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

MODEL
LE-2SSKO

DRAWING NUMBER(S)
AD691BG
AD691BGSYS.3
AD691BGSYS.4
AD691CC
AD691CD
AD691CG
AD691CI

MANUAL NUMBER
IOM-069

REVISION
Rev. F, 10/08/2024

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SAFETY

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 equipment damage and 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-2SSKO. For further information and instructions, please refer to the Installation, Operation, and Maintenance *(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, operation, and maintenance, 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 inspectors' 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

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 might 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 25-micron filter cartridge, and then returned to the pipeline through the stinger (see *Figure 1*).

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

1.3 Specifications

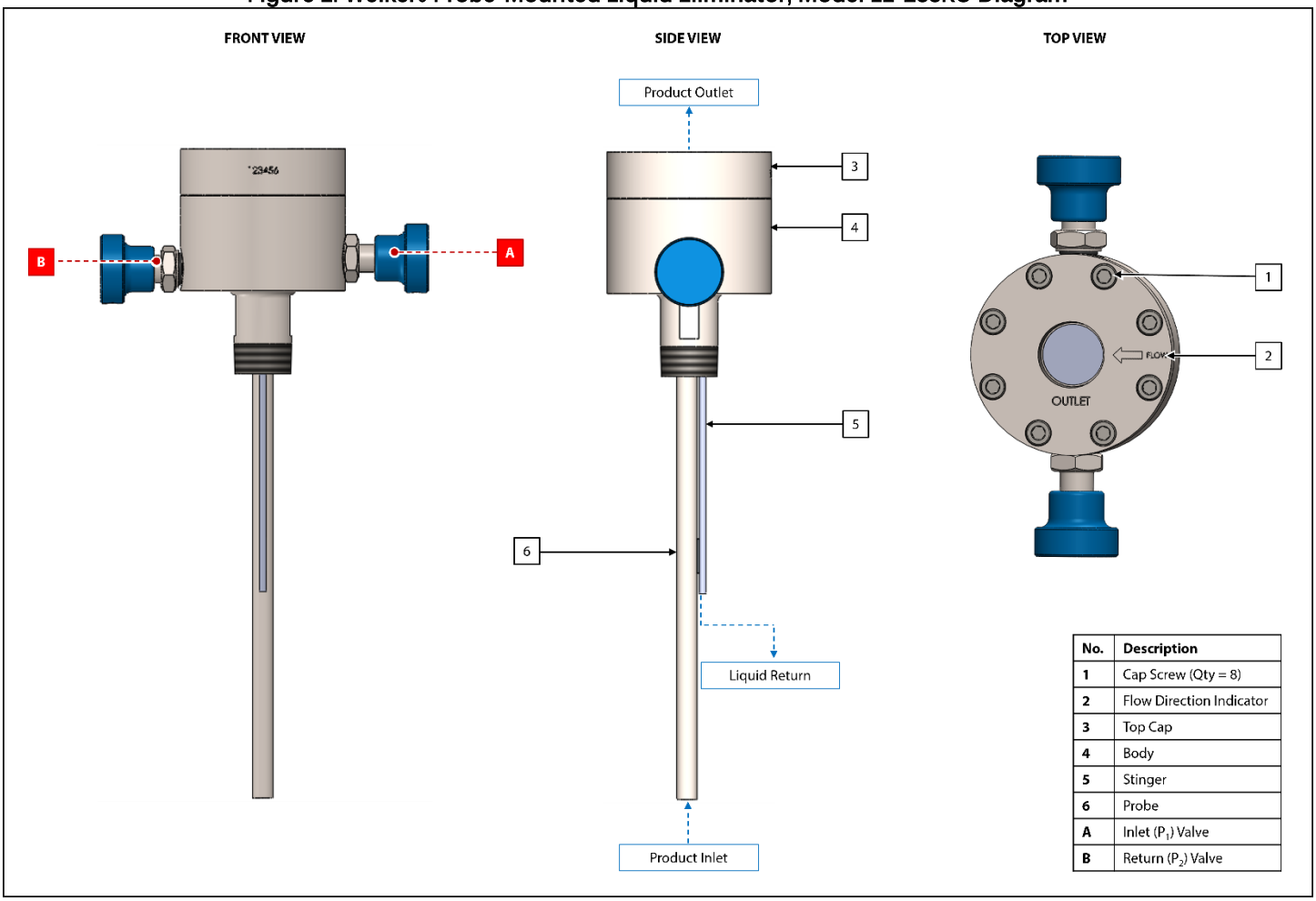
The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: Welker® LE-2SSKO Specifications

Products Sampled	Gases Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, PTFE, FFKM Others Available
Maximum Allowable Operating Pressure	1440 psig @ -20 °F to 120 °F (*99 barg @ -28 °C to 48 °C*) Others Available
Outlet Connection	¼" FNPT ½" FNPT (Standard) ¾" FNPT
Pipeline Connection	½" MNPT ¾" MNPT 1" MNPT 2" Class 600 RF Others Available
Filter Element	25-Micron LE Filter Cartridge (Replaceable)
Features	Integrated Pitot Probe NV-1 Instrument Valve NV-2 Instrument Valve Replaceable LE Filter Cartridge
	NACE Compliance (With Optional Double Block and Bleed Valves)
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 Equipment Diagram

Figure 1: Welker® Probe-Mounted Liquid Eliminator, Model LE-2SSKO Diagram



No.	Description
1	Cap Screw (Qty = 8)
2	Flow Direction Indicator
3	Top Cap
4	Body
5	Stinger
6	Probe
A	Inlet (P_1) Valve
B	Return (P_2) Valve

SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the Welker® LE-2SSKO, check it for compliance and any damage that might have occurred during shipment. Immediately contact a Welker® representative if you received a damaged LE-2SSKO.

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 (⅓) 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

STOP

The pipeline MUST BE depressurized prior to installing or removing the Welker® LE-2SSKO unit.

If the LE-2SSKO is equipped with double block and bleed valves, refer to *Appendix B, 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 *Appendix D, LE-2SSKO With Regulator(s) and Filter,* for instructions on correctly installing the unit.

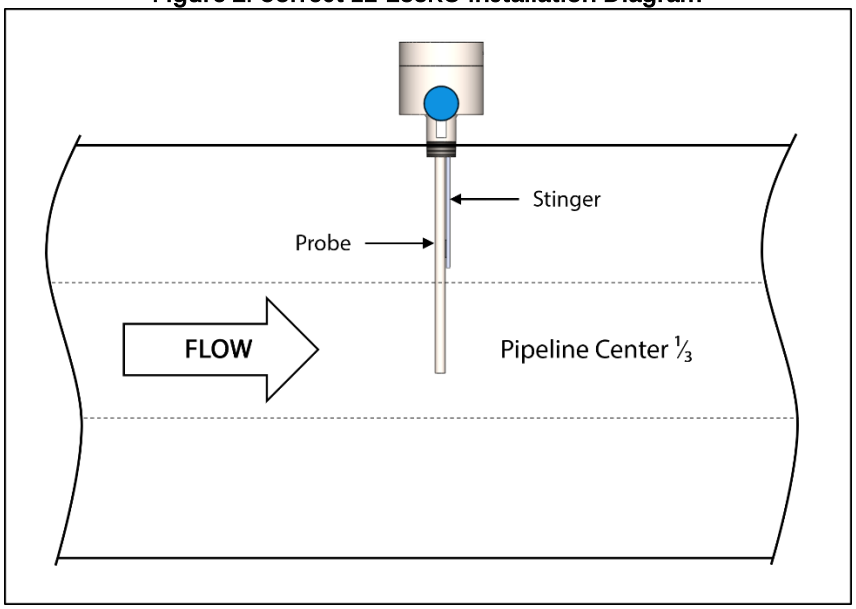
If the LE-2SSKO is equipped with the optional x-Wave™ Probe Tip, the x-Wave™ Probe Tip will seal and prevent product from reaching the outlet if the pipeline flow is greater than 400 cc/minute.

1. Ensure that the pipeline is depressurized.
2. Ensure that inlet (P_1) valve A and return (P_2) valve B are closed (*Figure 1*).
3. Ensure that all cap screws on the top cap are tightened (*Figure 1*).
4. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape. Refer to the proper sealing instructions for the brand used.

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 on the top cap (*Figure 1*) to determine the correct orientation of the LE-2SSKO before installing the unit to the pipeline.

Figure 2: Correct LE-2SSKO Installation Diagram



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 and tubing connections and repair or replace 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 *Appendix C, 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, verify that the gas stream can reach the product outlet. If product is not observed at the outlet, the force of the pipeline flow might have caused the ball to lock, requiring maintenance on the x-Wave™ Probe Tip. Refer to *Appendix E, 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 filter cartridge 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 to 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, because it might adversely affect analytical instrument results.

For sample-exposed seals, Welker® recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals, Welker® recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

2. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
3. Welker® recommends having the following tools available for maintenance. Please note that the exact tools required might vary by model.
    a. Clean Cloths
    b. Hex Key Set
    c. LE Filter Cartridge (New)
    d. Solvent
    e. Torque Wrench

3.2 Maintenance

If maintenance on any of the valves, the probe, the stinger, or the 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 ALWAYS BE isolated from pipeline pressure.
However, if you do not need to perform maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip, the LE-2SSKO does NOT need to be removed from the pipeline to remove and change the filter cartridge.

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

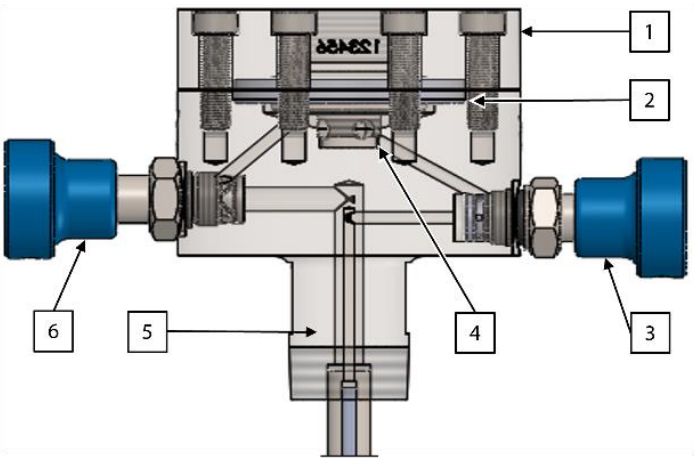
If the LE-2SSKO is equipped with the ALS-1 Analyzer Liquid Shutoff, refer to *Appendix C, LE-2SSKO With ALS-1,* for instructions on removing and performing maintenance on the unit.

If the LE-2SSKO is equipped with optional regulator(s) and filter, refer to *Appendix D, 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 *Appendix E, x-Wave™ Probe Tip*, for instructions on performing maintenance on the x-Wave™.

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

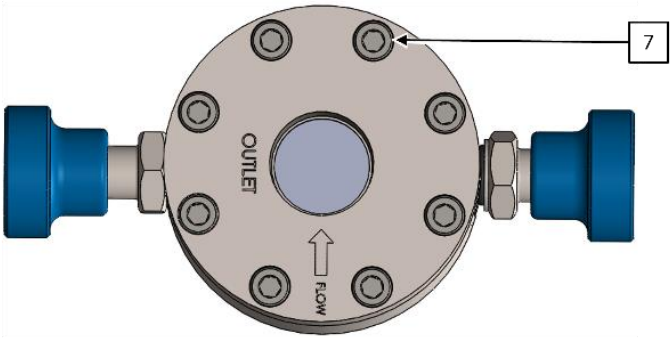
Figure 3: LE-2SSKO Maintenance Diagram



No.	Description
1	LE Cap
2	LE Cartridge
3	Valve Kit, NV-1
4	Thread Insert

No.	Description
5	Body/Probe Subassembly
6	Valve Kit, NV-2
7	Cap Screw (Qty = 8)

TOP VIEW



4. Loosen the cap screws, and then remove the LE cap.
5. Remove the LE filter cartridge.
6. Using a solvent, clean the inside of the LE-2SSKO body.

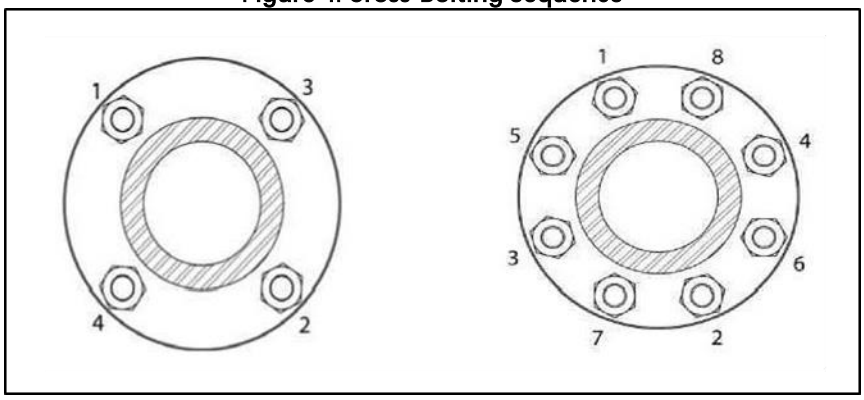
Welker® recommends using a solvent—such as rubbing alcohol—that does not leave a film when dry and will not adversely affect analytical instrument results.

7. Put in a new LE filter cartridge.

8. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure 4*).

Be sure to orient the top cap flow arrow correctly to ensure the stinger will be located downstream of product flow (*Figure 1* and *Figure 2*).

Figure 4: Cross-Bolting Sequence



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

Table 2: Torque Specifications for Cap Screws

Cap Screw Diameter & Threads per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
¼-20	80	8
⅜-16	250	27

10. If maintenance on the valves is necessary, remove the LE-2SSKO from the pipeline. 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.
11. 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 and tubing connections for leaks and repair or replace as necessary.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for reference or 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

Welker® data sheet suggested for reference with this unit:

- 004-100: Welker® ESR-2 Relief Valve

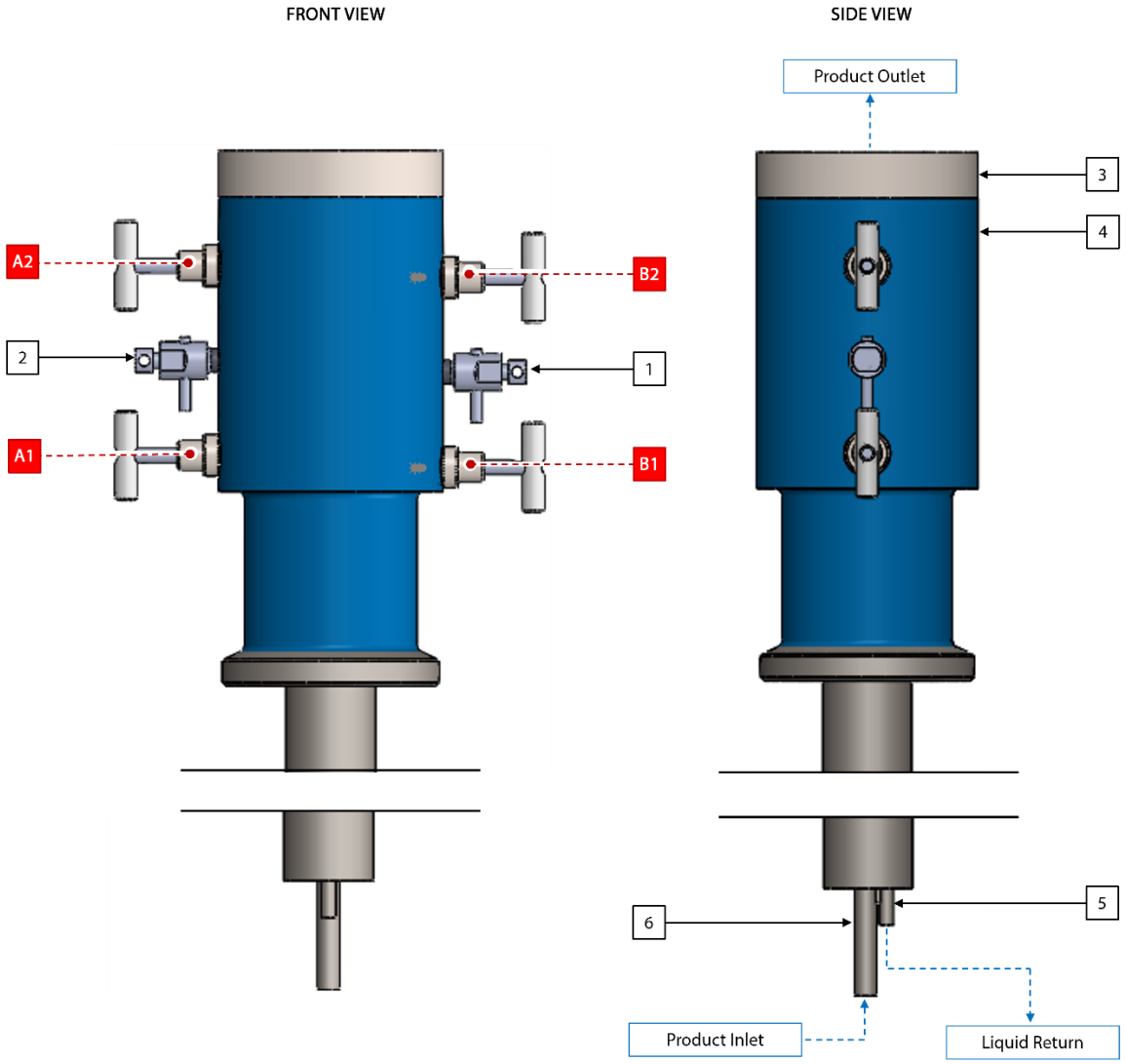
Welker® drawings and schematics suggested for reference or for use with this unit:

- Assembly Drawing: AD691BG.C.S (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: AD691CF.D5 (With Double Block and Bleed Valves)
- Assembly Drawing: AD691CG.1 (With x-Wave™ Probe Tip)

APPENDIX B: LE-2SSKO WITH DOUBLE BLOCK & BLEED VALVES

B1.1 System Diagram

Figure B1: LE-2SSKO With Double Block and Bleed Valves



No.	Description
1	Bleed Valve, Product Return
2	Bleed Valve, Product Inlet
3	Top Cap
4	Body
5	Stinger
6	Probe
7	Cap Screw (Qty = 8)
A1	First Inlet (P_1) Valve
A2	Second Inlet (P_1) Valve
B1	First Return (P_2) Valve
B2	Second Return (P_2) Valve

B1.2 Installation & Operation

The pipeline MUST BE depressurized prior to installing or removing the unit.

1. Ensure that the pipeline is depressurized.
2. Ensure that all valves are closed (*Figure B1*).
3. Ensure that all cap screws on the top cap are tightened (*Figure B1*).
4. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape. When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.
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 B1*).

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 B1*).
7. Pressurize the pipeline.
8. Open inlet (P_1) valves A1 and A2 and return (P_2) valves B1 and B2 (*Figure B1*). Check for leaks at the pipeline and tubing connections and repair or replace as necessary.
9. The LE-2SSKO is now operational.
10. If liquids are present at the product outlet, maintenance is required. See *Section B1.3, Maintenance,* for instructions on performing maintenance on the LE-2SSKO with Double Block and Bleed Valves.

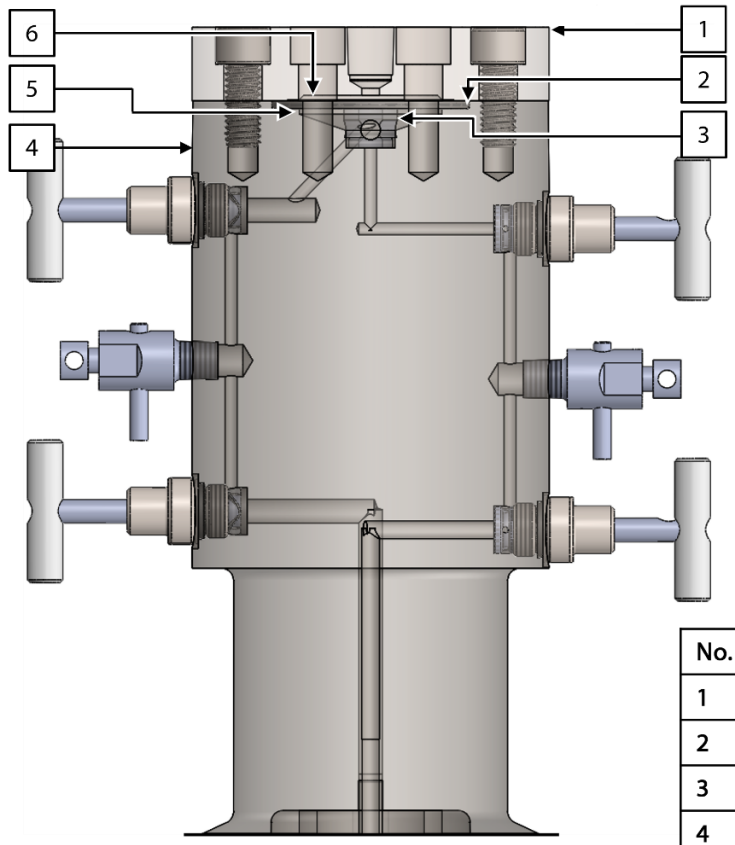
B1.3 Maintenance

If maintenance on any of the valves, the probe, the stinger, or the 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 ALWAYS BE isolated from pipeline pressure.
However, if you do not need to perform maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip, the LE-2SSKO does NOT need to be removed from the pipeline to remove and change the filter cartridge.

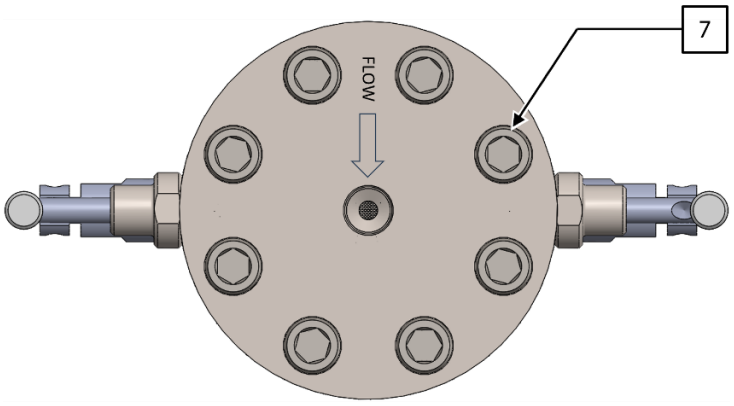
1. Close inlet (P_1) valve A1 and return (P_2) valve B1 (*Figure B1*).
2. Open both bleed valves to relieve pressure in the LE-2SSKO body (*Figure B1*).
3. Close both bleed valves, and then close inlet (P_1) valve A2 and return (P_2) valve B2 (*Figure B1*).
4. Disconnect all tubing from the LE-2SSKO.

Figure B2: LE-2SSKO With Double Block and Bleed Valves Maintenance Diagram



No.	Description
1	Top Cap
2	O-Ring
3	Thread Insert
4	Body
5	Copolymer Filter Element
6	Screen
7	Cap Screw (Qty = 8)

TOP VIEW



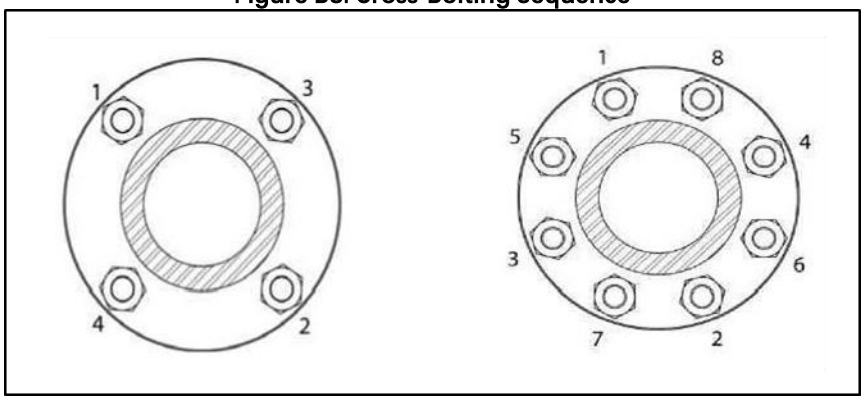
5. Loosen the cap screws, and then remove the top cap.
6. Remove the screen.
7. Remove the O-ring from the body.
8. Remove the copolymer filter cartridge.
9. Using a solvent, clean the screen and inside of the LE-2SSKO body.

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.

10. Put in a new copolymer filter cartridge.
11. Put in another O-ring.
12. Return the cleaned screen to the top of the copolymer filter cartridge.
13. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure B3*).

Be sure to orient the top cap flow arrow correctly to ensure the stinger will be located downstream of product flow (*Figure B2*).

Figure B3: Cross-Bolting Sequence



14. As necessary, tighten all cap screws to the correct torque (*Table B1*).

Table B1: Torque Specifications for Cap Screws

Cap Screw Diameter & Threads per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
¼-20	80	8
⅜-16	250	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 B1.2, Installation & Operation,* for instructions on installing the unit to the pipeline and/or returning the unit to operation.

During reinstallation check valves and tubing connections for leaks and repair or replace as necessary.

APPENDIX C: LE-2SSKO WITH ALS-1

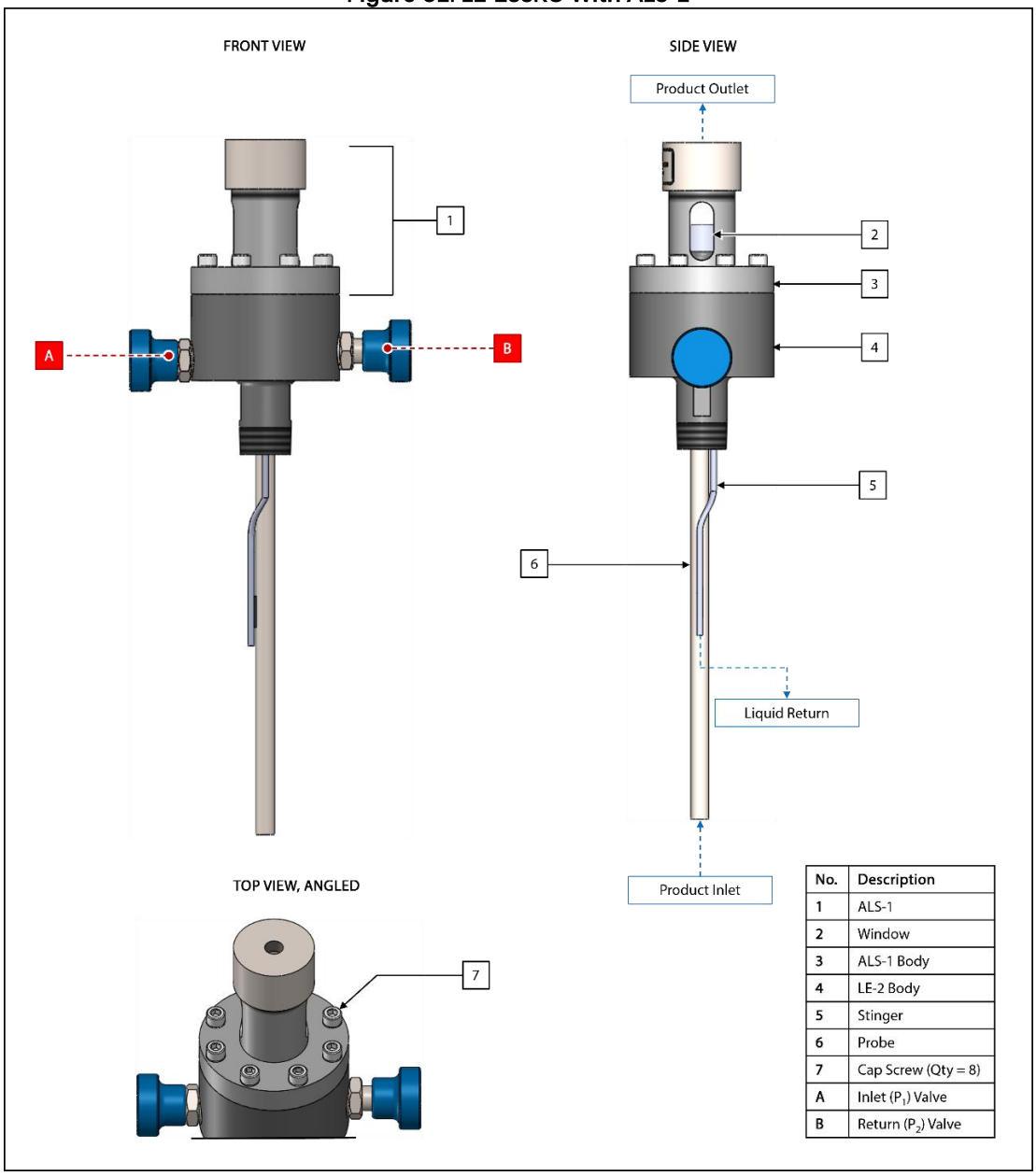
C1.1 Specifications

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 C1: LE-2SSKO With ALS-1 Specifications	
Materials of Construction	316/316L Stainless Steel, Aluminum, Glass, LEXAN™, PTFE, FKM
Maximum Allowable Operating Pressure	1000 psig @ -20 °F to 120 °F (*68 barg @ -28 °C to 48 °C*)

C1.2 System Diagram

Figure C1: LE-2SSKO With ALS-1



No.	Description
1	ALS-1
2	Window
3	ALS-1 Body
4	LE-2 Body
5	Stinger
6	Probe
7	Cap Screw (Qty = 8)
A	Inlet (P_1) Valve
B	Return (P_2) Valve

C1.3 Maintenance

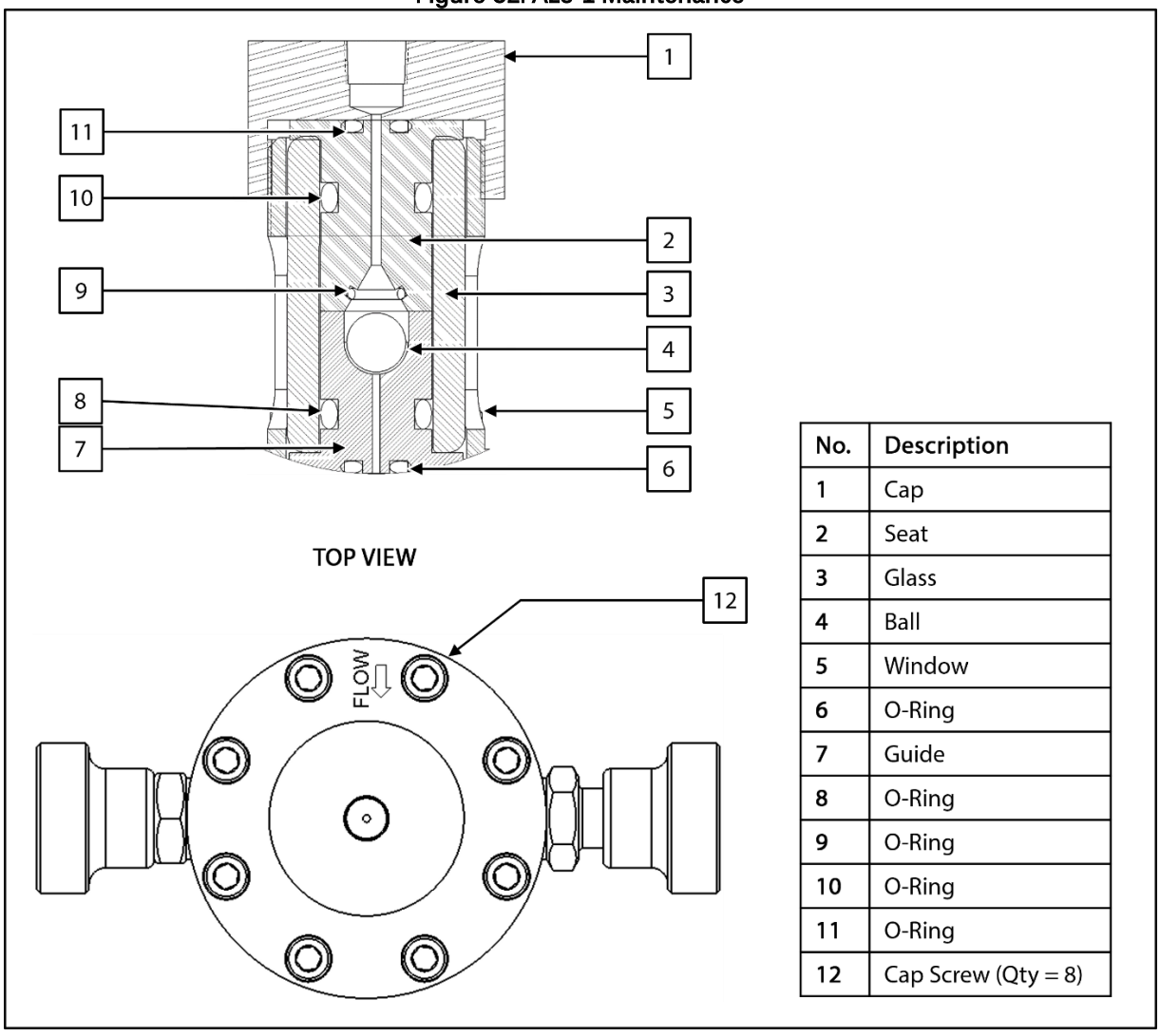
If maintenance on any of the valves, the probe, the stinger, or the optional x-Wave™ Probe Tip is required, the LE-2SSKO MUST BE isolated from pipeline pressure AND removed from the pipeline BEFORE maintenance can be safely performed.

Prior to performing maintenance, the LE-2SSKO MUST ALWAYS BE isolated from pipeline pressure.
However, if you do not need to perform maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip, the LE-2SSKO does NOT need to be removed from the pipeline to remove and change the filter cartridge.

1. Be sure to depressurize the pipeline.
2. Close inlet (P_1) valve A and return (P_2) valve B (*Figure C1*).
3. Disconnect all tubing from the LE-2SSKO.

ALS-1

Figure C2: ALS-1 Maintenance



No.	Description
1	Cap
2	Seat
3	Glass
4	Ball
5	Window
6	O-Ring
7	Guide
8	O-Ring
9	O-Ring
10	O-Ring
11	O-Ring
12	Cap Screw (Qty = 8)

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

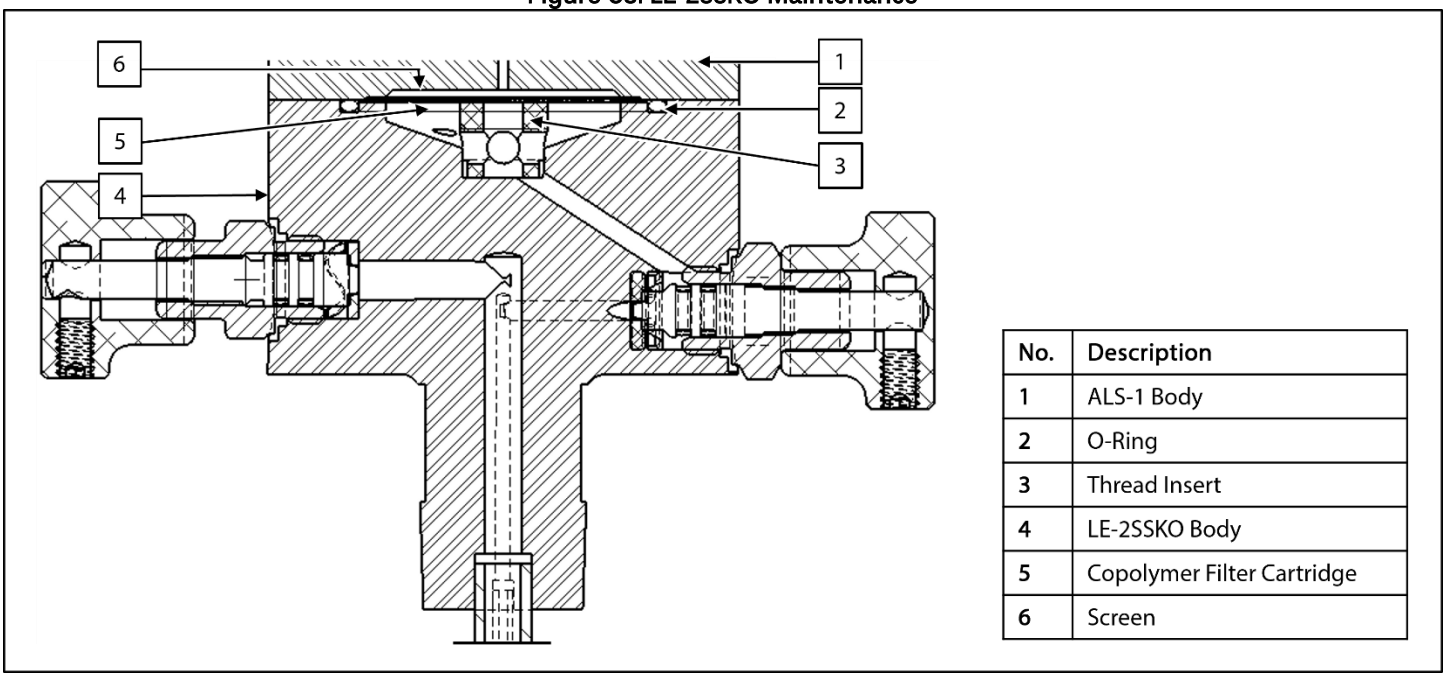
DO NOT lubricate the O-ring the ball seals on (*Figure C2, #10*).

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

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

Liquid Eliminator

Figure C3: LE-2SSKO Maintenance



No.	Description
1	ALS-1 Body
2	O-Ring
3	Thread Insert
4	LE-2SSKO Body
5	Copolymer Filter Cartridge
6	Screen

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

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.

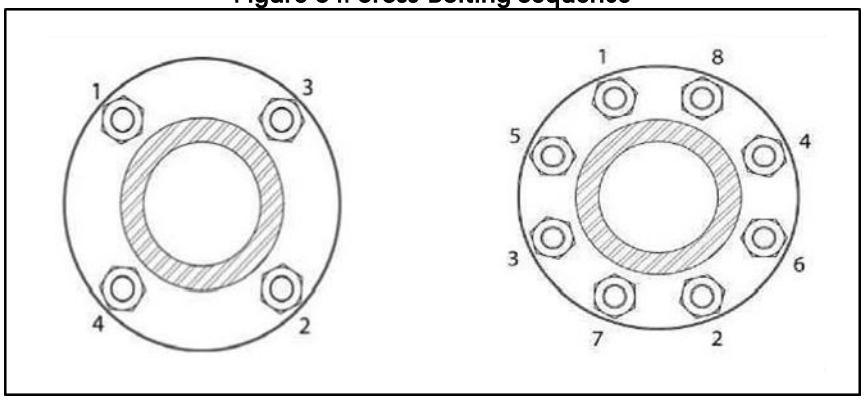
19. Put in a new copolymer filter cartridge.
20. Put in a new O-ring.
21. Return the cleaned screen to the top of the copolymer filter cartridge.

Reassembly

22. Align the ALS-1 with the LE-2SSKO body, and then reinstall the cap screws following a cross-bolting sequence (*Figure C4*).

> Be sure to orient the top cap flow arrow correctly to ensure the stinger will be located downstream of product flow (*Figure C2*).

Figure C4: Cross-Bolting Sequence



23. As necessary, tighten all cap screws to the correct torque (*Table C2*).

Table C2: Torque Specifications for Cap Screws

Cap Screw Diameter & Threads per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
¼-20	80	8
⅜-16	250	27

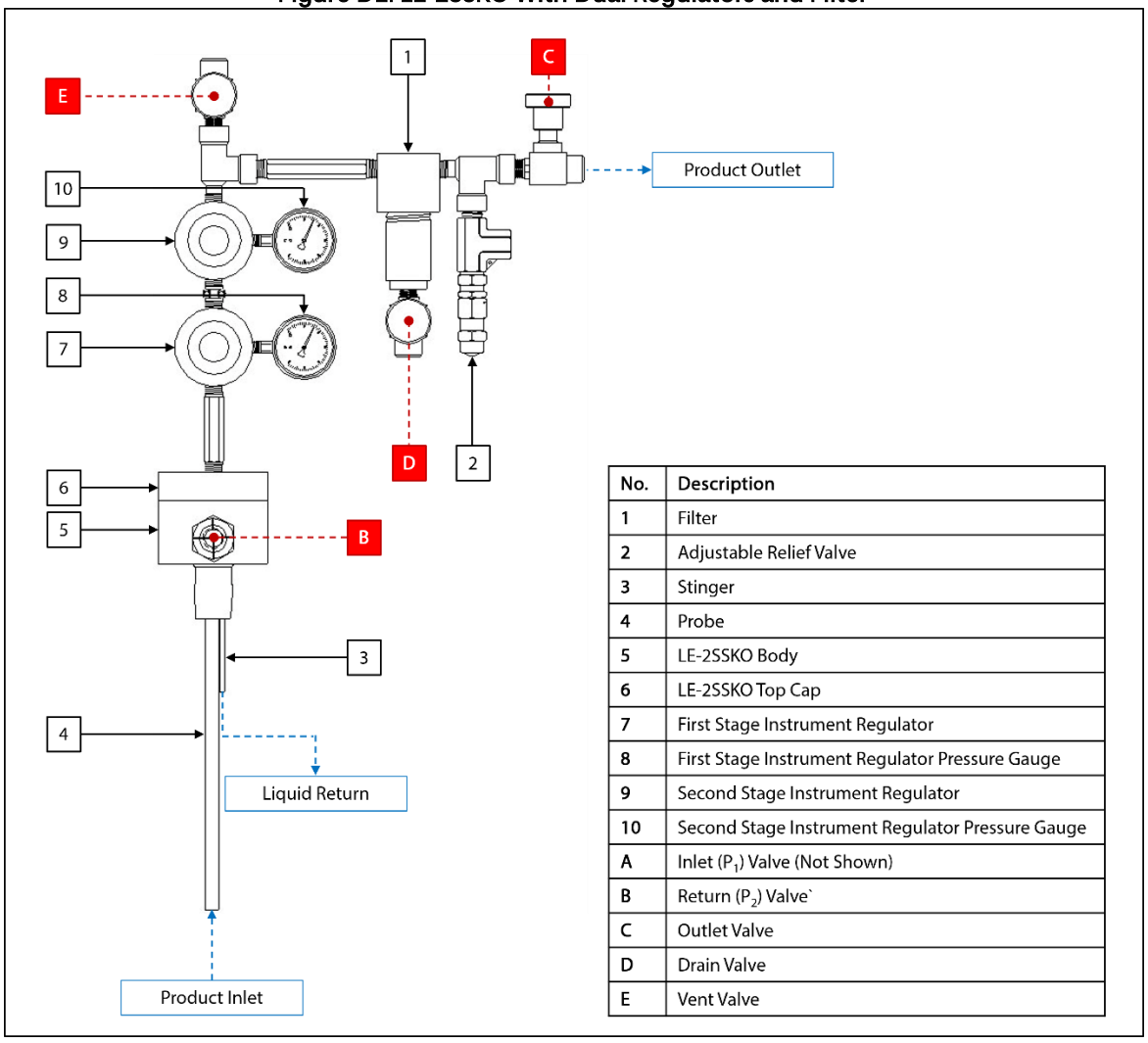
24. If maintenance on the valves is necessary, remove the LE-2SSKO from the pipeline, and then refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the Welker® NV-1 and NV-2 Instrument Valves for instructions on maintaining the valves.
25. The LE-2SSKO is now ready to be reinstalled 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 and tubing connections for leaks and repair or replace as necessary.

APPENDIX D: LE-2SSKO WITH REGULATOR(S) & FILTER

D1.1 System Diagram

Figure D1: LE-2SSKO With Dual Regulators and Filter



No.	Description
1	Filter
2	Adjustable Relief Valve
3	Stinger
4	Probe
5	LE-2SSKO Body
6	LE-2SSKO Top Cap
7	First Stage Instrument Regulator
8	First Stage Instrument Regulator Pressure Gauge
9	Second Stage Instrument Regulator
10	Second Stage Instrument Regulator Pressure Gauge
A	Inlet (P_1) Valve (Not Shown)
B	Return (P_2) Valve`
C	Outlet Valve
D	Drain Valve
E	Vent Valve

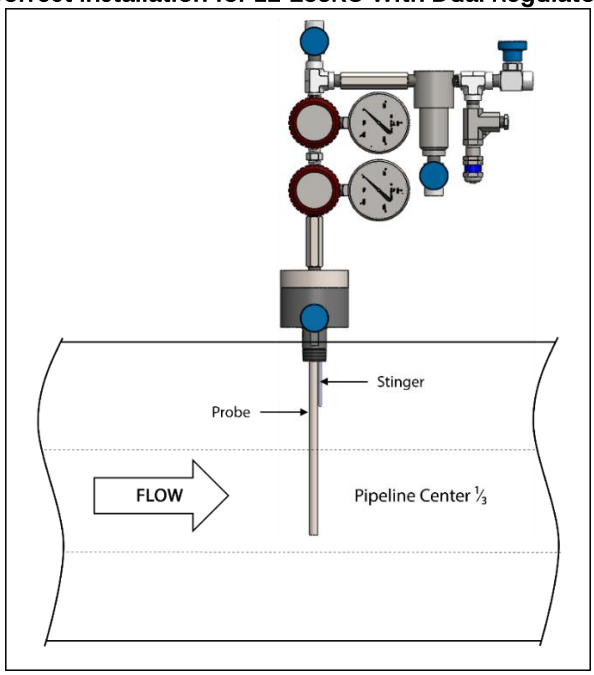
D1.2 Installation & Operation

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

1. Ensure that the pipeline is depressurized.
2. Ensure that all valves are closed (*Figure D1*).
3. Ensure that all cap screws on the top cap are tightened (*Figure D1*).
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 D2*).

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 D2: Correct Installation for LE-2SSKO With Dual Regulators and Filter



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 D1*).
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 D1*). 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 D1.3, Maintenance,* for instructions on performing maintenance on the LE-2SSKO.

Determine how quickly free liquids accumulate in the filter by frequently opening drain valve D (*Figure D1*).
During operation, routinely open drain valve D to allow moisture to drain from the filter.

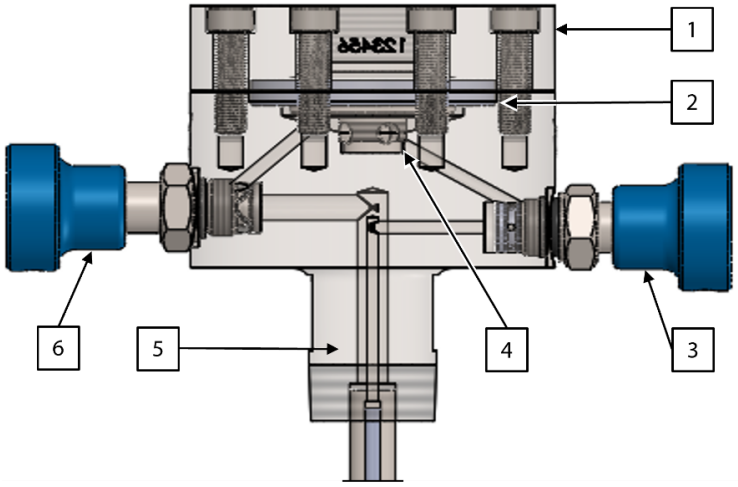
D1.3 Maintenance

If maintenance on any of the valves, the probe, the stinger, or the 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 ALWAYS BE isolated from pipeline pressure.
However, if you do not need to perform maintenance on the valves, probe, stinger, or optional x-Wave™ Probe Tip, the LE-2SSKO does NOT need to be removed from the pipeline to remove and change the filter cartridge.

1. Ensure that the pipeline is depressurized.
2. Close all valves.
3. Disconnect all tubing from the LE-2SSKO.

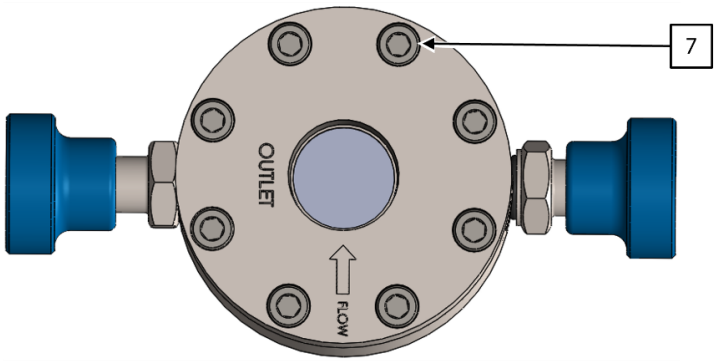
Figure D3: Maintenance Diagram



No.	Description
1	LE Cap
2	LE Cartridge
3	Valve Kit, NV-1
4	Thread Insert

No.	Description
5	Body/Probe Subassembly
6	Valve Kit, NV-2
7	Cap Screw (Qty = 8)

TOP VIEW



4. Disconnect the instrument regulator(s) and filter assembly from the LE-2SSKO (*Figure D1*).
5. Loosen the cap screws, and then remove the top cap.

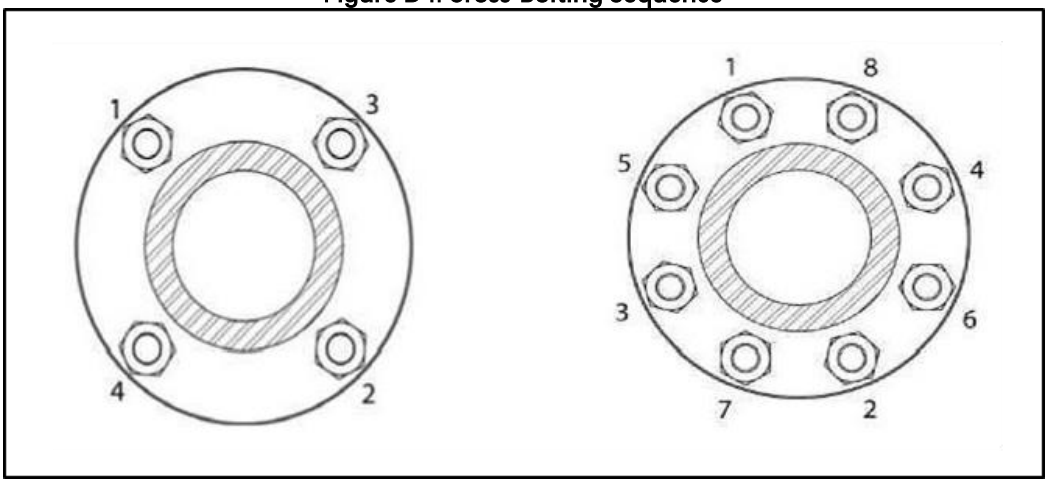
6. Remove the LE cartridge (*Figure D3*).
7. Using a solvent, clean the inside of the LE-2SSKO body.

> 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. Replace the LE cartridge.
9. Align the top cap with the body, and then reinstall the cap screws following a cross-bolting sequence (*Figure D4*).

> Be sure to orient the top cap flow arrow correctly to ensure the stinger will be located downstream of product flow (*Figure D3*).

Figure D4: Cross-Bolting Sequence



10. As necessary, tighten all cap screws to the correct torque (*Table D1*).

Table D1: Torque Specifications for Cap Screws

Cap Screw Diameter & Threads per Inch	Inch-Pounds (in·lb)	Newton Meter (N m)
¼-20	78	8
⅜-16	247	27

11. 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).
12. To perform maintenance on the filter, refer to the appropriate *Installation, Operation, and Maintenance* (IOM) *Manual* for instructions on maintaining the filter.
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. Reconnect the instrument regulator(s) and filter assembly to the LE-2SSKO.
15. The LE-2SSKO is now ready to be reinstalled to the pipeline and/or returned to operation. See *Section D2.2, Installation & Operation,* for instructions on installing the unit to the pipeline and/or returning the unit to operation.

> During reinstallation check valves and tubing connections for leaks and repair or replace as necessary.

APPENDIX E: LE-2SSKO WITH x-Wave™ PROBE TIP

E1.1 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.

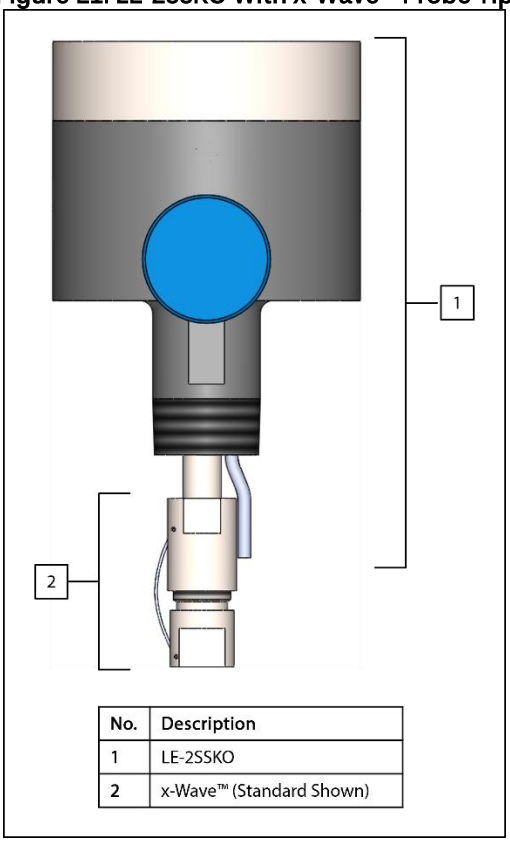
E1.2 Specifications

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 E1: x-Wave™ Probe Tip Specifications	
Materials of Construction	316 Stainless Steel, 316/316L Stainless Steel, Polypropylene, PTFE, FKM Others Available

E1.3 System Diagram

Figure E1: LE-2SSKO With x-Wave™ Probe Tip



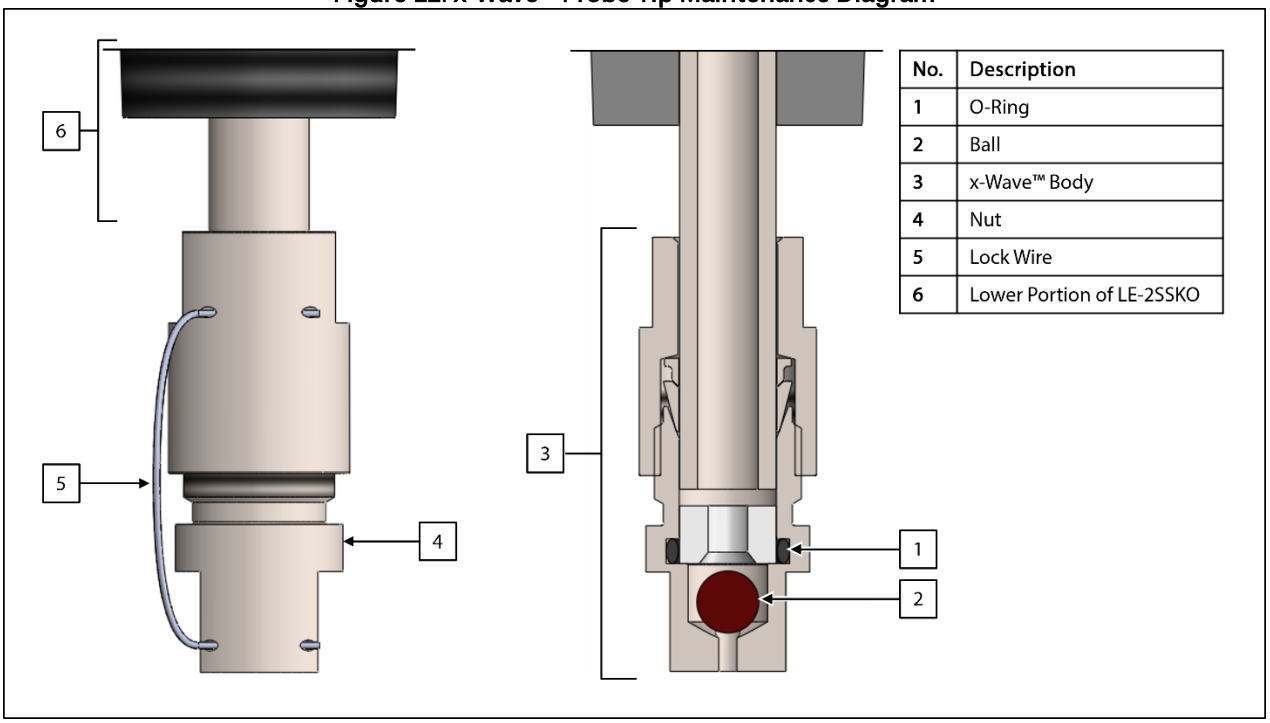
No.	Description
1	LE-2SSKO
2	x-Wave™ (Standard Shown)

E1.4 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. Ensure that the pipeline is depressurized.
2. Close inlet (P_1) valve A and return (P_2) valve B (*Figure 1*).
3. Disconnect all tubing from the LE-2SSKO.
4. Remove the LE-2SSKO from the pipeline.

Figure E2: x-Wave™ Probe Tip Maintenance Diagram



No.	Description
1	O-Ring
2	Ball
3	x-Wave™ Body
4	Nut
5	Lock Wire
6	Lower Portion of LE-2SSKO

5. Cut the lock wire on the x-Wave™ Probe Tip (*Figure E2*).
6. Unscrew the body from the nut, taking care not to misplace the ball, which will be removed with the body (*Figure E2*).
7. Replace the O-ring (*Figure E2*) on the body.
8. Screw the body—with the ball in place—into the nut.
9. Holding the body steady, tighten the nut using a wrench.
10. Connect a lock wire from the nut to the body (*Figure E2*).

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.

11. To continue maintenance on the LE-2SSKO, refer to *Section 3.2, Maintenance,* in this *Installation, Operation, and Maintenance* (IOM) *Manual* for instructions on maintaining the LE-2SSKO.
12. To install the LE-2SSKO with optional x-Wave™ Probe Tip after maintenance is complete, refer to *Section 2.2, Installation & Operation,* in this *Installation, Operation, and Maintenance* (IOM) *Manual* for instructions on installing the unit to the pipeline.
13. During reinstallation check the valves and tubing connections and repair or replace as necessary.

NOTES

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