

# **Continuous Oil Applicator**

**P/N SM1096**

***Installation Guide***

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# 1

## INTRODUCTION AND SITE PREPARATION

### INTRODUCTION

This book tells you how to prepare the site for and install the Continuous Oil Applicator. This book contains these chapters:

- This chapter, called Introduction and Site Preparation, which tells you about this book and tells you what you need to do before you install the Continuous Oil Applicator equipment
- [Equipment Installation](#), which tells you how to install and calibrate the Equipment
- [Troubleshooting](#), which tells you how to solve problems you may encounter during installation

Also included with the oiler is a book called the Continuous Oil Applicator User's Guide. It contains the information needed for daily use, maintenance and troubleshooting the Oil Applicator.

The Continuous Oil Applicator is one of several pieces of equipment that can make up an applicator system. Each separate piece has its own book or booklet. Your system may include one or more of these manuals as well:

- Rotating Drum Installation and User's Guide if you purchased a rotating drum.
- Seasoner Applicator Installation Guide and Seasoner Applicator User's Guide if you purchased a hopper and seasoner applicator bar.
- Documents from third-party manufacturers who supply things such as motors, blowers, and pumps.

### WHAT IS THE CONTINUOUS OIL APPLICATOR?

The Continuous Oil Applicator equipment delivers exact spray patterns of oil, oil and water solutions, or other light to medium weight liquids. The equipment is easy to use and sprays the same pattern in the same way each time, so the end product is consistent.

## SAFETY FIRST

### WARNING



Improper use or maintenance of the Continuous Oil Applicator equipment is a safety hazard. Operators, maintenance workers, and all other nearby persons must carefully observe all precautions marked on the equipment or mentioned in this book. Failure to observe the proper safety precautions can result in serious personal injury, electric shock, or death.

General safety precautions include:

- Turn off or disconnect all electrical power before opening guards, access doors, or covers. Failure to do so can result in an electrical shock hazard.
- All electrical work must be performed by a licensed, qualified electrician and comply with all applicable electrical codes.
- Turn off the compressed air supply before working on or near it. Failure to do so exposes you and others to the risk of injury from hoses and other pressurized or moving parts.
- Turn off any electrical or air-operated accessories and other devices near the applicator equipment. Such devices are often triggered by automatic sensors. If left powered, they might activate unexpectedly, causing injury.
- Keep all covers and guards in place while the equipment is running. Remove the covers or guards only for maintenance and testing. Running without its covers or guards can expose moving parts such as fan blades, coils, and springs that can cut, pinch, or otherwise injure you or other nearby persons.
- Always wear protective eye wear when installing, adjusting, or operating the Continuous Oil Applicator equipment.

### CAUTION



You must be able to safely lift at least 100 pounds to install the Continuous Oil Applicator equipment.

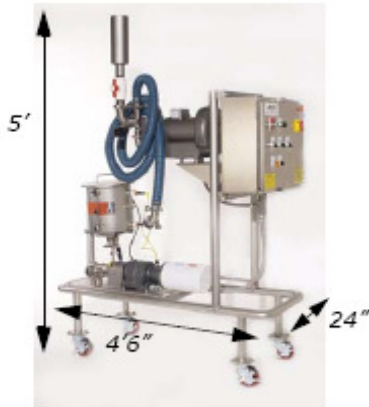
## STRUCTURE REQUIREMENTS

There are no special structural requirements for the Continuous Oil Applicator equipment.

## SPACE REQUIREMENTS

You will need a space at least 24" deep, 4'-6" wide and 5' high to fit the Continuous Oil Applicator. See [Figure 1-1](#).

*Figure 1-1 Continuous Oil Applicator Dimensions*



## UTILITY REQUIREMENTS

### Electrical

You must have 230 or 460 VAC at 25 amps, 3 phase, 60 Hz to provide power to the applicator. Refer to electrical print.

You must have 110 VAC to provide power to the control panel.

### Compressed Air

Your system must use one of these three options for air supply:

- A self-contained system, which includes an air blower and a positive displacement pump as part of the equipment you are installing.
- An air system provided by you, which includes a positive displacement pump and a filter and regulator assembly for 90psi, 3.5 cfm shop air.
- No air system, which includes the positive displacement pump only.



## 2

# EQUIPMENT INSTALLATION

## REQUIRED TOOLS

You need the following tools to install the Continuous Oil Applicator equipment:

- Phillips head screwdriver
- Straight head screwdriver
- Socket, open or box-end wrenches in these sizes: 7/16", 1/2", 9/16", and 13/16"

## PREREQUISITES

The Continuous Oil Applicator provides for a customer-supplied automatic start-and-stop method, such as a photoelectric eye. If your system will be using this, you must have this equipment available and ready to connect.

All site preparation requirements must be finished and all utilities ready to connect to the system before beginning installation.

## UNCRATING

The crate contains a Pick List. It shows all the parts that are shipped for your system.

Before you remove the equipment from the crate, inspect the crate carefully for shipping damage. Report any shipping damage to the freight carrier immediately.

### **Remove the equipment from the crate and:**

1. Compare each part against the Pick List to see if all parts are in the crate.
2. Identify each part in your own mind. A custom AutoCAD drawing with each part labelled is included with the system. Use this to help identify each part.
3. Inspect each part carefully for damage. Note any damaged parts by part number.
4. Report any damaged or missing parts immediately to PPM Technologies.

Contact information can be found in [Introduction and Site Preparation](#) in Chapter 1.

## INSTALLING THE CONTINUOUS OIL APPLICATOR

### To install the Continuous Oil Applicator:

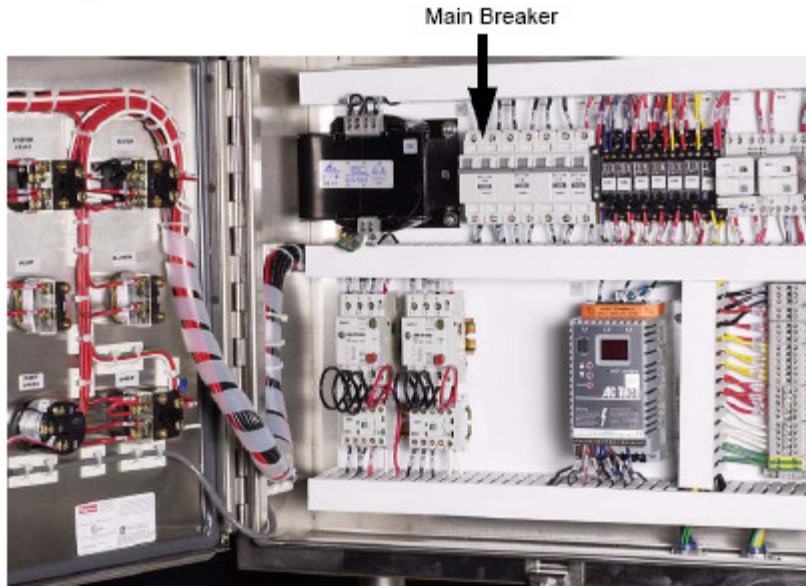
1. Connect electrical power to the control panel.
2. Connect compressed air, if your equipment uses compressed air for spraying.
3. Attach the spray bar to the coating drum.
4. Position the spray bar.
5. Connect the hoses that feed the material to be sprayed.
6. Attach any automatic start/stop equipment.
7. Test the system to see that it works correctly.
8. Clean and sanitize the system.
9. Calibrate the pump.

The following sections describe how to do each of these steps. See the chapter called [Troubleshooting](#) if you encounter problems.

## Step 1. Connecting Electrical Power

Connect the primary power source by connecting the three wires from your three-phase power supply to the main breaker in the control panel. See [Figure 2-1](#).

*Figure 2-1 Control Panel Main Breaker*



## Step 2. Connecting Compressed Air

If your system uses compressed air to deliver the spray, connect the plant air supply to the circulation solenoid on the right side of the control panel. See [Figure 2-2](#).

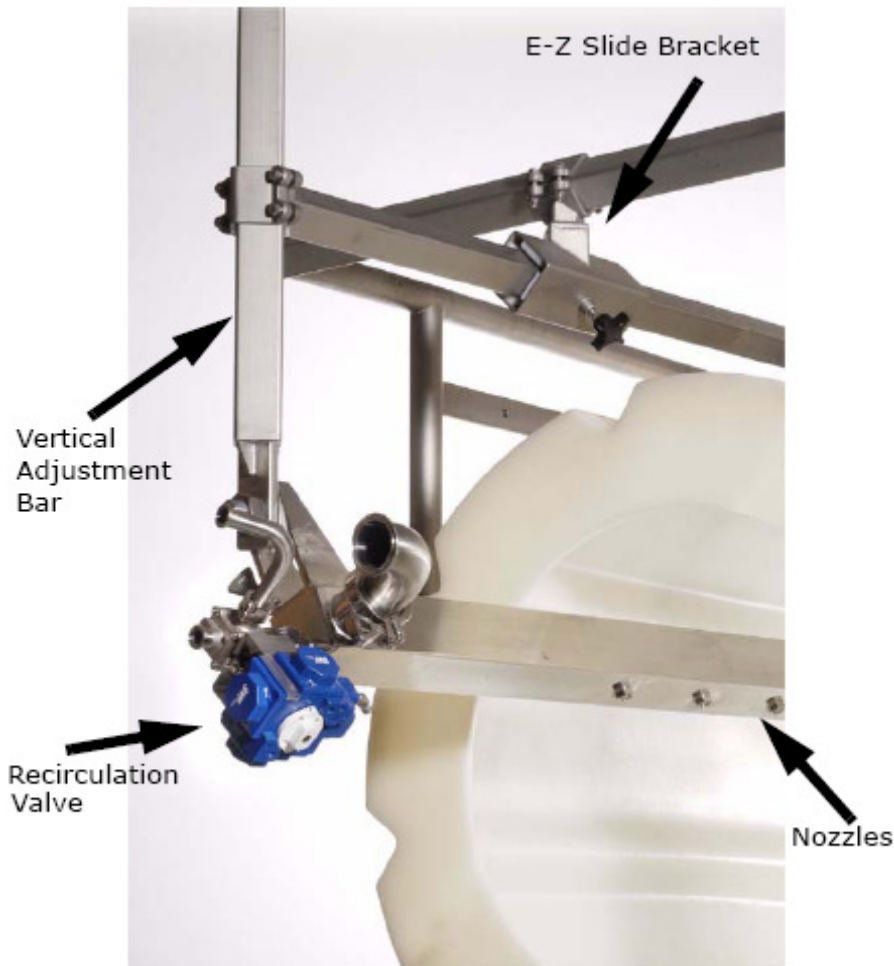
*Figure 2-2 Circulation Solenoid Location*



### Step 3. Attaching the Spray Bar

Attach the spray bar on the inlet side of the coating drum. [Figure 2-3](#) shows the relative positions of the drum and the spray bar, and points out where to attach the EZ-slide bracket and the vertical adjustment bar.

*Figure 2-3 Attaching the Spray Bar*



### Using Another Manufacturer's Drum Frame

If you are using another manufacturer's drum frame rather than the drum frame manufactured by PPM Technologies, you must install a horizontal support structure that is the same as the one used on the PPM Technologies drum frame. This support is:

- Constructed of 2" square tube with a 1/8" wall.
- Even with the end of the inlet face of the drum.

- About 12" above the drum.
- Rotated 45 degrees so that when you look at it head-on, it forms a diamond shape.
- Allows the E-Z Slide bracket slide bar and the vertical adjustment bracket to be mounted in the correct position.

Figure 2-3 above shows the correct positioning and placement.

#### Step 4. Positioning the Spray Bar

After attaching the spray bar, you must place it in the drum.

##### To position the spray bar that you just installed

1. Place the spray bar in position in the drum.
2. Use both the vertical and the horizontal adjustment brackets to move the spray bar above and opposite the area in the drum where the product will be when it is being coated.

**Tip:** Spray nozzles should be 12" to 15" above the product. You may need to make minor adjustments to reposition this spray bar after a test run.

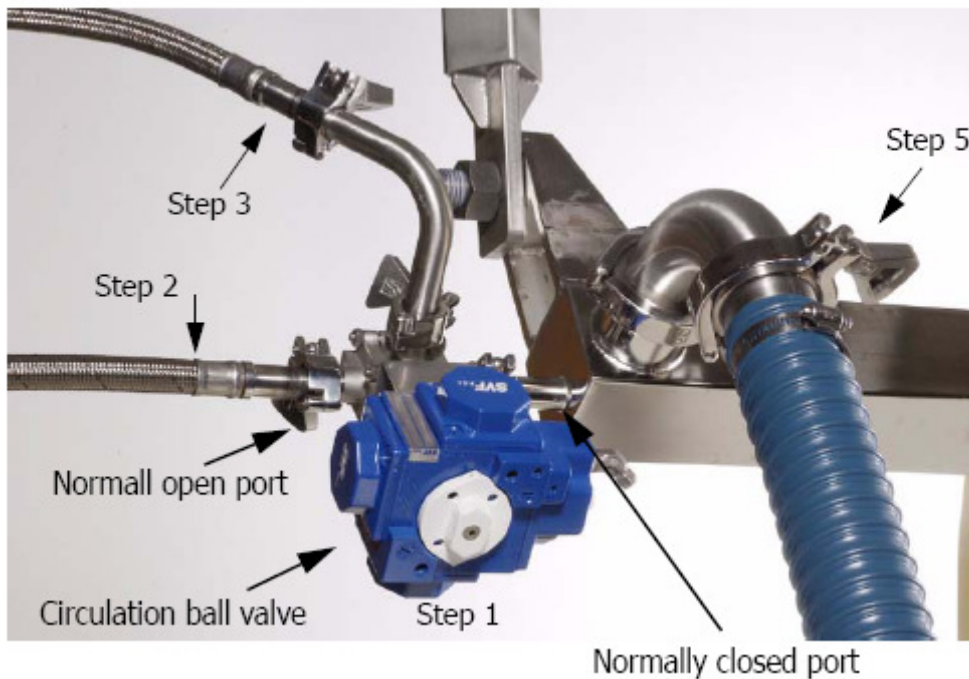
#### Step 5. Connecting the Hoses

Figure 2-4 below shows what a correct installation of the hoses looks like.

##### To connect the hoses:

1. Attach the circulation ball valve to the sanitary connection on the spray bar where the liquid to be sprayed comes into the spray bar. Be sure to connect the **normally closed port** of the ball valve to the spray bar. Use the fractional sanitary clamps and gaskets to make this connection.
2. There are two flexible hoses. Connect one of them between the discharge on the pump and the center port of the circulation ball valve.
3. Connect the second hose between the lowest port on the use tank and the **normally open port** of the circulation ball valve.
4. Connect the 1/4" blue air line from the circulation solenoid to the air actuated 3-way ball valve. (See Figure 2-2.)
5. Connect the 2" flexible hose between the spray bar and the atomizing blower, using the sanitary gasket clamps.

Figure 2-4 Connecting the Circulation Ball Valve



### Step 6. Attaching the Automatic Start/Stop Equipment

At this point, you must connect the automatic stop/start equipment, if your system will use this. See the instructions that came with your automatic stop/start equipment for specific instructions.

### Step 7. Checking Out the System

Once all connections are made, you must check that power has been properly connected, that there are no leaks or loose connections, and that all equipment works as it should.

These instructions work for an oiler that has its own control panel. Some systems come with a combined control panel that controls both the oiler and the drum.

#### To check out the system, follow these 12 steps:

1. In the control panel power, turn the main breaker ON.
2. Pull the red Emergency Stop (E-Stop) button out.
3. Push the Start button.
4. Fill the use tank with either water or a sanitizing solution.

5. Open the valve on the underside of the use tank.
6. Start and stop each motor quickly, to make sure it rotates in the correct direction.
7. In the control panel, move the Spray 3-position switch to ON. This starts the circulation solenoid valve.
8. Look at the valve to make sure it is rotating.
9. If the valve is rotating properly, turn the speed dial for the pump to MAXIMUM. Liquid should start to flow and return to the use tank.
10. Once liquid is flowing, turn on the atomizing blower.
11. Using the ball valve, adjust the air pressure to about .5 psi on the gauge.
12. Turn the spray selector switch to ON.

At this point, liquid should spray out the nozzles. If it does not, see [Troubleshooting](#). If it sprays properly, then sanitize, rinse and dry the entire liquid system before calibrating.

## Step 8. Sanitizing the System

### To sanitize the system:

1. Drain or pump any remaining test liquid from the tank.
2. Fill the use tank with hot (180 degrees) water and sanitizing solution.
3. Pump through the nozzles for at least 5 minutes or as directed by your standard plant procedures for sanitizing.
4. Drain the tank and refill with hot water and pump through to rinse thoroughly. Pump for at least 5 minutes or until nothing but clear water comes out, whichever is longer.
5. Dry by blowing air through or allow to air dry overnight.

When the system is dry, you can calibrate it.

## Step 9. Calibrating the System

To calibrate the system, you determine what speed the pump must run at to coat the product properly, for each type of liquid to be sprayed, each application rate and each type of product to be coated.

Calibrating the Oil Applicator system includes:

- Gathering data for a series of calculations.



- Estimating the right pump speed by working through some calculations to find out the right amount of spray per minute.
- Setting a trial speed by setting the pump speed using the Variable Frequency Dial (VFD).
- Running several one-minute trials.
- Adjusting the VFD until the trials produce the right amount of spray per minute.
- The rest of this section shows you how to do this and gives you an example to see how it works.

## Gather Data

**Tip** It is helpful to use a notebook where you can write down the product, application rate, and type of liquid, along with all the calculations you make, as well as the final VFD speed you determine.

The first step is to collect information you need for the calculations, including:

- How many pounds of product are sprayed in an hour?
- How much oil (in gallons) is sprayed per revolution of the pump? This can be found in the pump data sheet that is included with the equipment.
- What is the motor speed in revolutions per minute? This can be found on the data plate secured to the motor.
- What is the gear ratio of your pump? This can be found on the data plate secured to the gear box.
- How many pounds per gallon of oil to be used? Usually this is 7.65 pounds per gallon for oil, but it will vary depending on what type of liquid is sprayed.

## Perform Calculations

### Amount of oil to be sprayed each minute

This requires two calculations:

- Pounds of oil used per hour  
(pounds per hour of product X percent of oil = pounds per hour of oil used)
- Converting pounds per hour to gallons per minute

(pounds per hour of oil used / number of pounds per gallon) / 60 =  
gallons per minute (60 = the number of minutes in an hour)

### Example

This example uses snack crackers to be run at 800 pounds per hour, sprayed with 4% oil that weighs 7.65 pounds per gallon.

1. Multiply the pounds per hour of product by the percent of oil. In our example, this would be:

$$800 \text{ pounds per hour product} \times .04 = 32 \text{ pounds per hour oil used}$$

2. Convert pounds per hour to gallons per minute by dividing this result by the number of pounds per gallon, and then dividing that result by 60. In our example above, it would be:

$$32 / 7.65 = 4.18 \text{ gallon per hour oil used}$$

$$4.18 / 60 = .06 \text{ gallon per minute oil used}$$

So your target amount of oil to come out of the hose each minute is .06 gallons in this example.

### Required pump revolutions per minute

When you know the target amount of oil to come out of the hose each minute, you can calculate how many pump revolutions per minute are needed to produce this much spray.

This requires one calculation:

- Required pump revolutions per minute:  
(Gallons per minute of oil / number of gallons per revolution that the pump will spray).

### Example

In our example, we'll say the pump can spray .002 gallons per revolution. We find the target pump speed by dividing the target gallons per minute (.06) by the number of gallons per revolution (.002).

Our target pump speed is  $.06 / .002$ , or 34 revolutions per minute.

### Target Variable Frequency Dial (VFD) setting

When you know the target pump speed, you can calculate the VFD setting that produces the target pump speed. This requires two calculations:

- Target pump speed  
(Maximum motor speed / pump gear ratio = maximum pump speed)

- Variable Frequency Dial Setting  
(Target pump speed / maximum pump speed = maximum VFD setting)

**To calculate the target VFD setting:**

1. Find the maximum speed of the motor. You can find this on the plate on the motor itself.
2. Divide the maximum motor speed by the gear ratio of the pump to find the maximum pump speed. The gear ratio can be found on the pump.
3. Divide the target pump speed by the maximum pump speed to find the percentage of maximum that the VFD should be set at.
4. Set the starting VFD to the number of hertz that is the percentage of the maximum, since the maximum VFD setting is 100 hertz and percentage of parts of 100.

**Example**

For example, if your motor's maximum speed is 2875 revolutions per minute, and the gear ratio is 20, then the maximum speed of the pump is 2875/20 or 143.7 revolutions per minute.

The target pump speed for this example is 34 revolutions per minute. As a percentage of the maximum speed, it is 34/143.7, or 23.6% of the maximum.

In our example, the **starting VFD setting is 23.6.**

**Running trials**

Now collect several samples for one minute each, and measure how much spray comes out; adjust the VFD setting up or down to increase or decrease the amount of spray until the pump is producing exactly the amount that is needed.

**To run several one-minute trials:**

1. Fill the tank with the liquid to be sprayed.
2. Disconnect the feed line from the circulation ball valve. Support the feed line on the use tank.
3. Place a collecting container at the hose outlet; have several containers available.
4. Run the Continuous Oil Applicator for exactly one minute.
5. Measure the amount of liquid that has come out the hose into the container.
  - If it is less than your target amount, increase the VFD setting slightly and run another one-minute sample.

- If it is more than your target amount, decrease the VFD setting slightly and run another one-minute sample.
6. When the amount of liquid in the collecting container matches the amount you calculated, hook the feed line back to the circulation ball valve.

The applicator is now set at the correct flow rate and is ready to spray.

**NOTE**

You must recalculate the VFD setting for each change in type of liquid, rate of application and pounds of product to be sprayed per hour.

# 3 TROUBLESHOOTING

## COMMON INSTALLATION PROBLEMS AND CURES

Table 3-1 Common Installation Problems

Problem	Cure
<b>Motors do not run</b>	<ol style="list-style-type: none"> <li>1. Make sure the main power line from the plant’s electrical system is properly connected to the main breaker in the control panel.</li> <li>2. Make sure the main breaker in the control panel is ON.</li> </ol>
<b>Liquid sprays, but not from the spray bar</b>	<ol style="list-style-type: none"> <li>1. Double check all connections, making sure they are tight and gaskets are in place.</li> <li>2. Double check that hoses are running to and from the correct locations.</li> </ol>
<b>There is no spray, even though there is liquid in the use tank and the motors are running.</b>	<ol style="list-style-type: none"> <li>1. Make sure the 3-way circulation valve is installed correctly. The port that is <b>normally closed</b> connects to the spray bar. The port that is <b>normally open</b> connects to the tank.</li> <li>2. Make sure the Spray switch is set to ON.</li> <li>3. If using an automatic stop/start device, make sure the Spray switch is set to AUTO and the stop/start device is connected correctly and operating correctly.</li> <li>4. Make sure the 2-way hand valve on the use tank is open.</li> </ol>

**Table 3-1 Common Installation Problems (continued)**

Problem	Cure
<p><b>Liquid starts to spray, but stops.</b></p>	<p>There may be foreign material in one of several places.</p> <p><b>This can cause severe damage. Stop the equipment immediately.</b></p> <p><b>Never</b> leave the cover off the tank.</p> <p>Here is what can happen if there is foreign material in any of these areas:</p> <ol style="list-style-type: none"> <li>1. In the tank. This can fracture the pump gears.</li> <li>2. In the air filter on the blower. The blower can overheat if the fan stops.</li> <li>3. In the suction side of the air blower. This can damage the impeller.</li> <li>4. In one or more nozzles of the spray bar.</li> </ol> <p>To cure the problem, determine first where the foreign material is. Then disassemble, clean and reassemble that piece of equipment.</p>

## WHERE TO FIND MORE INFORMATION

If you cannot find your problem in the table above, contact PPM Technologies. Contact information can be found on page 2 of this manual.

# A INFORMATION ABOUT THIRD-PARTY EQUIPMENT

Many parts of the Continuous Oil Applicator equipment come from other manufacturers. In particular, the blower, motor, pump, AC drive, reducer and electrical controls are third-party equipment.

In your packing crate, you should have received data sheets and other information pertaining to the specific equipment that is used on your system. We have included as much information as we have available for each of these components. Please contact the manufacturer directly if you need more information.