

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

DEZVOLTAREA COMPETENȚELOR ȘI ABILITĂȚILOR STUDENȚILOR PENTRU IDENTIFICAREA DE SOLUȚII LA PROBLEME PRACTICE

Instruire privind Standardul ISO 1219-1

Conf. dr. ing. Mircea DULĂU

Șef lucr. dr. ing. Stelian OLTEAN

2018

Pneumatic Symbols

International Standard ISO 1219-1

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

- **Standards**
- **Basic symbols**
- **Functional elements**
- **Flowlines**
- **Connections**
- **Conditioners and plant**
- **Pressure regulators**
- **Relief valves**
- **Actuators**
- **Valve symbol structure**
- **Valve functions**
- **Three position valves**
- **Operators**
- **Port marking**
- **Function components**
- **Symbol Library**

Graphic Symbols Standards

- **Pneumatic symbols conform to and are devised from the International Standard ISO 1219-1 1991**
- **This covers graphical symbols for Fluid Power Systems and Components**
- **Port markings for fluid power valves are not covered by the ISO standard. These are taken from the recommendations of CETOP RP 68 P**

Basic Symbols

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

- **These shapes and lines in the relative proportions shown, make up a set of basic symbols from which fluid power symbols and circuits are constructed**



Basic Symbols

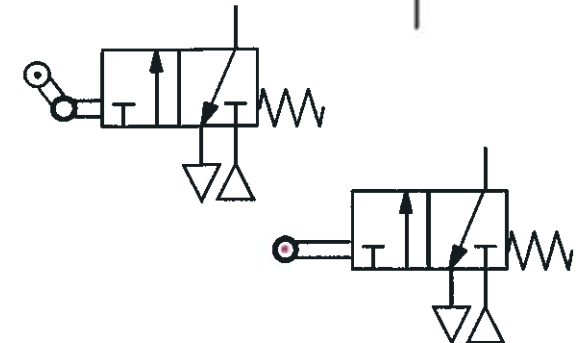
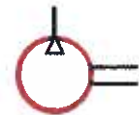
- **Symbol sets can be drawn to any size but their scale and relative proportions are determined by a basic dimension of your choice "l"**

Circles  l **energy conversion units**

 $3/4 l$ **measuring instrument**

 $1/3 l$ **mechanical link**

 $1/3 l$ **roller**



CNFIS-FDI-2018-0283

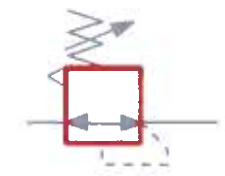
ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Basic Symbols

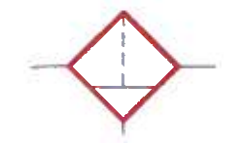
Square 

**control component
connections
perpendicular to sides**



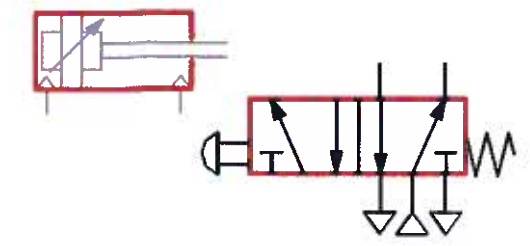
**Square at
45°** 

**conditioning apparatus
connections to corners**



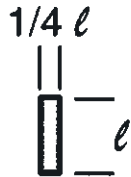
Rectangle 

cylinders and valves

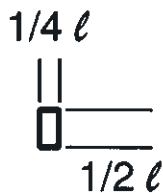


Basic Symbols

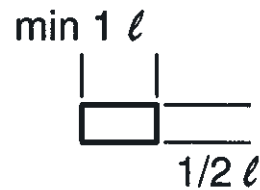
Rectangles continued



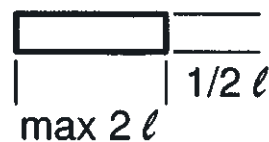
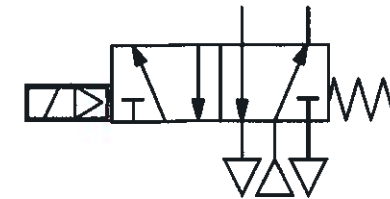
piston



cushion



certain control methods, length between limits to suit



Basic Symbols

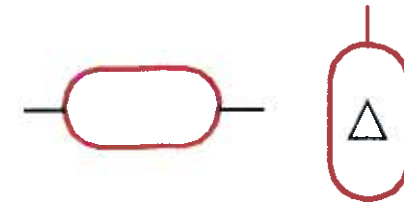
Semi-circle 

rotary actuator, motor
or pump with limited
angle of rotation



Capsule 

pressurised reservoir
air receiver, auxiliary
gas bottle



Double line 

mechanical connection
piston rod, lever, shaft

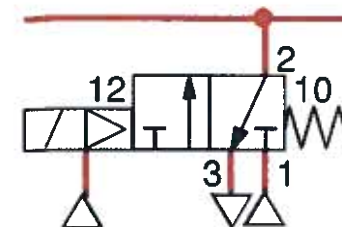


Basic Symbols

Line



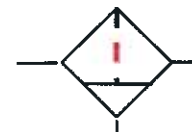
**Working line, pilot supply,
return, electrical**



Dashed



Pilot control, bleed, filter



Chain



**Enclosure of two or more
functions in one unit**



Line



Electrical line






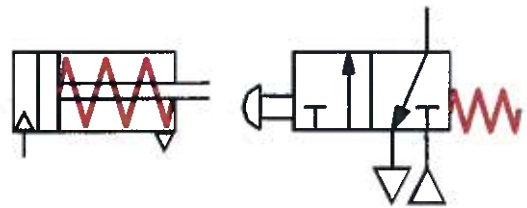


Functional Elements

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Functional Elements

Triangle	$\frac{1}{2} \ell$ 	$\frac{1}{4} \ell$ 	Direction and nature of fluid, open pneumatic or filled hydraulic	
Spring			size to suit	
Arrow		$\frac{1}{3} \ell$	Long sloping indicates adjustability	

Functional Elements

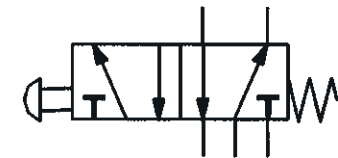
Arrows 

Straight or sloping path and flow direction, or motion



Tee 

Closed path or port




Restriction 

Size to suit



Functional Elements




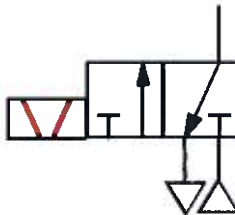

Curved arrows  **rotary motion**

Shaft rotation  **clockwise from right hand end**
anti-clockwise from right hand end
both

Seating  **90° angle**



Functional Elements

Temperature		Indication or control size to suit	
Operator		Opposed solenoid windings	
Prime mover	M	Electric motor	





Flowlines and Connections

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

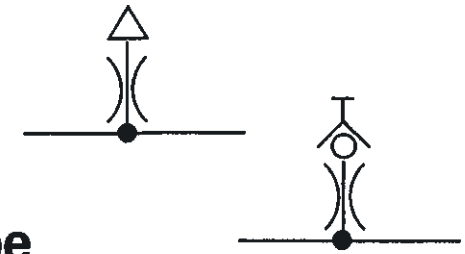
Flowlines

Junction		Single
Junction		Four way junction
Crossing		not connected
Flexible line		Hose usually connecting parts with relative movement

Connections

Air bleed

Continuous

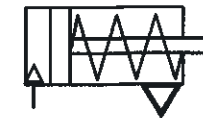


Temporary by probe

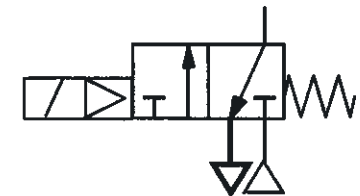
Air exhaust



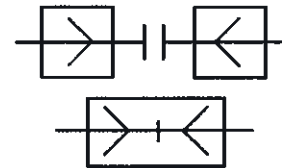
No means of connection



With means of connection

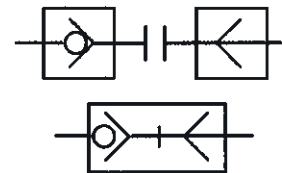


**Coupling quick
release**



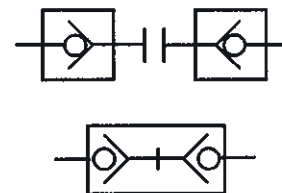
Both to exhaust

**Coupling quick
release self sealing**



Source sealed

**Coupling quick
release self sealing**



Both sealed

**Rotary connection one
line**



**Rotary connection two
lines**



**Rotary connection
three lines**



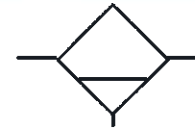
Conditioners and Pressure Producing Plant

CNFIS-FDI-2018-0283

ICADIS

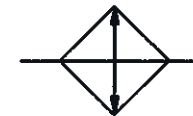
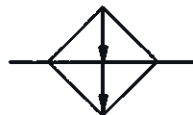
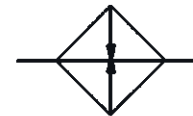
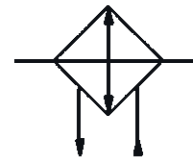
Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

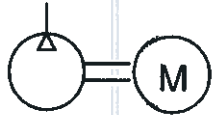



- **Water separator with manual drain**
- **Water separator with automatic drain**
- **Filter with manual drain**
- **Filter with automatic drain**
- **Lubricator**



Conditioners

- **Dryer**
- **Cooler with and without coolant flow lines**
- **Heater**
- **Combined heater / cooler**



- **Compressor and electric motor** 
- **Air receiver** 
- **Isolating valve** 
- **Air inlet filter** 

Pressure Control

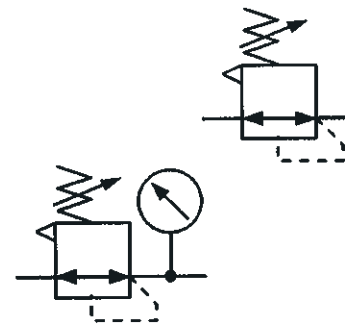
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

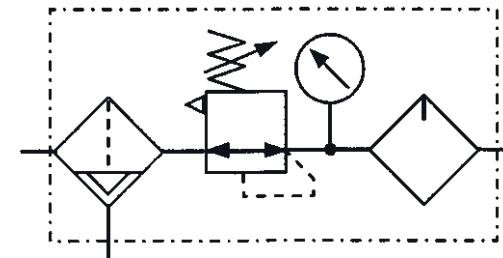
Pressure regulators

- A pressure regulator symbol represents a normal state with the spring holding the regulator valve open to connect the supply to the outlet.
- The dotted line represents the feedback, this opposes the spring and can vary the flow through the valve from full flow, through shut off, to exhaust. The symbol is usually drawn in only this one state. The flow path can be imagined to hinge at the right hand end to first shut off the supply then connect to the exhaust.
- Adjustable Regulator simplified
- Adjustable Regulator with pressure gauge simplified



Filter Regulator Lubricator

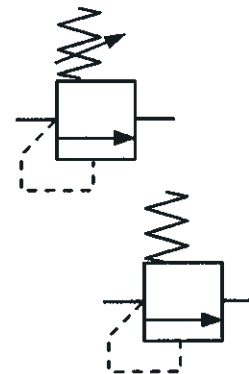
- **FRL Combined unit**
- **FRL Simplified symbol**



Pressure relief valves

- **A pressure relief valve symbol represents a normal state with the spring holding the valve closed.**
- **The dotted line represents feed-forward, this opposes the spring and can be imagined to lift the flow path. When the pressure reaches an excess value the flow path will line up with the ports and flow air to relief.**

- **Adjustable relief valve simplified**
- **Preset relief valve simplified**



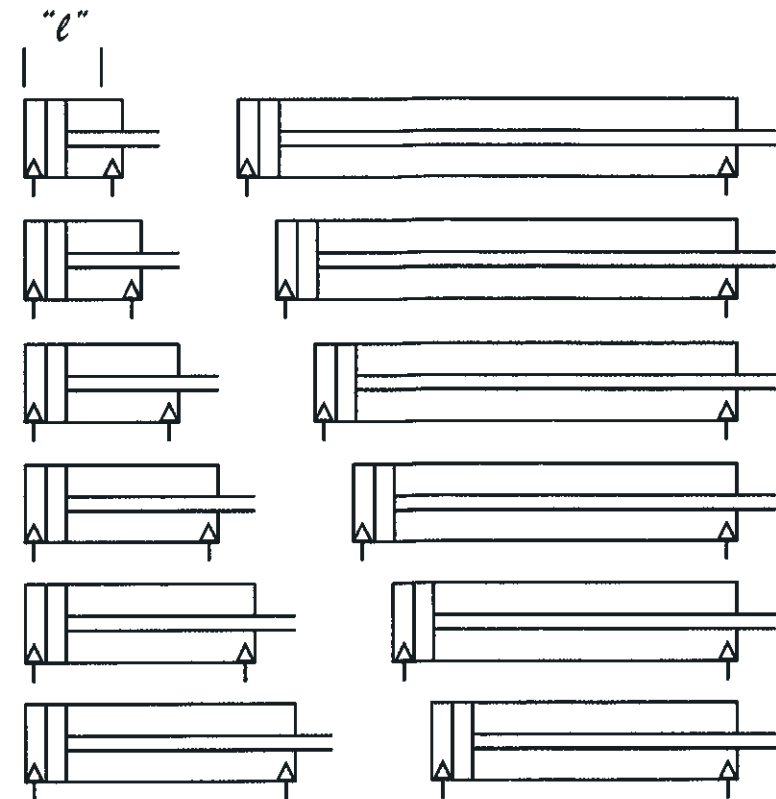
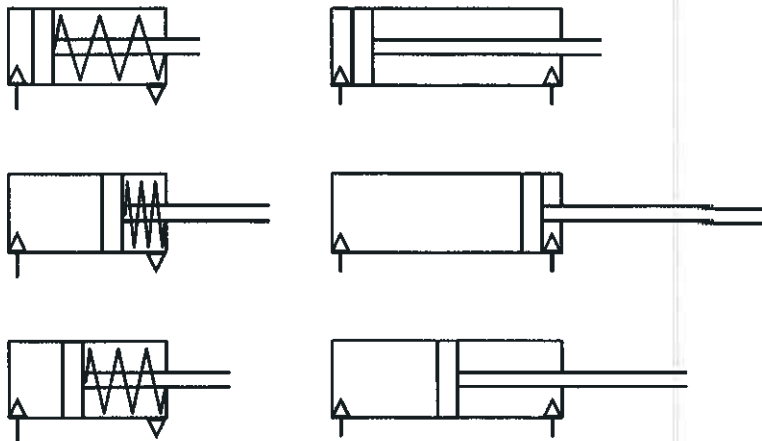
Actuators

CNFIS-FDI-2018-0283

ICADIS

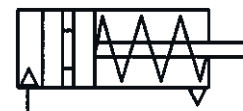
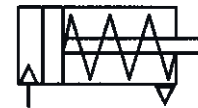
Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

- **Cylinders symbols can be any length over "l"**
- **The piston and rod can be shown in the retracted, extended or any intermediate position**



Single acting

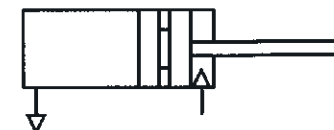
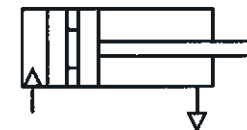
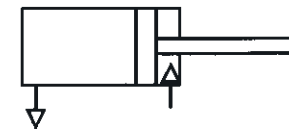
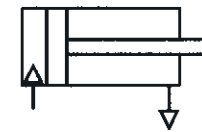
- **Single acting sprung instroked**
- **Single acting sprung outstroked**
- **Single acting sprung instroked magnetic ***
- **Single acting sprung outstroked magnetic ***



* ISO 1219-1 provides no example for magnetic cylinders

Single acting without spring

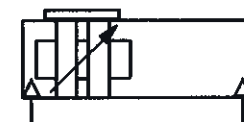
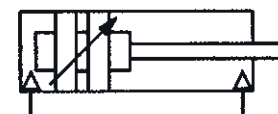
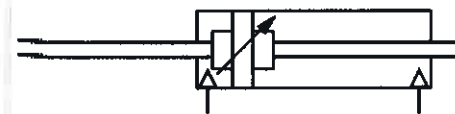
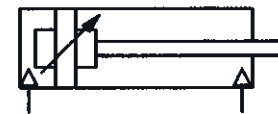
- **Single acting normally instroked external force returns**
- **Single acting normally outstroked external force returns**
- **Single acting normally instroked magnetic external force returns**
- **Single acting normally outstroked magnetic external force returns**



Note: the hardware is usually double acting cylinders applied as single acting

Double acting

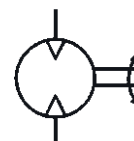
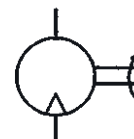
- **Double acting adjustable cushions**
- **Double acting through rod**
- **Double acting magnetic ***
- **Double acting rodless ***



* ISO 1219-1 provides no example for magnetic or rodless cylinders

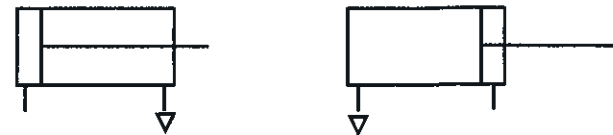
Rotary actuators

- **Semi rotary double acting**
- **Rotary motor single direction of rotation**
- **Rotary motor bi-directional**



Simplified cylinder symbols

- **Single acting load returns**



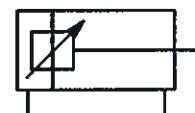
- **Single acting spring returns**



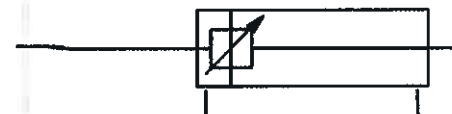
- **Double acting non cushioned**



- **Double acting adjustable cushions**



- **Double acting through rod**



Valve symbol structure

Valve symbol structure

- **The function of a valve is given by a pair of numerals separated by a stroke, e.g. 3/2..**
- **The first numeral indicates the number of main ports. These are inlets, outlets and exhausts but excludes signal ports and external pilot feeds.**
- **The second numeral indicates the number of states the valve can achieve.**

Valve symbol structure

- A 3/2 valve therefore has 3 ports (normally these are inlet, outlet and exhaust) and 2 states (the normal state and the operated state)
- The boxes are two pictures of the same valve

operated



normal

Valve symbol structure

- **A valve symbol shows the pictures for each of the valve states joined end to end**

operated



normal

Valve symbol structure

- A valve symbol shows the pictures for each of the valve states joined end to end

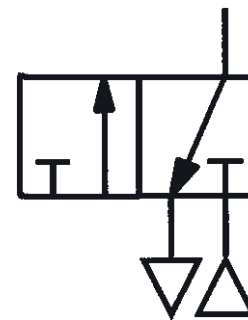
operated



normal

Valve symbol structure

- The port connections are shown to only one of the diagrams to indicate the prevailing state

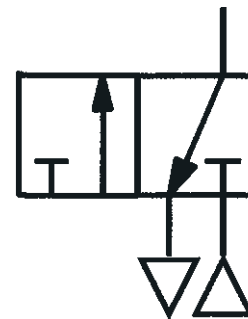


normal

Valve symbol structure

- The operator for a particular state is illustrated against that state

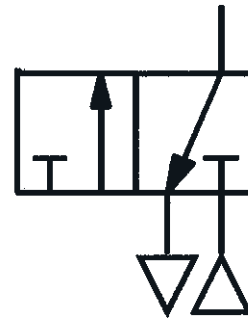
Operated state
produced by
pushing a button



Valve symbol structure

- The operator for a particular state is illustrated against that state

Operated state
produced by
pushing a button

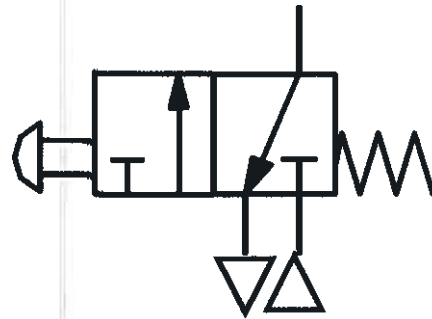


Normal state
produced by
a spring

Valve symbol structure

- **The operator for a particular state is illustrated against that state**

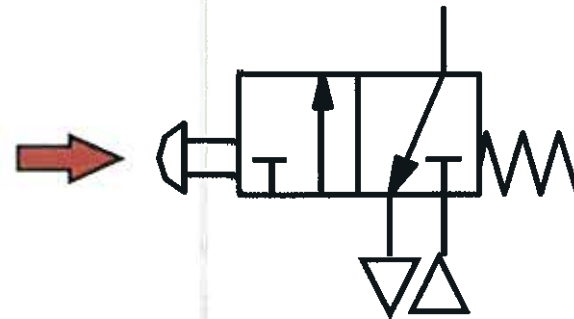
**Operated state
produced by
pushing a button**



**Normal state
produced by
a spring**

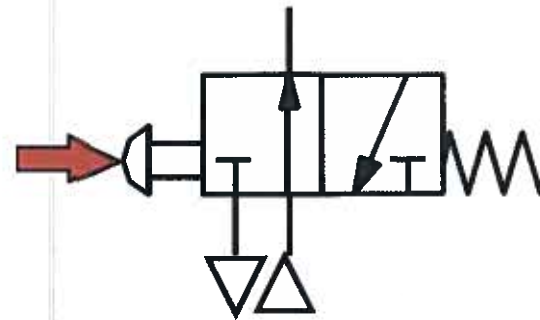
Valve symbol structure

- **The valve symbol can be visualised as moving to align one state or another with the port connections**



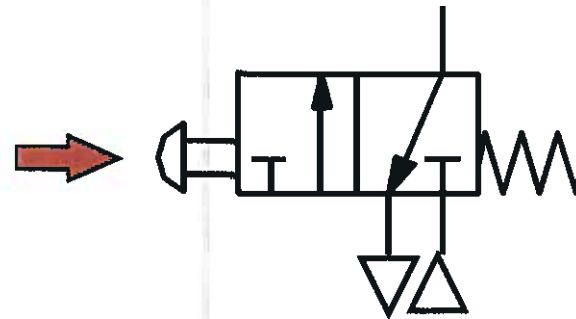
Valve symbol structure

- **The valve symbol can be visualised as moving to align one state or another with the port connections**



Valve symbol structure

- **The valve symbol can be visualised as moving to align one state or another with the port connections**



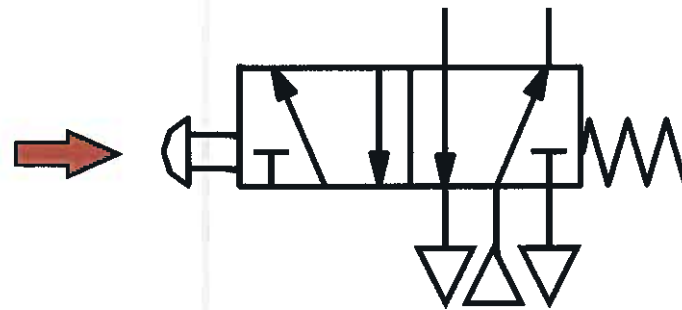
Valve symbol structure

- **A 5/2 valve symbol is constructed in a similar way. A picture of the valve flow paths for each of the two states is shown by the two boxes. The 5 ports are normally an inlet, 2 outlets and 2 exhausts**



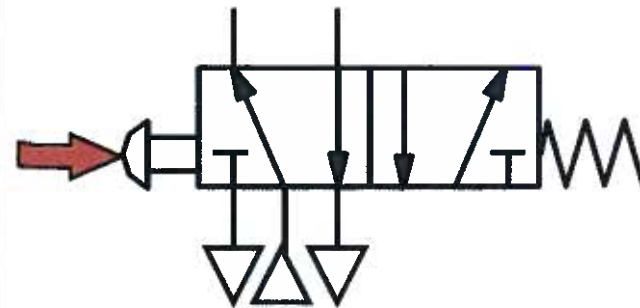
Valve symbol structure

- **The full symbol is then made by joining the two boxes and adding operators. The connections are shown against only the prevailing state**



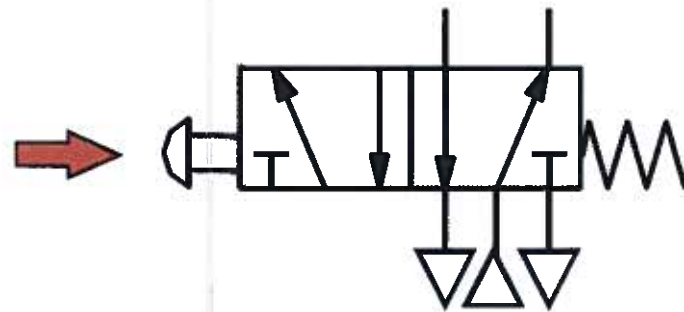
Valve symbol structure

- **The full symbol is then made by joining the two boxes and adding operators. The connections are shown against only the prevailing state**

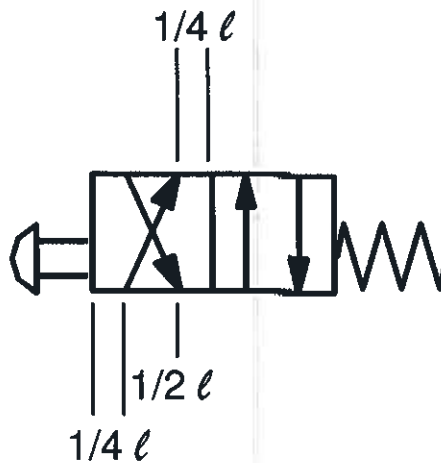
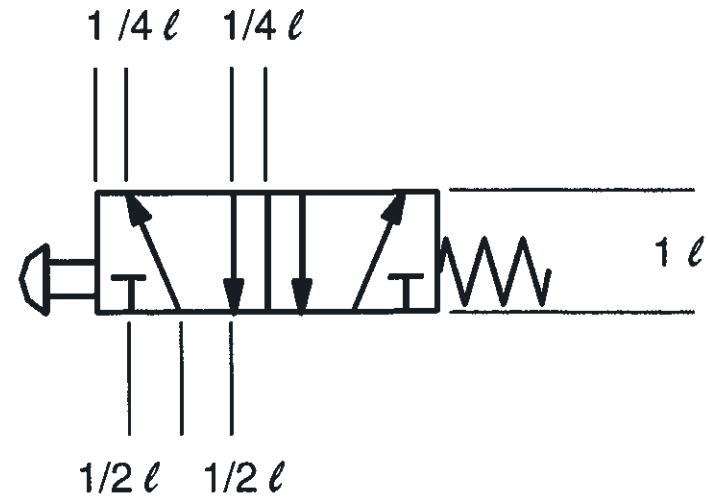
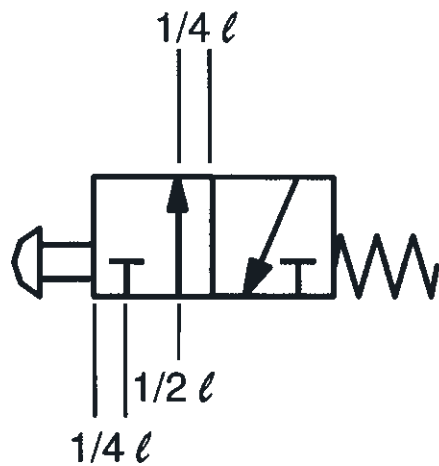


Valve symbol structure

- **The full symbol is then made by joining the two boxes and adding operators. The connections are shown against only the prevailing state**

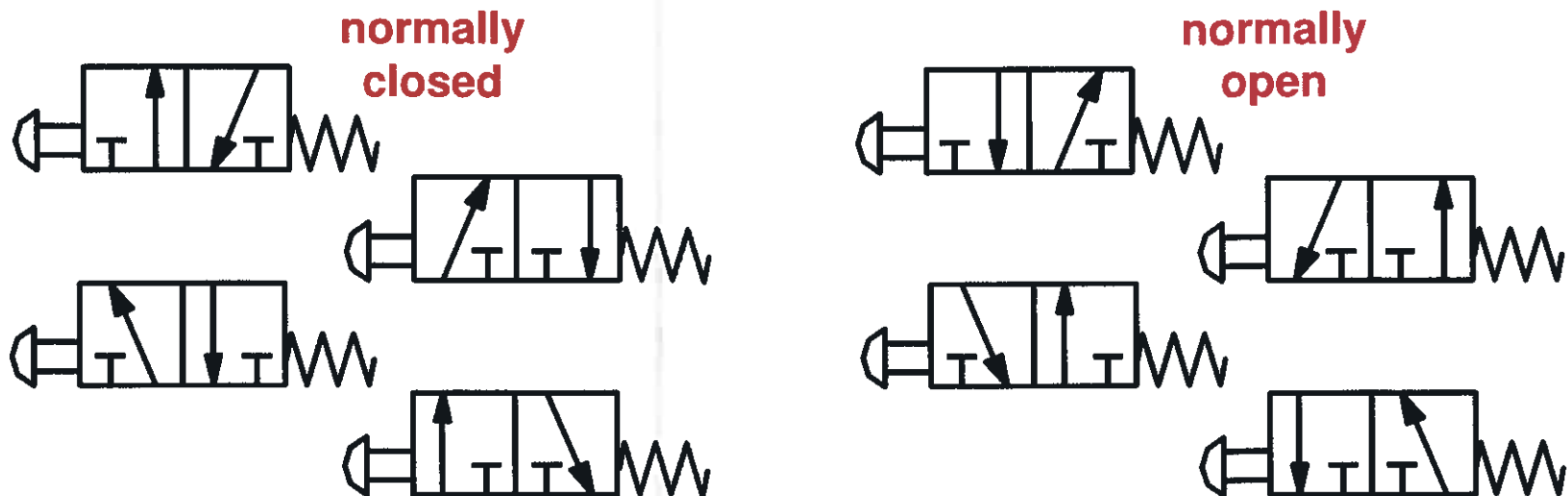


- The recommended spacing of the connections



Valve symbol structure

- The boxes can be joined at either end but the operator must be drawn against the state that it produces. The boxes can also be flipped
- A variety of symbol patterns are possible



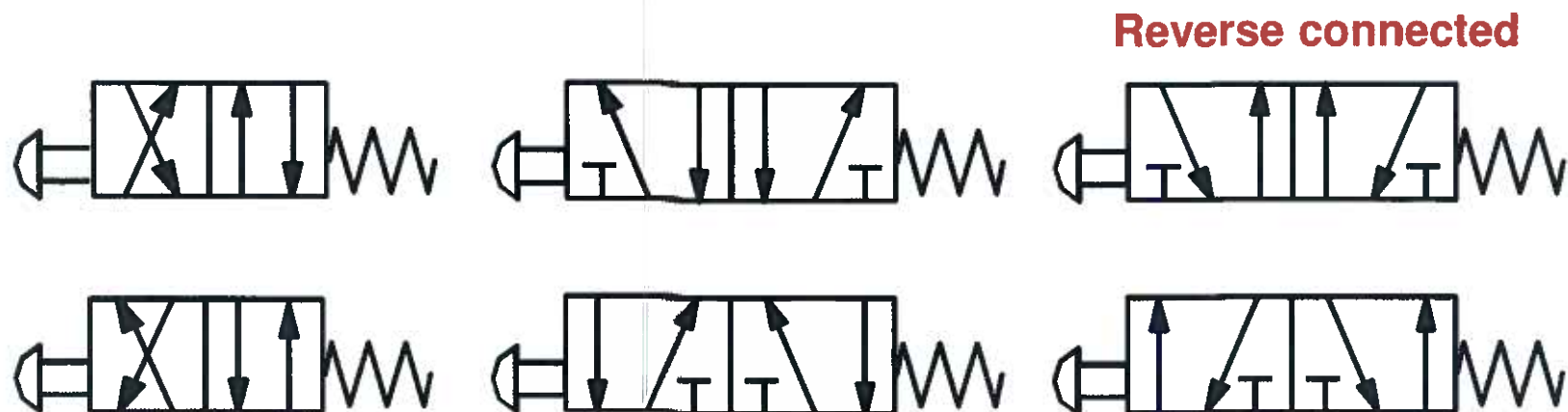
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Valve symbol structure

- The boxes can be joined at either end but the operator must be drawn against the state that it produces. The boxes can also be flipped
- A variety of symbol patterns can be produced



Valve functions

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Valve functions

Basic valves before operators are added

Function 2/2

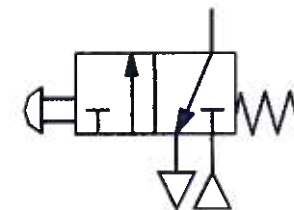
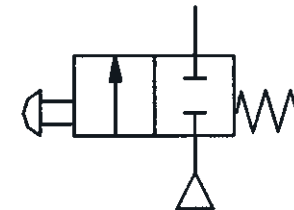


Function 3/2



Examples, push button operated with spring return

Normal position



Valve functions

Basic valves before operators are added

Function 2/2

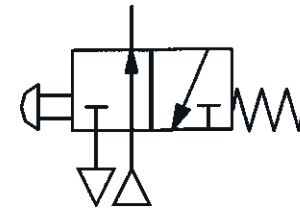
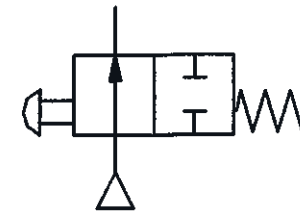


Function 3/2



Examples, push button operated with spring return

Operated position



Valve functions

Basic valves before operators are added

Function 4/2

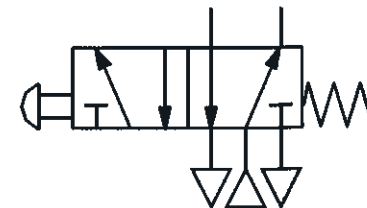
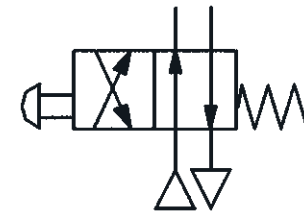


Function 5/2



Examples, push button operated with spring return

Normal position



CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
 Universitatea "Petru Maior" din Târgu-Mureș

Valve functions

Basic valves before operators are added

Function 4/2

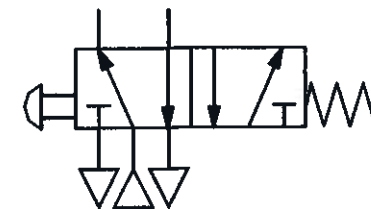
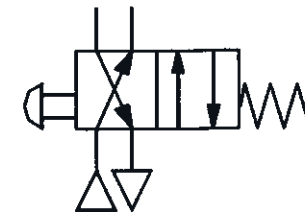


Function 5/2



Examples, push button operated with spring return

Operated position



CNFIS-FDI-2018-0283

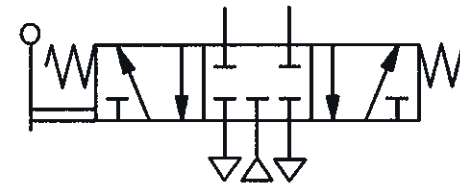
ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

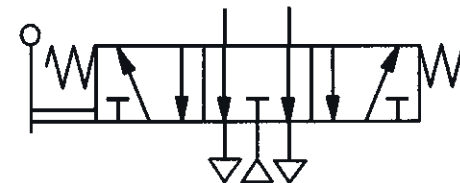
- **Three position valves have a normal central position that is set by springs or with a manual control such as a lever**
- **The flow pattern in the centre position varies with the type. Three types will be considered**
- **1, All ports sealed**
- **2, Outlets to exhaust, supply sealed**
- **3, Supply to both outlets, exhausts sealed**

- All valves types shown in the **normal position**

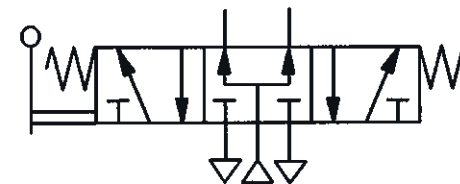
- **Type 1. All ports sealed**



- **Type 2. Outlets to exhaust**

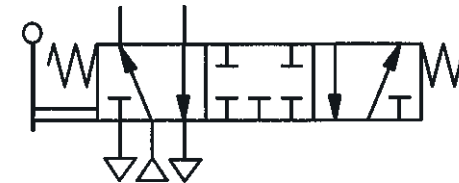


- **Type 3. Supply to outlets**

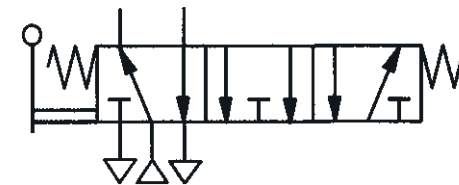


- All valves types shown in the **first operated position**

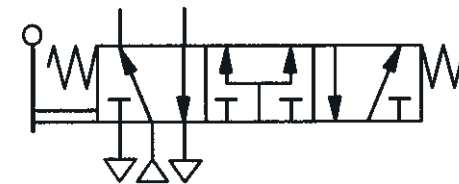
- Type 1. All ports sealed



- Type 2. Outlets to exhaust

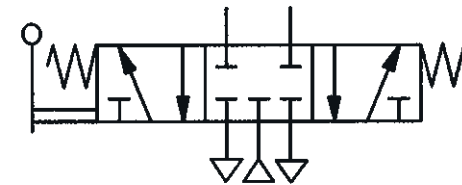


- Type 3. Supply to outlets

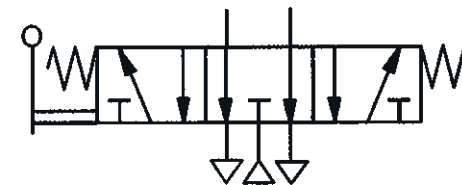


- All valves types shown in the **normal position**

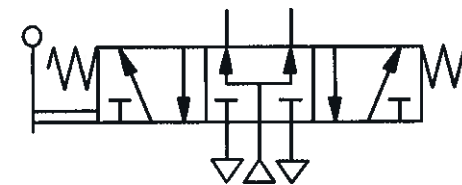
- Type 1. All ports sealed



- Type 2. Outlets to exhaust

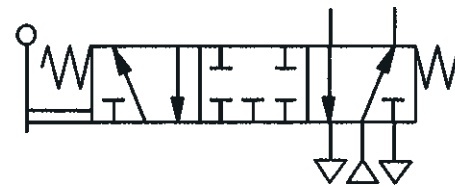


- Type 3. Supply to outlets

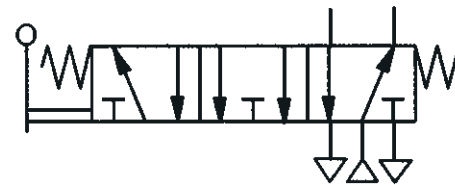


- All valves types shown in the **second operated position**

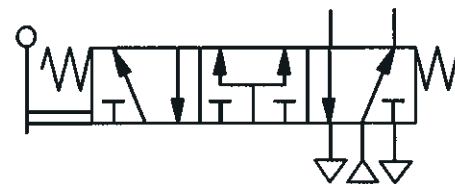
- Type 1. All ports sealed



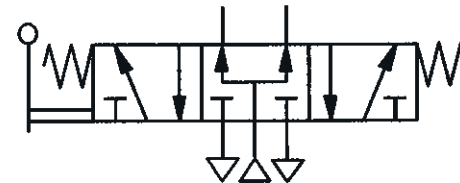
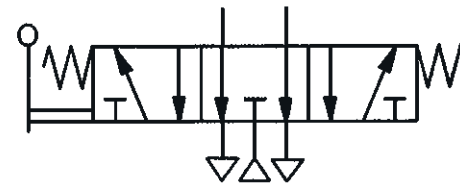
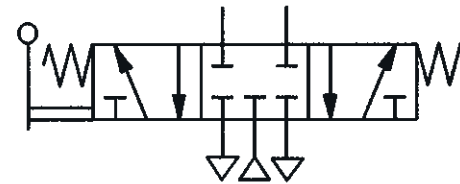
- Type 2. Outlets to exhaust



- Type 3. Supply to outlets



- All valves types shown in the **normal position**
- **Type 1. All ports sealed**
- **Type 2. Outlets to exhaust**
- **Type 3. Supply to outlets**



Operators

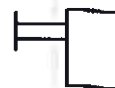
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Manual

General manual



Lever



Push button



Pedal



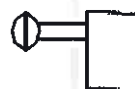
Pull button



Treadle



Push/pull button

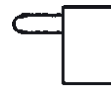


Rotary knob



Mechanical

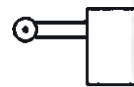
Plunger



Spring normally
as a return



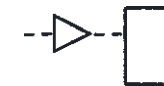
Roller



Uni-direction
or one way trip



Pressure



Pilot pressure



Differential pressure

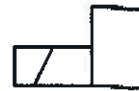


Detent in 3 positions



Electrical

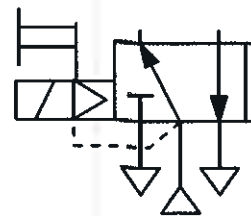
Solenoid direct



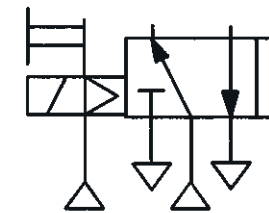
Solenoid pilot



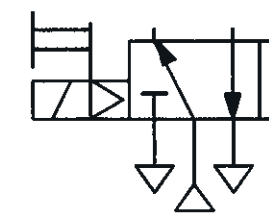
Solenoid pilot with manual override and integral pilot supply



Solenoid pilot with manual override and external pilot supply



When no integral or external pilot supply is shown it is assumed to be integral



Port markings

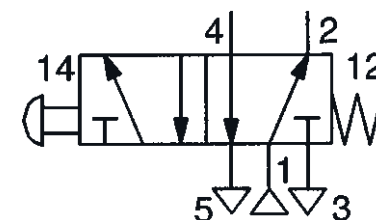
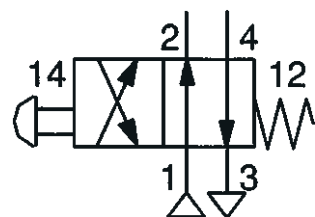
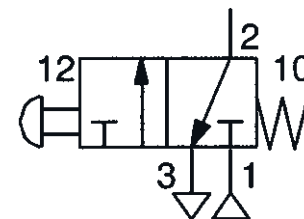
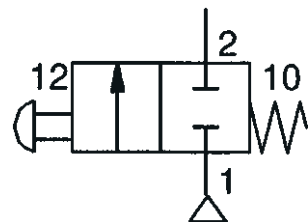
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

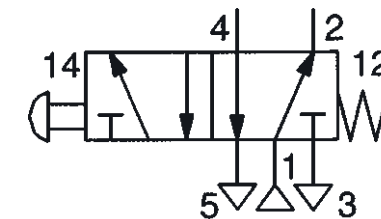
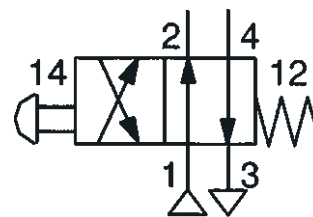
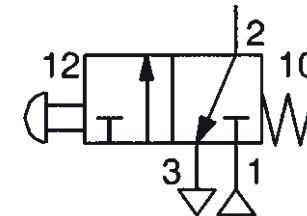
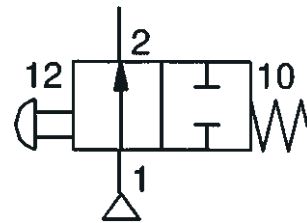
Port Markings

To CETOP RP68P



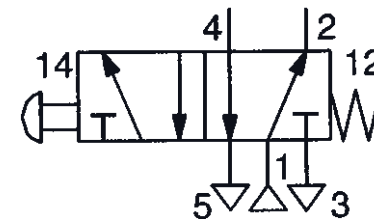
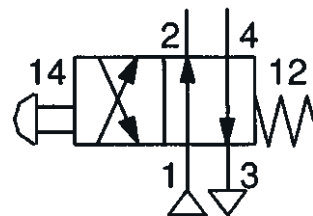
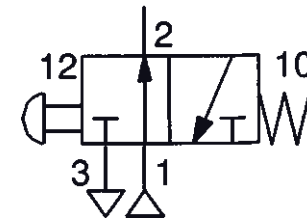
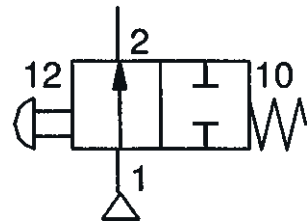
Port Markings

To CETOP RP68P



Port Markings

To CETOP RP68P



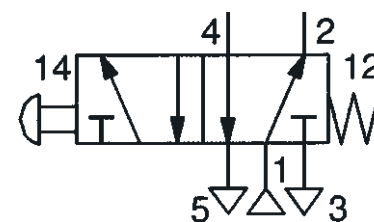
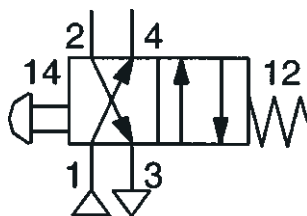
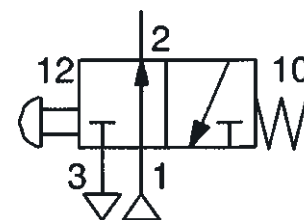
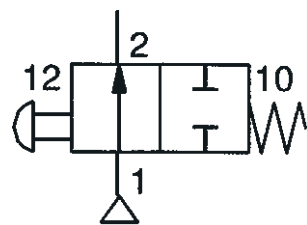
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Port Markings

To CETOP RP68P



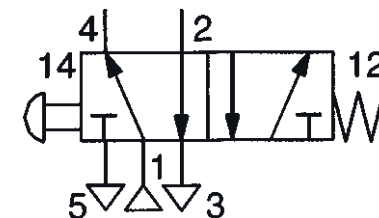
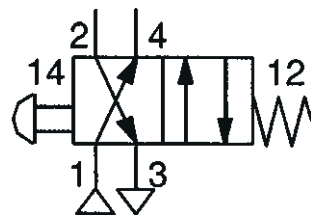
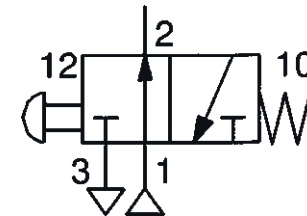
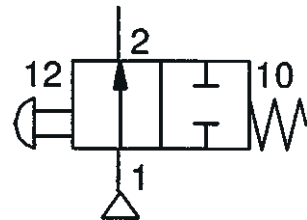
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
 Universitatea "Petru Maior" din Tîrgu-Mureș

Port Markings

To CETOP RP68P



CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
 Universitatea "Petru Maior" din Tîrgu-Mureș

Function components

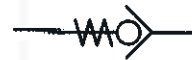
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Function components

- **Non-return valve simplified**
- **Flow regulator uni-directional**
- **Flow regulator bi-directional simplified**
- **Two pressure 'AND' simplified**
- **Shuttle valve 'OR' simplified**







Note: The output can exhaust back and is not trapped



Function components

- **Quick exhaust valve with silencer simplified**
- **Silencer**
- **Pressure to electric switch preset**
- **Pressure to electric switch adjustable**



Symbol Library

- **Actuators** 
- **Solenoid Valves** 
- **Valves** 
- **Air Line** 

- **Function Components** 
- **Vacuum** 
- **Electrical and
electronic** 

Symbol Library

Actuators

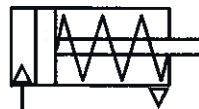
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Single acting cylinders

- Sprung in



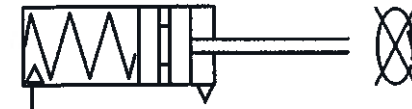
- Magnetic sprung in non-rotating rod



- Sprung out



- Magnetic sprung out non-rotating rod



- Magnetic sprung in

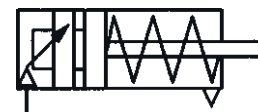
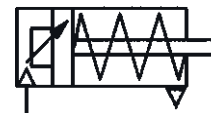


- Magnetic sprung out



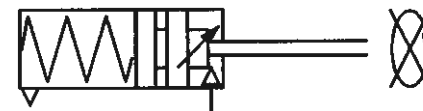
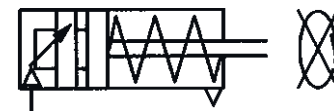
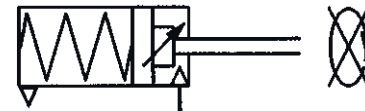
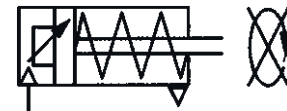
Single acting cylinders

- **Sprung in adjustable cushion**
- **Sprung out adjustable cushion**
- **Magnetic sprung in adjustable cushion**
- **Magnetic sprung out adjustable cushion**



Single acting cylinders

- Sprung in adjustable cushion non-rotating rod
- Sprung out adjustable cushion non-rotating rod
- Magnetic sprung in adjustable cushion non-rotating rod
- Magnetic sprung out adjustable cushion non-rotating rod



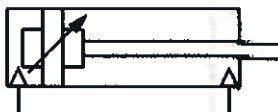
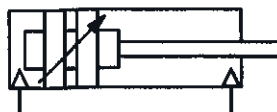
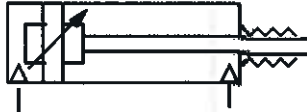
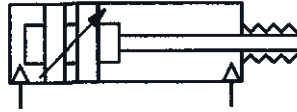
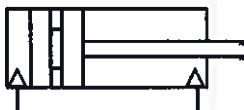


Single acting bellows

- **Bellows single convolution**
- **Bellows double convolution**
- **Bellows triple convolution**



Double acting cylinders

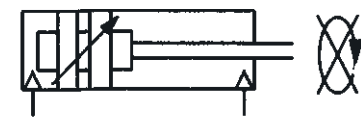
- **Non-magnetic** 
- **Magnetic hydraulic** 
- **Non-magnetic adjustable cushioned** 
- **Magnetic adjustable cushioned** 
- **Non-magnetic rod bellows** 
- **Magnetic adjustable cushioned rod bellows** 
- **Magnetic** 

Double acting cylinders

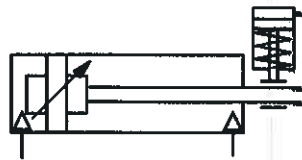
- **Non-rotating rod**



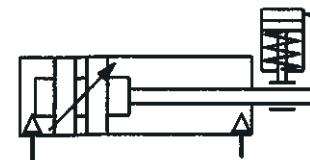
- **Magnetic non-rotating rod**



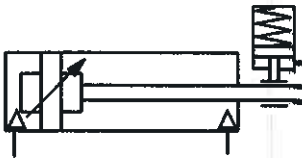
- **Active brake**



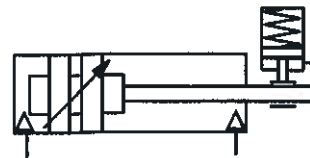
- **Magnetic active brake**



- **Passive brake**



- **Magnetic passive brake**



- **Guided rod magnetic**



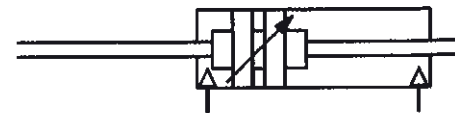
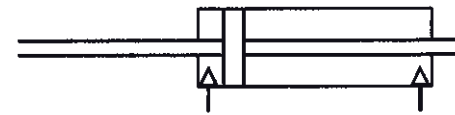
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Double acting cylinders

- **Non-magnetic through rod**
- **Non-magnetic adjustable cushioned through rod**
- **Magnetic through rod**
- **Magnetic adjustable cushioned through rod**



CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Double acting cylinders

- **Three position adjustable cushions (equal strokes)**
- **Three position adjustable cushions magnetic (equal strokes)**
- **Four position adjustable cushions (unequal strokes)**
- **Four position adjustable cushions magnetic (unequal strokes)**



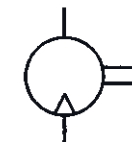
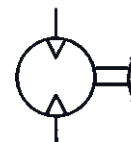
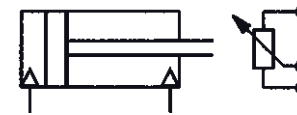
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

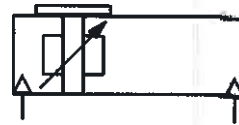
Other actuators

- **With electronic analogue output of piston position**
- **Slide unit**
- **Semi-rotary actuator**
- **Rotary motor bi-directional and non-reversible**

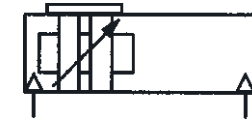


Rodless cylinders

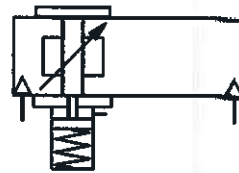
- **Cushioned**



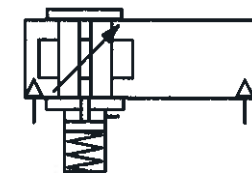
- **Cushioned magnetic**



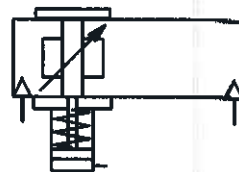
- **Cushioned passive brake**



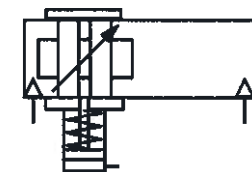
- **Cushioned magnetic passive brake**



- **Cushioned active brake**



- **Cushioned magnetic active brake**



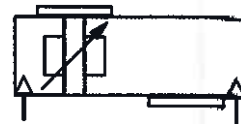
CNFIS-FDI-2018-0283

ICADIS

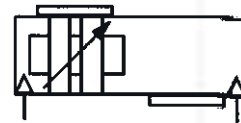
Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Rodless cylinders

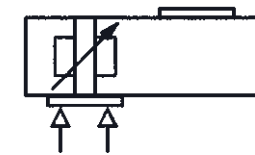
- **Twin stroke cushioned**



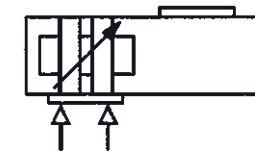
- **Twin stroke cushioned magnetic**



- **Twin stroke air through carriage**

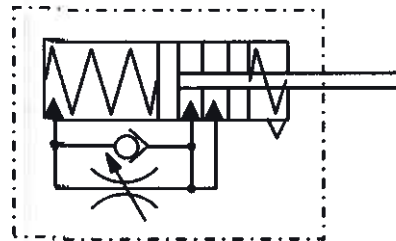
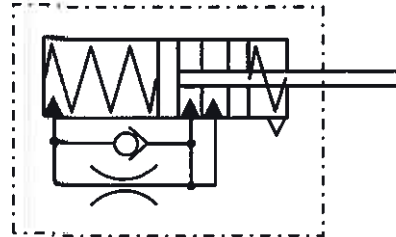


- **Twin stroke air through carriage magnetic**



Shock absorbers

- **Self adjusting**
- **Adjustable**



End

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Symbol Library

Air Line Equipment

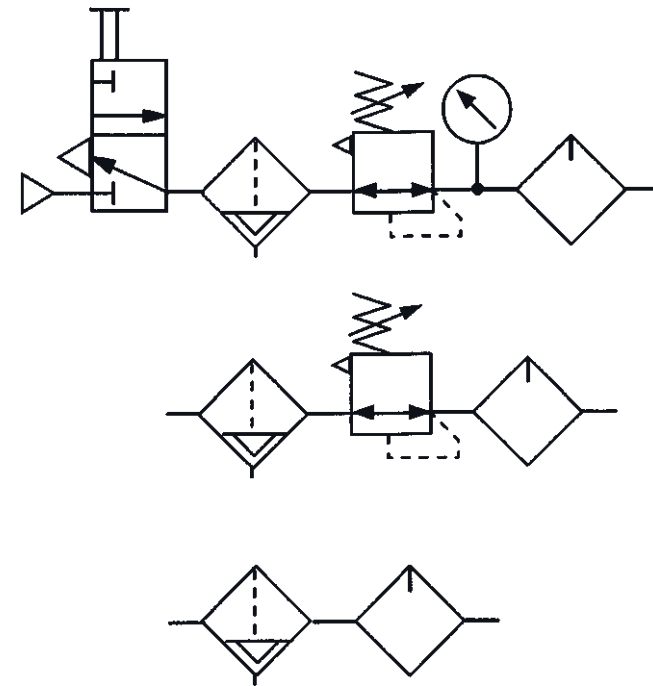
CNFI5-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

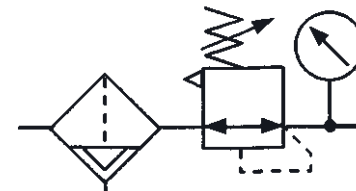
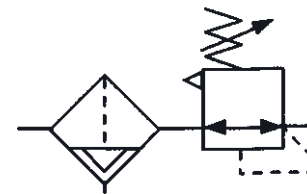
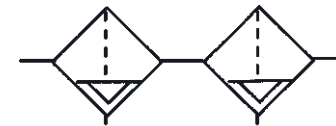
Combination units

- **FRL with shut off valve and pressure gauge**
- **Lubro-control unit**
- **Filter and lubricator**

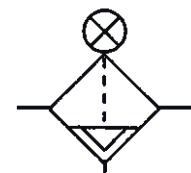
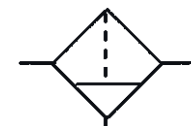


Combination units

- **Breathing air set**
- **Filter regulator**
- **Filter regulator with gauge**

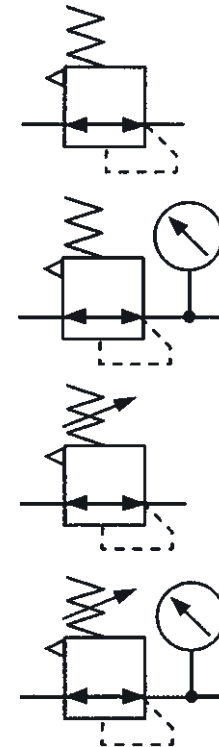


- **Filter with manual drain**
- **Filter with automatic drain**
- **Filter with automatic drain
and pressure drop
indicator**



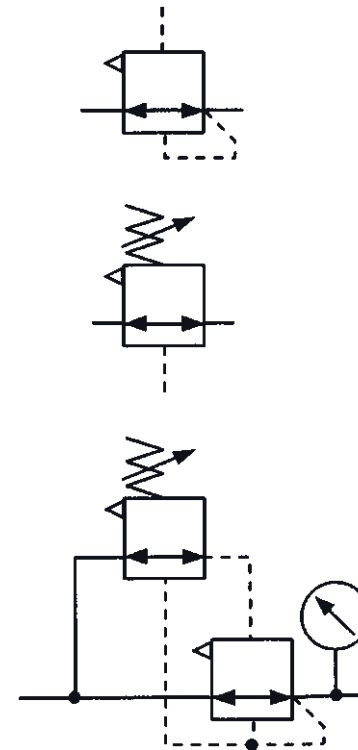
Pressure regulators

- **Pre-set relieving**
- **Pre-set relieving with pressure gauge**
- **Adjustable relieving**
- **Adjustable relieving with pressure gauge**



Pressure regulators

- **Pilot operated**
- **Pilot regulator with independent feedback**
- **Pilot operated regulator controlled from pilot regulator**



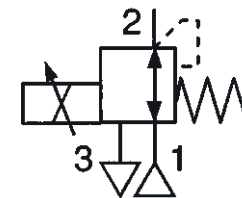
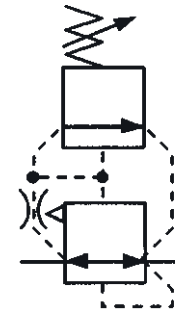
CNFIS-FDI-2018-0283

ICADIS

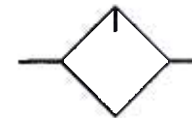
Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pressure regulators

- **Precision dual stage (11-818)**
- **Proportional pressure valve**

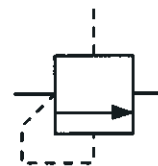
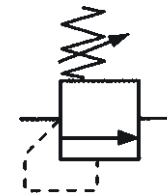
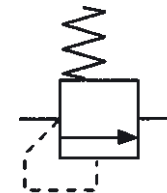
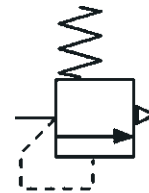


- **Lubricator**



Pressure relief valves

- **Preset, no means of connection to exhaust**
- **Preset, tapped exhaust port**
- **Adjustable, no means of connection to exhaust**
- **Adjustable, tapped exhaust port**
- **Pilot operated**



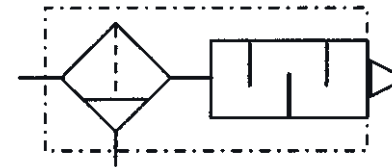
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Other components

- **Silencer**
- **Filter silencer**
- **Water separator
automatic drain**



End

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Symbol Library

Electrical and Electronic

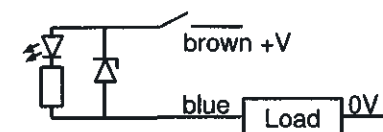
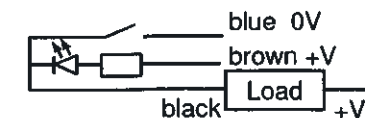
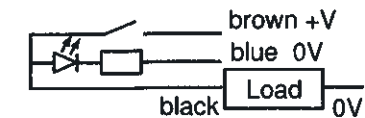
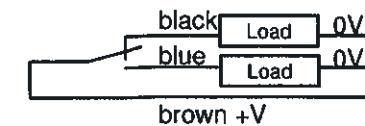
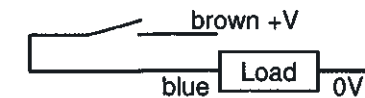
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

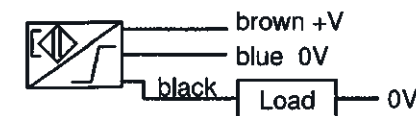
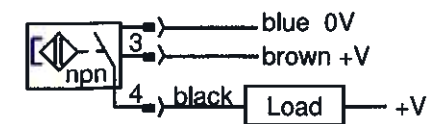
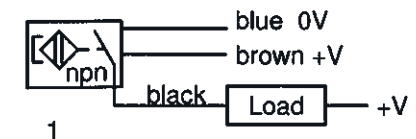
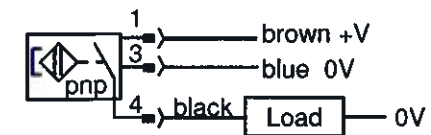
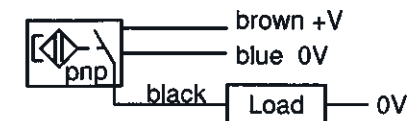
Loads must be additionally suppressed

- **Reed switch 2 wire**
- **Reed switch changeover**
- **Reed switch 3 wire with led indicator (emulating current sourcing pnp device)**
- **Reed switch 3 wire with led indicator (emulating current sinking npn device)**
- **Reed switch 2 wire with led indicator**



Loads must be additionally suppressed

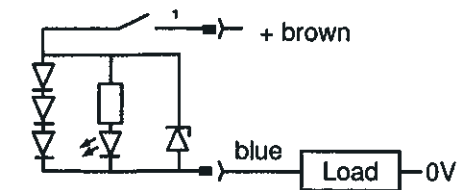
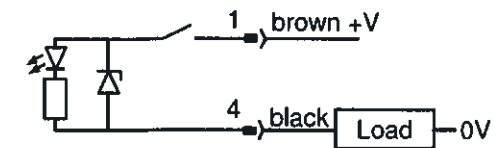
- **Solid state magnetic sensor pnp (current sourcing)**
- **Solid state magnetic sensor plug in cable pnp (current sourcing)**
- **Solid state magnetic sensor npn (current sinking)**
- **Solid state magnetic sensor plug in cable npn (current sinking)**
- **Solid state magnetic sensor with pulse extension**



Sensors

Loads must be additionally suppressed

- Reed switch 2 wire with led indicator and plug in cable
- Reed switch 2 wire with led indicator and plug in cable



Electrical Symbols

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Electrical symbols

- **Direct current (DC)**
- **Alternating current (AC)**
- **AC or DC**
- **Positive and negative polarity**



- **Line to earth**



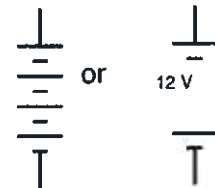
- **Line to chassis**






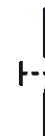
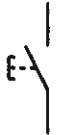
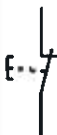

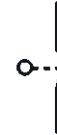
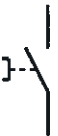
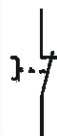


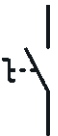
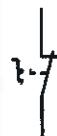

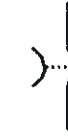
- **Cell**



- **Battery**



Electrical symbols

	Normally open	Normally closed		Normally open	Normally closed
● Relay contact			● General manual switch contact		
● Push button contact			● Roller switch contact		
● Pull button contact			● Delay to operate		
● Twist switch contact			● Delay to reset		

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Electrical symbols

- **Relay coil**



- **Relay coil delay to operate contacts**



- **Relay coil delay to reset contacts**



- **Solenoid valve coil**



Electrical symbols

- **Proximity switch**



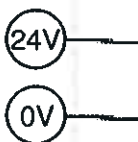
- **Touch sensitive switch**



- **Pressure switch**



- **Supply and return**



- **Bell**



- **Buzzer**



- **Microphone**



- **Loudspeaker**



Electronic Component Symbols

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

- **Opto-isolator**



- **Windings**

- inductor
- inductor with core
- variable inductor
- transformer



- **Capacitors**

- capacitor
- polarised capacitor
- variable capacitor
- pre-set capacitor



- **Resistors**







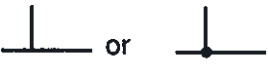

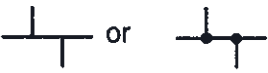
- Resistor
- Variable
- Potentiometer
- Pre-set pot
- Voltage dependent
- Light dependent



- **Diodes**

- diode
- zener diode
- light emitting diode



- **Thyristor** 
- **Triac** 
- **NPN Transistor** 
- **PNP Transistor** 
- **Photo-transistor** 
- **Fuse** 
- **Wires connected** 
- **Wires crossing** 
- **Double junction** 

- **Conductors in a cable**



- **Conductors twisted**



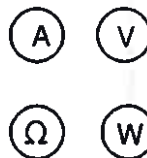
- **Plug and socket**



- **Coaxial plug and socket**



- **Meters for amps, volts, ohms & watts**



- **Motors dc & ac**



- **Generator**



- **Lamp steady & flashing**



- **Operational amplifier**



End

CNFIȘ-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Symbol Library

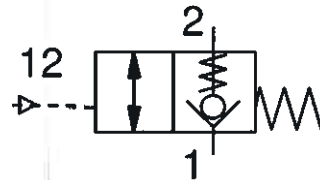
Function Fittings and Components

CNFIS-FDI-2018-0283

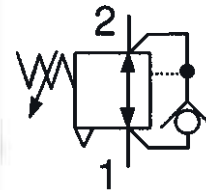
ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

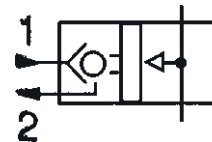
- **Blocking fitting**






- **Pressure reducing fitting**



- **Pneumatic sensor fitting**

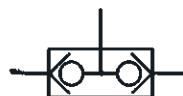


Function components

- **Air fuse** 
- **Non return valve** 
- **Non return valve** 

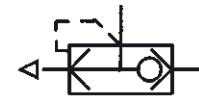
Function components

- **bi-directional flow regulator**
- **Exhaust flow regulator with and without silencer**
- **Silencers**
- **Shuttle valve 'OR'**
- **Two pressure valve 'AND' (will exhaust either signal back)**

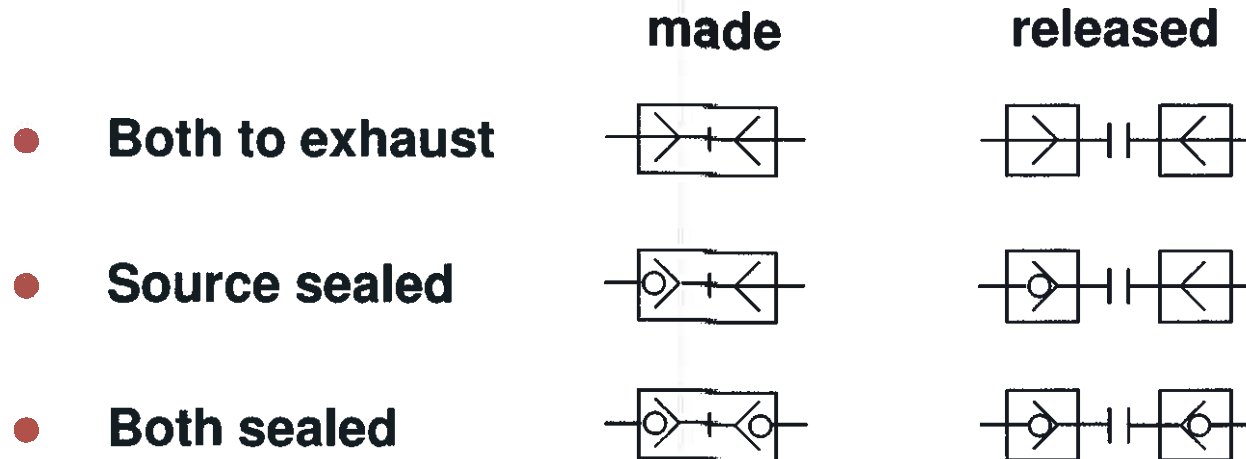


Function components

- **Uni-directional flow regulator**
- **Quick exhaust valve with and without silencer**
- **Rotating joint**
- **Pressure indicator**
- **Pressure drop indicator**



Quick release couplings



End

CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Symbol Library

Solenoid Valves

CNFIS-FDI-2018-0283

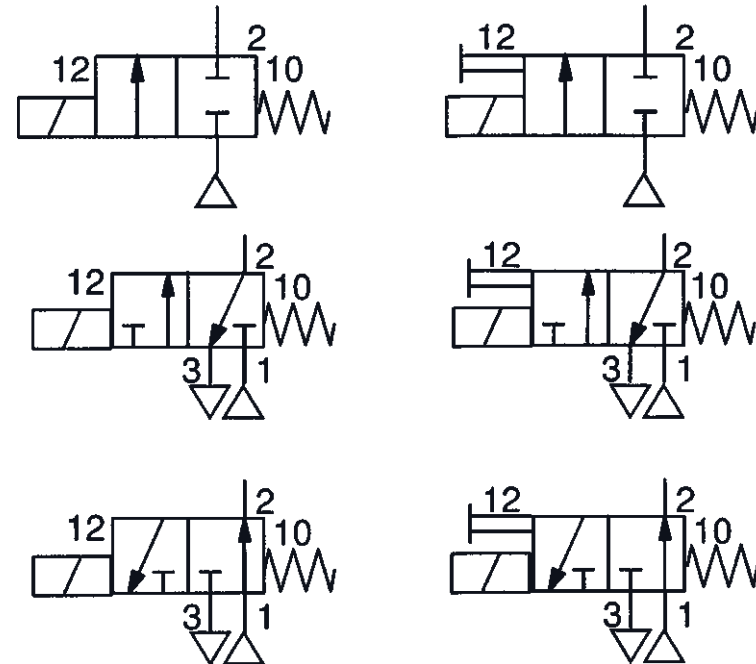
ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Solenoid valves

- **Direct solenoid actuated spring return 2/2 NC**
- **Direct solenoid actuated spring return 3/2 NC**
- **Direct solenoid actuated spring return 3/2 NO**

with man override on the solenoid



CNFIS-FDI-2018-0283

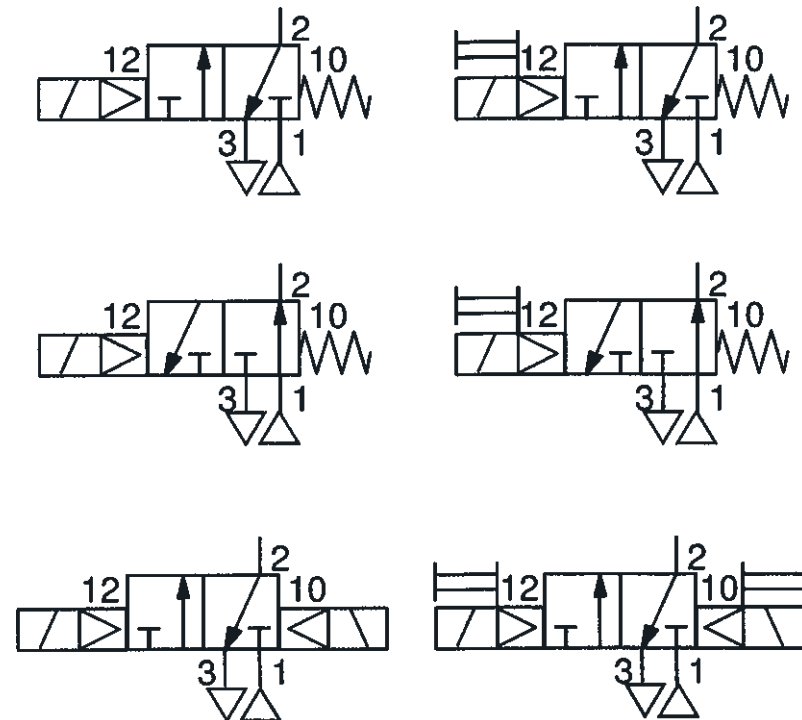
ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Solenoid valves

- **Pilot solenoid actuated spring return 3/2 NC**
- **Pilot solenoid actuated spring return 3/2 NO**
- **Pilot solenoid actuated pilot solenoid return**

with man override on the solenoid



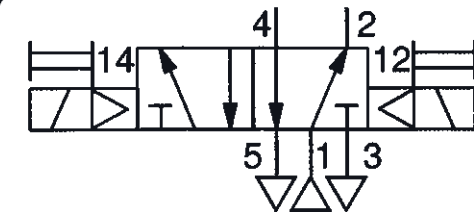
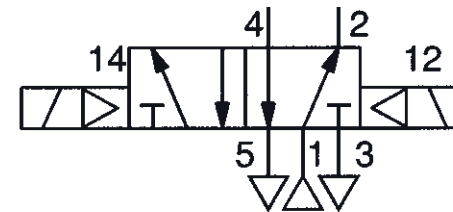
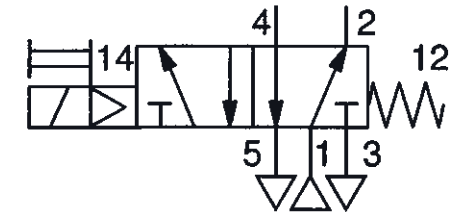
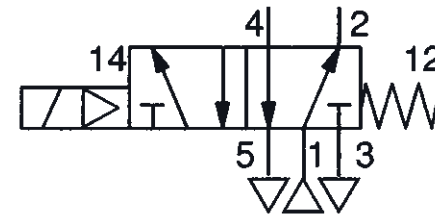
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Târgu-Mureș

Solenoid valves

- **Pilot solenoid actuated spring return, 5/2**
- **Pilot solenoid actuated spring return and manual override, 5/2**
- **Pilot solenoid actuated pilot solenoid return, 5/2**
- **Pilot solenoid actuated pilot solenoid return and manual override, 5/2**



CNFIS-FDI-2018-0283

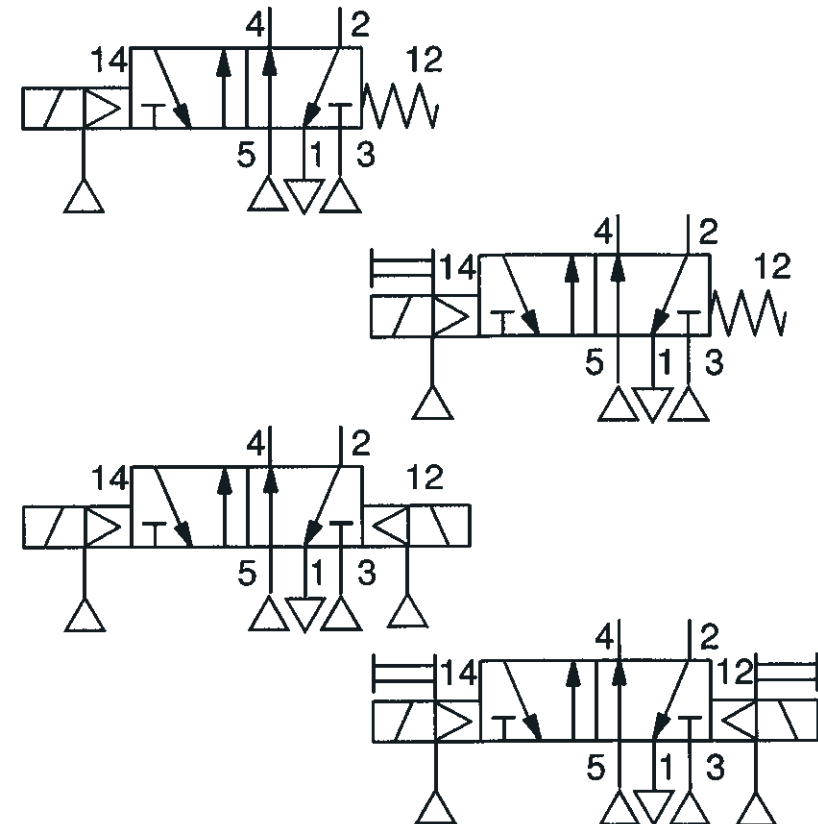
ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Solenoid valves

- **Pilot solenoid actuated spring return, 5/2**
- **Pilot solenoid actuated spring return and manual override, 5/2**
- **Pilot solenoid actuated and returned, 5/2**
- **Pilot solenoid actuated and returned with manual overrides, 5/2**

Reverse piped



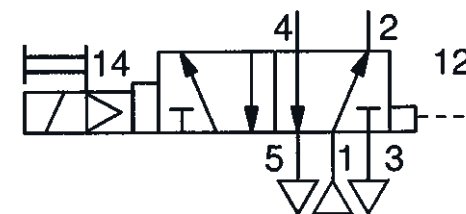
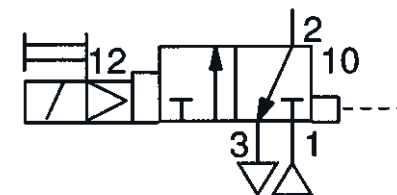
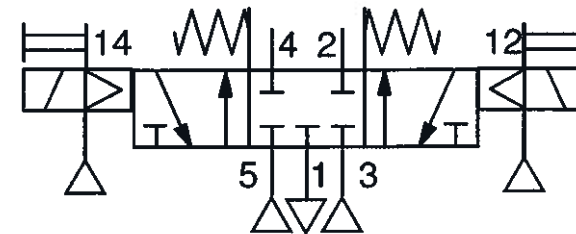
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Târgu-Mureș

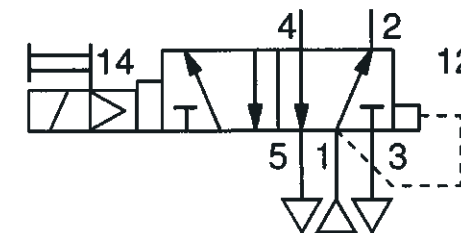
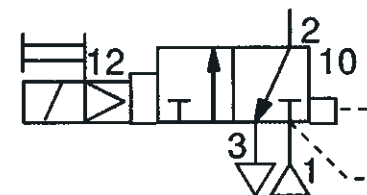
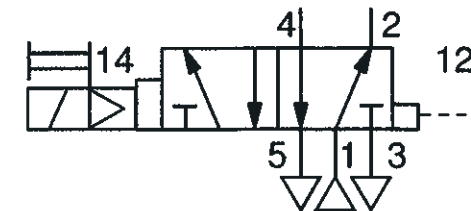
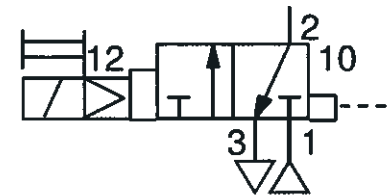
Solenoid valves

- **Double pilot solenoid actuated spring to centre all ports sealed reverse piped**
- **Priority pilot solenoid actuated differential air return, 3/2**
- **Priority pilot solenoid actuated differential air return, 5/2**



Solenoid valves

- **Priority pilot solenoid actuated differential air return, 3/2**
- **Priority pilot solenoid actuated differential air return, 5/2**
- **Priority pilot solenoid actuated air spring return, 3/2**
- **Priority pilot solenoid actuated air spring return, 5/2**



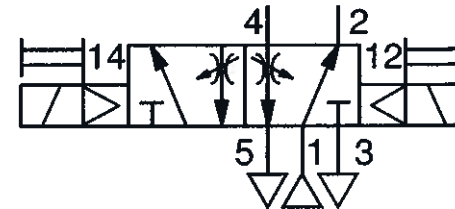
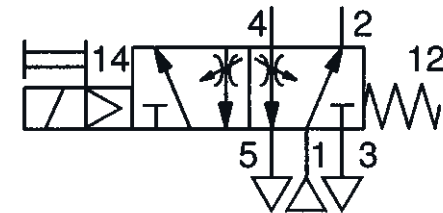
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
 Universitatea "Petru Maior" din Tîrgu-Mureș

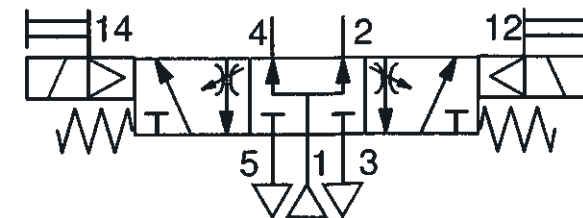
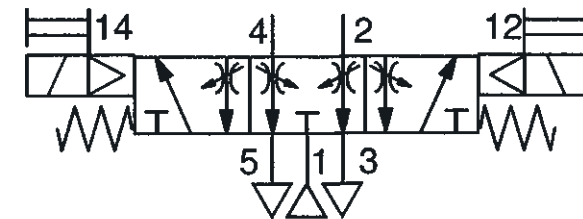
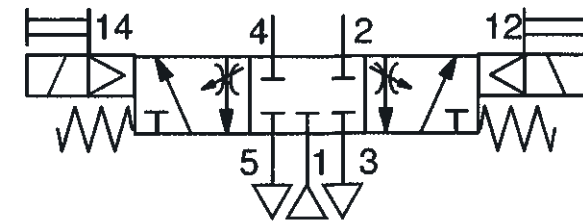
Solenoid valves

- **Pilot solenoid actuated spring return, manual override, 5/2 with integral flow regulators**
- **Double pilot solenoid actuated, manual override, 5/2 with integral flow regulators**



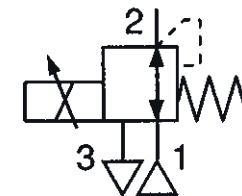
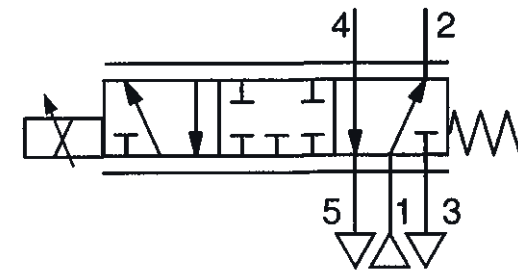
Solenoid valves

- **Double pilot solenoid actuated, spring to centre all ports sealed, 5/3 with integral flow regulators**
- **Double pilot solenoid actuated, spring to centre supply port sealed, 5/3 with integral flow regulators**
- **Double pilot solenoid actuated, spring to centre supply to outlets, 5/3 with integral flow regulators**



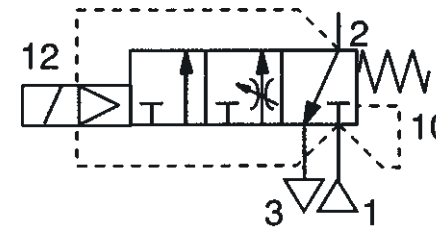
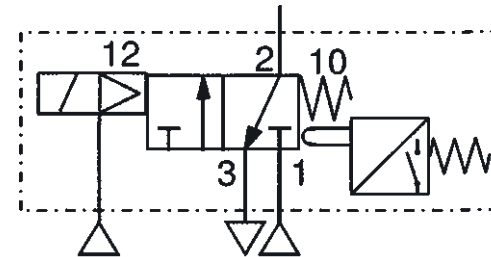
Proportional solenoid valves

- **Proportional flow to electrical signal**
- **Proportional pressure to electrical signal**



Safety related valves

- **Monitored dump valve**
- **Soft start valve**



End

CNFIS-FDI-2018-0283

ICADIS

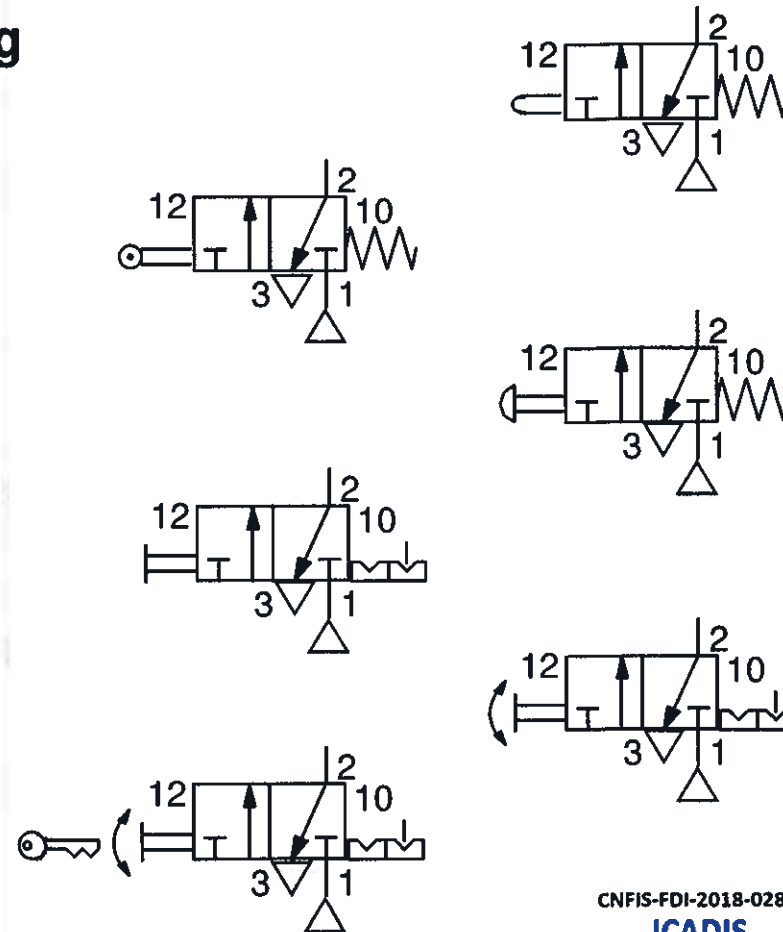
Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Symbol Library

Valves

Valves un-tapped exhaust

- **Plunger actuated spring return 3/2**
- **Roller actuated spring return 3/2**
- **Push button actuated spring return 3/2**
- **Toggle actuated detented 3/2**
- **Rotary knob actuated detented 3/2**
- **Key actuated detented 3/2**



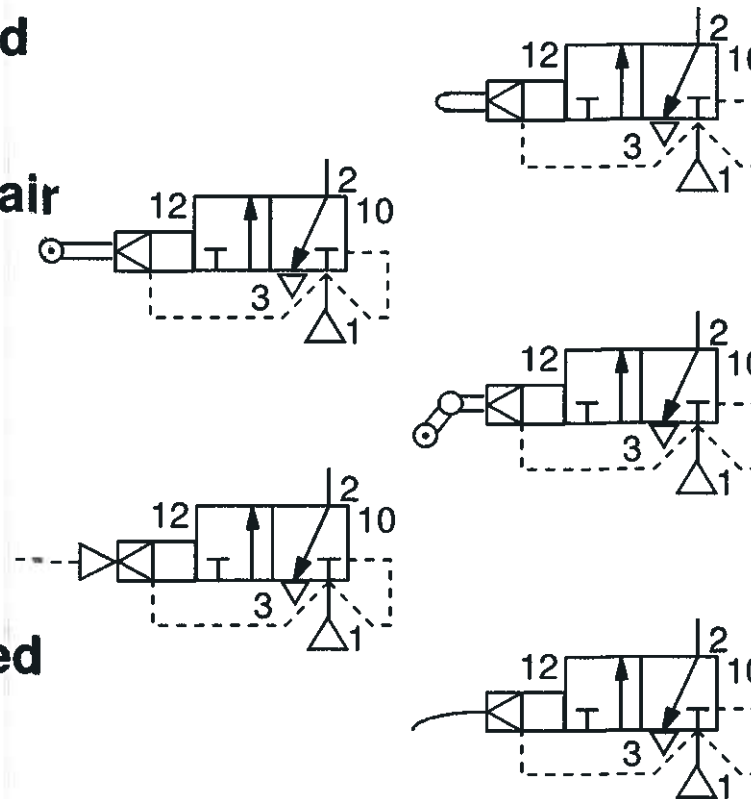
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Valves integral bleed supply

- **Plunger / bleed actuated air return 3/2**
- **Roller / bleed actuated air return 3/2**
- **One way trip / bleed actuated air return 3/2**
- **Low pressure / bleed actuated air return 3/2**
- **Antenna / bleed actuated air return 3/2**



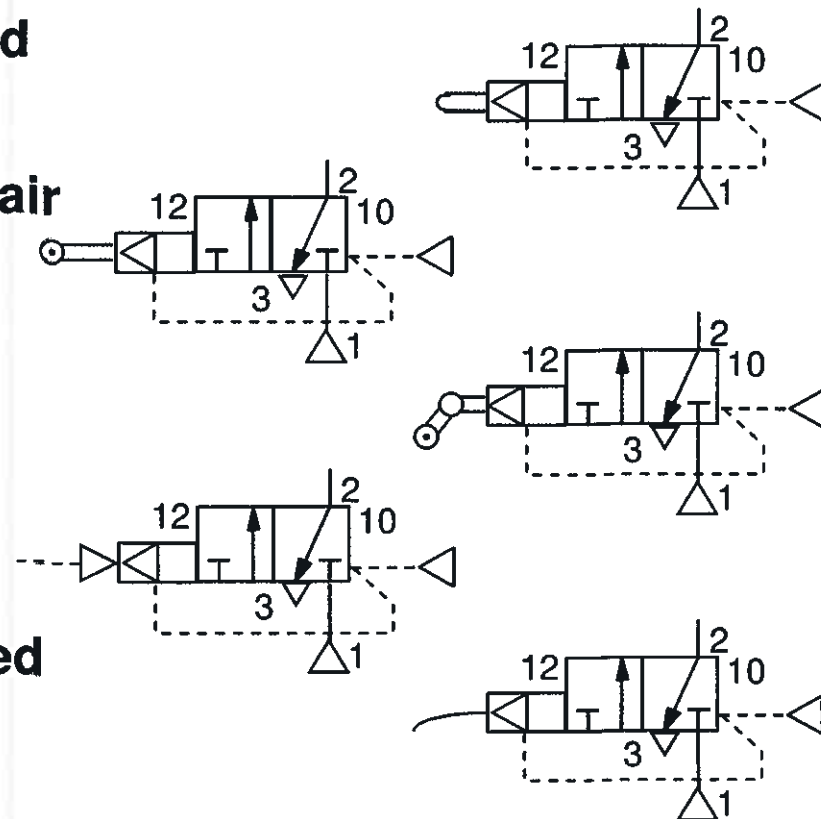
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Valves external bleed supply

- **Plunger / bleed actuated air return 3/2**
- **Roller / bleed actuated air return 3/2**
- **One way trip / bleed actuated air return 3/2**
- **Low pressure / bleed actuated air return 3/2**
- **Antenna / bleed actuated air return 3/2**



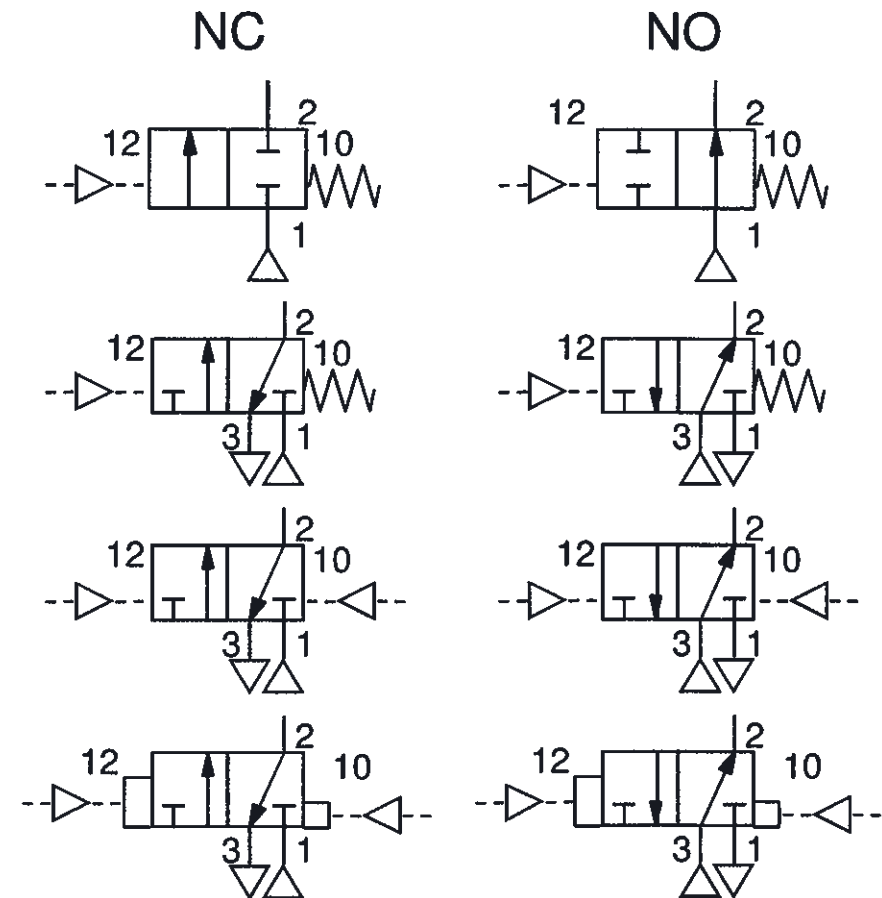
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- **Pilot actuated spring return 2/2**
- **Pilot actuated spring return 3/2**
- **Double pilot actuated 3/2**
- **Differential pilot actuated 3/2**



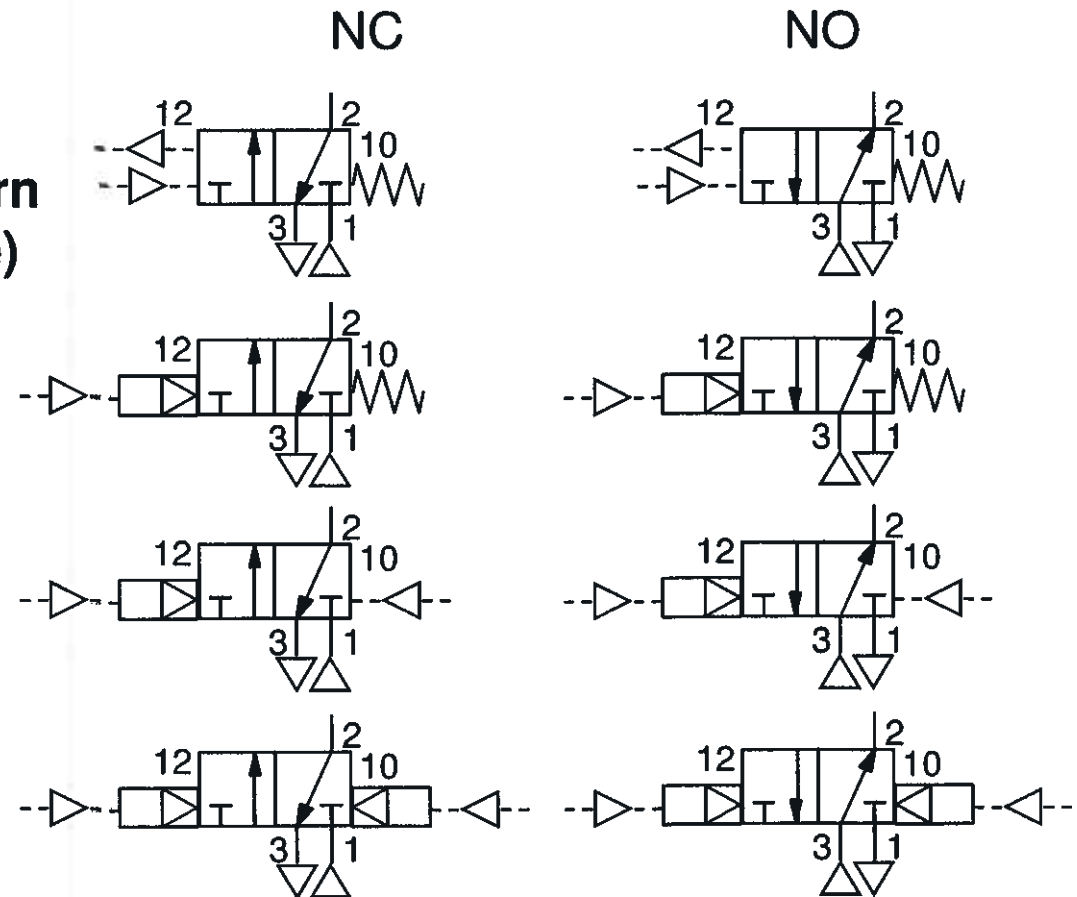
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- **Pressure or vacuum actuated spring return 2/2 (diaphragm valve)**
- **Low pressure pilot actuated spring return 3/2**
- **Low pressure pilot actuated pilot return, 3/2**
- **Low pressure pilot actuated and returned, 3/2**



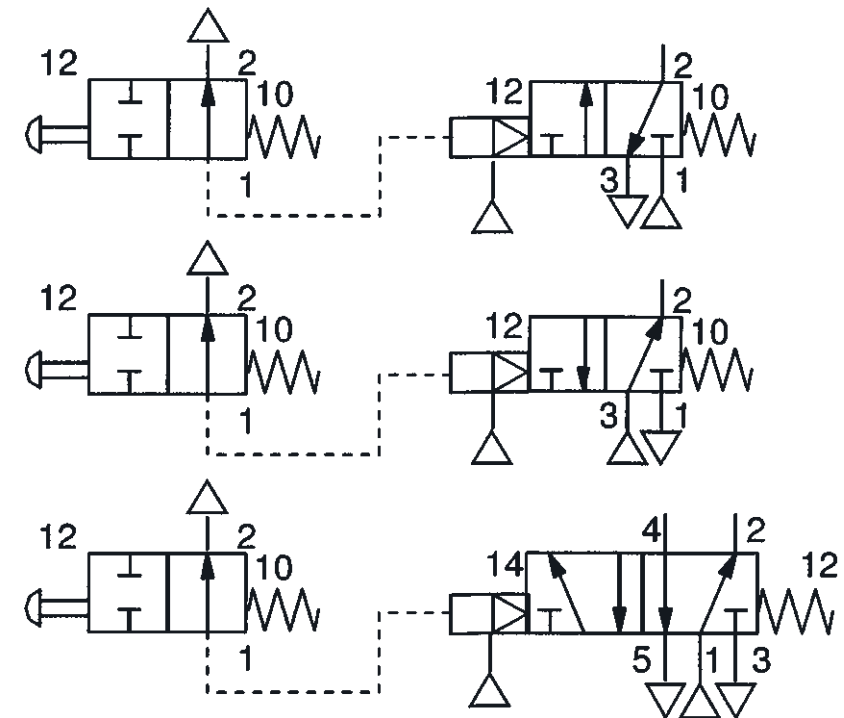
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- Remote pressure bleed actuated spring return, NC, 3/2
- Remote pressure bleed actuated spring return, NO, 3/2
- Remote pressure bleed actuated spring return, 5/2



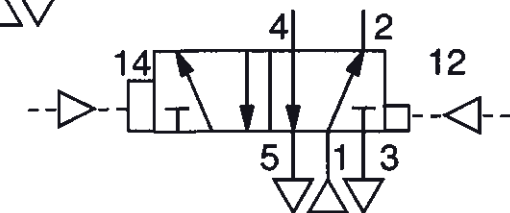
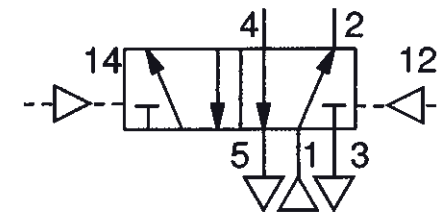
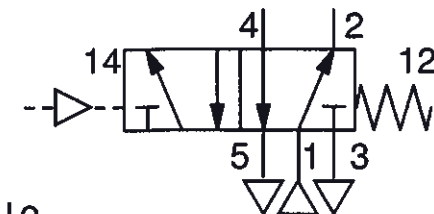
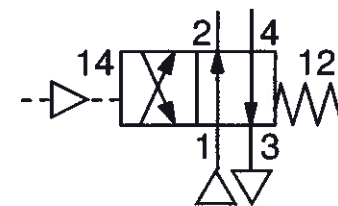
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- **Pilot actuated spring return, 4/2**
- **Pilot actuated spring return, 5/2**
- **Double pilot actuated 5/2**
- **Differential pilot actuated 5/2**



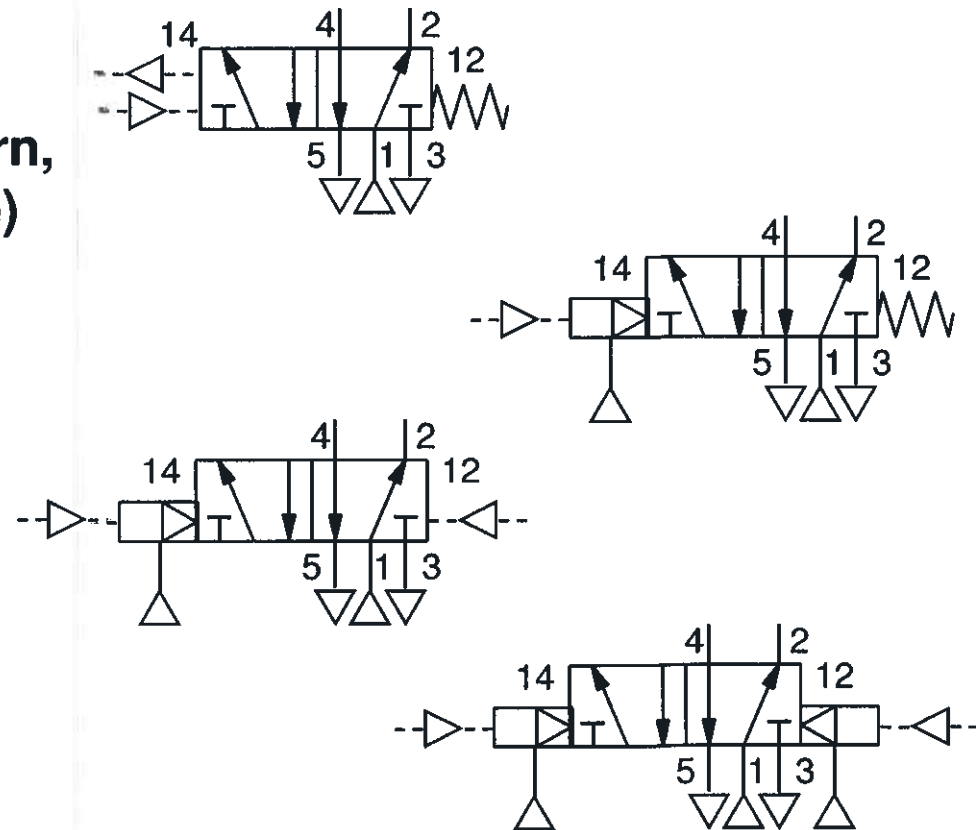
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- **Pressure or vacuum actuated spring return, 5/2 (diaphragm valve)**
- **Low pressure pilot actuated spring return, 5/2**
- **Low pressure pilot actuated pilot return, 5/2**
- **Low pressure pilot actuated and returned, 5/2**



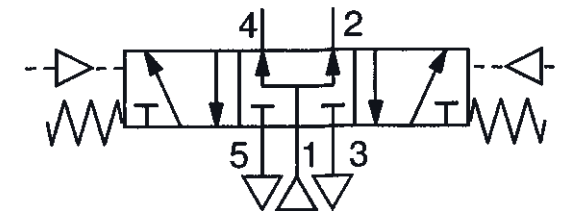
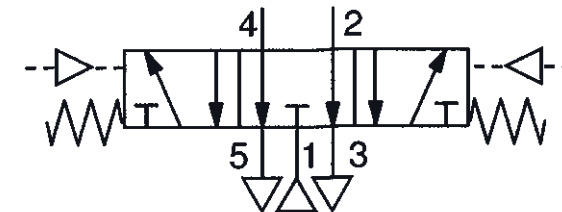
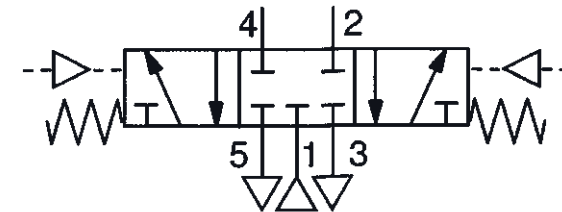
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Pilot actuated valves

- **Double pilot actuated spring to centre all ports sealed**
- **Double pilot actuated spring to centre supply port sealed**
- **Double pilot actuated spring to centre supply to outlets**

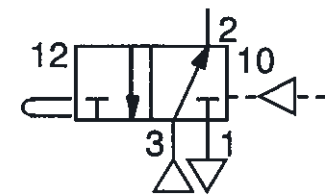
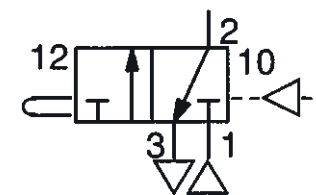
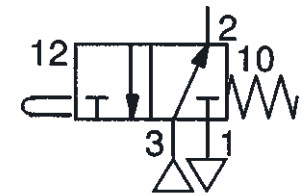
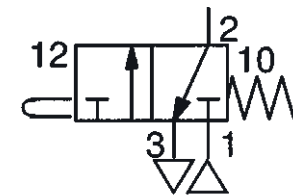
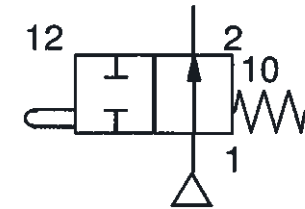
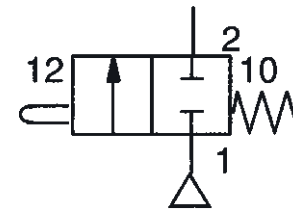


Mechanically actuated valves

- **Plunger actuated spring return 2/2**
- **Plunger actuated spring return 3/2**
- **Plunger actuated air reset 3/2**

NC

NO



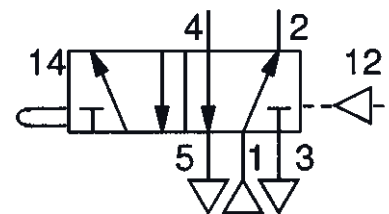
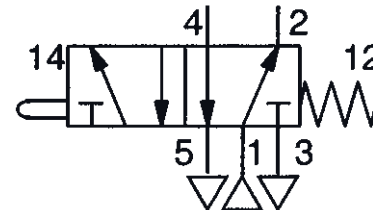
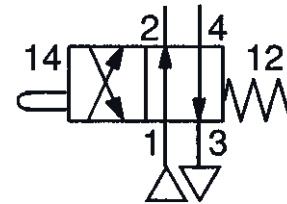
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Mechanically actuated valves

- **Plunger actuated spring return, 4/2**
- **Plunger actuated spring return, 5/2**
- **Plunger actuated air reset 5/2**

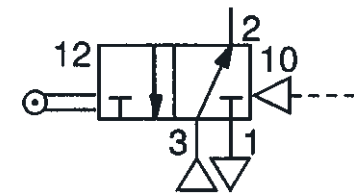
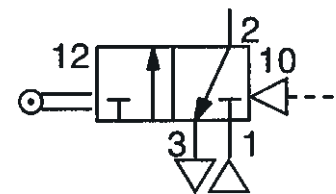
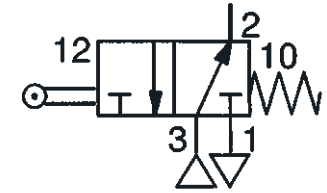
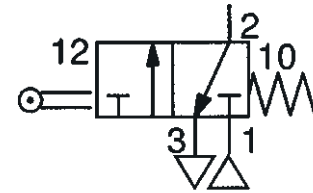
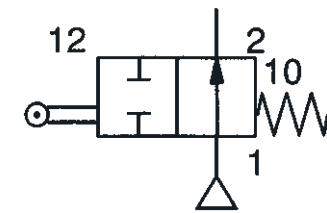
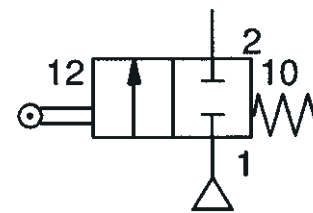


Mechanically actuated valves

- **Roller actuated spring return 2/2**
- **Roller actuated spring return 3/2**
- **Roller actuated air reset 3/2**

NC

NO



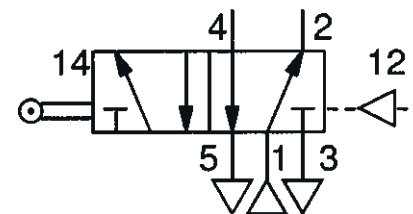
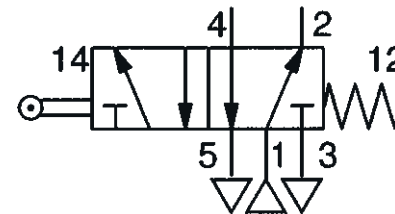
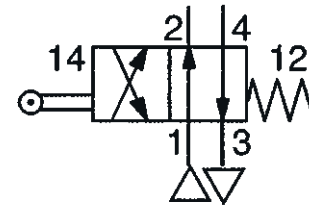
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Mechanically actuated valves

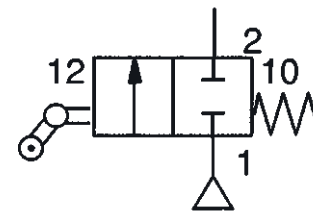
- **Roller actuated spring return, 4/2**
- **Roller actuated spring return, 5/2**
- **Roller actuated air reset 5/2**



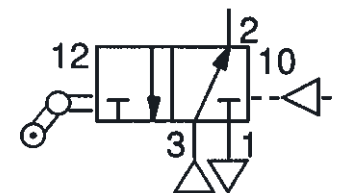
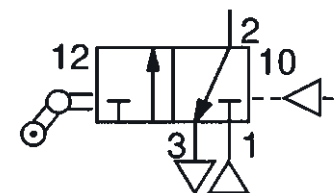
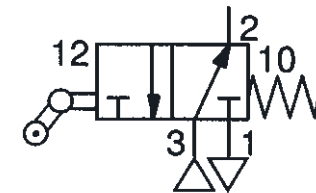
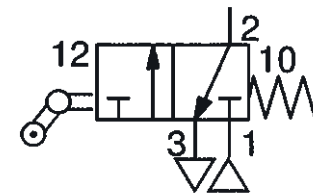
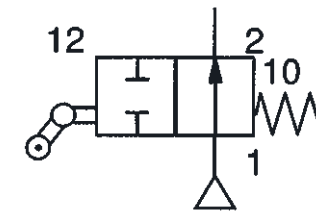
Mechanically actuated valves

- **One way trip actuated spring return 2/2**
- **One way trip actuated spring return 3/2**
- **One way trip actuated air reset 3/2**

NC



NO



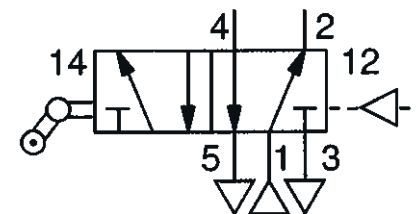
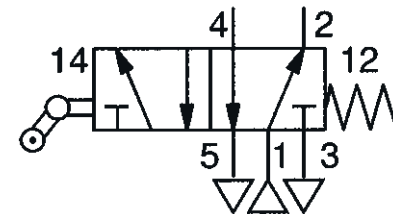
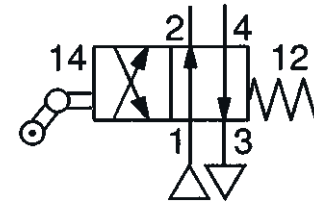
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Mechanically actuated valves

- **One way trip actuated spring return, 4/2**
- **One way trip actuated spring return, 5/2**
- **One way trip actuated air reset 5/2**

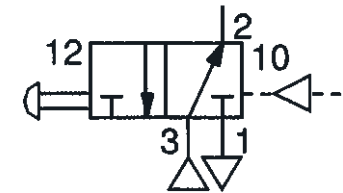
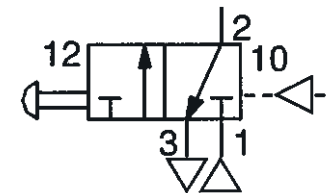
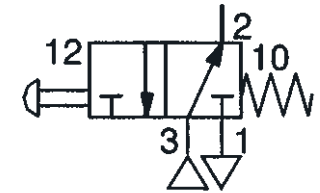
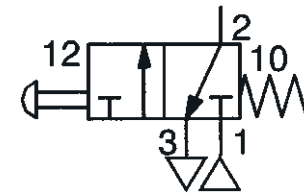
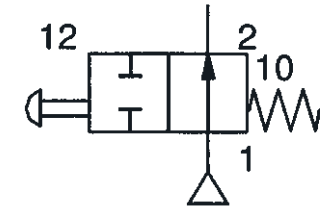
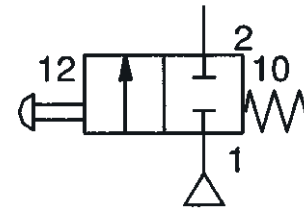


Manually actuated valves

- **Push button actuated spring return 2/2**
- **Push button actuated spring return 3/2**
- **Push button actuated air reset 3/2**

NC

NO



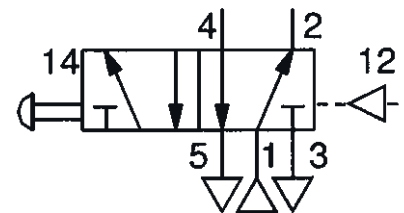
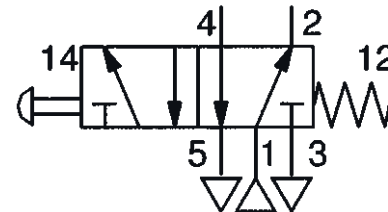
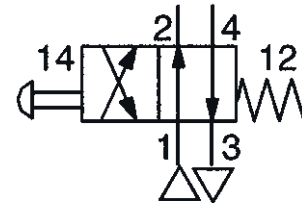
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
 Universitatea "Petru Maior" din Tîrgu-Mureș

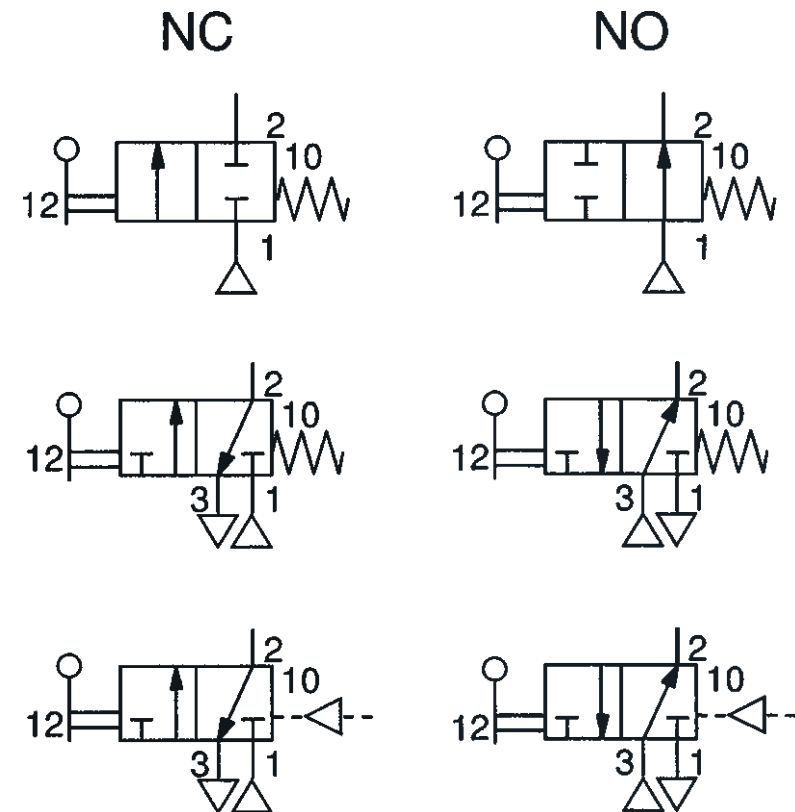
Manually actuated valves

- **Push button actuated spring return, 4/2**
- **Push button actuated spring return, 5/2**
- **Push button actuated air reset 5/2**



Manually actuated valves

- **Lever actuated spring return 2/2**
- **Lever actuated spring return 3/2**
- **Lever actuated air reset 3/2**



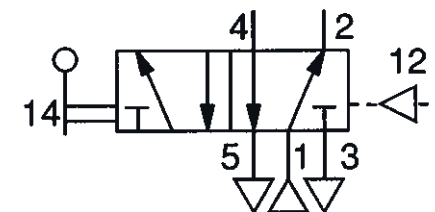
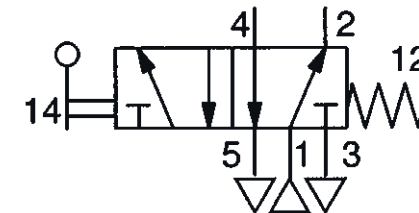
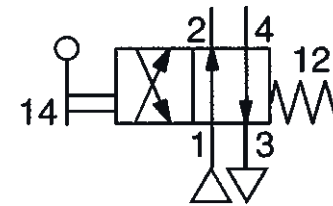
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

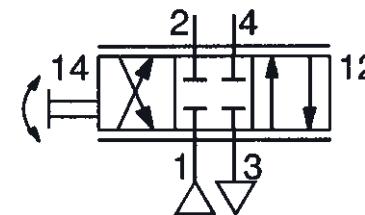
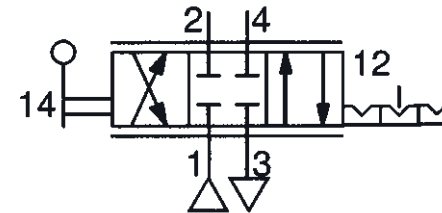
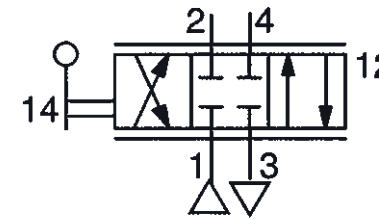
Manually actuated valves

- **Lever actuated spring return, 4/2**
- **Lever actuated spring return, 5/2**
- **Lever actuated air reset 5/2**



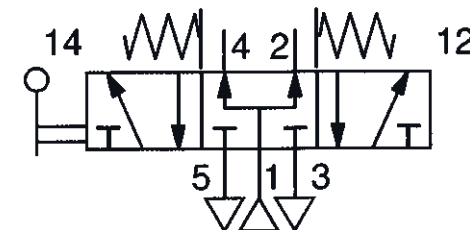
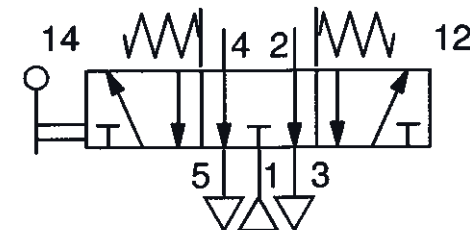
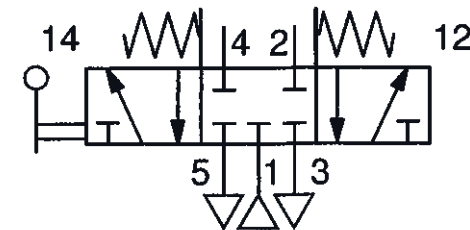
Manually actuated valves

- **Lever actuated lever return, variable throttling, 4/2**
- **Lever actuated lever return, variable throttling, detented, 4/2**
- **Rotary knob actuated and returned, variable throttling, 4/2**



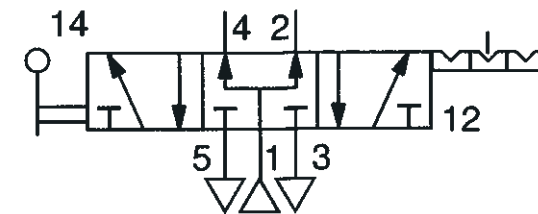
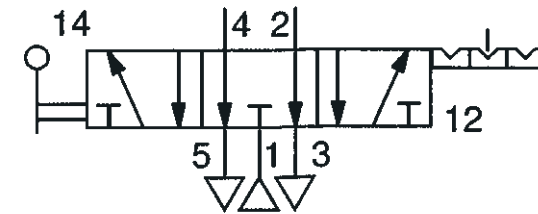
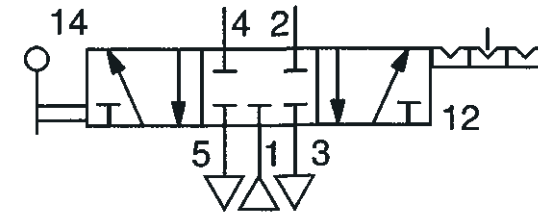
Manually actuated valves

- **Lever actuated spring to centre all ports sealed**
- **Lever actuated spring to centre supply port sealed**
- **Lever actuated spring to centre supply to outlets**



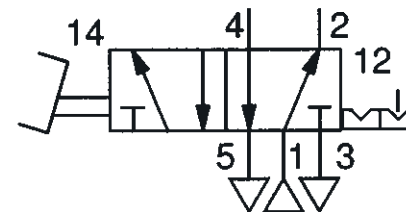
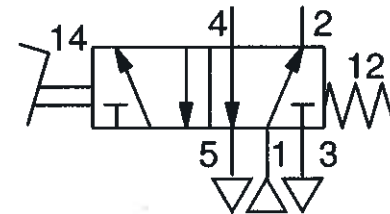
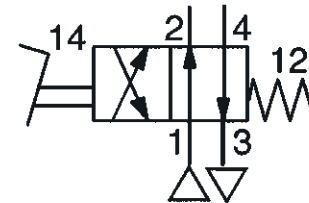
Manually actuated valves

- **Lever actuated, detented, all ports sealed centre**
- **Lever actuated, detented, supply port sealed centre**
- **Lever actuated, detented, supply to outlets centre**



Manually actuated valves

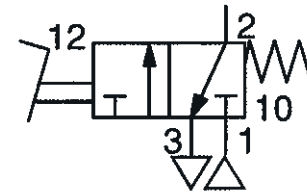
- Pedal actuated spring return, 4/2
- Pedal actuated spring return, 5/2
- Treadle actuated detented 5/2



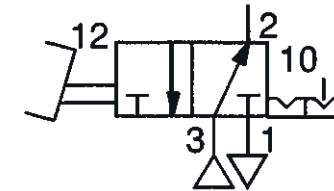
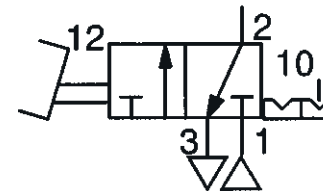
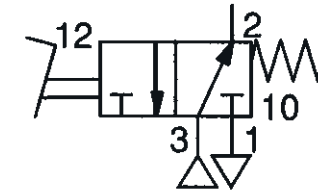
Manually actuated valves

- **Pedal actuated spring return 3/2**
- **Treadle actuated detented 3/2**

NC

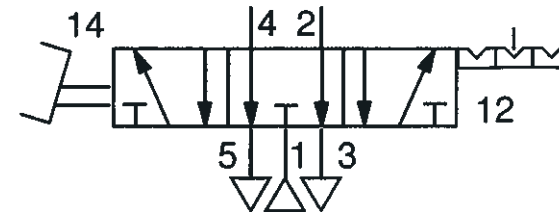
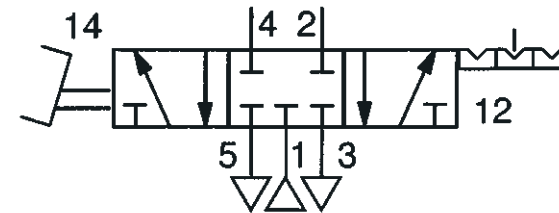


NO



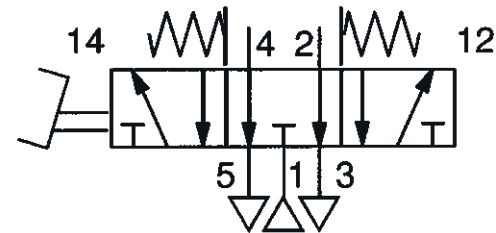
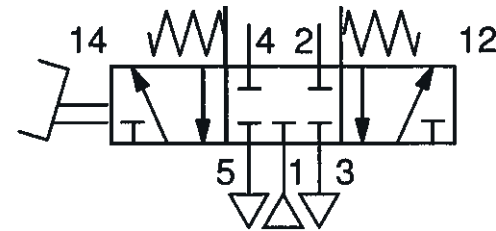
Manually actuated valves

- **Treadle actuated, detented, all ports sealed centre**
- **Treadle actuated, detented, supply port sealed centre**



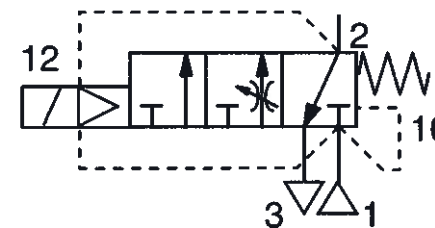
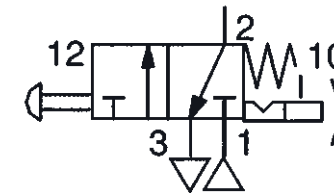
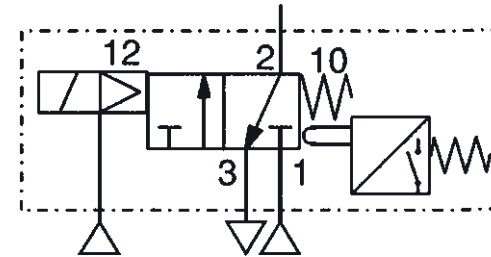
Manually actuated valves

- **Treadle actuated spring to centre all ports sealed**
- **Treadle actuated spring to centre supply port sealed**



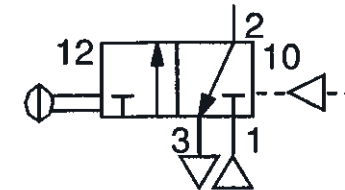
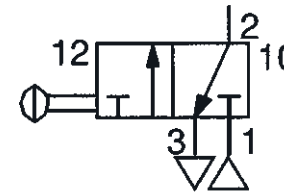
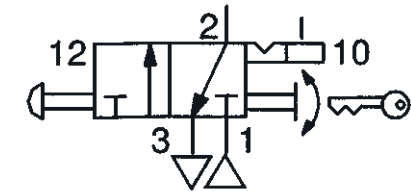
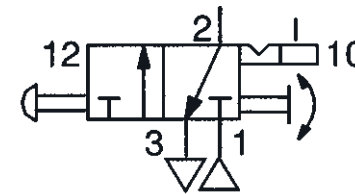
Safety related valves

- **Monitored dump valve**
- **Emergency stop valve**
- **Soft start valve**



Manually actuated valves

- **Push button actuated rotary manual return 3/2**
- **Push button actuated key return 3/2**
- **Push actuated pull returned 3/2**
- **Push actuated pull or air returned 3/2**



CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
 Universitatea "Petru Maior" din Tîrgu-Mureș

End

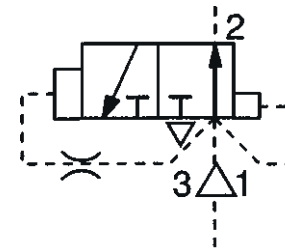
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

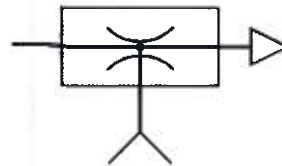
Special purpose valves

- **Impulse generator**

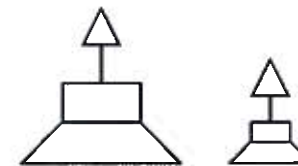


Vacuum equipment

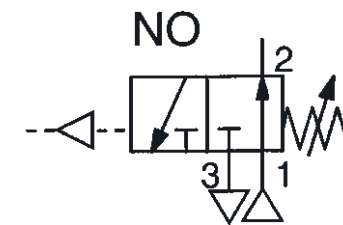
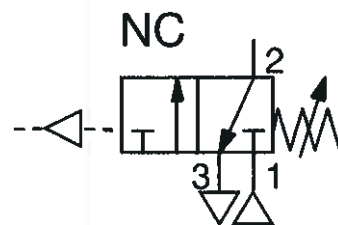
- **Vacuum generator**



- **Vacuum cups**



- **Vacuum switch pneumatic**



Symbol Library

Vacuum Equipment

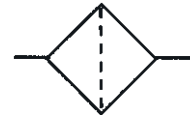
CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - Instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș

Vacuum equipment

- **Vacuum filter**



- **Vacuum silencer**

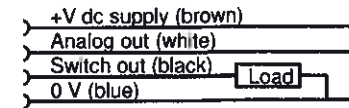
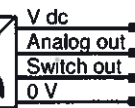
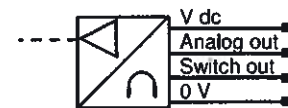
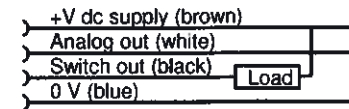
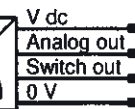
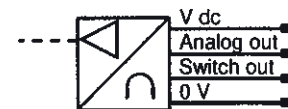


- **Vacuum gauge**



Vacuum equipment

- **Vacuum switch electric, normally open and normally closed**
- **Vacuum transducer with analog and switched outputs npn**
- **Vacuum transducer with analog and switched outputs pnp**



End



CNFIS-FDI-2018-0283

ICADIS

Îmbunătățirea calității activității didactice - instrument strategic la
Universitatea "Petru Maior" din Tîrgu-Mureș
