SECTION E CONTENTS

THREE WAY VALVES

DESCRIPTION	PAGE
70-600 Series, Threaded Bronze	E-1
70-900 Series, Solder Bronze	E-2
76-600 Series, Threaded Stainless Steel	E-3
77-640 Series, Full Port Bronze	E-4
3-Way Valve Application	E-5

70-600 Series

3-Way Diversion Bronze Ball Valve

Threaded, 400 psig WOG, Cold Non-Shock.

FEATURES

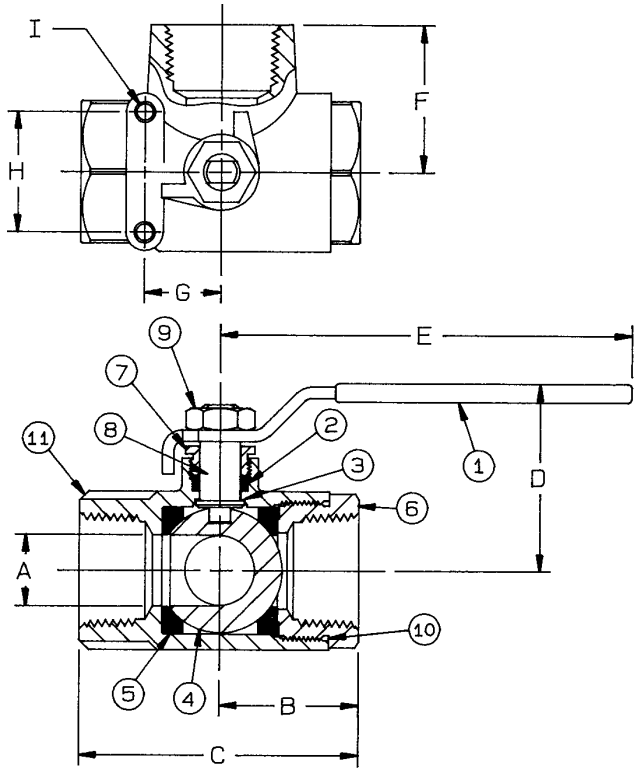
- Two piece body
- Reinforced seats
- Blow-out-proof stem design
- Adjustable packing gland

STANDARD MATERIAL LIST

1. Lever and grip	Steel, zinc plated w/vinyl	7. Gland nut	B16
2. Stem packing	MPTFE	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 (1/4" to 1") B584-C84400 (1-1/4" to 2")		

VARIATIONS AVAILABLE:

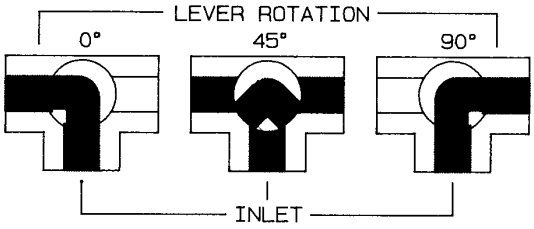
70-640 Series (316 SS Ball & Stem)



OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 2"
-04-	2-1/4" CS Stem Extension	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-	VTFE Trim	1/4" to 2"
-49-	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"
-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"	.43	1.09	2.25	1.87	3.88	1.18	.875	1.37	10-24	.91
70-602-01	3/8"	.50	1.09	2.25	1.87	3.88	1.18	.875	1.37	10-24	.88
70-603-01	1/2"	.50	1.09	2.25	1.87	3.87	1.18	.875	1.37	10-24	.76
70-604-01	3/4"	.68	1.48	2.97	2.08	4.78	1.62	.875	1.37	10-24	1.65
70-605-01	1"	.87	1.59	3.20	2.18	4.78	1.68	.875	1.37	10-24	2.15
70-606-01	1-1/4"	1.01	1.99	3.98	2.72	5.43	2.09	.937	1.50	1/4-20	3.85
70-607-01	1-1/2"	1.26	2.19	4.38	2.90	5.43	2.38	.937	1.50	1/4-20	5.22
70-608-01	2"	1.50	2.34	4.66	3.00	5.43	2.50	.937	1.50	1/4-20	6.20

For Pressure/Temperature Ratings,Refer to Page M-8, Graph No. 3

70-900 Series

3-Way Diversion Bronze Solder End Ball Valve

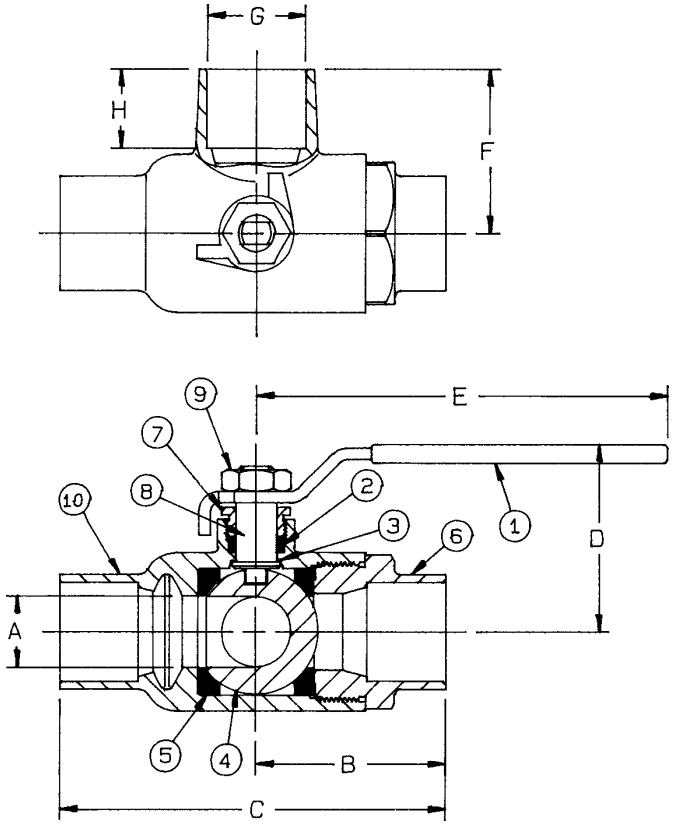
Solder, 400 psig WOG, Cold Non-Shock.

FEATURES

- Two-piece body
- Reinforced seats
- 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	MPTFE	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



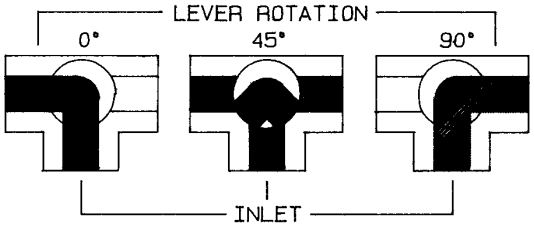
VARIATIONS AVAILABLE:

70-940 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/2" to 1"
-04-	2-1/4" CS Stem Extension	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-	VTFE Trim	1/2" to 1"
-49-	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"

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	2.33	2.04	3.87	1.34	.628	.50	.76
70-904-01	3/4"	.68	1.94	3.04	2.08	4.78	1.69	.878	.75	1.65
70-905-01	1"	.875	2.24	3.50	2.16	4.78	1.87	1.129	.90	2.15

For Pressure/Temperature Ratings, Refer to Page M-8, Graph No. 3

76-600 Series

3-Way Diversion Stainless Steel Ball Valve

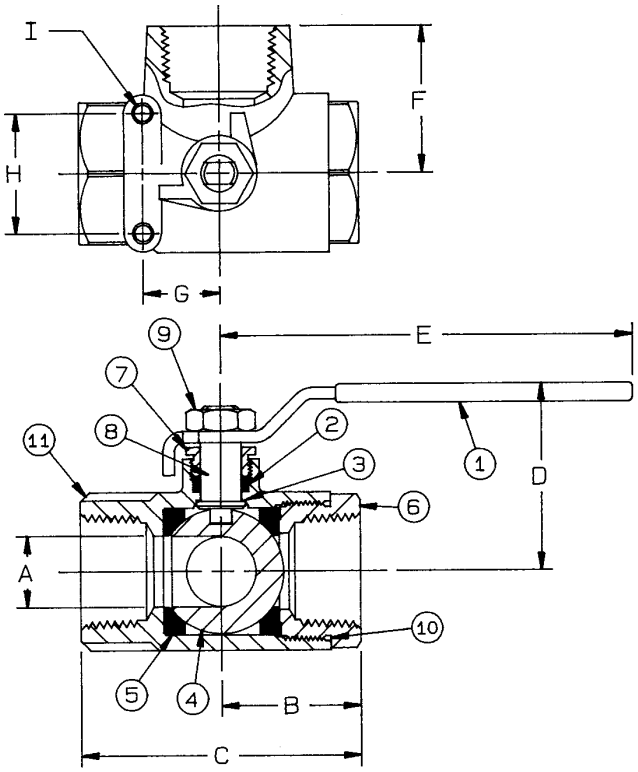
Threaded, 800 psig WOG, Cold Non-Shock.

FEATURES

- Reinforced seats
- Meets NACE MR-01-75
- Blow-out-proof stem design
- Adjustable packing gland
- Investment cast body

STANDARD MATERIAL LIST

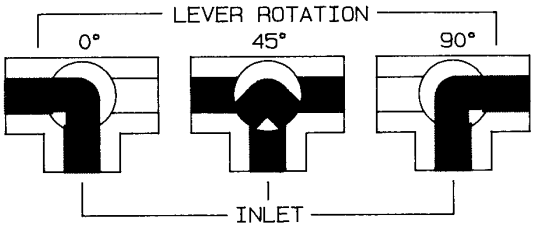
1. Lever and grip	304 SS w/vinyl	7. Gland nut	A276-316
2. Stem packing	MPTFE	8. Stem	A276-316
3. Stem bearing	RPTFE	9. Lever nut	18-8 SS
4. Ball	A276-316	10. Body seal (1-1/2" to 2")	PTFE
5. Seat (2)	RPTFE	11. Body	A351-CF8M
6. Retainer	A276-316 (1/4" to 1") A351-CF8M (1-1/2" to 2")		



OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 2"
-04-	2-1/4" CS Stem Extension	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-	VTFE Trim	1/4" to 2"
-49-	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"
-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"	.437	1.12	2.32	1.80	3.88	1.18	.875	1.375	10-24	.7
76-602-01	3/8"	.437	1.12	2.32	1.80	3.88	1.18	.875	1.375	10-24	.68
76-603-01	1/2"	.505	1.12	2.32	1.80	3.88	1.18	.875	1.375	10-24	.75
76-604-01	3/4"	.687	1.47	2.97	2.06	4.78	1.50	.875	1.375	10-24	1.45
76-605-01	1"	.875	1.60	3.20	2.15	4.78	1.68	.875	1.375	10-24	1.86
76-607-01	1-1/2"	1.265	1.99	4.38	3.03	5.43	2.40	.937	1.50	1/4-20	4.67
76-608-01	2"	1.515	2.75	5.45	3.22	5.43	2.81	.937	1.50	1/4-20	7.02

For Pressure/Temperature Ratings, Refer to Page M-16, Graph No. 21

77-648-27 Series

2" Full Port 3-Way Diversion Bronze Ball Valve

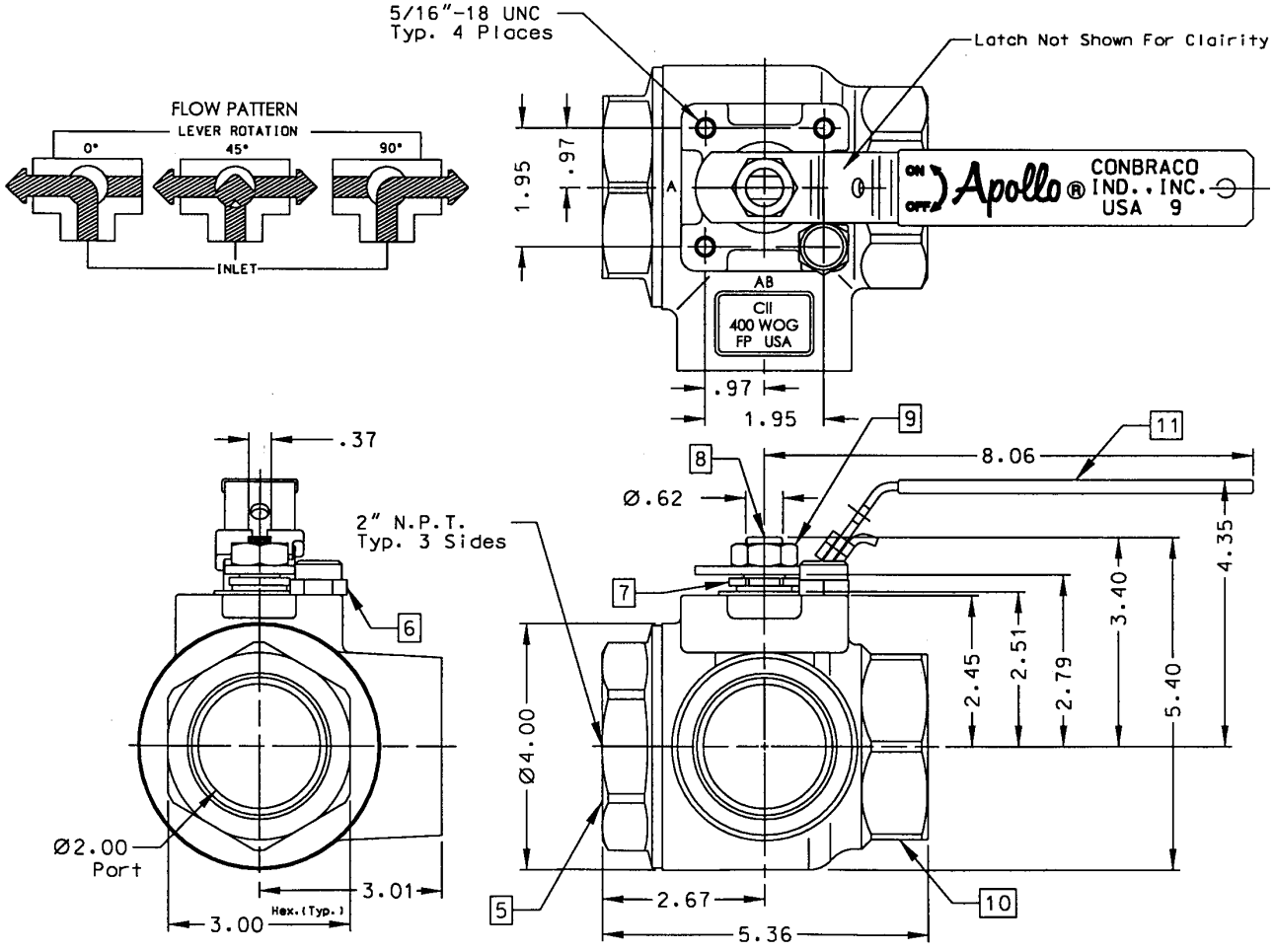
Threaded, 2" 400 psig CWP Cold Non-Shock

FEATURES

- Cast Body & Retainer
- MPTFE seats and stem packing
- Four Bolt ISO Mounting ISO 5211 (F07)
- Blow-out-proof stem design
- Adjustable packing gland
- SS Lever and Nut
- Latch Lock Lever

STANDARD MATERIAL LIST

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

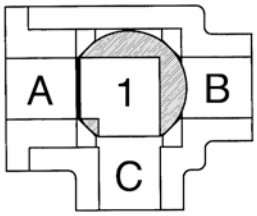


For Pressure/Temperature Ratings, Refer to Page M-8, Graph No. 3

3-Way Valves

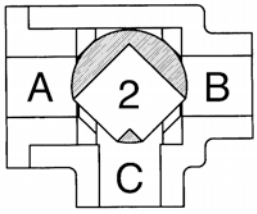
Mixing Vs. Diverting

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

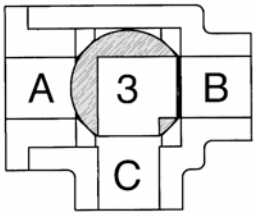
When ports "A" and "B" are the inlets, and port "C" is the outlet, the valve becomes a mixing valve. With minor variations in position 2 the percentage of components at "A" and "B" can be varied to the outlet "C". This has been successfully applied to hydronic systems.



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.