



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER VOLUME ADJUSTER

MODELS

PTVA-1
PTVA-1HP

DRAWING NUMBERS

AD758BB
AD758B0

MANUAL NUMBER

IOM-226

REVISION

Rev. 0, 1/3/2019

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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 Volume Adjusters, PTVA-1 and PTVA-1HP. 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 Volume Adjuster 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 Volume Adjuster, please contact a Welker representative immediately.

Phone: 281.491.2331

Address: 13839 West Belfort 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 may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker *PTVA-1* and *PTVA-1HP* Volume Adjusters are designed to manually control pressure when performing static calibrations.

The Volume Adjuster manifold has five (5) ports, so it can be connected to the calibration gas and the instrument being calibrated, while pressure is verified simultaneously using two (2) pressure gauges. A needle valve is installed to the remaining port, allowing the technician to bleed off pressure to reduce large errors before fine tuning the adjustment to reach the desired set point. If desired, the Volume Adjuster can be ordered with valves and an analog pressure gauge already installed.

Welker may custom design the PTVA-1 and PTVA-1HP 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: Volume Adjuster Specifications

Application	Static Calibration of Instruments
Materials of Construction	316/316L Stainless Steel, PTFE, and Viton®
Maximum Allowable Operating Pressure	Standard: 2160 psig @ -20 °F to 100 °F (148 barg @ -28 °C to 37 °C) High Pressure: 4000 psig @ -20 °F to 100 °F (275 barg @ -28 °C to 37 °C)
Connections	¼" FNPT
Utility Requirement	Pneumatic Calibration Standard
Feature	Handle for Manual Pressure Adjustment
Option	Analog Pressure Gauge and Two (2) Welker NV-1 Instrument Valves

1.4 Equipment Diagrams

Figure 1: PTVA-1 Diagram

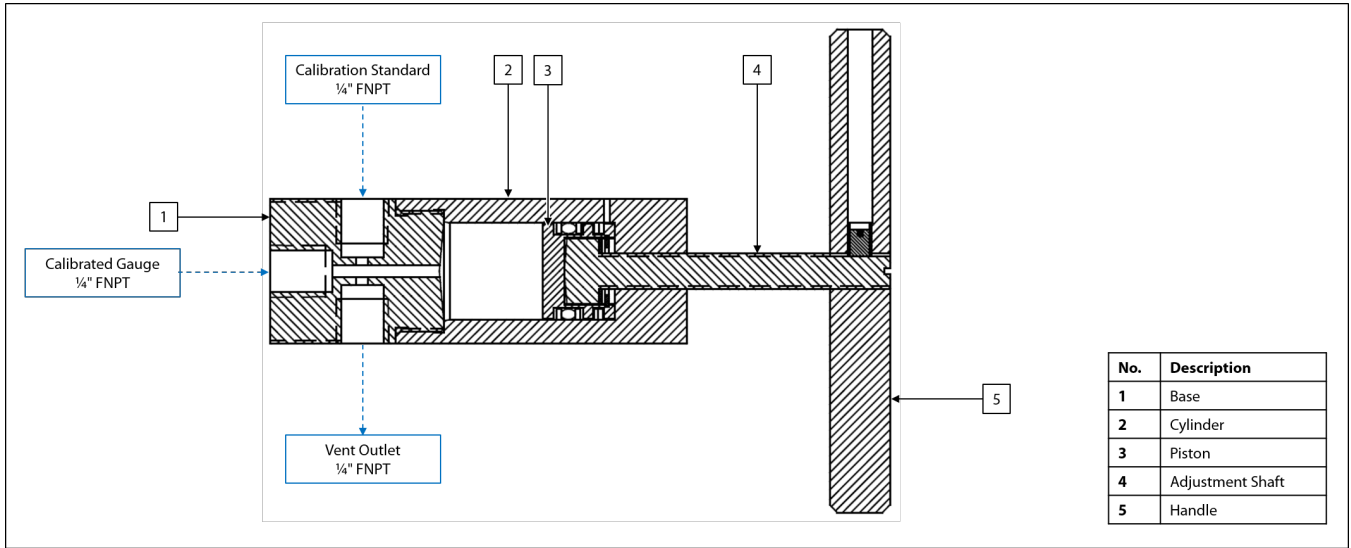
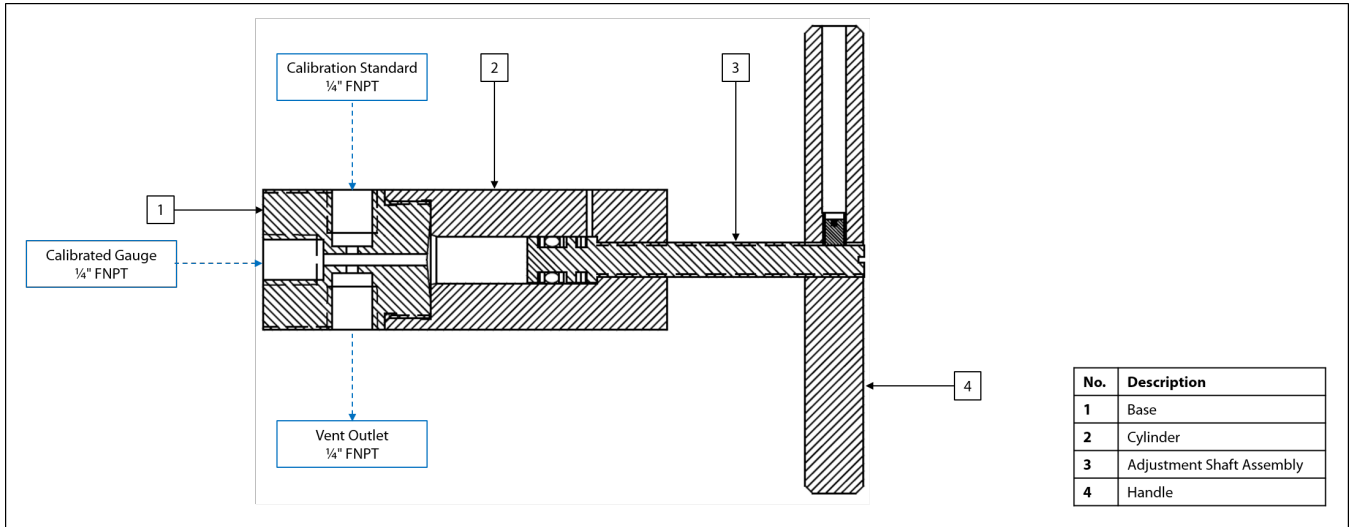


Figure 2: PTVA-1HP Diagram



SECTION 2: INSTALLATION & OPERATION

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.

2.2 Installation

1. As necessary, install a needle valve with a burst disc to the calibration standard port (*Figure 1 or Figure 2*). This will be calibration inlet valve A.
2. Connect from the customer-supplied calibration gas to calibration inlet valve A.
3. As necessary, install a needle valve to the vent outlet port (*Figure 1 or Figure 2*). This will be bleed valve B.
4. As necessary, install an analog pressure gauge to the port on the front of the Volume Adjuster between calibration inlet valve A and bleed valve B.
5. Using appropriately sized tubing, connect from the port on the rear of the Volume Adjuster between calibration inlet valve A and bleed valve B to the instrument requiring calibration.



DO NOT use black flex hose, as it can absorb heat, which can affect pressure readings.

6. Install a customer-supplied gauge to the calibrated gauge port (*Figure 1 or Figure 2*). The gauge may be electronic or large face analog.

2.3 Calibration Process



Refer to company procedures and appropriate standards prior to calibration.



Calibration should be performed by a control system technician with appropriate training. Document calibration in accordance with company policy and procedures.

Preparing the Volume Adjuster for Calibration

1. Ensure that calibration inlet valve A and bleed valve B are closed.
2. Turn the handle clockwise until the adjustment shaft is fully inserted. While turning the handle, be sure to count the number of rotations required to fully insert the adjustment shaft and then note the final number for future reference.
3. Divide the number of rotations required to fully insert the adjustment shaft by two (2). This is the number of rotations required to back the adjustment shaft halfway out of the cylinder. Note this number for future reference.
4. Turn the handle counterclockwise until the adjustment shaft has been backed out halfway. The number of rotations required was determined and noted in step 3.

Calibrating a Single Pressure Point

5. Open calibration inlet valve A, and then open the valve on the customer-supplied calibration gas.
6. Allow pressure inside the Volume Adjuster to build until it reaches the first set point, as verified by both pressure gauges.
7. Once the pressure has built to the desired point, close calibration inlet valve A.
8. Wait an appropriate amount of time to ensure a stable reading.
9. Check the pressure on the instrument being calibrated. If the error is large (i.e., there is a large difference in pressure readings between the gauges and instrument), continue to step 10. If the error is slight (i.e., there is a small difference in pressure readings between the gauges and instrument), proceed to step 14 for instructions on adjusting the pressure.

Large Pressure Adjustments

10. Slightly open bleed valve B to relieve pressure from the Volume Adjuster.
11. Close bleed valve B, and then wait an appropriate amount of time to ensure a stable reading.
12. Repeat steps 10–11 until the difference in pressure readings between the gauges and instrument are minimal.
13. If necessary, continue to step 14 to make fine pressure adjustments.

Fine Pressure Adjustments

14. To decrease the pressure in the Volume Adjuster, turn the handle counterclockwise. To increase the pressure in the Volume Adjuster, turn the handle clockwise.
15. Continue turning the handle in the appropriate direction until there is no difference in pressure readings or the difference in pressure readings is within the calibration tolerance.

Completing Calibration

16. Repeat steps 5–9 for the remaining pressure point(s) in the calibration range.
17. Once calibration is complete, disconnect the customer-supplied calibration gas from calibration gas inlet A, disconnect the instrument from the Volume Adjuster, and remove the customer-supplied gauge from the calibrated gauge port.

3.1 Before You Begin

1. **Maintenance is required when the cylinder leaks at the adjustment shaft assembly, one or both valves are leaking, and/or the burst disc is leaking.**
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.

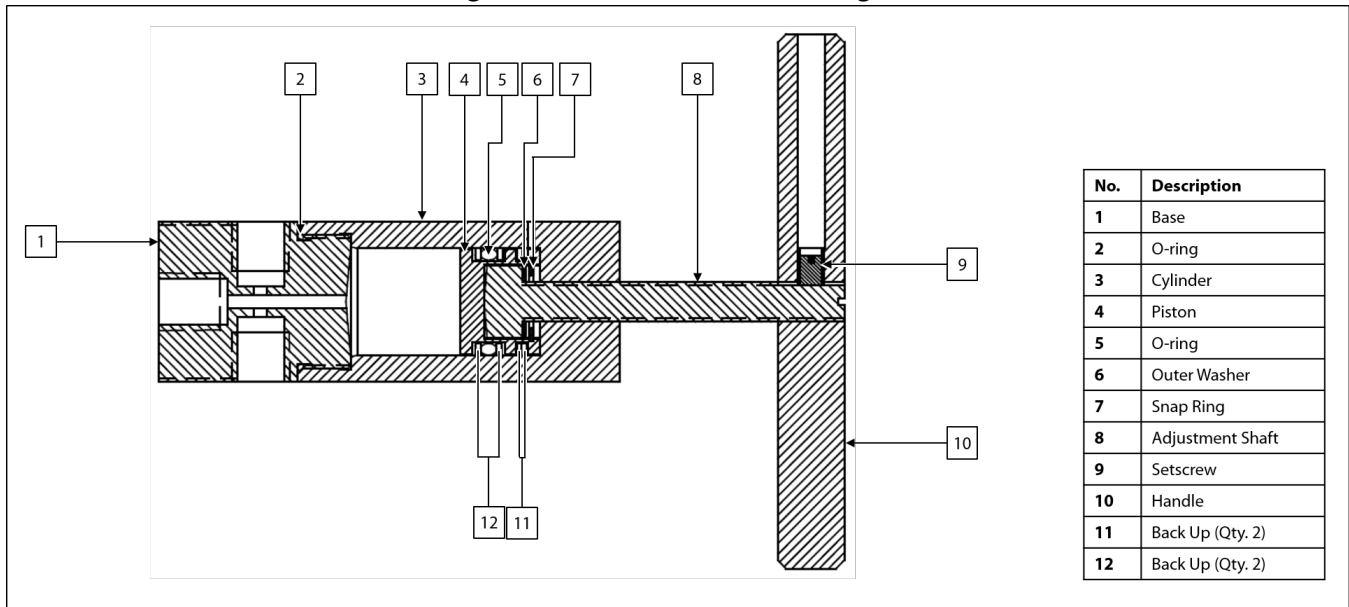


After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4. Welker recommends having the following tools available for maintenance. Please note that the exact tools required may vary by model.
 - a. Hex Key Set
 - b. Seal Pick
 - c. Snap Ring Pliers

3.2 Maintenance: PTVA-1

Figure 3: PTVA-1 Maintenance Diagram



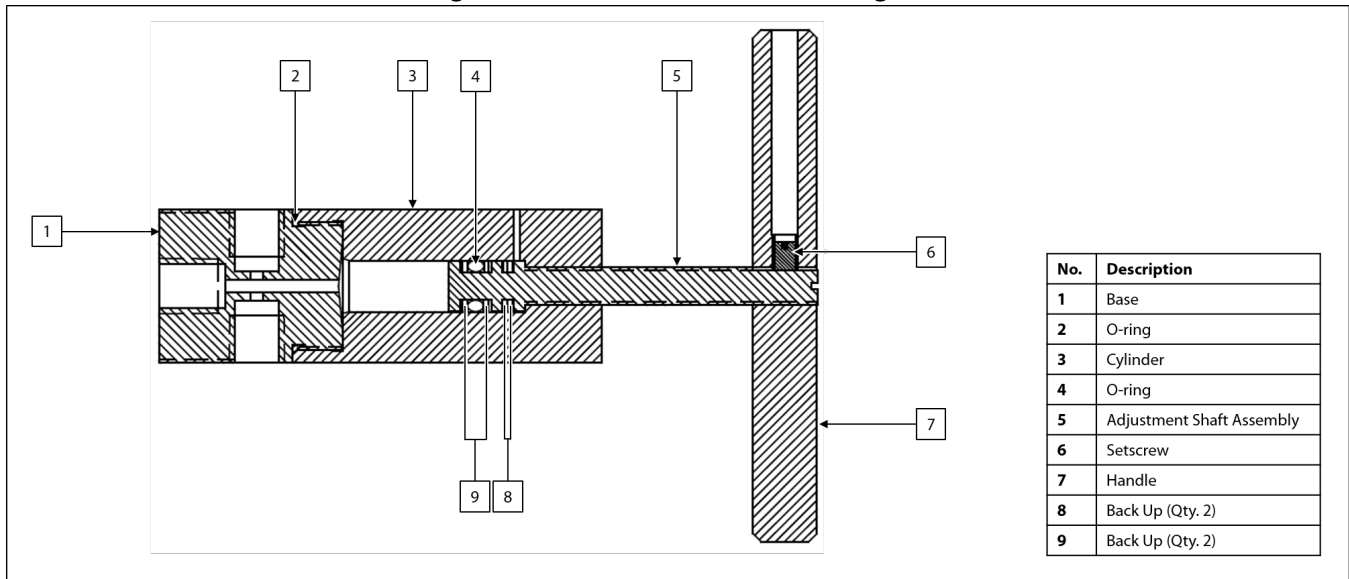
1. Ensure that the PTVA-1 has been disconnected from the instrument and calibration gas.
2. As necessary, maintain the valves. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the valves for instructions.
3. As necessary, maintain the burst disc. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the burst disc for instructions.
4. Loosen the setscrew in the handle, and then remove the handle from the adjustment shaft. Take care not to misplace the setscrew.
5. Unscrew the base from the cylinder, and then clean the base.
6. Turn the cylinder to unscrew it from the adjustment shaft.
7. Clean the cylinder.
8. Remove the snap ring and outer washer from the adjustment shaft. Inspect them for damage or wear. Replace as necessary.
9. Remove the O-ring and back ups from the piston.
10. Clean the piston.
11. Install replacement back ups and a replacement O-ring to the piston.
12. Insert the adjustment shaft through the bottom of the cylinder, and then turn the cylinder until the piston is at the top of the cylinder.
13. Screw the base into the cylinder.
14. Thread the handle onto the top of the adjustment shaft, and then tighten the setscrew to secure the handle to the adjustment shaft.
15. Maintenance is now complete. See *Section 2.2, Installation*, for instructions on installing the PTVA-1.



Check valves for leaks and repair as necessary during reinstallation.

3.3 Maintenance: PTVA-1HP

Figure 4: PTVA-1HP Maintenance Diagram



1. Ensure that the PTVA-1HP has been disconnected from the instrument and calibration gas.
2. As necessary, maintain the valves. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the valves for instructions.
3. As necessary, maintain the burst disc. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the burst disc for instructions.
4. Loosen the setscrew in the handle, and then remove the handle from the adjustment shaft. Take care not to misplace the setscrew.
5. Unscrew the base from the cylinder, and then clean the base.
6. Turn the cylinder to unscrew it from the adjustment shaft assembly.
7. Clean the cylinder.
8. Remove the O-ring and back ups from the adjustment shaft assembly.
9. Clean the piston.
10. Install replacement back ups and a replacement O-ring to the adjustment shaft assembly.
11. Insert the adjustment shaft assembly through the bottom of the cylinder, and then turn the cylinder until the adjustment shaft assembly is at the top of the cylinder.
12. Screw the base into the cylinder.
13. Thread the handle onto the top of the adjustment shaft, and then tighten the setscrew to secure the handle to the adjustment shaft assembly.
14. Maintenance is now complete. See *Section 2.2, Installation*, for instructions on installing the PTVA-1HP.



Check valves for leaks and repair as necessary during reinstallation.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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:

- WIKA Instrument Corporation 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: AD758BB (PTVA-1HP)
- Assembly Drawing: AD758BO (PTVA-1)

