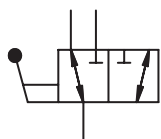


DIRECTIONAL CONTROL VALVES



DIRECTIONAL CONTROL VALVES

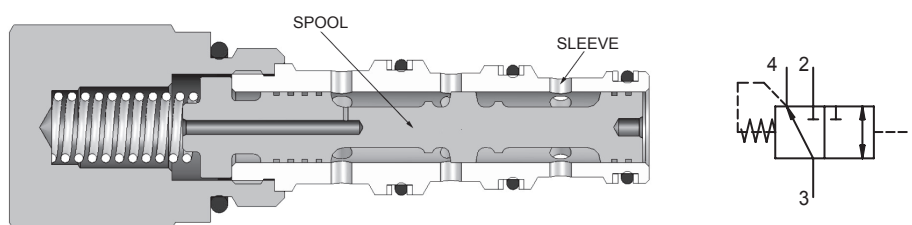
INTRODUCTION



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.



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.



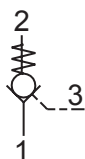
UNI-DIRECTIONAL VALVES

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.

DIRECTIONAL CONTROL VALVES



PILOT OPERATED CHECKVALVES

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 (r_p), which is the essential parameter for calculating the opening pilot pressure. Normally, given a generic load induced pressure (P_p), the pilot pressure (P_{pil}) required for opening the valve is calculated dividing the load induced pressure (P_p) by pilot ratio (r_p):

$$P_{pil} = P_p / r_p$$

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

$$P_{pil} = P_p / (r_p - r_a)$$

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

Cylinders out (Extension)
 $r_a = A_{fo} / A_{an} (>1)$

Cylinders in
 $r_a = A_{an} / A_{fo} (<1)$

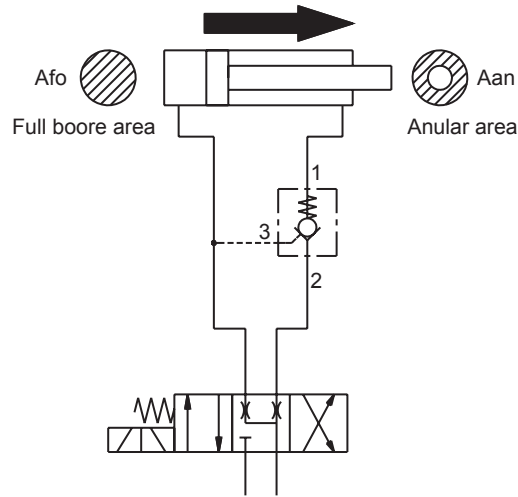
It's very important to remember that, in case of double acting cylinders, pilot ratio must be always higher than areas ratio:

$$r_p > r_a$$

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



DIRECTIONAL CONTROL VALVES

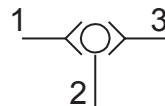


SELECTOR VALVES

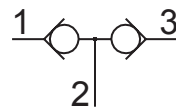
Selector valves are designed for pilot circuits or for circuits intended to transfer load sensing (LS) signals inside integrated circuits or directional control valves.

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.

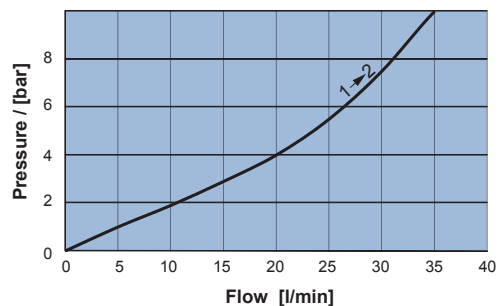
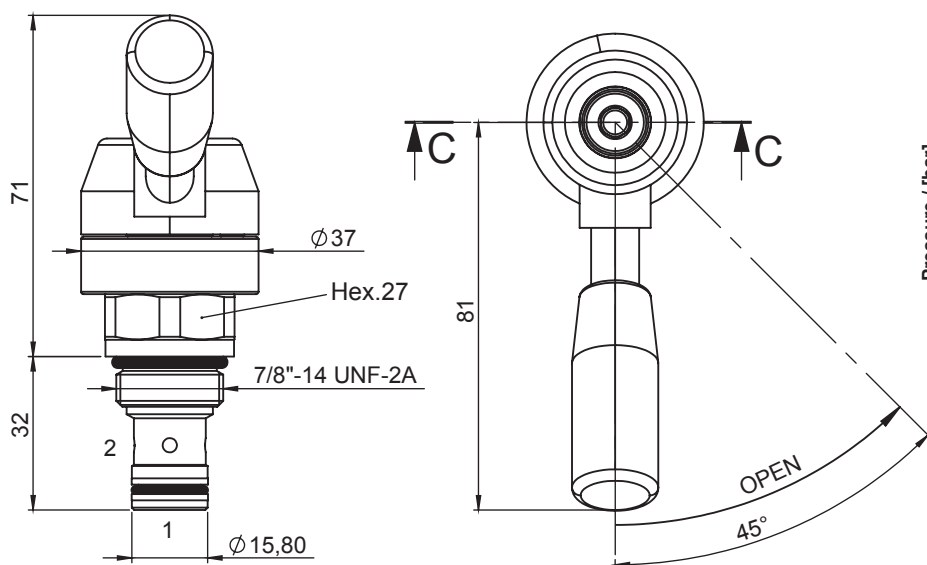
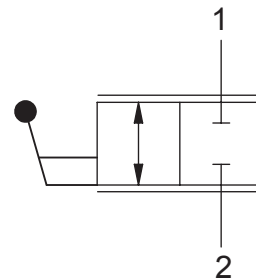


Uni-Directional Selector Valves: These valves compare 2 pressure signals, and allow a uni-directional flow of the highest.



2 WAY 2 POSITION ROTARY SPOOL DIRECTIONAL VALVE

- Max Flow.....**30 l/min**
- Max Pressure.....**350 bar**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**50 Nm**
- Weight.....**0,25 Kg**
- Cavity.....**C230000** page 210
- Body.....**171302** page 191

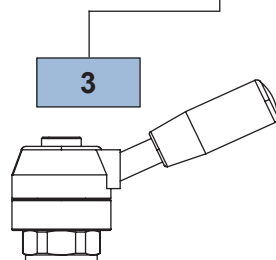


Notes:

- Valve regulation angle is 45° starting lever position can be set through CH6 nut.

Ordering code

0 4 9 3 1 0 0 0 0

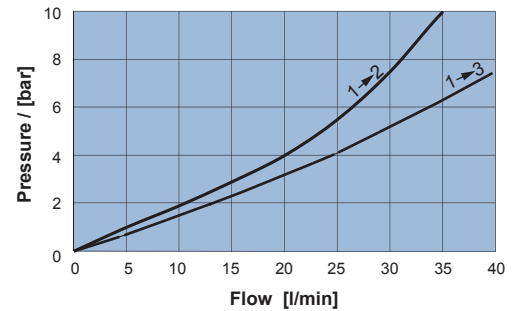
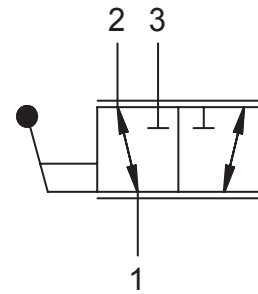
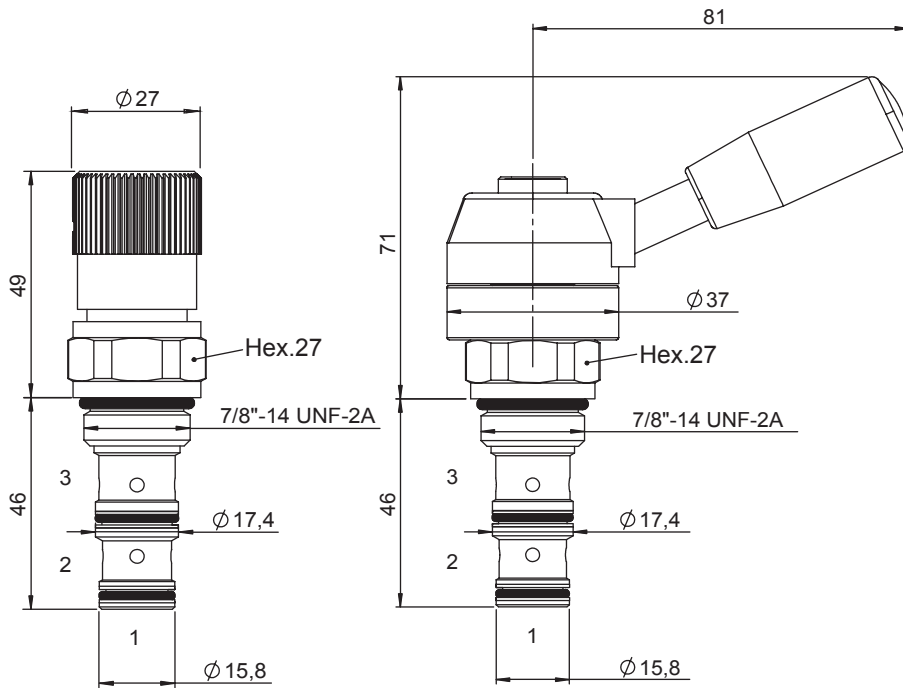


Hand lever frictioned



3 WAY 2 POSITION ROTARY SPOOL DIRECTIONAL VALVE

- Max Flow.....**30 l/min**
- Max Pressure.....**350 bar**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**50 Nm**
- Weight.....**0,2 Kg**
- Cavity.....**C330000** page 220
- Body.....**171312** page 192

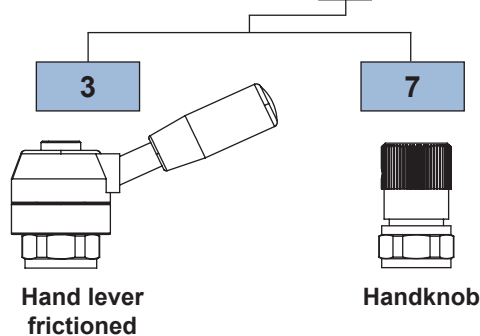


Notes:

- Valve regulation angle is 45° starting lever position can be set through CH6 nut.

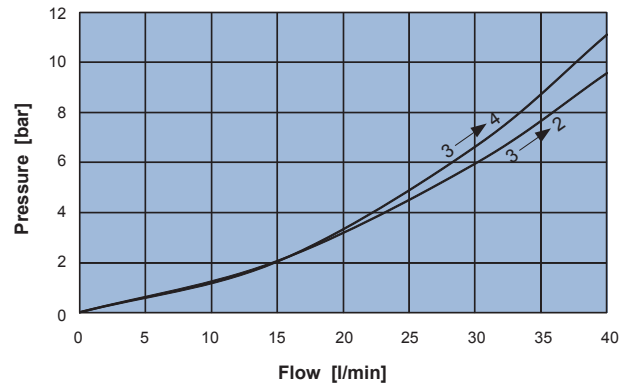
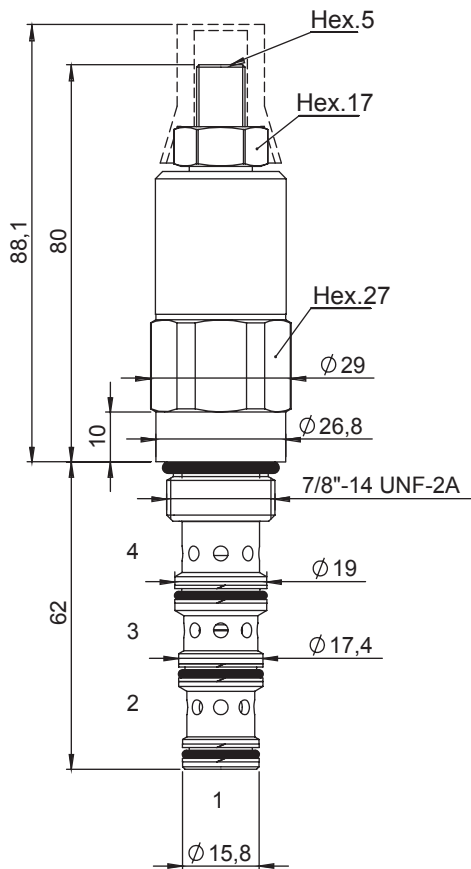
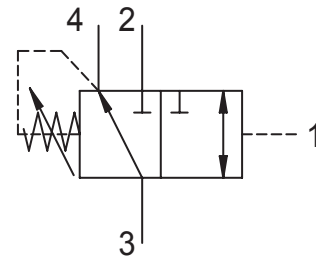
Ordering code

0 4 9 3 2 0 0 [] 0 0



ADJUSTABLE SETTING DIRECTIONAL VALVE

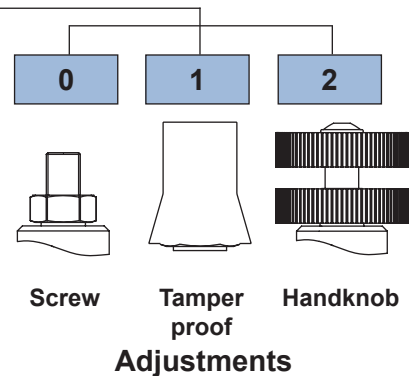
- Max Flow.....**50 l/min**
- Max Pressure.....**350 bar**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**50 Nm**
- Weight.....**0,35 Kg**
- Cavity.....**C430000** page 226
- Body.....**171322** page 195



Ordering code

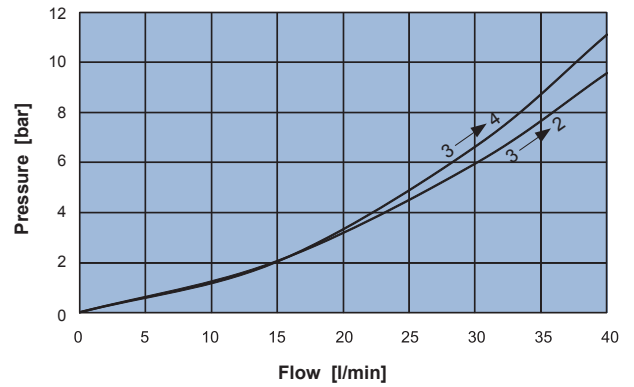
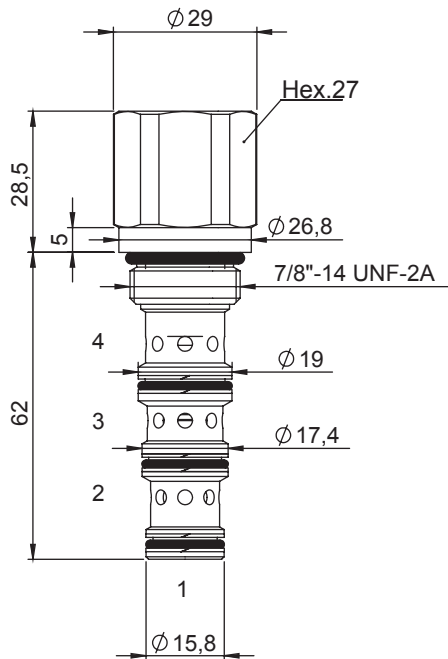
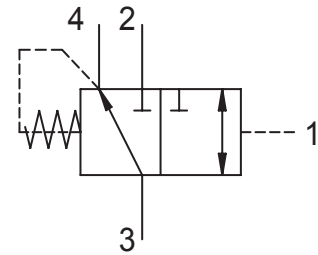
0 4 8 3 4 1 **0 0**

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



FIXED SETTING DIRECTIONAL VALVE

- Max Flow.....**50 l/min**
- Max Pressure.....**350 bar**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**50 Nm**
- Weight.....**0,2 Kg**
- Cavity.....**C430000** page 226
- Body.....**171322** page 195



Ordering code

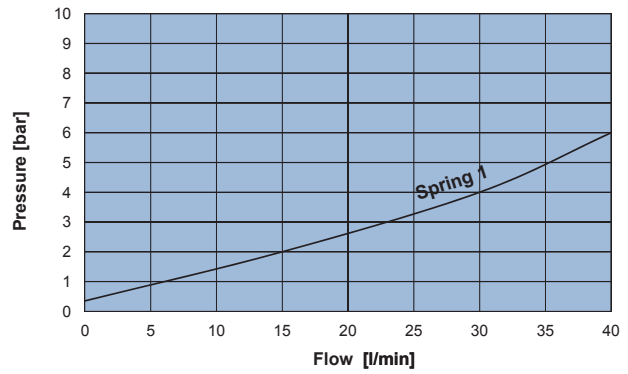
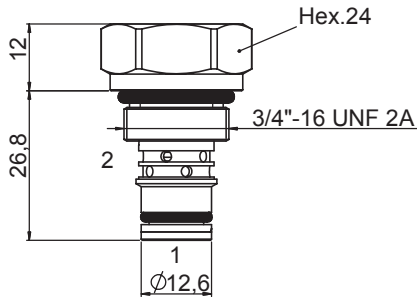
0 4 8 3 4 1 **0 0**

SPRINGS	1
Setting [bar]	6

3
Fix setting Adjustments

CHECK VALVE

- Max Flow.....**40 l/min**
- Max Pressure.....**350 bar**
- Leakage.....**0,25 cc/min**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**40 Nm**
- Weight.....**0,1 Kg**
- Cavity.....**C220000** page **208**
- Body.....**171202** page **186**



Ordering code

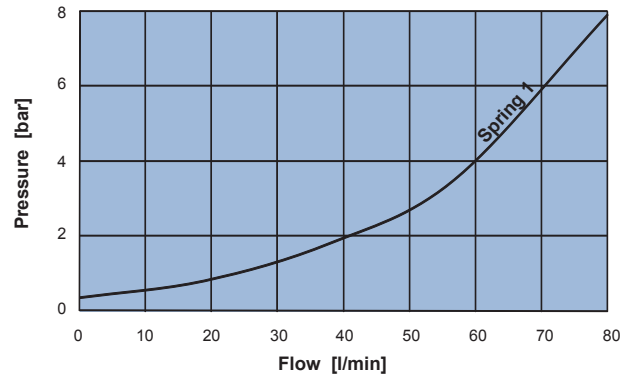
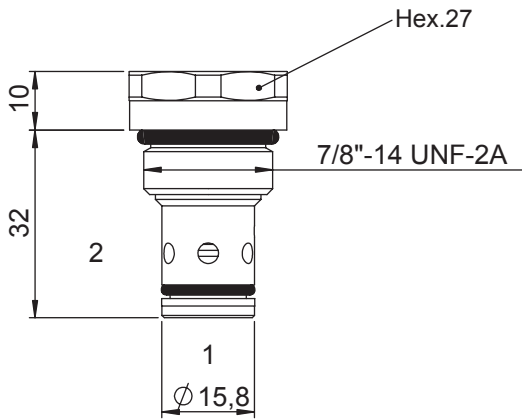
0 7 0 2 1 0 **0 0 0**

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



CHECK VALVE

- Max Flow.....**80 l/min**
- Max Pressure.....**350 bar**
- Leakage.....**0,25 cc/min**
- Seals.....**NBR and PTFE**
- Cartridge tightening torque.....**50 Nm**
- Weight.....**0,1 Kg**
- Cavity.....**C230000** page 210
- Body.....**171302** page 191



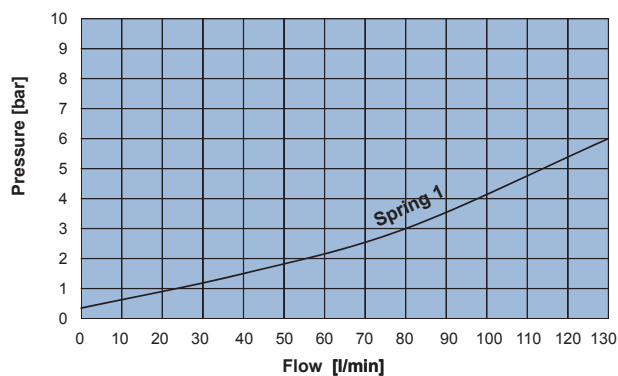
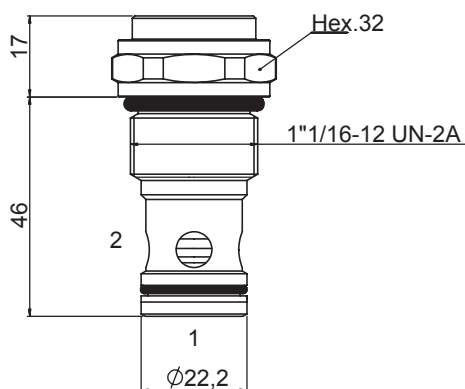
Ordering code

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.....130 l/min
- Max Pressure.....350 bar
- Leakage.....0,25 cc/min
- Seals.....NBR and PTFE
- Cartridge tightening torque.....60 Nm
- Weight.....0,2 Kg
- Cavity.....C240000 page 213
- Body.....171402 page 196



Ordering code

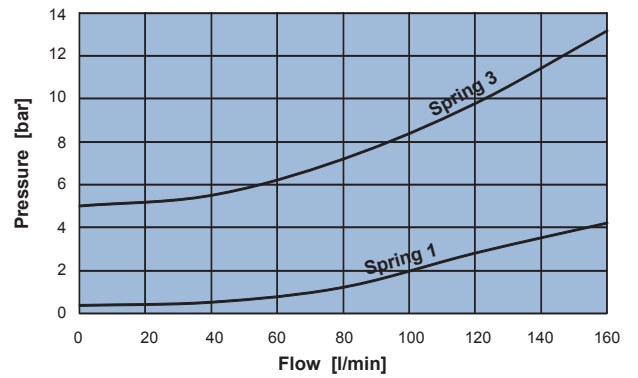
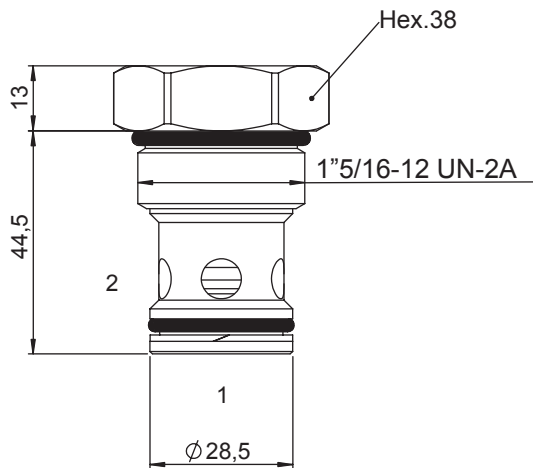
0 7 0 4 1 0 **0 0 0**

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



CHECK VALVE

- Max Flow.....150 l/min
- Max Pressure.....350 bar
- Leakage.....0,25 cc/min
- Seals.....NBR and PTFE
- Cartridge tightening torque......75 Nm
- Weight.....0,3 Kg
- Cavity.....C250000 page 215
- Body.....171502 page 201



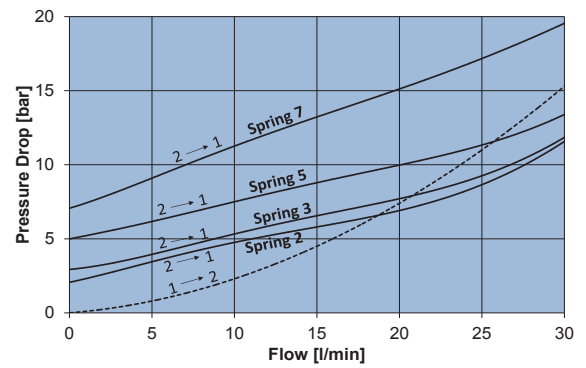
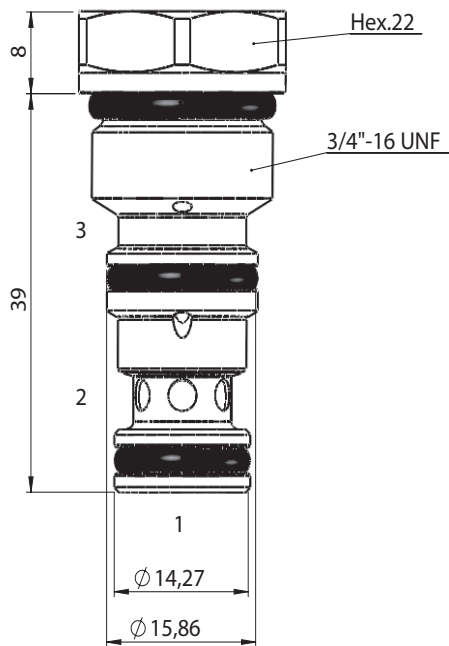
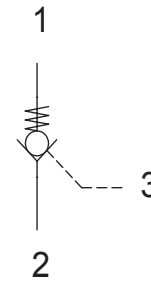
Ordering code

0 7 0 5 1 0 0 0 0

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

PILOT OPERATED CHECK VALVE

- Max Flow **30 l/min**
- Max working pressure **350 bar**
- Seals **NBR and PTFE**
- Leakage **0,1 cc/min @ 350 bar**
- Cartridge tightening torque **40 Nm**
- Weight **0,075 Kg**
- Cavity **C321000** page 219
- Body single cavity **172212** page 188
- Body double cavity **176212** page 189



Ordering code

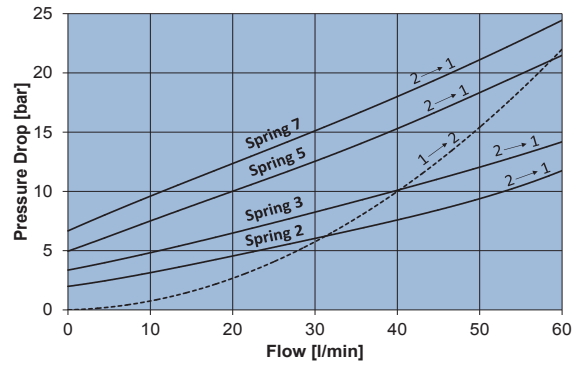
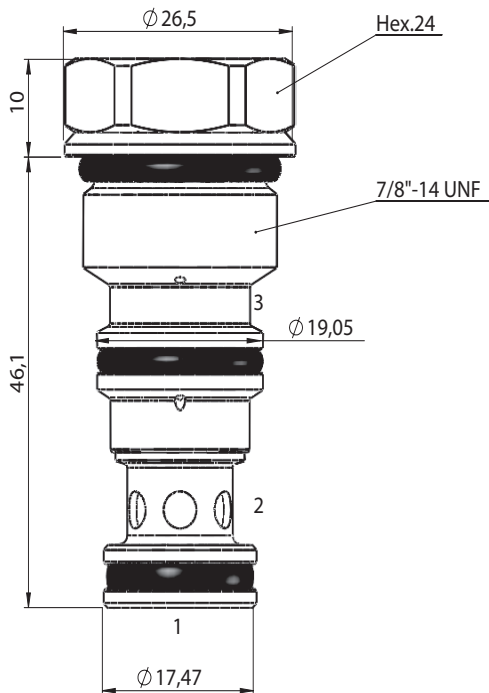
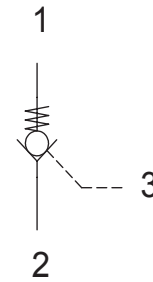
0 7 2 2 2 **0 1**

SEALS		SPRINGS				PILOT RATIO	
1	Without seals	2	3	5	7	1	3:1
2	With seals	Cracking pressure [bar]	2	3	5		



PILOT OPERATED CHECK VALVE

- Max Flow **60 l/min**
- Max working pressure..... **350 bar**
- Seals **NBR and PTFE**
- Leakage **0,1 cc/min @ 350 bar**
- Cartridge tightening torque **50 Nm**
- Weight **0,11 Kg**
- Cavity..... **C331000** page **221**
- Body single cavity..... **172312** page **193**
- Body double cavity **176312** page **194**



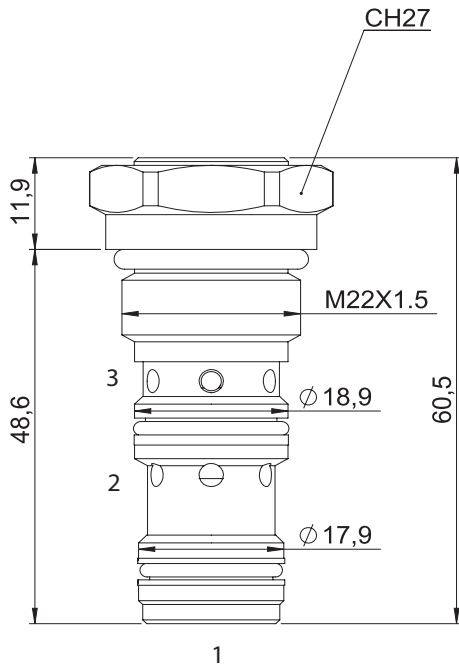
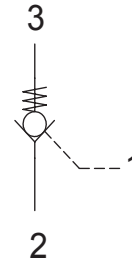
Ordering code

0 7 2 3 2 **0 1**

SEALS		SPRINGS				PILOT RATIO	
1	Without seals	2	3	5	7	1	3:1
2	With seals	Cracking pressure [bar]	2	3	5		

PILOT OPERATED CHECK VALVE

- Max Flow **50 l/min**
- Max working pressure..... **350 bar**
- Seals **NBR and PTFE**
- Cartridge tightening torque **50 Nm**
- Weight **0,13 Kg**
- Cavity **N330000** page **233**



Ordering code

0 7 2 3 1 2 **N 0**

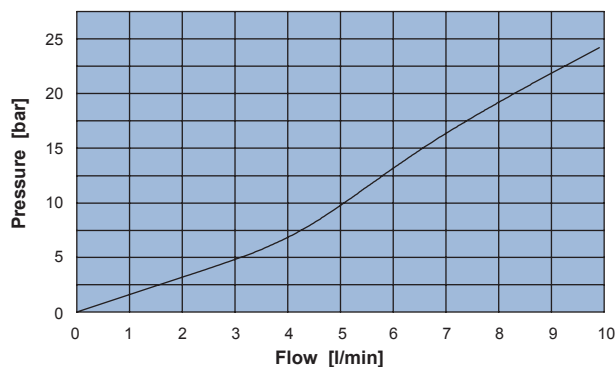
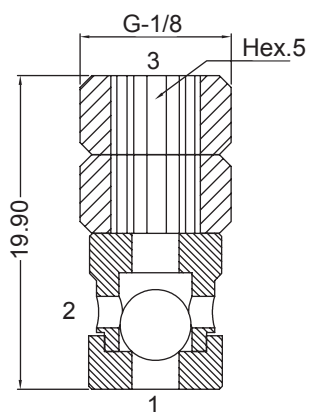
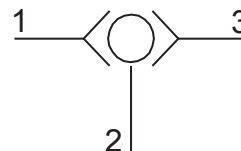
SPRINGS	4
Cracking pressure [bar]	10

PILOT RATIO	
1	3,4:1



INSERT SHUTTLE VALVE

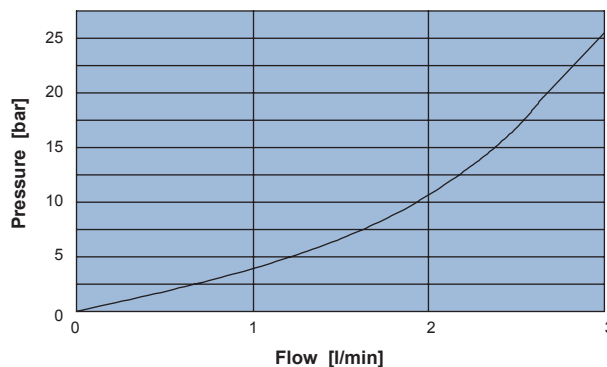
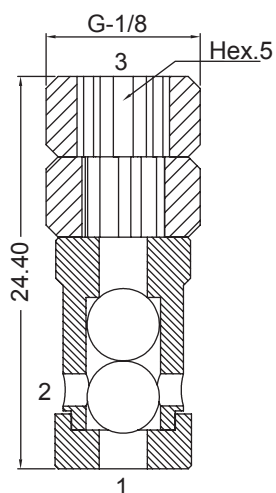
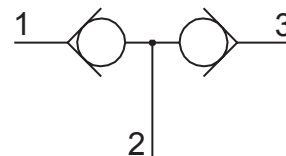
- Max Flow.....**10 l/min**
- Max Pressure.....**350 bar**
- Cartridge tightening torque.....**12-15 Nm**
- Weight.....**0,010 Kg**
- Cavity.....**S000004** page 230



Ordering code
074210000

UNIDIRECTIONAL INSERT SHUTTLE VALVE

- Max Flow..... **2 l/min**
- Max Pressure..... **350 bar**
- Cartridge tightening torque..... **12-15 Nm**
- Weight..... **0,010 Kg**
- Cavity..... **S000005** page 231



Ordering code
074220000

