



*Installation, Operation, and  
Maintenance Manual*

***Welker<sup>®</sup> Constant Pressure Cylinder  
With Solid Indicator  
(Non-mixer)  
Model  
CP-30SI***

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

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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.

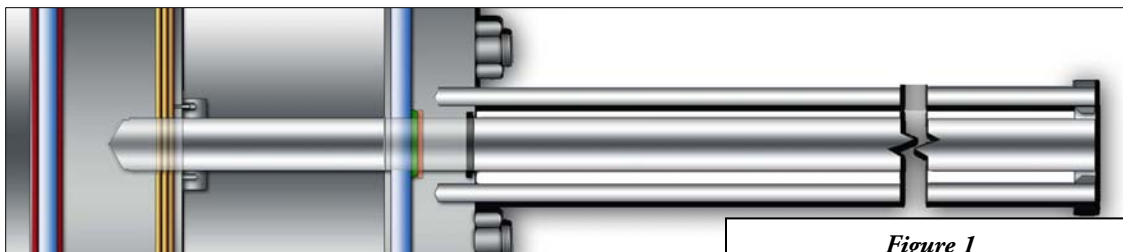
##### WARNING

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

# SPECIFICATIONS

## 1.2 DESCRIPTION OF PRODUCT

The Welker Constant Pressure Sample Cylinder is designed for use in systems where it is necessary to extract product samples and by maintaining a steady pressure on the cylinder container. The CP30 is equipped with a solid indicator and an indicating ring that has been set to identify when the cylinder is at 80% capacity. During continuous sampling, when the indicator rod reaches the 80% mark, all sampling should be stopped. A pneumatic supply pre-charges the cylinder with pressure to correspond with pipeline pressure. Pre-charging allows the sample to be transported through the cylinder without taking a pressure drop. The piston inside the cylinder helps to purge out air and contaminants prior to taking the sample. During the purge process, the piston is pushed to the end of the cylinder, also preventing any other possible contaminants from entering. Burst discs and gauges are also attached to each end cap of the device. In the event that the cylinder is overpressurized, these discs will rupture, relieving excess pressure inside the cylinder.



*Figure 1*  
*80% Indicator Rod & Ring*

## 1.3 IMPORTANT INFORMATION



### WARNING

**Please read the following information in its entirety upon receiving the Welker equipment described above.**

- Never fill a cylinder completely full of hydrocarbon liquid or refrigerated gas. Always allow for at least 20% expansion.
- Protect the cylinder at all times and handle with care. It is a precision instrument and may contain a hazardous product as well as a valuable representation of your company's product.
- When analysis is complete, the cylinder should be emptied safely and in a safe area by opening the product inlet valve, allowing the pre-charge pressure to push the piston to the product end cap, emptying the cylinder.
- Welker recommends cleaning and leak testing of the cylinders after each use.
- Because of the design of the cylinder and the incorporated seals, the process of emptying the cylinder will simultaneously wipe the walls of the device clean. The end cap will also be purged clean prior to the next use.

# SPECIFICATIONS

## 1.4 COMPONENT DIAGRAM

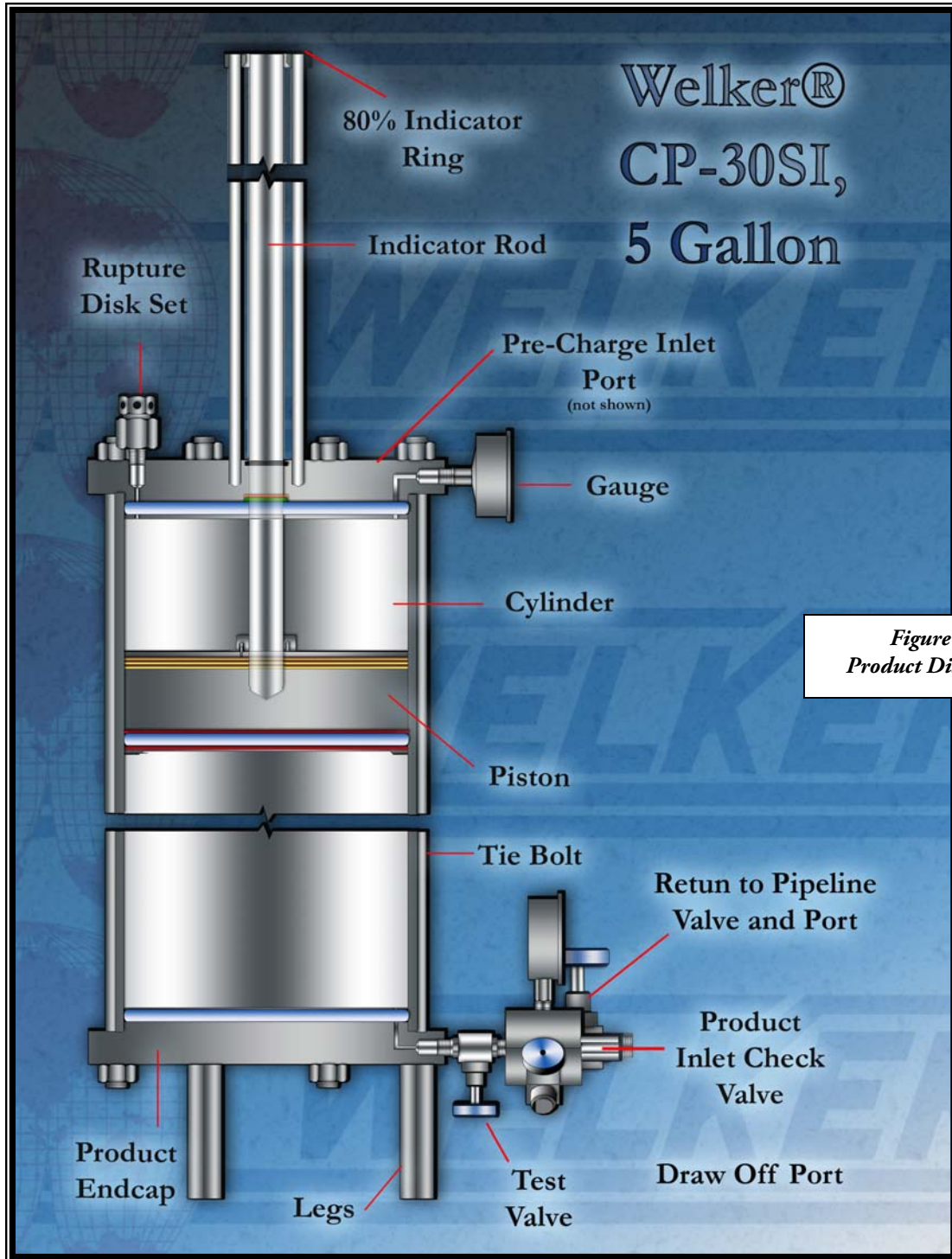


Figure 2  
Product Diagram

Refer to above diagram throughout manual. Color is for illustration purposes. Part colors may vary.

# SPECIFICATIONS

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## 1.5 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.**

**TABLE 1**

<b>Specifications</b>	
<b>Products Sampled:</b>	Crude oil, condensate, refined hydrocarbons, water, and all other gas or liquid products compatible with materials of construction.
<b>Materials of Construction:</b>	Anodized Aluminum, Viton <sup>®</sup> , PTFE (others available)
<b>Sample Volume:</b>	5 gallons
<b>Sample Inlet Connection:</b>	1/4" NPT
<b>Sample Outlet Connection:</b>	1/4" NPT
<b>Relief Valve Connection:</b>	1/2"-20 UNF (1/4" NPT available)
<b>Maximum Allowable Operating Pressure:</b>	300 psi @-20°F to 120°F

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

# INSTALLATION & OPERATIONS

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## 2. INSTALLATION & OPERATIONS

### 2.1 IMPORTANT INFORMATION

- After unpacking the unit, check it for compliance and for any damages that may have occurred during shipment.
- 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.
- When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.
- There are two ends to the cylinder, separated internally by a floating piston. The top end is marked pre-charge inlet; this end can easily be identified by the indicator rod attached to it. The bottom end of the cylinder is marked product inlet, and it is easily identified by the cylinder legs attached to it.
- The sample cylinder should be located as close to the sample point as is possible.

#### Recommended Tools

It would be advisable to have the following tools available for installation of the unit. However, tools used will vary depending on cylinder model and connectors.



- Flexible hose or tubing
- (2) 6" adjustable wrenches
- Tubing cutters
- Small diameter stainless steel tubing

### 2.2 CONNECTING THE SYSTEM (*Refer to Figure 3 on next page*)

1. Use small diameter stainless steel tubing to connect a customer supplied pre-charge gas storage container to a customer-supplied pre-charge fill valve "A", and then tube from the fill valve to the CP-30 cylinder.
2. Use small diameter stainless steel tubing to connect the return to pipeline valve "D" to a recovery system or return point on the pipeline.
3. Use small diameter stainless steel tubing to connect the product inlet check valve "F" to the sample point (i.e. sample or probe).

# INSTALLATION & OPERATIONS

## 2.3 PRE-CHARGING THE CYLINDER (*Refer to Figure 3*)

### ! CAUTION

The pre-charge gas being used must be compatible with the seals in the cylinder. The relief valves and gauges must also be adequate for the pressures used when pre-charging.

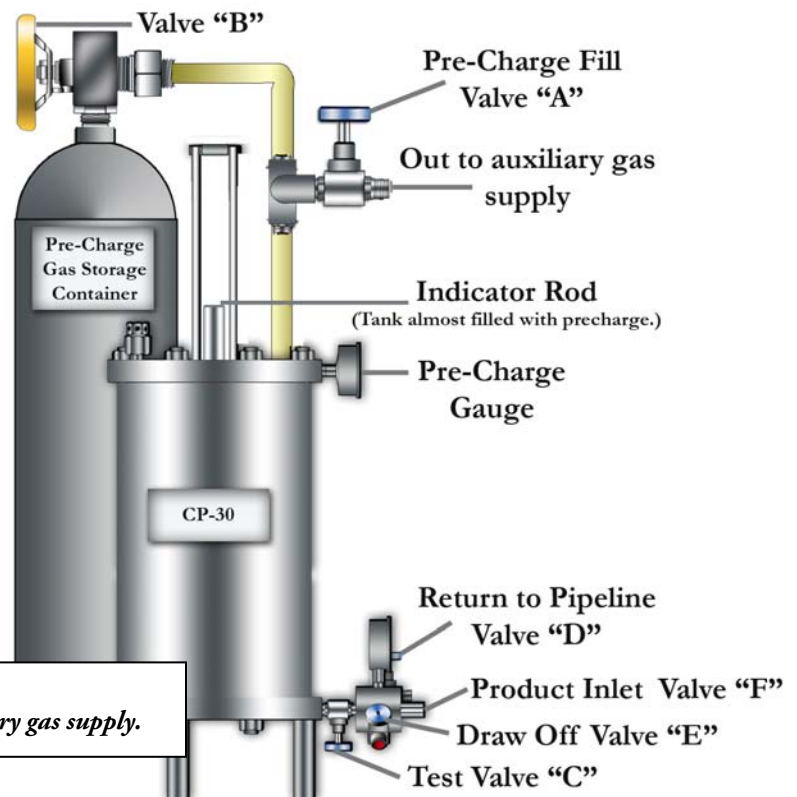
### N NOTE

When using an auxiliary gas, the pre-charge side of the cylinder should be pressurized with a gas supply (i.e., nitrogen or helium) and **set 50-100 psi above pipeline operating pressure, not to exceed the maximum allowable pressure of the device.**

### ! CAUTION

**Always open valves slowly to avoid slamming the piston from one end to the other.**

1. Connect the gas supply to the fill valve. Slowly open the valve on the gas supply (not shown). Open the pre-charge storage container valve "B", and if necessary, the optional pre-charge inlet valve (not shown). This will fill the CP30 and the pre-charge storage container with auxiliary gas.
2. Slowly open the test valve "C" and the draw-off valve "E" to relieve any pressure buildup. The piston will begin to move.
3. The pre-charge gauge should begin to read pressure and will eventually read the designated pressure.
4. Once the piston has reached the end of the cylinder, and the indicator rod is fully retracted, close the fill valve "A" and the draw-off valve "E", and then check system for leaks.
5. Disconnect the auxiliary gas supply.



*Figure 3*  
*Pre-Charging with an auxiliary gas supply.*



# INSTALLATION & OPERATIONS

## 2.4 PURGING THE SYSTEM

To purge the system in preparation for initial use:

1. Open the sample point, and apply pressure to the product inlet check valve "F"
2. Slowly open the draw-off valve "E" until air is displaced and product appears.
3. Close the draw-off valve "E".

## 2.5 CONTINUOUS SAMPLING

1. Open the sample outlet valve on the sampler.
2. The piston will not yet move because pre-charge pressure is above pipeline pressure.

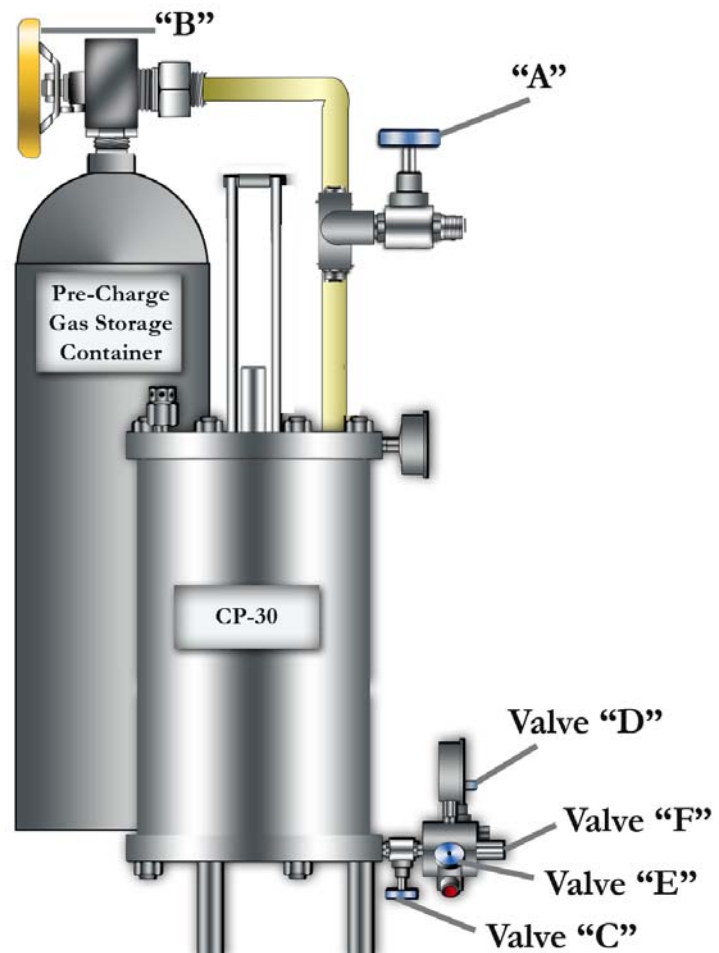
### **N** NOTE

The automatic sampler will push product against the piston, causing the pre-charge pressure to relieve to the pre-charge storage tank or to be pushed into the pipeline.

3. Turn the sampler off when the cylinder is at 80% capacity. This allows a 20% margin for possible expansion due to temperature changes.
4. When the desired amount of sample is extracted, close all valves on the cylinder except for valve "C", which should always remain open.
5. Close the sample outlet valve on the sampler.
6. Attach the transportation cylinder to the draw-off valve "E" and withdraw sample. Follow manufacturer instructions for filling the transportation cylinder, and **do not fill cylinder more than 80% full**.
7. Open return to pipeline valve "D" to discard remaining sample contents.
8. Close return to pipeline valve "D", and open the sample outlet valve on the sampler to begin a new sampling cycle.

### **W** WARNING

**Check with your company for transportation procedures and requirements; do not transport a constant pressure cylinder without following government regulations.**



# MAINTENANCE

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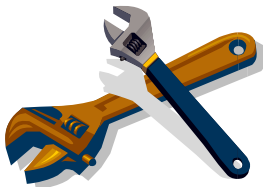
## 3. MAINTENANCE

### 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.

#### Recommended Tools

It would be advisable to have the following tools available for installation of the unit. However, tools used will vary depending on cylinder model and connectors used.



- (2) adjustable wrenches

#### **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.

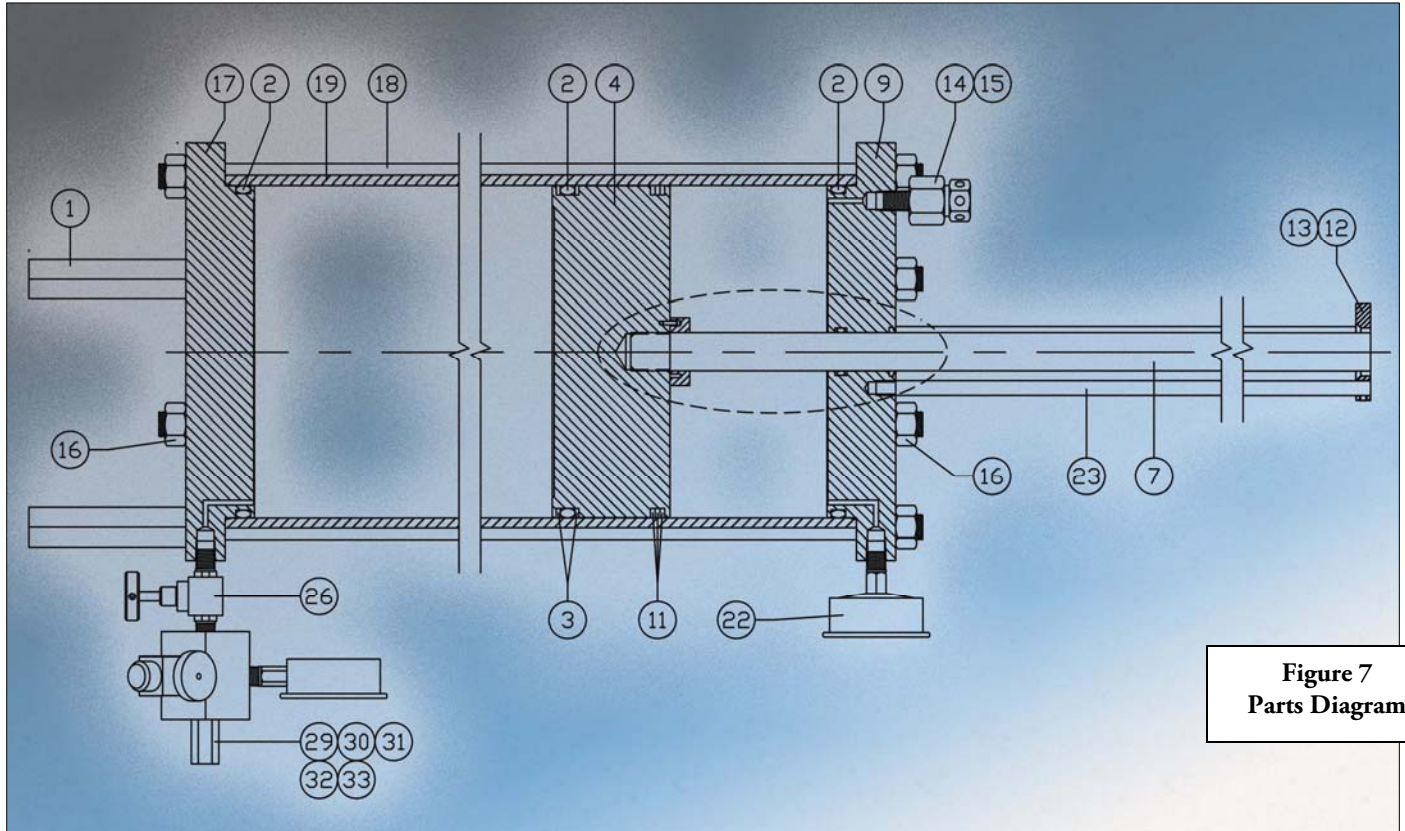
#### **N** NOTE

New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease (silicone grease or other) before they are installed into the equipment. This helps in 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 shafts or cylinder inner diameters to allow smooth transition of parts.

In the case of Constant Pressure Sample Cylinders, the lubrication grease should be applied sufficiently but lightly (Krytox<sup>®</sup> is preferred). Wipe excess lubrication from the seals as it may have an adverse effect on some analytical instrument results.

# MAINTENANCE

## 3.1 GENERAL (CONTINUED)



**Figure 7  
Parts Diagram**

<b>CONSTANT PRESSURE CYLINDER CP-42GA</b>					
<b>1</b>	<b>Leg</b>	<b>12</b>	<b>80% Indicator Ring</b>	<b>23</b>	<b>80% Indicator Bolt</b>
<b>2</b>	<b>O-ring</b>	<b>13</b>	<b>Set Screw</b>	<b>24</b>	<b>Back-Up Ring</b>
<b>3</b>	<b>Back-Up Ring</b>	<b>14</b>	<b>Rupture Disc Set</b>	<b>25</b>	<b>Manifold Block</b>
<b>4</b>	<b>Piston</b>	<b>15</b>	<b>Housing</b>	<b>26</b>	<b>Valve m/m 1/4" NPT</b>
<b>5</b>	<b>Pin</b>	<b>16</b>	<b>Hex Nut</b>	<b>27</b>	<b>Burst Relief Plug</b>
<b>6</b>	<b>Lock Collar</b>	<b>17</b>	<b>Product End Cap</b>	<b>28</b>	<b>O-ring</b>
<b>7</b>	<b>Indicator Rod</b>	<b>18</b>	<b>Tie Bolt</b>	<b>29</b>	<b>O-ring</b>
<b>8</b>	<b>O-ring</b>	<b>19</b>	<b>Cylinder</b>	<b>30</b>	<b>O-ring</b>
<b>9</b>	<b>Pre-Charge End Cap</b>	<b>20</b>	<b>Valve m/f 1/4" NPT</b>	<b>31</b>	<b>Spring</b>
<b>10</b>	<b>Wiper</b>	<b>21</b>	<b>Gauge 0-300#</b>	<b>32</b>	<b>Ball Bearing</b>
<b>11</b>	<b>Back-Up Ring</b>	<b>22</b>	<b>Gauge 0-300#</b>	<b>33</b>	<b>CV-1 Upstream Body</b>

Refer to above diagram throughout maintenance process.

# MAINTENANCE

## 3.2 DISASSEMBLY

1. Make sure the unit is depressurized prior to maintenance.
2. Remove the twelve hex nuts (Part 16), and the eight tie bolts (Part 18).
3. Remove the top end cap (Part 9).
4. Remove the cylinder (Part 19) and piston assembly from the lower end cap (Part 17).
5. Carefully remove the piston (Part 4) and indicator rod (Part 23) from the cylinder (Part 19).

### **N** NOTE

Burst discs should be replaced after 6-10 cylinder fillings or at least once a year. While the discs do help to maintain the product, they are designed as a safety device to prevent overpressurization of the cylinder.

6. If necessary, remove and replace the burst discs from the Rupture Disc Set (Part 14) on the end caps.
  - Insert the clear seal.
  - Insert the rupture disc after the clear seal. The dome should face out.
  - Torque the bursting relief caps to the proper specification (see Table 2).

Table 2

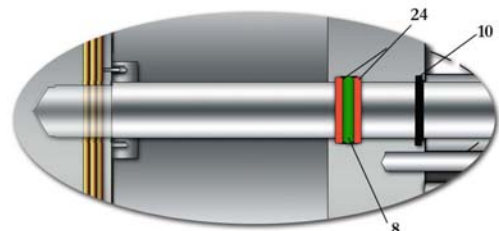
TORQUE SPECIFICATIONS FOR CYLINDER RUPTURE DISC CAPS		
Pressure Range (psi)	Torque Requirements	
0-300	50 in-lbs	5.6 Nm
301-5000	20 ft-lbs	27 Nm
5001-6000	24 ft-lbs	32 Nm
6001-7000	29 ft-lbs	39 Nm
7001-10,000	38 ft-lbs	52 Nm

7. If there is an adjustable relief valve on either end cap, remove it and replace all seals within the part (*refer to IO&M for adjustable relief valve*).

### **!** 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. Check the ball bearing for any signs of wear or damage. Replace if necessary.

8. Remove the set screw (Part 13) from the indicator ring (Part 12). Carefully remove the indicator rod (Part 7) from the pre-charge end cap (Part 9). Remove and replace the wiper (Part 10) the backups (Part 24) and the O-ring (Part 8) in the end cap.



# MAINTENANCE

## 3.3 MAINTENANCE INSTRUCTIONS

1. Remove and replace the backups (Part 3 and Part 11), and the O-ring (Part 2) on the piston.
2. Remove and replace the seals (Part 2) on each end cap.
3. Wipe down the inside of cylinder using solvent (acetone or similar cleaning agent), and dry carefully (*also see Section 3.5*).
4. Closely examine the honed surface of the cylinder. Scratches and pits will cause the seals to leak.

### **W** WARNING

The following are causes to return the device to the manufacturer:

- Scratches or pitting that allow migration of gas from one side to the other.
- Any damage to the outside cylinder shell that may compromise the cylinder wall thickness.

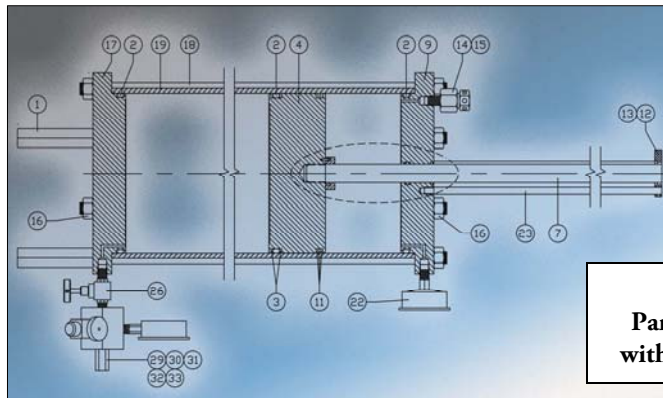
## 3.4 REASSEMBLY INSTRUCTIONS

1. Reassemble the indicator rod (Part 7), indicator bolt (Part 23), and indicator ring (Part 12) with the indicator set screw.
2. Slide the piston (Part 4) back into the cylinder (Part 19) taking care that the piston is pointed in the correct direction.
3. Reattach the burst disc relief valves (Part 4) to the end caps (Part 5).
4. Reattach the end caps (Parts 9 & 17) to the cylinder with the tie bolts and hex nuts.
5. If necessary, replace the O-rings in the product inlet check valve (Parts 29-33).
6. Pressure up cylinder at one end with an inert as supply and test for leaks. Repeat the process from the opposite end. Pressurize slowly to avoid slamming the piston from one end to the other.

### **N** NOTE

Welker recommends using helium to test for leaks.

7. Maintenance is now complete. Refer to Section 2 for re-installation, pre-charge, and operation instructions.



**Figure 7**  
**Parts Diagram (Enlarged**  
**with Parts List on page 11)**

# MAINTENANCE

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## 3.5 CYLINDER CLEANING

Regular cleaning of the cylinder is essential for the proper functioning of the device. Solvent cleaning is normally done during scheduled maintenance; however, some companies require this before each cylinder is put into service. Any debris or residue that is not removed from the cylinder will contaminate the results of the next sample extracted from the cylinder. Welker recommends cleaning and leak testing of the cylinder after each use.

### **Cleaning a constant pressure sample cylinder can be done one of two ways without disassembly:**

#### **1. Purging with helium (Normally used when CP30 is used for gas sampling)**

- Fill and empty the cylinder with helium repeatedly.
- Take a sample of the helium to test for trace amounts of hydrocarbons.

#### **N** NOTE

If hydrocarbons are present in the analysis, the system has not been adequately cleaned, and further purging will be necessary. If hydrocarbons or contaminants remain present, a solvent cleaning may be required (*see step 3.5.3*). After cleaning with solvent, purge with helium to remove the solvent and analyze the helium to verify the solvent and hydrocarbons have been removed.

- If no hydrocarbons are found, cleaning is complete.
- Repeat step 6 of Section 3.4.

#### **2. Cleaning with solvent**

- Fill and empty the cylinder repeatedly with solvent.
- Use an inert gas to dry and purge the cylinder.
- Use method 3.5.1 to verify the system is free of contaminants.
- Repeat step 6 of Section 3.4

# SAFETY WARNING

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## SAFETY ISSUE WARNING FOR LIQUID SAMPLE CYLINDERS

After drawing the sample into the cylinder, the inlet and pre-charge valves should be closed. The sample line is then disconnected from the cylinder and the cylinder is completely isolated from the process. Paperwork is processed and the cylinder is prepared for transport. Prior to transporting the cylinder, it is a common and recommended practice to plug or cap the valves on the cylinder. These valves may terminate with a female NPT or a male NPT. The female valves are typically plugged, while the male valves are typically capped.

In the case of liquid sampling and due to the potential extremes of thermal expansion of many LPG products, caution should be taken to ensure that any residual liquid is drained, blown, or absorbed from the accessible exterior dead volume of the valve body (downstream of the seat) prior to plugging or capping the valve.

It is common to see temperature differentials of as much as 100° F (38° C) or more. Liquid samples that are drawn at -40° F to -50° F (-40° C to -46° C) can be transported in shipping cases that may see ambient temperatures as high as 100° F to 160° F (38° C to 71° C), and at times may exceed 160° F (71° C).

Operators should be familiar with the basic and general physical properties of the product that they are sampling so that they can adequately estimate the expansion potential of the sampled product within the cylinder and therefore have them allow ample outage for expansion to occur. In a majority of cases, 80% fill and 20% pre-charge is acceptable, but certain products may require a larger inert gas pre-charge ratio – i.e., 70%-30% or 60%-40%.

### **WARNING**

Burst discs are installed on these cylinders to protect them from structural failure. The operator must be aware that flammable product will be released in the event of overpressurization of the working pressure of the cylinder and therefore it is important to allow for ample expansion within the cylinder prior to attainment of the rupture disc activation. Burst disc ranges and cylinder working pressures are determined by the U.S. Department of Transportation, and these guidelines and rules are found in CFR-49.

If you have any questions, please contact Welker.

# TROUBLESHOOTING

## 4.0 TROUBLESHOOTING GUIDE

The following is a troubleshooting table of issues most commonly associated with the Welker Constant Pressure Cylinder 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
Gauge indicates a loss of pressure.	<ul style="list-style-type: none"> <li>• There is a leak from one of the fittings.</li> <li>• There is a leak from the burst discs.</li> <li>• The cylinder experienced a temperature drop.</li> <li>• There is a defective valve.</li> </ul>	<ul style="list-style-type: none"> <li>• Check all fittings for leaks with leak detector. Replace thread sealant.</li> <li>• Make sure the burst discs are torqued properly. If the problem persists, the discs may need replacement. <i>See Table 2.</i></li> <li>• Restore the temperature to pipeline temperature.</li> <li>• Repair or restore the defective valve.</li> </ul>
Pressure is leaking across the piston.	Seals in the piston are leaking.	Disassemble and clean the unit. Inspect cylinder for scratches. Replace seals in the piston and reassemble.  <i>See Sections 3.2-3.4.</i>
Pressure is leaking from the indicator rod.	Seals in the pre-charge end cap are leaking.	Disassemble the unit. Replace pre-charge end cap seals. Inspect the rod for scratches and reassemble.  <i>See Section 3.3.</i>
The pre-charge or product end cap is leaking.	<ul style="list-style-type: none"> <li>• The burst disc is leaking.</li> <li>• There is a loose fitting.</li> <li>• The seat on purge valve is leaking.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the burst disc. <i>See step 3.2 Section 13.</i></li> <li>• Tighten the fittings.</li> <li>• Replace the seat.</li> </ul>





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