

# "Apollo"<sup>®</sup>



## **INSTALLATION, OPERATION & MAINTENANCE MANUAL**

1/2" - 2" Double Check Valve (DC) Backflow Preventer

**DC4A | DCLF4A | DC4AY | DCLF4AY**

ES1598 IOM BFMMD4ASBF rev.b

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

SECTION	DESCRIPTION	PAGE
I	Description and Operation	3
II	Installation	3
III	Troubleshooting Guide	5
IV	Maintenance Instructions	5
V	Testing Procedures	6-7
<b>Parts List</b>		
	Parts List (1/2" - 2")	8-11
<b>Repair Kits</b>		
	Repair Kits (1/2" - 2" )	12

### I. DESCRIPTION AND OPERATION

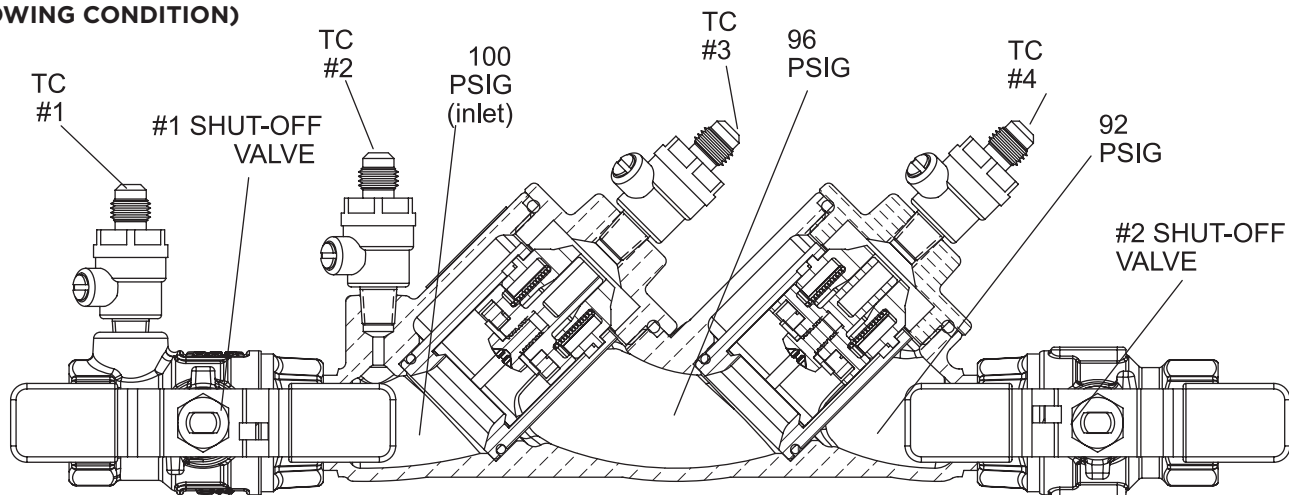
The Double Check Valve (DC) device consists of two independently-acting, spring-loaded check valves. Two resilient seated shut-off valves and four test cocks complete the assembly. Each check is designed to maintain a minimum of 1 psi across the valve during normal operation. If at any time the pressure downstream of the device increases above the supply pressure, both check valves will close to prevent any backflow from occurring. The flowing and no flow conditions are illustrated in figures 1 and 2. To initiate flow, supply pressure must be sufficient to open both checks and overcome friction, normally a minimum of 3 to 5 psi above the downstream pressure.

### II. INSTALLATION

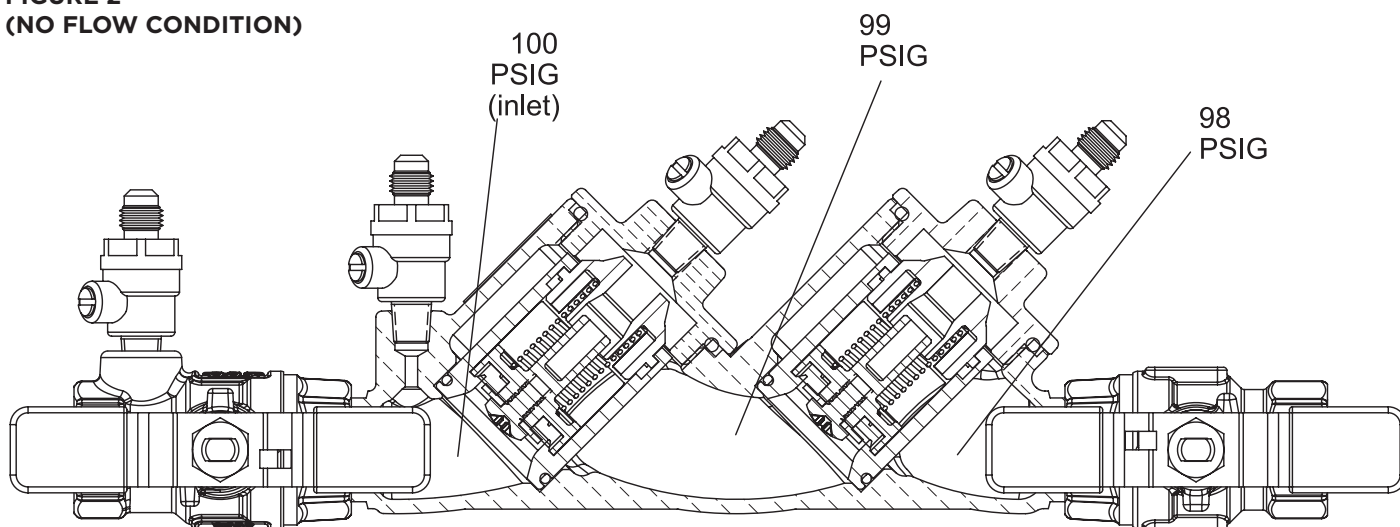
1. The DC must be installed in an accessible location to facilitate periodic field testing and maintenance.
2. Flush all upstream piping thoroughly to remove foreign matter prior to installing the device.
3. The device should be installed either horizontally or vertical up for ease of maintenance and testing. A clearance between the lower most portion of the device and flood grade or floor should be provided for ease of maintenance.
4. When shut-off valves are provided separately, they should be installed with a test cock on the upstream side of the inlet shut-off valve.

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

**FIGURE 1  
(FLOWING CONDITION)**



**FIGURE 2  
(NO FLOW CONDITION)**



*Note: Pressures shown are for illustrative purposes only and are not necessarily indicative of any actual valve.*

### III. TROUBLESHOOTING

SYMPTOM	CAUSE	CORRECTIVE ACTION
Check valve fails to hold 1 psid.	<ol style="list-style-type: none"> <li>1. Shut-off valve not closed completely</li> <li>2. Check valve fouled with debris.</li> <li>3. Check poppet stem not moving freely in guide.</li> </ol>	<ol style="list-style-type: none"> <li>4. Close #2 shut-off valve or inspect for possible through leakage.</li> <li>5. Inspect and clean seat disc and seat.</li> <li>6. Inspect for debris or deposit on poppet stem or guide.</li> </ol>

### IV. MAINTENANCE INSTRUCTIONS

#### A. DISASSEMBLY - CHECK VALVES

1. Close #2 shut-off valve, then close #1 shut-off valve.
2. Bleed pressure from the assembly by opening #2, #3, and #4 test cocks.
3. Unscrew cap using hex head provided.
4. Push down and turn the spring retainer 90 degrees to remove. Remove the spring. Remove the poppet from the check seat.
5. Normally, the check seat need not be removed. If removal is required, rock it back and forth while pulling outward.

#### DISASSEMBLY - CHECK VALVE POPPET

**CAUTION:** Do not use pliers or other tools, which may damage or scratch the plastic stem.

1. Holding the poppet assembly in one hand, remove screw and retaining washer.
2. Remove the seat disc.
3. All parts should be carefully inspected for any damage or excessive wear and thoroughly rinsed in clean water prior to reassembly. Replace worn parts as necessary.

#### C. ASSEMBLY - CHECK VALVE POPPET

1. Install new disc in poppet and secure with washer and screw.

#### D. ASSEMBLY - CHECK VALVE

1. If the check seat was removed, install the new o-ring and lubricate with a thin coat of Apollo® supplied lubricant, DOW 111 or equal. Line up the seat with the bore and push it firmly into place.
2. Place and center the poppet assembly in the check seat.
3. Install the spring onto the poppet.
4. Install the spring retainer onto the spring by pushing down into the grooves of the check seat and turning 90 degrees.
5. Ensure spring retainer pops up about .1" and locks into the lugs.

**CAUTION:** Ensure the spring retainer orientation matches that in the parts list drawing or the device's flow will be significantly restricted.

## V. TESTING PROCEDURES

This test is performed with the Differential Pressure Gauge Test Kit. The Differential Pressure Gauge simply measures the pressure drop across the check valve. This pressure drop is normally the same as the strength of the check valve spring. In using the Differential Pressure Gauge to test the Double Check assembly, a minimum of 1.0 psid is required for each check valve in order for that check valve to pass the test. Such a small reading is often difficult to read on most test kits. This is one of the drawbacks of this test. However, since the first shut-off valve is left in the open position for this test, it is possible to use this test when the first shut-off valve is leaking badly.

**NOTE:** This is a three-valve test kit procedure and may or may not be approved in all jurisdictions. Consult your local water purveyor for acceptable test procedures.

### TEST SETUP

1. Notify customer that the water service will be off. Identify the make, model, and serial number on the backflow device.
2. Inspect that this is an approved assembly - two check valves, two shut-off valves and four test cocks. Observe the area to make sure there are no leaks.
3. Flush test cocks (1, 2, 3 & 4), then close all test cocks.
4. Install appropriate adapters (if necessary).
5. Close shut-off valve #2.

#### TEST NO. 1

##### PURPOSE: TO TEST CHECK VALVE #1

1. Close all valves on test kit.
2. Connect the high side hose to test cock #2 and the low side hose to test cock #3. Open test cock #2 and test cock #3.
3. Open vent valve "C" and high "A" on the test kit to bleed air from the high side of the kit. Close high "A" valve and then open low "B" valve to bleed the low side. Close low "B" valve.
4. Record the gauge reading. It must be a minimum of 1.0 psid in order to pass. Close test cock #2 and test cock #3.

#### TEST NO. 2

##### PURPOSE: TO TEST CHECK VALVE #2

1. Move the high side hose to test cock #3 and the low side hose to test cock #4. Open test cock #3 and test cock #4.
2. Open vent "C" valve. Then open high "A" and bleed air from the high side of the kit. Close high "A" valve, and then open low "B" valve and bleed the low side of the kit. Close low "B" valve.
3. Record the gauge reading. It must be a minimum of 1.0 psid in order to pass. Close test cock #3 and test cock #4. Remove hoses and test kit. Slowly open shut-off valve #2 in order to restore water flow to the facility, placing the DC back into service.

#### TEST NO. 3

##### PURPOSE: TO TEST LEAKING #2 SHUT-OFF VALVE

As previously mentioned, the above test is not accurate when the second shut-off valve is leaking. The following test will expose a leaking shut-off valve.

1. Both shut-off valves should be open. Make sure all valves on test kit are closed. Connect the high "A" hose to test cock #2 and the low "B" hose to test cock #3. Open test cock #2 and test cock #3.
2. Open the high "A" valve and vent "C" valve to bleed air from high side of gauge. Open low "B" valve to bleed air from low side of gauge. Close valves "A", "B" and "C" on test kit.
3. Connect the vent hose to test cock #4. Open test cock #4.
4. Close shut-off valve #2. The differential gauge needle should read at least 1.0 psid in order to pass.
5. Open the high "A" valve and vent "C" valve. This will put back pressure on check valve #2.
6. Close test cock #2.

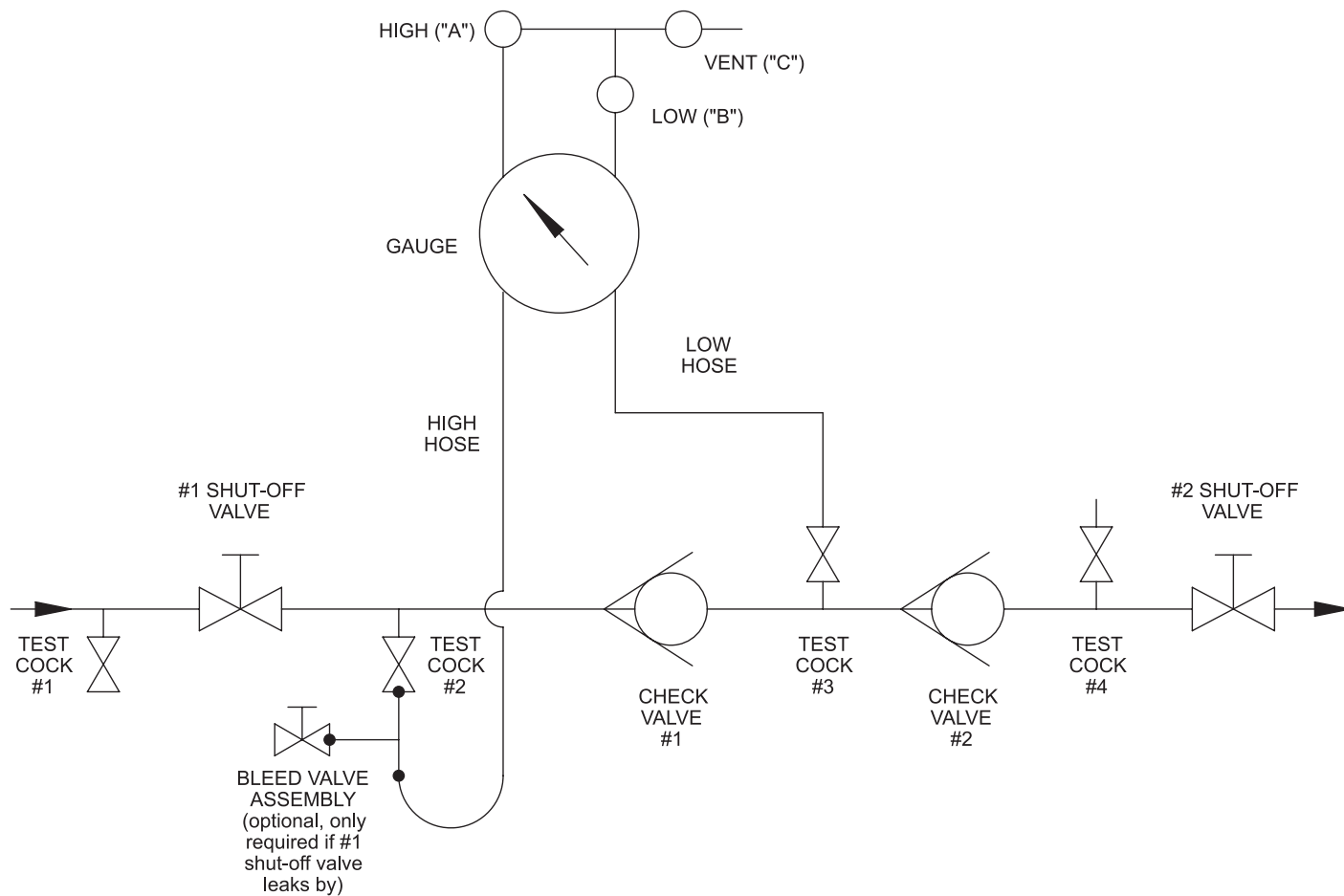
**NOTE:** If gauge is steady, then shut-off valve #2 is holding tight. However, if gauge drops to zero psid, then shut-off valve #2 is leaking.

**NOTE:** If the gauge rises then the #2 shut-off valve is still leaking, but is under backpressure from the facility.

## V. TESTING PROCEDURES

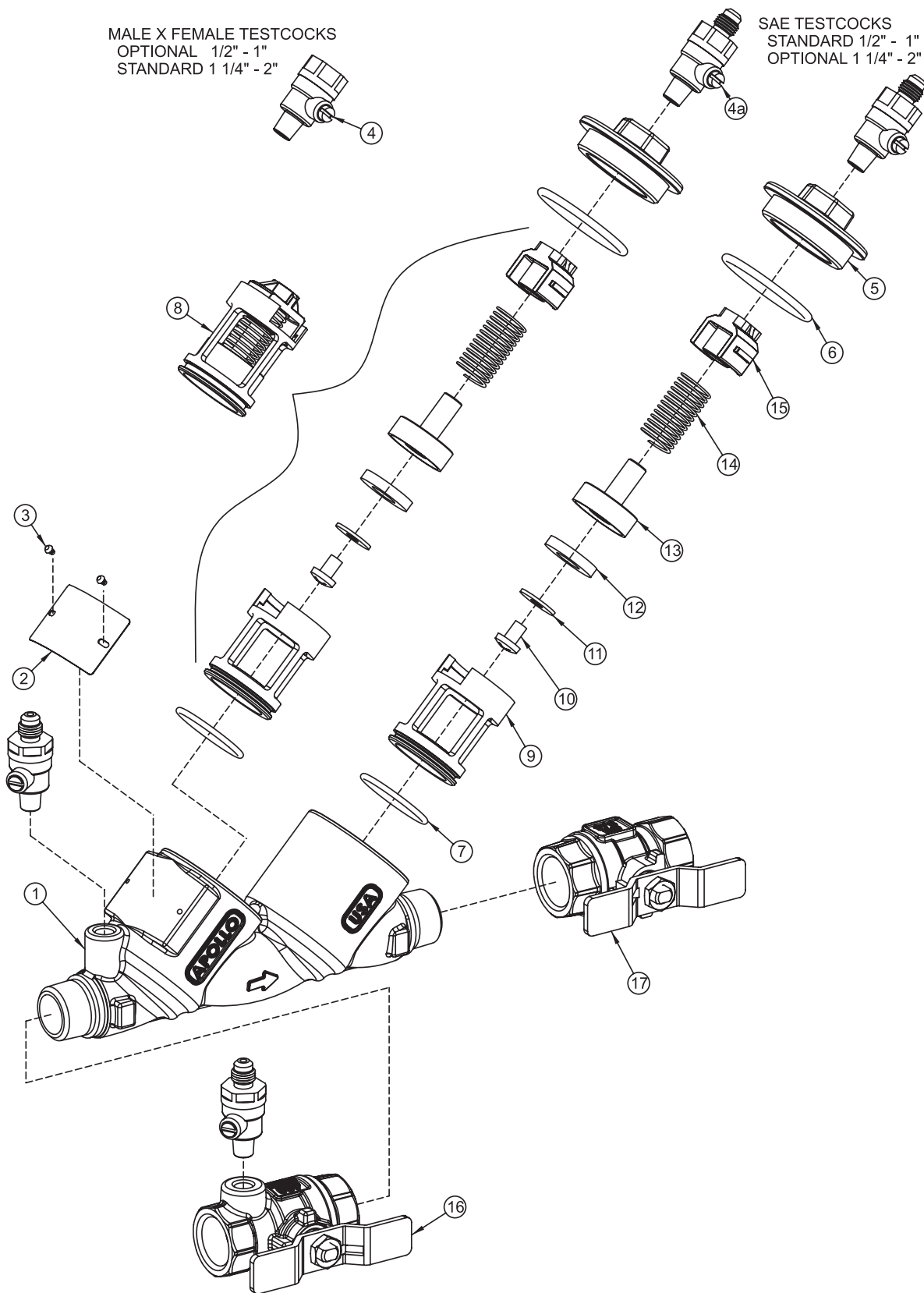
FIGURE 3

### 3-Valve Test Kit



## PART NUMBER DIAGRAM - 1/2" - 2"

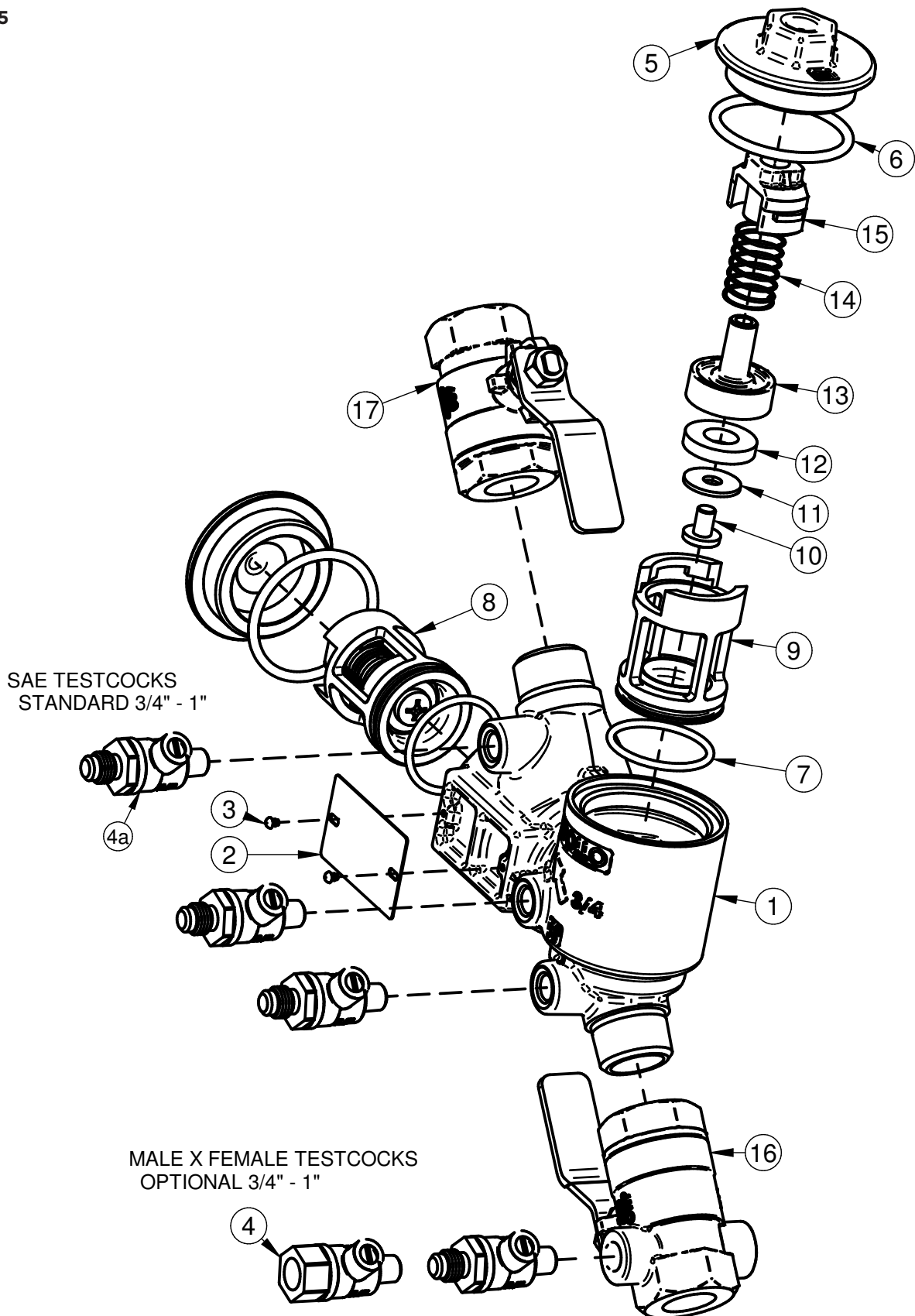
**FIGURE 4**





**PART NUMBER DIAGRAM - Y-PATTERN - 3/4" - 1"**

**FIGURE 5**



## PARTS LISTS - 1/2" - 2"

### DC4A AND DCLF4A PARTS LIST

ITEM #	DESCRIPTION	STD. OR LF	QTY.	PART NUMBER					
				1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
1	Body	All	1	Consult Factory					
2	Label Plate	All	1	Consult Factory					
3	Label Plate Tacks	All	2	I-2614-00					
4	Test Cock M x F (81 metal)	Std	4	78-290-01 (Optional)			78-291-01 (Standard)		
	Test Cock M x F (Lead Free)	LF		78LF-290-01 (Optional)			78LF-291-01 (Standard)		
	Test Cock SAE (81 metal)	Std		78-292-01 (Standard)			78-293-01 (Optional)		
	Test Cock SAE (Lead Free)	LF		78LF-292-01 (Standard)			78LF-293-01 (Optional)		
5	Cap (81 metal)	Std	2	F-3846-05	F-3822-05	F-3848-05	F-3850-05	F-3854-05	
	Cap (Lead Free)	LF		F-3847-05	F-3823-05	F-3849-05	F-3851-05	F-3855-05	
6	Cap O-Ring	All	2	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00	
7	Check Module O-Ring	All	2	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00	
8	Check S-Assy (see below)	All	2	W-9075-05	W-9003-05	W-9074-05	W-9159-05		W-9204-05

Individual parts are only available for bulk sales. Please refer to the appropriate repair kits on pages 11.

### CHECK MODULE SUB-ASSEMBLY PARTS LIST

ITEM #	DESCRIPTION	STD. OR LF	QTY.	PART NUMBER					
				1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
9	Check Seat	All	1	L-7815-00	L-7727-00	L-7813-00	L-7979-00		L-7983-00
10	Screw	All	1	B-3279-00	B-1750-00				
11	Disc Retaining Washer	All	1	E-2372-00	E-2841-00	E-2933-00	E-2860-00		E-2876-00
12	Seat Disc	All	1	D-4771-00	D-4743-00	D-4770-00	D-4853-00		D-4873-00
13	Poppet	All	1	K-4491-00	K-4471-00	K-4483-00	K-4511-00		K-4512-00
14	Spring	All	1	A-2505-00	A-2503-00	A-2510-00	A-2511-00		A-2512-00
15	Spring Retainer	All	1	L-7814-00	L-7726-00	L-7812-00	L-7980-00		L-7984-00

Individual parts are only available for bulk sales. Please refer to the appropriate repair kits on pages 11.

### INLET AND OUTLET SHUT-OFF VALVES

ITEM #	DESCRIPTION	STD. OR LF	QTY.	PART NUMBER					
				1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
16	T2 Inlet NPT Ball Valve w/ "T" Handle (Standard)	81 Mtl	1	77B-103-85	77B-104-83	77B-105-83	Not Available		
		LF		77BLF-103-85	77BLF-104-83	77BLF-105-83			
	T4 Inlet Union Ball Valve w/ "T" Handle (Option)	81 Mtl		77B-303-85	77B-304-83	77B-305-83	Not Available		
		LF		77BLF-303-85	77BLF-304-83	77BLF-305-83			
	T2 Inlet NPT Ball Valve w/ Lever Handle (Standard)	81 Mtl		Not Available			77B-106-84	77B-107-84	77B-108-84
		LF					77BLF-106-84	77BLF-107-84	77BLF-108-84
	T4 Inlet Union Ball Valve with Lever Handle (Option)	81 Mtl		Not Available			77B-306-84	77B-307-84	77B-308-84
		LF					77BLF-306-84	77BLF-307-84	77BLF-308-84
	T2 Inlet NPT Ball Valve with Locking "T" Handle (Option)	81 Mtl		Not Available	77B-104-91	77B-105-91	Not Available		
		LF			77BLF-104-91	77BLF-105-91			
	T4 Inlet Union Ball Valve with Locking "T" Handle (Option)	81 Mtl			77B-304-91	77B-305-91	Not Available		
		LF			77BLF-304-91	77BLF-305-91			
	T2 Inlet NPT Ball Valve with Locking Lever Handle (Option)	81 Mtl		Not Available			77B-106-86	77B-107-86	77B-108-86
		LF					77BLF-106-86	77BLF-107-86	77BLF-108-86
	T4 Inlet Union Ball Valve with Locking Lever Handle (Option)	81 Mtl		Not Available			77B-306-86	77B-307-86	77B-308-86
		LF					77BLF-306-86	77BLF-307-86	77BLF-308-86
17	T2 Outlet NPT Ball Valve with "T" Handle (Standard)	81 Mtl	1	77C-103-A4	77C-104-83	77C-105-83	Not Available		
		LF		77CLF-103-85	77CLF-104-83	77CLF-105-83			
	T4 Outlet Union Ball Valve with "T" Handle (Option)	81 Mtl		77C-303-85	77C-304-83	77C-305-83	Not Available		
		LF		77CLF-303-85	77CLF-304-83	77C-305-83			
	T2 Outlet NPT Ball Valve with Lever Handle (Standard)	81 Mtl		Not Available			77C-106-84	77C-107-84	77C-108-84
		LF					77CLF-106-84	77CLF-107-84	77CLF-108-84
	T4 Outlet Union Ball Valve with Lever Handle (Option)	81 Mtl		Not Available			77C-306-84	77C-307-84	77C-308-84
		LF					77CLF-306-84	77CLF-307-84	77CLF-308-84
	T2 Outlet NPT Ball Valve with Locking "T" Handle (Option)	81 Mtl		Not Available	77C-104-91	77C-105-91	Not Available		
		LF			77CLF-104-91	77CLF-105-91			
	T4 Outlet Union Ball Valve with Locking "T" Handle (Option)	81 Mtl			77C-304-91	77C-305-91	Not Available		
		LF			77CLF-304-91	77CLF-305-91			
	T2 Outlet NPT Ball Valve with Locking Lever Handle (Option)	81 Mtl		Not Available			77C-106-86	77C-107-86	77C-108-86
		LF					77CLF-106-86	77CLF-107-86	77CLF-108-86
	T4 Outlet Union Ball Valve with Locking Lever Handle (Option)	81 Mtl		Not Available			77C-306-86	77C-307-86	77C-308-86
		LF					77CLF-306-86	77CLF-307-86	77CLF-308-86

### REPLACEMENT HANDLES FOR BALL VALVE SHUT-OFF VALVES (T2 & T4 OPTIONS)

DESCRIPTION	STD. OR LF	PART NUMBER		
		1/2"	3/4" & 1"	1-1/4" / 1-1/2" / 2"
"T" Handle	All	W-9732-00	W-9864-00	W-9734-00
Lever Handle		Not Available		W-9366-00
Locking "T"		Not Available	W-2394-00	Not Available
Locking Lever		Not Available		W-9686-00

*Stainless steel handles are standard on all Apollo™ backflow devices.*

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

## REPAIR KITS DC4A & DCLF4A 1/2" - 2"

CHECK MODULE RUBBER KIT (ONE KIT REPAIRS ONE CHECK) (UNIVERSAL, FOR STANDARD & LEAD FREE VALVES)			SIZE				
			1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	REPAIR KIT MODEL NUMBER	QTY	RK4A12CMR	RK4A34CMR	RK4A1CMR	RK4A112CMR	RK4A2CMR
ITEM #	ORDERING NUMBER		4A-003-01	4A-004-01	4A-005-01	4A-007-01	4A-008-01
not shown	O-Ring Lubricant		I-9016-00				
11	Check Module Seat Disc	1	D-4771-00	D-4743-00	D-4770-00	D-4853-00	D-4873-00
7	Check Module O-Ring	1	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring	1	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00

DC CHECKS COMPLETE KIT (ONE KIT REPAIRS ONE CHECK) (UNIVERSAL, FOR STANDARD & LEAD FREE VALVES)			SIZE				
			1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	REPAIR KIT MODEL NUMBER	QTY	RK4A12CMC	RK4A34CMC	RK4A1CMC	RK4A112CMC	RK4A2CMC
ITEM #	ORDERING NUMBER		4A-003-02	4A-004-02	4A-005-02	4A-007-02	4A-008-02
not shown	O-Ring Lubricant		I-9016-00				
8	Check Module S-Assy	1	W-9075-05	W-9003-05	W-9074-05	W-9159-05	W-9204-05
7	Check Module O-Ring	1	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring (for DC/RP)	1	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00
extra part(s)	Bonnet O-Ring (for PVB)	1	D-4812-00	D-4883-00	D-4887-00	D-4858-00	

DC COMPLETE INTERNALS KIT (ONE KIT REPAIRS ONE DC VALVE) (UNIVERSAL, FOR STANDARD & LEAD FREE VALVES)			SIZE				
			1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	REPAIR KIT MODEL NUMBER	QTY	RK4A12TDC	RK4A34TDC	RK4A1TDC	RK4A112TDC	RK4A2TDC
ITEM #	ORDERING NUMBER		4A-003-08	4A-004-08	4A-005-08	4A-007-08	4A-008-08
not shown	O-Ring Lubricant		I-9016-00				
8	Check Module S-Assy	2	W-9075-05	W-9003-05	W-9074-05	W-9159-05	W-9204-05
7	Check Module O-Ring	2	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring	2	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00

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