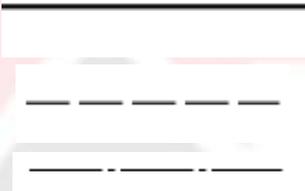


Basic Symbols

Lines



-continuous line - flow line

-dashed line - pilot, drain

-envelope - long and short dashes around two or more component symbols.

Circular



-large circle -
pump, motor



-small circle -
Measuring
devices



-semi-circle -
rotary actuator

Square



-one square
- pressure
control
function
-two or three
adjacent
squares -
directional
control

Diamond



-diamond -
Fluid
conditioner
(filter,
separator,
lubricator,
heat
exchanger)

Miscellaneous Symbols



-Spring



-Flow
Restriction

Triangle



-solid -
Direction of
Hydraulic
Fluid Flow



-open -
Direction of
Pneumatic
flow

Pumps and Compressors

Fixed Displacement hydraulic pump



-
unidirectional



-
bidirectional

Variable displacement hydraulic pump



-
unidirectional



-
bidirectional

Compressor



Motors

Fixed displacement hydraulic motor



-
unidirectional



-
bidirectional

Variable displacement hydraulic motor



- unidirectional



-bidirectional

Pneumatic motor



- unidirectional



-bidirectional

Rotary Actuator



- hydraulic



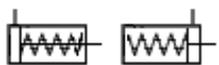
- pneumatic

Cylinders

Single acting cylinder



-returned by external force



-returned by spring or extended by spring force

Double acting cylinders



-single piston rod (fluid required to extend and retract)

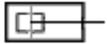


-double ended piston rod

Cylinders with cushions



- single fixed cushion



- double
fixed
cushion



- single
adjustable
cushion



- double
adjustable
cushion

Directional Control Valves

Directional control valve (2 ports / 2 positions)



-Normally
closed
directional
control valve
with 2 ports
and 2 finite
positions.



-Normally
open
directional
control valve
with 2 ports
and 2 finite
positions.

Directional control valve (3 ports / 2 positions)



-Normally
closed
directional
control valve
with 3 ports
and 2 finite
positions.



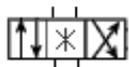
-Normally
open
directional
control valve
with 3 ports
and 2 finite
positions.

Directional control valve (4 ports / 2 positions)



-directional control valve with 4 ports and 2 finite positions

Directional control valve (4 ports / 3 positions)



-directional control valve with 4 ports and 3 finite positions
*-(center position can have various flow paths)

Directional control valve (5 ports / 2 positions) Normally a pneumatic valve



-directional control valve with 5 ports and 2 finite positions

Directional control valve (5 ports / 3 positions) Normally a pneumatic valve

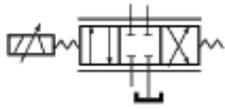


-directional control valve with 5 ports and 3 finite positions

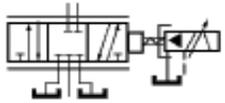
Proportional directional control valve

Electro-hydraulic servo valve

-The spool positions on these valves is variable allowing for variable flow conditions.



-single-stage
**direct
operation**
unit which
accepts an
analog
signal and
provides a
similar
analog fluid
power
output



-two-stage
with
mechanical
feedback
**indirect
pilot
operation**
unit which
accepts an
analog
signal and
provides a
similar
analog fluid
power
output

Control Methods

Manual Control



-general
symbol
(without
showing the
control type)



-pushbutton



-lever

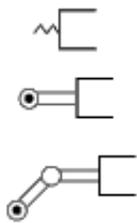


-foot pedal

Mechanical Control



-plunger or
tracer



-spring
 -roller
 -roller(one direction only)

Electrical Control



-Solenoid (the one winding)

Pilot Operation



-pneumatic



-hydraulic

Pilot operated two-stage valve



-Pneumatic:
 Sol first stage



-Pneumatic:
 Air pilot second stage



-Hydraulic:
 Sol first stage



-Hydraulic:
 Hyd pilot second stage

Check valves, Shuttle valves, Rapid Exhaust valves



-check valve
 -free flow one direction, blocked flow in other direction

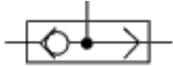


-pilot
operated
check valve,
pilot to close



-pilot
operated
check valve,
pilot to open

Shuttle valve



-to isolate
one part of a
system from
an alternate
part of
circuit.

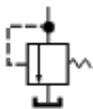
Rapid exhaust valve/Pneumatic



-installed
close to an
actuator for
rapid
movement
of the
actuator.

Pressure Control Valves

Pressure Relief Valve(safety valve) normally closed



- line
pressure is
limited to
the setting
of the
valve,
secondary
part is
directed to
tank.

Proportional Pressure Relief



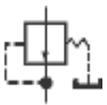
- line pressure is limited to and proportional to an electronic signal

Sequence Valve



- when the line pressure reaches the setting of the valve, valve opens permitting flow to the secondary port. The pilot must be externally drained to tank.

Pressure Reducing valve



- pressure downstream of valve is limited to the setting of the valve

Flow Control Valves

Throttle valve



-adjustable output flow

Flow Control valve



-with fixed output
(variations in inlet pressure do not affect rate of flow)



-with fixed output and relief port to reservoir
with relief for excess flow (variations in inlet pressure do not affect rate of flow)



-with variable output



-fixed orifice



-metered flow toward right free flow to left



-pressure compensated flow control fixed output flow regardless of load

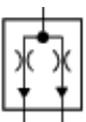


-pressure and temperature compensated



-with variable output and relief port to reservoir

Flow dividing valve



-flow is divided equally to two outputs.

Shut-Off Valve



-Simplified symbol

Accumulators

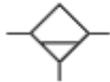


Filters, Water Traps, Lubricators and Miscellaneous Apparatus

Filter or Strainer



Water Trap



-with manual drain



-with automatic drained

Filter with water trap



-with manual drain



-automatic drain

Air Dryer



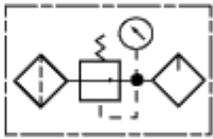
refrigerant, or chemical removal of water from compressed air line

Lubricator



Conditioning unit

-oil vapor is
indected into
air line



-compound
symbol of
filter,
regulator,
lubricator
unit



-Simplified
Symbol

Heat Exchangers



-air or water
cooled unit
designed to
remove heat
from oil
returning to
reservoir

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