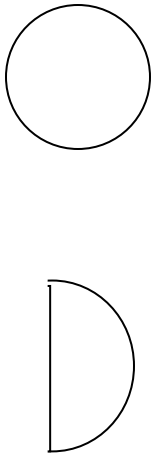
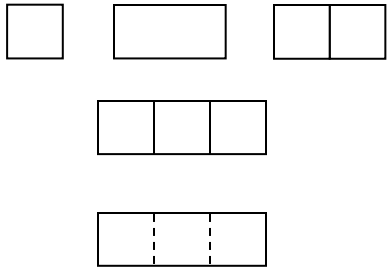
# Fluid Power Symbols

# Symbol Groups

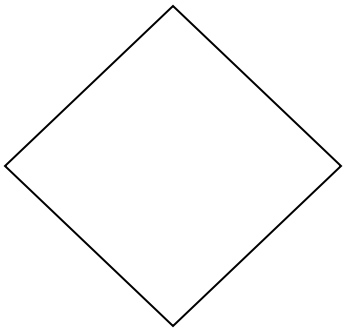
Circles/Semi Circles



Rectangles and Squares



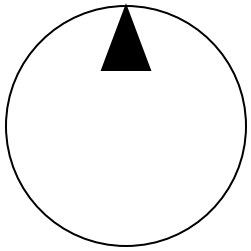
Diamonds



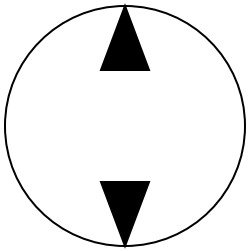
# Circles/Semi-Circles

Circles generally represent devices that can deliver or use oil.

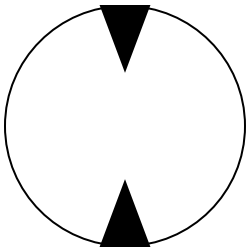
Unidirectional Fixed Displacement Hydraulic Pump



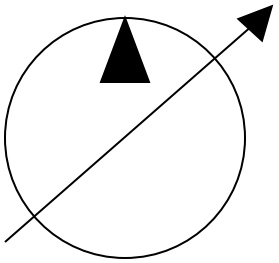
Bi-directional Fixed Displacement Hydraulic Pump



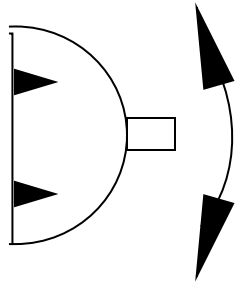
Bi-directional Fixed Displacement Hydraulic Motor



Unidirectional Variable Displacement Hydraulic Pump



Semi Rotary Actuator



# Three Types of Pump

Gear Pump

Vane Pump

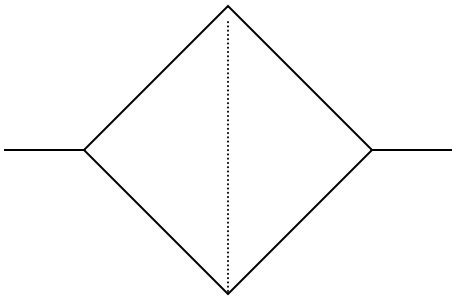
Piston Pump

Notice that the symbol does not describe the component construction. Symbols describe component functions only.

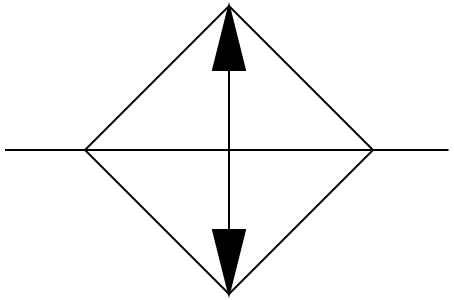
# Diamonds

Symbols in diamonds condition the oil in some way. Heating, cooling, filtering etc.

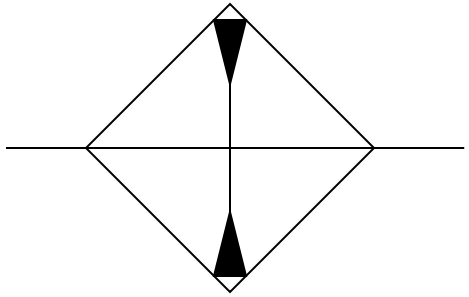
Filter



Cooler

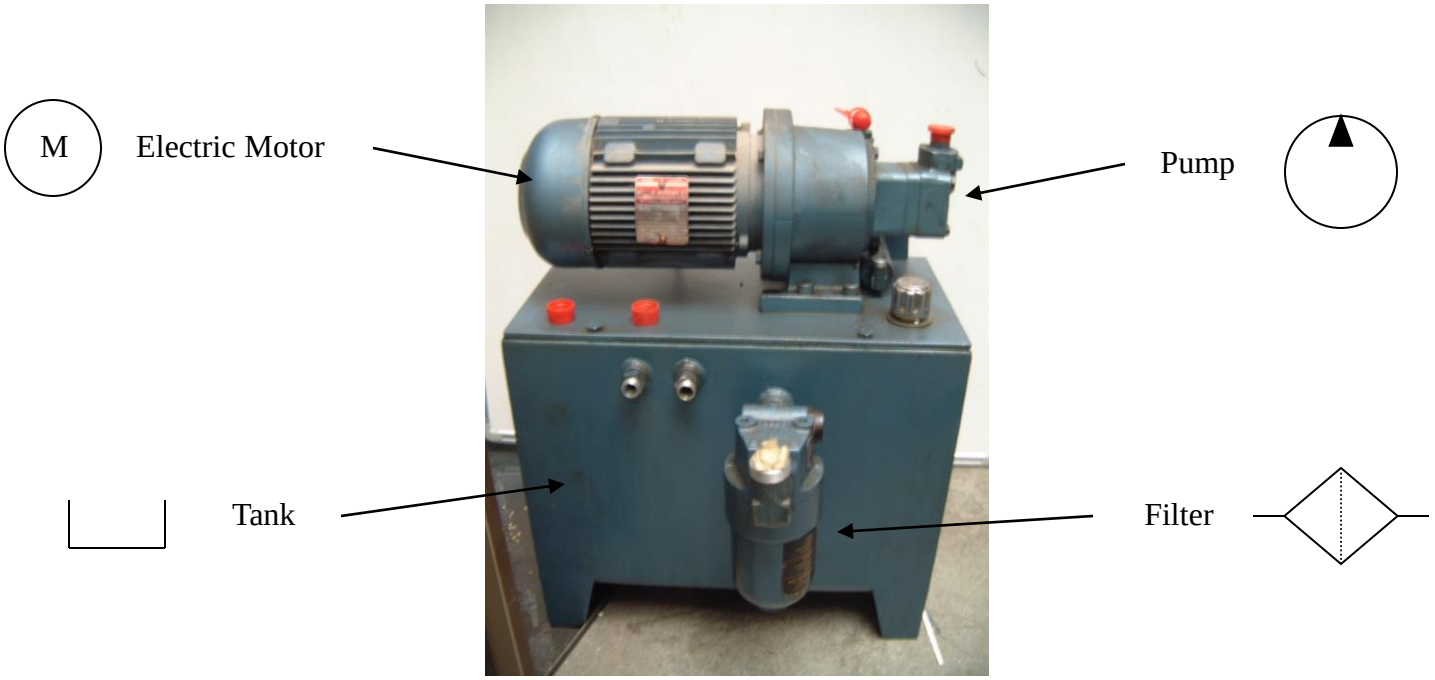


Heater



# The Hydraulic Power Pack and Symbols

The power pack produces the flow of oil (and consequently the pressure) for the hydraulic system.



# Rectangles and Squares

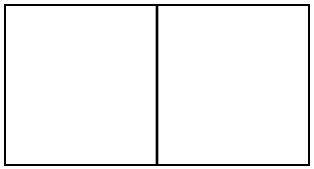
Rectangles and squares are generally used to represent components that direct and control oil in some way.

Valves can be:

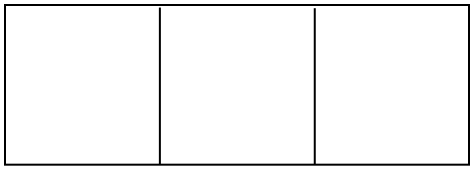
One Position

Usually control. Relieving or controlling pressure and flow for example.

Two Position



Three Position

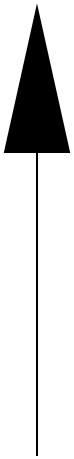


Directing the flow of oil to various positions.

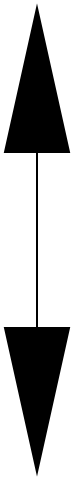
# Direction Arrows

Arrows Can Indicate:

Flow in One Direction

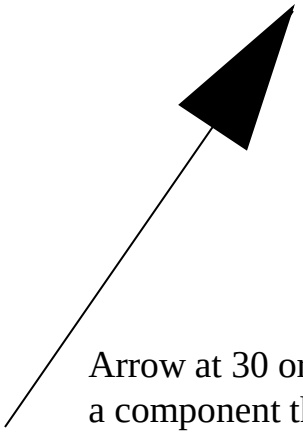


Flow in Two Directions



Rotation

Variability

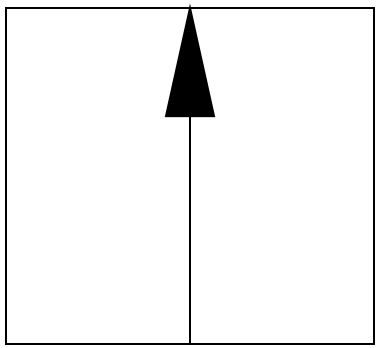


Arrow at 30 or 60 degrees through a component that can be varied.

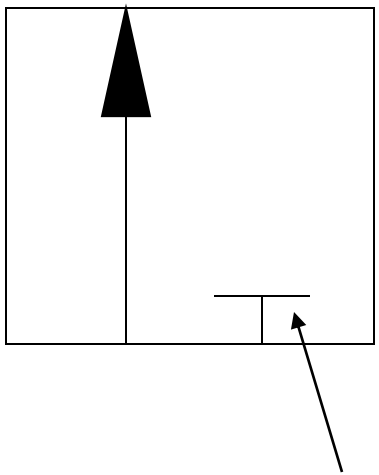
# Valves Ports

Valves Can Have Various Ports:

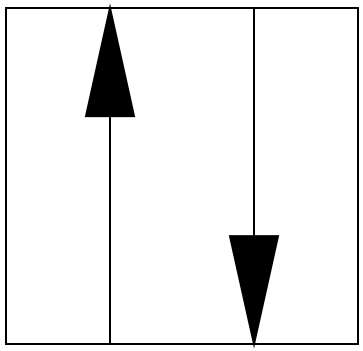
Two Ports



Three Ports




Four Ports

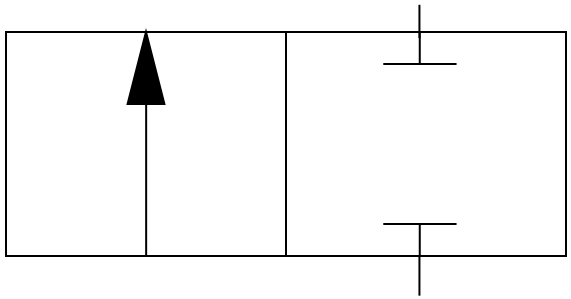


# Valve Classification

Valves Can Commonly be Classified as:

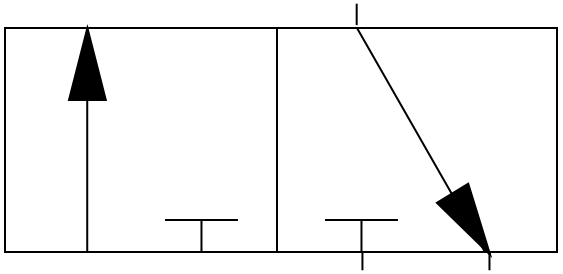
Two Port/Two Position Directional Control Valve (2/2 DCV)

2/2 Wegeventil Sperr Ruhestellung



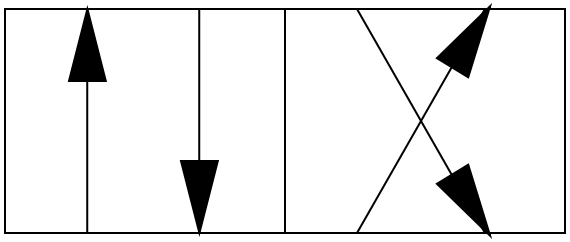
Three Port/Two Position Directional Control Valve (3/2 DCV)

3/2 Wegeventil Sperr Ruhestellung

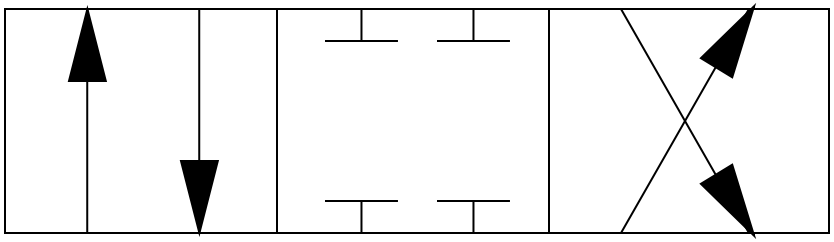


Four Port/Two Position Directional Control Valve (4/2 DCV)

4/2 Wegeventil



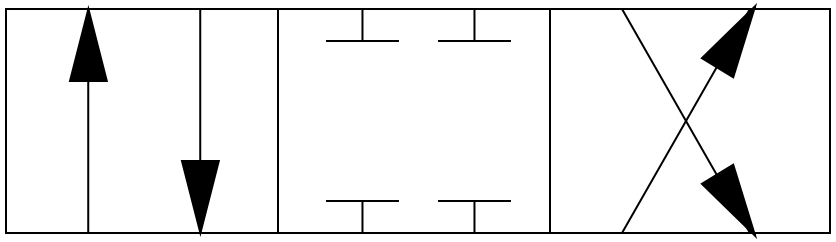
Four Port/Three Position Directional Control Valve (4/3 DCV)



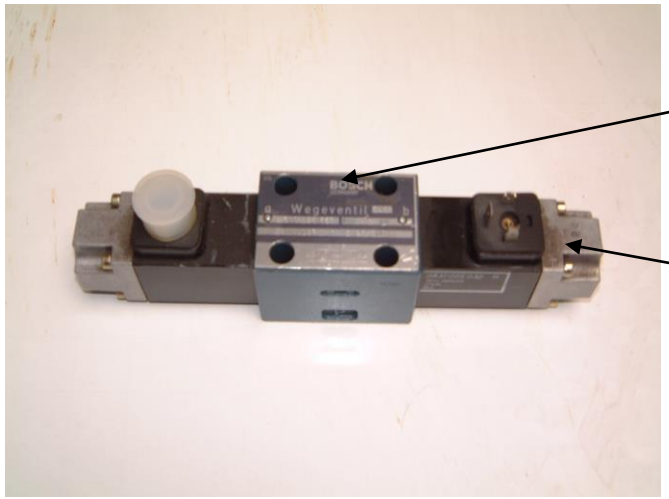
4/3 Wegeventil

# The 4/3 DCV

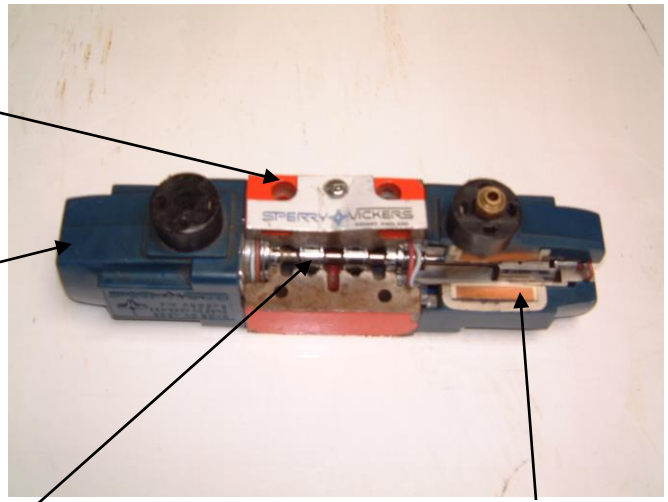
## Symbol



Bosch Solenoid Operated
4/3 DCV

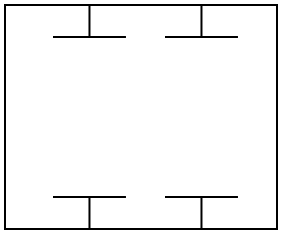


4/3 DCV Cut Away

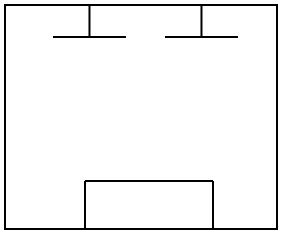


# Various 4/3 Centre Configurations

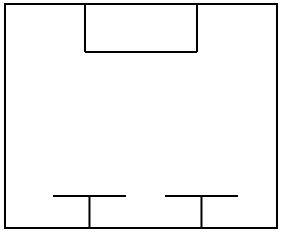
All Blocked



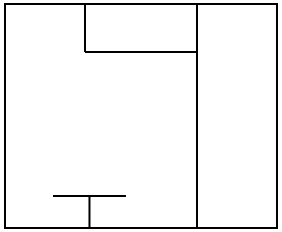
Semi Open Centre (Pump Side)



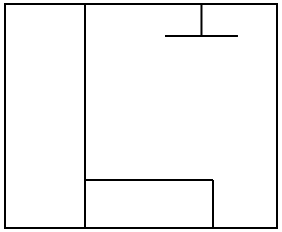
Semi Open Centre System Side)



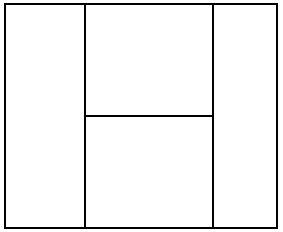
Y



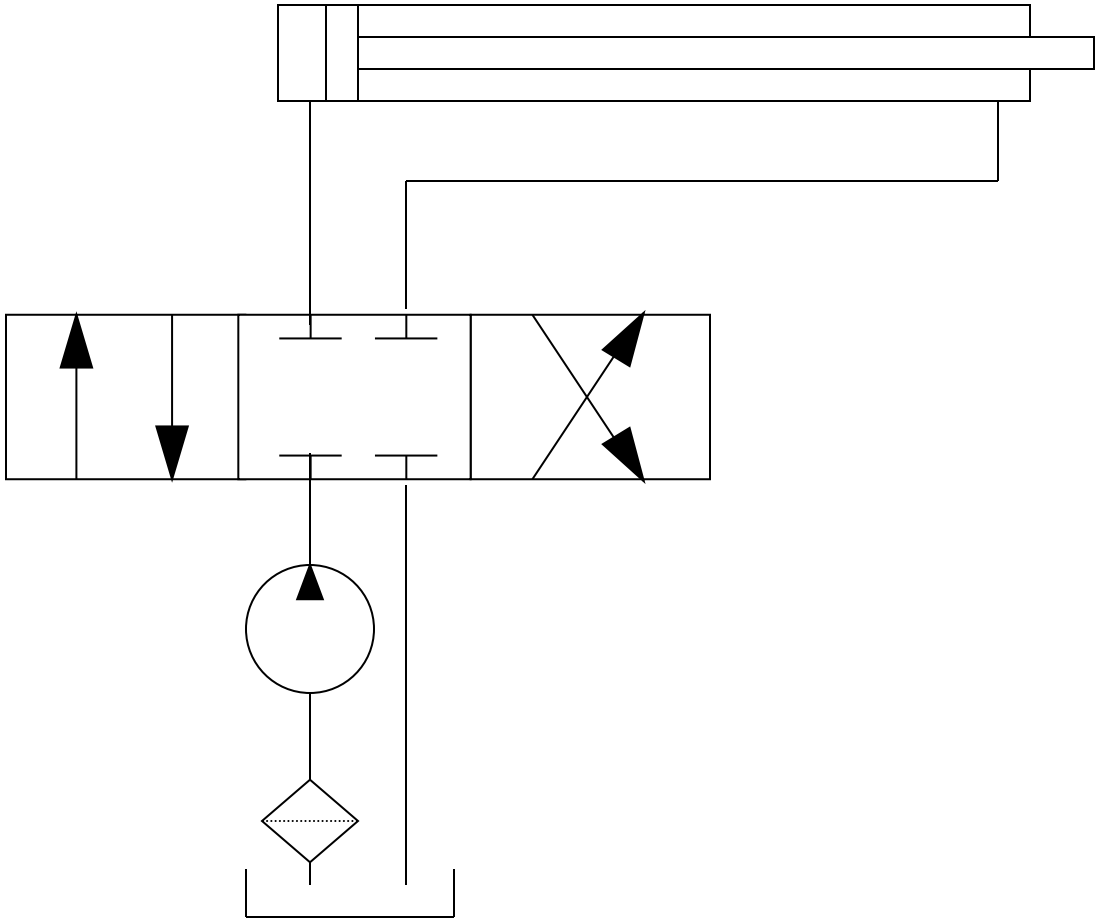
h



H



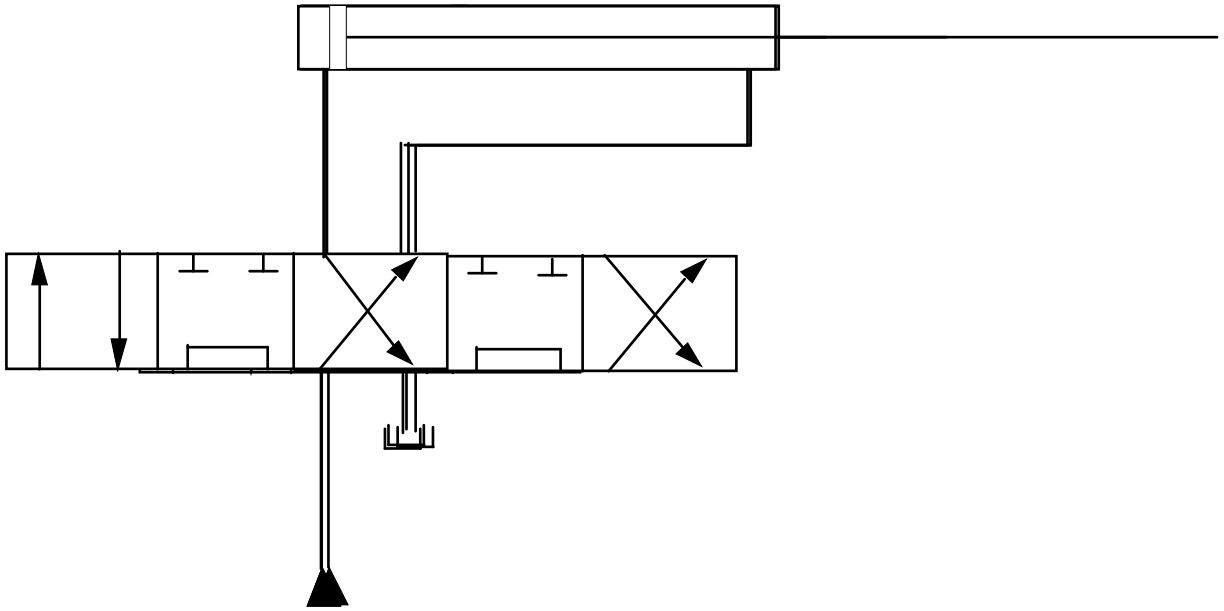
# The 4/3 DCV Controlling a Linear Actuator (Cylinder)



# Symbol Operation

Imagine the symbol moving from right to left as the valve is operated.

The system connections stay in position.

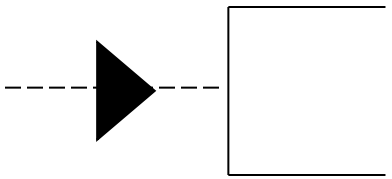


The symbol represents the spool position of the valve.

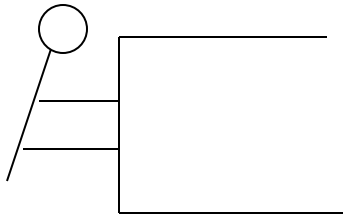
# Valve Actuators

The Valve Actuator Moves the Spool to its Various Positions:

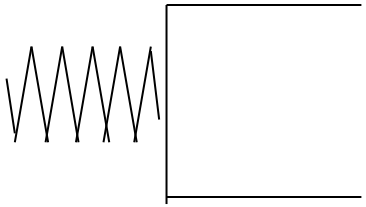
Pilot (Oil Pressure)



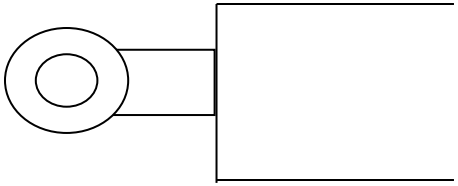
Lever



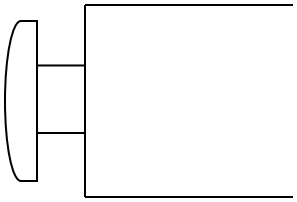
Spring



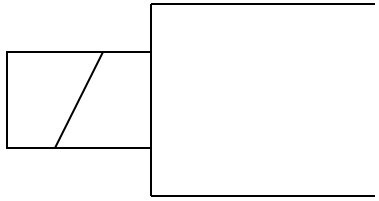
Roller



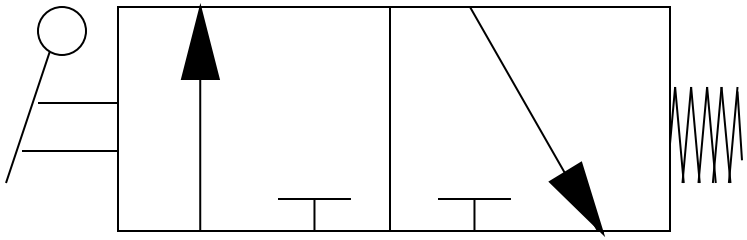
Push Button



Solenoid



# A 3/2 Lever/Spring DCV



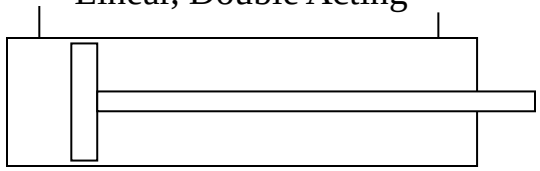
# Actuators

Actuators Can Be:

Linear, Single Acting

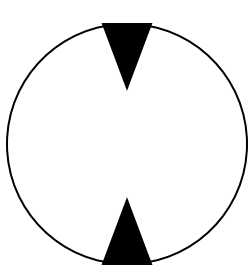
Oil pressure extends the cylinder. The load retracts the cylinder.

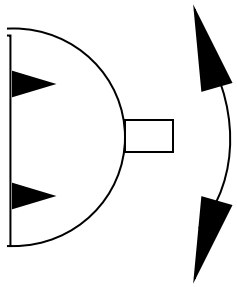
Linear, Double Acting



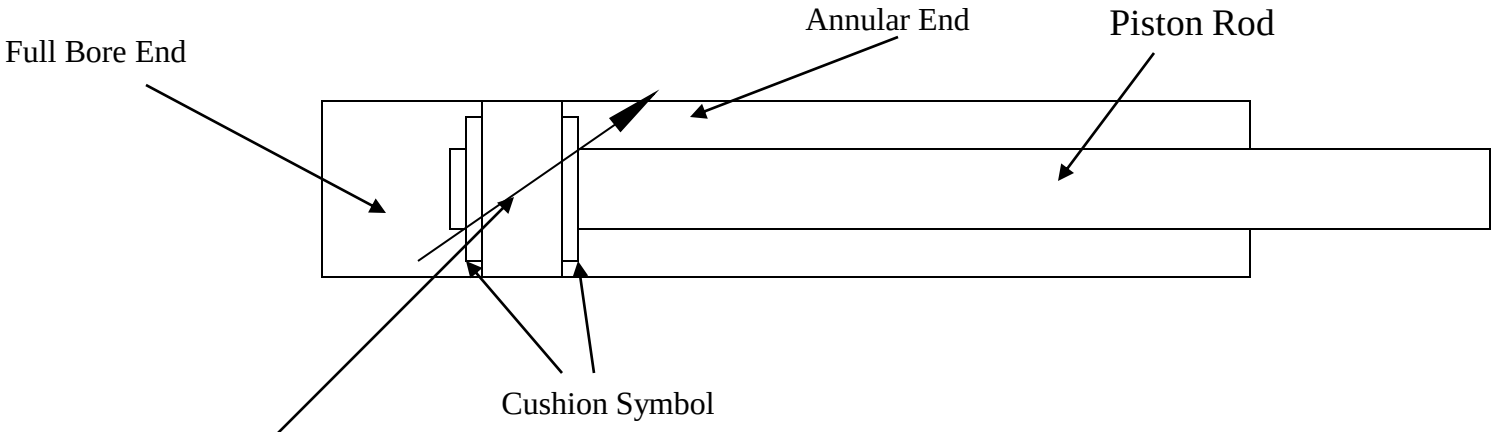
Oil pressure extends the cylinder and retracts the cylinder.

Or Rotary

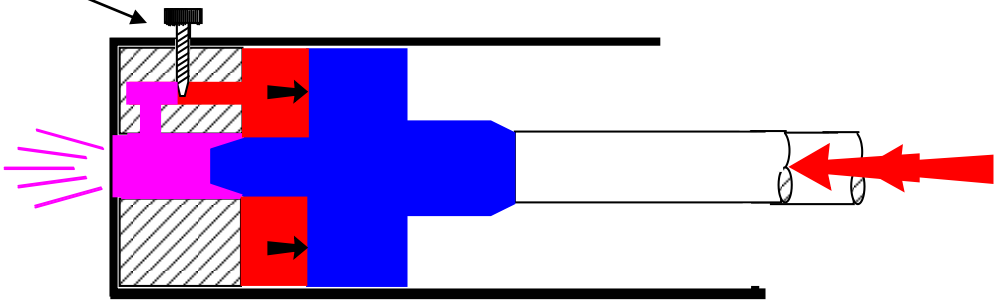




# Cylinder Cushioning




## Cushion Illustration



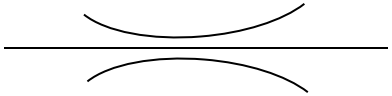
The cushion slows the cylinder down just before it hits the back (or front) of the cylinder.

# Other Common Components

Spring

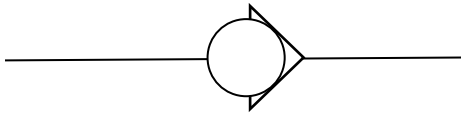
Used to return some valve spools to a known position.

Restrictor



Used to control the flow of oil.

Check Valve

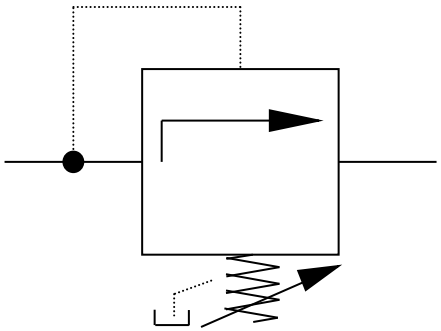


Allows oil in one direction only.

# Control Valves

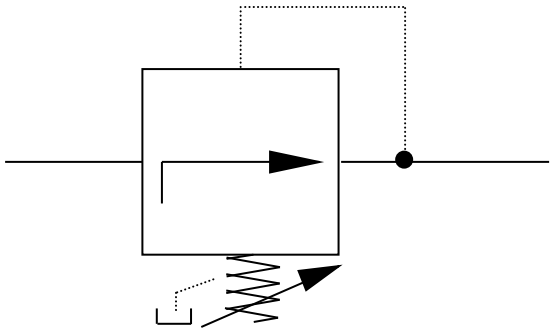
Control Valves Control Pressure and Flow

## Relief Valve



Pressure Relief Valves are primarily used to set the maximum system pressure.

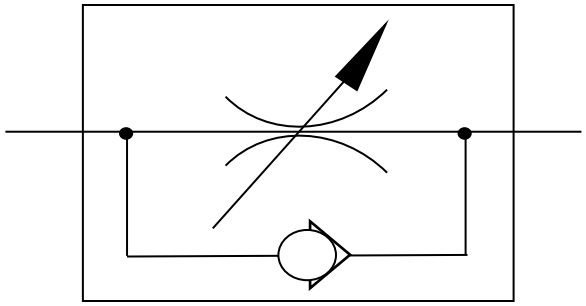
## Pressure Reducing Valve



Pressure Reducing Valves are used to set the maximum system pressure at the valve outlet. The valve gives a controlled pressure output lower than the inlet pressure.

Pressure Controlling Valves

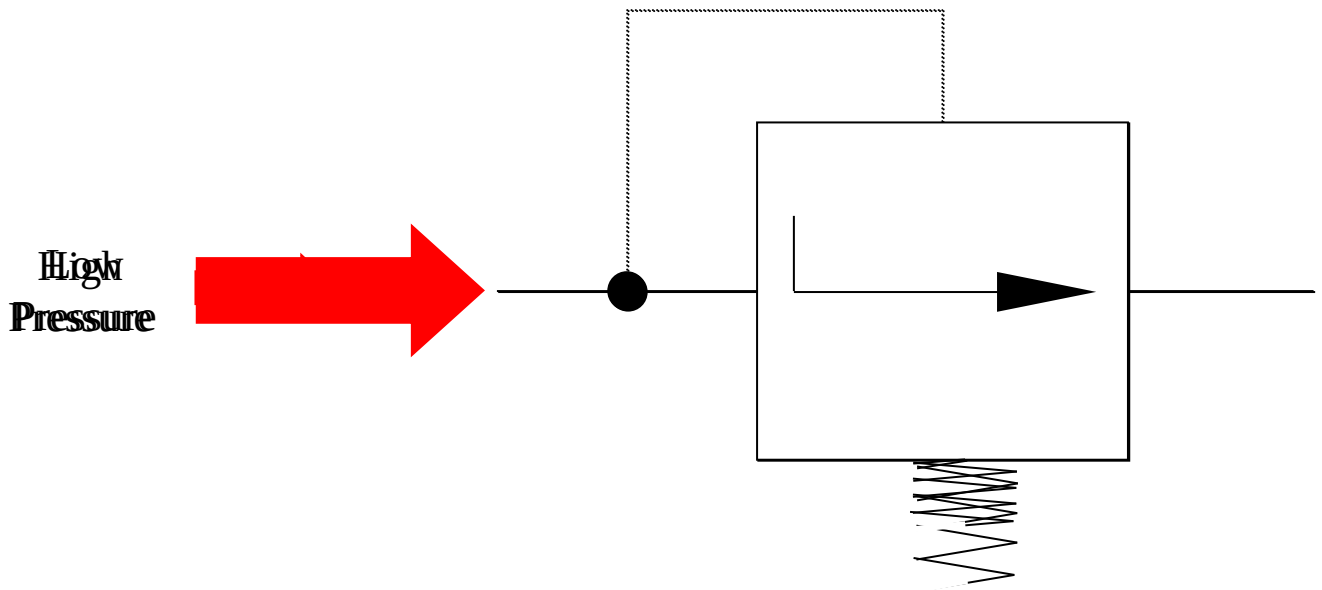
## Restrictor With Check Valve



Restrictors are used to control oil flow and thus actuator and system speeds.

Flow Controlling Valve

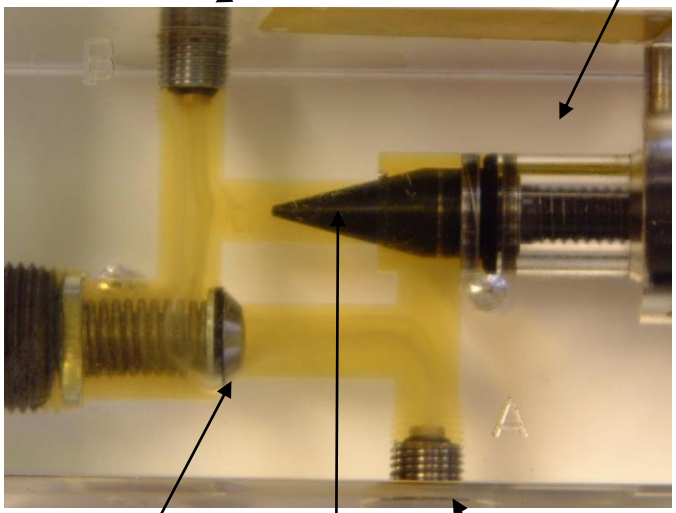
# Relief Valve Symbol Operation



# Inside the Relief Valve and Restrictor

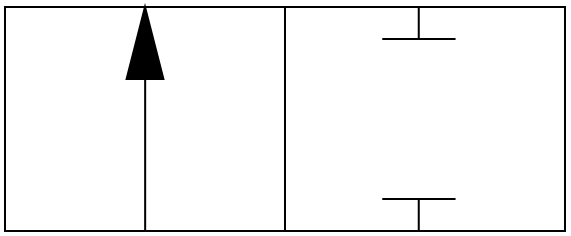
Relief Valves


Restrictor with Check Valve

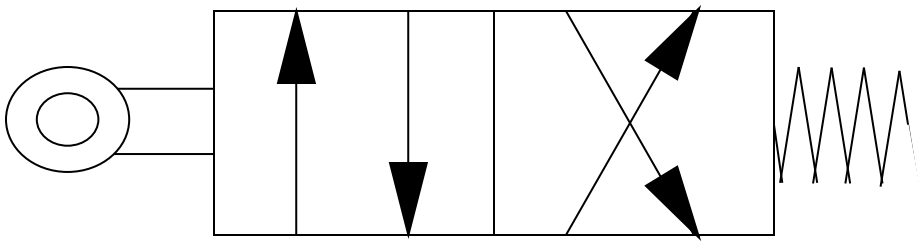


# Test

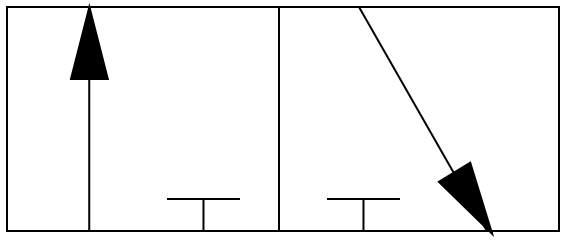
2/2 DCV



4/2 Roller/Spring DCV



3/2 DCV



4/3 DCV