

# ***DynaPak Gas Sampler***

S Y S T E M   S U P P O R T   M A N U A L

***DP-2000***





# **DP-2000**

# **INSTRUCTION & OPERATING**

# **MANUAL**

Version: 09092002

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# 1. Introduction

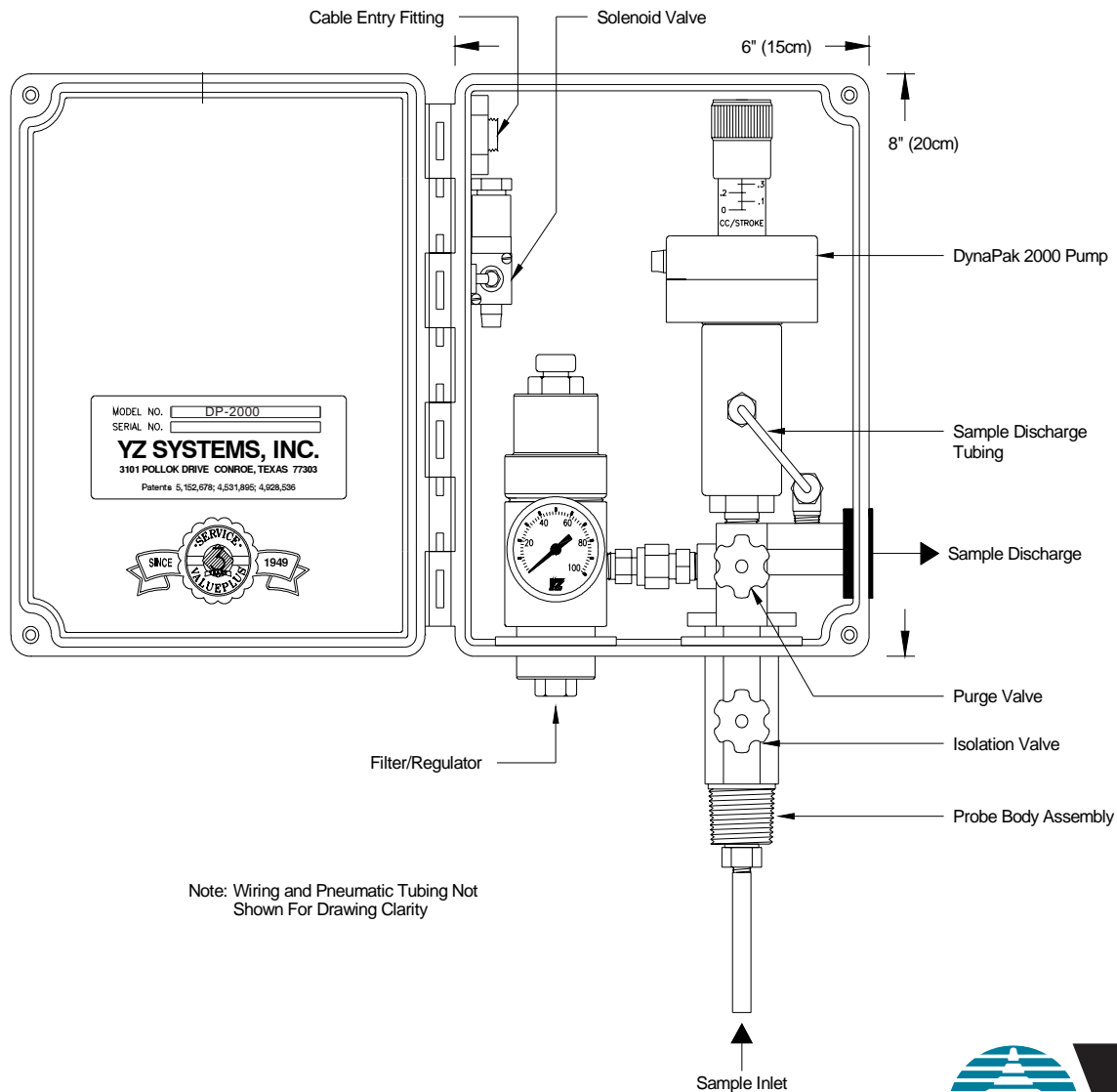
Congratulations on your purchase of the DynaPak 2000 Series Gas Sampler. You've made a wise measurement investment for your company.

Before you begin installation, insure that all of the necessary components are present. You will need a sample cylinder(s) during the installation. If you have questions concerning installation/operation, contact your YZ representative or YZ Customer Service at 936.788.5593.

Information contained in this document is subject to change without notice and does not represent a commitment on the part of YZ Systems.

## 2. System Components

The primary components of the DynaPak 2000 Sampling System are illustrated here.



## 3. Theory of Operation

### DynaPak 2000 Gas Sampler

The DynaPak 2000 Sampler is a pipeline mounted system which uses the pneumatically operated, positive displacement DynaPak 2000 pump, the YZ filter/regulator and a low power solenoid valve to obtain gas samples. This system may be operated at pipeline pressures between 25 psig (1.72 Bar) and 1500 psig (103.4 Bar).

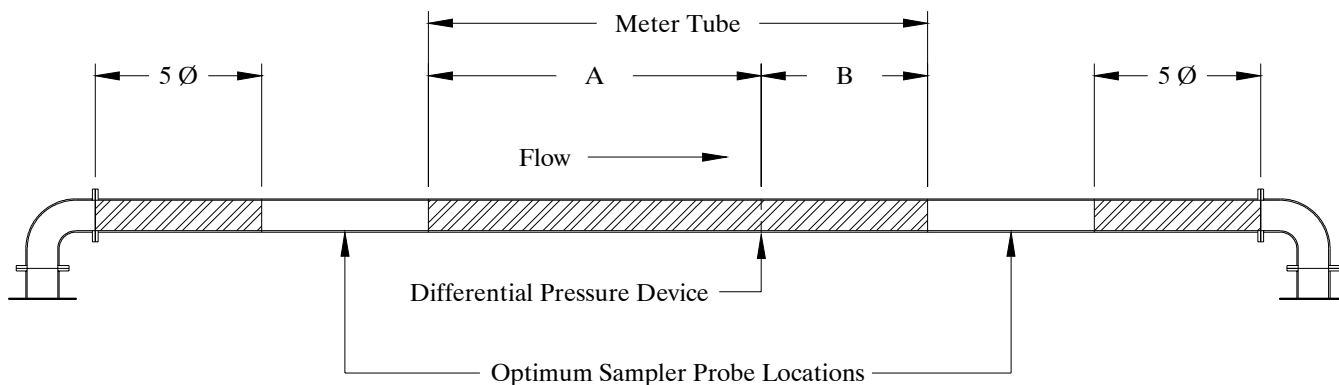
The DynaPak 2000 Pump is adjustable from 0 to .4 cc/stroke. The pump is actuated by pipeline gas which passes through a filter/regulator and to a 12VDC solenoid. The solenoid strokes the pump each time it is energized by the customer.



## 4. Sampler Location

4.1 The sampler should be a minimum of five pipe diameters from any device which could cause aerosols or significant pressure drops.

4.2 The sampler should not be located within the defined meter tube region (AGA 3-1985 ED.).



A = The number of unobstructed, straight pipe diameters upstream (see AGA - 3 manual).

B = The number of unobstructed, straight pipe diameters downstream (see AGA - 3 manual).



## 5. System Installation

### 5.1 DynaPak 2000

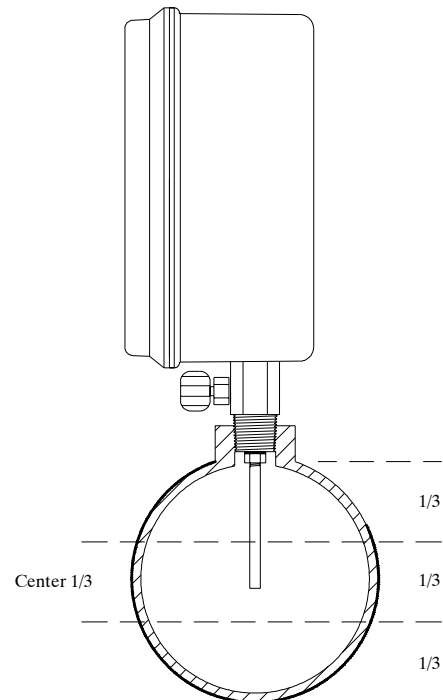
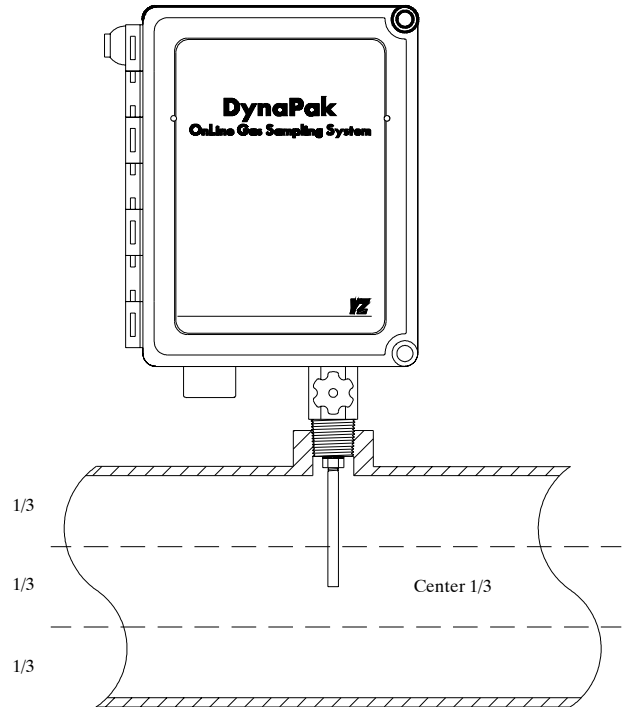
- The DynaPak 2000 sampler should be mounted vertically in a horizontal run of the pipeline.
- The end of the sampler probe should penetrate the center 1/3rd of the pipeline.
- The end of the sample probe should be cut parallel to the pipeline.
- Connect 12VDC actuation signal wires to the solenoid wires inside the enclosure. The positive lead connects to the red wire and the negative lead connects to the black wire.
- Before applying pipeline pressure to the DynaPak 2000, ensure that the isolation valve and purge valve are closed.
- After pipeline pressure has been applied to the sampler, check the probe body/pipeline connection using a liquid leak detector.

#### CAUTION:

*Incorrect operation of valves (over tightening) can result in damage to the valve components (isolation valve bonnet assembly) which might result in the valve stem being screwed out of the probe body. This of course results in product at pipeline pressure being vented continually through this port until this section of the pipeline is shut in. Be aware of the following procedures and information.*

**- DynaPak valves are of soft seat design and should only be closed or opened with fingers. No wrenches should ever be used.**

**-If a valve will not seal off with finger tight operation the valve should have maintenance performed to allow proper operation of the valve.**





## 6. Sample Vessel Installation

**6.1 Spun Cylinders.** Spun cylinders may be installed in a horizontal position on the DynaPak BackRack vessel rack. Avoiding traps in the line, install stainless steel tubing and fittings from the sample discharge port of the sampler to the product end of the sample cylinder.

### 6.2 Variable volume/constant pressure cylinder

The free-floating piston cylinder (DuraSite) may be installed in a horizontal position on an optional vessel rack. Free-floating piston cylinders should **NOT** be installed on the DynaPak BackRack vessel rack.

Install 1/8" tubing from the sample discharge port of the manifold to the product end of the vessel. Avoid traps in this line.

The vessel may be pre-charged using bottled inert gas such as nitrogen or helium (consult the factory for proper procedure).

**6.3 LinkPlus.** Install the optional LinkPlus directly into the sample discharge port of the sampler. Use stainless steel tubing and fittings to connect the LinkPlus outlet to the product end of the sample cylinder.



## 7. Operational Check & Leak Testing

7.1 When all of the tubing connections have been completed, close the purge valve on the front of the sampler probe body. Open the sample probe supply valve to allow pipeline pressure into the sampler. Check all connections using a liquid leak detector.

7.2 Adjust the filter/regulator from the following ranges:

Pipeline Pressure	Actuation Pressure
25 psig (1.72 Bar) to 50 psig (3.5 Bar)	Pipeline Pressure
50 psig (3.5 Bar) to 700 psig (48 Bar)	50 psig (3.5 Bar)
Over 700 psig (48 Bar) to 1500 psig (103.4 Bar)	65 psig (4.5 Bar)

7.3 Turn the stroke adjustment knob on the top of the pump counterclockwise to set the pump displacement at .4cc/stroke.

7.4 Utilizing the customer supplied control function initiate stroking of the actuation solenoid at a rapid rate until pipeline pressure **plus** is achieved at the sample discharge.

7.5 Check all connections from the sampler discharge to the connection on the sample cylinder using a liquid leak detector.

7.6 If no leaks are found, the pump and tubing should be considered tested and functional.



# 8. Sampler Set-Up

8.1 Calculate the sampling rate using the following 30 day chart:

Number of turns open on pump stroke knob	sample pump displacement per stroke	Sample cylinder volumes			Sample rate (minutes)	
		1000 cc	500 cc	300 cc		
<b>3</b>	<b>.100</b>	<b>4</b>	<b>9</b>	<b>15</b>		
<b>6</b>	<b>.200</b>	<b>9</b>	<b>18</b>	<b>30</b>		
<b>9</b>	<b>.300</b>	<b>13</b>	<b>27</b>	<b>45</b>		
<b>12</b>	<b>.400</b>	<b>18</b>	<b>36</b>	<b>60</b>		

8.2 Adjust the pump volume adjustment knob to the value used in the calculations in step 8.1.

Sample pump displacement per stroke	Number of turns open on the pump volume knob
.1cc	3
.2cc	6
.4cc	12



## 9. Sampler maintenance

### 9.1 Recommended preventative maintenance schedule

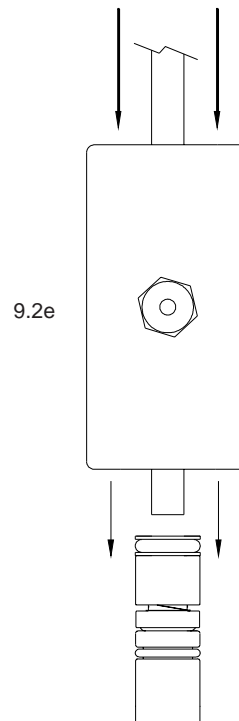
Every sampling situation is unique. Below are our recommendations for average conditions. A higher BTU content will necessitate more frequent pump/filter maintenance.

- a. Clean and lubricate the sample pump every six months.
- b. Check the filter element every six months replacing as necessary.
- c. Test the battery every six months.
- d. Test the system for leaks each time a fitting or connection has been made.

### 9.2 Cleaning and lubricating the DP-2000L pump

- a. Disconnect the plastic tubing from the solenoid valve to the pump diaphragm housing by depressing the tubing release sleeve on the diaphragm housing fitting while pulling out the tubing. It is not necessary to remove the fitting from the diaphragm housing.
- b. Remove the sample discharge (1/8" stainless steel tubing) from the pump body.
- c. Unscrew the pump body from the inlet check valve assembly. Separation at this point is recommended to maintain proper tubing location and alignment between the pump body and the probe body. Do not remove the inlet check valve body from the manifold unless cleaning is necessary. To replace the inlet check valve o-ring, cut the o-ring off the head of the dart and stretch the new o-ring over the head of the dart using a light coat of assembly grease.
- d. Remove the diaphragm housing from the pump body by unscrewing the diaphragm housing and carefully pulling the plunger out of the pump body. Inspect the plunger shaft for damage or wear. The diaphragm chamber houses the diaphragm, return spring, stroke adjustment screw and plunger assembly. The diaphragm chamber should not be disassembled unless one of these items needs replacing.
- e. Remove the internal bushings and o-rings from the pump body by inserting a nonmetallic rod (larger than 1/4", smaller than 1/2") into the top of the pump body. Gently tap to remove all bushings and o-rings out the bottom of the pump body.
- f. Clean and inspect all components. Replace if necessary.

*NOTE: normal service generally requires only the replacement of the o-rings and seal. A seal repair kit (part number D3-0002) is available from YZ.*



## 9. Sampler maintenance

g. Apply a light coat of non-soluble assembly grease on all o-rings and bushings to prevent damage.

h. Install the body bushing into the bottom of the pump body.

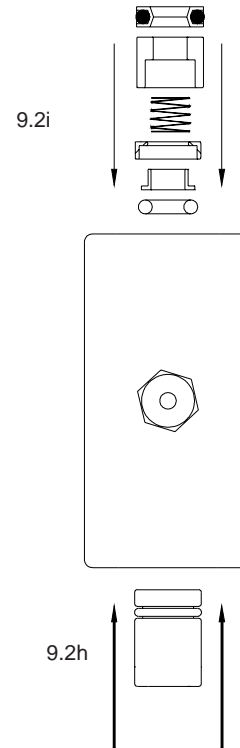
i. Insert all other bushings, springs, and o-rings on the plunger shaft and carefully install assembly into the top of the pump body.

*NOTE: apply a light coat of assembly grease on the plunger shaft prior to installation.*

j. Install the pump assembly on the inlet valve assembly.

k. Connect the 1/8" stainless steel tubing to the pump body and 1/8" plastic tubing to the diaphragm housing.

l. Pressure test the pump as previously described for proper operation.



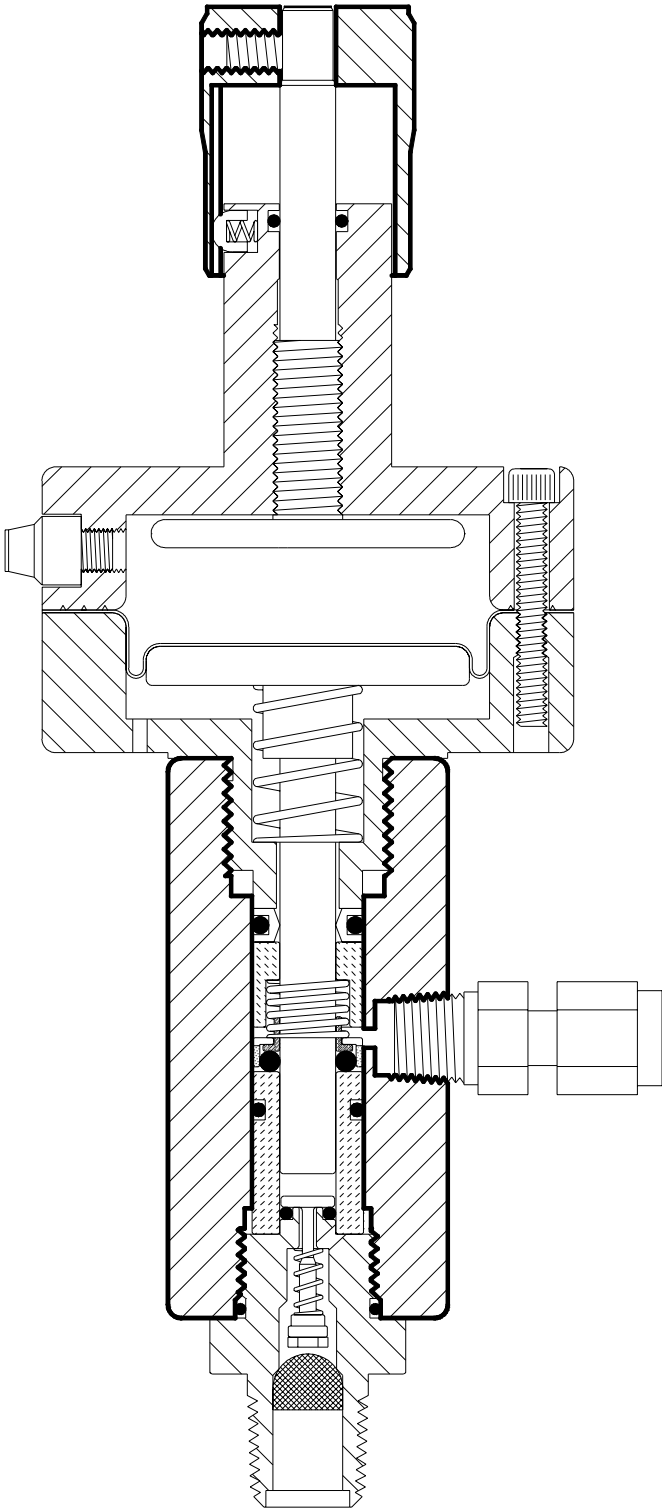
## 9. Sampler maintenance

### 9.3 Recommended spare parts for the DynaPak 2000 Series gas samplers.

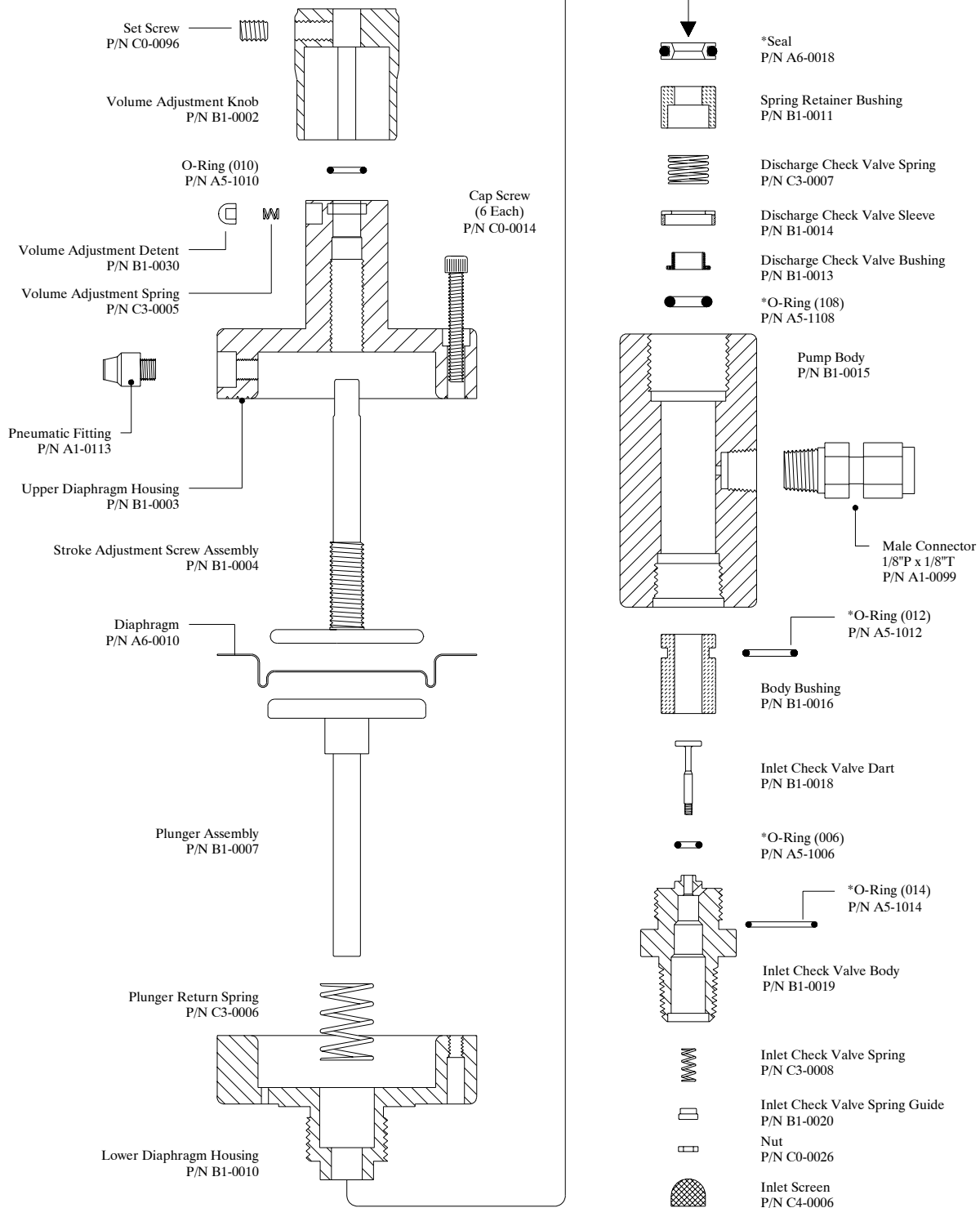
Part Number	Description	Qty.	Location
D3-0002	DP-2000 pump seal kit	1	see diagrams #1 and #2
D3-0003	YZ filter regulator repair kit	1	see diagrams #3 and #4
C4-0004	Filter Element	1	see diagrams #3 and #4



# Diagram #1: DP 2000 pump (assembled)



# Diagram #2: DP 2000 pump (exploded)

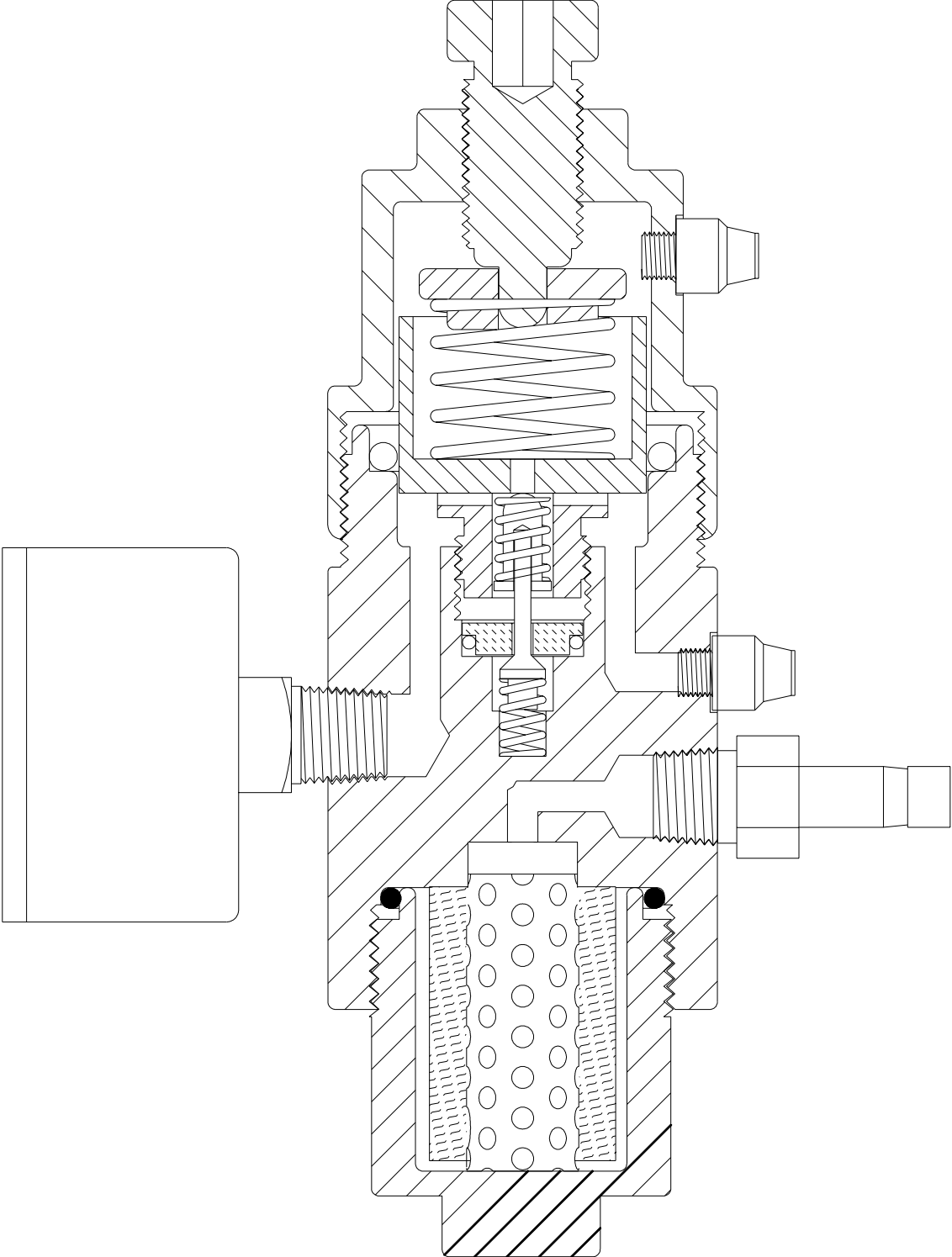


\*DP-2000 Pump Seal Kit - P/N D3-0002

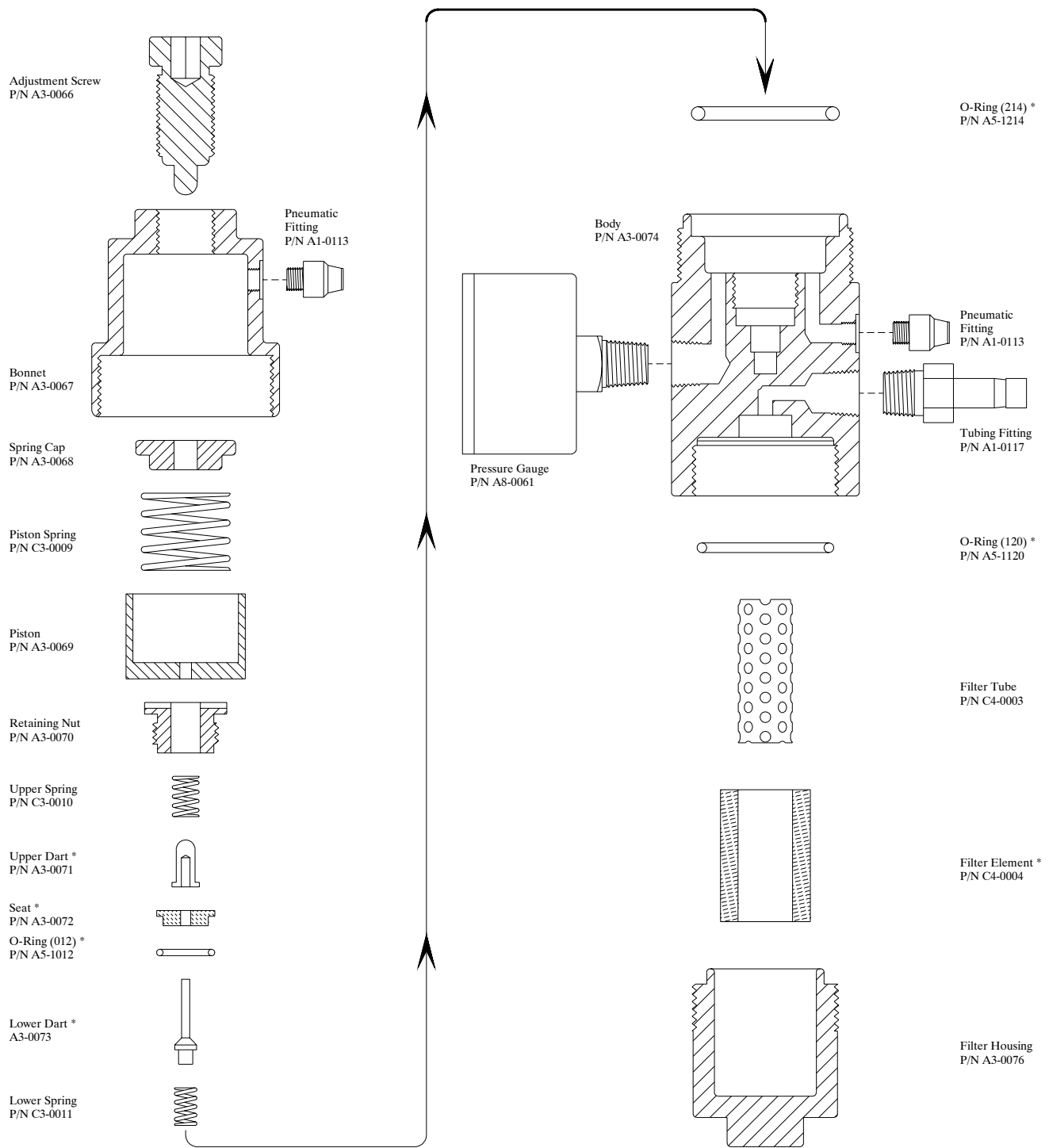




# Diagram #3: YZ filter/regulator (assembled)



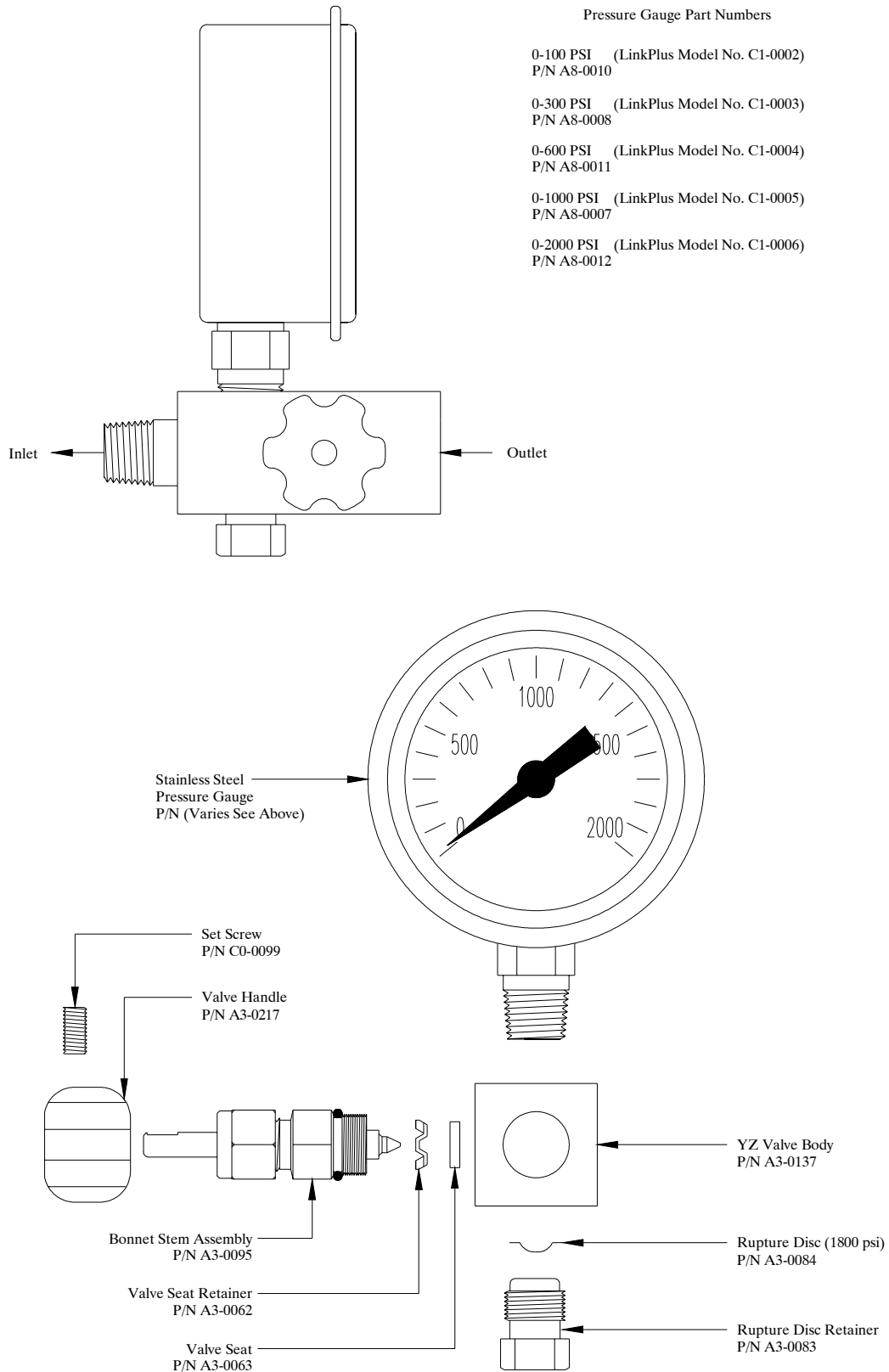
# Diagram #4: YZ filter/regulator (exploded)



\* Filter/Regulator Repair Kit P/N D3-0003



# Diagram #5: LinkPlus



## Diagram #7: DuraSite Portable Sample Vessel Instructions

**Purpose:** The DuraSite Portable Sample Vessel permits the user to remove a liquid or gas hydrocarbon sample from a pipeline or a sampling device. This is accomplished without changing the pressure of the product or exposing it to a contaminant fluid. If properly used and maintained the DuraSite will provide many years of safe, accurate and clean sampling.

**Use:** The DuraSite is a very safe device to use. As with any equipment dealing with flammable products, it is mandatory that a good, thorough operator training procedure be established prior to use.

Typical use of the cylinder would be as follows:

**Step 1: (In The Lab)** Connect a regulated inert gas supply to the pre-charge valve. The product valve should be open. By carefully controlling the pre-charge valve and the regulator, the cylinder can be slowly charged with pre-charge gas (NOTE: This should be done slowly to prevent slamming the piston down to the opposite end). The pressure on the pre-charge pressure gauge should be brought to a reading of 10-50 psi above the expected pressure of the product in the field. Close the pre-charge valve and disconnect the gas supply. Check the pre-charge valve, relief device, and the pre-charge pressure gauge for leaks. Any leaks should be stopped before continuing. The vessel should be placed in a padded carrying case and made ready for field use.

Proceed to **EITHER Step 2, or Step 3 as required for your application.**

### STEP 2: FOR COLLECTION OF SAMPLE VIA SPOT SAMPLE OR FROM COMPOSITE ACCUMULATOR VESSEL.

**2a:** Connect the product end of the pre-charged sample vessel to the product supply.

(Sampler product removal valve, or Pipeline sample probe)  
**NOTE: the pre-charge pressure gauge reading should be greater than the product supply pressure reading. If not, repeat Step 1 above.**

**2b:** Once the vessel is connected to the product supply, it is necessary to vent a small amount of product prior to filling the vessel. This assures fresh product and removes any air or gas when dealing with liquids. This can be done by loosening the product purge valve a very small amount until the product is purged. After thorough purging, the product purge valve should be tightened.

**2c:** The product pressure gauge reading should be 10-50 psi below the pre-charge pressure gauge reading. By carefully opening the pre-charge valve, the pressure becomes equalized, then begins to drop below the product pressure. The pre-charge valve should be carefully controlled so as to not vent the pre-charge gas too fast.

**2d:** When the cylinder becomes a maximum of 80% full (see volume indicator), all valves should be closed. The product connection is slowly broken in order to vent any trapped product. After vessel removal, all connections should be checked for leaks and the pre-charge and product valve ports capped to prevent leakage.

**2e:** Pack the DuraSite in appropriate carrying case to meet D.O.T. guideline, with D.O.T. paperwork and transport to lab for analysis.

### STEP 3: FOR DIRECT CONNECTION TO SAMPLER.

**3a:** Connect the sampler discharge port to the product inlet port to the DuraSite using 1/8" stainless steel tubing.

**3b: (Gas sampling)** Connect the pre-charge port to the DuraSite to the pipeline for pre-charge pressure (Proceed to step 3d), or configured like the liquid sample application below. (Step 3c)

**3c: (Light sampling)** Pre-charge the DuraSite as indicated in Step 1, then install a pressure relief valve to the pre-charge port and open the pre-charge valve on the DuraSite. (The pressure relief valve should have a relief pressure setting of approximately 100 psi above line pressure.)

**3d:** Open the product inlet valve of the DuraSite and the purge valve on the sampler. Next open the purge valve on the product end of the DuraSite and allow product to purge all lines and connections out.

**3e:** Close purge valves and begin sample cycle.

**3f:** At the end of sample cycle, close product inlet valve on the DuraSite and remove the DuraSite. Pack the DuraSite in appropriate carrying case to meet D.O.T. guideline, with D.O.T. paperwork and transport to lab for analysis.

**Step 4: (In The Lab)** Prior to analysis, the product should be mixed. This is accomplished simply and efficiently by inverting the cylinder end-over-end, causing the mixing ball to fall through the product. Approximately 10-12 trips of the mixing ball through the product assures a homogenous solution.

**Step 5:** The regulated pre-charge gas should be reconnected to the pre-charge side of the cylinder. The pre-charge gas supply should remain open during analysis.

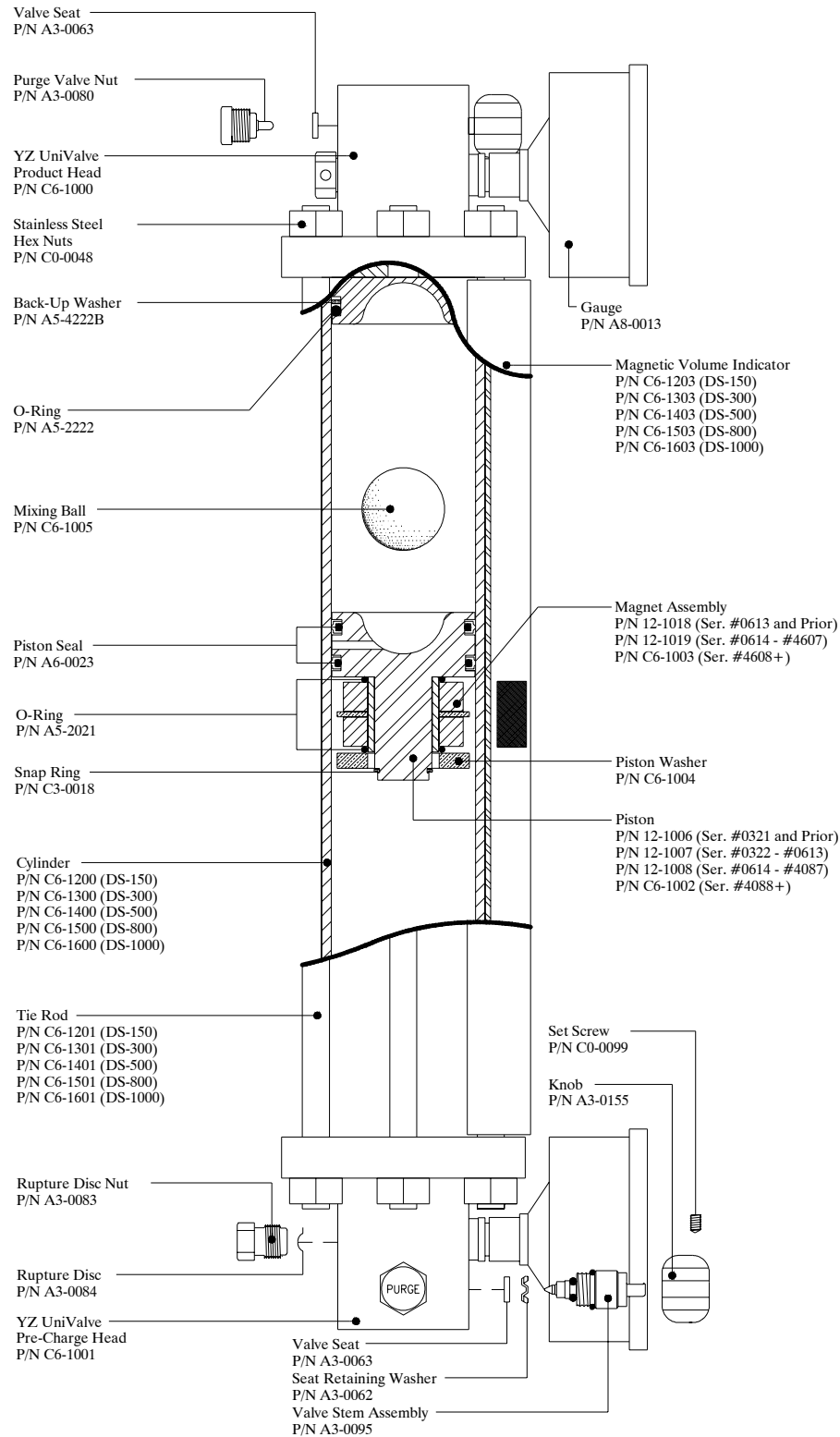
**Step 6:** Purging a small amount of product from the vessel removes unmixed product from the tee, relief device, gauge, etc. The unit can now be connected to a chromatograph and the product analyzed.

**Step 7:** After analyzing, the remainder of the product should be dumped and the vessel properly cleaned. Normal cleaning can be accomplished by rinsing the product end with a petroleum solvent and flushing with acetone. If a more thorough cleaning is required, the vessel should be disassembled.

**WARNING: A portable sample vessel should never be filled to more than 80%. This allows a 20% pre-charge cushion to absorb thermal expansion of the product.**



# Diagram #5: DuraSite Sample Vessel









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