



SECTION E

3-WAY BALL VALVES

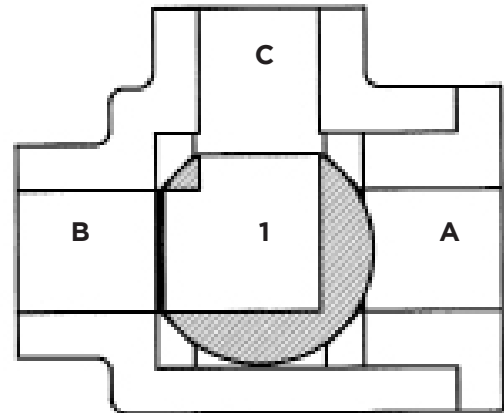
SERIES	DESCRIPTION	PAGE
	3-Way Valve Application	E-2
BRONZE		
70-600 SERIES	Threaded Bronze	E-3
70-900 SERIES	Solder Bronze	E-4
77-648 VALVE	Full Port Bronze	E-6
STAINLESS STEEL		
76-600 SERIES	Threaded Stainless Steel	E-5

3-WAY BALL VALVES

MIXING VS. DIVERTING



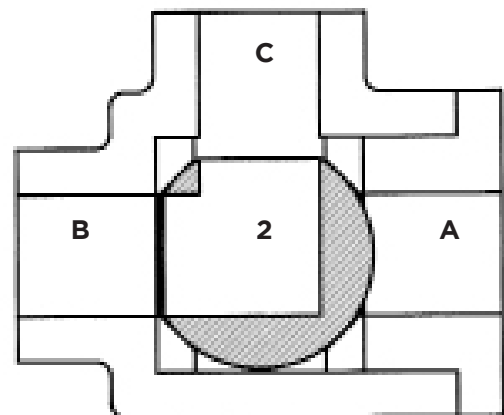
Illustrated are the three normal operating positions for a three-way valve. Apollo's three-way valve has only two (2) seats as illustrated and as such has limitations for use in both diverter and mixing valve applications. As can be seen from this illustration, there is no off position for port "C".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



3-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.

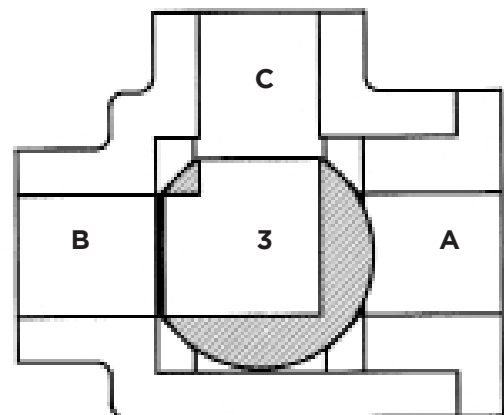
It may not be possible to isolate the ports from one another in any position. If the valve is in position 1, and the pressure at port "B" is significantly higher than port "A", the ball may be forced off the seat allowing mixing from all ports. Whether or not this is a problem depends on the application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



3-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.



Female NPT Thread, 400 CWP (psig), Cold Non-Shock.

FEATURES

- Two piece body
- Reinforced seats
- Blowout-proof stem design
- Adjustable packing gland

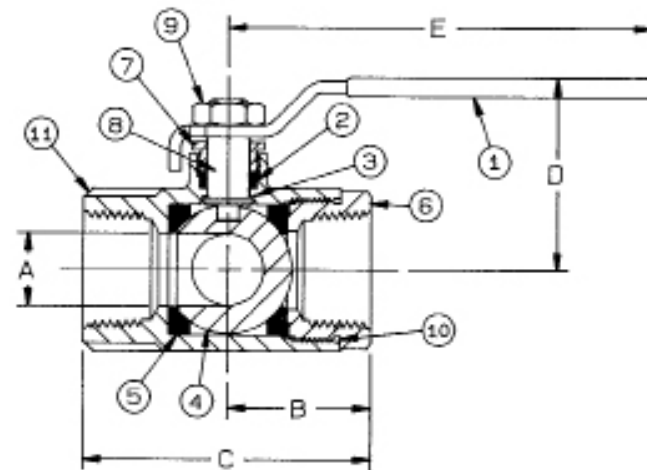
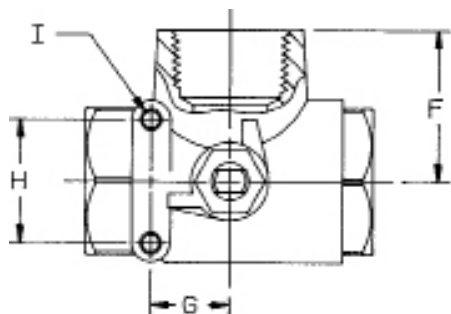
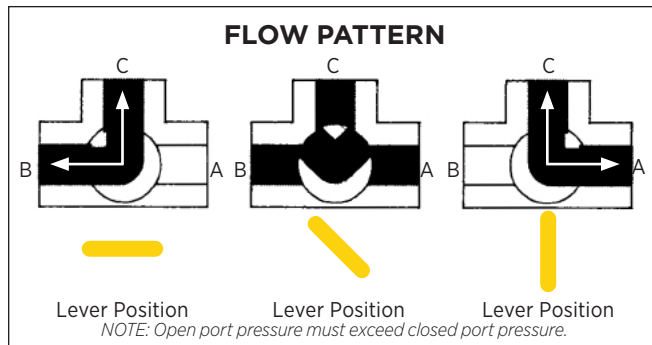
VARIATIONS AVAILABLE

- 70-640 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE

(MORE INFORMATION IN SECTION J)

- Minimum quantities apply
- To specify an option, replace the "01" standard suffix with the suffix of the option.
- To specify multiple options, replace the "01" suffix with the desired suffixes in the numerical order shown below. NOTE: Not all suffixes can be combined together.



(SUFFIX)	OPTION	SIZES
-01	Standard Configuration	All
-P-01-	BSPP (Parallel) Thread Connection	1/4" to 2"
-T-01-	BSPT (Tapered) Thread Connection	1/4" to 2"
-02-	Stem Grounded	1/4" to 2"
-04-	2-1/4" Stem Extension (Carbon Steel, Zinc Plated)	1/4" to 2"
-05-	Plain Ball	1/4" to 2"
-10-	SS Lever & Nut	1/4" to 2"
-17-	Rough Chrome Plated - Bronze Valves	1/4" to 2"
-21-	UHMWPE Seats (Non-PTFE)	1/4" to 2"
-24-	Graphite Packing	1/4" to 2"
-27-	SS Latch-Lock Lever & Nut	1/4" to 2"
-35-	PTFE Trim	1/4" to 2"
-49-	No Lubrication. Assembled Dry.	1/4" to 2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 2"
-56-	Multifill Seats & Packing	1/4" to 2"
-57-	Oxygen Cleaned	1/4" to 2"
-60-	Grounded Ball & Stem	1/4" to 2"

Pressure/Temperature Ratings - Page M-10, Graph No. 3

STANDARD MATERIAL LIST

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

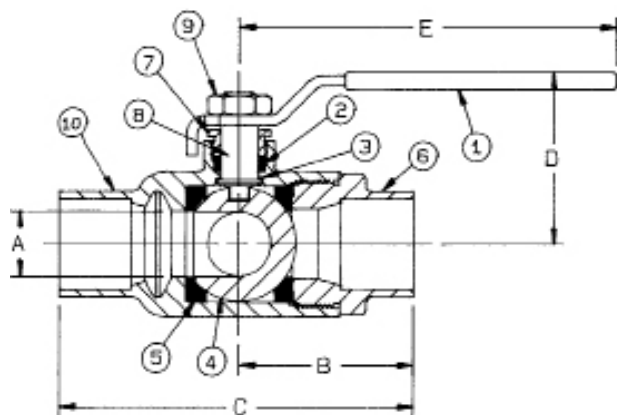
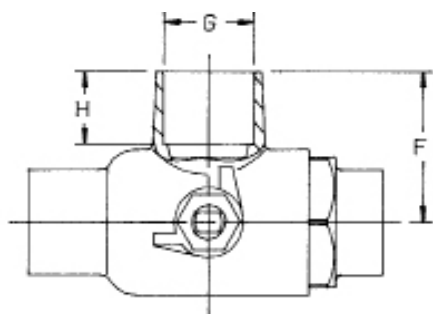
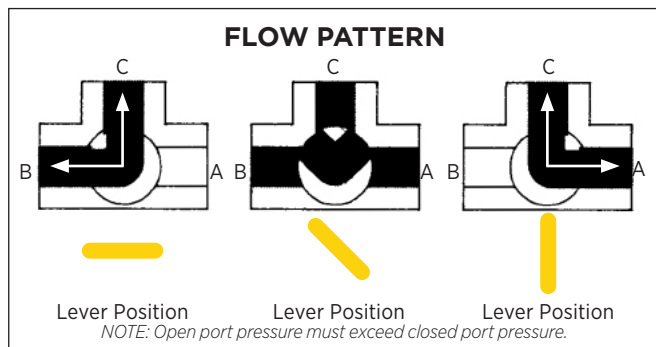
DIMENSIONS

PART NO.	SIZE	A	B	C	D	E	F	G	H	I	WT.
70-601-01	1/4"	0.50	1.09	2.25	1.80	3.88	1.18	0.87	1.37	10-24	0.86
70-602-01	3/8"	0.50	1.12	2.27	1.80	3.88	1.18	0.87	1.37	10-24	0.84
70-603-01	1/2"	0.50	1.10	2.75	1.75	3.88	1.18	0.87	1.37	10-24	0.99
70-604-01	3/4"	0.68	1.50	3.00	2.12	4.87	1.62	0.87	1.37	10-24	1.91
70-605-01	1"	0.87	1.59	3.20	2.20	4.87	1.71	0.87	1.37	10-24	2.42
70-606-01	1-1/4"	1.00	1.99	3.98	2.69	5.50	2.09	0.94	1.50	1/4-20	4.27
70-607-01	1-1/2"	1.25	2.21	4.40	2.87	5.50	2.38	0.94	1.50	1/4-20	5.82
70-608-01	2"	1.50	2.34	4.69	3.07	5.50	2.50	0.94	1.50	1/4-20	8.55

Solder, 400 CWP (psig), Cold Non-Shock.

FEATURES

- Two-piece body
- Reinforced seats
- Blowout-proof stem design
- Adjustable packing gland



DIMENSIONS

PART NO.	SIZE	A	B	C	D	E	F	G	H	WT.
70-903-01	1/2"	0.50	1.44	2.33	2.04	3.87	1.34	.628	0.50	0.76
70-904-01	3/4"	0.68	1.94	3.04	2.08	4.78	1.69	.878	0.75	1.65
70-905-01	1"	.875	2.24	3.50	2.16	4.78	1.87	1.129	0.90	2.15

VARIATIONS AVAILABLE

- 70-940 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE

(MORE INFORMATION IN SECTION J)

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(SUFFIX)	OPTION	SIZES
-01	Standard Configuration	All
-02-	Stem Grounded	1/2" to 1"
-04-	2-1/4" Stem Extension (Carbon Steel, Zinc Plated)	1/2" to 1"
-05-	Plain Ball	1/2" to 1"
-10-	SS Lever & Nut	1/2" to 1"
-17-	Rough Chrome Plated - Bronze Valves	1/2" to 1"
-21-	UHMWPE Seats (Non-PTFE)	1/2" to 1"
-24-	Graphite Packing	1/2" to 1"
-27-	SS Latch-Lock Lever & Nut	1/2" to 1"
-35-	PTFE Trim	1/2" to 1"
-49-	No Lubrication. Assembled Dry.	1/2" to 1"
-50-	2-1/4" CS Locking Stem Extension	1/2" to 1"
-56-	Multifill Seats & Packing	1/2" to 1"
-57-	Oxygen Cleaned	1/2" to 1"
-60-	Grounded Ball & Stem	1/2" to 1"

Pressure/Temperature Ratings - Page M-10, Graph No. 3

STANDARD MATERIAL LIST

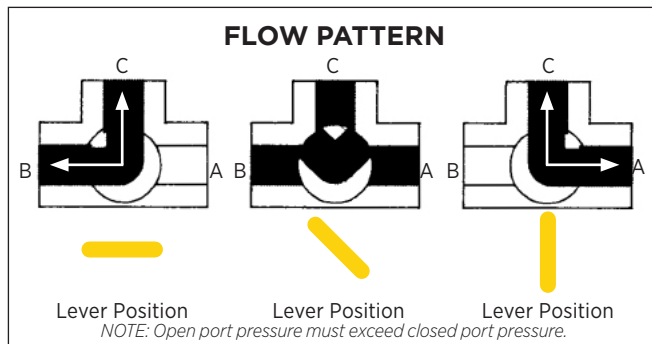
	PART	MATERIAL
1	Lever and grip	Steel, zinc plated w/vinyl
2	Stem packing	MPTFE
3	Stem bearing	RPTFE
4	Ball	B16 Brass, chrome plated
5	Seat (2)	RPTFE
6	Retainer	B16 Brass
7	Gland nut	B16 Brass
8	Stem	B16 Brass
9	Lever nut	Steel, zinc plated
10	Body	B584-C84400

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.

Female NPT Thread, 800 CWP (psig), Cold Non-Shock.

FEATURES

- Reinforced seats
- Meets NACE MR0175 (2000) & MR0103 (2012)
- Blowout-proof stem design
- Adjustable packing gland
- Investment cast body
- NSF/ANSI/CAN 61, Annex G



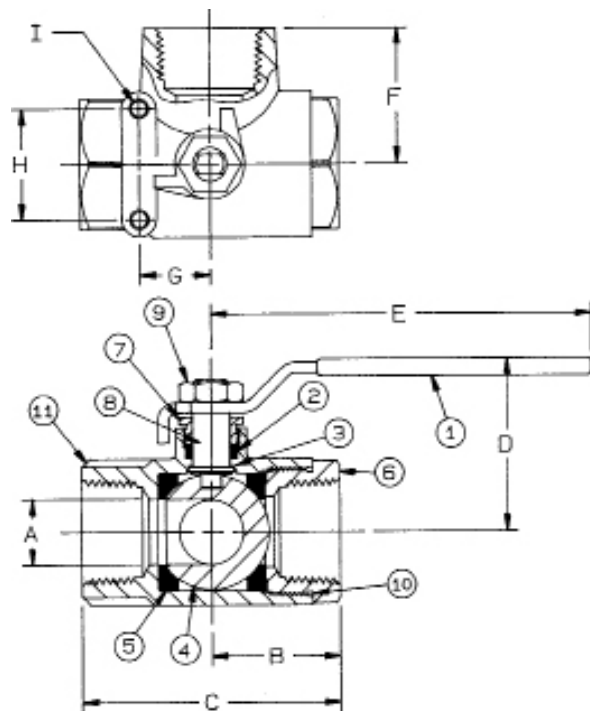
OPTIONS AVAILABLE

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-02-	Stem Grounded	1/4" to 2"
-04-	2-1/4" Stem Extension (Carbon Steel, Zinc Plated)	1/4" to 2"
-21-	UHMWPE Seats (Non-PTFE)	1/4" to 2"
-24-	Graphite Packing	1/4" to 2"
-27-	SS Latch-Lock Lever & Nut	1/4" to 2"
-35-	PTFE Trim	1/4" to 2"
-49-	No Lubrication. Assembled Dry.	1/4" to 2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 2"
-56-	Multifill Seats & Packing	1/4" to 2"
-57-	Oxygen Cleaned	1/4" to 2"
-60-	Grounded Ball & Stem	1/4" to 2"

Pressure/Temperature Ratings - Page M-18, Graph No. 21



STANDARD MATERIAL LIST

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

DIMENSIONS

PART NO.	SIZE	A	B	C	D	E	F	G	H	I	WT.
76-601-01A	1/4"	0.437	1.12	2.32	1.80	3.88	1.18	0.875	1.375	10-24	0.70
76-602-01A	3/8"	0.437	1.12	2.32	1.80	3.88	1.18	0.875	1.375	10-24	0.68
76-603-01A	1/2"	0.505	1.12	2.32	1.80	3.88	1.18	0.875	1.375	10-24	0.75
76-604-01A	3/4"	0.687	1.46	2.96	2.06	4.78	1.50	0.875	1.375	10-24	1.45
76-605-01A	1"	0.875	1.65	3.32	2.15	4.78	1.68	0.875	1.375	10-24	1.86
76-607-01A	1-1/2"	1.265	2.17	4.34	3.03	5.43	2.40	0.937	1.500	1/4-20	4.67
76-608-01A	2"	1.515	2.73	5.43	3.22	5.43	2.81	0.937	1.500	1/4-20	7.02

77-648-27 SERIES

2" FULL PORT 3-WAY DIVERSION BRONZE BALL VALVE



Female NPT Thread, 2" 400 CWP (psig), Cold Non-Shock

FEATURES

- Cast Body & Retainer
- MPTFE seats and stem packing
- Four Bolt ISO Mounting ISO 5211 (F07)
- Blowout-proof stem design
- Adjustable packing gland
- SS lever and nut
- Latch lock lever

STANDARD MATERIAL LIST

	PART	MATERIAL
1	Stem packing	MPTFE
2	Stem bearing	RPTFE
3	Ball	A276 316 SS
4	Seat (2)	MPTFE
5	Retainer	ASTM B584 C84400
6	Stop	A276 316 SS
7	Gland	ASTM B-16
8	Stem	A276 316 SS
9	Lever Nut	304 SS
10	Body	ASTM B584 C84400
11	Lever and Grip	SS w/Vinyl

Pressure/Temperature Ratings - Page M-10, Graph No. 3

