



*Installation, Operation, and  
Maintenance Manual*

*Welker<sup>®</sup> Flanged Liquid Sampler  
Model  
LSS-1F*

*Drawing No.: AD478BF.1  
Manual No.: IOM-140*

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<sup>®</sup> equipment described above. Correct operating and/or installation techniques, however, are the responsibility of the end user. Welker<sup>®</sup> reserves the right to make changes to this and all products in order to improve performance and reliability.

This manual is intended to be used as a basic installation and operation guide for the Welker<sup>®</sup> Flanged Liquid Sampler, LSS-1F. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is given in the Appendix section of this manual.

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# Section 1: SPECIFICATIONS

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## 1.1 INTRODUCTION

We appreciate your business and your choice of Welker<sup>®</sup> 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 1-800-776-7267 (USA) or 1-281-491-2331.

### Notes, Cautions, and Warnings



Notes emphasize information or set it off from the surrounding text.



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



Warnings are alerts to a specific procedure or practice that, if not followed correctly, could cause personal injury.

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

## 1.2 DESCRIPTION OF PRODUCT

The Welker<sup>®</sup> *LSS-1F Flanged Liquid Sampler* is designed to collect accurate, representative samples of pipeline product. Although intended primarily for use in liquid sampling, the LSS-1F can be modified slightly for use with gas. When in service, pipeline product flows through the body of the sampler, and upon actuation of the solenoid, the sampler will “grab” a set amount of sample from the flowing stream. The solenoid can be set to actuate after a predetermined period of time (timed sampling) or volume of flow (proportional-to-flow sampling).



This sampler may be used alone or as part of a complete sampling system. Note that these instructions are written for a sampler used as part of a complete system. If used alone or with equipment from a company other than Welker<sup>®</sup>, the sampler should be installed and operated in a manner consistent with the instructions in this manual.

***Welker<sup>®</sup> may custom design the LSS-1F Flanged Liquid Sampler to suit the particular application and specifications of each customer.***

### 1.3 SPECIFICATIONS

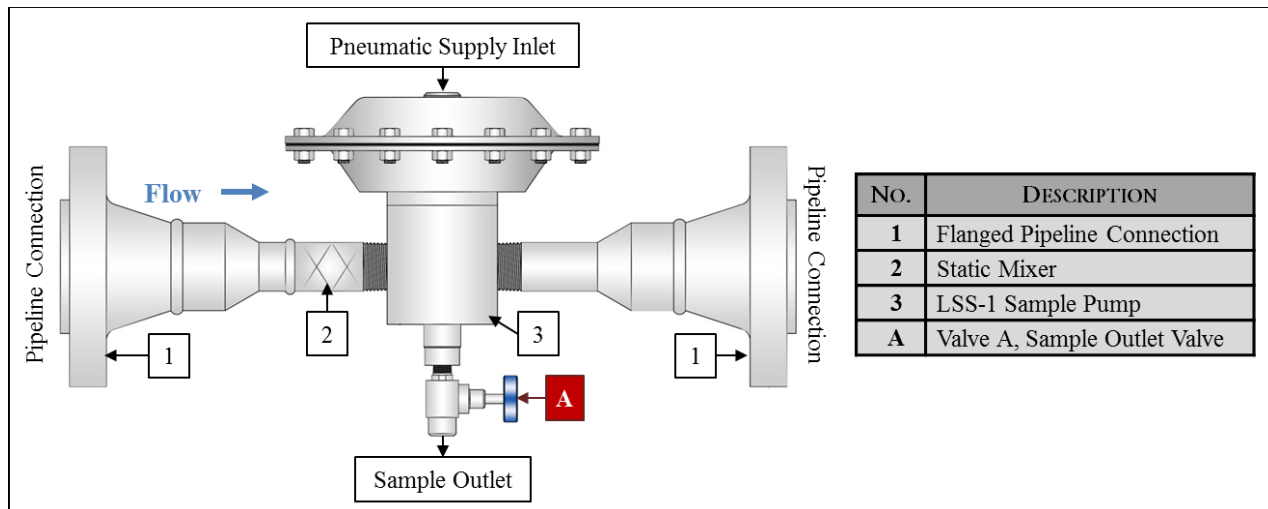


The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table 1: Sampler Specifications	
<b>Products Sampled</b>	Liquid, gas, and other products compatible with the materials of construction
<b>Materials of Construction</b>	316/316L Stainless Steel, Carbon Steel, Viton,® and PTFE Others available upon request
<b>Maximum Allowable Operating Pressure</b>	1480 psi @ -20° to 100°F (102 bar @ -28.9° to 37.8°C)
<b>Pipeline Connection</b>	2"-150RF or 2"-600RF Others available upon request
<b>Sample Outlet Connection</b>	1/4" NPT Others available upon request
<b>Pneumatic Supply Connection</b>	1/4" NPT Others available upon request
<b>Pneumatic Supply Pressure</b>	65 - 100 psi (4.5 – 6.9 bar)

### 1.4 SYSTEM DIAGRAM

**Figure 1: System Diagram**



## Section 2:

# INSTALLATION & OPERATIONS

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### 2.1 BEFORE YOU BEGIN



After unpacking the unit, check the equipment for compliance and for any damage that may have occurred during shipment. **Claims for damage caused during shipping must be initiated by the receiver and directed to the shipping carrier.** Welker<sup>®</sup> is not responsible for any damage caused by mishandling by the shipping company.



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

### 2.2 INSTALLATION & OPERATION

1. Depressurize the pipeline into which the sampler is to be installed.
2. Install the sampler into the pipeline. Ensure the sampler is oriented with the static mixer upstream of the sample pump (*Figure 1*). Bolt the flanges into place.
3. Connect a normally-closed three-way solenoid valve to the pneumatic supply inlet on the top of the sampler.
4. Connect a pneumatic supply to the solenoid valve. The supply should be no less than 40 psi and no more than 65 psi.
5. If using a timer or controller to operate the solenoid for timed or proportional-to-flow sampling, connect the timer or controller to the solenoid valve.
6. If the timer or controller is being controlled by an electronic signal from an outside source, such as a PLC, DCS, or flow computer, connect the appropriate electrical connections.



For this manual, the term “PLC,” or programmable logic computer, will be used to refer to the PLC, DCS, or other signal control system used by the customer to activate and operate the solenoid.

7. Open the valve on the pneumatic supply, if it is not already open.
8. Open valve A on the sampler.
9. To test that the sampler is properly set up, energize the solenoid for approximately three seconds. De-energize the solenoid for at least three seconds to reset the sampler. Repeat until a sample output is received to purge all air or old product from the sampler.
10. Connect a cylinder or sample container to the sample outlet port. If using a Welker<sup>®</sup> Constant Pressure Cylinder, ensure the cylinder is appropriately pre-charged before installing. Refer to the *Installation, Operation, and Maintenance Manual* for the appropriate cylinder for instructions on pre-charging and installing the cylinder.
11. Actuate the sampler to purge the cylinder if applicable. Refer to the *Installation, Operation, and Maintenance Manual* for the appropriate cylinder for instructions on purging the cylinder.
12. Open the product inlet valve and pre-charge valve (if applicable) on the sample cylinder. Refer to the *Installation, Operation, and Maintenance Manual* for the appropriate cylinder for instructions on set-up and valve usage on the cylinder.
13. Check the system carefully for leaks. Tighten loose connections or repair as necessary.
14. Set the actuation frequency in the PLC for the desired sampling frequency (timed or proportional-to-flow) based on the actuation equations (*Figure 2*).

15. To begin sampling, turn on the PLC to begin actuating the solenoid. Allow sampling to continue until the desired volume of sample has been collected. To cease sampling at any time, stop actuating the solenoid.

**Figure 2: Actuation Equations**

<b>Liquid Sampling, Proportional to Flow Collection</b>
<p><b>Equation 1: Number of Samples Needed</b></p> $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Cylinder Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$
<p><b>Equation 2: Proportional-to-Flow</b></p> $\text{Volume of Flow Between Sample Grabs} = \frac{\text{Batch Size (Total Volume to be Sampled)}}{\text{Number of Samples Needed (Eq. 1)}}$
<p><i>Use Equation 1 to determine the number of actuations needed. Use Equation 2 to determine how often (after what volume of flow) to take each sample.</i></p>
<b>Liquid Sampling, Timed Collection</b>
<p><b>Equation 1: Number of Samples Needed</b></p> $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Cylinder Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$
<p><b>Equation 2: Timed Sampling</b></p> $\text{Time Between Sample Grabs} = \frac{\text{Total Time in Sample Period}}{\text{Number of Samples Needed (Eq. 1)}}$
<p><i>Use Equation 1 to determine the number of actuations needed. Use Equation 2 to determine how often (after what amount of time) to take each sample.</i></p>



Note that 0.8 represents the 80% volume limit for liquid sampling. For gas sampling, the cylinder may be filled up to 100% as desired, so multiplying cylinder volume by 0.8 is not necessary.

## Section 3: MAINTENANCE

### 3.1 BEFORE YOU BEGIN

1. **Welker® recommends that the unit have annual maintenance under normal operating conditions.** 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.



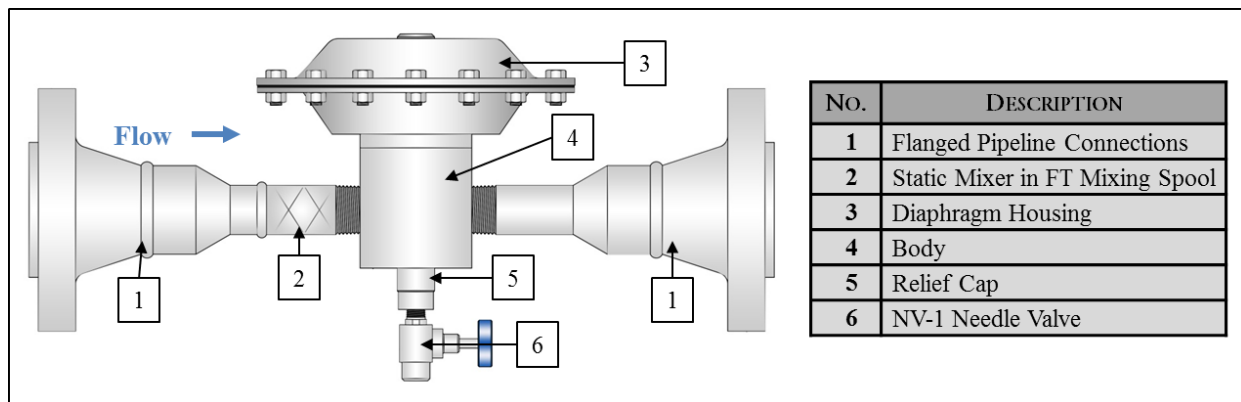
New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease before installation. Welker® recommends Dow Corning 111 [DC 111] or an equivalent lubricant for use with this unit.

3. All maintenance and cleaning of the unit should be done on a smooth, clean surface.

### 3.2 MAINTENANCE

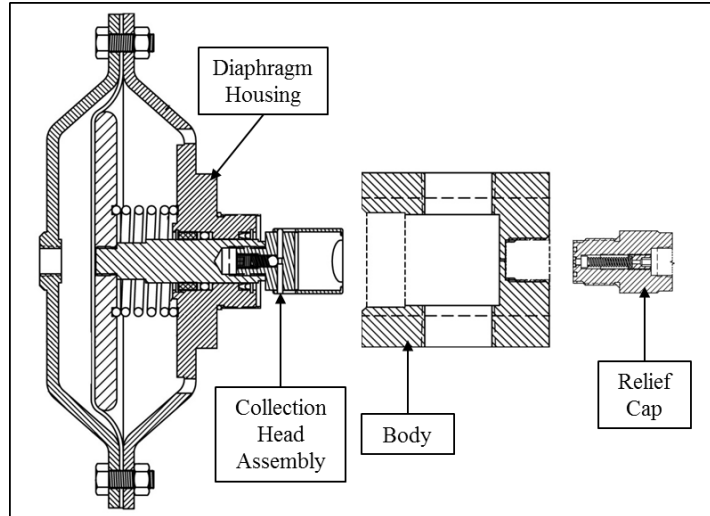
1. During system operation, check for leaks and repair as necessary.
2. Prior to performing maintenance, ensure that the PLC has been set to cease actuating the solenoid.
3. Depressurize the pipeline. Allow all pressure to drain from the mixing spool and sampler.
4. Turn off the electrical power to the system, and carefully remove all electrical connections.

**Figure 3: Maintenance Diagram, External View**



5. For most maintenance, the sampler may remain connected to the pipeline. If it is necessary or desirable to remove the entire sampler from the pipeline, proceed to steps 6. To perform maintenance on the sampler while it is connected to the pipeline, proceed to step 8.
6. Unbolt the flanged connections and remove the sampler from the pipeline. Ensure the appropriate orientation is labeled on the flanges before removing them.
7. Carefully unscrew the flanges from the body of the sampler. Ensure that the flanged connection containing the static mixer is labeled. Set the flanged connections aside.
8. Unscrew and remove the NV-1 Needle Valve. Maintenance on the needle valve may be performed on an as-needed basis. To perform maintenance on the needle valve, refer to the *Installation, Operation, and Maintenance Manual* for the NV-1 Needle Valve.
9. Unscrew and remove the relief cap from the body of the LSS-1 (*Figure 4*).

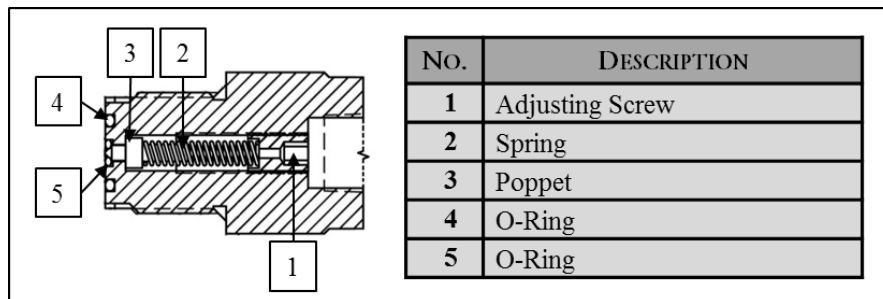
**Figure 4: LSS-1 Maintenance Overview**



**Relief Cap Maintenance (Figure 5)**

10. Unscrew the adjusting screw.
11. Carefully remove the adjusting screw, spring, and poppet.
12. Inspect the spring for wear and debris. Clean as necessary.
13. Inspect the poppet for scratches or other damage. Polish or replace as necessary.
14. Replace the two O-rings on the end of the relief cap.
15. Insert the poppet, spring, and adjusting screw back into the relief cap.
16. Tighten the adjusting screw.
17. Screw the relief cap back into the body.

**Figure 5: Relief Cap Maintenance Diagram**

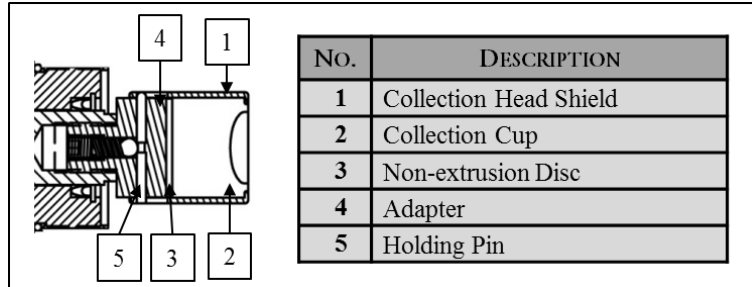


**Collection Head Assembly Maintenance (Figure 6)**

18. Unscrew the LSS-1 body from the diaphragm housing. Set the body aside.
19. Push the holding pin out of the collection head assembly.
20. Slide the collection head shield off the collection head assembly.
21. Slide the collection cup and non-extrusion disc out of the collection head shield.
22. Examine the collection cup. If the collection cup is damaged or shows signs of excessive wear, or if the collection cup is not functioning properly during operation, replace the collection cup.
23. Apply a thin layer of lubricant to the inside surface of the collection head shield, and then reinsert the collection cup and non-extrusion disc into the collection head shield.
24. Set the collection head shield and the holding pin aside.



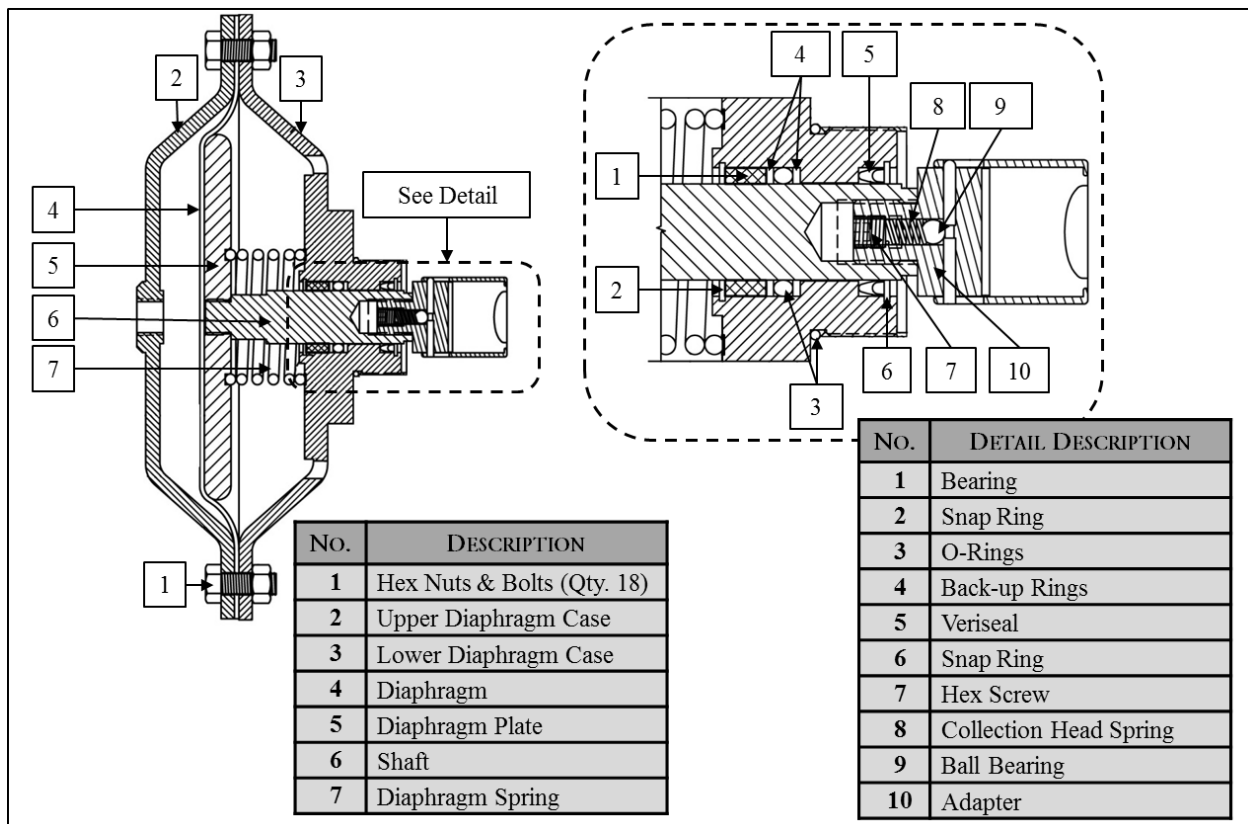
**Figure 6: Collection Head Assembly Maintenance Diagram**



**Diaphragm Housing Maintenance (Figures 7 & 8)**

25. Unscrew and remove the eighteen (18) hex nuts and bolts holding the upper and lower diaphragm cases together.
26. Separate the diaphragm cases to expose the diaphragm.
27. Examine the diaphragm for cracks or other damage. Replace as necessary.
28. Hold the diaphragm plate firmly in place, and unscrew the adapter from the shaft.
29. Push the shaft through the lower diaphragm case. Remove the diaphragm plate, diaphragm spring, and shaft.
30. Examine the shaft for scratches or other damage. Polish or replace as necessary.
31. Replace the O-ring on the lower diaphragm case.
32. Replace the snap ring, O-ring, and back-up ring on the shaft.
33. Remove and carefully replace the snap ring and SpectraSeal™ on the adapter end of the diaphragm housing.
34. Slide the diaphragm spring off the shaft, lightly lubricate the shaft, and slide the diaphragm spring back onto the shaft.

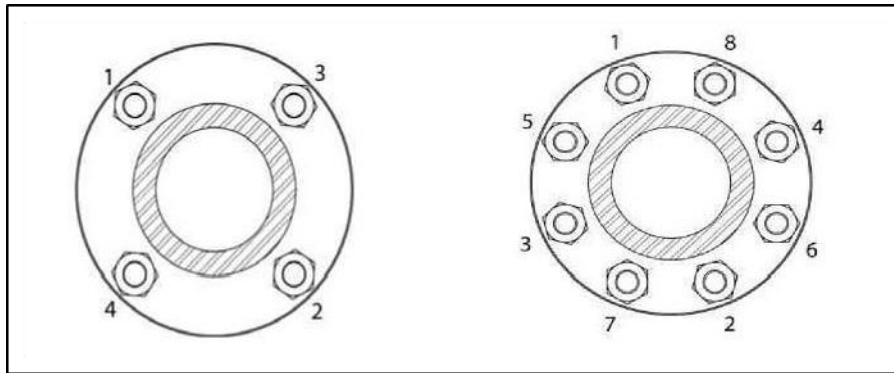
**Figure 7: Diaphragm Housing Maintenance Diagram**



## Reassembly

35. Carefully insert the shaft back into the diaphragm case.
36. Screw the adapter back onto the shaft.
37. Attach the diaphragm to the diaphragm plate.
38. Set the upper diaphragm case in place against the lower diaphragm case.
39. Bolt the upper and lower diaphragm cases together in a criss-cross pattern (*Figure 8*).
40. Slide the collection head shield with the collection cup and non-extrusion disc onto the adapter, and then insert the holding pin to hold the collection cup assembly in place.
41. Hand-tighten the body back onto the diaphragm housing.
42. Hand-tighten the relief cap onto the body.
43. Screw the flanges back into the body of the sampler. The unit is now ready for re-installation.

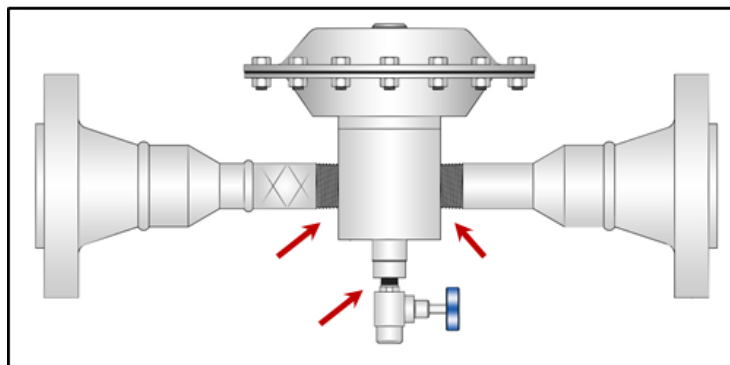
**Figure 8: Examples of Criss-cross Bolt Patterns**



## 3.3 TRANSPORTATION

1. The LSS-1F is a fragile precision instrument and should be packaged carefully and transported and handled with care.
2. If the LSS-1F is installed on other equipment during transportation, care should be taken to avoid putting stress on the narrow points of the equipment.

**Figure 9: Points to Protect During Transportation**



# APPENDIX

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## ATTACHED DOCUMENTS:

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

- IOM-105: NV-1 Needle Valve
- Appropriate Constant Pressure Cylinder (Optional)

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

- None

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

- Assembly Drawing: AD478BF.2 (2"150RF Model)
- Assembly Drawing: AD478BF.1 (2"600RF Model)
- LSS-1 Detail Drawing: AD478BF (Standard)



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