

GENERAL VALVE[®] Four-Way Diverter Valve



GENERAL VALVE[®]

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FOUR WAY DIVERTER VALVE MECHANICAL RETRACTION AND COMPRESSION ASSURES NO-LEAK STREAM SEPARATION AND LONGER LIFE

The Four-Way Diverter Valve does not rely on line pressure or external hydraulic pressure for positive sealing.

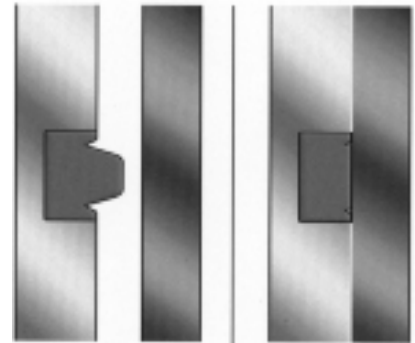
The seating elements, or slips, move perpendicularly against the face of the ports.

The seals themselves are highly resilient elastomers which are either bonded or mechanically retained in the slips.

Retraction of the slips, away from the body prior to cycling prevents friction and abrasion which can damage seals.

There is never any sliding or rubbing of the seals against the valve body or ports.

Metal-to-Metal secondary seating prevents over compression of the resilient primary seal.



Resilient seal
before compression

Resilient seal
after compression

IN-LINE MAINTENANCE CUTS OPERATING AND DOWNTIME COSTS



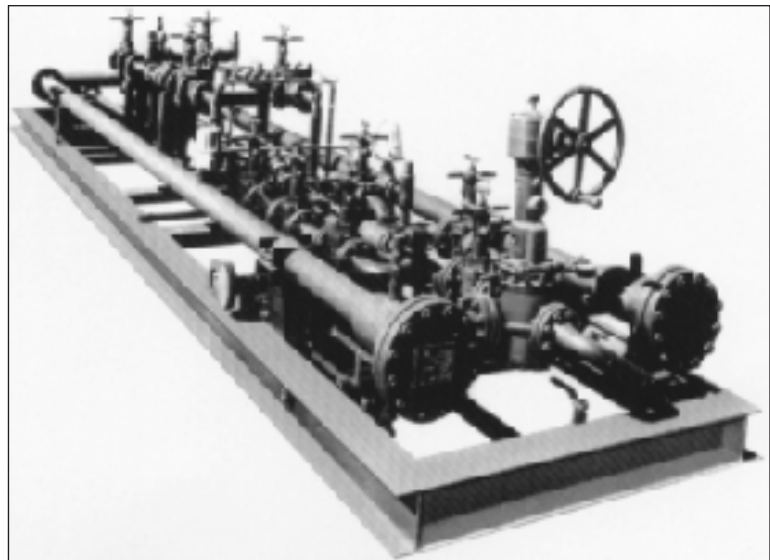
Because the seating segments are mounted via dovetailed connections to the plug, they may be removed from the top or the bottom and examined without having to take the valve from the line or disturb the actuator. This added flexibility allows the valve to be installed upside down for easy access to actuator and slips.

FAST-CYCLING

Fast and easy operation by hand or automatically with electric motor or hydraulic actuators is possible. Lower cycling torque permits use of smaller and less expensive power actuators.

The standard gear operated Four-Way Diverter Valve is NOT self locking, therefore it is recommended that all manually operated Four-Way Diverter Valves be equipped with a latching device to maintain seating position when the valve is unattended.

This item is available as an option (see page 7). When sold as a motor ADAPTED valve be sure to select ONLY self-locking actuators.



FOUR WAY DIVERTER VALVE AUTOMATIC PRESSURE GAUGE FOR QUICK CHECK OF SEAL INTEGRITY

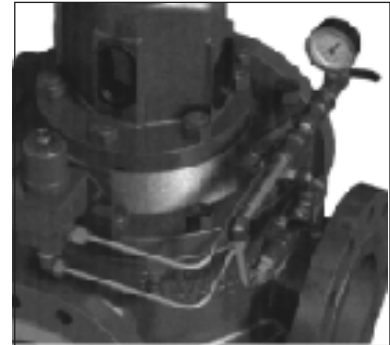
The Four-Way Diverter Valve uses the reliable pressure gauge method of checking for positive sealing to assure metering accuracy.

The gauge automatically indicates seal condition each time the valve is seated during proving, even in low differential operating conditions.

The pressure gauge connects to the body cavity between the valve slips. As the slips expand in the diverted position, the resilient seals contact the valve body, trapping the fluid between them. Further expansion of the slips during valve seating compresses the seals further. The resulting increase in volumetric space between the slips, without an increase in the amount of fluid, will cause a drop in pressure.

Any leakage through either seal permits additional fluid to enter the body cavity, causing an immediate increase in cavity pressure back to line pressure. Even the most minimal fluid leak will register on the gauge immediately.

A pressure switch may be used to supplement the gauge method as an option (see page 8).



CONTINUOUS FLOW CIRCULATION MAINTAINED THROUGH CYCLING



Seated in "R/L-Close - CCW" Position

Valve is seated. Flow streams completely separated. Pressure gauge in body would indicate reduced pressure.

As the valve is unseated the plug is raised and both slips are retracted. Plug and slips begin to turn. Slips and resilient seals are fully retracted away from the body. Pressure gauge would indicate line pressure.



Neutral - Fully Unseated Position

At this point in the cycle, the hole through the plug allows the flow to pass directly from the inlet port to the outlet port. Both slips and plug are designed so that the flow is not appreciably restricted when cycling. Pressure gauge would indicate line pressure.

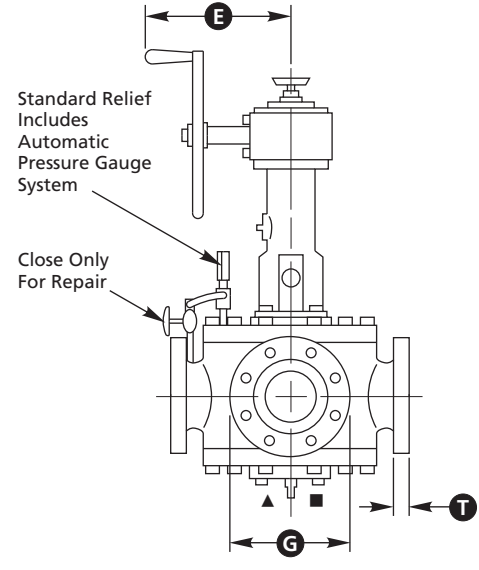
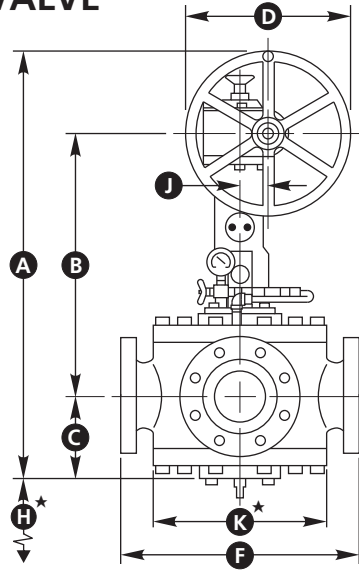


Seated in "L/R-Open - CW" Position

Plug and slips in fully rotated position. Plug moves down, expanding the slips against the body. Flow streams are completely separated. As the seals trap fluid between them and volumetric space increases the body pressure gauge would once again indicate less than line pressure.

Note: Valve position is quickly identified with a top-mounted flag. Position-indicator switches are available for remote locations (see page 7).

FOUR WAY DIVERTER VALVE GEAR OPERATED

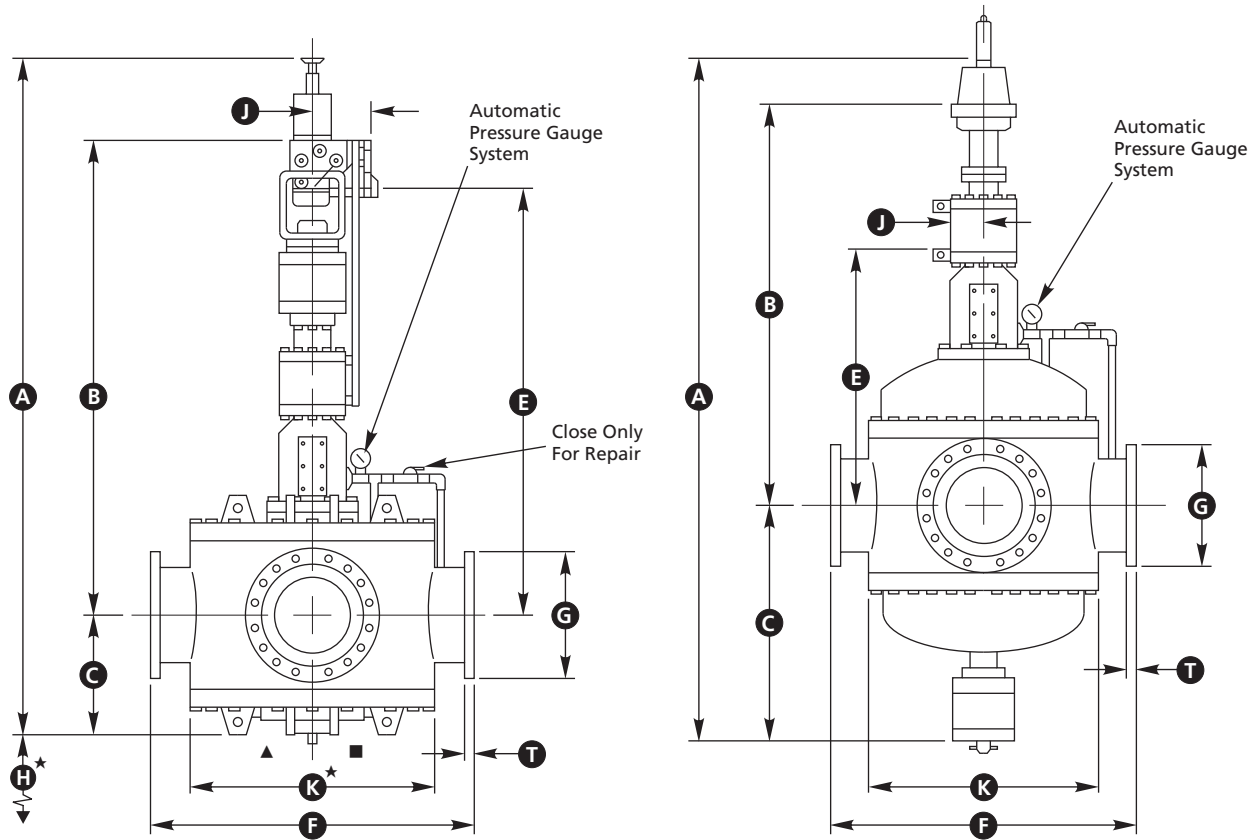


- ▲ This bleed valve allows for a pressure balanced plug condition and MUST REMAIN OPEN.
- NPT Drain Provided.
- ★ H & K are Minimum Clearance Required to Replace Slips.

DIMENSIONS in. (mm)

ASME Class	Size	Valve Model	4-Way Op.	A	B	C	D	E	F	G	H	J	K	T	Weight lb. (kg)
150	12 (300)	B4711	1251	59 1/2 (1511)	37 (940)	15 (381)	20 (508)	14 1/4 (362)	44 (1118)	19 (483)	11 (279)	5 (127)	25 (635)	1 5/16 (33)	2800 (1270)
	12 (300)	CA4711	1277	84 1/2 (2146)	48 1/2 (1232)	20 (508)	32 (813)	16 1/4 (413)	42 (1067)	19 (483)	13 (330)	9 (229)	35 1/2 (902)	1 15/16 (49)	6200 (2812)
	16 (400)	B4711	1500	89 1/2 (2273)	61 1/2 (1562)	18 1/2 (470)	32 (8130)	16 (406)	60 (1524)	23 1/2 (597)	22 (559)	9 (229)	35 (889)	1 7/16 (37)	7000 (3175)
300	2 (50)	C4721	625	35 1/2 (902)	22 (559)	6 (152)	14 (356)	12 1/2 (318)	14 (356)	6 1/2 (165)	5 (127)	3 (76)	11 (279)	15/16 (24)	335 (152)
	3 (80)	C4721	625	35 1/2 (902)	22 (559)	6 (152)	14 (356)	12 1/2 (318)	15 (381)	8 1/4 (210)	5 (127)	3 (76)	11 (279)	1 3/16 (30)	350 (159)
	4 (100)	C4721	325	37 (940)	23 (584)	7 (178)	14 (356)	12 1/2 (318)	20 (508)	10 (254)	7 (178)	3 (76)	15 1/2 (394)	1 5/16 (49)	650 (295)
	6 (150)	C4721	750	47 (1194)	28 (711)	9 (229)	20 (508)	12 1/2 (318)	24 (610)	12 1/2 (318)	9 1/2 (241)	3 1/2 (89)	18 1/2 (470)	1 7/16 (37)	1050 (476)
	8 (200)	C4721	1251	54 (1372)	34 1/2 (876)	9 1/2 (241)	20 (508)	14 1/2 (368)	28 (711)	15 (381)	10 (254)	5 (127)	22 (559)	1 11/16 (43)	1700 (771)
	10 (250)	C4721	1251	57 (1448)	35 1/2 (902)	11 (279)	20 (508)	14 1/2 (368)	32 (813)	17 1/2 (445)	12 (305)	5 (127)	25 1/2 (648)	1 15/16 (49)	2490 (1129)
	12 (300)	B4721	1251	59 1/2 (1511)	37 (940)	15 (381)	20 (508)	14 1/4 (362)	44 (1118)	20 1/2 (521)	11 (279)	5 (127)	25 (635)	2 1/16 (52)	3000 (1361)
600	12 (300)	CA4721	1277	84 1/2 (2146)	48 1/2 (1232)	20 (508)	32 (813)	16 1/4 (413)	42 (1067)	20 1/2 (521)	13 (330)	9 (229)	35 1/2 (902)	2 1/16 (52)	6500 (2948)
	16 (400)	B4721	1500	89 1/2 (2273)	61 1/2 (1549)	18 1/2 (470)	32 (813)	16 (406)	60 (1524)	25 1/2 (648)	22 (559)	9 (229)	35 (889)	2 1/4 (57)	7500 (3402)
	2 (50)	C4741	625	35 (889)	22 (559)	6 (152)	14 (356)	12 1/2 (318)	14 1/2 (368)	6 1/2 (165)	5 (127)	3 (76)	11 (279)	1 (25)	345 (156)
	3 (80)	C4741	625	35 (889)	22 (559)	6 (152)	14 (356)	12 1/2 (318)	15 3/4 (400)	8 1/4 (210)	5 (127)	3 (76)	11 (279)	1 1/4 (32)	360 (163)
	4 (100)	C4741	750	44 1/2 (1130)	27 (686)	7 1/2 (191)	20 (508)	12 1/2 (318)	20 7/8 (530)	10 3/4 (273)	8 (203)	3 1/2 (89)	15 1/2 (394)	1 1/2 (38)	810 (367)
	6 (150)	C4741	1251	53 (1346)	34 (864)	9 (229)	20 (508)	14 1/2 (368)	25 3/8 (645)	14 (356)	10 (254)	5 (127)	18 1/2 (470)	1 7/8 (48)	1460 (662)
	8 (200)	C4741	1251	54 (1372)	34 1/2 (876)	9 1/2 (241)	20 (508)	14 1/2 (368)	29 5/8 (753)	16 1/2 (419)	10 (254)	5 (127)	22 (559)	2 3/16 (56)	2010 (912)
900	10 (250)	C4741	1251	56 1/2 (1435)	35 1/2 (902)	11 (279)	20 (508)	14 1/2 (368)	33 5/8 (854)	20 (508)	12 (305)	5 (127)	25 1/2 (648)	2 1/2 (64)	2850 (1293)
	12 (300)	CA4741	1277	82 5/8 (2099)	50 (1270)	24 (610)	32 (813)	16 1/2 (419)	48 (1219)	22 (559)	10 (254)	9 (229)	36 1/4 (921)	2 5/8 (67)	8875 (4026)
	3 (80)	C4751	625	34 1/16 (865)	21 11/16 (551)	5 3/8 (137)	14 (356)	12 1/2 (318)	12 (305)	-	5 (127)	3 (76)	10 3/8 (264)	-	510 (231)
	4 (100)	C4751	750	44 (1118)	27 (686)	7 (178)	20 (508)	12 1/2 (318)	21 1/2 (546)	11 1/2 (292)	7 1/2 (191)	3 1/2 (89)	16 (406)	1 13/16 (46)	1050 (476)
	6 (150)	C4751	1251	53 (1346)	34 (864)	9 (229)	20 (508)	14 (356)	28 (711)	15 (381)	9 (229)	5 (127)	18 1/2 (470)	2 1/4 (57)	1700 (771)
8 (200)	C4751	1251	55 1/2 (1410)	35 (889)	10 1/2 (267)	20 (508)	14 (356)	32 (813)	18 1/2 (470)	10 (254)	5 (127)	23 (584)	2 9/16 (65)	2250 (1021)	
10 (250)	C4751	1277	74 1/2 (1892)	46 1/2 (1181)	12 (305)	32 (813)	16 1/2 (419)	37 (940)	21 1/2 (546)	12 (305)	9 (229)	27 (686)	2 3/4 (70)	3500 (1588)	

FOUR WAY DIVERTER VALVE HYDRAULIC OPERATED



- ▲ This bleed valve allows for a pressure balanced plug condition and MUST REMAIN OPEN.
- NPT Drain Provided.
- ★ H & K are Minimum Clearance Required to Replace Slips.

DIMENSIONS

in.
(mm)

ASME Class	Size	Valve Model	4-Way Op.	A	B	C	E	F	G	H	J	K	T	Weight lb. (kg)
150	12 (300)	CA4711	4W-110A	114 3/8 (2905)	80 3/16 (2037)	20 (508)	66 1/2 (1689)	42 (1067)	19 (483)	13 (330)	8 (203)	34 1/4 (870)	1 15/16 (49)	7500 (3402)
	16 (400)	B4711	4W-110A	114 1/2 (2908)	61 (1549)	18 1/2 (470)	50 (1270)	60 (1524)	23 1/2 (597)	22 (559)	8 (203)	35 (889)	1 1/2 (38)	8500 (3856)
	20 (500)	C4711	4W-110A-20	134 (3404)	88 11/16 (2253)	29 1/2 (749)	75 (1905)	62 (1575)	27 1/2 (699)	20 (508)	8 (203)	50 5/8 (1286)	1 3/4 (44)	13000 (5897)
300	12 (300)	CA4721	4W-110A	114 3/8 (2905)	80 3/16 (2037)	20 (508)	66 1/2 (1689)	42 (1067)	20 1/2 (521)	13 (330)	8 (203)	34 1/4 (870)	2 1/16 (52)	7800 (3538)
	16 (400)	B4721	4W-110A	114 1/2 (2908)	61 (1549)	18 1/2 (470)	50 (1270)	60 (1524)	25 1/2 (648)	22 (559)	8 (203)	35 (889)	2 5/16 (59)	8800 (3992)
	20 (500)	C4721	4W-110A-20	134 (3404)	88 11/16 (2253)	29 1/2 (749)	75 (1905)	32 (813)	30 1/2 (775)	20 (508)	8 (203)	50 5/8 (1286)	2 9/16 (65)	15150 (6872)
600	12 (300)	CA4741	4W-110A	115 (2921)	75 (1905)	20 (508)	65 (1651)	48 (1219)	24 (610)	10 (254)	8 (203)	36.5 (927)	2 5/8 (67)	11000 (4990)
	16 (400)	C4741	4W-110A	123 (3124)	77 (1956)	25 (635)	65 (1651)	60 (1524)	27 (686)	18 (457)	8 (203)	47 (1194)	3 (76)	12000 (5443)
900	10 (250)	C4751	4W-110A	104 (2642)	77 7/8 (1978)	12 (305)	64 3/16 (1630)	37 (940)	21 1/2 (546)	12 (305)	8 (203)	26 (660)	2 3/4 (70)	3500 (1588)

Note: See page 10 for performance data.

FOUR WAY DIVERTER VALVE HYDRAULIC ACTUATOR HGO

The Four-Way Diverter Valve can be supplied with Hydraulically Powered Gear Operators.

The General Valve Hydraulic Gear Operator (HGO) is custom designed and engineered to maximize reliability while minimizing installation and maintenance costs.

All actuating components are contained in a rugged, compact, explosion-proof module designed to withstand rough handling and hostile environments.

The system operates efficiently and quietly and can be installed or retrofitted on any existing gear-operated Four-Way Diverter Valve.

The Self-Locking HGO can operate at speeds of up to 900 rpm. See page 9 for performance data.



HYDRAULIC POWER SUPPLIES HPU

Electric or air-driven power supplies are specifically designed and manufactured to power Hydraulic Actuators.

Using standard components as building blocks, the power supplies satisfy a wide range of operating parameters reliability and economically.

Standard Hydraulic Features

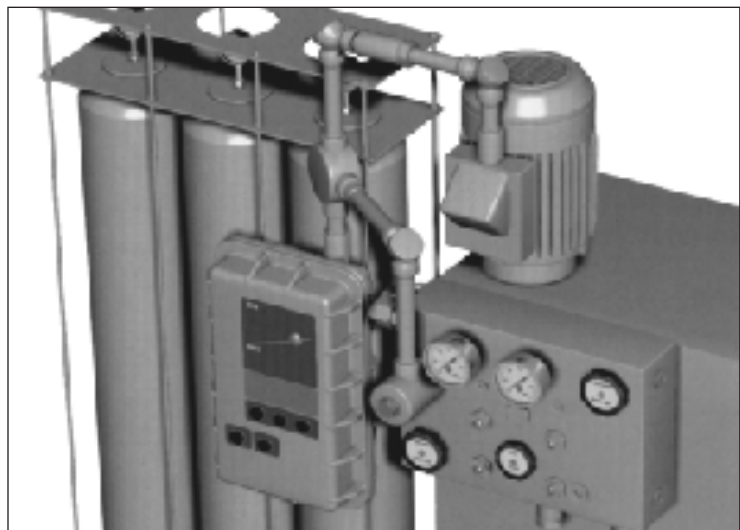
Each power supply features an integrated hydraulic control module composed of cartridge-type components, many of which are interchangeable.

This safe, easy-to-maintain module minimizes exposed piping joints, and reduces costly parts inventory.

Standard Electric Features

- Explosion-proof motor & motor control panel both UL approved for hazardous location.
- Low fluid level Shut-Off switch.
- Off/Auto pressure switch.

Having the ability to provide valve, actuator and power supply enhances the dependability of our equipment and amplifies your engineering, procurement and service.



FOUR WAY DIVERTER VALVE ELECTRIC MOTOR ACTUATOR

WHEN ORDERING ELECTRIC MOTOR OPERATORS
SPECIFY THE FOLLOWING DATA:

INSTALLATION

1. Mounting Style.
2. Valve installation orientation.

TYPE OF VALVE

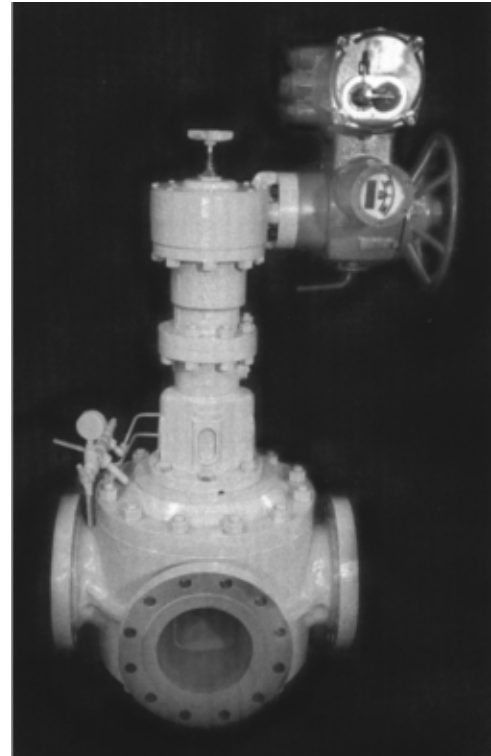
3. Valve figure number.
4. Size.
5. ASME Rating.

OPERATING CONDITIONS

6. Flow Rate.
7. Operating time in seconds. See page 9 for fast self-locking time.

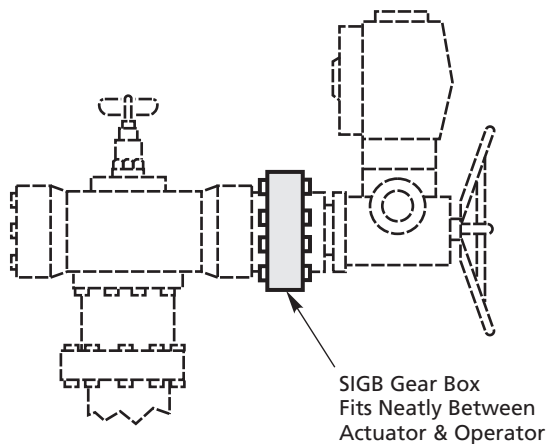
ELECTRICAL DATA

8. Hazardous Area Enclosure requirement.
9. Power voltage, phase and frequency.



HIGH SPEED ELECTRIC MOTOR ACTUATOR

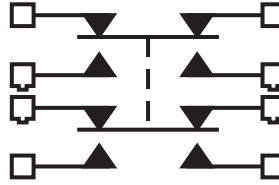
Typical self-locking electric motor operated valve speeds are limited. Therefore by **reducing the number of turns required with the Speed Increasing Gear Box (SIGB)** we can **significantly decrease actuation time**. Torque requirements increase proportionately.



See page 9 for performance data.

FOUR WAY DIVERTER VALVE REMOTE ELECTRICAL POSITION INDICATORS GOSP

The Gear Operated Switch Package (GOSP) is designed to perform reliably in the toughest environments. All electrical components are contained in one housing with no external wiring. The housing is explosion proof for use in hazardous locations.



Standard switching arrangement is one switch in each position, fully open and fully closed. Each switch is DPDT-DB (form ZZ). Current capability is 10A resistive, 7A inductive. Also standard is a space heater to prevent build up of condensation. Please provide us with your required voltage (standard voltage 110V).



MANUAL GEAR-OPERATED LATCHING DEVICE

The standard gear operated Four-Way Diverter Valve is NOT Self-Locking therefore it is recommended that all manually operated Four-Way Diverter Valves be equipped with a latching device to maintain seating position when the valve is unattended.



This item is available as an option. The device uses a reversible latching pawl which can be dented in mid position to allow free handwheel spin. At end of operation simply release pawl to latch valve in either seated position.

PORTABLE PROVER ACTUATORS DCGO

This 12 volt DC Gear Operator is ideal for repeatable proves with portable meter provers.

It has no belts, so there's no bounce back.

The Direct Current Gear Operator is a battery powered. Actuator and control system (available with optional power pack).

Designed to be mounted on 2 inch through 6 inch ASME 300/600/900 Four-Way Diverter Valve Gear Operators and to operate the 4-Way Diverter Valve with DC power.

DCGO's are capable of Self-Locking speeds in excess of 500 rpm. See page 10 for performance data.

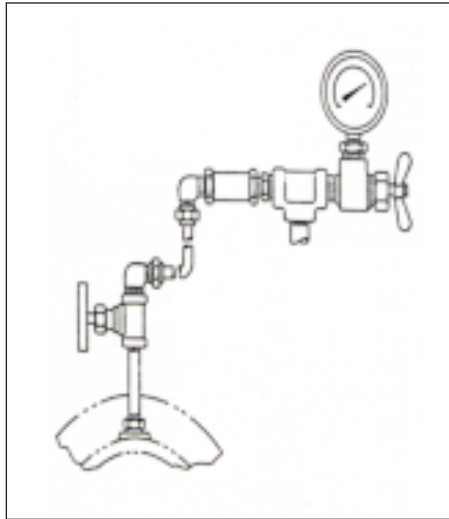
Having the ability to provide the valve, actuator and power pack enhance the dependability of our equipment and simplifies your engineering procurement and service.



FOUR WAY DIVERTER VALVE TWO METHODS OF CHECKING FOR SEAL INTEGRITY

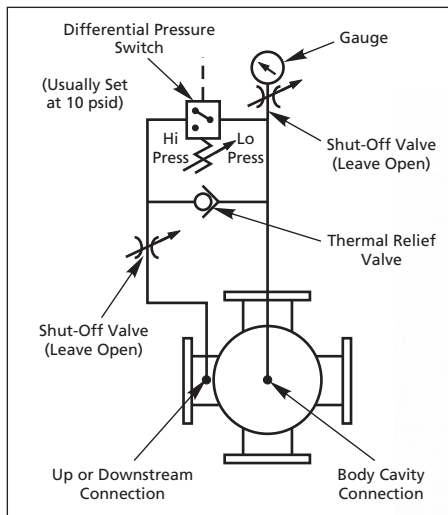
1) LOCAL MONITORING METHOD WITH AUTOMATIC PRESSURE GAUGE

The Four-Way Divertor Valve uses the pressure gauge method of checking for positive sealing to assure metering accuracy. This method is useful when in close proximity to the valve and is described fully in the beginning of this catalog. (See page 2)



2) REMOTE MONITORING METHOD WITH DIFFERENTIAL PRESSURE SWITCH

A differential pressure switch may be added, which provides the user with the ability to monitor the body cavity pressure from a remote location and/or interface with other electrical devices.



Notes:

1. Shut-Off valves are provided for repair only and **MUST REMAIN OPEN DURING NORMAL OPERATION.**
2. Thermal relief valve will allow pressure trapped in the body cavity to be relieved to line should there be an increase in pressure above line pressure.
3. For satisfactory valve operation the line operating conditions **MUST REMAIN CONSTANT** during seal integrity check.
4. Do not attempt to verify seal integrity by bleeding body cavity pressure to atmosphere.
5. Cavity pressure need not drop to zero while seated.
6. Dissimilar pressure drop can be expected in each seated position.

FOUR WAY DIVERTER VALVE TECHNICAL DATA

Size in. (mm)	VALVE		Max Flow (GPM)	Pressure Drop at Max Flow (psig)(1)(2)	C _v (1)	GEAR OPERATED (3)						
	Model	ASME Rating				Model	Torque (ft.-lbs.)	Total Turns (Rev.)	Turn Distribution (Rev)			
									Close	Divert	Open	
2 (50)	C4721	300	550	2.8	300	625	20	9	3.5	2.0	3.5	
	C4741	600	550	2.8	300	625	30	9	3.5	2.0	3.5	
3 (80)	C4721	300	550	2.8	300	625	30	9	3.5	2.0	3.5	
	C4741G	600	550	2.8	300	625	30	9	3.5	2.0	3.5	
	C4751	900	550	2.8	300	625	30	9	3.5	2.0	3.5	
4 (100)	C4721	300	1000	2.4	600	625	55	11	4.5	2.0	4.5	
	C4741	600	1000	2.4	600	750	55	14	5.5	2.5	5.5	
	C4751	900	1000	2.4	600	750	55	14	5.5	2.5	5.5	
6 (150)	C4721	300	2300	3.1	1200	750	70	15	3.6	2.5	6.3	
	C4741	600	2300	3.1	1200	1251	60	18	8.3	3.4	5.6	
	C4751	900	2300	2.7	1300	1521	60	18	8.3	3.4	5.6	
8 (200)	C4721	300	4000	3.1	2100	1251	100	21	10.4	3.4	7.0	
	24741	600	4000	3.1	2100	1251	100	21	10.4	3.4	7.0	
	C4751	900	4000	2.8	2200	1521	100	23	11.5	3.4	7.8	
10 (250)	C4721	300	6200	2.1	3900	1251	160	24	12.2	3.4	8.2	
	C4741	600	3200	2.1	3900	1251	160	24	12.2	3.4	8.2	
	C4751	900	6200	2.1	3900	1277	299	37	18.9	5.3	12.7	
12 (300)	B4711	150	640	1.9	4300	1251	190	22	10.7	3.4	7.2	
	B4721	300	6400	1.9	4300	1251	190	22	10.7	3.4	7.2	
	CA4711	150	7100	1.5	5300	1277	200	40	20.6	5.3	13.8	
	CA4721	300	7100	1.5	5300	1277	200	40	20.6	5.3	13.8	
	CA4741	600	7100	1.5	5300	1277	200	40	20.6	5.3	13.8	
16 (400)	B4711	150	10000	1.6	7300	1500	240	36	18.1	5.3	12.1	
	B4721	300	10000	1.6	7300	1500	240	36	18.1	5.3	12.1	
						ELECTRO-HYDRAULIC OPERATED (4)						
						Model	Press. (psd)	Volume (Gal)	Total Time (Sec.)	Time Distribution (Sec.)		
										Close	Divert	Open
10 (250)	C4751	900	6800	2.6	3900	4W-110A	800	1.6	5	1	3	1
12 (300)	CA4711	150	8800	2.3	5300	4W-110A	800	1.6	6	1	4	1
	CA4721	300	8800	2.3	5300	4W-110A	800	1.6	6	1	4	1
	CA4741	600	8800	2.3	5300	4W-110A	800	1.6	6	1	4	1
16 (400)	B4711	150	13000	2.7	7300	4W-110A	900	1.8	8	1	6	1
	B4721	300	13000	2.7	7300	4W-110A	900	1.81	8	1	6	1
	C4741	600	15000	3.7	7200	4W-110A	1200	0.9	10	1.5	7	1.5
20 (500)	C4711	150	17800	2.0	11500	4W-110A-20	1700	2.2	12	2	8	2
	C4721	300	17800	2.0	11500	4W-110A-20	1700	2.2	12	2	8	2

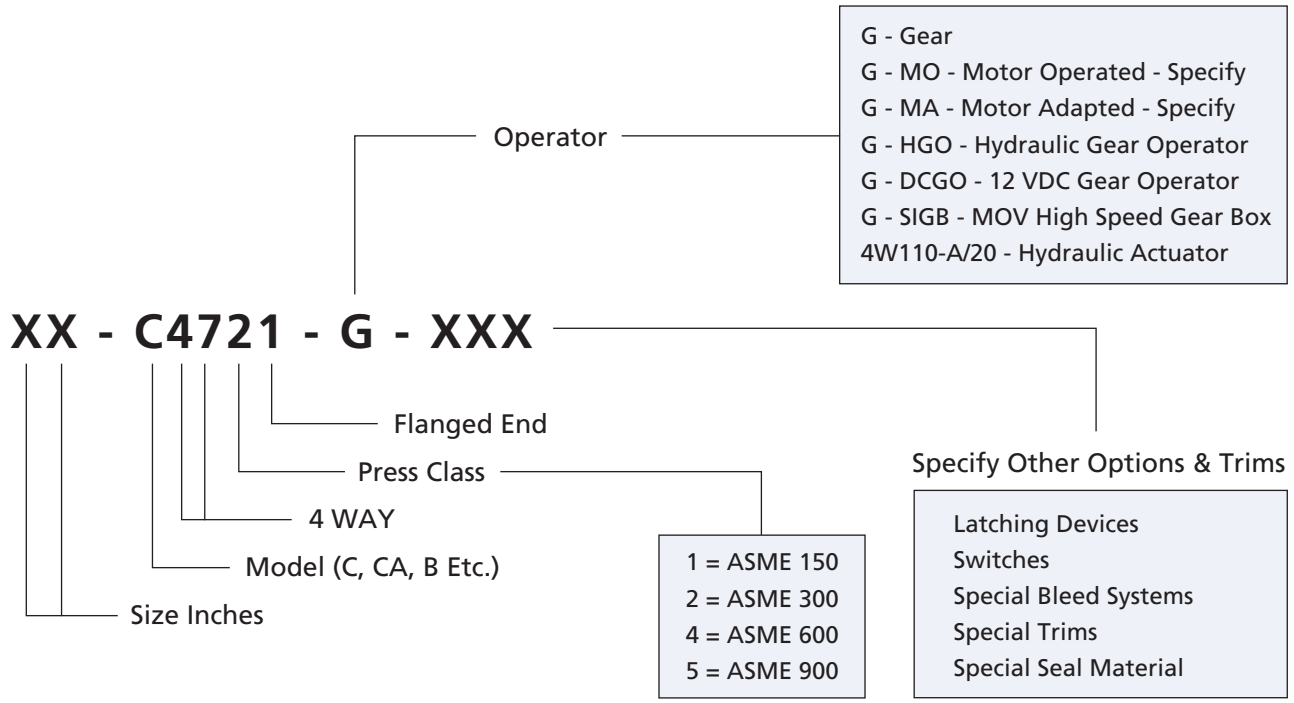
$$V = \frac{Q \times .4}{D^2} = \text{Approximate Velocity} \left(\frac{FT}{SEC} \right)$$

$$\Delta P = \left(\frac{Q}{C_v} \right)^2 \times S = \text{Pressure drop across one side of valve}$$

- Q = Flow GPM
- C_v = Valve flow coefficient
- S = Specific gravity
- D = Nominal Pipe Diameter (in.)

- Note: (1) Through one side of valve.
- (2) Values indicated are with 0.85 sq. qr. crude oil.
- (3) See page 3 for dimensions.
- (4) See page 4 for dimensions.

FOUR WAY DIVERTER VALVE HOW TO ORDER



STANDARD MATERIALS

Body	Cast Carbon Steel ASTM A216-WCB Chrome Plated
Bonnet/Lower Plate	Cast Carbon Steel ASTM A216-WCB, or Carbon Steel ASTM A36/A516 Grd 70 Plate
Plug	Cast Carbon Steel ASTM A216-WCB Chrome Plated
Slips	Cast Ductile Iron ASTM A536-80-55-06
Packing Gland	Type 2 NI-Resistant or ASTM A487-CA6NM
Packing	Graphite-Type
O-Rings & Slip Seals	Viton

USEFUL CONVERSIONS (Approximate)

Flow	Pressure
1BPH = .7007 GPM	1 Bar (Atmosphere) = 14.7 psi
1 IMP Ga/Min = 1.20 GPM	1 Kg/Cm ² = 14.2 psi
1 M3/Hr = 4.40 GPM	1Kp (Kilopascal) = 0.145 psi

TRADEMARK INFORMATION

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This document contains references to registered trademarks or product designations, which are not owned by Cameron.

Trademark	Owner
Celcon	Hoechst Celanese Corporation
Delrin	E.I. DuPont De Nemours & Company
Fluorel	Minnesota Mining and Manufacturing Company
Hastelloy	Haynes International, Inc.
Hycar	Hydrocarbon Chemical and Rubber Company
Hydrin	Zeon Chemicals USA, Inc.
Hypalon	E.I. DuPont De Nemours & Company
Inconel	INCO Nickel Sales, Inc.
Monel	INCO Alloys International, Inc.
Nordel	E.I. DuPont De Nemours & Company
Stellite	Stoody Deloro Stellite, Inc.
Teflon	E.I. DuPont De Nemours & Company
Viton	E.I. DuPont De Nemours & Company

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