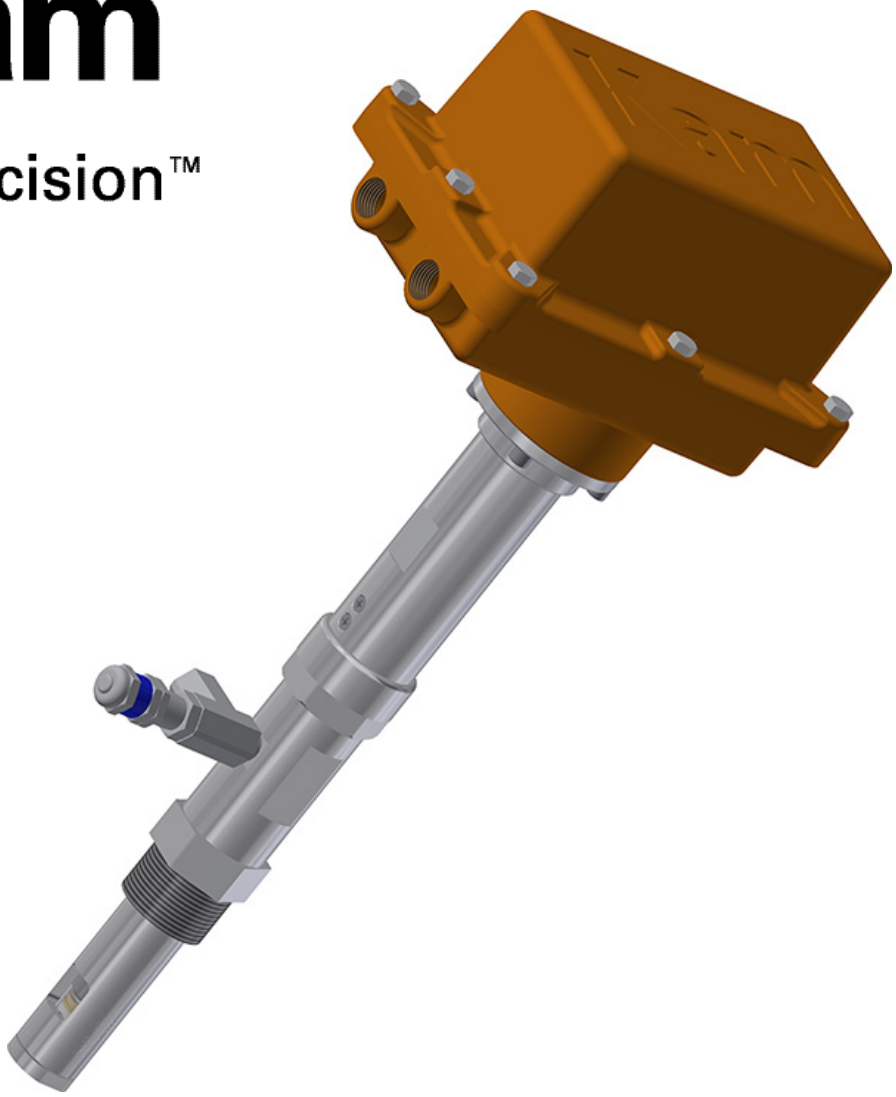
Kam®

Simple Precision™



KAM® E-IAS™
ELECTRIC ISOKINETIC AUTOMATIC SAMPLER

PER API 8.2, ASTM D4177
AND ISO 3171

User Manual

EIASMANUAL0723

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CAUTION:

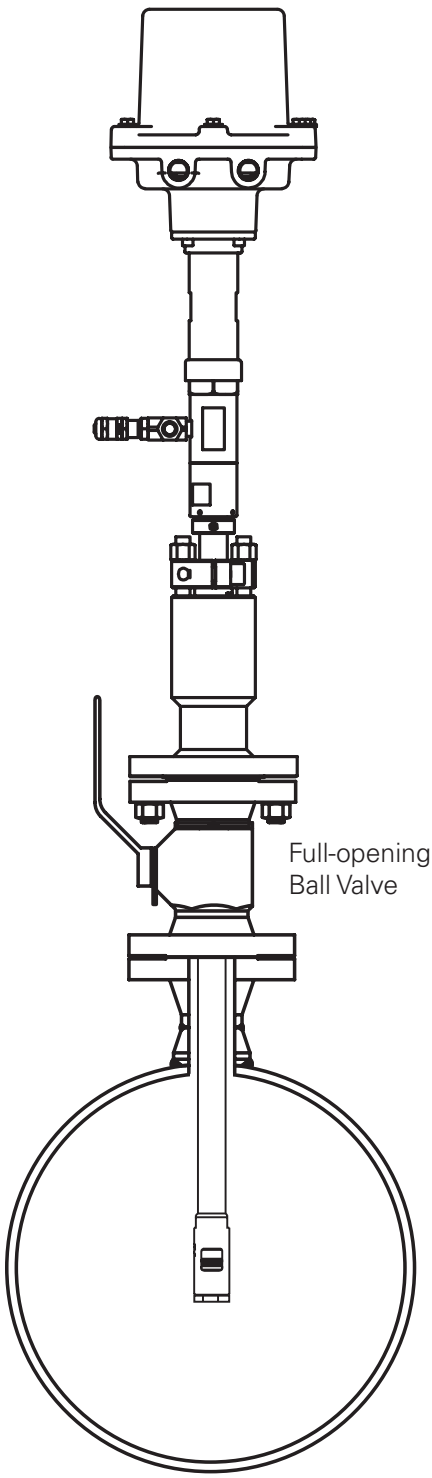
When installing the E-IAS™ sampler in a pipeline containing petroleum products, petro-chemicals, waste waters with the presence of pressure & temperature, and high-pressure steam refer to the Pipeline Operators' "Health, Safety and Environmental Policy Procedures" to ensure safe installation.

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

INTRODUCTION

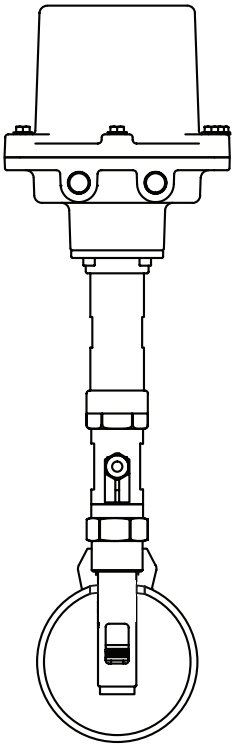
AVAILABLE MODELS and MOUNTING OPTIONS

FIG. 1-1



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

FIG. 1-2



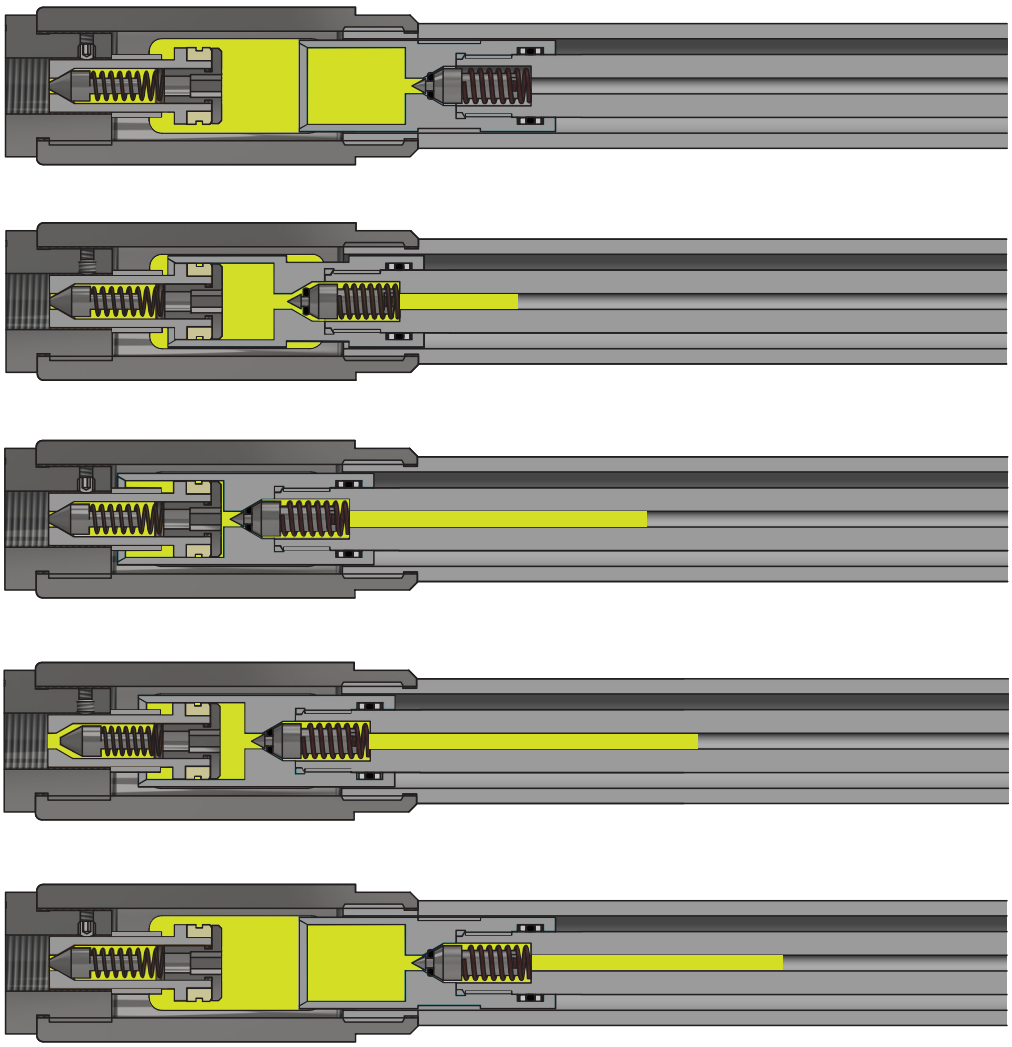
Option 2: Fixed insertion E-IAS™ with 1.25" NPT

THEORY OF OPERATION

Operating similarly to a downhole pump, the KAM® E-IAS™ Electric Isokinetic Automatic Sampler extracts a known volume of pipeline fluids for collection in a KAM® SR™ Sample Receiver. Sampling is electrically driven, and the time interval can be flow-based or time-based. All KAM sampling components comply with API MPMS Chapter 8.2, ASTM D4177, and ISO 3171 standards requirements.

SAMPLER SEQUENCE

FIG. 1-3



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 – 42"
Max. pressure:	285 psi
Temperature:	-40º to 350ºF (-40º to 177ºC)
Hazardous area:	CLASS I, DIV 1, GROUPS C & D, T6
Electrical Requirements:	120 VAC 2.0A RMS 50/60 Hz single phase
Ambient Temperature:	-20 ºC to +45 ºC
Motor:	High-torque stepper motor
Weight:	From 30 lbs (13.6 kg)

* Seal Housing for 2" MNPT Models are Carbon Steel.

INSTALLATION

PRIOR TO INSTALLATION

- Before installing the E-IAS™ Sampler, thoroughly inspect to ensure that unit was not damaged during transit.
- The E-IAS™ Sampler is normally shipped with a PRV spring per the pressure range of the application. Ensure the PRV is set to 50 to 100 psi above the maximum operating pressure as per instructions on page 11. Refer to Table 3-1 to ensure provided spring matches line pressure.
- The E-IAS™ Sampler should be installed per KAM recommendations, including the mixing requirement calculated per customer provided flow conditions.
- At the time of installation, the pipeline pressure needs to be reduced to under 100 psi or use a KAM® IT™ Insertion Tool where line pressure exceeds 100 psi in order to be able to install the E-IAS™ Sampler.
- The KAM® E-IAS™ is shipped with the motor housing separate from the probe body. KAM recommends full installation of probe (including fixed insertion and insertable/retractable models) prior to attaching motor housing to probe body. If motor housing is attached, detach prior to installation by removing the (4) hex screws at the bottom of the explosion proof enclosure with a 3/16" Allen wrench. FIG. 3-1.
- For insertable/retractable models, before mounting the E-IAS™ Sampler on the Full-Opening Ball Valve, determine the insertion length required per procedure on page 7. The Full-Opening Ball Valve is used to isolate the E-IAS™ 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. It is the user's responsibility to ensure that the E-IAS™ is placed in the most representative point in the flow profile.

FIG. 3-1

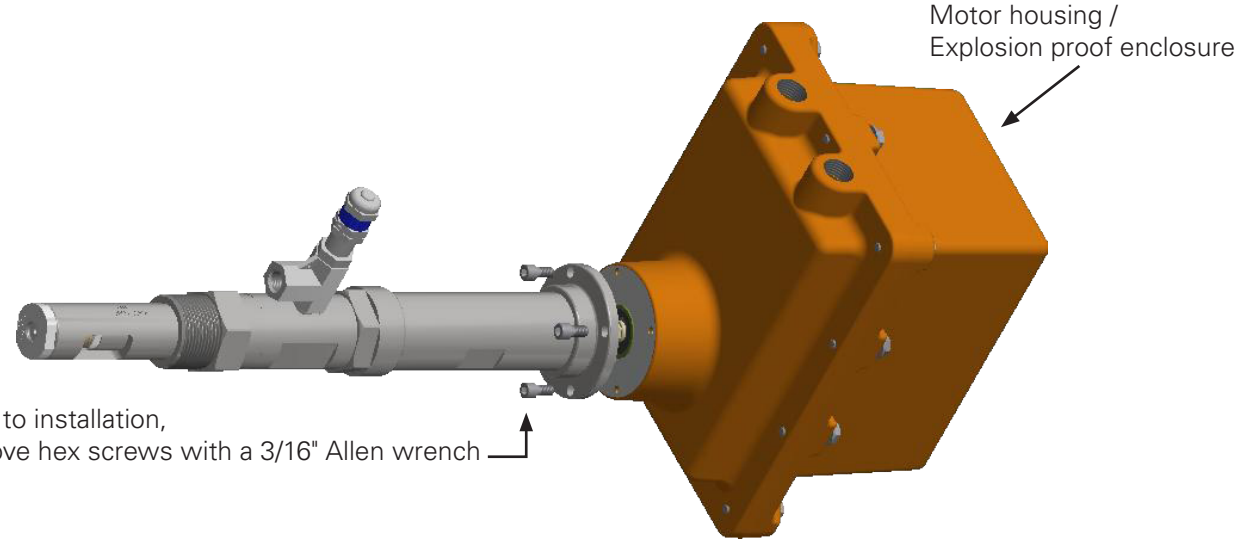


TABLE 3-1

PRV Spring Cracking Pressure Range (psig)	Spring Color
50 to 350	Blue
350 to 750	Yellow
750 to 1500	Purple
1500 to 2250	Orange

INSTALLATION CONTINUED

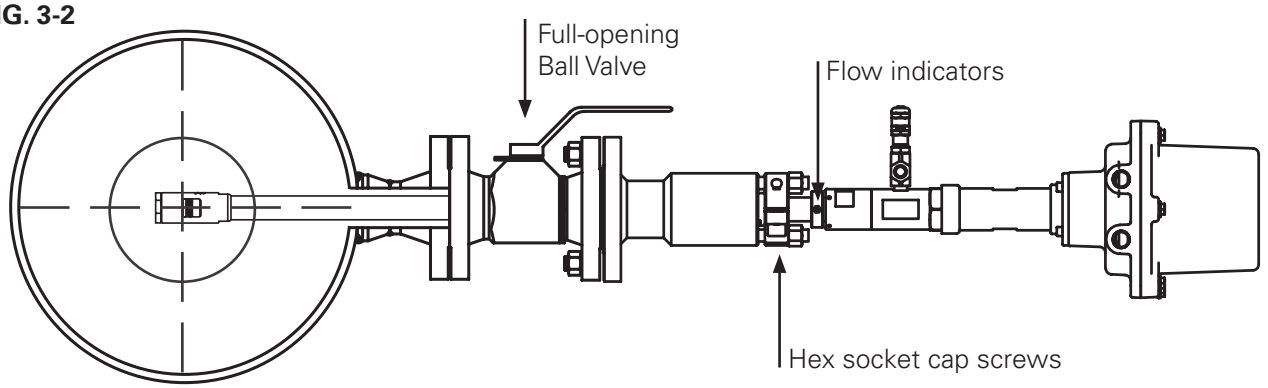
CONSIDERATIONS FOR FIXED INSERTION MODELS INSTALLATION

- In horizontal lines, the E-IAS™ Sampler should be installed with the probe horizontally oriented at 3 or 9 o'clock. FIG. 3-2. At the time of installation, the pipeline needs to be empty and without pressure in order to safely install the E-IAS™ Sampler.
- KAM recommends using liquid pipe sealant rather than Teflon tape on all threaded connections.
- Insertion distance/shaft length is set at factory per advised pipe diameter. 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.
- When installing the probe in the pipe, ensure that the flow markers on the probe body are aligned with the pipe. The flow needs to go through the sampling window.
- Follow wiring diagram on page 12 of this manual.

CONSIDERATIONS FOR 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. 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 E-IAS™ Sampler Probe should be inserted so that the middle of the sampling window is approximately in the center half 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 as per API MPMS Ch. 8.2 guidelines.
- 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.

FIG. 3-2



INSERTABLE/RETRACTABLE MODELS INSTALLATION

WARNING: Do not actuate the E-IAS™ until you have set the appropriate cracking pressure (page 11).

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

1. With the probe on the ground or a table, use a 3/8" Allen wrench to loosen Socket Cap Screws on the Locking Collar. FIG. 3-2. This will allow the E-IAS™ Sampler Shaft to slide through the Seal Housing.

2. If not already done, push the E-IAS™ Sampler Shaft through the Seal Housing until the sampling probe is fully retracted inside the Seal Housing. FIG. 3-3 and FIG. 3-4.

FIG. 3-3

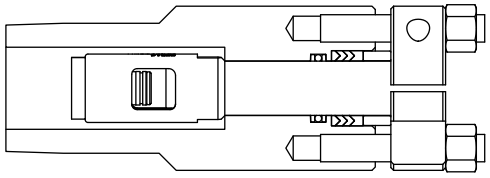
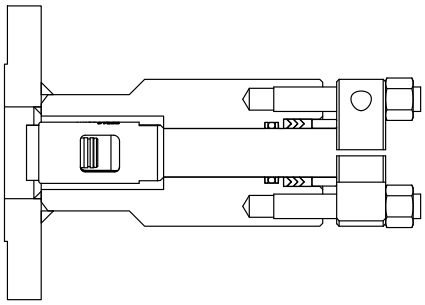


FIG. 3-4



3. Re-tighten the Socket Cap Screws on the Locking Collar. This will prevent the E-IAS™ shaft from sliding and the probe from getting damaged during mounting.

4. 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 and FIG. 3-6.

FIG. 3-5
Measurements for
Flanged Models

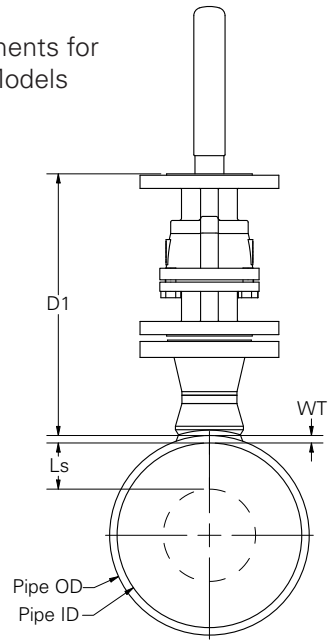
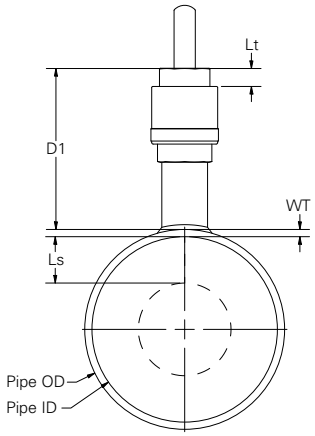


FIG. 3-6
Measurements for
MNPT Models



* Dashed line represents center 50% of pipe internal diameter (specified sample location per API MPMS Chapter 8.2)

5. Calculate the insertion distance:

For Flanged Seal Housing

MID	–	Minimum Insertion Distance
D1	–	Distance from the top of the valve to the pipe
Lg	–	Gasket Width (Typical 0.134")
WT	–	Pipe Wall Thickness
Ls	–	Pipe ID x 0.25

MID=D1 + Lg + WT + Ls + E-IAS Factor (per Table 3-2)

Example: D1=14"
Lg=0.134"
WT=0.25"
Pipe ID=8.125"
E-IAS Factor 2" 150#=2.35"

MID=14 + 0.134 + 0.25 + (8.125 x 0.25) + 2.35
14 + 0.134 + 0.25 + 2.03 + 2.35=18.76"

TABLE 3-2 E-IAS Factor - Flanged SH

Class Rating	2" Size	3" Size
150#	2.35"	2.54"

For 2" MNPT Seal Housing

MID	–	Minimum Insertion Distance
D1	–	Distance from the top of the valve to the pipe
WT	–	Pipe Wall Thickness
Ls	–	Pipe ID x 0.25
E-IAS Factor	–	2.35"
Lt	–	Thread Engagement (0.75")

MID=D1 + WT + Ls + E-IAS Factor - Lt

Example: D1=14"
WT=0.25"
Pipe ID=8.125"
E-IAS Factor=2.35"
Lt=0.75"

MID=14 + 0.25 + (8.125 x 0.25) + 2.35 - 0.75
14 + 0.25 + 2.03 + 2.35 - 0.75=17.88"

6. Measure the calculated MID from the top of the Locking Collar and place a mark with a permanent marker or tape on the Shaft (Do not use anything sharp to mark the shaft as this will create grooves that will damage the O-rings in the seal housing.) FIG. 3-7 and FIG. 3-8.

7. You are now ready to attach either model to the valve on the pipeline.

FIG. 3-7 MID for 2" MNPT Seal Housing

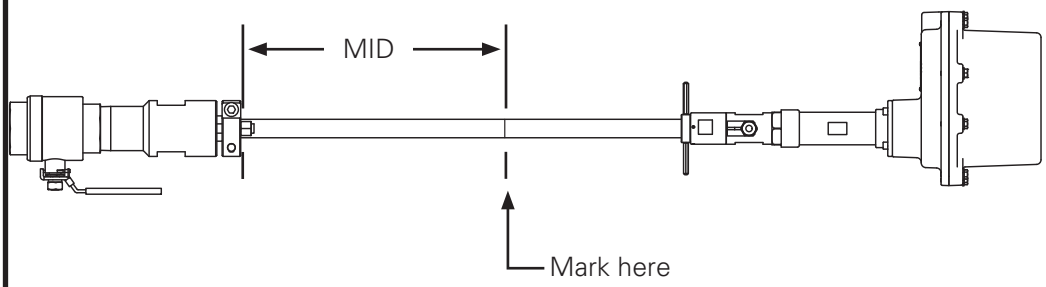
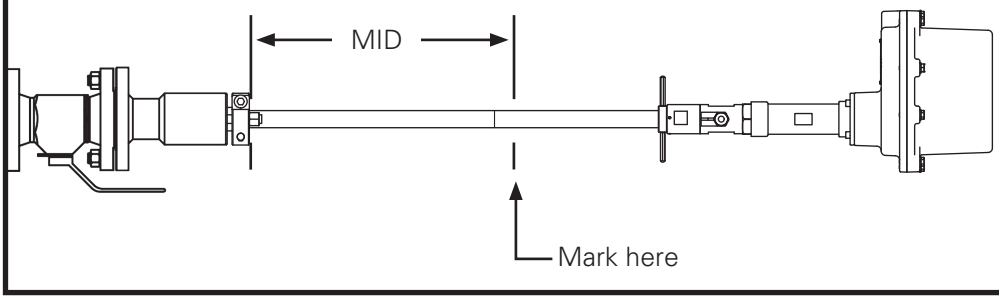


FIG. 3-8 MID for Flanged Seal Housing



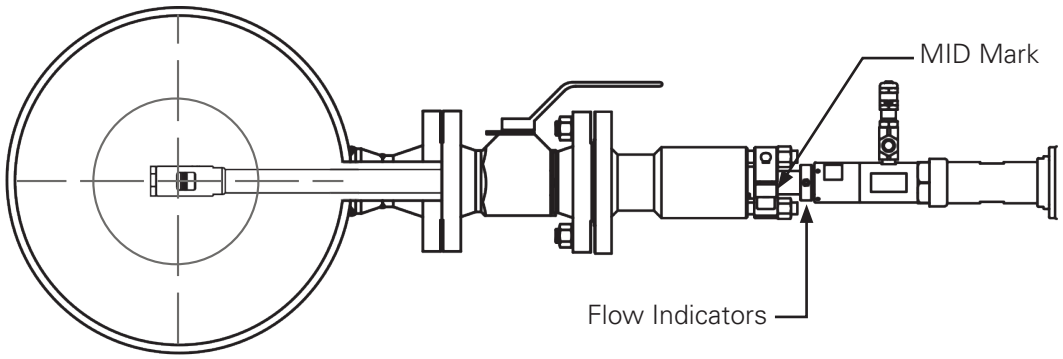
8. Slowly open Full-opening Valve and check for leaks.

9. Loosen the Socket Cap Screws on the Locking Collar using a 3/8" Allen wrench.

10. Align the 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. FIG. 3-9.

11. Push the E-IAS™ Sampler in until the MID Mark is at the top edge of the Locking Collar. FIG. 3-9.

FIG. 3-9



12. Re-tighten the Socket Cap Screws so that the gaps between each half of the Locking Collar are even, as tight as possible done by hand. Failure to properly tighten could result in ejection of the unit under process conditions. FIG. 3-10.

13. Use a 3/4" wrench to tighten the Hex Nuts holding the Locking Collar from ¼ to ½ 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. 3-11.

FIG. 3-10 Top View Locking Collar

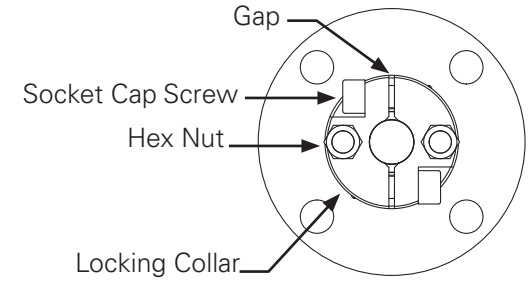
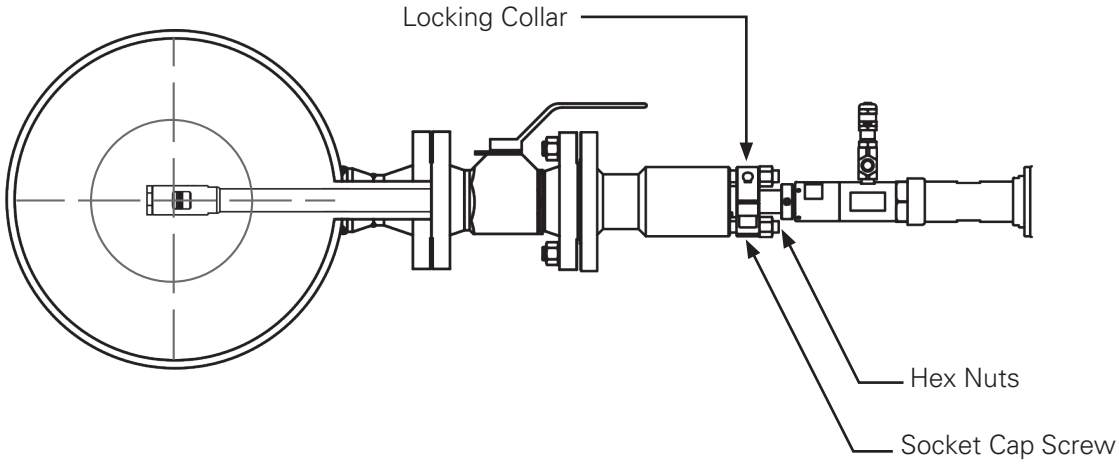


FIG. 3-11



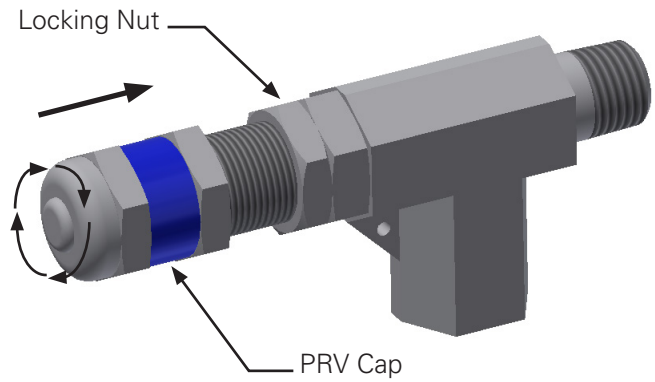
NOTE: If your line pressure is within the range of the cracking pressure of the PRV, follow steps on the next section "PRV Cracking Pressure Setup" to set the correct cracking pressure.

PRV CRACKING PRESSURE SETUP

1. Turn the PRV Locking Nut clockwise until it reaches the start of the PRV threads. FIG. 3-12.

2. Turn the PRV Cap clockwise until it reaches the Locking Nut. FIG. 3-13.

FIG. 3-12



3. Turn the PRV Cap counterclockwise to set the PRV cracking pressure to 50 psi above your maximum operating pressure per Table 3-3.

   Example:

   Maximum operating pressure=175 psi
   Desired cracking pressure=175 psi + 50 psi=225 psi

   Turning the PRV Cap counterclockwise 4 full turns will set the cracking pressure to around 225 psi.

   NOTE: Pressure vs number of turns are estimates only. Always make sure there are no leaks at the set cracking pressure with the maximum operating pressure. Not setting the PRV correctly will lead to an incorrect amount of sample being drawn.

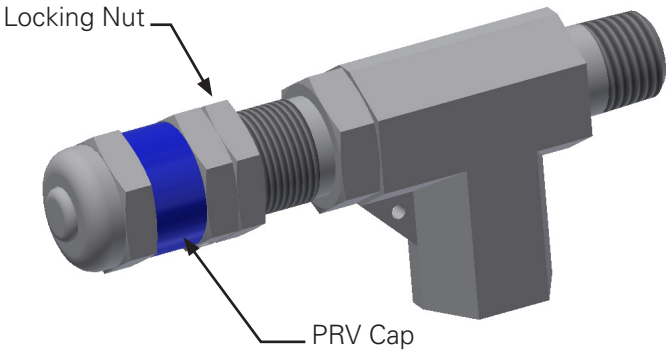
TABLE 3-3 Spring Cracking Pressure (psi)

# Turns	Blue (50-350 psi)	Yellow (350-750 psi)	Purple (750-1,500 psi)
2	340	N/A	N/A
2.5	320	795	1,520
2.75	310	744	1,466
3	285	664	1,379
3.5	248	607	1,242
4	225	494	1,095
4.5	184	431	945
5	150	316	810
5.5	105	N/A	N/A
6	75	N/A	N/A
6.5	50	N/A	N/A

4. Hold the PRV Cap in place using a 3/4" wrench while turning the Locking Nut counterclockwise until it reaches the PRV Cap and tighten to the point that the cap cannot move. Lock the PRV Cap with the Locking Nut and the provided wire and lead lock. FIG. 3-13.

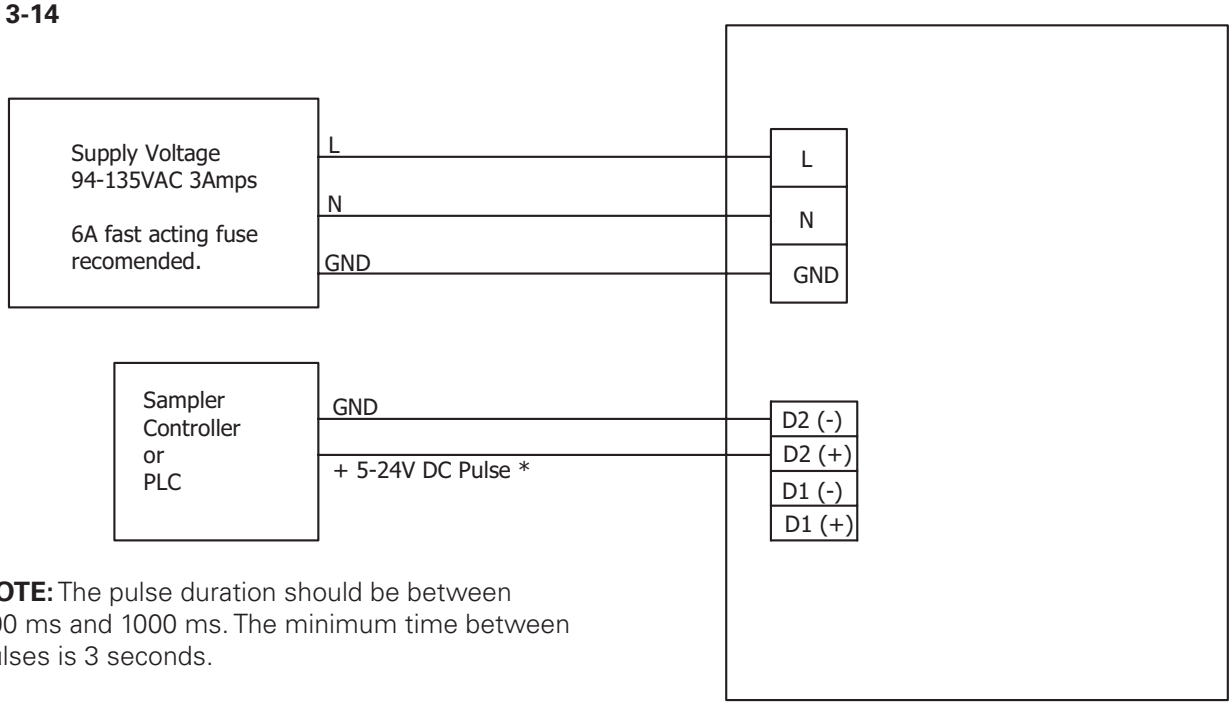
5. Thread provided wire through holes in Locking Nut and PRV Cap and twist to tighten.

FIG. 3-13



WIRING DIAGRAM

FIG. 3-14



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 (6) 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, by calling +1 713-784-0000 or faxing your request to +1 713-784-0001.

For instructions on changing seals, see the E-IAS™ Seal Replacement manual.

FIG. 4-1 Seal Kit Components 1 1/4" NPT Models

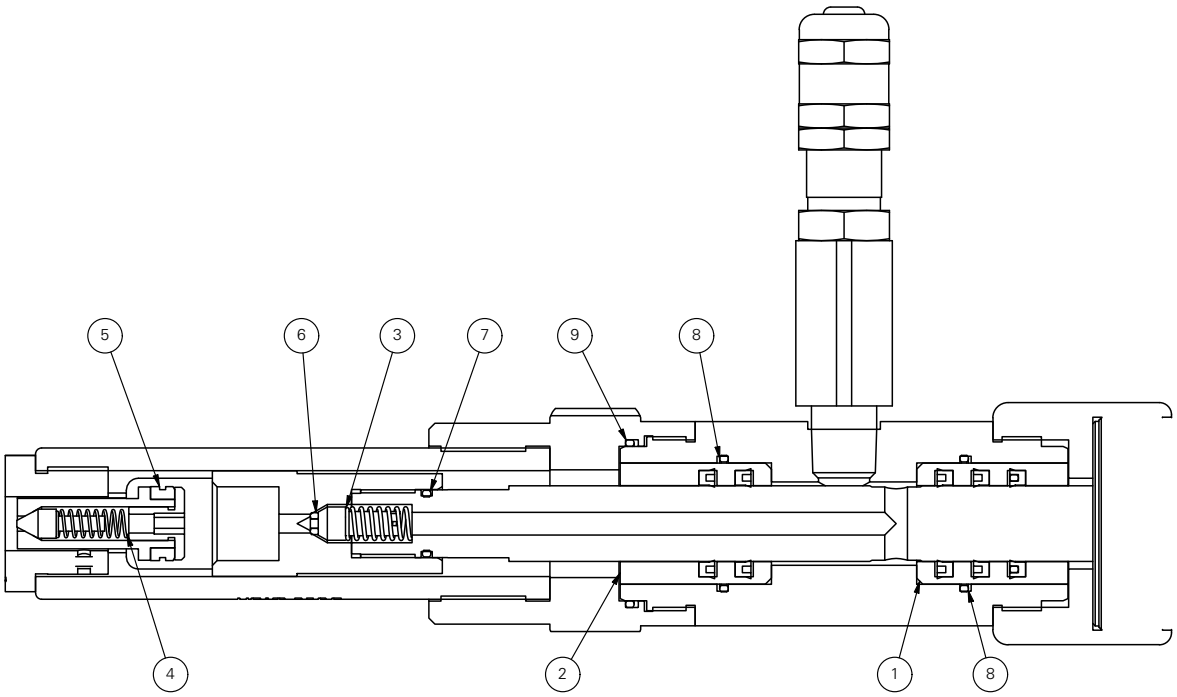


TABLE 4-1 Seal Kit 361300 1-1/4" NPT Models

ITEM	QTY	PART #	DESCRIPTION
1	1	361192	Seal Bushing Assembly
2	1	361191	Bottom Seal Bushing Assembly
3	1	360425	Check Spring
4	1	360390	Suction Spring
5	1	360410	Bottom Seal
6	1	150004	2-004 O-ring
7	1	150013	2-013 O-ring
8	2	150022	2-022 O-ring
9	1	150026	2-026 O-ring

FIG. 4-2 Seal Kit Components FT Models

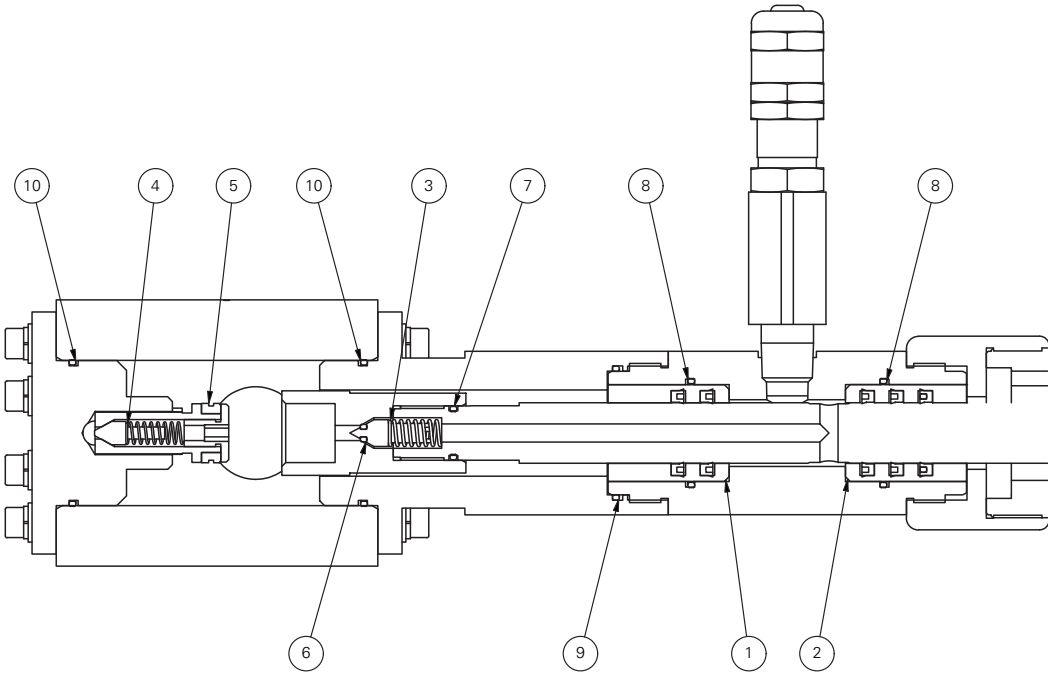


TABLE 4-2 Seal Kit 361302 FT Models

ITEM	QTY	PART #	DESCRIPTION
1	1	361191	Bottom Seal Bushing Assembly
2	1	361192	Seal Bushing Assembly
3	1	360425	Check Spring
4	1	360390	Suction Spring
5	1	360410	Bottom Seal
6	1	150004	2-004 O-ring
7	1	150013	2-013 O-ring
8	2	150022	2-022 O-ring
9	1	150026	2-026 O-ring
10	2	150028	2-028 O-ring

FIG. 4-3 Seal Kit Components Insertable/Retractable Models

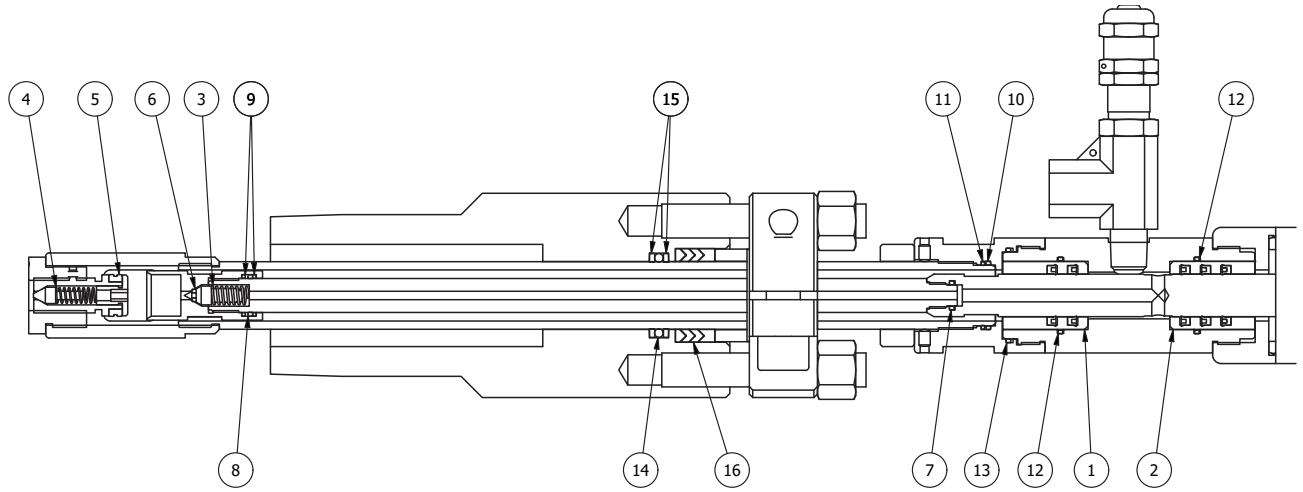


TABLE 4-3 Seal Kit 361301 Insertable/Retractable Models

ITEM	QTY	PART #	DESCRIPTION
1	1	361191	Bottom Seal Bushing Assembly
2	1	361192	Seal Bushing Assembly
3	1	360425	Check Spring
4	1	360390	Suction Spring
5	1	360410	Bottom Seal
6	1	150004	2-004 O-ring
7	1	150011	2-011 O-ring
8	1	150014	2-014 O-ring
9	2	151014	2-014 Backup Ring
10	1	150020	2-020 O-ring
11	1	151020	2-020 Backup Ring
12	2	150022	2-022 O-ring
13	1	150026	2-026 O-ring
14	1	150214	2-214 O-ring
15	1	151214	2-214 Backup Ring
16	1	153020	V-Groove Packing

TROUBLESHOOTING

PROBLEM	SOLUTION
Oil leaking through Seal Housing.	Perform standard maintenance (seal replacement).
Sampler is actuating but there is no sample output.	Replace the Bottom Seal. This is especially necessary if the sampler has more than 6 months of operation (Complete seal replacement is recommended).
The sampler is overfilling the Sample Receivers or the sampler doesn't stop outputting samples.	The line pressure is higher than the cracking pressure of the PRV. Please follow instructions on page 11 of this manual to adjust the PRV cracking pressure correctly.