

# ACE

## Model K4 Operation and Service Manual

### Ace Duraflo



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## EXPRESS WARRANTY AND DISCLAIMER OF IMPLIED WARRANTIES

### **Warning and Safety Precautions**

Ace DuraFlo dispensers can develop fluid pressures in excess of 2000 pounds per square inch. Mechanical members are actuated under forces of up to 500 psi. Do not energize the system unless all doors are closed, and fingers, tools, and other objects are outside of the machine cabinet.

Become thoroughly acquainted with first-aid procedures recommended by your resin supplier. Most resin suppliers also recommend skin & eye protection when handling epoxies. Closely follow these recommendations to avoid injury.

The heating element surface temperature can exceed 350 degrees Fahrenheit. Don't touch!

If solvents are to be used for cleaning, personnel should become thoroughly acquainted with their characteristics. Most solvents are hazardous under all circumstances and extremely dangerous in non-ventilated areas, or at elevated temperatures.

A thorough understanding of this Operation and Service Manual is crucial to safe operation. Do not attempt to operate this system until thoroughly familiar with its contents.

# Introduction

## Filling The Supply Tanks

Epoxies have two components: The base resin, (Part A) and the catalyst (Part B). The catalyst is usually thinner than the base. It is of the greatest importance that the person placing the components into the reservoirs knows—without any doubt—the difference. If there is any doubt as to which is which, STOP!.....until you “know” what you are doing.

The resin components are held in two gallon pressure vessels located inside the cabinet, below the metering assemblies. They are labeled Base (A) and Catalyst (B). The epoxy manufacturers containers are similarly identified. The (A) vessel is removed and filled from the right side (as viewed from the handle end) of the machine and the (B) vessel is removed and filled from the left side (as viewed from the handle end of the machine) of the machine.

The vessel lids cannot be removed if the vessels are pressurized. To vent the vessel, rotate the directional valve handle to point away from the inlet air tube as shown in photo 1. Once the tank is thoroughly vented, free the lid by lifting its bale and pressing the lid down. See photo 2.



1. Rotate the selector valve pointer 180° from the air inlet tubing. This will close off incoming air, and vent the tank.

2. Lift the bale and press down on the tank lid to free it.



3. Twist and tilt the lid until it clears the opening. The lid seal should be attached to the rim. If not, check to see if it has dropped into the tank, or stuck to the underside of the tank lip.

4. After the material has been added, replace the lid. Lock it into place by pushing its bale forward. Rotate the selector valve pointer back toward the air supply tubing to energize the tank.



Fill one vessel at a time to avoid contamination. Make no mistakes when filling the pressure vessels. Proceed slowly and deliberately, for if the wrong component is poured into a vessel, significant damage to the system can result. If you discover you have made a mistake, do not operate the machine! Rather, empty the contaminated vessel or vessels as quickly as possible and clean with solvent. If you have operated the machine, empty the vessels, and then pump a solvent through the machine until the solvent runs clean.

When filling the vessels, leave the fluid levels at least two inches or more below the lip to allow the lid to be maneuvered into place without dunking it into the resin. After replacing the lids, rotate the directional valves to point the to the air supply tube (see photo 4). This will pressurize the vessels.

# Introduction

## The Air Supply



The air inlet is located at the front of the machine (same side as the handle), as shown in the photo on the left. The machine requires 4-6 cfm of clean, dry air at a minimum of 70 psi. There is an air filter mounted inside the dispenser. It is a coalescing type filter that is designed to remove oil vapors and small particles from the air stream. It will remove some moisture but that is not its main function. Water that is accumulated within the air filter will be vented when the air pressure to the machine has been released. This is normal and not a cause for concern. Never use WD-40, Marvel Mystery Oil, 3 in 1 Oil or similar to enter the air supply. These lubricants contain additives that will damage the seals.



The pressure regulator at the front of the machine is adjusted by rotating to the right (clockwise) to increase the dispense pressure. Increasing the dispense pressure will increase the flow of material from the static mixer. Turning the regulator to the left (counter clockwise) decreases the dispense pressure. The knob locks into place when pushed in and must be pulled out to adjust the pressure.



The Pneumatic fittings used throughout the dispenser are of the “press-to-connect” variety. The connection is made by firmly inserting or pressing the tube into the fitting. The tube is released by holding the fitting collar firmly back against the fitting body, while pulling the tube from the fitting.

## The Electricity



The electrical connection is located on the front (handle side) of the machine. The electricity is used to power the heater inside the cabinet. The electric heater requires less than 10 amps of 110v or 240v AC voltage.

# Operation

## To Begin With

Fill both vessels with the appropriate resin and set the cycle counter to zero.

Connect electricity to the dispenser. Open the door opposite the foot pedal. At the bottom of the cabinet you will find the thermostat for the heater. Rotate the dial to the desired temperature setting at least four hours before use to assure thorough heating of the resin and system.

Reduce the air cylinder pressure setting by rotating the knob on the pressure regulator counter clockwise until the spring is relaxed.

Make sure that the proper personal protective equipment is being used. Make yourself familiar with the precautions recommended by the resin manufacturer.

Rotate the directional valves on the pressure vessels so that the handles point to the air supply tubing.

## Dispensing

Connect the air supply to the dispenser.

Attach a static mixer to the dispense nozzle. Its a good idea to put some grease on the threads of the dispense nozzle at this time. This will help to keep the mixer nut from being glued in place. Place a waste container below the static mixer to catch the epoxy resin. This container will then be disposed of.

Turn the dispenser on.

Step on the foot pedal. There will be an audible noise when the ball valves switch.

Increase the dispense air pressure to start material flow from the static mixer. This is done by rotating the knob on the regulator in the clockwise direction. The flow can be adjusted to the desired rate by increasing or decreasing the air pressure. Once this pressure is set it will remain constant for the following dispense cycles.

*Note: The dispenser will only register a reading on the pressure gauge during a dispense cycle. This is because it is reading the pressure to the main air cylinder on its dispense stroke.*

A full dispense stroke will yield approx. 100 cc's of resin. To dispense a partial stroke, switch the On/Off switch to the Off position and the dispenser will stop dispensing and reset.

## Clean - Up

Because the two resin components are not joined until they meet within the static mixer, there is no formal clean-up procedure required after each use. Turn the dispenser "Off". Remove the static mixer and dispose of it. Also wipe the threads clean with solvent. When you are ready to dispense again, simply install another static mixer. There is no need to flush or otherwise clean the system.

Make a daily check of resin leakage from the metering cylinders. A slight amount of wetting is normal, but if puddles begin to form below the cylinders, it is an indication that the piston seals need replacement.

## Ratio Assurance Check

**WARNING!** The Model K4 Dispenser contains moving parts which are by definition wearing parts. Critical components are wearing from the moment you energize the system. It is absolutely essential that this wear be anticipated and monitored to assure proper ratio dispensing. Key personnel must become familiar with the following procedure for monitoring the wear of metering seals, for if it does not become routine, improperly metered material will result.

The frequency with which the performance of the seals should be checked varies with the abrasiveness of the fillers within the product being dispensed, as well as the volume of resin dispensed. Normally, once each week of operation is sufficient to detect any ratio error before it becomes significant. However, if the results are critical, monitoring should be more intense. The ratio check is a three stage procedure.

**Stage I:** To determine if the COCO outlet valve seals are leaking in the direction of normal flow.

1. Switch the dispenser “off”. (This will open the inlet valves, and close the outlet valves.)
2. Disconnect the dispense hoses from the machine.
3. Wipe the outlet fittings, and place a paper towel beneath them.
4. Wait at least five minutes, and then observe the towel for any evidence of leakage from the fittings. If no seepage has occurred, move to stage II.

If seepage, regardless of how minute, has occurred, replace the leaking seals.

**Stage II:** To determine if the Coco inlet valve seals are leaking in the direction of normal flow.

1. Turn the pressure regulator counterclockwise until it becomes “loose”.
2. Flip the dispenser switch “on”. (This will open the outlet valves and close the inlet valves.)
3. Repeat steps 4 and 5 from **Stage I**.

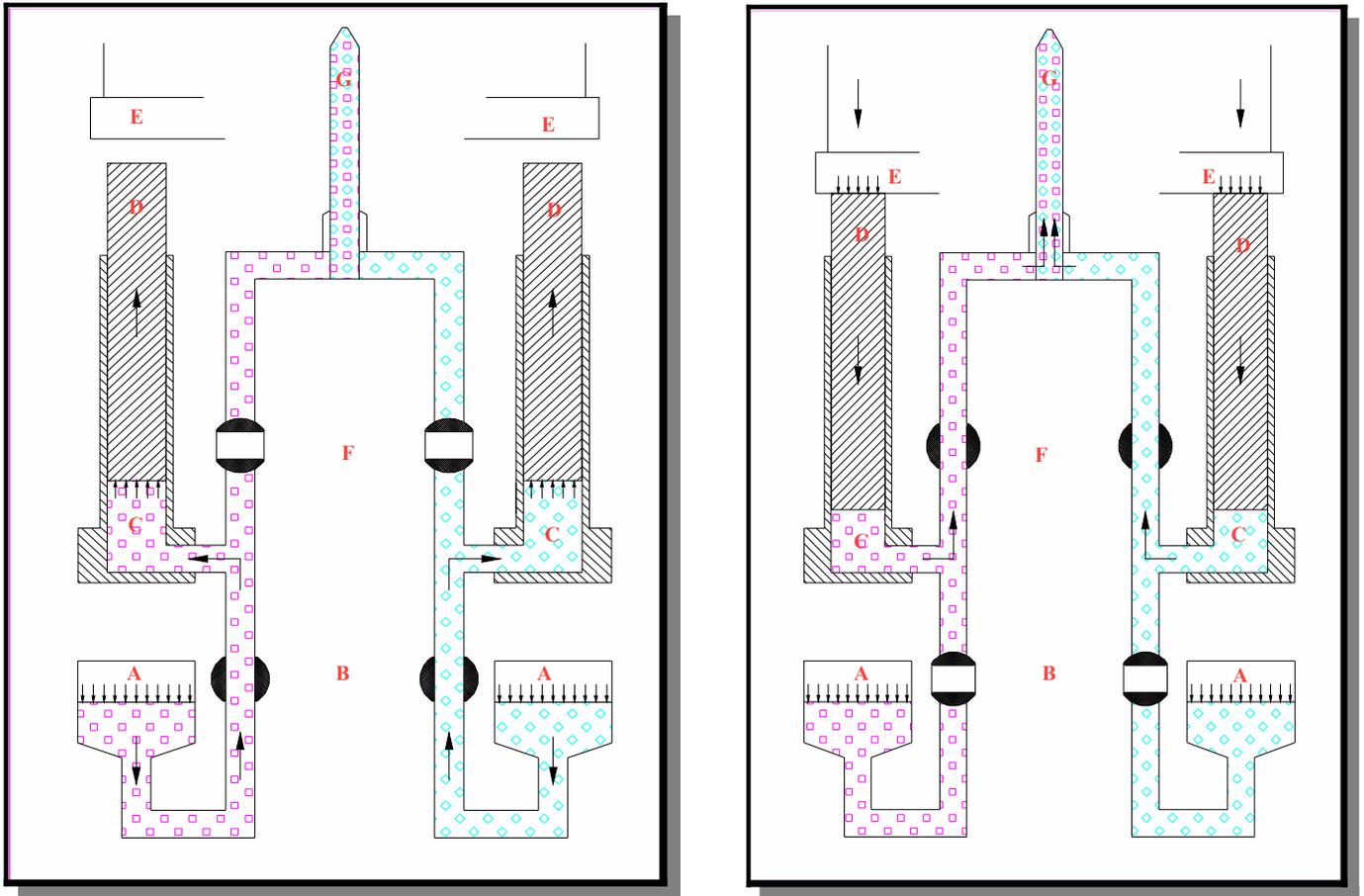
If seepage, regardless of how minute, has occurred, replace the leaking seals.

**Stage III:** To determine if the Coco inlet valves are leaking in the direction opposite normal flow.

1. Disconnect the outlet hoses and tightly cap the outlet fittings with the caps supplied.
2. Rotate the directional valves to vent the pressure vessels.
3. Disconnect the material supply hoses at the COCO valves.
4. Turn the dispenser pressure regulator knob clockwise to the maximum pressure available.
5. Wipe the inlet fittings, and place a paper towel beneath them.
6. Wait at least five minutes, and then observe the towel for any evidence of leakage from the fittings.

If seepage, regardless of how minute, has occurred, replace the leaking seals.

## CoCo Valve Module



The resin components are pressurized within vessels (A) or by pumps. Pressurized, the components flow through open inlet valves (B) to enter their respective metering cylinders (C).

The metering pistons (D) are extended by the resin pressure until they bear against the main air cylinder end cap (E).

After both metering pistons are fully extended, the inlet valves (B) close, and the outlet valves (F) open.

The resin components then exit under the pressure exerted by the main air cylinder (E) descending against the metering pistons (D).

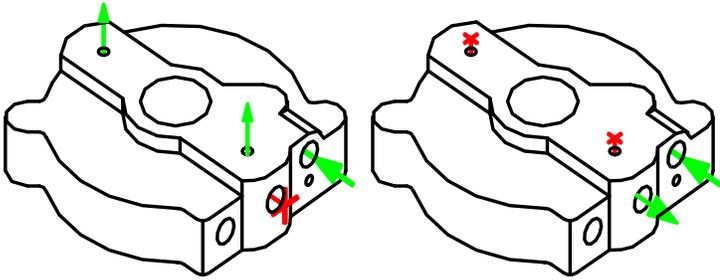
The components merge at a mixer (G). When the dispense stroke is completed, the outlet valves (F) close, the inlet valves (B) open to allow the metering cylinders to refill, as the main air cylinder ascends.

# The System and How It Works

## The Fill Sensors

Sensors prevent the dispense cycle until both metering cylinders are completely filled. This is important, because if a dispense cycle occurs before both metering cylinders are filled, there will be a shortage of one component, and inadequate cure of the dispensed resin as a result.

The air signal that triggers the system to dispense is routed through a conduit within the main air cylinder end cap. This conduit is intersected by two holes which vent, and thereby erase, the signal if they are not plugged.



The holes can only be sealed off by the impingement of the ends of both of the metering pistons when fully extended. Once both of the vent holes are sealed, (confirming the arrival of both pistons) pressure builds in the air circuit to trigger the dispense cycle.

Urethane pads fixed to the ends of the metering pistons cushion the impact against the air cylinder end cap, and make a tight seal at the vent holes.

## Servicing the System

If the K4 is properly maintained, service will involve little more than routine replacement of dynamic seals exposed to material being dispensed. The frequency of seal replacement will depend upon the material dispensed. Thousands of gallons of non-abrasive resin with good lubricity may be dispensed with little, if any, service; while the use of an abrasive – and usually inexpensive – material is likely to necessitate frequent seal replacement. Costly damage to metering cylinders and their pistons may also result from the use of an abrasive product.

### Lubrication

Periodic (twice a year) lubrication of the pneumatic components is recommended. To do so, de-energize the system and open the door on the foot pedal side. Below the pressure vessel grate, on the left side, you'll find a four way connector connected to the air filter. Disconnect the clear nylon 5/32" tubing, there are two. Squeeze a generous dose of silicone lubricant into the two clear tubes. To lube the Twin Valve, remove one of the two clear nylon tubes from the center port marked "Inlet". Squeeze a small amount of the silicone grease into the tubing. Reconnect the tubing. No other lubrication is needed. Never use WD-40 or similar products in the air circuit.



### The CoCo Module

When a ratio assurance check reveals a need for seal replacement at the Coco module, it is not necessary to replace all of the seals within the module. Rather, replace only those seals metering the same component. Resin components differ dramatically in terms of their abrasiveness, so the wear of the seal managing one component is seldom an indication that the seals on the opposite side are similarly worn.

It is good practice to replace the coupler shaft seals (S-328) when replacing the ball seals. They are exposed to the same product, so the wear is comparable. Besides, the seals are exposed during the course of replacing the ball seals, and therefore easily replaced in the course of ball seal replacement.

When servicing the Coco module, refer to the exploded parts view on [pages 16 & 17](#) as well as the illustrated steps below.

### Disassembly

Turn the switch off. Vent the fluid tanks, and disconnect the air supply to the dispenser. Grasp the metering pistons and press them down into their cylinders. This will purge the cylinders of material, which will flow back into the tanks. Disconnect the material supply and dispense hoses at the Coco fittings.



1. Use an 11/16" wrench to remove the inlet and outlet hose fittings at the COCO valves.

2. Disconnect the pneumatic tubes at the fittings of the COCO actuator



3. Use a 7/8" wrench to loosen the JIC fittings at the base manifold unions. The COCO ball valve assembly can now be removed from the cabinet for further disassembly.

4. Remove the bolt (S-334) securing the spacer block to the COCO frame.

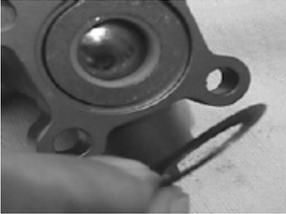


## Servicing the System



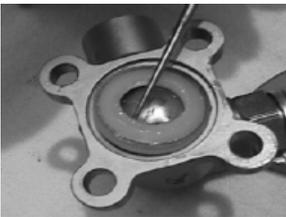
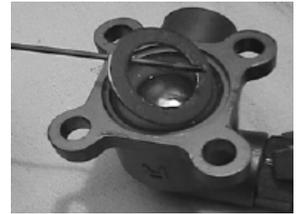
5. To remove the snap ring, grasp the coupler shaft (M-581) with a cushioned tool, and gently work it and its bushing (M-802) from the cavity.

6. Use a 3/16" allen wrench to remove the four screws securing the valve to the spacer block. If they do not separate easily, tap them apart. Use a plastic mallet.



7. Remove the O-Ring (S-509) and the seal spring (S-330) (concave washer).

8. Remove the remaining washer (S-329).



9. Use a seal pick to remove the seal (S-332). Take care not to scratch the ball or the wall of the pocket.

10. Shake the ball (M-803) free from the valve body.



11. Use the seal pick to gently urge the lower seal from its seat. Take care not to scratch the housing.

12. Remove the lower washer and spring. Take care not to scratch the housing.



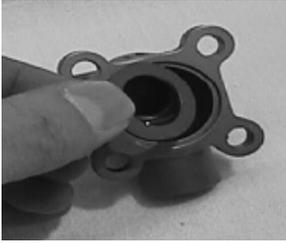
**Cleaning** Clean the components thoroughly, but do not use steel bristle brushes or instruments likely to scratch or gouge. Most solvents and cleaning agents can be used without damage to the stainless steel parts.

**Inspection** Carefully inspect each part. If possible, use a magnifier and light. Pay special attention to the balls and the valve sockets. If there is any blemish, replace the part. Flat and spring washers do not need to be replaced unless damaged.



# Servicing the System

## Assembly



1. Fit the seal spring (S-330) into the pocket with its concave side toward the ball.

2. Place the washer (S-329) over the spring. Nudge it to be certain that both it and the spring are fully seated.



3. Insert the seal vertical to the pocket until it is within the pocket. Then, twist it flat so that the spring side of the seal is facing down.

4. Nudge it into place with the fingers, and then press it firmly into the bottom of the pocket with the setting tool (M-806) from the seal kit.



5. Slide the ball into the pocket with the detent (slot) facing the coupler pocket. Use the tang of the coupler shaft (M-581) to squarely align the ball slot.

6. Install the exterior seal (S-332) with the spring groove facing away from the ball.



7. Install the flat washer over the seal, and apply silicone lube to hold it in place. Install the spring with the concave side facing the ball!!!

8. Press a new o-ring into the groove around the outside of the spring and washer. Use silicone lube to hold it in place.



9. Attach the valve bodies to the Coco Spacer Block (M-572). Take care not to distort the o ring seals. Snug, but do not tighten the bolts!

10. Insert the seal (S-328) into the shaft bore. To avoid damage to the seal, start it perpendicular to the bore, then flatten it into place with the spring toward the ball.

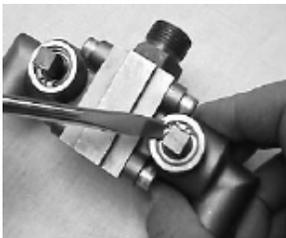


## Servicing the System



11. Carefully insert the coupler shaft (M-581), bronze bushing (M-802) and washer (P-469) into the housing.

12. Install the retaining ring (P-505). Note that one side of the ring has slightly rounded edges, while the other side has a sharp square edge. The sharp edge of the snap ring must face away from the ball. Use an 8-15mm snap ring tool to insert the ring.



13. Make certain the ring is fully engaged in its groove.

14. Before bolting the valve assembly to the frame, be certain that the valve positions are oriented properly. If the Coco air cylinder rod (M-580) is fully extended (normal position if the dispenser was switched off before disassembly), the inlet valves should be open, and the outlet valves closed. The valves are easily opened or closed by grasping the coupler shaft (M-581) with a cushioned tool, and rotating it. Slots are machined into the stems to indicate the valve positions. If the slot is perpendicular to the flow the valve is closed. If the slot is in line with the flow, the valve is open.



15. Fit the valve assembly to its frame. Make certain that the valve spline fits snugly into the frame slot. Apply an anti-seize compound to the threads of the mounting bolt (S-334) and draw it up tight.



**And finally, conduct a ratio assurance check!**

# Servicing the System

## The Metering Cylinders

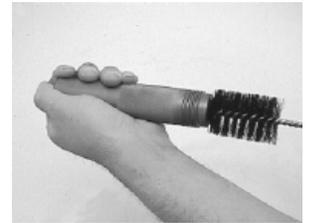
The frequency of service will depend upon the abrasive content of the material being dispensed, and to a lesser degree, the abrasive atmosphere common to many construction sites. The need for metering assembly service is recognized by leakage between the metering piston and its cylinder, sluggish extension of the piston, or by seizure of the piston within the cylinder.

To remove a metering cylinder for service, turn the dispenser switch off, disconnect the air supply at the dispenser, rotate the selector valves on the material tanks to vent. Follow steps 1-3 on page 11 to remove the Air Cylinder / Coco Valve Assembly from the cabinet. Once this assembly is out of the cabinet the metering cylinders can be easily removed from the base manifold using the strap wrench provided.



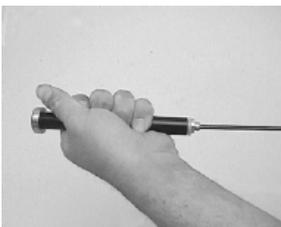
1. Press the metering piston from the cylinder bore. If it is seized, phone Lily or visit a machine shop for assistance. Do not damage the bore!

2. Clean the bore and piston thoroughly. Examine the cylinder. If it is scratched or otherwise damaged, it must be replaced.



3. If the piston is scratched or marred, polish its surface with an abrasive cloth until no burr remains to damage the metering sleeve.

4. To replace the piston seal, remove the screw in the cap retaining the seal. Then remove the cap and the seal.



5. Replace the seal with its spring groove towards the bottom of the piston.

6. Inspect the piston pad. If it is torn or worn, replace it by removing its retaining screw. Apply a drop of blue Loctite thread seal or equal to the screw at reassembly.



## SERVICING THE SYSTEM



7. Lubricate the piston and chamber with silicone and insert the piston pad end first into the bottom (threaded end) of the metering cylinder.

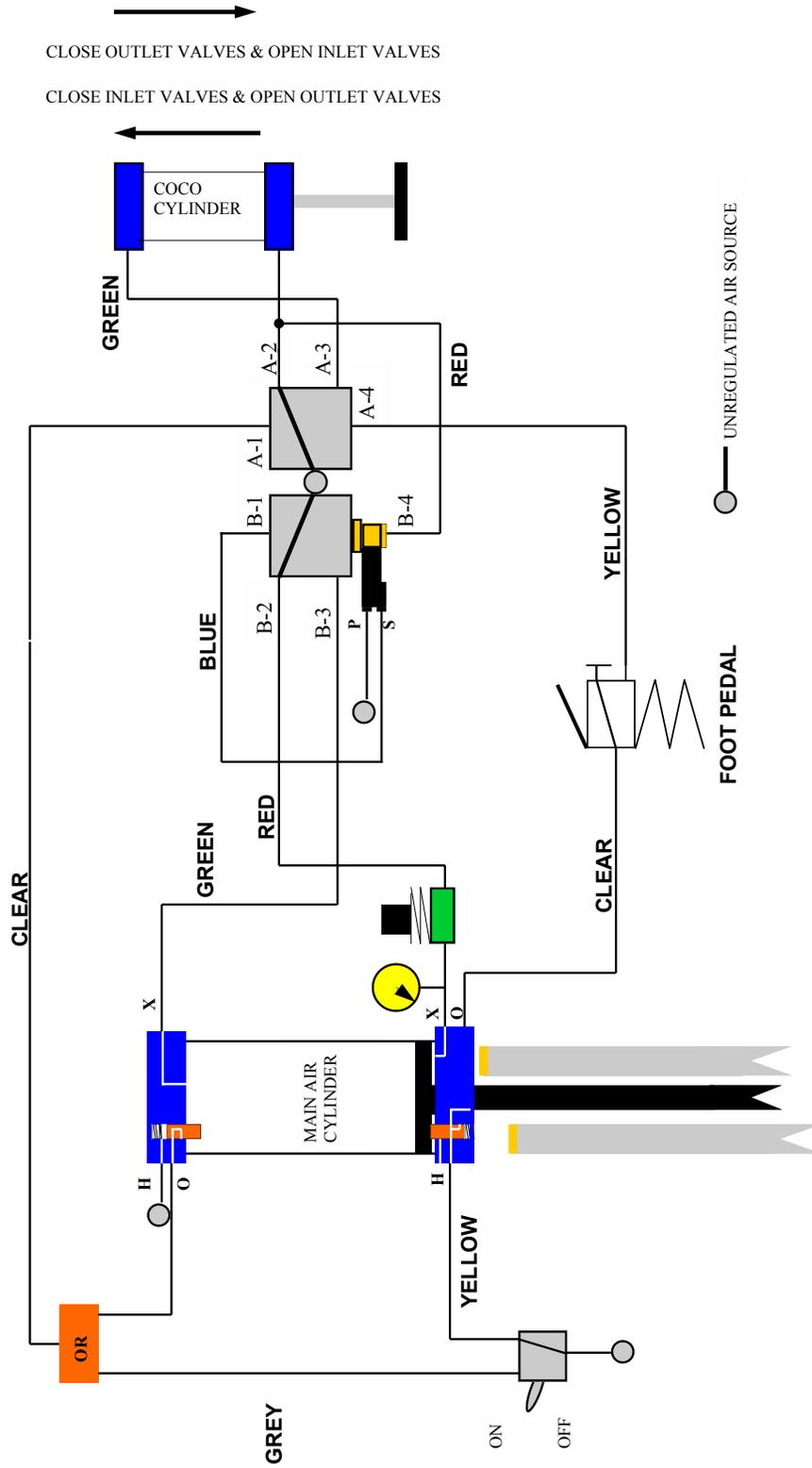
8. Use the seal pick (P-457) to remove the base manifold o-ring seal. Clean the pocket thoroughly before installing a new seal.



Apply an an anti-seize compound to the cylinder threads, and then screw it into the manifold. Do not overtighten!

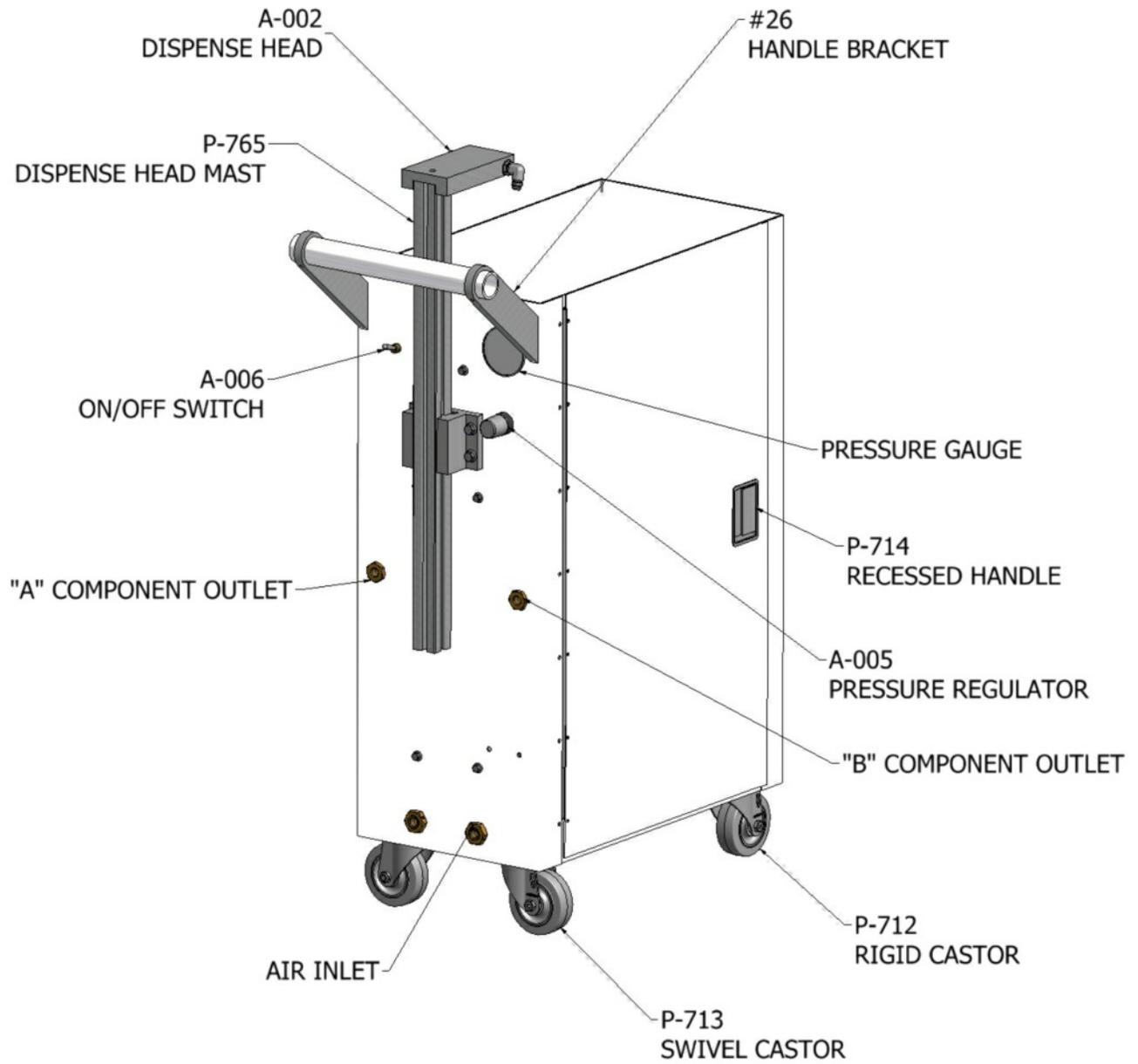
Following seal replacement, slight leakage may be noticed between the piston and the cylinder. This will usually stop after dispensing a few gallons of resin.

## The Control Circuit

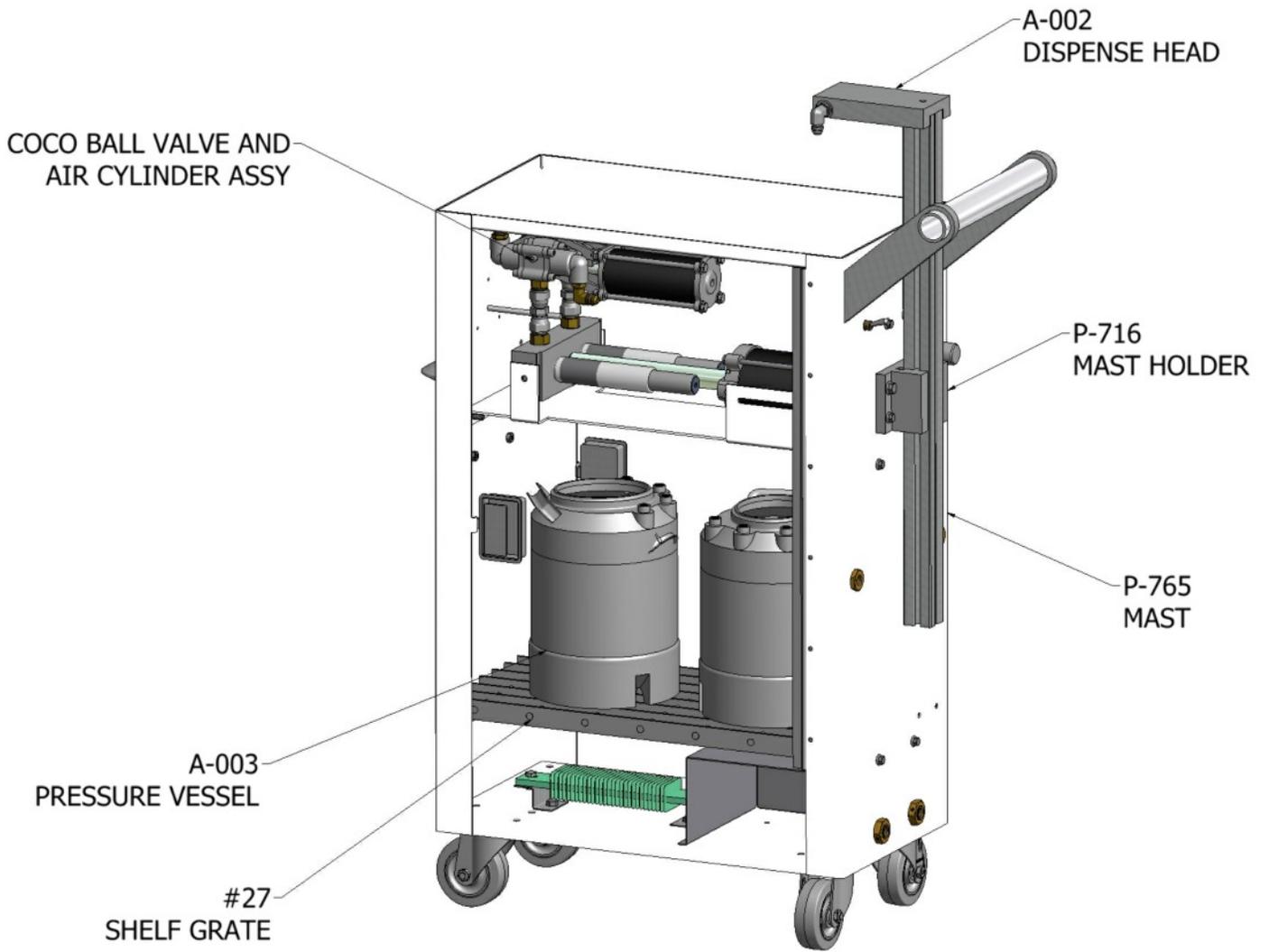


ACE DURAFLO MODEL K4 CONTROL CIRCUIT

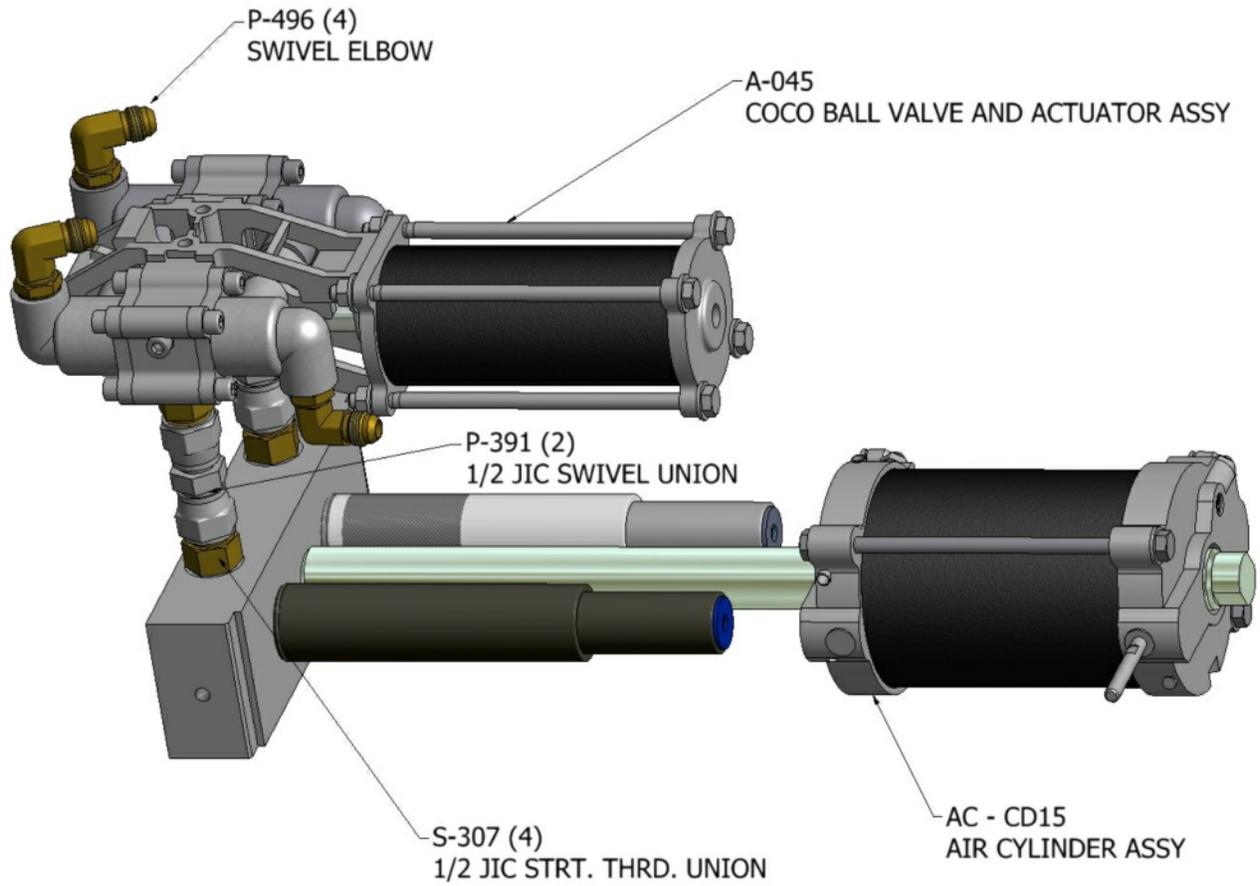
# Appendix

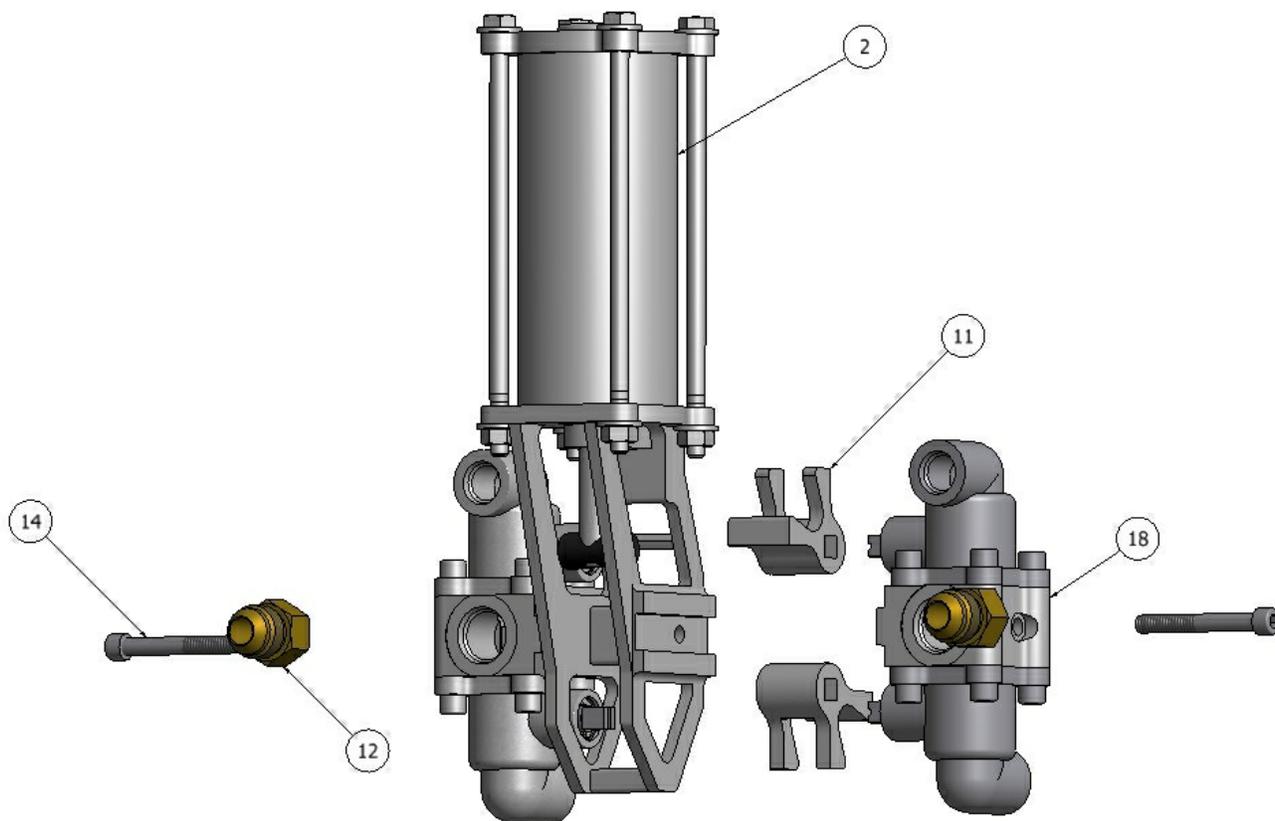


# Appendix



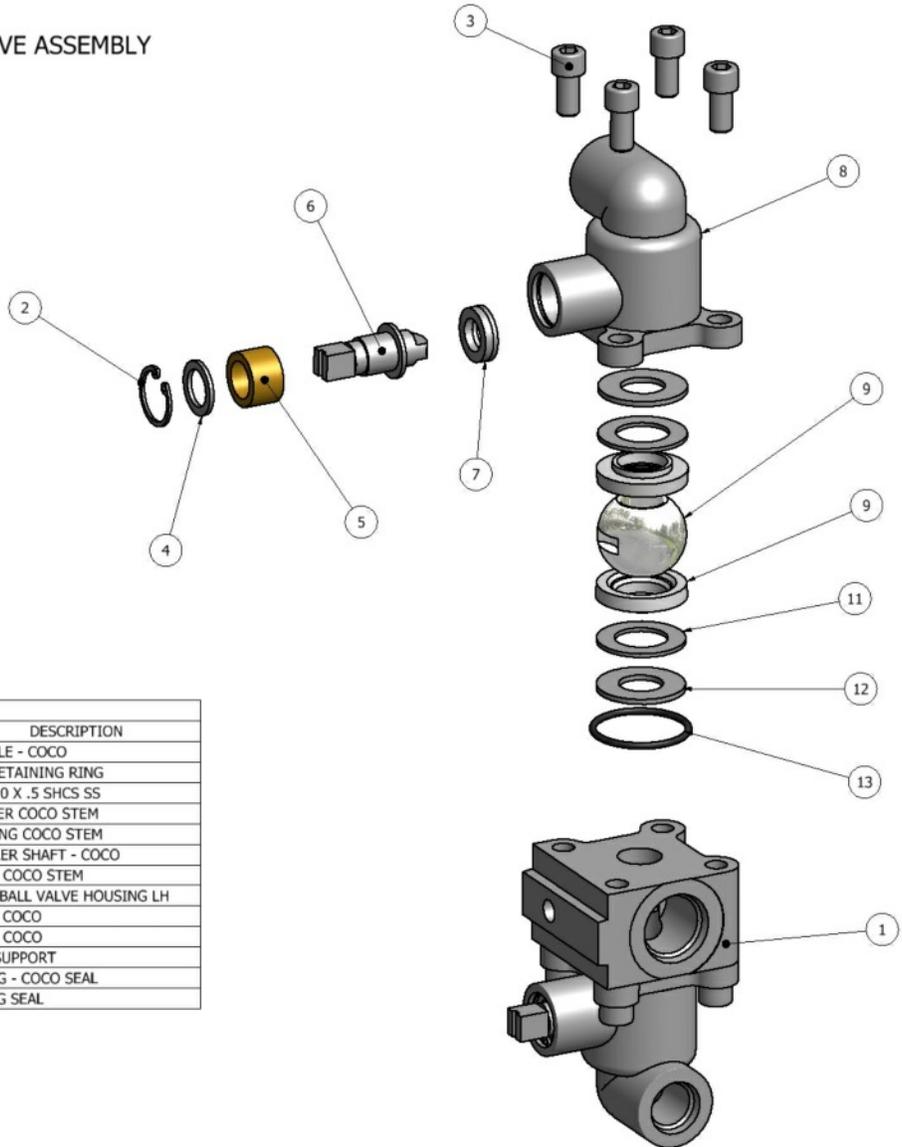
## Ace Duraflo Model K4 Air Cylinder and Coco Valve Assembly





PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
2	1	A-160-4	COCO AIR CYLINDER ASSY
11	2	M-574	COCO FLIPPER
12	2	S-307	1/2 JIC STRT. THRD. UNION
14	2	S-334	1/4-20 X2 SHCS SS
18	1	A-160-7	COCO BALL VALVE HALF ASSY

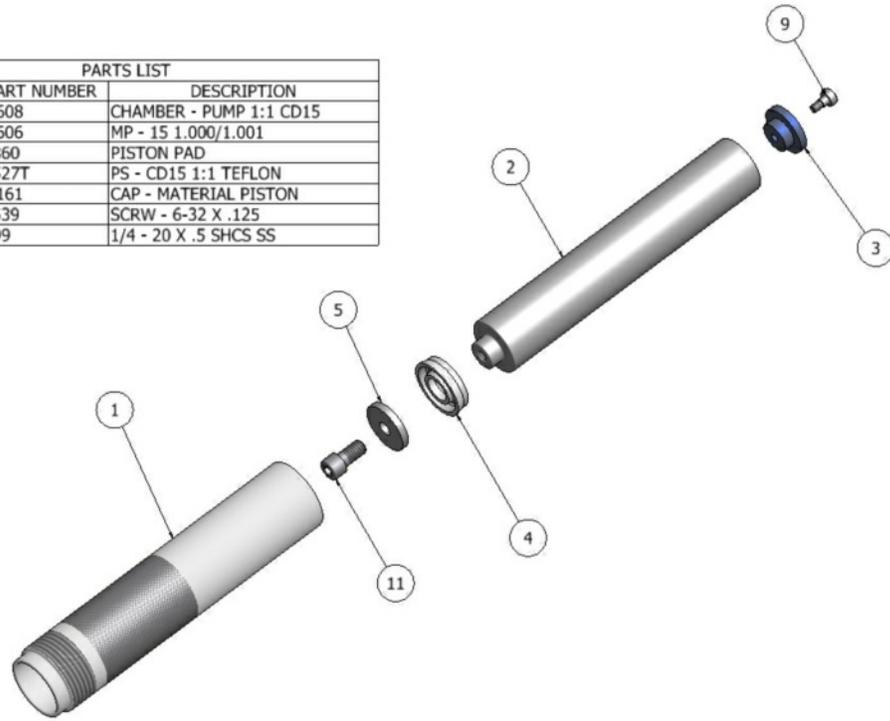
## ACE DURAFLO MODEL K4 BALL VALVE ASSEMBLY



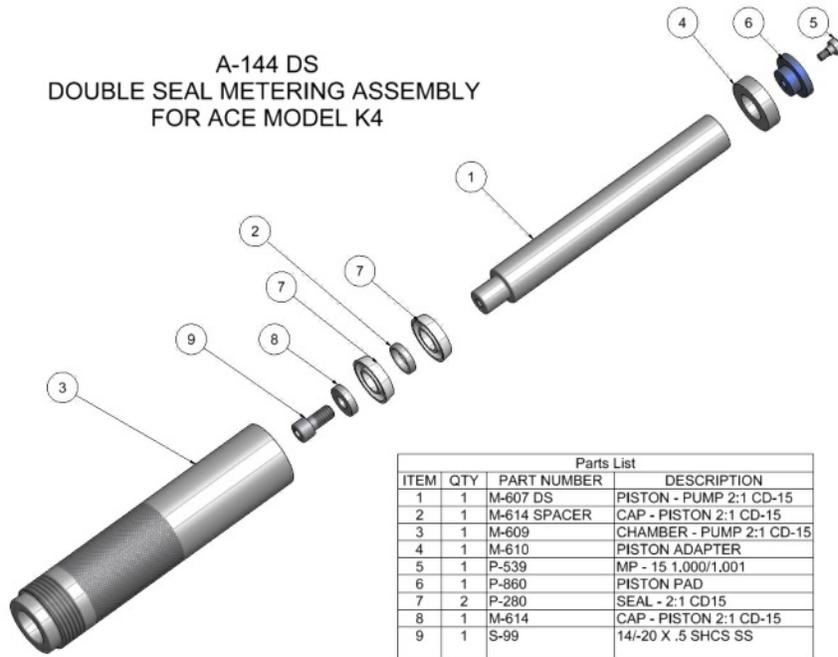
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-572	MODULE - COCO
2	1	P-505	5/8" RETAINING RING
3	8	S-310	1/4 - 20 X .5 SHCS SS
4	2	P-469	WASHER COCO STEM
5	1	M-802	BUSHING COCO STEM
6	1	M-581	COUPLER SHAFT - COCO
7	1	S-328	SEAL - COCO STEM
8	1	M-575	COCO BALL VALVE HOUSING LH
9	1	M-803	BALL - COCO
10	1	S-332	SEAL - COCO
11	1	S-329	SEAL SUPPORT
12	1	S-330	SPRING - COCO SEAL
13	1	S-509	O-RING SEAL

# Appendix

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-608	CHAMBER - PUMP 1:1 CD15
2	1	M-606	MP - 15 1.000/1.001
3	1	P-860	PISTON PAD
4	1	P-527T	PS - CD15 1:1 TEFLON
5	1	M-161	CAP - MATERIAL PISTON
9	1	P-539	SCRW - 6-32 X .125
11	1	S-99	1/4 - 20 X .5 SHCS SS



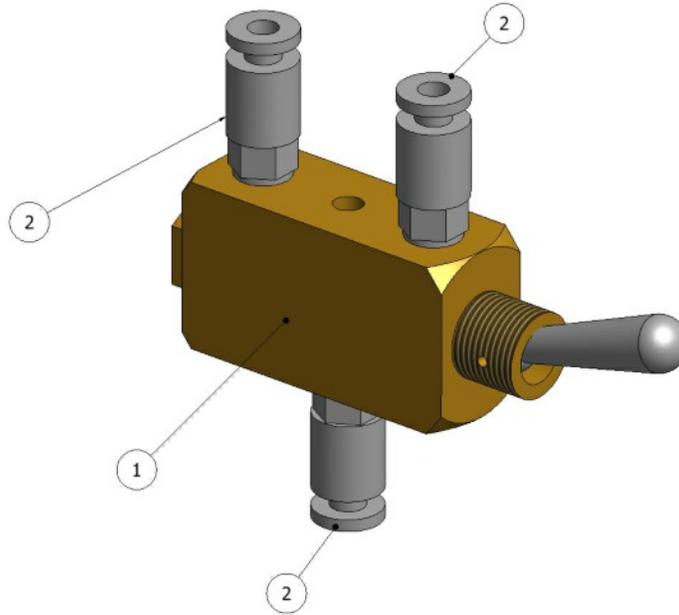
A-144 DS  
DOUBLE SEAL METERING ASSEMBLY  
FOR ACE MODEL K4



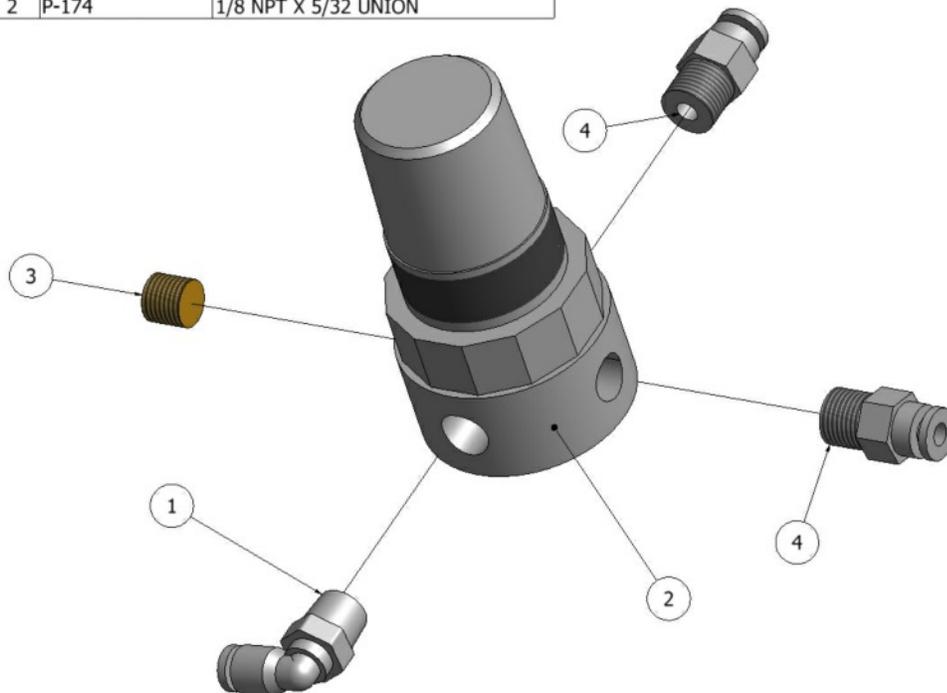
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-607 DS	PISTON - PUMP 2:1 CD-15
2	1	M-614 SPACER	CAP - PISTON 2:1 CD-15
3	1	M-609	CHAMBER - PUMP 2:1 CD-15
4	1	M-610	PISTON ADAPTER
5	1	P-539	MP - 15 1.000/1.001
6	1	P-860	PISTON PAD
7	2	P-280	SEAL - 2:1 CD15
8	1	M-614	CAP - PISTON 2:1 CD-15
9	1	S-99	14/-20 X .5 SHCS SS

# Appendix

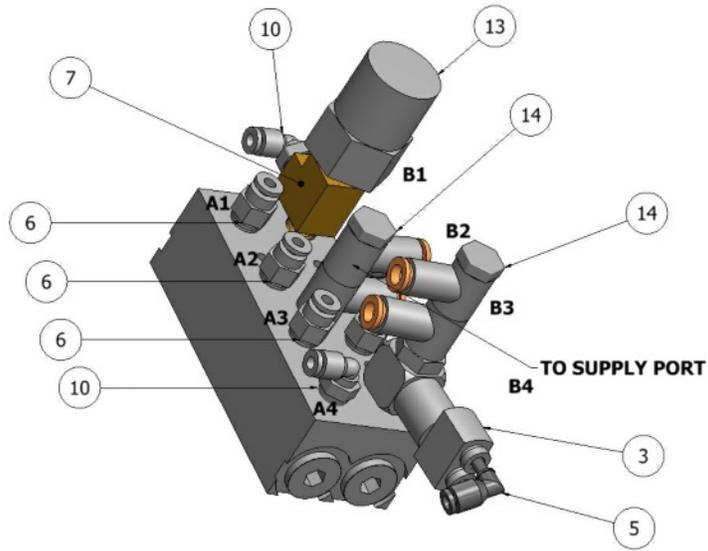
ACE MODEL K4 ON/OFF ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-700 ON OFF	CLIPPARD SWITCH
2	3	P-186	SEAL LOK - STRT THD UNION 1/2"



REGULATOR ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
2	1	A-106	PRESSURE REGULATOR W/ NUT
3	1	P-115	PIPE PLUG 1/8" NPT HOLLOW HEX
4	2	P-174	1/8 NPT X 5/32 UNION

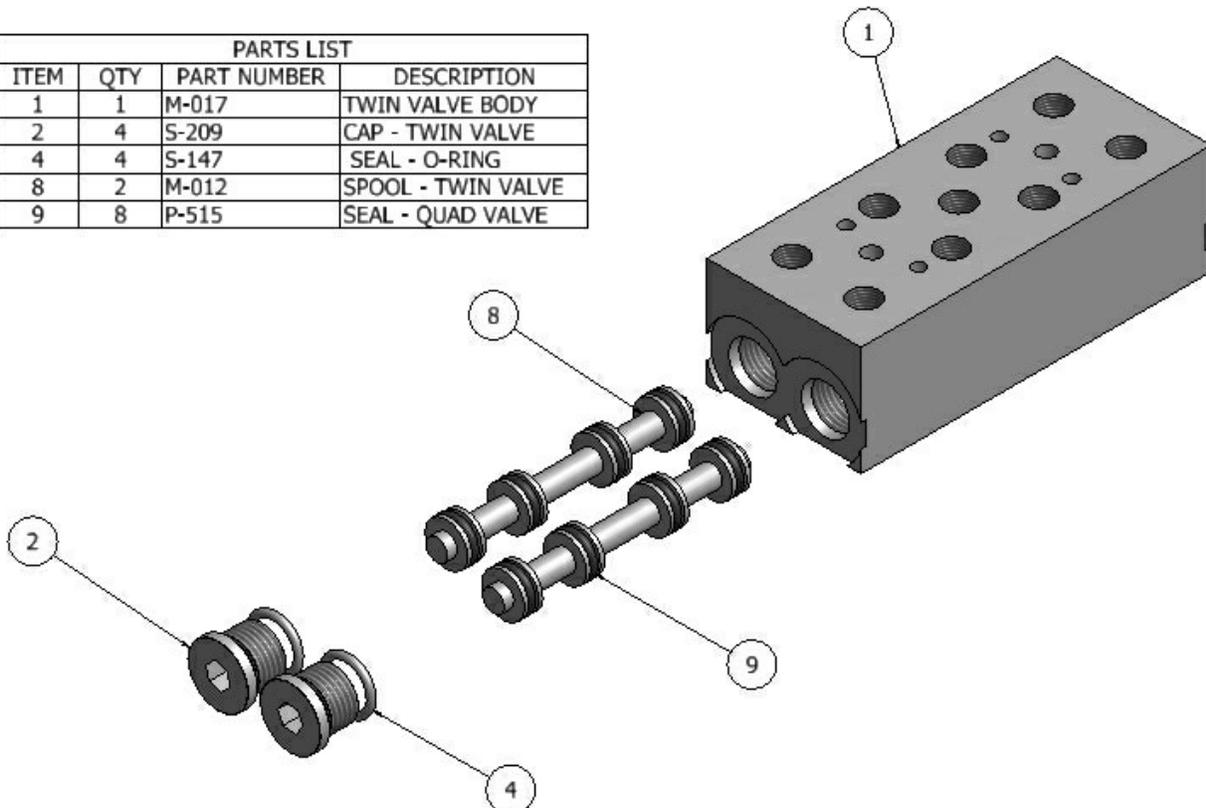


# Appendix



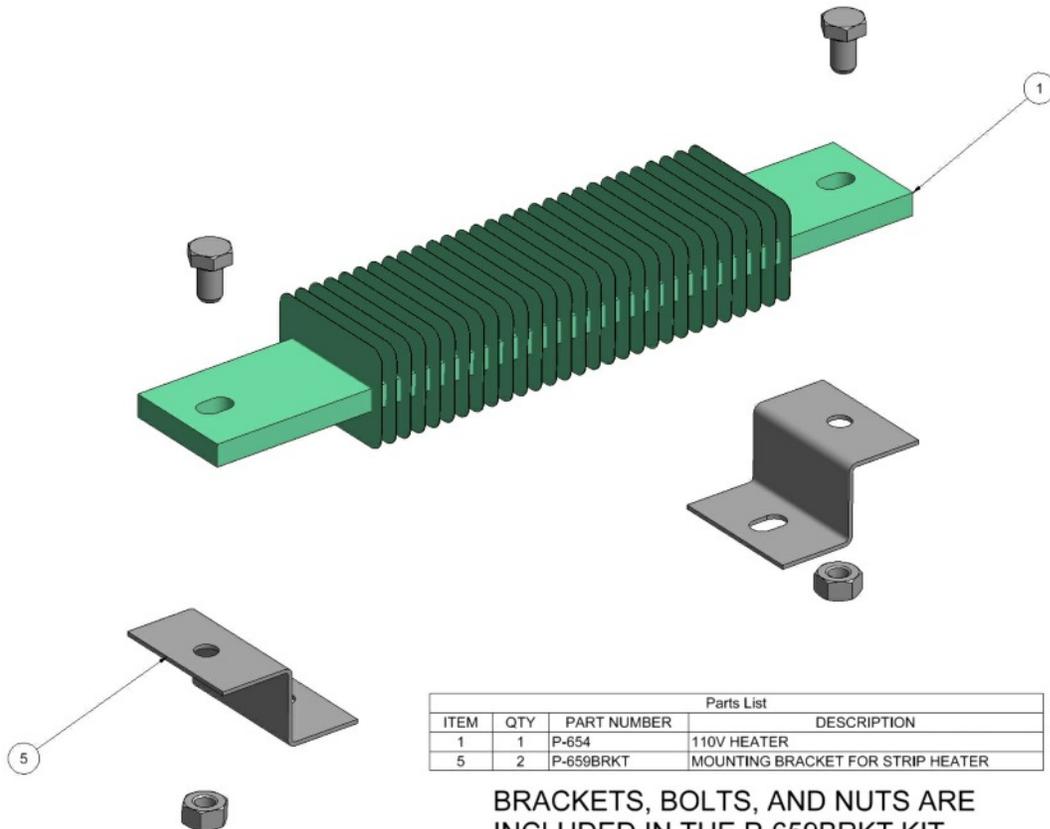
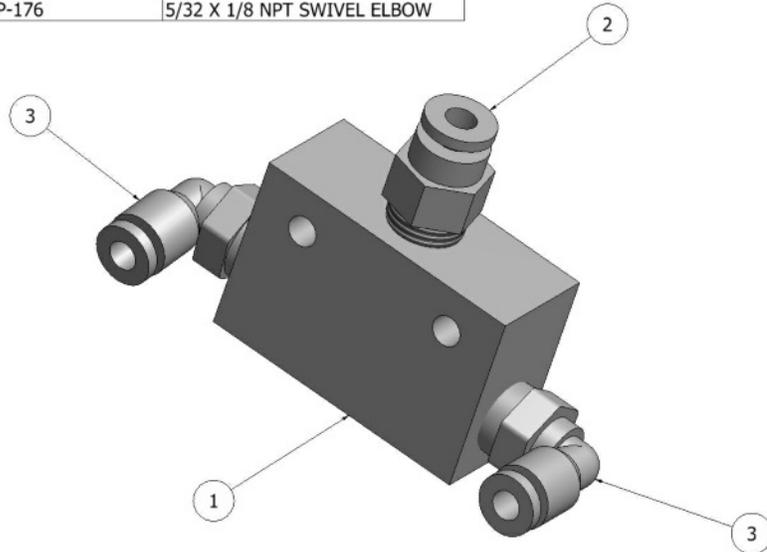
ACE MODEL K4 TWIN VALVE ASSY				
ITEM	QTY	PART NUMBER	DESCRIPTION	
3	1	P-182	AL - STROKE SENSOR 1/8 NPT	
5	1	P-209	5/32" ROTATING ELBOW	
6	4	P-174	1/8 NPT X 5/32 UNION	
7	1	S-021	PIPE TEE 1/8 NPT BRASS	
10	3	P-176	5/32 X 1/8 NPT SWIVEL ELBOW	
13	1	P-024	TRANSDUCER	
14	2	P-065	1/8"NPT X 5/32" TUBE DBL BANJO	

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	
1	1	M-017	TWIN VALVE BODY	
2	4	S-209	CAP - TWIN VALVE	
4	4	S-147	SEAL - O-RING	
8	2	M-012	SPOOL - TWIN VALVE	
9	8	P-515	SEAL - QUAD VALVE	



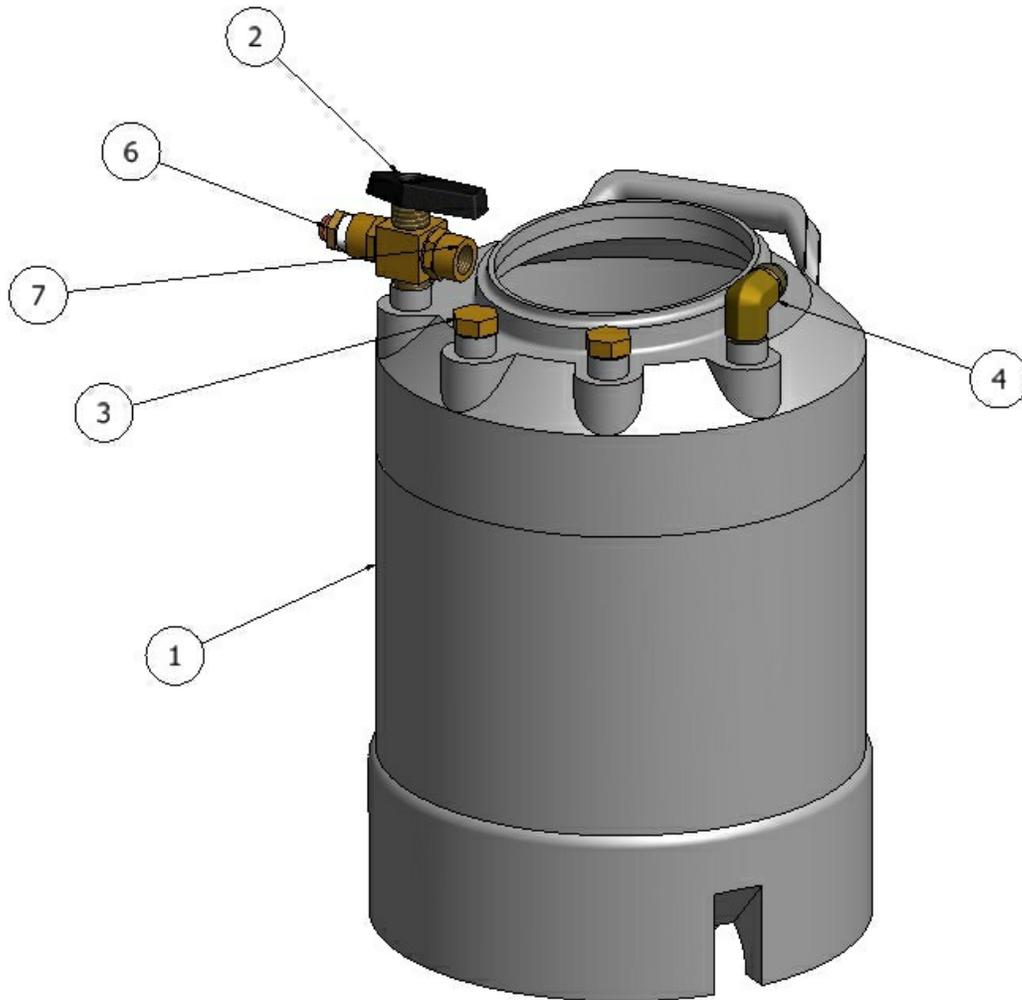
# Appendix

"OR" VALVE ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-794	AL - VALVE - "OR" ELEMENT
2	1	P-174	1/8 NPT X 5/32 UNION
3	2	P-176	5/32 X 1/8 NPT SWIVEL ELBOW



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-654	110V HEATER
5	2	P-659BRKT	MOUNTING BRACKET FOR STRIP HEATER

BRACKETS, BOLTS, AND NUTS ARE INCLUDED IN THE P-659BRKT KIT.

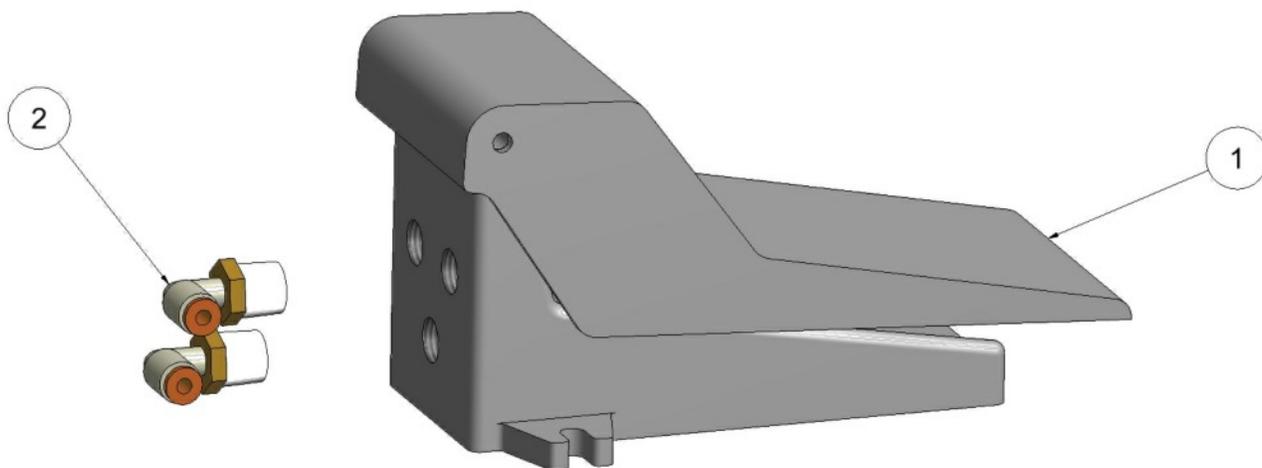


A-003  
2 GALLON PRESSURE VESSEL ASSEMBLY

ACE DURAFLO MODEL K4 PRESSURE VESSEL ASSEMBLY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-142	2 GALLON PRESSURE VESSEL
2	1	S-511	3-WAY BALL VALVE
3	2	P-143	1/4" NPT PIPE PLUG
4	1	P-206	1/4 NPT X 3/8 JIC ELBOW
6	1	P-384	5/32 X 1/4 NPT UNION
7	1	P-572	BREATHER - NOT SHOWN

Pressure Vessel Lid P-532 Not Shown

# Appendix



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-717	FOOT PEDAL
3	2	P-242	5/32 X 1/4 NPT SWIVEL ELBOW

Hose assemblies are not shown in the diagrams. Below is a description and part number for the material hoses used.

1. Dispense Hoses from the machine outlet to the Dispense Head:
  - Heated Hose Assembly 110V P-711 2 - Required
  - Heated Hose Assembly 220v HH-711 2 - Required
2. Hose Assembly from "A" tank to the CoCo inlet valve HA-230 1 - Required
3. Hose Assembly from "B" tank to the CoCo inlet Valve HA-231 1 - Required
4. Hose Assembly from the CoCo outlet valves to the cabinet outlets HA-232  
2 - Required