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PVA Queue Inspection Module

Operation Manual

Revision G

Precision Valve & Automation
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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.

This manual gives information on the common options and configurations for the PVA Queue/Inspection module. If the manual refers to an option that was not purchased, ignore that section. Refer to the configuration section of the Operating Guide for more information on additional options.

1.1 PVA Contact Information

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1.2 Document History

Revision	Revision Date	Reason for Changes
REV G	January 2020	Exhaust requirements and air velocity test points added
REV F	April 2019	Maintenance table
REV E	March 2016	UV warning
Rev D	June 2014	Template and STE updated
REV C	Nov 2000	Procedure updates

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 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 Theory of Operation

The PVA Queue/Inspection module is a board transfer and inspection machine. It is SMEMA (Surface Mount Equipment Manufacturers Association) rated for easy integration into a production line and designed to operate with PVA dispense systems.

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.

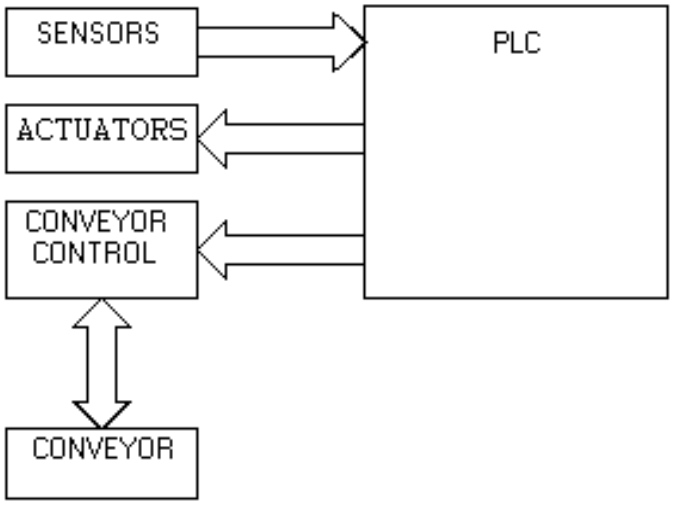

Figure 1: PVA Queue/Inspection Module Functional Block Diagram

1.5 Personal Protective Equipment

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 for other precautions.

1.6 Waste Disposal

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

1.7 Materials and 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.

1.8 Hazards Due to Contact

The PVA Queue/Inspection module is designed to minimize injury from contact with the machine. In some 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. There are no dangerous materials or chemicals used in the operation of the machine.

1.9 Noise Levels

The audible noise level of the PVA Queue/Inspection module is below 65 dBA.

2. Operating Handle Transportation and Storage

The system should have minimal vibration when handled and transported. Use an air- ride truck for roadway transport. The machine is made to operate in an industrial environment, but abuse will reduce its performance.

2.1 Dust and Debris

All enclosures and connector covers should be closed tightly. Put a cover over the system if dust or other airborne debris is present in the storage area.

2.2 Temperature and Humidity

Storage and operation should be done in an area at 40°F - 105°F (4°C – 41°C) and low humidity. Do not let the machine have condensation on it.

2.3 Location

The machine should be installed on a level surface, away from standing water, possible overspray, and overhead leaks.

3. Installation and Setup

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 Unpacking and Inspection

1. Remove all packing materials and strapping. Thoroughly examine the machine for damage, loose fasteners, etc.
2. Open the electrical enclosure and visually examine the connectors and components for vibration during shipping.
3. Close the door.

3.2 Installation

1. Connect the machine into an appropriate power source. Refer to the legend plate on the rear of the machine. The electrical service must be correctly grounded and the power source "clean". If high power equipment operates off the same source, a line conditioner may be necessary. Poor quality power can cause machine errors.

WARNING: Failure to comply with electrical specifications can result in damage to the machine as well as injury to installation personnel. Electrical hookup must be made by a qualified electrician and must comply with any applicable local standards.

2. Close any access doors and engage the "Emergency Stop" button.
3. Set the main power switch to "On".

4.Machine Communications (SMEMA)

For manufacturing lines (multiple machines utilizing conveyor systems) SMEMA cables are used so the machines can communicate. The cables must be connected in the correct manner.

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 boards sequence is correct. If these connections are not correct, 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 below:

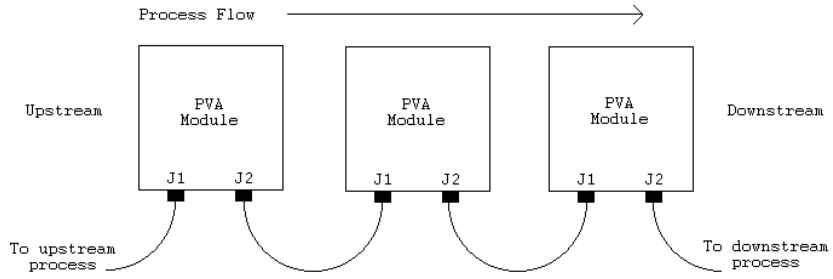

Figure 2: SMEMA Connections

5.Operating Safety

5.1 Notices and Warnings

- Wear safety glasses, gloves, and long-sleeved clothing to operate 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 the air and power supplies before servicing or cleaning any part of this equipment.
- Relieve the pressure before you remove any hose.
- Use hoses with sufficient pressure ratings.
- Use replacement parts recommended or supplied by the manufacturer.
- Stay away from all moving parts when the system is in operation.

5.2 Safety Devices and Guarding

The PVA Queue/Inspection module has 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 is not responsible for any damages incurred, mechanical or human, because of alteration or destruction of any safety features.

5.3 Safety Circuit

The 24 VDC power for the PVA Queue/Inspection module is monitored and controlled by the safety circuit. The safety circuit has a control relay and Emergency Stop button. The control relay stops power to the conveyor drive. The programmable logic controller (PLC) monitors the status of the control relay. The PLC will stop operation of the machine if the relay opens.

5.4 Exhaust Requirements

Exhaust Requirement	Machine Duct Size	Air Velocity at Test Point (ft/min)	Air Velocity at Test Point (m/sec)
300 CFM	4" (102mm)	3438	17.5

5.4.1 Air Velocity Test Point

Measure the velocity at the inlet to the factory supplied duct.

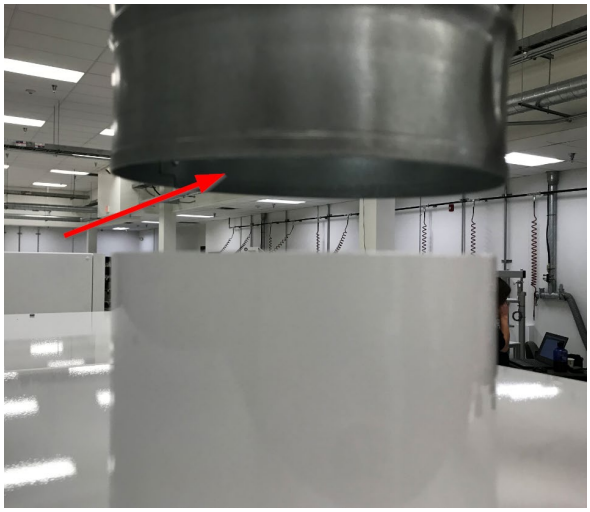

Figure 3: Air Velocity Test Point

6. Operation

6.1 Startup Procedure

1. Engage the Emergency Stop button.
2. Set on the main power switch to "**On**".

6.2 Light Tower Operation

Three stacked indicator lights and a buzzer are used to show the status of the machine. The lights are green, amber, and red with the buzzer below the green light. The lights are visible from all sides of the machine. The indicators operate as follows:

State	Red	Amber	Green	Buzzer
Cycle Stop	ON	OFF	OFF	OFF
Auto Cycle	OFF	OFF	ON	OFF
Cycle Stop	OFF	ON	OFF	OFF
Auto Cycle Standby	OFF	ON	OFF	OFF
Machine Error	OFF	OFF	OFF	Buzz

Figure 4: Light Tower and Buzzer Status

6.3 Shutdown Procedure

1. Wait for all boards to clear the module. The machine should be shutdown with no parts in the module.
2. Set the main power switch to "Off".

Caution: If maintenance will be done during the shutdown, lockout and tag the machine.

6.4 Cycle Stop

Cycle stop state is the default state for the PVA Queue/Inspection module. Cycle stop occurs when the Emergency Stop button is engaged and there is no fault. The red light will be on in cycle stop. The machine will not cycle boards in this state. To enter auto cycle, disengage the Emergency Stop button.

6.5 Auto Cycle

Auto cycle is the normal operating mode and occurs when the Emergency Stop button is disengaged and there is no fault. The module operates as part of a larger production line and automatically communicates with adjacent machines. The amber light is on when the module is waiting for a board, the green light is on when the module has a board.
Note: The PVA Queue/Inspection module can carry one board per conveyor section. More than one board per conveyor section will cause trafficking problems.

6.6 Queue Module

When the queue module operates as a transfer station, auto cycle operates as follows:

1. The queue module sends a ready signal to the upstream process that it can accept a board.
2. A signal from the upstream process that a board is available or a signal from the upstream sensor starts the conveyor. If there is no upstream process the board will be manually loaded.
3. When the upstream sensor is triggered, the ready signal to the upstream process (if present) is stopped.
4. The board moves to the downstream sensor unless the Emergency Stop button is engaged.
5. A signal is sent to the downstream process (if present) that a board available.
6. If the downstream machine is ready, the board will move out of the queue module.
7. If the downstream machine is not ready, the board will stop on the downstream sensor until a ready signal is received, or the board is removed.
8. When the downstream sensor is clear, the board available signal to the downstream process (if present) is turned off.
9. The cycle then starts again.

6.7 Inspection Module

When the inspection module operates as an inspection/transfer station, auto cycle operates as follows:

1. The inspection module sends a ready signal to the upstream process that it can accept a board.
2. A signal from the upstream process that a board is available or a signal from the upstream sensor starts the conveyor.
3. If there is no upstream process the board will be manually loaded.
4. When the upstream sensor is triggered, the ready signal to the upstream process (if present) is stopped.
5. If the Bypass switch is off, the board will move to the inspection sensor and stop.
6. Remove the board for inspection or leave it on the conveyor.
7. After inspection is complete, push the continue button.
8. The board shuttles to the downstream sensor unless the Emergency Stop button is engaged.
9. A signal is sent to the downstream process (if present) that a board is available.
10. If the downstream process is ready, the board will move out of the inspection module.
11. If the downstream process is not ready the board will stop on the downstream sensor until a ready signal is received, or the board is removed.
12. When the downstream sensor is cleared, the board available signal to the downstream process (if present) is stopped.
13. The cycle then starts again.

7. Fault Recovery Procedure

Warning: If the Emergency Stop was engaged because of system failure, do not disengage the Emergency Stop button. Shutdown the system and have qualified personnel repair the machine.

7.1 Recovery Procedure

For all errors that activate the buzzer do the procedure that follows, to return the module to operation.

1. Remove all boards from the module.
2. Engage the Emergency Stop button.
3. Disengage the Emergency Stop button.

8.Troubleshooting

Some problems are easy to identify and solve, for others more help may be necessary. This section is to assist in solving problems before you seek additional help. Refer to this section if a mechanical or electrical problem occurs.

8.1 Calling Technical Support

The technical support staff is always available to help solve any problems. The phone number is +1-518-371-2684. Have the following information before calling for help:

- The operation in progress when the machine had trouble (when did it have problems, what was it doing, etc.).
- If the error was not serious, attempt to repeat the error. If the error does not repeat, the problem may have been operator generated.

9. Fault Diagnosis

Operation	Other Symptoms	Possible Cause	Corrective Action
Board doesn't transfer to or from adjacent station		SMEMA connection is broken	Examine and correct the cable connections
		A module in the system is turned off	Turn on the inactive module
		The adjacent stations are not correctly aligned	Align the adjacent stations
Part-in-place sensor failure		Cable is loose or not connected	Examine and correct the cable connections
		The sensor is not positioned correctly	Move the sensor
		The sensor is dirty or scratched	Clean or replace the sensor
Pneumatic position failure		The air lines are kinked or torn	Repair or replace the lines
		Position sensor failure	Replace the sensor
		Position sensor needs to be adjusted	Move the sensor
Conveyor does not run or another conveyor error		The conveyor belt is stuck to the rails	Clean the rails or replace the belt
		Cable is loose or not connected	Examine and correct the cable connections
	There is no power to the conveyor motor	Control relay not energized or Power On light not illuminated (Certain Models)	Examine voltages and connections
		The fuse is blown	Correct or replace FU-3 in the electrical enclosure if necessary

10. Maintenance

Service Area	Weekly	Monthly
Conveyor System Belts	Examine the sensors for material and buildup	• Examine the conveyor belts for wear • Conveyor System Chains: Lubricates chain with Darmex 773ND or equivalent • Conveyor System Rails: Clean and lubricate with Mobile DTE-24 or equivalent. You can also use Darmex 773ND or equivalent.

10.1 Conveyor Belt Replacement

1. Disconnect, lockout and tag the power supply.
2. Use a 3 mm hex key to remove the dust cover plate. The dust cover plate is near the conveyor motor on the inside of the conveyor.
3. Use your hands to remove the old conveyor belt from the pulley wheels.
4. Install the new conveyor belt. Put the belt on the pulley wheels farthest from the motor first.

Note: Make sure that there are no twists in the belt.

5. Put the belt around the large pulley wheel, then around the remaining wheels.
6. Use your hands to turn the pulley wheels several turns by hand to make sure the belt is correctly installed.
7. Use a 3 mm hex key to install the dust cover plate.

10.2 Conveyor Speed

The conveyor speed is controlled by increasing or decreasing the line voltage to the stepper driver with a potentiometer (R4). To adjust the conveyor speed, do the procedure below:

1. Open the enclosure access door.
2. In the enclosure, find the speed control potentiometer R4 in the top right corner.
3. Cause the upstream sensor to operate the conveyors.
4. Use a small flat blade screwdriver and turn the screw clockwise to decrease conveyor speed, or counterclockwise to increase conveyor speed.
5. The factory setting for the conveyor speed is 80 ft/min. To go back to the factory setting, do the steps above and adjust the speed until the voltage across the terminals on the potentiometer R4 is 8 volts.

11. Notes

12. Warranty

12.1 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: