



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® PROBE MOUNTED LIQUID ELIMINATOR

MODEL
LE-2SSKO

DRAWING NUMBERS
AD691BG
AD691BGSYS.3
AD691BGSYS.4
AD691CC
AD691CD
AD691CG
AD691CI

MANUAL NUMBER
IOM-069

REVISION
Rev. E, 05/26/2015

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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, if not observed, could result in damage to equipment.



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

This manual is intended to be used as a basic installation and operation guide for the Welker® Probe Mounted Liquid Eliminator, LE-2SSKO. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in the Appendix section 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 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 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 Probe Mounted Liquid Eliminator, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Bellfort Street
Sugar Land, TX 77498

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this product becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manual* 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-2SSKO* Probe Mounted Liquid Eliminator is designed to remove entrained liquids, condensed hydrocarbons, glycol, and amines from gas samples, ensuring the collection of representative samples and protecting analyzers from damage and contamination.

Pipeline product enters the *LE-2SSKO* through the probe. The gas stream passes through the *LE-2SSKO* to the sample outlet, but any liquids present are separated from the sample stream by centrifugal flow, a membrane, and a screen and then returned to the pipeline through the stinger.

Optional features provide additional protection from entrained liquids. The Welker® *x-Wave™* Probe Tip and Welker® *ALS-1* Analyzer Liquid Shutoff are designed with a floating ball that will seal if liquid tries to pass through. The *x-Wave™* Probe Tip acts as a first defense against liquids, allowing only gas to enter through the probe of the *LE-2SSKO*. The *ALS-1* acts as a final defense against liquids, shutting off product flow to the analyzer in the presence of liquids.

Welker may custom design the LE-2SSKO to suit the particular application and specifications of each customer.

1.3 Specifications



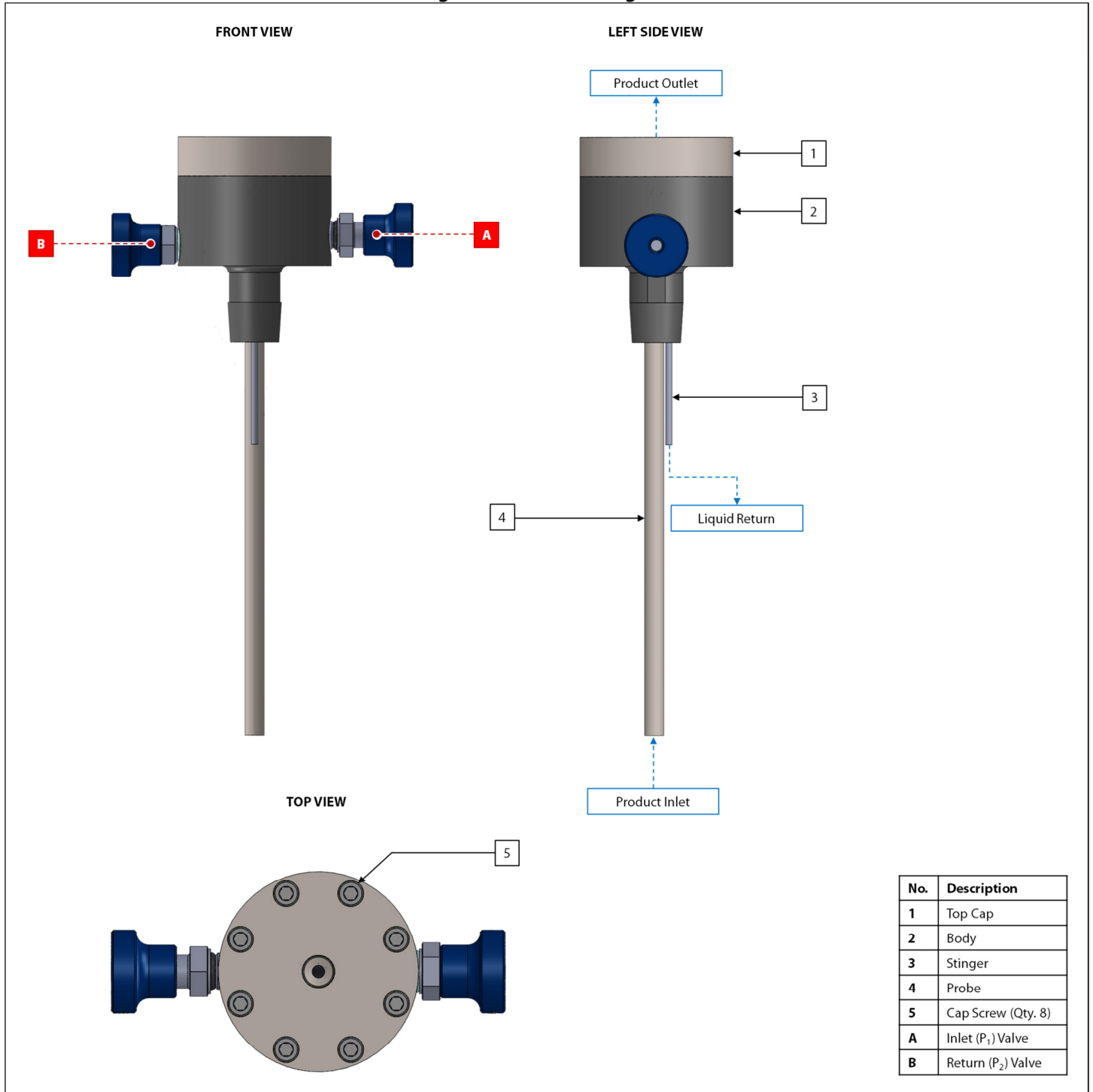
The specifications listed in this section are generalized for this equipment. Welker can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table 1: LE-2SSKO Specifications

Products Sampled	Gases Compatible With the Materials of Construction
Materials of Construction	304 Stainless Steel, 316/316L Stainless Steel, PTFE, Viton® Others Available
Maximum Allowable Operating Pressure	1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C) Others Available
Outlet Connection	1/4" NPT 1/2" NPT (Standard) 3/4" NPT
Pipeline Connection	1/2" NPT 3/4" NPT 1" NPT 2" – 600 ANSI RF Others Available
Filter Media	25 Micron Copolymer Membrane 304 Stainless Steel Mesh Screen
Options	Double Block and Bleed Valves Insulation Blanket Integrated Regulators, Relief Valves, and Filter Integrated Welker® ALS-1 Analyzer Liquid Shutoff x-Wave™ Probe Tip

1.4 System Diagram

Figure 1: LE-2SSKO 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.

1. Welker recommends that the unit be installed in the top of the pipe and inserted into the center one-third (1/3) of the pipeline in a location where the product is well-mixed and will yield an accurate and representative sample.
2. The sample probe should be located in the least turbulent area of the flowing stream available (i.e., not in a header or non-flowing area and away from obstructions, elbows, and partially closed valves).

2.2 Installation & Operation



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



If the LE-2SSKO is equipped with double block and bleed valves, refer to *Addendum A, LE-2SSKO With Double Block and Bleed Valves*, for instructions on correctly installing the unit.



If the LE-2SSKO is equipped with optional regulator(s) and filter, refer to *Addendum C, LE-2SSKO With Regulator(s) and Filter*, for instructions on correctly installing the unit.



If the LE-2SSKO is equipped with the optional x-Wave™ Probe Tip, the x-Wave™ Probe Tip may seal dry and prevent product from reaching the outlet if the pipeline flow is greater than 400 cc/minute.

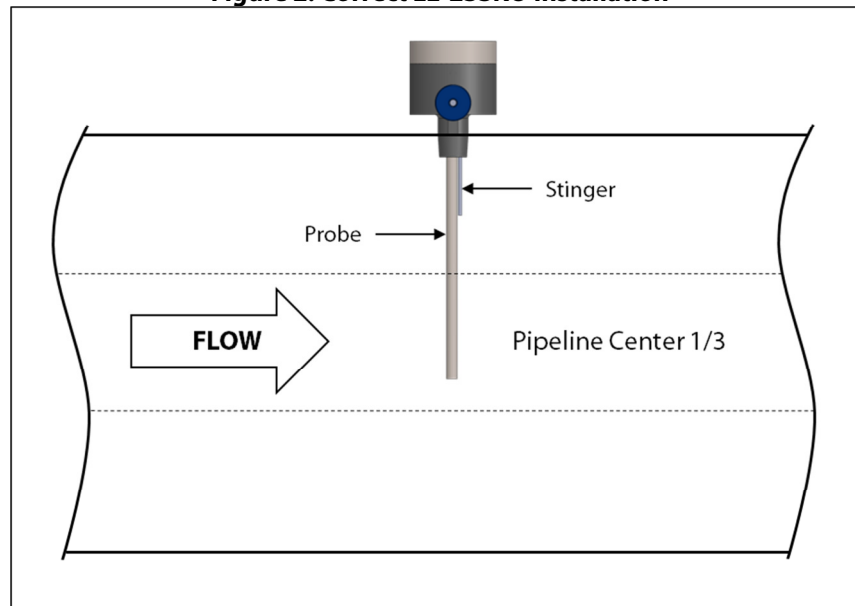
1. Ensure that inlet (P₁) valve A and return (P₂) valve B are closed (*Figure 1*).
2. Ensure that all cap screws on the top cap are tightened (*Figure 1*).
3. Ensure that the pipeline is depressurized.
4. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape.

5. Install the LE-2SSKO to the pipeline so that the stinger is downstream of the direction of product flow (*Figure 2*).



As necessary, refer to the flow direction stamped on the top cap to determine correct orientation before installing the LE-2SSKO to the pipeline.

Figure 2: Correct LE-2SSKO Installation



6. Using customer-supplied tubing, connect from the product outlet to the customer's downstream instrument(s) (e.g., a regulator assembly connected to an analyzer) (*Figure 1*).
7. Pressurize the pipeline.
8. Open inlet (P_1) valve A and return (P_2) valve B (*Figure 1*). Check for leaks at the pipeline connection and repair as necessary.
9. The LE-2SSKO is now operational.
10. If liquids are present at the product outlet, maintenance is required. See *Section 3.2, Maintenance*, for instructions on performing maintenance on the LE-2SSKO.
11. If the LE-2SSKO is equipped with the optional ALS-1 Analyzer Liquid Shutoff, observe the ball in the ALS-1. If the ball rises and shuts off the ALS-1, liquid has entered the system and maintenance is required. Refer to *Addendum B, LE-2SSKO With ALS-1*, for instructions on maintaining the LE-2SSKO with ALS-1.
12. If the LE-2SSKO is equipped with the optional x-Wave™ Probe Tip, visually verify that the gas stream can reach the product outlet. If product is not observed at the outlet, the force of the pipeline flow may have caused the ball to lock, requiring maintenance on the x-Wave™ Probe Tip. Refer to *Addendum D, x-Wave™ Probe Tip*, for instructions on maintaining the x-Wave™ Probe Tip.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker recommends that the unit have standard maintenance every six (6) months under normal operating conditions and any time liquid is present in the copolymer flat membrane or at the product outlet.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may be appropriate.
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. This eases the installation of the seals and reduces the risk of damage when positioning them on parts. Welker recommends non-hydrocarbon-based lubricants, such as Krytox®, for use with all sample cylinder seals and silicone-based lubricants, such as Molykote® 111, for use with seals not exposed to the sample product.



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.

3.2 Maintenance



If maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip is required, the LE-2SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.



Prior to performing maintenance, the LE-2SSKO must be isolated from pipeline pressure. However, the LE-2SSKO does NOT need to be removed from the pipeline to perform standard maintenance.



If the LE-2SSKO is equipped with double block and bleed valves, refer to *Addendum A, LE-2SSKO With Double Block and Bleed Valves*, for instructions on removing and performing maintenance on the unit.



If the LE-2SSKO is equipped with the ALS-1 Analyzer Liquid Shutoff, refer to *Addendum B, LE-2SSKO With ALS-1*, for instructions on removing and performing maintenance on the unit.



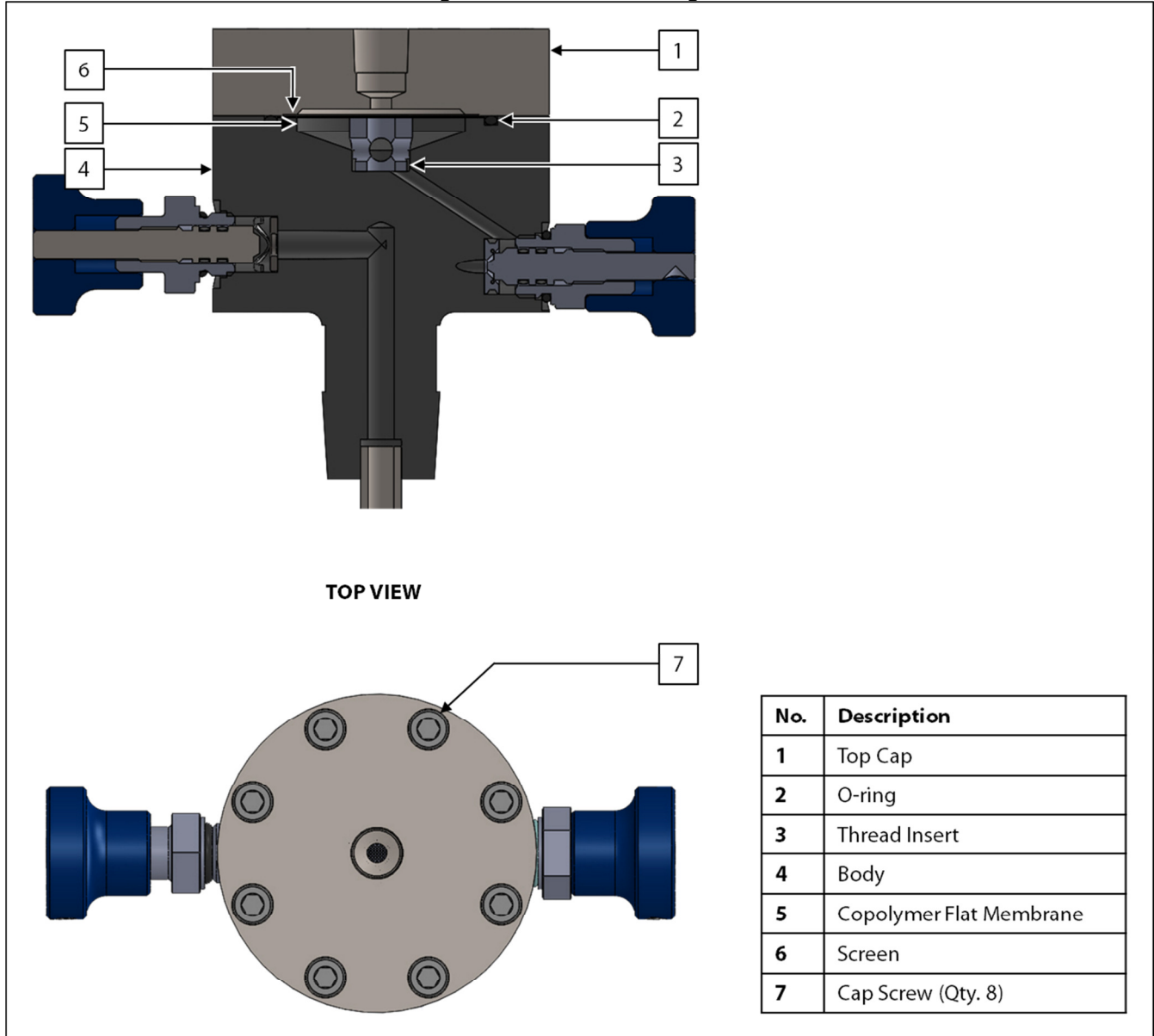
If the LE-2SSKO is equipped with optional regulator(s) and filter, refer to *Addendum C, LE-2SSKO With Regulator(s) and Filter*, for instructions on performing maintenance on the unit.



If the LE-2SSKO is equipped with the optional x-Wave™ Probe Tip, refer to *Addendum D, x-Wave™ Probe Tip*, for instructions on performing maintenance on the x-Wave™.

1. Close inlet (P₁) valve A and return (P₂) valve B.
2. Disconnect all tubing from the LE-2SSKO.

Figure 3: Maintenance Diagram



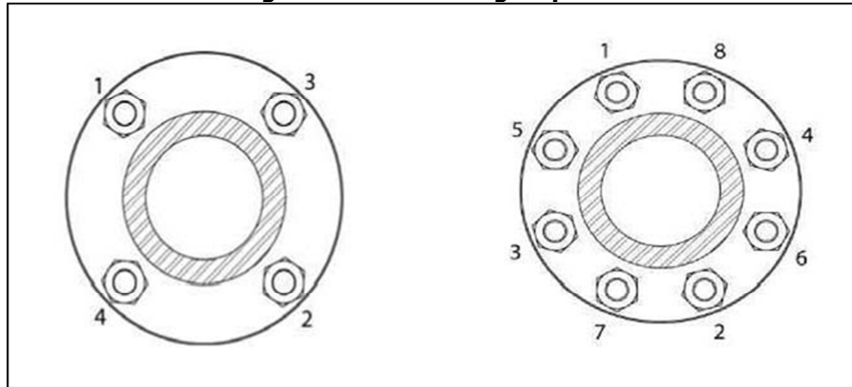
3. Loosen the cap screws, and then remove the top cap.
4. Remove the screen.
5. Remove the O-ring from the body.
6. Remove the copolymer flat membrane.
7. Using a solvent, clean the screen and inside of the LE-2SSKO body.



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

8. Replace the copolymer flat membrane.
9. Replace the O-ring.
10. Return the cleaned screen to the top of the copolymer flat membrane.
11. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure 4*).

Figure 4: Cross-Bolting Sequence



12. As necessary, tighten all cap screws to the correct torque (*Table 2*).

Table 2: Torque Specifications for Cap Screws

Cap Screw Diameter & Thirds per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
1/4-20	78	8
3/8-16	247	27

13. If maintenance on the valves is necessary, remove the LE-2SSKO 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.
14. The LE-2SSKO 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.

Referenced or Attached Documents

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

- IOM-025: Welker® IR-1, IR-2, IR-4, and IR-6 Instrument Regulators
- IOM-033: Welker® RV-1, RV-2, RV-2CP, and RV-3 Relief Valves
- IOM-077: Welker® ALS-1, ALS-1HP, ALS-2, ALS-3, and ALS-4HP Analyzer Liquid Shutoff
- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

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

- a1-cbiss Avenger 91 Particulate & Coalescing Filter (Welker® IOM-V169)
- Cashco, Inc. Model P1 Single Stage Pressure Reducing Regulator (Welker® IOM-V168)
- Swagelok® R Series Proportional Relief Valves (Welker® IOM-V015)

Addenda available for this *Installation, Operation, and Maintenance (IOM) Manual*:

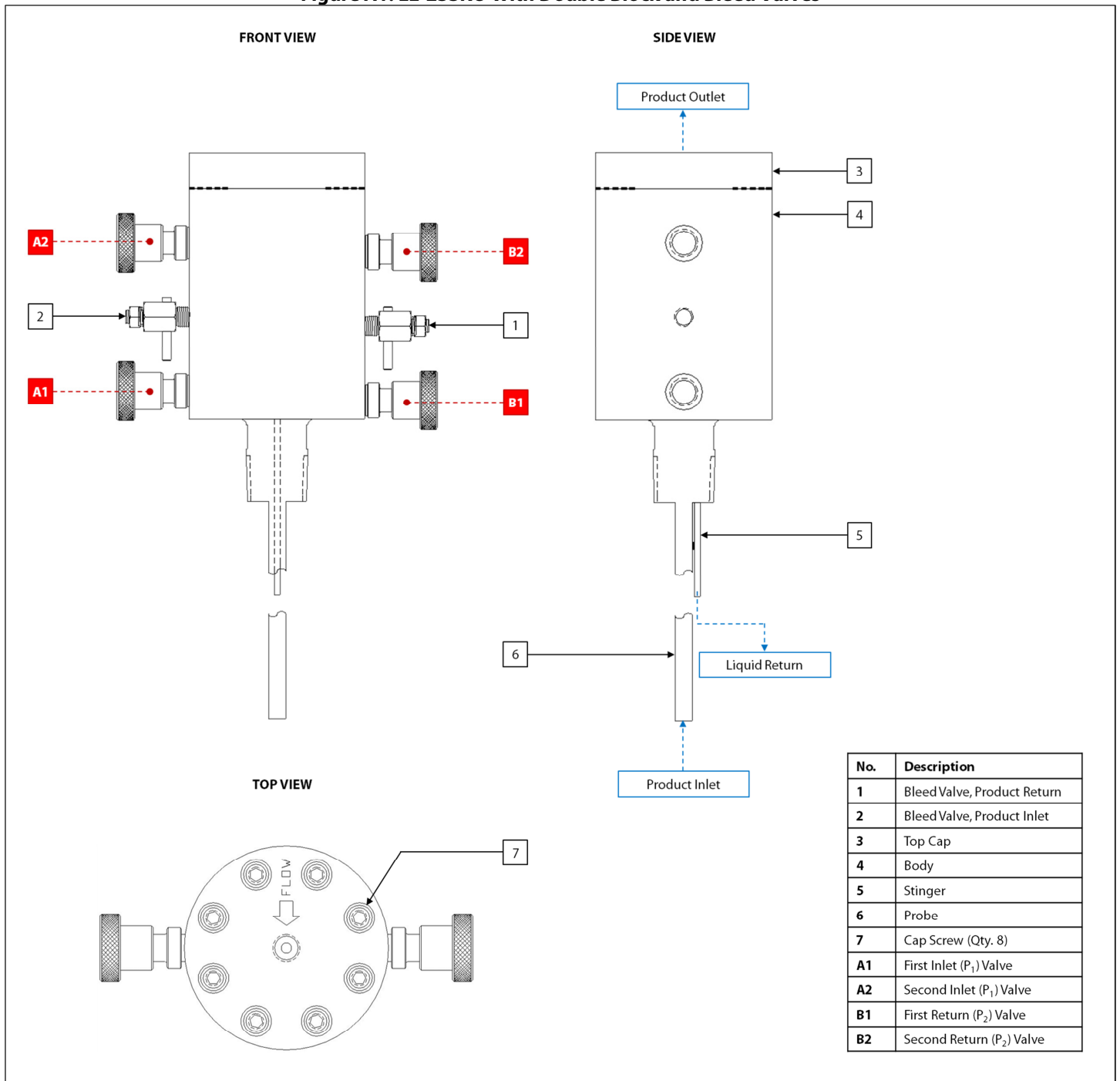
- Addendum A: LE-2SSKO With Double Block and Bleed Valves
- Addendum B: LE-2SSKO With ALS-1
- Addendum C: LE-2SSKO With Regulator(s) and Filter
- Addendum D: x-Wave™ Probe Tip

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

- Assembly Drawing: AD691BG (Standard)
- Assembly Drawing: AD691BGSYS.3 (With Single Regulator and Filter)
- Assembly Drawing: AD691BGSYS.4 (With Dual Regulators and Filter)
- Assembly Drawing: AD691CC (With ALS-1)
- Assembly Drawing: AD691CD (With Double Block and Bleed Valves)
- Assembly Drawing: AD691CG (With x-Wave™ Probe Tip)
- Assembly Drawing: AD691CI (x-Wave™ Kit)

A1.1 System Diagram

Figure A1: LE-2SSKO With Double Block and Bleed Valves



1.2 Installation & Operation



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

1. Ensure that all valves are closed (*Figure A1*).
2. Ensure that all cap screws on the top cap are tightened (*Figure A1*).
3. Ensure that the pipeline is depressurized.
4. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape.
5. Install the LE-2SSKO to the pipeline so that the stinger is downstream of the direction of product flow.



As necessary, refer to the flow direction stamped on the top cap to determine correct orientation before installing the LE-2SSKO to the pipeline (*Figure A1*).

6. Using customer-supplied tubing, connect from the product outlet to the customer's downstream instrument(s) (e.g., a regulator assembly connected to an analyzer) (*Figure A1*).
7. Pressurize the pipeline.
8. Open inlet (P_1) valves A1 and A2 and return (P_2) valves B1 and B2 (*Figure A1*). Check for leaks at the pipeline connection and repair as necessary.
9. The LE-2SSKO is now operational.
10. If liquids are present at the product outlet, maintenance is required. See *Section A1.3, Maintenance*, for instructions on performing maintenance on the LE-2SSKO with Double Block and Bleed Valves.

A1.3 Maintenance



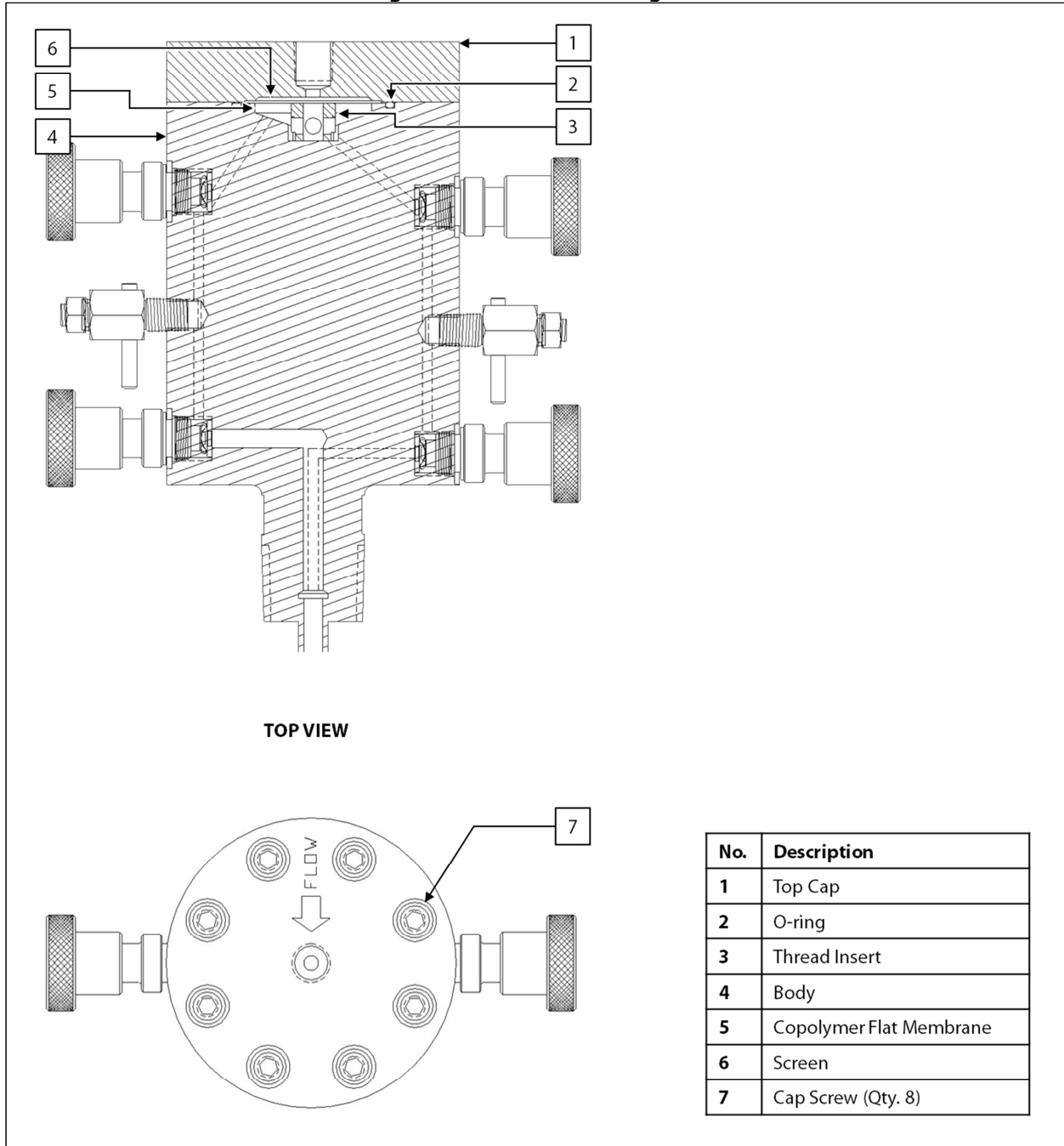
If maintenance on the valves, probe, or stinger is required, the LE-2SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.



Prior to performing maintenance, the LE-2SSKO must be isolated from pipeline pressure. However, the LE-2SSKO does NOT need to be removed from the pipeline to perform standard maintenance.

1. Close inlet (P_1) valve A1 and return (P_2) valve B1 (*Figure A1*).
2. Open both bleed valves to relieve pressure in the LE-2SSKO body (*Figure A1*).
3. Close both bleed valves, and then close inlet (P_1) valve A2 and return (P_2) valve B2 (*Figure A1*).
4. Disconnect all tubing from the LE-2SSKO.

Figure A2: Maintenance Diagram



5. Loosen the cap screws, and then remove the top cap.
6. Remove the screen.
7. Remove the O-ring from the body.
8. Remove the copolymer flat membrane.
9. Using a solvent, clean the screen and inside of the LE-2SSKO body.

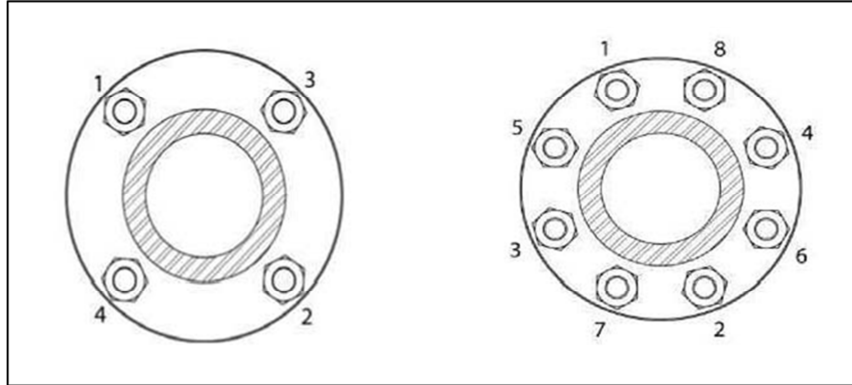


Welker recommends using a solvent that does not leave a film when dry and will not adversely affect analytical instrument results, such as rubbing alcohol.

10. Replace the copolymer flat membrane.
11. Replace the O-ring.
12. Return the cleaned screen to the top of the copolymer flat membrane.

13. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure A3*).

Figure A3: Cross-Bolting Sequence



14. As necessary, tighten all cap screws to the correct torque (*Table A1*).

Table A1: Torque Specifications for Cap Screws

Cap Screw Diameter & Thirds per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
1/4-20	78	8
3/8-16	247	27

15. If maintenance on the valves is necessary, remove the LE-2SSKO 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.
16. The LE-2SSKO is now ready to be reinstalled to the pipeline and/or returned to operation. See *Section A1.2, 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.

B1.1 Specifications



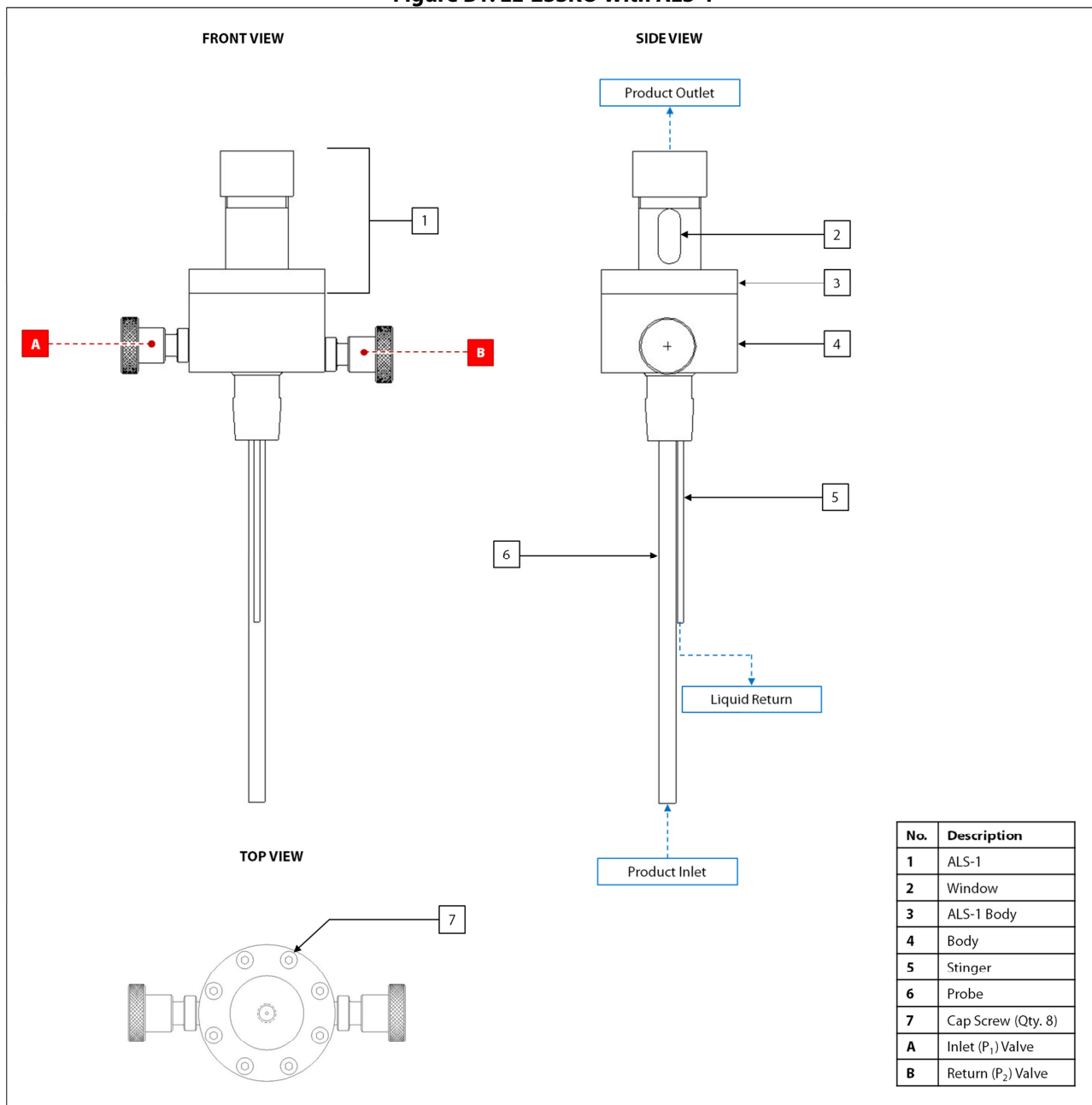
The specifications listed in this section are generalized for this equipment. Welker can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table B1: LE-2SSKO With ALS-1 Specifications

Materials of Construction	316/316L Stainless Steel, Aluminum, Glass, LEXAN™, PTFE, Teflon®, Viton®
Maximum Allowable Operating Pressure	1000 psig @ -20 °F to 120 °F (68 barg @ -28 °C to 48 °C)

B1.2 System Diagram

Figure B1: LE-2SSKO With ALS-1



B1.3 Maintenance



If maintenance on the valves, probe, or stinger is required, the LE-2SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.

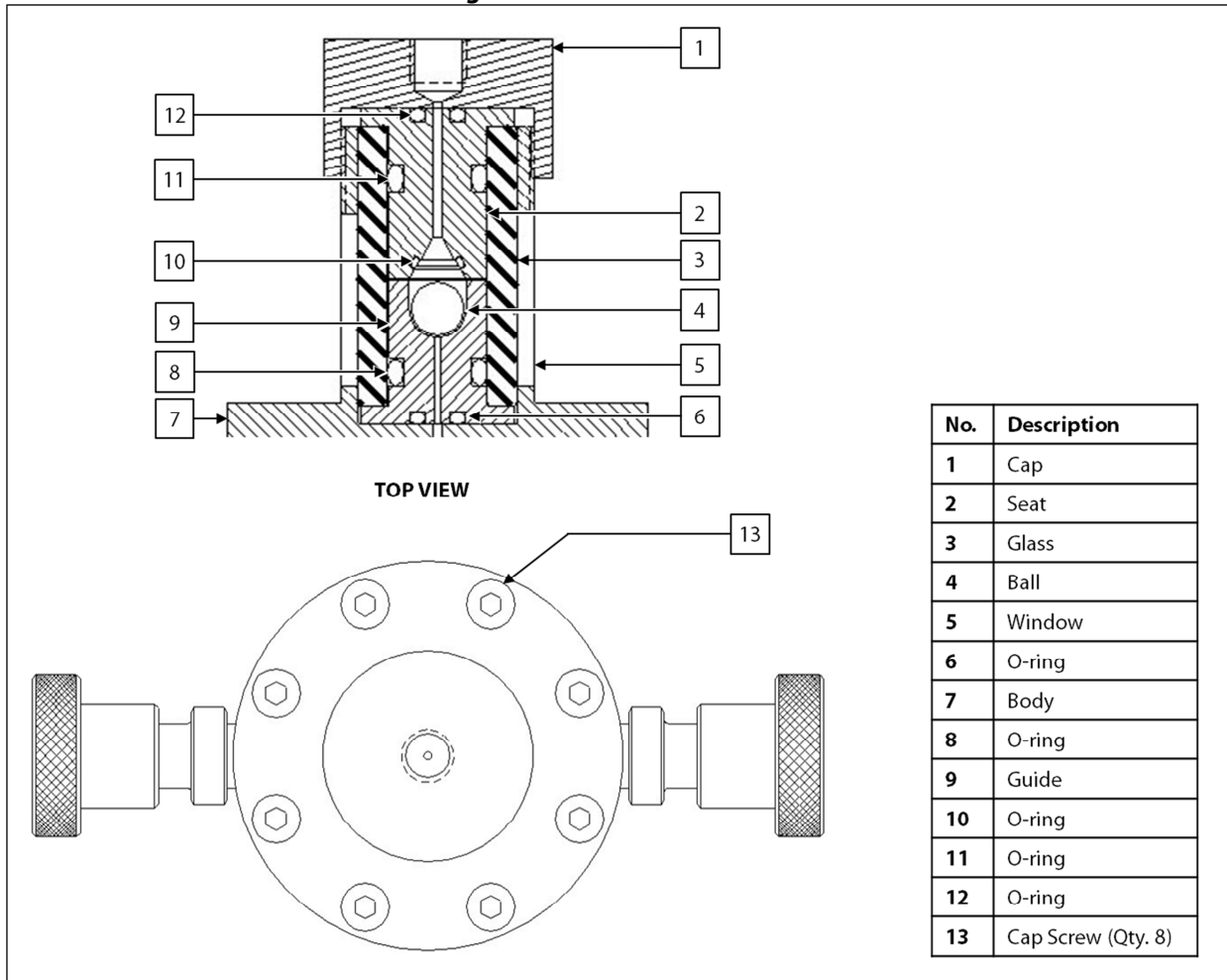


Prior to performing maintenance, the LE-2SSKO must be isolated from pipeline pressure. However, the LE-2SSKO does NOT need to be removed from the pipeline to perform standard maintenance.

1. Close inlet (P₁) valve A and return (P₂) valve B (Figure B1).
2. Disconnect all tubing from the LE-2SSKO.

ALS-1

Figure B2: ALS-1 Maintenance



3. Loosen the cap screws, and then remove the ALS-1 from the LE-2SSKO.
4. Unscrew the cap from the ALS-1.
5. Carefully remove the seat, taking care not to scratch the glass, and then replace the O-rings on the seat.



DO NOT lubricate the O-ring the ball seals on (Figure B2, #10).

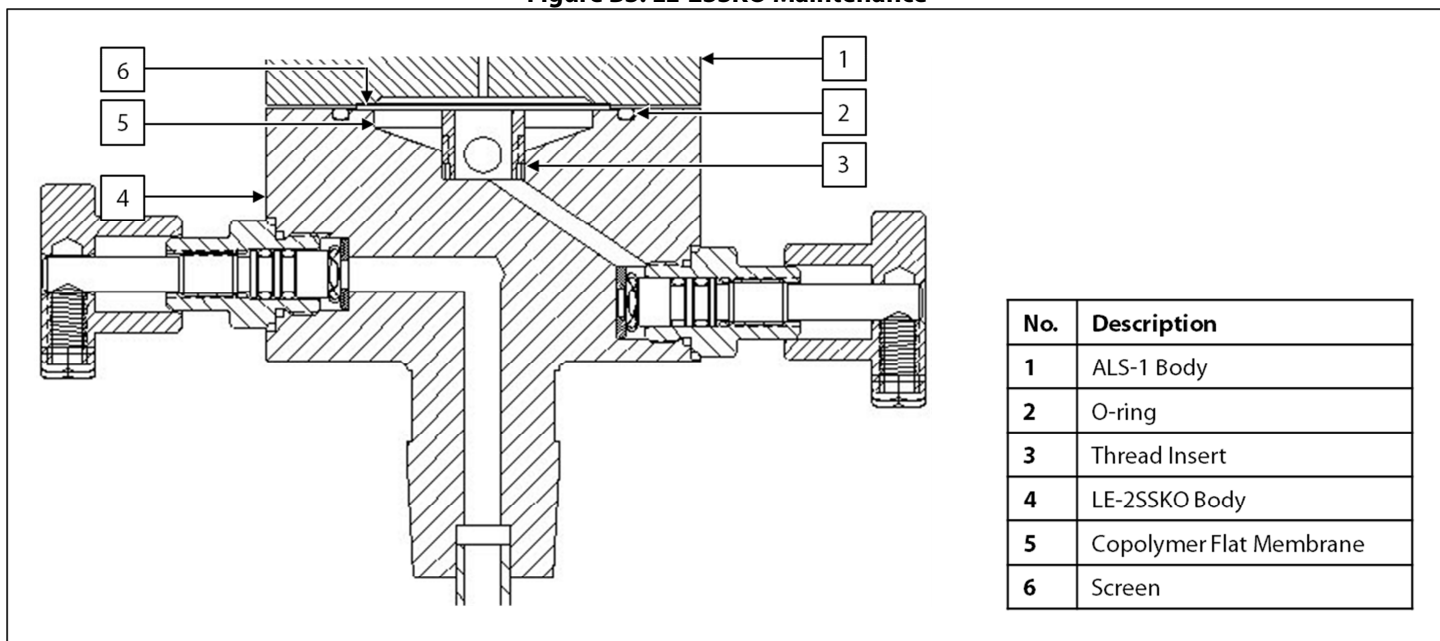
6. Remove the glass.
7. Remove the guide from the body, and then replace the O-rings on the body.
8. Inspect the ball for scratches or wear. Replace as necessary.
9. Return the ball to the guide.
10. Install the guide to the body.
11. Carefully install the glass over the guide.
12. Carefully insert the seat into the glass, taking care not to scratch the glass.
13. Return the cap to the ALS-1 and hand-tighten.



When reassembling the ALS-1, HAND-TIGHTEN ONLY.

Liquid Eliminator

Figure B3: LE-2SSKO Maintenance



14. Remove the screen.
15. Remove the O-ring from the LE-2SSKO body.
16. Remove the copolymer flat membrane.
17. Using a solvent, clean the screen and inside of the LE-2SSKO body.



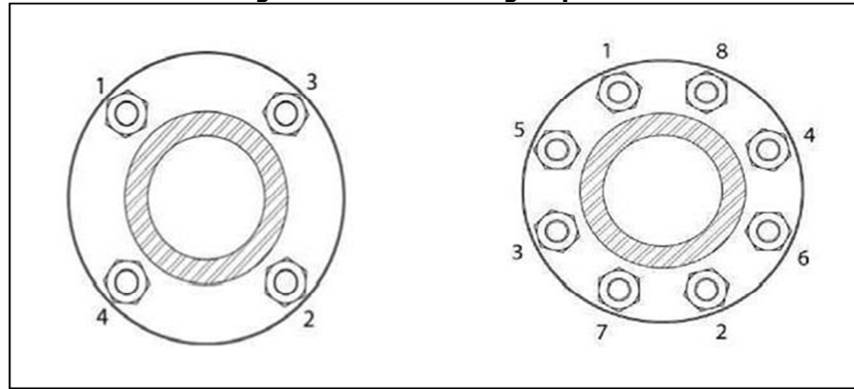
Welker recommends using a solvent that does not leave a film when dry and will not adversely affect analytical instrument results, such as rubbing alcohol.

18. Replace the copolymer flat membrane.
19. Replace the O-ring.
20. Return the cleaned screen to the top of the copolymer flat membrane.

Reassembly

21. Align the ALS-1 with the LE-2SSKO body, and then reinstall the cap screws following a cross-bolting sequence (*Figure B4*).

Figure B4: Cross-Bolting Sequence



22. As necessary, tighten all cap screws to the correct torque (*Table B2*).

Table B2: Torque Specifications for Cap Screws

Cap Screw Diameter & Thirds per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
1/4-20	78	8
3/8-16	247	27

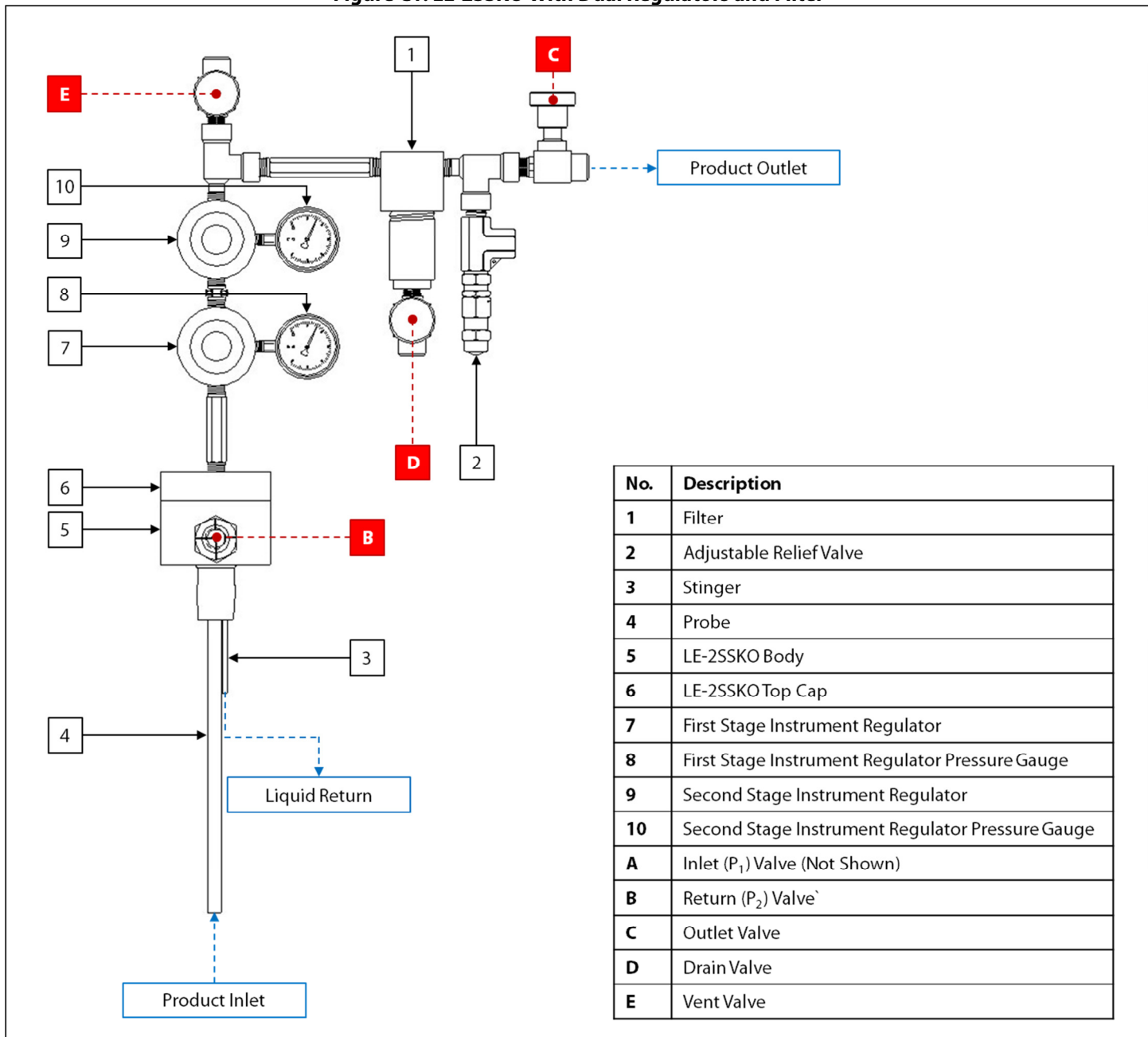
23. If maintenance on the valves is necessary, remove the LE-2SSKO from the pipeline, and then refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the Welker® NV-1 and NV-2 Instrument Valves for instructions on maintaining the valves.
24. The LE-2SSKO is now ready to be reinstalled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

C1.1 System Diagram

Figure C1: LE-2SSKO With Dual Regulators and Filter



C1.2 Installation & Operation



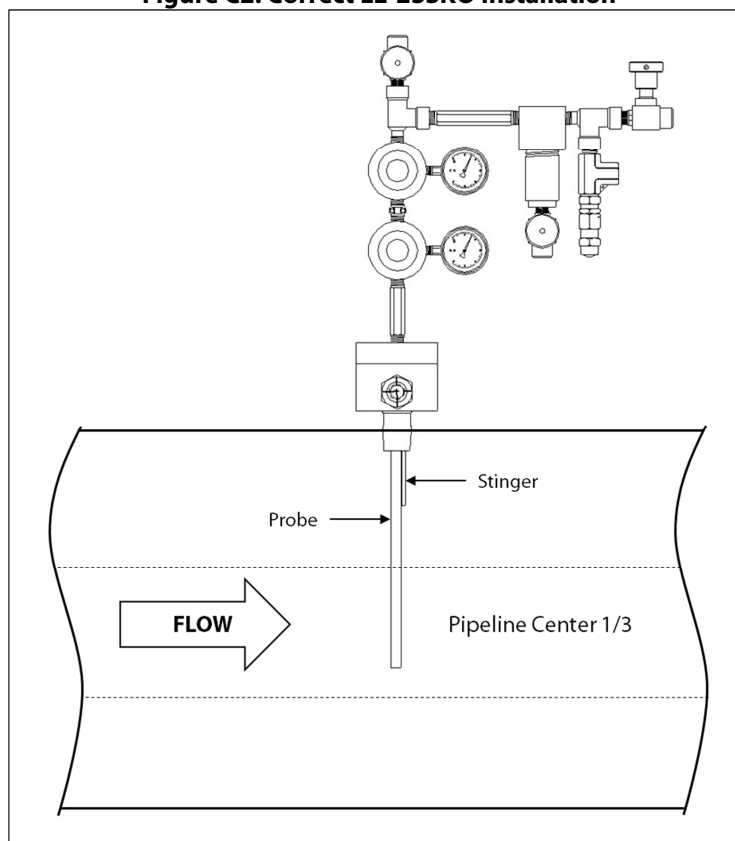
The pipeline must be depressurized prior to installing and removing the unit.

1. Ensure that all valves are closed (*Figure C1*).
2. Ensure that all cap screws on the top cap are tightened (*Figure C1*).
3. Ensure that the pipeline is depressurized.
4. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape.
5. Install the LE-2SSKO to the pipeline so that the stinger is downstream of the direction of product flow (*Figure C2*).



As necessary, refer to the flow direction stamped on the top cap to determine correct orientation before installing the LE-2SSKO to the pipeline.

Figure C2: Correct LE-2SSKO Installation



6. Using customer-supplied tubing, connect from the product outlet to the customer's downstream instrument(s) (e.g., a regulator assembly connected to an analyzer) (*Figure C1*).
7. To prevent over-pressurizing the downstream instrument(s), back the instrument regulator(s) off completely before pressurizing the pipeline.
8. Pressurize the pipeline.
9. Open inlet (P_1) valve A, return (P_2) valve B, and outlet valve C (*Figure C1*). Check for leaks at the pipeline connection and repair as necessary.
10. If the LE-2SSKO is equipped with one (1) instrument regulator, set the regulator. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the appropriate instrument regulator for instructions on setting the regulator. Proceed to step 13.

11. If the LE-2SSKO is equipped with two (2) instrument regulators, set the first stage regulator. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the appropriate instrument regulator for instructions on setting the regulator.



The first stage regulator should be set to half the desired outlet pressure. This pressure will vary by application.

12. If the LE-2SSKO is equipped with two (2) instrument regulators, set the second stage regulator. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the appropriate instrument regulator for instructions on setting the regulator.



The second stage regulator should be set to the desired outlet pressure. This pressure will vary by application.

13. Set the relief valve above the set outlet pressure. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for instructions on setting the relief valve.
14. The LE-2SSKO is now operational.
15. If liquids are present at the product outlet, maintenance is required. See *Section C1.3, Maintenance*, for instructions on performing maintenance on the LE-2SSKO.

C1.3 Maintenance



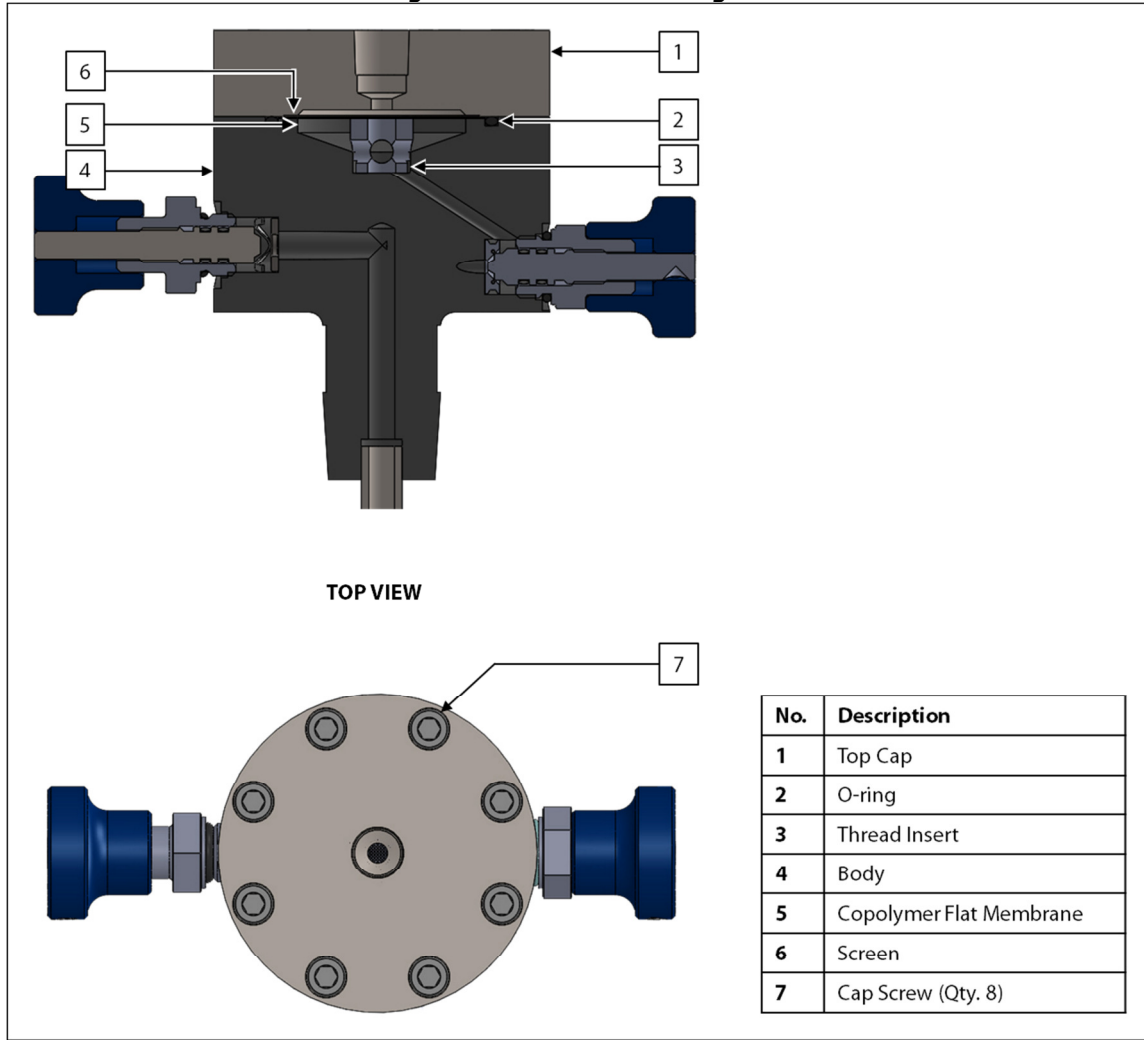
If maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip is required, the LE-2SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.



Prior to performing maintenance, the LE-2SSKO must be isolated from pipeline pressure. However, the LE-2SSKO does NOT need to be removed from the pipeline to perform standard maintenance.

1. Determine how quickly free liquids accumulate in the filter by frequently opening drain valve D (*Figure C1*). Routinely open drain valve D to allow moisture to drain from the filter.
2. Close all valves.
3. Disconnect all tubing from the LE-2SSKO.
4. Disconnect the instrument regulator(s) and filter assembly from the LE-2SSKO.

Figure C3: Maintenance Diagram



5. Loosen the cap screws, and then remove the top cap.
6. Remove the screen.
7. Remove the O-ring from the body.
8. Remove the copolymer flat membrane.
9. Using a solvent, clean the screen and inside of the LE-2SSKO body.

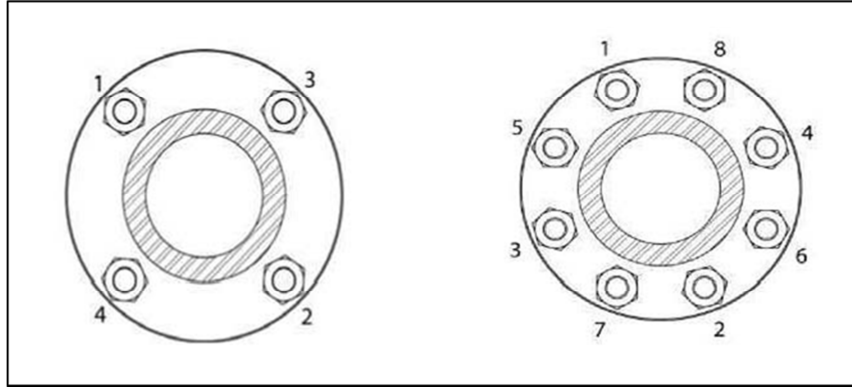


Welker recommends using a solvent that does not leave a film when dry and will not adversely affect analytical instrument results, such as rubbing alcohol.

10. Replace the copolymer flat membrane.
11. Replace the O-ring.
12. Return the cleaned screen to the top of the copolymer flat membrane.

13. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure C4*).

Figure C4: Cross-Bolting Sequence



14. As necessary, tighten all cap screws to the correct torque (*Table C1*).

Table C1: Torque Specifications for Cap Screws

Cap Screw Diameter & Thirds per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
1/4-20	78	8
3/8-16	247	27

15. To perform maintenance on the instrument regulator(s), refer to the appropriate *Installation, Operation, and Maintenance (IOM) Manual* for instructions on maintaining the regulator(s).
16. To perform maintenance on the filter, refer to the appropriate *Installation, Operation, and Maintenance (IOM) Manual* for instructions on maintaining the filter.
17. If maintenance on the valves is necessary, remove the LE-2SSKO 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.
18. Reconnect the instrument regulator(s) and filter assembly to the LE-2SSKO.
19. The LE-2SSKO is now ready to be reinstalled to the pipeline and/or returned to operation. See *Section C2.2, 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.

D1.1 Product Description

The Welker® x-Wave™ Probe Tip is designed to prevent failure of the LE-2SSKO caused by slugs of liquid in the pipeline and short-term flooding by reducing the volume of liquid that enters the probe.

When the liquid level in the pipeline rises, the liquid pushes the ball inside the x-Wave™ Probe Tip up, creating a seal and preventing the LE-2SSKO from being flooded by the liquid. When the liquid level falls, the stinger relieves pressure in the LE-2SSKO, breaking the seal of the ball and allowing product flow through the probe.



The x-Wave™ Probe Tip will not prevent failure of the LE-2SSKO caused by long-term flooding.

1.2 Specifications



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

Table D1: x-Wave™ Probe Tip Specifications

Materials of Construction

316 Stainless Steel, 316/316L Stainless Steel, Polypropylene, PTFE, Viton®
Others Available

D1.3 System Diagrams

Figure D1: LE-2SSKO With x-Wave™ Probe Tip

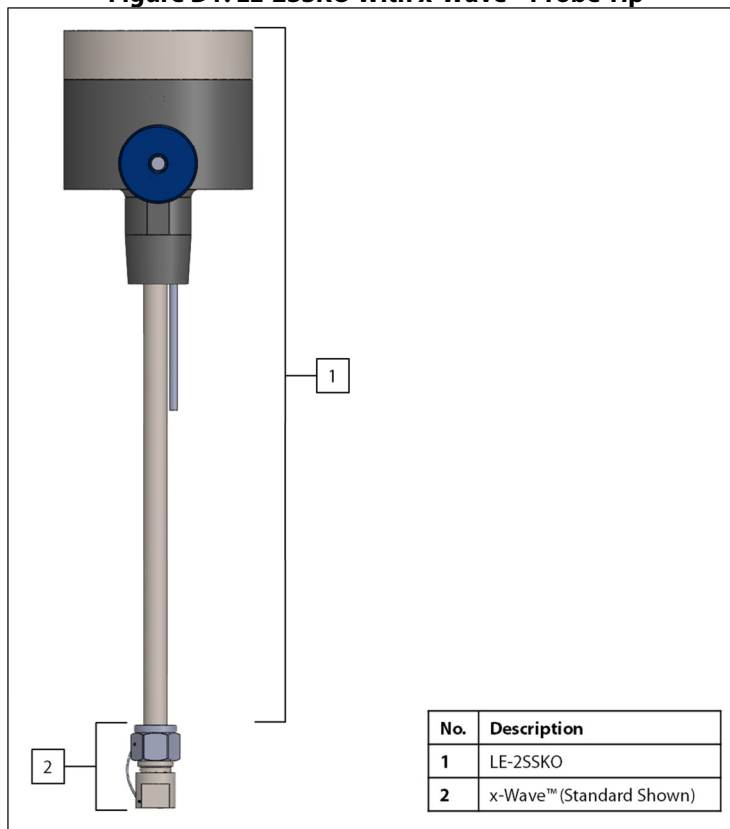
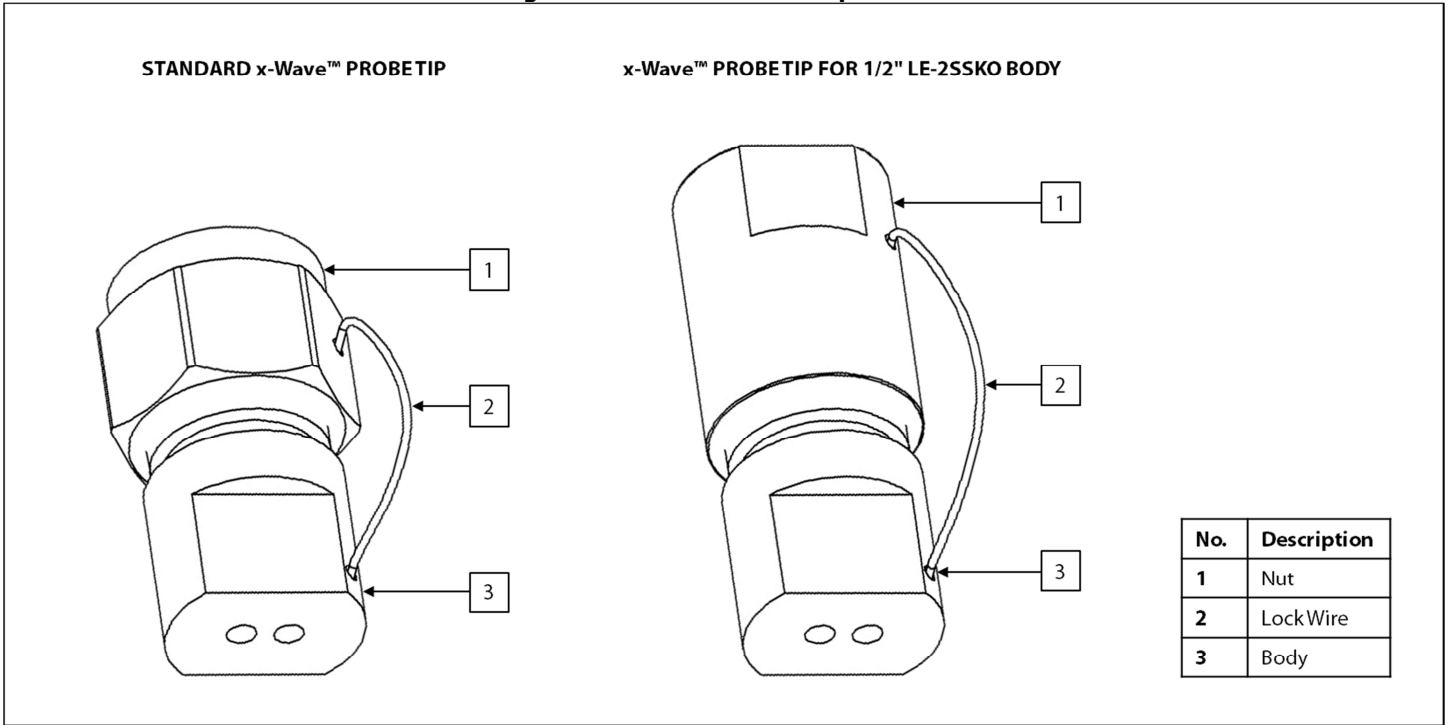


Figure D2: x-Wave™ Probe Tip Models



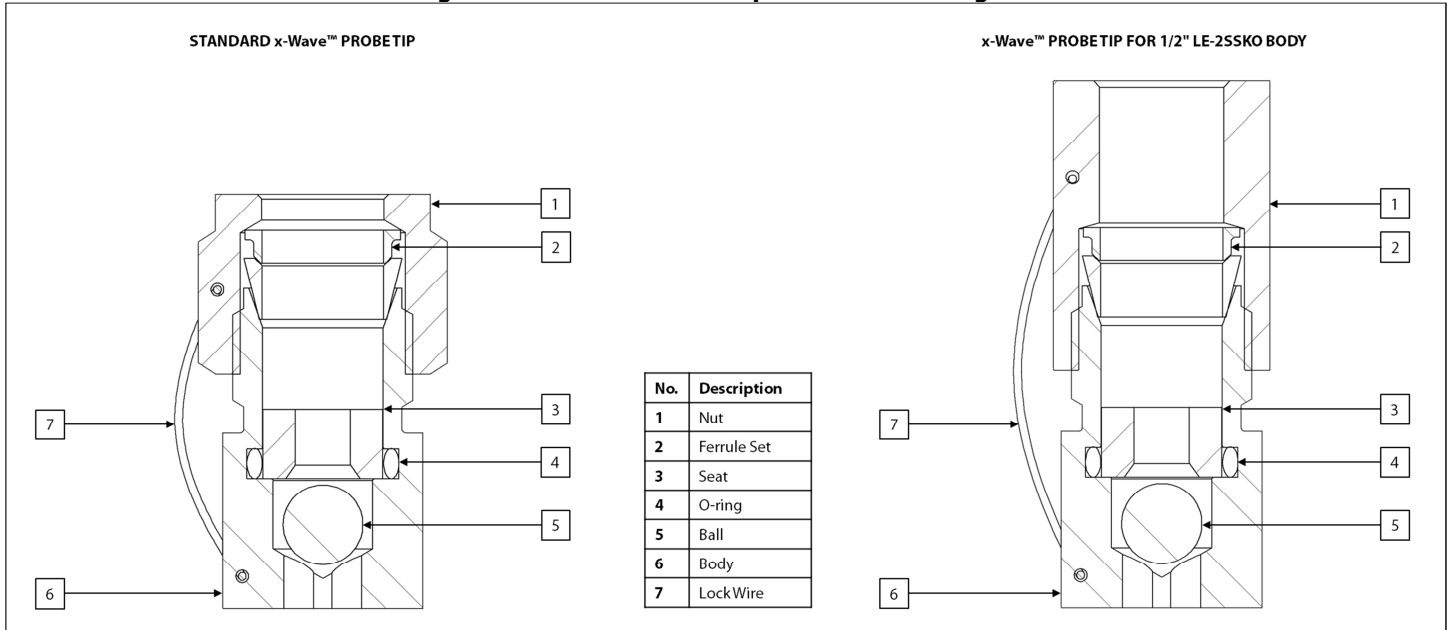
D1.4 Maintenance



If maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip is required, the LE-2SSKO must be isolated from pipeline pressure and removed from the pipeline before maintenance can be safely performed.

1. Close inlet (P₁) valve A and return (P₂) valve B.
2. Disconnect all tubing from the LE-2SSKO.
3. Remove the LE-2SSKO from the pipeline.

Figure D2: x-Wave™ Probe Tip Maintenance Diagram



4. Cut the lock wire on the x-Wave™ Probe Tip.
5. Unscrew the body from the nut, taking care not to misplace the ball, which will be removed with the body.
6. Replace the O-ring on the body.
7. Screw the body into the nut.
8. Holding the body steady, tighten the nut using a wrench.
9. Connect a lock wire from the nut to the body.



If a replacement lock wire is not available, ensure that the x-Wave™ Probe Tip is securely tightened so that it can withstand the pressure of the flowing stream.

10. To continue maintenance on the LE-2SSKO, refer to *Section 3.2, Maintenance*, in the *Installation, Operation, and Maintenance (IOM) Manual* for the LE-2SSKO for instructions on maintaining the LE-2SSKO.
11. To install the LE-2SSKO with optional x-Wave™ Probe Tip after maintenance is complete, refer to *Section 2.2, Installation & Operation*, in the *Installation, Operation, and Maintenance (IOM) Manual* for the LE-2SSKO for instructions on installing the unit to the pipeline.

