



**Installation,  
Operation,  
and  
Maintenance  
Manual**

**Welker<sup>®</sup> Automatic Insertion  
Temperature Probe**

***Model  
AITP-1  
AITP-1F***

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.

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# TABLE OF CONTENTS

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<b>1. GENERAL</b>	<b>4</b>
1.1 Introduction .....	4
1.2 Description of product.....	4
1.3 Specifications .....	5
<b>2. INSERTING AND OPERATING THE PROBE</b>	<b>7</b>
2.1 General .....	7
2.2 Preparing the unit for installation .....	7
2.3 Installing the unit.....	8
2.4 Helpful hints .....	9
2.5 Retracting the unit .....	9
<b>3. MAINTENANCE</b>	<b>11</b>
3.1 General .....	11
3.2 Replacing the temperature sensor .....	12
3.3 Disassembly.....	12
3.4 Maintenance .....	12
<b>4. TROUBLESHOOTING GUIDE</b>	<b>14</b>

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# INTRODUCTION

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## 1. GENERAL

### 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 in the USA or 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.

#### Notes, Warnings, and Cautions



#### NOTE

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



#### CAUTION

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



#### WARNING

**Warnings alert users to a specific procedure or practice that, if not followed correctly, could cause personal injury.**

### 1.2 Description of product

The Welker Automatic Insertion Temperature Probe is designed for use in operations where it is necessary to determine pipeline temperature for measurement or analysis. The design of the unit allows the operator to control the movement of the probe into and out of a pressurized pipeline safely by utilizing pipeline pressure and manipulating four valves. The unit should be installed in a straight Section of piping before the flowing stream is subjected to turns and impingements that can result in turbulent flow. A terminal at the top of the device is connected to the RTD sensor at the bottom of the probe. The RTD sensor transmits the data to the terminal strip that is mounted in an explosion-proof junction box.

#### **Oil Reservoir**

The probe is supplied with a hydraulic oil reservoir. Process or auxiliary pressure is applied to the reservoir in order to insert and retract the probe from the pipeline. The oil in the reservoir is applied on the shaft piston to assure a smooth travel. The reservoir is shipped from the factory with the necessary oil volume. It should be noted that the unit is also shipped from the factory with the assumption that the installation will be vertical. In cases where the unit is mounted horizontally, the operator will have to rotate the reservoir 90 degrees. *Further instructions are given in step five of Section 2.2.* **The internals of the reservoir will not function properly if the oil pot is placed in a horizontal position.**

# SPECIFICATIONS

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## 1.3 Specifications

**N** NOTE

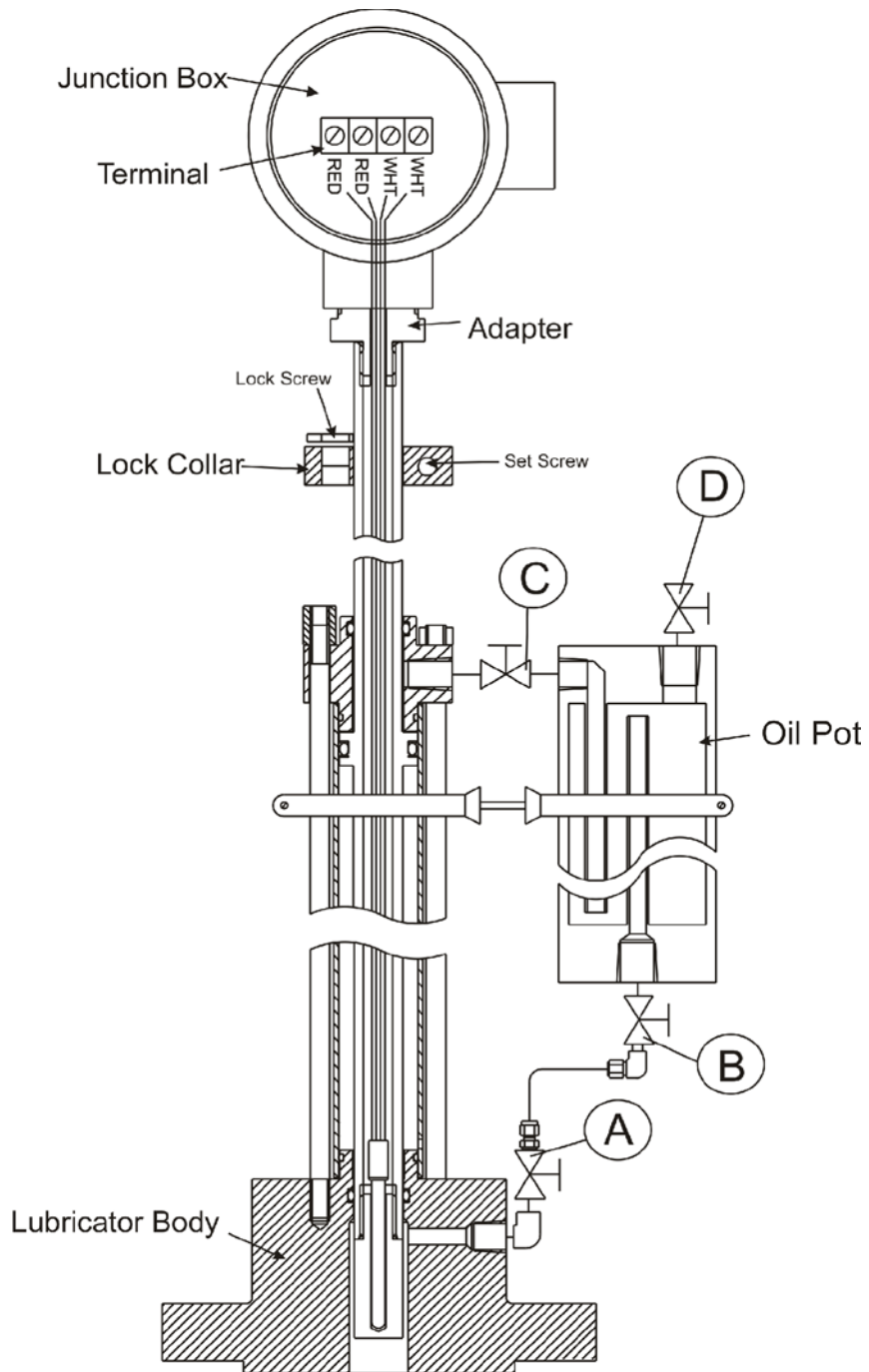
The specifications listed in this Section are generalized for this equipment. Welker can modify the equipment according to your needs. However, please note that **the specifications may vary depending on the customization of your product.**

Table 1

<b>General</b>	
Products	Gases
Materials of Construction	316 Stainless Steel, Viton <sup>®</sup> and PTFE (others available)
Insertion Length	18", 24", 36" (457 mm, 609 mm, 914 mm) (others available in 6" increments)
Viscosity Range	0.009 cp to 2,000 cp @ 68° F (20°C)
Pipeline Connection	1" MNPT (2.54 cm) standard (other NPT and flanged available)
Maximum Allowable Pressure *	<b><u>ANSI 900 Flange:</u></b> 2,160 psi @ -20° F to 100 ° F (149 bar @ -29° C to 38° C) <b><u>ANSI 600 Flange:</u></b> 1,440 psi @ -20° F to 100 ° F (99 bar @ -29° C to 38° C)

\* Maximum allowable temperatures and pressures may be lower depending on specifications of pipeline connection device.

# SPECIFICATIONS



**Figure 1**

*Refer to this Figure throughout the entire installation and operation process.*

# INSTALLATION & OPERATION

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## 2. INSERTING AND OPERATING THE PROBE

### 2.1 General

After unpacking the unit, check it for compliance and for any damages that may have occurred during shipment.

**N** NOTE

Claims for damages caused during shipping must be initiated by the receiver and directed to the shipping carrier. Welker is not responsible for any damages caused from mishandling by the shipping.

**N** NOTE

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

#### Recommended Tools

It would be advisable to have the following tools available for installation and retraction of the unit; however, tools used will vary depending on probe model.

- Measuring tape
- Small hex key set
- 6" adjustable wrench
- 10" adjustable wrench
- Flat blade screwdriver
- Permanent marker

### 2.2 Preparing the unit for installation

#### 2.2.1 Determining the insertion length

Before installing the probe, the length the insertion shaft will need to travel inside the pipeline must be determined. Measure from the top of the pipeline's isolation valve to the desired pipeline depth (see Figure 2).



Figure 2

#### 2.2.2 Setting the insertion length on the shaft

Once the insertion length of the shaft is determined, this length should be measured on the shaft itself.

- a. Pull up on the shaft to make sure it is fully retracted.
- b. Begin at the upper housing, and measure up on the shaft to the desired length (see Figure 3).
- c. Mark this point on the shaft, as this is where the lock collar will be positioned.

# INSTALLATION & OPERATION

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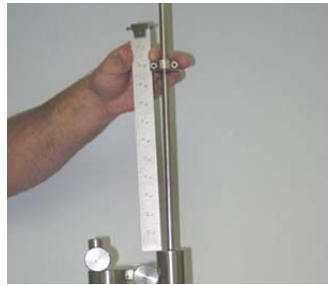


Figure 3

## 2.2.3 Positioning the lock collar

- a. Loosen the set screw in the lock collar, and move the collar to the position noted in the previous step.
- b. Tighten the lock collar set screw.

## 2.2.4 Using instrument air or an auxiliary gas supply

If the sample taken comes from a pipeline with a toxic gas, you will need to use an alternative source for pressure.

- a. Detach the tubing connected from Valve B to Valve A.
- b. Remove Valve A from the base cap of the probe.
- c. Plug the opening that is now in the base cap with a  $\frac{1}{4}$ " NPT plug.
- d. Connect the auxiliary gas supply to Valve B.

## 2.2.5 Using the oil reservoir in a horizontal position

- a. Loosen and detach the tubing connected from Valve B on the oil reservoir to Valve A on the base cap of the unit.
- b. Loosen the screws in the clamp, and remove the clamp from the reservoir.
- c. Reposition the reservoir at a  $90^\circ$  angle, making sure Valve B is aimed toward the ground.
- d. Measure a new piece of tubing to be connected from Valve A to Valve B.
- e. Replace the bolts and elbows onto the ends of the new tubing.
- f. Thread the new tubing onto Valve A and Valve B.

## 2.3 Installing the unit

### **N** NOTE

Make sure all of the unit's valves are closed prior to installation or removal.

2.3.1 Connect the unit to the pipeline via the pipeline isolation valve.

2.3.2 **Slowly** open the pipeline isolation valve, and check for leaks. If you are using an auxiliary gas supply, open the supply valve.

2.3.3 Open Valves A and B on the unit to allow pressure to enter the oil reservoir.



# INSTALLATION & OPERATION

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## CAUTION

Valve D should always be closed when pipeline pressure is flowing through Valves A and B. Opening Valve D while pipeline pressure is flowing may cause the oil in the reservoir to erupt from the valve.

- 2.3.4 **Slowly** open Valve C, located between the oil reservoir and the top cap. The shaft will begin to insert into the pipeline.



## CAUTION

Opening the valve too quickly may cause the shaft to insert harshly into the pipeline, possibly resulting in damage to the unit.



## NOTE

Once the shaft begins to move, there is no need to open the valve any further. This assures a slow and smooth insertion of the shaft into the pipeline.

- 2.3.5 **Carefully** rotate the probe to align the lock collar and upper housing so that the lock collar's lock screw can be inserted into the upper housing.
- 2.3.6 Tighten the lock screw.
- 2.3.7 Close Valves A, B, and C and check for leaks.
- 2.3.8 Check the entire system for leaks.
- 2.3.9 Open the lid of the explosion-proof box and make the necessary electrical connections to the unit's terminal.
- 2.3.10 The unit is now in service.

## 2.4 Helpful hints

- 2.4.1 Avoid rough handling of the unit and bending of the shaft. The shaft has a polished surface that travels through seals.
- 2.4.2 Operate the unit slowly and smoothly while inserting and retracting to avoid unnecessary slamming of the lock collar and/or the shaft piston located inside the unit.
- 2.4.3 The most common cause for repairs to an automatic insertion probe is due to the pipeline isolation valve closing on the shaft while the shaft is still inserted into the pipeline. Please avoid this practice.
- 2.4.4 The unit should be treated with care.

## 2.5 Retracting the unit



## CAUTION

Instrumentation attached to the unit must be shut down or disconnected prior to retracting.



## NOTE

Make sure all valves on the unit are closed prior to installation or removal.

# INSTALLATION & OPERATION

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- 2.5.1 Disconnect the wiring from the junction box.

**! CAUTION**

Do not close the pipeline isolation valve or the auxiliary gas supply valve at this time.

- 2.5.2 Loosen the lock screw in the lock collar in order to remove the lock collar from the upper housing (see Figure 4). At this point, the shaft will remain inside the pipeline.



Figure 4

- 2.5.3 **Slowly** open Valve D. This will vent the air inside the oil reservoir into the atmosphere, relieving pressure on the insertion shaft.

**! CAUTION**

Valves A and B should always be closed when opening Valve D. Opening Valve D while pipeline pressure is in the reservoir may cause the oil in the reservoir to discharge from the valve.

- 2.5.4 **Slowly** open Valve C to allow pressure to be relieved on the insertion shaft. The probe will now begin to retract from the pipeline.

**N NOTE**

Once the shaft begins to move, Valve C does not need to be opened any further. This assures a slow and smooth retraction of the probe.

- 2.5.5 When the probe has completely retracted from the pipeline, close the pipeline isolation valve, cutting off any pressure flowing into the unit.

- 2.5.6 If you are using instrument air or an auxiliary gas supply, close the supply valve.

**N NOTE**

If the probe needs to be withdrawn from the pipeline but the unit itself does not need to be removed from the pipeline, stop at step 6. Use caution not to remove the probe while the pipeline isolation valve is building pressure into it.

**N NOTE**

If pressure does not stop venting from one or more of the unit's valves, the pipeline isolation valve is possibly leaking.

- 2.5.7 Remove the unit from the pipeline isolation valve.

- 2.5.8 If you are using instrument air or an auxiliary gas supply, remove the unit from the supply.

- 2.5.9 The unit is now ready for maintenance or to be moved to another location.

# MAINTENANCE

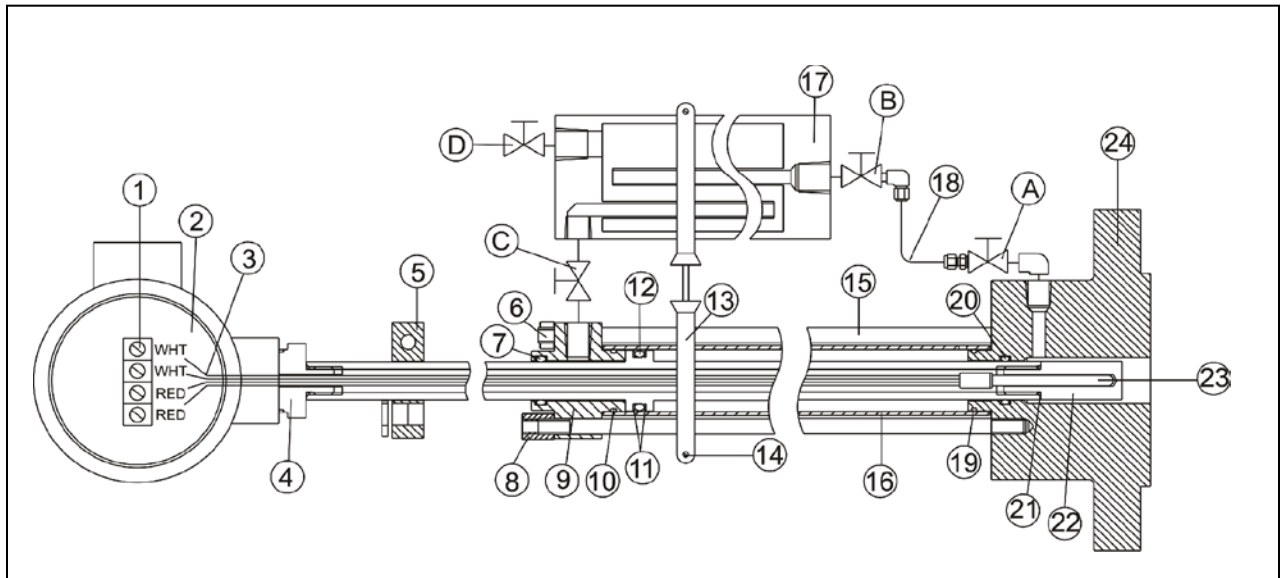
## 3. MAINTENANCE

### 3.1 General

Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit handy for the system in case of encountering unexpected wear or faulty seals. All maintenance and cleaning of the unit should be done on a smooth, clean surface.

#### **N** NOTE

We recommend that the unit have annual maintenance under normal operating conditions. In the case of severe service, dirty conditions, excessive cycling usage, or other unique applications that may subject the equipment to unpredictable circumstances, a more frequent maintenance schedule may be appropriate.



**FIGURE 5**

*Refer to this Figure throughout the entire maintenance process.*

#### **Recommended Tools**

It would be advisable to have the following tools available for maintenance of the unit; however, tools used will vary depending on probe model.

- Small hex key set
- 6" adjustable wrench
- 10" adjustable wrench
- 10" channel lock pliers
- Flat blade screwdriver

# MAINTENANCE

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## 3.2 Replacing the temperature sensor

### **N** NOTE

The temperature sensor can be replaced without removing the probe from the pipeline.

- 3.2.1 Open the cover of the junction box (Part 2).
- 3.2.2 Remove all wiring connected to the terminal strip (Part 1).
- 3.2.3 Remove the conduit connected to the box.
- 3.2.4 Disconnect the junction box from the adapter (Part 4).
- 3.2.5 Pull out the loose wiring inside the shaft. The temperature sensor (Part 23) is connected to the end of the wiring.
- 3.2.6 Replace the sensor with a new sensor.
- 3.2.7 Drop the new sensor into the shaft.
- 3.2.8 Reattach the junction box to the adapter.
- 3.2.9 Reconnect the new sensor wiring (Part 3) to the terminal.
- 3.2.10 Reconnect the incoming conduit to the junction box.
- 3.2.11 Reattach the wiring to the terminal strip.

## 3.3 Disassembly

- 3.3.1 Close Valves B, C, and D on the oil reservoir and Valve A on the base.
- 3.3.2 Disconnect the tubing (Part 18) between Valves A and B.
- 3.3.3 Loosen the screws (Part 14) in the oil reservoir's clamp (Part 13), and remove the clamp from the cylinder (Part 16) and the reservoir (Part 17).
- 3.3.4 Use an adjustable wrench on the body of Valve C to remove the oil reservoir from the upper housing (Part 9).
- 3.3.5 Disconnect the wiring from the temperature sensor to the terminal (Part 1).
- 3.3.6 Disconnect and remove the junction box (Part 2).
- 3.3.7 Tape down the loose wires to the side of the cylinder (Part 16).
- 3.3.8 Disconnect and remove the adapter (Part 4).
- 3.3.9 Loosen and remove the lock collar (Part 5) from the shaft.
- 3.3.10 Remove the stand off (Part 8), tie bolt nuts (Part 6), and tie bolts (Part 15).
- 3.3.11 Slide the upper housing off the shaft.
- 3.3.12 **Carefully** slide the shaft and the cylinder out of the lubricator body (Part 24).
- 3.3.13 Remove the cylinder from the shaft.
- 3.3.14 Remove the extension shaft (Part 22), if applicable.

## 3.4 Maintenance

- 3.4.1 Replace the two seals (Parts 7 and 10) in the upper housing.

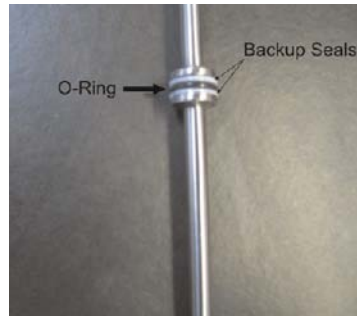
### **N** NOTE

New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease (Dow Corning 111 [DC 111] grease or equivalent lubricant) before they are installed into the equipment. This helps with the installation of the seals while reducing the risk of damage when positioning them on the parts. After the seals are installed, some additional lubrication can be applied to the shaft or cylinder inner diameters to allow smooth transition of parts.

# MAINTENANCE

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- 3.4.2 Replace the two seals (Part 19 and 20) on the lubricator body.
- 3.4.3 Replace the seal (Part 21) in the extension shaft, if applicable.
- 3.4.4 Replace the seal (Part 12) and the two backup seals (Part 11) on the piston (also see Figure 6).



**Figure 6**

- 3.4.5 Mark the top of the shaft and cylinder for identification purposes to ensure proper orientation during reassembly.
- 3.4.6 Examine the shaft carefully. The surface is polished and must be free of pits and scratches except on the ends. If scratches exist, the shaft will need to be replaced.
- 3.4.7 Examine the inside of the cylinder for pits and deep scratches. If scratches exist, the cylinder will need to be replaced.
- 3.4.8 Lightly lubricate the inside of the cylinder and reinsert the shaft into the cylinder approximately halfway.
- 3.4.9 Lightly lubricate the shaft.
- 3.4.10 Connect the probe shaft to the extension shaft, if applicable.
- 3.4.11 Slide the shaft and cylinder into the lubricator body.
- 3.4.12 Replace the tie bolts.
- 3.4.13 Slide the upper housing onto the top end of the shaft and down to the cylinder over the tie bolts.
- 3.4.14 Replace the stand off and tie bolt nuts. Tighten securely.
- 3.4.15 Replace the lock collar on the shaft.
- 3.4.16 Replace the adapter and the junction box.
- 3.4.17 Connect the sensor wiring to the terminal strip.
- 3.4.18 Fully retract the shaft and replace the oil reservoir and tubing.
- 3.4.19 If the oil reservoir needs oil, remove Valve D, and add oil until the reservoir is  $\frac{3}{4}$  full. Replace Valve D.

**N** NOTE

Oil can be added to the reservoir while the unit is still assembled and attached to a pipeline. To do so, depressurize the assembly, making sure Valve B is closed before removing Valve D.

**N** NOTE

If oil needs to be added, it may be due to a leak in the unit.

- 3.4.20 Repeat steps 2.2.1 through 2.3.10 for reinstallation.

# MAINTENANCE

## 4. Troubleshooting Guide

The following is a troubleshooting table of issues most commonly associated with the Welker Automatic Insertion Temperature Probe models. If you are having a problem that is not listed, or if the solution provided does not repair the problem, please call Welker for service options.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The shaft doesn't insert or retract smoothly.	Air may be trapped in the oil reservoir, or the reservoir may need oil.	Check to make sure the oil reservoir is $\frac{3}{4}$ full; vent any air trapped in the reservoir. <i>See step 19 in Section 3.4.</i> <i>See step 3 in Section 2.5.</i>
The oil reservoir needs to be refilled often.	Oil may be leaking past the piston seal.	Replace the piston seal, and reassemble the probe. <i>See step 4 in Section 3.4.</i>
The probe will not retract from the pipeline.	<ul style="list-style-type: none"><li>• There may not be enough pressure in the pipeline to eject the probe.</li><li>• The probe is bent inside the pipeline, possibly due to pigging, pipeline velocity, or the isolation valve closing on the shaft while the shaft is still inserted in the pipeline.</li></ul>	<ul style="list-style-type: none"><li>• Gently pull up on the shaft until it begins to retract.</li><li>• The unit will need to be repaired or replaced. Call Welker for service options.</li></ul>

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