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# *Loader & Unloader*

## *User Guide*

Version 3.1.1  
October 24, 2018  
Part No: 24000013M

for use with:

- **24000013 - Loader**
- **24000014 - Unloader**
- **24000015 - Heated Module**



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## Safety Notices



For user and operator safety, as well as to avoid material damage, all safety guidelines in this manual must be observed.

### WARNING Notices

Despite adhering to all applicable safety guidelines, some hazards remain which should be taken note of for operation of the system:



**WARNING:** Do not touch cables or connectors or reach inside moving parts even when the machine is stopped using the Emergency Stop button as electrical hazards and pinching or cutting hazards may still exist.



**WARNING:** Never reach into the heated conveyor module area to remove jammed material or cuts to the hand and/or crushed fingers may be the result.



**WARNING:** Never reach into the area where magazines are raised and lowered between the fixed and moving elements of the lift systems (Clamp) or hand injuries may be the result.



**WARNING:** High Voltage Electrical Risks - Do not touch cables or connectors before the machine has completely released all stored energy. The machine main power supply and several internal components are supplied with 230V AC. Direct contact with this voltage is very dangerous for human beings. Even if the machine is stopped by normal procedure or by pressing the E-stop button, some components and assemblies remained charged.



**WARNING:** Live Voltages after Main Switch Off - Any spare part replacement or maintenance work to be carried out on or near the components of the AC input line may only be started after the machine is disconnected from the AC supply (house line). These components carry dangerous electrical energy even when the main switch is turned off.

Many components still carry dangerous electrical energy even when the main switch of the machine is turned off. For example: bright yellow colored wires and components marked with a warning label.

To release any hazardous stored electrical energy, wait 10 minutes after switching off the system. This will allow any charged capacitors to discharge to a safe level. After 10 minutes, it is safe to begin maintenance work anywhere inside the machine.

## CAUTION Notices

Despite adhering to all applicable safety guidelines, some hazards remain which should be taken note of for operation of the system:



**CAUTION: High Temperature Risks** - Some parts are heated to very high temperatures. Operators should be careful to avoid touching these parts.



**CAUTION: Emergency Stop** - The Emergency Stop button can be used to instantly break off the safety circuit and stop all machine movement in case of an emergency. This does NOT remove all machine movement from the machine. The computer and monitor remain energized, as well as all DC power supplies considered non-critical. After using the Emergency Stop function in an emergency, the mushroom button has to be unlatched and the safety circuit has to be switched on again. For Emergency Stop button locations, refer to [Controls](#) (pg 5).

For safety's sake, the Emergency Stop function must be tested weekly.

**Test methods:** Push the three Emergency Stop buttons one by one, and then check whether all motors are disabled (lost torque) immediately every time. If so, the Emergency Stop function is operating normally.

## General Safety

Adhere to all applicable safety guidelines:



**CAUTION:** The system is built in accordance with modern technology and the current safety regulations, nevertheless, due to movable components, incorrect use, or other external influences, remaining hazards during operation cannot be totally eliminated.

Operation and maintenance functions should only be performed by qualified and trained personnel.

Any work on the electrical components of the machine may only take place by, or under the supervision of a certified electrician.

The system may only be used for its intended purpose when in perfect technical working order.

Changes to the machine may only be carried out with the specific permission of the manufacturer. This also applies to changes to the system software.

In case of malfunctions, especially with the power supply or compressed air supply, the machine must be powered off immediately.

All malfunctions, especially those that concern safety must be eliminated immediately.

Spare parts must be in accordance with the manufacturer specification; therefore, only original spare parts should be used.

Machine parts on which repairs, inspection or maintenance work is being carried out must, if specified, be disconnected from the power supply. Neighboring parts must be covered, and the voltage must be checked for those parts disconnected from the power supply.

In case of defect, use the Emergency Stop button on the operator panel to stop the machine.

Customer-applicable local guidelines for accident prevention must be added to this user manual.

## Warranty

**General Warranty.** Subject to the remedy limitation and procedures set forth in the Section "Warranty Procedures and Remedy Limitations," GPD Global warrants that the system will conform to the written description and specifications furnished to Buyer in GPD Global's proposal and specified in the Buyer's purchase order, and that it will be free from defects in materials and workmanship for a period of one (1) year. GPD Global will repair, or, at its option, replace any part which proves defective in the sole judgment of GPD Global within one (1) year of date of shipment/invoice. Separate manufacturers' warranties may apply to components or subassemblies purchased from others and incorporated into the system. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

**Limitations.** GPD Global reserves the right to refuse warranty replacement, where, in the sole opinion of GPD Global the defect is due to the use of incompatible materials or other damages from the result of improper use or neglect.

This warranty does not apply if the GPD Global product has been damaged by accident, abuse, or has been modified without the written permission of GPD Global.

Items considered replaceable or rendered unusable under normal wear and tear are not covered under the terms of this warranty. Such items include fuses, lights, filters, belts, etc.

**Warranty Procedures and Remedy Limitations.** The sole and exclusive remedy of the buyer in the event that the system or any components of the system do not conform to the express warranties stated in the Section "Warranties" shall be the replacement of the component or part. If on-site labor of GPD Global personnel is required to replace the non-warranted defective component, GPD Global reserves the right to invoice the Buyer for component cost, personnel compensation, travel expenses and all subsistence costs. GPD Global's liability for a software error will be limited to the cost of correcting the software error and the replacement of any system components damaged as a result of the software error. In no event and under no circumstances shall GPD Global be liable for any incidental or consequential damages; its liability is limited to the cost of the defective part or parts, regardless of the legal theory of any such claim. As to any part claimed to be defective within one (1) year of date of shipment/invoice, Buyer will order a replacement part which will be invoiced in ordinary fashion. If the replaced part is returned to GPD Global by Buyer and found by GPD Global in its sole judgment to be defective, GPD Global will issue to Buyer a credit in the amount of the price of the replacement part. GPD Global's acceptance of any parts so shipped to it shall not be deemed an admission that such parts are defective.

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Specifications, descriptions, and all information contained in this manual are subject to change and/or correction without notice.

Although reasonable care has been exercised in the preparation of this manual to make it complete and accurate, this manual does not purport to cover all conceivable problems or applications pertaining to this machine.

## Introduction

This manual describes how to use the following equipment which is designed for fully automatic, single-lane, material handling per SMEMA specifications:

- Magazine Input Loader
- Magazine Output Unloader
- Heated Conveyor Module (optional)

### Use of this Manual

This manual contains all important information needed for optimal use of a Loader and Unloader system.

It contains instructions for the safe and intended use of a Loader and Unloader system, which must be strictly adhered to.

Furthermore, it contains hints for economic and comfortable use of the a Loader and Unloader system

These instructions are the foundation for reliable function and long life of a Loader and Unloader system. They help avoid danger, minimize downtime and keep repair costs to a minimum.

It is important that all personnel dealing with operation, maintenance and inspection strictly adhere to the guidelines within this manual.

For easy access, this manual should be kept at a Loader and Unloader system site.

The customer must add their local regulations for health and safety and accident prevention to this manual.

As well as this manual and the local regulations for health and safety, the recognized technical guidelines must also be followed.

### Theory of Operation

1. Magazines containing substrates are loaded manually onto the lower stack tray in the Loader.
2. The manipulator catches one magazine and injects those substrates into the optional Heated Conveyor Module.
3. The Heated Conveyor Module transports the substrates to the working position in the middle of the Heated Conveyor Module.
4. After successful processing, the treated substrates are discharged into a magazine in the Unloader and sent to the Unloader output tray.

### Features

Features for both the Loader and Unloader:

- Magazines limited by input buffer area
- Pusher for product-to-conveyor
- Touch screen interface
- SMEMA communications

# Installation

## Transport & Storage

Only suitable and licensed transportation equipment may be used.

Do not work or stand under suspended objects.



**CAUTION:** Avoid jolts and hard bumps during transport to protect equipment from damage.

Immediately upon receipt, delivery must be checked to be sure it is complete and intact. Any damages must be recorded in the presence of carrier.

## Scope of Supply

The following standard modules have been integrated in processing system and delivered together.

- Magazine Input Loader
- Magazine Output Loader
- Cable for SMEMA communications per loader/unloader
- Heated Conveyor Modules (optional)

## Facility Requirements

Refer to [Specifications](#) (pg 20).

## Leveling

### Tools Required:

- Level
- Wrench
- Sample substrate

To ensure the Loader or Unloader runs well, align it carefully with input or output conveyor.

1. For ease of access, manually adjust rail width and height in the [Material Eject Pusher](#) (pg 7) before positioning the Unloader next to the conveyor.
2. Position the Loader/Unloader next to the conveyor.
3. Adjust the Loader/Unloader leveling pads to required conveyor height. The leveling pads can be adjusted by  $\pm 5$  mm.
4. Confirm proper height using a sample substrate.

## Connections

All power and air cables supplied by the facility for the machine must be in conformance with technical regulations and be in perfect technical condition.

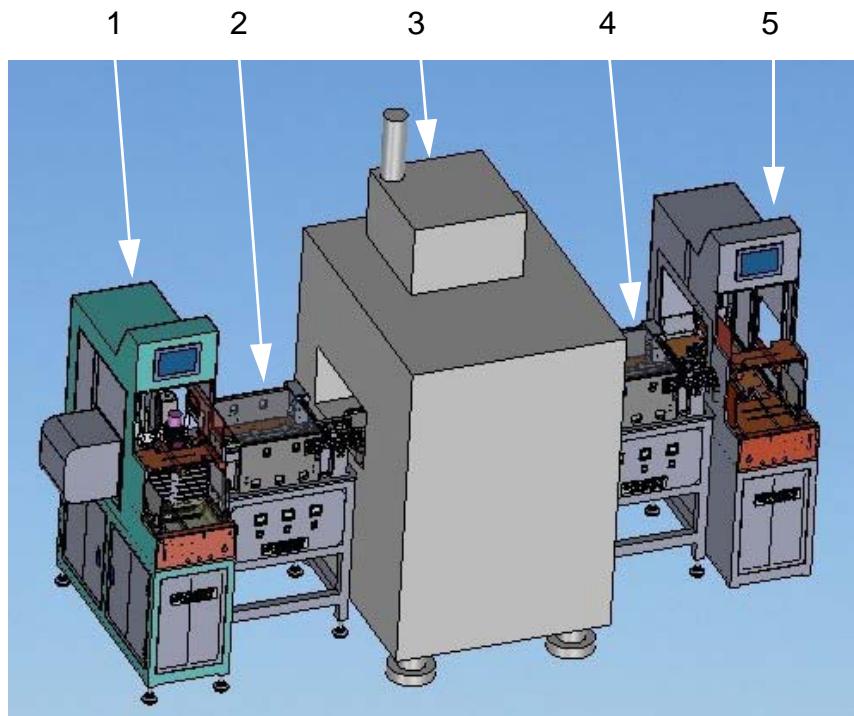
Refer to [SMEMA Communication](#) (pg 23).

## System Description

- [Major Systems](#) (pg 3)
- [Part Identification](#) (pg 4)
- [Controls](#) (pg 5)
  - [Front Control Panels](#) (pg 5)
  - [Temperature Controller](#) (pg 5)
  - [Rear Control Panel](#) (pg 6)
- [Light Tower](#) (pg 6)
- [Touch Screen](#) (pg 6)
- [Magazine Trays](#) (pg 7)
- [Magazine Handler](#) (pg 7)
- [Material Inject Pusher](#) (pg 7)
- [Material Eject Pusher](#) (pg 7)
- [Electrical Bench](#) (pg 7)
- [Rear Panel](#) (pg 8)
- [Sensors - Loader](#) (pg 9)
- [Sensors - Unloader](#) (pg 10)

Also see [Appendices](#) (pg 40).

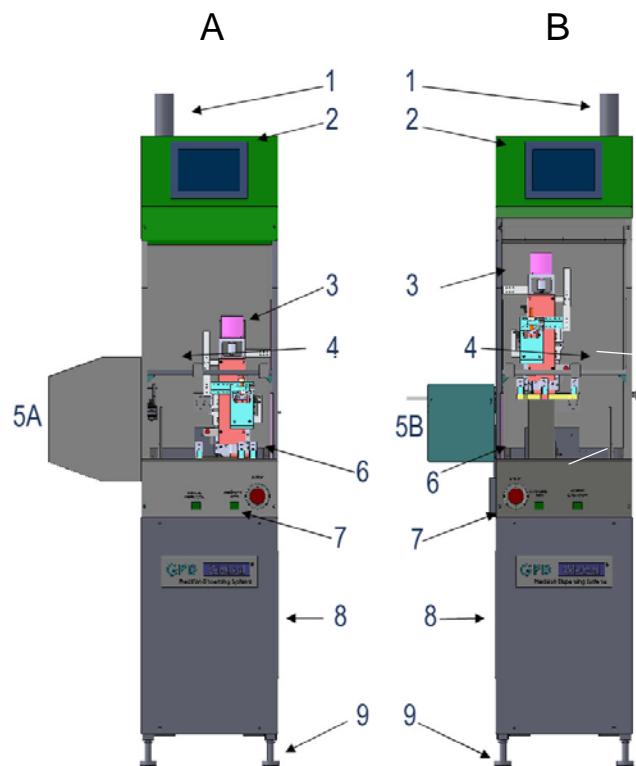
### Major Systems



|   |                                   |
|---|-----------------------------------|
| 1 | Loader                            |
| 2 | Heated conveyor module (optional) |
| 3 | Product processing system         |
| 4 | Heated conveyor module (optional) |
| 5 | Unloader                          |

## Part Identification

*Figure 1: Front View*

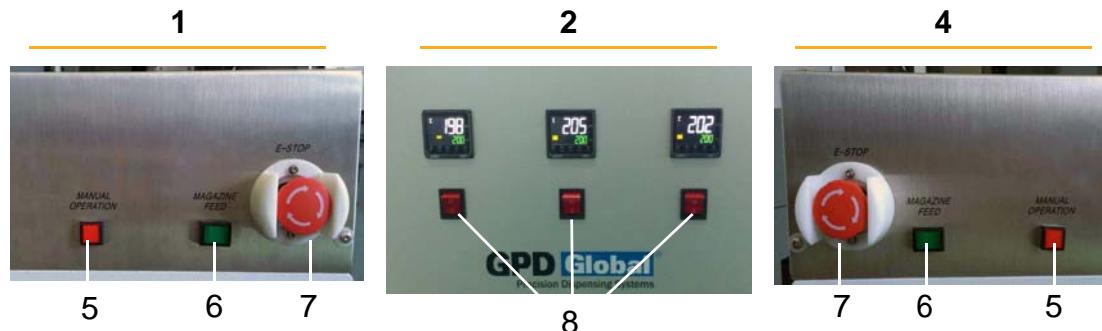


|   |                         |
|---|-------------------------|
| A | Loader                  |
| B | Unloader                |
| 1 | light tower             |
| 2 | touch screen            |
| 3 | 3-axis magazine handler |
| 4 | magazine output tray    |

|    |                          |
|----|--------------------------|
| 5A | material Inject assembly |
| 5B | material Eject assembly  |
| 6  | magazine output tray     |
| 7  | front panel              |
| 8  | electrical bench         |
| 9  | level pad                |

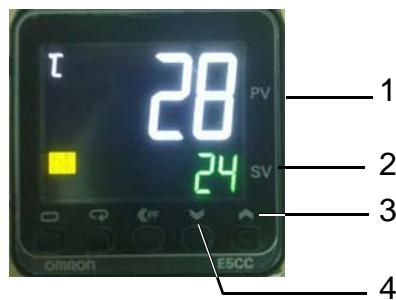
## Controls

### Front Control Panels



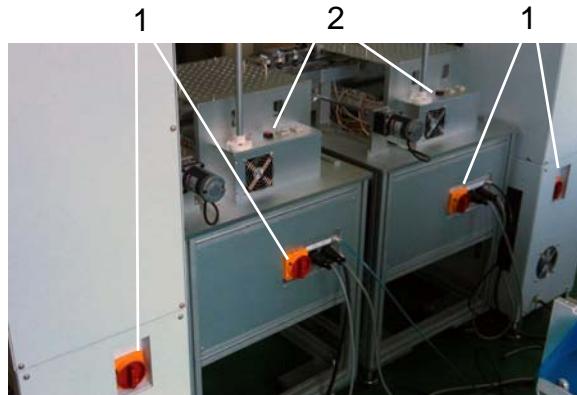
|   |                                      |  |
|---|--------------------------------------|--|
| 1 | <b>Magazine input</b><br>(Loader)    | front panel  |
| 2 | <b>Heater</b>                        | front panel  |
| 4 | <b>Magazine output</b><br>(Unloader) | front panel  |
| 5 | Manual Operation                     | Auto/Manual mode switch for magazine input/output loader. In manual mode, the operator can manually move a magazine to the next slot or release a magazine to the output tray.   |
| 6 | Magazine Feed                        | Feeds magazine in tray for loading.  |
| 7 | E-Stop                               | Emergency Stop. Immediately stops sequence and all motion when pressed. All motor torque is lost and the cylinder moves to home position. The machine needs to be initialized to restore it after an emergency stop condition. |
| 8 | Temperature                          | Controls corresponding heating units.  |

### Temperature Controller



|   |  |
|---|--|
| 1 | Present value of heater                        |
| 2 | Setting value / target value                   |
| 3 | Setting value will decrease 1 degree per click |
| 4 | Setting value will increase 1 degree per click |

## Rear Control Panel



|   |              |  |
|---|--------------|--|
| 1 | Main power   | Controls power to loader, unloader, and optional heated conveyor module. |
| 2 | Power On/Off | Controls power to optional heated conveyor module.                       |

## Light Tower



The light tower is located on the top of the back of the machine. It has three lights (red, yellow, and green) and one buzzer.

| Light Color | Active Condition  |
|-------------|---|
| Green       | Normal operation in automatic / production mode.                            |
| Yellow      | Operating in manual mode OR there is a material shortage in automatic mode. |
| Red         | Error has occurred.   |
| Buzzer      | Error has occurred OR there is a material shortage.                         |

## Touch Screen



There is a color touch screen at the top of the machine. The operator can access it on the front of the machine. It is used to operate the machine and display machine status and information.

## Magazine Trays

### **Input Magazine Tray**

---

The input tray is located in the lower level and used to store full magazines PRIOR TO operations (full magazine in Loader; empty magazine in Unloader). The 3-belt conveyor moves the magazine to a magazine target position sensor.

### **Output Magazine Tray**

---

The output tray is located in the upper level and used to store full magazines AFTER operations (empty magazine in Loader; full magazine in Unloader). A sensor detects when the tray is full.

## Magazine Handler

The magazine handler is a 3-axis robot that can catch a full magazine from the input (lower) tray and move it to the working position. It then puts the empty magazine in the output (upper) tray.

## Material Pushers

### **Material Inject Pusher**

---

The Material Inject Pusher, located on the left side of the loader, is driven by a timing belt and DC motor. It is equipped with a jam protect function and is used to push material out of the magazine.

### **Material Eject Pusher**

---

The Material Eject Pusher, located on the left side of the Unloader, is used to transfer material to the exit conveyor. It includes a belt and DC motor driven conveyor, a cylinder driven pusher, a stopper, and an assist press roller.

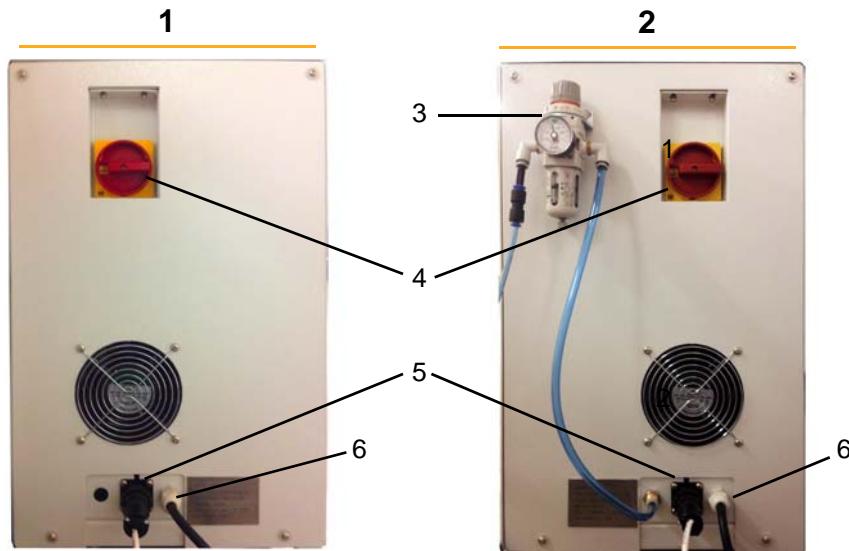
## Electrical Bench

The Bench contains electrical components and supports the whole machine. There are four leveling pads on the bottom. The side cover is shown removed to expose electrical parts.



## Rear Panel

The rear panel is located on the back of the electrical bench. This is the location of the Main Switch, main power, SMEMA connector, and compressed air connectors.



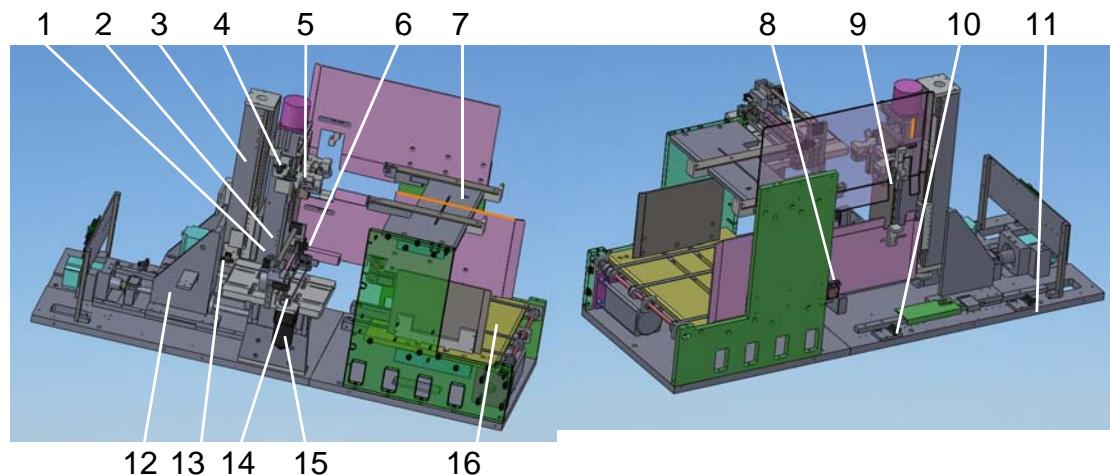
| 1 | Loader Rear Panel     |
|---|-----------------------|
| 2 | Unloader Rear Panel   |
| 3 | Compressed air        |
| 4 | Main switch           |
| 5 | SMEMA connection      |
| 6 | Main power connection |

## Sensors - Loader

Sensor detects the presence of a magazine in the **lower stack tray**. If a magazine is detected, a **clamp** grips the magazine and lifts it to a higher position.

Pusher extracts the boat from the lowest magazine slot onto the product processing system near the input area of the heated conveyor module. If the magazine slot is empty, the lift system moves to the next slot.

*Figure 2: Loader elements identified*

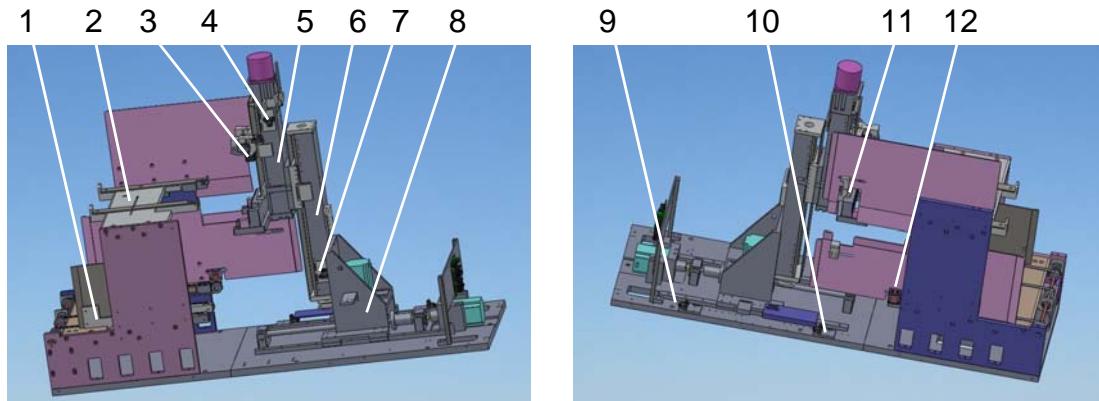


|    |                |  |
|----|----------------|--|
| 1  | Sensor         | Detects whether pusher is jammed.  |
| 2  | C Axis         | Clamps magazine.   |
| 3  | Z Axis         | Transports magazine up and down.   |
| 4  | C-home sensor  | C axis home position.  |
| 5  | Sensor         | Detects whether magazine is clamped well.  |
| 6  | Sensor         | Detects pusher is in extended position.  |
| 7  | Output tray    | Stores empty magazines sent back by the loader.  |
| 8  | Sensor         | Detects magazine is ready in input tray.   |
| 9  | Optical sensor | Detects whether the product has totally left magazine and pushed to lane.                          |
| 10 | Sensor         | Defines the safe position of Y axis, once lift over the position, then lift could not move upward. |
| 11 | Y-home sensor  | Y axis home position.  |
| 12 | Y Axis         | Transports magazine backward and forward.  |
| 13 | Z-home sensor  | Z axis home position.  |
| 14 | Sensor         | Detects pusher is in retracted position.   |
| 15 | Motor          | Drives pusher.   |
| 16 | Input tray     | Stores magazines with processed substrates.  |

## Sensors - Unloader

The Unloader is connected to the right side of the heated conveyor module and is used to load empty magazine onto output tray of unloader.

**Figure 3: Unloader elements identified**



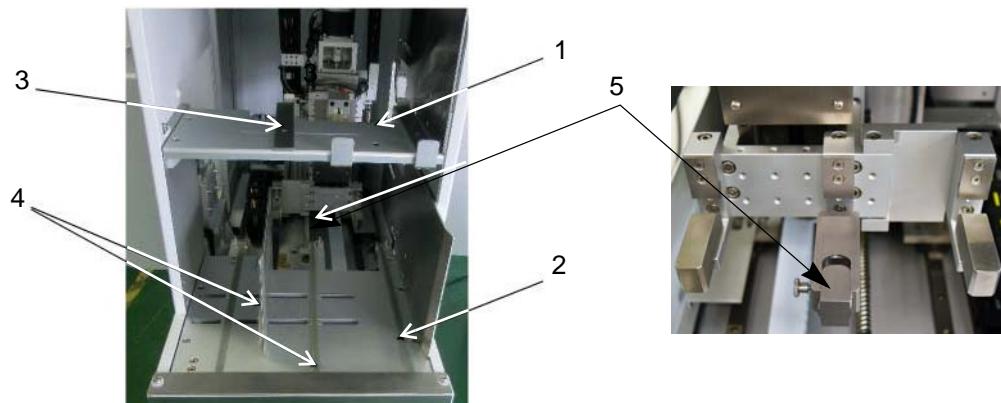
|    |                |  |
|----|----------------|--|
| 1  | Output Tray    | Stores full magazines sent back by the unloader.   |
| 2  | Input Tray     | Stores empty magazines.  |
| 3  | Sensor         | Detects whether magazine is clamped well,  |
| 4  | C_home sensor  | C axis home position.  |
| 5  | C Axis         | Clamps magazine.   |
| 6  | Z Axis         | Transports magazine up and down.   |
| 7  | Z-home sensor  | Z axis home position.  |
| 8  | Y Axis         | Transports magazine backward and forward.  |
| 9  | Y-home sensor  | Y-axis home position.  |
| 10 | Sensor         | Defines safe position of Y axis, once lift over the position, then lift could not move upward. |
| 11 | Optical sensor | Detects whether product has totally left magazine and pushed to lane.                          |
| 12 | Sensor         | Detects magazine is ready in input tray.   |

# Adjustments

## Input Magazine Tray

To adapt the input tray to different sizes of magazines:

1. Adjust the Support Bar (Item 3).
2. As needed, open the front panel, adjust the Middle Belt and insert a Side Guide Plate.
3. If the Tab Extension (Item 5) is present and if the magazine is wider than the Tab Extension in its retracted position:
  - a. Loosen the tab thumbscrew.
  - b. Pull the tab to its fully extended position.
  - c. Tighten the tab thumbscrew,

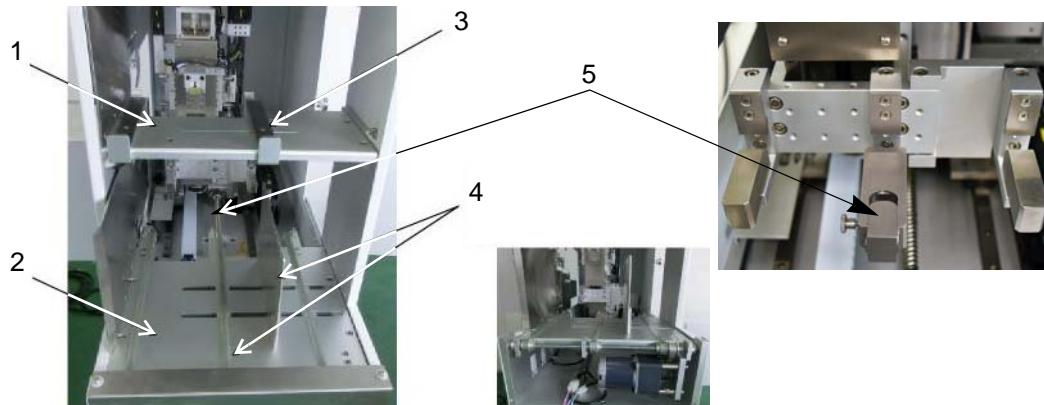


|   |  |
|---|--|
| 1 | Input Tray   |
| 2 | Output Tray  |
| 3 | Adjust Support Bar - to fit the size of magazine.  |
| 4 | To adjust for magazine size, open the front panel, adjust the middle belt and insert a side guide plate if needed. |
| 5 | (OPTIONAL) Tab Extension (PN 22296092) - provides extra support for wide magazines.                                |

## Output Magazine Tray

To adapt the input tray to different sizes of magazines:

1. Adjust the Support Bar (Item 3).
2. As needed, open the front panel, adjust the Middle Belt and insert a Side Guide Plate.
3. If the Tab Extension (Item 5) is present and if the magazine is wider than the Tab Extension in its retracted position:
  - a. Loosen the tab thumbscrew.
  - b. Pull the tab to its fully extended position.
  - c. Tighten the tab thumbscrew,

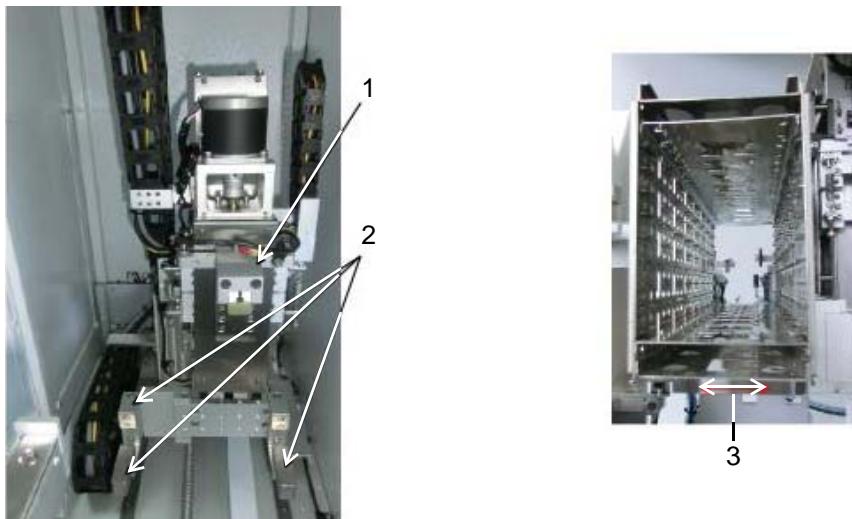


|   |  |
|---|--|
| 1 | Input Tray   |
| 2 | Output Tray  |
| 3 | Adjust Support Bar - adjust to fit the size of magazine.               |
| 4 | Middle Belt and Side Guide Plate - adjust as needed for magazine size. |
| 5 | (OPTIONAL) Tab Extension - provides extra support for wide magazines.  |

## Magazine Handler

To adapt the magazine handler to different sizes of magazines:

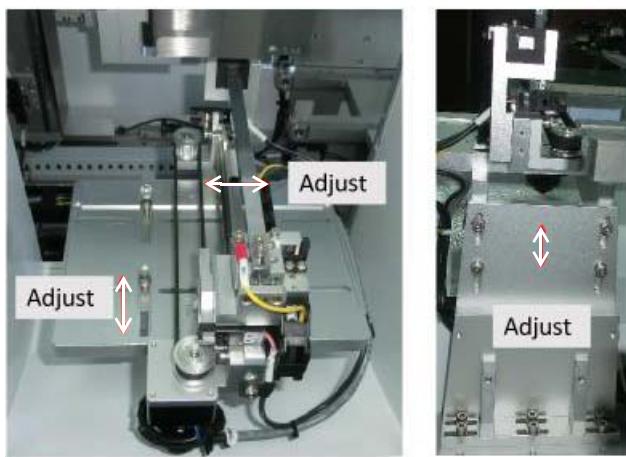
1. Adjust the Top Holder (Item 1) to fit the magazine.
2. Adjust the Bottom Holder (Item 2) to fit the magazine.
3. Adjust the bottom block (Item 3) to make sure the magazine can be held tightly.



|   |               |
|---|---------------|
| 1 | Top Holder    |
| 2 | Bottom Holder |
| 3 | Bottom Block  |

## Material Inject Pusher

The position of the pusher has to be aligned with the entrance conveyor.

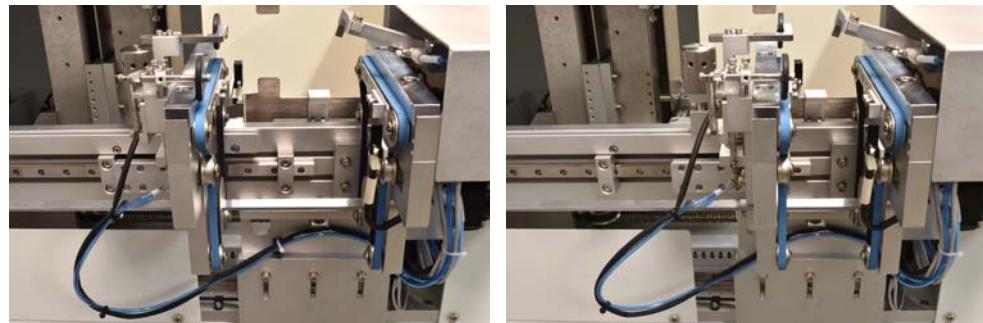


## Material Eject Pusher

### Adjust Position of Rear Conveyor Belt

Easily move the rear conveyor belt between two preset pallet widths:

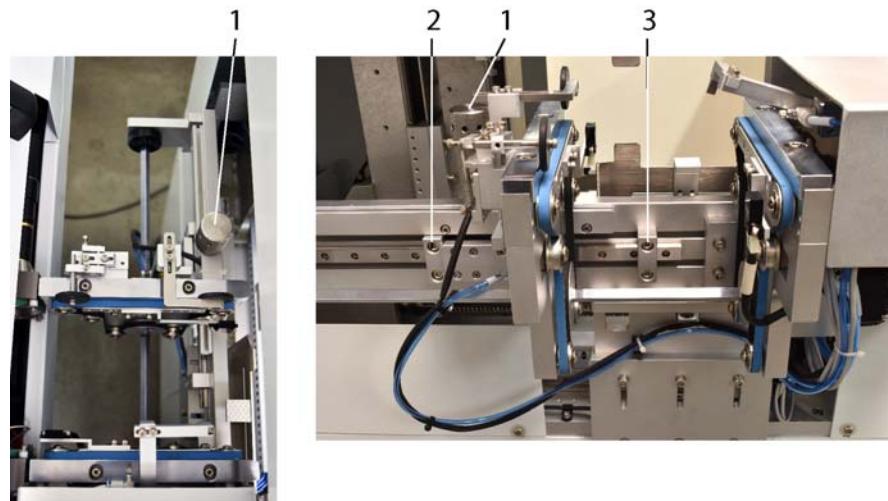
**Figure 4:** (Left) Rear conveyor at rear hard stop for wide pallet; (Right) at front hard stop for narrow pallet



To adjust the rear conveyor between wide and narrow pallet positions:

1. Loosen the Width Adjust Knob (Figure 5, Item 1).
2. Grasping the Width Adjust Knob, gently slide the rear conveyor assembly away from its current hard stop position (Figure 4) until the assembly rests against the other hard stop (Figure 5, Item 2 or 3). Be careful not to pinch cables or hoses.
3. Tighten the Width Adjust Knob.

**Figure 5:** Unloader auxiliary feed device: Material Eject Pusher



|   |                            |
|---|----------------------------|
| 1 | Width Adjust Knob          |
| 2 | Adjustable Rear Hard Stop  |
| 3 | Adjustable Front Hard Stop |

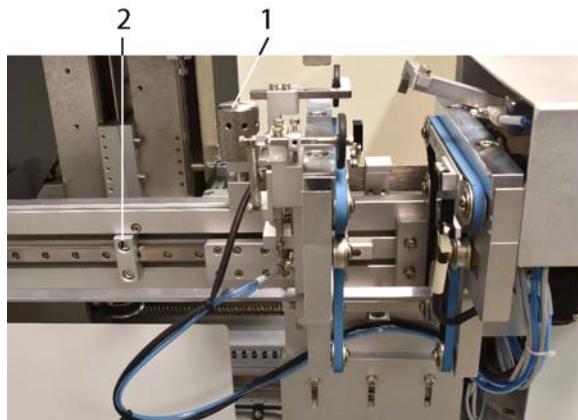
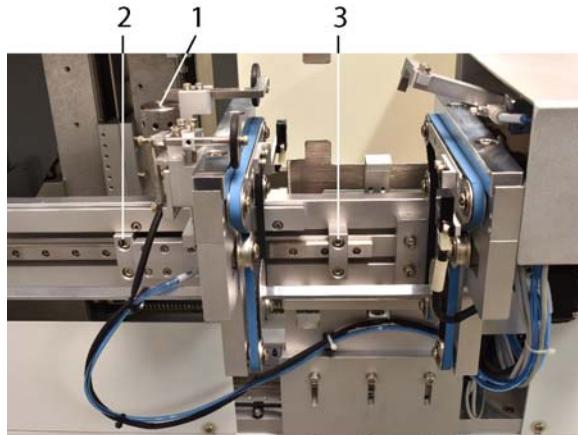
## Adjust Position of Conveyor Hard Stop(s)

To change the position of either or both hard-stops to accommodate different pallet widths:

**TOOL REQUIRED:** Metric #4 Allen Wrench

1. Loosen the two bolts in the hard stop you want to reposition.
2. Slide the hard stop to desired position. Verify the new position by placing a substrate on the conveyor belts.
3. When desired position is achieved, tighten both bolts.
4. As needed, adjust the position of the other hard stop.

**Figure 6:** Unloader auxiliary feed device: Material Eject Pusher:



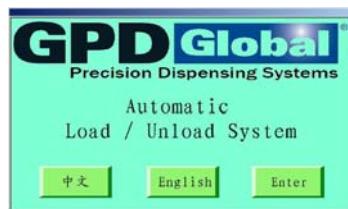
|   |                   |
|---|-------------------|
| 1 | Width Adjust Knob |
| 2 | Rear Hard Stop    |
| 3 | Front Hard Stop   |

## Operations

- [Prepare System](#) (pg 16)
- [Start Production](#) (pg 16)
- [Material Shortage Operation](#) (pg 17)
- [Release / Change Magazine](#) (pg 17)
- [Skip Slot in Automatic Mode](#) (pg 17)
- [Operating in Error Mode](#) (pg 18)
- [Shutdown](#) (pg 18)

### Prepare System

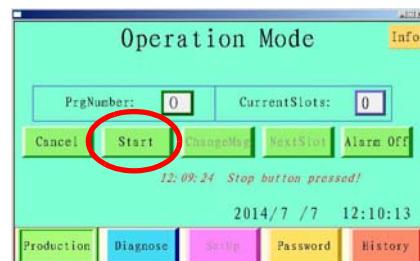
1. Inspect System prior to production and verify:
  - electrical power is connected,
  - compressed air is connected (Unloader only),
  - magazine holder is adjusted properly for the current size of magazine,
  - magazine tray is adjusted properly for the current size of magazine, and
  - Inject Pusher and Eject Pusher are adjusted properly and fit the current material.
2. Turn on:
  - power switch,
  - compressed air,
  - optional heating switch.
3. Select a language on the Main window and then press ENTER.



4. Place a magazine loaded with unprocessed product on the Loader input tray.
5. Place one or more empty magazines on the Unloader input tray.

### Start Production

1. Verify handler is in safety position. If it is not, push it back to safety position.
2. Remove all magazines from handler and all material from Eject Pusher.
3. Place full magazines in Loader input tray and empty magazines in the Unloader input tray.
4. Press START button to begin automatic production mode. The machine will home and then get a magazine, move it to working position, and proceed with automatic operations. The green light signal turns on.



5. Remove magazines from the output tray and add magazines to the input tray or a full magazine error will occur and stop operations.

## Material Shortage Operation

If no magazine is present in input tray, the machine is in Material Shortage status. The machine can operate normally but the Green and Yellow signal lights turn on, the Red signal light flashes and the Buzzer sounds.

1. Add a magazine to the input tray and press Magazine Feed button on the front panel.
2. Select ALARM OFF on touch screen. The buzzer will stop and the machine will enter standby status as a new magazine becomes available.

**NOTE:** It is suggested that you do NOT select CANCEL during a material shortage operation. Cancel stops the machine immediately and any material remaining in the machine will not be processed and will have to be removed by the operator.

## Release / Change Magazine

When the machine is in automatic mode, the operator can release the work-in-process magazine and replace it with a new one.

1. Select PAUSE (START) on touch screen or press CANCEL so machine does not try to receive another magazine. Refer to [Main](#) (pg 24).
2. Press the Manual button on the front panel. [Front Control Panels](#) (pg 5).
3. Select CHANGEMAG on the touch screen. Refer to [Main](#) (pg 24).

## Skip Slot in Automatic Mode

Operator can cause the Loader or Unloader to skip the current magazine slot and move to the next magazine slot.

To skip a magazine slot:

1. Select PAUSE on touch screen. Refer to [Main](#) (pg 24).
2. Press the Manual button on the front panel. [Front Control Panels](#) (pg 5).
3. Press NEXT SLOT on touch screen. Refer to [Main](#) (pg 24).

## Operating in Error Mode

If the machine cannot operate properly, normal operations will be suspended while the machine operates in error mode. Error mode is accompanied by the buzzer, the red tower light, and an error message.



To clear an error mode and restart the machine:

1. Inspect operation status.
2. Then choose the appropriate action from the following table:

| Operation Status    | Action   |
|---------------------|--|
| Can be recovered    | <p>1 - Clean the physical error condition.<br/>     2 - Press OK in the error dialog. A dialog displays: "Go into manual mode?"<br/>     3 - Make a selection depending on conditions:</p> <p>Select <b>NO</b> if nothing needs to be changed. The machine will operate in automatic mode continuously.</p> <p>Select <b>YES</b> if changes or inspection is necessary. The machine will exit automatic mode. In the future, select START to enter automatic mode again.</p> |
| Cannot be recovered | <p>1 - Press the E-Stop button or switch off main power.<br/>     2 - Clear the physical error condition.<br/>     3 - Restart.</p>  |

## Shutdown

To stop production:

1. Select STOP in the [Production](#) (pg 25) screen.
2. Turn off the optional heater.
3. Turn off the vacuum switch.
4. Turn off main power.

## **Parts List**

For consumable, spare, and general part information, refer to this document:

*Loader/Unloader Parts List (PN 24000601).*

## Specifications

**NOTE:** Unless otherwise noted, all specifications apply to all models of Loader and Unloader.

Typically, the Loader and Unloader have no requirements beyond that of the machine to which they are mounted.

|                           |  |
|---------------------------|--|
| Operation Modes . . . . . | Operates as part of MAX Series dispense machine,<br>operates separately from MAX Series dispense machine, and<br>operates individually (separately from Loader or CycDog). |
| User interface . . . . .  | 7" touch screen in English and Chinese.  |

## Capacities

Number of magazines . . . . . Limited by input buffer area of 300 mm L x 200 mm D

Magazine specifications . . . . . See Table 1.

**Table 1: Magazine Specifications**

| Magazine Specifications         | Models<br>PN 24000013, 24000014                                  |
|---------------------------------|--|
| Magazine size, minimum          | 150 mm L x 35 mm D x 117 mm H<br>(5.90" L x 1.37" D x 4.60" H)   |
| Magazine size, maximum          | 300 mm L x 200 mm L x 180 mm H<br>(11.81" L x 7.87" L x 7.08" H) |
| Magazine weight limit*, maximum | 8 kg (17.6 lb)<br>*capacity of Z-clamp and Z-motor               |

## Power supply

All power cables supplied by the facility for the machine must be in conformance with technical regulations and be in perfect technical condition.

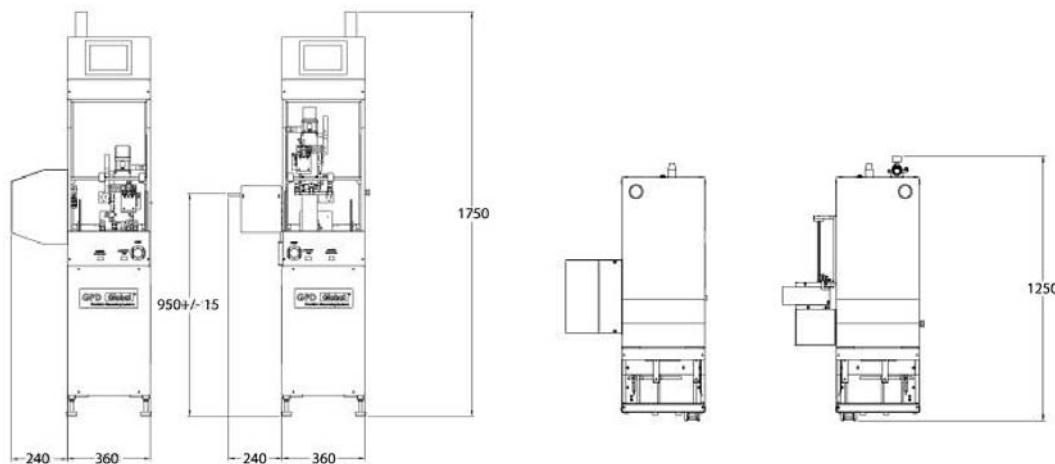
Before connecting the machine to the power supply, the main switch must be in the "OFF" position.

## Facility Requirements

Typically, the Loader/Unloader system has no requirements beyond that of the process machine to which it is mounted.

|                             |  |
|-----------------------------|--|
| Relative Humidity . . . . . | Not to exceed 80%  |
| Temperature Range . . . . . | Between 20°C and 30°C<br>Large temperature fluctuations should be avoided.   |
| Power                       |  |
| Voltage . . . . .           | 220V, 50-60 Hz   |
| Current . . . . .           | 5A, 4A in normal operation, 16A for break switch   |
| Phase . . . . .             | Single   |
| Plug . . . . .              | Customer supplies connection hardware to bare end of cable per customer's facility requirements and specifications for needed voltage.   |
| Compressed Air . . . . .    | 24000014 (Unloader) only:<br>2 CFM @ 5-6 bar (72-87 psi) with 8 mm O.D. air line push fit fitting  |
| Clearance . . . . .         | For ease of operation and maintenance access, allow an additional 300 mm (11.8") open space to left of Loader / right of Unloader, and 300 mm (11.8") open space in front of each machine. |

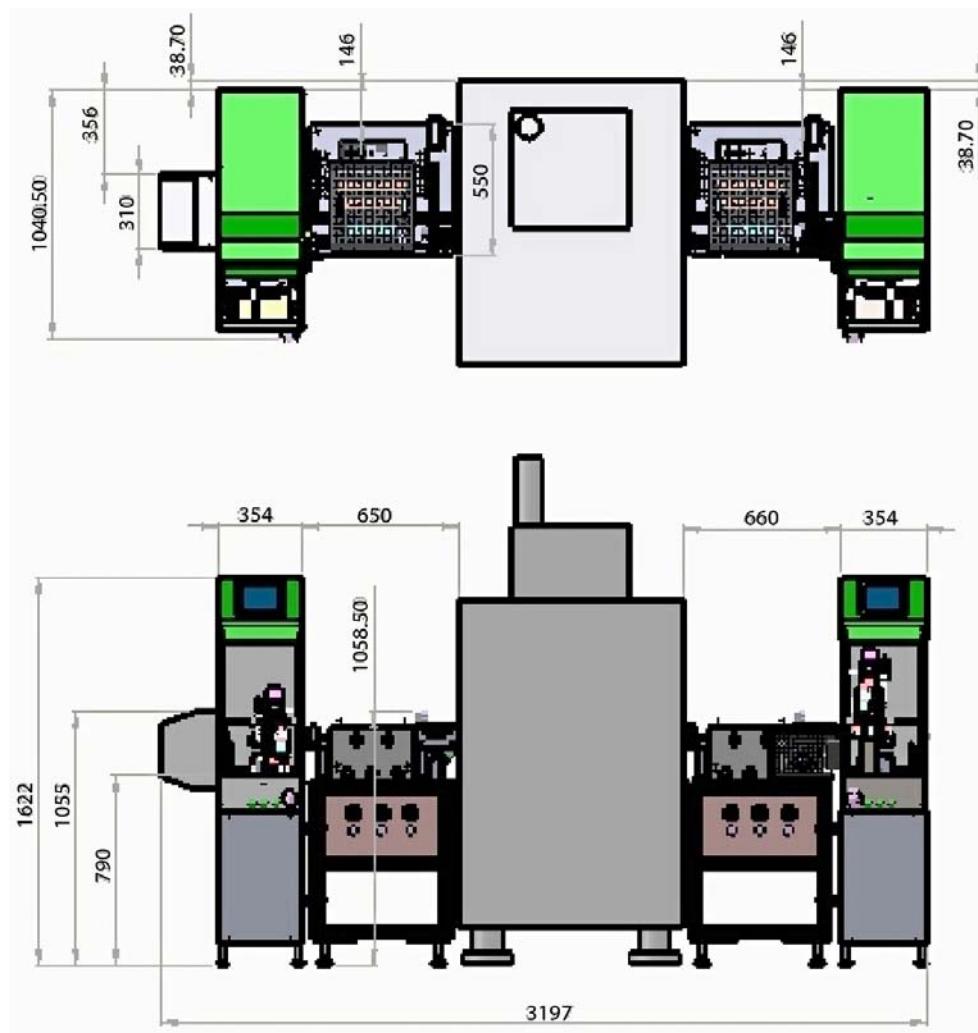
Footprint (L x W x H) . . . . . 1250 mm x 600 mm x 1750 mm  
(49.2" x 23.6" x 68.9")



Crated dimensions . . . . . 24000013 (Loader) **with** 24000014 (Unloader):  
1.4 m x 1.22 m x 1.7 m (55" x 48" x 67")

Crated weight . . . . . 24000013 (Loader) **with** 24000014 (Unloader):  
430 kg (948 lbs)

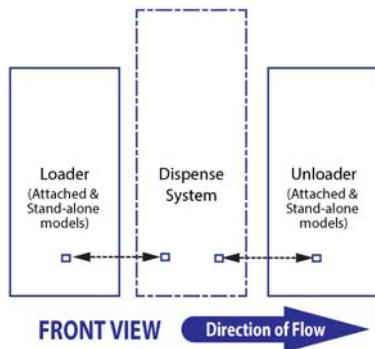
Footprint with optional Heated Conveyor Modules (L x W x H)  
3197 mm x 1040.5 mm x 1622 mm  
(125.87" x 40.96" x 63.86")



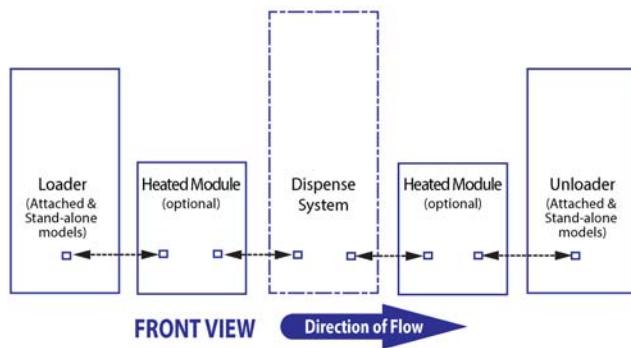
## SMEMA Communication

- SMEMA cables included.
- Standard direction of flow is left-to-right.

### Simplest Scenario

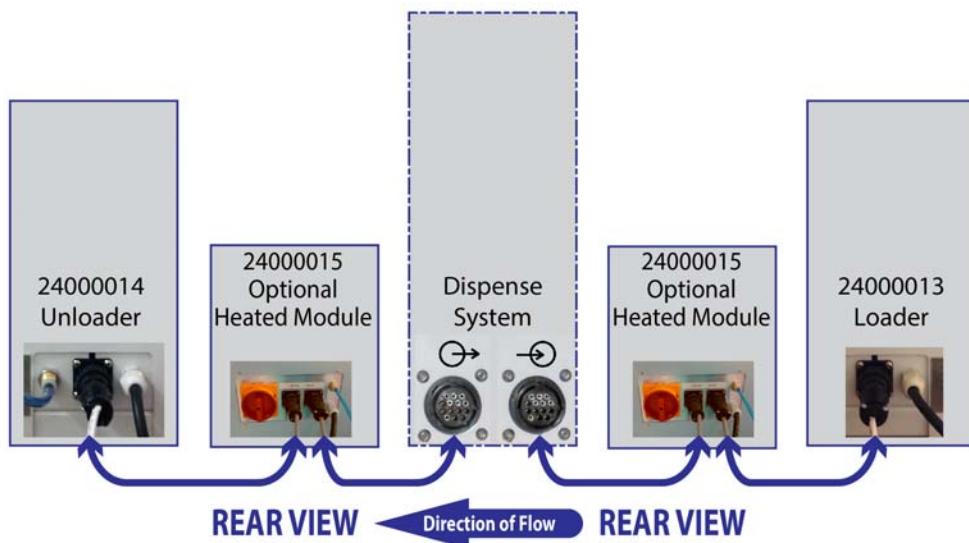


### Full Line



### SMEMA Connections & Ports

For additional details, refer to [Rear Panel](#) (pg 8).



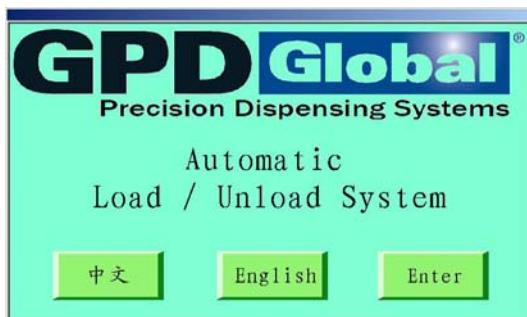
## Windows

- [Boot](#) (pg 24)
- [Main](#) (pg 24)
- [Production](#) (pg 25)
- [Diagnosis](#) (pg 26)
- [Setup](#) (pg 27)
- [Password](#) (pg 36)
- [History](#) (pg 36)
- [Versions](#) (pg 37)

### Boot

The following window displays after the machine is started.

- To enter the English system, select the ENGLISH button and then press ENTER.
- To enter the Chinese system, select the  button and then press ENTER.



### Main

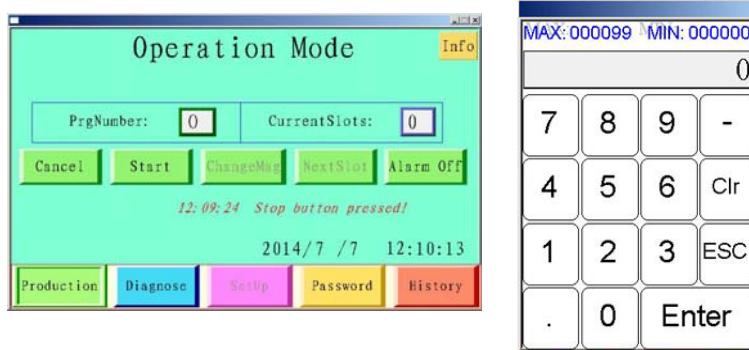
Use this window to navigate to specific function windows.



|                |  |
|----------------|--|
| PRODUCTION     | Enter the Production window to perform production operation.                 |
| DIAGNOSE       | Enter the Diagnose window to inspect system status.                          |
| SETUP          | Enter the Setup window to change the system parameter and program parameter. |
| PASSWORD       | Enter the Password window to login to the system.                            |
| HISTORY        | Enter the History window to inspect the history record.                      |
| A = status bar | Displays machine status. Refer to <a href="#">Status Messages</a> (pg 38).   |

## Production

To enter Production mode, select PRODUCTION on the Main window (page 24).



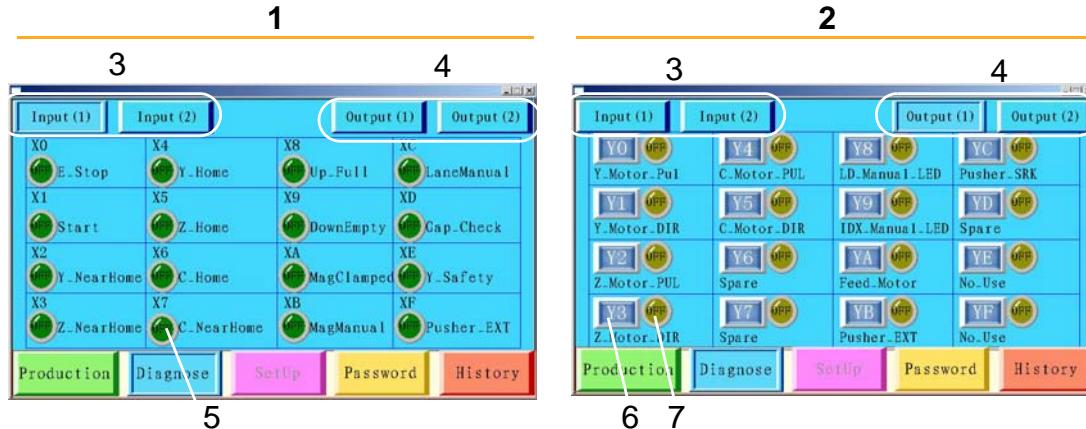
|                |  |
|----------------|--|
| PRODUCTION     | Starts production mode.  |
| PrgNumber      | Press to select current program number for product processing.   |
| CurrentSlots   | Displays the number of the slot currently being processed.   |
| START / MANUAL | START - Switches automatic mode on/off. Toggles between Pause for automatic mode and Start for manual mode.<br><br>MANUAL - Enters Manual production mode, and activates ChangeMag and Next-Slot buttons. Toggles to Automatic mode. |
| CHANGE MAG     | Releases the on-hold magazine and gets a new one. Active in Manual mode and when the physical Manual button is pressed.  |
| NEXT SLOT      | Moves magazine to next slot. Active when system is in Manual mode and when the physical Manual button is pressed.  |
| ALARM OFF      | Silences the buzzer.   |
| CANCEL         | Stops system operations.   |

## Diagnosis

To open the Diagnose window, select DIAGNOSE on the Main window (page 24).

**NOTE:** To activate outputs, the machine must be in Pause mode.

Select an Input or Output button to select the object you want to diagnose in the Input Status window or the Output Status window:



|   |                             |   |
|---|-----------------------------|---|
| 1 | <b>Input Status window</b>  | Select an input object to diagnose.   |
| 2 | <b>Output Status window</b> | Select an output object to diagnose.  |
| 3 | Input (1)<br>Input (2)      | Press either of these buttons to open the input status window.                          |
| 4 | Output (1)<br>Output (2)    | Press either of these buttons to open output status window.                             |
| 5 | Input status                | LED buttons display the status of input.  |
| 6 | Manual                      | Press a manual button to conduct manual operation and inspect whether output is normal. |
| 7 | Output status               | LED buttons display the status of output.   |

## Setup

To open the Setup window, select SETUP on the Main window (page 24).

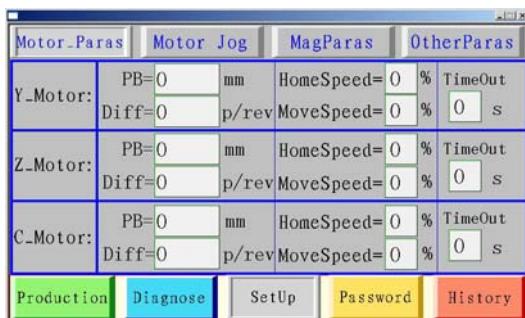
Select a parameter button to open the desired type of parameters window.



- [Motor Parameters \(pg 27\)](#)
- [Motor Jog \(pg 28\)](#)
- [Base Location \(pg 29\)](#)
- [Magazine Parameters \(pg 33\)](#)
- [Other Parameters \(pg 35\)](#)

### Motor Parameters

Use MOTOR PARAMETERS to set parameter values for the motor.

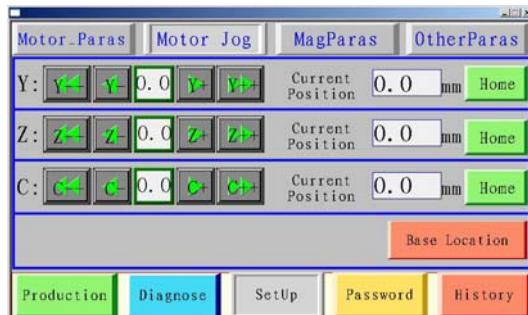


|              |   |
|--------------|---|
| PB = mm      | Screw pitch. Travel distance in one motor turn.   |
| Diff = p/rev | Sets number of pulses in one motor turn.  |
| HomeSpeed= % | Sets speed for homing. Percent of maximum speed.  |
| MoveSpeed= % | Sets speed for normal operations. Percent of maximum speed.   |
| TimeOut      | Maximum amount of time for homing. If homing exceeds this value, the system will report a homing error. |

## Motor Jog

---

Use MOTOR JOG to manually operate the motor for the Magazine Handler.



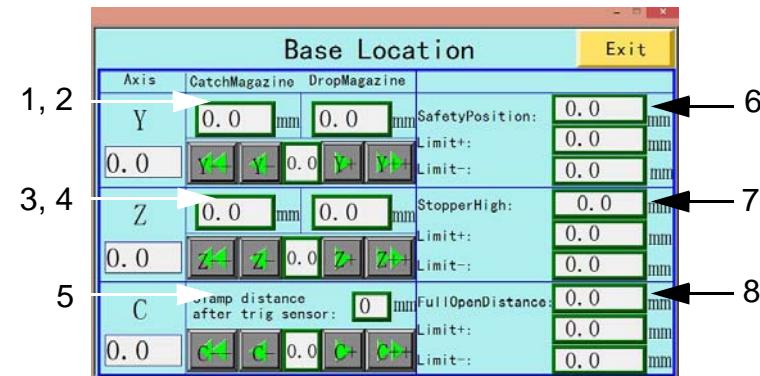
|                  |  |
|------------------|--|
| or               | Performs step motion. Axis moves backward or forward the distance set in the "0.0" field.                              |
| or               | Performs continuous jog motion. Axis moves at MoveSpeed set in <a href="#">Motor Parameters</a> (pg 27).               |
| Current Position | Displays the current motor position.   |
| 0.00 mm          | Select to input a value for step moving distance.  |
| HOME             | Performs homing action. The Magazine Handler must be empty (no magazines) or the C-axis HOME button will not function. |
| BASE LOCATION    | Opens the Base Location window - refer to <a href="#">Base Location</a> (pg 29).                                       |

## Base Location

Use the Base Location to input system parameter(s). This window requires third level security access.

**IMPORTANT:** Base Location use should be restricted to qualified engineer or maintenance personnel when verifying or teaching base location. Base location is initially established at the factory.

**IMPORTANT:** If existing Base Location values are lost, all values must be re-taught.



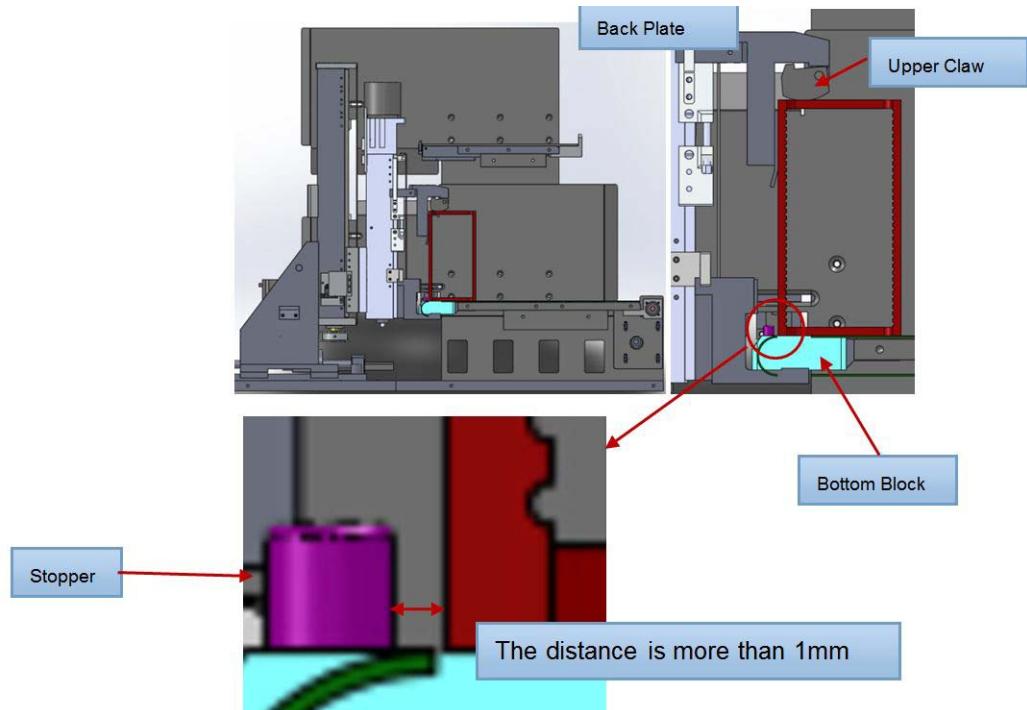
|      |   |
|------|---|
| 1    | Sets the Catch Position of Y axis. Refer to <a href="#">Catch Position</a> (pg 30).         |
| 2    | Sets the Drop Position of Y axis. Refer to <a href="#">Drop Position</a> (pg 30).           |
| 3    | Sets the Catch Position of Z axis. Refer to <a href="#">Catch Position</a> (pg 30).         |
| 4    | Sets the Drop Position of Z axis. Refer to <a href="#">Drop Position</a> (pg 30).           |
| 5    | Sets the C axis travel distance when sensor is triggered.                                   |
| 6    | Sets the Safety Position of Y axis. Refer to <a href="#">Safety Position</a> (pg 31).       |
| 7    | Sets the stopper height. Refer to <a href="#">Stopper High</a> (pg 32).                     |
| 8    | Sets the C axis position in Full Open. Refer to <a href="#">Full Open Distance</a> (pg 32). |
| EXIT | Returns to <a href="#">Motor Jog</a> (pg 28) window.  |

**Figure 7:** Default base location values for Loader (left) and Unloader (right).



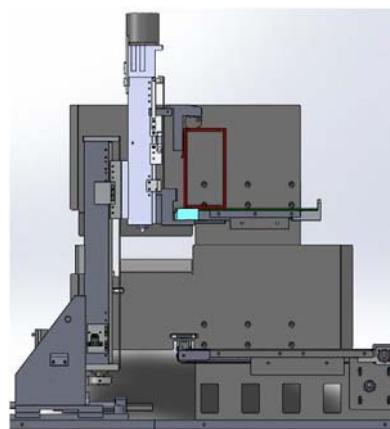
### Catch Position

When a magazine is ready in the input tray, the Magazine Handler moves to Catch Position to get the magazine. In Catch Position, the Bottom Block makes light contact with the magazine, the Upper Claw secures the magazine, and the Back Plate pushes the magazine toward the Stopper leaving at least a 1 mm gap.



### Drop Position

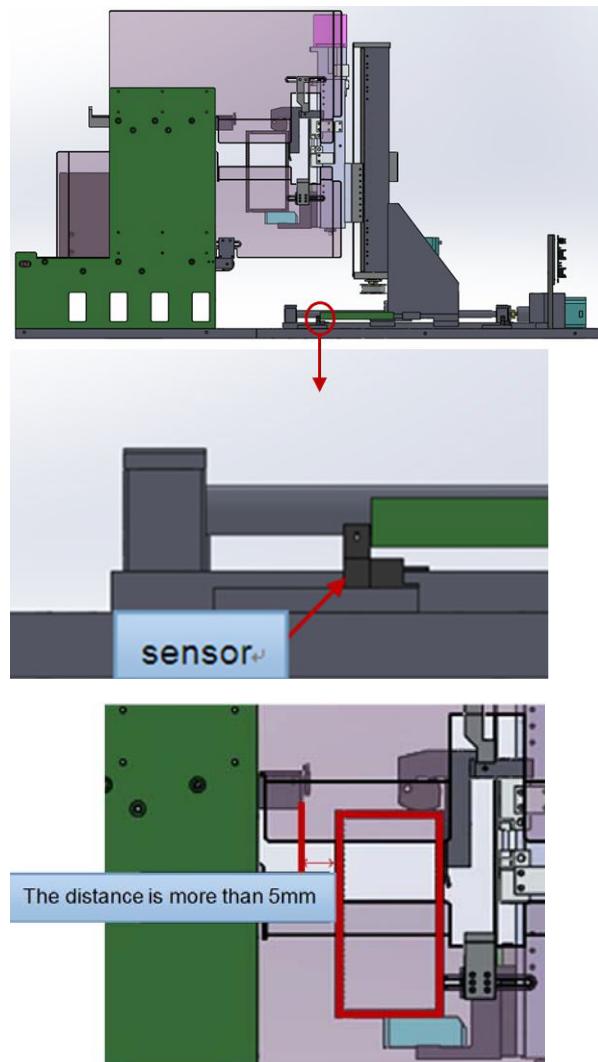
When a magazine is full, the Magazine Handler moves to Drop Position, and moves the magazine into the output tray. In Drop Position, the magazine is held with the bottom of the magazine just touching the output tray.



### Safety Position

The Magazine Handler can move to Safety Position when both of these conditions are met: (1) magazine is completely outside of the tray, and (2) the safety sensor is not activated.

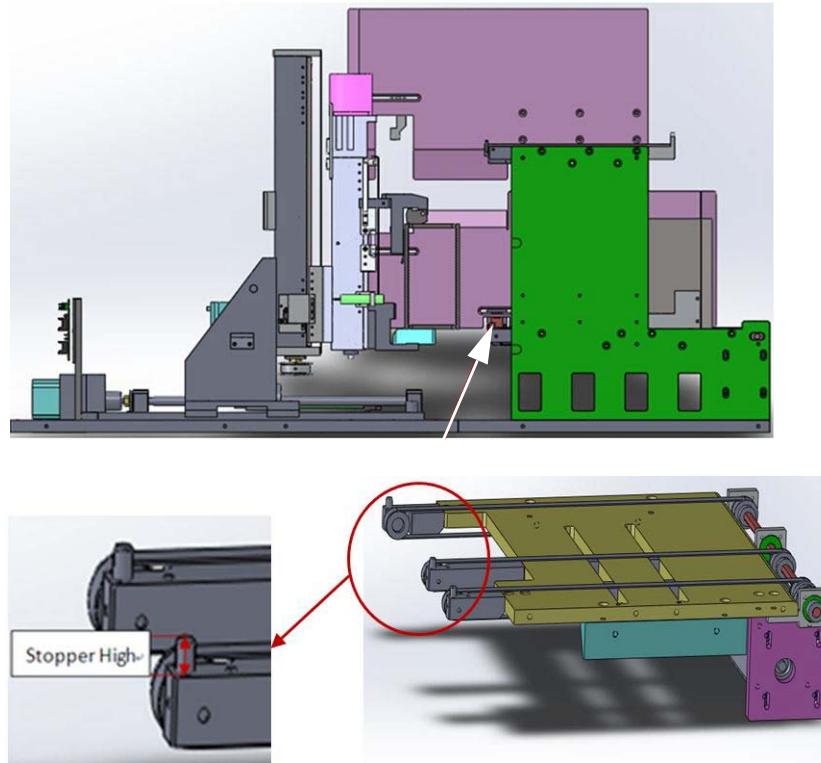
From zero to the sensor is safety position. You can adjust all axes to the safety position.



### Stopper High

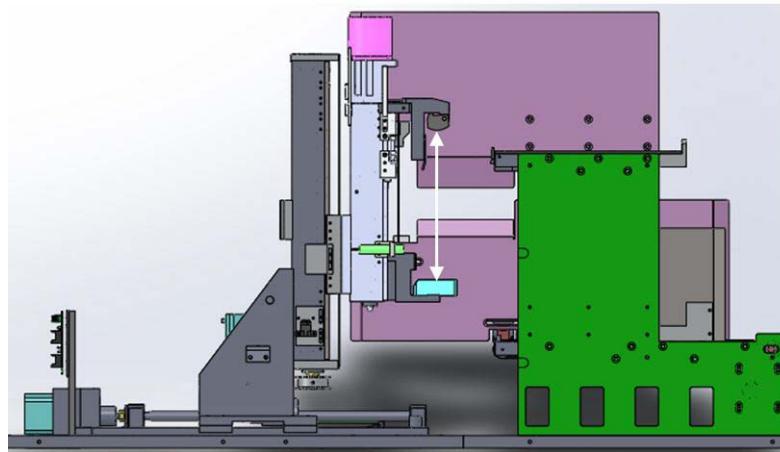
Stopper High protects magazines from sliding out of the tray.

**NOTE:** The Magazine Handler should never contact the Stopper High.



### Full Open Distance

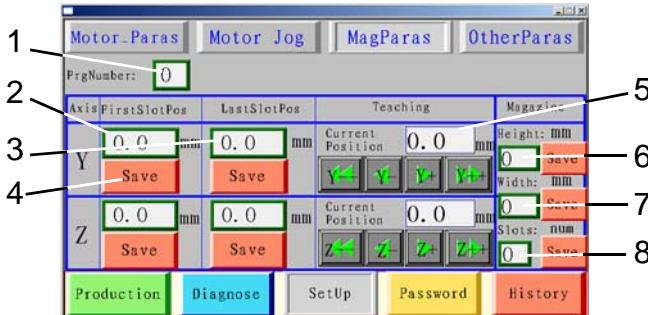
The Magazine Handler moves to Full Open Distance (C axis position) to safely catch a magazine. The clamp positions a magazine on the upper tray, and then retracts and returns to its home position.



## Magazine Parameters

Use MAGAZINE PARAMETERS to set parameter values for magazine.

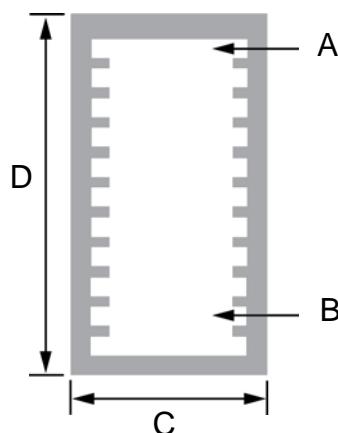
**NOTE:** Before teaching a new slot position, set Z axis and Y axis to home using [Motor Jog](#) (pg 28).



|   |   |
|---|---|
| 1 | Displays current program number.  |
| 2 | Displays and sets the position of the <b>first</b> magazine slot in Y axis.                         |
| 3 | Displays and sets the position of the <b>last</b> magazine slot in Y axis.                          |
| 4 | Saves modified data in the corresponding field.   |
| 5 | Displays and teaches magazine height.   |
| 6 | Displays and teaches magazine width.  |
| 7 | Displays and teaches the number of slots in a single magazine.                                      |
| 8 | Displays and teaches the current position of Y axis. Used to teach required data for items 2 and 3. |

Setting a first and last slot in a magazine determines the direction of magazine movement. Any slot can be designated as first or last slot within the top-most to bottom-most range of slots. Oftentimes, the top-most slot is designated as first slot due to its closer proximity to the magazine tray.

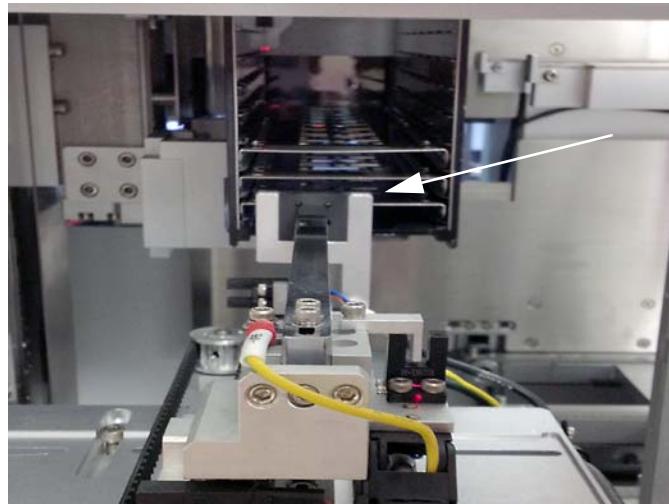
**Figure 8:** First and last slot positions can be located at either the top or bottom of the magazine.



|   |                  |   |                 |
|---|------------------|---|-----------------|
| A | Top-most slot    | C | Magazine width  |
| B | Bottom-most slot | D | Magazine height |

**First Slot Position**

When the status bar displays FIRST\_SLOT\_POS, adjust all axes so the magazine handler is aligned with your choice of first slot. The pusher must be able to smoothly push a substrate into the slot.

**Last Slot Position**

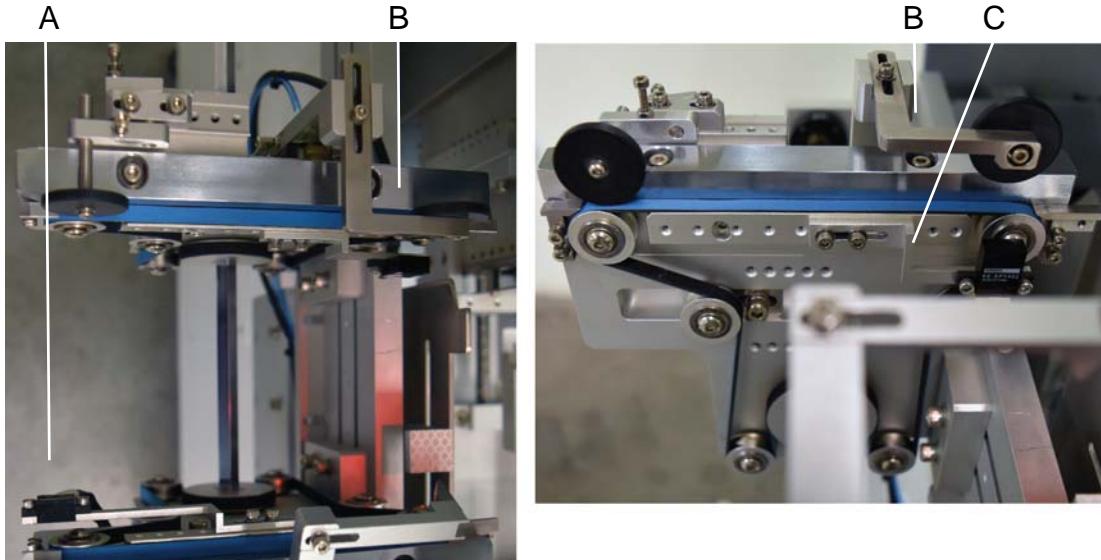
When the status bar displays LAST\_SLOT\_POS, the Clamp moves the magazine so the magazine handler is aligned with your choice of last slot. Again, the pusher must be able to smoothly push a substrate into the slot.

## Other Parameters



- |   |  |
|---|--|
| 1 | Displays and sets the current program number.  |
| 2 | Displays the machine currently controlled by software.   |
| 3 | 0 = no ejector, 1 = with ejector   |
| 4 | TimeOut is the maximum amount of time for homing. If homing exceeds this value, the system will report a homing error.   |
| 5 | The amount of time after a magazine trips the (C) Board Clear Sensor and before the (B) Wheel clamps onto that magazine. Refer to Figure 9. The (A) Board Detect Sensor is noted in the top view image for reference only. |
| 6 | Saves modified parameter.  |

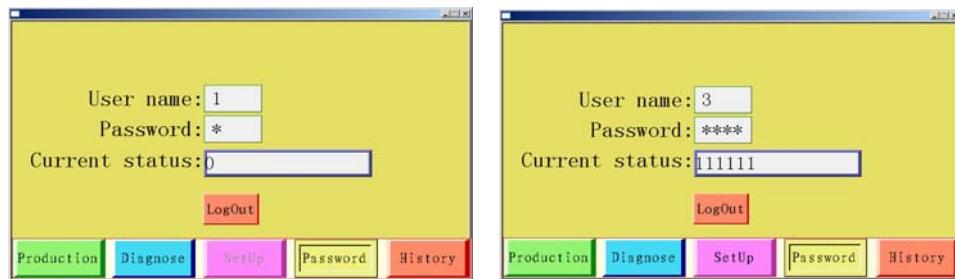
**Figure 9:** Wheel delay affects when (B) Wheel clamps onto magazine at (C) Board Clear Sensor position.



|   |                     |
|---|---------------------|
| A | Board detect sensor |
| B | Wheel               |
| C | Board clear sensor  |

## Password

Use this window to input user name and password. A user name needs to be set up before parameters can be changed. Passwords are a maximum of four characters.



## Security

Access to various system operations is controlled by unique, user-defined passwords that protect against unauthorized use of the access rights assigned to a user name. There are three user names (access levels):

**Table 2: Security levels**

| User Name | Access Level | Accessible Operations   |
|-----------|--------------|---|
| 1         | Operator     | Normal production operations.   |
| 2         | Technician   | Can perform normal production operations plus change product parameters, change program, and teach magazine position. |
| 3         | Engineer     | Can perform all operations.   |

An error message displays if you attempt to change parameters without adequate security access.



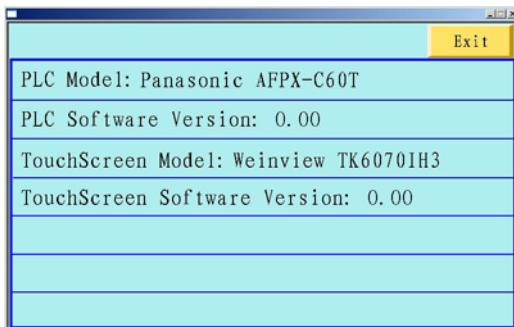
## History

This window displays historical records of operation.



## Versions

This window displays model and version data about the PLC and control software. To open this window, select the INFO button on the [Main](#) (pg 24) screen.



## Status Messages

The following is a list of status messages that may display in the status bar during operation. Status messages are recorded in [History](#) (pg 36) records.

| Message                                       | Description  |
|---|--|
| <i>Magazine Clamped sensor is not active!</i> | Inspect magazine for proper clamping.<br>Inspect sensor.   |
| <i>E-Stop button pressed!</i>                 | Release the E-stop button.   |
| <i>Full magazine sensor active</i>            | Inspect output tray. If it is full, remove it.<br>Inspect sensor.  |
| <i>Empty magazine sensor active.</i>          | Inspect input tray. If it is empty, put magazine in input tray and continue production.<br>Inspect sensor.                                     |
| <i>Pusher in sensor is not active!</i>        | Inspect sensor.<br>Inspect motor.  |
| <i>Gap check sensor active!</i>               | Inspect for product between Loader and lane.<br>Inspect for proper alignment position of Loader and lane.<br>Inspect sensor.                   |
| <i>Y safety sensor active!</i>                | Inspect lift. If it is in Y safety position, manually push it in Y axis back to home position,<br>then continue production.<br>Inspect sensor. |
| <i>Pusher jam sensor active!</i>              | Inspect for jammed product in Loader where it is ejected.<br>Inspect sensor.   |
| <i>Pos in sensor active!</i>                  | Inspect for product between Loader and lane. This may be caused by improper alignment<br>of Loader and lane.<br>Inspect sensor.                |
| <i>Pos bond sensor active!</i>                | Remove product or object in lane before continuing production.   |
| <i>Pos out sensor active!</i>                 | Remove product or object in lane before continuing production.   |
| <i>Pusher cannot move out</i>                 | The pusher cannot move out within the limit time set by system. Inspect for excessive<br>spring power or broken motor.                         |
| <i>Out check sensor active!</i>               | Inspect for product between Loader and lane.<br>Inspect for proper alignment position of Loader and lane.<br>Inspect sensor.                   |
| <i>Pusher cannot move in</i>                  | Inspect pusher for possible jam.<br>Inspect motor for possible damage.   |
| <i>Stopper cannot move up!</i>                | Inspect air supply.<br>Inspect cylinder for possible damage.<br>Inspect sensor.  |
| <i>Pusher move out jam</i>                    | Inspect loader for jammed product where it is pushed out.<br>Inspect sensor.   |
| <i>Parameters not complete!</i>               | Complete input for all parameters.   |
| <i>Stopper cannot move down!</i>              | Inspect air supply.  |
| <i>Work holder cannot move up!</i>            | Inspect cylinder for possible damage.  |
| <i>Work holder cannot move down!</i>          | Inspect sensor.  |
| <i>PreHeat not arrived temperature!</i>       | Inspect preheat time.<br>Inspect heating switch to be sure it is turned on.<br>Inspect heating tube for possible damage.                       |
| <i>The product blocked in the lane!</i>       | Inspect for misshapen product.<br>Inspect lane width.  |
| <i>Y axis positive over travel!</i>           | The requested target position is outside Y axis travel.  |
| <i>Y axis negative over travel!</i>           | The requested target position is outside Y axis travel.  |
| <i>Y reset time out!</i>                      | Inspect for cause of Y axis time out for homing. If problem is due to insufficient time, reset<br>the TimeOut parameter.                       |
| <i>Z axis positive over travel!</i>           | The requested target position is outside Z axis travel.  |
| <i>Y axis parameters is not complete!</i>     | Complete input for all parameters.   |
| <i>Z axis negative over travel!</i>           | The requested target position is outside Z axis travel.  |

| Message                                   | Description   |
|---|---|
| <i>Z reset time out!</i>                  | Inspect for cause of Z axis time out for homing. If problem is due to insufficient time, reset the TimeOut parameter. |
| <i>Z axis parameters is not complete!</i> | Complete input for all parameters.  |
| <i>C axis positive over travel!</i>       | The requested target position is outside C axis travel.   |
| <i>C axis negative over travel!</i>       | The requested target position is outside C axis travel.   |
| <i>C reset time out!</i>                  | Inspect for cause of Z axis time out for homing. If problem is due to insufficient time, reset the TimeOut parameter. |
| <i>C axis parameters is not complete!</i> | Complete input for all parameters.  |

## Appendices

- [Heated Conveyor Module](#) (pg 40)
- [Electrical Schematic](#) (pg 42)

### Heated Conveyor Module

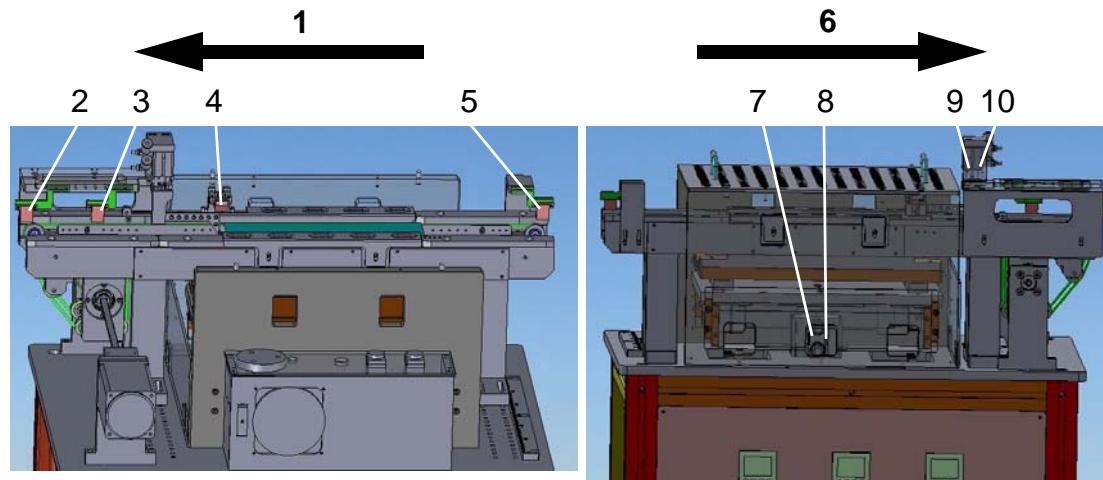
#### OPTIONAL EQUIPMENT

The optional heated conveyor module is a single lane transportation unit. It can move product to the centrally located heating zone, and then, after product is processed, move it to the downstream system.

- [Pre-Heat Module Sensors](#) (pg 40)
- [Post-Heat Module Sensors](#) (pg 41)

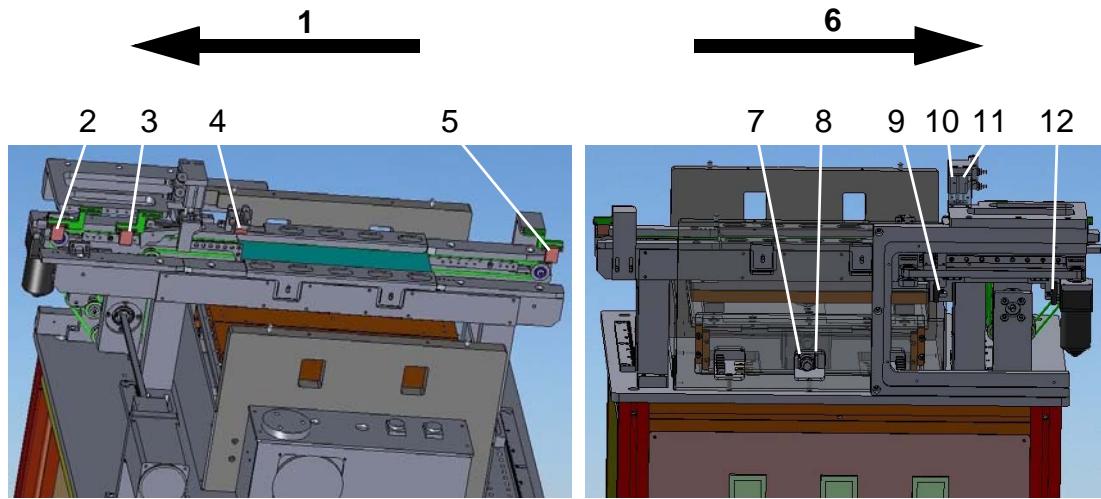
#### Pre-Heat Module Sensors

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| 1  | Rear view  | Direction of flow.  |
|----|------------|---|
| 2  | Sensor     | Checks whether product is totally pushed to processing system.  |
| 3  | Sensor     | Checks whether product leaving the position; if so, pusher will push it to processing system.                   |
| 4  | Sensor     | Checks whether product pushed in place; if so, the belt will stop moving, and heating module begins heating up. |
| 5  | Sensor     | Checks whether there is product in lane.  |
| 6  | Front view | Direction of flow.  |
| 7  | Sensor     | Raised position of work holder.   |
| 8  | Sensor     | Lowered position of work holder.  |
| 9  | Sensor     | Raised position of stopper.   |
| 10 | Sensor     | Lowered position of stopper.  |

## Post-Heat Module Sensors



| <b>1</b> | <b>Rear view</b>  | Direction of flow.  |
|----------|-------------------|---|
| 2        | Sensor            | Checks whether product is pushed out to the position.   |
| 3        | Sensor            | Checks whether product pushed in place; if so, the belt will stop moving, and heating module begins heating up. |
| 4        | Sensor            | Checks whether product leaving the position; if so, product will move to processing system.                     |
| 5        | Sensor            | Checks whether product is totally transported to processing system.   |
| <b>6</b> | <b>Front view</b> | Direction of flow.  |
| 7        | Sensor            | Raised position of work holder.   |
| 8        | Sensor            | Lowered position of work holder.  |
| 9        | Sensor            | Pusher retraction position.   |
| 10       | Sensor            | Raised position of stopper.   |
| 11       | Sensor            | Lowered position of stopper.  |
| 12       | Sensor            | Pusher extended position.   |

## Electrical Schematic

- [Electrical Schematic \(pg 42\)](#)

# **Electrical Schematic**

