INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER INSTRUMENT REGULATOR

MODEL
ISPE

DRAWING NUMBER
AD015E0

MANUAL NUMBER
IOM-238

REVISION
Rev. 0, 03/30/2022

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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, ISPE. 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

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

The ISPE is a piston-sensing instrument regulator suitable for regulating air and light gases, such as hydrogen, and is suitable for use in general and corrosive environments.

The compact design of the ISPE makes it suitable for small enclosures and panel mounting. No special tools are required, making maintenance quick and simple.

Welker may custom design the ISPE 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.**

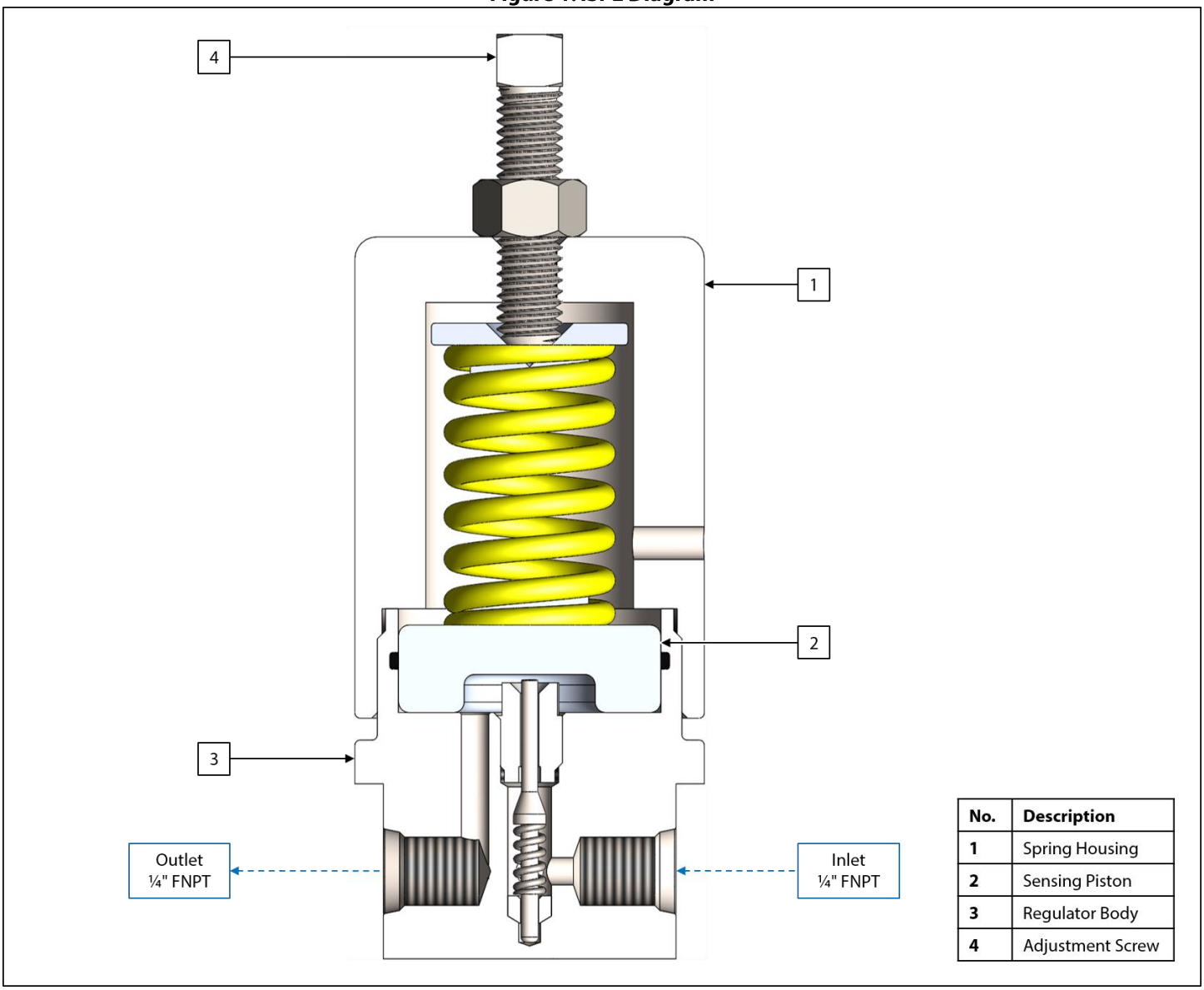
Table 1: ISPE Specifications	
Products	Natural Gas and Gases Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, Aluminum, Nickel-Plated Aluminum, PCTFE, Plastic, and Viton® Others Available
Maximum Allowable Inlet Pressure	**Nickel-Plated Aluminum Body:** 2160 psig (*148 barg*) **Plastic Body:** 500 psig (*34 barg*)
Temperature Range*	32 °F to 392 °F (*0 °C to 200 °C*) Others Available
Ports	¼" FNPT or SAE Inlet, Outlet, Relief, and Gauge
Pressure Control Ranges	0–25 psig (*0–1.7 barg*) 0–50 psig (*0–3.4 barg*) 0–100 psig (*0–6.8 barg*) 0–200 psig (*0–13.7 barg*)
Flow Coefficient (C_V)	0.02 0.06 0.10
Weight	Approx. 0.5 lb (*0.2 kg*)
Features	Aluminum and/or Plastic Body and Trim (Plastic Standard) Compact Design
Options	(2) Port Configurations Nickel-Plated Aluminum Body Low, Medium, and High Capacity Options Low, Medium, and High Stabilizer Options

*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: ISPE Diagram



No.	Description
1	Spring Housing
2	Sensing Piston
3	Regulator Body
4	Adjustment Screw

SECTION 2: INSTALLATION & OPERATION

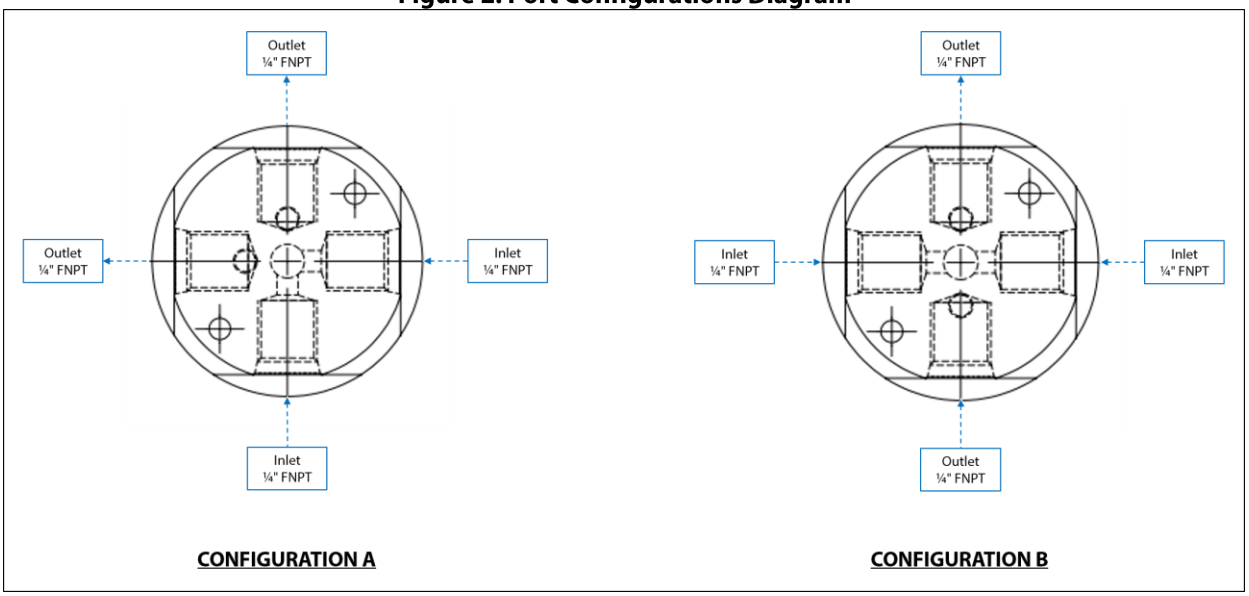
2.1 Before You Begin

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

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 ISPE inlet.

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

2.3 Setting the ISPE

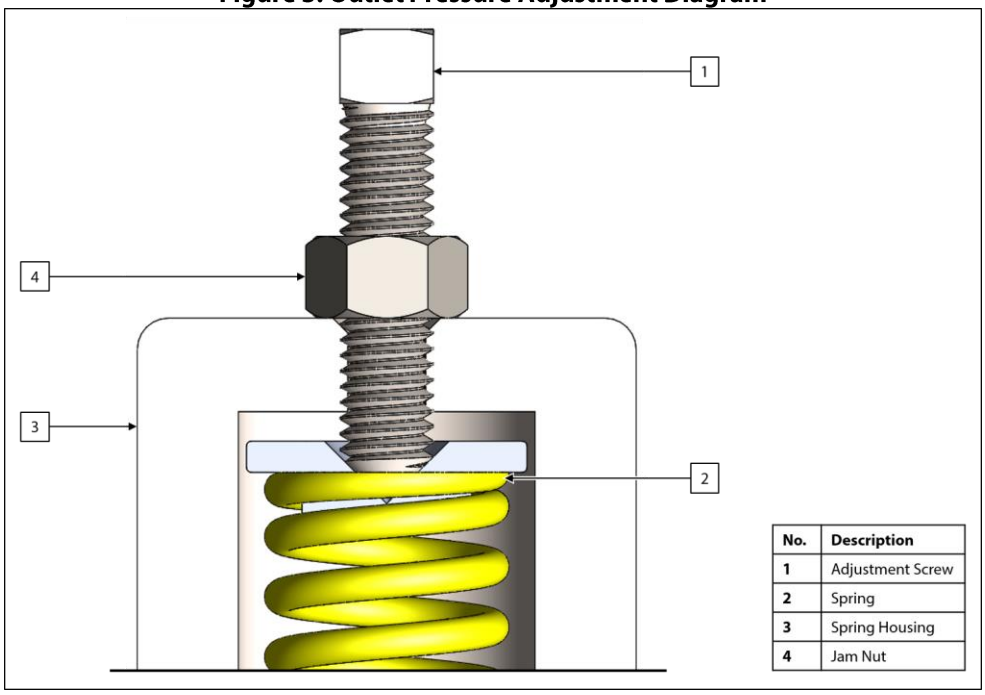
1. Use a safe auxiliary gas supply to set the relief valve to the proper pressure. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the relief valve for instructions on setting the relief.

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

> 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 ISPE.

Figure 3: Outlet Pressure Adjustment Diagram



No.	Description
1	Adjustment Screw
2	Spring
3	Spring Housing
4	Jam Nut

3. Loosen or tighten the adjustment screw until the ISPE 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 1* and *Figure 3*).
5. The ISPE 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.

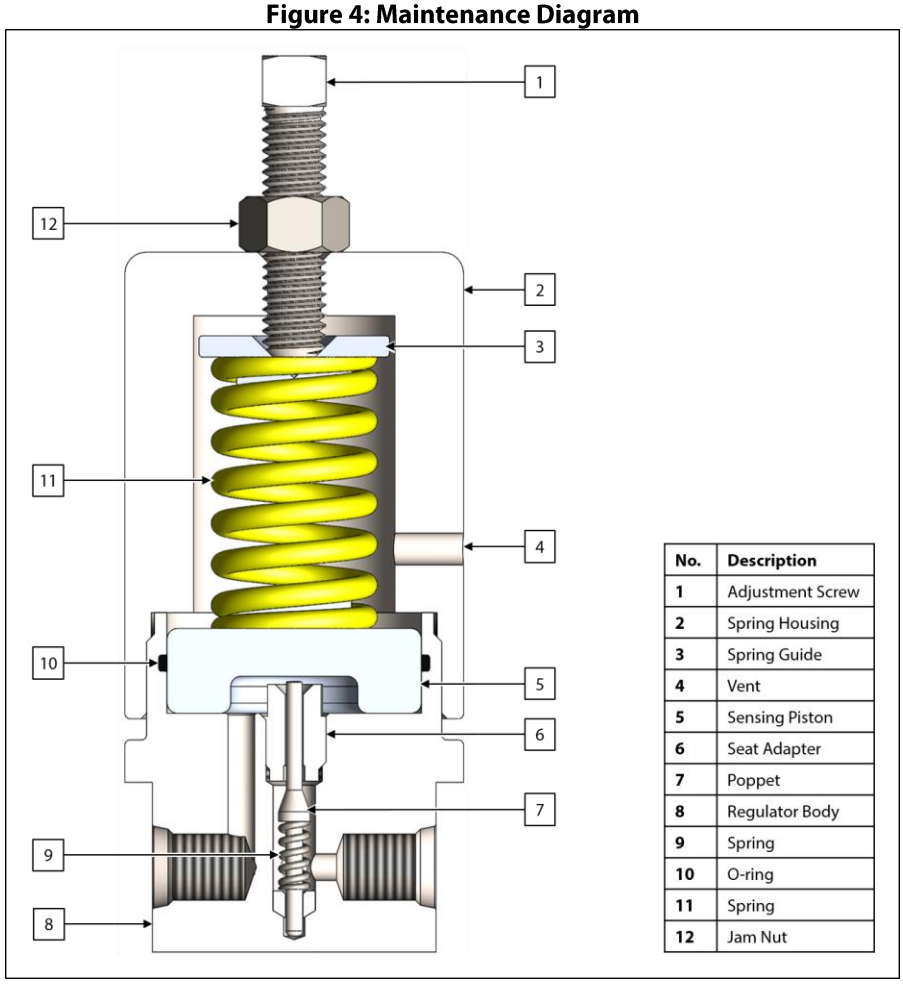
For sample-exposed seals, Welker recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals, Welker recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

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. ¼" Metal Rod
    b. 8–12" Crescent Wrench
    c. Adjustable Pliers
    d. Small Adjustable Wrench

3.2 Maintenance

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

Figure 4: Maintenance Diagram



No.	Description
1	Adjustment Screw
2	Spring Housing
3	Spring Guide
4	Vent
5	Sensing Piston
6	Seat Adapter
7	Poppet
8	Regulator Body
9	Spring
10	O-ring
11	Spring
12	Jam Nut

1. Turn OFF product supply to the inlet of the ISPE.
2. Disconnect the product supply from the inlet port of the ISPE (*Figure 1* and *Figure 2*).
3. Disconnect the customer-supplied tubing or other fittings from the outlet port(s) of the ISPE (*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 1* and *Figure 4*).

It may be necessary to place a ¼" metal rod in the spring housing vent to obtain better leverage when tightening or loosening the spring housing. DO NOT place the ISPE in a vice or other clamping device as this may damage the unit.

7. Remove the spring guide and the spring (*Figure 3* and *Figure 4*).
8. Carefully remove the sensing piston with a pair of adjustable pliers (*Figure 1* and *Figure 4*). Inspect for wear and replace if necessary.
9. Remove the seat adapter (*Figure 4*). Inspect for wear and replace if necessary.
10. Remove the poppet and spring (*Figure 4*). Inspect both for wear and replace if necessary.
11. Set the poppet and spring back into place (*Figure 4*).
12. Return the seat adapter to the regulator body (*Figure 4*).

Debris or scratches on the poppet or seat will prevent positive shutoff of the ISPE.

13. Set the sensing piston back into place (*Figure 1* and *Figure 4*).
14. Set the spring on top of the sensing piston (*Figure 3* and *Figure 4*).
15. Set the spring guide into place on top of the spring (*Figure 3* and *Figure 4*).
16. Reattach the spring housing securely to the regulator body (*Figure 1* and *Figure 4*).

It may be necessary to place a ¼" metal rod in the spring housing vent to obtain better leverage when tightening or loosening the spring housing. DO NOT place the ISPE in a vice or other clamping device as this may damage the unit.

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

3.3 Troubleshooting

Table 2: ISPE Troubleshooting		
Issues	**Possible Causes**	**Solutions**
There is no pressure and/or flow observed on the ISPE outlet after adjustment.	Inlet pressure has not been opened to the ISPE.	Open all valves upstream of the ISPE to allow inlet pressure to enter the ISPE.
Outlet pressure is not stabilized and increasing after adjustment.	The seat adapter is leaking due to debris.	Repair and/or replace the seat adapter (*Figure 4*). Install a 25-micron filter to the inlet of the ISPE to avoid debris (*Figure 1*).
The relief valve downstream of the ISPE is relieving.	The seat adapter 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 ISPE. See *Table 1: ISPE Specifications* for more information regarding compatible media and the maximum allowable operating temperature range.
Pressure is leaking from the spring housing vent.	The sensing piston has been damaged due to over-pressurization.	Repair and/or replace the sensing piston (*Figure 1* and *Figure 4*).
Outlet pressure and flow is reduced.	Filters upstream of the ISPE 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 ISPE 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 ISPE vibrates and emits noise at a certain pressure range.	Unstable flow conditions on the outlet are causing internal vibrations from the poppet and sensing piston.	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: AD015EO

NOTES

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