FLOW CONTROL VALVES

INTRODUCTION

BIDIRECTIONAL FLOW RESTRICTORS

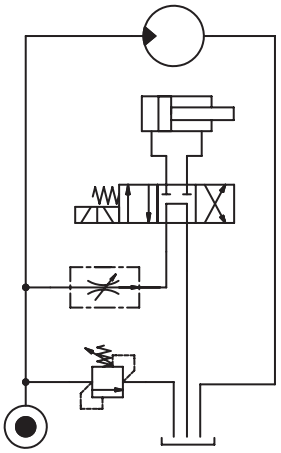
Thanks to this type of valves, it's possible to regulate flow passage inside an hydraulic circuit. The flow restriction brings about a non-compensated load loss which depends on the loads themselves.
These valves allow to obtain compensated flow regulators, when coupled with pressure compensators.

UNIDIRECTIONAL FLOW RESTRICTORS

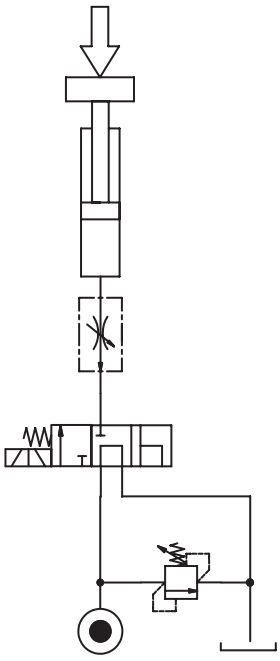
These valves regulate flow passage only in one direction, keeping the flow passage free in the opposite direction. Flow restriction brings about a non-compensated load loss which depends on the loads themselves.
These valves act as compensated flow regulators, when coupled with pressure compensators.

2-WAY COMPENSATED FLOW REGULATORS

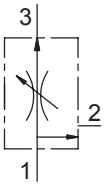
These valves regulate oil flow inside an hydraulic line, independently from the feeding pressure.
They are composed by an adjusting device for flow setting and a pressure compensator connected to it in series which keeps a constant pressure drop across the adjusting device flow area.
2-way compensated 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

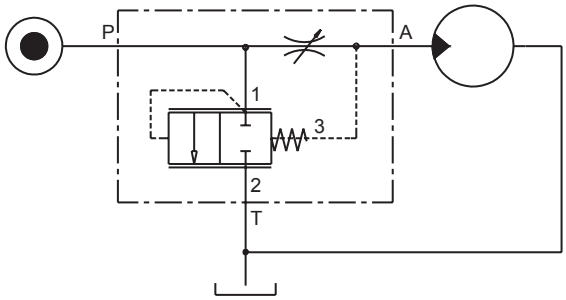
These valves regulate oil flow inside an hydraulic line, draining excess flow through a third line which makes the regulated flow independent from the working pressure.

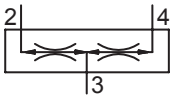
There are different types of 3-way regulators:

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).

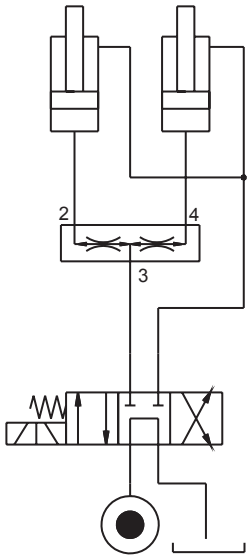
FLOW CONTROL VALVES



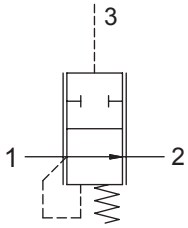


FLOW DIVIDERS/COMBINERS

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).

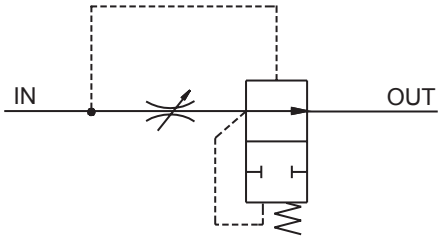


Flow divider/combiner hydraulic scheme

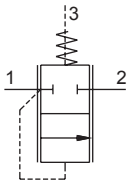


2-WAY N/O PRESSURE COMPENSATORS

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.

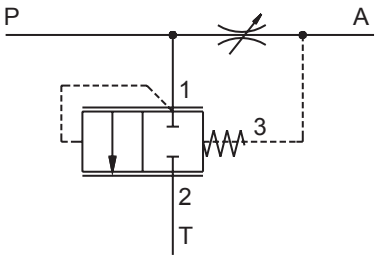


Example of 2 way compensated flow regulator

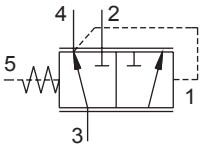


2-WAY N/C PRESSURE COMPENSATORS

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).

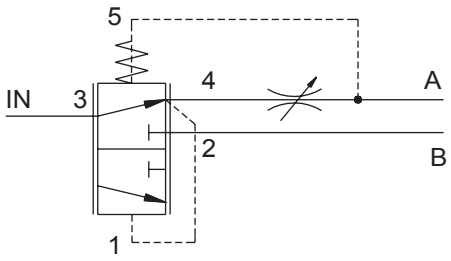


Example of 3 way compensated flow regulator

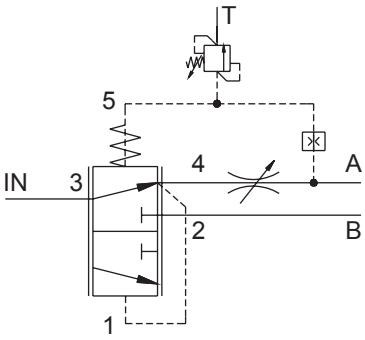


3-WAY POST- REGULATED PRESSURE COMPENSATORS

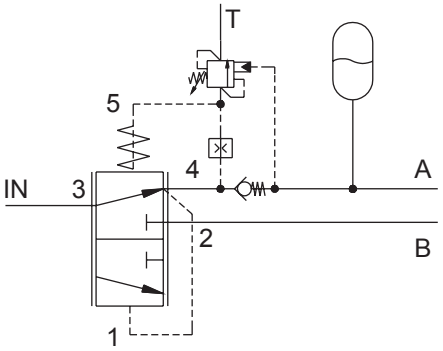
3-way post-regulated pressure compensators are cartridges designed for 4-way cavities.
If connected to a flow restrictor or to 2/2 proportional valve, they act as a 3-way compensated flow regulator, which enables a constant regulated flow independently from the pressure on ports (4) and (2).
As its main 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.



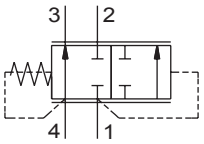
Post-regulated flow regulator



Flow and pressure-limited regulator

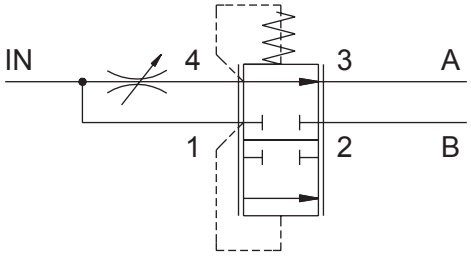


Feeding circuit for accumulators piloted dump valve equipped



4-WAY PRESSURE COMPENSATORS

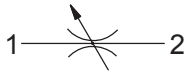
4-way pressure compensators are cartridges designed for 4-way cavities.
Connected to a flow restrictor or to a 2/2 proportional valve, they act as a 3-way compensated flow regulator which is able to keep a constant regulated flow independently from pressure on ports (2) and (3).
As its main characteristic, 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.

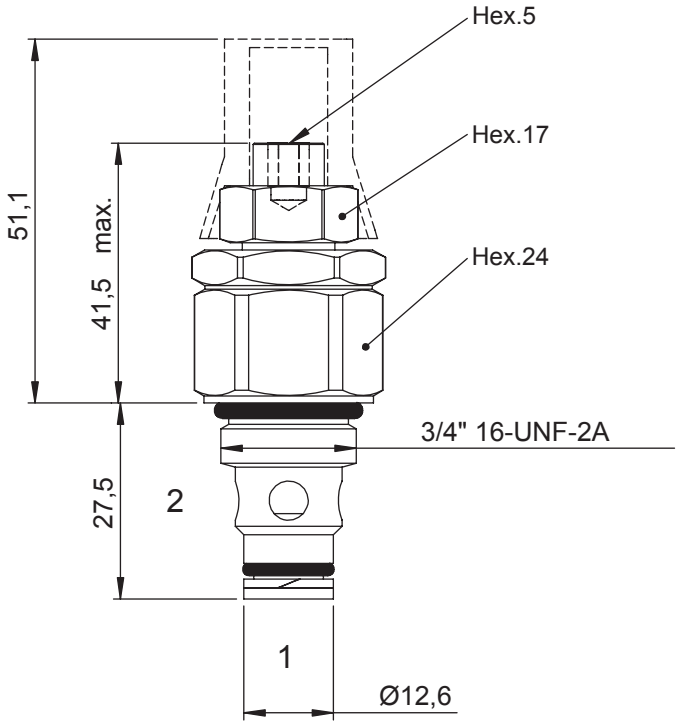


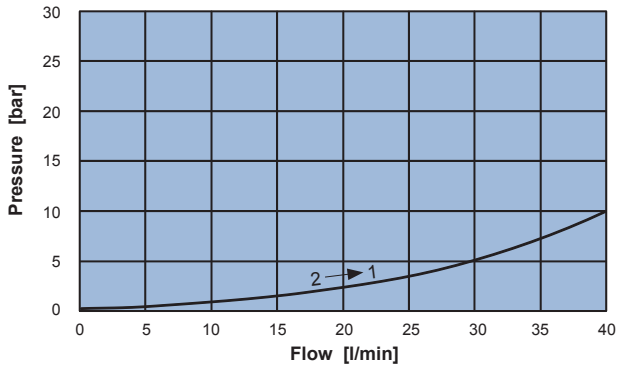
Pre-regulated flow regulator

BIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque. . . . . **40 Nm**
- Weight. . . . . **0,15 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**
- Cavity . . . . . **C220000** page **208**
- Body. . . . . **171202** page **186**







Fully open adjustment pressure drop

Ordering code

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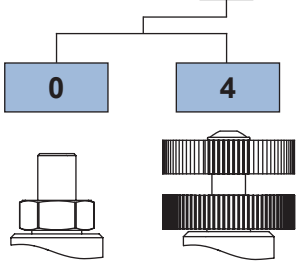
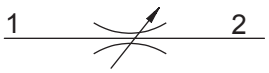


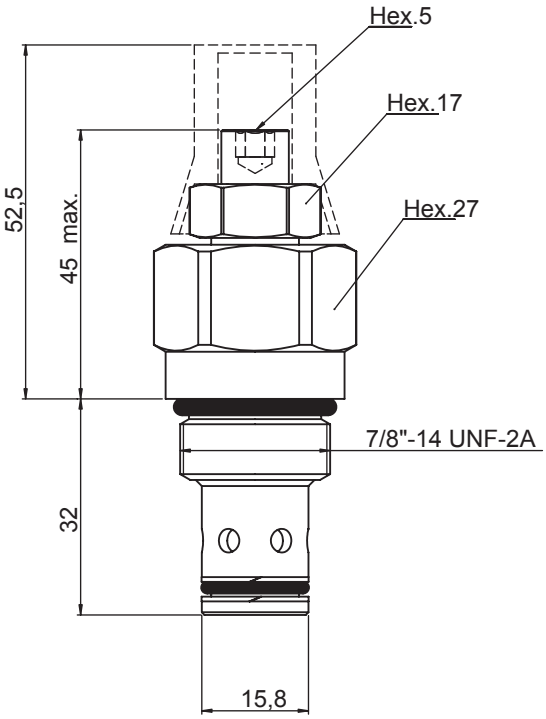
Screw **Handknob**

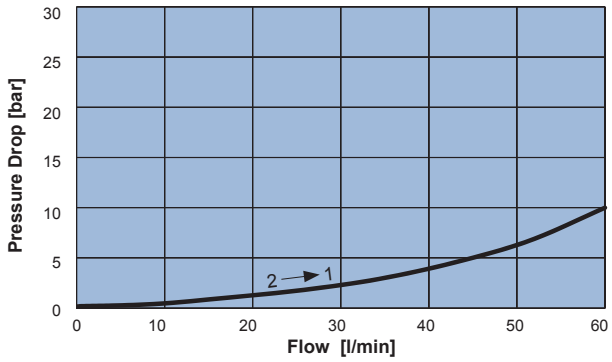
Adjustments

BIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque. . . . . **50 Nm**
- Weight. . . . . **0,2 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**
- Cavity . . . . . **C230000** page **210**
- Body. . . . . **171302** page **191**







Fully open adjustment

Ordering code

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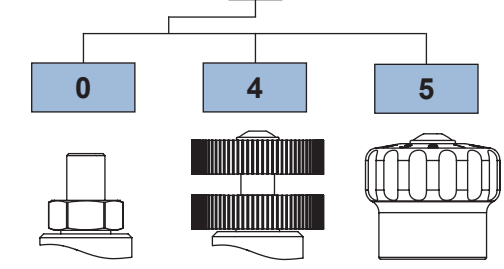
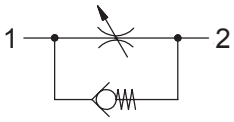


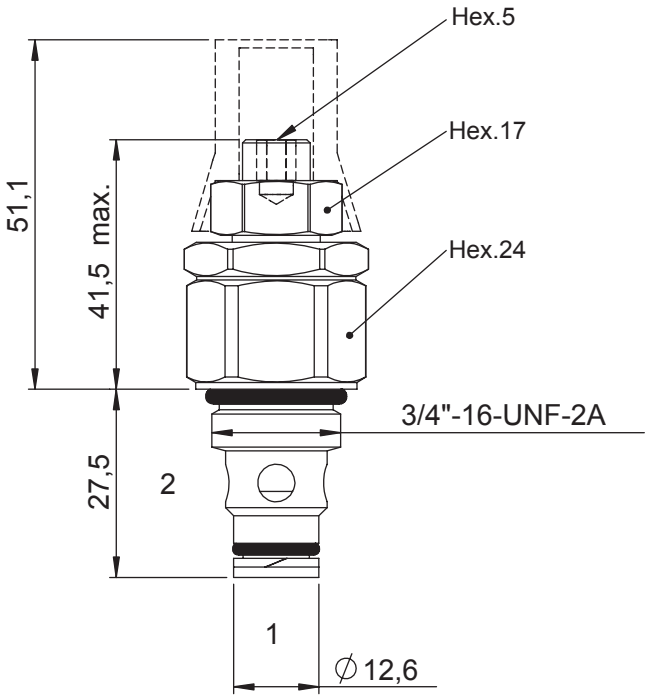
Screw **Handknob** **Handknob frictioned**

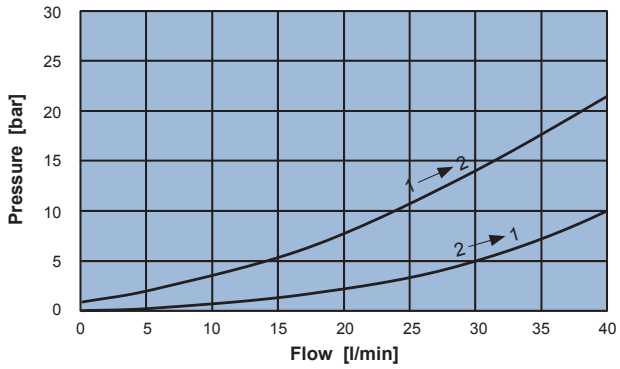
Adjustments

UNIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque. . . . . **40 Nm**
- Weight. . . . . **0,15 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**
- Cavity . . . . . **C220000** page **208**
- Body. . . . . **171202** page **186**







Ordering code

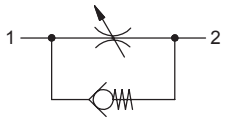
0 3 7 2 0 0 0 ☐ 0 1

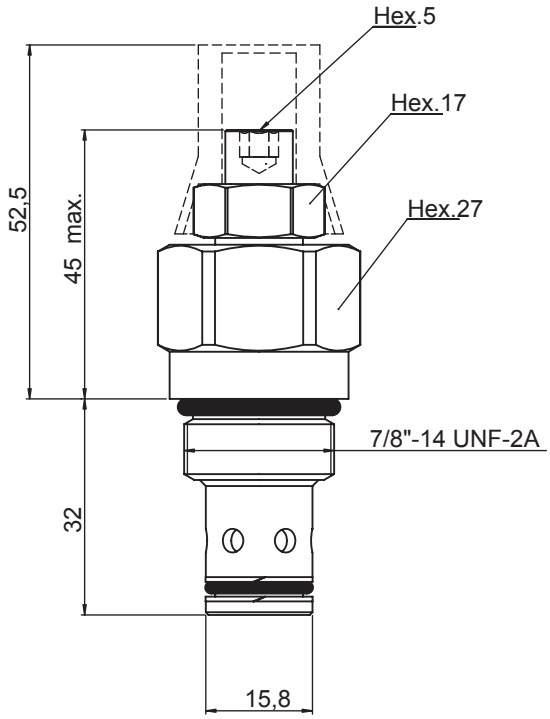
0	4
Screw	Handknob

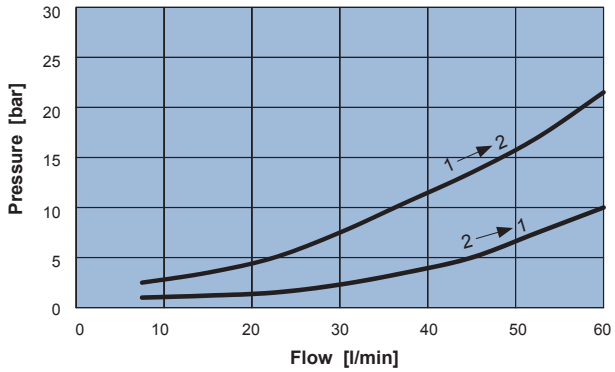
Adjustments

UNIDIRECTIONAL FLOW CONTROL VALVE

- Max Flow. . . . . **60 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque. . . . . **50 Nm**
- Weight. . . . . **0,2 Kg**
- Tamper proof cap: **cod.4029250280**
- Adjustment range. . . . . **5 turns**
- Cavity . . . . . **C230000** page **210**
- Body. . . . . **171302** page **191**

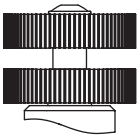
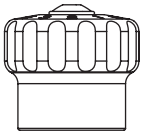






Ordering code

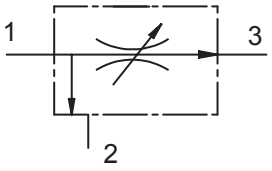
0 3 7 3 0 0 0 ☐ 0 1

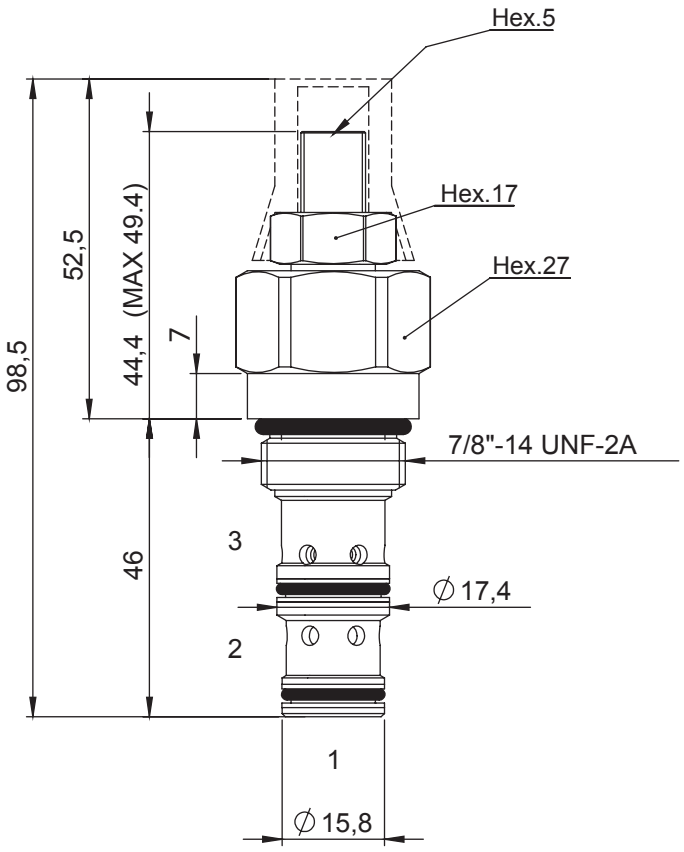
0	4	5
		
Screw	Handknob	Handknob frictioned

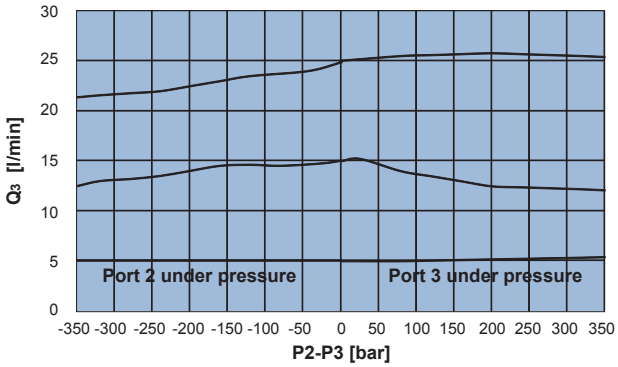
Adjustments

3 WAY COMPENSATED FLOW CONTROL VALVE

- Max Flow in (1). . . . . **50 l/min**
- Max Regulated Flow (3) . .. . **30 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque. . . . . **50 Nm**
- Weight. . . . . **0,31 Kg**
- Tamper proof cap: **cod.4029250280**
- Cavity . . . . . **C330000** page **220**
- Body. . . . . **171312** page **192**







Ordering code

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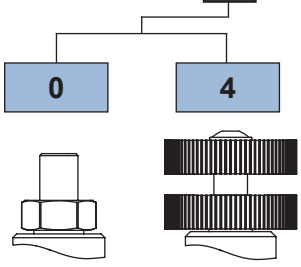
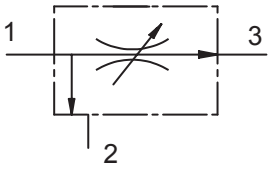


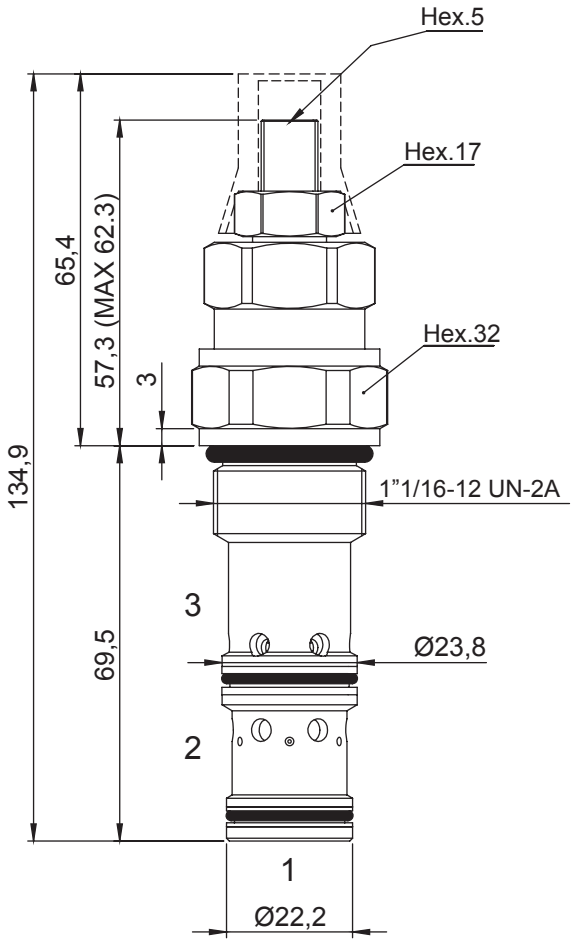
Screw **Handknob**

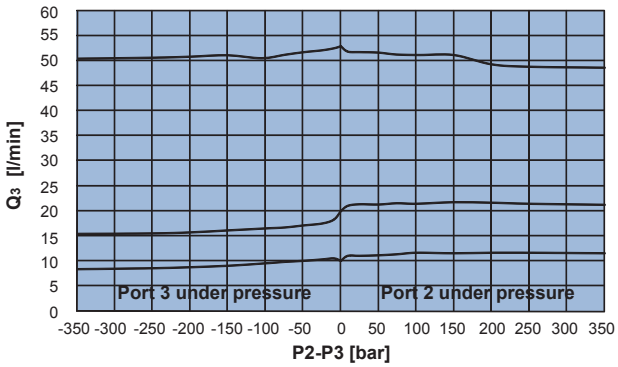
Adjustments

3 WAY COMPENSATED FLOW CONTROL VALVE

- Max Flow in (1). . . . . **90 l/min**
- Max Regulated Flow (3). . . . . **50 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cavity **C340000**
- Cartridge tightening torque. . . . . **60 Nm**
- Weight. . . . . **0,4 Kg**
- Tamper proof cap: **cod.4029250280**
- Cavity . . . . . **C340000** page **222**
- Body. . . . . **171412** page **197**

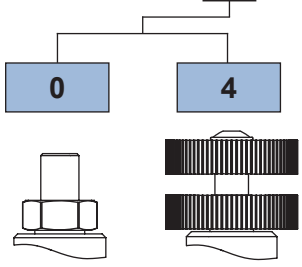






Ordering code

0 3 2 4 0 0 0 ☐ 0 1

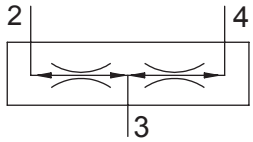


Screw **Handknob**

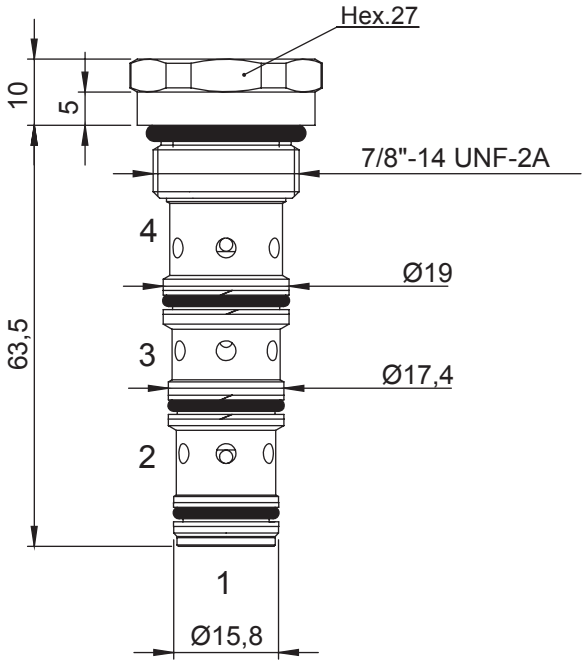
Adjustments

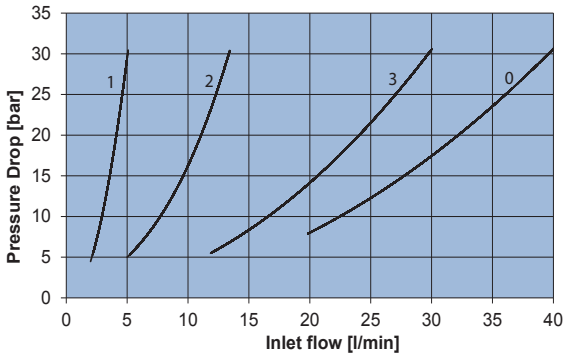
FLOW DIVIDER AND COMBINER VALVE

- Flow. . . . . **40 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Division ratio . . . . . **50% ÷ 50%**
- Accurancy. . . . . **< +/-5%**
- Cartridge tightening torque. . . . . **40 Nm**
- Weight. . . . . **0,15 Kg**
- Cavity . . . . . **C430000** page **226**
- Body. . . . . **171322** page **195**



Note:
- PATENDED FLOW DIVIDER AND COMBINER VALVE





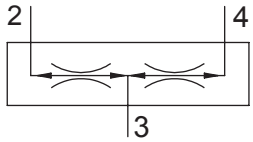
Ordering code

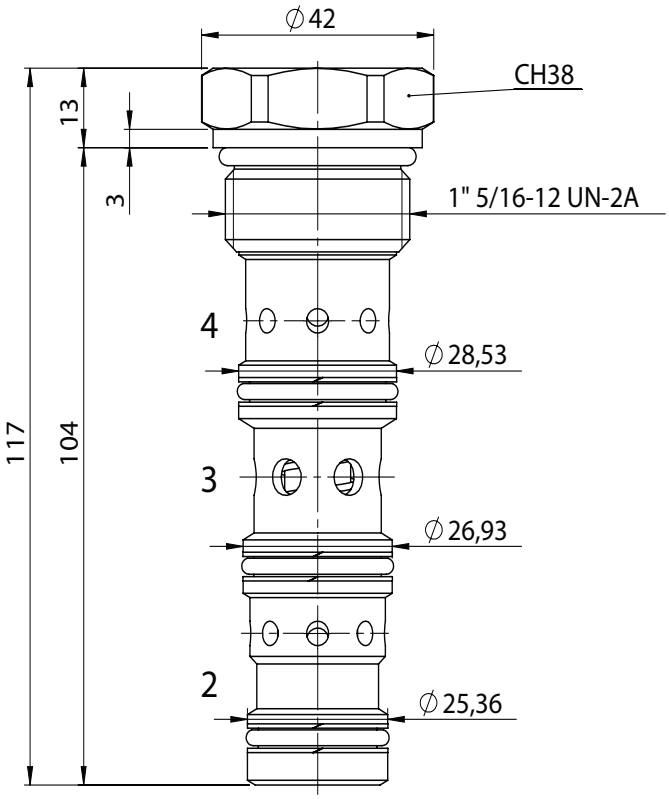
0 8 2 3 0 ☐ 0 0 0 0

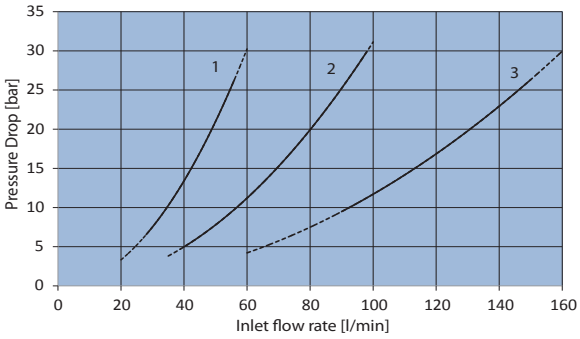
SETTING RANGE	0	1	2	3
Qmin ÷ Qmax l/min	20 ÷ 40	2 ÷ 6	5 ÷ 12	12 ÷ 30

FLOW DIVIDER AND COMBINER VALVE

- Flow. . . . . .150 l/min
- Max working pressure. . . . . .250 bar
- Seals . . . . . .NBR and PTFE
- Division ratio . . . . . 50% ÷ 50%
- Accurancy. . . . . < +/-3%
- Cartridge tightening torque. . . . . .70 Nm
- Weight. . . . . 0,40 Kg
- Cavity . . . . . C450000 page 228
- Body. . . . . 171512 page 202







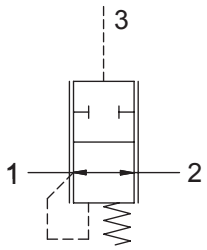
Ordering code

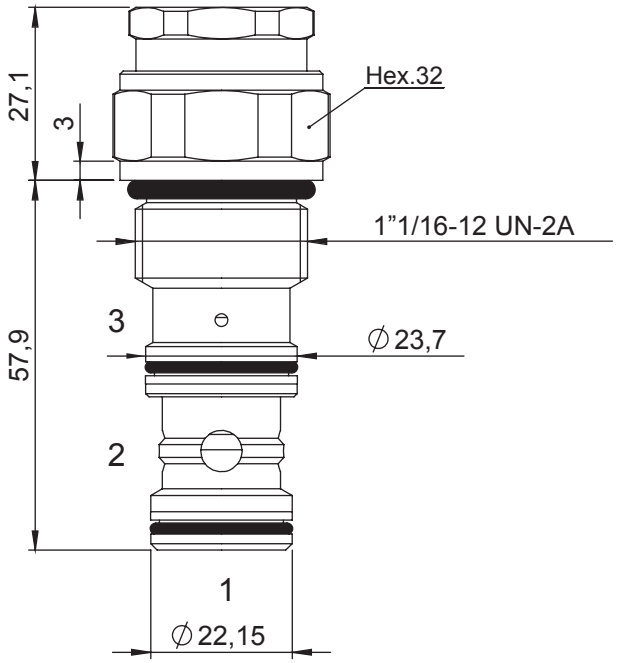
0 8 2 5 0 ☐ 0 0 0 0

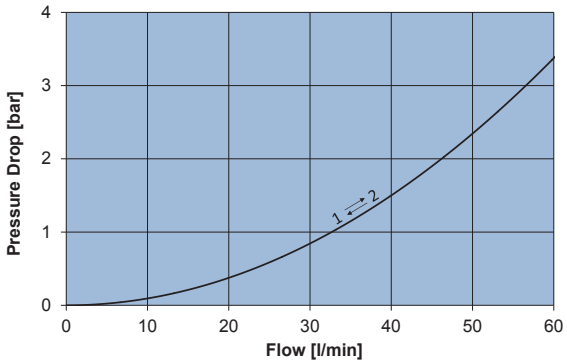
SETTING RANGE	1	2	3
Qmin ÷ Qmax l/min	28 ÷ 55	56 ÷ 95	90 ÷ 150

2 WAY NORMALLY OPEN SPOOL LOGIC ELEMENT

- Max Flow . . . . . .**100 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . .**NBR and PTFE**
- Cartridge tightening torque. . . . . **60 Nm**
- Weight. . . . . **0,3 Kg**
- Cavity. . . . . **C341000** page **223**
- Body. . . . . **172412** page **199**







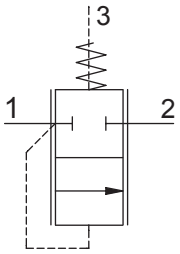
Ordering code

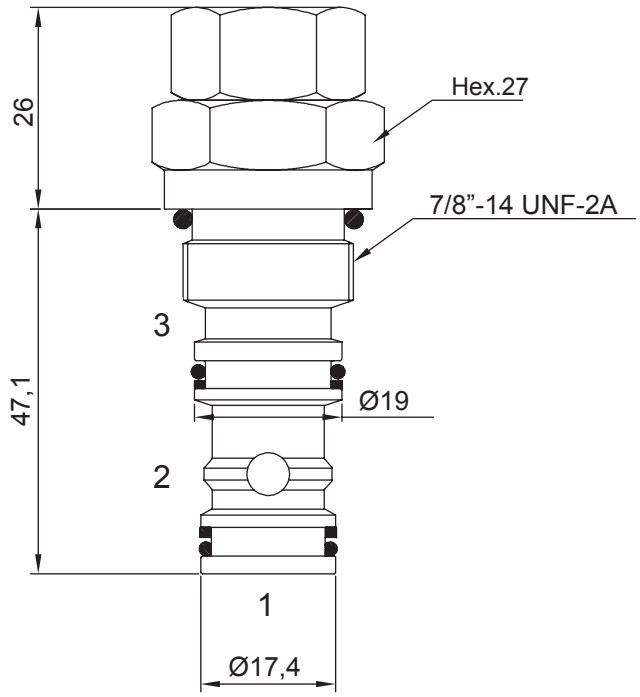
0 2 1 4 0 0 2 ☐ 0 0

SPRINGS	4
Cracking pressure [bar]	5

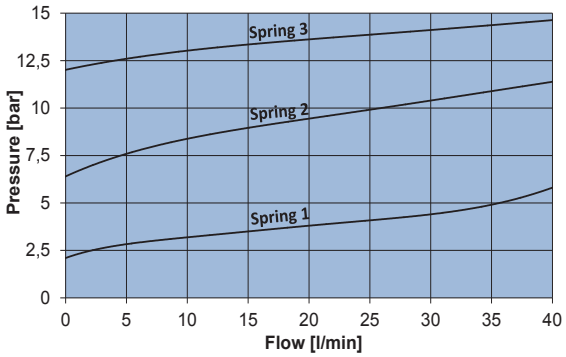
2 WAY NORMALLY CLOSED PRESSURE COMPENSATOR

- Max Flow . . . . . .**70 l/min**
- Max working pressure . . . . . .**350 bar**
- Seals . . . . . .**NBR and PTFE**
- Cavity **C331000**
- Cartridge tightening torque . . . . . .**50 Nm**
- Weight . . . . . .**0,17 Kg**
- Cavity . . . . . **C331000** page **221**
- Body. . . . . **172312** page **193**

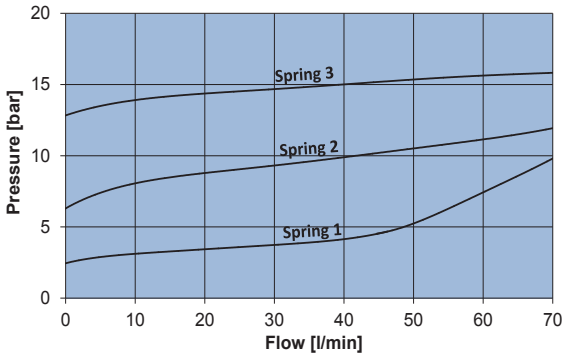




MAX FLOW 40 l/min (option 1)



MAX FLOW 70 l/min (option 2)



Ordering code

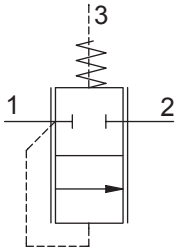
0 2 0 3 0 0 ☐ ☐ 0 0

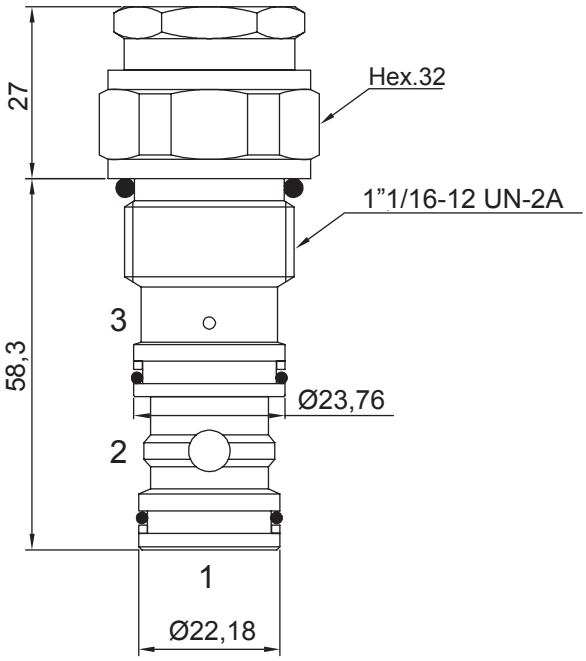
MAX FLOW	1	2
Q [l/min]	40 l/min	70 l/min

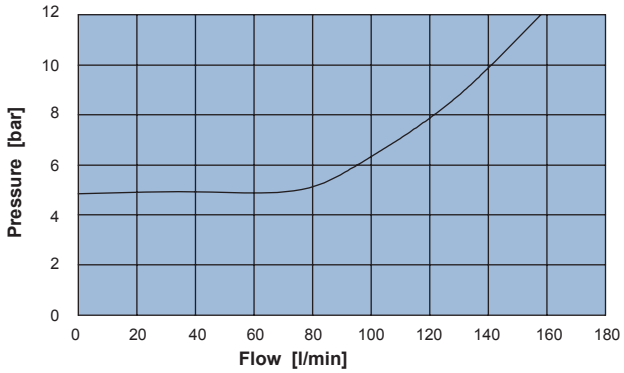
SPRINGS	1	2	3
Cracking pressure [bar]	2,5	7,5	11

2 WAY NORMALLY CLOSED PRESSURE COMPENSATOR

- Max Flow . . . . . **150 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque . . . . . **60 Nm**
- Weight . . . . . **0,26 Kg**
- Cavity. . . . . **C341000** page **223**
- Body. . . . . **172412** page **199**







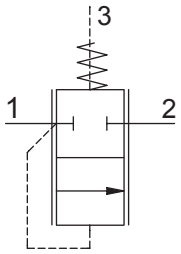
Ordering code

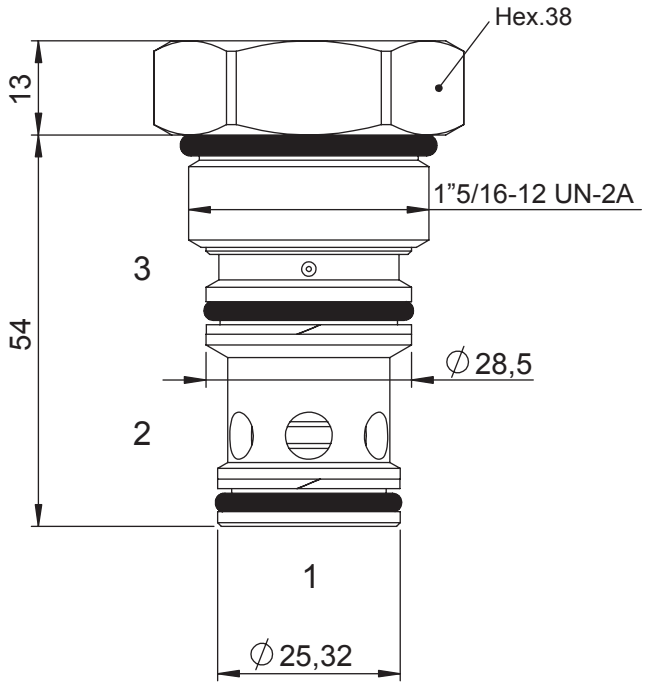
0 2 0 4 0 0 2 ☐ 0 0

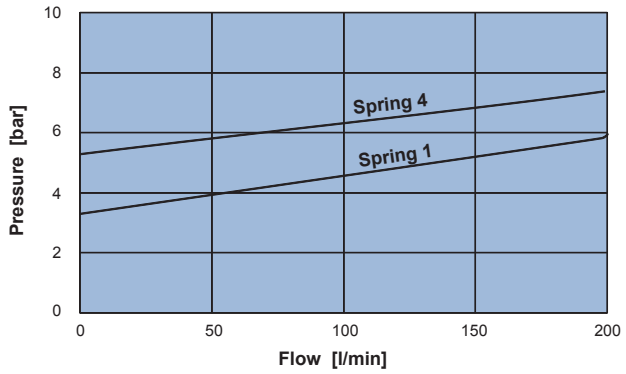
SPRINGS	4
Cracking pressure [bar]	5

2 WAY NORMALLY CLOSED PRESSURE COMPENSATOR

- Max Flow . . . . . .**200 l/min**
- Max working pressure . . . . . .**350 bar**
- Seals . . . . . .**NBR and PTFE**
- Cartridge tightening torque . . . . . .**75 Nm**
- Weight . . . . . .**0,3 Kg**
- Cavity. . . . . **C351000** page **224**
- Body. . . . . **172512** page **203**







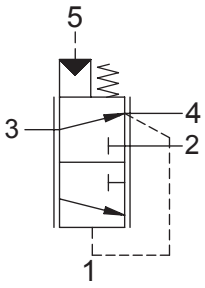
Ordering code

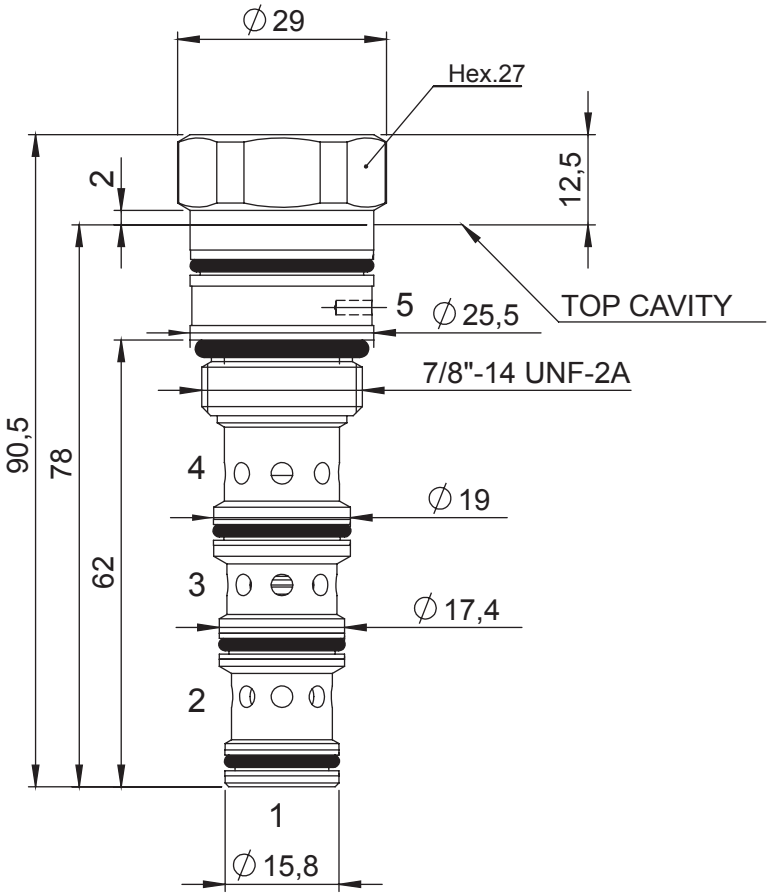
0 2 0 5 0 0 2 ☐ 0 0

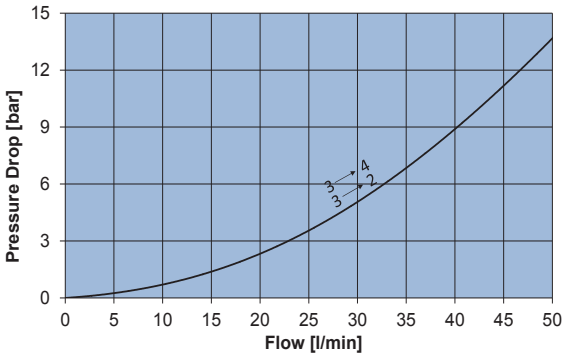
SPRINGS	1	4
Cracking pressure [bar]	2,8	4,8

3 WAY POST COMPENSATED PRESSURE COMPENSATOR

- Max flow from 3 to 2 . . . . . **50 l/min**
- Max flow from 3 to 4 . . . . . **40 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque . . . . . **50 Nm**
- Weight . . . . . **0,2 Kg**
- Cavity. . . . . **C533000** page **229**







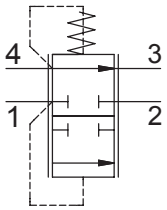
Ordering code

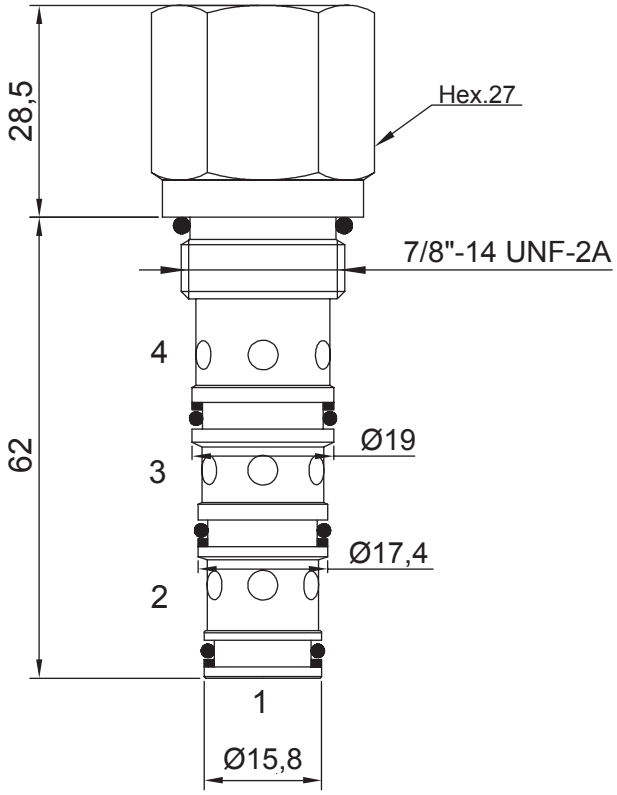
0 2 5 3 0 0 2 ☐ 0 0

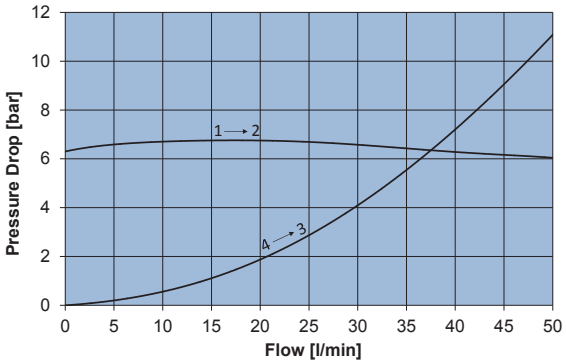
SPRINGS	4
Cracking pressure [bar]	5

4 WAY PRESSURE COMPENSATOR

- Flow . . . . . **50 l/min**
- Max working pressure. . . . . **350 bar**
- Leakage . . . . . **100 cc/min**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque . . . . . **50 Nm**
- Weight . . . . . **0,21 Kg**
- Cavity . . . . . **C430000** page **226**
- Body. . . . . **171322** page **195**







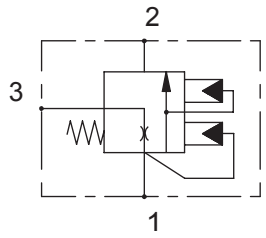
Ordering code

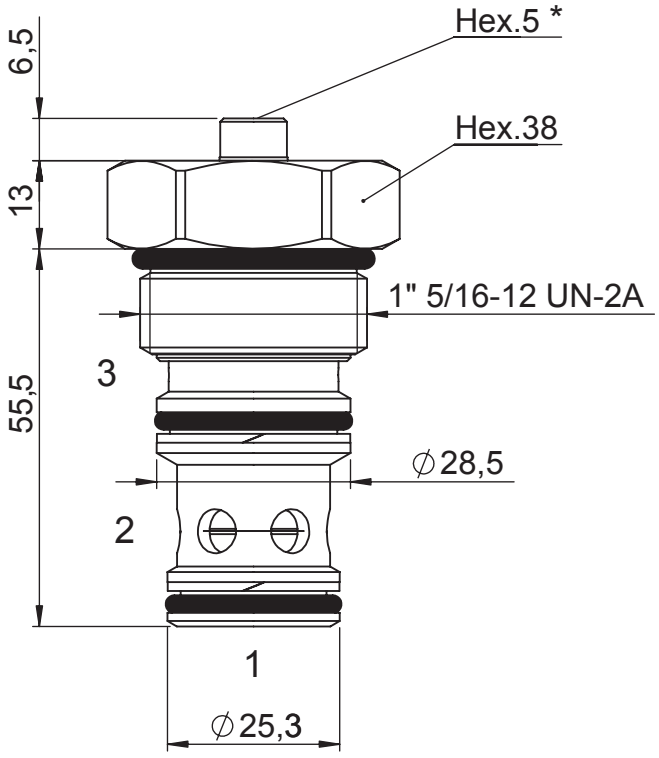
0 2 4 3 0 0 2 ☐ 0 0

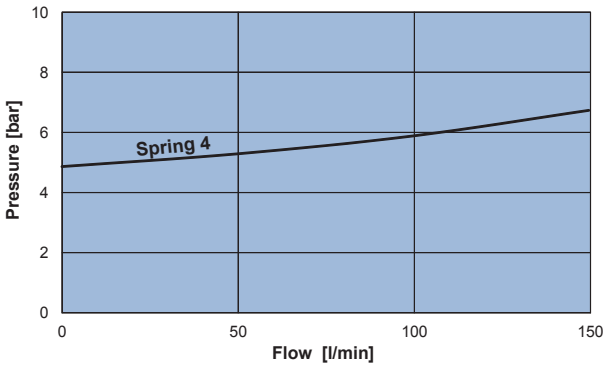
SPRINGS	4
Cracking pressure [bar]	5

2 WAY NORMALLY CLOSED LOGIC ELEMENT KICK-DOWN

- Max Flow . . . . . **150 l/min**
- Max working pressure . . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque . . . . . **75 Nm**
- Weight . . . . . **0,3 Kg**
- Cavity. . . . . **C351000** page **224**
- Body. . . . . **172512** page **203**







***Note:**
- When starting the system it is recommended to bleed air from the cap-cartridges.

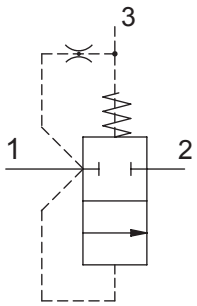
Ordering code

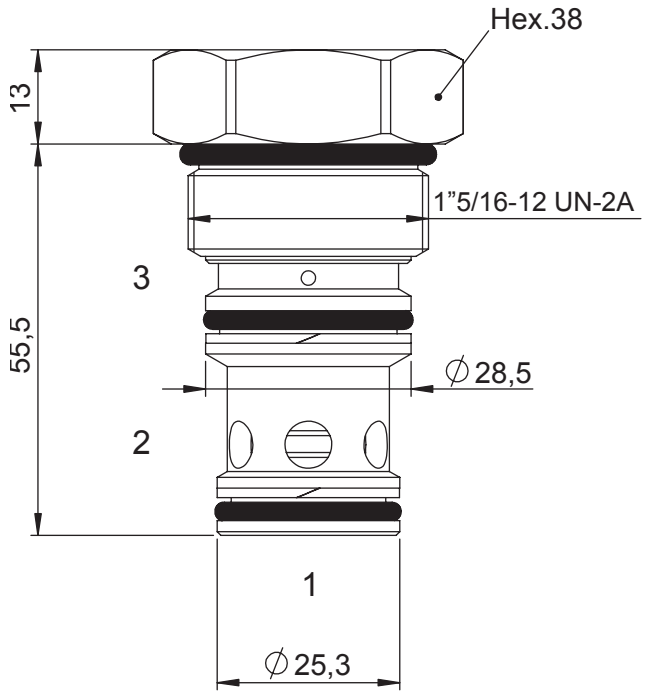
0 2 0 5 2 0 2 ☐ 0 0

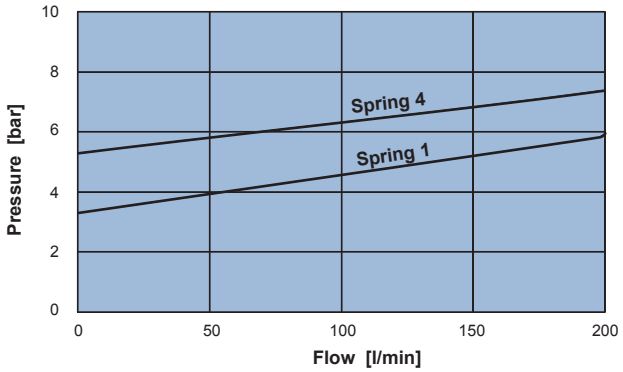
SPRINGS	4
Cracking pressure [bar]	4,8

2 WAY NORMALLY CLOSED LOGIC ELEMENT

- Max Flow . . . . . **200 l/min**
- Max working pressure. . . . . **350 bar**
- Seals . . . . . **NBR and PTFE**
- Cartridge tightening torque . . . . . **75 Nm**
- Weight . . . . . **0,3 Kg**
- Cavity. . . . . **C351000** page **224**
- Body. . . . . **172512** page **203**







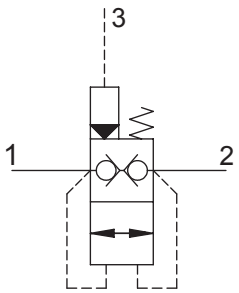
Ordering code

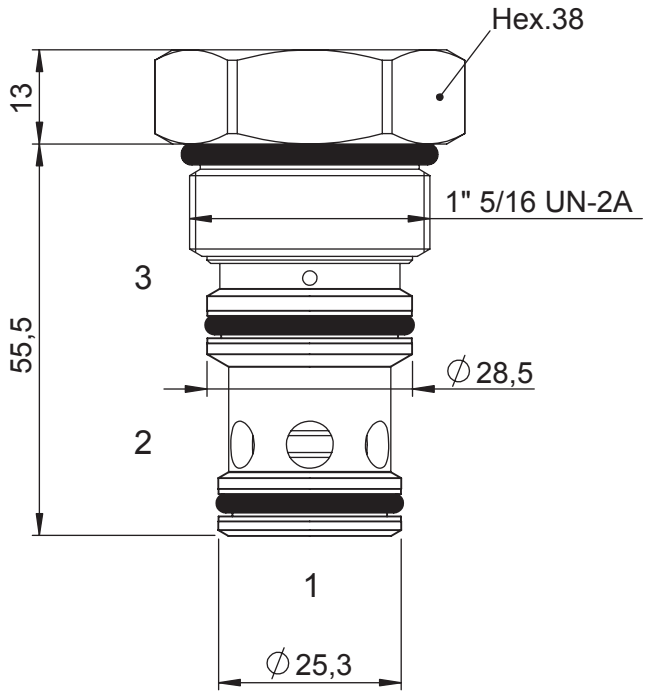
0 2 0 5 1 0 2 ☐ 0 0

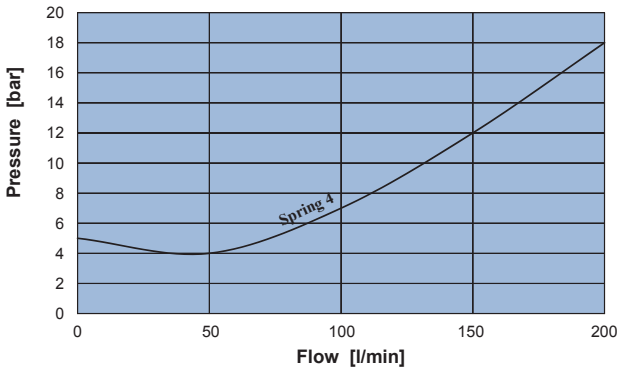
SPRINGS	1	4
Cracking pressure [bar]	2,8	4,8

2 WAY NORMALLY CLOSED POPPET LOGIC ELEMENT

- Flow . . . . . .**200 l/min**
- Max working pressure. . . . . .**350 bar**
- Seals . . . . . .**NBR and PTFE**
- Cavity. **C351000**
- Cartridge tightening torque. . . . . **75 Nm**
- Weight . . . . . .**0,3 Kg**
- Cavity. . . . . **C351000** page **224**
- Body. . . . . .**172512** page **203**







Ordering code

0 2 3 5 0 0 2 ☐ 0 0

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