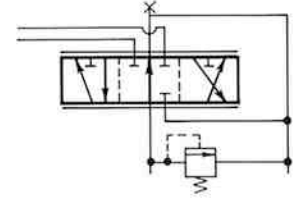




HYDRAULIC VALVES

DIRECTIONAL CONTROL C SERIES Specification Sheet



The CROSS series C monoblock type directional control valves provide good metering characteristics and long dependable service life. Select-fit spools give minimum leakage for maximum load holding ability. Many options are available including pressure release detents and solenoid actuators. Basically a series type valve, the first spool has priority in the 2-spool version. These valves are recommended for all general purpose applications except for metering-up with heavy vertical loads. See Hydraulic Safety Sheet.

GENERAL SPECIFICATIONS

Number of spools	1 or 2
Rated working pressure	2500 psi (172 bar)*
Maximum shock and surge pressure	4000 psi (276 bar)
Rated flow capacity	30 gpm (114 l/m)
Maximum spool leakage (@ 1000 psi w/100 SUS oil @ 120°F)	32 cc/min.
Mounting, any position	Three mounting holes for 3/8" dia. bolts
Weight	1 spool: Standard, 9 lbs. (4Kg); w/detents, 10 lbs. (4.5 Kg), w/sol., 12 lbs. (5 Kg) 2 spool: Standard, 17 lbs. (7.7 Kg), w/detents, 18 lbs. (8 Kg), w/sol., 23 lbs. (10 Kg)

MATERIAL SPECIFICATIONS

Body	High tensile strength cast iron
Spool	Ground, plated and polished steel alloy
Seals	Buna N

STANDARD FEATURES

- Built-in system relief valve (non-adjustable), set at 1500 psi
- Balanced select-fit spools for minimum leakage, smooth operation and long life
- 3-position, 4-way spool with spring centering and complete handle assembly
- 3/4" NPTF inlet and outlet ports, 1/2" NPTF work ports
- open center • 1 or 2 spools

OPTIONAL FEATURES AVAILABLE

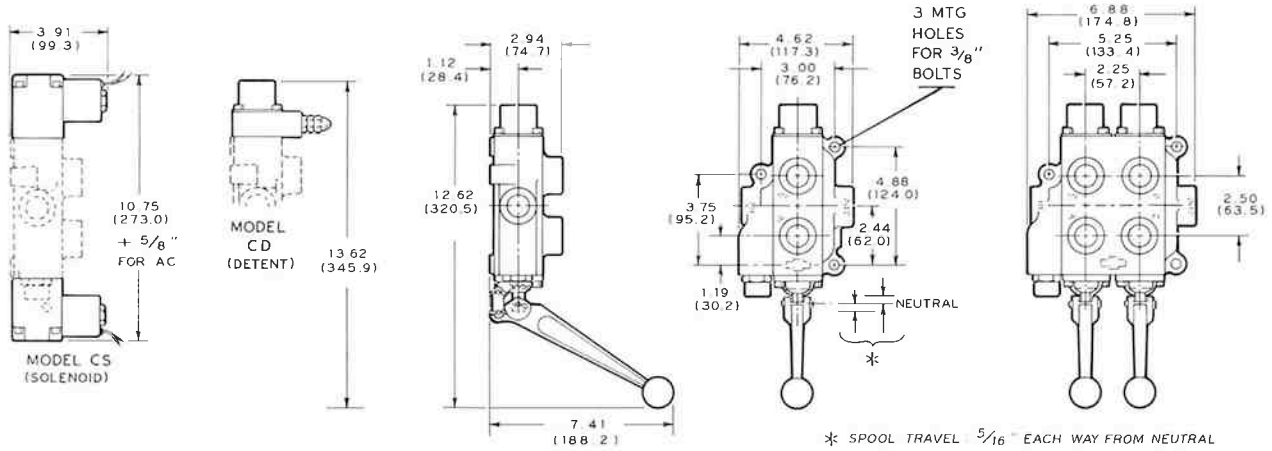
- Built-in system relief valve, fixed or adjustable, with optional pressure settings to 2000 psi
- Various spool types, 3 or 4-way, with various actuators and actuator positions
- Various sizes of SAE straight thread or NPTF dryseal pipe thread ports
- Pressure released detents (Model CD) in the "in", "out" or both positions
- AC or DC solenoid operation (Model CS), from 6 to 24 volt DC, 120 to 480 volts AC

* Limited to 2000 psi when integral relief valve is used.

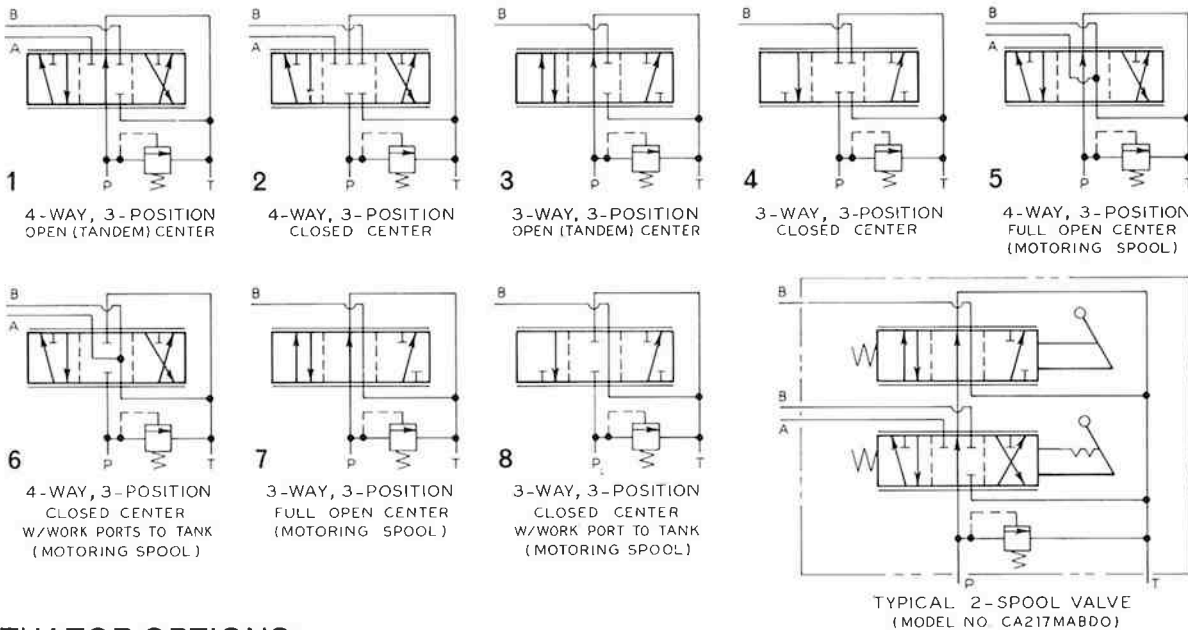
NOTE: Refer to CROSS Valve Technical/Service Sheet for recommendations and limitations.



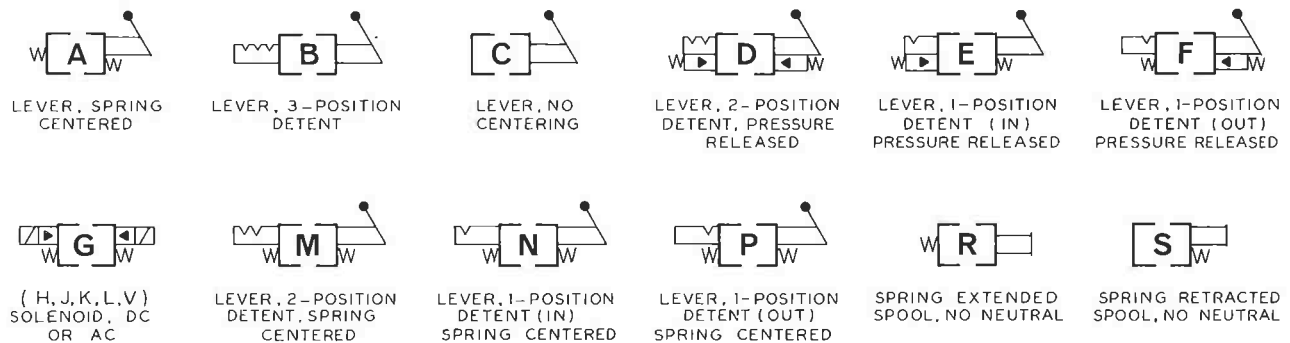
DIMENSIONAL DATA: in inches and (millimeters)



SPOOL OPTIONS:



ACTUATOR OPTIONS:



NOTE: ALL ACTUATORS MAY BE LOCATED AT EITHER END OF VALVE, EXCEPT ON MODEL CD.

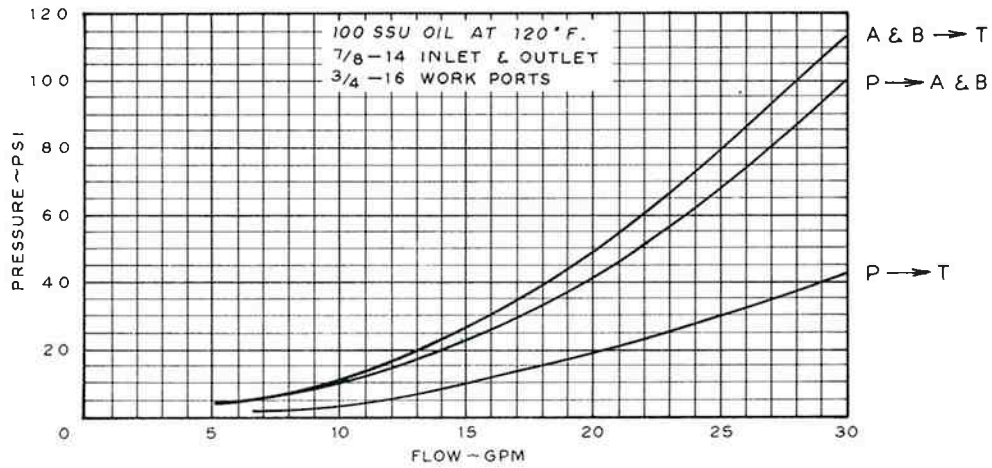


HYDRAULIC VALVES

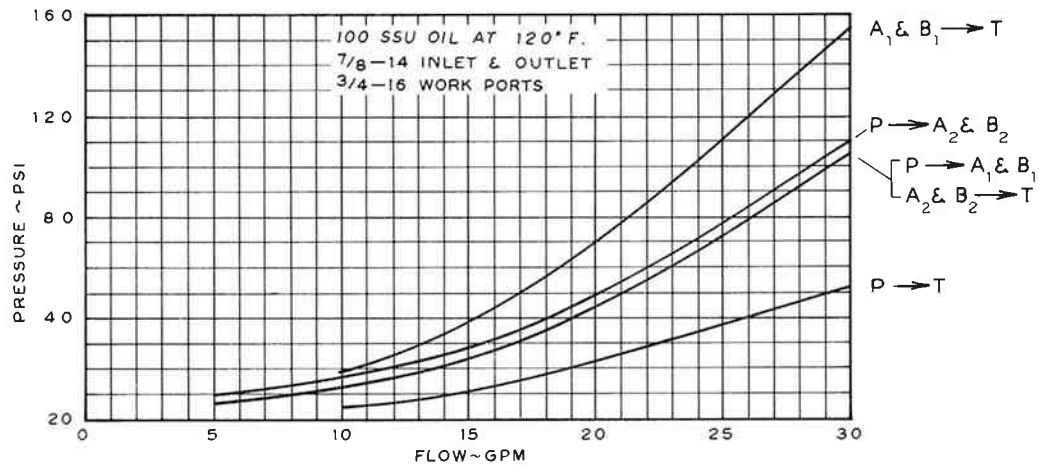
DIRECTIONAL CONTROL
C SERIES
Specification Sheet

TYPICAL PERFORMANCE DATA:

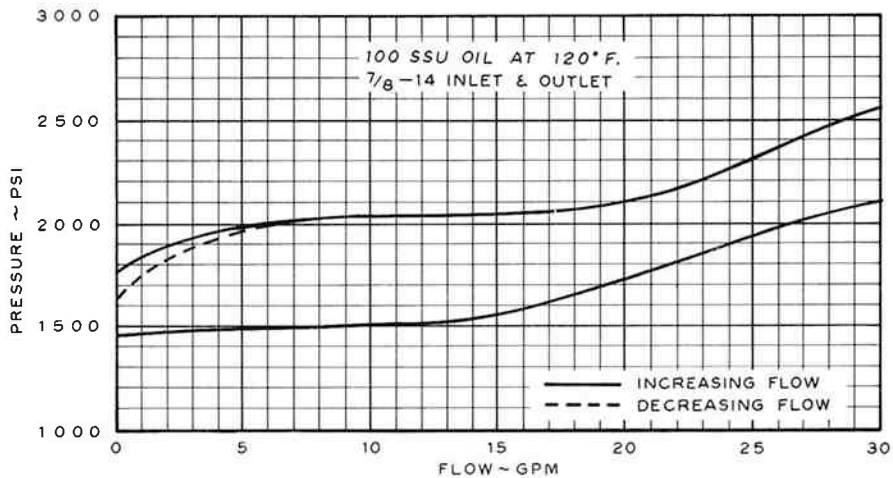
CA 1-SPOOL VALVE



CA 2-SPOOL VALVE



CA RELIEF VALVE REGULATION





ORDERING INFORMATION

MODEL NO.	# OF SPOOLS	SPOOL TYPE	ACTUATOR OPTIONS	RELIEF VALVE(6)	PORT SIZE & TYPE	HANDLE	DET. RELEASE
CA	1	1	A	A	A	0	(4)
Manual	Single	4-way, 3-position, open center	3 position Spring centered	1000 psi	In & Out 3/4" NPTF, Work 1/2" NPTF	Complete handle assy.- "A" port end	
	2	2	B	B	B	1	
CD	Double	4-way, 3-position, closed center	3 position detent - no spring centering	1500 psi	In & Out 3/4" NPTF, Work 3/8" NPTF	Complete handle assy.- "B" port end (3)	
pressure detent		3	C	C	C	2	
		3-way, 3-position, open center	manual - no detent - no centering spring	2000 psi	In & Out 3/4" NPTF, Work 3/4" NPTF	Less complete handle assy. "A" port	
		4	D	D	D	3	
CS		3-way, 3-position, closed center	Pressure detent "in & out" (4)	None	In & Out SAE #10, Work SAE #8	Less complete handle assy. "B" port (3)	
solenoid		5	E	E	E	4	
		4-way, 3-position, open center w/motoring spool	Pressure detent, "in" only, spring centering(4)	Other	In & Out SAE #12, Work SAE #12	Less handle w/brackets "A" port end	
		6	F	F	F	5	
		4-way, 3-position, closed center w/motoring spool	Pressure detent, "out" only, spring centering(4)	Adj. 750-1250 (set at 1000)	Other	Less handle w/brackets "B" port end (3)	
		7	H	G	G	6	
		3-way, 3-position, open center w/motoring spool	Solenoid, 12 volt DC (5)	Adj. 1750-2250 (set at 2000)	In & Out SAE #12, Work SAE #8	Other	
		8	J				
		3-way, 3-position, closed center w/motoring spool	Solenoid, 24 volt DC (5)				
		9	K				
		Other	Solenoid, 120 volt, AC (5)				
		(2)	L				
			Solenoid, 240 volt, AC (5)				
			M				
			2 -position detent, "In & out" spring centering				
			N				
			1 -position detent, "in only" spring centering				
			P				
			1 -position detent, "out only" spring centering				
			R				
			Spring ext. no neutral				
			S				
			Spring retr., no neutral				
			V				
			Solenoid, 480 Volt AC (5)				
			W				
			Rotary actuator				
CV	1 (1)	1(1)	A (1)	B (1)	A(1)	0(1)	

Standard Stock Valves:
 (see Full Line catalog)
 SCA2 (CA11ABA0)
 SCD2E (CD11FCA0) for
 Logsplitter
 Converta (SCV-1)

Part number building example:
CA217MABDO is a manually operated double spool valve: the **first** spool being 4-way, 3-position. open center, spring centered with detent in the "in" and "out" position; the **second** spool being 3-way, 3-position, open center motoring and spring centered. The non-adjustable relief is set at 1500 psi, inlet and outlet ports are SAE #10 and the work ports SAE #8. The complete handle assembly is located on the "A" port end.

- NOTES:** (1) **Model CV** (converta) is a standard model without options. A conversion plug for 3-way operation is included & a field installable manual detent kit (1V0294) is available. Refer to Form #VCV9 for details.
 (2) If closed center is required on a 2-spool valve, the first spool must be open center.
 (3) Not applicable for **Model CD**.
 (4) **Model CD** - specify detent kick-out pressure if other than 1000 psi (must be at least 200 psi below relief setting).
 (5) **Model CS**
 (6) Settings at 10 gpm. Other flow or pressure settings must be specified up to a maximum of 2000 psi.
 (7) Omit for CS version valves. Add second number if 2nd spool handle assembly is different from first.

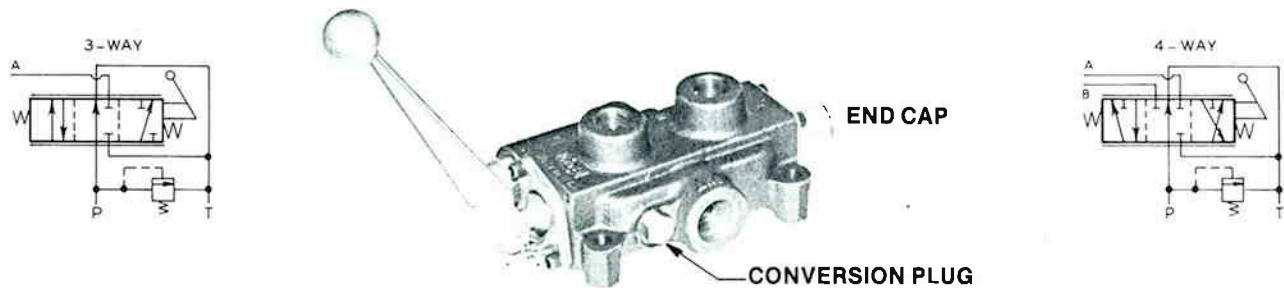


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HYDRAULIC VALVES

**DIRECTIONAL CONTROL
CV SERIES
Technical/Service Sheet**



The CROSS series CV (CONVERTA) valve is a highly versatile 3-way or 4-way, 3 position directional control valve for use with either double-acting or single-acting cylinders.

SPECIFICATIONS

Rated working pressure	.2000 psi (138 bar)
Maximum shock and surge pressure	.4000 psi (276 bar)
Rated flow capacity	.25 gpm (94.6 l/m)
Relief valve setting	.2000 psi (138 bar) at 10 gpm (37.8 l/m)
Ports	$\frac{3}{4}$ " NPTF inlet and outlet, $\frac{1}{2}$ " NPTF work (cylinder)
Basic spool type	.4-way, 3-position, spring centered, open (tandem) center
Shipping weight (boxed)	.9 lbs. (4 Kg)

CONVERSION

Included in the CV package is a 3-way cylinder port plug and a 3-way conversion plug. To convert from the basic 4-way (double-acting) to a 3-way (single-acting):

1. Insert the cylinder port plug (P/N 2A0349-8) into cylinder port "A" (port nearest handle).
2. Remove the conversion plug (P/N 1V0277), ie, the hex nut located adjacent to the outlet port, (as shown above).
3. Insert the 3-way conversion plug (P/N 2A0354-108).

The valve is now converted for use with a single-acting cylinder or uni-directional motor. (Save the 4-way conversion plug for later reconverting back to 4-way operation).

DETENT KIT

To change from the standard spring centered version to a 3-position detent, order Detent Kit P/N 1V0294. Convert as follows:

1. Remove end cap
2. Remove spring centering mechanism
3. Install detent kit
4. Replace end cap

The valve is now converted from spring centered to 3-position detent.

NOTE: This valve is not intended for use in lifting circuits.

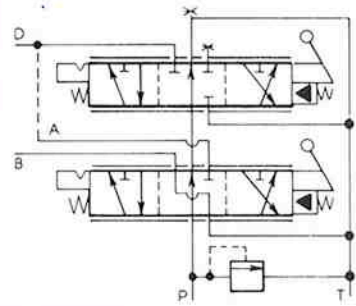
See reverse side for complete parts list, exploded view, and dimensions.

See Directional Control Valve Specification sheet "C Series" for additional information.



HYDRAULIC VALVES

DIRECTIONAL CONTROL AUTO-CYCLE Technical/Service Sheet

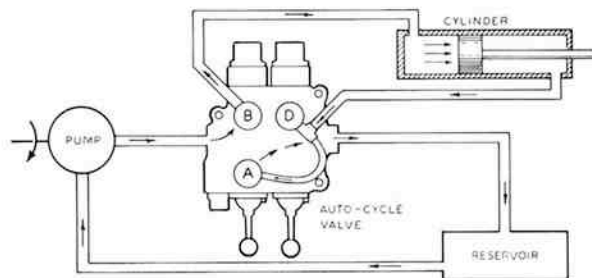


The CROSS AUTO-CYCLE valve is a modified series C directional control valve (Model Number CD213FFGAO) applied in a unique manner to provide automatic cycling.

For proper auto-cycle operation, the "A" and "D" ports must be inter-connected. If system flow rate exceeds 10 gpm (38 l/m), $\frac{1}{2}$ " minimum I.D. hose should be used.

The standard version valve (CD213FFGAO) is supplied with an adjustable relief valve (set at 2000 psi at 10 gpm), $\frac{3}{4}$ " inlet and outlet ports, $\frac{1}{2}$ " inlet ports, and complete handle assemblies located on the "A" port end of the valve. However, all C series relief, port and handle options are available. (Refer to C Series Directional Control Valve Specification Sheet).

OPERATION (Typical)

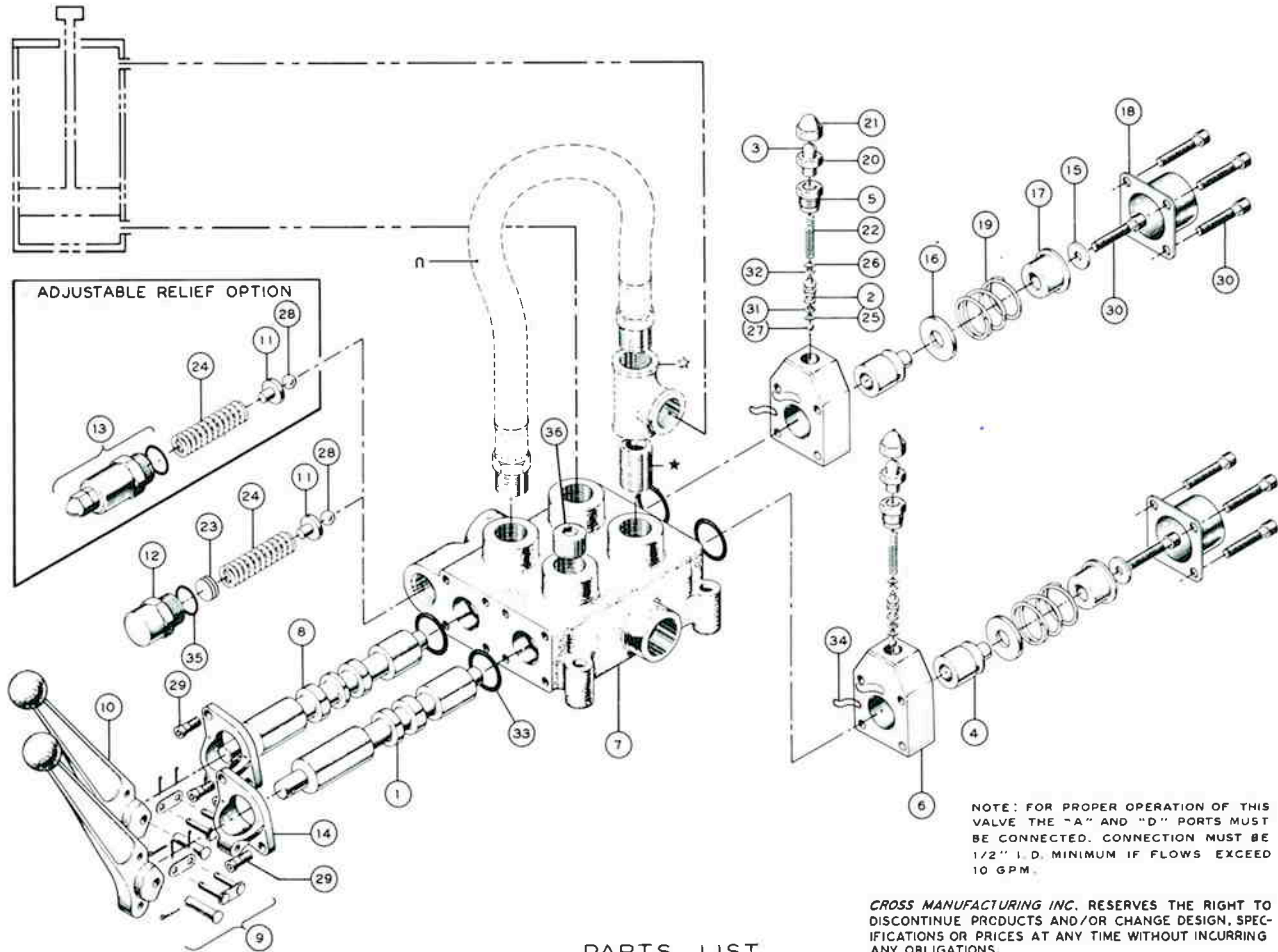


When both levers are pulled out, oil flow is directed from the inlet port, out the "B" port, to the piston side of the cylinder, causing the cylinder to extend. Return oil passes from the rod side of the cylinder through the valve "A" port to the outlet port back to the reservoir. Upon reaching the end of the cylinder stroke, pressure increases to the pre-set detent kick-out pressure, causing the first valve spool to return to neutral. Oil flow is then directed from the inlet port through the open center first spool and out the "D" port, thereby causing the cylinder to retract. Return oil from the piston side of the cylinder passes through the "B" port and out the outlet port back to the reservoir. When the cylinder is fully retracted, pressure increases to "kick-out" the second spool detent, returning it to neutral.

The system has now completed its full cycle and is ready to again be re-activated.

APPLICATIONS (Typical): Compactors, Presses

NOTE: NOT RECOMMENDED FOR LOGSPLITTERS.



PARTS LIST

○	PART NO.	DESCRIPTION	QTY REQD
1	1V0006	* SPOOL (3-WAY)	1
2	1V0068	PRESSURE DETENT PISTON	2
3	1V0069	ADJUSTMENT SCREW	2
4	1V0071	PRESSURE DETENT SLEEVE	2
5	1V0072	PISTON STOP	2
6	1V0263	DETENT HOUSING	2
7	1V0326	* VALVE HOUSING	1
8	1V0648	* SPOOL (4-WAY)	1
9	1V1702	PIN KIT	2
10	1V1703	HANDLE	2
11	1R0014	SPRING GUIDE	1
12	1R0028	RELIEF O-RING GUIDE	1
13	1R0045	ADJUSTABLE RELIEF CARTRIDGE	OPT.
14	424306	HANDLE BRACKET	2
15	1A0290	WASHER	2
16	1A0291	STOP WASHER	2
17	1A0292	SPOOL COLLAR	2
18	1A0294	END CAP	2

* THE SELECT-FIT HONING PROCESS AT FACTORY, WHICH FITS A SPOOL TO AN INDIVIDUAL VALVE BODY, ELIMINATES THE POSSIBILITY OF ORDERING THE VALVE BODY AND SPOOL AS SEPARATE ITEMS.

○	PART NO.	DESCRIPTION	QTY REQD
19	1A0332	CENTERING SPRING	2
20	1A0569	LOCKNUT	2
21	1A0570	ACORN NUT	2
22	1A0610	DETENT SPRING	2
23	1A0682	SHIM	AS REQD
24	1A0685	RELIEF SPRING	1
25	2A0012-007	LOWER O-RING BACK-UP	2
26	2A0012-008	UPPER O-RING BACK-UP	2
27	2A0017-8	STEEL BALL (1/4")	2
28	2A0017-14	STEEL BALL (7/16")	1
29	2A0079-404	MACHINE SCREW	4
30	2A0079-414	MACHINE SCREW	10
31	2A0283-7007	LOWER PISTON O-RING	2
32	2A0283-7008	UPPER PISTON O-RING	2
33	2A0283-7214	SPOOL SEAL	4
34	2A0283-9017	O-RING	2
35	2A0283-9910	O-RING	1
36	2A0349-8	PIPE PLUG	1

☆ 1/2" NPTF TEE

★ 1/2" NPTF NIPPLE

n 446035 HOSE ASSEMBLY



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Phone: 620-324-5525



HYDRAULIC VALVES

**DIRECTIONAL CONTROL
CS SERIES
Technical/Service Sheet**



The CROSS series CS solenoid operated directional control valves use standard solenoid cartridges to control the pilot flow for actuating the main valve spool. The pilot supply is obtained through drilled internal passages which connect pump pressure to the solenoid/pilot sections.

REQUIREMENTS

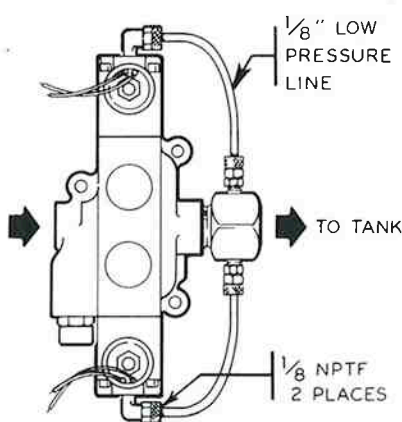
In order to move the valve spool hydraulically, a minimum of 30 psi (2.1 bar) is required. 50 to 60 psi (3.4 to 4.1 bar) is optimum, and 100 psi (6.9 bar) is maximum. 10 micron filtration is required for the CS valve.

CLOSED CENTER APPLICATIONS

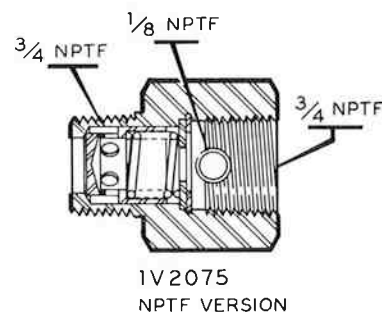
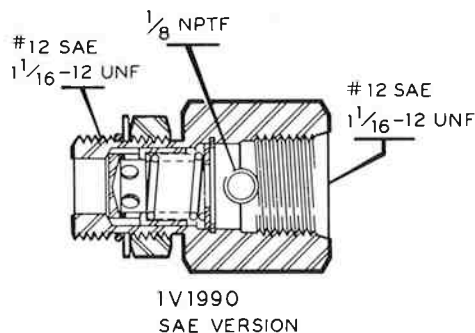
All necessary porting for operation of the CS valve is accomplished internally. No adjustments or modifications are necessary.

OPEN CENTER APPLICATIONS

In order to have ample pilot pressure available (30 psi minimum), it is necessary to install a back pressure check valve (formerly known as R-75) in the tank port and to vent the ends of both solenoid blocks back to tank. (If not vented, the valve spool would not shift as pressure is supplied to both ends of the spool).



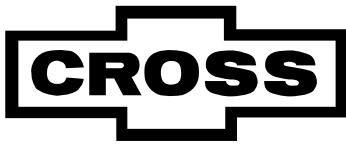
INTERNAL VIEW OF BACK PRESSURE CHECK VALVE



PILOT PRESSURE KITS

Each kit includes the back pressure check valve plus the necessary fittings and tubing to complete the assembly. If the CS valve is supplied with other than 3/4" NPTF outlet port, two additional adaptor fittings are necessary.

Kit Number		DESCRIPTION OF KIT
SAE	NPTF	
1V1991	1V0266	For 1-spool valve (except 3-way motoring spool) or 2-spool valve w/1st manual
1V1992	1V0266A	For 2-spool valve w/1st spool solenoid, 2nd spool manual
1V1993	1V0267	For 2-spool valve, both solenoid (except 3-way motoring spools)
1V1994	1V0268	For 1-spool valve with 3-way motoring spool
1V1995	1V0543	For 2-spool valve with 1-spool as a 3-way motoring spool
1V1996	1V0544	For 2-spool valve with both spools 3-way motoring spools



HYDRAULIC PRODUCT SAFETY



WARNING : Valve lever (spool) may "stick" (not center) under certain conditions allowing the hydraulic equipment to continue to operate and could cause serious injury, death or equipment failure.

VALVE SAFETY: Read and follow instructions carefully. Failure to observe instructions and guidelines may cause serious injury, death or equipment failure. A sticking valve (spool bind) may be caused by one or more of the following factors:

DIRTY OIL: Oil must be filtered to a minimum of 25 microns. Filters should be changed regularly - spin-on types after 50 hours of initial use and then after every two hundred fifty hours of use. Use of a condition indicator is recommended. Consult your tractor or implement owner's manual for filtration and changing recommendations for internal systems.

OIL REQUIREMENTS: Premium quality anti-wear type oil with a viscosity between 100 and 200 SSU at operating temperatures. Certain synthetic oils may cause spool seals to swell and the valve to stick. If in doubt, call CROSS Engineering.

IMPROPER HOOK UP OR MOUNTING: Always use the proper size fittings. Hook up "in" & "out" as noted on the valve body. Do not overtorque pipe fittings. Mounting surfaces should be flat and care should be used when tightening mounting bolts. Over-tightened bolts can cause spool bind and casting breakage. When hooking a valve in series, always use a power beyond sleeve. Consult your tractor or implement manual to make sure you have the proper quick disconnect line connected to the inlet of the remote valve.

MISAPPLICATION: Always use the proper valve for the job. CONVERTA, CD, CS or CA valves should never be used for metered heavy load lifting - loaders or similar applications. Use an open center valve for open center applications and a closed center valve for closed applications. If in doubt, check with your tractor dealer. Contact CROSS if the valve allows the hydraulic equipment to creep excessively.

MAINTENANCE: Make sure all bolts are tightened and torqued to the recommended specification. Bent or broken parts should not be used. Replace immediately. Always use exact replacements. Always protect valve spool from paint overspray. Faulty quick disconnects can cause high back pressures and sticking spools. Check quick disconnects periodically to make sure they are functioning properly. If valve spool does not center or appears to stick, do not use!

PUMPS & MOTORS SAFETY:



A relief or bypass in your hydraulic system is necessary to prevent pump from breakage due to overpressurization. Use correct fittings and proper oil as noted in the technical service manual packed with each unit. Change oil as recommended by your implement or tractor manufacturer.

CYLINDER SAFETY:



Check clevis clearances before, during and after extending the cylinder and before using the cylinder under pressure to avoid possible injury, or bent or broken rods caused by binding. Never operate a cylinder above recommended pressures. Never use a cylinder as a safety device when transporting equipment.

PINHOLE LEAKS:



If you observe a pinhole leak, discontinue use of the component. If oil has penetrated your skin or contacted your eye, seek medical attention immediately!