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Spectra UV Cure Module

Operation Manual

Revision E

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1. Introduction

Before you operate this system, read the operation and setup manual. This will help you to become familiar with the product and ensure successful operation.

If any questions or problems arise, contact PVA's Technical Support department.

1.1 PVA Contact Information

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1.2 Document History

Revision	Revision Date	Reason for Changes
REV E	May 2022	Global Settings screen updates
REV D	December 2021	Address change and Maintenance and Installation updates
REV C	February 2020	Spectra Version 1.9 Updates
REV B	February 2018	Maintenance and Processing Mode Updates
REV A	October 2016	Initial Release

Note: All photographs and CAD model representations in this document are a "general representation" of the system and its components. The actual appearance of the system and its components can differ based upon customer specific configuration.

1.3 Safety

Certain warning symbols are affixed to the machine and correspond to notations in this manual. Before operating the system, identify these warning labels and read the notices described below. Not all labels may be used on any specific system.

Always wear approved safety glasses when you operate or work near the workcell.

Before you operate the system, read and understand the manuals provided with the unit.

Never put hands or tools in areas with this symbol when the machine is in operation. A dangerous condition may exist.

Read and understand the manuals provided with the unit before any repairs or maintenance is done. Only a qualified individual should do service.

Use caution when there are pressurized vessels. Find and repair any leaks immediately. Always wear appropriate safety equipment when you work with pressurized vessels or vessels that contain chemicals

Shear hazard from moving parts. Avoid contact.

Do not remove protective guarding.

In situations where inattention could cause either personal injury or damage to equipment, a warning notice is used.

Do not smoke near the PVA UV cure machine. Always have a fire extinguisher available for emergency use.

Before performing any repairs or maintenance to the system, turn off power and lock out the power disconnect switch.

Warning notices are used to emphasize that hazardous voltages, current, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use. Only qualified personnel should enter areas designated with this symbol.

Laser light source present. Do not stare directly into the beam. Do not use in the presence of highly reflective surfaces

Pinch hazard from moving parts. Avoid contact.

Hot surface. Avoid contact.

Warning, Ultraviolet (UV) light hazard. Do not look directly at the UV light source.

1.4 Personal Protective Equipment

Do not look into the UV oven without wearing approved safety goggles. Operators must use eye protection because material contents are under pressure. Always wear gloves when handling materials and solvents. Refer to MSDS sheets on the material being dispensed or cured for other precautions.

1.5 Waste Disposal

Dispose of all used parts and materials in accordance with local laws and regulations.

1.6 Notice and Disclaimer

This manual describes the common options and configurations for the Spectra UV cure module. The machine associated with this manual may not have all of the options shown or it may have additions.

1.7 System Description

The Spectra UV cure module is an ultraviolet curing machine that can process multiple boards. Upstream and downstream ends are SMEMA (Surface Mount Equipment Manufacturers Association) rated for integration into a production line. The unit is designed to operate with PVA dispensing systems.

The operator interface terminal (OIT) is used to control the machine. Machine status and error messages are shown on the OIT and the light tower. All operators must have read the manual or, by training, understand the operation of this machine.

Any uses other than listed above could result in a dangerous condition and cannot be protected against by the safety features installed on the system.

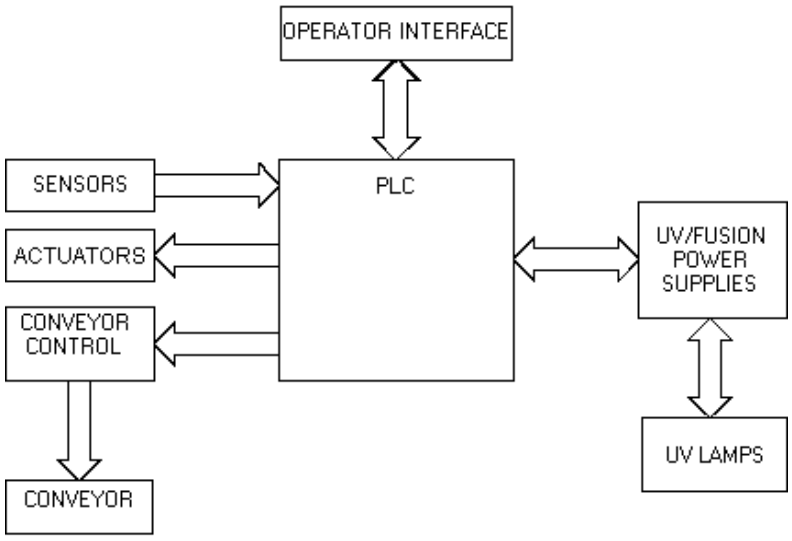


Figure 1: Spectra UV Cure Module Functional Block Diagram

2. Environmental

2.1 Noise and Light Levels

There are no standard lamp or power configurations. Refer to the separate Heraeus UV literature for information on the noise and light levels. Do not look directly at any UV light source.

2.2 Materials/Chemicals

There are no dangerous materials or chemicals used in the operation of the machine. Refer to the MSDS sheet on the material being cured.

2.3 Hazards Due to Contact

The Spectra UV cure module is designed in such a way as to minimize injury from contact with any accessible portion of the machine. However, under certain modes of operation, it is possible to enter the work area while the module is in operation. Only a qualified person should do this. All hot surfaces are indicated with a warning label.

3. Setup

Before you operate the system, know the system components. Complete the steps instructed below for safe and correct operation. Refer to the separate Installation Guidelines for information on transportation and unpacking.

Warning: The following procedures should be done by qualified persons in accordance with this manual and applicable safety regulations. A "qualified person" is defined as "a person or persons who, by possession of a recognized degree or certificate or professional training, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work." (ref. ANSI/ASME B30.2-1983.)

3.1 Installation

1. Plug the machine into an appropriate power source. Refer to the legend plate on the electrical enclosure door. The electrical service should be correctly grounded and the power source clean. A line conditioner may be necessary if there is high power equipment operating off the same source. Poor quality power can cause errors.

Warning: Failure to comply with electrical specifications can cause machine damage and injury to installation personnel. Electrical hookups must be made by a qualified electrician and comply with any applicable local standards.

2. Connect the ¼" NPT female fitting at the rear of the machine to a source of clean, dry air. A hose of ¼" inside diameter is sufficient.
3. Close any access doors and engage the "**Emergency Stop**" button.
4. Turn the main air supply to "**SUP**".
5. Turn the power switch on the electrical enclosure to "**On**".

Figure 2: Power Switch "On"

6. Install the appropriate exhaust for your system. 600 CFM is required for each exhaust blower connection. If your system has only top side lamps (or bottom side only), you will only need one 600 CFM exhaust connection. If your Spectra has both top and bottom side lamps, you will need two separate 600 CFM exhaust connections. The facility exhaust must be able to draw 600 CFM at the inlet connection to the Spectra.

7. Ensure that the blower(s) in the Spectra are spinning in the correct direction. With the factory exhaust connection disconnected, turn the blower on and make sure the exhaust is coming out of the Spectra. Refer to Section 9.2 on how to turn the fans on via the HMI.

8. If the blowers are running backwards, turn main power switch off then swap any two incoming power legs feeding the blower.

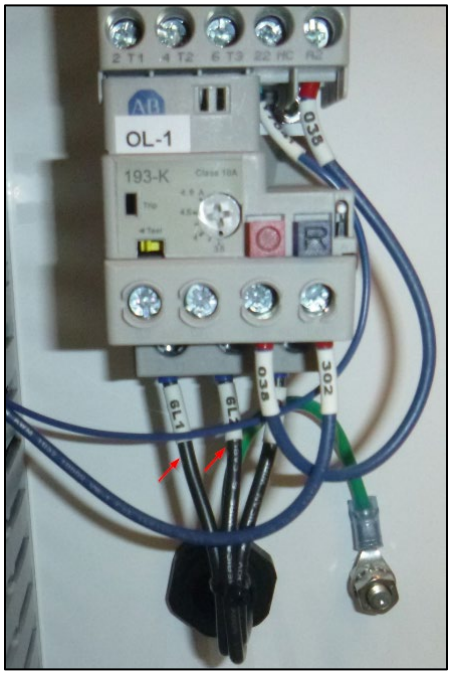


Figure 3: Incoming Power Legs Swapped Example

3.2 Conveyor Width Adjustment

This is for standard, non-automatic width adjustment. If the conveyor width has not already been adjusted, use the hand crank to adjust the conveyor width.

1. Put a board on the conveyor.
2. Turn the hand crank clockwise to decrease the conveyor width or counterclockwise to increase the conveyor width.

Figure 4: Hand Crank

3. Move the board back and forth on the conveyor to make sure that it slides smoothly and does not catch or drag. Continue to adjust the width as necessary.

4. SMEMA

For manufacturing lines with conveyor systems, the SMEMA and Intermodule cables must be correctly connected.

Note: On the diagrams, the J# refers to the label on the machine, not the label on the cable.

The Surface Mount Equipment Manufacturers Association (SMEMA) Electrical Equipment Interface Standard is used to make sure the sequence of boards is correct. If these connections are not in place, boards cannot move from one machine to another. SMEMA cables have male 14-pin amp-type CPC connectors. The cables are straight-through so orientation does not matter.

On each module, the wire to the J1 plug must connect to the J2 plug on the machine upstream. Similarly, the J2 plug on each machine must connect to the J1 plug on the machine downstream, as shown in the following diagram:

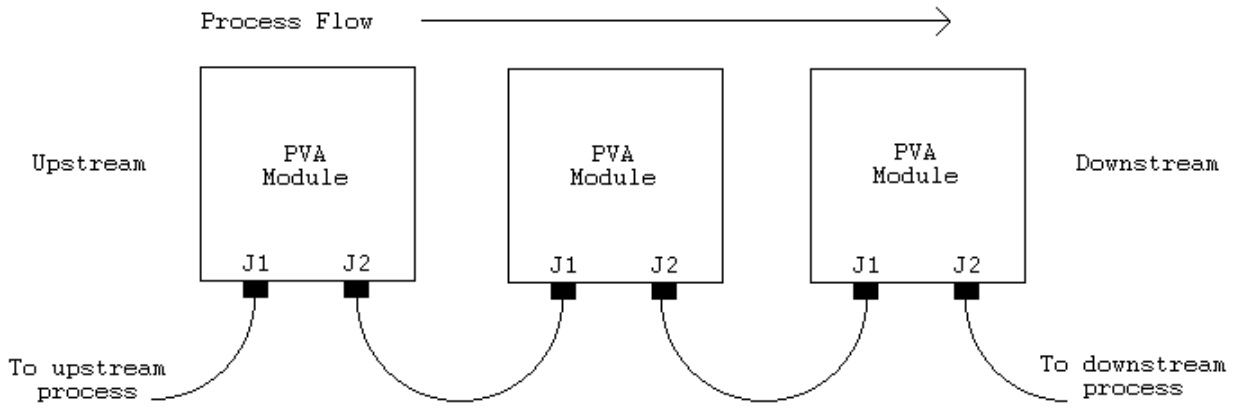


Figure 5: Process Flow

5. Operating Safety

The Spectra UV cure module has several safety features that protect the operator from hazards during normal operation of the machine.

Note: The safety features should NEVER be bypassed, disabled or tampered with. Precision Valve and Automation Inc. is not responsible for any damages incurred, mechanical or human, because of alteration or destruction of any safety features.

5.1 Notices and Warnings

- Do not look in the UV oven without wearing approved safety goggles.
- Wear safety glasses, gloves, and long-sleeved clothing when working with automated industrial equipment.
- Read and understand all operating manuals before using this equipment.
- Do not disable the safety features of the machine.
- Lock-out and tag-out the power supply before you service or clean any part of this equipment.
- Use only replacement parts recommended or supplied by the manufacturer.
- Always remain clear of all moving parts when the system is in operation.

5.2 Safety Circuit

The main power to the module is monitored and controlled by the safety circuit. The safety circuit contains a master control relay and one or more safety devices. The safety devices monitor the state of the Emergency Stop button and other safety mechanisms. When the safety relay detects that one or more of the safety devices has opened, the power to the system is stopped.

5.3 Doors

Access to the machine is provided by two doors. Modules have door protection through a non-defeatable limit switch. The UV lamps are disabled if a door is open.

5.4 Light Tower Operation

Three stacked indicator lights and a buzzer are used to indicate the status of the machine. The lights are visible from all sides of the machine and operate as follows:

- The green indicator is on when the module is in Auto Cycle and producing parts. It is off at all other times.
- The amber indicator is on when the module is in Auto Cycle and ready to produce parts but cannot due to an external material handling problem (no incoming parts or no room to unload parts). It is off at all other times.
- The red indicator is on steady when the module is not in Auto Cycle due to operator intervention. It flashes when the module is in cycle, but the cycle is halted due to a module problem. It is off at all other times.
- The buzzer cycles with the red indicator during module errors.

State	Red	Amber	Green	Buzzer
Cycle Stop	ON	OFF	OFF	OFF
Auto Cycle	OFF	ON	OFF	OFF
In Cycle	OFF	OFF	ON	OFF
Machine Error	FLASH	OFF	OFF	FLASH

Figure 6: Light Tower & Buzzer Status

5.5 Emergency Stop Button

The emergency stop button should be engaged whenever the module is shut down or if there is an emergency and the machine needs to be stopped.

1. Push the "**Emergency Stop**" button to engage it and stop power to the module components.
2. Pull the "**Emergency Stop**" button and turn it clockwise to disengage it.

6. Operation

6.1 Startup Procedure

1. Make sure the air pressure is set correctly. Refer to the legend plate on the door of the electrical enclosure for the correct setting.

2. Confirm all doors are closed.

3. Engage the "**Emergency Stop**" button.

Figure 7: Emergency Stop Button

4. On each lamp power supply, turn the power switch to the "**On**" position and push the Lamp Control "**LAMP ON**" button.

Figure 8: Lamp Power and Control Switch

5. Push the green "**POWER ON**" button on the front of the Spectra cure module.

Figure 9: Power On

6. If in protected mode, enter your password as necessary.
7. Operate the system as necessary.

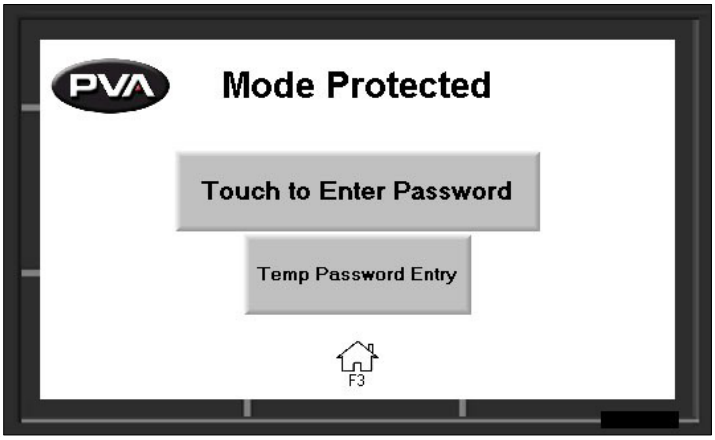


Figure 10: Enter Password

6.2 Shutdown Procedure

1. Wait for all boards to clear the module.
2. Select the Home icon or "**F3**" on the OIT. Wait for the Cycle stop screen.
3. Engage the "**Emergency Stop**" button when the exhaust fan stops. The module should not be shut down with parts in it.
4. If the module will be shut down longer than one day, turn the main air supply to "**OFF**".

CAUTION: Lock-out and tag-out the module if maintenance will be done.

7. Cycle Stop

Cycle Stop is the default state for the Spectra UV cure module. All other modes and capabilities are accessed via the buttons displayed below.

Figure 11: Cycle Stop

Options in Cycle Stop are Auto Cycle, Manual, and Setup.

Select "**F1**" or the auto cycle icon to operate the module in Auto Cycle.

Select "**F3**" or the manual icon to operate the module in Manual mode.

Select "**ESC**" or the settings icon to go to Setup mode and view or change the operating parameters of the module.

Select the Home icon or "**F3**" from any mode to return to Cycle Stop.

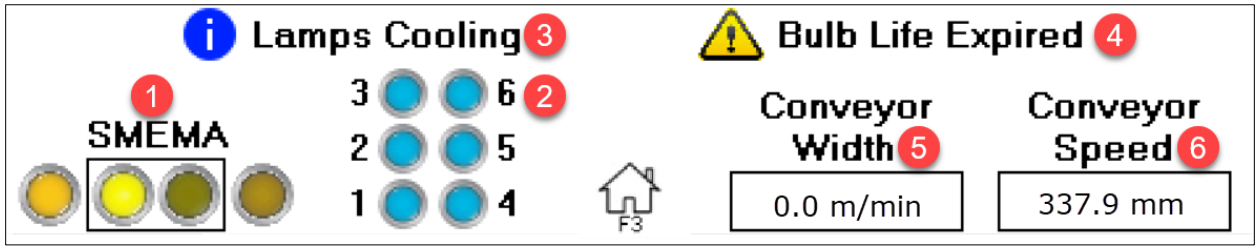
8. Auto Cycle

Auto Cycle is the normal operating mode when the module operates as part of a production line. In Auto Cycle, the parameters set in Setup mode are used. When there is a board near the UV lamps, the conveyor moves at the cure speed. The conveyor moves at the transfer speed at all other times. These speeds are set in Setup mode.

Push the Home icon or "**F3**" at any time to exit Auto Cycle, even when the lamps are in startup procedure.

8.1 All Modes

The options below are available in all modes of Auto Cycle.



1. The **SMEMA Status Indicators** display the current SMEMA status, and the signals being sent and received. Output from the module is in the box, external signals are outside the box.
2. The **Lamp Status Indicators** display each lamp's individual status.
    - A light on indicates a lamp bulb is on.
    - A light flashing indicates a lamp bulb is preparing to turn on.
    - A light off indicates a lamp bulb is off.
3. If the **Lamps Cooling Indicator** is flashing, it indicates a lamp bulb is cooling off. Bulb cooldown time is set in OEM mode.
4. If the **Bulb Life Expired Indicator** is flashing, it indicates at least one lamp bulb has reached the warning limit of expected lamp life.
5. The **Conveyor Width** will display the current conveyor width.
6. The **Conveyor Speed** will display the current conveyor speed.

8.2 Full Processing, Safe Processing, and Passthrough Mode

The **Recipe** is shown above the screen name. Recipes are changed in Setup mode.

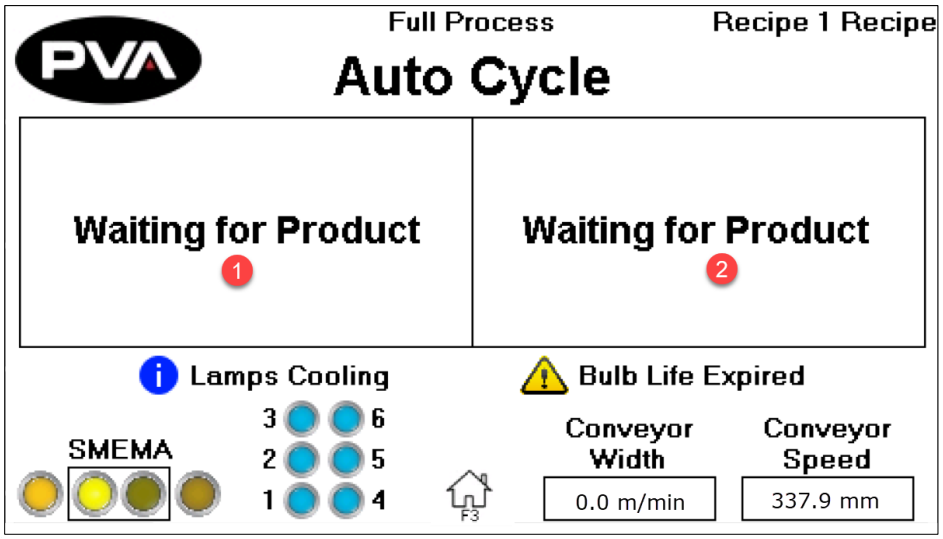


Figure 12: Full Process Auto Cycle

The text fields show information about board handling and processing.

1. The left screen is for **Queue Zone Messages** and will display information and state changes for the queue zone. If enabled, the Manual Load button will appear as well.

2. The right screen is for **Process Zone Messages** and will display information and state changes for the process zone. If enabled, the Manual Unload button will appear as well.

WARNING: For machines that have line control, Safe and Full Processing Mode may not be available or functional.

8.3 Quick Cure Mode

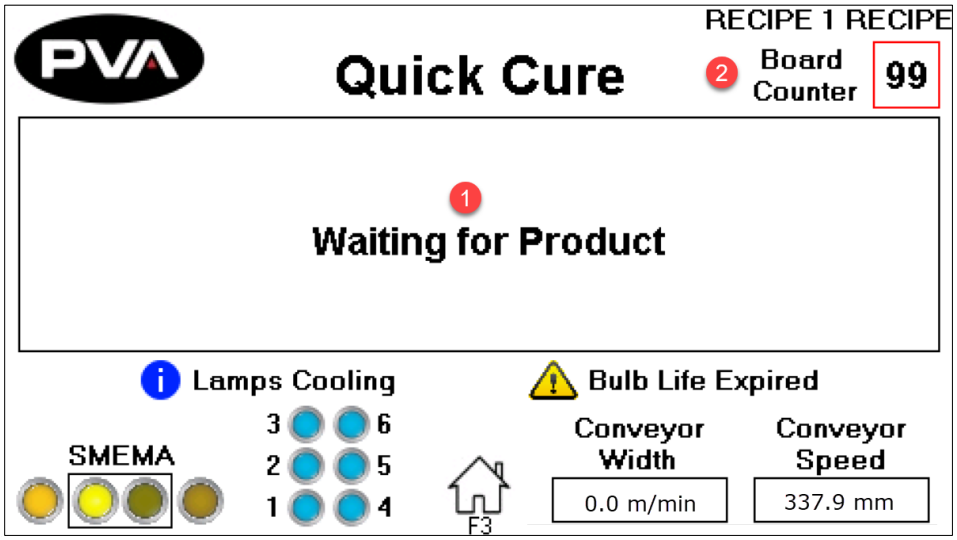


Figure 13: Quick Cure Auto Cycle

1. **Process Zone Messages** will display information and state changes for the process zone. If enabled, the Manual Unload button will appear as well.

2. The **Board Counter** displays the number of boards in the oven. It can be reset by pressing and holding the Board Counter section of the screen.

8.4 Lamp On/Off Cycling

- **Full Processing Mode**: The UV Lamps have an automatic shutoff feature (Inactive Timeout) that turns the lamp(s) off after a set time. The time for this is set at the factory. The timer begins after a board clears the sensor just after the lamps.

- **Quick Cure Mode**: The UV Lamps are on at all times unless a board is ready to exit the oven but the downstream machine is not ready. At this point, the lamps shut off to prevent a board from possibly burning under the lamps. The lamps will turn back on once the downstream machine is ready.

- **Safe Processing Mode**: The UV Lamps only turn on to process the board and turn off when trafficking the board upstream or downstream.

9. Manual Mode

In Manual mode, you can operate the components of the Spectra UV cure module individually and partially or fully process boards. The settings in this mode apply only to Manual mode. Select the Home icon or "**F3**" at any time to exit Manual mode.

9.1 Lamps

1. Select the **Manual** mode icon or **F3** from Cycle Stop.
2. In this screen, you can operate the individual lamps.

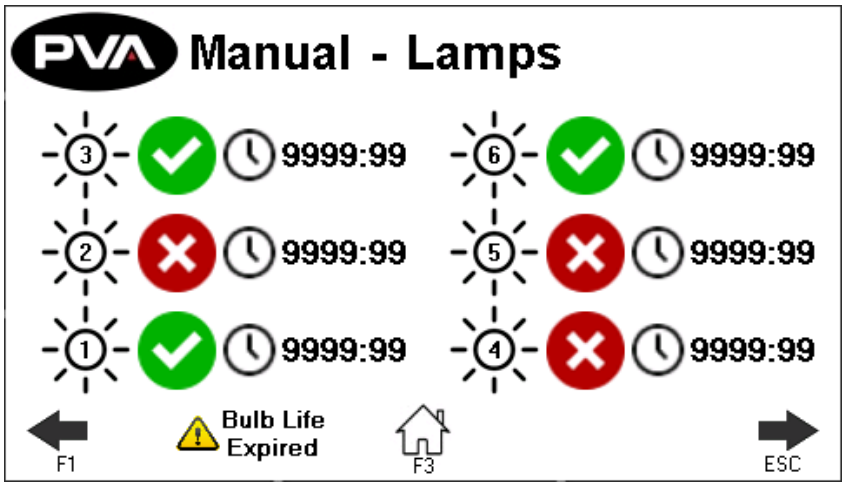


Figure 14: Lamps Screen

3. Select the lamp to turn the lamp on or off.

Note: The lights will not operate if the exhaust blowers are off.

4. The time shown next to the lamp is the total time the lamp has been on.
5. A **Lamp Bulb Life Expired** message will display if any of the bulbs are past their expected life.

9.2 Exhaust Fans

1. Select the **Manual** mode icon or F3 from Cycle Stop.
2. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Manual - Exhaust screen.
3. Select the exhaust fan to turn it on or off. Exhaust fans must be on for the lamps to operate.

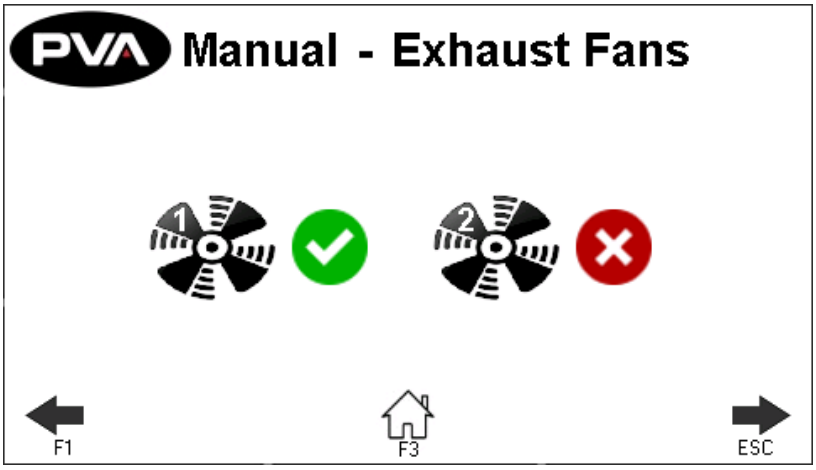


Figure 15: Exhaust Screen

9.3 Conveyor

Note: The conveyor does not have to be on to adjust the conveyor speed settings.

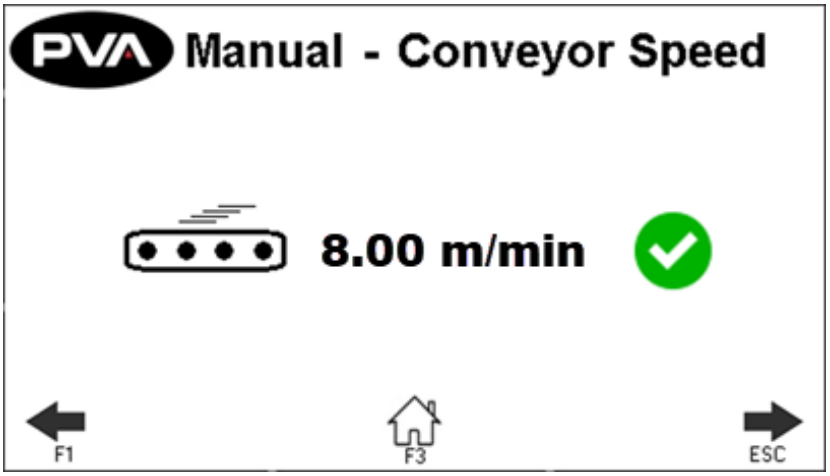


Figure 16: Conveyor Speed

1. Select the **Manual** mode icon or F3 from Cycle Stop.
2. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Manual-Conveyor speed screen and set the conveyor speed in feet or meters per minute. There is only one speed for the conveyor in Manual mode.
3. Select the **Conveyor** icon to operate the conveyor at the set speed.
4. To change the speed, select the speed and push the "**CLEAR**" button on the keypad.
5. Enter the necessary speed in feet per minute. No decimal is required. For example, to enter 6.0 feet per minute, press "**6**". To enter 6.5 feet per minute press "**6**" and then "**5**". Push the "**ENTER**" button. The new speed will take effect immediately.

9.4 Conveyor Width

Some cure modules have auto conveyor adjust. This is the manual mode screen for that option.

1. Select the **Manual** mode icon or F3 from Cycle Stop.
2. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Manual - Conveyor Width screen to see the current position.

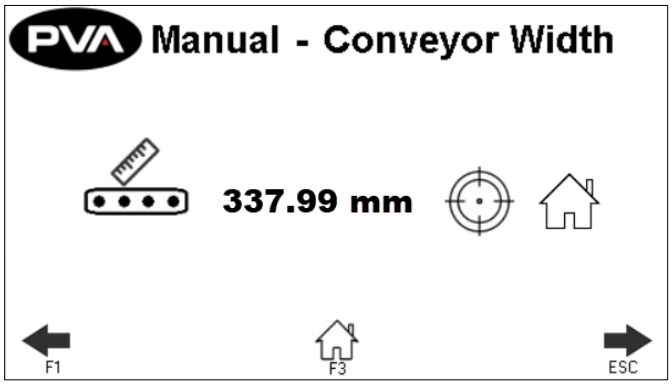


Figure 17: Conveyor Adjust

1. Select the numeric field to manually enter a conveyor width via keypad.
2. Select the **Bullseye** icon to move to a target width. The machine will check for boards prior to moving.
3. Select the **Home** icon to rehome the conveyor. The machine will check for boards prior to the moving.

9.5 Conveyor Width Jog

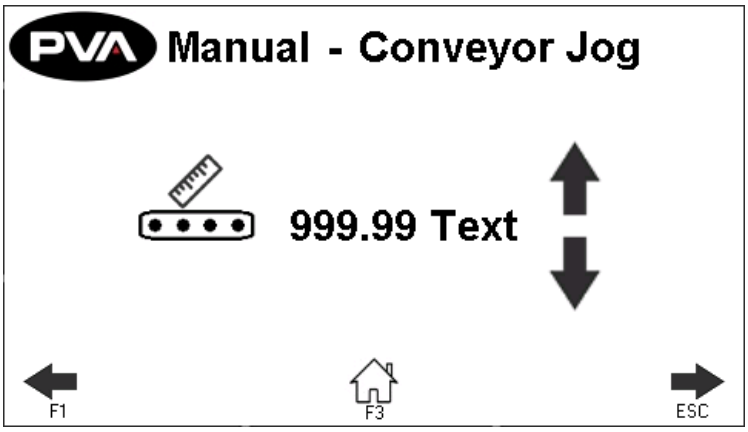


Figure 18: Conveyor Jog

1. This screen displays the current conveyor width.
2. Press to adjust the conveyor width. This will jog the conveyor width in a positive or negative direction.

Note: The clearboard sequence will not run prior to the jog.

9.6 Board Stops

1. Select the **Manual** mode icon or **F3** from Cycle Stop.
2. Use the arrows or the "**F1**" and "**ESC**" button to scroll to the Board Stops screen.
3. Select the Stop sensors to raise or lower the board stops.

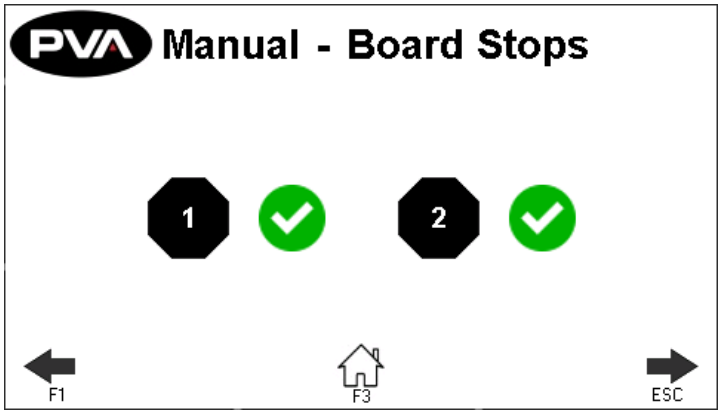


Figure 19: Board Stops

9.7 SMEMA

1. Select the **Manual** mode icon or **F3** from Cycle Stop.
2. Use the arrows or the "**F1**" and "**ESC**" button to the Manual-SMEMA screen.

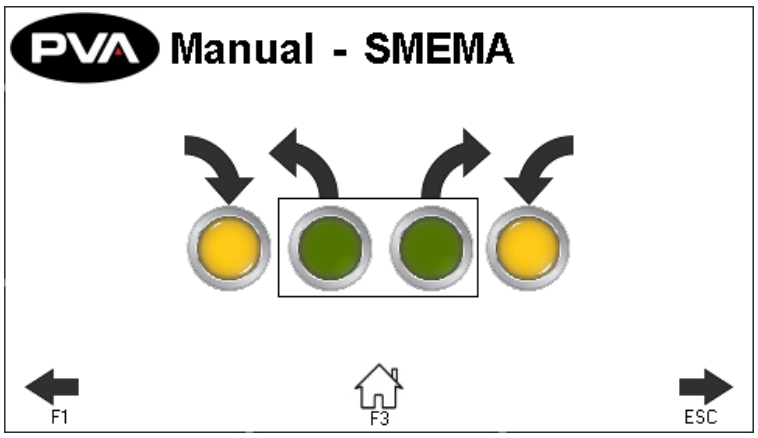


Figure 20: SMEMA

3. The indicators show the status of the SMEMA signals. The indicators inside the box are the signals for the module and the indicators outside of the box are the signals received from the upstream and downstream machines.

4. Press the center indicators to toggle the upstream and downstream signals on and off.

9.8 Manual Shutters

1. Press to raise and lower the inlet and outlet conveyor shutters.

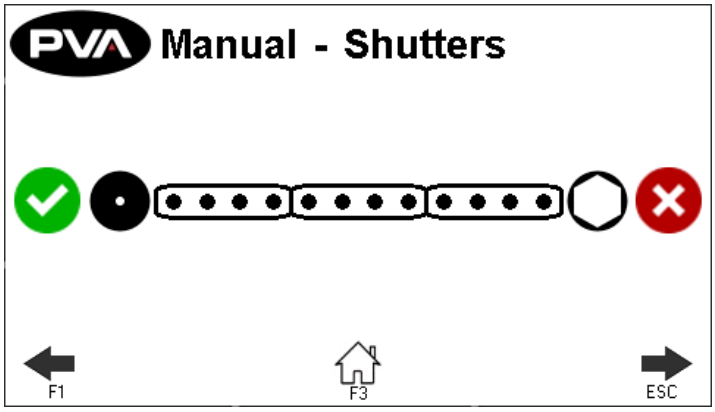


Figure 21: Manual Shutters

9.9 Manual PIP Status

This screen shows the status of the conveyor's PIP inputs including the inlets, queue, and process

Note: The Process End PIP will only show if there are no bottom lamps present in the system.

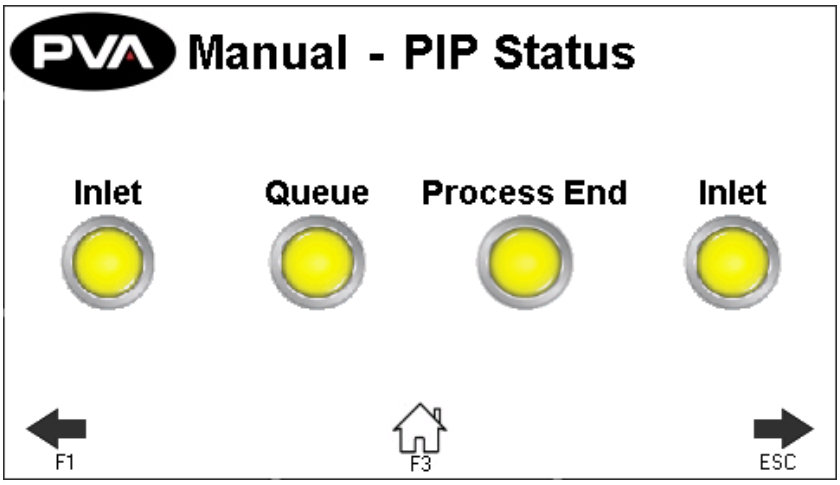


Figure 22: Manual PIP Status

10. Setup Mode

In Setup mode, the operator can set the parameters for module functions including the parameters for Auto Cycle. The Recipe name is shown at the top of the screen. You will edit the Recipe that is shown when you make changes in Setup mode.

1. Select the **Setup** icon or the "**ESC**" button from Cycle Stop.
2. Use the **+ - Page** icons or the F2 and F4 keys to scroll through the Recipes. The Recipe that will run in Auto Cycle is the one shown on the screen.

Note: The options shown may be different depending on module configuration.

10.1 Lamps

Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Setup-Lamps screen.

1. Select the lamp to toggle the lamp function on and off. If a lamp selection is "**ON**", it will turn on in auto mode. If the lamp selection is "**OFF**", it will not turn on in auto mode.

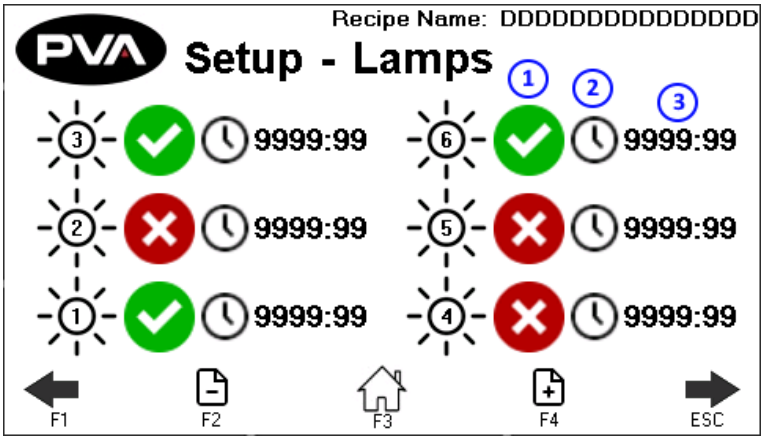


Figure 23: Setup Lamps

2. The time displayed next to each bulb indicates how long the lamp has been on. When you replace a bulb, select and hold the clock icon for five second to reset the timer to zero (0).
3. Use the **+ -** Page icons or the F2 and F4 keys to scroll through the Recipes. The Recipe name is shown at the top of the screen.

Note: The lights will not operate if the exhaust blowers are off.

10.2 Process Settings

1. The current **Recipe Name** displays at the top.
2. The **Conveyor Transfer Speed** during board transfer displays.
    - The range is 0.3–25 m/min (1 – 82.02 ft/min).
3. The **Conveyor Cure Speed** during curing process displays.
    - The range is 0.3–5.8 m/min (1-19.03 ft/min)
    - Select the speed you want to change.
    - Push the "**CLEAR**" button on the keypad.
    - Enter the necessary speed in feet per minute. No decimal is required. For example, to enter 6.0 feet per minute, press "**6**". To enter 6.5 feet per minute press "**6**" and then "**5**". Push the "**ENTER**" button. The new speed will take effect immediately.
4. The Recipe will display which **Conveyor Processing Mode** is selected. Use the arrows to scroll through the process modes (Full Processing, Safe Processing, Quick Cure, and Passthrough). See Section 8.2 for more information.
5. Use the **+ - Page** icons or the F2 and F4 keys to scroll through the Recipes.
6. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Setup-Conveyor Process screen.

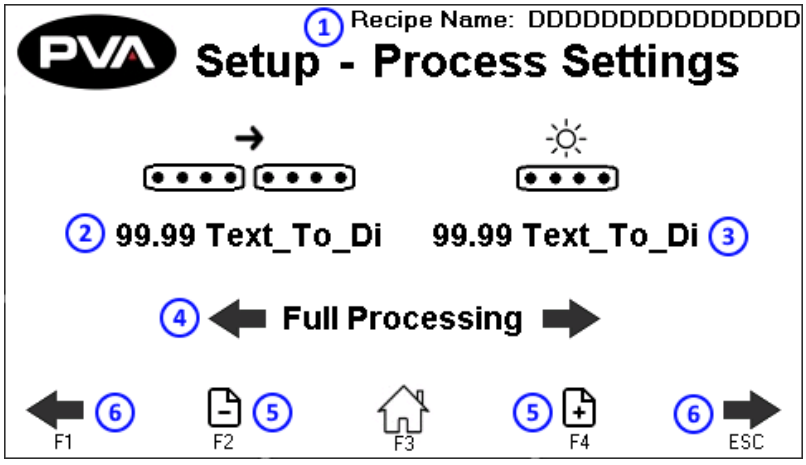


Figure 24: Setup Cure

10.2.1 Conveyor Processing Modes

Use the arrows to scroll through the Processing Modes. The modes are described below.

- **Full Processing Mode**: A part to be cured enters the oven and the shutter closes behind it. The shutter may open again, at any point, to let in another part, as long as the first part has begun to cure (Dual Zone Conveyor with Queue Zone).

- **Safe Processing Mode**: A part to be cured enters the oven and the shutter closes behind it. The shutter will not open again to let another part in until the first part is fully cured and ready to leave the oven (Single Zone Conveyor).

Note: Full processing and safe processing mode have two board trafficking speeds – one for parts moving in/out and one for the zone under the lamp.

- **Passthrough Mode**: A part enters the oven and is trafficked downstream. No curing takes place (Queue).

- **Quick Cure Mode**: A part enters the oven and is trafficked downstream. The light is on and the shutter is open as the part moves through (Queue with Curing).

Note: Pass through and quick cure modes have one board trafficking speed.

10.3 Conveyor Width

This is an optional setting. Not all modules will have this option. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Setup – Conveyor Width screen.

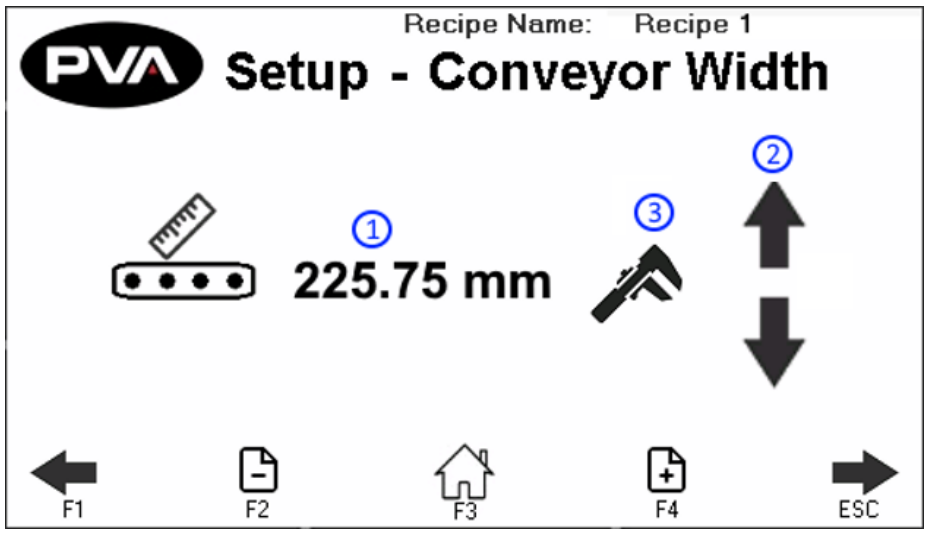


Figure 25: Conveyor Adjust

1. The screen displays the **Target Recipe Width**. If the width value is known, press the value to manually enter the width setpoint. A keypad will be shown.
    - Enter the necessary value. Select "**Save**" to keep and use the new value.
2. If the width value is unknown, press the arrows to use the **Auto Adjust Conveyor Width**. This will jog the conveyor in a negative or positive direction.
3. Once the target recipe width is correct, press the **wrench icon** to set the target recipe width to the **Current Conveyor Width**.

Note: The clear board sequence will not run prior to the jog.

Note: The conveyor width setpoint will not update during the manual jog.

Use the **+ - Page** icons or the F2 and F4 keys to scroll through the Recipes. The Recipe name is shown at the top of the screen.

10.4 Rename Recipe

1. Use the arrows on the screen or the "**F1**" and "**ESC**" button to scroll to the Setup-Rename Recipe screen.

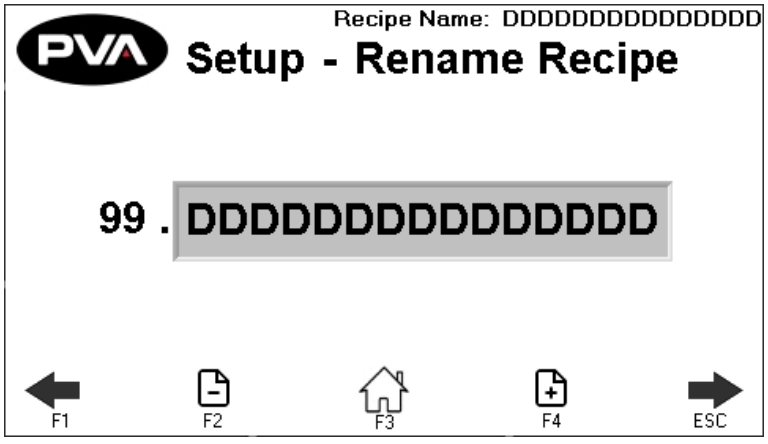


Figure 26: Setup-Rename Recipe

2. Use the **+ - Page** icons or the F2 and F4 keys to scroll through the Recipe names. You can have a maximum of 30 Recipes.
3. Select the name you want to change.
4. The keyboard will be shown, type the new name and select enter. The new name will be saved. Recipe names are limited to 15 characters.

10.5 Settings

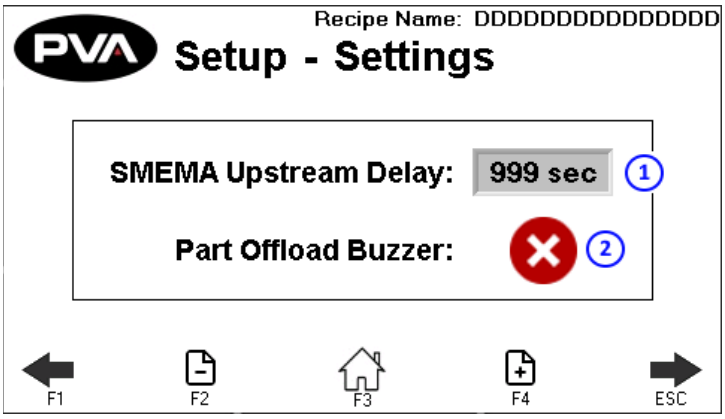


Figure 27: Setup Settings

1. The **SMEMA Upstream Delay** is for Quick Cure Process Mode only. After a board traffics into the machine from upstream, the SMEMA Upstream Ready will not turn back on until the delay is over. The timer begins counting once the board has passed the inlet PIP sensor. The default time is 3 seconds.

2. The **Part Offload Buzzer Alarm** allows a periodic alarm to sound if a board is waiting for downstream SMEMA for more than the designated timer value. The default time is 30 seconds.

10.6 Global Settings

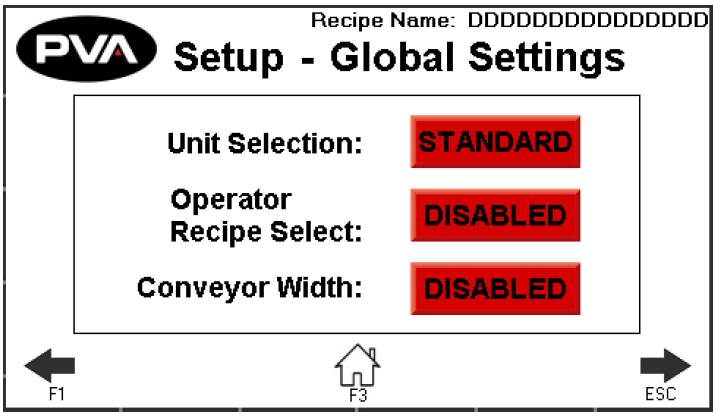


Figure 28: Global Settings 1

1. **Unit Selection** allows you to choose between standard or metric units.

2. **Operator Recipe Select** enables/disables operators from changing the current recipe without having to log into Setup mode with a password when a Setup

password is configured. When this setting is enabled, the password screen for Setup mode (and only Setup mode) will display as show in Figure 29. Tapping on the +/- images or pressing F4/F2 will iterate through the available recipes and the Recipe field will give the name of the currently loaded recipe.

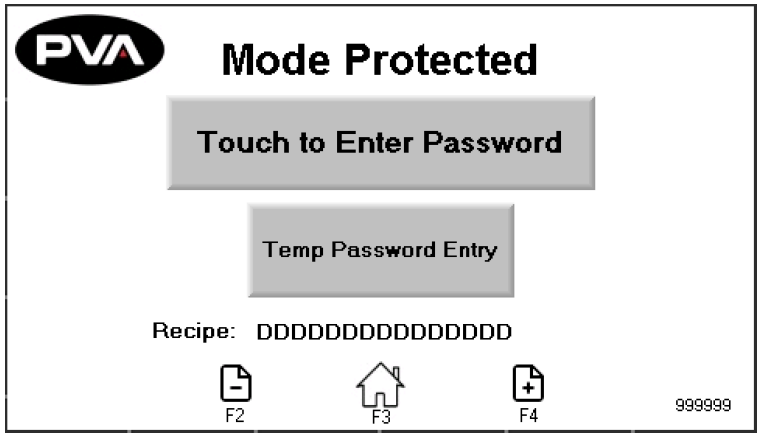


Figure 29: Password Screen in Setup Mode

3. Enable **Conveyor Width** to allow the conveyor width to move to the current recipe position during Auto Cycle and after homing.

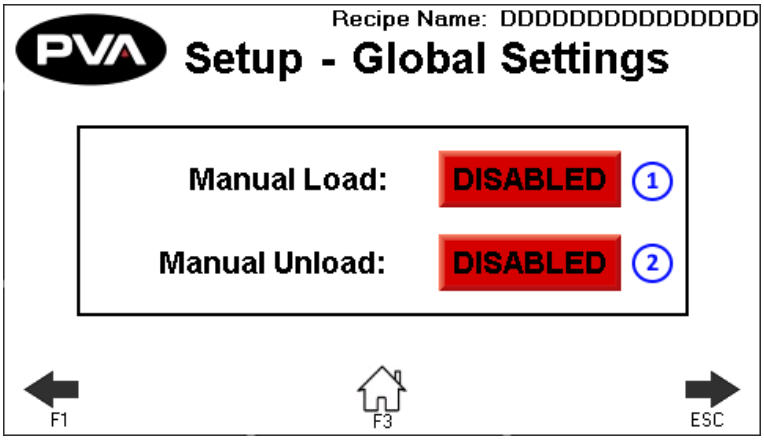


Figure 30: Global Settings 2

4. If **Manual Load** is enabled, this will allow the manual trigger of the SMEMA Upstream Board Available signal by pressing the queue zone message box during Auto Cycle.

5. If **Manual Unload** is enabled, this will allow the manual trigger of the SMEMA Downstream Ready signal by pressing the process zone message box during Auto Cycle.

11. Fault Recovery Procedure

Several errors can cause a fault condition, including:

- Emergency Stop engaged or an open door
- Low air pressure
- Exhaust fan failure
- UV Lamp failure
- Board processing failure
- Board Stop failure

The following sections show examples of each of these errors, but not all the possible errors. For a complete list of error messages, refer to the Fault Messages section for more information.

Warning: If the Emergency Stop was activated because of system failure, DO NOT disengage the Emergency Stop. Shutdown the system and have qualified personnel repair the machine.

Warning: The Module will be hot. Wait for the module to cool or wear protective clothing.

11.1 Recovery Procedure for Emergency Stop or Open Door

If the operator uses one of the Emergency Stop push buttons or the machine encounters a system error, this procedure should be used to return the machine to the Cycle Stop state.

1. Disengage the "**Emergency Stop**" button or close all doors.
2. Press the green "**POWER ON**" button.

11.2 Recovery Procedure for Low Air Pressure

Low air pressure may cause the board stops to operate incorrectly. There is an air pressure gauge on the main regulator with a low-pressure sensor. This is a gross check to make sure the machine has air. It does not detect slight fluctuations in line pressure. If the module has this error, perform the steps below:

1. Make sure the red main air pressure valve is set to "**SUP**".
2. Make sure the main air pressure regulator is set for 60-80 psi.

11.3 Recovery Procedure for Exhaust Fan Failure

CAUTION: Only complete this step if the error was due to a fan overload.

1. Turn the main power switch (Figure 2) to the off position.
2. Open the main enclosure and press the reset button on OL-1.
3. Make sure the module is cool and remove all obstructions from the exhaust screen inside the cure chamber.
4. Start the module and do the startup procedures. Refer to 6.1 for more information.
5. Operate the fan in Manual mode to make sure it operates correctly.

11.4 Recovery Procedure for UV Lamp Failure

- Operate the UV Lamp that caused the fault in Manual mode. If the lamp does not operate correctly, refer to the separate Heraeus UV literature.
- Open the front doors to check the LED status on the lamp systems.

11.5 Recovery Procedure for Board Processing Failure

1. Open the access doors.
2. Make sure no boards are jammed in the chains. Use caution as the module will be hot.
3. If there is a board jammed, wait until the module is cool, or wear protective clothing to remove the board.
4. If a board was jammed, examine the module for a cause. If no reason can be found, close the door and select the “Reset” icon.

11.6 Recovery Procedure for Board Stop Failure

1. Select the “**Reset**” icon.
2. Operate the board stops in Manual mode to make sure they operate correctly. Refer to Figure 32 in the Troubleshooting section for more information.

11.7 Reintroducing Unfinished Boards

In fault situations, the PVA UV cure module shuts down all operations. If a board is not completely cured, the operator must process the board again.

To do this, restart Auto Cycle and put the unfinished board on the conveyor to activate the first sensor in the process flow. For multiple boards, wait until the first board has cleared the module before processing another one. Continue until all unfinished boards are cured. The operator can then return to normal board processing.

Note: The operator must be careful when activating any sensors. Any inadvertent activation of a sensor may throw the program's operations out of sync and most likely generate an error. If something appears amiss, execute a Cycle Stop and then restart the Auto Cycle to reset the program.

12. Fault Messages

Description
Exhaust Fan 1 ON Failed
Exhaust Fan 2 ON Failed
Exhaust Fan 1 Low Pressure.
Exhaust Fan 2 Low Pressure.
Front Queue Stop Down Failed.
Front Queue Stop Up Failed.
Front Outlet Stop Down Failed.
Front Outlet Stop Up Failed.
General Lamp System Fault.
Lamp 1 System Fault. Check Power Supply LED's
Lamp 2 System Fault. Check Power Supply LED's
Lamp 3 System Fault. Check Power Supply LED's
Lamp 4 System Fault. Check Power Supply LED's
Lamp 5 System Fault. Check Power Supply LED's
Lamp 6 System Fault. Check Power Supply LED's
Lamp 1 Intensity Fault. Check Power Supply LED's
Lamp 2 Intensity Fault. Check Power Supply LED's
Lamp 3 Intensity Fault. Check Power Supply LED's
Lamp 4 Intensity Fault. Check Power Supply LED's
Lamp 5 Intensity Fault. Check Power Supply LED's
Lamp 6 Intensity Fault. Check Power Supply LED's
Inlet Shutter Up Failed.
Inlet Shutter Down Failed.
Outlet Shutter Up Failed.
Outlet Shutter Down Failed.

B&R I/O (CAN2) Mapping Fault
Conveyor Transfer (CAN3) Drive Mapping Fault
Board Exposure Exceeds Limits.
Conveyor Width (CAN4) Drive Homing Timeout
Board Transfer Fault - Queue Zone
Board Transfer Fault - Outlet Zone
Board Transfer Fault - Process Zone
Rear Queue Stop Down Failed
Rear Queue Stop Up Failed
Rear Outlet Stop Down Failed
Rear Outlet Stop Up Failed
Data Table Error Values Not Downloaded
B&R I/O (CAN2) Communication Timeout
Conveyor Transfer (CAN3) Communication Timeout
Conveyor Width (CAN4) Communication Timeout
Conveyor Width (CAN4) Drive Mapping Fault
Conveyor Transfer (CAN3) Drive Enable Fault Initialization Failed
Conveyor Transfer (CAN3) Drive Enable Fault Ready to Switch On State Failed
Conveyor Transfer (CAN3) Drive Enable Fault Switch On State Failed
Conveyor Transfer (CAN3) Drive Enable Fault Operation Enabled State Failed
Conveyor Width (CAN4) Drive Enable Fault Initialization Failed
Conveyor Width (CAN4) Drive Enable Fault Ready to Switch On State Failed
Conveyor Width (CAN4) Drive Enable Fault Switched On State Failed
Conveyor Width (CAN4) Drive Enable Fault Operation Enabled State Failed
Systems Options Changed Reboot Required
Conveyor Width (CAN4) Drive Runaway Fault

Figure 31: Fault Messages

13. Troubleshooting

This section is designed to help solve problems before you call PVA. Refer to this section if a mechanical or electrical problem occurs.

13.1 UV Lamps and Power Supplies

For problems with the UV lamps and power supplies, refer to the separate Heraeus UV literature included with the module. The manual contains a comprehensive fault diagnosis section for problems with the UV system.

13.2 Calling Technical Support

Technical Support is always available to help. The phone number is +1 (844) 734-0209. You can also email cs@pva.net to create a support ticket. Before you contact PVA, have the following information ready:

1. Record all the information on the OIT when the error occurred, include any error messages that may appear.
2. Record the operation in progress when the module had the error (when did the problem occur, during which step did it occur, etc.).
3. If the error was not serious, attempt to repeat the error. If the error does not repeat, the problem may have been operator generated.

13.3 Definitions

13.3.1 OIT

Operator Interface Terminal. Screen and/or keys used to control the machine.

13.3.2 PLC

Programmable Logic Controller. Type of controller used to program industrial machinery.

13.3.3 PVA

Precision Valve and Automation, Inc.

13.4 Fault Diagnosis

Operation	Other Symptoms	Possible Cause	Corrective Action
The machine is ON, the operator interface does not have power		Cables are loose or not connected	Examine the cables and correct loose connections
	The electrical enclosure does not have power	The electrical enclosure is open	Close the electrical enclosure
		A fuse is blown	Reset fuse FU20 inside the PLC power supply
Power On button does not stay on		The safety relay failed	Examine the relay and replace if necessary
		A bulb is blown	Replace the bulb
		A door is open	Close the door
		The emergency stop button is engaged	Disengage the emergency stop button
Board does not transfer to or from the adjacent station		SMEMA connection is broken	Examine the cables and correct loose connections
		A module in the system is turned off	Turn on the inactive module
Exhaust fan failure		A fuse is blown	Examine and reset fuses FU11, FU12, FU13 in the electrical enclosure
Part-in-place sensor failure		A cable is loose or disconnected	Examine the cables and correct loose connections
		The conveyor does not run	Operate the conveyor in Manual mode
		Poor sensor placement	Move the sensor
Conveyor does not run		Cable is loose or disconnected	Examine the cables and correct loose connections
	No power to conveyor motor	Control relay not energized or Power On light not illuminated	Examine the voltages and connections
		Blown fuse	Examine and reset fuses FU7 and CB3 in the electrical enclosure
Pneumatic position failure		Air lines kinked or damaged	Repair or replace the damaged line
		Position sensor failure	Replace the sensor
		Position sensor out of adjustment	Move the sensor

Figure 32: Fault Diagnosis

14. Maintenance

Type of Service					
Service Area	**Every Shift**	**Weekly**	**Monthly**	**Quarterly**	**As Necessary**
UV Lamps	Examine lamp filters and replace if dirty.		Remove lamps and clean exhaust screen inside the UV chamber.	Examine and clean reflectors. Replace if dull, severely arced or cannot be cleaned. See Heraeus UV literature for more details.	Measure UV lamp intensity as required for your process/specifications. Measure quarterly at a minimum. Record distance between bottom of lamp and top of radiometer, conveyor speed, and note location of radiometer from edge of conveyor.
Conveyor System		Examine for material and dust buildup on the sensors.	Lubricate chains with a small amount of high temperature chain lubricant such as Darmex RPL773ND or equivalent. Clean and lubricate conveyor rails with Darmex RPL773ND.	Inspect chains and sprockets for wear. Adjust chain tension if necessary. See 14.4 for chain adjustment.	Remove dust/dirt from bottom cabinet where power supplies reside. Vacuum and wipe down area. Clean air intakes on power supply by vacuuming.

Figure 33: Maintenance Schedule

Refer to the PVA Spectra Spare Parts Catalog for parts information. Refer to the Heraeus manual for maintenance, troubleshooting, and parts for the UV power supply and lamps.

14.1 Number of Lamps

The Spectra UV cure module is designed with up to six UV lamps, depending on the configuration. There can be a maximum of three lamps on the top and three lamps on the bottom. The Configuration section of the Operating Guide gives the number of lamps the module is programmed for. The module must have at least one lamp. Any unused lamp slots are covered by a metal plate. Lamps can be activated and deactivated in Setup mode.

Warning: If any lamps are removed from the system, a metal plate must be installed in its place to protect the operators and the surrounding environment from UV light.

14.2 Lamp Height

Maximum intensity will be achieved when the face of the lamp is 2.1 in (53.3 mm) from target. Distance is measured from the bottom face of the lamp assembly that retains the RF screen.

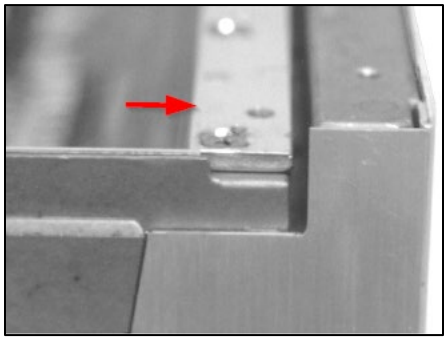


Figure 34: Face Distance

The height of the UV lamp(s) can be adjusted with the lamp height adjustment handles There are two adjustment handles on the left and right sides of the UV lamp mount. There are four total adjustment handles for the top lights and four for the bottom.

1. To adjust the lamp height, turn the adjustment handles counterclockwise until they are loose. Make sure you loosen the handles on both sides.

Figure 35: Adjustment Handles

2. Slide adjustment handles until the lamps are at the necessary height.

Figure 36: Slide the Adjustment Handles

3. Turn the adjustment handles clockwise to tighten them and keep the set position.

Note: Both sides must be adjusted evenly.

14.3 Irradiance and Dose

Refer to your material manufacturers recommendations for UV irradiance and dose requirements for your material.

- **Irradiance**: Irradiance is the intensity of the UV. The maximum irradiance is achieved with the lamp assembly at 2.1 in (53.3 mm) from the target (see Section 14.2). Distances farther and closer will result in lower intensity.

- **Dose**: UV dose is a function of irradiance and time. Slowing down the conveyor speed will increase time, therefore increase the total UV dose.

14.4 Chain Adjustment

14.4.1 Standard Conveyor

Chain tension can be adjusted by moving the sprocket near the drive motor. Moving closer to the motor will increase the tension. Moving away will the loosen the tension.

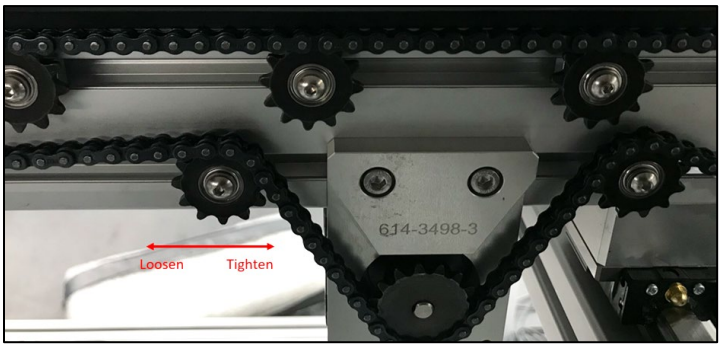


Figure 37: Adjusting Chain Tension

Chain tension should have slack at room temperature to allow the conveyor to expand when it is hot and in use. The chain should sag to the bottom of conveyor extrusion. Proper tension of the chain is shown below at room temperature.

Figure 38: Proper Chain Tension

14.4.2 Pin Conveyor

The pin conveyor has an adjustment screw and tensioner. To increase the tension, turn the adjustment screw clockwise. To loosen, turn counterclockwise. After adjusting, gently pull on the chain and release to make sure chain slack is distributed.

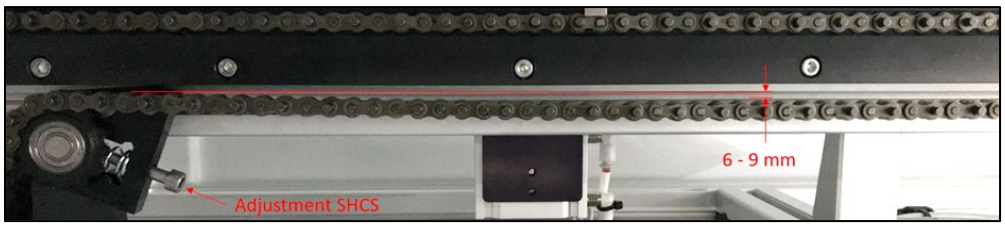


Figure 39: Pin Conveyor

15. Warranty

15.1 PVA Warranty Policy

PVA warrants the enclosed product against defects in material or workmanship on all components for one year from the date of shipment.

The warranty does not extend to components damaged due to misuse, negligence, or installation and operation that are not in accordance with the recommended factory instructions. Unauthorized repair or modification of the enclosed product, and/or the use of spare parts not directly obtained from PVA (or from factory authorized dealers) will void all warranties.

All PVA warranties extend only to the original purchaser. Third-party warranty claims will not be honored at any time.

Prior to returning a product for a warranty claim, a return authorization must be obtained from PVA's customer service department. Authorization will be issued either via the telephone, facsimile, or in writing upon your request.

To qualify as a valid warranty claim, the defective product must be returned to the factory during the warranty period. Upon return, PVA will repair (or replace) all components found to be defective in material or workmanship.

(Retain this for your records)

Product Information

PRODUCT:

SERIAL NUMBER:

DATE OF PURCHASE:

16. Table of Figures