



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER INSTRUMENT REGULATOR

MODEL

ISD

DRAWING NUMBER

AD015C0

MANUAL NUMBER

IOM-237

REVISION

Rev. 0, 05/26/2021

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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 Instrument Regulator, ISD. 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 Instrument Regulator 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 Regulator, 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 *ISD* Instrument Regulator is designed to maintain downstream pressure control in analytical, process, sampling, or injection systems to protect sensitive equipment from costly damage. The ISD is a spring-loaded pressure-reducing valve designed to reduce a higher pressure filtered pneumatic supply to a lower outlet pressure safe for downstream instrumentation.

The ISD is a diaphragm-sensing instrument regulator suitable for use in general and corrosive environments.

The compact design of the ISD makes it suitable for small enclosures and panel mounting, and maintenance is made simple due to the knurled spring housing and requirement of common tools only.

Welker may custom design the ISD 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: ISD Specifications

Products	Gaseous Fluids or Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, Buna Nitrile, and PCTFE Others Available
Maximum Allowable Inlet Pressure	6000 psig
Temperature Range*	32 °F to 392 °F (0 °C to 200 °C)
Ports	Configuration A: ¼" FNPT Inlet (Qty. 1), ¼" FNPT Outlet (Qty. 3) Configuration B: ¼" FNPT Inlet (Qty. 2), ¼" FNPT Outlet (Qty. 2) Configuration C: ¼" FNPT Inlet (Qty. 2), ¼" FNPT Outlet (Qty. 2)
Pressure Control Ranges	0–25 psig 0–50 psig 0–100 psig 0–200 psig
Flow Coefficient (C_v)	0.02 0.06 0.10
Operation	Diaphragm-Operated
Weight	Approx. 2 lb
Options	(3) Port Configurations

*Operating at Temperatures Below 32 °F is Not Recommended and Could Result in Major Flow Reduction

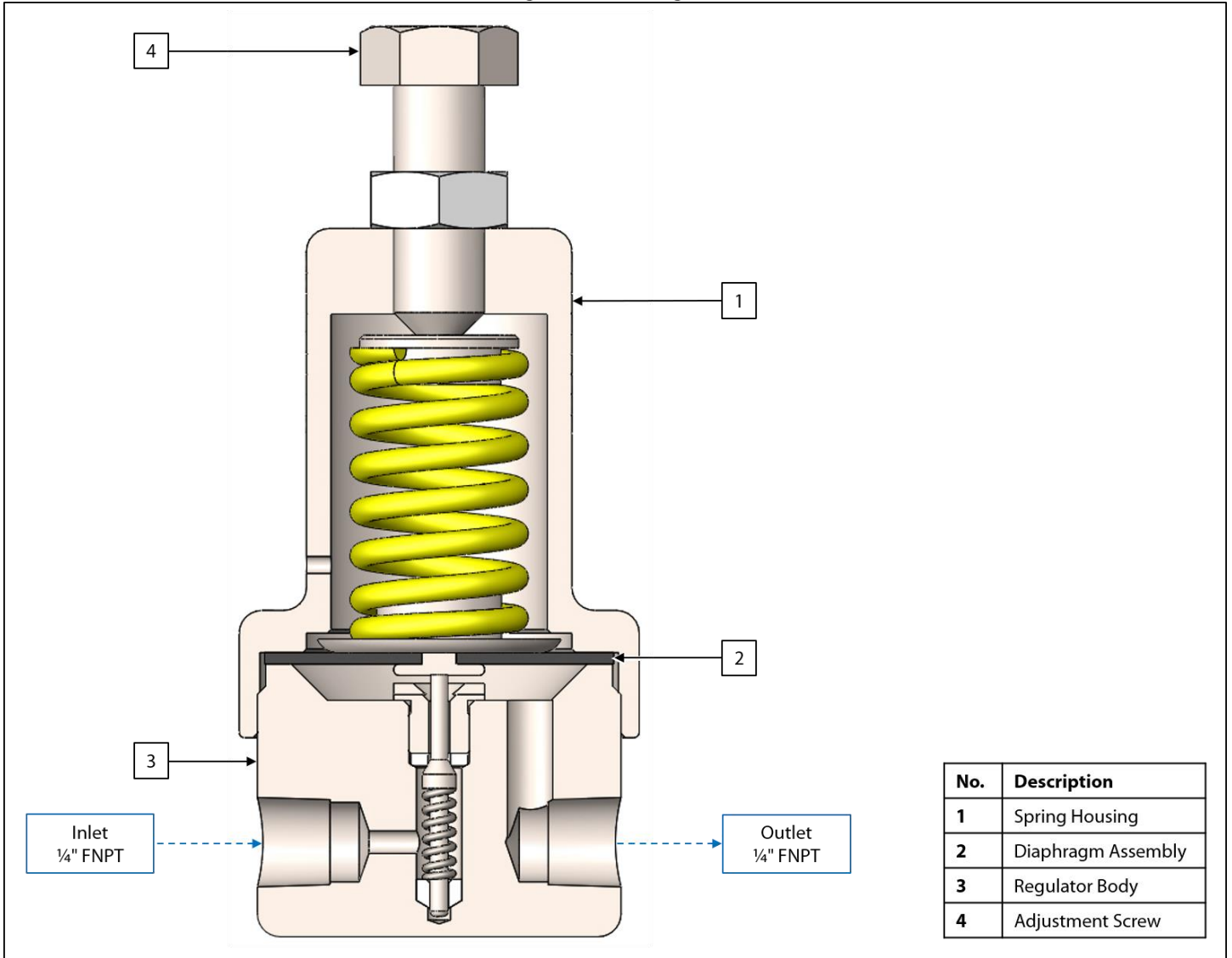
*May Vary Based on Seal Material



An upstream filter (25-micron minimum) and downstream relief are required.

1.4 Equipment Diagram

Figure 1: ISD Diagram



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin



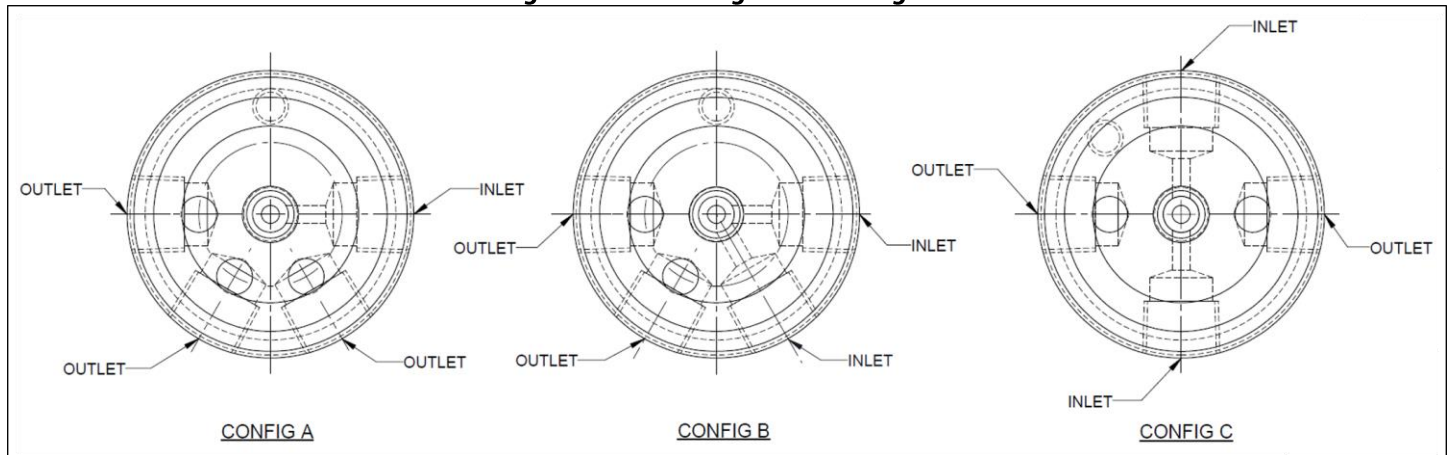
After unpacking the unit, check the equipment for compliance and any damage that may have occurred during shipment. Immediately contact a Welker representative if you received damaged equipment.



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

2.2 Installation

Figure 2: Port Configurations Diagram



1. As necessary, install a pressure gauge to one of the outlet ports on the ISD (Figure 2).
2. As necessary, install a relief valve to one of the outlet ports on the ISD (Figure 2).
3. Using ¼" tubing, connect from the upstream filter outlet to the inlet port of the ISD (Figure 1 and Figure 2).



DO NOT turn on the product supply at this time. Turning on the product supply before the relief has been set could over-pressurize the ISD.



Welker recommends installing an upstream filter (25-micron minimum) if the product has solid particles. The filter should be installed on the connection to the ISD inlet.

4. Using ¼" tubing, connect from the outlet port on the ISD to the inlet of the instrument being regulated (Figure 1 and Figure 2).

2.3 Setting the ISD

1. Use a safe auxiliary gas supply to set the relief valve to the proper pressure. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for instructions on setting the relief.



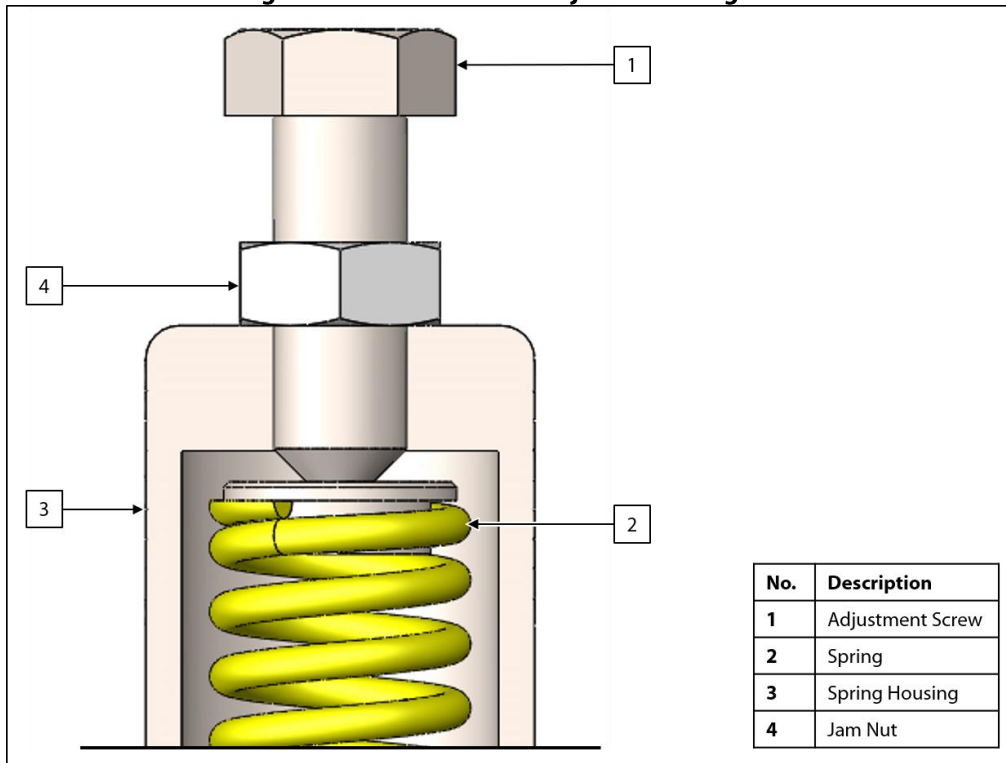
If the ISD is used to set the relief, DO NOT exceed the output pressure range of the ISD.



If a Welker relief valve is used, Welker can set the relief valve prior to shipment if noted at the time of order.

2. Turn ON the product supply to pressurize the inlet of the ISD.

Figure 3: Outlet Pressure Adjustment Diagram



3. Loosen or tighten the adjustment screw until the ISD outlet pressure gauge reads the desired outlet pressure (*Figure 1* and *Figure 3*).
4. Tighten the jam nut on the adjustment screw to secure the adjustment screw at the desired outlet pressure (*Figure 3*).
5. The ISD is now operational.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker recommends that the unit have standard yearly maintenance.** Based on the operating conditions and/or site requirements, adjustments to the maintenance schedule may be necessary.
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.

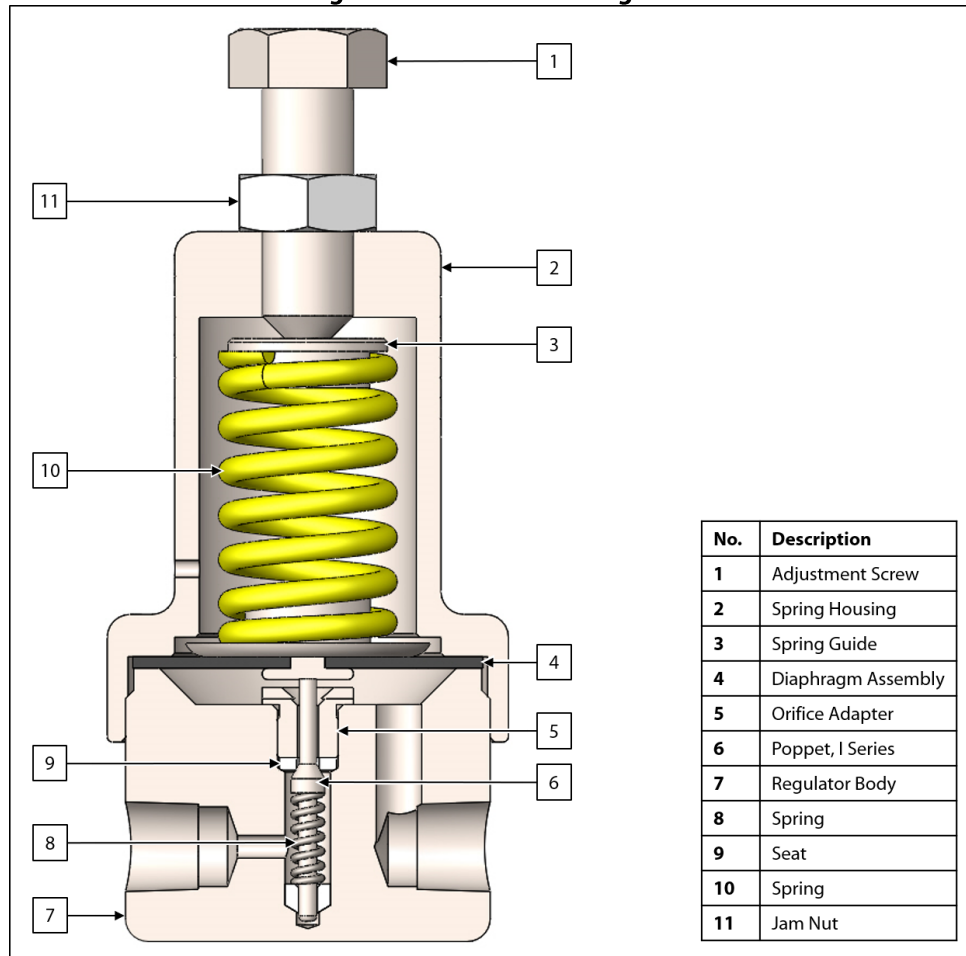
3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4. Welker recommends having the following tools available for maintenance. Please note that the exact tools required may vary by model.
 - a. $\frac{5}{8}$ " Hex Socket
 - b. 8"–12" Crescent Wrench

3.2 Maintenance



Maintenance should not be performed on the ISD until the ISD has been isolated from all pressure.

Figure 4: Maintenance Diagram



1. Turn OFF product supply to the inlet of the ISD.
2. Disconnect the product supply from the inlet port of the ISD (*Figure 1* and *Figure 2*).
3. Disconnect the customer-supplied tubing or other fittings from the outlet port of the ISD (*Figure 1* and *Figure 2*).
4. Loosen the jam nut on the adjustment screw (*Figure 4*).
5. Loosen the adjustment screw to relieve tension on the spring (*Figure 4*).
6. Unscrew the spring housing from the regulator body (*Figure 4*).
7. Remove the spring guide and the spring (*Figure 4*).
8. Remove the diaphragm assembly (*Figure 1* and *Figure 4*). Inspect for wear and replace if necessary.
9. Remove the orifice adapter (*Figure 4*). Inspect for wear and replace if necessary.
10. Remove and replace the seat (*Figure 4*).
11. Remove the poppet and spring (*Figure 4*). Inspect both for wear and replace if necessary.
12. Set the spring and poppet back into place (*Figure 4*).
13. Return the seat and orifice adapter to the regulator body (*Figure 4*).



Debris or scratches on either the poppet or seat will prevent positive shut off of the ISD.

14. Set the diaphragm assembly back into place (*Figure 1* and *Figure 4*).
15. Set the spring back into place (*Figure 4*).
16. Set the spring guide into place on top of the spring (*Figure 4*).
17. Reattach the spring housing securely to the regulator body (*Figure 4*).



When reattaching the spring housing to the regulator body, HAND-TIGHTEN ONLY.

18. The ISD is now ready for installation. See *Section 2.2, Installation*, for instructions on installing the ISD.

3.3 Troubleshooting

Table 2: ISD Troubleshooting		
Issues	Possible Causes	Solutions
There is no pressure and/or flow observed on the ISD outlet after adjustment.	Inlet pressure has not been opened to the ISD.	Open all valves upstream of the ISD to allow inlet pressure to enter the ISD.
Outlet pressure is not stabilized and increasing after adjustment.	The seat is leaking due to debris.	Repair and/or replace the seat (<i>Figure 4</i>). Install a 25-micron filter to the inlet of the ISD to avoid debris (<i>Figure 1</i>).
The relief valve downstream of the ISD is relieving.	The seat is leaking and is damaged due to incompatible media and/or exceeding the maximum allowable operating temperature range.	Ensure compatible media is being used within the maximum allowable operating temperature range of the ISD. See <i>Table 1: ISD Specifications</i> for more information regarding compatible media and the maximum allowable operating temperature range.
Pressure is leaking from the vent hole.	The diaphragm has been damaged due to over-pressurization.	Repair and/or replace the diaphragm (<i>Figure 5</i>).
Outlet pressure and flow is reduced.	Filters upstream of the ISD are clogged with debris. Inlet pressure has been reduced.	Clean or replace all filters to restore an adequate pneumatic supply. Increase the inlet pressure to an appropriate level for the desired operation.
The ISD outlet pressure set point changes.	Inlet pressure is fluctuating and not stabilized.	Ensure the inlet pressure is maintained at a constant and stabilized pressure.
The ISD vibrates and emits noise at a certain pressure range.	Unstable flow conditions on the outlet are causing internal vibrations from the poppet and diaphragm.	Open the outlet valve slowly to allow stabilization of the pressure and flow. Limit the outlet pressure drop on the valve.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- None

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

- None

Welker drawings and schematics suggested for use with this unit:

- Assembly Drawing: AD015CO

