



OSL - SINGLE TOTE – ALLEN BRADLEY PLC

OPERATION AND MAINTENANCE MANUAL

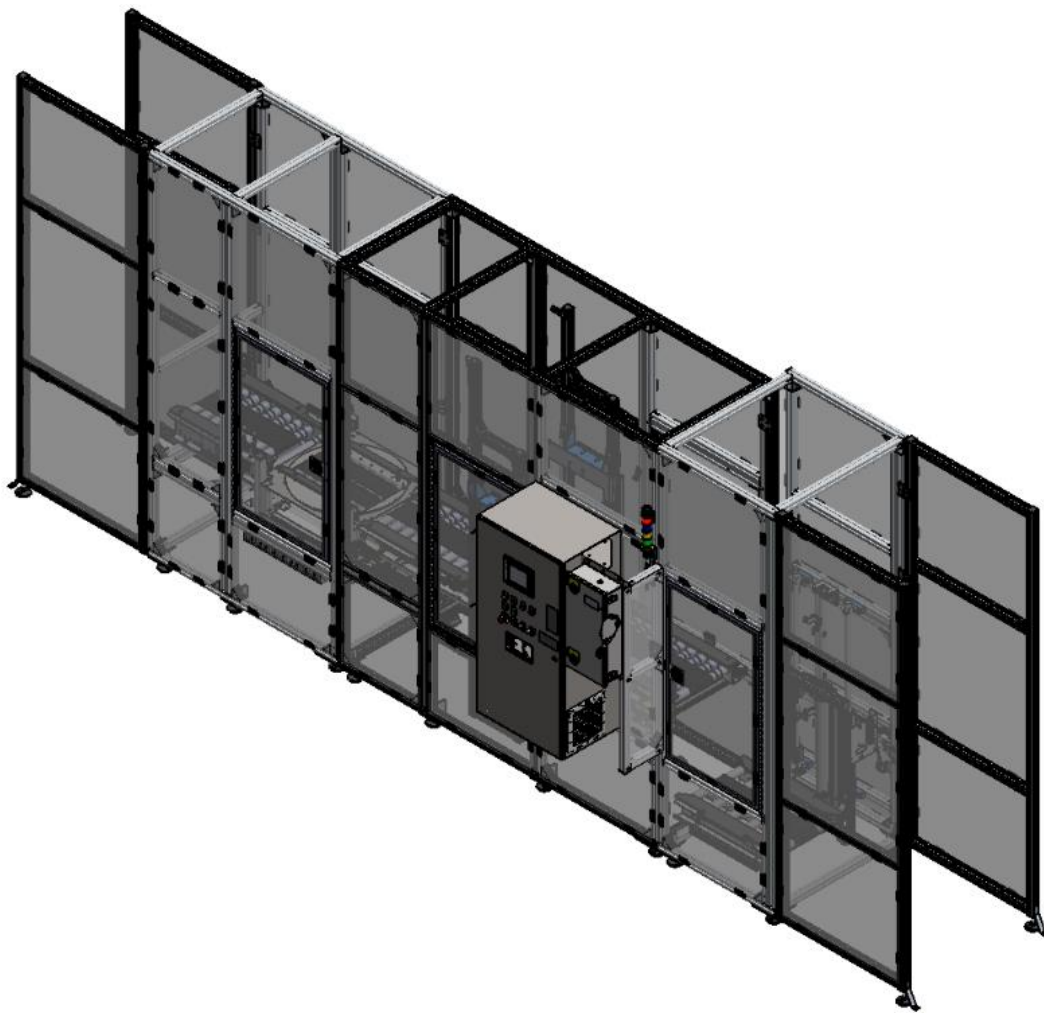


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1 Safety

The installation, service and maintenance of equipment described in this document is to be performed by qualified personnel who are employed by United Sortation Solutions Inc. or one of its affiliates or who are otherwise qualified by United Sortation Solutions or one of its affiliates to provide such services. All other persons including maintenance personnel and other persons who are not employed by or otherwise directly affiliated with or qualified by United Sortation Solutions or one of its affiliates are directed to contact one of the local offices of United Sortation Solutions or one of its affiliates before attempting installation, service or maintenance procedures.

During maintenance the system must be sufficiently powered down so that the restarting of the system or subsystem is impossible. The main cabinet control switch should also be locked and tagged out in the "off" position.

Ensure nearby personnel are aware of the work being performed and provide enough distance from the system or subsystems, including loose fitting clothes, so as to not endanger the safety of others.

Do not reach into, touch or otherwise engage with the system or subsystems, other than user interface areas, while the system is powered and/or operational. This can cause personal injury and damage to the machine.

Safety systems as installed should never be removed or de-activated from the system during operation.

Ensure a clean working/operation space around the system to prevent tripping over materials and undesirable contact with the system.

Never operate outside the stated technical specifications of the system.

2 Warning



Before operation of this United Sortation Solutions System, this manual should be thoroughly read.

This manual is meant for the operation and maintenance of an OSL.

3 Liability

This Instruction Manual is only valid for the machine as specified in the introduction section and does not apply to equipment or to the interface with this equipment, otherwise than supplied by United Sortation Solutions Inc.

4 System Description and Basic Operation

4.1 Overview

The Orienting Stacker Lowering (OSL) Module is an electro-mechanically-operated tote stacker. It is PLC-controlled, requiring a 480V 3 phase electrical connection and compressed air for pneumatic operation. The OSL is comprised of three sub-modules, one each for the Orientation, Stacking and Lowering of totes.

The totes used in this machine can only be nested if they are oriented in the same direction. If this is not the case, the totes will stack and not nest (photo 4.1). This is inefficient for the storage of large numbers of totes, so tote-nesting is preferred. The OSL is therefore capable of determining the orientation of an individual tote prior to stacking, and if necessary, rotating the tote by 180 degrees.



Photo 4.1 Nested totes on the left, stacked totes on the right – the latter are not oriented in the same direction, resulting in a taller stack.

4.1.1 Orientation

The Orientation sub-module consists of a short conveyer Infeed section and a rotating turntable - the Flexible Turntable Unit or FTU.

Totes enter the OSL from the site's upstream conveyer system. As the tote enters the Infeed section, the tote stop is in the raised position which prevents the tote moving downstream into the FTU. While the tote is stationary, two photoeyes detect the orientation of the tote (photo 4.2). If both photoeyes are blocked, the tote stop will lower, the tote will move onto the FTU and will be rotated 180 degrees. If only one photoeye is blocked (the one furthest from the tote stop), the tote stop will lower, the tote will pass directly through the FTU and into the stacker. There is a single reed switch on the tote stop which reports when it is in the retracted (lowered) state.

When the tote stop is raised and a tote is present in the Infeed section, the rollers and belt will be running. This ensures that as soon as the tote stop lowers, the tote is immediately moved onto the FTU.



Photo 4.2 Photoeyes on Infeed to detect tote orientation. Tote stop can be seen in down position.

The FTU alternates between clockwise and counterclockwise rotations of 180 degrees each. The limit of rotation for the FTU, in each direction, is controlled by one of two proximity sensors beneath the turntable (photo 4.11). The FTU never rotates more than 180 degrees (half a revolution) in either direction, nor does it ever rotate twice in succession in the same direction.

There are three photoeyes on the FTU (photo 4.3). The one looking diagonally across the turntable is the Tote Present photoeye. The other two are used to detect jams by being blocked for a period determined by the PLC logic.

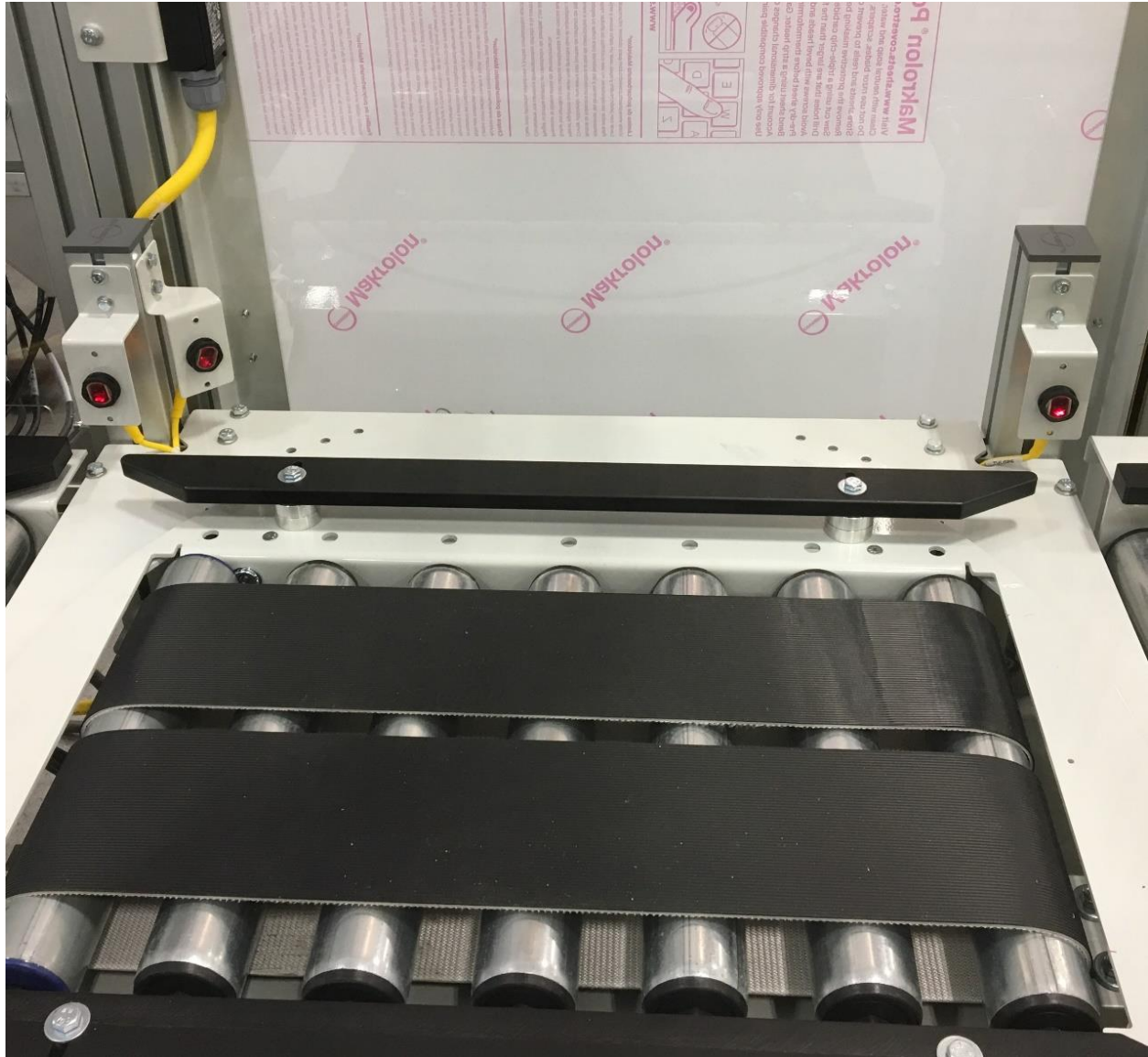


Photo 4.3 Photoeyes on FTU. The two on the outside detect tote jams. The one facing diagonally detects the presence of a tote.

4.1.2 Stacker

The Stacker sub-module consists of three small conveyer sections known as Zones 1, 2 and 3. Zone 2 has two sets of pneumatically-operated grippers and a pneumatically-operated lifting mechanism which together are used to create the tote stack.

Lifting Grippers: The lower pair of grippers are the lifting grippers which can extend and retract. The lifting grippers are used to raise individual totes to the waiting holding grippers above. Upon completion of a stack of twelve totes, the lifting grippers then lower the stack back down onto the Zone 2 rollers.

As the lifting mechanism raises and lowers, two adjustable proximity switches on the lift frame determine the upper and lower limit of travel (photo 4.4).

Holding Grippers: The upper pair of grippers are fixed-height holding grippers which can extend and retract. The holding grippers support the tote stack as it is assembled in the stacker.



Photo 4.4 Upper, Mid and Lower Proximity switches on the lifting mechanism.

Reed switches report the position of the individual gripper actuators: either extended (in) or retracted (out). There are 8 reed switches in total, two on each gripper, each with a green LED to detect and confirm actuation (photo 4.5).

There is a single reed switch on the stacker's tote stop which reports when it is in the retracted (lowered) state.

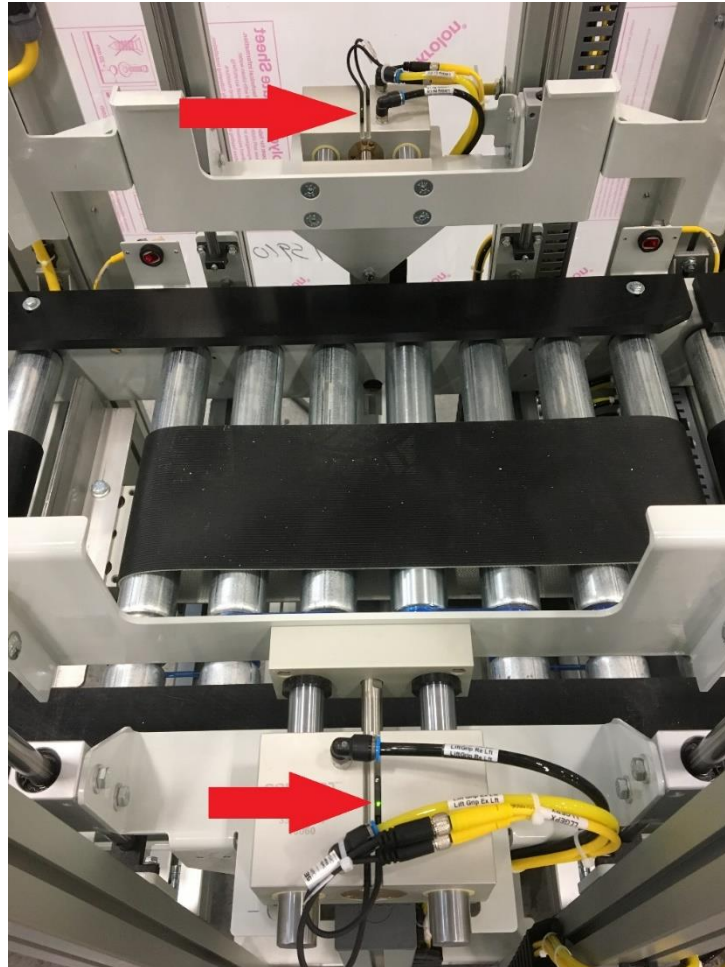


Photo 4.5 Reed switches on the lifting grippers (currently indicating extended position).

Each zone in the stacking sub-module has a zone photo-eye to detect presence of a tote. In addition, Zone 2 has a second photoeye that tells the PLC that a tote is positioned correctly and ready to be added to the stack (photo 4.6).

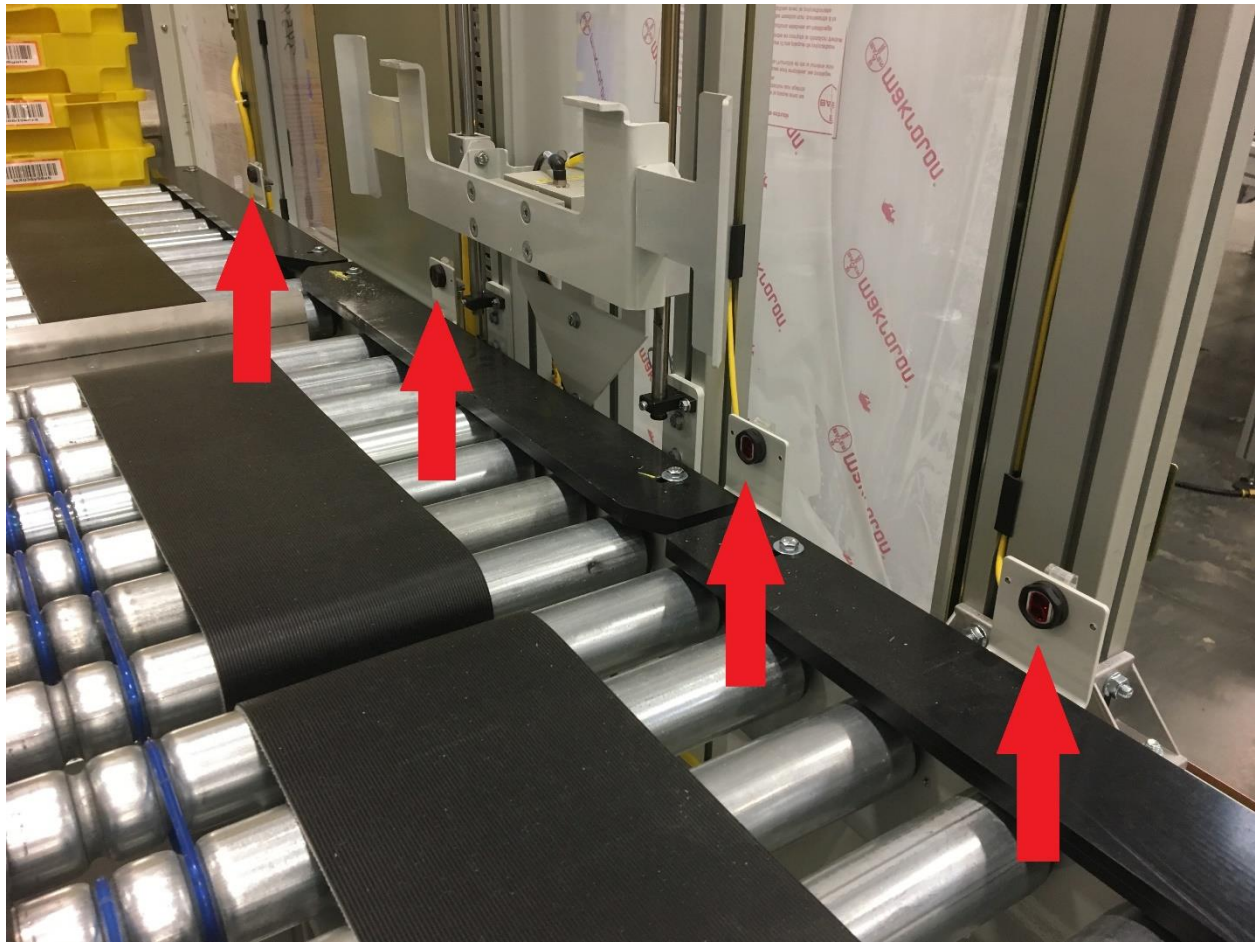


Photo 4.6 Stacking sub-module photoeyes. L-R: Zone 3 PE, Zone 2 PE, Tote Ready PE, Zone 1 PE.

Totes pass from the FTU to Stacking Zone 1 and then to Zone 2 assuming those zones are clear. A tote stop at the downstream end of Zone 2 raises to prevent the tote from progressing past the lifting mechanism. The tote position is ultimately controlled by the Zone 2 photo eye which stops the belt.

The stacking sequence then commences and is as follows:

1. Lifting grippers start in lowered position, extend and close around tote.
2. Lifting grippers raise tote to mid prox and continue upwards.
3. Holding grippers retract.
4. Lifting grippers continue to raise to slightly above level of holding grippers.
5. Holding grippers extend and close around tote.
6. Lifting grippers lower slightly and retract, releasing tote.
7. Lifting grippers lower fully and await next tote.
8. For the first tote through the eleventh tote in a stack, the sequence then repeats, adding one tote to the stack per cycle. Once the twelfth tote has been raised successfully and added to the stack, the Full Stack photoeye (photo4.7) is blocked and the stack is lowered, moved out of the stacker into Zone 3.

Two photoeyes on the stacking sub-module (photo 4.7), detect a tilted stack. Tilted stacks can be caused by a worn or misaligned tote nesting incorrectly when raised by the lifting grippers. This can result in the totes above tipping either forward or backward in the OSL. In this situation, upon activation of one of the tilt photoeyes, the stacking sequence is halted to prevent the tilted stack possibly falling. The stack is lowered and moved out of the stacker into Zone 3.

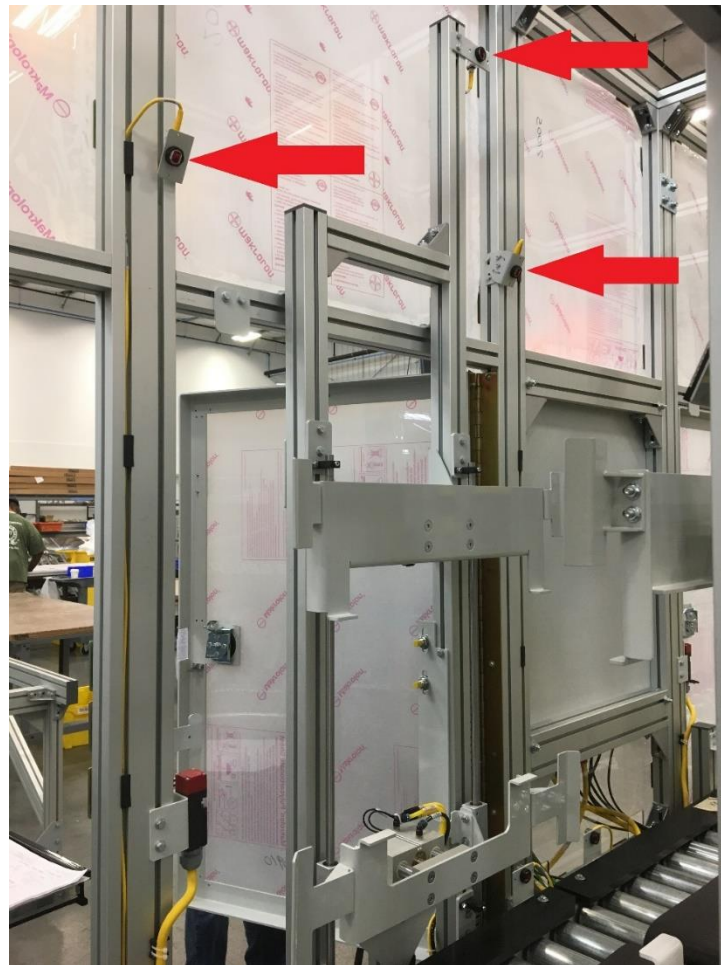


Photo 4.7 Full Stack photoeye at top, two Tilt Stack photoeyes below.

4.1.3 Loading

The Loading sub-module is a pneumatically-operated vertical lift machine (VLM). After a complete stack of twelve totes has been moved into Zone 3 of the stacker, it is conveyed to the VLM (assuming that the VKM is clear). This sub-module lowers the stack of totes to a downstream conveyor line where the tote stack leaves the machine. Once the VLM's zone photoeye is clear, the platform will return to its raised position and wait for the next complete stack.

The VLM also has a second photoeye which sends a RTS (Ready to Send) signal to the downstream conveyer system to offload the completed stacks from the OSL.

4.1.4 Pneumatics

The OSL requires a clean air supply of at least 80psi (5.5 Bar). A pressure regulator located beneath the stacking unit provides pressure adjustment and collects condensation. A low-pressure switch set to 60psi (4.2 Bar) is connected to the PLC and will stop the OSL if the pressure falls to that value.



Photo 4.8 Main air pressure regulator and low-pressure safety switch.

The pressure regulator feeds a solenoid-operated valve manifold controlled by the PLC (photo 4.9). This manifold which is also located below the stacking unit distributes air as required to all pneumatically controlled devices on the OSL (tote-stops, grippers and lifts).



Photo 4.9 PLC-controlled pneumatic manifold

4.1.5 Conveyor Control

Except for the FTU, the motor driven rollers on each section of the OSL are driven by Itoh Denki MDR controller cards (photo 4.10). Settings for all five cards are given in the troubleshooting and maintenance section and should not need to be changed.

The FTU differs from the rest of the OSL in that all photoeyes, proximity sensors and motors on the FTU are connected to, and powered by a ConveyLinX card mounted below the turntable (see photo 4.11). The ConveyLinX card is controlled by the PLC.

Adjacent to the ConveyLinX card is a small daughter-board with a potentiometer used to fine-tune the rotation speed of the FTU in the field (photo 4.11).

Settings for the ConveyLinX card can only be accessed through software and should never need to be changed



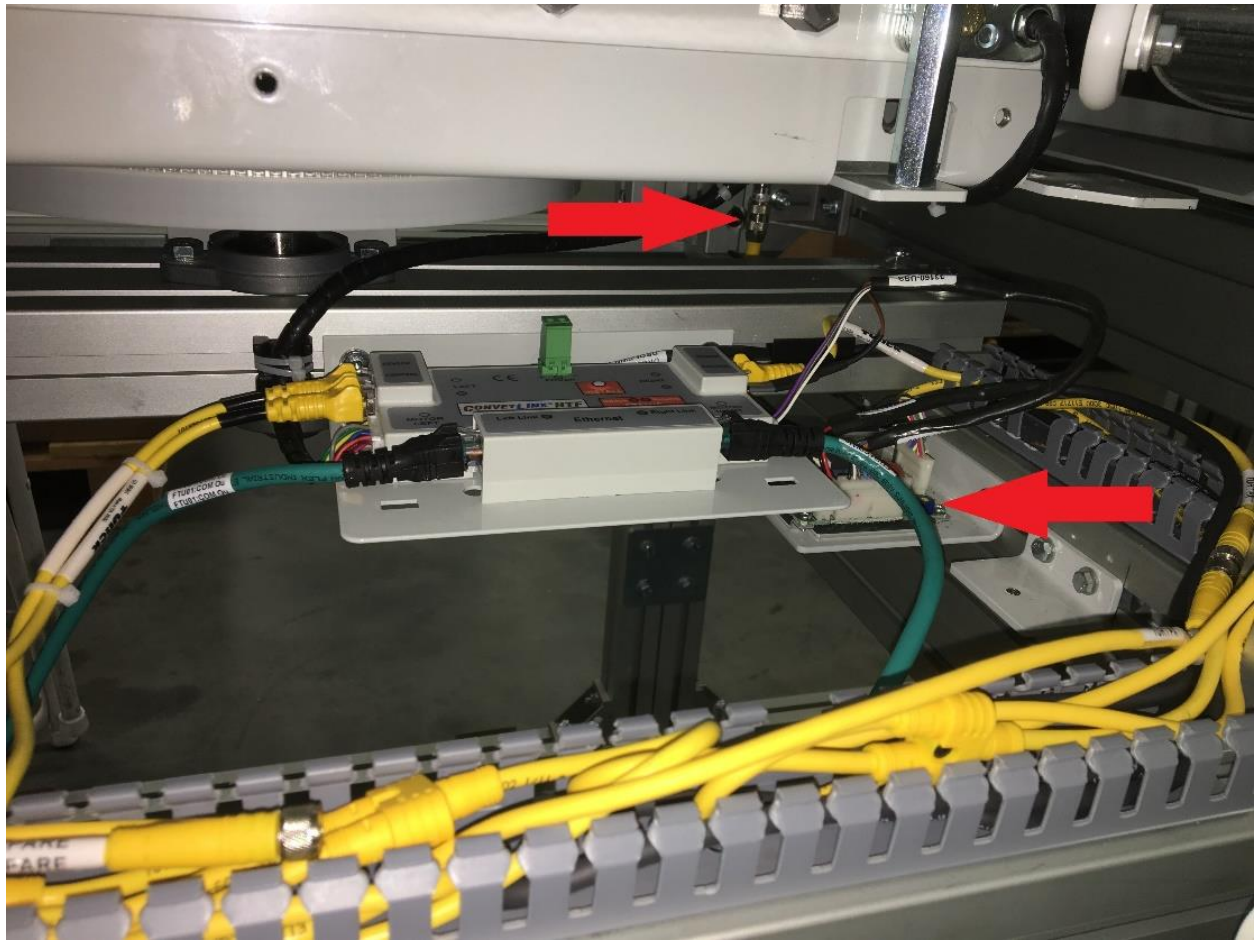
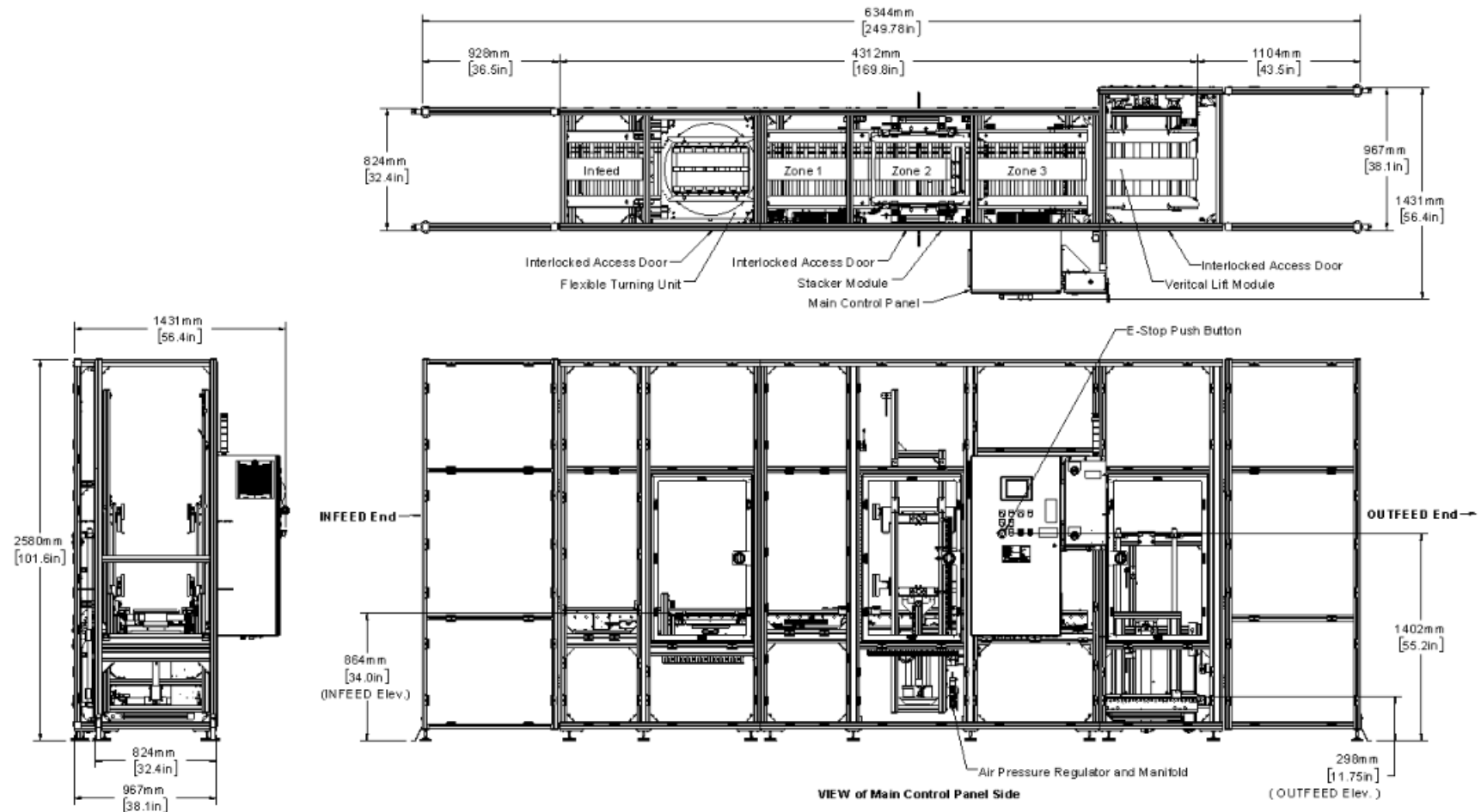


Photo 4.11 FTU is controlled by ConveyLinx card. Arrowed are the rotation speed potentiometer (lower arrow) and one of the two proximity switches controlling FTU rotation limit (upper arrow).

4.2 OSL System Layout (Right Hand) Showing Major Components



4.3 OSL Main Enclosure and Operator Panel

This panel contains the controls for the OSL and the operator interface (HMI) including the PLC, Safety Relay, circuit breakers and power supplies. On the outside of the panel are the Start and Stop buttons, Motor Fault, Jam and Low Air Pressure reset buttons, the Emergency Stop button and various warning lights (Figure 4.12).

4.4 Emergency Stop

When the Emergency Stop illuminated pushbutton is pressed, or a door is opened, the machine will discontinue its current action, turn off all outputs, and disable all motors. The machine will stop. To recover from an E-Stop, clear the reason for the E-Stop (if any), pull out the E-Stop pushbutton, ensure all doors are closed, and press the Start button to resume operation.



Key to Operator Panel (Figure 4.12)

- 1 **Touchscreen HMI**
- 2 **Indicator Light (White) – Power On**
- 3 **Push Button (Red) – Motor Fault Reset**
- 4 **Push Button (Orange) – Jam Reset**
- 5 **Push Button (Blue) – Low Air Pressure**
- 6 **Indicator Light (Red) – E-Stop Activated**
- 7 **Push Button (Green) – Start**
- 8 **Emergency Stop Button**
- 9 **Push Button (Red) – Stop**
- 10 **Ethernet Connection (RJ45)**
- 11 **USB Connection (USB-A)**

□

Picture 4.12 OSL Main Enclosure and Operator Panel

5 Homing and Normal Operation Modes

5.1 Homing

The homing process is performed every time the system is power cycled, or after the reset button has been pressed – usually in the case of an E-Stop or fault condition. During homing, the FTU should rotate until it is oriented correctly, the lifting grippers should lower and retract, and the holding grippers should close. The VLM should be in the raised position.

The machine is now in Auto/Run Mode in the Stopped state.

5.2 Auto / Run Mode – Stopped State

The HMI will show the screen in Figure 5.1. Note that after a power cycle it may take up to two minutes for this screen to be displayed. In this state, the machine is waiting to be started from the Start button on the front panel. There are no E-Stops and No Faults present. Both would be indicated on this screen.

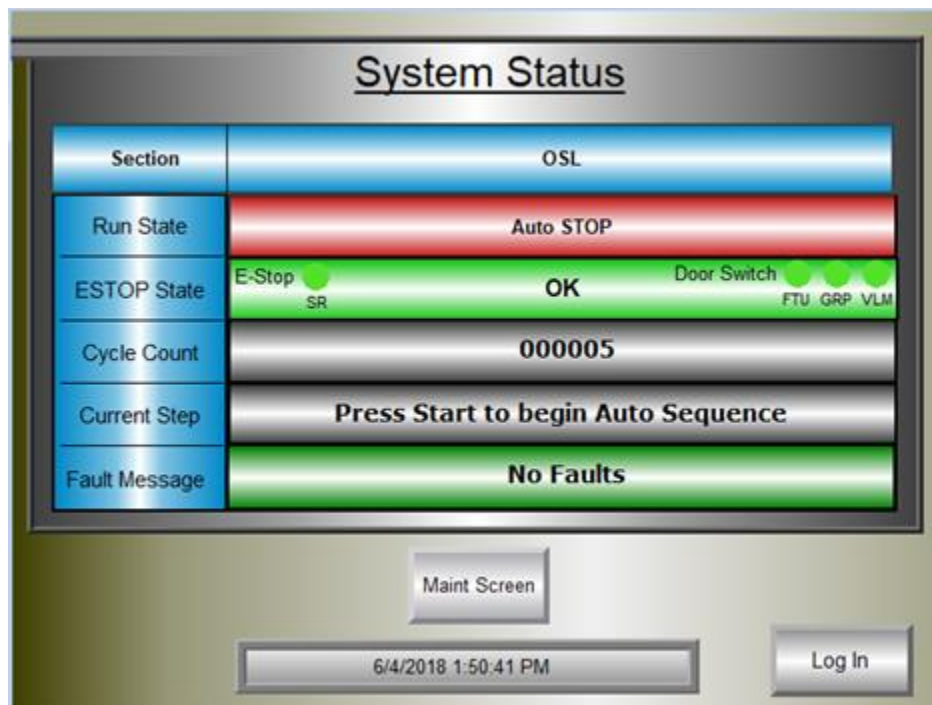


Figure 5.1 HMI indicating the OSL is in the Stopped State

5.3 Auto / Run Mode – Run State

Pressing the green Start button will start the machine and if a tote is present at the Infeed, the machine will move the tote through the FTU and into the Stacker and will continue to run until no more totes are present at the Infeed. The screen shown in Figure 5.2 will be displayed.

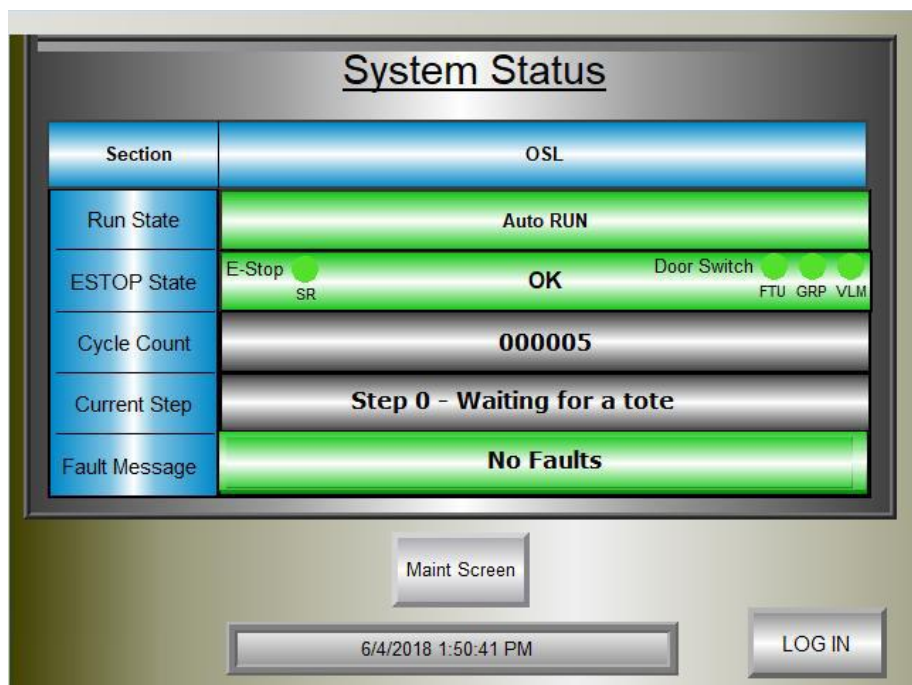


Figure 5.2 HMI indicating the OSL is in the Running State

Pressing the Stop button on the front panel will stop the machine and place it back in Auto/Run – Stopped State mode.

6 Maintenance Modes

6.1 Manual / Maintenance Mode Log-In

The maintenance screens allow for manual operation of the machine as well as the ability to troubleshoot the various input and outputs on the machine. Although the main maintenance screen is available directly from the 'Stopped State' screen, a Log-In is required to proceed past that main screen.

Pressing the Log In button from any screen will cause a numeric keypad to appear.

The log-in password is "21117". Then press the return arrow button. This will take this to the Maintenance Screens

6.1 Maintenance Screens

The main Maintenance Screens (Figure 5.3) allows access to Inputs (photoeyes, proximity sensors and reed switches) and Outputs (grippers, lifts, rollers, tote stops etc.) to verify their functionality and operation. For these functions to work, the OSL cannot be in E-Stop. All access doors must be closed.

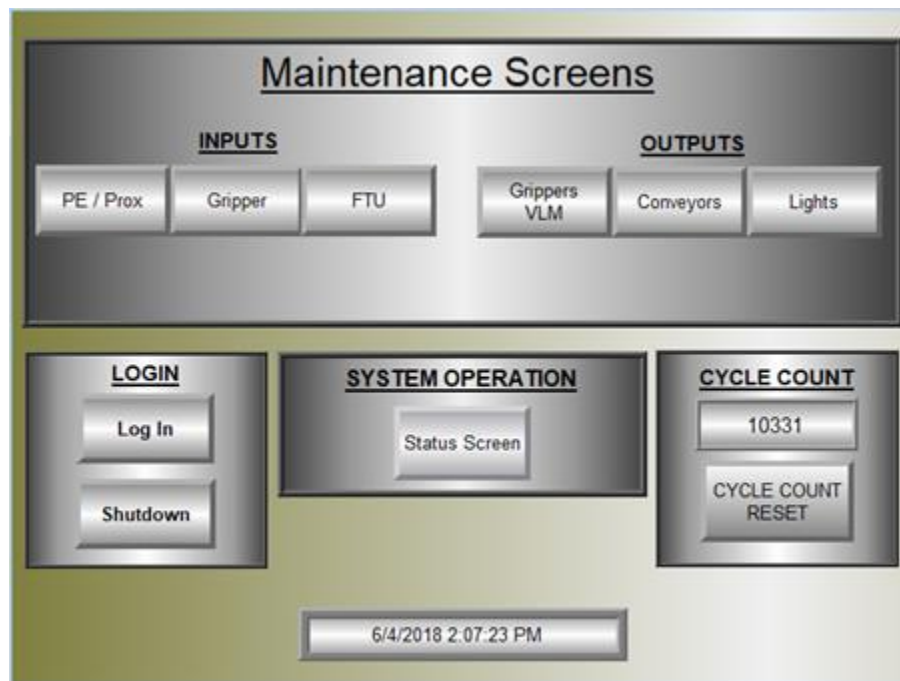


Figure 5.3 Maintenance Screen

Pressing any of the Input buttons will take you to one of three Input screens (Figures 5.4)

Pressing any of the Output buttons will take you to one of three Output screens (Figures 5.5)

6.2 Input Screens

These three screens (Figure 5.4) indicate the status of inputs on the machine. It is important to note that not all devices on the screens may be present on a particular OSL machine.

On all screens, a red dot indicates that the input is ACTIVATED. A green dot indicates that the input is NOT ACTIVATED.

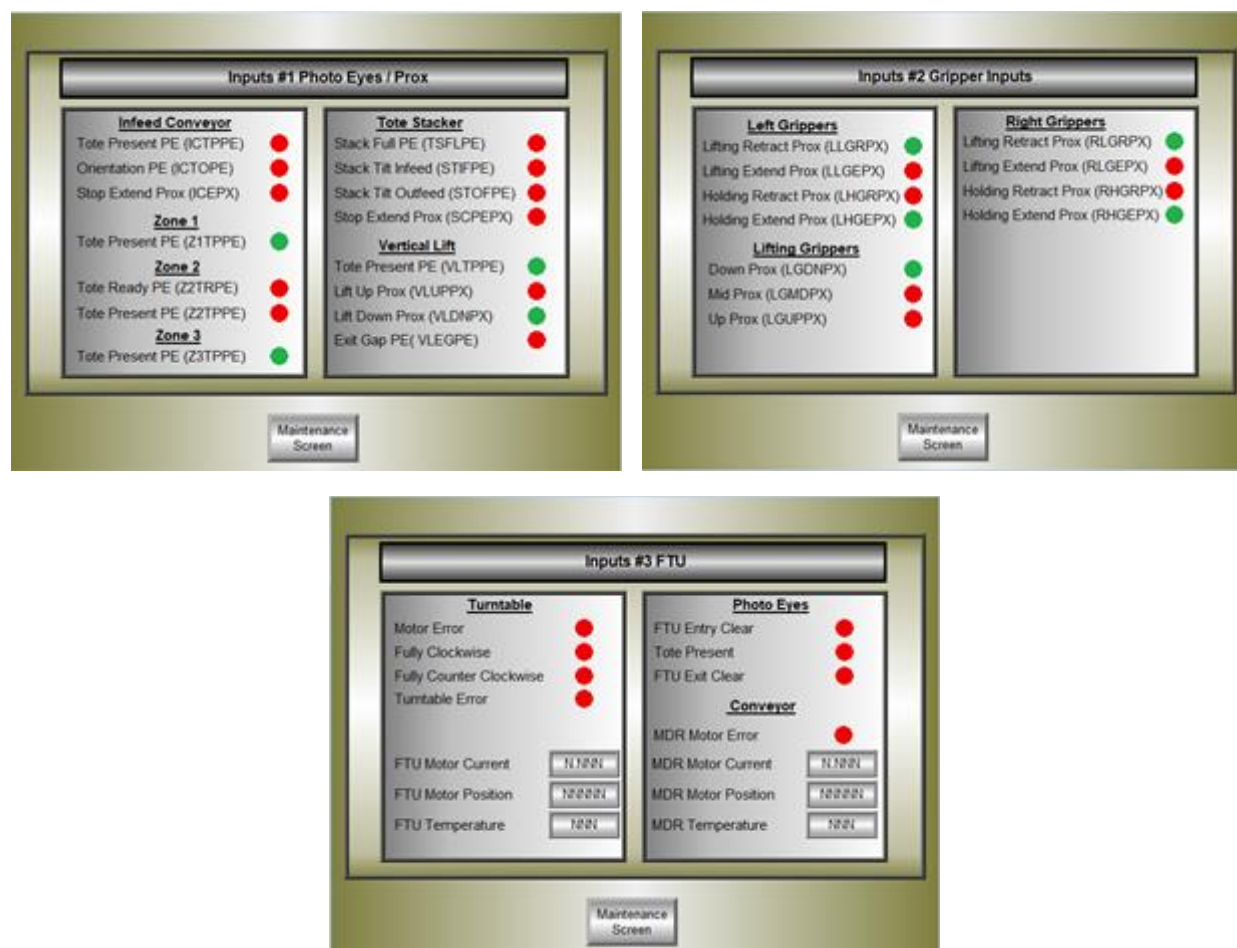


Figure 5.4 Input Screens showing the state of various inputs

6.2.1 Testing Photoeyes

To test a photo eye, first check that the yellow LED on the photoeye is illuminated and not flashing. If it is flashing yellow, the photoeye is slightly off axis with its reflector and needs to be adjusted. If the yellow LED is not illuminated the photoeye is either completely off axis with its reflector, or the photoeye does not have power. Check the photoeye accordingly.

Once the yellow LED has been confirmed, place an object between the photoeye and the corresponding reflector. A green LED on the photoeye should illuminate and the HMI (Figure 5.4) should indicate that the photoeye is blocked by showing a RED dot. Otherwise, the HMI should indicate that the photoeye is not blocked by showing a GREEN dot.

6.2.2 Testing Proximity Sensors

To test a proximity sensor, hold a steel object (screwdriver, wrench etc.) close to the yellow tip of the sensor. If the sensor is working, an LED in the sensor housing will illuminate. The HMI should indicate that the proximity sensor is activated by showing a RED dot. Otherwise, the HMI should indicate that the proximity sensor is not activated by showing a GREEN dot.

To adjust the position of a proximity sensor, use a 17mm wrench to loosen the locknut so that the sensor can be moved up/down or in/out as required. Care should be taken not to move the tip of the sensor too close to the metallic flag which is mounted to the lifting mechanism as direct contact between the flag and the sensor will cause damage.

6.2.3 Testing Reed Switches

Eight reed switches are used on the four gripper actuators, two per actuator (Photo 4.5). Two reed switches are on the two tote stops – one per stop. Each reed switch has a small green LED which will illuminate when the actuator is in the correct position. Ensure that the green LED is operating correctly.

If a green LED is not present, the switch may need to be adjusted. A small flat blade screwdriver should be used to loosen the small screw so that the switch may slide inwards or outwards as required until the LED illuminates. If the LED does not illuminate, then either the actuator is not in the correct state (for example, the actuator is retracted but we are checking the extended reed switch), or the switch is faulty or does not have power. Check accordingly. Ensure that the small screw is tightened after adjustment so that the switch will no longer move.

The HMI should indicate that the reed switch is activated by showing a RED dot. Otherwise, the screen should indicate that the reed switch is not activated by showing a GREEN dot. (Figure 6.4). On some versions of the machine, reed switches may be referred to as proximity sensors in the HMI.

6.3 Output Screens

These screens (Figure 5.5) allow the direct activation of grippers, lifts, rollers, tote stops etc. to verify their functionality and operation. Remember, the machine cannot be in E-Stop mode for these functions to operate.

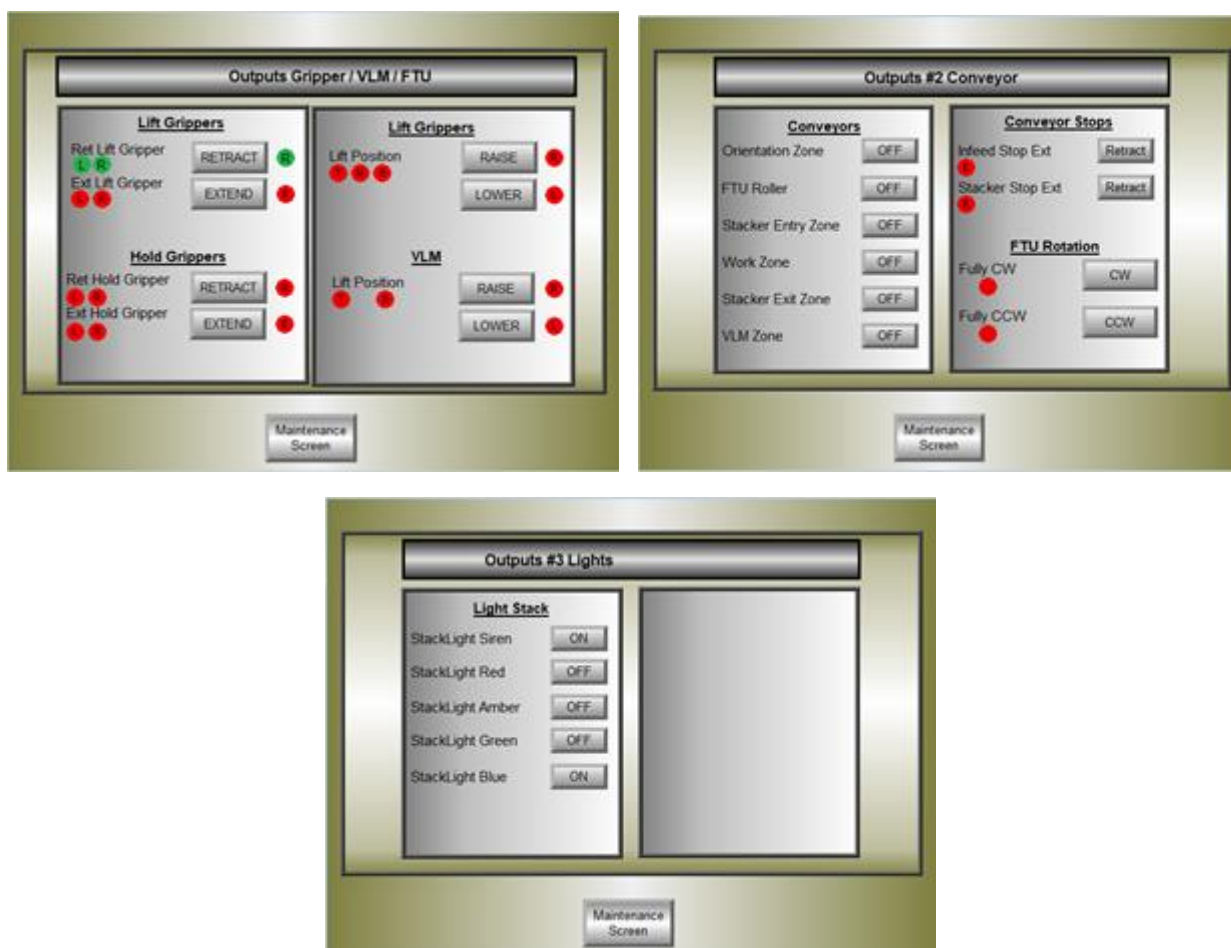


Figure 5.5 Output screens with buttons allowing activation of various outputs

To activate a specific output, press the associated button on the HMI screen. If the output activates, the red dots associated with the output will change from red to green. For conveyers, there are no colored dots however the user can visually confirm that the conveyor is running. Similarly, the stack lights are visibly verifiable.

7 Indicators and Fault Recovery

7.1 Indicators

Indicator	Mode	Meaning
Stack light Siren	Solid	Unused.
	Intermittent	Unused.
Stack light Blue	Solid	Machine is ready to receive additional totes.
	Flashing	Unused.
Stack light Red	Solid	Machine is E-Stopped.
	Flashing	Unused.
Stack Light Amber	Solid	Conveyor Jam.
	Flashing (1 Hz)	Machine has a Fault. Check Fault message and refer to list below.
Stack Light Green	Solid	Machine is running in Automatic mode.
	Flashing (1 Hz)	Machine is stopped.
	Flashing (2 Hz)	Machine is in Manual mode.
E-Stop Pushbutton (Red)	Solid	E-Stop pushbutton is pressed.
Reset Pushbutton (Blue)	Solid	E-Stop control relay is active.
	Flashing (1 Hz)	E-Stop control relay is inactive, and machine needs to be Reset.
	Flashing (5 Hz)	Reset All is active.

Table 7.1 Indicator list and meaning

7.2 Fault List and Recovery Suggestions

See the following tables for a list of fault messages possible on the HMI screen, their meanings, and suggested troubleshooting and recovery steps. All fault messages are communicated in real-time over Ethernet/IP to the plant monitoring system (ex. Intelligrated's InControlWare Command Center). Rather than having to store and retrieve a logfile on each machine, logging and history information should be made available using the plant monitoring system, allowing information about multiple machines at a single site to be more easily aggregated and compared.

Fault Message	Cause	Troubleshooting Suggestion
Tote jam at tote turner	Tote failed to clear tote turner zone when MDR turned on.	<ul style="list-style-type: none"> Ensure that no totes are jammed in this area of the machine. Check photoeyes for correct operation.
Tote jam at machine entry	Tote failed to clear machine entry zone when MDR turned on.	
Tote jam at Stacker entry	Tote failed to clear Stacker entry zone when MDR turned on.	

Tote jam in Stacker	Tote failed to clear Stacker work zone when MDR turned on.	<ul style="list-style-type: none"> Check that the relevant MDR turns when activated. Check photoeyes for correct operation
Tote jam at Stacker exit	Tote failed to clear Stacker exit zone when MDR turned on.	
Stack jam at machine exit	Tote failed to clear VLM zone when MDR turned on.	
Holding Gripper Not Open	One or both Holding Gripper Retracted proximity switches is not made when expected.	<ul style="list-style-type: none"> Check that air pressure is present. Check that there is no mechanical obstruction for the relevant cylinders. Check that both reed switches on each actuator are functioning properly.
Holding Gripper Not Closed	One or both Holding Gripper Extended proximity switches is not made when expected.	
Lifting Gripper Not Open	One or both Lifting Gripper Retracted proximity switches is not made when expected.	
Lifting Gripper Not Closed	One or both Lifting Gripper Extended proximity switches is not made when expected.	<ul style="list-style-type: none"> Check that air pressure is present. Check proximity switch is operational, in the correct position and that metal flag on lift is activating switch.
Lift Not Fully Raised	Lift Extended (Upper) proximity switch is not made when expected.	
Lift Not Fully Lowered	Lift Retracted (Lower) proximity switch is not made when expected.	
Table rotation fault	Table turner failed to rotate in less than 3 seconds, or table turner entry eye blocked during table rotation.	<ul style="list-style-type: none"> Check that there are no obstructions blocking table turner. Check that tote is centered on table turner. Check that table turner motor can turn the table. Check that table turner entry eye is functioning properly. Check that table turner end-of-travel proximity switches are functioning properly.
Turntable not in position	Turntable is not in either Fully Clockwise or Fully Counterclockwise position.	<ul style="list-style-type: none"> Press Reset to initiate table turner homing.

		<ul style="list-style-type: none"> Check that table turner motor can turn the table. Check that end-of-travel proximity switches are functioning properly.
Orienter door is open	The table turner door is open.	Close the table turner door.
Stacker door is open	The stacker door is open.	Close the stacker door.
Lift door is open	The lift door is open.	Close the lift door.
*Over-Voltage/Surge	Over Voltage at 480 VAC Monitoring Relay	Check Plant 480 VAC Supply Press Reset
*Under-Voltage/Phase Loss	Under Voltage at 480 VAC Monitoring Relay	Check Fuses FU109 (Phase Monitor Fuses) and Disconnect Fuses. Check Plant 480 VAC Supply Press Reset
Estop is active	The E-Stop control relay is inactive.	Close all doors, reset all E-Stop pushbuttons, and press Reset.
No Faults	There are no faults in the system.	None.
*Units equipped with 480 VAC Phase Monitoring Relay		

Table 7.2 Fault list and troubleshooting suggestions

8 Machine Settings / Major Component Identification

8.1 Holding Gripper (Upper Grippers)

- Press and hold the Extend (Close) button. The corresponding (Left and Right) gripper will extend to its closed position, or the position it would normally be in when holding a stack.
- Press and hold the Retract (Open) button. The corresponding (Left and Right) gripper will retract to its open position, or the position it would normally be in when releasing a tote from a stack.

8.2 Lifting Gripper (Lower Grippers)

- Press and hold the Extend (Close) button. The corresponding (Left and Right) gripper will extend to its closed position, or the position it would normally be in when holding a tote.
- Press and hold the Retract (Open) button. The corresponding (Left or Right) gripper will retract to its open position, or the position it would normally be in when releasing a tote.

8.3 Stacker Lift

- Press and hold the Raise button. The main cylinder will lift the Lifting Gripper assemblies to the upper-most position, or the position it would normally be when transferring a tote from or to a stack.
- Press and hold the Lower button. The main cylinder will lower the Lifting Gripper assemblies to the lower-most position, or the position it would normally be when transferring a tote from or to the conveyor.

8.4 VLM Lift

- Press and hold the Raise Button. The Stack lift will lift the VLM platform to the Zone 3 of the Stacking module.
- Press and hold the Lower Button. The Stack lift will lower the VLM platform to the outfeed conveyor height.

8.5 Jog Conveyor Zones

- Press the corresponding Run Conv Zone button to manually jog the motorized drive roller in that zone.

8.6 MDR Conveyor Settings

- The MDR settings on the machine are as follows and are for reference and troubleshooting only. These settings should never need to be changed:
- Infeed: High 5 (Last dipswitch "ON")
- Zone 1: High 9 (Last dipswitch "ON")
- Zone 2: High 3 (Last dipswitch "ON")
- Zone 3: Low 9 (Last dipswitch "OFF")
- VLM: Low 9 (Last dipswitch "OFF")

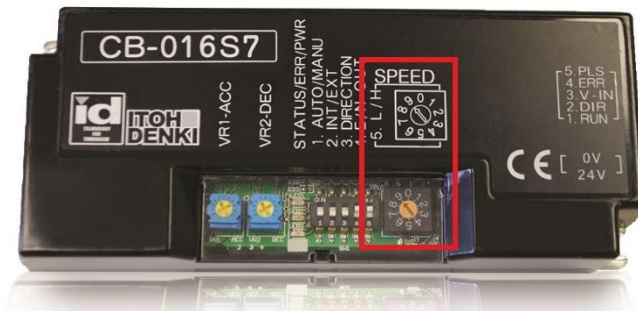


Photo 8.6 Itoh Denki MDR card with Speed potentiometer and Hi/Lo range switch highlighted

8.7 Tote Stops

- Press the corresponding Tote Stop button to manually raise and lower each of the two tote stops.

8.8 Lifetime Lift Cycles

- This is number of times the stacking cylinder has extended and retracted.

9 Periodic Maintenance

There are no grease points to maintain as all bearings are sealed. Weekly maintenance events per below are recommended. Do not use spray lubricant (i.e. WD40) on any part of the machine.

All

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Clean |
| <input type="checkbox"/> | Check for loose fasteners |
| <input type="checkbox"/> | Check for physical damage |
| <input type="checkbox"/> | Check guide rails for secure attachment and alignment |

Air Actuators and Pneumatic System

- | | |
|--------------------------|--|
| <input type="checkbox"/> | Check for leaks and secure air fittings |
| <input type="checkbox"/> | Check air pressure regulator setting. Recommended pressure is 80 psi or 5.5 Bar |
| <input type="checkbox"/> | Clean all cylinders with a dry, clean rag |
| <input type="checkbox"/> | Clean any debris from cylinder guide rods |
| <input type="checkbox"/> | Check mounting bolts |
| <input type="checkbox"/> | Check set screws are tight for cylinder guide rods |
| <input type="checkbox"/> | Check pop-up stop actuates vertically (90deg. to conveyor) and bracket is not bent |
| <input type="checkbox"/> | Check sheet metal mount brackets for cylinders do not have cracks |
| <input type="checkbox"/> | Check timing belts for wear, tracking, pulley set screw tightness |

Belts

- | | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | Check for damage |
| <input type="checkbox"/> | Check belts are tracking |

Photocells

- ☐ Check for damage
- ☐ Clean photocells and reflectors
- ☐ Check for tightness
- ☐ Check alignment with reflectors
- ☐ Check cables for tightness

Proximity Switches

- ☐ Check for damage
- ☐ Clean
- ☐ Check for tightness
- ☐ Check alignment with metal target

10 Supplier & Customer Information

This document is issued by:
United Sortation Solutions LLC

The System is delivered by:
United Sortation Solutions LLC
10331 S. Dolfield Rd
Owings Mills, MD 21117

11 Warranty

United Sortation Solutions warrants to the original purchaser that the products it manufactures will be free from defects in materials and workmanship for the warranty periods stated herein. During the warranty period, United Sortation Solutions or its designee will repair or replace, at its option, any component or product which upon inspection by them is found to be at variance with the terms of this warranty for the period specified for that product.

All warranty periods are effective on the date of customer acceptance for the original users. These warranties shall not apply to: (a) loss or damage to equipment due to abuse, mishandling, accident, or failure to follow operating instructions, and (b) equipment that has been serviced or modified by other than qualified agents of United Sortation Solutions.

UNITED SORTATION SOLUTIONS EXPRESSLY DISCLAIMS ALL WARRANTIES OTHER THAN THOSE SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING,

BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OR WARRANTY AGAINST INFRINGEMENT. United Sortation Solutions shall not be liable for any incidental or consequential loss, damage, or expense directly or indirectly arising from the use of this product. United Sortation Solutions neither assumes nor authorizes any other person to assume for it any other or additional liability or responsibility in connection with this system. Your specific legal rights may vary from state to state.

Equipment returned for warranty service must be sent with original PO number, a detailed explanation of the problem, and a Return of Materials Authorization (RMA) form and number obtainable from your United Sortation Solutions Service Representative. Shipping charges must be prepaid, although repairs and return shipping will be at no charge.

12 Exclusions

The guarantee shall lapse immediately, as of right, if:

- Service and/or maintenance work has not been carried out in accordance with instructions for use;
- Alterations to equipment delivered have been made without prior, written permission from United Sortation Solutions Inc.;
- Other than original United Sortation Solutions parts are used;
- Equipment delivered is not used in accordance with type and/or purpose;
- The apparatus delivered is not used competently, is operated carelessly, incorrectly and/or negligently; or,
- The equipment delivered becomes defective due to external circumstances and/or those outside the authority of United Sortation Solutions Inc.

13 Contact Us

For troubleshooting assistance, RMA requests, technical parts questions or general questions please call:	Dial: (877) 315-3400 and select: Option #1 for service or Option #2 for part number inquiries
For parts orders, please have the part numbers and quantities ready:	www.ontimeparts.com

14 Revisions

Rev.	Date	Init.	Description
1.0	November 14, 2014	JJ	Initial Release
1.1	August 5, 2015	EJB	Revised operation description, added indicator and troubleshooting information.
1.2	March 8, 2016	EJB	Added Plant Management System info.
1.3	May 12, 2016	SMF	Added maintenance info and formatted.
1.4	October 24, 2017	JEH	Updated contact numbers for service and parts.
1.5	December 7, 2017	GTH	Updated cover and system layout graphics
1.6	May 11, 2018	DTM	Updated cover and system layout graphics
1.7	June 12, 2018	ESG	Expanded General Operation and added Photos
1.8	November 29, 2018	ART	Added Faults for 480 VAC Phase Monitoring