



**Installation,
Operation,
&
Maintenance
Manual**

Welker® Constant Pressure Sample Cylinder with Ellipsoid Mixer

Model
CP55EM

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.

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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 Constant Pressure Sample Cylinder is designed for use in systems where it is necessary to extract and isolate accurate product samples by maintaining a steady pressure from the pipeline to the cylinder. The device is marked to indicate 80% capacity of the cylinder. A magnetic stud finder is provided to check the position of the piston inside the cylinder. When the piston reaches this 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. A piston equipped in 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 included on each end cap of the device. In the event that the cylinder is overpressurized, the burst discs will rupture, relieving excess pressure inside the cylinder.

An ellipsoid is included inside the product side of the cylinder and is used for mixing. Due to its light weight, all mixing should be done slowly to allow the ellipsoid adequate time to travel through the product.

Adjustable relief valve (optional)

The adjustable relief valve functions as a safety device for the unit. During continuous sampling and transportation of the cylinder, the relief valve assures that the device maintains a constant pressure and does not exceed maximum allowable pressure. The valve will relieve any pressure that exceeds the set pressure.

INTRODUCTION

1.3 Important information

W WARNING

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

- This cylinder does not carry D.O.T. approval at this time.
- Never fill a cylinder completely full of hydrocarbon liquid or refrigerated gas. Always allow for at least 20% expansion.
- **In cases where the cylinders are exposed to varying temperatures, do not allow the cylinder to exceed the maximum allowable operating pressure indicated in Table 1, below.**
- Protect the cylinder at all times and handle with care. It is a precision instrument and may contain a flammable or caustic product as well as a valuable representation of your '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, and thus to empty the cylinder.
- Welker recommends cleaning and leak testing of the cylinders after each use.
- Because of the design of the cylinder and its seals, the process of emptying the cylinder will simultaneously wipe the walls of the device clean. The end cap will also be purged clean with the next use.

N NOTE

The specifications listed in this Section are generalized for this equipment. Welker can modify the equipment according to your '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, Viton [®] , PTFE, (others available)
Sample Outlet Connection	1/4" NPT (others available)
Sample Inlet Connection	1/4" NPT (others available)
Maximum Allowable Operating Pressure*	2,160 psi @ -20° F to 100 ° F (124 bar @ -29° C to 38° C)
Cylinder Volume	1,000 cc, 500cc, 300cc (others available)

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

SPECIFICATIONS

1.4 Specifications

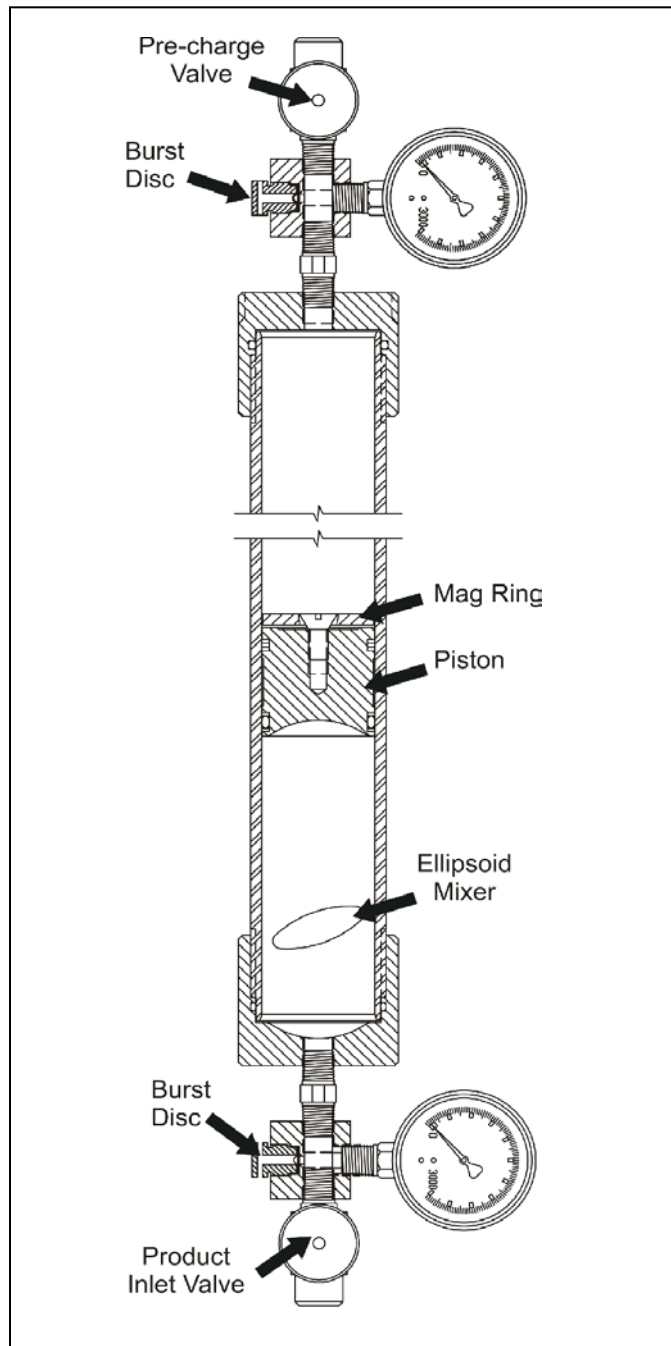


Figure 1

Refer to this Figure throughout the installation and operation process.

INSTALLATION

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.

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 of the unit. However, tools used will vary depending on model.

- Flexible hose or tubing
- Tubing cutters
- 6" adjustable wrench
- Pipe thread sealant

2.2 Pre-charging the cylinder


 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.

Pre-charging a constant pressure sample cylinder with a pre-charge gas can be done one of three ways:

2.2.1 Connecting the cylinder pre-charge valve to the pipeline (pressurized gas pipeline only):

- Use small diameter stainless steel tubing to connect the pre-charge valve (see Figure 1) to an available gas pipeline.
- Make sure all valves are closed on the sample cylinder.
- Open the pipeline isolation valve.
- Slowly** open the pre-charge valve.
- Slowly** open the product inlet valve. The piston will begin to move.

 CAUTION

Always open all valves slowly to avoid slamming the piston from one end to the other. Slamming the piston can result in damage to the mag ring (see Figure 1).

- The pre-charge gauge should begin to read pressure and will eventually reach pipeline pressure.
- Once the piston has reached the end of the cylinder, close all valves on the sample cylinder and close the pipeline valve.
- Disconnect the sample cylinder from the gas supply.**
- Check for leaks.

INSTALLATION

2.2.2 Connecting the pre-charge valve to the return port on a sampler probe:

- a) Install a valve into the return port of the sampler probe.
- b) Make sure all valves are closed on the sample cylinder.
- c) Use small diameter stainless steel tubing to connect the cylinder's pre-charge valve to the valve on the return port of the probe (see Figure 2).

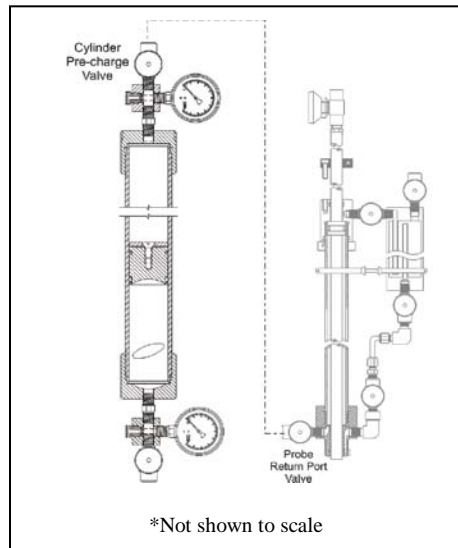


Figure 2

- d) Open the valve on the return port of the sample probe.
- e) **Slowly** open the pre-charge valve. The pre-charge gauge should begin to read pressure and will eventually read the sampler pressure.
- f) Once the piston has reached the end of the cylinder, close all valves on the sample cylinder and close the return port valve.
- g) Disconnect the sample cylinder from the return port of the probe.
- h) Check for leaks.

2.2.3 Using an auxiliary pre-charge gas:

N NOTE

When using an auxiliary gas, the pre-charge side of the cylinder should be pressurized with a regulated 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. An adjustable relief valve may be required if this method is used (*see step 1 of Section 2.3*).

- a) Make sure all valves on the sample cylinder are closed.
- b) Use small diameter stainless steel tubing to connect the pre-charge valve to the regulated auxiliary gas supply.
- c) **Slowly** open the valve on gas supply.
- d) **Slowly** open the pre-charge valve.
- e) Open the product inlet valve on the product end cap. The piston will begin to move.
- f) The pre-charge gauge should begin to read pressure and will eventually read the designated pressure.
- g) Once the piston has reached the end of the cylinder, close all valves on the sample cylinder and on the gas supply.
- h) Disconnect the sample cylinder from the gas supply.
- i) Check for leaks.

INSTALLATION

2.3 Installation

N NOTE

There are two ends to the cylinder, separated internally by a floating piston. One end is marked **PRODUCT INLET**; the other is the pre-charge end.

- 2.3.1 **If your cylinder is equipped with an adjustable relief valve:** set the valve at least 50-100 psi above pipeline pressure, not to exceed the maximum allowable working pressure indicated in Table 1 (*refer to IO&M for relief valve*).
- 2.3.2 Connect the product inlet to the sample point (i.e., probe or sampler).

2.4 Spot sampling from a pressurized source

N NOTE

Refer to GPA-2166 (Gas Processors Association) and API 14.1 (American Petroleum Institute) sampling standards for guidance.

- 2.4.1 After pre-charging the cylinder above pipeline pressure (*see Section 2.2*), connect the product inlet end of the cylinder to the probe outlet port (see Figure 3).

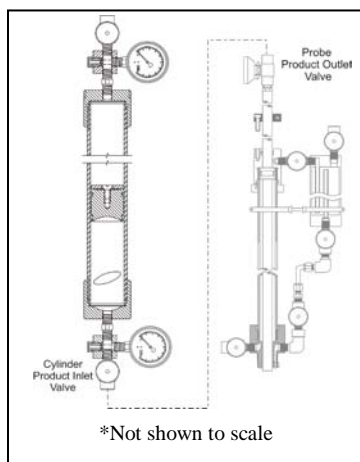


Figure 3

- 2.4.2 **Slowly** open the probe outlet valve.
- 2.4.3 **Slowly** open the product inlet valve on the product end cap. The piston will not yet move because pre-charge pressure is above pipeline pressure.
- 2.4.4 With the sampler valve and product valve fully open, **slowly** open the pre-charge valve to relieve pre-charge pressure. This will allow the sampled product to enter the cylinder and push against the piston. Thus, no pressure loss is encountered.

INSTALLATION

N NOTE

Relieving the pre-charge too quickly can result in a pressure drop and an inaccurate sample. A bleed plug can be installed on the pre-charge valve to regulate the relieving rate.

- 2.4.5 When the desired amount of sample is extracted, close all valves on the cylinder.
- 2.4.6 Close the probe outlet valve.
- 2.4.7 **Carefully** disconnect the cylinder from the probe, allowing the trapped product between the probe outlet valve and the product inlet valve to vent.

2.5 Continuous sampling

N NOTE

Before the sampling process, if applicable, open the purge valve for approximately 3-5 seconds to purge trapped air and residue and then close the valve. Welker recommends plugging the purge valve when not in use.

- 2.5.1 Pre-charge the sample cylinder (see Section 2.2), and connect the product inlet end of the cylinder to the sampler outlet port (see Figure 3).
- 2.5.2 Open the sample outlet valve (see Figure 3).
- 2.5.3 **Slowly** open the product valve on the product end cap. The piston will not yet move because pre-charge pressure is above pipeline pressure.
- 2.5.4 **Slowly** open the pre-charge valve.

N NOTE

The automatic sampler will push product into the cylinder, causing the piston to move.

- 2.5.4 Turn the sampler off when the cylinder is at 80% capacity. This allows a 20% margin for possible expansion due to temperature changes.
- 2.5.5 When the desired amount of sample is extracted, close all valves on the cylinder.
- 2.5.6 Close the sampler outlet valve.
- 2.5.7 **Carefully** disconnect the cylinder from the sampler, allowing the trapped product between the sampler outlet valve and the product inlet valve to vent.

2.6 Preparing the sample

- 2.6.1 Plug or cap all valves on the cylinder.
- 2.6.2 Record pressure, locations, etc., on the information tag according to policy.
- 2.6.3 Check all fittings for leaks.
- 2.6.4 Place the cylinder into a carrying case to provide maximum protection in transportation. Check with your for transportation procedures and requirements.
- 2.6.5 When mixing the cylinder's contents, tilt the device back and forth **slowly** to allow the ellipsoid adequate time to move through the product.

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 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.

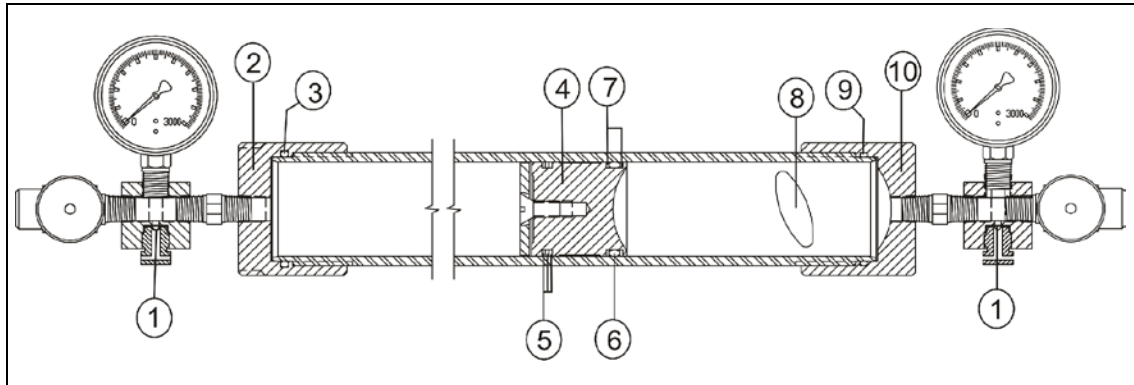


FIGURE 4

Refer to the above 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 cylinder model.

- Allen wrench
- 6" adjustable wrench
- Torque wrench
- Pipe thread lubrication and sealant

3.2 Instructions

- 3.2.1 Relieve pressure from the product and pre-charge ends of the cylinder.
- 3.2.2 Unscrew the pre-charge end cap (Part 2) from the cylinder.
- 3.2.3 Unscrew the product end cap (Part 10) from the cylinder.
- 3.2.4 Push the piston (Part 4) out of the cylinder and remove the ellipsoid (Part 8).
- 3.2.5 Replace the O-ring (Parts 3 and 9) in each end cap.

MAINTENANCE

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.

NOTE

New seals supplied in spare parts kits are not lubricated. All seals should be lightly coated with Krytox[®] lubrication grease before they are installed into the equipment. Other lubrication greases can be used, although they risk contaminating the sample. After the seals are installed, additional lubrication can be applied to the shaft or cylinder inner diameters to allow a smooth transition of the parts. While lubrication should be thorough, only a minimal amount should be applied. Wipe excess lubrication from the seals, as it may have an adverse effect on sampling.

- 3.2.6 Replace the backups (Parts 5 and 7) and O-ring (Part 6) in the piston.
- 3.2.8 Replace the burst disc (Part 1) if either one of them has ruptured.
 - a) Insert the clear seal.
 - b) Insert the rupture disc after the clear seal. The dome should face out.
 - c) Torque the bursting relief caps to the proper specification (see Table 2).

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.

Table 2

<u>TORQUE SPECIFICATIONS FOR CYLINDER RUPTURE DISC CAPS</u>		
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

- 3.2.9 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*).
- 3.2.10 Wipe down the inside of cylinder and dry carefully (*also see Section 3.3*).
- 3.2.11 Closely examine the honed surface of the cylinder. Scratches and pits will cause the seals to leak.

MAINTENANCE

W WARNING

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

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

- 3.2.11 Reinsert the piston into the cylinder.
- 3.2.12 Reinsert the ellipsoid. The ellipsoid should be on the product inlet side of the cylinder.
- 3.2.13 Tighten the pre-charge end cap back onto the cylinder.
- 3.2.14 Tighten the product end cap back onto the cylinder.
- 3.2.15 Pressure up cylinder at one end with an inert gas supply and test for leaks. Repeat the process from the opposite end.
- 3.2.16 Examine the gauges and valves for leaks. If damaged, replace the seals on the valves (*refer to IO&M for valves*). Replace the gauges if they are damaged or are reading incorrectly.

N NOTE

Welker recommends using helium to test for leaks.

3.3 Cylinder cleaning

Regular cleaning of constant pressure sample cylinders 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 a cylinder will contaminate the results of the next sample extracted into the cylinder. **Welker recommends cleaning and leak testing of the cylinders after each use.**

Cleaning a constant pressure sample cylinder can be done one of three ways:

3.3.1 Purging with helium

- a) Fill and empty the cylinder with helium repeatedly.
- b) 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.

- c) If no hydrocarbons are found, cleaning is complete.
- d) Repeat step 15 of Section 3.2.

3.3.2 Purging with new product

- a) Purge the cylinder using the product to be sampled. This can be accomplished each time the cylinder is put into service.
- b) Repeat step 15 of Section 3.2.

N NOTE

This method is acceptable only if the cylinder will be used in one location.

3.3.3 Cleaning with solvent

- a) Fill and empty the cylinder repeatedly with solvent.
- b) Use an inert gas to dry and purge the cylinder.
- c) Use method 3.3.1 to verify the system is free of contaminants.
- d) Repeat step 15 of Section 3.2.



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