



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® SIGHT GLASS

MODEL
SG-3

DRAWING NUMBER(S)
AD036A0
AD037A0
AD037LM

MANUAL NUMBER
IOM-172

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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 of operation guide for the Welker® Sight Glass, SG-3. 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 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 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 Sight Glass unit 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 Sight Glass unit, 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® SG-3 Sight Glass is designed to allow for visual verification of product flow and any of a variety of visually evident product issues. The SG-3 enables the operator to identify the presence or absence of product flow, as well as visually evident issues, such as phase change or product contamination. The standard SG-3 is intended for on-site verification of chemical (i.e., liquid) injection. When equipped with the optional visual flow indicator, the SG-3 can be used to visually verify the application-driven flow of a variety of liquid, gas, or chemical products.

All three models of the SG-3 must be oriented vertically with the product inlet on the top.



All three SG-3 Sight Glass models **MUST** be oriented vertically with the product inlet on the top. This is the orientation that is shown in the diagrams in this manual.

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

1.3. Special Safety Alerts



If there is a significant temperature differential between the SG-3 and the liquid or gas product, opening the inlet valve too quickly might cause a sudden clash between temperature extremes that can trigger thermal shock. Thermal shock can shatter glass and is therefore a safety risk that can also render the SG-3 inoperable. Be sure to allow the temperatures to equalize.



Because the SG-3 sight glass flow assembly contains a significant amount of glass, the SG-3 must be handled with care in order to avoid glass breakage. Do not drop or impact the SG-3. When disassembling and reassembling the SG-3 during maintenance, **handle the unit and its components carefully. During maintenance, set the unit's components on a smooth, clean, dry surface** on which the components will be secure from rolling around or falling.



Be careful **NEVER** to exceed the SG-3's MAOP of 1500 psig (103.42 barg). Even a slight increase in pressure over MAOP will most likely result in shattered glass. Whereas the stainless steel body can withstand some pressure above MAOP, glass cannot.

1.4 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® Sight Glass SG-3 Specifications

Applications	Standard: Visual Verification of Liquid Chemical Injection With Visual Flow Indicator: Visual Verification of Liquid or Gas Product Flow and/or Issues
Products	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	Carbon Steel, Glass, Plexiglass, and FKM Others Available
Maximum Allowable Operating Pressure	1500 psig @ -20 °F to 100 °F (103.42 barg @ -28 °C to 37 °C)
Approximate Weight	3 lb
Approximate Dimensions	Standard: 4½" x 2⅜" x 2⅜" (Length x Width x Height) With Visual Flow Indicator: 5" x 2⅜" x 2⅜" (Length x Width x Height)
Connections	¼" FNPT (Standard) ⅜" FNPT ½" FNPT
Options	CE Compliance High Capacity High Flow Visual Flow Indicator (Spacer Type or Spinner Type)

Figure 1: Welker® Standard Sight Glass SG-3 Diagram

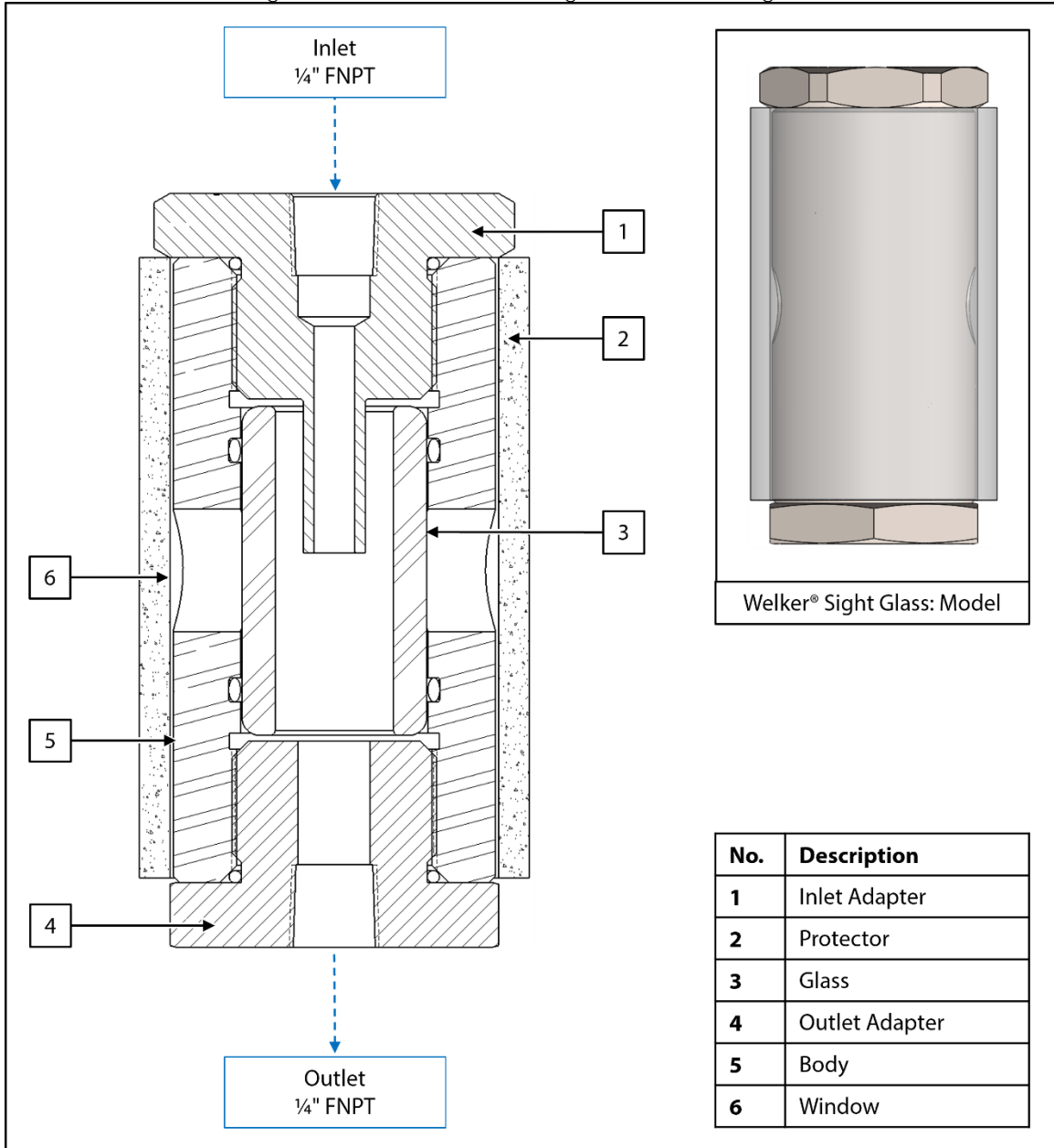


Figure 2: Welker® Sight Glass SG-3 With High-Flow, Spacer Type Visual Flow Indicator Diagram

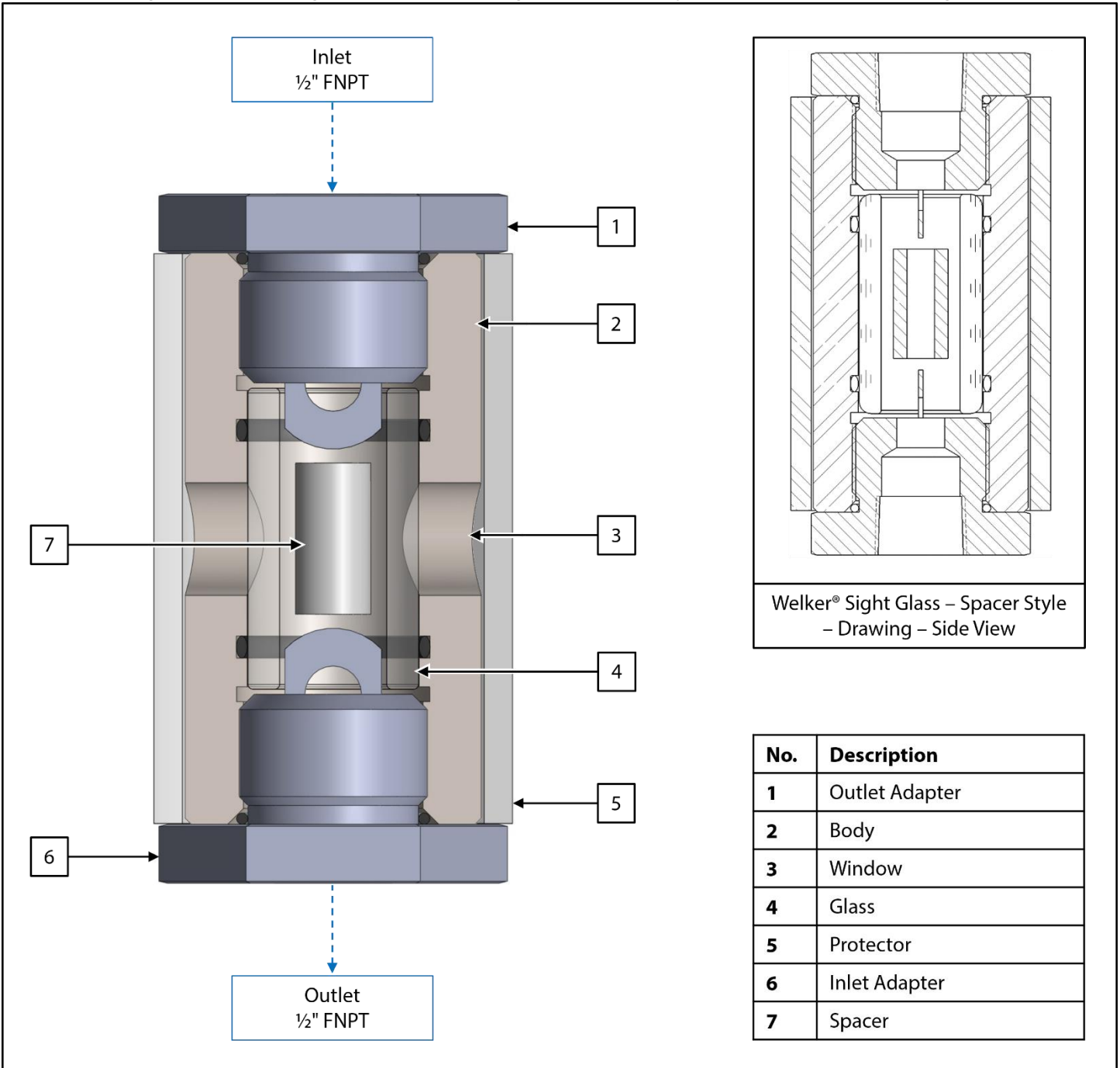
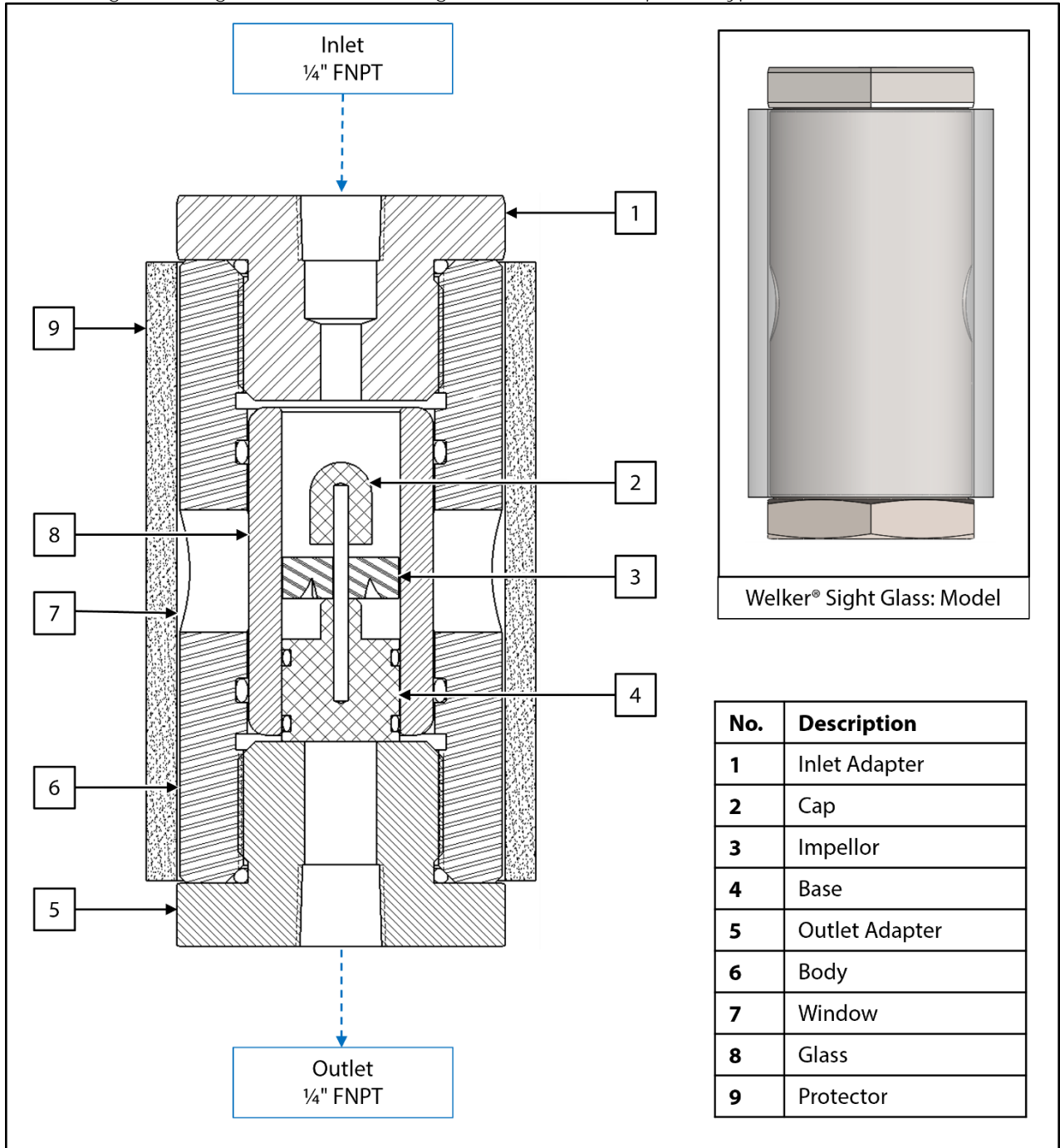


Figure 3: Diagram of the Welker® Sight Glass SG-3 With Spinner Type Visual Flow Indicator



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin



After unpacking the Welker® Sight Glass SG-3, check it 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



The SG-3 can be used in conjunction with existing equipment, such as pitot probes, injection pumps, and small pumps. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the equipment and company standards for proper equipment arrangement.

1. Connect the appropriate fittings to the inlet and outlet (*Figure 1, Figure 2, or Figure 3*). Then install the SG-3 on the product line.



All three SG-3 Sight Glass models MUST be oriented vertically with the product inlet on the top. This is the orientation that is shown in the diagrams in this manual.

2. Slowly open the inlet valve on the SG-3 (*Figure 1, Figure 2, or Figure 3*)



If there is a significant temperature differential between the SG-3 and the liquid or gas product, opening the inlet valve too quickly might cause a sudden clash between temperature extremes that can trigger thermal shock. Thermal shock can shatter glass and is therefore a safety risk that can also render the SG-3 inoperable. Be sure to allow the temperatures to equalize.

3. Be sure to allow the temperatures—of the product and the SG-3—to equalize.
4. Only open the inlet valve completely after the temperatures have equalized.
5. Visually check the SG-3 to verify product flow.



If the SG-3 is equipped with the optional spacer type visual flow indicator, product flow is indicated by the floating of the spacer.
If the SG-3 is equipped with the optional spinner type visual flow indicator, product flow is indicated by the spinning of the impellor.

6. If the SG-3 has fogged up and therefore product flow is not visible, the SG-3 must be cleaned. See *Section 3.2, Maintenance*, for removal and cleaning instructions.
7. If the SG-3 is equipped with the optional spinner type visual flow indicator and product flow is not visible, debris around the visual flow indicator could be preventing the impellor from spinning. See *Section 3.2, Maintenance*, for removal and cleaning instructions.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. Welker® recommends that the unit have standard maintenance under normal operating conditions: for *gas applications* every six (6) months; and for *liquid applications* every twelve (12) months. 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 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.



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, dry surface on which the SG-3's components will be secure from rolling around or falling.
4. Welker® recommends having the following items available for maintenance. Please note that the exact items required might vary by model.
 - a. Clean, Dry Cloths
 - b. Crescent Wrench
 - c. O-Ring Kit
 - d. Replacement Glass
 - e. Seal Pick
 - f. Solvent or Cleaning Agent

3.2 Maintenance

1. Halt product flow and close the inlet valve to the SG-3.
2. Allow product to run through the outlet until the SG-3 has been completely depressurized and no product remains in the SG-3.
3. Disconnect attached tubing from the SG-3. Remove the SG-3 from the system.
4. To perform maintenance on the standard SG-3, continue to step 5. To perform maintenance on the SG-3 with the spacer style visual flow indicator, proceed to step 17. To perform maintenance on the SG-3 with the spinner style visual flow indicator, proceed to step 32.

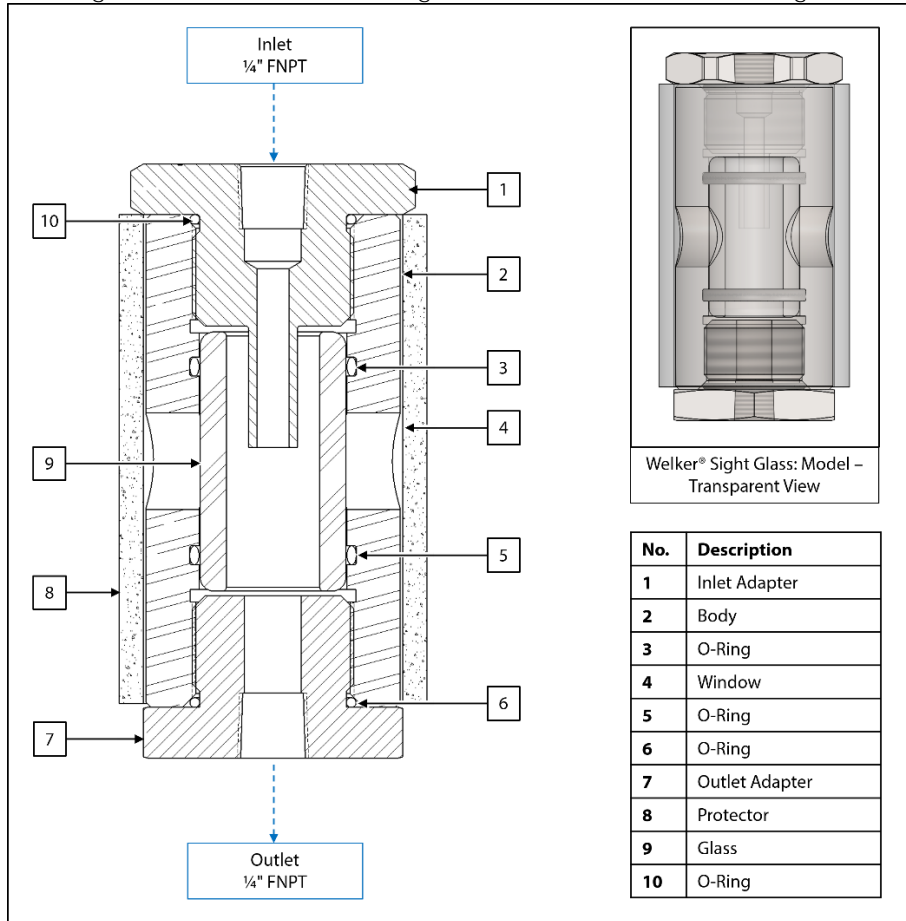


Because the SG-3 sight flow assembly contains a significant amount of glass, the SG-3 must be handled with care in order to avoid glass breakage. Do not drop or impact the SG-3. When disassembling and reassembling the SG-3 during maintenance, handle the **unit and its components carefully**. During maintenance, set the unit's components on a smooth, clean, dry surface on which the components will be secure from rolling around or falling.



Be careful NEVER to exceed the MAOP of 1500 psig. Even a slight increase in pressure over MAOP will most likely result in shattered glass. Whereas the stainless steel body can withstand some pressure above MAOP, glass cannot.

Figure 4: Standard Welker® Sight Glass SG-3 Maintenance Diagram



5. Carefully slide the protector off over the inlet adapter.
6. Carefully unscrew the inlet adapter from the body, taking care not to break the glass.
7. Carefully remove the glass from the body.
8. Inspect the glass for any cracks that might affect the integrity of the SG-3. Replace as necessary.
9. Remove the O-rings from the inlet adapter, outlet adapter, and body. Inspect for wear and replace as necessary.
10. Clean the inlet adapter, outlet adapter, body, protector, and glass with a solvent or cleaning agent. Then thoroughly dry them with a clean, dry cloth.



Welker® recommends cleaning the SG-3 with a quick-evaporating solvent, such as acetone. Refer to the appropriate company policy for the approved quick-evaporating solvent. Use chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and the Material Safety Data Sheet (MSDS).

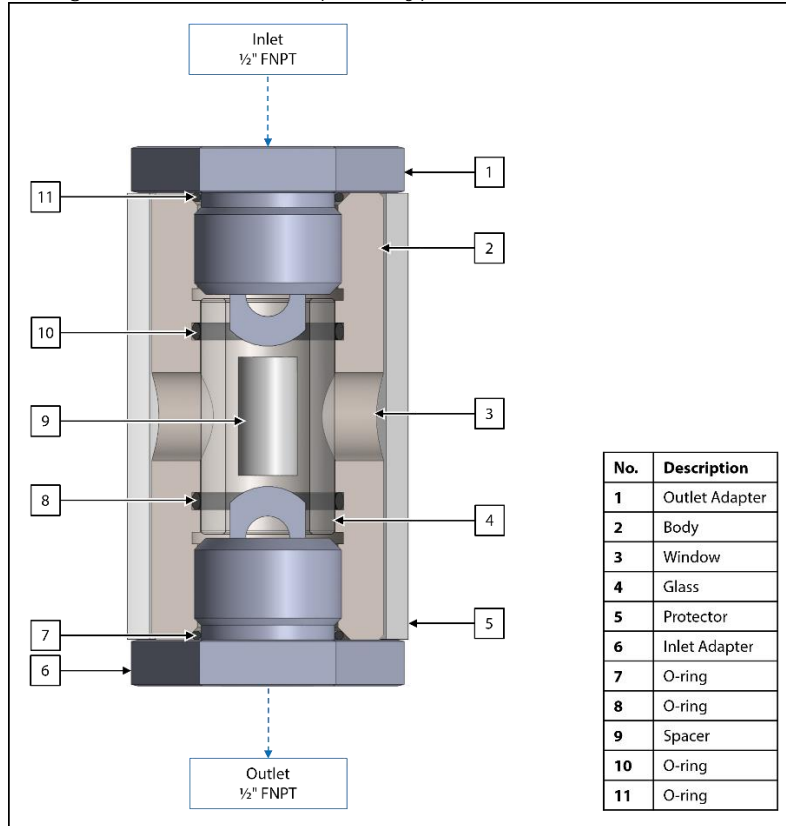
11. Place the O-rings on the inlet adapter, outlet adapter, and body.



To prevent leakage, ensure that the O-rings on the inlet and outlet adapters are seated properly.

12. Carefully slide the glass back into the body, taking care not to scratch the glass.
13. Carefully screw the inlet adapter into the body, taking care not to break the glass.
14. Carefully screw the outlet adapter into the body, taking care not to break the glass.
15. Carefully slide the protector on over the inlet adapter.
16. The SG-3 is now ready for installation. See *Section 2.2, Installation and Operation*, for instructions on installing the SG-3.

Figure 5: Welker® Sight Glass SG-3 With Spacer Type Visual Flow Indicator Maintenance Diagram



17. Carefully unscrew the inlet adapter from the body, taking care not to break the glass.
18. Remove the space from the SG-3.
19. Carefully unscrew the outlet adapter from the body, taking care not to break the glass.
20. Carefully slide the protector off the body.
21. Carefully remove the glass from the body.
22. Inspect the glass for any cracks that might affect the integrity of the SG-3. Replace as necessary.
23. Remove the O-rings from the inlet adapter, outlet adapter, and body. Inspect for wear and replace as necessary.
24. Clean the inlet adapter, outlet adapter, body, protector, and glass with a solvent or cleaning agent. Then thoroughly dry them with a clean, dry cloth.



Welker® recommends cleaning the SG-3 with a quick-evaporating solvent, such as acetone. Refer to the appropriate company policy for the approved quick-evaporating solvent. Use chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and the Material Safety Data Sheet (MSDS).

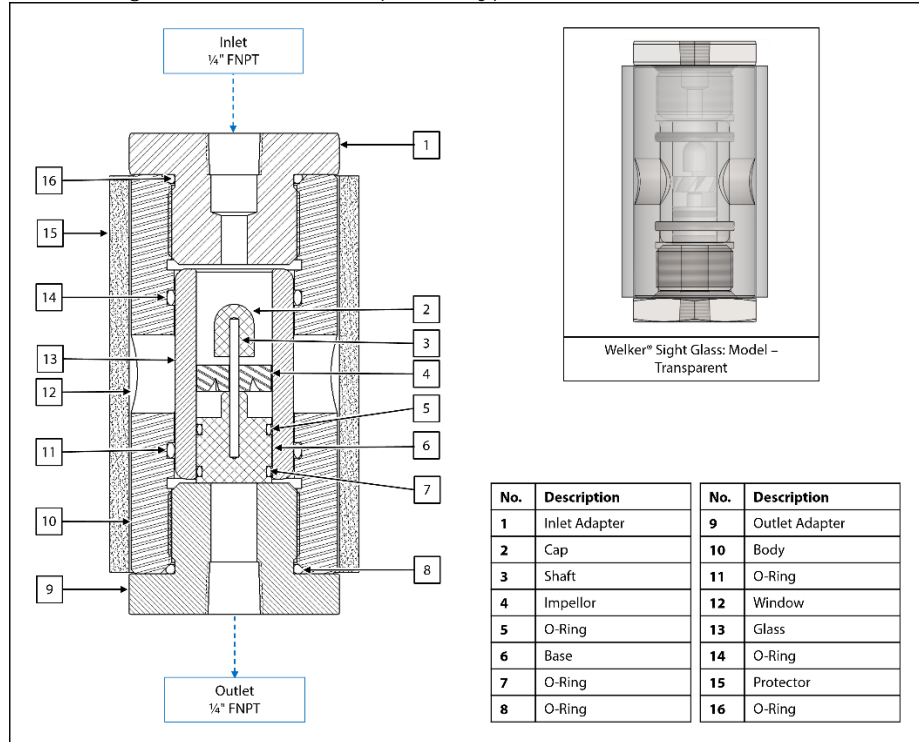
25. Place the O-rings on the inlet adapter, outlet adapter, and body.



To prevent leakage, ensure that the O-rings on the inlet and outlet adapters are seated properly.

26. Carefully slide the glass back into the body, taking care not to scratch the glass.
27. Carefully screw the inlet adapter into the body, taking care not to break the glass.
28. Install a new spacer to the glass.
29. Carefully slide the protector on over the body.
30. Carefully screw the outlet adapter into the body, taking care not to break the glass.
31. The SG-3 is ready for installation. See *Section 2.2, Installation and Operation*, for instructions on installing the SG-3.

Figure 6: Welker® Sight Glass SG-3 With Spinner Type Visual Flow Indicator Maintenance Diagram



32. Carefully slide the protector off over the inlet adapter.
33. Carefully unscrew the inlet adapter from the body, taking care not to break the glass.
34. Carefully unscrew the outlet adapter from the body, taking care not to break the glass.
35. Carefully remove the glass from the body.
36. Carefully remove the visual flow indicator from the glass.
37. Clean the visual flow indicator to remove any debris from around the impellor. Debris has been successfully removed once the impellor spins freely.
38. Inspect the glass for any cracks that might affect the integrity of the SG-3. Replace as necessary.
39. Remove the O-rings from the inlet adapter, outlet adapter, and body. Inspect for wear and replace as necessary.
40. Clean the inlet adapter, outlet adapter, body, protector, and glass with a solvent or cleaning agent, and then thoroughly dry them with a clean, dry cloth.



Welker® recommends cleaning the SG-3 with a quick-evaporating solvent, such as acetone. Refer to the appropriate company policy for the approved quick-evaporating solvent. Use chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and the Material Safety Data Sheet (MSDS).

41. Place the O-rings on the base of the visual flow indicator.
42. Place the O-rings on the inlet adapter, outlet adapter, and body.



To prevent leakage, ensure that the O-rings on the inlet and outlet adapters are seated properly.

43. Carefully slide the glass back into the body, taking care not to scratch the glass.
44. Carefully screw the inlet adapter into the body, taking care not to break the glass.
45. Carefully install the visual flow indicator to the glass. The impellor should point toward the inlet adapter.
46. Carefully screw the outlet adapter into the body, taking care not to break the glass.
47. Carefully slide the protector on over the inlet adapter.
48. The SG-3 is ready for installation. See *Section 2.2, Installation and Operation*, for instructions on installing the SG-3.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-094: Welker® Sight Glass, Model SG-4
- IOM-120: Welker® Spot Sample Manifold With Welker® Fluid Sentinel, Model SSM1 – WFS-3
- IOM-171: Welker® Fluid Sentinel, Model WFS-3

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

- None

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

- Assembly Drawing: AD036AO (Welker® Sight Glass SG-3 With Visual Flow Indicator)
- Assembly Drawing: AD037AO (Welker® Standard Sight Glass SG-3)
- Assembly Drawing: AD037LM (Welker® Sight Glass SG-3 With Spacer Type Flow Indicator)

