



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® SAMPLE CONDITIONING HEATED SYSTEM

MODEL
SCHS3

DRAWING NUMBER
CD946AA

MANUAL NUMBER
IOM-252

REVISION
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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 personal injury if not observed.

This manual is intended to be used as a basic installation and operation guide for the Welker® Sample Conditioning Heated System, Model SCHS3. 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 to 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 Sample Conditioning Heated System is of a mechanical and electrical 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 Sample Conditioning Heated System, 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® *Model SCHS3* Sample Conditioning Heated Systems is designed to prepare gas samples for a downstream analyzer by removing free liquids and then heating and regulating the sample stream.

Pipeline product enters the system through the Welker® LE-3SSKO Probe Mounted Liquid Eliminator. The gas stream passes through the LE-3SSKO to the dual-stage Heated Instrument Regulators where liquids are separated from the sample stream by a liquid coalescer and a filter element. Gravity then returns the separated liquids to the pipeline through the Pitot probe's return slot (i.e., stinger).

The dual-stage regulator components heat the gas prior to decreasing the pressure to compensate for the cooling brought on by the Joule-Thomson effect and to prevent changes in gas composition (i.e., to prevent phase changes).

After being conditioned, the gas must pass through the Welker® ALS-1 Analyzer Liquid Shutoff, the system's final line of analyzer defense. Gas flows freely through the ALS-1, but if liquid is present, the internal floating ball will seal, shutting off product flow to the analyzer.



For this manual, the term "Programmable Logic Controller" (PLC) will refer to the PLC, DCS, or other signal control used by the customer.

Welker® might custom design the SCHS3 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 might vary depending on the customization of your equipment.**

Table 1: Welker® SCHS-3 Sample Conditioning Heated System Specifications	
Products Sampled	Lean, Rich, Wet, Low- and High-Pressure Gases
Materials of Construction	316/316L Stainless Steel, FKM Seals, Glass, PTFE, Teflon®
Maximum Allowable Inlet Operating Pressure	3600 psig @ -50 °F to 120 °F (248 barg @ -45 °C to 48 °C)
Outlet Pressure Range	0–200 psig (0 barg–13.8 barg)
Temperature Range	Ambient: -50 °F to 120 °F (-45 °C to 48 °C) Process: 32 °F to 300 °F (0 °C to 148 °C)
Maximum Allowable Outlet Flow Rate	LE-3SSKO: 2000 cc/min @ 25 psig Inlet (Results in Approximately 2 psid on Membrane)
Power	Heater: AC 120/220 V – Self-Limiting, 80-Watt
Connections	1" MNPT Pipeline Connection – Others Available 1/8" Sample Outlet / Customer Connection
Spring (i.e., Output) Range	0–50 psig (0–3.4 barg) 0–100 psig (0–6.9 barg) 0–200 psig (0–13.8 barg)
Insertion Length	6" (Standard) Others Available
Electrical Connections	1/2" FNPT Heater Connection, 80 W @ 120/200 VAC
Volume	Flow Coefficient: 0.001 C _v
Nominal Filter Rating	LE-3SSKO: Nominal 25-Micron Internodal Distance
Filter Media	LE-3SSKO: Copolymer Filter Cartridge
Operation	Piston-Operated
Weight	Approx. 20 lbs
Dimensions	9" x 9" x 14 1/2" + "X" (Length x Width x Height)
Features	Insulated Enclosure Welker® LE-3SSKO Liquid Eliminator Knock-Out With Heated Regulators and Integrated Isolation and Drain Valves Integrated Pitot Type Sample Probe Pre-Set Relief 2 Welker® Dual-Stage Heated Instrument Regulators Sample Outlet Pressure Indicator (psig) Sample Outlet Temperature Indicator (°F) ALS Analyzer Liquid Shutoff Required Downstream
Industry Standards / Product Certifications / Patent	CSA/FM/UL U.S. Patents 6,764,536 and 7,471,882
Electrical Area Classification	Heater: NEC Class I, Division 1, Groups C & D, T3

1.4 Equipment Diagrams

Figure 1: Welker® SCHS-3 Sample Conditioning Heated System General Arrangement Diagram

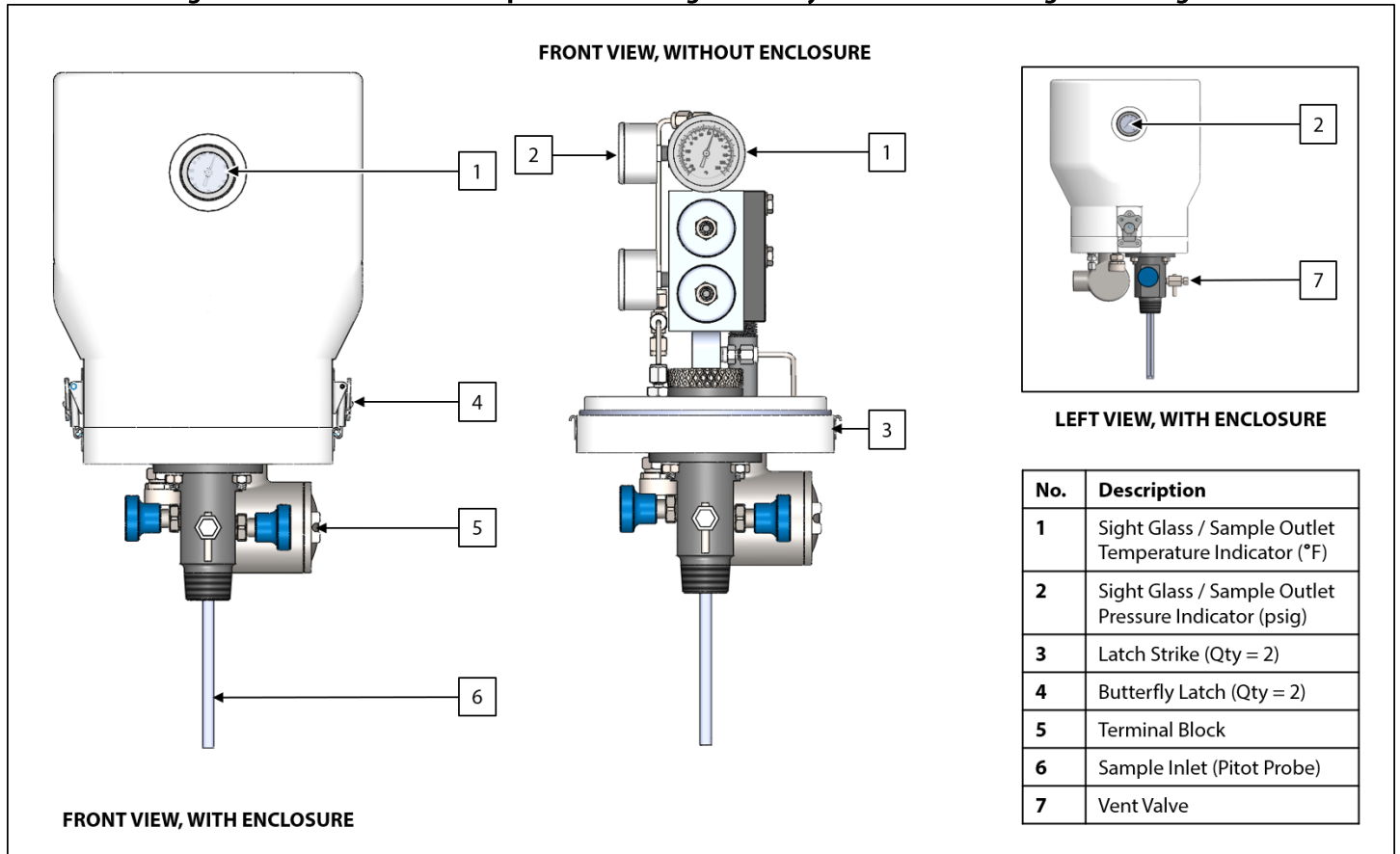


Figure 2: Welker® SCHS-3 Sample Conditioning Heated System Connections Diagram

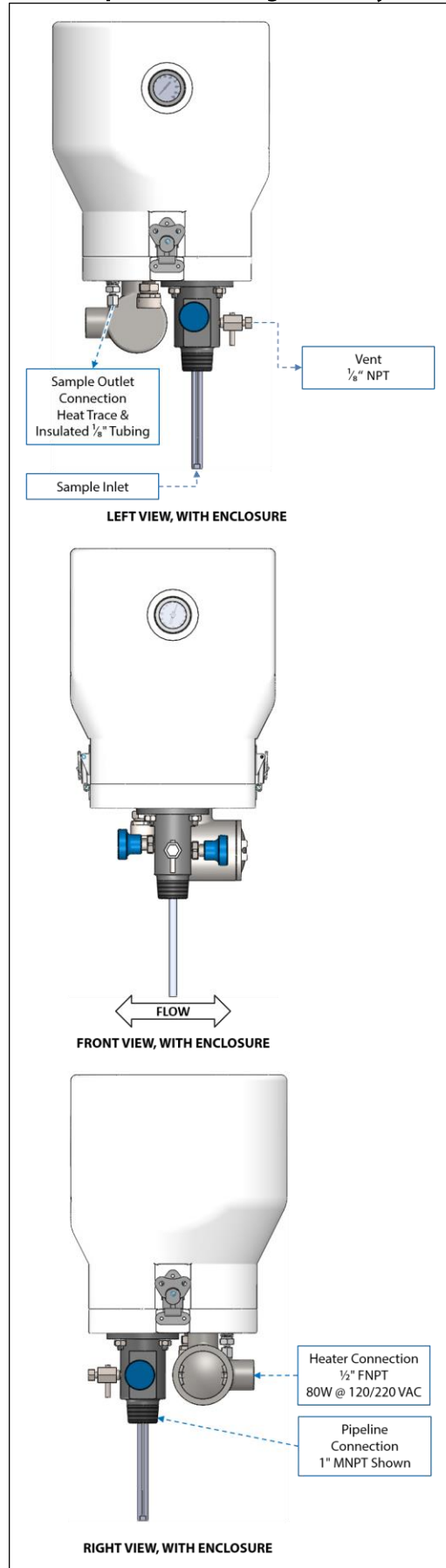


Figure 3: Welker® SCHS-3 Sample Conditioning Heated System Diagram (With Valves)

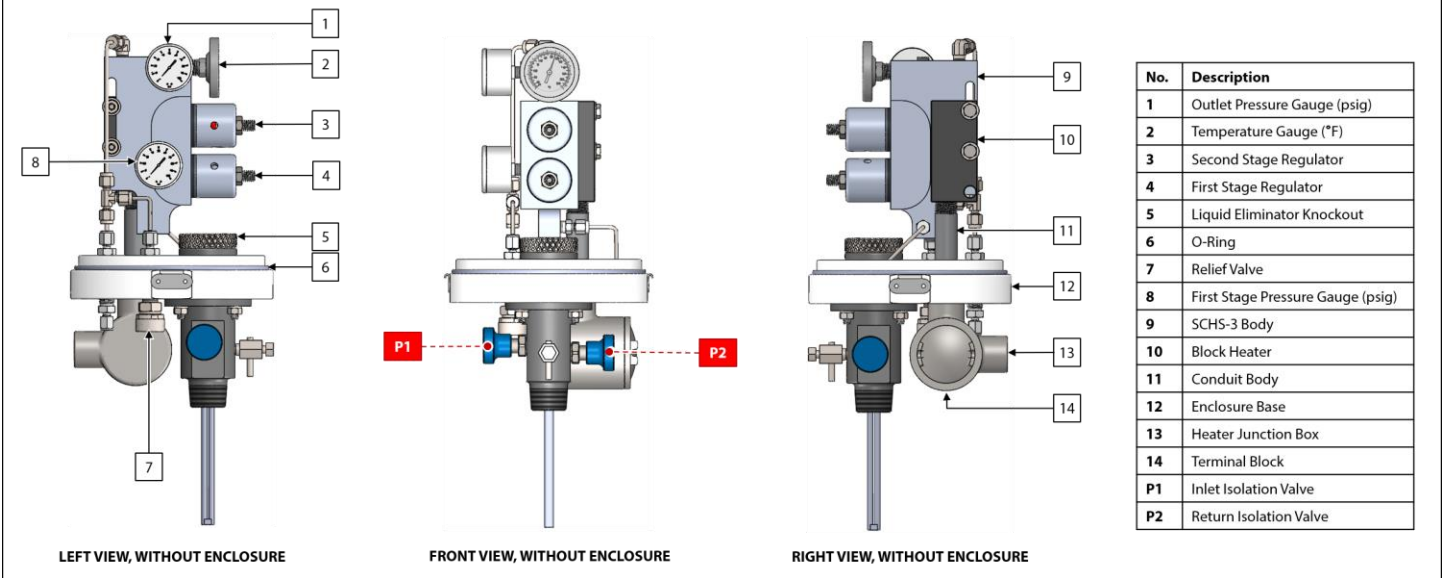
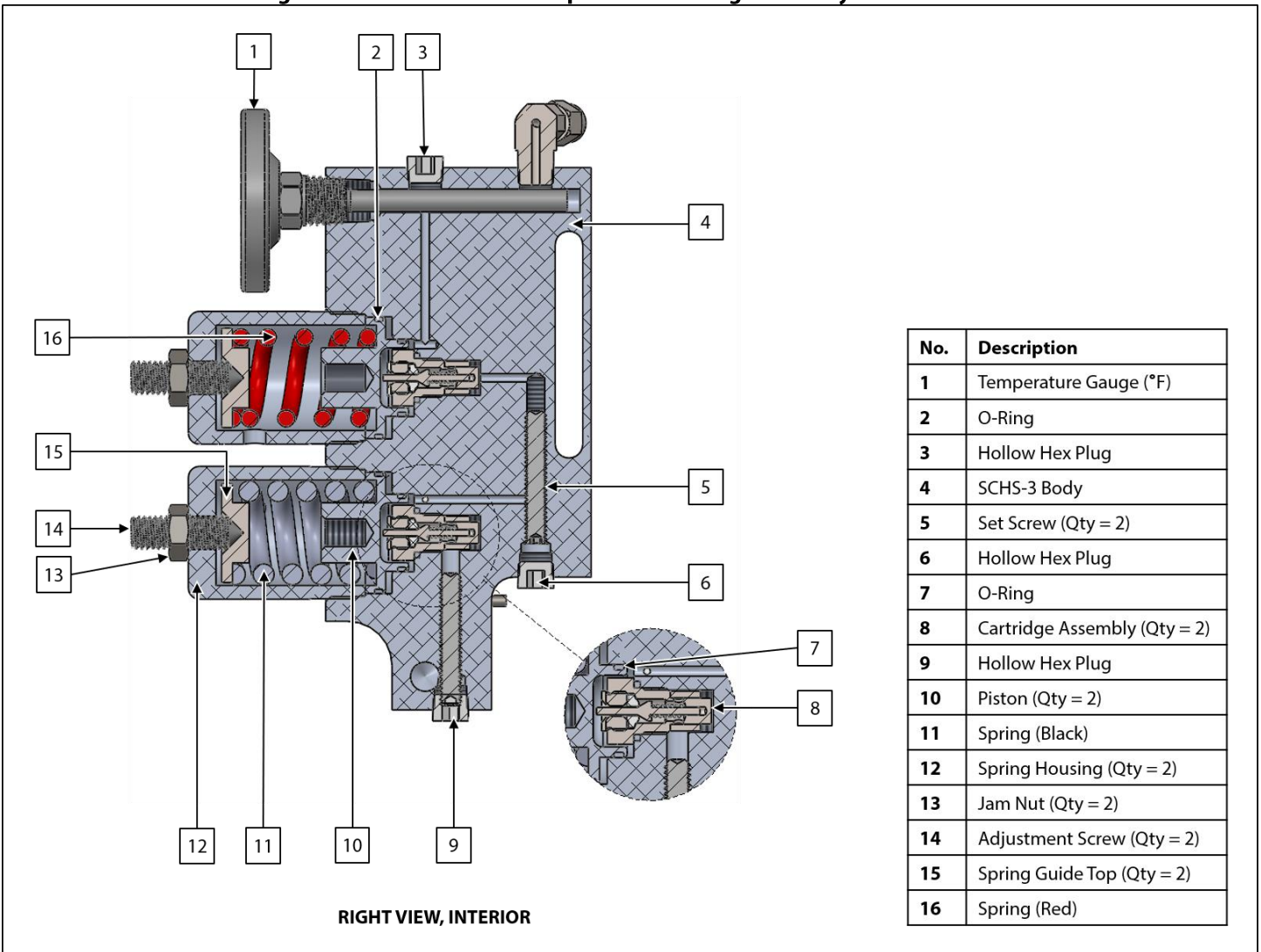


Figure 4: Welker® SCHS-3 Sample Conditioning Heated System – Interior



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin



After unpacking the unit, check the equipment for compliance and any damage that might 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 and Operation

1. Undo the enclosure butterfly latches and open the enclosure (see *Figure 1*).
2. Carefully remove the enclosure from the SCHS-3.

Preparing for Installation



Welker® recommends that the probe 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. 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).

Installing the SCHS-3

1. Depressurize the pipeline.



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

2. Ensure that all valves on the SCHS-3 are closed.
3. As necessary, wrap the threads of the threaded pipeline connection with PTFE tape.
4. Install the SCHS-3 to the pipeline so that the flow direction indicator matches the direction of product flow (see *Figure 2*).
5. Pressurize the pipeline. Check for leaks and repair as necessary.

System Connections

1. With the enclosure removed, using customer-supplied heated and/or insulated 1/8" tubing, connect from the sample outlet connection (*Figure 2*) to the ALS Analyzer inlet.



Welker® recommends that this tubing be insulated and heat-traced so the sample maintains its temperature increase prior to reaching the analyzer.

2. With the customer-supplied electrical power turned OFF, connect the AC 120/220 V leads to terminals 1(H)(H₁) and 2(N)(H₂) and 3(G) in the provided electrical housing (terminal block in *Figure 3*).



If wired incorrectly, the block heater will be damaged and will need to be replaced.

Start-Up Procedures

1. Turn ON the 120/220 V electrical power to the heater to begin operation.
2. The system's target temperature is set within the block heater at the manufacturer. Allow at least thirty (30) minutes for both heated instrument regulators to warm up.
3. Open inlet valve P1 and return valve P2 (*Figure 3*).
4. Screw the adjustment screw on both heated instrument regulators clockwise to adjust the outlet pressure (*Figure 4*). Tighten the jam nuts once the desired outlet pressures have been set.



The first- and second-stage regulators should be set by the manufacturer according to the operating pressure provided by the customer. If the regulators require adjustment, see *Table 2* for guidelines.

Table 2: Welker® SCHS-3 Sample Conditioning Heated System Regulator Settings

>1000 psig	600 psig	To Customer Specifications 5–200 psig
500–1000 psig	350 psig	
250–500 psig	150 psig	
50–250 psig	25 psig	
Inlet Pressure	First Stage	Second Stage

5. Set the relief valve (*Figure 3*). Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for instructions on setting the relief. The relief valve can be set by the manufacturer to customer specifications.
6. Purge the line to the analyzer in accordance with company policy.
7. Reattach the enclosure, securing it using the two butterfly latches (*Figure 1*).
8. Monitor the temperature on the temperature gauge that is visible through the sight glass on the enclosure exterior (*Figure 1*). Once the outlet temperature gauge indicates between 150 °F and 250 °F, the SCHS-3 is operational.

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.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that might lead to excess wear on the unit, a more frequent maintenance schedule might 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 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 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.



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. 6" Adjustable Wrench
 - b. Multimeter
 - c. Seal Pick
 - d. Small Hex Key ($\frac{3}{16}$ ")
 - e. $\frac{5}{8}$ " Socket Wrench
 - f. $\frac{1}{4}$ " Rod

3.2 Maintenance Instructions

1. Turn OFF all electrical power to the unit.



The heated regulators will be HOT after use. Allow approximately thirty (30) minutes for the regulators to cool down prior to performing maintenance.

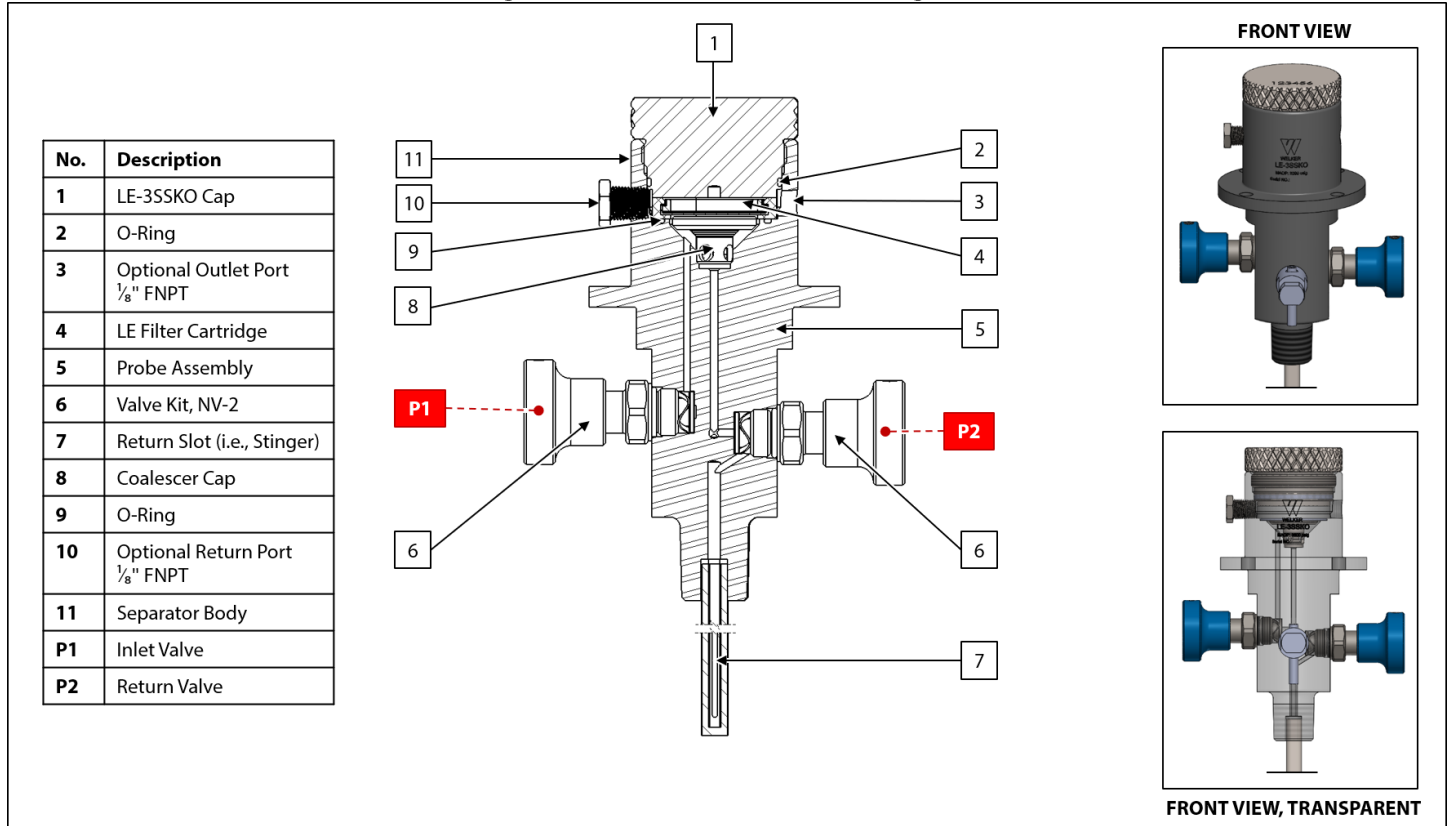
2. Undo the enclosure butterfly latches and open the enclosure lid (*Figure 1*).
3. Carefully remove the enclosure from the SCHS-3.
4. Close inlet valve P1 and return valve P2 (*Figure 3*).



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.

Standard Filter and Coalescer Maintenance: LE-3SSKO

Figure 5: LE-3SSKO Maintenance Diagram



If maintenance on the valves or probe tube 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. Ensure that inlet valve P1 and return valve P2 are closed.
2. Unscrew the LE-3SSKO cap and remove it from the separator body (*Figure 5*).
3. Remove the LE filter cartridge assembly from the separator body (*Figure 5*).
4. Remove the coalescer cap (*Figure 5*).
5. Remove the O-rings (*Figure 5*).
6. Verify that all openings are clear. Hold a clean rag over the opening in the body, and then open inlet valve P1 and return valve P2. If the return is clear, the rag will remain clean. If opening the valves cleared the return, the rag will be dirty. After verifying that all openings are clear, close inlet valve P1 and return valve P2.
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 all O-rings as required.
9. Install and tighten the coalescer cap (*Figure 5*).
10. Install a replacement LE coalescer cartridge to the separator body (*Figure 5*).
11. Align the top cap with the separator body and then screw in the top cap (*Figure 5*).



When adding and removing the top cap from the separator body, HAND-TIGHTEN ONLY. Ensure the top cap is flush with the separator body.

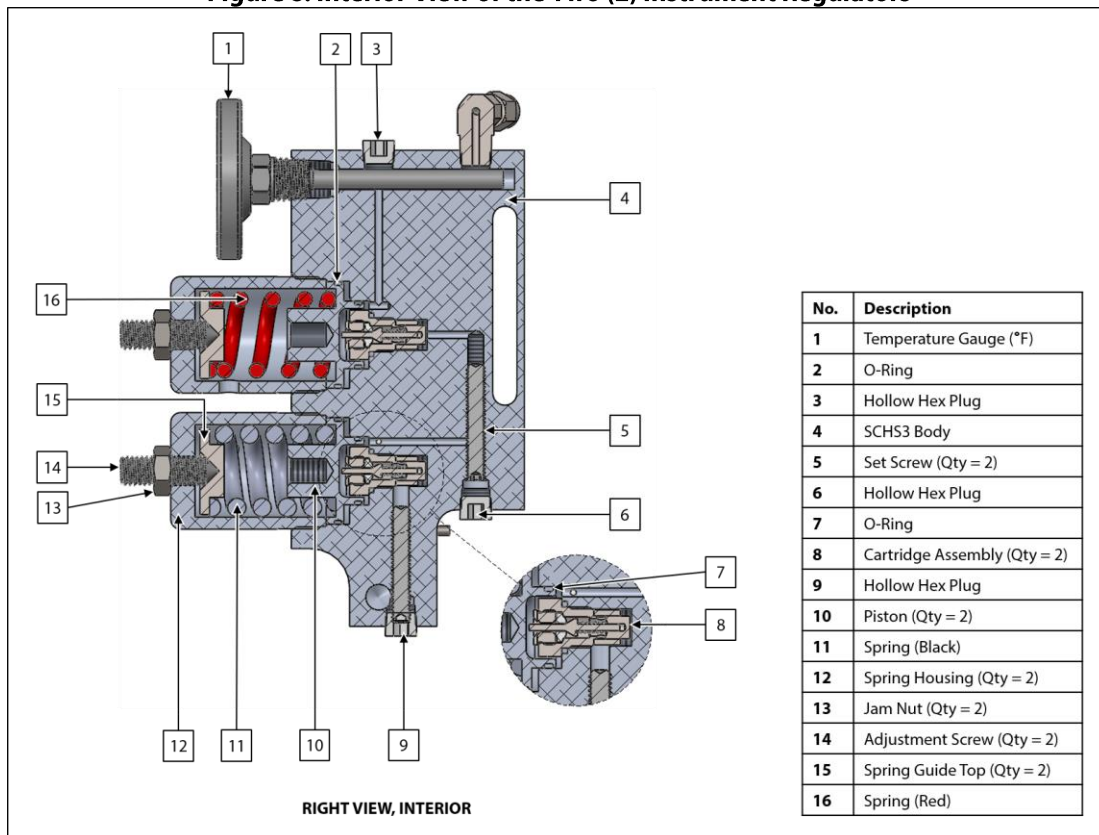
12. If further maintenance on the LE-3SSKO is required—such as replacement of the cartridge assembly filter—refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the LE-3SSKO.
13. If maintenance on the valves is necessary, remove the LE-3SSKO from the pipeline, and then refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the Welker NV-2 Instrument Valve for instructions on maintaining the valves.
14. The LE-3SSKO is now ready to be reinstalled to the pipeline and/or returned to operation. See *Section 2.2, Installation and Operation*, for instructions on installing the unit to the pipeline and/or returning the unit to operation.



Check valves for leaks and repair as necessary during reinstallation.

Instrument Regulator Maintenance

Figure 6: Interior View of the Two (2) Instrument Regulators



1. Loosen the jam nut on the adjustment screw.
2. Turning in a counterclockwise direction, back off the adjustment screw to relieve tension on the spring.
3. Separate the spring housing from the regulator body (*Figure 6*) using a ¼" rod if necessary.
4. Remove the spring guide and spring (*Figure 6*).
5. Remove the piston assembly (*Figure 6*) using the adjustment screw and jam nut.
6. Inspect the piston assembly for wear. Replace the O-ring as necessary.
7. With a 5/8" socket wrench, remove and replace the cartridge assembly with O-ring included.
8. Place the piston assembly on top of the regulator body with the bottom spring guide facing up.



Make sure all O-rings and grooves are lubricated before installing the piston.

9. Place the spring on the piston assembly. Ensure that the spring is sitting on the bottom spring guide.
10. Return the spring guide to the top of the spring.
11. Install the spring housing to the regulator body.



When reassembling the spring housing, HAND-TIGHTEN ONLY.

12. Repeat steps 1 through 11 for the other regulator.

Maintenance: ALS-1 Liquid Shutoff

1. As necessary, perform maintenance on the relief valve (see No. 7 on Figure 3). Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for maintenance instructions.
2. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the ALS-1 (IOM-077) for maintenance instructions.

Reassembly

1. Install the relief valve to the relief port.
2. Install the ALS-1 to the SCHS-3, if included with the unit.
3. Maintenance is now complete.
4. To complete reinstallation and return the SCHS-3 to operation, see *Section 2.2, Installation and Operation*, for instructions.

3.3 Heater Failure



Neither the heater nor the heating element is prone to fail. However, failure is possible in instances of misuse and extreme malfunction of the electrical system.



If the heater fails, replacement is required.



When reassembling the electrical housing, all joints should be thoroughly cleaned and may be lightly lubricated with suitable grease, such as Crouse-Hinds STL Thread Lubricant, to prevent corrosion and assist in weatherproofing. Use only non-metallic scrapers and non-corrosive cleaning fluids to clean flanges. Keep blind holes clear of grease.

Replacing the Heater

1. If the sample outlet temperature indicator shows less than 150 F, replacing the block heater is required.
2. Ensure that all electrical power to the unit has been turned OFF and that the electrical wiring has been disconnected.



The heated regulators will be HOT after use. Allow approximately thirty (30) minutes for the regulators to cool down prior to performing maintenance.



DO NOT open the electrical housing until the surface temperature and any stored energy have decayed to the point that the electrical energy can no longer be a potential ignition source.



Ensure that the heated regulators are isolated from all incoming and outgoing connections (including neutral conductors) prior to opening the electrical housing.

3. Remove the cover from the electrical housing (i.e., terminal block).
4. Disconnect the power supply leads from the terminal block.
5. Disconnect all tubing and remove the SCHS-3 body from the block heater (*Figure 3*).
6. Remove and replace the block heater to the conduit body.
7. Terminate the heater wires to the block heater.
8. Mount the SCHS-3 body to the terminal block so all tubing will fit (*Figure 3*).
9. Connect all tubing, then leak test.

3.4 Troubleshooting Guidelines

Table 3: Welker® SCHS-3 Sample Conditioning Heated System Troubleshooting Guidelines		
Issues	Possible Causes	Solutions
There is an outlet gas temperature drop.	The heater is not on or is not working correctly.	Follow <i>Section 3.3 – Heater Failure</i> . If the heater has indeed failed, contact Welker® for replacement.
There is inadequate outlet flow.	The filter element is dirty, saturated, and/or flooded by liquids.	Replace the LE filter cartridge assembly. See <i>Section 3.2, Maintenance Instructions</i> . Do not exceed the maximum allowable flow rate through the filter element.
	The filter element is damaged and/or flooded by free liquids.	Replace the LE filter cartridge. See <i>Section 3.2, Maintenance Instructions</i> . Do not exceed the maximum allowable flow rate through the filter element.
Liquids are reaching the downstream analyzer.	The maximum allowable flow rate has been exceeded.	See <i>Table 1: Specifications</i> to determine the proper outlet flow rate for the LE-3SSKO.
	The heater is not working to maintain outlet temperature.	Check the sample outlet temperature gauge to ensure it is indicating above 150 °F. Follow <i>Section 3.3 – Heater Failure</i> if the heater is not working correctly. If the heater has indeed failed, contact Welker® for replacement.
	The ALS-1 auto shut-off valve has malfunctioned.	In order to repair or replace the valve, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual (IOM-077)</i> for the ALS-1.
The sample outlet pressure has increased or lowered significantly.	The instrument regulators are leaking.	Replace the cartridge assembly. See <i>Section 3.2 – Maintenance Instructions</i> for instructions regarding cartridge assembly replacement.
	Debris is clogging the SCHS-3 body and probe openings.	Replace the LE filter cartridge. See <i>Section 3.2 – Maintenance Instructions</i> for instructions regarding LE filter cartridge replacement.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-069: Welker® LE-2SSKO Probe Mounted Liquid Eliminator
- IOM-077: Welker® ALS-1 Analyzer Liquid Shutoff
- IOM-078: Welker® HR-4SS Heated Instrument Regulator
- IOM-105: Welker® NV-1 and NV-2 Instrument Valves
- IOM-234: Welker® Relief Valves RV-110A and RV-110V
- IOM-241: Welker® Probe-Mounted Liquid Eliminator Model LE-3SSKO

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

- Ashcroft Inc. BI Series Bi-Metal Thermometers (Welker® IOM-V235)
- Generant Series VRV Vent Relief Valve (Welker® IOM-V175)
- WIKA Bourdon Tube Pressure Gauges Type 232.53 and Type 233.53 (Welker® IOM-V171)

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

- Assembly Drawing: AD946AA (Sample Conditioning Heated System, Fixed Probe, Dual-Stage Regulation)

