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THREE WAY VALVES

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<u>MATERIALS OR STYLE</u>		<u>TYPE</u>	<u>VARIATIONS</u>	<u>SIZE</u>
70	Bronze	1 NPT Female/150 Flange	1 One Size Larger	1 1/4"
71	Bronze with pads	2 Solder & Soc. Weld/150 Flange Full Port	2 Male Retainer	2 3/8"
72	Carbon Steel, High Pressure	3 Union End NPT/Reg.Port Soc.Weld	3 Adjustable Stop Lever	3 1/2"
73	Carbon Steel	4 Union End Solder/Reg.Port Soc.Weld	4 Cu-Ni Ball & Stem	4 3/4"
73A	A105 Carbon Steel	5 Spring Return/High Pressure Full Port NPT	5 SS Sall & Stem	5 1"
74	Nickel	6 3-way, NPT/High Pressure Soc.Weld Full Port	6 Original Balancing Stop- Attach to Lever or T-Handle	6 1 1/4"
75	Pad-Locking Bronze	7 Butt Weld/300 Flange	7 One Size Smaller Female Retainer	7 1 1/2"
76	CF8M Stainless Steel	8 Male x Female, NPT/600 Flange	8 (Not Assigned)	8 2"
76F	CF8M Stainless Steel, Full Port	9 3-way Solder/O-Ring Boss/300 Flange Full Port	9 Pinned Retainer	9 2 1/2"
77	Bronze Full Port			0 3"
77C	Bronze Full Port Economy			A 4"
78	Special Valves			C 6"
79	Refrigerant Valves			E 8"
7A	Chlorine Carbon Steel			G 10"
7K	Bronze Full Port Drain			H 12"
80	Bronze, UL Listed			
81	Bronze UL Listed Plain Ball			
82	Bronze 3-Piece Full Port			
83	CS 3-Piece			
83R	CS 3-Piece, Actuator Ready			
85	SS 3-Piece, Reg.Port			
85R	SS 3-Piece, Reg.Port, Actuator Ready			
86	SS 3-Piece, Full Port			
86R	SS 3-Piece, FullPort, Actuator Ready			
87	CF8M SS Flanged			
87A	CF8M SS Flanged			
87A-400	Alloy-20 Flanged			
88	Carbon Steel Flanged			
88A	Carbon Steel Flanged			
89	Cast Carbon Steel w/Pads			
9A	Bronze, Hvy.Patt. Unibody			
90	Bronze, Unibody, UL Listed			
91	Bronze, Unibody			
92	Cast Carbon Steel Unibody			
93	CS Unibody			
95	Bronze Stop & Drain			
96	CF8M SS Unibody			
399	Alloy-20 NPT			
401	Alloy-20, 3-Piece, Full Port			

DESIGN

-01	Standard	-46	SS Latch Lock Lever, Lock in Closed Position Only
-02	Stem Grounded	-47	SS Oval Latch Lock Handle, SS Nut
-03	1-1/4" Carbon Steel Ext.Stem	-48	SS Oval Handle, No Latch, SS Nut
-04	2-1/4" Carbon Steel Ext.Stem	-49	Assembled Dry
-05	Plain Ball	-50	2-1/4" CS Locking Stem Extension
-06	2000 lb. 73-100 Series (1-1/4" to 2")	-51	One Tack Weld (I-7362-05-1X)
-07	Steel Tee Handle	-52	Two Tack Weld (I-7362-05-2X)
-08	90 degree reversed stem	-53	Three Tack Weld (I-7362-05-3X)
-09	SS Lever	-54	Four Tack Weld (I-7362-05-4X)
-10	SS Lever & Nut	-56	MultiFill Seats and Packing
-12	Stamp "157 SWP" & Bagged	-57	Oxygen Cleaned (Bronze and SS Only)
-13	Stamp "157 SWP"	-58	Chain Lever, Horizontal
-14	Side Vented Ball (uni-directional)	-59	SS External Trim - 3-pc Valves
-15	Wheel Handle, Steel	-60	Grounded Ball & Stem
-16	Chain Lever, Vertical	-61	Grounded Ball & Stem, Assembled Dry
-17	Rough Chrome Plate - Bronze Valves	-62	Body Centre Section
-21	UHMWPE Trim (non-PTFE)	-63	NPT x Solder/Socket Weld
-22	Viton Union Seals	-64	250 lb. Steam Trim
-23	Tank Flange (2" 3-pc valves only)	-65	MultiFill Seats & Graphite Packing
-24	Graphite Packing	-66	FNPT x Butt Weld
-25	Graphite Packing, Vented Ball & Tack Welded Ret.	-68	4" Stem Extension (3" & 4" 3-pc. 82 Series
-26	Chevron Pkg Vent Assd.Dry Monel Trim (7A)	-69	Purge Ports Drilled/Tapped @ Bottom & approx. 45" from Top
-27	SS Latch Lock Lever & Nut	-70	4" Extended Bonnet
-28	Actuator Mounting Pad Not Drilled/Tapped	-72	RTFE Packing
-29	Graphite Packing & Seals	-73	TFE Packing - Spiral Wound Body Seals - TFE Fillers - Flange BV
-30	Cam-Lock and Grounded Stem	-74	Graphite Packing - Spiral Wound Body Seals - Graphoil Fillers - Flange BV
-31	7B Series w/Boss not Drilled/Tapped	-75	MPTFE Seats, PTFE Packing, RPTFE Gaskets
-32	SS Hi-Rise Tee Handle & Nut	-76	Live Loaded 87A/88A Series (Lever)
-33	76-300 Series w/Pad Drilled/Tapped	-77	Live Loaded 87A/88A Series (Gear & Actuated)
-34	Nylatron Seats (96 Series)	-78	Delrin Seats
-35	VTFE Trim	-79	Nylon Seats/Graphite Packing 72 Series
-36	SS HiRise Round Handle, SS Nut	-80	Multi-Seal (Super TFE) 87A/88A Series
-38	Peek Seats & Bearing (Graphite packing & seals)	-97	Grnd.Whl.Handle, Pinned or Tack Welded
-39	SS Hi-Rise Locking Wheel Handle, SS Nut	-98	Grnd.Whl. Pinned or Tack Welded & 1-1/4" Stem Ext.
-40	Cyl-loc and Grounded Stem	-SW	Limit Switch Mounted
-41	Auto.Drain (Bronze Valves Only)	-MG	Gear Operated, Std. Hand Wheel
-42	Non-Vented Ball, No Holes in Slot (CS and SS)	-MH	Gear Operated, Std. Hand Wheel, Lockout Device
-43	Cyl-Loc, Grnd B&S, 680 LocTite or 2-Tack Welds	-MJ	Gear Operated, Oversize Hand Wheel
-44	Seal Weld 76-100 & 89-100	-MK	Gear Operated, Oversize Hand Wheel, Lockout Device
-45	Less Lever & Nut	-P01	BSPP (Parallel) Thread Connection
		-BC	Ball Check
		T01	BSPT (Tapered) Thread Connection

Apollo® 70-600 Series

3-Way Diversion Bronze Ball Valve

Threaded, 400 psig WOG, Cold Non-Shock.

FEATURES

- Chromium plated ball
- RPTFE seats and stuffing box ring
- Blow-out-proof stem design
- Adjustable packing gland

STANDARD MATERIAL LIST

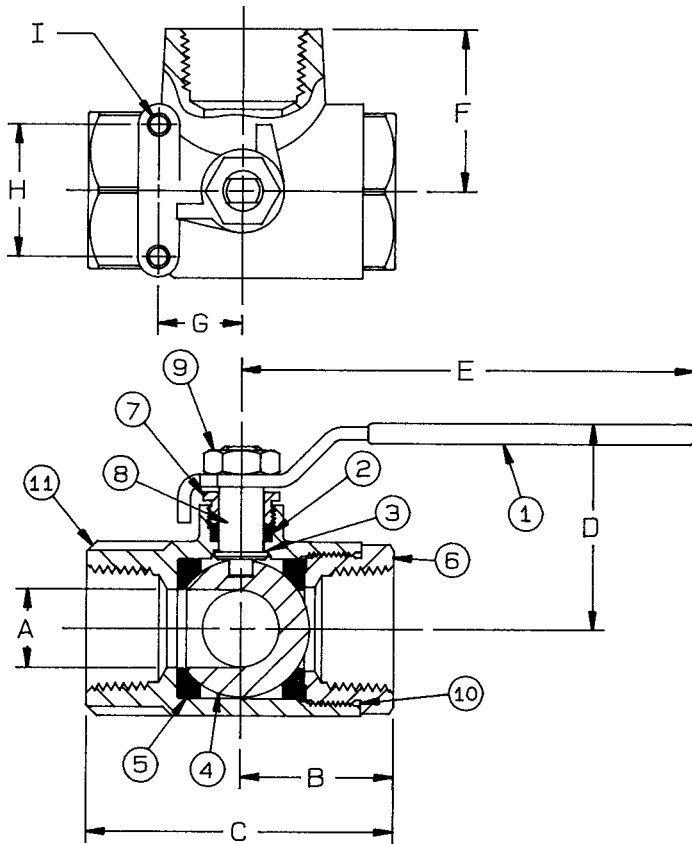
1. Lever and grip	Steel, zinc plated w/vinyl	7. Gland nut	B16
2. Stem packing	RPTFE	8. Stem	B16
3. Stem bearing	RPTFE	9. Lever nut	Steel, zinc plated
4. Ball	B16, chrome plated	10. Body seal (1-1/2" to 2")	PTFE
5. Seat (2)	RPTFE	11. Body	B584-C84400
6. Retainer	B16 (1/2" to 1")		
	B584-C84400 (1-1/4" to 2")		

VARIATIONS AVAILABLE:

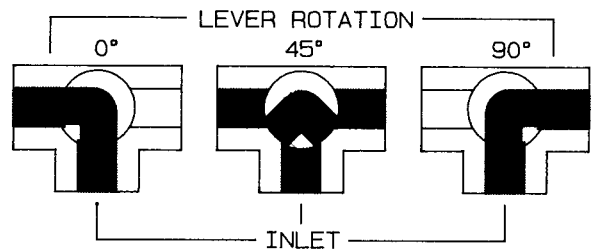
70-640 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Static Grounded	1/4" to 2"
-03-	1-1/4" Stem Extension	1/4" to 2"
-04-	2-1/4" Stem Extension	1/4" to 2"
-05-	Plain Ball	1/4" to 2"
-10-	SS Lever & Nut	1/4" to 2"
-17-	Rough Chrome Plating	1/4" to 2"
-21-	UHMWPE Seats (Non-PTFE)	1/4" to 2"
-24-	Graphite Stem Packing	1/4" to 2"
-27-	Latch Lock Lever	1/4" to 2"
-35-	PTFE Trim	1/4" to 2"
-49-	Assembled Dry	1/4" to 2"
-50-	2-1/4" Locking Stem Extension	1/4" to 2"
-56-	Multifill Seats	1/4" to 2"
-57-	Cleaned for Gaseous Oxygen	1/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 2"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 2"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 2"



FLOW PATTERN



NOTE: Open port pressure must exceed Closed port pressure.

3-WAY DIVERSION BRONZE BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	H	I	Wt.
70-601-01	1/4"	.37	1.12	2.32	1.8	3.88	1.18	.875	1.37	10-24	.91
70-602-01	3/8"	.37	1.12	2.32	1.8	3.88	1.18	.875	1.37	10-24	.88
70-603-01	1/2"	.50	1.09	2.25	1.75	3.87	1.18	.87	1.37	10-24	.76
70-604-01	3/4"	.68	1.50	3.00	2.12	4.87	1.62	.87	1.37	10-24	1.65
70-605-01	1"	.81	1.59	3.18	2.25	4.87	1.71	.87	1.37	10-24	2.15
70-606-01	1-1/4"	1.00	1.97	3.95	2.69	5.50	2.01	.93	1.50	1/4-20	3.85
70-607-01	1-1/2"	1.25	2.21	4.40	2.87	5.50	2.38	.94	1.50	1/4-20	5.22
70-608-01	2"	1.50	2.34	4.69	3.00	5.50	2.50	.94	1.50	1/4-20	6.20

For Pressure/Temperature Ratings, Refer to Page N-10, Graph No. 4

Apollo® 70-900 Series

3-Way Diversion Bronze Solder End Ball Valve

Solder, 400 psig WOG, Cold Non-Shock.

FEATURES

- Chromium plated ball
- RPTFE seats and stuffing box ring
- Blow-out-proof stem design
- Adjustable packing gland

STANDARD MATERIAL LIST

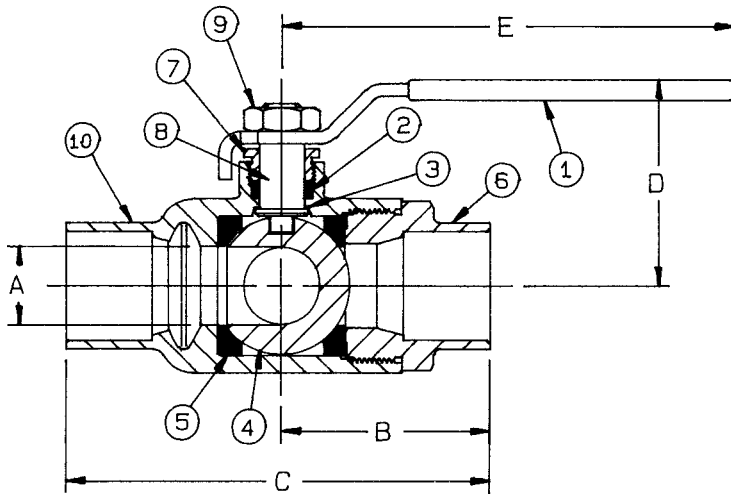
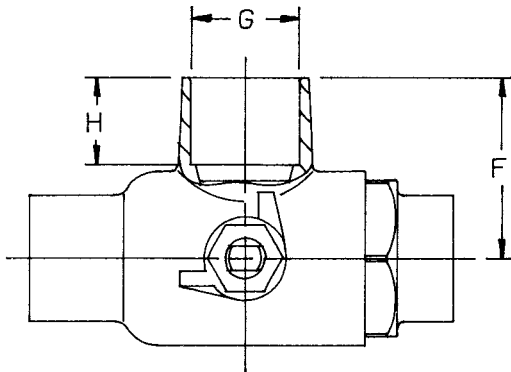
1. Lever and grip	Steel, zinc plated w/vinyl	6. Retainer	B16
2. Stem packing	RPTFE	7. Gland nut	B16
3. Stem bearing	RPTFE	8. Stem	B16
4. Ball	B16, chrome plated	9. Lever nut	Steel, zinc plated
5. Seat (2)	RPTFE	10. Body	B584-C84400

VARIATIONS AVAILABLE:

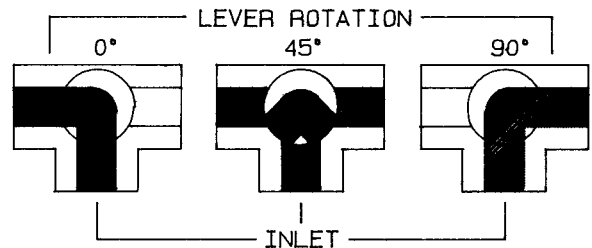
70-940 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Static Grounded	1/2" to 1"
-03-	1-1/4" Stem Extension	1/2" to 1"
-04-	2-1/4" Stem Extension	1/2" to 1"
-05-	Plain Ball	1/2" to 1"
-10-	SS Lever & Nut	1/2" to 1"
-17-	Rough Chrome Plating	1/2" to 1"
-21-	UHMWPE Seats (Non-PTFE)	1/2" to 1"
-24-	Graphite Stem Packing	1/2" to 1"
-27-	Latch Lock Lever	1/2" to 1"
-35-	PTFE Trim	1/2" to 1"
-49-	Assembled Dry	1/2" to 1"
-50-	2-1/4" Locking Stem Extension	1/2" to 1"
-56-	Multifill Seats	1/2" to 1"
-57-	Cleaned for Gaseous Oxygen	1/2" to 1"
-60-	Static Grounded Ball & Stem	1/2" to 1"



FLOW PATTERN



NOTE: Open port pressure must exceed Closed port pressure.

The 70-900 is designed to be soft soldered into lines without disassembly. This allows a tested valve to be installed without disturbing the seats and seals in any way. Soldering temperature not to exceed 500°F.

3-WAY DIVERSION BRONZE BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	H	Wt.
70-903-01	1/2"	.50	1.44	2.87	1.75	3.87	1.34	.628	.50	.76
70-904-01	3/4"	.68	1.94	3.87	2.12	4.87	1.69	.878	.90	1.65
70-905-01	1"	.81	2.19	4.42	2.25	4.87	1.87	1.129	.90	2.15

**For Pressure/Temperature Ratings,
Refer to Page N-10, Graph No. 3**

Apollo® 76-600 Series

3-Way Diversion Stainless Steel Ball Valve

Threaded, 800 psig WOG, Cold Non-Shock.

FEATURES

- RPTFE seats and stuffing box ring
- Meets NACE MR-01-75

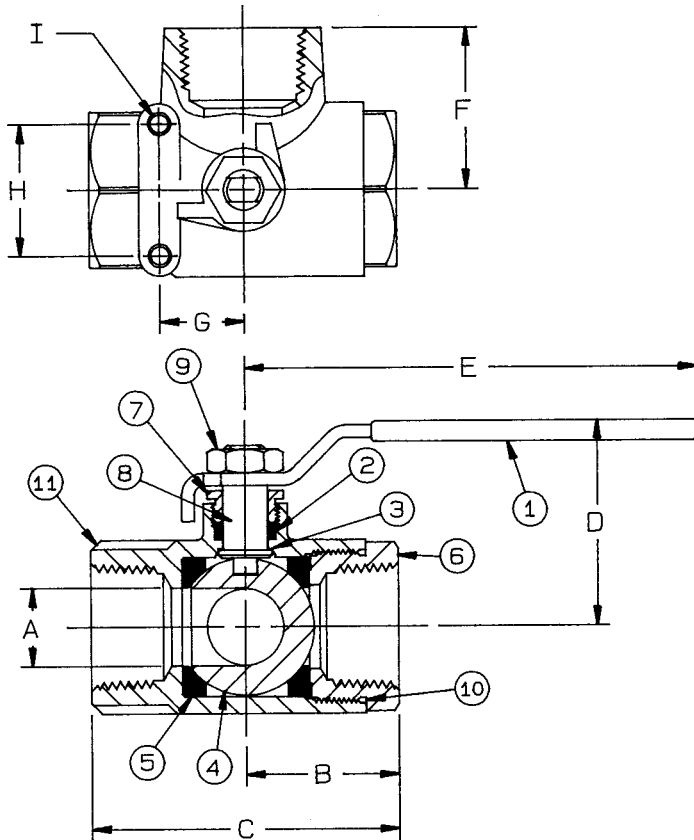
- Blow-out-proof stem design
- Adjustable packing gland
- Investment cast body

STANDARD MATERIAL LIST

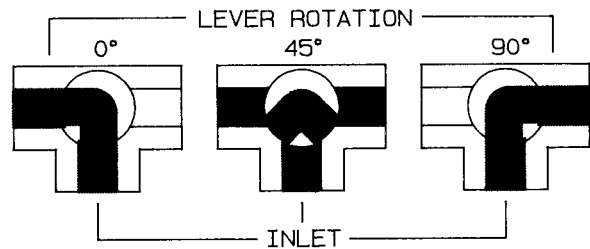
1. Lever and grip	304 SS w/vinyl	7. Gland nut	A276-316
2. Stem packing	RPTFE	8. Stem	A276-316
3. Stem bearing	RPTFE	9. Lever nut	18-8 SS
4. Ball	A276-316	10. Body seal (1-1/2" to 2")	PTFE
5. Seat (2)	RPTFE	11. Body	A351-CF8M
6. Retainer	A276-316 (1/2" to 1")		
	A351-CF8M (1-1/2" to 2")		

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Static Grounded	1/4" to 2"
-03-	1-1/4" Stem Extension	1/4" to 2"
-04-	2-1/4" Stem Extension	1/4" to 2"
-21-	UHMWPE Seats (Non-PTFE)	1/4" to 2"
-24-	Graphite Stem Packing	1/4" to 2"
-27-	Latch Lock Lever	1/4" to 2"
-35-	PTFE Trim	1/4" to 2"
-49-	Assembled Dry	1/4" to 2"
-50-	2-1/4" Locking Stem Extension	1/4" to 2"
-56-	Multifill Seats	1/4" to 2"
-57-	Cleaned for Gaseous Oxygen	1/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 2"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 2"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 2"



FLOW PATTERN



NOTE: Open port pressure must exceed Closed port pressure.

3-WAY DIVERSION STAINLESS STEEL BALL VALVE

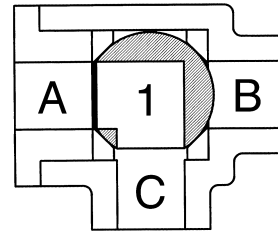
NUMBER	SIZE	A	B	C	D	E	F	G	H	I	Wt.
76-601-01	1/4"	.37	1.12	2.32	1.8	3.88	1.18	.875	1.37	10-24	.7
76-602-01	3/8"	.37	1.12	2.32	1.8	3.88	1.18	.875	1.37	10-24	.68
76-603-01	1/2"	.50	1.12	2.32	1.81	3.87	1.18	.87	1.37	10-24	.75
76-604-01	3/4"	.68	1.50	3.00	2.12	4.87	1.50	.87	1.37	10-24	1.45
76-605-01	1"	.81	1.60	3.21	2.25	4.87	1.68	.87	1.37	10-24	1.86
76-607-01	1-1/2"	1.25	2.21	4.40	2.87	5.50	2.40	.94	1.50	1/4-20	4.67
76-608-01	2"	1.50	2.75	5.45	3.06	5.50	2.81	.94	1.50	1/4-20	7.02

**For Pressure/Temperature Ratings,
Refer to Page N-19, Graph No. 21**

Apollo® 3-Way Valves

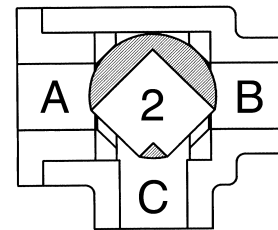
Mixing Vs. Diverting

Illustrated to the right are the three normal operating positions for a three-way valve. Apollo's three-way valve has only two (2) seats as illustrated and as such has limitations for use in both diverter and mixing valve applications. As can be seen from this illustration, there is no off position for port "C". Ports "A" and "B" cannot be off at the same time.



Apollo's Three-Way Valve as a Mixing Valve

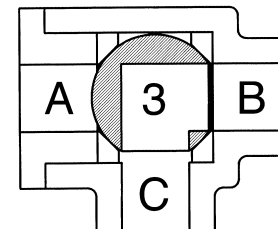
When ports "A" and "B" are the inlets, and port "C" is the outlet, the valve becomes a mixing valve. With minor variations in position 2 the percentage of components at "A" and "B" can be varied to the outlet "C". This has been successfully applied to hydronic systems.



It may not be possible to isolate the ports from one another in any position. If the valve is in position 1, and the pressure at port "B" is significantly higher than port "A", the ball may be forced off the seat allowing mixing from all ports. Whether or not this is a problem depends on the application and its sensitivity to unwanted mixing.

Apollo's Three-Way Valve as a Diverter Valve

When port "C" is the inlet, and ports "A" and "B" are the outlets, the valve is a diverter valve. With port "C" as the inlet, flow is diverted to either port "A" (position 1) or "B" (position 3). In position 2, inlet flow from "C" is split to "A" and "B".



Just as described above, it may not be possible to isolate any one port from the other two. That condition is most likely to occur in mixing applications. That is why the valve tends to be promoted as a diverter valve rather than a mixing valve.