



**Installation,
Operation,
&
Maintenance
Manual**

Welker[®] Crude Oil Sampler
Model
LS-12

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 to improve performance and reliability.

13839 West Belfort
Sugar Land, Texas 77498-1671
U.S.A.
Tel.: (800) 776-7267
Tel.: (281) 491-2331
Fax: (281) 491-8344
www.welkereng.com

This page intentionally left blank

TABLE OF CONTENTS

1	GENERAL	4
1.1	Introduction	4
1.2	Product description	4
1.3	Specifications	5
2	INSTALLATION INSTRUCTIONS	7
2.1	General	7
2.2	Installation	7
3	MAINTENANCE INSTRUCTIONS	9
3.1	General	9
3.2	Purging the system	10
3.3	Disassembly instructions	10
3.4	Collection head maintenance	11
3.5	Internal relief maintenance	11
3.6	Body diaphragm maintenance	12

Welker®, Welker Jet®, and WelkerScope® are Registered Trademarks owned by Welker.

INTRODUCTION

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 Product description

The Welker Crude Oil Sampler (LS-12 series) is designed to extract accurate samples of flowing product. The sampler is connected to a pipeline, where a continuous stream of product flows through the body of the device. When energized, a 3-way solenoid delivers instrument air pressure to the diaphragm motor, trapping a sample of product in the collection chamber and then forcing it out of the collection head. The sample is then pushed into a receiver.

One of two types of collection heads will be supplied on the sampler. The *B Head* uses a piston and cylinder assembly to trap the sample and push it from the device. The *Vanishing Chamber* uses a rubber cup to trap the sample, and when pressure is applied, the cup is squeezed, forcing the product into a receiver.

The sampler is also equipped with one of three types of internal relief assemblies that function as a check valve for the device. The *B style relief* and *cartridge relief* are the standard relief assemblies used, while the *sand relief* is designed for samplers used in severe service where sand or salt water exists in the product. Additionally, an external relief is included and acts as a backup to the internal relief. The two relief assemblies prevent product pressure from flowing into the device, therefore allowing the sampler to pump the sample through the sampler when the solenoid is energized.



NOTE

The external relief is not needed when sampling into constant pressure cylinders.

A purge tube is an optional addition and is designed to remove all product from the sample source to the container, at the conclusion of a sampled batch or sampling period.

SPECIFICATIONS

1.3 Specifications

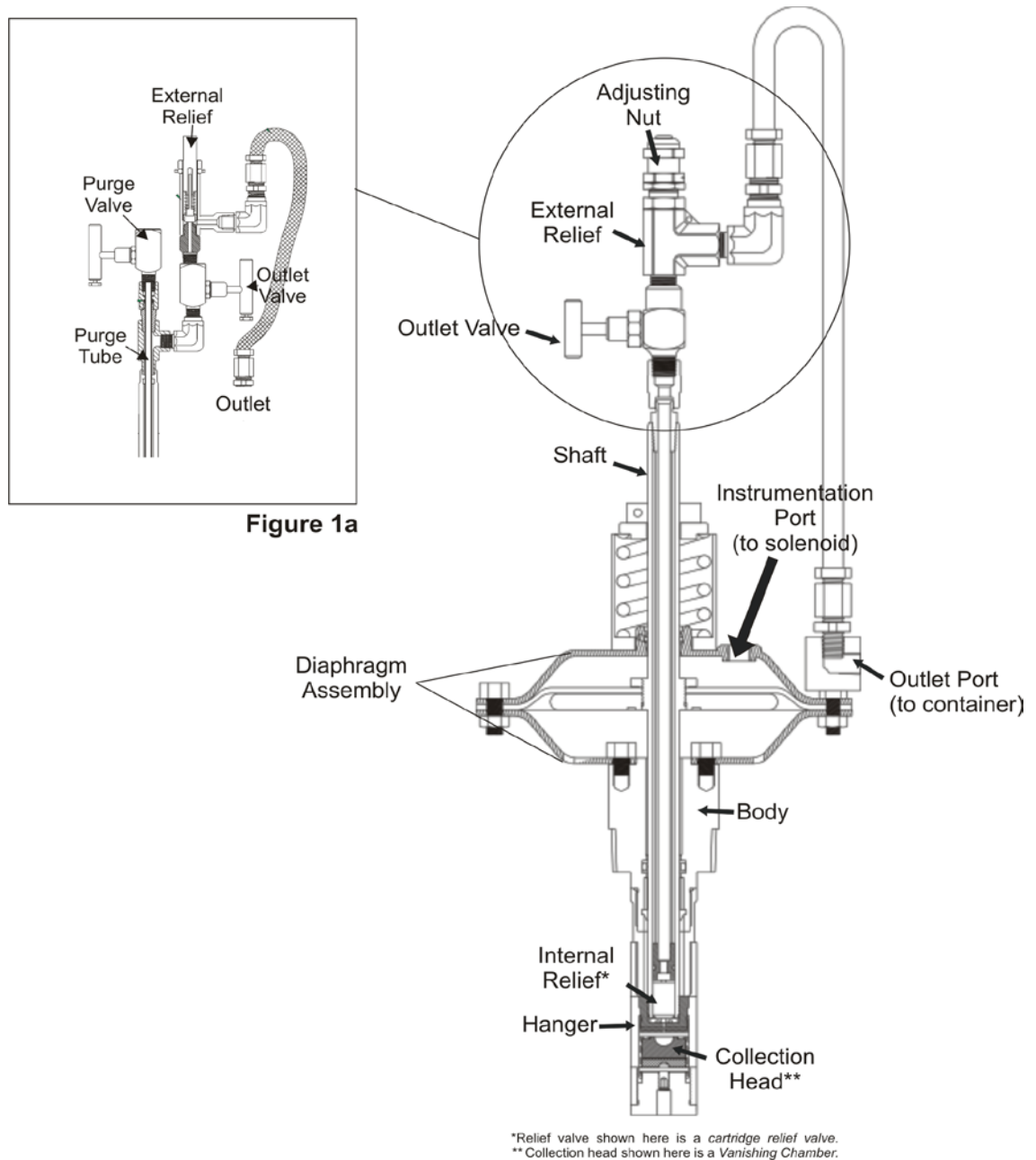


Figure 1

SPECIFICATIONS

N 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.**

LS-12 Series	
Model number	LS-12; LS-12F; LS-12FT
Products Sampled	Crude oil, condensate, refined hydrocarbons, water and all other gas or liquid products compatible with materials of construction
Materials of construction	Carbon steel, Viton [®] , 316 SS (others available), PTFE [®]
Sample Grab Sizes (nominal)	Vanishing Chamber Collection Head: 0.22, 0.5, 1.0, and 1.5 cc B Collection Head: 0.5 to 30 cc
Grab Rate	Up to 15 grabs per minute
Insertion length	6.25" (1905 mm) standard; other lengths available.
Viscosity Range	8 – 50° API
Maximum Allowable Temperature	Vanishing Chamber: 150° F @1440 psi (65° C @ 100 bar) (Varying temperatures available for B Collection Heads)
Maximum Allowable Operating Pressure	2160 psi @ -20° F to 100° F (148 bar @ -29 ° C to 100° C); or determined by flange rating
Pipeline Connection	LS-12: 2" NPT LS-12FT: 2" spool piece (other sizes and ratings available) LS-12F: 2" flanged
Sample outlet connection	1/4" NPT
Instrumentation Connection	1/4" NPT
Area classification	Can be used in hazardous locations
Utilities Required	Air/Hydraulic Pressure: 40-60 psi (2.75 – 4 bar) Air consumption: 0.1 SCF/Stroke @ 65 psi
Options	<ul style="list-style-type: none"> - Sampler completely 316SS or other materials - Purge assembly - High or low temperatures - Higher pressures and flange ratings - Elastomer compounds

INSTALLATION & OPERATION

2. INSTALLATION INSTRUCTIONS

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 company.

Recommended Tools

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

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

N NOTE

The sampler installation location should be 2 to 4 pipe diameters downstream of an inline static mixer or other flow conditioning system.

N NOTE

The sampler should always be mounted horizontally.

N NOTE

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

2.2 Installation

- 2.2.1 A hanger at the bottom of the device (refer to Figure 1) is equipped with an opening for the flowing stream to move through. With the sampler on a bench or a clean working surface, mark the sampler body to indicate where the opening is on the hanger.

N NOTE

Either opening on the hanger can face upstream. Marking the body will help to determine where the opening is when the sampler is installed in the pipeline.

- 2.2.2 Depressurize the pipeline.
- 2.2.3 Make sure all valves are closed on the sampler.
- 2.2.4 Connect the sampler to the pipeline.
- 2.2.5 Check the mark in step 1 to verify that the flow path is correct.
- 2.2.6 Tube from the outlet port (refer to Figure 1) to the sample receiver (i.e. atmospheric container or constant pressure cylinder).
- 2.2.7 Connect an instrument supply to a 3-way solenoid valve.
- 2.2.8 If needed, connect a pressure regulator to the instrument supply.

INSTALLATION & OPERATION



CAUTION

Pressure from supply should not exceed 60 psi.

- 2.2.9 Make the necessary electrical connections to the solenoid (*refer to IO&M for solenoid valve*).
- 2.2.10 Tube from the normally open port (stamped *A* or *NO* on most solenoids) on the solenoid (in the de-energized position) to the sampler's solenoid port (*refer to Figure 1*).
- 2.2.11 Pressurize the pipeline.
- 2.2.12 Check the connection point for leaks.
- 2.2.13 Open the outlet valve.
- 2.2.14 **Immediately** tighten the adjusting nut on the external relief valve just enough to stop any product from freely flowing through the sampler to the receiver.

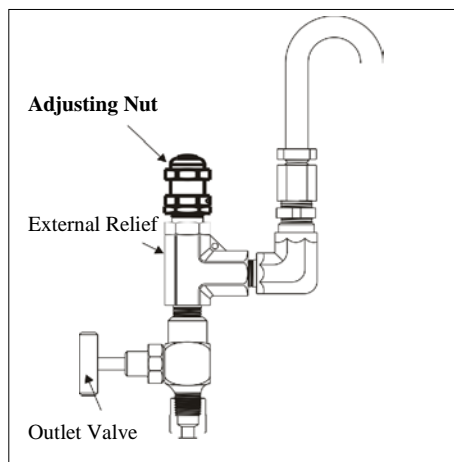


Figure 2

- 2.2.15 Tighten the adjusting nut one quarter turn to set the external relief valve above maximum pipeline pressure.
- 2.2.16 Turn on the instrument supply to the solenoid.
- 2.2.17 Turn on the customer supplied sample rate controller.



NOTE

When the sampler is placed into service, the solenoid will have to be energized several times before samples exit the sampler. This is normal, as the device must fill with sampled product.

- 2.2.18 Verify that the output volume is equal to the volume of the sample head. Once the output volume is confirmed, the sampler is ready to operate.



WARNING

Never close the outlet valve during operation because the sampler can build extremely high internal pressures and damage key parts. The outlet valve is used to provide shutdown for performing maintenance on the external relief or to stop product flow if both the internal and external relief need maintenance. The valve must remain fully open during sampling operations.

MAINTENANCE

3. MAINTENANCE INSTRUCTIONS

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.

N NOTE

We recommend that the unit have biannual 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.

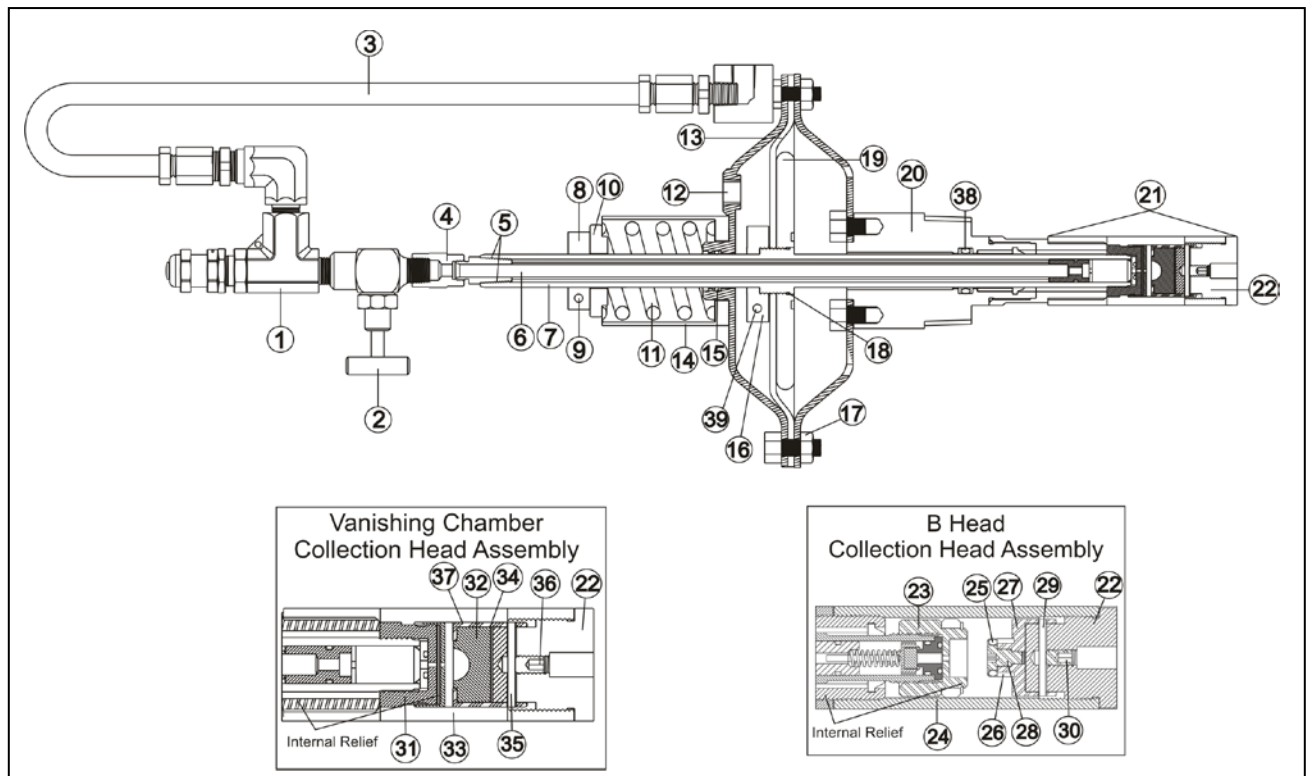


Figure 3

Refer to this Figure throughout the entire maintenance process.

MAINTENANCE

Recommended Tools

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

- 12" adjustable wrench
- 6" adjustable wrench
- 8" channel lock pliers
- Hex wrench, sizes $\frac{5}{32}$ " , $\frac{3}{16}$ " , $\frac{1}{4}$ " , and $\frac{3}{8}$ "
- $\frac{1}{2}$ " socket wrench
- $\frac{1}{2}$ " combination wrench
- Tubing
- Tubing cutters

3.2 Purging the system (optional)

N NOTE

If your unit is equipped with a purge inlet valve, it will be located at the top of the device, above the outlet valve.

- 3.2.1 Use tubing to connect the purge source (i.e. N₂ or Argon) to the purge inlet valve (see Figure 1).
- 3.2.2 Set the purge source at least 10 psi above the external relief setting.
- 3.2.3 Turn on the purge supply.
- 3.2.4 Make sure the outlet valve is open.
- 3.2.5 **Slowly** open the purge inlet valve, allowing sufficient time (determined by length of tubing container) to completely purge sampler and sample line to container.

3.3 Disassembly instructions

- 3.3.1 Isolate, depressurize and drain the pipeline at the sampler location.
- 3.3.2 Close the container inlet valve and disconnect tubing from the sampler to the sample container.
- 3.3.3 Disconnect tubing from the solenoid to the sampler.
- 3.3.4 Remove sampler and place it in a clean work area.
- 3.3.5 Use an adjustable wrench to loosen the collection assembly (Part 21) from the body (Part 20). If a lock nut is used together with the collection assembly, loosen the lock nut to loosen the assembly.
- 3.3.6 Remove the collection assembly, and remove the base (Part 22) from the collection assembly.
- 3.3.7 Hold a backup wrench on the flats of the shaft (Part 5).
- 3.3.8 Use another wrench to remove the anvil (Part 31) or cylinder (Part 23).

! CAUTION

Do not allow the shaft to turn or rotate when removing the anvil.

N NOTE

The B style relief and sand relief are spring loaded and will pop out when removing anvil or cylinder. With a cartridge style relief, the cartridge check must be pulled out of the shaft.

N NOTE

The Vanishing Chamber is equipped with an anvil, while the B collection head is equipped with a cylinder.

MAINTENANCE

3.4 Collection head maintenance

3.4.1 For a Vanishing Chamber collection head:

- a) Remove the base from the hanger (Part 33).
- b) Loosen the set screw (Part 36) in the base.
- c) Remove the holding pin (Part 35), and slide the shield (Part 37) off the base.
- d) Push the collection cup (Part 32) and the non-extrusion disc (Part 34) out of the shield.
- e) Lubricate the inside of the shield and insert a new collection head and non-extrusion disc.
- f) Reattach the shield on the base. Continue to step 3.4.3.

3.4.2 For a B collection head:

- a) Remove the base from the hanger (Part 24).
- b) Loosen the set screw in the base (Part 30).
- c) Remove the holding pin (Part 29), and slide the piston (Part 27) off the base.
- d) Remove the retainer (Part 28) from the piston.
- e) Remove the piston seal (Part 25) and piston bearing (Part 26).
- f) Inspect the piston bearing and replace, if necessary.
- g) Replace the piston seal.
- h) Reassemble the retainer to the piston. Tighten enough to securely hold the piston seal and piston bearing in place.
- i) Reassemble the piston to the base. Continue to step 3.4.3.

3.4.3 Insert the holding pin, and snugly tighten the set screw.



CAUTION

Do not overtighten the set screw.

3.4.4 Complete maintenance on the internal relief according to the type of relief your sampler is equipped with (see Section 3.5).

3.5 Internal relief maintenance

3.5.1 For a B relief:

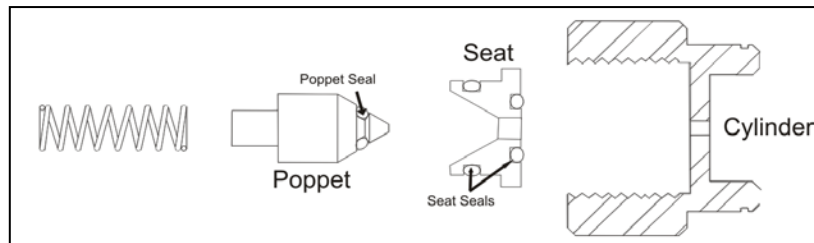


Figure 4

Refer to this Figure for the following steps.

MAINTENANCE

- a) Replace the seal on the poppet (see Figure 4).
- b) Replace the two seals on the seat.
- c) Examine the poppet and seat for wear. The seat should have a smooth tapered finish.
- d) Reassemble and continue with maintenance instructions.

3.5.2 For a sand relief:

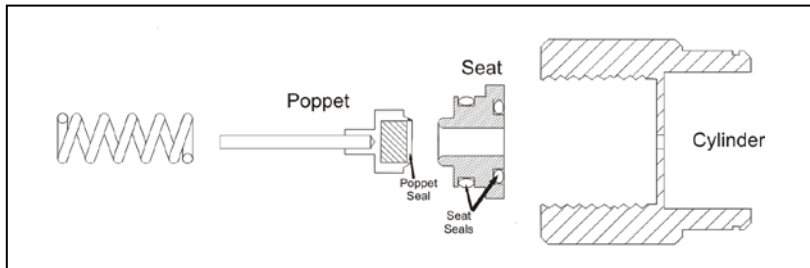


Figure 5

Refer to this Figure for the following steps.

- a) Replace the seals on the seat (see Figure 5).
- b) Inspect the poppet seal. This seal, under normal operation, will show a smooth indentation from the seat. Replacement will be necessary if the seal has deteriorated.
- c) Reassemble and continue with maintenance instructions.

3.5.3 For a cartridge relief:

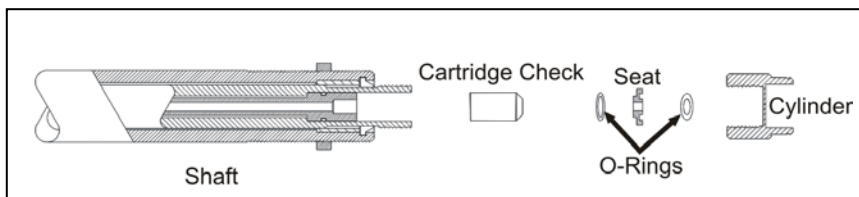


Figure 6

Refer to this Figure for the following steps.

- a) Replace the cartridge check (see Figure 6).
- b) Inspect O-rings for wear. Replace if necessary.
- c) Reassemble and continue with maintenance instructions.

3.6 Body diaphragm maintenance

- 3.6.1 Remove the flex line (Part 3, Figure 3).
- 3.6.2 Remove the outlet valve (Part 2), external relief (Part 1), and the coupling (Part 4).
- 3.6.3 Slowly loosen the set screw (Part 9) on the spring lock collar (Part 8).

MAINTENANCE



CAUTION

Spring tension will cause the collar to slide up the shaft.

- 3.6.4 Remove the spring lock collar, retainer (Part 10), guard (Part 14) and spring (Part 11).
- 3.6.5 Remove the hex head nuts and bolts (Part 17) holding the diaphragm assembly together.
- 3.6.6 Lift the top diaphragm housing off the shaft and pull the shaft through the assembly, removing it from the lower diaphragm case.
- 3.6.7 Remove the diaphragm (Part 13), diaphragm plate (Part 19), and shaft (Part 6) from the body.
- 3.6.8 Replace the seal (Part 15) in the upper diaphragm case.
- 3.6.9 Replace the seal (Part 38) in the body.
- 3.6.10 Examine the diaphragm. If it is leaking or cracked, it will need replacement. If it does not need replacement, proceed to step 19 of this Section.
- 3.6.11 Loosen the set screw (Part 39) on the diaphragm lock collar (Part 16).
- 3.6.12 Unscrew the lock collar and remove the diaphragm.
- 3.6.13 Hold the diaphragm plate securely and unscrew the shaft (Part 6).
- 3.6.14 Examine the shaft for damage. The shaft is polished and should be free of scratches and pits. Replace if scratches are present.
- 3.6.15 Replace the O-ring (Part 18) on the shaft.
- 3.6.16 Add thread lock to the threads.
- 3.6.17 Reinstall the diaphragm plate.
- 3.6.18 Reinstall the diaphragm and lock collar tightly.
- 3.6.19 Tighten the set screw on the lock collar.
- 3.6.20 Lubricate the shaft and place it through the lower diaphragm case and housing.
- 3.6.21 Replace the top diaphragm case and reinstall the hex head nuts and bolts securely (Part 17).
- 3.6.22 Slide the spring retainer (Part 10), spring guard (Part 14), spring (Part 11), and lock collar over the exposed shaft.
- 3.6.23 Place the shaft in the vertical position on top of a wooden surface and press down on the lock collar (Part 8) until the set screw is just slightly above the spring guard.
- 3.6.24 Tighten the set screw firmly.
- 3.6.25 Reinstall the outlet valve (Part 2), external relief (Part 1), and coupling (Part 4).
- 3.6.26 Reinstall the flex line (Part 3).
- 3.6.27 Reinstall the relief and anvil (or cylinder) using the backup wrench.
- 3.6.28 Reinstall the collection cup assembly.
- 3.6.29 Reinstall the sampler to the pipeline.



13839 West Bellfort, Sugar Land, Texas 77498-1671

Phone: (281) 491-2331

Fax: (281) 491-8344

Toll Free: (800) 776-7267

Web Page: www.welkereng.com