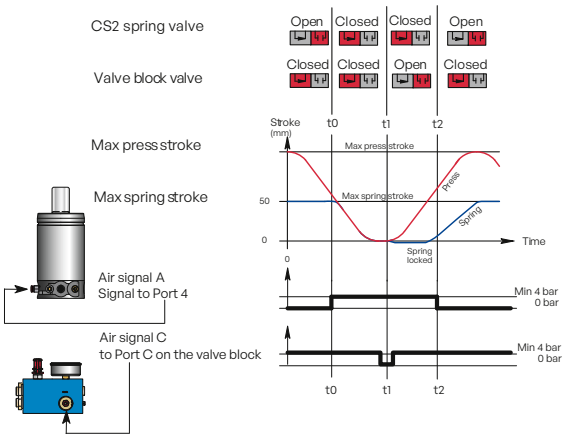
When the PS Passive Gas Spring is connected to the active CS2 spring(s) via the valve block, an additional signal from the press (or separate mechanical pressure switch) is required to control the valve within the valve block.

As the valve in the valve block is identical to that used in the CS2 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.

Note: The valve in the valve block is to be opened and closed exactly at the BDC according to the diagram.

For examples showing how to connect the CS2 + PS Controllable Gas Spring system to a control system, see Installations, page 348.

- t0 = Approximately when closing the die
- t1 = Press Bottom Dead Center
- t2 = Start of spring return stroke



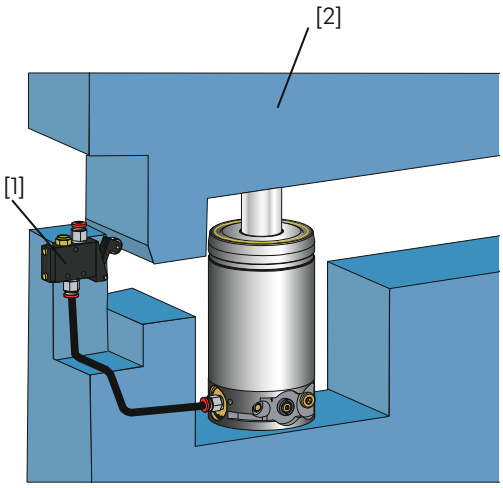
Tool Integrated Control System

The control system required to lock the CS2 spring(s) can be integrated into the tool itself by using a mechanical pressure switch. The control system required to lock and unlock the CS2 spring(s) is therefore independent of the press's own control system.

The CS2 spring(s) remain locked as long as the mechanical pressure switch [1] is activated by the tool [2].

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

Note: Can also be used to control the valve block's valve for positive lock systems.



Hose System (optional)

CS2 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, CS2

For information on recommended Hose System, see page 350.

CS2 Controllable Gas Springs are connected together in a Hose System in the same way as standard Gas Springs. For information on connecting the newer CS2 springs together with the older CS Controllable Gas Springs, see page 362.

For examples showing how to connect CS2 Controllable Gas Springs to a Hose System, see Installations, page 348.

CP-N2 LG G1/8

Hose System

Positive Lock System, CS2 + PS

You can connect up to four CS2 springs to one valve block.

A CS2 + PS Controllable Gas Spring system requires two hose connections:

- One EZ-Hose connection (see page 352)
- One EO24 Hose connection (see page 352)

EZ-Hose connections

Gas port 1, which is marked on each CS2 spring, is connected to gas port 1 on the valve block (also marked) using EZ-Hose system components.

EO24 Hose connections

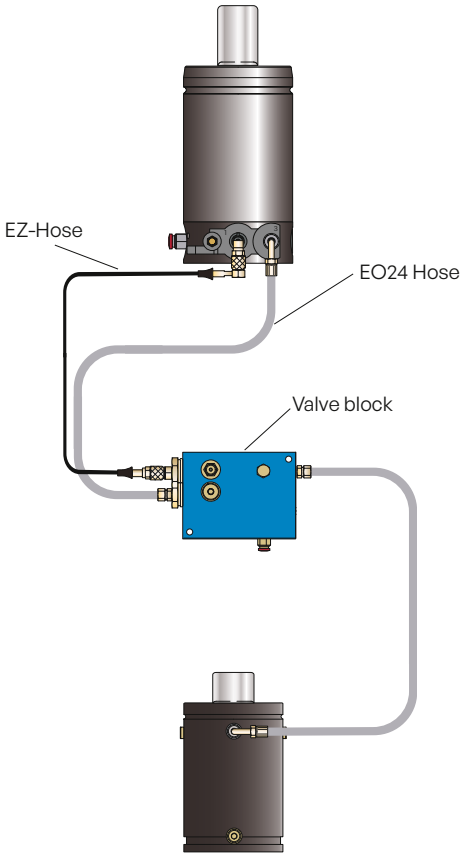
To connect the CS2 Controllable Gas Spring(s) to a PS Passive Gas Spring via the valve block, use the EO24 Hose System (or its equivalent).

Gas port 3, which is marked on each CS2 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 PS Passive Gas Spring using EO24 Hose System components also.

For information on connecting the newer CS2 springs together with the older CS Controllable Gas Springs, see page 361.

For examples showing how to connect CS2 + PS Controllable Gas Spring systems to a Hose System, see Installations, page 348.



CS2 + PS
Single system assembly

Cooling System (optional)

About Cooling

There are two methods for cooling a CS2 Gas Spring system. Which method you choose depends on the required cooling effect and the number of CS2 springs to be cooled.

CS2-NC/CS2A-NC uses a Nitro Cooler, ideal for a small number of springs run at higher production rates and requiring cooling. They are also appropriate when there is insufficient space for cooling jackets and the Liquid Cooler Unit.

CS2-CJ/CS2A-CJ uses a Liquid Cooler Unit, ideal for a larger number of springs run at higher production rates and requiring cooling. Two models, 10kW and 25kW, are available. Each Gas Spring is fitted with a cooling jacket to allow the cooling liquid to circulate around it.

Every time a CS2 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.

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 because of friction, etc.).

Since the return stroke of a CS2 Controllable Gas Spring does not follow the press's return stroke, the transferred energy is dissipated as heat in the CS2 spring.

To avoid overheating in some applications, cooling of the CS2 spring(s) is required.

Nitro Cooler Method

Liquid Cooler Unit Method

Heat Factor

Determining if cooling is required

The need for cooling is determined by calculating the heat factor for the application.

The heat factor is calculated by multiplying the stroke frequency in strokes per minute (spm), with the CS2 spring's stroke length (mm).

For example

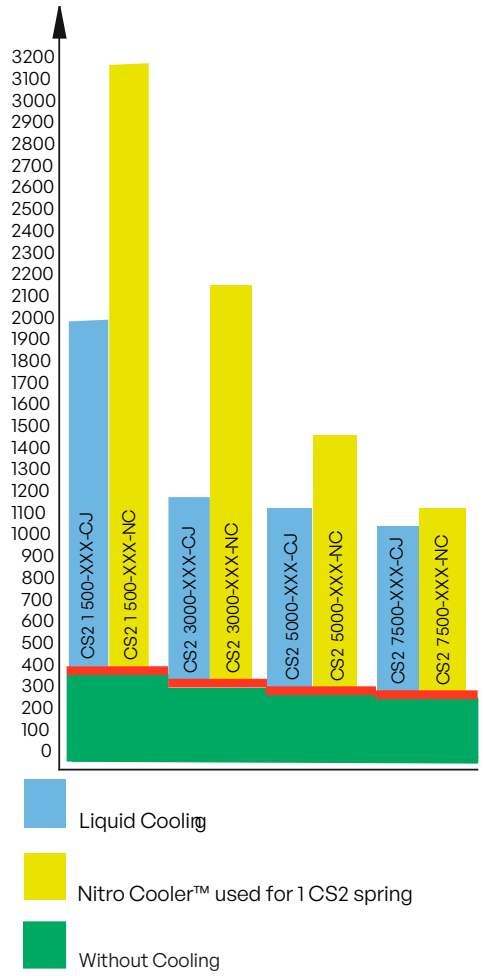
Stroke frequency: 15 spm

CS2 stroke length: 100 mm

Heat factor = stroke frequency x stroke length
= 15 x 100
= 1500

If this heat factor exceeds the maximum without cooling values given for the different CS2 spring sizes in the diagram to the right, then cooling is required.

Heat factor = Stroke length x Frequency
(mm) (stroke/minute)



Note:

Diagram is based on calculations made for CS2 Gas Springs with 150 bar charge pressure, surrounding temperature 24°C (75,2 °F), and a well-ventilated area.

How to Eliminate the Need for Cooling

1. Add More CS2 Springs

By adding CS2 Controllable Gas Spring s to the system, the charge pressure in each CS2 spring is reduced in order to maintain the same net spring force in the tool. The heat factor reduction for the CS2 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.

Option 1:
The first choice would be to select 10 pieces CS2-3000-50 springs at 150 bar charge pressure.
In this case, the heat factor would be 10 x 50 = 500.
This is 120 greater than allowed for a system without cooling.
Add 4 pieces CS2-3000-50 springs to the system and reduce nitrogen pressure to get the required force.
The total net spring force at 150 bar is 420 kN.

$$\text{New heat factor} = \text{Original heat factor} \times \left(\frac{\text{Required Net Force at Reduced Pressure}}{\text{Net Force at 150 bar}} \right) \text{Reduction Factor}$$

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

$$= 360$$

The new heat factor is now 20 below that required for CS2-3000 cooling.
The original heat factor is reduced by 29% so the fill pressure must be reduced by the same amount.
Reduced fill pressure = 71% of 150 bar = 107 bar

2. Use Larger CS2 Springs

By selecting a larger size of CS2 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 CS2 spring is directly proportional to the reduction in charge pressure.

Option 2:

Selecting 10 pieces CS2-5000-50 springs 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.

$$\text{New heat factor} = \text{Original heat factor} \times \left(\frac{\text{Required Net Force at Reduced Pressure}}{\text{Net Force at 150 bar}} \right) \text{Reduction Factor}$$

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

$$= 300$$

The new heat factor is now 60 below that required for CS2-5000 cooling.
The original heat factor is reduced by 40% so the fill pressure must be reduced by the same amount.

Choosing a Cooling System

A liquid cooler must be used for large dies with a large number of Gas Springs. The cooling capacity is limited to 25 kW. The Nitro Cooler is suited to smaller dies with one-six Gas Springs. The Nitro Cooler must be placed as close to the springs as possible. **The return speed will be slower by approx. 40% using the Nitro Cooler.** This is a die-integrated system with a cooling capacity of 1.5 kW.

Overheat Protection

Thermal Relay

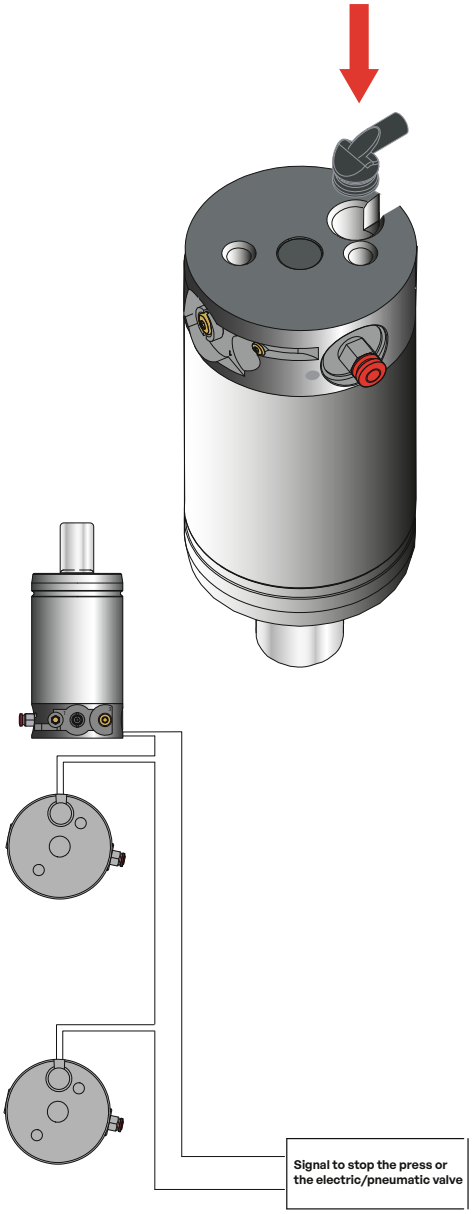
To avoid overheating the CS2 Gas Spring, a thermal relay (bimetallic) should be used to stop the press or prevent the CS2 Controllable Gas Spring (s) from locking.

If the CS2 Gas Spring temperature exceeds 80ºC (176ºF), the thermal relay will open, sending a signal to the press's control system that the springs are overheating.

The thermal relay will automatically close as the CS2 Gas Spring temperature returns to normal. Running the CS2 Gas Spring at higher temperatures will shorten the service life of the spring.

Note: A thermal relay is included with each order.

Thermal Relay
Order No. 503388

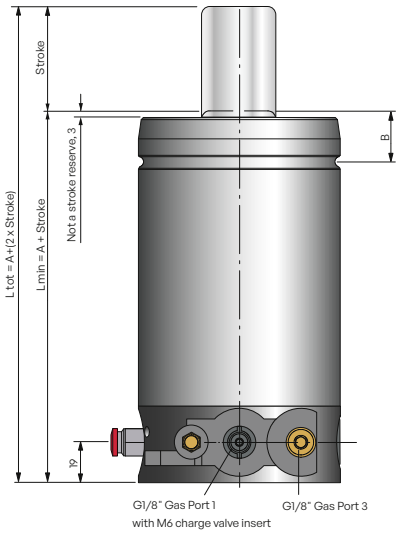


Product Specifications

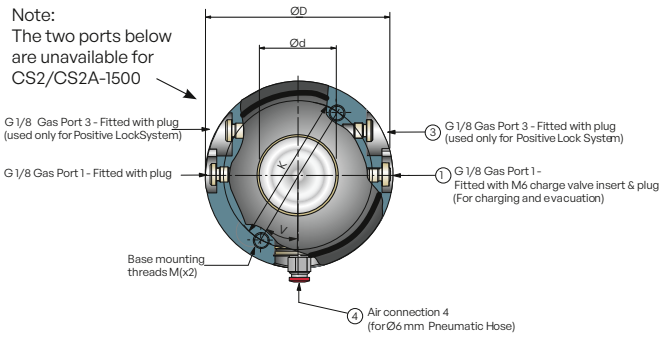
Normally closed
Break temp ..... 83±3º
Hysteresis ..... < 7ºC
Max voltage 250VAC
Max current 16A
Min current 50mA
Delivered with 2m of electric wire

Technical Information

CS2 - Dimensions, Standard Version



Top view



Model	Stroke		Contact Force at full charge		Full Stroke Force		Cylinder Height		Body Height		Gas vol.	Threads
	S						Y ±0.25	Y ±0.010	L			M
	mm	in	N	lbf.	N	lbf.	mm	in	mm	in	ℓ	size
CS2-1500	5–160	0.20-6.30	15,000	22,000	125	28.101	24	95	36	50	60°	M12×15
CS2-3000	6–160	0.24-6.30	30,000	42,000	135	30.349	25.5	120	50	95	30°	M12×15
CS2-5000	6–160	0.24-6.30	50,000	74,000	160	35.969	27.5	150	65	110	30°	M16×18
CS2-7500	8–160	0.31-6.30	75,000	98,000	180	40.466	33.5	195	80	120	30°	M16×18

- 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 CS2 springs be used for mounting.

Product Specifications

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* ..... 0.22 m/s for CS2 1500
Return Speed Piston Rod* ..... 0.15 m/s for CS2 3000
Return Speed Piston Rod* ..... 0.10 m/s for CS2 5000
Return Speed Piston Rod* ..... 0.065 m/s for CS2 7500
Tube ..... Nitrided
Rod ..... Nitrided

*Note: CS2 springs with even slower return speeds are available on request. Increased stroke length reduces the speed.
Contact order@HysonSolutions.com

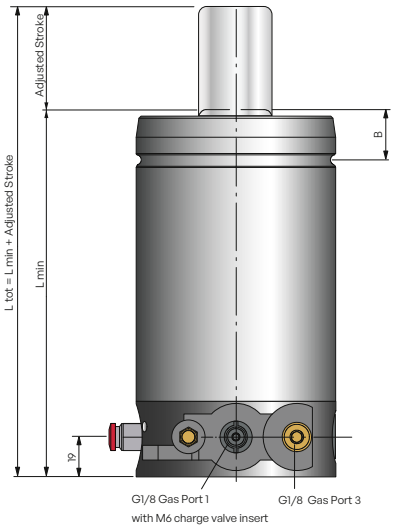
How to order

CS2-3000 - 78
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).

CS2A - Dimensions, Adjustable Version

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

The CS2A Controllable Gas Spring models offer adjustable stroke lengths within 15 mm, with the use of four specially designed spacers that are built into the guide of the spring.



Order No.	Nominal Stroke	Min. stroke length	Max. stroke length	L min			
				1500	3000	5000	7500
CS2A-XXXX-10	10	4	17	142	152	177	197
CS2A-XXXX-20	20	12	27	152	162	187	207
CS2A-XXXX-30	30	22	37	162	172	197	217
CS2A-XXXX-40	40	32	47	172	182	207	227
CS2A-XXXX-50	50	42	57	182	192	217	237
CS2A-XXXX-60	60	52	67	192	202	227	247
CS2A-XXXX-70	70	62	77	202	212	237	257
CS2A-XXXX-80	80	72	87	212	222	247	267
CS2A-XXXX-90	90	82	97	222	232	257	277
CS2A-XXXX-100	100	92	107	232	242	267	287
CS2A-XXXX-110	110	102	117	242	252	277	297
CS2A-XXXX-120	120	112	127	252	262	287	307
CS2A-XXXX-130	130	122	137	262	272	297	317
CS2A-XXXX-140	140	132	147	272	282	307	327
CS2A-XXXX-150	150	142	157	282	292	317	337
CS2A-XXXX-160	160	152	167	292	302	327	347

For information on how to adjust the stroke length of the CS2 spring, see page 359 “How to adjust the stroke length of a CS2A.”

How to order

CS2A-3000 - 30 - 30

Model:
CS2A-1500
CS2A-3000
CS2A-5000
CS2A-7500

Nominal stroke

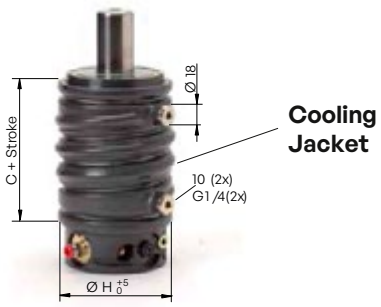
Delivered stroke

Gas Springs with Cooling Systems

CS2/CS2A with Cooling Jacket (CJ)

These Gas Springs are used with the liquid cooler (fig. 1).
The Cooling Jacket must be connected to the cooler.

Model	CS2 C	CS2A C+7	Ø H $^{+5}_{0}$
CS2/CS2A 1500-XXX-CJ	75	82	110
CS2/CS2A 3000-XXX-CJ	85	92	135
CS2/CS2A 5000-XXX-CJ	110	117	165
CS2/CS2A 7500-XXX-CJ	130	137	210

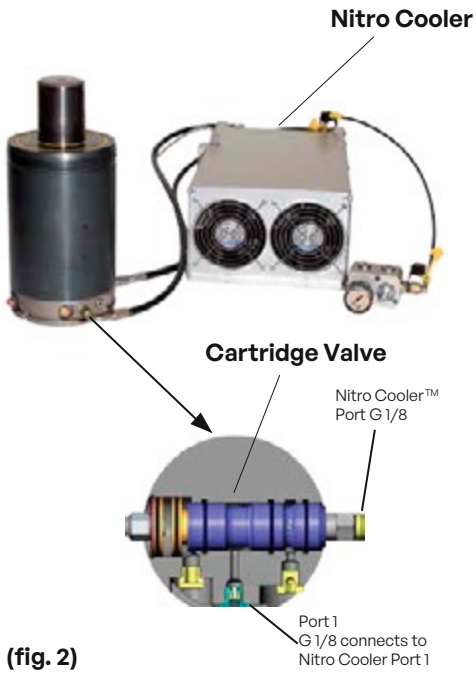


(fig. 1)

CS2/CS2A for Nitro Cooler (NC)

These Gas Springs with a special cartridge valve are used with the Nitro Cooler (fig. 2). Since nitrogen gas passes from the Gas Spring through the Nitro Cooler, **the piston rod has approximately a 40% slower return stroke when compared to a CS2 spring without a Nitro Cooler.**

NC Cartridge Valve Order No.	For Gas Spring
3021780	CS2/CS2A 1500
3121780	CS2/CS2A 3000
3221780	CS2/CS2A 5000
3321780	CS2/CS2A 7500



(fig. 2)

How to order CS2/CS2A with a Cooling Jacket (CJ)

CS2A-XXXX - XXX - CJ

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

How to order CS2/CS2A with a Nitro Cooler™ (NC)

CS2 XXXX - XXX - XXX - NC

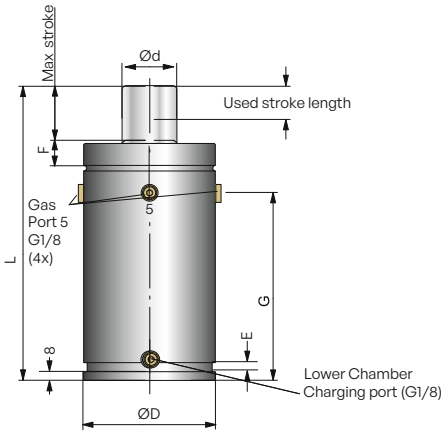
- Model size: 1500, 3000, 5000, 7500
- Nominal Stroke length [mm]
- Adjusted Stroke length [mm]
- Additional Port for Nitro Cooler™

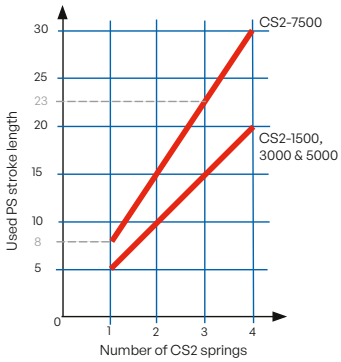
PS - Dimensions

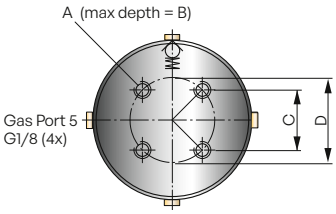
PS Passive Gas Springs should:

- Not be used for any operation in the tool other than to eliminate CS2 springback.
- Be the same model size as the CS2 spring(s)(except CS2-7500 which uses the PS-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.

Note: The PS 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 PS spring's lower gas chamber. The PS spring's charge pressure should be the same as the CS2 spring(s).







Order No.	ØD	Ød	F	E	L	G	A	B	C	D	Max. Stroke Length
PS-1500	95	36	24	7	220	140	M8	13	42.4	60	30
PS-3000	120	50	25.5	7	220	140	M10	16	56.6	80	30
PS-5000	150	65	27.5	8	300	193	M10	16	70.7	100	35

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

* The forces are calculated based on a charging pressure of 150 bar in the CS2 and the PS spring(s).

Product Specifications

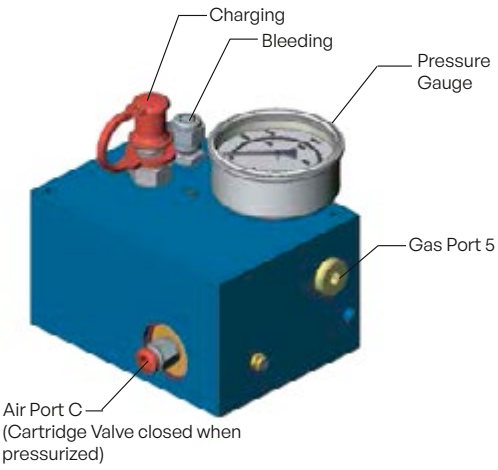
Pressure medium ..... Nitrogen
Max. charging pressure ..... 150 bar
Min. charging pressure ..... 25 bar
Operating temperature ..... 0 to +80ºC
Force increase by temperature ..... ±0.8%/ºC
Max. piston rod velocity ..... 0.8 m/s
Tube ..... Nitrided
Rod ..... Nitrided

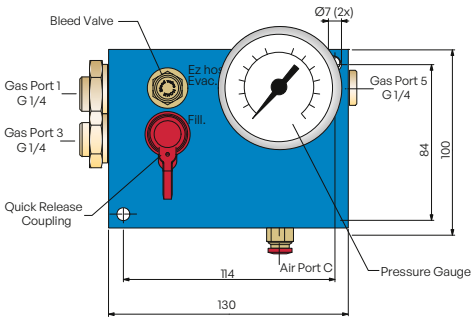
Valve Block Dimensions

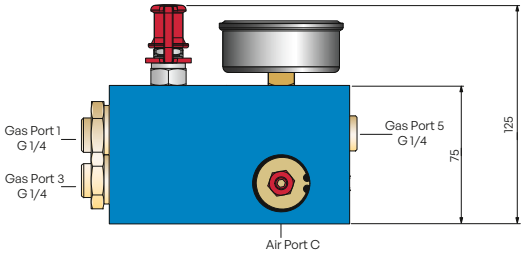
Two valve block models are available:

- all-in-one Valve Block, with built-in gas charging and bleeding equipment, plus gauge.
- Standard Valve Block, for use with separate control panel.

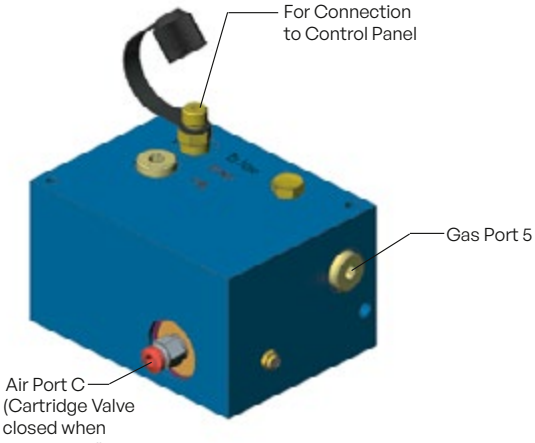
Order No. CSPSCP-AI1

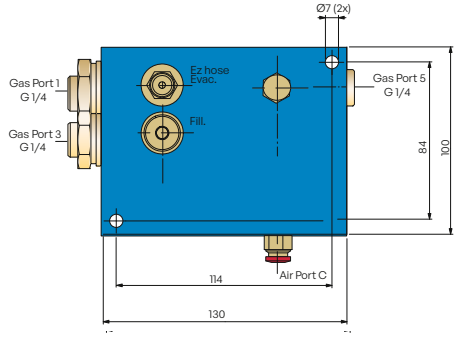


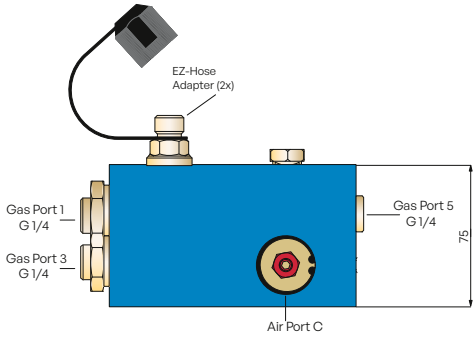




Order No. CSPSCP-SVB







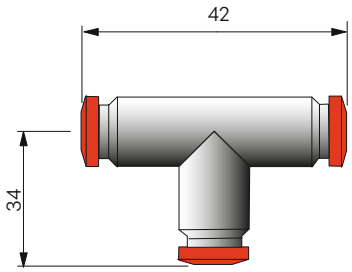
For information showing how to connect the different valve blocks to a positive lock system, see Installations, page 349.

Control System Components

Hose and fittings for Ø6 mm pneumatic hose

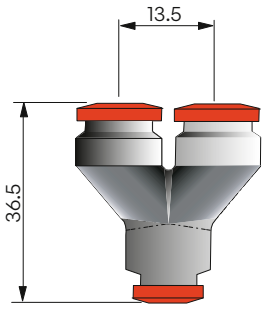
T - Connector (hose to hose)

Order No. CSNF-3500



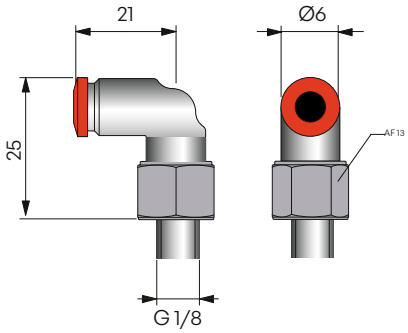
Y - Connector (hose to hose)

Order No. CSNF-3510

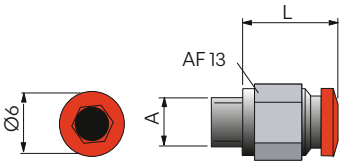


90° - G 1/8

Order No. CSNF-2000-G 1/8



Straight Connector (see Table below)



Order No.	A	L
CSNPF-1000-G1/8	G1/8	15
CSNPF-1000-G1/4	G1/4	13.5
CSNPF-1000-1/4	1/4 NPT	28

Pneumatic hose

Ø 6 mm

How to order 506795 - XX

Order the length in whole meters

Product Specifications

Material ..... Polyamid
Max. temperature ..... 130°C
Max. pressure ..... 27 bar
Color ..... Blue
Min. bend radius ..... 35 mm

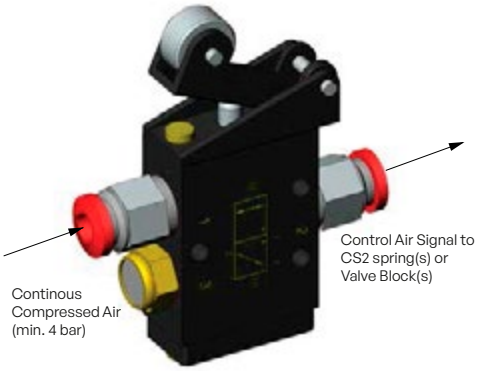
Mechanical Pressure Switch

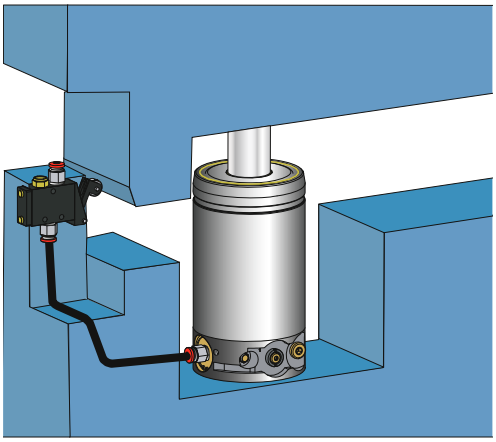
Order No. HMPS-G 1/8

The mechanical pressure switch can be used to control the valve in the CS2 Controllable Gas Spring (s) or valve block for tool integrated control systems.

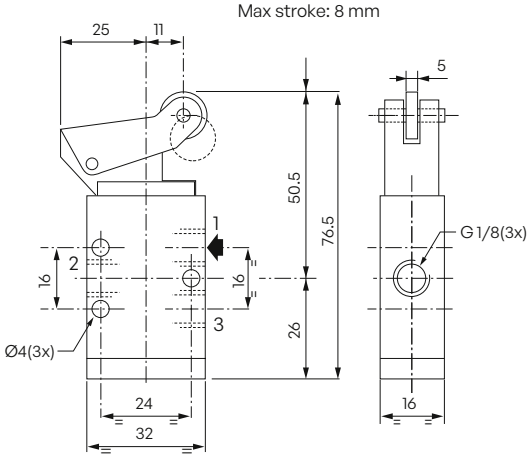
Mechanical Pressure Switches:

- **Can** control up to six pieces CS2 springs or valve blocks.
- **Require** a constant compressed air supply (min. 4 bar).





Stroke: 5 mm
Max stroke: 8 mm



Product Specifications

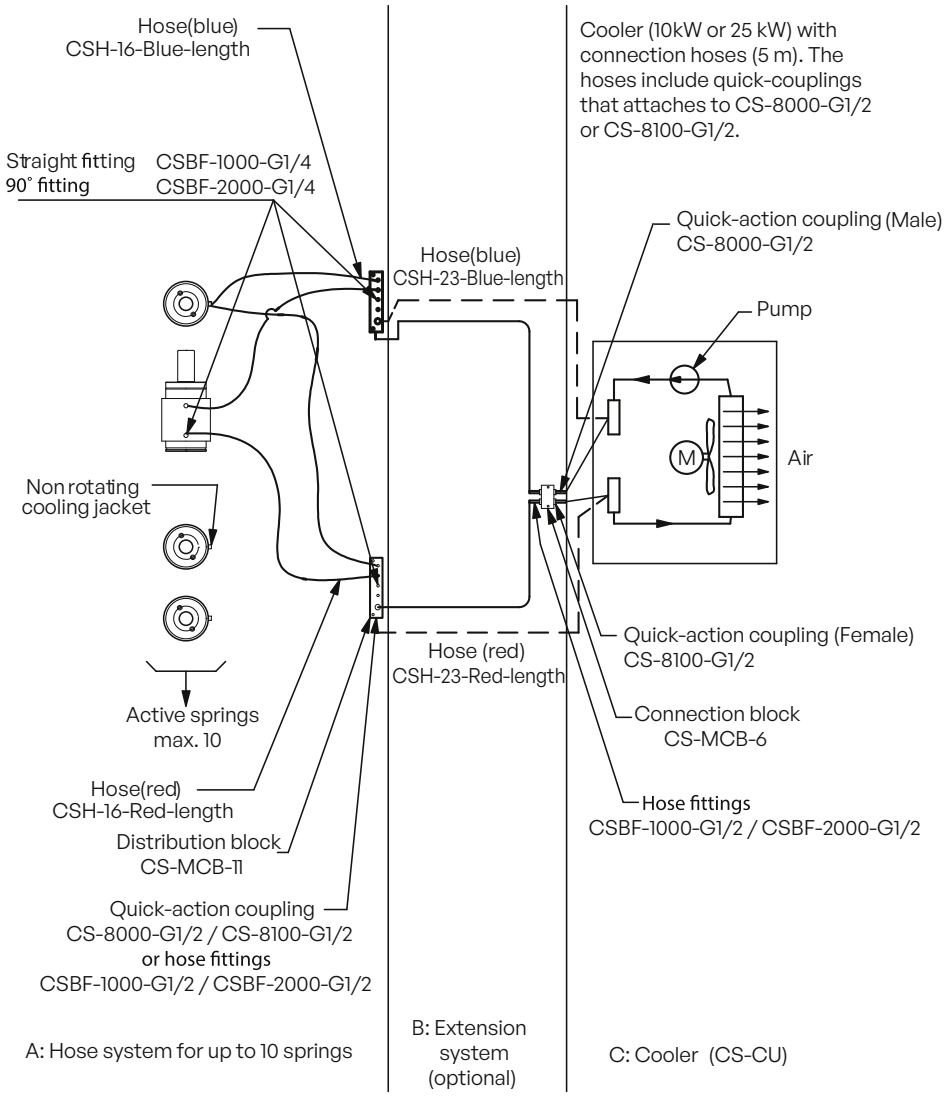
Fluid	Air or inert gas, filtered & lubricated
Pressure	0 to 10 bar
Temperarture	10°C to + 60°C
Functions	3/2
Connection ports	G 1/8 (3x)
Flow rate (at 6 bar)	200 l/min

Cooling System Components

For applications where cooling is required, each CS2 Controllable Gas Spring must be:

- **Fitted** with a Cooling Jacket (CJ).
- **Fitted** with a Thermal Relay (see Overheat Protection, page 17).
- **Connected in parallel** to the Cooler Unit as shown below.

CS2 spring fitted with Cooling Jacket (CJ)

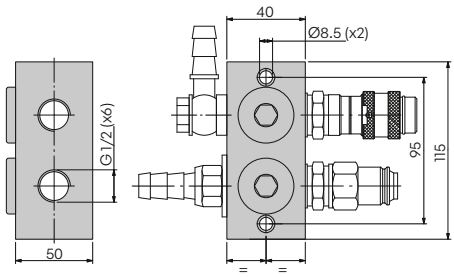


The Cooling Fluid is circulated within a closed system through the Cooling Jacket(s), to a Cooler Unit (10kW or 25kW), where heat from the CS2 spring(s) is then radiated to the surroundings.

Cooling System - Hose & Fittings

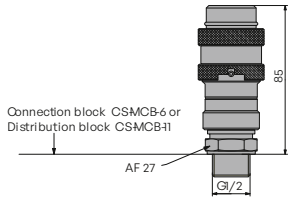
Connection Block

Order No. CS-MCB-6



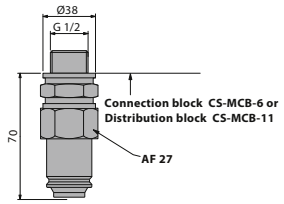
Female Quick Release Coupling

Order No. CS-8100-G 1/2



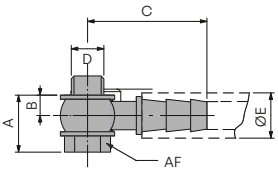
Male Quick Release Coupling

Order No. CS-8000-G 1/2



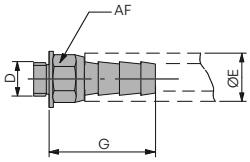
90° Hose Fitting

Order No.	D	A	B	C	E	AF
CSBF-2000-G 1/4	G1/4	23	8	44	16	17
CSBF-2000-G1/2	G1/2	30	12	68	23	27



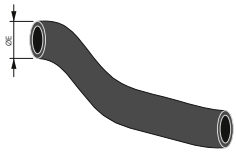
Straight Hose Fitting

Order No.	D	E	G	AF
CSBF-1000-G 1/4	G1/4	16	28	12
CSBF-1000-G1/2	G1/2	23	58	27



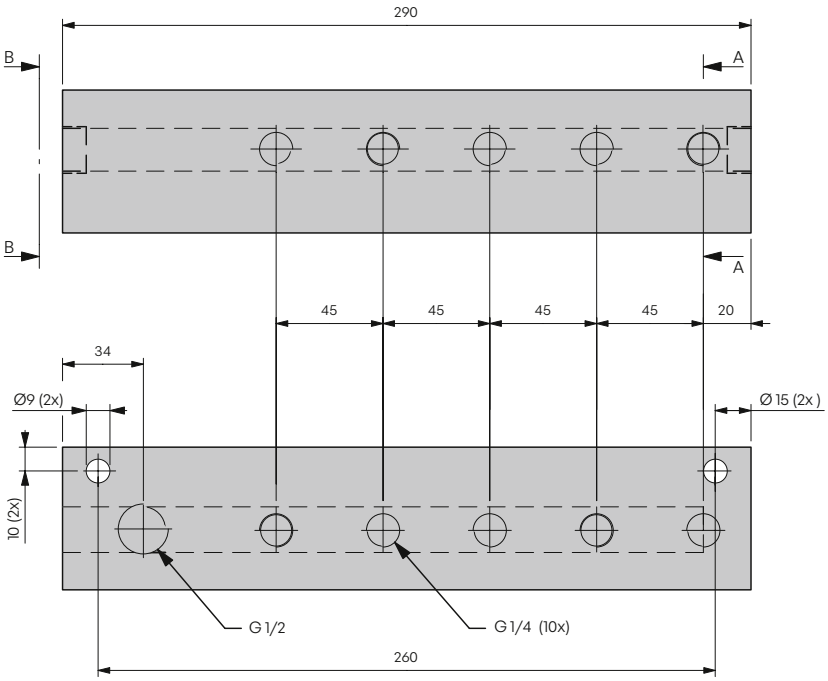
Cooling Hose

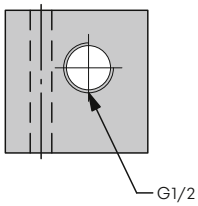
Order No.	E	DN	Color	Min. Bend Radius
CSH-16-Blue	16	10	Blue	75
CSH-16-Red	16	10	Red	75
CSH-23-Blue	23	16	Blue	150
CSH-23-Red	23	16	Red	150



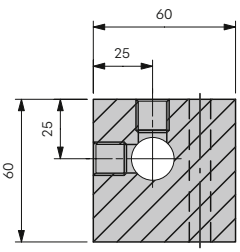
Cooling System - Hose & Fittings

Order No. CS-MCB-12





View B-B



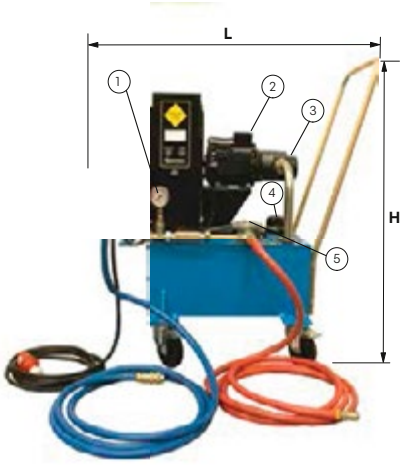
View A-A

Cooling System - Cooler Unit

There are two sizes of Cooler Unit available:

- 10 KW - Order No. CS-CU-10KW
- 25 KW - Order No. CS-CU-25KW

For information on which Cooler Unit is suitable for your application, please check the CS-Configurator at Hyson website.



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

9 Control Button

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.

Note:

Do not use Cooler Unit without cooling fluid! The unit is equipped with a level/temp switch that will shut down the unit if it leaks or overheats.

Product Specifications

10 KW Cooler Unit:

Order No.	**CS-CU-10KW**
H	1000
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

25 KW Cooler Unit:

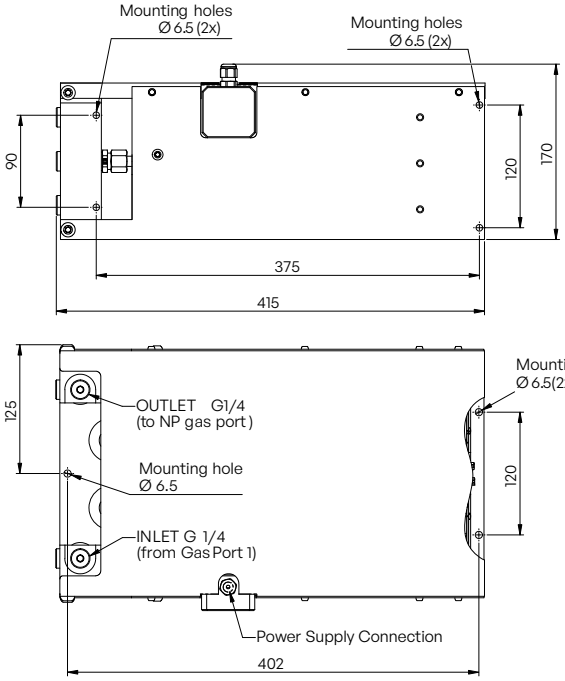
Order No.	**CS-CU-25KW**
H	1070
L	1070
B	890
Pump flow	60 l/min
Tank capacity	90 l
Electric motor	3 KW
Power supply	380 V AC
Weight	220 kg

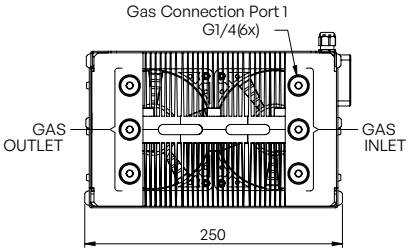
Nitrogen Cooling System - Nitro Cooler™ (NC)

The Nitro Cooler (NC) is engineered to provide tool integrated cooling for CS2/CS2A Controllable Gas Spring s running at high production rates. It is compact and provides 1.5 kW of cooling power. Each unit is able to cool up to four CS2 or CS2A Gas Springs. Gas Springs with special cartridge valves are required for use with the Nitro Cooler.

The Nitro Cooler requires 24 V DC (22W) to operate and conforms to IP64 class. Units can be mounted vertically or horizontally, inside or outside the die.

Nitro Cooler ™ - Order No. 2021641





Product Specifications

Max. cooling capacity 1.5kW
Max. charging pressure ..... 150 bar
Min. charging pressure ..... 25 bar
Operating temperature ..... 0 to 80ºC
Weight ..... 16 kg
Connection ports ..... G ¼(8x)
Power supply ..... 24 V DC (22W)
Contains a built-in thermal relay.

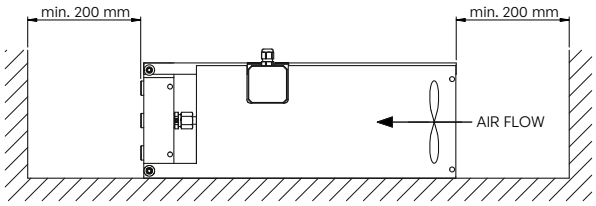
Nitrogen Cooling System - Nitro Cooler™ (NC)

Mounting Options

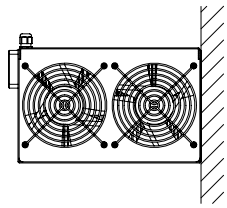
Nitro Coolers can be mounted vertically or horizontally. When mounting, it is important NOT to restrict the air flow through the cooler. If air flow is restricted, it will have a negative effect on the unit's performance.

Electrical Connections

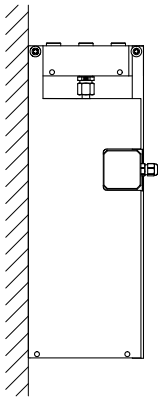
The wiring diagram (at right) for the Nitro Cooler is also included on the unit's label next to the connection box. Note: The Nitro Cooler contains a built-in thermal relay. The thermal relay has a normally closed circuit that opens if the temperature of the relay exceeds 85ºC±5%. The thermal relay should be connected to the PLC of the press to prevent overheating of the CS2-NC Gas Springs.



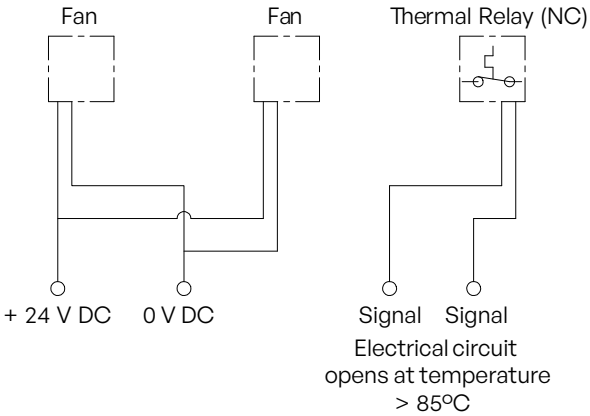
Base Mount



Horizontal Mount



Vertical Mount



Nitrogen Cooling System - Nitro Cooler™ (NC)

Nitro Cooler Performance

Depending on the amount of heat generated by the Gas Springs, up to four Gas Springs can be connected to each Nitro Cooler. These charts illustrate the maximum number of strokes per minute (SPM) allowed when one to four Gas Springs, with 150 bar pressure, are connected to a single Nitro Cooler. Along each of the four Gas Springs curves, the heat generation is 1.5 kW, the maximum cooling effect of the Nitro Cooler.

Each chart can be used to determine how many CS2-NC Gas Springs can be connected to one Nitro Cooler. For any given stroke length, DO NOT EXCEED the corresponding SPM rate curve for the number of CS2-NC Gas Springs.

Note:

When using the Nitro Cooler, the return stroke speed of the piston is decreased by approximately 50%. With a distance of 1 m between the cooler and the Gas Spring the speeds are as follow:

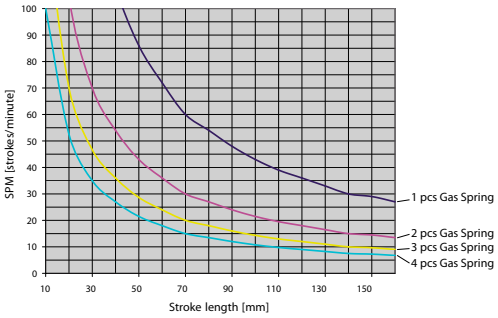
CS2/CS2A 1500 – 0.10 m/sec

CS2/CS2A 3000 – 0.08 m/sec

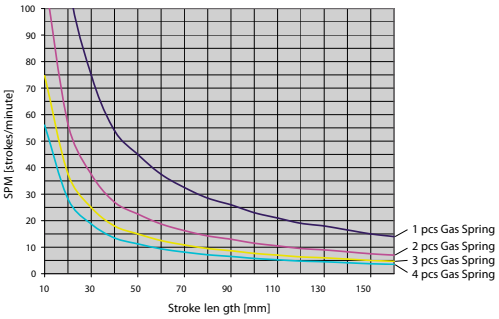
CS2/CS2A 5000 – 0.05 m/sec

CS2/CS2A 7500 – 0.03 m/sec

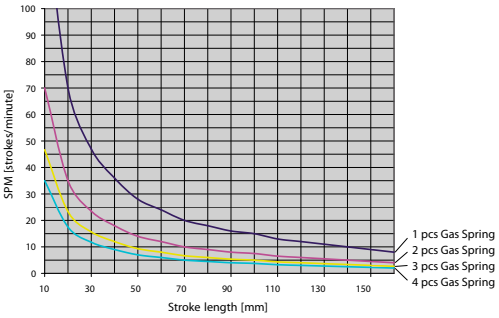
CS2/CS2A 1500



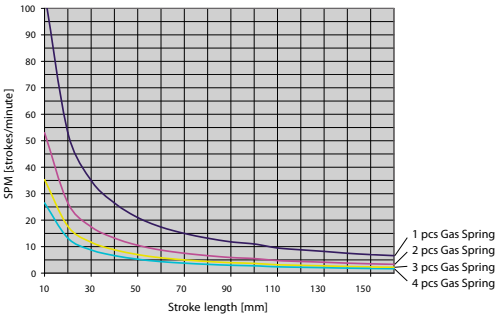
CS2/CS2A 3000



CS2/CS2A 5000



CS2/CS2A 7500



Nitrogen Cooling System - Nitro Cooler™ (NC)

How to Determine the Maximum Running Speed for an Application

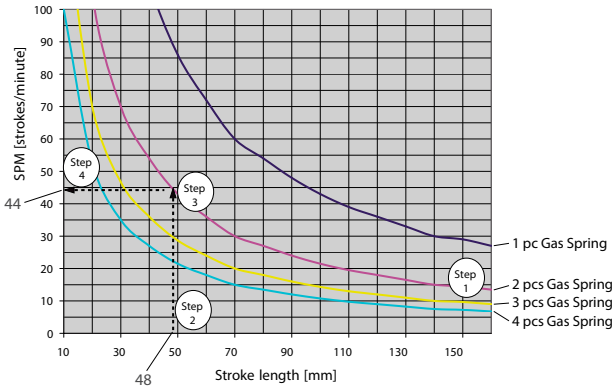
Gas Spring: CS2-1500-48-NC

Used Stroke Length : 48 mm

Pressure: 150 bar with 1.5 ton initial force

Number of Gas Springs: 2

Max SPM for one Gas Spring with one Nitro Cooler



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

Step 2 According to the used stroke length, go up vertically until crossing the diagram from 2 to 3.

Step 3 From point 3, go horizontally to the vertical axis SPM stroke/min point 4.

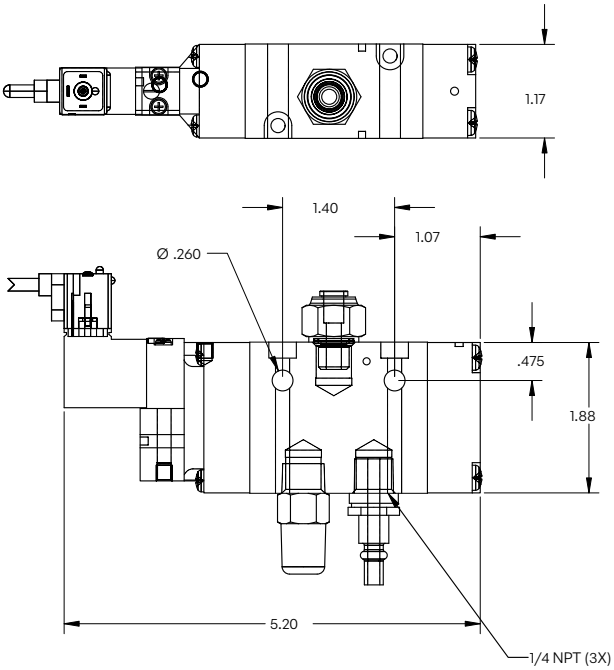
Step 4 Read the value for the maximum used SPM 44 strokes/min.

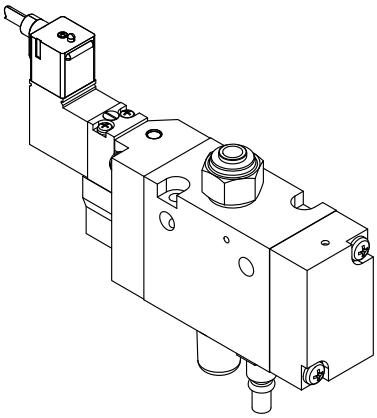
For lower charging pressure, this value increases proportionately.

For example: a charging pressure of 100 bar increases the maximum used SPM from 44 to 44 x 150/100 = 66 strokes/min.

Electric/Pneumatic Air Control Valve

Order No. CS3W2P24VDC





Note: CS3W2P24VDC comes completely assembled with (2) 1/4-NPT hose connectors for 6 mm hose, exhaust muffler and a 3-pin din connector with 6-foot cord.

Where extensions to electrical cord are needed, use 20 AWG.

Power Requirement: 24 VDC

Operation

Valve Energized: Pressure at inlet port 1 connected to outlet port 2, exhaust port 3 blocked. Valve must be energized to lock Gas Spring.

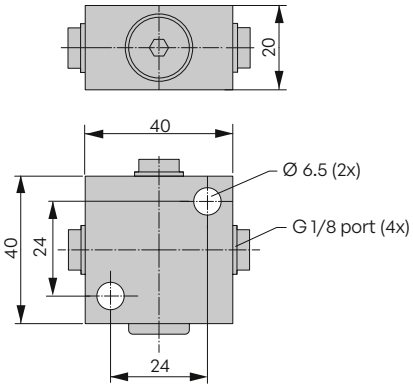
Valve De-Energized: Pressure at inlet port 1 blocked, outlet port 2 connected to exhaust port 3. When valve is not energized, Gas Spring piston rod will return to fully extended position.

Multi-Coupling Blocks

Order No. CS-MCB-14

This is a small and compact block for linking hoses. The block is provided with four G 1/8 ports.

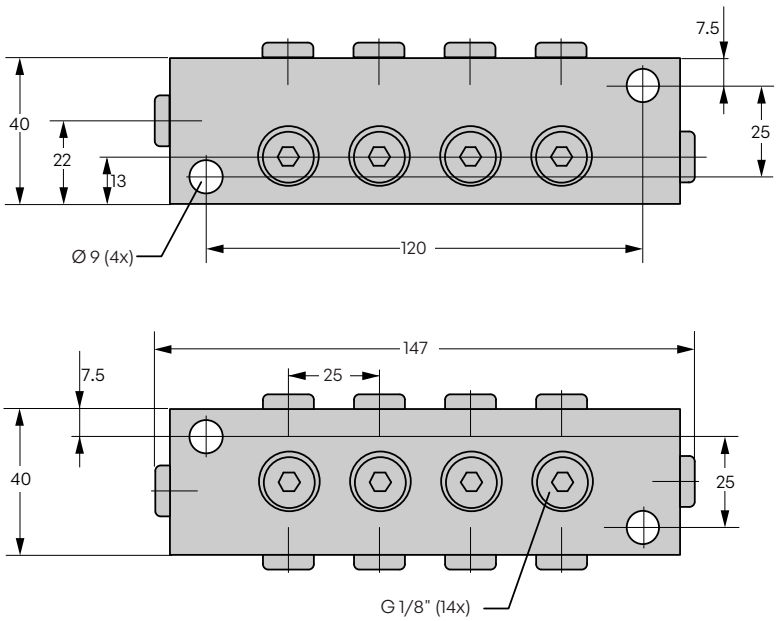
On delivery, one of the ports is provided with a sealing plug, while the other ports are provided with protective covers.



Order No. CS-MCB-14

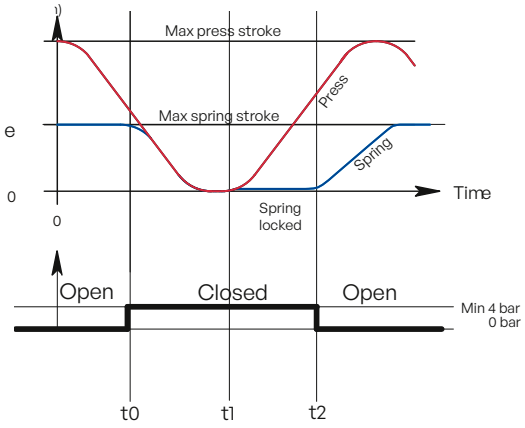
This multi-coupling block is manufactured in steel and has 13 G 1/8 connections and one G 1/4connection.

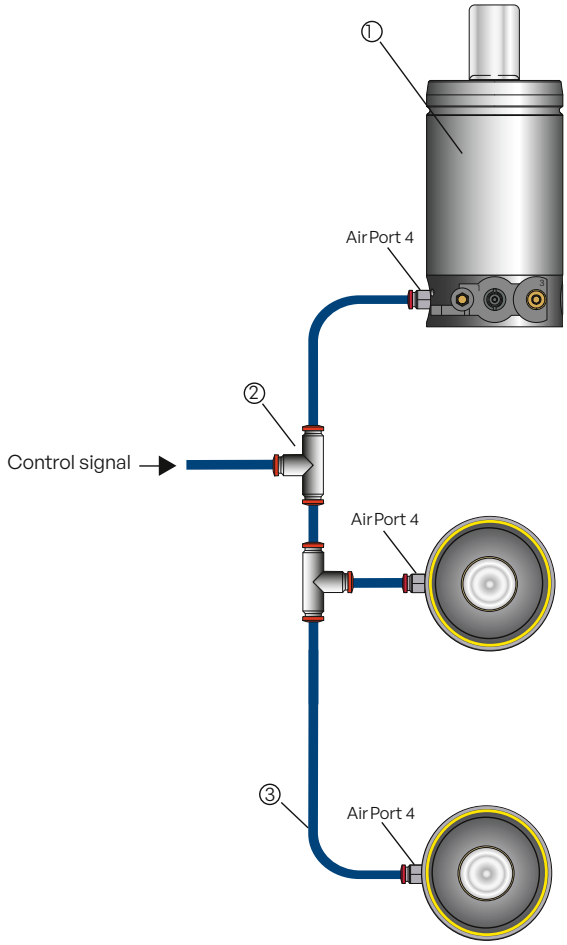
All connections are plugged on delivery.



Installations

Control System - Standard Lock CS2





Position	Quantity	Description	Order No.
1	2	Controllable Gas Spring	CS2-XXXX-XXX
2	2	T - Connector	CSNF-3500
3	1	Pneumatic Hose Ø6 mm	506795

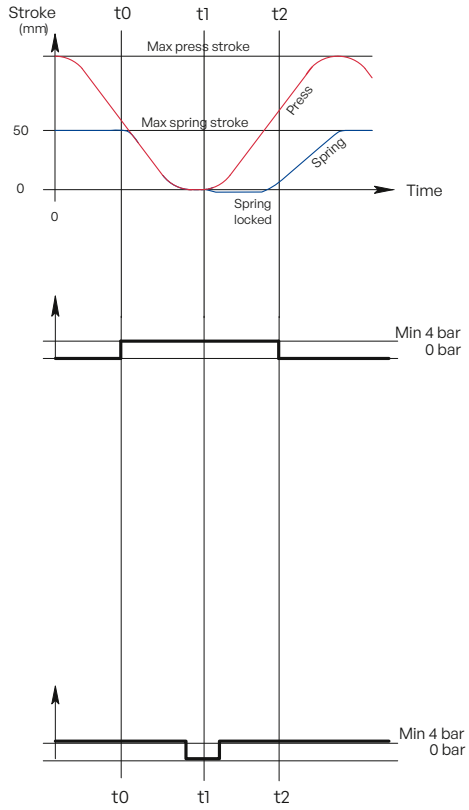
A standard lock system requires one air control signal.

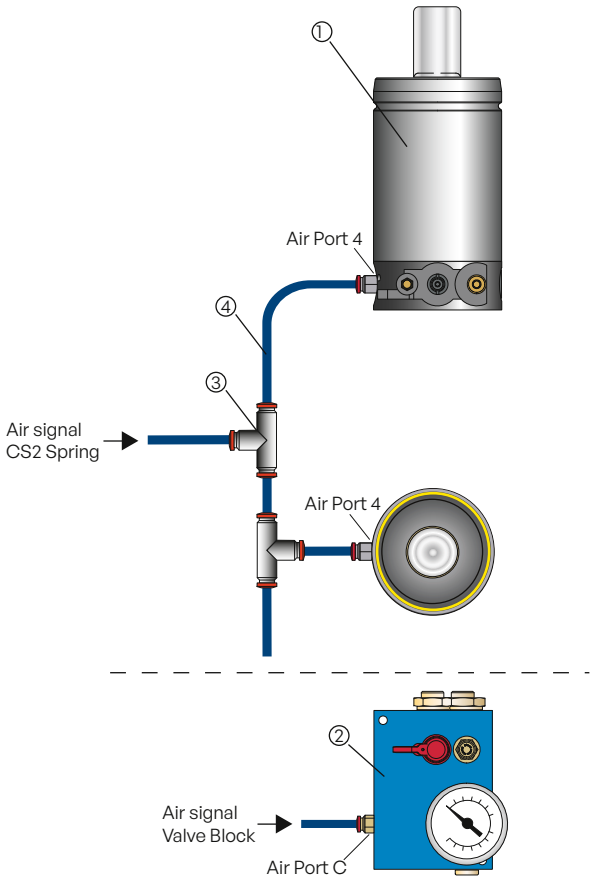
The CS2 Gas Springs are delivered with air fittings suitable for Ø6 mm air hoses.

Note: To lock and unlock all CS2 springs simultaneously, the hose lengths from the different springs to the air inlet should be close to the same length.
Cut the air hoses to the right length during the installation (push-lock system).

The CS2 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 CS2 + PS





Position	Quantity	Description	Order No.
1	2	Controllable Gas Spring	CS2-XXXX-XXX
2	1	All-in-One Valve Block	CSPSCP-All
3	1	T - Connector	CSNF-3500
4	1	Pneumatic Hose Ø6 mm	506795

A positive lock system requires two air control signals: one to operate the CS2 Gas Spring(s) and one to operate the valve block

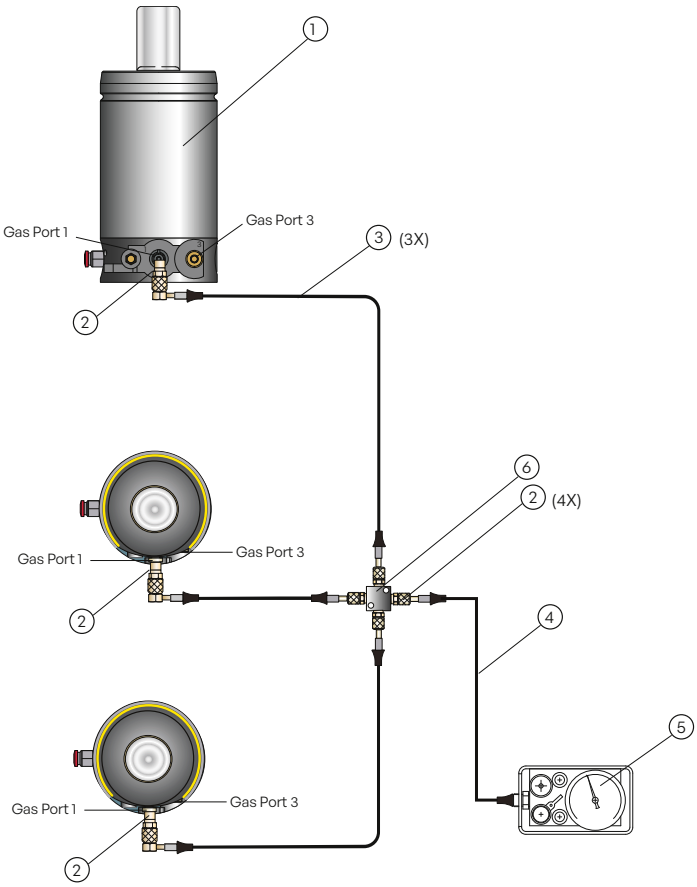
The CS2 Gas Springs and valve block are delivered with air fittings suitable for Ø6 mm pneumatic hoses.

Note: To lock and unlock all CS2 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.

Hose System - Standard Lock CS2

Method Using Coupling Block(s)



Position	Quantity	Description	Order No.
1	3	Controllable Gas Spring	CS2-XXXX-XXX
2	7	EZ Adapter G1/8	4114973-G1/8
3	3	Hose Straight - 90°	4017568-XXXX
4	1	Hose Straight - Straight	4014974-XXXX
5	1	Control Panel	CP-N2 LG EZ
6	1	Multi-Coupling Block	CS-MCB-4

To charge, bleed and check the gas pressure for a standard lock CS2 Gas Spring system, all springs should be connected to a standard control panel (shown above connected via a coupling block).

We recommend the EZ-Hose system and fittings be used for such systems. The CS2 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 CS2 Gas Spring must be removed.

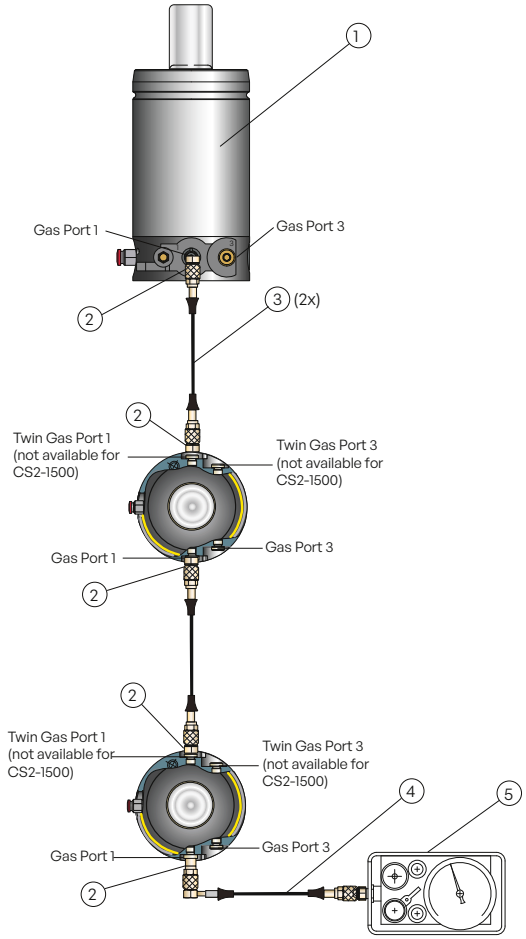
Each G 1/8 gas port, for both the CS2 Gas Spring and coupling block, requires an adapter (4114973-G1/8) for connection to an EZ-Hose.

The control panel should be placed higher than the CS2 springs to avoid loss of internal oil when bleeding.

Hose System - Standard Lock CS2

Method Using Twin Ports

(Not for use with CS2-1500 because it does not have the additional ports.)

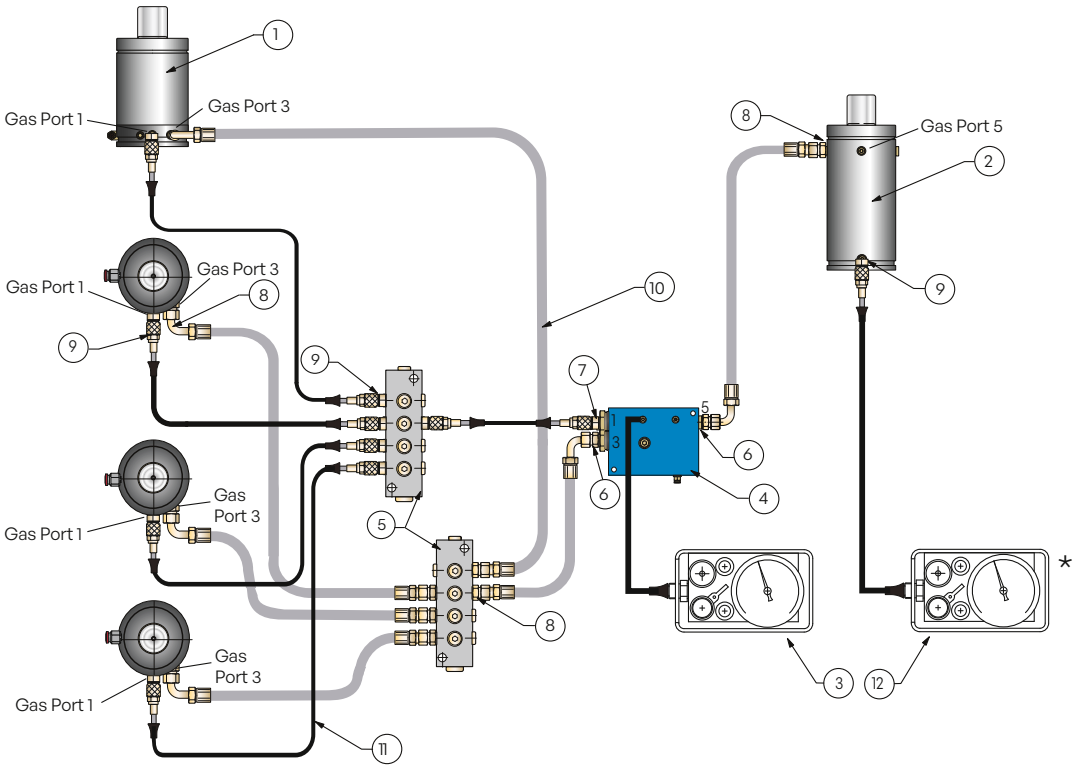


Position	Quantity	Description	Order No.
1	3	Controllable Gas Spring	CS2-XXXX-XXX
2	5	EZ Adapter G1/8	4114973-G1/8
3	2	EZ Hose Straight - Straight	4014974-XXXX
4	1	EZ Hose Straight - 90°	4017568-XXXX
5	1	Control Panel	CP-N2 LG EZ

To charge, bleed and check the gas pressure for a standard lock CS2 Gas Spring system, all springs should be connected to a standard control panel. We recommend the EZ-Hose system and fittings be used. The CS2 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 CS2 Gas Spring **must** first be removed. Each G 1/8 gas port, for both the CS2 Gas Spring and coupling block, requires an adapter (4114973-G1/8) for connection to EZ-Hose. The control panel should be placed higher than the CS2 springs to avoid loss of internal oil when bleeding.

Hose System - Positive Lock System CS2 + PS

Example 1



To connect CS2 Controllable Gas Spring (s) to a PS Passive Gas Spring via the valve block, you need two hose connections:

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

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

Position	Quantity	Description	Order No.
1	4	Controllable Gas Spring	CS2-XXXX-XXX
2	1	PS Passive Spring	PS-XXXX
3	1	Control Panel	CP-N2 LG EO M10
4	1	Standard Valve Block	CSPSCP-SVB
5	2	Multi-Coupling Block G1/8	CS-MCB-14
6	2	EO24 Adapter G1/4	504144
7	1	EZ Adapter G1/4	4014973-G1/4
8	10	EO24 Adapter G1/8	503593
9	10	EZ Adapter G1/8	4114973-G1/8
10	6	EO24 Hose Straight - 90°	3220857-XXXX
11	7	EZ Hose Straight - Straight	4014974-XXXX
12	1	Control Panel	CP-N2 LG EZ

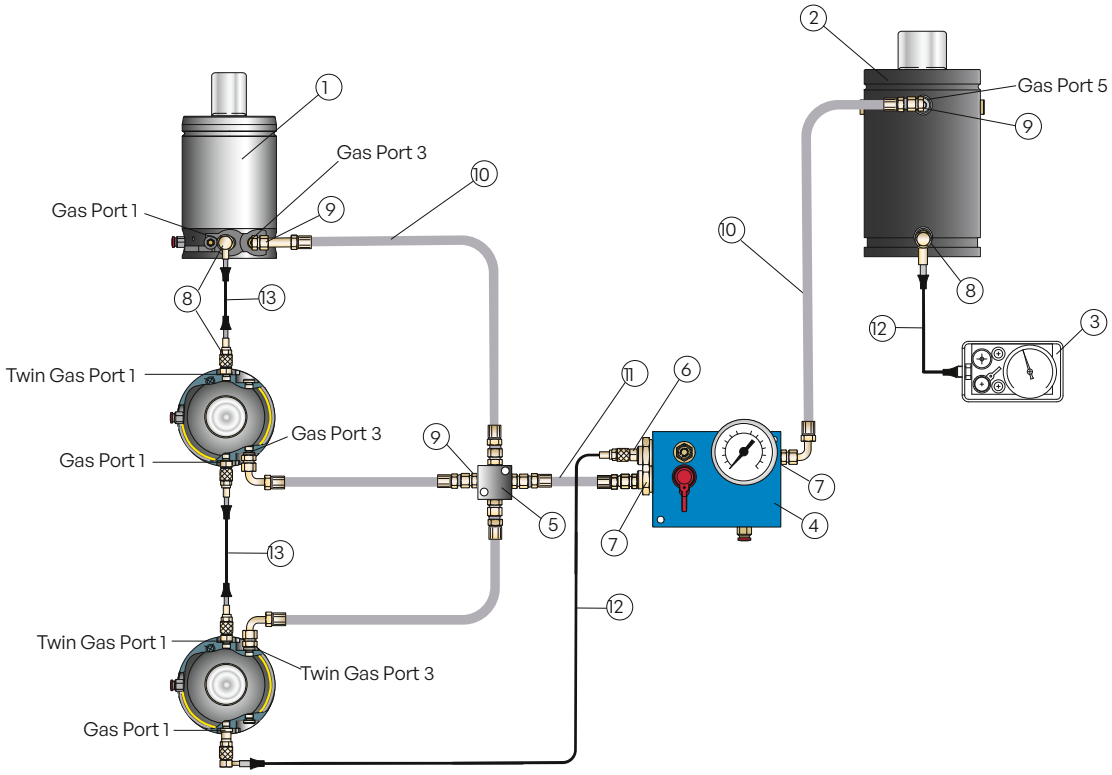
Positive Lock CS2 + PS

Gas charging and bleeding is carried out as follows:

1. Charge the lower gas chamber in the PS Passive Gas Spring through the control panel (3)*.
2. Charge the CS2 standard spring(s) and upper chamber of the PS Gas Spring via the control panel (3) connected to the standard valve block (4).

Hose System - Positive Lock System CS2 + PS

Example 2



To connect CS2 Controllable Gas Spring (s) to a PS Passive Gas Spring via the valve block, you need two hose connections:

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

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

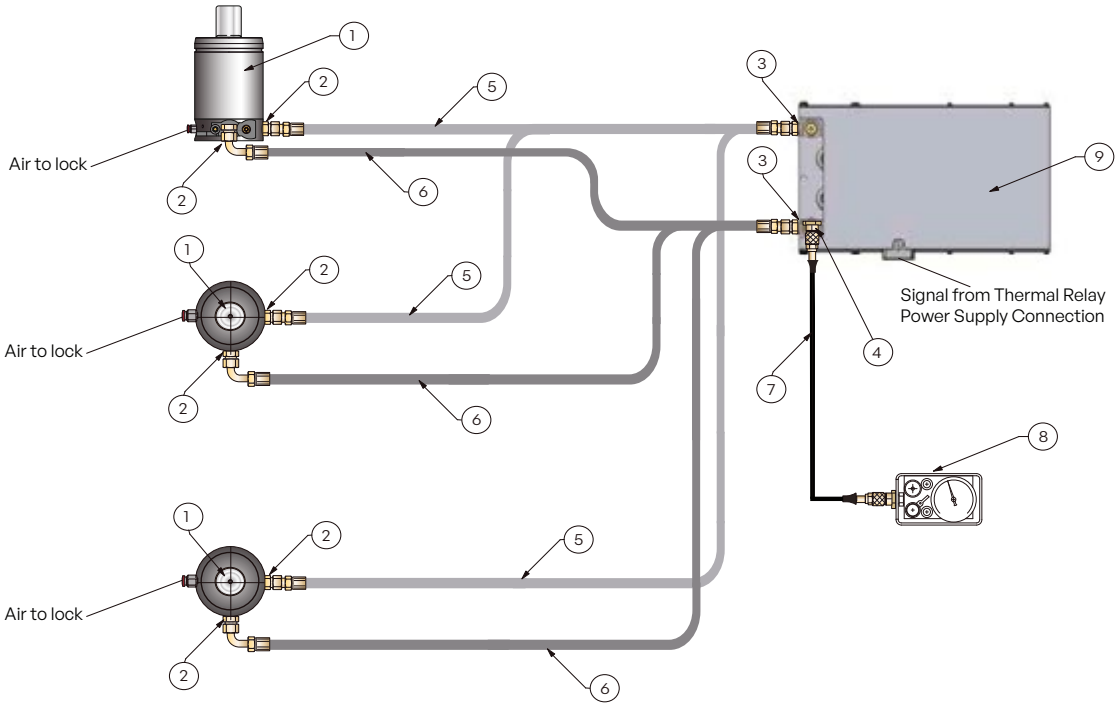
Position	Quantity	Description	Order No.
1	3	Controllable Gas Spring	CS2-XXXX-XXX
2	1	PS Passive Spring	PS-XXXX
3	1	Control Panel	CP-N2 LG EZ
4	1	All-in-One Valve Block	CSPSCP-All
5	1	Coupling Block G1/8	CS-MCB-4
6	1	EZ Adapter G1/4	4014973-G1/4
7	2	EO24 Adapter G1/4	504144
8	6	EZ Adapter G1/8	4114973-G1/8
9	8	EO24 Adapter G1/8	503593
10	3	EO24 Hose Straight - 90o	3220857-XXXX
11	1	EO24 Hose Straight - Straight	3020857-XXXX
12	2	EZ Hose Straight - 90o	4017568-XXXX
13	2	EZ Hose Straight - Straight	4014974-XXXX

Positive Lock CS2 + PS

Gas charging and bleeding is carried out as follows:

1. Charge the lower gas chamber in the PS Passive Gas Spring through the control panel (3)*.
2. Charge the CS2 standard spring(s) and upper chamber of the PS Gas Spring via the all-in-one valve block (4).

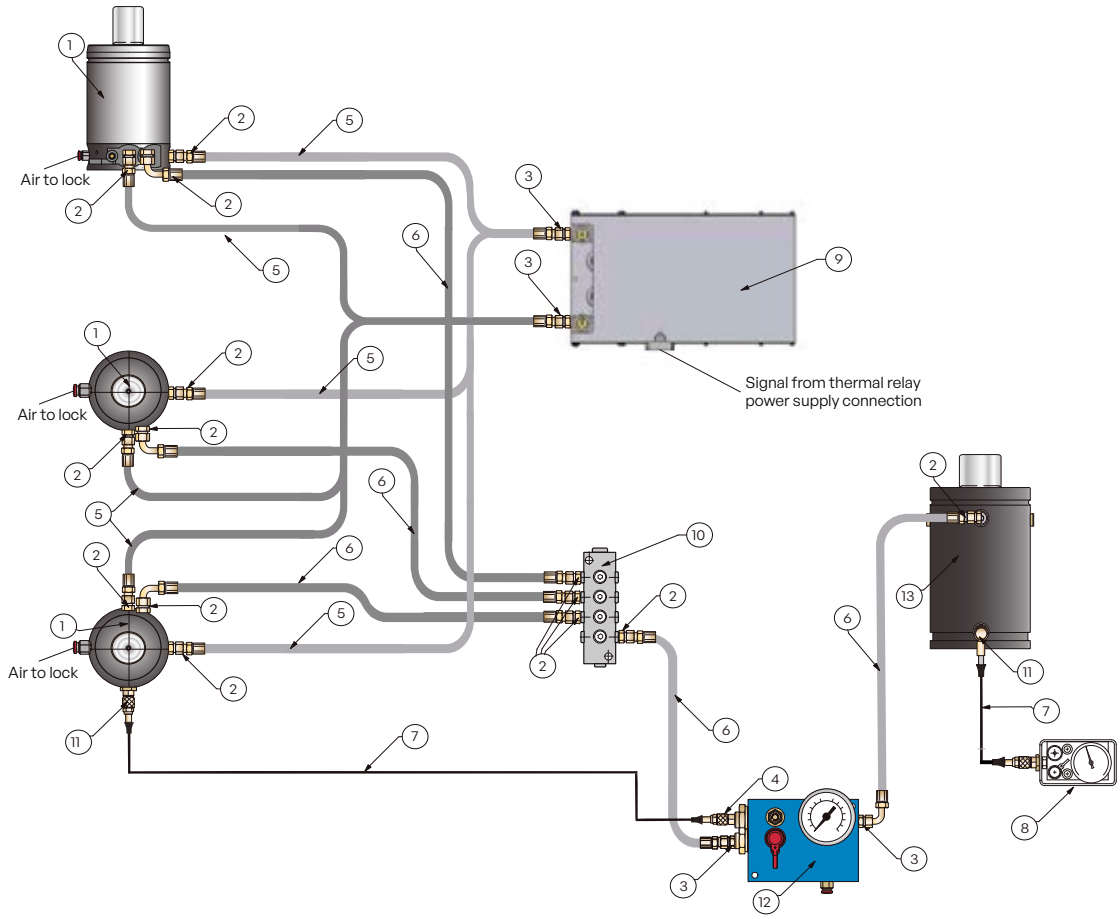
Connecting a CS2-NC Standard Lock Gas Spring with a Nitro Cooler™



Position	Quantity	Description	Order No.
1	3	Controllable Gas Spring	CS2 XXXX-XXXX-NC
2	6	EO24 Adapter G1/8	503593
3	6	EO24 Adapter G1/4	504144
4	1	EZ Adapter G1/4	4014973-G1/4
5	3	EO24 Hose Straight - Straight	3020857-XXXX
6	3	EO24 Hose Straight - 90o	3220857-XXXX
7	1	EZ Hose Straight - Straight	4014974-XXXX
8	1	Control Panel	CP-N2 LG EZ
9	1	Nitro Cooler Block	2021641

Use EO24 hoses when using a Nitro Cooler and place the Nitro Cooler as close as possible to the Gas Springs to minimize the length of the hoses. The Nitro Cooler includes heat protection so thermal relays at the Gas Springs are not necessary. If desired, a control panel for charging and bleeding can be connected to either port 2 on the Gas Springs or to the Nitro Cooler.

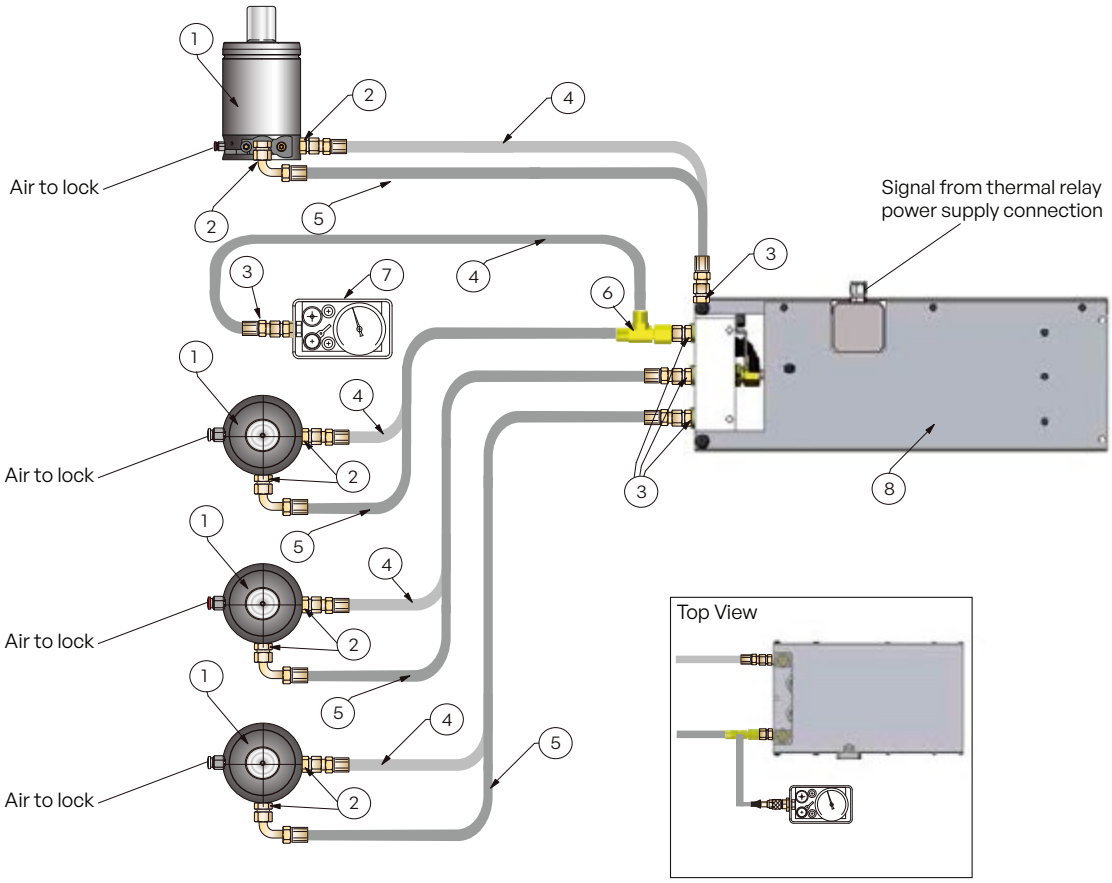
Connecting a CS2-NC Positive Lock System with a Nitro Cooler™



Position	Quantity	Description	Order No.
1	3	Controllable Gas Spring	CS2 XXXX-XXXX NC
2	14	EO24 Adapter G1/8	503593
3	8	EO24	504144
4	1	EZ Adapter G1/4	4014973-G1/4
5	6	EO24 Hose Straight - Straight	3020857-XXXX
6	5	EO24 Hose Straight - 90o	3220857-XXXX
7	2	EZ Hose Straight - Straight	4014974-XXXX
8	1	Control Panel	CP-N2 LG EZ
9	1	Nitro Cooler Block	2021641
10	1	Multi Coupling Block G1/8	CS-MCB-14
11	2	EZ Adapter G1/8	4114973-G1/8
12	1	Standard Valve Block	CSPSCP-SVB
13	1	PS Passive Cylinder	PS-XXXX

The positive lock system has the same requirements as the standard lock. Use EO24 hoses when using a Nitro Cooler and place the Nitro Cooler as close as possible to the Gas Springs to minimize the length of the hoses. The Nitro Cooler includes heat protection so thermal relays at the Gas Springs are not necessary. If desired, a control panel for charging and bleeding can be connected to either port 2 on the Gas Springs or to the Nitro Cooler.

Connecting four CS2-1500-NC Standard Lock Gas Springs with a Nitro Cooler™



Position	Quantity	Description	Order No.
1	4	Controllable Gas spring	CS2 XXXX-XXXX NC
2	8	EO24 Adapter G1/8	503593
3	9	EO24 Adapter G1/4	504144
4	5	EO24 Hose Straight - Straight	3020857-XXXX
5	4	EO24 Hose Straight - 90o	3220857-XXXX
6	1	L-Coupling	504147
7	1	Control Panel	CP-N2 LG EZ
8	1	Nitro Cooler Block	2021641

Frequently Asked Questions (FAQs)

General

What air pressure is required to operate the cartridge valves?

Four 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?

Ten bar maximum air pressure is allowed to operate the cartridge valves.

What service life can I expect from a CS2 Controllable Gas Spring?

As long as you use the thermal relay the following service life can be expected:
For stroke lengths up to 50 mm: half-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 brochure are used. Please contact Hyson Inside Sales at orders@HysonSolutions.com for more information.

Can I mix different size CS2 springs in the same system?

No. Please contact Hyson Inside Sales at orders@HysonSolutions.com for more information..

Standard Lock CS2

Is it possible to adjust the stroke length of the CS2 spring, or must I always use 100% of the nominal stroke (within 0.5 mm)?

There are two versions of the CS2 Controllable Gas Spring, the standard model CS2 and an adjustable model CS2A.

How fast can the CS2 spring be stroked?

0.8 m/sec is the max. allowed compression velocity. The maximum stroke frequency (spm) at which a CS2 spring can run depends on the stroke length of the spring and level of cooling.

What can I do to eliminate CS2 springback?

If you are using 100% stroke length (within 0.5 mm) of the CS2 spring, a max. 1 mm of springback can be expected. It is possible to eliminate this by converting the standard lock into a positive lock system. Please contact Hyson Inside Sales at orders@HysonSolutions.com for more information.

Can I lock a CS2 Controllable Gas Spring at any position?

Basically yes, but the less you stroke the CS2 Controllable Gas Spring, the greater the springback will be. Please contact Hyson Inside Sales at orders@HysonSolutions.com for more information.

Positive Lock System CS2+PS

How many CS2 Controllable Gas Spring s can be connected to a single PS Passive Gas Spring?

Up to four CS2 springs can be connected to a single PS spring.

How many valve blocks do I need in the system?

One valve block is required for each PS Passive Gas Spring in the system.

Can I use the PS spring in the tool for forming?

No. The PS spring is not to be used for any operation in the tool, other than to eliminate CS2 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 CS2 spring(s), valve block and PS Passive Gas Spring.

Can I use just the EO24 Hose System to connect up my positive lock system?

Yes.

Cooling

Is cooling always required?

Not always. Generally speaking, longer stroke lengths and faster press stroke frequencies normally require cooling.

How many CS2 Controllable Gas Springs can be connected to a single cooler unit?

The maximum heat effect for all springs together has to be lower than the cooling effect of the cooler.

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 Hyson cannot be held responsible for poor performance.

The Nitro Cooler

How many CS2 springs can be connected to one Nitro Cooler?

Up to four CS2 springs can be connected to one Nitro Cooler, depending on how much heat is generated in the application.

Can we eliminate the decrease in return speed caused by the Nitro Cooler?

No. When using the Nitro Cooler, gas passes between the cooler and Gas Springs with every stroke so the return speed is affected. With a distance of 1m between the cooler and Gas Spring, the return stroke speed is: 0.12m/sec (CS2/CS2A 1500 & 3000) and 0.06m/sec (CS2/CS2A 5000 & 7500).

How many Nitro Cooler units can we use in one die?

There is no limit as long as there is a ventilated area for each cooler in the die.

Troubleshooting

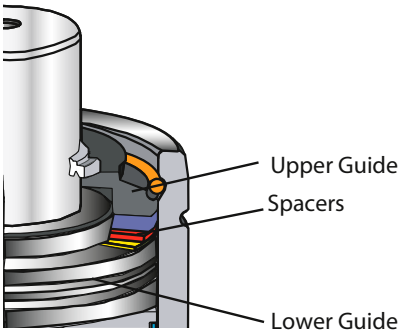
System	Problem	Solution
Standard Lock CS2	CS2 spring does not lock.	Make sure CS2 spring's air port 4 has min. 4 bar air pressure before press BDC.
		Check that all hose connections are correct.
	CS2 piston rod's springback is greater than 1 mm.	Make sure 100% of the CS2 spring's nominal stroke length (within 0.5 mm) is used.
		Make sure CS2 spring's air port 4 has min. 4 bar air pressure before press BDC.
	CS2 piston rod does not return.	Make sure CS2 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 CS2 spring.

System	Problem	Solution
Positive Lock System CS2 + PS	CS2 spring does not lock.	Make sure CS2 spring's air port 4 has min. 4 bar air pressure before press BDC.
		Check that all hose connections are correct.
	CS2 piston rod's springback is greater than 0 mm.	Make sure the cartridge valve in the valve block is closed during the press's downstroke and that the PS Passive Gas Spring is being stroked enough for this application.
		Make sure 100% of the CS2 spring's nominal stroke length (within 0.5 mm) is used.
		Check that the cartridge valve in the valve block is opened at BDC.
	CS2 piston rod does not return.	Make sure CS2 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 CS2 spring.

Appendix

Stroke Length Adjustment of CS2A

The guide in the CS2A is made up of the following main components:



1 mm of thickness
2 mm of thickness
4 mm of thickness
8 mm of thickness (not shown)

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 (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.

Caution:

- Only fully trained personnel with experience servicing Gas Springs should make adjustments to the stroke length.
- Make sure the work surface where you will be working on the CS2A spring(s) is clean and free from contaminants.
- Make sure there is no gas pressure in the CS2A spring before proceeding.

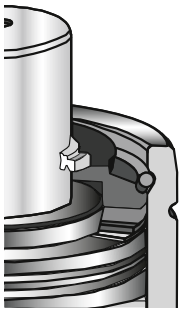
To adjust from nominal stroke length

		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

Stroke Length Adjustment of CS2A

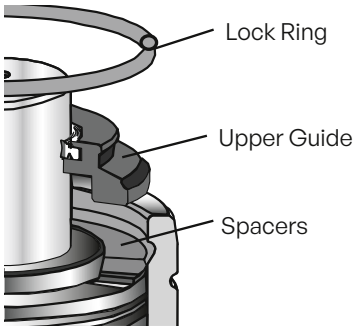
Adjustment Procedure

1. Make sure the Gas Spring is emptied of gas and remove the dust cover if applicable.



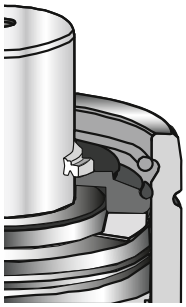
2. Knock down the guide and remove the lock ring by using a mounting sleeve and a plastic hammer.

3. Remove the upper guide and install the combination of spacers that will give you the required stroke length.



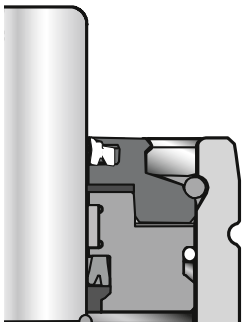
4. Install the upper guide and use the mounting sleeve and plastic hammer again to knock down the guide to expose the lock ring groove.

5. Install the lock ring and pull up the piston rod assembly using a T-handle.



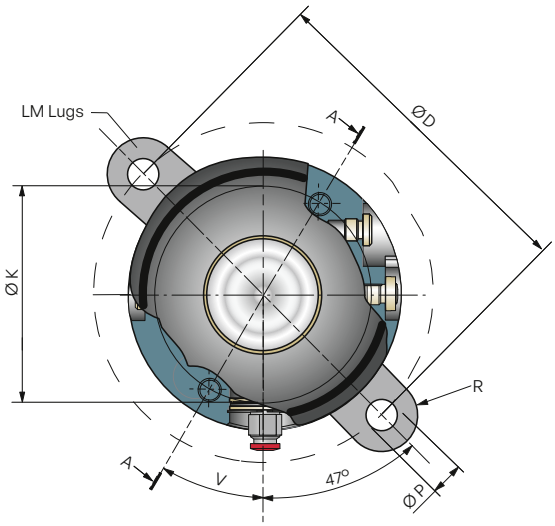
6. Make sure that the guide is flush with the top of the tube. (If not, check the installation of the lock ring.)

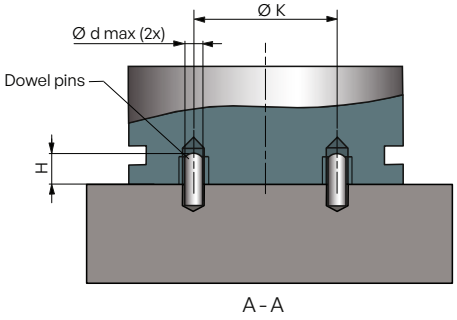
7. Fill the spring with nitrogen gas and replace the dust cover if applicable.

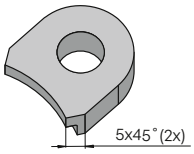


CS2/CS2A Alternative Mounting

For upside down installations, use the threaded holes in the base of the CS2/CS2A for mounting the Gas Spring to the tool. For upright installations, an alternative mounting method is to use two LM lug mounts in combination with dowel pins as shown. The dowel pins engage the threaded holes in the base and prevent the spring from moving out of position even if the lugs come loose. The dowel pins also ensure that the spring is installed in the correct position.







Modification of LM-3000 Lug

Model	ØD	Ød max.	H	ØK	V	ØP	R	Order No.
CS2/CS2A -1500	130	8	10	50	60	17.5	20	2 pcs LM-3000*
CS2/CS2A -3000	155	8	10	95	30	17.5	25	2 pcs LM-5000
CS2/CS2A -5000	195	12	10	110	30	21.5	25	2 pcs LM-7500
CS2/CS2A-7500	240	12	10	120	30	21.5	29	2 pcs LM-10000

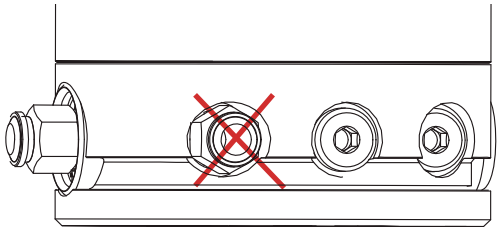
Note:
LM-3000 lugs require a slight modification as shown before they are fitted to the CS2/CS2A 1500 Gas Spring.

Note:
It is also possible to mount the CS2/CS2-A Controllable Gas Springs using an FCSC Flange Mount if cooling is required. For more information contact Hyson Inside Sales at orders@HysonSolutions.com for more information.

How does the New CS2 Differ from the Original CS?

CS2 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



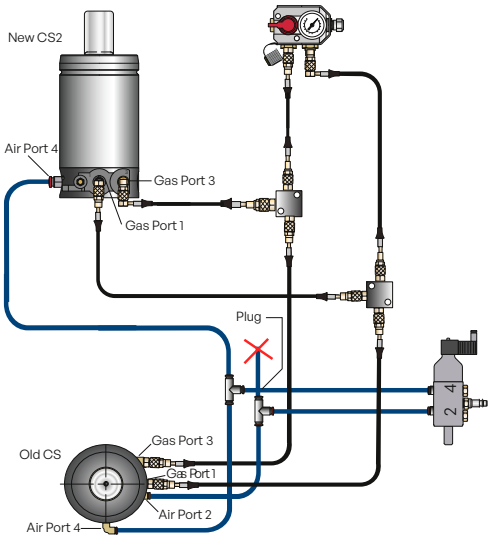
How to Fit the New CS2 to Existing CS Systems

- CS2 Controllable Gas Spring s are completely interchangeable with existing CS springs.

Standard Lock Example: Replacing an Existing CS with a New CS2

To replace an existing CS spring with a new CS2 spring in a standard lock system, simply plug the air signal that went to the CS spring's air connection port 2.

Air line plug
Order No. CSNF-77



Positive Lock System Example: Replacing an Existing CS with a New CS2

To replace an existing CS spring with a new CS2 spring in a positive lock system, simply plug the air signal that went to the CS spring's air connection port 2.