



Four-Way Diverter Valve

GENERAL valves



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Four-Way Diverter Valve

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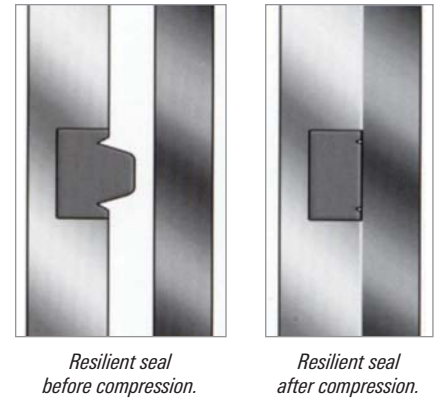
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Features and Benefits

The four-way diverter model of the GENERAL* 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 that 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 overcompression of the resilient primary seal. Mechanical retraction and compression ensures no-leak stream separation and longer life.



Inline maintenance

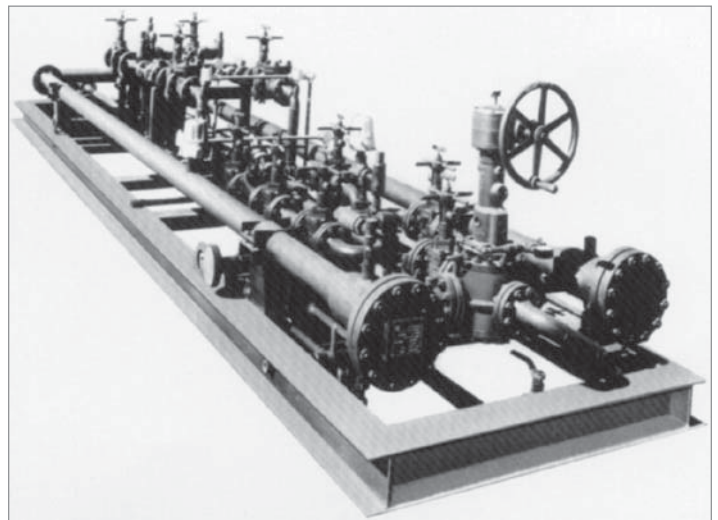
Inline maintenance cuts operating costs and downtime. Because the seating segments are mounted via dovetailed connections to the plug, they can be removed from the top or the bottom and examined without having to take the valve from the line or disturbing the actuator. This added flexibility allows the valve to be installed upside down for easy access to actuator and slips.



Fast cycling

Fast and easy manual or automatic operation with an electric motor or hydraulic actuators is possible. Lower cycling torque permits the use of smaller and less expensive power actuators.

Because the standard gear-operated four-way diverter valve is not self locking, all manually operated four-way diverter valves should be equipped with a latching device to maintain seating position when the valve is unattended. This item is available as an option. If requiring a motor-adapted valve, select only self-locking actuators.



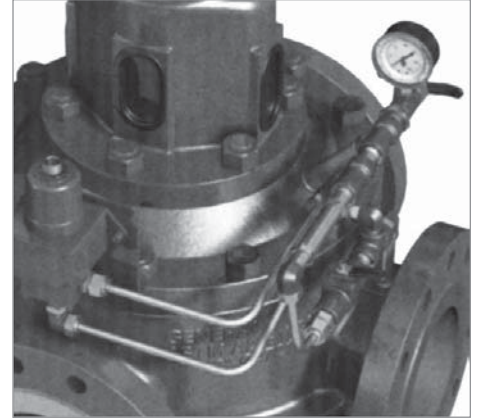
Features and Benefits

Automatic pressure gauge

The automatic pressure gauge is used for quick checking of seal integrity. The four-way diverter valve uses the pressure gauge method of checking for positive sealing to ensure 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 further compresses the seals. 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 immediately register on the gauge. A pressure switch can be used to supplement the gauge method as an option.

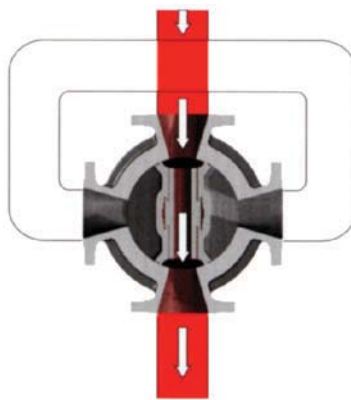


Continuous flow circulation maintained through cycling



Seated in "R/L-Close—CCW" position

The valve is seated and the flow streams are completely separated. The pressure gauge in the body indicates reduced pressure. As the valve is unseated, the plug is raised and both slips are retracted, causing the plug and slips to begin to turn. Then, the slips and resilient seals are fully retracted away from the body. The pressure gauge indicates 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 the slips and the plug are designed so that the flow is not appreciably restricted when cycling. The pressure gauge indicates line pressure.



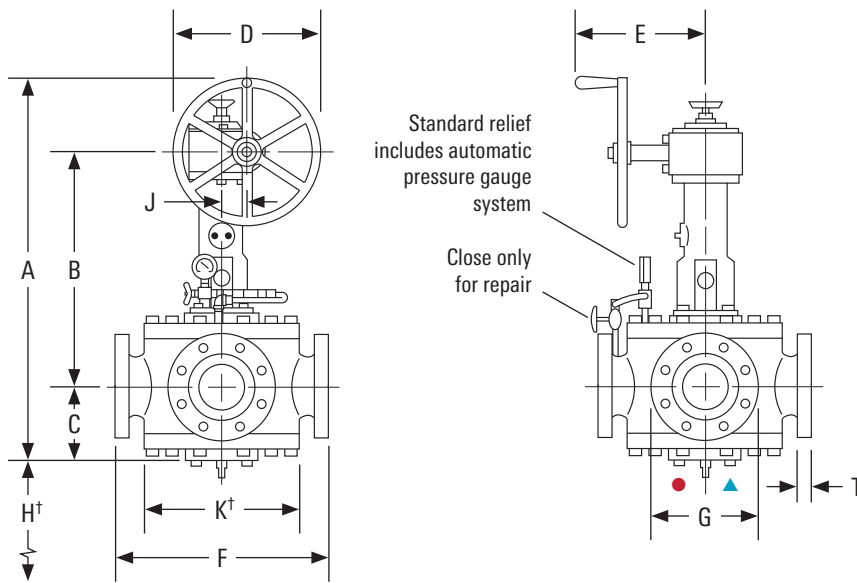
Seated in "L/R-Open—CW" position

The plug and slips are in a fully rotated position. The plug moves down, expanding the slips against the body. Here, the flow streams are completely separated. As the seals trap fluid between them and volumetric space increases, the body pressure gauge once again indicates less than line pressure.

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

Types of Operation

Gear operated

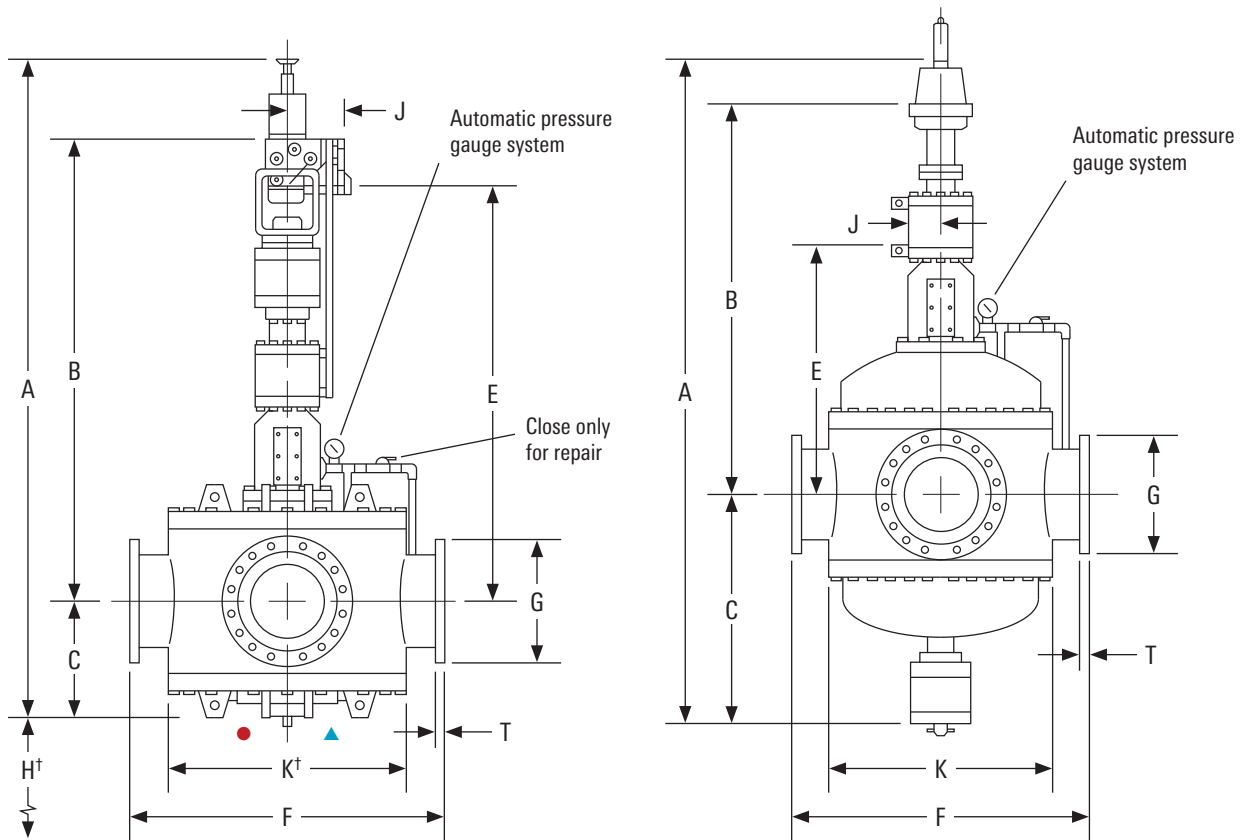


- This bleed valve allows for a pressure-balanced plug condition and must remain open.
- ▲ National pipe thread (NPT) drain provided.
- † Minimum clearance required to replace slips.

Dimensions

ASME Class	Size, in [mm]	Valve Model	Four-Way Option	A	B	C	D	E	F	G	H	J	K	T	Weight, lbm [kg]
150	12 [300]	B4711	1,251	59½ [1,511]	37 [940]	15 [381]	20 [508]	14¼ [362]	44 [1,118]	19 [483]	11 [279]	5 [127]	25 [635]	1½ [33]	2,800 [1,270]
	12 [300]	CA4711	1,277	84½ [2,146]	48½ [1,232]	20 [508]	32 [813]	16¼ [413]	42 [1,067]	19 [483]	13 [330]	9 [229]	35½ [902]	1½ [49]	6,200 [2,812]
	16 [400]	B4711	1,500	89½ [2,273]	61½ [1,562]	18½ [470]	32 [813]	16 [406]	60 [1,524]	23½ [597]	22 [559]	9 [229]	35 [889]	1½ [37]	7,000 [3,175]
300	2 [50]	C4721	625	35½ [902]	22 [559]	6 [152]	14 [356]	12½ [318]	14 [356]	6½ [165]	5 [127]	3 [76]	11 [279]	1½ [49]	335 [152]
	3 [80]	C4721	625	35½ [902]	22 [559]	6 [152]	14 [356]	12½ [318]	15 [381]	8¼ [210]	5 [127]	3 [76]	11 [279]	1½ [30]	350 [159]
	4 [100]	C4721	325	37 [940]	23 [584]	7 [178]	14 [356]	12½ [318]	20 [508]	10 [254]	7 [178]	3 [76]	15½ [394]	1½ [49]	650 [295]
	6 [150]	C4721	750	47 [1,194]	28 [711]	9 [229]	20 [508]	12½ [318]	24 [610]	12½ [318]	9½ [241]	3½ [89]	18½ [470]	1½ [37]	1,050 [476]
	8 [200]	C4721	1,251	54 [1,372]	34½ [876]	9½ [241]	20 [508]	14½ [368]	28 [711]	15 [381]	10 [254]	5 [127]	22 [559]	1½ [43]	1,700 [771]
	10 [250]	C4721	1,251	57 [1,448]	35½ [902]	11 [279]	20 [508]	14½ [368]	32 [813]	17½ [445]	12 [305]	5 [127]	25½ [648]	1½ [49]	2,490 [1,129]
	12 [300]	B4721	1,251	59½ [1,511]	37 [940]	15 [381]	20 [508]	14¼ [362]	44 [1,118]	20½ [521]	11 [279]	5 [127]	25 [635]	2½ [52]	3,000 [1,361]
	12 [300]	CA4721	1,277	84½ [2,146]	48½ [1,232]	20 [508]	32 [813]	16¼ [413]	42 [1,067]	20½ [521]	13 [330]	9 [229]	35½ [902]	2½ [52]	6,500 [2,948]
16 [400]	B4721	1,500	89½ [2,273]	61 [1,549]	18½ [470]	32 [813]	16 [406]	60 [1,524]	25½ [648]	22 [559]	9 [229]	35 [889]	2¼ [57]	7,500 [3,402]	
600	2 [50]	C4741	625	35 [889]	22 [559]	6 [152]	14 [356]	12½ [318]	14½ [368]	6½ [165]	5 [127]	3 [76]	11 [279]	1 [25]	345 [156]
	3 [80]	C4741	625	35 [889]	22 [559]	6 [152]	14 [356]	12½ [318]	15¼ [400]	8¼ [210]	5 [127]	3 [76]	11 [279]	1¼ [32]	360 [163]
	4 [100]	C4741	750	44½ [1,130]	27 [686]	7½ [191]	20 [508]	12½ [318]	20½ [530]	10¼ [273]	8 [203]	3½ [89]	15½ [394]	1½ [38]	810 [367]
	6 [150]	C4741	1,251	53 [1,346]	34 [864]	9 [229]	20 [508]	14½ [368]	25½ [645]	14 [356]	10 [254]	5 [127]	18½ [470]	1½ [48]	1,460 [662]
	8 [200]	C4741	1,251	54 [1,372]	34½ [876]	9½ [241]	20 [508]	14½ [368]	29½ [753]	16½ [419]	10 [254]	5 [127]	22 [559]	2½ [56]	2,010 [912]
	10 [250]	C4741	1,251	56½ [1,435]	35½ [902]	11 [279]	20 [508]	14½ [368]	33½ [854]	20 [508]	12 [305]	5 [127]	25½ [648]	2½ [64]	2,850 [1,293]
12 [300]	CA4741	1,277	82½ [2,099]	50 [1,270]	24 [610]	32 [813]	16½ [419]	48 [1,219]	22 [559]	10 [254]	9 [229]	36¼ [921]	2½ [67]	8,875 [4,026]	
900	3 [80]	C4751	625	34½ [865]	21¼ [551]	5½ [137]	14 [356]	12½ [318]	12 [305]	–	5 [127]	3 [76]	10½ [264]	–	510 [231]
	4 [100]	C4751	750	44 [1,118]	27 [686]	7 [178]	20 [508]	12½ [318]	21½ [546]	11½ [292]	7½ [191]	3½ [89]	16 [406]	1½ [46]	1,050 [476]
	6 [150]	C4751	1,251	53 [1,346]	34 [864]	9 [229]	20 [508]	14 [356]	28 [711]	15 [381]	9 [229]	5 [127]	18½ [470]	2¼ [57]	1,700 [771]
	8 [200]	C4751	1,251	55½ [1,410]	35 [889]	10½ [267]	20 [508]	14 [356]	32 [813]	18½ [470]	10 [254]	5 [127]	23 [584]	2½ [65]	2,250 [1,021]
	10 [250]	C4751	1,277	74½ [1,892]	46½ [1,181]	12 [305]	32 [813]	16½ [419]	37 [940]	21½ [546]	12 [305]	9 [229]	27 [686]	2¼ [70]	3,500 [1,588]

Hydraulically operated



- This bleed valve allows for a pressure-balanced plug condition and must remain open.
- ▲ NPT drain provided.
- † H and K are minimum clearance required to replace slips.

Dimensions														
ASME Class	Size, in [mm]	Valve Model	Four-Way Option	A	B	C	E	F	G	H	J	K	T	Weight, lbm [kg]
150	12 [300]	CA4,711	4W-110A	114 ⁵ / ₁₆ [2,905]	80 ³ / ₁₆ [2,037]	20 [508]	66 ¹ / ₂ [1,689]	42 [1,067]	19 [483]	13 [330]	8 [203]	34 ¹ / ₄ [870]	1 ¹ / ₁₆ [49]	7,500 [3,402]
	16 [400]	B4,711	4W-110A	114 ¹ / ₂ [2,908]	61 [1,549]	18 ¹ / ₂ [470]	50 [1,270]	60 [1,524]	23 ¹ / ₂ [597]	22 [559]	8 [203]	35 [889]	1 ¹ / ₂ [38]	8,500 [3,856]
	20 [500]	C4,711	4W-110A-20	134 [3,404]	88 ¹ / ₁₆ [2,253]	29 ¹ / ₂ [749]	75 [1,905]	62 [1,575]	27 ¹ / ₂ [699]	20 [508]	8 [203]	50 ⁵ / ₁₆ [1,286]	1 ³ / ₄ [44]	13,000 [5,897]
300	12 [300]	CA4,721	4W-110A	114 ⁵ / ₁₆ [2,905]	80 ³ / ₁₆ [2,037]	20 [508]	66 ¹ / ₂ [1,689]	42 [1,067]	20 ¹ / ₂ [521]	13 [330]	8 [203]	34 ¹ / ₄ [870]	2 ¹ / ₁₆ [52]	7,800 [3,538]
	16 [400]	B4,721	4W-110A	114 ¹ / ₂ [2,908]	61 [1,549]	18 ¹ / ₂ [470]	50 [1,270]	60 [1,524]	25 ¹ / ₂ [648]	22 [559]	8 [203]	35 [889]	2 ¹ / ₁₆ [59]	8,800 [3,992]
	20 [500]	C4,721	4W-110A-20	134 [3,404]	88 ¹ / ₁₆ [2,253]	29 ¹ / ₂ [749]	75 [1,905]	32 [813]	30 ¹ / ₂ [775]	20 [508]	8 [203]	50 ⁵ / ₁₆ [1,286]	2 ¹ / ₁₆ [65]	15,150 [6,872]
600	12 [300]	CA4,741	4W-110A	115 [2,921]	75 [1,905]	20 [508]	65 [1,651]	48 [1,219]	24 [610]	10 [254]	8 [203]	36 ¹ / ₂ [927]	2 ⁵ / ₁₆ [67]	11,000 [4,990]
900	10 [250]	C4,751	4W-110A	104 [2,642]	77 ⁵ / ₁₆ [1,978]	12 [305]	64 ³ / ₁₆ [1,630]	37 [940]	21 ¹ / ₂ [546]	12 [305]	8 [203]	26 [660]	2 ³ / ₄ [70]	3,500 [1,588]

Note: See page 11 for performance data.

Actuators

Hydraulic actuator

The four-way diverter valve can be supplied with hydraulically powered gear operators. The Cameron hydraulic gear operator (HGO) is custom engineered to improve reliability while reducing 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 10 for performance data.



Hydraulic power supplies

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, both reliably and economically.

Standard hydraulic features

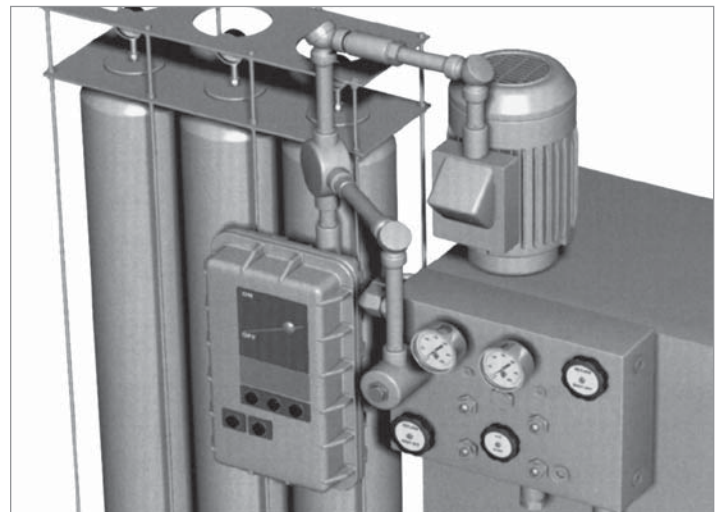
Each hydraulic power unit (HPU) supply features an integrated hydraulic control module composed of cartridge-type components, many of which are interchangeable.

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

Standard electric features

- UL-approved explosion-proof motor and motor control panel for hazardous locations
- Low-fluid-level shutoff switch
- Off and autopressure switch

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



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 10 for fast self-locking time)

Electrical Data

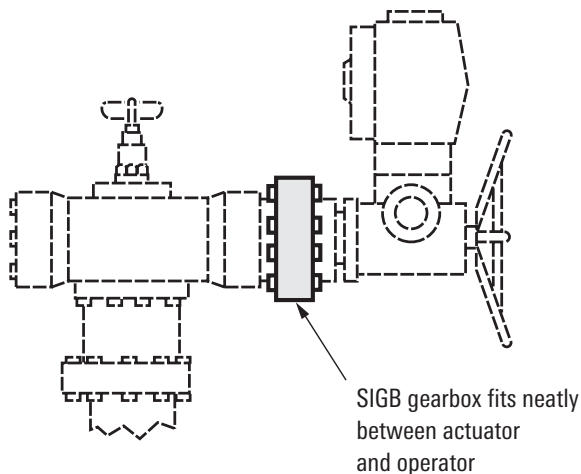
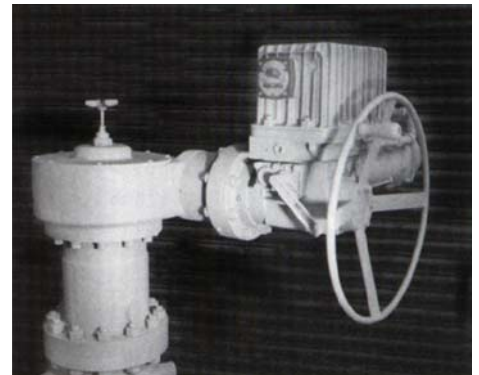
8. Hazardous area enclosure requirement
9. Power voltage, phase, and frequency.



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 gearbox (SIGB), we can significantly decrease actuation time.

Note: Torque requirements increase proportionately.



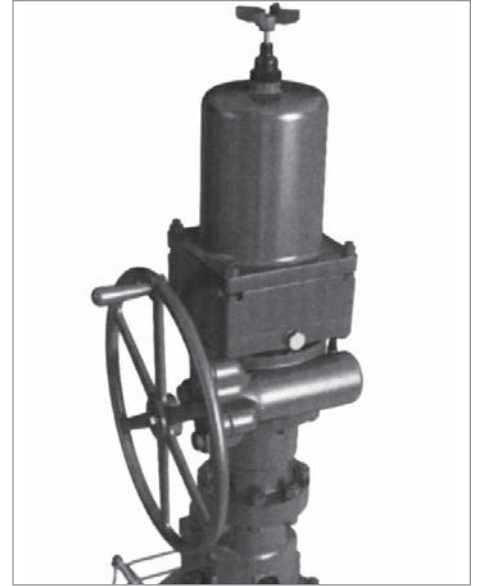
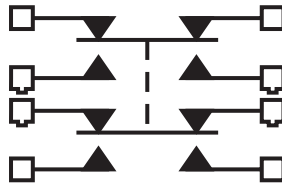
Note: See page 10 for performance data.

Remote electrical position indicators

The Cameron 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, and the housing is explosion proof for use in hazardous locations.

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



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 midposition to enable free handwheel spin. At the end of operation, simply release the pawl to latch the valve in either seated position.



Portable prover actuators

The Cameron 12-V direct current gear operator (DCGO) is ideal for repeatable proves with portable meter provers. Because it has no belts, there is no bounceback.

The DCGO is battery powered. The actuator and control systems are available with an optional power pack.

The DCGO is designed to be mounted on 2-in through 6-in ASME 300, 600, and 900 four-way diverter valve gear operators and to operate the four-way diverter valve with DC power. DCGOs are capable of self-locking speeds in excess of 500 rpm. See page 11 for performance data.

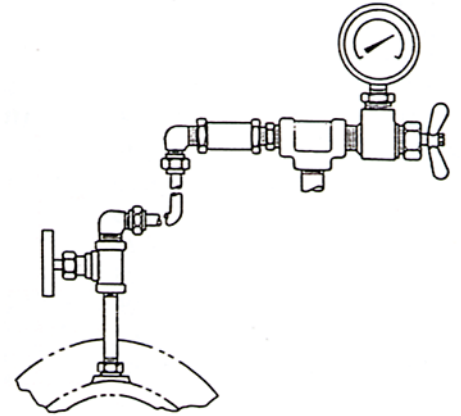


Seal Integrity

Two methods of checking for seal integrity

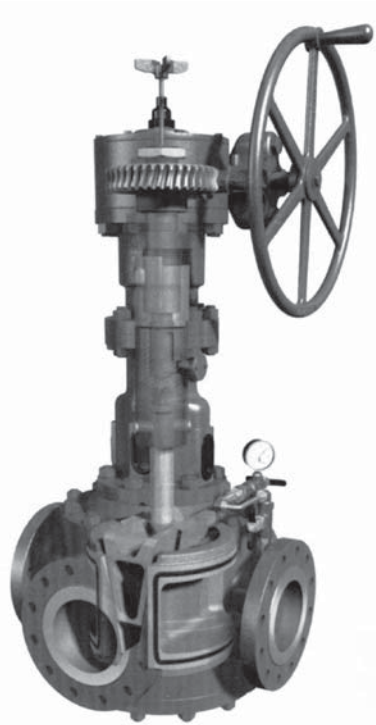
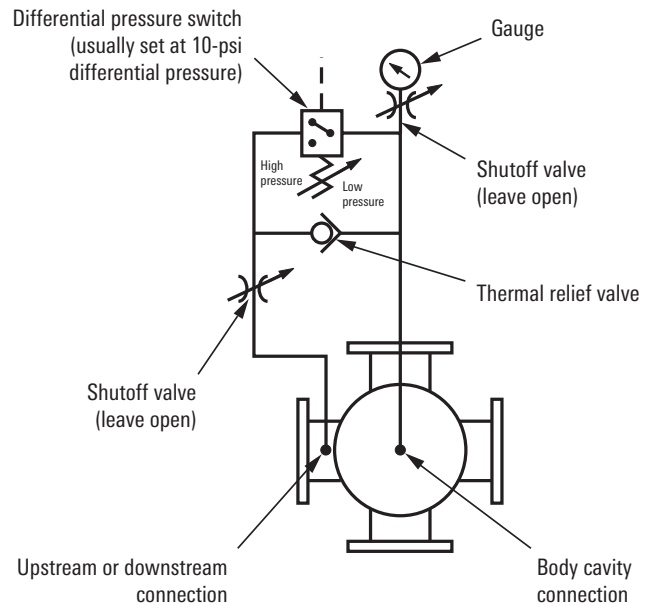
1. Local monitoring method with automatic pressure gauge

The four-way diverter valve uses the pressure gauge method of checking for positive sealing to ensure metering accuracy. This method is useful when in close proximity to the valve. (See page 3 for details.)



2. Remote monitoring method with differential pressure switch

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



Notes

1. Shutoff 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.

Technical Data

Gear Operated

Size, in [mm]	GENERAL Valve		Max. Flow, galUS/min	Gauge Pressure Drop at Max. Flow, psi ^{†,‡}	C _v [†]	Model	Torque, ft.lbf	Total Turns	Turn Distribution		
	Model	ASME Rating							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	1,000	2.4	600	625	55	11	4.5	2.0	4.5
	C4741	600	1,000	2.4	600	750	55	14	5.5	2.5	5.5
	C4751	900	1,000	2.4	600	750	55	14	5.5	2.5	5.5
6 [150]	C4721	300	2,300	3.1	1,200	750	70	15	3.6	2.5	6.3
	C4741	600	2,300	3.1	1,200	1,251	60	18	8.3	3.4	5.6
	C4751	900	2,300	2.7	1,300	1,521	60	18	8.3	3.4	5.6
8 [200]	C4721	300	4,000	3.1	2,100	1,251	100	21	10.4	3.4	7.0
	24741	600	4,000	3.1	2,100	1,251	100	21	10.4	3.4	7.0
	C4751	900	4,000	2.8	2,200	1,521	100	23	11.5	3.4	7.8
10 [250]	C4721	300	6,200	2.1	3,900	1,251	160	24	12.2	3.4	8.2
	C4741	600	6,200	2.1	3,900	1,251	160	24	12.2	3.4	8.2
	C4751	900	6,200	2.1	3,900	1,277	299	37	18.9	5.3	12.7
12 [300]	B4711	150	6,400	1.9	4,300	1,251	190	22	10.7	3.4	7.2
	B4721	300	6,400	1.9	4,300	1,251	190	22	10.7	3.4	7.2
	CA4711	150	7,100	1.5	5,300	1,277	200	40	20.6	5.3	13.8
	CA4721	300	7,100	1.5	5,300	1,277	200	40	20.6	5.3	13.8
	CA4741	600	7,100	1.5	5,300	1,277	200	40	20.6	5.3	13.8
16 [400]	B4711	150	10,000	1.6	7,300	1,500	240	36	18.1	5.3	12.1
	B4721	300	10,000	1.6	7,300	1,500	240	36	18.1	5.3	12.1

See page 4 for dimensions.

[†]Through one side of valve.

[‡]Values indicated are with 0.85-specific-gravity crude oil.

Electrohydraulic Operated

Size, in [mm]	GENERAL Valve		Max. Flow, galUS/min	Gauge Pressure Drop at Max. Flow, psi ^{†,‡}	C _v [†]	Model	Diff. Pressure, psi	Volume, galUS	Total Time, s	Turn Distribution		
	Model	ASME Rating								Close	Divert	Open
10 [250]	C4751	900	6,800	2.6	3,900	4W-110A	800	1.6	5	1	3	1
12 [300]	CA4711	150	8,800	2.3	5,300	4W-110A	800	1.6	6	1	4	1
	CA4721	300	8,800	2.3	5,300	4W-110A	800	1.6	6	1	4	1
	CA4741	600	8,800	2.3	5,300	4W-110A	800	1.6	6	1	4	1
	B4711	150	13,000	2.7	7,300	4W-110A	900	1.8	8	1	6	1
16 [400]	B4721	300	13,000	2.7	7,300	4W-110A	900	1.81	8	1	6	1
	C4741	600	15,000	3.7	7,200	4W-110A	1,200	0.9	10	1.5	7	1.5
	C4711	150	17,800	2.0	11,500	4W-110A-20	1,700	2.2	12	2	8	2
20 [500]	C4721	300	17,800	2.0	11,500	4W-110A-20	1,700	2.2	12	2	8	2

See page 5 for dimensions.

[†]Through one side of valve.

[‡]Values indicated are with 0.85-specific-gravity crude oil.

$$V = \frac{Q \times 0.4}{D^2} = \text{Approximate velocity, ft/s}$$

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

where

Q = Flow, galUS/min

C_v = Valve flow coefficient

S = Specific gravity

D = Nominal pipe diameter, in

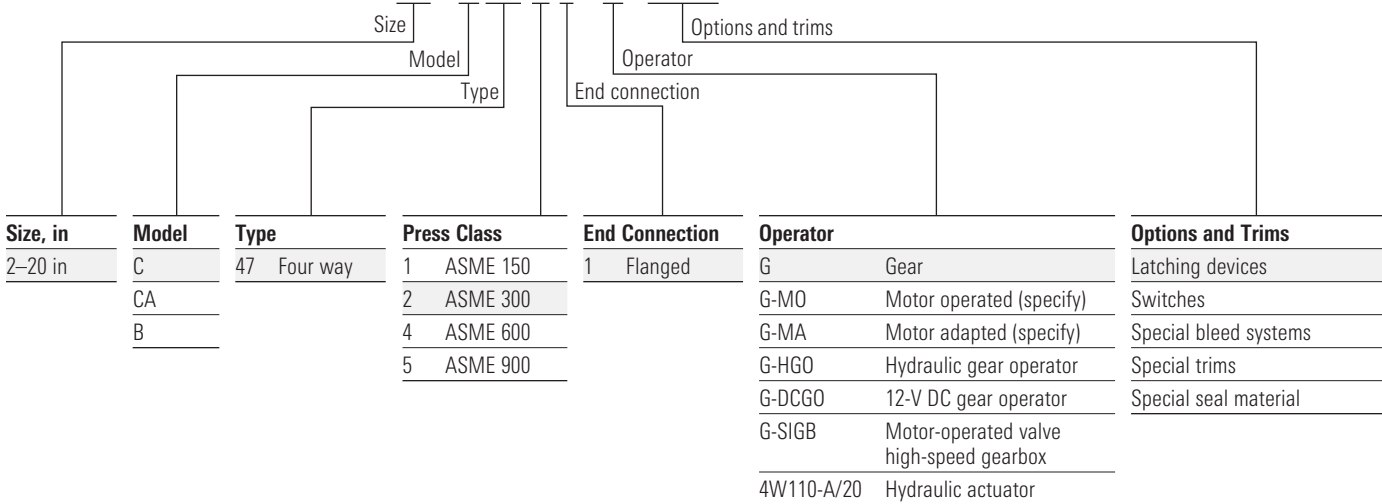
How to Order

10-C4721-G-XXX

10-in four-way Model C ASME 300 with flanged end connections, gear operator, and latching device.

Example

10-C4721-G-XXX



Standard Materials

Part	Material
Body	Cast carbon steel ASTM A216-WCB, chrome plated
Bonnet and lower plate	Cast carbon steel ASTM A216-WCB or carbon steel ASTM A36/A516 Grade 70 plate
Plug	Cast carbon steel ASTM A216-WCB, chrome plated
Slips	Cast ductile iron ASTM A536-80-55-06
Packing gland	Type 2 nickel resist or ASTM A487-CA6NM
Packing	Graphite-type
O-rings and slip seals	Viton®

Useful Conversions (Approximate)

Flow	Pressure
1 bbl/h = 0.7007 galUS/min	1 bar = 14.7 psi
1 galUK/min = 1.20 galUS/min	1 kg/cm ² = 14.2 psi
1 m ³ /h = 4.40 galUS/min	1 kPa = 0.145 psi

Services for Valves and Actuation

Cameron is well positioned to quickly and efficiently deliver total support with unmatched OEM expertise. Our highly skilled engineers and technicians are available around the clock to respond to customer queries, troubleshoot problems, and offer reliable solutions.

Easily accessible parts and spare valves

- OEM spare valves, actuators, and parts (including non-Cameron brands)
- Handling, storage, packaging, and delivery
- Dedicated stocking program

Comprehensive services portfolio

- Parts and spare valves
- Repair
- Field services
- Preventive maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty

Customized total valve care programs

- Engineering consultancy
- Site management
- Flange management
- Startup and commissioning
- Spare parts and asset management
- Operational support



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