WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® PROBE-MOUNTED LIQUID ELIMINATOR

MODEL
LE-3SSKO

DRAWING NUMBER
AD945AA

MANUAL NUMBER
IOM-241

REVISION
Rev. 0, 03/07/2024

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IMPORTANT SAFETY INFORMATION
READ ALL INSTRUCTIONS

Notes emphasize information and/or provide additional information to assist the user.

Caution messages appear before procedures that could result in damage to equipment if not observed.

Warning messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation and operation guide for the Welker® Probe-Mounted Liquid Eliminator, LE-3SSKO. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in Appendix A of this manual.

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide for the installation, operation, and maintenance of the Welker® equipment described in this manual. Correct installation and operation, however, are the responsibility of the end user. Welker® reserves the right to make changes to this manual and all products in order to improve performance and reliability.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT – Save these instructions for local inspector's use.

IMPORTANT – Observe all governing codes and ordinances.

Note to Installer – Leave these instructions with the end user.

Note to End User – Keep these instructions for future reference.

Installation of this LE-3SSKO Probe-Mounted Liquid Eliminator is of a mechanical nature.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged LE-3SSKO Probe-Mounted Liquid Eliminator, please contact a Welker® representative immediately.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
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SECTION 1: PRODUCT INFORMATION

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance* (IOM) *Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker® at 1.281.491.2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *LE-3SSKO* Probe Mounted Liquid Eliminator is designed to remove free liquids, condensed hydrocarbons, glycol, and amines from gas samples to be analyzed, while also ensuring the collection of representative gas samples and protecting analyzers from damage and contamination.

Pipeline product enters the LE-3SSKO through the probe. The gas stream passes through the LE-3SSKO to the sample outlet, but free liquids present are separated from the sample stream by centrifugal flow and a membrane and then returned to the pipeline through the integrated return (i.e., stinger) in the Pitot probe.

Welker® might custom design the LE-3SSKO to suit the particular application and specifications of each customer.

1.3 Specifications

The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: Welker® LE-3SSKO Liquid Eliminator Knock-Out Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	304 Stainless Steel, 316/316L Stainless Steel, Anodized Aluminum, and FKM Others Available
Maximum Allowable Operating Pressure	3600 psig @ -20 °F to 120 °F (*248 barg @ -28 °C to 48 °C*)
Maximum Allowable Outlet Flow Rate	4200 cc/min @ 25 psig Inlet (Results in Approximately 2 psid on Membrane)
Connections	**Sample Outlet Connections (2):** ⅛" FNPT **Pipeline Connection:** ½" MNPT (Others Available) **Drain/Bypass Connection:** ⅛" NPT
Insertion Length	4" Insertion Length (Others Available)
Nominal Filter Rating	Nominal 25-Micron Internodal Distance
Filter Media	304 Stainless Steel Mesh Screen (Copolymer Filter Cartridge)
Approximate Dimensions	5½" + "X" x 4⅝" x 2¾" (Length x Width x Height)
Approximate Weight	5 lbs
Features	Replaceable Filter Cartridge Assembly Threaded Housing Cap Integrated Pitot Type Sample Probe Integrated Isolation and Drain Valve Automatically Sheds Liquids Back to the Pipeline Block Valves (2) and Bleed Valve
Options	Insulation Blanket Integrated Regulators, Relief Valves, and Filter Integrated Welker® ALS-1 Analyzer Liquid Shutoff x-Wave™ Probe Tip

1.4 Equipment Diagrams

Figure 1: LE-3SSKO Connections

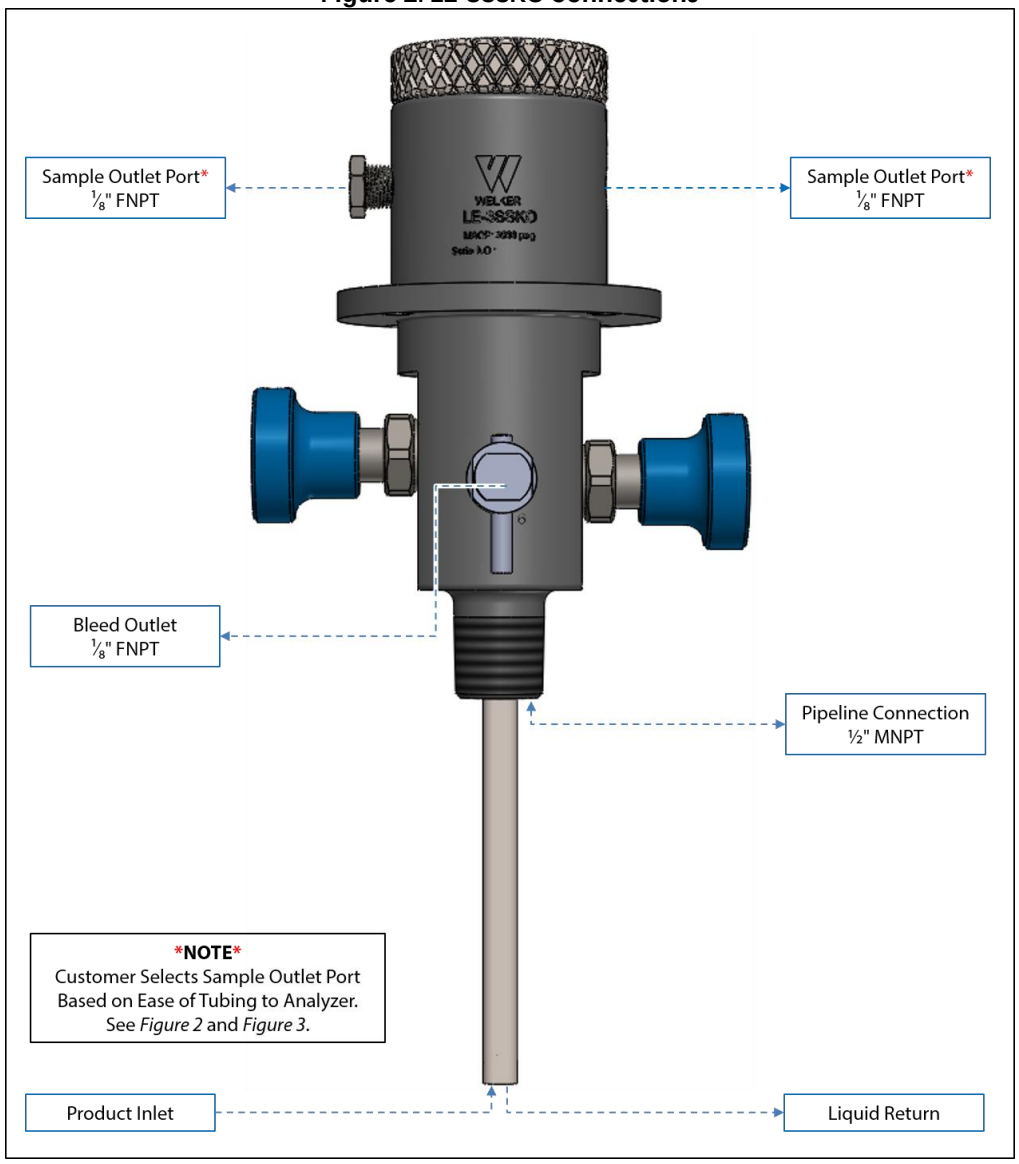
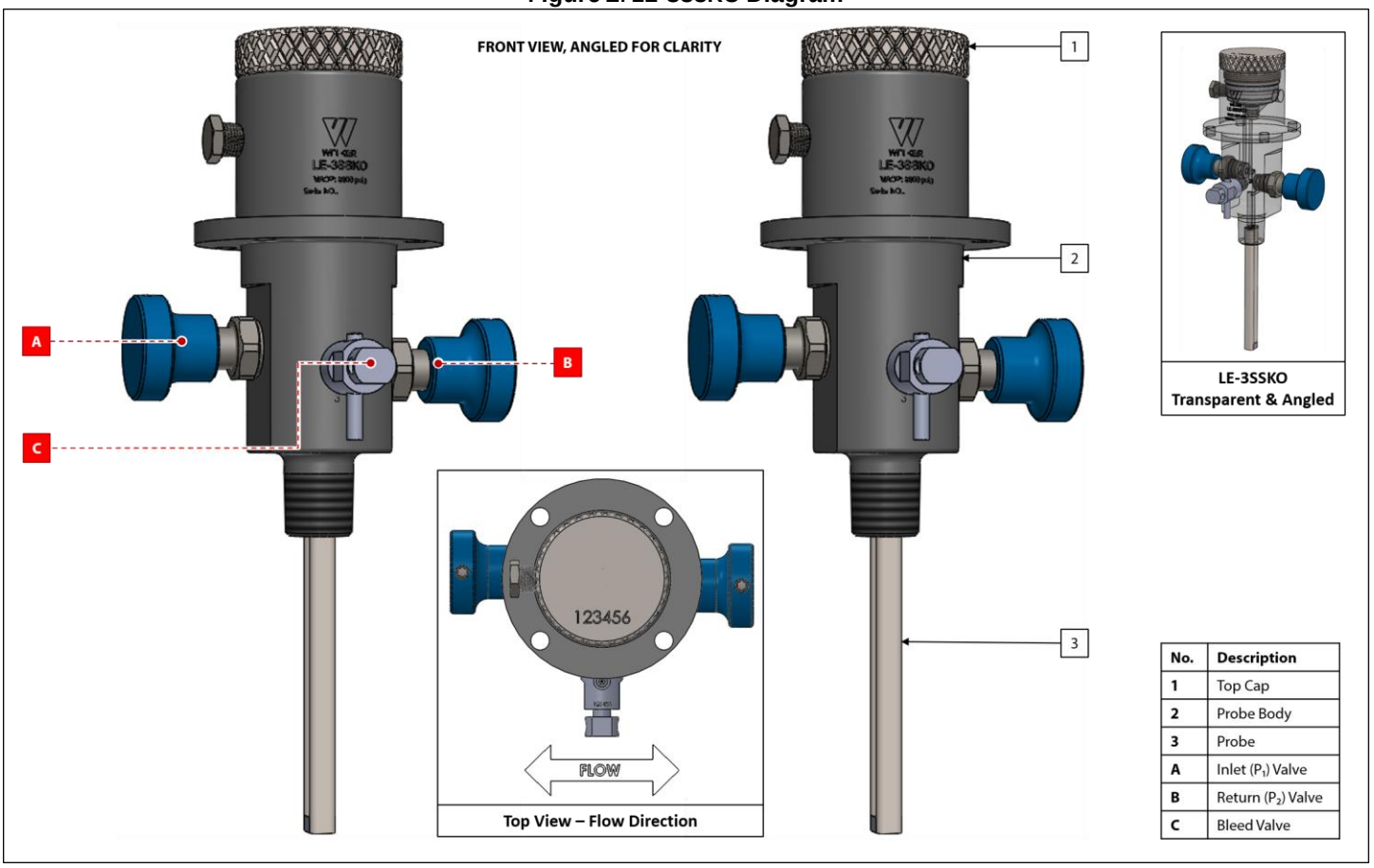


Figure 2: LE-3SSKO Diagram



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the unit, check the equipment for compliance and any damage that may have occurred during shipment. Immediately contact a Welker® representative if you received damaged equipment.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.

2.2 Installation & Operation

The pipeline must be depressurized prior to installing and removing the unit.

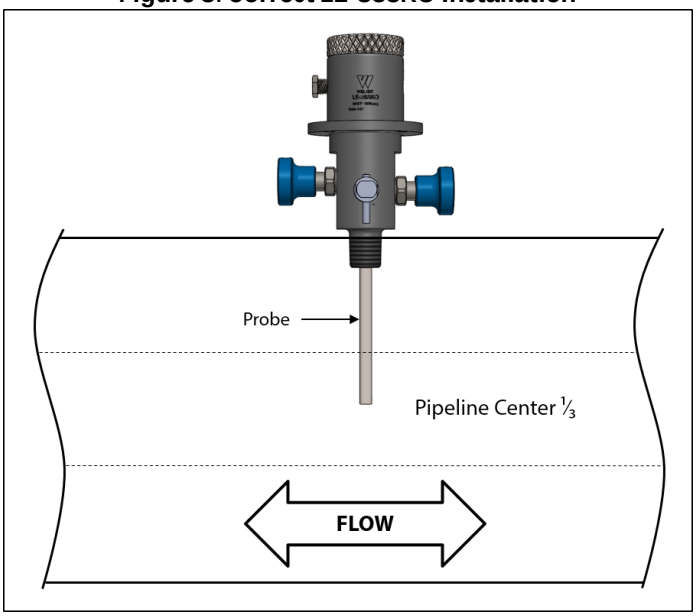
The Pitot probe is directionally sensitive. The probe must be parallel to the direction of flow (see *Figure 2* and *Figure 3*).

Customer selects which of the sample outlet ports to use and plugs the other sample outlet port. Sample outlet port is selected based on ease of tubing to the analyzer (see *Figure 2*, *Figure 3*, and *Figure 4*).

Welker® recommends that the probe be installed in the top of the pipe and inserted into the center one-third (⅓) of the pipeline in a location where the product is well-mixed and will yield an accurate and representative sample. The sample probe should be located in the least turbulent area of the flowing stream available (i.e., not in a header or blow-down stack and away from obstructions, elbows, and partially closed valves).

1. Ensure that inlet (P_1) valve A and return (P_2) valve B are closed (*Figure 2*).
2. Ensure the top cap is secured tightly to the LE-3SSKO (*Figure 2*).
3. Ensure that the pipeline is depressurized.
4. Wrap the threads of the threaded pipeline connection with PTFE tape.
5. Install the LE-3SSKO to the pipeline so that inlet (P_1) valve A and return (P_2) valve B are parallel with the direction of product flow (*Figure 2* and *Figure 3*).

Figure 3: Correct LE-3SSKO Installation



6. Using customer-supplied, small-diameter (⅛" recommended) tubing (see *cautionary note* below), connect from the selected sample outlet port to the customer's downstream instrument(s) (e.g., a regulator assembly connected to an analyzer) (*Figure 1*).

> In cold weather or if the gas is close to the hydrocarbon dew point, insulate and possibly heat trace the tubing from the selected sample outlet port in order to avoid the possible formation of liquids prior to reaching the analyzer.

7. With ALL valves closed, pressurize the pipeline.
8. Open inlet (P_1) valve A and return (P_2) valve B (*Figure 2*). Check for leaks at the pipeline connection and repair as necessary.
9. The LE-3SSKO is now operational.
10. See *cautionary note* above prior to pressurizing the pipeline. However, if liquids are present at the selected sample outlet port, maintenance is required. See *Section 3.2, Maintenance*, for instructions on performing maintenance on the LE-3SSKO.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the unit have standard yearly maintenance.** Based on the operating conditions and/or site requirements, adjustments to the maintenance schedule might be necessary.
2. Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit available for repairs of the system in case of unexpected wear or faulty seals.

New seals supplied in spare parts kits should be lightly lubricated before being installed to ease the installation of the seals and reduce the risk of damage when positioning them on parts. Wipe excess lubricant from the seals, as it may adversely affect analytical instrument results.

Wipe excess lubricant from the seals, as it may adversely affect analytical instrument results.

After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4. Welker® recommends having the following tools available for maintenance. Please note that the exact tools required might vary by model.
    a. Disposable Gloves
    b. Hex Key Set
    c. Seal Pick
    d. Small Adjustable Wrench

3.2 Maintenance

If maintenance on the valves or probe is required, the LE-3SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.

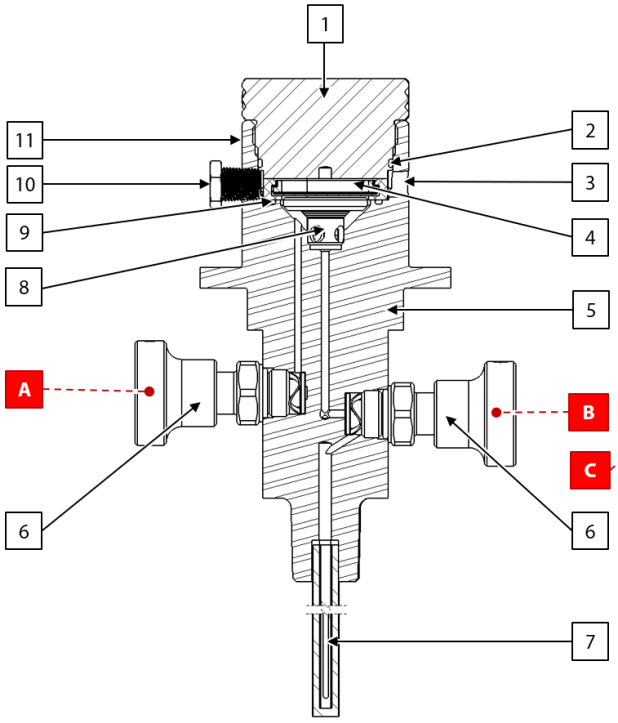
Prior to performing maintenance, the LE-3SSKO must be isolated from pipeline pressure. However, the LE-3SSKO does NOT need to be removed from the pipeline to perform *standard* maintenance.

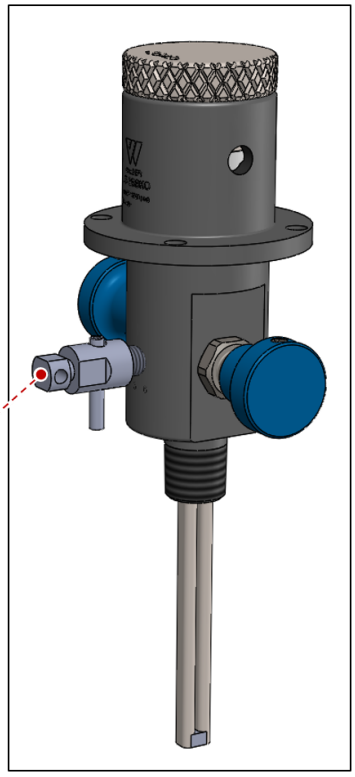
1. Close inlet (P_1) valve A and return (P_2) valve B.
2. Disconnect all tubing from the LE-3SSKO.

Figure 4: Maintenance Diagram

No.	Description
1	LE-3SSKO Cap
2	O-Ring
3	Sample Outlet Port* ⅛" FNPT
4	LE Cartridge Assembly
5	Probe Assembly
6	Valve Kit, NV-2
7	Return Slot (i.e., Stinger)
8	Thread Insert Cap
9	O-Ring
10	Sample Outlet Port* ⅛" FNPT
11	Separator Body
A	Inlet Valve
B	Return Valve
C	Bleed Valve

NOTE
Customer Selects Sample Outlet Port Based on Ease of Tubing to Analyzer.
See *Figure 2* and *Figure 3*.





RIGHT SIDE VIEW, ANGLED

3. Unscrew the top cap and remove from the separator body (*Figure 2* and *Figure 4*).

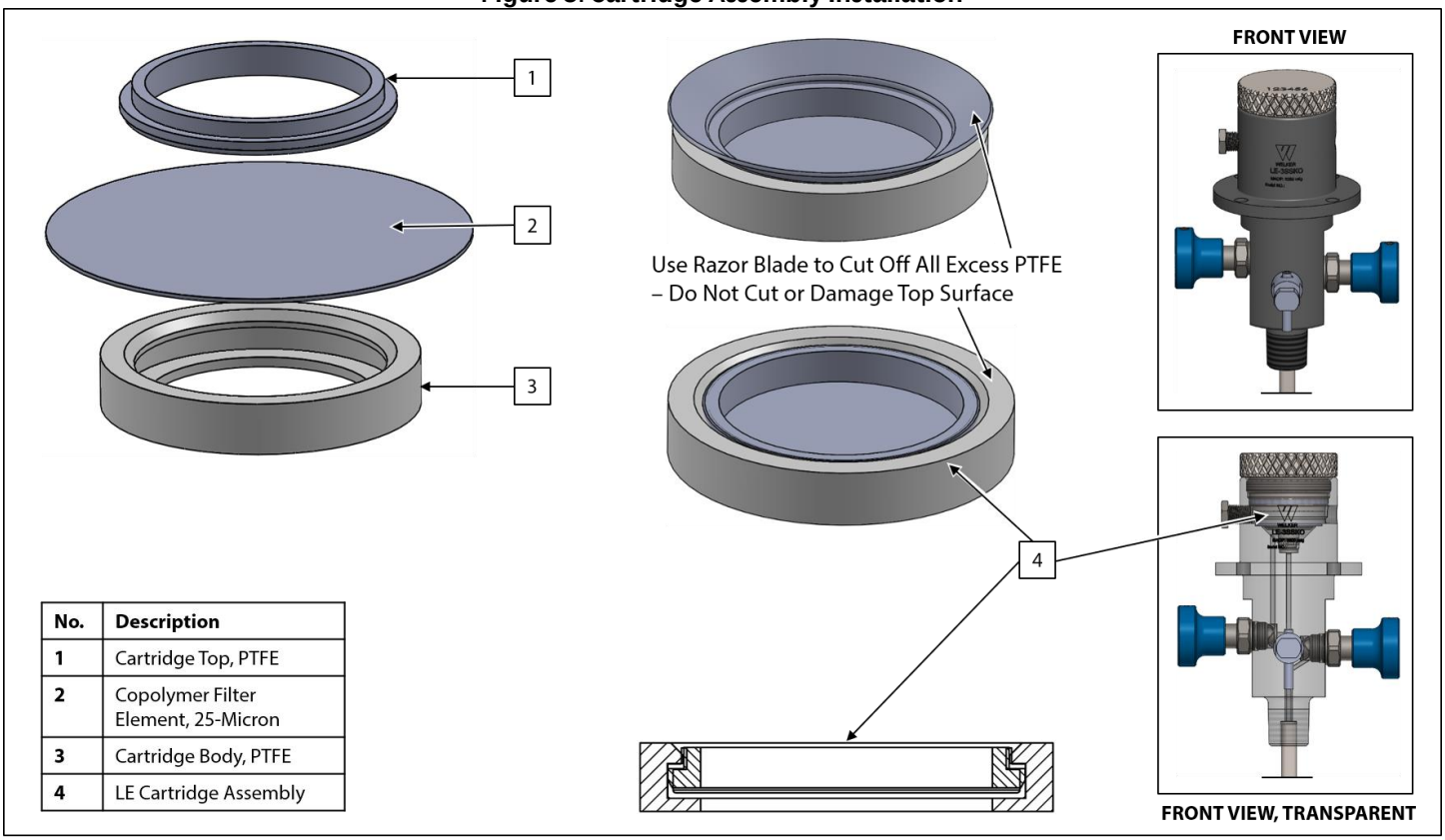
When adding and removing the top cap from the separator body, HAND-TIGHTEN ONLY. Using a vice might result in damage to the separator body and cause the LE-3SSKO to malfunction.

4. Remove and replace the O-rings (*Figure 4*).
5. Remove the cartridge assembly from the separator body (*Figure 4*).
6. Remove the thread insert cap (*Figure 4*).
7. Using a solvent, clean the inside of the separator body and porting.

Welker® recommends using a solvent, such as rubbing alcohol, that does not leave a film when dry and will not adversely affect analytical instrument results.

8. Install and tighten the thread insert cap (*Figure 4*).
9. Follow instructions in *Figure 5* for replacing the filter in the cartridge assembly. Then install the replacement cartridge assembly to the separator body (*Figure 5*). Ensure the screen is facing up to the outlet.

Figure 5: Cartridge Assembly Installation



No.	Description
1	Cartridge Top, PTFE
2	Copolymer Filter Element, 25-Micron
3	Cartridge Body, PTFE
4	LE Cartridge Assembly

10. Align the top cap with the separator body, and then screw in the top cap (*Figure 2* and *Figure 4*).

> When adding and removing the top cap from the separator body, HAND-TIGHTEN ONLY. Using a vice may result in damage to the separator body and cause the LE-3SSKO to malfunction.

11. If maintenance on the valves is necessary, remove the LE-3SSKO from the pipeline, and then refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the Welker® NV-1 and NV-2 Instrument Valves for instructions on maintaining the valves.
12. The LE-3SSKO is now ready to be reinstalled to the pipeline and/or returned to operation. See *Section 2.2, Installation & Operation*, for instructions on installing the unit to the pipeline and/or returning the unit to operation.

> During reinstallation, check valves for leaks and repair as necessary.

3.3 Troubleshooting Guidelines

Table 2: LE-3SSKO Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
There is restrictive flow through the LE-3SSKO.	The filter element is dirty, saturated, and/or flooded by liquids.	Replace the cartridge assembly. See *Section 3.2, Maintenance*, for instructions. Do not exceed the maximum allowable flow rate through the filter element.
	There is too long a time between performance of regular maintenance.	Shorten timing between scheduled maintenance.
Liquids are reaching the downstream analyzer.	The filter element is dirty, saturated, and/or flooded by liquids.	Replace the cartridge assembly. See *Section 3.2, Maintenance*, for instructions. Do not exceed the maximum allowable flow rate through the filter element.
	There is too long a time between performance of regular maintenance.	Shorten timing between scheduled maintenance.
	The maximum allowable flow rate has been exceeded.	See *Table 1: LE-3SSKO Specifications* to determine the proper outlet flow rate for the LE-3SSKO.
	The weather is cold and/or the gas is close to the hydrocarbon dew point.	Insulate and possibly heat trace the tubing from the LE-3SSKO sample outlet port.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for reference or use with this unit:

- IOM-069: Welker® Probe Mounted Liquid Eliminator
- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for reference or use with this unit:

- None

Welker® drawings and schematics suggested for use with this unit:

- Assembly Drawing: AD945AA (Probe Mounted Liquid Eliminator, Vacuum Tube Style)

NOTES

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