

# Data I/O Taper User Manual

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- ***Please read this user manual carefully before operating.***
- ***Product is subject to change without additional notice.***



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# Preface

## Product Overview

The Data I/O Taper is designed to tape several types of surface-mounted devices (SMD). It receives programmed devices directly from the PnP head(s) and advances the carrier tape through a sealer (heat or pressure) before rolling the filled tape onto a reel for delivery to the next stage in the manufacturing process.

## Features

1. High Versatility
  - Supports 8mm – 44mm JEDEC tape
  - Sensors for error-monitoring
  - Easy change-over:
    - Easy carrier-tape feeding with guide channel
    - Easy cover-tape adjusting with pre-set side
    - Easy hot-shoe positioning by mechanical pointer
    - Parameters sent to taper while task downloads.
2. Precise Hot Shoes
  - Fine-tuning structure for setting the hot shoes position
  - Separate controls for each hot shoe
  - Safety covers for hot shoes to prevent injury
  - PID controller for setting temperature of each hot shoe
3. Precise Positioning
  - Step-motor for precise positioning
  - Easily integrates with automated handling system
4. Adjustable Cover Tape
  - Adjustable cover-tape tension
  - Adjustable cover-tape position
5. Adjustable Carrier Tape
  - Guide channel for carrier-tape feeding
  - Rotation knob plus extended structure for adjusting tape width
  - High output/productivity (up to 5,000 Units/Devices Per Hour)
6. Lightweight Installation
  - < 20 Kg (44 lb) weight
7. Multi-Language Touchscreen
  - Simplified controls navigation with large buttons
  - Easily switch between English, Chinese, and German

## Safety Precautions

Do not use this machine in tilted, uneven, or otherwise unstable flooring. Else the machine may fall and cause damage and/or injury.

Always exercise sound judgment and extreme care around high-voltage, high-temperature equipment.



**Danger! Electric Shock Hazard!**

Injury or death may result from contact to parts inside the taper. Do not remove covers; no user-serviceable parts.



**High Temperature Hazard!**

The heat sealer can reach temperatures above 200° C/400° F. Use extreme caution around the taper when the heat sealer is powered-on, else injury can occur from coming into contact.

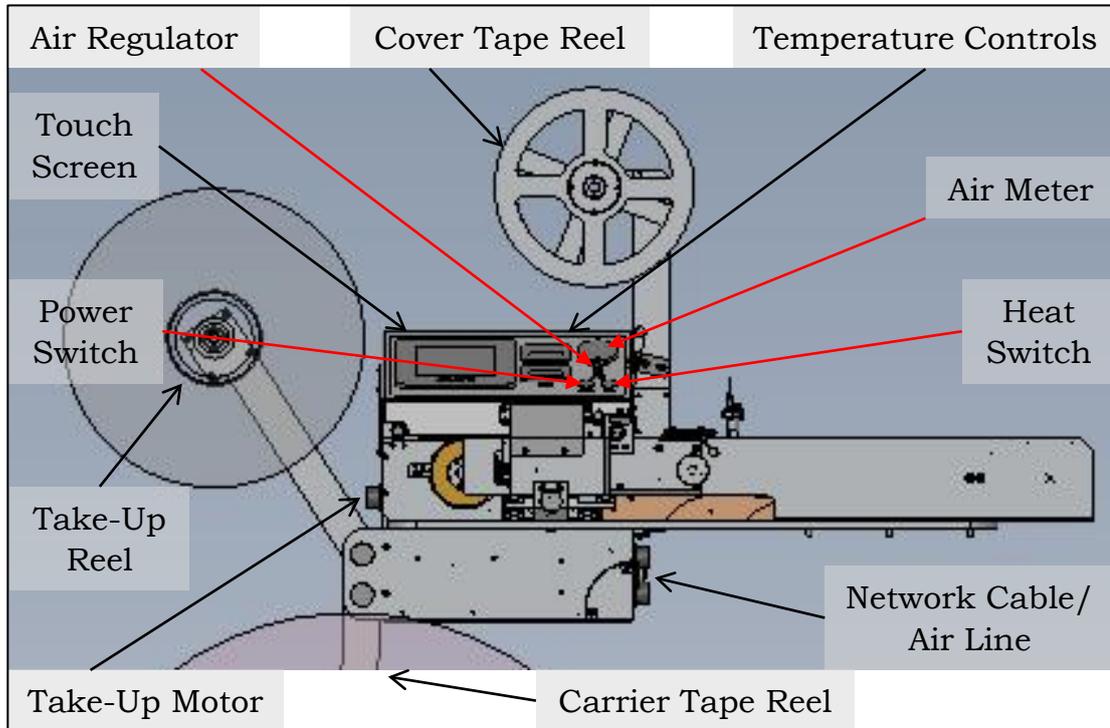


**Electrostatic Discharge Hazard!**

ESD may damage equipment and integrated circuits. Always discharge static electricity to a common ground.

# Introduction

## Snapshot



## Taper Specifications

Dimensions	H:50cm (20") W:106cm (42") D:25cm (10")
Weight	< 20 Kg (44 Lbs)
Power Supply	220 VAC/50 - 60 Hz
Input Current	15 Amp
Air Pressure	0 - 1 MPa (0 - 145 PSI)
Tape Width	8mm - 44mm, JEDEC
Devices Per Hour	5000 @ 2 x 3mm device
Carrier Tape Diameter	< 670mm
Cover Tape Diameter	< 250mm
Heating Temperature	< 220°C (428°F)

## Environmental Considerations

Operating Temperature	5 - 40°C (41 - 104° F)
Humidity	< 70%
Height Clearance	< 1000 meters
Noise Level	< 75 dB
Flooring	Must be level and stable

# Installation

## Mounting the Taper

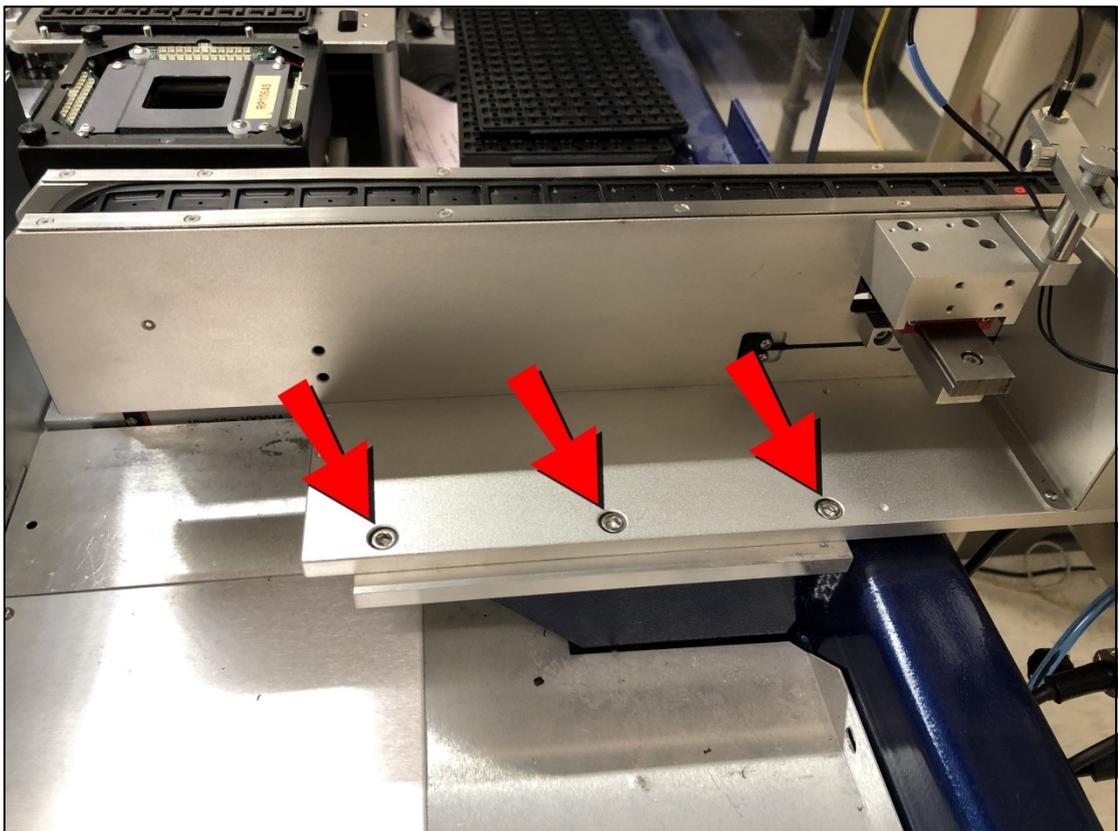
Complete the following steps to mount the taper to the automated programming system (ex. PSV3000/PSV5000/PSV7000).

1. Engage two people to lift and install the taper.



**Warning!** Possible injury or equipment damage! The Taper is heavy (20 Kg/44 Lbs), so please exercise caution. Two people are required to lift this equipment. A third person may be required to bolt it into place.

2. Slowly direct the long track of the taper into the Tape-Out position of the automated programming system, and position the taper track over the Tape-Out mounting plate.
3. Use a 5 mm hex driver to secure the taper to the mounting plate with the six mounting screws (only three depicted below, three more locations on opposite side of track).

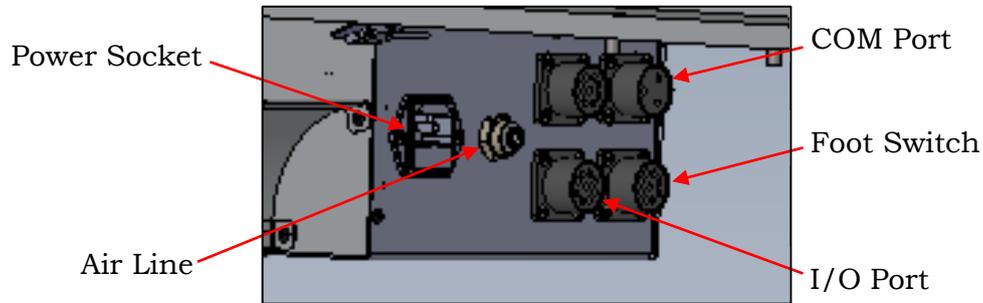


Taper Mounting Screws (viewed from back of machine)

## Starting Up the Taper

Complete the following steps to start the taper.

1. On the back of the controller box, connect the power cord, network cable, and air line into their respective ports.



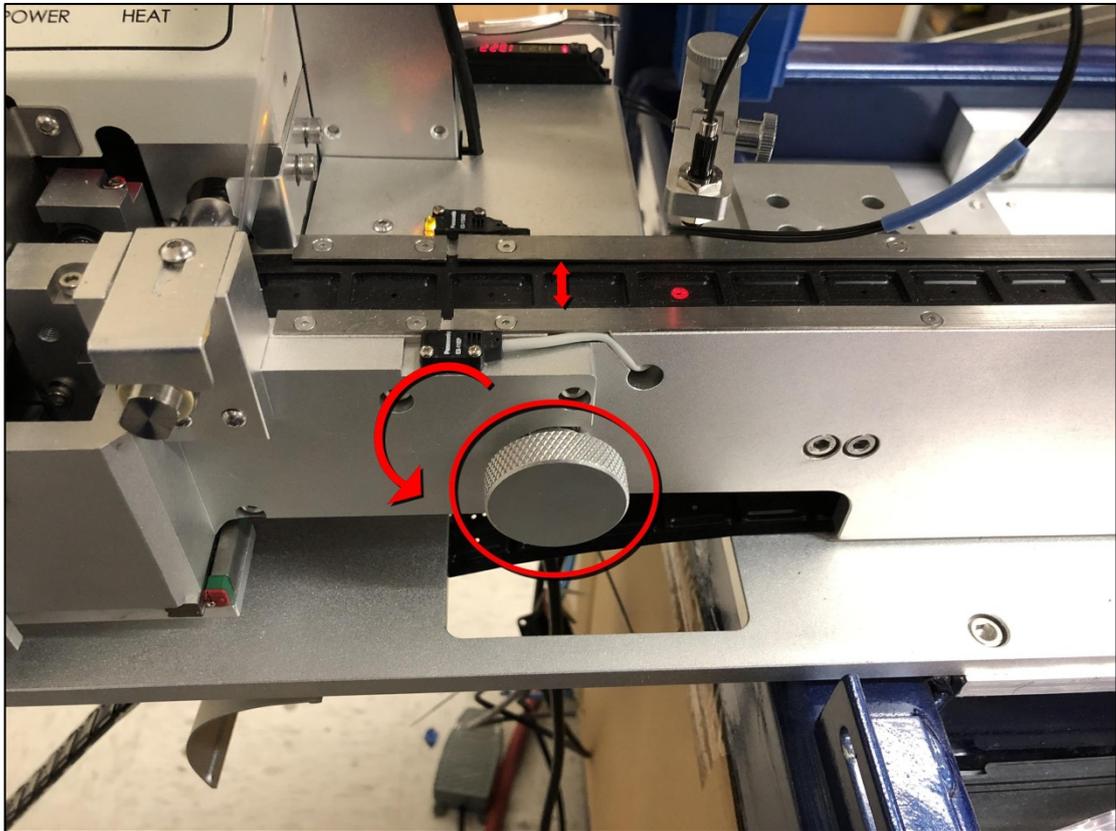
Connections on back of Controller Box

2. On the Control Panel, Press the **Power** button to power-up the taper.
3. Adjust the air pressure by twisting the silver “**Adjust**” knob (below the “**Pressure**” gauge).



Air Regulator and Pressure Gauge

- Determine the carrier tape width and adjust the track width accordingly by rotating the width adjustment knob, which stops at preset detents for 8, 12, 24, 32, and 44 mm (routed tape shown here for depiction only):



Track Width Adjustment Knob

# Tape Loading

This section provides steps for loading the (empty) tape take-up reel, (loaded) carrier tape reel, and cover tape reel.

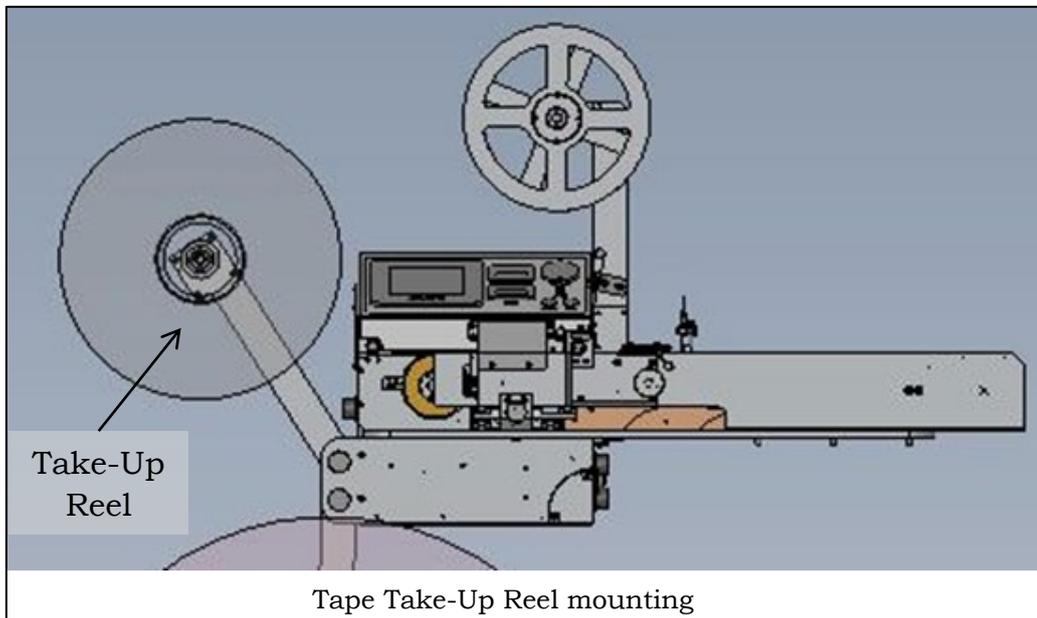
## Loading the Take-Up Reel



Tape Take-Up Reel

Complete the following steps to load the tape take-up reel.

1. Select an empty tape take-up reel that matches the carrier tape width, and mount the take-up reel onto the spindle.



2. Push the reel onto the spindle and push it all the way in, such that it “snaps” into the grooves on the spindle and fits securely (does not fall off).

## Loading the Carrier Tape Reel



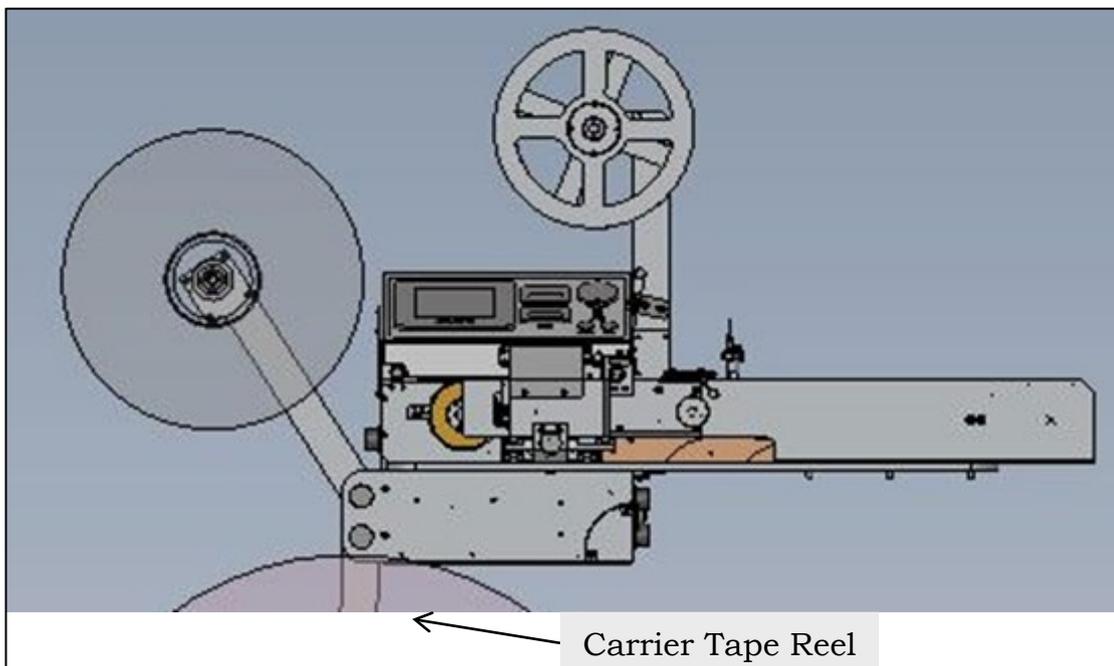
Carrier Tape Reel



Quick-Lock Clamp

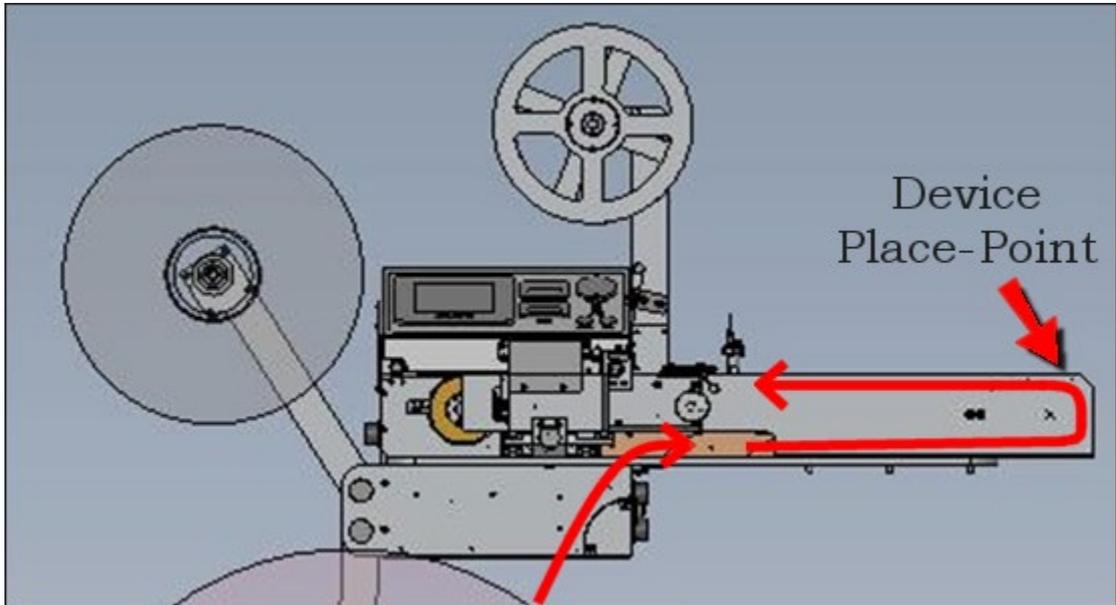
Complete the following steps to load the carrier tape reel.

1. On the lower spindle below the taper unit, remove the quick-lock clamp from the carrier tape spindle.
2. Mount the carrier tape reel onto the spindle and **ensure the tape unwinds from the bottom**.



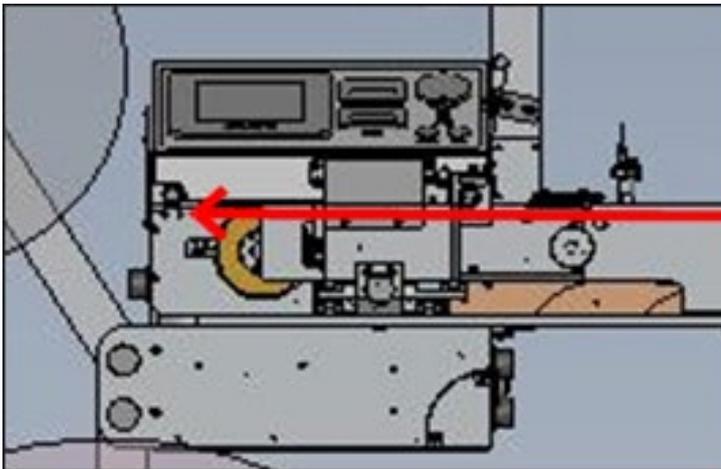
3. Push the reel onto the spindle and push it all the way in.
4. (Re)Mount the quick-lock clamp back onto the spindle and push it all the way to ensure the reel fits securely.

5. Route the carrier tape by feeding it into the loading track. Ensure the tape pockets are face-down when first guiding the tape from the bottom. Then ensure the pockets are face-up when the tape rounds the corner at the place-point (depicted below on the right).



Carrier Tape Routing

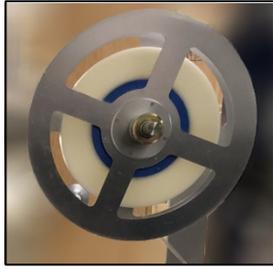
6. Now pull the end of the carrier tape past the sealer and align the sprocket holes on the tape with the teeth of the drive sprocket.



Pull tape past sprocket; engage sprocket teeth in tape holes

7. Before using adhesive tape to secure the end of the carrier tape to the take-up reel, first load the cover tape next.

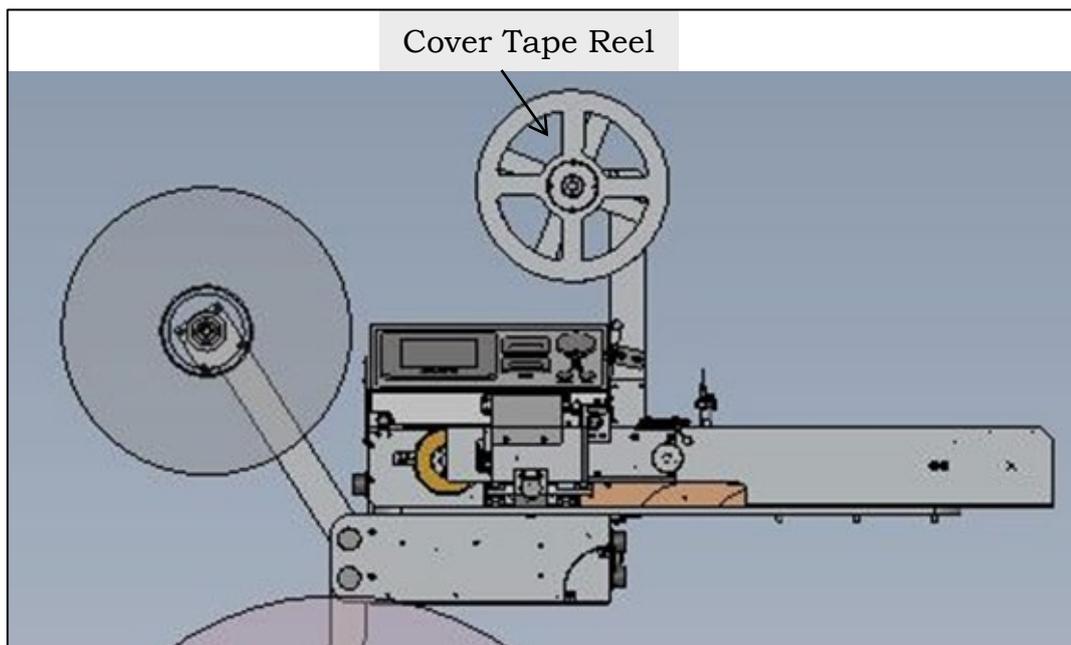
## Loading the Cover Tape Reel



Cover Tape Reel

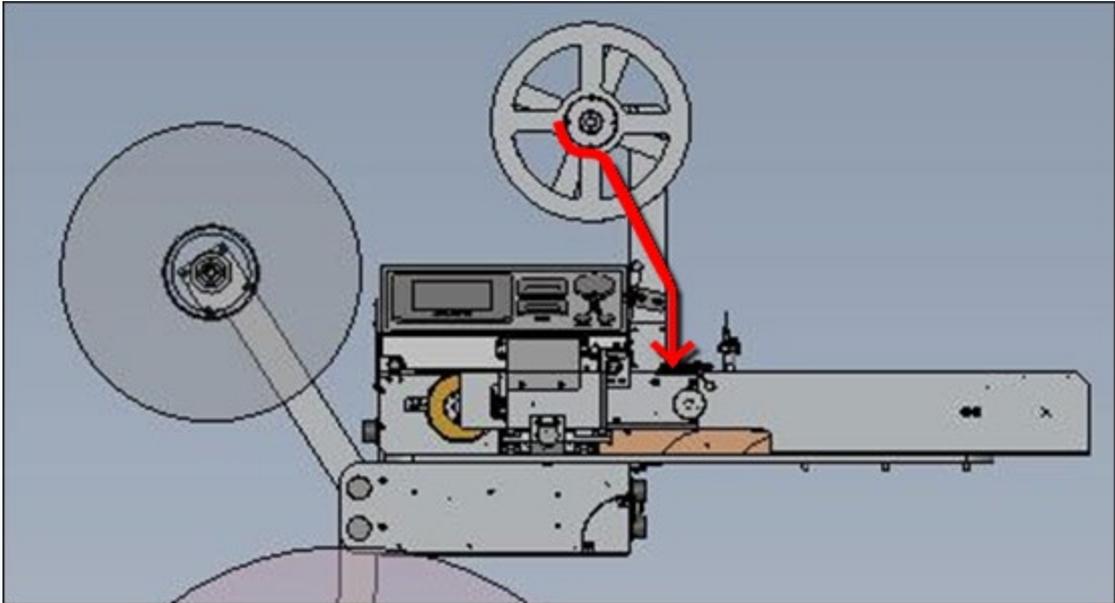
Complete the following steps to load the cover tape reel.

1. On the upper spindle above the taper unit, remove the quick-lock clamp from the cover tape spindle.
2. Select a cover tape reel that matches the carrier tape width, and mount the cover tape reel onto the spindle. **Ensure the tape unwinds to the right from the bottom of the spindle.**



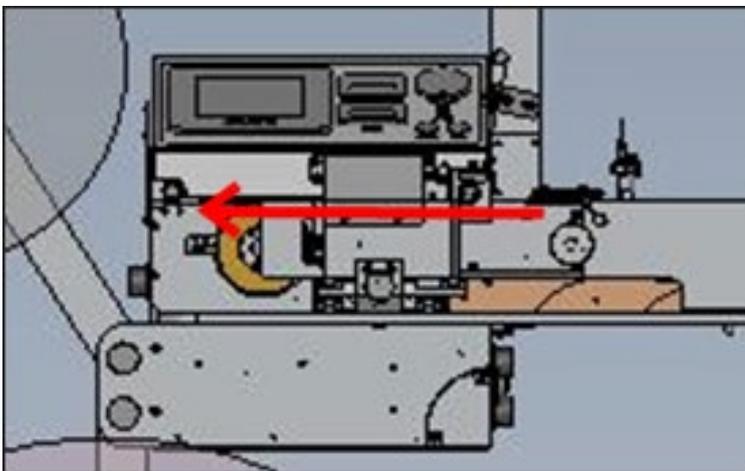
3. Push the reel onto the spindle and push it all the way in.
4. (Re)Mount the quick-lock clamp back onto the spindle and push it all the way to ensure the reel fits securely.

5. Route the cover tape by feeding it down into the loading track such that it meets with the carrier tape.



Cover Tape Routing

6. Use adhesive tape to bind the end of the cover tape to the carrier tape, and then feed both tapes together through the track and sealer.



Feed Cover Tape and Carrier Tape through Sealer

7. Ensure proper alignment: the cover tape should run parallel with the carrier tape, the cover tape should adequately cover the carrier tape width (as depicted below).



Cover Tape aligned with Carrier Tape

8. Run the machine to advance the tape through the sealer.
9. Use adhesive tape to secure the end of the tape to the take-up reel.
10. On the left side of the controller box, use the Take-Up Motor Control Panel to set the speed of the take-up motor (**Up** and **Down** arrows), and then press **REV** to start the take-up motor tension.



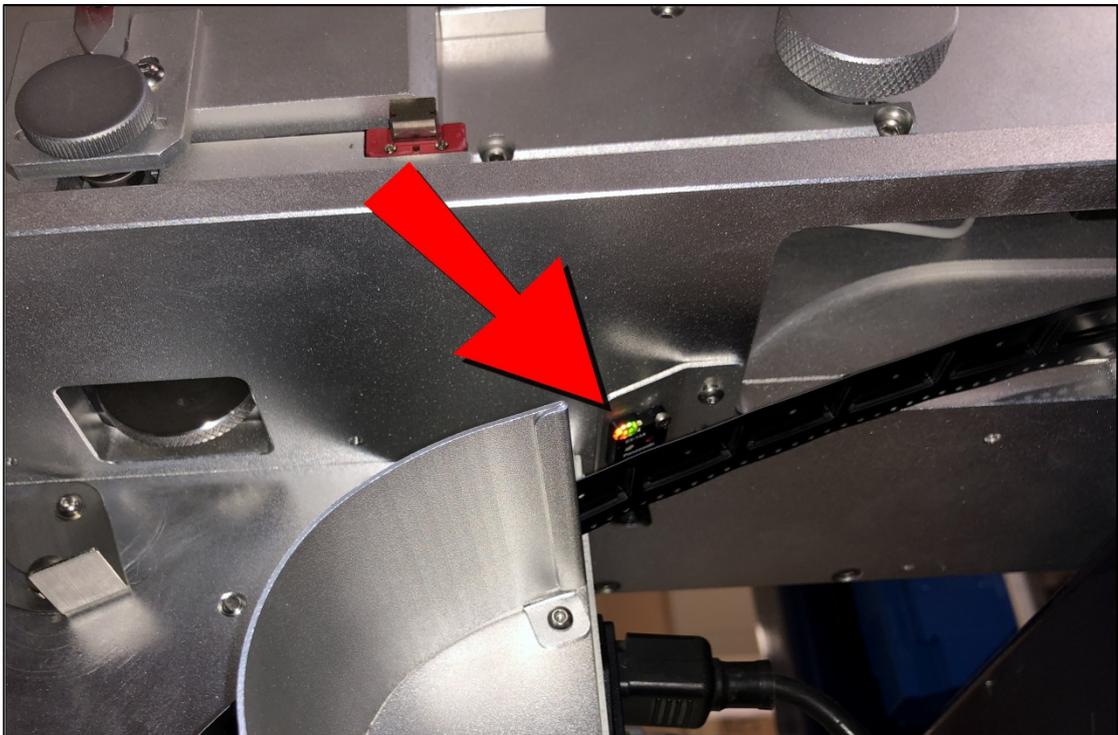
Take-Up Tension Motor Controller

## Sensor Testing

With the tape(s) now routed through the taper, it is a good time to test the sensors before configuring the sealer in the next section (as there are no sensors beyond the sealer). Complete the following steps to test that the sensors properly trip as designed.

### Carrier Tape Sensor

On the under (bottom) side of the controller box, ensure that the carrier tape sensor has power (lights) and that it properly detects the absence of carrier tape (for example, when the tape is depleted).



Carrier Tape Sensor

## Cover Tape Sensor

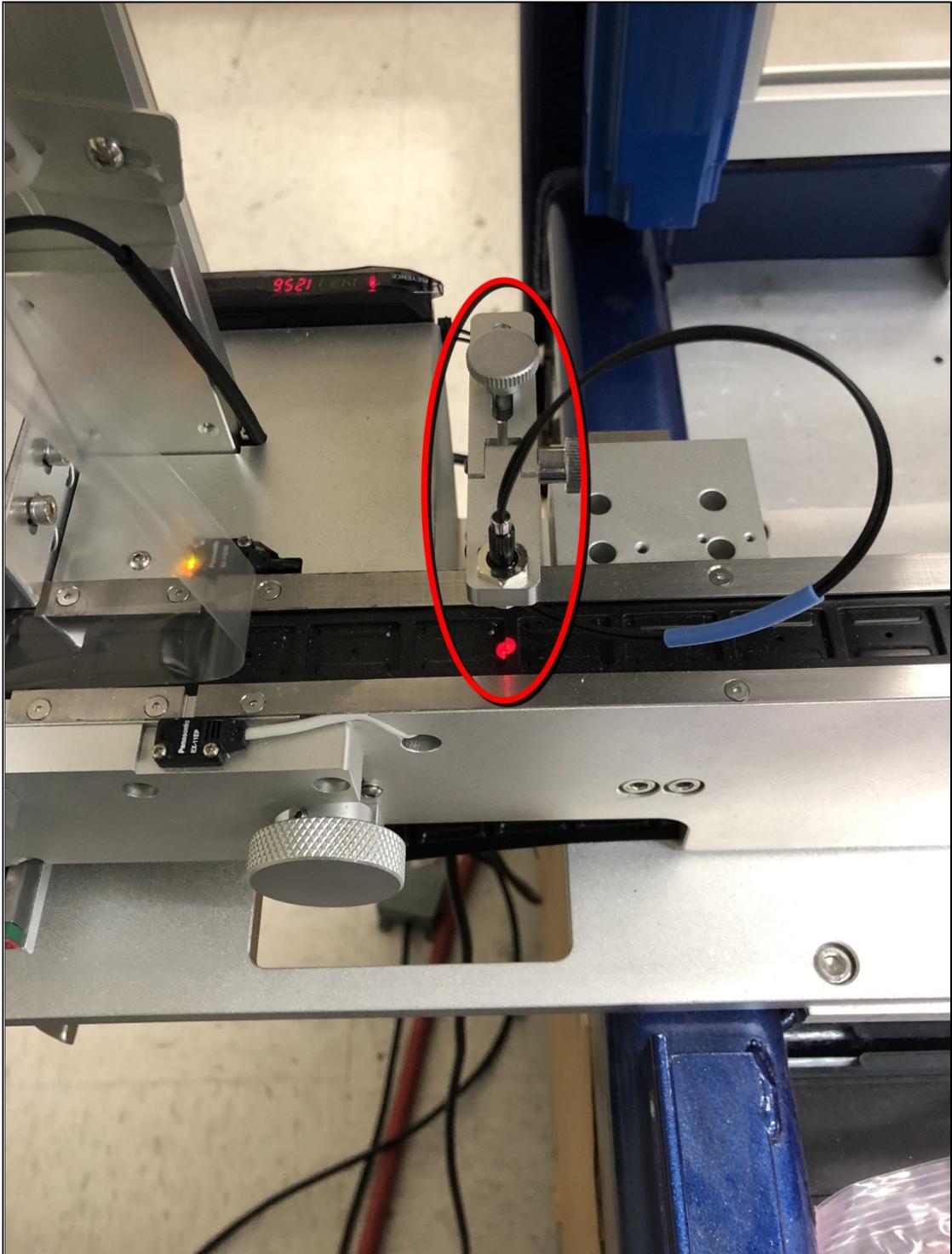
On the arm of the cover tape spindle, ensure that the cover tape sensor has power (lights) and that it properly detects the absence of cover tape (for example, when the tape is depleted).



Cover Tape Sensor

## Empty Pocket Sensor

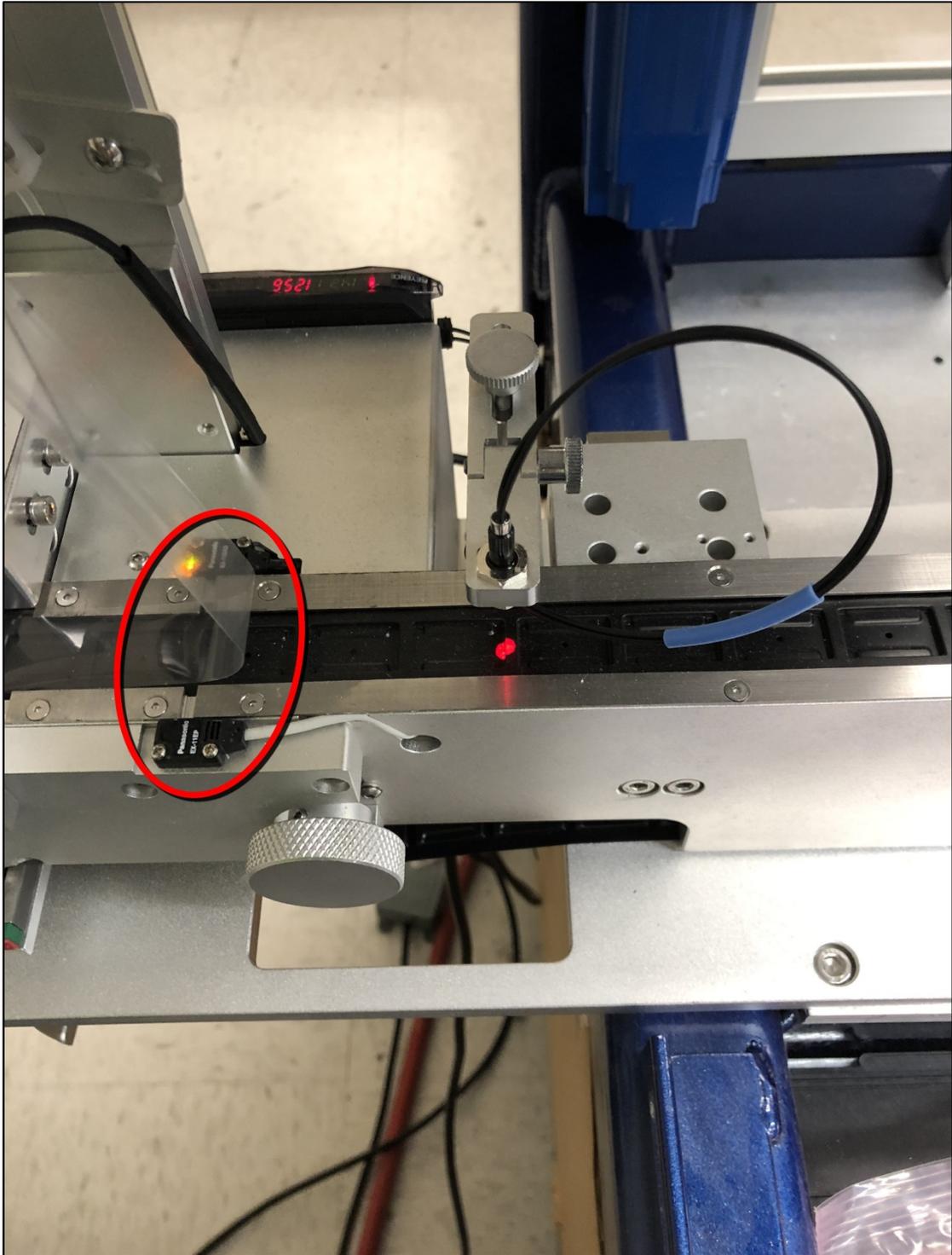
On top of the taper track, ensure that the empty pocket sensor has power (lights) and that it properly detects the absence of devices (for example, when a device mis-pick or misplacement occurs).



Empty Pocket Sensor

## Track Jam Sensor

On top of the taper track (immediately before the carrier tape enters the cover taping area), ensure the track jam sensor has power (lights) and that it properly detects when a device is not properly seated in pocket.



Track Jam Sensor

# Sealer Configuration

This section provides steps for configuring a sealer (heat or pressure).

## Configuring the Heat Sealer

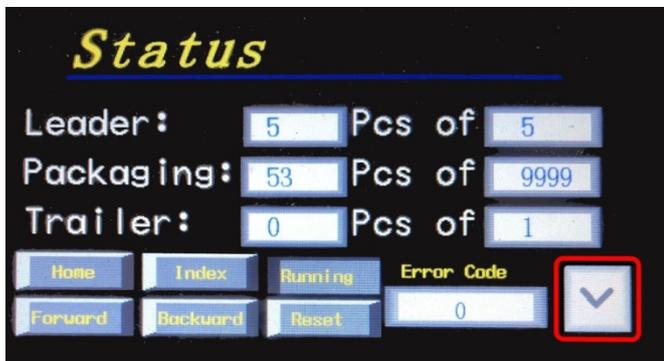
Complete the following steps to configure the heat sealer.

1. On the Control Panel, press the **Heat** button to power-up the sealer.
2. Set the temperature using the temp controls (145° C recommended).



Heat Sealer Temperature Controls

3. Set the air pressure for the heat shoes (0.35 MPa recommended).
4. On the touchscreen, in the lower-right corner of the **Status** screen, press the **Down** arrow for the next screen.



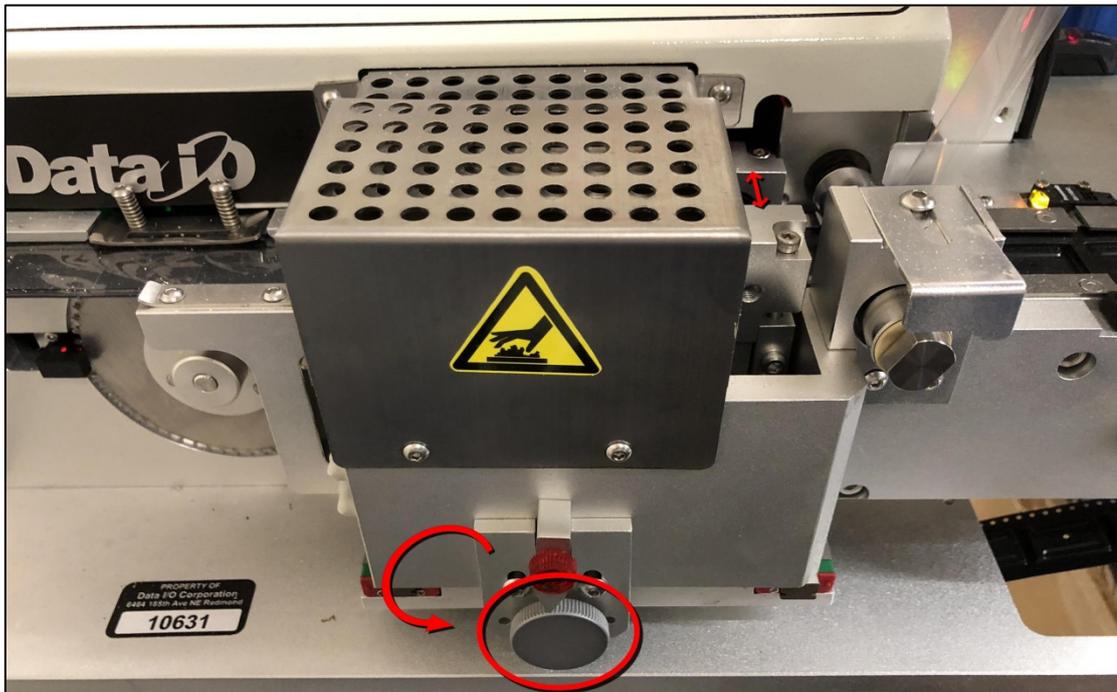
**Down** arrow for next screen

5. On the **Setting** screen, set the desired parameters for the job (Pitch, Dwell time, Speed, Packaging/Count, etc.), and then press the **Up** arrow (lower-right corner) to return to the **Status** screen.



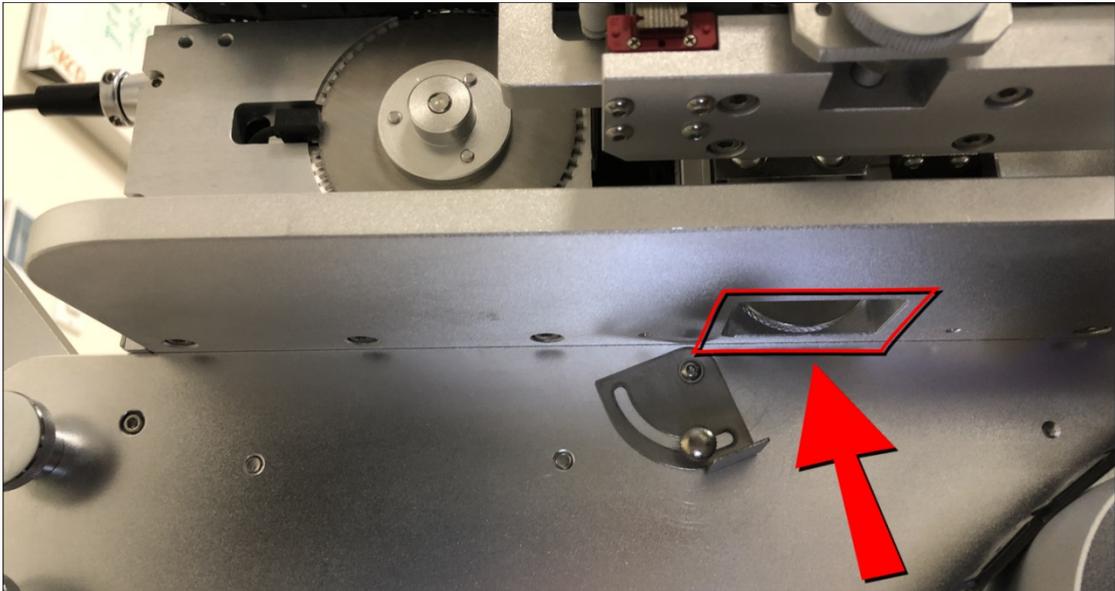
Job Parameters on **Setting** screen

6. Dry-run a few parts using the foot switch.
7. Inspect the sealed tape for any wrinkles and creases (re-check alignment of tapes), and ensure that the sealing quality is adequate.
8. To adjust the outer heat shoe position, turn the outer sealer position adjustment knob (as depicted below).



Sealer Position Adjustment Knob

9. To adjust the inner heat shoe position, turn the inner sealer position adjustment knob (access the knob from underneath the taper).

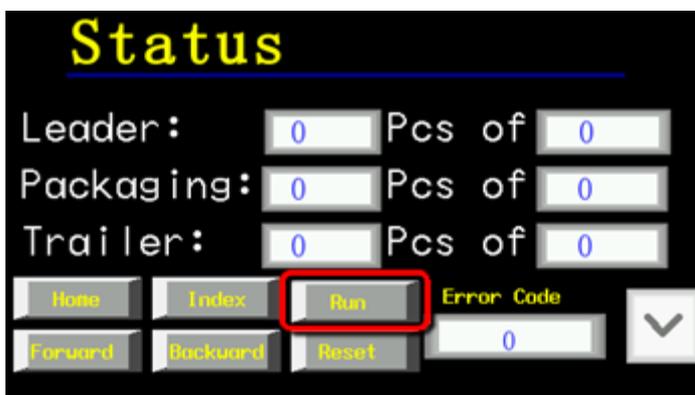


10. Confirm that taped devices are sealed securely in the take-up reel:
- Perform a **peel back test** by peeling the cover tape from the carrier tape, paying attention to how well they adhere.
  - Perform a **twist test** by giving the tape a slight twist, noting if the cover tape detaches from the carrier tape.

If either test produces loose cover tape, increase the roller pressure of the press sealer (turn the sealer adjustment screw clockwise).

If the cover tape is intact after completing both tests, then visually inspect the taped devices for any excess adhesive/glue. If adhesive is visible, then decrease the roller pressure (turn the sealer adjustment screw counter-clockwise) and test again.

11. The Taper is ready for operation. On the **Status** screen, press **Run**.



## Configuring the Press Sealer

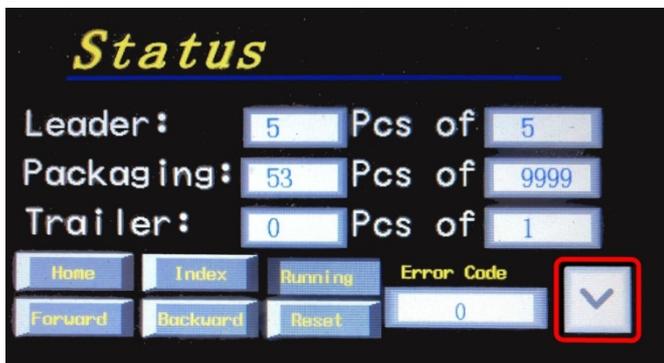
Complete the following steps to configure the press sealer.

1. On the Control Panel, ensure that **Power** is On but **Heat** is Off.



Power and Heat Controls

2. On the touchscreen, in the lower-right corner of the **Status** screen, press the **Down** arrow for the next screen.



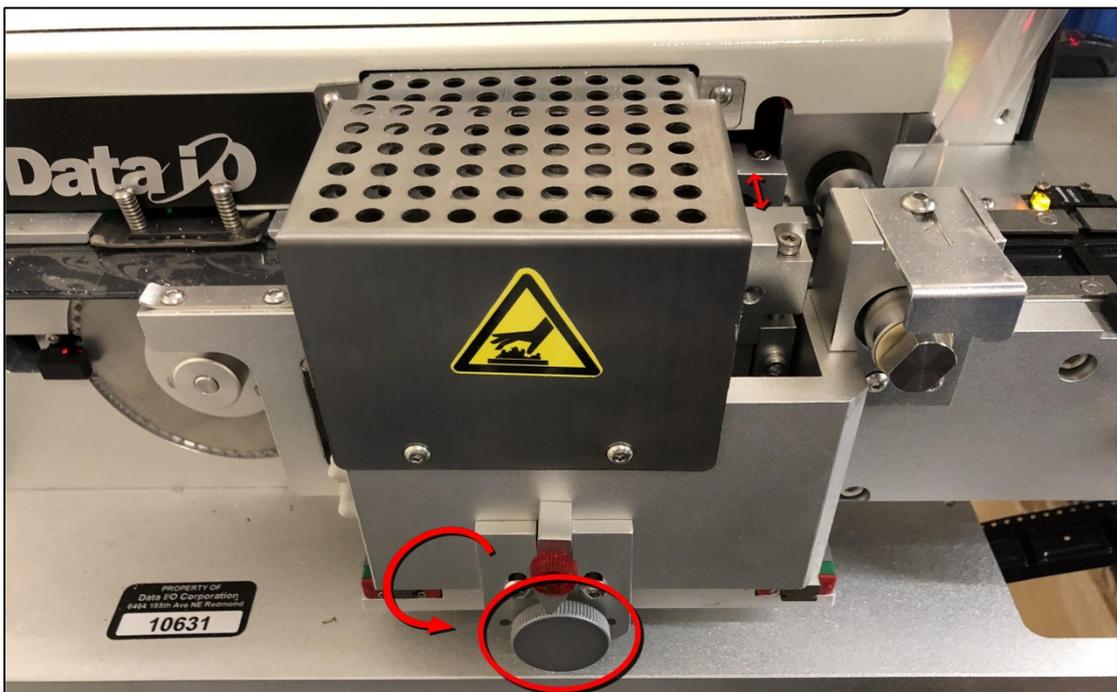
Down arrow for next screen

3. On the **Setting** screen, set the desired parameters for the job (Pitch, Speed, Packaging/Count, etc.), then press the **Up** arrow (lower-right corner) to return to the **Status** screen.



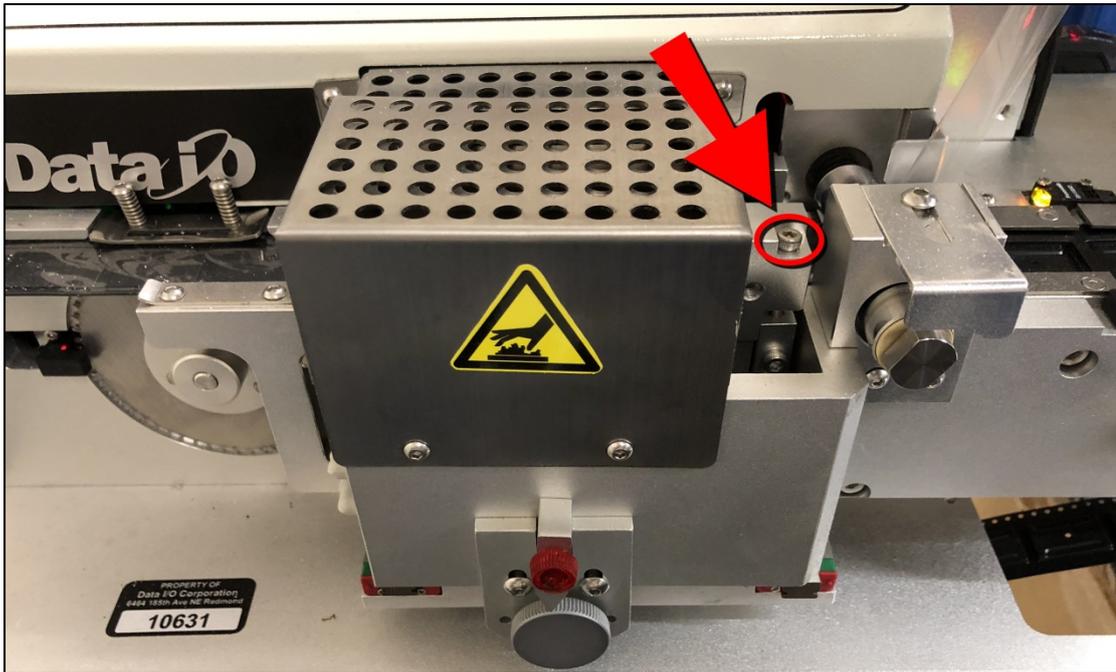
Job Parameters on **Setting** screen

4. Dry-run a few parts using the foot switch.
5. Inspect the sealed tape for any wrinkles and creases (re-check alignment of tapes), and ensure that the sealing quality is adequate.
6. To adjust the press sealer (roller) position, turn the sealer position adjustment knob (as depicted below).



Sealer Position Adjustment Knob

7. To adjust the press sealer rollers pressure, rotate a 3mm hex driver in the press sealer adjustment screw hole (as depicted below).



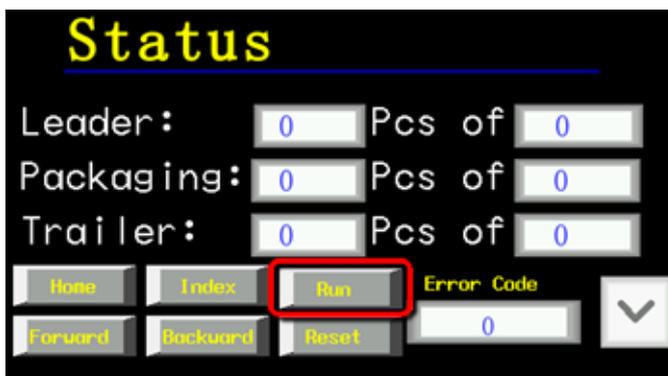
Press Sealer Pressure Adjustment

8. Confirm that taped devices are sealed securely in the take-up reel:
- Perform a **peel back test** by peeling the cover tape from the carrier tape, paying attention to how well they adhere.
  - Perform a **twist test** by giving the tape a slight twist, noting if the cover tape detaches from the carrier tape.

If either test produces loose cover tape, increase the roller pressure of the press sealer (turn the sealer adjustment screw clockwise).

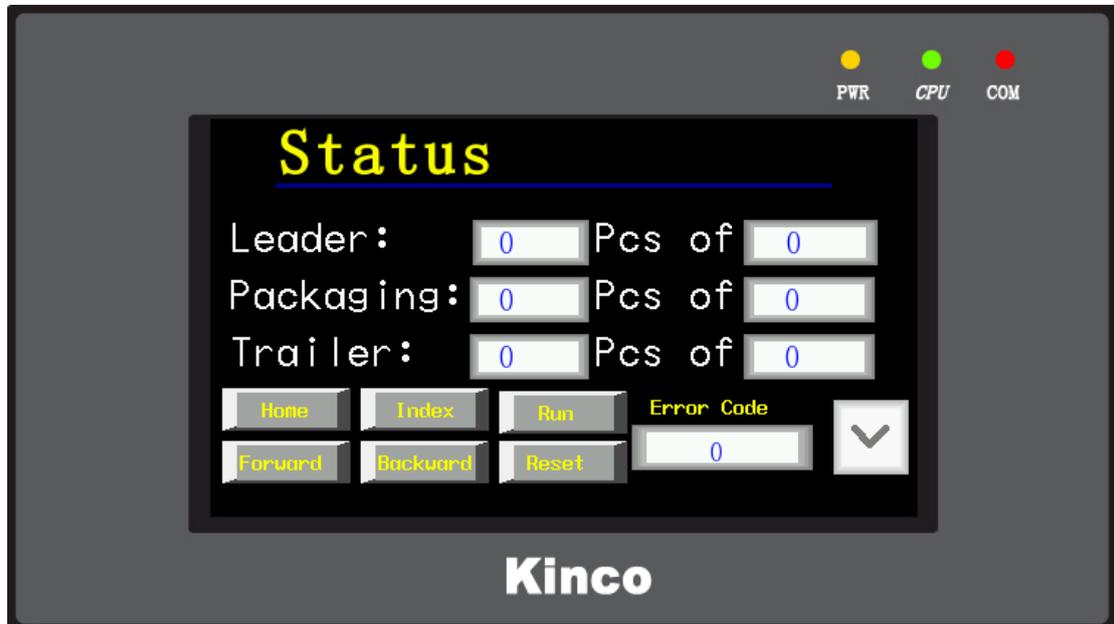
If the cover tape is intact after completing both tests, then visually inspect the taped devices for any excess adhesive/glue. If adhesive is visible, then decrease the roller pressure (turn the sealer adjustment screw counter-clockwise) and test again.

9. The Taper is ready for operation. On the **Status** screen, press **Run**.



# Touchscreen Controls Reference

## Status Screen



Status screen

This screen presents the current status of the job. Press the **Down** arrow (lower-right corner) to advance to the next screen.

- **Leader:** empty pockets number at the start of the tape.
- **Packaging amount:** number/count to package this time.
- **Trailer amount:** empty pockets number at the end of the tape.
- **Home:** homing; use for positioning the carrier tape.
- **Index:** seal one pocket when in the packaging stage.
- **Run:** start the process.
- **Forward:** advance the carrier tape forward.
- **Backward:** advance the carrier tape backward.
- **Reset:** reset the values of Leader, Packaging, and Trailer.
- **Err Code:** displayed if there is an error. 0 means no error. See Troubleshooting section at end of document.

## Setting Screen



Setting screen

This screen presents settings for the current job. Press a specific box/field and enter the desired number value. Press the **Down** arrow (lower-right corner) to advance to the next screen; or press the **Up** arrow to return to the **Status** screen.

- **Leader:** Set the empty pockets number at the start of the tape.
- **Packaging:** Set the number/count to package this time.
- **Trailer:** Set the empty pockets number at the end of the tape.
- **Pitch:** Set how far (mm) the index motor will move.
- **Dwelling time:** Set the time (ms) when the hot shoes on the tape.
- **Index Speed:** Set the index motor speed (mm/s).
- **Jog Speed:** Set the jog speed (mm/s).
- **ACC/DEC Time:** Set the index motor accelerate and de-accelerate time (ms).

## Function Screen



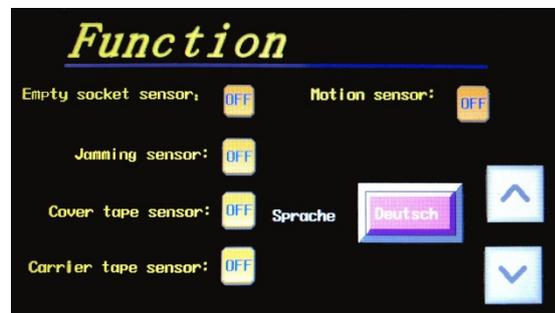
Function screen

This screen presents toggles for the sensors and language. Press a specific button to enable or disable the desired function. Press the **Down** arrow (lower-right corner) to advance to the next screen; or press the **Up** arrow to return to the **Setting** screen.

- **Empty pocket sensor:** detects if a pocket is empty.
- **Jamming sensor:** detects if a device is jammed in the pocket.
- **Carrier tape sensor:** detects if carrier tape is present.
- **Cover tape sensor:** detects if cover tape is present.
- **Language:** changes the language displayed in the touchscreen (cycles between English, Chinese, and German).



Chinese Language UI



German Language UI

## I/O Screen



I/O screen

This screen presents the PLC I/O status. Green light means the I/O port is On (no green light means the I/O port is Off). Press the **Up** arrow to return to the **Function** screen.

- **HS Up:** set the hot shoe up and down.
- **Motor Enable:** enable/disable the index motor.

## Motor

## Take-Up Controls



Take-Up Motor Control Panel

The tape take-up motor controls are located on the left side of the controller box.

- **Up/Down arrow:** set the torque of the tape take-up motor.
- **REV:** start the motor.
- **Stop:** stop the motor.
- **FWD:** advance the motor.

## Maintenance

Perform the following maintenance tasks to help keep your taper running smoothly:

- Perform **weekly** cleaning of taper surfaces using dry or damp shop towels.
- Inspect parts **monthly** to ensure integrity and proper function.
- Clean any excess build-up of grime and residue on the loading track, cover tape rollers, press sealer rollers, and heat shoes.
- Turn off the Power when not in use.

## Parts and Supplies

You can order a Spare Parts Kit for the taper from Data I/O. This spares kit includes the following parts:

Part Name	Description	Part Number
<b>Temperature Sensor/Transducer</b>	Two rigid-sheath thermocouple tubes (3.175 mm D x 12.7 mm L) for heating the heat shoe	369-0025-001
<b>Temperature Controller/Heater</b>	Two thermostats for maintaining target temperature range	370-0022-001
<b>Ball Bearing</b>	Extra bearing (4 mm x 13 mm) for various taper rollers	280-0016-001
<b>Heat Shoe/Plate</b>	Two metal blocks/heat shoes (7 cm x 62 cm x 27 cm)	636-0701-001

## Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Sealing quality is poor	Temperature setting is too low or too high.	Reset the temperature.
	Hot shoe is dirty.	Clean the hot shoe(s).
	Air pressure is too low.	Increase the air pressure.
	Carrier Tape is broken.	Exchange with a new carrier tape reel.
	Cover Tape and Carrier Tape are not aligned.	Adjust position to proper tape alignment.
Cannot index	Pitch is set too low.	Set it to the desired value.
	Speed is set too low.	Set it to the desired value.
	Motor is broken.	Contact Data I/O Service.

### Error Codes:

- 1 cover tape error
- 2 carrier tape error
- 4 jamming error
- 8 empty pocket error
- 16 temperature controller error #1
- 32 temperature controller error #2
- 64 motion error

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