



P4 Pumper with  
single poppet  
Chemical valves

## UNPACKING

Please open and inspect your package upon receipt. Your package was packed with great care and all the necessary packing materials to arrive to you undamaged. If you do find an item that is broken or damaged, you must contact the delivering carrier to report the claim.

# STANDARD PUMPER INSTRUCTIONS

## GETTING TECHNICAL ASSISTANCE

The H.E. Anderson Company is dedicated to assisting our customers with installation and use of our products. Our technical staff are available each weekday from 8:30 AM to 4:30 PM central time. You may call us toll free at **1-800-331-9620** from anywhere in the U.S.A. and Canada. If no one is available, we will promptly return your call. You may also contact us via e-mail at **info@heanderson.com**

**Before you call**, review this manual. You may find the answer to your question here. But if not, reviewing the manual will help us to help you.



Model No.

Date Code

You should have the Pumper model number and date code available when you call. See photo at left for their locations.

If you need an additional owners manual for **any** H.E. Anderson Company product, please visit our website at <http://heanderson.com/manuals.php>



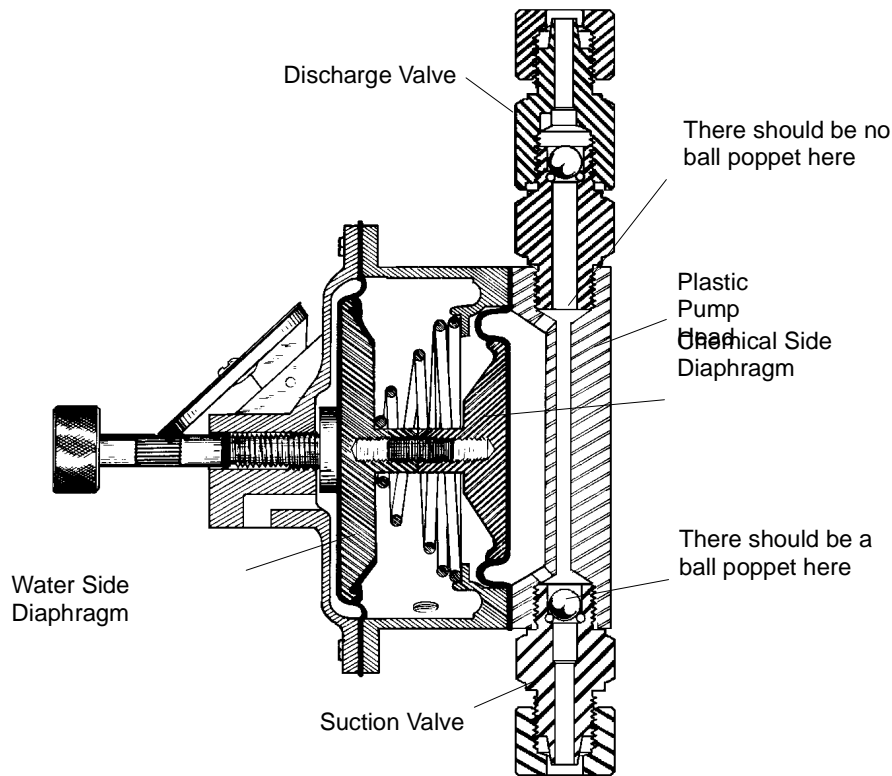


Figure 1  
Sectional view of standard pumper

We manufacture pumpers (pumpheads) of two types; standard capacity and high capacity. These instructions apply specifically to standard capacity pumpers and chemical fittings using 1/4" I.D. (3/8" O.D.) tubing.

Table 1 - Standard Capacity Pumpers	
Model Designation	Capacity Per Stroke
A3	3 ml
P1	10 ml
A10	10 ml
P2	20 ml
A20	20 ml
P4	40 ml

Plumbing of the flow meter and tee(s) for the injection point fitting(s) should be completed before installing the pumper(s). See the *System Overview & Guidelines* for your system type for installation details.

Pumpers can be used individually or on a multi-pumper manifold with additional standard capacity pumpers. You should have separate instruction

manuals for other components of your system such as control units, flow meters, and accessories.

## SET-UP

Each pumper is calibrated under actual operating conditions at the factory. Occasionally the dial scale gear will become disengaged in shipment, or by rough handling. If this has happened, follow the procedures in the PUMPER CALIBRATION section once you have completed the set-up and initial check-out.

## Pumper Installation

Depending on your system type, there are three ways of installing the pumper.

- On a multi-pumper manifold by mounting to a multi-adapter,
- Mounting directly to a type AS pilot valve,
- Mounting directly to a model SD water operated control unit.

Mount the pumper using the rectangular gasket (P/N 00448) and two 1/4-20 x 1/2 pan head screws (P/N 01298).

## Chemical Valves

- Install the suction valve into the bottom of the pumper. **NOTE:** The ball poppet in this valve is exposed and is retained by the plastic pump head after installation. Be careful not to lose the ball when installing the valve.
- Install the discharge valve in the top of the plastic pump head. **NOTE:** There should **not** be a loose ball poppet in the top of the plastic pump head.
- Be sure the arrows on each valve are pointing up.

## Injection Point Fitting (IPF)

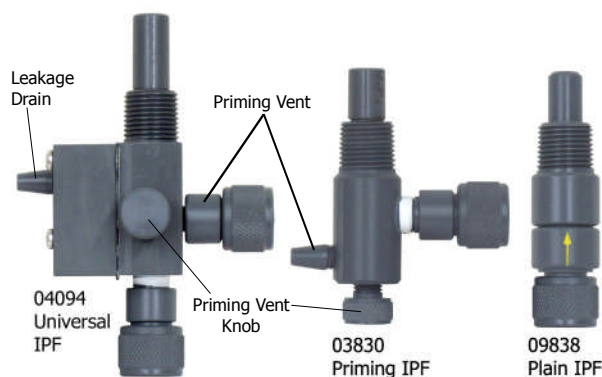


Figure 2  
Injection Point Fittings

Your injection point fitting should be one of the types shown in Figure 2. All serve as an injection point check valve, with the first two offering additional functions. Refer to the instruction sheet specific to your fitting for additional information.



**Use only the black stiff tubing or reinforced tubing for the discharge line. Never use the flexible clear vinyl tubing on the discharge side of the pumper. It is not rated for discharge pressures.**

Connect a cut-to-length piece of tubing between the discharge valve and the injection point fitting. The tubing should be long enough to reach, but without any sharp bends that might collapse into a kink.

Place the concentrate tank into position and cut another piece of tubing to connect from the universal suction fitting (foot-valve/strainer) to the

suction valve on the pumper. But do not install the universal suction fitting at this time. **Here, the clear vinyl tubing may be used when not feeding acids. This tubing is not suitable for acids.**

## Drain Tubes

The universal IPF and priming IPF each has a priming vent fitting. See Figure 2. The vent is opened by unscrewing the knurled priming vent knob. This is done only to prime the pumper and to vent air from the discharge line. Never open the vent more than two turns, because once the air is gone, liquid will come out the vent (possibly with great force). For this reason the vent is made to attach a 3/8" O.D. drain tube. The priming IPF does not have a retaining nut for the vent tube. You may route this tube to a drain, catch container, or even back to the solution container where practical.

The universal IPF also has a leakage drain. Liquid will come out this drain only when the internal diaphragm ruptures. You may also attach a tube to this drain.



**Attaching tubes to these vents and drain is especially important when pumping hazardous chemicals such as acids.**

## Initial Check-out

Turn the water on slowly and let all lines fill with water. You should be getting intermittent discharges of water from the waste line(s) of the injector.

These instructions should be repeated for each pumper.

If you have a plain IPF, disconnect the injection tube at the injection point and let it hang loose. If you have a priming or universal IPF, open the knurled knob two turns.



**WARNING! When working with hazardous chemicals use extreme caution and carefully follow the handling instructions and safety procedures in the Material Safety Data Sheets. Use only the 04094 Universal IPF when feeding acid.**

Fill a small container with the chemical you will be feeding and **set the pumper dial to 10** (maximum

## Standard Pumper Instructions

feed).

**NOTE: Adjust the feed knob only when the unit is making a pumping stroke; it will turn much easier during that time, especially when going to a lower feed.**

Raise the container as high as possible. This will normally allow the pumper to prime itself. As soon as chemical is visible at the end of the discharge line (or injection fitting drain port) turn off the main water line. Reconnect the discharge line (hand tighten the nut only) or close the knurled vent knob hand tight.

Fill the 400 ml calibration beaker (supplied with your unit) to the 400 ml mark. Remove the suction fitting and put the tube into the beaker with the end near the bottom, but not so close as to restrict flow.

**TIP: You may want to use the 400 ml beaker to calibrate a larger wide mouth container such as a quart jar. Then you can submerge the end of the suction tube with the suction fitting still attached.**

<b>Model Designation</b>	<b>Strokes to Pump</b>	<b>ml to Pump</b>
A3	10	30
P1	4	40
A10	4	40
P2	2	40
A20	2	40
P4	1	40

- Refer to Table 2 above.
- Restart the feeder and allow the pumper to make the number of strokes as determined by the table.
- Remove the suction line.
- Compare the amount pumped to the amount to pump in the table.
- If the amount pumped does not agree with the table, you need to recalibrate the pumper. Refer to the separate PUMPER CALIBRATION instructions supplied with your unit.

### START-UP

- Turn off the water to stop the feeder.
- If you have not already done so, install the foot valve/flush fitting (P/N 13334) in

the solution concentrate tank. There are separate instructions for this fitting.

- If installing it as a bulkhead fitting, install it about 2 inches above the bottom of the tank, to prevent the strainer from becoming fouled by sediment which may collect on the bottom.
- Connect the suction line from foot valve/flush fitting to the suction valve on the pumpers. Set the pumpers to the number on the dial calculated to give the desired feed. Fill your concentrate tanks and restart your feeder. It should now be operational. You may need to check, as done in the initial check-out, to be sure the pumpers are properly primed.

### MAINTENANCE

Normally the pumper should require little maintenance. This, however, depends on the quality and cleanliness of the chemical being pumped.

- The pumper should be inspected at regular intervals for proper operation and leaks.
- Check the suction and discharge valves for cleanliness, chemical attack, and scale build-up.
- At some time the elastomer parts(O-rings and diaphragms) will have to be replaced. Refer to the section SUCTION AND DISCHARGE CHECK VALVES for complete information on servicing these valves.
- Periodically shut off the water and remove and inspect the injection point fitting. Reaction of the chemical being injected with the chemicals already in the water can sometimes cause scale to form. This can restrict or even completely stop chemical flow. If scale is found, clean it off thoroughly and establish a regular schedule for checking the fittings. (See Figure ?)
- Check to be sure all pumpers are properly primed after completing these checks and putting the feeder back into service.

### STORAGE

If a feeder will not be used for a long period:

- Remove it from service.

- Flush the pumper and chemical check valves with water, or other suitable cleansing solution, either by pumping water through the unit (**if not feeding acid**) before removing it or by rinsing these parts after removal.
- Tape the valve openings closed while still wet. This will protect the seals and prevent insects from plugging up the openings.



**Protect the entire system from freezing temperatures. Our warranty does not cover freeze damage.**

## PUMPER AND DIAPHRAGM PROBLEMS



**Do not disassemble the pumper cylinder until testing and trouble shooting indicate that you need to do so. There is normally very little maintenance or service required internally.**

If your feeder has a clear acrylic head, you will be able to see inside the diaphragm chamber. If you have the gray or black head, you will have to rely on external checks to determine problems which might develop inside the chemical chamber. Few things can go wrong in the chemical chamber, and they are easily checked.

## Problems With Chemicals

Some chemicals may not be compatible with the pumper diaphragm. You should check compatibility of a chemical with the diaphragm material before pumping. Because we do not have control of what chemicals you pump, we do not warrant diaphragms or plastic heads against chemical attack.

Some chemicals can attack the diaphragm or head, causing it to stick to the head. When this happens it will not pump.

Changing chemicals without flushing the head can sometimes cause a chemical reaction which can damage the diaphragm, plastic head, or fittings.

Wettable powders sometimes cake up inside the head. This reduces the pumping capacity. If your unit does not appear to pump as much as it should, check the calibration. You may need to

remove and clean the plastic head.

## Problems With Diaphragms

The most common problem with pumpers other than faulty check valves is a ruptured diaphragm. A ruptured diaphragm will cause drainage out the drain hole in the bottom of the cylinder. If the chemical side diaphragm has ruptured chemical will drain from the hole. If the water side diaphragm has ruptured water will drain.



**It is very important that you replace a ruptured chemical side diaphragm immediately. If you do not, the chemical will attack the back side of the water side diaphragm causing it to fail also.**

The spring and other parts in the cylinder can also be affected. Prompt attention can save added expensive repairs. A ruptured water side diaphragm should also be fixed as soon as possible, but it is not nearly as critical as the chemical side diaphragm.

## Changing the Chemical Side Diaphragm

- Remove the chemical check valves. Use a pan to catch the chemical which might be spilled when the plastic pump head is removed.



**Use precautions when dangerous chemicals are being pumped; here you should remove the chemical check valves and wash the pump head to remove any remaining chemical. Use baking soda to neutralize acid**

- Refer to Figure 3, Page 6, for the following steps.
- Remove the screws and plastic pump head.
- You may have to use a thin blade screwdriver several places to free the diaphragm (1) from the head and cylinder.
- Turn the stroke adjusting knob until the dial reads 7 or less.
- Now unscrew and remove the diaphragm.
- Before installing the new diaphragm, coat the threads of the threaded stud (5) with an anti-seize lubricant to prevent sticking

to the aluminum diaphragm insert.

- Screw in the new diaphragm until it just touches the water side diaphragm. If the holes in the diaphragm do not line up with the holes in the cylinder (6), unscrew the diaphragm until they line up.
- Set the dial to 10, align the valve holes in the plastic head so the head is vertical, and reinstall the plastic head.
- After changing a diaphragm check the calibration of pumper.
- Recalibrate it if necessary. Refer to the separate PUMPER CALIBRATION instructions supplied with your unit.

### Changing the Water Side Diaphragm

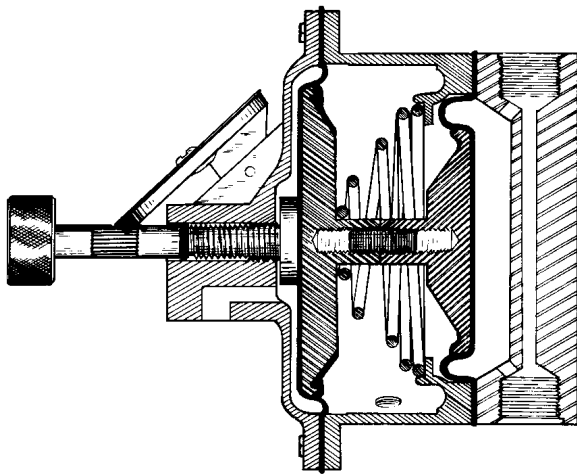


Figure 3  
Cut-a-way Drawing of Pumper

Before disassembling the pumper, mark the brass flange and cylinder so you can reassemble them in the same positions. (Refer to the exploded view parts drawing in the rear of the manual.)

- To change the water side diaphragm (2) first remove the chemical side diaphragm (See previous heading).
- Place the small end of the cylinder face down on your work bench.
- Remove all but two screws, which should be opposite each other.
- There is a spring with about thirty pounds force pushing the diaphragm against the flange. Carefully follow the following procedure to remove the flange from the cylinder. Support the flange with your hand as the last screws are removed.

This will prevent damage to the threaded holes and also prevent the pieces from flying apart.

- To reassemble, place the cylinder, large end up, on your workbench.
- Place the large end of the spring into the cylinder. If you have a low pressure pumper, place the spring guide (P/N 10009), then the spring (P/N 09995) into the cylinder.
- Next, lay the water side diaphragm on the flange.
- Place all the screws through the flange and diaphragm.
- Align the marks you made on the cylinder and flange. (If you did not mark the pieces, the cylinder has a drain hole which is at the bottom. Match this drain hole to the bottom of the flange.)
- Place the flange/diaphragm assembly onto the spring, push the flange and diaphragm down and start all the screws in their holes. Screw the screws down evenly; take care to be sure the flange goes into position without “cocking.” Then tighten all screws securely. Replace the chemical side diaphragm (See previous section).

### STROKE SHAFT SERVICING

To replace the O-ring shaft seal the flange must be removed from the cylinder. Before disassembling the pumper, mark the brass flange and cylinder so you can reassemble them in the same positions.

- Carefully remove the screws from around the edge of the flange.



**Do not leave the cylinder assembly open after the flange has been removed. Place a weight of at least thirty pounds on the exposed diaphragm to hold it in the cylinder. This will prevent damage to the chemical side diaphragm.**

- Unscrew the screw holding the pad (4) to the stroke shaft (3). You may now unscrew the shaft and remove it from the flange.
- If the seal was leaking, inspect the bore in the flange. If the hole is badly damaged, the flange will have to be replaced.

- Check the O-ring for tears or nicks.
- When replacing the O-ring, be very careful when stretching it over the threads. You may find it easier to wrap the threads with tape before sliding the O-ring into position; then removing the tape.
- Lubricate the O-ring, shaft, and hole with a silicone lubricant (such as Dow Corning #111 silicone grease).

- Reinstall the shaft and replace the pad. Screw the pad retaining screw in just enough to allow the pad to revolve, but have no end play.



***Over tightening the screw may cause the shaft to expand, making it difficult or impossible to adjust the chemical feed. Reassemble the pumper according to the procedure in the last paragraph in the previous section.***



**H.E. Anderson**  
**COMPANY**  
 Muskogee, OK. 74402-1006  
 (918) 687-4426

NAME: STANDARD CAPACITY LIQUID END PARTS

DATE: 3-11-2015

Proprietary Rights Apply To The Subject Shown And Are Property Of H.E. Anderson Co., Inc.

17087 SUCTION PIPE  
 2 PIECE 33"

13334 STANDARD CAPACITY  
 1/4" FOOT VALVE FLUSH FITTING

04094  
 UNIVERSAL INJECTION  
 POINT FITTING

06892 TUBING  
 3/8 O.D. BLACK  
 USE WITH  
 PRESSURE AND ACID

06909 TUBING  
 3/8 O.D. CLEAR  
 DO NOT USE WITH  
 PRESSURE OR ACID

01205 SCREW  
 (4 REQUIRED)

04234 NOZZLE STD 4"  
 04391 FOR 1-1/2" & 2"  
 04250 FOR 1" & 1-1/4"  
 04242 FOR 3/4"

01743 TUBE NUT

28143 HOSE ADAPTER NUT  
 28127 HOSE ADAPTER BARB 1/4"

01743 TUBE NUT

04028 ADAPTER

04268 PIN

02542 ADAPTER

01800 GASKET  
 13391 FOOT VALVE ADAPTER

01719 CERAMIC POPPET  
 01701 O-RING VITON  
 01686 O-RING VITON

04119 COVER

03781 SPRING  
 04424 PAD

17076 PVC NIPPLE 16.5"

01800 GASKET  
 01818 F-VALVE NUT

04167 VALVE DOUBLER BODY  
 01719 CERAMIC POPPET  
 01701 O-RING VITON  
 01686 O-RING VITON

DISCHARGE VALVE COMPLETE  
 02857 SINGLE POPPET  
 09275 DOUBLE POPPET  
 SUFFIX 'G' = WITH SPRING  
 SUFFIX 'S' = STAINLESS BALL

04416 DIAPHRAGM COMPLETE 1/2 IPF

16286 COUPLING 1/4 NPT

01800 GASKET  
 01800 GASKET

04036 D-VALVE BODY

05420 O-RING  
 12352 O-RING  
 04226 NEEDLE

17076 PVC NIPPLE 16.5"

13424 BULKHEAD ADAPTER  
 01785 F-VALVE SCREEN

01686 O-RING VITON

05420 O-RING  
 04218 ADAPTER

16465 FOOT VALVE ADAPTER

01719 BALL POPPET CERAMIC  
 01701 O-RING

PUMPER

01719 CERAMIC POPPET  
 01701 O-RING VITON  
 01686 O-RING VITON

SUCTION VALVE COMPLETE  
 06742 SINGLE POPPET  
 09812 DOUBLE POPPET  
 SUFFIX 'G' = WITH SPRING  
 SUFFIX 'S' = STAINLESS BALL

01719 BALL POPPET CERAMIC  
 01701 O-RING  
 01686 O-RING

01777 F-VALVE BODY

04167 VALVE DOUBLER BODY  
 01719 CERAMIC POPPET  
 01701 O-RING VITON  
 01686 O-RING VITON

16476 FOOT VALVE BODY

16487 FOOT VALVE

04151 S-VALVE BODY  
 01743 TUBE NUT

09838 PLAIN INJECTION POINT FITTING

04234 NOZZLE STD 4"  
 04391 FOR 1-1/2" & 2"  
 04250 FOR 1" & 1-1/4"  
 04242 FOR 3/4"

03822 IPF BODY  
 01719 BALL POPPET CERAMIC  
 01701 O-RING  
 01686 O-RING

04151 S VALVE BODY  
 01743 TUBE NUT

**06735 POPPET KIT**  
 3 ea 01719 CERAMIC POPPET  
 2 ea 05420 O-RING  
 3 ea 01686 O-RING

**05404 IPF REPAIR KIT**  
 1 ea 01701 O-RING  
 1 ea 04416 DIAPHRAGM COMPLETE  
 2 ea 05420 O-RING  
 1 ea 12352 O-RING

**OPTIONAL PARTS**  
 01917 STAINLESS STEEL BALL POPPETS  
 19609 SPRINGS FOR CHECK BALLS





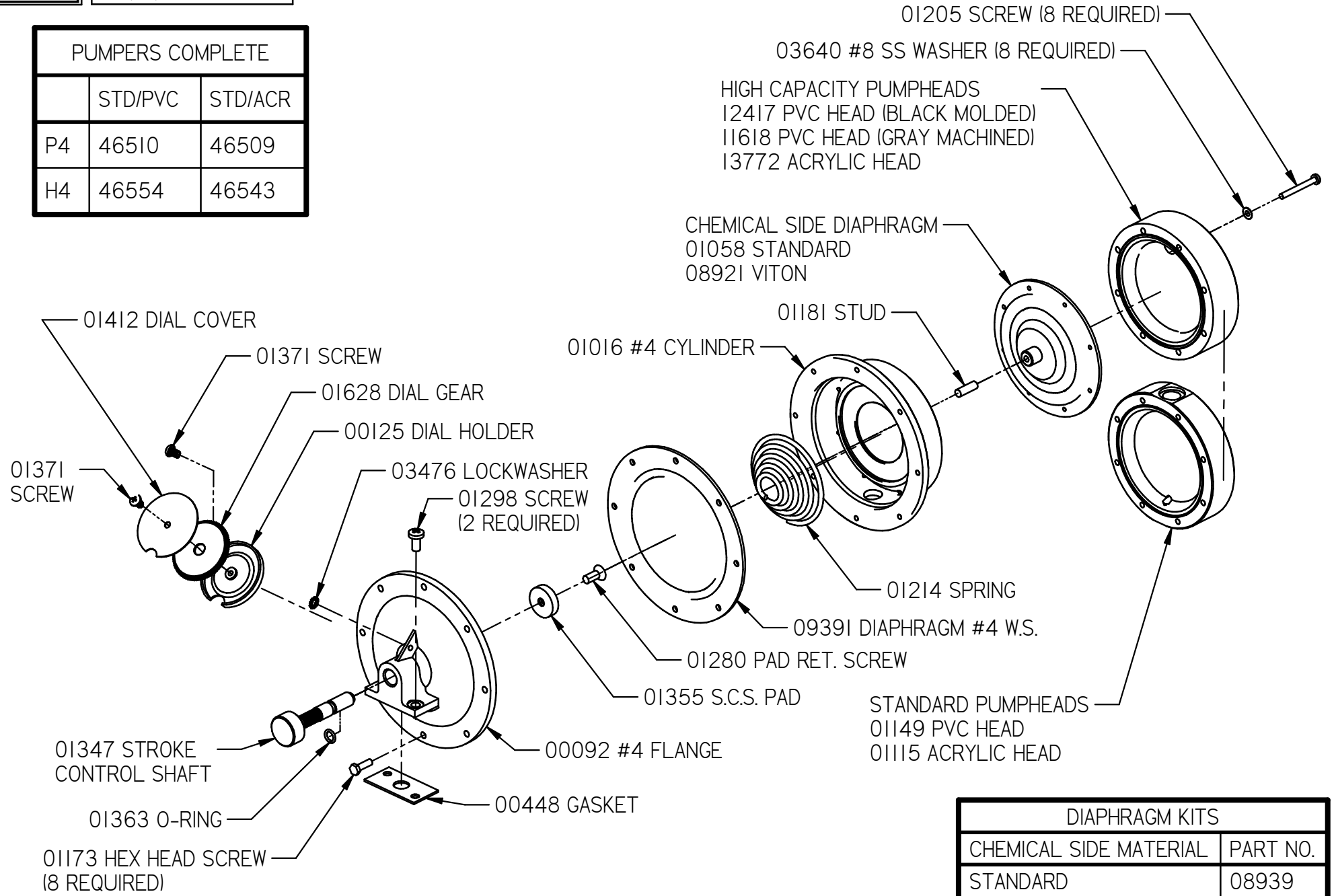
**H.E. Anderson**  
**COMPANY**  
 Muskogee, OK. 74402-1006  
 (918) 687-4426

NAME: H4 or P4 PUMPER ASSEMBLY

DATE: 11-25-2013

Proprietary Rights Apply To The Subject Shown And Are Property Of H.E. Anderson Co., Inc.

PUMPERS COMPLETE		
	STD/PVC	STD/ACR
P4	46510	46509
H4	46554	46543



DIAPHRAGM KITS	
CHEMICAL SIDE MATERIAL	PART NO.
STANDARD	08939
VITON	08921



**H.E. Anderson**  
**COMPANY**  
 Muskogee, OK. 74402-1006  
 (918) 687-4426

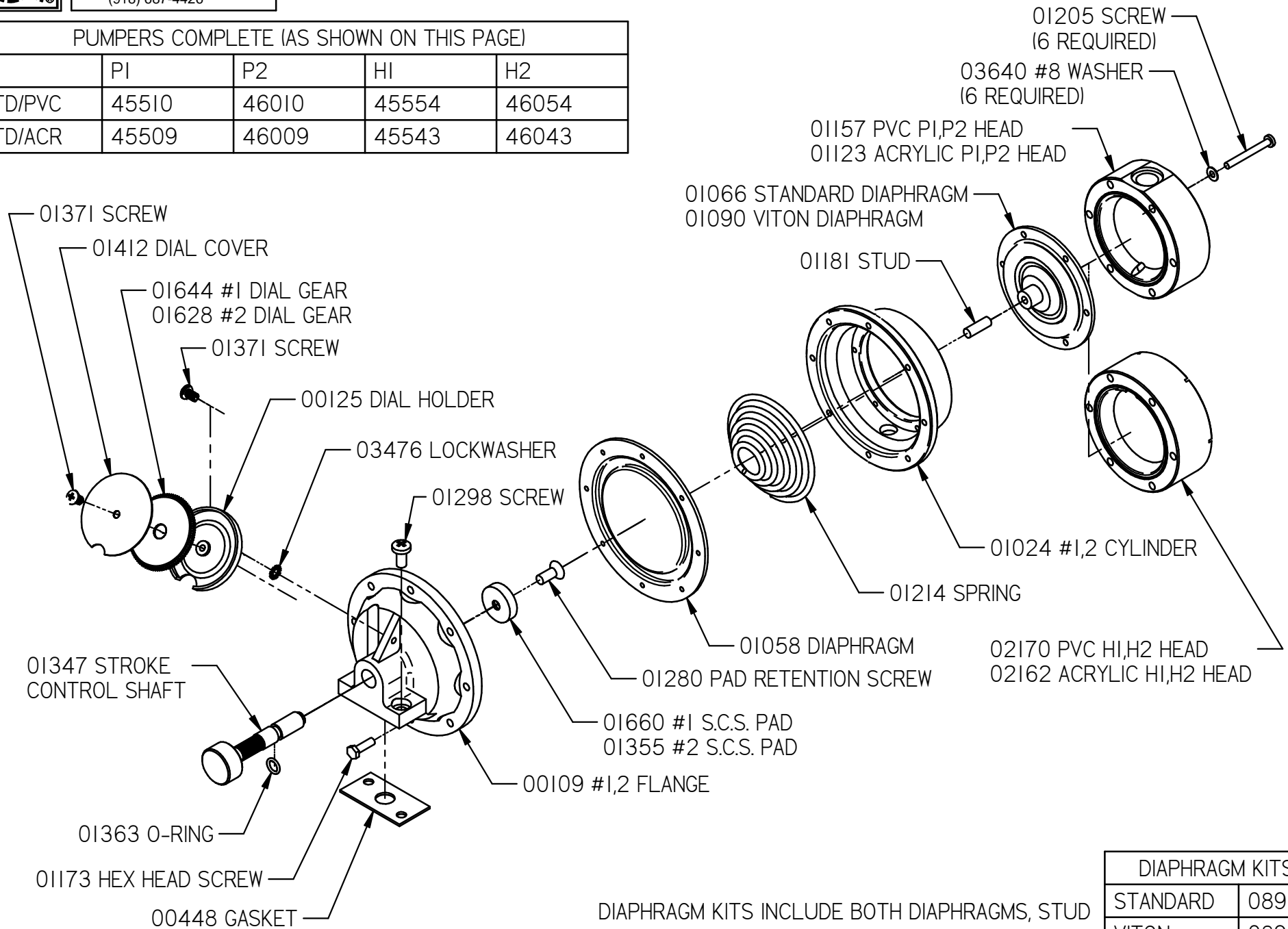
NAME: PI, P2, HI, H2 PUMPER ASSEMBLY

DATE: 11-25-2013

Proprietary Rights Apply To The Subject Shown And Are Property Of H.E. Anderson Co., Inc.

PUMPERS COMPLETE (AS SHOWN ON THIS PAGE)

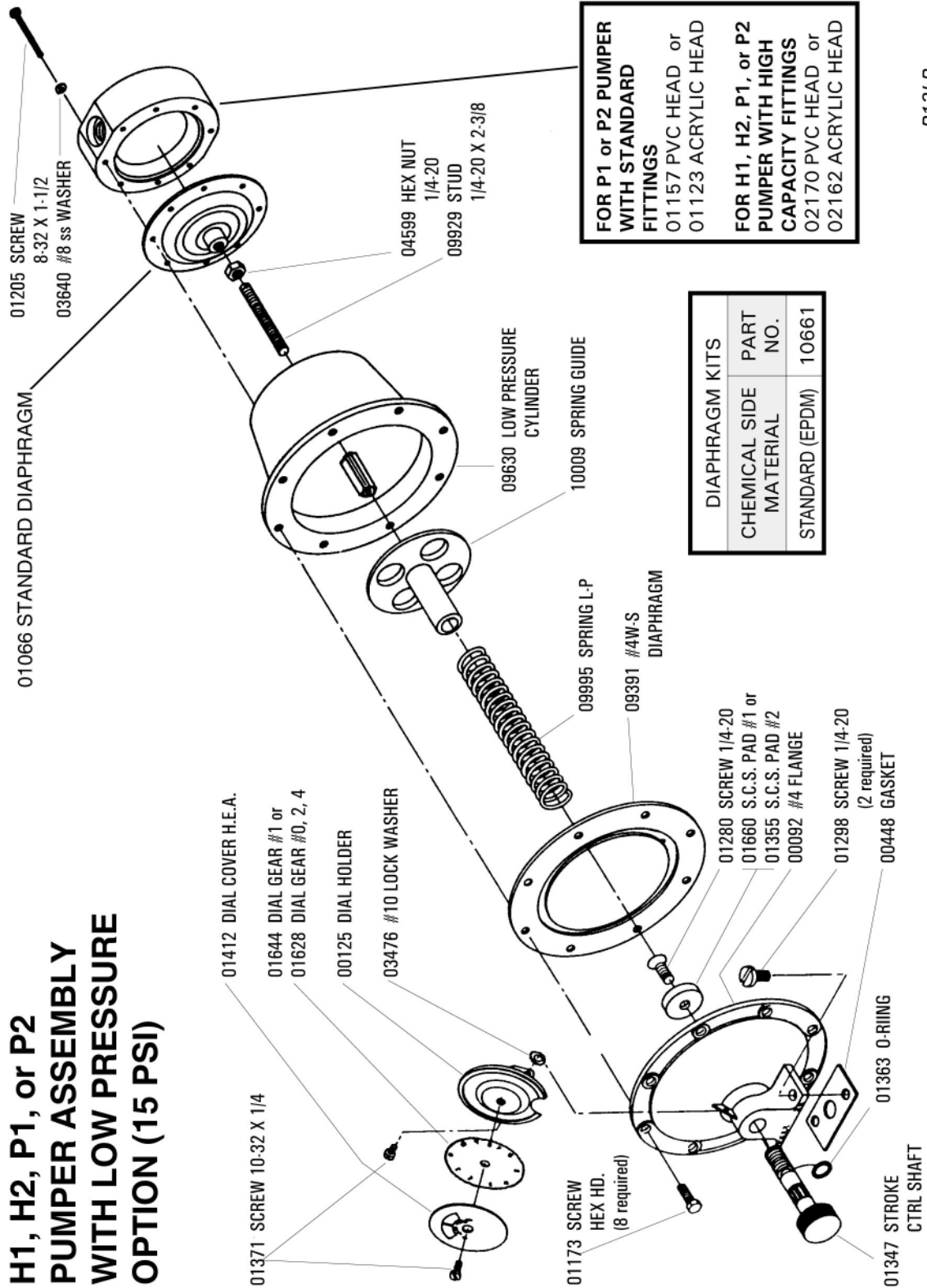
	PI	P2	HI	H2
STD/PVC	45510	46010	45554	46054
STD/ACR	45509	46009	45543	46043



DIAPHRAGM KITS INCLUDE BOTH DIAPHRAGMS, STUD ALL O-RINGS, GASKETS AND 2 EACH EXTRA SCREWS

DIAPHRAGM KITS	
STANDARD	08913
VITON	08905

**H1, H2, P1, or P2  
PUMPER ASSEMBLY  
WITH LOW PRESSURE  
OPTION (15 PSI)**

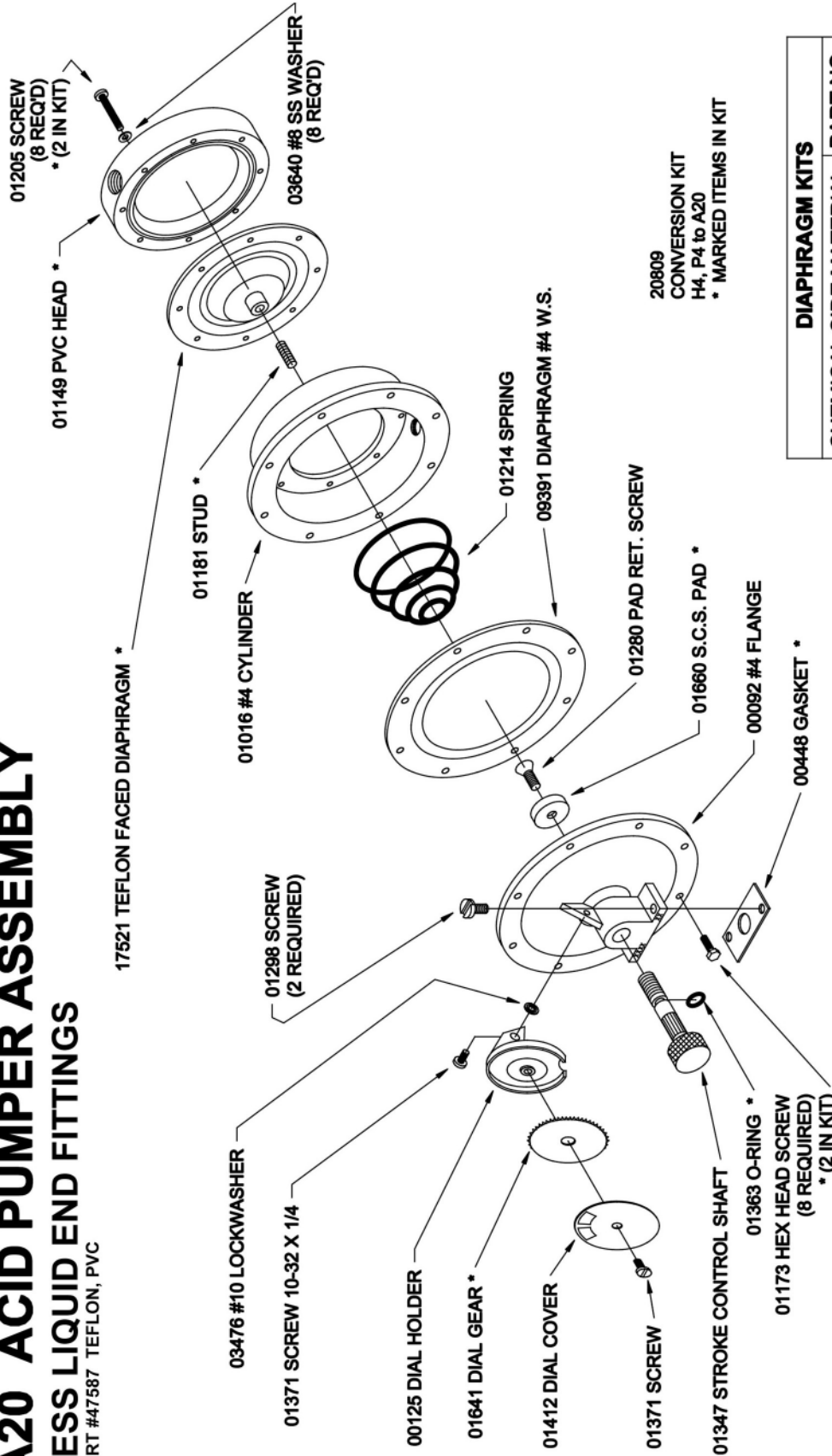


P12LP

# A20 ACID PUMPER ASSEMBLY

## LESS LIQUID END FITTINGS

PART #47587 TEFLON, PVC



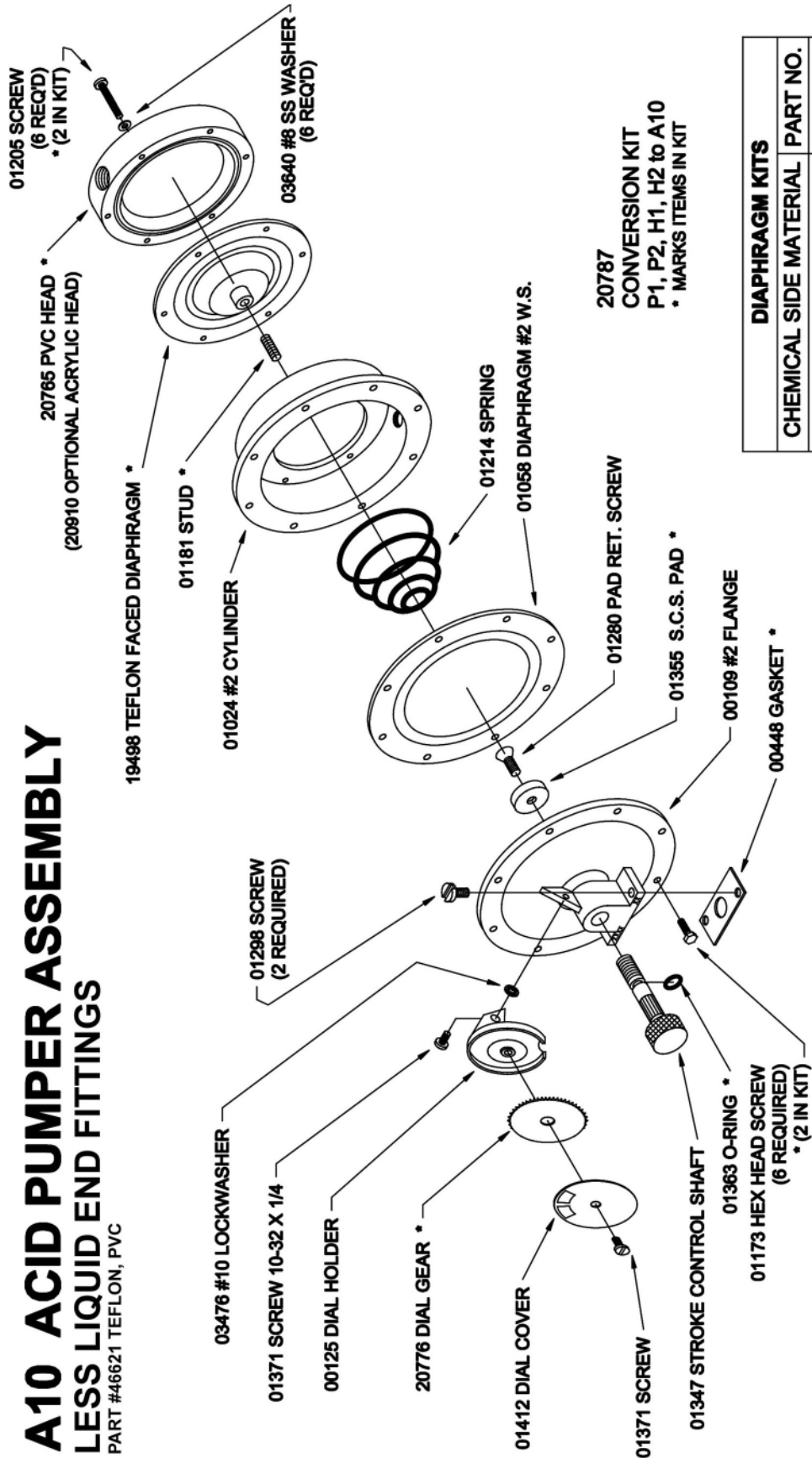
DIAPHRAGM KITS	
CHEMICAL SIDE MATERIAL	PART NO.
TEFLON FACED	18932

DIAPHRAGM KITS INCLUDE BOTH DIAPHRAGMS, STUD ALL O-RINGS, GASKETS AND 2 EACH EXTRA SCREWS

A20 06-2011

# A10 ACID PUMPER ASSEMBLY LESS LIQUID END FITTINGS

PART #46621 TEFLON, PVC



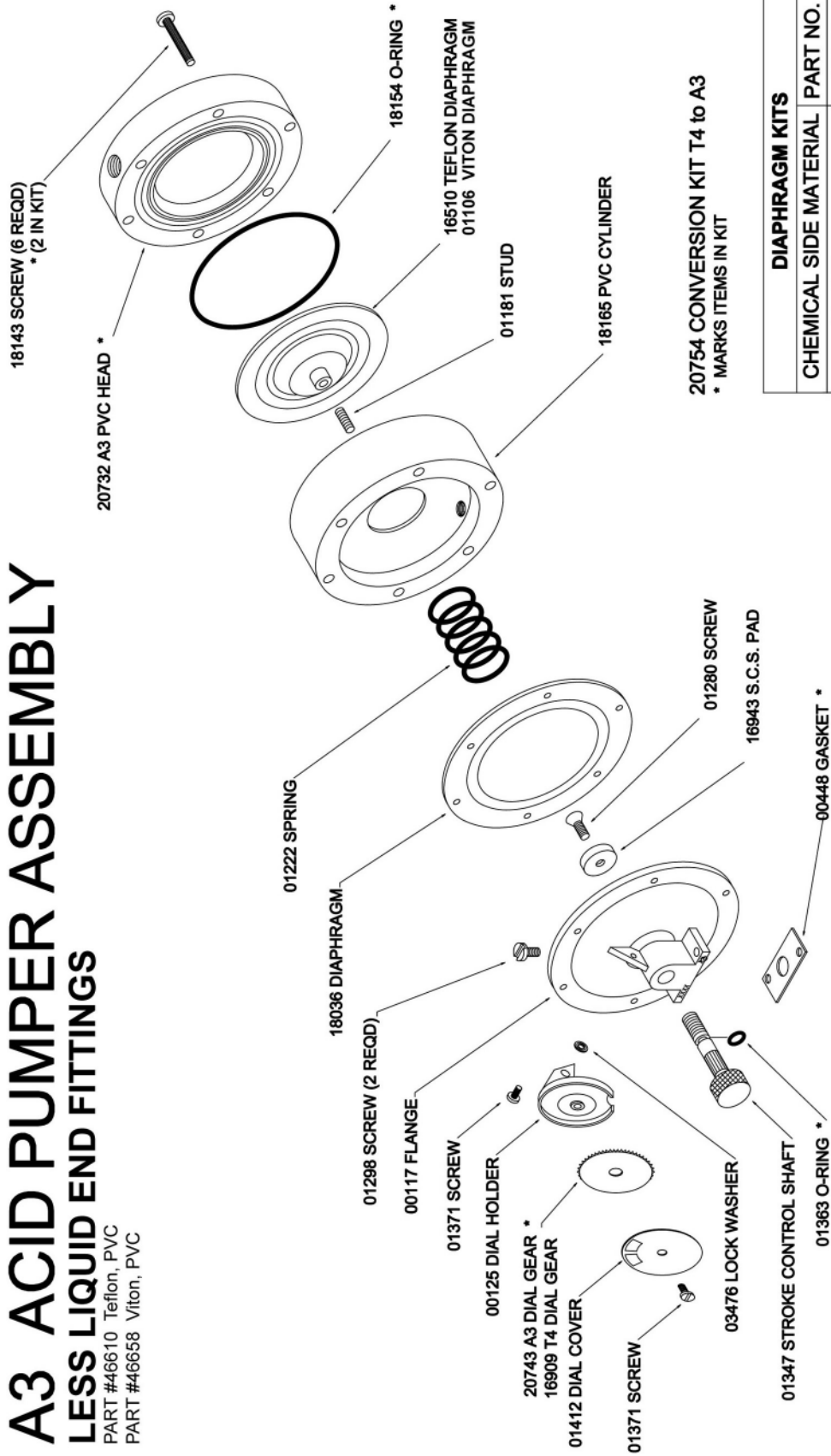
DIAPHRAGM KITS	
CHEMICAL SIDE MATERIAL	PART NO.
TEFLON FACED	20798

DIAPHRAGM KITS INCLUDE BOTH DIAPHRAGMS, STUD ALL O-RINGS, GASKETS AND 2 EACH EXTRA SCREWS

A10 06-2011

# A3 ACID PUMPER ASSEMBLY LESS LIQUID END FITTINGS

PART #46610 Teflon, PVC  
PART #46658 Viton, PVC



20754 CONVERSION KIT T4 to A3  
\* MARKS ITEMS IN KIT

DIAPHRAGM KITS	
CHEMICAL SIDE MATERIAL	PART NO.
VITON	08889
TEFLON FACED	17032

DIAPHRAGM KITS INCLUDE BOTH DIAPHRAGMS, STUD  
ALL O-RINGS, GASKETS AND 2 EACH EXTRA SCREWS

A3 6-2011

# RATIO:FEEDER® LIMITED WARRANTY

## WHAT IS COVERED

The H.E. Anderson Company of Muskogee, Oklahoma, will make any necessary repairs and/or replace any parts of any Ratio:Feeder® product made necessary because of defects in materials or workmanship for fifteen months from date of manufacture. Warranty repairs and/or replacements will be performed without charge to the owner by H.E. Anderson Company within a reasonable time after prepaid delivery of the defective product to the H.E. Anderson Company, 2100 Anderson Drive, Muskogee, Oklahoma 74403.

## WHAT IS NOT COVERED

This warranty specifically excludes failure of any parts or materials caused by chemical attack or damage caused by operation above rated capacity or pressure. Further, this warranty does not cover wear or failure caused by sand or other foreign materials which may be found in water that is passed through our products, or damage caused by freezing or exposure to water temperatures above 60 °C (140 °F).

This warranty does not cover damage caused by failure to follow prescribed installation instructions and limitations issued by H.E. Anderson Company. In addition, this warranty does not cover service adjustments, repairs, or replacements caused by misuse, negligence, alteration, accident, or lack of specified maintenance.

This warranty does not cover components used by, but not manufactured by H.E. Anderson Company, in the manufacture of our products except to the extent of said component manufacturer's warranty.

This warranty specifically excludes liability for consequential damages or for charges for labor or expense in making repairs or adjustments, or losses of time or inconvenience.

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This warranty gives you specific legal rights and you may also have other legal rights which may vary from state to state. H.E. Anderson Company does not authorize any person to create for it any other obligation or liability in connection with these products. ANY IMPLIED WARRANTY APPLICABLE TO THESE PRODUCTS IS LIMITED TO THE DURATION OF THIS WARRANTY. H.E. Anderson Company shall not be liable for consequential damages resulting from breach of this written warranty.

NOTE: Some states do not allow limitation on how long an implied warranty will last or the exclusion of limitations of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

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## WHAT TO DO IF THERE IS A QUESTION REGARDING WARRANTY

- 1) Promptly notify the consumer adviser at H.E. Anderson Company by telephone at 800-331-9620 or 918-687-4426.
- 2) Confirm the report in writing (or via FAX at 918-682-3342) to the H.E. Anderson Company, stating the circumstances surrounding the problem.

## PURCHASER'S OBLIGATION

- a) Purchaser must give H.E. Anderson Company immediate written notice on discovery of defect.
- b) Purchaser must pay for shipment of the defective product to the H.E. Anderson Company, 2100 Anderson Drive, Muskogee, Oklahoma 74403.