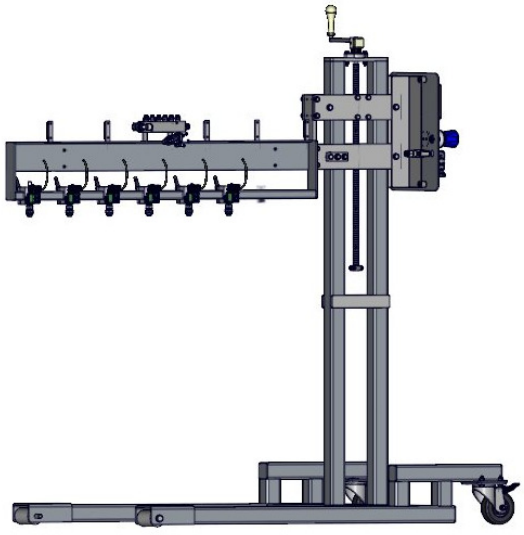
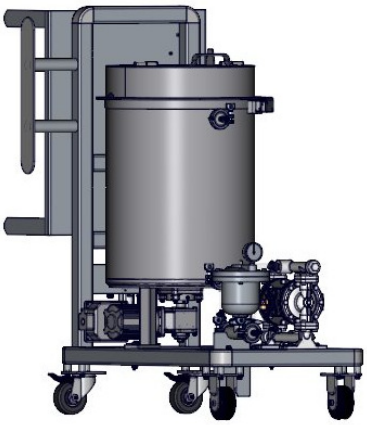
824 Spray Applicator





First Edition, Date: April/2015
Manual Part No. _____
Serial # _____

CE DECLARATION OF CONFORMITY

We hereby declare that the following machinery complies with the essential health and safety requirements of the Machinery Directive 2006/42/EC.

Name type or model - 824
Serial Number - 19868
Machine description - Model 824 Spray Applicator – RH unit; Industrial equipment used in bakeries. The 824 sprays liquid baking ingredients onto products as they pass underneath on a conveyor. SO 100988.

Name of manufacture or supplier: Burford Corp.

Full postal address including country of origin:
P.O. Box 748
11284 Hwy 74
Maysville, OK 73057
United States of America

This machinery has been designed and manufactured in accordance with the following transposed harmonized European standards:

EN ISO 12100:2003 parts 1 & 2: Safety of Machinery….Basic concepts, general principles for design
BS EN ISO 13857:2008 Safety of Machinery…….Safety distances to prevent danger zones being reached by the upper limbs
BS EN 349: 1993 Safety of Machinery……..……Minimum gaps to avoid crushing of parts of the human body
BS EN ISO 13850:2006 Safety of Machinery……Emergency stop equipment, functional aspects – principles for design
BS EN 60204 part 1: 2006 Safety of Machinery……..…..Electrical equipment of machines

A technical construction file for this machinery is retained at the office of Burford Corp. at the above address.

Authorized representative: Tim Spencer
Unit 4, Sam Alper Court
Depot Road
Newmarket, Suffolk
CB8 0GS
United Kingdom

Declaration:
I declare that being the responsible person appointed by the manufacturer (or nominated authorized representative of the manufacturer established in the EC), the above information in relation to the supply/manufacturer of this machinery is in conformity with the stated standards and other related documents following the provisions of 2006/42/EC Directive.

Signed: _____ Date: 3-30-2015
Name: Tim Spencer Position: Authorized Representative
Employer: Burford Corp. Place of declaration: Maysville, OK - USA

SAFETY PRECAUTIONS

As Burford® Corp. strives to promote safety in the maintenance and operation of Burford® equipment, we request that the following safety procedures be followed, along with any additional safety procedures set by the customer's in-plant safety officers or local codes.

1. Read the manual completely before attempting installation or operation of this unit.

2. This machine may contain programs that are password protected. Contact your supervisor or Burford® Corp. for password.

3. Incoming electrical power must be properly shielded, routed, and grounded. All safety codes should be followed. Study wiring diagrams before attempting installation.

4. Disconnect power to equipment before removing any guards or covers. Replace guards or covers before resuming operation of the unit.

5. Loose clothing, jewelry and long hair should be considered a safety hazard around mechanical equipment. Ensure that they will not be entangled in the equipment.

6. Keep clear of moving machine parts. Bodily harm and/or serious injury may result from contact with moving gears, sprockets, chains or pneumatically controlled machine components.

7. Do not bypass safety switches.

8. Do not attempt repairs while equipment is running.

9. Use only original equipment parts designed to safely operate in the equipment.

10. Only authorized personnel should be allowed to operate or perform maintenance on the unit.

11. This unit is not wash-down ready. Do not wash the unit or any of its electrical or mechanical components, with any form of high pressure or running liquids.

CAUTION SYMBOL INDICATES BODILY HARM MAY INCUR IF INSTRUCTIONS ARE NOT FOLLOWED.

STOP SYMBOL INDICATES IMPORTANT INSTRUCTIONS TO PREVENT UNIT DAMAGE OR ADVERSE EFFECTS.

INFO SYMBOL INDICATES USEFUL INFORMATION TO ASSIST IN INSTALLATION AND OPERATION OF THE UNIT.

DISCLAIMER

The descriptions and specifications contained in this Service Manual were in effect when this manual was approved for printing. Our policy is one of continuous improvements, and we do hereby reserve the right to discontinue models at any time, or to change specifications, prices, or design without notice and without incurring obligations.

Burford® Corp. expressly disclaims any liability for damages and/or injuries caused as a result of negligence or misuse of its product. Such negligence or misuse includes, but is not limited to, software program alteration, removal of guards, faulty wiring due to improper installation, subjecting the unit to wash-down environments or any physical or mechanical changes made to a Burford® unit, by anyone other than a qualified Burford® Technician.

Burford® equipment should only be used for the purpose for which it was sold, and should not be modified in any way without notifying the General Manager of Burford® Corp. in writing of the modification.

The original language for this document is English. Translations to other languages may not be accurate.

Fitness for a Particular Purpose disclaimer

The Burford Corporation disclaims any warranty, expressed or implied, regarding the fitness of this equipment for any particular purpose other than that specifically expressed within this disclaimer. Use of this product for any purpose other than its intended purpose, or failure to follow the cleaning and maintenance instructions, constitutes a violation of the warranty agreement.

This product is designed to spray liquid toppings that do not denature or coagulate and that have no microbiological activity. Additionally, failure to follow the Cleaning and Maintenance instructions could result in damage to the equipment and/or a cross contamination or spoilage of products.

WARNING

■ Always Follow Cleaning Procedures

Failure to flush products from machine immediately after use could result in:

- Material coagulating in the inner components of the machine to include the manifold, pump, tank, and accumulator.
- Product falling out of suspension in the tank if left for long periods of time (overnight).
- Tips and filters clogging and/or becoming unserviceable



Follow cleaning procedures outlined in chapter 6: Cleaning and Maintenance

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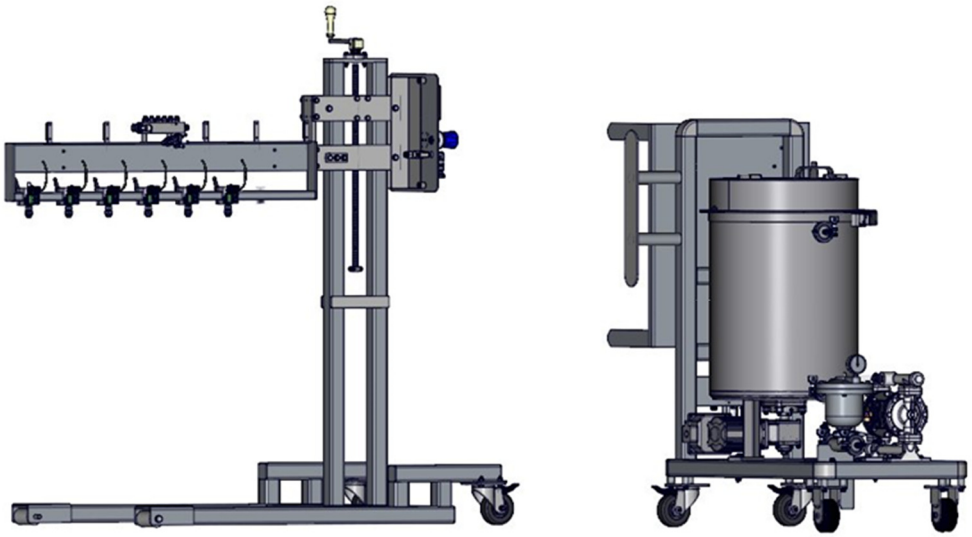
Chapter 1

Introduction

CHAPTER 1: INTRODUCTION

The Burford® Spray Applicator has been designed to apply a variety of liquid sprays, including but not limited to, synthetic egg, glazes, high sheen blends and other topically materials automatically without interruption to the product flow. Modular, digital, electronic controls allow precise and even product coverage.

The Burford Spray Applicator brings together precision, convenience of operation and ease of maintenance into one system.

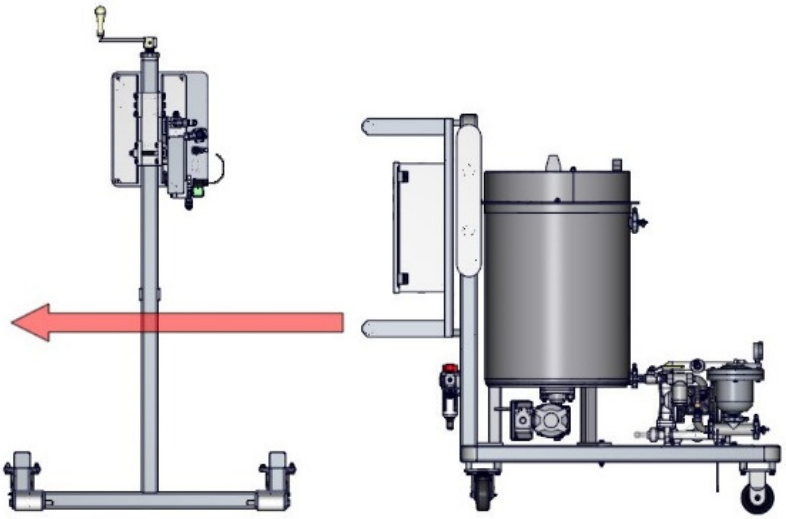


■ Specifications

The Burford® Spray Applicator that you received was manufactured to dispense only the spray material that was specified by your company upon placement of the order. If later you should decide to change the spray material, check with Burford ® Corporation for compatibility.

SPECIFICATIONS
Electrical:
230 V_{AC}, 50/60 Hz, 1 Φ, 10 A
Air:
80 PSI @SCFM

MODELS
824 (RH) Product flows from right to left viewed from operator side.
825 (LH) Product flows from left to right viewed from operator side.



Product Flow

Chapter 2

Key Components

CHAPTER 2: Key Components

Below is a list of key components that you must familiarize yourself with to gain a better understanding of this manual and to fully comprehend how the unit functions.

■ Tank Cart

The Tank Cart contains the Tank, F.R.L., Diaphragm Pump, Dampener, and the Control Panel. All of these components work in unison to deliver a consistent fluid application to the product. It is on a stand with casters for portability. It is connected to the Spray Rail Assembly by flow hoses and the communication cable.
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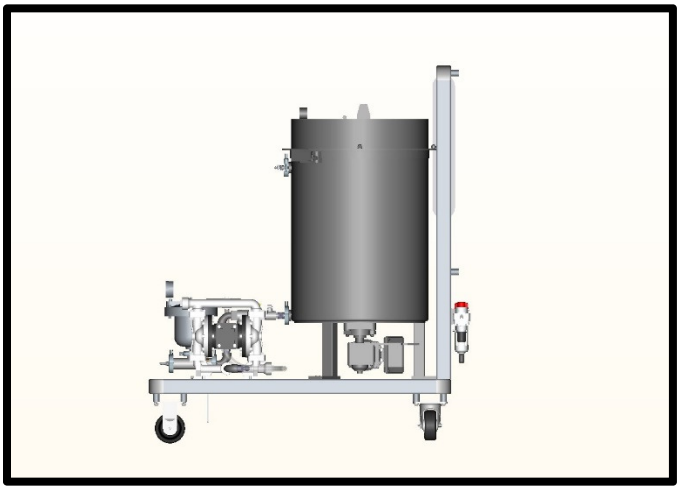
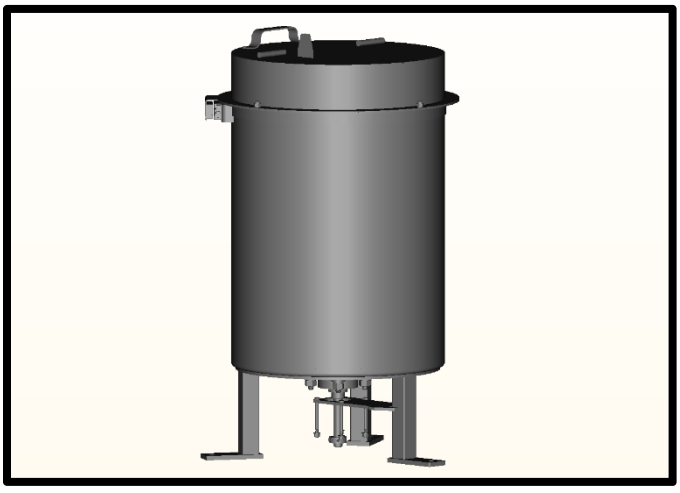


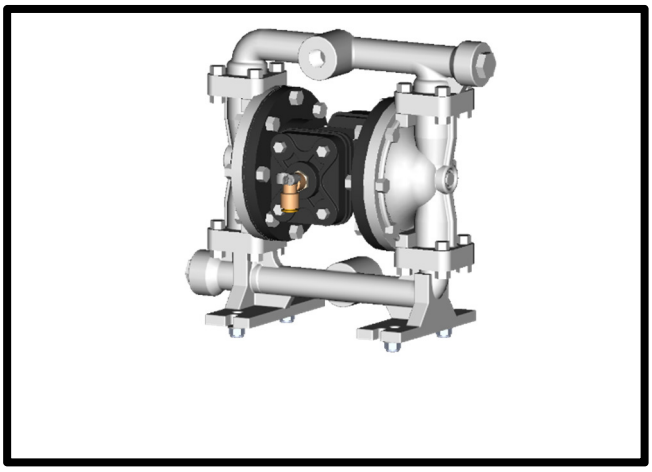
■ Tank

Tank – The purpose of the Tank is to supply the pump with liquid. The Tank contains a drain valve for easy draining and sanitation.



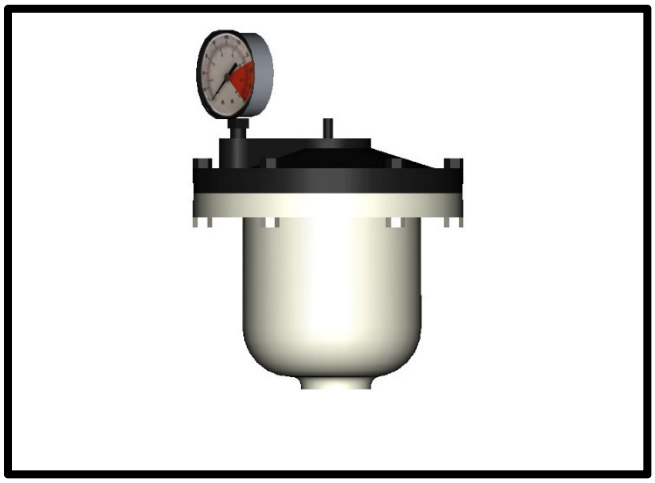
■ Diaphragm Pump

Diaphragm Pump – The Diaphragm Pump is a positive displacement pump that uses a reciprocating rubber diaphragm and valves on either sides to pump the fluid into the hydraulic system. The Diaphragm Pump is powered by a supply of air pressure that is controlled by the air regulator feeding the pump.



■ Dampener

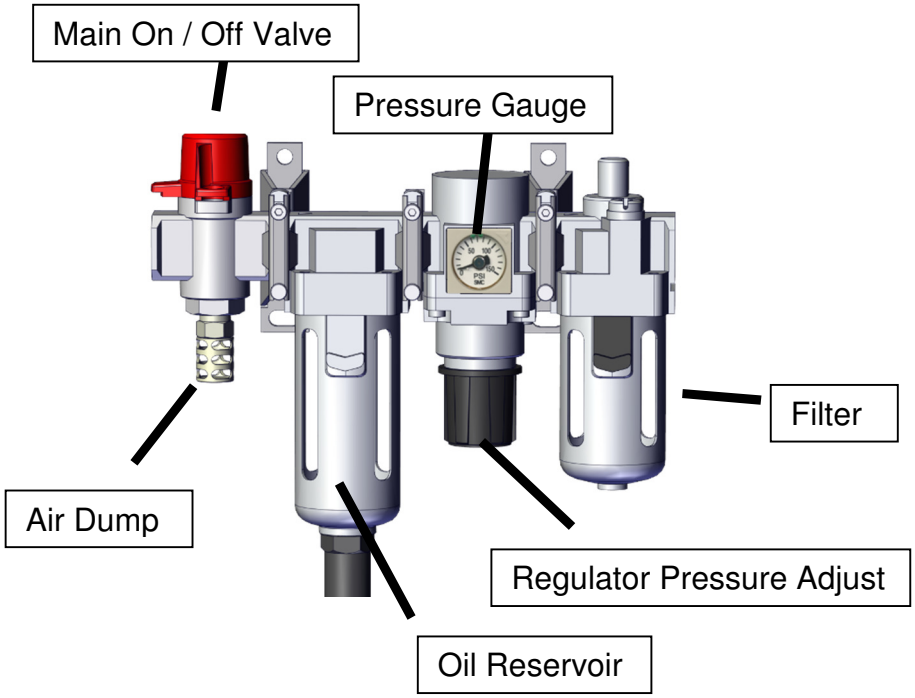
Dampener – The Dampener is a pressure storage reservoir in which the fluid is held under pressure by an internal bladder filled with compressed gas kept at a constant pressure, also known as a hydro-pneumatic Dampener. The use of the Dampener allows the hydraulic system to respond more quickly to a temporary demand and to smooth out any pulsations that may be present in the system. The internal bladder should be kept at 80% psi of the running pressure and uses a standard Schrader valve. Compressed air may be used to fill the bladder.



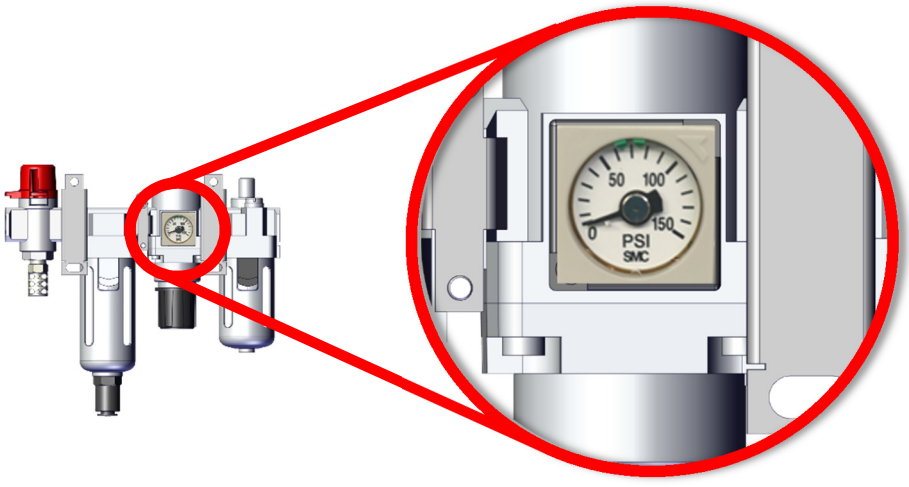
NOTICE: Dampener must be charged before use. Air or Nitrogen only

■ F.R.L. (Filter Regulator Lubricator)

The Following illustrations show the main components of the F.R.L.



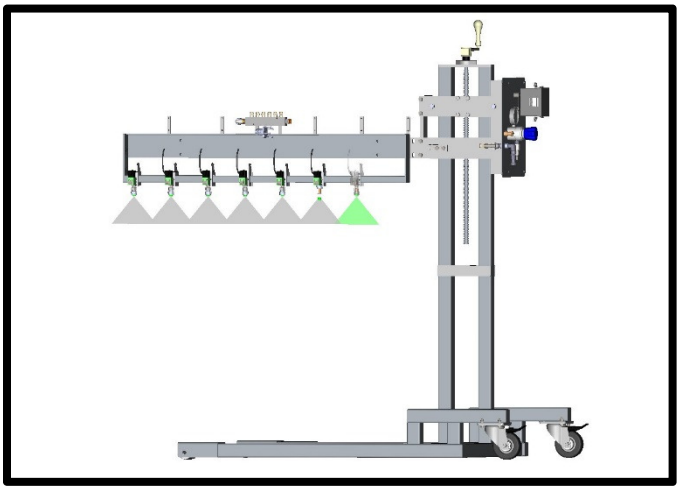
Pneumatic oil must be kept in the Oil Reservoir at all times. Burford recommends Parker Pneumatic oil F442.



There is a pressure gauge that indicates the output pressure of the F.R.L. The normal operating pressure is 80 psi.

■ Spray Assembly

Spray Assembly - The Spray Assembly is stationed over the conveyor and applies the desired amount of liquid to the product. The frame is mounted on casters for portability. It is composed of an adjustable frame, the spray rail, product sensor, pressure regulator, and spray valves.

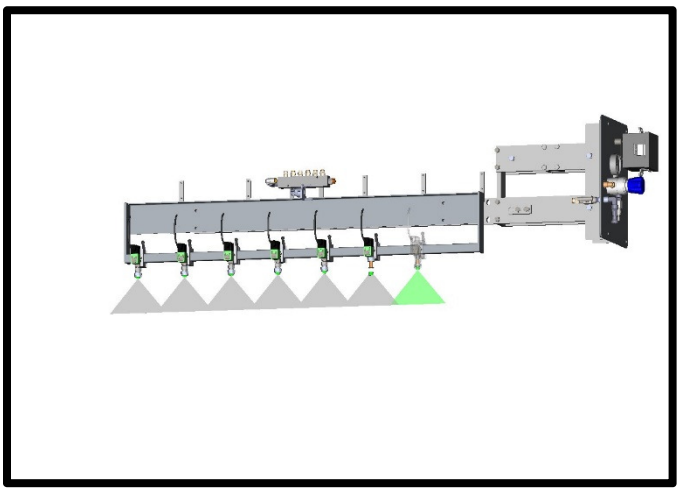


■ Adjustable Frame

Adjustable Frame - The Adjustable Frame allows for the height of the Spray Rail in relation to the product to be adjusted. It is mounted on casters for portability.

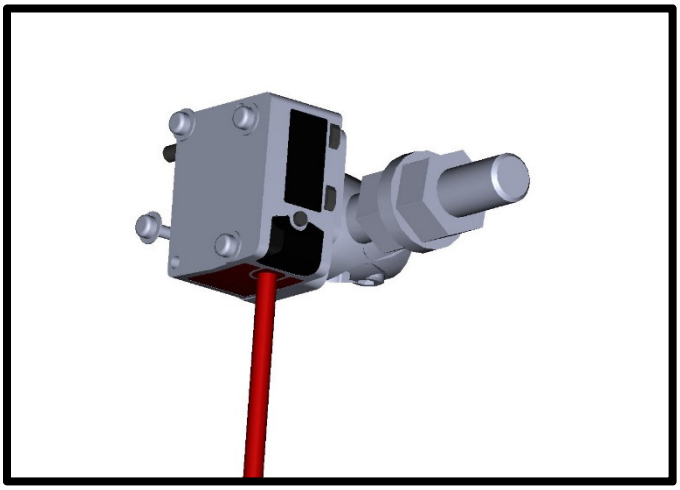
■ Spray Rail

Spray Rail - The Spray Rail is positioned to provide adequate coverage of the product. It is composed of the product sensor, pressure regulator, and the spray valves. The spray rail is supplied liquid from the tank cart.



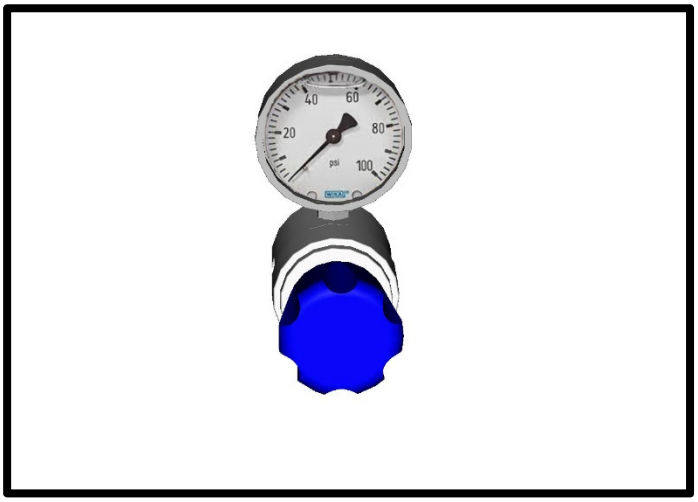
■ Product Sensor

Product Sensor - The unit uses an adjustable Laser Product Sensor. The Product Sensor signals the PLC when a pan is present. The Spray ON and Spray OFF are dependent of the output of the Product Sensor. The laser must be directed slightly upstream from the spray rail for proper operations. The depth of the sensor is adjustable for a variety of range in product detection. Refer to page 56 for adjustment instructions.



■ Pressure Regulator

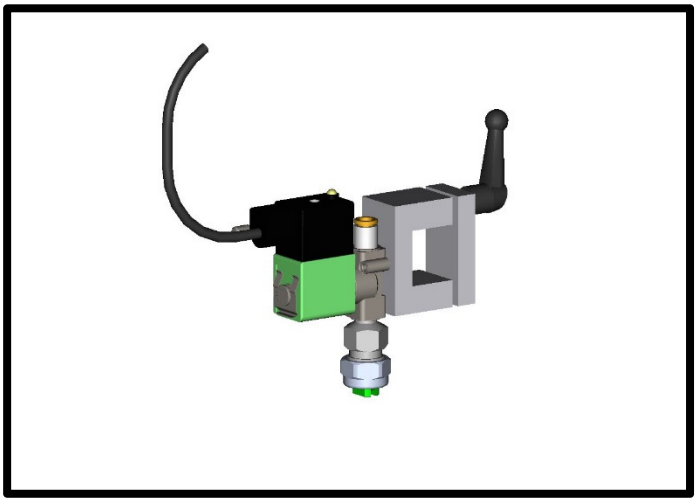
Pressure Regulator – The Pressure regulator is a valve that automatically cuts off the flow of liquid at a certain pressure. An adjustable knob is used to control the amount of pressure desired. In our application it is used to control the amount of backpressure on the product at the spray rail. The amount of product pressure from the spray tips determine the coverage applied to your product.



The Pressure regulator is equipped with a filter on input line from manufacture. It was removed at time of Spray Applicator assembly. If replacement regulator is needed, verify that filter is removed prior to installation.

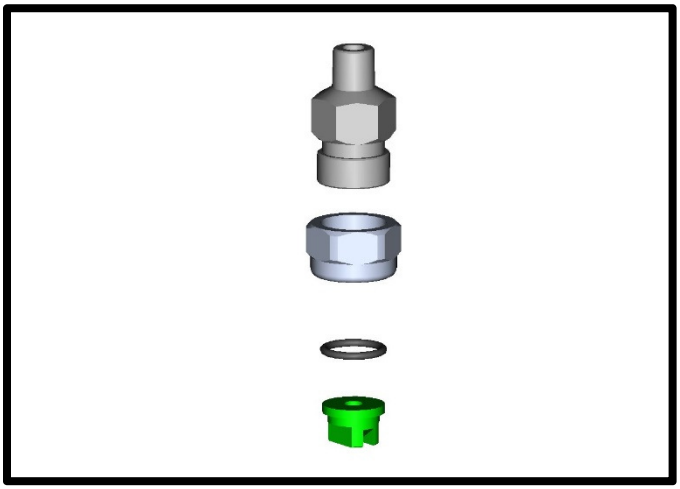
■ Spray Valve

Spray Valve – The Spray valve is controlled by the PLC and actuates for a programmable set of time to control the liquid being placed unto the product.



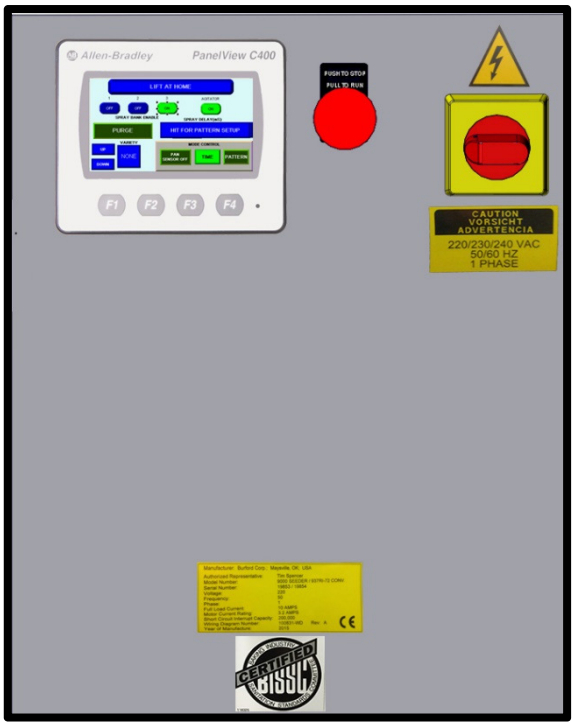
■ Spray Tip

Spray Tip – The Spray Tip contains the components to ensure a desirable application of product. There may be a check valve that is used to close the valve once the pressure reaches a minimum pressure. This prevents dripping and air from getting into the hydraulic system. An O - ring gasket seals the spray nozzle and prevents any leaking. A tip is then used to direct the product into a controlled pattern with an orifice size specific for your needs. Different orifice sizes are available to meet a wide range of applications.



■ Control Panel

Control Panel – The Control Panel is the interface for the user. An integrated HMI provides full control of Spray Timing, Pattern Sequence, and Spray Duration. The Control Panel includes the Main Disconnect, the HMI, and the Emergency Stop.

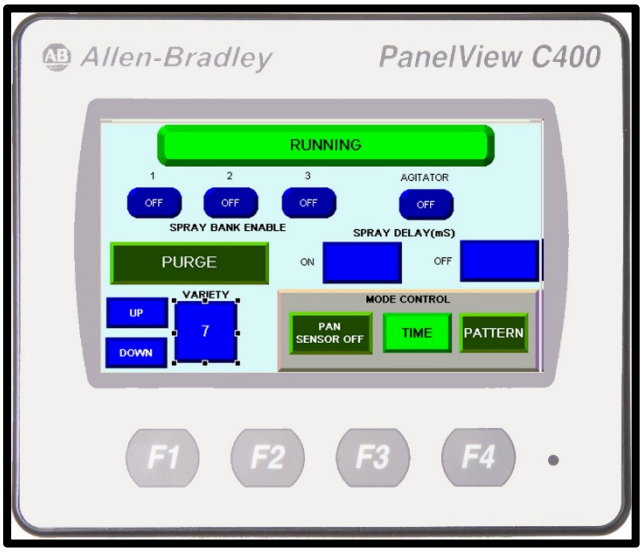


■ PLC

PLC - (Programmable Logic Controller), is a digital computer used for the automation of the unit. The PLC contains proprietary Burford® software that executes the operations of the Spray Applicator.

■ HMI

HMI - (Human Machine Interface), is where the interactions between the unit and software occur. It allows the operator to input parameters that controls the Spray Applicator.



Chapter 3

Installation

CHAPTER 3: INSTALLATION PROCEDURES

■ Installation Overview

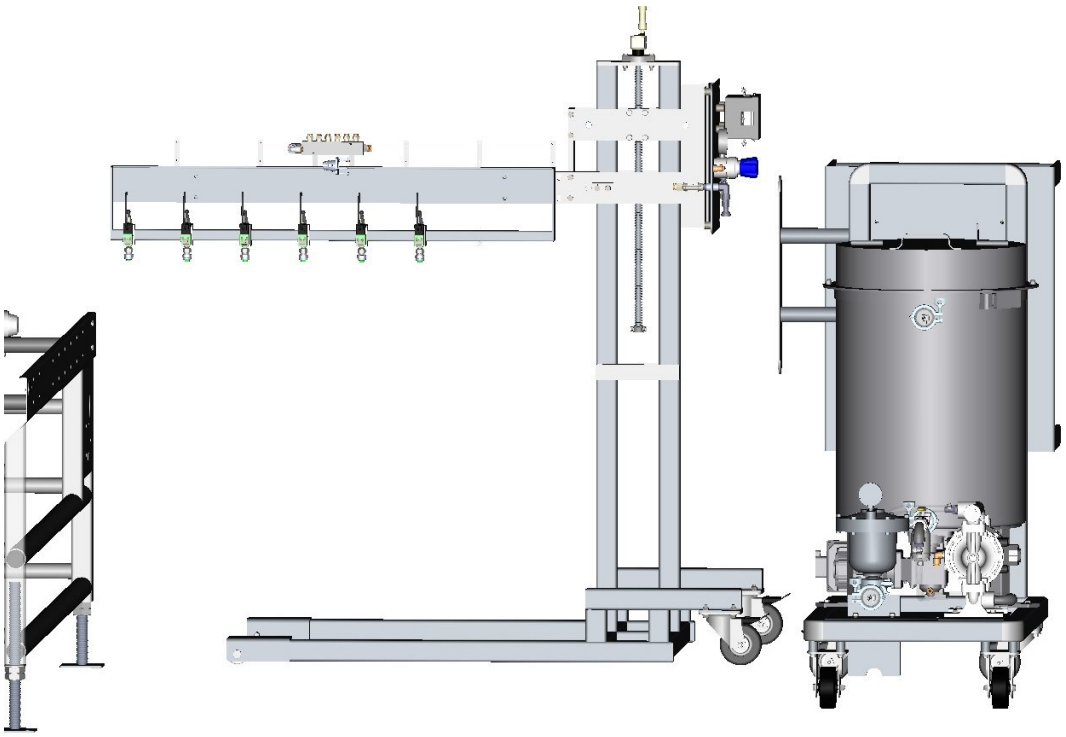
The unit was shipped to you completely assembled. It is a portable system designed to be easily moved in and out of production areas.

■ Installation Requirements

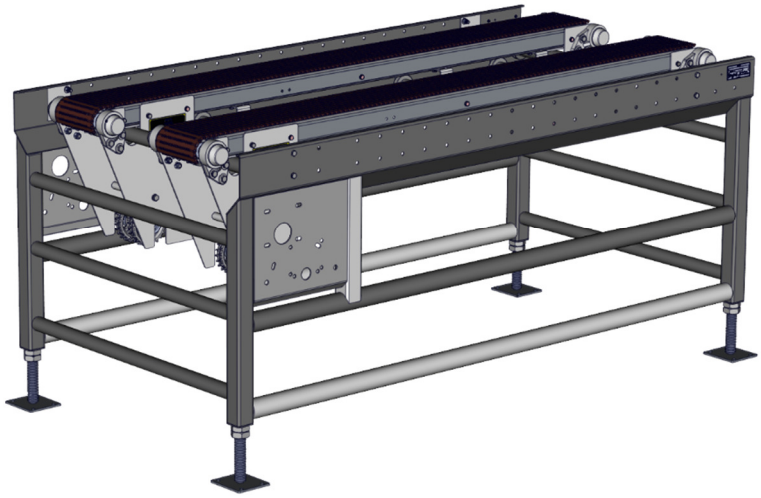
The Conveyor where the unit is to be used should have at least 30 inches of available length without any obstructions. The conveyor chosen should not allow product to stop, turn, or back-up. Area around the unit should be clear of any obstructions and not block a normal passageway. Clearance must conform to all local safety codes.

■ Installation

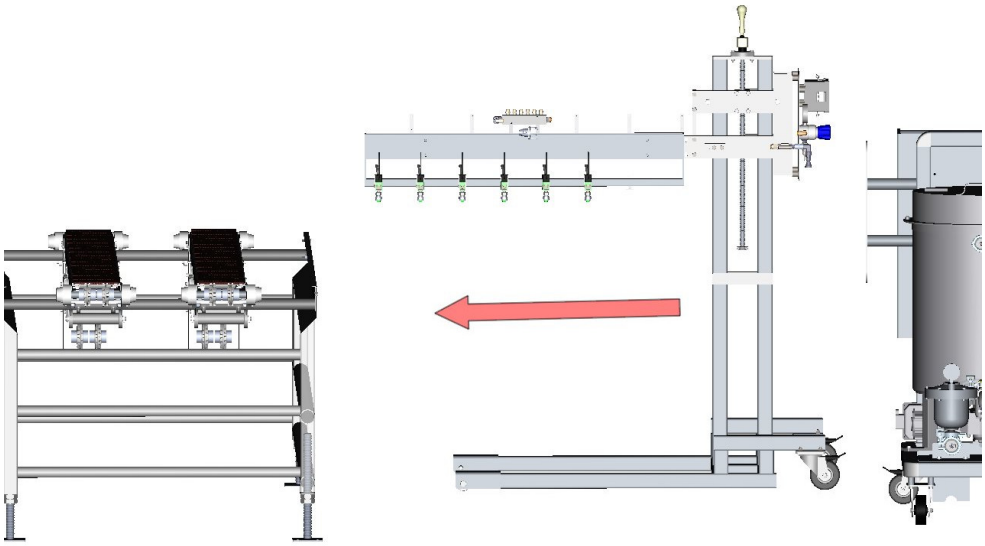
1. The unit is mounted on castors for portability. Roll the unit into place.



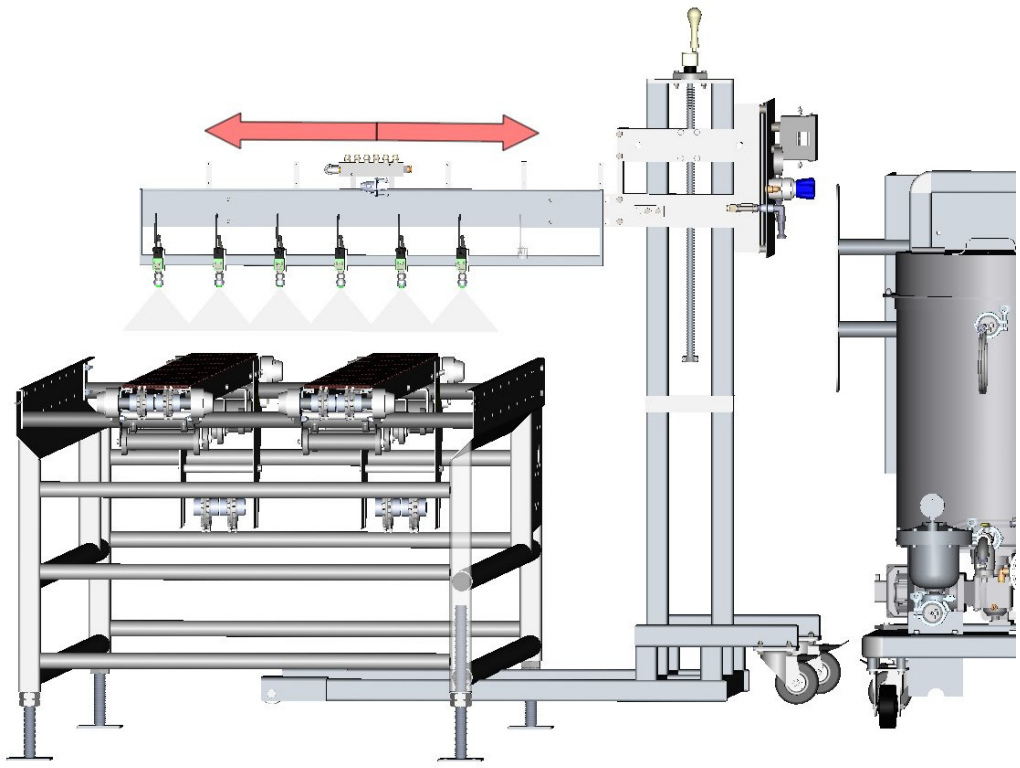
2. Locate an area that is clear of obstructions. The conveyor chosen should not allow the product to stop, turn, or back-up. Compressed air needs to be present at the selected location.



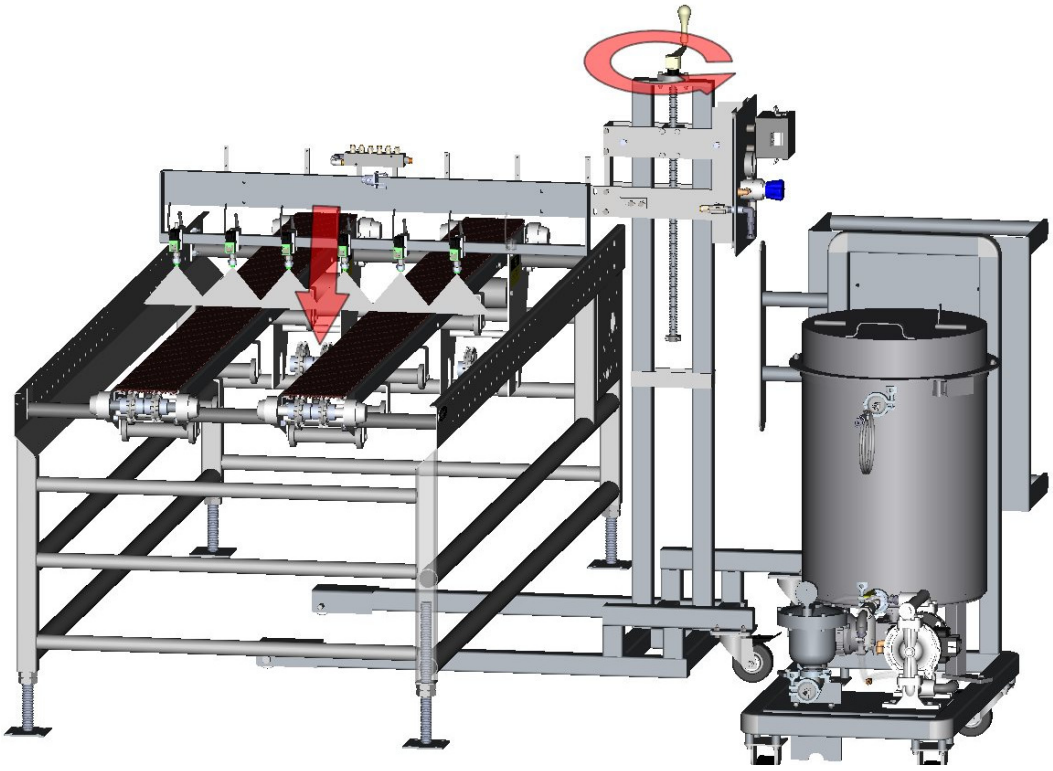
3. Roll the unit into place.



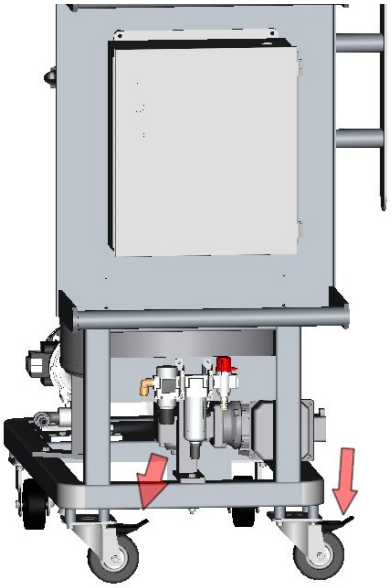
4. Line the Spray Rail into the desired position to provide adequate coverage of product.



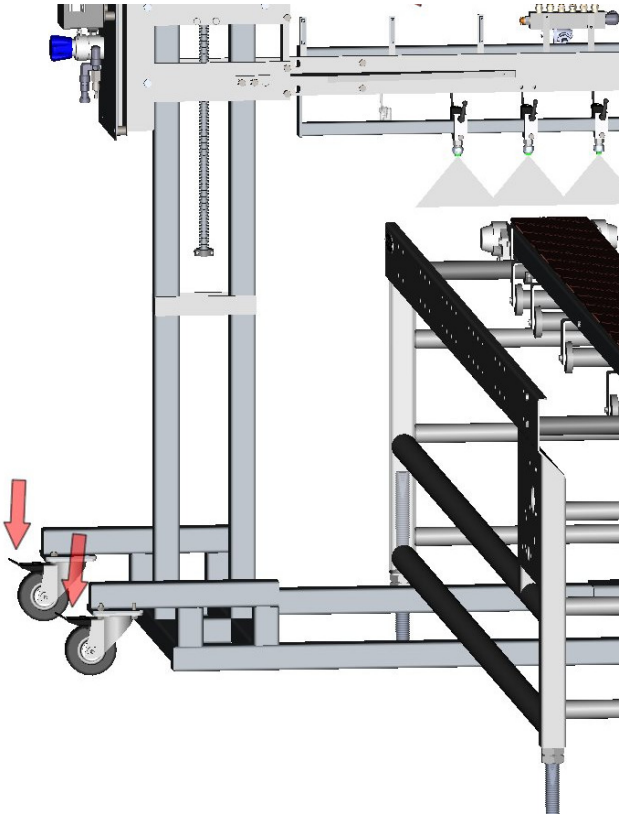
5. Adjust the height of the spray rail by turning the crank clockwise or counter-clock wise to ensure uniform coverage of the product.



6. Lock Castors to prevent movement during operations.

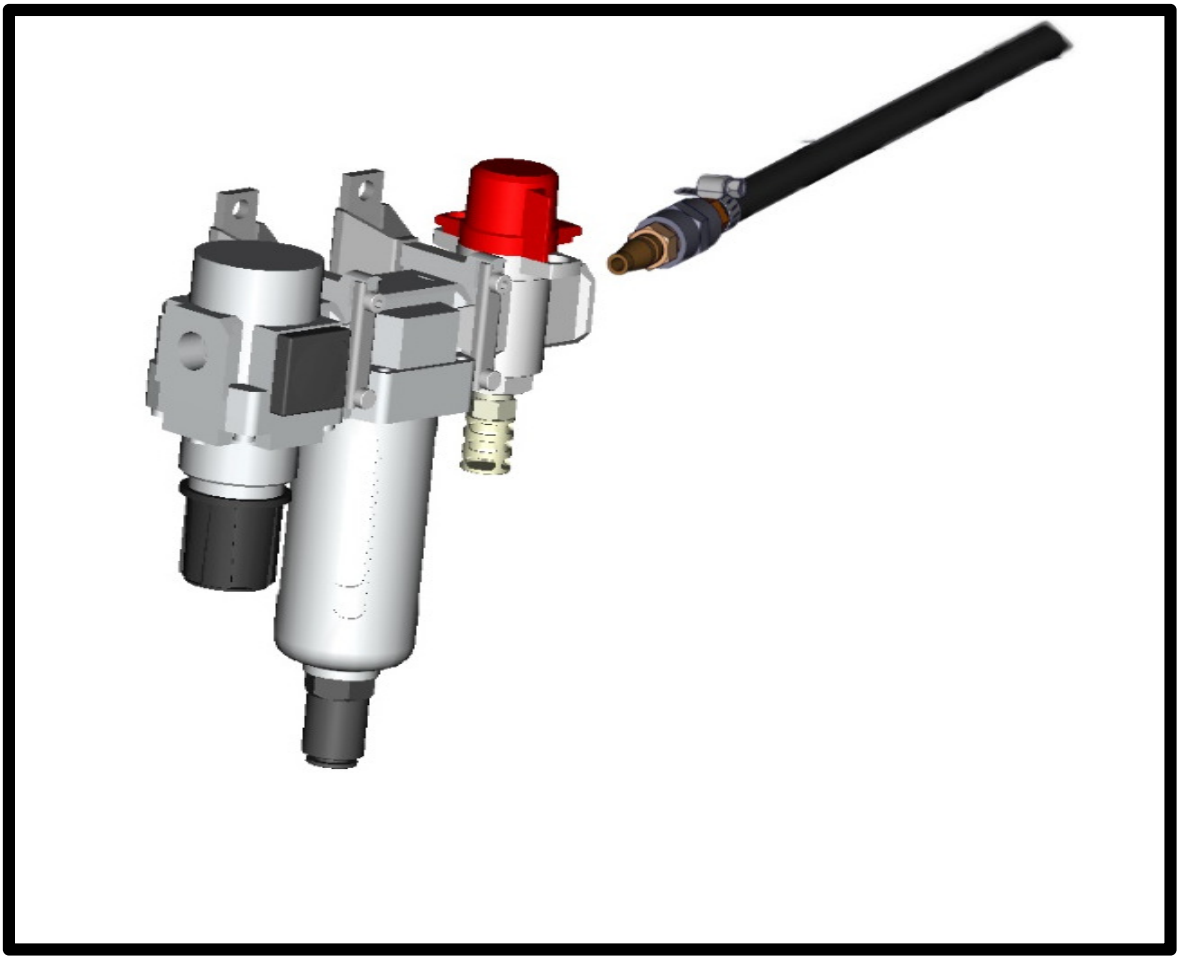


Press down on the castor locking lever mechanism to lock wheel in place.

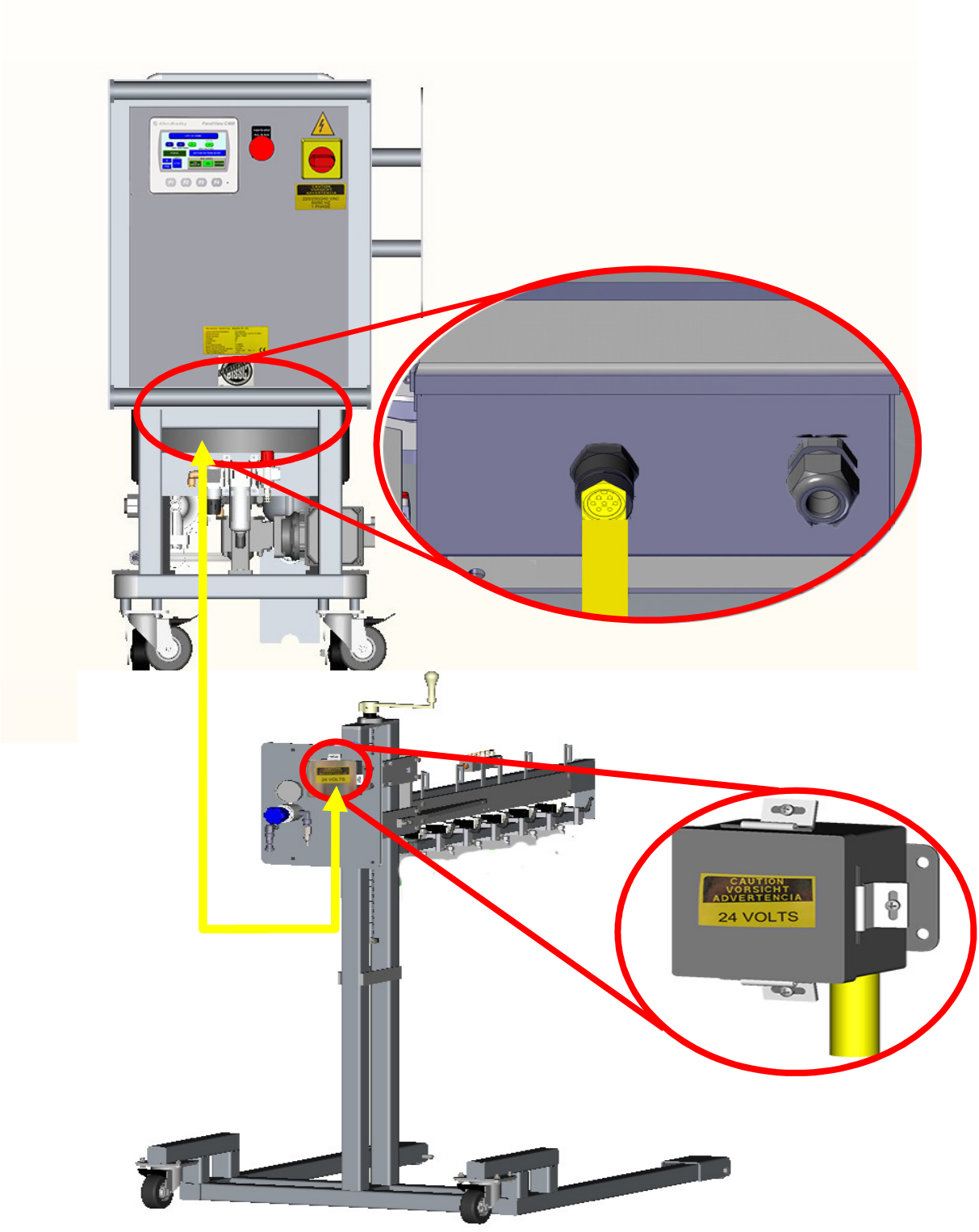


Press down on opposite side of the locking lever mechanism to unlock the wheels.

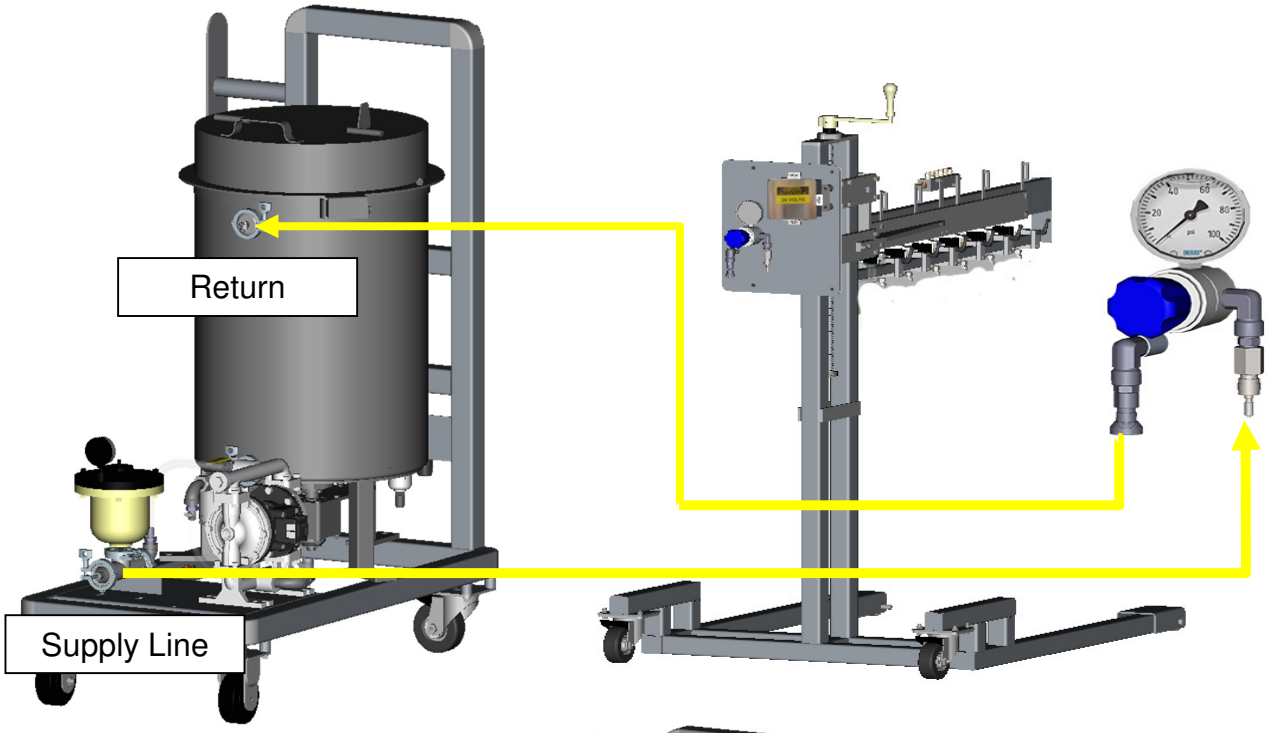
7. Connect Air Supply to the FRL. A minimum of 80 psi is required.

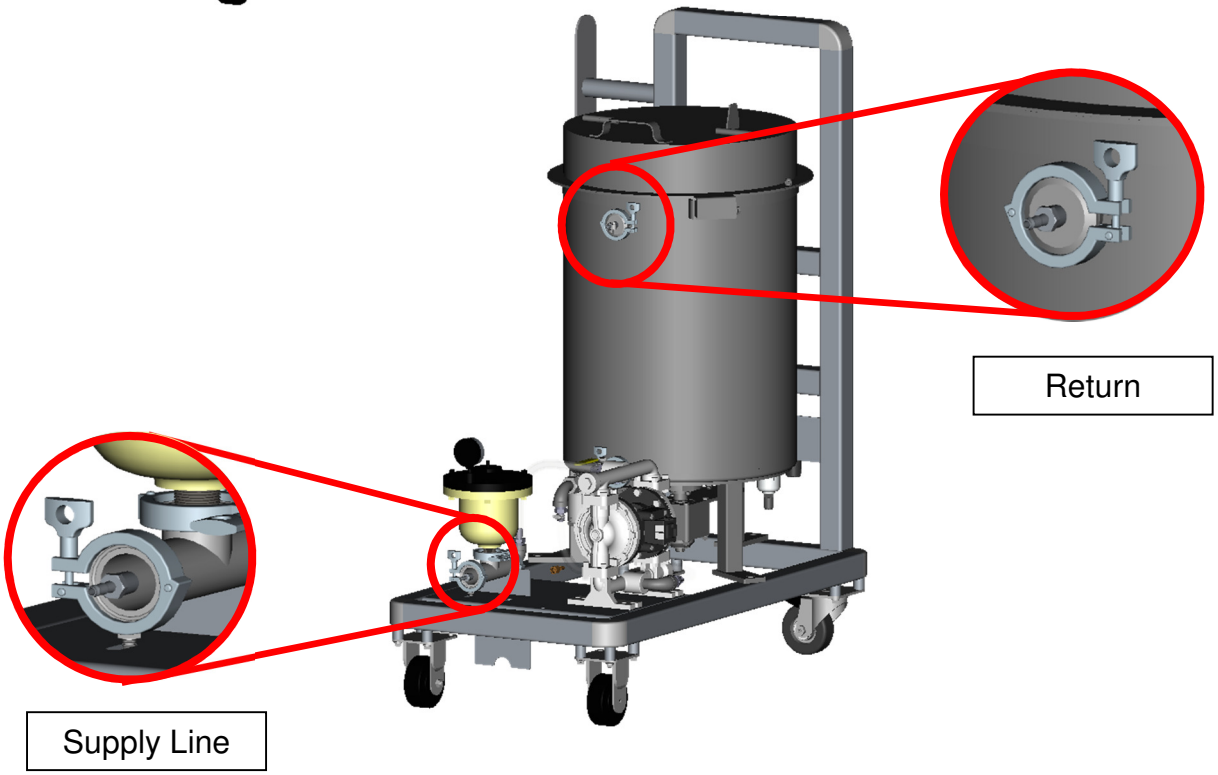


8. Connect the control cable from the Tank Cart to the Spray Assembly



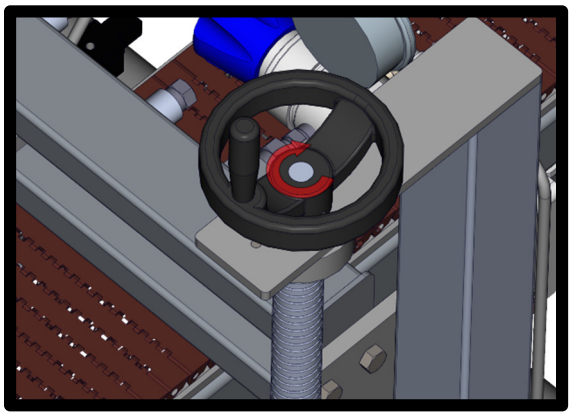
9. Connect the Supply and Return hoses from the Tank Cart to the Spray Assembly.



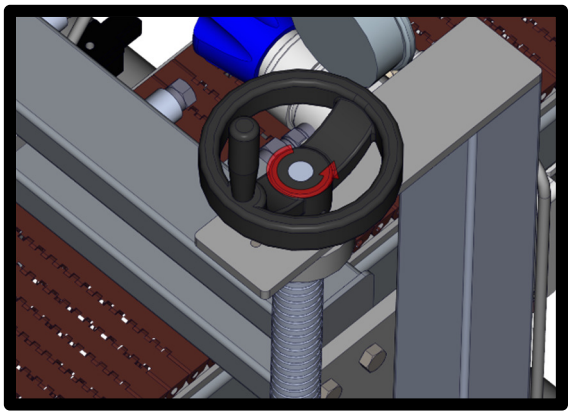


■ Spray Rail Height

The height of the Spray Rail is adjustable by a crank located on the rail mount. The height of the Spray nozzles in relation to the product will achieve different results. For spraying applications ensure that the fan angle of spray covers product completely. Raise or Lower the Spray Rail to achieve desirable results on product.



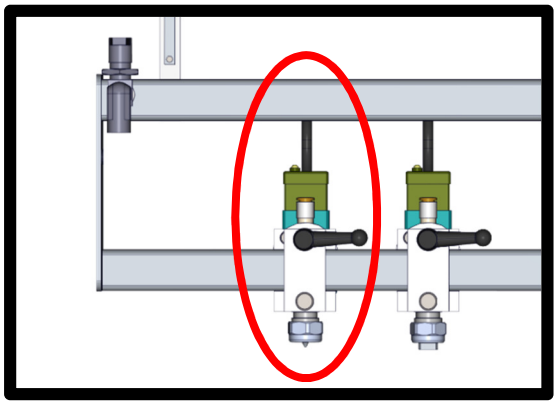
Rotate crank clockwise to raise rail.



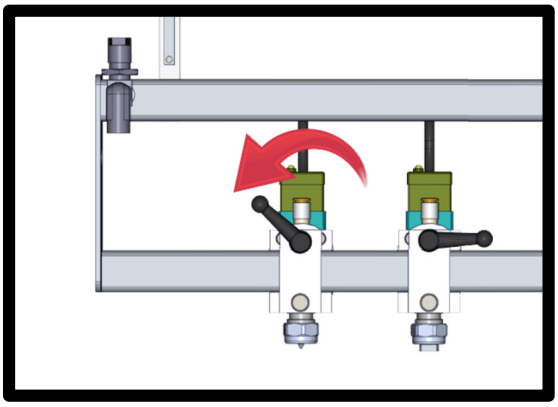
Rotate crank counter-clockwise to lower rail.

■ Nozzle Location

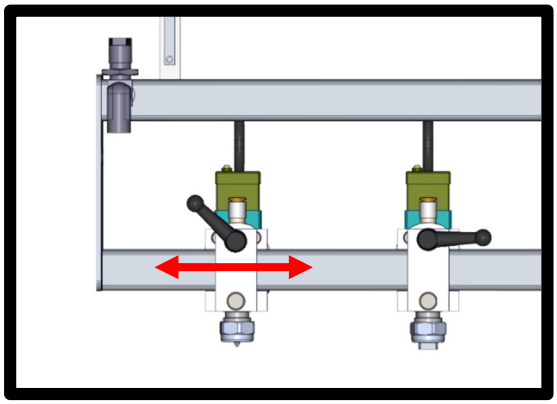
The Nozzles are adjustable laterally for alignment with product.



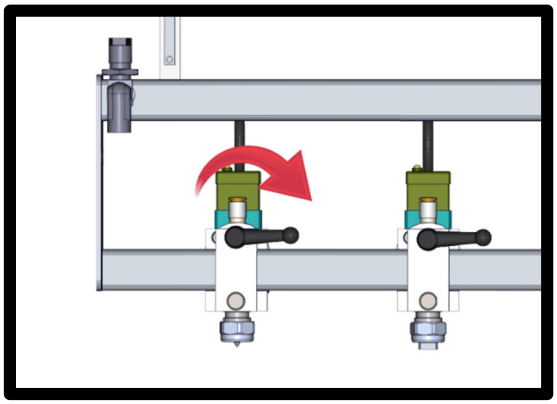
1. Locate nozzle to be positioned.



2. Rotate lever to free nozzle.



3. Position nozzle to desired location.

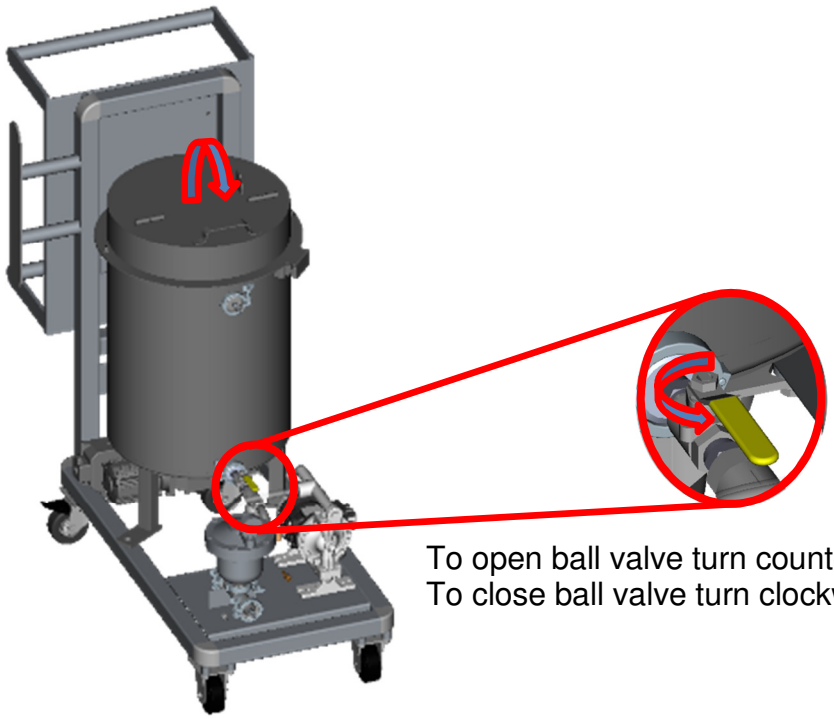


4. Rotate lever to lock nozzle.

When positioning nozzles be mindful of the water hoses and electrical connections. Plumbing and connectors to the nozzles should not be taut.

■ Starting the Unit

Connect the Tank Cart to 230-50-1 electrical supply suitable for 10 amp service.



To open ball valve turn counter-clockwise.
To close ball valve turn clockwise.

- Verify that the tank is filled with liquid and tank lid is closed.
- Turn main disconnect to ON position.
- Pull E-Stop out.
- Press the start button on HMI.
- Open ball valve.

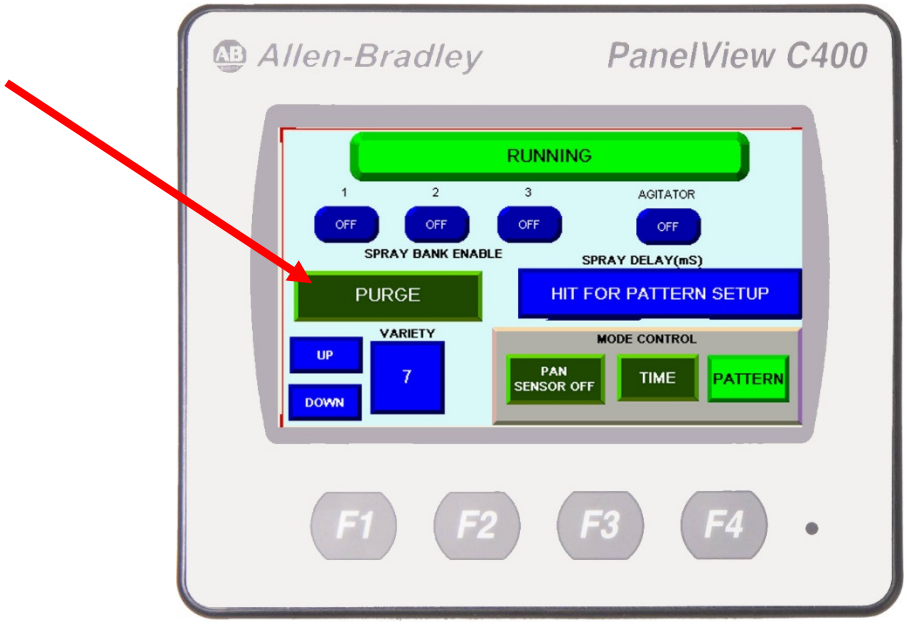
It may be useful to observe the reading on the pressure gauge during the initial pressurization of the unit. The pressure should rapidly climb to approximately 60 PSI and then the pump should stop.

■ Purge Unit

Once top pressure is reached, the unit must be purged of all air. Press the Purge Button on the main enclosure until the nozzles are providing constant coverage and is free of any air. This allows the valves to be held open to purge all of the air out of the valve infeed lines. After the unit is purged and re-pressurized, now test the spray valve operation.

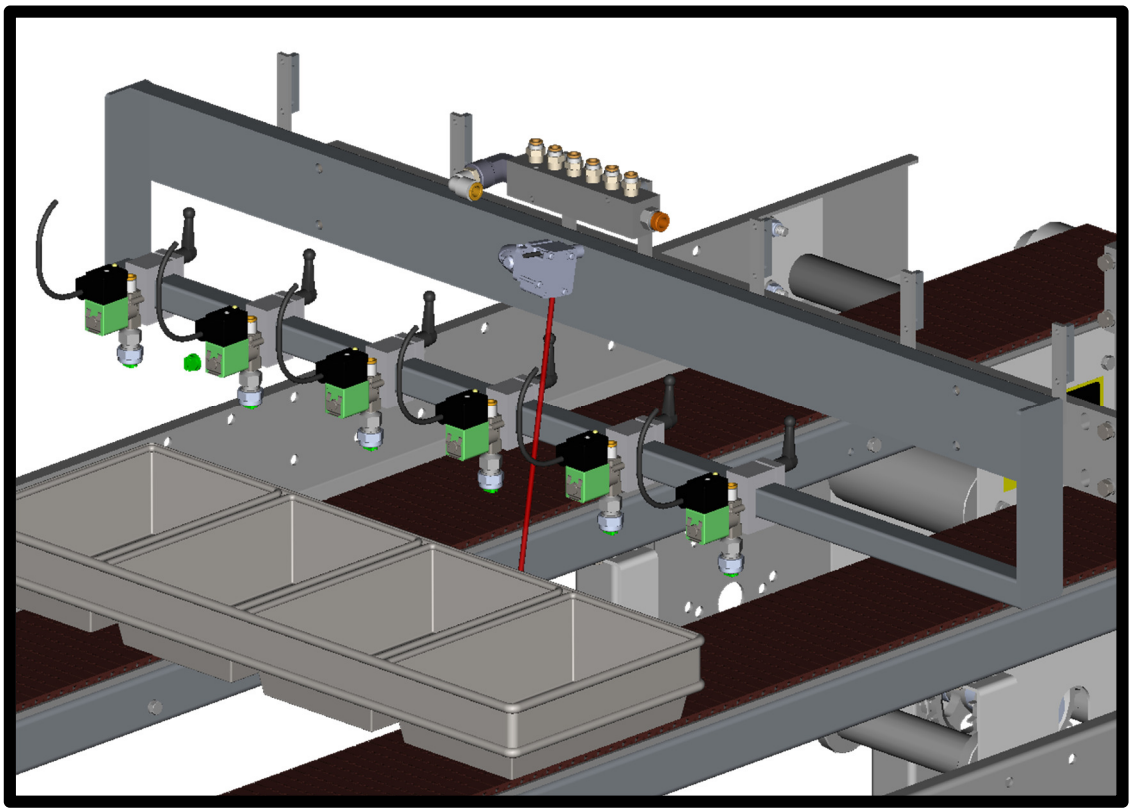
Turn on each spray valve individually from the operator interface and press the Purge button. Initially, some small air bubbles may be in the nozzles, but with additional spraying the air should clear. The spray from the nozzle should have a distinct “turn on” and “turn off” with no dripping. After the operation of each solenoid is confirmed, the unit is now ready for placement.

WARNING: SERIOUS PUMP DAMAGE MAY RESULT IF OPERATED WITHOUT FLUID.



■ Sensor Placement

Ensure that the sensor is on by running your hand under it. The light will change from green to amber.



The product sensor laser must be directed slightly upstream from the spray rail. The unit uses an adjustable Laser Product sensor. The depth of the sensor is adjustable for a variety of range in product detection. Refer to page 56 for adjustment instructions.

Your Unit is now ready for Operation.

■ Installation Arrangements

A Burford® factory trained Installation Engineer may be hired for any installation. The arrangement can be made with the Service Manager:

Burford® Corp.
Maysville, Oklahoma
Phone: 1-877-BURFORD® or 405-867-4467

Chapter 4

Operation

CHAPTER 4: OPERATION PROCEDURES

■ Theory of Operation

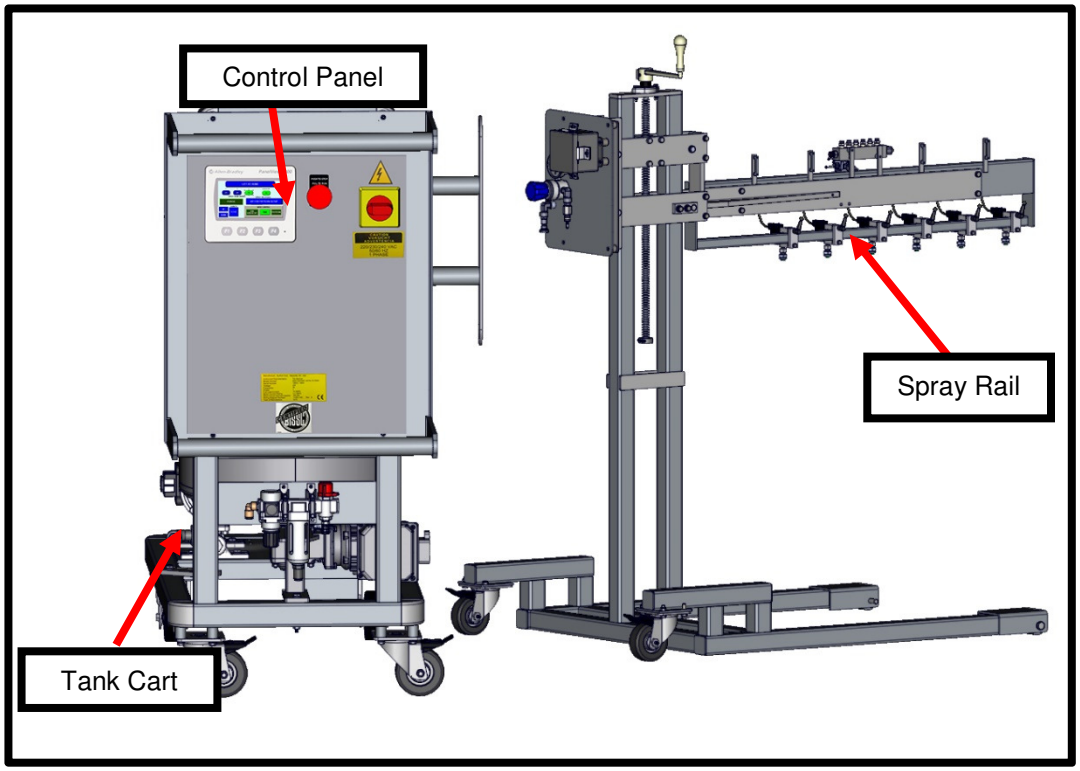
As the product flows down the conveyor system it is detected by a product sensor. The product sensor is a laser directed just upstream of the Spray Rail. The unit can operate in one of two modes: Time Mode or Pattern Mode. The unit will actuate the valves dependent on the mode selected and the parameters entered.

■ Operating Modes

Time Mode – A value in milliseconds is entered for the DELAY ON and the DELAY OFF. When a pan energizes the Product Sensor the PLC will wait the set value for the ON DELAY and then will turn the Spray Nozzles on. When the Product Sensor is then De-energized the PLC will wait the value for DELAY OFF and then turn the Spray Nozzles off. Time Mode works best for product with a single cavity where the spray will be on for the entire duration of product.

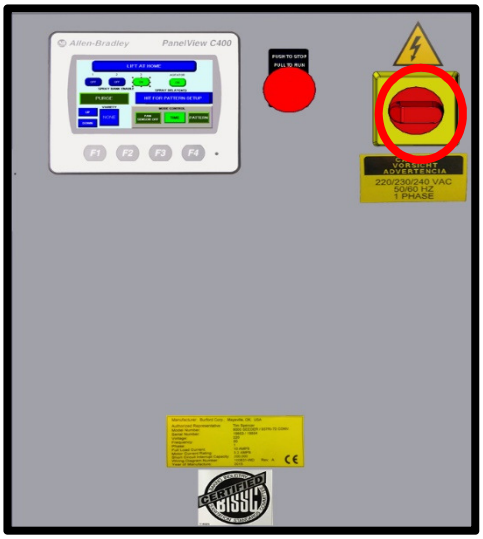
Pattern Mode – Pattern Spray allows a sequence to be programmed that will execute when the Product Sensor is energized. In Pattern Mode a value in milliseconds is entered for the DELAY TO FIRST SPRAY. This is the time from when the Product Sensor is triggered and the Spray begins. A value in milliseconds is entered for SPRAY TIME. This is the duration of each spray. A value is entered in NUMBER OF SPRAYS. This is the number of rows present and the number of times the valves will actuate. A value in milliseconds is entered for DELAY BETWEEN SPRAYS. This is the amount of time it takes the product to travel beneath the nozzle until it is in the next desired row.

■ Machine Descriptions

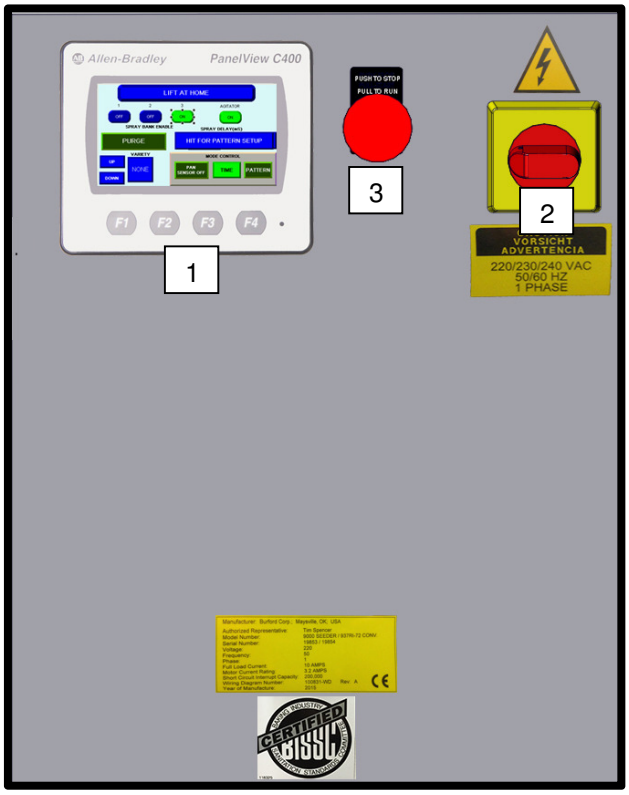


The main Disconnect Switch is located on the Control Panel on the front of the unit. Turning the Disconnect Switch to the “OFF” position will remove power from the unit. Turning the Disconnect “ON” will energize the unit.

Power will still be present on the LINE side of the Disconnect switch inside the electrical panel even if disconnect is in the OFF position. Only authorized personnel should ever have access to the electrical panel. Use extreme caution if working in the panel.

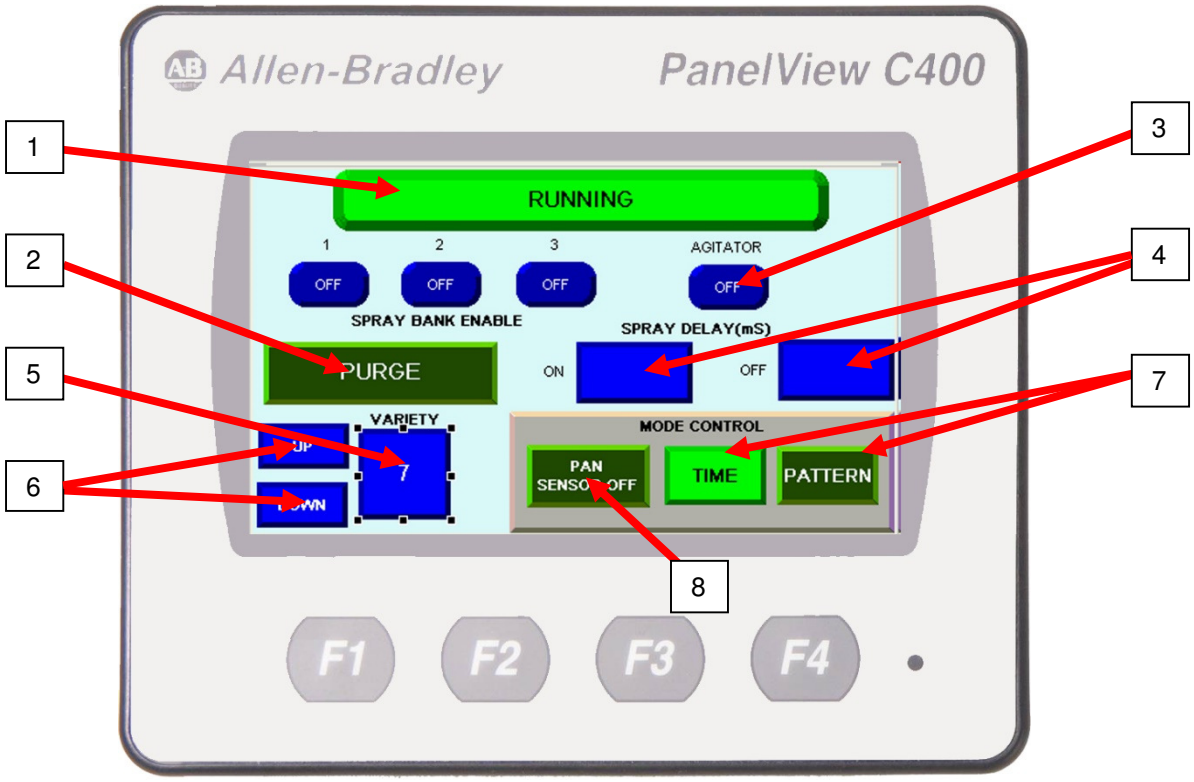


■ Control Panel



Ref	Name	Description
1	Operator Interface (HMI)	This is the operator interface where all machine settings and variety setup are altered.
2	Main Disconnect	Controls the incoming power to unit.
3	“PUSH-STOP PULL-START”	When this button is pushed electrical power to the unit is turned off. When this button is pulled out the electrical power will be restored to the unit.

■ Main Screen



Ref	Function	Description
1	Machine Status Bar	Notifies the user of any important messages.
2	Purge	When Pressed all nozzles enabled are actuated to remove air from the system.
3	Agitator Control	When pressed will toggle Agitator ON or OFF for selected variety. Use to keep the product mixed in the tank.
4	Spray Delay / Pattern Mode Setup	When unit is in Time mode the ON and OFF delays will control the when the Valves turn ON/OFF. When unit is in Pattern mode depress for pattern set up.
5	Variety	Indicates which variety is selected.
6	Variety Select	Press UP or DOWN to select the desired Variety.
7	Mode	Select between TIME mode and PATTERN mode.
8	Pan Sensor	When Pressed turns Pan Sensor ON or OFF.

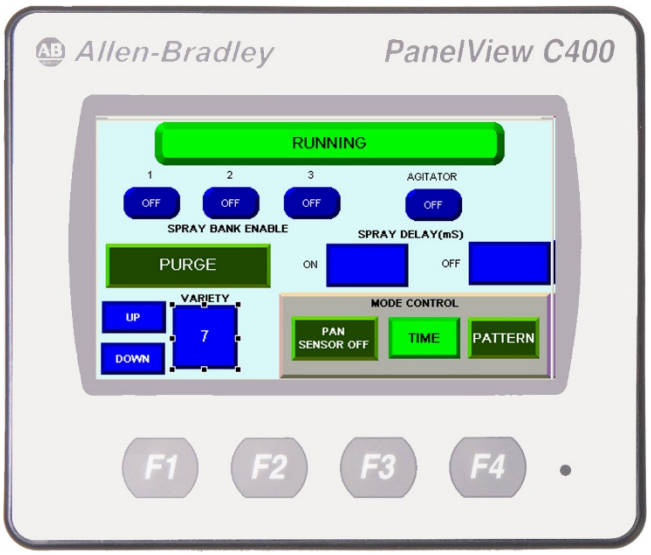
Any changes made will be automatically saved to the current variety selected.

■ Valve Control

The unit comes equipped with 7 Valves mounted on the Spray Rail divided into 3 banks.

The HMI allows the operator to enable / disable each bank of valves.

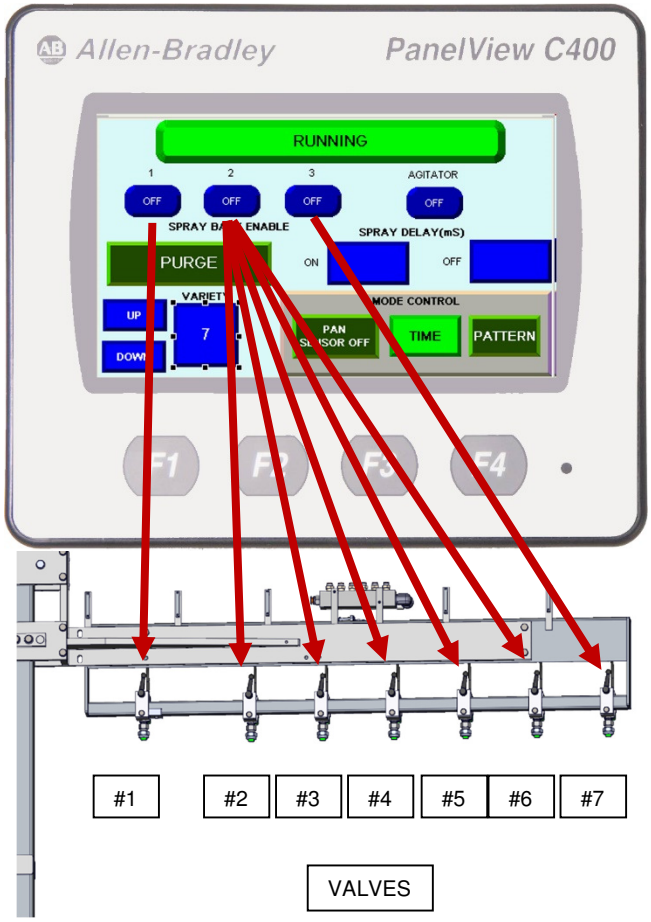
The Valves are numbered with number one being closest to the control panel.



Button number 1 controls bank 1 which consists of valve #1.

Button number 2 controls bank 2 which consists of valves #2 through #6.

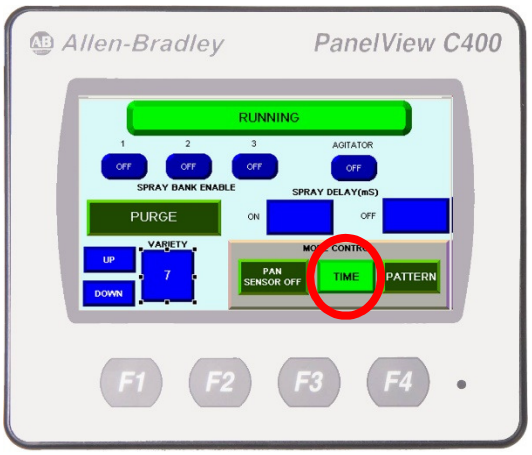
Button number 3 controls bank 3 which consists of valve #7.



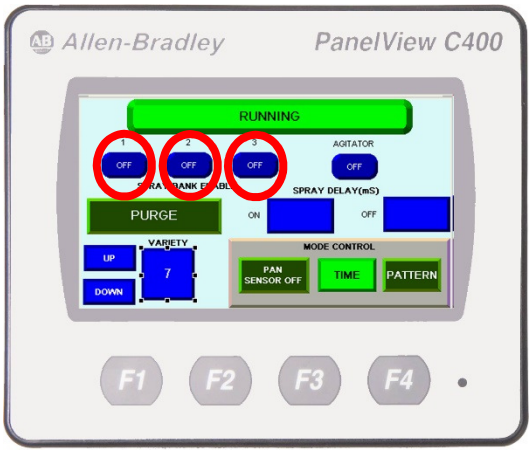
■ Setup Time Mode

The unit operates in one of two modes: TIME mode and PATTERN mode. Select “TIME” in the Mode Control box.

Time mode is generally used when spraying the entire length of a pan or product. The unit will activate the valves the entire duration that the product sensor is activated with exception to the ON and OFF Delay.



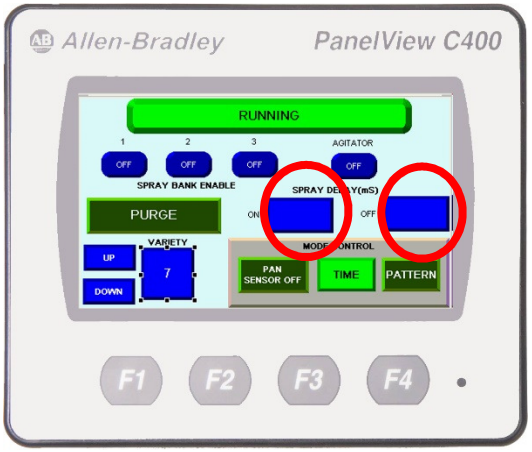
Select the Valves that you want “ON” during the Spray by touching the valve button and toggling the state to either ON or OFF.



Enter the SPRAY DELAY ON time in milliseconds. This is the time from when the Product Sensor detects the pan and turns on the enabled valves.

Pass pans through system and modify the SPRAY DELAY ON time until the valves come on exactly when product is beneath the spray nozzles.

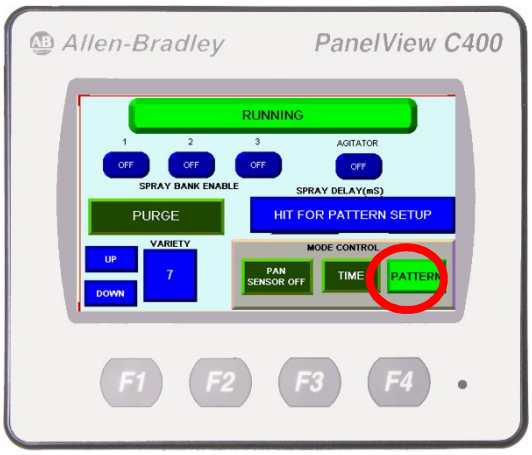
Modify the SPRAY DELAY OFF time until the spray valve stops exactly at the end of the product or until desired.



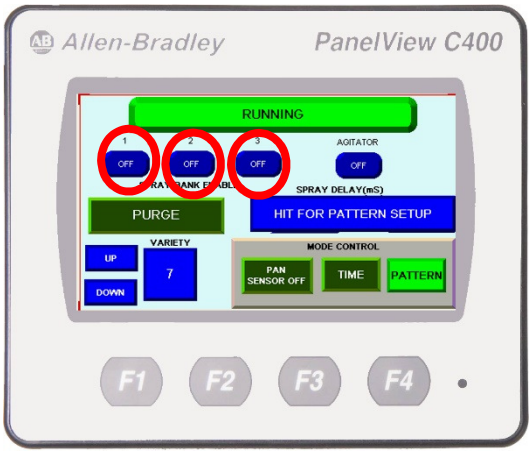
■ Setup Pattern Mode

The unit operates in one of two modes: TIME mode and PATTERN mode. Select “PATTERN” in the Mode Control box.

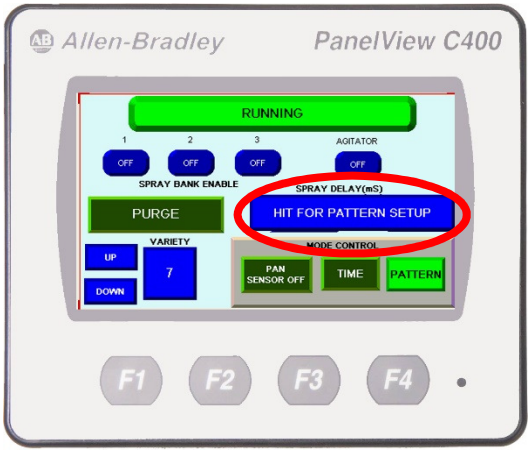
Pattern mode permits the user to customize each individual spray shot in a sequence of spray shots to optimize spray coverage.



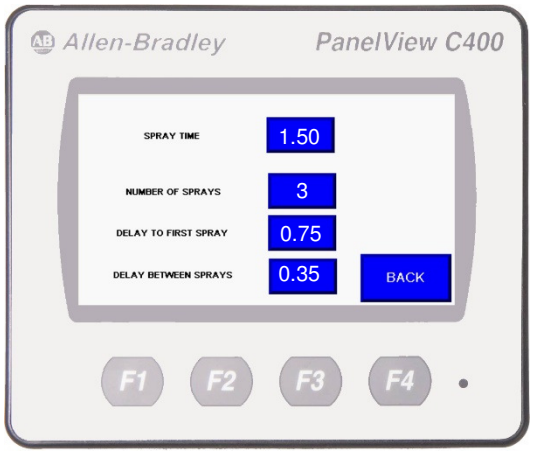
Select the Valves that you want “ON” during the spray by touching the valve button and toggling the state to either ON or OFF.



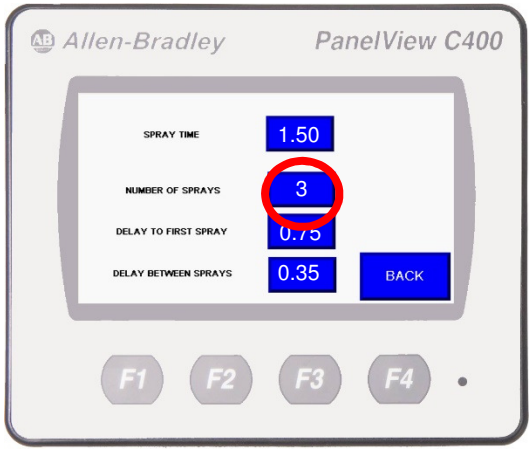
Select Pattern Setup.



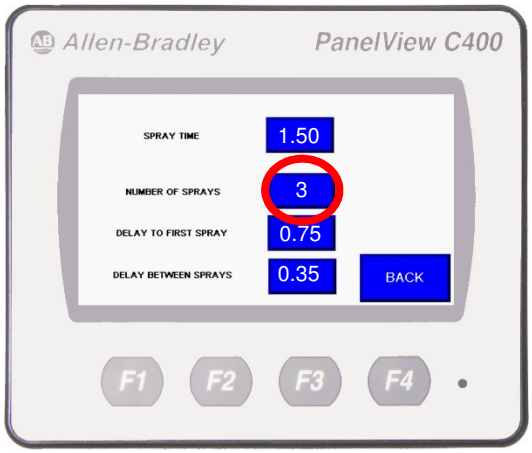
In the Pattern Setup Screen the available configurations include Spray Time, Number of Sprays, Delay to First Spray, and Delay Between Sprays.



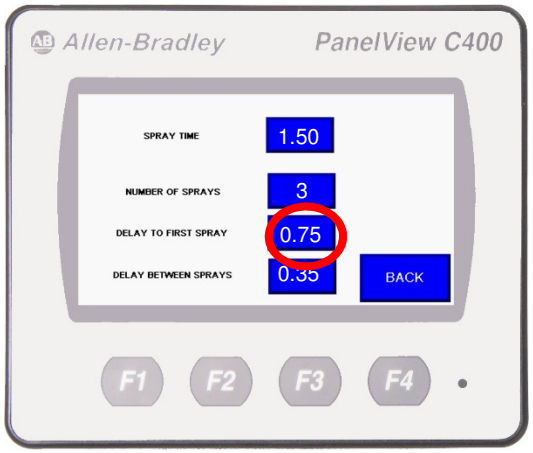
Spray Time is the duration that the selected Valves will actuate at each row.



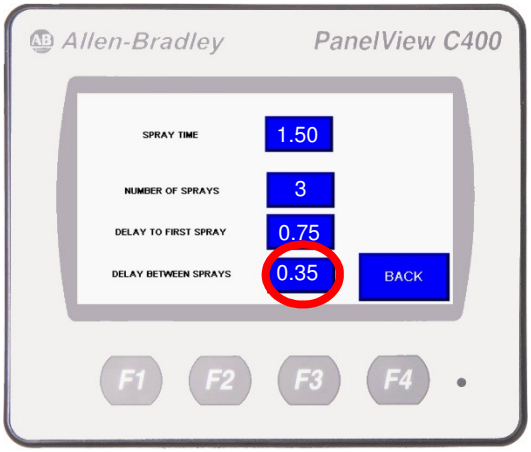
Number of Sprays determines the number of times, or rows, the PLC will actuate the Valves.



Delay to First Spray is the time from the leading edge of the pan / product until the Valve turns on.



Delay Between Sprays is the amount of time between the rows that the Valves will be turned off.



■ Pattern Setup Instructions

The Pattern control function allows the user to customize the individual spray shot into a sequence of spray shots to optimize spray coverage and minimize spray topping usage.

With this function the user can control the number of shots, the delay to begin the first shot and the time between shots. Each variety can be individually configured for your needs.

1. Select the variety that you would like to setup. Changes made to the Sequence Timing will only affect the current variety selected.

2. Select the “Pattern” button on the main screen and select “Pattern Setup”. This will take you to the Pattern Control Set-Up screen.

3. Set the “Number of Sprays” to 1.

4. Run a pan through the unit and adjust the “Delay to Spray” time value until the spray topping is depositing where desired. Repeat until satisfactory results.

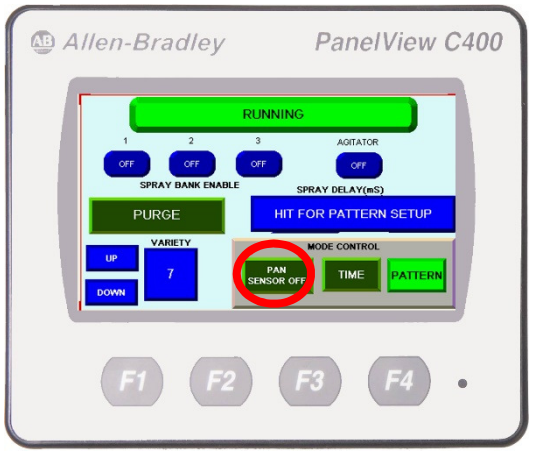
5. Set the “Number of Sprays” to 2.

6. Run a pan through the unit and adjust the “Delay Between Shots” until the spray topping is depositing where desired of the second row. Repeat until satisfactory results.

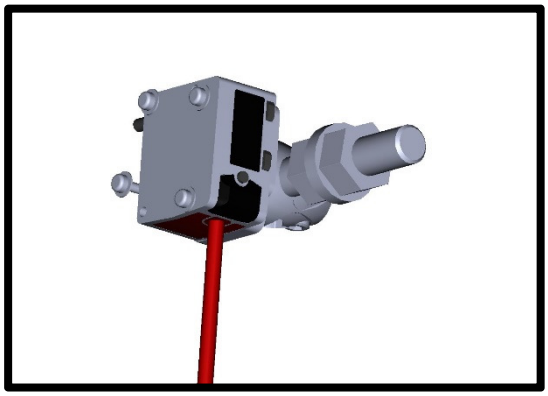
7. Set the “”Number of Sprays” to the number of rows for the target product.

■ Product Sensor

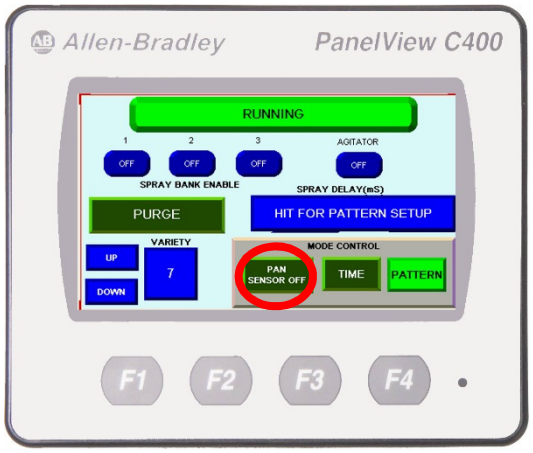
On the HMI under MODE CONTROL is the button **PAN SENSOR**. Pressing the button will toggle the product sensor ON or OFF.



The Product Sensor detects the pan. If the Pan Sensor is enabled then the Valves will actuate dependent to which Mode is selected: TIME or PATTERN. If the Pan Sensor is disabled then triggers from the product sensor will be disregarded in the PLC.

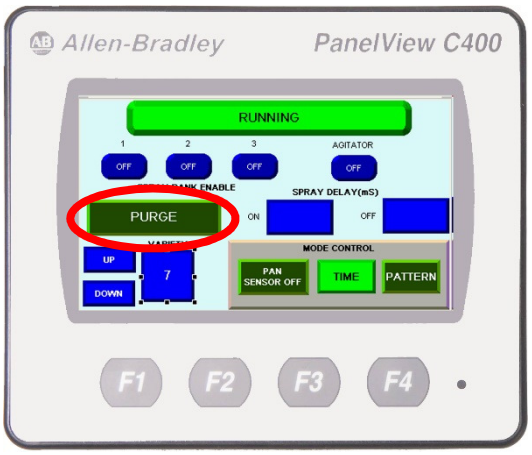


When the button is bright green the Product Sensor is enabled and the valves will actuate when the Product Sensor is triggered. When the button is dark green the Product Sensor is disabled and the unit will disregard any triggers.



■ Purge

Pressing the **PURGE** button will actuate the Valves that are enabled. The Purge feature is used mainly to remove any air that may be in the lines. Air in the lines may result in water dripping, un-uniformed spray and poor spray pattern.

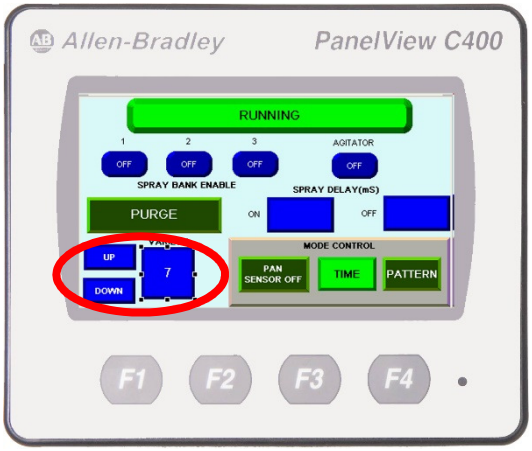


■ Variety

There are 15 varieties that can be programmed into the unit. Each variety can store the mode, active valve configuration, delays, and pattern mode parameters.

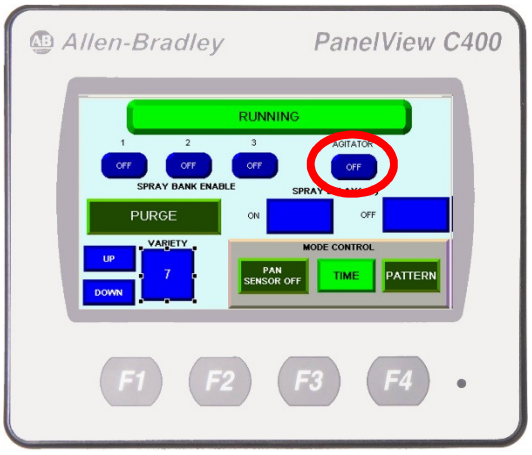
Press the **up** and **down** buttons to select a variety.

The software will automatically save any configuration changes to the selected variety. There is no need to save after any changes are made.



■ Agitator

The tank contains an **Agitator** that keeps your product from sticking to the sides and in a liquid state. Press the Agitator button on the HMI to toggle the Agitator in the tank OFF and ON.



Chapter 5

Troubleshooting

CHAPTER 5: TROUBLESHOOTING

1. Problem: Unit will not power up.
    a. Check incoming power supply.
    b. Check circuit breaker (CB1).

2. Problem: Inadequate spray coverage
    a. Check spray output setting.
    b. Check spray nozzle height setting.
    c. Check product sensor to nozzle timing.

3. Problem: Excessive spray coverage
    a. Check manifold output pressure.
    b. Check nozzle height.
    c. Check product sensor to nozzle timing.

4. Problem: Loss of nozzle pressure
    a. Check fluid output setting.
    b. Check fluid filter.
    c. Check for dirty tips.

5. Problem: Uneven distribution of spray
    a. Check nozzle height.
    b. Check sensor to nozzle timing.
    c. Check fluid return valve
    d. Check for dirty tips.

6. Problem: Sensor not detecting product
    a. Check sensor alignment.
    b. Check for product.

7. Problem. Not enough material on product.
    a. Check fluid pressure setting.
    b. Check nozzle height setting.
    c. Check fluid filter.
    d. Check product sensor to nozzle timing.
    e. Check fluid return valve.
    f. Check for dirty spray tips.

8. Problem. Fluid will not draw to pump.
    a. Check main fluid supply.
    b. Check fluid filter.
    c. Check hoses for leaks.
9. Check for loose hose connections.

Chapter 6

Cleaning & Maintenance

CHAPTER 6: CLEANING & MAINTENANCE

■ Fitness for a Particular Purpose Disclaimer

The Burford Corporation disclaims any warranty, expressed or implied, regarding the fitness of this equipment for any particular purpose other than that specifically expressed within this disclaimer. Use of this product for any purpose other than its intended purpose, or failure to follow the cleaning and maintenance instructions, constitutes a violation of the warranty agreement.

This product is designed to spray liquid toppings that do not denature or coagulate and that have no microbiological activity. Additionally, failure to follow the Cleaning and Maintenance instructions could result in damage to the equipment and/or a cross contamination or spoilage of products.

■ **WARNING** Always Follow Cleaning Procedures

Warning: Failure to follow cleaning procedures and/or failure to perform procedures according to schedule could result in damage to the equipment that would render it **NOT** cleanable!

Failure to flush products from machine immediately after use could result in:

- Material coagulating in the inner components of the machine to include the manifold, pump, tank, and accumulator.
- Product falling out of suspension in the tank if left for long periods of time (overnight).
- Tips and filters clogging and/or becoming unserviceable

■ Basic Procedures

Fill the tank with no more than 4 hours of run time worth of product. Run the tank low, then refill with refrigerated liquid as needed. Product should be refrigerated until it is to be used. Any unused product should be flushed and dumped. **Do Not** reuse any leftover from the machine, or product that is not in the original container and has NOT been refrigerated according to the manufactures recommendations.

After each production run the unit must be cleaned in accordance to the *Basic Cleaning Steps* outlined in this chapter. The unit has a maximum run time of 8 hours. After 8 hours of run time the unit must be cleaned before continuing production.

■ Basic Cleaning Steps (after each run)

1. Position suitable catch container beneath spray tips. Remove tips and check screens. Mechanically clean and soak in hot water.

CAUTION: To eliminate possible fluid spillage, look through the return hose and verify fluid has retreated from the connector point before disconnecting hose.

2. Press and hold the "Purge" button. Alternately, the product return line may be disconnected from the tank and placed in a suitable catch container.

NOTE: Additional backpressure may be required to force water through applicator nozzles. **Do not use water pressure greater than 60 psi.**

3. Partially fill product tank with hot water, then turn on agitator. Flush the hot water through the system as in step 1. Repeat as necessary until product has been flushed from system.

4. Circulate hot water through system until product has been completely flushed from supply and return hoses.

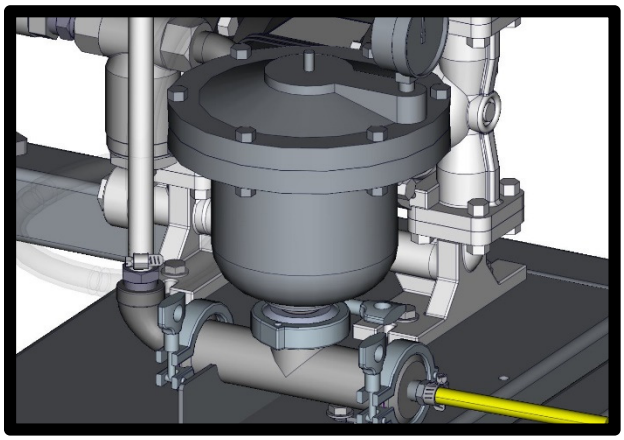
5. Purge water from system as in step 1 to empty tank and flow lines.

Repeat Steps 1-5 using a sanitizing solution such as; Ball® mfg. Quad10®, then flush with clean water.

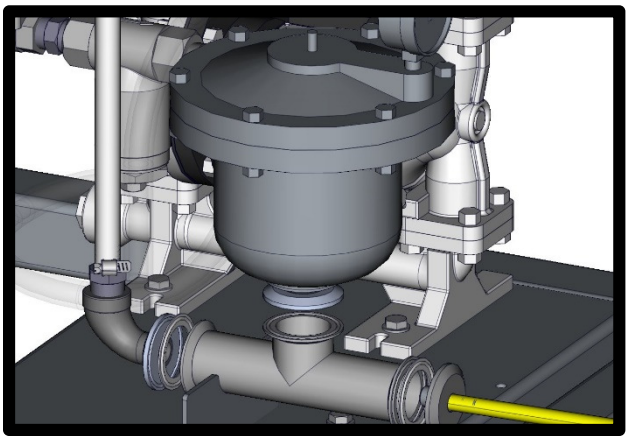
NOTE: To assure complete cleaning of all components, a breakdown and clean out of place (COP) procedure should be conducted.

■ Clean out of Place Procedure (Dampener)

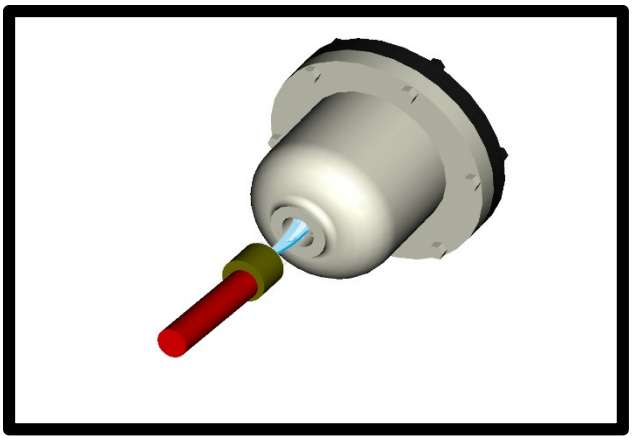
1. Complete steps in Basic Cleaning.
2. Verify tank and flow lines are empty.



3. Begin disassembly of the Dampener by removing (2) flow lines and (3) clamps. 2 clamps secure flow lines to Dampener and 1 securing Dampener to plumbing assembly. All 3 clamps will have O-ring present.

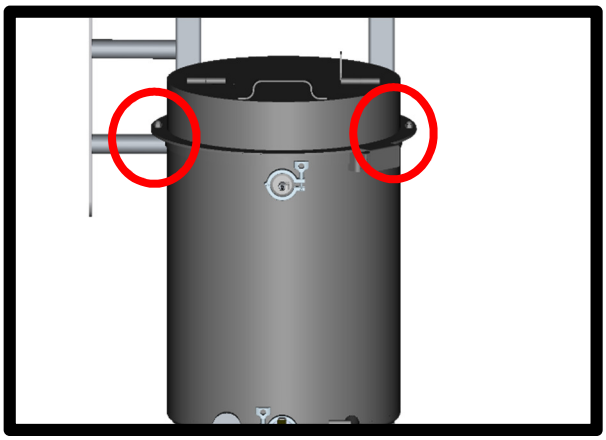


4. Once Dampener has been removed and positioned in a convenient place. Clean with a hose and water. Spray water in Dampener until water is free of debris.
5. Reassemble and move to the next COP.

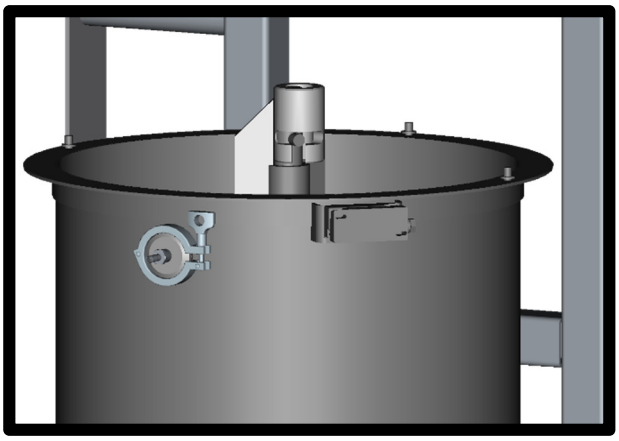


■ Clean out of Place Procedure (Agitator)

1. Loosen and remove (3) acorn nuts for the agitator. Disconnect water supply and return hoses from melting rack. Remove melting rack cover.



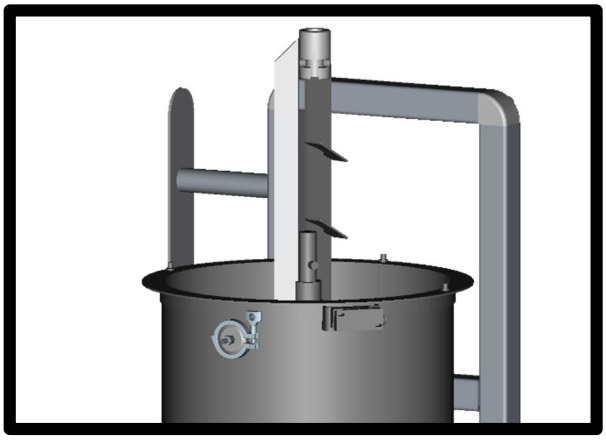
2. Rotate agitator to align with removal slot.



3. Carefully lift agitator from tank.

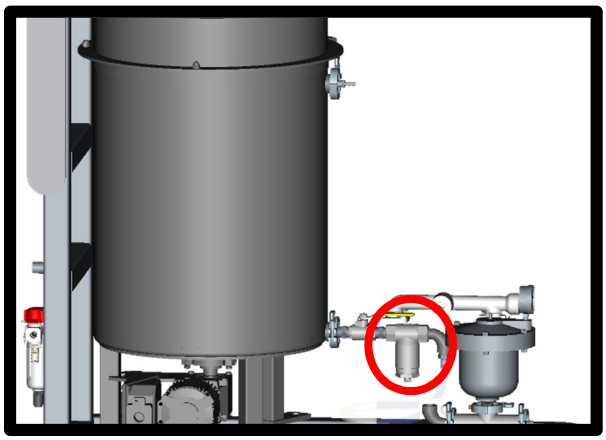
4. Clean any remaining product from tank and agitator assembly. Rinse with clean water.

5. Assemble in reverse order.

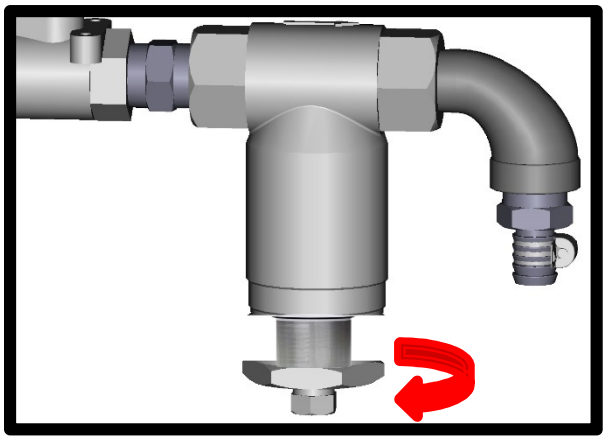


■ Clean out of Place Procedure (in-line filter)

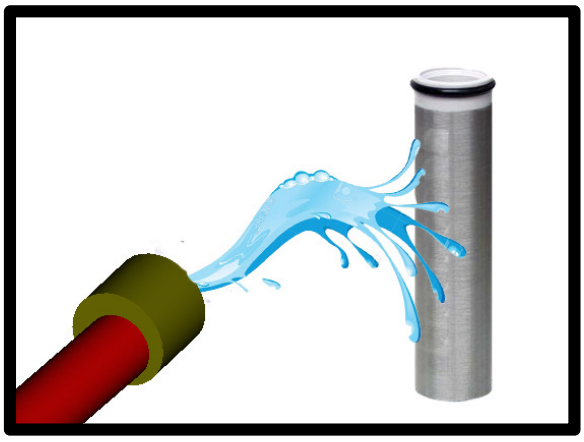
The Burford® Spray Applicator contains a 50-mesh fluid filter to remove any particles that may be contained in the main fluid supply. The filter is located just past the fluid supply outlet.



1. Place a catch pan under the filter and remove the cover cap. The filter can be easily removed by wrenching the cap clockwise.



2. Once filter has been removed and positioned in a convenient place, clean with a hose and water. Mechanically clean with water until filter is free of debris. You may need to soak with hot water.



3. Reassemble in-line-filter. Check to make sure that all flow lines are connected. This filter should be checked after each production run.

■ Preventive Maintenance

Burford® Corp. recommends the following preventive maintenance schedule to insure proper performance of your Burford® Spray Applicator.

■ After each run

Clean in-line filter.
Perform Basic Clean Steps.
Check tips and check screens.
Inspect and clean pan sensor lenses.
Inspect all air and flow lines.
Wipe unit down.

■ Monthly

Check Fluid lines for leaks.
Replace in-line-filter.
Check bladder pressure in Dampener.

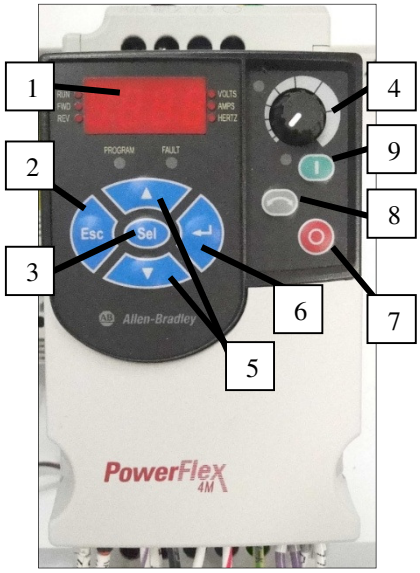
■ Semi – Annual

Check flow lines and valves for debris.
Replace parts when necessary and restock.

Do not use any form of high pressure spray on unit while cleaning. Damage may occur

■ Drive Settings

The Burford® Unit is equipped with an AC motor drives to control the operation of the unit. The above programmable motor controller is an example of the drives used. The table below provides a brief description of the function keys. See supplied motor drive manual for additional information.



Below are the parameters for the VFD. All other settings should remain on the default value

824 Spray (POWER FLEX4)	
DRV1	AGITATOR
P36	2
P38	0
P39	0.1
P40	0.1

Ref	Function	Description
1	Display	Displays parameter groups and values. Also contains status LEDs. See accompanying owner manual for more information.
2	Escape	Back one step in programming menu. Cancels a change and exit programming mode.
3	Select	Advance one step in programming menu. Selects a digit when viewing parameter values.
4	Speed Dial	Used to control speed of drive.
5	Scroll	Used to scroll through parameters or to increase/decrease parameter values.
6	Enter	Advance one step in programming menu. Save a change to a parameter value.
7	Stop	Used to stop the drive or clear a fault.
8	Reverse	Used to reverse direction of drive.
9	Start	Used to start the drive.

Power must be cycled before any parameter changes will take effect.

Chapter 7

Recommended Spare Parts

CHAPTER 7: SPARE PARTS

QTY	Part Number	Description
2	610760	GASKET, TEFLON 1-1/2”
2	612008	SOLENOID VALVE (ASCO)
1	611210	PUMP REPAIR KIT ELASTOMER
1	611211	PUMP REPAIR KIT (AIR)
1	611274	SOLENOID VALVE (AIR)
1	300720	FILTER SCREEN 50 MESH
1	A05803	GASKET FILTER
6	312029-35-140	SPRAY TIPS
6	312029-35-094	SPRAY TIPS
6	312029-35-190	SPRAY TIPS
1	612061	LASER SENSOR

Verify machine voltage before ordering parts.

Chapter 8

Supplemental Material

CHAPTER 8: SUPPLEMENTAL MATERIAL

Below is the O.E.M. instructions for the LR-TB2000 Series Sensor.

KEYENCE

96M12738

All-Purpose Laser Sensor

LR-TB2000 Series

Instruction Manual

Read this manual before using the product in order to achieve maximum performance. Keep this manual in a safe place after reading it so that it can be used at any time.

The following symbols alert you to important messages. Be sure to read these messages carefully.

WARNING	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	It indicates a situation which, if not avoided, could result in product damage as well as property damage.

1 Introduction

Safety Information for LR-TB Series

WARNING	• This product is only intended to detect object(s). Do not use this product for the purpose to protect a human body or part of a human body. • This product is not intended for use as an explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere. • This product uses DC power. The product may explode or burn if an AC voltage is applied.
NOTICE	• Do not wire the cable along with power lines or high-tension lines, as the sensor may malfunction or be damaged due to noise. • When using a commercially available switching regulator, ground the frame ground terminal and ground terminal. • Do not use this product outdoors or in a location in which its light-receiving surface will come in direct contact with stray ambient light.

Safety Precautions on Laser Product

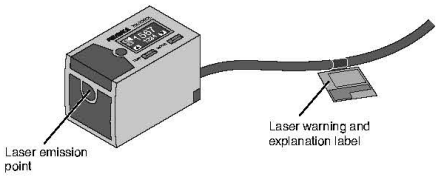
This product uses a semiconductor laser as its light source.

WARNING	• Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. • Follow the instructions mentioned in this manual. Otherwise, injury to the human body (eyes and skin) may result. • Laser emission from this product is not automatically stopped when it is disassembled. Do not disassemble this product. • Precautions on Class 2 Laser Product - Do not stare into the direct or specularly reflected beam. - Do not direct the beam at people or into areas where people might be present. - Be careful of the path of the laser beam. If there is a possibility that the operator may be exposed to the specular or diffuse reflections, block the beam by installing a protective enclosure. - Install this product so that the path of the laser beam is not as the same height as that of human eye. • Precautions on Class 1 Laser Product - Do not stare into the direct or specularly reflected beam.

Item		Description	
Model		LR-TB2000	LR-TB2000CL
		LR-TB2000C	
Wavelength		660 nm	
Pulse width		4.3 ns	
FDA(CDRH) Part1040.10	Laser class*	Class 2 laser product	Class 1 laser product
	Output	1.0 mW	390 µW
JIS C 6802/ IEC 60825-1	Laser class	Class 2 laser product	Class 1 laser product
	Output	1.0 mW	390 µW

* The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.

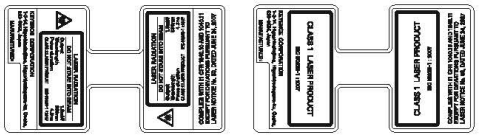
■ **Laser warning and explanation labels**



● **Laser warning and explanation labels**

- Attached to the cable

Class 2 (English) Class 1



- Included with the product

Class 2 (included with the product in each language)

* For a Class 2 laser product, select from the warning and explanation labels included in the package the appropriate warning and explanation label according to the country and region where the Class 2 laser product will be used. Then, affix the warning and explanation label over top of the existing warning and explanation label on the product.

Precautions on Regulations and Standards

■ **CSA Certificate**

LR-TB series complies with the following CSA and UL standards and has been certified by CSA (Class 2252 06 / Class 2252 86).

- Applicable standard: CAN/CSA C22.2 No.61010-1
  UL61010-1
- Use the following power supply.

CSA/UL certified power supply that provides Class 2 output as defined in the CEC (Canadian Electrical Code) and NEC (National Electrical Code), or CSA/UL certified power supply that has been evaluated as a Limited Power Source as defined in CAN/ CSA-C22.2 No. 60950-1/UL60950-1

- Use this product at the altitude of 2000 m or less.
- Use this product at the level of overvoltage category I.
- Use this product at pollution degree 3.
- Indoor use only.

■ **CE Marking**

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EC Directive, based on the following specifications.
Be sure to consider the following specifications when using this product in a member state of the European Union.

● **EMC Directive (2004/108/EC)**

- Applicable standard EMI : EN60947-5-2, Class A
  EMS : EN60947-5-2

● **Low-voltage Directive (2006/95/EC)**

- Applicable standard: EN61010-1, EN60825-1
- Use the power supply that has been evaluated as a Limited Power Source as defined in IEC60950-1/EN60950-1.
- Use this product at the altitude of 2000 m or less.
- Use this product at the level of overvoltage category I.
- Use this product at pollution degree 3.
- Indoor use only

Remarks: These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of the EMC Directive.
The manufacturer of the end-product is solely responsible for the compliance of the end-product itself according to the EMC Directive.

Package Contents

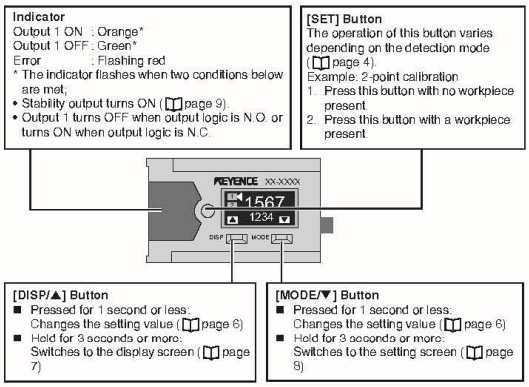
- Main unit
- Instruction manual
- Laser warning and explanation labels (LR-TB2000/TB2000C only)

Specifications

Model	Cable	LR-TB2000	-
	Cable with connector M12	LR-TB2000C	LR-TB2000CL
Detectable distance*1		60 to 2000 mm	
Spot diameter		Approx. 4 mm	
Response time		1 ms/10 ms/25 ms/ 100 ms/1000 ms selectable	2 ms/20 ms/50 ms/ 200 ms/2000 ms selectable
Light source	Type	Red laser (660 nm)	
	Laser class	Class 2 laser product IEC60825-1,FDA(CDRH) Part1040.10*2	Class 1 laser product IEC60825-1,FDA(CDRH) Part1040.10*2
Mutual interference prevention function		4 units (when using the interference prevention function)	
Timer		OFF/OFF delay/ON delay/One-shot	
Power voltage		20 to 30 VDC, including 10% ripple (P-P), Class 2 or LPS	
Current consumption		45 mA or less (without load)*3	
I/O*4*5	Control output	NPN open collector/PNP open collector selectable 30 VDC or less, 50 mA or less, residual voltage: 2 V or less, N.O./N.C. selectable	
	External input	Transmission OFF / Tuning / Reference surface update selectable Short-circuit current: 1 mA or less for both NPN and PNP For the applied voltage, see the wiring diagrams (page 2 in the instruction manual). For the input times, see the time charts (page 3 in the instruction manual).	
Protection circuit		Protection against reverse power connection, power supply surges, output overcurrent, output surge, and reverse output connection	
Environmental resistance	Enclosure rating	IP65/IP67 (IEC60529)	
	Ambient light	Incandescent lamp/Sunlight: 100000 lux or less	
	Ambient temperature	-20 to +55°C (no freezing)	
	Ambient humidity	35 to 85%RH (no condensation)	
	Shock resistance	1000m/s² in X, Y, Z axis directions respectively 6 times	
	Vibration resistance	10 to 55 Hz Double amplitude 1.5 mm in the X, Y, Z axis directions respectively, 2 hours	
Material		Case: Zinc die cast (Nickel chrome plating), Indicator cover and buttons: PES, Lens cover and display: PMMA (scratch-resistant coating specifications), Cable bushing: PBT, Cable: PVC, M12 connector (only for the cable with connector M12 type): TPE, PBT, Nickel-plated brass	
Weight		Cable type: Approx. 125 g (Including cable) Cable with connector M12 type: Approx. 85 g	

*1 The range for displayable distance is from 50 to 2200.
*2 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
*3 145mA or less (with load)
*4 You can select the I/O from the following combinations.
Control output × 2, control output + external input
(For details on the setting method, see page 3 of the instruction manual.)
*5 IO-Link specification v.1.1/COM2 (38.4 kbps) is supported.
You can download a setup file from the KEYENCE website (http://www.keyence.com).
If you are using the product in an environment in which you cannot download files over the Internet, contact your nearest KEYENCE office.

Part Functions



For a more detailed explanation, see "Switching between Display Screens" (page 7).

2 Installation and Wiring

Installation

- Tightening torque for the mounting holes: 0.63 N·m (M3 screw)
- If the detecting object has a mirrored surface, install the sensor in a position where specular reflection will not penetrate the optical receiver.

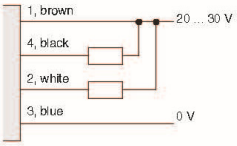
Wiring

With the LR-TB Series, you can select the functions of the I/O wires (black and white) from the combinations shown below during the initial settings. "3 Initial Settings" (page 3) Independently isolate any I/O wires that you will not use.

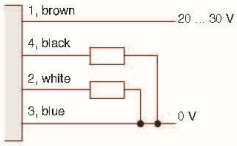
Load (input device)

■ Out1+Out2

● NPN

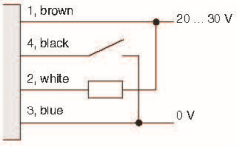


● PNP

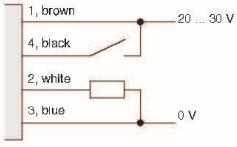


■ Input+Out1

● NPN

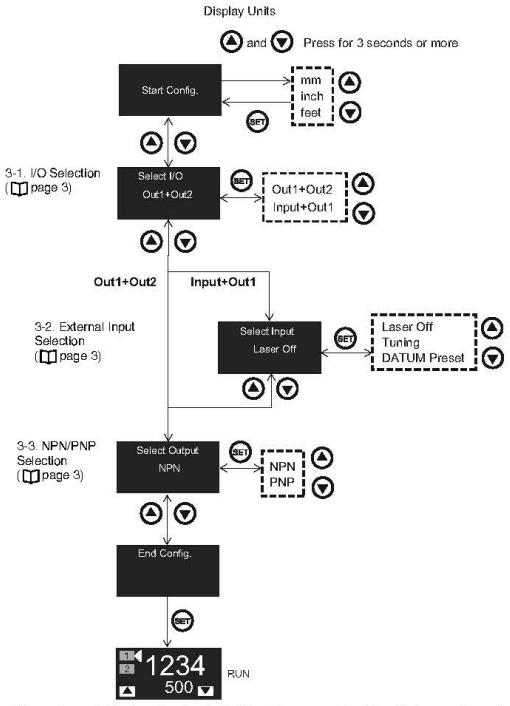


● PNP



3 Initial Settings

When you turn on the LR-TB Series for the first time after you purchase it or when you have initialized the LR-TB Series, the following initial settings must be configured.



- After you have finished configuring the initial settings, you will not be able to reconfigure the unit, I/O, or NPN/PNP selection. To change any of these settings, you will have to initialize the product. "Initialization" (page 7).

3-1. I/O Selection

Select from the following table the functions assigned to the I/O wires (black and white).

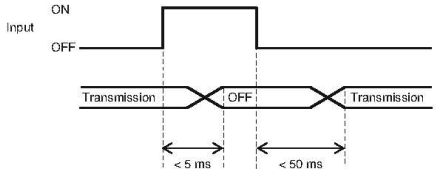
Options	Black Wire	White Wire
Out1 + Out2	Output 1	Output 2
Input + Out1	External input	Output 1

The functions assigned to output 1, output 2, and external input can be changed after you finish configuring the initial settings. "6 Detailed Settings" (page 8).

3-2. External Input Selection

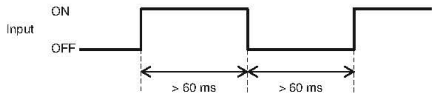
■ Transmission OFF [Laser Off]

The laser beam transmission is stopped.



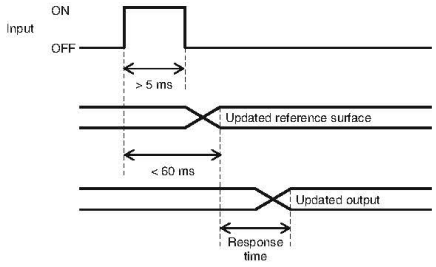
■ External Calibration [Tuning]

When selected, this external input performs the same function as pressing the [SET] button.



■ Reference surface update [DATUM Preset]

When the detection mode ("4 Detection Mode" [page 4]) is set to "DATUM mode," this external input updates the reference surface.



3-3. NPN/PNP Selection

You can select between NPN outputs or PNP outputs. For details, see "Wiring" (page 2).

4 Detection Mode

The LR-TB Series has four output modes and three detection modes.

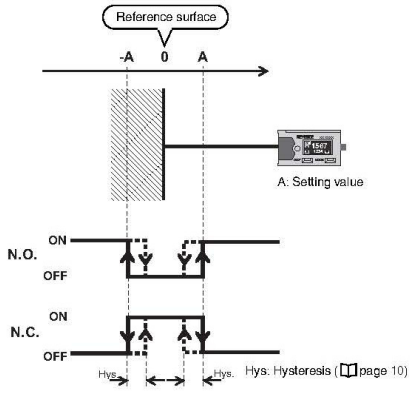
Output Mode (page 9)	Detection Mode
Standard (default value) [Standard]	**4-1. DATUM mode (FGS)**
	4-2. Distance mode (BGS)
Window [Window]	**4-3. Window mode**
Stability [Stability]	(page 9)
Error [Error]	(page 9)

When the output modes for Out1 & Out2 are either [Standard] or [Window], the detection modes can only be set in the below combinations.
[Out1] / [Out2] = [DATUM]/ [DATUM], [Distance]/ [Distance], [Distance]/ [Window], [Window]/ [Distance], [Window]/ [Window]

4-1. DATUM Mode (FGS)

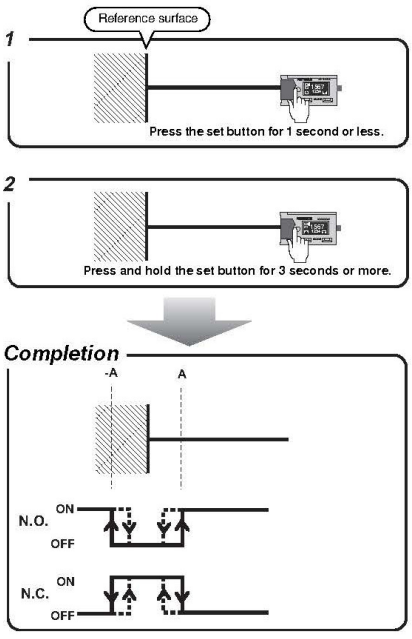
■ Operation

- In this mode, the change in position from a reference surface (which has a value of 0) is displayed.
- This mode is useful in detecting the passage of workpieces in front of a stationary background.



■ Setting

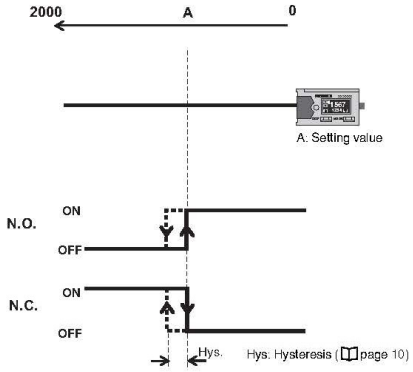
- Set the output mode to [Standard], which is the default mode. "6 Detailed Settings" (page 8)
- For details on setting output 2, see " 4-5. Switching Out1/Out2" (page 6).
- In DATUM mode, a "±" is displayed in front of the setting value.



4-2. Distance Mode (BGS)

■ Operation

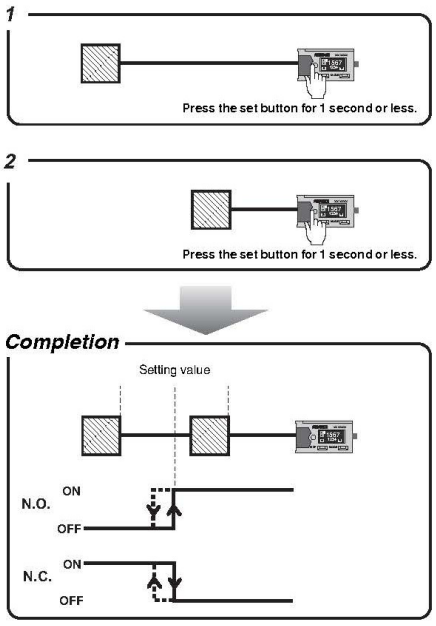
- In this mode, the distance from the sensor is displayed.



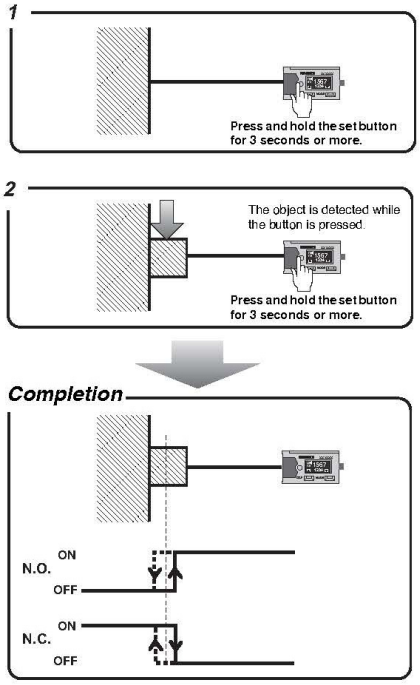
■ Setting

- Set the detection mode to [Standard], which is the default value. "6 Detailed Settings" (page 8)
- For details on setting output 2, see " 4-5. Switching Out1/Out2" (page 6)

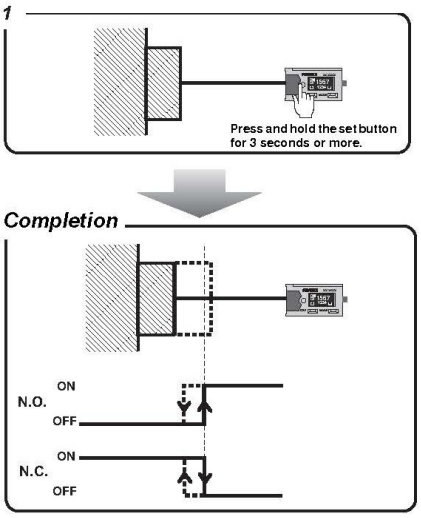
● **2-point calibration**



● **Full auto calibration**
Use this function when the movement of detected objects cannot be stopped.



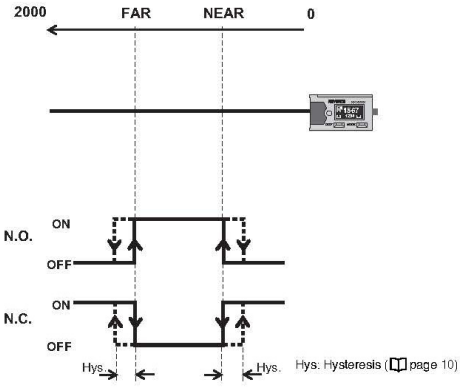
● **1-point calibration**
Use this function to enable the installation of detected objects at the upper limit that you do not want to detect.



4-3. Window Mode

■ Operation

- In this mode, the distance from the sensor is displayed.
- You can assign setting values to the upper and lower limits.

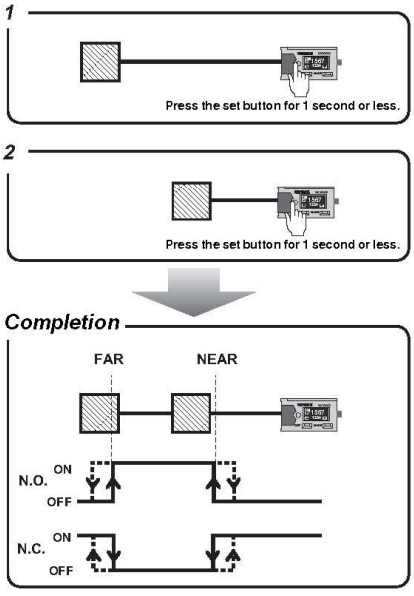


Hys: Hysteresis (page 10)

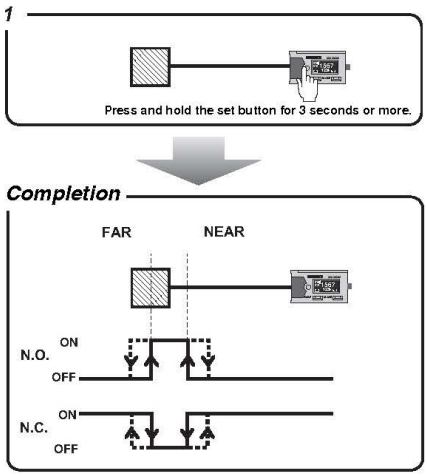
■ Setting

- Set the detection mode to [Window]. "6 Detailed Settings" (page 8)
- For details on setting output 2, see "4-5. Switching Out1/Out2" (page 6).

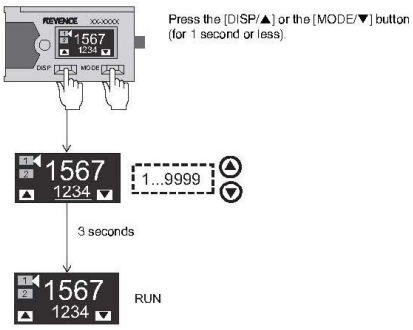
● **2-point calibration**
Use this function to detect objects inside a range of specific upper and lower limits.



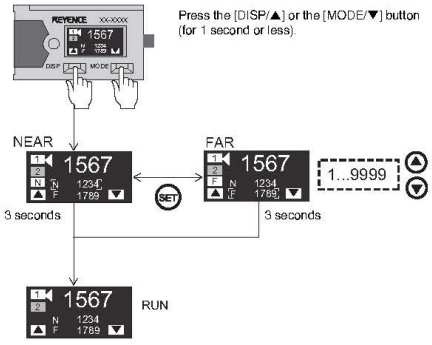
● **1-point calibration**
Use this function when you cannot move detected objects away from the center of the detection range.



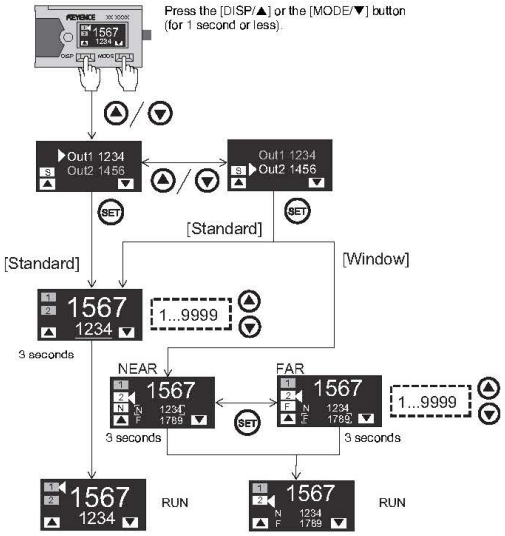
4-4. Manual Tuning



■ **When the detection mode is set to [Window]**

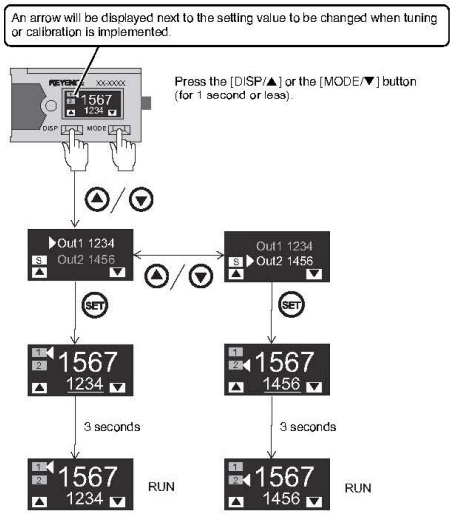


■ **When [Out2] mode is set to [Standard] or [Window]**



4-5. Switching Out1/Out2

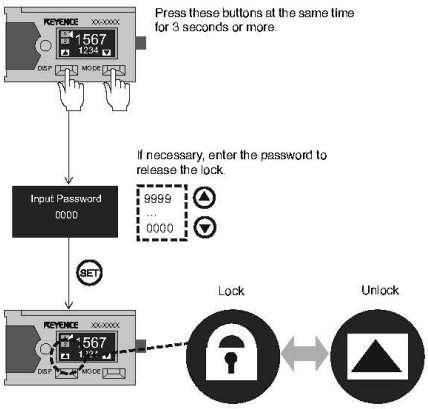
The initial [Out2] mode is [Stability]. "6 Detailed Settings" (page 8)
When [Out2] mode is set to [Standard] or [Window], the setting below could be manipulated.



5 Useful Functions

Key Lock

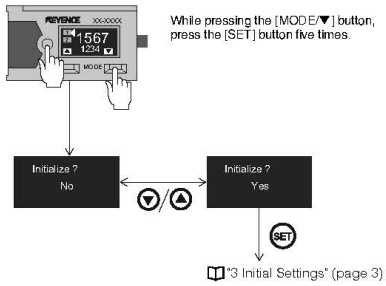
To require a password to release the key lock, see "6-11. Password" (page 10).



Initialization

Initialization resets the product to its factory default settings. After initialization, you will have to configure the "3 Initial Settings" (page 3).

■ **Using the shortcut keys to execute the initialization**



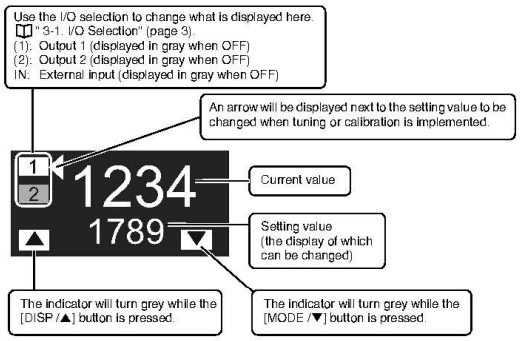
■ **Using the setting menu to execute the initialization**

On the "Initialize?" screen, select "Yes". "6 Detailed Settings" (page 8)

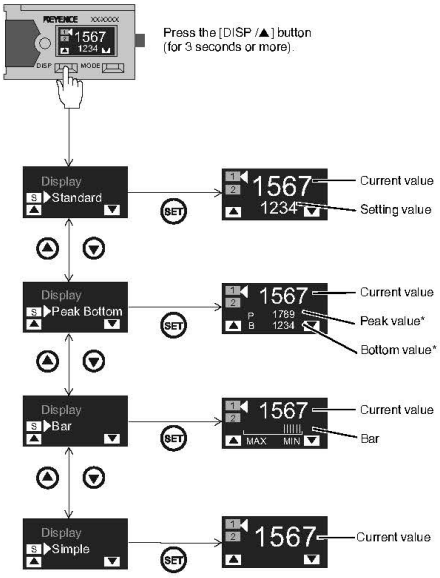
Switching between Display Screens

You can select between four different displays.

■ **Display screen**



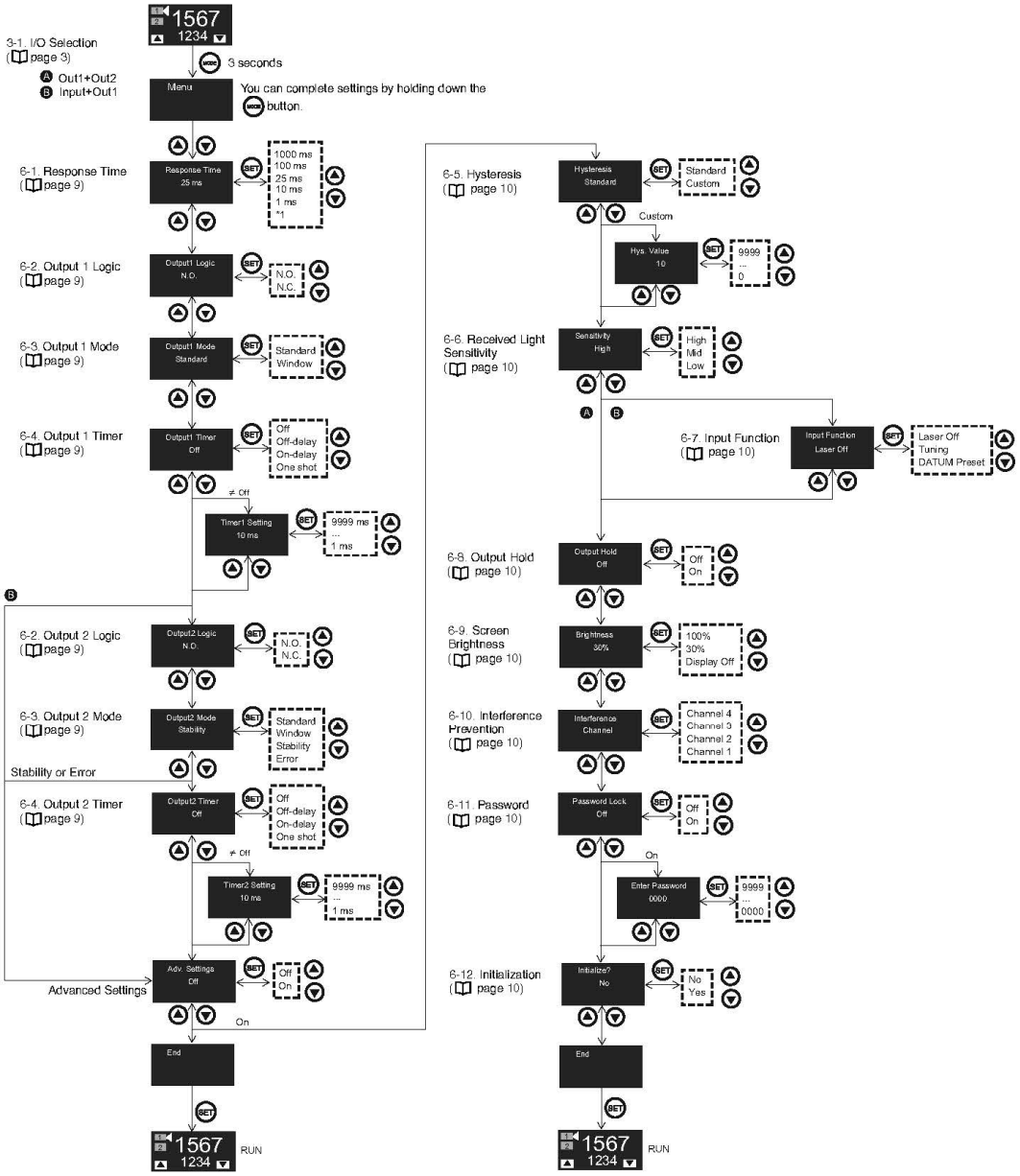
■ **How to switch the display**



* When the output changes from ON to OFF, the bottom value is reset to the current value.
When the output changes from OFF to ON, the peak value is reset to the current value.

6 Detailed Settings

The values shown on the display screen are the initial values.



*1 The LR-TB2000CL has the following response times.
2000 ms
200 ms
50 ms
20 ms
2 ms

6-1. Response Time

Longer response times lead to more stable detection.

■ **LR-TB2000/TB2000C**

Detecting distance [mm]	Repetition Accuracy[mm] (Typical) (Under stable temperature) White Paper (Reflectivity: 90%) Response Time [ms]				
	1	10	25	100	1000
1000	±9	±4	±3	±3	±3
2000	±25	±7	±6	±3	±3

Detecting distance [mm]	Repetition Accuracy[mm] (Typical) (Under stable temperature) Gray Paper (Reflectivity: 18%) Response Time [ms]				
	1	10	25	100	1000
1000	±26	±7	±6	±3	±3
2000	±69	±21	±13	±6	±4

■ **LR-TB2000CL**

Detecting distance [mm]	Repetition Accuracy[mm] (Typical) (Under stable temperature) White Paper (Reflectivity: 90%) Response Time [ms]				
	2	20	50	200	2000
1000	±10	±5	±3	±3	±3
2000	±26	±8	±7	±5	±3

Detecting distance [mm]	Repetition Accuracy[mm] (Typical) (Under stable temperature) Gray Paper (Reflectivity: 18%) Response Time [ms]				
	2	20	50	200	2000
1000	±26	±9	±6	±3	±3
2000	±71	±22	±15	±9	±5

6-2. Output Logic

Select N.O. or N.C. for the output logic. For details, see "4 Detection Mode" (page 4).

6-3. Output Mode

■ Standard [Standard]

The output is activated according to the detecting distance. For details, see "4 Detection Mode" (page 4).

■ Window [Window]

The output is activated according to the detecting distance. For details, see "4-3. Window Mode" (page 5).

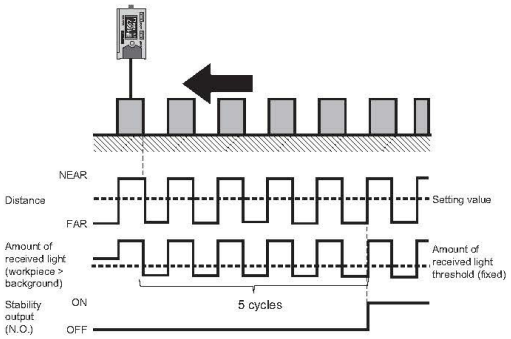
■ Stability [Stability]

This function can be used to check whether there has been a decrease in the amount of light received due to problems such as dirt on the detected surface.

- **When the I/O selection is [Out1 + Out2]**
  Output is activated if the amount of light received falls below the threshold (fixed value) during the observation period.

Detection Mode	Observation Period
DATUM	Negative setting value < detected value < positive setting value
Distance	Detected value < setting value
Window	LOW-side setting value < detected value < HIGH-side setting value

Example) Chart during DATUM mode



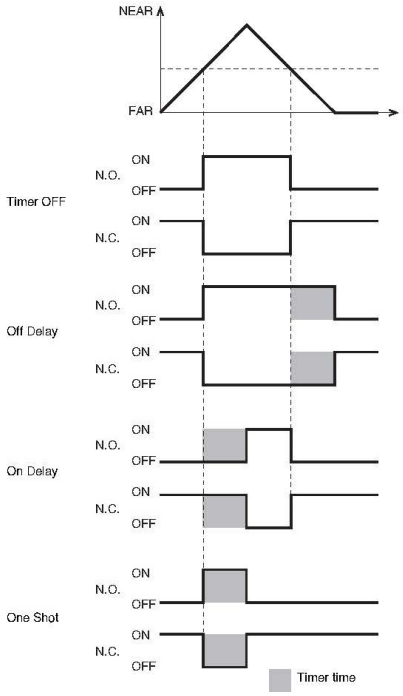
■ Error [Error]

Output is activated when an error occurs. When the error is cleared, the output is also automatically reset. For causes of errors, see "Error Display" (page 10).

6-4. Timer

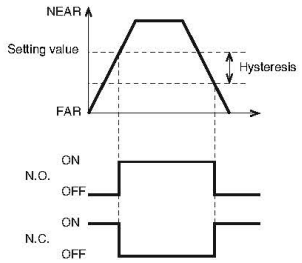
This function can be used to delay the timing with which the sensor output is switched.

- Off delay [Off-delay]
- On delay [On-delay]
- One shot [One shot]

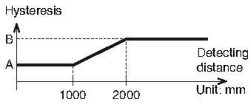


6-5. Hysteresis

Hysteresis is the difference between the value at which the output turns ON and the value at which the output turns OFF.



- With [Standard], the hysteresis varies depending on the response time and the detecting distance.



Response Time (ms)	A(mm)	B(mm)
25 to 2000	15	20
10, 20	30	40
1, 2	60	80

- With [Custom], you can specify an arbitrary value regardless of the detecting distance.
- For details on the operation differences between the detection modes, see "4 Detection Mode" (page 4).

6-6. Received Light Sensitivity

By lowering the received light sensitivity level, you can reduce the number of times that malfunctions such as the following occur.

- Detections of dirt and mist between the sensor and the detected object.
- Detections of translucent objects when passing through translucent objects to detect the target.

You cannot change the received light sensitivity when "6-1. Response Time" (page 9) is set to [1ms/10ms]/[2ms/20ms].

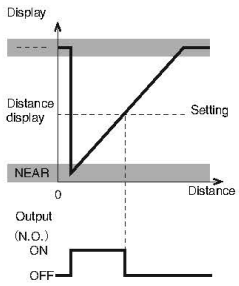
6-7. Input Function

For details, see "3-2. External Input Selection" (page 3).

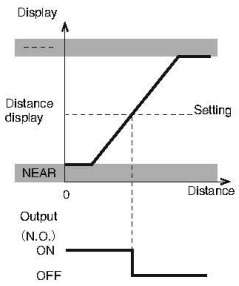
6-8. Output Hold

This function holds the display value and the output status that were in use immediately prior to the LR-TB Series becoming unable to receive light.

■ When Output Hold is OFF



■ When Output Hold is ON



6-9. Screen Brightness

You can set the operation to perform when no button operations are performed for a set length of time.

Item	Description
100%	The display brightness is always kept at 100%.
30% (default value)	After a certain length of time elapses, the display brightness is set to 30%.
Display Off	After a certain length of time elapses, the display is turned OFF.

- If you use the LR-TB Series for a long period of time, the display brightness will decrease.
- If you set this to [100%], the display brightness will decrease at a faster rate.

6-10. Interference Prevention

With the LR-TB Series, you can prevent the effect of mutual interference by changing the laser emission channel. If you are using multiple LR-TB Series units in close proximity to each other, set each one to have a different laser emission channel.

6-11. Password

If you set this to [ON], you can set a personal identification number that must be entered to release the "Key Lock" (page 7). You can set the personal identification number to a value from 0 to 9999.

6-12. Initialization

Initialize the sensor settings. You can also use the shortcut keys to execute the initialization. "Initialization" (page 7)
After initialization, you will have to configure the "3 Initial Settings" (page 3).

7 Other

Error Display

Error Display	Cause and Remedy
NEAR*	The detected object is not within the detectable range (the detected object is too close).
----*	Light reflected from the detected object could not be received. • The amount of light received from the detected object is low. • The detected object is not within the detectable range of the LR-TB (the detected object is too far away).
Over Current	An overcurrent is flowing through the output wire. • Check whether the output wire is connected correctly. • Check whether the output wire is in contact with other wires.
Laser Error	A laser diode error has occurred. • If you cannot fix the problem by restarting the product, the product must be replaced.
EEPROM Error	1) Settings have been rewritten more than 1,000,000 times. • The memory has reached the end of its service life. 2) A recording memory error has occurred. • If you cannot fix the problem by restarting the product, the product must be replaced.
System Error	An internal system error has occurred. • If you cannot fix the problem by restarting the product, the product must be replaced.

* When Output mode is set to [Error], while "Near" or "- - - -" is on display, the output would not switch.

Output When an Error Occurs

Error Display	Output ON or OFF	
	N.O.	N.C.
NEAR	ON	OFF
-----	OFF	ON
Over Current*1	OFF	OFF
Laser Error*2	OFF	ON
EEPROM Error*2	The same as during normal operation	
System Error*2	OFF	ON

*1 When Output mode is set to [Error], despite the setting of N.O. or N.C., LR-T would remain OFF to protect the output circuit.
*2 When Output mode is set to [Error], LR-T would turn ON with N.O. and turn OFF with N.C.

Chapter 9

Drawings & Parts

Contents

Drawings & Parts

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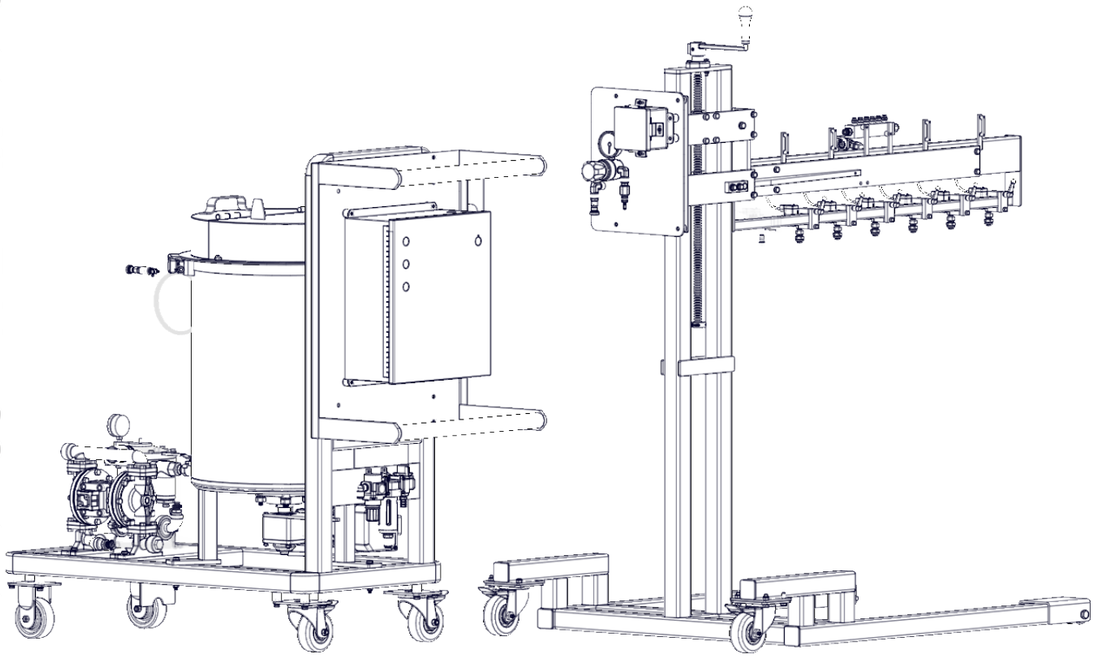
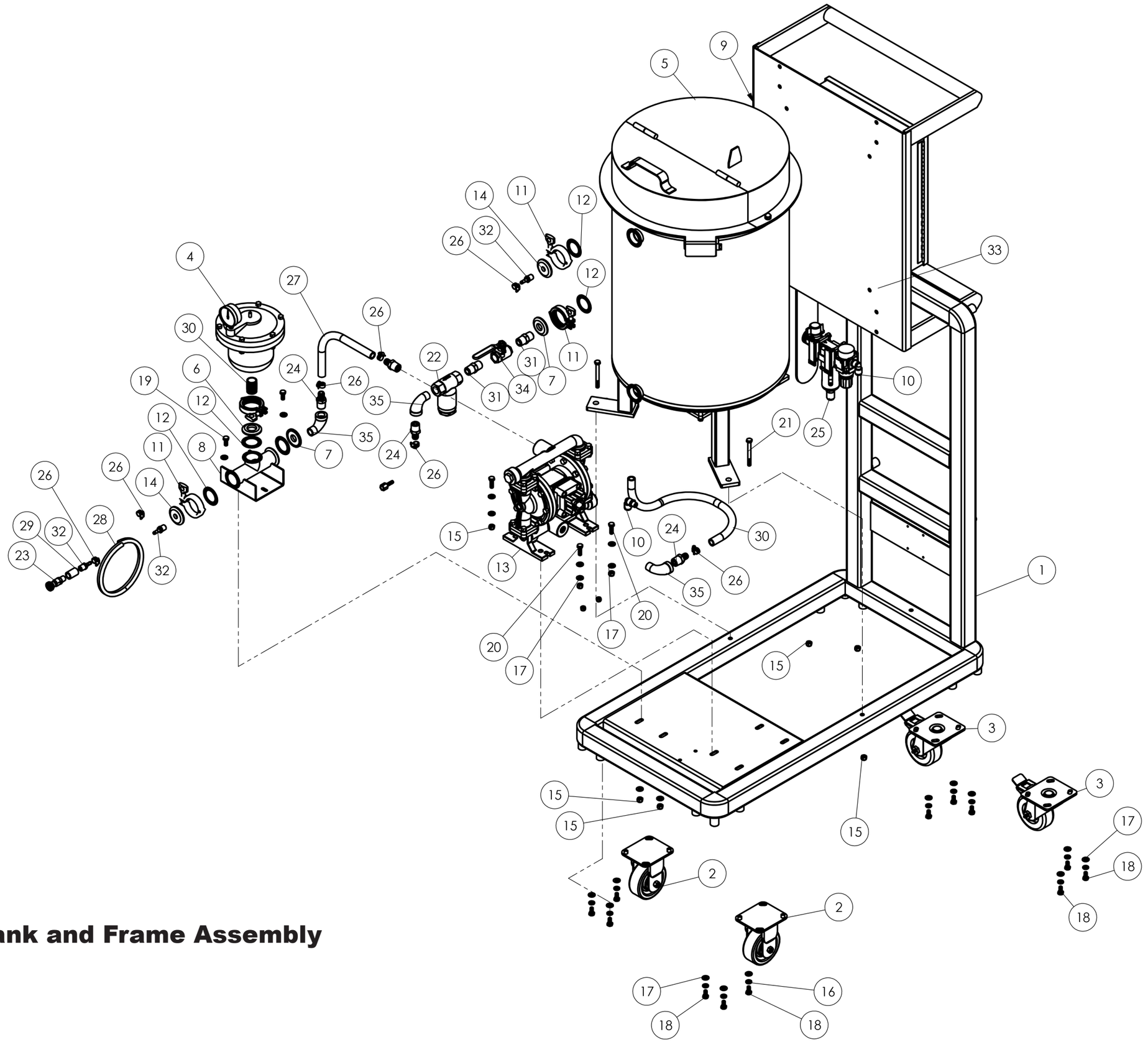


Call 1-877-BURFORD or fax
405-867-4219 to order your parts.

Spray Applicator (Model 824)

Tank and Frame Assembly 100988--004

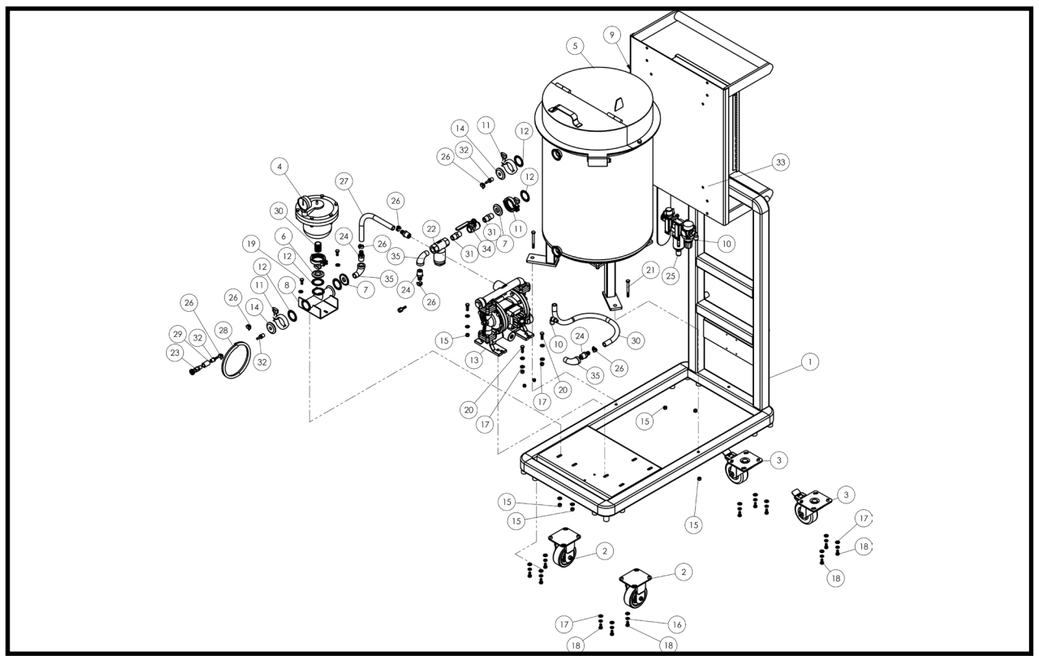
QTY.	ITEM #	PART#	DESCRIPTION
1	1	100988-005	A/W, CART TANK FRAME
2	2	104318	CASTER 4" RIGID NON LOCKING SST
2	3	152161	CASTER, 4" SWIVEL LOCKING
1	4	305710	DAMPENER 150 PSI 36 C.I.
1	5	305905	TANK ASSY W AGIT 20 GAL 220-3
1	6	305908	PLATE CAP 1.5 SANITARY TAP 3/4
2	7	305909	PLATE CAP 1-1/2 SAN. TAP 1/2" NPT
1	8	305920	A/W TEE ACCUMULATOR MOUNT
1	9	305925	A/W GUARD EGGWASH
2	10	610505	FITTING,ELL,1/4NPT X 3/8T, ENP, Q.R
5	11	610759	CLAMP, HEAVYWEIGHT, 1 1/2"
5	12	610760	GASKET, TEFLON, 1.5"
1	13	611121	PUMP, AIR POWERED DBL DIAPHRAGM
2	14	711730	PLATE CAP 1-1/2 SAN. TAP 1/4" NPT
9	15	955619	NUT HEX NYLOC 5/16-18 UNC SST
12	16	955939	WASHER LOCK 5/16" SST
27	17	955976	WASHER FLAT 5/16 SST
12	18	989710	SCREW FIN HEX 5/16-18 X 5/8 SST
2	19	989712	SCREW FIN HEX 5/16-18 X 3/4 SST
4	20	989716	SCREW FIN HEX 5/16-18 X 1 SST
3	21	989748	SCREW FIN HEX 5/16-18 X 3 SST
1	22	A06702	STRAINER, SST 1/2" 100 MESH
1	23	A06722	FITTING,QC,BODY,LIQ,1/4 NPTM,SST
4	24	A06859	FITTING, 1/2MPT X 1/2 TUBE
1	25	C00404	FRL COMBO w/ SHUTOFF VALVE & GAUGE
7	26	C00414	CLAMP 1/4" TO 5/8" SST
3'	27	C00435	HOSE CLEAR REINF 1/2 ID
24 FT	28	C00437	TUBING 1/4" VINYL W/ POLYESTER
1	29	C00900	FITTING,COUPLING,1/4 NPTF,SST
1	30	C01012	FITTING NIPPLE 3/4 NPT CLOSE
2	31	C01018	FITTING,NIPPLE,HEX,1/2 NPTM,SST
3	32	c01953	FITTING,HOSE BARB,1/4MPT X 1/4H,SST
4	33	C03845	SPACER. .34 ID, .75 OD .75 L, SST
1	34	C05431	VALVE, 1/2 NPT 2-WAY, BALL, SST
3	35	C05575	FITTING,STREET ELL,1/2M X 1/2F,SST
1	36	C01915	FITTING,HOSE BARB,7/16-20JIC X 1/4H
2	37	955661	NUT HEX NYLOC 1/4-20 UNC SST



Tank and Frame Assembly

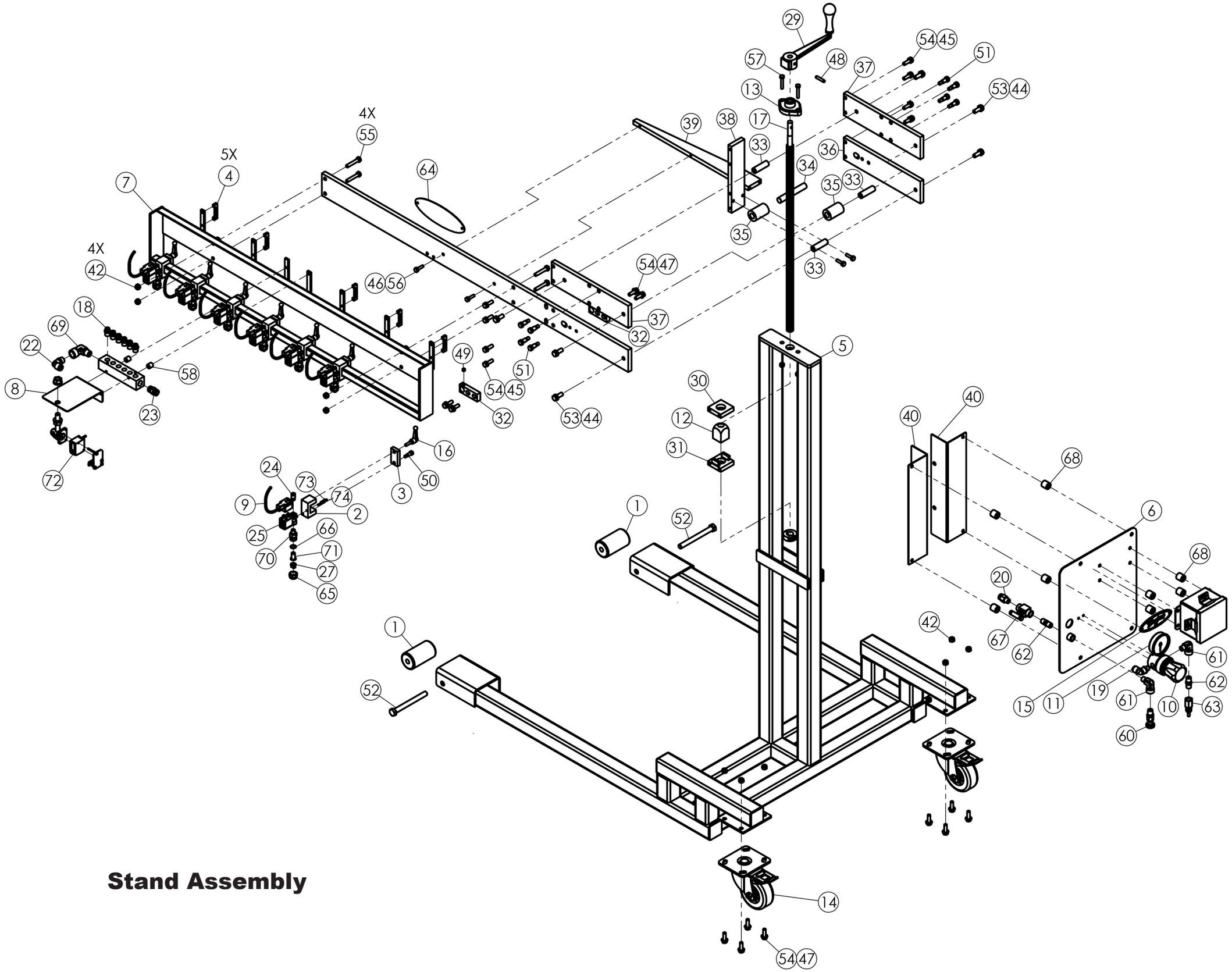
Tank and Frame Assembly
100988-004

FOLD OUT TO VIEW DRAWING



Stand Assembly
100988-001

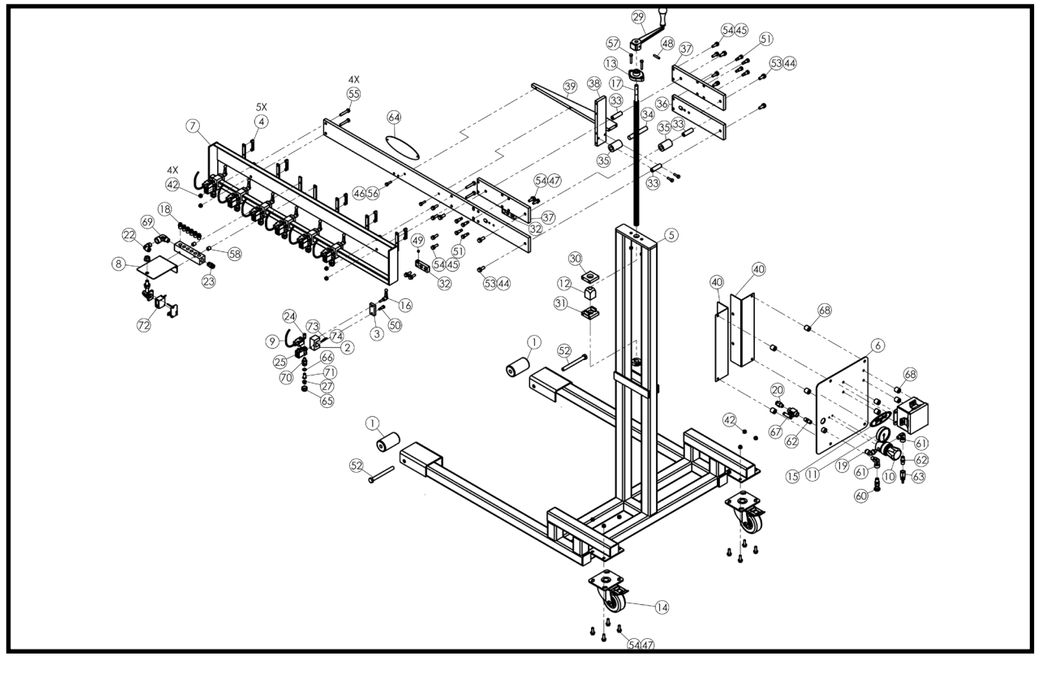
QTY.	ITEM #	PART#	DESCRIPTION
2	1	69187-111	ROLLER LOW PROFILE STAND
7	2	99650-122	BLOCK, SPRAY NOZZLE CLAMP
7	3	99650-123	BAR, SPRAY NOZZLE CLAMP
5	4	99650-124	BAR, SRPAY NOZZLE 6 CABLE MNT
1	5	100988-002	A/W, FRAME HOPPER, 824
1	6	100988-017	A/W, CONNECTION PLATE
1	7	100988-021	A/W, SPRAY RAIL
1	8	100988-025	ANGLE, SENSOR MOUNT
7	9	100988-401	MICRO-CHANGE, W/PIGTAIL, DIN, 5M
1	10	100988-402	REGULATOR, 1/4 NPT SS 0 - 100 PSI
1	11	100988-403	GUAGE SST 0-100 PSI
1	12	103647	NUT-ADJUSTMENT
1	13	111910	BEARING,1/2" DIA 2 BOLT FLANGE,ENP
2	14	152161	CASTER, 4" SWIVEL LOCKING
1	15	303000	LABEL,BURFORD LOGO,4.25 SCRIPT
7	16	304208	ADJUSTABLE HANDLE 1/4-20 THREAD
1	17	305823	SHAFT HEIGHT ADJ
6	18	401152	FITTING,CONN,1/4MPT X 1/4T,ENP,Q.R.
1	19	610505	FITTING,ELL,1/4NPT X 3/8T, ENP, Q.R
1	20	610507	FITTING,CONN,1/4NPT X 3/8T,ENP,Q.R.
1	21	610774-06	MANIFOLD REDUCING 1/4 NPT X 6 3/8 NPT
1	22	610826	FITTING, ELL, 3/8NPT X 3/8T, ENP, Q.R
1	23	610827	FITTING,CONN,3/8NPT X 3/8T,ENP,Q.R.
7	24	610966	FITTING,CONN,1/8NPT x 1/4T, Q.R.,HEX
7	25	612008	VALVE,SOL SS 1/8NPT 2 WAY 24VDC
7	26	612029-35-094	TIP #650017 SS TEE JET
7	27	612029-35-140	TIP #650017 SS TEE JET
7	28	612029-35-190	TIP #650017 SS TEE JET
1	29	711359	HANDLE, HEIGHT ADJ CRANK, SK
1	30	716046	PLATE HEIGHT ADJ PIVOT
1	31	716047	A/W HEIGHT ADJ NUT RETAINER
2	32	716048	BLOCK LEVELING ADJ.
3	33	716049	SHAFT STAND SPACER
1	34	716050	SHAFT LEVEL ADJ.
2	35	716051	ROLLER STAND EL90
1	36	716052	PLATE SIDE STAND ADJ.
2	37	716053	PLATE UPPER SIDE STAND ADJ
1	38	716054	PLATE FRONT STAND ADJ.
1	39	716055	GUSSET MOUNT BAR EL90 STAND
2	40	716064	ANGLE ENCLOSURE MT EL90
1	41	716067	PLATE LOWER MT EL90 STAND
12	42	955619	NUT HEX NYLOC 5/16-18 UNC SST
2	43	955661	NUT HEX NYLOC 1/4-20 UNC SST
6	44	955938	WASHER, LOCK 3/8" SST
12	45	955939	WASHER, LOCK 5/16" SST
4	46	955940	WASHER LOCK 1/4" SST
12	47	955976	WASHER FLAT 5/16 SST
1	48	958520	PIN, ROLL 1/4 DIA X 1 1/4 SST
2	49	972004	SCREW SET SOC 5/16-18 UNC X 1/4 SST
7	50	975008	SCREW SHLDR 5/16 X 1/2, 1/4-20 SST
8	51	975110	SCREW SHLDR 3/8 X 5/8, 5/16-18 SST
2	52	988380	SCREW FIN HEX 1/2-13 X 5 SST
6	53	988916	SCREW FIN HEX 3/8-16 X 1 SST
20	54	989716	SCREW FIN HEX 5/16-18 X 1 SST
4	55	989728	SCREW FIN HEX 5/16-18 X 1 3/4 SST
4	56	989916	SCREW FIN HEX 1/4-20 X 1 SST
2	57	989924	SCREW FIN HEX 1/4-20 X 1 1/2 SST
2	58	A01003	SPACER, 1/2" OD X 1/4" ID X 1/2" L.
1	59	A05020	COLLAR,3/4" SPLIT,SST
1	60	A06722	FITTING,QC,BODY,LIQ,1/4 NPTM,SST
2	61	A06857	FITTING,STREET ELL,1/4M X 1/4F,SST
2	62	A06878	FITTING,NIPPLE,HEX,1/4 NPTM,SST
1	63	A06955	FITTING 1/4 QC STEM SST
1	64	A08049	NAMEPLATE,BURFORD LOGO,LARGE
7	65	C00506	RETAINER CAP CP1325-NP
7	66	C01164	O-RING, .489 ID X .070 THICK
1	67	C01955	VALVE 1/4" SHUT OFF
12	68	C03845	SPACER. .34 ID, .75 OD .75 L, SST
1	69	C05092	FITTING,STREET ELL,3/8M X 3/8F,SST
7	70	C05145	NOZZLE BODY STAINLESS 509
7	71	C06047	STRAINER, CHECK VALVE
1	72	612061	SENSOR, KEYENCE LASER DISTANCE, 2M
7	73	MC0316	SCREW, FLAT HD, 3 X 16 MM
7	74	MC0335	SCREW, FLAT HD, 3 X 35 MM



Stand Assembly

Stand Assembly
100988-001

FOLD OUT TO VIEW DRAWING



Electrical BOM
Drawing 100988-WD

WATER SPRAY CIRCUIT				
REF	SYMBOL	PART #	QUAN	DESCRIPTION
1	CB1	C07650-010	1	CIRCUIT BREAKER,600V,10 AMP
2	CB2	C07650-005	1	CIRCUIT BREAKER,600V,5 AMP
3	CB3	C07650-003	1	CIRCUIT BREAKER,600V,3 AMP
4	CB4	C07649-010	1	CIRCUIT BREAKER,250V,10 AMP
5	CB5	C07649-002	1	CIRCUIT BREAKER,250V,2 AMP
6	CB4,5 P/O	C07649-100	2	CIRCUIT BREAKER,250V,BASE
7	CBL1	304502-003	1	CABLE,YELLOW PATCH,3FT.
8	CRM	C07245	1	RELAY,CONTACTOR,24VDC
9	DISC1	A02345	1	DISCONNECT,30A.,600V.,3 POLE
10	DISC1 P/O	A02346	1	HANDLE,DISCONNECT
11	DISC1 P/O	610342-004	1	SHAFT,DISCONNECT
12	DISP1	611747	1	PLC,DISPLAY,PV-C400 ETHERNET,TOUCH
13	ENC1	100988-100	1	ENCLOSURE,REWORK,MAIN
14	ENC1 P/O	C03845	4	SPACER 9/32 x 3/4 x 3/4 LG.
15	ENC1 P/O	302554	1	GUARD,ENCLOSURE,A/W ASSEMBLY
16	ENC2	C01014	1	ENCLOSURE,4X4X3
17	GND	C06488	1	LUG,GROUNDING
18	PB1	C07213	1	SWITCH,PUSH-BUTTON,RED,MUSHROOM HEAD
19	PB1 P/O	C07101	1	CONTACT CARTRIDGE, N.C.
20	PB1 P/O	C05395	1	NAMEPLATE PUSH/OFF-PULL/ON
21	PL1	610867	1	CABLE,7WIRE,18AWG,FEMALE,QC,STR,12'
22	PL1	610868	1	BULKHEAD,7WIRE,18AWG,MALE,QC.
23	PLC1	C07613	1	PLC,ML1100,CPU,24VDC,10IN/6 OUT
24	PLC1 P/O	610883	1	PLC,ML1200,OUTPUT MODULE,16 OUT
25	PNL1	C06019	1	PANEL,REWORK
26	PSM1	304160	1	POWER SUPPLY,110/220-24 VDC,10 AMP
27	SSR1,2,3	610421	3	RELAY,TERM-MTG,24VDC,SSR
28	SSR1 P/O	610387	2	RELAY,TERM-MTG,SEPARATION PLATE
29	TB1 P/O	C05843	44	MARKER,STRIP,BLANK
30	TB1 P/O	C06369	1	TERMINAL JUMPER 2 POLE
31	TB1 P/O	C06411	1	TERMINAL JUMPER 3 POLE
32	TB1 P/O	C06461	10	TERMINAL BLOCK,SINGLE
33	TB1 P/O	C06462	1	END COVER,SINGLE
34	TB1,TB2,TB3 P/O	C06464	24"	RAIL,DIN
35	TB1,TB2,TB3 P/O	C06465	6	CLAMP,END,ANCHOR
36	TB1 P/O	C06525	4	TERMINAL,GROUNDING
37	TB1 P/O	C07117	6	TERMINAL BLOCK,DUAL
38	TB1 P/O	C07118	3	END COVER,DUAL
39				
40		C07066	15'	CABLE,22AWG,25 COND.
41		C00174	8	CONNECTOR,LOCK-NUT,1/2NPT,NYLON
42		610953	7	CONNECTOR,CORD,.13-.39,DOME,NYLON
43		610954	1	CONNECTOR,CORD,.39-.56,DOME,NYLON
44		610955	8	CONNECTOR,SEAL RING,1/2NPT,POLYETH
45		112009	1	CABLE,SERVICE 8' (110VAC ONLY)

210406-001 CONVEYOR 110VAC CIRCUIT				
REF	SYMBOL	PART #	QUAN	DESCRIPTION
1	DRV1	304161-001	1	DRIVER,AC INVERTER,110-1PH,220-3PH
2	MTR1	119577	1	MOTOR,1/2HP,230/460,56C,NO BASE

210406-002 CONVEYOR 220VAC CIRCUIT				
REF	SYMBOL	PART #	QUAN	DESCRIPTION
1	DRV1	304161-002	1	DRIVER,AC INVERTER,220-1PH,220-3PH
2	MTR1	119577	1	MOTOR,1/2HP,230/460,56C,NO BASE

PAN SENSOR CIRCUIT				
REF	SYMBOL	PART #	QUAN	DESCRIPTION
1	PSC1	100349-455	1	SENSOR,LASER,24VDC,QC
2	PSC1 P/O	100349-456	1	SENSOR,LASER,MOUNT
3	PSC1 P/O	100349-457	1	SENSOR,LASER,MOUNT ARM
4	PSC1 P/O	100349-458	1	SENSOR,LASER,FACE COVER
5	PSC1 P/O	304430	1	SENSOR,CABLE,M12,5WIRE,F,QC,STR

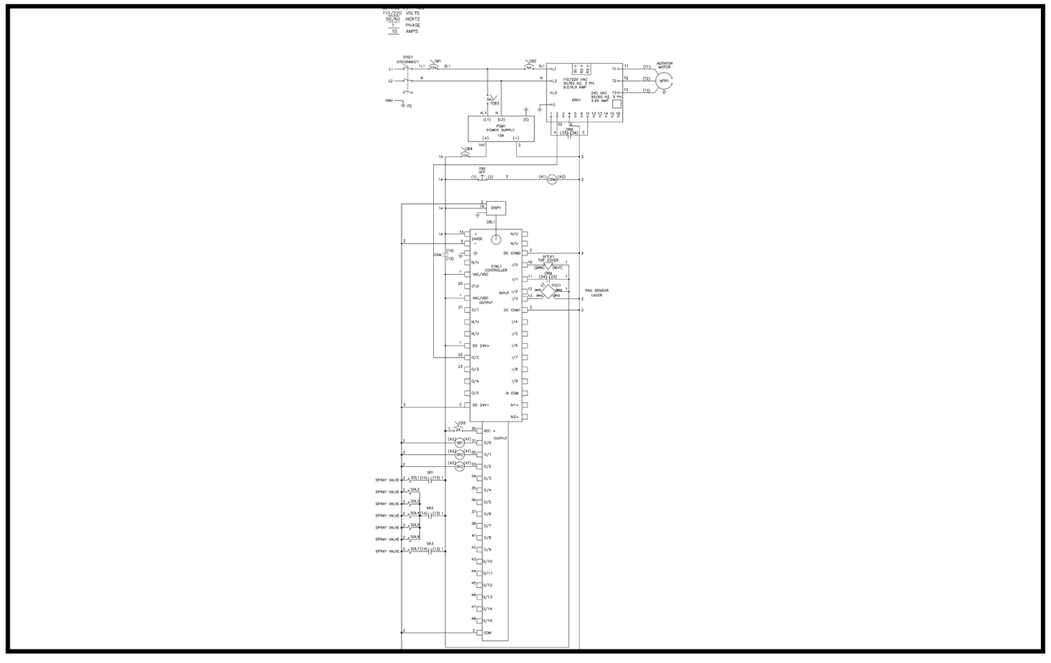
WATER SPRAY CIRCUIT				
REF	SYMBOL	PART #	QUAN	DESCRIPTION
1	SOL1-8	612008	8	VALVE,APPLICATOR HEAD,24VDC.
2	SOL1-8 P/O	610187-002	8	SENSOR,MICRO-CHANGER,M12,5WIRE,W/SUP
3	SOL1-8 P/O	610169	8	SENSOR,BULKHEAD,M12,5WIRE,F,QC
4	SOL1-8 P/O	610174	8	SENSOR,CAP,BULKHEAD,M12,F,QC
5	TB5	610967	1	TERMINAL,BREAK-A-PART,12TERM,MINI

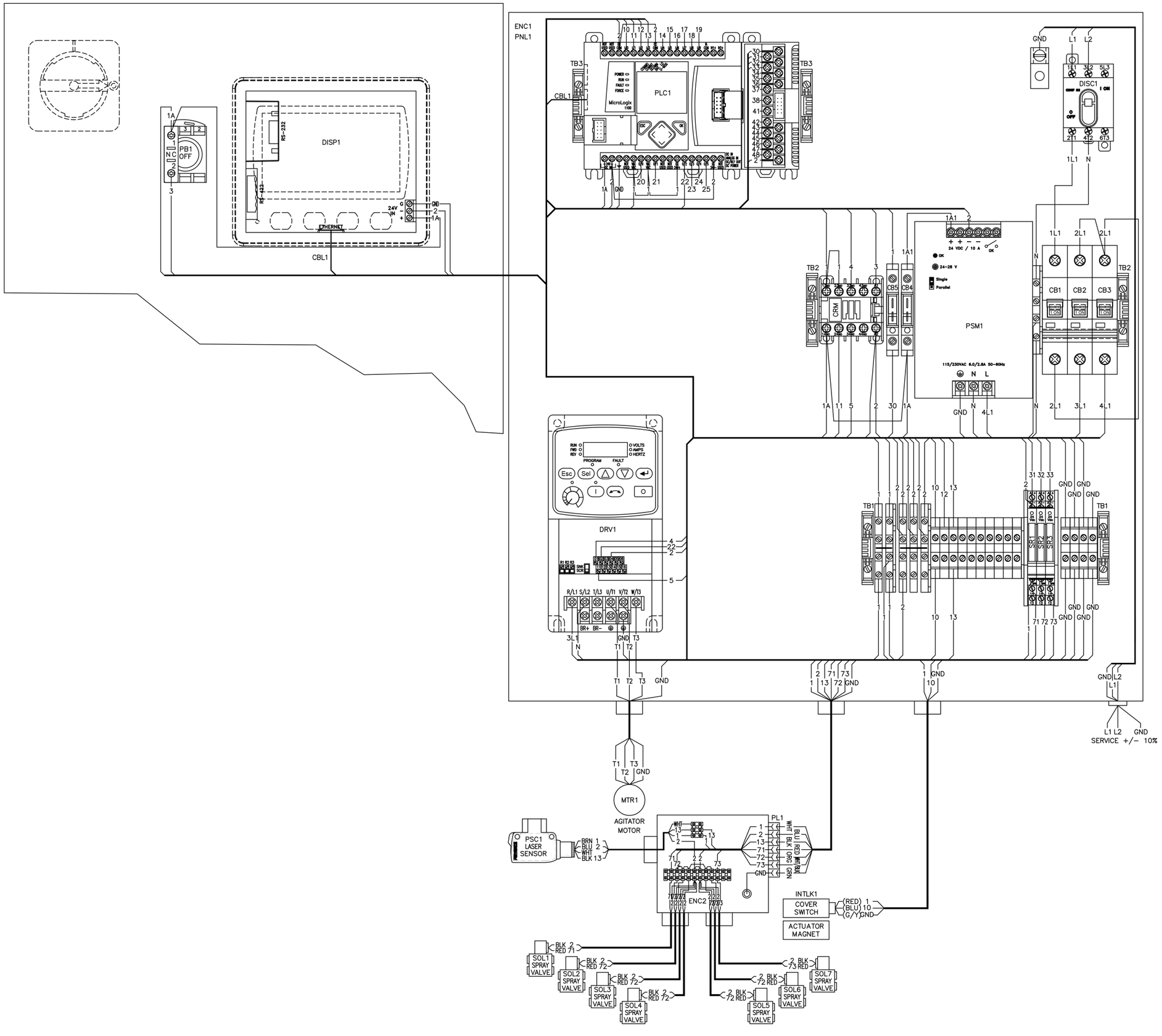
SERVICE +/– 10%
110/220 VOLTS
50/60 HERTZ
1 PHASE
10 AMPS

DISC1
DISCONNECT
L1
L2
GND
PE
1L1
2L1
CB1
10A
3L1
CB2
5A
N
L1
L2
L3
T1
T2
T3
R1
R2
R3
110/220 VAC
50/60 HZ, 3 PH.
9.0/6.0 AMP
240 VAC
50/60 HZ, 3 PH
3.45 AMP
DRV1
AGITATOR
MOTOR
MTR1
CB3
3A
4L1
PSM1
POWER SUPPLY
(L1) (L2) (G)
(+) (–)
10A
1A1
2
CB4
10A
PB1
OFF
(1) (2) 3
CRM
(A1) (A2)
DISP1
CBL1
1A
2
24VDC
+
–
N/U
DC COM0
DC COM1
I/0
I/1
I/2
I/3
I/4
I/5
I/6
I/7
I/8
I/9
O/1
O/2
O/3
O/4
O/5
IA COM
IV1+
IV2+
DC 24V–
DC 24V+
CTRL1
CONTROLLER
VAC/VDC
O\0
VAC/VDC
OUTPUT
INPUT
20
21
22
23
INTLK1
TOP COVER
(BRN) (WHT)
CRM
(13) (14) (23) (24)
PSC1
(WHT) (BRN) (BLK) (BLU)
PAN SENSOR
LASER
CRM
(13) (14)
OUTPUT
VDC +
30
CB5
2A
SR1
(A1) 31
(A2)
SR2
(A1) 32
(A2)
SR3
(A1) 33
(A2)
34
35
36
37
38
41
42
43
44
45
46
47
48
O/0
O/1
O/2
O/3
O/4
O/5
O/6
O/7
O/8
O/9
O/10
O/11
O/12
O/13
O/14
O/15
COM
SR1
SOL1 (14) (13) 1
SOL2
SOL3
SR2
SOL4 (14) (13) 1
SOL5
SOL6
SR3
SOL7 (14) (13) 1
SPRAY VALVE

Electrical Ladder Diagram

FOLD OUT TO VIEW DRAWING




ENC1
PNL1
PB1
OFF
1A
3
DISP1
RS-232
RS-422
ETHERNET
CBL1
TB3
PLC1
MicroLogix
1100
POWER
RUN
FAULT
FORCE
ESC
OK
GND
L1
L2
DISC1
ON
OFF
1L1
N
1A1
24 VDC / 10 A
OK
24-28 V
Single
Parallel
PSM1
115/230VAC 6.0/2.8A 50-60Hz
TB2
CRM
CB1
CB2
CB3
CB4
CB5
1L1
2L1
3L1
4L1
TB1
SR1
SR2
SR3
RUN
FWD
REV
VOLTS
AMPS
HERTZ
PROGRAM
FAULT
Esc
Sel
DRV1
R/L1 S/L2 T/L3 U/T1 V/T2 W/T3
BR+ BR-
MTR1
AGITATOR
MOTOR
PSC1
LASER
SENSOR
BRN
BLU
WHT
BLK
PL1
ENC2
INTLK1
COVER
SWITCH
ACTUATOR
MAGNET
SOL1
SPRAY
VALVE
SOL2
SOL3
SOL4
SOL5
SOL6
SOL7
SERVICE +/- 10%

Electrical Layout

FOLD OUT TO VIEW DRAWING