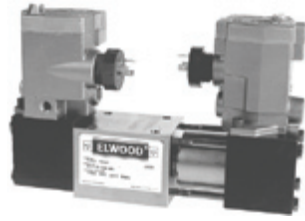


Packed Spool Directional Control Valves

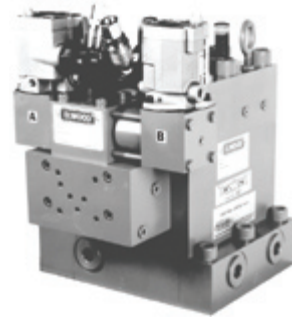
- Directional Valve for a range of applications
- Up to 46 GPM (32 GPM nominal)
- 3000 PSI (207 bar) and 6000 PSI (414 bar)



- Air Solenoid Operated
- 3-position spring centered
- 2-position spring offset
- 2-position momentary contact

Brochure 82

Poppet Type Directional Control Valves



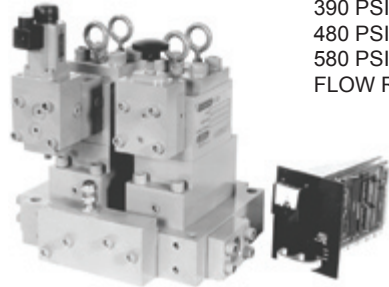
- Capacities to 1600 GPM (6057 LPM)
- 3000 PSI (207 bar), 4500 PSI (310 bar) and 6000 PSI (414 bar) models are available
- Built-in flow control
- Manifold mounted, NPT, socket weld or flanged

Brochure 395

Proportional Pressure Control System

Controlled Pressure Ranges:

390 PSI (27 bar) to 1500 PSI (103 bar)
 480 PSI (33 bar) to 3000 PSI (207 bar)
 580 PSI (40 bar) to 6000 PSI (414 bar)
 FLOW RATE: To 1000 GPM (3785 LPM)



Brochure 104

Modular ISO-Lock

- Isolates manifold mounted directional control valves
- Reduces maintenance time - replace Directional Valves without depressureizing and draining hydraulic system.
- Single lever operation to close all four ports (P, T, A, B). Cylinders can remain under the external load without having to be blocked.
- Lockable per OSHA safety standard
- NFPA "DO"/CETOP and special mounting patterns available



Brochure 250

Descaling & Pump Unloading Valves



Capacities:

3000 PSI (207 bar)
 6000 PSI (414 bar)
 6000 GPM (22710 LPM)

Connection Sizes: 1-1/4" to 10"

Descaling Valves - Spindle – Brochure 2218
 DIN – Brochure 2219

Pump Unloading Valves – Brochure 2213

Accumulator Systems



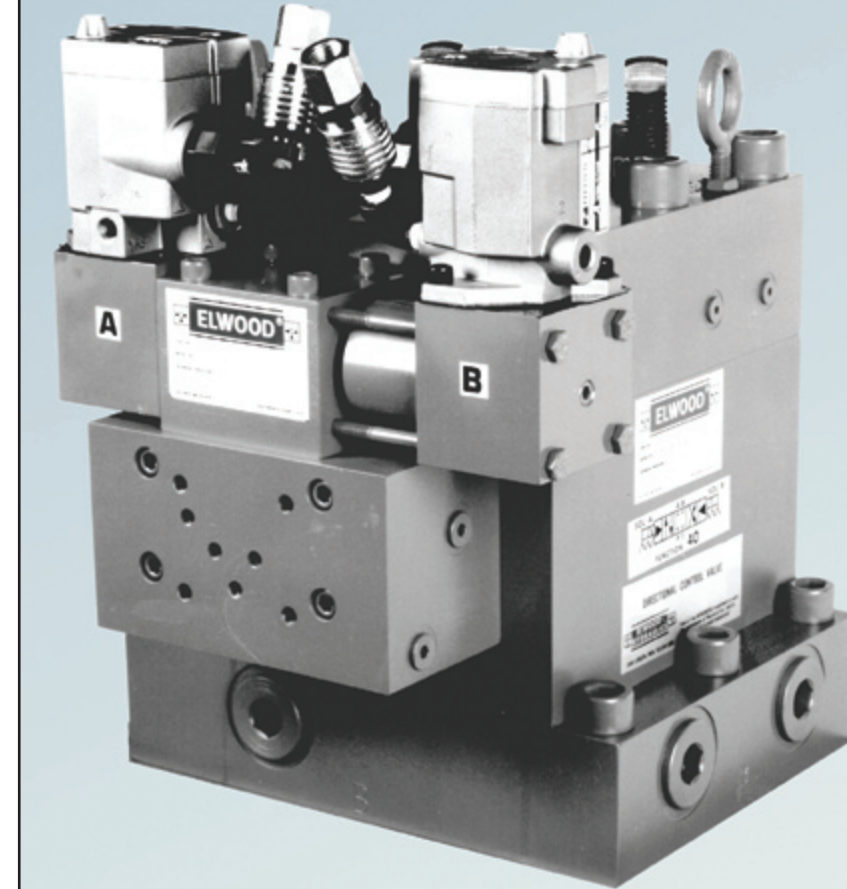
- Descaling
- Mill Systems
- Presses
- Controls
 - Level
 - Pressure
 - Pump Sequencing
 - Ballast Charging

- Designed to your specifications

Brochures 102, 105 & 380

2-, 3- AND 4-WAY DIN POPPET SERIES

www.elwood.com



ELWOOD CORPORATION
 195 West Ryan Road • Oak Creek, Wisconsin 53154 • USA
Phone: 800-527-7500 • **Fax:** 414-764-4298
 www.elwood.com

9/06 - Brochure 395
 Rev. B

Features of our Poppet Directional Valves

The Elwood line of DIN Poppet Directional Valves is a modern controls concept in water hydraulics - a line of 2-, 3- and 4-Way control valves incorporating the following features:

Zero Leakage - Positive, drop tight sealing is achieved by poppet type plunger assemblies with resilient seating discs, which close against heat treated stainless steel mitered seats.

Extended Poppet Seal Life - The dynamic seals never cross ports during operation, therefore, cannot extrude into ports. These seals are wear compensating.

Minimal Valve Space Requirements - Compact subplate mounted design reduces space requirements by as much as 50%.

Easy Valve Maintenance - All normal maintenance can be performed from the top side of the valve without removing the valve from the system. The internals are designed eliminating all "press" fitted as well as "selectively" locked parts or assemblies. Cavities conform to international DIN standards and are sleeved to facilitate seal and parts replacement.

Directional Control Function Flexibility - Main control valve function can be changed by removing the top plate and relocating the plugs in the pilot fluid passageways.

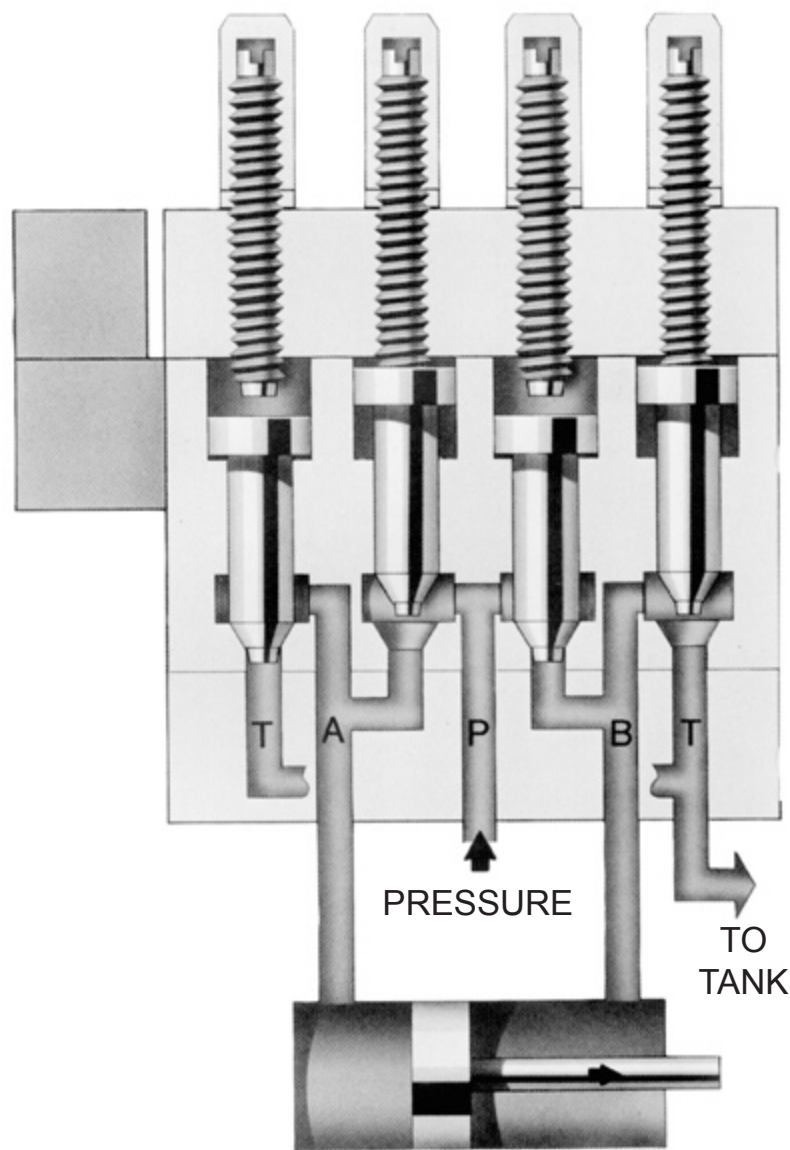
Less Inventory Required - Because such parts as poppets, seals, etc., are interchangeable between 2-, 3- and 4-Way valves, spare parts inventory requirements are minimized. Exchanging the poppet assembly replaces all dynamic seals.

Built in Flow Controls - Totally independent "meter-in" and/or "meter-out" flow control from either port is accomplished by simply limiting the poppet stroke by use of the externally accessible stainless steel flow control screw.

Maximum Efficiency of Fluid Flow - The design of the passage-ways through Elwood Directional Control Valves, results in outstanding valve efficiency and minimum pressure drops, allowing smaller Elwood valve size selection for most applications. Thus, it is smaller in comparison to competitive valves and requires less manifold space.

Pilot Designed to Suit Application - For heavy duty mill type applications, our standard air actuated packed spool pilot valve (Bulletin E82) is furnished. This valve requires no secondary operating media.

Six Poppet Models Available - Designed for dual speed applications.



SIMPLIFIED SECTION THROUGH 4-WAY CONTROL VALVE.

Ordering Data - Directional Control Valves

VALVE AND PORT CONNECTION SIZE						
RECOMMENDED FLOW				2-, 3- & 4-WAY		
GPM		LPM		NOM. PORT SIZE	CODE	MOUNTING PATTERN
MAX	NOM	MAX	NOM			
				1/2"	Bulletin E82	ISO D05
31	23	117	87	7/8"	DIN16 C08	ISO C08
75	56	284	212	1-1/4"	DIN25 C09	ISO C09
110	83	416	314	2"	DIN32 RP10	ISO RP10
202	151	765	572	2-1/2"	DIN40	ELWOOD
367	275	1390	1041	3"	DIN50 M	ELWOOD
496	372	1880	1410	4"	DIN63 M	ELWOOD
808	606	3060	2295	6"	DIN80 M	ELWOOD

Type of Valve	Code No.	NFPA Hyd. Symbol	Neutral Position Description	Pilot Type
4-Way	40		All Ports Blocked	1D
	41		All Ports Open	1D
	42		P to A & T Blocked	2S
	43		P to B & T Blocked	2S
	44		P to A & B Blocked	2S
	45		P Blocked	2S
	46		P & A Blocked	2S
	47		P & B Blocked	2S
	48		P to A	1S
	49		P to B	1S
3-Way	30		All Ports Blocked	1D
	31		All Ports Open	1D
	32		P to A Blocked	2S
	33		P Blocked	2S
	34		P to A Blocked	1S
	35		P Blocked	1S
	36		No Neutral Position	1DM
2-Way	20		P to C Blocked (N.C.)	1S
	21		P to C Open (N.O.)	1S
	22		No Neutral Position	1DM

PRESSURE RATING	
Code	Pressure
3K	3000 PSI (207 bar)
6K	6000 PSI (414 bar)

VALVE ACCESSORIES	
Code	Description
10	Air Quick Disconnect
11B	Hirschmann Type Industrial Electrical Connector Pattern, Form B, 11MM
11D	Electrical Quick Disconnect, Male Half (DIN #43650 3 Blade Pattern)
11E	Electrical Quick Disconnect, Male Half (Brad-Harrison 3 Pin Type)
22	Choke and Check Plate
33E	Positive Pilot Supply (supply from "P" Conn and External Press Supply)
51	External Pilot Pressure & Drain Connection
MO	Manual Lever Operated Pilot
MD	Manual Detent Lever Operated Pilot
81	Black "T" Finish
84	Black Oxide Finish
86	Complete Stainless Steel

ELECTRICAL SOLENOIDS	
Code	Voltage
3	24V D.C.
6	110/120V 50/60Hz A.C.
8	220/240V 50/60Hz A.C.

Other voltages available, consult factory.

Electrical cord assemblies are not supplied with valve and must be ordered separately, if required.

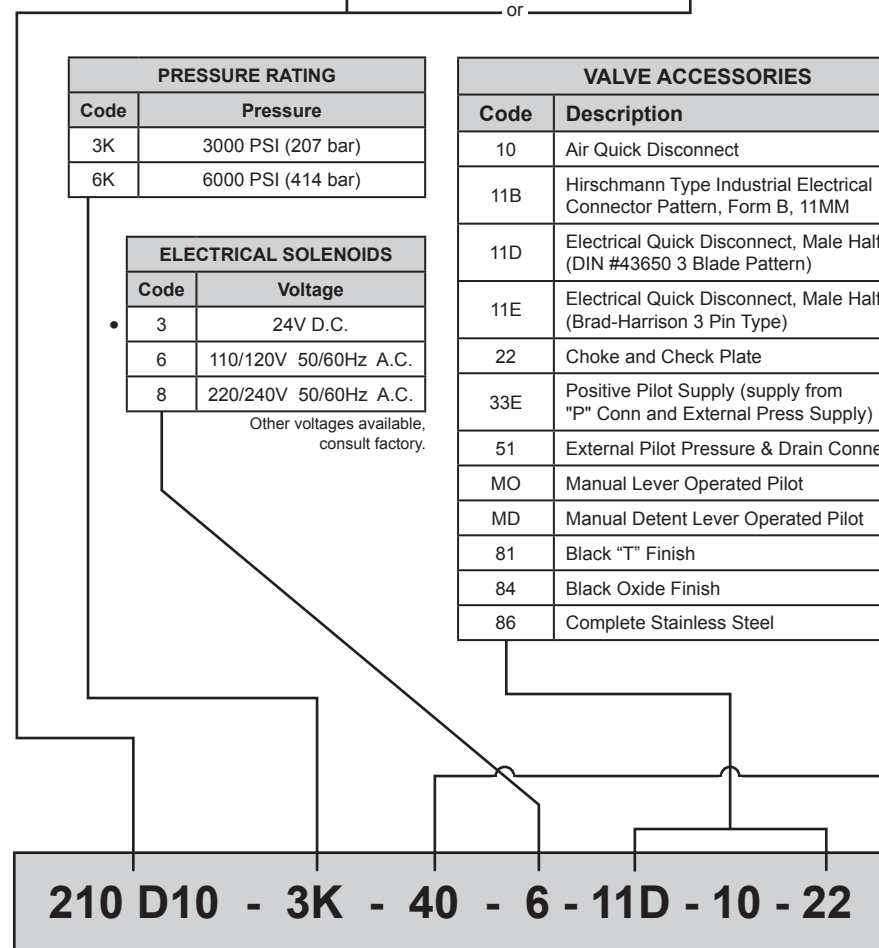
Solenoid Explanation:

- 1D - 1 double solenoid spring centered
- 1DM - 1 double solenoid momentary contact
- 1S - 1 single solenoid spring offset
- 2S - 2 single solenoid spring offset

NOTE: All valves are supplied for manifold mounting unless otherwise specified. See table above for mounting patterns of 3- and 4-Way valves. Contact Elwood for 2-, 3- & 4-Way mounting patterns not shown. If connections other than manifold are required, a suitable subplate must be ordered separately. Contact Elwood with your connection requirements. For operating pressures below 400 PSI, consult Elwood.

Filtration Requirements:

- 149 Micron (100 MESH) - Minimum
- 74 Micron (200 MESH) - Recommended
- 40 Micron - Optimal



CODE NO. EXAMPLE

• = Standard

Valve Sizing

Valve sizing and selection requires consideration in two (2) areas:

1) PIPE VELOCITY & PRESSURE DROP

Allowable maximum pipe velocity is based on various system considerations and fluid velocity and resultant pressure drop. Generally, the following flow rates are acceptable parameters for most piping systems:

- for short-to-medium length runs, 26 ft/sec (8 m/sec.), and a maximum of 30 ft/sec. (9 m/sec.)
- for long piping runs, 20 ft/sec. (6.5 m/sec.)

These parameters consider pressure drop. However, to do a complete engineering analysis, one would need to calculate the length of actual pipe runs, factoring in the number of elbows, valves, etc., to determine the system pressure drop. In this case, Cranes Reference or other reference can be used.

2) PRESSURE DROP THROUGH THE VALVE

For correct valve sizing, it is necessary to determine pressure drop through the valve. Due to the fact that not all manufacturers clearly state their valve flow characteristics, it may not seem easy to determine the pressure drop. But, it is simple when the Cv is given. The most effective method for comparing alternative valves is by the Cv factors that valve manufacturers provide for each individual valve. This enables engineers to calculate and compare pressure drops at system design flow rates. This will result in selecting valves with a smaller envelope, but superior internal design and flow characteristics and lower valve and installation costs.

$$1. \Delta P = \left(\frac{GPM}{Cv}\right)^2$$

$$2. Cv = \sqrt{\frac{GPM^2}{\Delta P}}$$

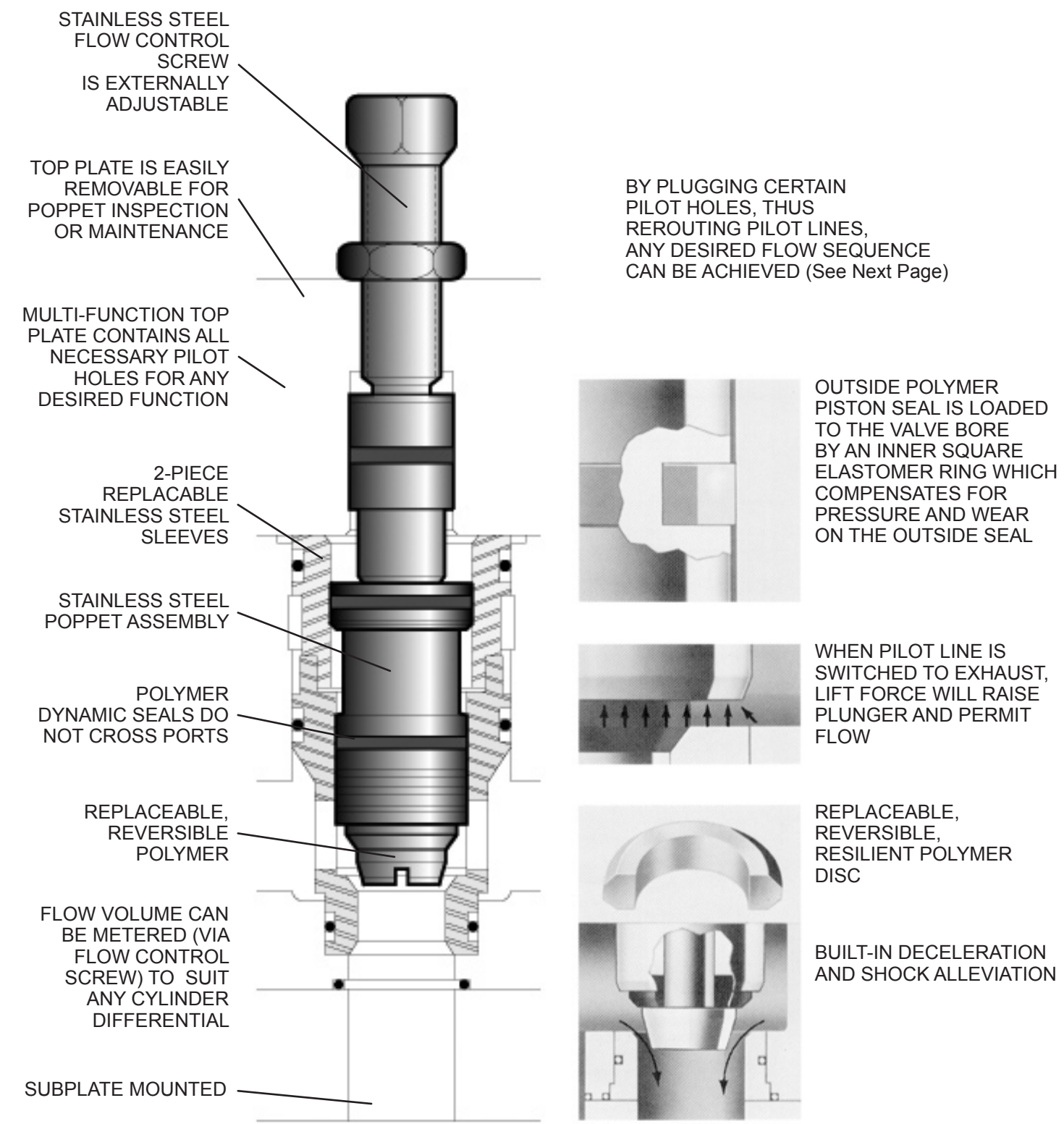
$$3. GPM = Cv \sqrt{\Delta P}$$

ΔP = Pressure drop (PSI)
 GPM = Flow (GPM)
 Cv = Cv factor

Cv Factor for Manifold Mounted Valves			
	2-Way	3-Way	4-Way
DIN 16	5.2	3.2	5.3
DIN 25	11.3	7.9	9.3
DIN 32	16.5	10.5	12.2
DIN 40	29	27	24.5
DIN 50	52.5	49.3	37
DIN 63	75	-	-

Total Cv for one pass thru the valve body, pressure to cylinder or cylinder return.

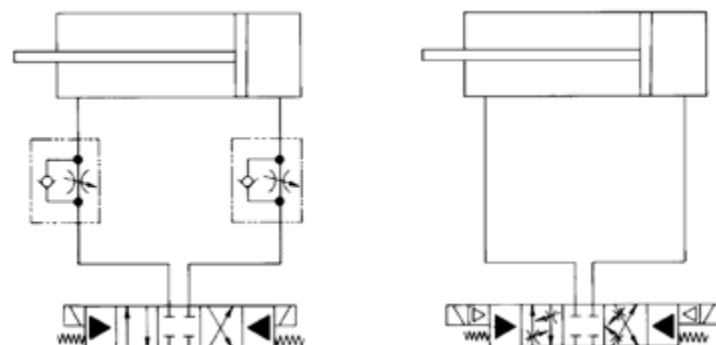
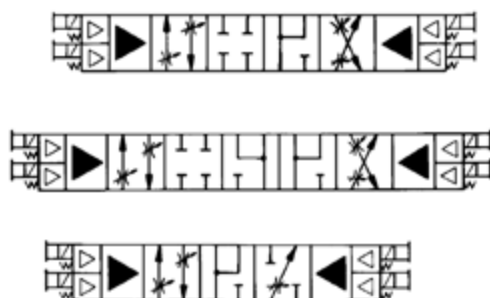
Directional Control Valve Design Features



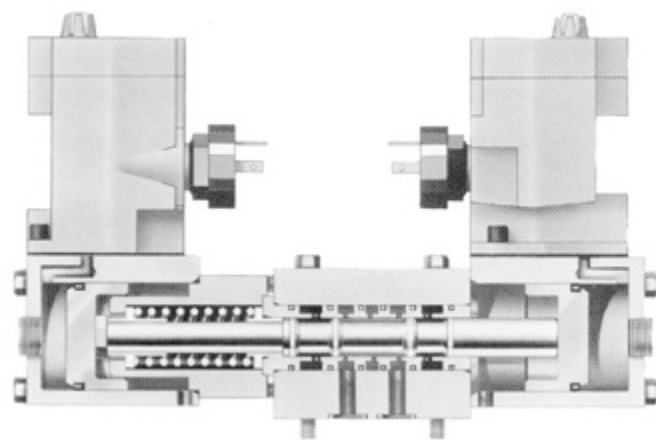
Poppet Valve Feature

Versatility:
Here are a few examples of the versatility of the Elwood Valve, illustrating multi-purpose valves. As many as nine (9) positions are available in one valve, though normally, only 4 to 5 positions are used. This flexibility eliminates the need for additional valving and manifold space. Any existing standard 3-position Elwood Valve can be converted to provide multi-position valves. This offers considerable versatility in the field, as design requirements change, without requiring manifold or piping changes. Basic valves are interchangeable, therefore spares are minimized. In addition to the illustrated functions, several others are available; contact Elwood.

Features:
This example demonstrates how circuit design, manifolding and piping are simplified. This is achieved by eliminating the need for piped-in or manifolded speed and flow control valves. The Elwood Valves have integral externally adjustable flow control screws.



Main Pilot Valve



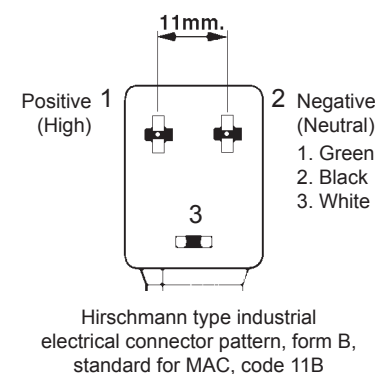
Heavy-Duty Durable Design Using Corrosion-Resistant Materials:
Seals are self-compensating. The same piston rings are used throughout. Spool is hydraulic-balanced, assuring uniform wear and eliminates concentricity problems. Designed with no-lap fitted parts.

Versatile:
Changing the main valve function is accomplished by changing pilot spool and plugs. Multiple positions of the main valve are

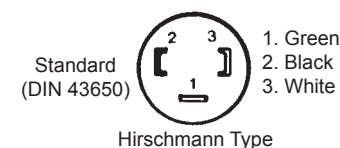
achieved by mounting an additional pilot valve. For additional pilot valve information see Bulletin E82. Recommended air supply: 60 PSI (4 bar) minimum; 120 PSI (8 bar) maximum inrush current for 110/120 Volt 50/60 Hz and 220/240 Volt 50/60 Hz is 87 VA, holding 30 VA.

Electronic Connector:

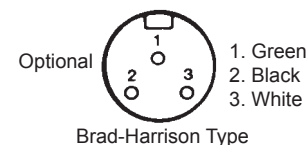
TYPE 11B



TYPE 11D



TYPE 11E



Technical Data

HYDRAULIC Minimum Operating Pressure	400 PSI (28 bar) (Consult factory for pressures below 400 PSI)	
Hydraulic Media	HWCF, 97/3 Soluble Oil in Water, Synthetics, Mineral Oils and Kerosene	
Viscosity Range at 100° F (38° C)	20 SSU (1.2 Cst.) to 1800 SSU (385 Cst.)	
Maximum Pressure Rating	2 Ranges 3000 PSI (207 Bar), 6000 PSI (414 Bar)	
Fluid Temperature Range	HWFC 35° to 150° F (2° to 65° C) Mineral Oil 5° to 150° F (-15° to 65° C)	
Recommended Filtration	Minimum - 149 Micron (100 mesh) Recommended - 74 Micron (200 mesh) Optimal - 40 Micron	
Available Valve Finishes		
Finish	Corrosion Resistance	Description
Carbon Steel	N / A	Standard Valve (Painted Surface)
Black Oxide	Good	Conversion coating by chemical reaction to form a protective surface for corrosion resistance
Elwood Black T	Better	Elwood's Black T surface treatment is as good as 18-8 stainless steel against salt solution spray. Corrosion resistance according to ASTM B117, which is a salt spray test, shows that it is significantly better than hard chrome and electroless nickel.*
Stainless Steel	Best	

* It should be noted that other water characteristics also have an affect on the surface, and it will have a reduced protection level when sulfur-reducing and iron-reducing bacteria exists.