Installation, Operation, and Maintenance Manual

Welker® High Pressure Instrument Regulator

Model

IR-1T HP

Drawing No.: AD028BE
Manual No.: IOM-139

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 above. Correct operating and/or installation techniques, however, are the responsibility of the end user. Welker® reserves the right to make changes to this and all products in order to improve performance and reliability.

This manual is intended to be used as a basic installation and operation guide for the Welker® High Pressure Instrument Regulator, *IR-1T HP*. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is given in the Appendix section of this manual.

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Section 1:

SPECIFICATIONS

1.1 INTRODUCTION

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this product becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manual* 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 1-800-776-7267 (USA) or 1-281-491-2331.

Notes, Cautions, and Warnings

Notes emphasize information or set it off from the surrounding text.

Caution messages appear before procedures that, if not observed, could result in damage to equipment.

Warnings are alerts to a specific procedure or practice that, if not followed correctly, could cause personal injury.

*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 DESCRIPTION OF PRODUCT

The Welker® Instrument Regulator *IR-1T HP* is a non-bleed, spring-loaded pressure regulator designed to provide reduction in output pressure for instruments that are unable to sustain high pressures. Pressure is reduced as it travels from the regulator's inlet port to its outlet port. In order to set the desired output pressure, an adjusting screw on the regulator is tightened, pushing down on a spring inside the regulator. The spring then pushes down on a diaphragm, which, in turn, pushes against a poppet. When high pressure is applied to the regulator's inlet port, the poppet is pushed toward the outlet, creating a gap or channel that allows only the set amount of pressure to pass through the regulator and into the instrument requiring the pressure reduction.

In addition to the inlet port, the instrument regulator has three common output ports on the body: the gauge, relief, and outlet. All ports are marked on the device accordingly. The upper housing of the *IR-1T HP* model contains a diaphragm assembly and is connected to the regulator body using eight (8) socket screws.

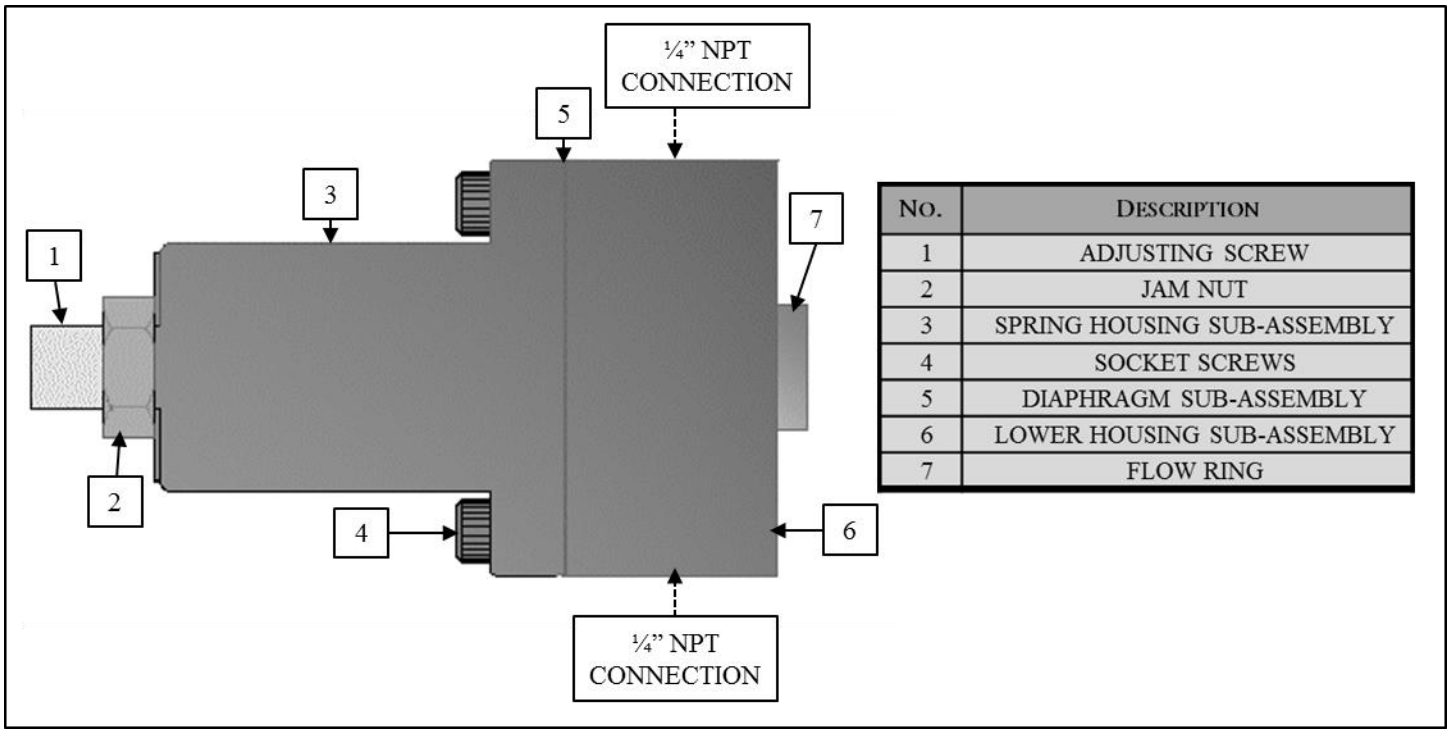
1.3 SPECIFICATIONS

The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table 1: IR-1T Specifications	
Products	Gaseous fluids or liquids compatible with the materials of construction
Materials of Construction	316 Stainless Steel and Viton® or Buna-N® Teflon® or Kel-f® seat dependent on maximum inlet pressure Others available upon request.
Maximum Allowable Inlet Pressure	6000 psi @ -20° to 120°F (413 bar @ -28° to 49°C)
Output Range	20 to 100 psi @ -20° to 120°F (1 to 7 bar @ -28° to 49°C)
Sample Outlet Connection	¼" NPT Others available upon request.
Sample Inlet Connection	¼" NPT Others available upon request.

1.4 SYSTEM DIAGRAM

Figure 1: Product Diagram



NO.	DESCRIPTION
1	ADJUSTING SCREW
2	JAM NUT
3	SPRING HOUSING SUB-ASSEMBLY
4	SOCKET SCREWS
5	DIAPHRAGM SUB-ASSEMBLY
6	LOWER HOUSING SUB-ASSEMBLY
7	FLOW RING

Section 2:

INSTALLATION & OPERATIONS

2.1 Before you Begin

After unpacking the unit, check the equipment for compliance and for any damage that may have occurred during shipment. **Claims for damage caused during shipping must be initiated by the receiver and directed to the shipping carrier.** Welker® is not responsible for any damage caused by mishandling by the shipping company.

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

2.2 Installation

1. Connect a gauge to the gauge port on the regulator. Make sure the gauge range includes the desired output range.
2. Use a safe auxiliary gas supply to set the relief valve to the proper pressure. Refer to the *Installation, Operation, and Maintenance Manual* for the Welker® Relief Valve (*IOM-033*).

If you choose to use the regulator to set the relief, be careful not to exceed the output pressure range of the regulator or any connected instruments.

If requested, the manufacturer can preset the relief prior to shipment.

3. Connect the preset relief valve to the relief valve port on the regulator.
4. Use tubing to connect the inlet supply to the inlet port on the regulator.

Do not turn on the inlet supply without a preset relief valve in place. Doing so may result in over-pressurizing the regulator.

Welker® recommends the use of an upstream filter for products containing solid particles. The filter should be installed on the connection to the regulator inlet.

5. Use tubing to connect the outlet port on the regulator to the inlet port of the instrument for which the pressure is being regulated.

2.3 Operations

1. Loosen the jam nut.
2. Loosen the adjusting screw until all spring tension on the screw is relieved.
3. Turn on the inlet supply to pressurize the regulator inlet.
4. Tighten the adjusting screw until the gauge indicates the desired output pressure.
5. Tighten the jam nut on the adjusting screw to secure it into place.
6. Check the system for leaks.
7. If no leaks are present, the regulator should now be operating properly. If the regulator is not operating properly, see Section 4, Troubleshooting Guide.

Section 3:

MAINTENANCE

3.1 BEFORE YOU BEGIN

1. **Welker® recommends that the unit have annual maintenance under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may be appropriate.
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 are not lubricated. They should be lightly coated with lubrication grease before installation. Welker® recommends Dow Corning 111 [DC 111] or an equivalent lubricant for use with this unit.

3. All maintenance and cleaning of the unit should be done on a smooth, clean surface.

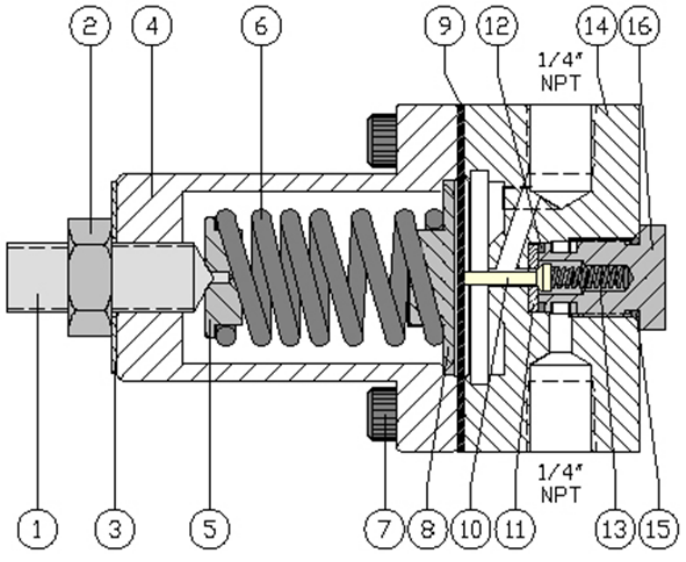
Maintenance on the instrument regulator should not be performed until the regulator has been isolated from all pressure.

Recommended Tools

It is advisable to have the following tools available for maintenance of this unit. Tools needed may vary depending on the product model.

- $^{3}/_{16}$" Allen wrench
- ¼" Allen wrench
- 6" Adjustable wrench
- Small, pointed instrument

Figure 2: Maintenance Diagram



No.	Description
1	ADJUSTING SCREW
2	JAM NUT
3	SPRING RANGE DISC
4	SPRING HOUSING SUB-ASSEMBLY
5	SPRING GUIDE
6	SPRING
7	SOCKET SCREWS (QUANTITY: 8)
8	BOTTOM SPRING GUIDE
9	DIAPHRAGM ASSEMBLY
10	POPPET
11	SEAT
12	O-RING
13	SPRING
14	BODY
15	O-RING
16	FLOW RING

3.2 Spring Housing Maintenance (*Figures 2 & 3*)

1. Turn off the inlet supply pressure to the regulator inlet.
2. Disconnect the inlet supply from the regulator inlet port.
3. Disconnect the instrument from the regulator outlet port.
4. Loosen the nut on the adjusting screw.
5. Loosen the adjusting screw to relieve tension on the spring.

Disassemble the diaphragm assembly:

6. Remove the eight socket screws and remove the spring housing.
7. Remove the top spring guide and the spring.
8. Remove the bottom spring guide.
9. Remove the diaphragm.
10. Inspect the diaphragm for wear and replace as necessary.

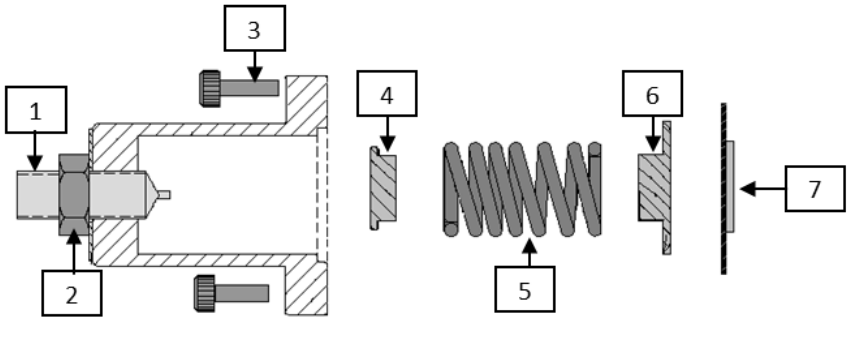
Reassemble the diaphragm assembly:

11. Place the bottom spring guide on top of the rubber side of the diaphragm.

The metal plate of the diaphragm should be facing down, toward where the lower housing and poppet would be on the completely assembled unit.

12. Place the spring on top of the bottom spring guide.
13. Place the top spring guide on top of the spring.
14. Insert the spring assembly (Steps 11-13) into the spring housing (*Figure 3*). It may help to hold the spring housing vertically with the opening facing downward, and lower the housing onto the spring assembly.
15. Reattach the spring housing securely to the regulator body. Tighten the eight socket screws in a cross-bolt pattern.

Figure 3: Spring Housing Maintenance Diagram



No.	Description
1	ADJUSTING SCREW
2	JAM NUT
3	SOCKET SCREWS
4	TOP SPRING GUIDE
5	SPRING
6	BOTTOM SPRING GUIDE
7	DIAPHRAGM

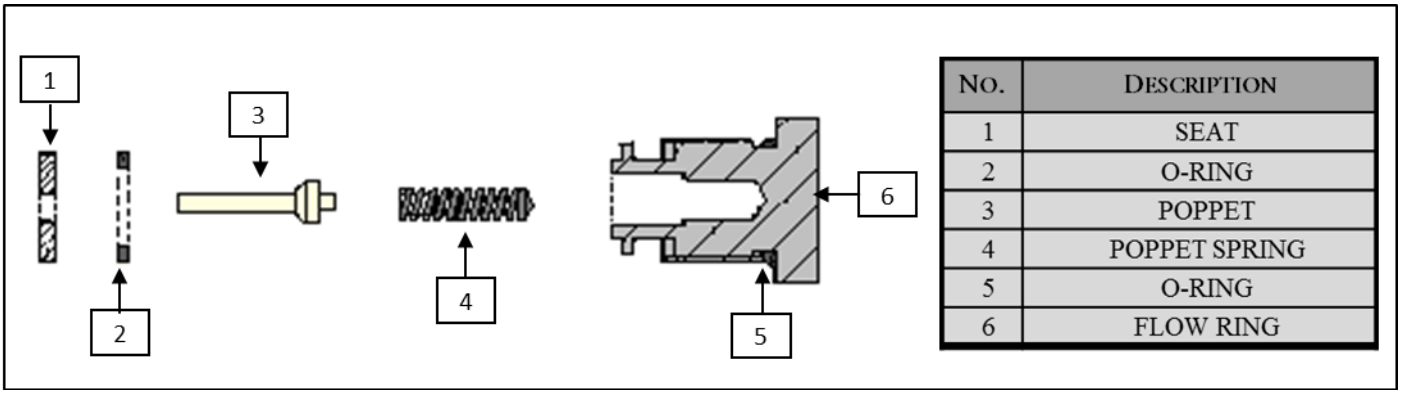
3.3 Lower Housing Maintenance (*Figures 2 & 4*)

1. Unscrew the flow ring from the regulator body.
2. Remove the poppet spring, poppet, and O-ring.
3. Use a pointed instrument to carefully pull the seat out of the body.
4. Examine the seat and replace as necessary.
5. Examine the poppet and poppet spring and replace as necessary.

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

6. Replace the O-ring on the flow ring.
7. Insert the poppet into the seat and place the first O-ring on top of the seat.
8. Place the poppet spring on top of the poppet.
9. Insert the spring assembly (Steps 7-8) into the lower housing (*Figure 4*). It may help to hold the housing vertically with the opening facing downward, and lower the housing onto the spring assembly.
10. Reattach the flow ring.
11. Tighten the flow ring securely.
12. Reattach the spring housing securely to the regulator body.

Figure 4: Lower Housing Maintenance Diagram



No.	Description
1	SEAT
2	O-RING
3	POPPET
4	POPPET SPRING
5	O-RING
6	FLOW RING

Section 4:

TROUBLESHOOTING

Table 2: Troubleshooting Guide		
PROBLEM	**POSSIBLE CAUSE**	**SOLUTION**
Pressure rises on output without adjustment	There may be dirt on or damage to the seat or poppet.	Replace damaged seat or poppet. Consult Section 3.3 of this manual for procedures for disassembling the lower housing and replacing damaged parts.
Vent hole leaks pressure	There may be dirt, damage, or flaws in the diaphragm.	Replace damaged diaphragm. See Section 3.2 of this manual for procedures for disassembling the upper housing and replacing damaged parts.
There is a leak around spring housing	The spring housing may not be tightened correctly.	Lubricate and tighten the spring housing in a cross-bolt pattern.
There is no output when adjusted	• One or both of the spring guides may not be in place. • The poppet may be out of place (e.g., too high, incorrect length or obstructed by a foreign object in the seating area).	• Check the placement of the spring guides. Replace as necessary. • Check the poppet and the seating area. Make sure there is not an extra seat left in the seating area from prior maintenance.

Section 4:

APPENDIX

ATTACHED DOCUMENTS:

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

- IOM-033: Welker® Relief Valves

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

- None

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

- Assembly Drawing: AD028BE

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