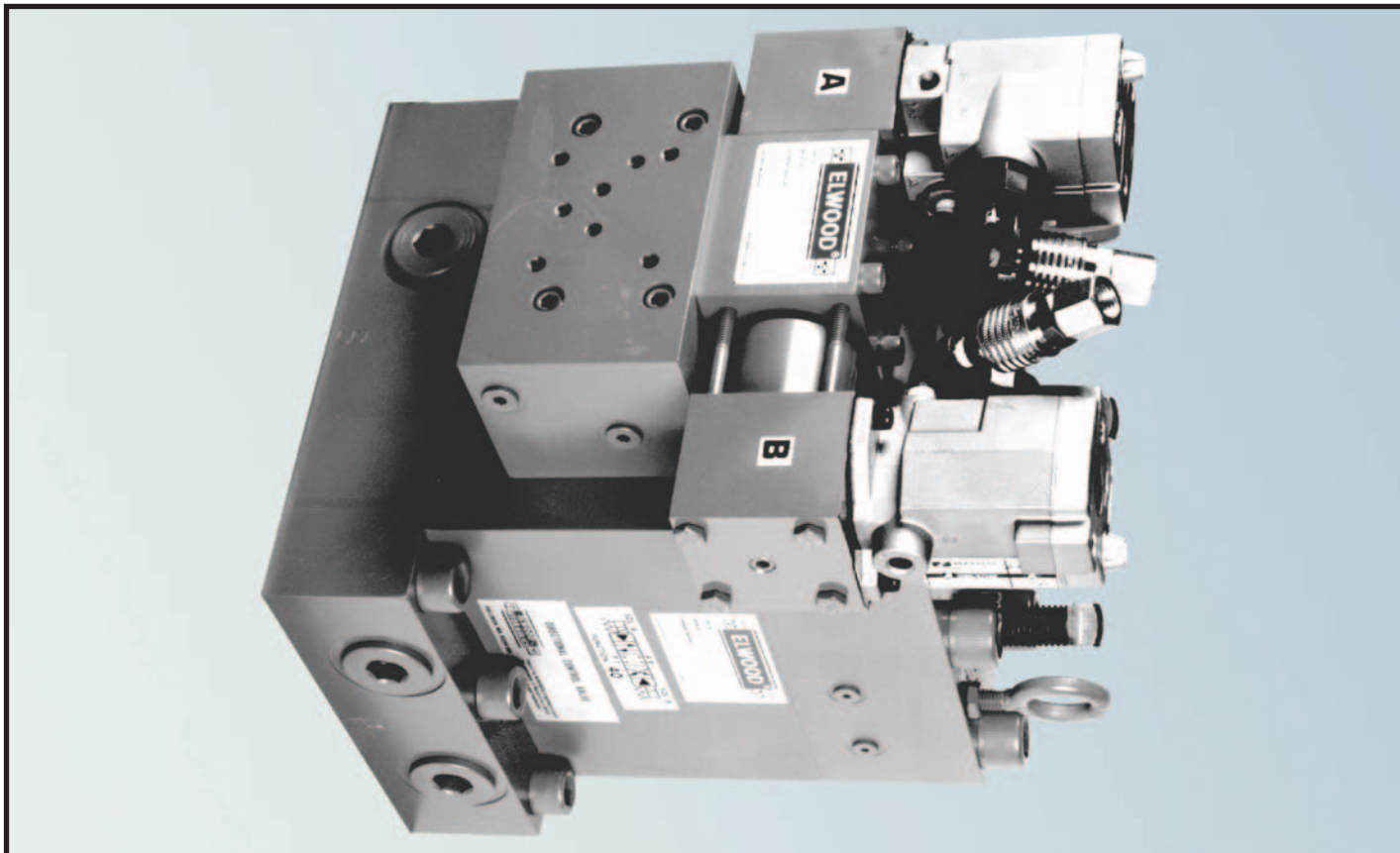
DIRECTIONAL CONTROL VALVES
2-, 3- AND 4-WAY DIN POPPET SERIES

www.elwood.com

ISO 9001:2000 CERTIFIED COMPANY

ELWOOD® FLUID POWER



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.

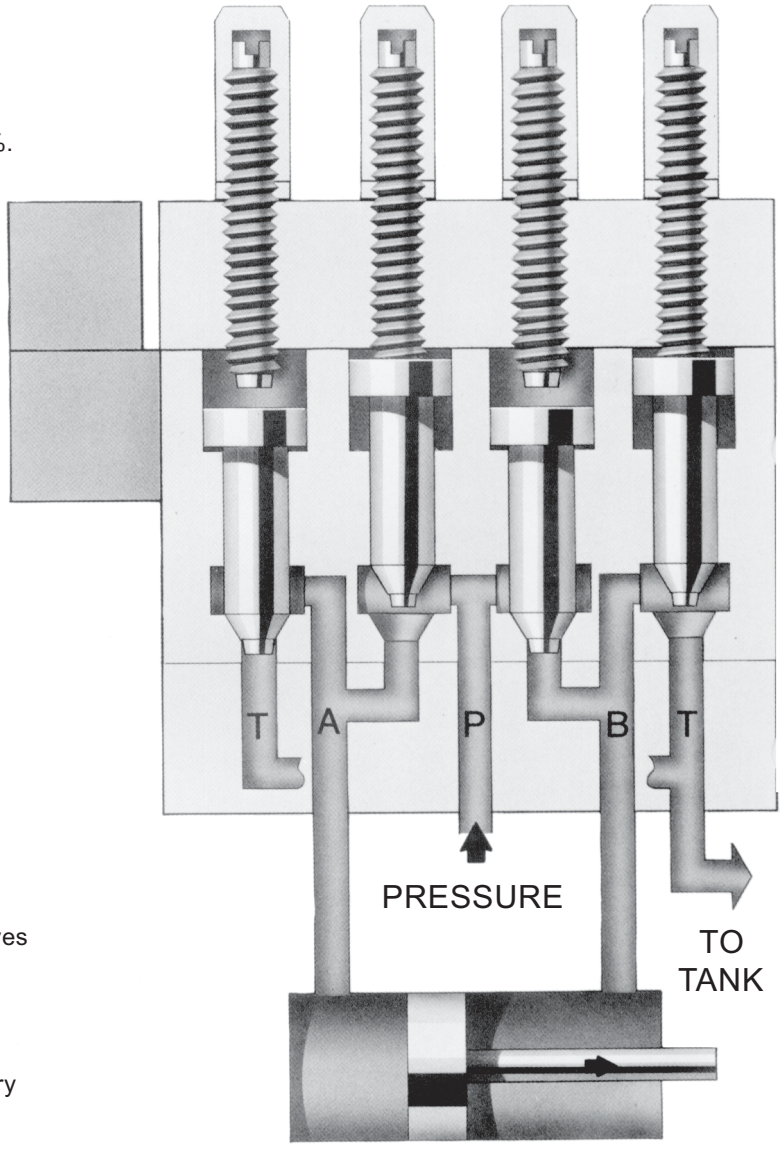
Less Inventory Required - Because such parts as poppets, seals, etc., are interchangeable between 2-, 3- and 4-way valves, spare parts inventory requirements are minimized. Exchanging the poppet assembly replaces all dynamic seals.

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.

Directional Control Valve

STAINLESS STEEL FLOW CONTROL SCREW IS EXTERNALLY ADJUSTABLE

TOP PLATE IS EASILY REMOVABLE FOR POPPET INSPECTION OR MAINTENANCE

MULTI-FUNCTION TOP PLATE CONTAINS ALL NECESSARY PILOT HOLES FOR ANY DESIRED FUNCTION

2-PIECE REPLACEABLE STAINLESS STEEL SLEEVES

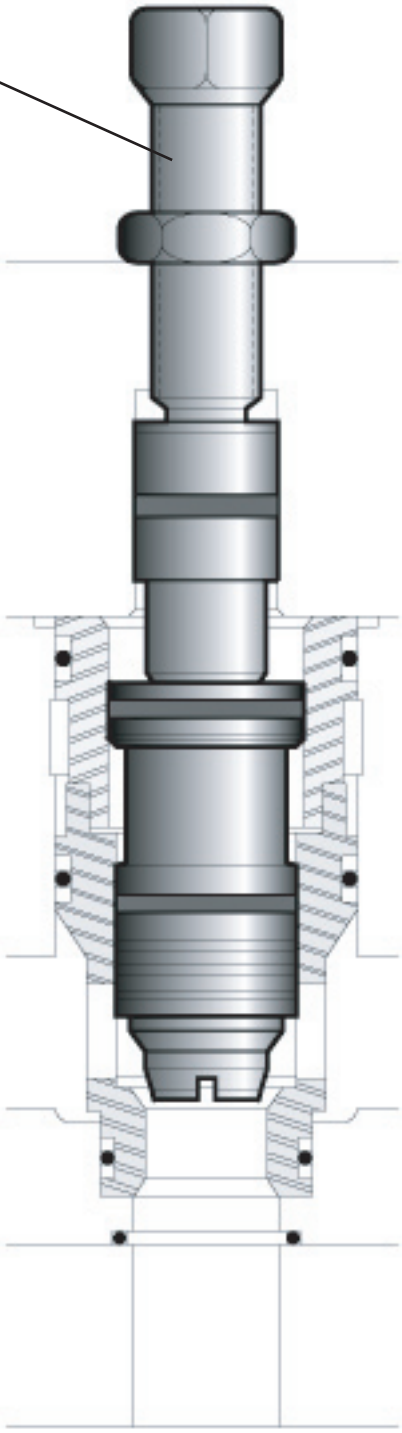
STAINLESS STEEL POPPET ASSEMBLY

POLYMER DYNAMIC SEALS DO NOT CROSS PORTS

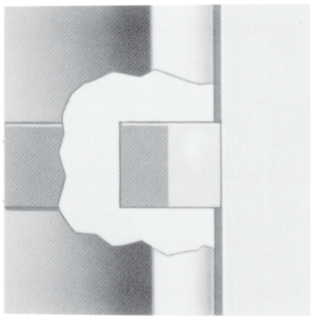
REPLACEABLE, REVERSIBLE POLYMER

FLOW VOLUME CAN BE METERED (VIA FLOW CONTROL SCREW) TO SUIT ANY CYLINDER DIFFERENTIAL

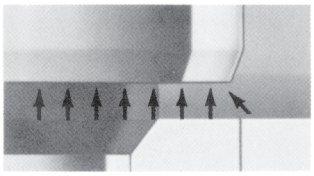
SUBPLATE MOUNTED



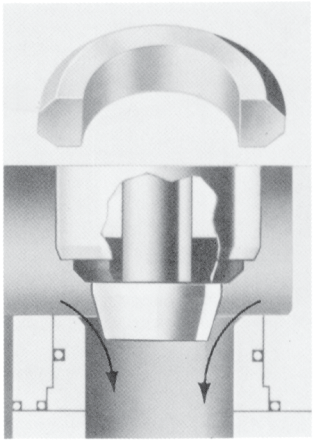
BY PLUGGING CERTAIN PILOT HOLES, THUS REROUTING PILOT LINES, ANY DESIRED FLOW SEQUENCE CAN BE ACHIEVED (See Next Page)



OUTSIDE POLYMER PISTON SEAL IS LOADED TO THE VALVE BORE BY AN INNER SQUARE ELASTOMER RING WHICH COMPENSATES FOR PRESSURE AND WEAR ON THE OUTSIDE SEAL



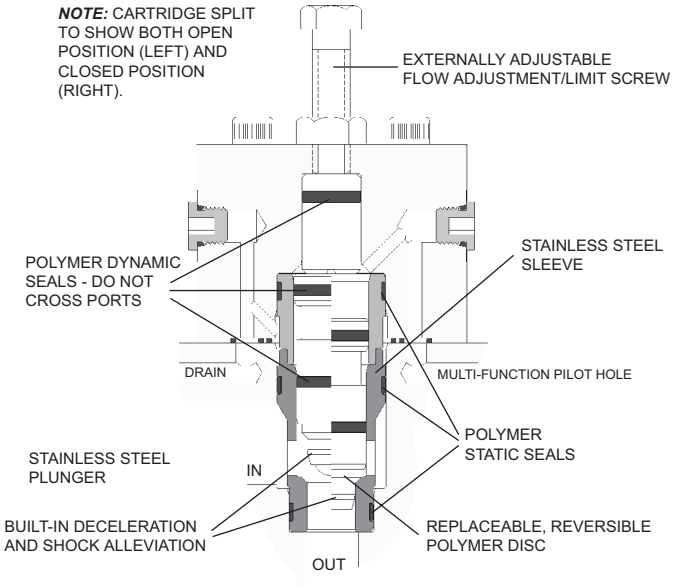
WHEN PILOT LINE IS SWITCHED TO EXHAUST, LIFT FORCE WILL RAISE PLUNGER AND PERMIT FLOW



REPLACEABLE, REVERSIBLE, RESILIENT POLYMER DISC

BUILT-IN DECELERATION AND SHOCK ALLEVIATION

Cartridge Group



Sizes 16 to 100 ISO 7368 / DIN 24342 &
Sizes 150 & 200

Working Pressures to 4500 psi (310 bar)
and 6000 psi (414 bar)

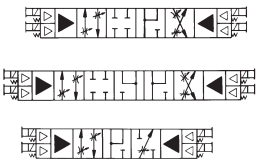
Flow Rates to 1600 gpm (6100 l/min.)

Designed for drop tight sealing and
includes All standard Elwood features

Poppet Valve Feature

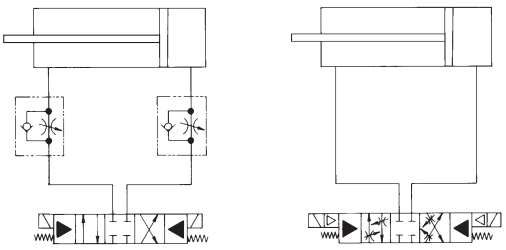
Versatility:

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.

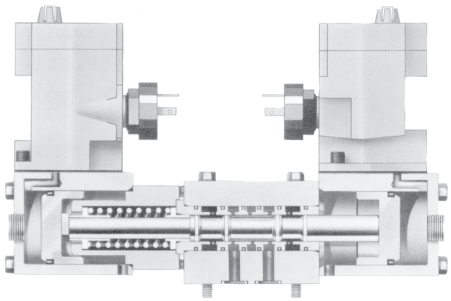


Features:

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

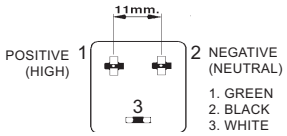


Heavy-Duty Durable Design Using Corrosion-Resistant Materials:

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.

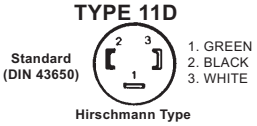
Electronic Connector:

TYPE 11B



HIRSCHMANN TYPE INDUSTRIAL ELECTRICAL CONN. PATTERN, FORM B, STANDARD FOR MAC, CODE 11B

TYPE 11D



Hirschmann Type

TYPE 11E

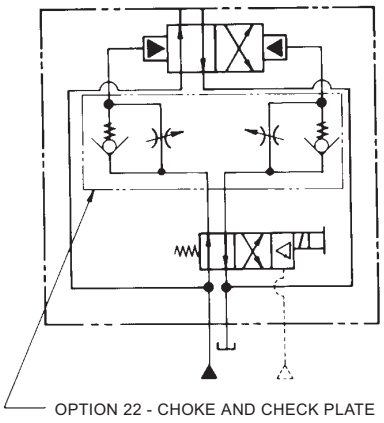
Brad-Harrison

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.

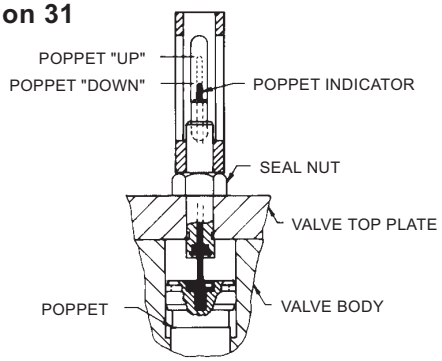
Valve Accessories

Option 22



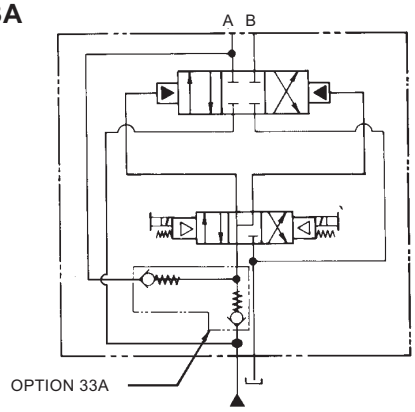
Option 22 - Check and Choke Plate arrangement allows the customer to adjust the shifting time of the main valve by controlling pilot flow.

Option 31



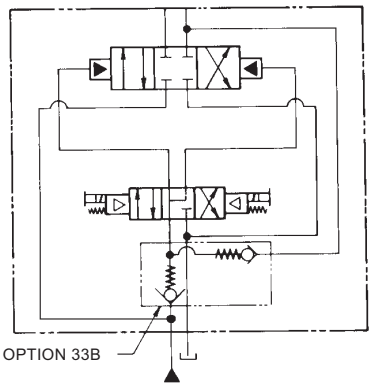
Option 31 - Provides visual external indication of the poppet position by means of viewing the pin position. This can aid in troubleshooting.

Option 33A



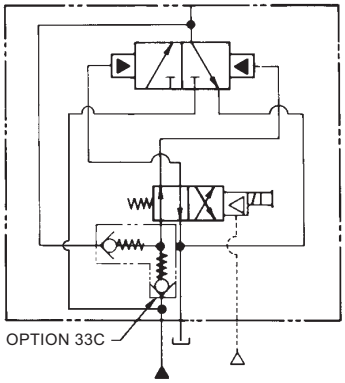
Option 33A, 4-Way Valves, provides for piloting from the normal pressure source and/or the A cylinder port.

Option 33B



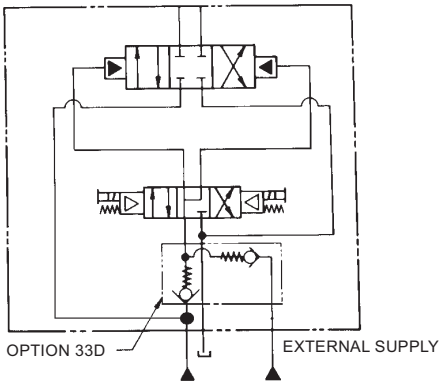
Option 33B, 4-Way Valves, provides for piloting from the normal pressure source and/or the B cylinder port.

Option 33C



Option 33C, 3-Way Valves, provides for piloting from the normal pressure port and/or the cylinder port.

Option 33D



Option 33D, 4-Way Valves, provides for piloting from the normal pressure port and/or an external pilot supply.

NOTE: If hydraulic fluid contamination is a concern, contact Elwood for information on the incorporation of a pilot filter.

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 feet per second (8 meters per second), and a maximum of 30 feet per second (9 meters per second).

- for long piping runs, 20 feet per second (6.5 meters per second).

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

where P = 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.)

Ordering Data 2-, 3- & 4-Way Directional Control Valve

VALVE AND PORT CONNECTION SIZE									
RECOMMENDED FLOW				3- & 4-WAY		2-, 3- & 4-WAY	2-WAY		
gpm		l/min.		CODE	MOUNTING	NOM. PORT SIZE	CODE	MOUNTING	DIN CAR. SIZE
MAX	NOM	MAX	NOM						
43	32	163	121	Bulletin E82	ISO D05	1/2"	Bulletin E82	ISO D05	N/A
110	70	520	265	110D08	ISO D08	7/8"	DIN16 C08	ISO C08	16
210	135	800	510	210D10	ISO D10	1-1/4"	DIN25 C09	ISO C09	25
310	250	1170	945	310 D32	ELWOOD	2"	DIN32 RP10	ISO RP10	32
500	390	1890	1500	500 E40	ELWOOD	2-1/2"	DIN40 M	ELWOOD	40
680	500	2570	1890	680 F50	ELWOOD	3"	DIN50 M	ELWOOD	50
1000	800	3780	3030	1000 G63	ELWOOD	4"	DIN63 M	ELWOOD	63
1600	1300	6050	4920	1600 H80	ELWOOD	6"	DIN80 M	ELWOOD	80

or

NOTE:
ALL VALVES ARE SUPPLIED FOR MANIFOLD MOUNTING UNLESS OTHERWISE SPECIFIED. SEE TABLE ABOVE FOR MOUNTING PATTERNS OF 3- & 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

MAXIMUM WORKING PRESSURE	
3K	3000 psi (207 bar)
4.5K	4500 psi (310 bar)
6K	6000 psi (414 bar)

TYPE OF VAVLE	NEUTRAL POSITION DESCRIPTION	CODE NO.	NFPA HYD. SYMBOL	ELECT. SOL. & TYPE *
4 WAY-DIRECTIONAL CONTROL VALVES	ALL PORTS BLOCKED	40		1D
	ALL PORTS OPEN	41		1D
	P TO A & T B BLOCKED	42		2S
	P TO B & T A BLOCKED	43		2S
	P TO A & B T BLOCKED	44		2S
	P BLOCKED A & B TO T	45		2S
	P & A BLOCKED B TO T	46		1S
	P & B BLOCKED A TO T	47		1S
	P TO A B TO T	48		1DM
	P TO B A TO T	49		1D
	NO NEUTRAL POSTION	50		1D
3 WAY-DIRECTIONAL CONTROL VALVES	ALL PORTS BLOCKED	30		2S
	ALL PORTS OPEN	31		2S
	P TO A T BLOCKED	32		2S
	P BLOCKED A TO T	33		2S
	P TO A T BLOCKED	34		1S
	P BLOCKED A TO T	35		1S
	NO NEUTRAL POSITION	36		1DM
2 WAY-D C V	P TO C BLOCKED (N.C.)	20		1S
	P TO C OPEN (N.O.)	21		1S
	NO NEUTRAL POSITION	22		1DM

VALVE ACCESSORIES		
CODE NO.	DESCRIPTION	
10	AIR QUICK DISCONNECT	
• NONE	SOLENOID INDICATOR LIGHT (STANDARD)	
• 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 & CHECK PLATE	
31	POPPET POSITION INDICATORS	
33A	POSITIVE PILOT SUPPLY (4-WAY VALVE) SUPPLY FROM "P" CONN & "A" CYL CONN	
33B	POSITIVE PILOT SUPPLY (4-WAY VALVE) SUPPLY FROM "P" CONN & "B" CYL CONN	
33C	POSITIVE PILOT SUPPLY (3-WAY VALVE) SUPPLY FROM "P" CONN & "C" CYL CONN	
33E	POSITIVE PILOT SUPPLY SUPPLY FROM "P" CONN & EXTERNAL PRESS SUPPLY	
40	PLATED VALVE FOR RAW WATER APPLICATIONS	
50	DIRECT OPERATING PILOT 1500 PSI (105 BAR) MAX -KEROSENE ONLY-	
51	EXTERNAL PILOT PRESSURE & DRAIN CONNECTION	
MO	MANUAL LEVER OPERATED PILOT	
MD	MANUAL DETENT LEVER OPERATED PILOT	
81	BLACK "T" FINISH (HARD CORROSION PROTECTION)	
84	BLACK OXIDE FINISH	

ELECTRONIC SOLENOIDS	
CODE NO.	VOLTAGE
1	6V. D.C.
2	12V. D.C.
3	24V. D.C.
5	110V. D.C.
6	110/120V. 50/60HZ. A.C.
8	220/240V. 50/60HZ. A.C.
9	410/460V. 50/60HZ. A.C.
10	200V. 50/60HZ. A.C.
11	440/480V. 60HZ. A.C.
12	24V. 50/60HZ. A.C.

CODE NO. EXAMPLE } 210 D10 - 3K - 40 - 6 - 11D - 10 - 22

- 210 D10: VALVE WITH A FLOW RATE OF 210 GPM MAX ISO D10 MANIFOLD MTG.
- 3K: 3000 PSI 210 (BAR) WORKING PRESSURE
- 40: 3 POSITION 4-WAY VALVE WITH ALL PORTS BLOCKED IN NEUTRAL
- 6: 110/120 VOLTS 50/60Hz
- 11D: (no description)
- 10 - 22: ACCESSORIES (SPECIFY ALL REQUIRED)

ELECTRICAL CORD ASSEMBLIES ARE NOT SUPPLIED W/ 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

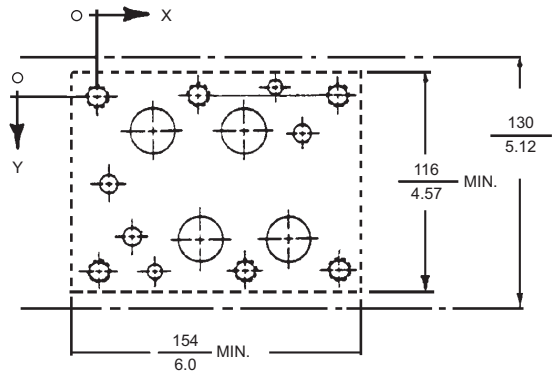
• STANDARD

ELWOOD® FLUID POWER

Dimensional Data

D08 and D10 mounting patterns shown below. Contact factory for certified drawings of these and other sizes.

D08

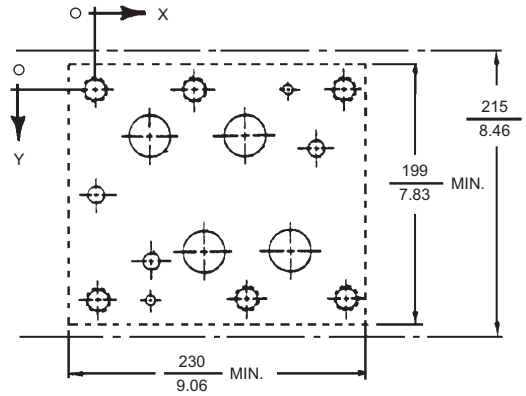


D08 - Mounting surface for 4-port hydraulic directional control valves with 23.4/.92 maximum port diameter.

D08 - Mounting surface for 4-port hydraulic directional control valves with 23.4/.92 maximum port diameter.

	P	A	T	B	L	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
X	77 3.03	53.2 2.09	29.4 1.16	100.8 3.97	5.6 .22	17.5 .69	112.7 4.44	94.5 3.719	29.4 1.156	0 0	130.2 5.125	130.2 5.125	0 0	53.2 2.094	77 3.031
Y	17.5 .69	74.6 2.93	17.5 .69	74.6 2.93	46 1.81	73 3.88	19 .75	-4.8 -.187	92.1 3.625	0 0	0 0	92.1 3.625	32.1 3.625	0 0	92.1 3.625
Ø	23.4 .92 Max.	23.4 .92 Max.	23.4 .92 Max.	23.4 .92 Max.	11.2 .44 Max.	11.2 .44 Max.	11.2 .44 Max.	7.5 .28	7.5 .28	M12 .5	M12 .5	M12 .5	M12 .5	M12 .5	M12 .5

D10



D10 - Mounting surface for 4-port hydraulic directional control valves with 32/1.25 maximum port diameter.

D10 - Mounting surface for 4-port hydraulic directional control valves with 32/1.25 maximum port diameter.

	P	A	T	B	L	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
X	114.3 4.5	82.5 3.25	41.3 1.63	147.6 5.81	0 0	41.3 1.63	168.3 6.63	94.5 3.719	29.4 1.156	0 0	190.5 7.5	190.5 7.5	0 0	76.2 3.0	114.3 4.5
Y	35 1.38	123.8 4.87	35 1.38	123.8 4.87	79.4 3.13	130.2 5.13	44.5 1.75	-4.8 -.187	92.1 3.625	0 0	0 0	158.8 6.25	158.8 6.25	0 0	158.8 6.25
Ø	32 1.25 Max.	32 1.25 Max.	32 1.25 Max.	32 1.25 Max.	11.2 .44 Max.	11.2 .44 Max.	11.27 .44 Max.	.5 .28	7.5 .28	M20 .75	M20 .75	M20 .75	M20 .75	M20 .75	M20 .75

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