



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® SAMPLE PROBE

MODELS

SP-1	SP-3
SP-1W	SP-5
SP-2	SP-F

DRAWING NUMBERS

AD631AD
AD631BC
AD631BJ
AD631CO
AD631DB
SP2918[][][A]

MANUAL NUMBER

IOM-035

REVISION

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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® Sample Probes, SP-1, SP-1W, SP-2, SP-3, SP-5, and SP-F. For comprehensive instructions, please refer to the 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 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 Probe 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 Sample Probe, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Bellfort Street
Sugar Land, TX 77498

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 may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *SP-1*, *SP-1W*, *SP-2*, *SP-3*, *SP-5*, and *SP-F* Sample Probes are single probes designed for sampling and siphoning applications. Two (2) Sample Probes can be installed across a pressure drop to create a bypass for a customer sampler or sampling system.

Welker® may custom design the SP-1, SP-1W, SP-2, SP-3, SP-5, and SP-F 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: SP-1 Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Material of Construction	316/316L Stainless Steel
Maximum Allowable Operating Pressure	½" MNPT: 7700 psig @ -50 °F to 300 °F (530 barg @ -45 °C to 148 °C) ¾" MNPT: 7300 psig @ -50 °F to 300 °F (503 barg @ -45 °C to 148 °C) 1" MNPT: 5300 psig @ -50 °F to 300 °F (365 barg @ -45 °C to 148 °C) 2" MNPT: 3900 psig @ -50 °F to 300 °F (268 barg @ -45 °C to 148 °C)
Connections	Pipeline: ½", ¾", 1", or 2" MNPT (Others Available) Outlet: ¼" (Standard), ⅜", ½", ¾", or 1"
Insertion Length	2" (5 cm) 4" (10 cm) 6" (15 cm) 8" (20 cm) 10" (25 cm) 12" (30 cm) Others Available
Probe Diameter	¼" ⅜" (Standard) ¾" Others Available
Feature	NACE Compliance
Options	Sulfinert®-Treated Sample Exposed Parts CE Compliance CRN Certification

Table 2: SP-1W Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Material of Construction	316/316L Stainless Steel (Standard) Others Available
Maximum Allowable Operating Pressure	150 ANSI Stainless Steel: 275 psig @ -20 °F to 100 °F (18 barg @ -28 °C to 37 °C) 300 ANSI Stainless Steel: 720 psig @ -20 °F to 100 °F (49 barg @ -28 °C to 37 °C) 600 ANSI Stainless Steel: 1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C)
Pipeline Connection	Size: 1" or 2" Rating: 150, 300, or 600 ANSI Facing: RF, RFSF, or RTJ Others Available
Probe Diameter	$\frac{3}{8}$ " (Standard) $\frac{1}{2}$ " $\frac{5}{8}$ " $\frac{3}{4}$ " 1" 1 $\frac{1}{4}$ "
Features	Handle 90° Scoop on Probe Tip
Options	45° Beveled Probe Flow Arrow Stamped on Handle Sulfinert®-Treated Sample Exposed Parts CE Compliance NACE Compliance

Table 3: SP-2 Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, Kel-F®, PTFE, and Viton®
Maximum Allowable Operating Pressure	$\frac{1}{2}$" MNPT: 6000 psig @ -20 °F to 120 °F (413 barg @ -28 °C to 48 °C) $\frac{3}{4}$" MNPT: 6000 psig @ -20 °F to 120 °F (413 barg @ -28 °C to 48 °C) 1" MNPT: 5300 psig @ -20 °F to 120 °F (365 barg @ -28 °C to 48 °C)
Connections	Pipeline: $\frac{1}{2}$ ", $\frac{3}{4}$ ", or 1" MNPT; Blind Flange for 1" MNPT Outlet: $\frac{1}{4}$ " FNPT
Insertion Length	2" (5 cm) 4" (10 cm) 6" (15 cm) 8" (20 cm) 10" (25 cm) 12" (30 cm) Others Available
Probe Diameter	$\frac{1}{4}$ " $\frac{3}{8}$ " (Standard)
Features	Welker® NV-2 Instrument Valve NACE Compliance
Options	45° Beveled Probe Tip Sulfinert®-Treated Sample Exposed Parts CRN Certification

Table 4: SP-3 Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Material of Construction	316/316L Stainless Steel
Maximum Allowable Operating Pressure	1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C)
Connections	Pipeline: ½" MNPT or ¾" MNPT Outlet: ¼" FNPT or ½" FNPT
Insertion Length	2" (5 cm) 4" (10 cm) 6" (15 cm) 8" (20 cm) 10" (25 cm) 12" (30 cm) Others Available
Probe Diameter	¼" ⅜" (Standard)
Feature	Outlet Ball Valve

Table 5: SP-5 Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Material of Construction	316/316L Stainless Steel
Maximum Allowable Operating Pressure	3600 psig @ -20 °F to 100 °F (248 barg @ -28 °C to 37 °C)
Connections	Pipeline: ½" MNPT, ¾" MNPT, or 1" MNPT; Blind Flange for 1" MNPT Outlet: ¼" FNPT (Standard)
Insertion Length	2" (5 cm) 4" (10 cm) 6" (15 cm) 8" (20 cm) 10" (25 cm) 12" (30 cm) Others Available
Probe Diameter	⅜" (Standard) 1"
Option	45° Beveled Probe Tip

Table 6: SP-F Specifications	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Material of Construction	316/316L Stainless Steel (Standard) Others Available
Maximum Allowable Operating Pressure	150 ANSI Carbon Steel: 285 psig @ -20 °F to 100 °F (19 barg @ -28 °C to 37 °C) 150 ANSI Stainless Steel: 275 psig @ -20 °F to 100 °F (18 barg @ -28 °C to 37 °C) 300 ANSI Carbon Steel: 740 psig @ -20 °F to 100 °F (51 barg @ -28 °C to 37 °C) 300 ANSI Stainless Steel: 720 psig @ -20 °F to 100 °F (49 barg @ -28 °C to 37 °C) 600 ANSI Carbon Steel: 1480 psig @ -20 °F to 100 °F (102 barg @ -28 °C to 37 °C) 600 ANSI Stainless Steel: 1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C) 900 ANSI Carbon Steel: 2200 psig @ -20 °F to 100 °F (151 barg @ -28 °C to 37 °C) 900 ANSI Stainless Steel: 2160 psig @ -20 °F to 100 °F (148 barg @ -28 °C to 37 °C) 1500 ANSI Carbon Steel: 3705 psig @ -20 °F to 100 °F (255 barg @ -28 °C to 37 °C) 1500 ANSI Stainless Steel: 3600 psig @ -20 °F to 100 °F (248 barg @ -28 °C to 37 °C)
Pipeline Connection	Size: ¾", 1", 1½", 2", or 3" Rating: 150, 300, 600, 900, or 1500 ANSI Facing: RF or RTJ
Outlet Connection	None ¼" FNPT ⅜" FNPT ½" FNPT ¾" FNPT Others Available
Insertion Length	2" (5 cm) 4" (10 cm) 6" (15 cm) 8" (20 cm) 10" (25 cm) 12" (30 cm) 18" (45 cm) 22" (55 cm) Others Available
Probe Diameter	¼" ⅜" (Standard) ½" ⅝" ¾" 1½"
Options	45° Beveled Probe Outlet Valve Flow Arrow Stamped on Handle Electropolished and Sulfinert®-Treated Sample Exposed Parts NACE Compliance

1.4 Equipment Diagrams

Figure 1: SP-1 Diagram

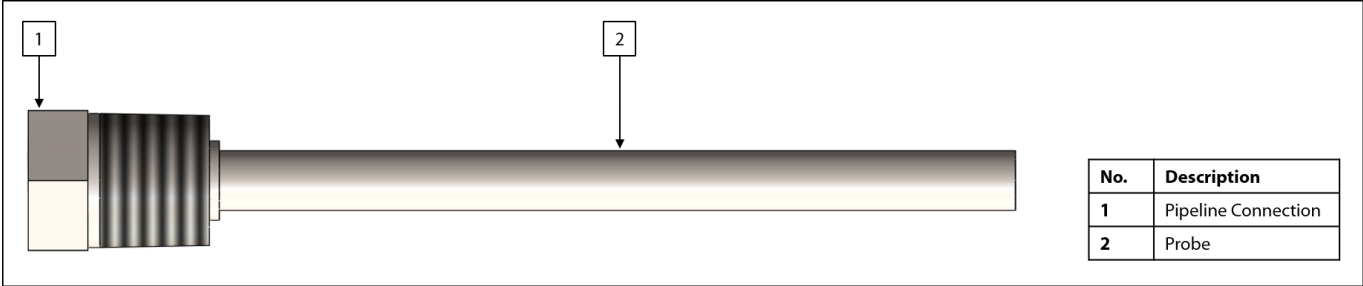


Figure 2: SP-1W Diagram

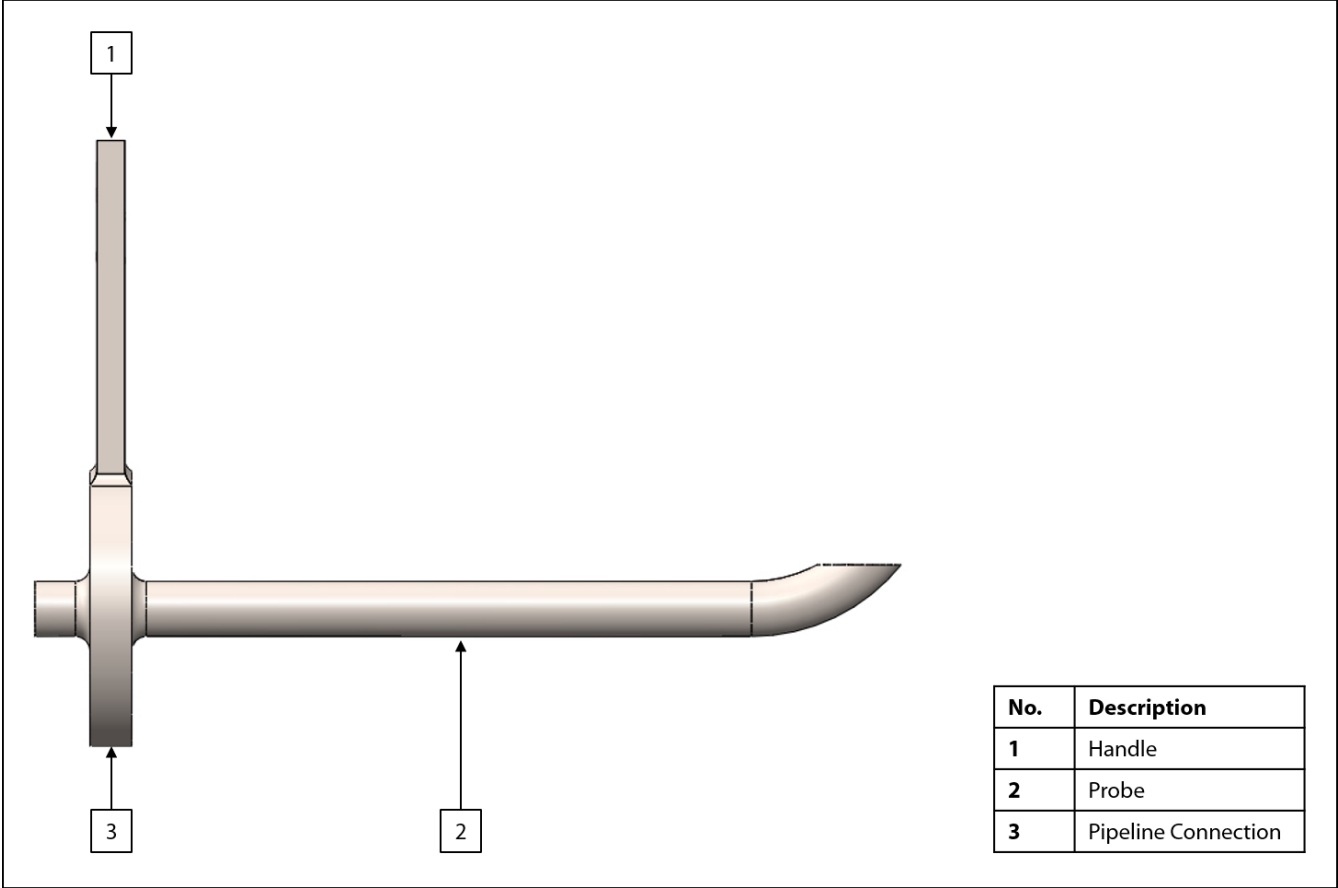


Figure 3: SP-2 Diagram

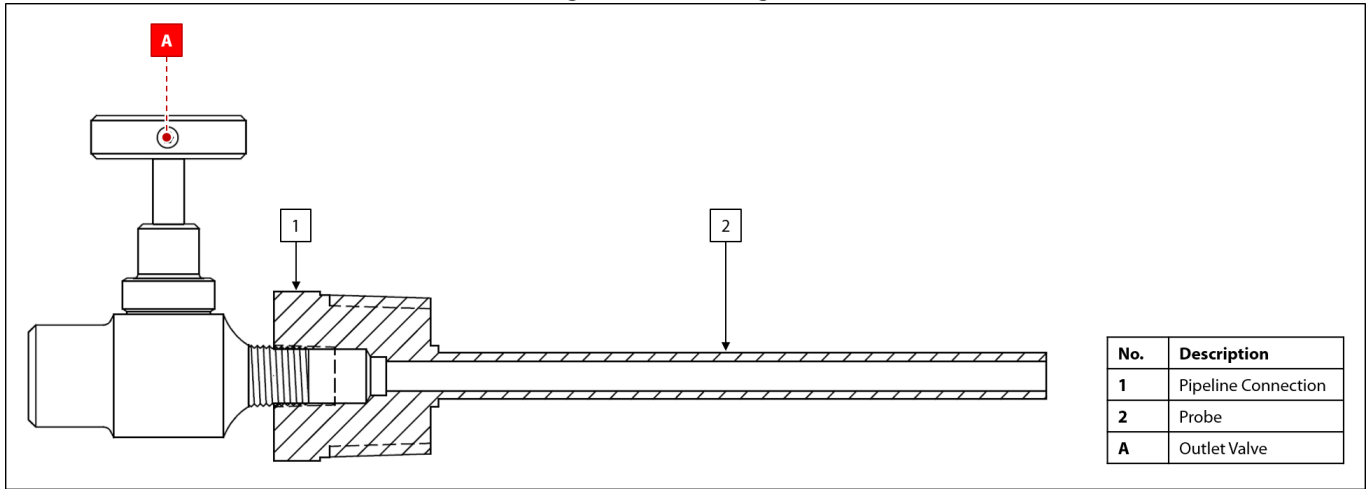


Figure 4: SP-3 Diagram

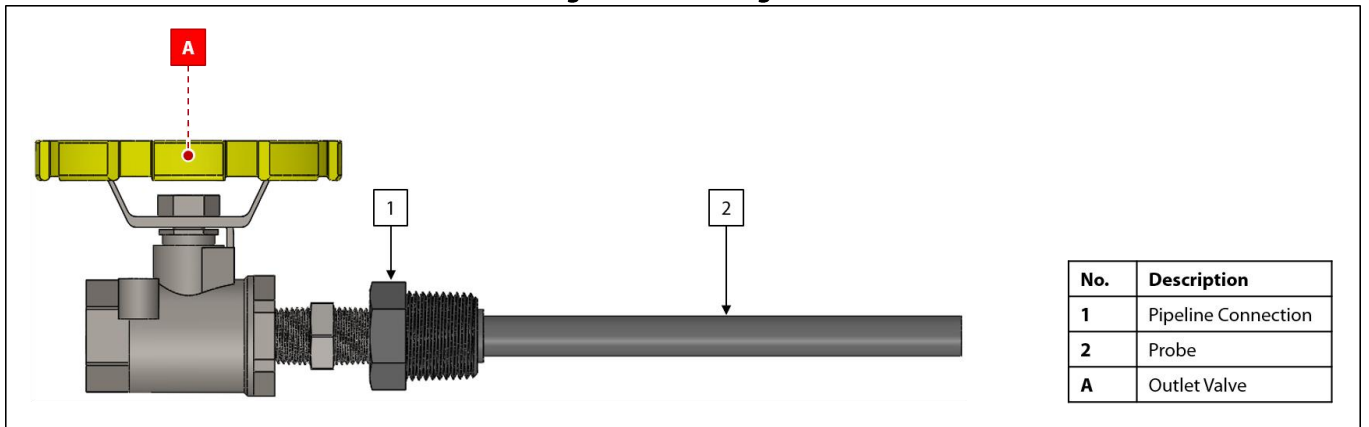


Figure 5: SP-5 Diagram

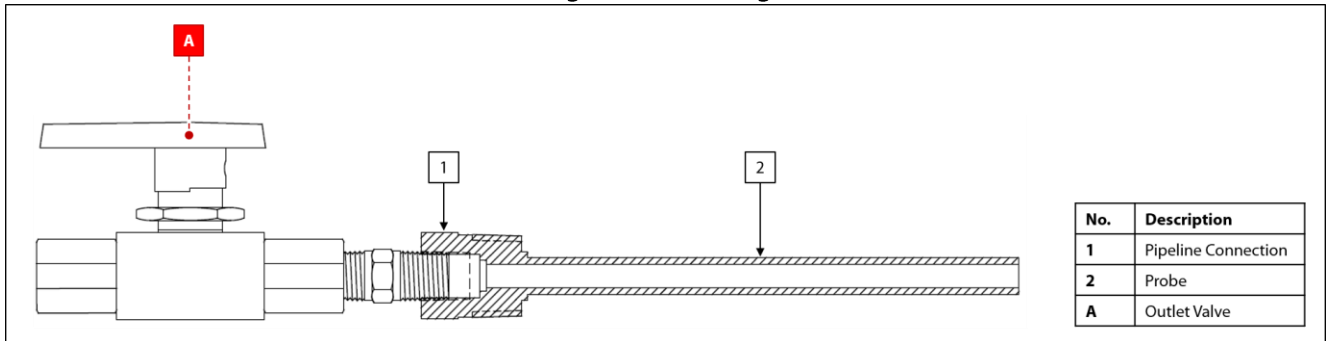
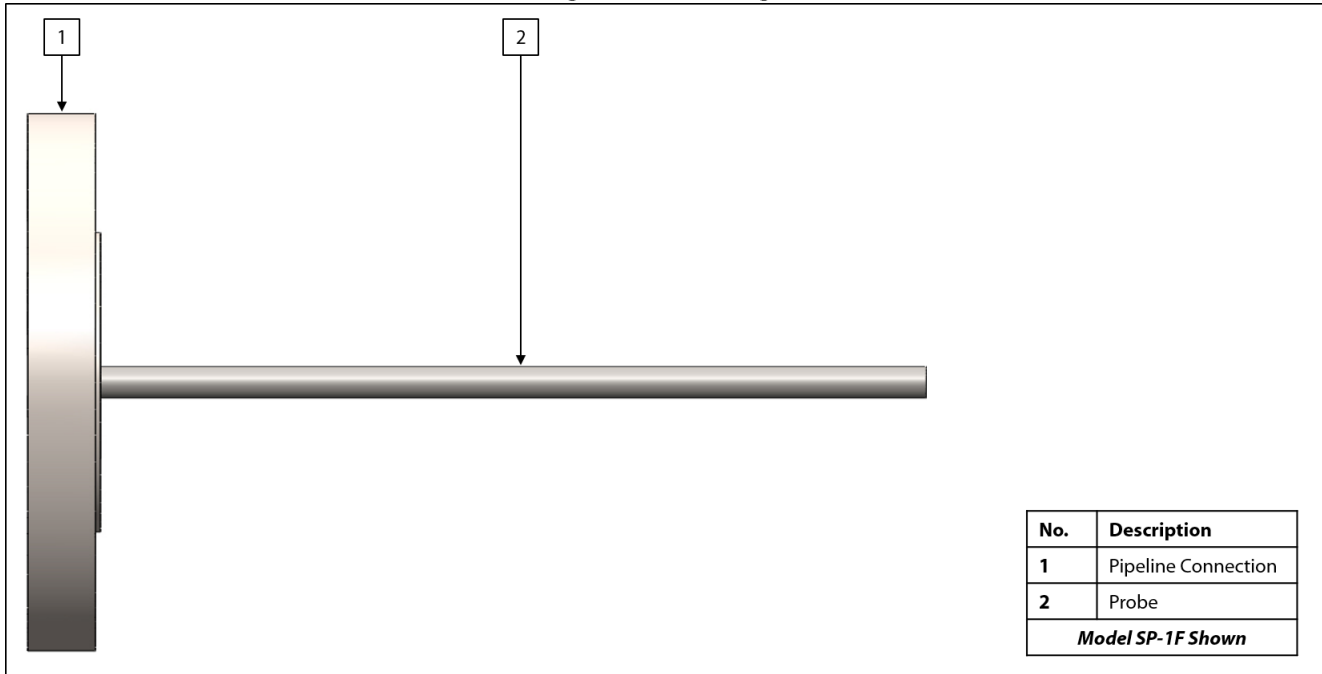


Figure 6: SP-F Diagram



2.1 Before You Begin



After unpacking the unit, check the equipment for compliance and any damage that may 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.

1. For sampling applications, Welker® recommends that the unit be inserted into the center one-third ($\frac{1}{3}$) of the pipeline in a location where the product is well-mixed and will yield an accurate and representative sample.
2. For siphoning applications, Welker® recommends that the unit be inserted into the liquids in the pipeline.
3. For gas sampling and siphoning applications, Welker® recommends that the unit be installed in the top of the pipe.
4. For liquid sampling applications, Welker® recommends that the unit be installed in the side of the pipe.
5. For liquid sampling applications, locate the unit two to four pipe diameters (2–4D) downstream of an inline static mixer or other flow conditioning system.
6. Handle the unit with care.

2.2 Installation and Operation

1. Depressurize the pipeline.



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

2. As necessary, install a valve to the pipeline connection (*Figure 1* or *Figure 6*). This will be outlet valve A.
3. Ensure that outlet valve A is closed (*Figure 3*, *Figure 4*, or *Figure 5*).
4. If the probe tip is scooped or beveled, determine the direction of product flow in the pipeline. Install the Sample Probe with the scooped or beveled tip according to company policy and procedure.



If applicable, refer to the flow direction stamped on the pipeline connection or handle to determine correct orientation before installing the Sample Probe to the pipeline.

5. If the Sample Probe has an MNPT pipeline connection, continue to step 6. If the Sample Probe has a flanged pipeline connection, proceed to step 9. If the Sample Probe has a wafer style pipeline connection, proceed to step 14.

MNPT Pipeline Connection

6. Wrap the threads of the threaded pipeline connection with PTFE tape.
7. Install the Sample Probe to the mating connection on the pipeline and tighten.
8. Proceed to step 21.

Flanged Pipeline Connection

9. Position an appropriately sized gasket on the mating flange connection.
10. Install the Sample Probe to the mating flange connection.
11. Following a cross-bolting sequence, install bolts and nuts to the flanges.
12. Tighten all bolts to the appropriate torque.
13. Proceed to step 21.

Wafer Style Pipeline Connection

14. Position an appropriately sized gasket on the mating flange connection.
15. Install the Sample Probe to the lower mating flange connection.
16. Position an appropriately sized gasket to the top of the Sample Probe.
17. Install the upper mating flange connection to the Sample Probe. Note that the upper mating flange connection should have a valve installed.
18. Following a cross-bolting sequence, install bolts and nuts to the flanges.
19. Tighten all bolts to the appropriate torque.
20. Continue to step 21.

Completing Installation

21. Pressurize the pipeline and check for leaks.
22. Use appropriately sized tubing to connect from outlet valve A to the customer equipment (*Figure 3, Figure 4, or Figure 5*).
23. Open outlet valve A to begin operation (*Figure 3, Figure 4, or Figure 5*).

2.3 Removing the Sample Probe

1. Depressurize the pipeline.



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

2. Close outlet valve A (*Figure 3, Figure 4, or Figure 5*).
3. Disconnect customer equipment from the outlet.
4. Remove the Sample Probe from the pipeline.

3.1 Before You Begin

1. **Maintenance is necessary if a leak occurs at the valve.**
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 may 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 adjustable wrenches available for maintenance. Please note that the exact tool required may vary by model.

3.2 Maintenance



Maintenance is needed when a leak occurs at the outlet valve.

- 1. Prior to performing maintenance, the Sample Probe must be removed from the pipeline. See *Section 2.3, Removing the Sample Probe*, for instructions on removing the Sample Probe from the pipeline.
- 2. Unscrew outlet valve A from the pipeline connection (*Figure 3, Figure 4, or Figure 5*).
- 3. To perform maintenance on outlet valve A, refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the valve.
- 4. As necessary, clean the probe.
- 5. Install outlet valve A to the pipeline connection (*Figure 3, Figure 4, or Figure 5*).
- 6. Maintenance is now complete. Reinstall the Sample Probe according to the instructions in *Section 2.2, Installation and Operation*.



Check valves for leaks and repair as necessary during reinstallation.

3.3 Troubleshooting

Table 7: Sample Probe Troubleshooting		
Issues	Possible Causes	Solutions
The outlet valve is leaking.	There is debris in the valve.	Maintain the valve. Refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the valve for maintenance instructions.
	The valve O-rings and/or seat are worn or damaged.	Maintain the valve. Refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the valve for maintenance instructions.

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

- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

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

- Apollo Valves 76-100 Series Stainless Steel Ball Valve With Mounting Pad 1/4" - 1" (Welker® IOM-V141)
- DK Amans Valve DSI Valves Forged Steel Carbon, Stainless and Alloy Gate, Globe and Check Valves (Welker® IOM-V426)
- Emerson Anderson Greenwood H7/H71 Hand Valves (Welker® IOM-V414)
- Parker Hannifin Corporation Ball Valves B Series (Welker® IOM-V365)
- Parker Hannifin Corporation Ball and Plug Valves (Welker® IOM-V213)
- Parker Hannifin Corporation Double Block and Bleed with Ultra-Low Emission options (Welker® IOM-V425)
- Swagelok Company Ball Valves 60 Series (Welker® IOM-V018)
- WIKA Instrument Corporation Bourdon Tube Pressure Gauges Type 232.53 & Type 233.53 (Welker® IOM-V171)

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

- Assembly Drawing: AD631AD (SP-F)
- Assembly Drawing: AD631BC (SP-2)
- Assembly Drawing: AD631BJ (SP-3)
- Assembly Drawing: AD631CO (SP-1)
- Assembly Drawing: AD631DB (SP-5)
- Machine Drawing: SP2918[][]A (SP-1W)

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