Installation, Operation, and Maintenance Manual

Welker® Automatic Insertion Probe with Outer Shaft Assembly & Horizontal Mount

Model

AIP-7L

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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SPECIFICATIONS

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.

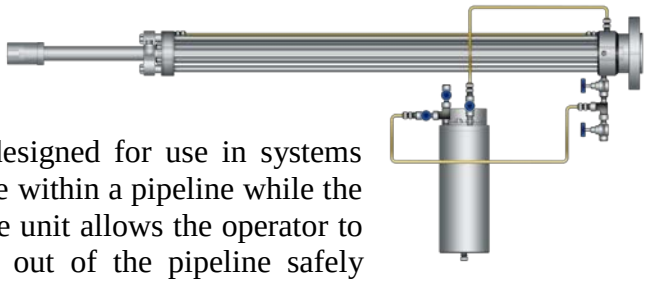
Notes, Warnings, and Cautions

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.**

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 Automatic Insertion Probes are designed for use in systems where it is desirable to insert and retract a probe within a pipeline while the pipeline remains pressurized. The design of the unit allows the operator to control the movement of the probe into and out of the pipeline safely through the use of five valves and an auxiliary gas supply, instrument air, or process fluid. For gas sampling applications, the unit should be installed on top of a straight Section of piping before the flowing stream is subjected to turns and impingements that can result in turbulent flow. For liquid sampling applications, the probe should be installed in a Section of pipe where the process fluid is properly conditioned, such as downstream of a mixing device.

SPECIFICATIONS

1.3 SPECIFICATIONS

NOTE

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

SPECIFICATIONS	
Products	Gases/Liquids
Materials of Construction	316 Stainless Steel, Carbon, Viton® and PTFE (others available)
Insertion Length	18", 24", 36" (45.72 cm, 60.96 cm, 91.44 cm) (others available in 6" increments)
Viscosity Range	0.009 cp to 2,000 cp @ 68° F (20°C)
Pipeline Connection	2" ANSI Flange (other connections available)
Sample Outlet Connection	$^1/_2$" FNPT Need to Install a Valve
Maximum Allowable Temperature *	325° F @ 500 psi (163 ° C @ 35 bar)
Maximum Allowable Pressure *	1,440 psi @ -20° F to 100 ° F (Only at 600 ANSI) (99 bar @ -29° C to 38° C)

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

CAUTION

In a pipeline with liquid service, Welker strongly recommends using an auxiliary gas supply in order to prevent damage to the cylinder and the oil reservoir.

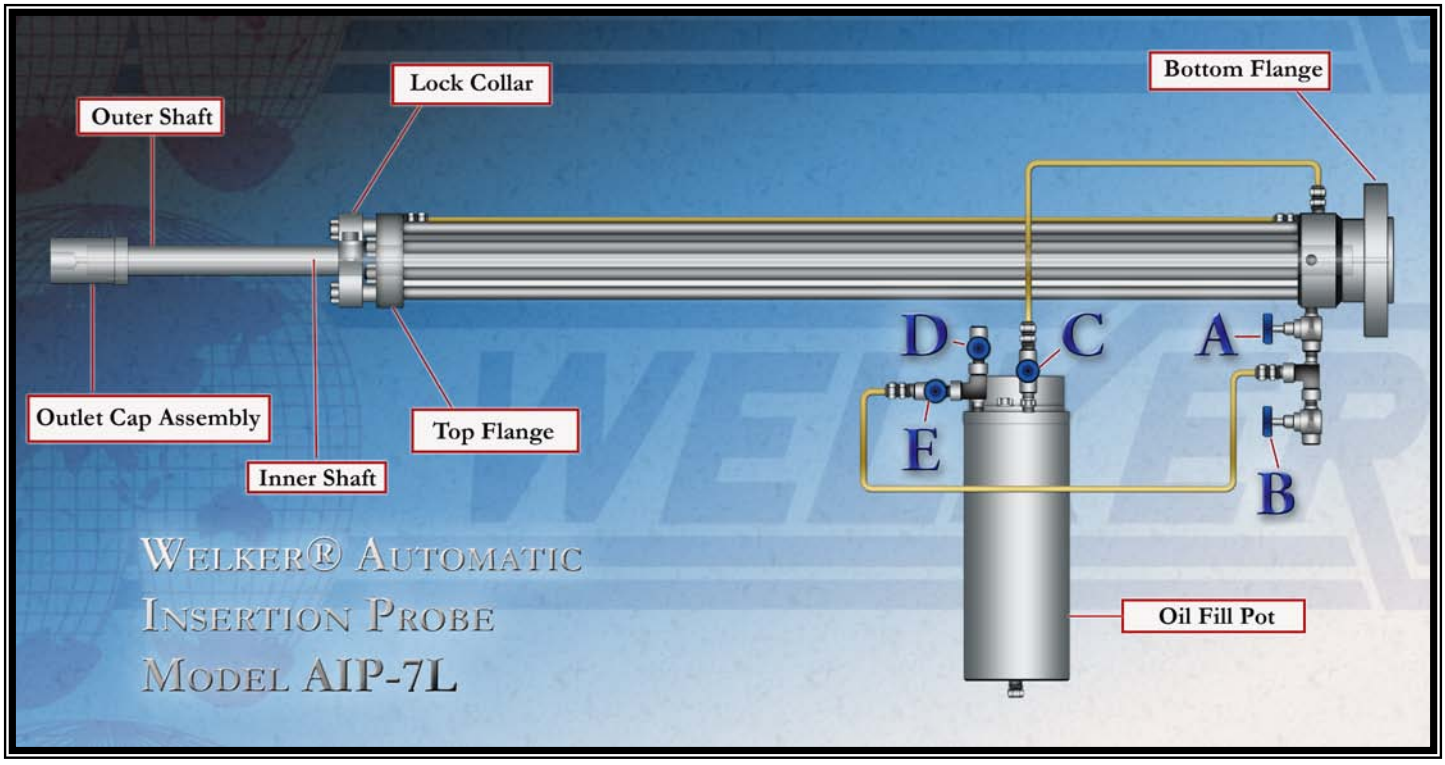
Oil Reservoir

With the use of a hydraulic oil reservoir, process or auxiliary pressure is applied within the reservoir in order to insert and retract it from the pipeline. The oil in the reservoir is applied on the probe piston to assure a smooth travel. The reservoir is shipped from the factory with the necessary oil volume. It should be noted that the AIP-7L is also shipped from the factory with the assumption that the installation will be horizontal. This unit is designed so the reservoir will be placed in a vertical position, and the reservoir should remain in this position.

SPECIFICATIONS

1.4 SYSTEM COMPONENTS

- Bottom Flange
- Top Flange
- Lock Collar
- Probe Shaft (Outer)
- Probe Shaft (Inner)
- Outer Cap Assembly
- Oil Fill Pot
- Needle valves and associated piping, fittings, etc.



2. INSTALLATION INSTRUCTIONS

2.1 GENERAL

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

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 company.

NOTE

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

NOTE

The Welker AIP-7L was designed according to customer specifications. This manual contains photographs of a standard Welker Automatic Insertion Probe, and are provided for part identification guidance only. When necessary, please refer to assembly drawing in Appendix A for specific part placement and design.

Recommended Tools

It would be advisable to have the following tools available for installation 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

INSTALLATION

2.2 PREPARING THE UNIT FOR INSTALLATION

1. Determine the insertion length

Before installing the probe, the length the insertion probe will need to travel inside the pipeline must be determined. Measure from the top of the pipeline's isolation valve to the center $^1/_3$ of the pipeline (Insertion Length A on Figure 2)

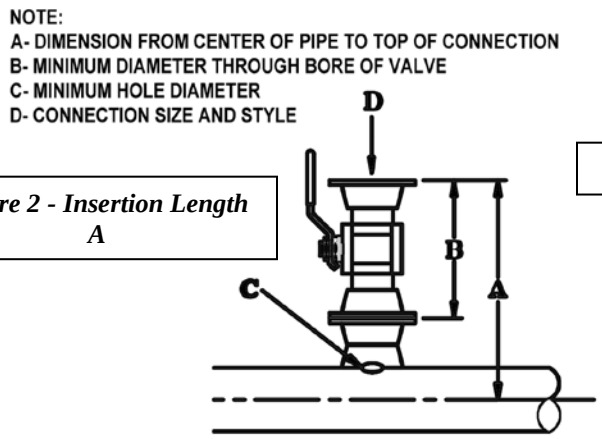
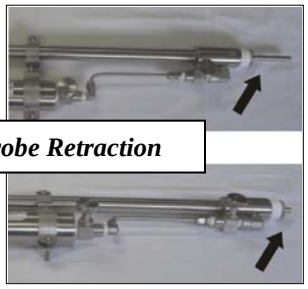


Figure 2 - Insertion Length A



Not retracted

Retracted

Figure 3- Probe Retraction

2. Set the insertion length on the probe

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

- Pull up on the probe to make sure it is fully retracted (see Figure 3).
- Begin at the top cap, and measure up on the probe to the desired length (see Figure 4).
- Mark this point on the probe, as this is where the bottom of the lock collar will be positioned.

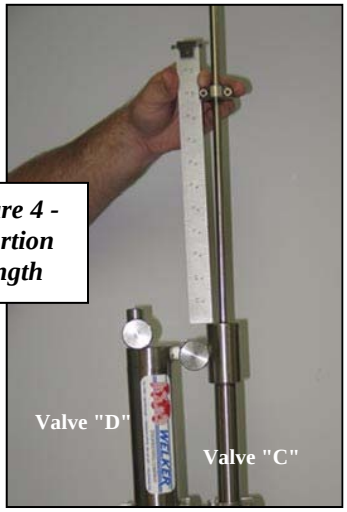


Figure 4 - Insertion Length

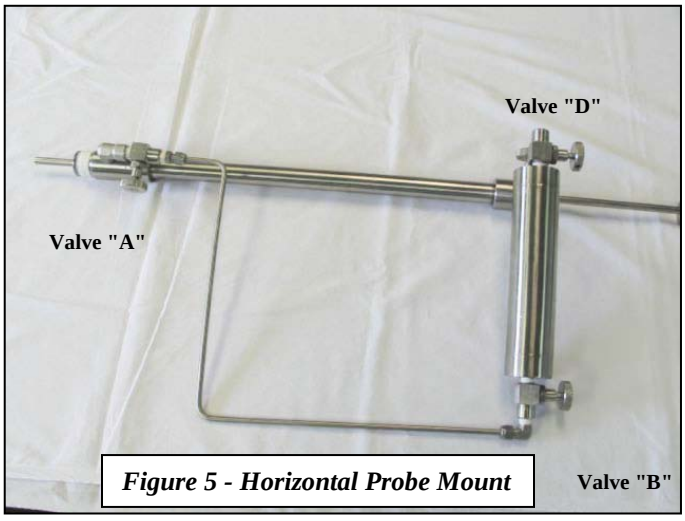


Figure 5 - Horizontal Probe Mount

2.2 PREPARING THE UNIT FOR INSTALLATION (CONTINUED)

3. Position the lock collar

- Loosen the two set screws in the lock collar, and move the bottom of the collar to the position noted in the previous step.
- Position the lock screw so that it is aligned with its port in the top cap.
- Tighten the lock collar set screws.

4. If necessary, connect an instrument air or an auxiliary gas supply

If the pipeline contains a liquid or toxic gas, you will need to use an alternative source for pressure.

- Detach the tubing between Valve B and Valve A.
- Remove Valve A from the base cap or flange of the probe.
- Plug the opening that is now in the base cap or flange with a $^{1}/_{4}$" NPT plug.
- Connect the auxiliary gas supply to Valve B.

5. Install a 1/2" NPT valve on the outlet cap assembly.

INSTALLATION

2.3 INSTALLING THE UNIT

1. Close all valves on the AIP-7L including the 1/2" outlet valve.
2. Connect the unit to the pipeline via the pipeline isolation valve.
3. **Slowly** open the pipeline isolation valve, and check for leaks. If you are using an auxiliary gas supply, open the supply valve.
4. Open Valves A and B on the unit to allow pipeline pressure to enter the oil reservoir.

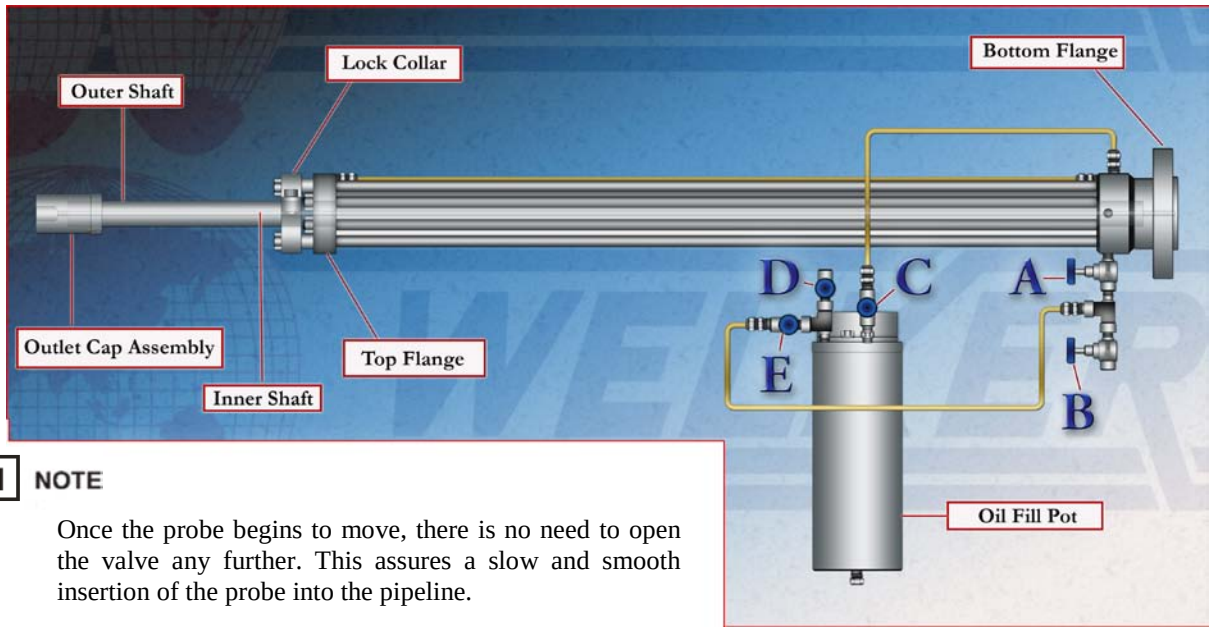
CAUTION

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.

4. **Slowly** open Valves C & E, located between the oil reservoir and the top cap. The probe will begin to insert into the pipeline (see Figure 6).

CAUTION

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



NOTE

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

5. When the lock collar reaches the top cap, close valve C.
6. Tighten the lock collar and hold down the nuts to the top flange.
7. Close all valves.
8. Check the entire system for leaks. The unit is now in service.
9. You may now attach the 1/2" outlet valve.

2.4 HELPFUL HINTS

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

2.5 RETRACTING THE UNIT

CAUTION

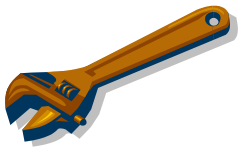
The instrument attached to the unit must be shut down or disconnected prior to retracting.

NOTE

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

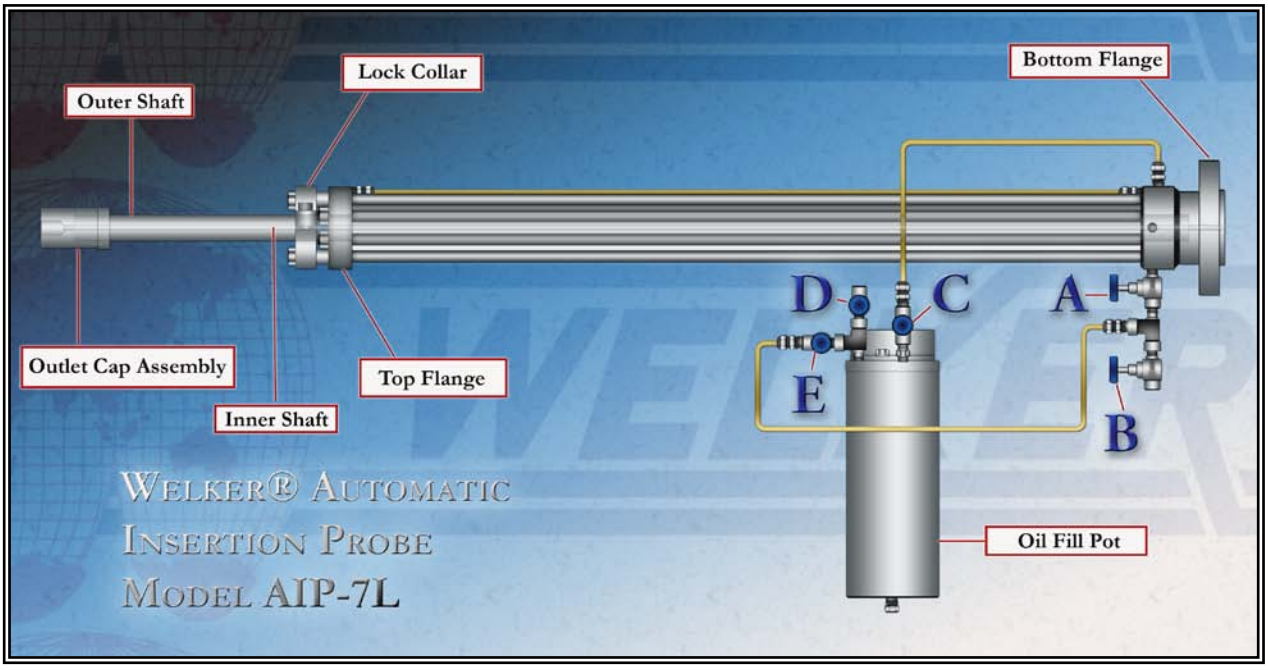
Recommended Tools

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



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

1. With all valves closed, open valves A, E, and C. This will assure the probe is ready for step 3, removing the lock collar.
2. Remove any tubing attached to the 1/2" outlet valve.
3. Close all valves, including A, E, and C.
4. Loosen the lock collar screw and hold down the nuts. At this point, the probe will remain inside the pipeline.



2.5 RETRACTING THE UNIT (CONTINUED)

CAUTION

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

5. **Slowly** open Valve D. This will vent the air inside the oil reservoir. Leave this valve open.
6. **Slowly** open Valve C to allow pressure to be relieved from the insertion probe. The probe will now begin to retract from the pipeline.

NOTE

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

7. When the probe has completely retracted from the pipeline, close the pipeline isolation valve, cutting off any pressure flowing into the unit.
8. If you are using instrument air or an auxiliary gas supply, close the supply valve.

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 8 of this Section.

9. Vent the pressure in the unit by opening Valves E, A, and B allowing pressure to be released, and then close all of the valves.

CAUTION

If pressure does not stop venting from one or more of the unit's valves, the pipeline isolation valve is possibly leaking. User should consult on-sight safety engineer.

10. Remove the unit from the pipeline isolation valve.
11. The unit is now ready for maintenance or to be moved to another location.

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 unexpected wear or faulty seals. All maintenance and cleaning of the unit should be done on a smooth, clean surface.

NOTE

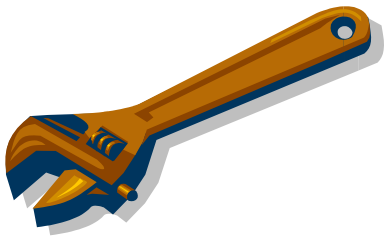
We recommend that the unit have annual maintenance under normal operating conditions. In the case of severe service, dirty conditions, excessive cycling usage, or other unique applications that may subject the equipment to unpredictable circumstances, a more frequent maintenance schedule may be appropriate.

3.2 MAINTENANCE INSTRUCTIONS

Refer to Appendix A 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
- Fine-grit sandpaper
- Flat blade screwdriver

1. Close all valves.
2. Disconnect and remove all tubing.
3. Remove the oil reservoir and mounting clamp.
4. Unclamp the top lock collar clamp (Part 29).

NOTE

The locking pin (part 28) is very small. Be careful not to drop it, and keep it in a safe place for reassembly.

5. Remove the eight nuts and bolts and the lock collar (Part 12) and top flange (Part 14).
6. Remove the inlet cap (Part 10) and the outlet cap (Part 1).

3.2 MAINTENANCE INSTRUCTIONS (CONTINUED)

Refer to Appendix A throughout the entire maintenance process.

7. Slide out the outer shaft assembly (part 11) from the cylinder.

8. Remove and replace the seals and O-rings (Parts 7, 17, 15, 5, and 2) if necessary.

9. ***Replacing the seals***

CAUTION

Do not dig into the metal surfaces of the parts when removing O-rings from the O-ring grooves. Scratching the sealing surface can result in a leak. If necessary, dig into the O-ring, and replace it during reassembly. If the sealing surface becomes damaged, use a 600-grit wet sand paper strip to smooth the surface, and then clean it.

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 probe or cylinder inner diameters to allow smooth transition of parts.

10. Examine the outer and inner surfaces of the cylinder and inner shaft for a smooth finish. If there are any pits or major scratches, the seals will leak. Call Welker for service if necessary.

11. Remove and replace the seals in the inlet cap (Parts 19 and 20).

12. Carefully, slide the inner shaft back into the cylinder, replace the cylinder, and replace the inlet cap.

13. Replace the top flange, lock collar, and eight nuts and bolts.

14. Replace the top lock collar.

15. Re-clamp the oil reservoir and replace all tubing.

16. Add oil to the oil reservoir

The unit is shipped from the factory with the necessary oil volume. If oil is needed, remove Valve D and add oil until the reservoir is ¾ full. Replace Valve D.

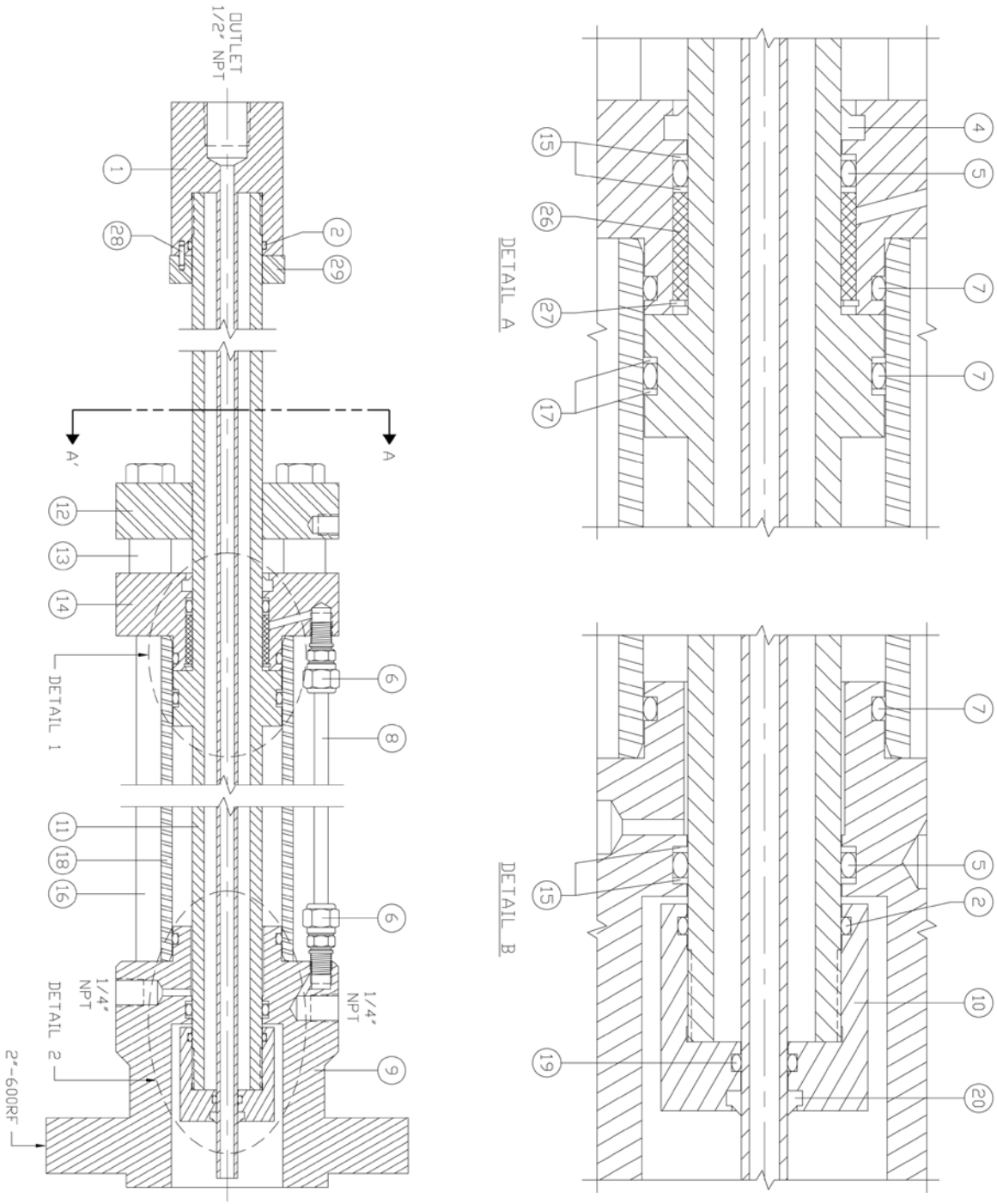
NOTE

If you are adding oil while the unit is still assembled and attached to a pipeline, depressurize the assembly, making sure Valve B is closed before removing Valve D.

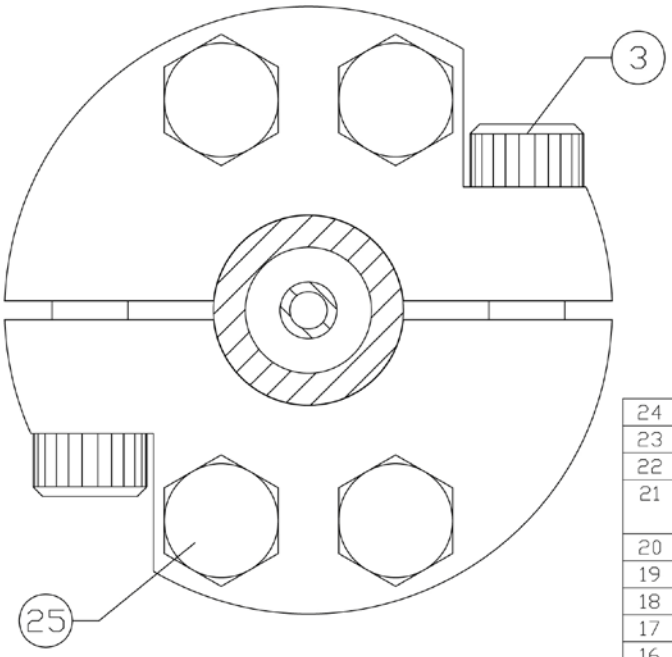
NOTE

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

APPENDIX A CROSS SECTIONAL DIAGRAM



APPENDIX A CROSS SECTIONAL DIAGRAM



SECTION A-A'

NO.	REQ.	DESCRIPTION	PART NUMBER
30	1	OIL FILL POT	OFP1CE
29	1	LOCK COLLAR	AIP7025
28	1	PIN	CP1000
27	1	SPIROLOX	RR037IX
26	1	BEARING	LSM4039
25	4	HEX HD. MACH. SCREW 1/2"-13 x 1" LG.	MA034EX

NO.	REQ.	DESCRIPTION	PART NUMBER
24	4	HEX NUT, 1/2"-13	MA033OXCE
23	1	STREET TEE, 1/4"	MF010OXCE
22	2	VALVE, 1/4" M/F	NV1MFCE
21	4	MALE CONNECTOR 1/4" T x 1/4" NPT	MF018OXCE
20	1	WIPER	WP006OO
19	1	O-RING	VO70110
18	1	CYLINDER	AIP700336CE
17	2	BACK-UP RING	BU223SP
16	8	TIE BOLT	AIP700436CE
15	4	BACK-UP RING	BU218SP
14	1	TOP FLANGE	AIP7007CE
13	4	LOCK COLLAR SPACER	LSM4023CE
12	1	LOCK COLLAR	LSM4012
11	1	OUTER SHAFT ASS'Y	AIP701336CE
10	1	INLET CAP	AIP7011
9	1	LUBRICATOR BODY	AIP7015XCE
8	AS REQ	TUBING, 316 S.S. 1/4" O.D. x .035 W.T.	0316S0025T03CE
7	3	O-RING	VO70223
6	2	MALE CONNECTOR 1/4" T x 1/8" NPT	MF087OXCE
5	2	O-RING	VO90218
4	1	WIPER	WP013OO
3	2	HEX SOCK. CAP SCREW 1/2"-13 x 2" LG.	MA019IX
2	2	O-RING	VO70124
1	1	OUTLET CAP ASS'Y	AIP701836CE

TROUBLESHOOTING

4.1 TROUBLESHOOTING GUIDE

The following is a troubleshooting table of issues most commonly associated with the Welker Liquid Knockout System 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 probe 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 ¾ full; vent any air trapped in the reservoir. *See step four in Section 3.3.* *See step four in Section 2.5.*
The oil reservoir needs to be refilled often.	Oil may be leaking past the piston seal.	Replace the piston seal, and reassemble the probe. *See step 3 in Section 3.3.* *See Section 3.2 and 3.4.*
Pipeline or process pressure is leaking from the base cap's vent hole.	Seals in the base cap are leaking.	Replace the seals. *See step 3 in Section 3.3.* *See Figure 14.*
The probe will not retract from the pipeline.	• There may not be enough pressure in the pipeline to eject the probe. • The probe is bent inside the pipeline, possibly due to pipeline velocity or the isolation valve closing on the probe while the probe is still inserted in the pipeline.	• Gently pull up on the probe until it begins to retract. • The unit will need to be repaired or replaced. Call Welker for service options.

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