# INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
# WELKER® MANUAL VACUUM PUMP SAMPLER

**MODEL**
MVS-2

**DRAWING NUMBER**
AD420C0

**MANUAL NUMBER**
IOM-055

**REVISION**
Rev. C, 03/21/2024

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# IMPORTANT SAFETY INFORMATION
# READ ALL INSTRUCTIONS

Notes emphasize information and/or provide additional information to assist the user.

Caution messages appear before procedures that 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® Manual Vacuum Pump Sampler, MVS-2. 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 Manual Vacuum Pump Sampler 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 Manual Vacuum Pump Sampler, 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® *MVS-2* Manual Vacuum Pump Sampler is designed for use in pumping product that is very low-pressure, no-pressure, or in a vacuum to a sample container to build enough pressure and volume adequate for laboratory analysis.

*Welker® might custom design the MVS-2 to suit the particular application and specifications of each customer.*

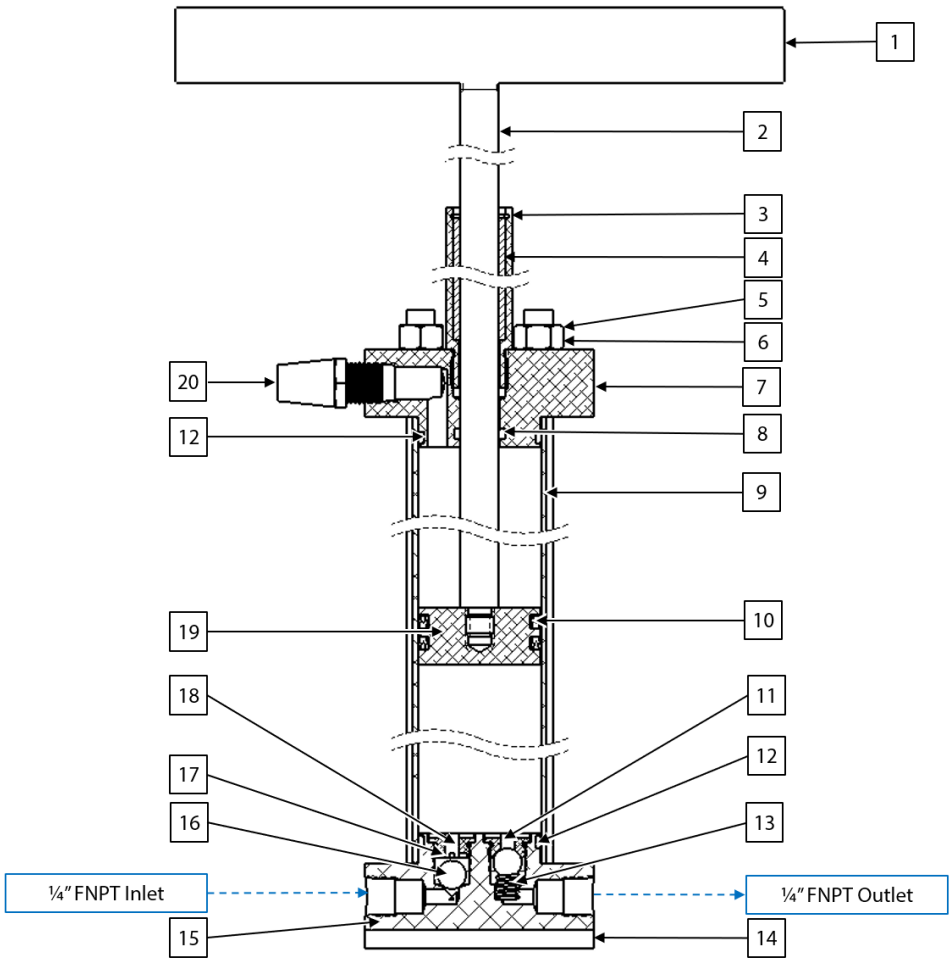
## 1.3 Specifications

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® MVS-2 Manual Vacuum Pump Sampler Specifications | |
|---|---|
| **Application** | To Pump Product That Is Low-Pressure, No-Pressure, or at a Vacuum Into a Sample Container at Pressure Adequate for Analysis |
| **Products Sampled** | Products Compatible With the Materials of Construction |
| **Materials of Construction** | 6061 Aluminum, Anodized Finish; (316/316L Stainless Steel Available); FKM Seals |
| **Maximum Allowable Operating Pressure** | 350 psig @ -20 °F to 120 °F (*24 barg @ -28 °C to 48 °C*)<br>*MAOP Limited to 260 psig (*17 barg*) by Tubing<br>Capable Vacuum Pulled: 30 psig (*2 barg*) in $H_2O$<br>Capable Outlet Pressure Build-Up: 100 psig (*6.9 barg*)<br>*MAOP Is Primarily Limited by Operator Strength and Sample Container MAOP |
| **Connections** | ¼" NPT Inlet and Outlet Connections<br>NV-1 Inlet Valve With Fitting |
| **Operation** | Piston-Operated |
| **Dimensions** | 41½" Fully Retracted (25$^{1}/_{20}$" Fully Inserted) x 3" x 12" (Height x Width x Length) |
| **Features** | Pump Handle<br>Inlet and Outlet Check Valves |
| **Options** | Valves<br>Pressure Gauge<br>Cross Fitting<br>Hex Plug<br>Flexible Tubing, NPT Fittings |

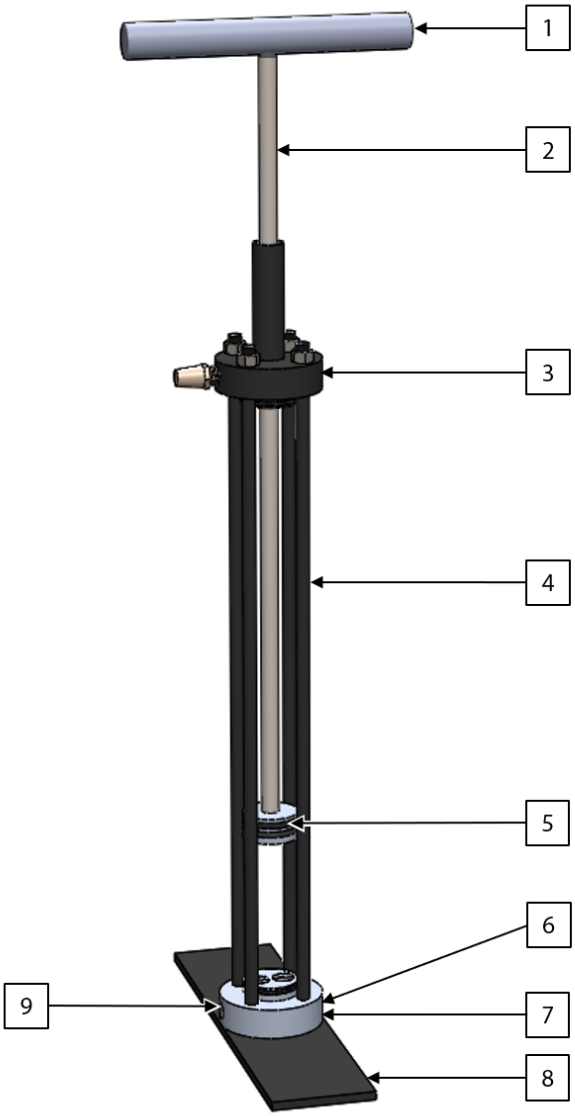
## 1.4 Equipment Diagrams

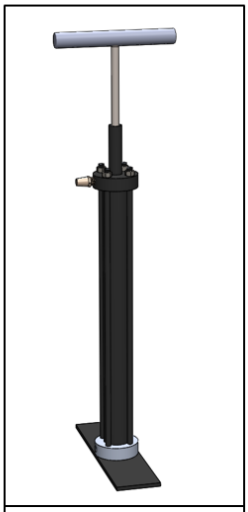
**Figure 1: Welker® MVS-2 Manual Vacuum Pump Sampler Diagram**




| No. | Description |
|---|---|
| 1 | Pump Handle |
| 2 | Shaft |
| 3 | Retaining Ring |
| 4 | Bearing |
| 5 | Hex Nut (Qty = 4) |
| 6 | Tie Bolt (Qty = 4) |
| 7 | Pre-Charge End Cap |
| 8 | O-Ring, FKM |
| 9 | Cylinder |
| 10 | U-Cup (Qty = 2) |
| 11 | Outlet Cap |
| 12 | O-Ring, FKM (Qty = 2) |
| 13 | Spring |
| 14 | Base |
| 15 | Product End Cap |
| 16 | Ball, FKM (Qty = 2) |
| 17 | O-Ring, FKM (Qty = 2) |
| 18 | Inlet Cap |
| 19 | Piston |
| 20 | Muffler, ¼" NPT Bronze Sint |

**Figure 2: Welker® MVS-2 Manual Vacuum Pump Sampler – Shown With Cylinder Transparent**

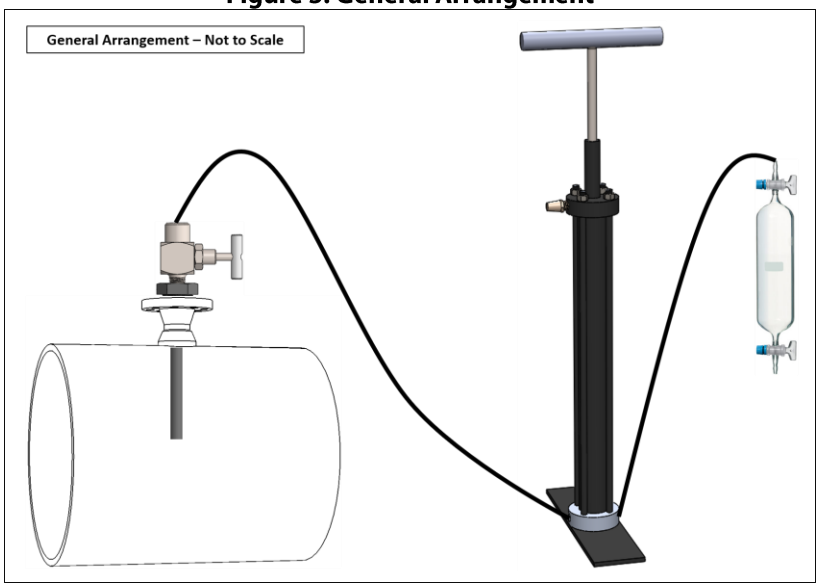


MVS-2 Manual Vacuum Pump Sampler

| No. | Description |
|---|---|
| 1 | Pump Handle |
| 2 | Shaft |
| 3 | Pre-Charge End Cap |
| 4 | Tie Bolt (Qty = 4) |
| 5 | Piston Assembly |
| 6 | Product End Cap |
| 7 | Product Outlet |
| 8 | Base |
| 9 | Product Inlet |

**Figure 3: General Arrangement**



# 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.

Welker® recommends having flexible hose or tubing and tubing cutters available for use during installation of the MVS-2 Manual Vacuum Pump Sampler. However, the tools used will vary according to probe and sample container models used. For further details, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the specific probe and/or sample container.

## 2.2 Installation

1. Ensure that all valves are closed.
2. With a length of tubing, connect the sample probe to the MVS-2 inlet (*Figure 1*).

Do not connect to a pressure that exceeds the pressure manageable by the operator (e.g., 10–50 psig).

3. With a short length of tubing, connect the sample container to the MVS-2 outlet (*Figure 1*). Ensure that the sample container is in the vertical position with its sample inlet at the top.

## 2.3 Purge Cycling

Purging the system of excess air is important to ensure the system is not contaminated by the previous sample or by the air itself.

Be sure to open all valves slowly because the pressurized inflow of product might move the MVS-2 pump handle up quickly or the inflow of product under a vacuum might move the MVS-2 pump handle down quickly.

4. Slowly open the inlet valve on the sample container.
5. Slowly open the sample probe pipeline outlet valve.
6. Place the MVS-2 on an even surface. The operator should place their feet on either side of the base to stabilize and hold the pump down so the pump can be operated like a bicycle pump.
7. Move the pump handle up and down until the MVS-2 outlet gauge pressure indicates a pressure that is manageable by the operator (e.g., 10–50 psig).
8. Close the inlet valve on the sample container.
9. Open the outlet valve on the sample container.
10. Bleed the pressure until the MVS-2 gauge reads 1 psig.
11. Close the outlet valve on the sample container.
12. Slowly open the inlet valve on the sample container.
13. Repeat the purge cycle (steps 5 through 12) an appropriate number of times to ensure the system is not contaminated by air or the previous sample.

## 2.4 Collecting Sample for Analysis

14. Following the final purge, fill the sample container to a pressure adequate for analysis. This may require the operator to manually push the pump multiple times.
15. Close all the valves and disconnect the tubing from the sample container.
16. Plug or cap all valves on the sample container.
17. Record pressure, locations, and so forth, on the information tag according to the customer's company's policy.
18. Check all fittings for leaks.
19. The sample container is now ready for product removal. Place the container into a carrying case to provide maximum protection during transportation. Ensure that you follow your company's transportation procedures and requirements.
20. Ship or transport the sample container according to D.O.T. requirements.

# SECTION 3: MAINTENANCE

## 3.1 Before You Begin

1. **Welker® recommends that the unit have standard maintenance as needed**—according to the operator's company policy. 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.

> 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. Welker® recommends non-hydrocarbon-based lubricants, such as Krytox™.

> After the new seals are installed, the outer diameter of the shaft and the inner diameter of the cylinder may be very lightly lubricated to allow smooth transition of parts.

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. 6" Adjustable Wrench
    b. 10" Channel Lock Pliers
    c. Fine Grit Sandpaper
    d. Seal Pick
    e. O-Ring/Seal Kit

## 3.2 Disassembly Instructions

1. Refer to *Figure 1* throughout the maintenance process.
2. Make sure the unit is depressurized prior to maintenance.

> Check valves for leaks and repair as necessary during reassembly.

3. Unscrew the pump handle and remove.
4. Remove the four (4) hex nuts and carefully slide the product end cap off the shaft. Be careful not to scratch the shaft.
5. Carefully remove the shaft/piston/cylinder assembly. Be careful not to scratch the shaft, piston, and cylinder.
6. Push the piston assembly out the end of the shaft. Be careful not to scratch the surface of the shaft or the piston.

> Be careful when removing O-rings from the O-ring grooves. Scratching the sealing surface can result in a leak. If necessary, carefully extract the O-ring and replace it during reassembly. Should the sealing surface become damaged, use a 600-grit wet sandpaper strip to carefully smooth the surface, after which the surface should be cleaned.

> Welker® recommends cleaning and leak testing of the unit after each use.

## 3.3 Maintenance Instructions

To ease the installation of the seals and reduce the risk of damage when positioning them on parts, Welker® recommends placing a **small** amount of a non-hydrocarbon-based lubricant, such as Krytox™, on the U-cups, O-rings, and balls—just enough to make them shiny but not enough to contaminate product and adversely affect analytic results. After the new U-cups, seals, and balls are installed, the outer diameter of the shaft and inner diameter of the cylinder may likewise be lubricated to allow smooth transition of parts.

1. Carefully remove, discard, and replace the U-cups on the piston assembly.
2. Carefully remove, discard, and replace the O-rings in the pre-charge end cap.
3. Remove the inlet cap and the outlet cap in the product end cap.
4. Carefully remove the O-rings, spring, and balls in the product end cap. Replace the O-rings and reinsert the spring and balls into the product end cap.
5. Reinsert the inlet cap and the outlet cap.
6. Carefully dry-wipe the inside of the cylinder. Also, carefully dry-wipe all other parts.
7. Closely examine the honed surface of the cylinder. Scratches and pits will cause the seals to leak.

## 3.4 Reassembly Instructions

1. Carefully reinsert the piston/shaft assembly back into the cylinder and reinsert the piston/shaft/cylinder assembly into the pump. Be careful not to scratch the cylinder or damage the seals. Make sure that the female ends of the U-cups go toward the product end cap and the male ends go toward the pre-charge end cap.
2. Carefully slide the pre-charge end cap down the shaft and screw in and tighten the four (4) hex nuts.
3. Place the pump handle on top of the shaft, screw it in, and tighten it.
4. The MVS-2 is now ready to go back into service.

## 3.5 Cleaning the MVS-2 Manual Vacuum Pump Sampler

Regular cleaning of the MVS-2 is essential for the device's proper functioning. Solvent cleaning is normally done during scheduled maintenance. However, some companies require such cleaning before each time the unit is put into service. Any debris or residue that is not removed from the unit will contaminate the results of the next sample. Welker® recommends cleaning and leak testing of the unit after each use.

Welker® recommends cleaning and leak testing of the unit after each use.

**Cleaning an MVS-2 can be accomplished one of the following four ways:**

**1. Purging (i.e., flushing) with new product:**

- Purge (i.e., flush) the unit using the product to be sampled. This can be accomplished each time the unit is put into service. This method is acceptable only if the unit will be used in one location.

**2. Cleaning with solvent:**

- Fill and empty the unit repeatedly with solvent.
- Use an inert gas to dry and purge the unit.
- Purge the system with helium to ensure the system is free of contaminants.

**3. Using a very clean rag:**

- Unscrew and remove the pump handle. Then remove the four (4) hex nuts.
- Carefully slide the product end cap off the shaft.
- Using a very clean rag, wipe the product end cap and what can be seen of the piston assembly.
- Carefully slide the product end cap back on the shaft, then screw on the four (4) hex nuts and the pump handle.

**4. Using a steam cleaner:**

Ensure that the temperature rating of the steam cleaner will not exceed that of the seals, U-cups, and balls. When the steam cleaning is complete, ensure that no moisture from the steam remains within the unit. Also, allow sufficient time for the steam heat to dissipate and the temperature of the unit to normalize. When the steam cleaning is finished, purge the unit with an inert gas (e.g., helium).

# APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-105: Welker® Instrument Valves—Models NV-1, NV-2

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

- None

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

- Assembly Drawing: AD420CO (MVS-2 Manual Vacuum Pump Sampler)

## NOTES

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