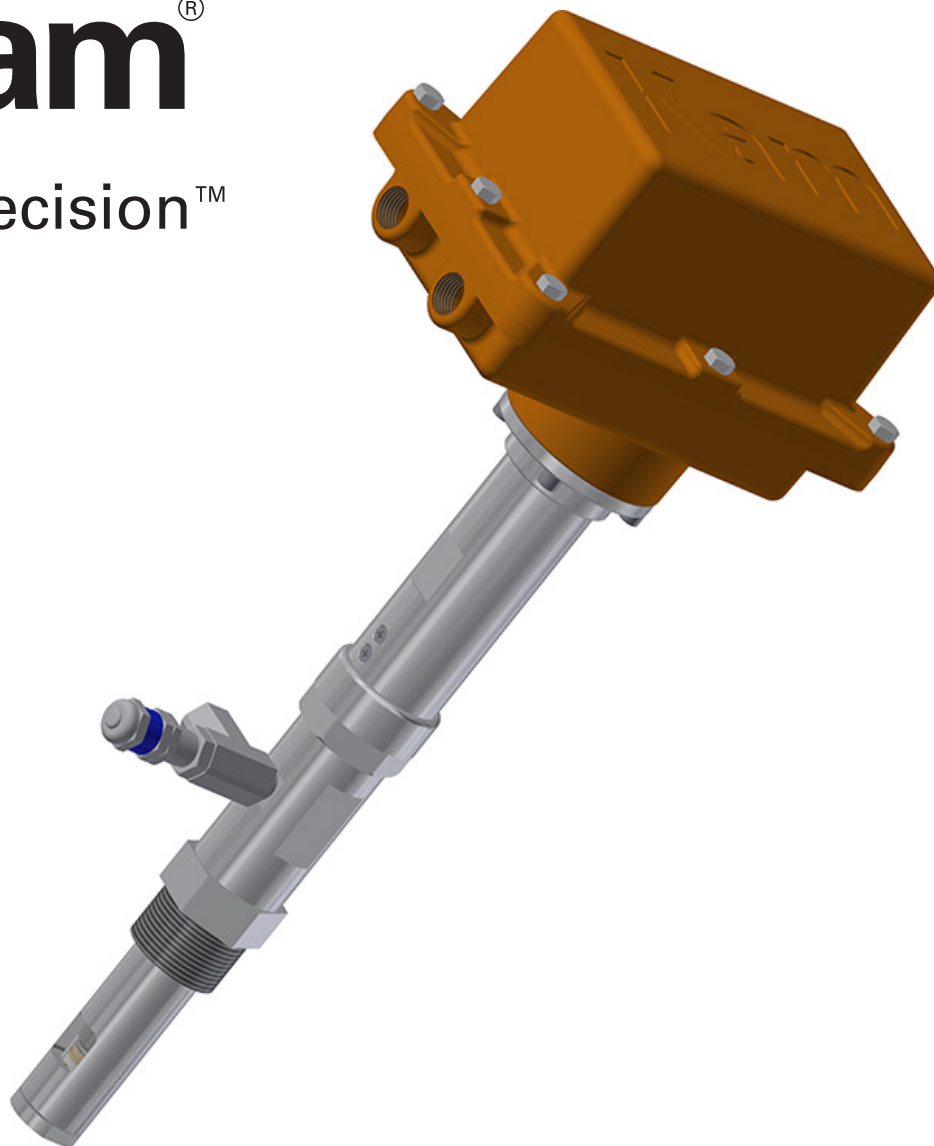




Simple Precision™



KAM® E-IAS™

ELECTRIC ISOKINETIC AUTOMATIC SAMPLER

PER API 8.2, ASTM D4177
AND ISO 3171

User Manual

EIASMANUAL0719

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CAUTION:

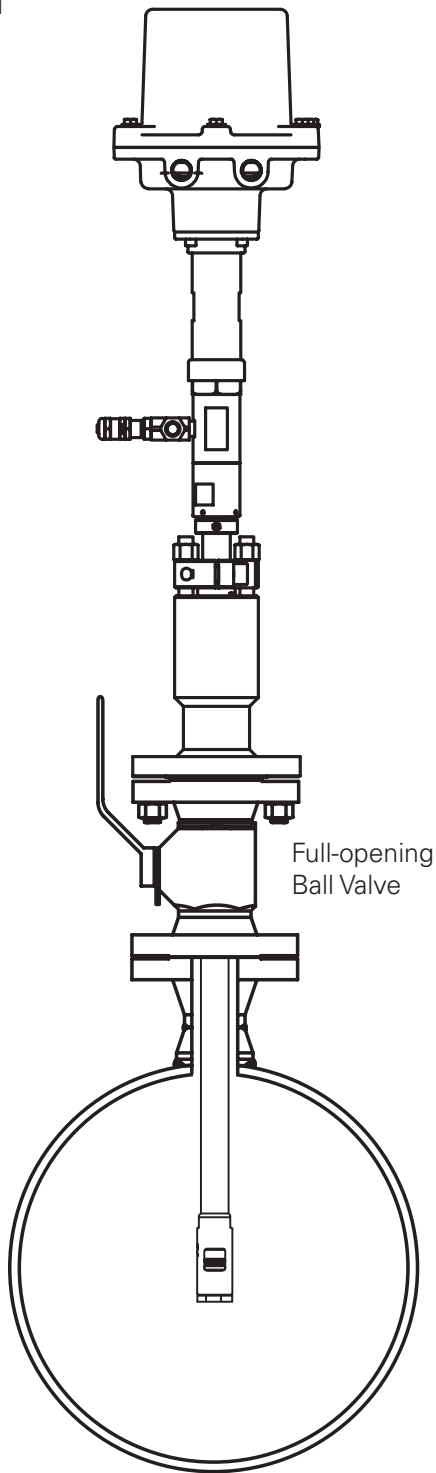
When installing the E-IAS™ sampler in a pipeline containing petroleum products, petro-chemicals, waste waters with the presence of pressure & temperature, and high-pressure steam refer to the Pipeline Operators' "Health, Safety and Environmental Policy Procedures" to ensure safe installation.

KAM CONTROLS, INC. reserves the right to make changes to this document without notice.

INTRODUCTION

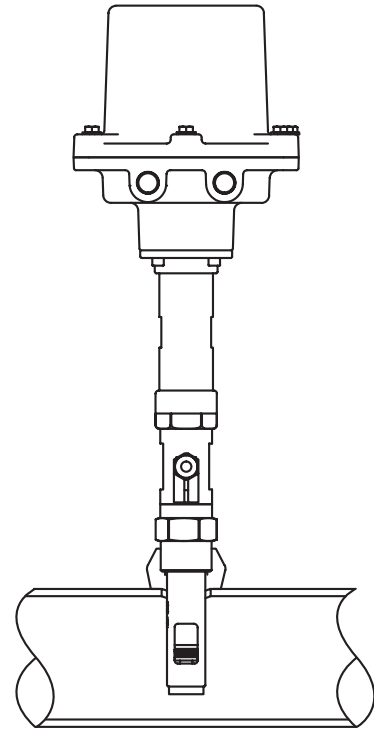
AVAILABLE MODELS and MOUNTING OPTIONS

FIG. 1-1



Option 1: Insertable/retractable E-IAS™ with 2" 3" or 4" flanged seal housing or 2" MNPT

FIG. 1-2



Option 2: Fixed insertion E-IAS with 1.25" NPT or 2", 3" or 4" flange

SPECIFICATIONS

Media:	Liquid hydrocarbons, including crude oil and condensate
Materials:	Wetted parts SS316, Peek Standard O-rings Viton
Bite size:	0.5, 1, 1.5 or 2 cc
Sample rate:	20 samples/minute max
Viscosity:	1-500 cSt
Pipe size:	1 – 36"
Max pressure:	285 psi
Temperature:	-40° to 350°F (-40° to 177°C)
Electrical	
Requirements:	120 VAC 2.0A RMS 50/60 Hz single phase -20 °C to +45 °C
Motor:	High-torque stepper motor

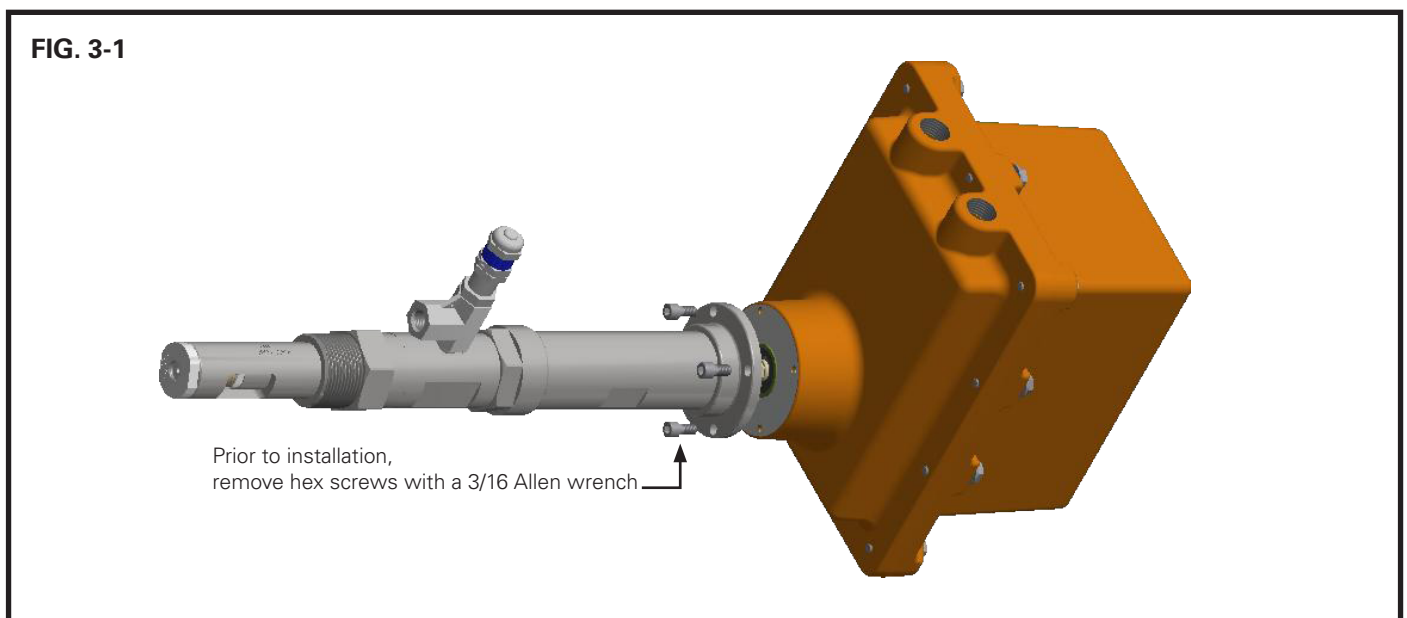
INSTALLATION

PRIOR TO INSTALLATION

Before installing the E-IAS™ Sampler, thoroughly inspect to ensure that unit was not damaged during transit.

KAM CONTROLS recommends that the E-IAS™ Sampler be installed 2 to 4 pipe diameters downstream of a KAM® static mixer and in conjunction with a KAM® ML™ Measurement Loop. At the time of installation the pipeline pressure needs to be reduced to under 100 psi in order to safely install the E-IAS™ Sampler.

The KAM® E-IAS is shipped with the motor and housing separate from the probe body. KAM recommends full installation of probe (including insertion on insertable models) prior to attaching motor housing to probe body. If motor housing is attached at time of installation, detach prior to installation by removing the (4) hex screws at the bottom of the housing with a 3/16 Allen wrench. (Fig. 3-1)



FIXED INSERTION MODELS INSTALLATION

In horizontal lines, the E-IAS™ Sampler should be installed with the probe horizontally oriented at 3 or 9 o'clock.

KAM recommends using liquid pipe sealant rather than Teflon tape on all threaded connections.

Insertion distance/shaft length is set at factory. After installation of probe body on the line, attach the motor housing to probe body using four hex screws and a 3/16 Allen wrench. (Fig. 3-1).

Follow wiring instructions on page 10 of this manual.

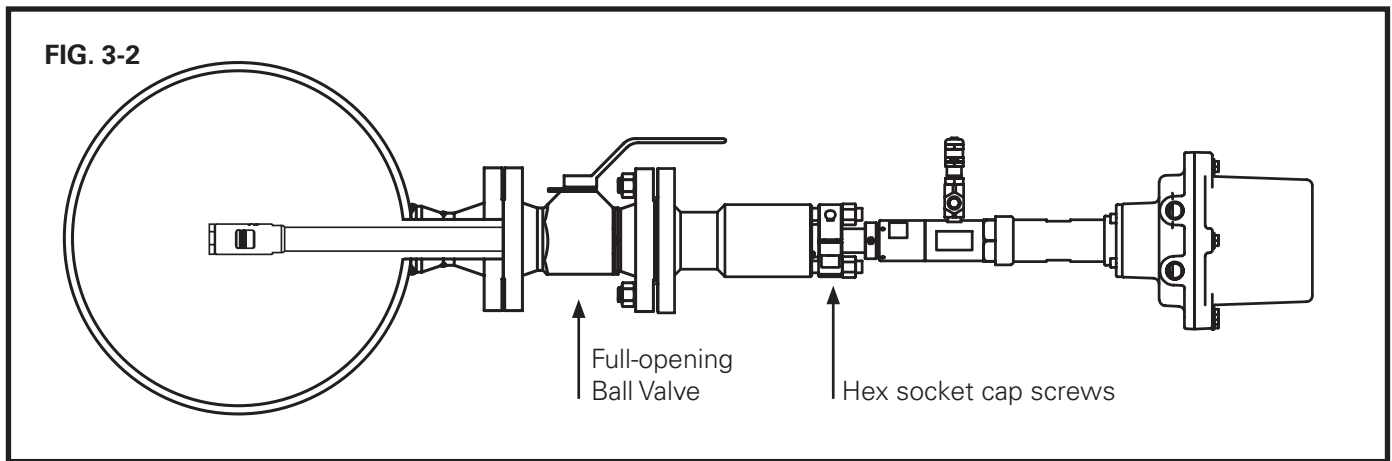
INSTALLATION

INSERTABLE/RETRACTABLE MODELS INSTALLATION

In horizontal lines, the E-IAS™ Sampler should be installed with the probe horizontally oriented at 3 or 9 o'clock. Fig. 3-2.

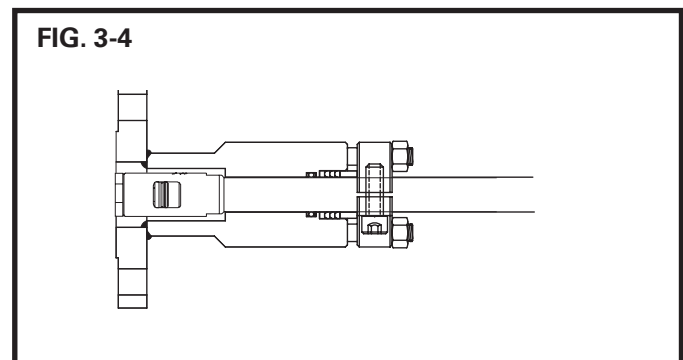
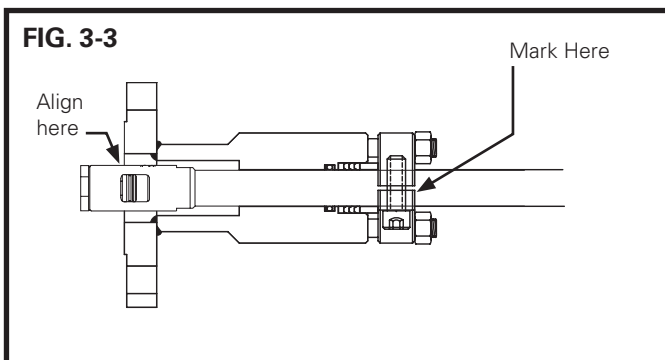
The E-IAS™ Sampler Probe should be inserted so that the middle of the sampling window is in the 20% center area of the pipe. Fig. 3-2. It is the user's responsibility to ensure that the E-IAS™ Sampler is placed in the most representative point in the flow profile.

Insertable models of the E-IAS™ Sampler should be installed according to Fig. 3-2. The Full-Opening Ball Valve is used to isolate the E-IAS™ Sampler from the pipeline during installation or removal. The Seal Housing of the E-IAS™ Sampler allows the Sampler Probe to be inserted in and out of the pipe under pressure and flow conditions up to 100 psi.



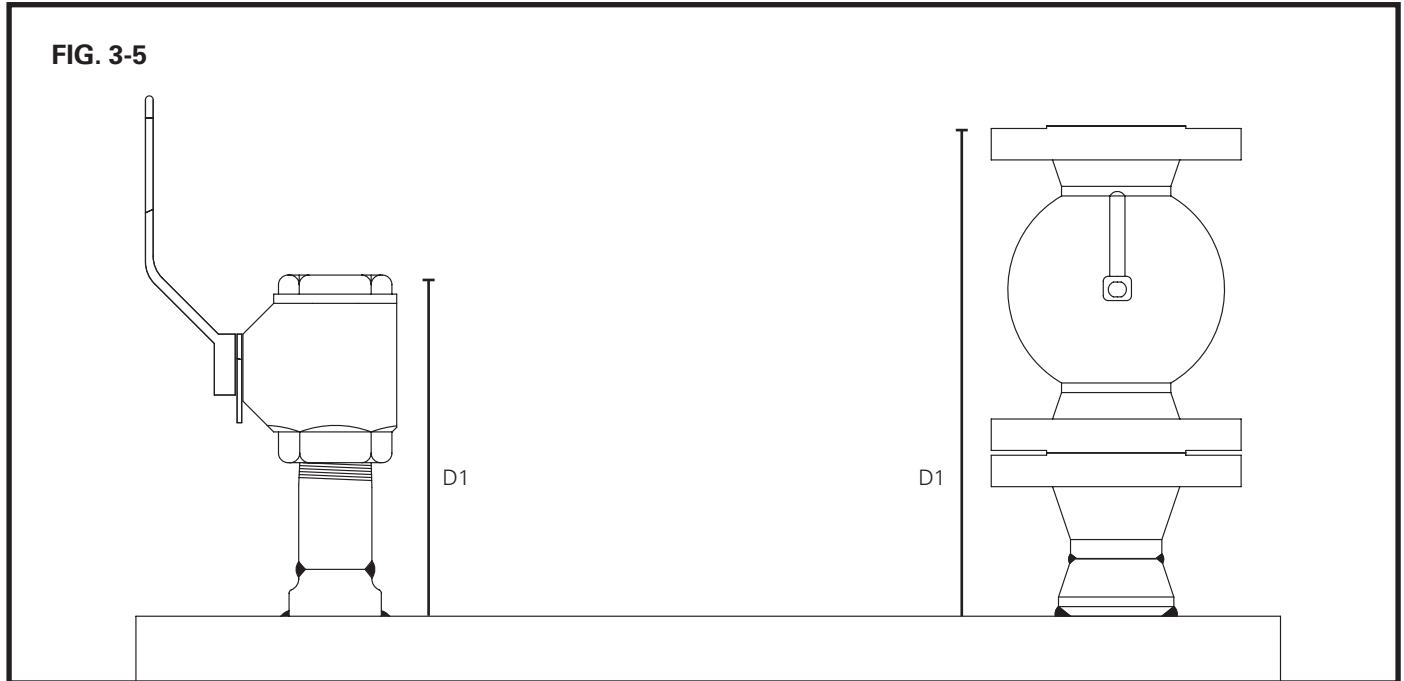
Before mounting the E-IAS™ Sampler on the Full-Opening Ball Valve, determine the insertion length required.

1. Lay the E-IAS™ Sampler on the ground or a table.
2. Loosen Hex Socket Cap Screws on the Locking Collar using a 3/8" Allen wrench. Fig. 3-2. This will allow the E-IAS™ Sampler Shaft to slide through the Seal Housing.
3. Push the E-IAS™ Sampler Shaft through the Seal Housing until the middle of the sampler window chamber is aligned with the end of the Seal Housing. Fig. 3-3.
4. Use a Sharpie or other permanent marker to mark the shaft at the edge of the Locking Collar. (Do not use anything sharp to mark the shaft. This will create grooves that will damage the O-rings in the Seal Housing.)



INSTALLATION CONTINUED

5. Pull Shaft back until the Probe is all the way within the Seal Housing and tighten the Hex Socket Cap Screws on the Locking Collar. This will prevent the E-IAS™ Sampler Shaft from sliding and the Probe will be protected inside the Seal Housing until and during installation. Fig. 3-4.
6. Measure the distance (D1) from the top of the main pipe to the end of the connection where the E-IAS™ Sampler is going to be installed. Fig. 3-5.



7. Calculate the insertion distance using the following formula:

TID	-	Total Insertion Distance
D1	-	Distance from the top of the valve to the pipe
WT	-	Pipe Wall Thickness
TD	-	Threaded Depth
ID	-	Inside Diameter

For Flanged Seal Housing

Total Insertion Distance (TID)= D1 + WT + (Pipe ID x 7/16) + Seal Thickness

Example: D1= 14"
 WT= .25"
 ID = 8.125"
 Seal Thickness=1/8"

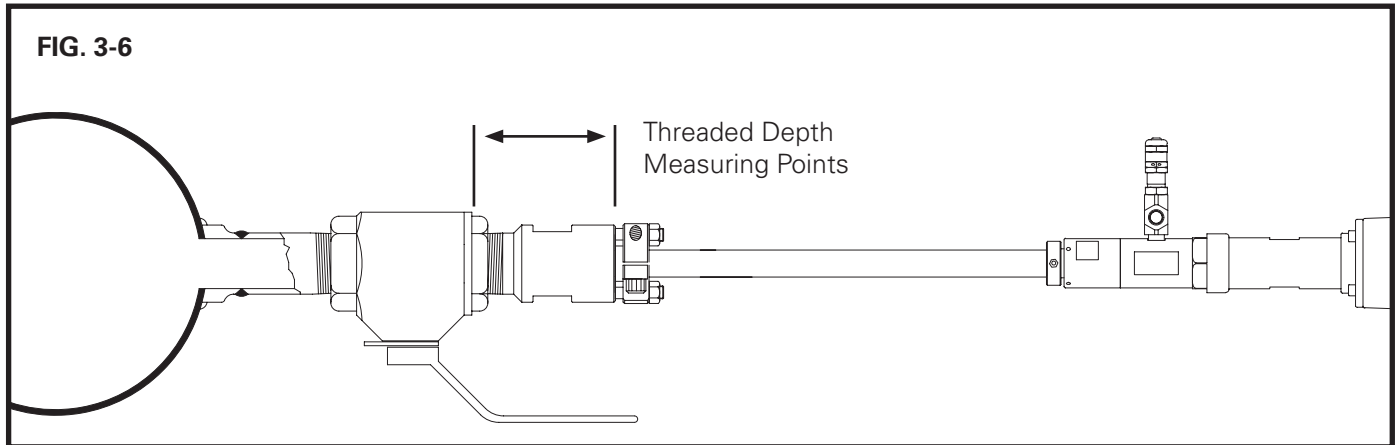
TID=14 + .25 + (8.125 x 7/16) + 1/8
 14 + .25 + 3.55 + .125=17.93

INSTALLATION CONTINUED

For 2" MNPT Seal Housing

TID cannot be calculated until the Seal Housing is screwed into place. Bolt or Screw the E-IAS™ Sampler to the Valve or designated installation location. (KAM CONTROLS recommends liquid thread sealant and not teflon tape for the threaded E-IAS™ Sampler.)

You must then measure the Threaded Depth (TD) into the Valve or connection in order to calculate TID. You can do this by measuring the distance from the edge of the Valve or female connection to the top of the Seal Housing body and subtracting that distance from 5.25". Fig 3-6.



$$\text{Total Insertion Distance (TID)} = D1 + WT + \frac{7}{16} \text{ Pipe ID} - \text{Threaded Depth (TD)}$$

For example: If the measured distance from the top of the Valve and the top of the Seal Housing body is 4.65" you should calculate the threaded depth (TD) by subtracting 4.65" from 5.25". (5.25-4.65=0.6)

8. You are now ready to calculate the TID.

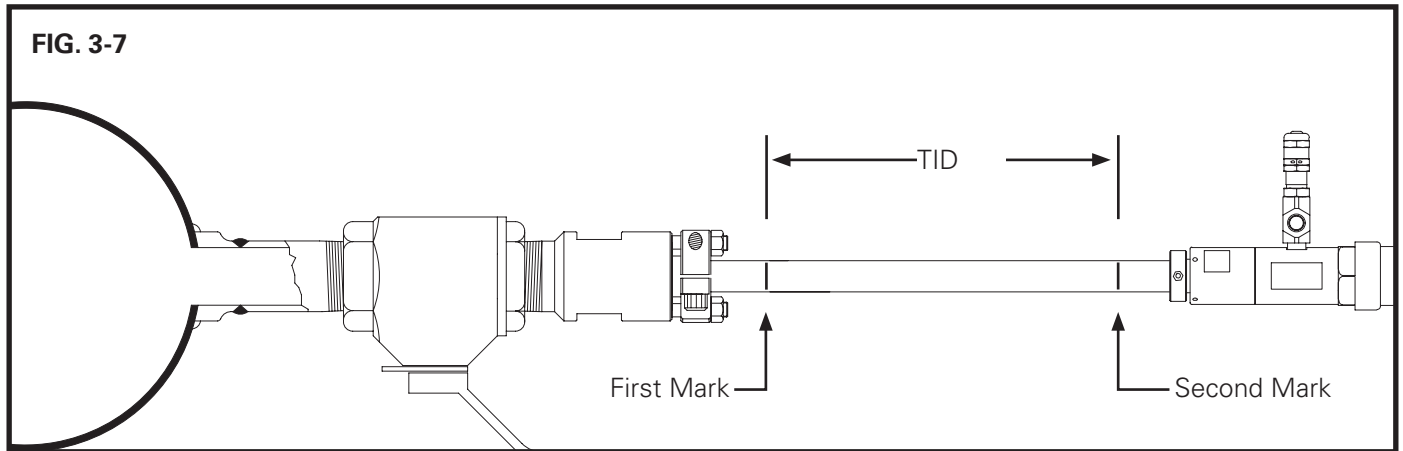
$$\text{TID} = D1 + WT + (\text{Pipe ID} \times \frac{7}{16}) - \text{TD (from page 8)}$$

Example: D1= 14"
 WT= .25"
 ID = 8.125"
 TD=.6"

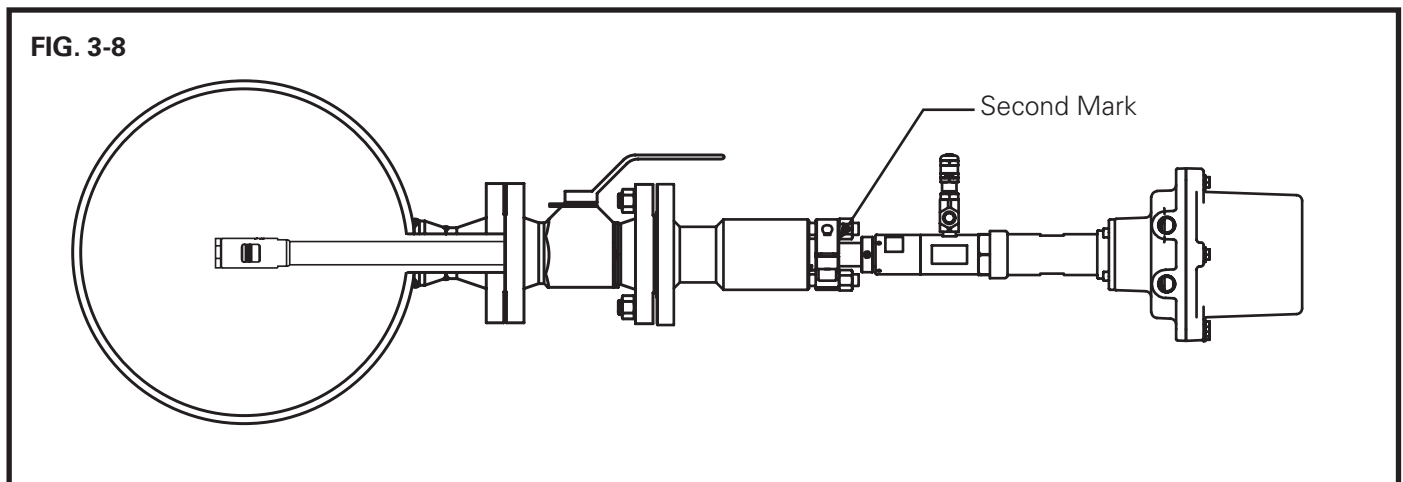
$$\text{TID} = 14 + .25 + 3.55 - .6 = 17.2$$

INSTALLATION CONTINUED

- For all insertable models, use the calculated TID and make another mark on the shaft, measuring from First Mark. Fig 3-7.

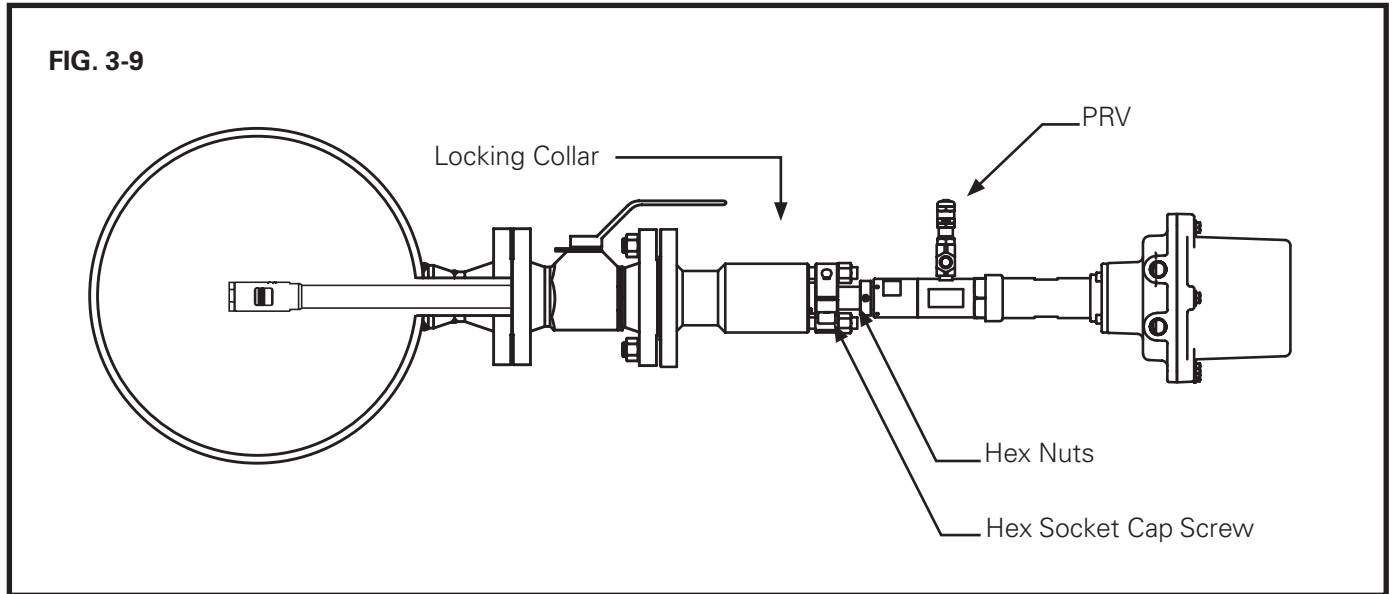


- If you have an E-IAS™ Sampler with a Flanged Seal Housing, you may now attach it to the Valve on the pipeline.
- Slowly open Full Opening Valve and check for leaks.
- Loosen Hex Socket Cap Screw on the Locking Collar.
- Align Window of the E-IAS™ Sampler to face the flowing stream. This can be done by aligning the Flow Indicators in parallel with the main pipe. The Flow Indicators are located at the bottom of the Actuator Housing.
- Push the E-IAS™ Sampler in until the Second Mark is at the top edge of the Locking Collar. Fig. 3-8.



INSTALLATION CONTINUED

15. Re-tighten the Hex Socket Cap Screw.
16. Tighten the Hex Nuts holding the Locking Collar from $\frac{1}{4}$ to $\frac{1}{2}$ of a turn. The Hex Nuts holding down the Locking Collar should never be over tightened. Their major function is to apply light pressure on the Chevron Packing to ensure a secondary seal between the Seal Housing Body and the Insertion Shaft. Fig. 3-9.

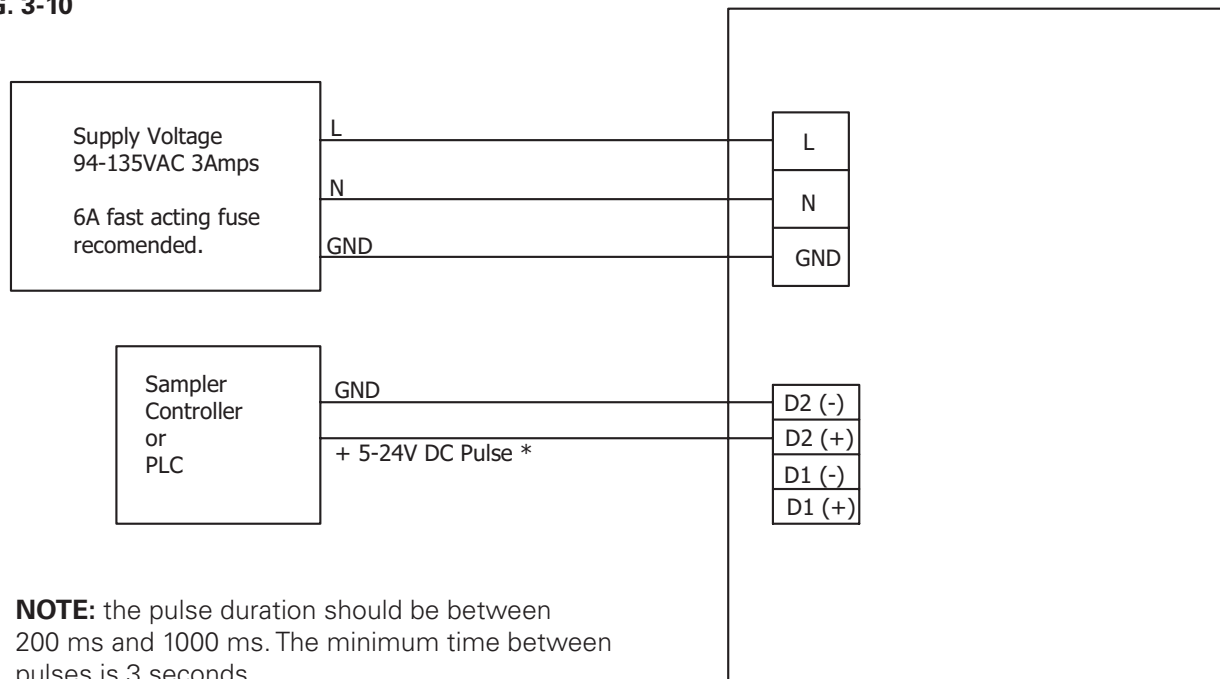


17. The PRV arrives set at the maximum cracking pressure for the spring installed (normally a yellow spring for 750 psi). If the maximum pressure does not exceed 350 psi, set the cracking pressure to the lowest cracking pressure for the PRV by twisting the cap 8 turns counter-clockwise. The PRV is going to have the highest cracking pressure when the cap is screwed all the way in and the lowest cracking pressure when the cap is almost all the way out. If your line pressure is within the range of the cracking pressure of the PRV, take the following steps to set the correct cracking pressure:
 - a) Slowly turn the cap counter-clockwise until liquid starts to come out of the PRV outlet.
 - b) Turn the cap two turns clockwise to stop the leak and set the PRV cracking pressure 200psi above the current pressure.
 - c) Tighten lock nut against the cap.
 - d) Lock wire cap and body together to maintain set pressure.

INSTALLATION CONTINUED

WIRING DIAGRAM

FIG. 3-10



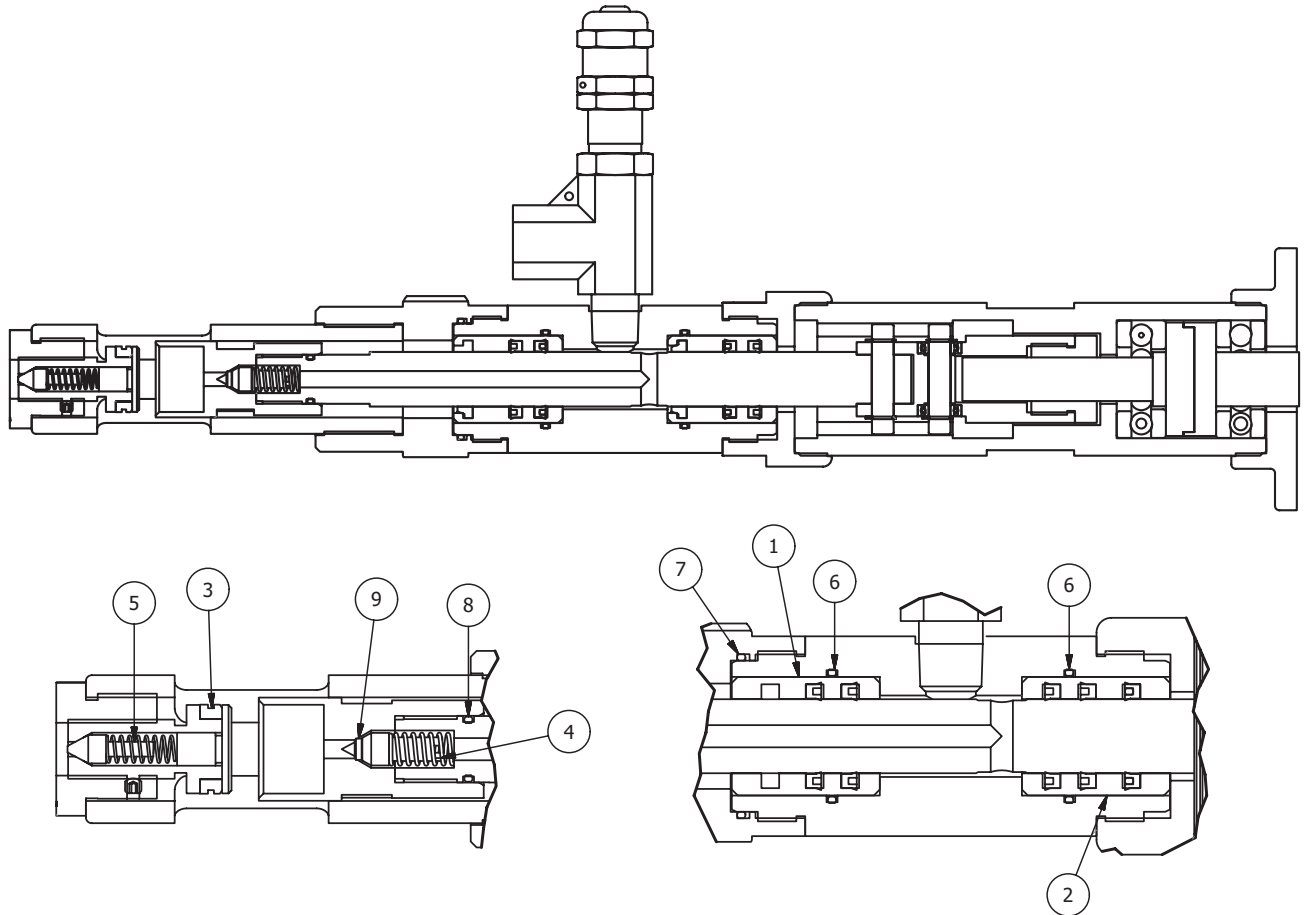
NOTE: the pulse duration should be between 200 ms and 1000 ms. The minimum time between pulses is 3 seconds.

MAINTENANCE

During normal operation of the KAM® E-IAS™ Sampler, some seals will wear. In order to ensure continuous accurate sampling, KAM CONTROLS recommends replacing the seals on your E-IAS™ Sampler every six months.

A complete kit with all the E-IAS™ Sampler O-rings, seals, etc. can be ordered by contacting KAM CONTROLS at sales@kam.com and requesting Seal Kit 361300 or by calling +1 713-784-0000 or faxing your request to +1 713-784-0001.

FIG. 4-1 KAM® E-IAS™ SEAL KIT PART NUMBER 361300



ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	361150	Seal Bushing Assembly #1(2 internal O-rings)
2	1	361192	Seal Bushing Assembly #2 (3 internal O-rings)
3	1	360411	3/4" Plunger Piston Seal
4	1	360425	Check Spring
5	1	360390	Suction Spring
6	2	150022	2-022 O-ring 75 Durometer
7	1	150026	2-026 O-ring 75 Durometer
8	1	150013	2-013 Viton O-ring 75 Durometer
9	1	150004	2-004 Viton O-ring 75 Durometer

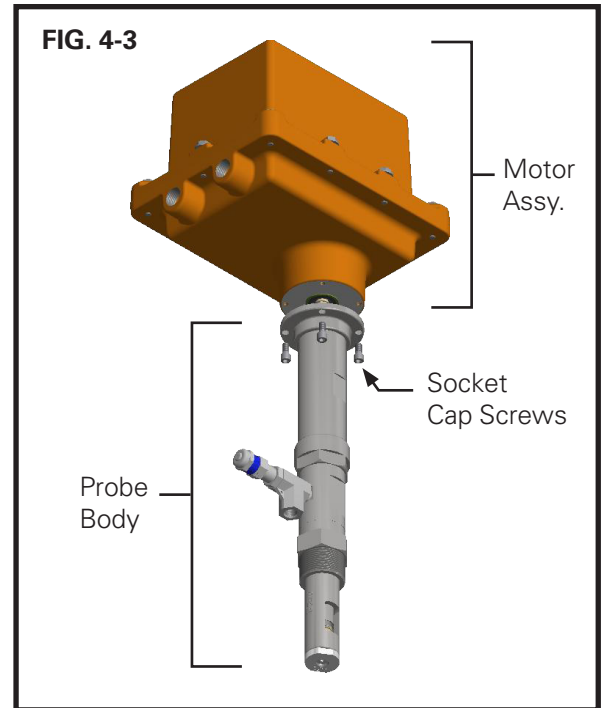
MAINTENANCE CONTINUED

REPLACING SEALS AND O-RINGS

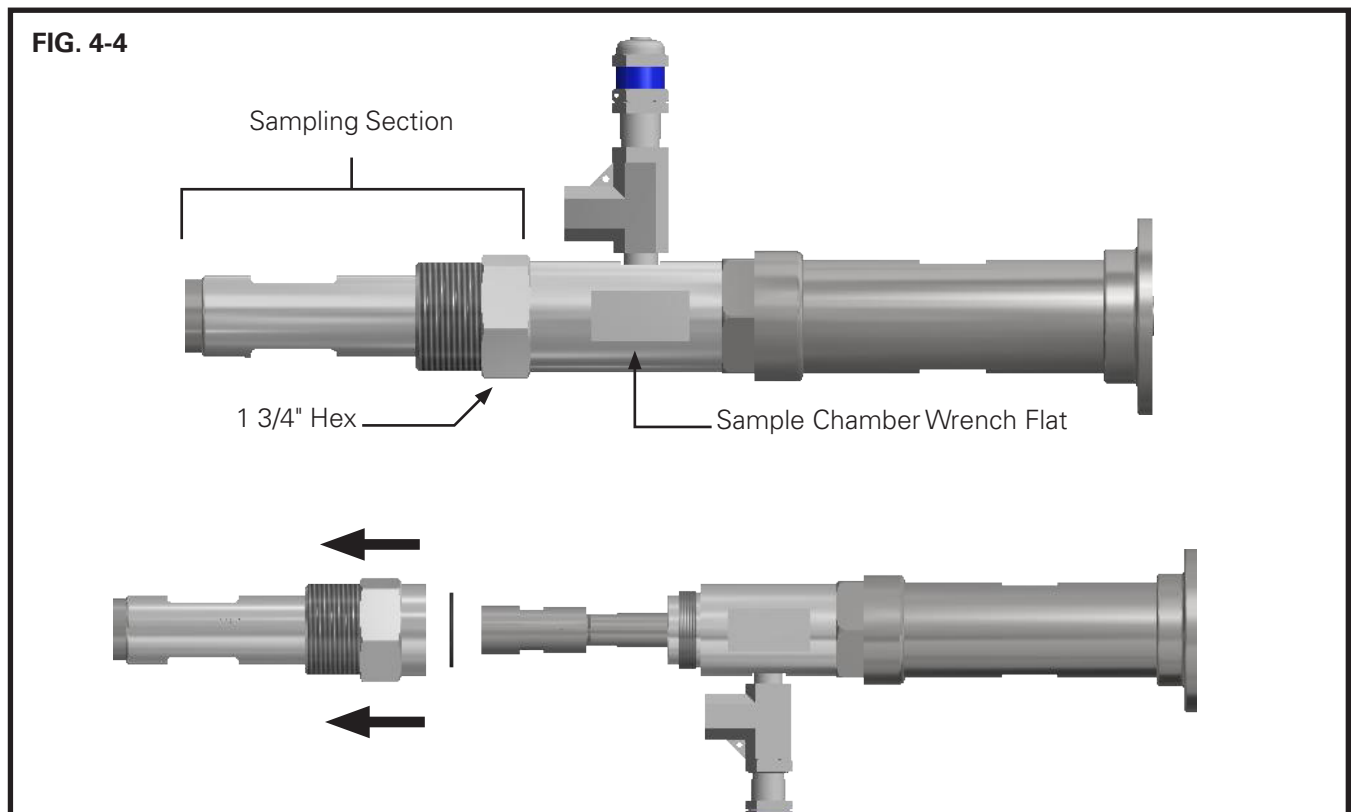
The seal/O-ring replacement process requires the following materials:

- 3/16" Allen wrench
- 9/16", 11/16", 1 1/2", 1 3/4" wrenches, or (2) adjustable wrenches. Do not use pipe wrenches on the E-IAS.
- Pick or hook to removed old O-rings
- Solvent/part washer
- Grease for O-ring lubrication
- Loctite 242

1. Prior to removing the probe from the pipeline, disconnect the probe body from the motor assembly. Using a 3/16" Allen wrench, remove the (4) socket cap screws connecting the probe to the motor assembly. (Fig. 4-3.) Pull the probe free of the motor assembly.
2. Remove the E-IAS™ probe body from the pipeline.
3. Once you've removed your E-IAS™ Sampler from the pipeline, clean all surfaces as much as possible.

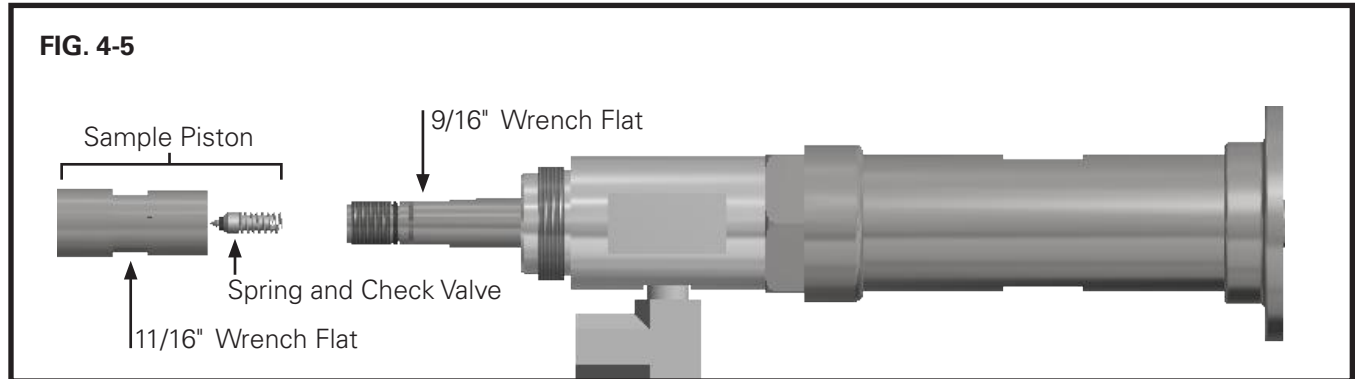


4. Remove the sampling section of the probe by placing a 1-1/2" wrench on the wrench Flats of the sample chamber and turning the bottom section of the probe counterclockwise using a 1-3/4" wrench on the 1-3/4" hex section of the probe. (Fig. 4-4)



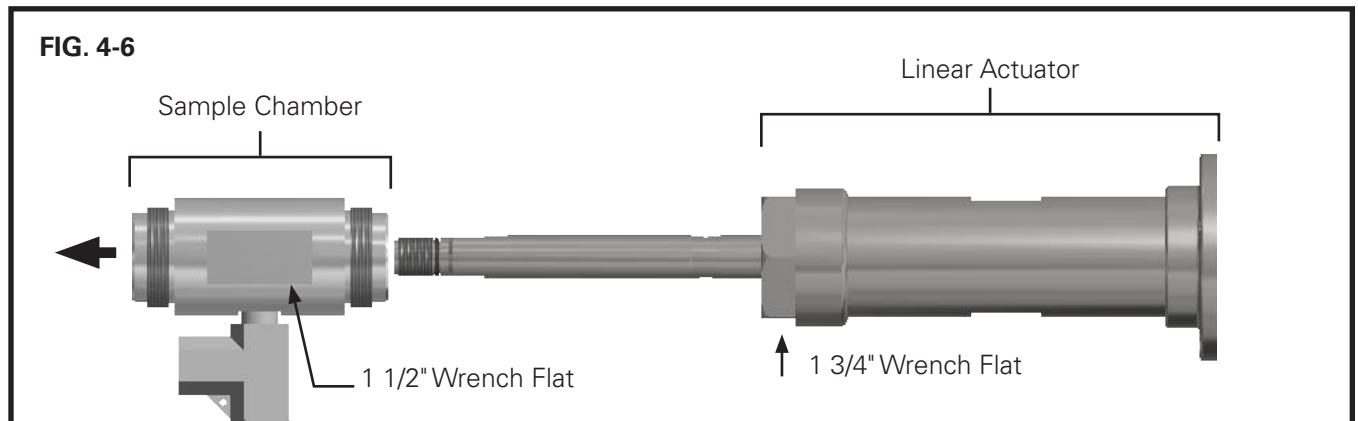
MAINTENANCE CONTINUED

5. Hold the sample shaft using a 9/16" wrench, while unscrewing the sample piston using an 11/16" wrench. Be careful not to lose the small check valve and spring located inside the sample piston. They are not fixed in place.

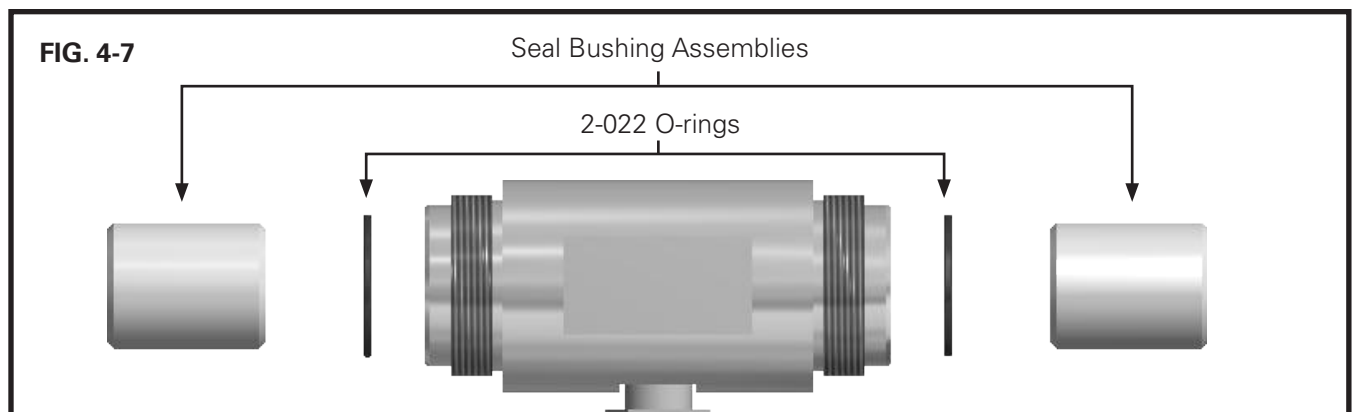


6. Using a 1 1/2" wrench, remove the Sample Chamber by turning it counterclockwise while holding the Linear Actuator with a 1 3/4" wrench. (Fig. 4-6)

NOTE: There are (2) Seal Bushing Assemblies in either end of the Sample Chamber. These may come loose or stick to the shaft when Sample Chamber is removed.

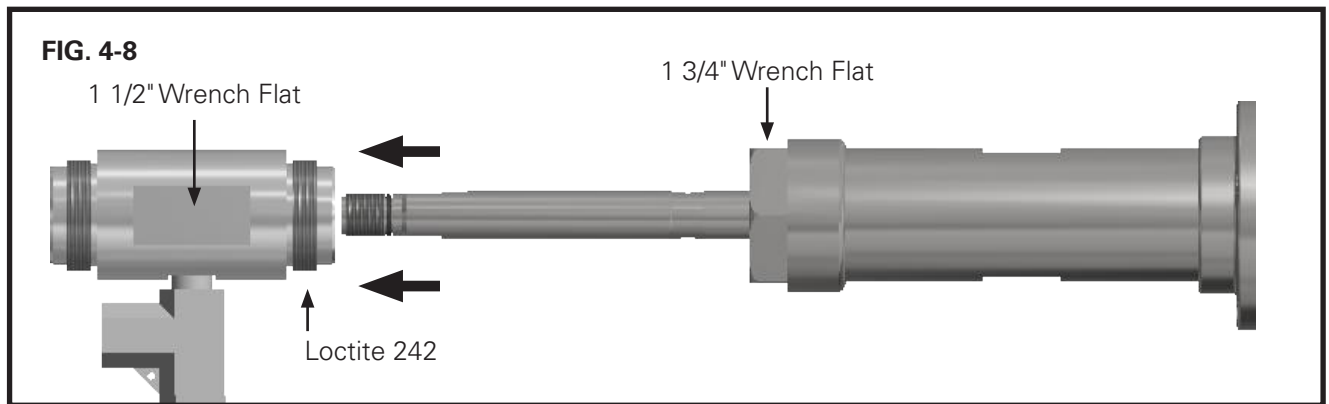


7. Remove Seal Bushing Assemblies from both sides of the Sample Chamber using a small hook or pick. (Fig. 4-7)
8. Remove internal 2-022 O-rings inside both sides of the sample chamber.
9. Clean Chamber with a solvent to remove any oil.

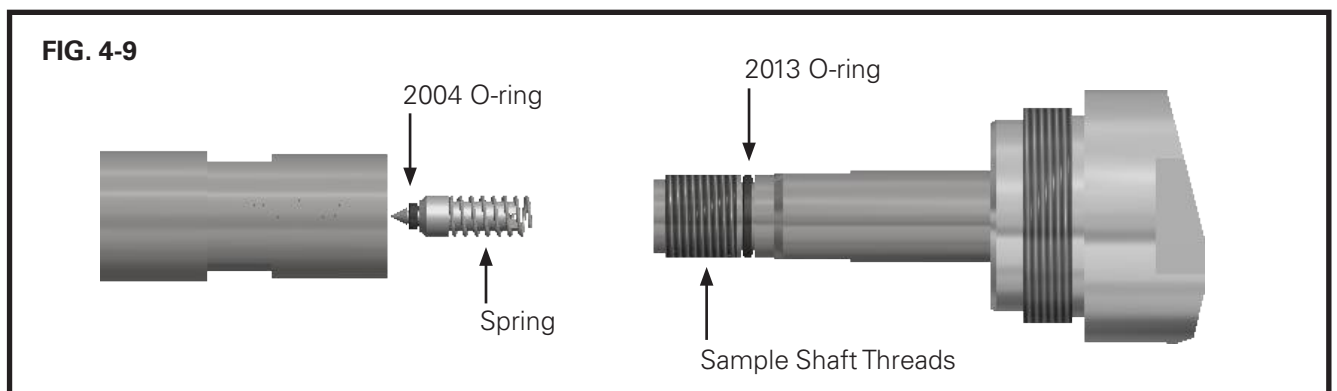


MAINTENANCE CONTINUED

10. Install new 2-022 O-rings inside both sides of the Sample Chamber.
11. Apply a small amount of grease around the inside of the installed 2-022 O-rings.
12. Install new Seal Bushing Assemblies inside both sides of the Sample Chamber.
13. Apply grease around the inside of the new Seal Bushing Assemblies.
14. Insert the Linear Actuator back through the Sample Chamber. (Fig. 4-8) The fit should be tight and may require some force. Ensure that both Seal Bushing Assemblies are in place inside the Sample Chamber when done.
15. Apply Loctite 242 to the threads and tighten in place using 1 1/2" wrench and 1 3/4" wrench.

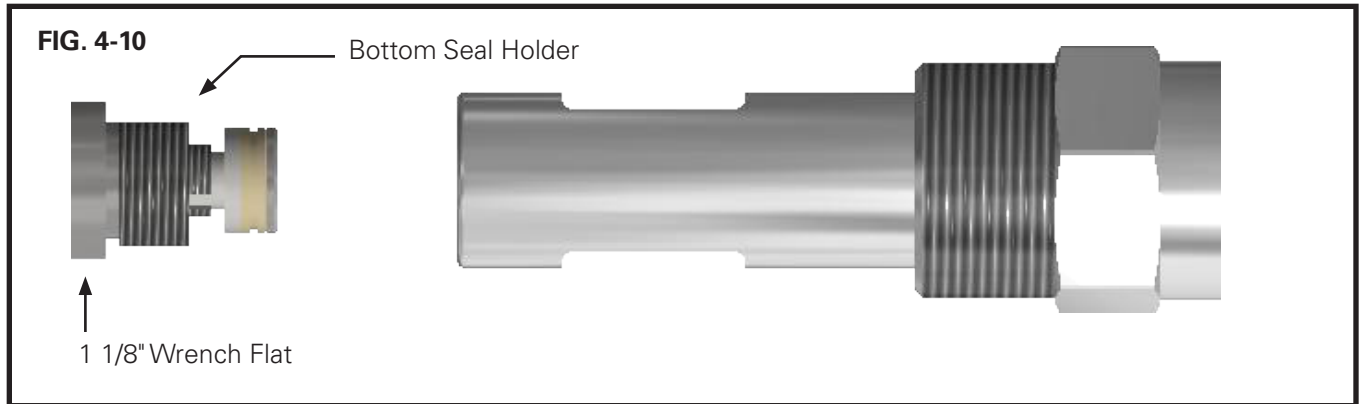


16. Replace 2-013 O-ring from the sample shaft. (Fig. 4-9)
17. Replace 2-004 O-ring on the sample check valve.
18. Replace spring if necessary.
19. Insert check and spring back into the sample piston.
20. Clean the sample shaft threads.
21. Screw the sample piston on to the sample shaft by holding the shaft with a 9/16" wrench and using an 11/16" wrench to turn the sample piston.



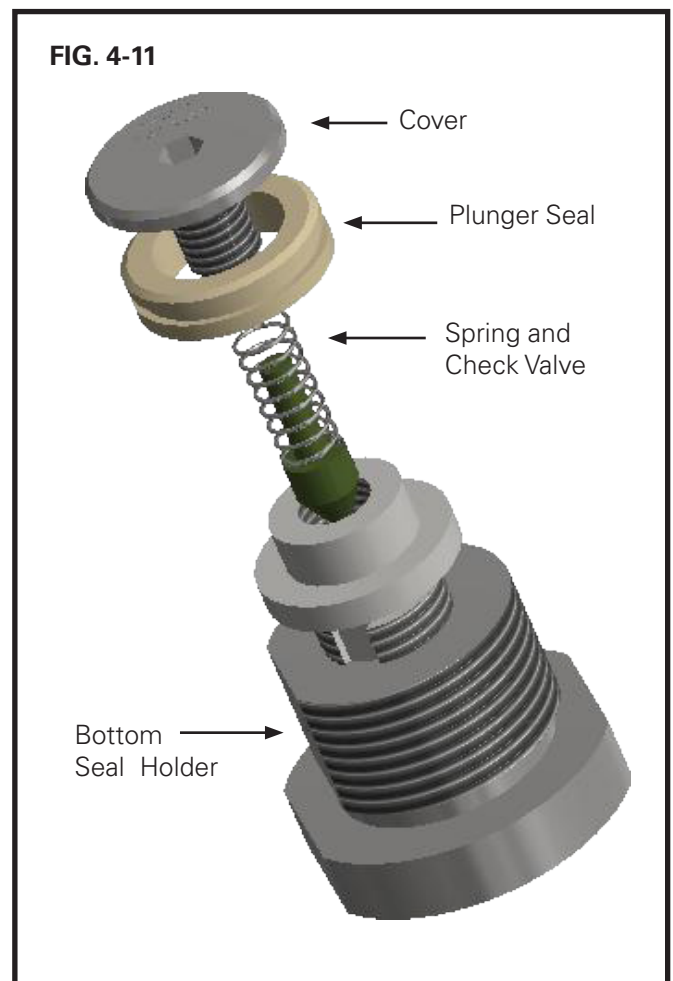
MAINTENANCE CONTINUED

22. On the remaining sampling section, remove the Bottom Seal Holder by using a 1 1/8" wrench. (Fig. 4-10)



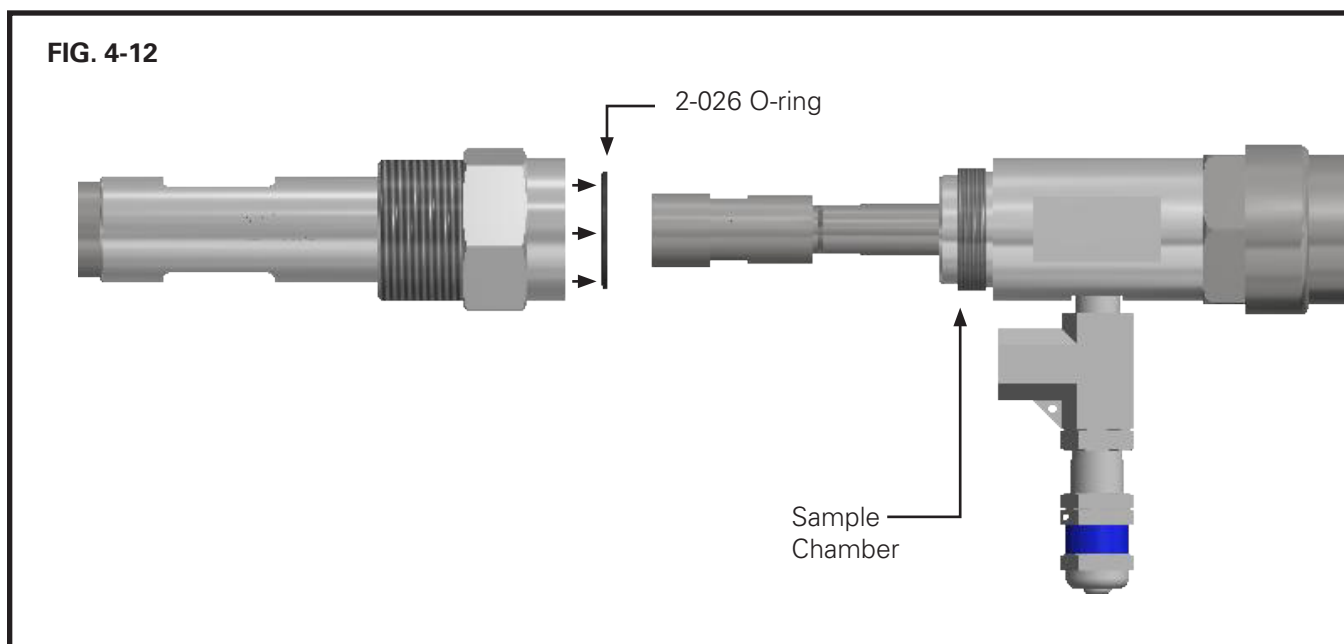
23. Using a 5/32" Allen wrench remove the Cover holding the plunger seal. (Fig. 4-11)
24. Inspect the Spring and Check Valve for damage and replace if necessary.
25. Using solvent clean the inside threads of the Cover.
26. Place Check Valve and Spring back in place.
27. Install a new Plunger Seal.
28. Clean the outside Cover threads and apply a small amount of blue Loctite 242 or equivalent.
29. Screw the cover back in place using 5/32" Allen wrench

NOTE: Do not alter small set screw on flat of Bottom Seal Holder threads. This determines sample bite volume. To change, please consult factory.



MAINTENANCE CONTINUED

30. Replace the 2-026 O-ring located inside sampling section of the probe, at the same level as the hex section. (Fig. 4-12)
31. Apply grease to the 2-026 O-ring previously installed.
32. Apply Loctite 242 to the Sample Chamber thread.
33. Screw the sampling section back on to the sample chamber by holding the sample chamber with 1 1/2" wrench and turning the bottom section of the probe clockwise using a 1 3/4" wrench.



34. Install probe body on pipeline and then attach the motor assembly using a 3/16" Allen wrench and the (4) 1/4" x 1/2" socket cap screws. (Fig. 4-13)

