WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL FOR WELKER® INSTRUMENT VALVES

MODELS
NV-1
NV-2

DRAWING NUMBERS
AD456AO.4 (NV-1)
AD456AG.K (NV-2)
NV1MM (NV-1)
NV1MFK (NV-1)
NV2MF (NV-2)

MANUAL NUMBER
IOM-105

REVISION
Rev. C, 09/10/2024

TABLE OF CONTENTS

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® Instrument Valves, Models NV-1 and NV-2. 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 these Instrument Valves 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 Instrument Valve, 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® *NV-1 and NV-2* Instrument Valves are large-ported needle-type valves designed for manual on/off flow applications for instrumentation. The NV-1 and NV-2 Instrument Valves feature ports with a globe design to reduce chilling due to the Joule-Thomson effect. Generally, the NV-1 and NV-2 valves are used with lighter, less-viscous liquids and with liquids and gases that have relatively low flow rates (see *Specifications* for flow coefficients).

Welker® might custom design the NV-1 and/or NV-2 Instrument Valve to suit the particular application and specifications of each customer.

Figure 1: Welker® Constant Pressure Cylinder Showing Three (3) Installed NV-1MF Valves (*Circled*)

1.3 Specifications

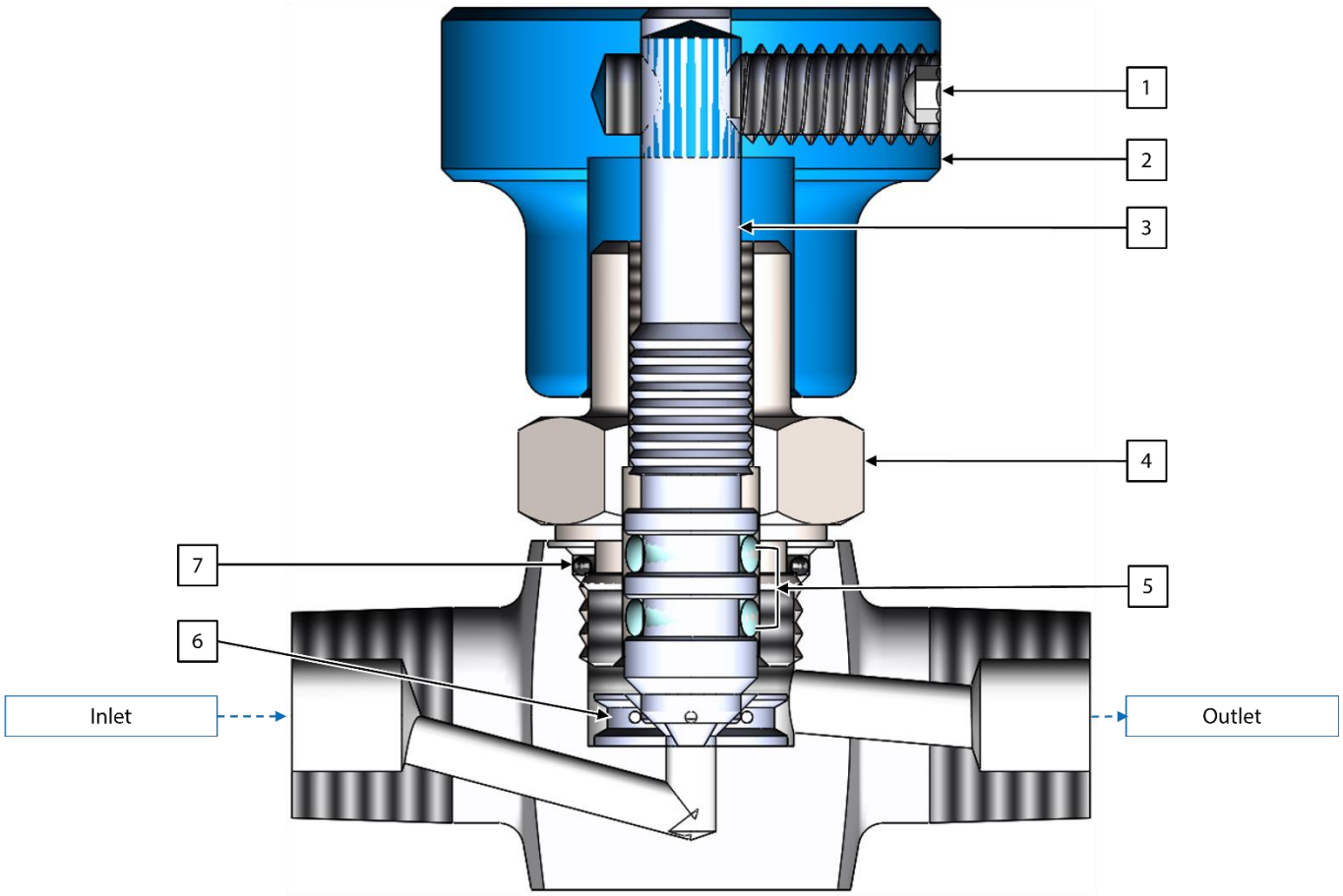
The specifications listed in this section are generalized for this unit. Welker® can modify the unit according to your company's needs. **Please note that the specifications might vary depending on the customization of your equipment.**

Table 1: Welker® Instrument Valves, Models NV-1 and NV-2 Specifications

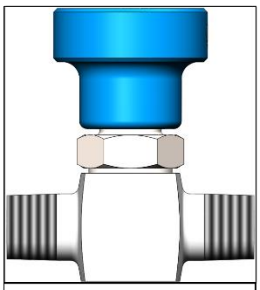
Products Sampled	Gases and Light Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, Aluminum (Handle Only), FFKM, and PTFE Others Available
Maximum Allowable Operating Pressure	6000 psig @ -20 °F to 392 °F (*413.68 barg @ -28.88 °C to 200 °C*)
Connections	¼" NPT (MM, MF, FF Configurations Available)
Seat	PCTFE (Standard) PTFE (Available) PEEK (Available)
Volume	**Flow Coefficient:** C_V for NV-1—.182 **Flow Coefficient:** C_V for NV-2—.290
Approximate Dimensions	**NV-1:** 2" x $^5/_8$" x $^5/_8$" (Length x Width x Height) **NV-2:** 2½" x 1¼" x 2½" (Length x Width x Height) (Others Available)
Feature	Aluminum Handle
Options	Rupture Disc Stainless Steel Handle CE Compliance NACE Compliance

1.4 Equipment Diagrams

Figure 2: Welker® Instrument Valve Model NV-1MM Diagram

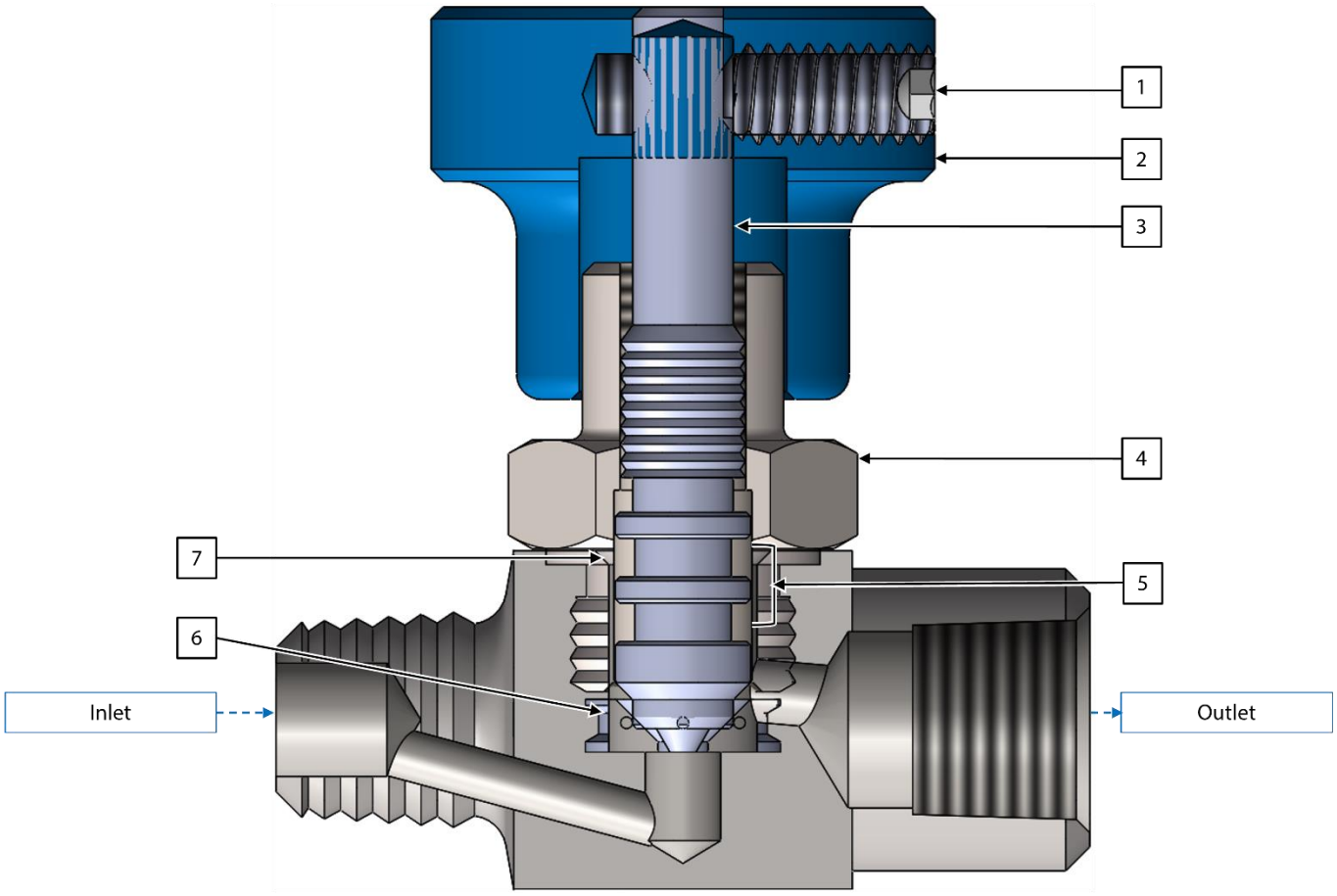


No.	Description
1	Hex Set Screw
2	Valve Handle (Aluminum)
3	Valve Stem
4	Bonnet
5	Small O-Rings (Qty = 2)
6	Seat
7	Large O-Ring

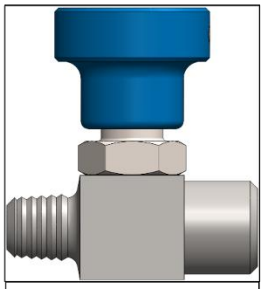


NV-1 Assembled With Body

Figure 3: Welker® Instrument Valve Model NV-1MF Diagram (Shown in Figure 1)

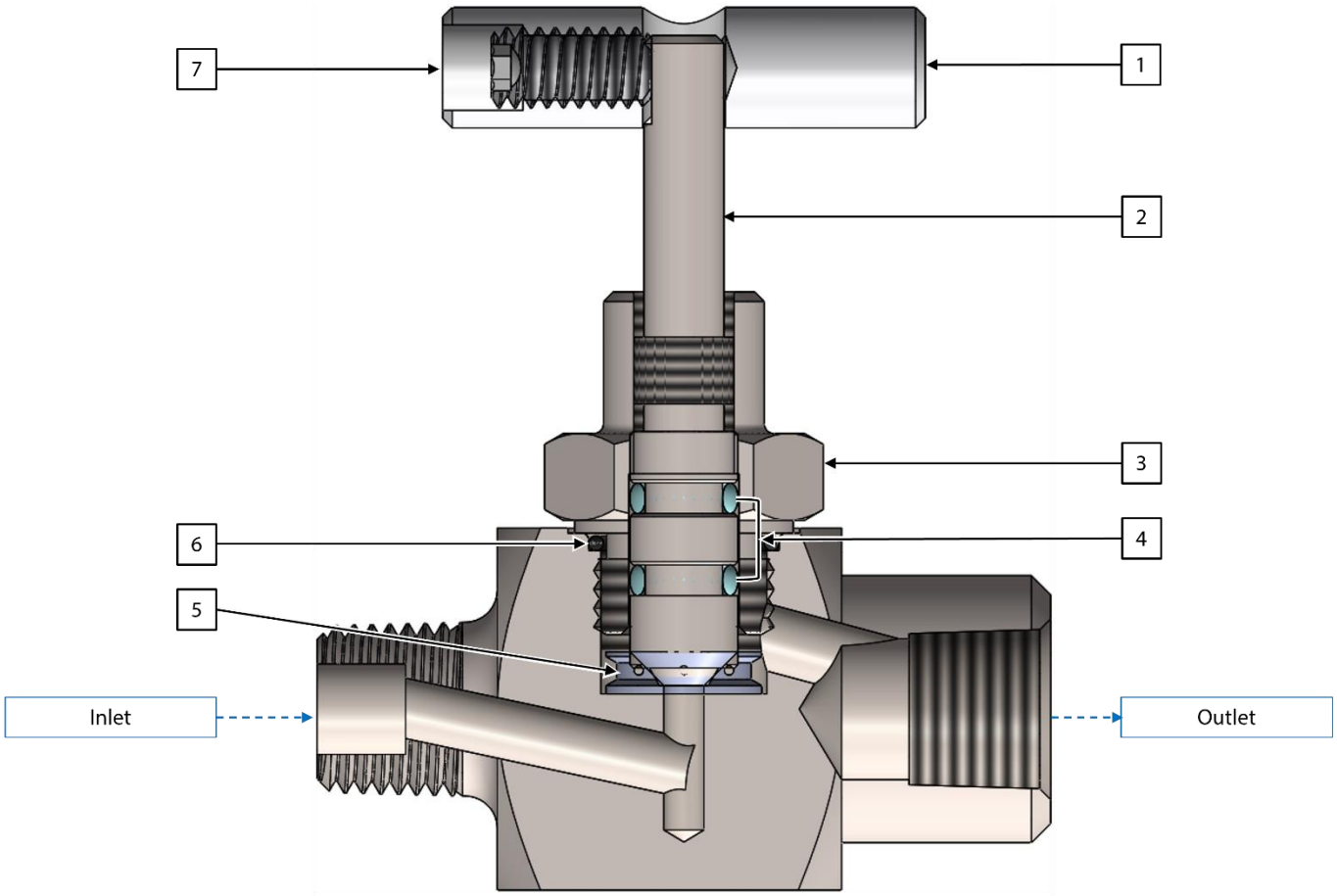


No.	Description
1	Hex Set Screw
2	Valve Handle (Aluminum)
3	Valve Stem
4	Bonnet
5	Small O-Rings (Qty = 2)
6	Seat
7	Large O-Ring

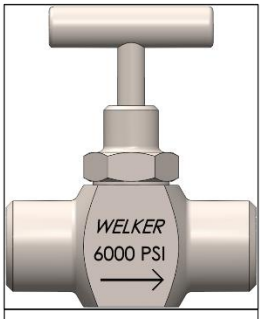


NV-1MF Assembled With Body

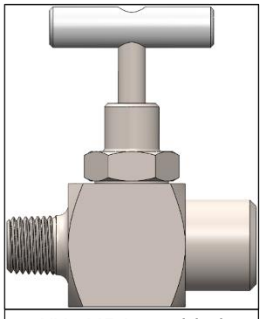
Figure 4: Welker® Instrument Valve Model NV-2MF Diagram



No.	Description
1	Valve Handle (Stainless Steel)
2	Valve Stem
3	Bonnet
4	Small O-Rings (Qty = 2)
5	Seat
6	Large O-Ring
7	Hex Set Screw



NV-1FF Assembled With Body, Markings, & Stainless Steel Handle



NV-2MF Assembled With Body & Stainless Steel Handle

SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the Welker® NV-1 and/or NV-2 Instrument Valve, check it for compliance and any damage that might have occurred during shipment. Immediately contact a Welker® representative if you received a damaged Instrument Valve.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.
When wrapping with PTFE tape, wrap clockwise 1½ to 2 wraps only and NOT over the first thread or the end of the valve.

To accomplish the installation and operation, Welker® recommends having the following items available:

1. Adjustable Wrench
2. PTFE Tape
3. Tweezers

2.2 Valve Installation

1. Placement of your valve or valves is likely on a larger product or system (see example in *Figure 1*). Refer to other relevant *Installation, Operation, and Maintenance* (IOM) *Manuals* for complete instructions on installing and operating your product or system.
2. Tighten fittings. Welker® Instrument Valves, Models NV-1 and NV-2 are available with male or female fittings on either opening of the body. Tighten the fittings on either the valve body (*Figure 2, Figure 3,* and *Figure 4*) or the application. Then seal the male fittings with PTFE tape. When wrapping with PTFE tape, wrap clockwise 1½ to 2 wraps only and NOT over the first thread or the end of the valve.
3. Check for leaks and repair or replace as necessary.

2.3 Valve Operation

1. Exercise caution in opening and closing your Instrument Valve. For example, before installing or removing the Instrument Valve, ensure that your pipeline is depressurized. Severe damage to equipment and personnel could result if this caution is ignored.

The pipeline MUST BE depressurized prior to installing and/or removing your Welker® Instrument Valve and/or any unit of which it is a part.

2. To open the valve, hand-turn it counterclockwise. To close the valve, hand-turn it clockwise until it is reasonably firmly shut. Do NOT over-torque.

Never use tools to tighten shut or open the valve. Hand-tighten only. At higher pressures, use only a reasonably firm grip. Excessive tightening can damage the seat (*Figure 2*, *Figure 3*, *Figure 4*, *Figure 5*, and *Figure 6*).

SECTION 3: MAINTENANCE

3.1 Before You Begin

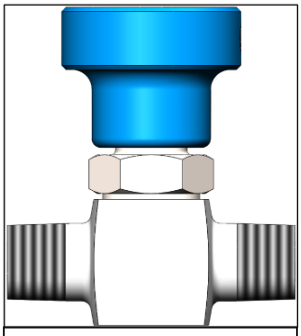
1. **Welker® recommends that the unit have standard maintenance every six (6) months under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that might lead to excess wear on the unit, a more frequent maintenance schedule might 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.

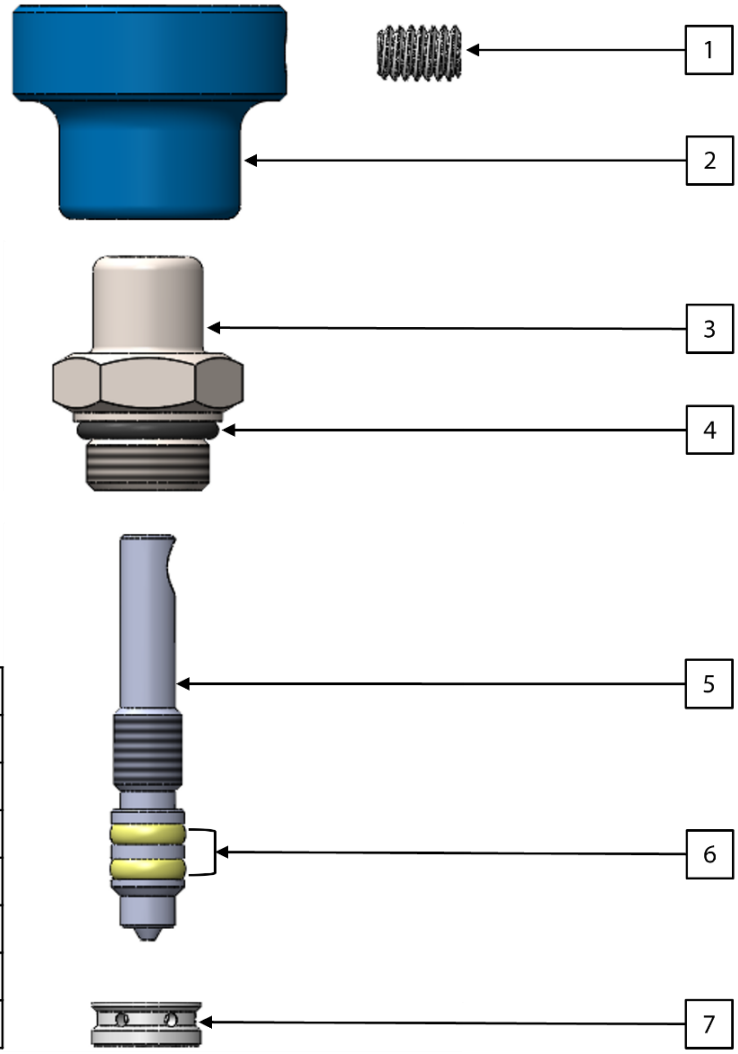
For sample-exposed seals, Welker® recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals, Welker® recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

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 might vary by model.
    a. Adjustable Wrench
    b. Hex Key Set
    c. Lubricant (See *Notes Above*)
    d. PTFE Tape
    e. Seal Kit
    f. Seal Pick

Figure 5: Welker® Instrument Valve Model NV-1 (With 1-Piece Seat) Maintenance Diagram

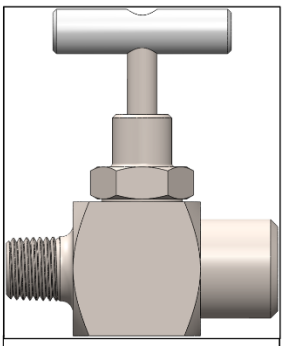


NV-1 Assembled With Body

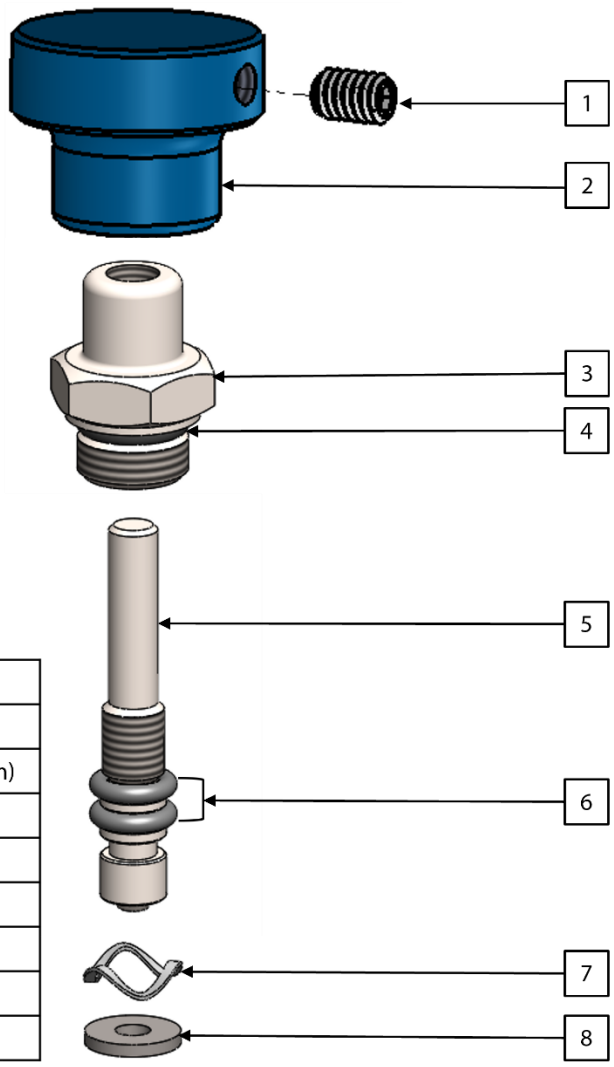


No.	Description
1	Hex Set Screw
2	Valve Handle (Aluminum)
3	Bonnet
4	Large O-Ring
5	Valve Stem
6	Small O-Rings (Qty = 2)
7	Seat

Figure 6: Welker® Instrument Valve Model NV-2 (With Retaining Ring) Maintenance Diagram



NV-2 Assembled
With Body &
Stainless Steel Handle



No.	Description
1	Hex Set Screw
2	Valve Handle (Aluminum)
3	Bonnet
4	Large O-Ring
5	Valve Stem
6	Small O-Rings (Qty = 2)
7	Retaining Ring
8	Seat

3.2 Maintenance

1. Before performing maintenance, be certain your pipeline is depressurized, if applicable. Severe equipment damage and/or bodily harm could result if this caution is ignored.

> The pipeline MUST BE depressurized prior to installing and/or removing your Welker® Instrument Valve and/or any unit of which it is a part.

2. Using an adjustable wrench, carefully loosen and remove the valve from the unit or system of which it is a part.

> Check all valves for leaks and repair or replace, as necessary.

3. Using a $^{1}/_{8}$ hex wrench, loosen the hex screw and remove the valve handle (*Figure 5* and *Figure 6*).
4. Using an adjustable wrench, loosen and remove the valve stem/bonnet assembly from the body (*Figure 5* and *Figure 6*).
5. Use a seal pick to carefully pick the seat (*Figure 2, Figure 3, Figure 4, Figure 5,* and *Figure 6*) and, if necessary, retaining ring (*Figure 6*) out of the valve body.

> Take care not to scratch the threads or the seating surface inside the body. Scratches on the surface or seals could cause the valve to leak.

6. Replace the seat (*Figure 2, Figure 3, Figure 4, Figure 5,* and *Figure 6*) and, if necessary, retaining ring (*Figure 6*).
7. Grasp the bottom of the valve stem. Then turn the bonnet clockwise until the valve stem comes out of the bottom of the bonnet (*Figure 5* and *Figure 6*).
8. Remove and replace the two small O-rings (*Figure 5* and *Figure 6*). Be careful not to overstretch, cut, tear, or twist the O-rings when rolling them over the end of the stem and into place.

> 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.

9. Lightly lubricate the threads on the valve stem (see *preceding notes* between step 8 and step 9).
10. Remove and replace the large O-ring on the bonnet (*Figure 5* and *Figure 6*). Be careful not to overstretch, cut, tear, or twist the O-ring when rolling it over the threads and into place.
11. Slide the top of the valve stem back through the bottom of the bonnet.
12. Hand-turn the bonnet counterclockwise until it will not longer turn and the valve stem is all the way up (*Figure 2, Figure 3,* and *Figure 4*). Failure to perform this step completely will likely result in a leak.
13. Thread the bonnet back into the valve body (*Figure 2, Figure 3,* and *Figure 4*). Then carefully tighten with an adjustable wrench.
14. Place the valve handle back onto the valve stem, making sure the hex screw is aligned with the etched-out portion of the valve stem (*Figure 2*, *Figure 3*, *Figure 4, Figure 5,* and *Figure 6*).
15. Place the valve back using the installation instructions in *Section 2*. Refer to any relevant *Installation, Operation, and Maintenance* (IOM) *Manual* for installation instructions on the complete product or system of which your valve is a part.

3.3 Troubleshooting Guidelines

Table 2: Welker® NV-1 and NV-2 Instrument Valves Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
	The bonnet is not turned enough.	Turn the bonnet counterclockwise until it will no longer turn and the valve stem is all the way up (see *Figure 2* and *Figure 3*).
	One or more of the O-rings are damaged.	Disassemble the valve according to instructions in *Section 3*. Examine the O-rings for damage and replace as necessary. Be careful not to overstretch, cut, tear, or twist the O-ring when rolling it over the threads and into place.
The valve is leaking.	The seat is damaged.	Disassemble the valve according to instructions in *Section 3*. Examine the seat for damage and replace as necessary.
	The threads or the seating surface inside the valve body could be scratched.	This is a rare occurrence because the valve body is made of stainless steel. However, should this occur, the valve body should likely be replaced. Having spare valve bodies and valve kits available would be advisable should this occur. Otherwise, please call Welker® for service options.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- None (Please refer to the *IOM* for the system of which this valve is a part.)

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

- None (Please refer to the *IOM* for the system of which this valve is a part.)

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

- Assembly Drawing: AD456AO.4 (NV-1 Valve Kit)
- Assembly Drawing: AD456AG.K (NV-2 Valve Kit)
- Valve Drawing: NV1MM (NV-1 Valve With Body, MM)
- Valve Drawing: NV1MFK (NV-1 Valve With Body, MF)
- Valve Drawing: NV2MF (NV-2 Valve With Body, MF)

NOTES

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