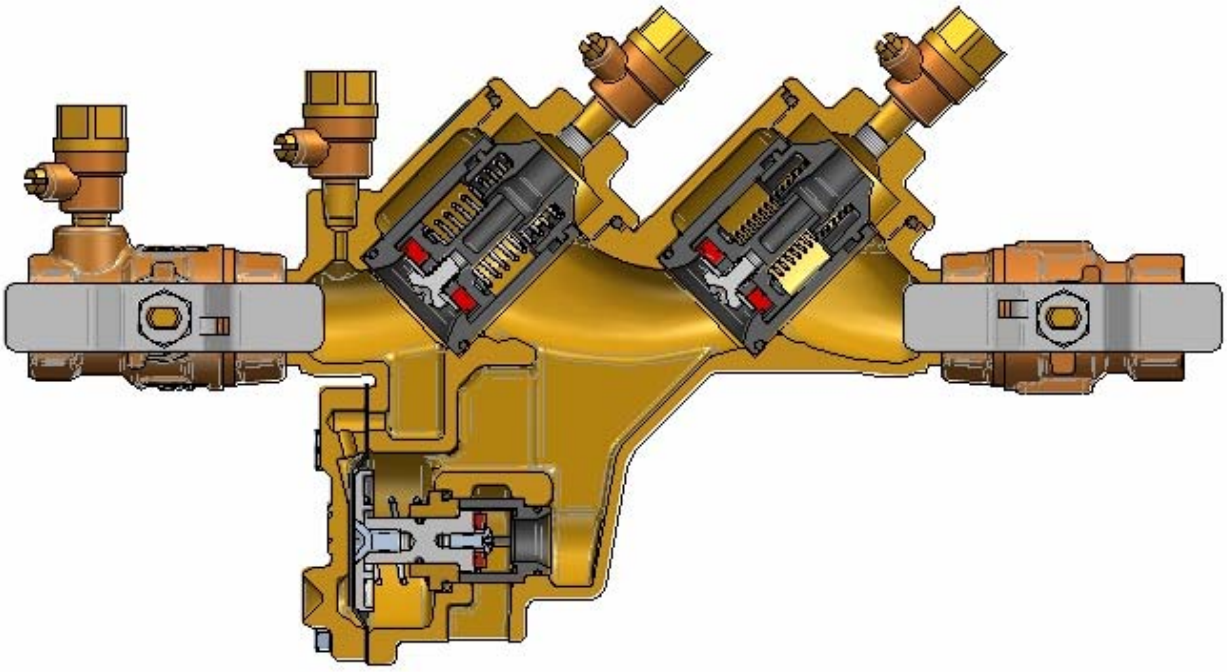
"Apollo" Valves

Made In The USA

RP4A Series

Installation, Operation, and Maintenance Manual



Reduced Pressure Principle (RP) Backflow Preventers 1/2” – 2”

TABLE OF CONTENTS

Reduced Pressure Principle Backflow Preventer 1/2" – 2"

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I. DESCRIPTION AND OPERATION

The Reduced Pressure Principle (RP) device consists of two independently acting, spring-loaded check valves, together with a hydraulically dependent, mechanically independent pressure differential relief valve, located in the zone between the check valves. Two resilient seated shut-off valves and four test cocks complete the assembly.

The first check is designed to maintain a minimum of 5 psi across the valve. The second check is designed to maintain a minimum of 1 psi across the valve during normal operation. The relief valve operates on a differential pressure. Supply pressure on the upstream side of the first check valve acts against the diaphragm to close the relief valve during normal operation. In the event of back-pressure, the relief valve will open to maintain the pressure in the "zone" at least 2 psi less than the inlet pressure.

The flowing and no flow conditions are illustrated in figures 1 and 2. A minimum supply pressure of 20 psig is normally required to fully shut the relief valve and open both checks.

II. INSTALLATION

A. The RP must be installed in an accessible location to facilitate periodic field testing and maintenance.
B. The location selected should have adequate drainage for relief valve discharge. The device should never be placed where it may be submerged in standing water.
C. Flush all upstream piping thoroughly to remove foreign matter prior to installing the device.
D. The device should be installed in the horizontal position. A clearance between the lower most portion of the device and flood grade or floor should be provided for ease of maintenance.
E. 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.
F. After installing the assembly and with downstream or #2 shut-off valve closed, pressurize the device and bleed air through test cock #4. Then open #2 shut-off valve.

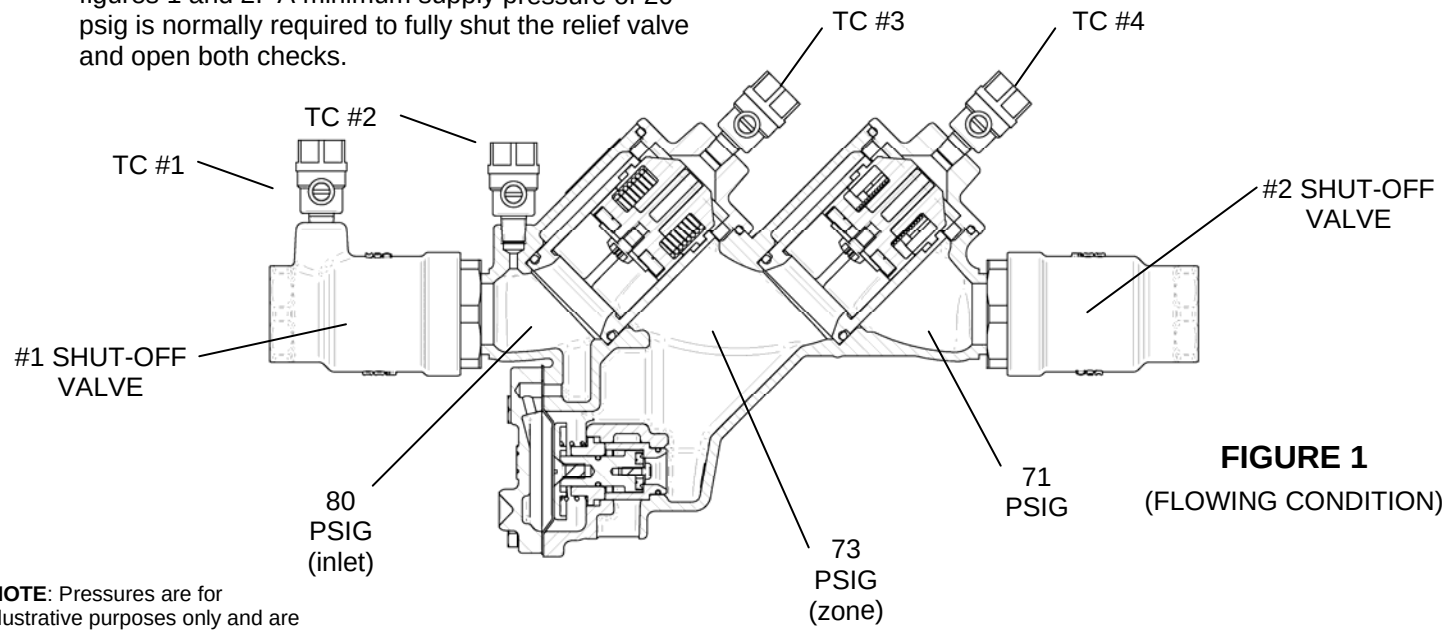

FIGURE 1
(FLOWING CONDITION)

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

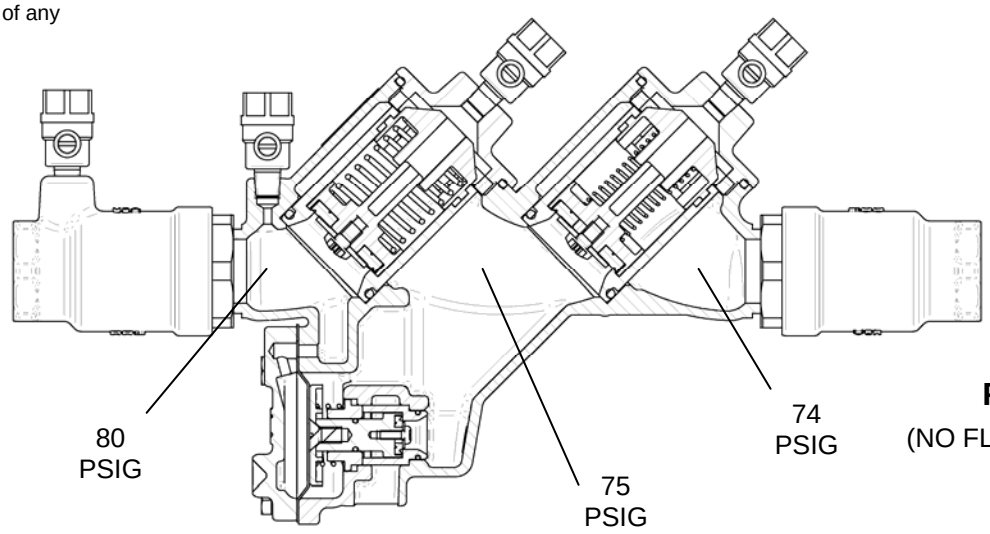

FIGURE 2
(NO FLOW CONDITION)

III. TROUBLE SHOOTING GUIDE

SYMPTOM	CAUSE	CORRECTIVE ACTION
1. Relief valve continuously discharges during no-flow condition.	a. #1 check valve fouled with debris. b. #2 check valve fouled with debris coupled with a backpressure condition. c. #1 check poppet stem not moving freely in guide (or #2 check poppet during a backpressure condition).	a. Inspect and clean seat disc and seat. b. Inspect and clean seat disc and seat. c. Inspect for debris or deposit on poppet stem or guide.
2. Relief valve discharges continuously during flow and no-flow conditions.	a. Relief valve fouled with debris. b. Damaged diaphragm (allows water to pass through from inlet to zone). c. Sensing passage to inlet side of diaphragm plugged. d. #1 check poppet stem not moving freely in poppet guide.	a. Inspect and clean relief valve seat disc and seat. b. Replace diaphragm. c. Inspect and clean passage in cover and body. d. Inspect for debris or deposits on poppet stem or guide.
3. Relief valve discharges intermittently in a “spitting” action during no-flow condition.	a. Pressure fluctuations or water hammer from supply.	a. Eliminate or reduce supply pressure fluctuations.
4. Relief valve does not open during test No. 1.	a. #2 shut-off valve not closed completely. b. Test equipment improperly installed.	a. Close #2 shut-off valve or inspect for possible through leakage. b. Recheck test procedure.
5. #2 check valve fails to hold backpressure.	a. #2 shut-off valve not closed completely. b. #2 check valve fouled with debris. c. #2 check poppet stem not moving freely in guide.	a. Close #2 shut-off valve or inspect for possible through leakage. b. Inspect and clean seat disc and seat. c. Inspect for debris or deposits on poppet stem or guide.
6. Pressure differential across #1 check valve is low during field test No. 3 (does not meet 5 PSID minimum).	a. #1 check valve fouled with debris. b. Upstream pressure fluctuations causing inaccurate gauge reading. c. #1 check poppet stem not moving freely in guide.	a. Inspect and clean seat disc and seat. b. Eliminate pressure fluctuations. c. Inspect for debris or deposits on poppet stem or guide.

IV. MAINTENANCE INSTRUCTIONS 1/2" – 2"

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.

B. 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 using Apollo lubricant of 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, ensure spring retainer pops up about .1" and locks into the lugs. 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.**
5. Apply a thin coat of Apollo lubricant of DOW® 111 or equal on cap o-ring.
6. Install cap.

E. Disassembly – Relief Valve

1. Remove cover bolts, cover, and diaphragm.
2. Grasp the diaphragm plate and pull the assembly straight out of the body.
3. Holding the relief valve assembly in one hand, remove the screw (and retaining washer on 1 ¼", 1 ½", & 2" models only).
4. Remove the seat disc.

(Items 5 through 7 are not normally required.)

5. Turn the assembly over, keeping the spring compressed by holding down on the diaphragm plate, remove the screw
6. Remove the diaphragm plate, spring, and bushing from the R.V. stem. Note the orientation of the bushing with respect to the spring.
7. Remove the o-ring from the R.V. stem.
8. Normally, the R.V. seat need not be removed. If removal is required, rock it back and forth while pulling outward.
9. 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.

F. Assembly – Relief Valve

1. Apply a thin coat of Apollo lubricant of DOW® 111 or equal on o-rings before installing.
2. Install o-ring on R.V. seat. Line up the seat with the bore and push firmly into place.
3. If the R.V. stem has been disassembled, install o-ring onto R.V. stem.
4. Slide bushing over R.V. stem and position spring onto bushing. Note the correct position of the bushing from step #6 in disassembly instructions. (Spring must fit over the smaller shoulder of the bushing upon reassembly.)
5. Position diaphragm plate and compress spring, install screw into R.V. stem.
6. Turn the assembly over and install seat disc, (and retaining washer on 1 ¼", 1 ½", & 2" models only), and screw.
7. Install o-ring onto bushing.
8. Slide complete assembly into the body.
9. Position diaphragm over flange, install cover, and tighten bolts evenly.
10. Open #1 shut-off valve and bleed air out of the unit through #2, #3, and #4 test cocks; then open #2 shut-off valve.
11. Test complete assembly to ensure proper operation.

V. TESTING PROCEDURES

NOTE: This 3 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 water will be off; inspect device for leaks, verify the make, model, and serial number.
2. Flush test cocks in order (4-1-2-3), (open # 2 test cock very slowly to prevent accidental opening of the relief valve), then install fittings.
3. Close valves “A”, “B”, & “C” on test kit and close the #2 shut-off valve.
4. Connect high side hose to test cock #2, and low hose to test cock #3.
5. Slowly open test cock #3, then open vent “C” valve and low “B” valve. This will bleed air from low side of gauge. Slowly open test cock #2, then open high “A” valve. This will bleed air from high side of gauge. Close valve “A”, then valve “B”, then valve “C”.
6. Observe this apparent differential pressure for check valve #1; this value must be at least 5.0 psi or greater.

TEST NO. 1

Purpose: To test check valve #2 against back pressure.

1. Connect the vent “C” hose to test cock #4.
2. Slowly open the high “A” and vent “C” valves and keep the low “B” closed.
3. Open test cock #4.
4. Gauge may decrease slightly due to disc compression. If pressure differential continues to decrease until the vent opens, then check valve #2 is reported as leaking.

TEST NO. 2

Purpose: To test shut-off valve #2 for tightness.

1. After passing test No. 1, continue to test No. 2 by closing test cock #2.
2. The indicated pressure differential will decrease slightly. If pressure differential continues to decrease (approaching zero) the No. 2 shut-off valve is reported to be leaking.

TEST NO. 3

Purpose: To test check valve #1 for tightness.

1. Close high “A” valve and open test cock #2.
2. Close test cock #4.
3. Open low valve “B”, this will bleed air from low side of gauge, then closing valve “B” restores the system to a normal static condition.
4. Observe the pressure differential gauge; this value must be at least 5.0 psi or greater. Record this value for check valve #1 on the backflow test report form.

TEST NO. 4

Purpose: To test operation of the Differential Pressure Relief Valve.

The Pressure Differential Relief Valve must operate to maintain the “zone” between the two check valves at least 2 psi less than supply pressure.

1. Close vent “C” valve.
2. Open the high “A” valve.
3. Slowly open the low “B” valve no more than one turn.
4. Hold the valve at this position and observe the gauge reading at the first moment the first discharge is noted from the relief valve.
5. Record this as the opening differential pressure of the relief valve on the test report form.

TEST NO. 5

Purpose: To do a differential pressure test on check valve #2.

1. After completing test No. 4, close test cock #2, then close test cock #3.
2. Close valves “A”, “B”, and “C” on test kit.
3. Move low hose “B” to test cock #4, then move high hose “A” to test cock #3.
4. Slowly open test cock #4, then open vent “C” valve and low “B” valve. This will bleed air from low side of gauge.
5. Slowly open test cock #3, then open high “A” valve. This will bleed air from high side of gauge.
6. Close valve “A”, then “B”, then “C”.
7. Observe the pressure differential gauge, this value must be at least 1.0 psi or greater.
8. Record this value for check valve #2 on the backflow test report form.

END OF TESTING

Make sure all test cocks are closed. Remove hoses and fittings. Slowly open shut-off valve #2 to restore water supply to the customer.

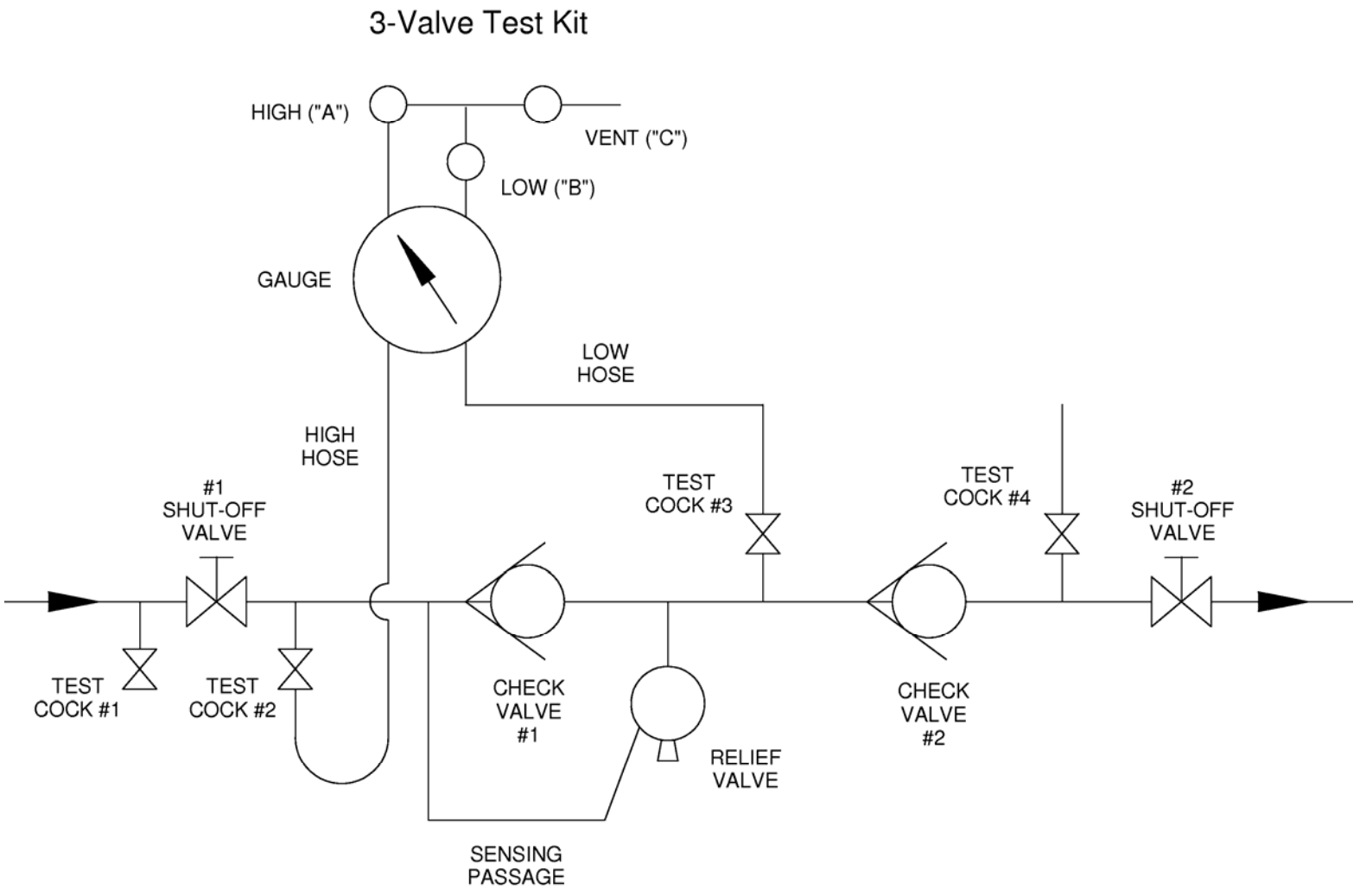
3-Valve Test Kit
HIGH ("A")
VENT ("C")
LOW ("B")
GAUGE
LOW
HOSE
HIGH
HOSE
#1
SHUT-OFF
VALVE
TEST
COCK #3
TEST
COCK #4
#2
SHUT-OFF
VALVE
TEST
COCK #1
TEST
COCK #2
CHECK
VALVE
#1
CHECK
VALVE
#2
RELIEF
VALVE
SENSING
PASSAGE

FIGURE 3

VI. PARTS LIST 1/2” – 2”

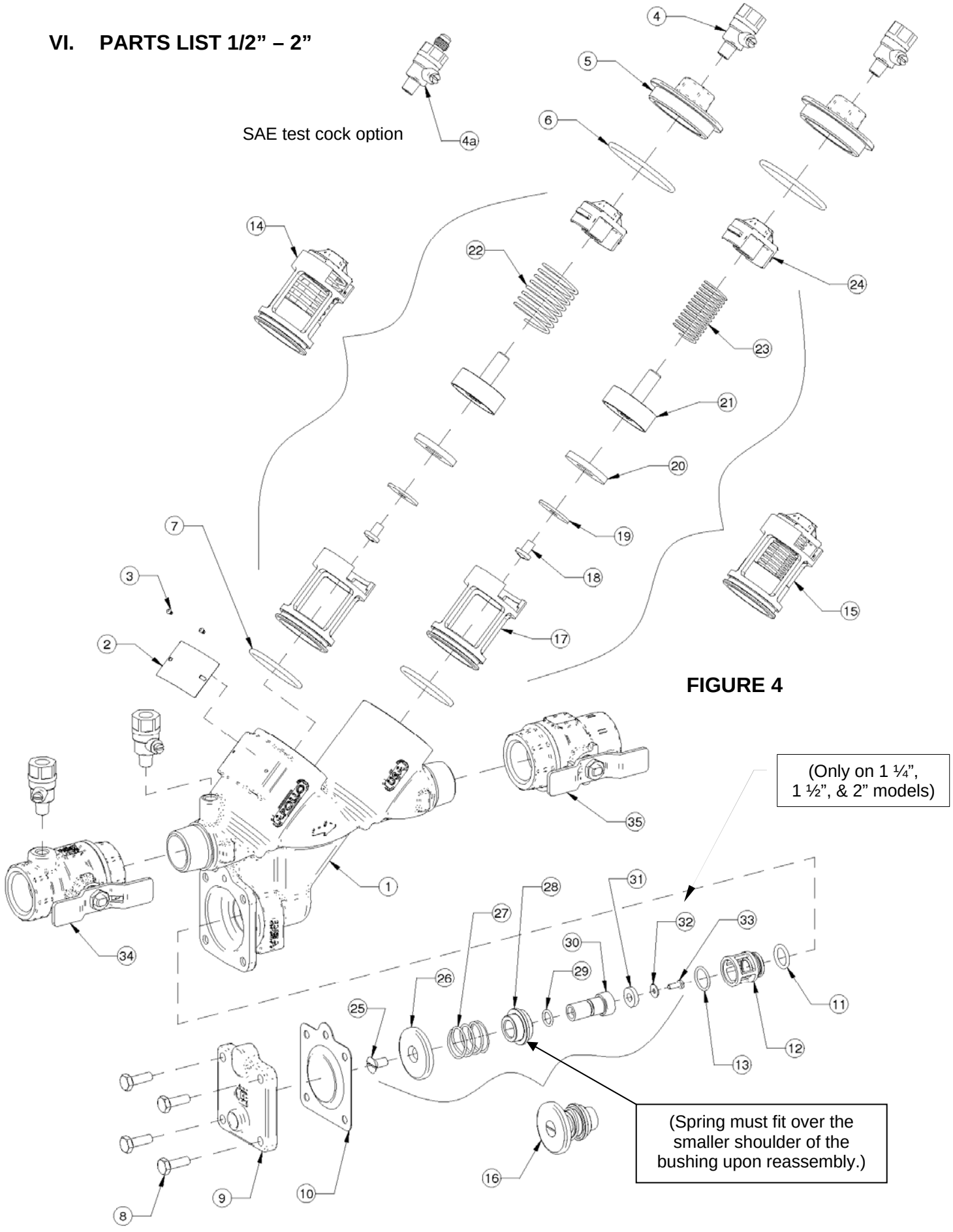

FIGURE 4

RP4A PARTS LIST

ITEM #	DESCRIPTION	QTY.	PART #					
			1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
1	Body	1	Q-6890-05	Q-6866-05	Q-6892-05	Q-6894-05	Q-6896-05	Q-6898-05
2	Label Plate	1	I-9025-00					
3	Label Plate Tack	2	I-2614-00					
4	Test Cock	4	78-290-01			78-291-01		
4a	SAE Test Cock (optional)	4	78-292-01			78-293-01		
5	Cap	2	F-3846-05	F-3822-05	F-3848-05	F-3850-05		F-3854-05
6	Cap O-Ring	2	D-4881-00	D-4812-00	D-4884-00	D-4885-00		D-4888-00
7	Check Module O-Ring	2	D-4880-00	D-4744-00	D-4882-00	D-4884-00		D-4885-00
8	RV Cover Bolts	(QTY)	B-1793-00 (4)			B-1751-00 (6)		B-1751-00 (7)
9	RV Cover	1	F-3890-05			F-3894-05		F-3892-05
10	RV Diaphragm	1	D-2632-00			D-2505-00		D-4909-00
11	RV Seat O-Ring	1	D-4892-00			D-4910-00		D-4903-00
12	RV Seat	1	L-7894-00			L-8038-00		L-8039-00
13	RV Bushing Face O-Ring	1	D-4893-00			D-4744-00		D-4904-00
14	1st Check Module S-Assy (see table below)	1	W-9207-05	W-9208-05	W-9209-05	W-9210-05		W-9211-05
15	2nd Check Module S-Assy (see table below)	1	W-9075-05	W-9003-05	W-9074-05	W-9159-05		W-9204-05
16	RV Module S-Assy (see table below)	1	W-9223-05			W-9244-05		W-9245-05

CHECK MODULE SUB-ASSEMBLY PARTS LIST

ITEM #	DESCRIPTION	QTY.	PART #					
			1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
17	Check Seat	1	L-7815-00	L-7727-00	L-7813-00	L-7979-00		L-7983-00
18	Screw	1	B-3279-00	B-1750-00				
19	Disc Retaining Washer	1	E-2372-00	E-2841-00	E-2933-00	E-2860-00		E-2876-00
20	Seat Disc	1	D-4771-00	D-4743-00	D-4770-00	D-4853-00		D-4873-00
21	Poppet	1	K-4491-00	K-4471-00	K-4483-00	K-4511-00		K-4512-00
22	Spring, First Check	1	A-2514-00	A-2515-00	A-2516-00	A-2517-00		A-2518-00
23	Spring, Second Check	1	A-2505-00	A-2503-00	A-2510-00	A-2511-00		A-2512-00
24	Spring Retainer	1	L-7814-00	L-7726-00	L-7812-00	L-7980-00		L-7984-00

RELIEF VALVE MODULE SUB-ASSEMBLY PARTS LIST

ITEM #	DESCRIPTION	QTY.	PART #					
			1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
25	RV Diaphragm Plate Screw	1	B-1749-00					B-1750-00
26	RV Diaphragm Plate	1	E-2222-00			D-2506-00		E-2891-00
27	RV Spring	1	A-2542-00			A-2543-00		A-2519-00
28	RV Bushing	1	I-8976-00			I-9053-00		I-9054-00
29	RV Stem O-Ring	1	D-4891-00			D-4927-00		D-4902-00
30	RV Stem	1	G-4791-00			G-3212-00		G-4816-00
31	RV Seat Disc	1	D-4833-00			D-4911-00		D-4912-00
32	RV Seat Disc Washer	1	NONE			E-2280-00		E-2890-00
33	RV Seat Disc Screw	1	B-3254-00			B-3280-00		B-1750-00

INLET AND OUTLET SHUT-OFF VALVES

ITEM #	DESCRIPTION		PART #					
			1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
34	T2 standard	Inlet Shut-Off Valve	77B-103-85	77B-104-83	77B-105-83	77B-106-84	77B-107-84	77B-108-84
	T4 option	Inlet Shut-Off Valve w/Union	77B-303-85	77B-304-83	77B-305-83	77B-306-84	77B-307-84	77B-308-84
35	T2 standard	Outlet Shut-Off Valve	77C-103-A4	77C-104-83	77C-105-83	77C-106-84	77C-107-84	77C-108-84
	T4 option	Outlet Shut-Off Valve w/Union	77C-303-85	77C-304-83	77C-305-83	77C-306-84	77C-307-84	77C-308-84
	Replacement Handles for Shut-Off Valves		H-3821-00	H-3818-00		W-9366-00		
4	Standard	Test Cock (MNPT X FNPT)	78-290-01			78-291-01		
4a	T2F option	SAE Flare Test Cock (MNPT X SAE Flare)	78-292-01			78-293-01		

REPAIR KITS

CM is Check Module **C is Complete subassembly(s)** **R is Rubber only**
RPCM is RP first Check Module

		RP Checks Rubber Only Kit (One kit repairs one check)				
		Size				
		1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	Repair Kit Model Number	RK4A12CMR	RK4A34CMR	RK4A1CMR	RK4A112CMR	RK4A2CMR
	Ordering Code	4A-003-01	4A-004-01	4A-005-01	4A-007-01	4A-008-01
not shown	O-Ring Lubricant	l-9016-00				
20	Check Module Seat Disc	D-4771-00	D-4743-00	D-4770-00	D-4853-00	D-4873-00
7	Check Module O-Ring	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring (for RP)	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00

		RP First Check Complete Kit (One kit repairs one check)				
		Size				
		1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	Repair Kit Model Number	RK4A12RPCMC	RK4A34RPCMC	RK4A1RPCMC	RK4A112RPCMC	RK4A2RPCMC
	Ordering Code	4A-003-03	4A-004-03	4A-005-03	4A-007-03	4A-008-03
not shown	O-Ring Lubricant	l-9016-00				
14	Check Module S-ASSY	W-9207-05	W-9208-05	W-9209-05	W-9210-05	W-9211-05
7	Check Module O-Ring	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring (for RP)	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00

		RP Second Check Complete Kit (One kit repairs one check)				
		Size				
		1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	Repair Kit Model Number	RK4A12CMC	RK4A34CMC	RK4A1CMC	RK4A112CMC	RK4A2CMC
	Ordering Code	4A-003-02	4A-004-02	4A-005-02	4A-007-02	4A-008-02
not shown	O-Ring Lubricant	l-9016-00				
15	Check Module S-ASSY	W-9075-05	W-9003-05	W-9074-05	W-9159-05	W-9204-05
7	Check Module O-Ring	D-4880-00	D-4744-00	D-4882-00	D-4884-00	D-4885-00
6	Cap O-Ring (for RP)	D-4881-00	D-4812-00	D-4884-00	D-4885-00	D-4888-00
extra part*	Bonnet O-Ring (for PVB)	D-4812-00	D-4883-00	D-4887-00	D-4858-00	

*Extra part not needed for RP4A

		RP Relief Valve Rubber Kit				
		Size				
		1/2"	3/4"	1"	1-1/4" - 1-1/2"	2"
ITEM #	Repair Kit Model Number	RK4A1RVR			RK4A112RVR	RK4A2RVR
	Ordering Code	4A-005-04			4A-007-04	4A-008-04
not shown	O-Ring Lubricant	l-9016-00				
10	RV Diaphragm	D-2632-00			D-2505-00	D-4909-00
13	RV Bushing O-Ring	D-4893-00			D-4744-00	D-4904-00
11	RV Seat O-Ring	D-4892-00			D-4910-00	D-4903-00
29	RV Stem O-Ring	D-4891-00			D-4927-00	D-4902-00
31	RV Seat Disc	D-4833-00			D-4911-00	D-4912-00
		RP Relief Valve Complete Kit				
ITEM #	Repair Kit Model Number	RK4A1RVC			RK4A112RVC	RK4A2RVC
	Ordering Code	4A-005-05			4A-007-05	4A-008-05
not shown	O-Ring Lubricant	l-9016-00				
10	RV Diaphragm	D-2632-00			D-2505-00	D-4909-00
13	RV Bushing O-Ring	D-4893-00			D-4744-00	D-4904-00
11	RV Seat O-Ring	D-4892-00			D-4910-00	D-4903-00
16	RV S-ASSY	W-9223-05			W-9244-05	W-9245-05
12	RV Seat	L-7894-00			L-8038-00	L-8039-00

ITEM #	Repair Kit Model Number	QTY.	RP Complete Rubber Only Kit (One kit repairs one RP valve)				
			Size				
			1/2"	3/4"	1"	1 1/4" 1 1/2"	2"
	Repair Kit Model Number		RK4A12TR	RK4A34TR	RK4A1TR	RK4A112TR	RK4A2TR
	Ordering Code		4A-003-09	4A-004-09	4A-005-09	4A-007-09	4A-008-09
not shown	O-Ring Lubricant	2	I-9016-00				
20	Check Module Seat Disc	2	D-4771-00	D-4743-00	D-4770-00	D-4853-00	D-4873-00
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
10	RV Diaphragm	1	D-2632-00			D-2505-00	D-4909-00
13	RV Bushing O-Ring	1	D-4893-00			D-4744-00	D-4904-00
11	RV Seat O-Ring	1	D-4892-00			D-4910-00	D-4903-00
29	RV Stem O-Ring	1	D-4891-00			D-4927-00	D-4902-00
31	RV Seat Disc	1	D-4833-00			D-4911-00	D-4912-00