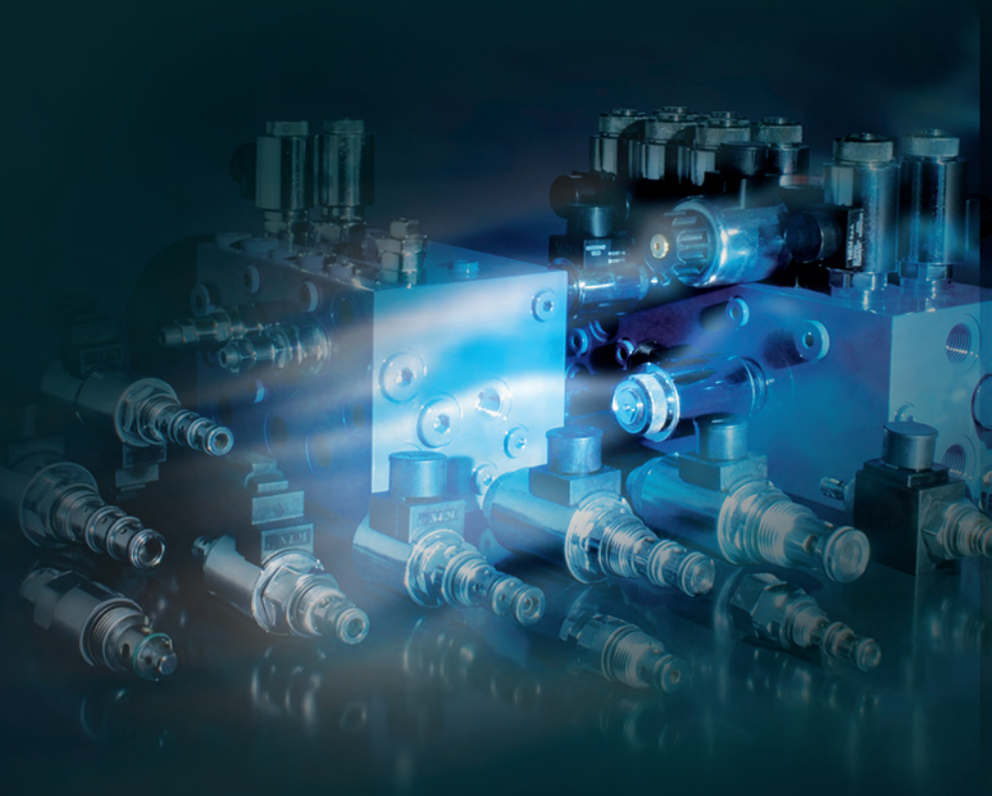
General Catalogue Valves



NEM-HYDRAULICS.COM



Imer Iori, *General Manager*
Danilo Manfredi, *President*

Graziano Levoni, *R&D Manager*
with technical staff

Innovation and competence in systems' development

NEM S.p.A., founded in 1993, is a specialist in developing hydraulic solutions for mobile applications. Our aim is to be a reliable partner for every customer of ours, providing him with a skilled staff, its know-how and its attitude towards the development of custom projects.
NEM S.p.A. is aware that the future of hydraulics is represented by the systems, hence the decision of delivering high quality products whose outstanding performances will not change despite different applications. Our components will guarantee maximum standards of safety, and handiness in every condition. These factors together with our patented electro - proportional directional control valve made so that soon many OEM, among the most important, would appreciate our products at first, to then prove us their trust.
Our total commitment and our flexibility brought us in 2004 to become partner of Hydrocontrol S.p.A., leader in designing and production of directional control valves. The support given by Hydrocontrol brought rapidly NEM to a solid international success.

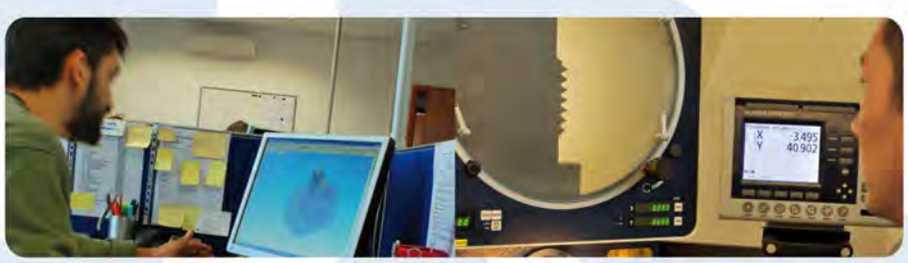


Reliability specialists

NEM strongly believes that the synergy between its departments is the winning strategy that will always allow its customers to get the best possible service. This is the reason why every day we share our knowledge and discuss together our solutions bringing into play our expertise and the most advanced technologies.
In order to provide its customers with the best possible service NEM decided to hire some amongst the best professionals of the field and to make use of the most advanced and reliable equipments in order to verify the perfect functionality of each produced components.
NEM vision has always been quality oriented, a way of working that, starting from the staff through all the production processes, results into a long-lasting efficiency of all NEM signed products.

NEM in the world

Europe	• Italy	• Sweden	• France	• Finland	• Germany
Asia	• China	• India			
North America	• USA				



Team work at your service

NEM human capital is its most important resource and main reason for the success. Our company believes in people, in their intuitions and in their personal expertise. Our know-how and deep knowledge of the possible product's application allow us to customize every solution.
In fact it represents a plus for our customers that can count on a complete compatibility with their systems, this certainty will reveal a better functioning of their equipments and therefore a higher degree of safety for the operators.

Our solutions...

NEM can offer a broad range of products, from pressure control valves to flow control valves to coils and electro – hydraulic actuators.



Cartridges
Main relief valves . Overcenter valves
Directional control valves
Flow control valves . Logic elements



Parts in body valves
Main relief valves . Overcenter valves
Valves for excavators . Flow control valves
Direct acted and Pilot operated Check valves



Electric cartridges
Main relief valves . Directional control valves
Flow control valves . Standard bodies



Applications
Weight lifting . Earth moving
Agricultural and industrial vehicle

...feel safe

Our components find application in many fields, from the agricultural to the industrial vehicle to earth moving and weigh lifting equipments. They are preferred by those OEM that want to distinguish their products with the most advanced equipments.
The synergy with Hydrocontrol enhanced our sale's net and the technical assistance, on both national and international levels.
Such capillary network allows us on time deliveries and rapid reaction to customer demands, anytime, anywhere.



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09300	12.01.002	631131	11.01.005	H1506N	8.01.019
09300	12.01.002	631131X8	11.01.008	H1530C	8.01.057
09300	12.01.002	63114	11.01.003	H1530N	8.01.021
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09400	12.01.003	D01107	9.01.001	H2502N	8.01.062
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09801	12.01.005	D10500	11.01.012	H3005N	8.01.009
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171202	13.01.001	H1005N	8.01.012	H3008N	8.01.016
171212	13.01.002	H1006C	8.01.055	H3060N	8.01.024
171222	13.01.003	H1006N	8.01.018	H3061N	8.01.028
171302	13.01.004	H1030N G1/2	8.01.020/A	H3062N	8.01.032
171312	13.01.005	H1030N G3/4	8.01.020/B	H3080N	8.01.060
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631121	11.01.004	H1505C	8.01.051	H5005N	8.01.011

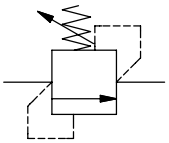
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H5060N	8.01.025
H5060N47	8.01.027
H5061N40	8.01.029
H5061N47	8.01.031
H5062N	8.01.033
H5304S	8.01.035
H5305S	8.01.036
H5306S	8.01.037
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Y1001N	10.01.007
Y1001Y	10.01.004
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HYDRAULIC CARTRIDGES

PRESSURE CONTROL VALVES

INTRODUCTION



PRESSURE RELIEF VALVES

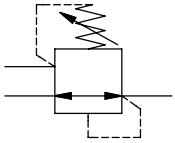
Pressure relief valves are normally closed hydraulic valves. They will open when a certain pressure is reached in order to dump the necessary flow to keep the hydraulics' ducts pressurized.
Their primary function is to protect circuits and/or components (pumps, motors, actuators and pipes) from overloads and pressure peaks.
Pressure relief valves can be classified into two categories: direct acting and pilot operated valves.

Direct Acting Pressure Relief Valves are characterized by the presence of conical or differential poppets on which acts directly the pressure to be regulated.
These valves are simple, reliable and tough (the spring acts directly on the poppet). Their external dimensions result bigger than the pilot operated ones for flows over 50 lt/min.
Direct Acting Pressure Relief Valves find their application in circuits having less than 50 lt/min flows. They are particularly indicated for all those applications in which a good hydraulic sealing level is demanded (eg: hydraulic motors or actuators).

2

Pilot Operated Pressure Relief Valves are characterized by the presence of a logic element controller by a pilot stage.
These are valves able to control big flows combining reduced dimensions. A certain leakage, due to the coupling of the logic element, must be taken into account.
Pilot Operated Pressure Relief Valves are generally installed on pumps or hydraulic lines to control the maximum pressure.

Pressure Relief Valves must be considered also under the point of view of their reaction to the back-pressure.
Generally these valves equilibrate the differential ratio on the basis of their setting (pin-pout).
When a pressure relief valve is mounted before a pressurized line we must consider the effects of the back-pressure on its setting. In these cases the installation of compensated valves is advisable.
These valves, thanks to their internal design, will not be affected by the back-pressure on the return line, guaranteeing a control of the maximum feeding pressure considering only their setting (Pin).



PRESSURE REDUCING VALVES

Pressure reducing valves are 3 ways normally open hydraulic valves able to feed a secondary circuit with a lower pressure than the main one.

The reduced pressure acts on a cylindric spool kept in open position by a spring.
When the pressure of the secondary circuit overcomes the force of the spring the spool will move, assuring so that the pressure in the secondary line will not increase above its setting.

The third way, typical of pressure reducing valves, is connected to the tank in the direct acted type, and sometimes in the pilot operated ones as well.
This connection is necessary to unload the exceeding flow in case the pressure of the secondary circuit would increase above its setting.

There are two different types of design for these valves as well: direct acted and pilot operated.

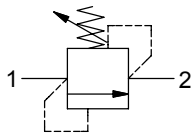
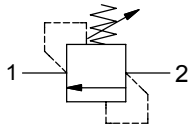
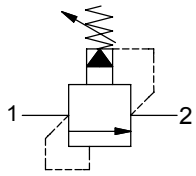
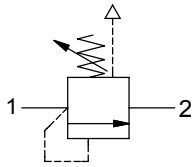
Direct acted pressure reducing valves are characterized by the presence of a cylindric spool on which the pressure to be regulated acts directly.
Thanks to their simple design they are very tough and reliable, particularly indicated for feeding the pilot circuits that do not imply a continous oil flow.
Their main application is on feeding units for earth moving servo-controls.

Pilot operated pressure reducing valves are characterized by the presence of a logic element controller by a pilot stage.
Thanks to the logic element it is possible to guarantee a reduced pressure even when big amounts of flow are present.
Depending on the type of spool it is possible to design the cartridge both in the basic way and in the way that combines the pressure reducing to the pressure relieving process.

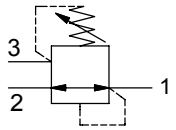
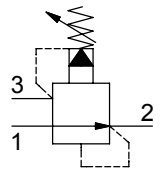
It is very important to consider that the setting pressure of the pressure reducing valves increases when some backpressure is present in the drain line.
To avoid this we advise to connect the drain line directly to the tank just in case some pressure losses due to filters and heat exchangers would be present.

PRESSURE CONTROL VALVES

PRESSURE RELIEF VALVES

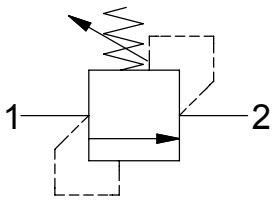
		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	M-021	1,5	450	M16x1,5	S000020	1.01.001
	CT-022	20	350	SAE-08	C220000	1.01.002
	CT-042-0	30	350	SAE-08	C220000	1.01.003
	CT-023	40	410	SAE-10	C230000	1.01.004a
	CT-023-HD	40	410	SAE-10	C230000	1.01.005
	CT-024	90	350	SAE-12	C240000	1.01.006
	CT-042-6	30	350	SAE-08	C220000	1.01.003
	CT-033	100	350	SAE-10	C230000	1.01.007
	CT-023-HD-C	40	410	SAE-10	C230000	1.01.008

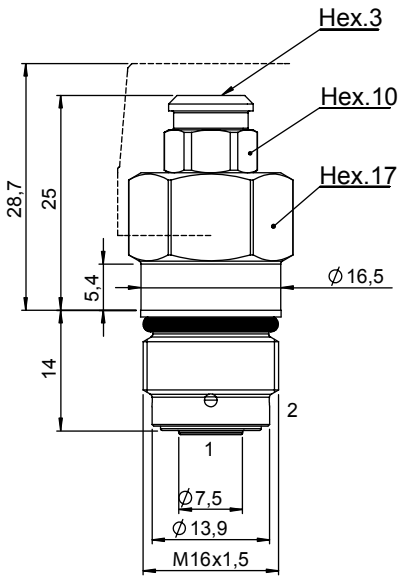
PRESSURE REDUCING VALVES

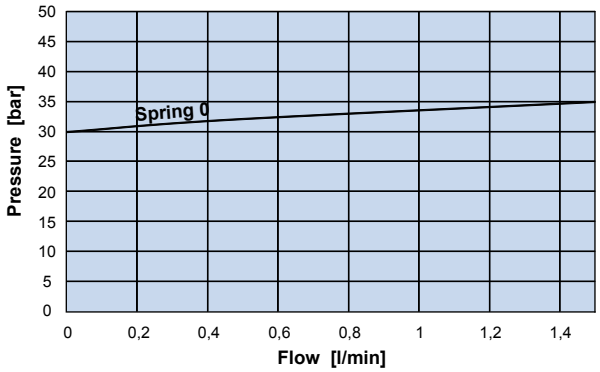
	CT-121	2	350	SAE-6	C310000	1.01.009
	CT-122	10	350	SAE-08	C320000	1.01.010
	CT-123	30	350	SAE-10	C320000	1.01.011
	CT-133	30	350	SAE-10		in development

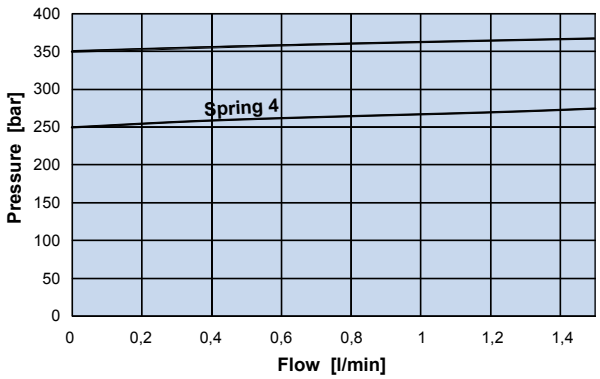
DIRECT ACTING RELIEF VALVE

- Flow . . . . . **1,5 l/min**
- Max working pressure. . . . . **450 bar**
- Seals . . . . . **NBR**
- Cavity . . . . . **S 000020**
- Cartridge thightening torque. . . . . **40 Nm**
- Weight . . . . . **0,05 Kg**
- Tamper proof cap. **cod.9021015101**









5

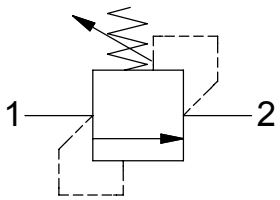
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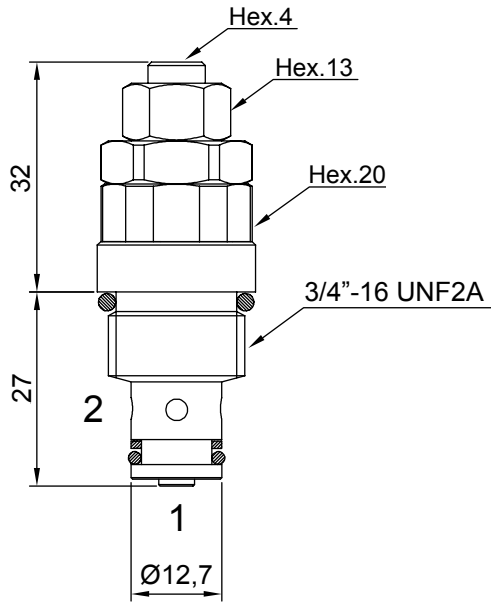
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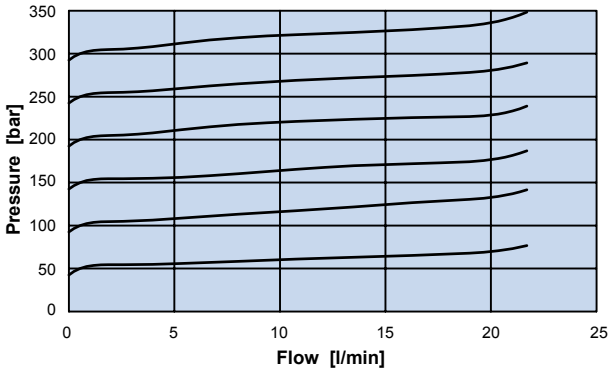
SPRINGS	0	4
Setting range min.-max. [bar]	5 - 30	250 - 450
Pressure Increase [bar/by turn]	10	250
Standard setting 20 cc/min [bar]	30	100

DIRECT ACTING RELIEF VALVE

- Flow . . . . . **20 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity . . . . . **C 220000**
- Cartridge thightening torque. . . . . **40 Nm**
- Weight . . . . . **0,085 Kg**







6

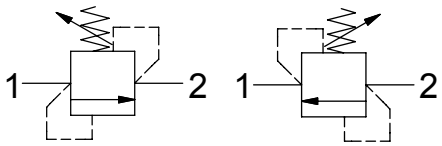
Ordering code

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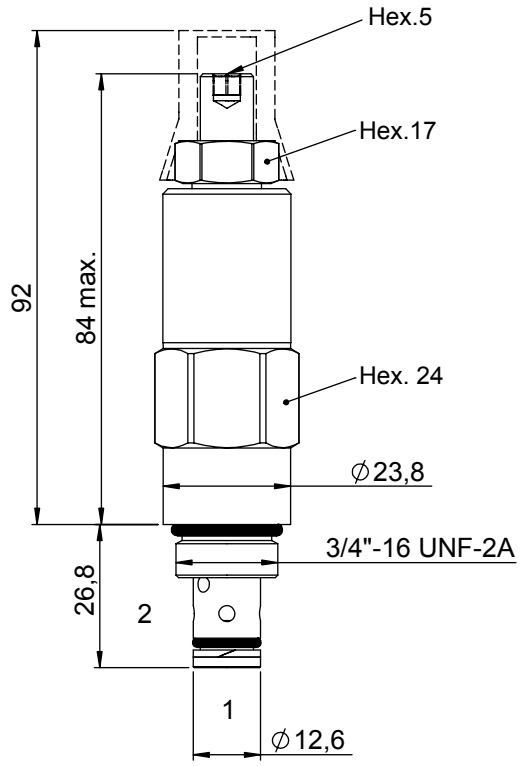
SPRINGS	1	2	3
Setting range min.-max. [bar]	20 - 100	40 - 220	50 - 350
Pressure Increase [bar/by turn]	29	84	127
Standard setting 4 l/min [bar]	50	100	100

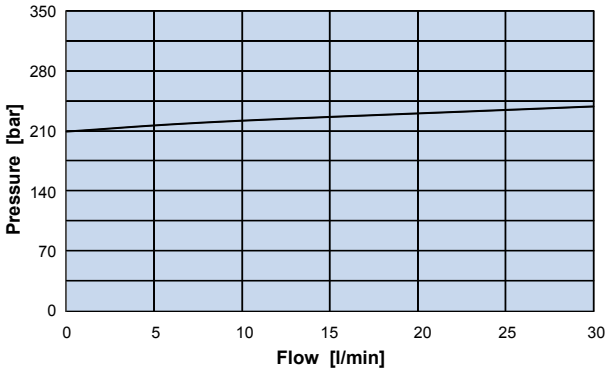
DIFFERENTIAL AREA RELIEF VALVE

- Flow. . . . . **30 l/min**
- Max working pressure. . . . . **350 bar**
- Seals. . . . . **NBR**
- Cavity . . . . . **C 220000**
- Cartridge thightening torque . . . . . **40 Nm**
- Weight . . . . . **0,25 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**



Scheme 0 **Scheme 6**





7

Ordering code

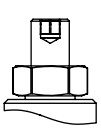
0 0 4 2 ☐ 0 ☐ ☐ 0 0

SPRINGS	**1**	**2**	**3**
Setting range min.-max. [bar]	20 - 80	30 - 150	50 - 250
Pressure Increase [bar/turn]	13	26	43
Standard setting 4 l/min [bar]	50	100	100

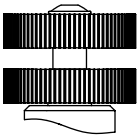
0 **6**

Hydraulic scheme

0 **2**



Hex socket screw

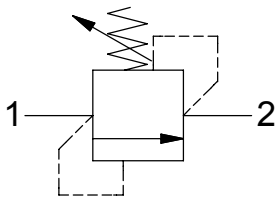


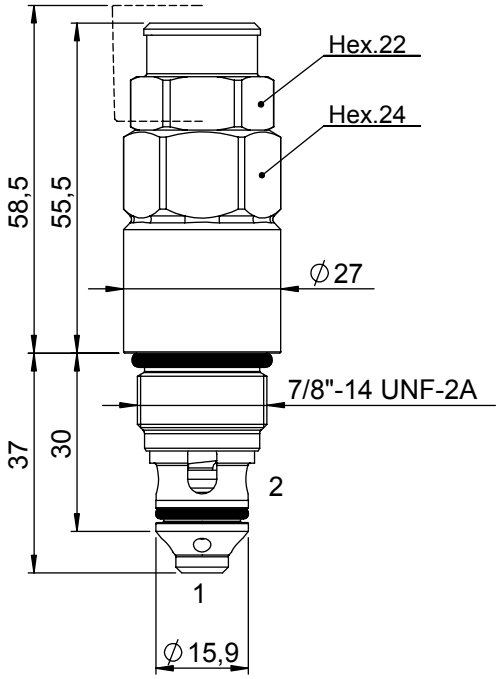
Handknob

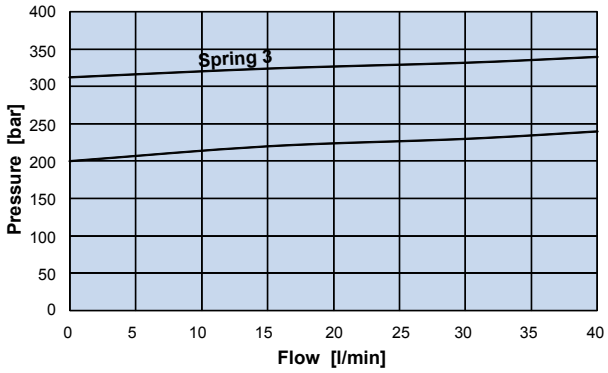
Adjustments

DIRECT ACTING RELIEF VALVE

- Flow . . . . . **40 l/min**
- Max working pressure . . . . . **410 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity **C230000**
- Cartridge thightening torque . . . . . **50 Nm**
- Weight. . . . . **0,23 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







8

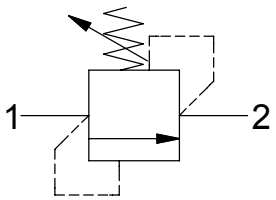
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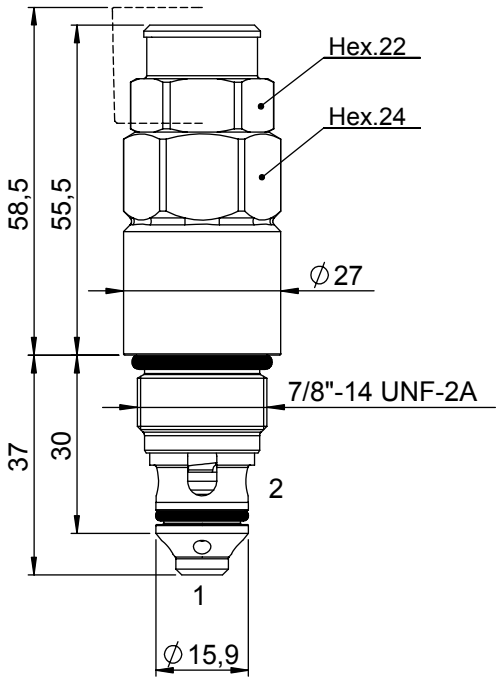
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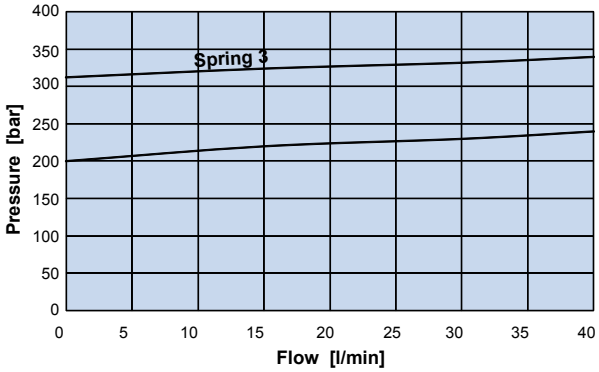
SPRINGS	1	2	3
Setting range min.-max. [bar]	40 - 140	120 - 250	220 - 410
Pressure Increase [bar/by turn]	23	31	53
Standard setting 4 l/min [bar]	50	150	250

HARDNED SEALING BODY RELIEF VALVE

- Flow . . . . . **40 l/min**
- Max working pressure. . . . . **410 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity . . . . . **C 230000**
- Cartridge thightening torque. . . . . **50 Nm**
- Weight . . . . . **0,23 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







9

Note:
Hardned body cartridge, suggested for heavy duty applications (HD) and for lifting equipment.

For lifting equipments, cleanliness class ISO 4406 17/14 (NAS 1653 class 8) or better is recommended.

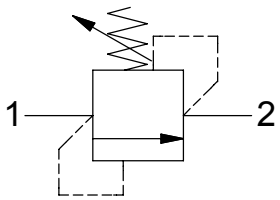
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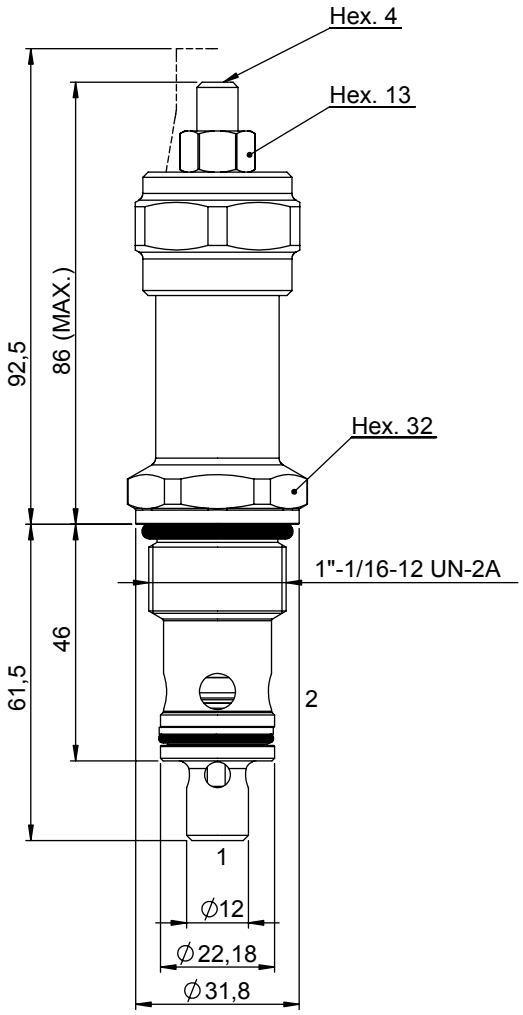
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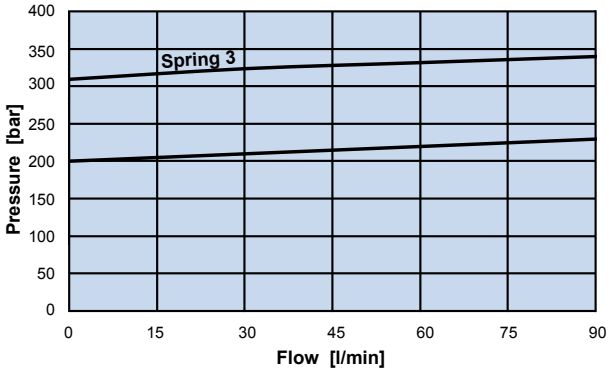
SPRINGS	1	2	3
Setting range min.-max. [bar]	40 - 140	120 - 250	220 - 410
Pressure Increase [bar/by turn]	23	31	53
Standard setting 4 l/min [bar]	50	150	250

DIRECT ACTING RELIEF VALVE

- Flow . . . . . **90 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity **C240000**
- Cartridge thightening torque . . . . . **90 Nm**
- Weight. . . . . **0,35 Kg**
- Tamper proof cap. . . . . **cod. 9021020250**







10

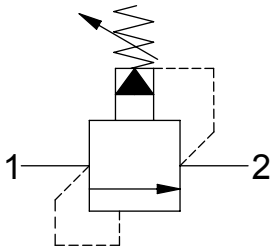
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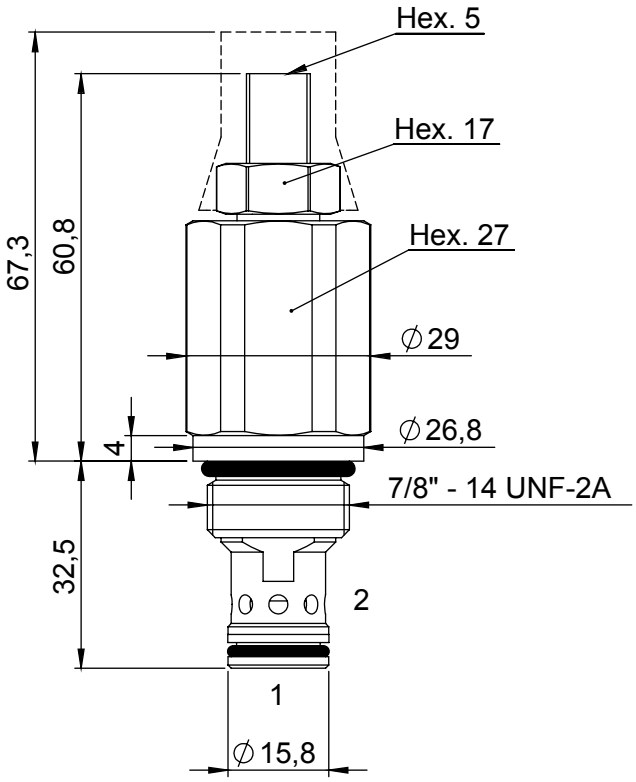
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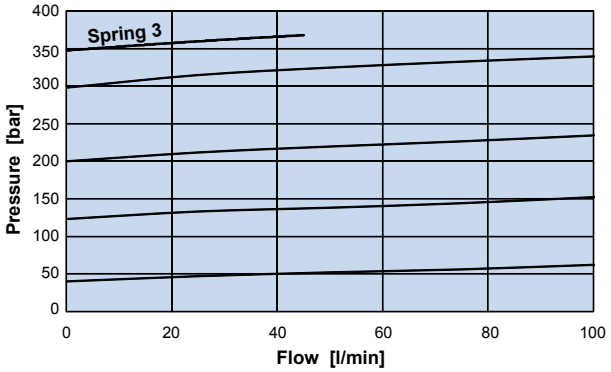
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 250	200 - 350
Pressure Increase [bar/by turn]	22	56
Standard setting 4 l/min [bar]	100	200

PILOT OPERATED RELIEF VALVE

- Flow . . . . . **100 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity . . . . . **C 230000**
- Cartridge thightening torque. . . . . **50 Nm**
- Weight . . . . . **0,25 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**







11

Ordering code

0 0 3 3 0 □ 0 □ 0 0

SPRINGS	3
Setting range min.-max. [bar]	20 - 350
Pressure Increase [bar/by turn]	136
Standard setting 4 l/min [bar]	100

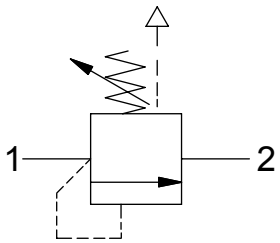
0 — **Hex socket screw**

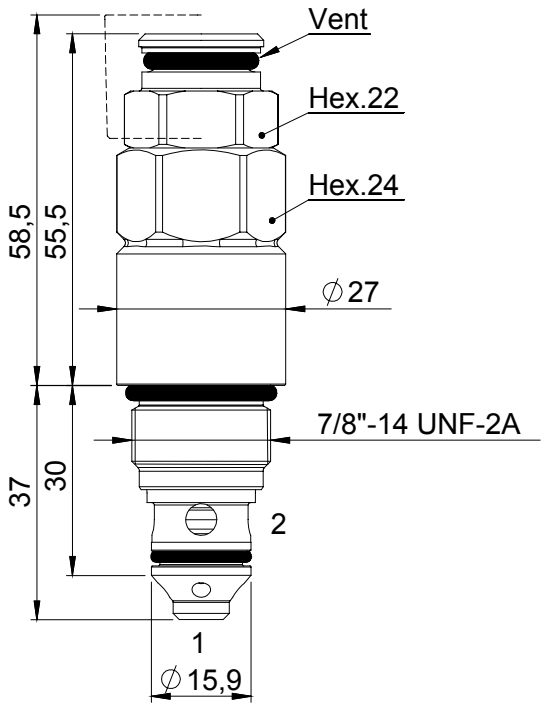
2 — **Handknob**

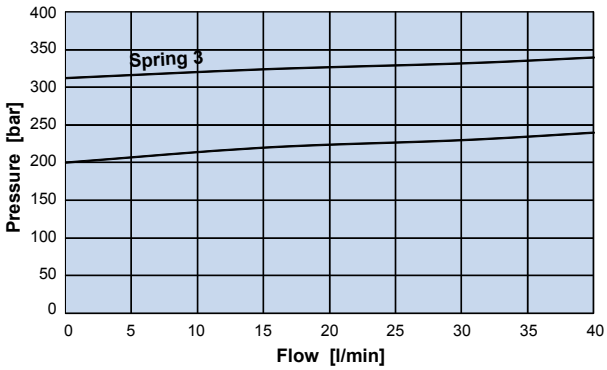
Adjustments

DIRECT ACTING COMPENSATED RELIEF VALVE

- Flow . . . . . **40 l/min**
- Max working pressure . . . . . **410 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity **C230000**
- Cartridge thightening torque . . . . . **50 Nm**
- Weight. . . . . **0,23 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
Hardned body cartridge, suggested for heavy duty applications (HD) and for lifting equipment.

For lifting equipments, cleanliness class ISO 4406 17/14 (NAS 1653 class 8) or better is recommended.

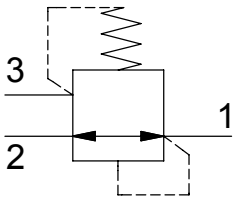
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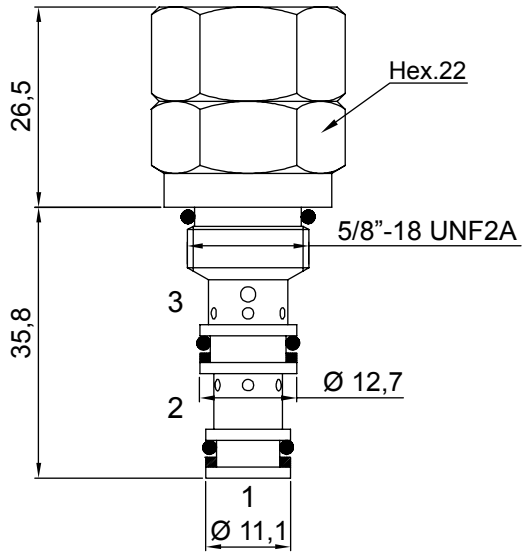
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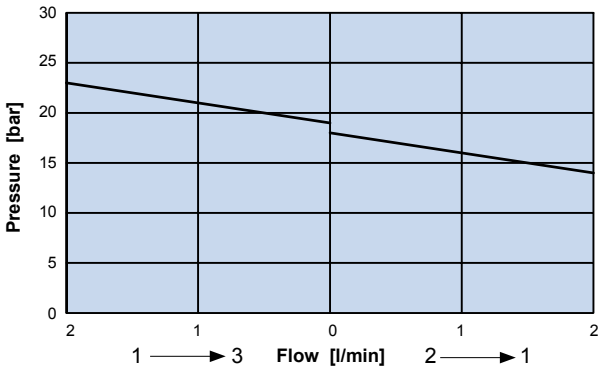
SPRINGS	2	3
Setting range min.-max. [bar]	120 - 250	220 - 410
Pressure Increase [bar/by turn]	31	53
Standard setting 4 l/min [bar]	150	250

FIX SETTING DIRECT ACTING PRESSURE REDUCING VALVE

- Flow . . . . . **2 l/min**
- Max working pressure in 2 . . . . . **350 bar**
- Max working pressure in 1 . . . . . **18 bar**
- Max working pressure in 3 . . . . . **1 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity . . . . . **C 310000**
- Cartridge thightening torque. . . . . **15 Nm**
- Weight . . . . . **0,10 Kg**







13

Note:
- Fix setting valve
- In case of different setting from standard, contact NEM customer service.

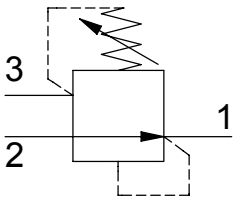
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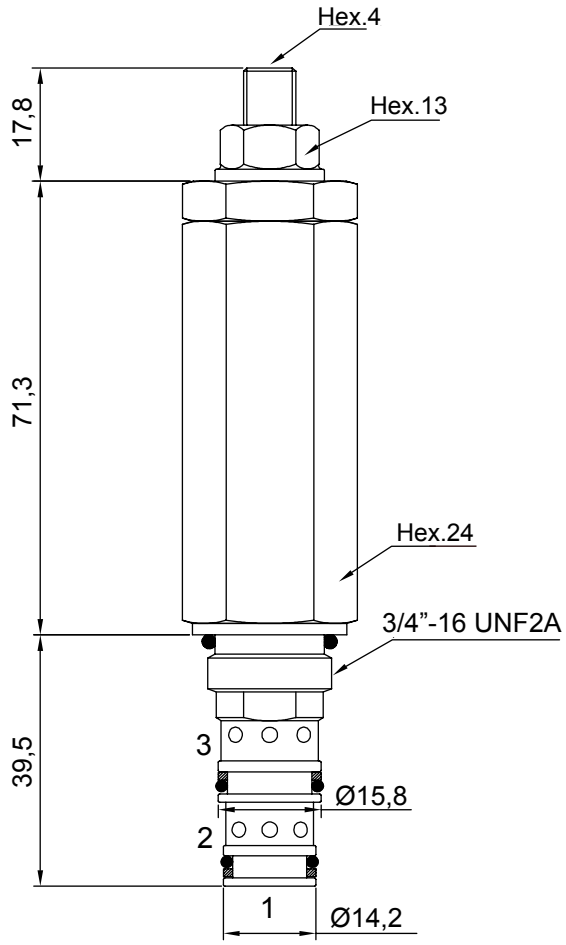
0 1 2 1 2 ☐ 0 3 0 0

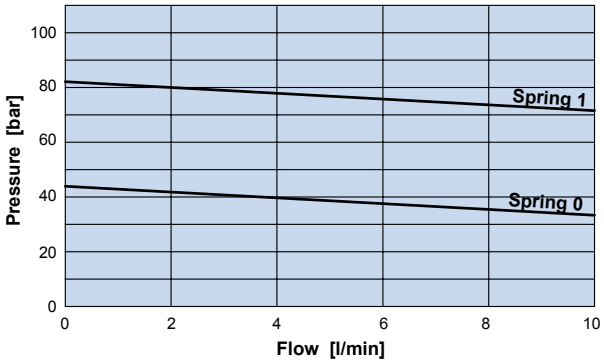
SPRINGS	0
Standard setting [bar]	18

DIRECT ACTING PRESSURE REDUCING VALVE

- Flow . . . . . **10 l/min**
- Max working pressure in 2 . . . . . **350 bar**
- Max working pressure in 1 . . . . . **100 bar**
- Max working pressure in 3 . . . . . **1 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity . . . . . **C 320000**
- Cartridge thightening torque. . . . . **40 Nm**
- Weight . . . . . **0,25 Kg**







14

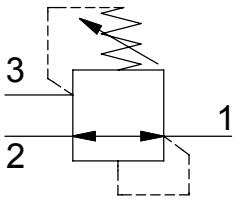
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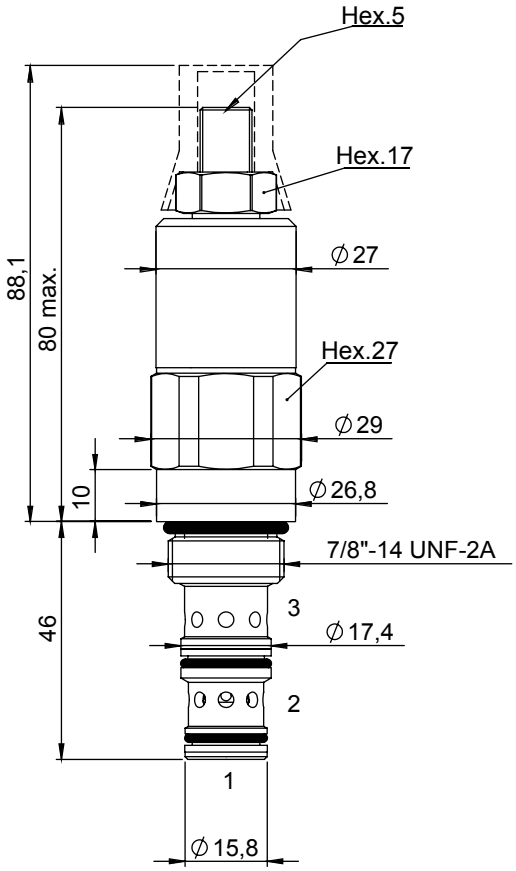
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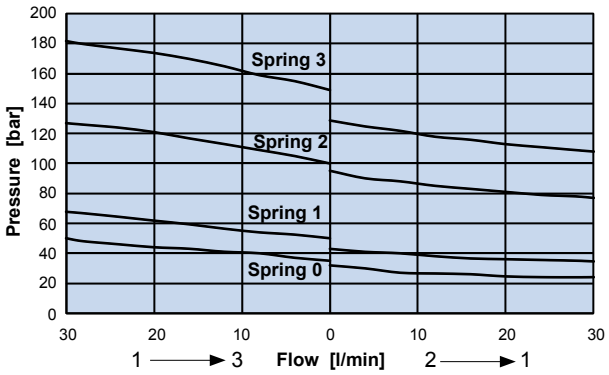
SPRINGS	1	2
Setting range [bar]	5 - 50	20 - 100
Pressure Increase [bar/turn]	7	17
Standard setting [bar]	25	50

DIRECT ACTING PRESSURE REDUCING VALVE

- Flow . . . . . **30 l/min**
- Max working pressure in 2 . . . . . **350 bar**
- Max working pressure in 1 . . . . . **150 bar**
- Max working pressure in 3 . . . . . **1 bar**
- Seals . . . . . **NBR**
- Cavity . . . . . **C 330000**
- Cartridge thightening torque. . . . . **50 Nm**
- Weight . . . . . **0,31 Kg**
- Leakage with 350 bar in 2: . . . . . **70 cc/min**
- Tamper proof cap. . . . . **cod. 4029250280**







15

Ordering code

0 1 2 3 2 ☐ 0 ☐ 0 0

SPRINGS	0	1	2	3
Setting range [bar]	5 - 30	15 - 55	20 - 103	30 - 150
Pressure Increase [bar/turn]	5	8	20	30
Standard setting [bar]	25	50	100	140

0 — Hex socket screw

2 — Handknob

Adjustments

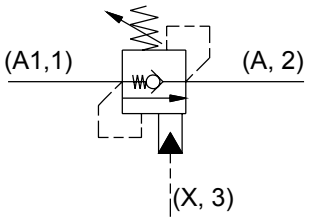
HYDRAULIC CARTRIDGES VALVES

COUNTERBALANCE VALVES

16

INTRODUCTION

Counterbalance valves are hydraulic valves designed specifically to hold and control negative or gravitational loads. They are meant to serve all those applications that involve the control of suspended loads, such as mechanical joints, lifting applications, extensible movable bridge, winches, etc…
Counterbalance valves main functionalities are lowering velocity control and stationary load holding.
Counterbalance valves hydraulic symbol is similar to an integrated micro-circuit, in which 3 characteristic components can be identified:



- A uni-directional valve, which allow a free feeding to the hydraulic actuator and lock load in the required position.
- A pressure relief valve, which, thanks to its specific configuration, holds the loads acting on hydraulic actuators (for instance, cylinders or motors) and limits max pressurization, allowing also stress control, where needed.
- A pilot piston, which opens the pressure relief valve, thanks to connection to hydraulic energy source.

17

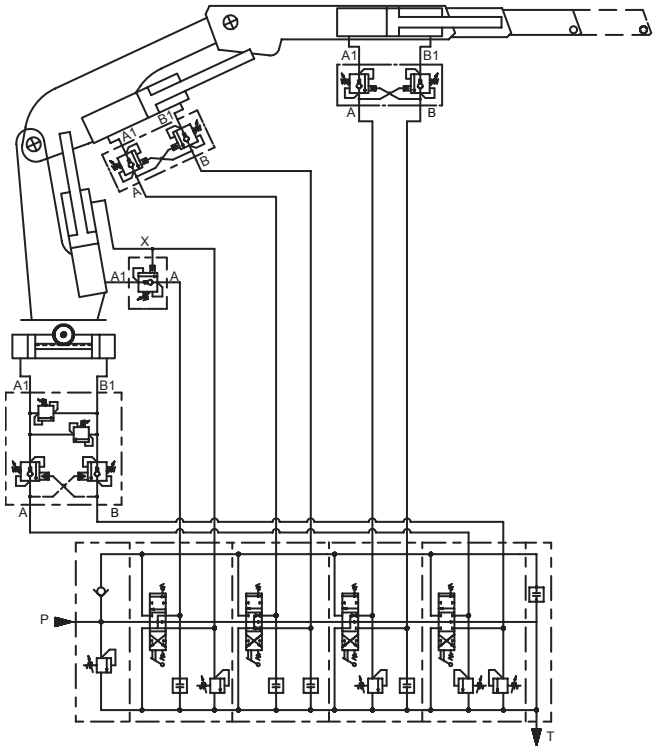


Fig.2 Example of counterbalance valve application

Generally, counterbalance valves are installed directly on cylinders or hydraulic actuators (ex. Port A1-1).

That guarantees load control and holding even in case of rupture or external leakage of the hoses connecting valve and setting device (directional control valve). Picture nr. 2 shows an example of truck crane hydraulic scheme, which is a typical application for counterbalance valves.

WORKING PRINCIPLE

Thanks to the uni-directional valves, oil flow regulated by the directional control valve comes inside the cylinder facing minimum resistance.
When directional spools are in neutral position, sealing devices are in rest position, locking connection between hydraulic actuator and directional control valve. Thanks to mechanical sealing obtained through grinded sealing point, it's possible to avoid leakage through the spools of uni-directional valve. Counterbalance valves, in fact, are able to close with very small leakage (<10 drops/min). Since there are no dents nor saturation effects (possible even in case of clean oil), a perfect sealing will take place in a few minutes.
Pump Connection to pilot line (X-3)– consequence of directional spool change-over– determines the progressive opening of the counterbalance valves, up to the balance satisfying the flows continuity equation. That guarantees the absence of cavitations and also the control of dragged loads lowering velocity.

SETTING

Counterbalance valves setting corresponds to the opening pressure of pressure relief section. This pressure determines the max load which counterbalance valve is able to hold.
Usually the setting pressure value must be at least 1.3 times the max load induced pressure to hold. That tolerance allows induced loads safe holding.

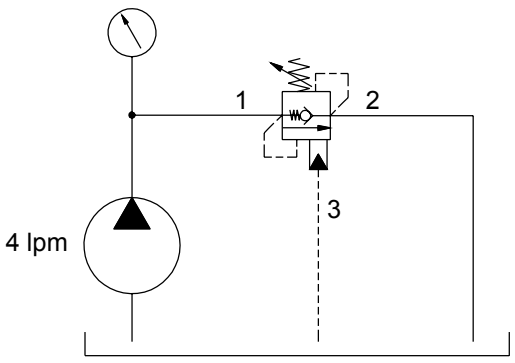


Fig.3

Standard setting pressure (Pt) of counterbalance valves corresponds to pressure on port (1), while the valve is crossed by a 4l/min flow (picture 3).

es. Pt: 350 bar @ 4 l/min

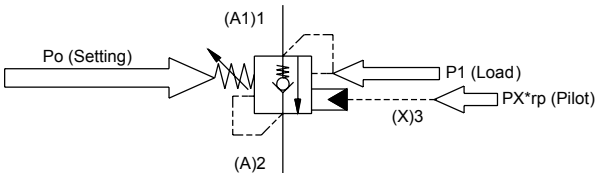
In particular cases, and generally upon customers' request, the pressure can be set considering the initial opening value, corresponding almost to 20 ml/min. flow.

es. Pt: 350 bar @ 20 ml/min

PILOT RATIO

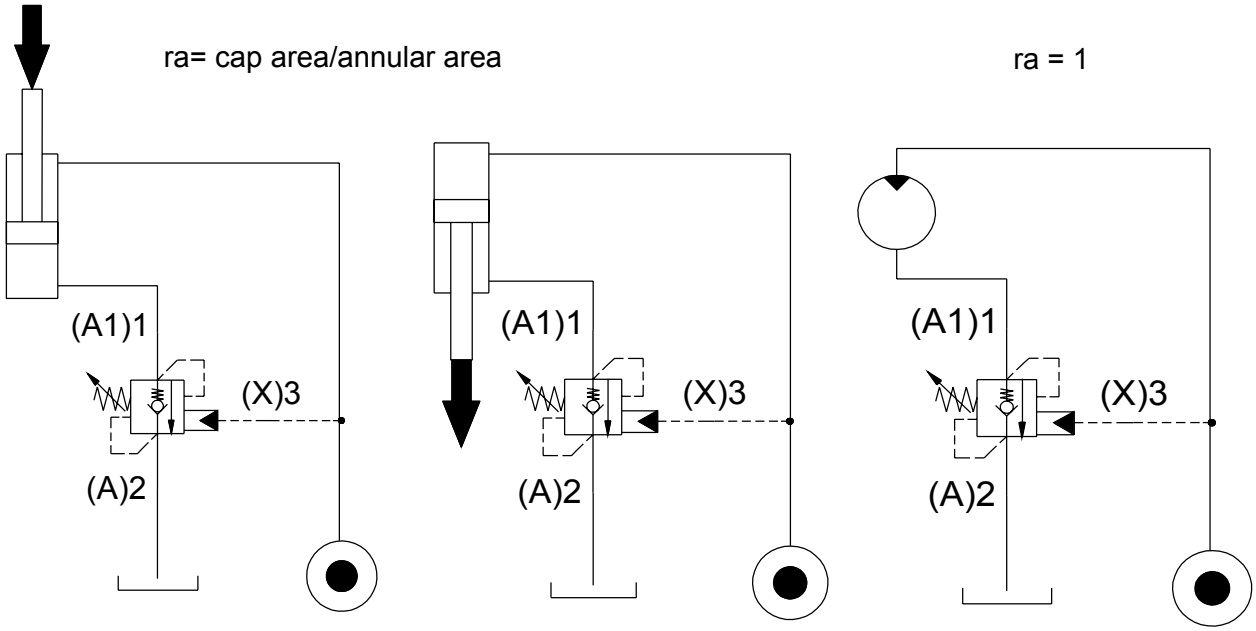
As mentioned before, counterbalance valves are characterized by a pilot area on which pressure coming from the actuator's feeding line acts. Such pressure, together with the pressure due to the load, moves pilot piston, progressively contrasting the force generated by the setting spring.
Hence the combined action of the two pressures is connected to the ratio between the pushing areas on which they act. This ratio is known as "Pilot Ratio" (pr), and it is the basic parameter for any counterbalance valve.
Pilot Ratio (pr) is defined as the geometrical ratio between the area on which the load acts (port 1) and the pilot area (port 3). Thanks to this parameter, it is possible to calculate the values of pilot pressures first opening (Px):

Px = (Pt – P1) / rp



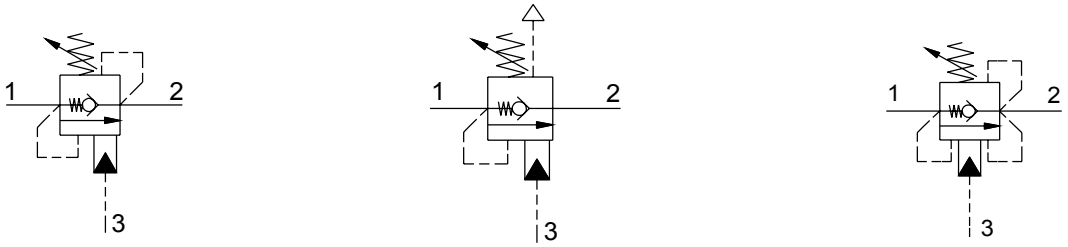
According the Pilot Ratio, counterbalance valves can be divided in 2 types:
High Pilot Ratio (>6:1): suitable for those applications where the loads are constant (for instance, hydraulic motors) and very stable, where low pilot pressures are demanded in favour of speed and energy savings.
Low Pilot Ratio (<5:1): suitable for those applications where loads can vary (for instance, trucks cranes) and for those mechanical structures are not stable, where more control and more stability are needed, an higher pilot pressure is required.
When counterbalance valves are installed on hydraulic actuators, to determine the correct value of pilot pressure it is necessary to introduce in the calculation the ratio between the areas of the actuator itself.

Px = (Pt – P1) / (rp+ra)
ra: ratio between the areas of the hydraulic actuator



COMPENSATION

Because of coupling counterbalance valves with directional control valves, considering the type of spool to use is needed. When the counterbalance valves are in charge of the pressure relief function, it's essential to make a distinction between "closed-centre" spool applications and "open-centre" spool application.
Generally, when "closed-centre" spools are installed, it's necessary to use compensated counterbalance valves: since these valves are insensitive to back-pressure on return line (A-2), their pressure setting won't change.

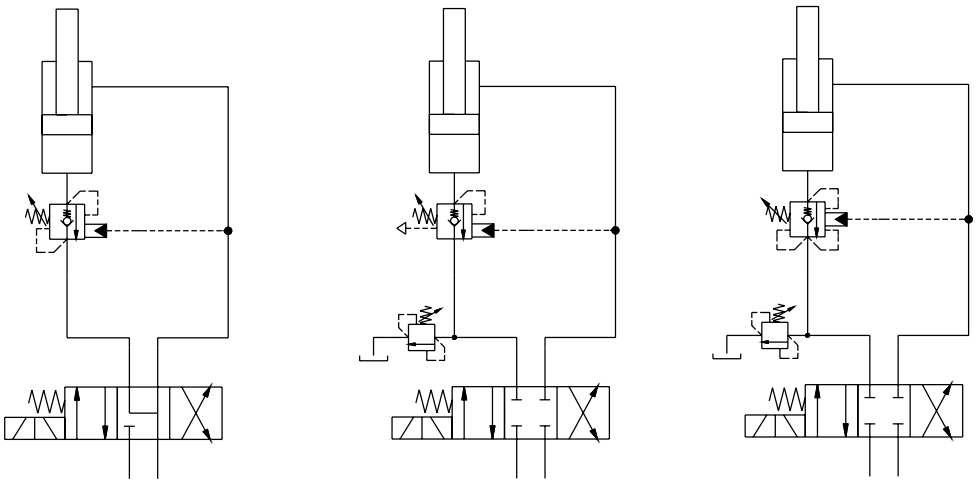


Two examples of compensated valves application are regenerative circuits and circuits in which draining of eventual pressure peaks must be relieved in series by the anti-shock valves installed inside the directional control valve.
In case of "open-centre" directional spool application, not-compensated valves are compulsory, in which the spring is connected to the return line (A-2).

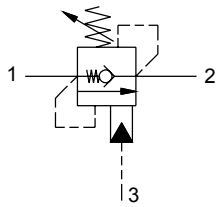
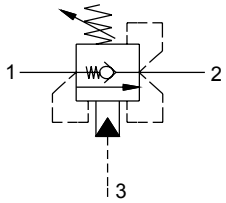
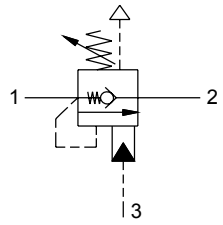
In **Not-Compensated (N)** type valves, back-pressure affects both pressure setting and pilot pressure
In these valves, the return line is directly connected to the spring. Valves in which adjustable spring is connected to return line are not compensated ones.
Main use: open-centre spool application.

In **Fully-Compensated (C)** type valves, back-pressure does not affect neither pressure setting nor pilot pressure. Belong to this type the valves in which the adjustable spring is separated from return line (A-2) and is connected to a draining line or is air-vented.
In these valves, back-pressure (A-2) is balanced, so it won't find any area to carry out its force, so that both setting and pilot pressures are independent from pressure on return line (A).
Main use: closed-centre spool applications, regenerative circuits.

In **Partially-Compensated (S)** valves, only pressure setting is independent from back-pressure, while pilot pressure is affected by back-pressures, which sometimes can be helpful in stabilizing the circuit.
To this kind of valves belong all the valves in which only the area subject to the load (A1-1) is balanced.
Main use: closed-centre spool applications.

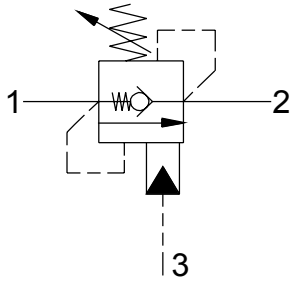


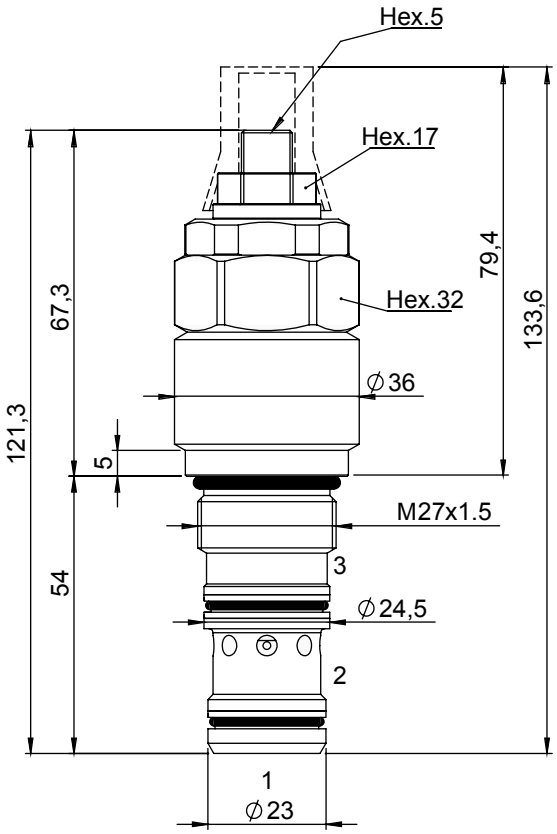
COUNTERBALANCE VALVES

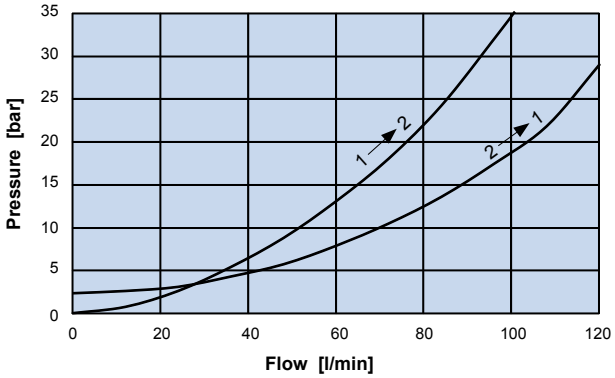
NOT COMPENSATED		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-6440	100	410	M27x1.5	M340000	2.01.001
	CT-6140	100	410	SAE-12	C341000	2.01.002
PARTIALLY COMPENSATED						
	CT-6442	100	410	M27x1.5	M340000	2.01.003
	CT-6142	100	410	SAE-12	C341000	2.01.004
FULLY COMPENSATED						
	CT-6141	100	410	SAE-12	C341000	2.01.005
	CT-6441	100	410	M27x1,5	M340000	2.01.006

NOT COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**100 l/min**
- Max working pressure. . . . . **410 bar**
- Cavity . . . . . **M 340000**
- Compensation. . . . . **Not compensated**
- Cartridge thightening torque. . . . . .**60 Nm**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap . . . . . .**cod. 4029250280**







Note:
-Setting: 1,3 times the maximum load induced pressure.
-The back pressure (2) can affect the relief function (for circuits with back pressure use CT-6441 o CT-6442).

Ordering code

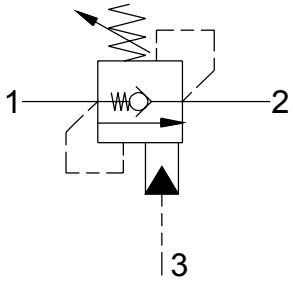
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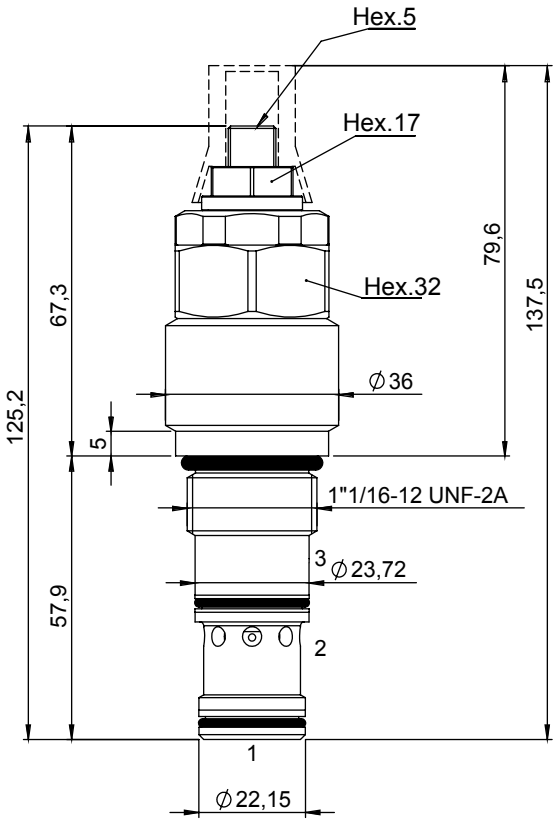
PILOT RATIO	
5	**5:1**

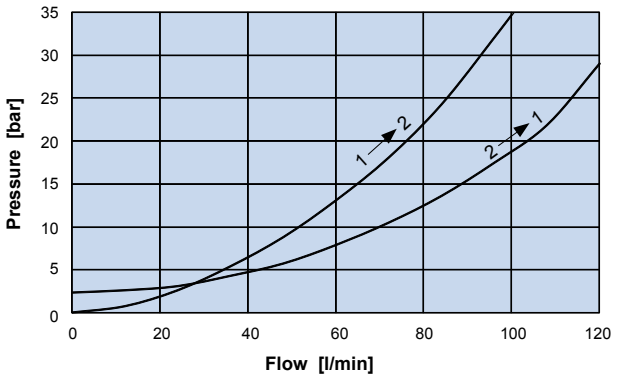
SPRINGS	**4**
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

NOT COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .100 l/min
- Max working pressure. . . . . 410 bar
- Cavity . . . . . M 340000
- Compensation. . . . . Not compensated
- Cartridge thightening torque. . . . . .90 Nm
- Weight. . . . . 0,7 Kg
- Tamper proof cap . . . . . .cod. 4029250280







23

Note:
-Setting: 1,3 times the maximum load induced pressure.
-The back pressure (2) can affect the relief function (for circuits with back pressure use CT-6142).

Ordering code

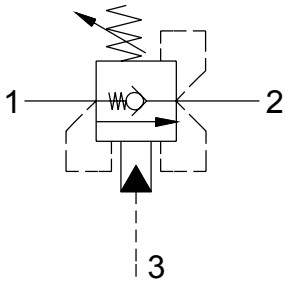
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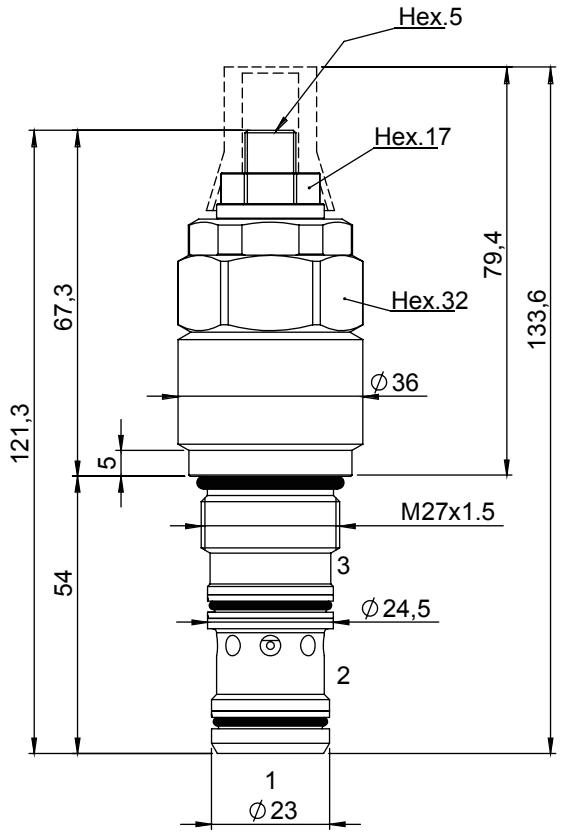
PILOT RATIO	
5	**5:1**

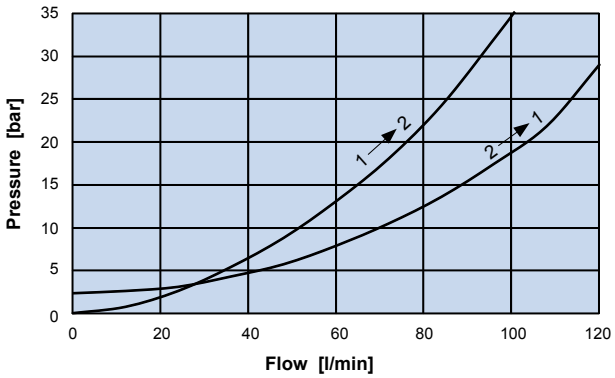
SPRINGS	4
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

PARTIALLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .100 l/min
- Max working pressure. . . . . 410 bar
- Cavity . . . . . M 340000
- Compensation. . . . . Partially compensated
- Cartridge thightening torque. . . . . .60 Nm
- Weight. . . . . 0,7 Kg
- Tamper proof cap . . . . . .cod. 4029250280







Note:
-Setting: 1,3 times the maximum load induced pressure.

Ordering code

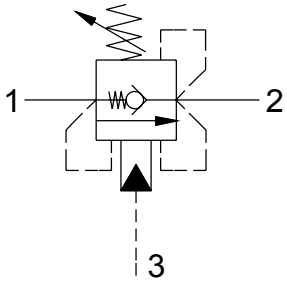
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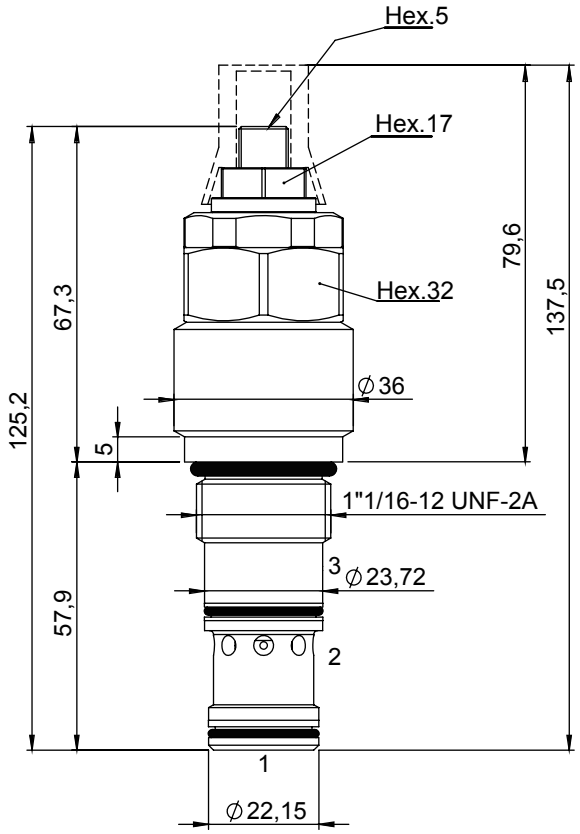
PILOT RATIO	
5	**5:1**

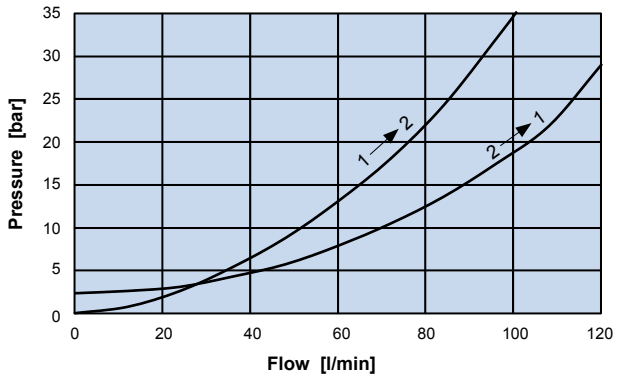
SPRINGS	4
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

PARTIALLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**100 l/min**
- Max working pressure. . . . . **410 bar**
- Cavity . . . . . **C 341000**
- Compensation. . . . . **Partially compensated**
- Cartridge thightening torque. . . . . .**90 Nm**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap . . . . . .**cod. 4029250280**







25

Note:
-Setting: 1,3 times the maximum load induced pressure.

Ordering code

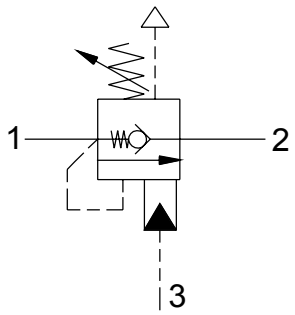
0 6 1 4 2 ☐ ☐ 0 0 0

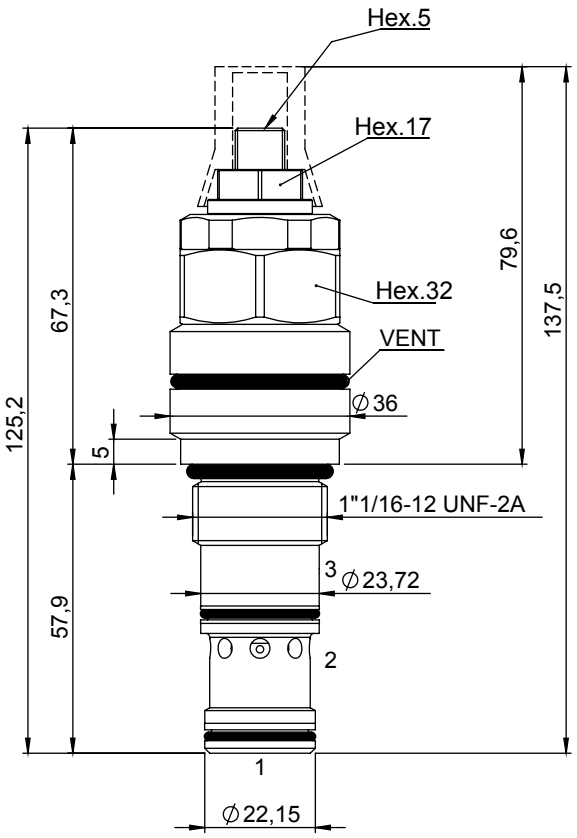
PILOT RATIO	
5	**5:1**

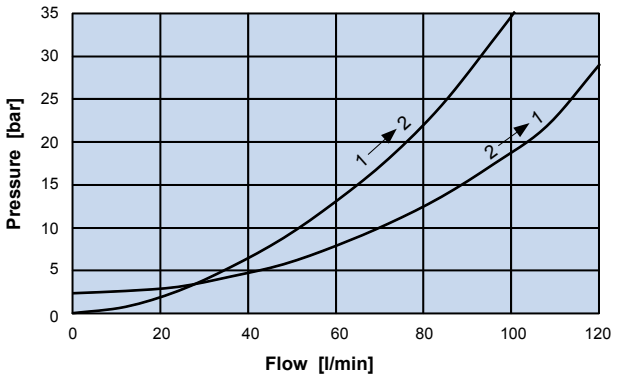
SPRINGS	**4**
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**100 l/min**
- Max working pressure. . . . . **410 bar**
- Cavity . . . . . **C 341000**
- Compensation. . . . . .**Fully compensated**
- Cartridge thightening torque. . . . . .**90 Nm**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap . . . . . .**cod. 4029250280**







Note:
-Setting: 1,3 times the maximum load induced pressure.

Ordering code

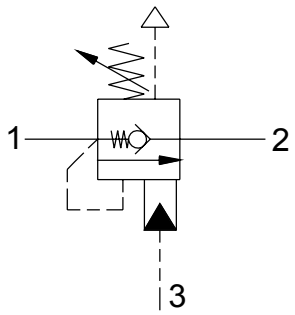
0 6 1 4 1 ☐ ☐ 0 0 0

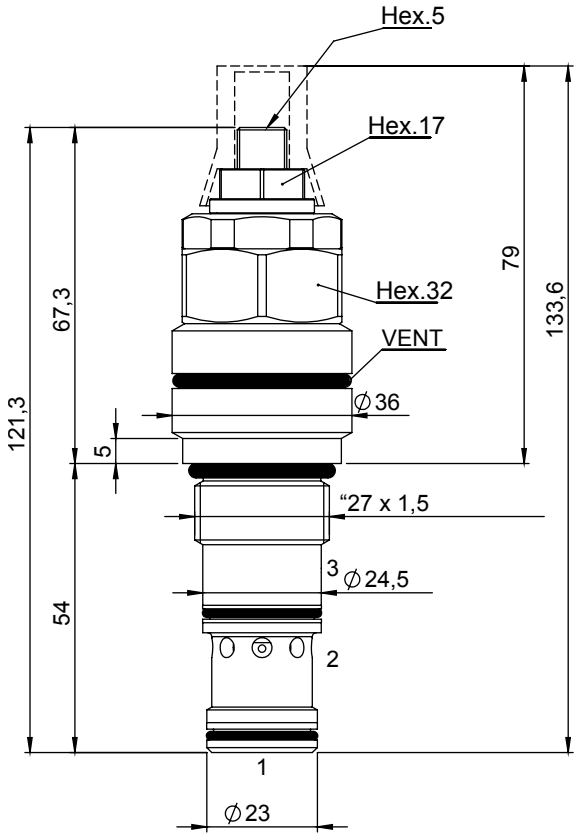
PILOT RATIO	
5	**5:1**

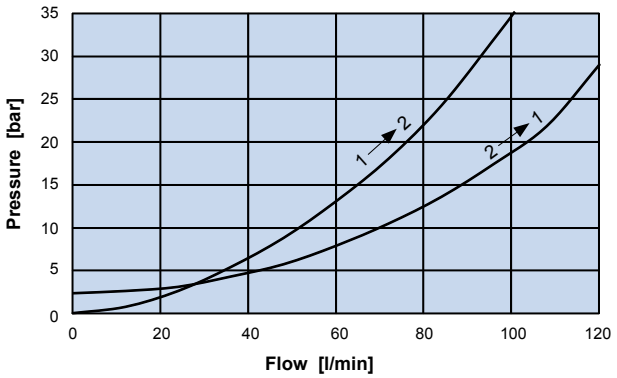
SPRINGS	**4**
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**100 l/min**
- Max working pressure. . . . . **410 bar**
- Cavity . . . . . **M 340000**
- Compensation. . . . . **Fully compensated**
- Cartridge thightening torque. . . . . .**60 Nm**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap . . . . . .**cod. 4029250280**







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Note:
-Setting: 1,3 times the maximum load induced pressure.

Ordering code

0 6 4 4 1 ☐ ☐ 0 0 0

PILOT RATIO	
5	**5:1**

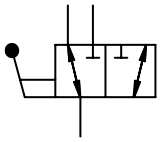
SPRINGS	**4**
Setting range [bar]	230 - 410
Pressure Increase [bar/turn]	34
Standard setting 4 l/min [bar]	350

HYDRAULIC CARTRIDGES VALVES

DIRECTIONAL CONTROL VALVES

28

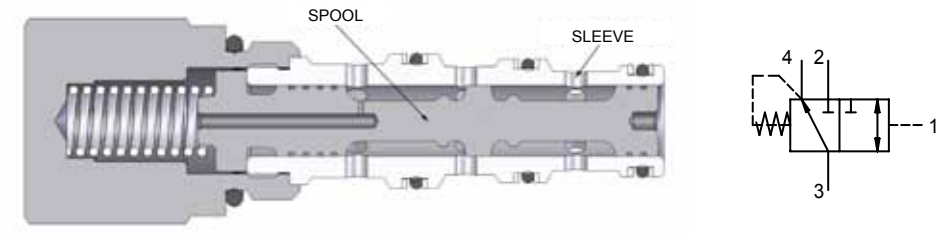
INTRODUCTION



SPOOL TYPE DIRECTIONAL VALVE

Spool type cartridge directional valves are valves which allow to direct or to drive in-coming oil flow through different hydraulic circuit lines. Depending on their actuator type they can be commutated by an external pilot pressure or by a manual override.

The construction is based on matching a drilled cylindrical sleeve with a mobile spool. The spool commutation allows the opening and/or closing of the radial holes made on the cylindrical sleeve.



29

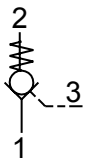
Example of uni-directional valve- spool type

These kind of valves are characterized by a radial clearance between the mobile spool and the cylindrical sleeve that determines an internal leakage of a few cc/min. This is why it's use is not advised for gravitational loads holding without the installation of specific valves like: check valves or counterbalance valves.



UNI-DIRECTIONAL VALVES

Unidirectional valves are 2-way valves which allow oil flow only in single direction, with low pressure drops. Flow in the opposite direction is prevented by sealing devices like conical poppets or balls, kept in a closed position by a spring.
The function which prevents oil from crossing the valve in the opposite direction is characterized by an optimal hydraulic sealing (<0,25 cc/min), and by the fact that pressure inside the cartridge acts together with the spring, keeping the sealing device in a closed position.
The passage through uni-directional valve is called "free flow", and it's subject to closing spring strength, whose setting brings about initial opening pressure.



PILOT OPERATED CHECK VALVES

Pilot operated check valves, also known as lock valves, are uni-directional valves in which the opening of the a normally-closed passage can take place thanks to the pilot pressure.
The sealing device's opening through pilot pressure is of an on/off type (from fully closed to fully opened), so that check valves are used to lock hydraulic cylinders.
It's use is not advised at all for the applications intended to lower gravitational loads, on which modulation and/or control of lowering speed is required. This type of applications requires counterbalance valves.

The ratio between the sealing device's area and pilot area determines the valve pilot ratio (rp), which is the essential parameter for calculating the opening pilot pressure. Normally, given a generic load induced pressure (Pp), the pilot pressure (Ppil) required for opening the valve is calculated dividing the load induced pressure (Pp) by pilot ratio (rp):

$$Ppil = Pp / rp$$

When check valves are used on hydraulic actuators (i.e. Cylinders), due to area ratio (ra) of the actuator itself, the effects of inner pressure must also be considered.

$$Ppil = Pp / (rp - ra)$$

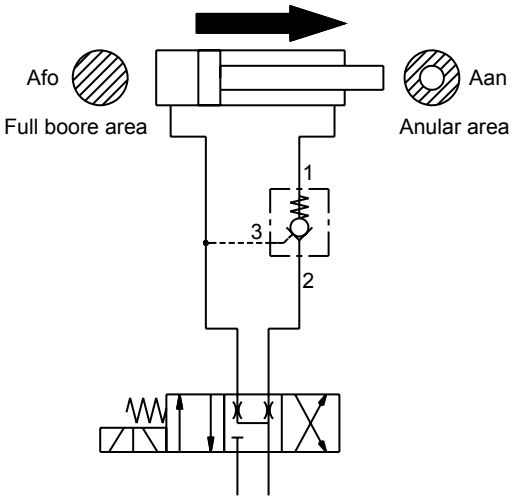
On the hydraulic cylinders, the areas ratio "Ra" is calculated with reference to the type of movements.

Cylinders out (Extension)	Cylinders in
ra = Afo / Aan (>1)	ra = Aan / Afo (<1)

It's very important to remember that, in case of double acting cylinders, pilot ratio must be always higher than areas ratio:

rp > ra

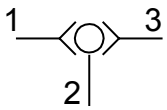
If this rule is not respected, then it is not possible to pilot the check valve during the cylinder extension.



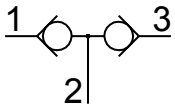
SELECTOR VALVES

Selector valves are designed for pilot circuits or for circuits intended to transfer load sensing (LS) signals inside integrated circuits or directional control valves.
According to their hydraulic schematic, there are 2 types of selector valves:

Bidirectional Selector Valves: These valves compare 2 pressure signals, and allow a bi-directional flow of the highest. 31

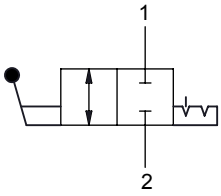
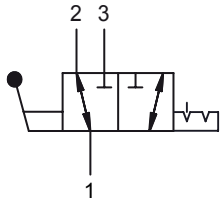
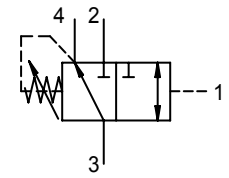
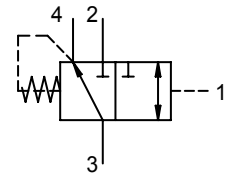


Uni-Directional Selector Valves: These valves compare 2 pressure signals, and allow a uni-directional flow of the highest.



DIRECTIONAL CONTROL VALVES

SPOOL DIRECTIONAL VALVES

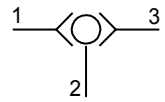
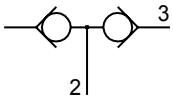
		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-4931	30	350	SAE-10	C230000	3.01.001
	CT-4932	30	350	SAE-10	C330000	3.01.002
	CT-4834-1 TV	50	350	SAE-10	C430000	3.01.003
	CT-4834-1 TF	50	350	SAE-10	C430000	3.01.004

CHECK VALVES

	CT-703	80	350	SAE-10	C230000	3.01.005
	CT-705	200	350	SAE-20	C250000	3.01.006
	CT-713	40	350	Speciale 7/8”-14	C230001	3.01.007

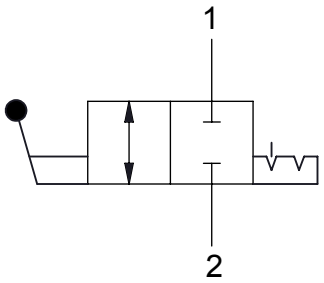
DIRECTIONAL CONTROL VALVES

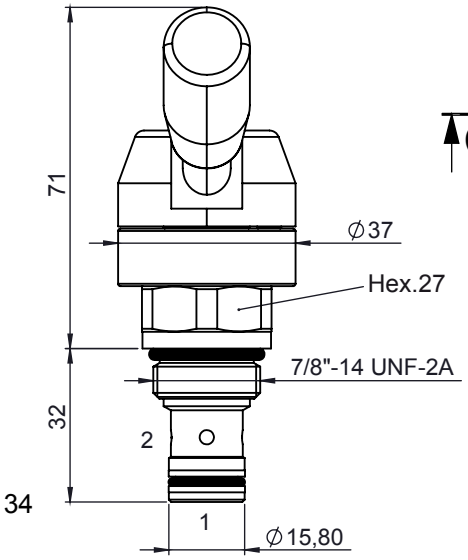
SELECTOR VALVES

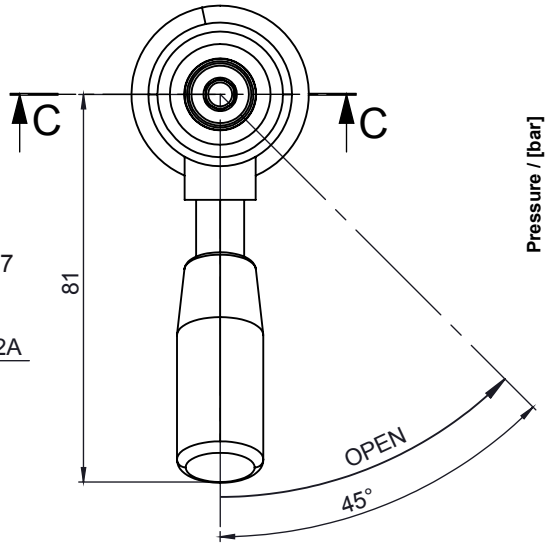
		Q l/min	Pmax bar	GRANDEZZA	CAVITA'	PAGINA
	CT-074	10	350	G-1/8	S000004	3.01.008
	CT-074	2	350	G-1/8	S000005	3.01.009

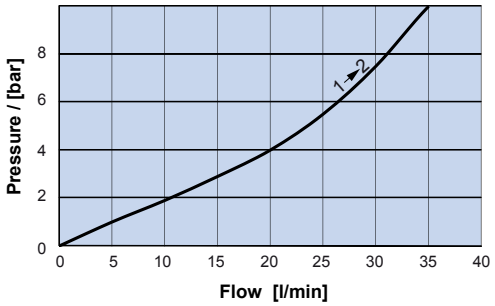
2 WAYS 2 POSITION ROTARY SPOOL DIRECTIONAL VALVE

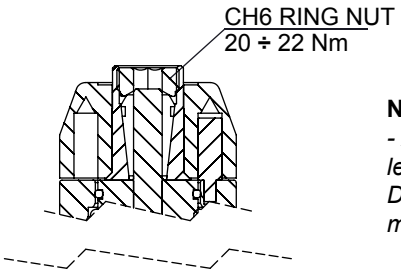
- Max Flow. . . . . .**30 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity **C230000**
- Seals . . . . . .**NBR**
- Cartridge thightening torque. . . . . .**50 Nm**
- Weight . . . . . .**0,25 Kg**











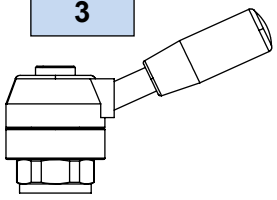
C-C SECTION

Note:
- Allentando la ghiera, il cliente ha la possibilità di orientare la leva di comando sull'arco 360°.
Dopo aver serrato la ghiera a 20 ÷ 22 Nm la valvola può essere manovrata in apertura con un angolo di rotazione di 45°.

Ordering code

0 4 9 3 1 0 0 ☐ 0 0

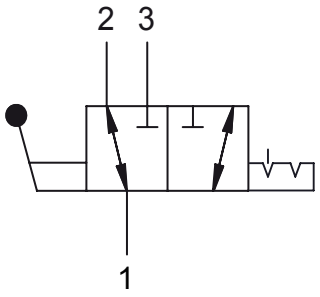
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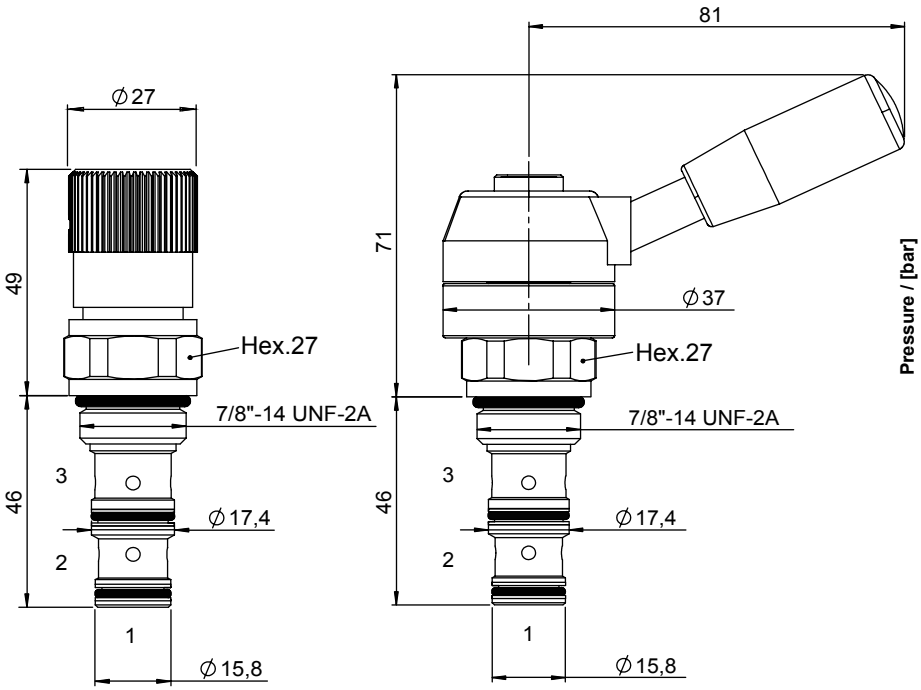


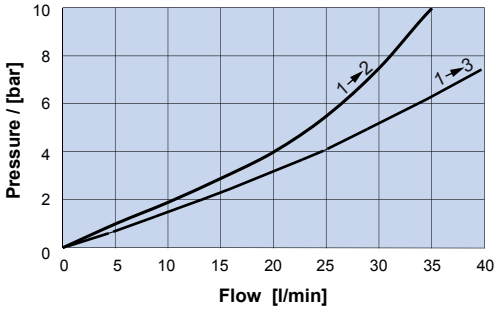
Hand lever

3 WAYS 2 POSITION ROTARY SPOOL DIRECTIONAL VALVE

- Max Flow. . . . . .**30 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity **C330000**
- Seals . . . . . .**NBR**
- Cartridge thightening torque. . . . . .**50 Nm**
- Weight . . . . . .**0,2 Kg**



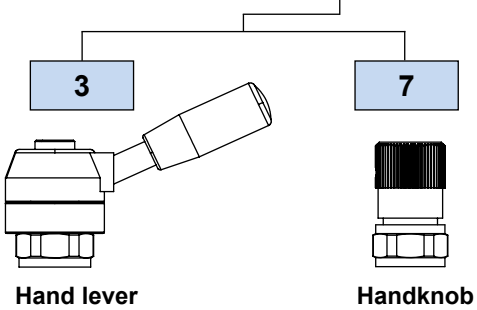




35

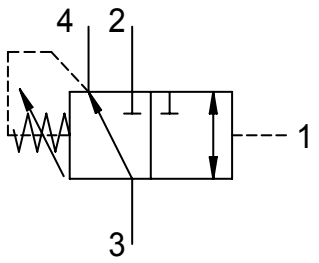
Ordering code

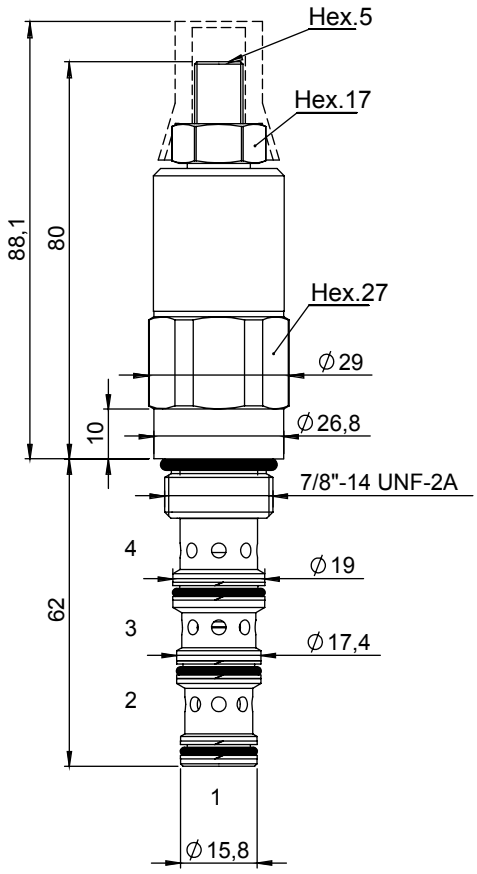
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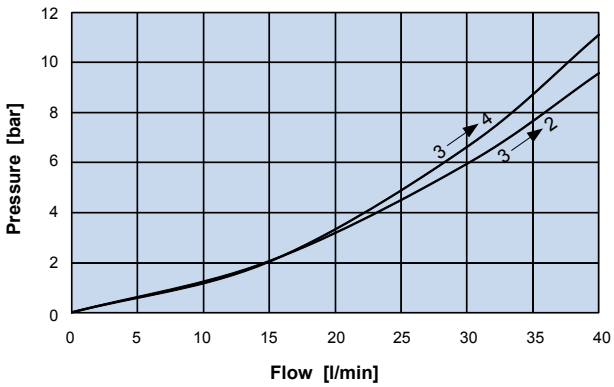


ADJUSTABLE SETTING DIRECTIONAL VALVE

- Max Flow. . . . . .**50 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity . . . . . **C 430000**
- Cartridge thightening torque. . . . . .**40 Nm**
- Weight . . . . . .**0,35 Kg**







Ordering code

0 4 8 3 4 1 ☐ ☐ 0 0

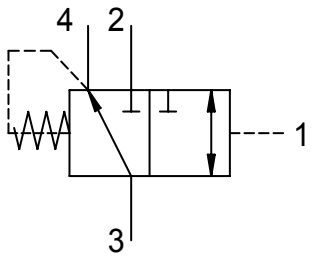
SPRINGS	1	2	3
Setting	2 - 10 bar	5 - 20 bar	10 - 60 bar
Standard setting	5	8	20
Bar/turn	1,9	3	10,3

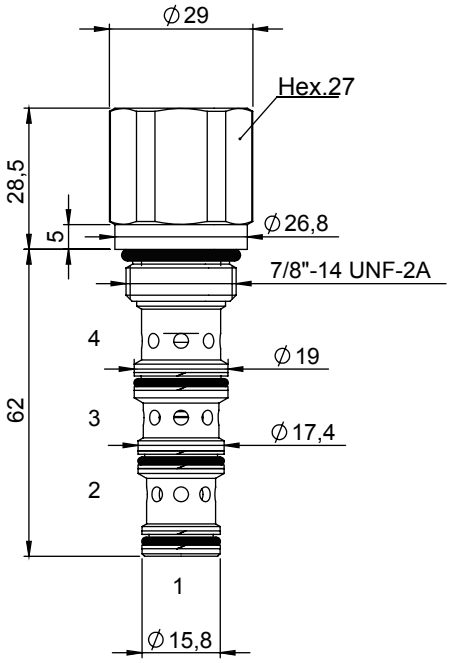
0	1	2
Screw	Tamper proof	Handknob

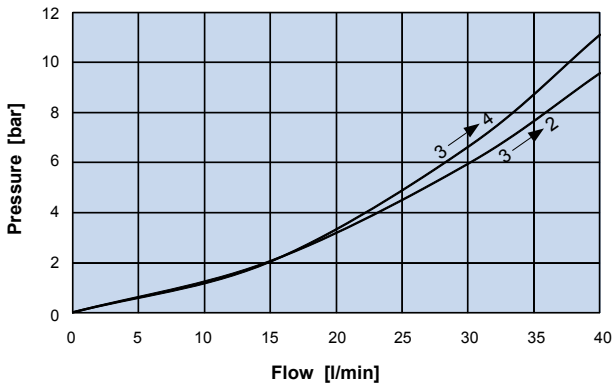
Adjustments

FIX SETTING DIRECTIONAL VALVE

- Max Flow. . . . . .**50 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity . . . . . **C 430000**
- Cartridge thightening torque. . . . . .**40 Nm**
- Weight . . . . . .**0,2 Kg**







37

Ordering code

0 4 8 3 4 1 □ □ 0 0

SPRINGS	1
Setting	6

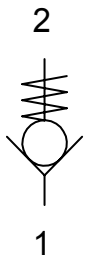
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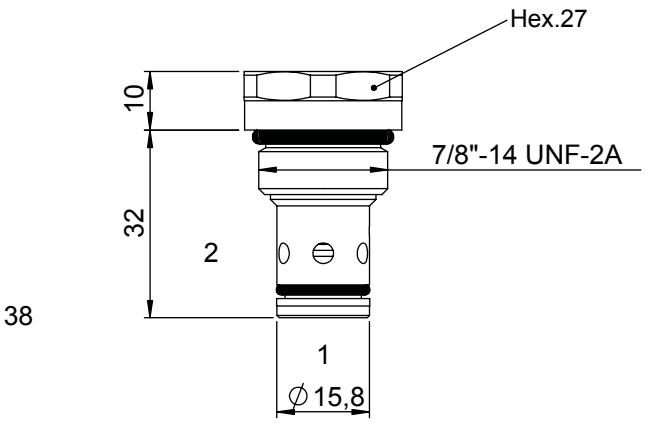
Fix setting

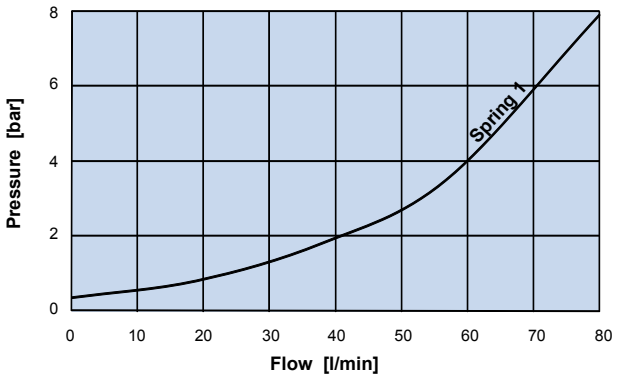
Adjustments

CHECK VALVE

- Max Flow. . . . . .80 l/min
- Max Pressure. . . . . .350 bar
- Cavity . . . . . C 230000
- Leakage. . . . . .0,25 cc/min
- Seals . . . . . .NBR
- Cartridge thightening torque. . . . . .50 Nm
- Weight . . . . . .0,1 Kg







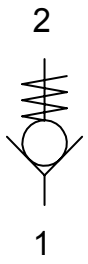
Ordering code

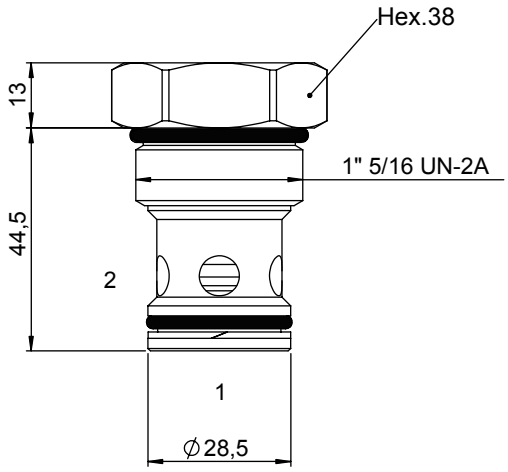
0 7 0 3 1 0 □ 0 0 0

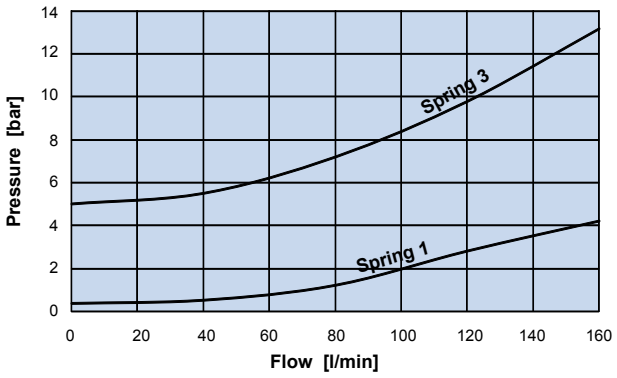
SPRINGS	1	2	3
Cracking pressure [bar]	0,35	2,5	5

CHECK VALVE

- Max Flow. . . . . .150 l/min
- Max Pressure. . . . . .350 bar
- Cavity . . . . . C 250000
- Leakage. . . . . .0,25 cc/min
- Seals . . . . . .NBR
- Cartridge thightening torque. . . . . 110 Nm
- Weight . . . . . .0,3 Kg







39

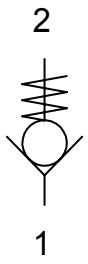
Ordering code

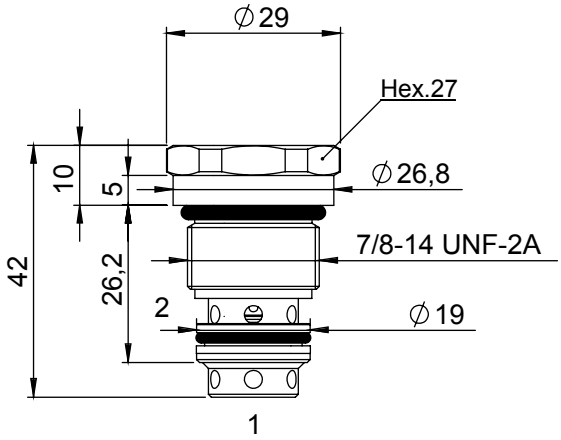
0 7 0 5 1 0 ☐ 0 0 0

SPRINGS	1	2	3
Cracking pressure [bar]	0,35	2,5	5

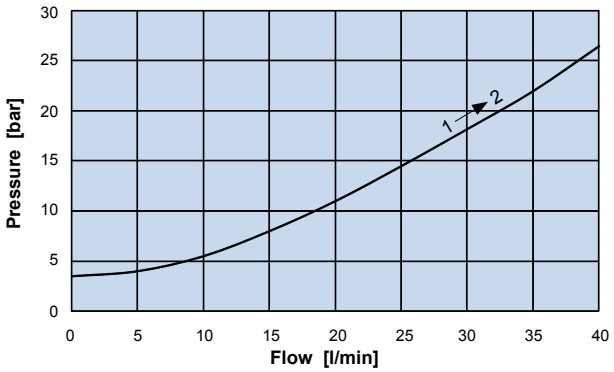
CHECK VALVE

- Max Flow. . . . . .**40 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity . . . . . .**C 230001**
- Leakage. . . . . .**0,25 cc/min**
- Seals . . . . . .**NBR**
- Cartridge thightening torque. . . . . .**40 Nm**
- Weight . . . . . .**0,1 Kg**





40



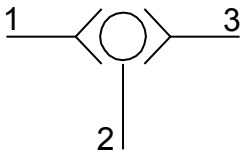
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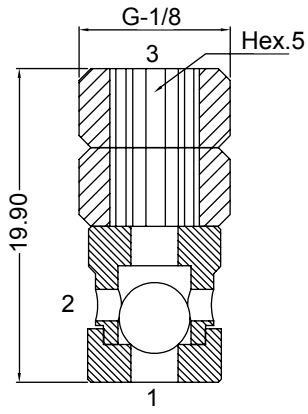
0 7 1 3 1 0 ☐ 0 0 0

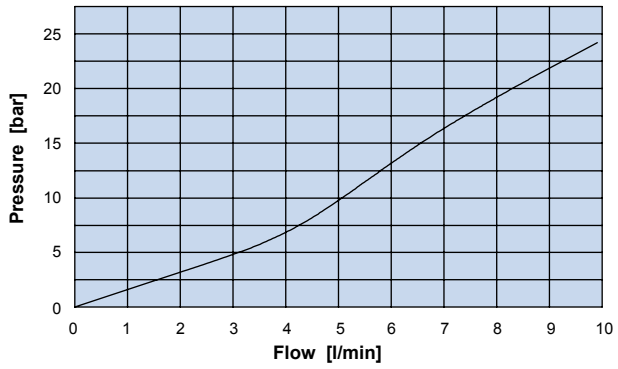
SPRINGS	2	3
Cracking pressure [bar]	2	5

INSERT SHUTTLE VALVE

- Max Flow. . . . . .**10 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity **S000004**
- Cartridge thightening torque. . . . . **12-15 Nm**
- Weight . . . . . .**0,010 Kg**







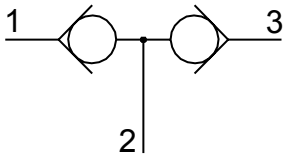
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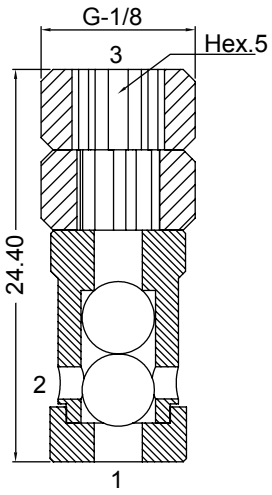
Ordering code

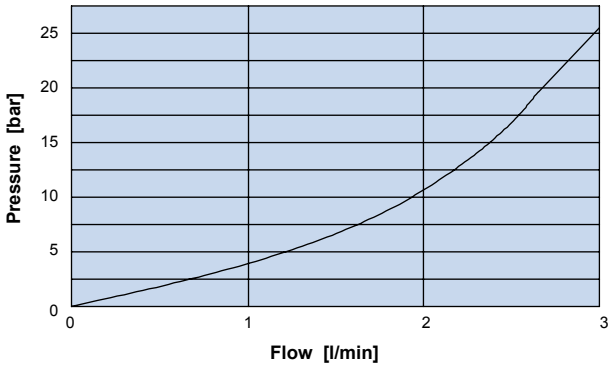
0 7 4 2 1 0 0 0 0 0

UNIDIRECTIONAL INSERT SHUTTLE VALVE

- Max Flow. . . . . .**2 l/min**
- Max Pressure. . . . . .**350 bar**
- Cavity . . . . . .**S 000005**
- Cartridge thightening torque. . . . . **12-15 Nm**
- Weight . . . . . .**0,010 Kg**







42

Ordering code

0 7 4 2 2 0 0 0 0 0

HYDRAULIC CARTRIDGES VALVES

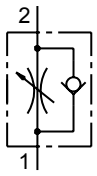
FLOW CONTROL VALVES

INTRODUCTION



BIDIRECTIONAL FLOW RESTRICTORS

Thanks to this type of valves, it's possible to regulate flow passage inside an hydraulic circuit. The flow restriction brings about a non-compensated load loss which depends on the loads themselves.
These valves allow to obtain compensated flow regulators, when coupled with pressure compensators.



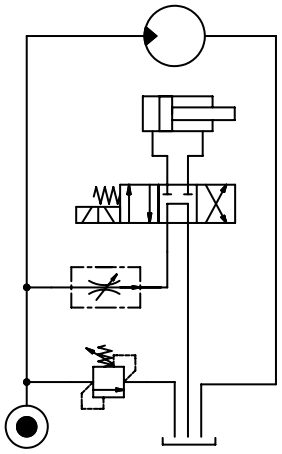
UNIDIRECTIONAL FLOW RESTRICTORS

These valves regulate flow passage only in one direction, keeping the flow passage free in the opposite direction. Flow restriction brings about a non-compensated load loss which depends on the loads themselves.
These valves act as compensated flow regulators, when coupled with pressure compensators.

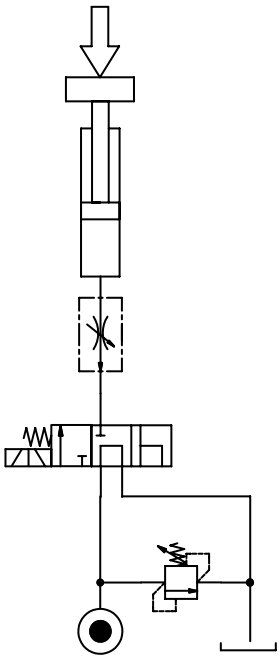


2-WAY COMPENSATED FLOW REGULATORS

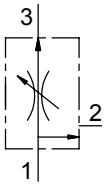
These valves regulate oil flow inside an hydraulic line, independently from the feeding pressure.
They are composed by an adjusting device for flow setting and a pressure compensator connected to it in series which keeps a constant pressure drop across the adjusting device flow area.
2-way compensated flow regulators are usually installed in parallel to the main line:
1) to reduce feeding on secondary circuits, which work at lower pressures compared to the main feeding line pressure;
2) to reduce inertial/dragged maximum speed.
In the first case, it's important to provide draining of oil in excess in comparison with set flow, installing a pressure relief valve.



Derivation connection



Series connection



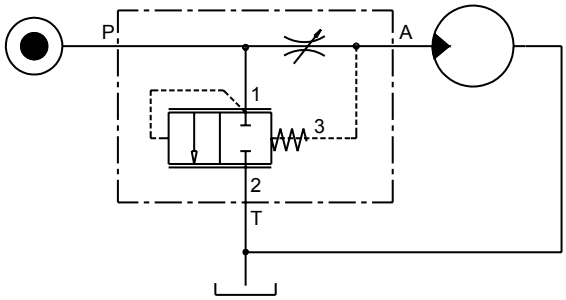
3-WAY COMPENSATED FLOW REGULATORS

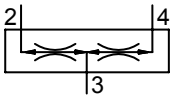
These valves regulate oil flow inside an hydraulic line, draining excess flow through a third line which makes the regulated flow independent from the working pressure.

There are different types of 3-way regulators:

Cartridge type: this type is very compact and enable a constant regulated flow, independently from pressure on both lines. The excess flow line can be pressurized even at higher values than the regulated line. Regulated flow has priority over any line connected to the excess port.

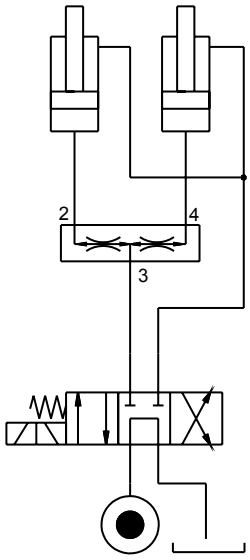
Integrated circuit type: these valves are flow regulators designed using cartridges installed in a manifold. Their main characteristic is that they're able to manage higher flows than the cartridge type.
Main components are: (1) flow control device; (2) 2-way normally closed compensator.
For an optimal functionality, pressure on third line (T) must be lower than pressure on regulated line (A).



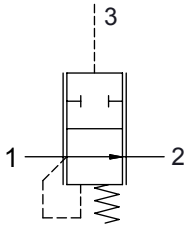


FLOW DIVIDERS/COMBINERS

These valves enable the division of the inlet oil flow(3) in equal parts or with a predetermined ratio on ports (2) e (4), so that flow onto the actuators is pressure compensated.
This function is guaranteed also in the opposite direction, where the flows from the hydraulic actuators are reunified in port (3).

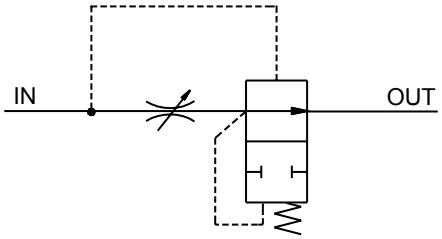


Flow divider/combiner hydraulic scheme

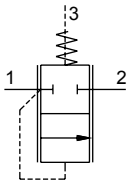


2-WAY N/O PRESSURE COMPENSATORS

2-way N/O pressure compensators are cartridges designed for 3-way cavities, which allow to obtain 2-way compensated flow regulator, since they are series connected to a flow restrictor or to a 2/2 proportional valve.

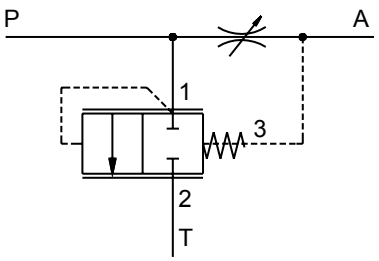


Example of 2 way compensated flow regulator

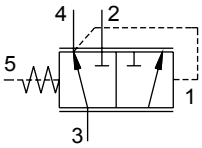


2-WAY N/C PRESSURE COMPENSATORS

2-way N/C pressure compensators are cartridges designed for 3-way cavities, which act as a 3-way compensated flow regulator, since they are connected in parallel to a flow restrictor or to a 2/2 proportional valve.
For an optimal functionality, pressure on port (2-T) must be lower than pressure on regulated line (3-A).

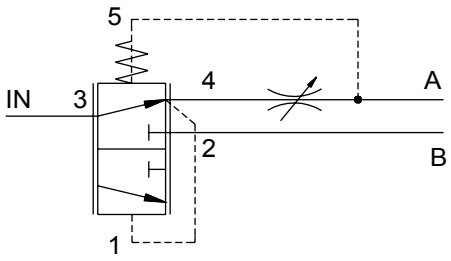


Example of 3 way compensated flow regulator

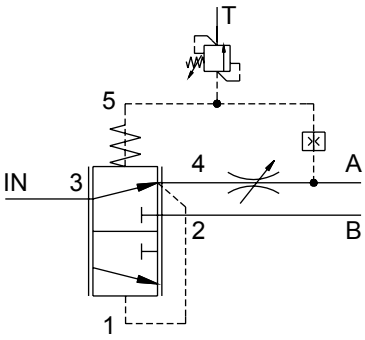


3-WAY POST- REGULATED PRESSURE COMPENSATORS

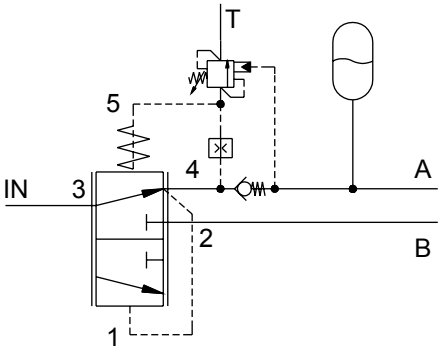
3-way post-regulated pressure compensators are cartridges designed for 4-way cavities.
If connected to a flow restrictor or to 2/2 proportional valve, they act as a 3-way compensated flow regulator, which enables a constant regulated flow independently from the pressure on ports (4) and (2).
As its main characteristic, this type of compensator is able to feel the pressures to be balanced on line (4-A), i.e. it's able to work on regulated line pressure.
So that it's possible to regulate pressure or even to intercept regulated flow, by adding the necessary components.
Feeding circuits for accumulators (braking systems) are interesting applications of these type of compensators.



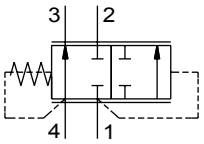
Post-regulated flow regulator



Flow and pressure-limited regulator

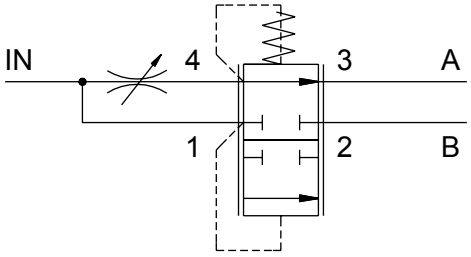


Feeding circuit for accumulators piloted dump valve equipped



4-WAY PRESSURE COMPENSATORS

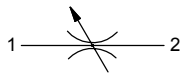
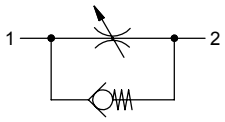
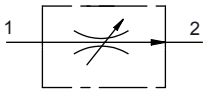
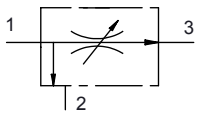
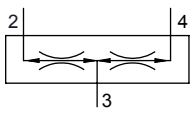
4-way pressure compensators are cartridges designed for 4-way cavities.
Connected to a flow restrictor or to a 2/2 proportional valve, they act as a 3-way compensated flow regulator which is able to keep a constant regulated flow independently from pressure on ports (2) and (3).
As its main characteristic, this type of compensator is able to feel pressures to be balanced on line (4-IN), i.e.
It is able to work on pressure picked up-stream the compensator. Only flow regulations can be done with this type of compensator.



Pre-regulated flow regulator

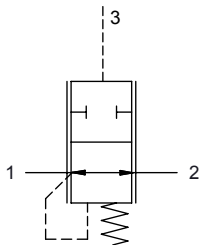
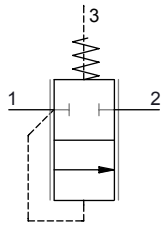
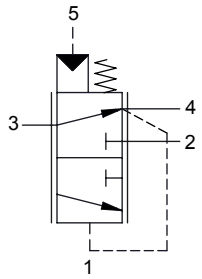
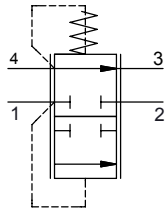
FLOW CONTROL VALVES

FLOW CONTROL VALVES

2 WAYS FLOW CONTROL VALVES		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-302	30	350	SAE-8	C220000	4.01.001
	CT-372	30	350	SAE-8	C220000	4.01.002
	CT-313	30	30	SAE-10	C230000	4.01.003
	CT-314	50	50	SAE-12	C240000	4.01.004
3 WAYS FLOW CONTROL VALVES						
	CT-323	50	30	SAE-10	C330000	4.01.005
	CT-324	90	50	SAE-12	C340000	4.01.006
FLOW DIVIDER AND CONBINER VALVES						
 ***Flow divider and conbiner valve**	CT-823	50	350	SAE-10	C430000	4.01.007

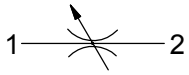
FLOW CONTROL VALVES

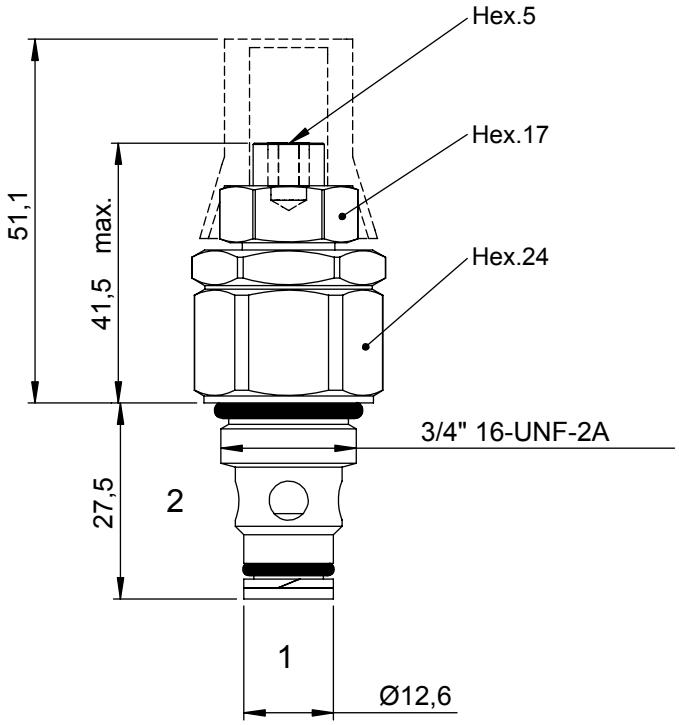
LOGIC ELEMENTS

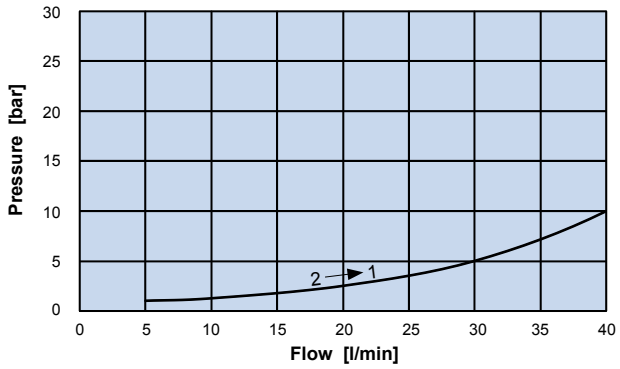
		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-214	60	350	SAE-12	C341000	4.01.008
	CT-203	70	350	SAE-10	C331000	4.01.009
	CT-204	150	350	SAE-12	C341000	4.01.010
	CT-205	200	350	SAE-16	C351000	4.01.011
	CT-243	60	350	SAE-10	C430000	4.01.012
	CT-253	50	350	SAE-10	C533000	4.01.013

BIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **40 Nm**
- Weight. . . . . **0,15 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**





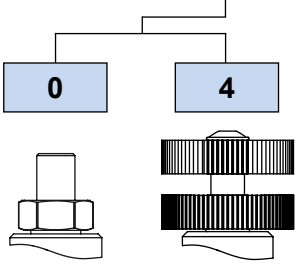


Fully open adjustment pressure drop

51

Ordering code

0 3 0 2 0 0 0 □ 0 1

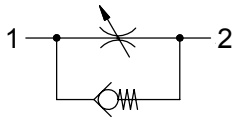


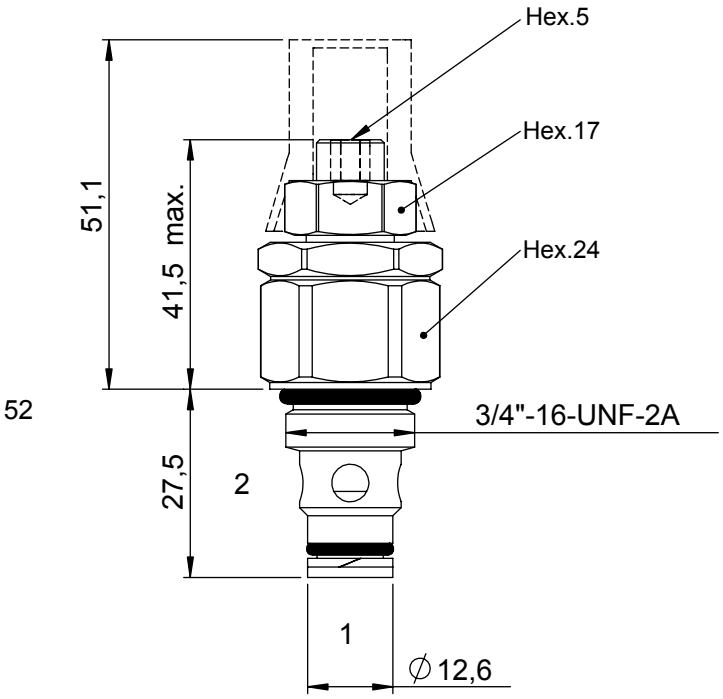
Screw **Handknob**

Adjustments

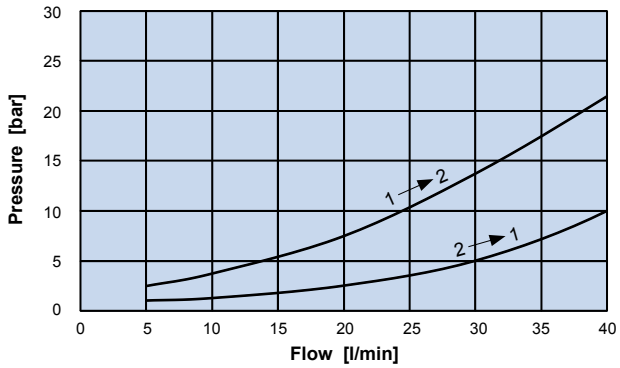
UNIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **40 Nm**
- Weight. . . . . **0,15 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**





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Ordering code

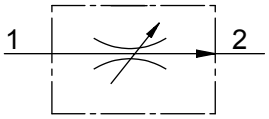
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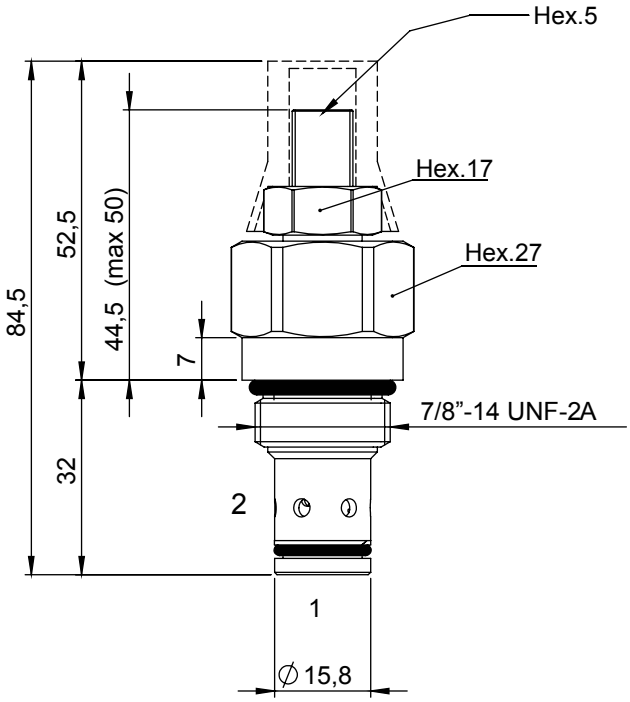
0	4
Screw	Handknob

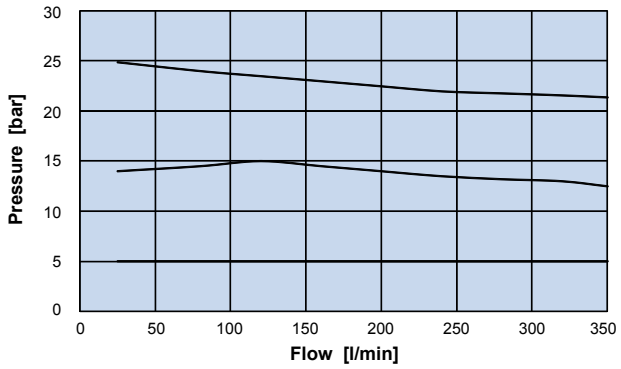
Adjustments

2 WAYS COMPENSATED FLOW CONTROL VALVE

- Max Flow. . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Cavity **C230000**
- Cartridge thightening torque. . . . . **50 Nm**
- Weight. . . . . **0,2 Kg**
- Tamper proof cap: **cod.4029250280**



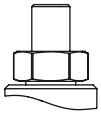
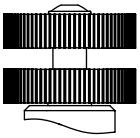




53

Ordering code

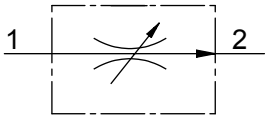
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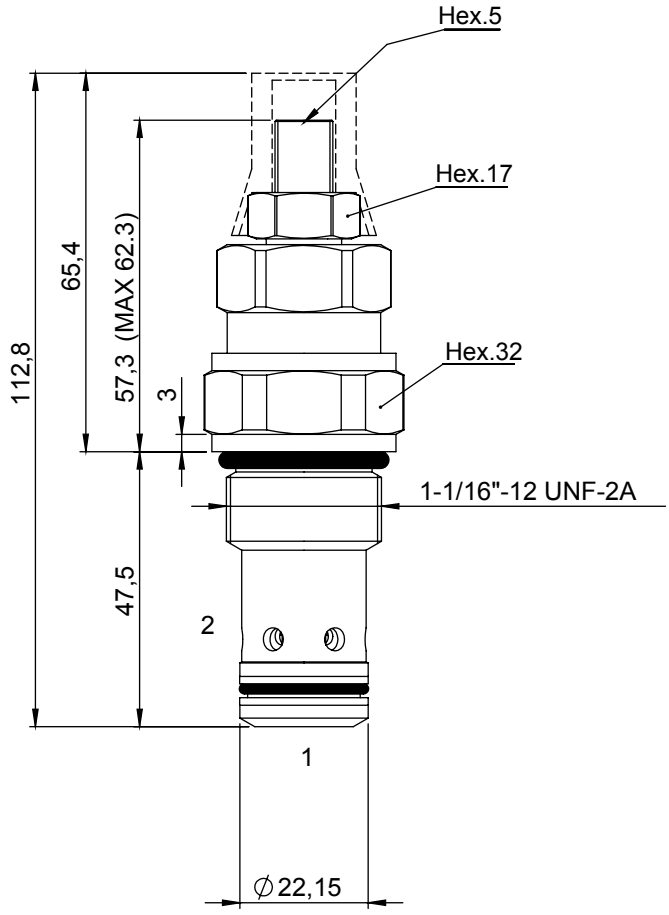
0	4
	
Screw	Handknob

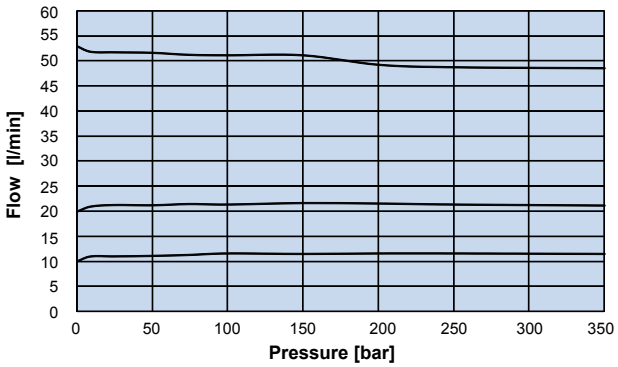
Adjustments

2 WAYS COMPENSATED FLOW CONTROL VALVE

- Max Flow. . . . . .**50 l/min**
- Max working pressure . . . . . .**350 bar**
- Cavity **C240000**
- Cartridge thightening torque. . . . . .**90 Nm**
- Weight. . . . . .**0,31 Kg**
- Tamper proof cap: **cod.4029250280**



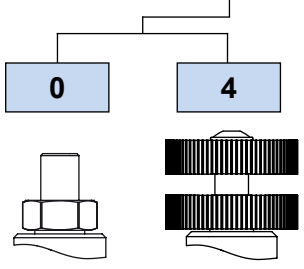




54

Ordering code

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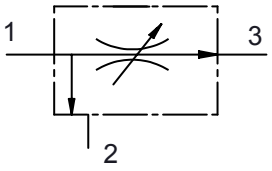


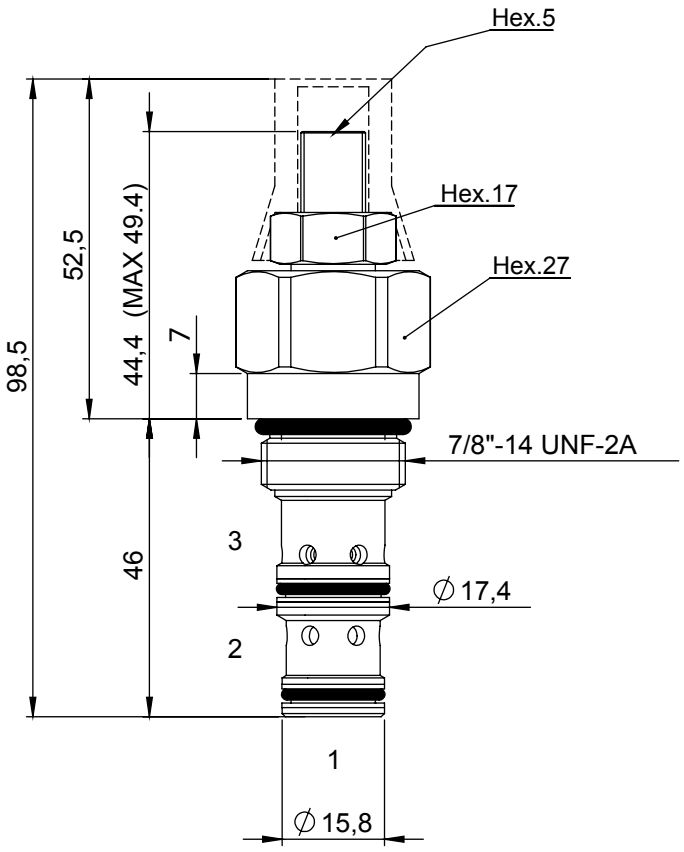
Screw **Handknob**

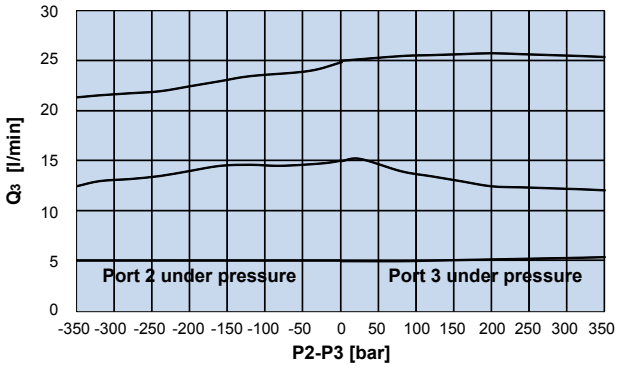
Adjustments

3 WAYS COMPENSATED FLOW CONTROL VALVE

- Max Flow in (1). . . . . **50 l/min**
- Max Regulated Flow (3) . .. . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Cavity **C330000**
- Cartridge thightening torque. . . . . **50 Nm**
- Weight. . . . . **0,31 Kg**
- Tamper proof cap: **cod.4029250280**



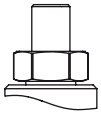
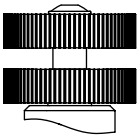




55

Ordering code

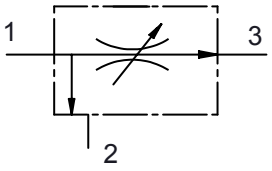
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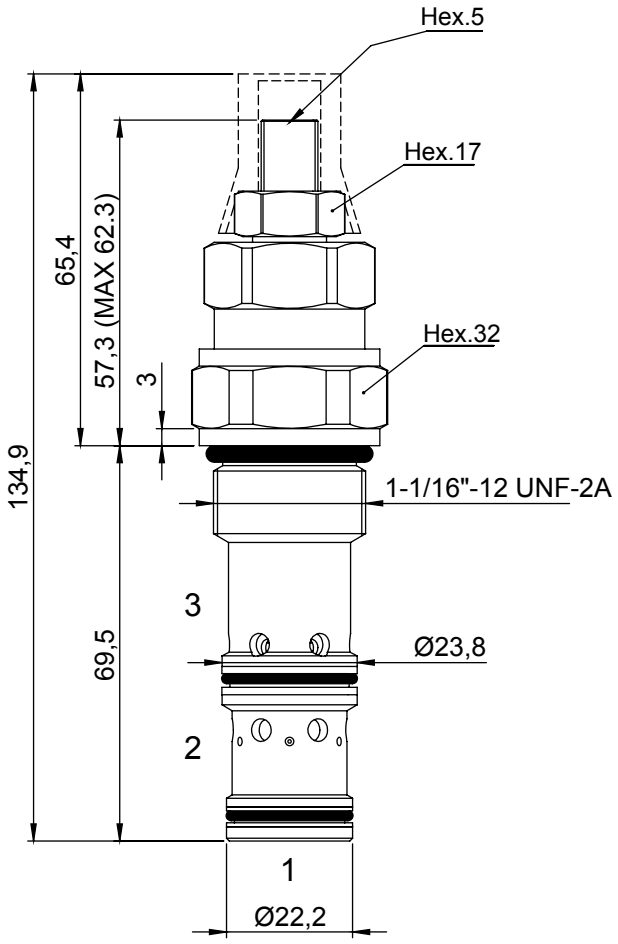
0	4
	
Screw	Handknob

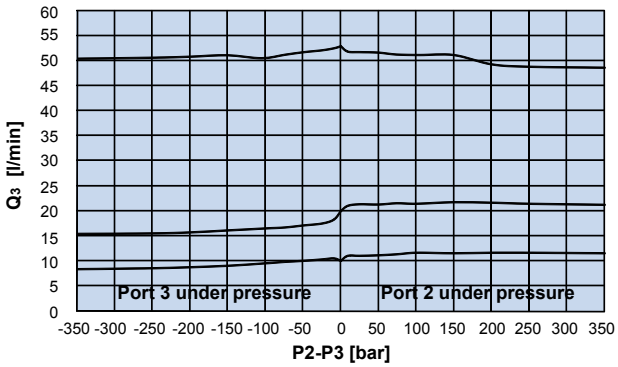
Adjustments

3 WAYS COMPENSATED FLOW CONTROL VALVE

- Max Flow in (1). . . . . **90 l/min**
- Max Regulated Flow (3). . . . . **50 l/min**
- Max working pressure . . . . . **350 bar**
- Cavity **C340000**
- Cartridge thightening torque. . . . . **90 Nm**
- Weight. . . . . **0,4 Kg**
- Tamper proof cap: **cod.4029250280**

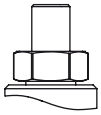
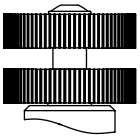






Ordering code

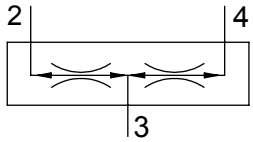
0 3 2 4 0 0 0 ☐ 0 1

0	4
	
Screw	Handknob

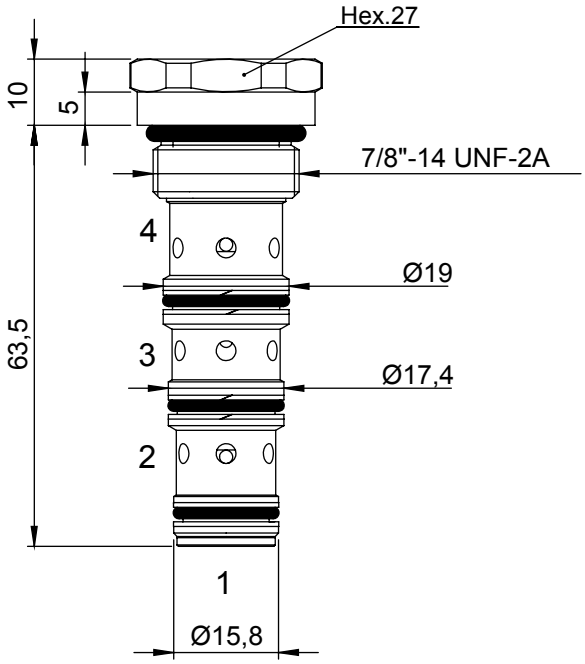
Adjustments

FLOW DIVIDER AND COMBINER VALVE

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . .**350 bar**
- Rapporto di divisione. . . . . .**50% ÷ 50%**
- Cavity **C430000**
- Tollerance. . . . . .**< +/-5%**
- Seals . . . . . .**NBR**
- Cartridge thightening torque. . . . . .**50 Nm**
- Weight. . . . . .**0,15 Kg**



Note:
- PATENDED FLOW DIVIDER AND COMBINER VALVE



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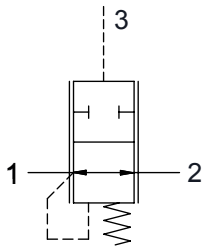
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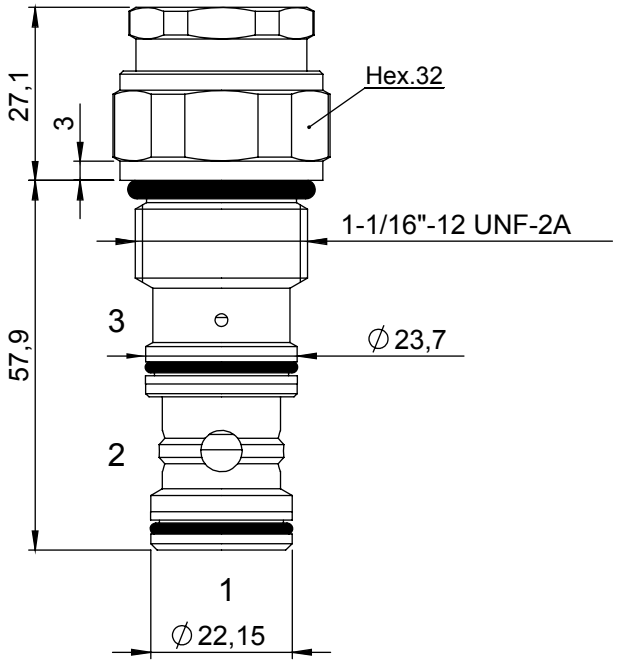
0 8 2 3 0 ☐ 0 0 0 0

SETTING RANGE	0	1	2	3
Qmin ÷ Qmax l/min	20 ÷ 40	2 ÷ 6	5 ÷ 12	12 ÷ 30

2 WAYS NO SPOOL LOGIC ELEMENT

- Max Flow . . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR**
- Cavity . . . . . **C 341000**
- Cartridge thightening torque. . . . . **90 Nm**
- Weight. . . . . **0,3 Kg**





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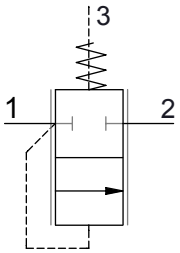
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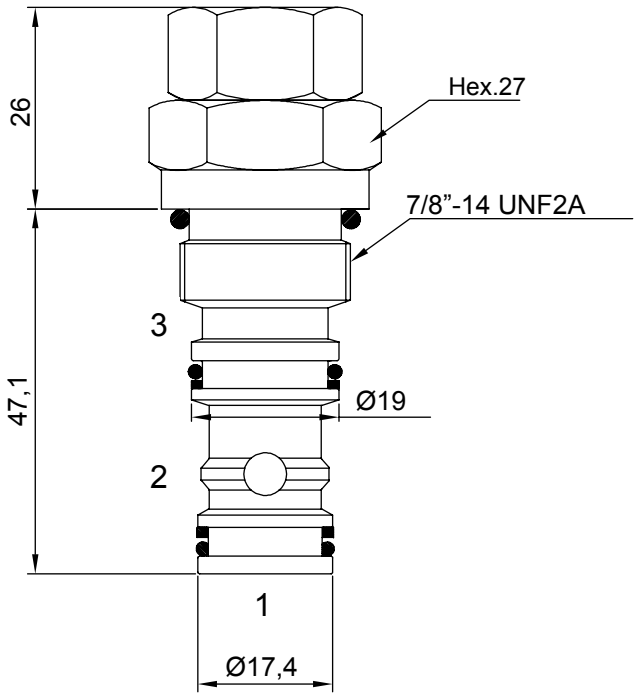
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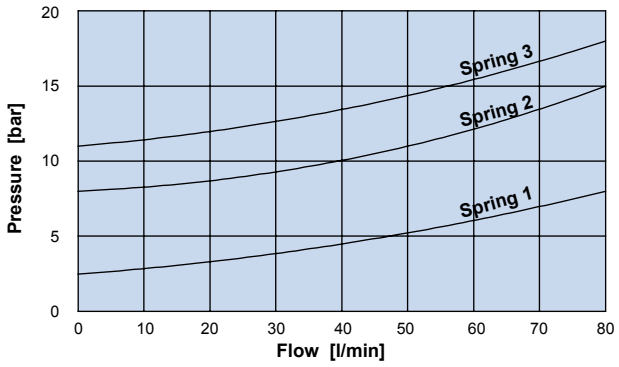
SPRINGS	4
Cracking pressure [bar]	5

2 WAYS NC PRESSURE COMPENSATOR

- Max Flow . . . . . **70 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity **C331000**
- Cartridge thightening torque . . . . . **50 Nm**
- Weight . . . . . **0,17 Kg**







59

Ordering code

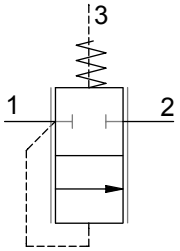
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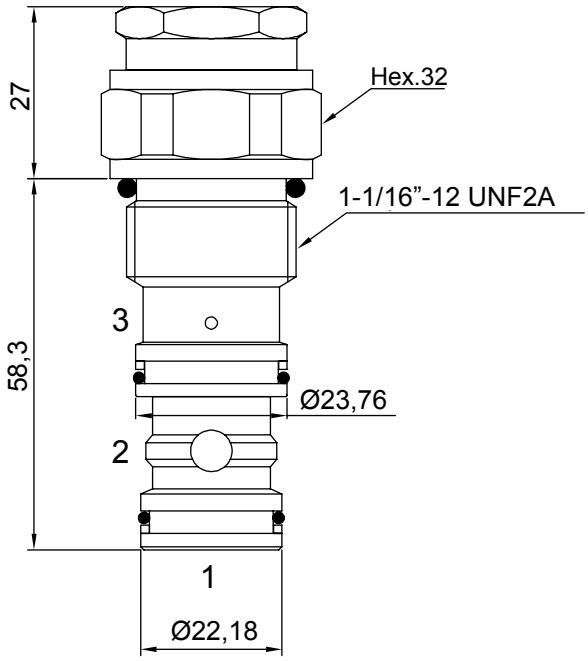
MAX FLOW	1	2
Q [l/min]	40 l/min	70 l/min

SPRINGS	1	2	3
Cracking pressure [bar]	2,5	7,5	11

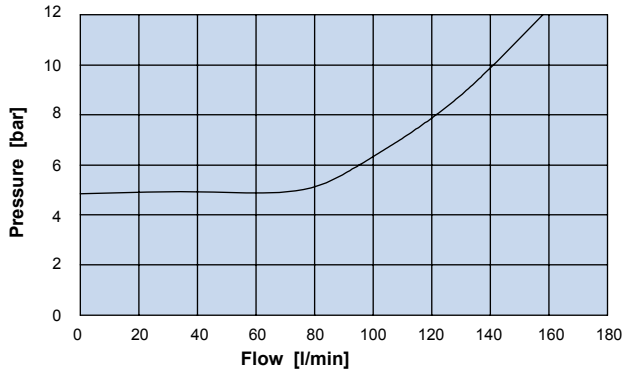
2 WAYS NC PRESSURE COMPENSATOR

- Max Flow . . . . . **150 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR e PTFE**
- Cavity **C341000**
- Cartridge thightening torque . . . . . **90 Nm**
- Weight . . . . . **0,26 Kg**





60



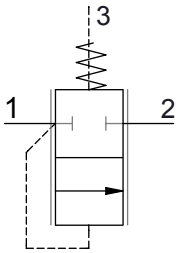
Ordering code

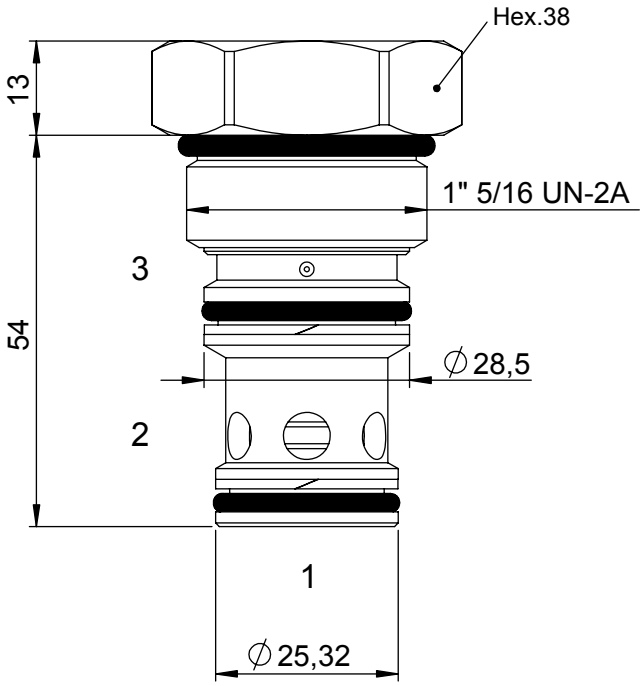
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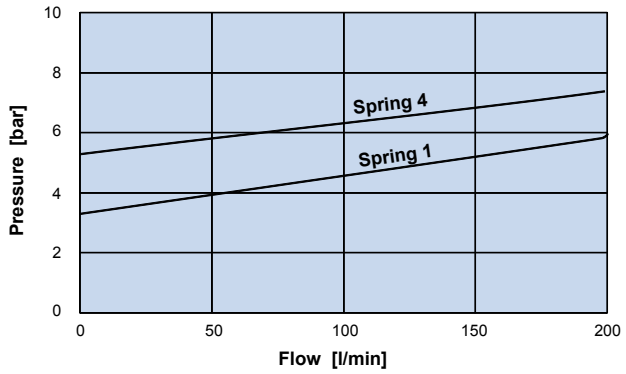
SPRINGS	4
Cracking pressure [bar]	5

2 WAYS NC PRESSURE COMPENSATOR

- Max Flow . . . . . **200 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR**
- Cavity **C351000**
- Cartridge thightening torque . . . . . **110 Nm**
- Weight . . . . . **0,3 Kg**







61

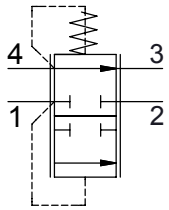
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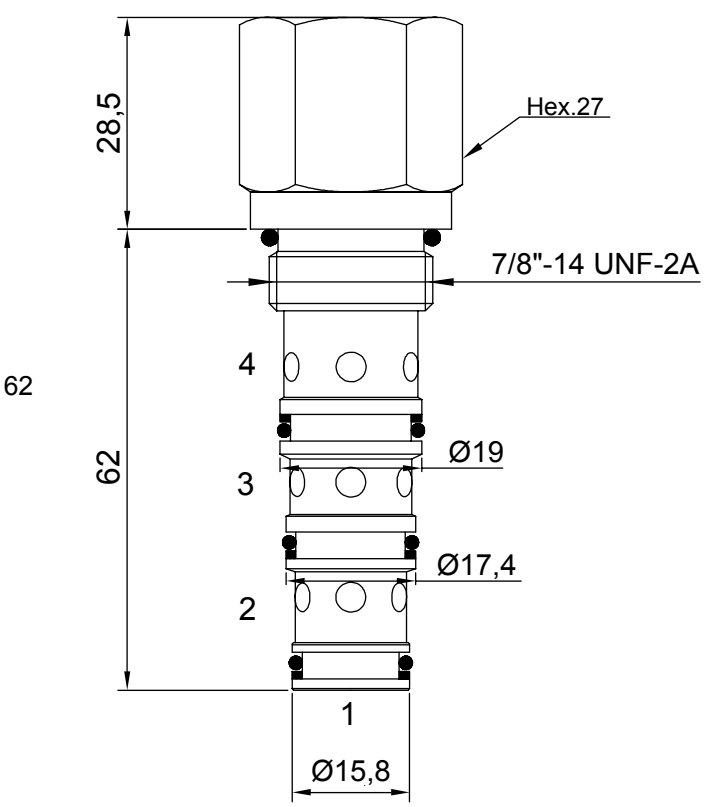
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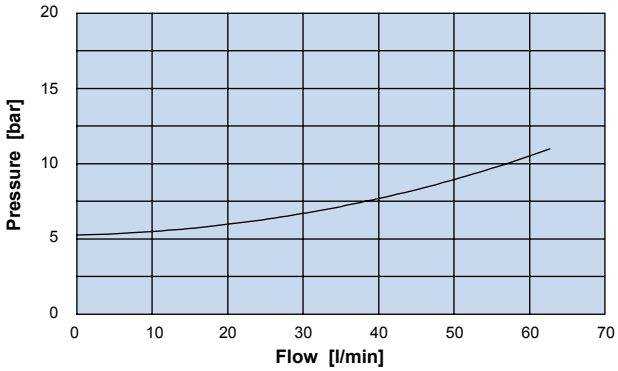
SPRINGS	1	4
Cracking pressure [bar]	2,8	4,8

4 WAYS PRESSURE COMPENSATOR

- Flow . . . . . **60 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR e PTFE**
- Cavity **C430000**
- Cartridge thightening torque . . . . . **50 Nm**
- Weight . . . . . **0,21 Kg**







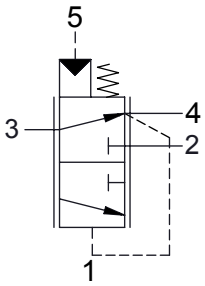
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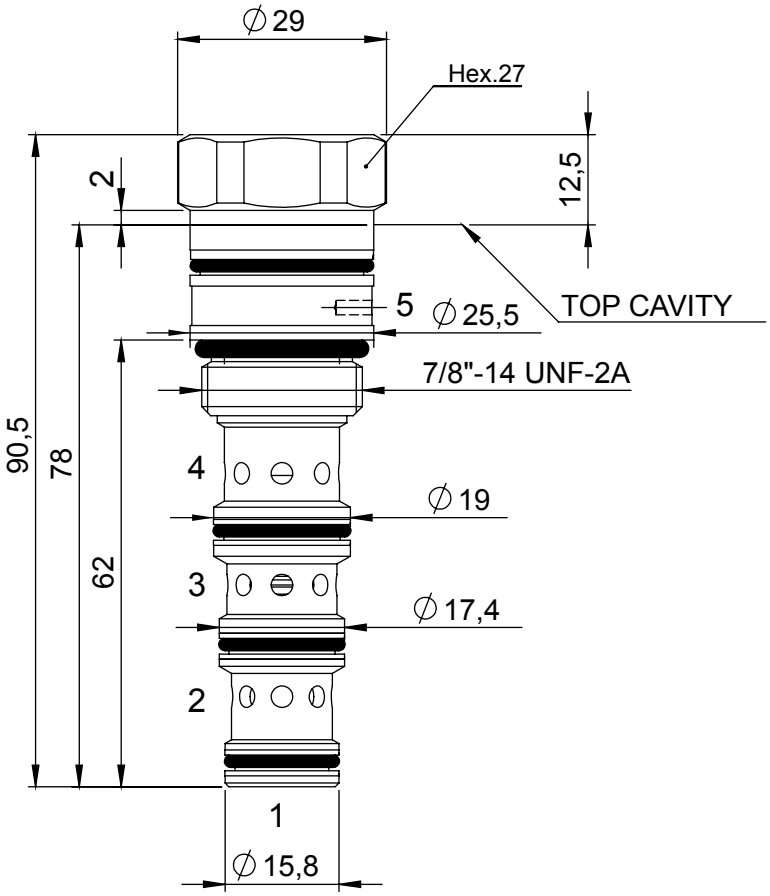
0 2 4 3 0 0 2 ☐ 0 0

SPRINGS	4
Cracking pressure [bar]	5

3 WAYS POST COMPENSATED PRESSURE COMPENSATOR

- Flow . . . . . **50 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR**
- Cavity **C533000**
- Cartridge thightening torque . . . . . **50 Nm**
- Weight . . . . . **0,2 Kg**





63

Ordering code

0 2 5 3 0 0 2 ☐ 0 0

SPRINGS	4
Cracking pressure [bar]	5

ELECTRIC CARTRIDGES

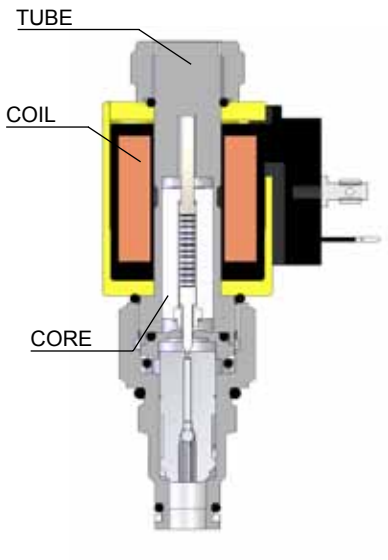
VALVES ON/OFF

64

INTRODUCTION

The hydraulic circuits of mobile machinery, are often equipped with automatic devices or remote controls that require the use of electro hydraulic systems to generate hydraulic power from an electric signal.

The components capable of doing this are called electric valves or solenoid valves.
These valves are hydraulic components that by using a specific mechanical devices can obtain linear movements using the force generated by a magnetic field of a coil fed with current.



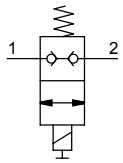
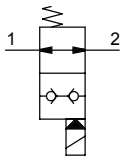
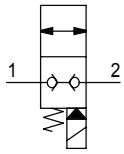
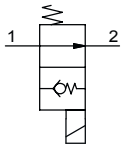
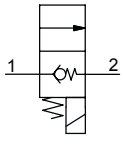
NEM production of solenoid cartridge valves is based on SAE cavity and can cover most of the available circuit: 2 and 3 way 2 positions direct acting lock valves, 2 way 2 position pilot operated lock valves and spool valves 2, 3 and 4 way.

The main characteristics of NEM solenoid cartridge valves is the design and construction of the “Tube”: without any kind of welding, the working principle is based on the tube magnetic saturation, it makes the valve stronger and reliable at high pressures, with an excellent electromagnetic performance.

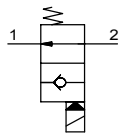
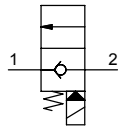
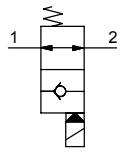
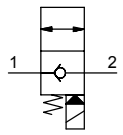
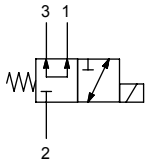
Each NEM solenoid cartridge valve has a dedicated coil (to be ordered as separate item).
The coil has to be selected through the specifications available on the technical sheet, with respect to required voltage and type of connector.

DIRECTIONAL VALVES

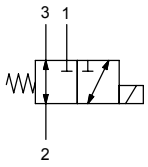
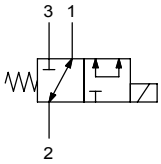
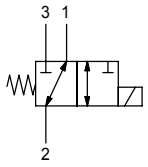
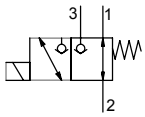
2 WAYS DIRECTIONAL CONTROL VALVES ON/OFF

		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-502 NC	20	250	SAE-08	C220000	5.01.001
	CT-503 NC	30	350	SAE-10	C230000	5.01.002
	CT-512 NA	40	350	SAE-08	C220000	5.01.003
	CT-513 NA	60	350	SAE-10	C230000	5.01.004
	CT-514 NA	150	350	SAE-12	C240000	5.01.005
	CT-512 NC	40	350	SAE-08	C220000	5.01.006
	CT-513 NC	60	350	SAE-10	C230000	5.01.007
	CT-514 NC	150	350	SAE-12	C240000	5.01.008
	CT-532 NA	2	350	SAE-08	C220000	5.01.009
	CT-532 NC	2	350	SAE-08	C220000	5.01.010

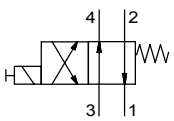
DIRECTIONAL VALVES

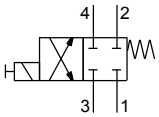
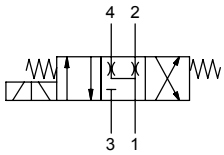
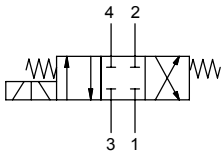
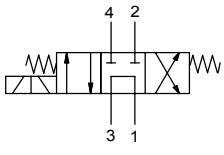
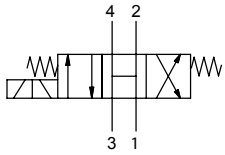
		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-552 NA	30	300	SAE-08	C220000	5.01.011/A
	CT-552 NA	40	350	SAE-08	C220000	5.01.011/B
	CT-553 NA	60	350	SAE-10	C230000	5.01.012
	CT-554 NA	150	350	SAE-12	C240000	5.01.013
	CT-565 NA	200	250	SAE-16	C250000	5.01.014
	CT-552 NC	30	300	SAE-08	C220000	5.01.015/A
	CT-552 NC	40	350	SAE-08	C220000	5.01.015/B
	CT-553 NC	60	350	SAE-10	C230000	5.01.016
	CT-554 NC	150	350	SAE-12	C240000	5.01.017
	CT-565 NC	200	350	SAE-16	C250000	5.01.018
	CT-562 NA	30	300	SAE-08	C220000	5.01.019/A
	CT-562 NA	40	350	SAE-08	C220000	5.01.019/B
	CT-563 NA	60	350	SAE-10	C230000	5.01.020
	CT-564 NA	150	350	SAE-12	C240000	5.01.021
	CT-562 NC	30	300	SAE-08	C220000	5.01.022/A
	CT-562 NC	40	350	SAE-08	C220000	5.01.022/B
	CT-563 NC	60	350	SAE-10	C230000	5.01.023
	CT-564 NC	150	350	SAE-12	C240000	5.01.024
3 WAYS DIRECTIONAL CONTROL VALVES ON/OFF						
	CT-402.1	15	250	SAE-08	C320000	5.01.025

DIRECTIONAL VALVES

		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-402.3 BP	5	50	SAE-08	C320000	5.01.026
	CT-402.3	15	250	SAE-08	C320000	5.01.027
	CT-402.4	15	250	SAE-08	C320000	5.01.028
	CT-402.2	13,5	250	SAE-08	C320000	5.01.029
	CT-403.2	20	250	SAE-10	C330000	5.01.030
	CT-404.2	55	250	SAE-12	C340000	5.01.031
	CT-423.2	30	350	SAE-10	C330000	5.01.032

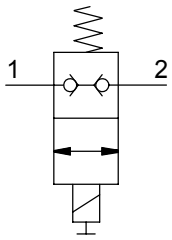
4 WAYS DIRECTIONAL VALVES ON/OFF

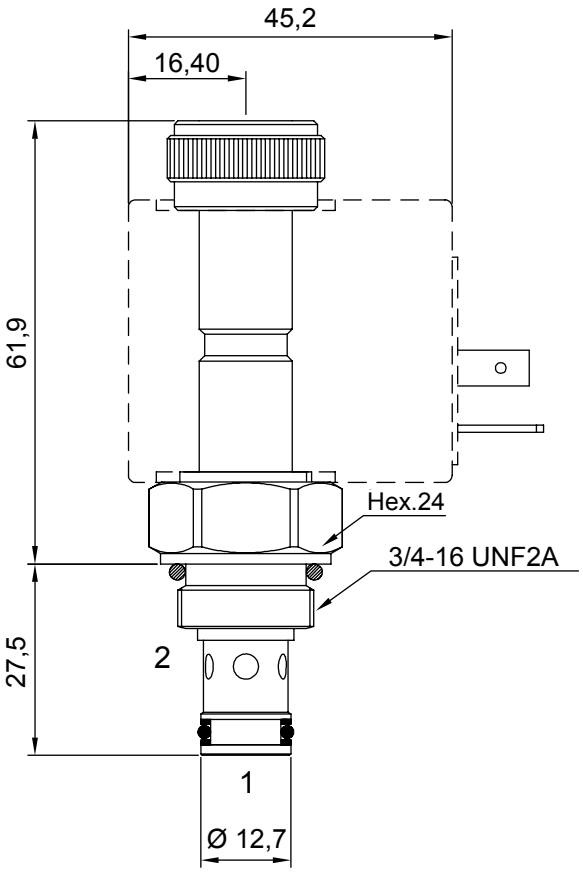
	CT-412.2	10	210	SAE-08	C420000	5.01.033
	CT-413.2	25	250	SAE-10	C430000	5.01.034

		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-412.3	10	210	SAE-08	C420000	5.01.033
	CT-413.3	25	250	SAE-10	C430000	5.01.034
	CT-462.1	10	210	SAE-08	C420000	5.01.035
	CT-463.1	25	250	SAE-10	C430000	5.01.036
	CT-462.2	10	210	SAE-08	C420000	5.01.037
	CT-463.2	25	250	SAE-10	C430000	5.01.038
	CT-462.3	10	210	SAE-8	C420000	5.01.039
	CT-463.3	25	250	SAE-10	C430000	5.01.040
	CT-462.4	10	250	SAE-8	C420000	5.01.041
	CT-463.4	25	250	SAE-10	C430000	5.01.042

2 WAYS 2 POSITIONS ELECTRIC VALVE DIRECT ACTING POPPET OPERATED NC

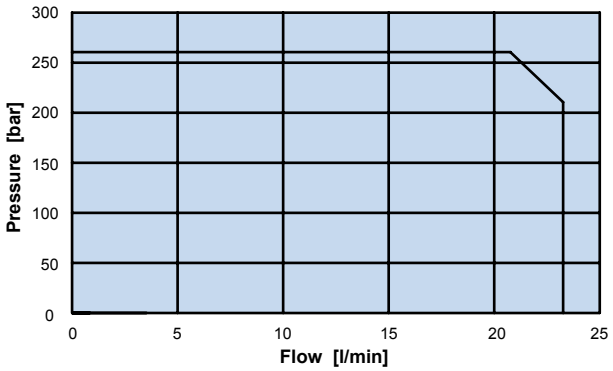
- Flow . . . . . **20 l/min**
- Max working pressure . . . . . **250 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque . . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil) . . . . . **0,32 Kg**
- Coil **CT-9400** to be ordered separately



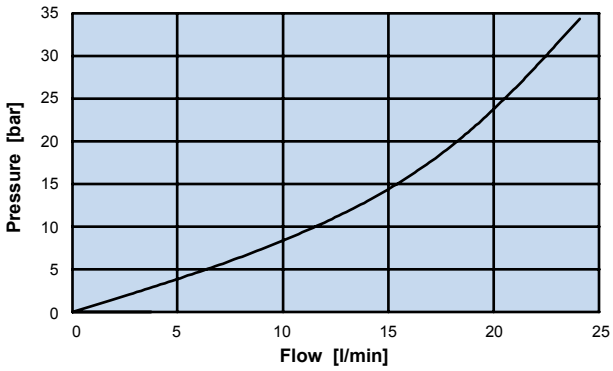


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Application limits from 1 in 2 and 2 in 1



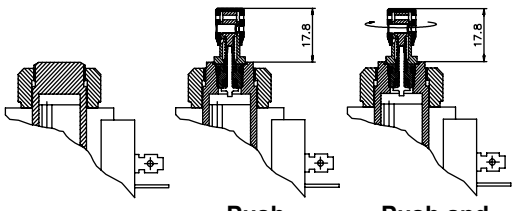
Pressure drop with energized coil



Ordering code

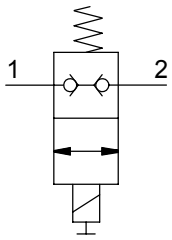
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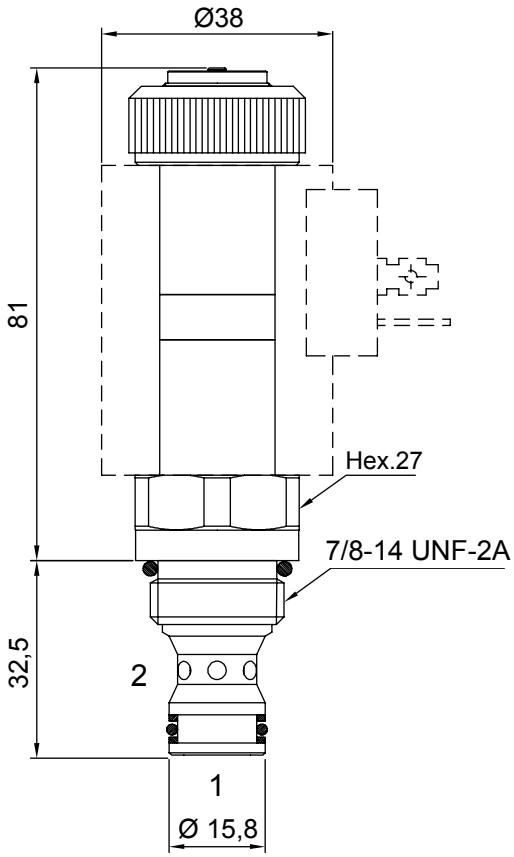
0	4	5
No emergency	Push Button	Push and Twist

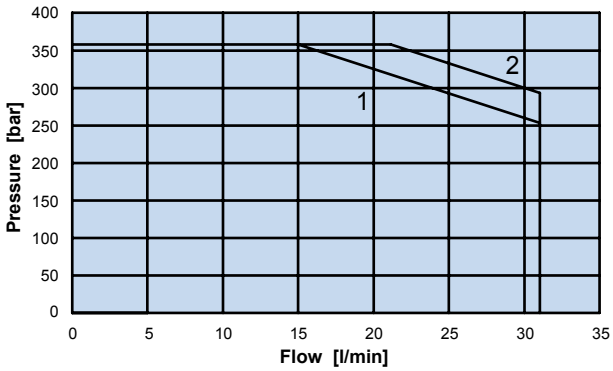


2 WAYS 2 POSITIONS ELECTRIC VALVE DIRECT ACTING POPPET OPERATED NC

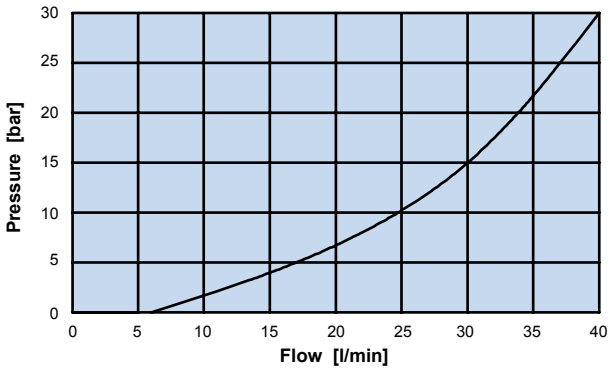
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals. . . . . **NBR**
- Cavità **C230000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). .. . . . . **0,56 Kg**
- Coil **CT-9800** to be ordered separately







1 = Limits from 2 to 1
2 = Limits from 1 to 2



Pressure drop with energized coil

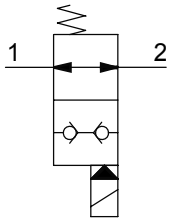
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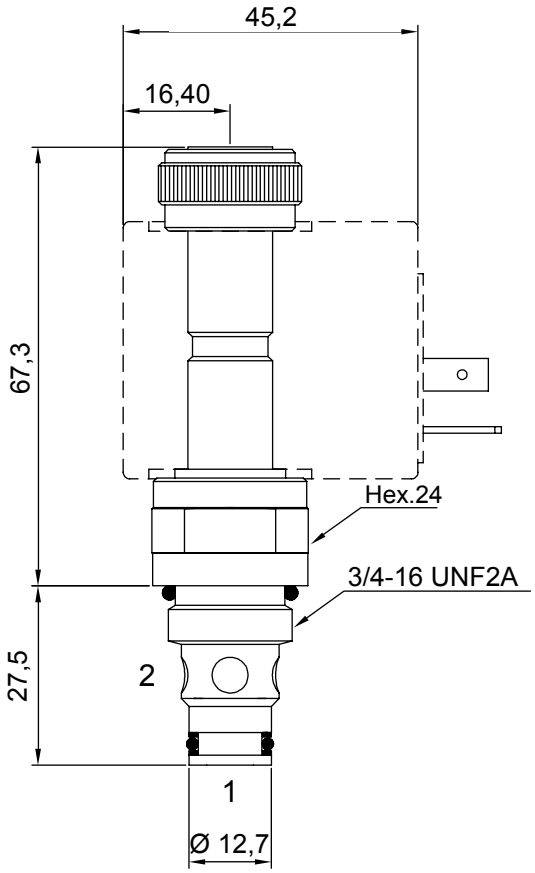
0 5 0 3 1 0 0 ☐ 0 0

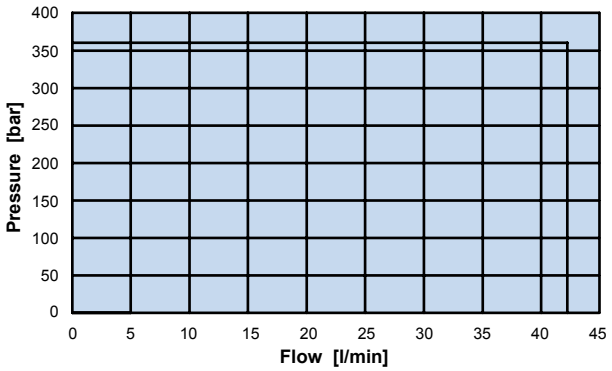
0	1	4	5
No emergency	Push pin	Push Button	Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

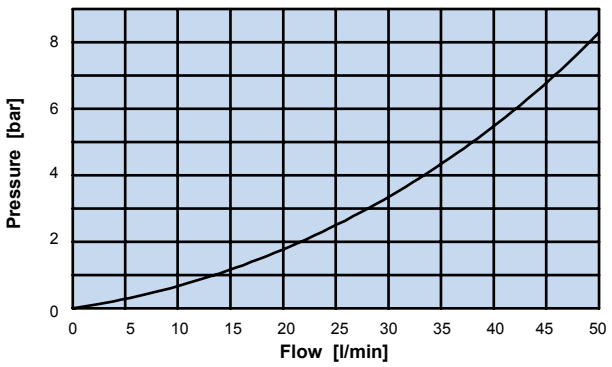
- Flow . . . . . **40 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil) . . . . . **0,32 Kg**
- Coil **CT-9400** to be ordered separately







Application limits from 2 to 1 and 1 to 2

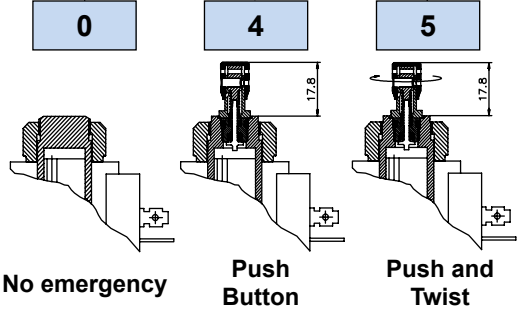


Pressure drop from 2 to 1 and from 1 to 2

72

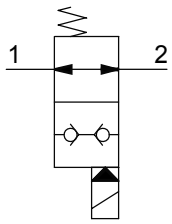
Ordering code

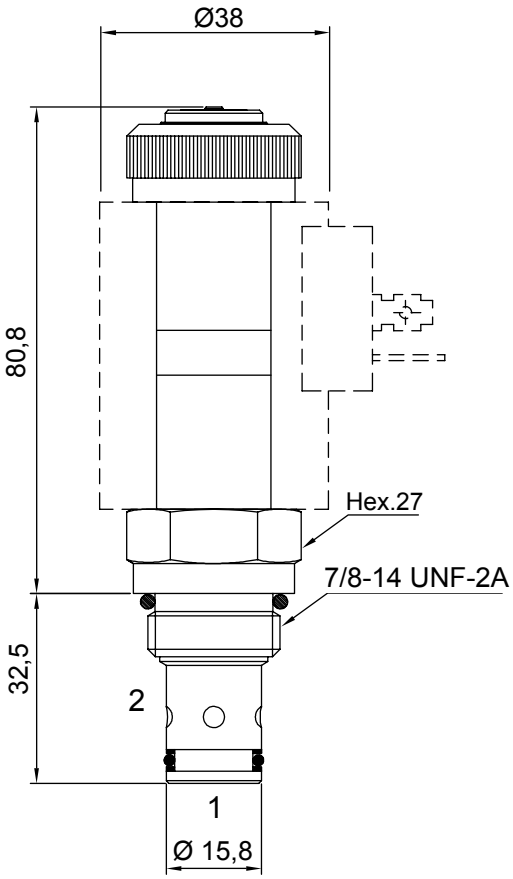
0 5 1 2 0 0 0 ☐ 0 0

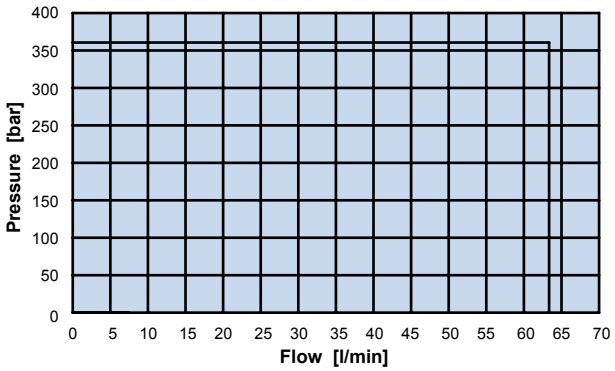


2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

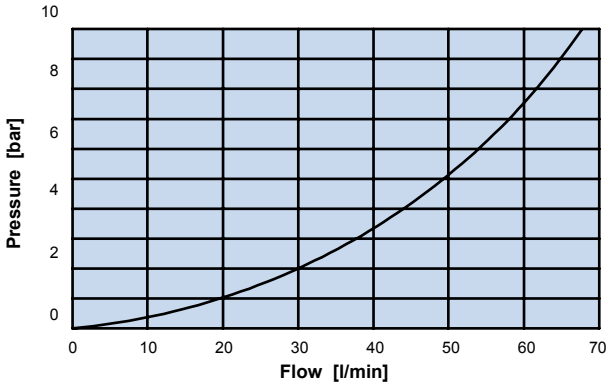
- Flow . . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage. . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C230000**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil) . . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately







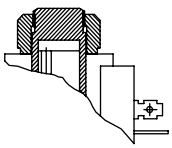
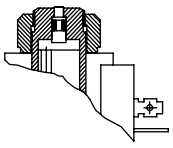
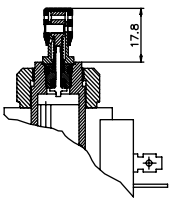
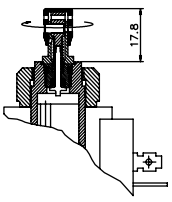
Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

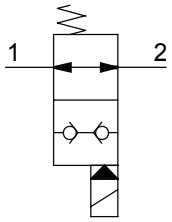
Ordering code

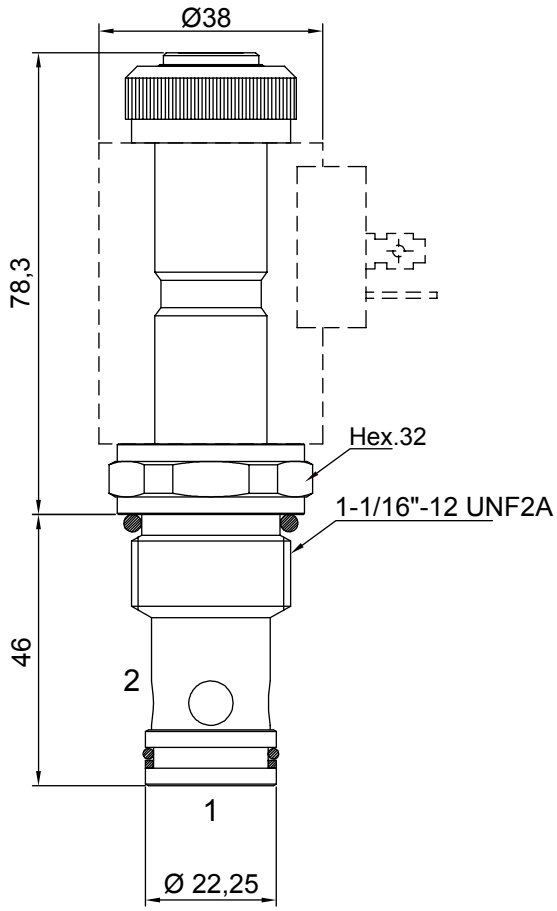
0 5 1 3 0 0 0 ☐ 0 0

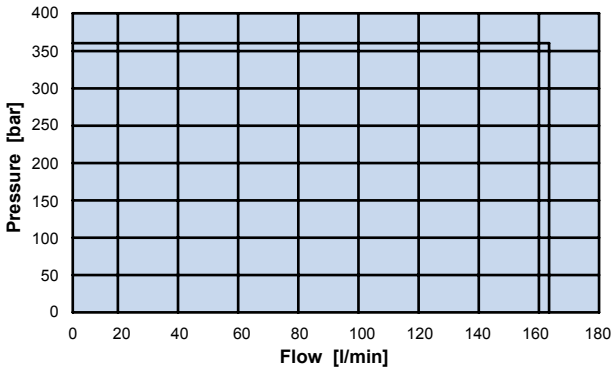
0	1	4	5
			
No emergency	Push pin	Push Button	Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

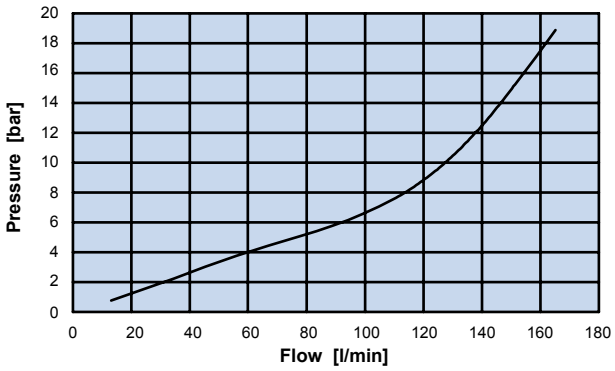
- Flow . . . . . .150 l/min
- Max working pressure . . . . . 350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . .NBR
- Cavity C240000
- Cartridge thightening torque . . . . . 50 Nm
- Ring nut thightening torque . . . . . 5 Nm
- Weight (with coil) . . . . . 0,58 Kg
- Coil **CT-9801** to be ordered separately







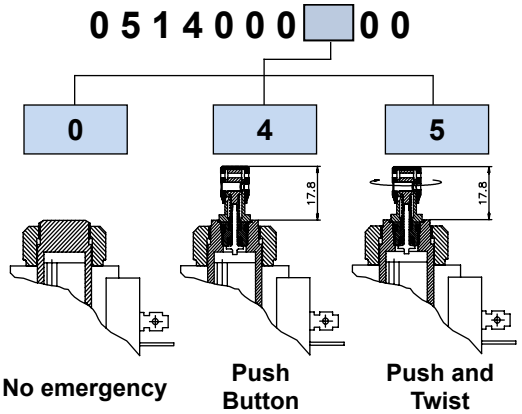
Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

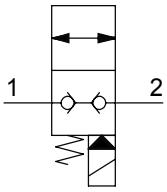
Ordering code

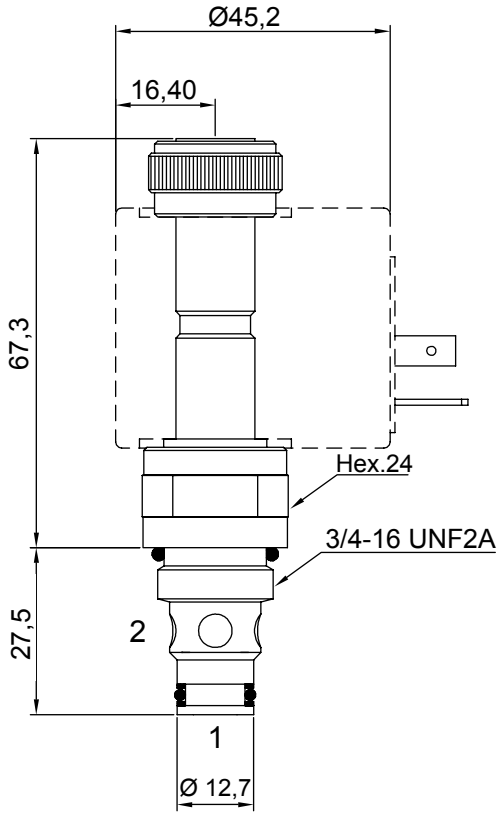
0 5 1 4 0 0 0 ☐ 0 0

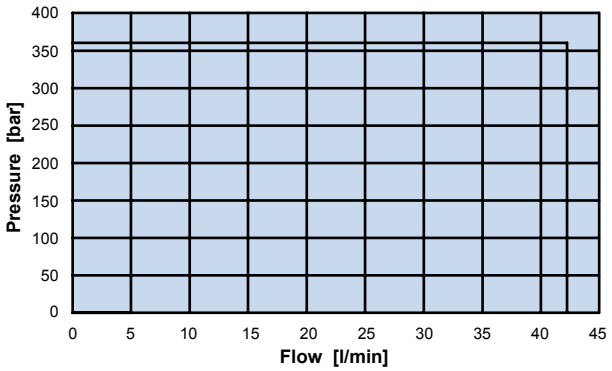


2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

- Flow . . . . . .40 l/min
- Max working pressure . . . . . .350 bar
- Leakage . . . . . .0,25 cc/min
- Seals . . . . . NBR
- Cavity C220000
- Cartridge thightening torque. . . . . .30 Nm
- Ring nut thightening torque. . . . . .5 Nm
- Weight (with coil). . . . . .0,32 Kg
- Coil **CT-9400** to be ordered separately

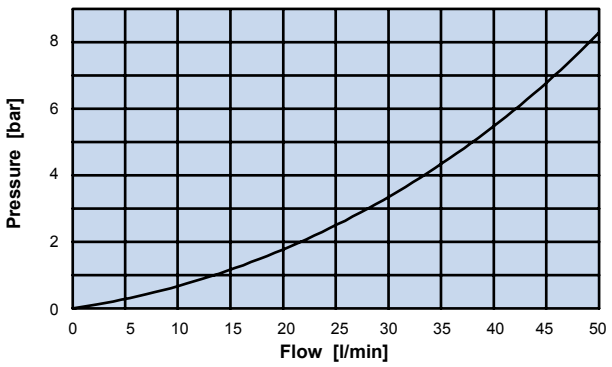






Application limits from 2 to 1 and 1 to 2

75

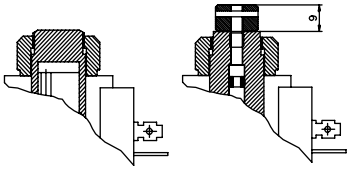


Pressure drop from 2 to 1 and from 1 to 2

Ordering code

0 5 1 2 1 0 0 ☐ 0 0

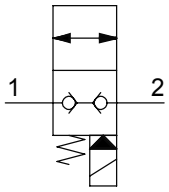
0	6

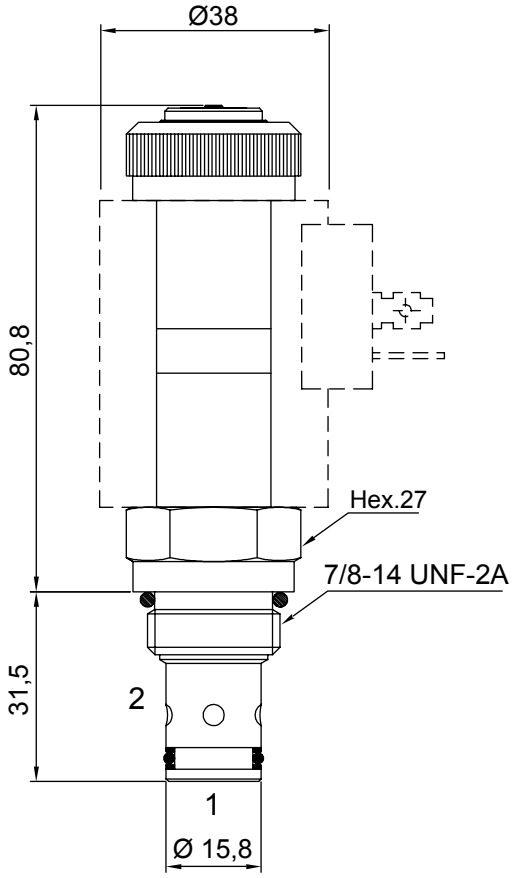


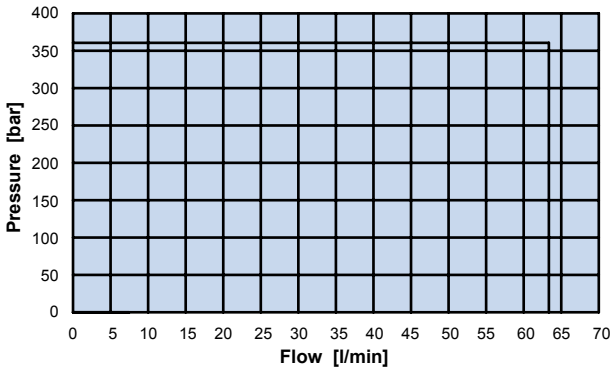
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

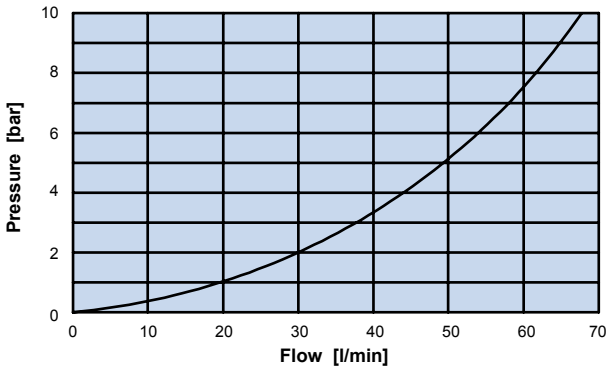
- Flow . . . . . .60 l/min
- Max working pressure . . . . . .350 bar
- Leakage . . . . . .0,25 cc/min
- Seals . . . . . NBR
- Cavity C230000
- Cartridge thightening torque. . . . . .40 Nm
- Ring nut thightening torque. . . . . 5 Nm
- Weight (with coil). . . . . .0,56 Kg
- Coil **CT-9801** to be ordered separately







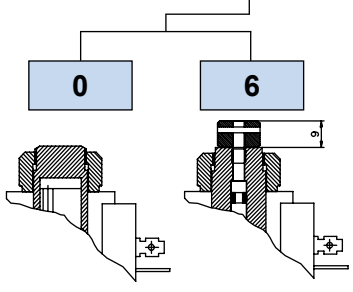
Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

Ordering code

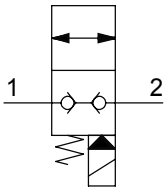
0 5 1 3 1 0 0 ☐ 0 0

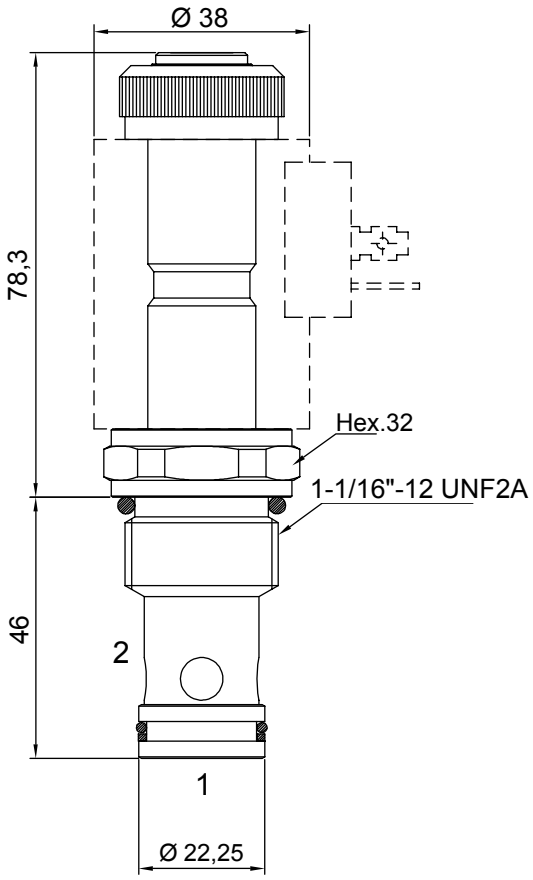


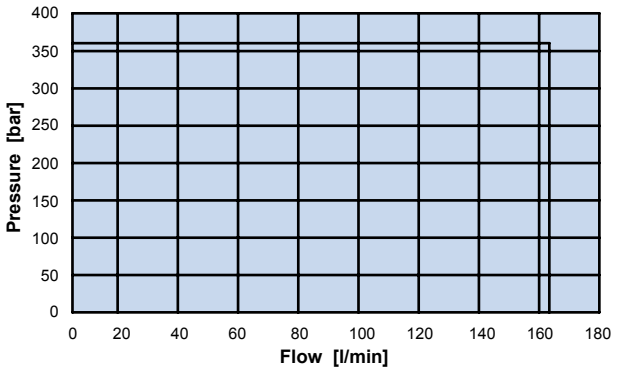
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

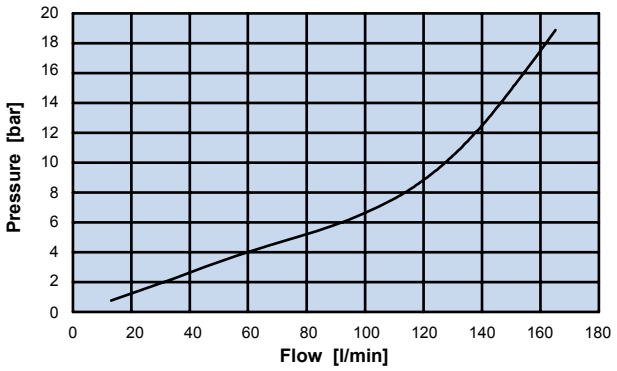
- Flow . . . . . .150 l/min
- Max working pressure . . . . . .350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . .NBR
- Cavity C240000
- Cartridge thightening torque . . . . . 50 Nm
- Ring nut thightening torque . . . . . 5 Nm
- Weight (with coil). . . . . 0,58 Kg
- Coil **CT-9801** to be ordered separately







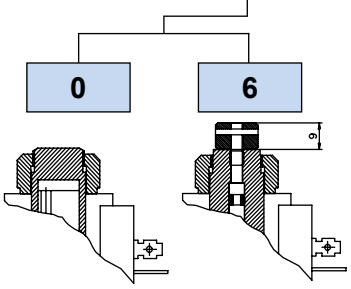
Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

Ordering code

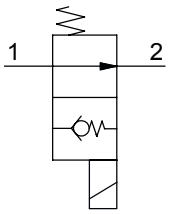
0 5 1 4 1 0 0 ☐ 0 0

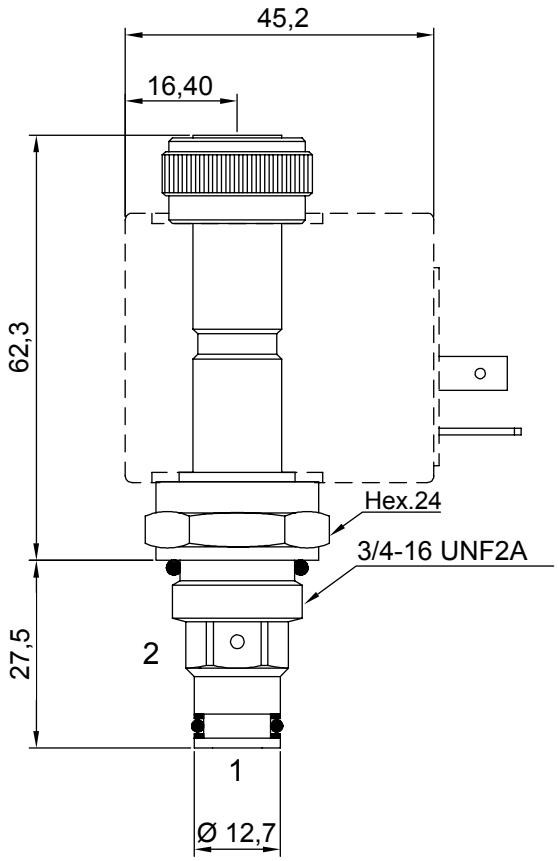


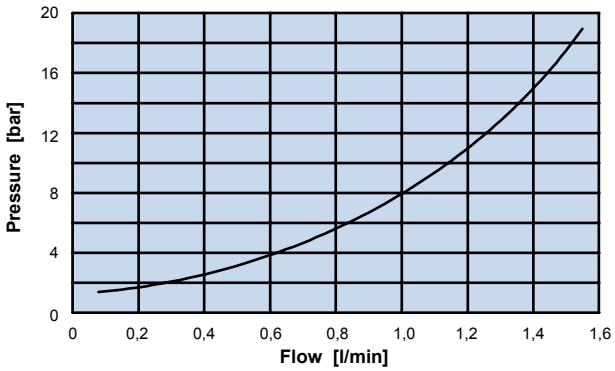
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, DIRECT ACTING NO

- Flow . . . . . .2 l/min
- Max working pressure in 1. . . . . .350 bar
- Max working pressure in 2. . . . . .20 bar
- Leakage. . . . . .0,25 cc/min
- Seals. . . . . NBR
- Cavity C220000
- Cartridge thightening torque. . . . . .30 Nm
- Ring nut thightening torque. . . . . .5 Nm
- Weight (with coil). . . . . .0,32 Kg
- Coil **CT-9400** to be ordered separately





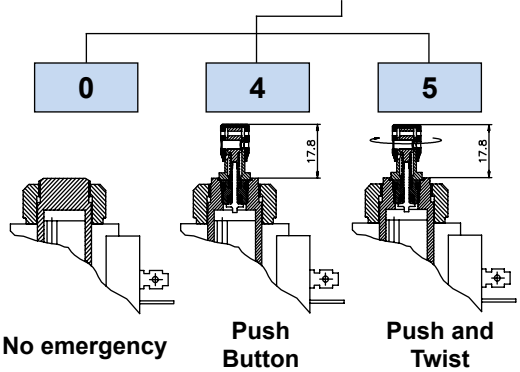


Pressure drop graph 1 in 2

78

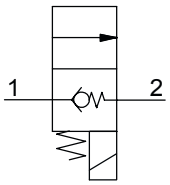
Ordering code

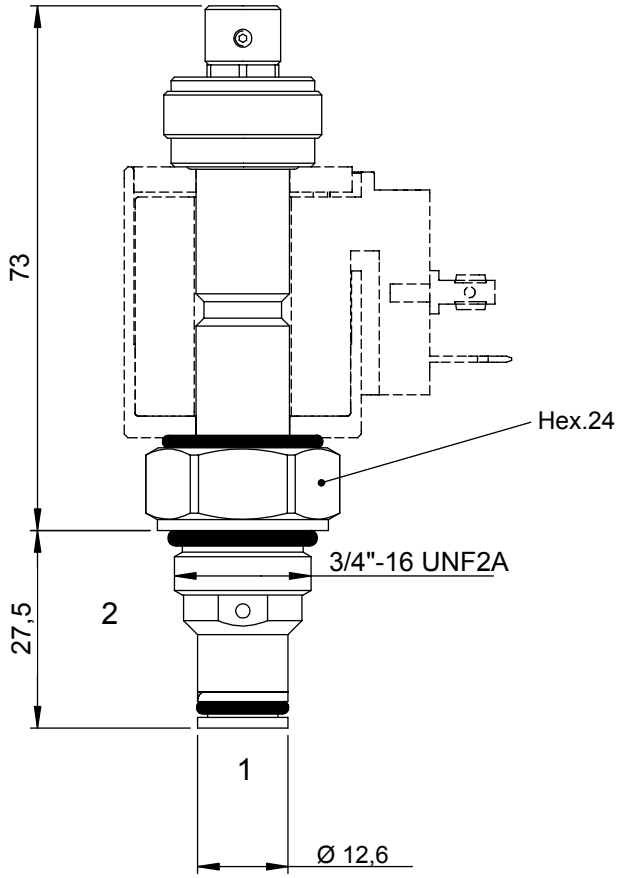
0 5 3 2 0 1 0 ☐ 0 0



2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

- Flow. . . . . .**2 l/min**
- Max working pressure in 1 . . . . . .**350 bar**
- Max working pressure in 2 . . . . . **20 bar**
- Cavity **C220000**
- Leakage. . . . . **0,25 cc/min**
- Seals . . . . . .**NBR**
- Cartridge thightening torque. . . . . .**30 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight . . . . . .**0,32 Kg**
- Coil **CT-9400** to be ordered separately



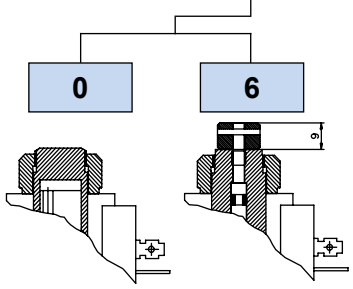


79

Note:
- Cracking pressure with de-energized coil 1 to 2 at 380 bar.

Ordering code

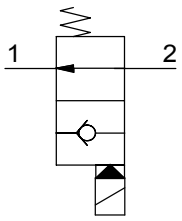
0 5 3 2 1 1 0 ☐ 0 0

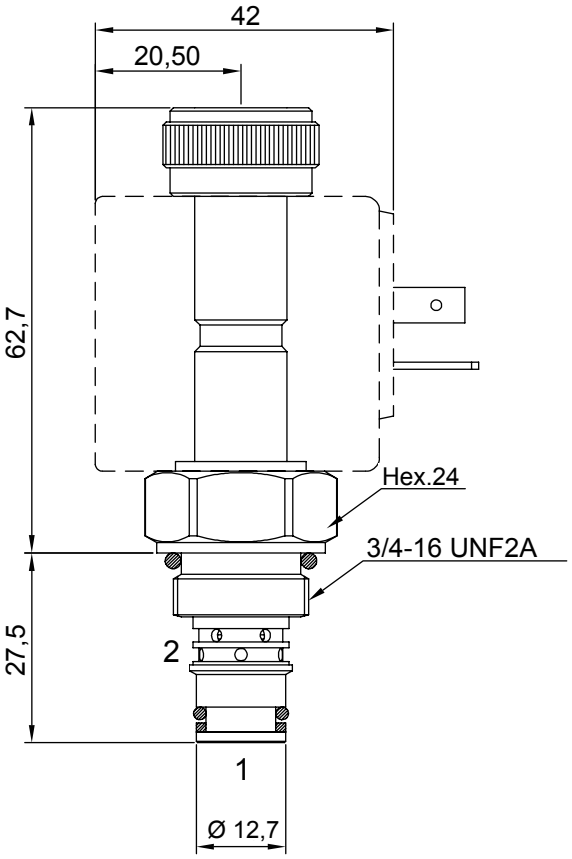


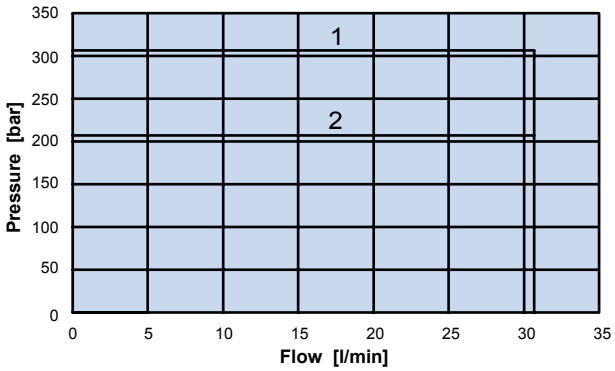
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

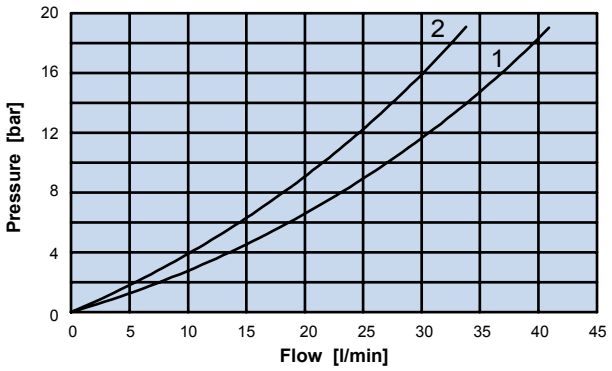
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **300 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque . . . . . **30 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Filter. . . . . **280 microm**
- Coil **CT-9300** to be ordered separately







1 = Application limits from 2 to 1
2 = Application limits from 1 to 2



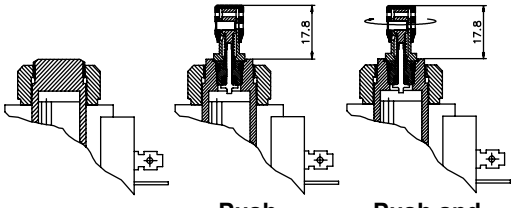
1 = Pressure drop from 2 to 1 without filter
2 = Pressure drop from 2 to 1 with filter

80

Ordering code

0 5 5 2 5 0 0 ☐ ☐ 0

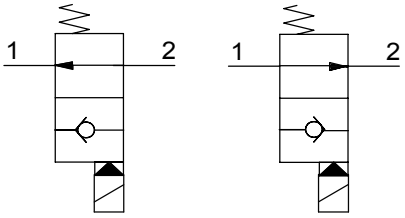
0	4	5	0	1
			Without filter	With filter



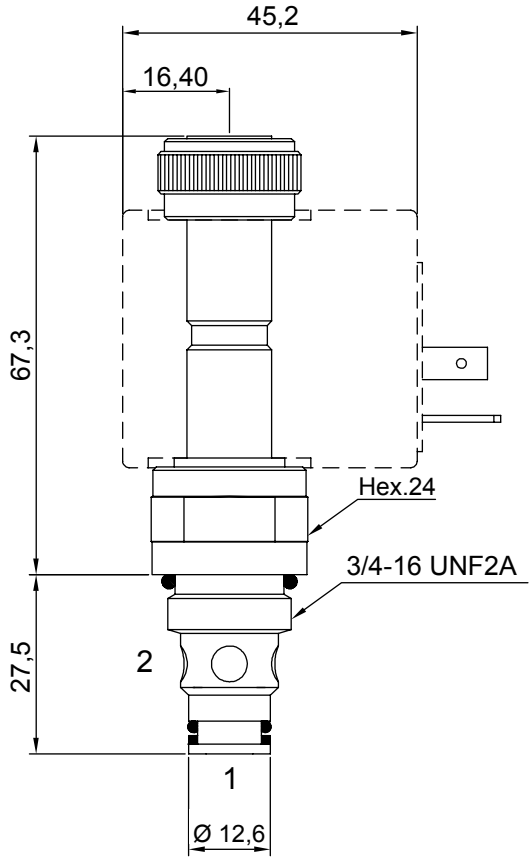
No emergency | Push Button | Push and Twist

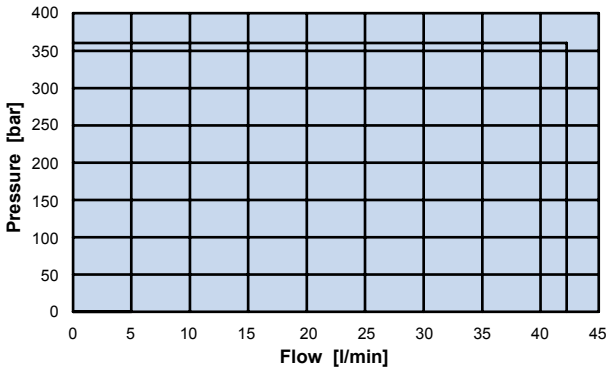
2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

- Flow . . . . . **40 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Coil **CT-9400** to be ordered separately

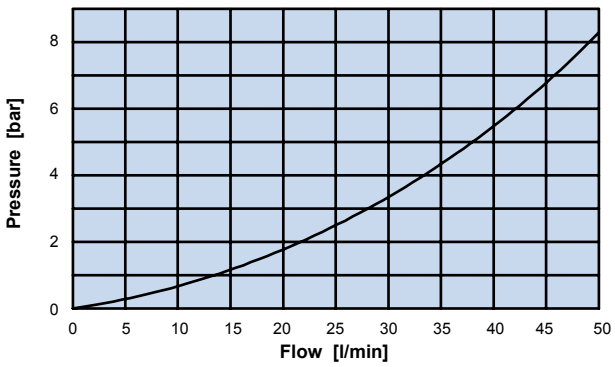


Scheme 0 **Scheme 1**





Application limits from 1 to 2 and 2 to 1



Pressure drop with energized coil

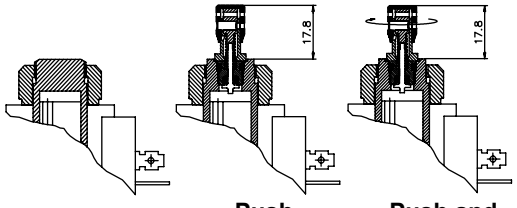
Ordering code

0 5 5 2 0 ☐ 0 ☐ 0 0

0	1

Hydraulic Scheme

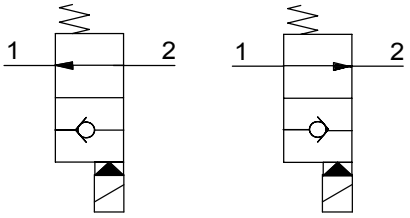
0	4	5



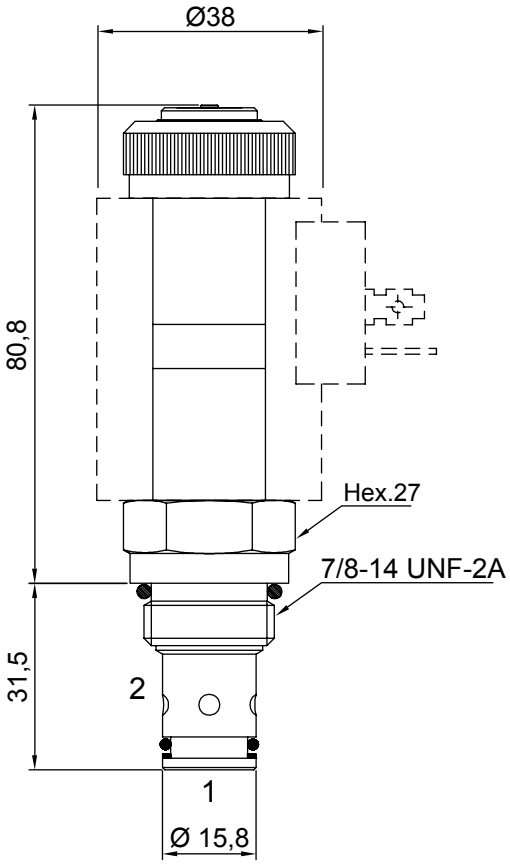
No emergency **Push Button** **Push and Twist**

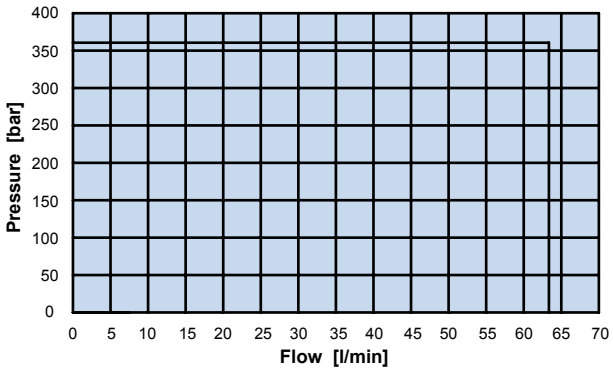
2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

- Flow . . . . . .60 l/min
- Max working pressure . . . . . .350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . NBR
- Cavity C230000
- Cartridge thightening torque. . . . . 40 Nm
- Ring nut thightening torque. . . . . .5 Nm
- Weight (with coil). . . . . .0,56 Kg
- Coil **CT-9801** to be ordered separately

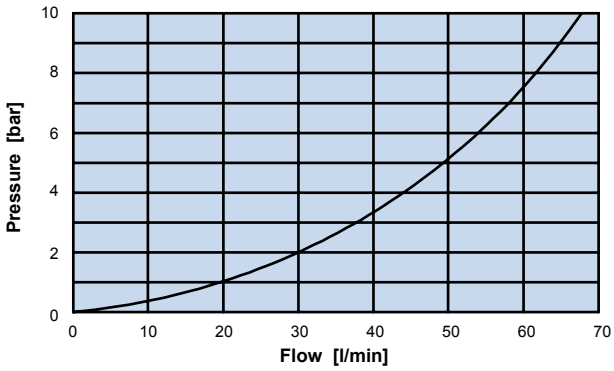


Scheme 0 Scheme 1





Application limits from 2 to 1 and 1 to 2



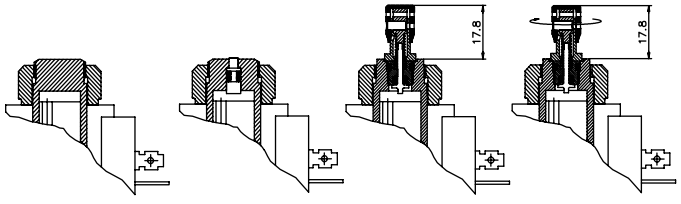
Pressure drop from 2 to 1 and from 1 to 2

Ordering code

0 5 5 3 0 ☐ 0 ☐ 0 0

0	1	0	1	4	5

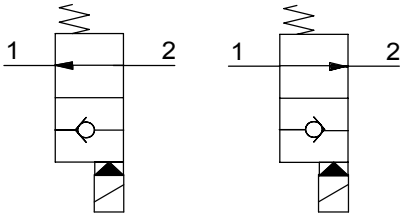
Hydraulic scheme



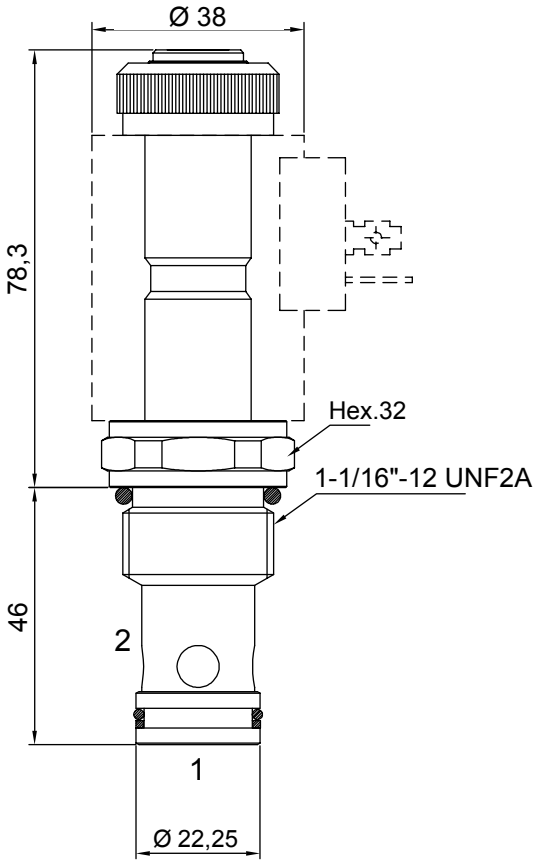
No emergency | Push pin | Push Button | Push and Twist

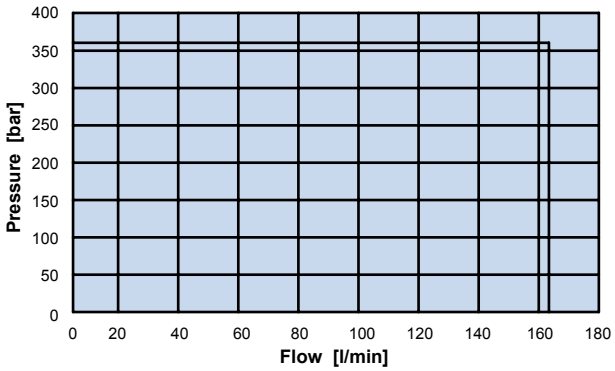
2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

- Flow . . . . . **150 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C240000**
- Cartridge thightening torque. . . . . **50 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately

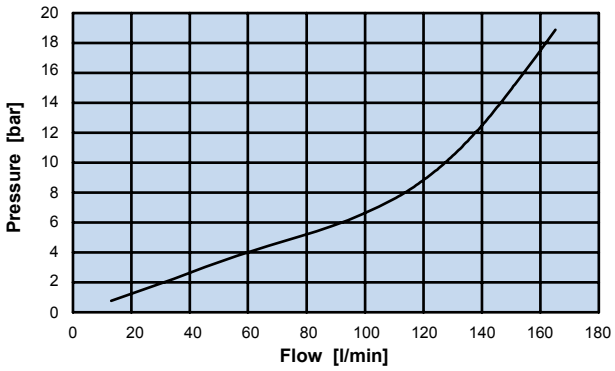


Scheme 0 **Scheme 1**





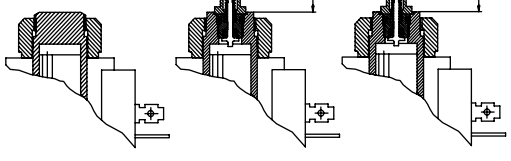
Application limits from 1 in 2 and 2 in 1



Pressure drop with energized coil

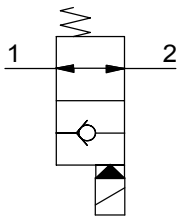
Ordering code

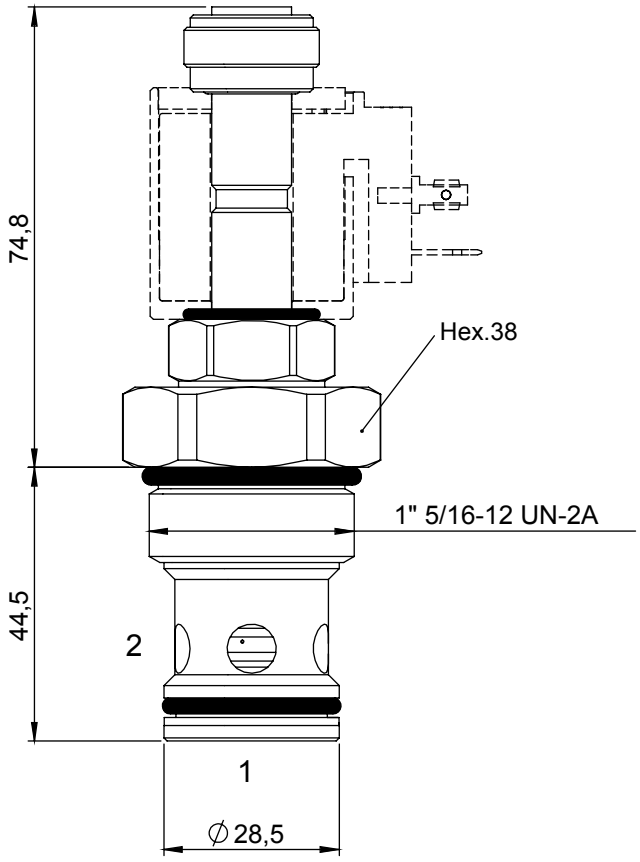
0 5 5 4 0 ☐ 0 ☐ 0 0

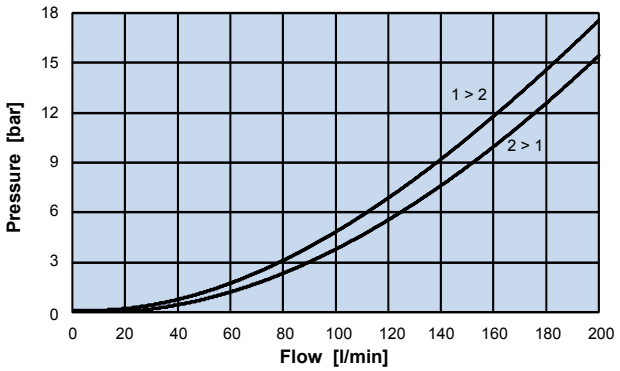
0	**1**		**0**	**4**	**5**
Hydraulic scheme					
			No emergency	**Push Button**	**Push and Twist**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

- Flow. . . . . .**200 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage. . . . . **0,25 cc/min**
- Seals. . . . . **NBR**
- Cavity **C250000**
- Cartridge thightening torque . . . . . **65 Nm**
- Ring nut thightening torque . . . . . .**5 Nm**
- Weight (with coil). . . . . **0,58 Kg**
- Coil **CT-9400** to be ordered separately





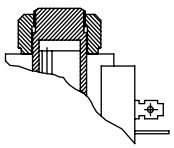
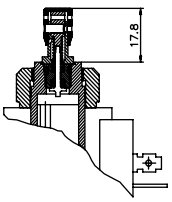
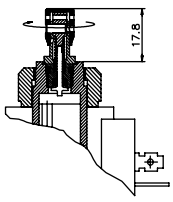


Application limits from 1 in 2 and 2 in 1

84

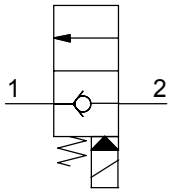
Ordering code

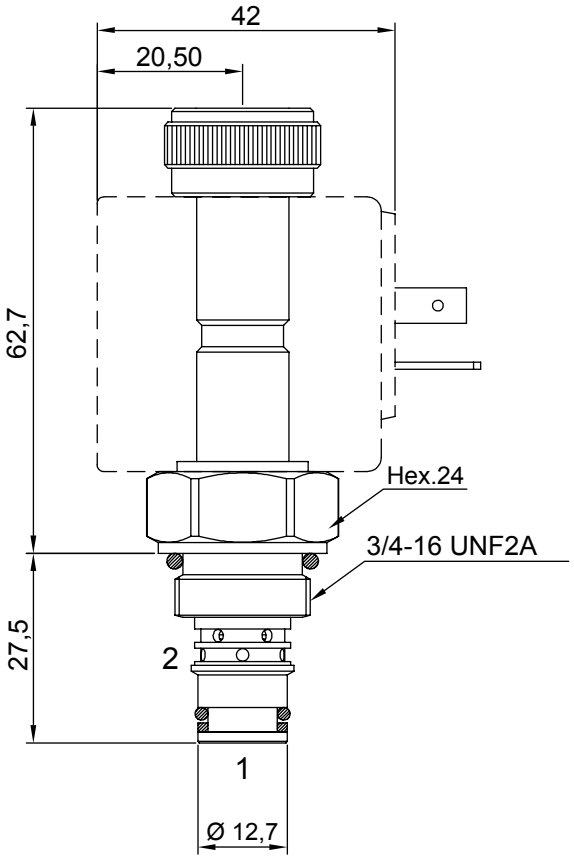
0 5 6 5 0 0 0 □ 0 0

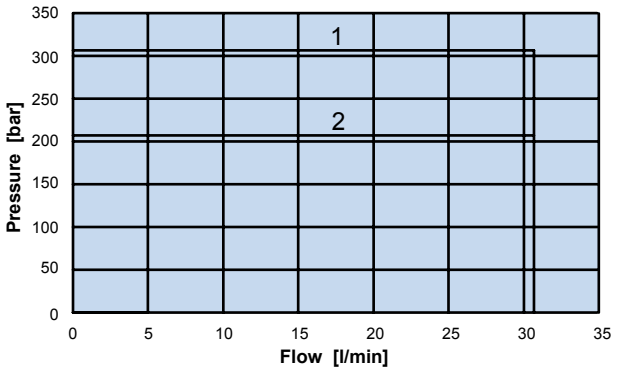
0	4	5
		
No emergency	Push Button	Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

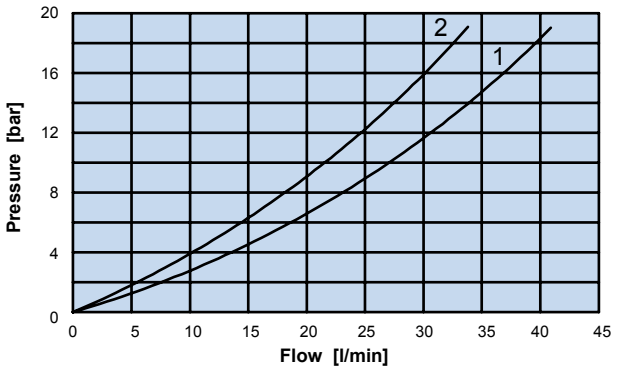
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **300 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Filter. . . . . **280 microm**
- Coil **CT-9300** to be ordered separately







1 = Application limits from 2 to 1 without filter
2 = Application limits with filter

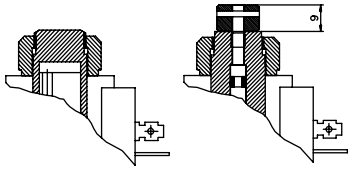


1 = Pressure drop from 2 to 1 without filter
2 = Pressure drop from 2 to 1 with filter

Ordering code

0 5 5 2 6 0 0 ☐ ☐ 0

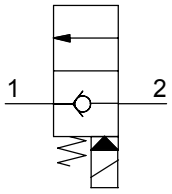
0	**6**	**0**	**1**
		Without filter	With filter



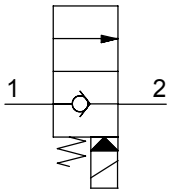
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

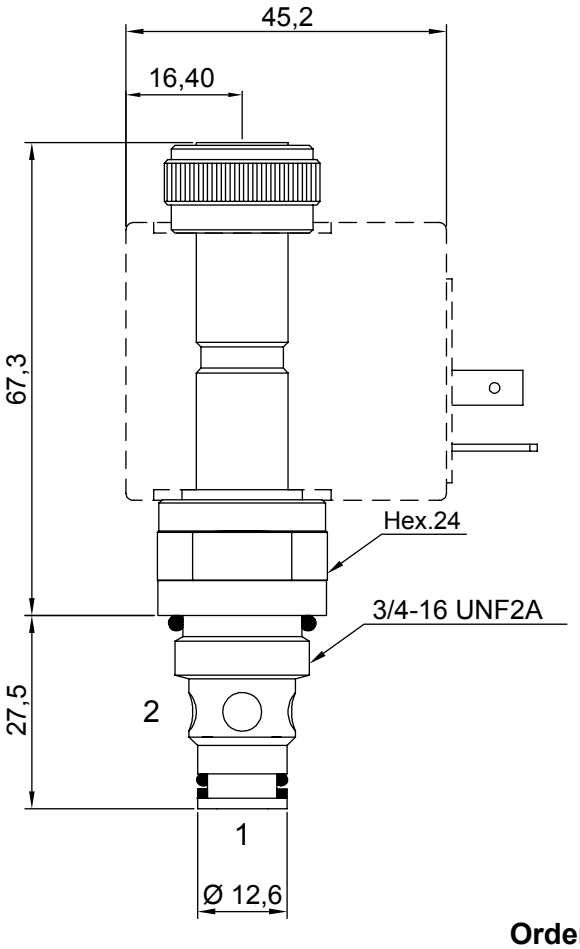
- Flow . . . . . .40 l/min
- Max working pressure . . . . . 350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . .NBR
- Cavity C220000
- Cartridge thightening torque . . . . . .30 Nm
- Ring nut thightening torque. . . . . .5 Nm
- Weight (with coil). . . . . .0,32 Kg
- Coil **CT-9400** to be ordered separately

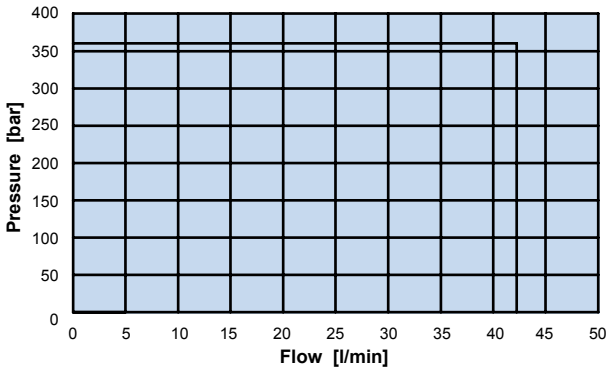


Scheme 0

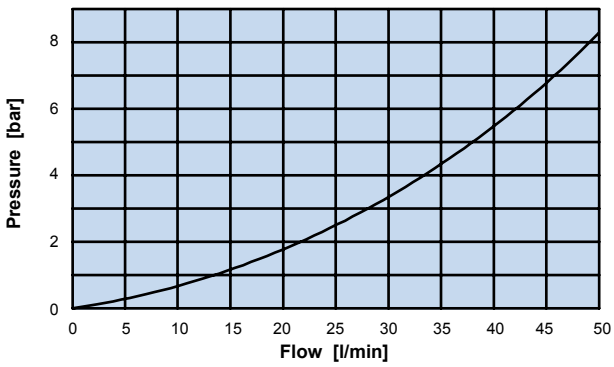


Scheme 1





Application limits from 2 to 1 and 1 to 2



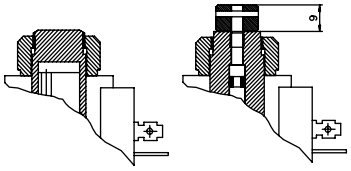
Pressure drop from 2 to 1 and from 1 to 2

Ordering code

0 5 5 2 1 ☐ 0 ☐ 0 0

0	1	0	6

Hydraulic scheme

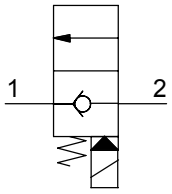


No emergency

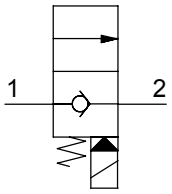
Unscrew type

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

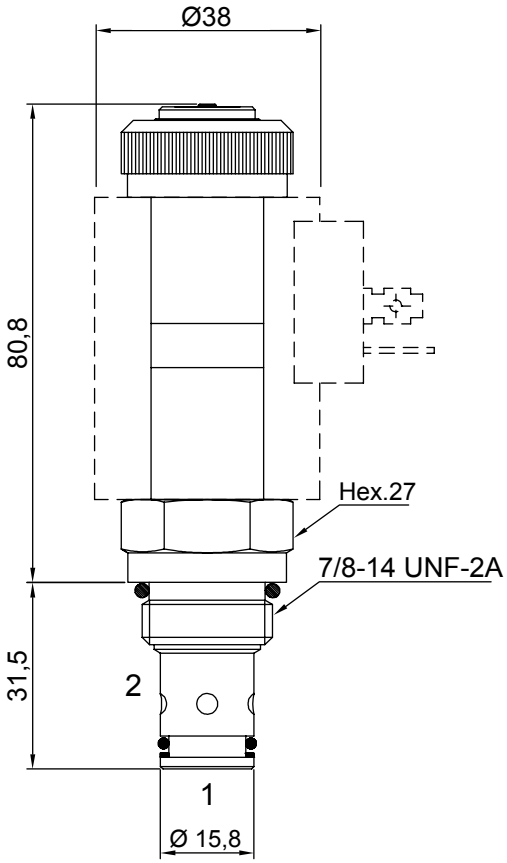
- Flow . . . . . .60 l/min
- Max working pressure . . . . . 350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . NBR
- Cavity C230000
- Cartridge thightening torque. . . . . .40 Nm
- Ring nut thightening torque. . . . . .5 Nm
- Weight (with coil). . . . . .0,56 Kg
- Coil **CT-9801** to be ordered separately

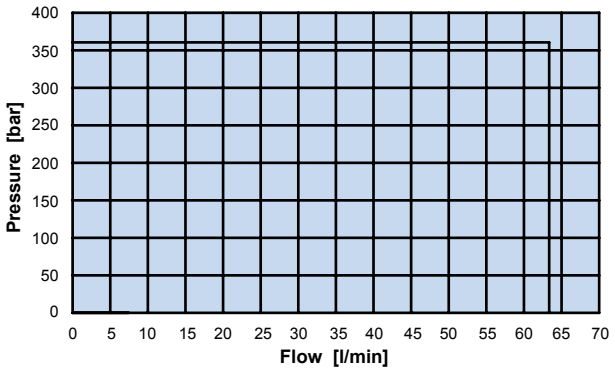


Scheme 0

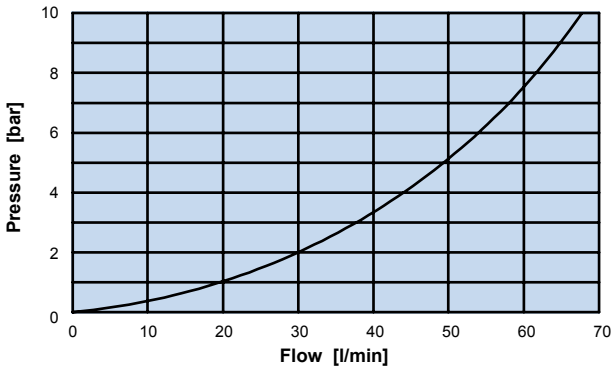


Scheme 1





Application limits from 2 to 1 and 1 to 2



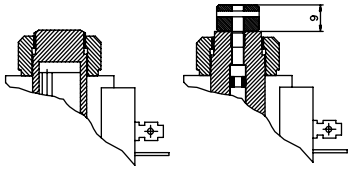
Pressure drop from 2 to 1 and from 1 to 2

Ordering code

0 5 5 3 1 ☐ 0 ☐ 0 0

0	1	0	6

Hydraulic scheme

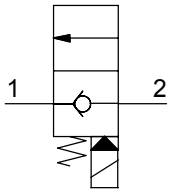


No emergency

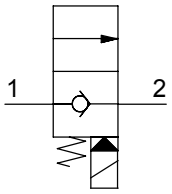
Unscrew type

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

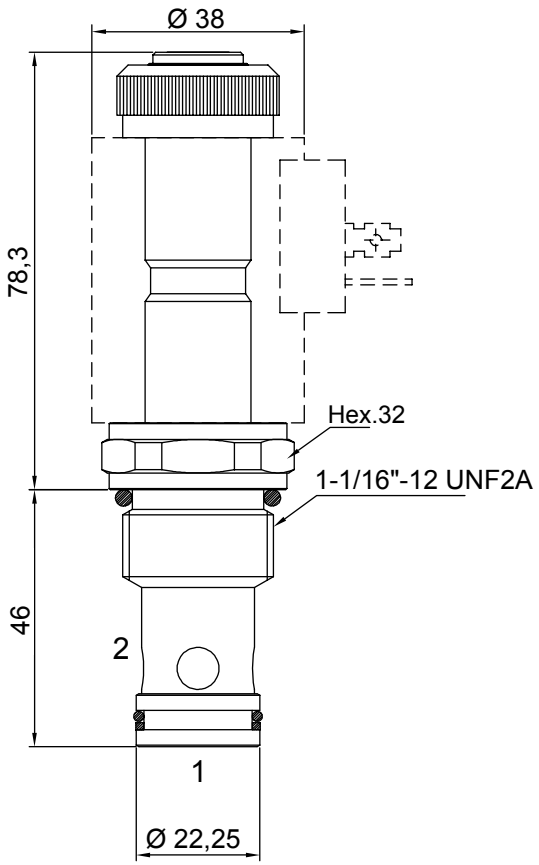
- Flow . . . . . **150 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C240000**
- Cartridge thightening torque . . . . . **50 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,58 Kg**
- Coil **CT-9801** to be ordered separately

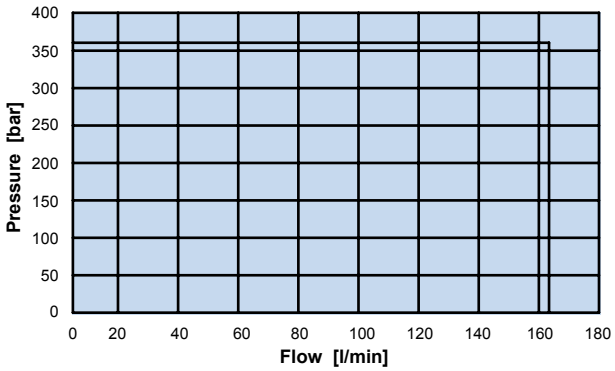


Scheme 0

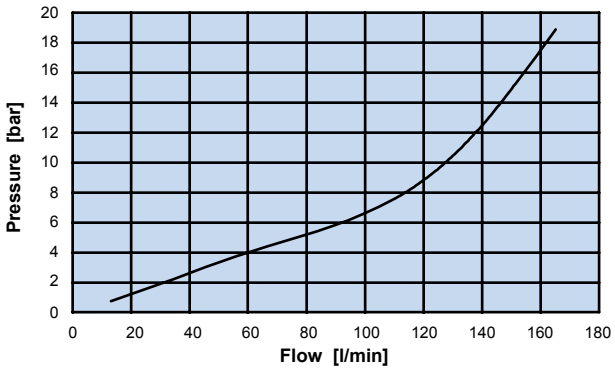


Scheme 1





Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

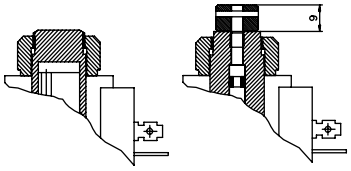
88

Ordering code

0 5 5 4 1 ☐ 0 ☐ 0 0

0	1	0	6

Hydraulic scheme

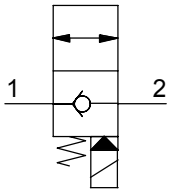


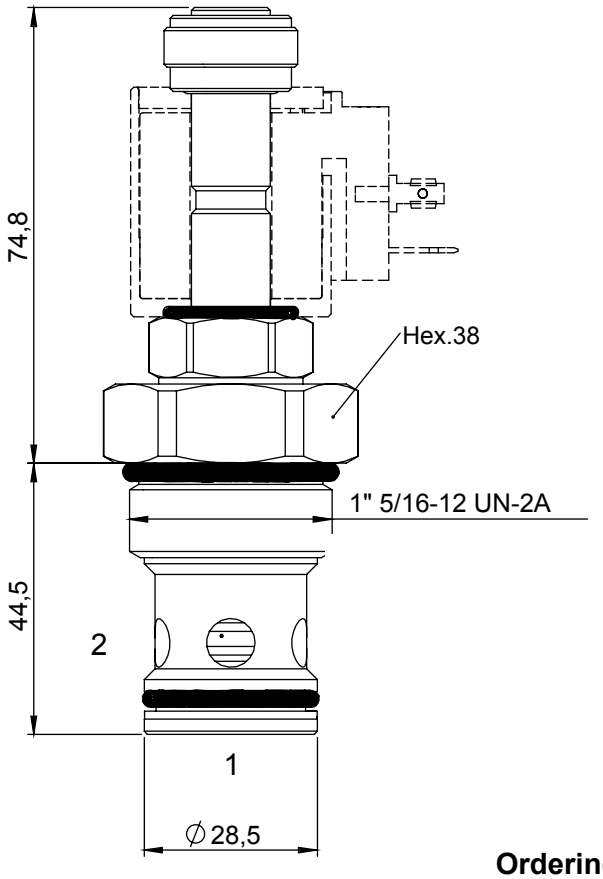
No emergency

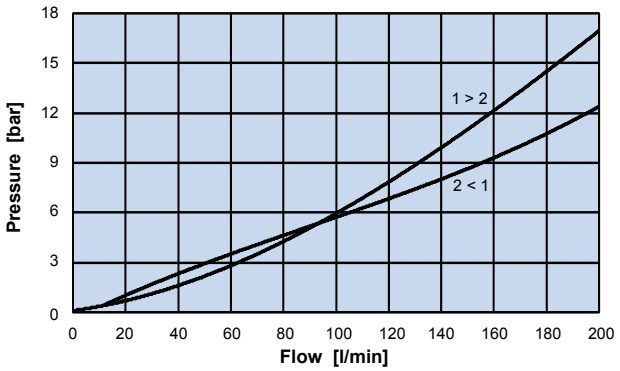
Unscrew type

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

- Flow. . . . . .**200 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage. . . . . **0,25 cc/min**
- Seals. . . . . **NBR**
- Cavity **C250000**
- Cartridge thightening torque. . . . . **65 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,58 Kg**
- Coil **CT-9400** to be ordered separately



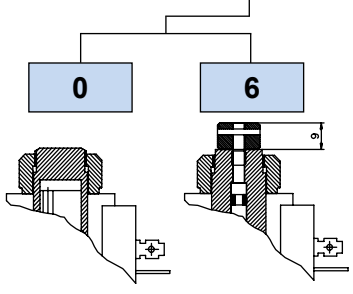




89

Ordering code

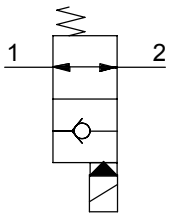
0 5 6 5 1 0 0 ☐ 0 0

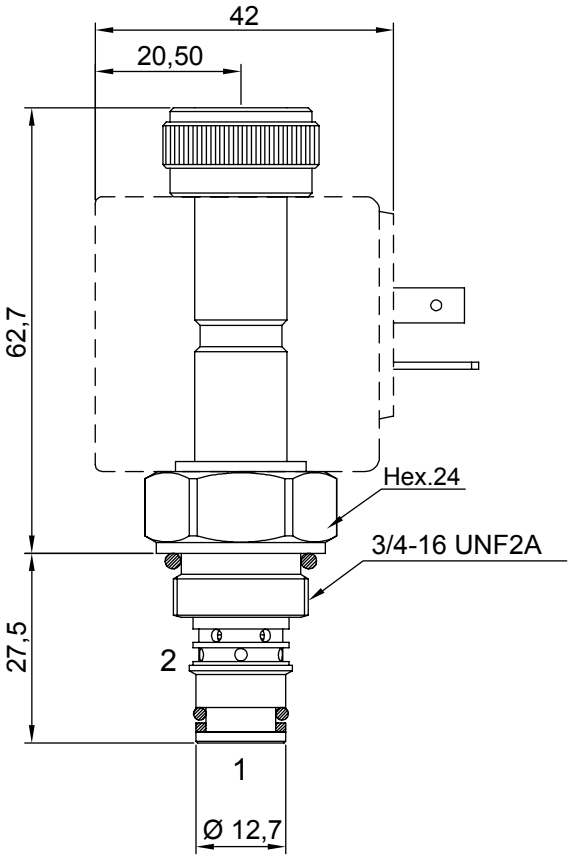


No emergency **Unscrew type**

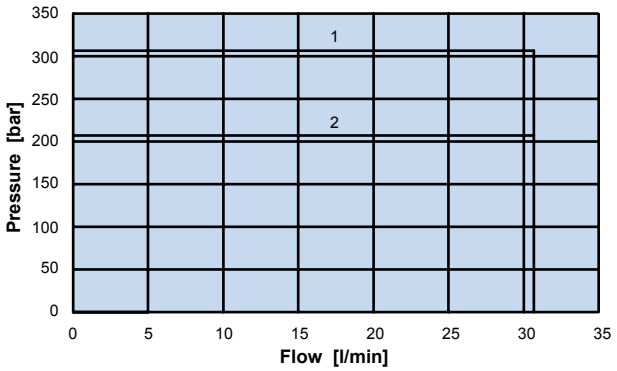
2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **300 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque . . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Filter. . . . . **280 microm**
- Coil **CT-9300** to be ordered separately

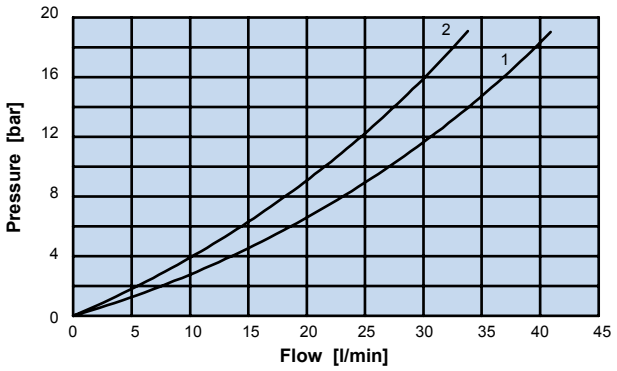




90



1 = Application limits from 2 to 1
2 = Application limits from 1 to 2

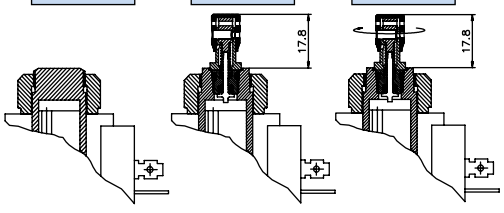


1 = Pressure drop from 2 to 1 without filter
2 = Pressure drop from 2 to 1 with filter

Ordering code

0 5 6 2 5 0 0 ☐ ☐ 0

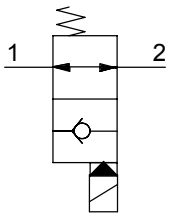
0	4	5	0	1
			Without filter	With filter

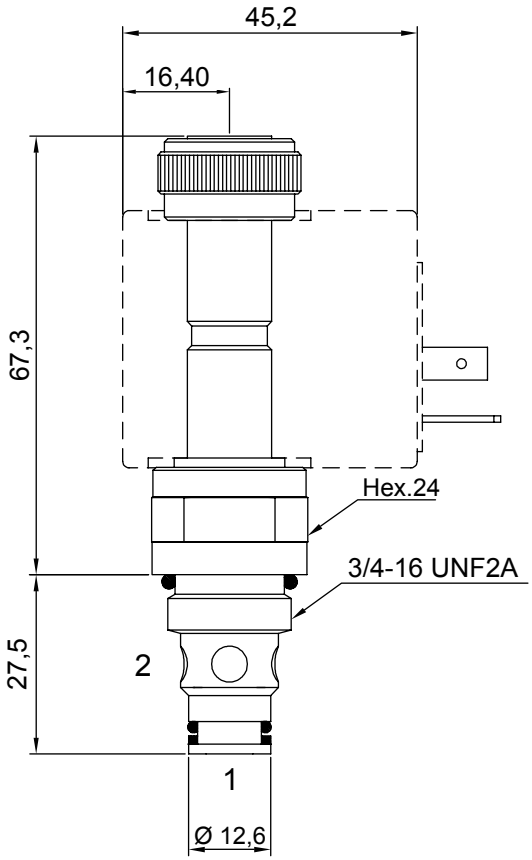


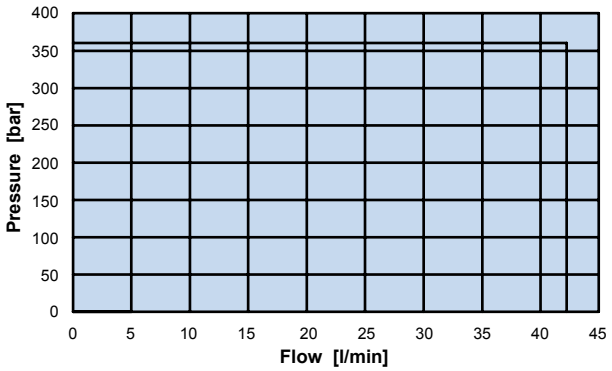
No emergency | Push Button | Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

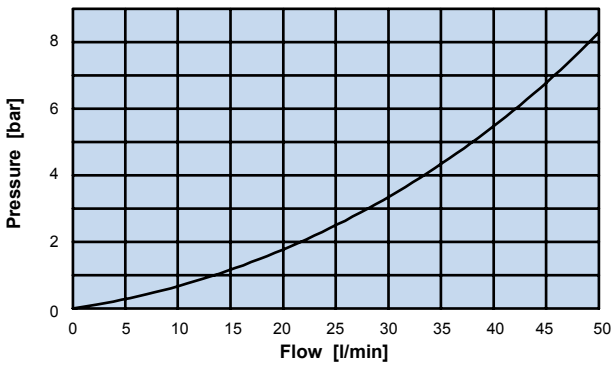
- Flow . . . . . **40 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque. . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Coil **CT-9400** to be ordered separately







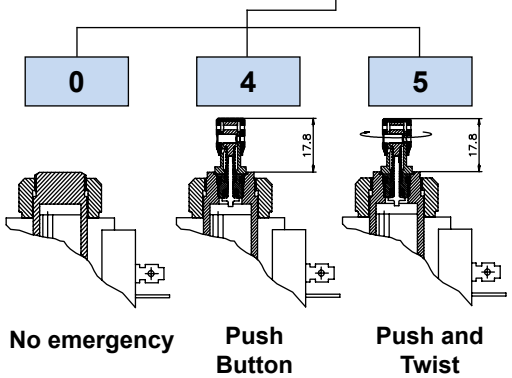
Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

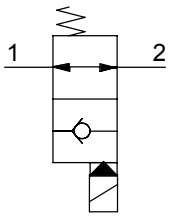
Ordering code

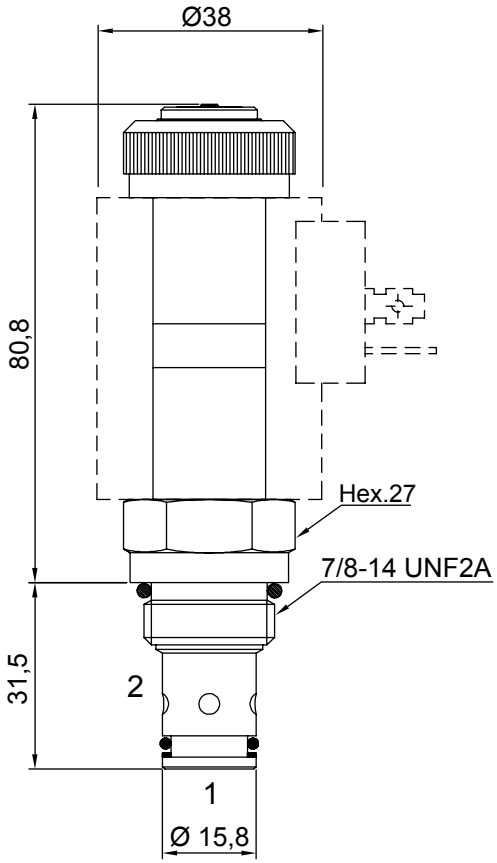
0 5 6 2 0 0 0 □ 0 0

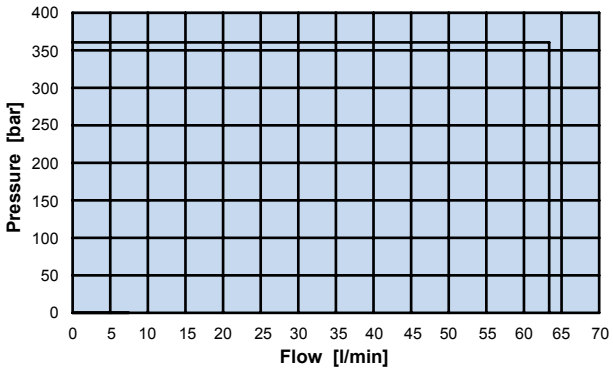


2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

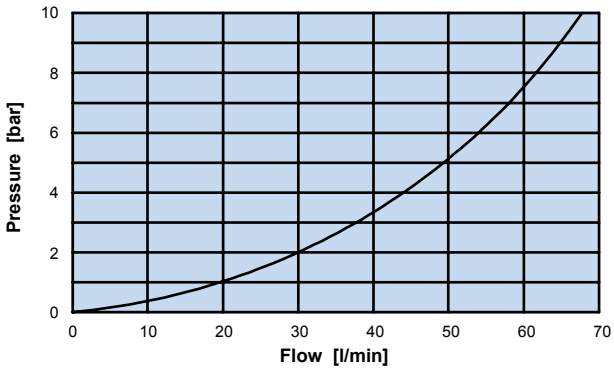
- Flow . . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C230000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately







Application limits from 2 to 1 and 1 to 2

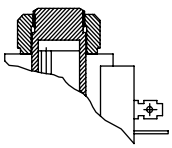
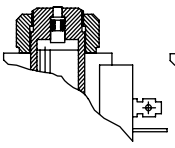
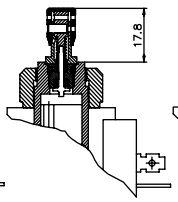
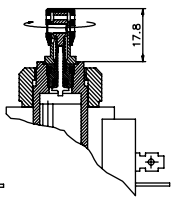


Pressure drop from 2 to 1 and from 1 to 2

92

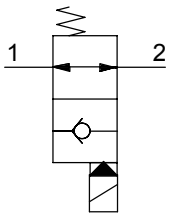
Ordering code

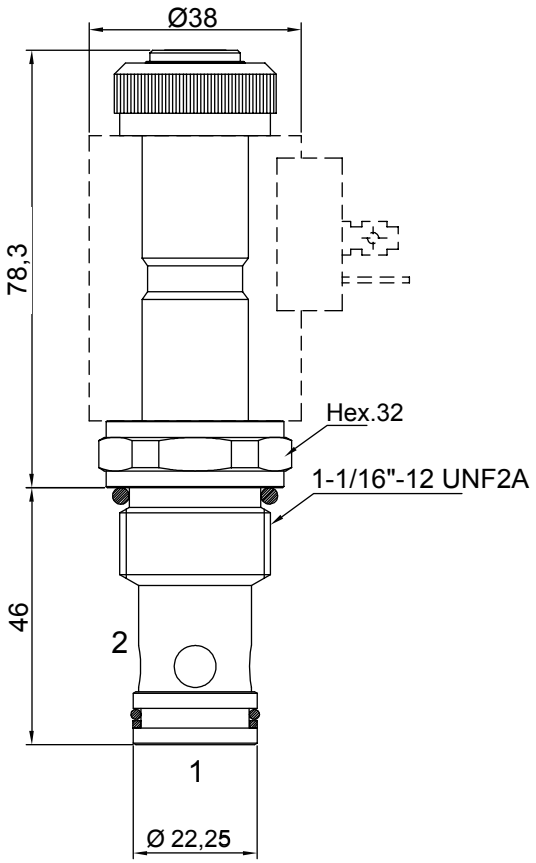
0 5 6 3 0 0 0 ☐ 0 0

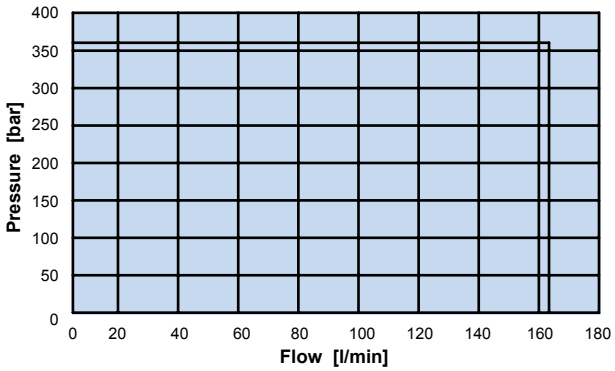
0	1	4	5
			
No emergency	Push pin	Push Button	Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NO

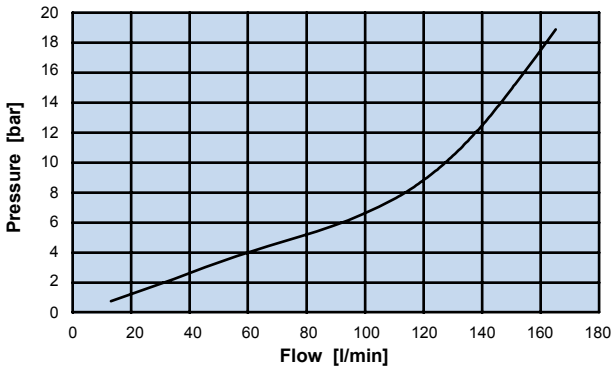
- Flow . . . . . **150 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C240000**
- Cartridge thightening torque. . . . . **50 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,58 Kg**
- Coil **CT-9801** to be ordered separately







Application limits from 2 to 1 and 1 to 2



Pressure drop from 2 to 1 and from 1 to 2

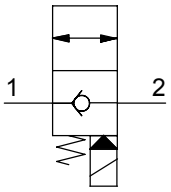
Ordering code

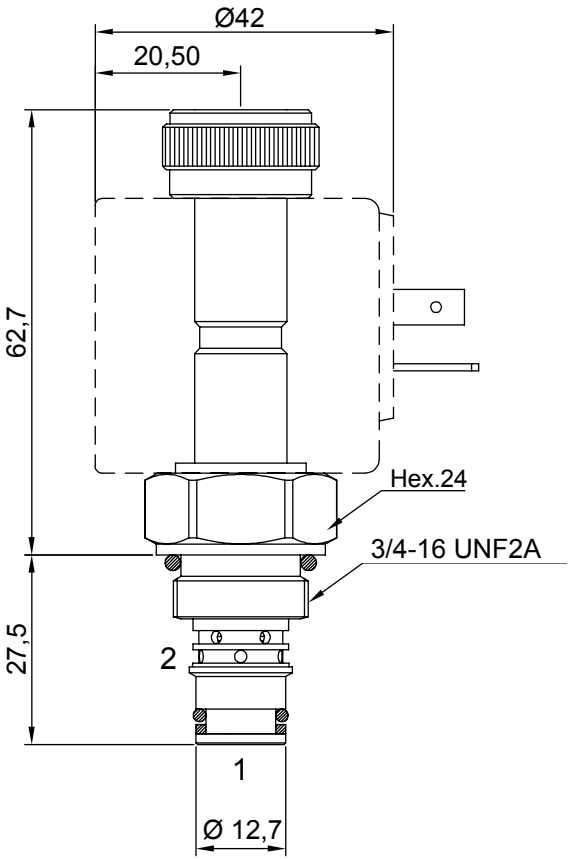
0 5 6 4 0 0 0 □ 0 0

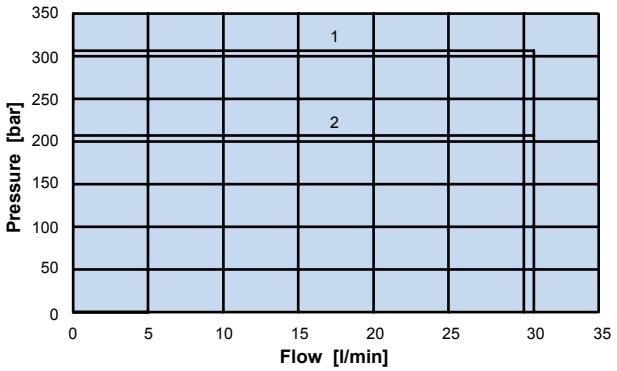
0	4	5
No emergency	Push Button	Push and Twist

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

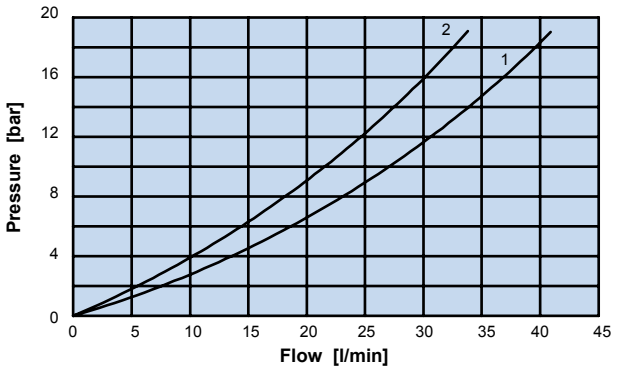
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **300 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Filter. . . . . **280 microm**
- Coil **CT-9300** to be ordered separately







1 = Application limits from 2 to 1
2 = Application limits from 1 to 2

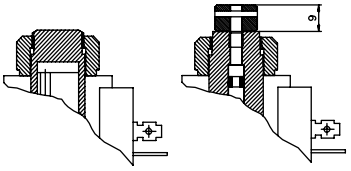


1 = Pressure drop from 2 to 1 without filter
2 = Pressure drop from 2 to 1 with filter

Ordering code

0 5 6 2 6 0 0 ☐ ☐ 0

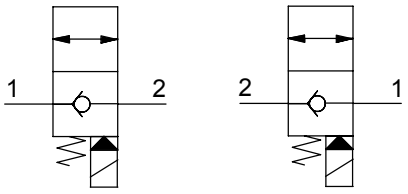
0	**6**	**0**	**1**
		Without filter	With filter



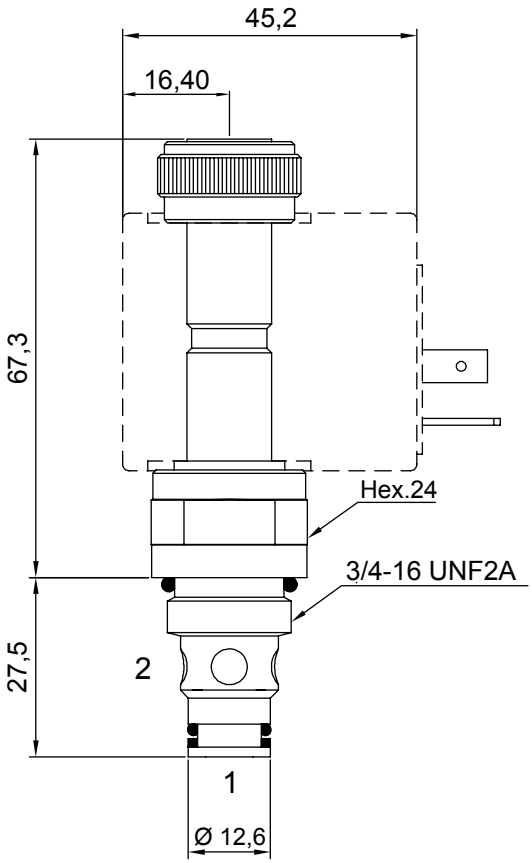
No emergency Unscrew type

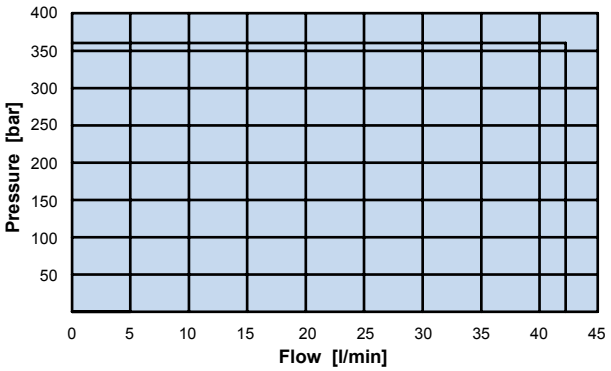
2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

- Flow . . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C220000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,32 Kg**
- Coil **CT-9400** to be ordered separately

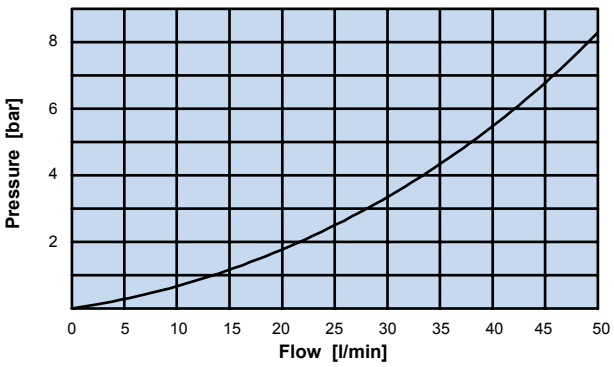


Scheme 0 **Scheme 1**





Application limits from 2 to 1 and 1 to 2



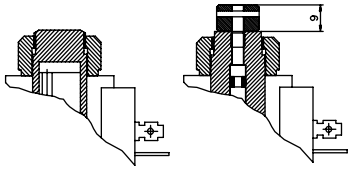
Pressure drop from 2 to 1 and from 1 to 2

Ordering code

0 5 6 2 1 ☐ 0 ☐ 0 0

0	1	0	6

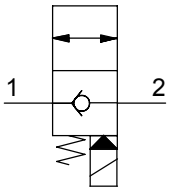
Hydraulic scheme

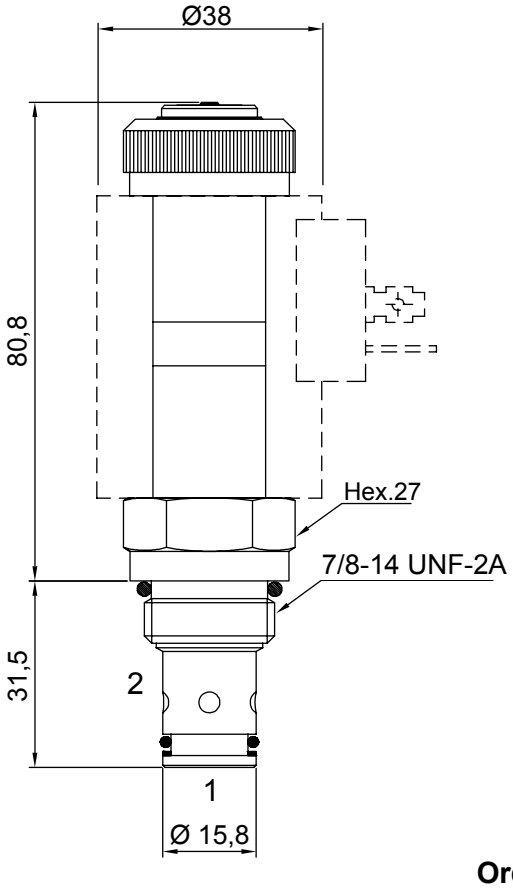


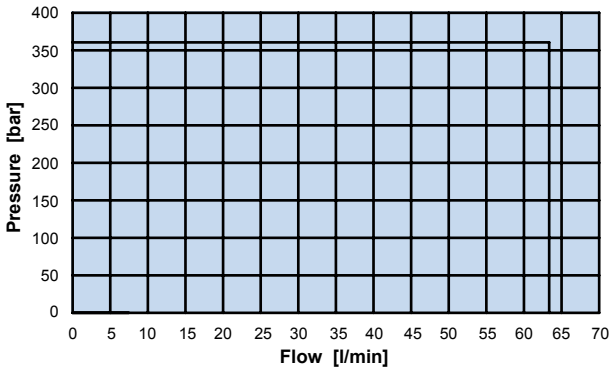
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

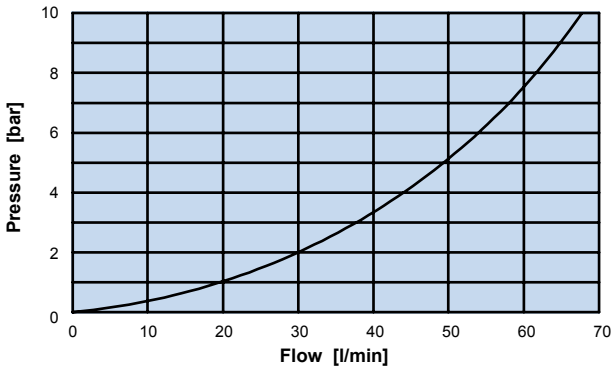
- Flow . . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **NBR**
- Cavity **C230000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately







Application limits from 2 to 1 and 1 to 2



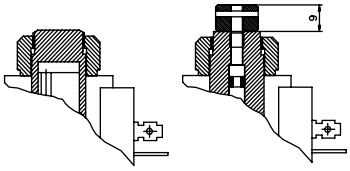
Pressure drop from 2 to 1 and from 1 to 2

96

Ordering code

0 5 6 3 1 0 0 ☐ 0 0

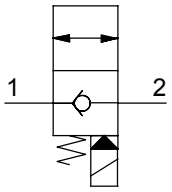
0 — **6**

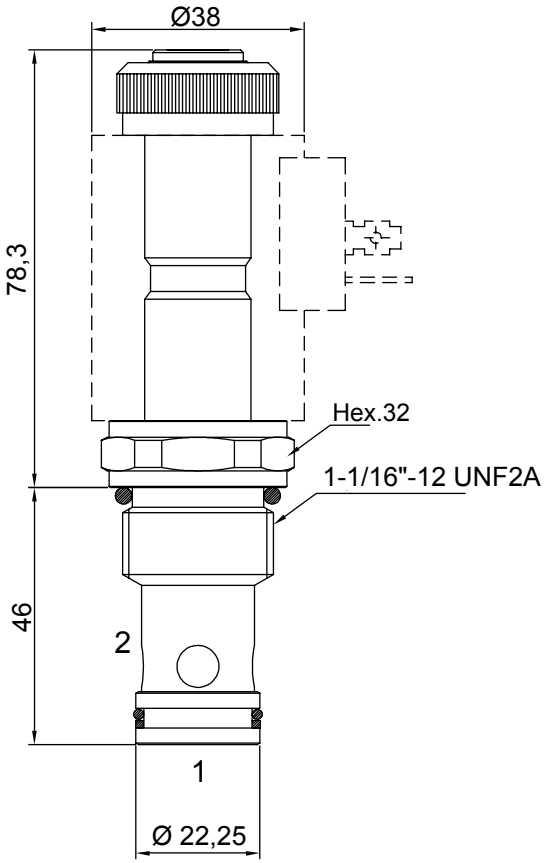


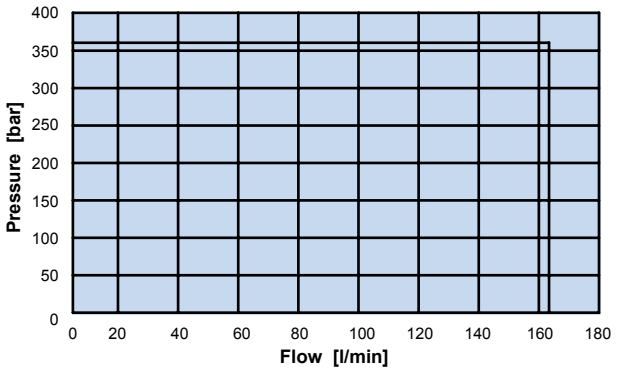
No emergency **Unscrew type**

2 WAYS 2 POSITIONS ELECTRIC VALVE, PILOT POPPET OPERATED NC

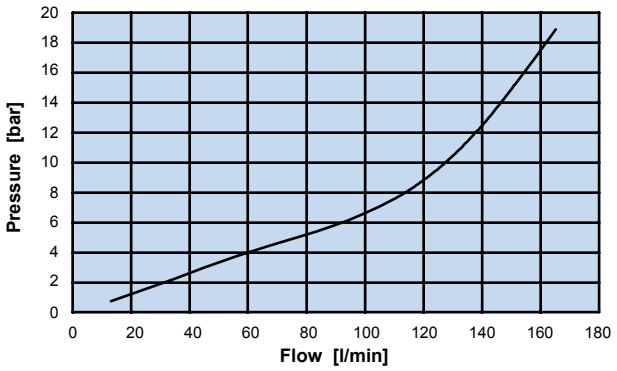
- Flow . . . . . .150 l/min
- Max working pressure. . . . . .350 bar
- Leakage . . . . . 0,25 cc/min
- Seals . . . . . .NBR
- Cavity C240000
- Cartridge thightening torque. . . . . 50 Nm
- Ring nut thightening torque . . . . . 5 Nm
- Weight (with coil). . . . . .0,58 Kg
- Coil **CT-9801** to be ordered separately







Application limits from 2 to 1 and 1 to 2

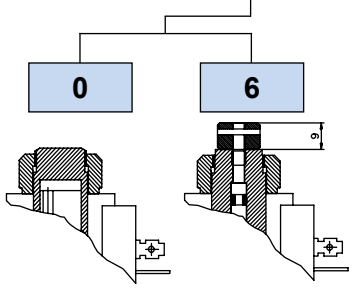


Pressure drop from 2 to 1 and from 1 to 2

97

Ordering code

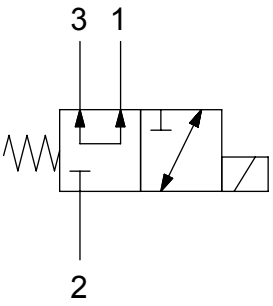
0 5 6 4 1 0 0 ☐ 0 0

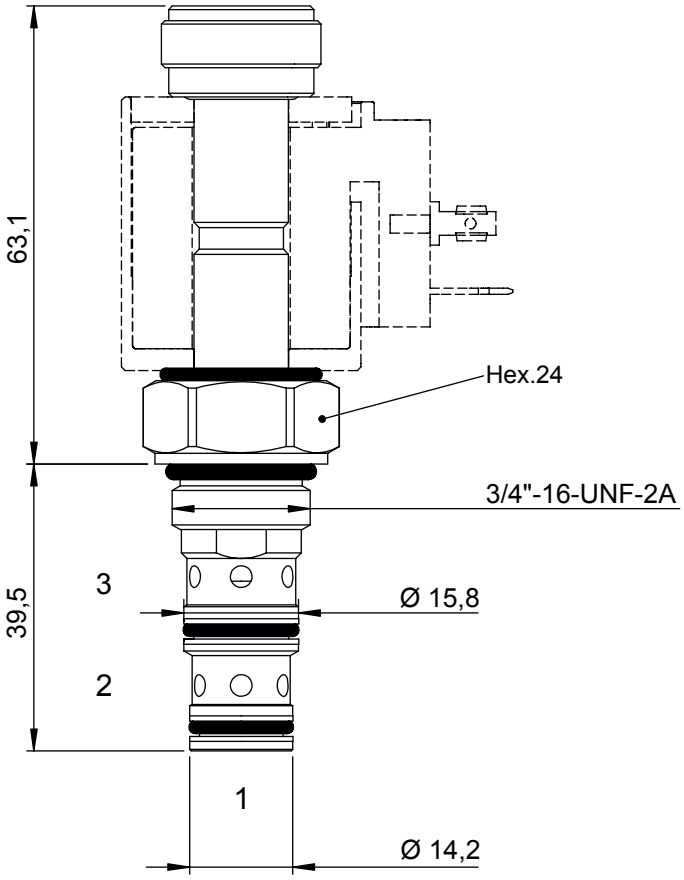


No emergency **Unscrew type**

3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

- Max working flow (P in port 1) . . . . . **6 l/min**
- Max working flow (P in port 2) . . . . . **15 l/min**
- Max working flow (P in port 3) . . . . . **5,5 l/min**
- Max working pressure. . . . . **250 bar**
- Cavity **C320000**
- Max Leakage at 250 bar. . . . . **40 cc/min**
- Seals. . . . . **NBR**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately

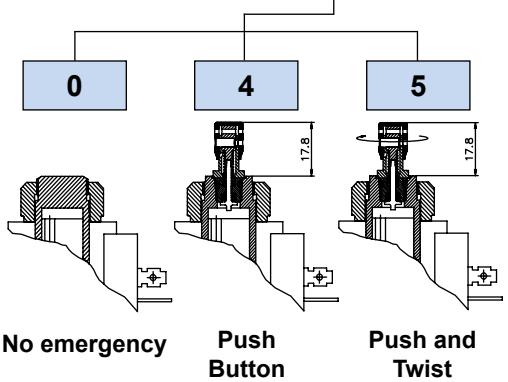




98

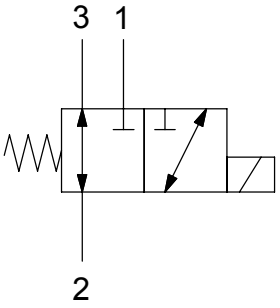
Ordering code

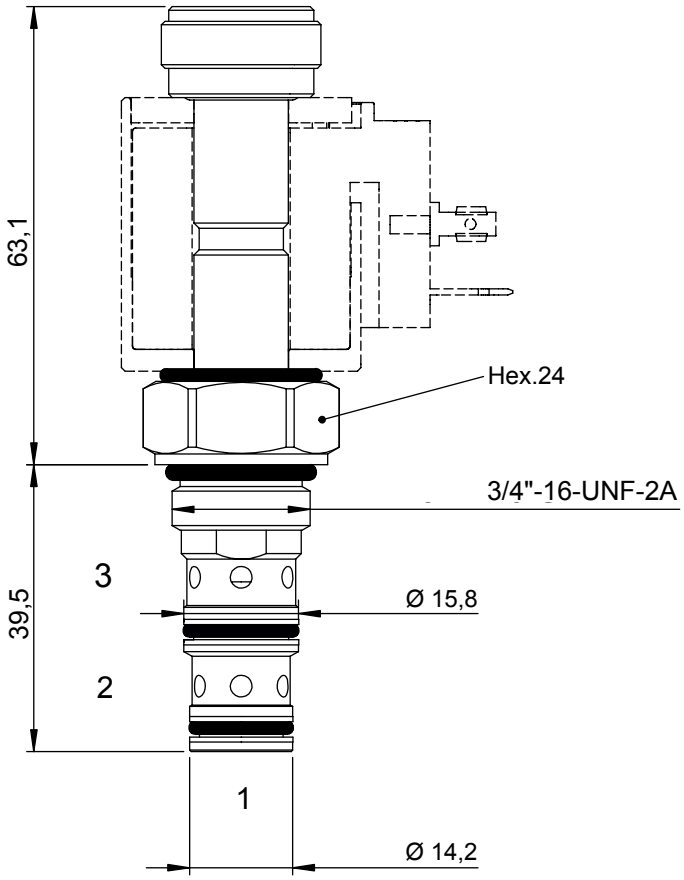
0 4 0 2 1 0 0 ☐ 0 0

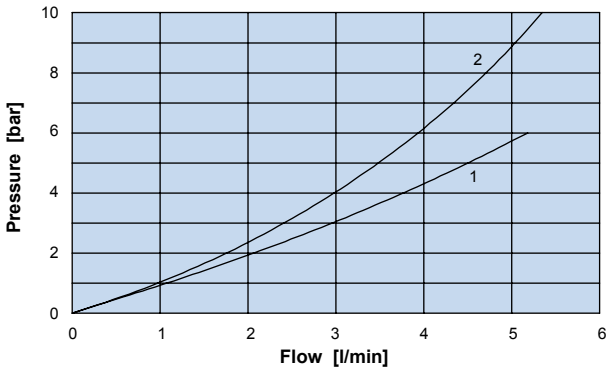


3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING - LOW PRESSURE -

- Flow . . . . . **5 l/min**
- Max working pressure. . . . . **50 bar**
- Leakage . . . . . **20 cc/min**
- Seals . . . . . **NBR**
- Cavity **C320000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately







1 = Pressure drop from 2 in 1
2 = Pressure drop from 3 in 1

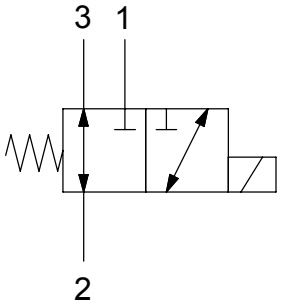
99

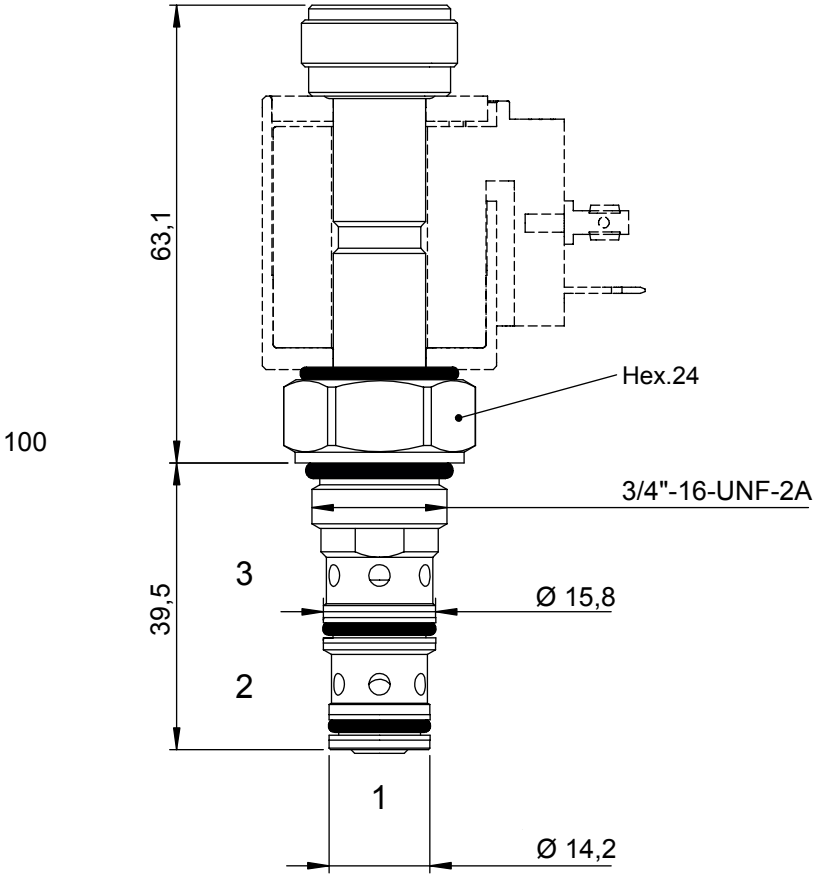
Ordering code

0 4 0 2 3 1 0 0 0 1

3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

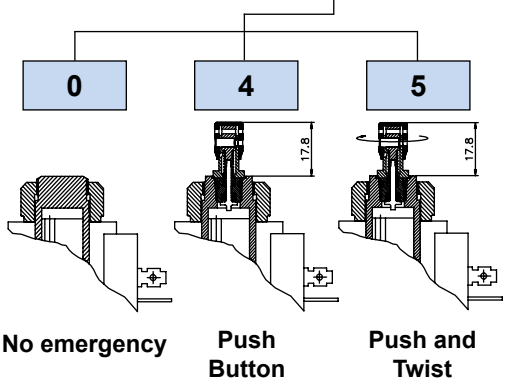
- Max working flow (P in port 1) . . . . . **7 l/min**
- Max working flow (P in port 2) . . . . . **15 l/min**
- Max working flow (P in port 3) . . . . . **15 l/min**
- Max working pressure. . . . . **250 bar**
- Cavity **C320000**
- Max Leakage at 250 bar. . . . . **40 cc/min**
- Seals. . . . . **NBR**
- Cartridge thightening torque. . . . . .**30 Nm**
- Ring nut thightening torque . . . . . .**5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately





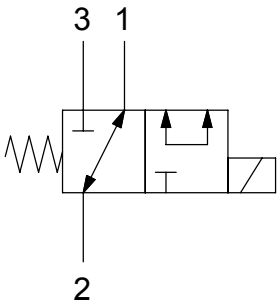
Ordering code

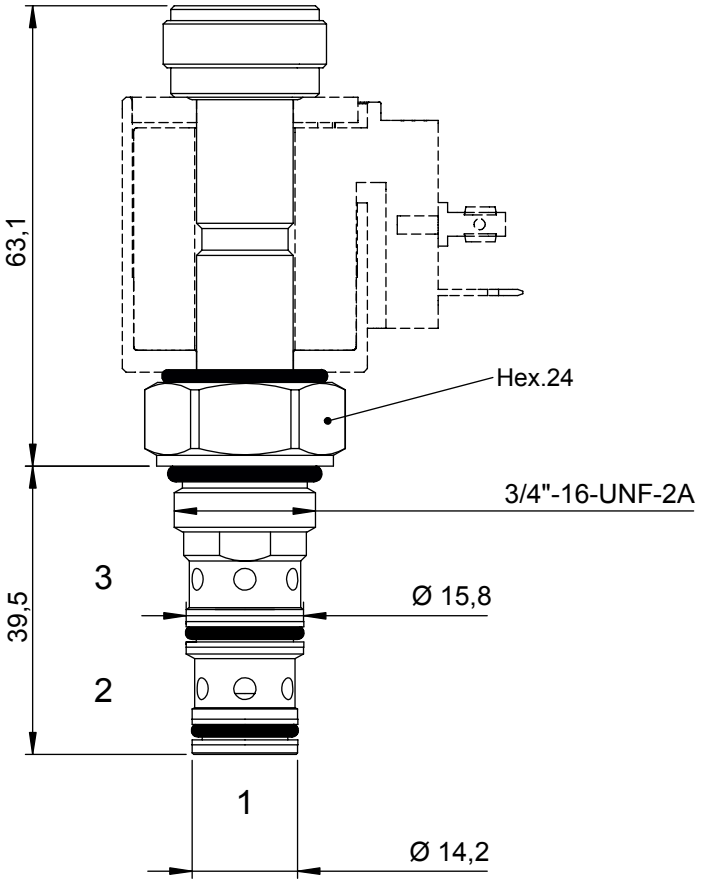
0 4 0 2 3 0 0 ☐ 0 0



3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

- Max working flow (P in port 1) . . . . . **7 l/min**
- Max working flow (P in port 2) . . . . . **15 l/min**
- Max working flow (P in port 3) . . . . . **15 l/min**
- Max working pressure. . . . . **250 bar**
- Cavity **C320000**
- Max Leakage at 250 bar. . . . . **40 cc/min**
- Seals. . . . . **NBR**
- Cartridge thightening torque. . . . . .**30 Nm**
- Ring nut thightening torque . . . . . .**5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately

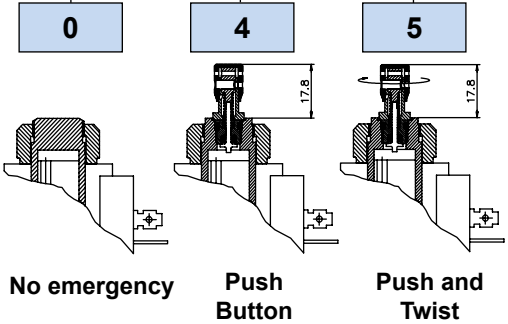




101

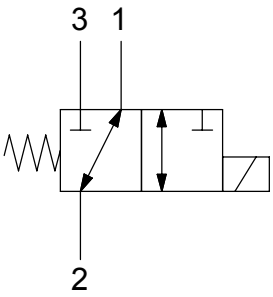
Ordering code

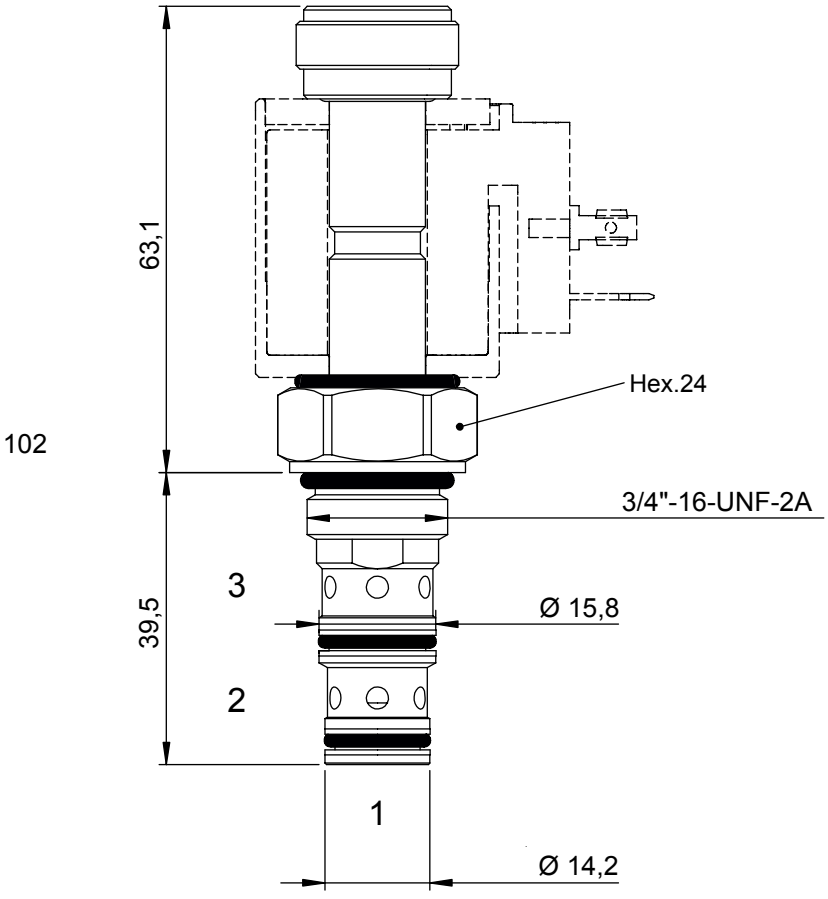
0 4 0 2 4 0 0 ☐ 0 0



3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

- Max working flow (P in port 1) . . . . . **7 l/min**
- Max working flow (P in port 2) . . . . . **13,5 l/min**
- Max working flow (P in port 3) . . . . . **5,5 l/min**
- Max working pressure. . . . . **250 bar**
- Cavity **C320000**
- Max Leakage at 250 bar. . . . . **40 cc/min**
- Seals. . . . . **NBR**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately

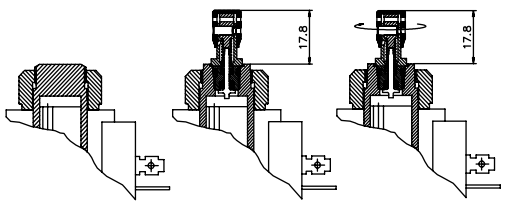




Ordering code

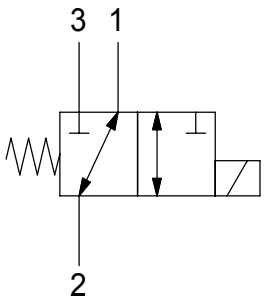
0 4 0 2 2 0 0 ☐ 0 0

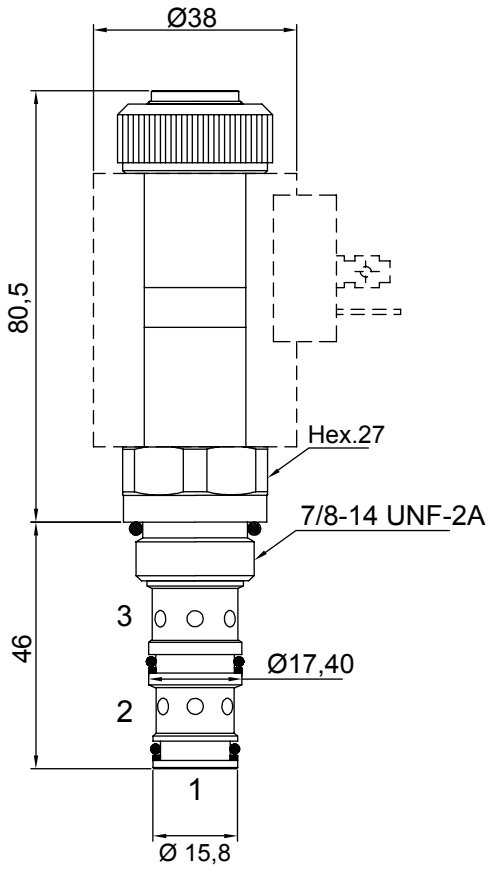
0	4	5
No emergency	Push Button	Push and Twist

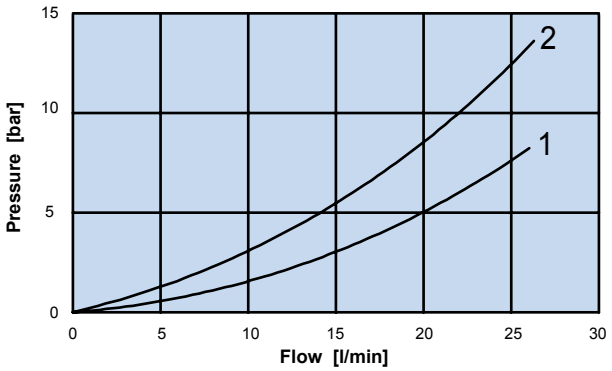


3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

- Flow . . . . . **20 l/min**
- Max working pressure. . . . . **250 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C330000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately

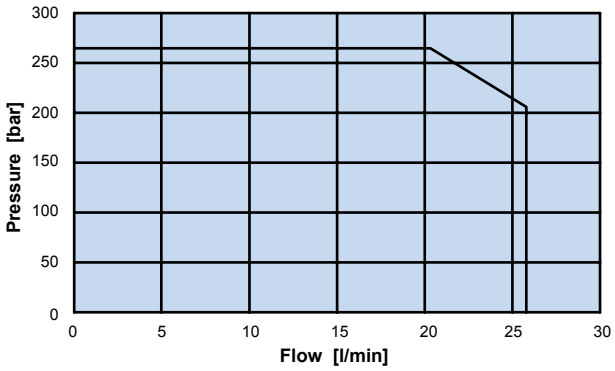






1 = Pressure drop from 2 in 1
2 = Pressure drop from 3 in 2

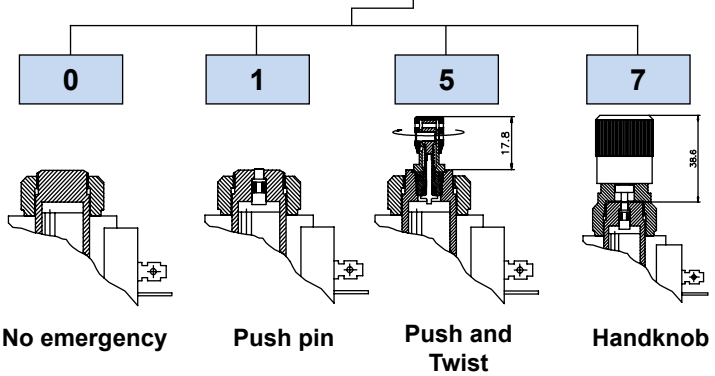
103



Application limits from 2 in 1 and 2 in 3

Ordering code

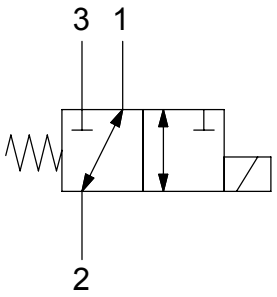
0 4 0 3 2 0 0 ☐ 0 0

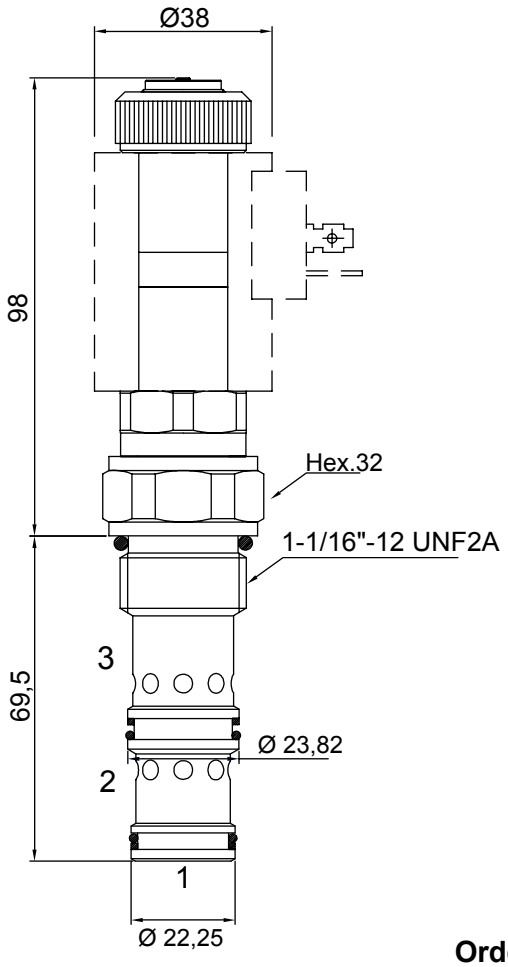


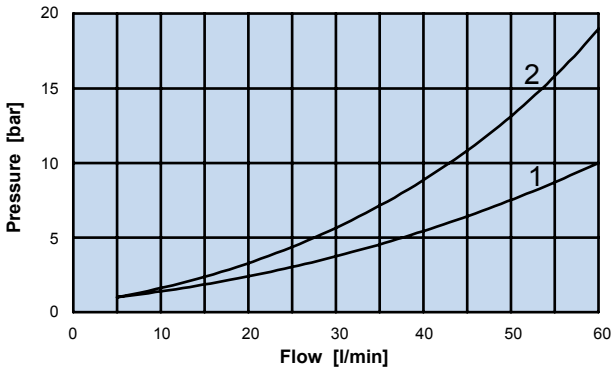
No emergency | **Push pin** | **Push and Twist** | **Handknob**

3 WAYS 2 POSITIONS ELECTRIC SPOOL VALVE, DIRECT ACTING

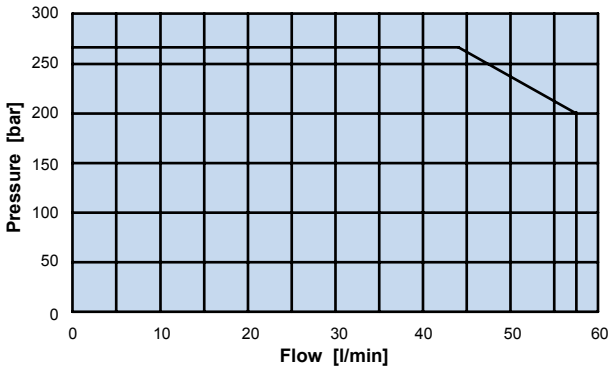
- Flow . . . . . **50 l/min**
- Max working pressure in 1:2:3 . . . . . **350 bar**
- Leakage . . . . . **150 cc/min**
- Seals . . . . . **NBR**
- Cavity **C340000**
- Cartridge thightening torque. . . . . **50 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,70 Kg**
- Coil **CT-9800** to be ordered separately







1 = Pressure drop from 2 in 1
2 = Pressure drop from 3 in 2

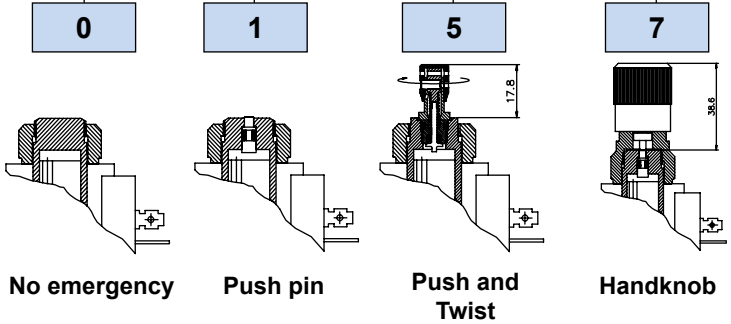


Application limits from 2 in 1 and 2 in 3

104

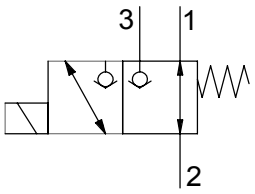
Ordering code

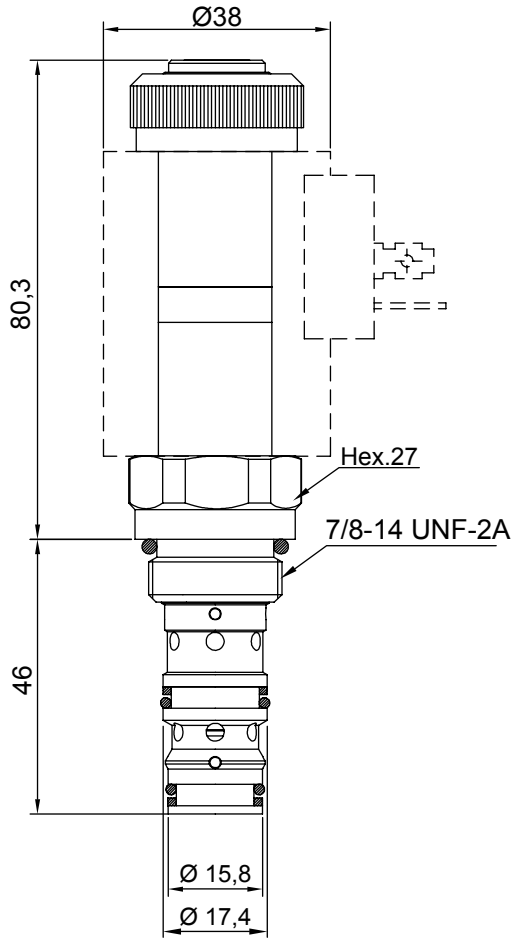
0 4 0 4 2 0 0 ☐ 0 0

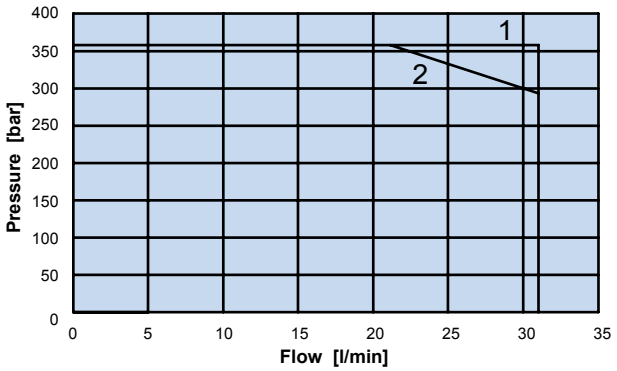


3 WAYS 2 POSITIONS ELECTRIC ON/OFF POPPET VALVE DIRECT ACTING

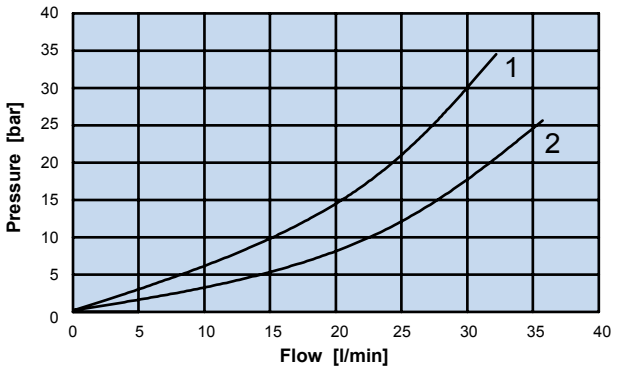
- Flow . . . . . **30 l/min**
- Max working pressure in 3:2:1 . . . . . **.350 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals . . . . . **.NBR**
- Cavity **C330000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **.0,56 Kg**
- Coil **CT-9800** to be ordered separately







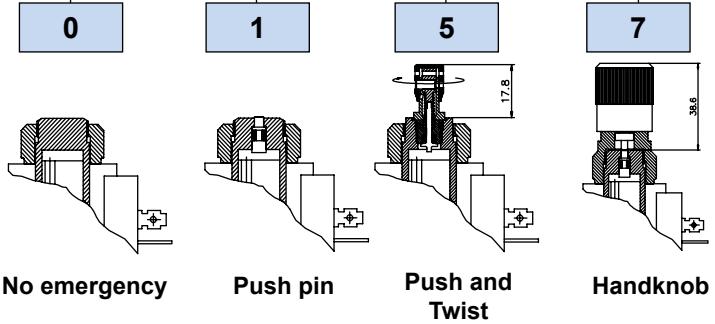
1 = Application limits from 1 to 2 and 2 to 1
2 = Application limits from 2 to 3 and 3 to 2



1 = Pressure drop from 2 to 3 and 3 to 2
2 = Pressure drop from 1 to 2 and 2 to 1

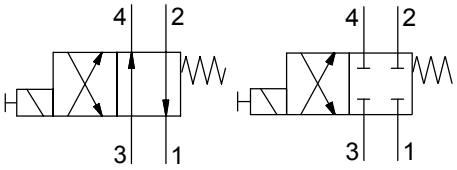
Ordering code

0 4 2 3 2 0 0 ☐ 0 0

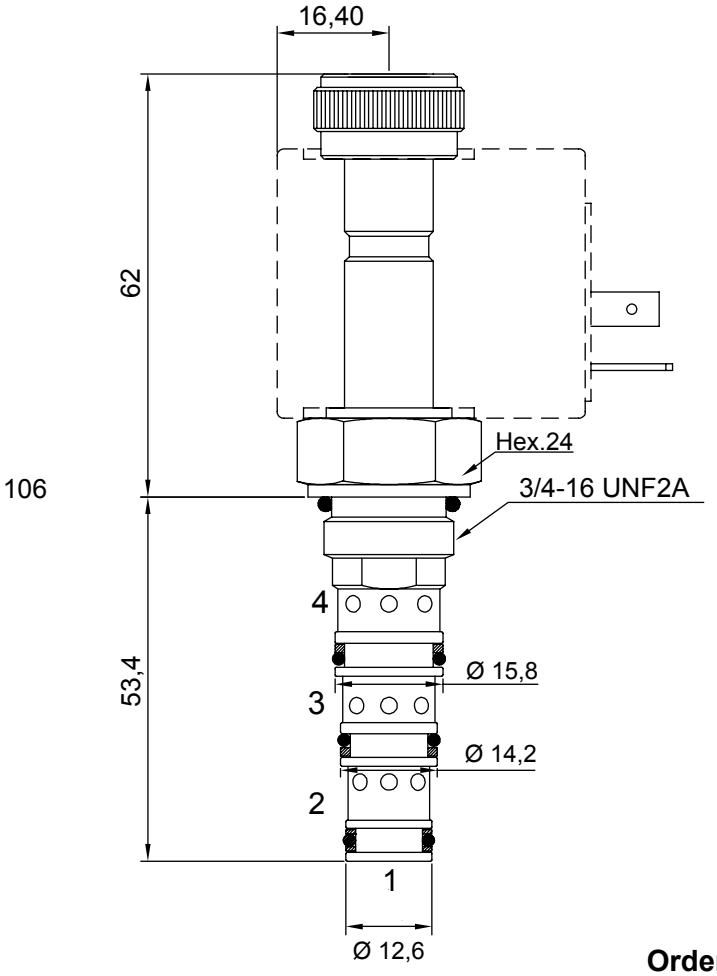


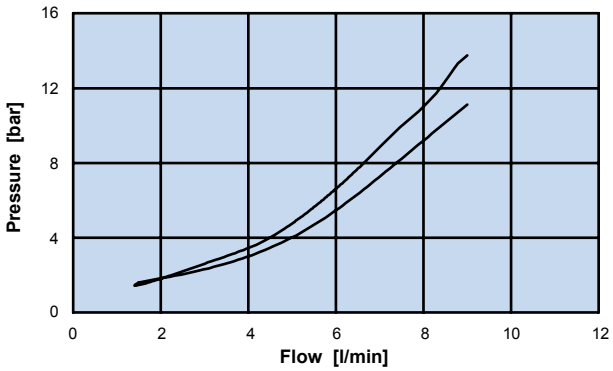
4 WAYS 2 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **10 l/min**
- Max working pressure . . . . . **210 bar**
- Leakage . . . . . **60 cc/min**
- Seals . . . . . **NBR**
- Cavity **C420000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,35 Kg**
- Coil **CT-9400** to be ordered separately

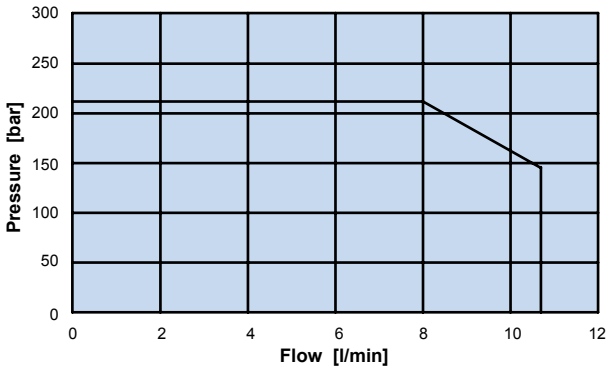


Scheme 2 **Scheme 3**





1 = Pressure drop from 2/4 to 3
2 = Pressure drop from 3 to 2/4



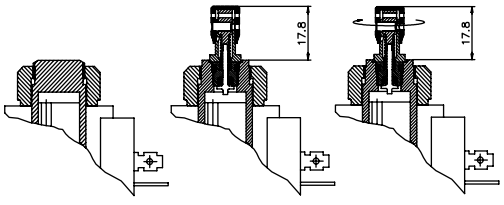
Application limits from 3 in 2/4

Ordering code

0 4 1 2 ☐ 0 0 ☐ 0 0

2 **3** — **Hydraulic scheme**

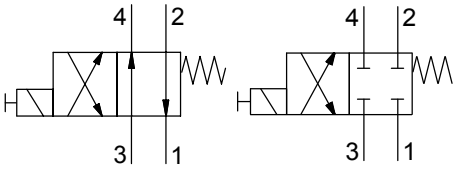
0 **4** **5**



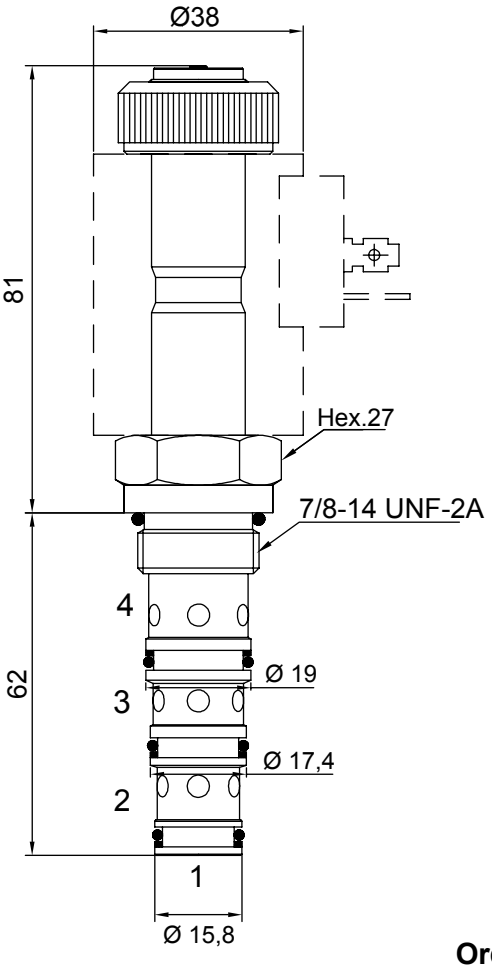
No emergency **Push Button** **Push and Twist**

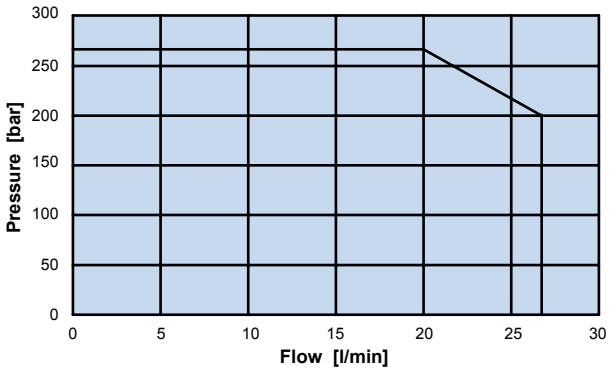
4 WAYS 2 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **25 l/min**
- Max working pressure . . . . . **250 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C430000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9801** to be ordered separately

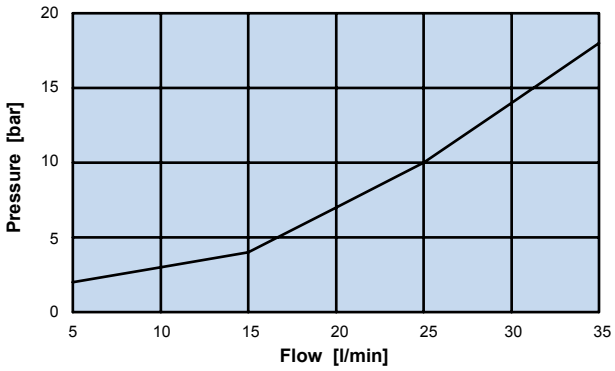


Scheme 2 **Scheme 3**





Application limits from 3 in 2/4



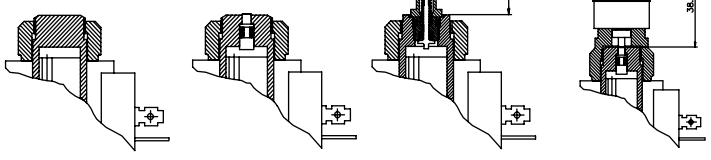
Pressure drop from 3 to 2/4

Ordering code

0 4 1 3 ☐ 0 0 ☐ 0 0

2	3	0	1	5	7

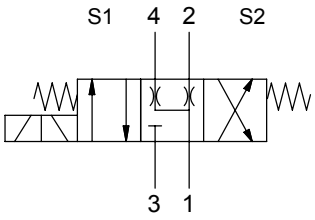
Hydraulic scheme

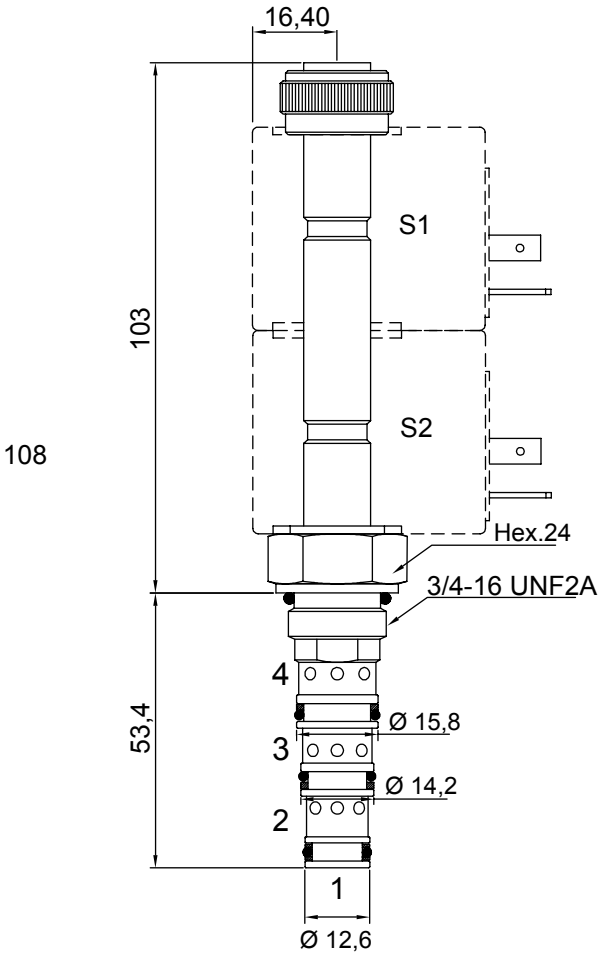


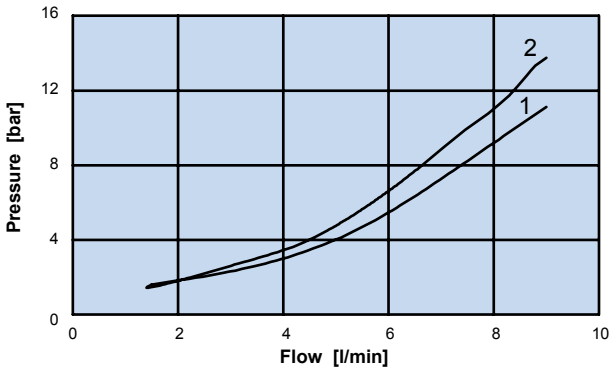
No emergency **Push pin** **Push and Twist** **Handknob**

4 WAYS 3 POSITIONS ELECTRIC SPOOL VALVE DIRECT ACTING

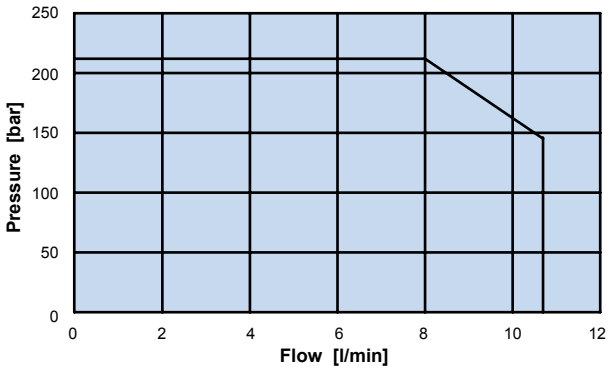
- Flow . . . . . **10 l/min**
- Max working pressure in 2:3:4. . . . . **210 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **60 cc/min**
- Seals . . . . . **NBR**
- Cavity **C420000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,70 Kg**
- Coil **CT-9400** to be ordered separately







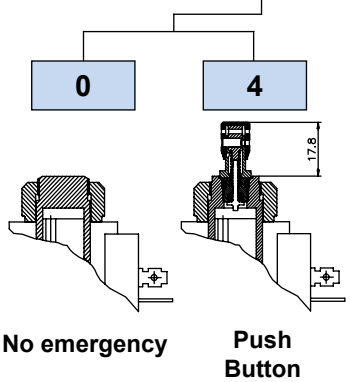
1 = Pressure drop from 2/4 to 3
2 = Pressure drop from 3 to 2/4



Application limits from 3 in 2/4

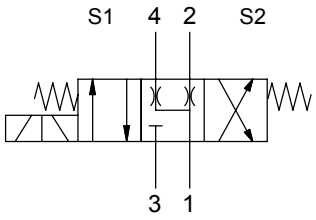
Ordering code

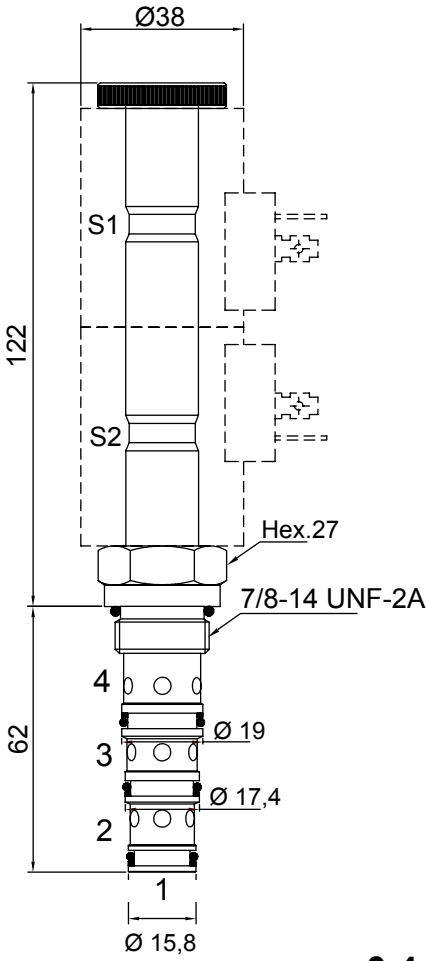
0 4 6 2 1 0 0 ☐ 0 0

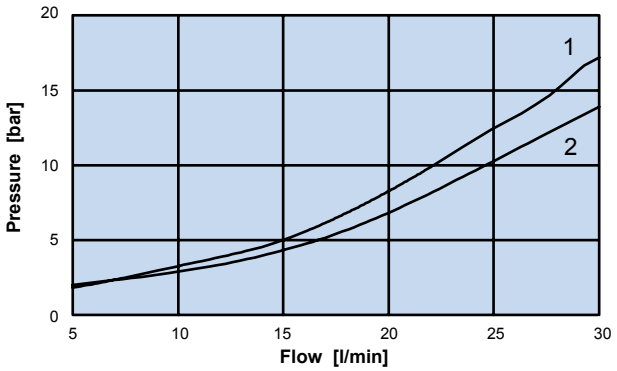


4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

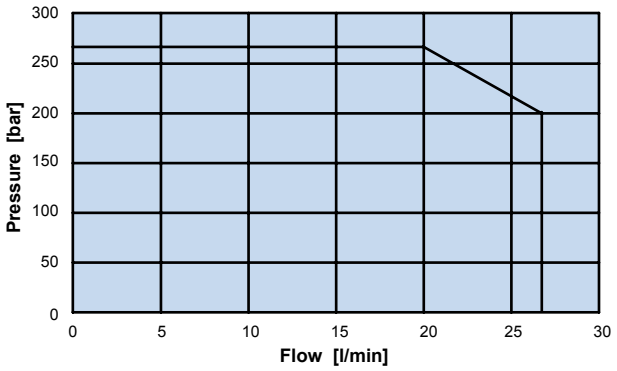
- Flow . . . . . **25 l/min**
- Max working pressure in 2:3:4. . . . . **250 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C430000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,9 Kg**
- Coil **CT-9801** to be ordered separately







1 = Pressure drop graph from 3 to 2 or 4
2 = Pressure drop graph from 2 or 4 in 1

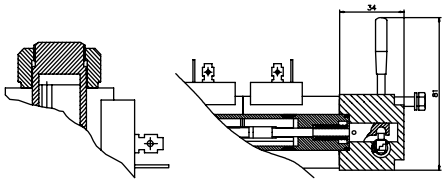


Application limits from 3 to 4 or 2

Ordering code

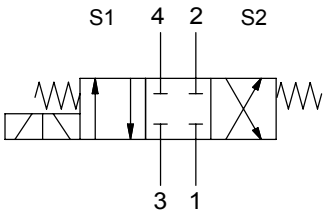
0 4 6 3 ☐ 0 0 ☐ 0 0

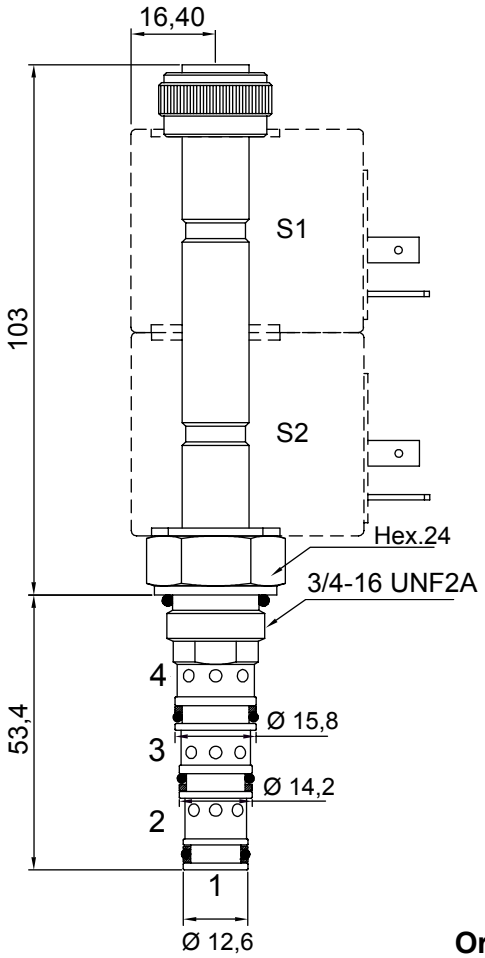
- ☐ = **1** — **Hydraulic scheme**
- ☐ = **0** — **No emergency**
- ☐ = **3** — **Safety lever**



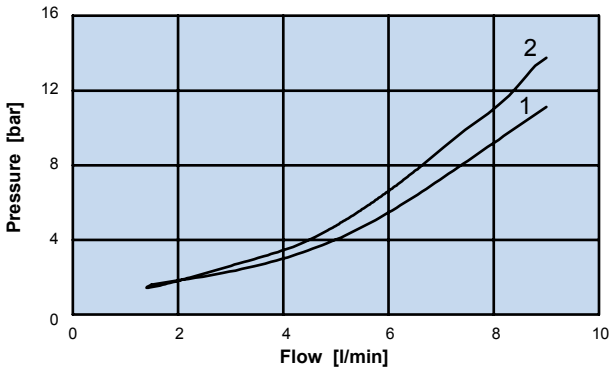
4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **10 l/min**
- Max working pressure in 2:3:4. . . . . **210 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **60 cc/min**
- Seals . . . . . **NBR**
- Cavity **C420000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,70 Kg**
- Coil **CT-9400** to be ordered separately

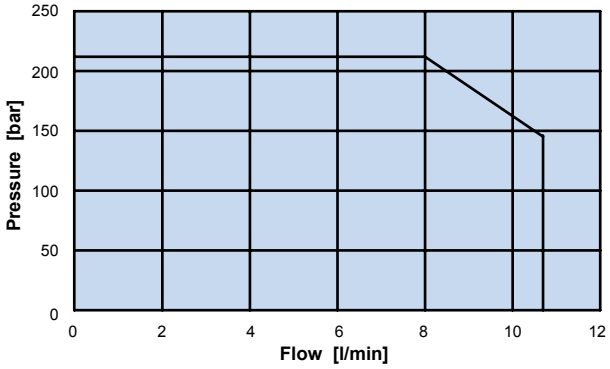




110



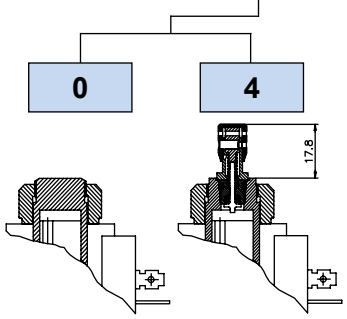
1 = Pressure drop from 2/4 to 3
2 = Pressure drop from 3 to 2/4



Application limits from 3 in 2/4

Ordering code

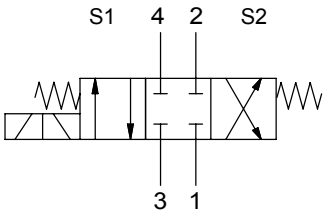
0 4 6 2 2 0 0 ☐ 0 0

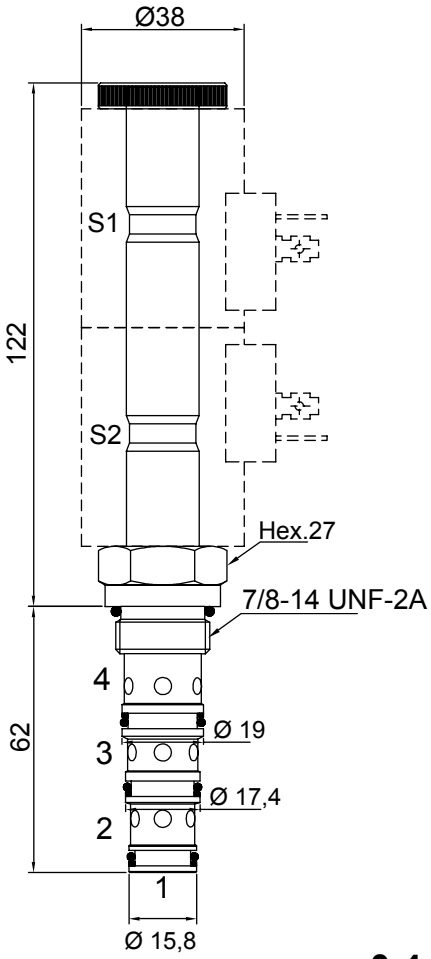


No emergency — **Push Button**

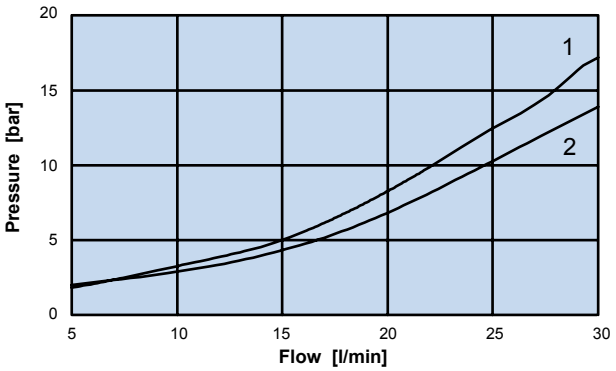
4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **25 l/min**
- Max working pressure in 2:3:4. . . . . **250 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C430000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,9 Kg**
- Coil **CT-9801** to be ordered separately



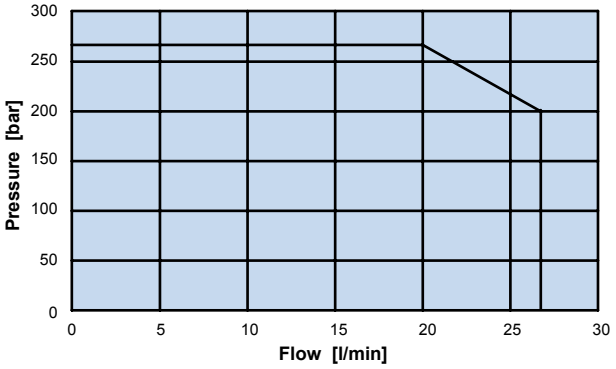


Application limits from 1 in 2 and 2 in 1



1 = Pressure drop graph from 3 to 2 or 4
2 = Pressure drop graph from 2 or 4 in 1

111

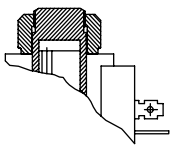


Application limits from 3 to 4 or 2

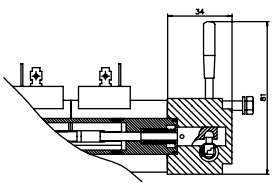
Ordering code

0 4 6 3 ☐ 0 0 ☐ 0 0

2 — **Hydraulic scheme**

0 — 

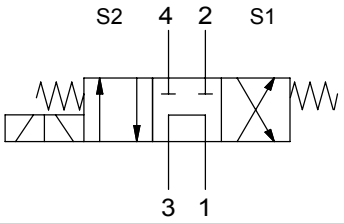
No emergency

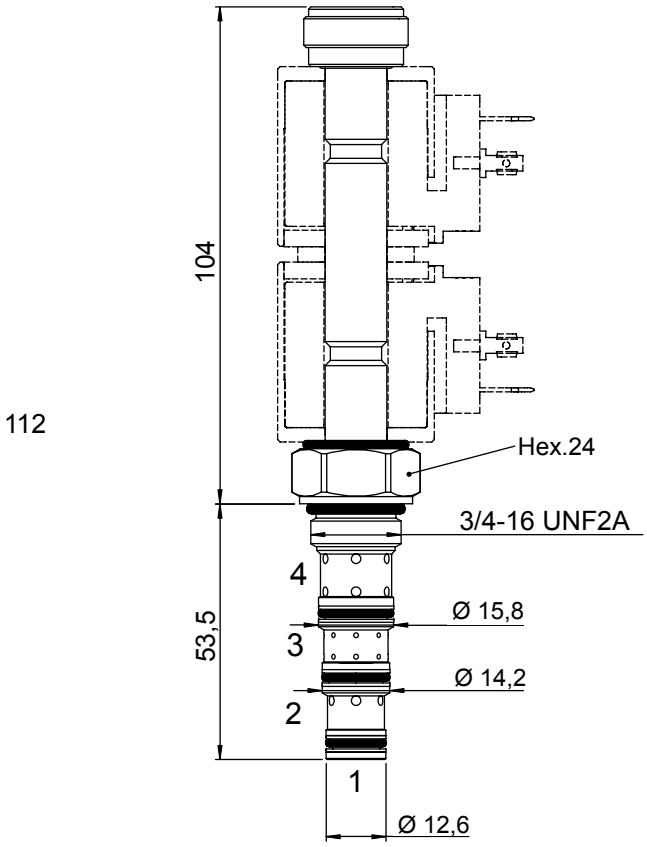
3 — 

Safety lever

4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **10 l/min**
- Max working pressure in 2:3:4. . . . . **210 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **40 cc/min**
- Seals . . . . . **NBR**
- Cavity **C420000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,20 Kg**
- Coil **CT-9400** to be ordered separately

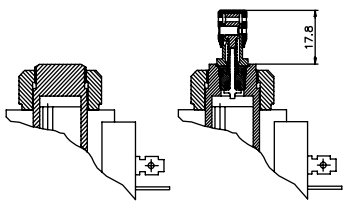




Ordering code

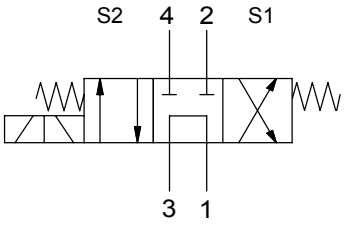
0 4 6 2 3 0 0 □ 0 0

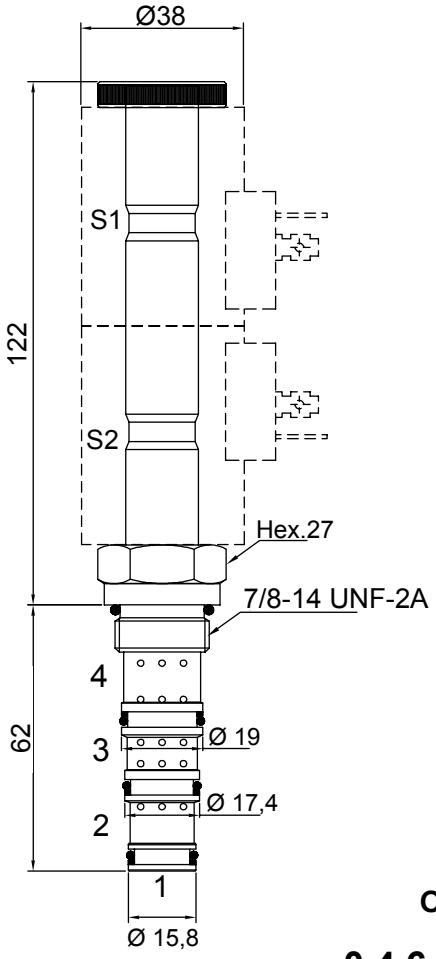
0	4
No emergency	Push Button

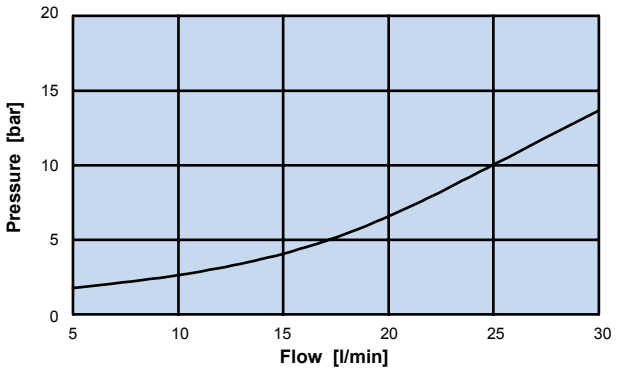


4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

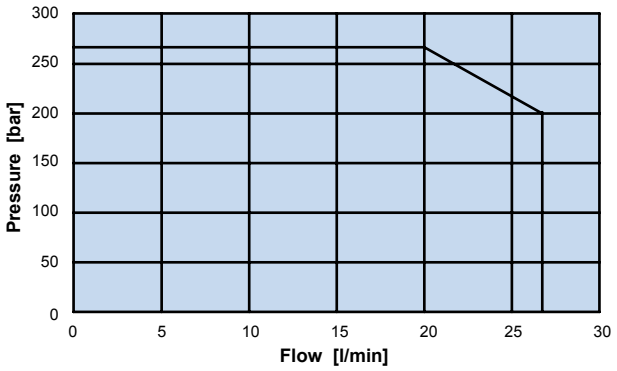
- Flow . . . . . **25 l/min**
- Max working pressure in 2:3:4. . . . . **250 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C430000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,9 Kg**
- Coil **CT-9801** to be ordered separately







1 = Pressure drop graph from 3 to 1



Application limits from 3 to 4 or 2

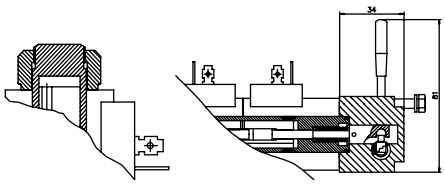
Ordering code

0 4 6 3 ☐ 0 0 ☐ 0 0

3 — **Hydraulic scheme**

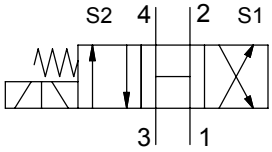
0 — **No emergency**

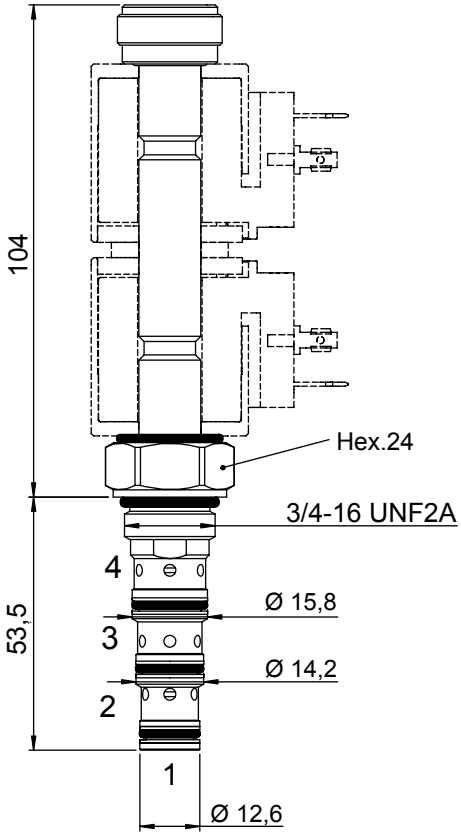
3 — **Safety lever**



4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **10 l/min**
- Max working pressure in 2:3:4. . . . . **210 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **40 cc/min**
- Seals . . . . . **NBR**
- Cavity **C420000**
- Cartridge thightening torque. . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,7 Kg**
- Coil **CT-9400** to be ordered separately

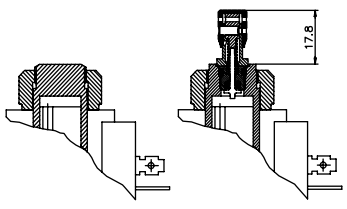




Ordering code

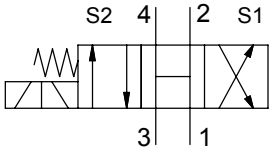
0 4 6 2 4 0 0 ☐ 0 0

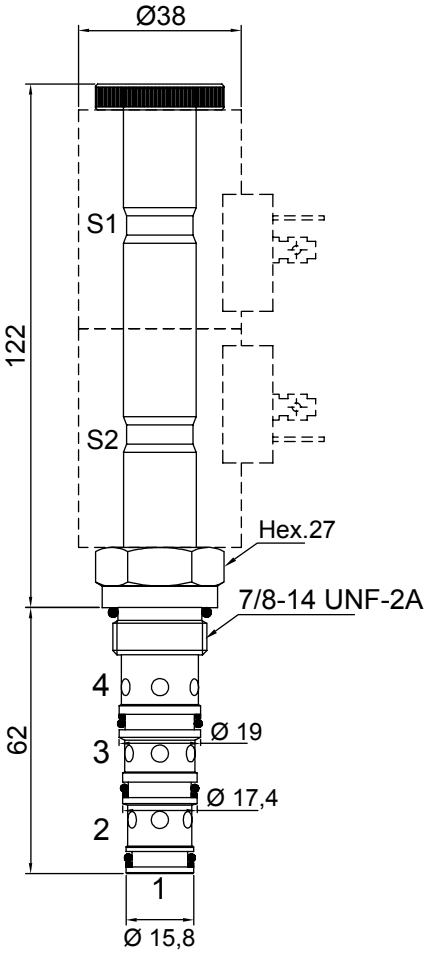
0	4
No emergency	Push Button



4 WAYS 3 POSITIONS ELECTRIC ON/OFF SPOOL VALVE DIRECT ACTING

- Flow . . . . . **25 l/min**
- Max working pressure in 2:3:4. . . . . **250 bar**
- Max working pressure in 1. . . . . **20 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR**
- Cavity **C430000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,9 Kg**
- Coil **CT-9801** to be ordered separately



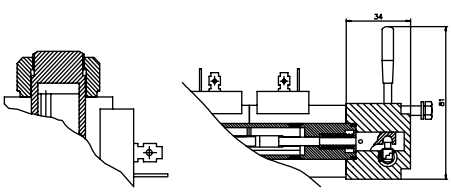


115

Ordering code

0 4 6 3 4 0 0 ☐ 0 0

0	3



No emergency **Safety lever**

ELECTRIC CARTRIDGES

PROPORTIONAL VALVES

116

PROPORTIONAL PRESENTATION

NEM is pleased to present its new line of proportional flow pressure regulators.

These new valves are equipped, with proportional solenoid controls and provide for continuos flow and pressure controls by adjustment of the valve openings to the different values resulting from the amount of energy to the solenoids.

The proportional cartridges are seated in standard cavities and can be connected to various types of compensators to obtain schemes as shown further on in this catalogue. Proportional flow control cartrigde must be operated by the discharge tube.

Following is a glossary of technical terms as used in this catalogue.

Current: electrons flow produced by voltage across a coil whose power is proportional to the crossing current and the number of coils. Common abbreviation is I.

No load current: power consumed by the proportional controller when no coil output is available.

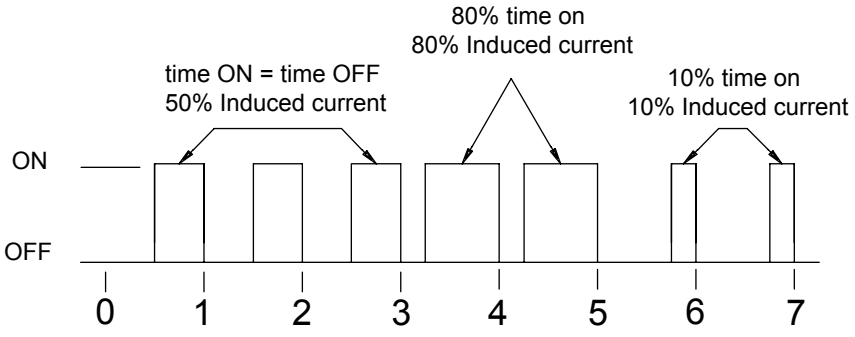
Threshold current (or polarization): point where increasing input current causes a flow or pressure variation

Maximum working current: is the point where input current no longer results into a flow pressure variation.

I min - I max: is the minimum and maximum control current fed to the solenoid of the proportional cartridge.

Hysteresis: is the measure of the output current difference between increasing and decreasing current in the solenoid. Example: when current is increasing you need 1200 mA current to produce a 3L/min flow. When current is decreasing,you need 1140 mA current to get the same flow. So there is a 60 mA difference in input current to achieve 3 gpm flow depending on whether current is increasing or decreasing. If I max = 1600mA, and Imin = 350 mA the total input difference is = 1250 mA. Hysteresis=(60/1250)100 = 4.8%.

Pulse with modulation (PWM): amount method used to vary the average current induced in a coil by a squere wave of fixed frequency and variable time ratios.



Proportional controller or amplifier: electronic device converting a low - power input signal into an output signal capable of operating the valve. This output signal can be modified to include PWM ramping or dither.

Ramping: a system for adjustment of output current variation of a proportional control.

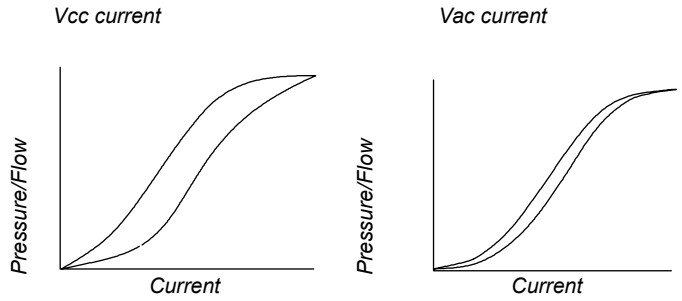
Compensator: hydraulic device combined to proportional control valves to provide fixed outlet flow when pressure change.

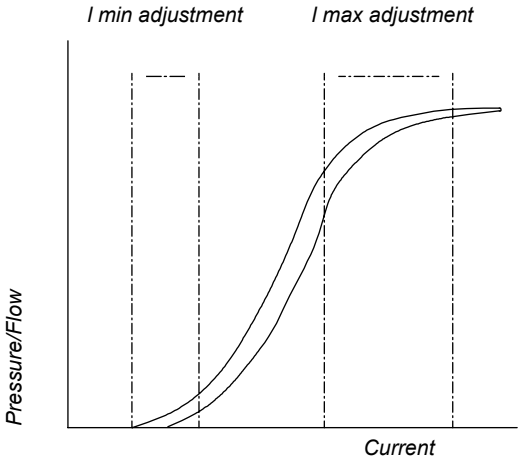
Voltage: current flow potential in an electric circuit. It is measured in units called volts (and is sometimes abbreviated V). Generally, higher voltage will induce a higher current.

ELECTRIC CONTROL REQUIREMENTS

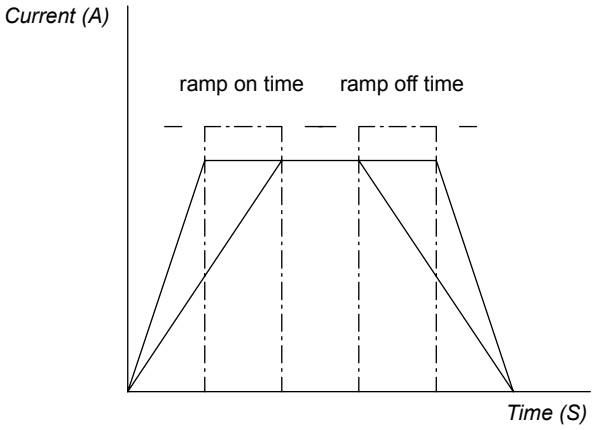
NEM spa offers a range of electro proportional controls equipped with 12 and 24 Vcc coils.
On going test indicates that a current from 110 to 150 Hz significantly improves the valve performance, as against operation with straight Vcc. The graphs on the side show how the addition of PWM noticeably reduces hysteresis. This feature is available from virtually all standard controls manufacturers at low cost. For valves,hysteresis is represented by a double tracking curve where as the lower and upper track show decreasing and increasing current respectively. These valves are not designed for rapid operation rates. Please consult the factory if relatively fast valve response is required. One way of enhancing operation rates is to add a control function for (I min - I max) adjustment. This function will allow control across the full range. Again, this feature is widely available on commercial products. Many commercially available controllers also include ramping control.

TYPICAL HYSTERESIS



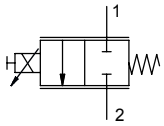
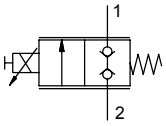


RAMP SLOPE CONTROL

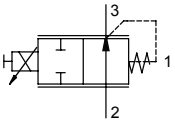
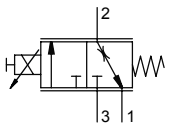


PROPORTIONAL VALVES

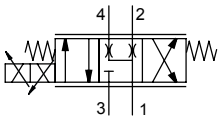
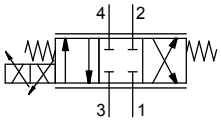
2 WAYS DIRECTIONAL PROPORTIONAL CONTROL VALVES

		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-343 NC	30	350	SAE-10	C230000	6.01.001
	CT-344 NC	100	350	SAE-12	C240001	6.01.002
	CT-523 NC	40	250	SAE-10	C230000	6.01.003

3 WAYS DIRECTIONAL PROPORTIONAL CONTROL VALVES

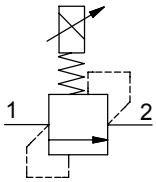
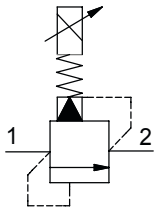
	CT-353 NA	30	350	SAE-10	C330000	6.01.004
	CT-353 NC	30	350	SAE-10	C330000	6.01.005
	CT-354 NC	70	350	SAE-12	C340000	6.01.006

4 WAYS DIRECTIONAL PROPORTIONAL CONTROL VALVES

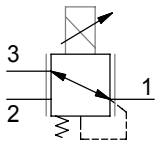
	CT-473.1	30	250	SAE-10	C430000	6.01.007
	CT-473.2	30	250	SAE-10	C430000	6.01.007

PROPORTIONAL VALVES

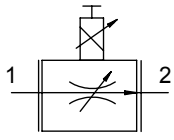
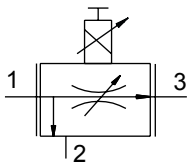
PRESSURE RELIEF VALVES

		Flow l/min	Pmax bar	SIZE	CAVITY	PAGE
	CT-052	2	350	SAE-08	C220000	6.01.008
	CT-063	60	350	SAE-10	C230000	6.01.009

PRESSURE REDUCING VALVES

	CT-172	4	210	SAE-8	C320000	6.01.010

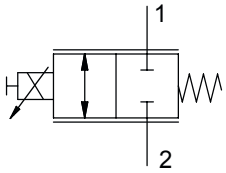
FLOW CONTROL VALVES

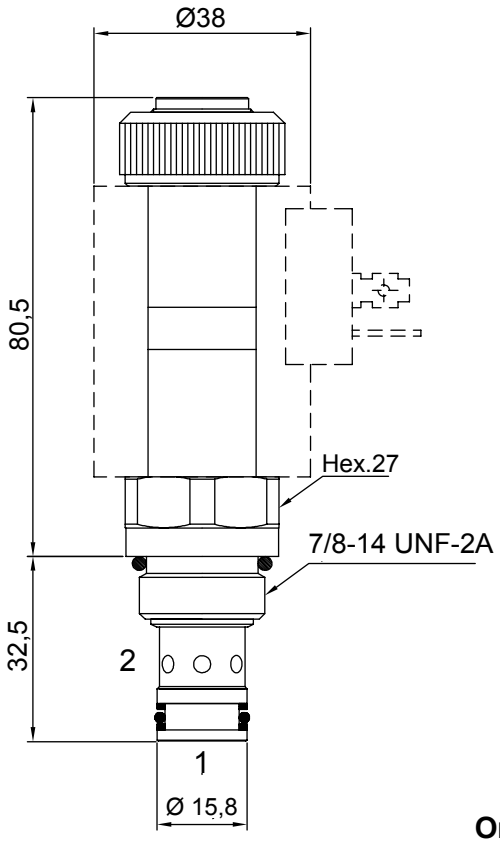
	CT-333 NC	30	350	SAE-10	C230000	6.01.011
	CT-334 NC	50	350	SAE-12	C240000	6.01.012
	CT-363 NC	50	250	SAE-10	C330000	6.01.013
	CT-364 NC	80	250	SAE-12	C340000	6.01.014

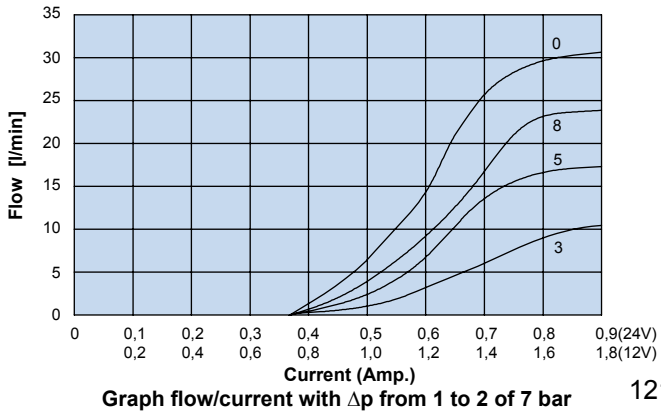
120

FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROLS NC

- Flow . . . . . **30 l/min**
- Max working pressure in 1:2. . . . . **350 bar**
- Application limits with Δp max from 1 to 2. . . . . **15 bar**
- Leakage . . . . . **150 cc/min**
- Seals. . . . . **NBR e PTFE**
- Cavity **C230000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **4 Nm**
- Weight (with coil). . . . . **0,48 Kg**
- Coil **CT-9800** to be ordered separately

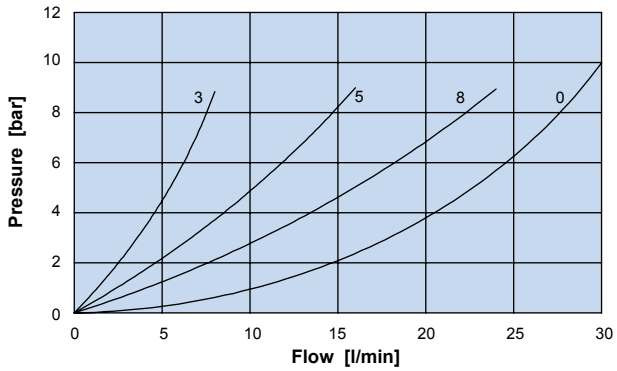






Graph flow/current with Δp from 1 to 2 of 7 bar

121



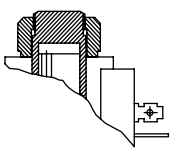
Pressure drop with energized coil

Ordering code

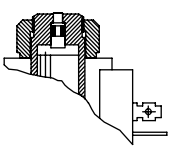
0 3 4 3 1 ☐ 0 ☐ 0 1

0	**3**	**5**	**8**	**0**	**1**	**7**
100% Q.max	30% Q.max	50% Q.max	80% Q.max			

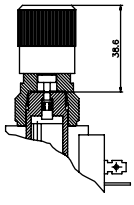
Flow range



No emergency



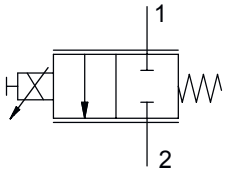
Push pin

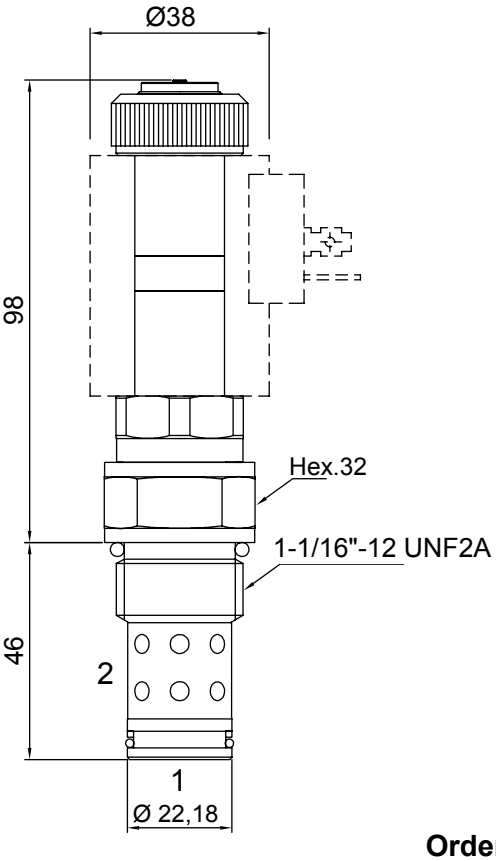


Handknob

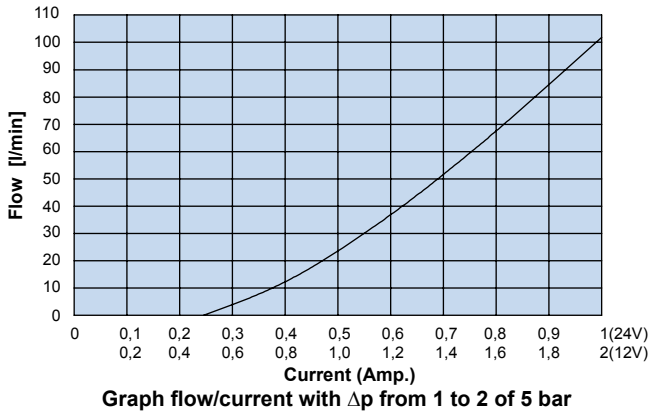
FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROLS NC

- Flow . . . . . **100 l/min**
- Max working pressure in 1:2. . . . . **350 bar**
- Application limits with Δp max from 1 to 2. . . . . **10 bar**
- Leakage . . . . . **150 cc/min**
- Seals. . . . . **NBR e PTFE**
- Cavity **C240001**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **50 Nm**
- Ring nut thightening torque . . . . . **4 Nm**
- Weight (with coil). . . . . **0,61 Kg**
- Coil **CT-9800** to be ordered separately

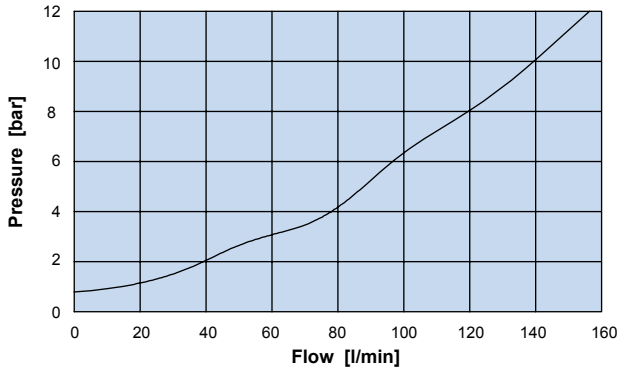




122



Graph flow/current with Δp from 1 to 2 of 5 bar



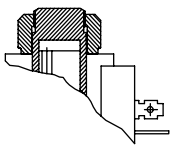
Pressure drop from 1 to 2

Ordering code

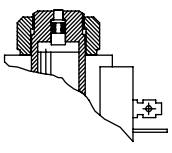
0 3 4 4 1 ☐ 0 ☐ 0 1

0	**3**	**5**	**8**	**0**	**1**	**7**
100% Q.max	30% Q.max	50% Q.max	80% Q.max			

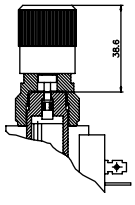
Flow range



No emergency



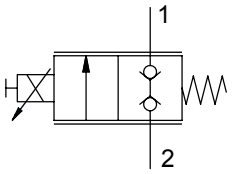
Push pin

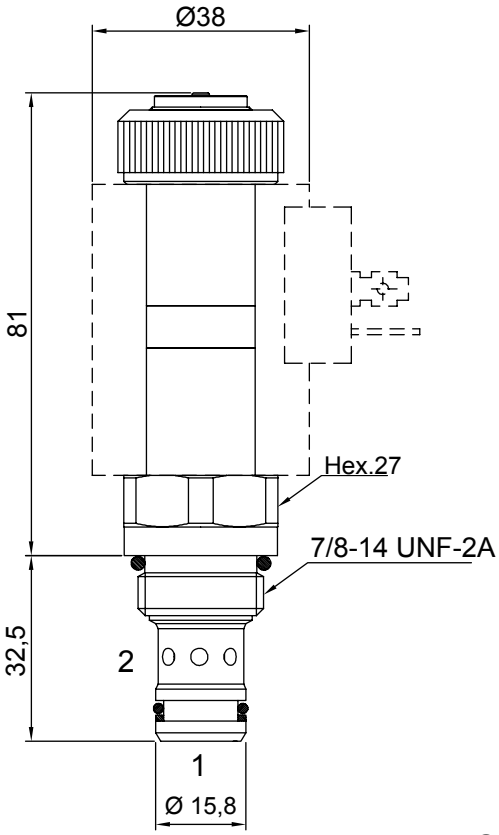


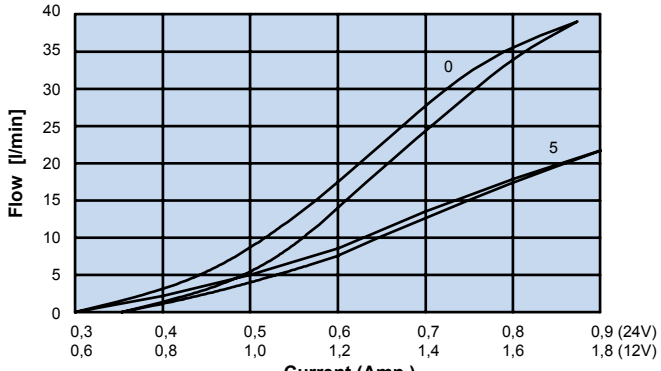
Handknob

2 WAYS ELECTRIC PROPORTIONAL FLOW CONTROL VALVE. DIRECT ACTED POPPET OPERATED, NC

- Flow . . . . . **40 l/min**
- Max working pressure in 1:2. . . . . **250 bar**
- Leakage . . . . . **0,25 cc/min**
- Seals. . . . . **NBR**
- Cavity **C230000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,53 Kg**
- Coil **CT-9800** to be ordered separately

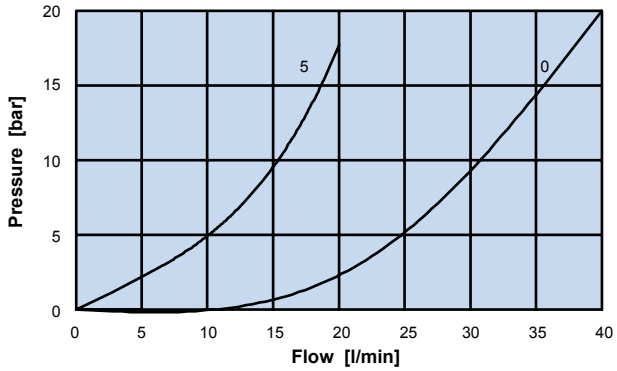






Graph flow/current with Δp from 2 to 1

123



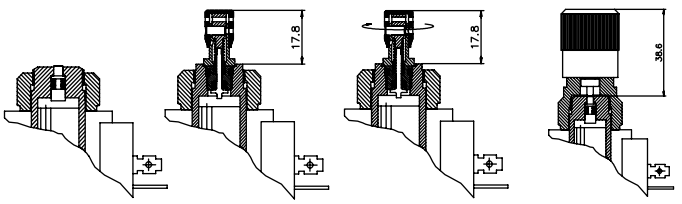
Pressure drop from 2 to 1

Ordering code

0 5 2 3 1 0 0 ☐ ☐ 0

1	4	5	7	0	5
				100% Q.max	50% Q.max

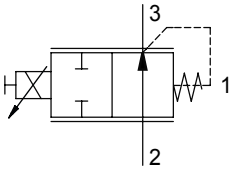
Flow range

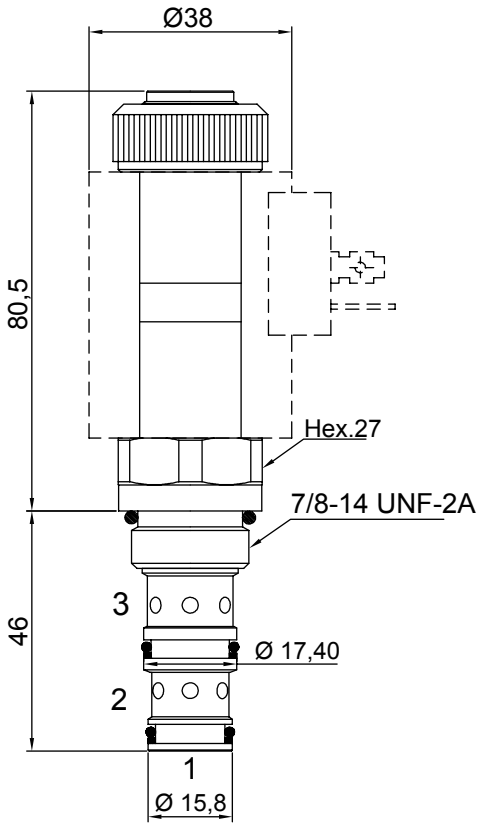


Push pin | **Push Button** | **Push and Twist** | **Handknob**

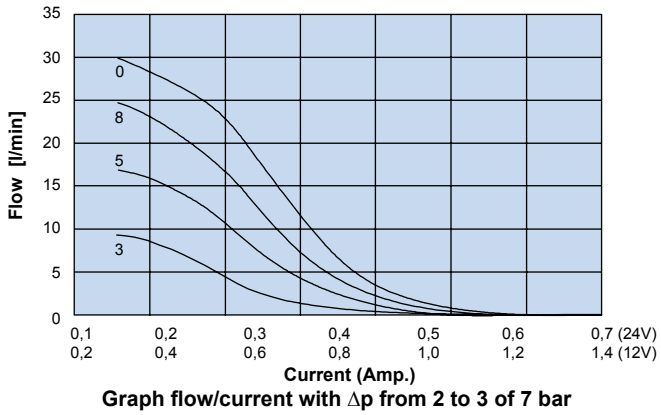
FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROLS NC

- Flow . . . . . **30 l/min**
- Max working pressure in 1:2:3. . . . . **350 bar**
- Application limits with Δp max from 2 to 3. . . . . **15 bar**
- Leakage . . . . . **150 cc/min**
- Seals. . . . . **NBR**
- Cavity **C330000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **4 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9800** to be ordered separately

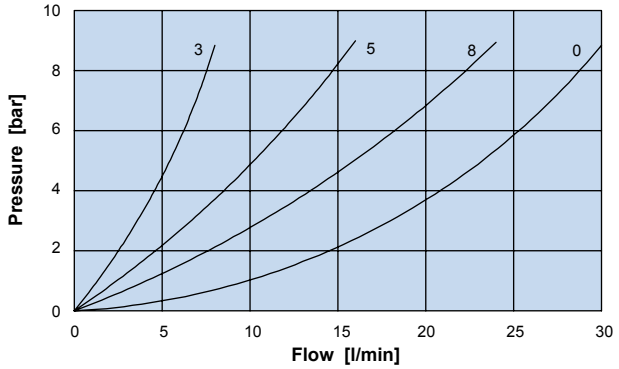




124



Graph flow/current with Δp from 2 to 3 of 7 bar



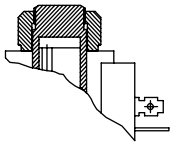
Pressure drop with de-energized coil

Ordering code

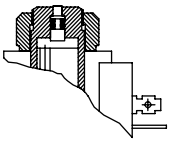
0 3 5 3 4 ☐ 0 ☐ 0 1

0	**3**	**5**	**8**	**0**	**1**	**7**
100% Q.max	30% Q.max	50% Q.max	80% Q.max			

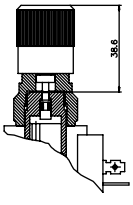
Flow range



No emergency



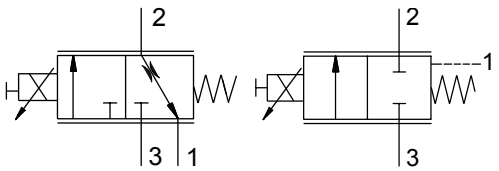
Push pin



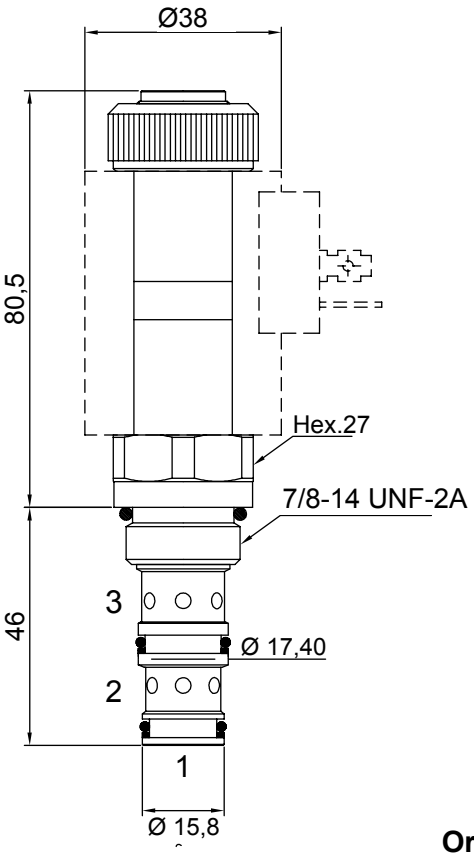
Handknob

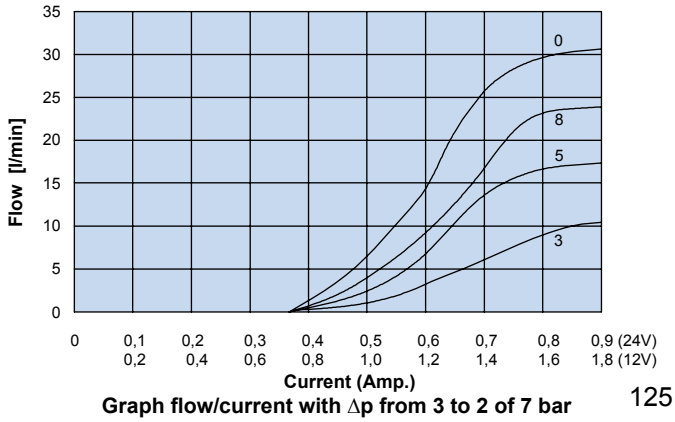
FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROLS NC

- Flow . . . . . **30 l/min**
- Max working pressure in 1:2:3. . . . . **350 bar**
- Application limits with Δp max from 3 to 2. . . . . **15 bar**
- Leakage . . . . . **150 cc/min**
- Seals. . . . . **NBR e PTFE**
- Cavity **C330000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- Coil **CT-9800** to be ordered separately

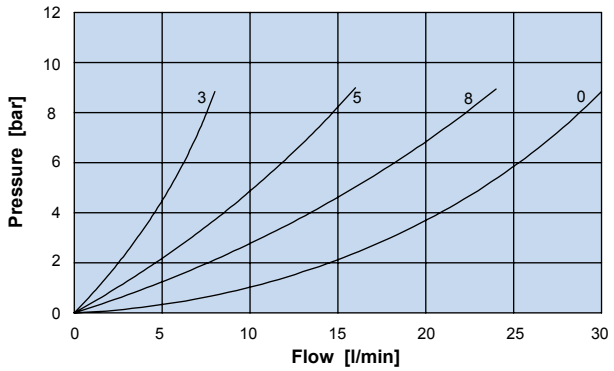


Scheme 0 **Scheme 1**





Graph flow/current with Δp from 3 to 2 of 7 bar



Pressure drop with de-energized coil

Ordering code

0 3 5 3 ☐ ☐ 0 ☐ 0 1

0 **1**

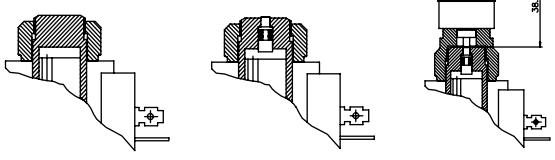
Hydraulic scheme

0 **3** **5** **8**

100% Q.max **30% Q.max** **50% Q.max** **80% Q.max**

Flow range

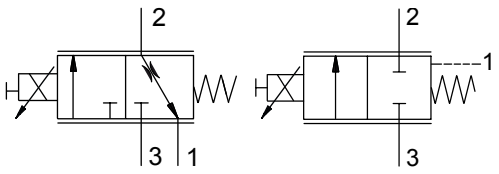
0 **1** **7**



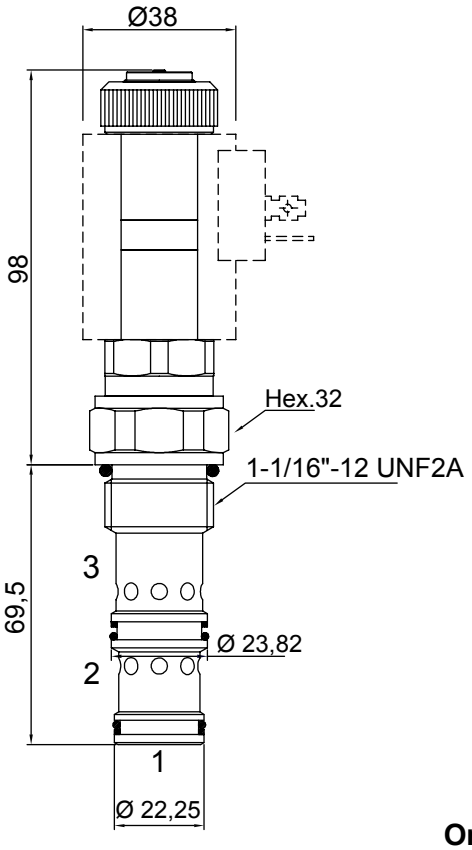
No emergency **Push pin** **Handknob**

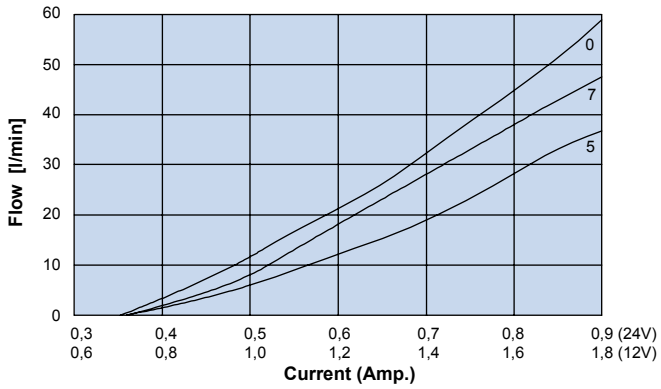
FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROLS NC

- Flow . . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Max working pressure in 1. . . . . **10 bar**
- Application limits with Δp max from 3 to 2. . . . . **15 bar**
- Leakage . . . . . **250 cc/min**
- Seals. . . . . **NBR**
- Cavity **C340000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **50 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,70 Kg**
- Coil **CT-9800** to be ordered separately

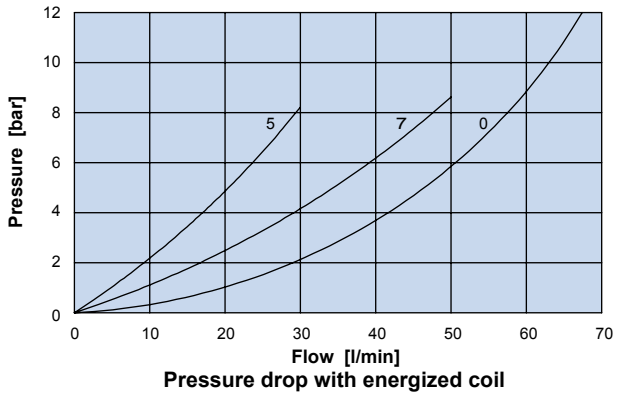


Scheme 0 **Scheme 1**





Graph flow/current with Δp from 3 to 2 of 7 bar
Graph 0 with Δp from 3 to 2 of 11 bar



Pressure drop with energized coil

126

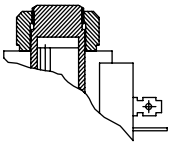
Ordering code

0 3 5 4 ☐ ☐ 0 ☐ 0 1

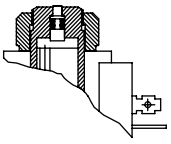
0 **1**
Hydraulic scheme

0 **5** **7**
100% Q.max **50% Q.max** **70% Q.max**
Flow range

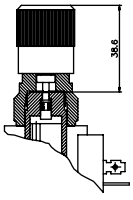
0 **1** **7**



No emergency



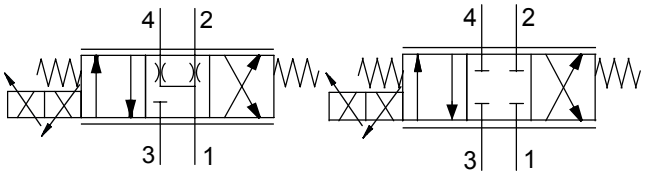
Push pin



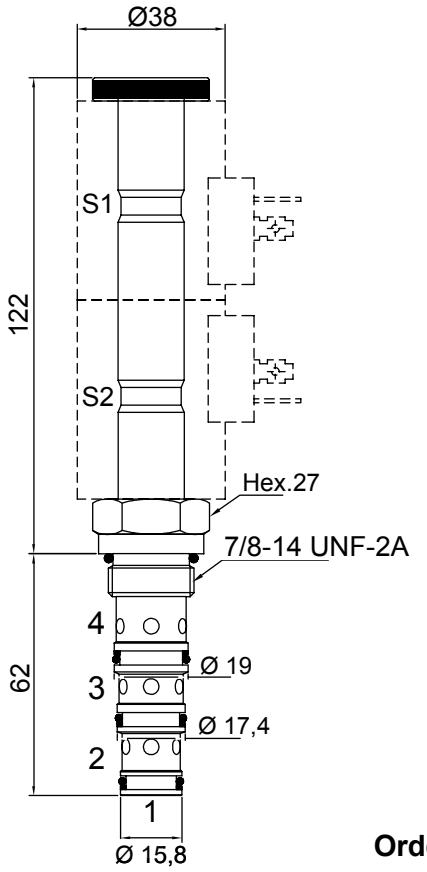
Handknob

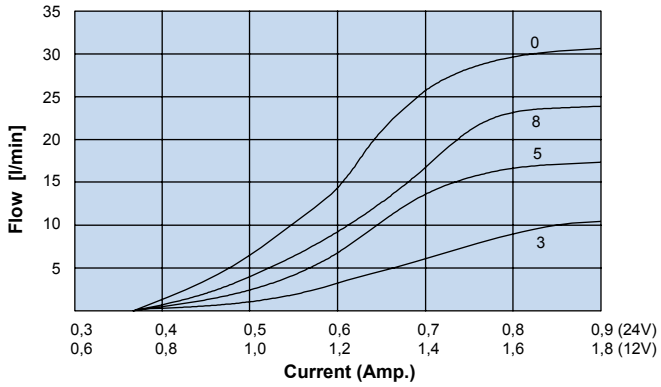
4 WAYS DIRECT ACTING ELECTRIC SPOOL VALVE DIRECT ACTING

- Flow . . . . . **30 l/min**
- Max working pressure in 2:3:4. . . . . **250 bar**
- Max working pressure in 1. . . . . **20 bar**
- Application limits with Δp max from 3 to 4/2 . . . . **15 bar**
- Leakage . . . . . **100 cc/min**
- Seals. . . . . **NBR**
- Cavity **C430000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,9 Kg**
- Coil **CT-9800** to be ordered separately

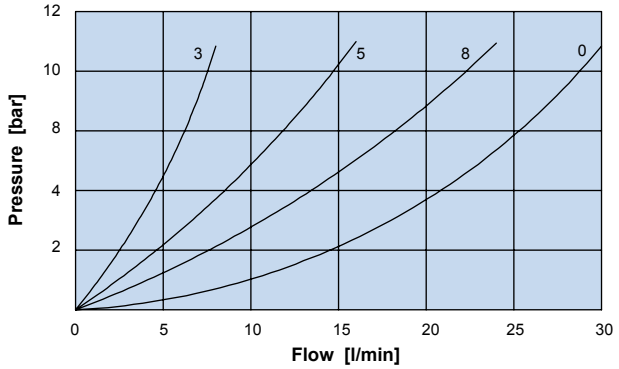


Scheme 1 **Scheme 2**





Graph flow/current with Δp from 3 to 4/2 of 7 bar 127
Graph 0 with Δp of 11 bar



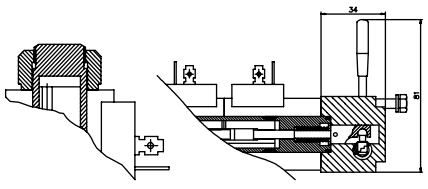
Pressure drop with energized coil from 3 to 4/2

Ordering code

0 4 7 3 ☐ 0 0 ☐ ☐ 0

1	2	0	3	0	3	5	8
Hydraulic scheme				100% Q.max	30% Q.max	50% Q.max	80% Q.max

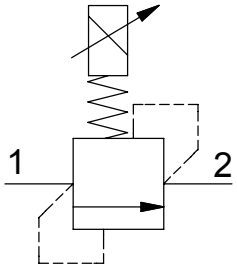
Flow range

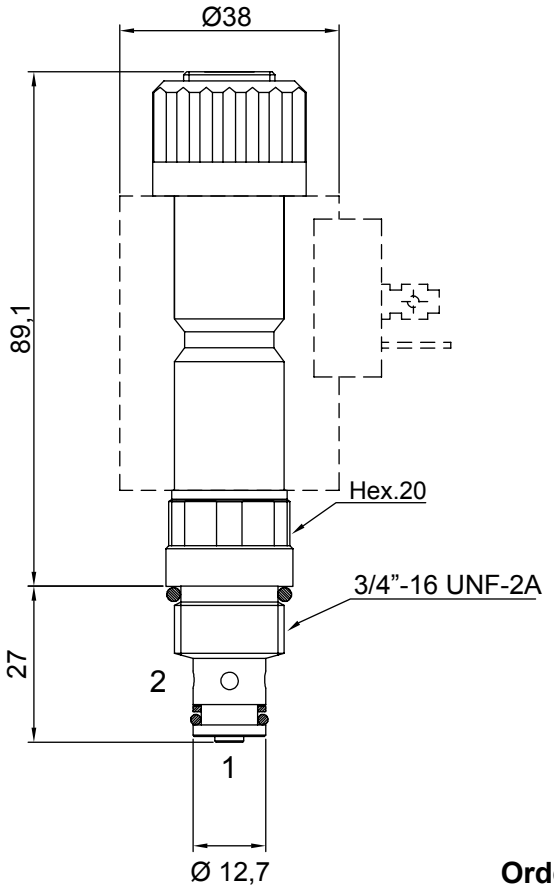


No emergency **Safety lever**

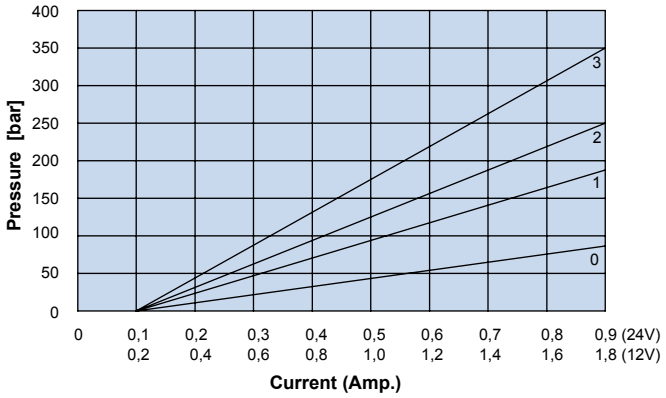
PRESSURE RELIEF VALVE DIRECT ACTING PROPORTIONAL ELECTRIC CONTROL

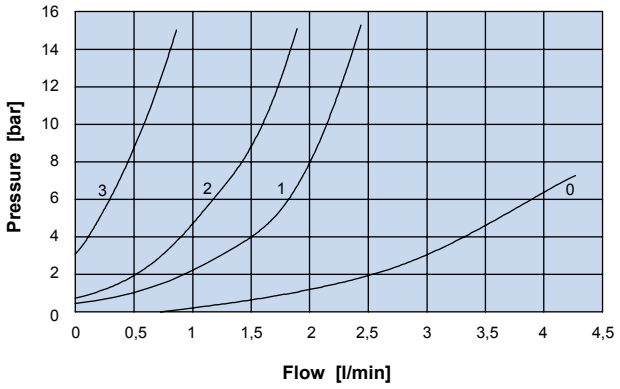
- Flow . . . . . **2 l/min**
- Max working pressure in 1. . . . . **350 bar**
- Max working pressure in 2. . . . . **20 bar**
- Seals. . . . . **NBR e PTFE**
- Cavity **C220000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **30 Nm**
- Ring nut thightening torque . . . . . **4 Nm**
- Weight (with coil). . . . . **0,46 Kg**
- Coil **CT-9800** to be ordered separately





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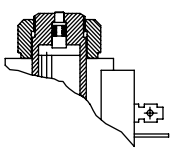


Ordering code

0 0 5 2 0 ☐ 0 ☐ 0 0

SETTING RANGE	0	1	2	3
Min - Max [bar]	0 ÷ 80	0 ÷ 150	0 ÷ 250	0 ÷ 350

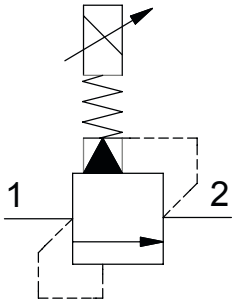
1

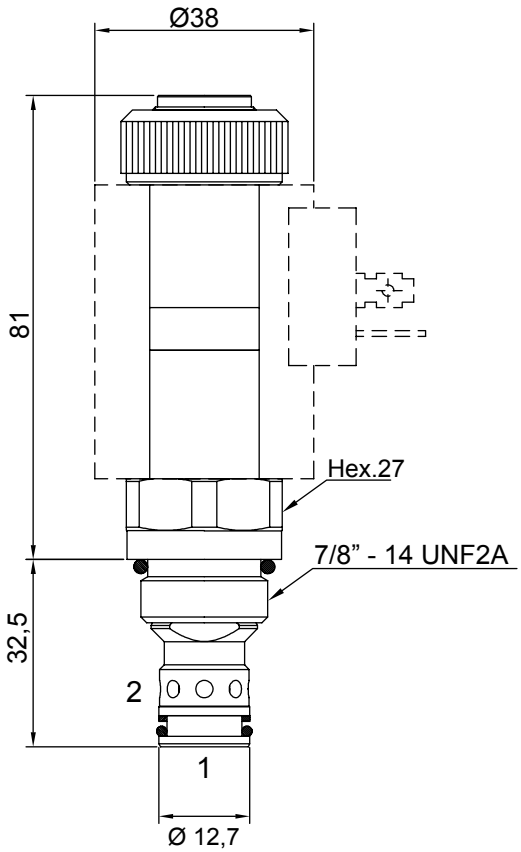


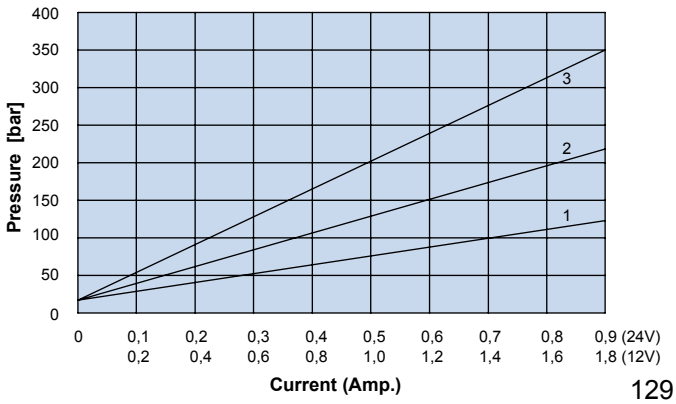
Push pin

PRESSURE RELIEF VALVE DIRECT ACTING PROPORTIONAL ELECTRIC CONTROL

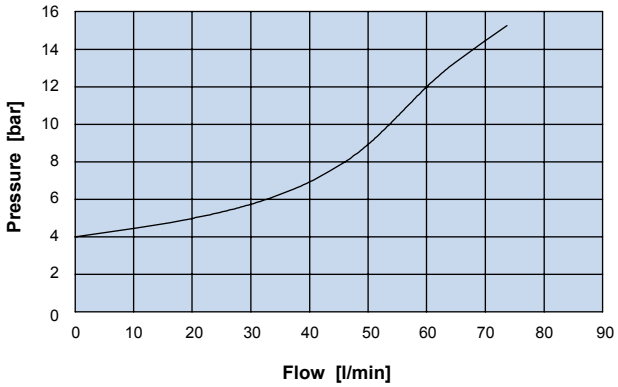
- Flow . . . . . **60 l/min**
- Max working pressure. . . . . **350 bar**
- Seals. . . . . **NBR e PTFE**
- Cavity **C230000**
- Max current at 12 Vcc **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **40 Nm**
- Ring nut thightening torque . . . . . **4 Nm**
- Weight (with coil). . . . . **0,48 Kg**
- Coil **CT-9800** to be ordered separately







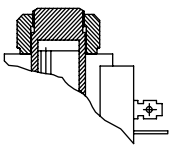
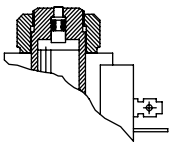
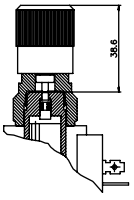
129



Ordering code

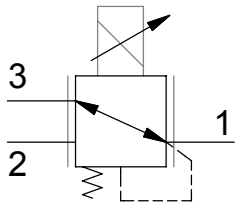
0 0 6 3 0 ☐ 0 ☐ 0 0

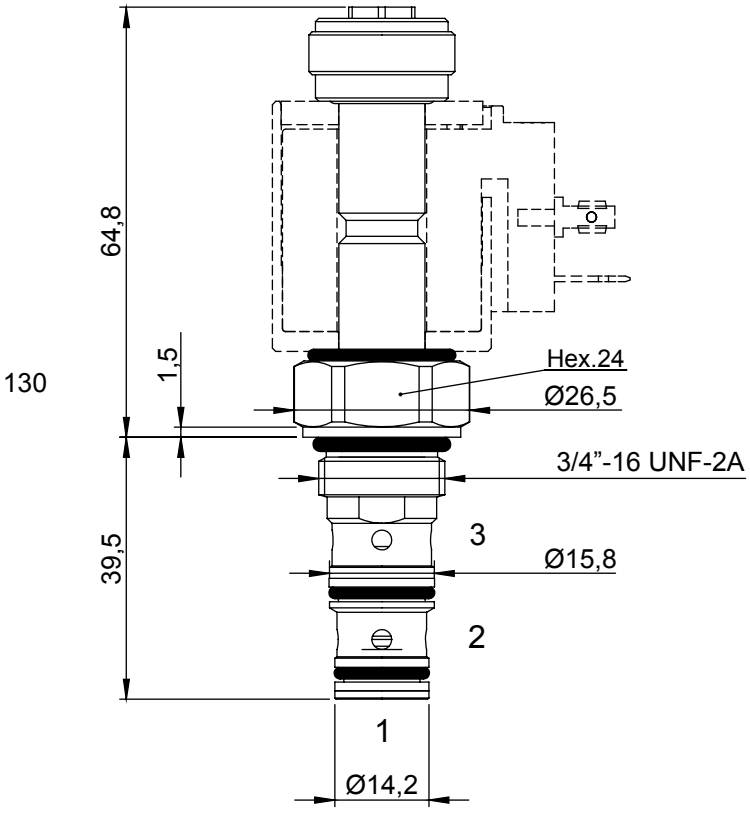
SETTING RANGE	1	2	3
Min - Max [bar]	0 ÷ 150	0 ÷ 250	0 ÷ 350

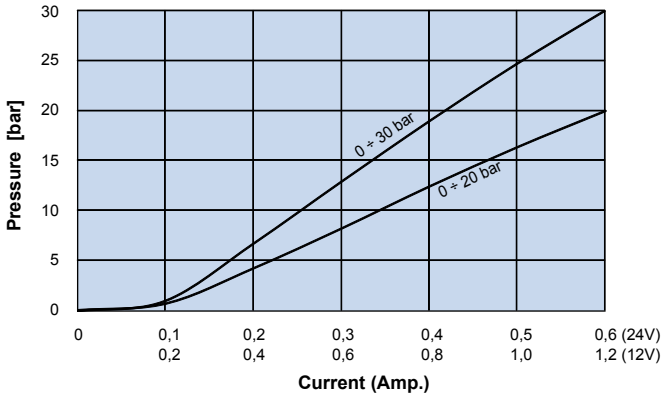
0	1	7
		
No emergency	Push pin	Handknob

PRESSURE REDUCING VALVE PROPORTIONAL ELECTRIC CONTROL

- Flow . . . . . **4 l/min**
- Max working pressure in 2. . . . . **210 bar**
- Max working pressure in 1. . . . . **30 bar**
- Max working pressure in 3. . . . . **1 bar**
- Leakage . . . . . **150 cc/min**
- Cavity **C320000**
- Max current at 12 Vcc **1200mA**
- Max current at 24 Vcc **600mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Cartridge thightening torque . . . . . **30 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,4 Kg**
- Coil **CT-9400** to be ordered separately







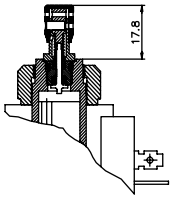
Ordering code

0 1 7 2 2 ☐ 0 ☐ ☐ 0

SETTING RANGE	0	1
Min - Max [bar]	0 ÷ 20	0 ÷ 30

0 — No emergency

4 — Push button

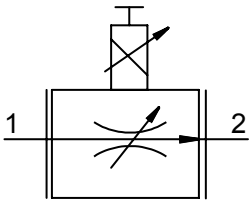


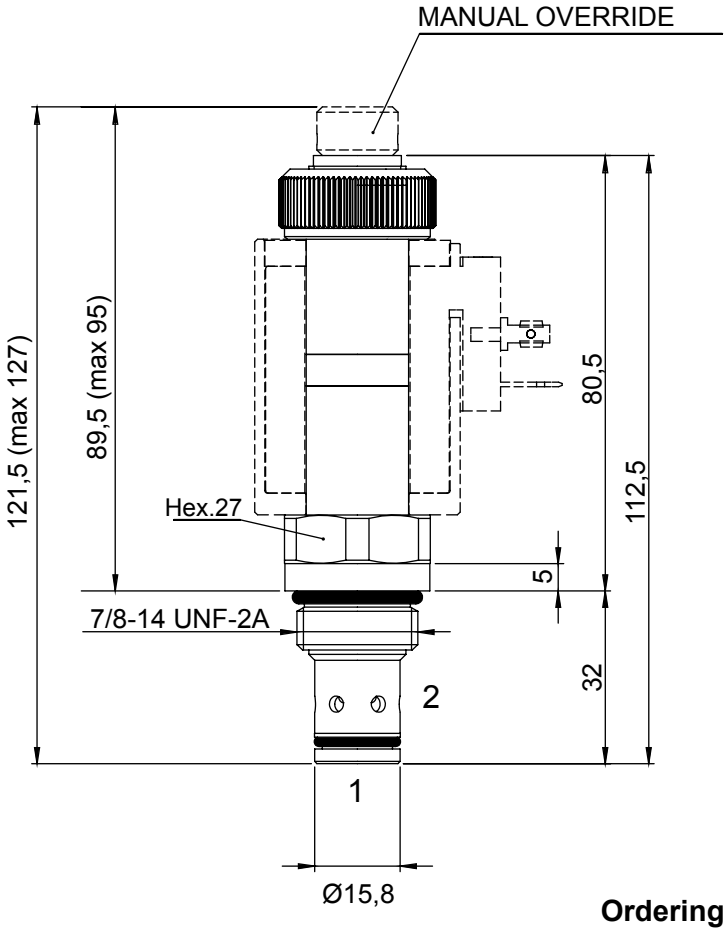
0 — Without filter

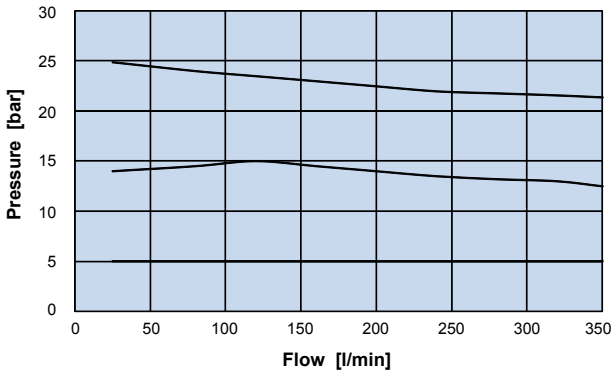
1 — With filter

2 WAYS PROPORTIONAL FLOW CONTROL VALVE

- Max flow range . . . . . **30 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **150 cc/min**
- Cavity . . . . . **C 230000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,3 Kg**
- PWM . . . . . **120 Hz**
- Hysteresis **5%**
- Max current at 24 Vcc . . . . . **0,9 A**
- Max current at 12 Vcc. . . . . **1,8 A**
- Coil **CT-9800** to be ordered separately





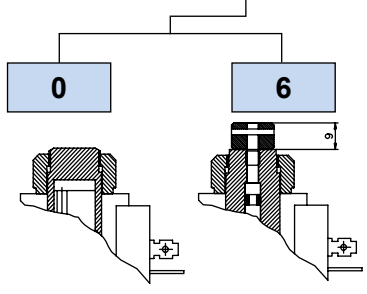


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Note:
- (NC) Normally closed in the energized position

Ordering code

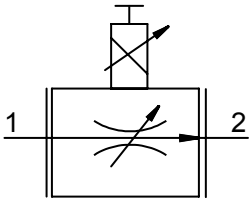
0 3 3 3 1 0 0 ☐ 0 1

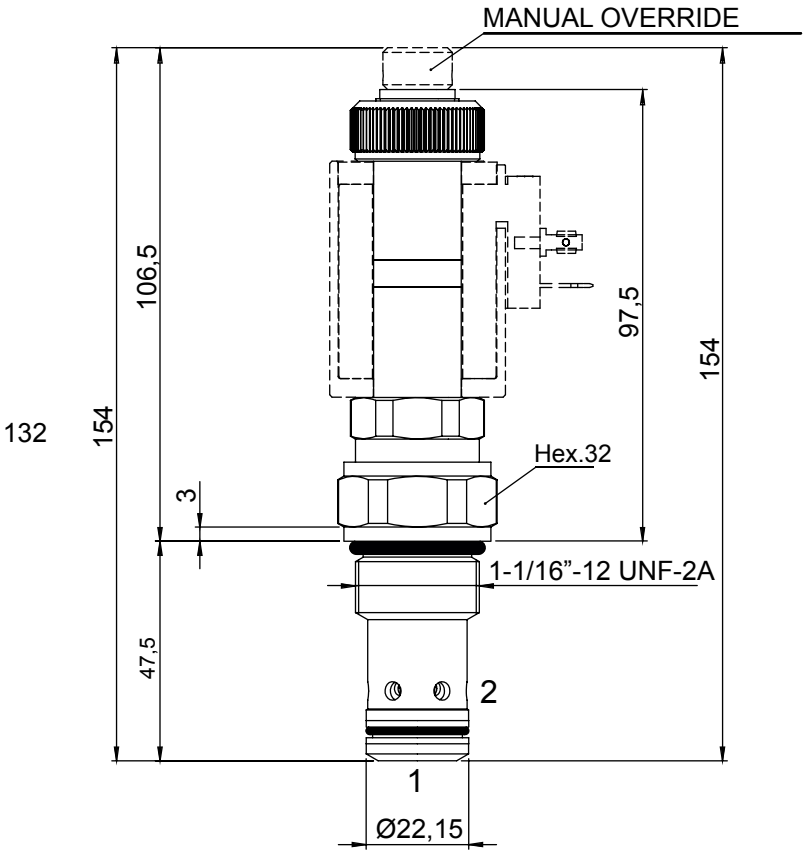


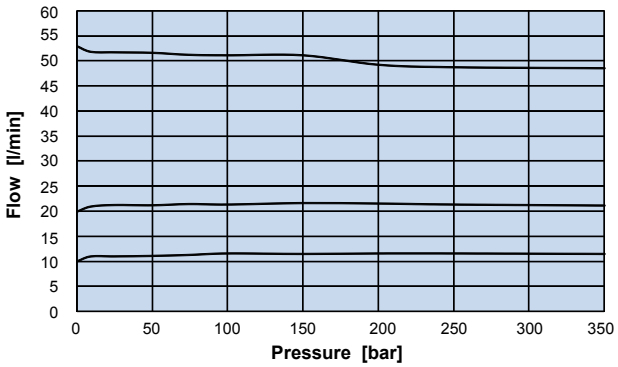
No emergency **Unscrew type**

2 WAYS PROPORTIONAL FLOW CONTROL VALVE

- Max flow range . . . . . **50 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **150 cc/min**
- Cavity **C240000**
- Cartridge thightening torque. . . . . **50 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,8 Kg**
- PWM . . . . . **120 Hz**
- Hysteresis **5%**
- Max current at 24 Vcc **900mA**
- Max current at 12 Vcc. **1800mA**
- Coil **CT-9800** to be ordered separately



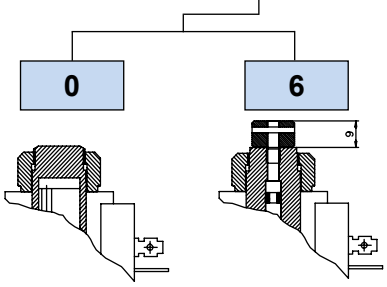




Note:
- (NC) Normally closed in the energized position

Ordering code

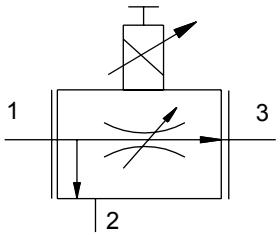
0 3 3 4 1 0 0 ☐ 0 1

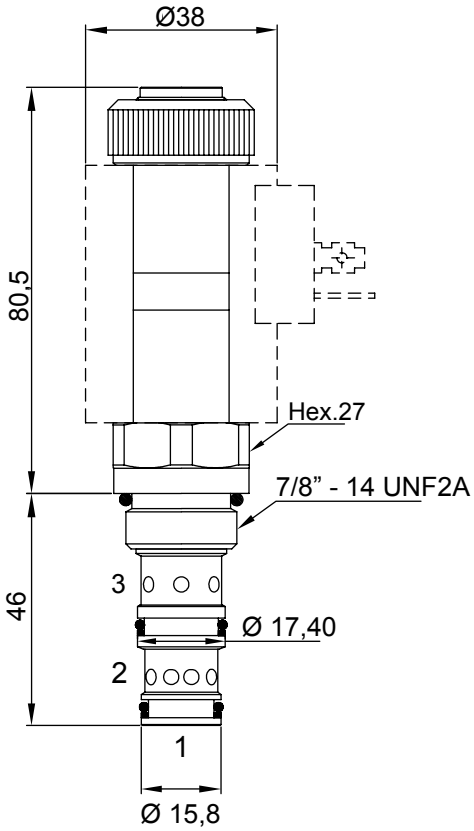


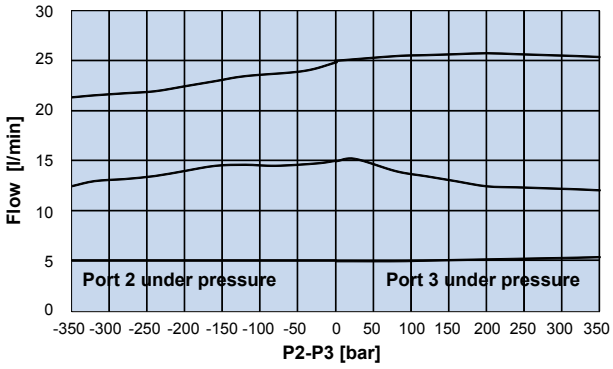
No emergency **Unscrew type**

3 WAYS PROPORTIONAL FLOW CONTROL VALVE

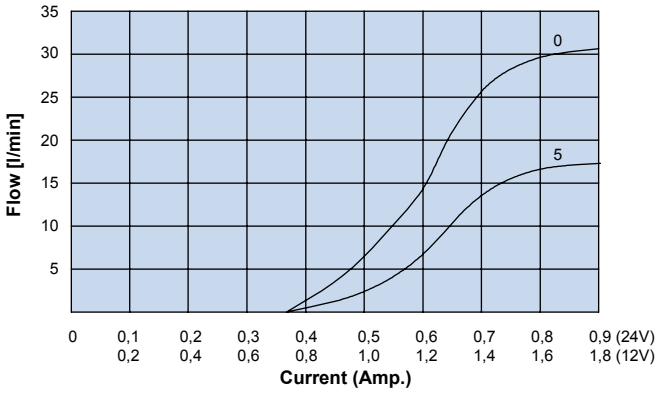
- Max working flow in 1 . . . . . **50 l/min**
- Max working pressure in 1:2:3 . . . . . **350 bar**
- Leakage . . . . . **150 cc/min**
- Seals . . . . . **NBR**
- Cavity **C330000**
- Cartridge thightening torque. . . . . **40 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,56 Kg**
- PWM . . . . . **120 Hz**
- Hysteresis **5%**
- Max current at 24 Vcc **900mA**
- Max current at 12 Vcc. **1800mA**
- Coil **CT-9800** to be ordered separately







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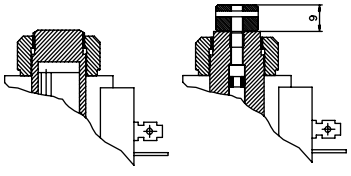
Ordering code

0 3 6 3 1 ☐ 0 ☐ 0 1

0	**30 l/min**
5	**15 l/min**

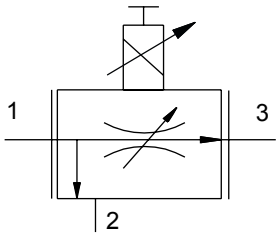
Flow range

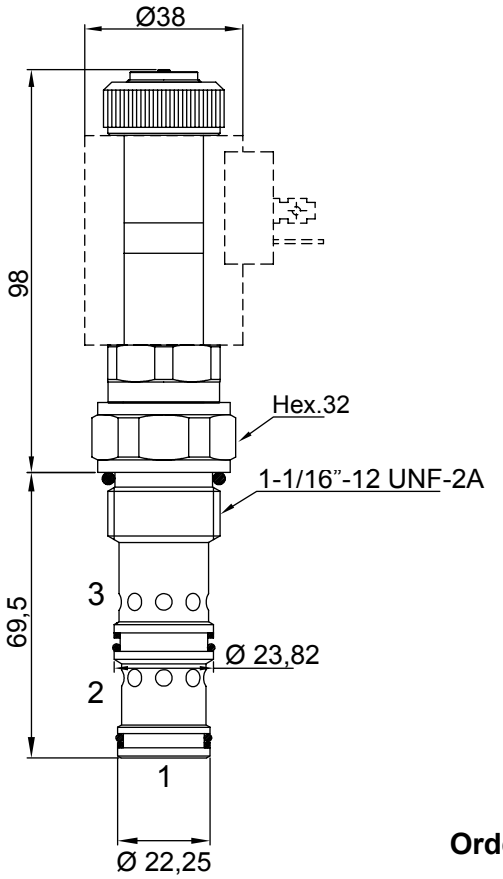
0	**No emergency**
6	**Unscrew type**

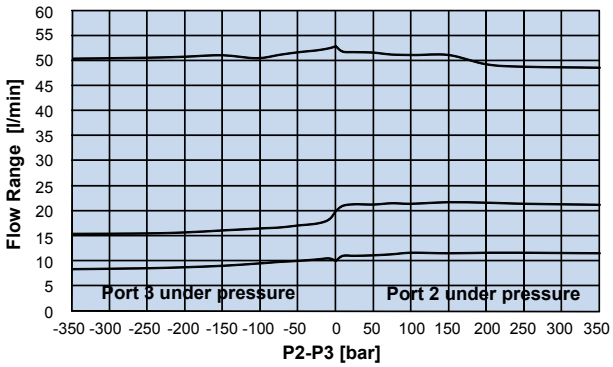


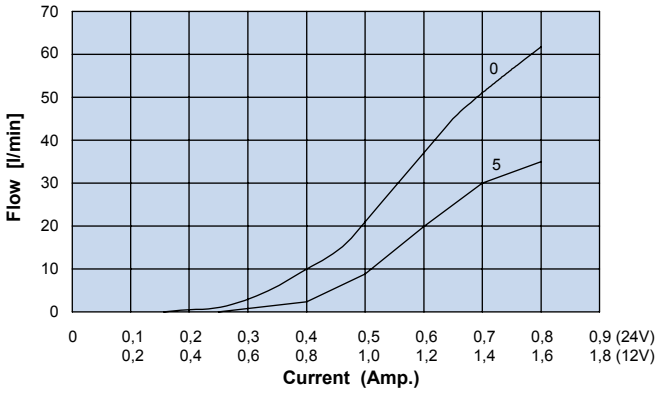
3 WAYS PROPORTIONAL FLOW CONTROL VALVE

- Max flow range in 1 . . . . . **80 l/min**
- Max working pressure in 1:2:3 . . . . . **350 bar**
- Leakage . . . . . **150 cc/min**
- Seals . . . . . **NBR**
- Cavity **C340000**
- Cartridge thightening torque. . . . . **50 Nm**
- Ring nut thightening torque . . . . . **5 Nm**
- Weight (with coil). . . . . **0,7 Kg**
- PWM . . . . . **120 Hz**
- Hysteresis **5%**
- Max current at 24 Vcc **900mA**
- Max current at 12 Vcc. **1800mA**
- Coil **CT-9800** to be ordered separately









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Ordering code

0 3 6 4 1 ☐ 0 ☐ 0 1

SETTING RANGE	0	5
FLOW RANGE	60 l/min	35 l/min

0	6
No emergency	Unscrew type

PARTS IN BODY

PRESSURE CONTROL VALVES

INTRODUCTION

PROPORTIONAL IT PRESSURE REDUCING VALVES

The proportional IT pressure reducing valves, are made to remotely control directional control valves with hydraulic actuators or to control variable displacement pump regulator devices.

Thanks to the special architecture that enables all the components to be build into the electro-proportional coil, the IT pressure reducing valves are very compact having a flange mounting assembly, this solution does not require any machining of the cavity.

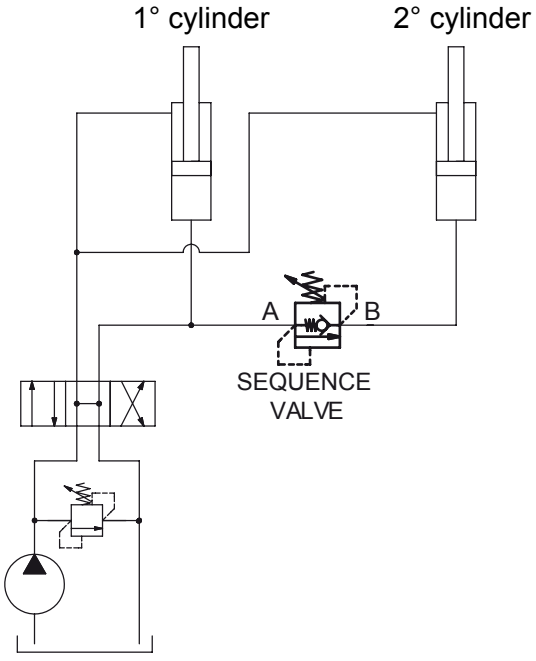
Feeding the coil with current (PWM 120Hz) from “0” to “I max” it is possible to create a proportional increase of the regulated pressure in the V port.

Besides the IT27 version, as a single components, we can offer solutions that are already assembled into a body with CETOP 2 and CETOP 3 flanging or for in-line assembly.

IN LINE SEQUENCE VALVES

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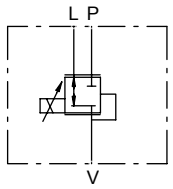
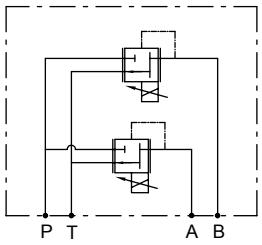
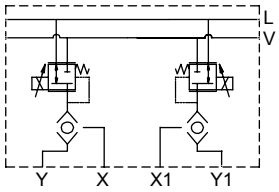
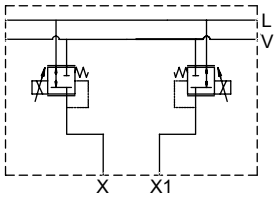
The sequence valves are used when it is necessary to hydraulically control the sequence of two or more movement using a single source of power, establishing the priority of a movement versus another one. As an example, we may allow the start of a cylinder only after the system reaches a specific pressure. Sequence valve are based on a relief valve combined with a check valve that allow the oil passage in reverse with a low pressure drop.



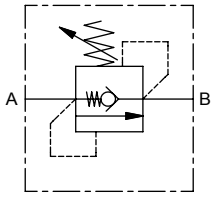
As per the relief valves, also the sequence valves can be produced as direct acting or pilot operated as well as fully balanced not sensitive to back pressure.

PRESSURE CONTROL VALVES

PROPORTIONAL PRESSURE REDUCING VALVES

		Q l/min	Pmax bar	PORTS	PAGE
	IT-027	2	50	FLANGIATA	7.01.001
	IT-044-CETOP2	2	50	CETOP 2	7.01.002
	IT-043-CETOP3	2	50	CETOP 3	7.01.003
	IT-128	2	50	G 1/4”	7.01.004
	IT-128	2	50	G 1/4”	7.01.004

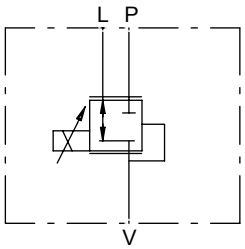
SEQUENCE VALVES

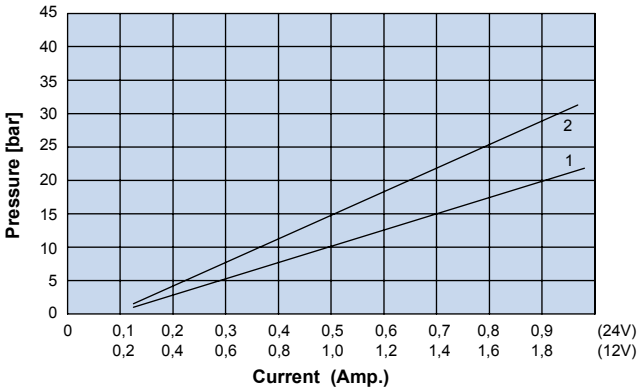
	P-SL-LHD05XA-N	80	350	G 1/2”	7.01.005

137

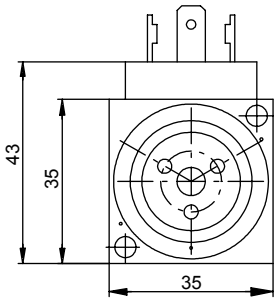
PROPORTIONAL PRESSURE REDUCING VALVE FLANGE MOUNTING

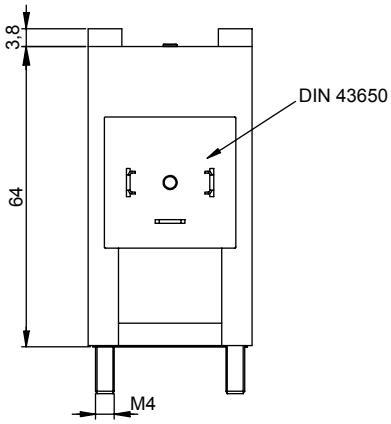
- Max working pressure in P. . . . . **50 bar**
- Max working pressure in L . . . . . **1 bar**
- Max working flow. . . . . **2 l/min**
- Leakage. . . . . **8 cc/min**
- Seals. . . . . **NBR**
- Max current at 12 Vcc . . . . . **1600 mA**
- Max current at 24 Vcc . . . . . **800 mA**
- Hysteresis.. . . . . **5%**
- PWM . . . . . **120 HZ**
- Resistance. . . . . **12Vcc: 3,7Ω - 24 Vcc: 15,5Ω**
- Protection index with standard connector. **IP-65**
- Screw thightening torque . . . . . **3 Nm**
- Weight . . . . . **0,44 Kg**

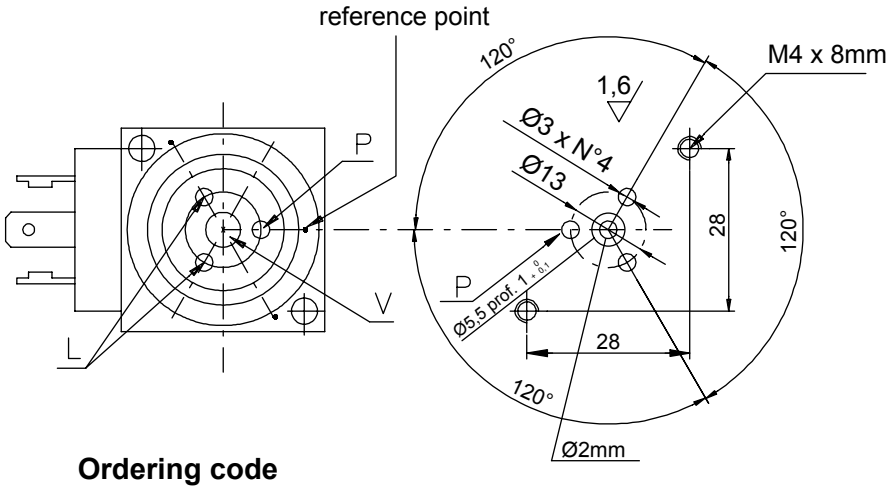




138







Ordering code

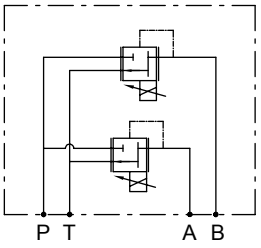
1 0 2 7 0 0 ☐ 0 ☐ 0

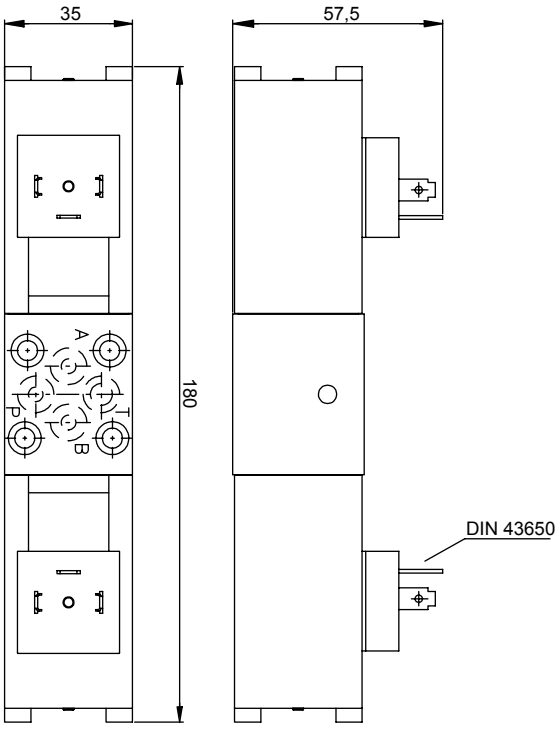
VOLTAGE	
1	**2**
12 Vcc	24Vcc

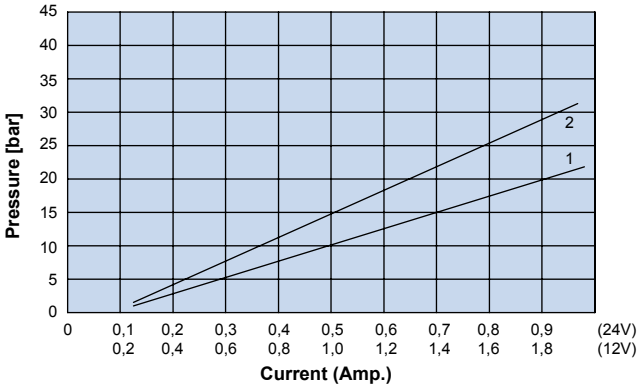
REDUCED PRESSURE	
1	**2**
3:18 bar	3:28 bar

DOUBLE PROPORTIONAL PRESSURE REDUCING VALVE ON BODY WITH CETOP-2 FACE MOUNTING

- Max working pressure in P. . . . . **50 bar**
- Max working pressure in T . . . . . **1 bar**
- Max working flow. . . . . **2 l/min**
- Leakage. . . . . **8 cc/min**
- Seals. . . . . **NBR**
- Max current at 12 Vcc . . . . . **1600 mA**
- Max current at 24 Vcc . . . . . **800 mA**
- Hysteresis.. . . . . **5%**
- PWM . . . . . **120 HZ**
- Resistance. . . . . **12Vcc: 3,7Ω - 24 Vcc: 15,5Ω**
- Protection index with standard connector. **IP-65**
- Weight . . . . . **1,42 Kg**







139

Ordering code

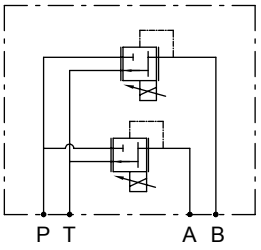
1 0 4 4 1 1 ☐ 0 ☐ 1

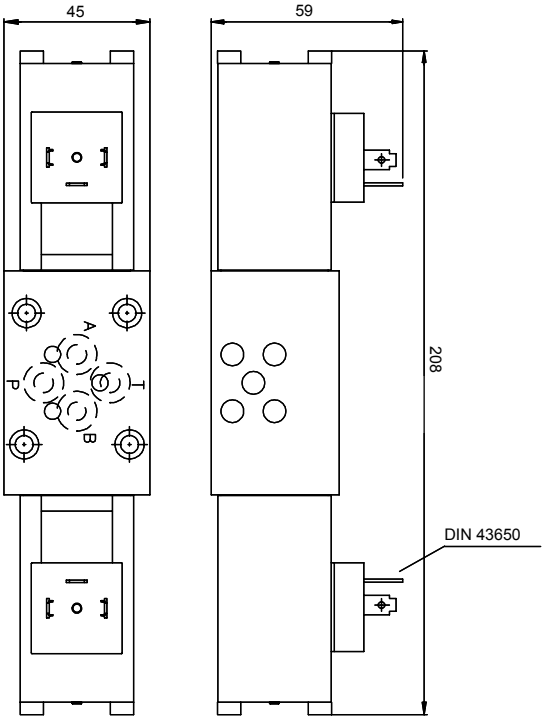
VOLTAGE	
1	2
12 Vcc	24Vcc

REDUCED PRESSURE	
1	2
3:18 bar	3:28 bar

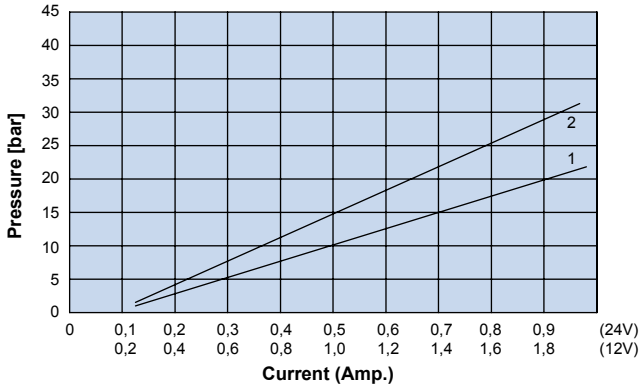
DOUBLE PROPORTIONAL PRESSURE REDUCING VALVE ON BODY WITH CETOP-3 FACE MOUNTING

- Max working pressure in P. . . . . **50 bar**
- Max working pressure in T . . . . . **1 bar**
- Max working flow. . . . . **2 l/min**
- Leakage. . . . . **8 cc/min**
- Seals. . . . . **NBR**
- Max current at 12 Vcc . . . . . **1600 mA**
- Max current at 24 Vcc . . . . . **800 mA**
- Hysteresis.. . . . . **5%**
- PWM . . . . . **120 HZ**
- Resistance. . . . . **12Vcc: 3,7Ω - 24 Vcc: 15,5Ω**
- Protection index with standard connector. **IP-65**
- Weight . . . . . **1,42 Kg**





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Ordering code

1 0 4 3 1 1 ☐ 0 ☐ 0

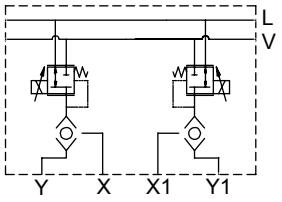
VOLTAGE	
1	2
12 Vcc	24Vcc

REDUCED PRESSURE	
1	2
3:18 bar	3:28 bar

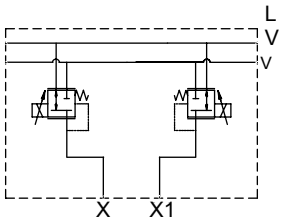
REMOTE CONTROL MANIFOLDS FOR HYDRAULIC PILOT OPERATED CONTROL VALVES AND VARIABLE PUMPS

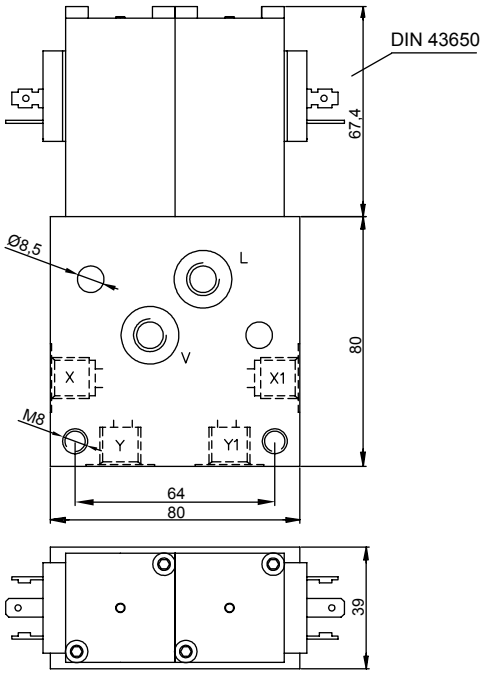
- Max working pressure in V. . . . . **50 bar**
- Max working pressure in X:X1:Y:Y1 . . . . . **28 bar**
- Max working pressure in L . . . . . **1 bar**
- Max working flow. . . . . **2 l/min**
- Leakage. . . . . **16 cc/min**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. . . . . **1600 mA**
- Max current at 24 Vcc. . . . . **800 mA**
- Hysteresis **5%**
- PWM . . . . . **120 HZ**
- Resistance. . . . . **12Vcc: 3,7Ω - 24 Vcc: 15,5Ω**
- Protection index with standard connector. **IP-65**
- Weight . . . . . **2,5 Kg**

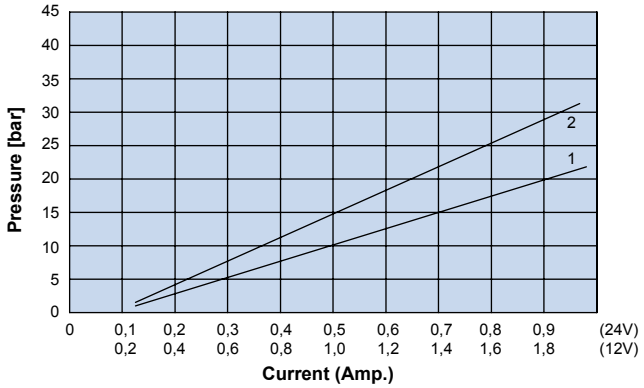
SCHEME 0



SCHEME 1







141

Ordering code

1 1 2 8 ☐ ☐ ☐ ☐ 0 0

HYDRAULIC SCHEME	
0	1

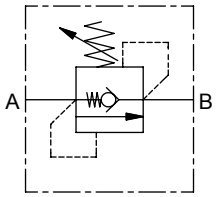
SECTIONS NUMBER
1
2
3
...

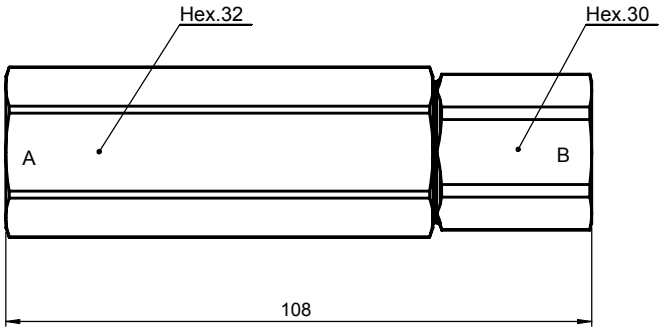
VOLTAGE	
1	2
12 Vcc	24Vcc

REDUCED PRESSURE	
1	2
3:18 bar	3:28 bar

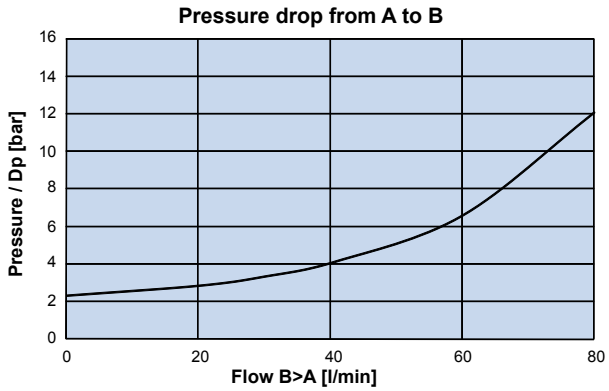
IN LINE SEQUENCE VALVE G1/2”

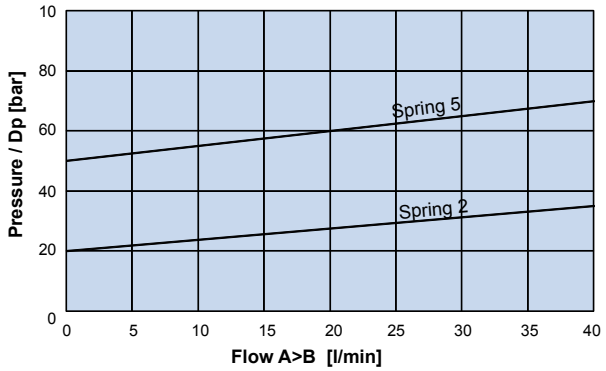
- Flow. . . . . .80 l/min
- Pressure . . . . . .350 bar
- Weight. . . . . 0,6 Kg





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Ordering code

P 0 6 0 5 0 0 0 ☐ S ☐ 0 0

SPRINGS	2	5
Setting range min - max	10 - 30	25 - 90
bar/turn	9	28
Standard setting 4 l/min	20	50

PORTS	04
A,B	G 1/2”

PARTS IN BODY

COUNTERBALANCE VALVES

COUNTERBALANCE VALVES

INTRODUCTION

Counterbalance Valves of the Parts-in-Body line, are hydraulic valves designed specifically to hold and control negative and gravitational loads. They are meant to serve all those applications that involve the control of suspended loads, such as mechanical joints, lifting applications, winches, etc.
These valves are characterized by internal movable parts sliding directly inside the manifold, allowing direct installation onto the hydraulic actuators: line-mounting or flange-mounting.
Parts in body counterbalance valves are an alternative solution to the cartridge counterbalance valves as their design allows the direct mounting on the application.

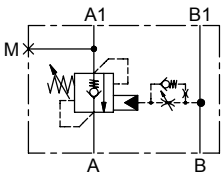


***Parts-in-Body** valve section view*

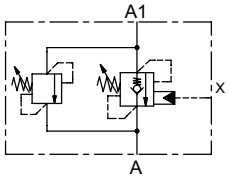
144

Further on its simple installation, **Parts-in-Body** counterbalance valves allow to obtain specialized valves: valves which are able to optimize their functionality in particular situations/working conditions, since they are equipped with specific components.

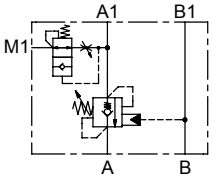
Examples of specialized valves:



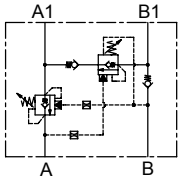
VALVE WITH PILOT DUMP



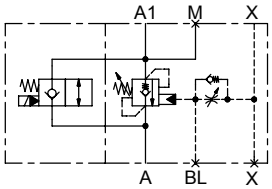
VALVE WITH INTEGRATED ANTI-SCHOCK



VALVE PRE-ARRANGED FOR LOAD LIMITING DEVICE CONNECTION PORT



VALVE WITH REGENERATIVE CIRCUIT



VALVE WITH ELECTRIC BY-PASS AND PILOT DUMP

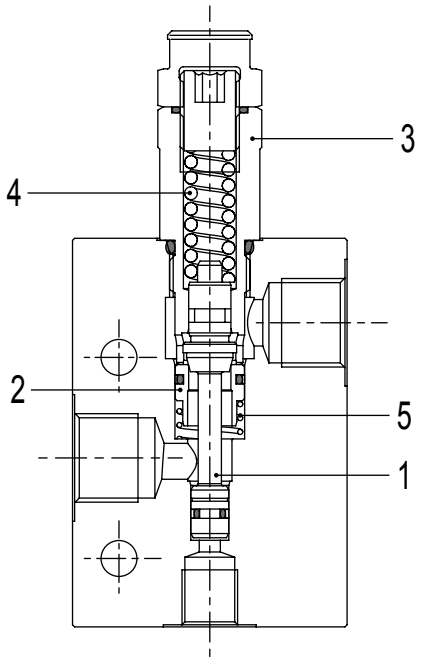
NEM'S RANGE

Nem's range of **Parts in body** counterbalance valves come in 4 series types, named LHD (acronym for Load Holding Devices)

	Qmax [lpm]	Pmax [bar]	Pilot Ratio	Compensation*	
LHD03X	40	350	4:1	N - C	***N - Not-Compensated*** *Version* ***C - Fully Compensated*** *Version* ***S - Partially Compensated*** *Version* *(See Compensation Paragraph)*
LHD05X	70	350	4:1 9,5:1	N - S - C	
LHD10X	110	410	4:1 8:1	N - C	
LHD15X	180	410	4:1 8:1	N - C	
LHD25X	350	500	4:10 6:1	N - C	

LHD_X valves are made up of different parts mounted inside a body made of either steel or aluminium.

LHD_X valves internal main parts are:
1. A sealing piston which bears both actuators and pilot pressure.
2. A unidirectional valve which also works as sealing seat for position n°1.
3. A spring-case cap, whose design determines the behaviour of the valve, in function of the back pressure.
4. An adjustable spring to regulate the pressure on piston n°1.
5. A non adjustable spring to bring the unidirectional valve 2 back to its initial position.



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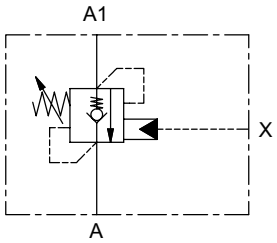
CIRCUITS

The type of movement required by the actuators determines the valve circuit design. For instance: if in a specific application where the external loads always move in the same direction, it's possible to choose **Single Acting** valves (circuit **A**). If instead, external loads will act alternatively on both sides of the hydraulic actuator, a **Double Acting** valve (circuits **AB1** – **AB2**) should be used.

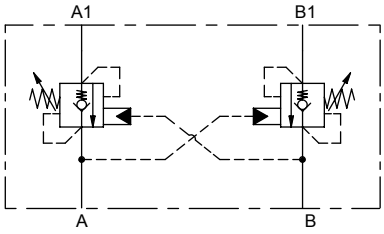
COUNTERBALANCE VALVES

LHD_X double acting valves, can be designed in 2 different ways: the choice between them depends on the installation or on the type of compensation required:

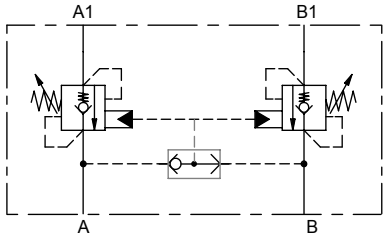
- When the cavities are independent (Circuit **AB1**) we will have a double acting valve in which the 2 sections (A/A1 e B/B1) are completely independent from each other (crossed pilot line). This characteristic allows to install either Compensated and Not-Compensated types.
- With coaxial cavities (Circuit **AB2**), we will have a double acting valve in which the 2 sections (A/A1 e B/B1) are designed on the same axis, sharing part of the pilot circuit. This characteristic makes it possible to install either Partially-Compensated and Not-Compensated types.



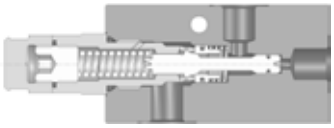
*Single Acting Circuit (**A**)*

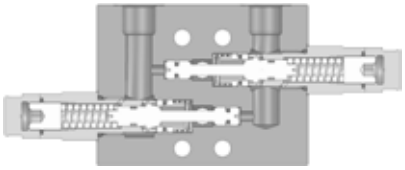


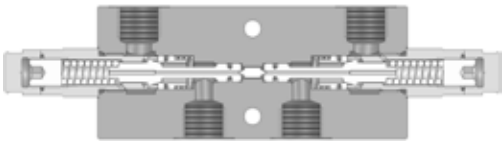
*Double Acting Circuit with indipendent cavities (**AB1**)*



*Double Acting Circuit with coaxial cavities (**AB2**)*

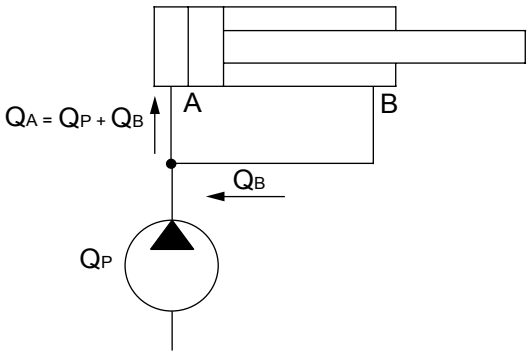






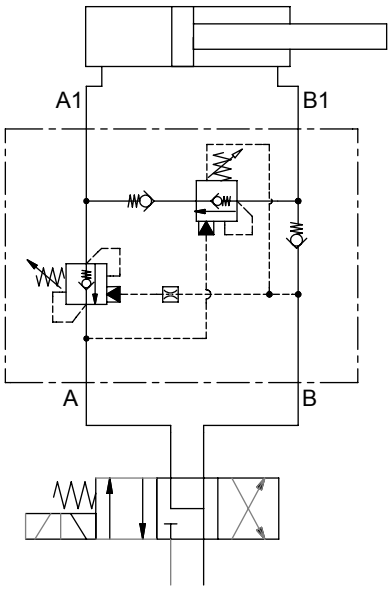
For applications on cylinders, it's possible to increase the actuators extension speed through a **Regen-Block** (**R** Circuit). This type of circuit is advisable for all those applications characterized by long stroke of the actuators with no loads or very small ones, for instance, truck mounted telescopic cranes, loaders, hook loaders, hydraulic presses, garbage trucks.

Regenerative circuits base their functioning on retrieving of the oil coming out of ring chamber during the differential-area cylinder extension. The oil coming from the ring chamber is driven into the cylinder cap to join with oil flow coming from the pump. In this way the cylinder outgoing speed corresponds to the pump flow related to the rod area, and not related to the cap area, creating a considerable speed increase.



More specifically, the **counterbalance valves for regenerative circuits** allow not only for the management of regenerated flow but also to control the speed and to lock the cylinders even in case of dragged loads.

COUNTERBALANCE VALVES

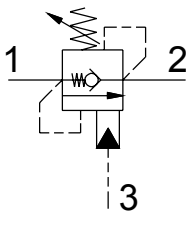


Example of counterbalance valve for regenerative circuit

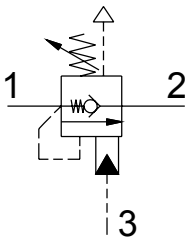
COMPENSATION

The coupling of counterbalance valves with directional control valves requires to determine the type of spools to be used. When the counterbalance valves are in charge of the pressure relief function, it's essential to make a distinction between "closed-centre" spool applications and "open-centre" spool application.
Generally, when "closed-centre" spools are installed, it's necessary to use compensated counterbalance valves: since these valves are insensitive to back-pressure on the return line (A-2), their pressure setting will not change.
Two examples of compensated valves application are regenerative circuits and circuits in which the darining of the eventual pressure peaks must be relieved in series by the anti-shock valves installed inside the directional control valve.
In case of "open-centre" directional spool applications, non-compensated valves are compulsory, in which the spring is connected to the return line (A-2).

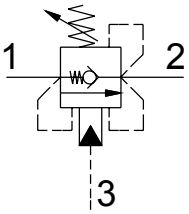
**Non Compensated Version (N)*



**Fully Compensated Version (C)*



**Partially Compensated Version (S)*



In **Non-Compensated (N)** type valves, back-pressure determines both the pressure setting and the pilot pressure. In these valves the return line is directly connected to the spring.
Main use: In combination with open centre spool applications.

In **Fully compensated (C)** type valves, back-pressure does not influence neither pressure setting nor pilot pressure. This valve type belongs the family of valves in which the adjustable spring is separated from return line (A-2) and is connected to a draining line or air-vented.
In these valves, back-pressure (A-2) is balanced, so it will not find any area on which it can apply its force, so that both setting and pilot pressures are independent from pressure on return line (A).
Main use: In combination with closed-centre spool applications, regenerative circuits.

In **Partially-Compensated (S)** type valves, only the pressure setting is independent from back-pressure, while the pilot pressure is influenced by back-pressures, which sometimes can be helpful in stabilizing the system.
This valve type belongs to the family of valves in which only the areas subject to the load (A1-1) are balanced Vs the back pressure (A - 2).
Main use: In combination with closed-centre spool applications.

SETTINGS

Counterbalance valves setting corresponds to the opening pressure of pressure relief section. This pressure determines the max load which counterbalance valve is able to hold.
Usually the setting pressure value must be at least 1.3 times the max load induced pressure to hold. That tolerance allows induced loads safe holding.

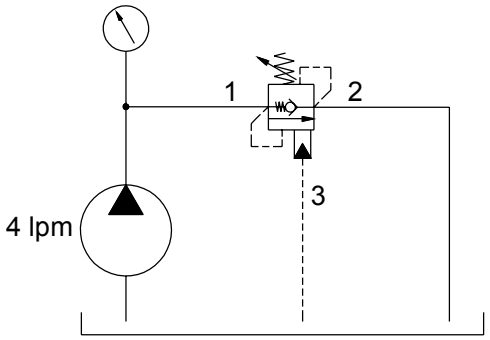


Fig.3

The **standard pressure setting (Pt)** of the counterbalance valves corresponds to pressure detected on port (1) while the valve is crossed by 4 l/min. (fig.3)

es. Pt: 350 bar @ 4 l/min

In particular cases, and generally upon customers' request, the pressure can be set considering the initial opening value, corresponding almost to 20 ml/min. flow.

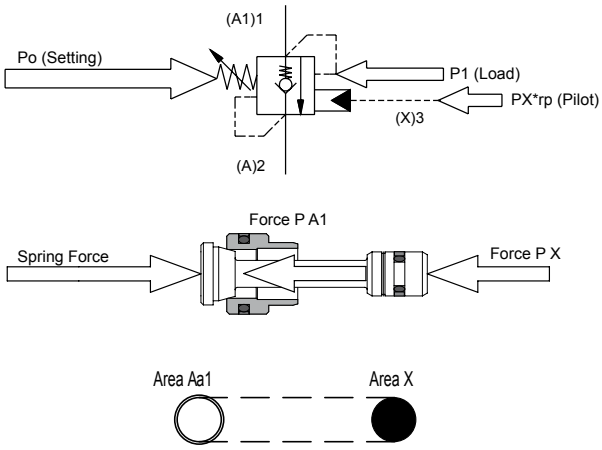
es. Pt: 350 bar @ 20 ml/min

PILOT RATIOS

As mentioned before, counterbalance valves are characterized by a pilot area on which pressure coming from the actuator's feeding line acts. Such pressure, together with the pressure due to the load, opens the pilot piston, progressively contrasting the force generated by the setting spring.

COUNTERBALANCE VALVES

As mentioned before, counterbalance valves are characterized by a pilot area on which pressure coming from the actuator's feeding line acts. Such pressure, together with the pressure due to the load, moves pilot piston, progressively contrasting the force generated by the setting spring.
Hence the combined action of the two pressures is connected to the ratio between the pushing areas on which they act. This ratio is known as "Pilot Ratio" (pr), and it is the basic parameter for any counterbalance valve.
Pilot Ratio (pr) is defined as the geometrical ratio between the area on which the load acts (port 1) and the pilot area (port 3). Thanks to this parameter, it is possible to calculate the values of pilot pressures first opening (Px):

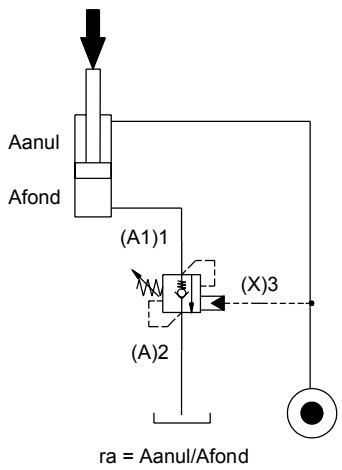


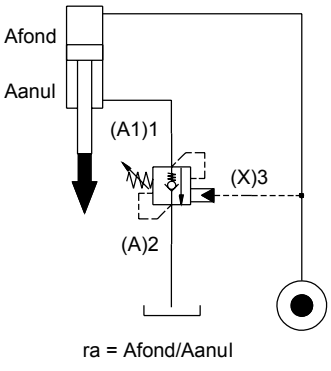
Px = (Pt - P1) / rp

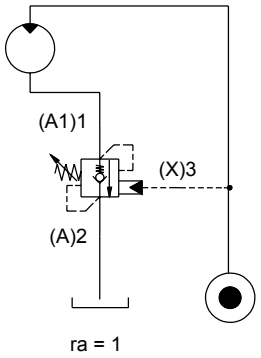
According the Pilot Ratio, counterbalance valves can be divided in 2 types:

High Pilot Ratio (>6:1): suitable for those applications where the loads are constant (for instance, hydraulic motors) and very stable, where low pilot pressures are demanded in favour of speed and energy savings.
Low Pilot Ratio (<5:1): suitable for those applications where loads can vary (for instance, trucks cranes) and for those mechanical structures are not stable, where more control and more stability are needed, an higher pilot pressure is required.
When counterbalance valves are installed on hydraulic actuators, to determine the correct value of pilot pressure it is necessary to introduce in the calculation the ratio between the areas of the actuator itself.

Px = (Pt - P1) / (rp+ra) **ra** = ratio between the areas of the hydraulic actuator

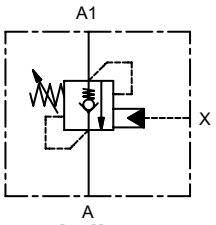
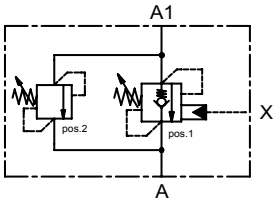
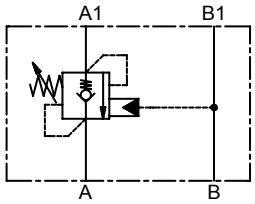
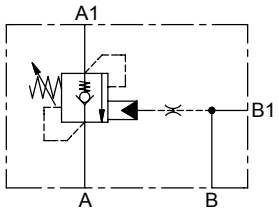
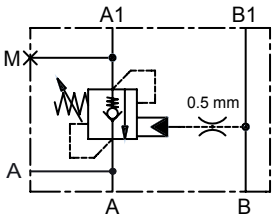






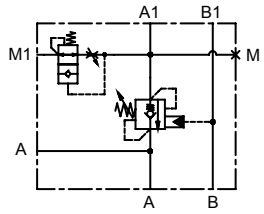
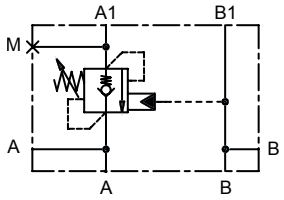
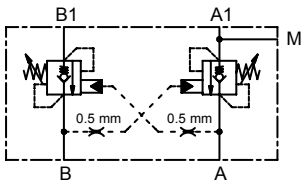
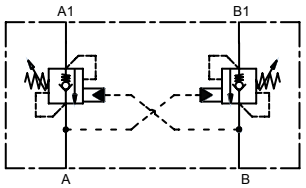
COUNTERBALANCE VALVES

NOT COMPENSATED MODELS

SINGLE		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **In line**	H3001N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.001
	H5001N	70	350	4 : 1 - 9 : 1	G 3/8” - G 1/2”	8.01.002
 **In line**	H3001N463	40	350	4 : 1	G 1/4” - G 3/8”	8.01.003
	H5001N463	70	350	4 : 1	G 3/8” - G 1/2”	8.01.004
 **In line**	H3004N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.005/A
	H5004N	70	350	4 : 1	G 3/8” - G 1/2”	8.01.006
	H1004N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.007
	H1504N	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.008
 **In line**	H3004N41	40	350	4 : 1	G 3/8”	8.01.005/B
 **A1 port flanged**	H3005N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.009
	H3007N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.010
	H5005N	70	350	4 : 1	G 3/8” - G 1/2”	8.01.011
	H1005N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.012
	H1505N	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.013

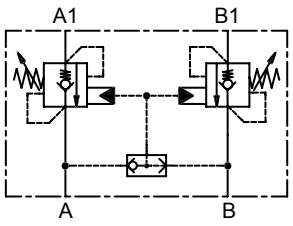
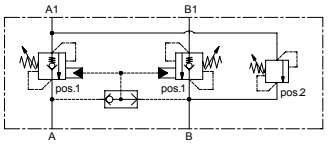
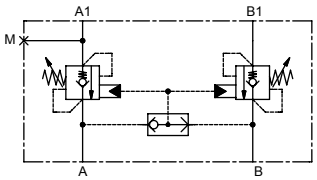
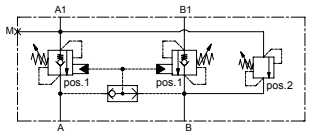
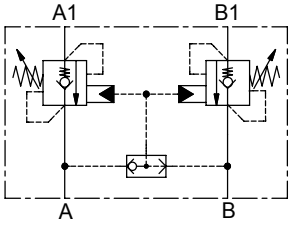
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COUNTERBALANCE VALVES

		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **A1 port flanged**	H3005N433	40	350	4 : 1	G 1/4” - G 3/8”	8.01.014
 **A1/B1 port flanged**	H3006N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.015
	H3008N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.016
	H5006N	70	350	4 : 1	G 3/8” - G 1/2”	8.01.017
	H1006N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.018
	H1506N	110	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.019
DOUBLE						
 **In line**	H1030N	110	410	4 : 1	G 1/4” - G 3/4”	8.01.020
	H1530N	180	410	4 : 1 - 8 : 1	G 3/4”	8.01.021
 **A1/B1 port flanged**	H5032N	72	350	4 : 1	G 3/8”	8.01.022
	H1532N	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.023

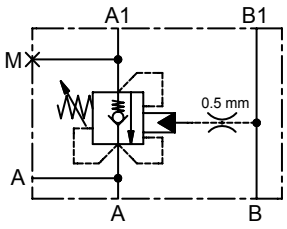
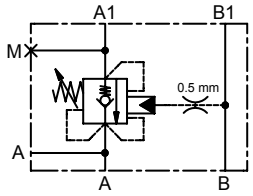
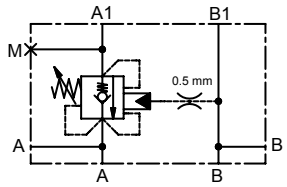
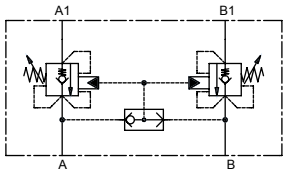
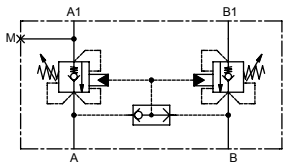
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COUNTERBALANCE VALVES

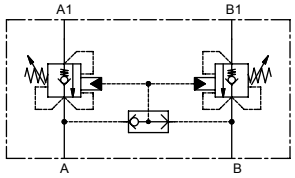
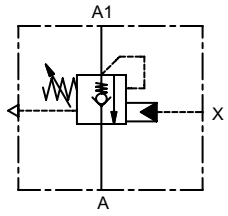
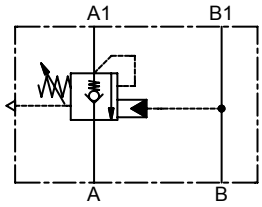
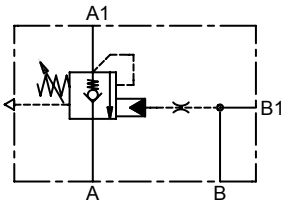
		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **In line**	H3060N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.024
	H5060N	70	350	4 : 1 - 9 : 1	G 3/8” - G 1/2”	8.01.025
	H1060N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.026
 **In line**	H5060N473	70	350	4 : 1	G 3/8” - G 1/2”	8.01.027
 **A1 port flanged**	H3061N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.028
	H5061N	70	350	4 : 1	G 3/8” - G 1/2”	8.01.029
	H1061N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.030
 **A1 port flanged**	H5061N473	70	350	4 : 1	G 3/8” - G 1/2”	8.01.031
 **A1/B1 port flanged**	H3062N	40	350	4 : 1	G 1/4” - G 3/8”	8.01.032
	H5062N	70	350	4 : 1 - 9 : 1	G 3/8” - G 1/2”	8.01.033
	H1062N	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.034

COUNTERBALANCE VALVES

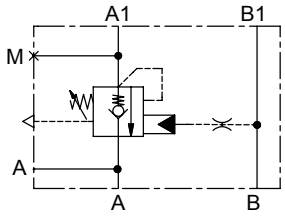
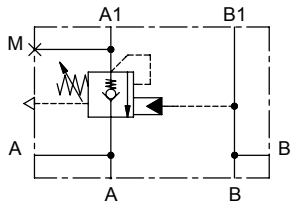
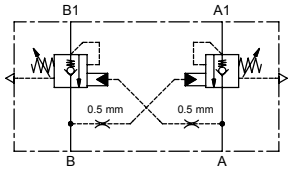
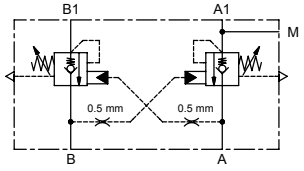
PARTIALLY COMPENSATED MODELS

SINGLE		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **In line**	H5304S	70	350	4 : 1	G 3/8” - G 1/2”	8.01.035
 **A1 port flanged**	H5305S	70	350	4 : 1	G 3/8” - G 1/2”	8.01.036
 **A1/B1 port flanged**	H5306S	70	350	4 : 1	G 3/8” - G 1/2”	8.01.037
DOUBLE						
 **In line**	H5360S	70	350	4 : 1	G 3/8” - G 1/2”	8.01.038
 **A1 port flanged**	H5361S	70	350	4 : 1	G 3/8” - G 1/2”	8.01.039

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		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 A1/B1 port flanged	H5362S	70	350	4 : 1	G 3/8" - G 1/2"	8.01.040
FULLY COMPENSATED MODELS						
SIMPLE						
 In line	H3001C	40	350	4 : 1	G 1/4" - G 3/8"	8.01.041
	H5001C	70	350	4 : 1	G 3/8" - G 1/2"	8.01.042
 In line	H3004C	40	350	4 : 1	G 1/4" - G 3/8"	8.01.043/A
	H5004C	70	350	4 : 1	G 3/8" - G 1/2"	8.01.044
	H1004C	110	410	4 : 1 - 9 : 1	G 1/2" - G 3/4"	8.01.045
	H1504C	180	410	4 : 1 - 8 : 1	G 1/2" - G 3/4"	8.01.046
 In line	H3004C41	40	350	4 : 1	G 3/8"	8.01.043/B

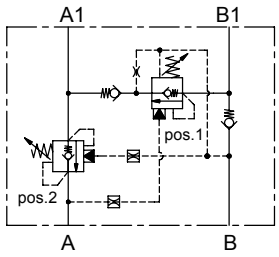
COUNTERBALANCE VALVES

		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **A1 port flanged**	H3005C	40	350	4 : 1	G 1/4” - G 3/8”	8.01.047
	H3007C	40	350	4 : 1	G 1/4” - G 3/8”	8.01.048
	H5005C	70	350	4 : 1	G 3/8” - G 1/2”	8.01.049
	H1005C	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.050
	H1505C	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.051
 **A1/B1 port flanged**	H3006C	40	350	4 : 1	G 1/4” - G 3/8”	8.01.052
	H3008C	40	350	4 : 1	G 1/4” - G 3/8”	8.01.053
	H5006C	70	350	4 : 1	G 3/8” - G 1/2”	8.01.054
	H1006C	110	410	4 : 1 - 9 : 1	G 1/2” - G 3/4”	8.01.055
	H1506C	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.056
DOUBLE						
 **In line**	H1530C	180	410	4 : 1 - 8 : 1	G 3/4”	8.01.057
 **A1/B1 port flanged**	H5032C	70	350	4 : 1	G 3/8”	8.01.058
	H1532C	180	410	4 : 1 - 8 : 1	G 1/2” - G 3/4”	8.01.059

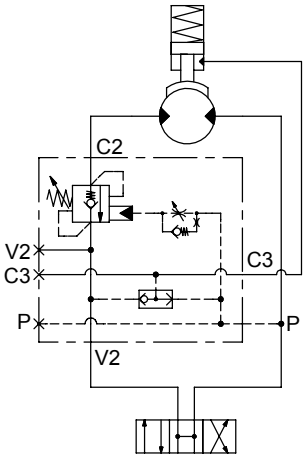
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COUNTERBALANCE VALVES

REGENERATIVE CIRCUIT

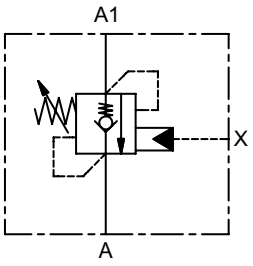
		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
	H3080N	40	350	4 : 1	G 1/2”	8.01.060
	H1080N	110	410	4 : 1	G 1/2”	8.01.061

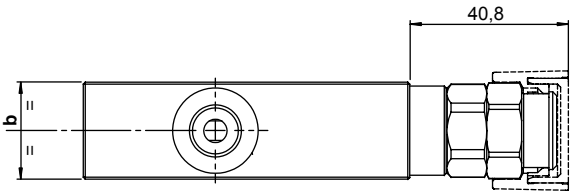
COUNTERBALANCE VALVES FOR MOBILE CRANES

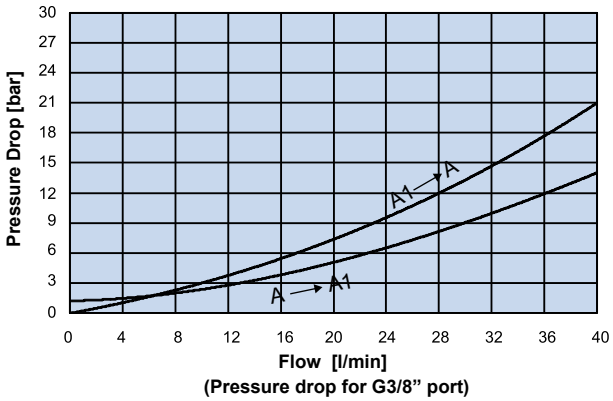
 **P/C3 port flanged**	H2502N	350	500	13 : 1	G 1/4”	8.01.062

SINGLE ACTING COUNTERBALANCE VALVE

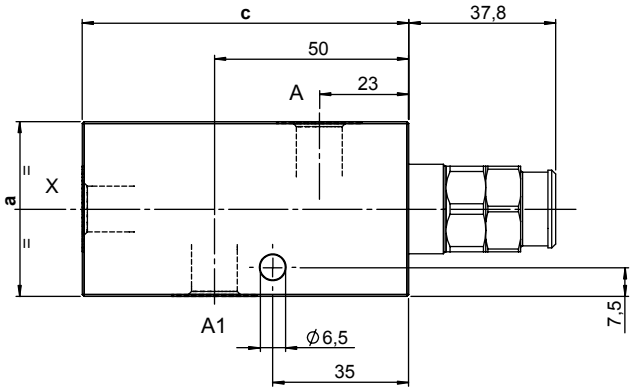
- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c
02	45	25	84
03	50	30	90

Ordering code

H 3 0 0 1 N ☐ ☐ S ☐ 0 0

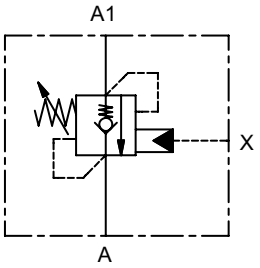
PILOT RATIO	
40	**4:1**

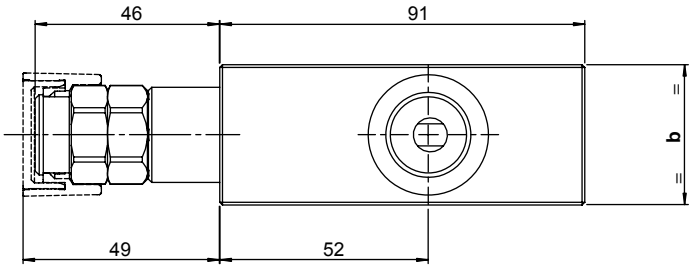
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

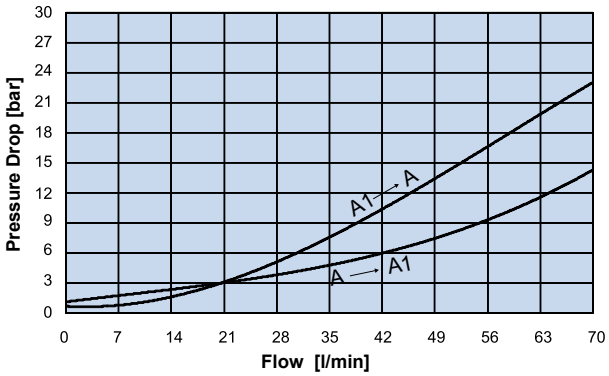
PORTS	02	03
A,A1,X	G 1/4"	G 3/8"

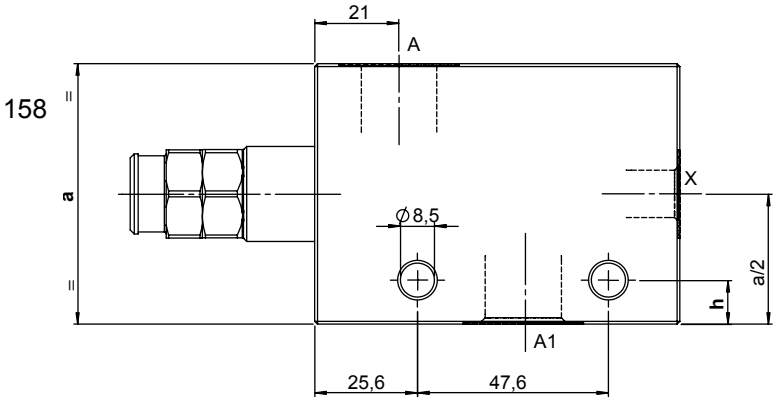
SINGLE ACTING COUNTERBALANCE VALVE

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b	h
03	55	30	7
04	65	35	11

Ordering code

H 5 0 0 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

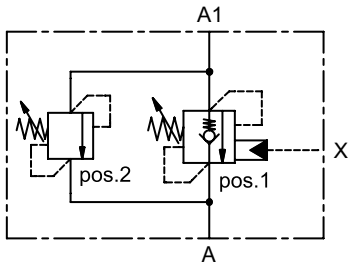
SPRINGS	rp 4:1		rp 9:1	
	2	**3**	**2**	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350	80 - 250	190 - 350
Pressure Increase [bar/turn]	62	114	50	121
Standard setting 4 l/min [bar]	200	350	200	350

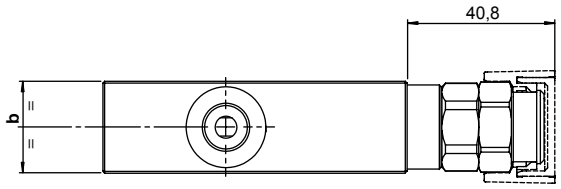
PORTS	03	04
A,A1	G 3/8"	G 1/2"
X	G 1/4"	G 1/4"

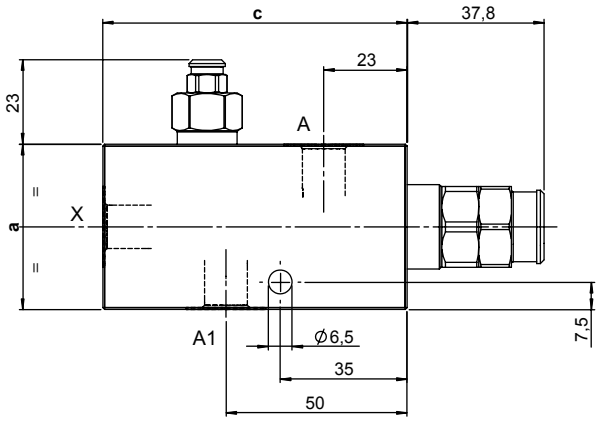
LHD03X-A3000-N-VMD04-A1A
Steel Body

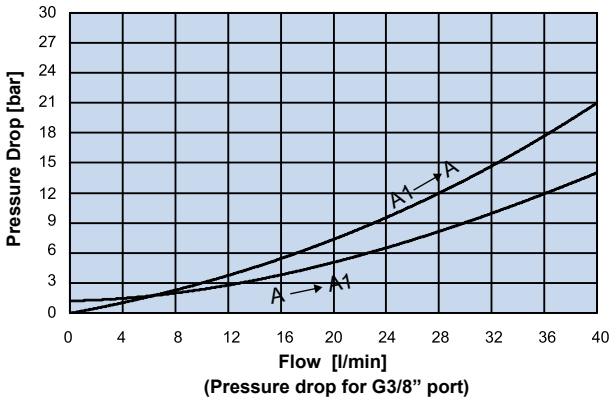
SINGLE ACTING COUNTERBALANCE VALVE WITH PRESSURE RELIEF

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,85 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Antishock valve pos.2 max flow 3 l/min
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c
02	45	25	84
03	50	30	90

Ordering code

H 3 0 0 1 N [ ] [ ] S [ ] 0 0

PILOT RATIO	
46	**4:1+RELIEF A1>A**

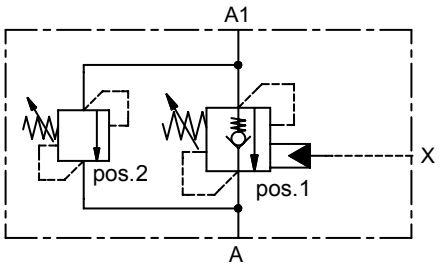
SPRINGS	3	
	pos.1	pos.2
Setting range min.-max. [bar]	120 - 350	250 - 400
Pressure Increase [bar/turn]	100	250
Standard setting [bar]	350 ∞ a 44 l/min	300 ∞ a 20 cc/min

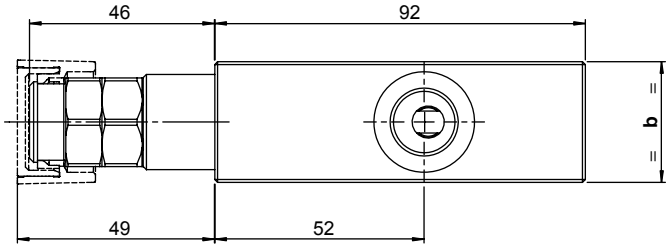
PORTS	02	03
A,A1,X	G 1/4"	G 3/8"

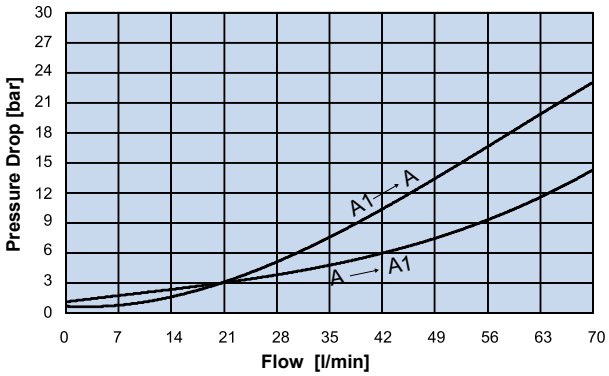
LHD05X-A3000-N04-VMD02-A1A
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE WITH PRESSURE RELIEF

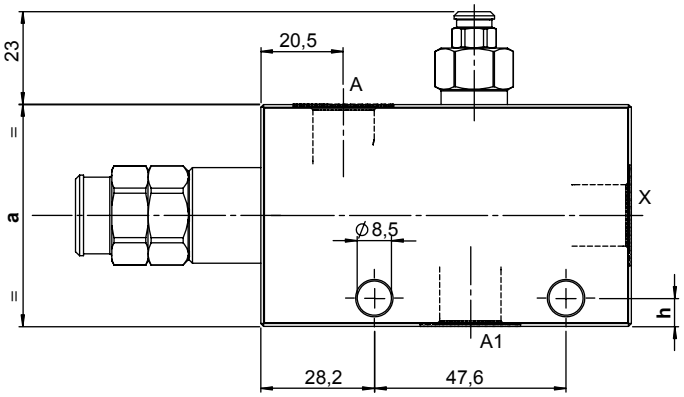
- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Antishock valve pos.2 max flow 3 l/min
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b	h
03	55	30	7
04	65	35	11

Ordering code

H 5 0 0 1 N ☐ ☐ S ☐ 0 0

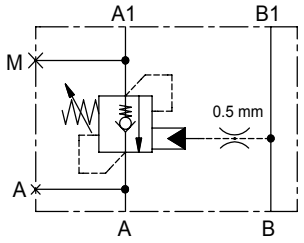
PILOT RATIO	
46	**4:1+RELIEF A1>A**

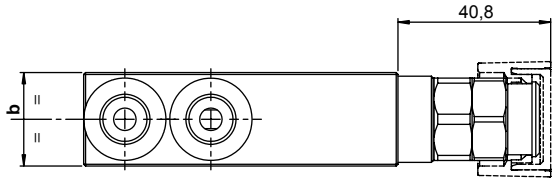
SPRINGS	3	
	pos.1	pos.2
Setting range min.-max. [bar]	120 - 350	250 - 400
Pressure Increase [bar/turn]	114	250
Standard setting 4 l/min [bar]	350 a 4 l/min	300 a 20 cc/min

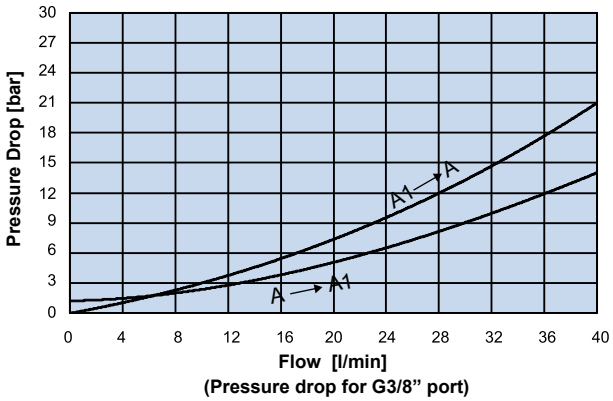
PORTS	03	04
A,A1	G 3/8”	G 1/2”
X	G 1/4”	G 1/4”

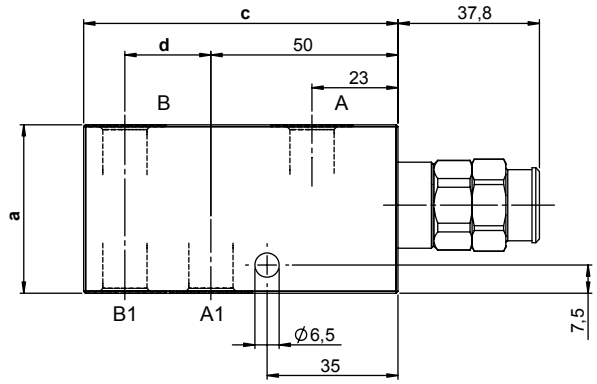
SINGLE ACTING COUNTERBALANCE VALVE

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,75 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d
02	45	25	84	23
03	50	30	95	30

Ordering code

H 3 0 0 4 N ☐ ☐ S ☐ 0 0

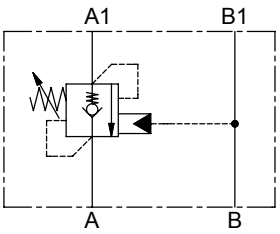
PILOT RATIO	
40	**4:1**

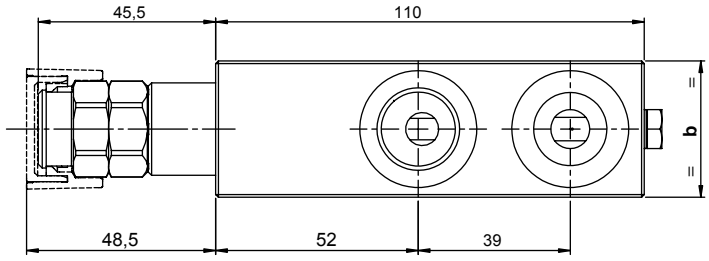
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

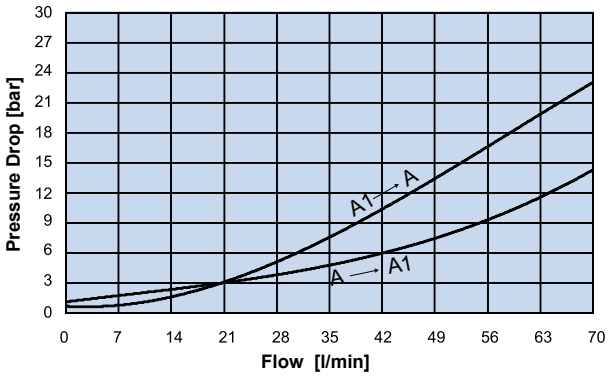
PORTS	02	03
A,B,A1,B1	G 1/4"	G 3/8"

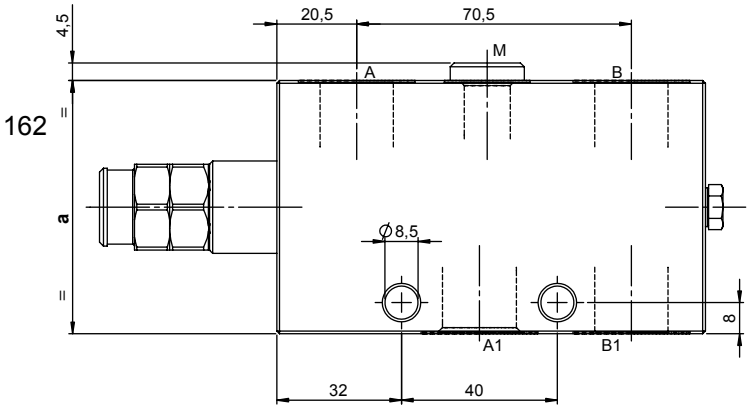
SINGLE ACTING COUNTERBALANCE VALVE

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	30
04	65	35

Ordering code

H 5 0 0 4 N [ ] [ ] S [ ] 0 0

PILOT RATIO	
40	**4:1**

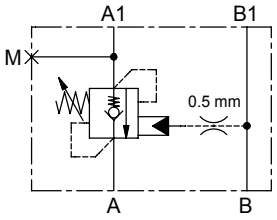
SPRINGS	4:1	
	2	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03	04
A,A1,B,B1	G 3/8”	G 1/2”
M	G 1/4”	G 1/4”

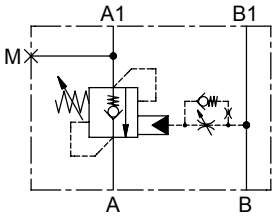
SINGLE ACTING COUNTERBALANCE VALVE

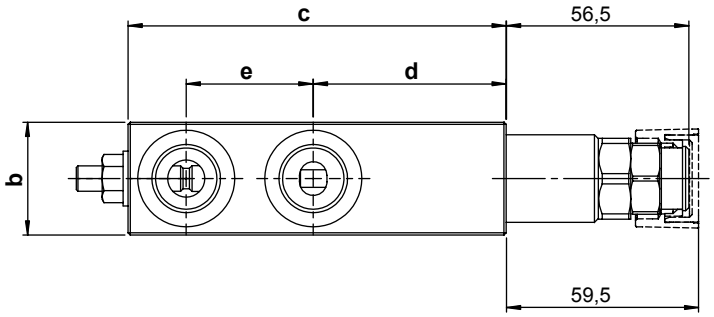
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **2,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

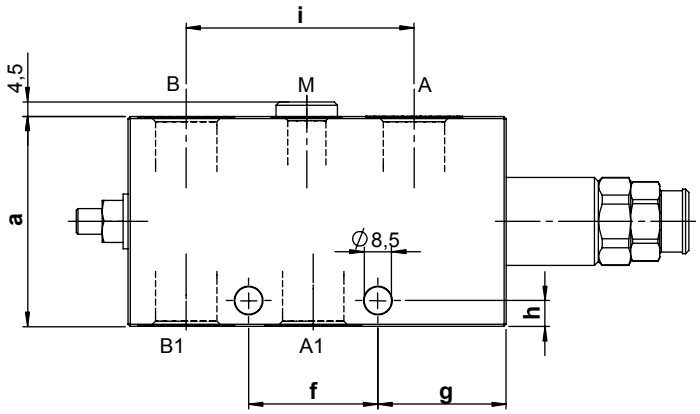
SCHEME 40 - 90

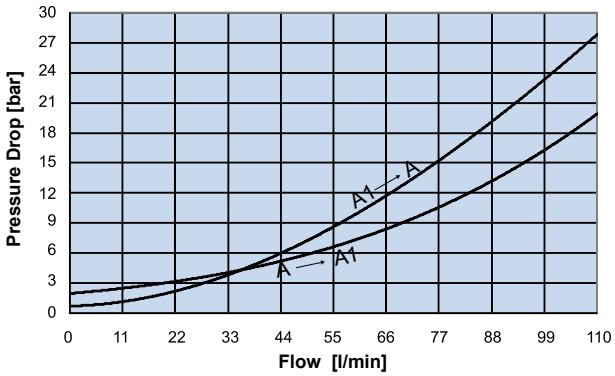


SCHEME 42 - 92









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b	c	d	e	f	g	h	i
04	65	35	117	59,7	39.3	40	39,7	8	70.5
05	70	40	130	60	47	47.6	36	11	78

Ordering code

H 1 0 0 4 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

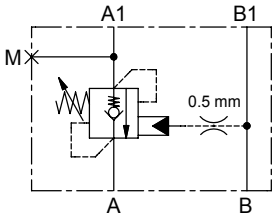
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

PORTS	04	05
A,A1,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"

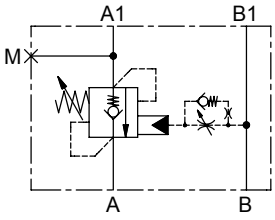
SINGLE ACTING COUNTERBALANCE VALVE

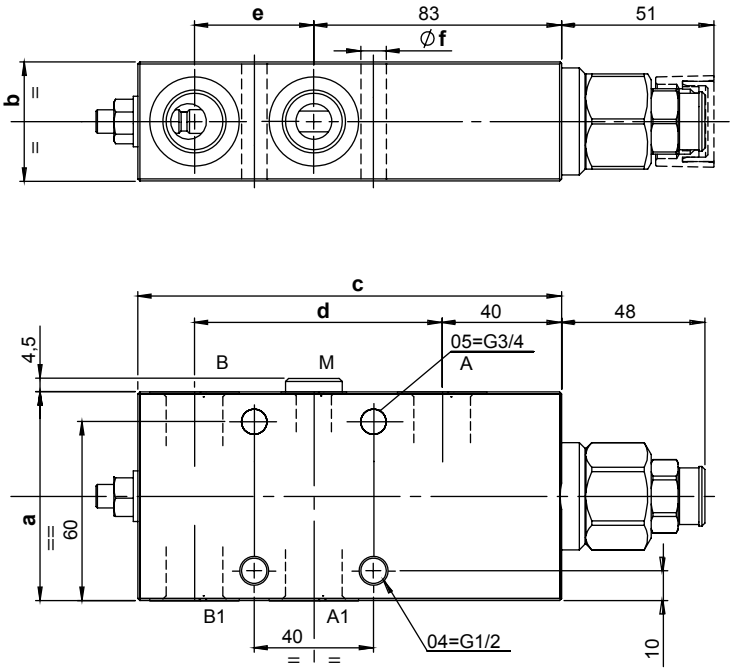
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

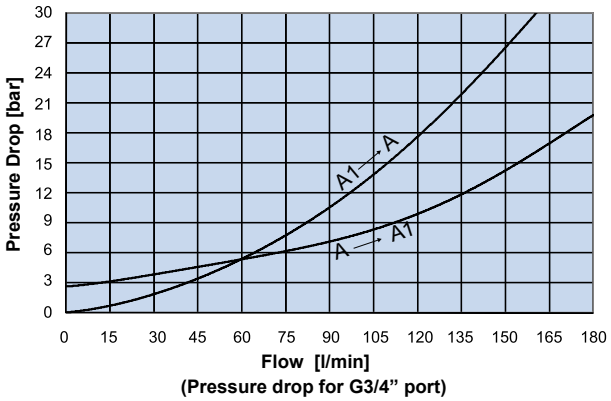
SCHEME 40 - 80



SCHEME 42 - 82







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD15X-C is recommended for circuits with high back pressure)

	a	b	c	d	e	f
04	70	40	142	83	40	8,5
05	80	40	147	86	43	10,5

Ordering code

H 1 5 0 4 N ☐ ☐ S ☐ 0 0

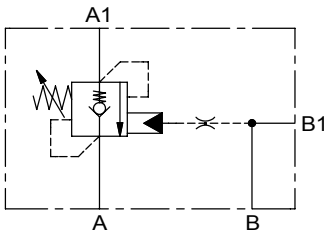
PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

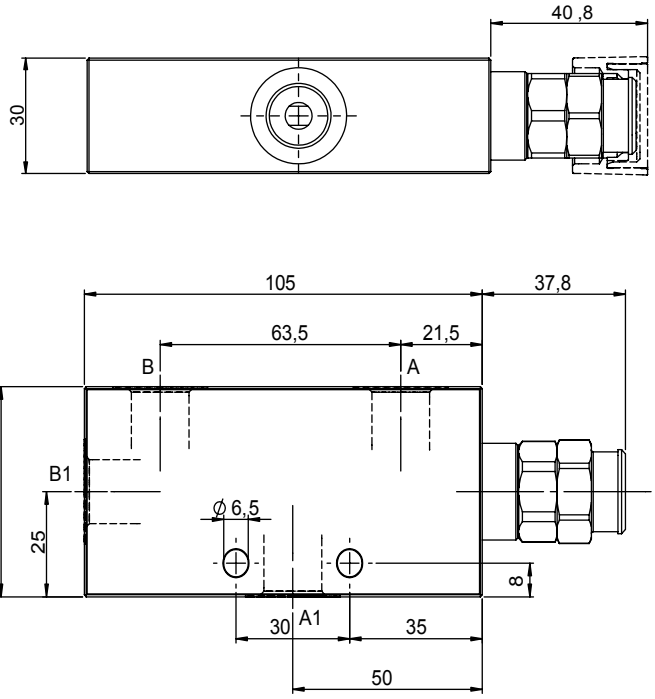
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

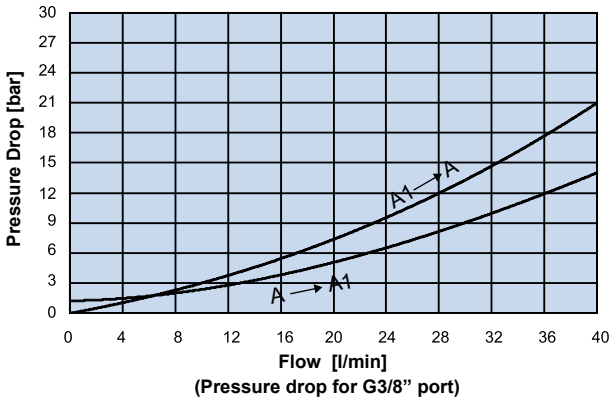
PORTS	04	05
A,A1,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"

SINGLE ACTING COUNTERBALANCE VALVE

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,75 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

Ordering code

H 3 0 0 4 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
41	4:1+dia.0,5mm

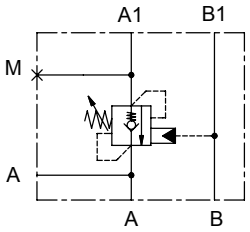
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

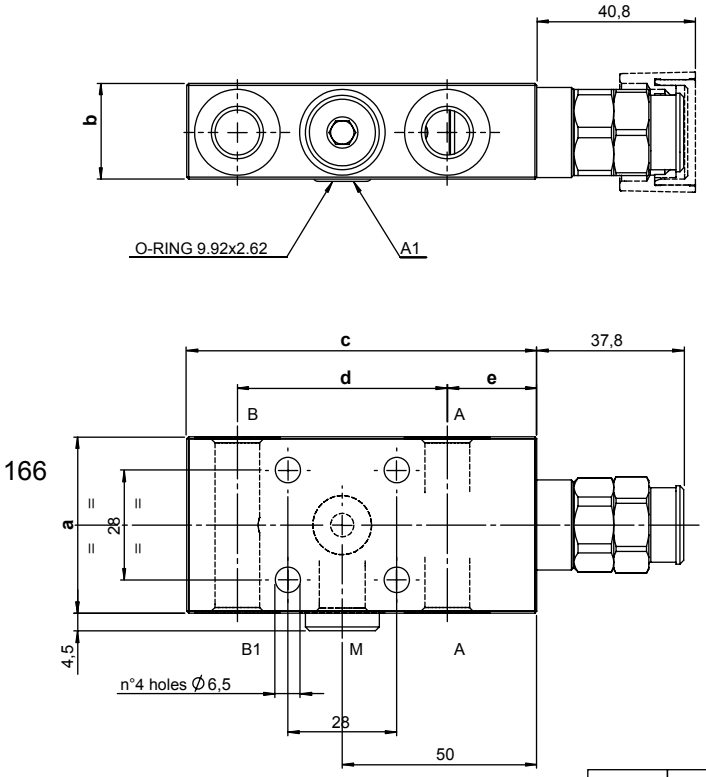
PORTS	03
A,B,A1,B1	G 3/8"

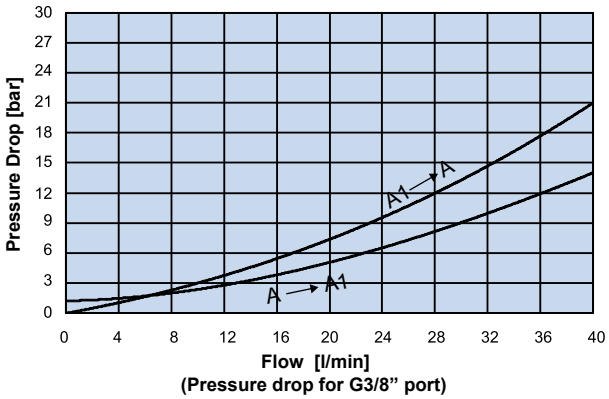
LHD03X-A4100-N
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	90	54	23
03	50	29,5	95	60	20

Ordering code

H 3 0 0 5 N ☐ ☐ S ☐ 0 0

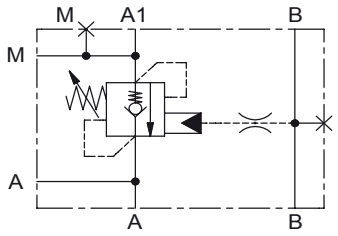
PILOT RATIO	
40	**4:1**

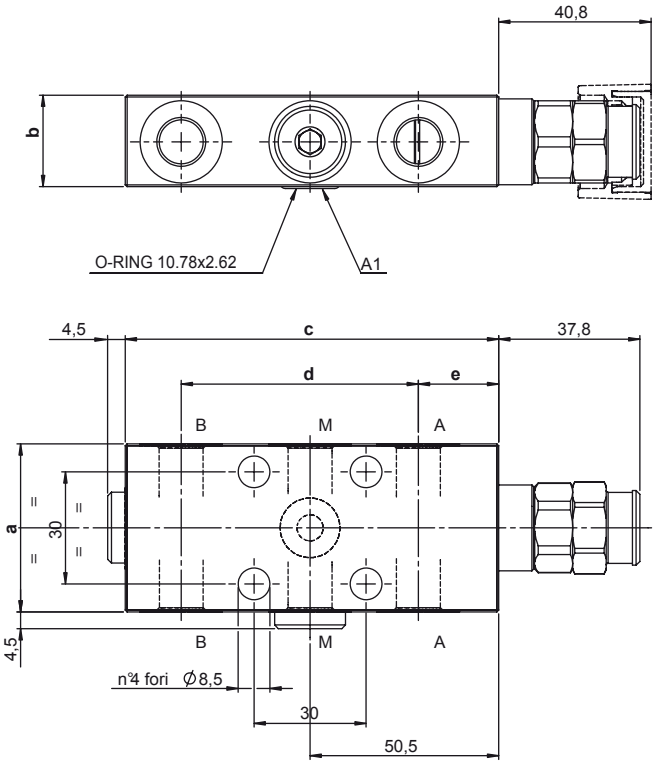
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

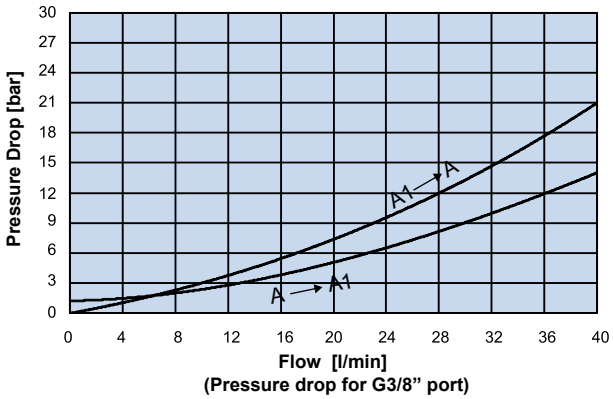
PORTS	02	03
A,B,B1	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,85 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	100	63,5	21,5
03	50	29,5	100	66	19,5

Ordering code

H 3 0 0 7 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

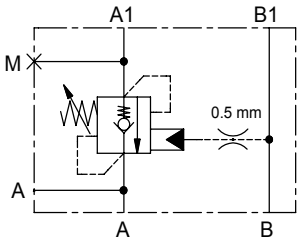
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

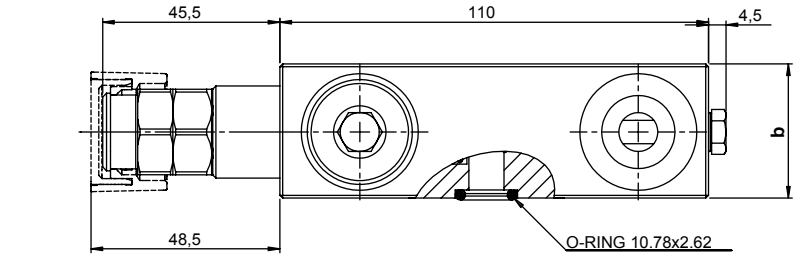
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

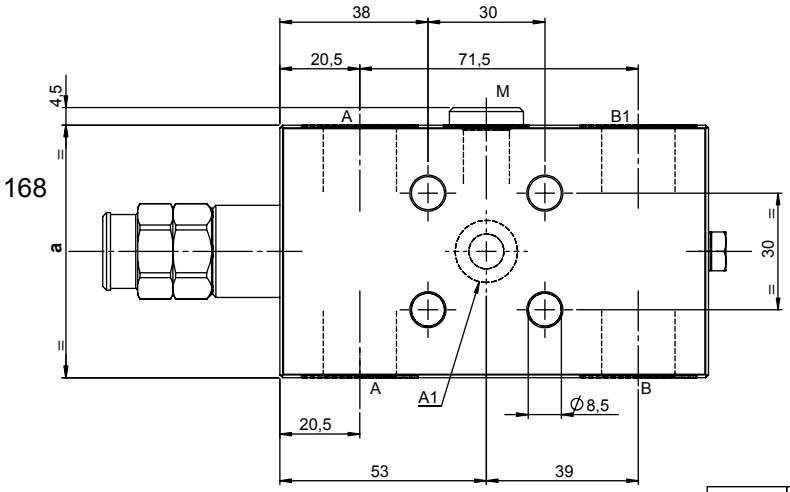
LHD05X-A4100-N
Steel Body

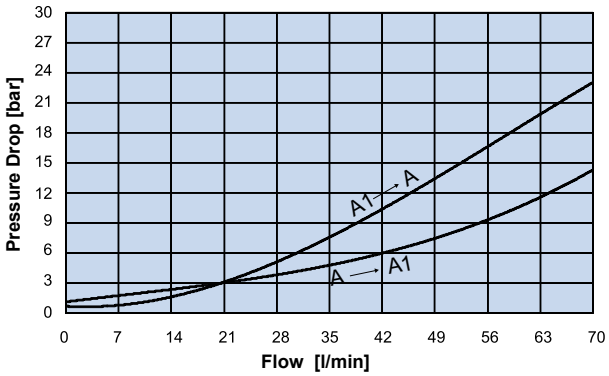
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 0 5 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

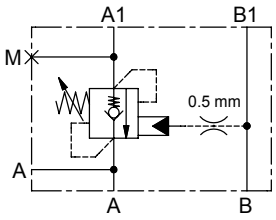
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03	04
A,B,B1	G 3/8”	G 1/2”
A1	Ø 9	Ø 9
M	G 1/4”	G 1/4”

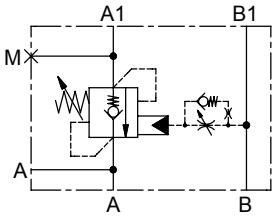
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

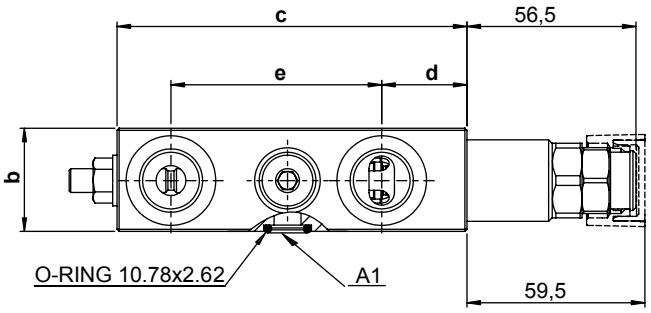
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

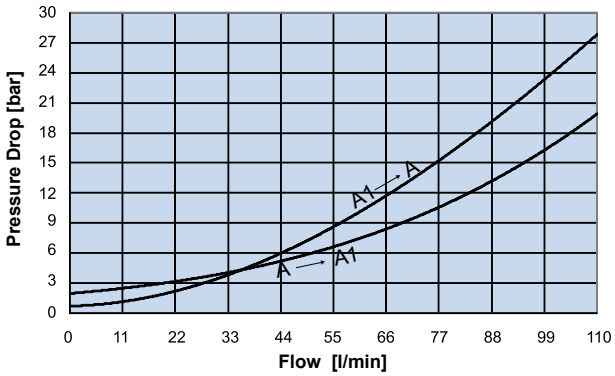
SCHEME 40 - 90

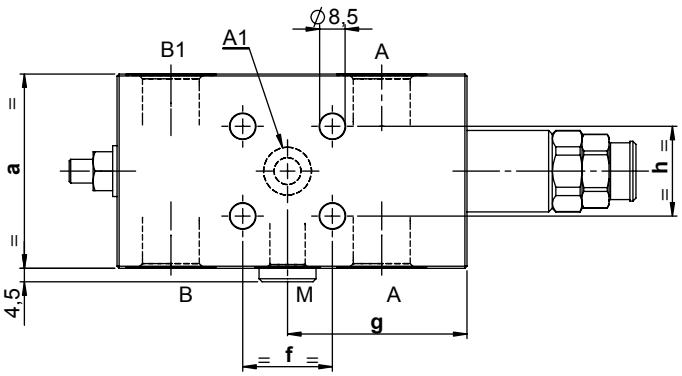


SCHEME 42 - 92









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b	c	d	e	f	g	h
04	65	34,5	117	26,5	72,5	30	45	30
05	80	39,5	130	22	86	40	45	40

Ordering code

H 1 0 0 5 N [ ] [ ] S [ ] 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

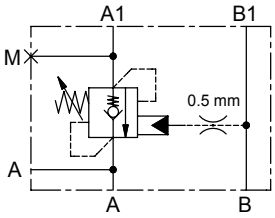
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

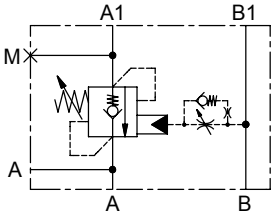
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

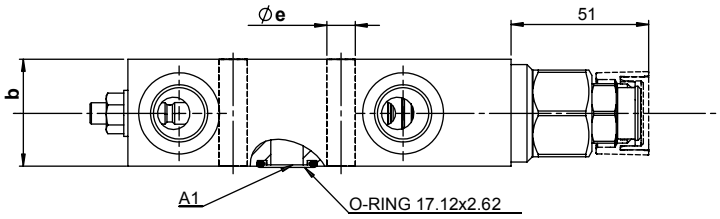
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3,2 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

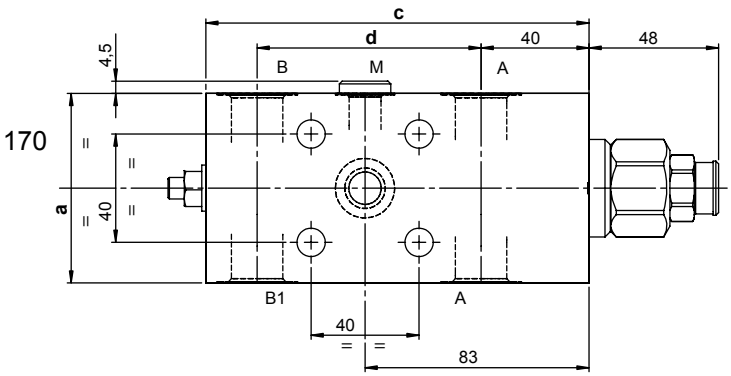
SCHEME 40 - 80

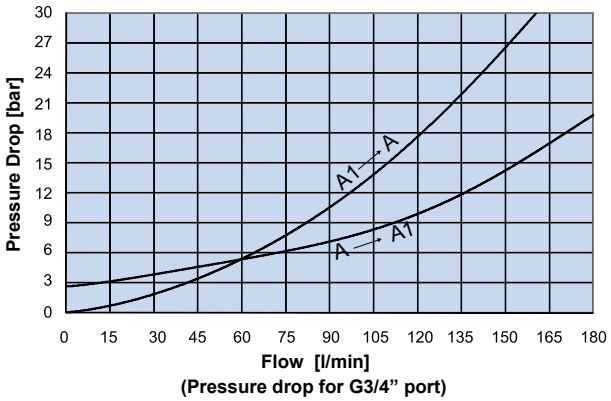


SCHEME 42 - 82









(Pressure drop for G3/4" port)

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD15X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
04	70	39,5	142	83	10,5
05	80	39,5	147	86	10,5

Ordering code

H 1 5 0 5 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

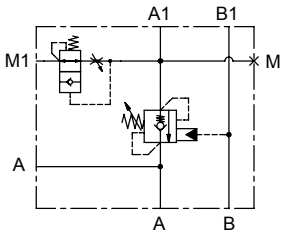
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

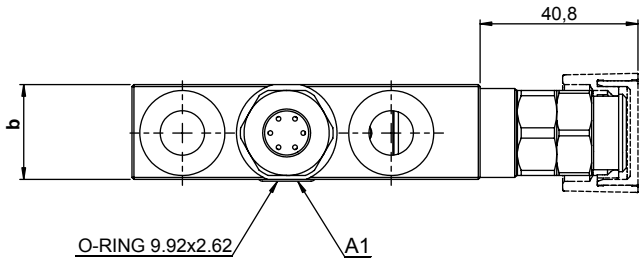
PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1	Ø 12	Ø 12

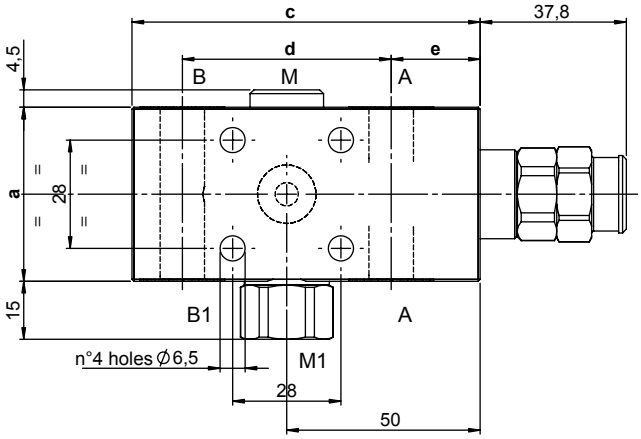
LHD03X-A4100-N-VP
Steel Body

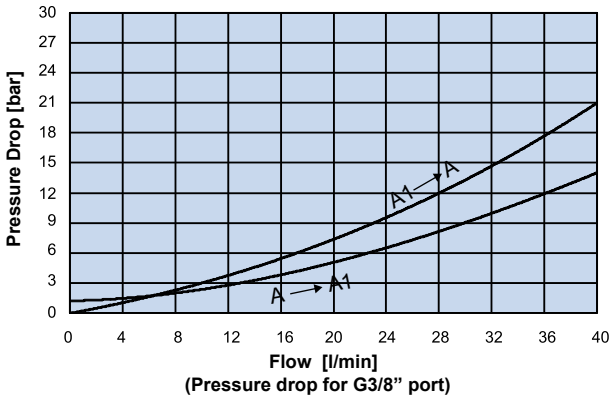
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	90	54	23
03	50	29,5	95	59	21

Ordering code

H 3 0 0 5 N ☐ ☐ S ☐ 0 0

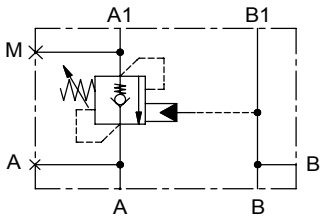
PILOT RATIO	
43	**4:1**

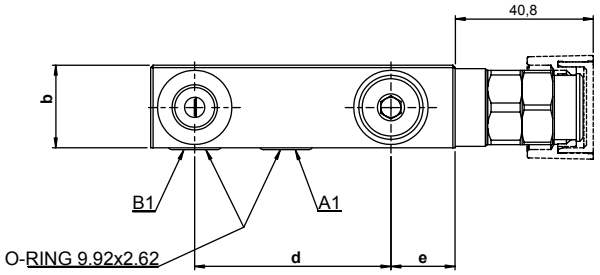
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

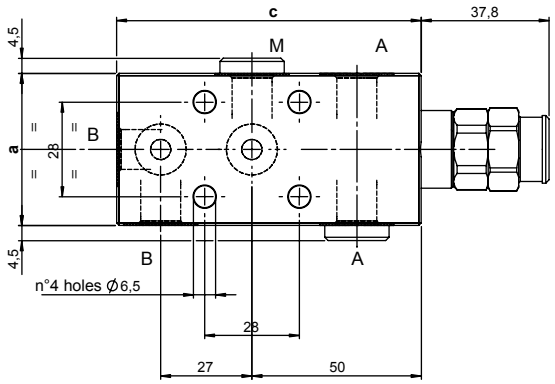
PORTS	02	03
A,B,B1	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

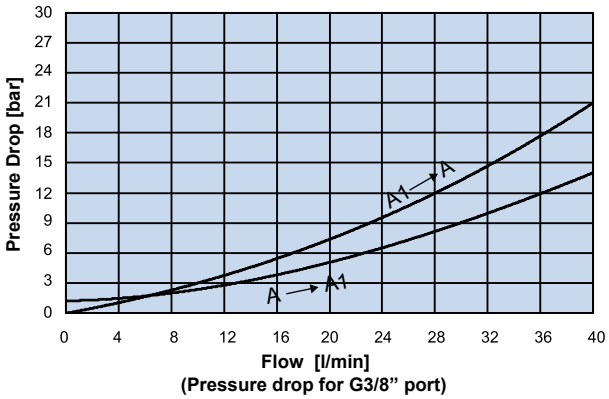
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	90	58	19
03	50	29,5	95	59	21

Ordering code

H 3 0 0 6 N ☐ ☐ S ☐ 0 0

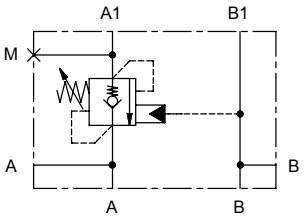
PILOT RATIO	
40	**4:1**

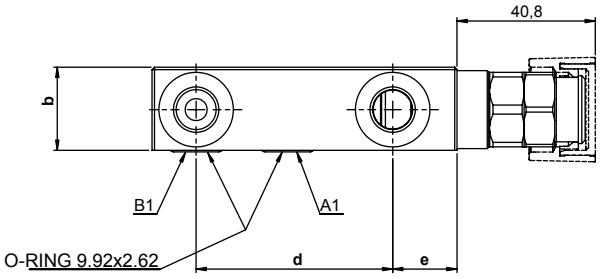
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

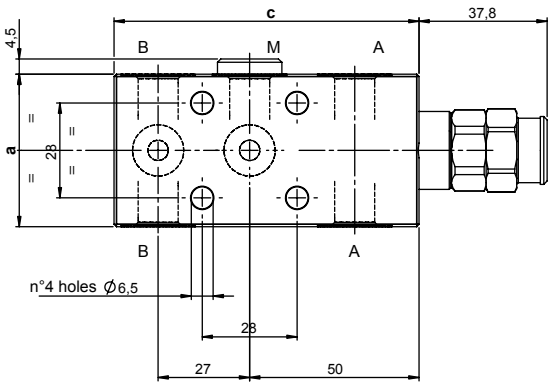
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1,B1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

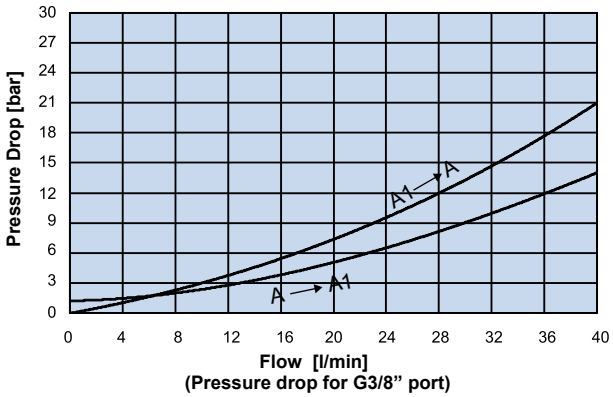
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	90	58	19
03	50	29,5	95	59	21

Ordering code

H 3 0 0 8 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

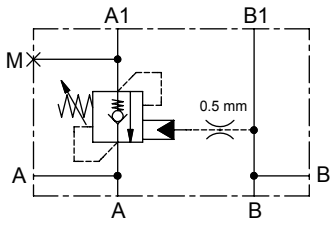
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

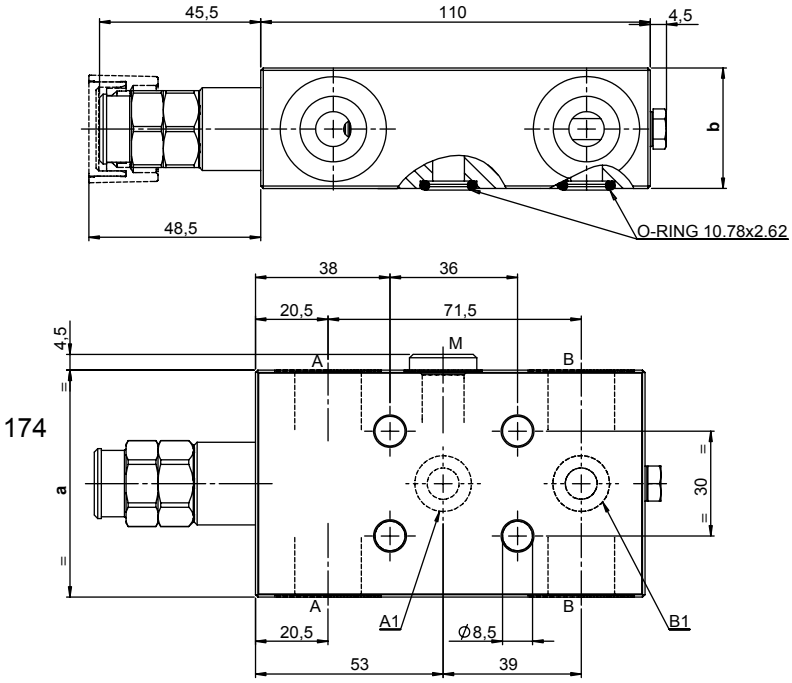
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1,B1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

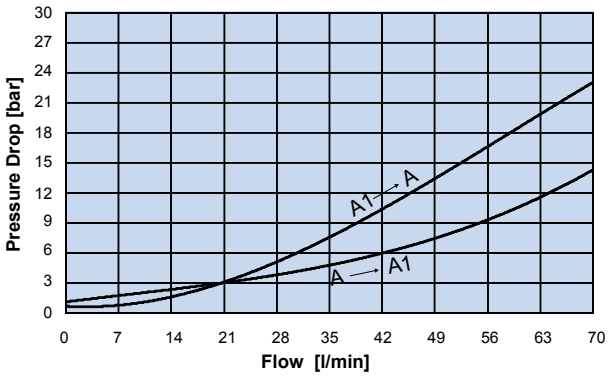
LHD05X-A4200-N
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 0 6 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

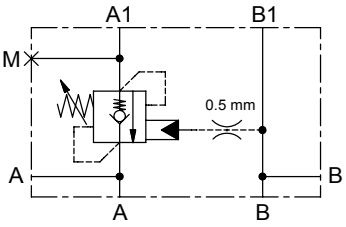
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03	04
A,B	G 3/8"	G 1/2"
A1,B1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

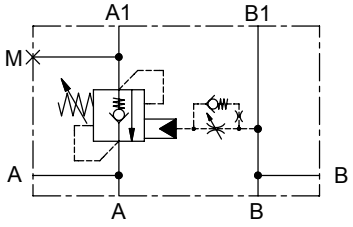
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

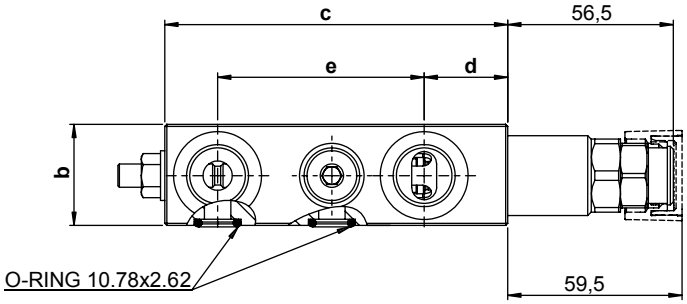
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

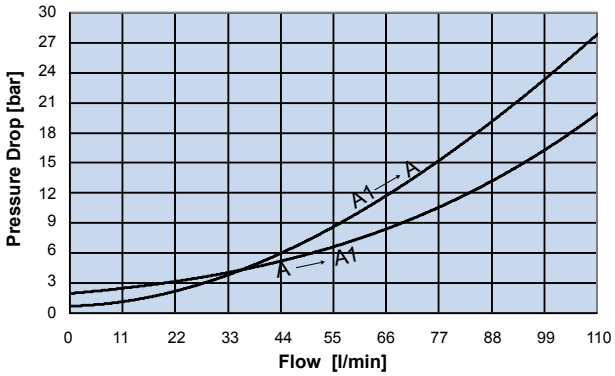
SCHEME 40 - 90

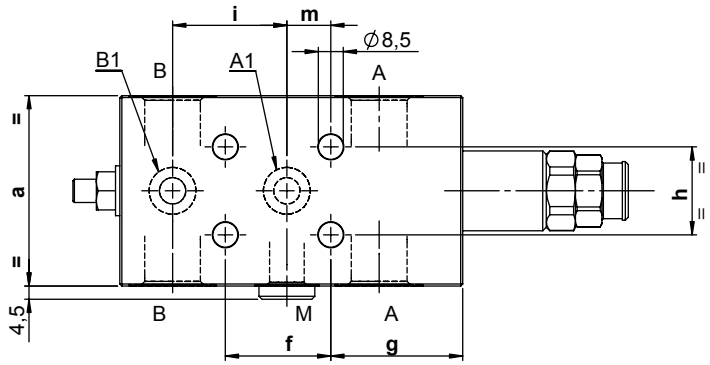


SCHEME 42 - 92









175

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b	c	d	e	f	g	h	i	m
04	65	34,5	117	28,5	70,5	36	45	30	39	15
05	80	39,5	130	22	86	40	45	40	43	20

Ordering code

H 1 0 0 6 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

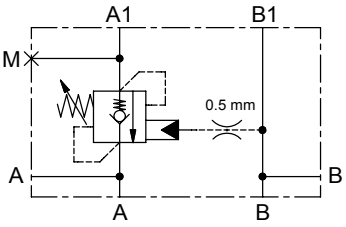
PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
A1,B1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

LHD15X-A4200-N
Steel Body

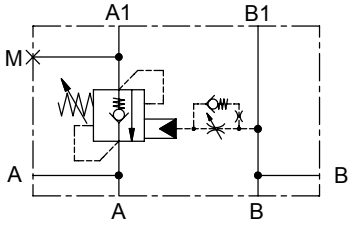
SINGLE ACTING COUNTERBALANCE VALVE FLANGED

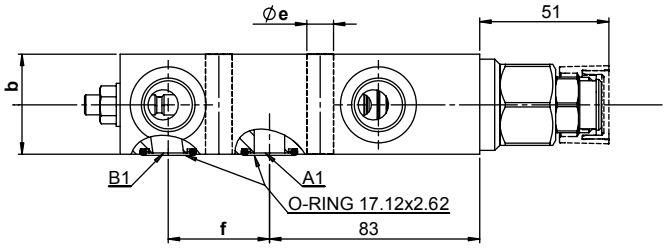
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

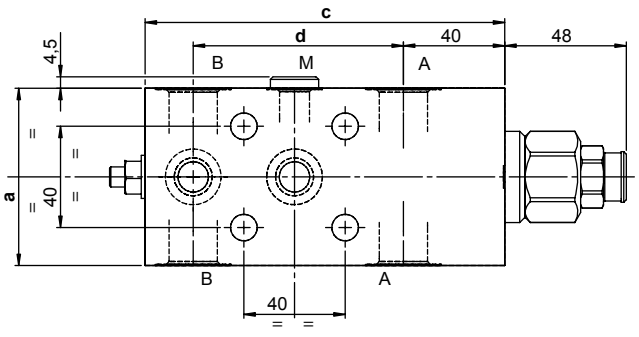
SCHEME 40 - 80

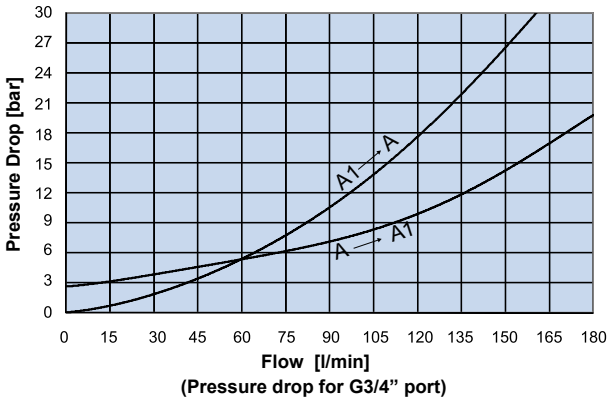


SCHEME 42 - 82









(Pressure drop for G3/4" port)

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD15X-C is recommended for circuits with high back pressure)

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	a	b	c	d	e	f
04	70	39,5	142	83	10,5	40
05	80	39,5	147	86	10,5	43

Ordering code

H 1 5 0 6 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

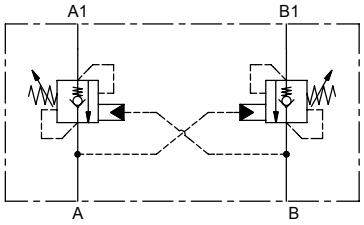
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

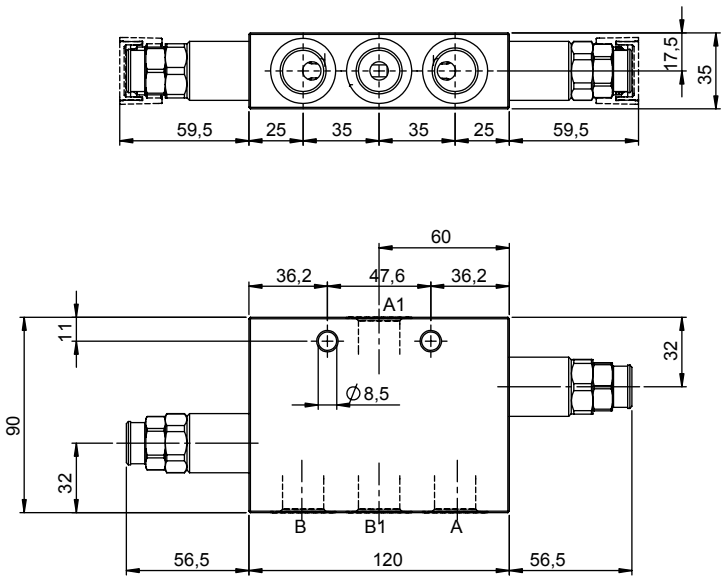
PORTS	04	05
A,B	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1,A2	Ø 12	Ø 12

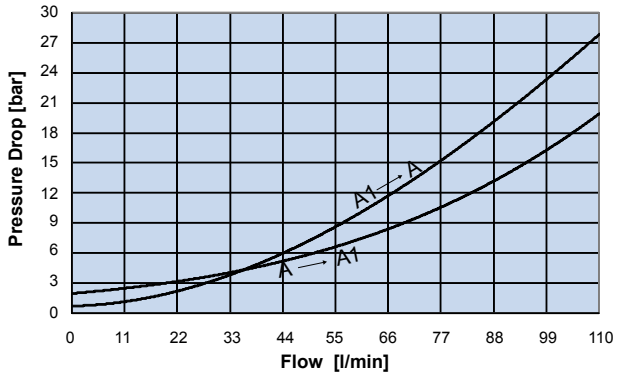
LHD10X-AB14000-N G 1/2
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE

- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3 Kg (G 1/2), 4,7 (G 3/4)**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

Ordering code

H 1 0 3 0 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

SPRINGS	2	4
Setting range min.-max. [bar]	60 - 210	120 - 410
Pressure Increase [bar/turn]	52	85
Standard setting 4 l/min [bar]	200	350

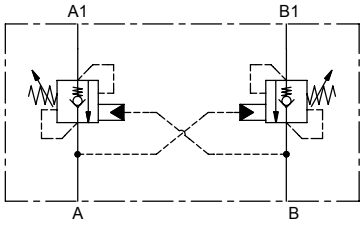
PORTS	04
A,A1,B,B1	G 1/2"

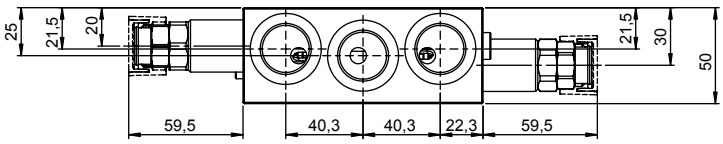
NEM-HYDRAULICS.COM

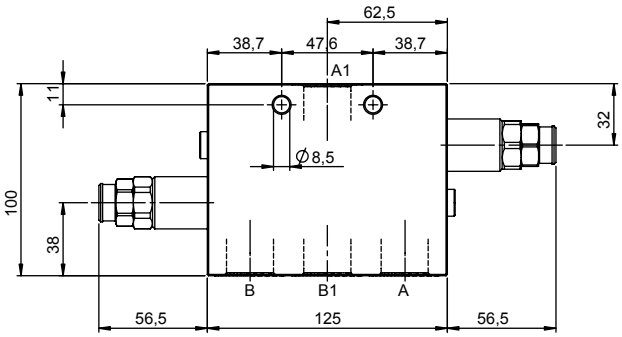
LHD10X-AB14000-N G 3/4
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE

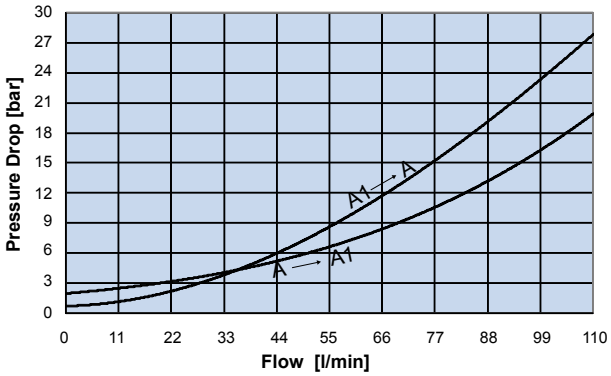
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3 Kg (G 1/2), 4,7 (G 3/4)**
- Tamper proof cap. . . . . **cod. 9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

Ordering code

H 1 0 3 0 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

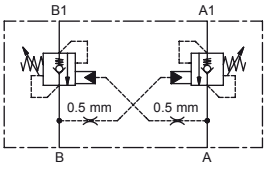
SPRINGS	**2**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410
Pressure Increase [bar/turn]	52	85
Standard setting 4 l/min [bar]	200	350

PORTS	**05**
A,A1,B,B1	G 3/4"

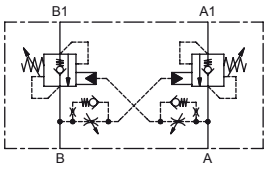
DOUBLE ACTING COUNTERBALANCE VALVE

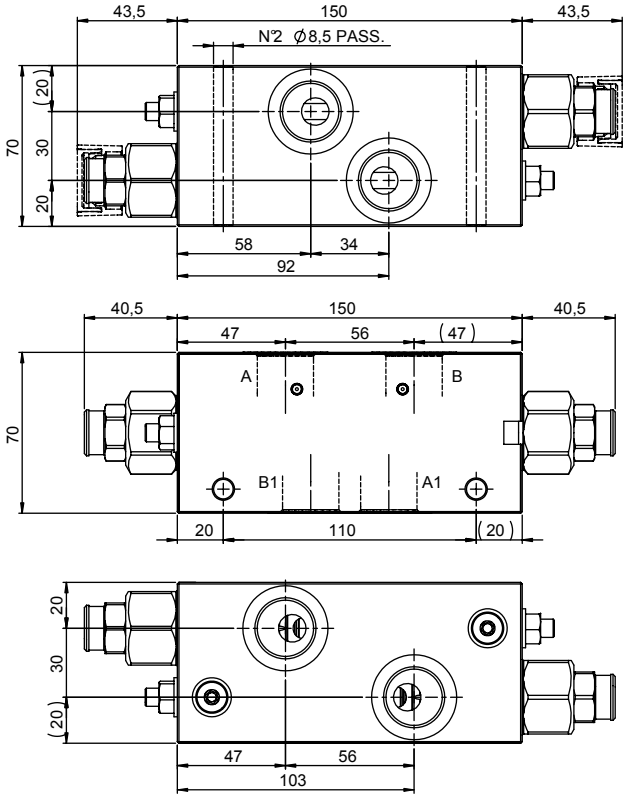
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **5,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

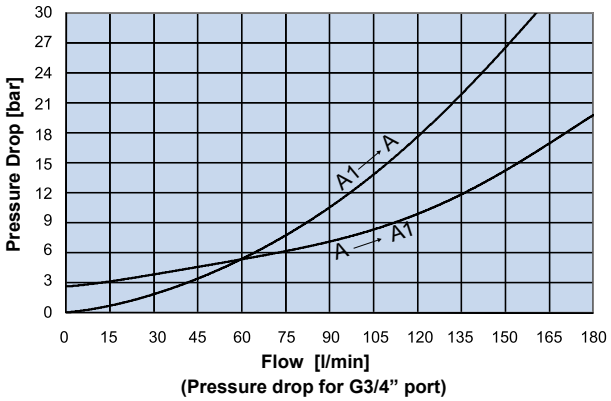
SCHEME 40 - 80



SCHEME 42 - 82







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD15X-C is recommended for circuits with high back pressure)

Ordering code

H 1 5 3 0 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

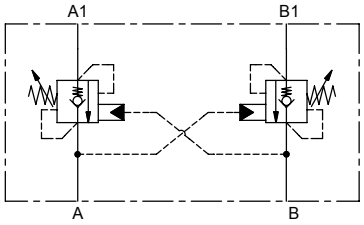
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

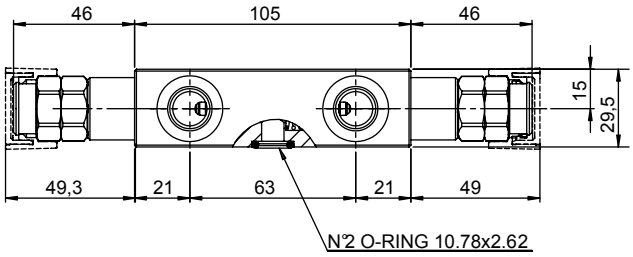
PORTS	05
A,A1,B,B1	G 3/4"

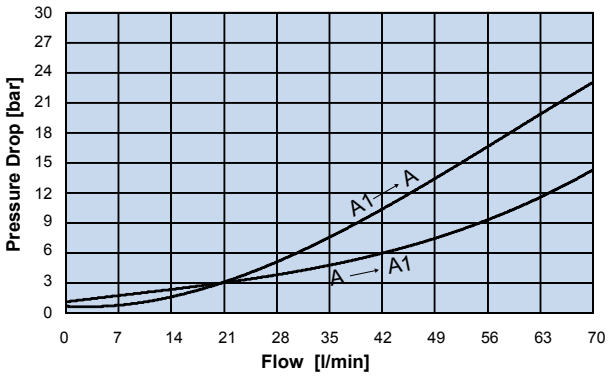
LHD05X-AB14200-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE FLANGED

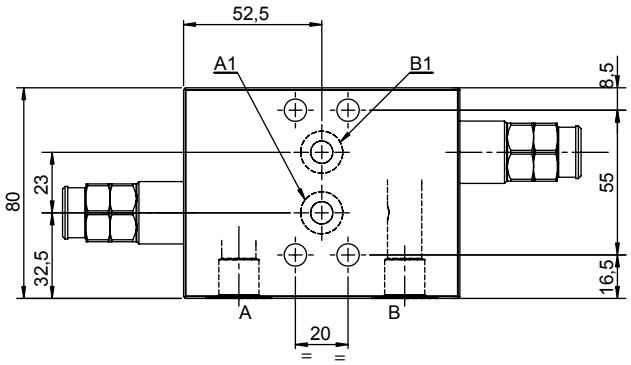
- Flow. . . . . **72 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







180



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

Ordering code

H 5 0 3 2 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

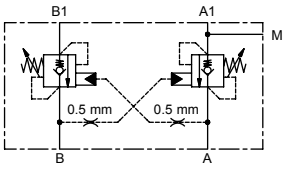
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03
A,B	G 3/8”
A1,B1	Ø 9

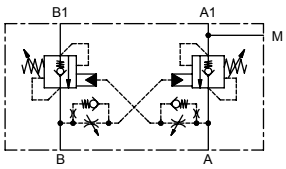
DOUBLE ACTING COUNTERBALANCE VALVE FLANGED

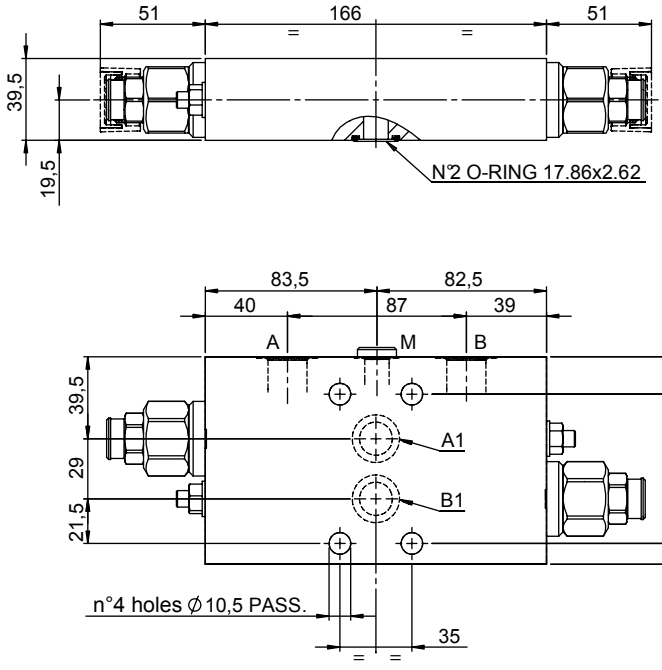
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

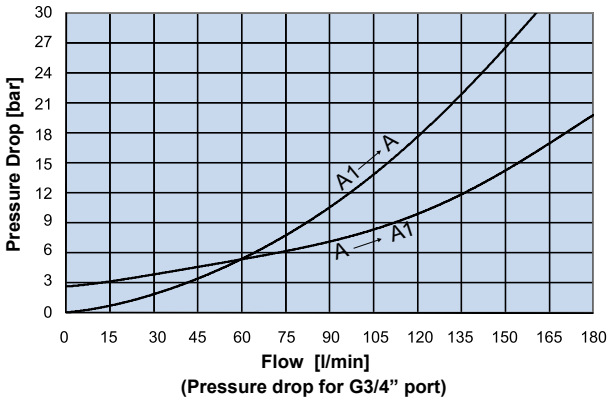
SCHEMI 40 - 80



SCHEMI 42 - 82







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD15X-C is recommended for circuits with high back pressure)

Ordering code

H 1 5 3 2 N ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

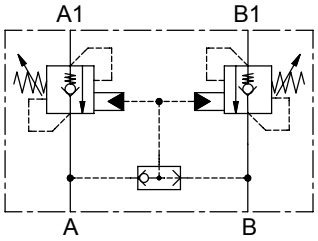
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

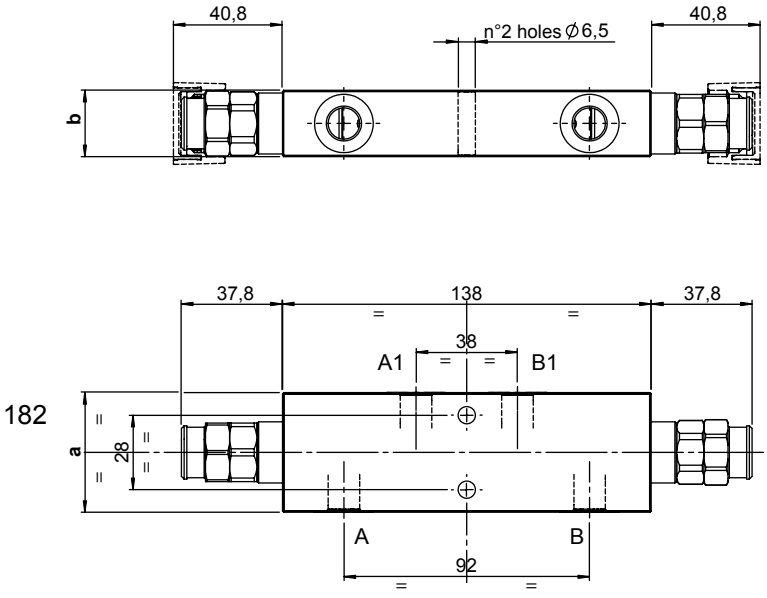
PORTS	04	05
A,B	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1,A2	Ø 12	Ø 12

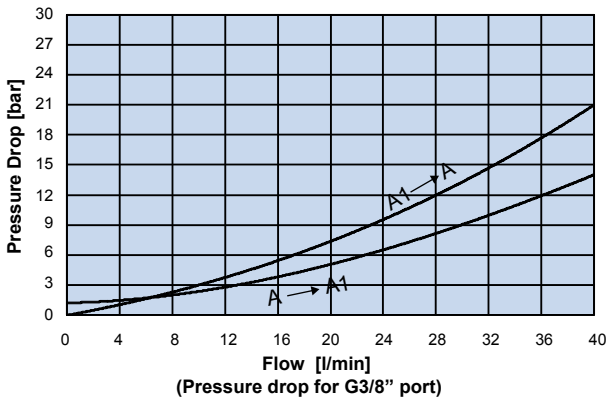
LHD03X-AB24000-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b
02	45	25
03	50	30

Ordering code

H 3 0 6 0 N ☐ ☐ S ☐ 0 0

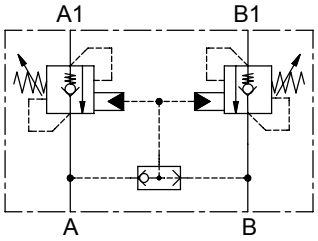
PILOT RATIO	
40	**4:1**

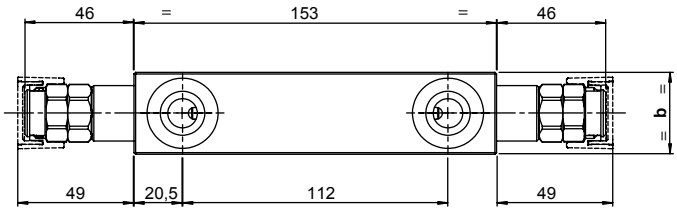
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

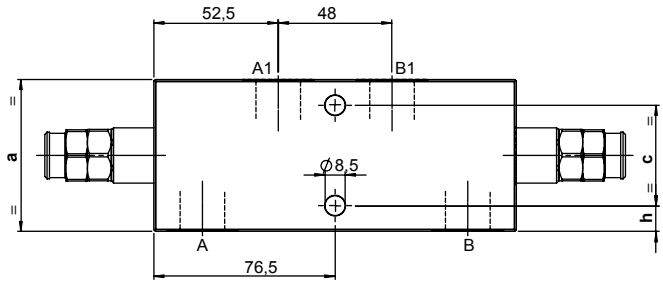
PORTS	02	03
A,B,A1,B1	G 1/4"	G 3/8"

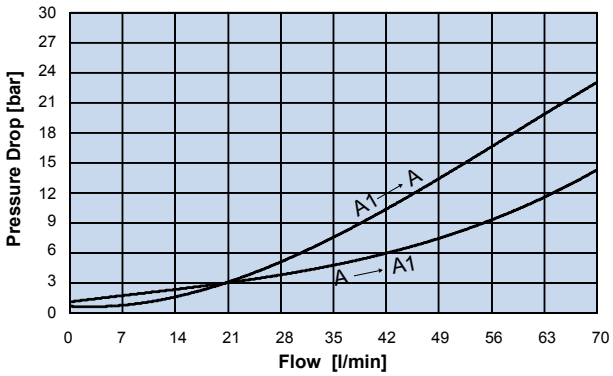
DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b	c	h
03	55	30	38	8,5
04	65	35	43	11

Ordering code

H 5 0 6 0 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

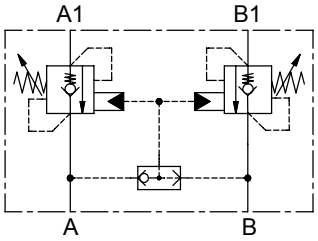
SPRINGS	rp 4:1		rp 9:1	
	2	**3**	**2**	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350	80 - 250	190 - 350
Pressure Increase [bar/turn]	62	114	50	121
Standard setting 4 l/min [bar]	200	350	200	350

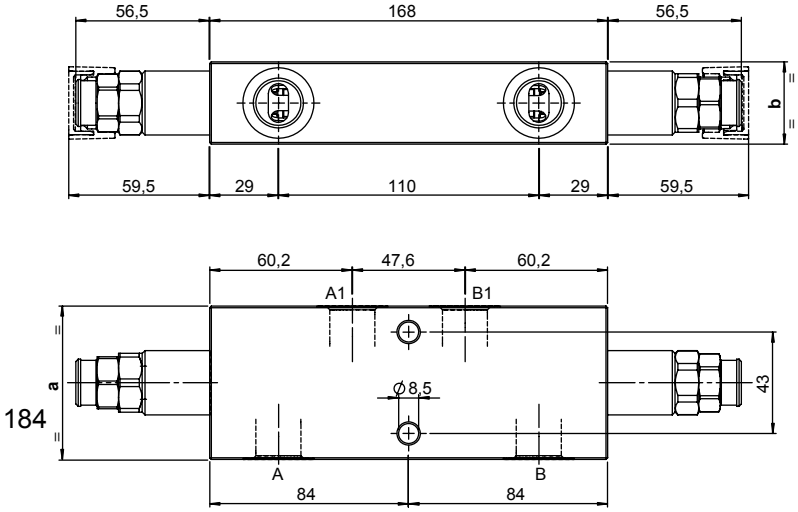
PORTS	03	04
A,B,A1,B1	G 3/8"	G 1/2"

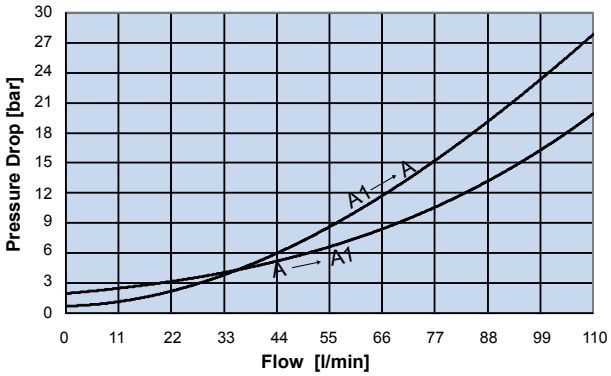
LHD10X-AB24000-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY

- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b
04	65	35
05	70	40

Ordering code

H 1 0 6 0 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

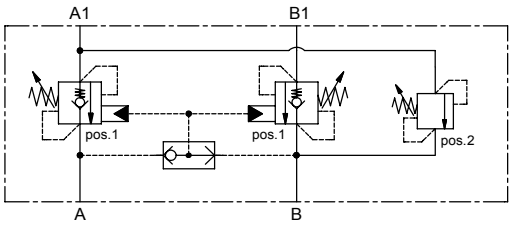
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

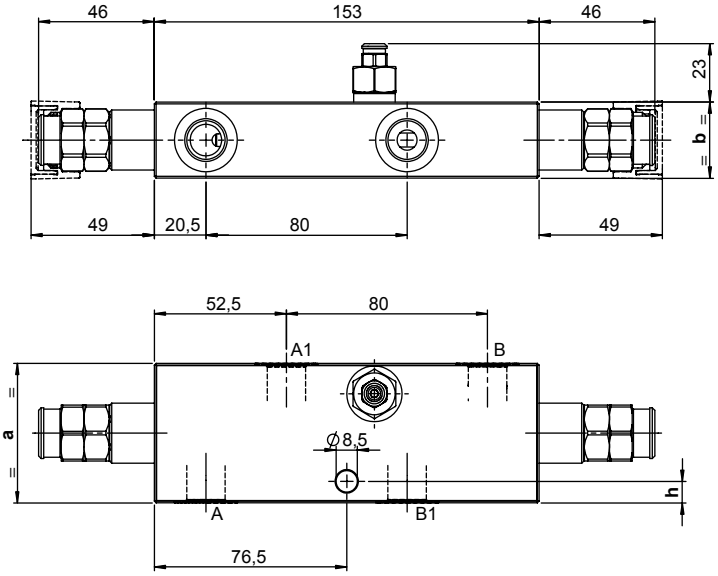
PORTS	04	05
A,A1,B,B1	G 1/2”	G 3/4”

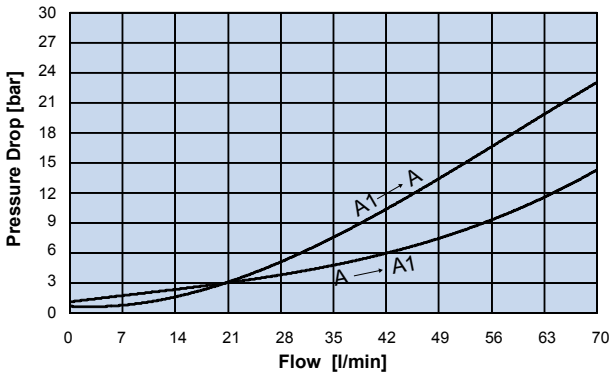
LHD05X-A24000-N04-VMD02-A1B
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **2,1 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







185

Note:
- Antishock valve pos.2 max flow 3 l/min
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b	c	h
03	55	30	38	8,5
04	65	35	43	11

Ordering code

H 5 0 6 0 N ☐ ☐ S ☐ 0 0

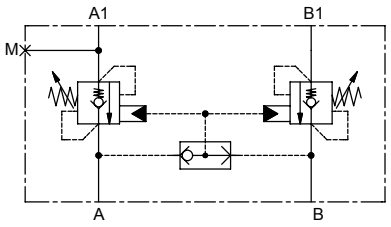
PILOT RATIO	
47	**4:1+RELIEF A1>B**

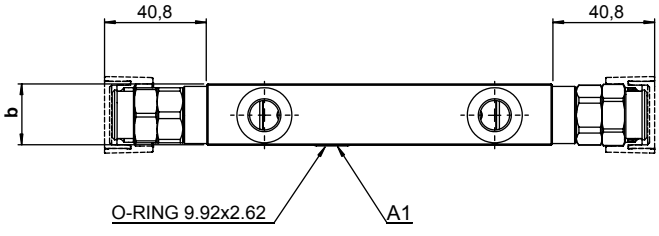
SPRINGS	3	
	pos.1	pos.2
Setting range min.-max. [bar]	120 - 350	250 - 400
Pressure Increase [bar/turn]	114	250
Standard setting 4 l/min [bar]	350 bar a 4 l/min	300 bar a 20 cc/min

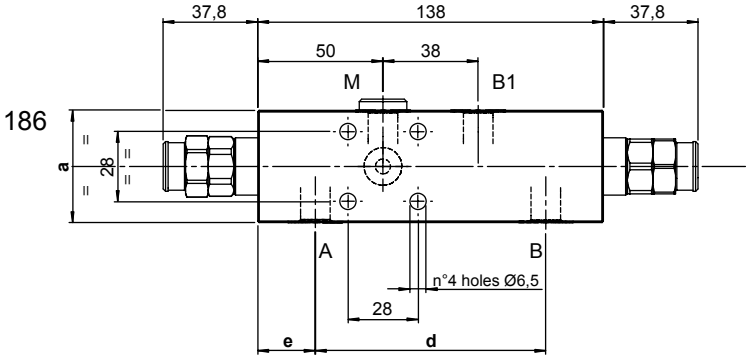
PORTS	03	04
A,B,A1,B1	G 3/8"	G 1/2"

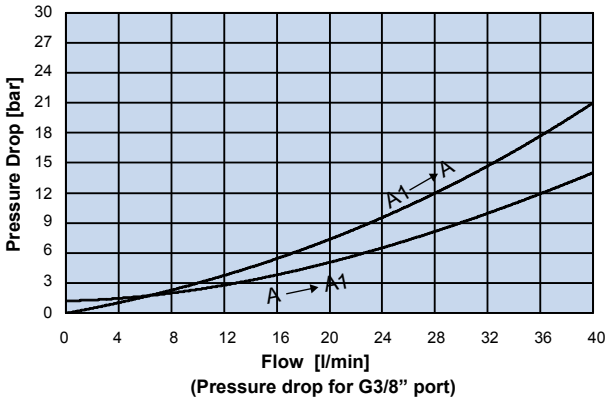
DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1 PORT FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b	c	d	e
02	45	24,5	12,5	92	23
03	50	29,5	15	96	21

Ordering code

H 3 0 6 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

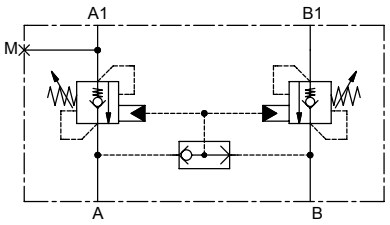
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

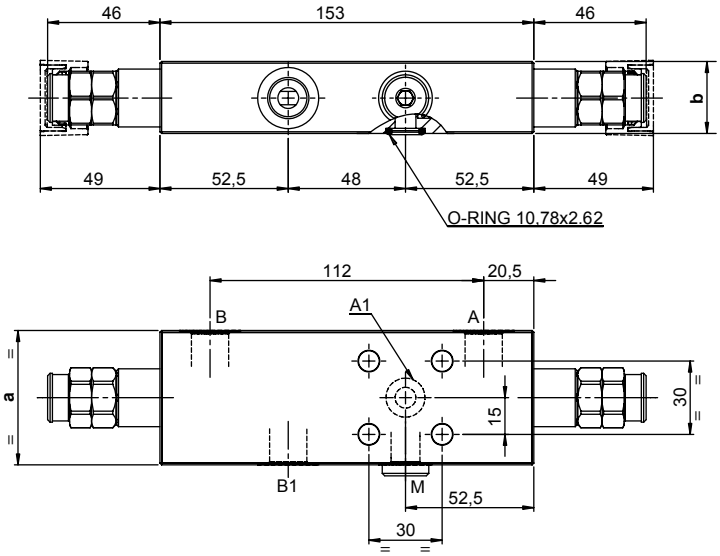
PORTS	02	03
A,B,B1	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

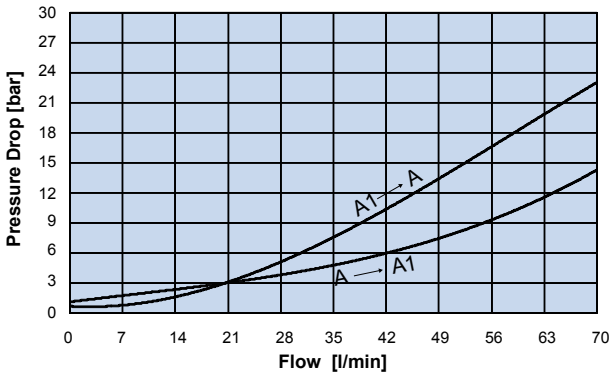
LHD05X-AB24100-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1 PORT FLANGED

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







187

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	29,5

Ordering code

H 5 0 6 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

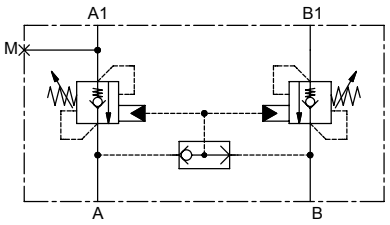
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

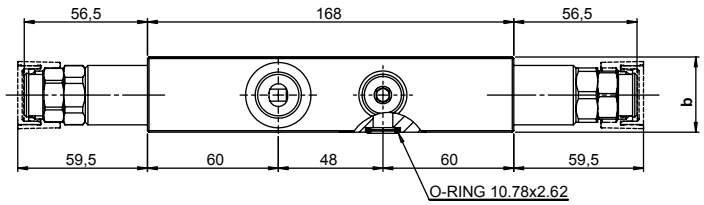
PORTS	03	04
A,B,B1	G 3/8"	G 1/2"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

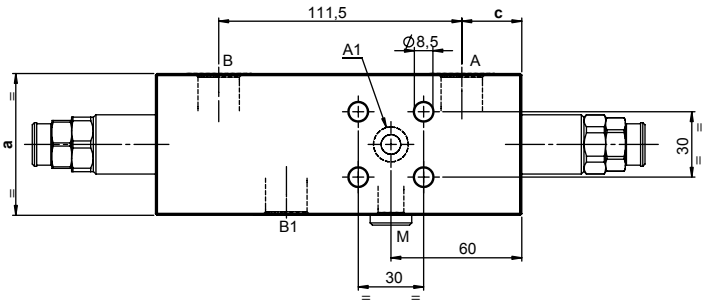
LHD10X-AB24100-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1 PORT FLANGED

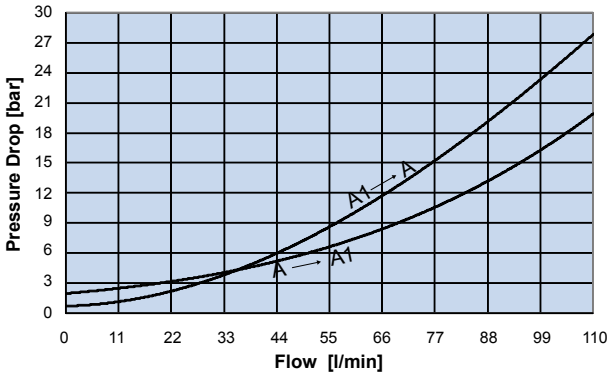
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







188



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b	c
04	65	34,5	27,5
05	70	39,5	24

Ordering code

H 1 0 6 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

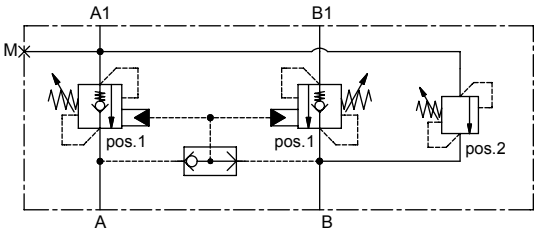
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

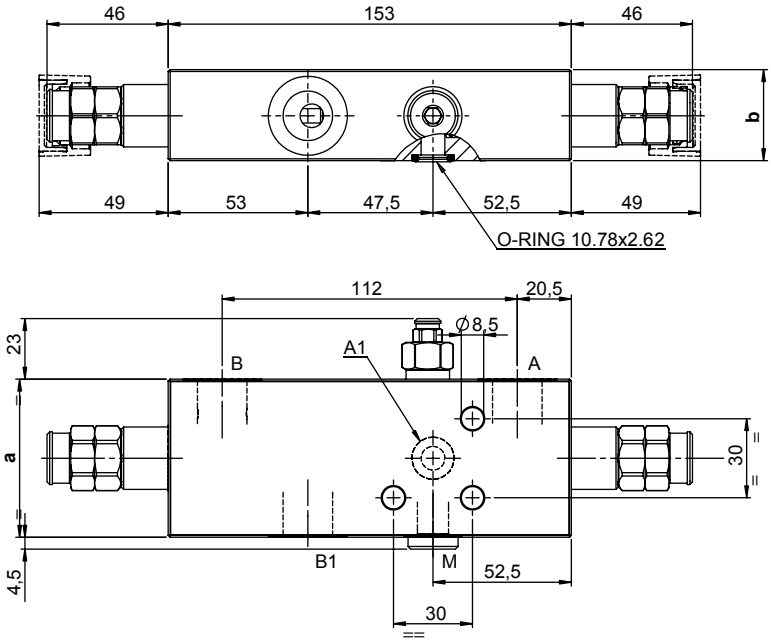
PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

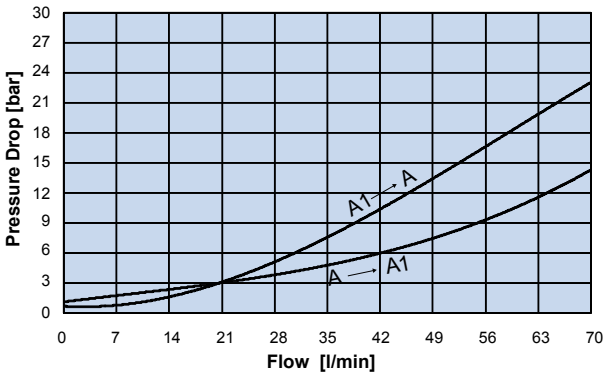
LHD05X-AB24100-N04-VMD02-A1B
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1 PORT FLANGED

- Flow. . . . . .70 l/min
- Max working pressure. . . . . 350 bar
- Compensation. . . . . Not Compensated
- Weight. . . . . 1,9 Kg
- Tamper proof cap. . . . . cod. 9021030190







189

Note:
- Antishock valve pos.2 max flow 3 l/min
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 6 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
47	**4:1+RELIEF A1>B**

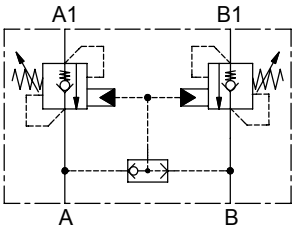
SPRINGS	3	
	pos.1	pos.2
Setting range min.-max. [bar]	120 - 350	250 - 400
Pressure Increase [bar/turn]	114	250
Standard setting 4 l/min [bar]	350 bar a 4 l/min	300 bar a 20 cc/min

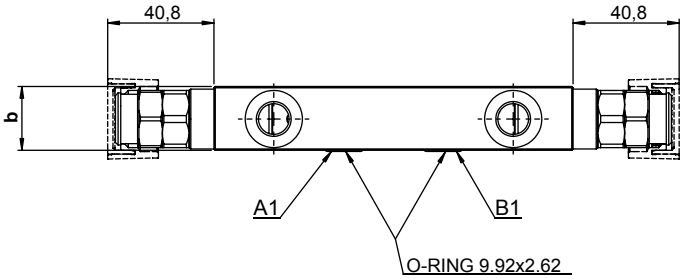
PORTS	03	04
A,B,B1	G 3/8"	G 1/2"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

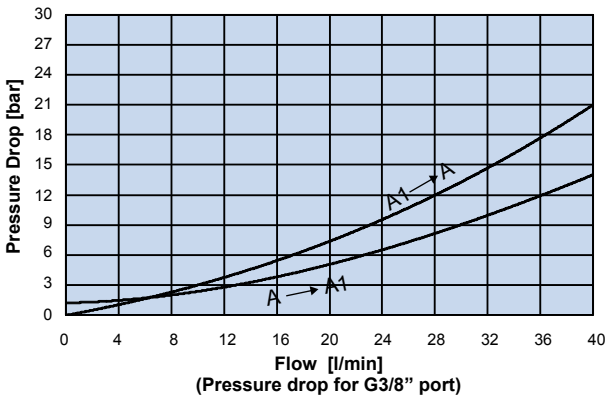
LHD03X-AB24200-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1/B1 PORT FLANGED

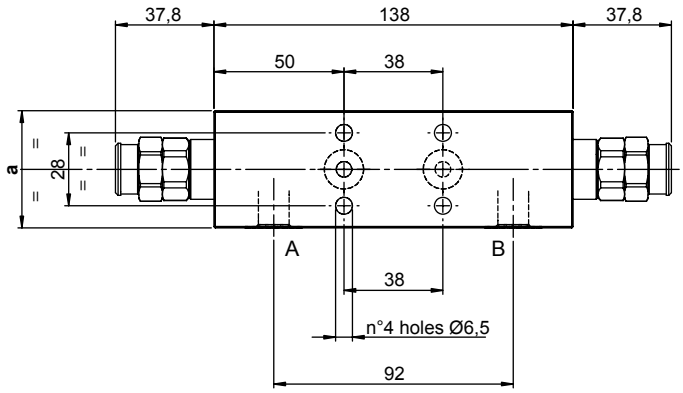
- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







190



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD03X-C is recommended for circuits with high back pressure)

	a	b
02	45	24,5
03	50	29,5

Ordering code

H 3 0 6 2 N ☐ ☐ S ☐ 0 0

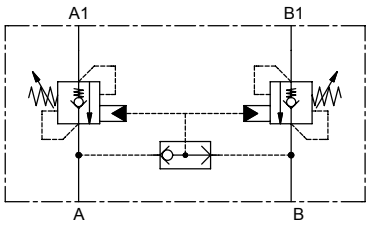
PILOT RATIO	
40	**4:1**

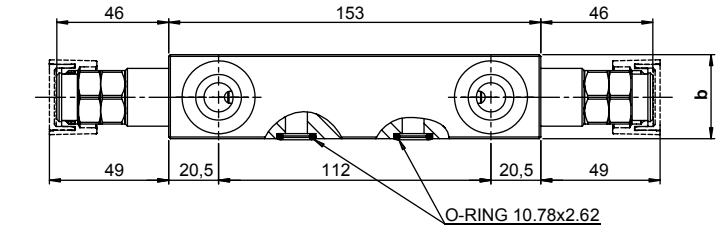
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

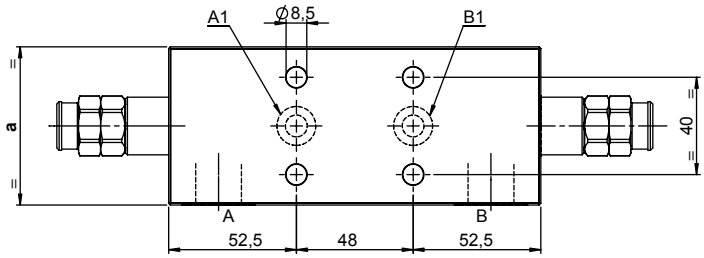
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1,B1	Ø 6	Ø 6

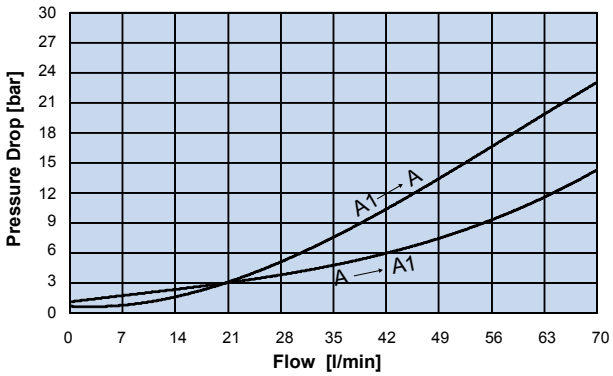
DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1/B1 PORT FLANGED

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









191

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD05X-C is recommended for circuits with high back pressure)

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 6 2 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

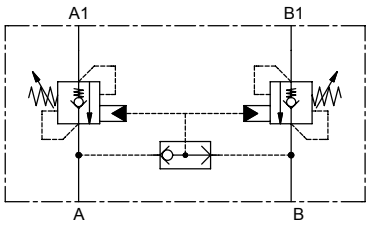
SPRINGS	rp 4:1		rp 9:1	
	2	**3**	**2**	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350	80 - 250	190 - 350
Pressure Increase [bar/turn]	62	114	50	121
Standard setting 4 l/min [bar]	200	350	200	350

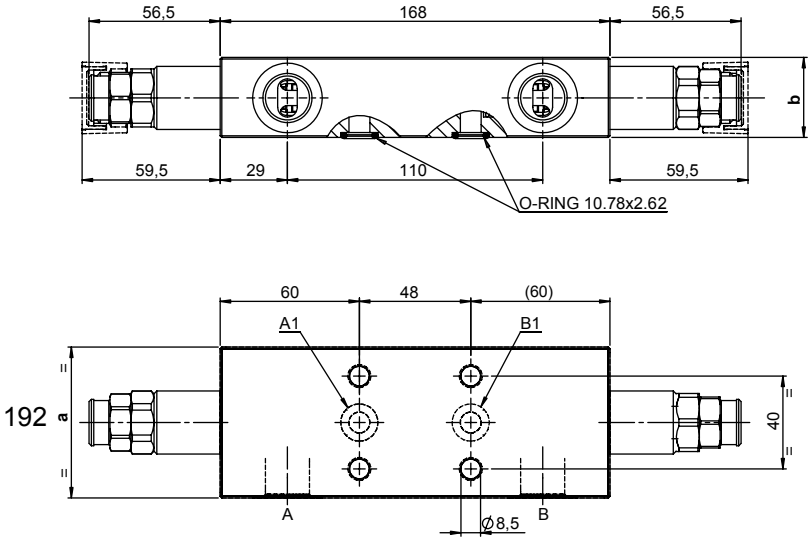
PORTS	03	04
A,B	G 3/8"	G 1/2"
A1,B1	Ø 9	Ø 9

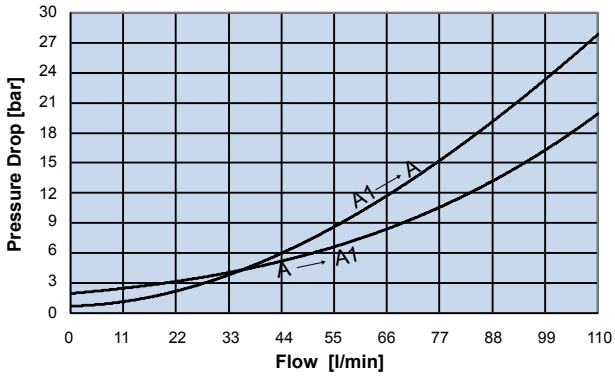
LHD10X-AB24200-N
Steel Body

DOUBLE ACTING COUNTERBALANCE VALVE WITH COAXIAL CAVITY - A1/B1 PORT FLANGED

- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **. .3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

	a	b
04	65	34,5
05	70	39,5

Ordering code

H 1 0 6 2 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

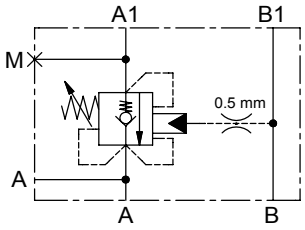
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

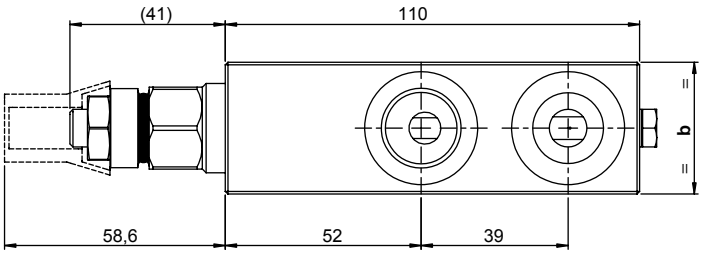
PORTS	04	05
A,B	G 1/2"	G 3/4"
A1,B1	Ø 9	Ø 9

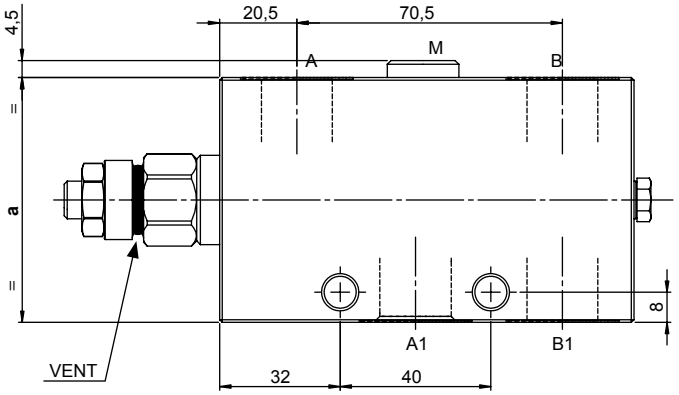
LHD05X-A4000-S
Steel Body

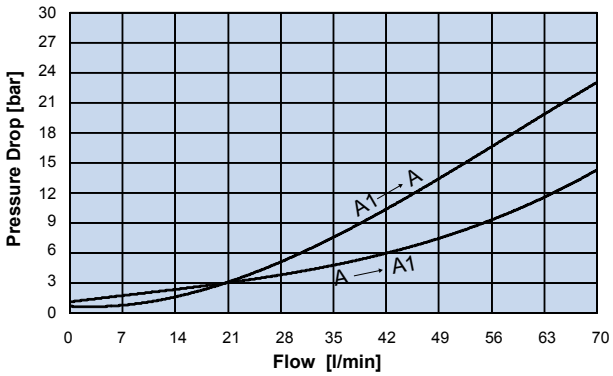
SINGLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**









193

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	30
04	65	35

Ordering code

H 5 3 0 4 S ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

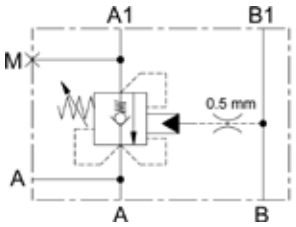
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

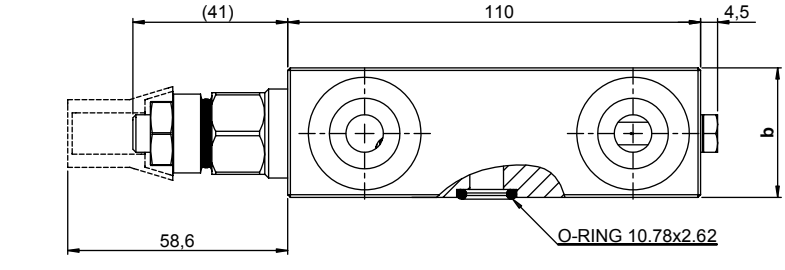
PORTS	03	04
A,A1,B,B1	G 3/8"	G 1/2"
M	G 1/4"	G 1/4"

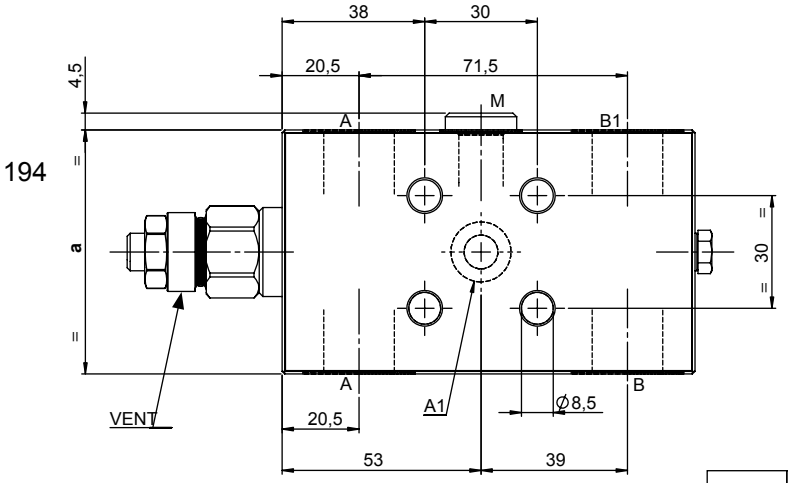
LHD05XM-A4100-S
Steel Body

SINGLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

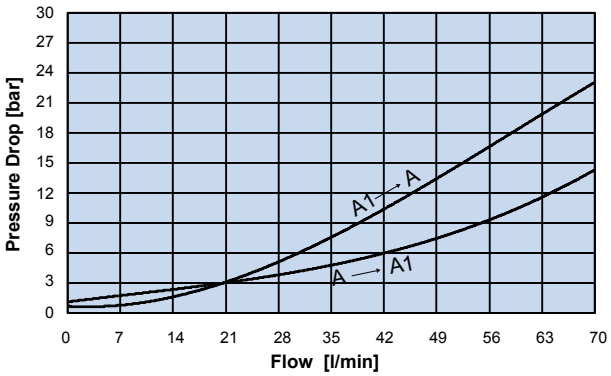
- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**







194



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	30
04	65	35

Ordering code

H 5 3 0 5 S ☐ ☐ S ☐ 0 0

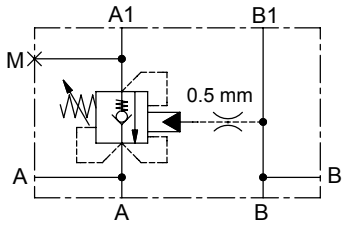
PILOT RATIO	
40	**4:1**

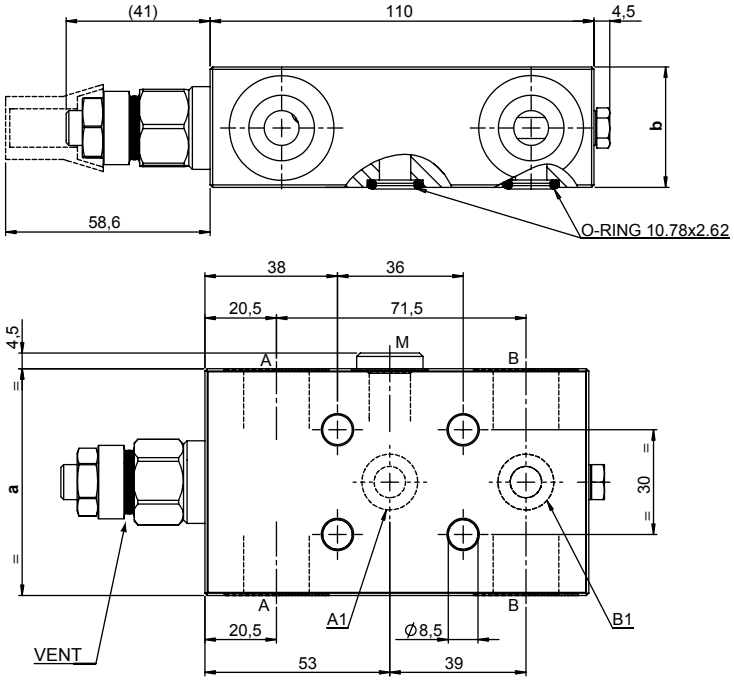
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

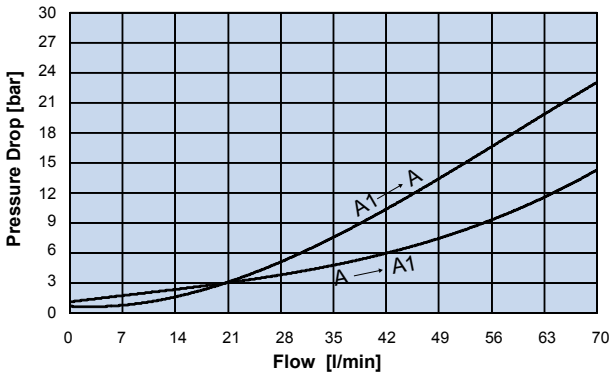
PORTS	03	04
A,A1,B,B1	G 3/8"	G 1/2"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

SINGLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . .**cod. 4029250280**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 3 0 6 S ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

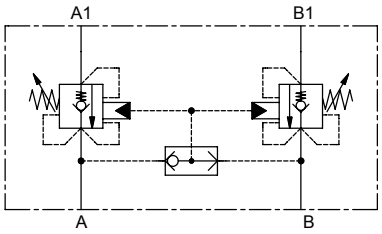
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

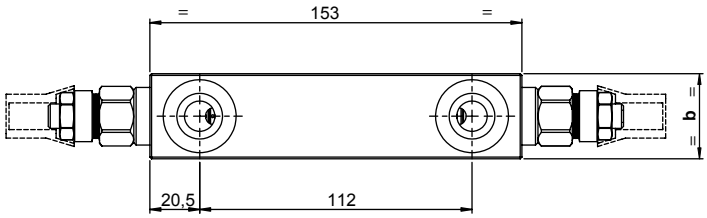
PORTS	03	04
A,B	G 3/8"	G 1/2"
A1,B1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

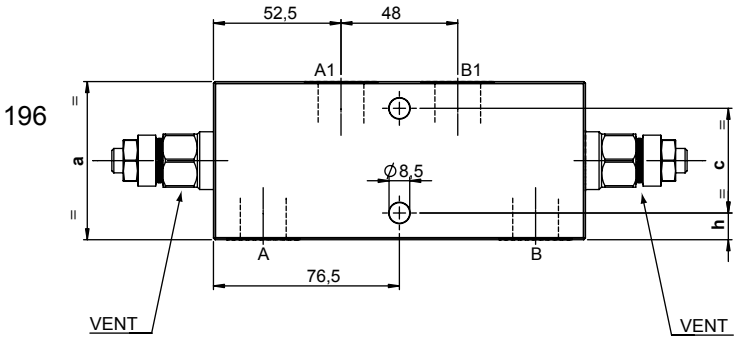
LHD05X-AB24000-S
Steel Body

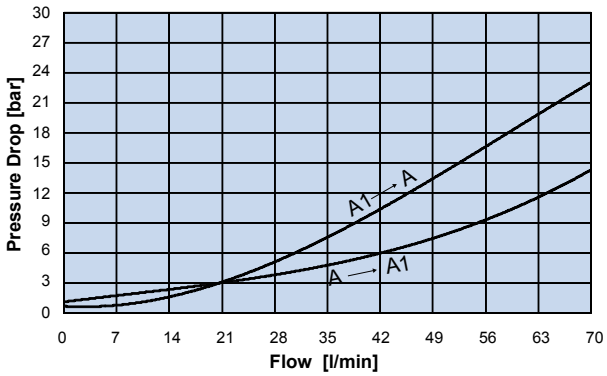
DOUBLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	h
03	55	30	38	8,5
04	65	35	43	11

Ordering code

H 5 3 6 0 S ☐ ☐ S ☐ 0 0

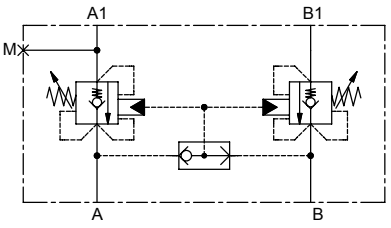
PILOT RATIO	
40	**4:1**

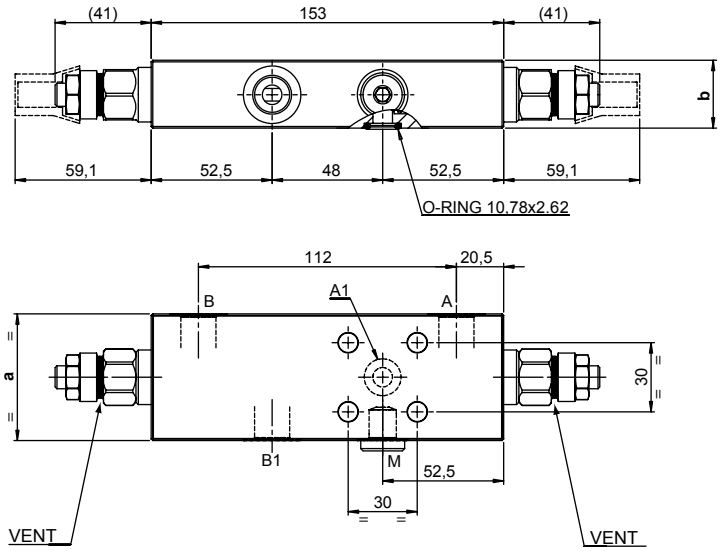
SPRINGS	**2**	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

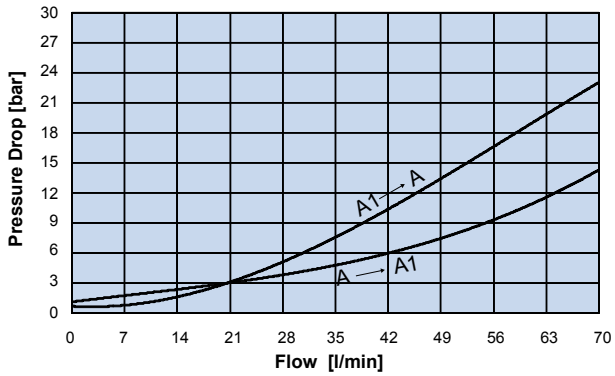
PORTS	**03**	**04**
A,B,A1,B1	G 3/8"	G 1/2"

DOUBLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

- Flow. . . . . .**70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**







197

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 3 6 1 S ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

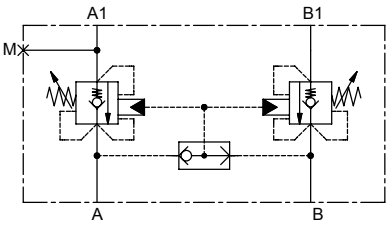
PORTS	03	04
A,B,B1	G 3/8"	G 1/2"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

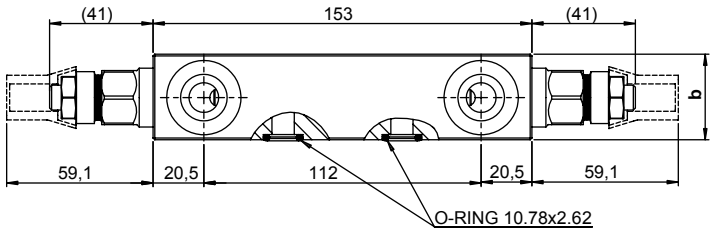
NEM-HYDRAULICS.COM

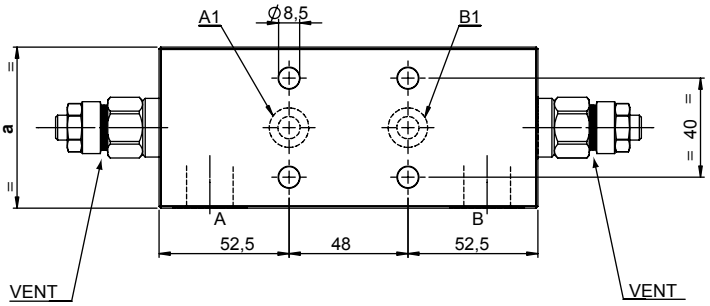
LHD05XM-A24200-S
Steel Body

SINGLE ACTING PARTIALLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

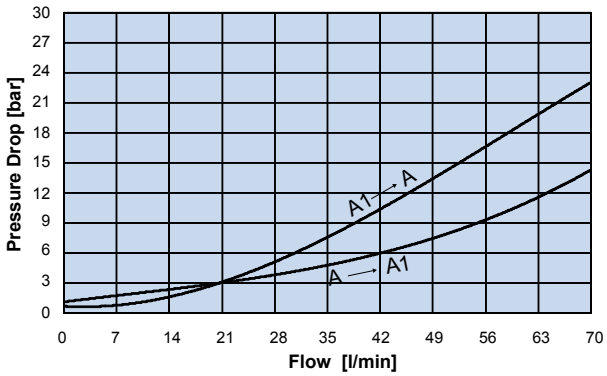
- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Partially Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 4029250280**







198



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 3 6 2 S ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

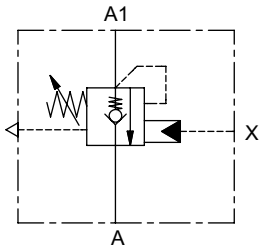
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

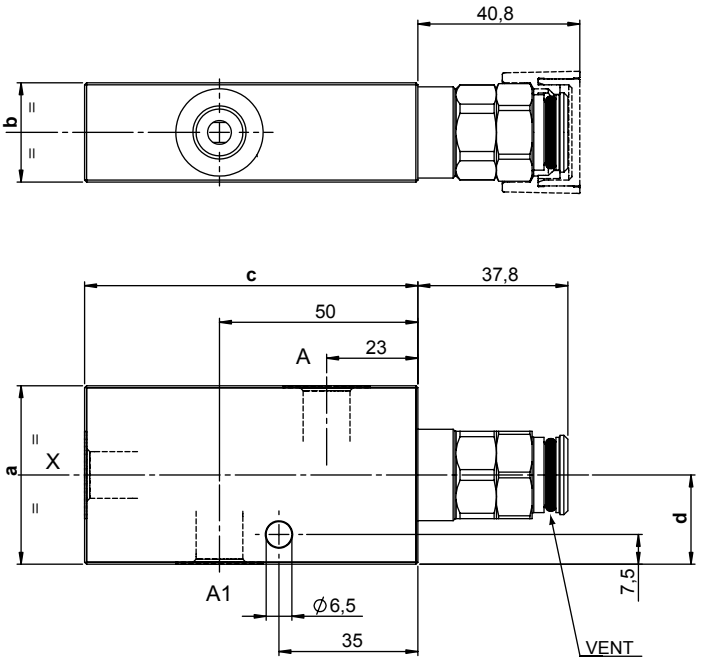
PORTS	03	04
A,B	G 3/8"	G 1/2"
A1,B1	Ø 9	Ø 9

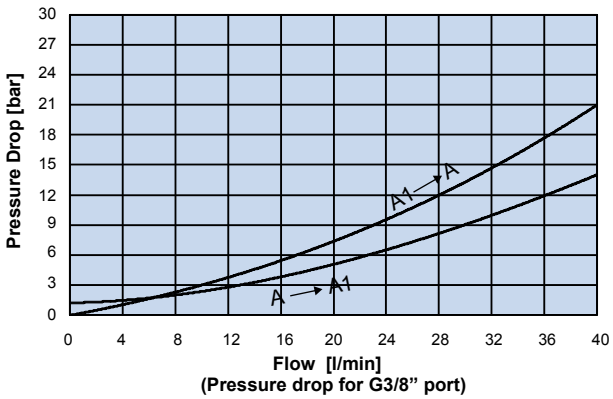
LHD03X-A3000-C
Steel Body

SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







199

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d
02	45	25	84	22,5
03	50	30	90	25

Ordering code

H 3 0 0 1 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

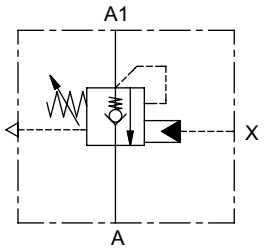
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

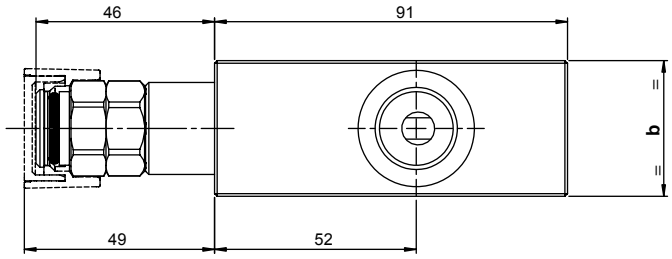
PORTS	02	03
A,A1,X	G 1/4"	G 3/8"

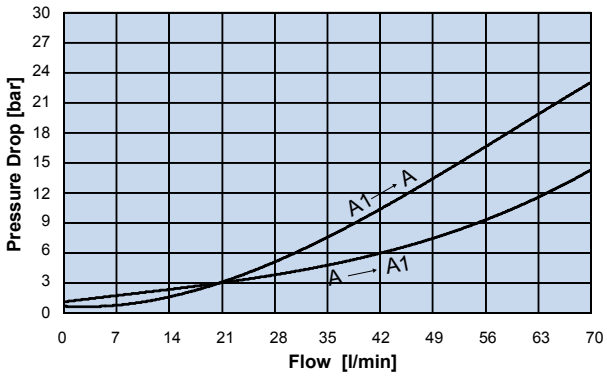
LHD05X-A3000-C
Steel Body

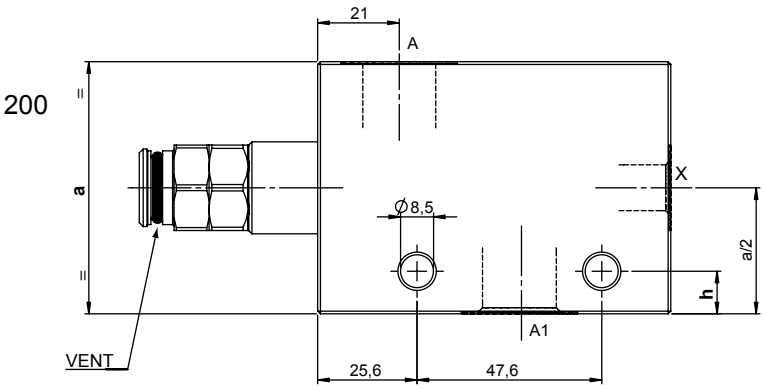
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	h
03	55	30	7
04	65	35	11

Ordering code

H 5 0 0 1 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**
90	**9:1**

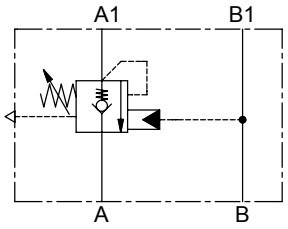
SPRINGS	rp 4:1		rp 9:1	
	2	**3**	**2**	**3**
Setting range min.-max. [bar]	60 - 210	120 - 350	80 - 250	190 - 350
Pressure Increase [bar/turn]	62	114	50	121
Standard setting 4 l/min [bar]	200	350	200	350

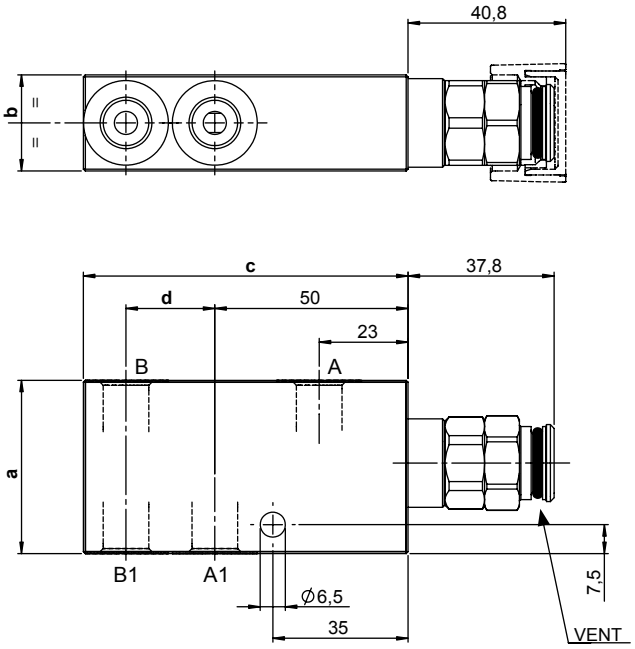
PORTS	03	04
A,A1	G 3/8"	G 1/2"
X	G 1/4"	G 1/4"

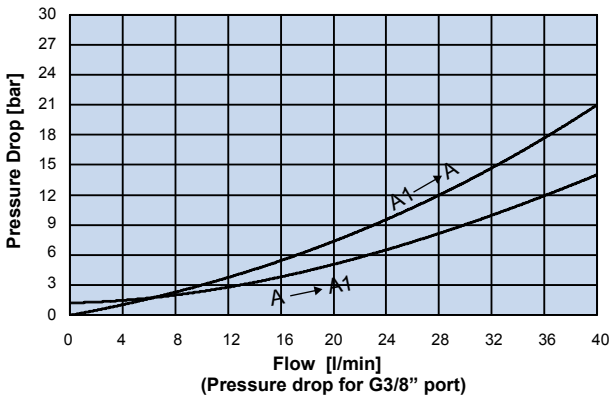
LHD03X-A4000-C
Steel Body

SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,75 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







201

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d
02	45	25	84	23
03	50	30	95	30

Ordering code

H 3 0 0 4 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

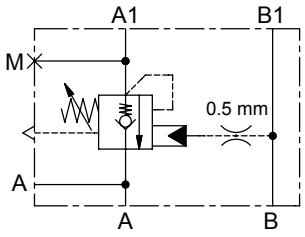
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

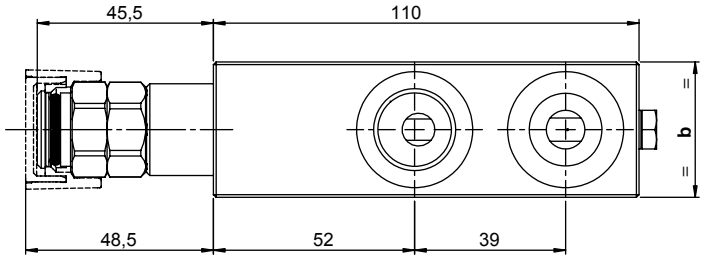
PORTS	02	03
A,B,A1,B1	G 1/4"	G 3/8"

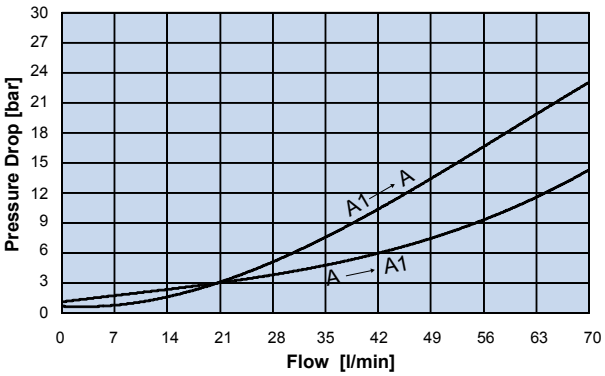
LHD05X-A4000-C
Steel Body

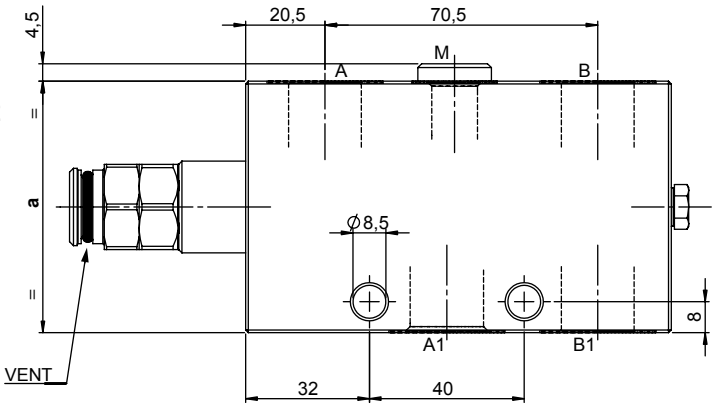
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









202

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	30
04	65	35

Ordering code

H 5 0 0 4 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

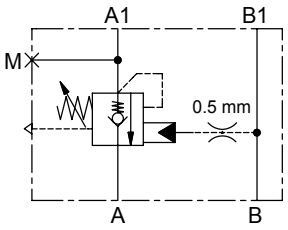
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03	04
A,A1,B,B1	G 3/8”	G 1/2”
M	G 1/4”	G 1/4”

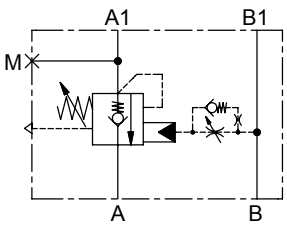
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

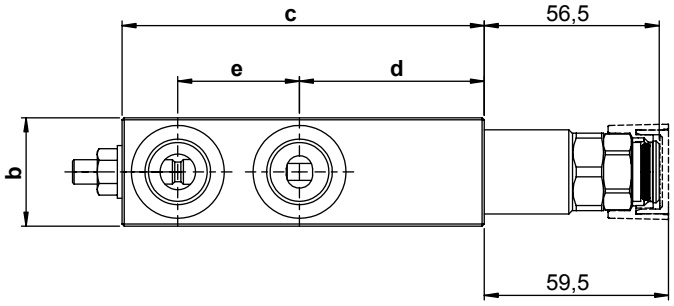
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **2,5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

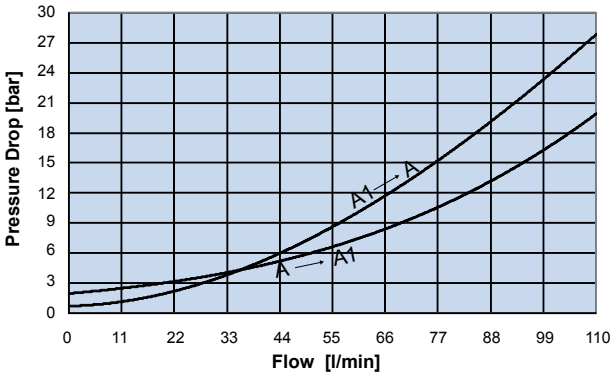
SCHEME 40 - 90



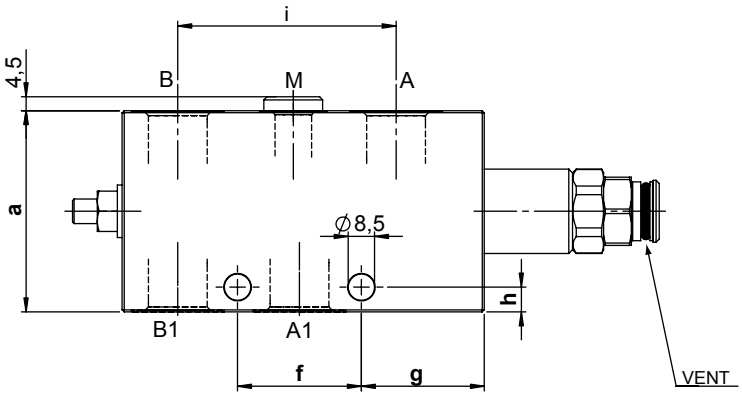
SCHEME 42 - 92







203



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e	f	g	h	i
04	65	35	117	59,7	39.3	40	39,7	8	70.5
05	70	40	130	60	47	47.6	36	11	78

Ordering code

H 1 0 0 4 C [ ] [ ] S [ ] 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

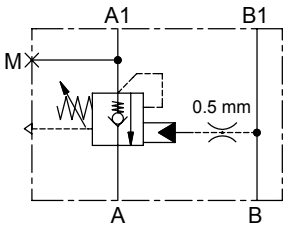
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

PORTS	04	05
A,A1,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"

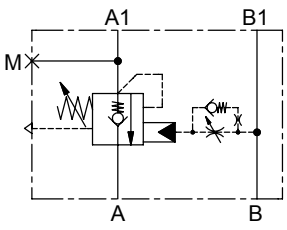
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

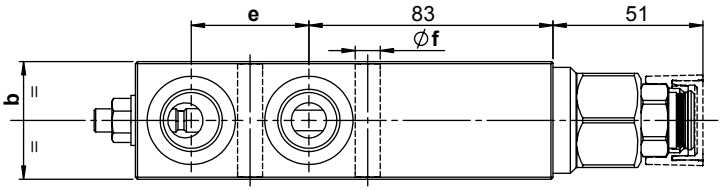
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **3,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

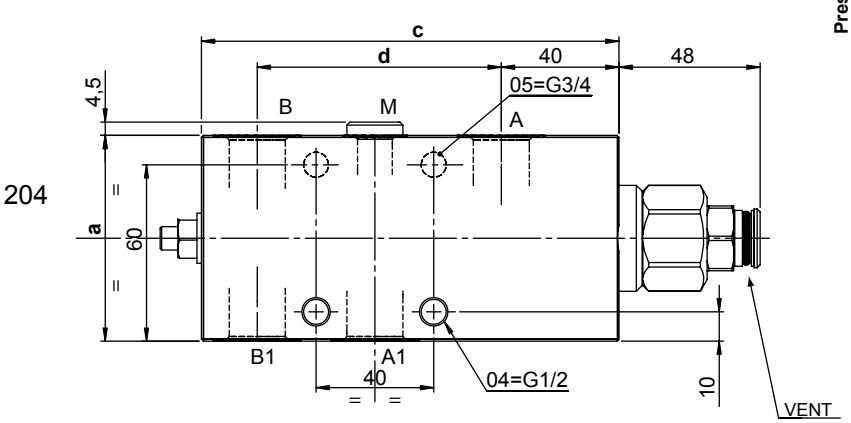
SCHEME 40 - 80

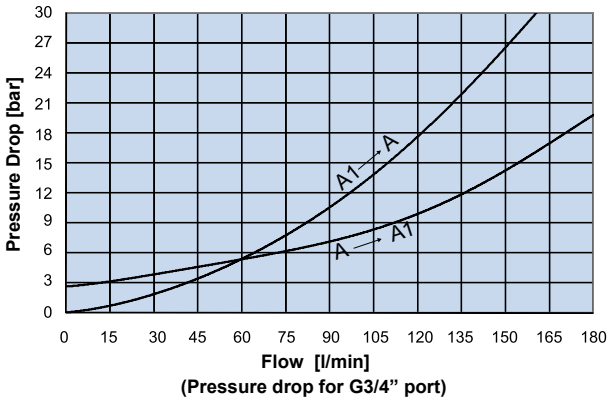


SCHEME 42 - 82









(Pressure drop for G3/4" port)

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e	f
04	70	40	142	83	40	8,5
05	80	40	147	86	43	10,5

Ordering code

H 1 5 0 4 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

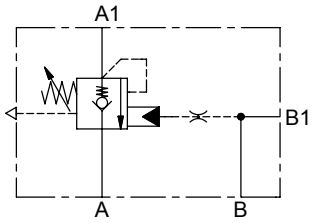
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

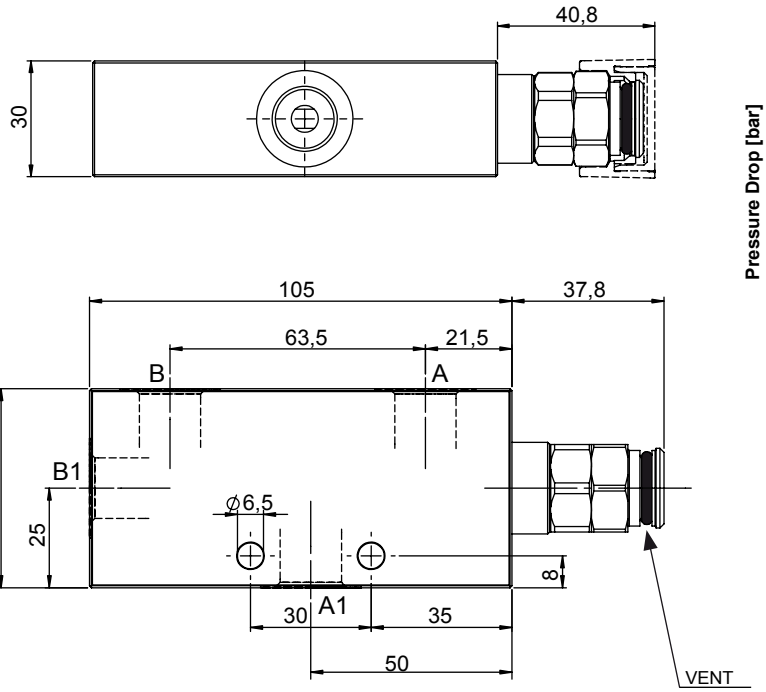
PORTS	04	05
A,A1,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"

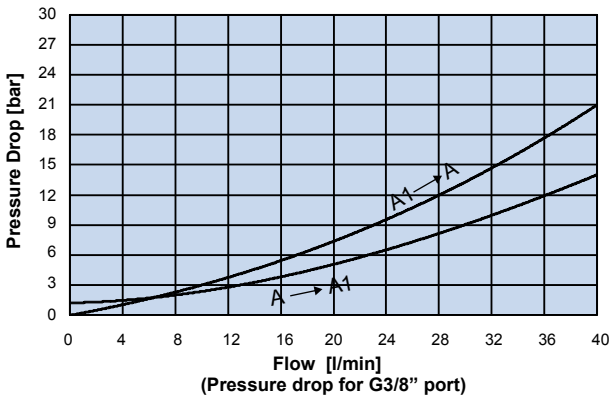
LHD03X-A4000-C41
Steel Body

SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,75 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







205

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

Ordering code

H 3 0 0 4 C ☐ ☐ S ☐ 0 0

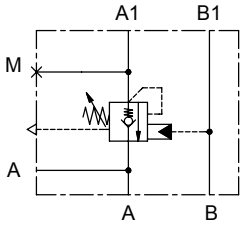
PILOT RATIO	
41	**4:1+dia.0,5mm**

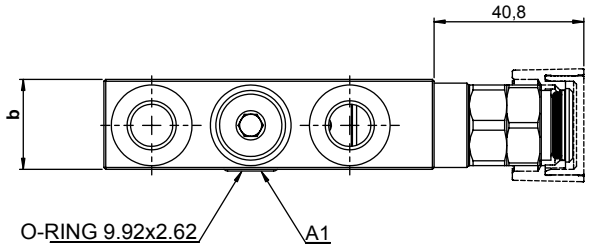
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

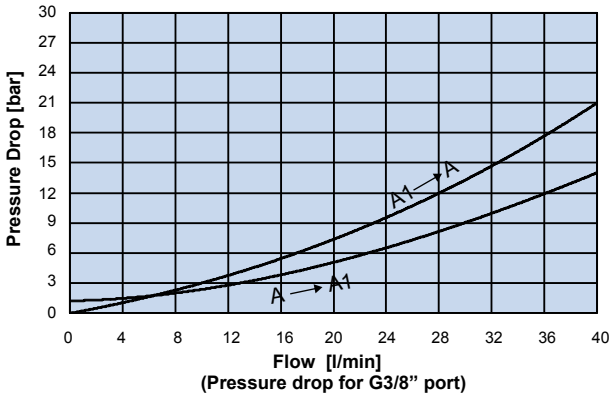
PORTS	03
A,B,A1,B1	G 3/8"

SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

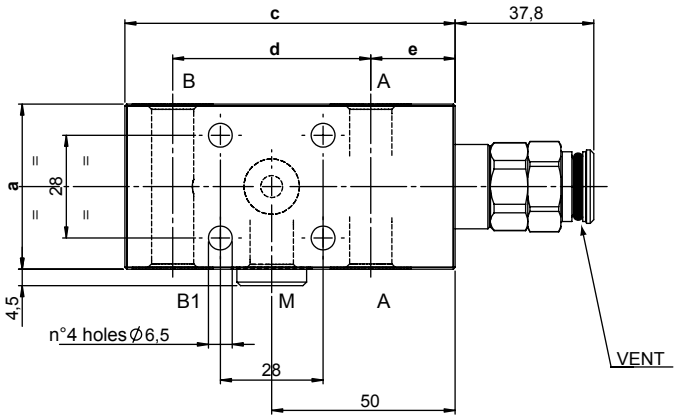
- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







206



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e
02	45	24,5	90	54	23
03	50	29,5	95	59	21

Ordering code

H 3 0 0 5 C ☐ ☐ S ☐ 0 0

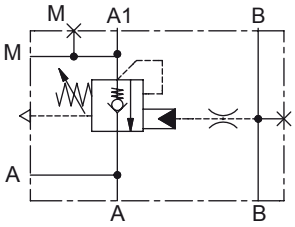
PILOT RATIO	
40	**4:1**

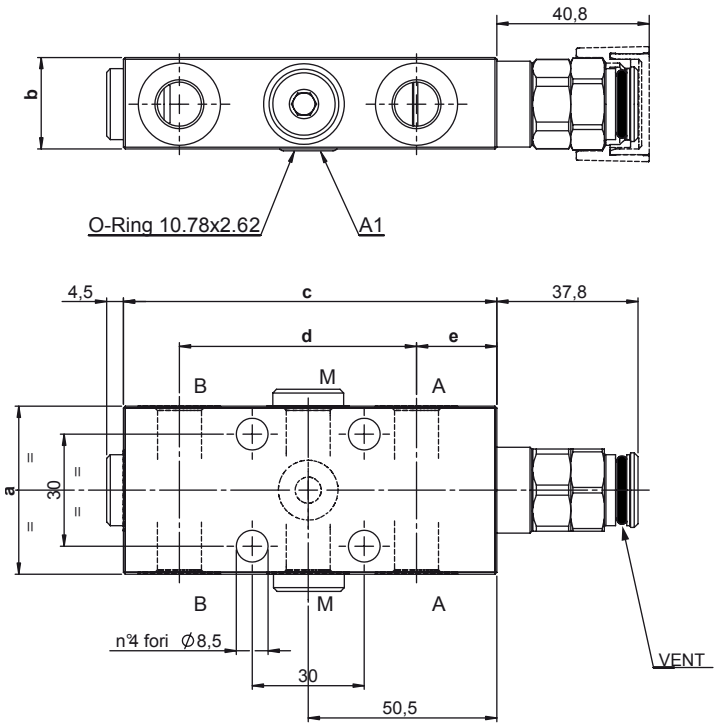
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

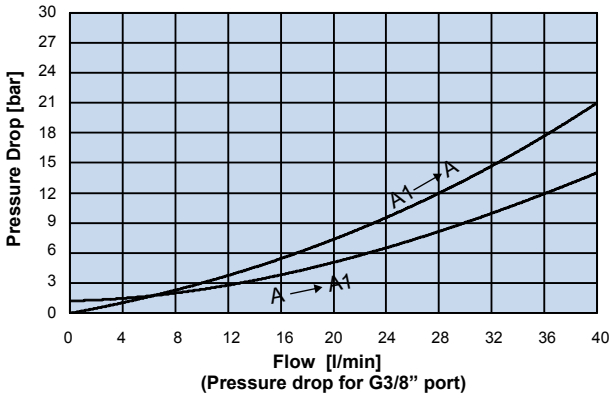
PORTS	02	03
A,B,B1	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,85 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







207

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e
02	45	24,5	100	63,5	21,5
03	50	29,5	100	66	19,5

Ordering code

H 3 0 0 7 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

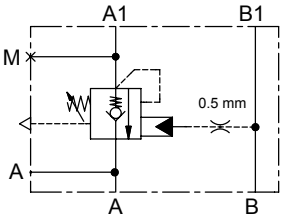
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

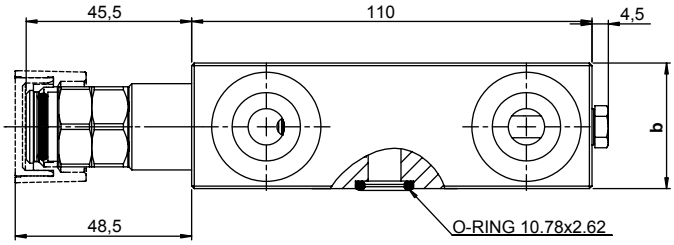
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

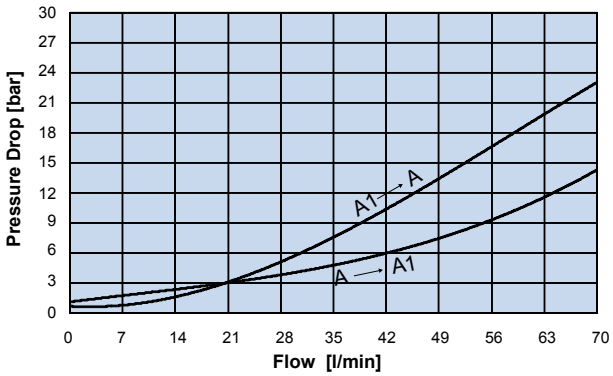
LHD05X-A4100-C
Steel Body

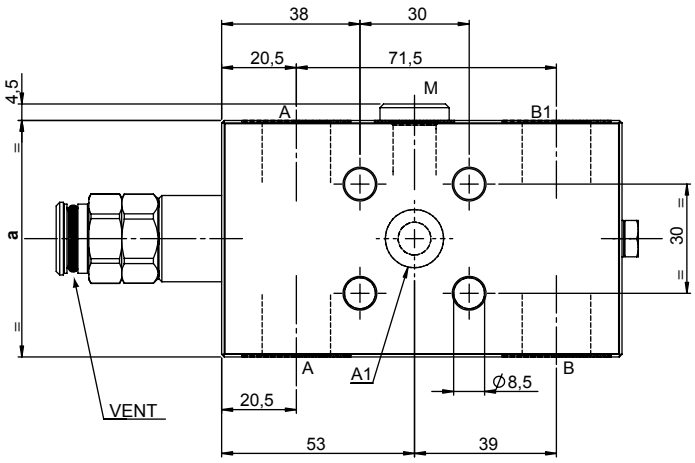
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









208

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 0 5 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

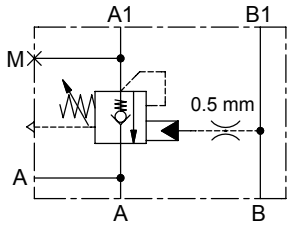
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03	04
A,B,B1	G 3/8"	G 1/2"
A1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

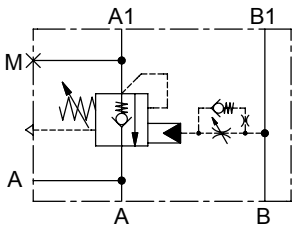
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

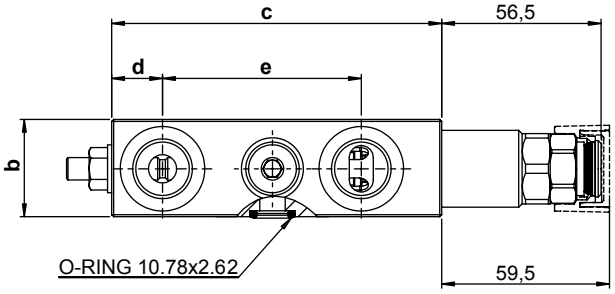
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

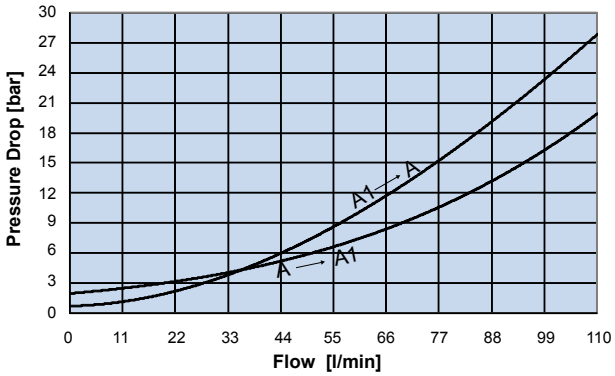
SCHEME 40 - 90

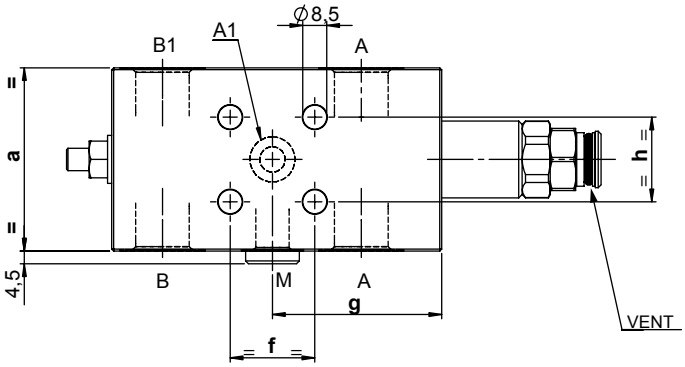


SCHEME 42 - 92









Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e	f	g	h
04	65	34,5	117	26,5	72,5	30	45	30
05	80	39,5	130	22	86	40	45	40

Ordering code

H 1 0 0 5 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

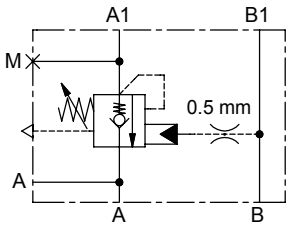
SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
A1	Ø 9	Ø 8,5
M	G 1/4"	G 1/4"

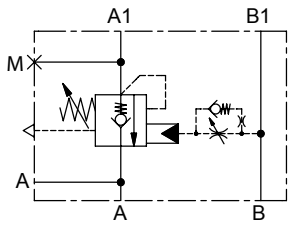
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1 PORT FLANGED

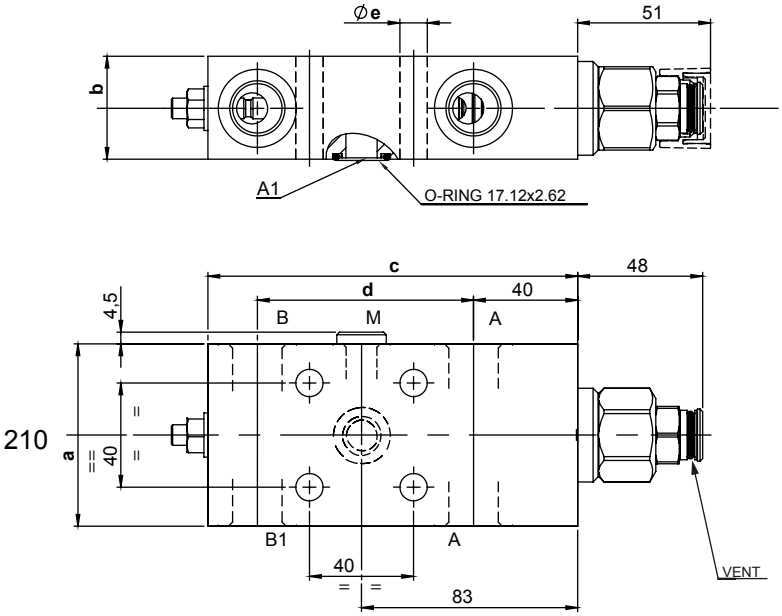
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **3,2 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

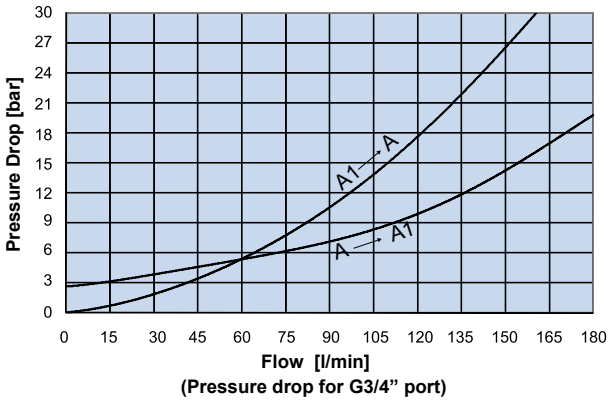
SCHEME 40 - 80



SCHEME 42 - 82







(Pressure drop for G3/4" port)

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e
04	70	39,5	142	83	10,5
05	80	39,5	147	86	10,5

Ordering code

H 1 5 0 5 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

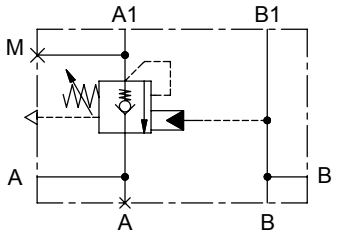
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

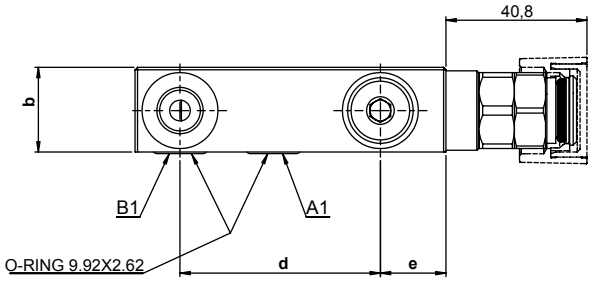
PORTS	04	05
A,B,B1	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1	Ø 12	Ø 12

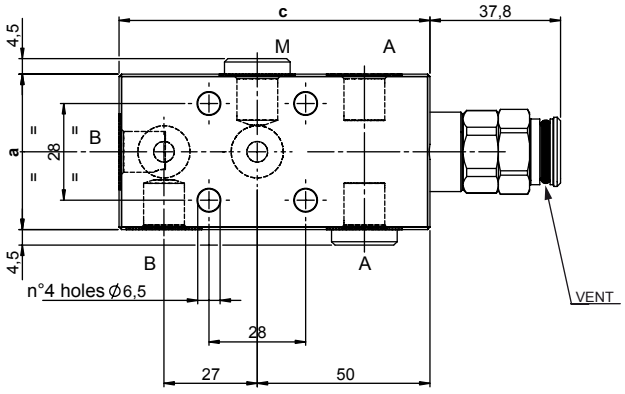
LHD03X-A4200-C
Steel Body

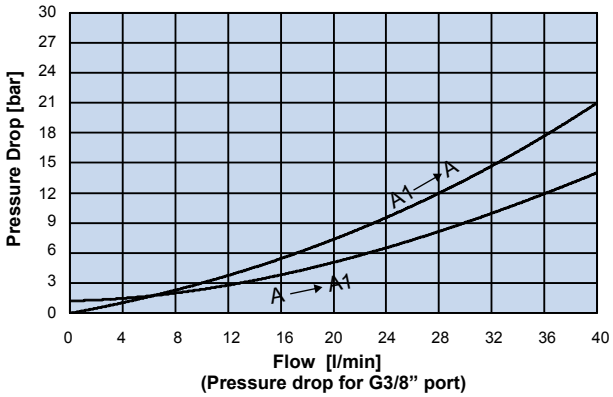
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









211

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e
02	45	24,5	90	58	19
03	50	29,5	95	59	21

Ordering code

H 3 0 0 6 C ☐ ☐ S ☐ 0 0

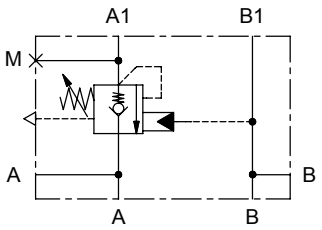
PILOT RATIO	
40	**4:1**

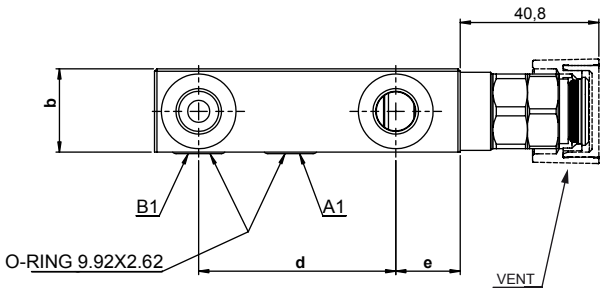
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

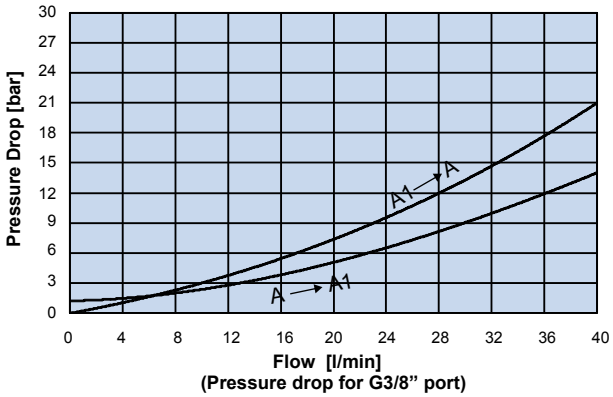
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1,B1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

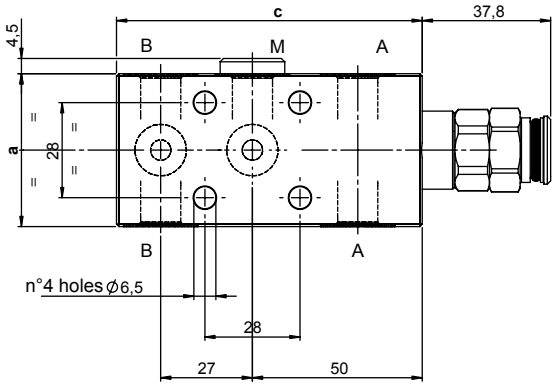
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **0,8 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









212

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e
02	45	24,5	90	58	19
03	50	29,5	95	59	21

Ordering code

H 3 0 0 8 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

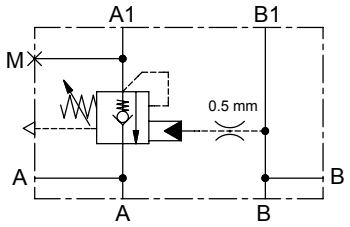
SPRINGS	2	3
Setting range min.-max. [bar]	80 - 210	150 - 350
Pressure Increase [bar/turn]	41	100
Standard setting 4 l/min [bar]	200	350

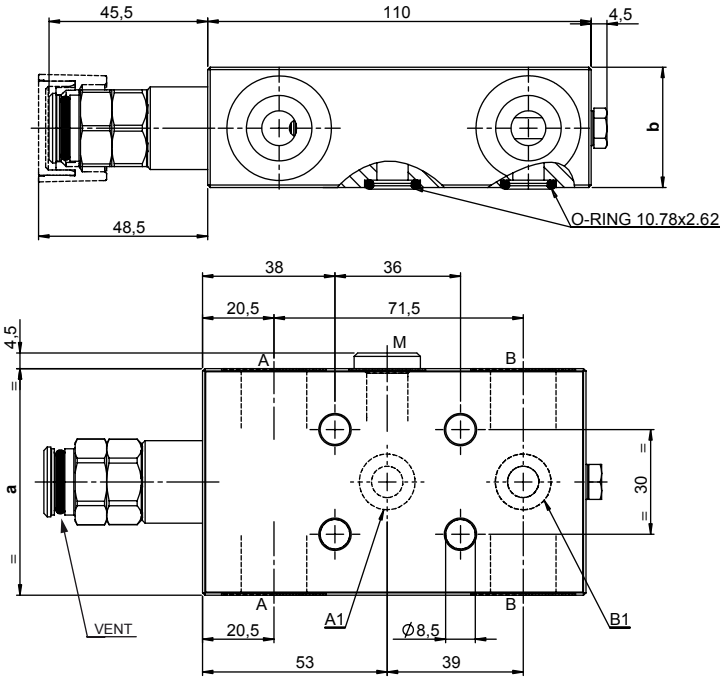
PORTS	02	03
A,B	G 1/4"	G 3/8"
A1,B1	Ø 6	Ø 6
M	G 1/4"	G 1/4"

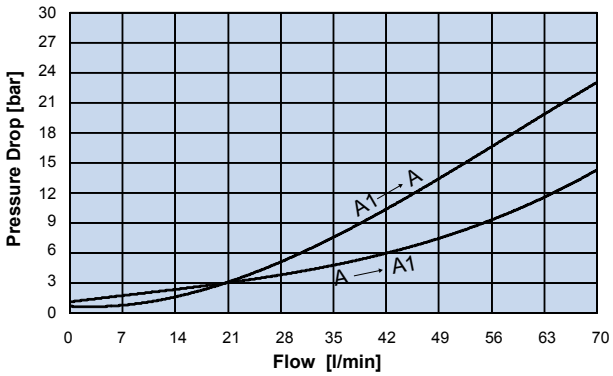
LHD05X-A4200-C
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE FLANGED

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,7 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







213

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b
03	55	29,5
04	65	34,5

Ordering code

H 5 0 0 6 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

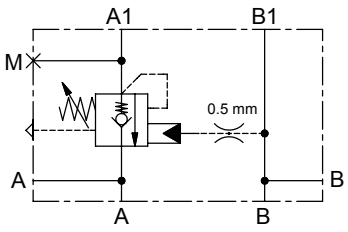
PORTS	03	04
A,B	G 3/8"	G 1/2"
A1,B1	Ø 9	Ø 9
M	G 1/4"	G 1/4"

LHD10X-A4200-C
Steel Body

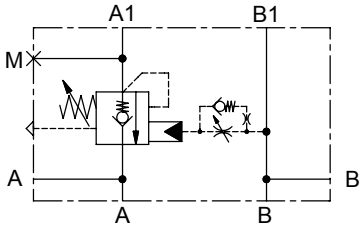
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

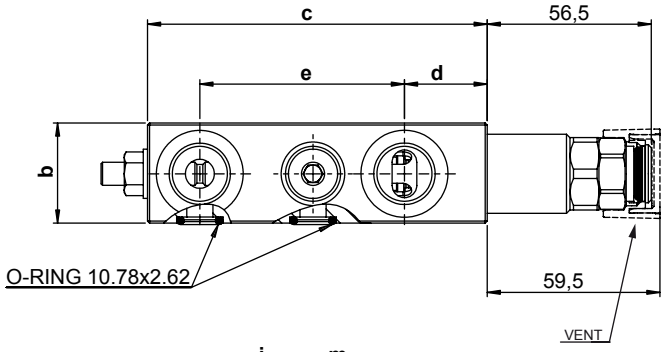
- Flow. . . . . **110 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

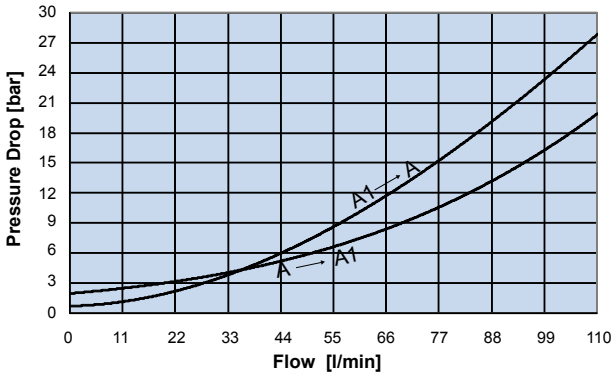
SCHEME 40 - 90

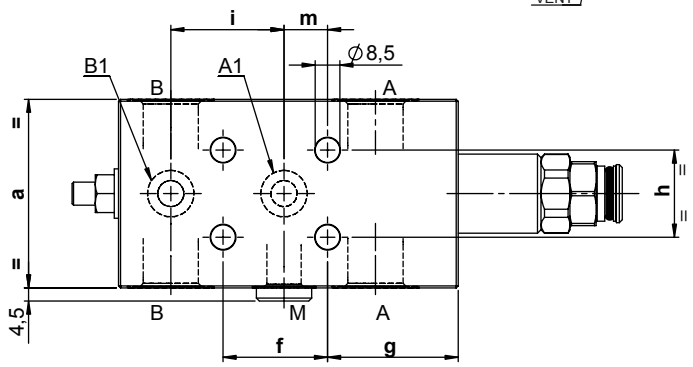


SCHEME 42 - 92









214

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e	f	g	h	i	m
04	65	34,5	117	28,5	70,5	36	45	30	39	15
05	80	39,5	130	22	86	40	45	40	43	20

Ordering code

H 1 0 0 6 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
90	**9:1**	
92	**9:1**	ADJUSTABLE DUMP SCREW

SPRINGS	rp 4:1		rp 9:1
	2	**4**	**4**
Setting range min.-max. [bar]	60 - 210	120 - 410	150 - 410
Pressure Increase [bar/turn]	52	85	100
Standard setting 4 l/min [bar]	200	350	350

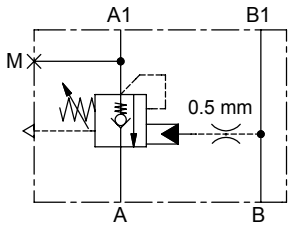
PORTS	04	05
A,B	G 1/2"	G 3/4"
A1,B1	Ø 9	Ø 8,5
M	G 1/4"	G 1/4"

LHD15X-A4200-C
Steel Body

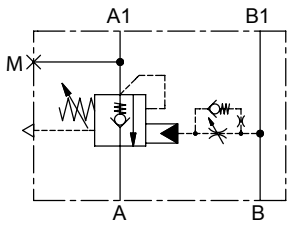
SINGLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

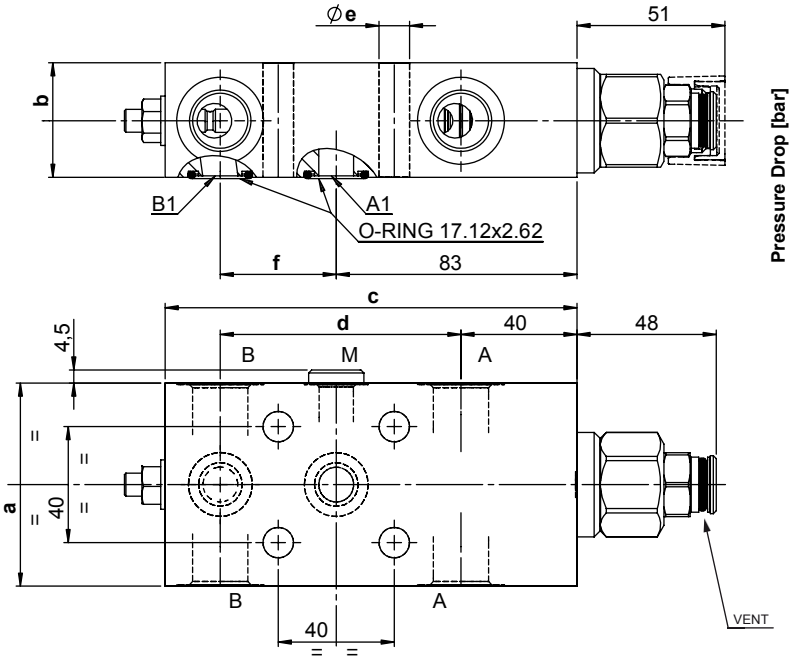
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **3,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

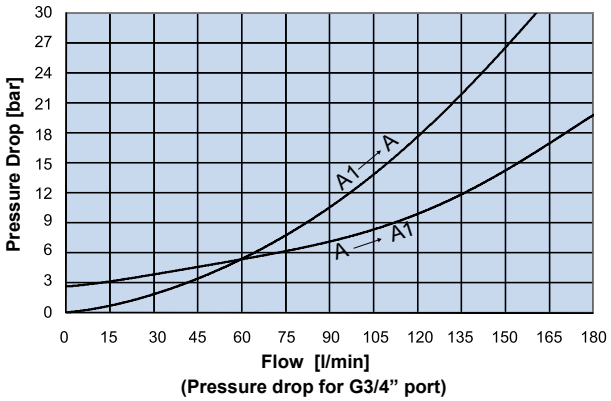
SCHEME 40 - 80



SCHEME 42 - 82







(Pressure drop for G3/4" port)

215

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

	a	b	c	d	e	f
04	70	39,5	142	83	10,5	40
05	80	39,5	147	86	10,5	43

Ordering code

H 1 5 0 6 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

SPRINGS	4:1		8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

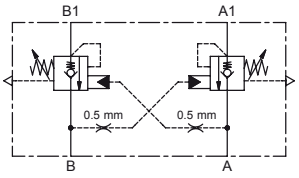
PORTS	04	05
A,B	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1,A2	Ø 12	Ø 12

LHD15X-AB14000-C
Steel Body

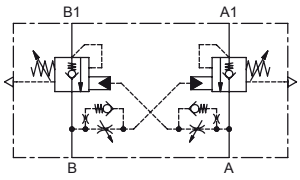
DOUBLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE

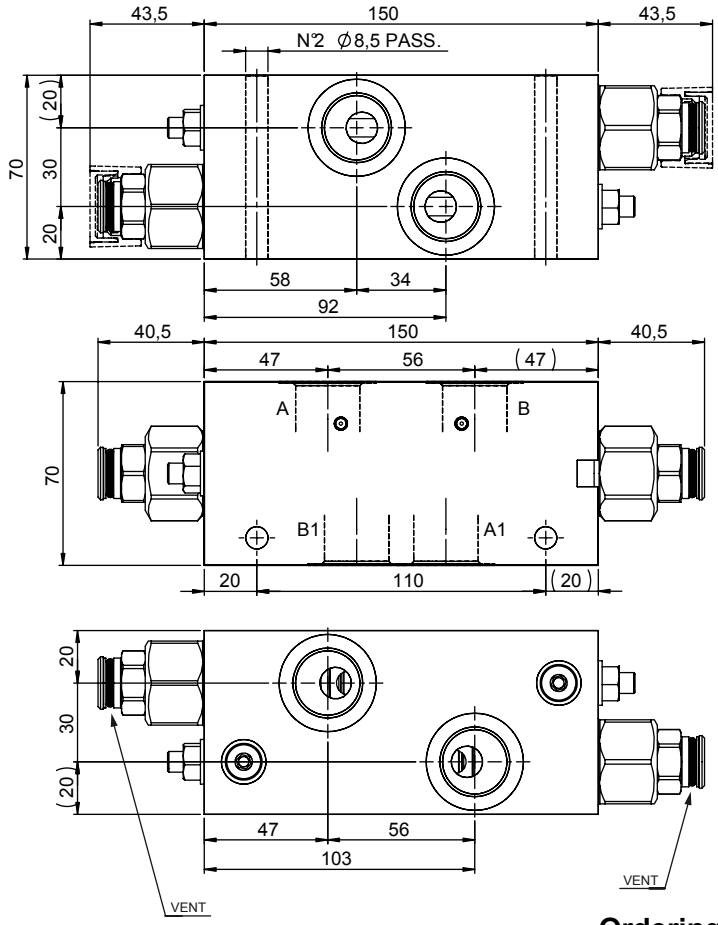
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **5,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

SCHEME 40 - 80

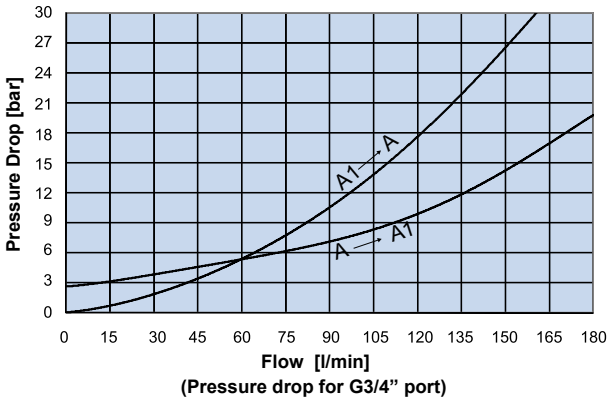


SCHEME 42 - 82





216



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

Ordering code

H 1 5 3 0 C ☐ ☐ S ☐ 0 0

PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

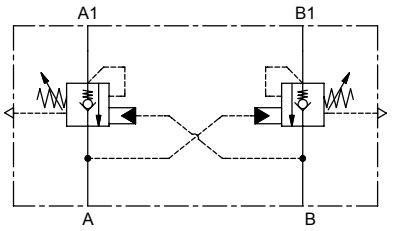
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

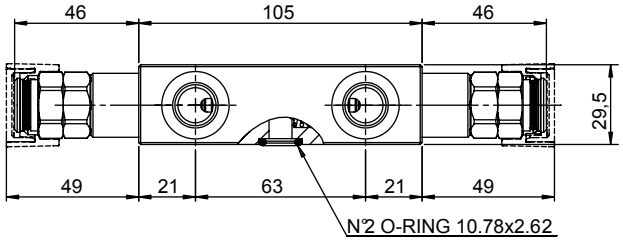
PORTS	05
A,A1,B,B1	G 3/4"

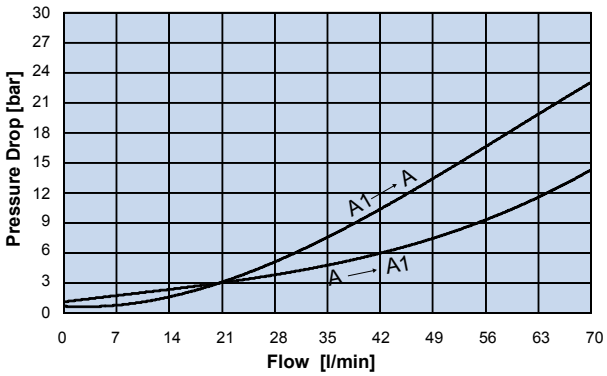
LHD05X-AB14200-C
Steel Body

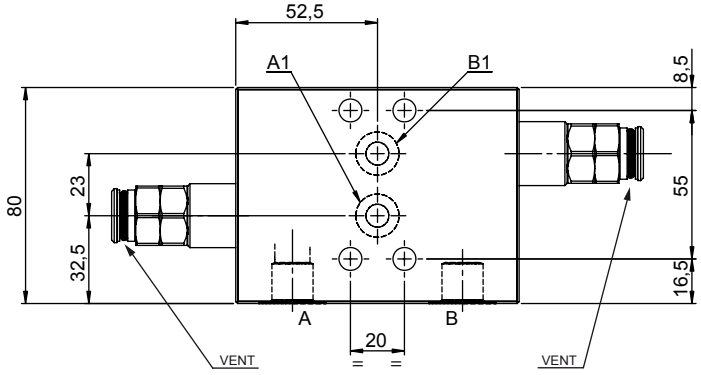
DOUBLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

- Flow. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**









217

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

Ordering code

H 5 0 3 2 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
40	**4:1**

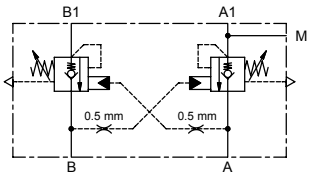
SPRINGS	2	3
Setting range min.-max. [bar]	60 - 210	120 - 350
Pressure Increase [bar/turn]	62	114
Standard setting 4 l/min [bar]	200	350

PORTS	03
A,B	G 3/8"
A1,B1	Ø 9

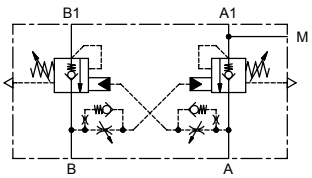
DOUBLE ACTING FULLY COMPENSATED COUNTERBALANCE VALVE - A1/B1 PORT FLANGED

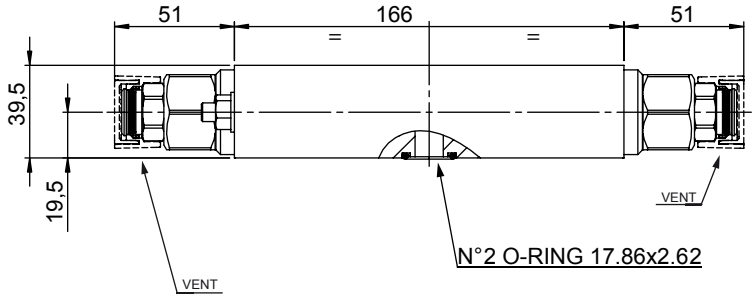
- Flow. . . . . **180 l/min**
- Max working pressure. . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **5 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**

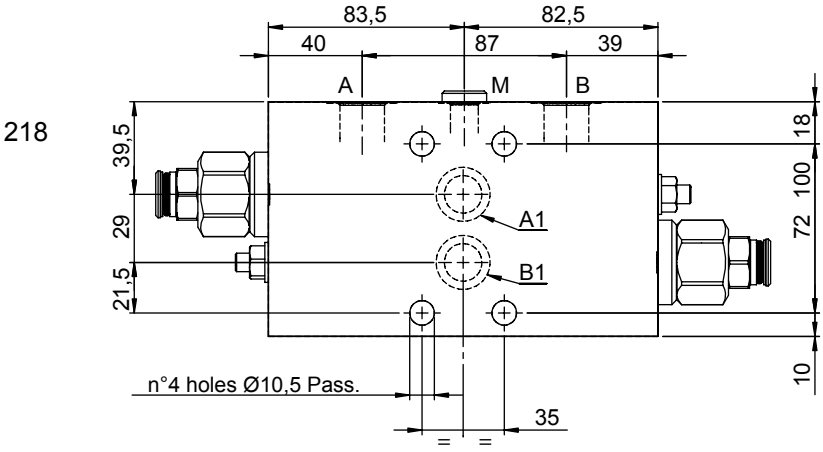
SCHEME 40 - 80



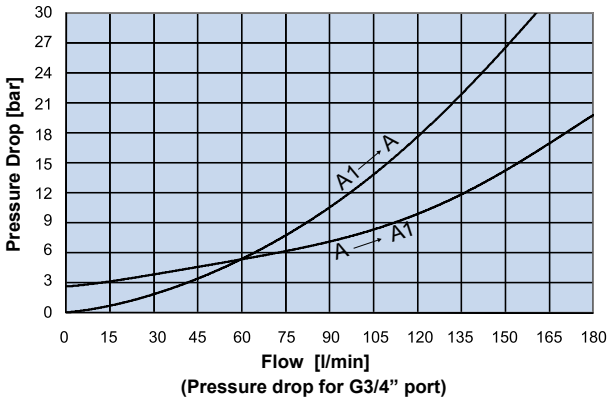
SCHEME 42 - 82







218



Note:
- Pressure setting must be 30% higher thah pressure induced by the load.

Ordering code

H 1 5 3 2 C ☐ ☐ S ☐ 0 0

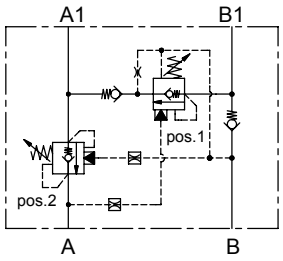
PILOT RATIO		
40	**4:1**	
42	**4:1**	ADJUSTABLE DUMP SCREW
80	**8:1**	
82	**8:1**	ADJUSTABLE DUMP SCREW

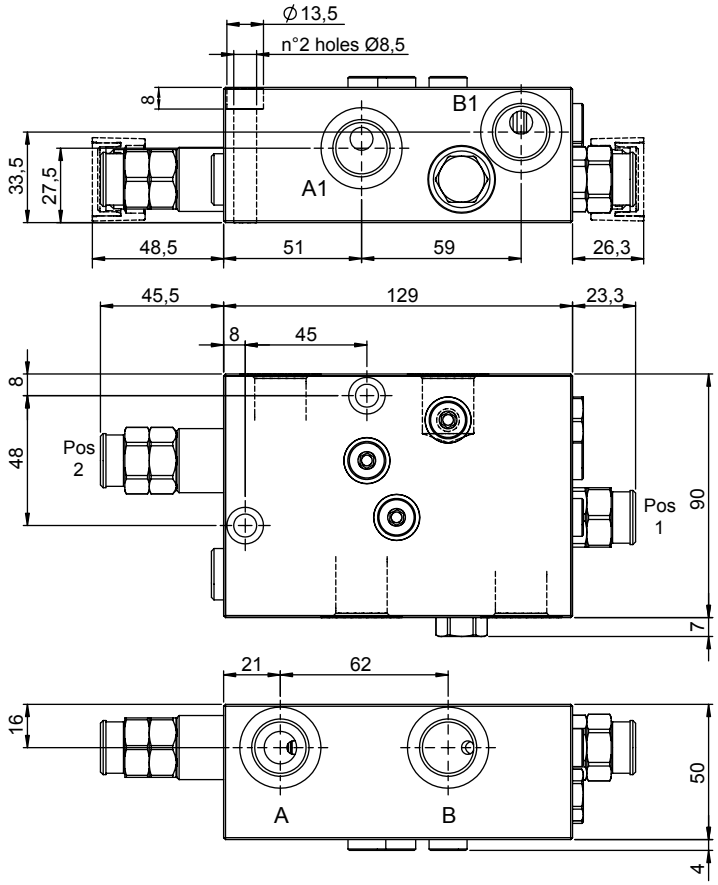
SPRINGS	rp 4:1		rp 8:1
	2	**4**	**4**
Setting range min.-max. [bar]	80 - 210	80 - 410	140 - 410
Pressure Increase [bar/turn]	40	72	72
Standard setting 4 l/min [bar]	200	350	350

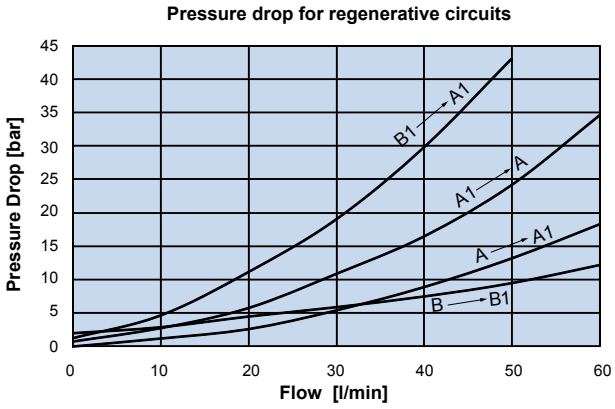
PORTS	04	05
A,B	G 1/2"	G 3/4"
M	G 1/4"	G 1/4"
A1,A2	Ø 12	Ø 12

DOUBLE ACTING COUNTERBALANCE VALVE FOR REGENERATIVE CIRCUITS

- Flow on Ports A/A1. . . . . **70 l/min**
- Flow on Ports B1/A1. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Weight. . . . . **4,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







219

Ordering code

H 3 0 8 0 N ☐ ☐ S ☐ 0 0

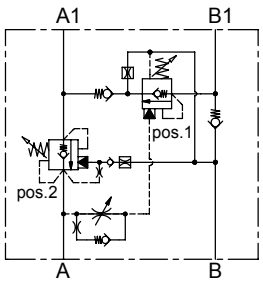
PILOT RATIO	
40	4:1 Pos 1
	4:1 Pos 2

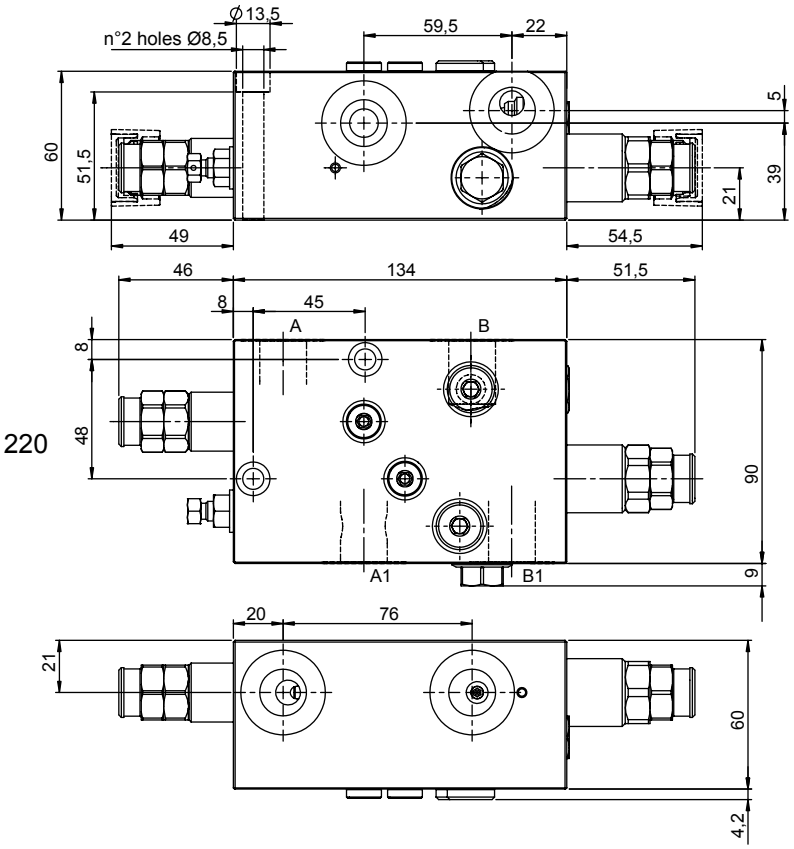
SPRINGS	3	
	pos.1	pos.2
Setting range min.-max. [bar]	150 - 430	120 - 350
Pressure Increase [bar/turn]	100	114
Standard setting 4 l/min [bar]	430	210

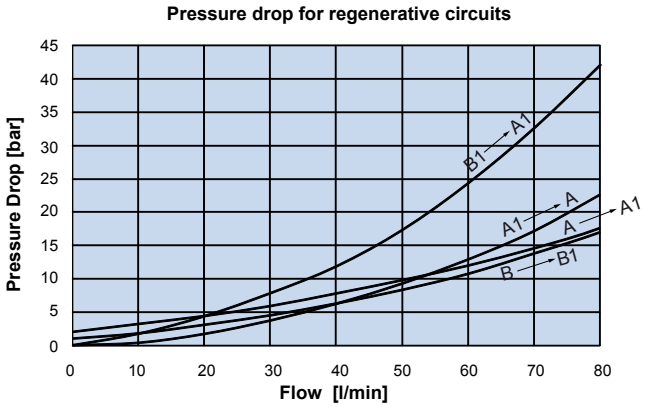
PORTS	04
A,B,A1,B1	G 1/2"

DOUBLE ACTING COUNTERBALANCE VALVE FOR REGENERATIVE CIRCUITS

- Flow on Ports A/A1. . . . . **70 l/min**
- Flow on Ports B1/A1. . . . . **70 l/min**
- Max working pressure. . . . . **350 bar**
- Weight. . . . . **5,3 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







Ordering code

H 1 0 8 0 N ☐ ☐ S ☐ 0 0

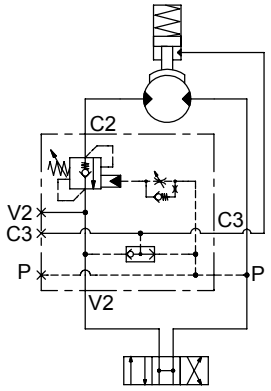
PILOT RATIO	
40	4:1 Pos 1
	2:1 Pos 2

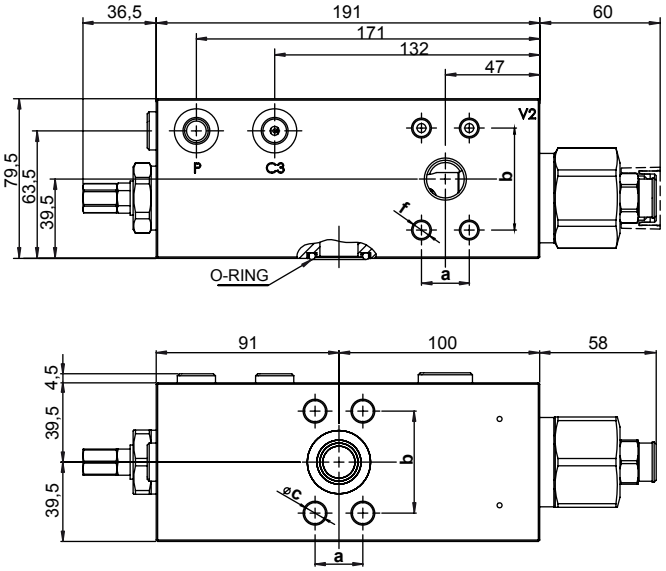
SPRINGS	4	
	Pos.1	Pos.2
Setting range min.-max. [bar]	120 - 410	60 - 210
Pressure Increase [bar/turn]	85	52
Standard setting 4 l/min [bar]	430	210

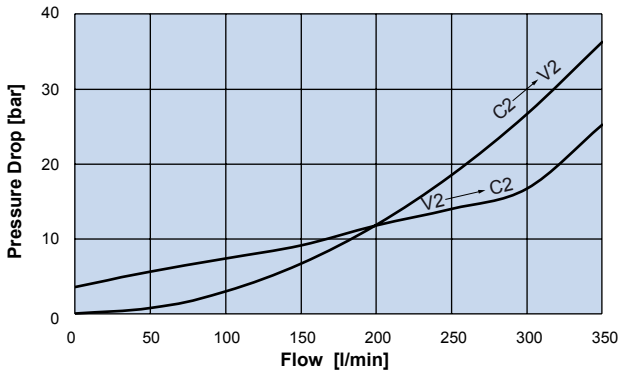
PORTS	04
A,B,A1,B1	G 1/2"

SINGLE ACTING COUNTERBALANCE VALVE - C2/V2 PORT FLANGED

- Max flow. . . . . .**350 l/min**
- Max pressure. . . . . **500 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **8,9 Kg**
- Tamper proof cap. . . . . **cod. 9021030190**







221

Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Backpressure may have a strong influence on overpressure function (LHD10X-C must be used on backpressure circuits).

	a	b	Øc	f	O-RING
65	23,8	50,8	Ø10,5	M10 prof.17	23,39x3,53 NBR 70°SH
66	27.8	57,2	Ø12,5	M12 prof.20	32,92x3,53 NBR 70°SH

Ordering code

H 2 5 0 2 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
21	**13:1**

SPRINGS	**5**
Setting range min.-max. [bar]	250 - 500
Pressure Increase [bar/turn]	64
Standard setting 4 l/min [bar]	500 0/+ 30 bar

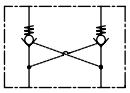
PORTS	**65**	**66**
C2 - V2	SAE 3/4 - 6000	SAE 1” - 6000
P - C3	G 1/4”	G 1/4”

PARTS IN BODY

PILOT OPERATED CHECK VALVES

222

INTRODUCTION



PILOT OPERATED CHECK VALVES

They are non modular valves, arranged for in line or flanged mounting. They allow the feeding and locking of hydraulic cylinders.
As the cartridge valves, they are made of 1 or 2 unidirectional check valves, in which pilot pressure opens the sealing poppet.
This type of valve shows an excellent sealing function, while “free flow” is subject to the closing spring load. Cracking pressure is determined by intial opening pressure.
The opening of the sealing poppet by pilot pressure is on/off (from closed to totally open). So that its use is not adviced at all for the applications on which modulation and/or control of gravitational load lowering velocity is required. This type of applications requires load holding valves **LHD** series.
Check valves most important parameter is pilot ratio **rp**.
Generally, given a generic load **P**, pilot pressure required for opening the valve is calculated dividing load by pilot ratio:

Ppil = Pp / rp

When check valves are used on hydraulic actuators (i.e. cylinders), due to areas ratio (ra) of the actuator itself, also the effects of inner pressure must be considered.

223

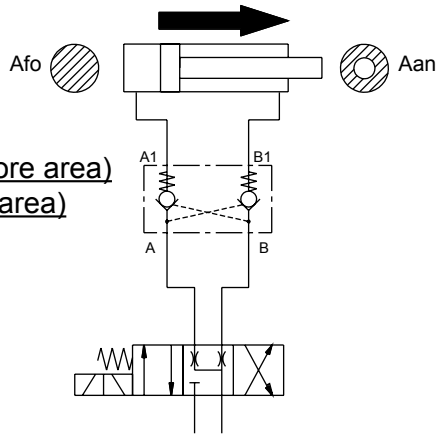
Ppil = Pp / (rp – ra)

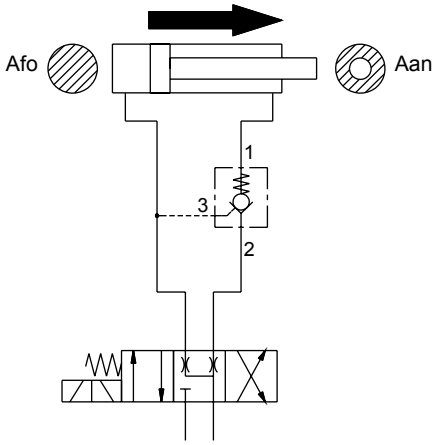
On the hydraulic cylinders, the areas ratio “ra” is calculated with reference to the type of movements:

Cylinders Out (Extension)
ra = Afo / Aan (>1)

Cylinders In
ra = Aan / Afo (<1)

- Afo (Full boore area)
- Aan (Anular area)





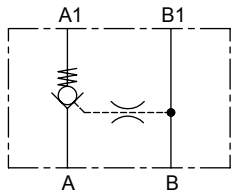
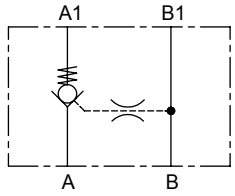
It’s very important to remember that, in case of double effect cylinders, pilot ratio must be always higher than areas ratio:

rp > ra

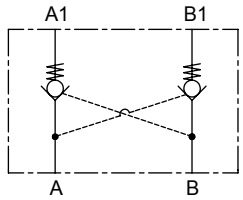
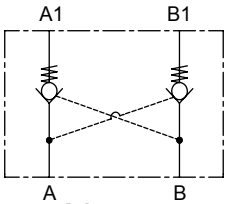
If this rule is not respected, then it is not possible to pilot the check valve during the cylinder extension.

PILOT OPERATED CHECK VALVES

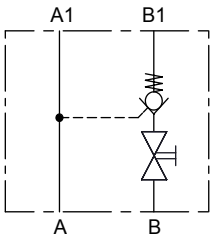
SINGLE ACTING MODELS

		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
 **In line**	D-BSE-L-SAE10	40	350	7 : 1	G 3/8”	9.01.001
 **A1 port flanged**	D-BSE-F-SAE10	40	350	7 : 1	G 3/8”	9.01.002

DOUBLE ACTING MODELS

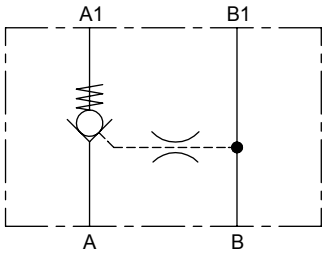
 **In line**	D-BDE-L-SAE10	40	350	7 : 1	G 3/8”- SAE6	9.01.003
	D-BDE-L-SAE10	50	350	5 : 1	G 1/2”	9.01.004
	D-BDE-L-V	30	310	4,6 : 1	G 3/8”	9.01.005
 **A1 port flanged**	D-BDE-F-SAE10	40	350	7 : 1	G 3/8”- SAE6	9.01.006
	D-BDE-F-SAE10	50	350	5 : 1	G 1/2”	9.01.007

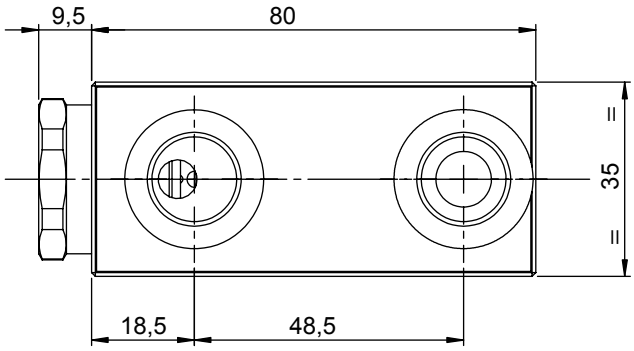
SINGLE ACTING MODELS WITH 2 POSITIONS MANUAL SHUT OFF

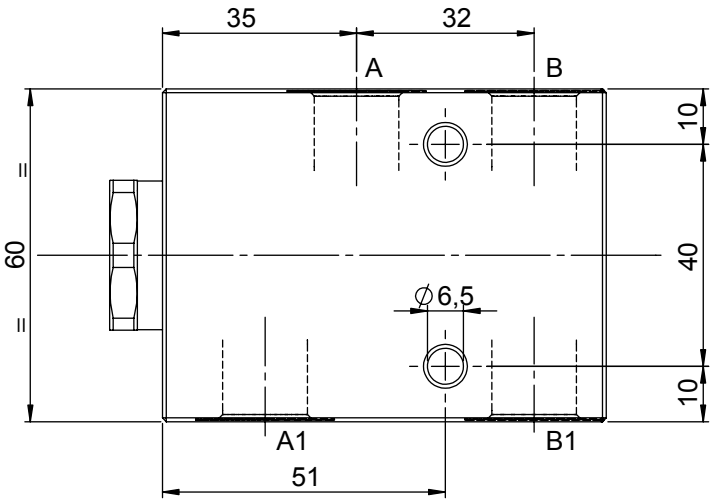
	D-BSE-RDX-V6 Right	30	350	4,7 : 1	G 3/8”	9.01.008
	D-BSE-RSX-V6 Left	30	350	4,7 : 1	G 3/8”	9.01.009

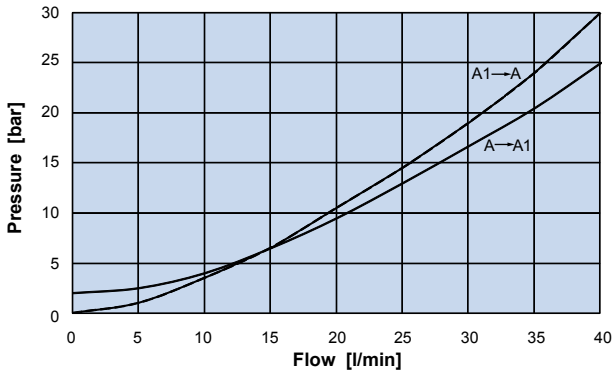
SINGLE ACTING PILOT OPERATED CHECK VALVE

- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Working pressure . . . . . **210 bar**
- Weight. . . . . **0,5 Kg**









225

Ordering code

D 0 1 1 0 ☐ ☐ 0 A ☐ 0 0

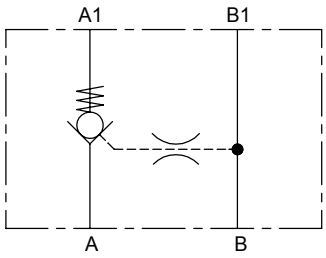
PILOT RATIO	
7	**7:1**

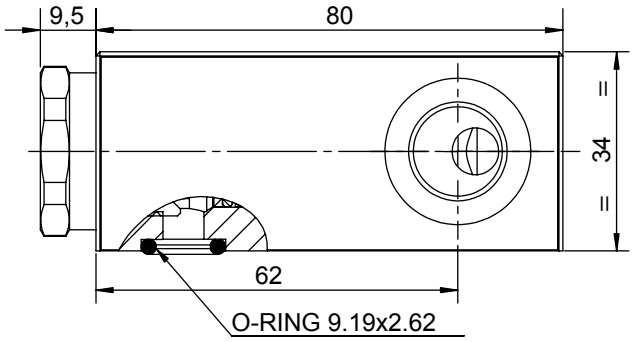
SPRING	**02**
Setting	2.0 bar
Seals	no seal

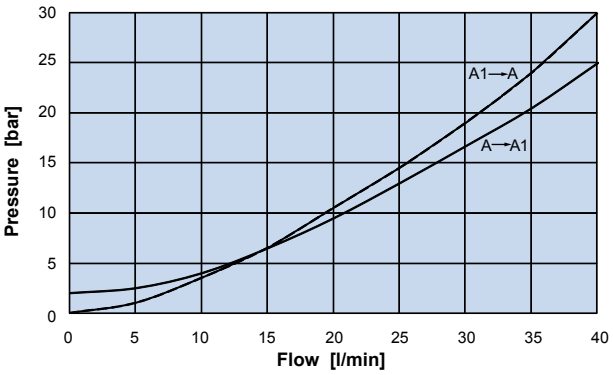
PORTS	**03**
A,A1,B,B1	G 3/8”

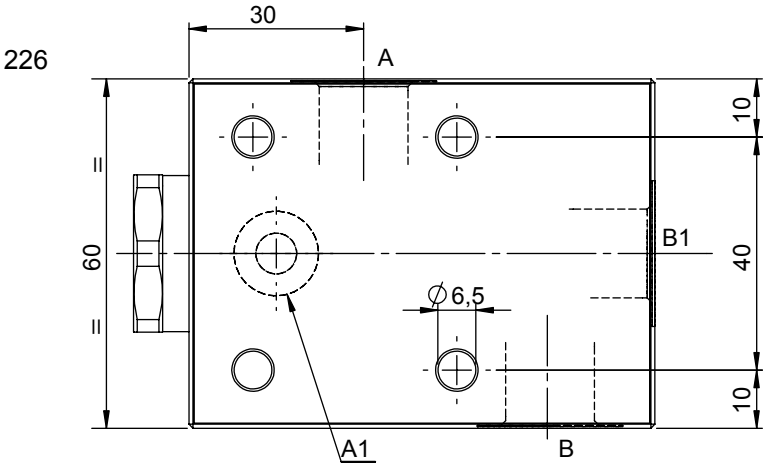
SINGLE ACTING PILOT OPERATED CHECK VALVE - A1 PORT FLANGED

- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Working pressure . . . . . **210 bar**
- Weight. . . . . **0,5 Kg**









Ordering code

D 0 2 1 0 ☐ ☐ 0 A ☐ 0 0

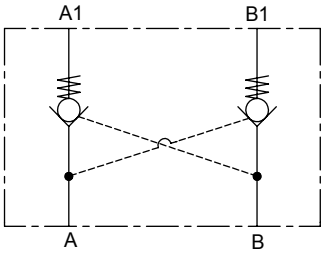
PILOT RATIO	
7	**7:1**

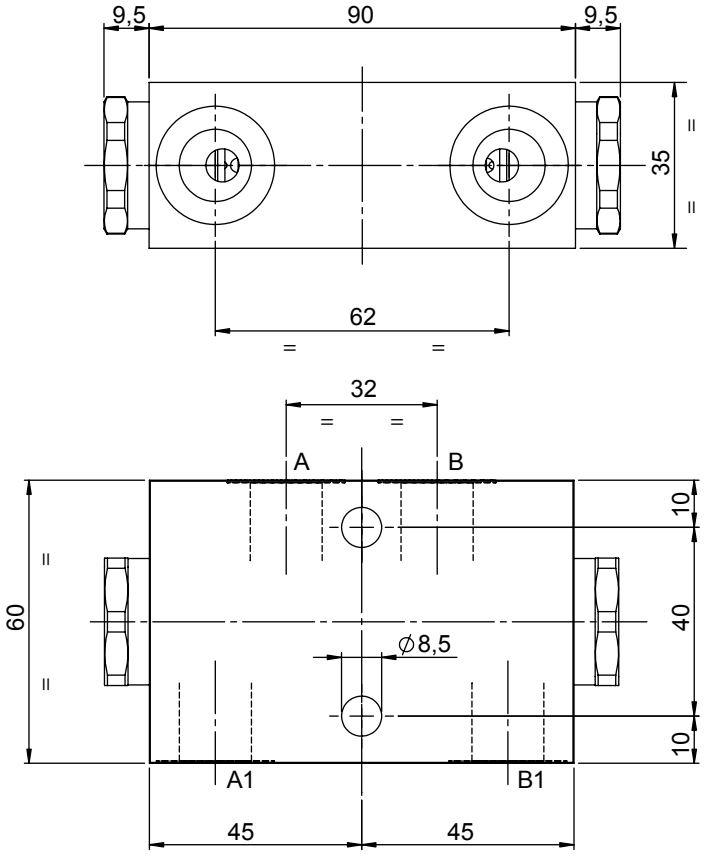
SPRING	**02**
Setting	2.0 bar
Seals	no seal

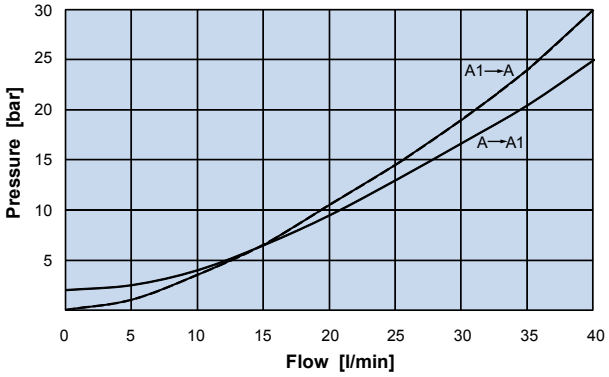
PORTS	**03**
A,B,B1	G 3/8”
A1	Ø 7

DOUBLE ACTING PILOT OPERATED CHECK VALVE

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Working pressure . . . . . **210 bar (Aluminium Body)**
- Working pressure. . . . . .**350 bar (Steel Body)**
- Weight in steal. . . . . **0,9 Kg**
- Weight in aluminium . . . . . .**0,64 Kg**







227

Ordering code

D 0 4 1 0 ☐ ☐ 0 ☐ ☐ 0 0

PILOT RATIO	
7	**7:1**

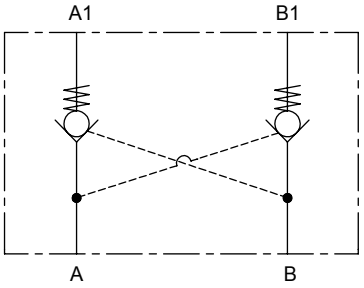
SPRING	**02**
Setting	2.0 bar
Seals	no seal

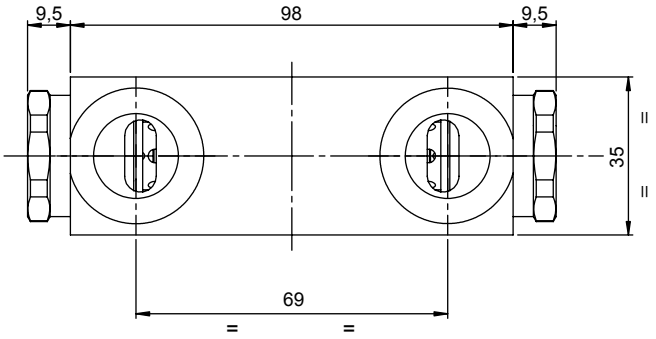
MATERIALS	
A	Alluminium
S	Steel

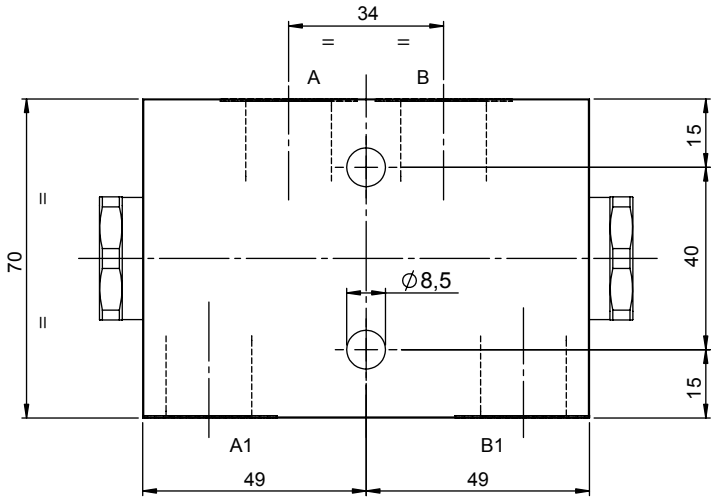
PORTS	**03**	**52**
A,A1,B,B1	G 3/8”	SAE 6
a	32	31
b	62	63

DOUBLE ACTING PILOT OPERATED CHECK VALVE

- Flow. . . . . .**50 l/min**
- Max working pressure. . . . . **350 bar**
- Working pressure . . . . . **210 bar (Aluminium Body)**
- Working pressure. . . . . .**350 bar (Steel Body)**
- Weight in steal. . . . . **0,9 Kg**
- Weight in aluminium . . . . . .**0,64 Kg**







228

Ordering code

D 0 4 1 0 ☐ ☐ 0 ☐ ☐ 0 0

PILOT RATIO	
5	**5:1**

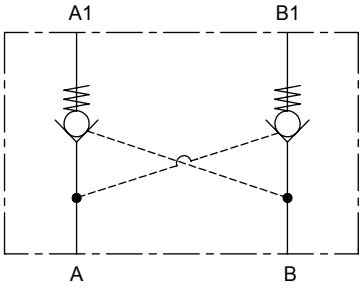
SPRING	02
Setting	1,5 bar
Seals	no seal

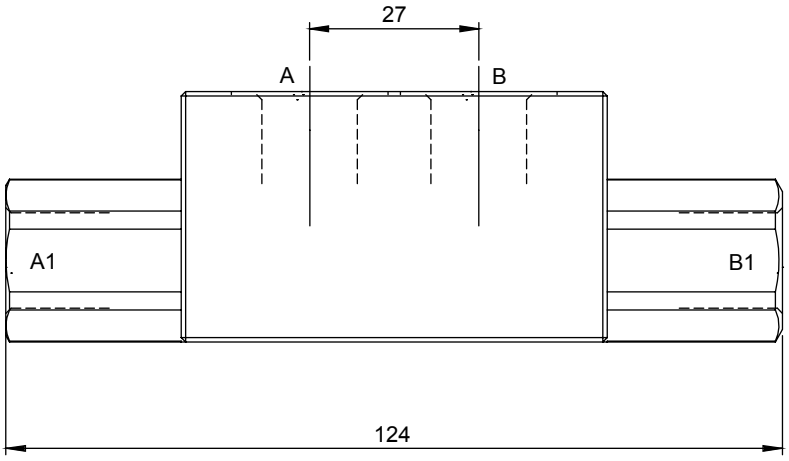
MATERIALS	
A	Alluminium
S	Steel

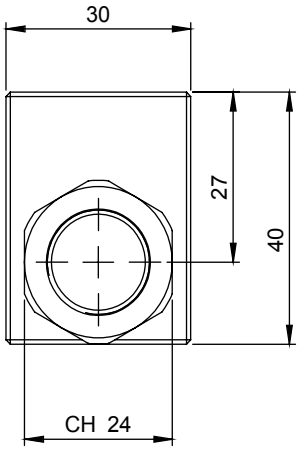
PORTS	04
A,A1,B,B1	G 1/2”
a	34
b	69

DOUBLE ACTING PILOT OPERATED CHECK VALVE

- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **310 bar**
- Weight. . . . . **0,65 Kg**







229

Ordering code

D 0 4 5 0 ☐ ☐ 0 S ☐ 0 0

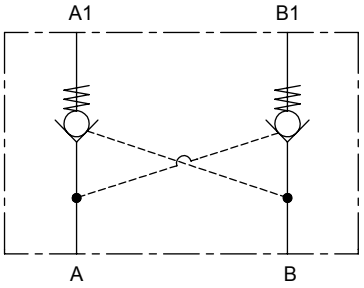
PILOT RATIO	
4	**4,6:1**

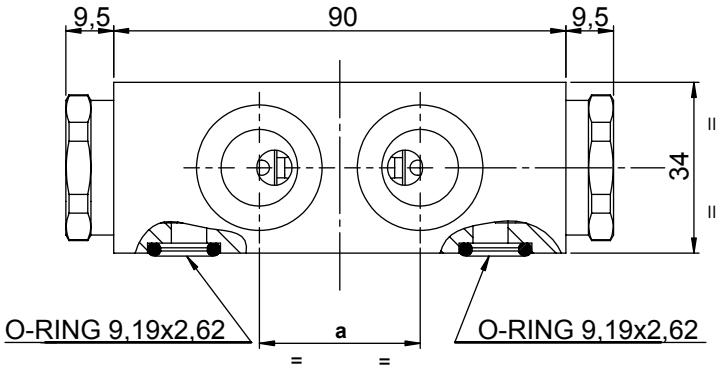
SPRING	01
Setting	0.5 bar
Seals	no seal

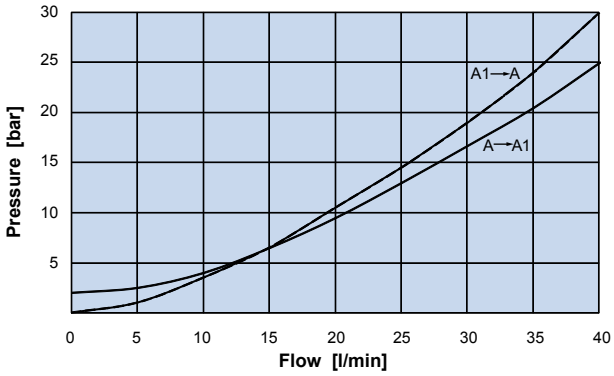
PORTS	03
A,A1,B,B1	G 3/8”

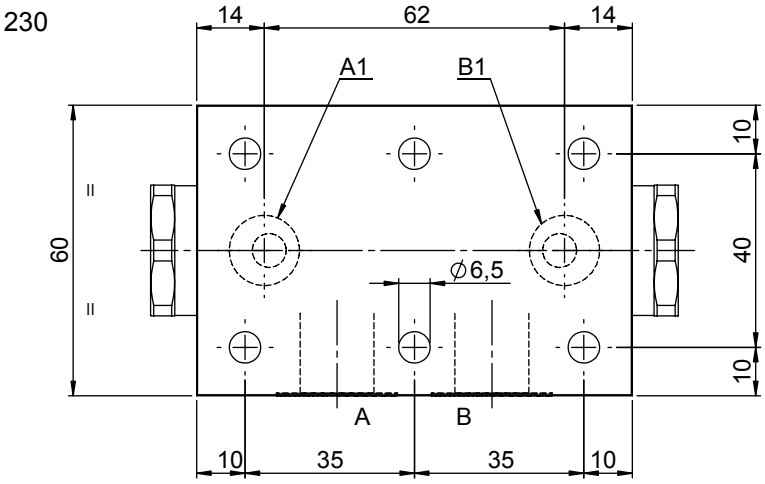
DOUBLE ACTING PILOT OPERATED CHECK VALVE - A1/B1 PORT FLANGED

- Flow. . . . . .**40 l/min**
- Max working pressure. . . . . **350 bar**
- Working pressure . . . . . **210 bar (Aluminium Body)**
- Working pressure. . . . . .**350 bar (Steel Body)**
- Weight in steal. . . . . **0,9 Kg**
- Weight in aluminium . . . . . .**0,64 Kg**









Ordering code

D 0 5 1 0 ☐ ☐ 0 ☐ ☐ 0 0

PILOT RATIO	
7	**7:1**

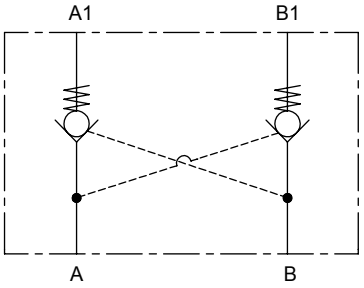
SPRING	02
Setting	2.0 bar
Seals	no seal

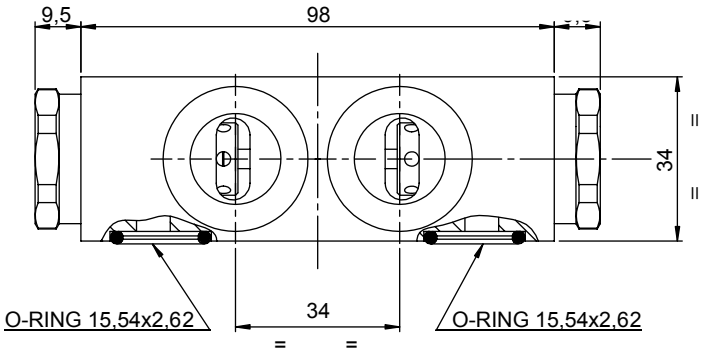
MATERIALS	
A	Alluminium
S	Steel

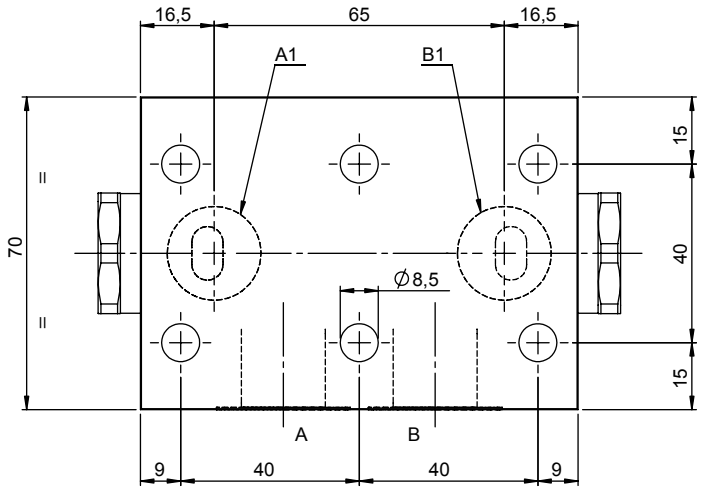
PORTS	03	02
A,B	G 3/8"	SAE 6
A1,B1	Ø 7	Ø 7
a	32	31

DOUBLE ACTING PILOT OPERATED CHECK VALVE - A1/B1 PORT FLANGED

- Flow. . . . . .**50 l/min**
- Max working pressure. . . . . **350 bar**
- Working pressure . . . . . **210 bar (Aluminium Body)**
- Working pressure. . . . . .**350 bar (Steel Body)**
- Weight in steal. . . . . **0,9 Kg**
- Weight in aluminium . . . . . .**0,64 Kg**







231

Ordering code

D 0 5 1 0 ☐ ☐ 0 ☐ ☐ 0 0

PILOT RATIO	
3	**5:1**

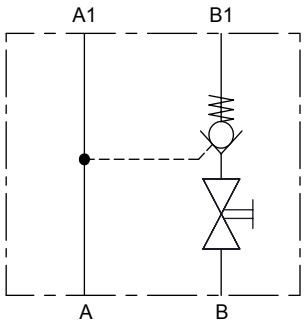
SPRING	**02**
Setting	1.5 bar
Seals	no seal

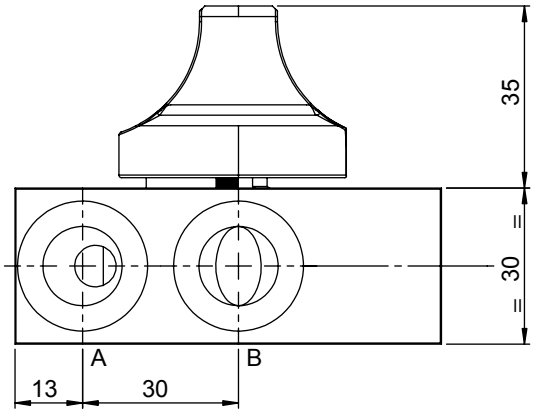
MATERIALS	
A	Alluminium
S	Steel

PORTS	**04**
A,B	G 1/2”
A1,B1	Ø 8

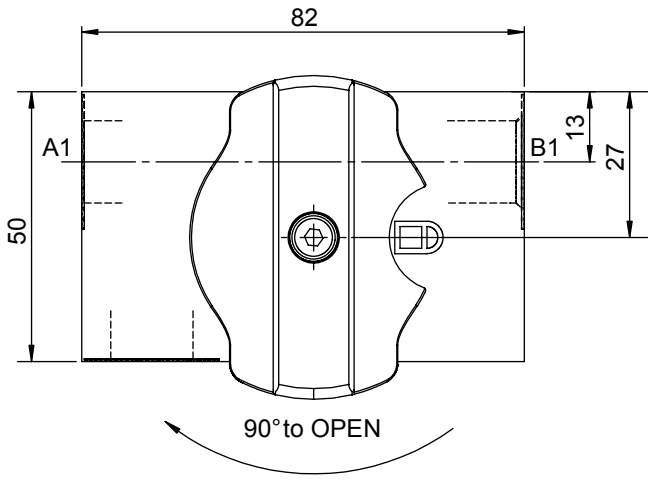
SINGLE ACTING PILOT OPERATED CHECK VALVE WITH 2 POSITIONS MANUAL SHUT OF - RIGHT

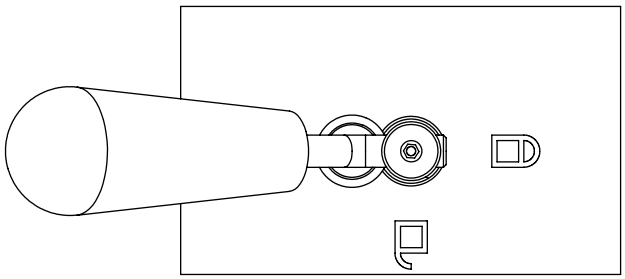
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Working pressure . . . . . **210 bar**
- Weight. . . . . **0,5 Kg**
- Lever. . . . . **Lever/Handknob**





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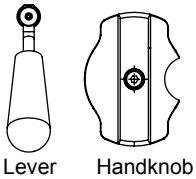
Ordering code

D 0 8 5 1 ☐ ☐ ☐ A ☐ 0 0

PILOT RATIO	
4	**4,7:1**

SPRING	03
Setting	2.7 bar
Seals	with seal

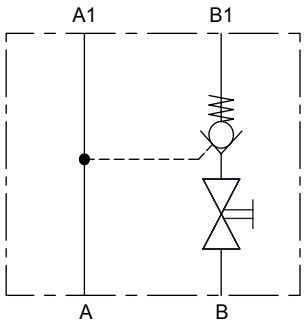
LEVER	
L	**M**

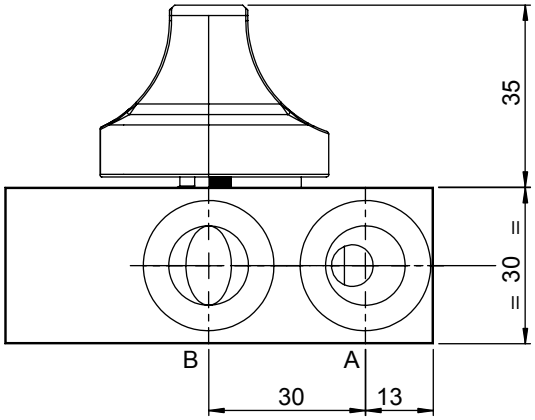


PORTS	03
A,A1,B,B1	G 3/8”

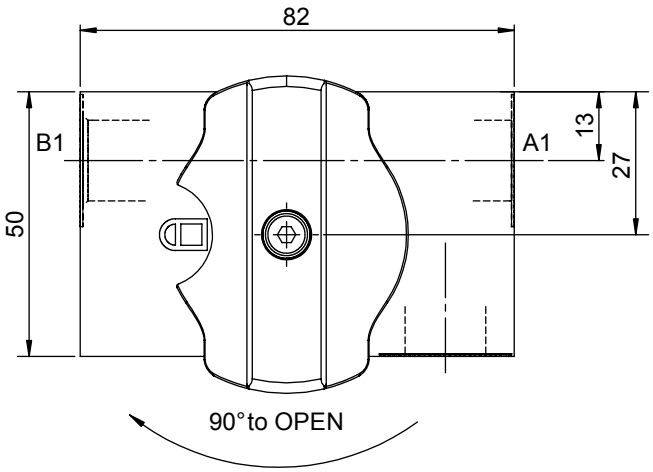
SINGLE ACTING PILOT OPERATED CHECK VALVE WITH 2 POSITIONS MANUAL SHUT OF - LEFT

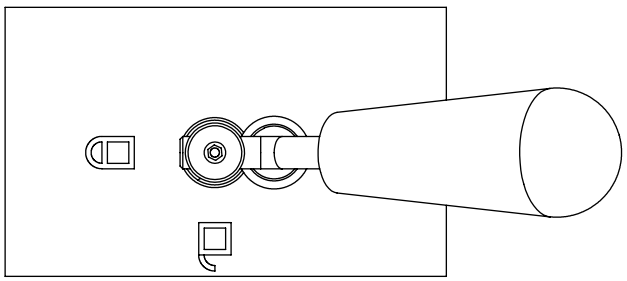
- Flow . . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Working pressure . . . . . **210 bar**
- Weight. . . . . **0,5 Kg**
- Lever . . . . . **Lever/Handknob**





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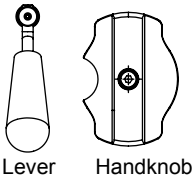
Ordering code

D 0 7 5 1 ☐ ☐ ☐ A ☐ 0 0

PILOT RATIO	
4	**4,7:1**

SPRING	03
Setting	2.7 bar
Seals	with seal

LEVER	
L	**M**



PORTS	03
A,A1,B,B1	G 3/8”

PARTS IN BODY

BOOM LOWERING CONTROL DEVICES

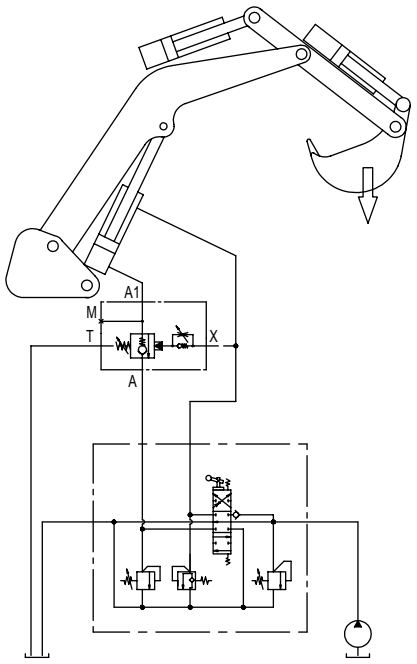
234

INTRODUCTION

According the European Standard for Earth moving machinery - Safety requirements (EN 474), when an excavator or a backhoe loader is used to handle loads with a mass bigger than 1000 Kg, or with a momentum force above 40.000 Nm, the carrying cylinders have to be equipped with control devices able to prevent the effects of a possible hose failure.
When excavators and backhoes are used to lift heavy weights, in fact, any carrying circuit malfunction or breakdown could be a threat for the operator and generally other people around the machine. This risk can be reduced by installing in the hydraulic circuit boom lowering control devices, these are able to prevent an uncontrolled descent of the load in case of hose failure on carrying circuits.

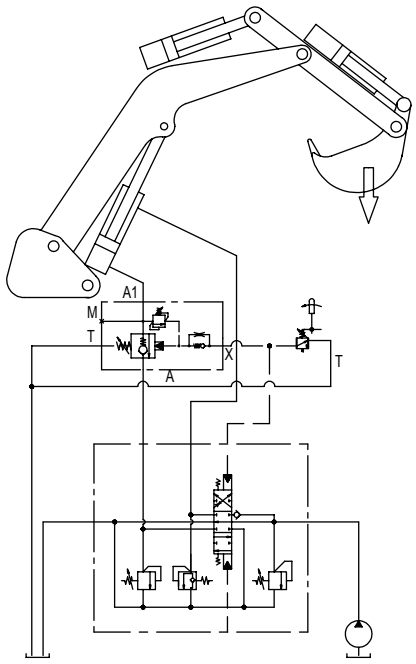
COUNTERBALANCE VALVES
INSTALLATION ***(MANUAL OPERATED D.C.V.)***

(LHD..X)



BOOM LOWERING VALVES
INSTALLATION ***(JOYSTICK OPERATED D.C.V.)***

(LHD..Y)

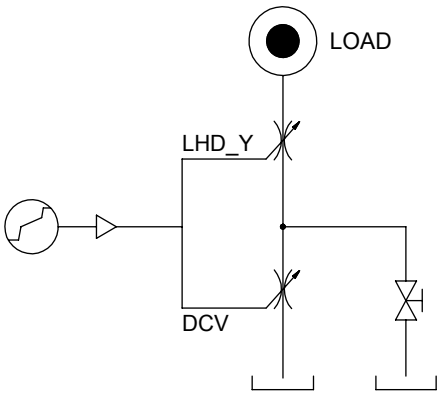


For this kind of application, the suitable valves must be able to withstand the requirements indicated by the international standard **ISO 8643** (Earth-Moving Machinery - Hydraulic Excavator and Backhoe Loader Boom-Lowering Control Device - Requirements and Tests), which states the testing procedures and the evaluation criteria for both excavators and backhoes mounting boom lowering valves.

ISO8643

The international standard ISO 8643 describes a series of tests, consisting in simulating the failure of the flexible hoses during the control of a test load.
The failure simulating device consists in a 2 way- 2 position valve, installed in parallel to any connecting line whose failure could cause the boom to lower. In this way it will be possible to reproduce the consequences of a suddenly failure on flexible hoses.

BOOM LOWERING CONTROL DEVICES



The main tests described by ISO 8643 standard are 3:

Holding position Test: The test is aimed to verify the static load holding capacity of load lowering control valves. It consists of simulating the hose failure after rising approximately the test load 1 m above the ground level, and having set the directional control valve in its neutral position.
The Standard requirement fix a maximum total drop of the load, that shall not exceed the **100 mm** in the first 10 seconds following the opening of the 2 way- 2 position valve installed in the flexible hose.
Thanks to his “poppet style” design, **LHD** valves are able to maintain the actuator still in its position.

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Lifting Movement Test: in this test the hose failure simulation shall be operated while rising the test load smoothly and continuously to a maximum speed of 200 mm/s. Even in this case the Standard requirement fix a maximum total drop of the load, that shall not exceed the **100 mm** in the first 10 seconds following the opening of the 2 way- 2 position valve installed in the flexible hose.
As well as in the previous case, thanks to its “poppet style” design, **LHD** valves do not consider any possible lowering of the load.

Lowering movements test: in this case the hose failure simulation shall be operated while lowering the test load smoothly and continuously to a maximum speed of 200 mm/s.
The increase in the lowering speed following the opening of the failure simulation device shall be less than 100% of the initial speed (eg. V1=200mm/s , V2max=400 mm/s).
After having set the directional control valve in its neutral position, the maximum total drop of the load shall not exceed the **100 mm** in the first 10 seconds of test.

Lowering movement test with counterbalance valves

Thanks to the connection that characterizes the installation of the **LHD..X** counterbalance valves, the load lowering velocity depends exclusively on the flow rate of the directional control valves (meter-in), consequently it will result independent from the back-pressure generated from the control of the flow in its return line. In these conditions, an hose failure does not generate any effect on the load lowering speed.

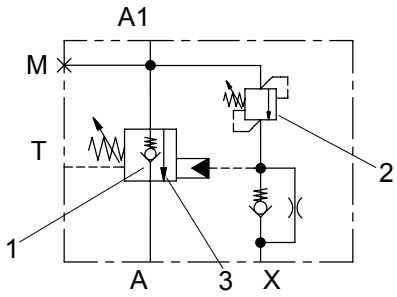
Lowering movement test with boom lowering control valves

In the case of the boom lowering control valves **LHD..Y**, due to the pilot signal coming from an external source (remote control), the opening of the valve and of the directional control valve must be synchronized. In these conditions, controlling the lowering speed, the ISO8643 Standard specification tends to verify the distribution of the pressure drops. The Standard requirement is satisfied if in the first phase of the lowering speed control the load is withstand mainly by the **LHD..Y** valve.
The above considerations put in evidence the strong relationship between the boom lowering valve design and the main control valve spool metering characteristics. A correct matching of the two opening

characteristics will allow to satisfy the ISO 8643 safety requirements and enhance the performances in terms of stability, speed and pump pressurisation.

BOOM LOWERING CONTROL VALVES LHD_Y

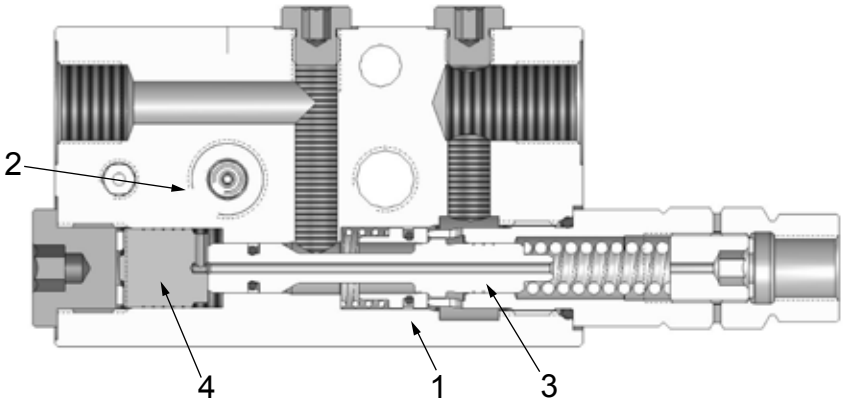
The hydraulic symbol of **LHD_Y** valves is similar to a micro integrated circuit which includes different components characterizing their structure.



1. Uni-directional check valve guarantees a free feeding to the hydraulic actuator, and the load's block in the desired position.
2. Pressure relief valve, thanks to its specific configuration, can hold external loads, and can limit the actuator's maximum pressure, allowing a control of the pressure bursts, where demanded.
3. The conical poppet guarantees a precise control of the flow during lowering movements, satisfying the ISO8643 requirements and reducing its impact on the machine's capacities during standard excavating movements.
4. The pilot piston, that allows to open the conical poppet using the pilot pressure coming from the joysticks.

The LHD_Y valves are designed by inserting a main subgroup composed of single different elements inside a steel manifold, plus other components.

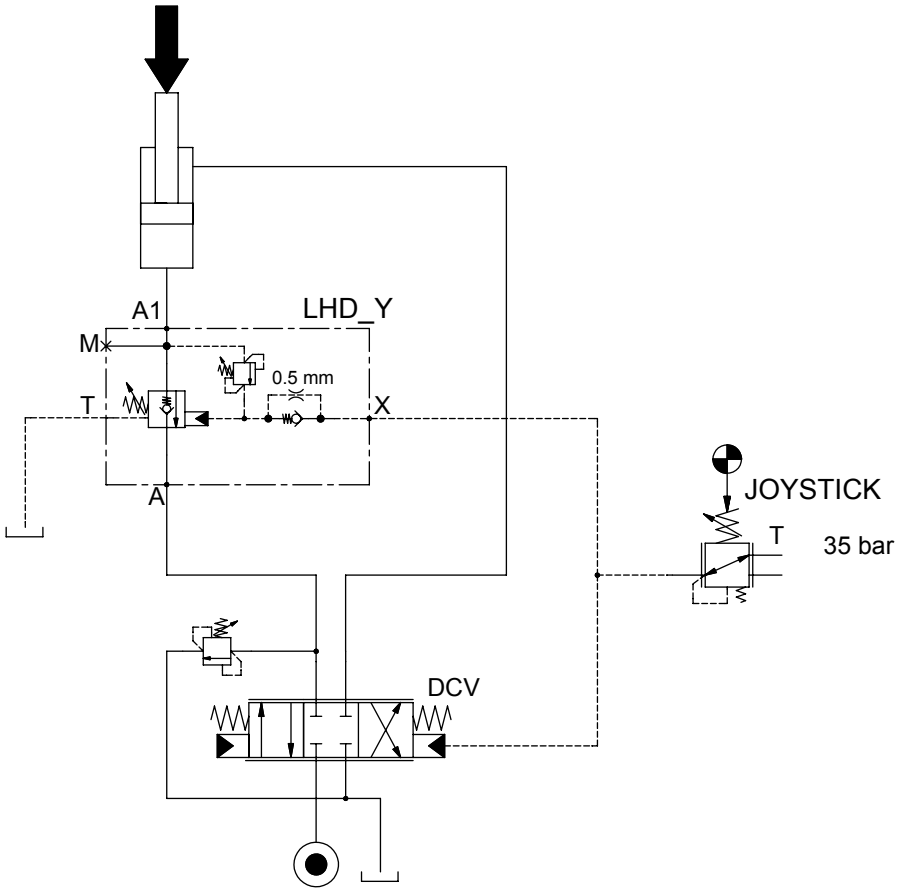
Fig.



BOOM LOWERING CONTROL DEVICES

INSTALLATION

LHD_Y boom lowering valves are installed directly on the cylinders which they must control through a SAE flange or rigid jointed pipes.
Having to work together with Closed-Centre directional control valves, **LHD_Y** boom lowering valves are designed to be insensitive to the back-pressure, both during load lowering movements control and draining pressure peaks generated by bumps, or by sudden interruptions of the lowering movements.



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The above hydraulic scheme shows an example of typical application involving **LHD_Y**.

Ports on standard applications:

- Port **A1** to the cylinder
- Port **A** to the flexible hose which connects the cylinder to the directional control valve
- Port **X** to the joystick pilot line of the which controls the lowering movement (connection in parallel)
- Port **T** direct to the tank or to a draining collecting line, like servocontrol line T. Eventual back-pressures on line T would add to setting pressure with factor 1:1.

BOOM LOWERING CONTROL DEVICES

WORKING PRINCIPLE

The above LHD_Y hydraulic schematic shows how the operator is able to move a load, avoiding some risks which are characteristic of these types of movements. Thanks to their design, NEM boom lowering control valves grant to earth moving machinery the following advantages:

The **lifting** of a load or it's joint is made through an unidirectional valve (1), which allows the oil flow – regulated by the directional control valve – to enter in the cylinder with less resistance as possible.

Load Holding must be guaranteed, when the directional valve spool is in the neutral position. Thanks to spring (6), the unidirectional valve touches the sealing poppet, hermetically closing the connection between the hydraulic actuator and the directional control valve.
Thanks to fine-grinding of the sealing areas between the check valve and the conical poppet, the valve is perfectly closed, avoiding internal leakage in the directional control valve.

Load lowering takes place by opening the conical poppet, and thus using the pressure usually used to pilot the directional control valve's spool. The pilot pressure acting on the pilot piston area (4) generates sufficient pressure to win the force of the adjustable spring (5). Adjusting pilot pressure intensity, the conical poppet between the pilot piston and the adjustable spring will move, thus opening an area section proportional to the intensity of the pilot pressure itself. Pilot pressure modulation through the hydraulic joysticks allows the operator to adjust boom lowering speed.

Boom lowering speed through the **LHD_Y** valves allow to reach a compromise between two requirements which are apparently in conflict:

1. To full fill the requirements of the international standard ISO8643, which establishes how machines must work in case of hose failure, when the booms are used for handling loads at reduced speed (V< 200 mm/s).
2. To minimize the impact on the machine with regards to system's pressures, speeds and metering when machines are used for regular earth moving operations.

SETTINGS

The **LHD__Y** boom lowering control valve's settings are characterized by 2 different values:

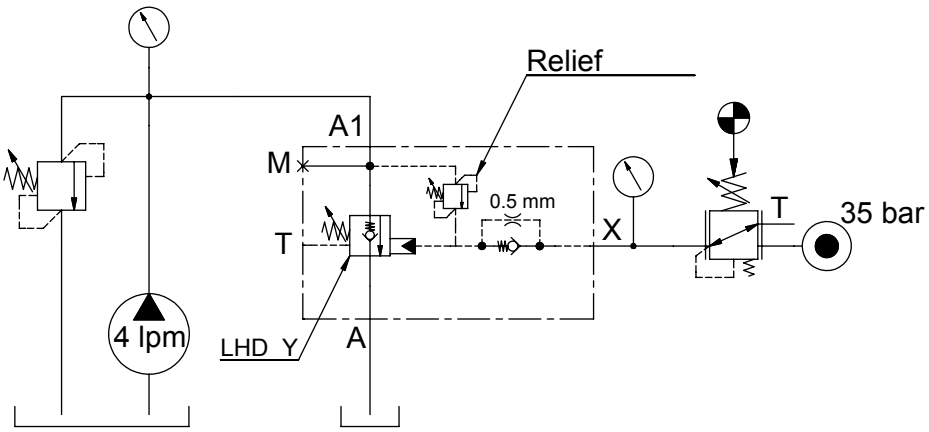
1. The main poppet setting, which will controls oil flow during boom lowering movements.
2. Relief function pressure setting, which will limit the cyilinder pressurisation due by external loads.

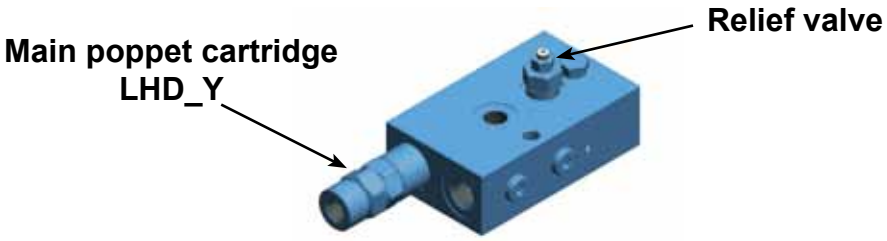
Main poppet setting corresponds to the pilot pressure (Px) at the initial opening, i.e. pressure on port X, which determines the detachment of conical poppet from its seating.
The setting is verified by putting on port A1, 100 Bar of steady pressure. The pilot pressure is increased progressively up to obtaining 20cc/min leakage through port A.

Relief pressure setting determines the maximum limit of pressure inside the cylinder, with external forces. This value is regulated working on the relief valve installed above the pilot chamber.

Standard setting is obtained regulating the pressure on port A1, with 5 l/min flow.

BOOM LOWERING CONTROL DEVICES





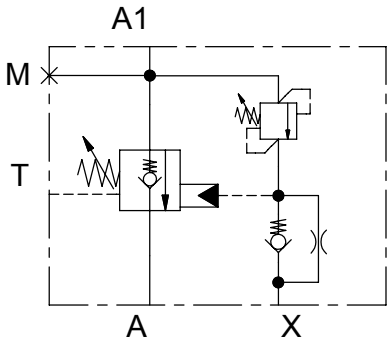
240

Usually the setting of the main relief valve function must consider the re-closing value. Generally the setting value must be at least 1.3 times the pressure given by the heaviest load:

$$Pt = 1,3 \times P\ max$$

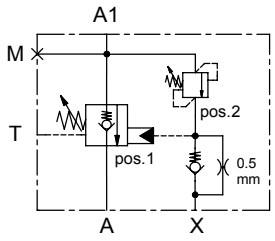
COMPENSATION

LHD_Y boom lowering control valves belong to compensated type valves, that means they are insensitive to backpressure on port A.
This characteristic is a precondition relating boom lowering control valves, because they are usually coupled with centre-close directional spools.
Conpensation takes place thanks to an independent **LHD_Y** spring-housing chamber drained directly to tank through port (Y).
An eventual back-pressure on port Y determines 1:1 ratio pilot pressure increasing.

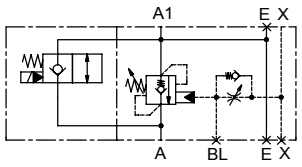
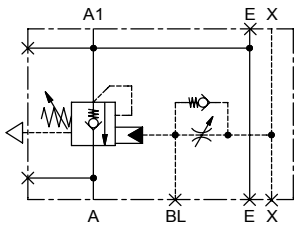


BOOM LOWERING CONTROL DEVICES

BOOM LOWERING VALVES FOR EXCAVATORS

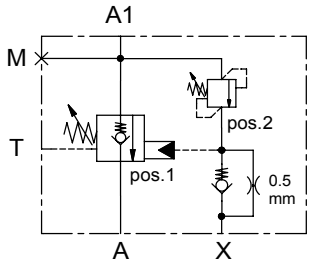
IN LINE		Q l/min	P bar	PILOT RATIO	PORTS	PAGE
	Y0502Y SX	40	350	1 : 0	G 3/8" SAE 8	10.01.001
	Y0501Y DX	40	350	1 : 0	G 3/8" SAE 8	10.01.002
	Y1002Y SX	75	410	1 : 0	G 1/2" SAE 10	10.01.003
	Y1001Y DX	75	410	1 : 0	G 1/2" SAE 10	10.01.004
	Y1502Y SX	150	410	1 : 0	G 3/4" SAE 12	10.01.005
	Y1501Y DX	150	410	1 : 0	G 3/4" SAE 12	10.01.006
FLANGED						
	Y1013Y	75	410	1 : 0	G 1/2" SAE 10	in development
	Y1513Y	150	410	1 : 0	G 3/4" SAE 12	in development

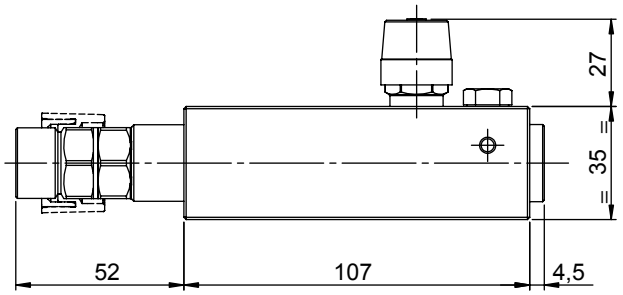
BOOM LOWERING VALVES FOR LOADERS

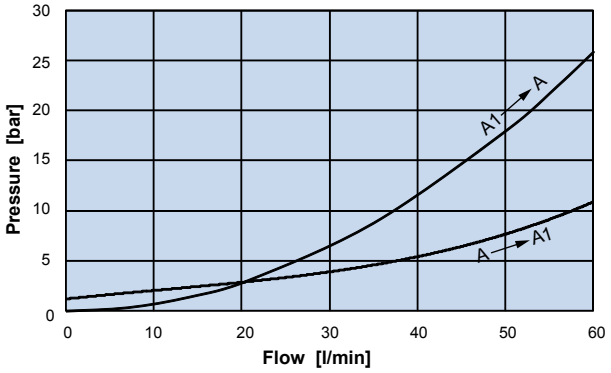
	H1001N504	110	410	4 : 1	G 1/2" SAE 10	10.01.007
	H1001C424	110	410	4 : 1	G 1/2" SAE 10	10.01.008

BOOM LOWERING VALVE

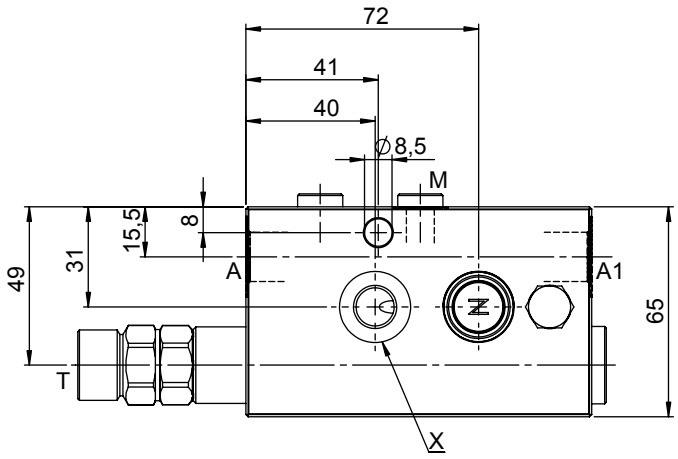
- Flow . . . . . **40 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. **cod.9021030191**







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Ordering code

Y 5 0 0 2 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

PORTS	03	53
A,A1	G 3/8”	SAE8
X,T	G 1/4”	SAE6

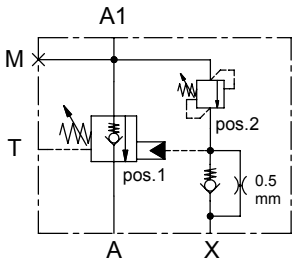
SPRING pos.1			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @20 cc/min [bar]
2	5 - 14	4,7	7,5

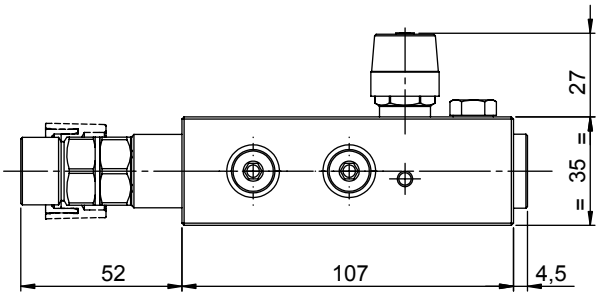
SPRING pos.2			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @4 l/min [bar]
3	200 - 400	250	350

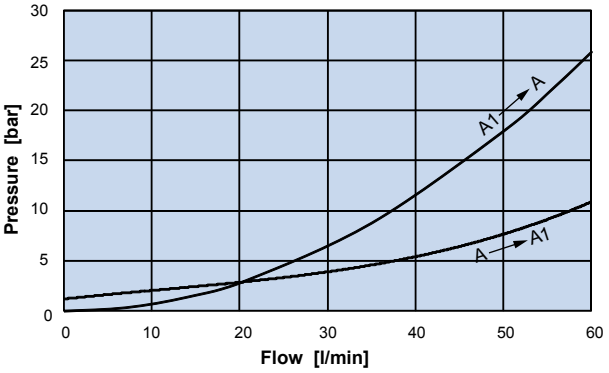
LHD05Y-DX-VMD02
Steel Body

BOOM LOWERING VALVE

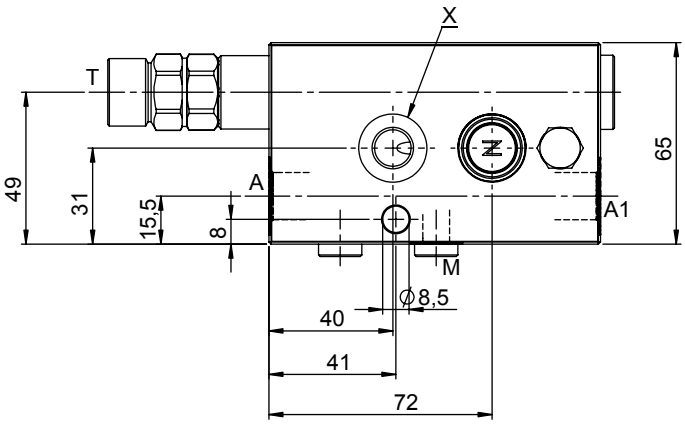
- Flow . . . . . **40 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **1,9 Kg**
- Tamper proof cap. **cod.9021030191**







243



Ordering code

Y 5 0 0 1 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

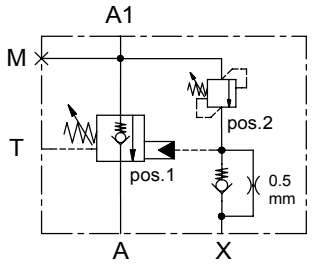
PORTS	03	53
A,A1	G 3/8”	SAE8
X,T	G 1/4”	SAE6

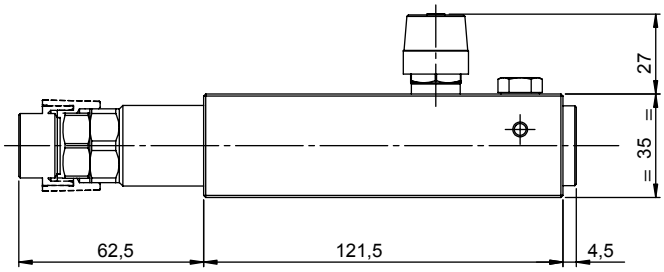
SPRING pos.1			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @20 cc/min [bar]
2	5 - 14	4,7	7,5

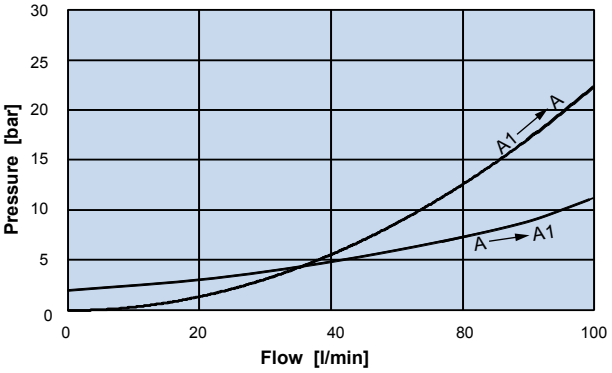
SPRING pos.2			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @4 l/min [bar]
3	200 - 400	250	350

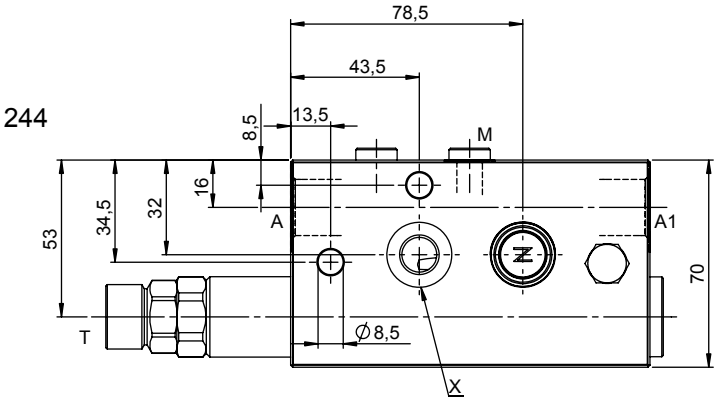
BOOM LOWERING VALVE

- Flow . . . . . **75 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **2,3 Kg**
- Tamper proof cap. **cod.9021030191**









Ordering code

Y 1 0 0 2 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

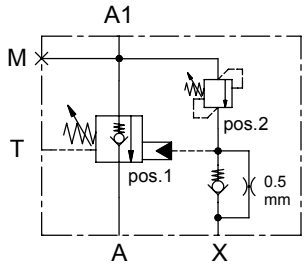
PORTS	04	54
A,A1	G 1/2”	SAE10
X,T	G 1/4”	SAE6

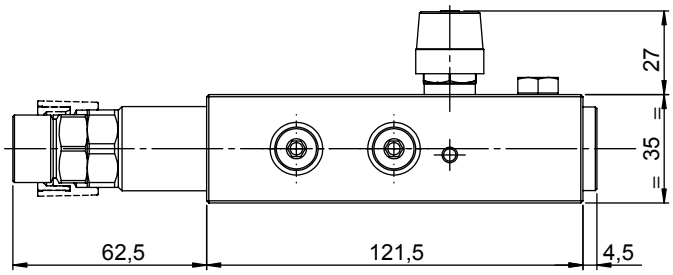
SPRING pos.1			
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2	5 - 14	2,5	7,5

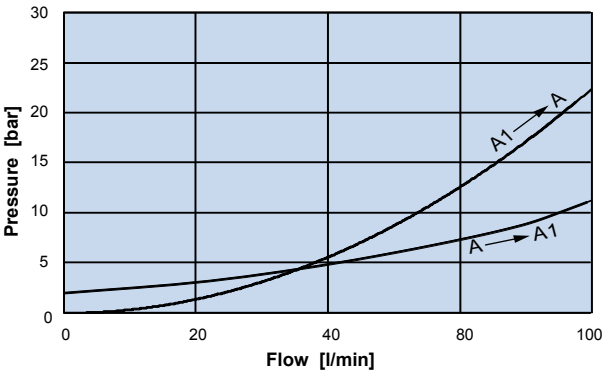
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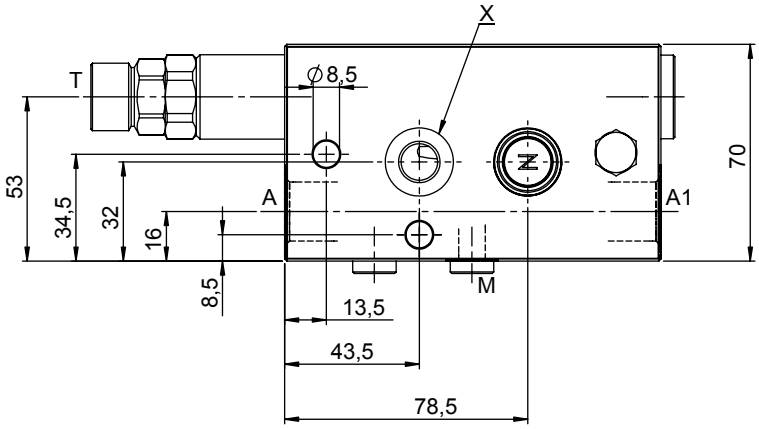
BOOM LOWERING VALVE

- Flow . . . . . **75 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **2,3 Kg**
- Tamper proof cap. **cod.9021030191**









245

Ordering code

Y 1 0 0 1 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

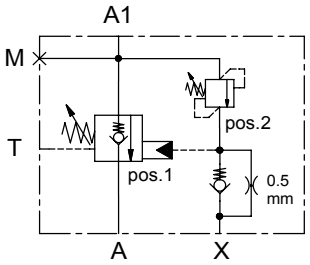
PORTS	04	54
A,A1	G 1/2”	SAE10
X,T	G 1/4”	SAE6

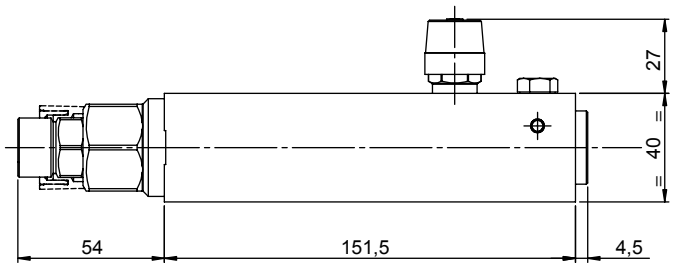
SPRING pos.1			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @20 cc/min [bar]
2	5 - 14	2,5	7,5

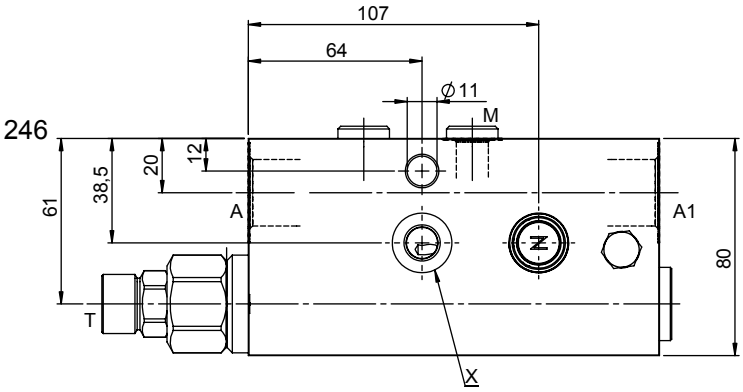
SPRING pos.2			
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3	200 - 400	250	350

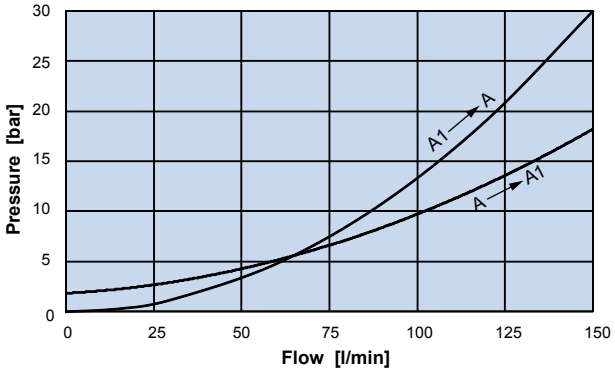
BOOM LOWERING VALVE

- Flow . . . . . **150 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **3,6 Kg**
- Tamper proof cap. **cod.9021030191**









Ordering code

Y 1 5 0 2 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

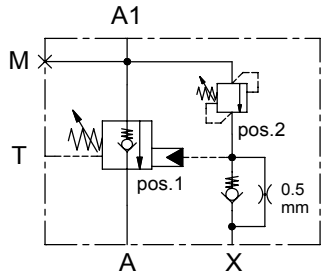
PORTS	05	55
A,A1	G 3/4”	SAE12
X,T	G 1/4”	SAE6

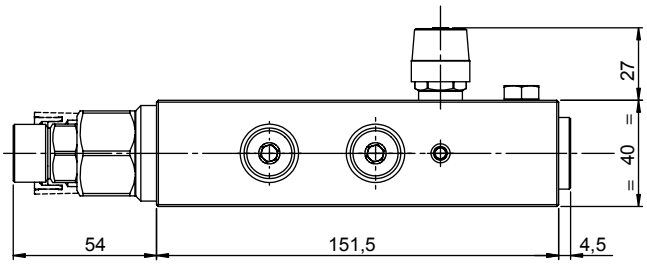
SPRING pos.1			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @20 cc/min [bar]
2	5 - 14	2,5	7,5

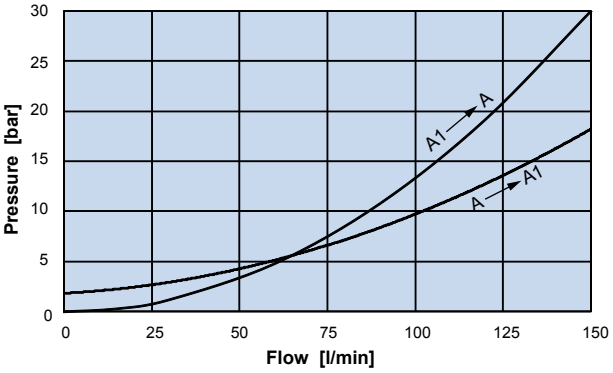
SPRING pos.2			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @4 l/min [bar]
3	200 - 400	250	350

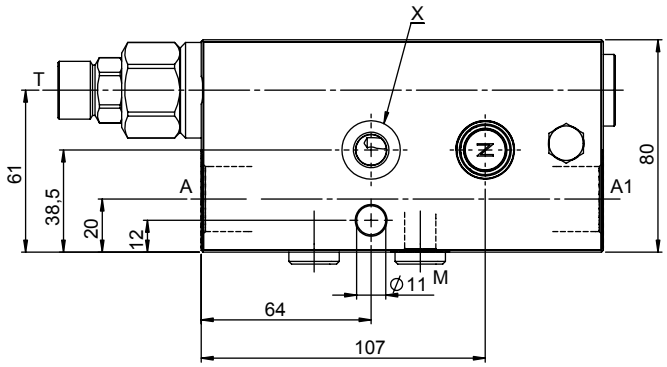
BOOM LOWERING VALVE

- Flow . . . . . **150 l/min**
- Maximum pressure . . . . . **400 bar**
- Compensation. . . . . **Fully Compensated with drain line**
- Weight. . . . . **3,6 Kg**
- Tamper proof cap. **cod.9021030191**









247

Ordering code

Y 1 5 0 1 Y ☐ ☐ ☐ ☐ **0 0**

PLUNGER	
00	1:0 Standard Plunger

PORTS	05	55
A,A1	G 3/4"	SAE12
X,T	G 1/4"	SAE6

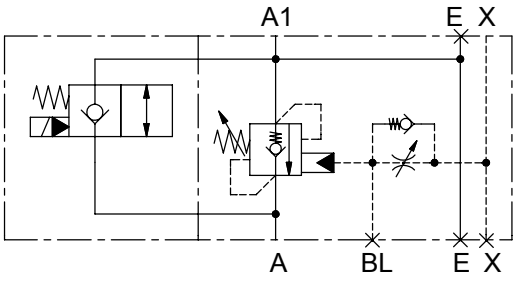
SPRING pos.1			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @20 cc/min [bar]
2	5 - 14	2,5	7,5

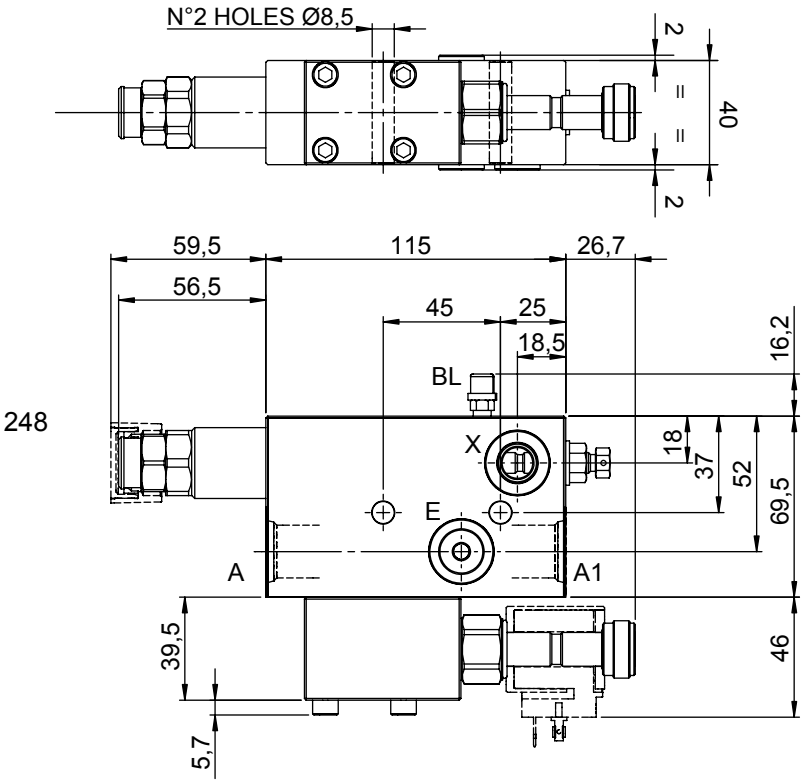
SPRING pos.2			
	Setting Range min.-max. [bar]	Pressure Increase [bar/turn]	Standard Setting @4 l/min [bar]
3	200 - 400	250	350

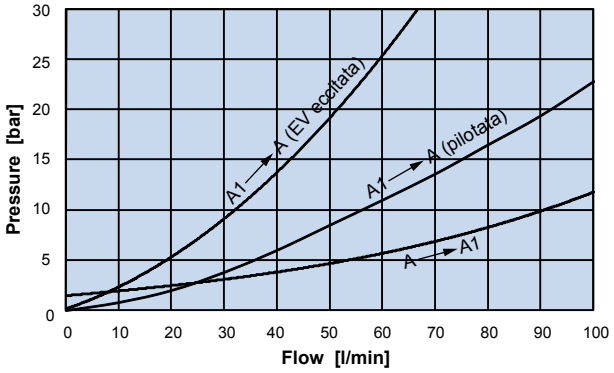
LHD10X-A3000-N04-BPE
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE WITH ELECTRIC BYPASS

- Flow . . . . . **110 l/min**
- Maximum pressure . . . . . **410 bar**
- Compensation. . . . . **Not Compensated**
- Weight. . . . . **3,6 Kg**
- Tamper proof cap. **cod.9021030190**







Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Back pressure can influence the opening pressure (LHD10X-C is recommended for circuits with high back pressure)

Ordering code

H 1 0 0 1 N ☐ ☐ S ☐ 0 0

PILOT RATIO	
50	**4:1 + BPE**

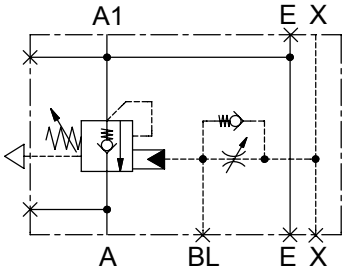
SPRINGS	**4**
Setting Range min.-max. [bar]	210 - 410
Pressure Increase [bar/turn]	86
Standard Setting 4 l/min [bar]	260

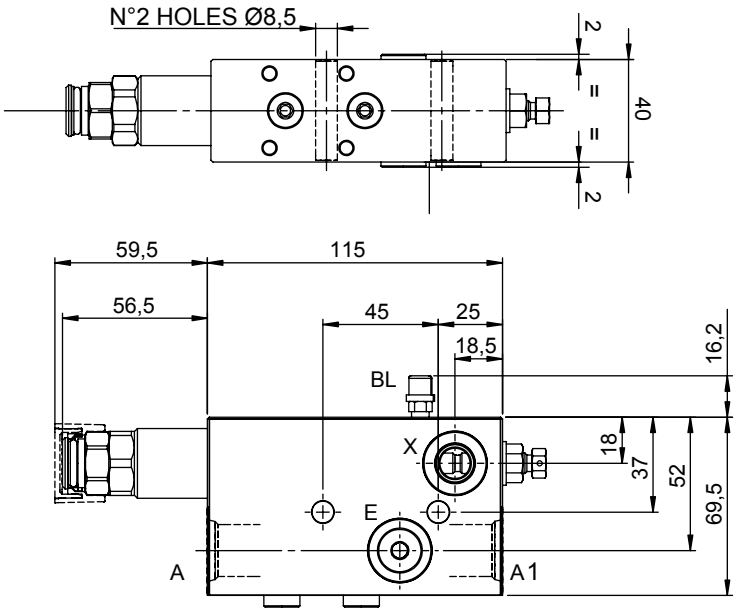
PORTS	**04**	**54**
A,A1	G 1/2"	SAE 10
X,E	G 1/4"	SAE 6

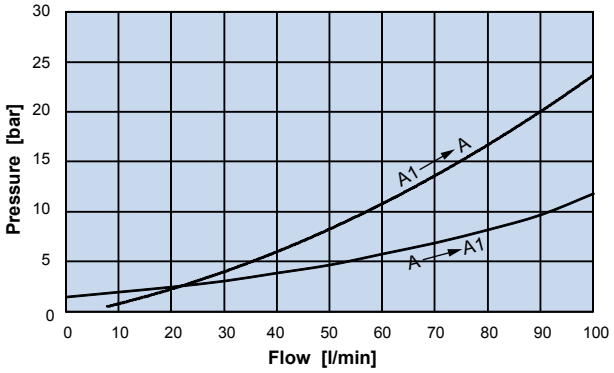
LHD10X-A3000-C04-BP
Steel Body

SINGLE ACTING COUNTERBALANCE VALVE

- Flow . . . . . **110 l/min**
- Maximum pressure . . . . . **410 bar**
- Compensation. . . . . **Fully Compensated**
- Weight. . . . . **3,5 Kg**
- Tamper proof cap. **cod.9021030190**







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Note:
- Pressure setting must be 30% higher thah pressure induced by the load.
- Valve pre-arranged for electric bypass assembly

Ordering code

H 1 0 0 1 C ☐ ☐ S ☐ 0 0

PILOT RATIO	
51	**4:1**

SPRINGS	**4**
Setting Range min.-max. [bar]	210 - 410
Pressure Increase [bar/turn]	86
Standard Setting 4 l/min [bar]	290

PORTS	**04**	**54**
A,A1	G 1/2”	SAE 10
X,E	G 1/4”	SAE 6

PARTS IN BODY

FLOW CONTROL VALVES

250

INTRODUCTION

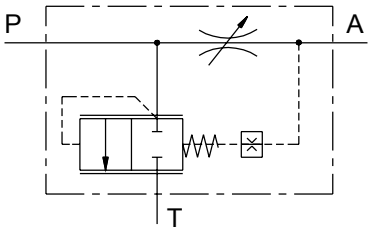
The main characteristic of Flow control valves described in this chapter is that compensator and flow regulator are mounted directly inside the manifold, so that this type of valve is directly installed in the hydraulic circuit.

There are 2 different types of flow control valves, according to the type of adjuster:

- Electro-proportional flow regulators
- Manual flow regulators

3 WAYS IN LINE MOUNTED FLOW REGULATORS

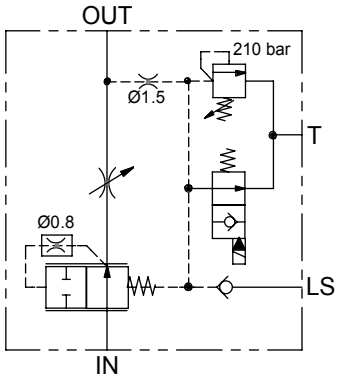
Whatever working pressure is, 3-way flow regulators grant a constant adjustment of oil flow inside an hydraulic line (A), draining excess flow through a third line (T).
Main components are: an flow regulator device and a 2-way NC compensator.
To have an efficient functionality, pressure on third line (T) must be lower than pressure on regulated line (A).



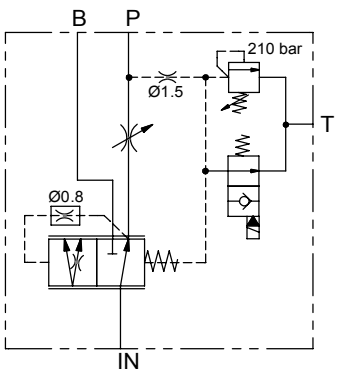
FLOW REGULATORS FOR EARTH MOVING MACHINES

Flow regulators for Earth movement machines are hydraulic valves designed to allow the installation of hydraulic hammers, trenchers and/or other hydraulic tools on excavators, backhoes and/or other machines.

Flow regulators for earth moving machines are designed in two different types: 2 way or 3 way valves. They are equipped with: (1) relief valves, to reduce pressure on regulated line; (2) dump electric valves.



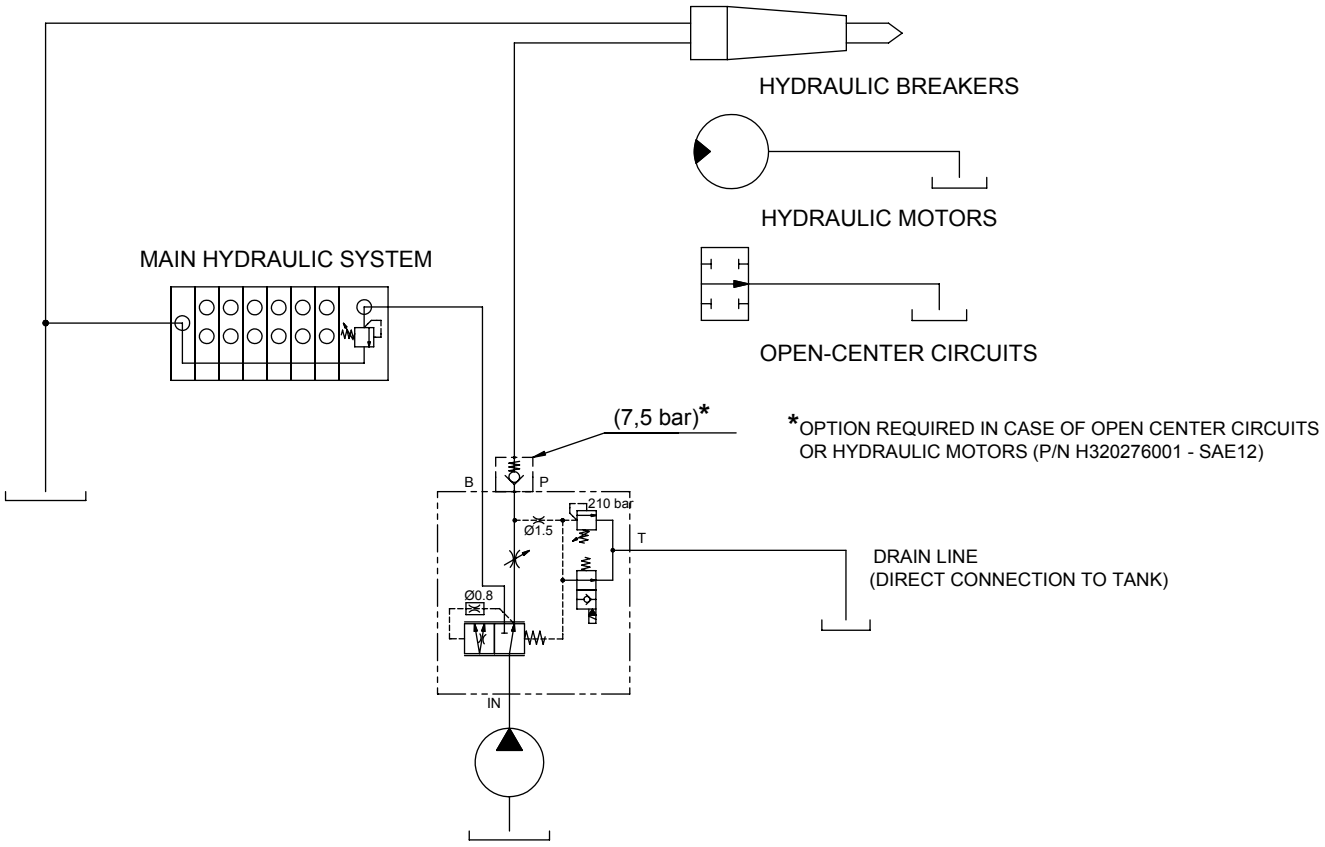
2 way LS Regulator



3 way priority Regulator

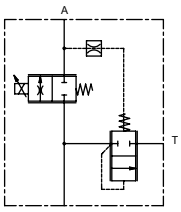
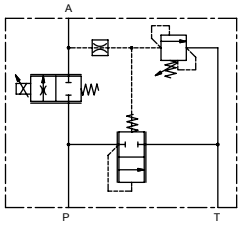
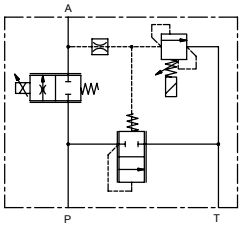
FLOW CONTROL VALVES

To have an efficient functionality, when flow control valve is not operating, it is necessary to assure at least 7.5 bar pressure on the regulated port (OUT or P). For applications linked to hydraulic motors or open-centre direct control valves, the installation of a 7.5 bar-pre-loaded uni-directional valve is required.



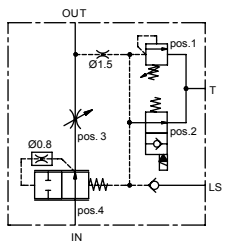
FLOW CONTROL VALVES

FLOW CONTROL VALVES FOR MOBILE APPLICATIONS

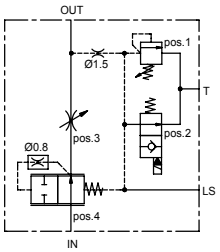
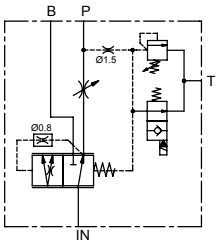
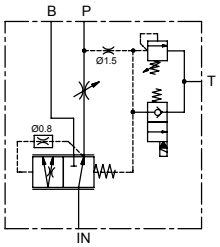
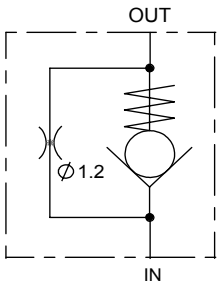
3 WAYS FLOW REGULATORS		Qin l/min	Qreg l/min	Pmax bar	PORTS	PAGE
 WITH 2/2 ELECTRO-PROPORTIONAL ADJUSTMENT	FR-3C-1-EP G3/8	30	30	250	G 3/8”	11.01.001
	FR-3C-1-EP G1/2	90	50	350	G 1/2”	11.01.002
	FR-3C-1-EP G3/4	150	100	350	G 3/4”	11.01.003
 WITH 2/2 ELECTRO-PROPORTIONAL ADJUSTMENT AND RELIEF VALVE	FR-3C-1-EP-_-VM G3/8	90	50	350	G 3/8”	11.01.004
	FR-3C-1-EP-_-VM G1/2	90	50	350	G 1/2”	11.01.005
	FR-3C-1-EP-_-VM G3/4	150	100	350	G 3/4”	11.01.006
 WITH 2/2 ELECTRO-PROPORTIONAL ADJUSTMENT AND ELECTRO - PROPORTIONAL RELIEF VALVE	FR-3C-1-EP-_-VMEP G3/8	90	50	350	G 3/8”	11.01.007
	FR-3C-1-EP-_-VMEP G1/2	90	50	350	G 1/2”	11.01.008
	FR-3C-1-EP-_-VMEP G3/4	150	100	350	G 3/4”	11.01.009

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FLOW CONTROL VALVES FOR EARTH MOVING MACHINE

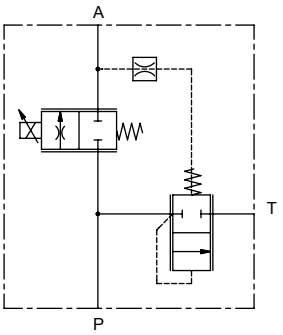
2 WAYS FLOW REGULATORS						
 SCHEME 2 - 3	FR2-S		140	350	G 3/4”-SAE12	11.01.010

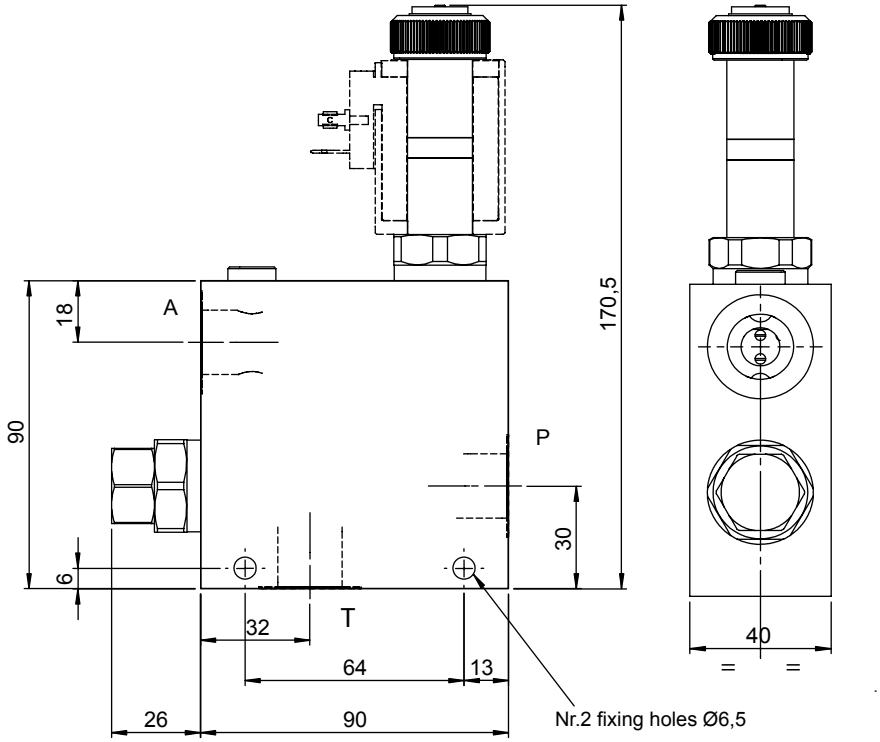
FLOW CONTROL VALVES

		Qin l/min	Qreg l/min	Pmax bar	ATTACCHI	PAGINA
 SCHEMA 4 - 5	FR2-S		140	350	G 3/4”-SAE12	11.01.010
3 WAYS FLOW REGULATORS						
 SCHEMA 0	FR3-S	200	140	350	G 3/4”-SAE12	11.01.011
 SCHEMA 1	FR3-S	200	140	350	G 3/4”-SAE12	11.01.011
ACCESSORIES FOR FR-S						
	D-R-M/F-V			350	G 3/4”-SAE12	11.01.012

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **50 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately





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Ordering code

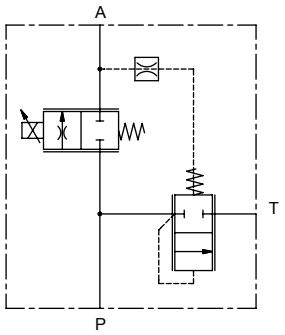
6 3 1 1 ☐ 1 ☐ 5 0 0

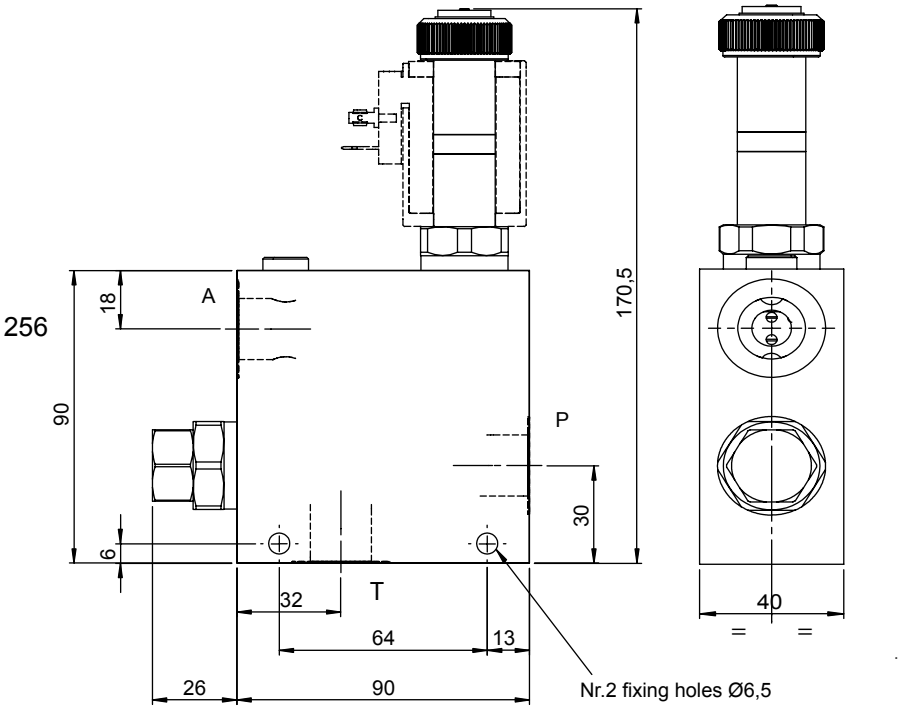
PORTS	2
A,P,T	G 3/8”

0	1	7
No emergency	Push pin	Handknob

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **90 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately



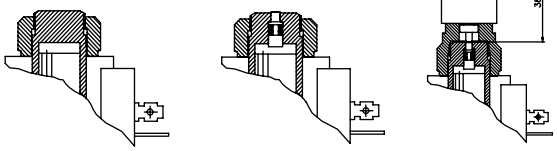


Ordering code

6 3 1 1 ☐ 1 ☐ 5 0 0

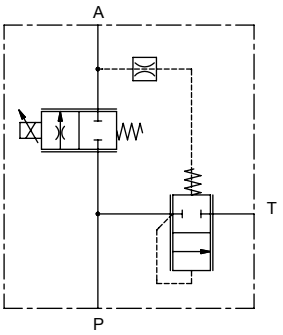
PORTS	3
A,P,T	G 1/2"

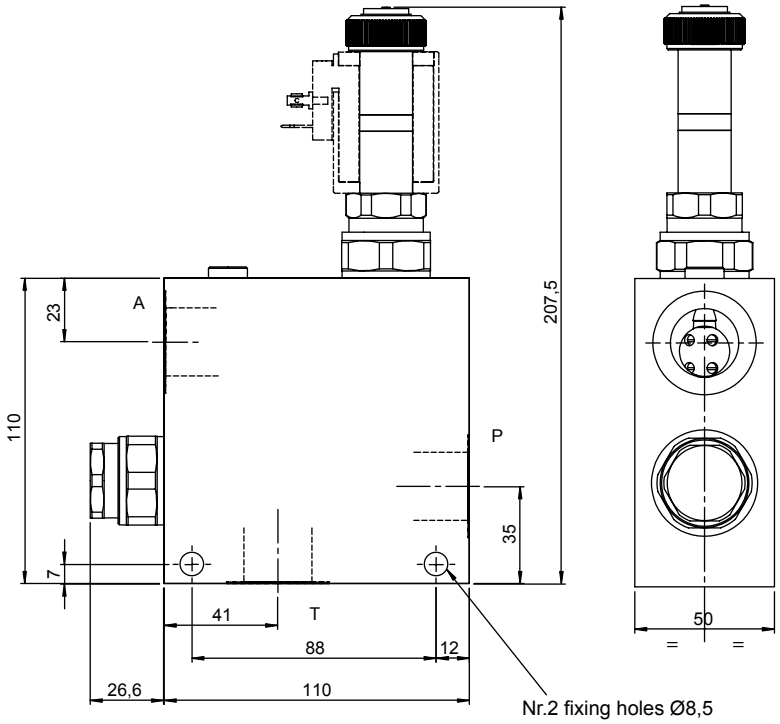
0	1	7
No emergency	Push pin	Handknob



3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL 2/2 NC

- Max regulated flow . . . . . **90 l/min**
- Maximum flow. . . . . **150 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately





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Ordering code

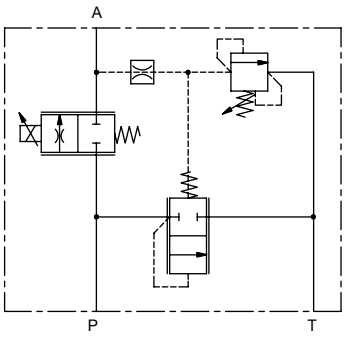
6 3 1 1 ☐ 1 ☐ 5 0 0

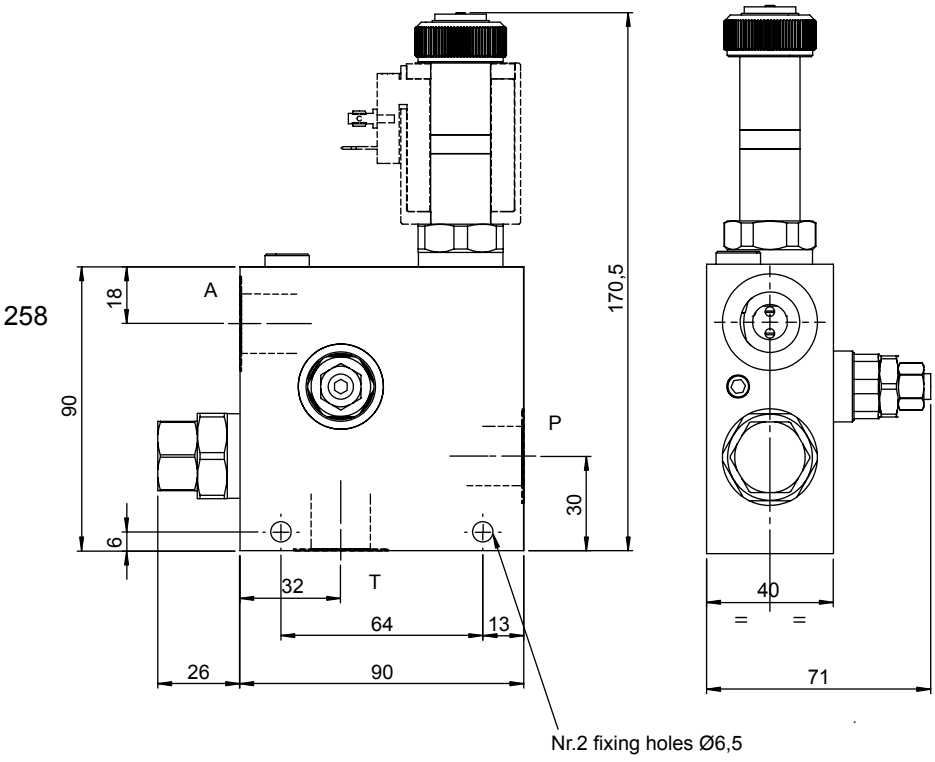
PORTS	4
A,P,T	G 3/4”

0	1	7
No emergency	Push pin	Handknob

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **50 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately

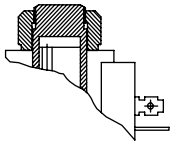
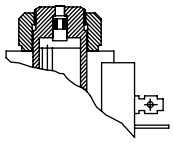
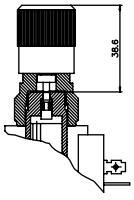




Ordering code

6 3 1 1 ☐ 1 ☐ 6 ☐ 0

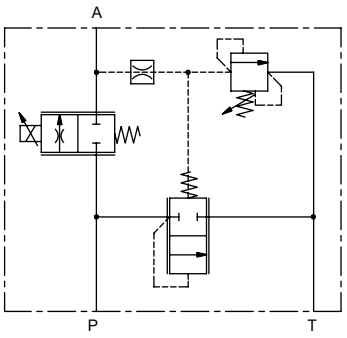
PORTS	2
A,P,T	G 3/8"

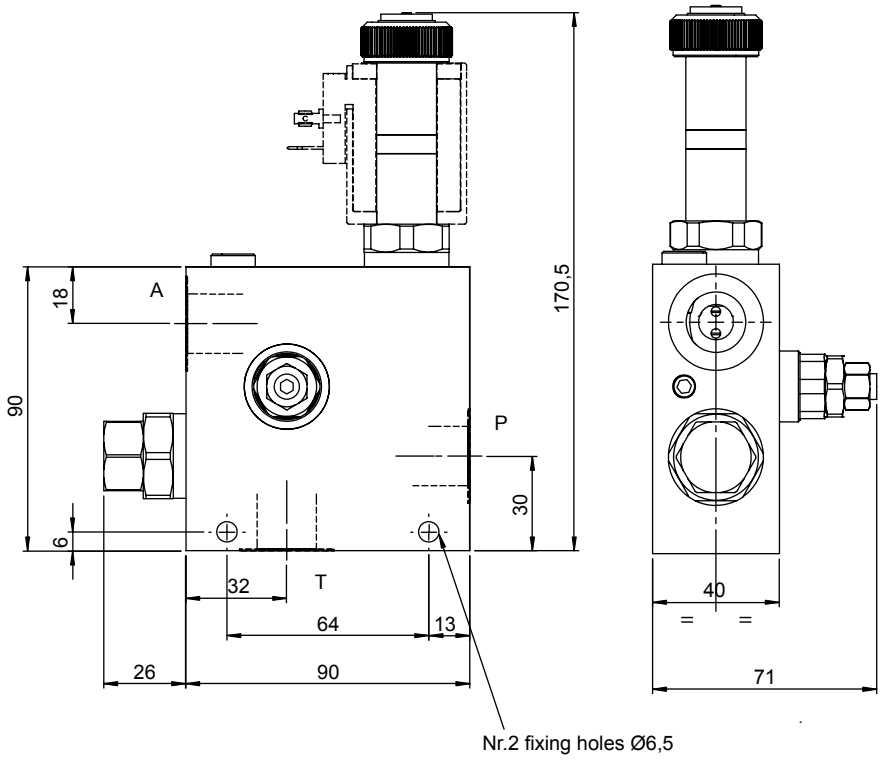
0	1	7
		
No emergency	Push pin	Handknob

RELIEF VALVE	0
Setting range [bar]	40 - 220
Pressure increase [bar/turn]	84
Standard Setting 4 l/min [bar]	210

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **90 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately



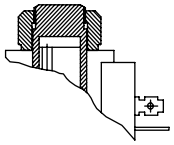
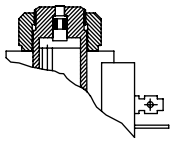
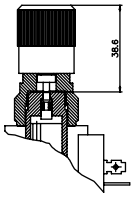


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Ordering code

6 3 1 1 ☐ 1 ☐ 6 ☐ 0

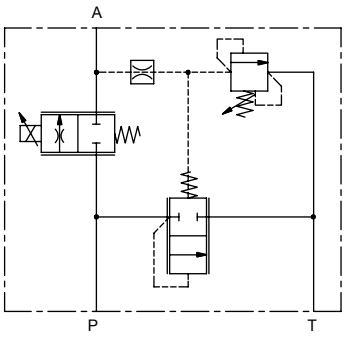
PORTS	3
A,P,T	G 1/2"

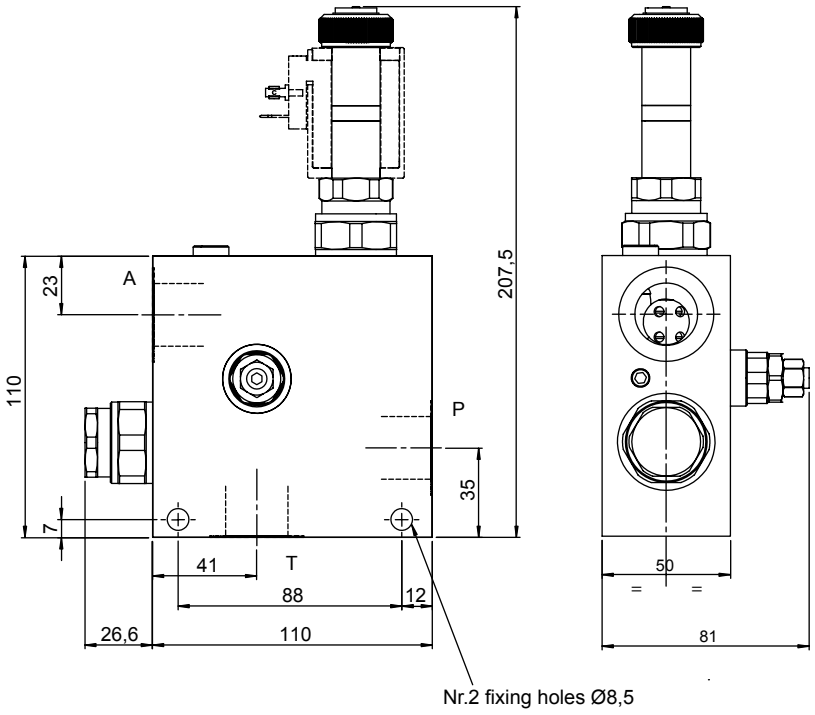
0	1	7
		
No emergency	Push pin	Handknob

RELIEF VALVE	0
Setting range [bar]	40 - 220
Pressure increase [bar/turn]	84
Standard Setting 4 l/min [bar]	210

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **90 l/min**
- Maximum flow. . . . . **150 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately

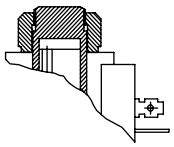
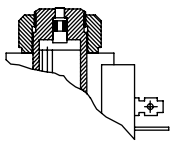
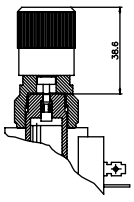




Ordering code

6 3 1 1 ☐ 1 ☐ 6 ☐ 0

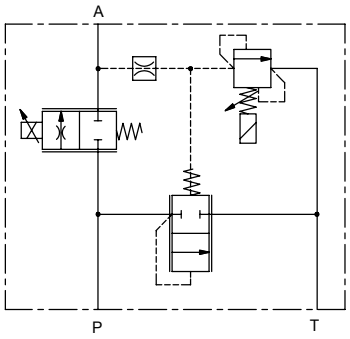
PORTS	4
A,P,T	G 3/4"

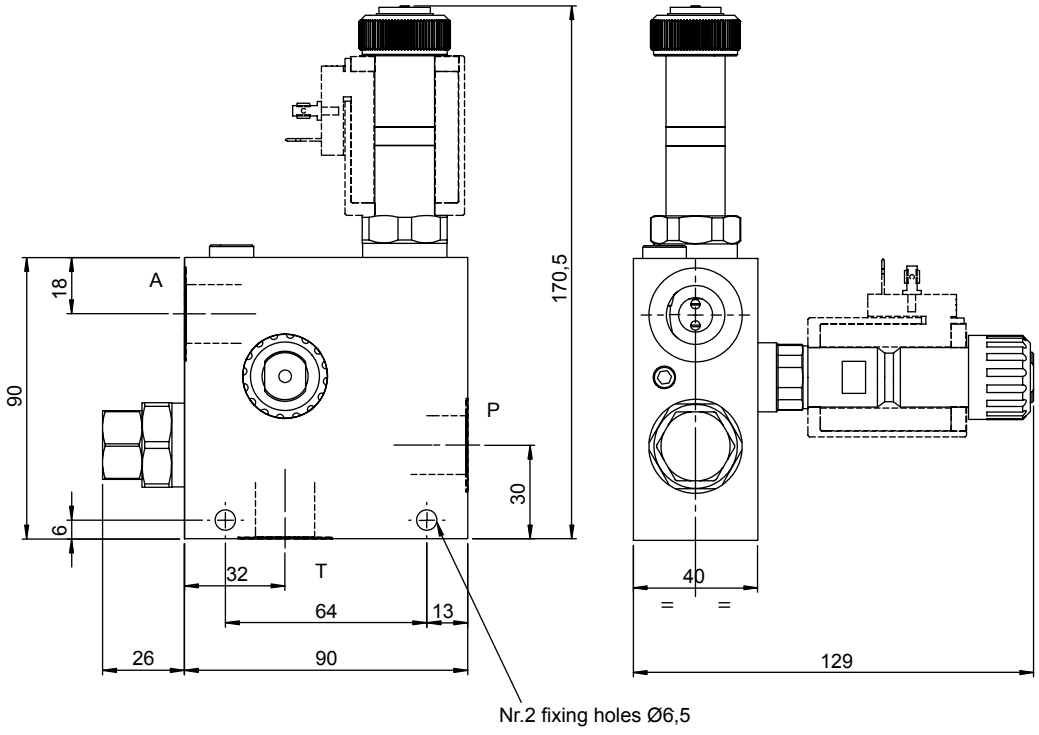
0	1	7
		
No emergency	Push pin	Handknob

RELIEF VALVE	0
Setting range [bar]	40 - 220
Pressure increase [bar/turn]	84
Standard Setting 4 l/min [bar]	210

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **90 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately





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Ordering code

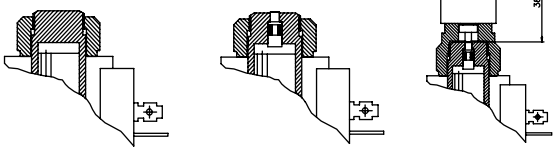
6 3 1 1 ☐ 1 ☐ 7 ☐ 0

PORTS	2
A,P,T	G 3/8"

0 — No emergency

1 — Push pin

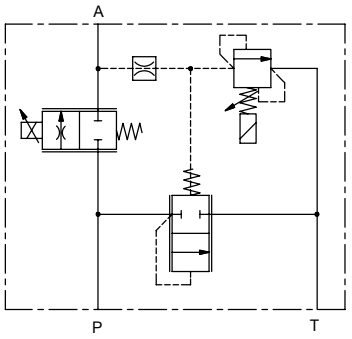
7 — Handknob

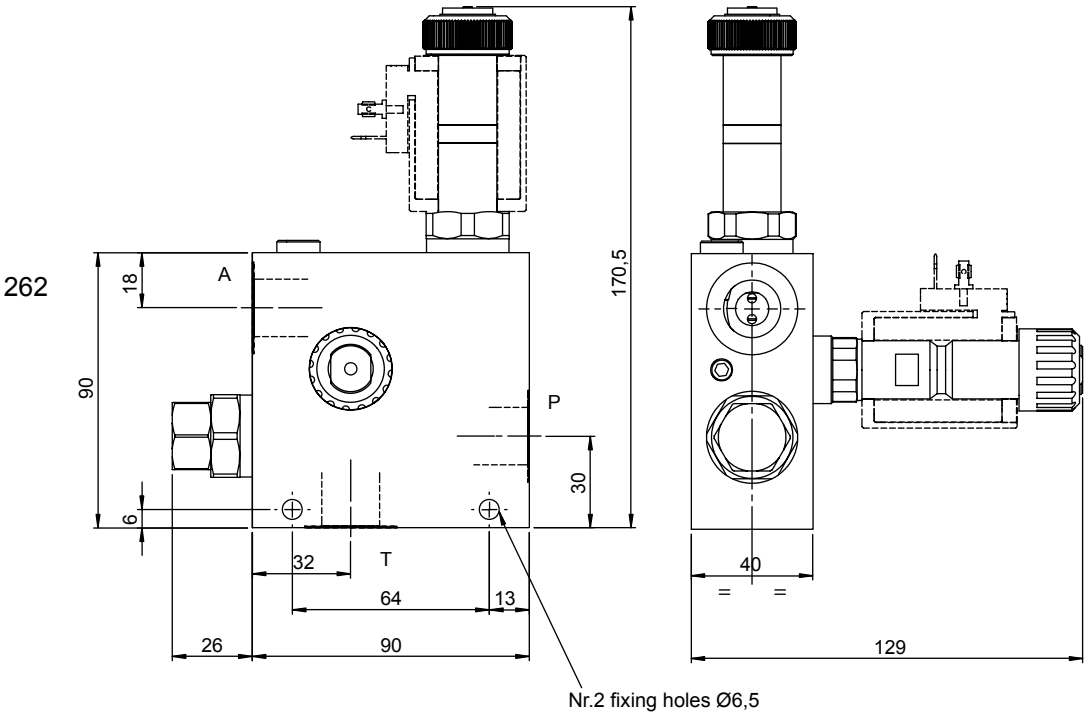


RELIEF VALVE	0
Setting range [bar]	8 - 250

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **90 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately



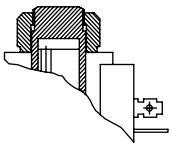


Ordering code

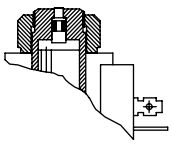
6 3 1 1 ☐ 1 ☐ 7 ☐ 0

PORTS	3
A,P,T	G 1/2"

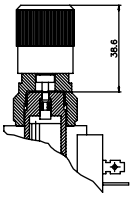
0 — No emergency



1 — Push pin



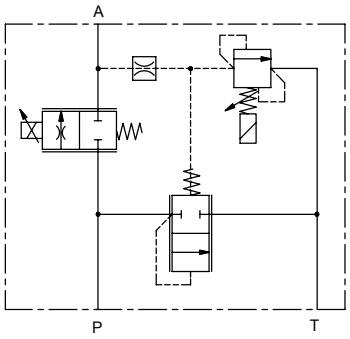
7 — Handknob

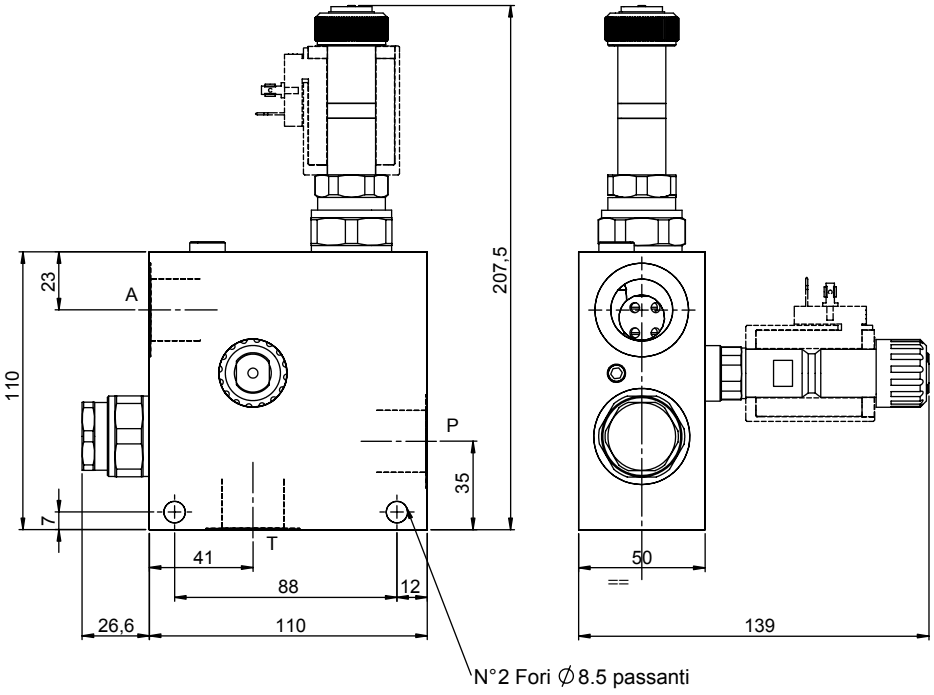


RELIEF VALVE	0
Setting range [bar]	8 - 250

3 WAYS FLOW CONTROL VALVE, FULLY COMPENSATED WITH ELECTRIC PROPORTIONAL CONTROL, RELIEF VALVE 2/2 NC

- Max regulated flow . . . . . **50 l/min**
- Maximum flow. . . . . **150 l/min**
- Max pressure T. . . . . **10 bar**
- Max pressure P:A. . . . . **350 bar**
- Seals. . . . . **NBR**
- Max current at 12 Vcc. **1800mA**
- Max current at 24 Vcc **900mA**
- PWM . . . . . **120 Hz**
- Hysteresis. **5%**
- Weight (with coil). . . . . **1,800 Kg**
- Ring nut thightening torque for coil: . . . . . **5 Nm**
- Coil **CT-9800** to be ordered separately





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Ordering code

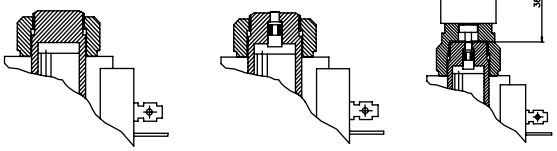
6 3 1 1 ☐ 1 ☐ 7 ☐ 0

PORTS	4
A,P,T	G 3/4”

0 — No emergency

1 — Push pin

7 — Handknob

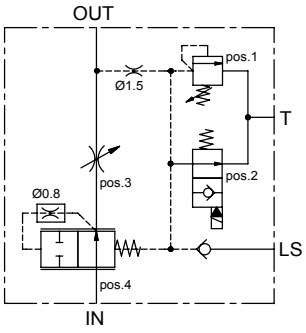


RELIEF VALVE	0
Setting range [bar]	5 - 250

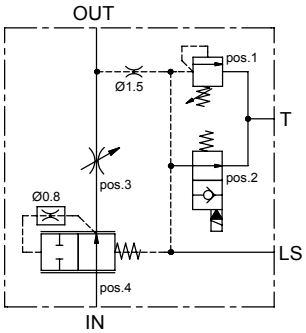
2 WAYS FLOW REGULATOR G3/4", SAE12

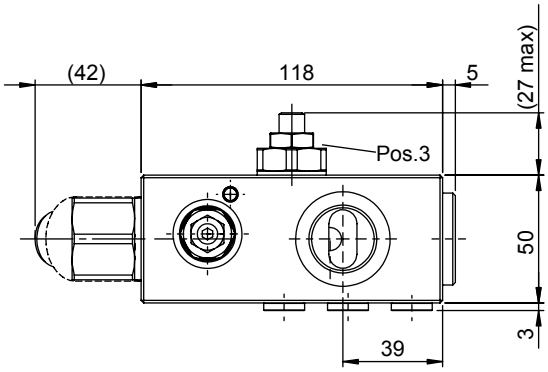
- Max pressure. . . . . **350 bar**
- Max regulated flow . . . . . **140 l/min**
- Standard regulated flow. . . . . **30 l/min**
- Weight . . . . . **4,6 Kg**
- Coil **CT-9400** to be ordered separately

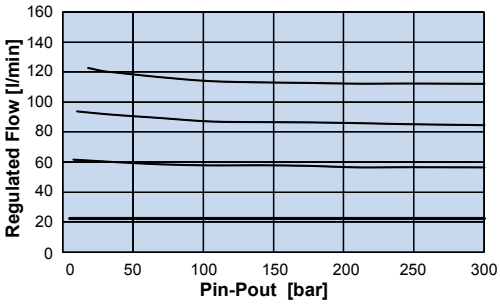
SPRING 2-3

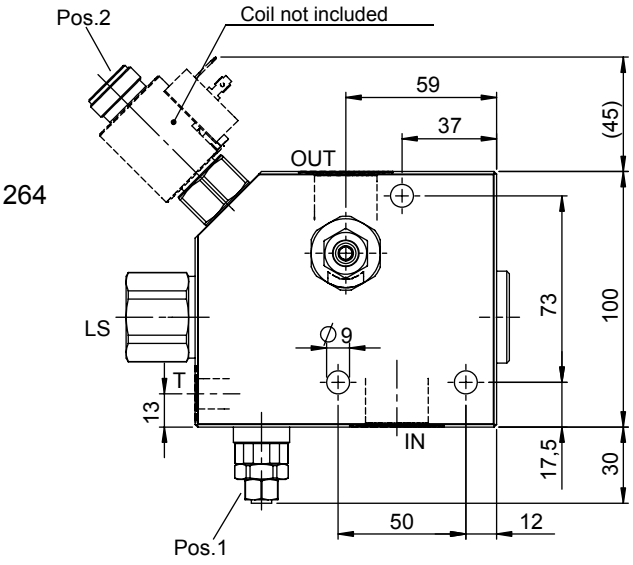


SPRING 4-5









Note:

- The flow (OUT) can be regulated at the required value, acting on adjustable screw (pos. 3); flow gets increased when the screw is clockwise turned.
- Max leakage in T: 3l/min.
- Max backpressure in T: 1,5 Bar.
*- For optimal functionality of the compensator, when the electric valve (pos. 2) is open, it's important to make sure that regulated line OUT is pressurized at 7,5 Bar at least. If not, a unidire ctional valve must be installed, to supply the required backpressure (see **D-R-M/F-V**).*
- Check valve on port LS requires dumping of Load Sensing line, through a compensated draining, when electric valve is open (pos. 2).
- For applications which need Post-Compensated directional control valves, refer to schemes 2 and 3, in which there is an LS check valve.
- For applications which need Pre-Compensated directional control valves and direct connections to variable piston pumps, refer to schemes 4 and 5, in which there is no LS check valve.

Ordering code: F R 2 S [ ] [ ] [ ] 0 0

ELECTRIC-VALVE SCHEME	
0	Normally open - NO

SPRING	2	3	4	5
Setting range [bar]	40 - 220	50 - 350	40 - 220	50 - 350
Pressure Increase [bar/giro]	84	127	84	127
Standard Setting [bar]	210	350	210	350
Check Valve LS	present	present	not present	not present

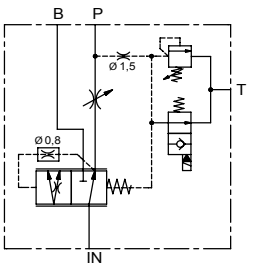
PORTS	05	55
IN,OUT	G 3/4"	SAE12
T,LS	G 1/4"	SAE6

RELIEF VALVE SETTING RANGE

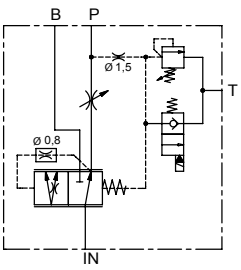
FLOW REGULATOR - G3/4", SAE12

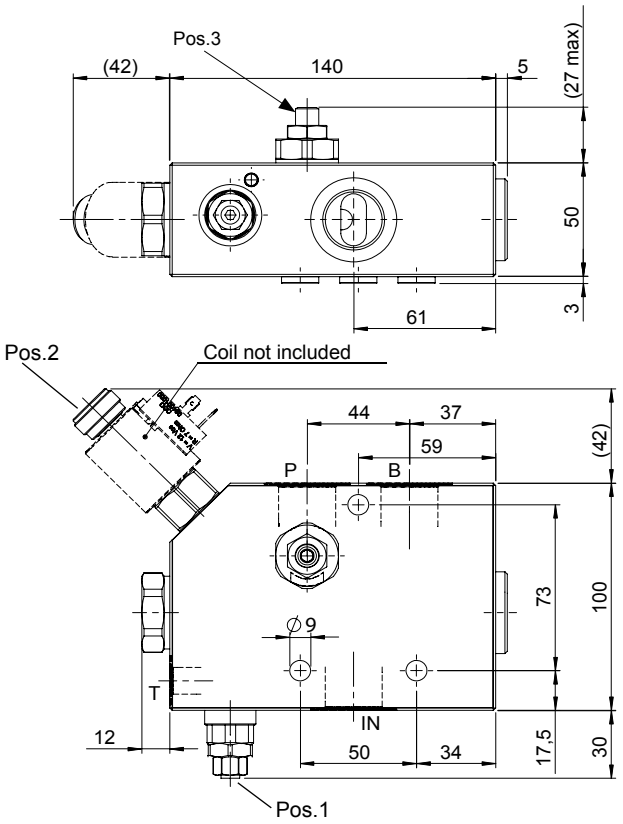
- Nominal Flow (IN). . . . . **200 l/min**
- Max pressure. . . . . **350 bar**
- Max regulated flow (P) . . . . . **140 l/min**
- Standard regulated flow. . . . . **30 l/min**
- Regulated flow variation by turn (Pos.3). . . . . **15,5 l/min**
- Weight . . . . . **5 Kg**
- Coil **CT-9400** to be ordered separately

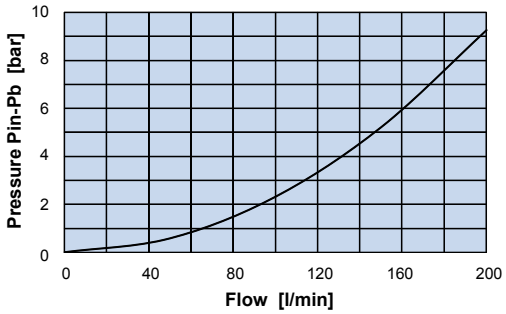
SCHEME 0

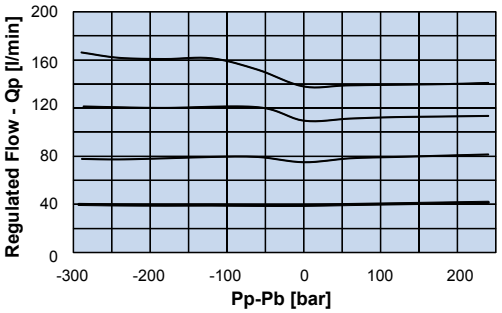


SCHEME 1









Note:

- The flow (P) can be regulated at the required value, acting on adjustable screw (pos. 3); flow gets increased when the screw is clockwise turned.
- Max leakage in T: 3l/min.
- Max backpressure in T: 1,5 Bar
*- For optimal functionality of the compensator, when the electric valve (pos. 2) is open, it's important to make sure that regulated line OUT is pressurized at 7,5 Bar at least. If not, a unidirectional valve must be installed, to supply the required back-pressure (see **D-R-M/F-V**)*

Ordering code

F R 3 S ☐ ☐ ☐ **0**

ELECTRIC-VALVE SCHEME	
0	Normally open - NO
1	Normally closed - NC

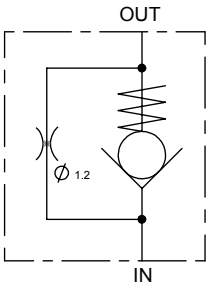
SPRING	2	3
Setting Range [bar]	40 - 220	50 - 350
Pressure Increase [bar/giro]	84	127
Standard Setting [bar]	210	350

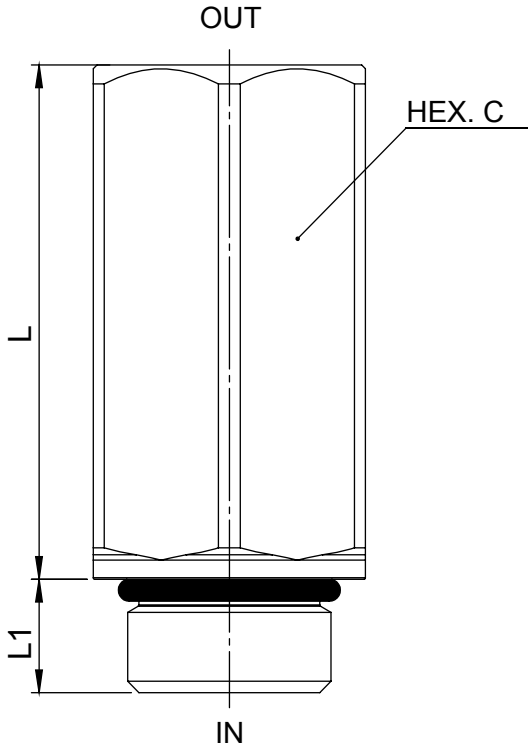
RELIEF VALVE SETTING RANGE POS. 1

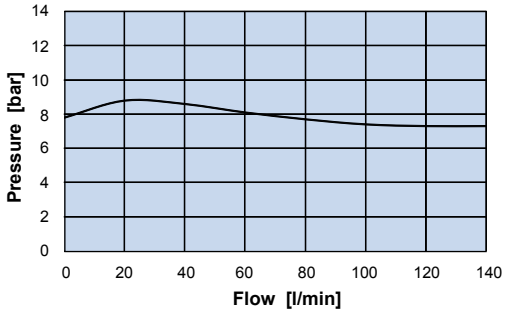
PORTS	05	55
IN,P,B	G 3/4"	SAE12
T	G 1/4"	SAE6

IN-LINE UNI-DIRECTIONAL CHECK VALVE

- Max pressure. . . . . **350 bar**
- Max flow. . . . . **130 l/min**
- Seals. . . . . **NBR**
- Cartridge thightening torque: . . . . . **150 Nm**
- Weight. . . . . **0,45 Kg**







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Ordering code

D 1 0 5 0 0 ☐ 3 S ☐ 0 0

SPRING	
08	7.8 bar

PORTS		C	L1	L
05	**G3/4**	36	15	68
55	**SAE12**	36	15	68

TECHNICAL SPECIFICATIONS

AND GENERAL CONDITIONS

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TECHNICAL SPECIFICATIONS

FILTRATION

The state of oil used for hydraulic systems and machines is one of the main factors for proper use and performance. Use of excessive dirty oil may lead to earlier wearing of parts and components, faster hardening and thus functional troubles of your equipment. Due Filtration is a must to assure top efficiency and life of your hydraulic equipment. Selection of the most suitable filtration systems must be done according to the technical features of your equipment. However, the following table provides most current oil recommendations.

HYDRAULIC OILS

The use of mineral based oil is recommended (like HLP to DIN 51524). All performances and calibrations are carried out by using hydraulic oil with approximate viscosity of 46 cSt at 40° C.

VISCOSITY CLASS

Normally expressed as ISO-VG in accordance to ISO DIN standards. Average viscosity is figured at 40°C (mm 2/s or centistokes - cSt). Recommended oil viscosity for NEM parts is: from 15 cSt to 250 cSt.

NEM-HYDRAULICS.COM

Chart:
Selection of filtration

Filtration type	Type of equipment Nominal filtration (micron)	Absolute Filtration as for ISO 4572	Polluting class	
			ISO4406	**NAS1653**
High pressure equipment (>200 bar) Proportional valves reachin to dirty	**5**	**X=5.....10**	**17/14**	**8**
Medium pressure equipment (<200 Bar)	**10**	**X=10.....15**	**18/14**	**9**

POLLUTING CLASS ISO 4406

with two figures respectively showing the quantity of 5 and 15µ or larger particles in 1 ml oil.

MATERIALS

The valves are made out high quality steel, while all movable parts are hardened and rectified.
Manifolds are produced in steel or aluminum in relation to the max working pressure.

POLLUTING CLASS NAS 1653

Expressed with one figure showing the quantity of variable size particles in 100 ml oil.

SEALING

O-RING. made out of butadiene/acrylonitril(BUNA N or NBR according to ASTM standards). The ASTM standards D76 set a brittleness safety temperature of -30°C +125° C. For use at higher temperature consult our technical office.

TECHNICAL SPECIFICATIONS

BACK UP RINGS

Made out of poly-tetrafluoroethylene (PTFE).

Q - RINGS: special sealing gaskets with 4 shaped lobes designed to prevent gaskets pull-off chances in case of dynamic applications. All O-rings are made out of Acrylonytril-Butadiene (NBR).

CARTRIDGE VALVE INSTALLATION

PLEASE CAREFULLY READ THESE INSTRUCTIONS

BEFORE VALVE INSTALLATION

Check-up general valve conditions and make sure there is no dirt. Check-up gaskets and seals conditions identifying their exact location. Lubricate the sals. First hand screw the cartridge in. Tightening should be performed according to the technical datas listed for each product.

TEST CURVES

All diagrams in this catalogue report performance curves obtained by use of mineral oil at ISO viscosity VG46 and at 40° C temperature.

STORAGE

Keep valves away and protected from the sunlight and any other heat/ozone source. Make sure that an ideal storage temperature of -20 :+50°C is available.

TEMPERATURE LIMITS

Ambient temperature:
from -20° C to +50°C

Oil temperature:
from -20° C to +90°C

DESIGN AND INSTALLATION WORK

All NEM valves and manifolds are function tested after assembly. Technical features and operation limits are statistically tested. As for all components which are then to be mounted on other equipment, real working conditions may not be lab simulated at the manufacturer's. This means that the customer is always ultimately responsible for the choice and final use of the product. Valves and manifolds in this catalogue are very versatile. However they are strictly recommended for use on equipment complying with the European regulation no. 89/392 and following amendements. No installation should be done on equipment without above mentioned European approval.

GENERAL CONDITIONS

1. GENERAL

1.1 These general conditions are applicable to all the supplies which Nem s.p.a. will carry out, on the base of purchasing orders forwarded from the Customer.

1.2 Terms like EXW, DDP and so on are referred to the so called Incotems published by the International Chamber of Commerce, current at the date of conclusion of these General Conditions.

2. PURCHASING ORDERS MANAGEMENT

2.1 Purchasing orders are binding for Nem s.p.a. only if confirmed in writing with order confirmations.

2.2 Nem s.p.a. engages itself to supply goods up to the order confirmations.

2.3 Any complaints regarding the content of the order confirmation must be notified in writing to Nem s.p.a. by 5 days and no later the forwarding of the order confirmation.

2.4 The Customer undertakes to pay the goods supplied by Nem s.p.a., according to the prices listed on the order confirmation.

3. PAYMENT CONDITIONS

3.1 The Parties agree upon the payment conditions at the beginning of the supply.

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3.2 In case of delay of payment, Nem s.p.a. will have the right to request of moratory interests equal to the Euribor, increased by 2 points.

3.3 In case of delay of payment, Nem s.p.a. will have the right to not execute the eventual purchasing orders in progress, even if confirmed.

4. DELIVERY AND SHIPMENT

4.1 The supply of the goods will always be Ex-Works, even in the case that Nem s.p.a. had agreed with the Customer that Nem s.p.a. takes care of the shipment, or part of it.

4.2 In any case, the risks about perishment or damage of the goods will pass to the Customer, at latest, when the goods are delivered to the first carrier.

5. CHARACTERISTICS OF PRODUCTS

5.1 Nem s.p.a. engages itself to supply good quality products, up to the technical specifications contained in technical schedules or in the catalogue.

5.2 Nem s.p.a. reserves the exclusive right to make any change to the products, which, without altering their essential features, appear to be necessary or suitable.

6. COMPLAINTS

6.1 The complaints regarding the apparent defects of the Products (such as, for instance, the packing, quantity, number or exterior features of the Products) must be notified in writing to Nem s.p.a. by 7 days and no later upon the receipt of the goods. Failing such notification, the Customer's right to claim the above defects will be forfeited.

6.2 The hidden defects (defects which cannot be discovered by the Customer on the basis of a careful inspection upon the receipt) shall be notified in writing to Nem s.p.a. by 7 days and no later from the discovery of the defects, and in any case no later than 18 months from the delivery of the Goods. Failing such notification, the Customer's right to claim the above defects will be forfeited.

6.3 It's agreed that, even in case of any complaint or objection, the Customer will not have the right to suspend or delay the payments due to Nem s.p.a., as well as payment of any other supplies.

7. WARRANTY

7.1 In case of any defects, lack of quality or non-conformity of the supplied Products, Nem s.p.a., at its exclusive choice, engages itself to replace or repair the defective Products provided such defects or non-conformity have been timely notified in writing to Nem s.p.a., in accordance to point nr. 6, by 18 months from the delivery of the Goods and no later.

7.2 Products repaired or replaces under warranty as above described are submitted to the same guarantee, for a period of 18 months from the date of repair or replacement.

7.3 Except in case of fraud or gross negligence, in case of defects, lack of quality or non- conformity, Nem S.p.a. undertakes only to repair or replace the defective Products, in accordance to what above described.

7.4 This guarantee (i.e. the obligation of repairing or replacing the Products) is in lieu of any other legal guarantee or liability of the Supplier, with the exclusion of any other guarantee or liability – whether contractual or non-contractual – in connection with the Products supplied (i.e. compensation for damages, loss of profit, recall campaigns, …).

7.5 Nem s.p.a. is covered by appropriate policy of Product Legal Liability.

8. RETENTION OF TITLE

8.1 The Goods supplied by Nem s.p.a. remain property of Nem s.p.a. until the complete payment of the supply is received.

9. SECRECY BOND

9.1 Nem s.p.a. engages itself to treat as highly confidential all the technical or commercial information should learnt from the Customer, which are not already of public divulgence.

GENERAL CONDITIONS

10. PATENTS

10.1 Except preventive written authorization of Nem s.p.a., the Customer cannot use the supplied Products, or part of them, or the descriptions or the drawings of them – whether registered patented or not – to project or make similar goods.

10.2 Even in case of preventive written authorization of Nem s.p.a., all the patents, labels and registered design, royalties and intellectual property rights related or in connection with Products supplied by Nem s.p.a., are and remain property of Nem s.p.a. The Customer undertakes to treat all of them as highly confidential.

11. APPLICABLE LAW AND JURISDICTION

11.1 The supplies carried out by Nem S.p.a. are governed by these present General Conditions and, for what here not expressly provided, by the Italian Law.

11.2 The competent Law Courts of Reggio Emilia have the exclusive jurisdiction in any controversies regarding the supplies of Products by Nem s.p.a., or from the supplies arising out or to the supplies connected, in which Nem s.p.a. is part.