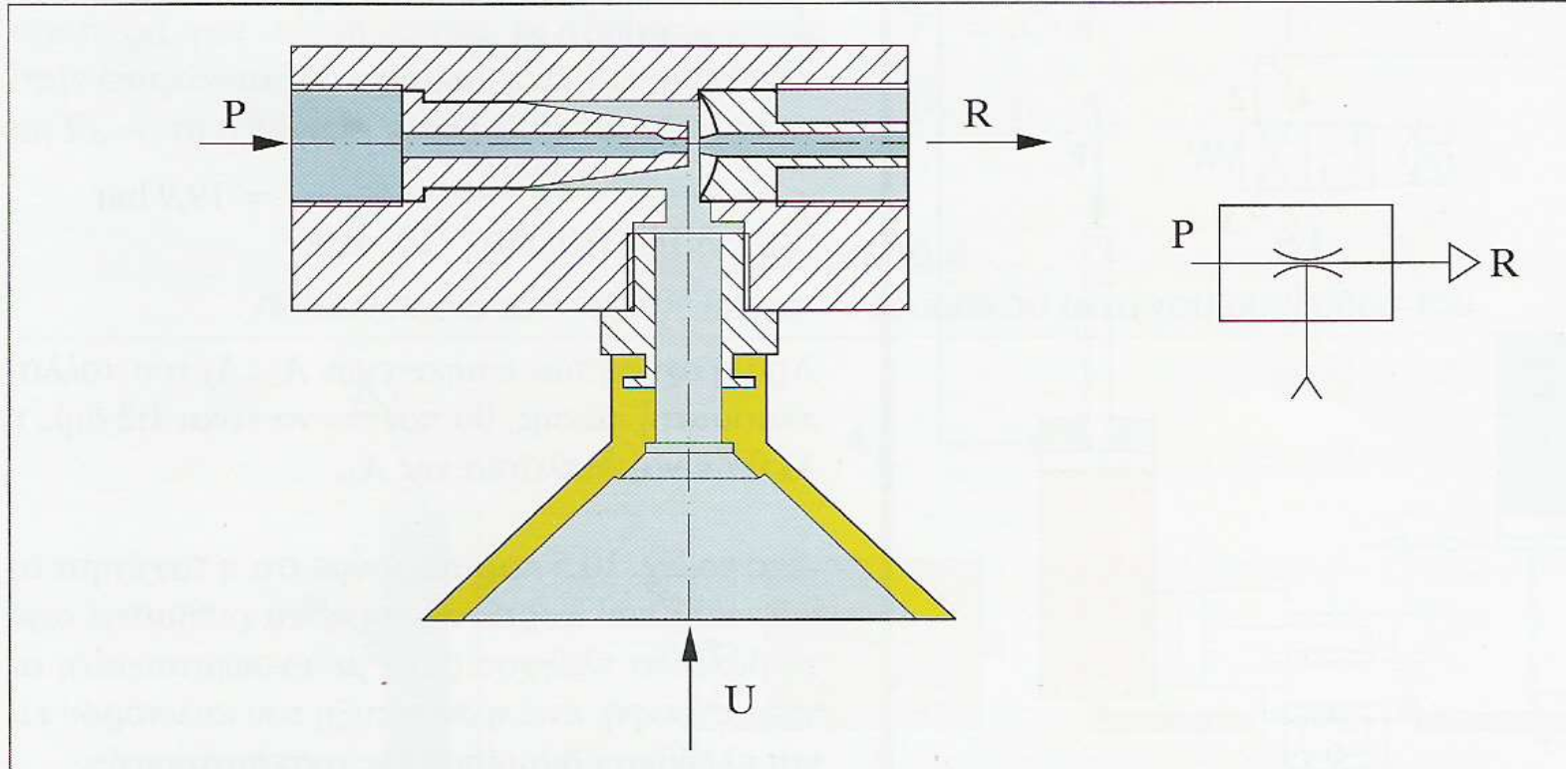
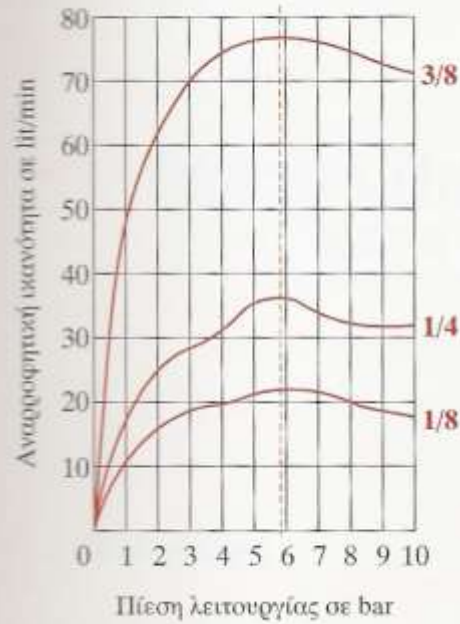


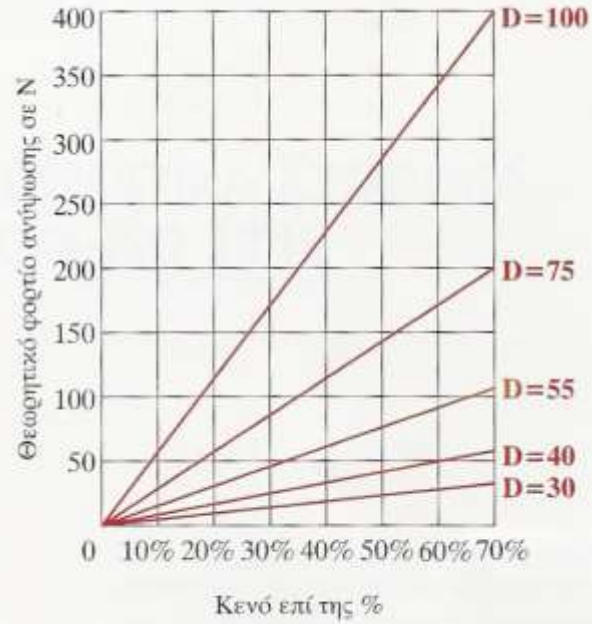
Γεννήτρια κενού σε τομή μετά του συμβόλου της













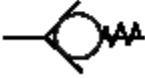

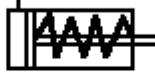

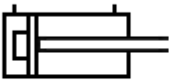
Διαγράμματα γεννητριών κενού


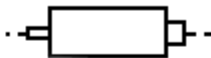










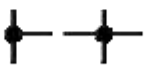
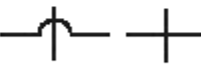







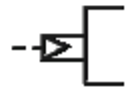
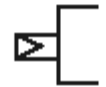

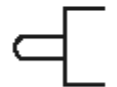




α.



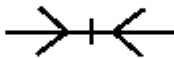


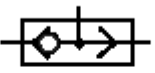














β.

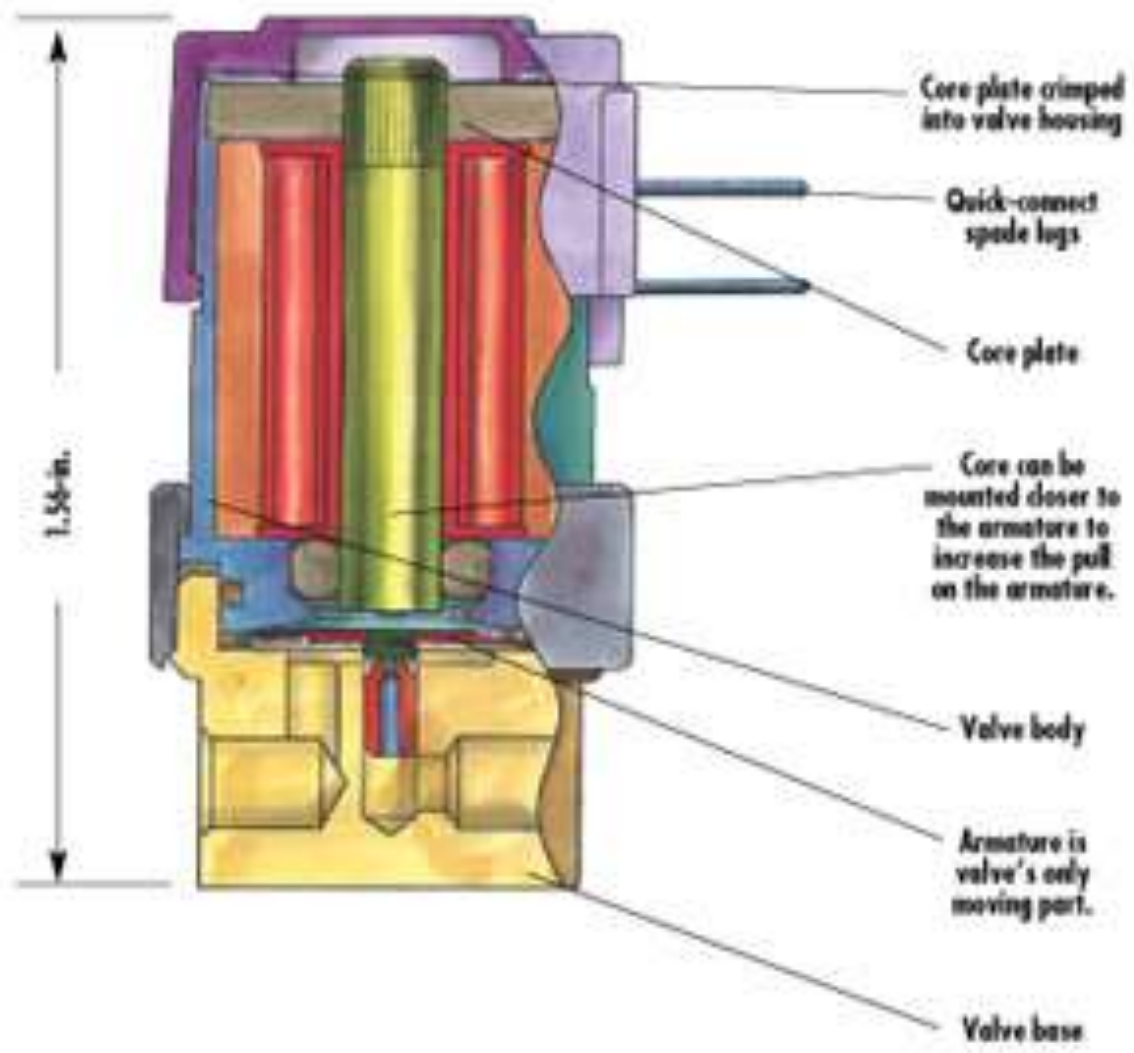
 <p>Βαλβίδα διεύθυνσης 2/2; 2 θύρες, 2 θέσεις λεπούργιας</p>	 <p>Βαλβίδα διεύθυνσης 3/2; 3 θύρες, 2 θέσεις λεπούργιας</p>	 <p>Βαλβίδα διεύθυνσης 4/2; 4 θύρες, 2 θέσεις λεπούργιας</p>
 <p>Βαλβίδα διεύθυνσης 4/3; 4 θύρες, 3 θέσεις λεπούργιας</p>	 <p>Βαλβίδα διεύθυνσης 5/2; 5 θύρες, 2 θέσεις λεπούργιας</p>	 <p>Βαλβίδα διεύθυνσης 5/3; 5 θύρες, 3 θέσεις λεπούργιας</p>
 <p>συσσωρευτής</p>	 <p>Ξηραντής</p>	 <p>Πνευματικός Κινητήρας (Μίας κατεύθυνσης)</p>
 <p>Πνευματικός Κινητήρας (Δύο κατεύθυνσεων)</p>	 <p>Βαλβίδα αντεπιστροφής (με ελατήριο επαναφοράς)</p>	 <p>Συμπιεστής</p>
 <p>Κύλινδρος απλής ενεργείας με ελατήριο επαναφοράς.</p>	 <p>Κύλινδρος διπλού βάαρου</p>	 <p>Κύλινδρος διπλής ενεργείας με απλή επιβράδυνση</p>

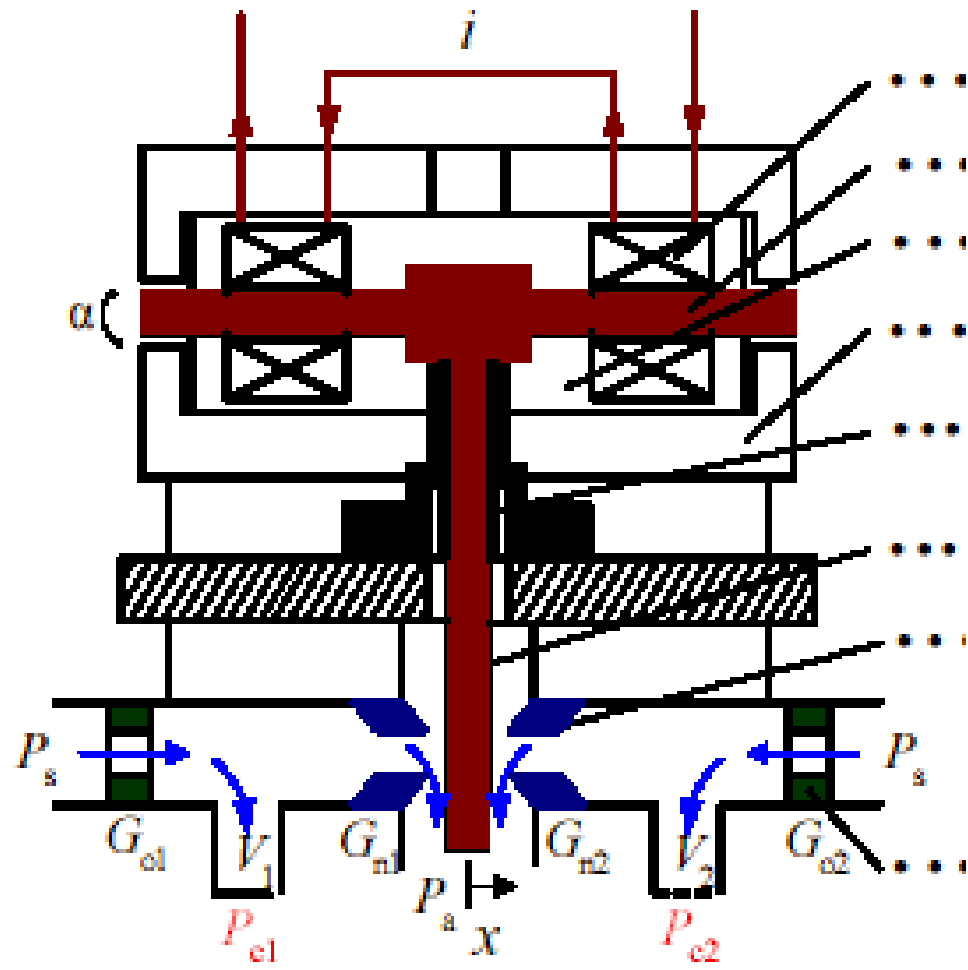
 <p>Κύλινδρος διπλής ενεργείας με διπλή ρυθμιζόμενη επιβράδυνση</p>	 <p>μειαστροπέας πίεσης</p>	 <p>κατεύθυνση ροής</p>
 <p>Γραμμή εκτόνωσης ή ελέγχου</p>	 <p>Φίλτρο</p>	 <p>Φίλτρο με αυτόματο στράγγισμα</p>
 <p>Φίλτρο με χειροκίνητο στράγγισμα</p>	 <p>σωλήνας</p>	 <p>είκαμπτος σωλήνας</p>
 <p>Βαλβίδα ελέγχου ροής</p>	 <p>Διακόπτης ροής</p>	 <p>χειροκίνητη ενεργοποίηση</p>
 <p>συνδέσεις σωλήνων</p>	 <p>διακοπαιρούμενες σωλήνες</p>	 <p>λιπαντής</p>

 <p>πλήκτρο ενεργοποίησης</p>	 <p>δύο κλειστές θύρες και μια όδευση παράκαμψης</p>	 <p>μια όδευση</p>
 <p>ποδόπληκτρο ενεργοποίησης</p>	 <p>εξωτερική πνευματική ενεργοποίηση</p>	 <p>εσωτερική πνευματική ενεργοποίηση</p>
 <p>ταπωμένη γραμμή (ή θύρα)</p>	 <p>ενεργοποιητής θέσεως</p>	 <p>πνευματική γραμμή</p>
 <p>πνευματικά ενεργοποιούμενος διακόπτης</p>	 <p>μανόμετρο</p>	 <p>ρυθμιστής πίεσης (χωρίς εκτόνωση)</p>

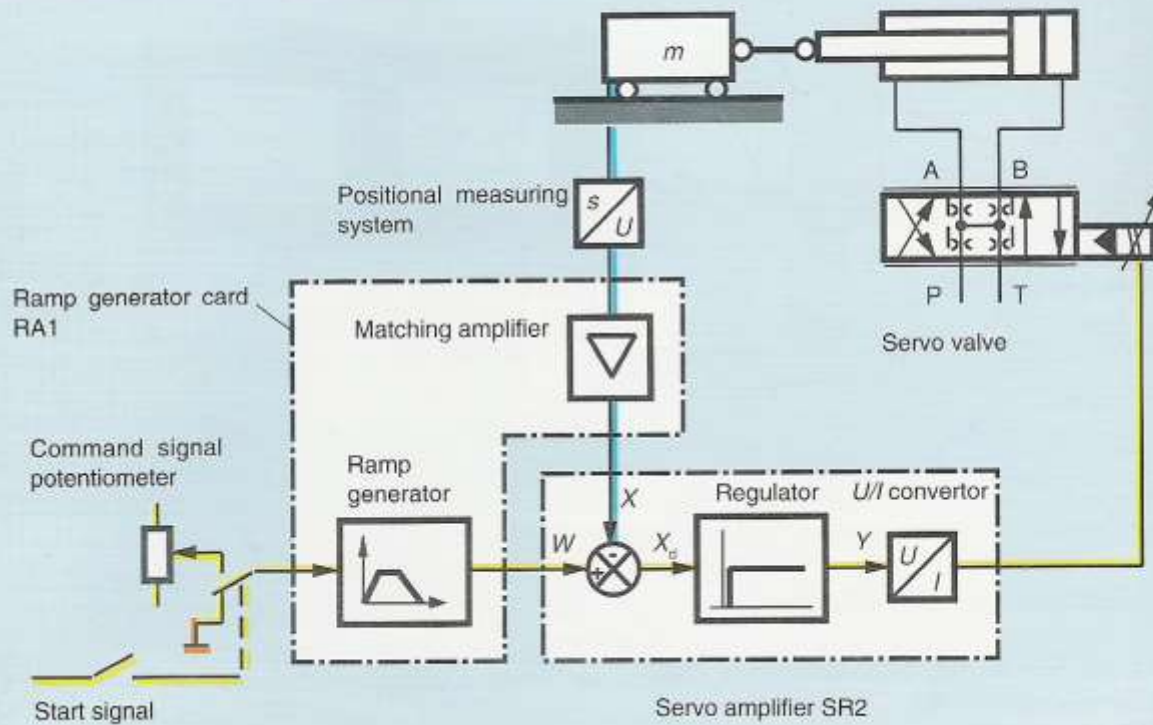
 <p>ρυθμιστής πίεσης (με εκτόνωση)</p>	 <p>πλήκτρο ενεργοποίησης</p>	 <p>ταχυσύνδεσμος</p>
 <p>ενεργοποιητής με ροδάκι</p>	 <p>ενεργοποιητής με ροδάκι</p>	 <p>Shuttle Valve</p>
 <p>Silencier</p>		 <p>Έμβοση ηλεκτρική ή χαροκίνητη ενεργοποίησης.</p>

 <p>Ηλεκτρική ενεργοποίηση</p>	 <p>ελατήριο επαναφοράς</p>	 <p>δύο κλειστές θύρες</p>
 <p>βαλβίδα τριών θέσεων</p>	 <p>οδεύσεις σε παράλληλη και διασταυρούμενη διάταξη</p>	 <p>βαλβίδα 5 θυρών (κεντρική θέση) δύο παράλληλες οδεύσεις και μια κλειστή θύρα.</p>
 <p>βαλβίδα 4 θυρών (κεντρική θέση) δύο παράλληλες οδεύσεις που επικοινωνούν μεταξύ τους.</p>	 <p>αντλία κενού</p>	 <p>στραγγαλωτικό</p>
 <p>μεταβλητό στραγγαλωτικό</p>		

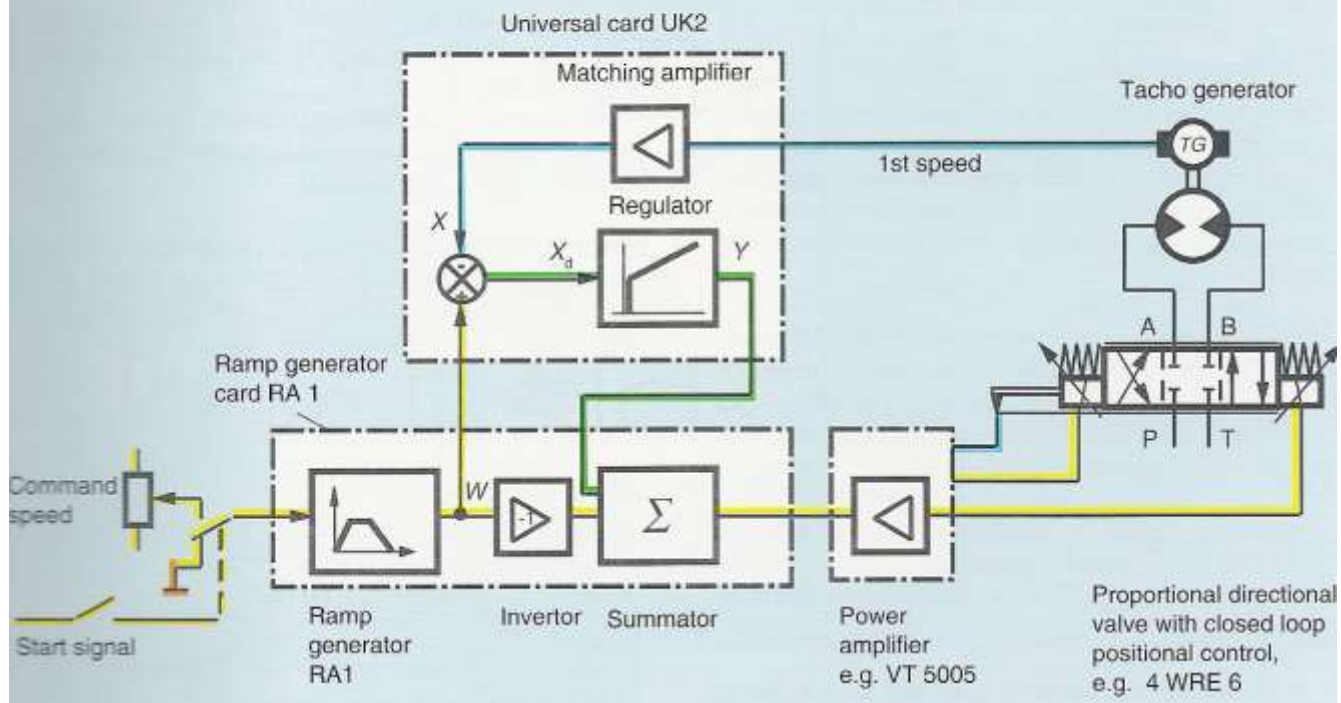


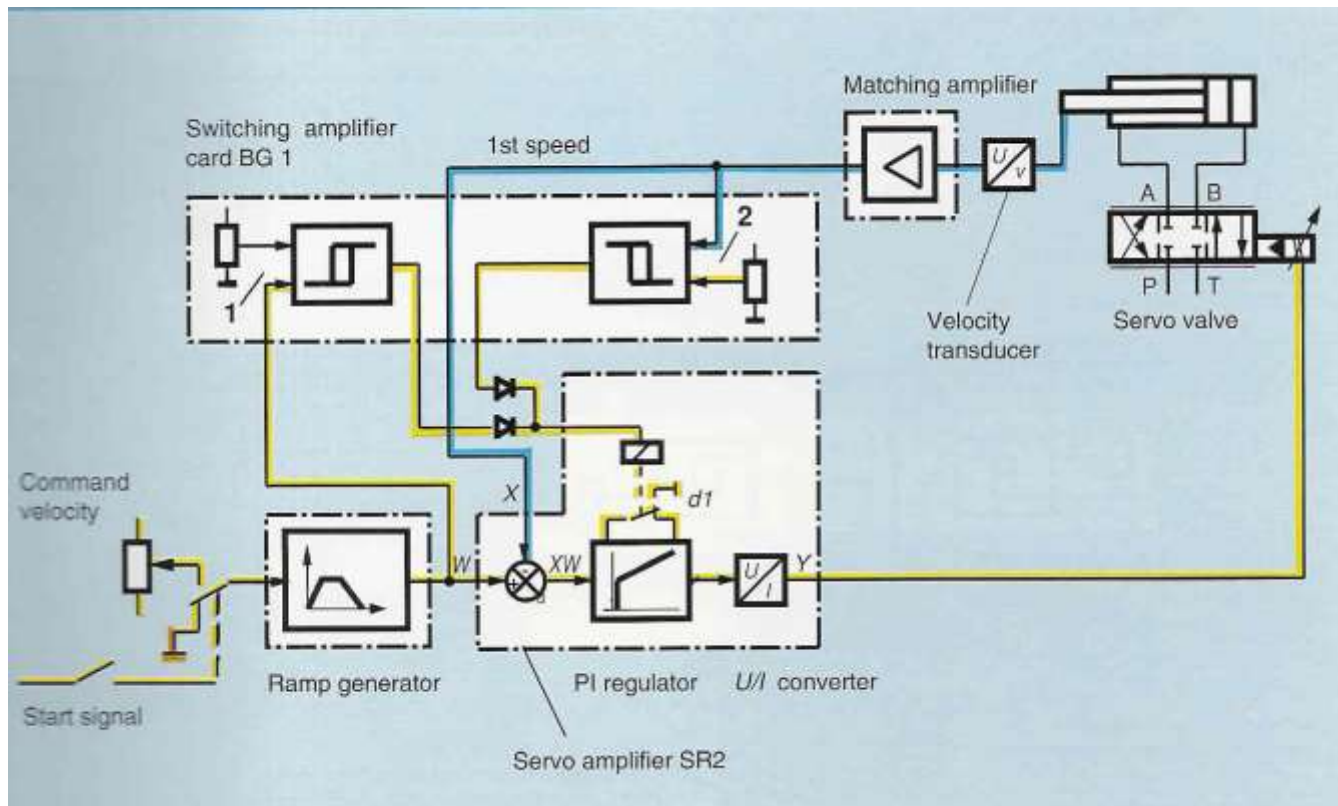


Closed Loop Positional Control (Servo Control)

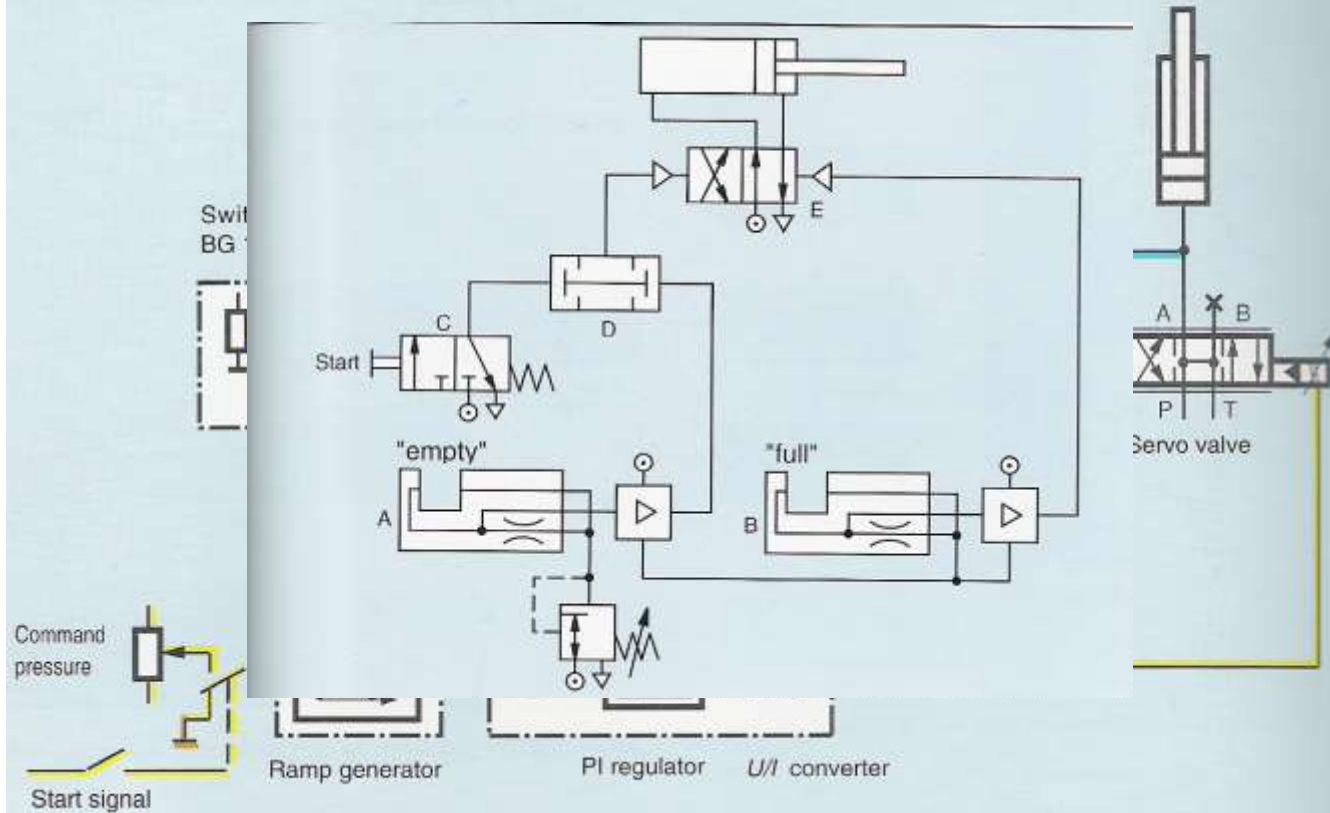


4 Closed Loop Speed Control
 (Velocity Control)
 with Integration of Reference Values

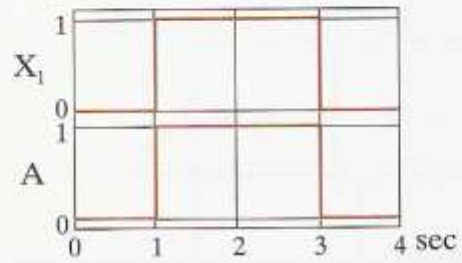
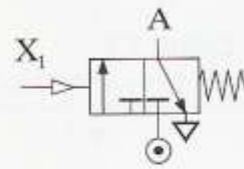



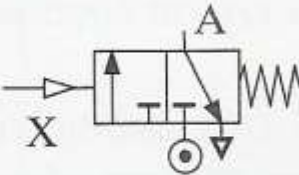
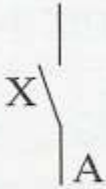


1.6 Closed Loop Pressure Control

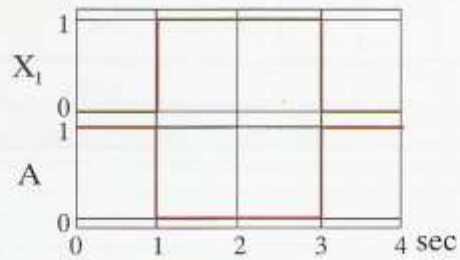
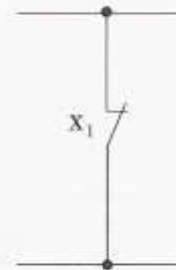
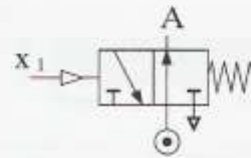


Δημιουργία συνθήκης YES - διάγραμμα σημάτων



<p>Identity Ταυτότητα YES</p> <table border="1"> <tr> <td>X</td> <td>A</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> </tr> </table>	X	A	0	0	1	1	$A = X$			
X	A									
0	0									
1	1									

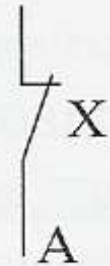
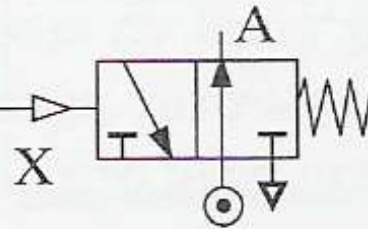
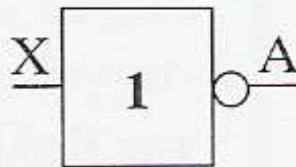
Δημιουργία συνθήκης NOT - διάγραμμα σημάτων



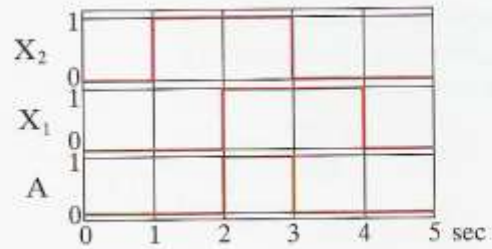
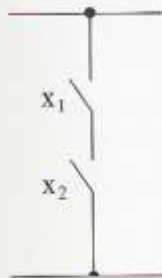
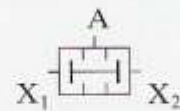
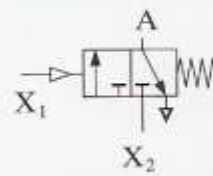
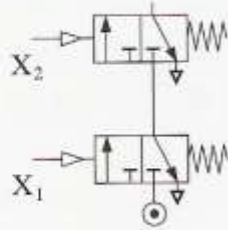
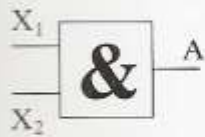
Negation
Άρνηση NOT

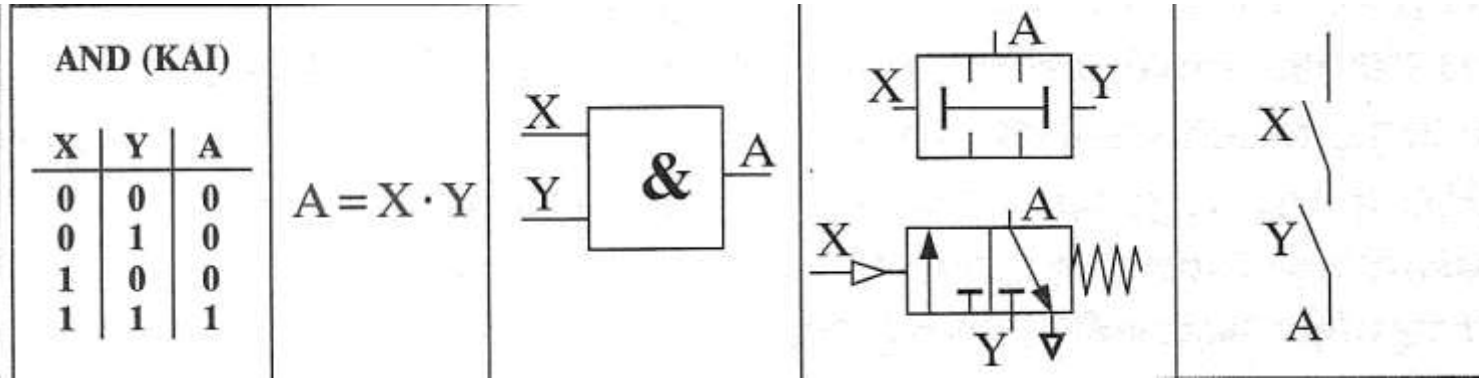
X	A
0	1
1	0

$$A = \bar{X}$$

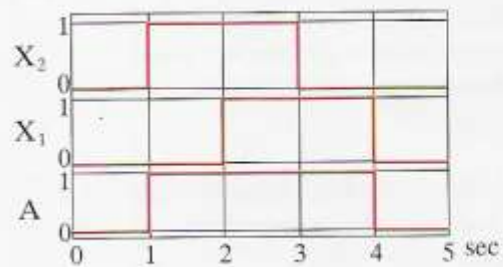
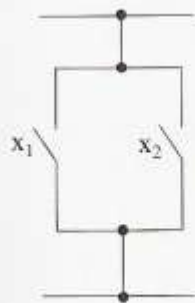
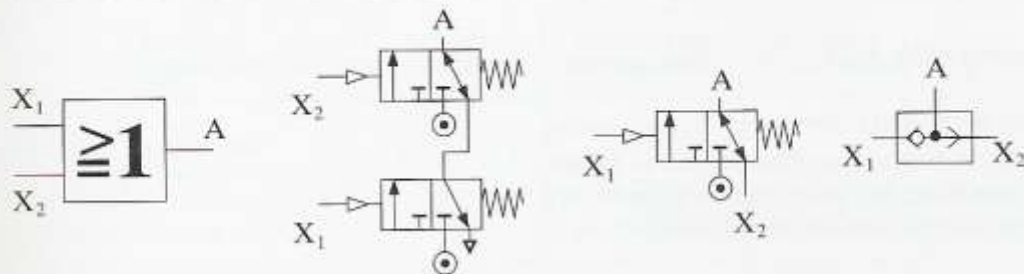


Δημιουργία συνθήκης AND - διάγραμμα σημάτων





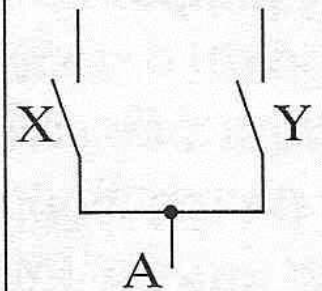
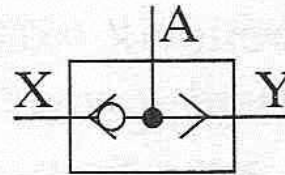
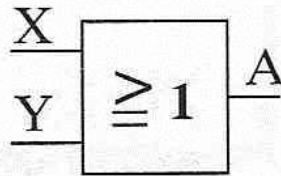
Δημιουργία συνθήκης OR - διάγραμμα σημάτων



OR (η)

X	Y	A
0	0	0
0	1	1
1	0	1
1	1	1

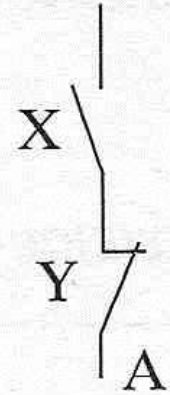
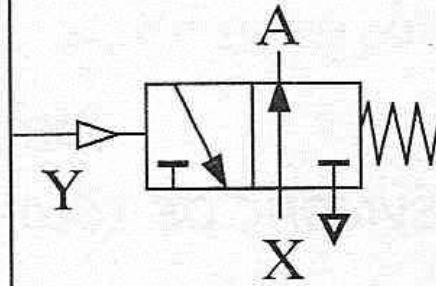
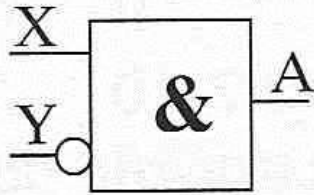
$$A = X + Y$$



**Exclusion
Απόκλιση**

X	Y	A
0	0	0
0	1	0
1	0	1
1	1	0

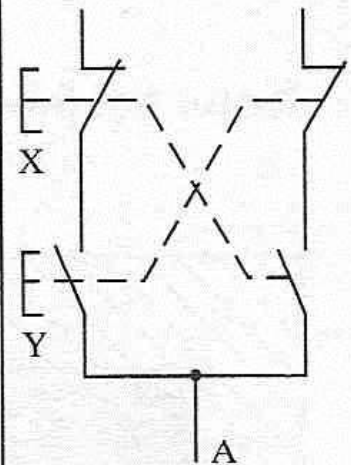
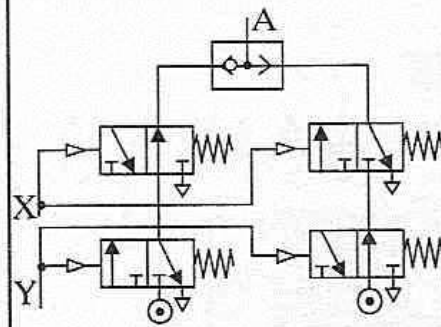
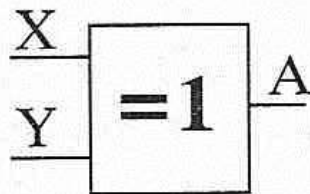
$$A = X \cdot \bar{Y}$$



Exclusion OR
Απόκλιση ή

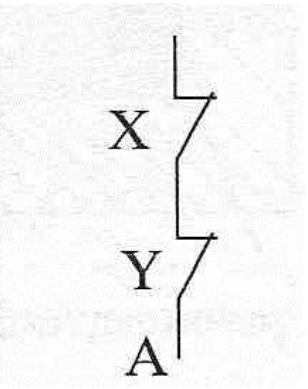
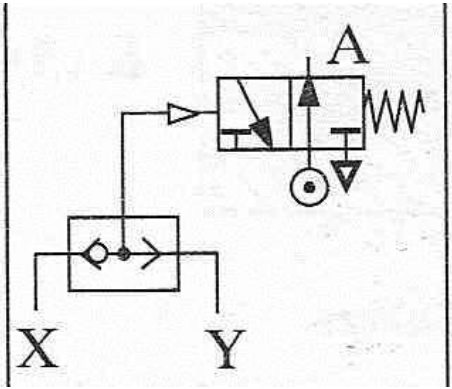
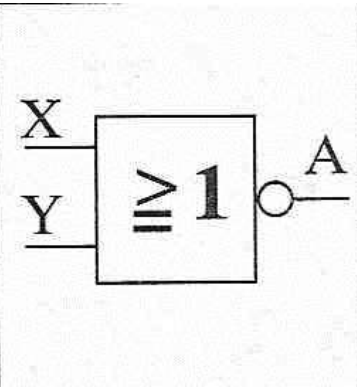
X	Y	A
0	0	0
0	1	1
1	0	1
1	1	0

$$A = (\bar{X} \cdot Y) + (X \cdot \bar{Y})$$



NOR		
X	Y	A
0	0	1
0	1	0
1	0	0
1	1	0

$$A = \overline{(X+Y)} + (\bar{X} \cdot \bar{Y})$$



2.4.2.1 Συνοπτική περιγραφή των θεωρημάτων της Άλγεβρας BOOLE

1. Θεώρημα μοναδικότητας

- α) Το στοιχείο 1 είναι μοναδικό
- β) Το στοιχείο 0 είναι μοναδικό
- γ) Το \bar{A} του A είναι μοναδικό

2. Θεώρημα της διπλής άρνησης

$$(\bar{\bar{A}}) = \bar{\bar{A}} = A$$

3. Θεώρημα του DE MORGAN

$$\begin{aligned} \overline{(A + B)} &= \bar{A} \cdot \bar{B} \\ \overline{(A \cdot B)} &= \bar{A} + \bar{B} \end{aligned} \longrightarrow \text{ΔΥΪΚΟΤΗΤΑ} \quad \begin{array}{l} \text{όπου (+) βάζω (.) \& \text{ αντίστροφα} \\ \text{όπου A βάζω } \bar{A} \text{ \& \text{ αντίστροφα} \end{array}$$

Το θεώρημα επεκτείνεται και για περισσότερα από δύο στοιχεία, π.χ.

$$\overline{A \cdot B \cdot C} = \bar{A} + \bar{B} + \bar{C}$$

4. Θεώρημα συμπληρώματος

$$\begin{aligned} \alpha) A + \bar{A} &= 1 \\ \beta) A \cdot \bar{A} &= 0 \end{aligned} \longrightarrow \text{ΔΥΪΚΟΤΗΤΑ}$$

5. Θεώρημα αυτοένωσης και αυτοτομής

$$\begin{aligned} \alpha) A + A &= A \\ \beta) A \cdot A &= A \end{aligned}$$

6. Θεώρημα κυριαρχικότητας

$$\begin{aligned} \alpha) A + 1 &= 1 \\ \beta) A \cdot 0 &= 0 \end{aligned}$$

7. Θεώρημα απορροφητικότητας

$$\begin{aligned} \alpha) A \cdot (A + B) &= A \\ \beta) A + (A \cdot B) &= A \end{aligned}$$

8. Θεώρημα αντιμετάθεσης

α) $A+B = B+A$

β) $A.B = B.A$

9. Θεώρημα προσεταιρισμού

α) $A+(B+C) = (A+B)+C$

β) $A.(B.C) = (A.B).C$

10. Θεώρημα επιμερισμού

α) $A.(B+C) = A.B+A.C$

β) $A+B.C = (A+B).(A+C)$

11. Θεωρήματα μηδενός και μονάδας




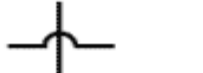








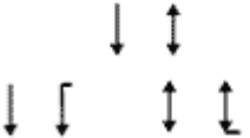

α) $A+0 = A$

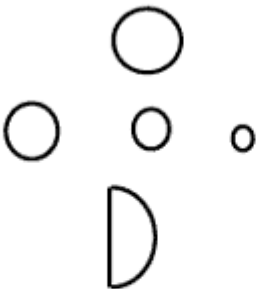
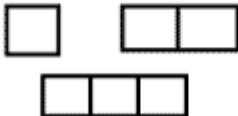


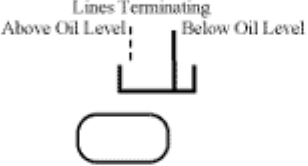




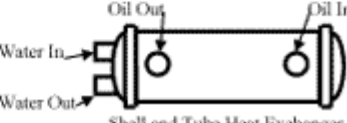
β) $A.1 = A$

γ) $A+1 = 1$

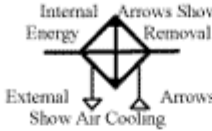
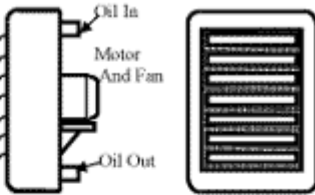
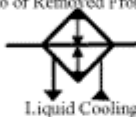
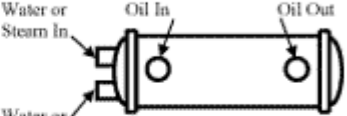
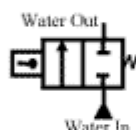
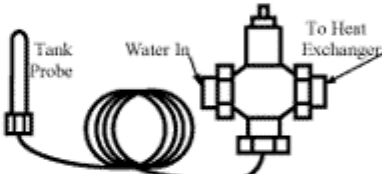

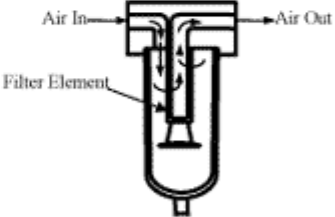
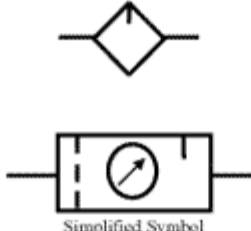
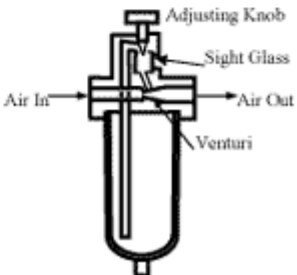
δ) $A.0 = 0$

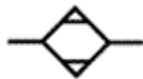
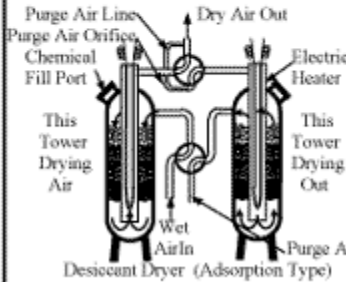
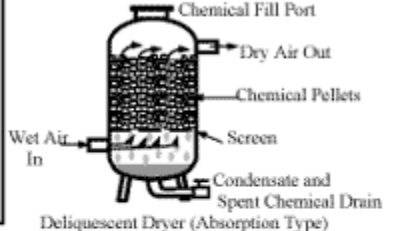
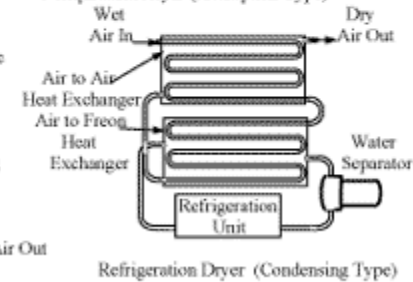

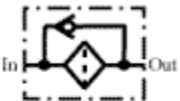

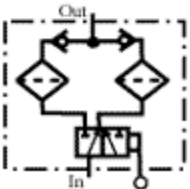
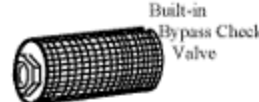
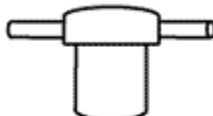
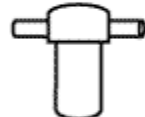
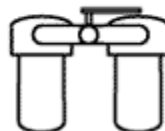
Σύμβολα

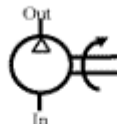

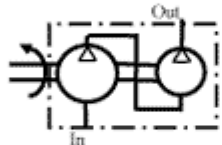

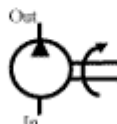
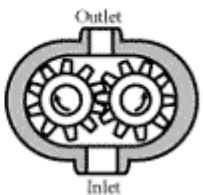
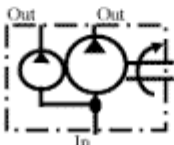
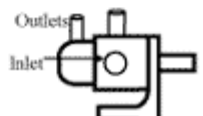
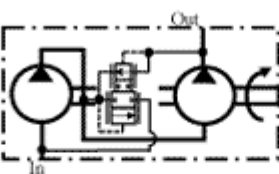
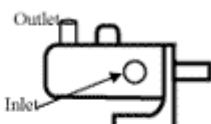
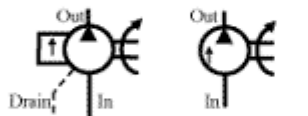
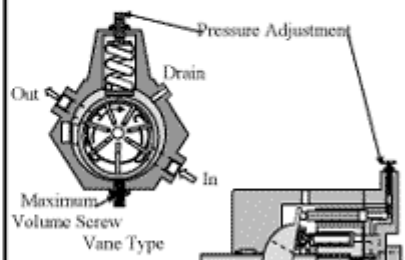
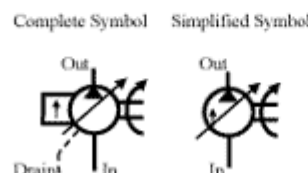
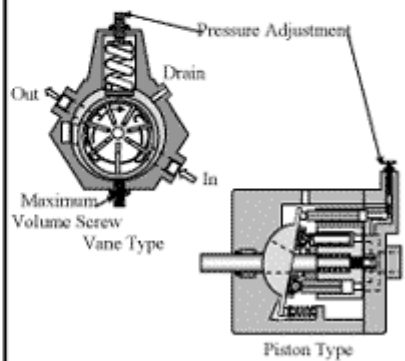
ISO Designation	Symbol	Picture Representation
Flexible Line		Shows hose or other flexible line. Could be whole length or only a portion of the conduit.
Pipe Junction		Denotes a tee or cross where lines connect to one another. The connecting Dot is always used with the Jumper below. Preferred way.
Pipe Junction		Denotes pipes connecting at a tee or cross. Optional way.
Pipes Crossing		Denotes pipes crossing. Preferred way
Pipes Crossing		Denotes pipes crossing. Optional way
Plug		
Air Bleed		Shows a connection for bleeding trapped air
Pressure Takeoff		A connection for taking power from a line or for pressure testing. Shown plugged.
Pressure Takeoff		With takeoff line connected .
Energy Triangle		Shows direction of flow and type of fluid.
Power Source		Denotes a power source from another part of the schematic or a another source
Arrows		Indicates direction of rotation of a pump or motor shaft, valve actuator or other actuator.
Arrows		Indicates direction of movement of a component. Arrows used for flow direction in valves. Arrows with a perpendicular line opposite the arrow head Arrows with a perpendicular line at the head end indicates the path stays connected to its outlet when it moves
Sloping Arrow		A sloping arrow through a pump, valve, spring, cushion plunger, solenoid or other device indicates it is adjustable or variable.

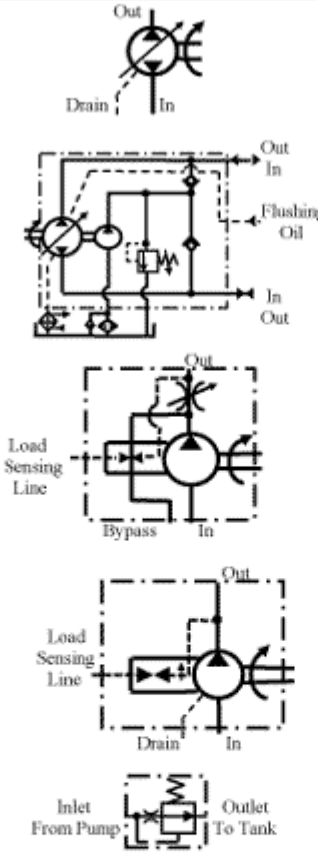
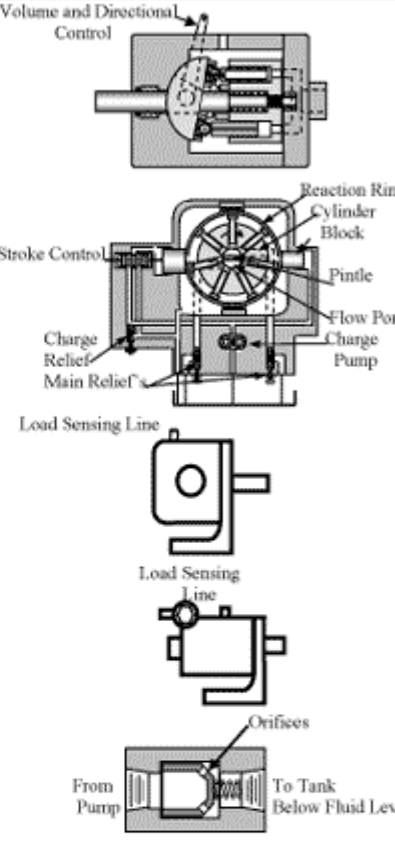
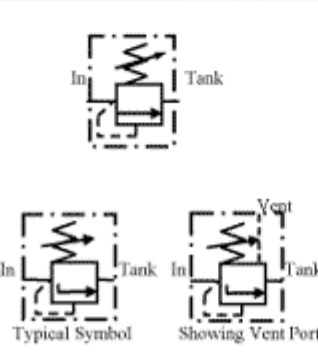
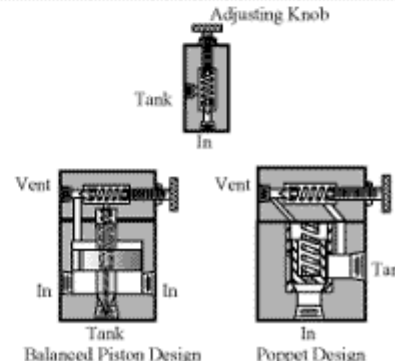
ISO Designation	Symbol	Picture Representation
Circles and Semi-circles		<p>Represents a rotary device such as a pump or motor. Denotes the device is capable of continuous rotation in one or both directions.</p> <p>Circles of different sizes are the basis of unit of measurement instruments such as gauges. Also represents mechanical rollers on cam operated valves.</p> <p>Semi-circles denote rotary output devices that are not capable of continuous rotation. These actuators only oscillate through some arc.</p>
Squares and Rectangular Boxes (Envelopes)		<p>Square or rectangular boxes or envelopes are the basic unit of pressure and directional control valves. Single boxes denote pressure controls while multiple boxes show directional controls. The valve operator box is also a rectangle</p>
Diamond Shaped Boxes		<p>Diamond shaped boxes indicate a fluid conditioning device like a filter, lubricator, or heat exchanger.</p>
Miscellaneous Symbols		<p>A sawtooth line represents a spring.</p> <p>Back to back semi-circles on a line show a standard orifice that is affected by viscosity.</p> <p>Back to back "V" on a line denotes an orifice That is not affected by viscosity.</p>
<p>Reservoirs Chapter 6</p> <p>Reservoir Open To Atmosphere</p> <p>Pressurized Reservoir</p>	<p>Lines Terminating Above Oil Level Below Oil Level</p> 	<p>Breather Filler Cap</p>  <p>For systems that operate in contaminated locations or when using pressure to force fluid flow.</p>
<p>Heaters Chapter 6</p> <p>Tank Heater</p>	 <p>Arrows Show Energy Entering Fluid Flow</p>	<p>Heating Rods</p>  <p>Temp. Control</p> <p>Electric Heating Unit</p>
<p>Heat Exchangers (Coolers) Chapter 6</p> <p>Water Cooled Heat exchanger</p>	<p>Internal Arrows Show Energy Removal</p>  <p>External Show Liquid Cooling</p>	 <p>Oil Out</p> <p>Oil In</p> <p>Water In</p> <p>Water Out</p> <p>Shell and Tube Heat Exchanger</p>

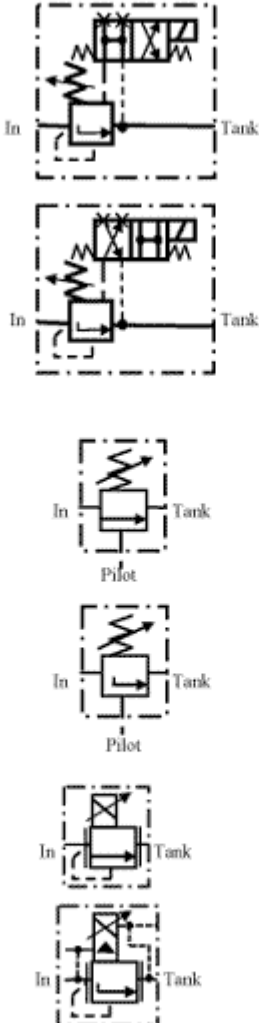
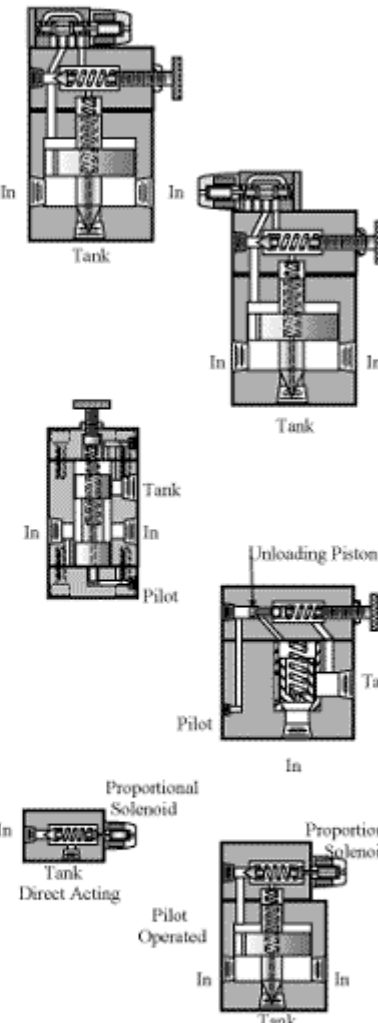
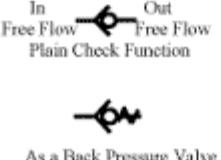
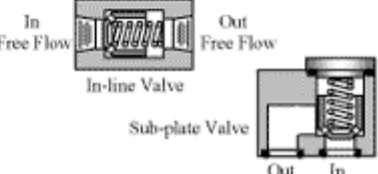
CHAPTER 4 ISO Symbols & Glossary


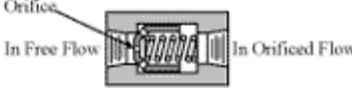
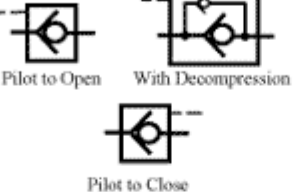
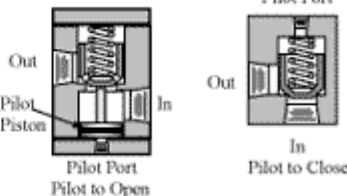
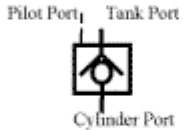
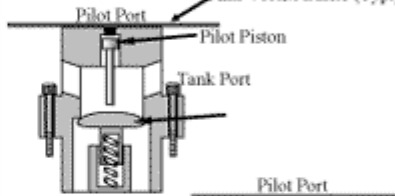

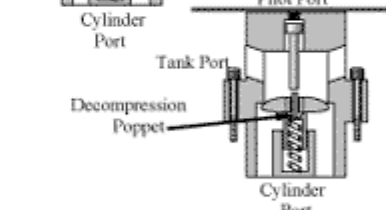
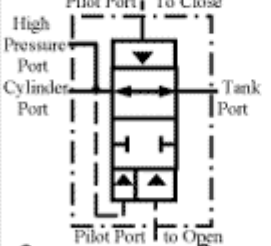
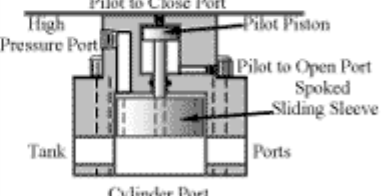
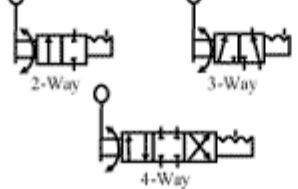
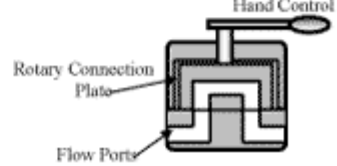
ISO Designation	Symbol	Picture Representation
<p>Heat Exchangers (Coolers) Chapter 6</p> <p>Air Cooled Heat Exchanger</p>	<p>Internal Arrows Show Energy Removal</p>  <p>External Arrows Show Air Cooling</p>	 <p>Fan Cooled Radiator Type Heat Exchanger</p>
<p>Temperature Controller Chapter 6</p>	<p>Internal Arrows Show Energy Added to or Removed From Fluid Flow</p>  <p>Liquid Cooling</p>	 <p>Shell and Tube Temperature Controller</p>
<p>Temperature Controlled Water Valve Chapter 6</p>	 <p>Water In</p>	 <p>Temperature Controlled Water Valve</p>
<p>Air Line Filter Chapter 7</p>	 <p>With Manual Drain</p> <p>With Automatic Drain</p>	
<p>Air Line Lubricator Chapter 7</p> <p>Air Line Filter, Regulator and Lubricator Chapter 7</p>	 <p>Simplified Symbol</p>	

ISO Designation	Symbol	Picture Representation
<p>Air Dryer Chapter 7</p>	  <p>Desiccant Dryer (Adsorption Type)</p>	 <p>Deliquescent Dryer (Absorption Type)</p>  <p>Refrigeration Dryer (Condensing Type)</p>
<p>Hydraulic Filters Chapter 7</p> <p>In Tank Hydraulic Suction Strainer With Bypass</p> <p>In-Line Return Filter With Bypass</p> <p>In-Line Pressure Filter Without Bypass</p> <p>Dual Pressure Filter For Changing Elements While Circuit is Running</p>	   	 <p>In Tank Type Suction Strainer</p>   

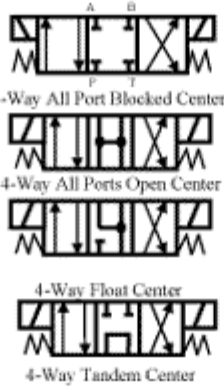
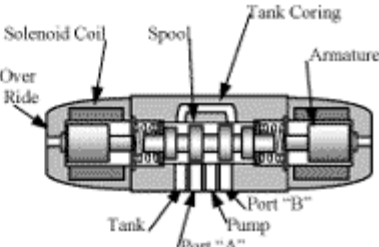
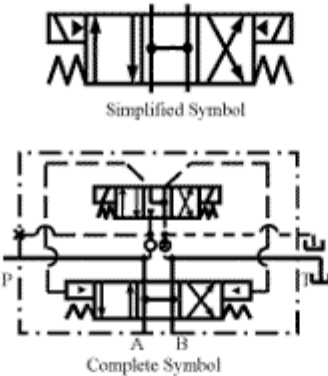
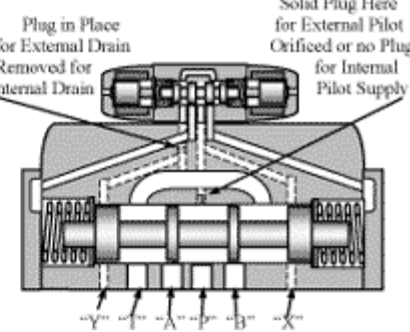
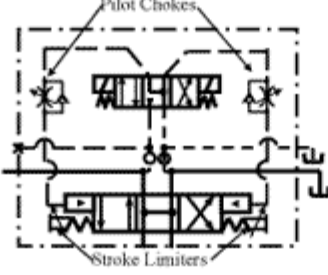
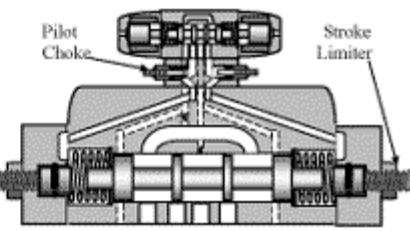
ISO Designation	Symbol	Picture Representation
Pumps Chapter 8 Air Pump Single Stage (Compressor)		
Air Pump Two Stage (Compressor)		
Hydraulic Pump Fixed Volume Single Flow Single Stage		
Hydraulic Pump Fixed Volume Double Flow Single Stage		
Hydraulic Pump Fixed Volume Single Flow Two Stage		
Hydraulic Pump Pressure Compensated Single Flow Single Stage		
Hydraulic Pump Pressure Compensated Variable Volume Single Flow Single Stage		

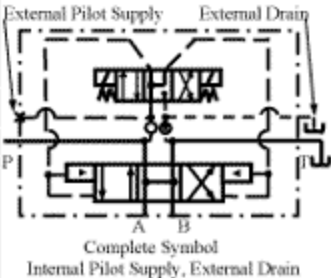
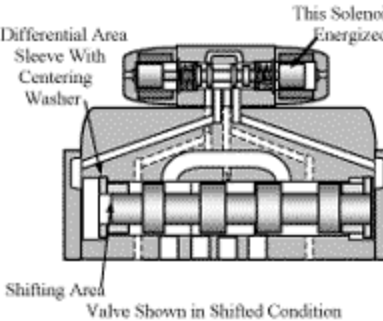
ISO Designation	Symbol	Picture Representation
<p>Pumps (Cont'd.)</p> <p>Hydraulic Pump Variable Volume Bi-directional Flow Single Stage</p> <p>Hydraulic Pump Variable Volume Bi-directional Single Stage With Charge Pump For Closed Loop Circuits</p> <p>Hydraulic Pump Fixed Volume Single Flow Single Stage With Load Sensing</p> <p>Hydraulic Pump Pressure Compensated Single Flow Single Stage With Load Sensing</p> <p>Air Bleed Valve for closed center circuits to let trapped air escape from pump outlet</p>		
<p>Relief and Unloading Valves Chapter 9</p> <p>Relief Valve Direct Acting Adjustable</p> <p>Relief Valve Pilot Operated Adjustable With Vent Port</p>		

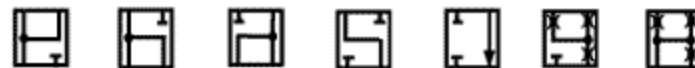
ISO Designation	Symbol	Picture Representation
<p>Relief and Unloading Valves (Cont'd.)</p> <p>Solenoid Operated Relief Valve Normally Open</p> <p>Solenoid Operated Relief Valve Normally Closed</p> <p>Unloading Valve External Pilot Operated Direct Acting</p> <p>Unloading Valve External Pilot Operated Pilot Operated Also Used as an Accumulator Circuit Pump Unloading Valve Through Unloading Spool</p> <p>Proportional Relief Valve Direct Acting</p> <p>Proportional Relief Valve Pilot Operated</p>		
<p>Directional Control Valves Chapter 10</p> <p>Check Valves In-line, Sub-plate Mounted, Screw In Cartridge</p>		

ISO Designation	Symbol	Picture Representation
Directional Control Valves (Cont'd.) Orificed Check Valve		
Pilot Operated Check Valves		
Pre-fill Valves Without Decompression Feature		
With Decompression Feature		
Sliding Sleeve Pre-fill Valve		
Rotary Shear Valve		

ISO Designation	Symbol	Picture Representation
Directional Control Valves (Cont'd.)		
Poppet Type Valve		
Sliding Plate Valve		
Spool Type Valve		
4-Way 2 Position Valve Spring Return Direct Acting Solenoid		
4-Way 2 Position Valve Detented Direct acting Solenoid		
4-Way 2 Position Valve Spring Return and Detented Solenoid Pilot Operated		
2 Position Valve Typical Transition or Crossover Condition		

ISO Designation	Symbol	Picture Representation
<p>Directional Control Valves (Cont'd.)</p> <p>Spool Type Valves</p> <p>Direct Solenoid Operated, Three Position, Spring Centered Directional Control Valves</p>	 <p>Manual</p> <p>4-Way All Port Blocked Center</p> <p>4-Way All Ports Open Center</p> <p>4-Way Float Center</p> <p>4-Way Tandem Center</p> <p>Four Standard Center Conditions</p>	 <p>Solenoid Coil</p> <p>Spool</p> <p>Tank</p> <p>Armature</p> <p>Over Ride</p> <p>Tank</p> <p>Port "A"</p> <p>Port "B" Pump</p> <p>All Ports Blocked Spool</p> <p>All Ports Open Spool</p> <p>Float Center Spool</p> <p>Tandem Center Spool</p>
<p>Solenoid Pilot Operated Three Position, Spring Centered Directional Control Valve</p>	 <p>Simplified Symbol</p> <p>Complete Symbol</p>	 <p>Plug in Place for External Drain</p> <p>Removed for Internal Drain</p> <p>Solid Plug Here for External Pilot</p> <p>Orificed or no Plug for Internal Pilot Supply</p> <p>Y</p> <p>A</p> <p>B</p> <p>X</p>
<p>Solenoid Pilot Operated, Three Position, Spring Centered Directional Control Valves With Pilot Chokes and Main Spool Stroke Limiting Screws</p>	 <p>Pilot Chokes</p> <p>Stroke Limiters</p>	 <p>Pilot Choke</p> <p>Stroke Limiter</p>

ISO Designation	Symbol	Picture Representation
<p>Directional Control Valves (Cont'd.)</p> <p>Solenoid Pilot Operated, Three Position, Hydraulic Centered, Directional Control Valve</p>		



Other Available Center Conditions From Most Manufacturers

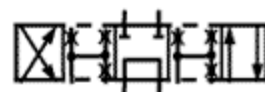


4-Way 2 Position Single Solenoid
All Ports Blocked Center

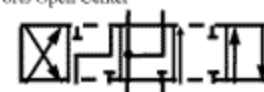
4-Way 3 Position Double Solenoid Spring Centered
All Ports Open Center



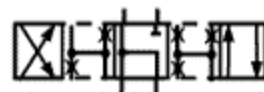
Float Center



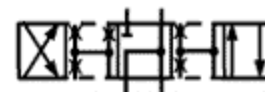
Tandem Center



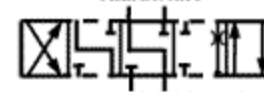
Pump "A" and "B" Connected
Tank Blocked



Pump "A" and Tank Connected
"B" Blocked



Pump "B" and Tank Connected
"A" Blocked



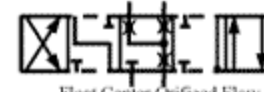
Pump and "B" Blocked
"A" to Tank



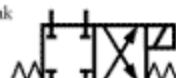
Pump and "A" Blocked
"B" to Tank



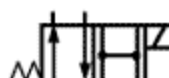
Open Center Orificed Flow



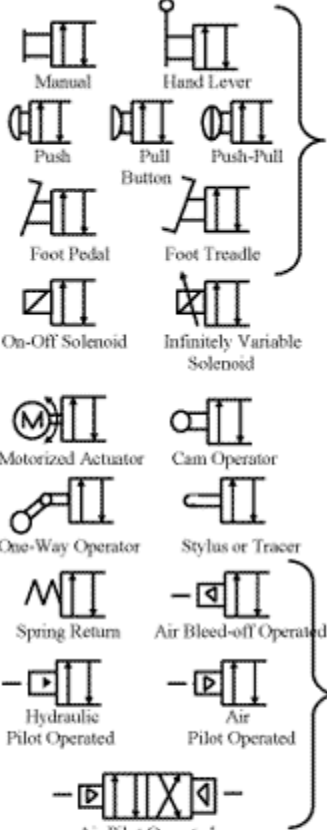
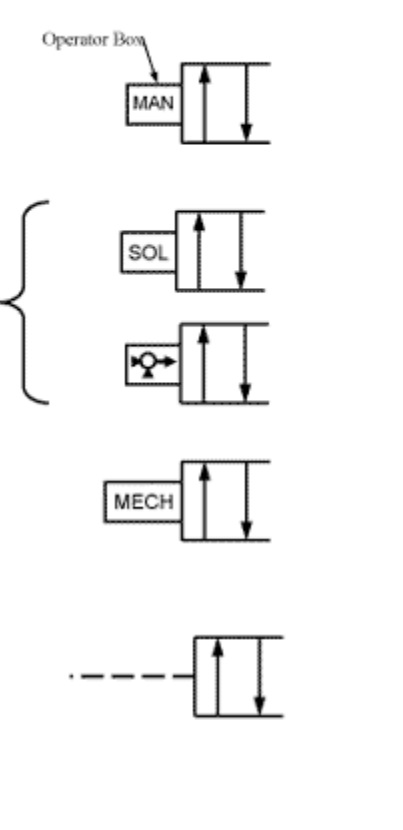
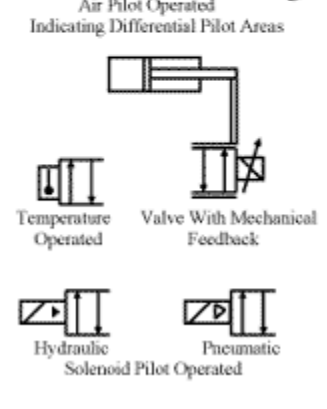
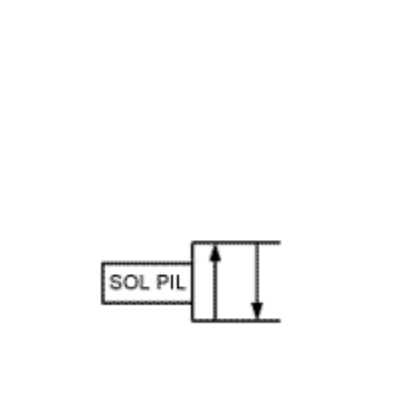
Float Center Orificed Flow



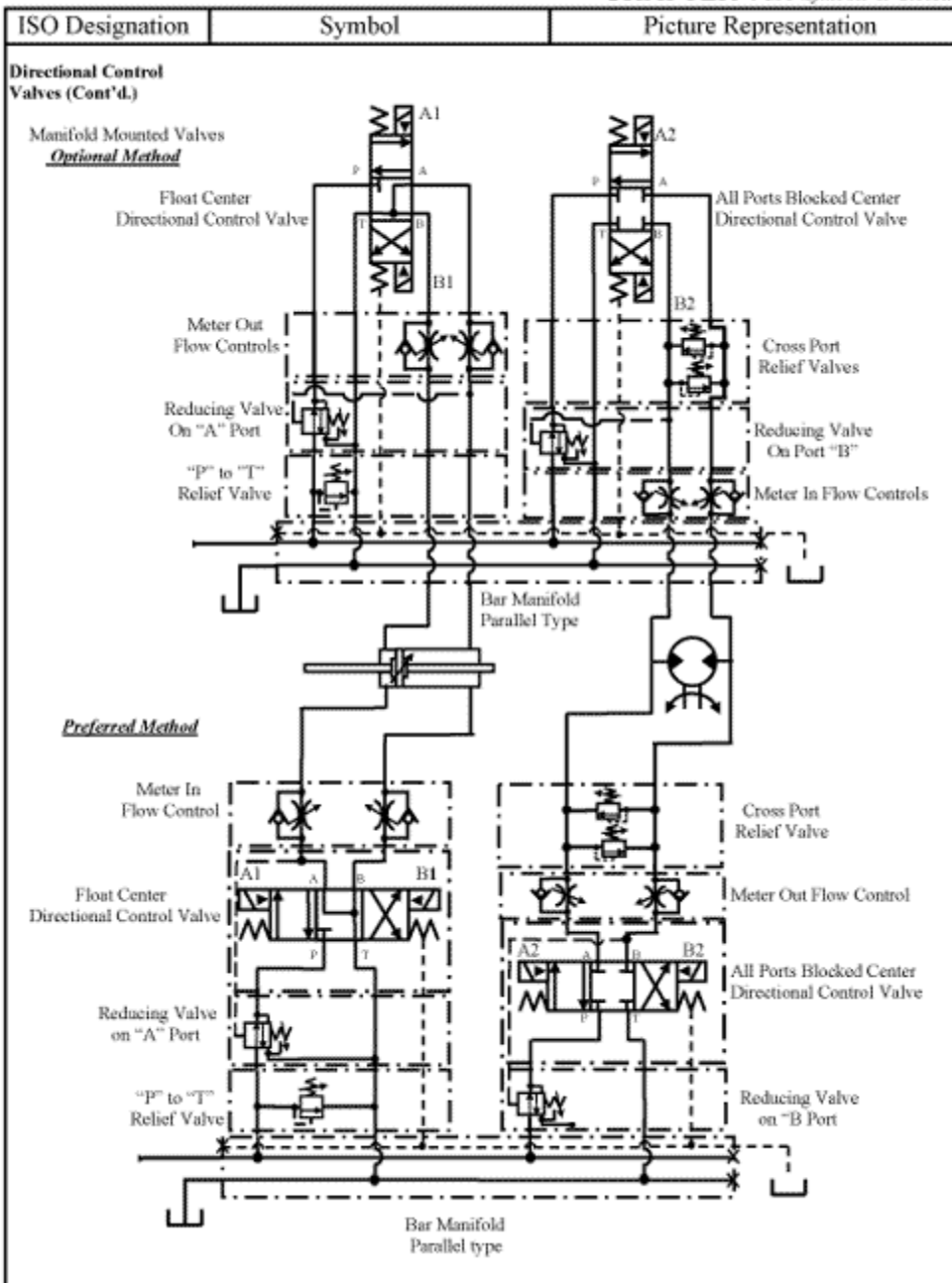
Single Solenoid Spring Centered
At Rest in Center Condition Shift to Flow Path

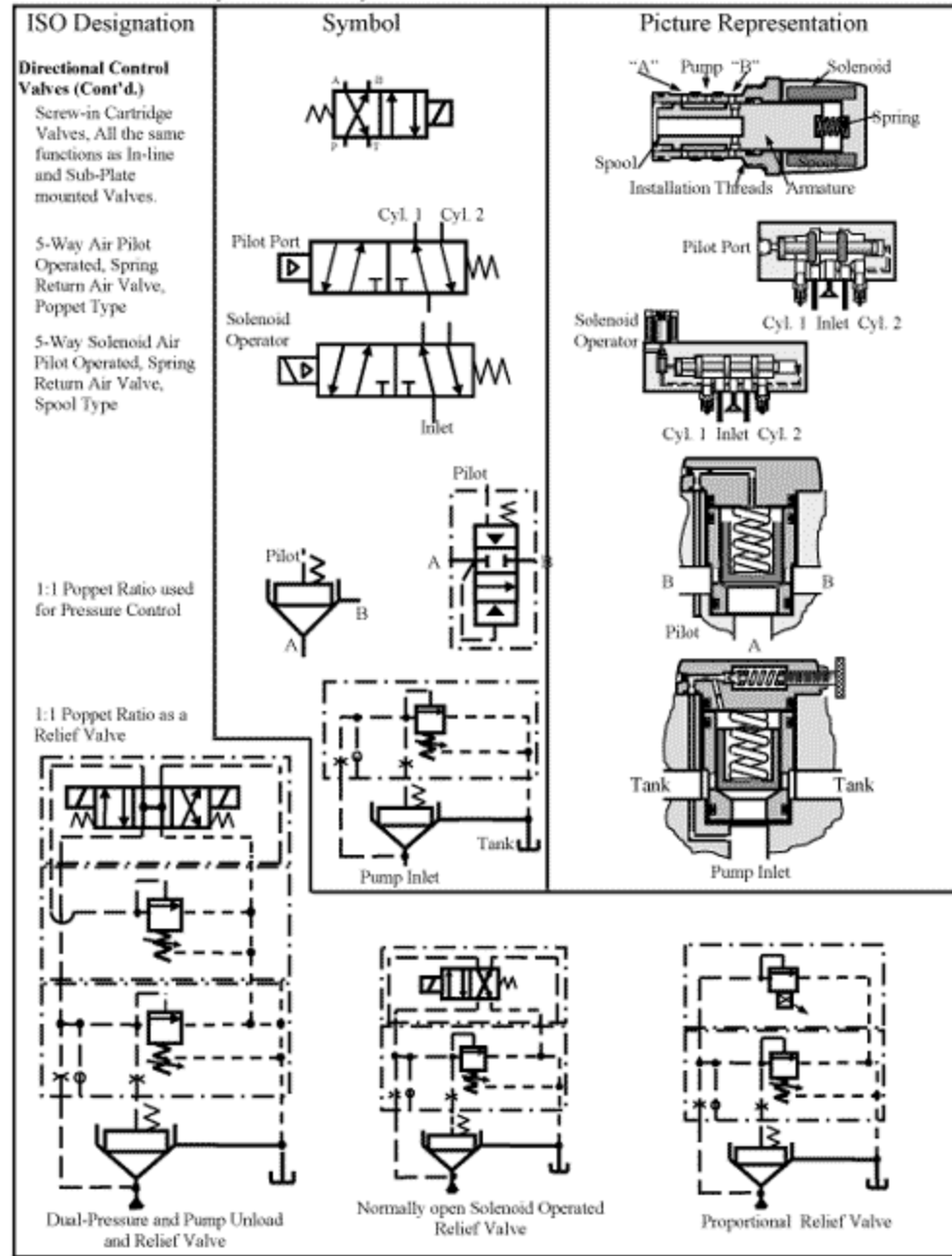


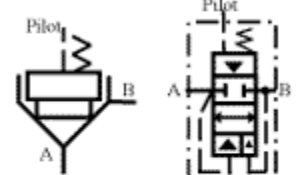
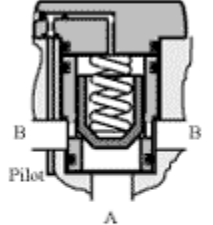
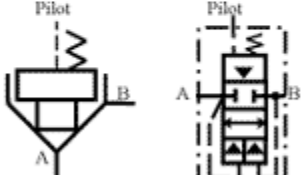
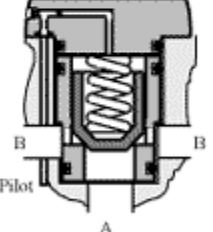
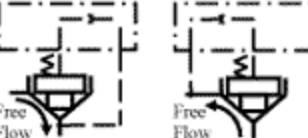
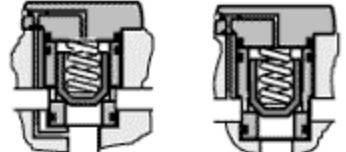
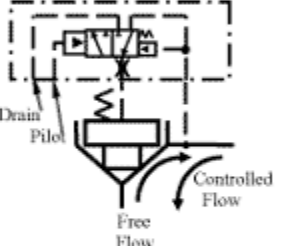
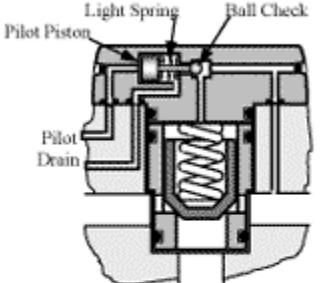
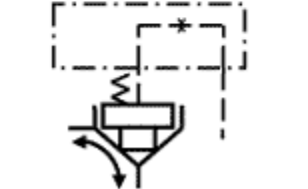
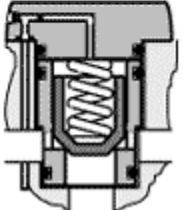
Single Solenoid Spring Return
At Rest in Flow Path, Shift to a Center Condition

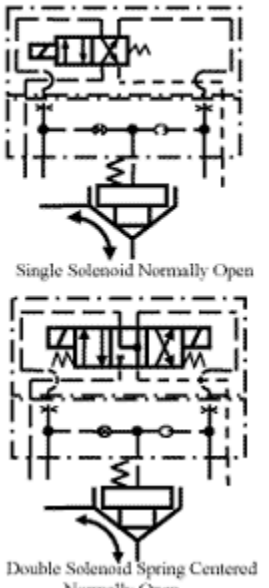
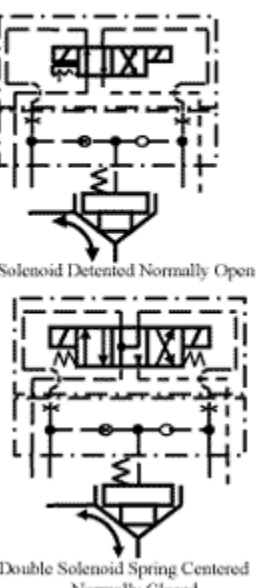
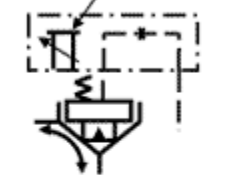
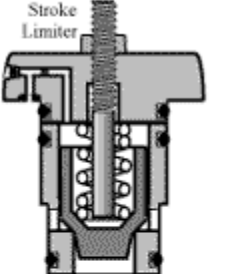
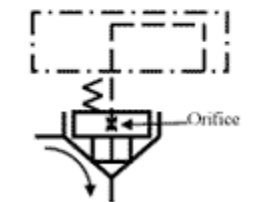
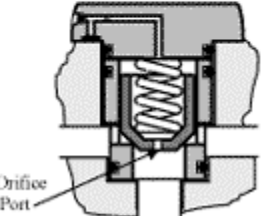
ISO Designation	Symbol	Pre 1966 ANSI Symbol
<p>Directional Control Valves (Cont'd.)</p> <p>Valve Operators</p>	 <p>Manual</p> <p>Hand Lever</p> <p>Push</p> <p>Pull</p> <p>Push-Pull Button</p> <p>Foot Pedal</p> <p>Foot Treadle</p> <p>On-Off Solenoid</p> <p>Infinitely Variable Solenoid</p> <p>Motorized Actuator</p> <p>Cam Operator</p> <p>One-Way Operator</p> <p>Stylus or Tracer</p> <p>Spring Return</p> <p>Air Bleed-off Operated</p> <p>Hydraulic Pilot Operated</p> <p>Air Pilot Operated</p> <p>Air Pilot Operated Indicating Differential Pilot Areas</p> <p>Temperature Operated</p> <p>Valve With Mechanical Feedback</p> <p>Hydraulic Solenoid Pilot Operated</p> <p>Pneumatic Solenoid Pilot Operated</p>	 <p>Operator Box</p> <p>MAN</p> <p>SOL</p> <p>MECH</p> <p>SOL PIL</p>
<p>Valve Operators</p>	 <p>Air Pilot Operated Indicating Differential Pilot Areas</p> <p>Temperature Operated</p> <p>Valve With Mechanical Feedback</p> <p>Hydraulic Solenoid Pilot Operated</p> <p>Pneumatic Solenoid Pilot Operated</p>	 <p>SOL PIL</p>

ISO Designation	Symbol	Picture Representation				
Directional Control Valves (Cont'd.)						
NFPA AND ISO STANDARD INTERFACE LAYOUTS FOR HYDRAULIC DIRECTIONAL CONTROL VALVES						
NFPA	ISO	CETOP	NG	PORT DIA	PORT CONFIGURATION	NOMINAL FLOW
D02	02	2	4	.177	Port "A" Port "T" Port "P" Port "B"	5 GPM
D03	03	3	6	.295	Port "A" Port "T" Port "P" Port "B"	10 GPM
D05	05	5	10	.440	Port "B" Port "B" Port "T" Port "A" Port "T"	20 GPM
All Views Shown Looking Into Ports On The Valve						
D05H	05			.440	Port "X" Port "B" Port "T" Port "P" Port "A" Port "T" Port "Y"	25 GPM
D07	07	7	16	.690	Port "A" Port "T" Port "B" Port "Y" Port "X" Port "P"	30 GPM
D08	08	8	25	.984	Port "Y" Port "P" Port "B" Port "T" Port "X" Port "A"	60 GPM
D10	10	10	32	1.250	Port "Y" Port "P" Port "B" Port "T" Port "X" Port "A"	100 GPM



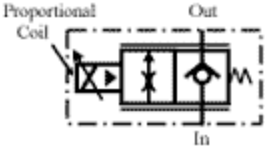
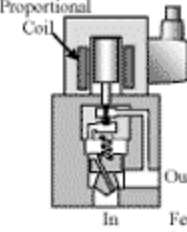
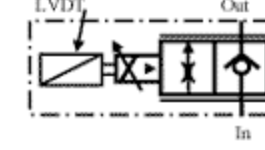
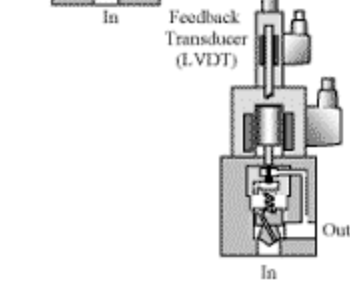
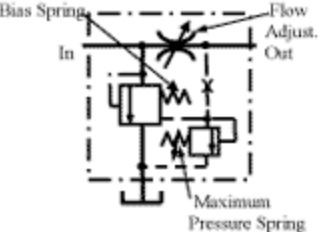
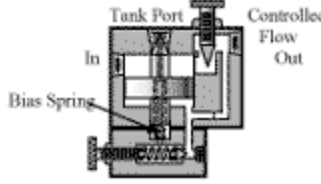
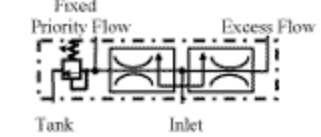
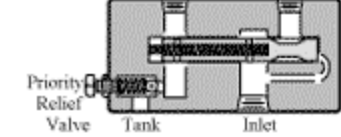
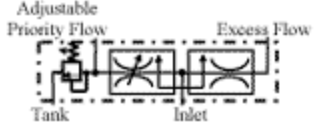
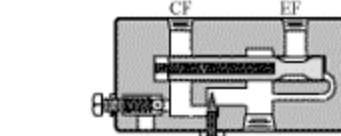
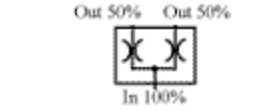
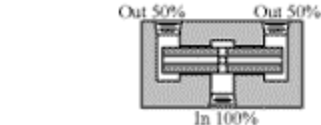


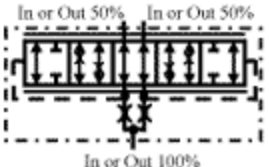
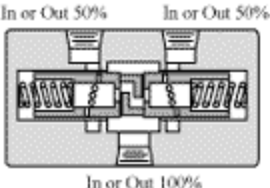
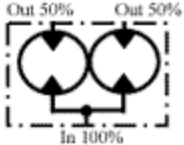
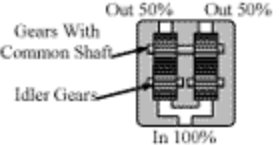
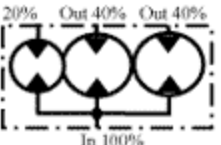
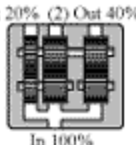
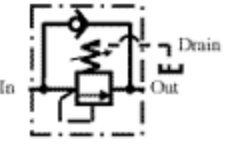
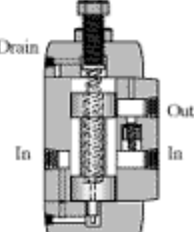
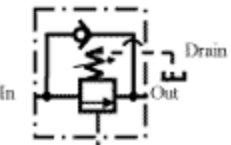
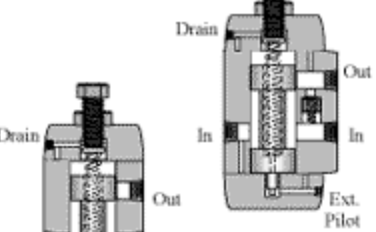

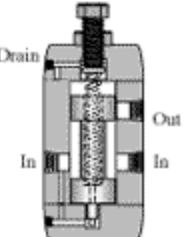
ISO Designation	Symbol	Picture Representation
Slip-in Cartridge Valves (Cont'd.) 1:1 Poppet Ratio Used for Pressure Control or Directional Control	 <p>Frequently Used Symbol</p> <p>Symbol using ISO Rules</p>	 <p>A</p>
1:2 Poppet Ratio Used For Directional Control	 <p>Frequently Used Symbol</p> <p>Symbol using ISO Rules</p>	 <p>A</p>
1:2 Poppet Ratio as a Check Valve With Plain Cover and Internal Connection	 <p>Free Flow</p> <p>Free Flow</p>	
1:2 Pilot Ratio as a Pilot Operated Check Valve With Pilot Operated Check Valve Cover	 <p>Drain</p> <p>Pilot</p> <p>Controlled Flow</p> <p>Free Flow</p>	 <p>Light Spring</p> <p>Ball Check</p> <p>Pilot Piston</p> <p>Pilot Drain</p>
1:2 Pilot Ratio as a Directional Control Valve With Plain Cover and External Connection		


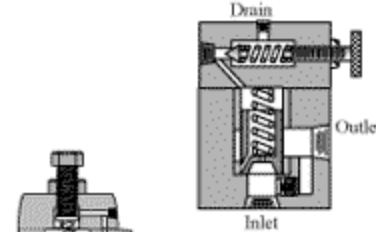

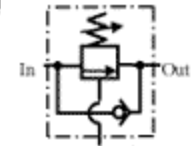
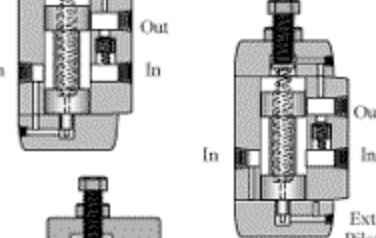
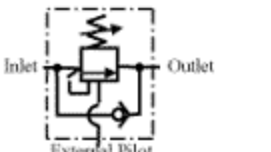
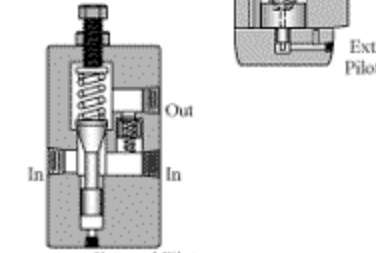
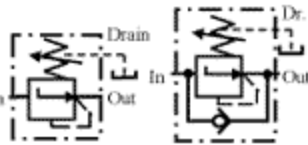
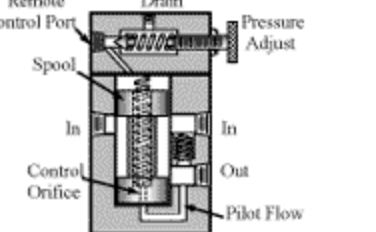
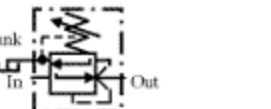

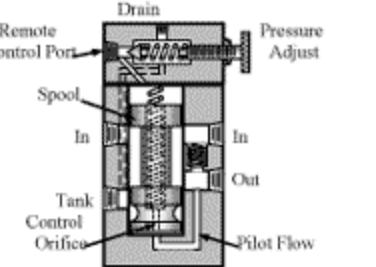
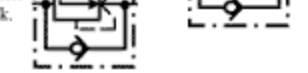
ISO Designation	Symbol	Picture Representation
<p>Slip-in Cartridge Valves (Cont'd.)</p> <p>1:2 Pilot Ratio as:</p>	 <p>Single Solenoid Normally Open</p> <p>Double Solenoid Spring Centered Normally Open</p>	 <p>Double Solenoid Detented Normally Open</p> <p>Double Solenoid Spring Centered Normally Closed</p>
<p>Slip-in Cartridge Valve With Stroke Limiter and Deceleration Skirts</p>	 <p>Stroke Limiter</p>	 <p>Stroke Limiter</p>
<p>Slip-in Cartridge valve With Orifice port As a Check Valve</p>	 <p>Orifice</p>	 <p>Orifice Port</p>

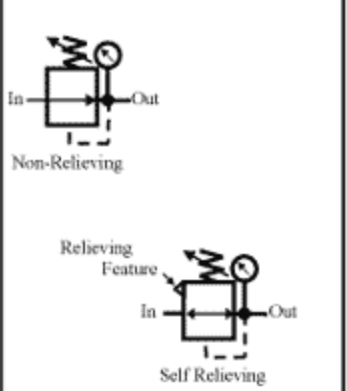
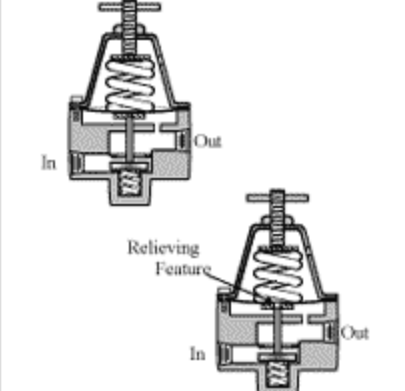
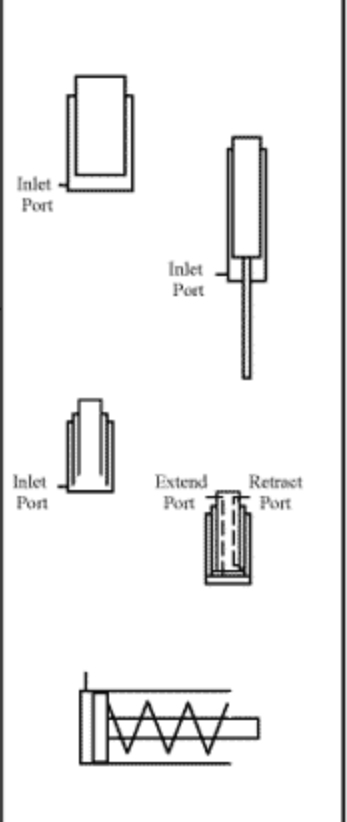
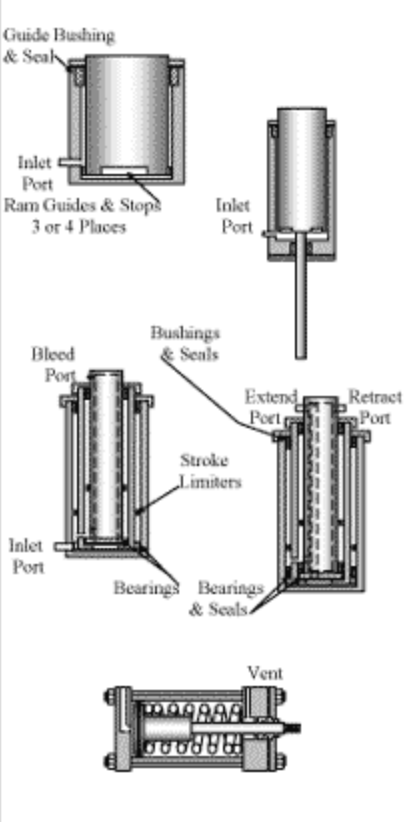
ISO Designation	Symbol	Picture Representation
<p>Slip-in Cartridge Valves (Cont'd.)</p> <p>Slip-in Cartridge Valve as a Reducing Valve</p>		
<p>Infinitely Variable Directional Valves Chapter 12</p> <p>Proportional Controls</p> <p>Direct Solenoid Operated Without Spool Position Feedback</p>		
<p>Direct Solenoid Operated With Spool Position Feedback</p>		
<p>Direct Solenoid Operated With Spool Position Feedback and Pressure Compensating Module (Hydro-Stat)</p>		
<p>Simplified Symbol for a Solenoid Pilot Operated Valve With Spool Position Feedback</p>		<p>SEE NEXT PAGE PROPORTIONAL VALVE COMPLETE SYMBOL.</p>


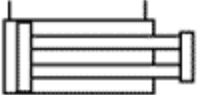
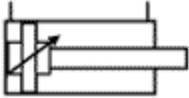
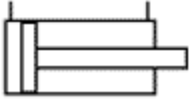
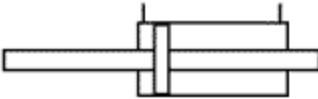

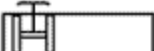

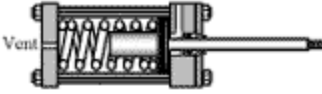
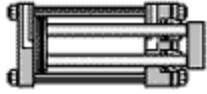
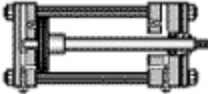
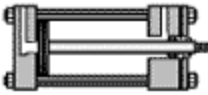
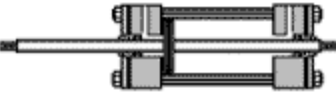
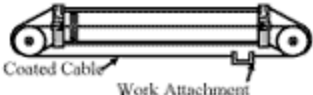
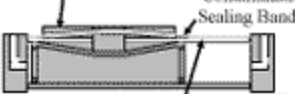
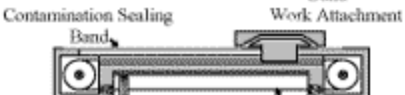
ISO Designation	Symbol	Picture Representation
<p>Infinitely Variable Directional Valves (Cont'd.)</p> <p>Complete Symbol for a Solenoid Pilot Operated Valve With Spool Position Feedback</p>		
<p>Servo Valves</p>	<p>ANSI Symbol</p> <p>ISO Symbol</p>	
<p>Flow Control Valves Chapter 13</p>	<p>Affected by Viscosity</p> <p>Un-affected by Viscosity</p>	<p>Standard Orifice</p> <p>Knife Edge Orifice</p>
<p>Fixed Orifice</p>		
<p>Needle Valve</p>		
<p>Non-Compensated Flow Control Valve</p>		
<p>Pressure and Temperature Compensated Flow Control</p>	<p>ANSI Symbol</p> <p>ISO Symbol</p>	

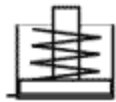
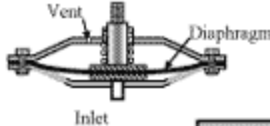

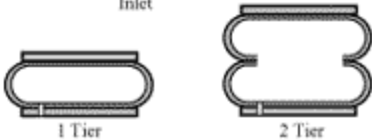
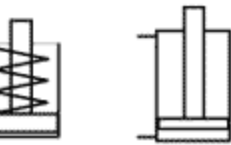
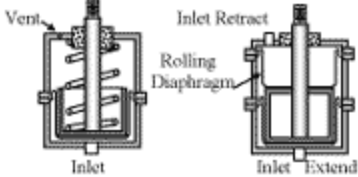

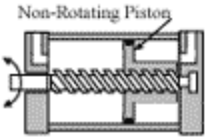

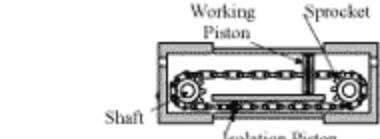

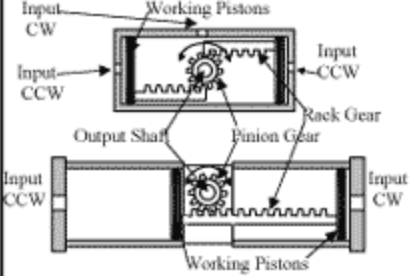
ISO Designation	Symbol	Picture Representation
<p>Flow Control Valves (Cont'd.)</p> <p>Proportional Flow Control Valves Without Feedback</p>		
<p>With Feedback</p>		
<p>Three Port Flow Control With Built-in Relief Valve. Also Called a Bypass Flow Control. Bypass Flow Cannot be Used to do Work</p>		
<p>Priority Type Three Port Flow Control Bypass Flow can be Used to do Work</p>		
<p>Adjustable Priority Flow</p>		
<p>Flow Dividers Spool Type One Direction Only</p>		


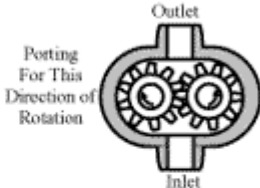

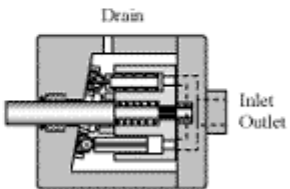



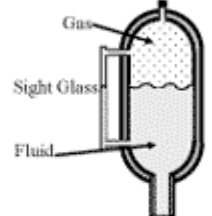
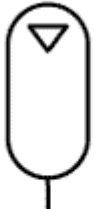
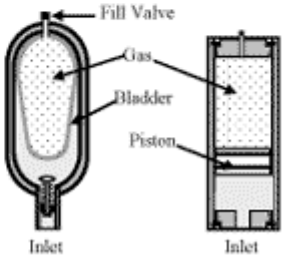
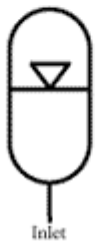
ISO Designation	Symbol	Picture Representation
<p>Flow Control Valves (Cont'd.)</p> <p>Flow Dividers Spool Type Bi-directional (Functional Symbol)</p>		
<p>Flow Dividers Motor Type</p>		
<p>Pressure Control Valves Chapter 14 (Except Relief and Unloading Valves)</p>		
<p>Sequence Valve Internal Pilot</p>		
<p>External Pilot</p>		
<p>Internal Pilot Without Check Valve</p>		


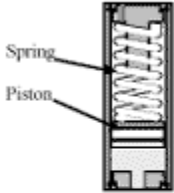

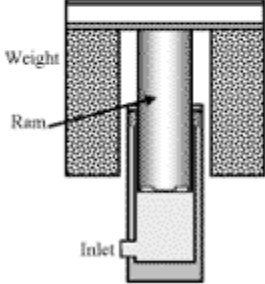
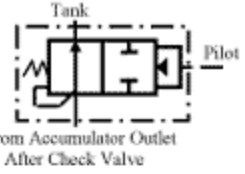
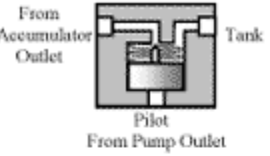
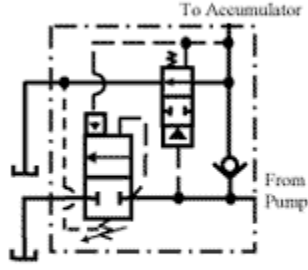
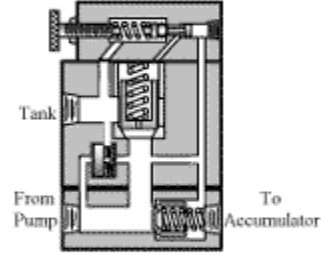
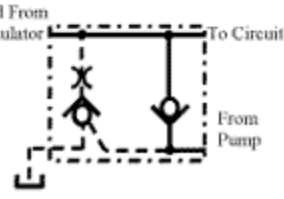
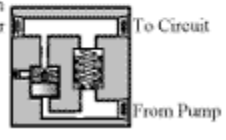
ISO Designation	Symbol	Picture Representation
Pressure Control Valves (Except Relief and Unloading Valves) (Cont'd.)		
Kick Down Sequence Valve		
Counter Balance Valve		
Internal Pilot Internal Drain		
External Pilot Internal Drain		
Internal and External Pilot, Internal Drain		
Reducing Valves		
Reducing Only With and Without Bypass Check		
Reducing, Relieving Without Bypass Check		
With Bypass Check		
With External Drain		

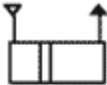
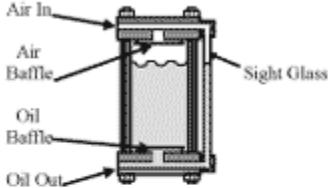
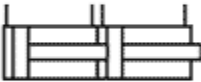

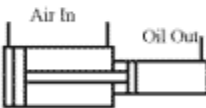
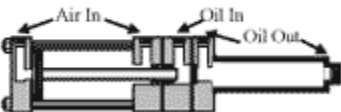
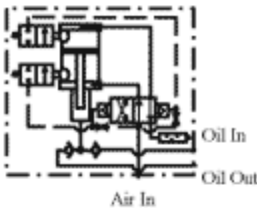
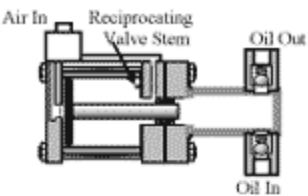



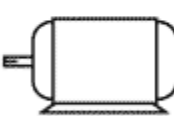

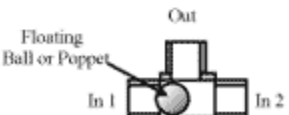
ISO Designation	Symbol	Picture Representation
<p>Pressure Control Valves (Except Relief and Unloading Valves) (Cont'd.) Air Line Regulator (Reducing Valve)</p>		
<p>Actuators Chapter 15 Single Acting Rams Push Type The Inlet Port Can be Anyplace on the Body The Only Seals are Where the Rams Exit The Body. Pull Type May Have a Cover Over the Top Ram to Protect Personnel Single Acting Telescoping Double Acting Telescoping Single Acting Spring Return</p>		


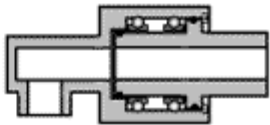

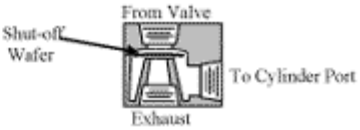

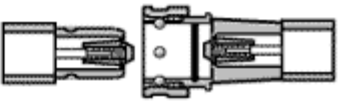


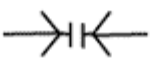

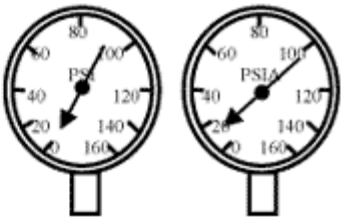


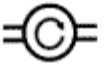

ISO Designation	Symbol	Picture Representation
<p>Actuators (Cont'd.)</p> <p>Single Acting Spring Extend</p> <p>Non-rotating Rod Cylinder (Twin Rod)</p> <p>Double Acting Cylinder With Cushions Both Ends. Arrow through Cushion Blocks Indicate They Are Adjustable. May Have Cushions Either End, Neither End or Both Ends. Double Acting Cylinder Non-Cushioned</p> <p>Double Acting, Double Rod End Cylinder Non-Cushioned</p> <p>Cable Cylinder</p> <p>Rodless Cylinder (Slot Type)</p> <p>Rodless Cylinder (Band Type)</p>	  <p>Symbol From Manufacturers Catalog</p>     <p>Proposed Symbol</p>  <p>Symbol From Manufacturers Catalog</p> 	       


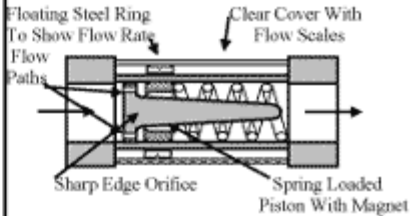
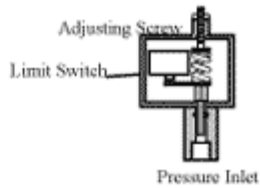

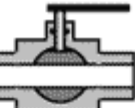

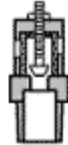
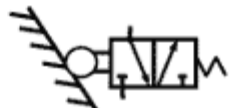
ISO Designation	Symbol	Picture Representation
Actuators (Cont'd.) Diaphragm Type		
Bellows Type		
Rotary Actuators Vane Type		
Helical Screw		
Chain & Sprocket		
Rack & Pinion		

ISO Designation	Symbol	Picture Representation
Actuators (Cont'd.) Hydraulic Motors Fixed Displacement Bi-directional Variable Volume Bi-directional Air Motors Uni-directional Bi-directional		 <p>Outlet</p> <p>Porting For This Direction of Rotation</p> <p>Inlet</p> <p>Gear Motor</p>
		 <p>Drain</p> <p>Inlet</p> <p>Outlet</p> <p>Piston Motor</p>
		 <p>Vane Motor</p>
		 <p>Gas</p> <p>Sight Glass</p> <p>Fluid</p> <p>Inlet</p>
	 <p>Inlet</p>	 <p>Fill Valve</p> <p>Gas</p> <p>Bladder</p> <p>Piston</p> <p>Inlet</p> <p>Inlet</p>
	Accumulators Chapter 16 Gas Charged Non-separated Gas Charged Bladder or Piston Type	 <p>Inlet</p>

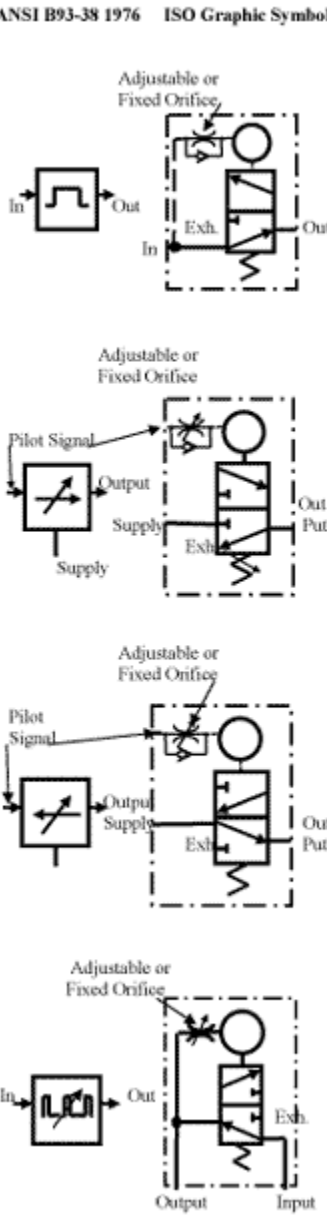
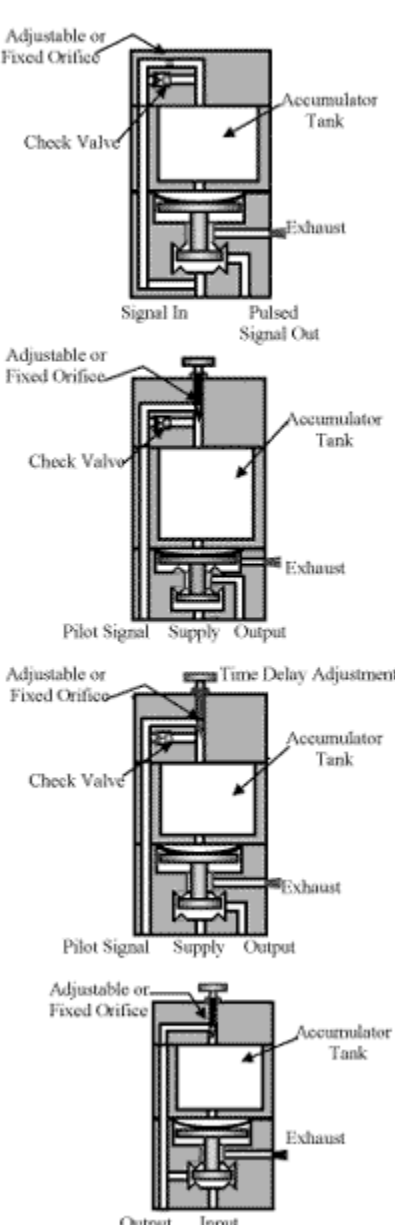
ISO Designation	Symbol	Picture Representation
Accumulators (Cont'd.) Spring Loaded Weight Loaded Accumulator Dump Valve (High Ratio) Accumulator Unloading Relief Valve and Dump Valve For Fixed Volume Pumps Accumulator Dump and Isolation Check Valve For Pressure Compensated Pumps		
		
		
		
		

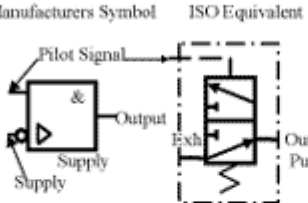
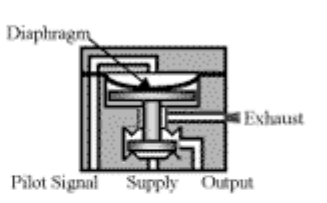
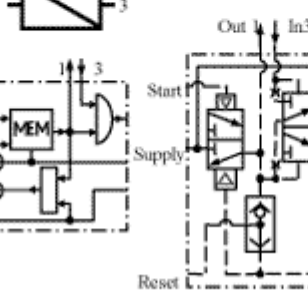
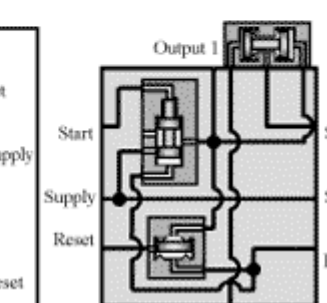
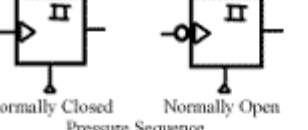
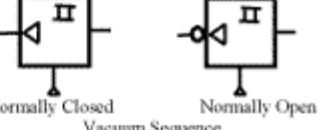

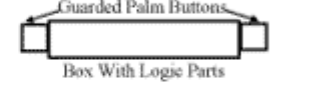

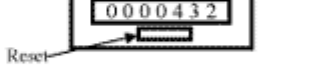
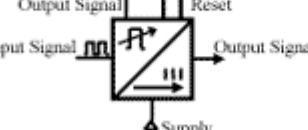
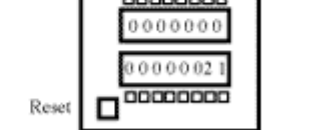
ISO Designation	Symbol	Picture Representation
Air-Oil & Intensifiers Chapter 17 Air-Oil Tank Changing a Pneumatic Pressure into an Equal Liquid Pressure		
Tandem Cylinder		
Intensifier or Booster	 <p>Single Shot Intensifier</p>	 <p>Three Head Intensifier</p>
Air-Oil Intensifier Reciprocating Type Self Contained		
Miscellaneous Fluid Power Items Chapter 18		
Heat Motor		
Electric Motor		
Shuttle Valve		

ISO Designation	Symbol	Picture Representation
Miscellaneous Fluid Power Items (Cont'd.)		
Rotating Union	 <p>Working Flow Line</p>	
Quick Exhaust	 <p>To Cylinder Port From Valve Exhaust</p>	
Quick Disconnects Without Shut-offs		
Shown Dis-connected		<p>Plug Socket</p>
Shown Connected		
Shown Without Shut-offs		
Pressure Gauges		 <p>Gauge Pressure Absolute Pressure</p>
Temperature Gauges		 <p>Probe Gauge Surface Gauge Often Part of Tank Sight Gauge</p>
Tachometer Measurement of Rotation in RPM		
Torque Meter Measurement of Torque		

ISO Designation	Symbol	Picture Representation
<p>Miscellaneous Fluid Power Items (Cont'd.)</p> <p>Liquid or Gas Flow Meter</p> <p>Pressure Switch</p> <p>Limit Switch</p> <p>Shut-off Valve</p> <p>Muffler (Silencer)</p> <p>Machine Member To Show Contact by a Valve or Other Device With a Machine Part</p>	<p>Flow Only Flow Meter Totalizing Flow</p> <p>ANSI ISO</p> <p>Roller Plunger</p> <p>Muffler With Speed Control</p> 	       <p>Shows Valve is in Shifted Condition at Rest</p>

ISO Designation	Symbol	Picture Representation
Air Logic Chapter 19	ANSI B93-38 1976 ISO Graphic Symbol	
<p>"AND" Element A Signal at "In 1" AND "In 2" Gives an Output. Output Always Lowest Of Input Signals</p>		
<p>"OR" Element A Signal at "In 1" OR "In 2" Gives an Output. Output Always Highest Input Signals</p>		
<p>"NOT" Element 3-Way Normally Open "Supply" Goes to Output Until an "OFF Signal" is Received.</p>		
<p>"YES" Element 3-Way Normally Closed Similar to "AND" But Can Choose "Output" Signal</p>		
<p>"FLIP-FLOP" Element 4-Way Double Pilot Operated Supplies and Exhaust's Either of Two Outputs</p>		
<p>"MEMORY" Element 3-Way Normally Closed Supplies or Exhaust's a Single Port. Can be "Reset" While "Set" Signal is on.</p>		

ISO Designation	Symbol	Picture Representation
<p>Air Logic (Cont'd.)</p> <p>"DIFFERENTIATOR" Element 3-Way Normally Open (Also Called a "ONE SHOT" Element or an "IMPULSE GENERATOR") A Fixed Signal in Gives a Fixed or Adjustable Timed Signal Out</p> <p>"ON DELAY TIMER" Element 3-Way Normally Closed An "Output" is Given After a "Pilot Signal" Has Been on for a Fixed or Adjustable Time Delay.</p> <p>"OFF DELAY TIMER" Element 3-Way Normally Open The "Output" is Lost After a "Pilot Signal" Has Been on for a Fixed or Adjustable Time Delay</p> <p>"FREQUENCY GENERATOR" Element 3-Way Normally Open An "Input" Signal Gives a Fixed or Adjustable Output for One Time Period, Then it Goes Off for Two Time Periods.</p>	<p>ANSI B93-38 1976 ISO Graphic Symbol</p> 	

ISO Designation	Symbol	Picture Representation
<p>Air Logic (Cont'd.)</p> <p>"PRESSURE DECAY SENSOR" Element 3-Way Normally Open Same as a "NOT" except it Takes a lower "Pilot Signal" to Shift i Used for Indicating end of Stroke of Cylinders.</p>	<p>Manufacturers Symbol ISO Equivalent</p> 	
<p>"SEQUENCER" Element A Combination of an "AND", "OR" and a "MEMORY" Element in a Common Housing to Simplify Circuit Design. Used in Series To Make a Complete Operating System.</p>		
<p>"SEQUENCE" Element Gives or Drops a Signal at a pre-determined Adjustable Pressure.</p>	 <p>Normally Closed Normally Open Pressure Sequence</p>	 <p>Normally Closed Normally Open Vacuum Sequence</p>
<p>"ANTI TIEDOWN" Element Requires Two Inputs to Get an Output</p>		
<p>Counters: Counts Number of Cycles</p>		
<p>Counts Down From Pre-selected Number Then Gives an Output</p>		
<p>Pressure Indicator</p>	