


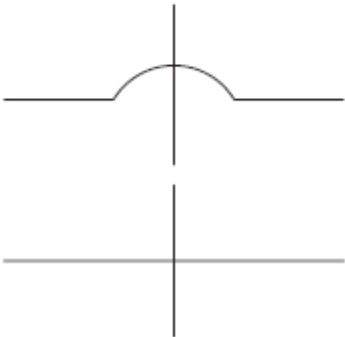



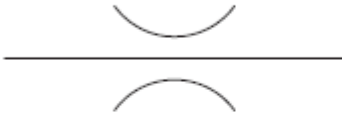


Hydraulic symbols

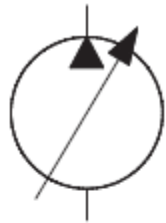
Hydraulics and hydraulic drives

Dr inż. Jarosław Zubrzycki

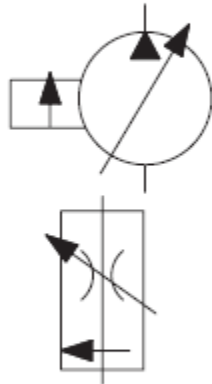
Lines

	Line, Working (Main)
	Line, Pilot or Drain
	Flow Direction Hydraulic Pneumatic
	Lines Crossing

	Lines Joining
	Lines With Fixed Restriction
	Line, Flexible
	Station, Testing, Measurement or Power Take-Off



Variable Component (run
arrow through symbol
at 45°)



Pressure Compensated
Units (Arrow parallel to
short side of symbol)



Temperature Cause or
Effect

Hydraulic Pumps





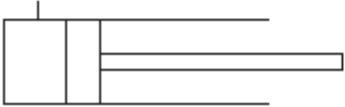
Fixed Displacement



Variable Displacement

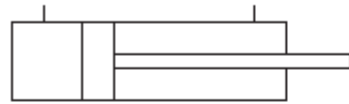
Motors and Cylinders

Hydraulic

	Fixed Displacement
	Variable Displacement
	Cylinder, Single-Acting

Motors and Cylinders

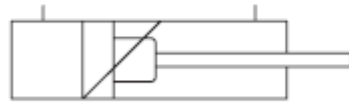
Cylinder, Double-Acting



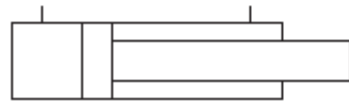
Single End Rod



Double End Rod



Adjustable Cushion
Advance Only

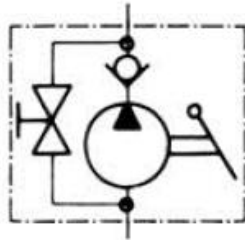


Differential Piston

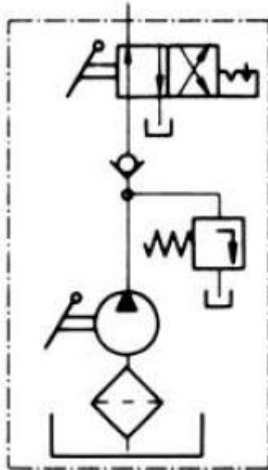
Motors and Cylinders



FIXED DISPLACEMENT PUMP

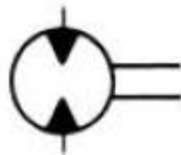


SINGLE-ACTING HAND PUMP
(e.g. 376)

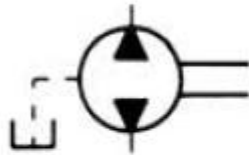


DOUBLE ACTING HAND PUMP
(e.g. 27906)

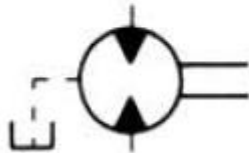
Motors and Cylinders



FIXED DISPLACEMENT REVERSIBLE
MOTOR WITHOUT DRAIN



FIXED DISPLACEMENT REVERSIBLE
PUMP WITH DRAIN

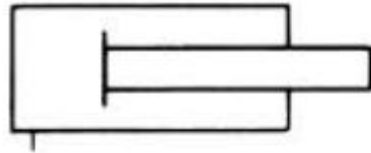


FIXED DISPLACEMENT REVERSIBLE
MOTOR WITH DRAIN

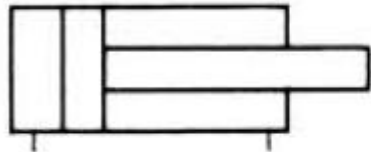


ROTARY ACTUATOR
(e.g. 1APA...)

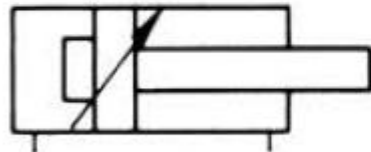
Motors and Cylinders



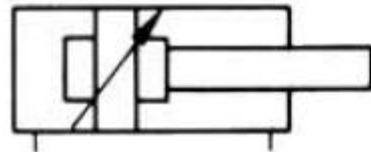
SINGLE ACTING CYLINDER



DOUBLE ACTING CYLINDER

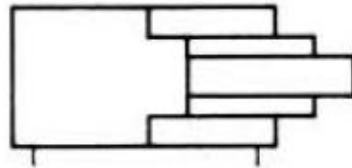


DOUBLE ACTING CYLINDER
WITH VARIABLE DAMPING
AT ONE END

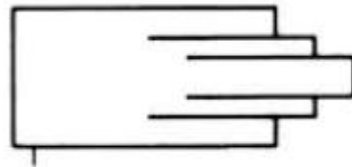


DOUBLE ACTING CYLINDER
WITH VARIABLE DAMPING
AT BOTH ENDS

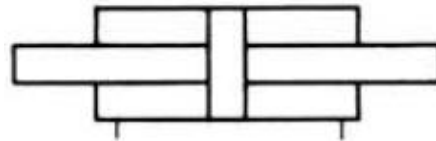
Motors and Cylinders



DOUBLE ACTING
TELESCOPIC CYLINDER



SINGLE ACTING
TELESCOPIC CYLINDER


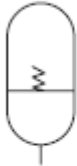
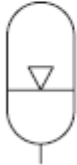



DOUBLE ACTING DOUBLE
ROD CYLINDER


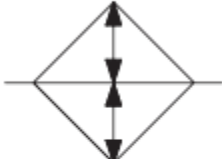
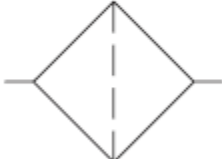



ACCUMULATOR WITH
GAS PRE-CHARGE




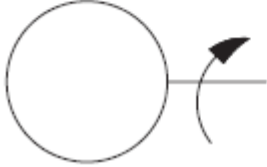
Miscellaneous Units

	Electric Motor
	Accumulator, Spring Loaded
	Accumulator, Gas Charged
	Heater


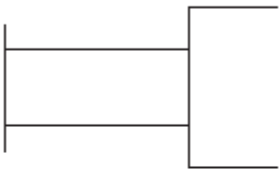

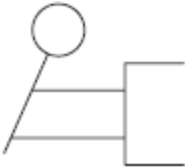
Miscellaneous Units

	Cooler
	Temperature Controller
	Filter, Strainer
	Pressure Switch

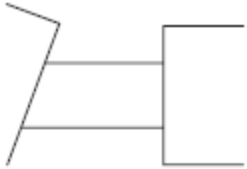
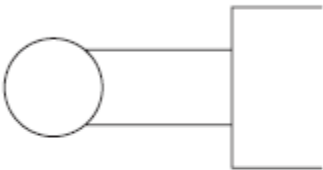
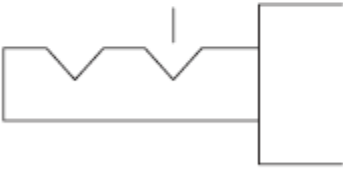
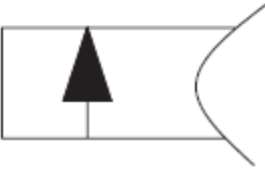
Miscellaneous Units

	Pressure Indicator
	Temperature Indicator
	Component Enclosure
	Direction of Shaft Rotation (assume arrow on near side of shaft)

Methods of Operation

	Spring
	Manual
	Push Button
	Push-Pull Lever

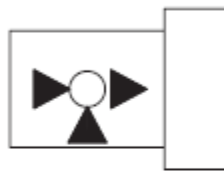
Methods of Operation

 A schematic symbol for a pedal or treadle, consisting of a rectangular body with a diagonal line extending upwards and to the left from the top-left corner.	Pedal or Treadle
 A schematic symbol for a mechanical actuator, consisting of a rectangular body with a circle attached to the left side.	Mechanical
 A schematic symbol for a detent, consisting of a rectangular body with a series of three downward-pointing triangular teeth along its top edge.	Detent
 A schematic symbol for a pressure-compensated valve, consisting of a rectangular body with a solid black triangle pointing upwards from the bottom edge, and a curved line on the right side.	Pressure Compensated

Methods of Operation

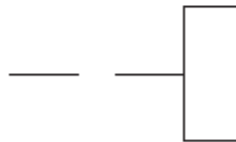


Solenoid, Single Winding

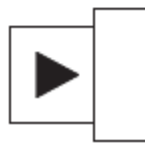


Servo Control

Pilot Pressure

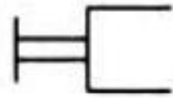


Remote Supply

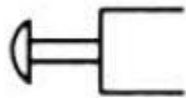


Internal Supply

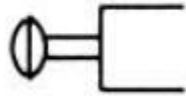
Spool controls



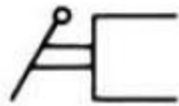
GENERAL SYMBOL



PUSH KNOB



PUSH-PULL KNOB



LEVER

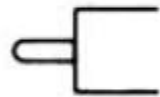
Spool controls



SINGLE ACTING PEDAL



DOUBLE ACTING PEDAL



PLUNGER

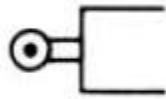


PLUNGER WITH
STROKE LIMITATION

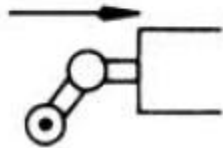
Spool controls



SPRING

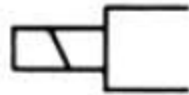


ROLLER

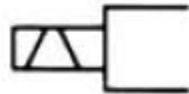


LEVER WITH ROLLER

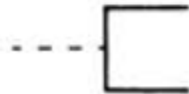
Spool controls



SINGLE SOLENOID

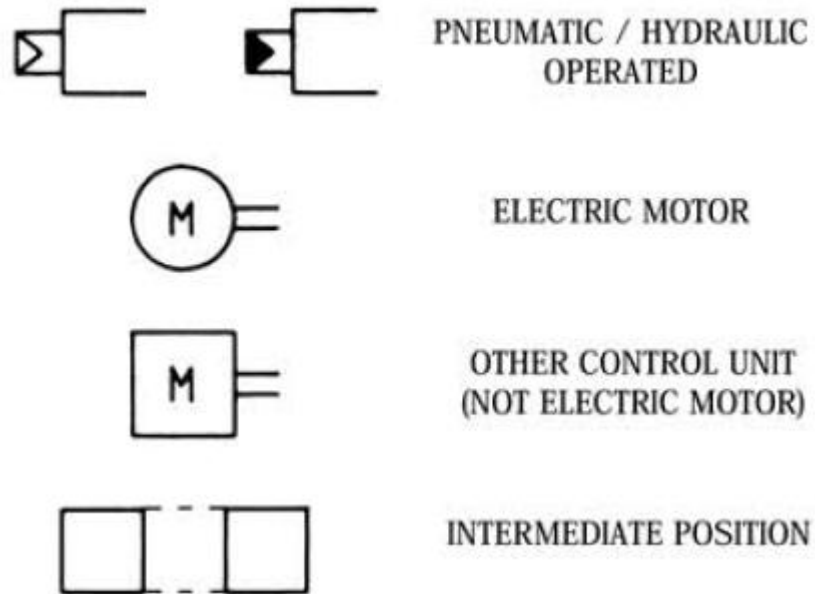


PUSH/PULL SOLENOID

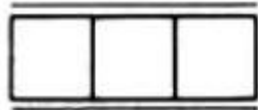


DIRECT PILOT OPERATED

Spool controls



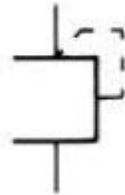
Spool controls



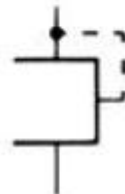
PROPORTIONAL SPOOL



COUPLING

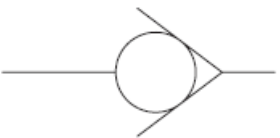

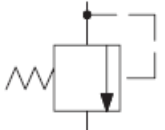
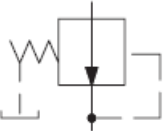

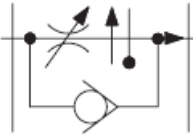


INTERNAL PILOT



EXTERNAL PILOT

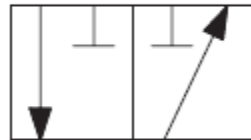
Valves

	Check
	On-Off (manual shut-off)
	Pressure Relief
	Pressure Reducing
	Flow Control, Adjustable - Non-Compensated
	Flow Control, Adjustable (Temperature and pressure compensated)

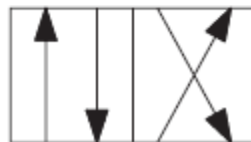
Valves



Two-Position
Two Connection

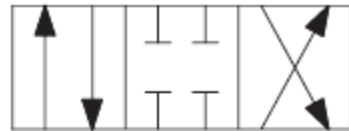


Two-Position
Three Connection

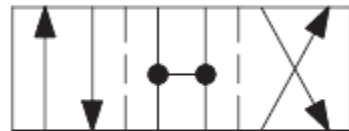


Two-Position
Four Connection

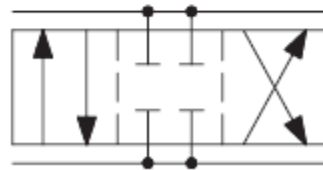
Valves



Three-Position
Four Connection



Two-Position
In Transition

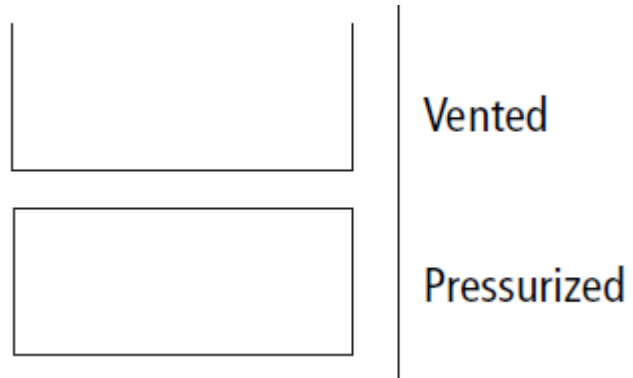


Valves Capable of Infinite
Positioning (Horizontal
bars indicate infinite
positioning ability)

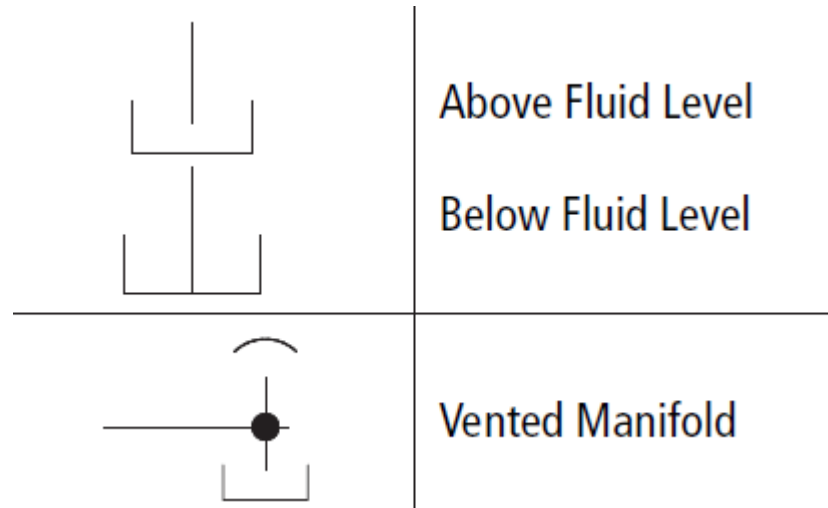
Color Code for Fluid Power Schematic Drawings

Black	Intensified Pressure
Red	Supply
Intermittent Red	Charging Pressure
Intermittent Red	Reduced Pressure
Intermittent Red	Pilot Pressure
Yellow	Metered Flow
Blue	Exhaust
Green	Intake
Green	Drain
Blank	Inactive

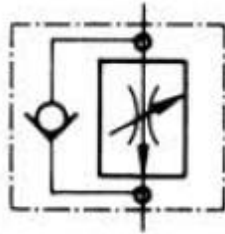
Reservoir



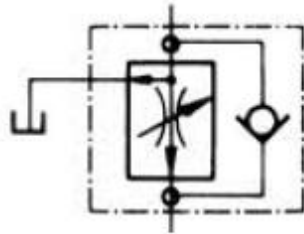
Line, To Reservoir



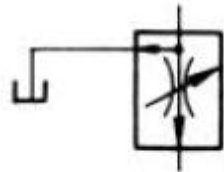
Energy control



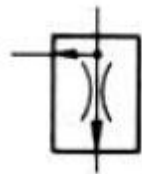
ADJUSTABLE 2-WAY
FLOW CONTROL WITH
REVERSE FLOW CHECK



ADJUSTABLE 3-WAY
FLOW CONTROL WITH
REVERSE FLOW CHECK

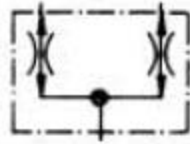


ADJUSTABLE 3-WAY
FLOW CONTROL

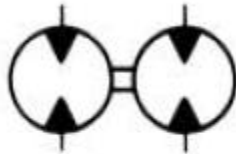


FLOW DIVIDER

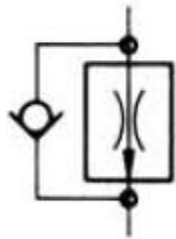
Energy control



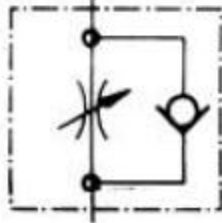
SPOOL TYPE FLOW DIVIDER



ROTARY FLOW DIVIDER

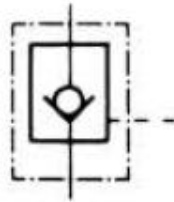


LOWERING VALVE WITH
REVERSE FLOW CHECK



THROTTLE WITH
REVERSE FLOW CHECK

Energy control



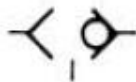
PILOT OPERATED CHECK VALVE WITHOUT DRAIN



PILOT OPERATED CHECK VALVE WITH DRAIN

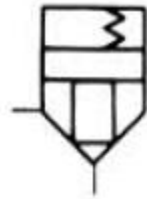


CHECK VALVE WITH SPRING

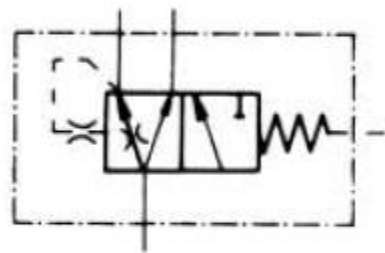


SHUTTLE VALVE

Energy control

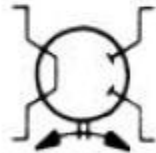


LOGIC ELEMENT



PRIORITY VALVE

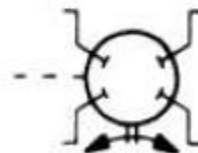
STEERING UNITS



OPEN CENTRE



CLOSED CENTRE



CLOSED CENTRE WITH LS
(FOR USE WITH
PRIORITY VALVE)