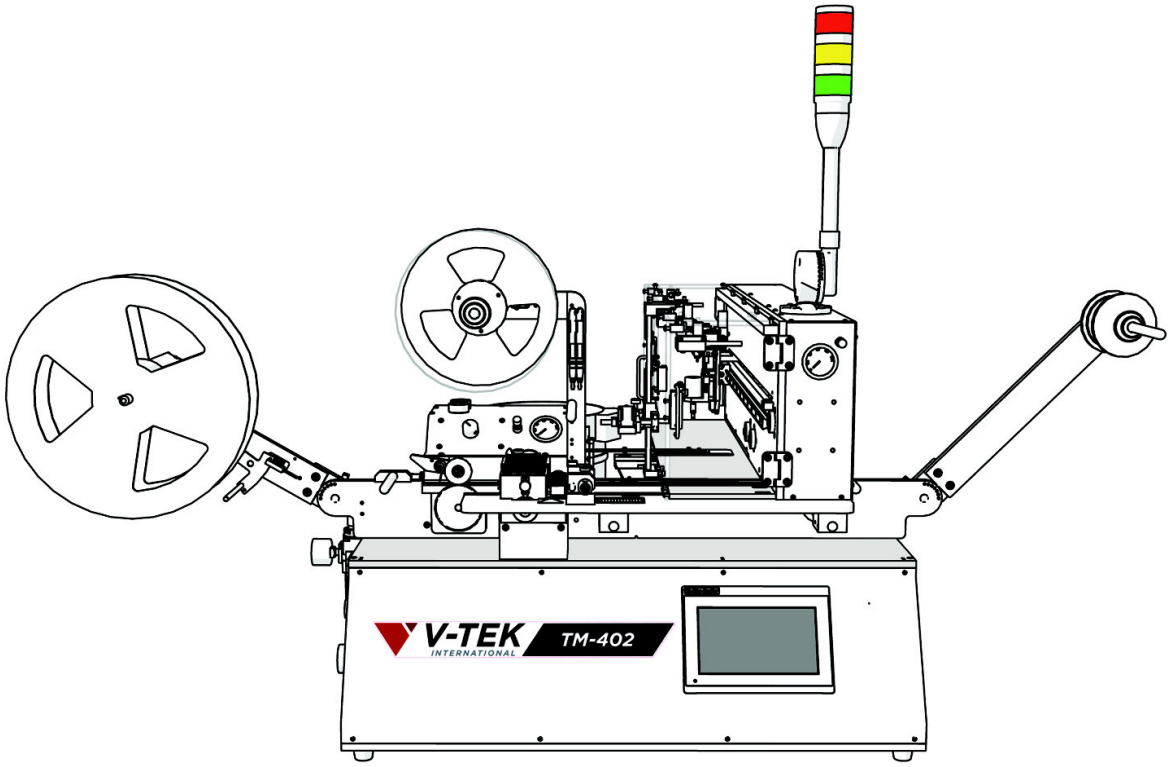

TM-402 User's Guide

User's Guide # D292105F

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www.vtekusa.com

Vendor Provided Material

Significant portions of this documentation were provided by:

KEYENCE CORPORATION OF AMERICA
1100 North Arlington Heights Road, Suite210, Itasca, IL 60143
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www.keyence.com

EC Declaration of Conformity

Manufacturers Name: V-TEK Incorporated.
Manufacturers' Address: 751 Summit Avenue,
Mankato, Minnesota 56002, USA.

Declare that the machinery described below complies with applicable health and safety requirements of Part 1 of Annex 1 of the Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC. Confidential technical documentation has been compiled in accordance with Part A of Annex VII of Machinery Directive 2006/42/EC and is available to European national authorities on written request only. If a request is received documentation will be delivered on a CD or by post.

Description: **TM-400**
Model Number: **TM-400**
Specification: **Component Handling Machine**
Serial Number\s:

The following standards have either been referred to or been complied with in part or in full as relevant:

ENISO 12100: 2006	Machinery Safety	-	Safety of machinery - General principles for design – Risk assessment and risk reduction
EN13849: 2008	Machinery Safety	-	Safety Related Parts of Control Systems – Part 1 General Principals for Design and Part 2 Validation.
EN ISO 13732: 2008	Machinery Safety	-	Ergonomics of the thermal environment
EN 614-2:2000+A1:2008	Machinery Safety	-	Ergonomic design principals
EN 13850: 2008	Machinery Safety	-	Emergency-stop equipment, functional aspects Principals for Design
EN60204-1: 2010	Machinery Safety	-	Electrical Equipment of Machines
ENISO 11202/A1 1997	Acoustics	-	Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions.
EN61000-6-3:2007	EMC	-	Generic standards - Emission standard for residential, commercial and light-industrial environments
EN61000-6-1: 2007	EMC	-	Generic standards - Immunity for residential, commercial and light-industrial environments

Full Name of responsible person and place of signing Christina James

Place V-TEK Incorporated **Position** Compliance Director

Signature **Date** 02/24/2014

EC REP
QNET BV
Hommerterweg 286
6436 AM Amstenrade
The Netherlands

Introduction

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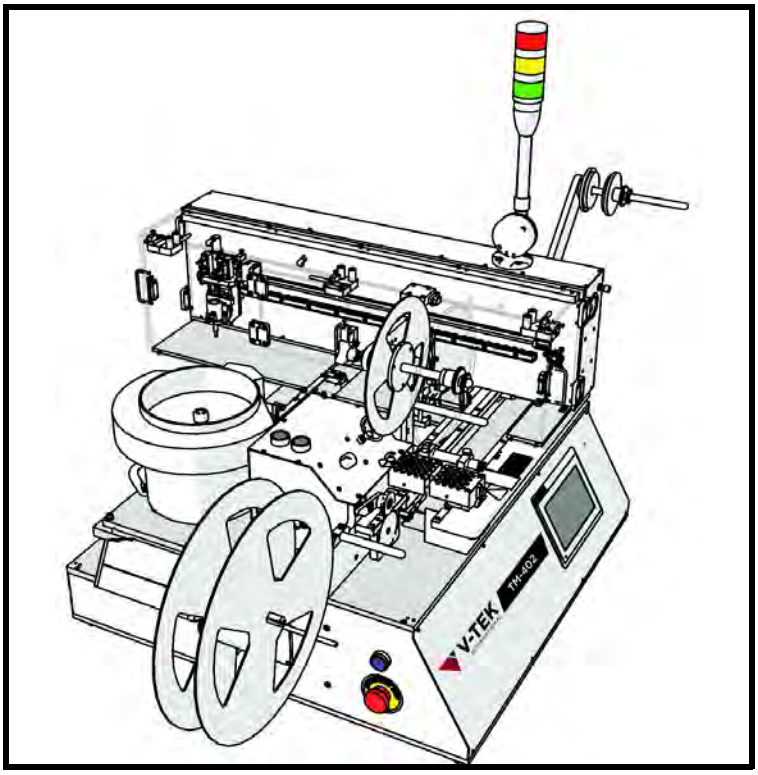
Introduction

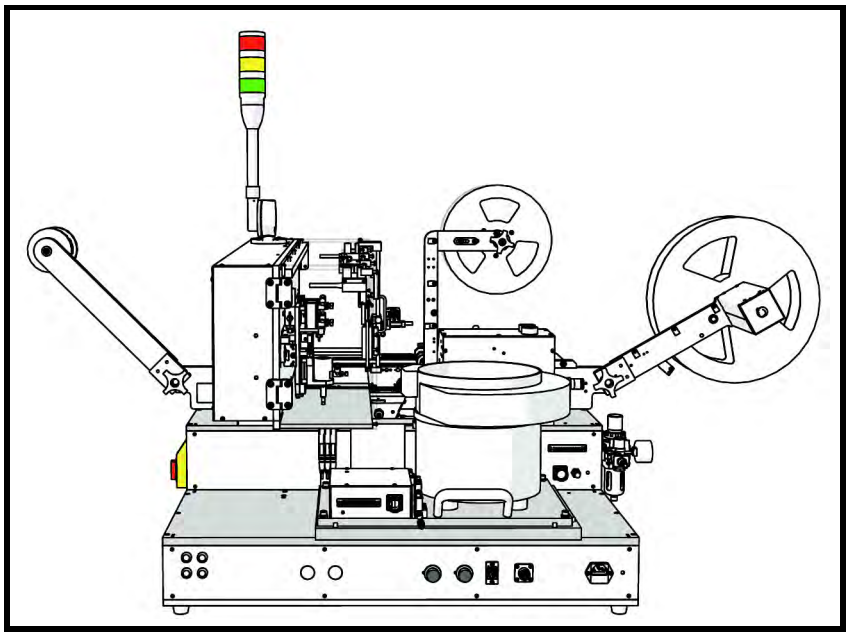


Thank you for purchasing the **TM-402 Component Handling Machine**. The TM-402 is a table-top pick and place tape and reel machine with vision, designed for use in production environments for electronic devices. This machine accepts devices loaded in a bowl feeder. It features a 2D over tape vision system for component verification. A touch screen interface simplifies the setup process, and minimizes set up time and operator intervention for fast, easy functioning.

Standard Features:

- Touch screen operator interface for easy setup and operation
- Bowl input, Tape output
- Ability to rotate components +/-90° or 180°
- Innovative universal adjustable heat and PSA sealer
- Software controlled advance movement of carrier tape (2mm to 144mm pitch)
- Adjustable track assembly for tape widths 8mm to 72 mm
- 2D Vision over tape inspection for Mark, Orientation and Empty Pocket Detection.
- User-friendly safety enclosure with multiple access points provides easy access with minimal downtime
- Automatic *Jam in Track* and *Low Cover Tape Detection Sensors*

Theory of Operation



Operation of the TM-402 is simple. The operator loads the Bowl Feeder and then configures the job for the selected part using the TM-402's intuitive, touch screen *Human Machine Interface (HMI)*. Job configuration includes selecting and programming inspection criteria.

When the TM-402 is set in motion, the pick head picks an individual part from the *Bowl Feeder Nest* and places the part directly into a carrier tape pocket. The *2D Vision System* detects empty pockets and inspects placed parts for mark and orientation prior to cover tape application. Parts that fail inspection stop operation and trigger an error message, allowing the user to correct the error before continuing operation.

As the tape advances, it passes sensors which detect jams in tape. Once the carrier tape reaches the TM-402 sealer assembly, cover tape is applied. The part is then sealed in the pocket with either a *Heat Seal* or *Pressure Sensitive Adhesive (PSA)* cover tape. When the sealing process is complete, the finished tape is routed onto a take-up reel.

During operation, the operator keeps the selected *Bowl Feeder* supplied with parts and observes the inspection process, adjusting operation and inspection settings as needed. In the event of 2D inspection fails, the operator may re-orient or swap out parts from the output area as needed. When tape reels are complete, the operator removes the full reel and replaces it with a new reel.

Machine Details

Controls:

Touch screen Operator Interface includes:

- User-friendly Job Wizard and Pitch Setting Wizard for easy set-up
- Customizable job configuration
- Sealer Dwell Adjustment
- Manual/Automatic leader/trailer
- Password protection

Speed:

Placement speed of up to 2,800 UPH

Dimensions:

- Height: 39.5” (100 cm) *(includes Tower Light*)
- Width: 50.5” (128.5 cm)
- Depth: 35.5” (90 cm)
- Working area: 11’ x 9’ (3.5 m x 2.75 m)

Weight:

- 267 lb. (121 Kg)

Power Requirements:

- Air consumption: 5 SCFM at 85 PSI
- Electrical: 120 OR 240 VAC (bowl dependent), 50/60Hz AC

Note: The TM-402 is designed and tested to meet the CE Directives: 2006/42/EC, 2004/108/EC. These tests were conducted with the power requirements of 230V 50Hz. However, the TM-402 can also handle other voltage levels seen in other parts of the world including voltages from 208V-240V @ 50/60 Hz.

Reference below when wiring the electrical plug:

- Attach the BROWN wire to L1
- Attach the BLUE wire to N/L2
- Attach the GREEN/YELLOW wire to Ground

Intended Use

The intended use of the TM-402 Taping Machine is to produce taped reels of individually sealed and consistently orientated components. Use of this equipment in any other way is not recommended.

The TM-402 is designed to accommodate a full range of electronic devices. The Bowl Feeder accommodates parts which are 0805 size and larger.

Suitable carrier and sealing tapes include any conductive or non-conductive tapes with feedholes that are pitched at 4 mm. Tapes must operate in a temperature range from 120-160° Celsius with a pressure range from 40-60 psi and dwell time between 250-400 milliseconds. The TM-402 can accommodate tape widths from 8mm to 72mm.

Tape advance and Pick Head speeds are set on the machine's controller and can be set at speeds of 1-10. The Bowl Feeder's Linear Track speeds are set with the control knobs on the Bowl assembly. Feed rates are up to 2,800 units per hour dependent on component size.

Caution:

V-TEK® Incorporated takes no responsibility for the safety of the TM-402 if it is used for any purpose other than the intended purpose as specified in this User's Guide.

Operating Environment

The TM-402 is designed to be operated in a temperature and humidity controlled, light, industrial setting. It requires an ISO Class 9 clean room environment.

The machine should be installed on a flat, dry, stable surface in a well lit area (ambient lighting of 200 to 300 Lux (Lumens/m2).

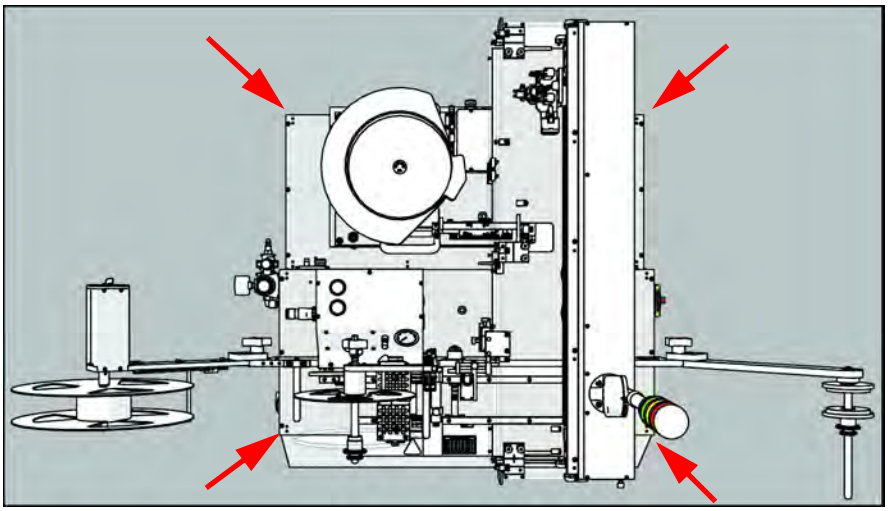
The recommended climate is between 5 - 75% non-condensing humidity with a room temperature between 0 - 50 degrees Celsius.

> **Note**: Although all of the components used on the machine will withstand the temperature range of 0 to 50 degrees Celsius, such temperatures may decrease the life of some of the components.

The intended electrical environment is Pollution Degree 2 and Over Voltage Category II.

Misuse

The TM-402 weighs approximately 267 lbs. (121 kg.) and requires four people to safely carry it. Operators are cautioned to follow the instructions and illustrations for safely transporting the TM-402. Failure to do so could result in injury or damage to the machine.



Lift Points

Installation instructions clearly state that the TM-402 should only be installed or operated on a level surface to prevent toppling.

The user is protected from moving parts and exposure to objects being ejected under pressure by 16 standard wire gauge sheet metal and 3/8 inch clear, polycarbonate enclosures. Door sensors ensure operation automatically stops if the enclosure doors are opened. No attempt should be made to remove these enclosures or to block, disable or override the door sensors.

The enclosure doors may be left open during basic set-up procedures such as positioning the pick head at place or pick locations. If the enclosure doors are left open during setup the TM-402 automatically reduces the speed of the pick head to a fraction of its normal operating speed to prevent operator injury due to collision, etc.

The user is protected from the TM-402's heat sealer by a metal guard. Operators are cautioned not to touch the heat seal guard or to try to reach underneath the guard while the heat sealer is in operation.

The TM-402 air supply should be adjusted to operate at a maximum working pressure not exceeding 7.6 bar (110 psi). The maximum permissible source pressure should not exceed 9 bar (130 psi). Failure to set the air pressure within these limits could result in a failure in the pneumatic system which could lead to injury.

Operator Requirements

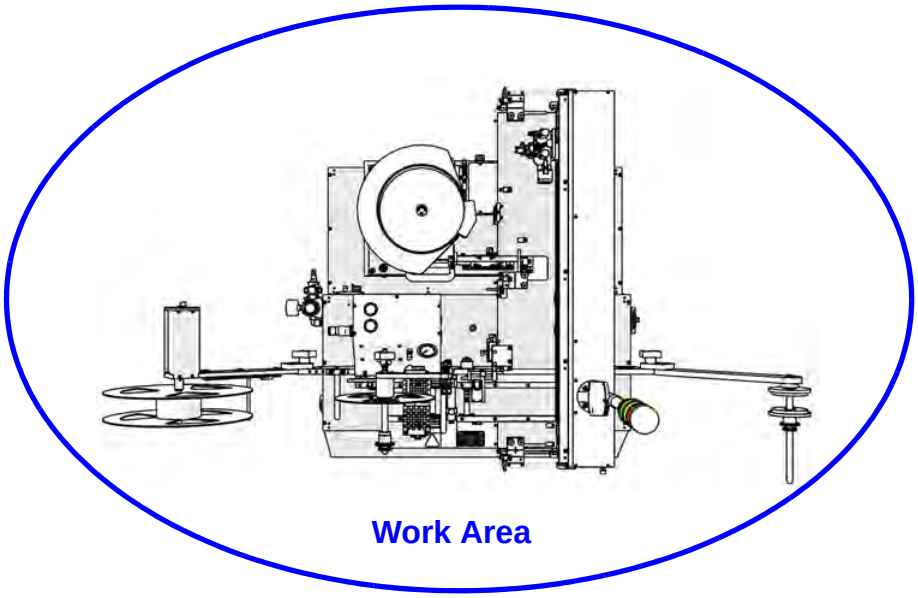
The guidelines provided in the following pages are intended to educate the user about how to operate the TM-402 safely. They contain important information on avoiding potential hazards to the operator and to the equipment. Only personnel who have thoroughly reviewed and understand the *TM-402 User's Guide* and are aware of the possible hazards should operate or perform maintenance on the TM-402.

Operators and maintenance personnel are advised not to wear loose fitting clothing or jewelry when operating or maintaining the TM-402. Protective eye wear should be worn when loading, operating or maintaining the TM-402.

Caution: Users should always wear protective eye wear when loading, operating or maintaining the TM-402.

Safe operation of the TM-402 does not require gloves of any type, however some component manufacturers may recommend gloves be worn when handling parts. Consult the component manufacturer for specific placement instructions. Ear protection is not necessary during normal operation.

When running the TM-402, the operator should stand or sit in front of the touch screen to assure easy access to all controls and the *Power/Emergency Stop Button*. This position allows the operator to view all parts of the TM-402 while it is in operation. When loading the TM-402 Bowl Feeder or changing Taper reels, the operator may also need to access the side and back of the machine



Work Area

Caution!

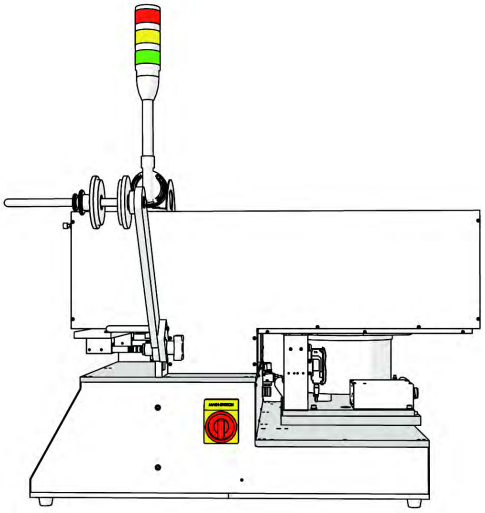
The TM-402 should never be operated while under the influence of alcohol or drugs. V-TEK® Incorporated takes no responsibility for the safety of TM-402 if it is used for any purpose other than the intended purpose as specified in this User's Guide.

Safety Features

Main Power Switch

The *Main Power Switch* is located on the right side of the machine. Turning the switch to the right turns power **ON**. Turning the switch back to the left turns the power **OFF**.

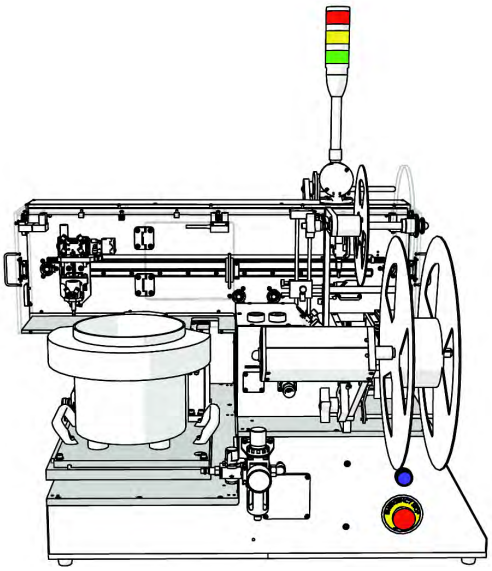
When the *Main Switch* is in the **OFF** position, it exposes a lockout-tagout hole. The switch can be locked by inserting a lock through the hole. The switch on the right is pictured in the **OFF** position.



Emergency Stop Switch

There is one *Emergency Stop Switch* on the TM-402. It is located on the left side of the machine below the *Take-up Arm*. When an emergency stop switch is triggered, all motion will be halted and the machine will require a reset before operation can continue.

The emergency stop control circuit removes electrical power to all motors, moving parts, heat sources, pneumatics, and energy storing devices. This includes the stepper motor drive, stepper motors, the servo motor drive, servo motors, drive circuits, the main control board, the heat sealer and all pneumatics. The only devices that remain powered are the inspection module cameras, the enclosure lights, the sensors, and the HMI.



Reset Button

The TM-402's blue *Reset* button is located on the left side of the machine above the *Emergency Stop Switch.* When the machine is powered up, it is automatically placed into an emergency stop state to prevent the motors from moving until the operator is ready to begin operating the machine. The error state is cleared by pressing the **Reset** button on the front of the machine.

Open Doors Stop Operation

All automated motion stops and the machine is unable to enter *Run Mode* when an enclosure door is opened. An error message will display at the bottom of the HMI Run screen alerting the user that the TM-402 door(s) are open.

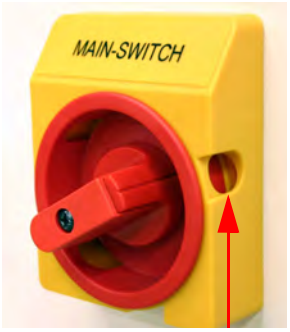
The enclosure doors may be left open during basic set-up procedures such as positioning the pick head at place or pick locations. If the enclosure doors are left open during setup the TM-402 automatically reduces the speed of the pick head to a fraction of its normal operating speed to prevent operator injury due to collision, etc.

Buzzer Alarm

The buzzer alarm will sound and halt the *Run Mode* process of the machine at any time a *System Alarm* occurs. A description of the *System Alarm* and suggestions for resolving it will appear on the HMI *Main Screen.*

Lockout/Tagout

The *Main Switch* can be turned **ON** and **OFF** by turning the red knob back and forth. When the red knob is placed in the **OFF** position, the lockout/tagout hole is exposed. The *Main Switch* can then be locked out by placing a lock through the hole.



lockout/tagout hole

The *Air Regulator* can be turned **ON** and **OFF** by turning the top red cap back and forth. When the red cap is placed in the **OFF** position, the lockout/tagout hole will be exposed. The *Air Regulator* can then be locked out by placing a lock through the hole.

Be sure to follow your company guidelines regarding lockout/tagout procedures.

Tower Light

The tower light feature allows taping machine operators and production supervisors in determining the operational state of the taping machine at a glance.

Color Codes

Green
A solid green light indicates the machine is running a job.

Red
A flashing red light indicates that the machine is on but not running.

Green + Amber
The combination of a solid green light and a solid amber light indicate the machine is at the end of a job and is in the process of creating a leader.

Red + Amber
The combination of a blinking red light and a blinking amber light indicates the machine is at the end of a job and attempting to create a leader, however something has interfered with the process, stopping the machine.

A blinking red light and a solid amber light indicates the machine is at the end of a job, the leader creation sequence is complete and the TM-402 is ready for the next process.

Safety Warning Labels

The following warning labels have been placed in various places on the machine to bring safety issues to the attention of operators and technicians working with or near the machine.

Attention

Indicates an adjustment or danger zone requiring attention.

Electrical Hazards

Indicates that hazardous voltage levels are present. Always disconnect power to the machine before removing panels or enclosures with this warning label.

Temperature Hazards

Indicates a hot surface. Use care when working near these surfaces and allow them to cool before performing maintenance.

Pinch Hazard

Indicates areas where moving parts or doors can pinch fingers if safety precautions are not observed.

Consult Manual

Consult User's Guide for proper procedure.

Disconnect power and air supplies and refer to *Chapter 7: Maintenance* of this manual before performing maintenance on the TM-402.

Note: Do not remove or obstruct any of the warning or instruction labels on the TM-402.

Contact Information

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For customer service, please refer to the *Customer Service Contact Sheet* at the back of this manual.

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Chapter 1: Assembly & Installation

Contents

Preparing the Work Area

Space Requirements

The TM-402 is a table-top machine which needs to be placed on a flat, stable surface in a well lit work area that is a minimum of 7' high x 11' wide x 9'deep (2.2 m x 3.5 m x 2.7 m) to provide sufficient space for the assembled machine when it is fully loaded with a variety of tape reel sizes.

The TM-402 is pictured mounted on the optional 80/20 Frame in the minimum required work area below.

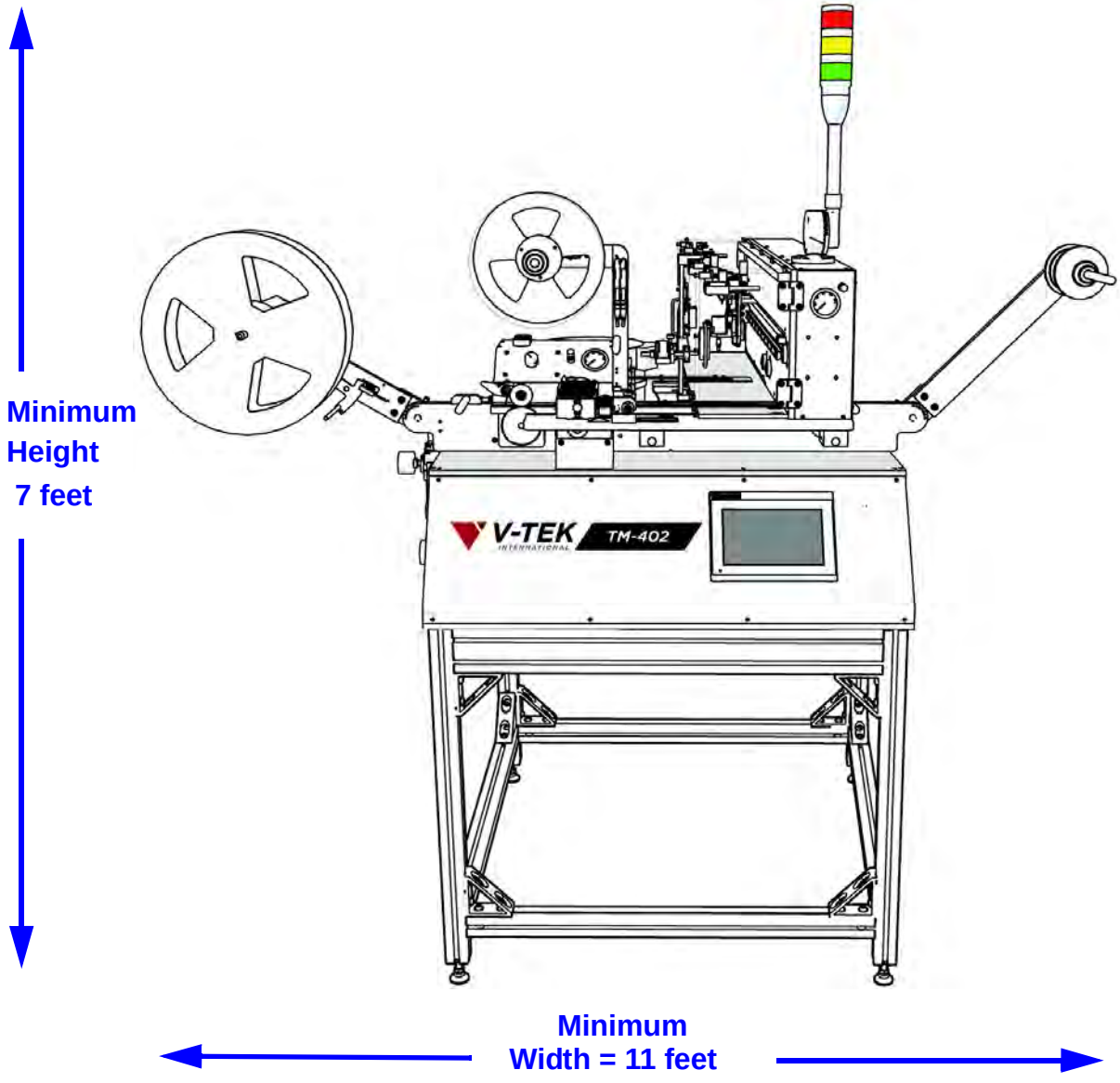


Table Requirements

The TM-402 should be placed on a user-supplied table or bench that is capable of supporting a minimum of 290 lb. (132 kg). An optional 80/20 frame (pictured above) is also available for mounting the TM-402.

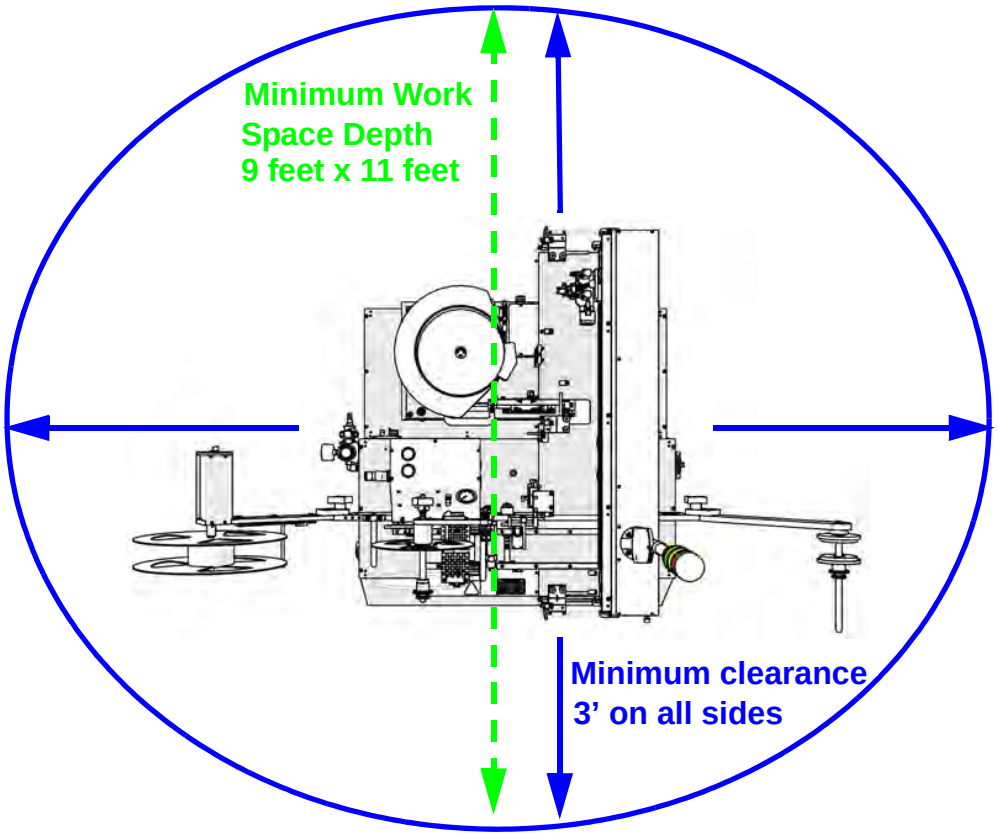
Choose a table that is at least 52” wide by 36” deep to provide sufficient space for the assembled machine when it is fully loaded with a variety of tape reel sizes.

Ideally the table height should be adjustable so the machine height can be easily adjusted to suit operators of varying heights. The objective is to position the TM-402 controls so they are easily accessible for operation and maintenance. The suggested level is 36” (900 mm) above the floor, but this may vary from one operator to another.

The table’s working surface should have a slope of no more than 5 degrees. Ensure that the TM-402 feet is positioned on a table or the optional 80/20 frame so the machine is fully supported, immobilized and level during operation.

Clearance

Allow at least three feet of clearance on all sides of the machine for easy access and operation. A birds-eye view of the TM-402 with minimum clearance on all sides is shown below.



When positioning the TM-402, choose an area that is not located below overhead gantries, walkways or power lines to ensure objects or liquids cannot be dropped on the machine from overhead.

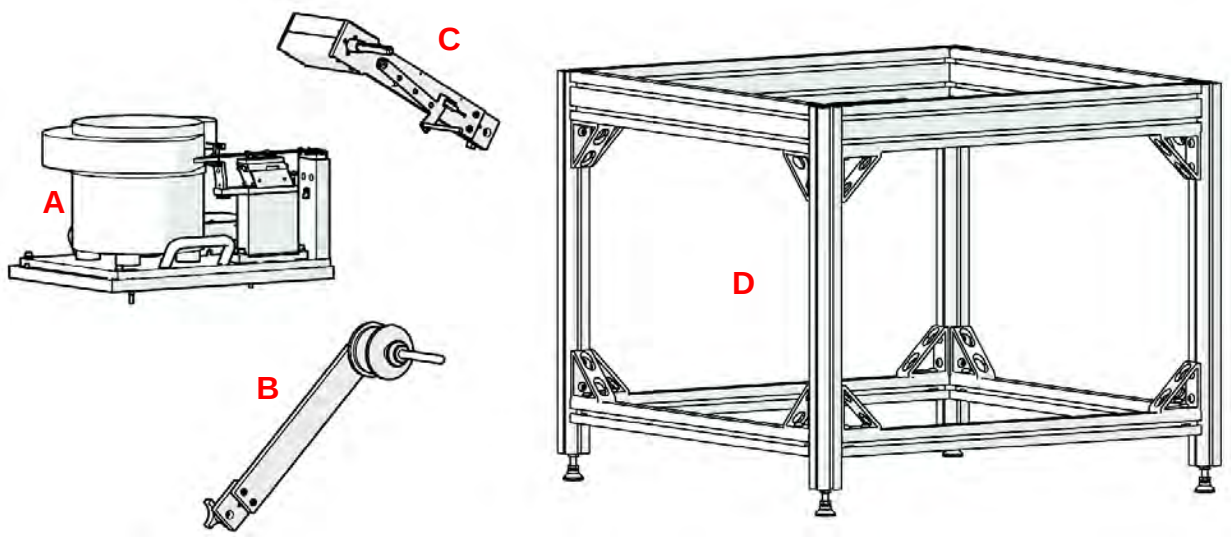
Power Requirements

The TM-402 will also require access to a 85-110 PSI air pressure system and a 240 VAC, 50/60 Hz power supply. Locate the machine so electrical power cables can be routed away from areas where personnel are expected to move.

> **Note:** It is recommended that cables be routed overhead or underground. If cables must be routed over the floor, cover them with rubber ramps.

Unpacking the TM-402

Prior to shipment, the TM-402 is partially disassembled, then shrink wrapped, placed in a crate, and strapped to the crate floor. The disassembled TM-402 parts, which include the *Carrier Tape Arm,* the *Take-up Assembly*, the *Bowl Feeder* and the *Spare Parts Kit*, are individually bubble-wrapped and packed around the base machine. The TM-402 crate should contain the base machine along with the following items:



A. 240 Volt Bowl Feeder

B. Carrier Tape Arm

C. Take-up Arm

D. 80/20 Frame (optional, shipped disassembled)

E. Laptop Computer (optional, not pictured)

A *User's Guide, Standard* and *Metric Hex Wrench Sets,* and a *Spare Parts Kit* are also included but not pictured above.

Note: Bowl appearance will vary depending on part size to be processed and the bowl which was selected at the time of purchase.

Assembling the TM-402

Equipment Required

- Adjustable wrench (needs to fit 1 1/16" to 1 3/32" nut)
- Standard and Metric Hex Wrench Sets (provided with machine)
- 85-110 PSI air pressure system

Note: Read the *TM-402 User's Guide* before assembling the TM-402.

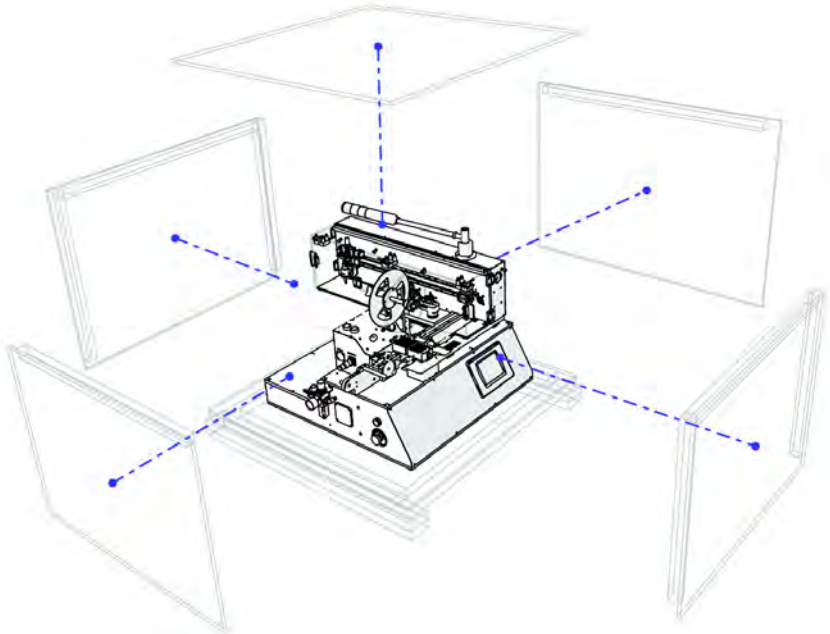
Unpack the TM-402 Crate

1. **Move the Crate to the Work Area.** Use a fork lift to move the TM-402 crate to the prepared work area. Ensure the fork is centered under the crate before lifting.

Note: Use a forklift with a minimum load capacity of 300 pounds (136 kg) and a fork length that is a minimum of 40 inches (102 cm) so the fork fully extends beyond the crate on the other side. The forklift should only be operated by a licensed/certified operator.

2, **Unpack the Crate.**

a. Remove the top and sides from the TM-402 crate. Set aside.



b. The TM-402 is shipped partially disassembled, with the *Bowl Feeder, Take-up Arm* and *Carrier Tape/Feed Arm* detached and wrapped in bubble wrap. Remove the smaller items one at a time from the crate and place on a flat, stable surface for assembly.

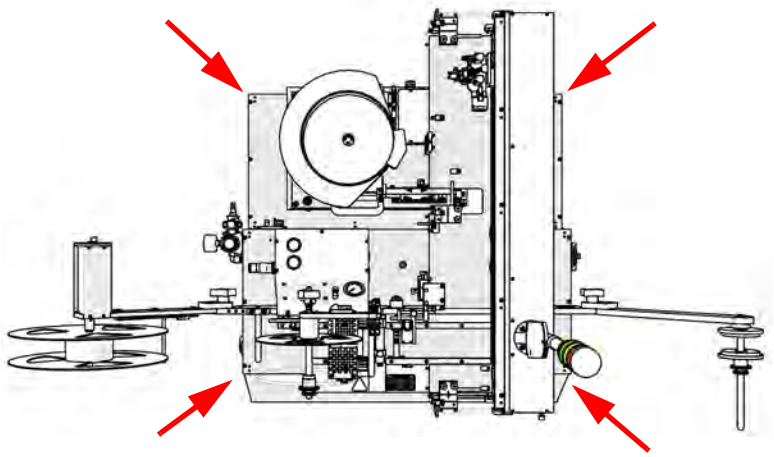
c. Remove and discard the protective wrapping from each part.

3. Remove the TM-402 from the Crate.

a. The TM-402 is bolted to the bottom of the crate for shipping. Reach below the crate to unfasten the bolts.

Note: If the optional 80/20 Frame was purchased, follow the assembly instructions in the *80/20 Frame Exploded Views* document which can be found in the *Exploded Views* section at the end of this manual before proceeding.

b. Moving the TM-402 Base Machine. The machine may be manually lifted from the crate. The base machine weighs 265 lb. (120 Kg) so the task will require four people.



Lift Points

Position one person at each corner of the machine using the lift points illustrated above to safely distribute the machine's weight. Lift the machine from the crate and place it onto the prepared work table/bench.

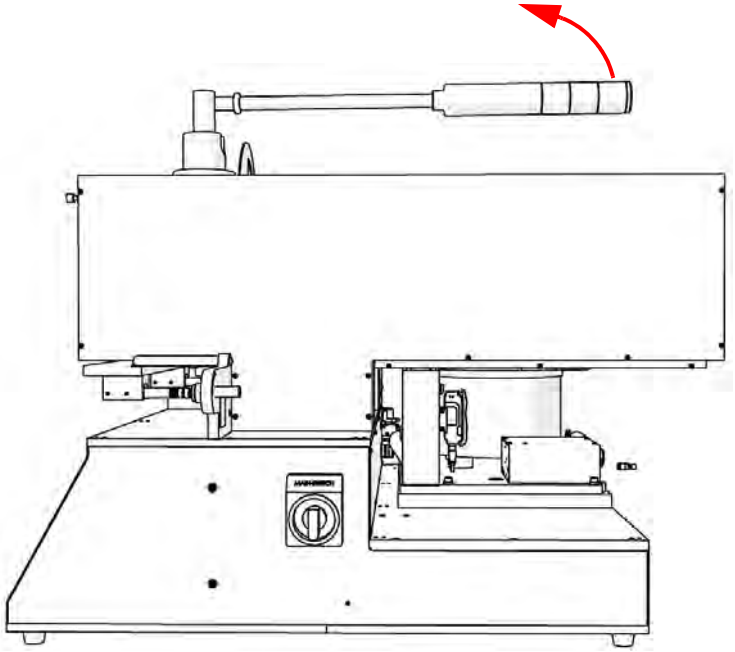
4. Position the TM-402 in the work area so there is at least 3 feet of clearance on all sides. (See the *Preparing the Work Area* section earlier in this chapter for details.)

5. The TM-402 is shipped with zip ties securing the pick head, the 2D Camera and any mobile portions of the machine. Cut and remove all zip ties.

Re-assemble the TM-402

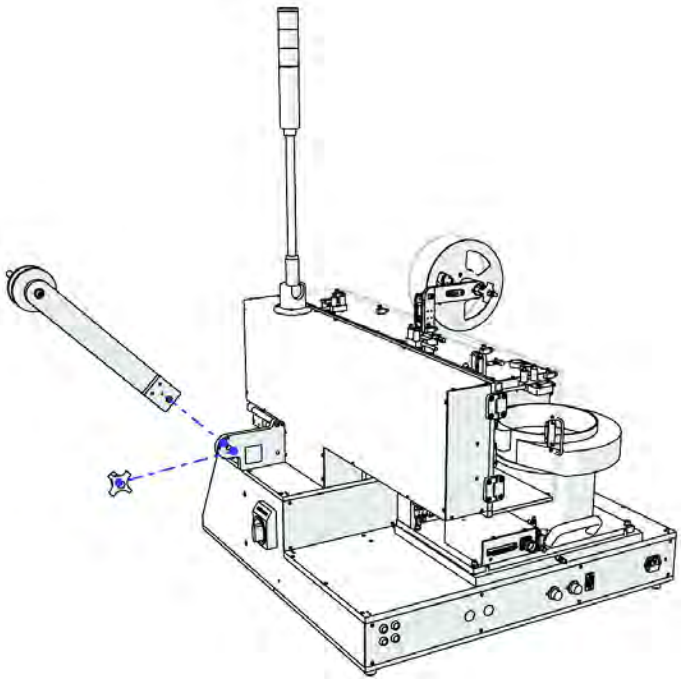
1. Position the Tower Light

Lift Tower Light, snapping it in place in an upright position perpendicular to the TM-402.

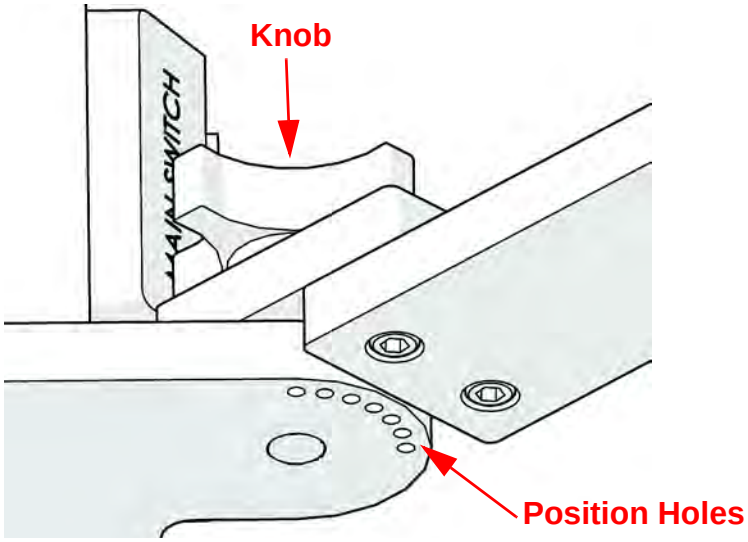


2. Connecting the *Carrier Tape Arm*

a. Remove the black knob from the right side of the *Track Support Bracket*.

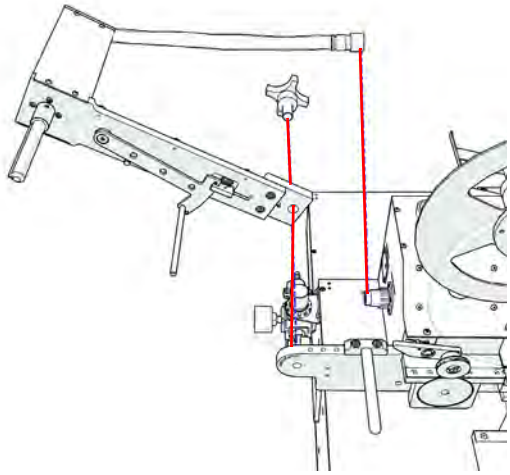


b. The *Carrier Tape Arm* has a dowel pin which locks into position holes on the *Track Support Bracket*. Slide the *Carrier Tape Arm* onto the threaded rod, engage the dowel pin into the desired position, and secure it into place with the black knob.

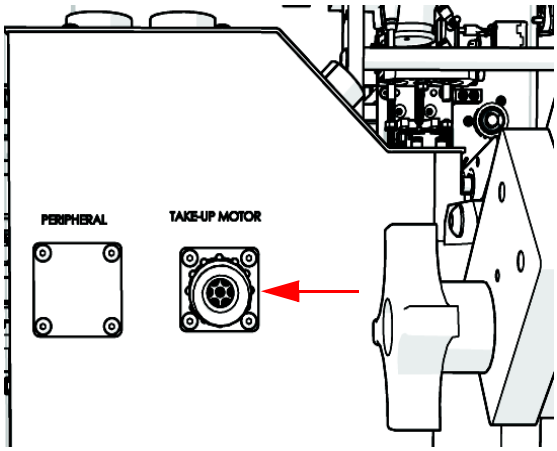


4. Positioning the Take-up Arm

a. The *Take-up Arm* has a dowel pin which locks into position holes on the *Track Support Bracket*. Loosen the black knob on the back of the *Take-up Arm* and position it at about a 45 degree angle from the baseplate assembly. Engage the dowel pin into the desired position and secure it into place with the black knob..



b. Plug the electrical connector into the take-up motor receptacle.

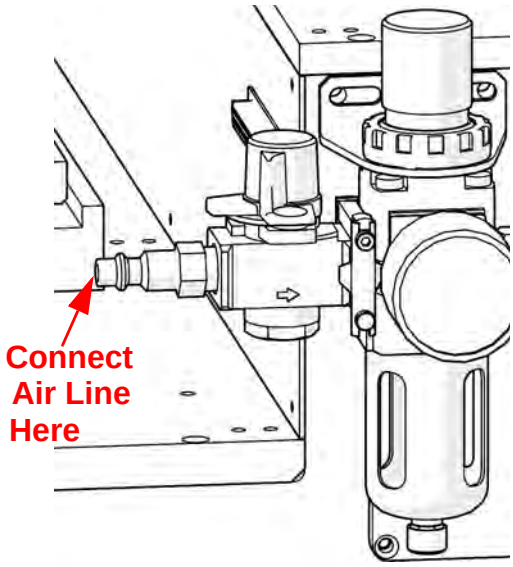


5. Connect the Air Supply..

a. Attach the air supply line to the air regulator, then connect it to the air supply.

b. Set the regulator to **85 psi**, if necessary. It can be adjusted by lifting the adjustment knob and turning it. Once it reads 85 psi, push the knob back in to lock it into place.

NOTE: It is recommended that the air hose be routed overhead or underground. If it must be routed over the floor, cover the hose with rubber ramps.



6. Inspect the TM-402.

a. Inspect the fully assembled TM-402, verifying that all twist ties have been removed and all cables are secure.

b. Connect the power cord to the power receptacle on the back of the TM-402, then connect the other end to a 240 Volt single phase power supply

Note: It is recommended that the power cord be routed overhead or underground. If it must be routed over the floor, cover the cords with rubber ramps.

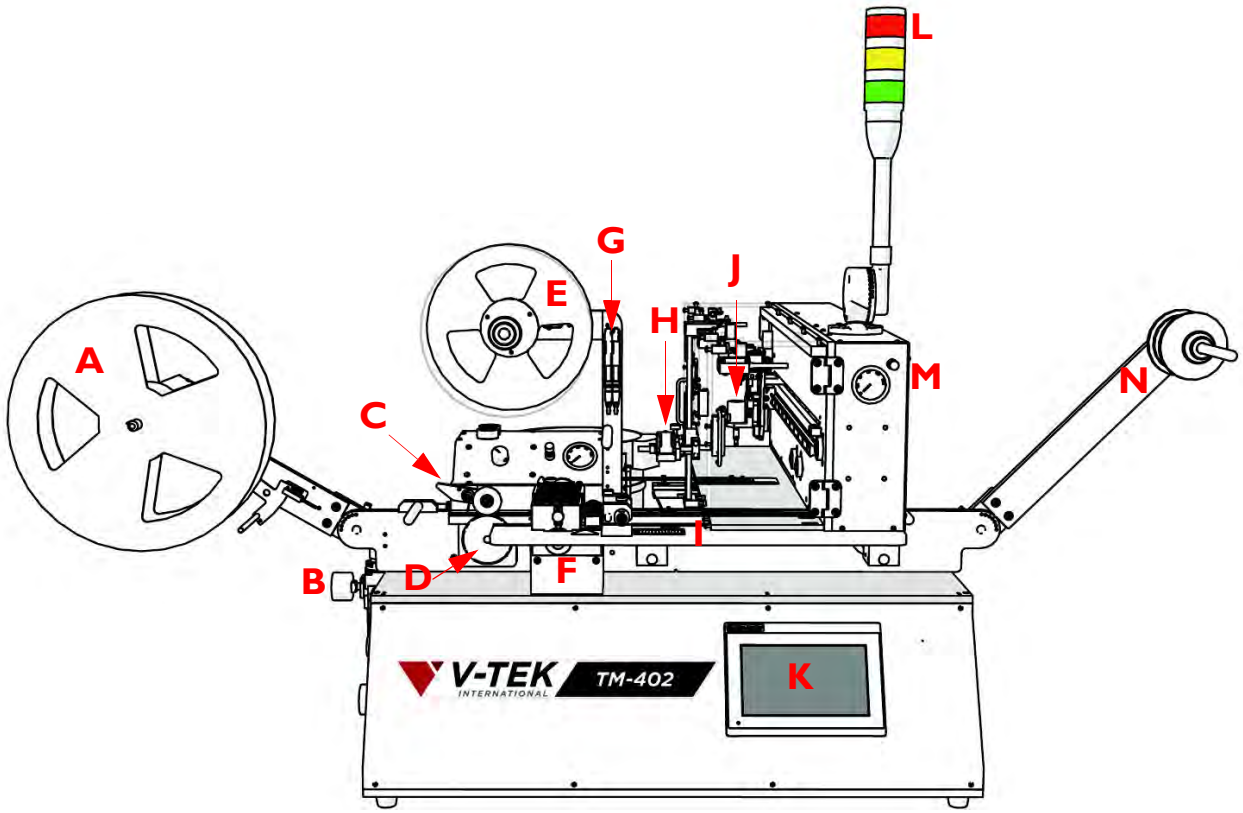
Protective earth grounding of the TM-402 is included in the manufacture of the TM-402 at V-TEK. The TM-402 is fully tested before shipping. No further grounding or testing is required during re-assembly and installation.

The TM-402 is ready to power up. Follow the instructions in *Chapter 3: Machine Setup* to setup the machine for operation.

Chapter 2: Machine Overview

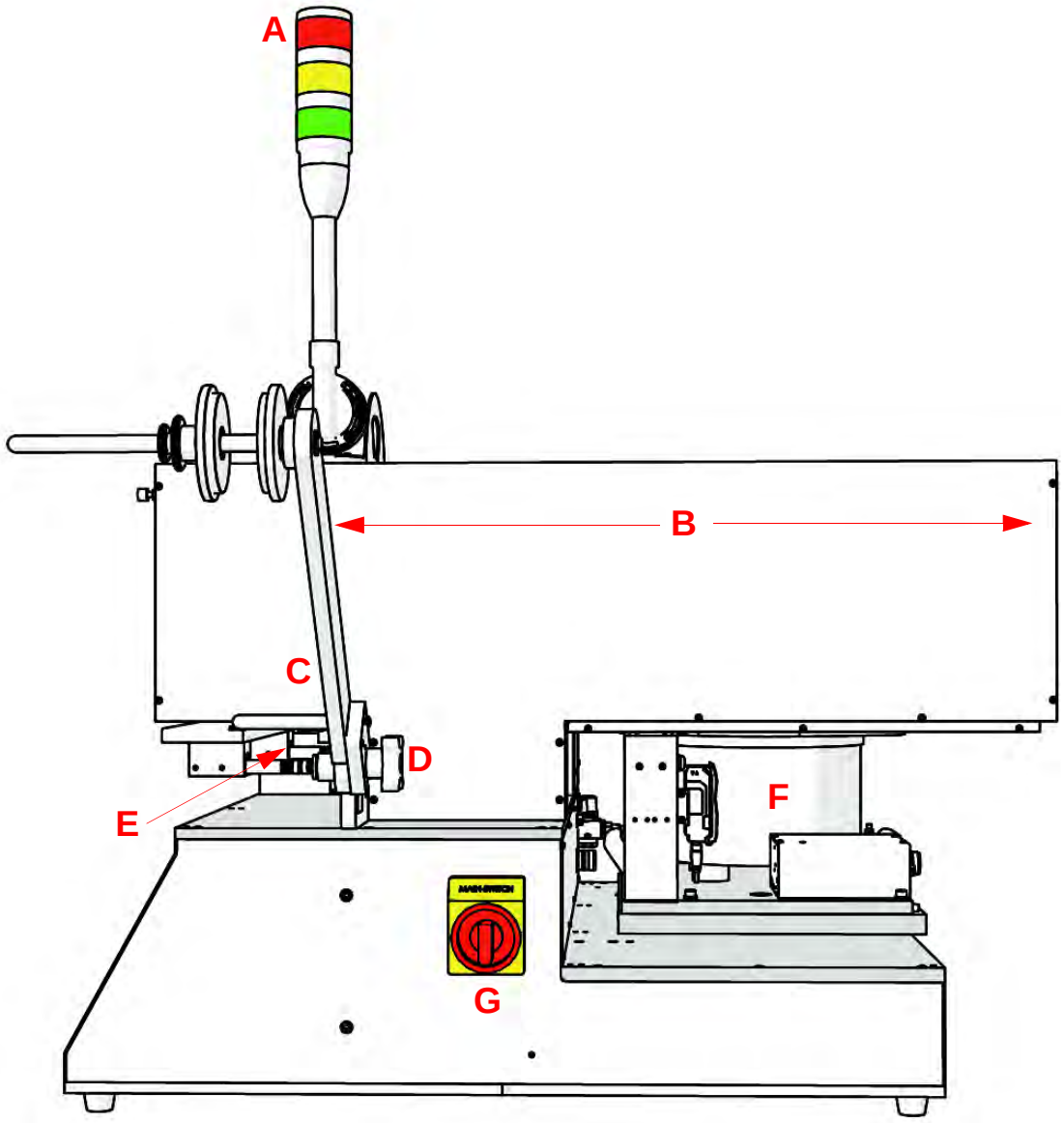
Contents

Front View



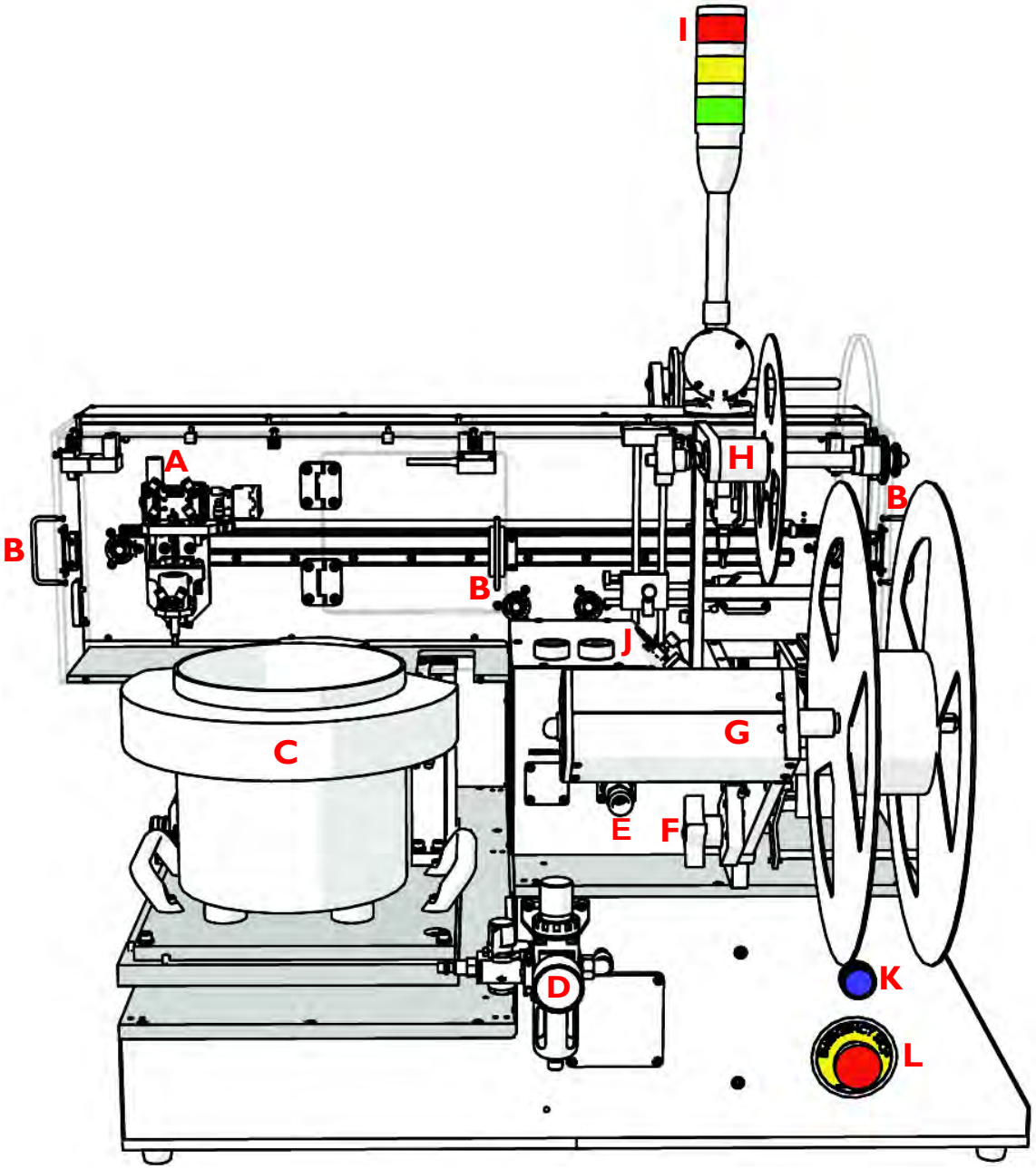
A. Take-up Arm
B. Air Regulator
C. Idler Wheel
D. Drive Sprocket
E. Cover Tape Arm
F. Heat/PSA Sealer
G. Sensor Amplifiers
H. Vision System
I. Taper Track
J. Pick & Place Head Assembly & Bridge
K. Touch Screen HMI
L. Tower Light
M. Air Pressure Gauge & Control
N. Carrier Tape Arm

Right Side View



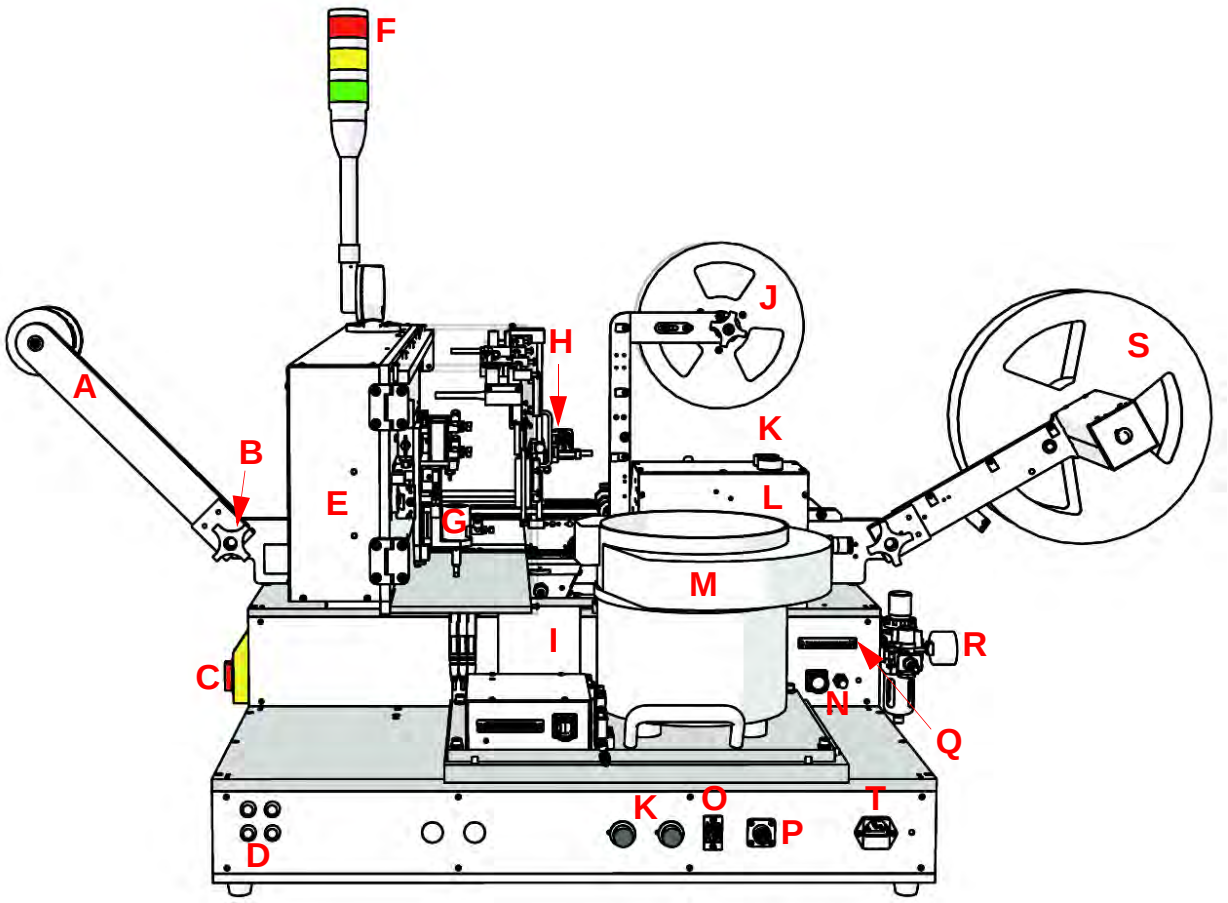
A. Tower Light
B. Pick & Place Head Enclosure
C. Carrier Tape Arm
D. Carrier Tape Arm Adjustment Knob
E. Taper Input
F. Bowl Feeder
G. Main Power Switch

Left Side View



A. Pick & Place Head Assembly
B. Enclosure Doors (3)
C. Bowl Feeder
D. Air Regulator
E. Take-up Motor Connection
F. Take-up Arm Adjustment Knob
G. Take-up Arm
H. Cover Tape Arm
I. Tower Light
J. Heat/PSA Sealer
K. Reset Button
L. Emergency Stop Switch

Back View

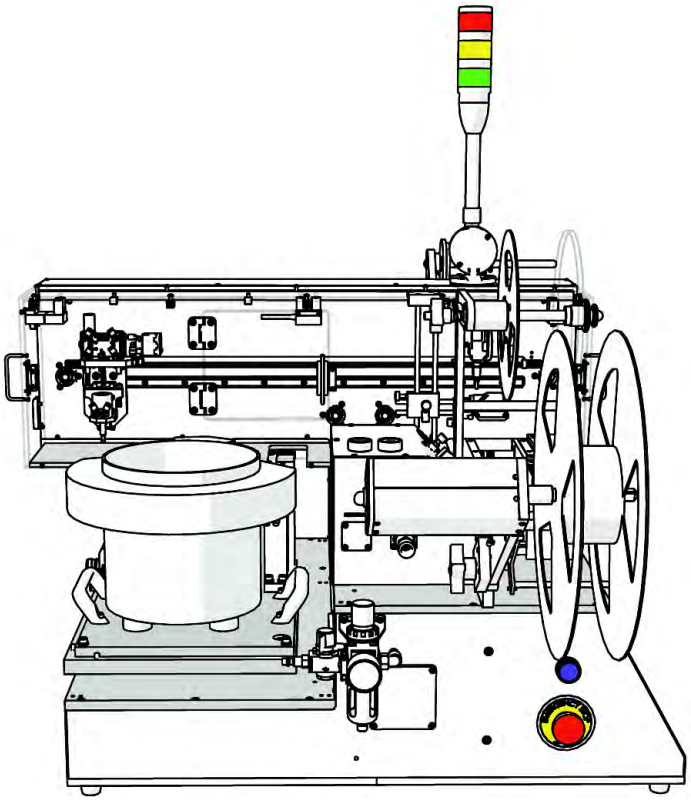


A. Carrier Tape Arm
B. Carrier Arm Adjustment Knob
C. Main Power Switch
D. Fuse Holders (Bowl application only)
E. Pick Head Enclosure
F. Tower Light
G. Pick & Place Head Assembly
H. 2D Vision System
I. Taper Assembly
J. Cover Tape Arm
K. Pick Head Jog Buttons
L. Heat/PSA Sealer
M. Bowl Feeder
N. Amplitude Adjustment Knobs
O. Ethernet Connection
P. Keyence Monitor Connection
Q. Bowl Feeder Power Connection
R. Air Pressure Regulator
S. Take-up Arm
T. Power Receptacle

Controls, Connections & Labeling

Reset Button

The TM-402's blue *Reset Button* is located on the left side of the machine below the *Take-up Arm*. (pictured below)

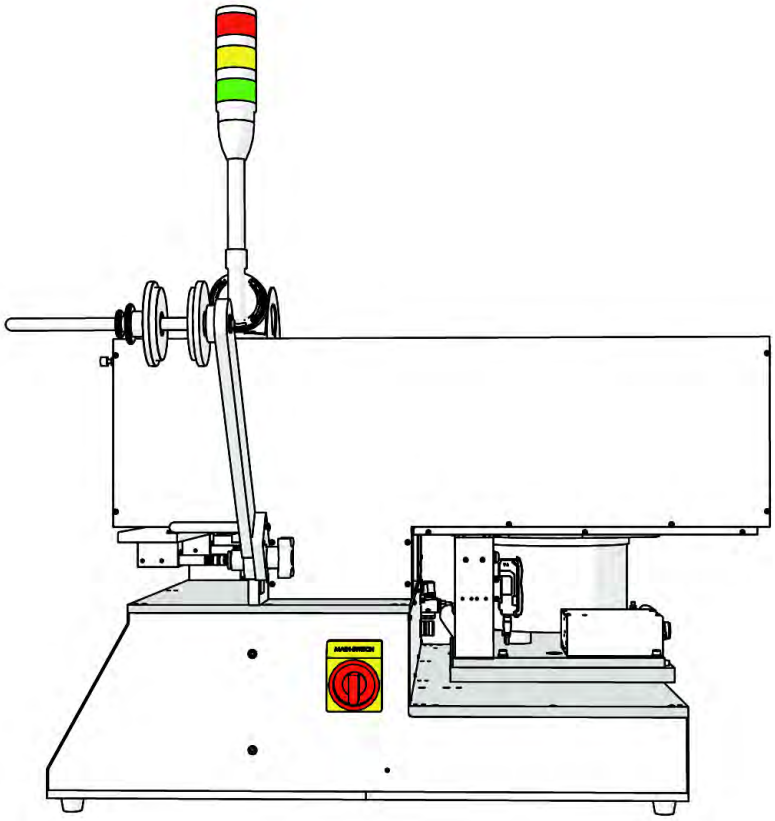


Emergency Stop Switch

The *Emergency Stop Switch* is located on the left side of the machine below the blue *Reset Button*. (pictured above)

Main Power Switch

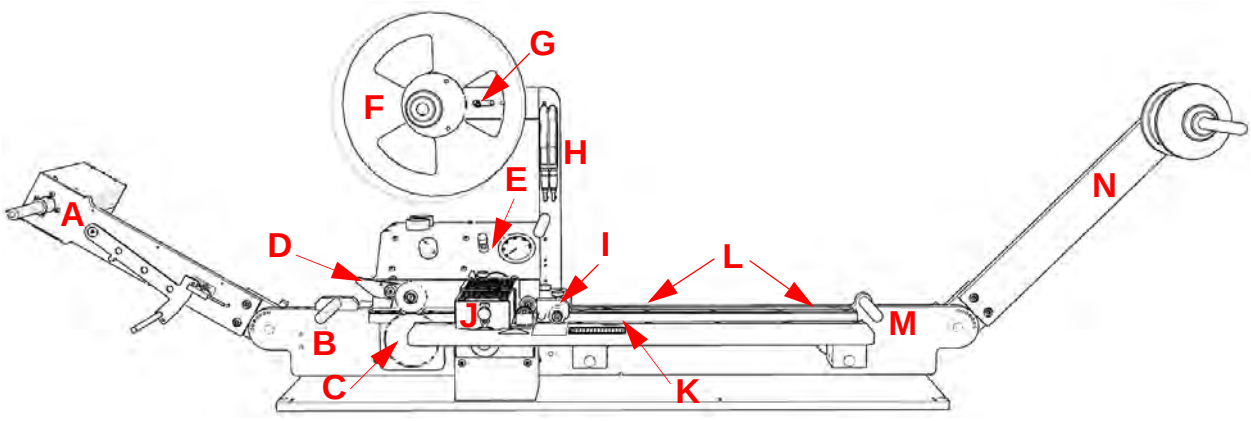
The *Main Power Switch* is located on the right side of the machine behind the *Carrier Tape Arm* on the lower sheet metal enclosure.



Serial Plate

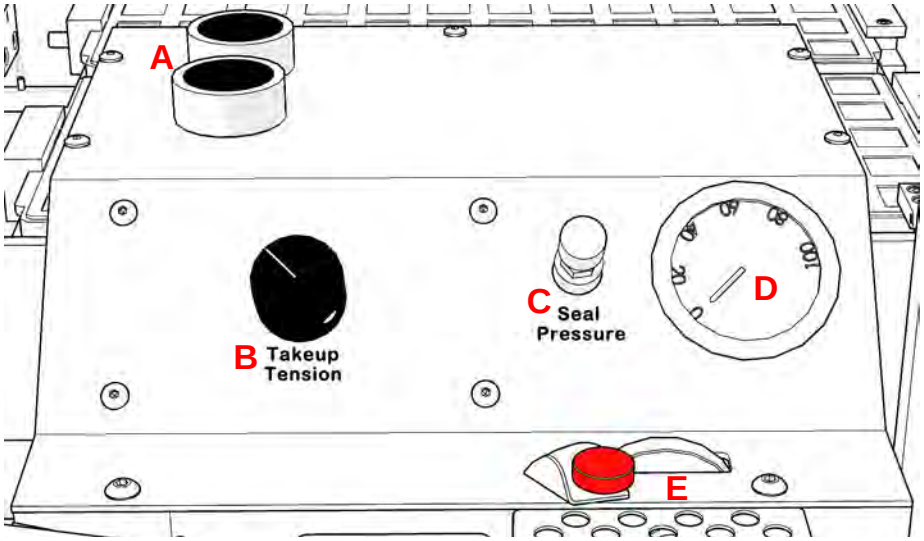
This is an example of the *Serial Plate* which is permanently affixed to the back of the TM-402. It includes basic machine information such as machine weight, *power usage and short circuit rating*. The *Serial Plate* also documents machine specific information such as the machine's model name, date of manufacture and unique serial number

The Taper



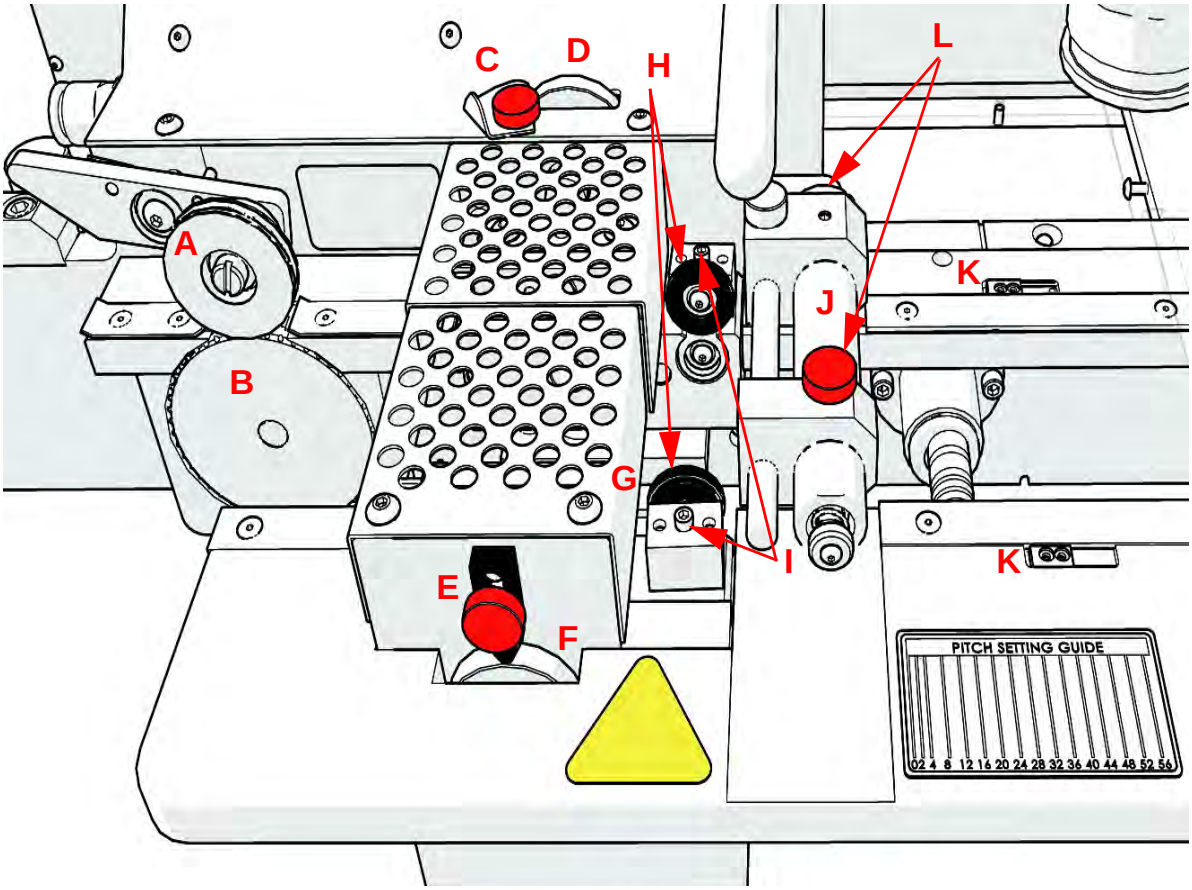
A. Take-up Arm
B. Take-up Guide
C. Drive Sprocket
D. Idler Wheel
E. Sealer Controls & Pressure Gauge
F. Cover Tape Reel
G. Low Cover Sensor
H. Sensor Amplifiers
I. Cover Tape Guide
J. Heat/PSA Sealer
K. Tape Jam Sensor
L. Adjustable Width Track
M. Carrier Tape Guide
N. Carrier Tape Arm

Taper Controls



A. Pick Head Jog Buttons
B. Take-up Tension Control
C. Sealer Air Pressure Control
D. Sealer Air Pressure Gauge
E. Inside Seal Position Lock/Adjust

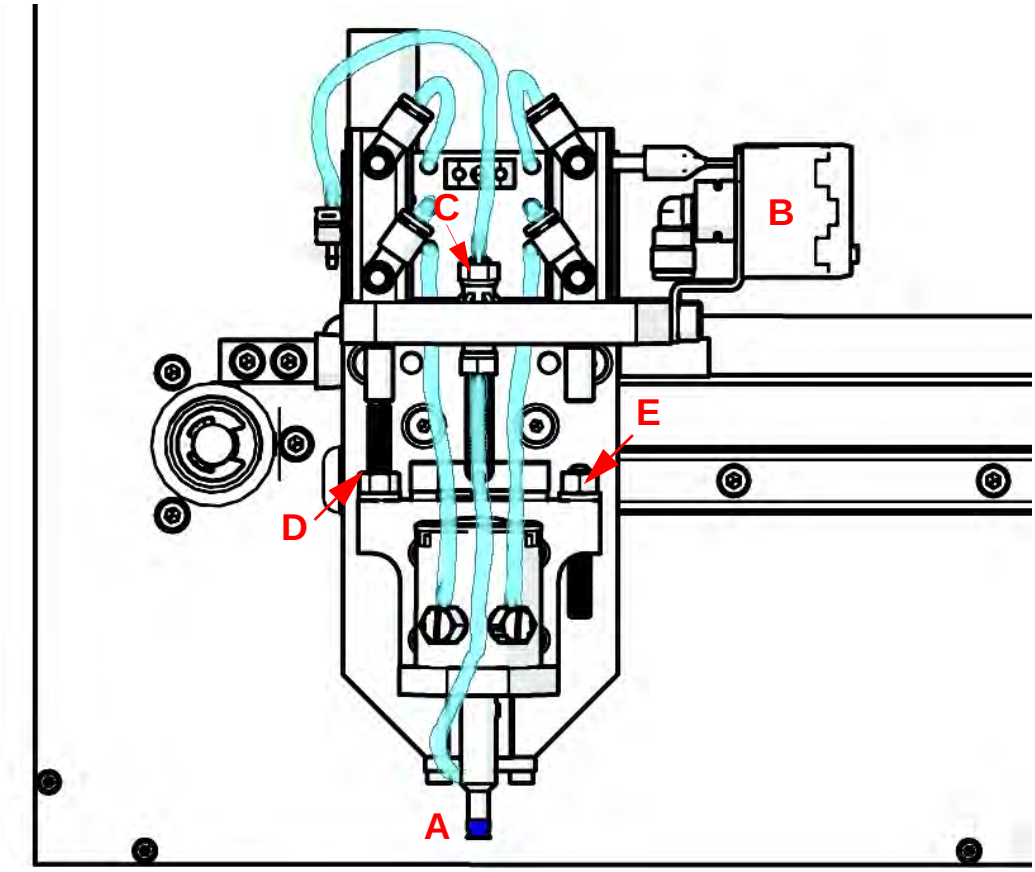
Taper: Sealer



A. Idler Wheel
B. Drive Sprocket
C. Outer Seal Lock
D. Outer Seal Adjuster
E. Inner Seal Lock
F. Inner Seal Adjust
G. Heat Sealer
H. PSA Pressure Wheels
I. PSA Pressure Adjustment Screws
J. Cover Tape Guide
K. Tape Jam Sensors
L. Cover Tape Width Adjusters

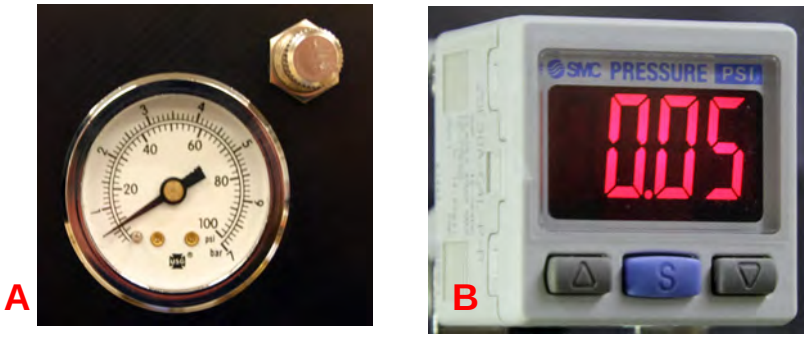
Pick & Place Assembly

Pick & Place Head



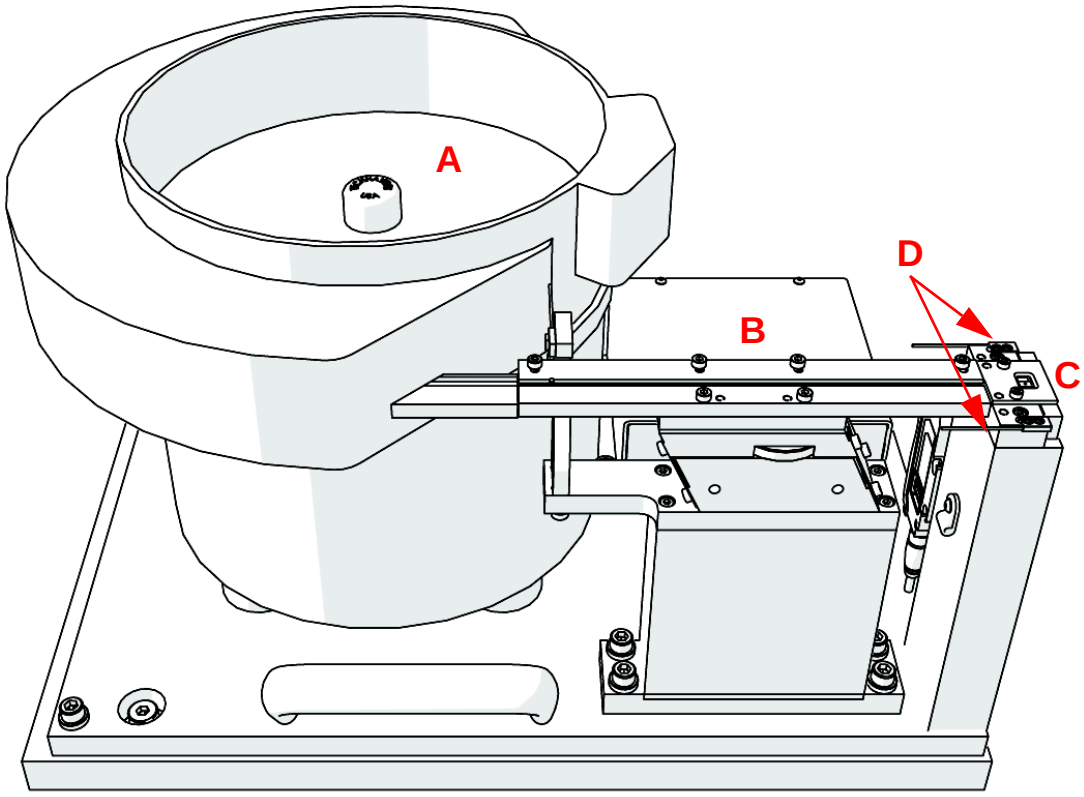
A. Nozzle
B. Nozzle Vacuum Sensor
C. Nozzle Vacuum Filter
D. Pick Actuator Adjustment Screw
E. Place Actuator Adjustment Screw

Pick & Place Controls

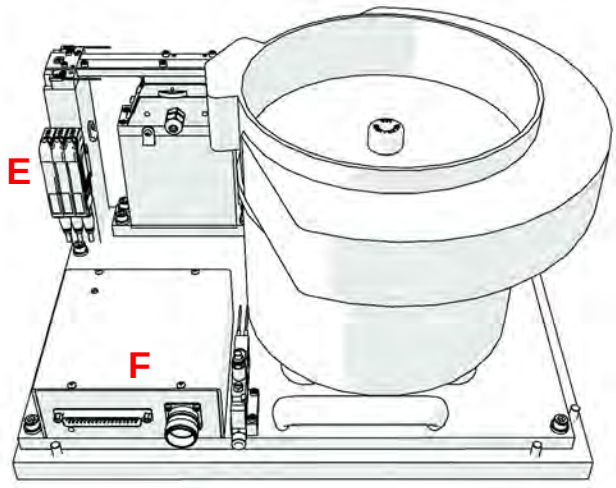


A. Blow-off Air Pressure Gauge & Control
B. Nozzle Vacuum Sensor

Bowl Feeder



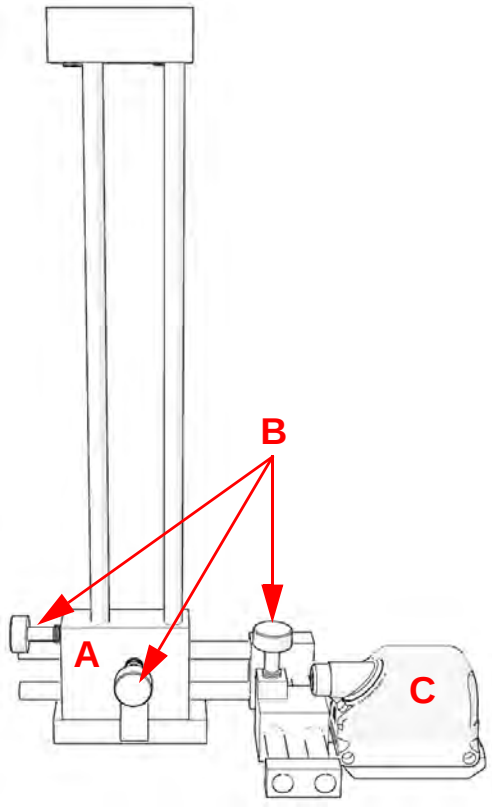
A. Bowl
B. Linear Track
C. Nest
D. Part Present Sensors
E. Amplifiers
F. Bowl Connections



Note: The Bowl Feeder Assembly's appearance may vary, depending on the part size which will be processed and the bowl size which was ordered.

2D Vision System

The Keyence IV Vision system consists of the following components shown below.



A. Adjustable Mounting Bracket
B. Position Adjustment Knobs
C. Power & I/O Connector
D. Ethernet Connector
E. M12 Ethernet Cable (not shown)
F. Status LED
G. Ethernet Traffic Indicator
H. Keyence IV-G Camera
I. Lens Cover/Focus Ring

Note: For advanced Vision configuration, a computer is required. This can be provided by the user or purchased as an option from V-TEK, Inc. System requirements for the vision computer follow:

- Operating system: Microsoft® Windows 7™ (32 or 64 bit)
- 128 MB RAM
- 1024 x 768 (96 DPI) or 1280 x 1024 (120 DPI display
- Ethernet port

Chapter 3: Human Machine Interface

Contents

Introduction

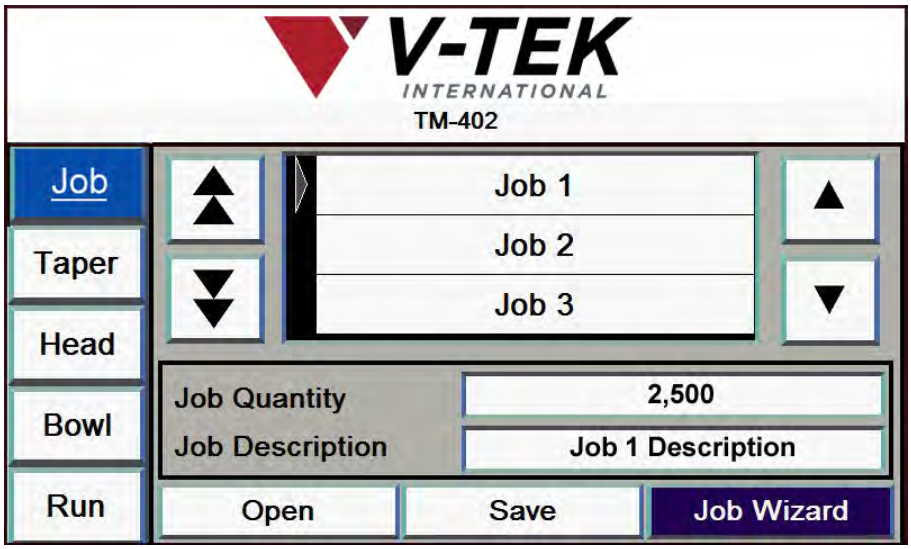
This chapter gives an overview of the TM-402 *Human Machine Interface (HMI)*, defining the buttons, screens and setting options that allow the operator to customize the TM-402's performance to their taping needs.

> **Note:** Proceed to *Chapter 4: Setup* for instructions on how to configure the HMI and to *Chapter 5: Operation* for instructions on how to run a job

Touch Screen

The user interacts with the TM-402 through a touch screen HMI which is located on the front of the machine below the taper. Touching the HMI screen has the same effect as a left click with the mouse. Although only lightly touching the buttons or data fields is necessary for activation, the action is referred to as "pressing" in this manual.

> **Note**: Use care when operating the touch screen and do not use any objects other than a finger to touch the screen. A stylus can also be used to click the various buttons.



HMI Tabs

When the TM-402 is powered on, the user interface opens to the *Job Tab.* The *Job Tab* is pictured above as it appears when the motors have been homed.

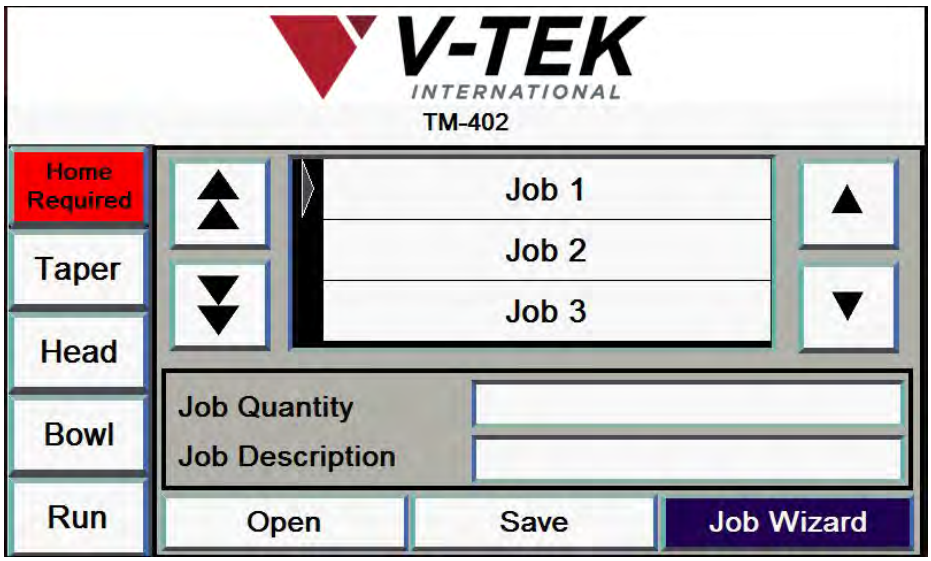
The *Tab Menu* is located on the left side of all screens. There are five tabs on the TM-402 HMI: *Job, Taper, Head, Bowl* and *Run*. These tabs allow the user to configure pick head, taper, bowl feeder and job settings and to run jobs.

To navigate between tabs, press the desired tab name on the Tab Menu and the selected tab will open. The active tab button is shaded blue. In the example on the above, the *Job Tab* is selected.

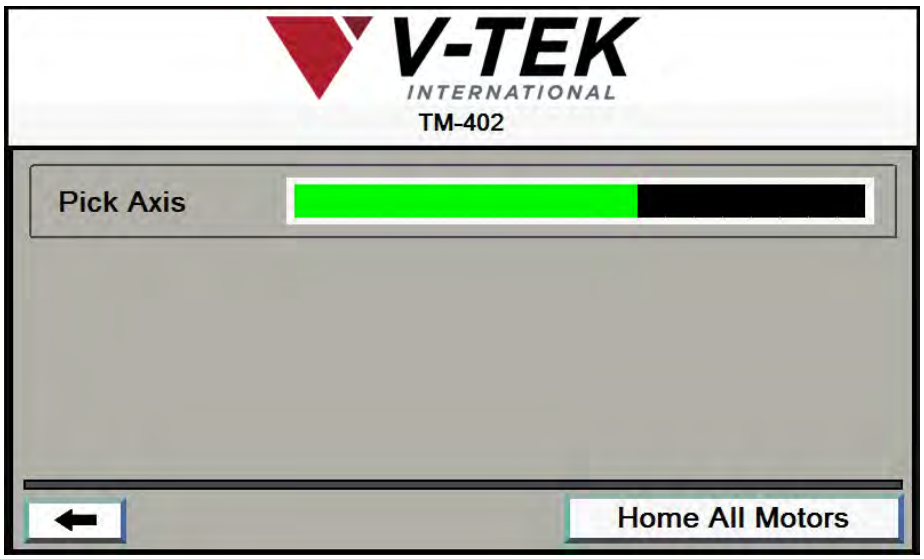
Each tab contains a variety of toggle buttons and open fields. Press any field to open a numeric or alpha-numeric keypad and enter the appropriate information.

Job Tab

When the TM-402 is initially powered up, the HMI will open to the Job Tab with a red **Home Required** button at the top of the *Tab Menu* and the other tab buttons grayed out.

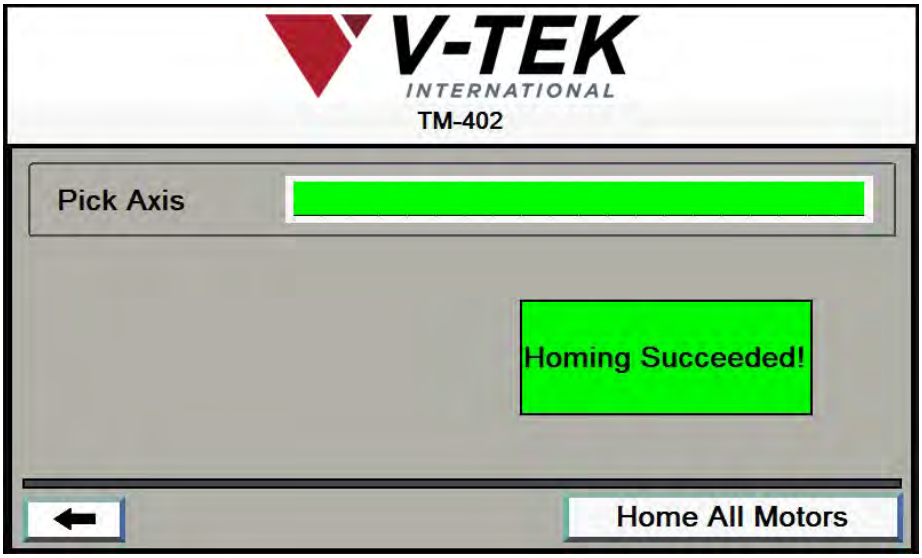


Homing motors should be done following every system power up or emergency stop. Press **Home Required** to open the *Homing Status* window.

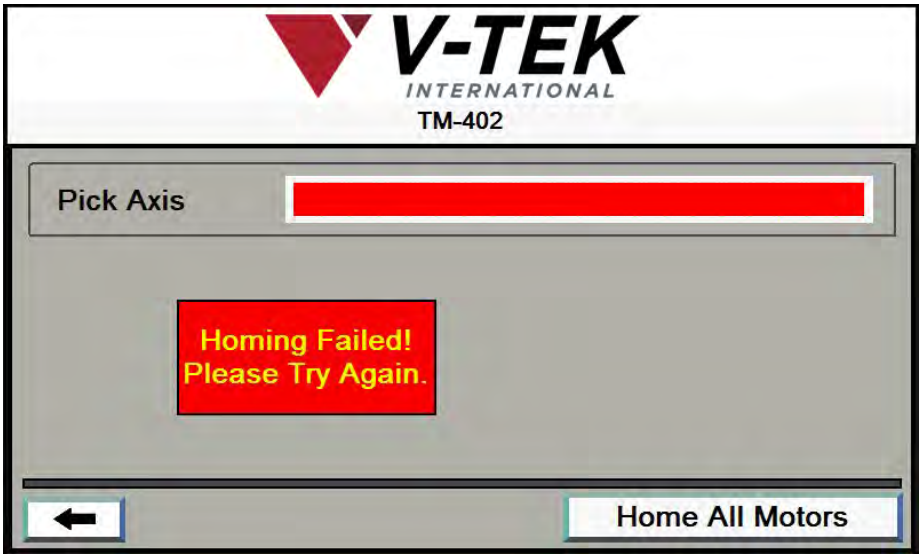


Press the **Home All Motors** button to begin the homing sequence. Homing progress is displayed in the *Pick Axis Motor Status Bar*.

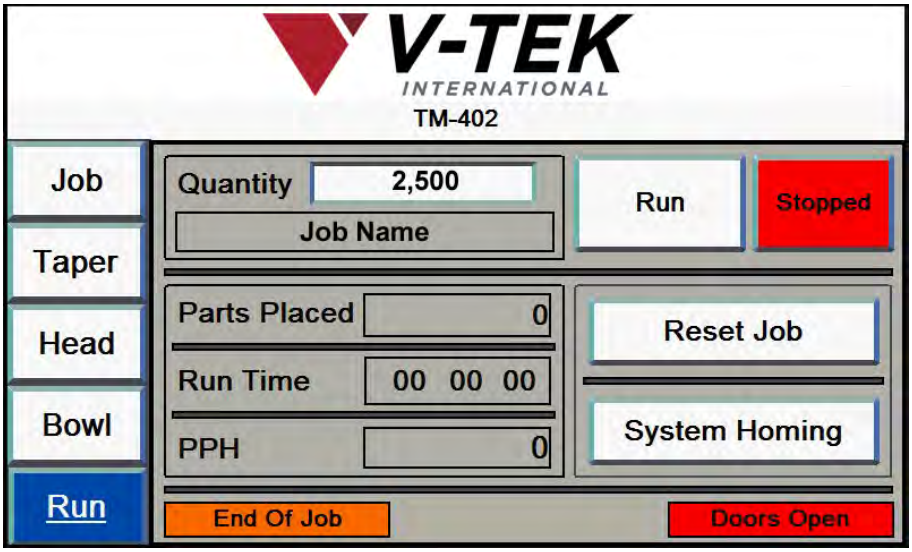
As the homing sequence is completed, the bar gradually turns from black to **green**. A **Homing Succeeded!** message appears at the end of the sequence.



If a problem arises during homing of the motor, the status bar will turn **red** and a **Homing Failed** message will appear.



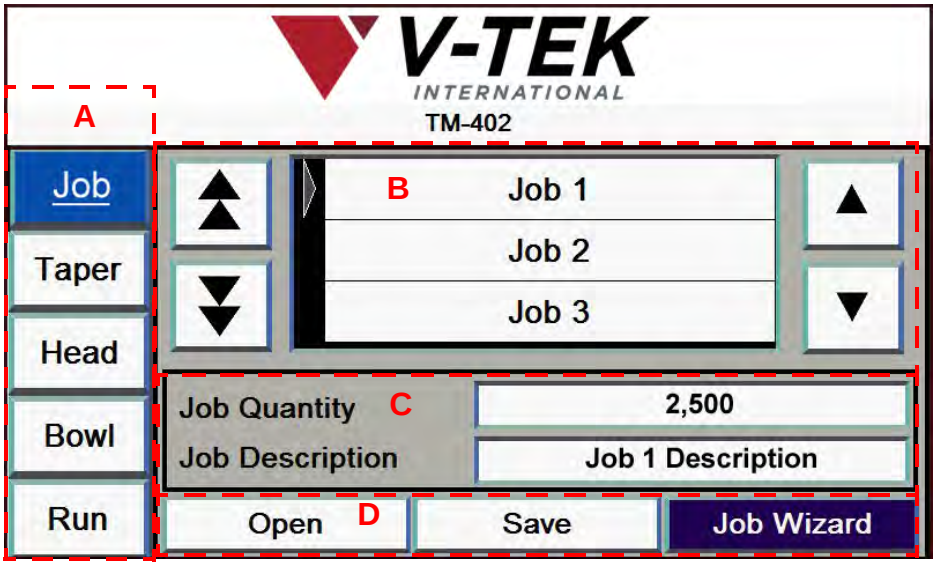
Pressing the **Left Arrow** button in the *Homing Screen* will open the *Run Tab.*



Select the *Job Tab* from the *Tab Menu* to navigate back to the *Job Tab*.

Job Tab Overview

The *Job Tab* allows the user to select a pre-programmed job, change job information and move to the other tab screens. It also features an easy-to-use *Job Wizard* which leads the user through the job set-up process. The *Job Tab* is pictured below.



A. Press any tab in the **Tab Menu** to open that tab window.

B. The **Job Library** holds up to fifty saved jobs (Job 1 through Job 50). The **Up** and **Down Arrows** buttons to the right of the *Job Library* are used to move through the job list one job at a time. The **Page Up** and **Page Down Arrows** buttons to the left

of the *Job Library* are used to move through the job list five jobs at a time. The **Enter** button selects and highlights a job from the *Job Library* list so it can be opened or saved.

C. The **Job Information** section has two open fields for entering job information: *Job Quantity* and *Job Description*. Press the field to open a keypad for data entry. The maximum number of characters for any field is 20.

D. At the bottom of the *Job Tab* there are three control buttons:

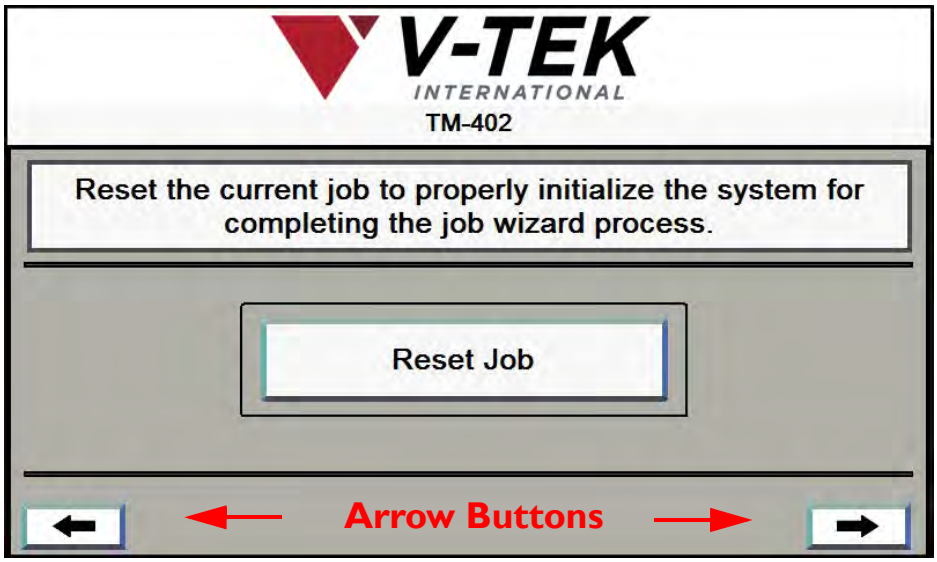
- The **Open** button opens the currently selected job.
- The **Save** button is used to save current job settings for future use.
- The **Job Wizard** button opens the *Job Wizard*, allowing the user to configure job settings.

Job Wizard

Pressing the **Job Wizard** button in the *Job Tab* opens the *Job Wizard*. The *Job Wizard* has 13 screens that lead the user through the job set-up process. Instructions at the top of each *Job Wizard* screen explain each step. The **Arrow** buttons on the bottom of the window move the user forward and backwards through the process. Pressing the right **Arrow** button opens the next *Job Wizard* screen. Pressing the left **Arrow** opens the previous screen.

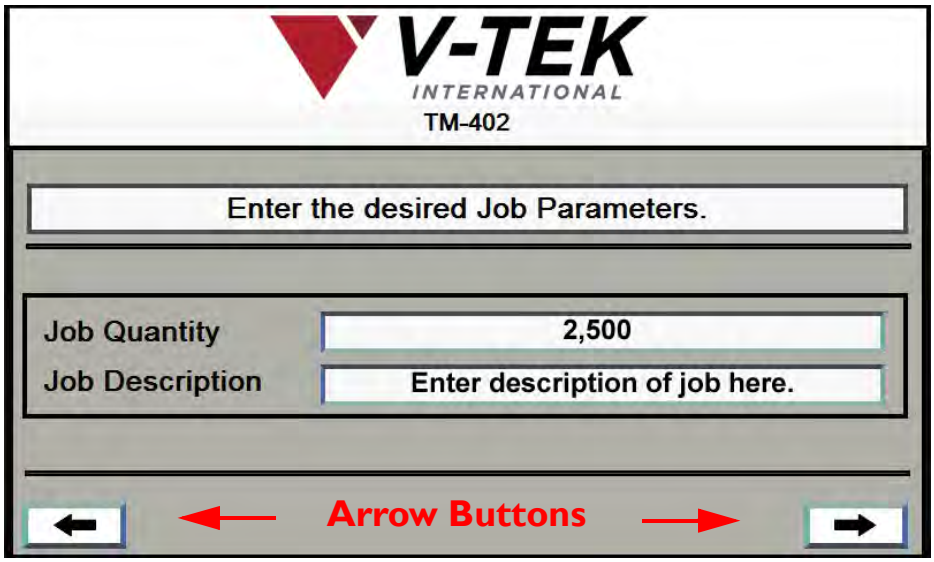
1. In the first *Job Wizard* screen the user resets the job to initialize the system. Press **Reset Job**, then press the right **Arrow** key to move to the next *Job Wizard* screen.

Job Wizard Step 1



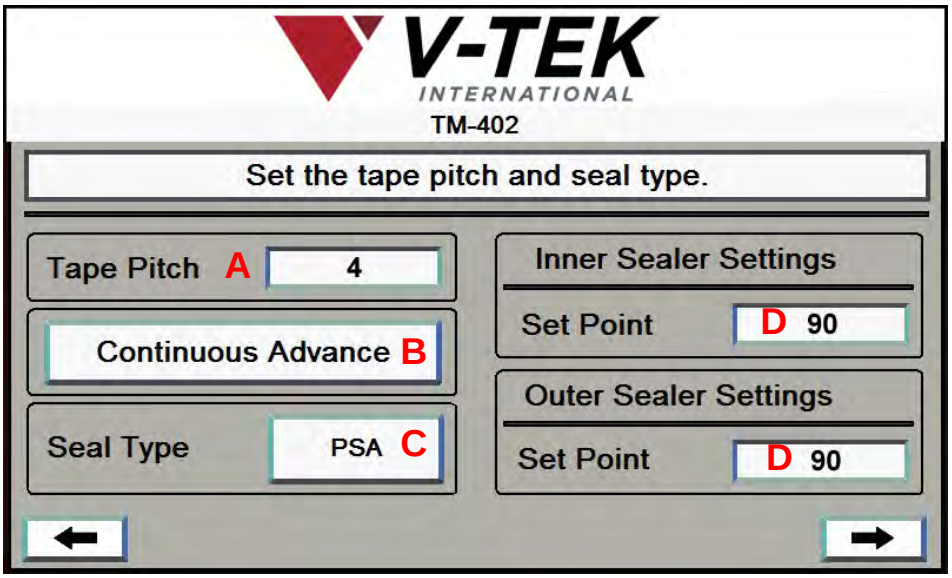
2. In the second *Job Wizard* screen the user enters the **Quantity** of parts that will be run and a brief **Description** of the job. When the job parameters are set, press the right **Arrow** key to move to the next *Job Wizard* screen.

Job Wizard Step 2



3. The third *Job Wizard* step sets up *Taper* operation.

Job Wizard Step 3



A. **Tape Pitch** is determined by the carrier tape selected. Use the *Pitch Setting Guide* on the taper to determine the correct pitch. Press the *Tape Pitch* field to open a keypad and type in the desired value.

B. The **Continuous Advance** button advances the tape through the *Taper*. It will continue to advance until **Continuous Advance** is pressed a second time.

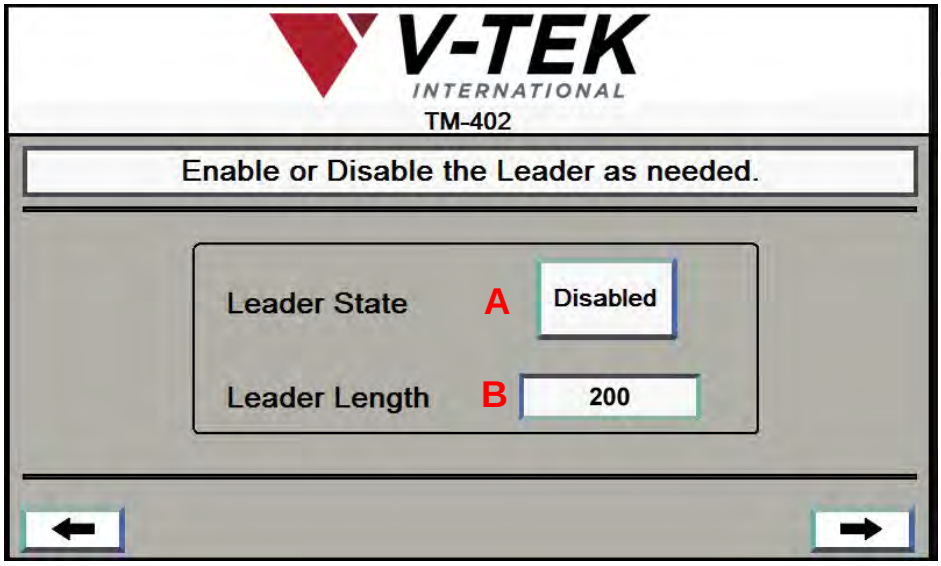
C. **Seal Type** toggles between **PSA** and **Heat** seal, select correct seal type.

D. The **Set Point** fields are only active when Heat Seal is selected. These fields are used to set the desired temperature for the *Inner* and *Outer Sealer*. Enter the correct value in both fields, then press the right **Arrow Key** to move to the next *Job Wizard* screen.

Note: The TM-402 accommodates a wide range of carrier tapes and cover tapes. Settings may vary from one tape product to another. The recommended starting point is 90° C. The maximum recommended operating temperature is 160° C. The temperature for each seal shoe should be increased or decreased as needed after running a peel force test.

4. The fourth *Job Wizard* screen enables or disables the tape *Leader*.

Job Wizard Step 4

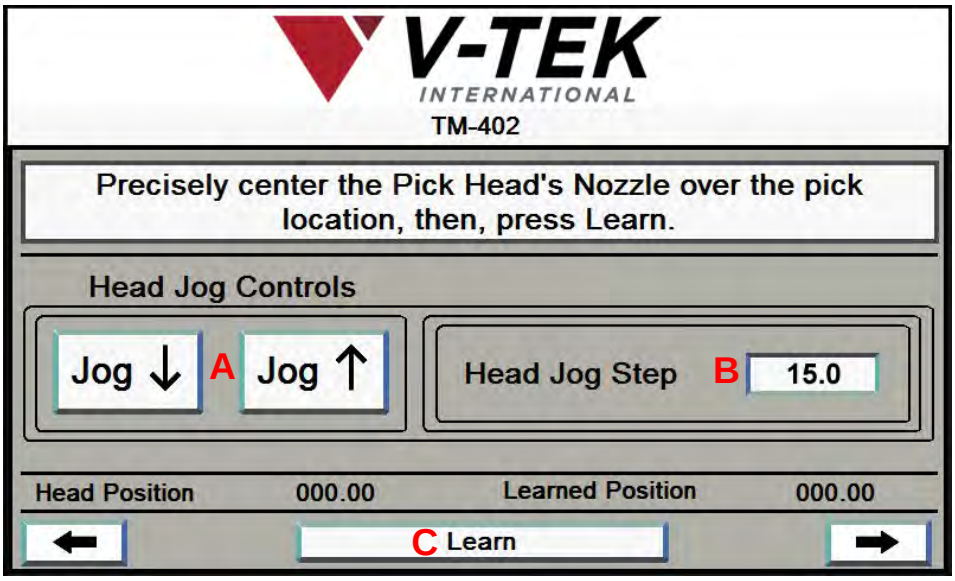


A. **Leader State** toggles between **Enabled** and **Disabled.**

B. When the Leader State is set to Enabled, pressing the **Leader Length** field will open a keypad. Type in the desired value, then press the right **Arrow Key** to move to the next *Job Wizard* screen.

5. The next six *Job Wizard screens* are used to set the *Nozzle* positions at the *Pick* and *Place* locations. The first is shown below.

Job Wizard Step 5



A. Press the **Jog** buttons to move the *Pick Head* to the *Bowl Feeder,* centering it over the *Linear Track's Nest* in the pick position.

B. Adjust the Jog Step in the **Head Jog Step** field, if necessary.

C. Once the Pick Head is centered over the pick position, press **Learn**. The current *Nozzle* position will be saved as the pick position for the current job and the *Learned Position* will update to match the *Current Position* on the screen.

9. Press the right arrow key to move to the next screen.

Job Wizard Step 6

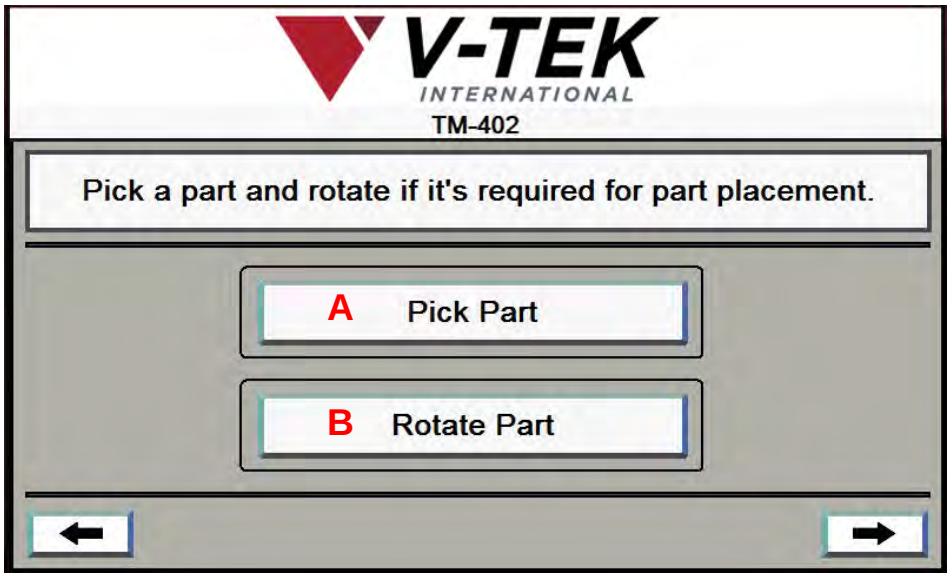
A. Press **Pick Extend** to lower the *Nozzle* to the Nest. The button will change to **Pick Retract**.

Note: Follow the directions in *Chapter 4: Setup* for manually adjusting the *Pick Actuator* to set the correct *Nozzle Height*.

B. Once the nozzle height has been set, press **Pick Retract** to raise the *Nozzle* to its original height. Index the *Nozzle* until it is once again at the origin position.

10. Press the right arrow key to move to the next screen.

Job Wizard Step 7



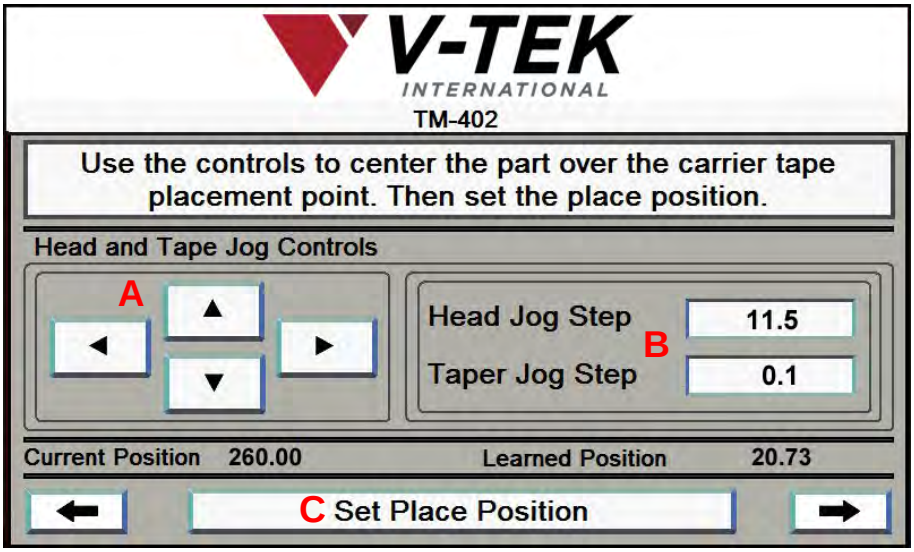
A. Press **Pick Part** to pick a part from the nest.

B. If no rotation is required for part picking, skip this step. If part rotation is required for picking, press **Rotate Part** to rotate the *Nozzle* 90°.

Note: Follow the directions in *Chapter 4: Setup* for manually adjusting the *Solenoid* to set **Pick Head Rotation**.

11. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Job Wizard Step 8



A. The **Arrow** keys allow the user to jog the *Pick Head* and *Carrier Tape* forward or backward in small preset increments. This is useful for centering the *Nozzle* in the pick and place positions.

The **Up/Down Arrow** keys move the *Pick Head* forward and backward.

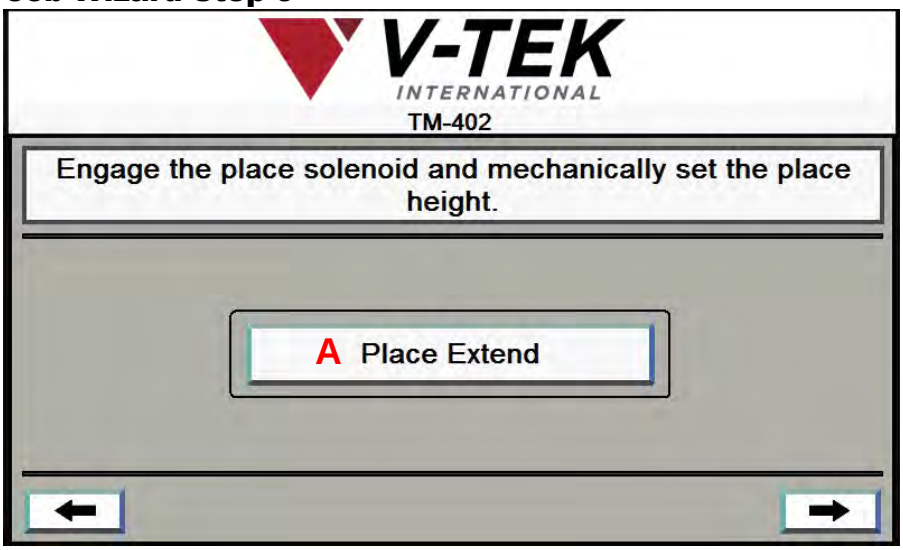
The **Left/Right Arrow** keys move the tape left and right in the *Taper Track*.

B. Enter the value in millimeters for the **Head Jog Step** and **Taper Jog Step** fields.

C. Pressing **Set Place Position** saves the current *Nozzle* position as the *Place* position for the current job and the *Learned Position* will update to match the *Current Position* on the screen. In the bottom right corner of the screen the right **Arrow** key will appear.

12. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Job Wizard Step 9



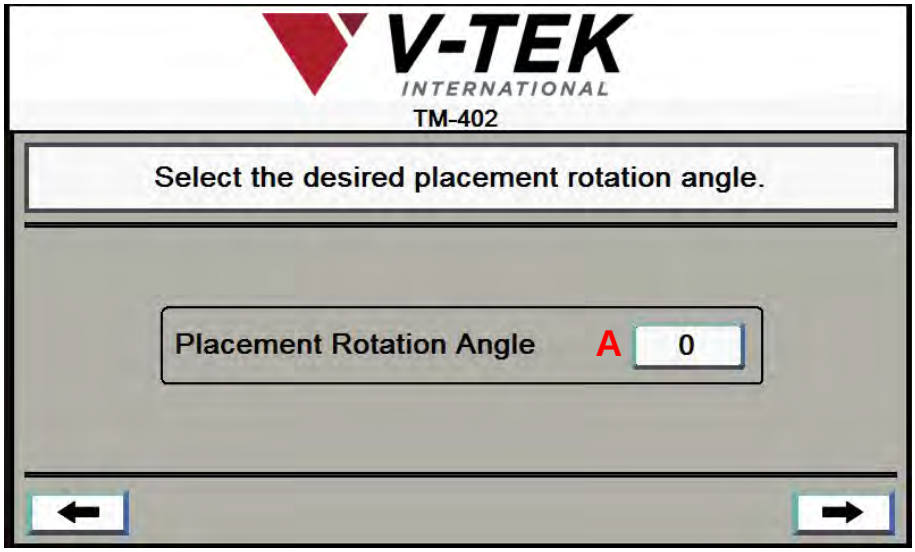
A. Press **Place Extend** to lower the *Nozzle* to the *Carrier Tape Pocket*.

> **Note:** The **Place Extend** button toggles between *Place Extend* and *Place Retract*. Once **Place Extend** has been pressed, the button will change to **Place Retract**.

Follow the directions in *Chapter 4: Setup* for manually adjusting the place *Actuator* to set the correct *Nozzle Height* at the *Place* position.

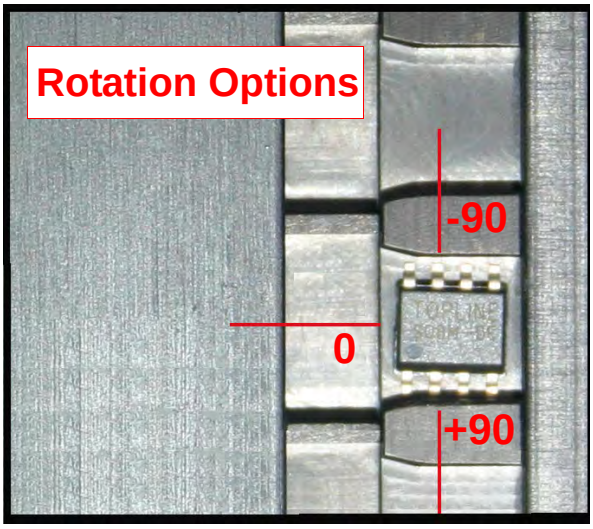
13. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Job Wizard Step 10



A. Enter the placement angle which was manually set in Step 10. The options are 0, -90 and +90.

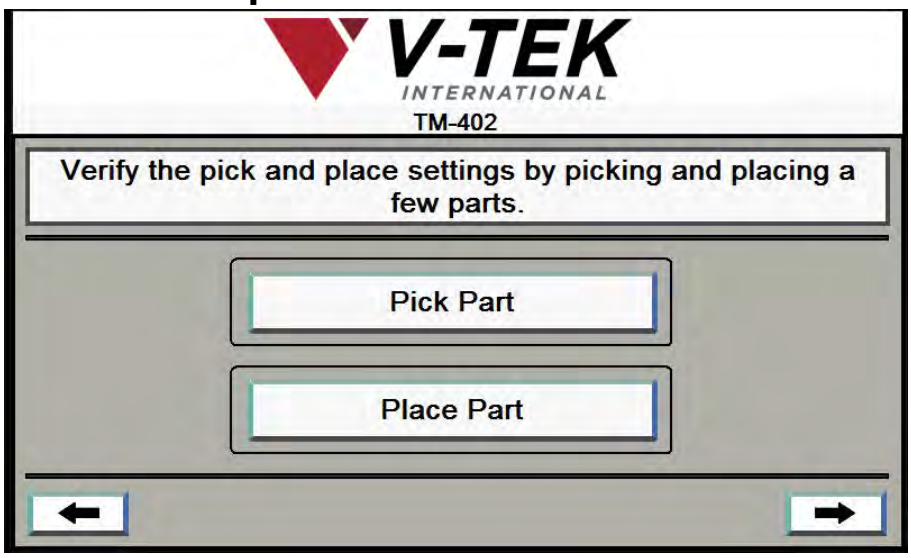
In the photo below, a part is shown at the pick position as viewed from the front of the machine.



- If rotation is set at **0**, the part will be placed in the same orientation as it was picked.
- If rotation is set at **-90**, the part will be rotated 90 degrees clockwise prior to placement.
- If rotation is set at **+90**, the part will be rotated 90 degrees counter-clockwise prior to placement.

14. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Job Wizard Step 11

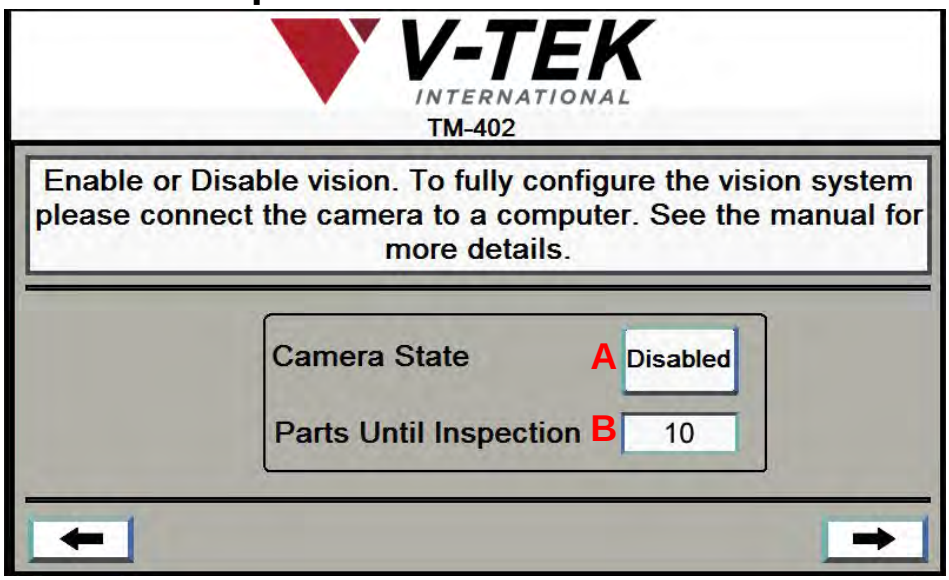


A. Test the job settings, using the **Pick Part** and **Place Part** buttons to pick and place parts.

B. If adjustment are required, use the left **Arrow** key to return to the desired step and adjust settings until the TM-402 picks and places parts as desired.

15. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Job Wizard Step 12

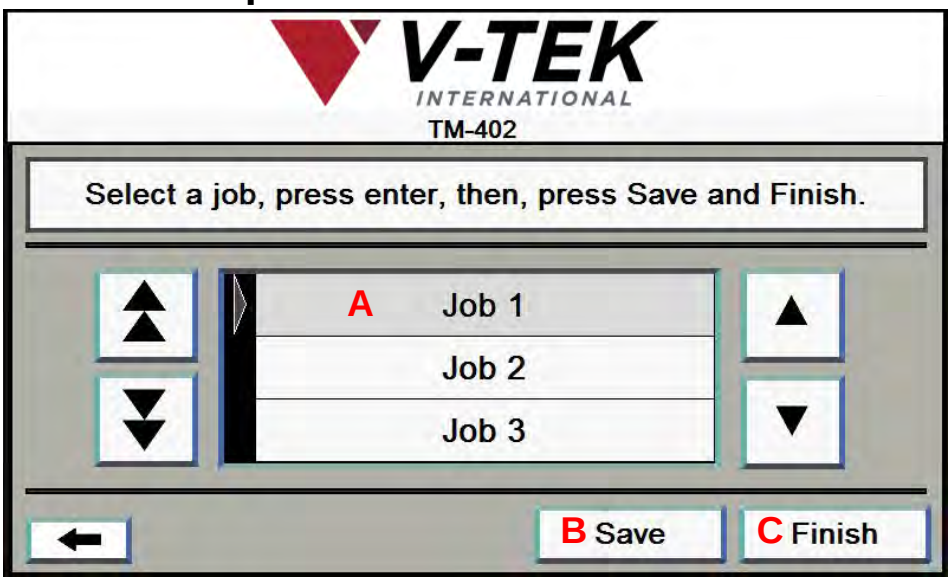


A. Select the Camera State to **Enabled** and **Disabled** as desired.

B. If the camera is enabled, enter the number of pockets between the *Place* point and the *Inspection* point in the **Parts Until Inspection** field. Begin the count with the *Place* position as zero so the Place pocket is not included in the count.

16. Press the right **Arrow Key** to move to the final *Job Wizard* screen.

Job Wizard Step 13

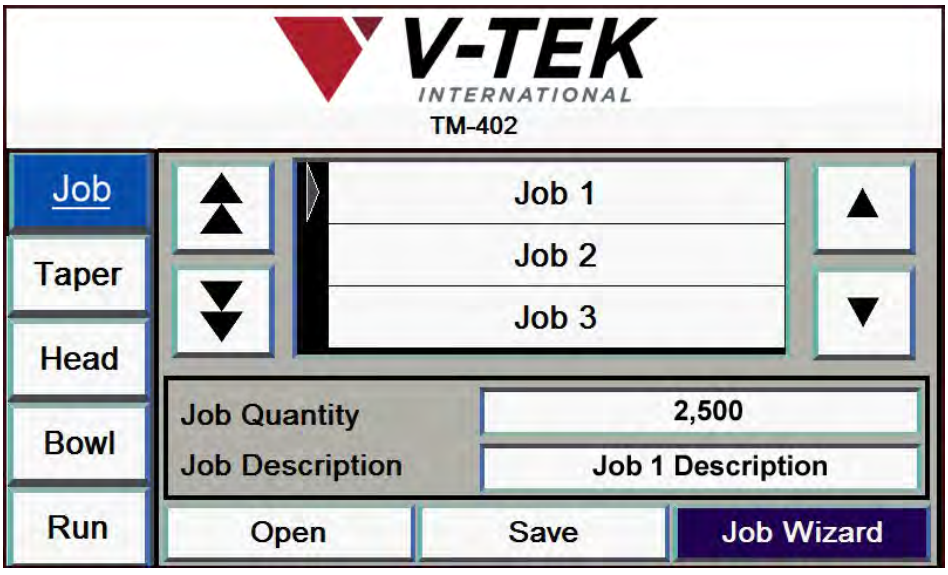


A. Browse through the *Job Library* using the **Up/Down Arrow** keys to move up or down through the list. To select a *Job Name* from the list, press the **Enter** key.

Note: The **Save** function will overwrite the information stored for the currently selected job. Therefore, it is important to select the desired job prior to pressing the **Save** button.

B. Press the **Save** button to save job settings to the selected job name.

C. Press **Finish** to close the *Job Wizard* and return to the *Job Tab.*

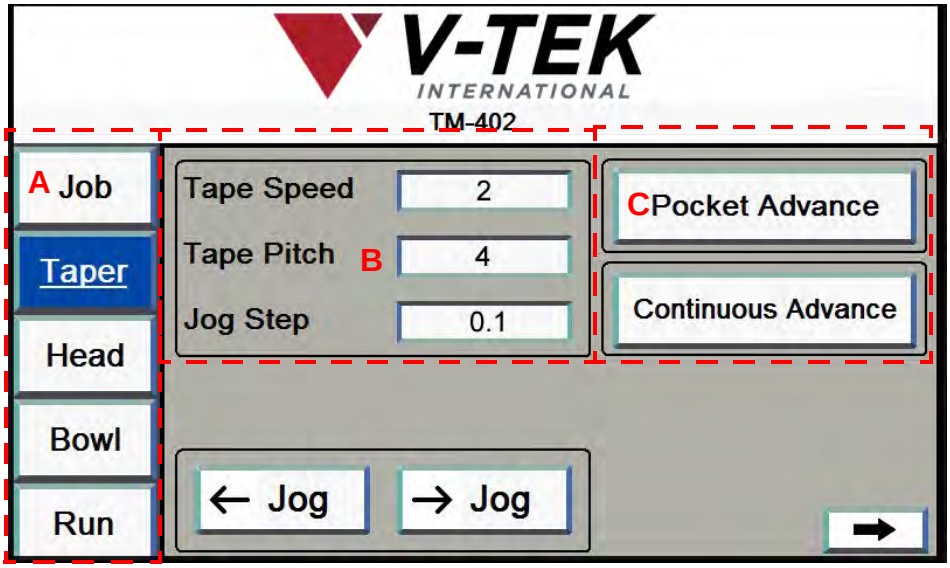


Taper Tab

The *Taper Tab* allows the user to adjust taper settings by leading them through four *Taper Setup* screens.

1. The first screen of the *Taper Tab* is shown below.

Taper Screen 1



A. Press any tab in the **Tab Menu** to open that tab window.

B. **Tape Speed** is a percentage of the maximum velocity the carrier tape can be advanced at. It can be set between 1-10.

Tape Pitch is determined by the carrier tape selected. Use the *Pitch Setting Guide* on the taper to determine the correct pitch.

Jog Step sets the distance in millimeters the carrier tape will move forward or backward each time a Jog button is pressed.

Note: The *Jog Step* field requires the value to be entered in the following format: XX.XX. (i.e. 60.00).

C. The **Jog** buttons in the *Index Settings* section jog the tape forward or backward along the *Taper Track*.

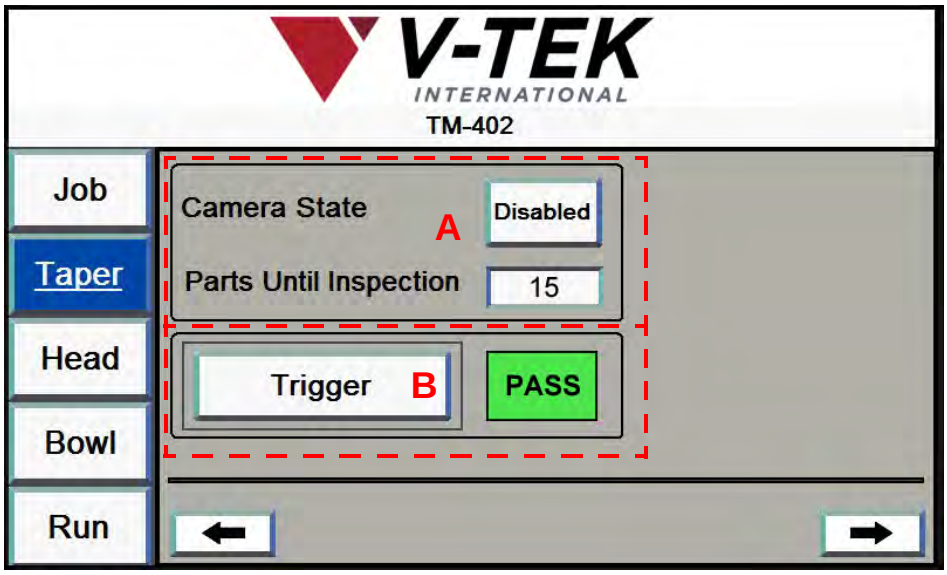
The **Pocket Advance** button advances the tape one pocket at a time. The speed at which the tape advances is set in the *Tape Speed* field.

The **Continuous Advance** button advances the tape through the *Taper* and onto the take-up reel. It will continue to advance until **Continuous Advance** is pressed a second time.

Note: Continuous Advance is useful for creating a trailer or loading tape at the beginning of a job.

2. Pressing the right **Arrow** button opens the next *Taper Setup* screen which focuses on *Vision Setup*.

Taper Screen 2



A. The **Camera State** button toggles between **Enabled** and **Disabled**.

The **Parts Until Inspection** value is the number of pockets between the *Place* point and the *Inspection* point. Begin the count at the *Place* position at **zero**, so the *Place* position is not included.

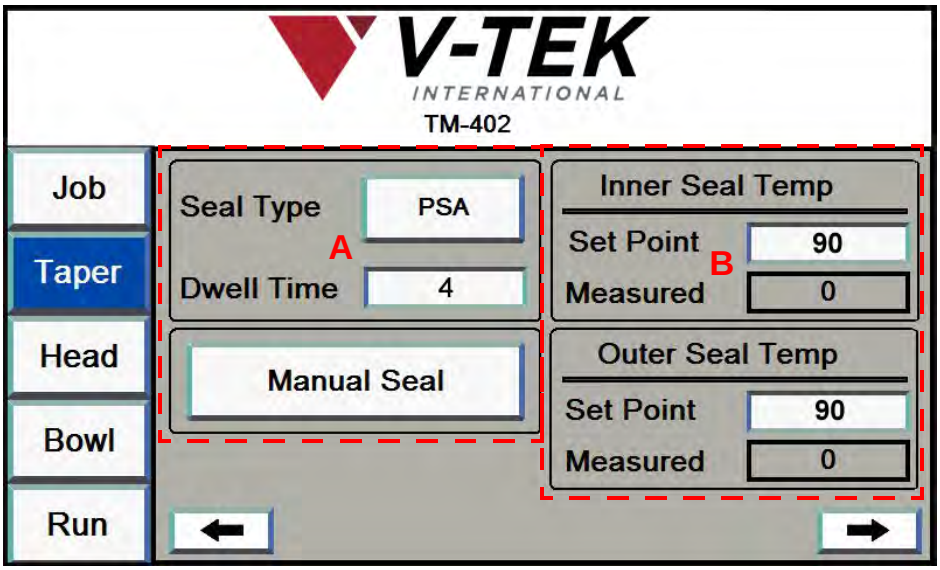
B. Pressing the **Trigger** button triggers the *2D Camera* to inspect the part which is currently at the *Inspection* point. The box to the right of the **Trigger** button will display a green **PASS** message or a red **FAIL** message.

Note: For more detailed inspection configuration and procedures, see the *Cognex Checker User's Guide* which was included with the TM-402.

Pressing the right **Arrow** button opens the next *Taper Setup* screen.

3. The third *Taper Setup* screen focuses on *Sealer Settings*. It will vary in appearance depending on the type of sealer selected. In the example below, the selected *Seal Type* is **Heat**.

Taper Screen 3



A. The **Seal Type** button toggles between Heat seal and PSA seal.

The **Dwell Time** field is only active when heat seal is enabled. Dwell time refers to the amount of time that the *Heat Seal Shoes* are in contact with the *Cover Tape*. Enter the desired dwell time in milliseconds in this field.

The **Manual Seal** button activates the sealer to perform one seal.

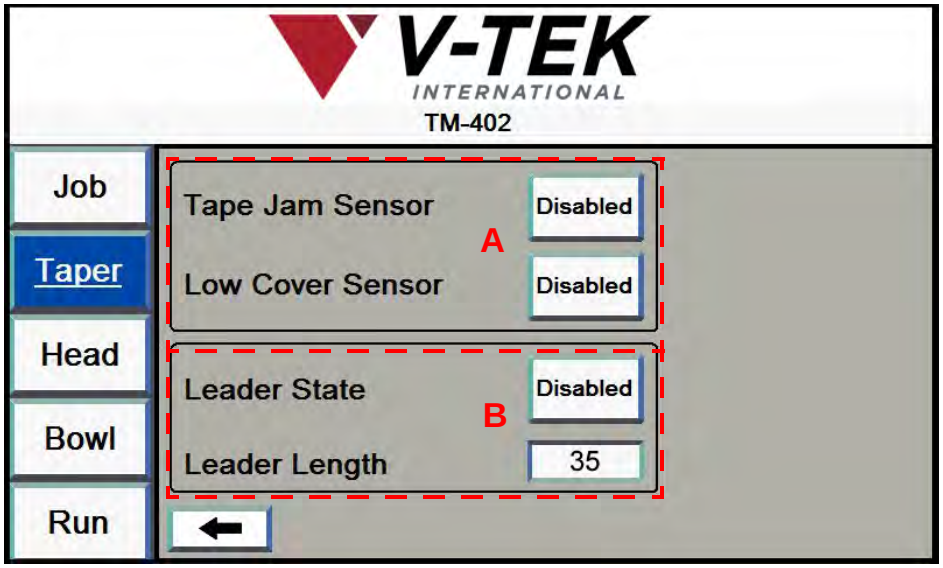
B. The **Set Point** field allows the user to select the *Heat Sealer* set point, or target temperature. Press the field to open the keypad, then enter the desired temperature in degrees Celsius.

The **Measured** field shows the current *Heat Sealer* temperature in degrees Celsius.

Note: The TM-402 accommodates a wide range of carrier tapes and cover tapes. Settings may vary from one tape product to another. The recommended starting point is 90° C. The maximum recommended operating temperature is 160° C. The temperature for each seal shoe should be increased or decreased as needed after running a peel force test.

4. Pressing the right **Arrow** button in the third *Taper Setup* screens opens the final *Taper Setup* screen. The fourth *Taper Setup* screen focuses on *Leader* and *Sensor* settings.

Taper Screen 4



A. The *Tape Jam Sensor* **Enabled/Disabled** button turns the *Tape Jam Sensor* on and off. The *Tape Jam Sensor* registers a tape jam whenever something protrudes above the top of the carrier tape pocket. This might be caused by a misplaced part, a pocket that has been loaded with two parts or by a buckle in the tape.

When the *Tape Jam Sensor* is activated, the job that is being run is paused and an error message appears on the HMI screen. The recommended setting for the *Tape Jam Sensor* is **Enabled**.

The *Low Cover Sensor* **Enabled/ Disabled** button turns the *Low Cover Tape Sensor* on and off. The *Low Cover Tape Sensor* detects when the cover tape reel is running low. When the *Low Cover Tape Sensor* is activated, an error message appears on the HMI screen. The recommended setting for the *Low Cover Tape Sensor* is **Enabled**.

Note: The *Low Cover* error message is only displayed once during a job.

B. When Leader State is enabled, the TM-402 will create a leader of the specified length at the end of the job.

The **Leader Length** field is only active when **Leader State** is enabled. Enter the desired leader length in millimeters in the field.

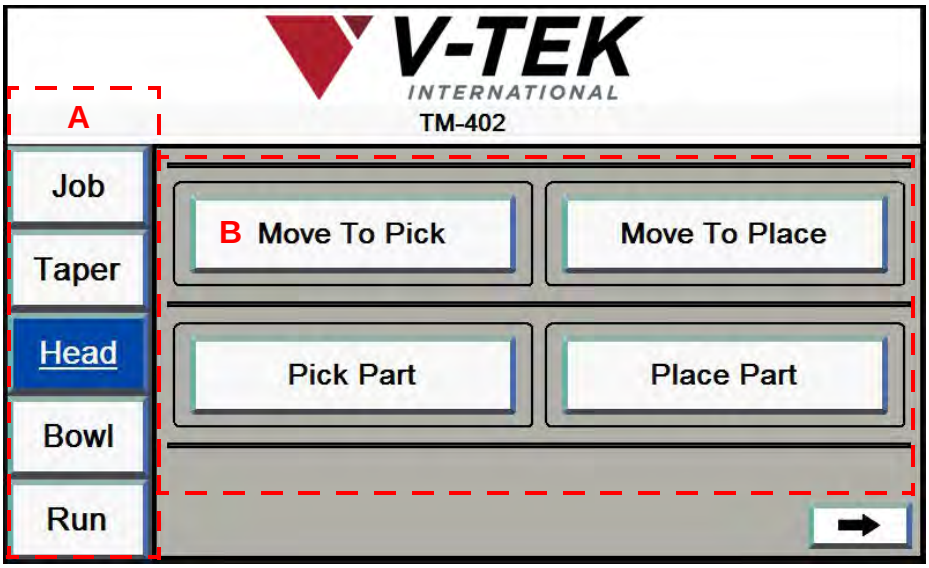
Note: The TM-402 will use these settings for the current job. To save *Taper Settings* for future jobs, go to the **Job Tab,** select a job name and **Save**. If settings are not saved, all data is lost when the TM-402 is powered off.

Head Tab

The three *Head Setup Tab* screens allow the user to set pick and place head positions, head speed, and blow off time. There are also buttons that allow the user to manually pick, place and rotate parts.

1. Head Screen 1 is used to position the head.

Head Screen 1



A. Press any tab in the **Tab Menu** to open that tab window.

B. The **Move To Pick** button moves the head to the preset *Pick Positions*.

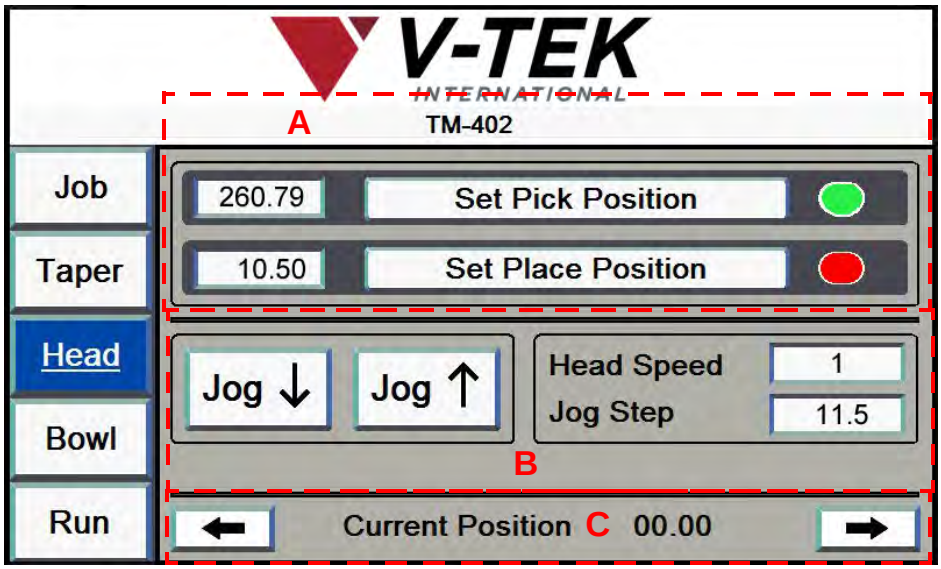
The **Move To Place** button moves the pick head to the preset *Place Position*.

The **Pick Part** button moves the head from its current location and picks a part from the programmed pick location. It then returns the nozzle to its *Ready* (retracted) position.

The **Place Part** button moves the head from its current location and places a part into the programmed place position.

2. Press the right **Arrow** button to open the second *Head Setup* screen (shown below).

Head Screen 2



A. The **Set Pick** button saves the current position as the pick position.

The **Set Place** button saves the current position as the place position.

The user can either jog the head to the correct position or click inside the location field to the left of the **Set** buttons and manually enter the correct position. Once the correct position is entered, press the **Set Pick/Place Position** button to save it.

If the position has been learned, the status color after the button will appear **green**. If not learned, the status color will appear **red**. In the screen above, both the *Pick Position* and the *Place Position* have not been learned.

B. The **Jog** buttons jog the head forward or backward along the X Axis (forward/backward).

Head Speed is a percentage of the maximum velocity. It can be set between 1-10.

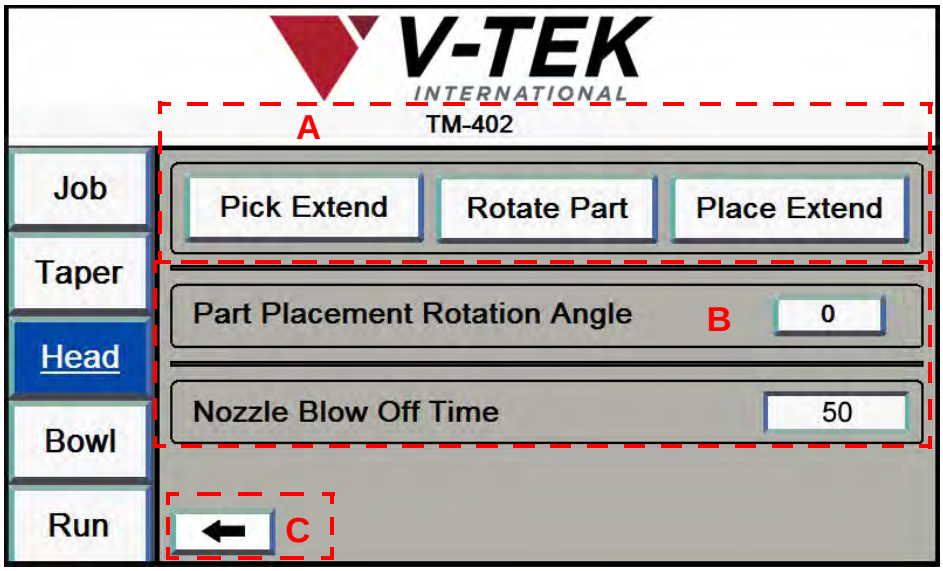
Jog Step is the distance in millimeters that the head will move when **Jog** is pressed.

Note: The *Jog Step* field requires the value to be entered in the following format: XX.XX. (i.e. 60.00).

C. The **Current Position** message show the location of the pick head in relation to the *Home* position (when the head is closest to the front of the machine). For example when the pick head is homed, the current position will be 0.00. This distance is measured in millimeters.

3. Press the right **Arrow** button to open the second *Head Setup* screen (shown below).

Head Screen 3

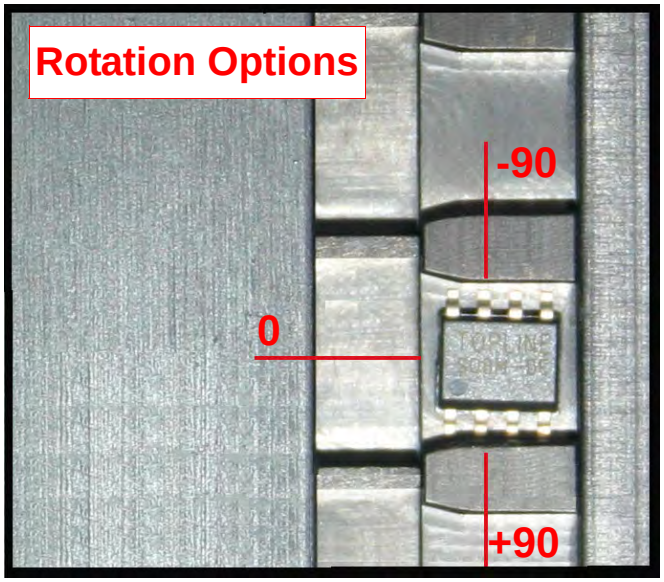


A. The **Pick Extend/Pick Retract** button actuates the *pick solenoid* to enable the operator to set the pick height.

The **Rotate Part** button rotates the *pick head* to the preset rotation angle.

The **Place Extend/Place Retract** button actuates the *place solenoid* to enable the operator to set the place height.

B. The **Part Placement Rotation Angle** is manually set during machine setup. The options are 0, -90 and +90.



- If rotation is set at **0**, the part will be placed in the same orientation as it was picked.

- If rotation is set at **-90**, the part will be rotated 90 degrees clockwise prior to placement.

- If rotation is set at **+90**, the part will be rotated 90 degrees counter-clockwise prior to placement.

Nozzle Blow Off Time is the amount of time in milliseconds that the nozzle will activate the blow-off pressure to place a part in the *Taper*.

C. Press the left **Arrow** button to return to the second *Head Setup* screen or press a button on the T*ab Menu* to move to a new tab.

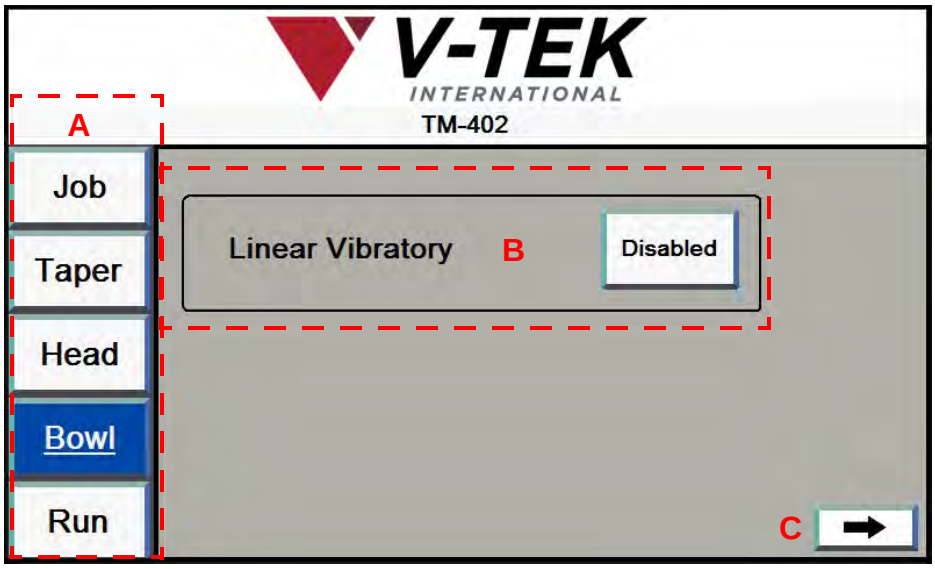
Note: The TM-402 will use these settings for the current job. To save *Head Settings* for future jobs, go to the **Job Tab,** select a job name and **Save**.

Bowl Tab

The *Bowl Setup Tabs* allows the user to configure vacuum and vibratory settings for the Bowl Feeder and Linear Track.

1. *Bowl Screen 1* allows the user to configure Linear Track and Nest settings as desired..

Bowl Screen 1



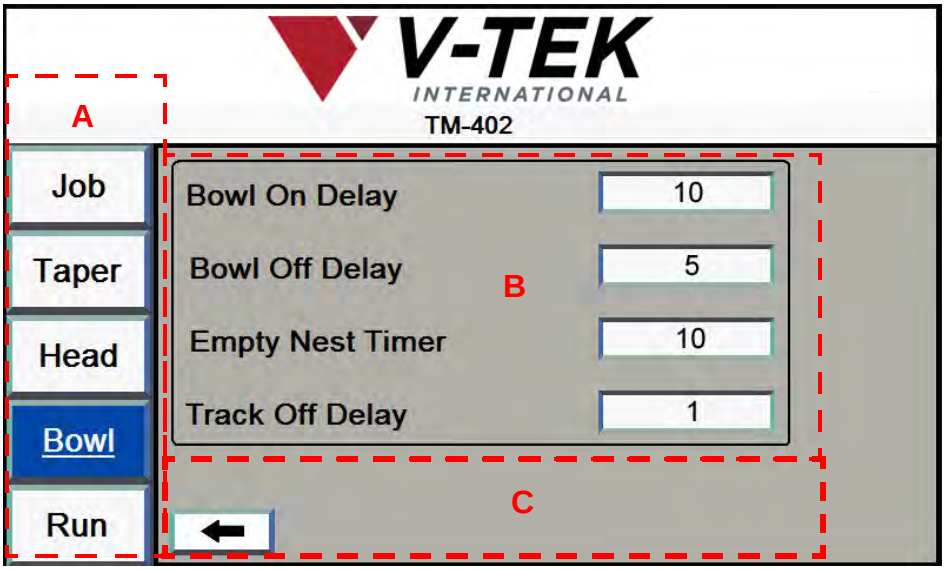
A. Press any tab in the **Tab Menu** to open that tab window.

B. The **Linear Vibratory** button turns the *Linear Track Vibratory* to **Enabled** or **Disabled** to fill the *Linear Track*.

C. The **Arrow** button advances the user to the next *Bowl Tab* screen.

2. *Bowl Screen 2* allows the user to set timers and delays..

Bowl Screen 2



A. Press any tab in the **Tab Menu** to open that tab window.

B. **Bowl On Delay** is used to set the length of time in seconds between when the *Track Full Sensor* detects that there are no parts in the track and when the bowl is turned on to feed parts. The minimum recommended setting for *Bowl On Delay* is one second.

Bowl Off Delay is used to set the length of time in seconds between when the *Track Full Sensor* first detects a part in the nest and when the bowl is automatically turned off.

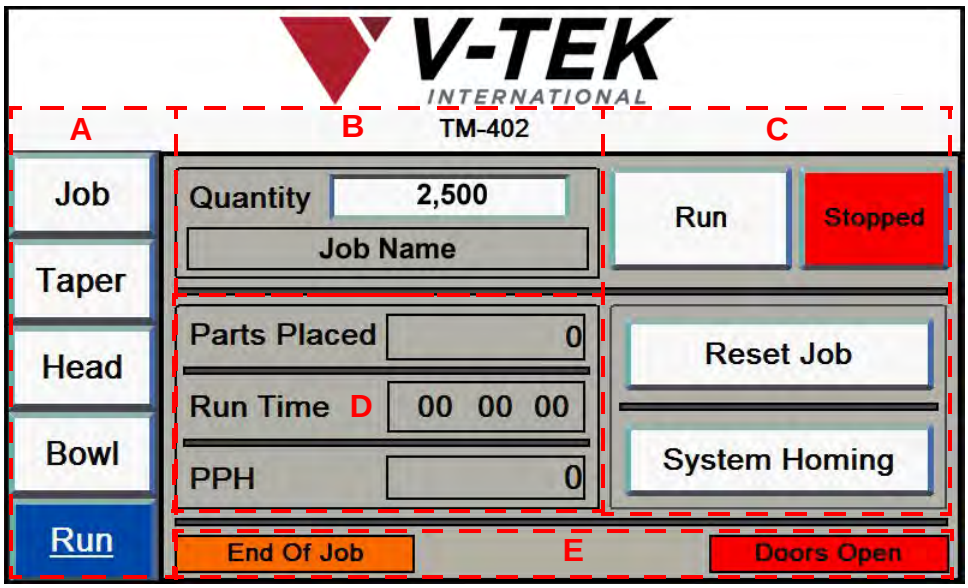
The *Linear Track's Nest* has a sensor which detects when parts are present. The **Empty Nest Timer** setting is the time in milliseconds the *Empty Nest Timer* should wait before it beeps to indicate parts are not loading in the nest.

Track Off Delay is the time in seconds that the vibratory will continue to vibrate the track after the machine is stopped.

Note: The TM-402 will use these settings for the current job. To save *Bowl Feeder Settings* for future jobs, go to the **Job Tab,** select a job name and **Save**.

Run Tab

When **Run** is selected from the *Tab Menu*, the *Run Tab* opens. It includes job information, current job statistics, Status messages and Run control buttons. The *Run Screen* with all status messages displayed appears below.



A. Press any tab in the **Tab Menu** to open that tab window.

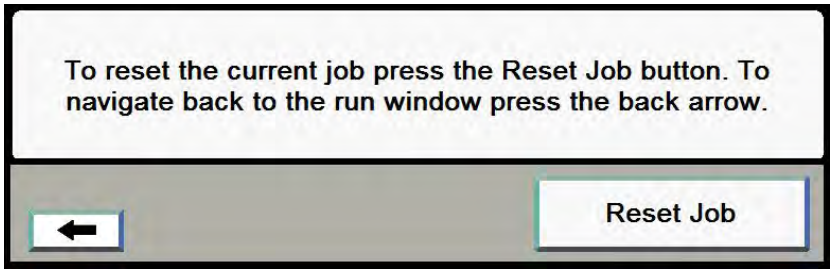
B. The **Job Information** section has two fields: *Quantity* and *Job Description*. This information was entered in the Job Wizard during job setup. The *Job Description* field is greyed out, indicating it cannot be altered in this tab. To edit the *Quantity* field, press anywhere inside the field to open a keypad for data entry.

C. There are four control buttons on the *Run Tab*: **Run/Running, Stop/Stopped, Reset Job,** and **System Homing**.

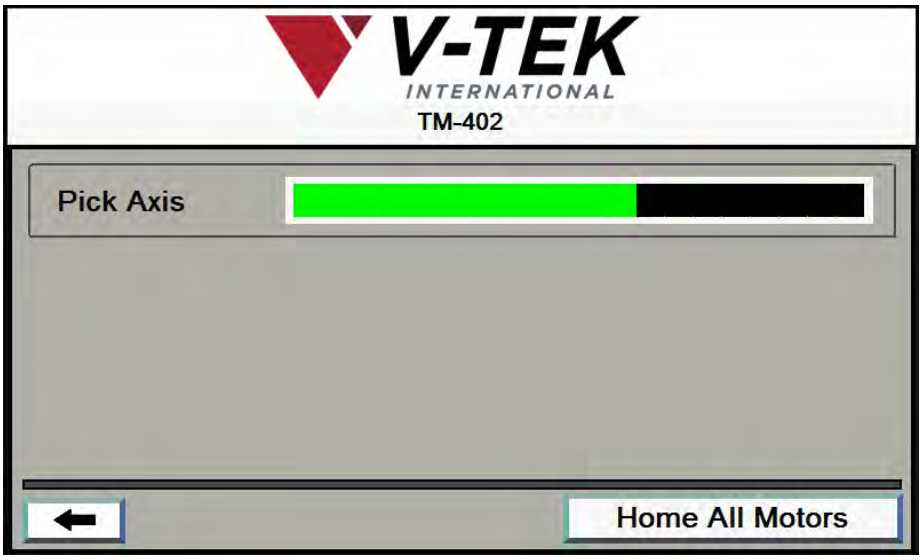
- The **Run** and **Stop** buttons start and stop job processing. They change color to indicate they are active. In the *Run Tab* above, the red **Stopped** button indicates the current job has been stopped.

- The **Reset Job** button resets all job statistics to zero. This is useful for running multiple reels of the same job.

  When **Reset Job** is pressed, the following message appears.

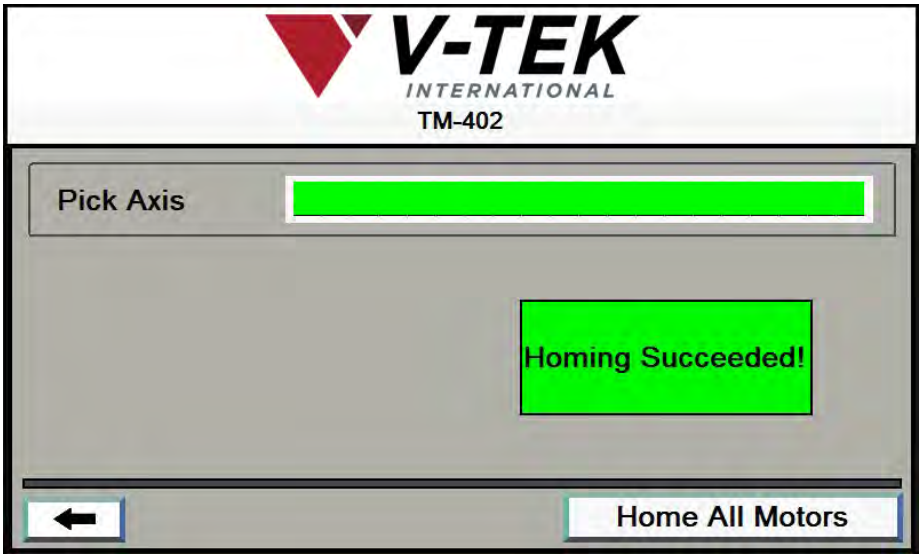


- The **System Homing** button allows the user to home the motor. Homing motors should be done once following every system power up. When *System Homing* is selected, the *Homing Status* window will appear.

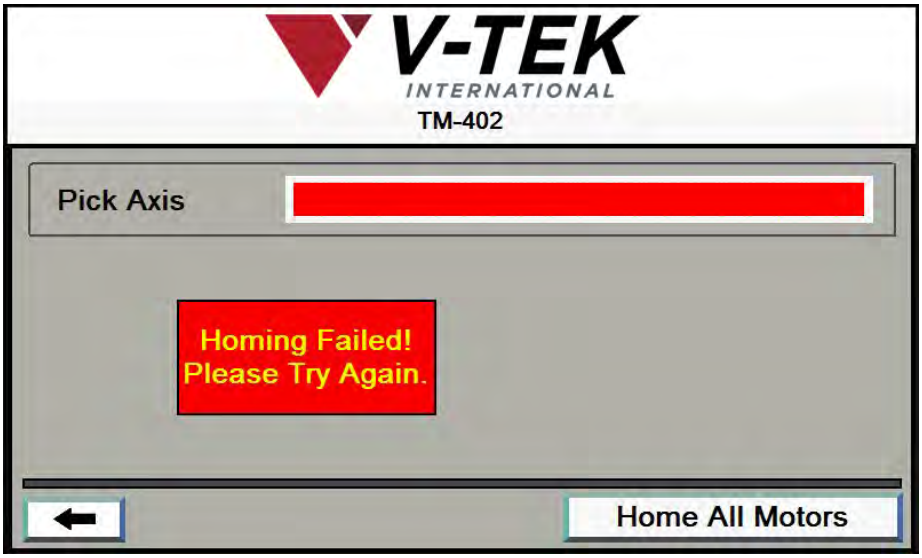


Pressing the **Home All Motors** button begins the homing sequence. Homing progress is displayed in the *Pick Axis Motor Status Bar*.

As the homing sequence is completed, the bar gradually turns from **black** to **green**. A *Homing Succeeded!* message appears at the end of the sequence.



If a problem arises during homing for the motor, the status bar will turn **red** and a *Homing Error* message will appear.



Pressing the **Left Arrow** button returns the user to the *Run Tab*.

D. The **Statistics** section keeps a running tally of the current job's *Parts Placed*, *Run Time*, and *Parts Per Hour*.

E. **Status Messages** only appear when conditions exist which require the user's attention before the job can be run.

- If the preset quantity of parts has been processed, the **End Of Job** message will appear.

- If the Doors are open, the **Doors Open** message will appear.

Chapter 4: Setup

Contents

Quick Start: Setup

The following is an outline of the basic steps required to setup the TM-402 for operation. More detailed instructions follow in the next section of this chapter.

Caution: Users should always wear protective eye wear when operating or maintaining the TM-402.

1. Power up
- Power up the machine. Press *Reset*. Close all doors.

2. Home the motors
- Press **Home Required** and **Home All Motors**.

3. Load the Bowl Feeder
- Load components into the *Bowl Feeder*.

4. Install Nozzle
- Ensure correct nozzle size and tip are installed.

5. Load Taper
- Load carrier tape.
- Load cover tape.
- Place an empty reel on the *Take-up Arm*.

6. Configure HMI settings
- Go to the *Job Tab* and run the *Job Wizard* to configure job settings.

7. Test Sealer
- Perform a *Seal Test* to ensure a good seal, adjust *Sealer* settings as necessary.

8. Setup 2D Vision
- Connect
- Setup *2D Vision* Inspection.

Step 1: Power Up

Power Up the System

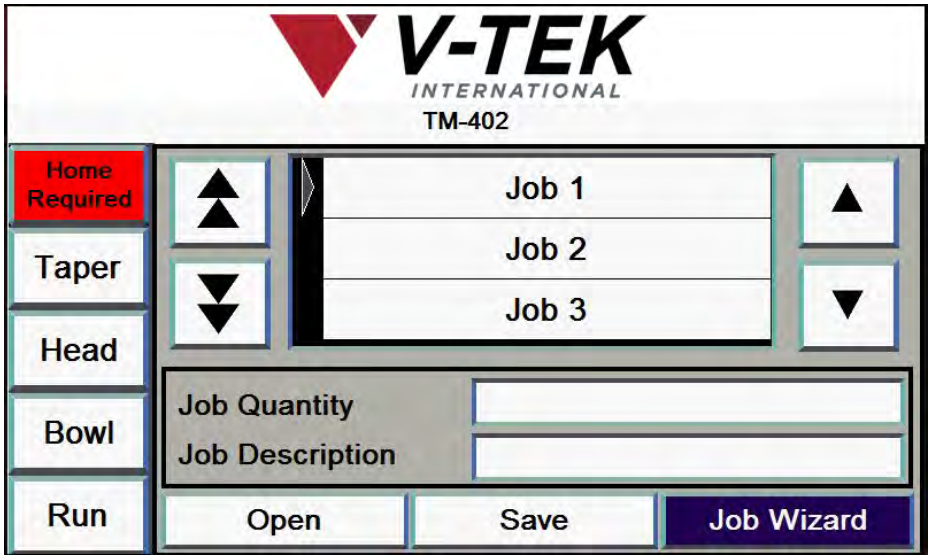
1. Power up the machine by turning the *Main Power* control on the lower right side of the cabinet to the **ON** position.

2. Press the blue **Reset Button** on the left side of the machine.

There will be a brief popping sound as the *Air Dump Valve* releases air to the machine. As the TM-402 powers up the PLC, Servo Drivers and HMI Monitor will boot up. On top of the machine, the *Tower Light* will flash red indicating the machine is on but not running.

Note: The boot up process takes approximately 2 minutes.

The monitor will display the HMI *Job Tab* with a red **Home Required** message at the top of the *Tab Menu*.



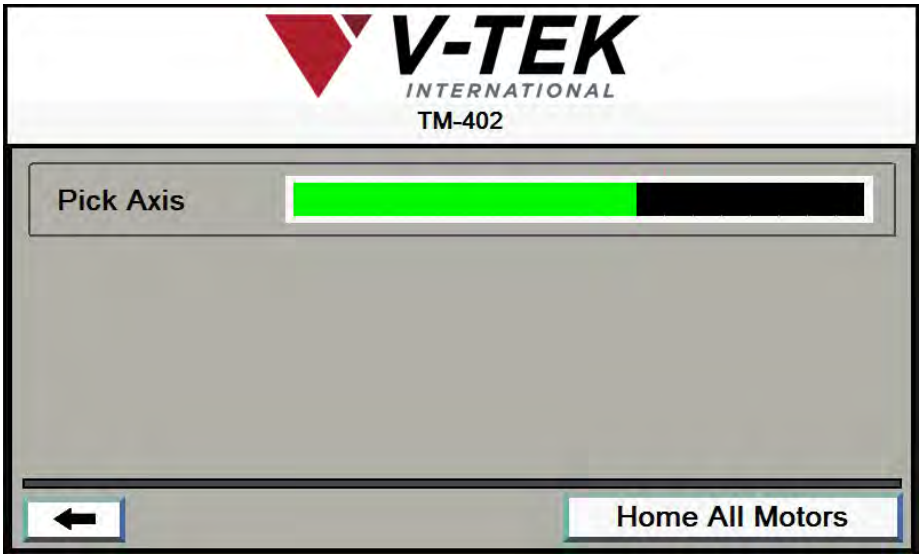
Home Motors

Step 2: Home Motors

Note: The TM-402 needs to be homed once after each power up or *Emergency Stop* activation. The HMI will prompt the operator to home the motors whenever it is required. Once the motors have been homed, they remain homed until the machine is powered down or the E-Stop is activated.

1. Press the red **Home Required** button at the top of the *Tab Menu*.

2. The TM-402 motor homing sequence begins with the pick head moving slowly to the right towards the taper (**X Axis** movement).



When the head has stopped moving, homing is complete.

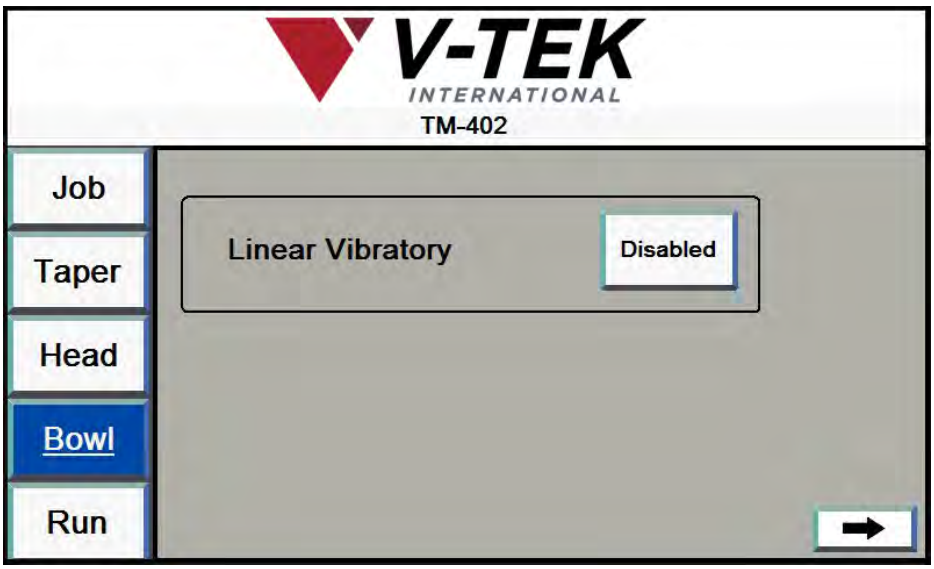
Step 3: Load the Bowl Feeder

Load the Bowl Feeder

1. To prepare the *Bowl Feeder* for operation, ensure the correct *Bowl* and *Linear Track* are installed for the part which will be run.

2. Load the *Bowl* with parts. Do not overfill.

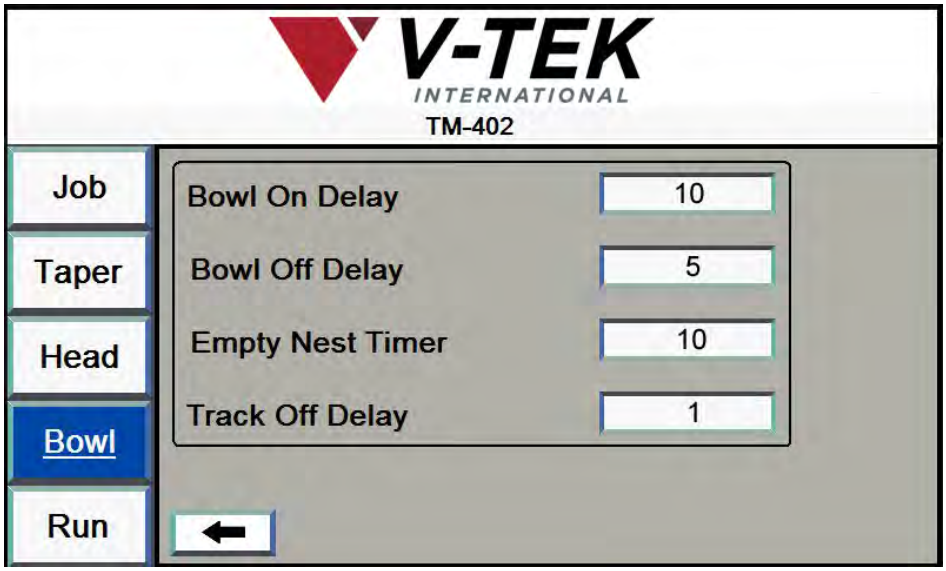
3. On the HMI, select **Bowl** from the tab menu on the left to open the *Bowl Setup Tab*..



4. Enable the **Linear Vibratory**. The *Linear Track* will turn on and activate the *Bowl*

5. Manually adjust the **Vibratory Controls** for *Linear Track* and *Bowl* as needed to suit the type of component that is being processed. Parts should move fluidly into the track and on to the nest.

7. Click the right **Arrow** to move to the second *Bowl Setup Screen*..



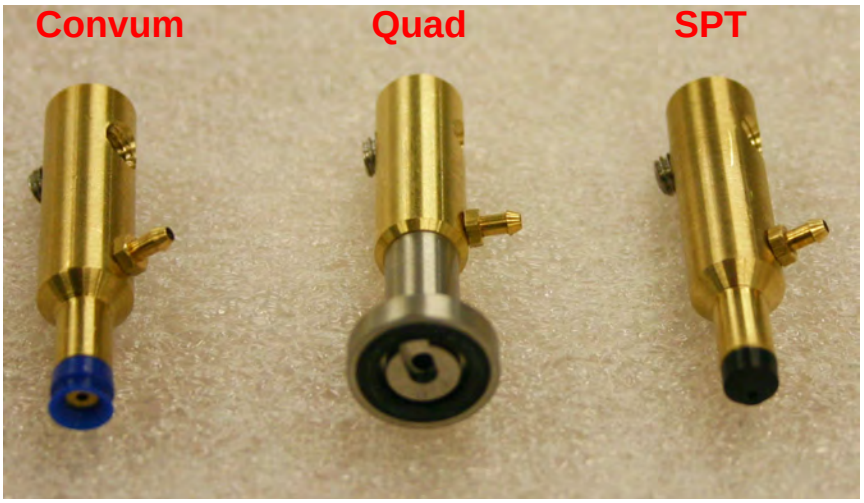
8. Set the desired times in milliseconds for **Bowl On Delay, Bowl Off Delay, Empty Nest Timer** and **Track Off Delay**.

The *Bowl Feeder* is now ready to operate. Feeder settings will be configured later in this chapter in the *Job Wizard* section.

Step 4: Nozzle Installation
SELECT NOZZLE

Nozzle Installation

The TM-402's is shipped with the following nozzles and nozzle tips:



- (1) Quad Nozzle Shank *(Part # 267090)*
- (1) Small Precision Tool (SPT) Nozzle Shank *(Part # 267091)*
- (1) Convum Nozzle Shank *(Part # 267008)*
- (1) Large Quad Vacuum Cup *(Part # 201297)*
- (1) Medium Quad Vacuum Cup *(Part # 201298)*
- (1) Small Quad Vacuum Cup *(Part # 201299)*
- (1) SPT Vacuum Cup *(Part # 201271)*
- (1) Convum Vacuum Cup *(Part # 201207)*
- (2) Nozzle O-Rings *(Part # 212025)*

Note: *Nozzle Tips* are available in a wide range of sizes and style. See the Suggested Spare Parts List in the back of this User's Guide for more details. Contact V-TEK Service for information on ordering additional *Nozzle Tips*.

Selecting the Correct Nozzle & Nozzle Tip

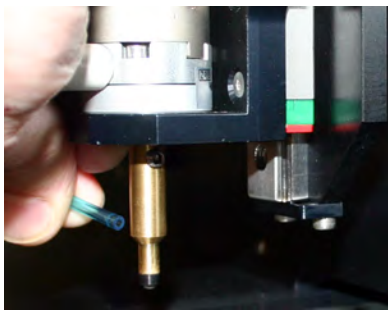
To achieve the best picking results, select the largest cup size the part can accommodate. Maximizing the cup size gives the vacuum access to more surface area which increases its pick-up capability. The goal is to use a nozzle cup that is just slightly smaller than the part being picked.

The Convum bellows-style cups have a flexible flange that are useful for picking irregular or heavy parts.

Step 4: Nozzle Installation
INSTALL NOZZLE

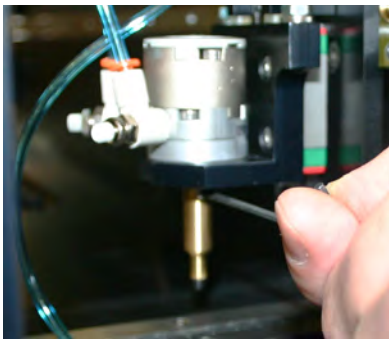
Installing Nozzle & Nozzle Tip

1. Move the *Pick & Place Head* to the **Place** position so it is easily accessible from the front. .



2. Remove the air line from the *Nozzle Shank*, supporting the *Nozzle* with one hand while gently pulling the tube off the *Nozzle Barb*.

3. Using a 2mm Hex wrench, loosen the set screw that retains the *Nozzle Shaft*.



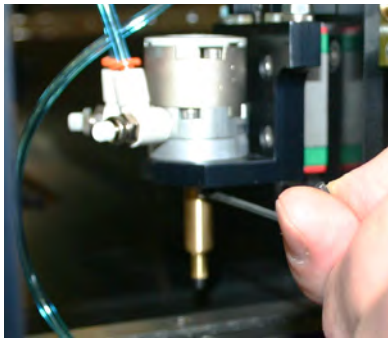
4. Slide the *Nozzle Shank* down and remove it from the Pick & Place Assembly. Store the unused *Nozzle Shank* and *Nozzle Cup* in the Spare Parts Kit.

5. Select the correct *Nozzle Shank* and *Nozzle Cup* for the part that will be run. Press the *Nozzle Cup* onto the *Nozzle Shaft*.

6. Insert the *Nozzle Shank* into the *Actuator Shaft* in the Pick & Place Assembly.

> **Note:** When positioning the *Nozzle Shank*, push it all the way up to the *Actuator Shaft*, then pull it back slightly (about 1mm) so the body of the *Nozzle Shank* doesn't rub the body of the *Actuator*.

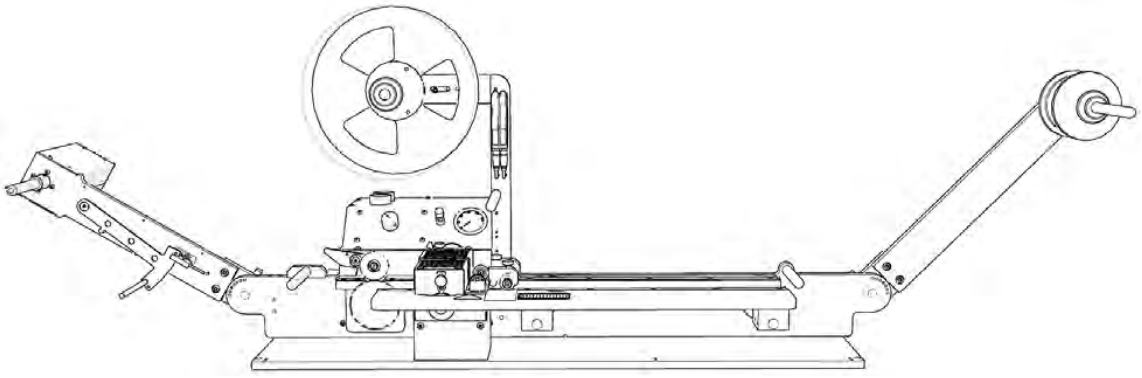
7. Using a 2mm Hex wrench, tighten the set screw to retain the Nozzle Shaft..



8. Re-attach the air line to the *Nozzle Barb*.

Step 5: Setup Taper

Taper Setup



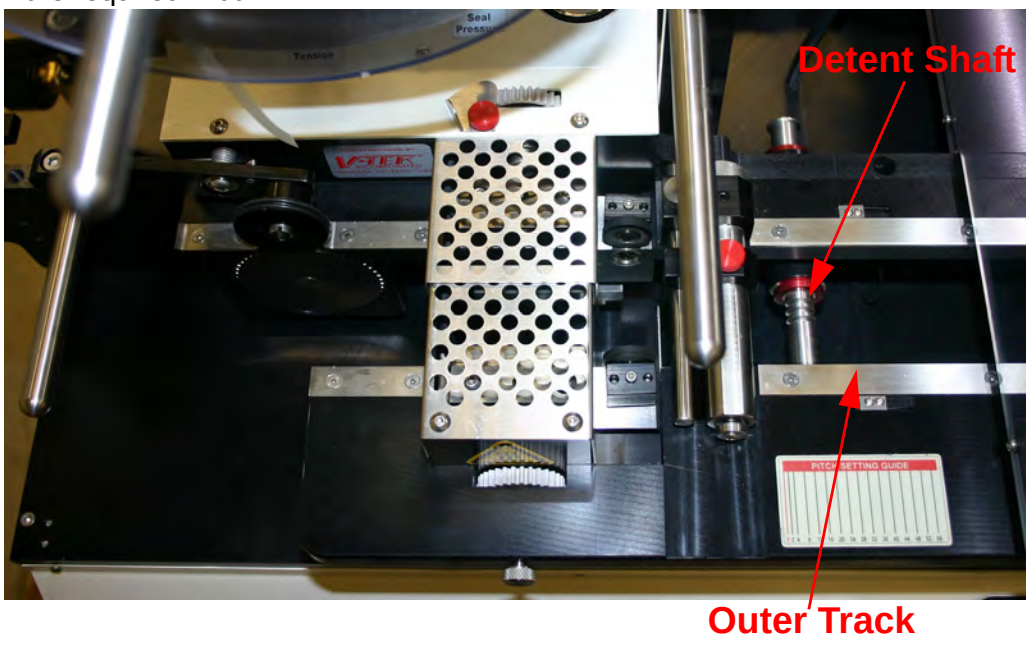
Loading Tape

The *Taper* must be loaded with carrier and cover tapes and configured for operation. Begin by preparing the *Taper*, then move to the HMI to adjust settings. (*Step 7*)

Step 5: Setup Taper CARRIER TAPE

Load Carrier Tape

1. Check that the taper is set at the correct width for the carrier tape. If not, push or pull the outer track in or out as needed, sliding it on the Detent Shafts until it is at the required width.



3. Once the track is adjusted, use a strip of the carrier tape as a test to determine if the setting is correct. The carrier tape should slide through freely, but without excess play back and forth. Tighten the set screws down again to secure the track into place.

4. Mount the bulk carrier tape reel on the spindle, ensuring that there is sufficient tape for the batch to be run.The carrier tape should roll off to the left, unwinding from the top so it will feed right side up into the carrier tape channel underneath the *Pick Head Enclosure*.

   The sprocket holes of the carrier tape are on the inside for tape widths less than 32mm. Tapes wider than 32mm have holes on both sides.

5. Trim the end of the carrier tape, cutting between two pockets with a sharp scissors so the edge is cleanly cut. Cut the edge of the tape again, cutting through a sprocket hole at a 45° angle so the tape feeds easily.

6. Guide the carrier tape under the *Carrier Tape Guide* and then feed it through the carrier tape channel under the taper.

   Note: A sharp instrument, such as a pair of tweezers may aid in guiding the carrier tape into the loading track.

7. Continue to guide the carrier tape forward through the loading track and the sealer until it reaches the sprocket.

8. Lift the idler wheel and place the carrier tape onto the sprocket so that the holes engage the teeth. Release the idler wheel so that it is secured in place.

Mechanical Hazard!

*Do not attempt to activate the **sprocket** while tape is being routed through the sealer. Pinching or entrapment may occur if safety precautions are not observed.*

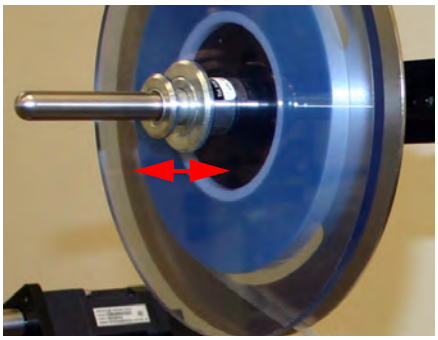
Step 5: Setup Taper COVER TAPE

Load Cover Tape

1. Remove the *Reel Lock* mechanism and place a reel of cover tape of the correct width to match the carrier tape on the cover tape spindle. The tape should unwind to the right from the bottom of the reel. Ensure that there is sufficient tape for the batch to be run. The reel should be pushed onto the holder so that it is flush with the back.

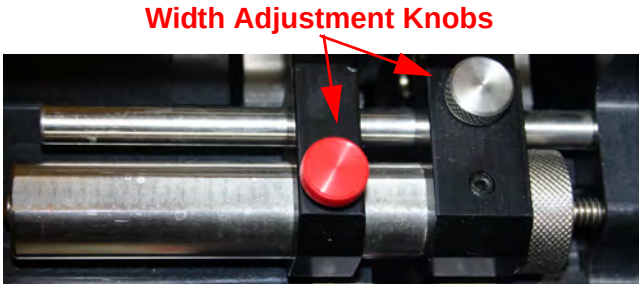
2. Replace the *Reel Lock* and position it so the reel is supported and spins freely on the spindle with little or no drag.

Note: To remove the *Reel Lock* mechanism from the cover tape support arm, simply pull the two metal disks apart and slide the *Reel Lock* off the spindle.



3. Check that the cover tape guide width is adjusted correctly for the cover tape that will be used. Pull the cover tape down and compare it to the current setting

If the guide is set too wide or too narrow, loosen the red knob set screw and pull or push the guide in and out until it matches the width of the cover tape with only a slight amount of extra room..



4. If the cover tape is *PSA*, attach it to the carrier tape using the adhesive on the underside of the tape.

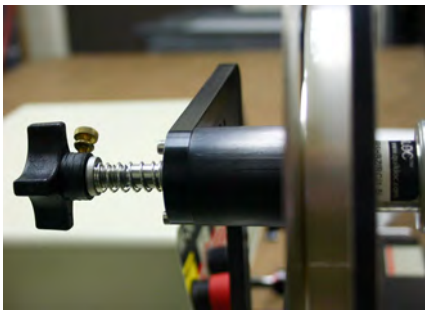
If the cover tape is *Heat Seal*, use blue Permacel tape to attach the cover tape to the carrier tape just ahead of the cover tape guide.

5. Thread both the carrier tape and cover tape through the cover tape guide sealer assembly.

Note: A sharp instrument, such as a pair of tweezers may aid in guiding the cover tape into the sealer.

Step 5: Setup Taper TAKE-UP

6. Adjust the *Cover Tape tension,* turning the *Tension Adjustment Knob* on the back of the *Cover Tape Arm* clockwise (in) to increase tension. The goal is to tighten the cover tape so there is not excess freedom in the tape when it is advanced.



Load Take-up Reel

1. Mount an empty take-up reel on the take-up reel spindle. The width of the reel must match the width of the carrier tape and its diameter should be large enough to accommodate the number of components in the taping job.

2. The *Take-up Tension Control* is located on the front of the Heat Sealer enclosure next to the *Seal Pressure Gauge & Control*. Adjust the take-up tension to a rate that suits the weight of the parts that are being processed, adjusting it so the take-up motor pulls the sealed tape gently forward.

Mechanical Hazard!

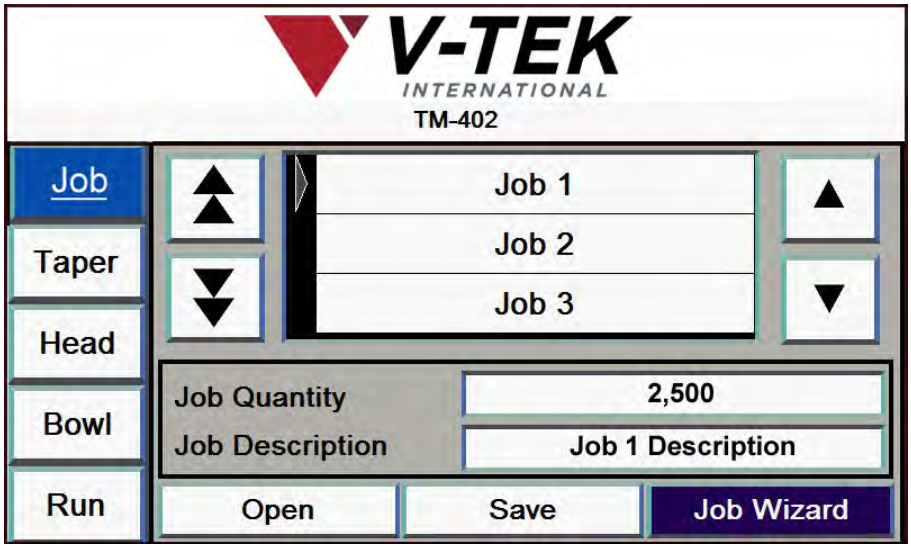
Avoid placing fingers between the carrier tape and the Take-up Reel when the TM-402 is in operation. Pinching or entrapment may occur if safety precautions are not observed.

Step 6: Setup HMI JOB

Configure HMI Settings

The TM-402's *Job Wizard* leads the user through the HMI setup process.

1. OPEN JOB WIZARD



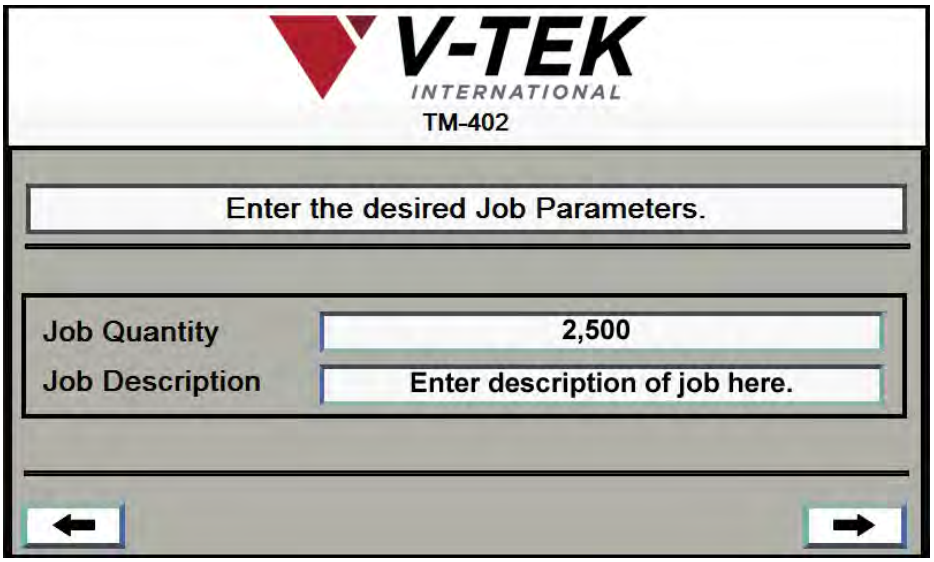
a. Press the **Job Wizard** button to open the *Job Wizard*.

2. RESET JOB

a. Press **Reset Job** to initialize system for Job Wizard.

b. Press the right **Arrow** key to open the next *Job Wizard* screen.

3. **ENTER JOB PARAMETERS**.

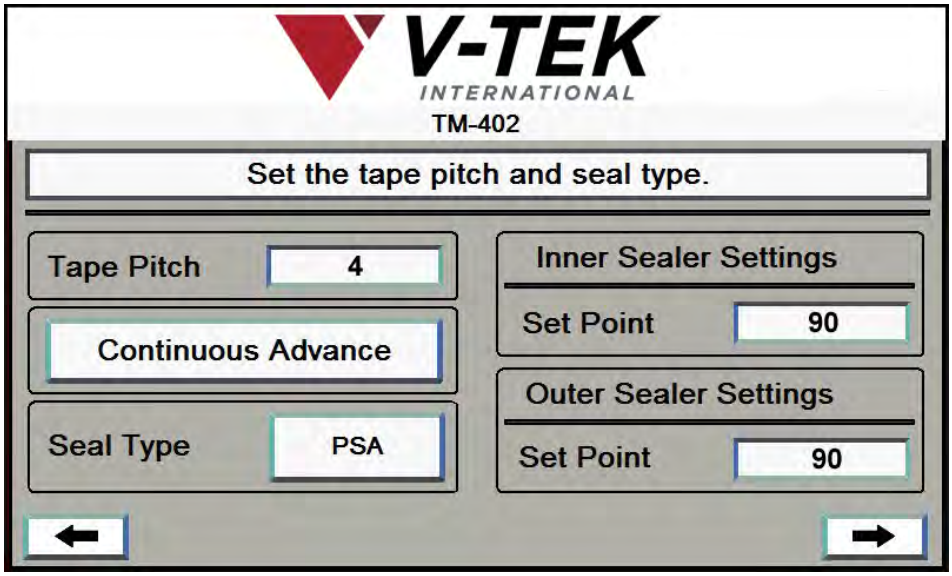


a. Enter *Job Quantity*

b. Enter *Job Description*. Press the right **Arrow** key to open the next *Job Wizard* screen.

Step 6: Setup HMI TAPER

4. **TAPER SETUP**
Enter *Pitch, Seal Type.* If Heat Seal Type is selected, enter *Sealer Set Points.*



Step 6: Setup HMI TAPER

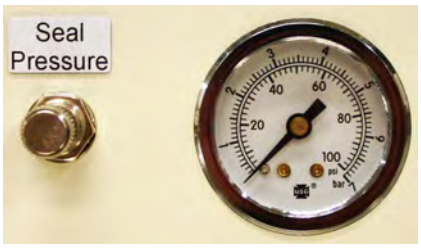
a. Enter the correct tape pitch for the carrier tape that will be run. If unsure, use the **Pitch Setting Guide** on the *Taper* to determine the pitch.

b. Select **PSA** or **Heat Seal**.

c. If **Heat Seal** is enabled, enter the desired temperature in degrees Celsius for both the *Inner* and *Outer Sealer Temperature Settings*. Allow the heat sealer to reach its operating temperature before continuing.

Note: The TM-402 accommodates a wide range of carrier tapes and cover tapes. Settings may vary from one tape product to another. The recommended starting point is 90° C. The maximum recommended operating temperature is 160° C. The temperature for each seal shoe should be increased or decreased as needed after running a peel force test.

d. Set the heat shoe **Seal Pressure** to the appropriate setting. This setting controls the amount of force applied when the sealer shoes drop. The recommended starting point is **50 psi**.



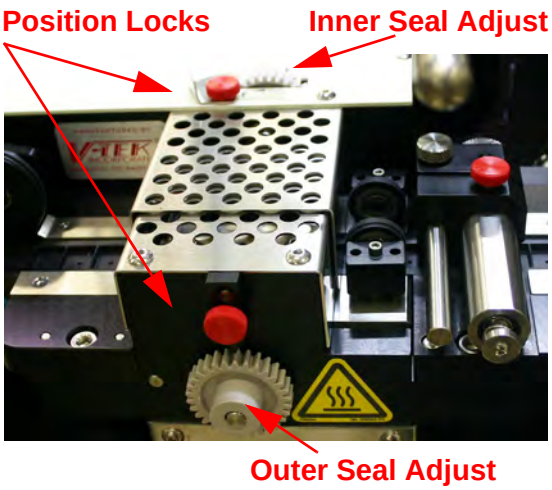
e. Press the **Continuous Advance** button.

The taping module will begin the advance of the carrier tape and cover tape through the sealer. The cover tape will be sealed onto the carrier tape as it advances.

f. Observe whether the sealer's width is adjusted correctly for the cover tape. It should seal just inside the outside edges of the carrier tape without going off the edges or over the pockets. If it is not, stop the taper by pressing the **Continuous Advance** button again.

Step 6: Setup HMI TAPER

The sealer's inside and outside seals are independently adjustable. If one of the seals needs to be moved, loosen the corresponding position lock and turn the adjusters.



Turning the wheel counter-clockwise will move the guide towards the operator. Turning it clockwise will move the guide closer to the machine. Adjust the *Inner Seal Adjust* and the *Outer Seal Adjust* to the desired position, then tighten the *Position Locks* to secure them.

Note: See *Chapter 6: Trouble-shooting* for sealer adjustment tips.

After the initial adjustment, run the tape out again and observe whether the cover tape aligns itself satisfactorily. If it is still misaligned, continue adjusting the cover tape guide until it is aligned properly.

5. CREATE TRAILER (optional)

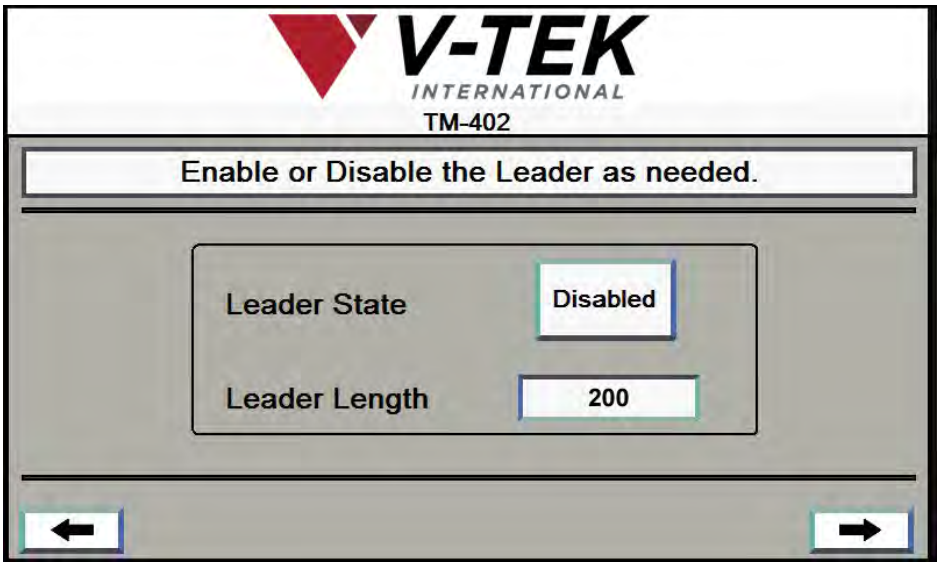
The term "leader" and "trailer" refer to the lengths of empty carrier tape required at the beginning (leader) and the end (trailer) of the finished reel of placed parts. Therefore, when the reel is being taped on the TM-402, the trailer is the first length of empty carrier tape run before the first part is taped and the leader is the length of empty carrier tape run after the last part is taped.

a. There are no HMI controls for creating a *Trailer*. If a *Trailer* is desired, simply open the HMI *Taper Tab* and press **Continuous Advance** at the beginning of the reel and run out sealed empty pockets until the desired trailer length is reached.

b. Press the right **Arrow** key to move to the next screen and configure leader creation.

Step 6: Setup HMI TAPER

6. **ENABLE LEADER**.



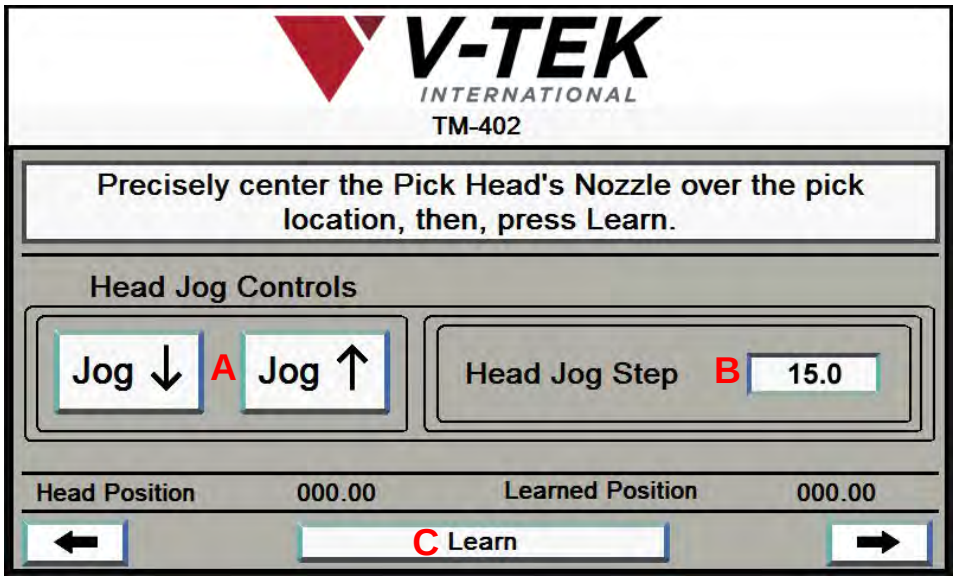
a. Select *Leader State* and enter *Leader Length* in millimeters if enabled.

Note: If *Leader* is **disabled** or a leader value of **zero** is entered, the *Taper* will automatically advance the last part until it reaches the cut point. If a leader value is entered, it will move the last placed part that distance beyond the cut point.

b. Press the right **Arrow** key to move to the next screen.

Step 6: Setup HMI PICK HEAD

7. **PICK HEAD SETUP** The next seven *Job Wizard screens* are used to set the pick and place positions.



a. Press the **Jog** buttons or the **Jog** buttons on top of the Sealer enclosure to move the *Pick Head* to the *Bowl Feeder,* centering it over the *Nest* in the pick position.

b. Press **Learn**. The *Learned Position* will now match the *Current Position* and the **Learn** button will turn green and update to read **Learned**.

c. Press the right **Arrow** to move to the next *Job Wizard* screen. .

Step 6: Setup HMI PICK HEAD

8. SET PICK HEIGHT.

a. Open the TM-402 enclosure doors to access the pick head.

b. Use a 2.5mm hex wrench to hold the *Actuator Adjustment Screw* in place from the bottom, while loosening the *Jam Nut* on top of the *Actuator Adjustment Screw* with an 8mm open ended wrench. Raise the *Nozzle* until it is at a safe height so it will not collide with the current part when extended.

c. Tighten the *Jam Nut*.

d. Press the **Pick Extend** button**.**

e. Loosen the *Jam Nut* on top of the *Actuator Adjustment Screw* again, then lower the *Nozzle* until it is barely touching the part in the *Pick Location*.

Note: For all *Nozzle Tips* except the *Convum Tips*, the pick position should be set just above the surface of the part with a very small clearance between the nozzle and the part. Because the *Convum Nozzle Tips* are flexible, it is all right if the tip is programmed to touch the part when picking.

f. Tighten the *Jam Nut*.

g. Press **Pick Retract** to retract the *Nozzle* to a safe height.

h. Press the right **Arrow** to move to the next *Job Wizard* screen.

Step 6: Setup HMI PICK HEAD

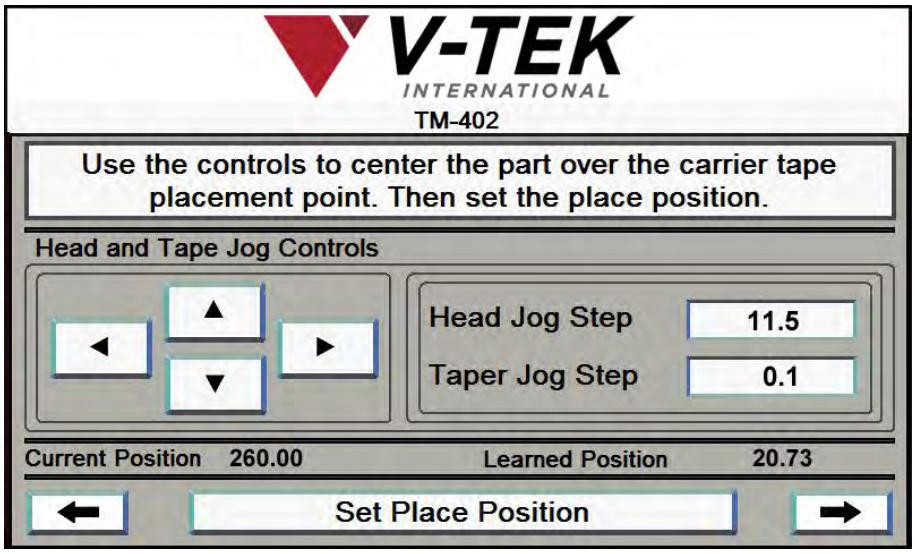
9. Nozzle Setup: Manual Rotation

a. Place a part in the pick position. Press **Pick Part** to activate the Pick Head and pick a part from the pick location.

b. If the part needs to be rotated before it is placed in tape, press **Rotate Part.** This will rotate it +90°. If no rotation is required for part placement, skip this step.

c. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

10. Set Place Position



a. Use the **Arrow** keys to position the *Pick Head* and *Carrier Tape* so the *Nozzle* is centered over the carrier tape placement position. The **Up/Down Arrow**

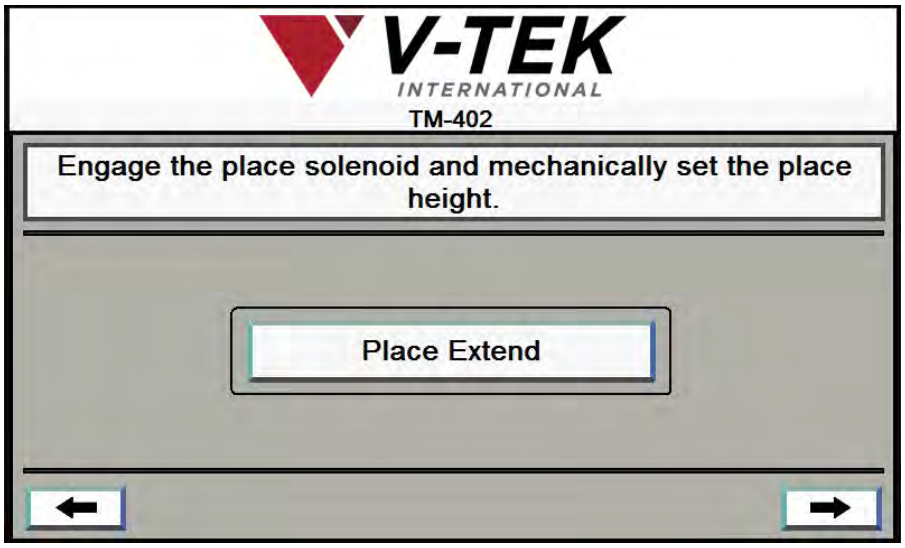
Step 6: Setup HMI PICK HEAD

keys move the *Pick Head* forward and backward. The **Left/Right Arrow** keys move the tape left and right in the *Taper Track*.

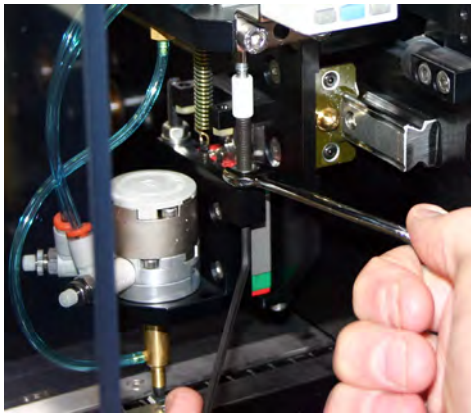
b. When the Nozzle is centered over the tape pocket, press **Set Place Position** to set the position.

c. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

11. **Set Place Nozzle Height** The *Pick Head*'s **Z Axis** (up/down) position needs to be set at the *Place* position.



a. To manually set the *Place Actuator* to the correct nozzle height, press **Place Extend**



b. Use a 2.5mm hex wrench to hold the *Actuator Adjustment Screw* in place from the bottom, while loosening the *Jam Nut* on top of the *Actuator Adjustment Screw* with an 8mm open ended wrench. Lower the *Nozzle* until the part is barely touching the top of the pocket in the *Place Location*.

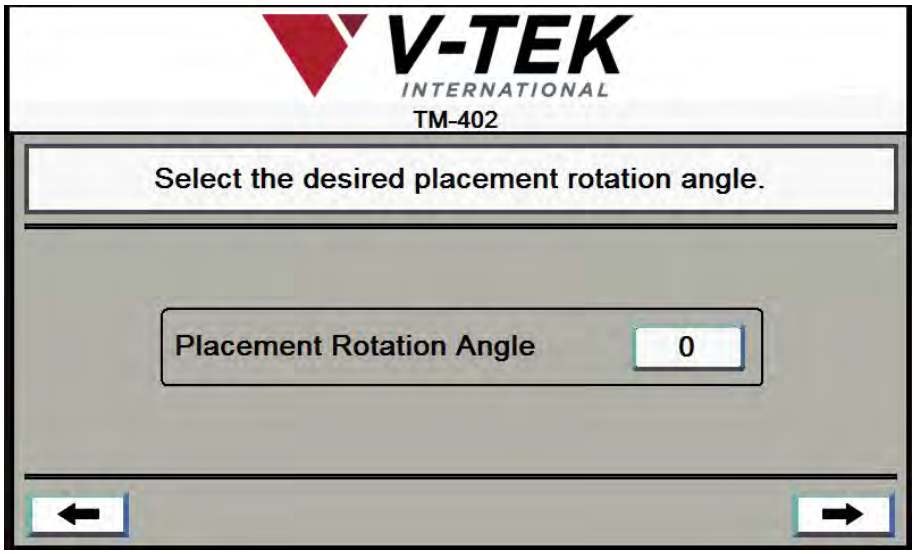
c. Tighten the *Jam Nut*.

d. Press **Place Retract** to retract the Nozzle to a safe height.

e. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

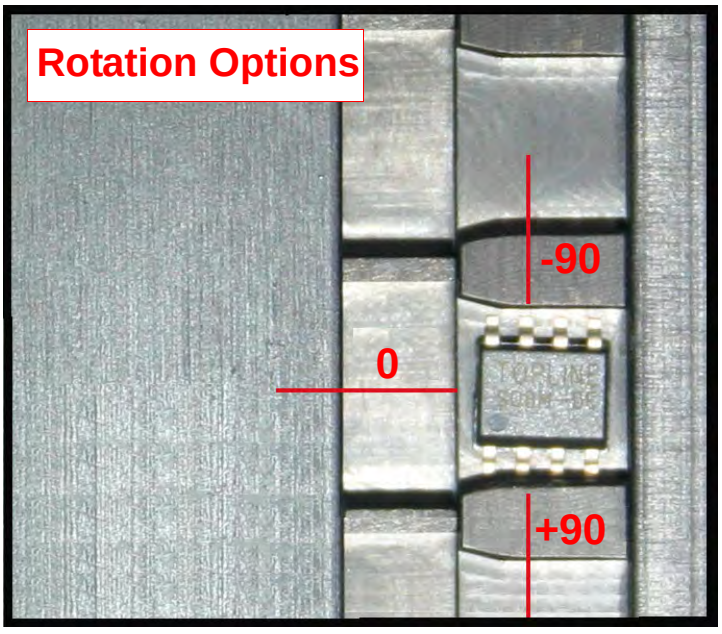
Step 6: Setup HMI PICK HEAD

12. Set Rotation Angle



a. Press the **Placement Rotation Angle** field to toggle through the rotation options. The options are 0, -90 and +90. Select the correct placement angle.

- If rotation is set at **0**, the part will be placed in the same orientation as it was picked.
- If rotation is set at **-90**, the part will be rotated 90 degrees clockwise prior to placement.
- If rotation is set at **+90**, the part will be rotated 90 degrees counter-clockwise prior to placement.



b. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Step 6: Setup HMI VERIFY

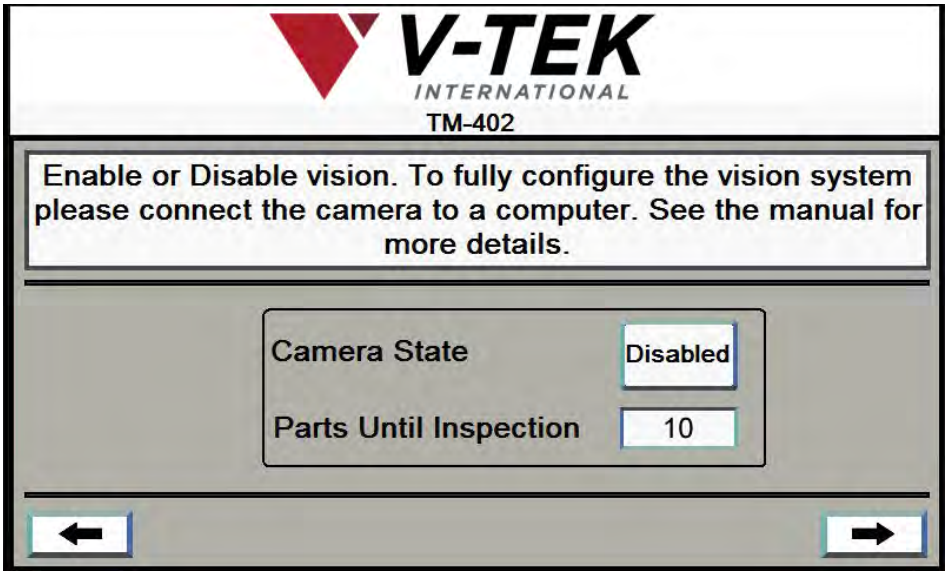
13. Verify Job Settings

Test the job settings, using the **Pick Part** and **Place Part** buttons to pick and place parts. If adjustment are required, use the left **Arrow** key to return to the desired step and adjust settings. Press the right **Arrow Key** to move to the next *Job Wizard* screen.

Note: Manually placed parts will be counted in the current job.

Step 6: Setup HMI VISION

14. Vision Settings

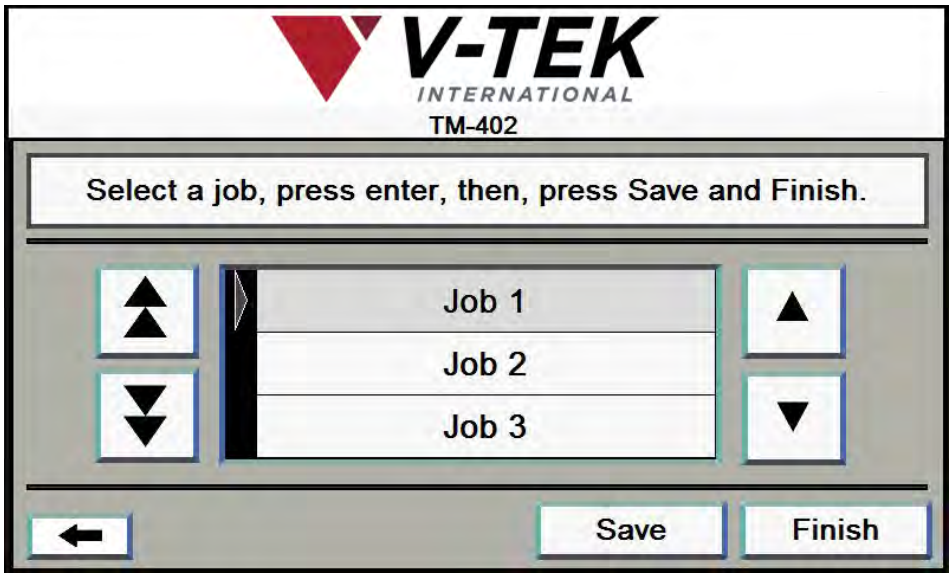


a. Set *Camera State* to **Enabled** or **Disabled.**

b. If camera is enabled, enter number of **Parts Until Inspection** (do not include part at Pick point.). Press the right **Arrow Key** to move to the final *Job Wizard* screen.

Step 6: Setup HMI SAVE SETTINGS

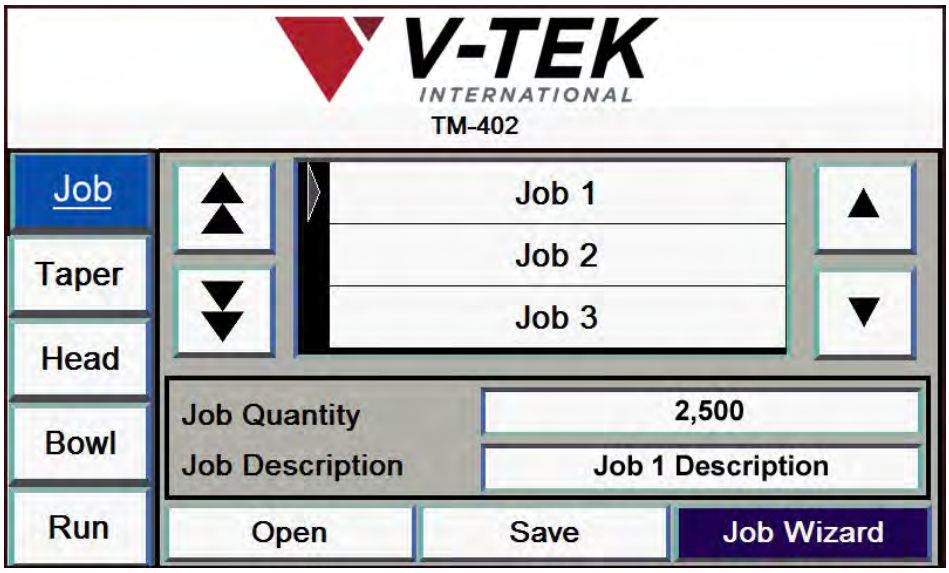
15. Save Job Settings



a. Browse through the *Job Library* using the **Up/Down Arrow** keys to move up or down through the list. To select a *Job Name* from the list, press the **Enter** key.

Note: The **Save** function will overwrite the information stored for the currently selected job. Therefore, it is important to select the desired job prior to pressing the **Save** button.

b. Press the **Save** button to save job settings to the selected job name, then press **Finish** to close the *Job Wizard* and return to the main *Job Tab.*

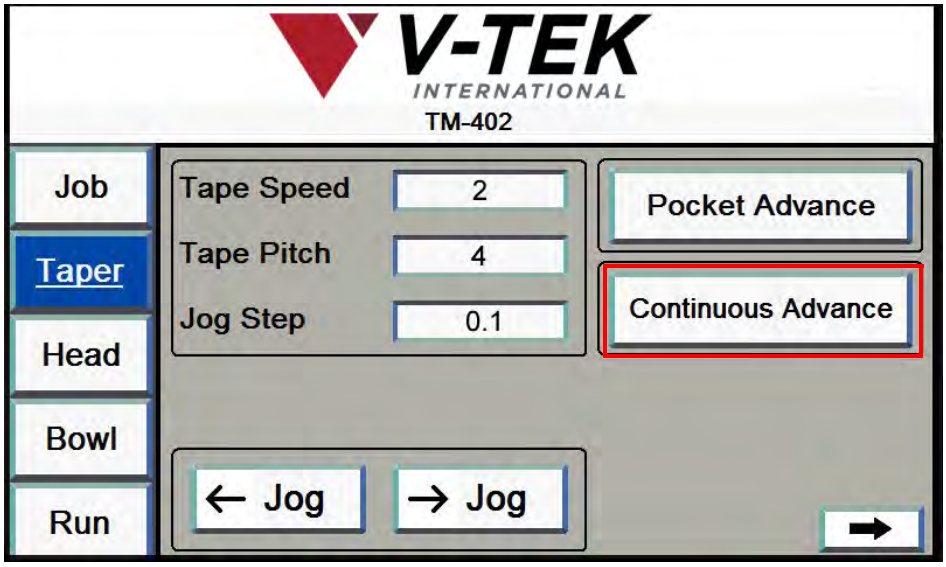


Step 7: Seal Test

Test Seal

Perform a *Seal Test* to ensure a good seal. Adjust *Sealer* settings in the HMI *Taper* tab as necessary.

Taper Screen 1

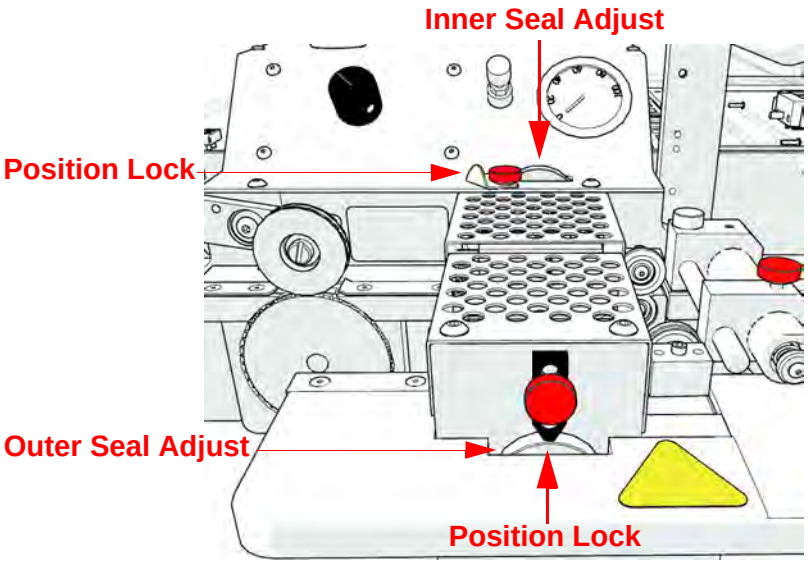


1. Run the tape through the taping module by pressing the **Continuous Advance** button in the HMI *Taper Tab*.

2. As the seal is occurring, watch the alignment of the cover tape with the carrier tape. The cover tape should run exactly in the groove of the cover tape guide and the seal should appear as a solid, consistent line. If the seal width is incorrect, stop the *Taper* by pressing the **Continuous Advance** button again.

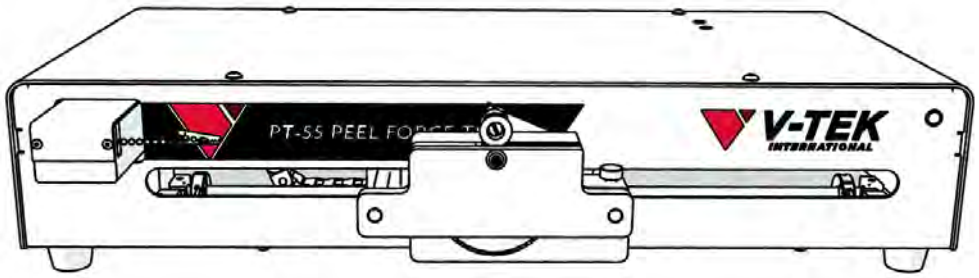
3. Adjust the seal positions as necessary. The sealer's inside and outside seals are independently adjustable. If one of the seals needs to be moved, loosen the

corresponding position lock and turn the adjusters.



Turning the wheel counter-clockwise will move the guide towards the operator. Turning it clockwise will move the guide closer to the machine. Adjust the *Inner Seal Adjust* and the *Outer Seal Adjust* to the desired position, then tighten the *Position Locks* to secure them.

4. Perform a Seal Test.



The V-TEK *PT-55 Peel Force Tester* is pictured above. (Sold separately.)

Proceed to *Chapter 5: Vision Setup* to configure the Vision System for operation.

Chapter 5: Vision Setup

Contents

Quick Start: Vision Setup

The following is an outline of the basic steps required to configure inspection on the TM-402. More detailed instructions follow in the next section of this chapter.

1. **Load Vision Software** (user supplied computer only)

2. **Connect Vision Computer/Monitor to Camera**

3. **Configure Inspection**

If the optional laptop was purchased for vision configuration V-TEK, Inc. recommends users create a computer **Recovery Disk** prior to operation and conduct periodic back-ups as needed. Visit the computer manufacturer's website for instructions on creating a recovery disk.

V-TEK, Inc. does not create or maintain recovery information for this laptop. Creating a recovery disk is solely the users' responsibility.

Step 1: Vision Setup CONNECT

Connect Vision

Note: The TM-402 vision system can be run with a computer or a Keyence IV-G Monitor. These options are not included with the TM-402. They can be purchased separately from V-TEK, Inc. or the user may provide their own computer.

System requirements for the vision computer follow:

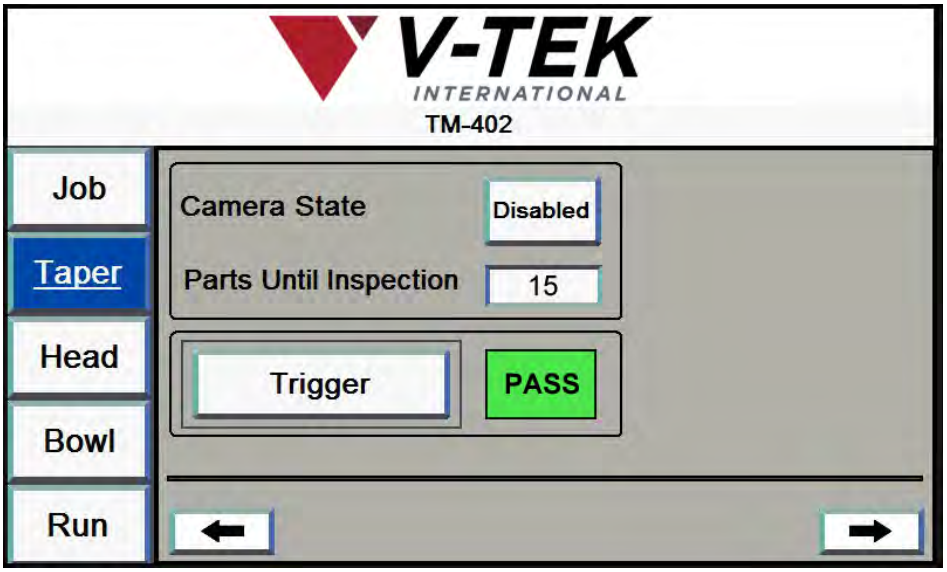
- Operating system: Microsoft® Windows XP™ (32 bit), Windows Vista™ (32bit), or Windows 7™ (32 or 64 bit)
- 128 MB RAM
- 1024 x 768 (96 DPI) or 1280 x 1024 (120 DPI display
- Ethernet port

If vision is enabled for a job, the vision computer/monitor must be connected to the *Keyence IV-G Camera* and the camera must be trained to inspect the part before the job can be run.

Setup HMI

Follow the steps below to enable Vision Inspection on the TM-402.

1. On the TM-402 HMI, open the *Taper Tab*. Press the right **Arrow** button to advance to the second *Taper* screen.Ensure the *Camera State* is set to **Enabled.**



2. Using the M12 ethernet cable which was provided with the TM-402 system, connect the vision computer to the Keyence camera.

Step 1: Vision Setup
CONNECT

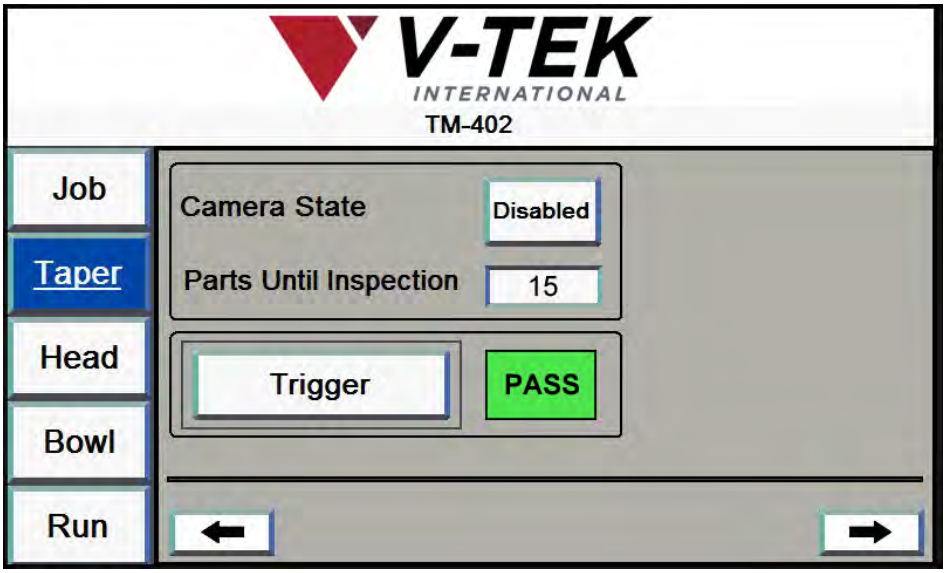
If the optional laptop was purchased for vision configuration V-TEK, Inc. recommends users create a computer **Recovery Disk** prior to operation and conduct periodic back-ups as needed. Visit the computer manufacturer's website for instructions on creating a recovery disk.

V-TEK, Inc. does not create or maintain recovery information for this laptop. Creating a recovery disk is solely the users' responsibility.

3. Turn the computer on, then insert the Keyence IV-G software CD. When the software installation screen appears, follow the prompts to install the Keyence software.

Note: Keyence IV-G Software is automatically installed if using the optional V-TEK laptop or Keyence IV-G Monitor. If using one of these options, skip this step and proceed to *Configure Inspection*.

4. On the TM-402 HMI, select the *Taper Tab*, then press the **Right Arrow** key to advance to the second Taper screen.



5. Ensure the *Camera State* is **Enabled**. Ensure the *Parts Until Inspection* field is correct.

Note: The **Parts Until Inspection** value is the number of pockets between the *Place* point and the *Inspection* point. Begin the count at the *Place* position at zero, so the *Place* position is not included.

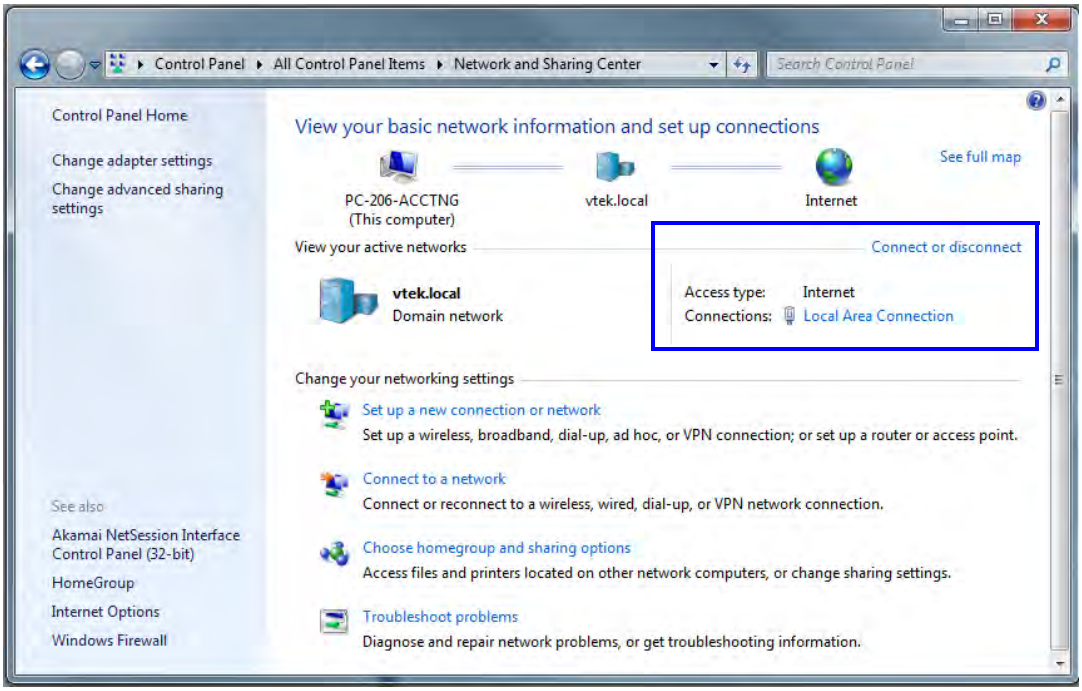
Step 1: Vision Setup

Connect Computer

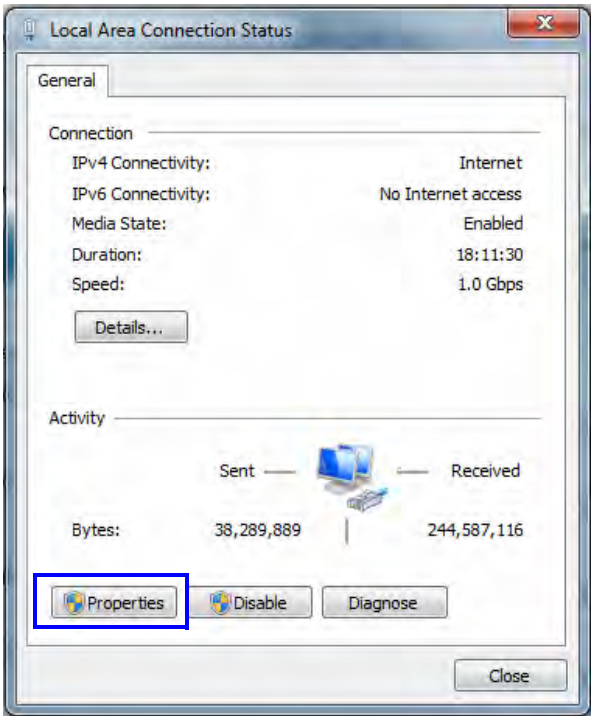
Follow the steps below to connect the Keyence IV-G Camera to the vision computer. (Proceed to the next section if using the Keyence Monitor instead of a computer.)

CONNECT LAPTOP

1. Open the *Control Panel,* then select *Network and Sharing Center.* In the *Connect or Disconnect* section, click **Local Area Connection**.

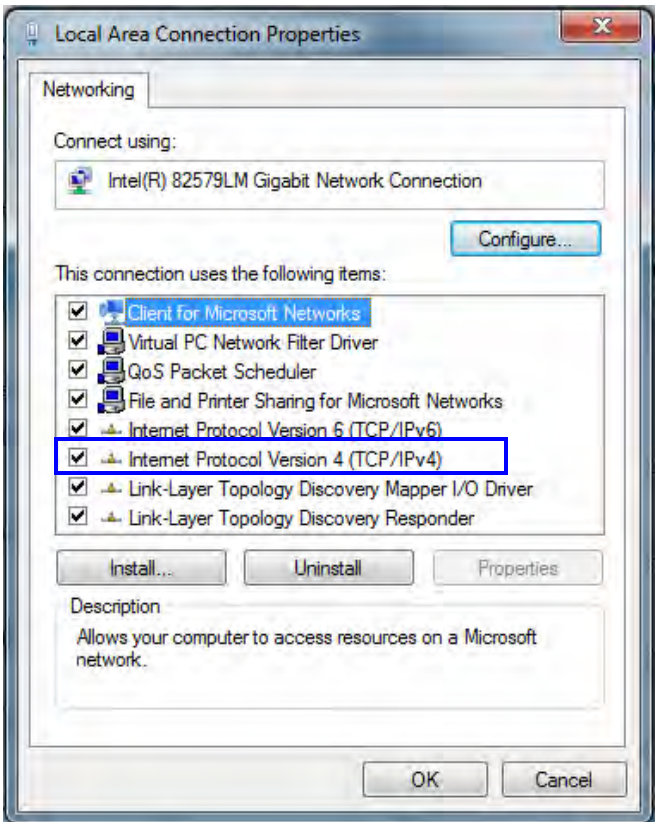


2. The *Local Area Connection Status* window will open. Click **Properties.**

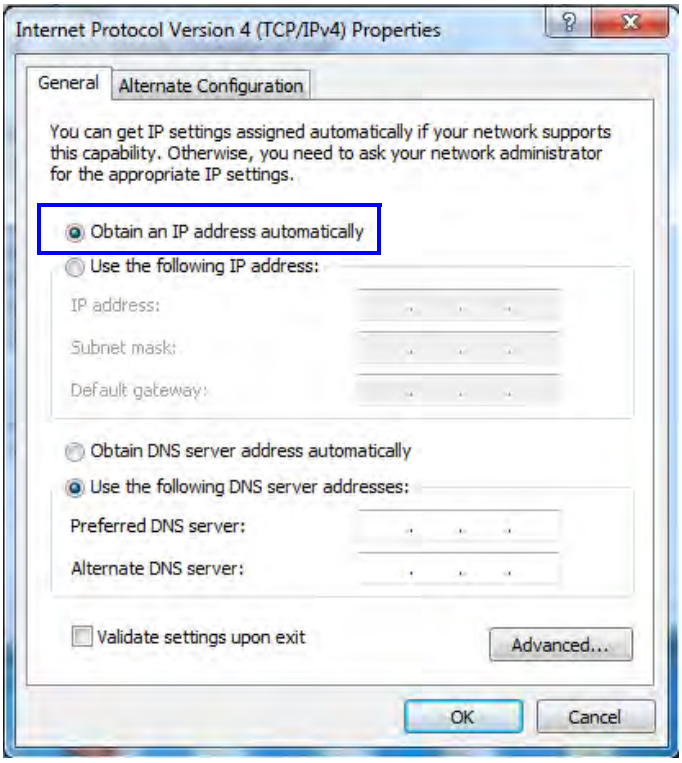


Step 1: Vision Setup
CONNECT LAPTOP

3. Double click **Internet Protocol version4 (TCP/IPv4)**



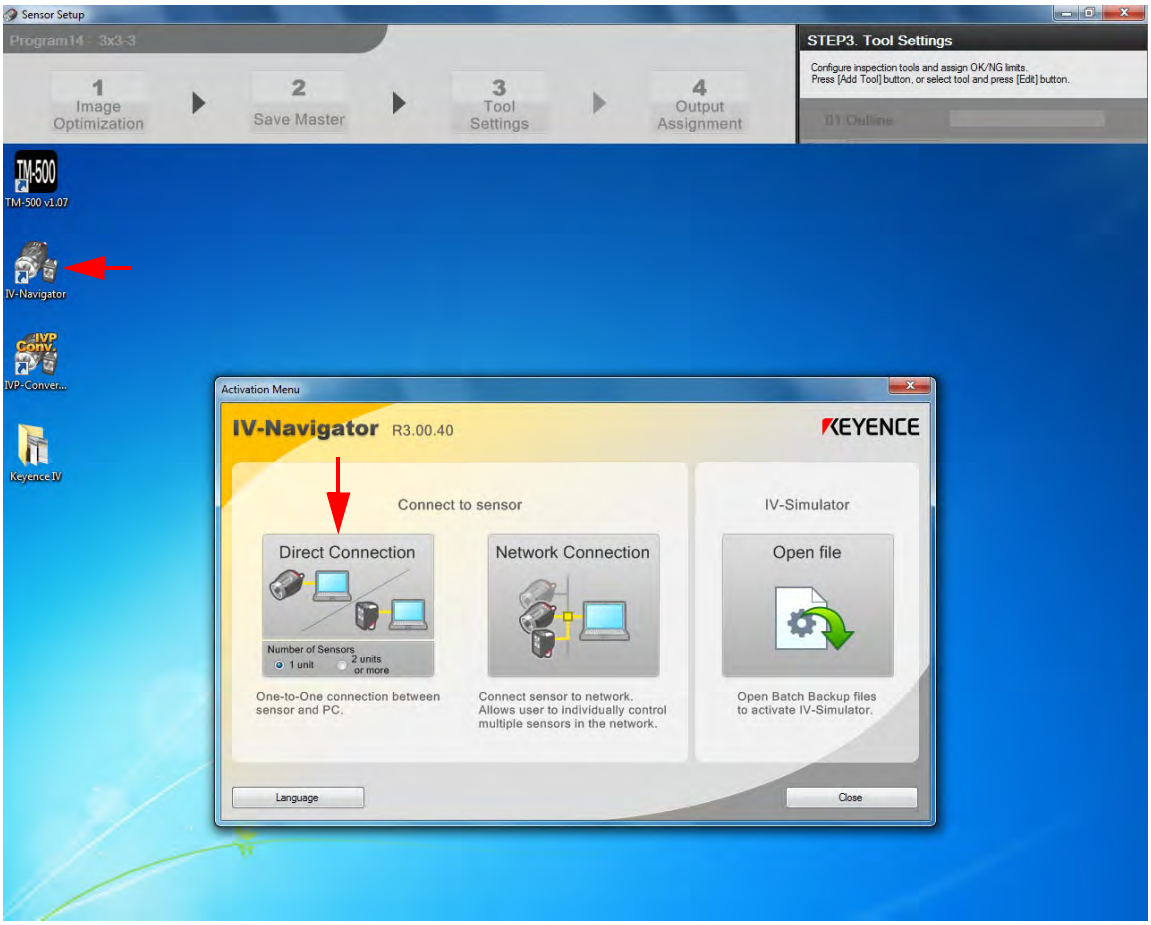
4. Ensure *Obtain an IP address automatically* is selected. Click **OK**.



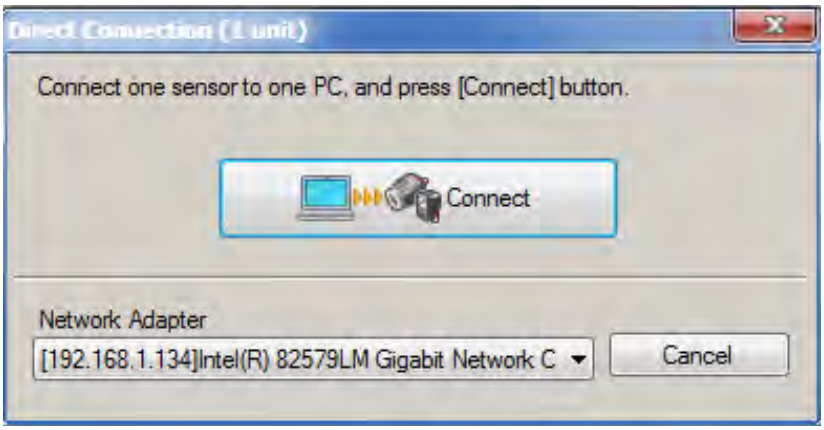
Step 1: Vision Setup
CONNECT LAPTOP

5. To select a stored inspection or configure a new inspection, open the *Keyence Inspection System* software by double-clicking on the **IV Navigator** icon on the desktop.

6. Select **Direct Connection**.

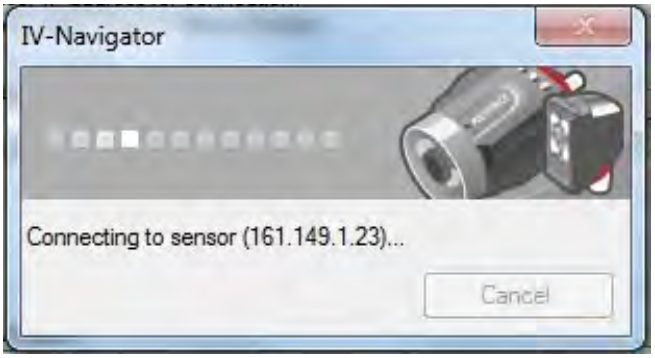


7. The following pop-up will appear. Press **Connect**.

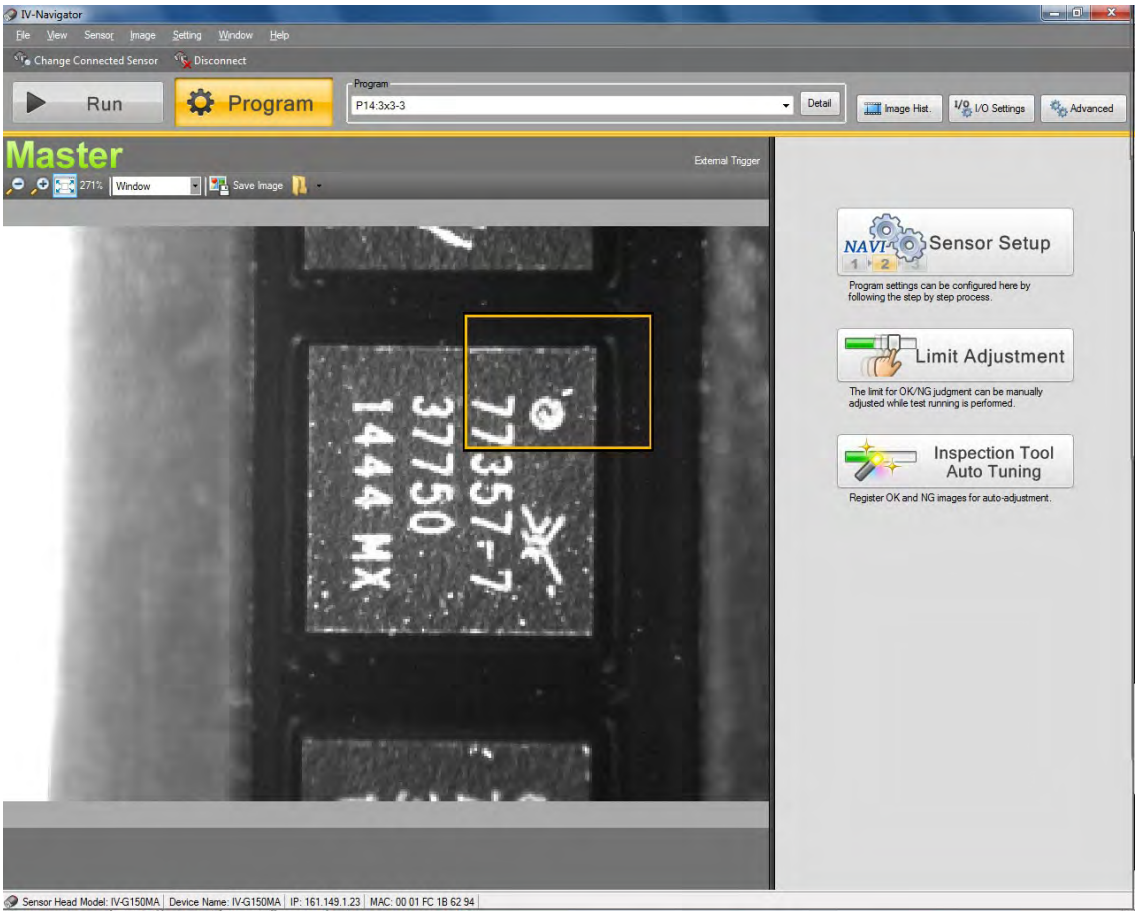


Step 1: Vision Setup
CONNECT LAPTOP

A *Connecting to Sensor* status window will open.



8. Once the connection is complete, the *Run/Program* window will open.



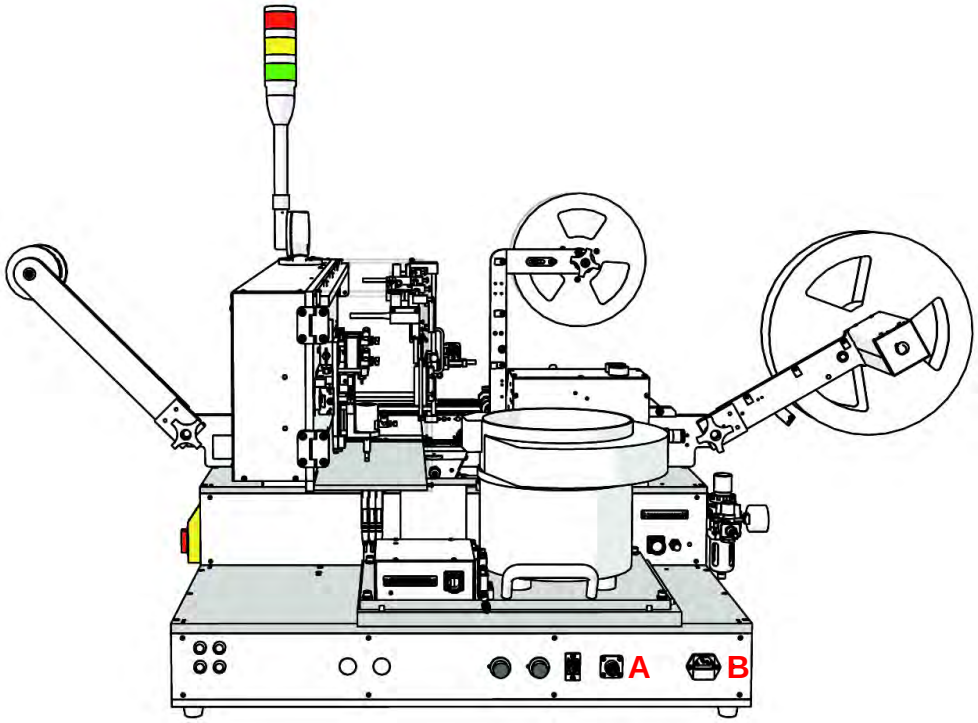
Step 1: Vision Setup

CONNECT MONITOR

Connect Keyence Monitor

Follow the steps below to connect the Keyence IV-G Camera to the Keyence Monitor. (See previous section if using the Keyence computer.)

1. Connect the Monitor's Ethernet cable to the Ethernet port on the back of the TM-402 **(A)**.



2. Connect the Monitor's power cable to the power connection on the back of the TM-402 **(B)**.

3. Turn the TM-402 **ON**. The Keyence Monitor will automatically start and open the Keyence software program.

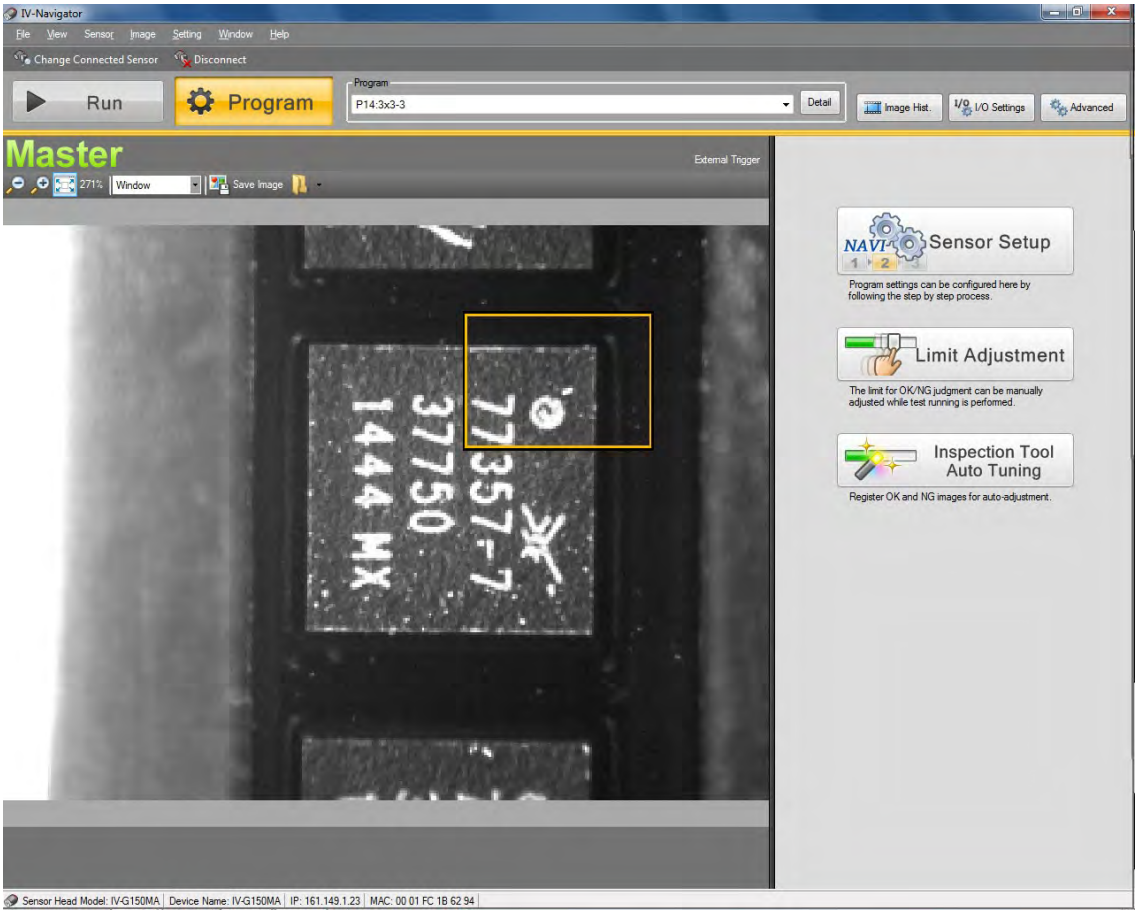
4. Select **Direct Connection**, then press **Connect** to establish a connection between the Keyence Monitor and the Keyence Camera.

Configure Inspection

Note: Significant portions of this documentation were provided by: *Keyence Corporation of America.* In order to use the Keyence IV Vision System, the camera must be configured and set to **Run Mode** in the Keyence HMI as well as being enabled on the TM-402 HMI. Please complete the following instructions to correctly configure the vision system.

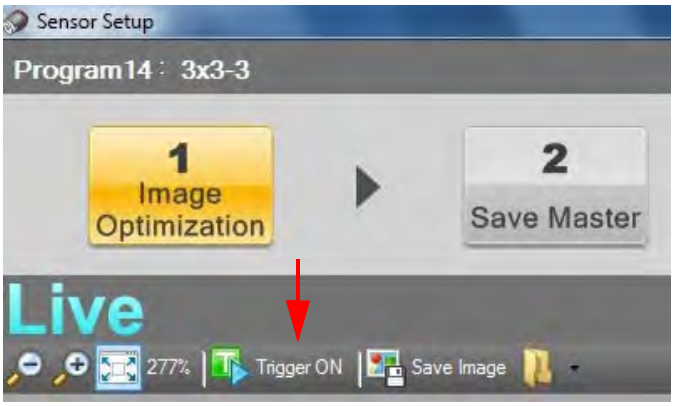
Configure Computer

1. Once the connection is complete, the *Run/Program* window will open. Select **Program**.



Step 2: Vision Setup
CONFIGURE COMPUTER

2. Click **Trigger ON**, then center a part under the camera.



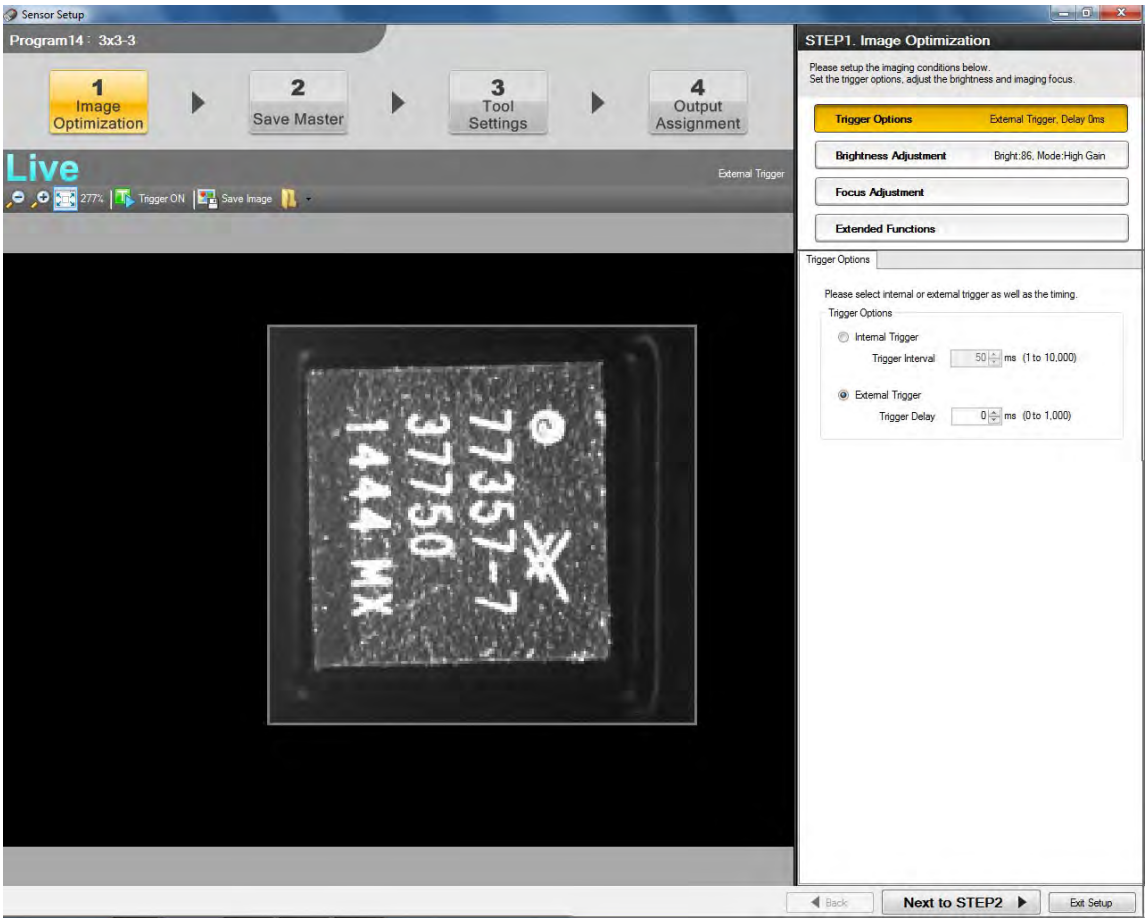
3. Select or create a program from the **Program** drop-down menu. A yellow *Selection Box* will appear over the part image.

4. Click **NAVI Sensor Setup**.

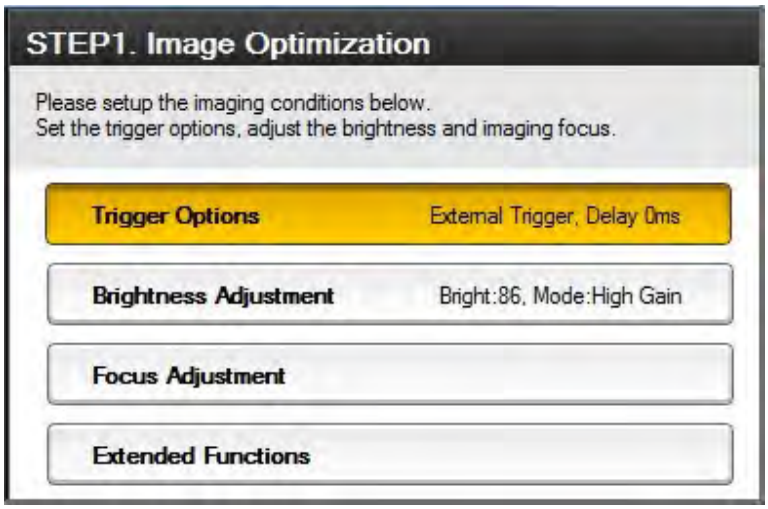
Step 2: Vision Setup

CONFIGURE COMPUTER

5. The *Image Optimization* window will open.

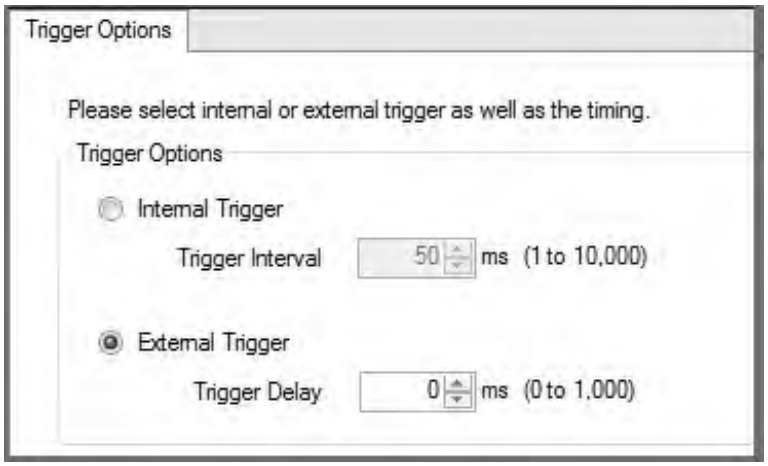


Select the **Trigger Options** button on the right.

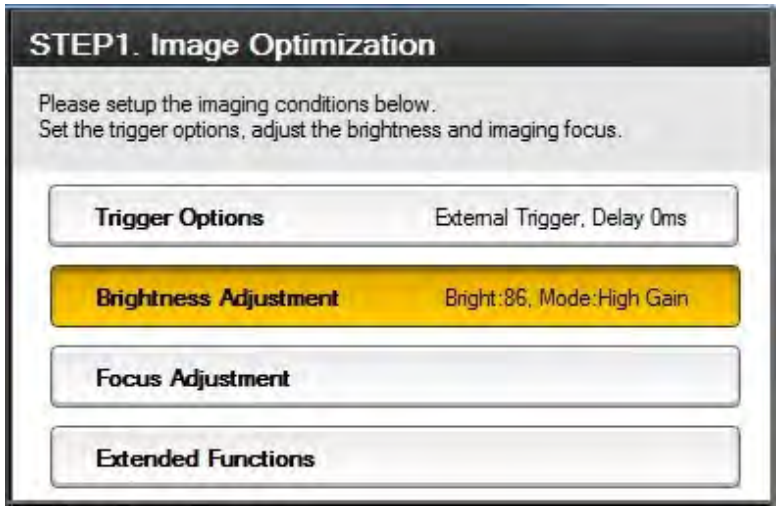


Step 2: Vision Setup
CONFIGURE COMPUTER

Adjust *Trigger Options* to **External Trigger** with a **0ms** *Trigger Delay*.

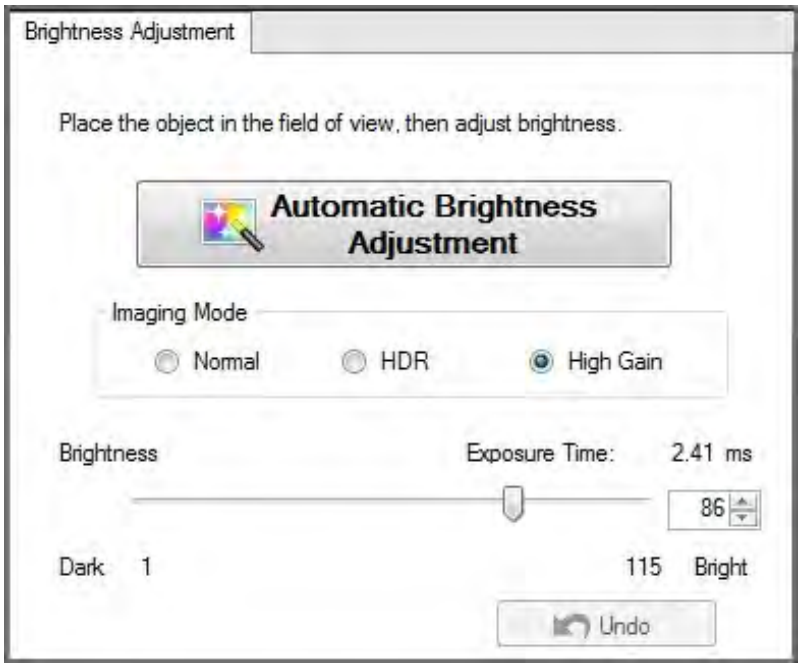


6. Select the **Brightness Adjustment** button on the right

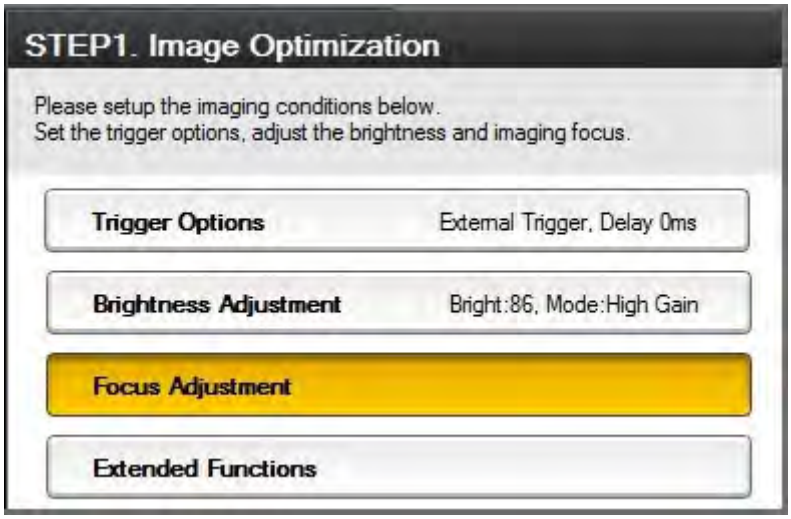


Set the *Imaging Mode* to **High Gain**, then click the **Automatic Brightness Adjustment** button. Adjust the *Exposure Time* as needed to achieve the best contrast between the laser mark and the part.

Step 2: Vision Setup
CONFIGURE COMPUTER

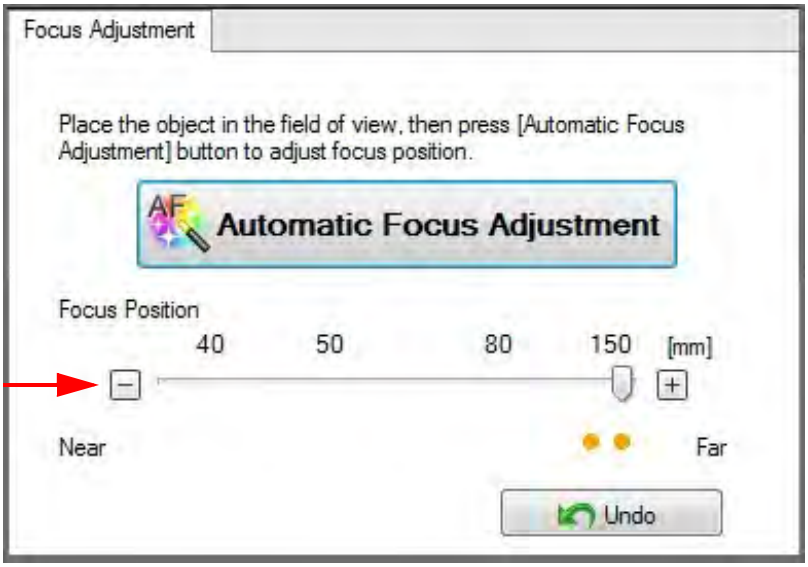


7. Select the **Focus Adjustment** button on the right.

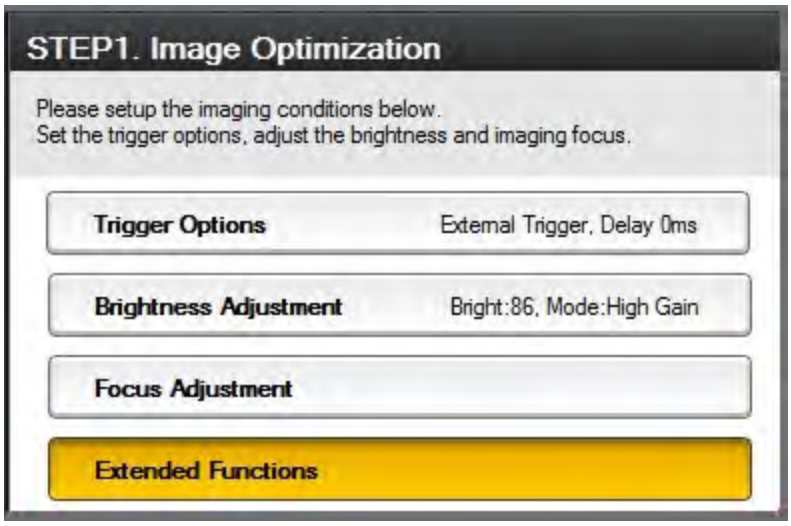


Click the **Automatic Focus Adjustment** button. One or more yellow dots may appear above the **Undo** button, representing the best focus point(s). Click on the yellow dot(s) to jump to the associated focus point and select the best one. Adjust *Focus Position* as needed using the plus/minus buttons.

Step 2: Vision Setup
CONFIGURE COMPUTER

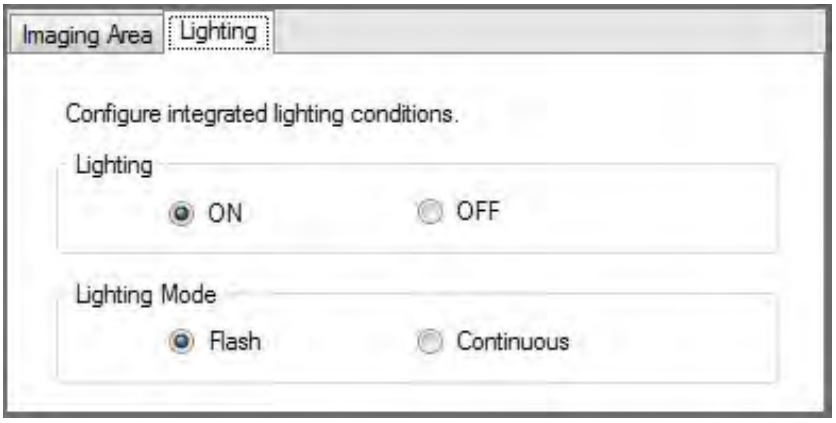


8. Select the **Extended Functions** button on the right.



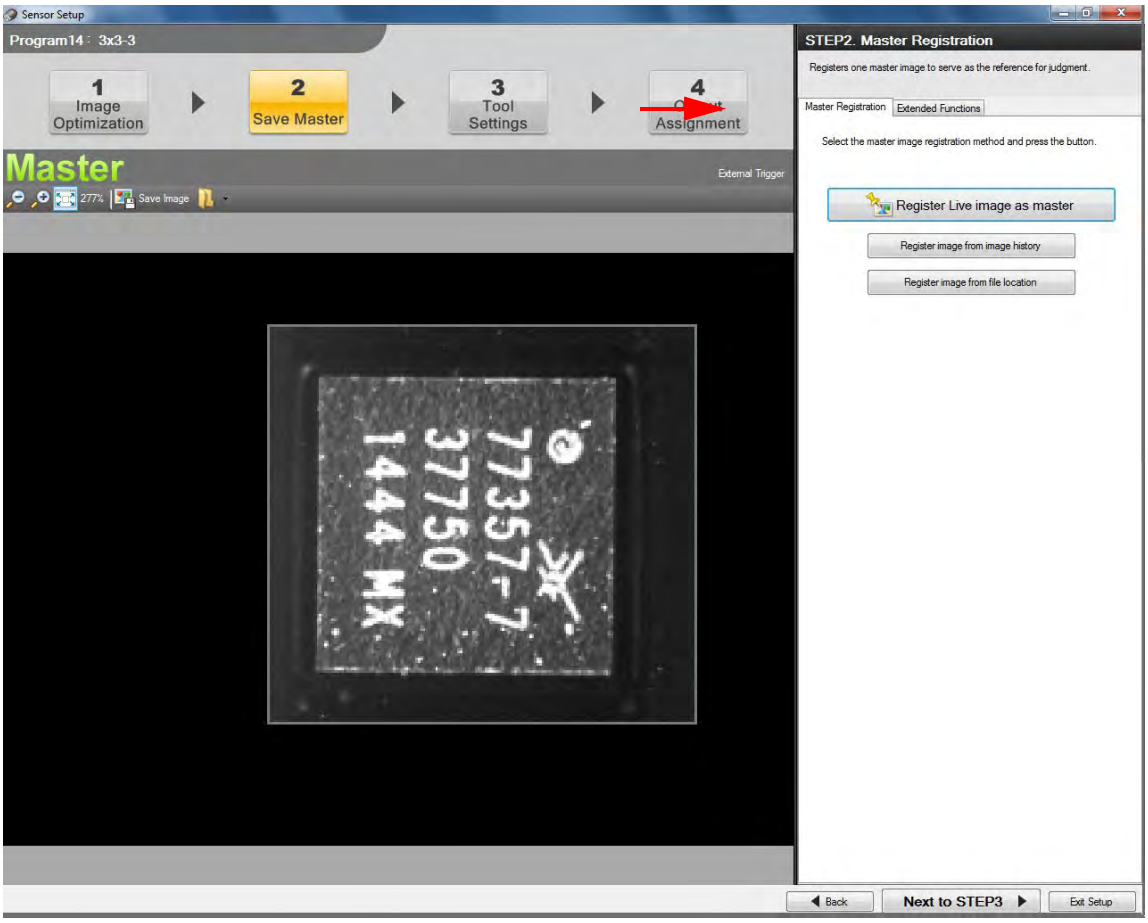
Click on the *Imaging Area* tab (not shown) and adjust the selection box so it captures the minimum area needed to achieve the desired inspection.

Step 2: Vision Setup
CONFIGURE COMPUTER



Click on the *Lighting* tab and select **ON** and **Flash**. Then click the **Next to STEP2** button which is located in the bottom right corner of the window.

9. The *Save Master* window will open.

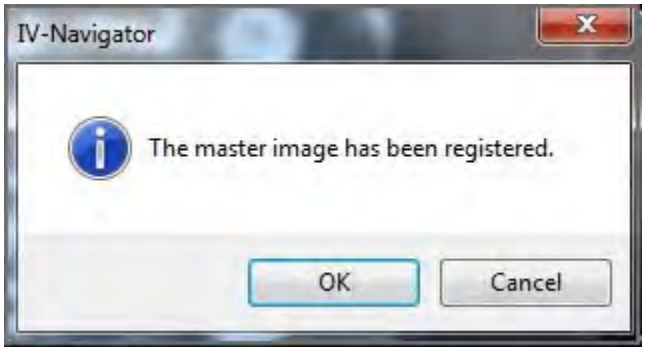


Step 2: Vision Setup
CONFIGURE COMPUTER

Select **Register Live image as master**.

Select **Register the image**.

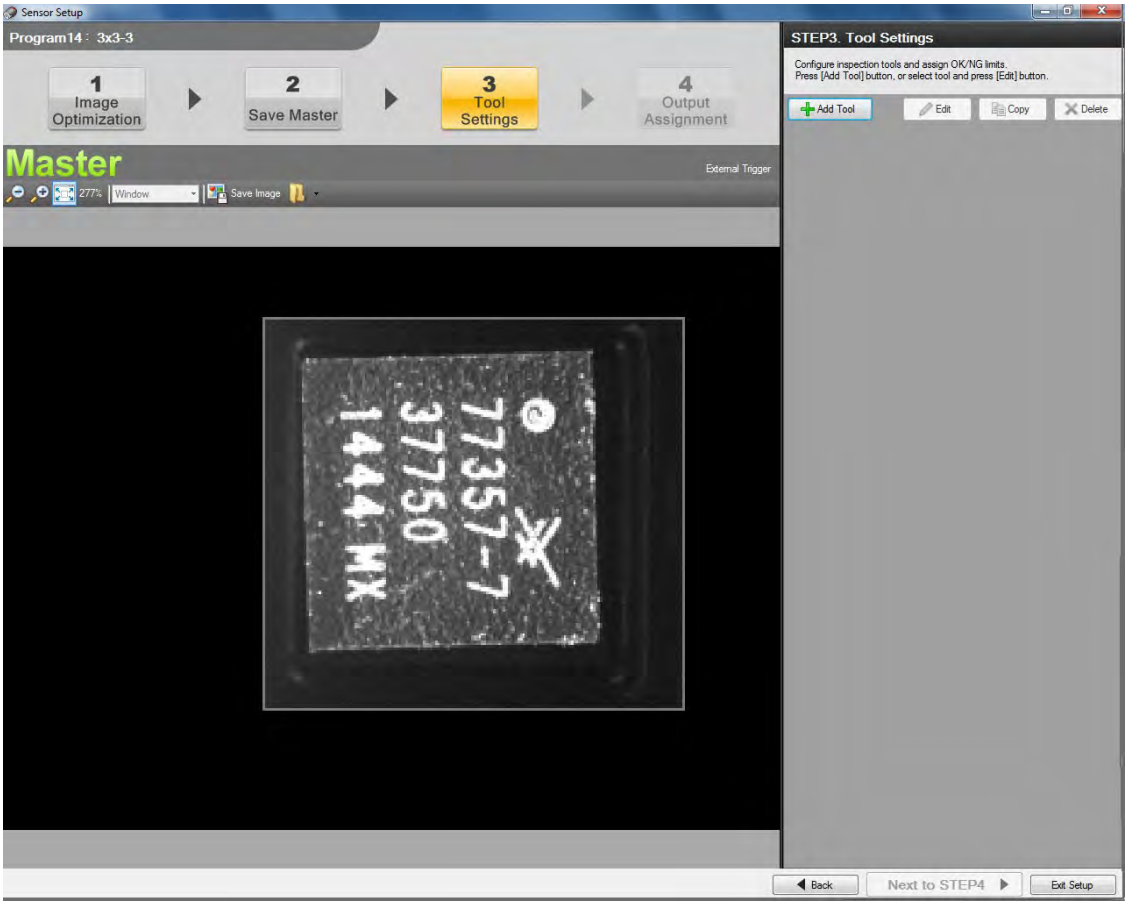
Once the image has been registered, click **OK**. Then click **Next to STEP3**.



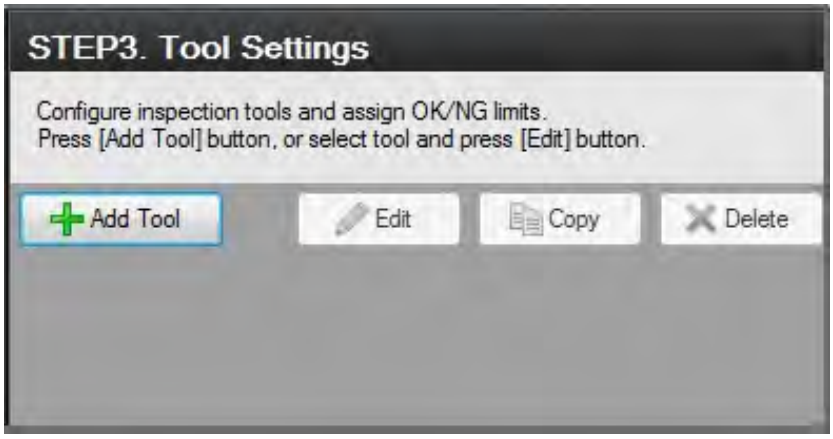
Step 2: Vision Setup

CONFIGURE COMPUTER

10. The *Tool Settings* window will open.

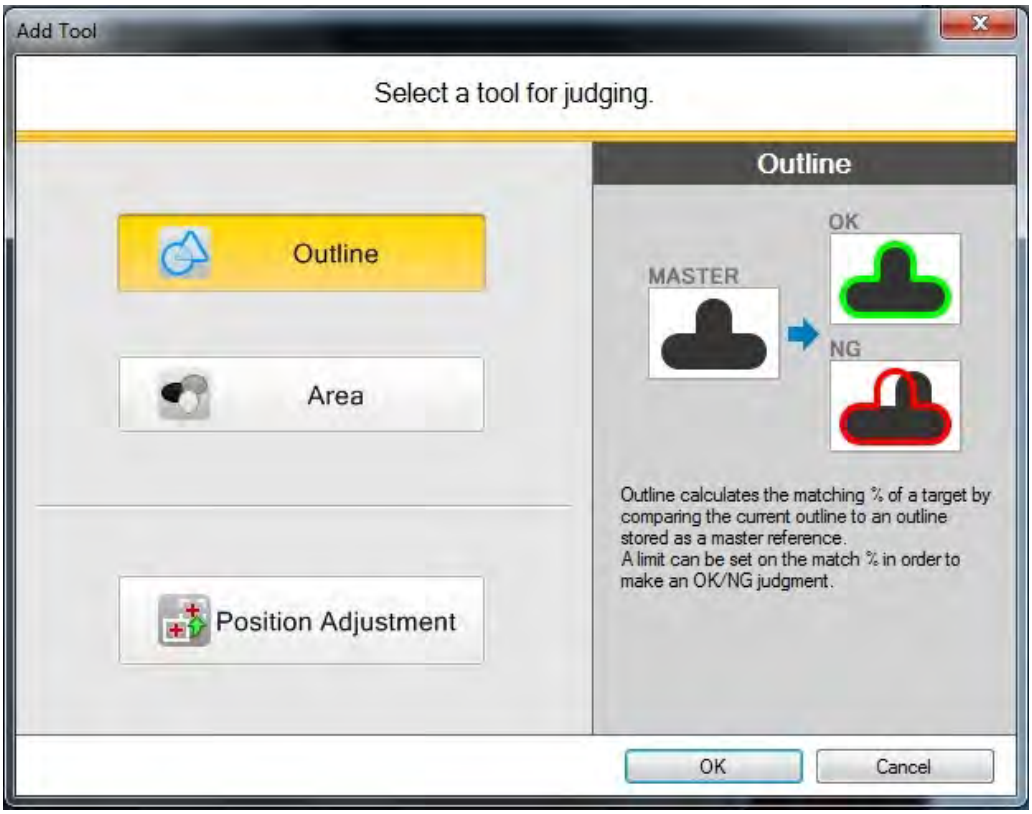


Select **Add Tool.**

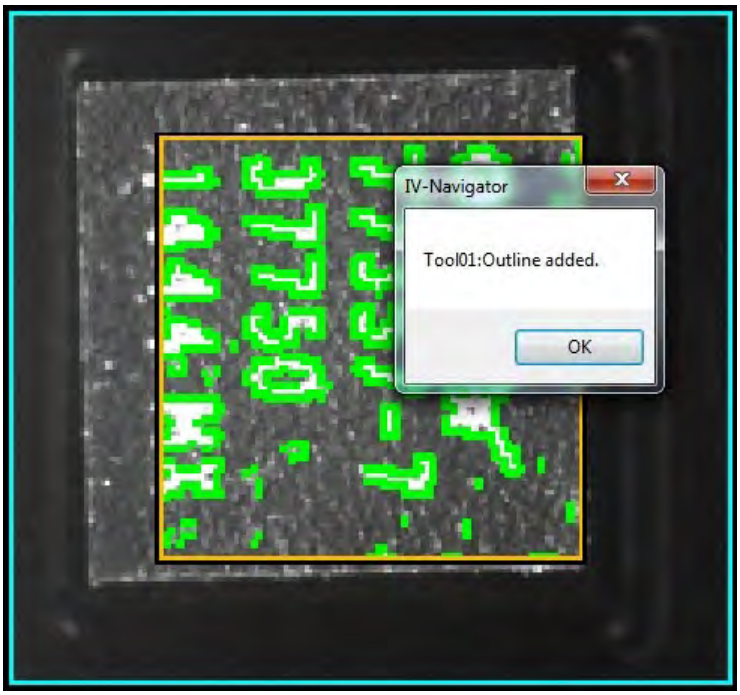


Step 2: Vision Setup
CONFIGURE COMPUTER

Select the **Outline** tool, then click **OK**.

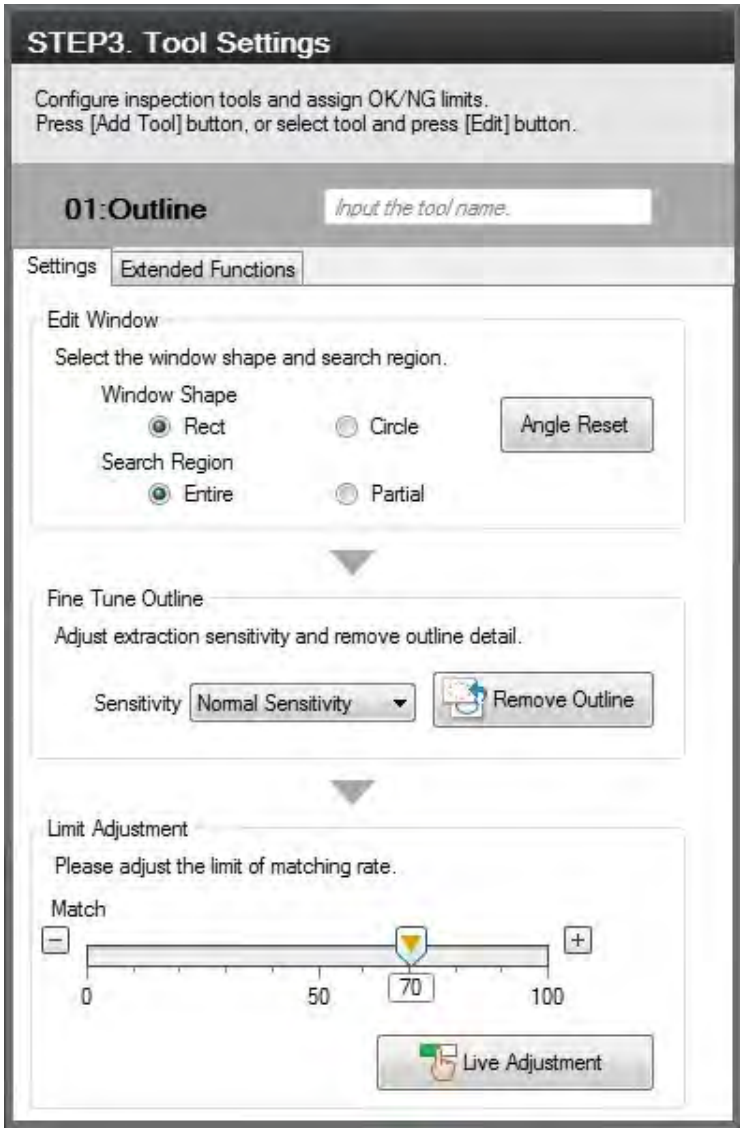


A green outline will now appear around the selected mark. Click **OK.**



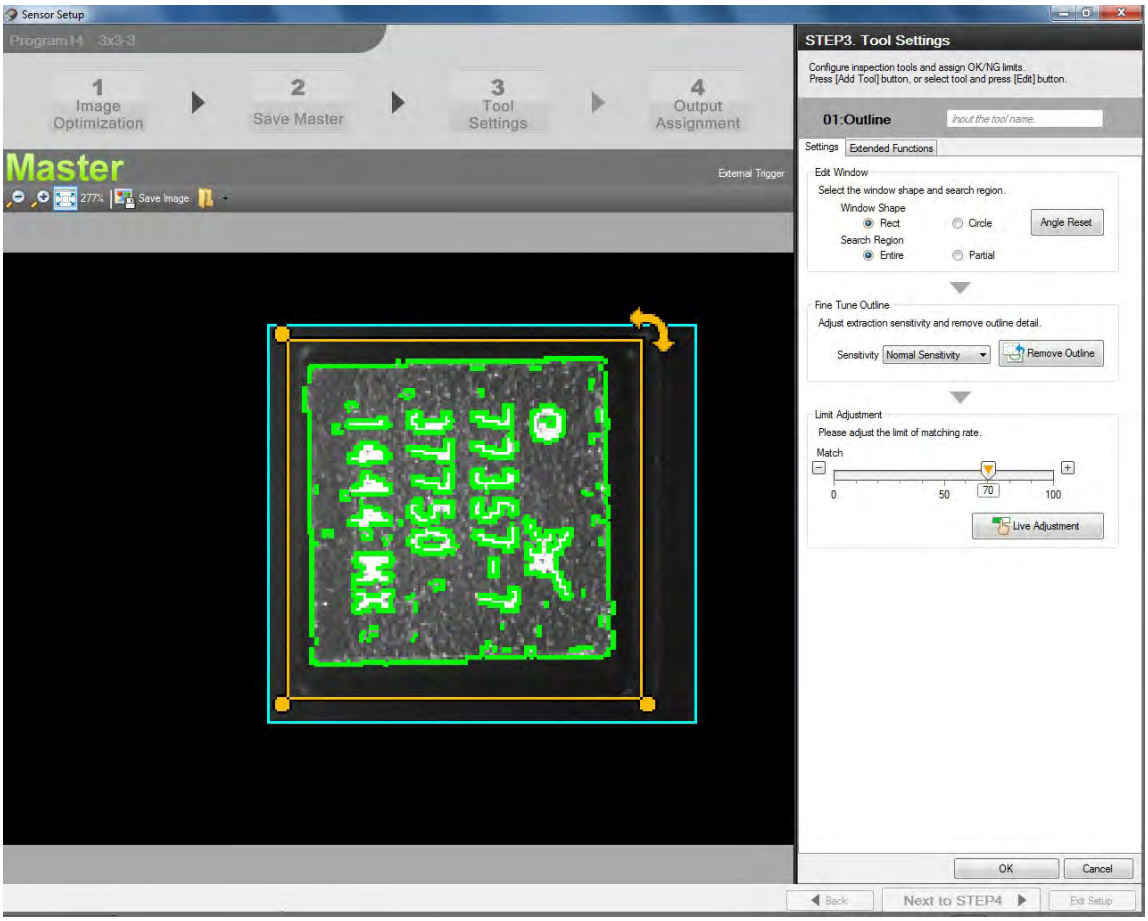
Step 2: Vision Setup
CONFIGURE COMPUTER

The *Tool Settings Options* will now appear as below.

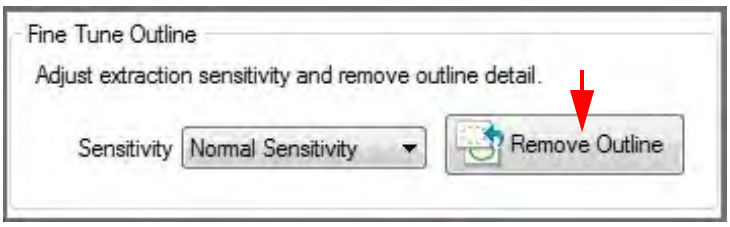


Step 2: Vision Setup
CONFIGURE COMPUTER

Adjust the yellow *Selection Box* so it surrounds the selected mark.

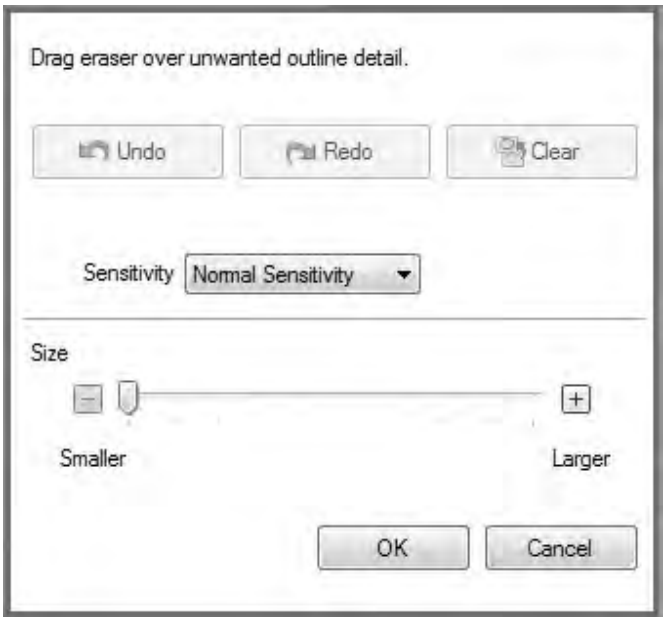


In the *Fine Tune Outline* section, click the **Remove Outline** button.

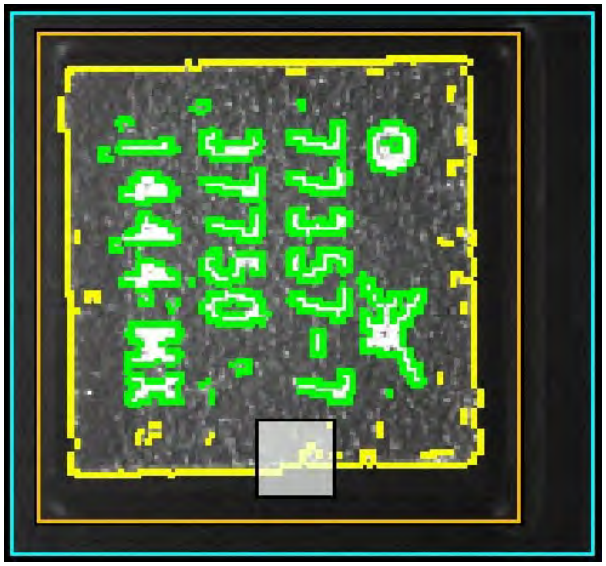


Step 2: Vision Setup
CONFIGURE COMPUTER

The *Eraser Settings* window will open.



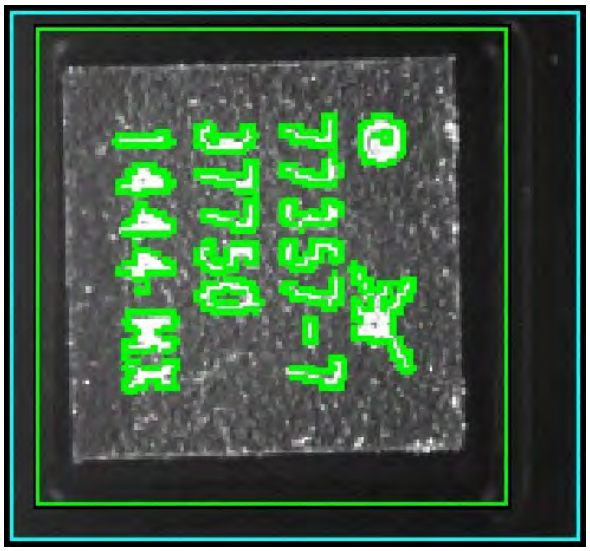
The *Eraser* appears as a white square on the image. Adjust eraser size as needed, then click and drag it over any unwanted data that is outlined in green on the image.



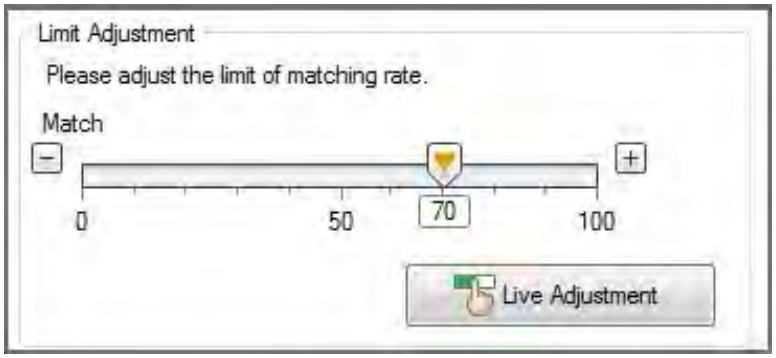
Reduce *Eraser* size to remove any smaller green spots of unnecessary data. Click **OK** to finalize edit**.**

Step 2: Vision Setup

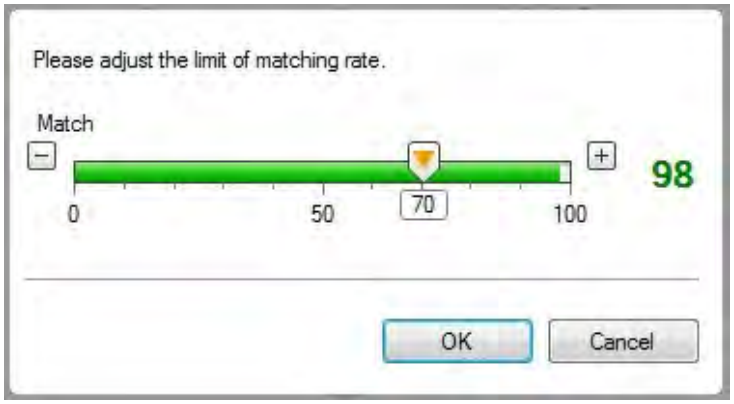
CONFIGURE COMPUTER



Click **Live Adjustment** and the sensor will continuously take measurements.

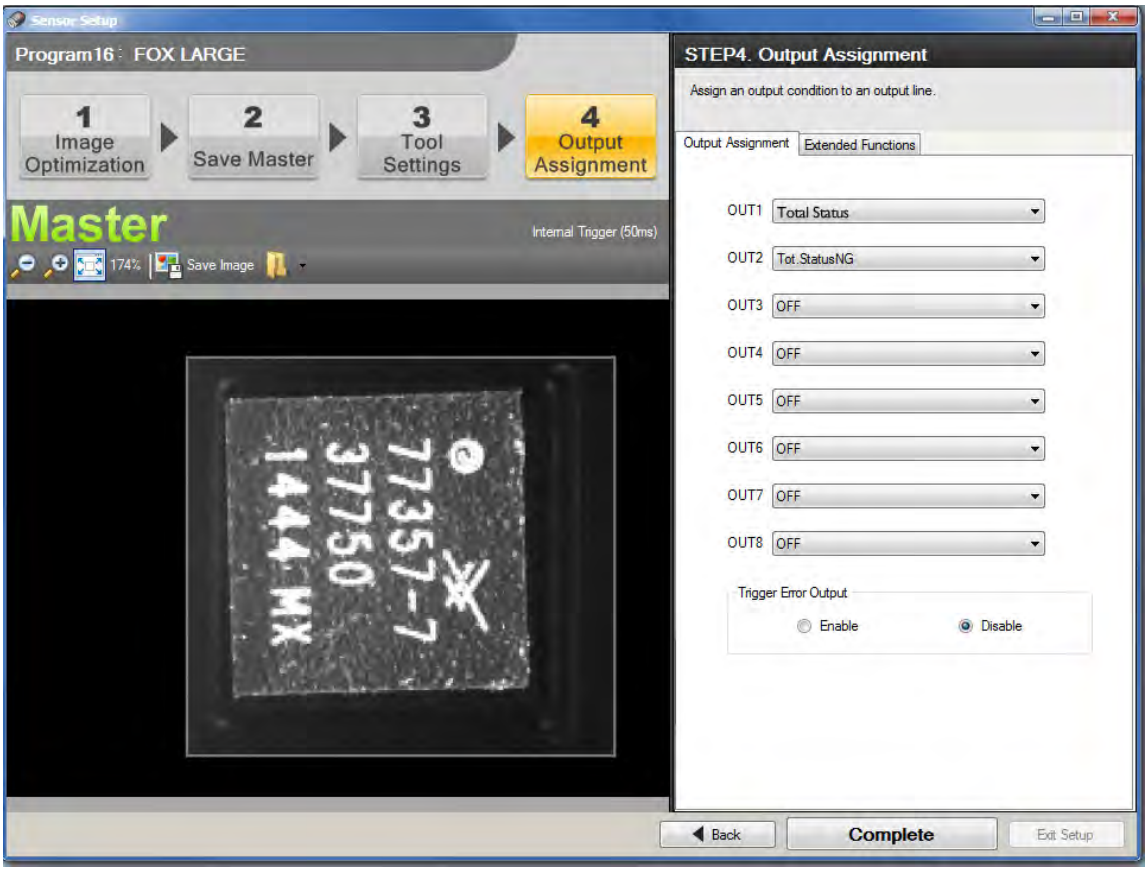


Adjust the threshold to yield the highest difference between good and bad parts, then click **OK.**



Step 2: Vision Setup
CONFIGURE COMPUTER

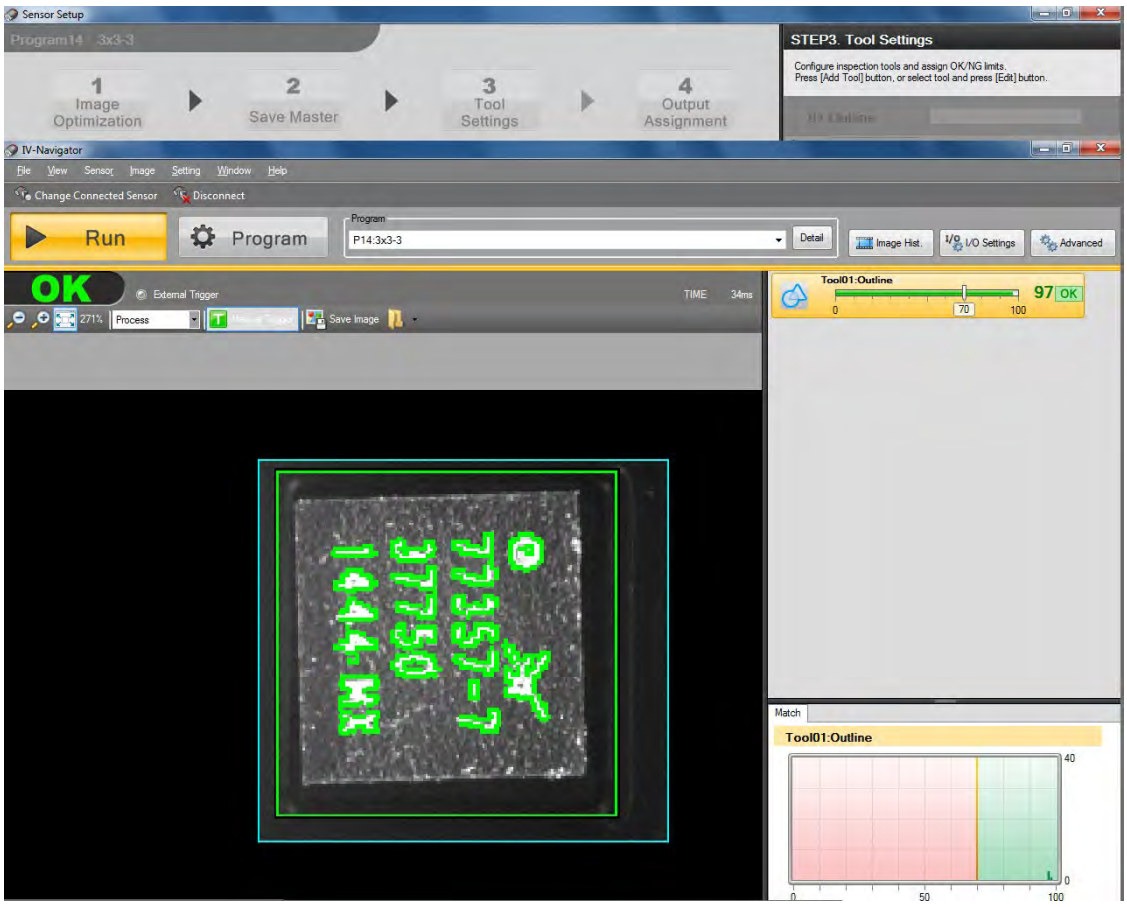
11. The *Output Assignment* window will open. Set up the Outputs as shown below.



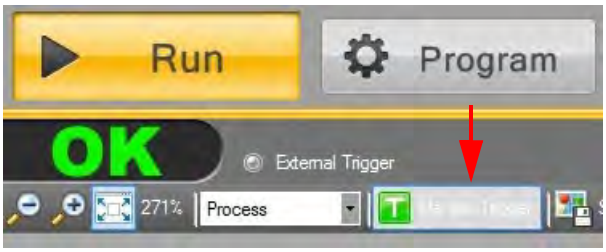
- Set *OUT1* to **Total Status**.
- Set *OUT2* to **Tot.StatusNG**.
- Set all remaining output to **OFF**.
- Set *Trigger Error Output* to **Disable**.

Step 2: Vision Setup
CONFIGURE COMPUTER

12. Click **Complete** to return to the *Run/Program* window. Select **Run**.



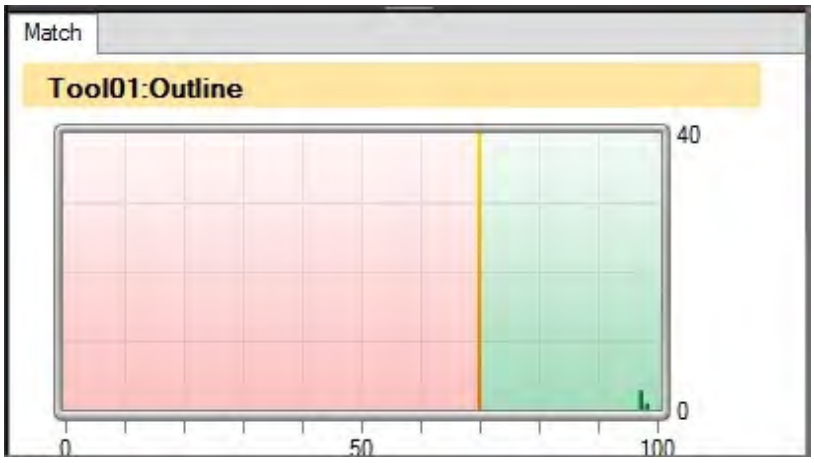
13. Click the **Manual Trigger** button which is located under the **Program** button to test the inspection criteria.



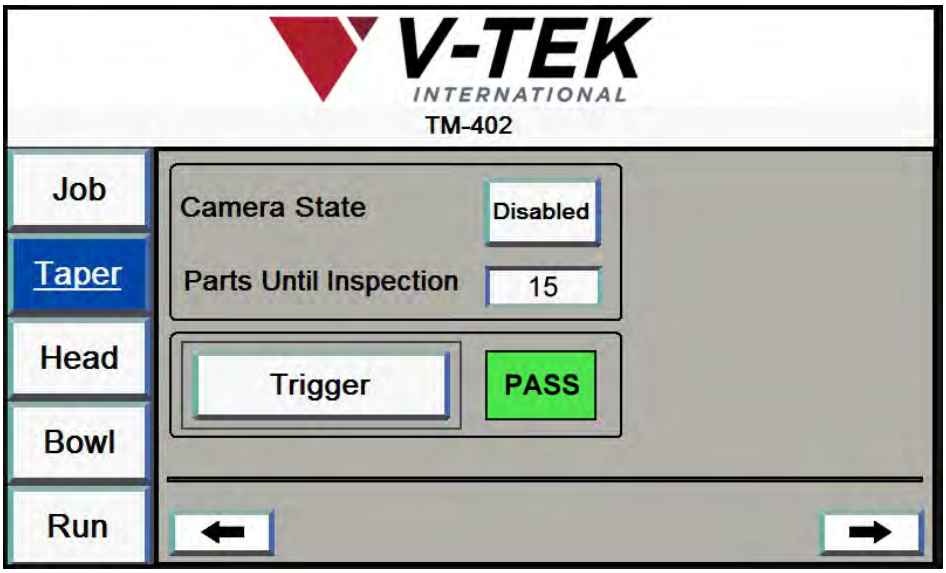
The test results will appear on the right side of the window.

Step 2: Vision Setup
CONFIGURE COMPUTER

A *Statistics Graph* of all test results will appear in the lower right corner.



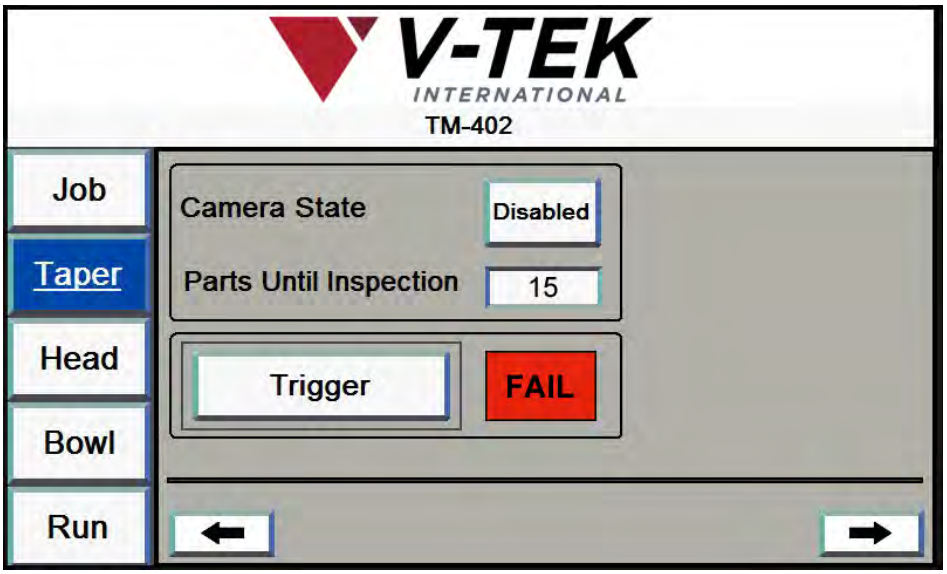
14. On the TM-402 HMI, open the *Taper Tab*. Press the right **Arrow** button to advance to the second *Taper* screen.



Press **Trigger** to manually trigger an inspection of the part under the camera. The green **PASS** message should appear. Test several good parts to ensure TM-402 correctly and consistently passes good parts.

Step 2: Vision Setup
CONFIGURE COMPUTER

15. Next trigger inspections with parts which are incorrectly oriented, badly marked or with an empty pocket to ensure that they generate a red **FAIL** message.



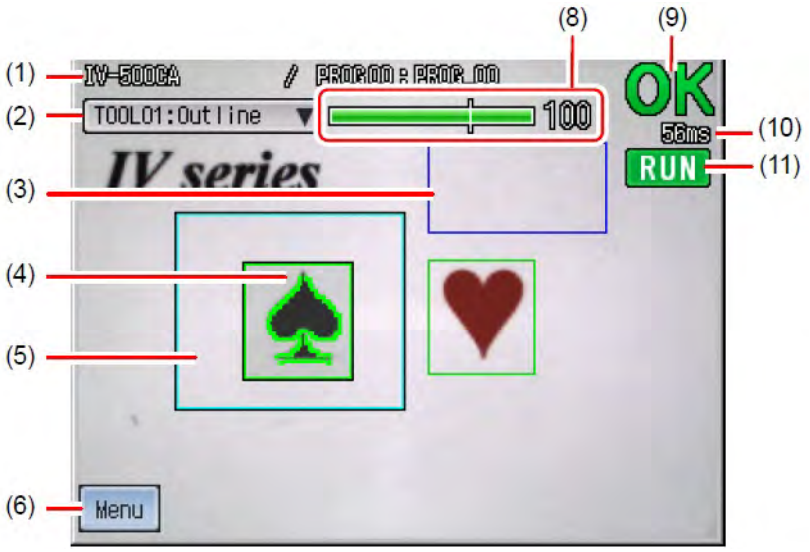
The TM-402 is now ready for operation. Select the *Run Tab* to run the job.

Step 2: Vision Setup

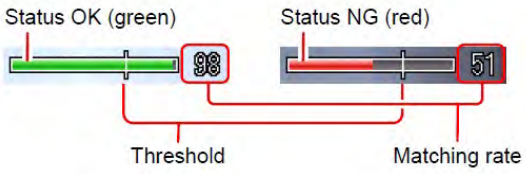
CONFIGURE MONITOR

Configure Keyence Monitor

Monitor Display: Menu OFF



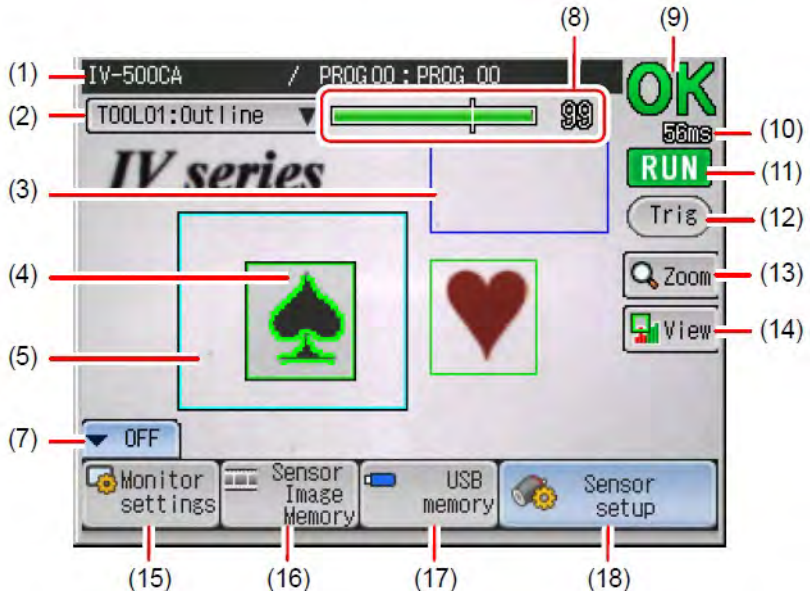
1. **Title**: Displays the device name, the program number and the program name.
2. **Tool name:** Displays the tool number and the tool name of the tool selected. The selected tool can be switched.
3. **Brightness correction range:** When Brightness correction is set, the range will be displayed with a blue frame.
4. **Tool window:** Displays the tool window which has been set.
5. **Search Window:** If the search window of the tool is set, the range will be displayed with a light blue frame.
6. **MENU/OFF button:** Changes the screen from Menu ON to Menu OFF.
7. **Status gauge**: Displays the result (OK/NG) of the tool selected.



9. **OK/NG display:** Displays the total status result.
10. **Processing time:** Displays the time from receiving a trigger until the result is output.
11. **Image Type display:** Displays the situation of the screen. Run mode or Test mode.

Step 2: Vision Setup
CONFIGURE MONITOR

Monitor Display: Menu ON



1. **Title**: Displays the device name, the program number and the program name.
2. **Tool name:** Displays the tool number and the tool name of the tool selected. The selected tool can be switched.
3. **Brightness correction range:** When Brightness correction is set, the range will be displayed with a blue frame.
4. **Tool window:** Displays the tool window which has been set.
5. **Search Window:** If the search window of the tool is set, the range is displayed with a light blue frame.
7. **MENU/OFF button:** Changes the screen from Menu ON to Menu OFF.
8. **Status gauge**: Displays the result (OK/NG) of the tool selected.
9. **OK/NG display:** Displays the total status result.
10. **Processing time:** Displays the time from receiving a trigger until the result is output.
11. **Image Type display:** Displays the situation of the screen. Run mode or Test mode.
12. **Trig button:** Displayed when the external trigger is set. When this button is touched, a trigger signal is sent to the sensor.
13. **Zoom button:** Changes the display to full screen mode and allows image enlargement.
14. **View button:** Displays the menu to select how to show the tools and the analyze screen.
15. **Monitor settings button:** Displays the monitor screen.

Step 2: Vision Setup

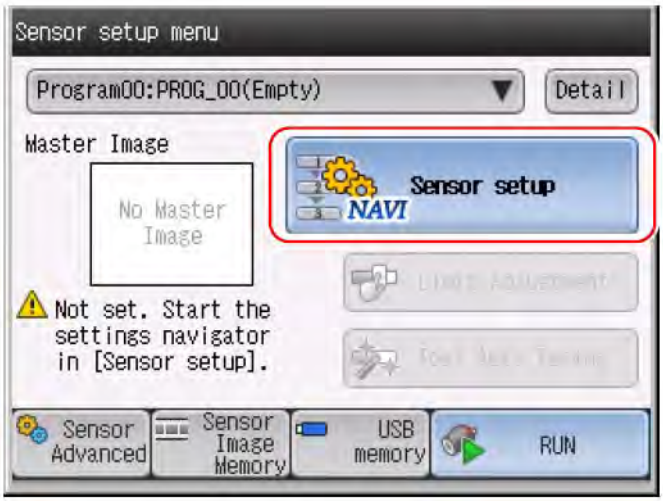
CONFIGURE MONITOR

16. **Sensor Image Memory button:** Displays the Sensor Image Memory screen.
17. **USB memory button:** Displays the USB memory screen.
18. **Sensor setup button:** Stops running mode and displays the Sensor setup menu screen.

Program Job

Start Navigator

1. Touch the **Sensor setup** button.



2. Touch the **Start** button.

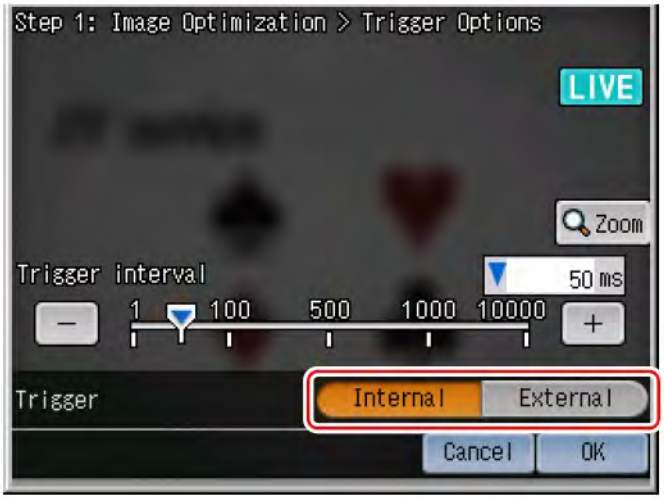
Step 2: Vision Setup

CONFIGURE MONITOR

Setup Image Optimization

1. Touch **Trigger Options**.

2. Select the **External** Trigger type. Touch **OK**.



Step 2: Vision Setup
CONFIGURE MONITOR

3. Touch **Auto Brightness Adjustment**. Touch **OK**.

4. Touch **Focus Adjustment**. If *Auto* focusing is selected, the focus position is adjusted automatically. If *Manual* focusing is selected, the focus indicator will be displayed. Adjust focus as desired. Touch **OK**.

5. Touch **Next** to proceed to "STEP2".

Step 2: Vision Setup

CONFIGURE MONITOR

Register Master Image

1. After setting the image optimization, press **Register Live Image as Master**.

2. Image the target and touch the **Trig** button.

3. Check the image displayed on the monitor and touch the **Register** button. Touch **OK**.

4. Touch **Next** to proceed to “STEP3”.

Step 2: Vision Setup

CONFIGURE MONITOR

Setup Outline Detection Tool

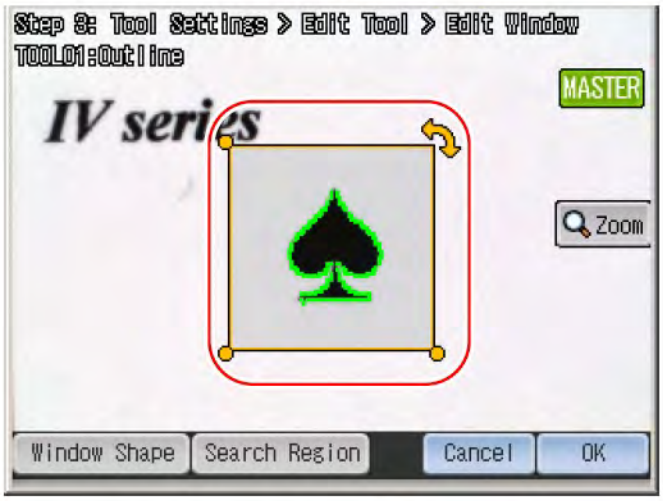
1. Touch the **Add Tool** button.

2. Select **Outline**.

3. Touch **Edit Window**.

Step 2: Vision Setup
CONFIGURE MONITOR

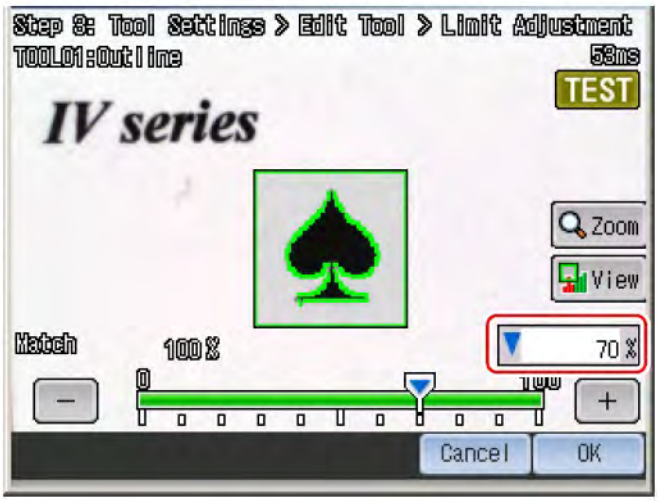
4. Set the position, size, and the angle of the tool window. The detected outline will be displayed in green. After the setting is completed, touch **OK**.



5. Touch the **Limit Adjustment** button.

Step 2: Vision Setup
CONFIGURE MONITOR

6. Set the threshold to judge OK and NG.



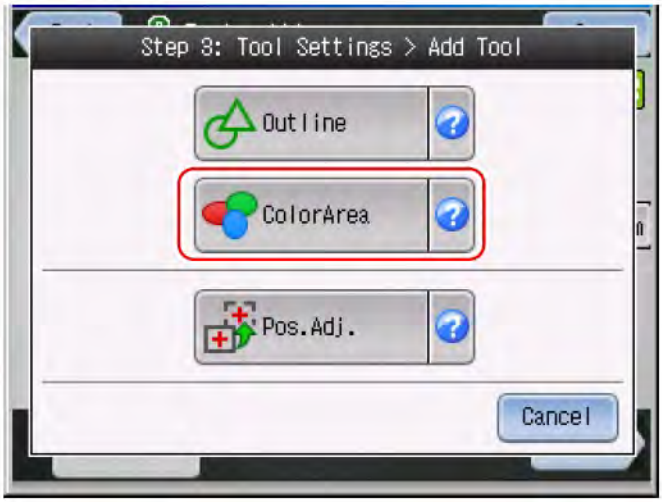
7. The display will return to the main screen for the Outline tool.

8. Touch **OK**, then touch **Next** to proceed to "STEP4".

Setup Area Detection Tool

1. Touch the **Add Tool** button.

2. Select **Area**.



Step 2: Vision Setup
CONFIGURE MONITOR

3. Touch **Edit Window** button.

4. Set the position, size, and the angle of the tool window. After the setting is completed, touch **OK**

Step 2: Vision Setup
CONFIGURE MONITOR

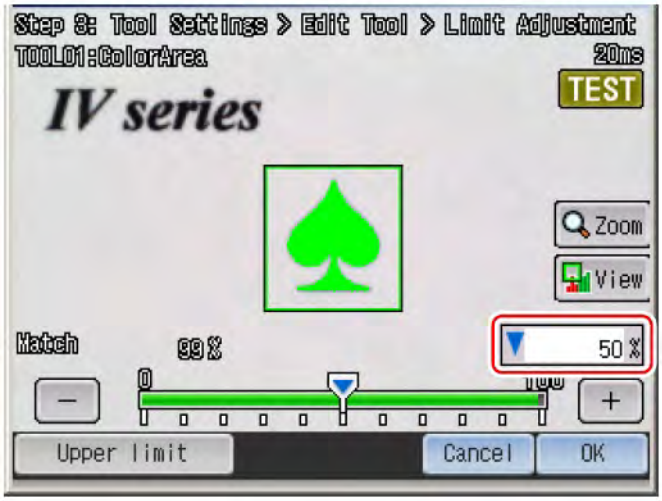
5. Touch the **Brightness Extraction** button.

6. Touch the brightness area to be the reference of judgment for the Area tool, then touch **OK**.

Step 2: Vision Setup
CONFIGURE MONITOR

7. Touch the **Limit Adjustment** button.

8. Set the threshold to judge OK and NG, then touch **OK**. The display will return to the main screen for the Color Area/Area tool.



9. Touch **OK**, then touch **Next** to proceed to “STEP4”.

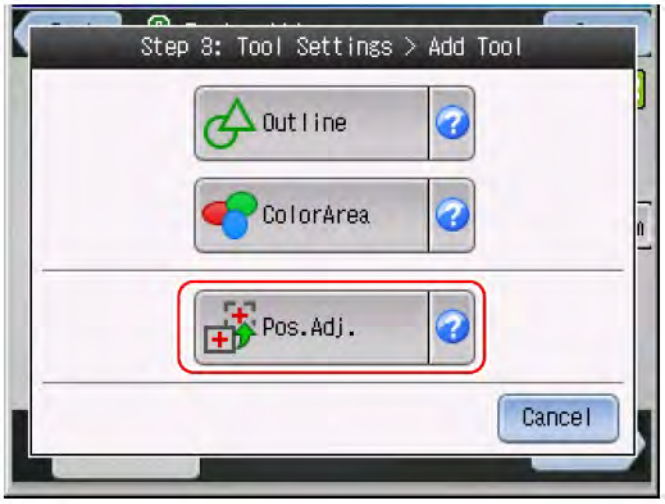
Step 2: Vision Setup

CONFIGURE MONITOR

Setup Position Adjust Detection Tool

1. Touch the **Add Tool** button.

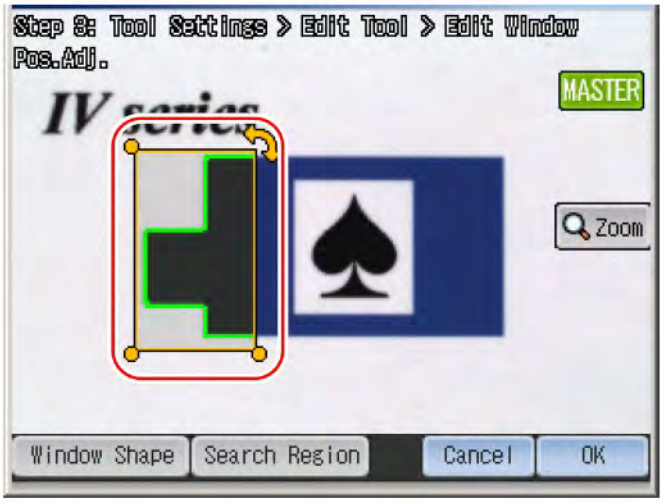
2. Touch the **Pos.Adj.** button.



3. Touch the **Edit Window** button.

Step 2: Vision Setup
CONFIGURE MONITOR

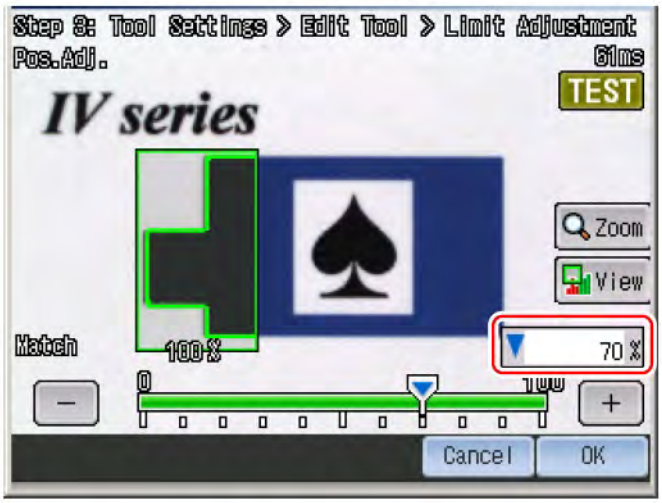
4. Set the position, size, and the angle of the tool window. The detected outline will be displayed in green. Touch **OK**.



5. Touch the **Limit Adjustment** button.

Step 2: Vision Setup
CONFIGURE MONITOR

6. Set the threshold to judge OK and NG.

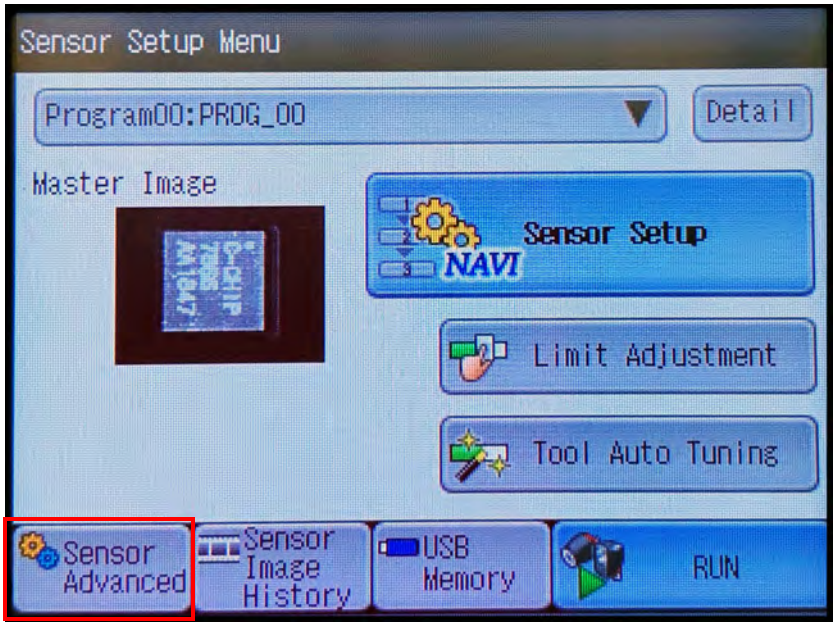


7. After the setting is completed, touch **OK**. The display will return to the main screen for Position Adjustment tool.

8. Touch **OK** again, then touch **Next** to proceed to "STEP4".

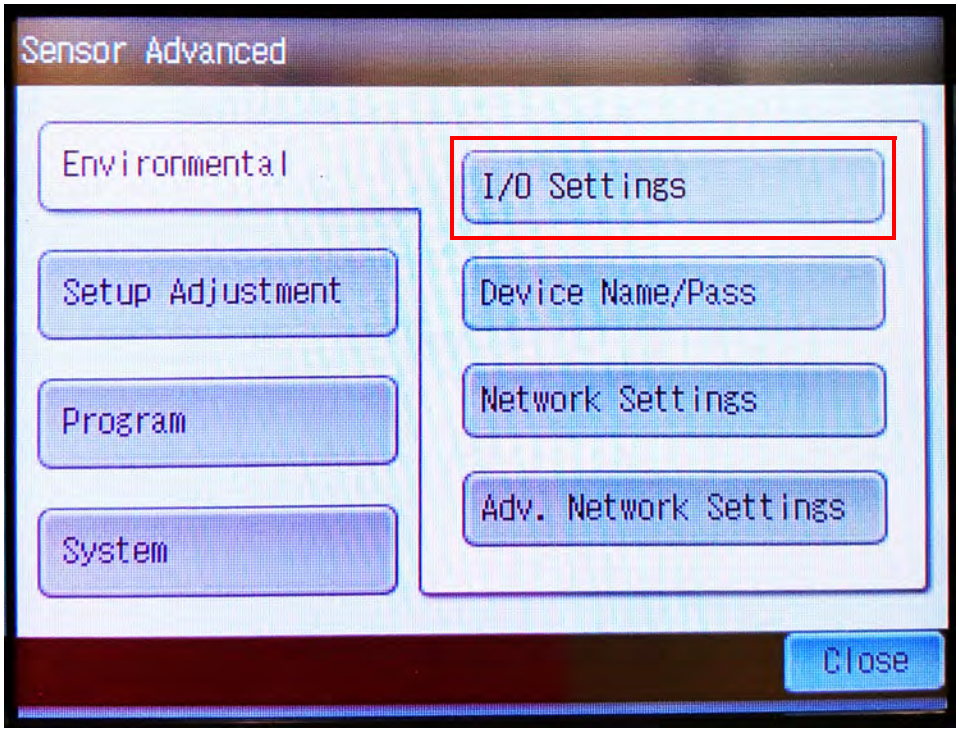
Confirm I/O Settings

1. In the *Sensor Setup Menu*, touch **Sensor Advanced**.

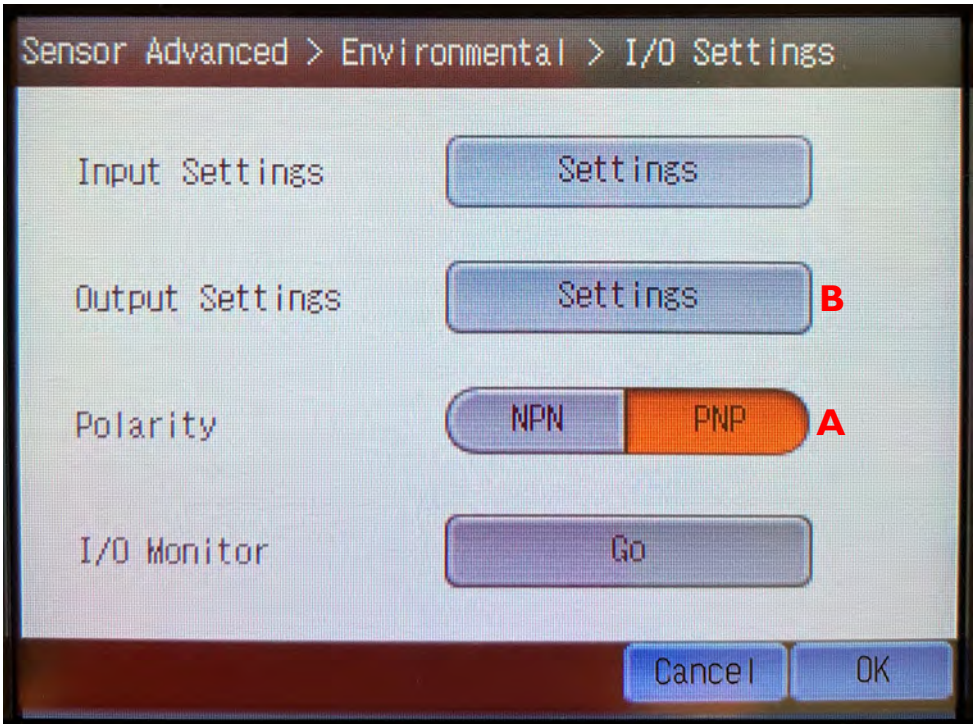


Step 2: Vision Setup
CONFIGURE MONITOR

2. In the *Sensor Advanced* screen, touch **I/O Settings**.



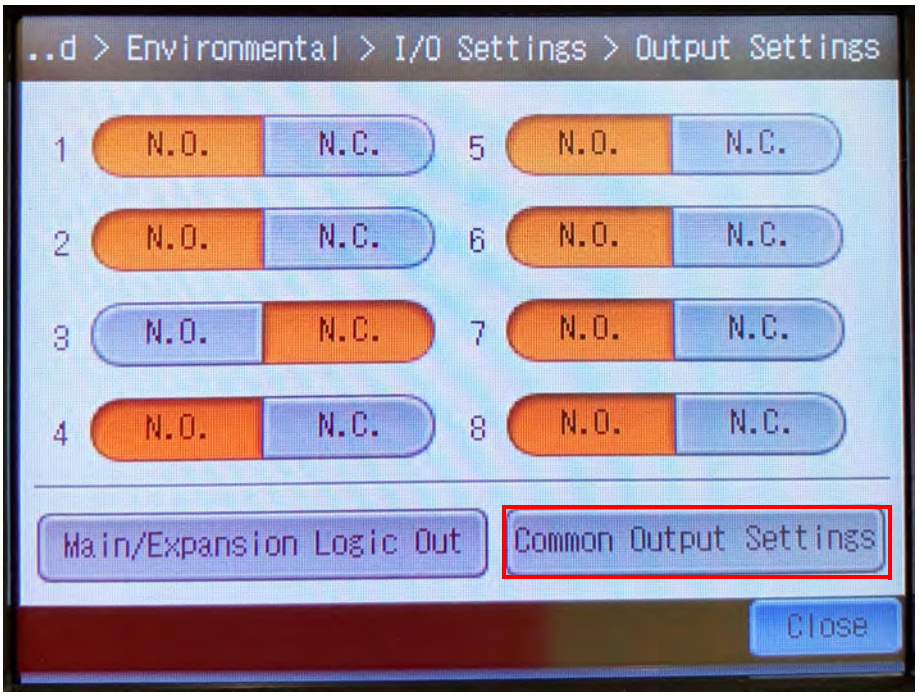
3. In the *I/O Settings* screen, ensure Polarity is set to **PNP**. **(A)**



Next, touch the **Output Settings** button. **(B)**

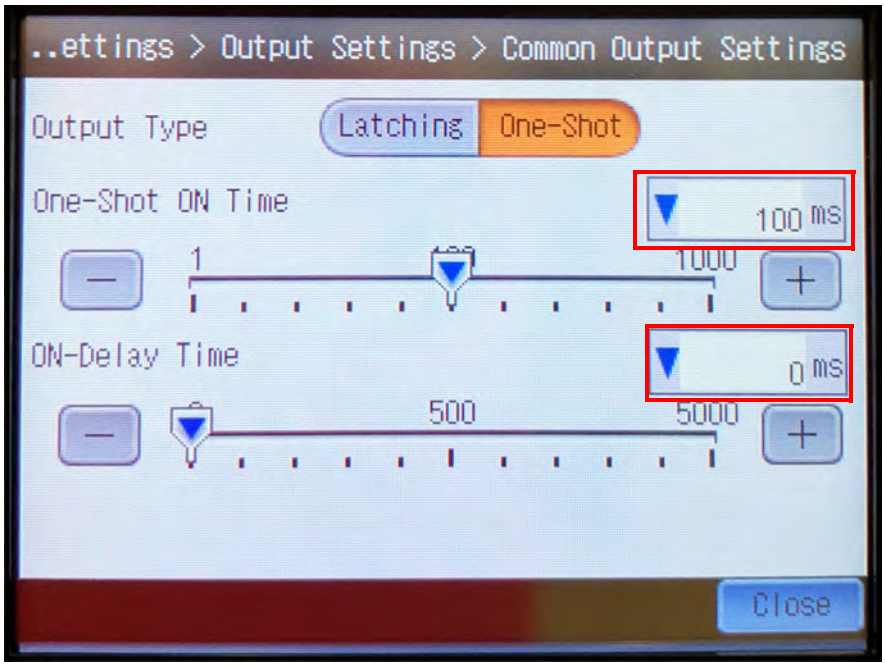
Step 2: Vision Setup
CONFIGURE MONITOR

4. In the *Output Settings* screen, touch the **Common Output Settings** button.



5. In the *Common Output Settings* screen, adjust settings as follows:

- **One-Shot ON Time** = 100 ms
- **ON-Delay Time** = 0 ms

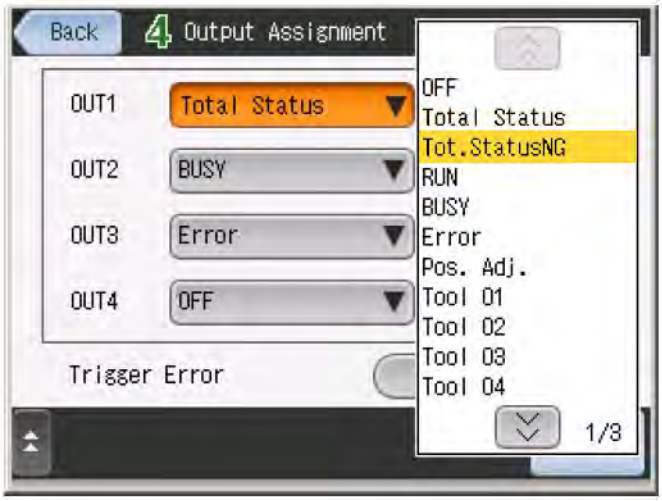


Step 2: Vision Setup

CONFIGURE MONITOR

Setup Output

1. Touch the output line to assign the output function.

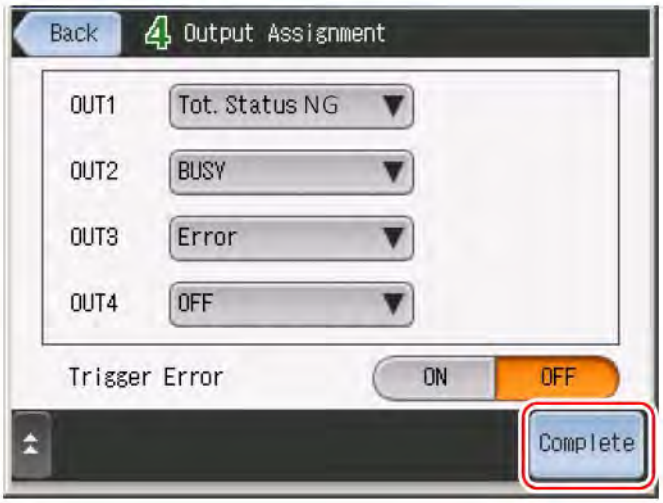


Output function	Explanation
OFF	No output assigned
Total Status	When the total status result is OK, the output is ON.
Tot. Status NG	When the total status result is NG, the output is ON.
RUN	When the sensor is running with no system error, the output is ON.
BUSY	While the sensor cannot receive the trigger signal, the output is ON.
Error	When an error has occurred, the output is ON.
Pos. Adj.	When the position adjustment tool is OK, the output is ON.
Tool 1 to 16	When the result of the tool is OK, the output is ON.
Logic 1 to 4	When the result of the logic is OK, the output is ON.

Set the output functions as follows:

- **OUT1 = Busy**
- **OUT2 = Total Status**
- **OUT3 - OUT8 = OFF**

2. After the setting is completed, touch **Complete**, then touch **Yes**.



Chapter 6: Operation

Contents

Quick Start

Quick Start: Running a Job

The following is an outline of the basic steps required to run a pre-programmed job. More detailed instructions follow in the next section of this chapter.

Caution: Users should always wear protective eye wear when operating or maintaining the TM-402.

1. Power up.

- Power up the machine by turning on the *Main Power Switch*.
- Press the **Reset** button.

2. Home the motors.

- Open the *Run Tab* on the *HMI* and select ***Home Motors.***

3. Setup Bowl Feeder.

- Ensure correct *Linear Track* is installed.
- Load components.

4. Setup Taper.

- Ensure sufficient carrier tape and cover tape are loaded to complete the job.
- Load an empty take-up reel.
- Run peel force test to verify seal.

5. Setup the Pick Head.

- Ensure the correct nozzle is installed for the part that will be picked.
- Observe the vacuum sensor, adjusting nozzle pressure as necessary.
- Adjust *Blow-off Pressure* as needed to achieve proper part placement.
- Close the enclosure doors.

6. Select Job.

- Open the *Job Tab* on the HMI. Select the desired job from the *Job Library* and press Open to open the selected job in the *Run Tab*.

Quick Start

7. Setup Vision.

- Open the *Taper Tab* on the HMI and advance to the second screen.
- Ensure camera is **ON**. Configure inspection as needed.

Note: To configure vision inspection, see *Chapter 4: Setup*.

8. Run the Job.

- On the HMI, select the *Run Tab* then press **Run**.
- Load/unload parts and reels as needed.

Caution!
V-TEK® Incorporated takes no responsibility for the safety of TM-402 if it is used for any purpose other than the intended purpose as specified in this User's Guide.

Preparing to Run a Pre-programmed Job

The initial set-up and configuration of a new job are covered in *Chapter 4: Setup*. This chapter discusses the procedure for setting up existing jobs, running a job and routine operator tasks.

Caution: Users should always wear protective eye wear when operating or maintaining the TM-402.

Step 1: Power Up

Power up the System

1. Power up the machine by turning the *Main Power Switch*, which is located on the right side of the machine, to the **ON** position.

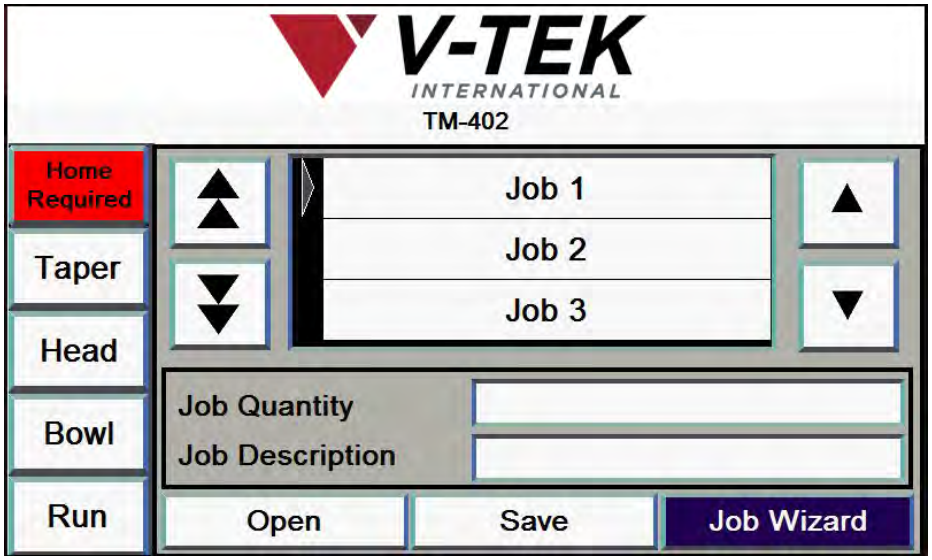
2. Press the blue **Reset** button on the left side of the machine.

Step 2: Home Motors

Home Motors

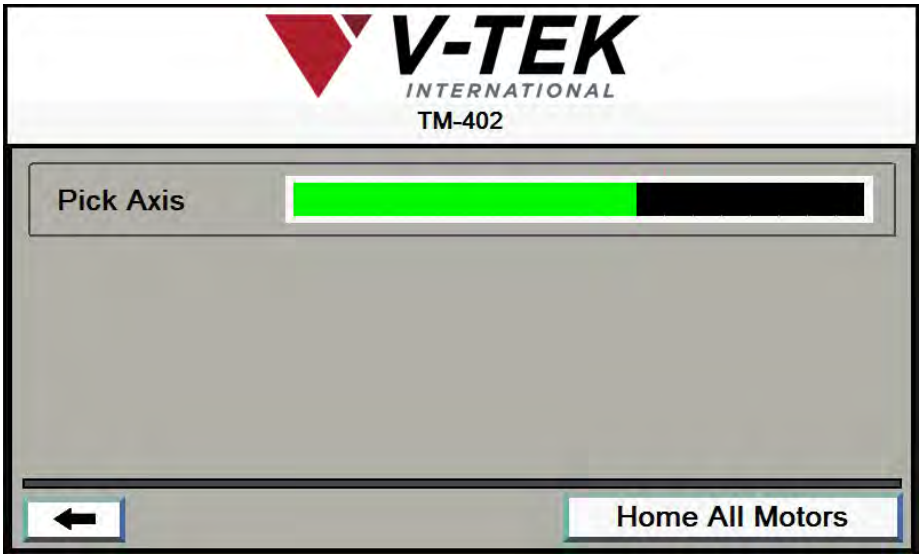
Note: The TM-402 only needs to be homed once after each power up or emergency stop. Once the motors have been homed, they remain homed until the machine is powered down.

1. The HMI will open to the *Job Tab* with a red **Home Required** button at the top of the *Tab Menu* and the other tab buttons grayed out. Press **Home Required** to open the *Homing Status* window.



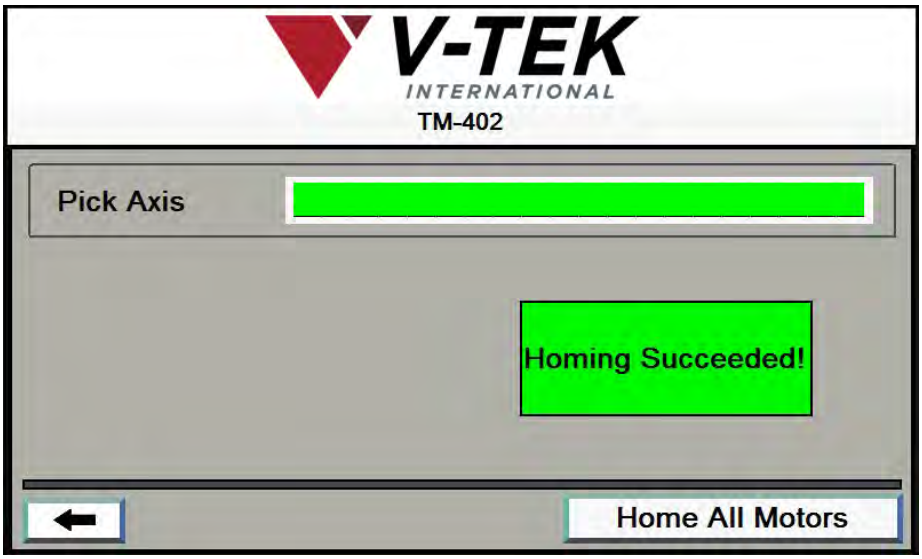
Step 2: Home Motors

2. Press the **Home All Motors** button.



The motor homing sequence begins with the nozzle moving slowly upwards (**Z Axis** movement). After about a three second delay, the pick head will begin to move slowly to the right towards the taper (**X Axis** movement).

The pick head homing sequence will continue until the nozzle has risen to its highest position and then returned to home and the head has moved all the way to the right and then returned to home.

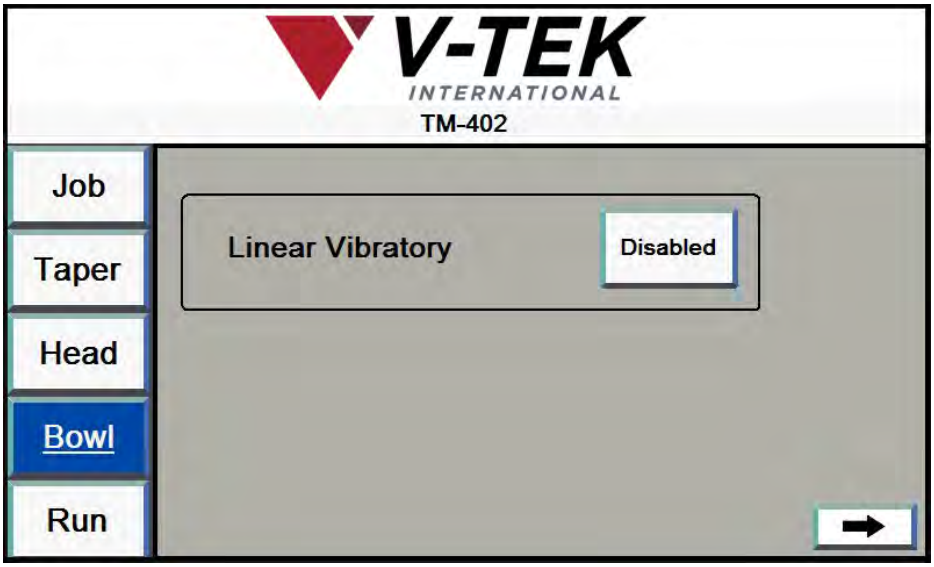


Homing progress is displayed as a green bar in the *Pick Axis Motor* field of the *Homing* window. Once the nozzle and head have stopped moving, homing is complete. A **Homing Succeeded!** message will appear on the bottom of the screen.

Step 3: Setup Bowl Feeder

Setup the Bowl Feeder

1. On the HMI, select **Bowl** from the tab menu on the left to open the *Bowl Setup Tab*.



2. Ensure the correct track size is installed for the part which will be run.

3. Load parts into the *Bowl Feeder.*

4. In the HMI Bowl Settings Tab, turn the Linear Vibratory to **Enabled**. The *Linear Track* will turn on and activate the *Bowl* and *Hopper*, feeding parts into the *Bowl*.

5. Manually adjust the **Vibratory Controls** on the Bowl Assembly for *Linear Track* and *Bowl* as needed to suit the type of component that is being processed.

Step 4: Setup Taper

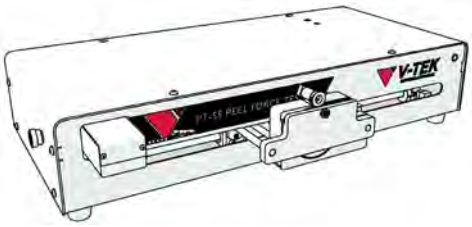
Setup the Taper

1. Load the correct carrier tape and cover tape, adjusting the track width as necessary.

2. Select *PSA* or *Heat* seal.

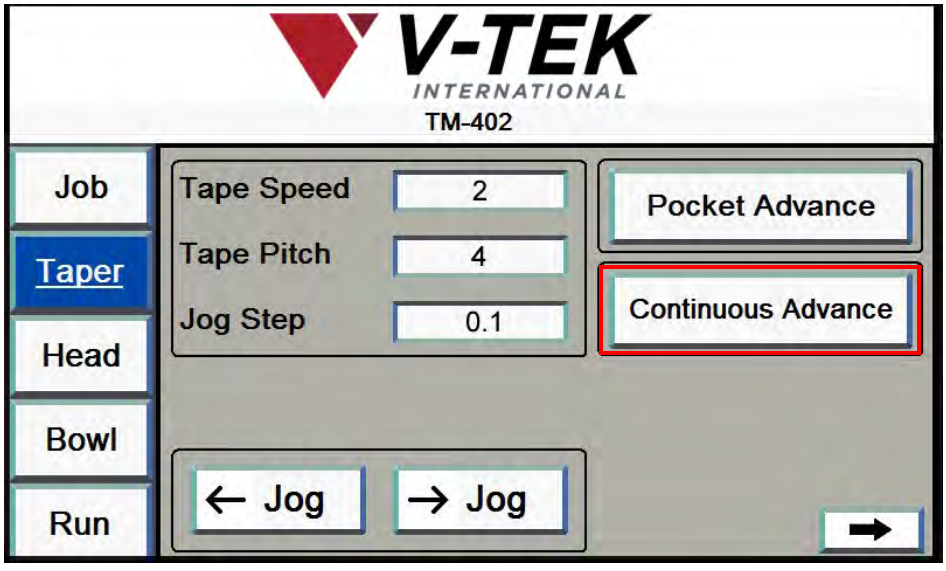
3. Align cover tape with carrier tape.

4. Run a pull test and adjust seal strength as needed.



5. Place an empty reel onto the take-up reel spindle.

6. Use the **Continuous Advance** button on the *Taper Tab* to run out the tape until it can be attached to the reel.



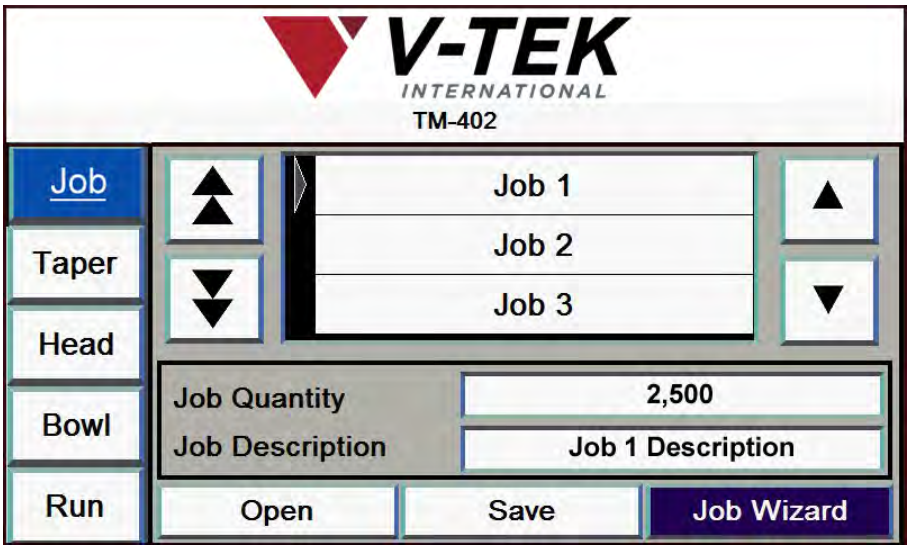
The tape normally can be attached by inserting it into the reel hub or with blue Permacel tape.

Step 5: Select Job

Select Job

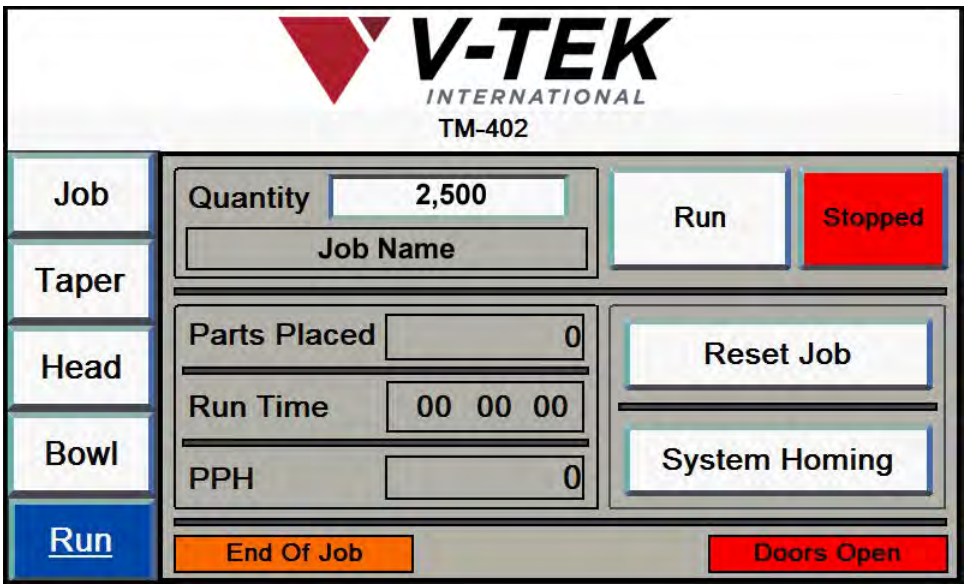
When a job is already set up and saved in the machine's memory, the first step in running the job is to call it up with the *Job Select* screen.

1. On the HMI, select the *Job Tab*



2. Browse through the *Job Library* to locate the desired job by using the up and down **Arrow** buttons.

3. Press the **Enter** button to select the job, then press **Open** to open the selected job in the *Run Tab*..

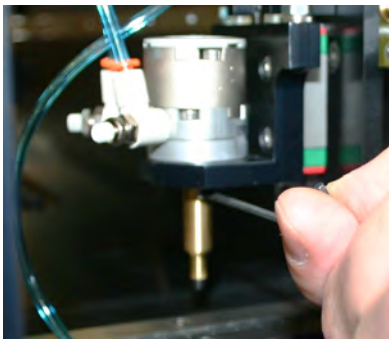


Step 6: Setup Pick Head

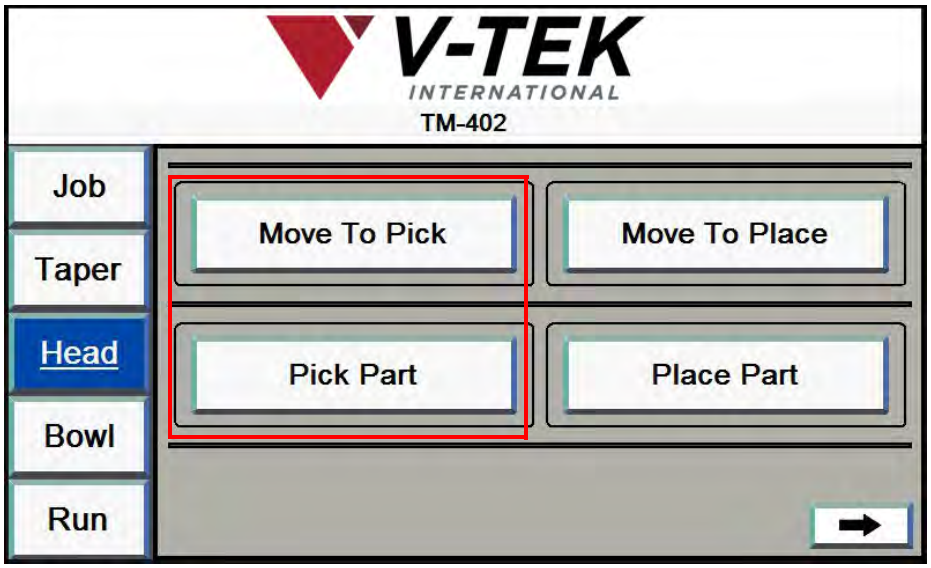
Setup the Pick Head

1. Ensure the correct *Nozzle* and *Nozzle Tip* are installed for the job that will be run.:

Note: See the *Chapter 4: Setup* for nozzle change procedures.



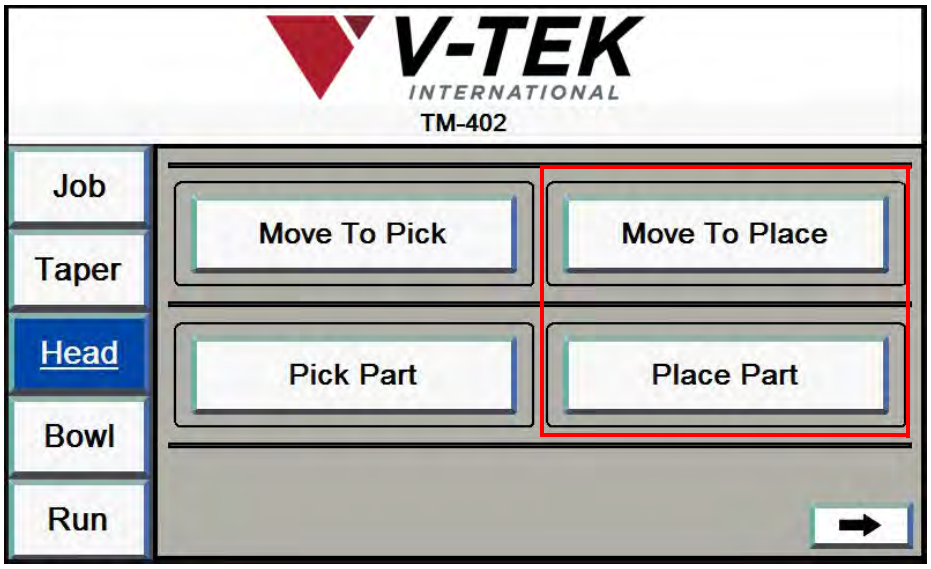
2. Open the *Head Tab* on the HMI.



3. Press **Move To Pick**, then press **Pick Part.** Observe the vacuum sensor which is located on top of the head to see if it is set correctly for the current part. The numbers should be lit in **green** with components on the nozzle and **red** if components are not.

Note: See the *Chapter 6: Troubleshooting* for vacuum sensor adjustment procedures.

4. Return to the *Head Setup Tab*.Press **Move To Place**, then press **Place Part.**



Check that the **Blow Off Pressure** is set correctly for the current part. The *Blow-off Pressure Gauge* is located on the front of the *Pick Head Bridge*. If components are not dropping properly, pull the gauge out and rotate to adjust pressure levels. When the desired pressure level is reached, push the gauge back in.

Step 7: Setup Vision

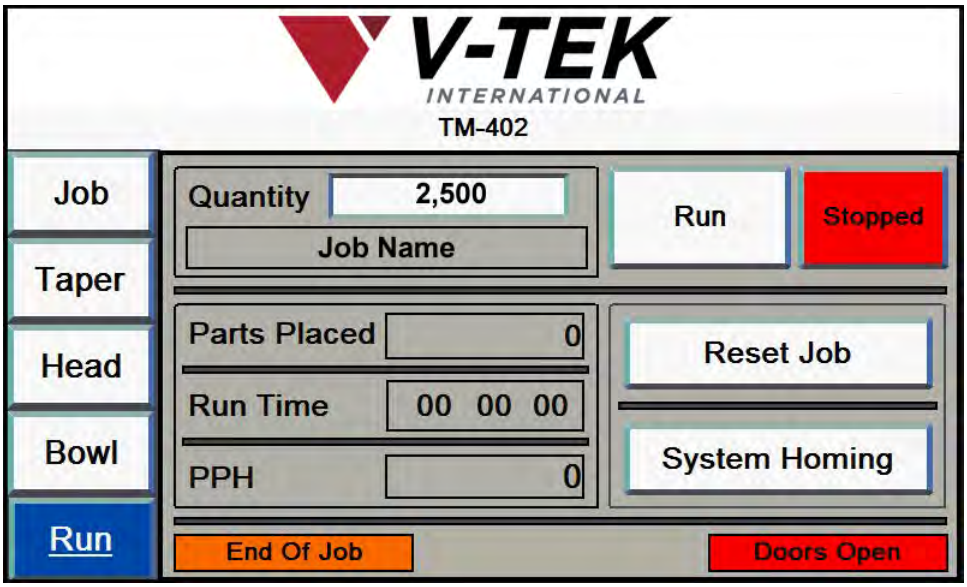
Setup Vision

The TM-402 Vision System will automatically revert to the previous inspection. If the same part is being run, there is no need to retrain the camera. Proceed to Step 8. If a different job/inspection is being run, follow the setup instructions in *Chapter 4: Setup*.

Step 8: Run Job

Run the Job

1. Close the enclosure doors, then open the HMI *Run Tab* and press **Run**.

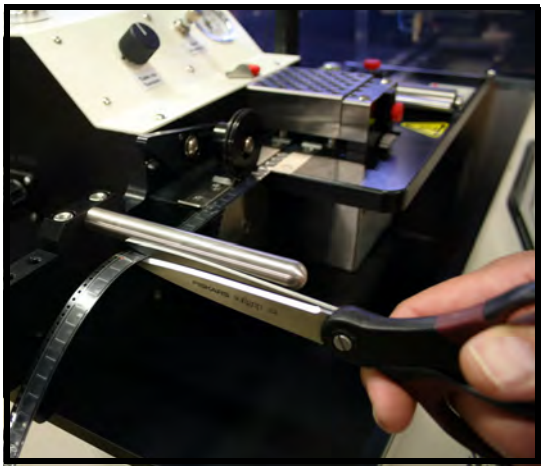


During operation, the operator will add additional parts to the *Bowl Feeder* and unload packaged parts from the *Taper* as necessary. The operator may also replace parts that fail 2D Inspection. Otherwise no other adjustments are required for a job that has already been defined properly.

2. When the preset number of parts has been run, the TM-402 will automatically stop operation.

Note: If *Leader* has been **ENABLED**, the *Taper* will continue to seal tape until it reaches the programmed *Leader* length. If *Leader* is **DISABLED**, the *Taper* will continue to seal tape until the last sealed part has reached the cut point.

3. Cut the sealed tape at the cut point and use a piece of blue Permacel tape to secure the finished reel. Remove processed output.

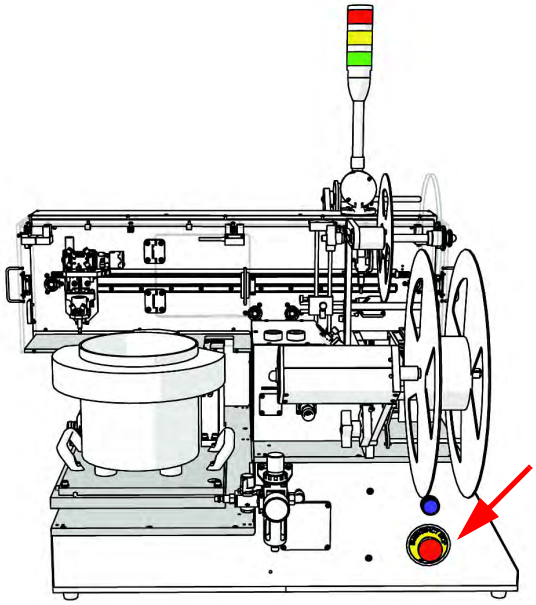


Chapter 7: Troubleshooting

Contents

Emergency Stop

The **Emergency Stop Button** is located on the left side of the TM-402.

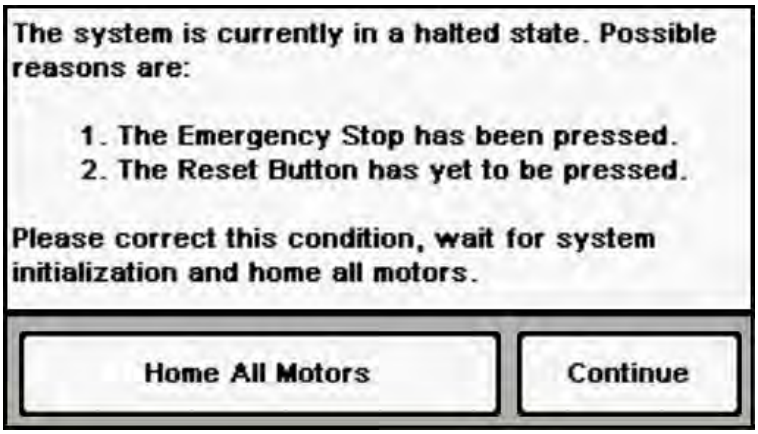


If the **Emergency Stop** is pushed, the TM-402 will automatically enter an *Emergency Stop* state. When an *Emergency Stop* is triggered, the *Tower Light* switches to red and all operations cease.

Activating an Emergency Stop

If emergency stop condition occurs, follow the steps below to resolve the failure.

1. Press the red **E-Stop** button to place the TM-402 into an *Emergency Stop* state. The *Tower Light* will switch to red and all operations will cease. On the HMI, a *Halted State* message will appear.



2. Resolve the problem.(See tips on resolving error conditions which follow.)

Clearing an Emergency Stop

To clear an *Emergency Stop*, follow the directions below.

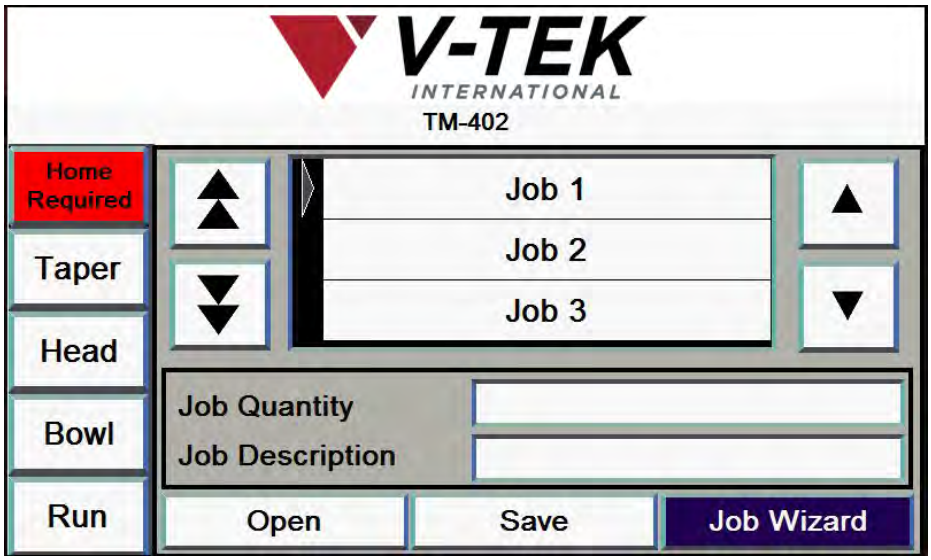
1. Twist the activated **Emergency Stop** button to turn it off and release the button.

2. Close all the doors on the TM-402.

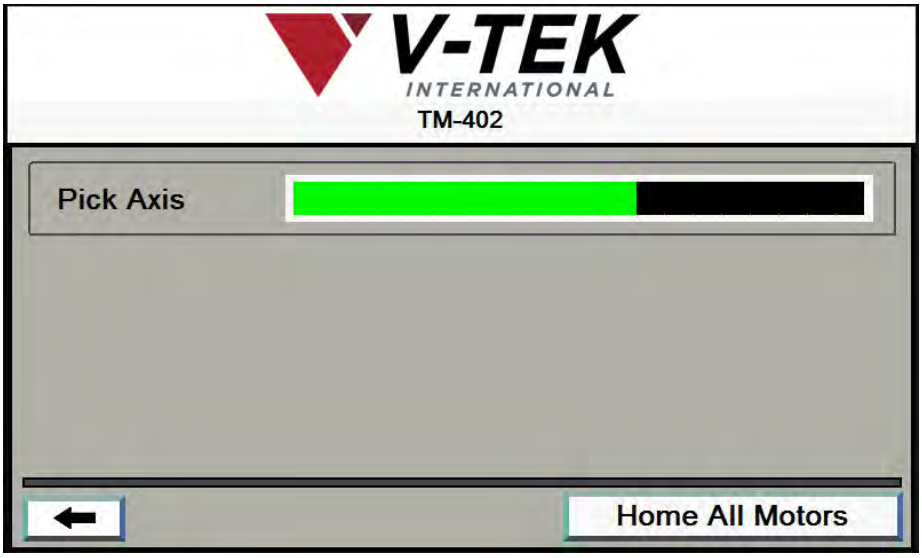
3. Press the blue **Reset** button.

4. The *Boot Screen* will appear on the HMI Monitor and display a loading progress message. This process typically takes about 90 seconds to complete.

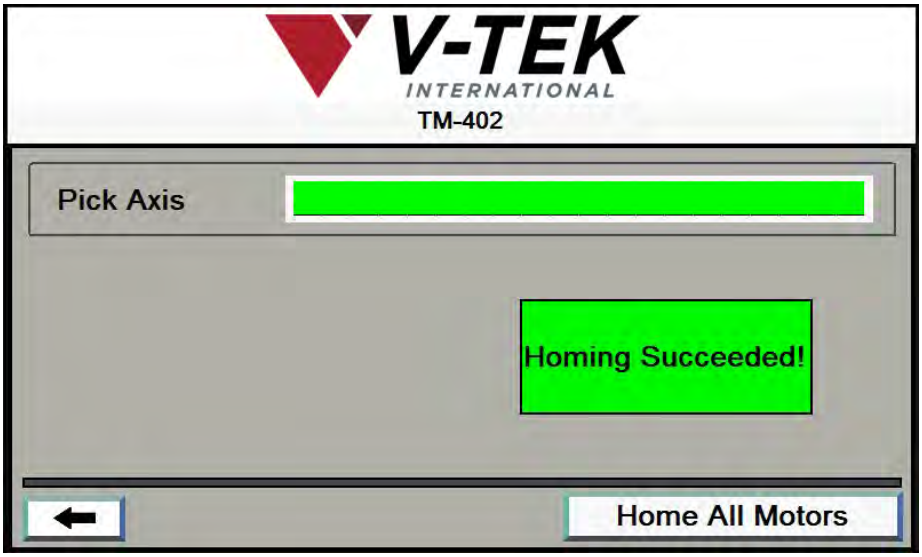
5. Once the system has finished booting, the HMI will open to the *Job Tab* with the **Home Required** button displayed. Press **Home Required** to begin the homing sequence.



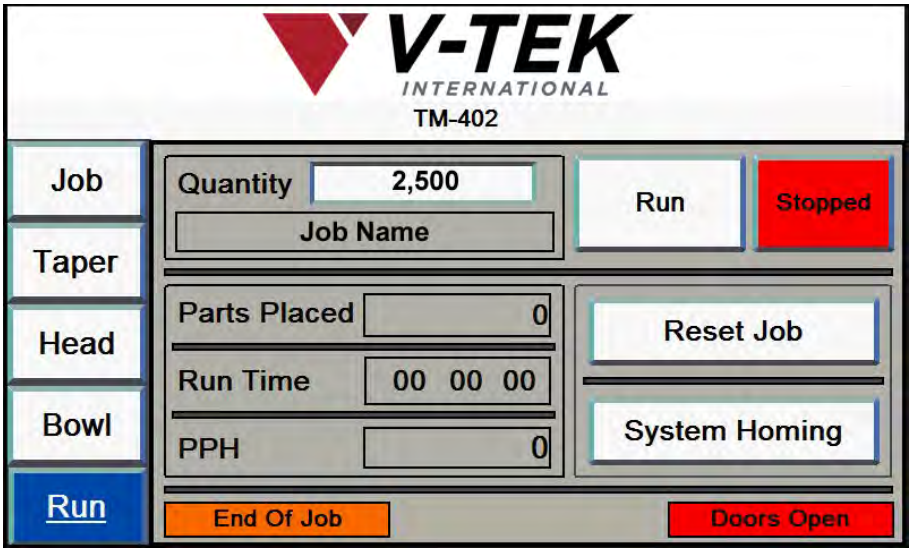
6. The *Homing Status* window will open. Press **Home All Motors**



7. When the homing sequence is completed, the bar will turn from black to **green** and a **Homing Succeeded!** message will appear.



8. Once homing is complete, press the **Left Arrow** button will open the *Run Tab.*



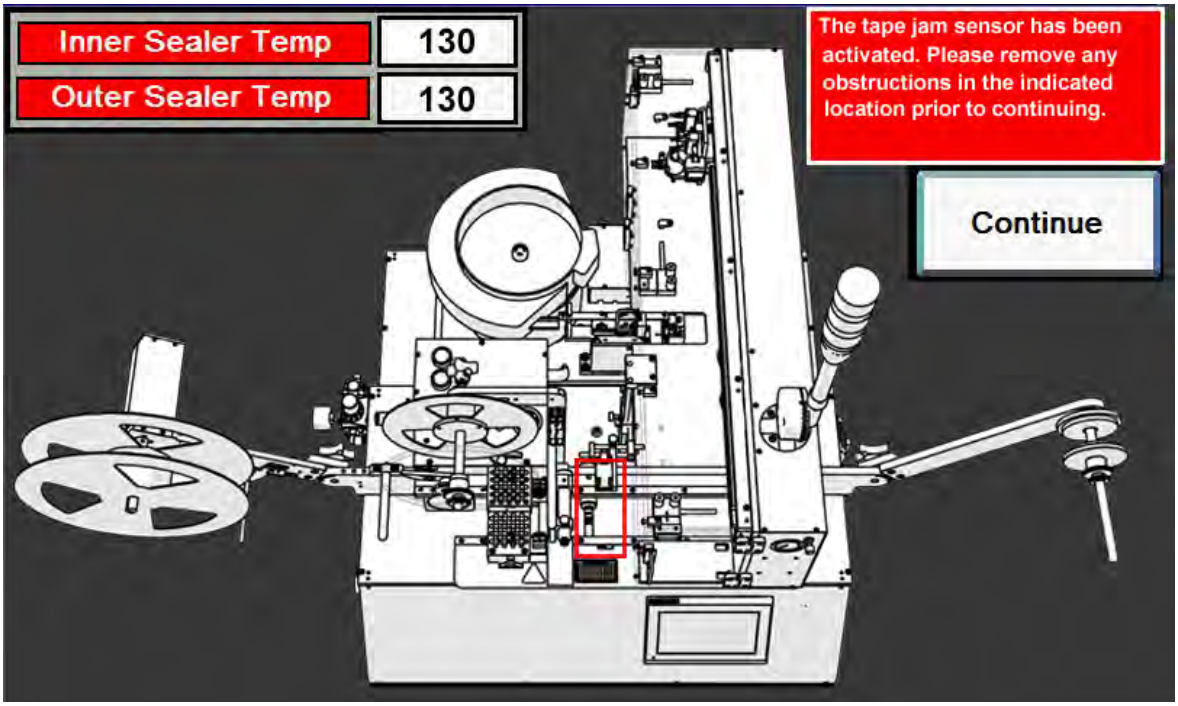
9. Press the **Run** button on the HMI *Run Tab* to resume operation.

System Alarm Messages

During TM-402 operation, the operator will occasionally be prompted to fill the *Tray Feeder* with parts, unload the *Taper* or check an *Inspection Fail*.

When the TM-402 requires attention it will automatically stop. A beep will sound and the *Tower Light* will turn flashing red to draw the operator's attention.

On the HMI, a **System Alarm Message** will appear.



System Alarms are triggered for several reasons. When the TM-402's sensors detect an error situation such as *Low Cover Tape* or a *Tape Jam,* the *System Alarm Message* alerts the user to the error. *System Alarms* will also appear if the TM-402 needs to be adjusted before operation can begin. For example, if the *E-Stop* button is depressed preventing operation, the *System Alarm* alerts the user so the situation can be resolved and operation can begin.

System Alarm Messages contain a description of the problem and suggestions for resolving the problem. They also include an illustration of the TM-402 with the area of interest indicated by a flashing red outline.

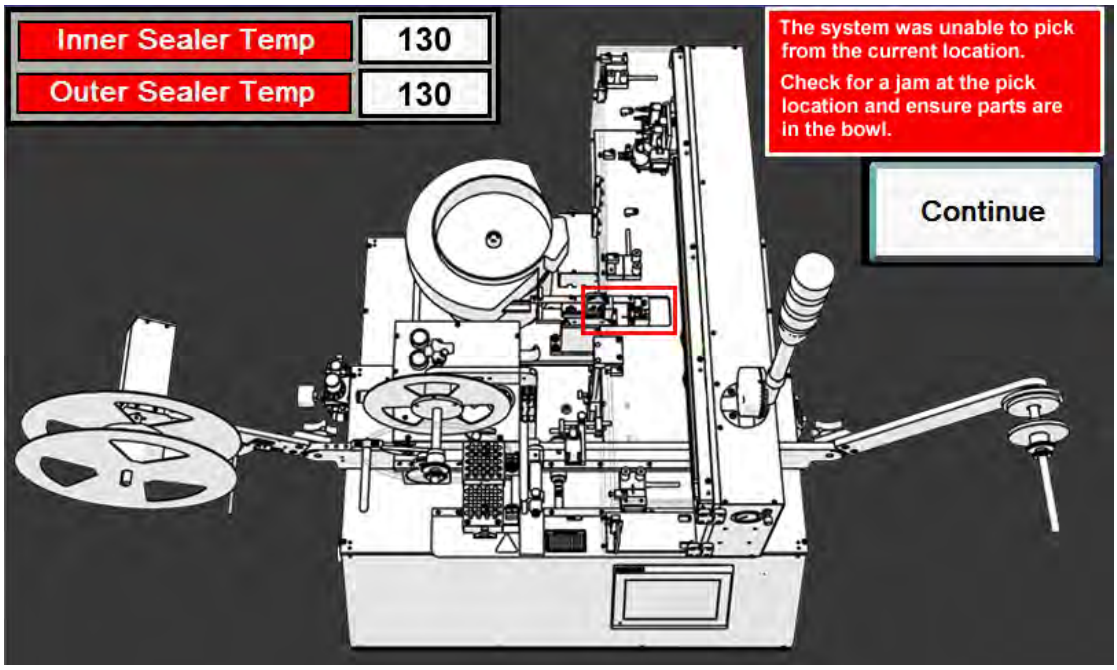
To resolve a *System Alarm*, follow the suggested steps to clear the error situation then click **Continue** to return to the HMI screen that was active before the alarm was activated. To resume operation, press **Start** on the HMI *Run Tab*.

Note: There are a variety of error conditions which could cause the machine to stop. See the *Error Message Table* at the end of this section for an explanation of the various error messages and their suggested solutions.

An illustration and description of each *System Alarm Message* follows.

Part Not Picked System Alarm

If the nozzle is unable to pick a part from the Bowl Feeder, the *Part Not Picked* system alarm will be activated. When this happens, operation stops, a beep sounds, and a warning appears on the HMI.

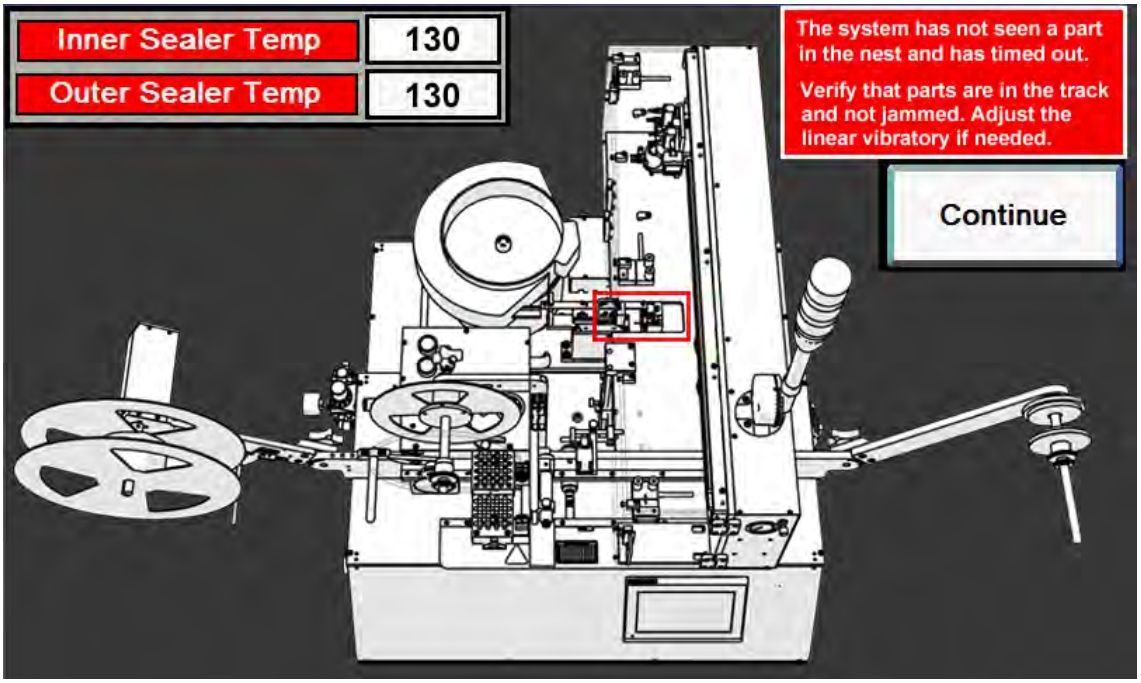


To clear the *Unable to Pick Alarm,* ensure there are parts in the bowl and it is feeding properly with no jams in the feeding track. If that does not resolve the problem, ensure the *Pick Height* is not set too high. Finally, verify the *Vibratory* is **Enabled**.

When the *Bowl Feeder* is ready for operation, press **CONTINUE** to clear the alarm and resume operation.

Empty Nest System Alarm

If the *Part Present Sensor* does not see a part in the *Nest*, the system will time out and the *Empty Nest* system alarm will be activated. When this happens, operation stops, a beep sounds, and a warning appears on the HMI.

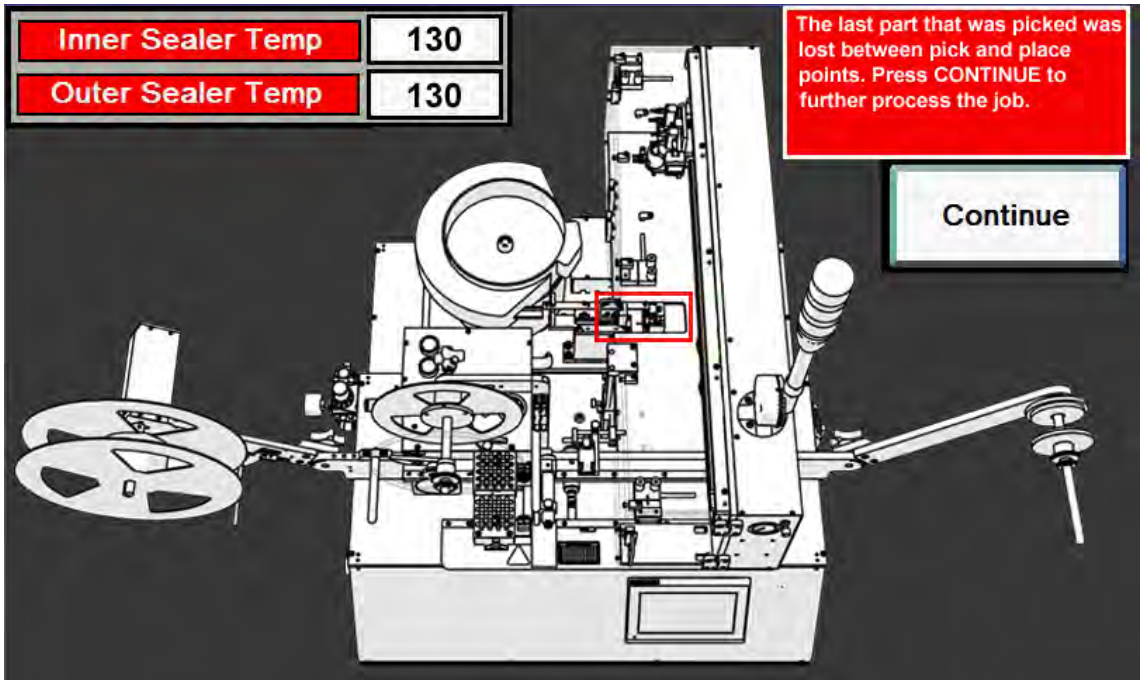


To clear the *Empty Nest Alarm,* ensure there are parts in the linear track and it is feeding properly with no jams. If that does not resolve the problem, adjust the linear vibratory amplitude as needed.

When the *Bowl Feeder* is ready for operation, press **CONTINUE** to clear the alarm and resume operation.

Part Lost System Alarm

If a part falls off the nozzle and is lost during the pick process, the *Part Lost* system alarm will be activated. When this happens, operation stops, a beep sounds, and a warning appears on the HMI.

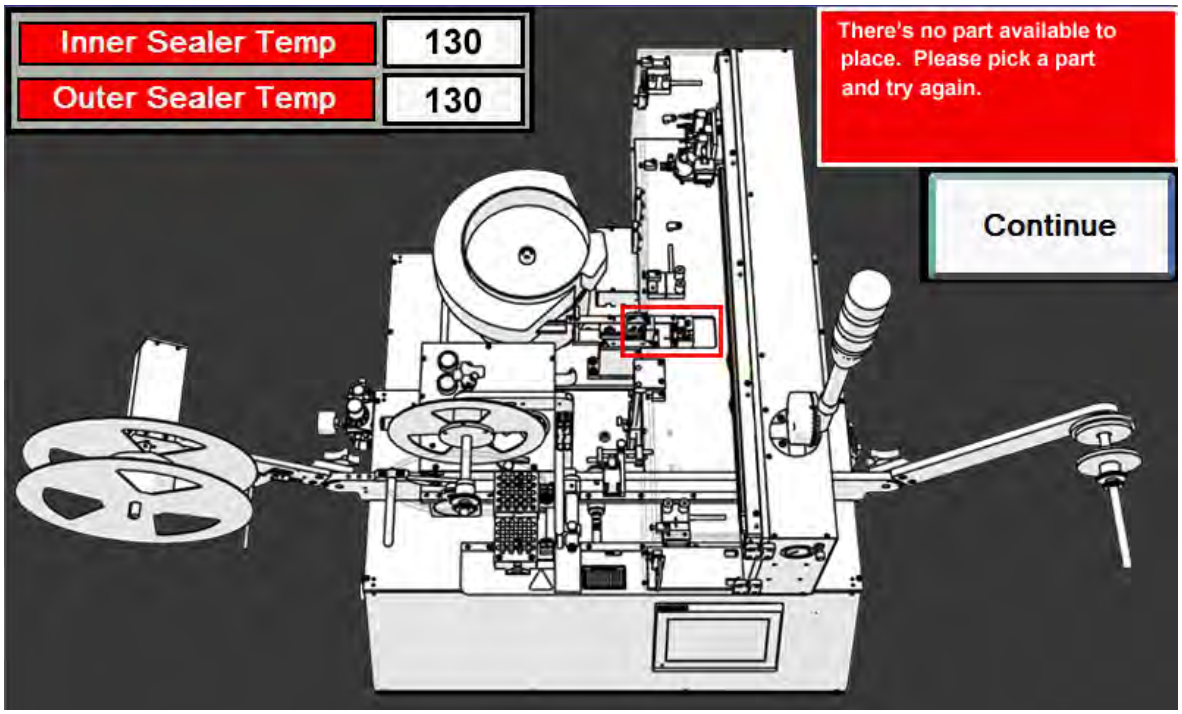


To clear the *Part Lost System Alarm,* check the *Vacuum Sensor* to ensure it is set correctly. Ensure the correct *Nozzle Tip* for the part that is being picked is installed. Check the nest to ensure there is no part jam. Finally, check the *Pick Position* to ensure it is centered correctly. Adjust as necessary.

When the *Bowl Feeder* is ready for operation, press **CONTINUE** to clear the alarm and resume operation.

No Part to Place System Alarm

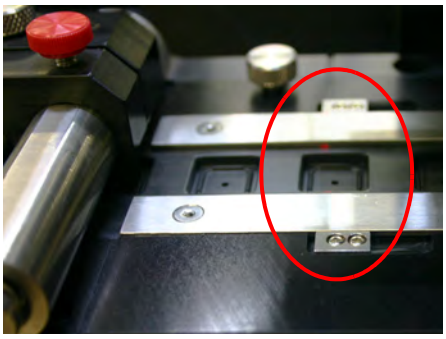
If the user attempts to place a part in tape when there is no part on the Nozzle, the *No Part To Place System Alarm* will be activated. When this happens, operation stops, a beep sounds, and a warning appears on the HMI



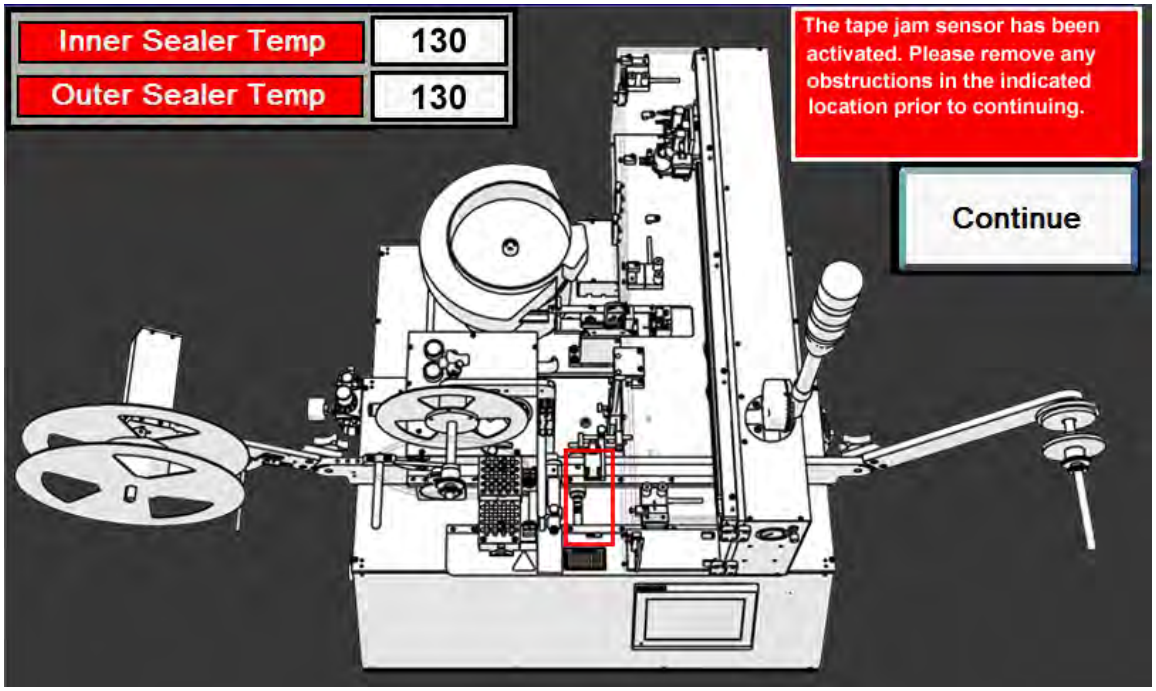
To clear the *No Part To Place System Alarm,* pick a part then press **CONTINUE** to clear the alarm and resume part placement.

Tape Jam Sensor System Alarm

The *Tape Jam Sensor* is located on the *Taper Track* just before the *Sealer*. It detects when parts are protruding above the top of the pocket due to a misplaced part or tape jam.



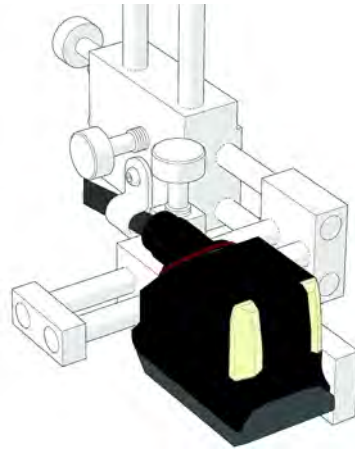
When the *Tape Jam* sensor is enabled and a jam occurs, operation stops, a beep sounds and a warning appears on the HMI.



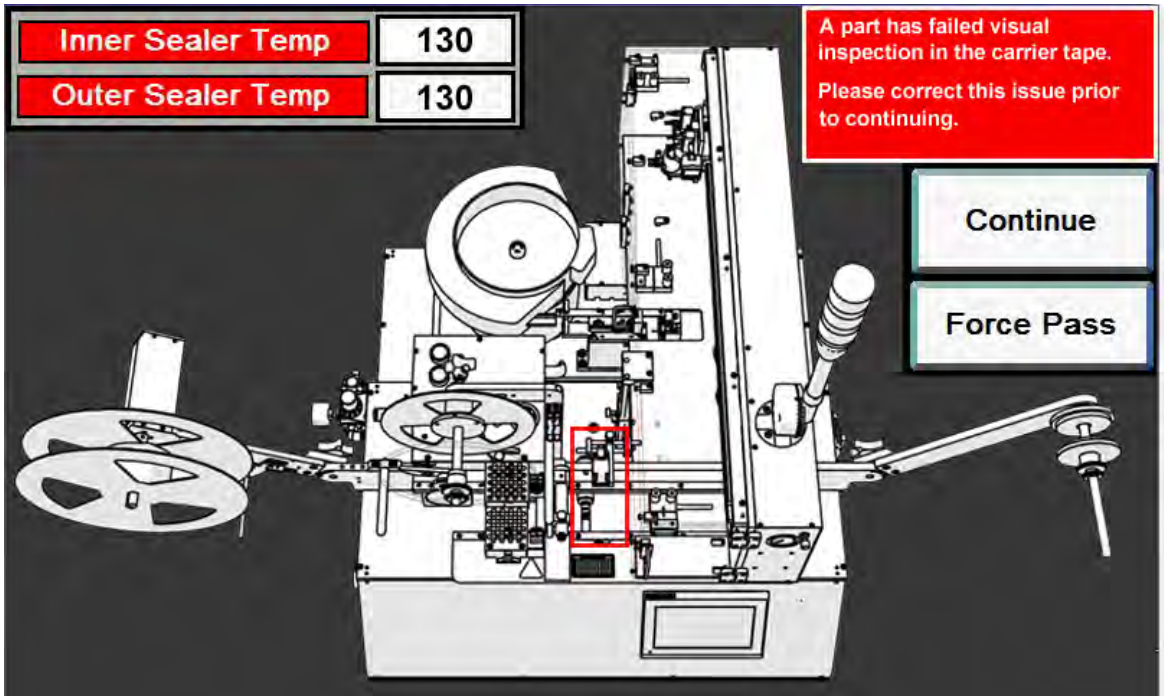
Clear the tape jam and then press **CONTINUE** to clear the error message and continue operation.

Vision Error System Alarm

The *2D Inspection System* is mounted on the *Taper* between the place point and the *Sealer*. It inspects parts for mark and orientation. It also detects empty pockets



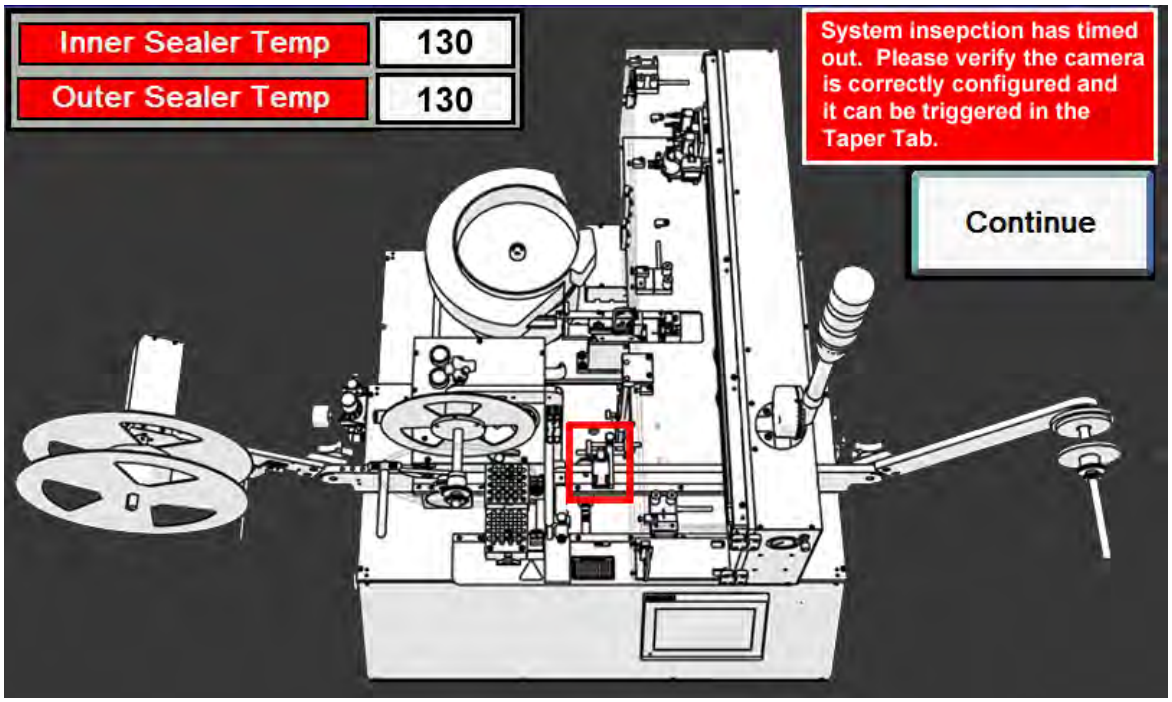
If the *2D Inspection System* detects an inspection error, the *2D Inspection System Alarm* will be activated. Tape advance stops, a beep sounds and a warning appears on the HMI.



To clear the *Vision Error* system alarm, re-orient or replace the failed part under the *2D Inspection Camera*. Press **CONTINUE** to clear the alarm and resume operation.

Inspection Time-out System Alarm

If the *2D Inspection System* fails to inspect a part within a preset time period, the *Inspection Time-out System Alarm* will be activated. Tape advance stops, a beep sounds and a warning appears on the HMI.

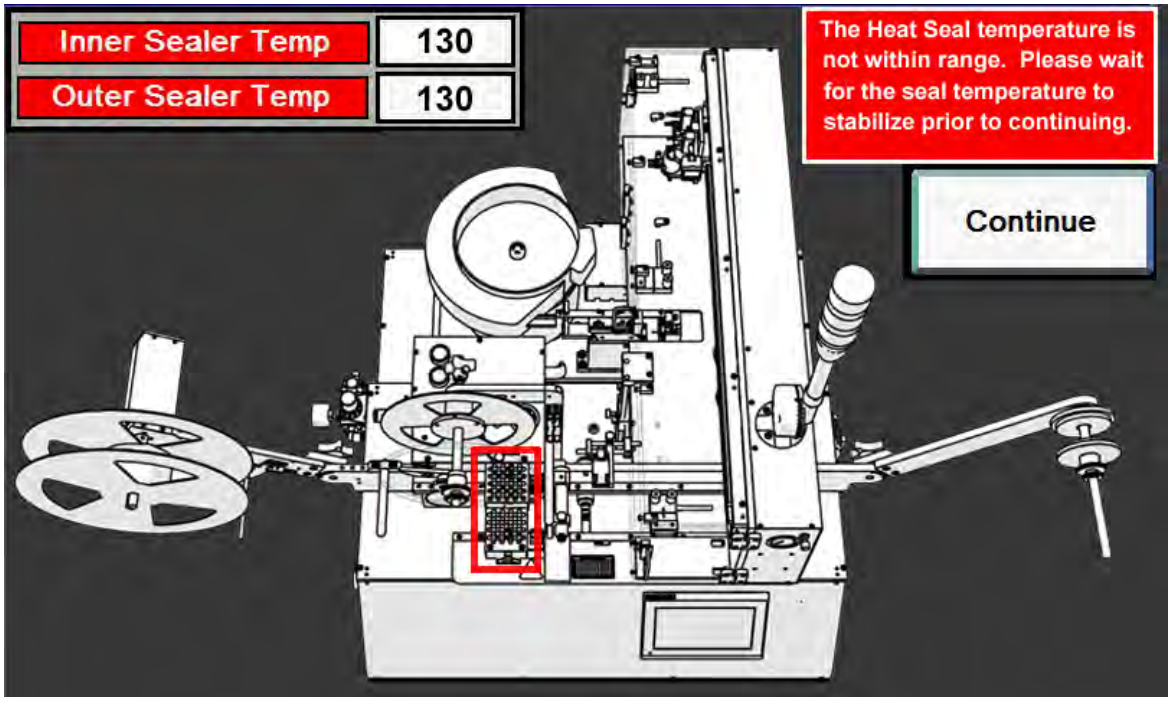


To clear the *Inspection Time-out System Alarm*, ensure the *2D Inspection Camera* is connected to power and setup correctly. Press **CONTINUE** to clear the alarm and resume operation.

Temperature Out of Range System Alarm

When *Heat Seal* is enabled and the *Heat Shoe* temperatures are either too hot or too cold, a *Heat Seal Temperature Out of Range* system alarm will activate.

When this occurs, tape advance stops, a beep sounds and a warning appears on the HMI.

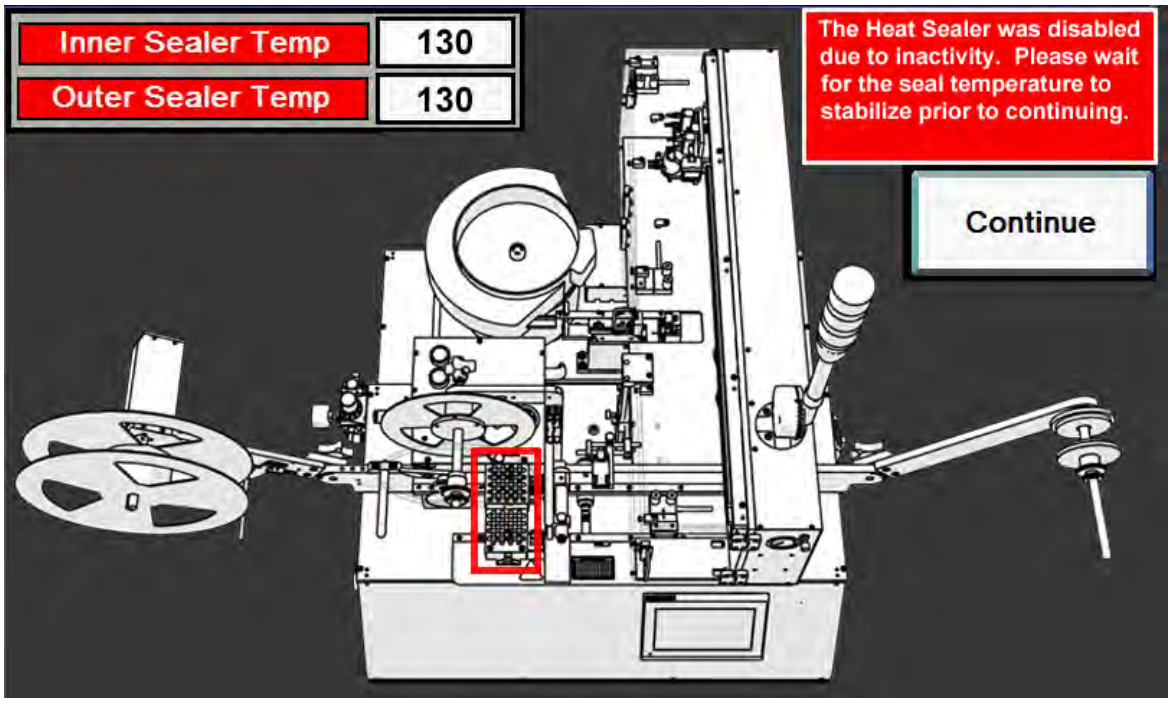


To clear the *Heat Seal Temperature Out of Range System Alarm*, wait for the heat shoes to reach their set point and then press **CONTINUE** to clear the alarm and resume operation.

Heat Sealer Inactivity System Alarm

If the *Taper* is inactive for 40 minutes or longer, the *Heat Sealer* is automatically disabled. Once that occurs, if a user attempts to run a job, or use *Continuous Advance, Pocket Advance* or *Manual Seal* a *Heat Sealer Inactivity* system alarm will activate.

When this occurs, tape advance stops, a beep sounds and a warning appears on the HMI.



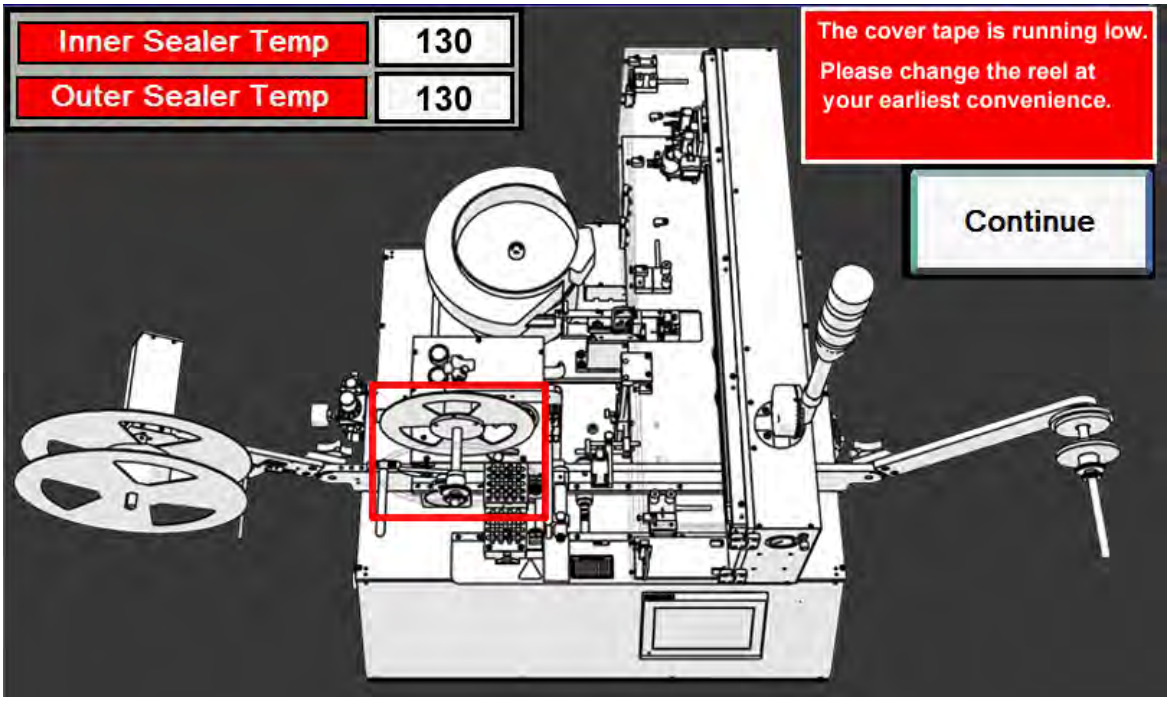
To clear the *Heat Seal Inactivity System Alarm*, wait for the heat shoes to reach their set point and then press **CONTINUE** to clear the alarm and resume operation. The current temperature is displayed on the system alarm message.

> **Note:** If the user presses **Continue** and then attempts to move tape through the sealer before the temperature has reached the set point, the *Temperature Out Of Range* system alarm will appear, prompting the user to wait until the sealer temperature is correct.

Low Cover Tape System Alarm

The *Low Cover Tape* sensor is located on the *Cover Tape Arm*. It detects when the cover tape supply on the *Cover Tape Reel* is below a preset minimum.

If an operator attempts to start a job when the cover tape level is below the sensor, operation will not begin. Instead a beep will sound and a *Low Cover Warning* message will appear on the HMI.

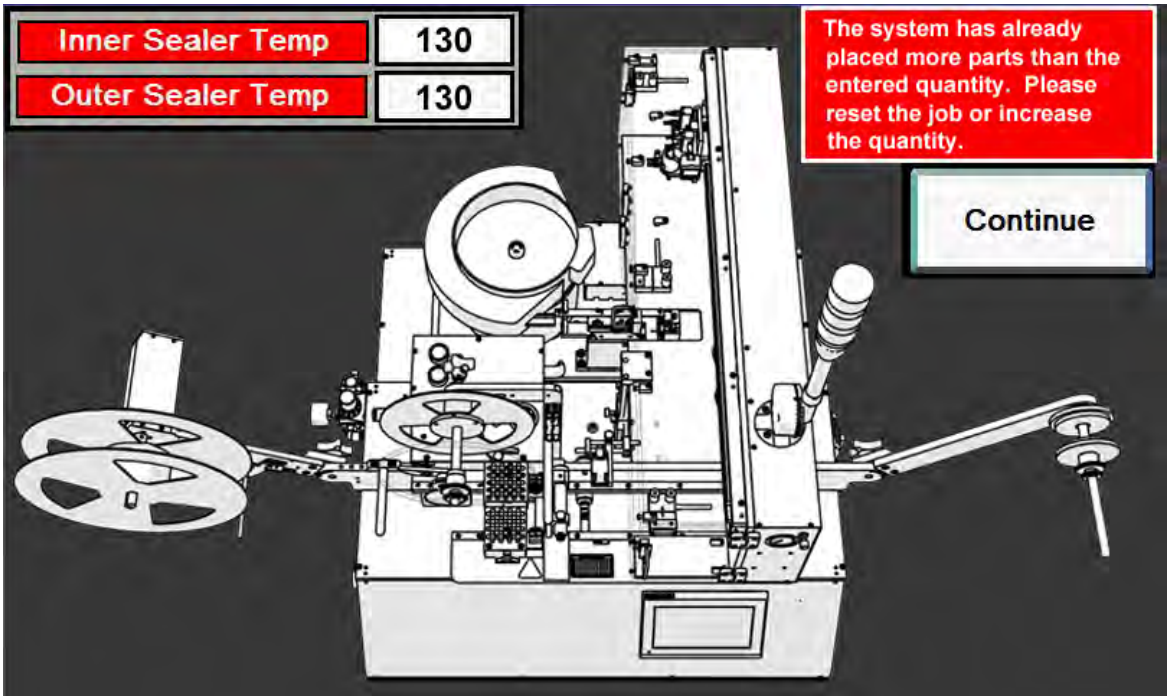


The operator can either resolve the warning by loading a full reel of cover tape or ignore the warning and push **START** again to continue with the current level of cover tape.

> **Note:** The *Low Cover Tape* warning will only appear once during a job. If the user ignores the message and continues operation, the TM-402 will continue taping until the job is finished or the cover tape is empty.

Job Quantity Inadequate System Alarm

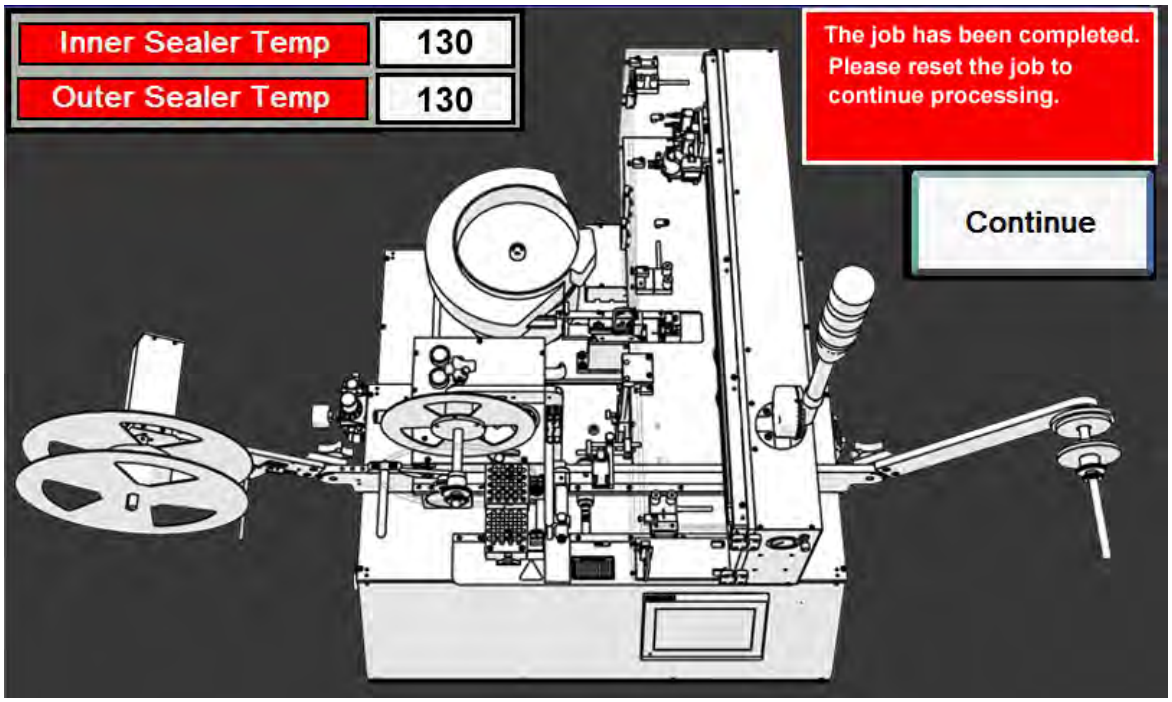
If during the course of a job, the operator changes the job quantity to less than the amount of parts that have already been processed a *Job Quantity Inadequate* message will appear on the HMI.



The operator can resolve the warning by either resetting the job or increasing the job quantity. Push **Continue** to clear the alarm message and resume processing.

End of Job System Alarm

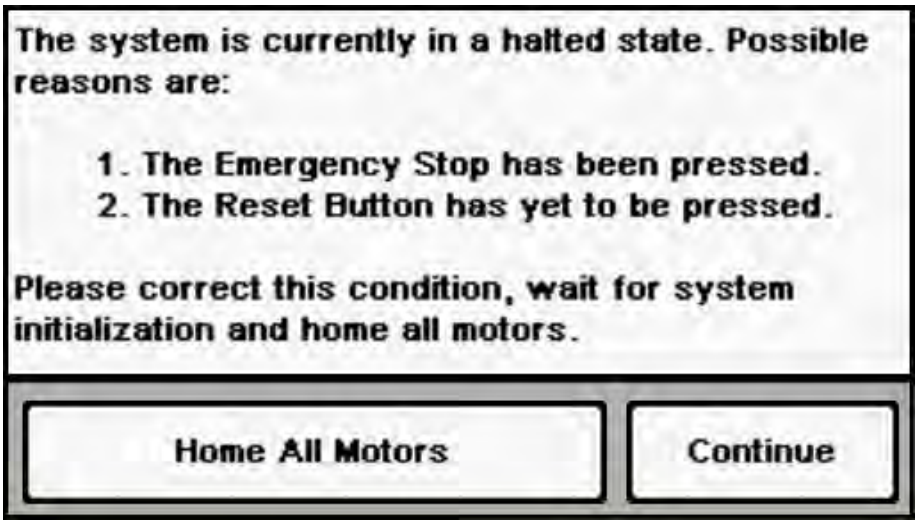
If the operator completes a job and then attempts to run the same job again without resetting the job, an *End of Job System Alarm* will appear on the HMI.



The operator can resolve the alarm by resetting the job. Push **Continue** to clear the alarm message and resume processing.

Halted State Error Condition

If the **E-Stop** button is pressed or the system is started up and the **Reset** button is not pressed, the following message will appear on the HMI.

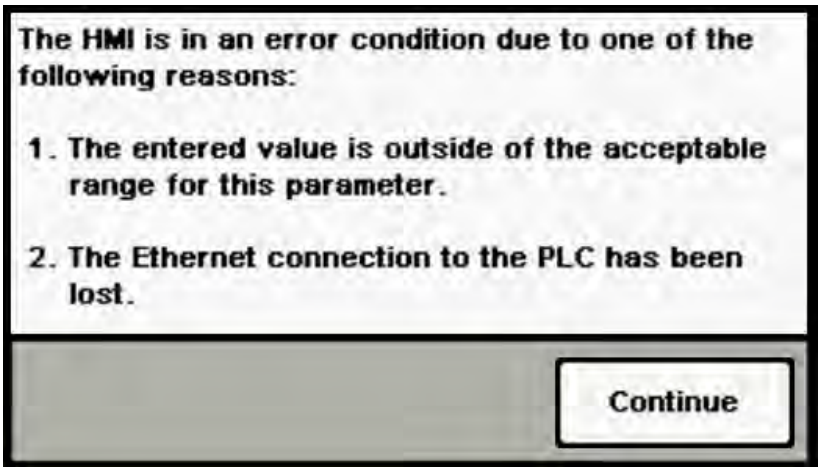


To resolve the error message, clear the emergency stop condition, then twist and release the **E-Stop** button.

Press the **Reset *button***. Once the system has finished booting, open the HMI *Job Tab* and press **Home Required** to begin the motor homing sequence.

HMI Error Condition

If the operator enters a value in a setup field that is outside the accepted range for the field or if the Ethernet connection to the PLC is lost, the following message will appear on the HMI.



To resolve the error condition in this instance, enter an acceptable value into the field.

If this message persists, it indicates that the Ethernet connection to the PLC may have been lost. Contact V-TEK Service for support.

Error Message Table

Error Condition	Solution
"The system was unable to successfully pick from the current location."	Nozzle is not picking parts from the *Bowl Feeder*. Check the following: - Feeder is empty. - Linear Track is jammed. - Pick height is too high.
"The heat seal temperature is not within range."	The *Heat Sealer* on the *Taper* has not reached the correct temperature. Wait until sealer has had enough time to reach the correct temperature.
"The heat sealer was disabled due to inactivity."	The *Heat Sealer* on the *Taper* was automatically disabled after being inactive for more than 40 minutes. Wait until sealer has had enough time to reach the correct temperature, then proceed.
"The tape jam sensor has been activated."	Check carrier tape prior to *Sealer* to ensure part is not sticking out of pocket. Remove any obstructions, then resume operation.
"The cover tape is running low."	Refill cover tape.
"A part has failed visual inspection in the carrier tape."	Check the following: - Part is incorrectly oriented. - Part mark is missing or obscured. - Part is missing.
"The inspection system has timed out."	Check the following: - Vision system is not connected to power - Vision System is setup incorrectly.
"The last part picked was lost between the pick and place point."	Check the following: - *Vacuum Sensor* is set correctly. - The correct *Nozzle Tip* is installed. - *Pick Position* is centered correctly.
"There's not a part available to place."	Pick a part and proceed.
"The job has been completed. Reset the job to continue processing."	Reset the job.
"The system has already placed more parts than the entered quantity."	The job quantity was changed after parts have been run. Reset job or increase quantity.

Error Condition	Solution
"The system is currently in a halted state."	Check the following: - The *Emergency Stop* has been pressed. Resolve the situation, then twist and release the. **E-Stop** button. - The **Reset** Button has not been pressed. Press **Reset**. - Once the condition is corrected, wait for system initialization and home all motors.
"The HMI is in an error condition..."	- If an unacceptable value has been entered into a setup field, change the value to one that fits that field's parameters. - If this message persists, the Ethernet connection to the PLC may have been lost. Contact V-TEK Service for support.

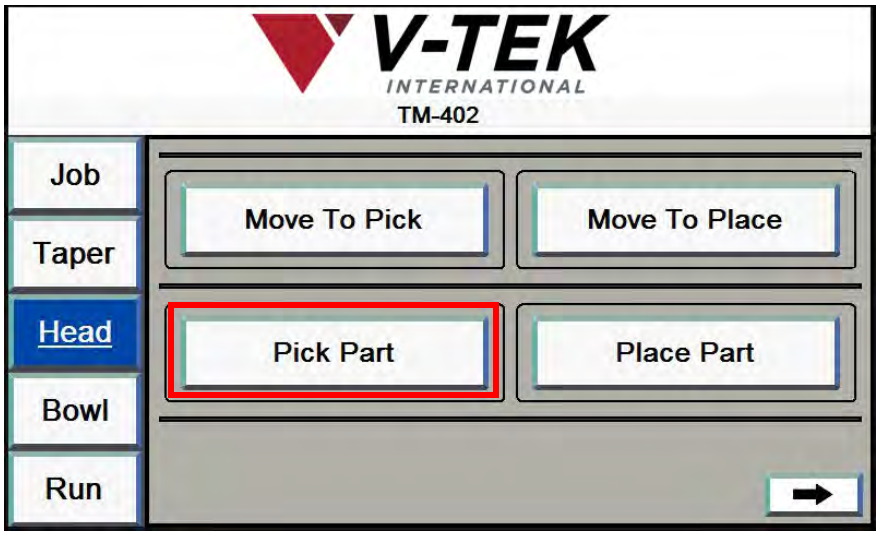
Adjusting Nozzle Vacuum Sensors

The TM-402's *Nozzle Vacuum Sensor* is setup before the machine is shipped. It may occasionally require adjustment depending on vacuum sensitivity and the type of part that is being processed.

If the TM-402 places "empty" pockets (i.e. places as though it held a part when it did not) or returns a picking part error when it picked a part, the vacuum sensor's threshold point probably needs to be adjusted.

Vacuum Sensor Settings

1. Close the enclosure doors, then open the *Head Setup Tab*.



2. Press the **Pick Part** button to activate vacuum and pick a part. Observe the vacuum sensor indicator which is located on the *Pick & Place Head* above the nozzles. The numbers should be lit in **green** with components on the nozzle and **red** if components are not.

3. If the sensors require adjustment, Press the blue **Set** button once. The sensor will alternately flash **P_1** and the current value.

4. Use the **Up/Down Arrow Keys** to adjust the sensor as needed with components both on and off of the nozzles..

5. Press the blue **Set** button again to exit back to normal operation.

Tips on Part Placement

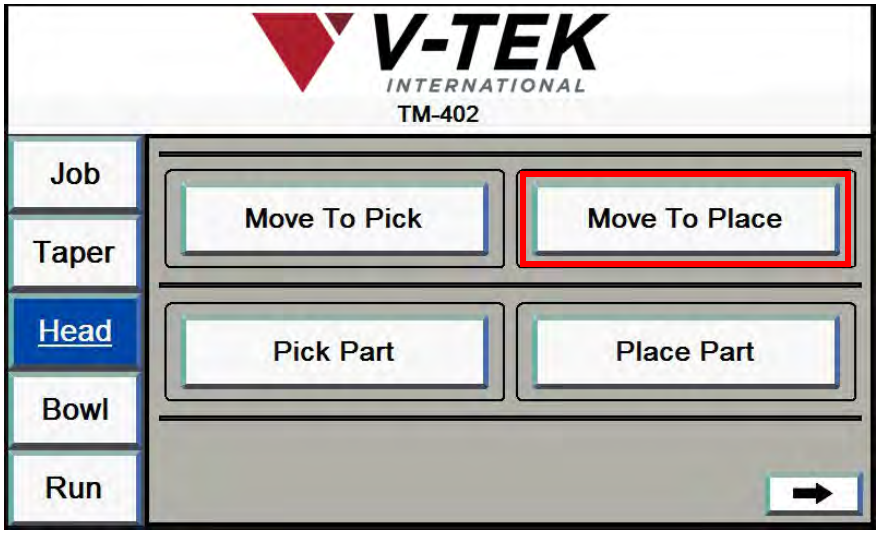
If components are not dropped properly, there are four variables that can be adjusted to correct the problem.

Note: Each part is different and may require a different combination of adjustments to obtain proper place performance.

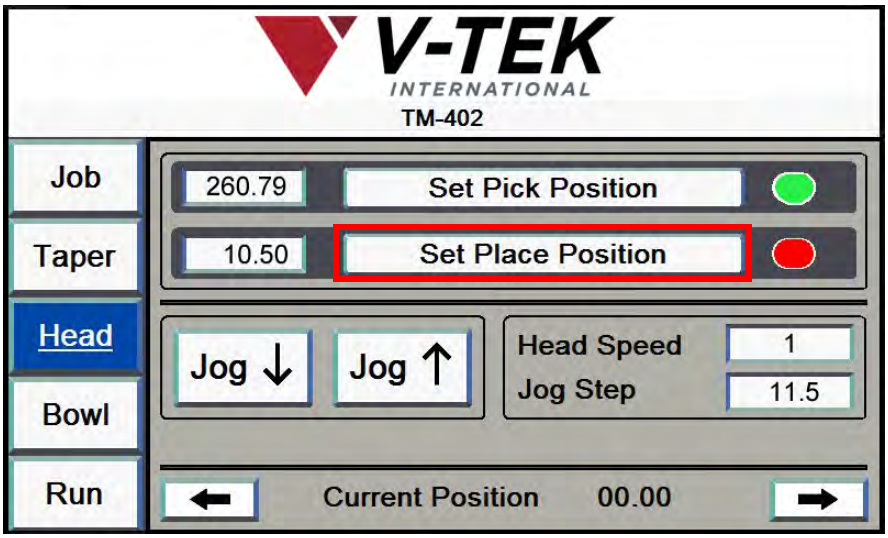
1. **Adjust Blow-off Pressure.** The *Blow-off Pressure Gauge* is located on the front of the *Pick Head enclosure*. If components are not dropping properly, pull the gauge out and rotate to adjust pressure levels. When the desired pressure level is reached, push the gauge back in.

Note: Every part is different and may require a different combination of adjustments to obtain proper place performance.

2. **Adjust Place Position X**. Open the HMI *Head Tab*. Press the **Move To Place** button.



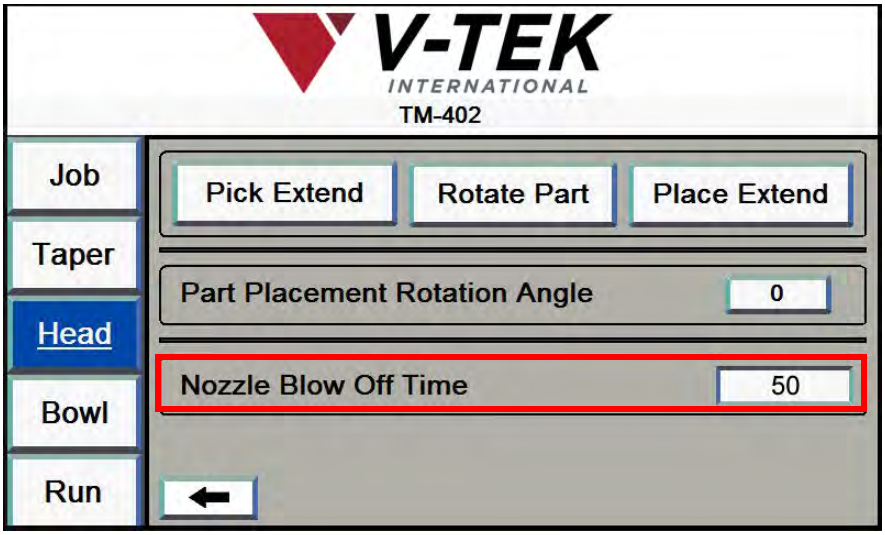
3. Press the **Right Arrow** to move to the next *Head Tab*.



Jog the head up or down until the nozzle is centered correctly over the place location. When the nozzle is positioned correctly, press the **Set Place Position** button.

4. **Adjust Place Position Z**. Manually adjust the right *Actuator Adjustment Screw* up or down until the nozzle is extended the appropriate distance above the place location. You may need to experiment with placing a part to determine what Z Axis height works best. When the nozzle is positioned correctly, press the **Set Place Position** button.

5. **Adjust Blow Off Time.** Press the right **Arrow** button on the bottom of the second *Head Tab* to move to the last *Head Tab* screen



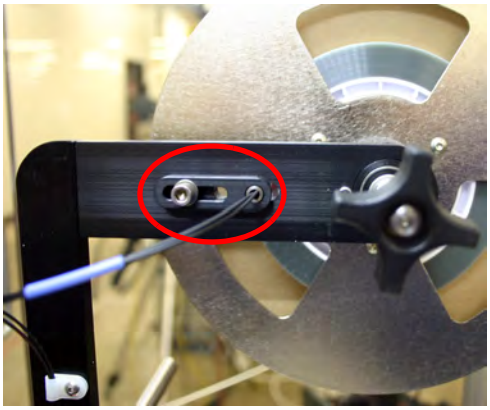
6. Adjust the length of **Blow Off** as needed to drop the part properly.

Note: If *Nozzle Blow Off* is set too low, the part may remain on the *Nozzle Tip* or "float" down, resulting in an incorrectly placed part in the pocket.

If *Nozzle Blow Off* is set too high, the excess air may cause the part to bounce back out of the pocket. Adjust the *Nozzle Blow Off* value until the TM-402 consistently and accurately places parts in the carrier tape.

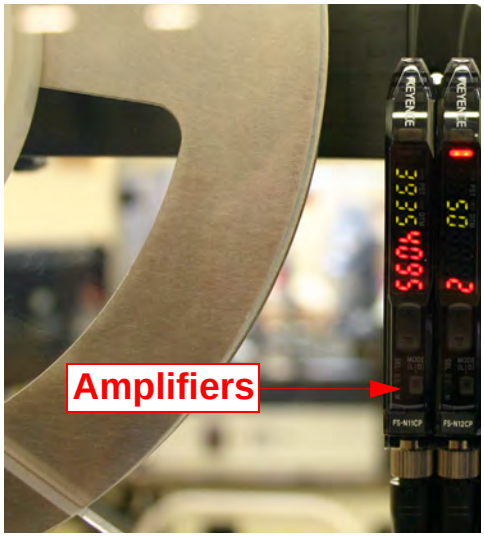
Sensor Adjustments

Adjusting the Low Cover Sensor



The *Low Cover Sensor* alerts the operator at the beginning of a job if there is not enough cover tape loaded on the *Cover Tape Reel* to complete the job.

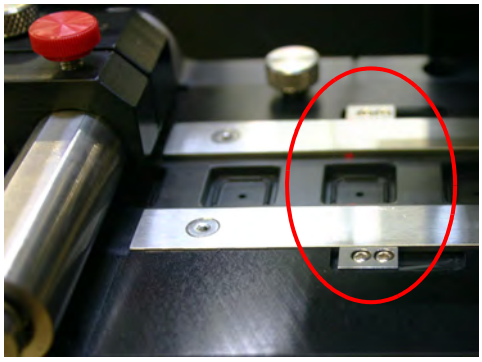
Loosen the screws on the *Cover Tape Low Sensor* to adjust it's position. It should rest so the sensor light is positioned at the minimum level of cover tape required to complete a job.



If sensor sensitivity needs to be fine tuned, adjust the amplifiers at the base of the *Cover Tape Arm*. For more information on the sensor/amplifier, refer to *Appendix A: Sensors*

No further setup is required. The *Low Cover Sensor* is ready to operate.

Adjusting the Tape Jam Sensor



The *Tape Jam Sensor* is located on the *Taper* track just before the *Sealer*. It detects if parts are doubled up or incorrectly placed in a carrier tape pocket so that the part protrudes above the level of the track and would interfere with cover tape placement.

If sensor sensitivity needs to be fine tuned, adjust the amplifiers at the base of the *Cover Tape Arm*. For more information on the sensor/amplifier, refer to *Appendix A: Sensors.*

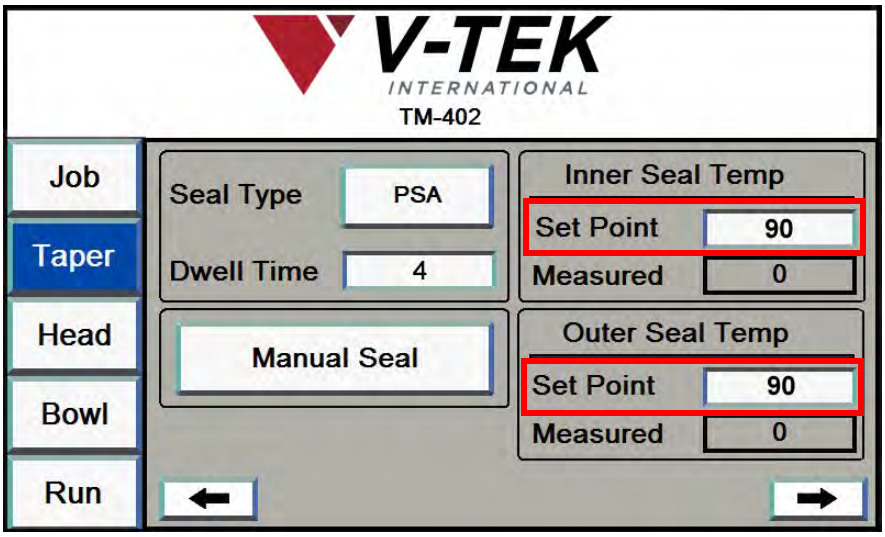
No further setup is required. The *Jam In Tape Sensor* is ready to operate.

Adjusting Heat Seal Quality

If a *Peel Force Test* determines the *Heat Sealer* is not generating a satisfactory seal, try one of the adjustments below to improve seal strength.

Heat Seal Shoe Temperature

Open the HMI *Taper Tab*. Press the right **Arrow** button twice to advance to the third *Taper* screen.

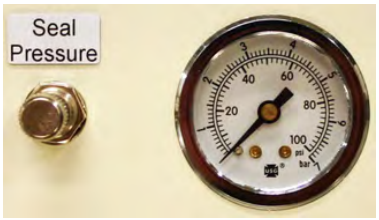


Increase or decrease the temperature of the sealer shoes. The inside and outside seals have independent temperature controllers. Increase or decrease the **Set Point** for each sealer as needed. Under normal conditions and materials, changing the temperatures should suffice.

> **Note:** Generally it is best practice to adjust the temperature to achieve the desired peel force.
>
> The TM-402 accommodates a wide range of carrier tapes and cover tapes. Settings may vary from one tape product to another. The suggested starting point is *90 degrees Celsius*. The maximum recommended operating temperature is 160° C. The temperature for each seal shoe should be increased or decreased as needed after running a peel force test.

Seal Pressure

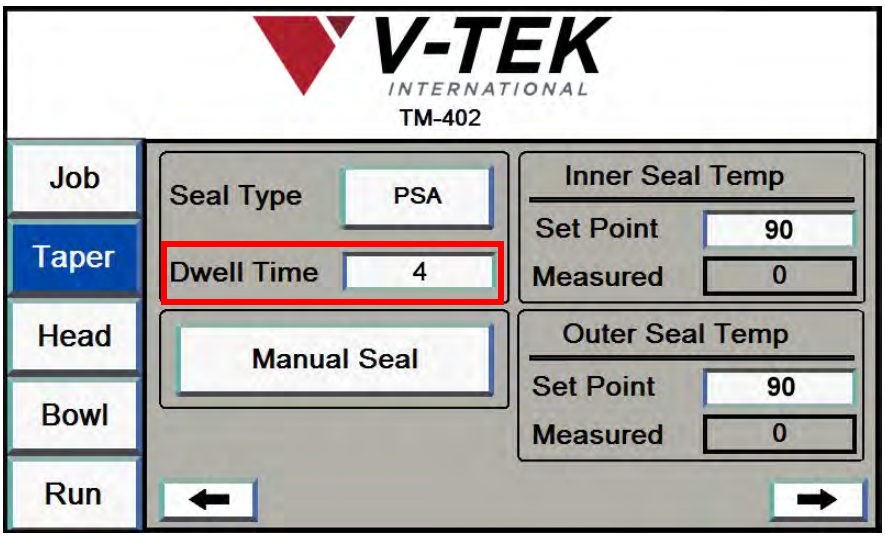
This control is located on the front of the *Taper*. It controls the amount of force applied when the sealer shoes drop. Turning the **Seal Pressure** control clockwise will increase the pressure, while turning it counter-clockwise will decrease the pressure.



Adjust the heat shoe **Seal Pressure** to the appropriate setting. The recommended starting point is between **40-60 psi**.

Sealer Dwell Time

Open the HMI *Taper Tab*. Press the right **Arrow** button twice to advance to the third *Taper* screen.



The *Dwell Time* is the amount of time the sealer spends in contact with the cover tape. Increase or decrease the dwell time.

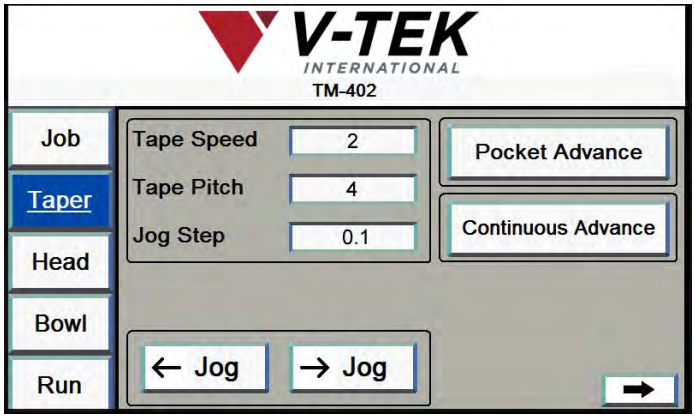
> **Note:** The dwell time affects the throughput of the taper. **The recommended *Dwell Time* is 400 ms**.

Adjusting PSA Seal Quality

If a *Peel Force Test* determines the *PSA Sealer* is not generating a satisfactory seal, try one of the adjustments below to improve seal strength.

Check Sealer Settings

Open the HMI *Taper Tab*. Review the settings on the four *Taper Tab* screens to ensure *Tape Settings* and *Sealer Settings* are appropriate for the current job.



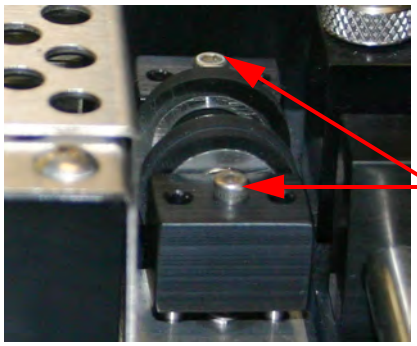
Materials Used

For a **PSA seal,** seal strength is determined first by the nature of the materials used. It is normally recommended to use the same brand of cover and carrier tapes together as the manufacturers use the appropriate adhesive to match the material used to make the carrier tapes.

Seal Roller Pressure

The second factor in PSA seal strength is the pressure applied to the cover tape as it is sealed to the carrier tape. The seal should appear as a solid stripe and it should not show any inconsistencies. If it does, the alignment of the cover tape should be confirmed and then the pressure to the seal rollers adjusted.

On the top of each sealer block, there are three holes with a screw in the center hole. With carrier and cover tape loaded, spin the *Sealer Wheel*. While spinning the *Sealer Wheel,* turn the screw clockwise until the wheel no longer spins freely, then turn the screw another 1/8 turn. The wheel should be firmly in contact with the tape.



Adjust the seal roller pressure until the PSA adhesive is firmly adhered to the carrier tape. Experience will allow the operator to judge the correct adjustment by feel. Repeat for the other sealer wheel.

> **Note:** Excessive roller pressure may cause carrier tape advance problems or elongation of sprocket holes in the carrier tape.

Chapter 8: Maintenance

Contents

Safe Maintenance Steps

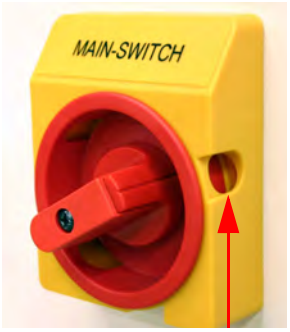
Caution! It is dangerous to service or maintain the TM-402 while it is connected to air and power supplies.

Before performing any maintenance tasks, ensure the machine is stationary and disconnect the electrical and pneumatic power supplies placing the unplugged cables in clear view. Follow your company's *Lock-out/Tag-out Procedures*.

Follow the steps below when performing routine maintenance or cleaning the TM-402.

1. Turn the TM-402 **OFF**.

2. Ensure the *Main Power Switch* is rotated to the **OFF** position. The *Main Power Switch* is Lock-out/Tag-out capable. Follow your company's Lock-out/Tag-out procedure to ensure safe maintenance.



lockout/tagout hole

3. Ensure the *Air Regulator* is rotated to the **OFF** position. The *Air Regulator* is Lock-out/Tag-out capable. Follow your company's Lock-out/Tag-out procedure to ensure safe maintenance.

4. Disconnect the air supply and place the unplugged air hose so it is clearly visible.

5. Disconnect the power supply and place the unplugged power cord so it is clearly visible.

6. Remove all carrier and cover tape from the *Taper*.

7. Remove parts from the *Bowl Feeder*.

8. Perform cleaning/maintenance as needed.

9. Reload *Bowl Feeder* parts.

10. Reload *Taper* carrier tape and cover tape.

11. Reconnect the air supply.

12. Reconnect the power supply.

13. Turn the TM-402 back **ON**.

Maintenance

Only maintenance personnel that have thoroughly read and understand the TM-402 User's Guide and have several years experience operating and maintaining similar machines should be permitted to maintain the TM-402.

Routine Maintenance Schedule

The TM-402's simple, low-maintenance design keeps required maintenance to a minimum. The following schedule indicates common maintenance tasks and how frequently they should be performed.

Maintenance Task	Schedule	Materials needed
Vacuum or brush dust and debris off machine, including sensors	Daily	• soft bristled paint brush or vacuum
Inspect nozzle tip for wear or damage	Daily	• To replace worn nozzle tip, call V-TEK Service for specific nozzle part number.
Check and set incoming air pressure to 85 psi with the vacuum on	Every 120 hours of operation or as needed.	• None
Check & record vacuum levels	Every 40-80 hours of operation	• None
Clean Heat Sealer shoes	Every 120 hours of operation or as needed	• 3/32" hex wrench • plastic or brass brush • alcohol
Clean Loading Track	Every 40 hours of operation	• small, stiff bristled paint brush
Clean Cover Tape Guide	Every 40 hours of operation	• alcohol • cotton swabs
Inspect Air Pressure Regulator for moisture build-up	Every 40 hours of operation	• none
Clean PSA Sealer assembly	Every 40 hours of operation	• alcohol • cotton swabs
Replace nozzle vacuum filter	Every 200-300 hours of operation	• nozzle vacuum filter (p/n 201026)
Remove heat shoes, replace if necessary	Every 4 months	• Heat Shoes (p/n 261122)

Caution!

Users should always wear protective eye wear when operating or maintaining the TM-402.

General Maintenance Tasks

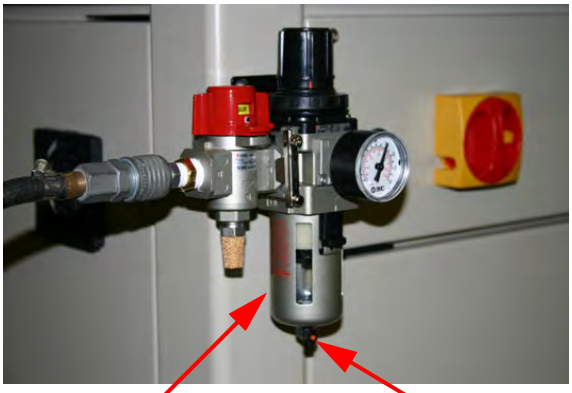
Daily cleaning

Vacuum or brush off the machine with a stiff bristled paint brush **daily**, removing dust and debris from all operating areas including the sensors.

Air Pressure Regulator

Check the incoming air pressure **every 40-80 hours of operation** to ensure it is set to 85 psi with all vacuums ON. Adjust if necessary.

Inspect the air regulator for moisture accumulation after **every 40 hours of operation**. Turn the petcock on the bottom of the regulator clockwise to release the fluid if moisture is present. Tighten the petcock when moisture is gone.



Note: Frequency of moisture build-up will vary with air quality. Check the Air Pressure Regulator periodically to determine if fluids need to be released more frequently.

Other than the release of moisture build-up, the TM-402 pneumatic system should not require adjustment or replacement. Should an issue with the pneumatic system arise, call V-Tek Service for assistance.

Caution!

The TM-402 air supply should be adjusted to operate at a maximum working pressure not exceeding 7.6 bar (110 psi). The maximum permissible source pressure should not exceed 9 bar (130 psi). Failure to set the within these limits could result in a failure in the pneumatic system which could lead to injury.

Lubrication

No lubrication is required or desired on the TM-402 as all parts are no maintenance in this regard and the use of lubricants could interfere with components.

Pick Head Maintenance

Nozzle Tip

Inspect the nozzle tip **daily** for excessive wear or damage. Remove and replace as necessary. See *Chapter 4: Machine Setup* for instructions on changing the nozzle tip.

Vacuum Levels.

Check Vacuum levels **weekly**. This recorded information on high/low vacuum levels is useful on a week to week basis and can indicate pneumatic problems such as loose fittings or seal problems.

1. Turn on the vacuum generator from the HMI.

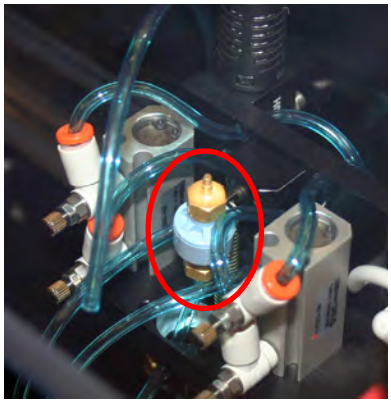
2. Observe and record vacuum level for the nozzle with no part present.

3. Cover the nozzle (with part or some object) and record vacuum levels.

4. Compare the current vacuum levels with those previously recorded. A partially blocked nozzle or restricted filter in the nozzle assembly is indicated by a smaller vacuum swing.

5. Remove and replace the nozzle vacuum filter if there are high vacuum levels without part or poor pickup.

Replace the Vacuum Filter

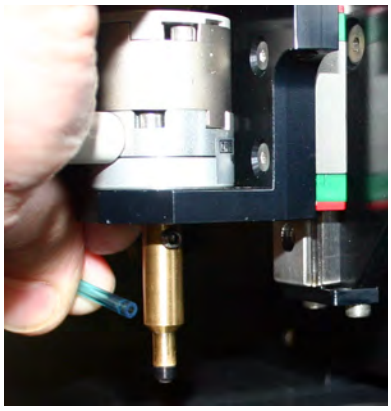


If parts are not picking consistently or if the *Nozzle Vacuum Sensor* indicates there is a part on the *Nozzle* (values appear green) without a part on the nozzle, this is an indicator that the *Vacuum Filter* needs to be cleaned or replaced. Typically the *Vacuum Filter* will require attention after 200-300 hours of operation.

The *Vacuum Filter* is located on top of the *Pick Head Assembly.*

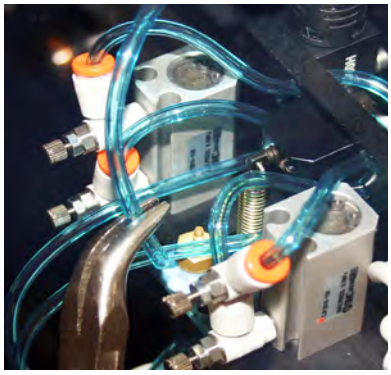
1. Open the front door and manually move the pick head all the way to the front for easy access.

2. Remove the air line from the *Nozzle Shank*.



3. Use a needle-nose pliers to remove the air line from the *Upper Filter Fitting* which is located at the top of the *Vacuum Filter*.

4. Use a 2.5mm Hex wrench to remove the retaining screw that holds the *Filter* in place.



5. Lift the *Filter* from the housing and remove it from the machine.

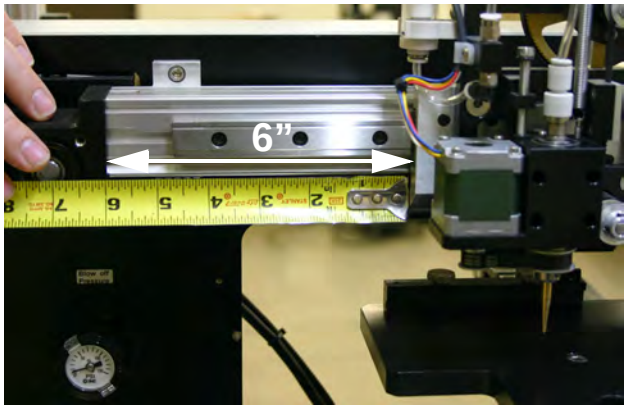
6. Blow air through the filter to clean it or replace with a new filter. (See *Spare Parts List* in the back of this User's Guide for order information.).

7. Replace the *Filter* on the *Pick Head*, reconnecting the air line at the top of the *Vacuum Filter* and at the *Nozzle Shank*.

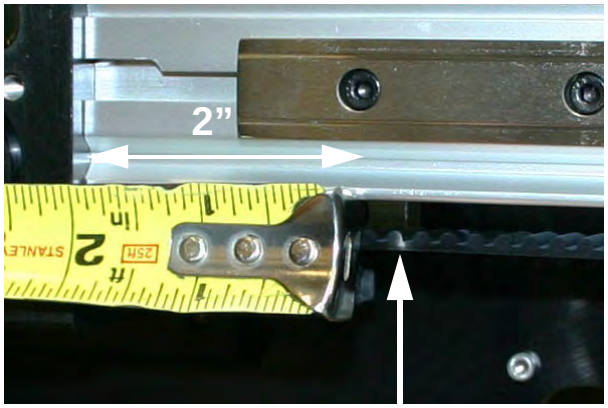
Check Actuator Belt Tension

The Actuator Belt tension should be measured after its first 30-40 hours of run time, then annually after that. To measure belt tension, follow the instructions below.

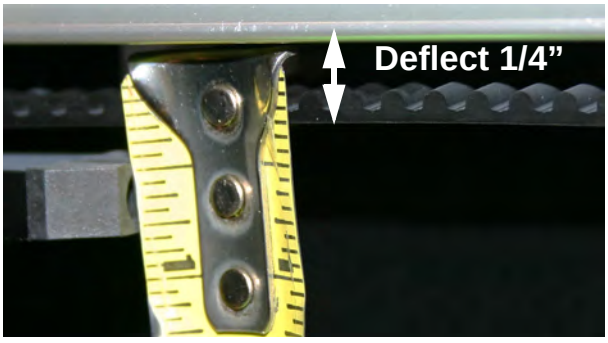
1. Position the Pick Head Carrier so the edge of the carrier is 6" from the inside end of the Actuator Head.



2. Position a force gauge on the Belt 2” from the inside end of the Actuator Head.



3. Deflect the Belt 1/4" (6 mm) in either direction. The force gauge should read between 12 and 16 lbs. [53 - 62 N].



Note: Contact V-TEK Service for tensioning procedure if belt tension is outside tolerance.

Taping Module Maintenance

Heat Sealer

Heat sealer maintenance consists mainly of cleaning built-up debris and adhesive residues from the heat shoes. It should be cleaned after **every 120 hours of operation or as needed**.

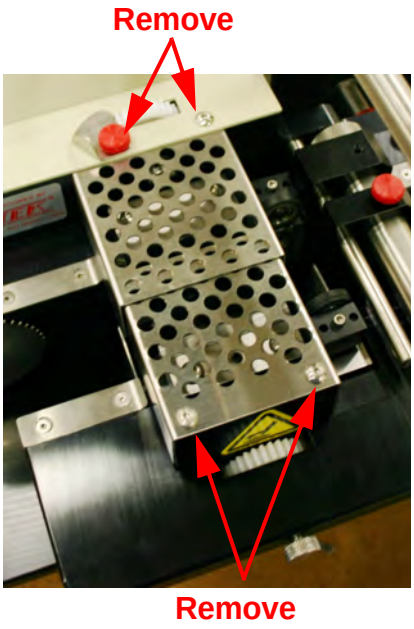
To clean the heat shoes, follow the steps below.

1. Slide the loading track all the way out.

2. If the sealer assembly is still hot, allow it to cool completely before continuing.

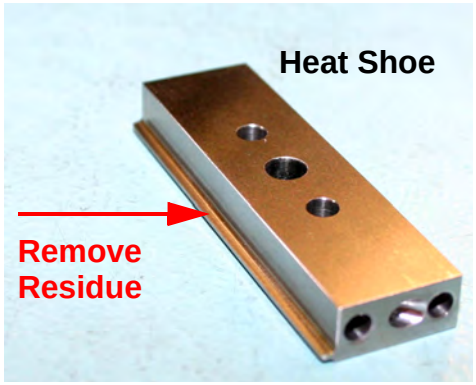
Note: Do not attempt to use alcohol when the sealer is hot.

3. Using a 3/32" hex wrench, remove the (3) *Button Head Cap Screws* and the red Thumb Screw from the two sheet metal covers.



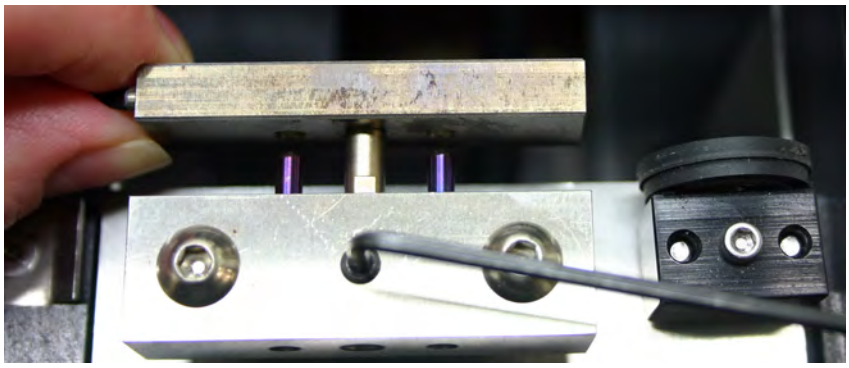
4. Clean the residues from the heat shoes by using a plastic or brass brush soaked in alcohol to remove any residue that has built up on the lip of the heat shoe.

   Note: Do not use a steel bristled brush. It could damage the heat shoes.



Remove/Replace Heat Shoes

Remove heat shoes **every four months** and inspect and clean them. Replace if necessary.



1. Ensure the heater is off and has cooled completely.
2. Remove the outer heat sealer guard as described above.
3. Use a 5/64 inch hex wrench to release the shoe from the heat sealer assembly.
4. Use a 5/64 inch hex wrench to unscrew the set screws on both ends of the heat shoe so the heater and the thermocouple can be removed.
5. Insert the heater and the thermocouple in a new heat shoe, aligning them so their ends are flush with the end of the heat shoe. Tighten the set screws to hold them in position.
6. Place the heat shoe back on the sealer assembly and tighten the set screw.
7. Replace the outer sealer guard.

Loading Track.

The Loading Track should be cleared of dust and debris after **every 40 hours of operation**.

Strip the machine, remove the cover tape guide, and brush the dust and debris from the track with a small, stiff bristled paint brush. Excessive build-up of dirt and debris can cause carrier tape jams.

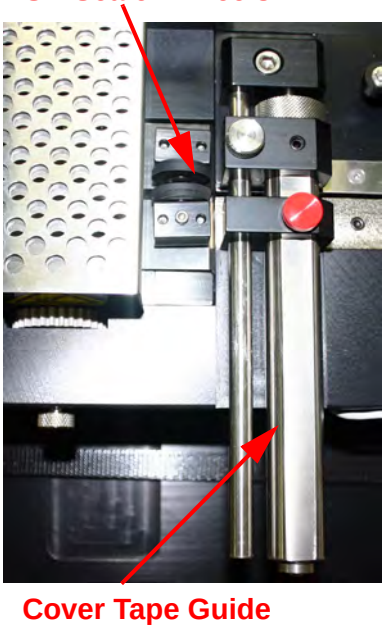
PSA Sealer

The adhesive residues should be cleaned from the sealer assembly **every 40 hours of operation**.

Wipe the entire assembly using a cloth soaked in alcohol. Using a cotton swab soaked in alcohol, clean between the sealer wheels. Also, clean the entire surface of the black polyurethane wheel.

> **Note**: Do not use solvents other than alcohol when cleaning the black polyurethane wheels.

If during the cleaning process the sealer has become completely out of adjustment, turn the small screw behind the wheel counterclockwise approximately three turns. Slowly turn the screw clockwise while spinning the top wheel. Stop adjusting when the bottom wheel starts spinning with the top wheel.



Cover Tape Guide

The *Cover Tape Guide* may become coated with adhesive and dirt during taping. It is important to keep the tape groove clean for proper alignment of the cover tape.

Clean the tape groove with alcohol and a cotton swab whenever it appears dirty. The recommended cleaning schedule is **every 40 hours of operation**.

Appendix A: Sensors

Contents

Keyence FS-N11CP & FSN12CP Sensor Amplifiers

The *Keyence FS-N11CP* and *FS-N12CP* sensor amplifiers (shown in Figure A.1 below) are used on the TM-400 Series machines for the *Low Cover Tape Sensor* and the *Tape Jam Sensor*. Both amplifiers are mounted on the *Cover Tape Arm*. The *Low Cover Tape* amplifier (FS-N11CP) is located on the left. The *Tape Jam* amplifier (FS-N12CP) is located on the right.

The two amplifiers are designed to be attached electrically and share power. Otherwise, the two units function independently of one another.

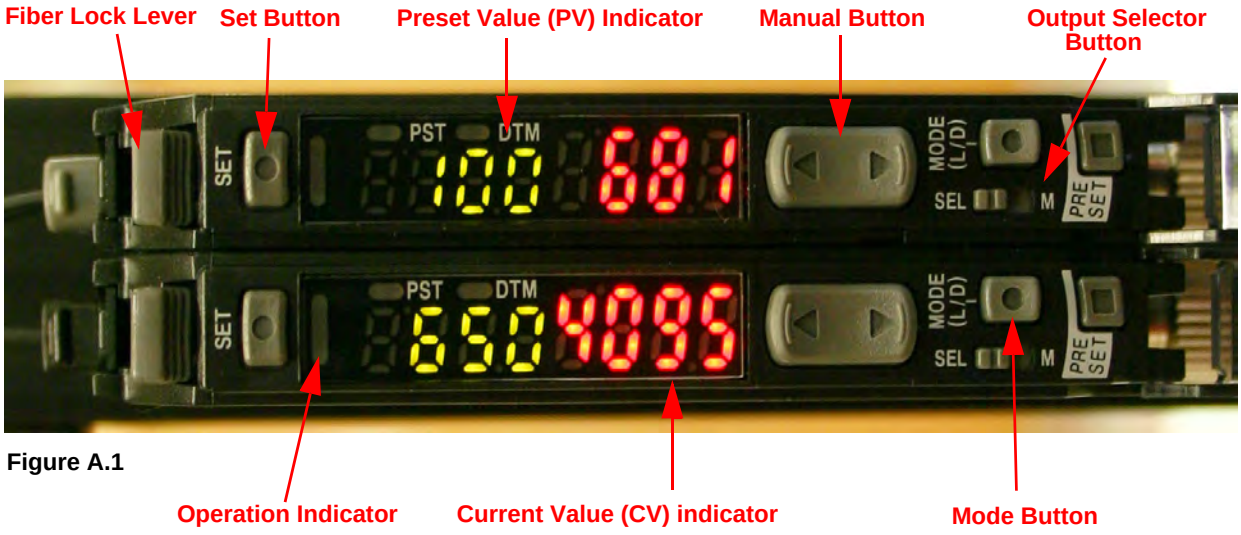


Figure A.1

Selecting the Output Mode

The FS-N11CP/FS-N12CP sensor-amplifiers can be set to two *Output Modes*: **light-ON** or **dark-ON**. This determines under what conditions the sensor is triggered and the *Operation Indicator* is lit.

In **light-ON** mode, the sensor will be triggered when the current value (CV) of detected light from the emitter is higher than the preset value (PV). In **dark-ON** mode, the sensor is triggered when the CV of detected light is lower than the PV. Essentially, in **light-ON** *Output Mode* the sensor detects when an obstruction occurs (causing reflected light to increase) and in **dark-ON** *Output Mode* the sensor detects when an obstruction is removed (causing reflected light to decrease).

1. Press the **Output Selector** button. The *CV Indicator* will display the current mode.

2. Press the **Manual** button within 5 seconds of having pressed the **Output Selector** button. The *Output Mode* will be toggled.

3. The *CV Indicator* will return to its normal display after 5 seconds have elapsed.

Locking the Keys

It is sometimes desirable to lock the keys of the sensor amplifiers so that the currents settings are not inadvertently changed.

1. Hold down the **Manual** button and the **Mode** button simultaneously for at least three seconds.

2. The *CV indicator* will display **Loc** to indicate that the lock is in place.

3. Repeat the same procedure to unlock the keys. The display will flash the message **unL**.

Two-point Calibration

1. With an obstructing object between the sensors (ideally, a full reel of cover tape), press and release the **SET** button. The *PV Indicator* will be lit.

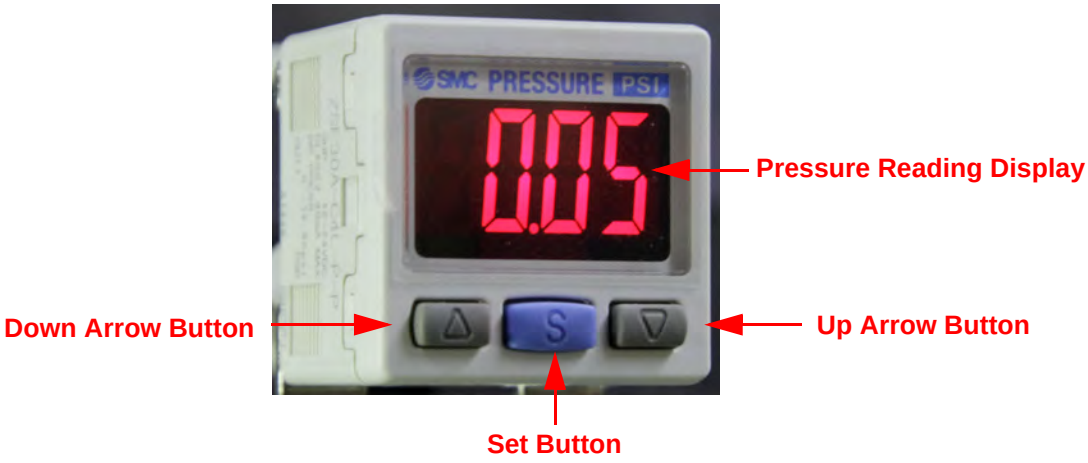
2. Remove the obstruction between the sensors and press **SET** again. The amplifier will return to its normal operating mode. The number shown on the *PV Indicator* should change.

3. If the sensor is in dark-ON mode, the operation indicator should be lit while there is an obstruction between the sensors. If the sensor is in light-ON mode, the operation indicator should be lit while there is no obstruction between the sensors.

SMC ZSE30 Vacuum Sensor

The SMC ZSE30 Vacuum Sensor functions as a *Pick & Place Head* part present sensor. It compares the vacuum pressure at the pick and place nozzle to a threshold point.

When the vacuum pressure drops beneath this level the sensor sends an **OFF** signal to the machine (the LCD display will be green). When the vacuum rises above the threshold, the sensor sends an **ON** signal to the machine (the LCD screen will be red).



Adjusting the Vacuum Sensor

If the machine places “empty” pockets (i.e., places as though it held a part when it did not) or returns a picking part error when it picked a part, the vacuum sensor’s threshold point probably needs to be adjusted.

To adjust the threshold point, follow these instructions:

1. With no part on the nozzle and the vacuum **ON**, note the reading on the vacuum sensor. *Example: -60.5.*

2. Press the **Set** button. The sensor will alternately flash **n_1** and the current setting. This is the threshold point.

3. Using the **Up Arrow** and **Down Arrow** buttons, adjust the value of **n_1** to about 5 less than the pressure reading that was noted with no part on the nozzle. *Example: -60.5 - 5 = -65.5.*

4. Press the **Set** button again. The sensor will now display the **h** (hysteresis) setting. This should read **0.0**.

5. Press the **Set** button again to exit back to *Normal Operation* mode. Run the machine and observe if the vacuum sensor is functioning properly.

6. If the machine places empty pockets, set the threshold point closer to the pressure reading when a part is on the nozzle. If the machine fails to detect a part on the nozzle when

one is present, set the threshold closer to the pressure reading when no part is on the nozzle. In this way, the optimum setting for each specific part can be reached.

Initial Factory Settings

If for some reason the sensor needs to be re-initialized to the default factory settings, follow the steps below:

1. Press and hold the **Set** button for at least two seconds. The sensor will enter initialization mode. The first setting to appear will be the *Indication Unit* setting. This should be set to **PA**. Use the **Up Arrows** and **Down Arrows** to adjust this, if necessary.

2. Press the **Set** button to advance to the *Display Color* setting. This should be set to **Sor** (Red/ON).

3. The next setting is the *Operation* mode setting. This should be set to **HyS** (hysteresis).

4. The next setting is the *Output* mode setting. This should be set to **nC** (normally closed). If this setting is incorrect, the sensor will function backwards, such that the machine will not detect a part when is on the nozzle and detect a part when no part is present.

5. The next setting is the *Response Time* setting. This should be set to **2.5.**

6. The final setting is the *Auto Preset* setting. This should be set to **mAn** (manual).

7. Press the **Set** button to return to *Normal Operation* mode.

TM-402 Suggested Spare Parts List

Part Number	Description	Qty
102534	Reset Switch Contact	1
102597	Digital Pressure Switch	1
105786	Take-up Motor	1
200401	Sealer Air Regulator	1
200636	Solenoid Air Valve	1
201026	Pick & Place Vacuum Air Filter	1
201207	Convum Vacuum Cup	1
201280	Nozzle Cup A3, 60 x 30	2
209250	Pick & Place Spring	1
201271	SPT Vacuum Cup	1
201297	Large Quad Vacuum Cup	1
201298	Medium Quad Vacuum Cup	1
201299	Small Quad Vacuum Cup	1
210019	Taper Timing belt	1
210109	Pick & Place Timing Belt	1
212001	Solenoid O-Rings	3
212008	Taper Idler O-Ring	2
212025	Nozzle O-Rings	2
244010	Taper Thermocouple	2
244012	Taper Heater	2
261122	Heat Shoe	1
266737	Taper Drive Sprocket	1
292464	Convum Nozzle Kit	1
292465	Quad Nozzle Kit	1
292467	SPT Nozzle Kit	1
290603	Taper Upper PSA Wheel Assembly	2
500440	Vision Sensor Amplifier	1

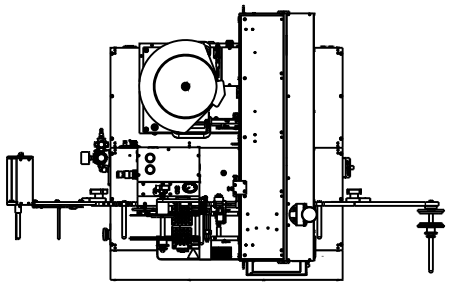
Caution!

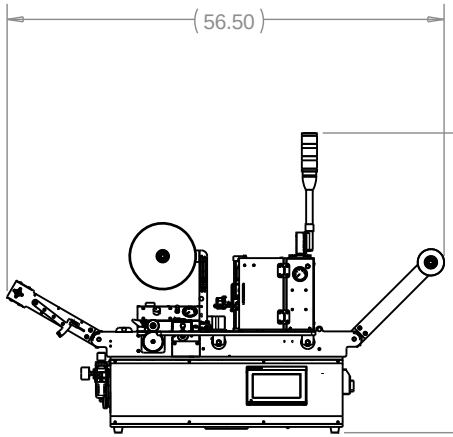
Only genuine spares should be used on the TM-402. Failure to use genuine spare parts could render the machine unsafe and void factory warranty.

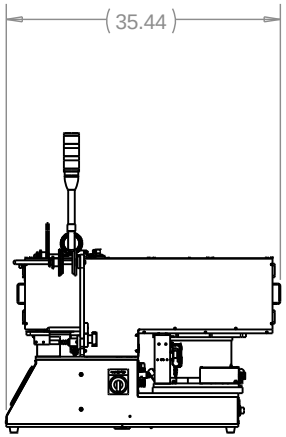
TM-402 Exploded Views

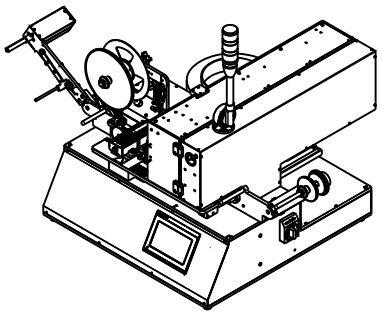
Document List

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/12/2013	PVO
2873	B	REPLACE ASSEMBLY 291669 WITH ASSEMBLY 292050	8/10/2015	RH
2904	C	REPLACED 292050,291668 WITH 292324,291327	7/21/2016	PVO
2954	D	UPDATE LOGO DECALS	7/17/2017	PVO
3099	E	ADDED NOZZLE KIT 292755 TO THE BOM	3/5/2019	PVO









UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

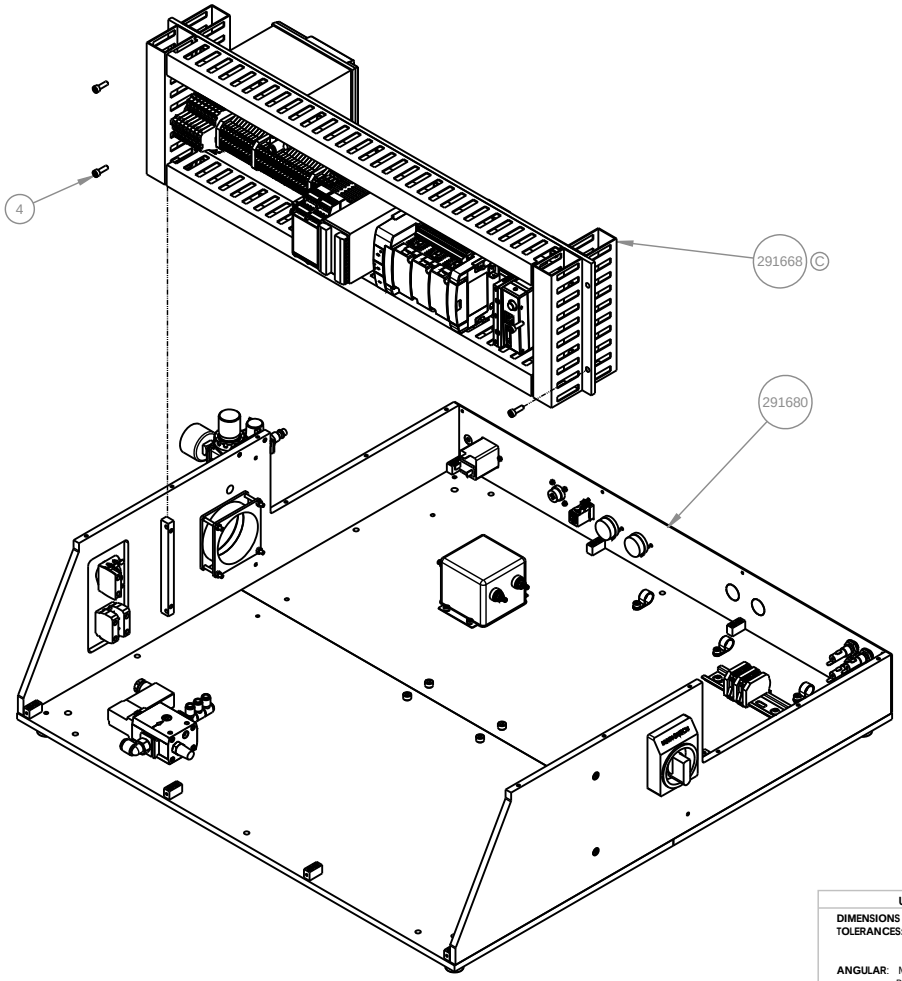
TM-402 240V BOWL

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291683 | REV E

WEIGHT (lbs): 384.83 | SHEET 1 OF 6



ITEM NO.	PART NO.	DESCRIPTION	QTY
4	221745	SHCS SS M5 X 16	4
7	291668	TM402 ELECTRICAL PANEL (BOWL 240V)	1
9	291680	TM-402 BASE (BOWL)	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

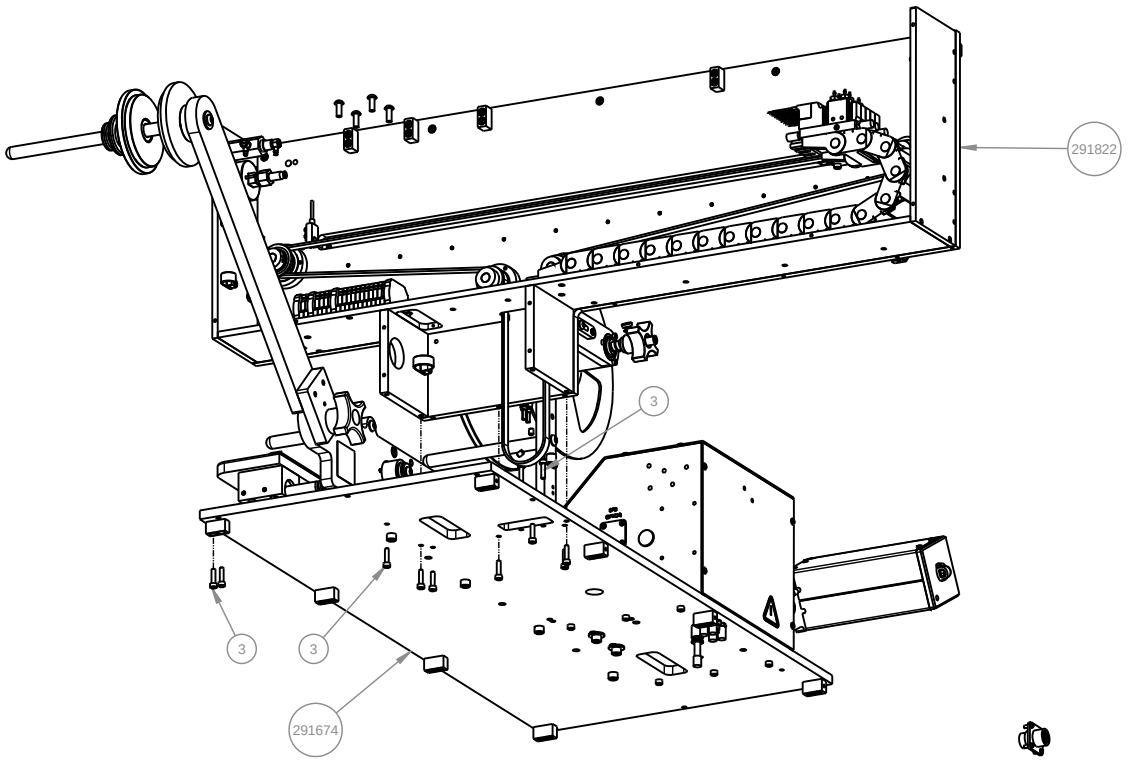
TM-402 240V BOWL

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291683 | REV E

WEIGHT (lbs): 384.83 | SHEET 2 OF 6



NOTE:
THIS IS THE FINAL ASSEMBLY OF THE ***TM-400 P&P ASSEMBLY*** (291822) AS NOTED ON THE ASSEMBLY DRAWING.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
3	221733	SS SHCS M4X16	31
7	291674	TM-400 TAPER ASSEMBLY	1
11	291822	TM-400 PICK & PLACE ASSEMBLY	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

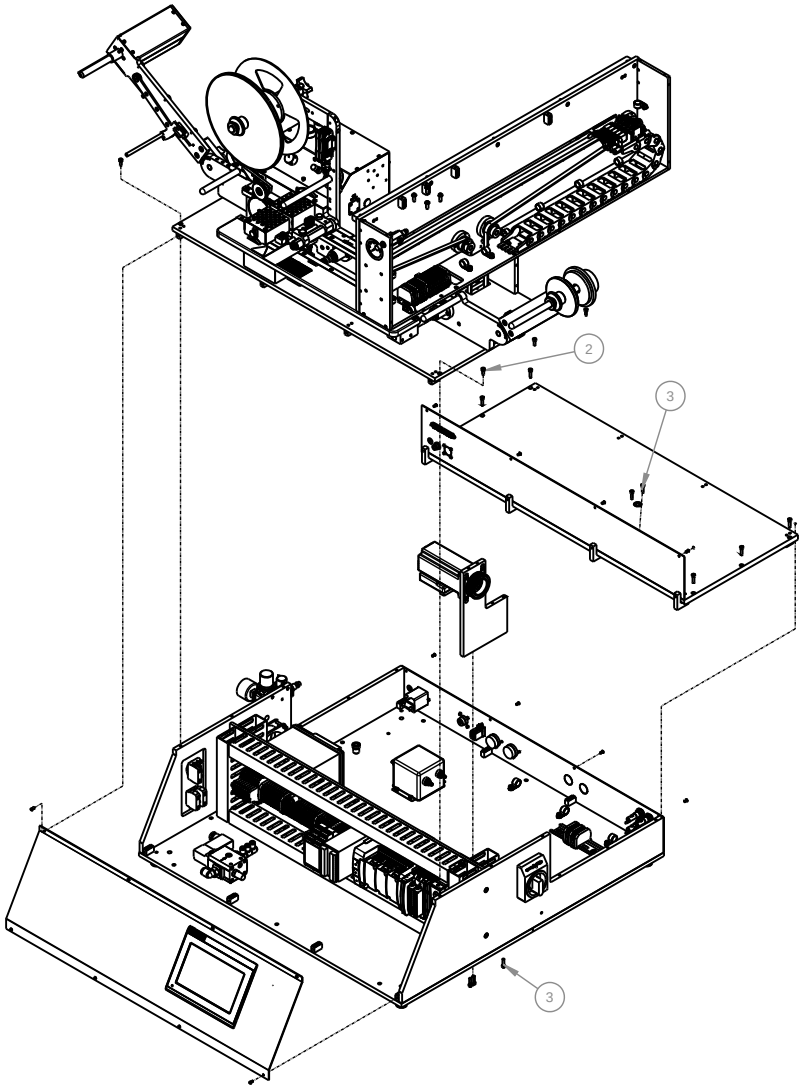
TM-402 240V BOWL

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291683 | REV E

WEIGHT (lbs): 384.83 | SHEET 3 OF 6



NOTE:
THIS IS THE FINAL ASSEMBLY OF THE ***TM-402 BASE ASSEMBLY*** (291680) AND THE ***TM-400 P&P ASSEMBLY*** (291822)AS NOTED ON THE ASSEMBLY DRAWING.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
2	221731	SHCS SS M4 X 12	6
3	221733	SS SHCS M4X16	31

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-402 240V BOWL

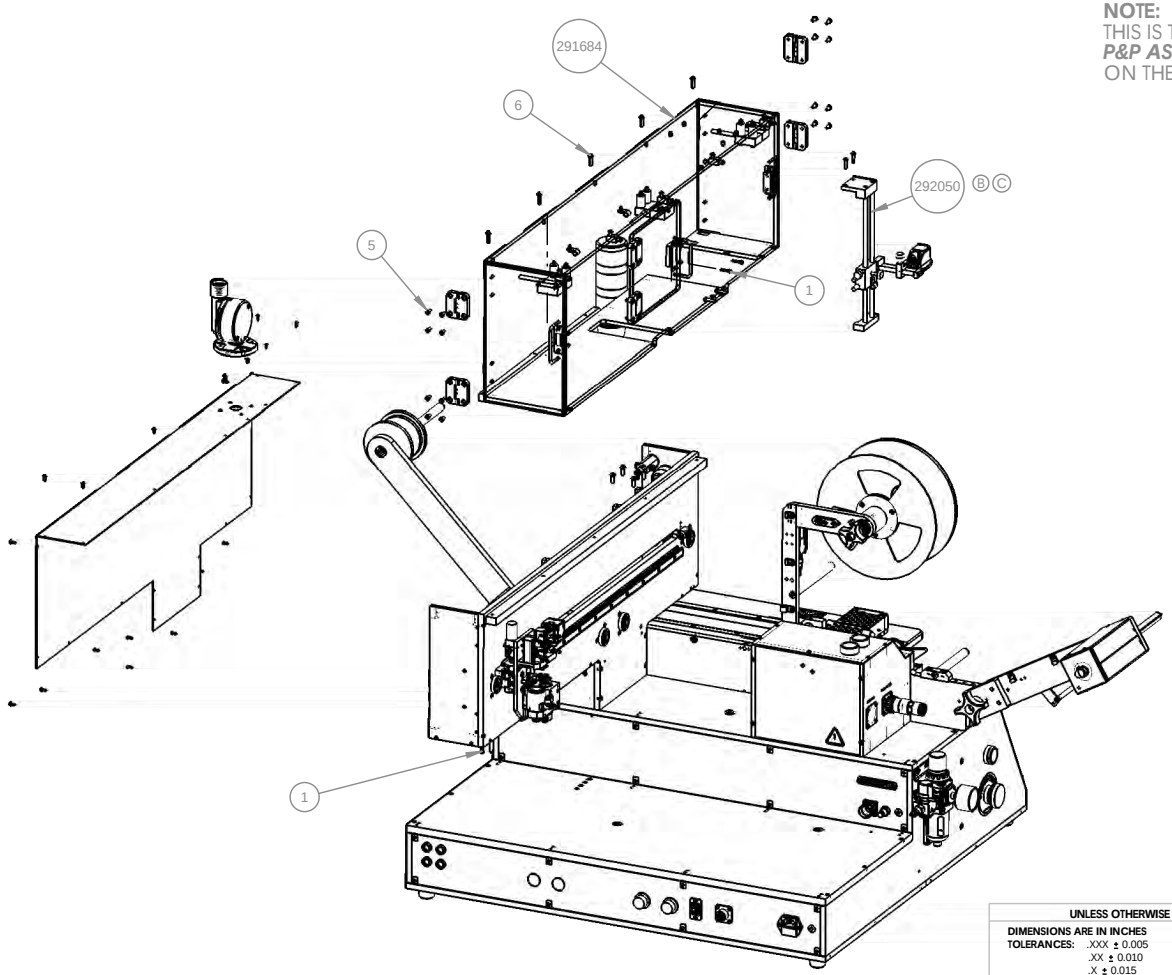
MATERIAL

FINISH

SIZE **B** | DWG. NO. 291683 | REV E

WEIGHT (lbs): 384.83 | SHEET 4 OF 6

NOTE:
THIS IS THE FINAL ASSEMBLY OF THE ***P&P ASSEMBLY*** (291822) AS NOTED ON THE ASSEMBLY DRAWING.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	221714	SHCS SS M3 X 16	5
5	223730	BHCS SS M4 X 10	8
6	223733	BHCS SS M4 X 16	5
10	291684	TM-402 GUARD ASSEMBLY (BOWL)	1
13	292050	OVER TAPE CAMERA ASSEMBLY	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

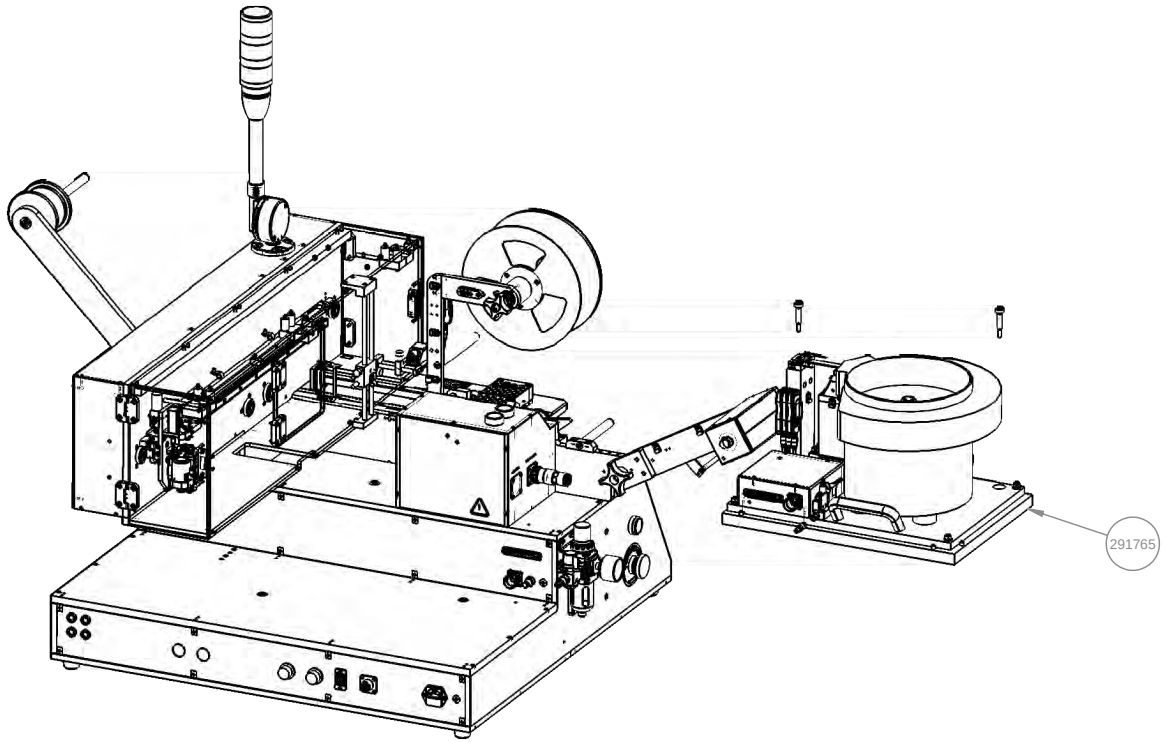
TM-402 240V BOWL

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291683 | REV E

WEIGHT (lbs): 384.83 | SHEET 5 OF 6



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
11	291765	TM402 240V BOWL ASSY	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-402 240V BOWL

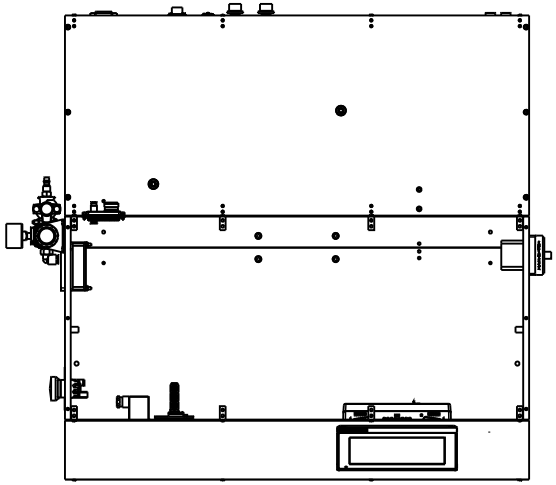
MATERIAL

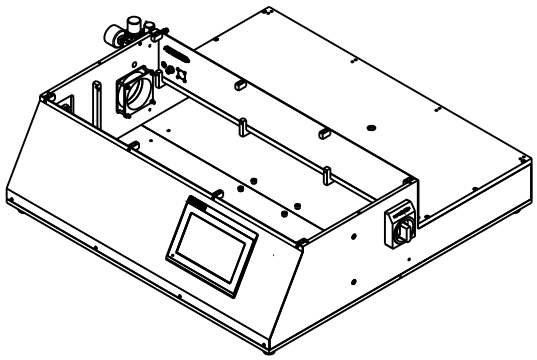
FINISH

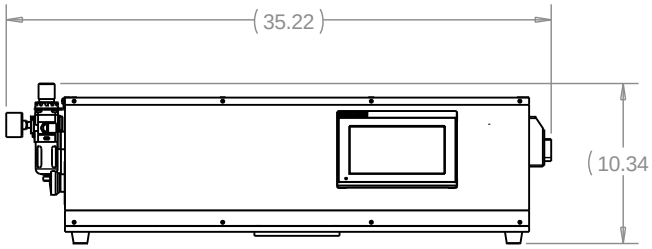
SIZE **B** | DWG. NO. 291683 | REV E

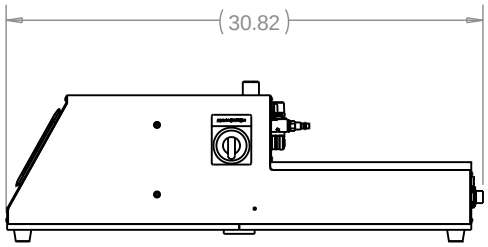
WEIGHT (lbs): 384.83 | SHEET 6 OF 6

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/11/2013	PVO
2895	B	ADDED PART #103058	6/30/2016	PVO
2920	C	REPLACE 105830 WITH 105926	1/12/2017	PVO
2954	D	REPLACE 111160 WITH 111177	7/17/2017	PVO









UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

TITLE:

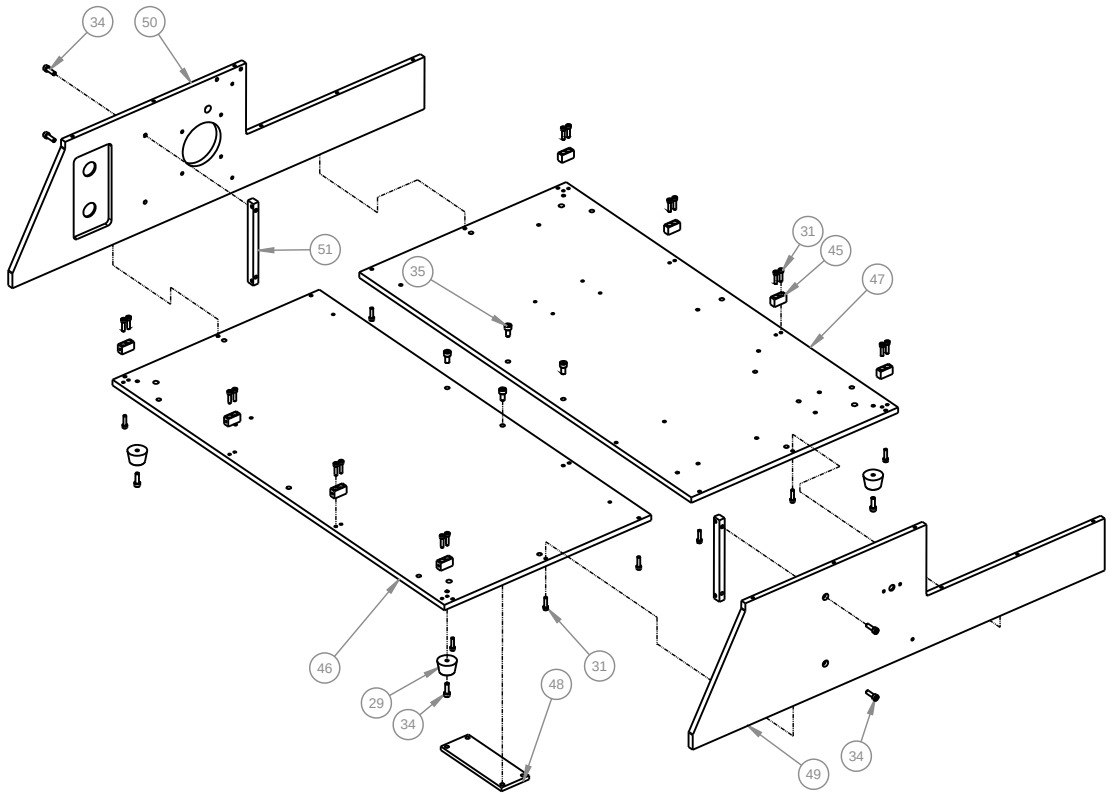
TM-402 BASE (BOWL)

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291680 | REV **D**

WEIGHT (lbs): 80.36 | SHEET 1 OF 8



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
29	217211	FEET POLY	4
31	221733	SS SHCS M4 x 16mm	34
34	221745	SS SHCS M5 x 16mm	8
35	221754	SS SHCS M6 x 12mm	4
45	267021	BUMPER MOUNT	20
46	267050	TM400 LOWER BASEPLATE (FRONT)	1
47	267051	TM400 LOWER BASEPLATE (REAR)	1
48	267052	JOINING PLATE	1
49	267053	TM400 BASE SIDE (RIGHT)	1
50	267054	TM400 BASE SIDE (LEFT)	1
51	267055	ELECTRICAL PANEL MOUNT	2

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

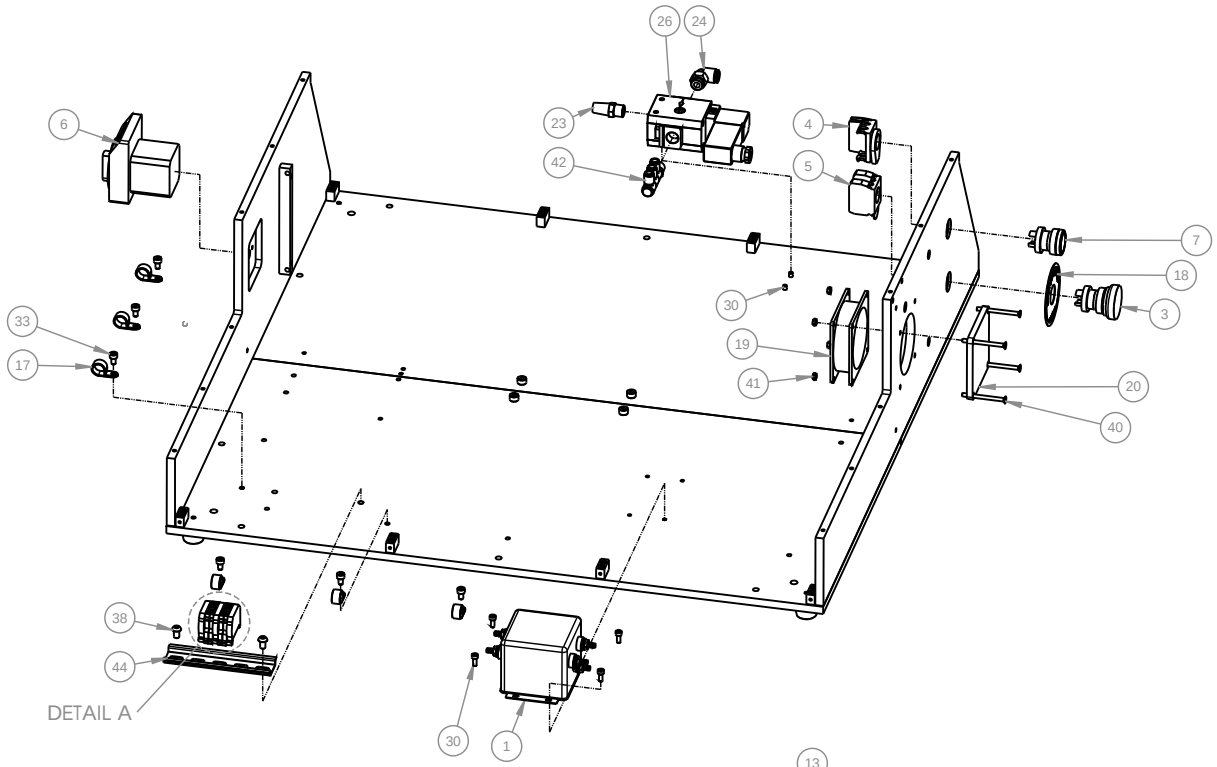
TM-402 BASE (BOWL)

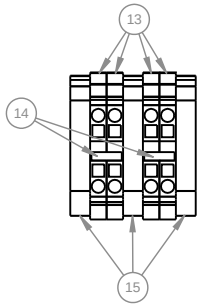
MATERIAL

FINISH

SIZE **B** | DWG. NO. 291680 | REV **D**

WEIGHT (lbs): 80.36





DETAIL A
TERMINAL BLOCK
SCALE 1:5

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	101906	FILTER RFI 30A	1
3	102528	SWITCH ESTOP	1
4	102534	SWITCH CONTACT BLOCK (NO)	1
5	102535	SWITCH CONTACT BLOCK (NC) (2)	1
6	102570	SWITCH - MAIN POWER	1
7	102586	SWITCH RESET	1
13	104158	TERM BLOCK	4
14	104159	TERM JUMPER	2
15	104160	TERM END CAP	3
17	107112	CABLE CLAMP 9/16-.203 HOLE	6
18	111008	SAFETY STICKER E-STOP W/ROTA	1
19	113001	FAN	1
20	113003	FAN FILTER ASSEMBLY	1
23	200294	AIR FITTING 1/4" EXHAUST MUFFL	1
24	200367	ONE TOUCH FITTING, SMC 010	2
26	200685	VALVE, DUMP; SOFT START	1
30	221730	SS SHCS M4 x 10mm	6
33	221741	SS SHCS M5 x 8mm	6
38	223754	SS BHCS M6 x 10mm	2
40	225738	SS FHCS M4 x 50mm	4
41	239104	SS M4 NUT	4
42	246542	FITTING, KQ2 INCH SIZE	1
44	266776	BOWL ASSEMBLY DIN RAIL	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-402 BASE (BOWL)

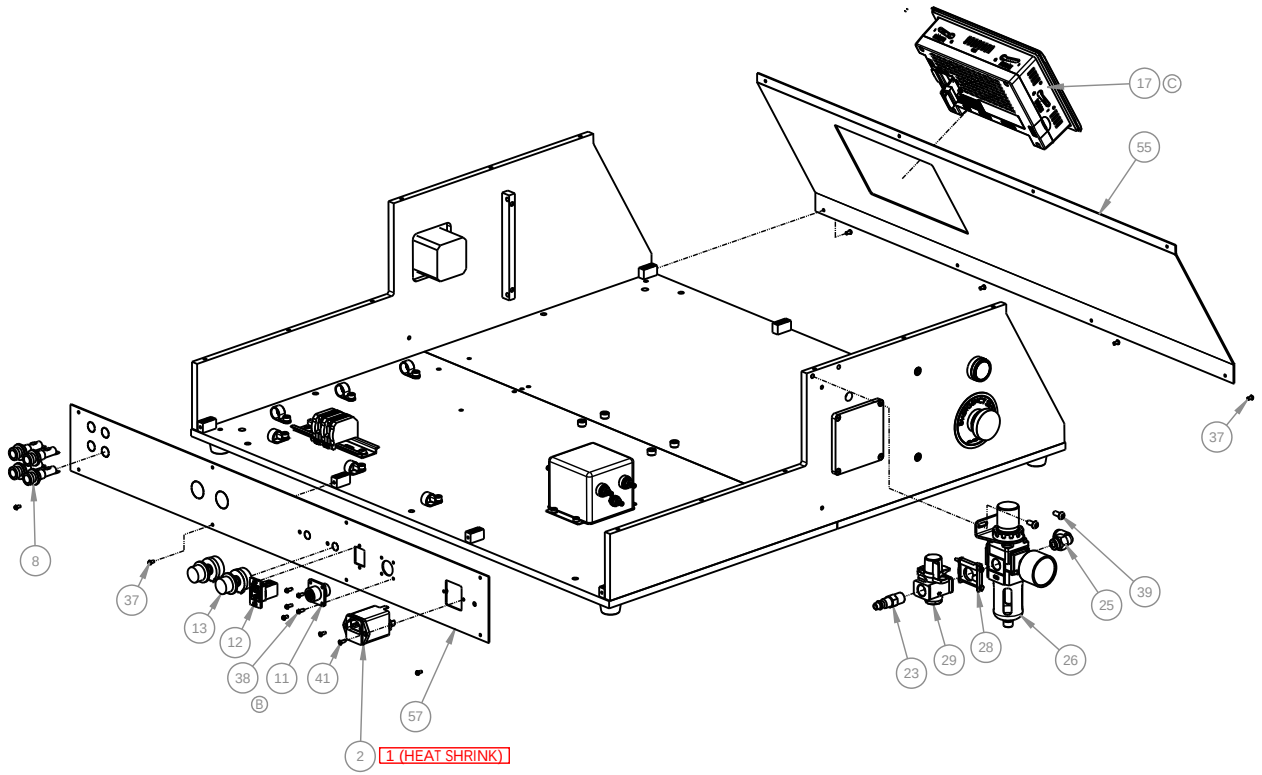
MATERIAL

FINISH

SIZE B | DWG. NO. 291680 | REV D

WEIGHT (lbs): 80.36

NOTE:
THE ***PANELVIEW*** (105926) AND THE ***TM-400 FRONT PANEL*** (267057) SHOULD NOT BE PLACED UNTIL THE FINAL ASSEMBLY OF THE ***TM-402*** (291683).



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
2	101908	FILTER AC ENTRY FUSED	1
8	102621	FUSE HOLDER	4
11	103058	RECEPT AMP 4 PIN	1
12	103215	CONNECTOR PANEL MOUNT RJ-45	1
13	103586	POTENTIOMETER	2
17	105926	PANELVIEW	1
23	200281	AIR FITTING, 1/4" MALE COUPLER	1
25	200367	ONE TOUCH FITTING, SMC 010	2
26	200433	AW20-N02BG-Z	1
28	207054	SPACER 20 SERIES	1
29	217049	VHS20-N01-Z	1
37	223711	SS BHCS M3 x 6mm	24
38	223712	SS BHCS M3 x 8mm	4
39	223743	SS BHCS M5 x 12mm	2
41	224035	SS FHCS M3 x 8mm	2
55	267057	TM400 FRONT PANEL	1
57	267059	TM400 REAR PANEL	1

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
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BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

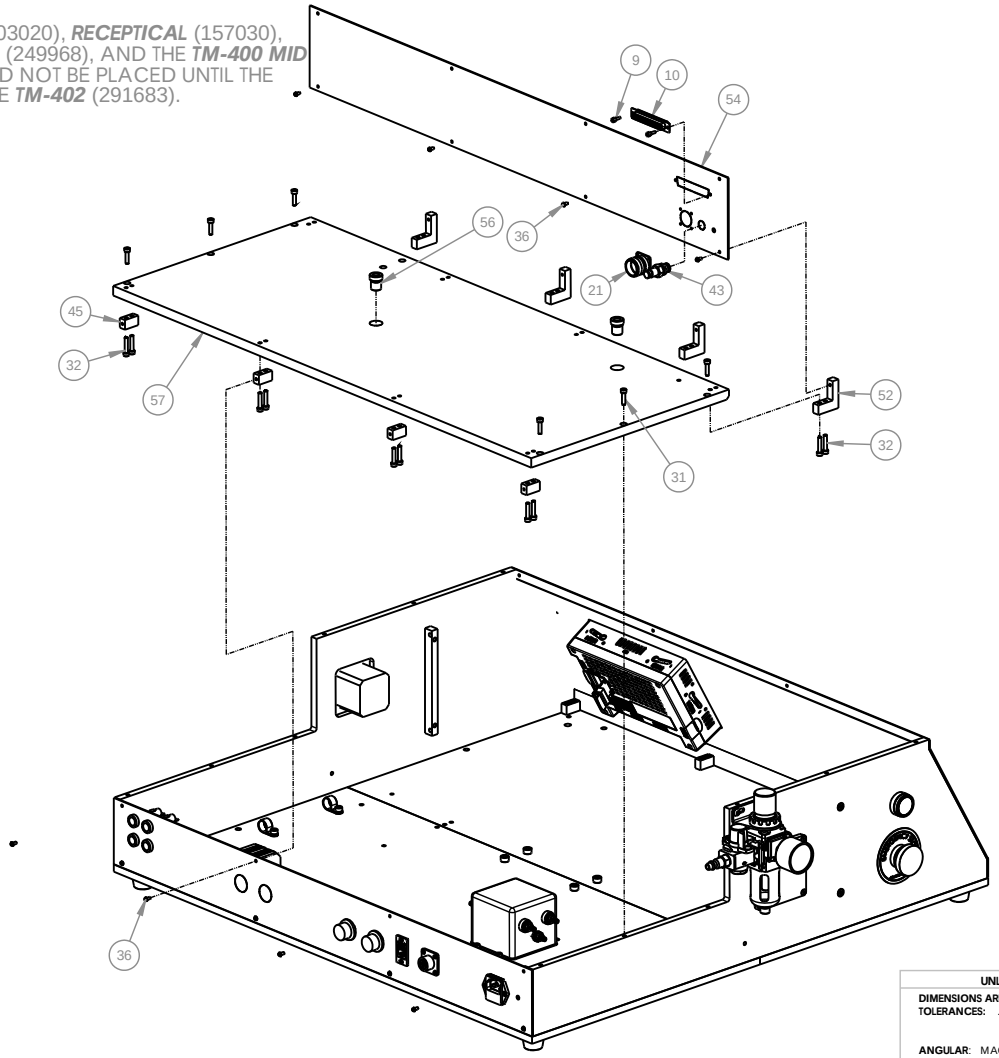
TITLE:
TM-402 BASE (BOWL)

MATERIAL
FINISH

SIZE **B** | DWG. NO. **291680** | REV **D**

WEIGHT (lbs): 80.36 | SHEET 4 OF 8

NOTE:
THE ***D SUB 37 PIN (F)*** (103020), ***RECEPTICAL*** (157030), ***SMC PART #(KK25-06E)*** (249968), AND THE ***TM-400 MID PANEL*** (267058) SHOULD NOT BE PLACED UNTIL THE FINAL ASSEMBLY OF THE ***TM-402*** (291683).



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
9	103012	D SUB MOUNTING HEX POST (2)	2
10	103020	D SUB 37 PIN (F)	1
21	157030	RECEPTICAL	1
31	221733	SS SHCS M4 x 16mm	34
32	221735	SS SHCS M4 x 20mm	16
36	223711	SS BHCS M3 x 6mm	24
43	249968	SMC PART # (KK2S-06E)	1
45	267021	BUMPER MOUNT	20
52	267056	PANEL MOUNT	4
54	267058	TM400 MID PANEL	1
56	267060	SHOULDER BOLT RECEIVER (1/2" PLATE)	2
57	267077	TM400 INPUT PLATE (BOWL)	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-402 BASE (BOWL)

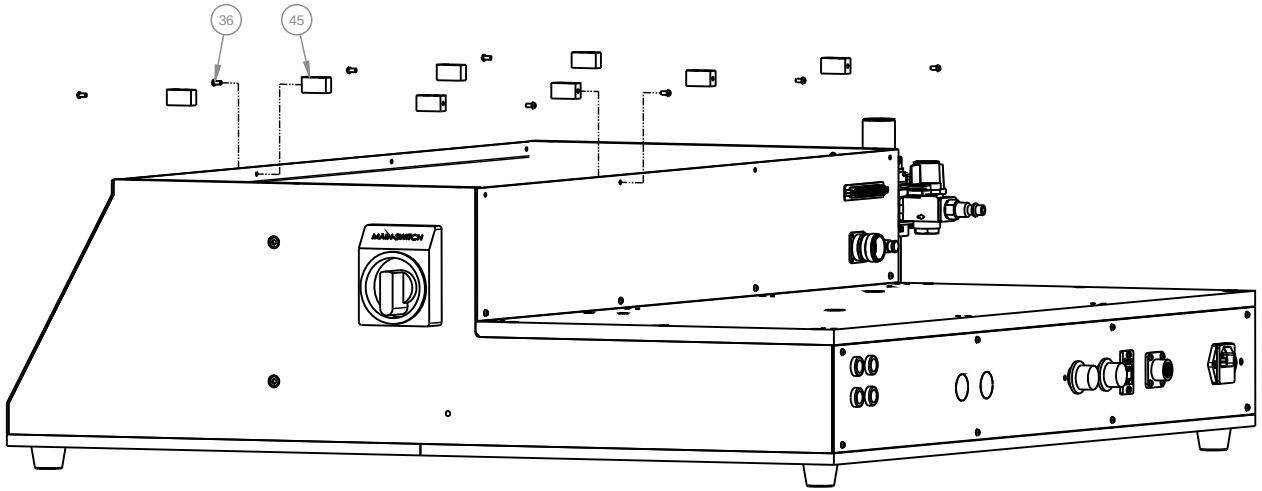
MATERIAL

FINISH

SIZE **B** | DWG. NO. 291680 | REV **D**

WEIGHT (lbs): 80.36

NOTE:
THE ***BUMPER MOUNTS*** (267021) SHOULD BE PLACED ON THE UNDER SIDE OF THE ***TM-400 TAPER BASEPLATE*** (267069)DURING THE FINAL ASSEMBLY OF THE ***TM-402*** (291683).



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
36	223711	SS BHCS M3 x 6mm	24
45	267021	BUMPER MOUNT	20

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

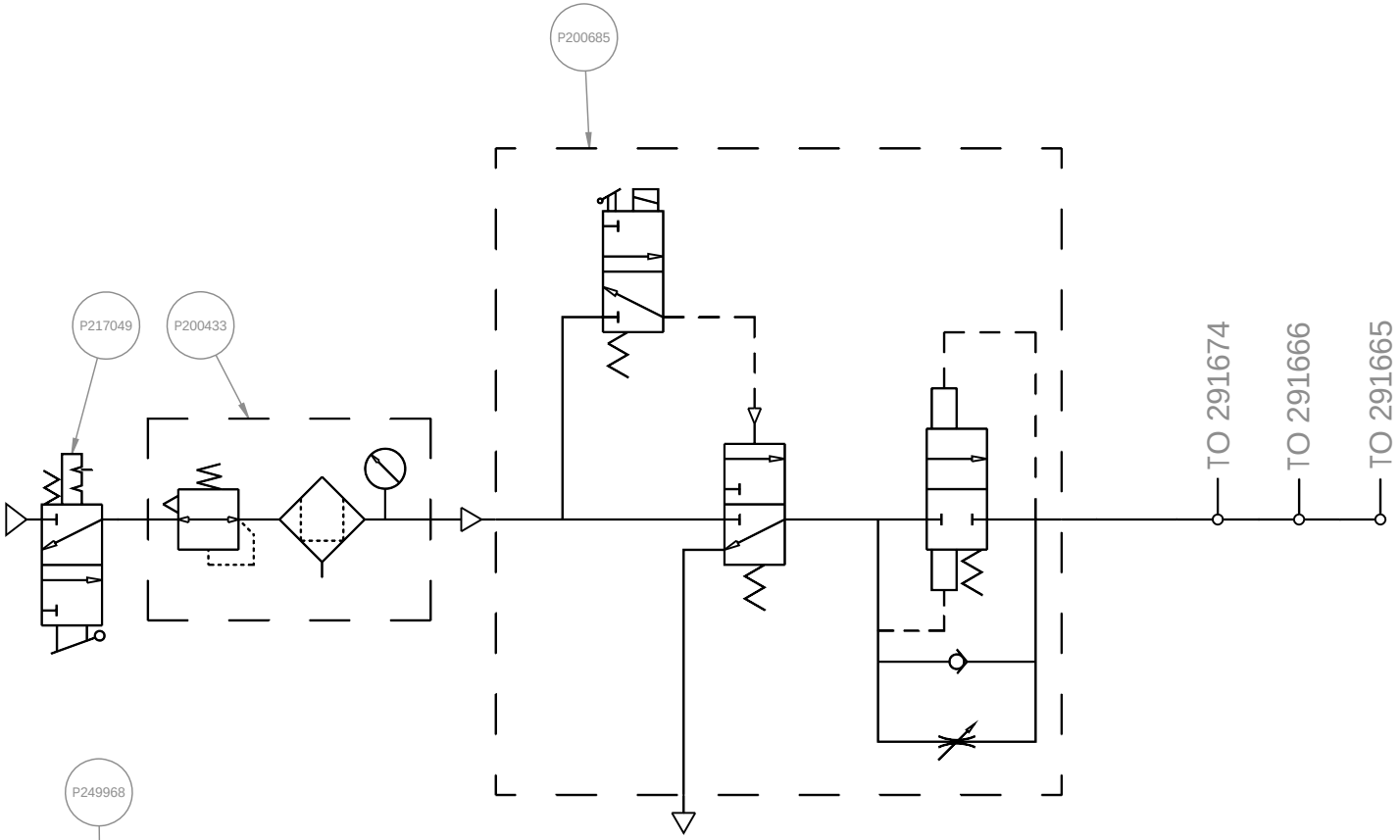
TM-402 BASE (BOWL)

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291680 | REV D

WEIGHT (lbs): 80.36 | SHEET 6 OF 8



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	9/4/2013
ENG APPR.	PVO	~

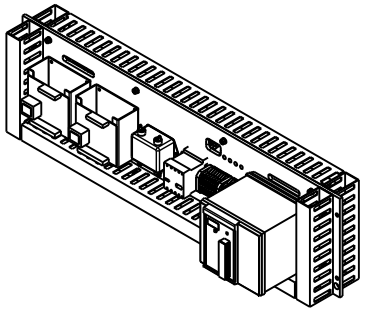
TITLE:
TM400 BASE PNEUMATICS DRAWING

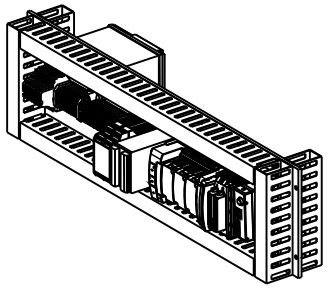
MATERIAL
FINISH

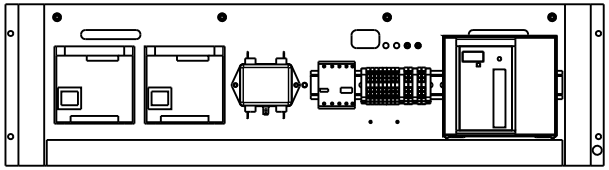
SIZE	DWG. NO.	REV
B	291680	D

WEIGHT (lbs): 0.00
SHEET 7 OF 8

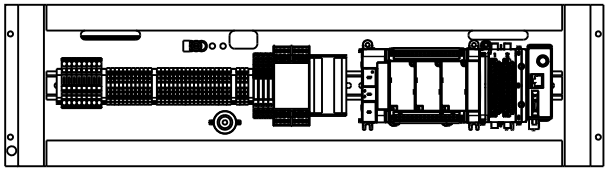
REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/10/2013	PVO
2873	B	ADD 1x 104178	8/10/2015	RH
2946	C	REPLACE 102595 WITH TWO 102614S	5/9/2017	PVO
3132	D	REPLACED TWO 102614S WITH ONE 102595 (SAME AS REV. B)	4/22/2019	PVO







ELECTRICAL PANEL SIDE A



ELECTRICAL PANEL SIDE B

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

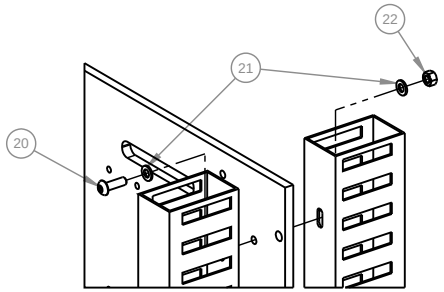
TM402 ELECTRICAL PANEL (BOWL 240V)

MATERIAL

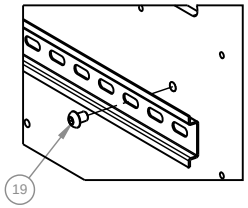
FINISH

SIZE **B** | DWG. NO. 291668 | REV **D**

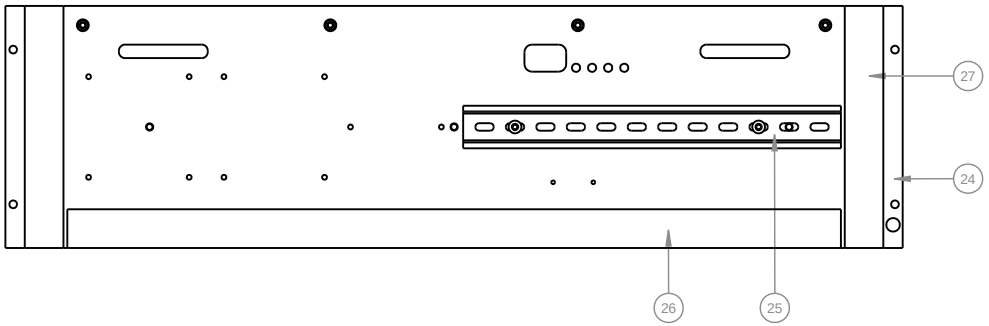
WEIGHT (lbs): 16.81 | SHEET 1 OF 6



DETAIL A
WIRE CHASE ATTACHMENT
SCALE 1:3



DETAIL B
DIN RAIL ATTACHMENT
SCALE 1:3



ELECTRICAL PANEL SIDE A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
19	223749	BHCS SS M6X8	5
20	223750	SHBS SS M5 X 16	12
21	238044	M5 SS FLAT WASHER	24
22	239105	M5 SS HEX NUT	12
24	267029	TM-400 ELECTRICAL PANEL	1
25	267030	TM-400 DIN RAIL - SHORT	1
26	267031	TM-400 WIRE CHASE #1	3
27	267032	TM-400 WIRE CHASE #2	4

UNLESS OTHERWISE SPECIFIED:

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TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
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BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

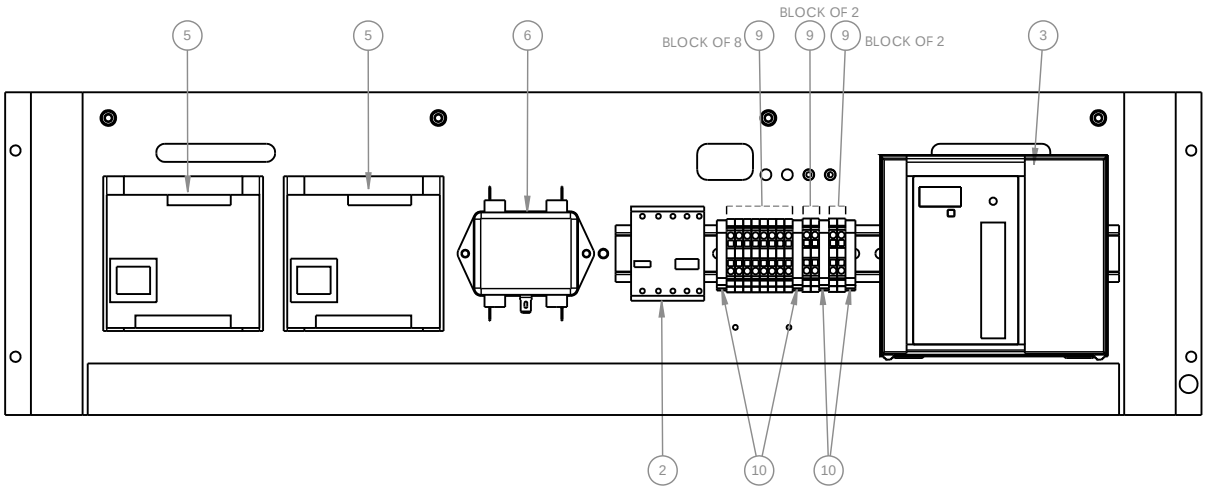
TM402 ELECTRICAL PANEL (BOWL 240V)

MATERIAL

FINISH

SIZE B | DWG. NO. 291668 | REV D

WEIGHT (lbs): 16.81



ELECTRICAL PANEL SIDE A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
2	102198	RELAY ELECTROGUIDE	1
3	102595	SWITCHING POWER SUPPLY	1
5	103580	RODIX CE-44-240V	2
6	103581	CE POWER LINE INPUT FILTER	1
8	104157	TERMINAL GROUND BLOCK	8
9	104158	TERM BLOCK	36
10	104160	TERM END CAP	9

UNLESS OTHERWISE SPECIFIED:

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.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

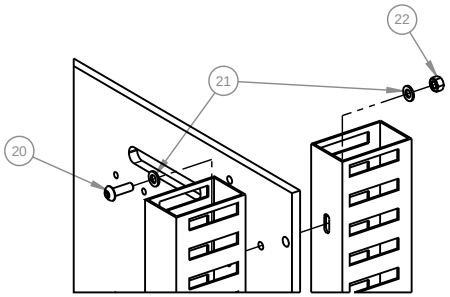
V-TEK INCORPORATED

TITLE:

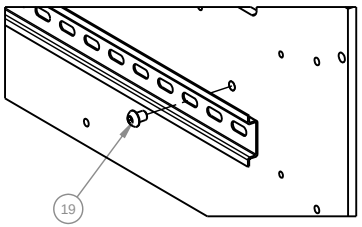
TM402 ELECTRICAL PANEL (BOWL 240V)

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291668	D

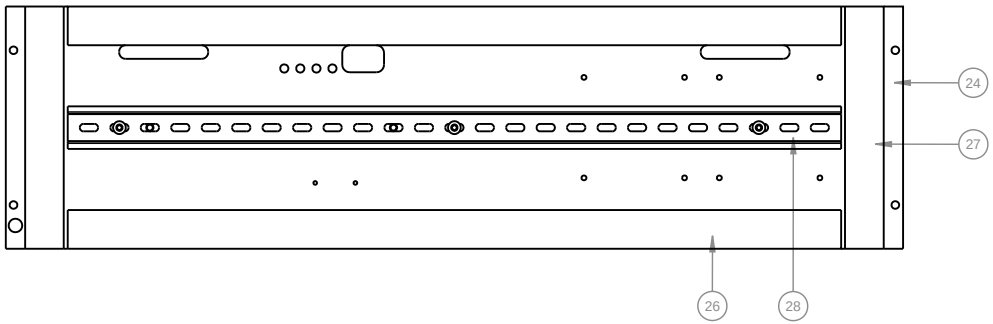
WEIGHT (lbs): 16.81 | SHEET 3 OF 6



DETAIL A
WIRE CHASE ATTACHMENT
SCALE 1:3



DETAIL B
DIN RAIL ATTACHMENT
SCALE 1:3



ELECTRICAL PANEL SIDE B

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
19	223749	BHCS SS M6X8	5
20	223750	SHBS SS M5 X 16	12
21	238044	M5 SS FLAT WASHER	24
22	239105	M5 SS HEX NUT	12
24	267029	TM-400 ELECTRICAL PANEL	1
26	267031	TM-400 WIRE CHASE #1	3
27	267032	TM-400 WIRE CHASE #2	4
28	267033	TM-400 DIN RAIL - LONG	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

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	NAME	DATE
DRAWN	RH	9/10/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

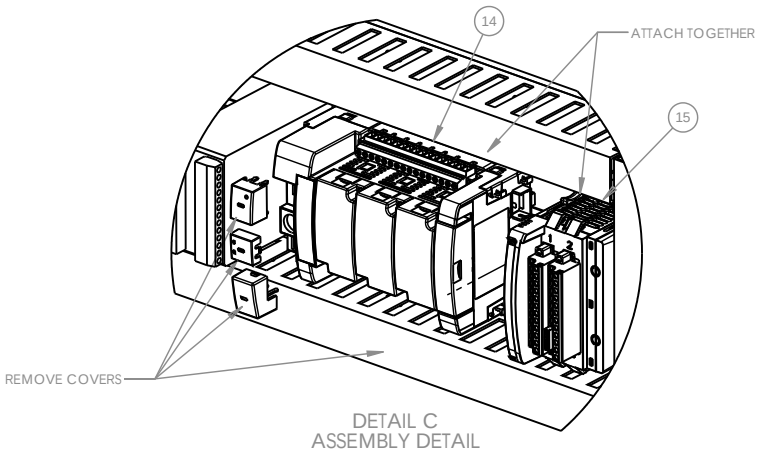
TM402 ELECTRICAL PANEL (BOWL 240V)

MATERIAL

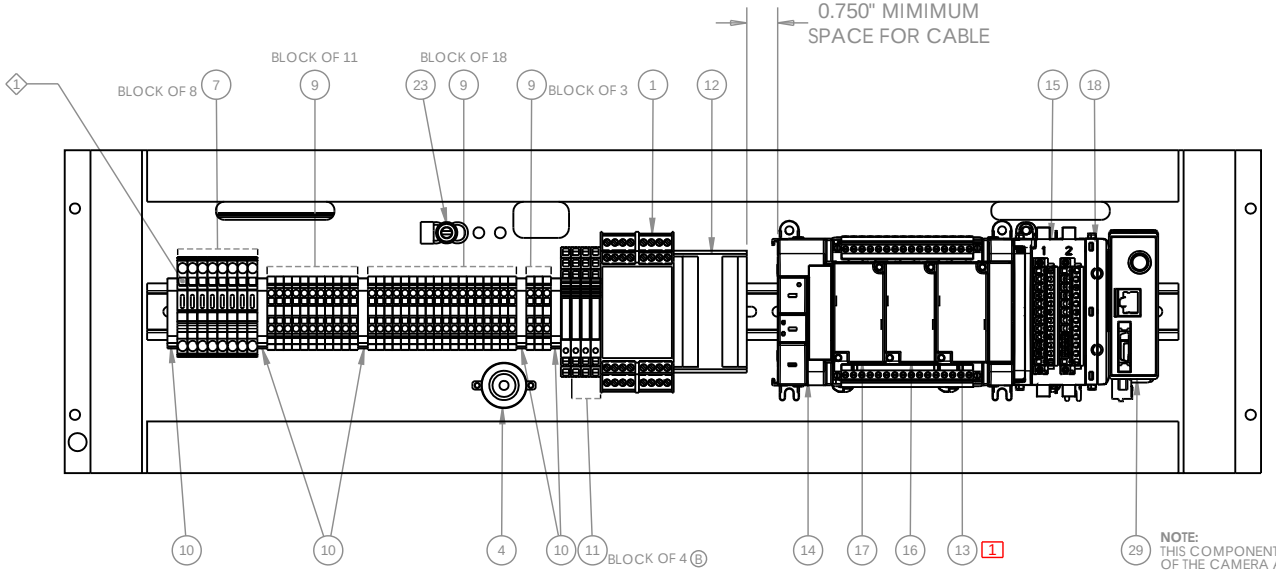
FINISH

SIZE B | DWG. NO. 291668 | REV D

WEIGHT (lbs): 16.81 | SHEET 4 OF 6



DETAIL C
ASSEMBLY DETAIL
SCALE 1:3



NOTE:
THIS COMPONENT IS PART OF THE CAMERA ASSEMBLY

ELECTRICAL PANEL SIDE B

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102173	RELAY SAFETY MONITOR	1
4	102640	BUZZER	1
7	104139	TERMINAL BLOCK, FUSE MODULE	8
9	104158	TERM BLOCK	36
10	104160	TERM END CAP	9
11	104178	PLC RELAY OPTOCOUPLER 24VDC	4
12	105117	INTERLOCK SWITCH CONTROL UNIT	1
13	105813	2 CHANNEL THERMOCOUPLE PLUG IN	1
14	105814	A-B 2080-LC50-24QBB	1
15	105832	A-B 2085-IRT4	1
16	105828	MICRO 800 ISOLATED	1
17	105829	MICRO 800 MEMORY	1
18	105833	BUS TERMINATOR MODULE	1
23	246539	SMC PART # (KQ2U07-00)	1
29	500440	VISION SENSOR AMPLIFIER	1

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ENG APPR.	PVO	~

V-TEK INCORPORATED

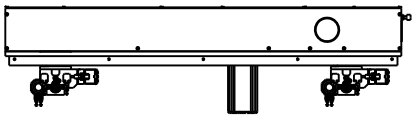
TITLE:
TM402 ELECTRICAL PANEL (BOWL 240V)

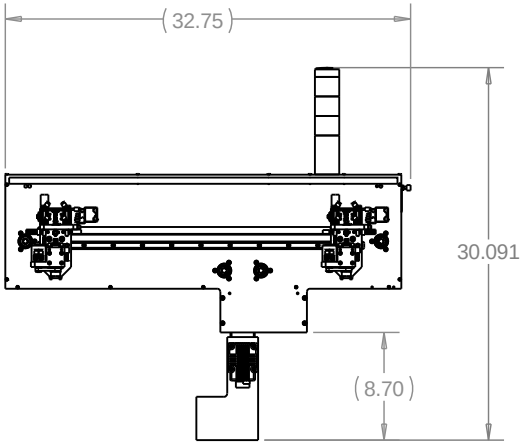
MATERIAL
FINISH

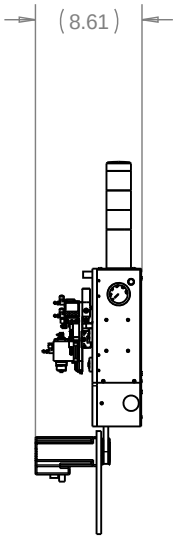
SIZE B | DWG. NO. 291668 | REV D

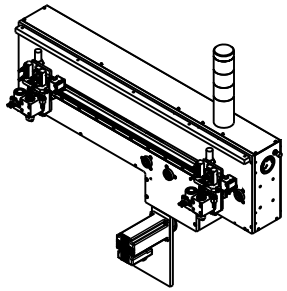
WEIGHT (lbs): 16.81 | SHEET 5 OF 6

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	6/27/14	PVO
2909	B	REPLACE 110012 WITH 268942	7/22/2016	PVO
2945	C	REPLACE 110011, 268942 WITH 110013, 110014, 110015, 110016	5/15/2017	PVO
	D	UPDATED REVISION TO MATCH GSS	12/10/2018	PVO
3099	E	REPLACE P&P HEAD 291665 WITH 292752	3/5/2019	PVO
3134	F	REPLACE 267433 WITH 270113 & REPLACE 110013, 110014, 110015, 110016 WITH 110018	4/24/2019	pvo









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	NAME	DATE
DRAWN	RH	6/5/2014
ENG APPR.	PVO	~

TITLE:

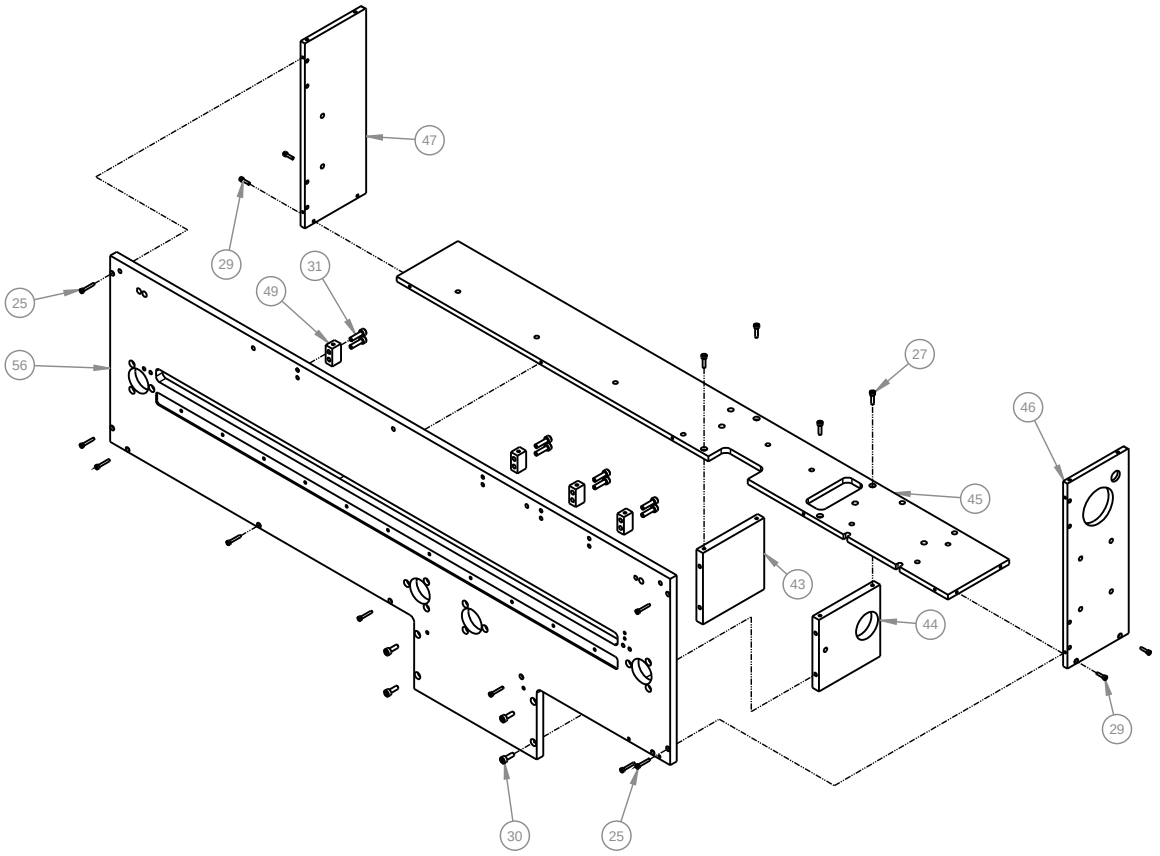
TM-400 PICK & PLACE ASSEMBLY

MATERIAL

FINISH

SIZE **B** | DWG. NO. **291822** | REV **F**

WEIGHT (lbs): 38.75 | SHEET 1 OF 10



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
25	221706	SHCS SS M2.5 X 16	9
27	221713	SHCS SS M3 X 12	4
29	221721	SHCS SS M2.5 X 10	4
30	221731	SHCS SS M4 X 12	21
31	221733	SS SHCS M4X16	16
43	267015	P&P ENCLOSURE LOWER (REAR)	1
44	267016	P&P ENCLOSURE LOWER (FRONT)	1
45	267017	E-CHAIN MOUNT	1
46	267018	HEAD ENCLOSURE, FRONT	1
47	267019	HEAD ENCLOSURE, REAR	1
49	267021	BUMPER MOUNT	6
56	267414	P&P BRIDGE PLATE	1
59	292752	P&P HEAD ASSEMBLY	1

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DRAWN	RH	6/5/2014
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-400 PICK & PLACE ASSEMBLY

MATERIAL

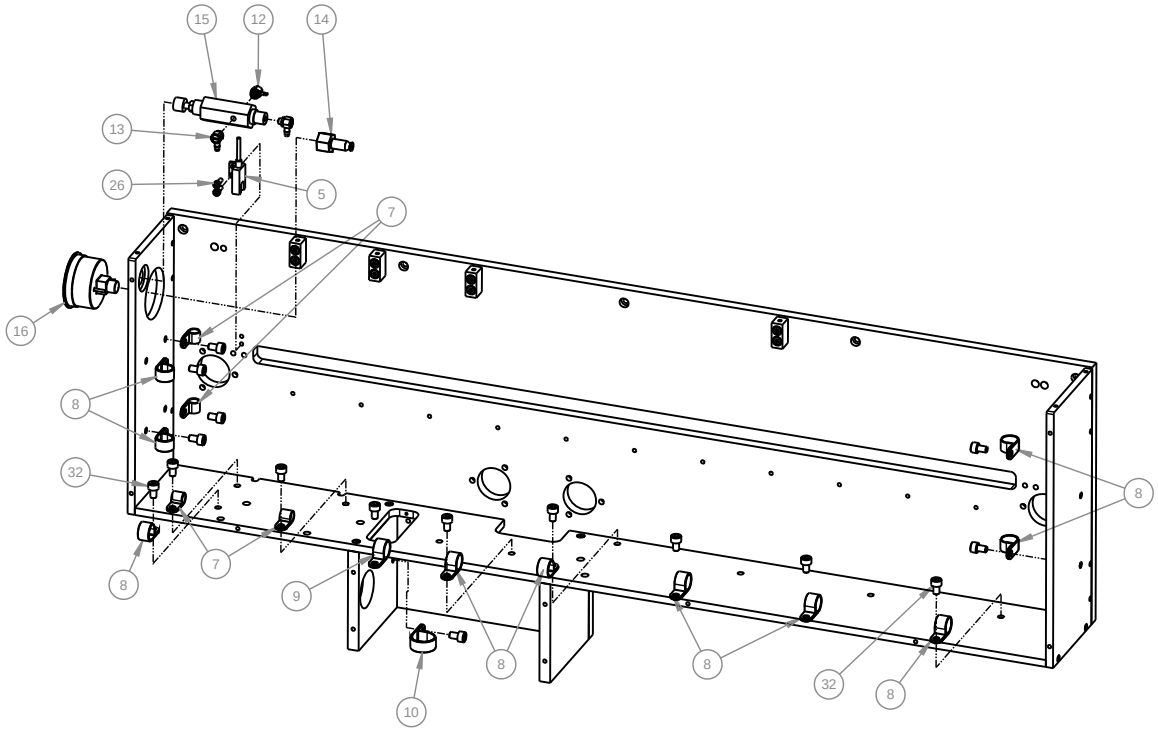
FINISH

SIZE **B**

DWG. NO. 291822

REV F

WEIGHT (lbs): 38.75



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
5	104994	SUNX PM-R45P	1
7	107108	CABLE CLAMP 5/16-.203	4
8	107111	CABLE CLAMP 1/2-.203 HOLE	10
9	107112	CABLE CLAMP 9/16-.203 HOLE	1
10	107113	CABLE CLAMP 3/4-.203 HOLE	1
12	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	1
13	200260	AIR FIT 90 DEG 10-32 X 1/8 TB	2
14	200267	AIR FIT 1/8NPT FEMALE X 1/8TB	1
15	200401	AIR REGULATOR SMC ARJ210-M5	1
16	200801	GUAGE PRESSURE GP-100	1
26	221711	SHCS SS M3 X 8	2
32	221741	SHCS SS M5 X 8	16
59	292752	P&P HEAD ASSEMBLY	1

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V-TEK INCORPORATED

TITLE:

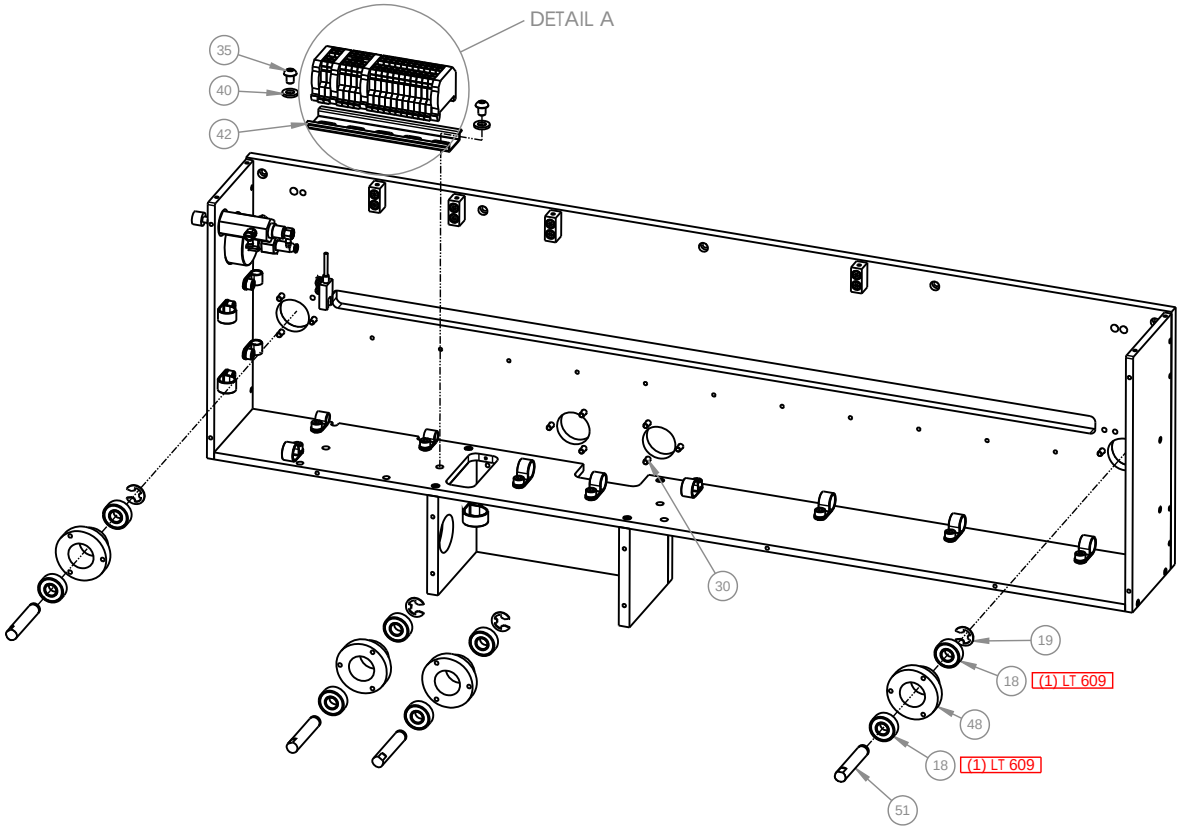
TM-400 PICK & PLACE ASSEMBLY

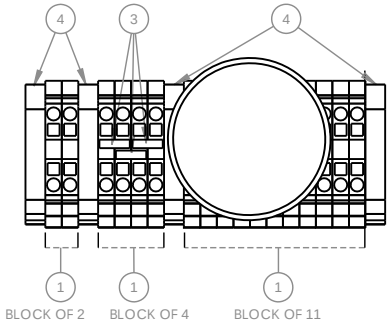
MATERIAL

FINISH

SIZE **B** | DWG. NO. 291822 | REV F

WEIGHT (lbs): 38.75





DETAIL A
TERMINAL BLOCK
SCALE 1:1.5

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
2	104158	TERM BLOCK	17
3	104159	TERM JUMPER	3
4	104160	TERM END CAP	4
18	204051	BEARING, 3/8ID X 7/8OD	8
19	204138	McMASTER CARR 92725A550	4
30	221731	SHCS SS M4 X 12	21
35	223749	BHCS SS M6X8	4
40	238045	M6 SS FLAT WASHER	2
42	266776	BOWL ASSEMBLY DIN RAIL	1
48	267020	P&P BEARING MOUNT	4
51	267025	IDELR SHAFT	4
59	292752	P&P HEAD ASSEMBLY	1

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V-TEK INCORPORATED

TITLE:

TM-400 PICK & PLACE ASSEMBLY

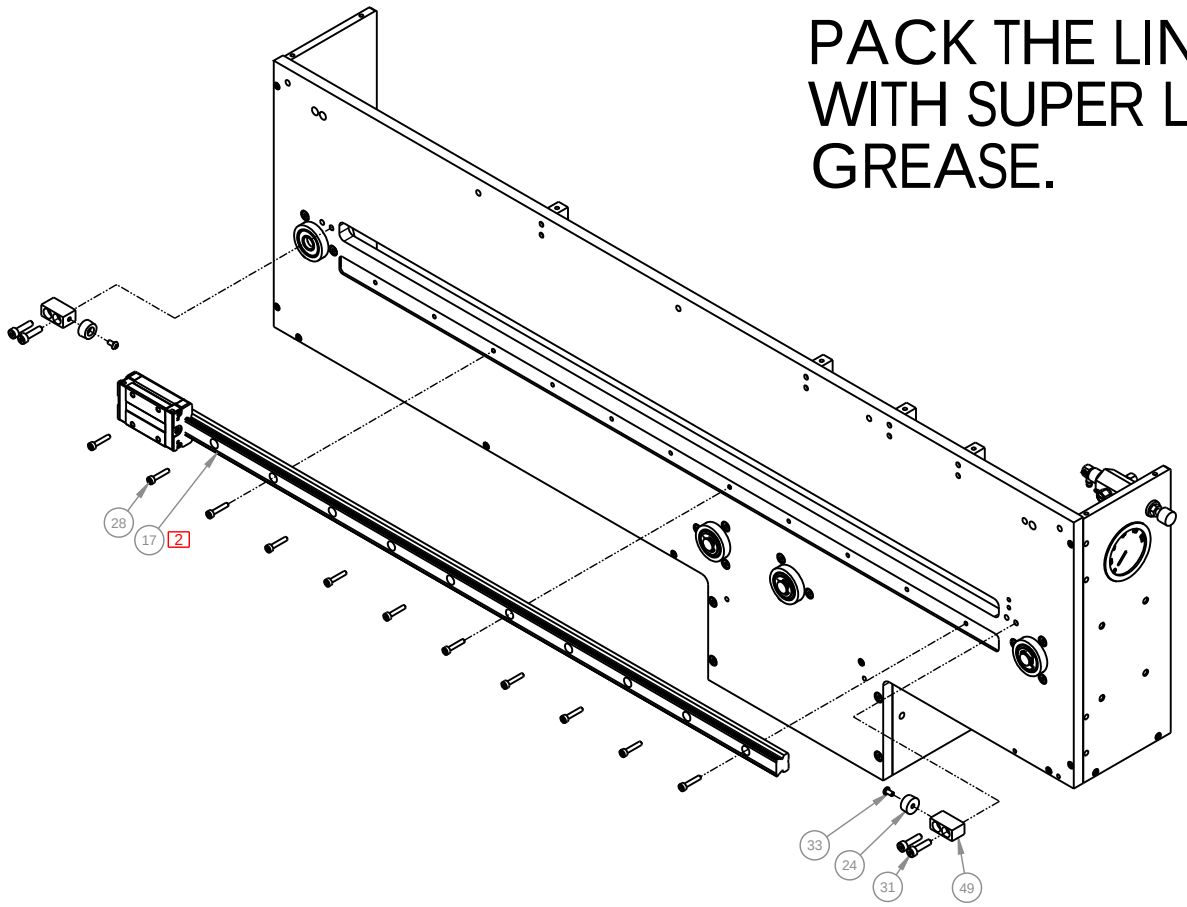
MATERIAL

FINISH

SIZE B | DWG. NO. 291822 | REV F

WEIGHT (lbs): 38.75

PACK THE LINEAR BEARING BLOCK WITH SUPER LUBE MULTI-PURPOSE GREASE.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
17	202090	RAIL, HIWIN 622 MM	1
24	217210	RUBBER FOOT	2
28	221714	SHCS SS M3 X 16	11
31	221733	SS SHCS M4X16	16
33	223711	BHCS SS M3 X 6	6
49	267021	BUMPER MOUNT	6
59	292752	P&P HEAD ASSEMBLY	1

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V-TEK INCORPORATED

TITLE:

TM-400 PICK & PLACE ASSEMBLY

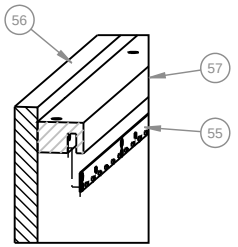
MATERIAL

FINISH

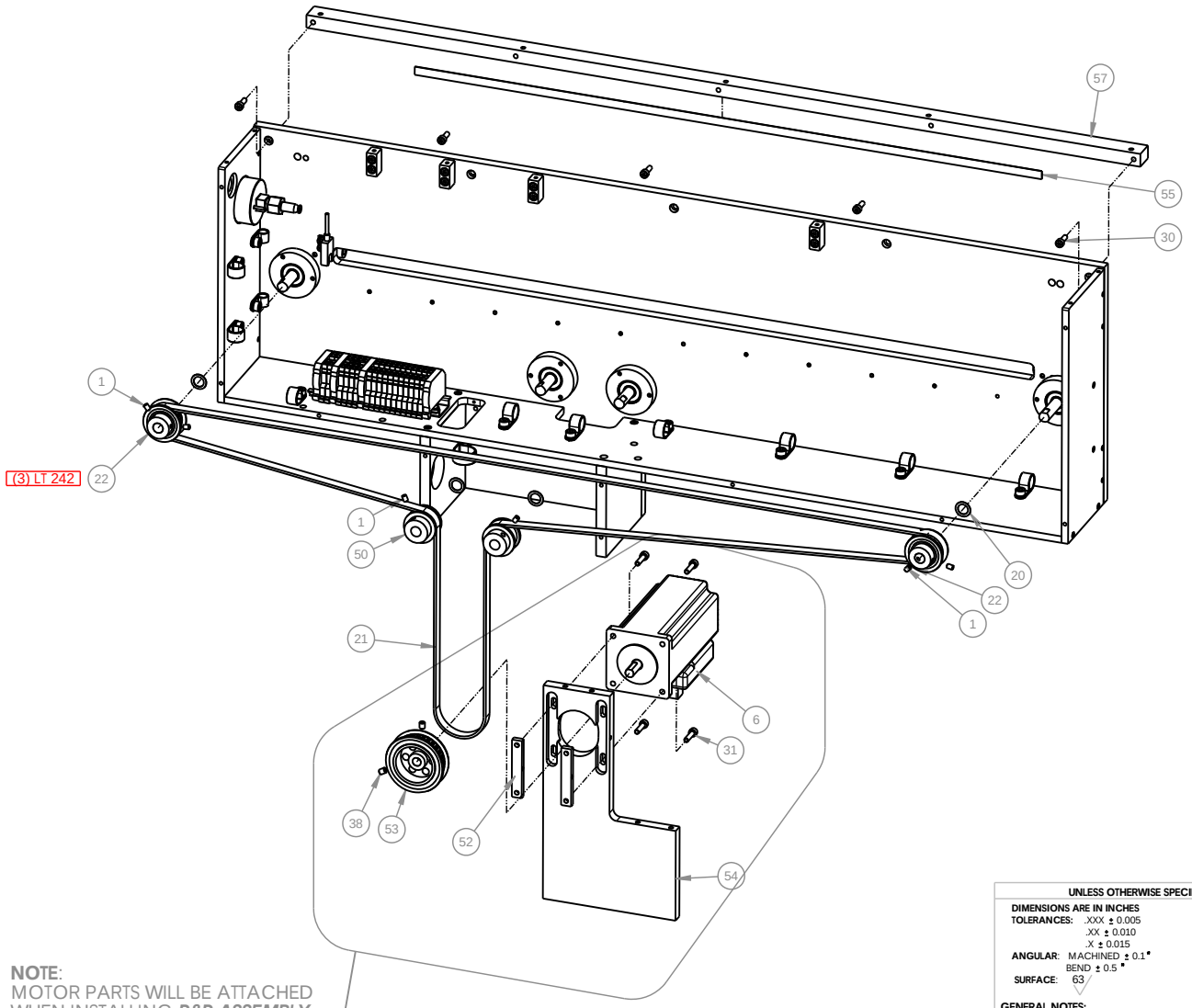
SIZE B | DWG. NO. 291822 | REV F

WEIGHT (lbs): 38.75

NOTE:
ADHESIVE ON LIGHT STRIP TO GO SIDE ON LIGHT BAR THAT ATTACHES TO THE P&P BRIDGE PLATE. LIGHT STRIP TO BE CENTERED IN LIGHT BAR.



DETAIL B
SECTION VIEW
LIGHT STRIP ATTACHMENT
SCALE 1:2



NOTE:
MOTOR PARTS WILL BE ATTACHED WHEN INSTALLING ***P&P ASSEMBLY*** ONTO ***BASE ASSEMBLY*** (291672).

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	22970	AS CUP SET M4 x 6mm	6
6	105827	MOTOR DRIVE FOR NEMA 24	1
20	207025	SHIM, 3/8 ID, 9/16 OD, .010 THICK	4
21	210109	GATES 770XL037	1
22	211058	PULLEY TIMING 18 TEETH MISUMI	2
30	221731	SHCS SS M4 X 12	21
31	221733	SS SHCS M4X16	16
38	230024	AS CUP SET 10-32 x 1/4	2
50	267022	BELT IDLER	2
52	267162	MOTOR NUT	2
53	267163	P&P DRIVE PULLEY	1
54	267246	P&P MOTOR MOUNT	1
55	267247	LED LIGHT STRIP	1
56	267414	P&P BRIDGE PLATE	1
57	267415	LED LIGHT BAR	1
59	292752	P&P HEAD ASSEMBLY	1

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	NAME	DATE
DRAWN	RH	6/5/2014
ENG APPR.	PVO	~

V-TEK INCORPORATED

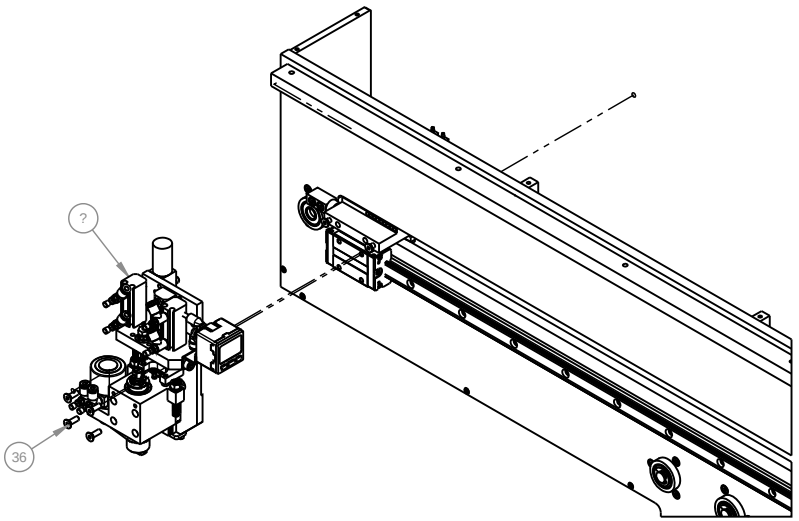
TITLE:
TM-400 PICK & PLACE ASSEMBLY

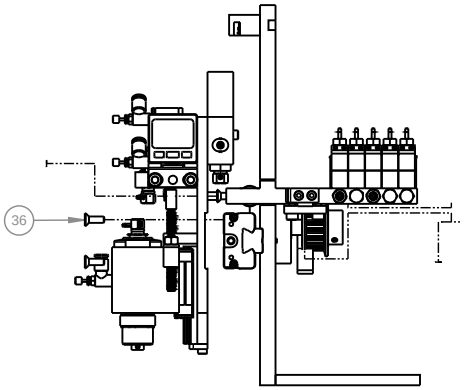
MATERIAL
FINISH

SIZE B | DWG. NO. 291822 | REV F

WEIGHT (lbs): 38.75 | SHEET 6 OF 10

NOTE:
THIS IS THE FINAL ASSEMBLY OF THE ***PICK & PLACE HEAD*** (291665) AS NOTED ON THE ASSEMBLY DRAWING.





SECTION VIEW
SCALE 1:3

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
36	225731	FHCS SS M4 X 12	4
59	292752	P&P HEAD ASSEMBLY	1

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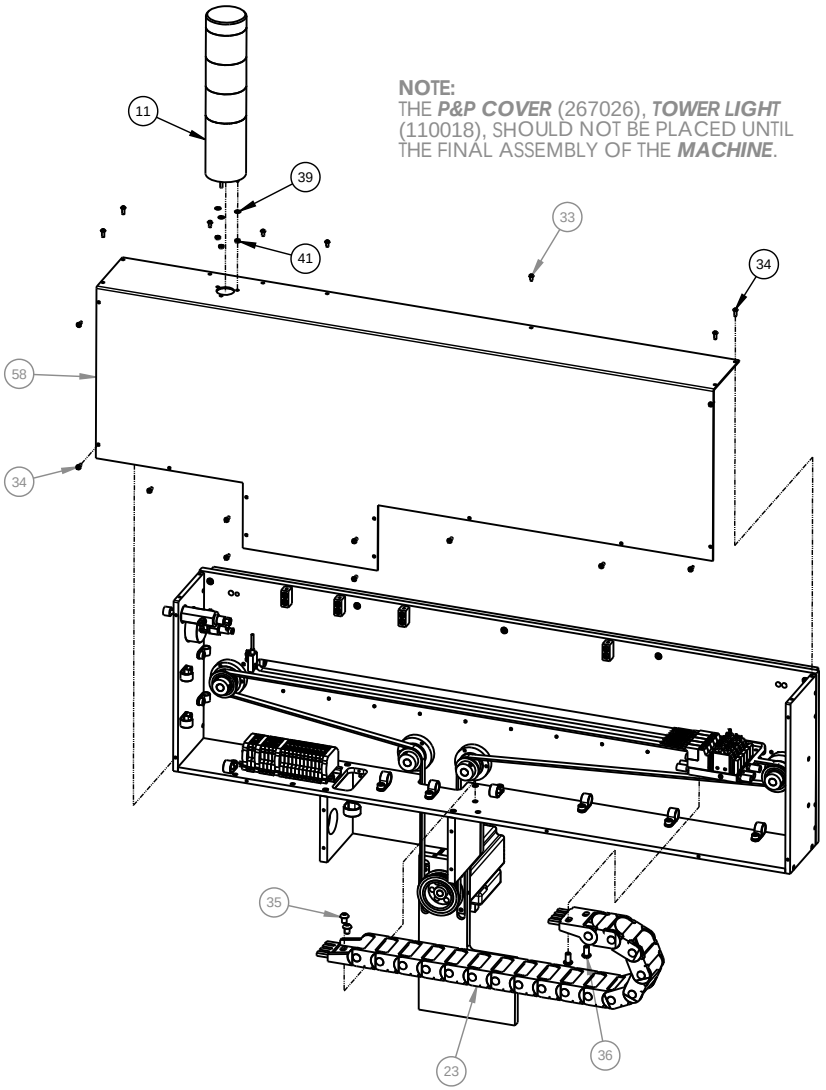
V-TEK INCORPORATED

TITLE:
TM-400 PICK & PLACE ASSEMBLY

MATERIAL
FINISH

SIZE B | DWG. NO. 291822 | REV F

WEIGHT (lbs): 38.75 | SHEET 7 OF 10



NOTE:
THE ***P&P COVER*** (267026), ***TOWER LIGHT*** (110018), SHOULD NOT BE PLACED UNTIL THE FINAL ASSEMBLY OF THE ***MACHINE***.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
11	110018	TOWER LIGHT	1
23	211535	E-CHAIN 400	1
33	223711	BHCS SS M3 X 6	6
34	223712	BHCS SS M3 X 8	15
35	223749	BHCS SS M6X8	4
36	223753	BHCS SS M6 X 12	2
39	238042	M3 STAINLESS WASHER	3
41	239103	SS M3 NUT	3
58	270113	P&P COVER	1
59	292752	P&P HEAD ASSEMBLY	1

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V-TEK INCORPORATED

TITLE:

TM-400 PICK & PLACE ASSEMBLY

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291822 | REV F

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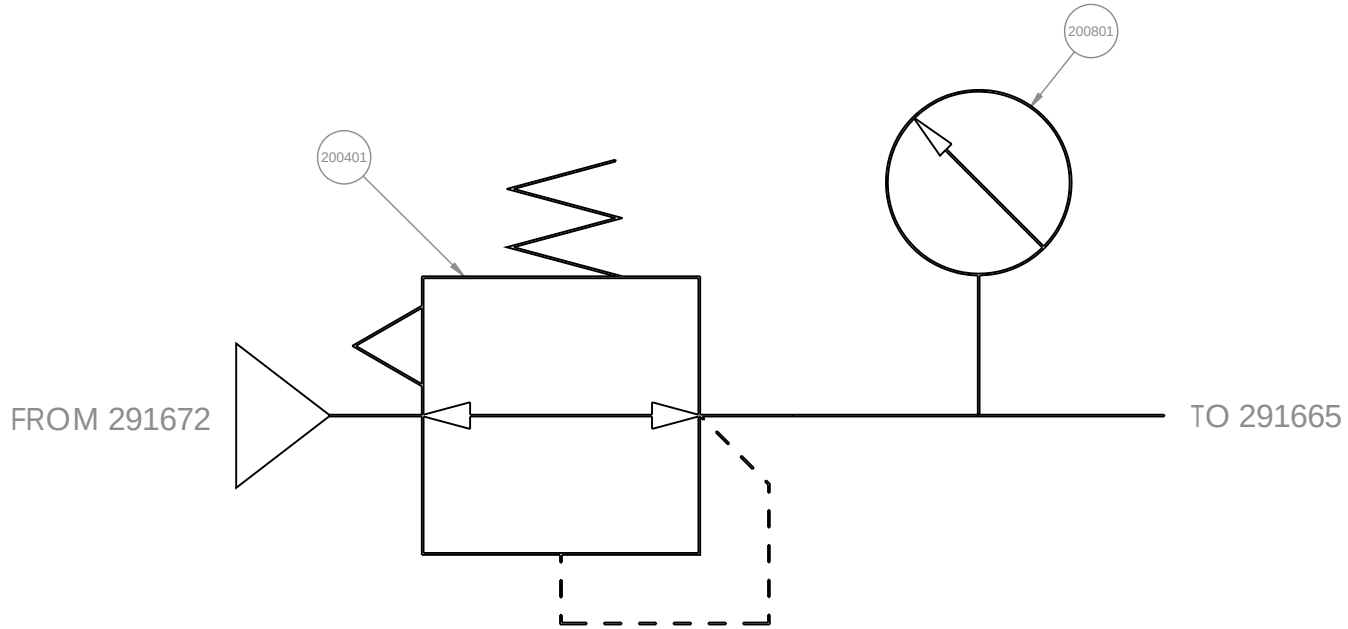

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- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/10/12
ENG APPR.	PVO	~

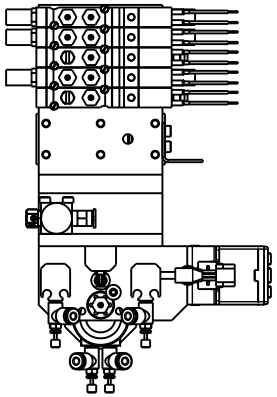
TITLE:
TM400 PNEUMATICS PICK & PLACE ASSEMBLY

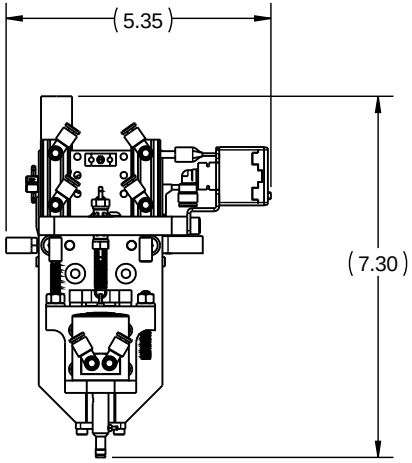
MATERIAL
FINISH

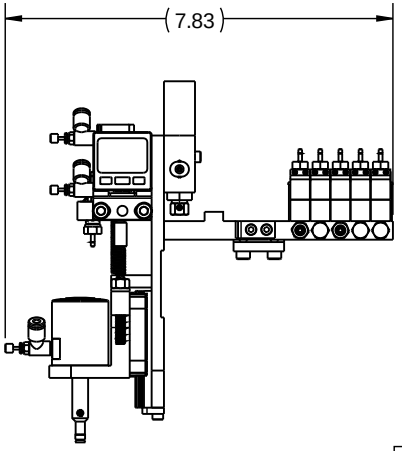
SIZE B | DWG. NO. 291822 | REV F

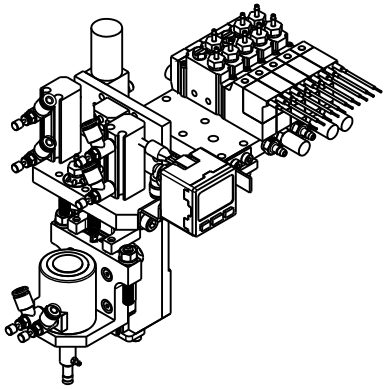
WEIGHT (lbs): 0.00 | SHEET 9 OF 10

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	8/22/2013	PVO









UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM400 PICK & PLACE HEAD

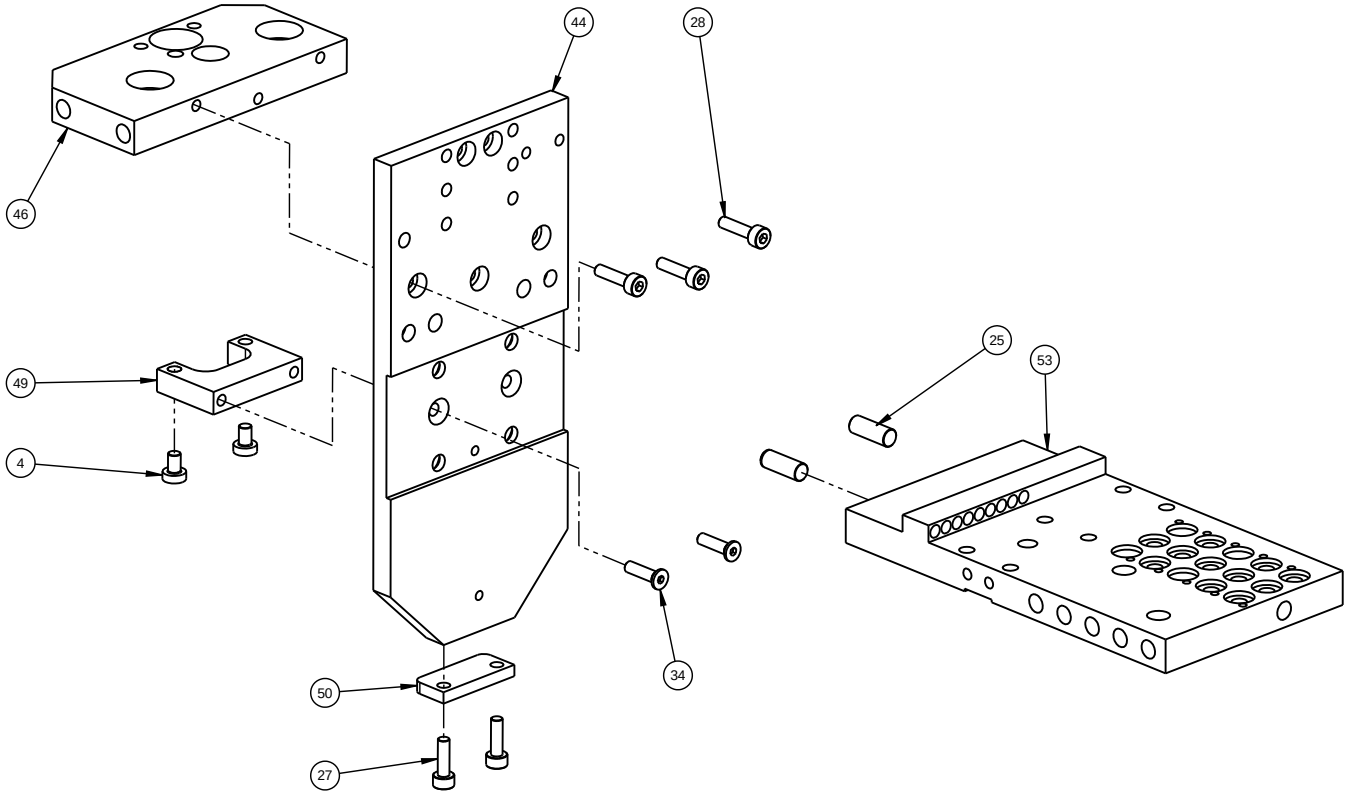
MATERIAL

FINISH

SIZE	DWG. NO.	REV
B	291665	B

WEIGHT (lbs): 2.50

SHEET 1 OF 10



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
4	200153	BUMPER	2
25	219041	3/16 X 1/2 LG. SS DOWEL PIN	2
27	221712	SHCS SS M3 X 10	2
28	221713	SHCS SS M3 X 12	5
34	225714	FHCS SS M3 X 12	2
44	267004	P&P BACKPLATE	1
46	267006	CYLINDER MOUNT	1
49	267009	UPPER STOP	1
50	267010	LOWER STOP	1
53	267013	P&P MANIFOLD	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:

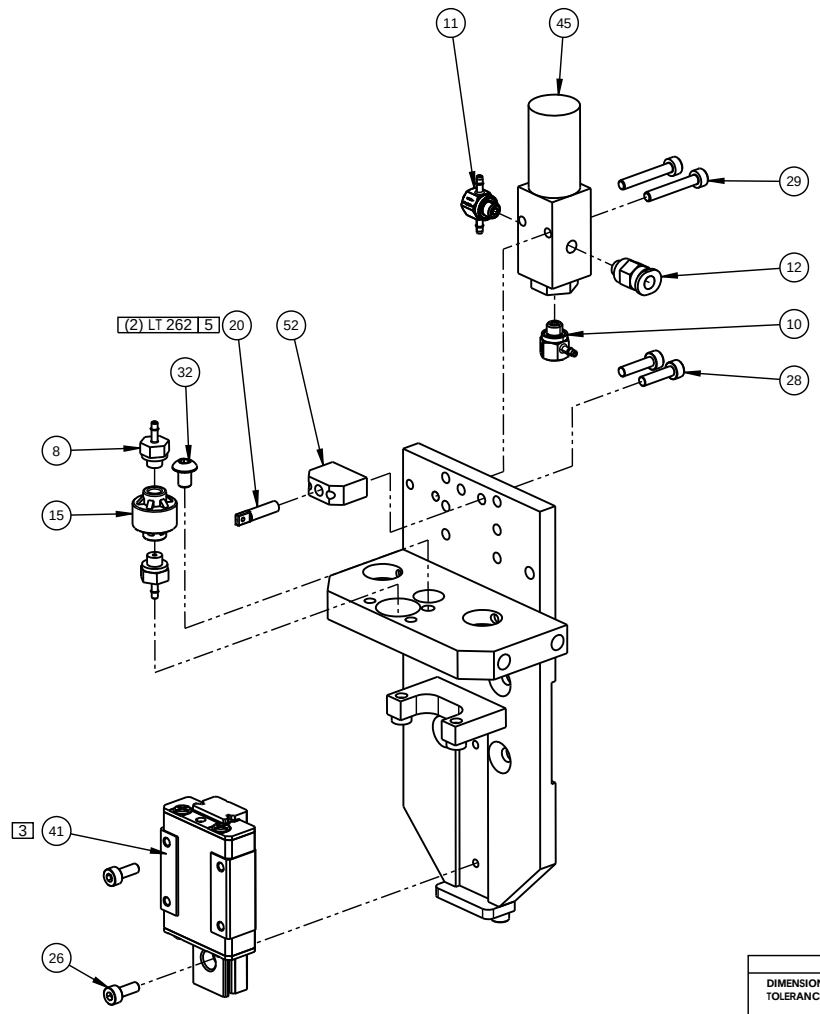
TM400 PICK & PLACE HEAD

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291665 | REV B

WEIGHT (lbs): 2.50 | SHEET 2 OF 10



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
8	200253	10-32 x 1/16 HOSE BARB	10
10	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	1
11	200261	AIR FIR 10-32 TEE TO 1/16" TB	1
12	200273	AIR FIT 5/32 TB 10-32 MALE	1
15	201026	FILTER	1
20	209101	SPRING ANCHOR	2
26	221711	SHCS SS M3 X 8	7
28	221713	SHCS SS M3 X 12	5
29	221716	SHCS SS M3 X 20	2
32	223728	BHCS SS M4 X 6	1
41	249974	HIWINN MGN-15 BLOCK	1
45	267005	VACUUM GENERATOR MODIFICATION	1
52	267012	SPRING ANCHOR MOUNT	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:

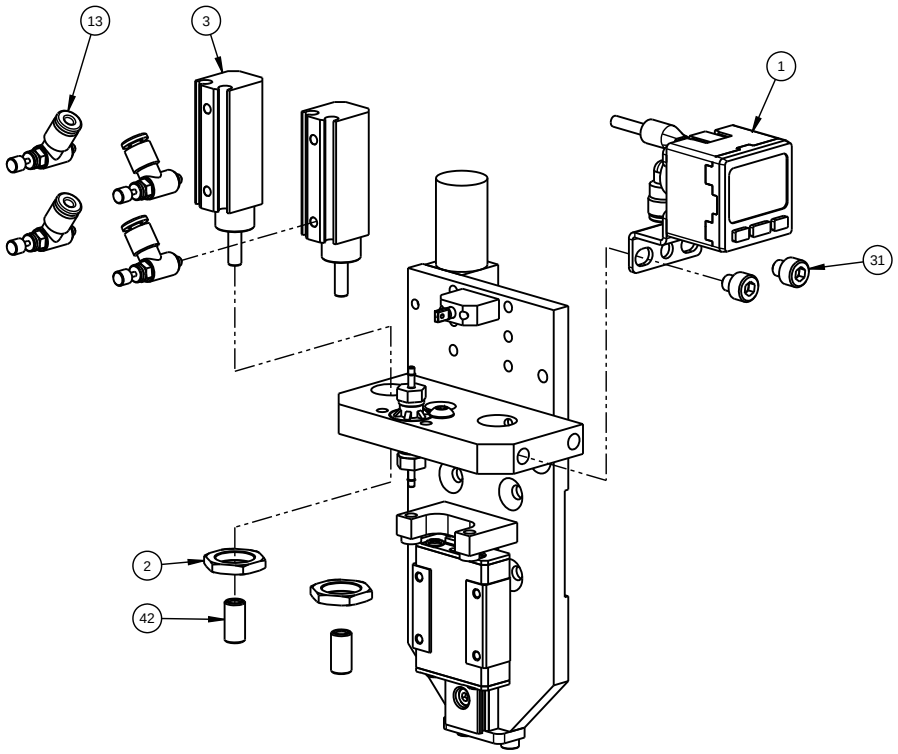
TM400 PICK & PLACE HEAD

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291665 | REV B

WEIGHT (lbs): 2.50



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102597	SMC VACUUM SENSOR (ZSE30A-C4L-P-LA2)	1
2	200062	CYLINDER NUT	2
3	200063	CYLINDER AIR PIN W/O P. SWITCH	2
13	200343	AS 1 2 0 1F-M3-01 (SMC)	6
31	221766	SHCS SS M5 X 5	2
42	266482	CYLINDER BUMPER	2

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
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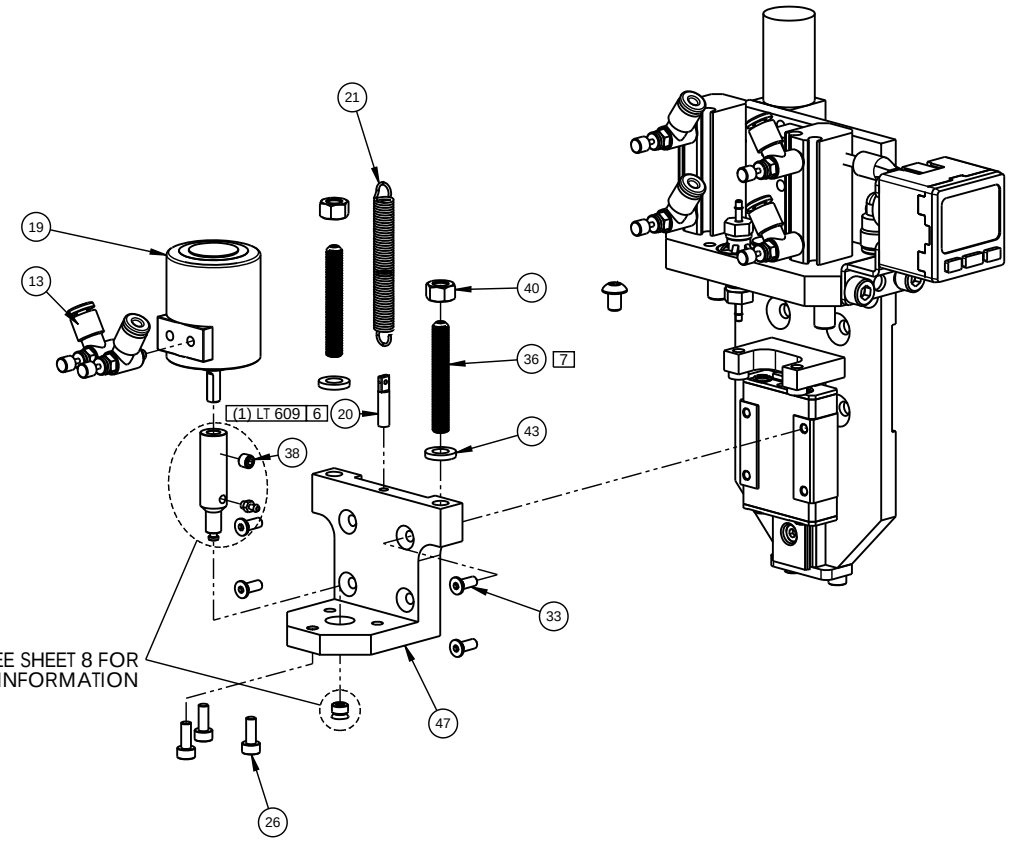
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:

TM400 PICK & PLACE HEAD

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291665	B
	WEIGHT (lbs): 2.50		SHEET 4 OF 10



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
13	200343	AS 1 2 0 1F-M3-01 (SMC)	6
19	202523	SMC CRB2BWU10-180SZ	1
20	209101	SPRING ANCHOR	2
21	209250	LeeSpring-MS24586-1054	1
26	221711	SHCS SS M3 X 8	7
33	224035	FHCS SS M3 X 8	4
36	230083	McMASTER CARR 91390A232	2
38	231724	M4X4 SS SET SCREW	1
40	239105	M5 SS HEX NUT	2
43	266483	HEAVY WASHER	2
47	267007	ROTATE HOUSING	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
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	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:

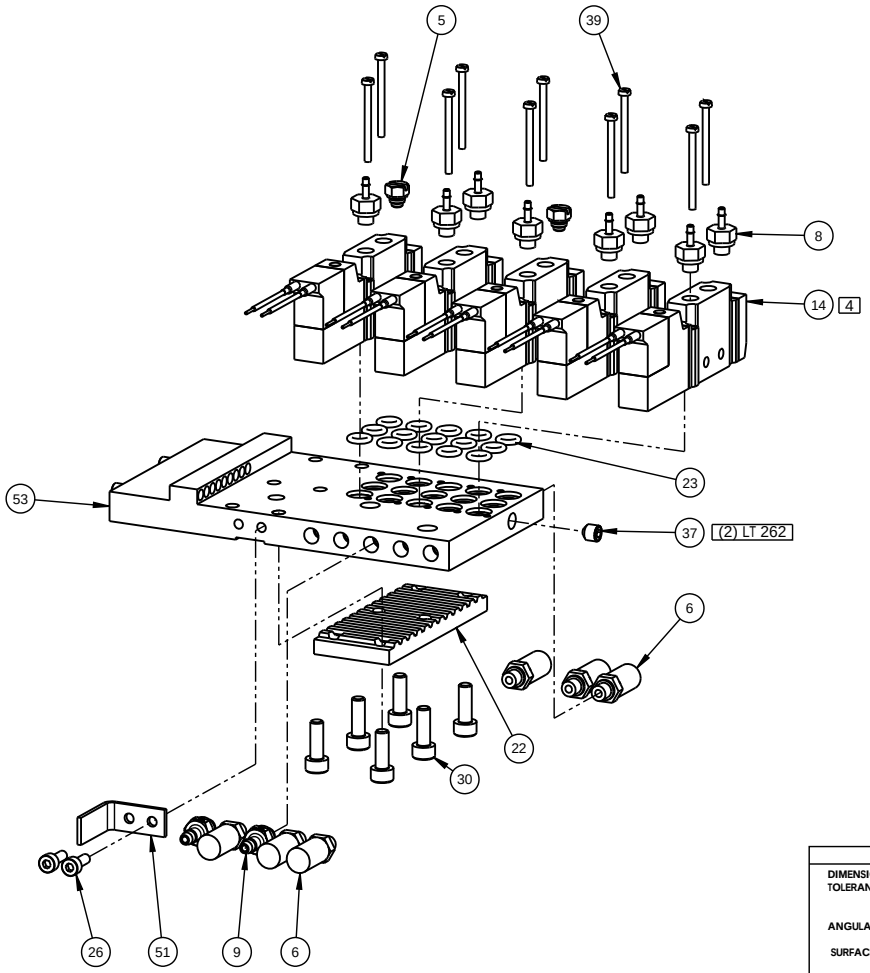
TM400 PICK & PLACE HEAD

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291665 | REV B

WEIGHT (lbs): 2.50 | SHEET 5 OF 10



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
5	200201	FITTING	2
6	200207	AIR FIT 10-32 M SS MUFFLER	6
8	200253	10-32 x 1/16 HOSE BARB	10
9	200254	AIR FIT 1/8 BARB X 10-32MALE	2
14	200636	AIR VALVE	5
22	210072	BELT COUPLER Misumi-TBCS-XL037	1
23	212001	ORING 5/16	15
26	221711	SHCS SS M3 X 8	7
30	221731	SHCS SS M4 X 12	6
37	231038	M5 X 5 ALLOY SET SCREW	1
39	236062	M2 X 25 SS SLOTTED CHEESE HEAD SCREW	10
51	267011	HOME SENSOR FLAG	1
53	267013	P&P MANIFOLD	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:

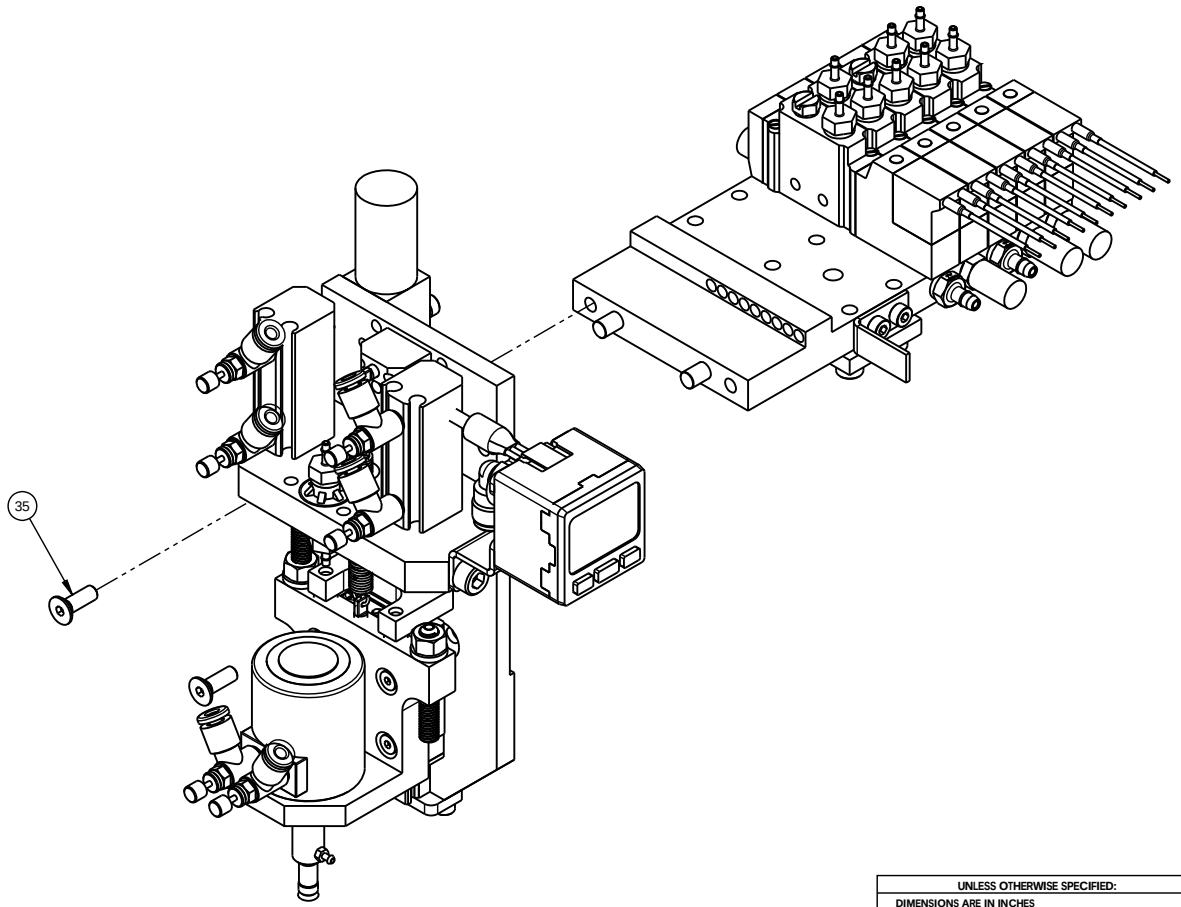
TM400 PICK & PLACE HEAD

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291665 | REV B

WEIGHT (lbs): 2.50



NOTE:
THE 2 HALVES OF THE ***PICK & PLACE HEAD*** WILL BE ATTACHED TO EACH OTHER WHEN BEING PLACED ON THE ***PICK & PLACE ASSEMBLY*** (291666).

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
35	225731	FHCS SS M4 X 12	2

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
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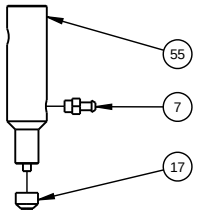
	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

TITLE:
TM400 PICK & PLACE HEAD

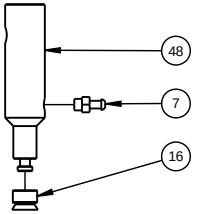
MATERIAL
FINISH

SIZE **B** | DWG. NO. 291665 | REV B

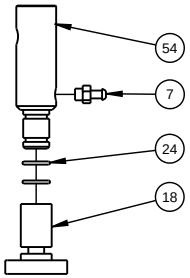
WEIGHT (lbs): 2.50 | SHEET 7 OF 10



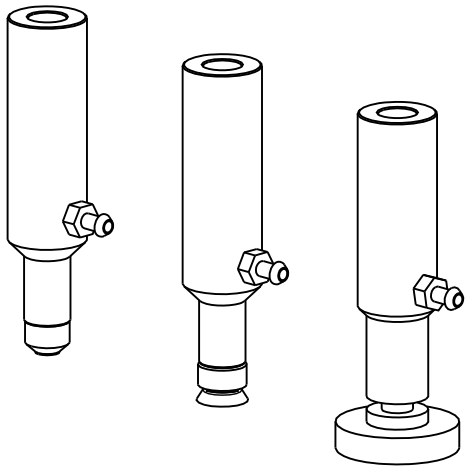
DETAIL A
SPT NOZZLE
SCALE 1:1



DETAIL B
CONVUM NOZZLE
SCALE 1:1



DETAIL C
QUAD NOZZLE
SCALE 1:1



COMPLETE NOZZLE SET
SCALE 2:1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
7	200208	Clippard 11750-2-PKG 3-56 to 1/16" ID Hose Fitting	3
16	201207	VACUUM CUP PFG-5U	1
17	201271	VACUUM CUP A1 100	1
18	201297	NOZZLE QUAD LARGE VISION	1
24	212025	QUAD NOZZLE O-RING	2
48	267008	TM-400 NOZZLE (CONVUM)	1
54	267090	TM-400 NOZZLE (QUAD)	1
55	267091	TM-400 NOZZLE (SPT)	1

UNLESS OTHERWISE SPECIFIED:

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TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

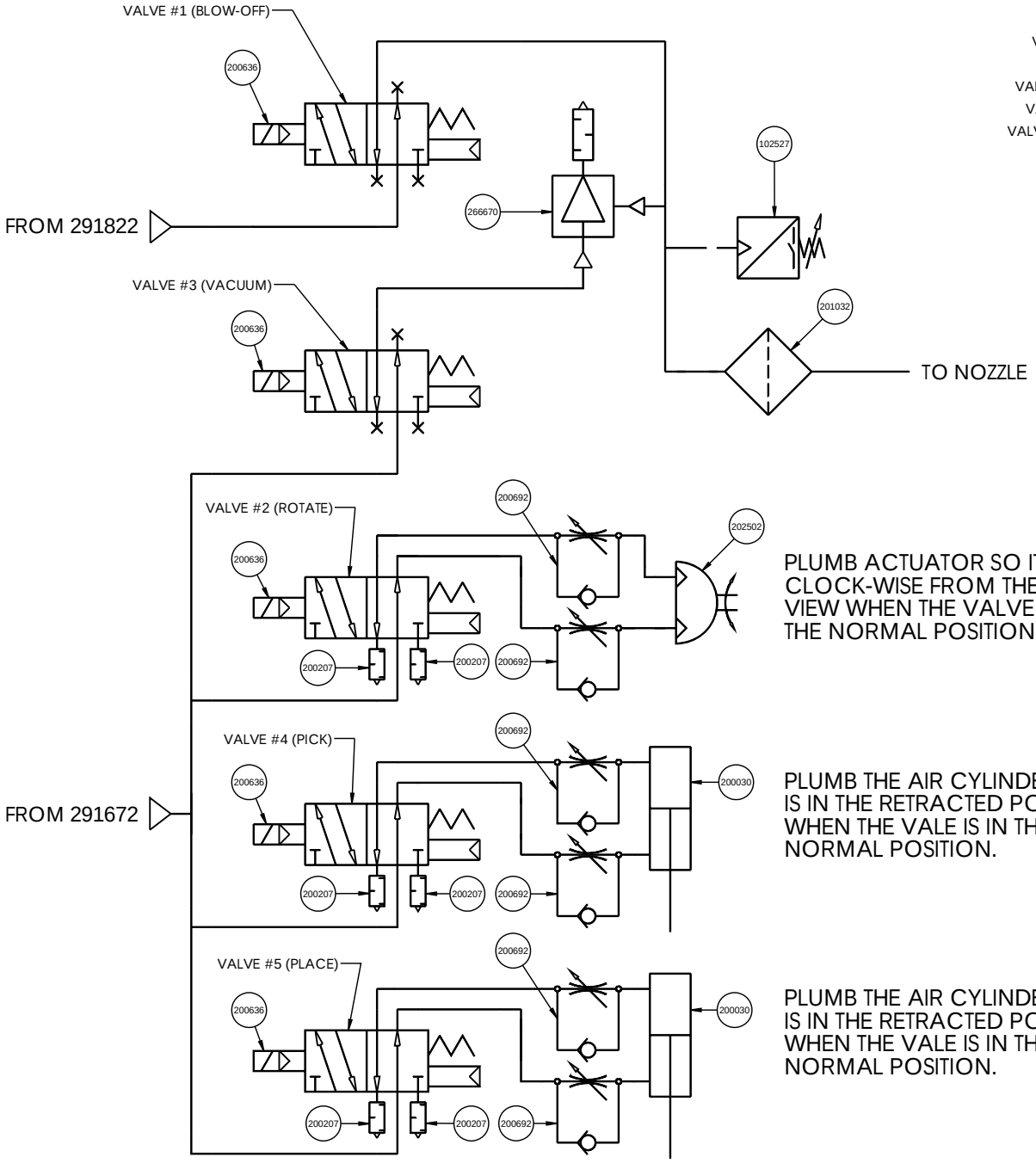
	NAME	DATE
DRAWN	RH	8/15/2013
ENG APPR.	PVO	~

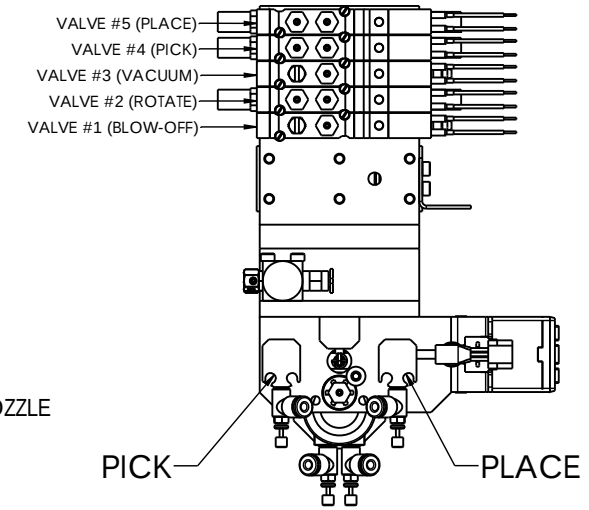
TITLE:
TM400 PICK & PLACE HEAD

MATERIAL
FINISH

SIZE **B** | DWG. NO. 291665 | REV B

WEIGHT (lbs): 2.50 | SHEET 8 OF 10

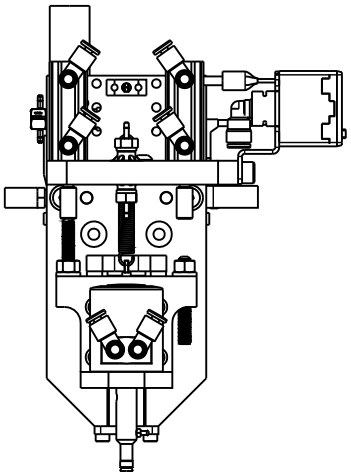




PLUMB ACTUATOR SO IT TURNS CLOCK-WISE FROM THE TOP VIEW WHEN THE VALVE IS IN THE NORMAL POSITION.

PLUMB THE AIR CYLINDER SO IT IS IN THE RETRACTED POSITION WHEN THE VALE IS IN THE NORMAL POSITION.

PLUMB THE AIR CYLINDER SO IT IS IN THE RETRACTED POSITION WHEN THE VALE IS IN THE NORMAL POSITION.



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/4/2013
ENG APPR.	PVO	~

TITLE:
TM400 P&P HEAD PNEUMATIC DRAWING

MATERIAL
FINISH

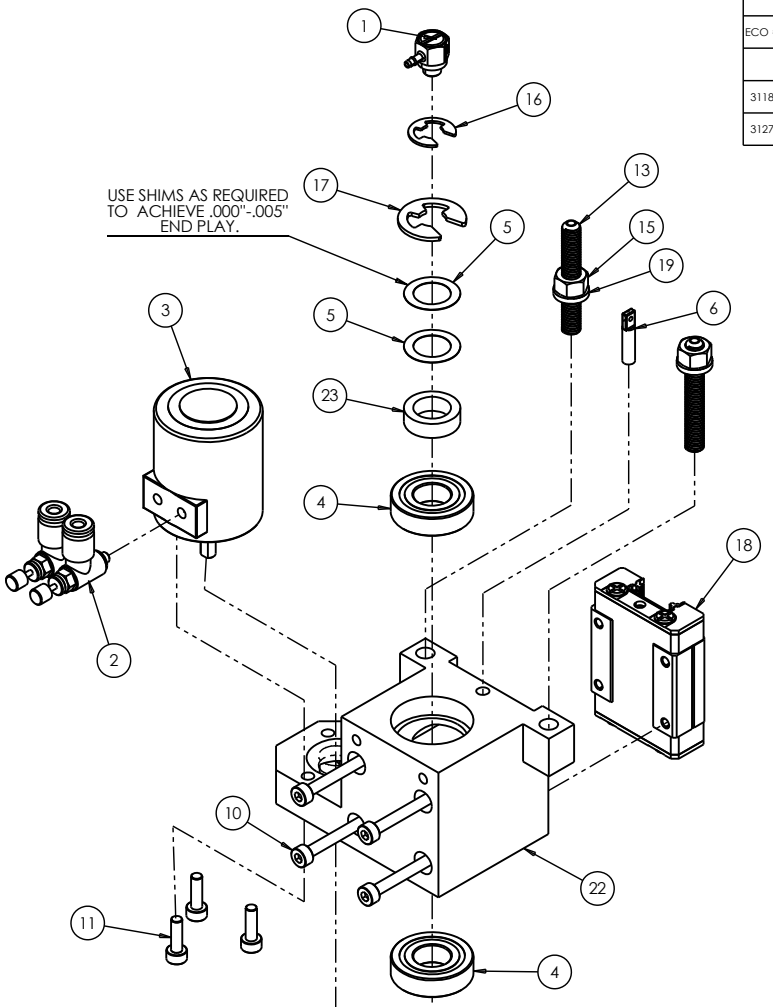
SIZE	DWG. NO.	REV
C	291665	B

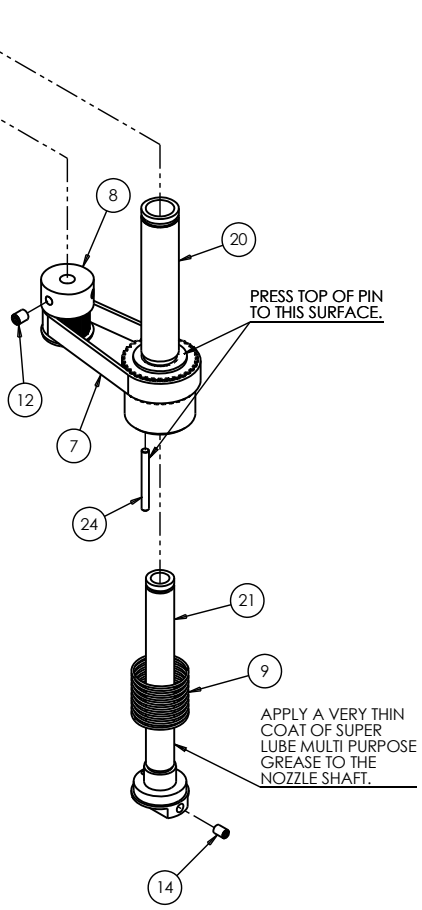
WEIGHT (lbs): 0.00
SHEET 9 OF 10

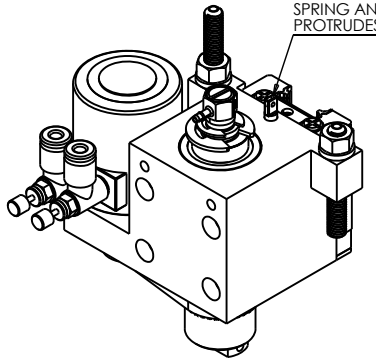
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	1
2	200343	AS 1 2 0 1F-M3-01 (SMC)	2
3	202523	SMC CRB2BWU10-180SZ	1
4	204174	BALL BEARING	2
5	206007	.005" SHIM	2
6	209101	SPRING ANCHOR	1
7	210063	TIMING BELT	1
8	211068	19 TOOTH TIMING PULLEY	1
9	216227	COMPRESSION SPRING	1
10	220202	SS SHCS M3 x 35mm	4
11	221712	SS SHCS M3 x 10mm	3
12	230008	AS CUP SET M3 x 4mm	1
13	230083	McMASTER CARR 91390A232	2
14	231037	AS CUP SET M2.5 x 4mm	1
15	239105	M5 SS HEX NUT	2
16	249006	RETAINING RING	1
17	249017	RETAINING RING	1
18	249974	HIWINN MGN-15 BLOCK	1
19	266483	HEAVY WASHER	2
20	270060	OUTER BUSHING	1
21	270061	NOZZLE SHAFT	1
22	270072	NOZZLE HOUSING	1
23	270073	NOZZLE SPACER	1
24	218907	5/64 X 3/4" DOWEL PIN	1

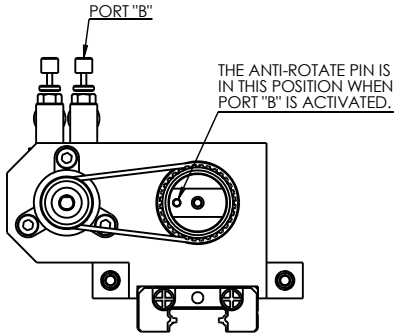
REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12/7/2018	PVO
3118	B	CHANGED ANTI-ROTATE PIN & TIMING PULLEY	2/20/2019	PVO
3127	C	REPLACED 218906 WITH 218907	4/11/2019	PVO

PACK THE LINEAR BEARING BLOCK WITH SUPER LUBE MULTI-PURPOSE GREASE. INSTALL THE BLOCK SO THE GREASE FITTING IS POINTED DOWN.

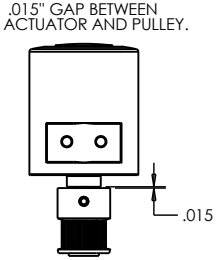








BOTTOM VIEW



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5°
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	12/7/2018
ENG APPR.	PVO	–

V-TEK INTERNATIONAL, ROYCE INSTRUMENTS

TITLE:
NOZZLE OVERTRAVEL ASSEMBLY

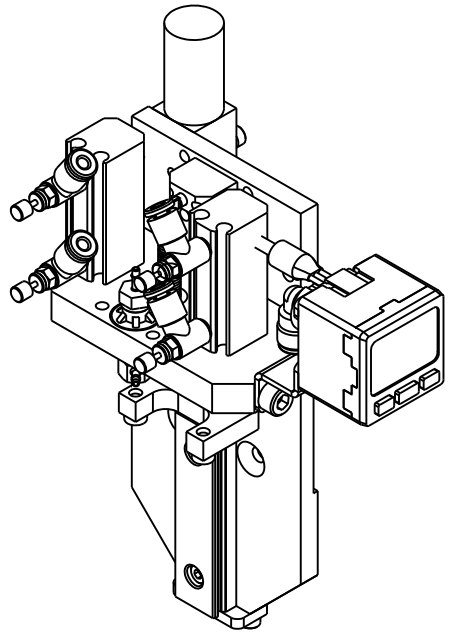
MATERIAL
FINISH

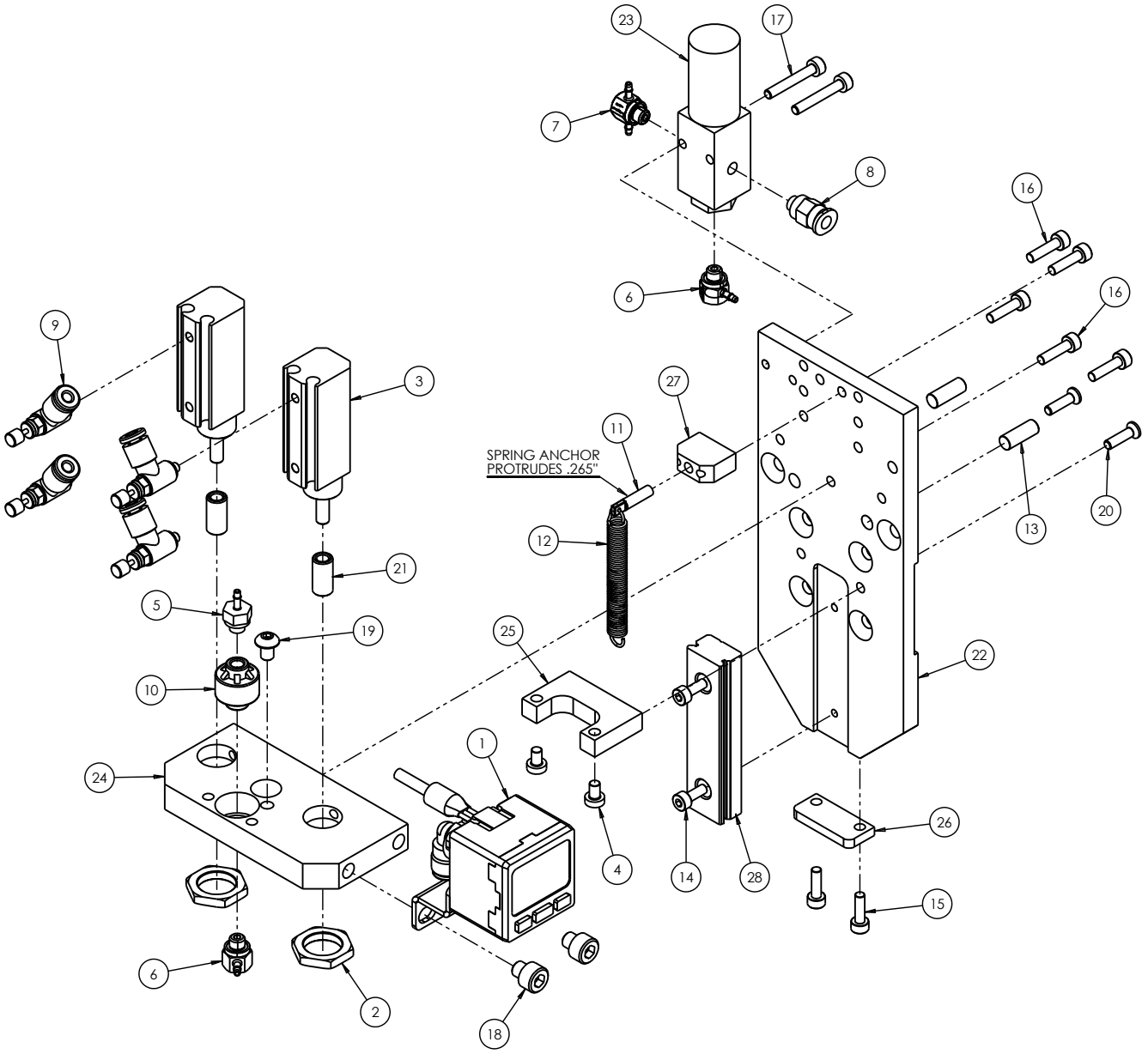
SIZE C | DWG. NO. 292749 | REV C

WEIGHT (lbs): 0.61 | SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	102597	SMC VACUUM SENSOR (ZSE30A-C4L-P-LA2)	1
2	200063 NUT	CYLINDER NUT	2
3	200063	AIR CYLINDER 15mm STROKE	2
4	200153	BUMPER	2
5	200253	10-32 x 1/16 HOSE BARB	1
6	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	2
7	200261	AIR FIR 10-32 TEE TO 1/16" TB	1
8	200273	AIR FIT 5/32 TB 10-32 MALE	1
9	200343	AS 1 2 0 1F-M3-01 (SMC)	4
10	201026	FILTER	1
11	209101	SPRING ANCHOR	1
12	209250	LeeSpring-MS24586-1054	1
13	219041	3/16 X 1/2 LG. SS DOWEL PIN	2
14	221711	SHCS SS M3 X 8	2
15	221712	SHCS SS M3 X 10	2
16	221713	SHCS SS M3 X 12	5
17	221716	SHCS SS M3 X 20	2
18	221766	SHCS SS M5 X 5	2
19	223728	BHCS SS M4 X 6	1
20	225714	FHCS SS M3 X 12	2
21	266482	CYLINDER BUMPER	2
22	267004	P&P BACKPLATE	1
23	267005	VACUUM GENERATOR MODIFICATION	1
24	267006	CYLINDER MOUNT	1
25	267009	UPPER STOP	1
26	267010	LOWER STOP	1
27	267012	SPRING ANCHOR MOUNT	1
28	249974 RAIL	LINEAR RAIL	1

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12/7/2018	PVO





UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5°
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	12/7/2018
ENG APPR.	PVO	–

V-TEK INTERNATIONAL, INC. / ROYCE INSTRUMENTS

TITLE:

P&P HEAD FRAME

MATERIAL

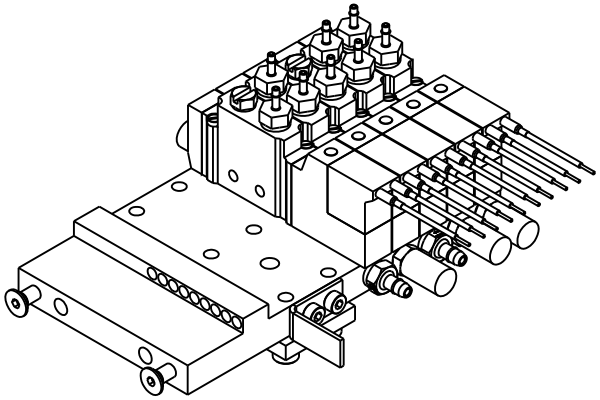
FINISH

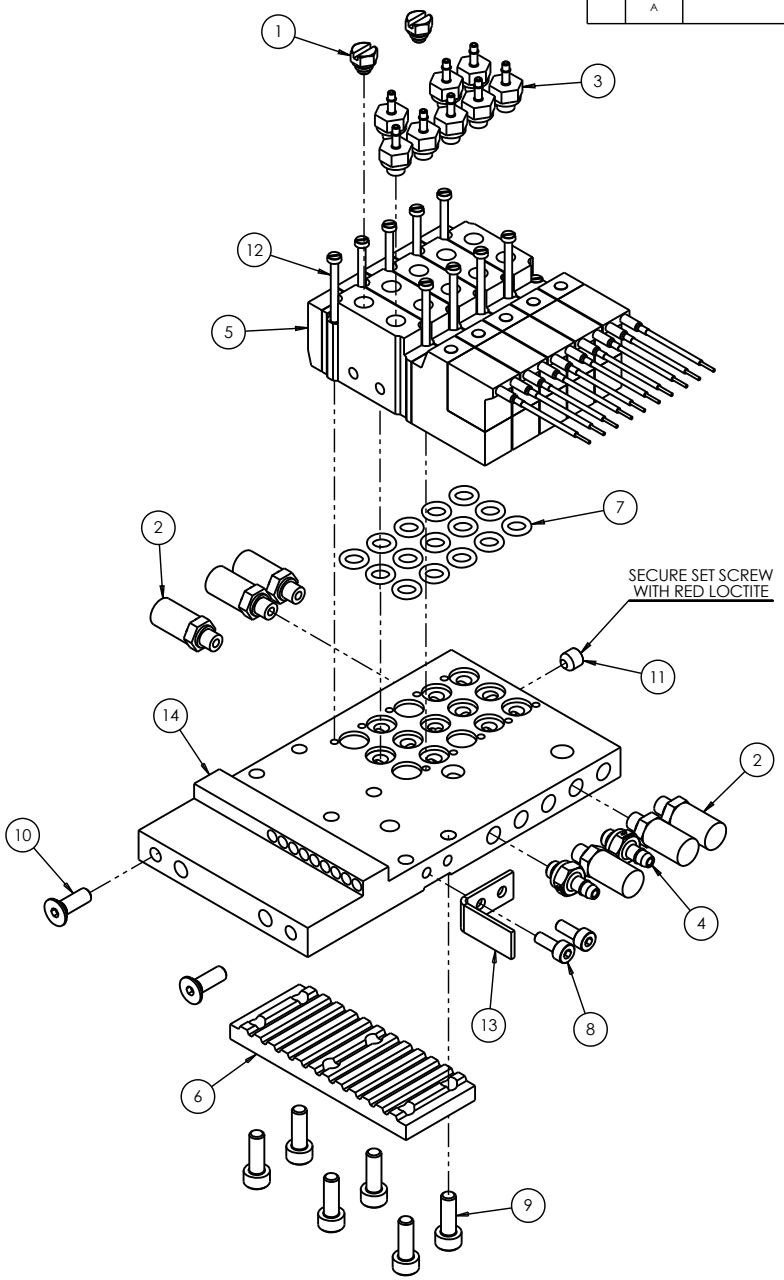
SIZE C | DWG. NO. 292750 | REV A

WEIGHT (lbs): 1.03 | SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200201	FITTING	2
2	200207	AIR FIT 10-32 M SS MUFFLER	6
3	200253	10-32 x 1/16 HOSE BARB	8
4	200254	AIR FIT 1/8 BARB X 10-32MALE	2
5	200636	AIR VALVE	5
6	210072	BELT COUPLER Misumi-TBCS-XL037	1
7	212001	ORING 5/16	15
8	221711	SHCS SS M3 X 8	2
9	221731	SHCS SS M4 X 12	6
10	225731	FHCS SS M4 X 12	2
11	231038	M5 X 5 ALLOY SET SCREW	1
12	236062	M2 X 25 SS SLOTTED CHEESE HEAD SCREW	10
13	267011	HOME SENSOR FLAG	1
14	267013	P&P MANIFOLD	1

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12/7/2018	PVO





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.X ± 0.015
ANGULAR: MACHINED ± 0.1 °
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	12/7/2018
ENG APPR.	PVO	–

V-TEK INTERNATIONAL / ROYCE INSTRUMENTS

TITLE:

P&P HEAD FRAME

MATERIAL

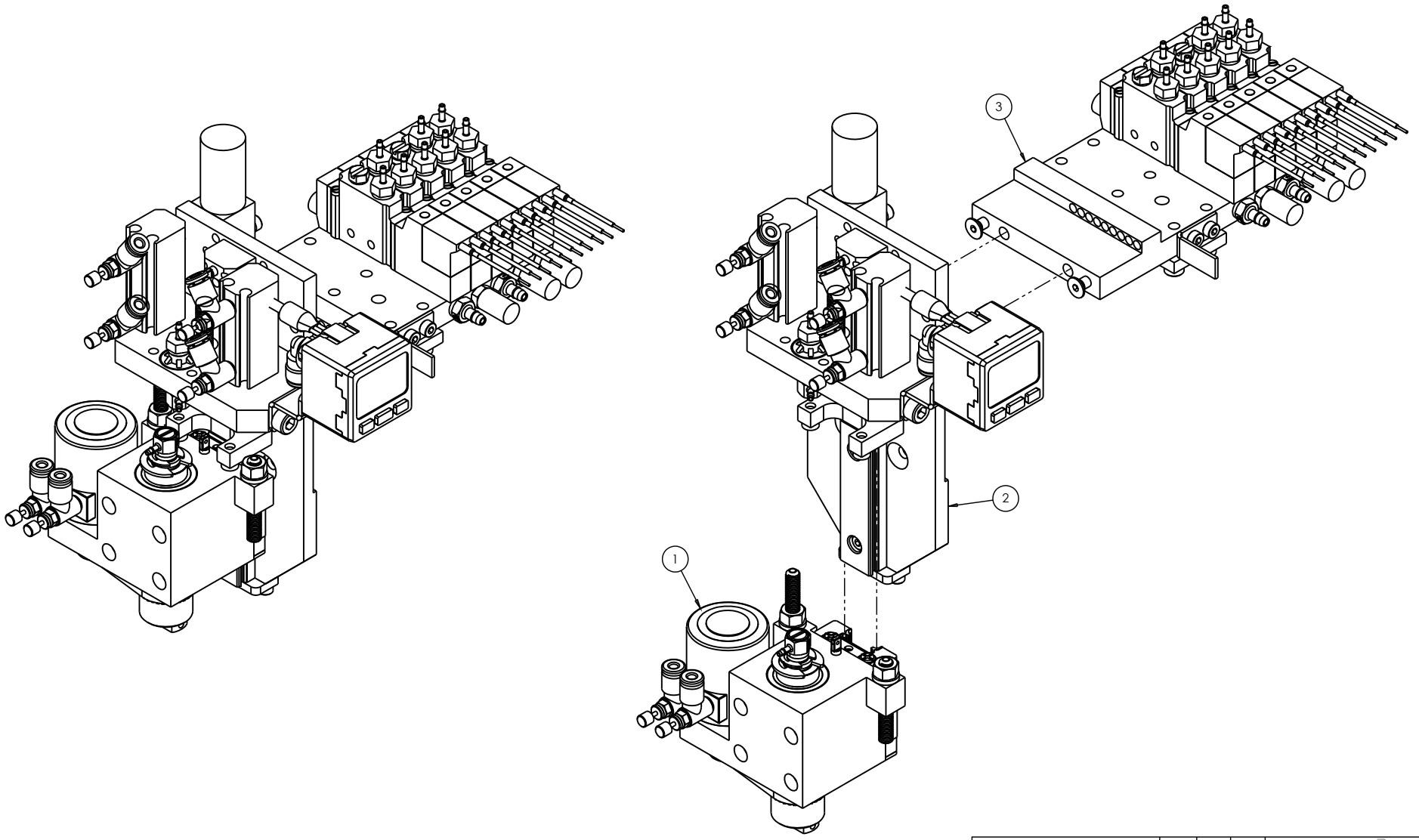
FINISH

SIZE	DWG. NO.	REV
C	292751	A

WEIGHT (lbs): 1.10 SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	292749	NOZZLE OVERTRAVEL ASSEMBLY	1
2	292750	P&P HEAD FRAME	1
3	292751	P&P HEAD FRAME	1

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12/7/2018	PVO



UNLESS OTHERWISE SPECIFIED:

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TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1 °
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
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- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	12/7/2018
ENG APPR.	PVO	–

V-TEK INTERNATIONAL / ROYCE INSTRUMENTS

TITLE:

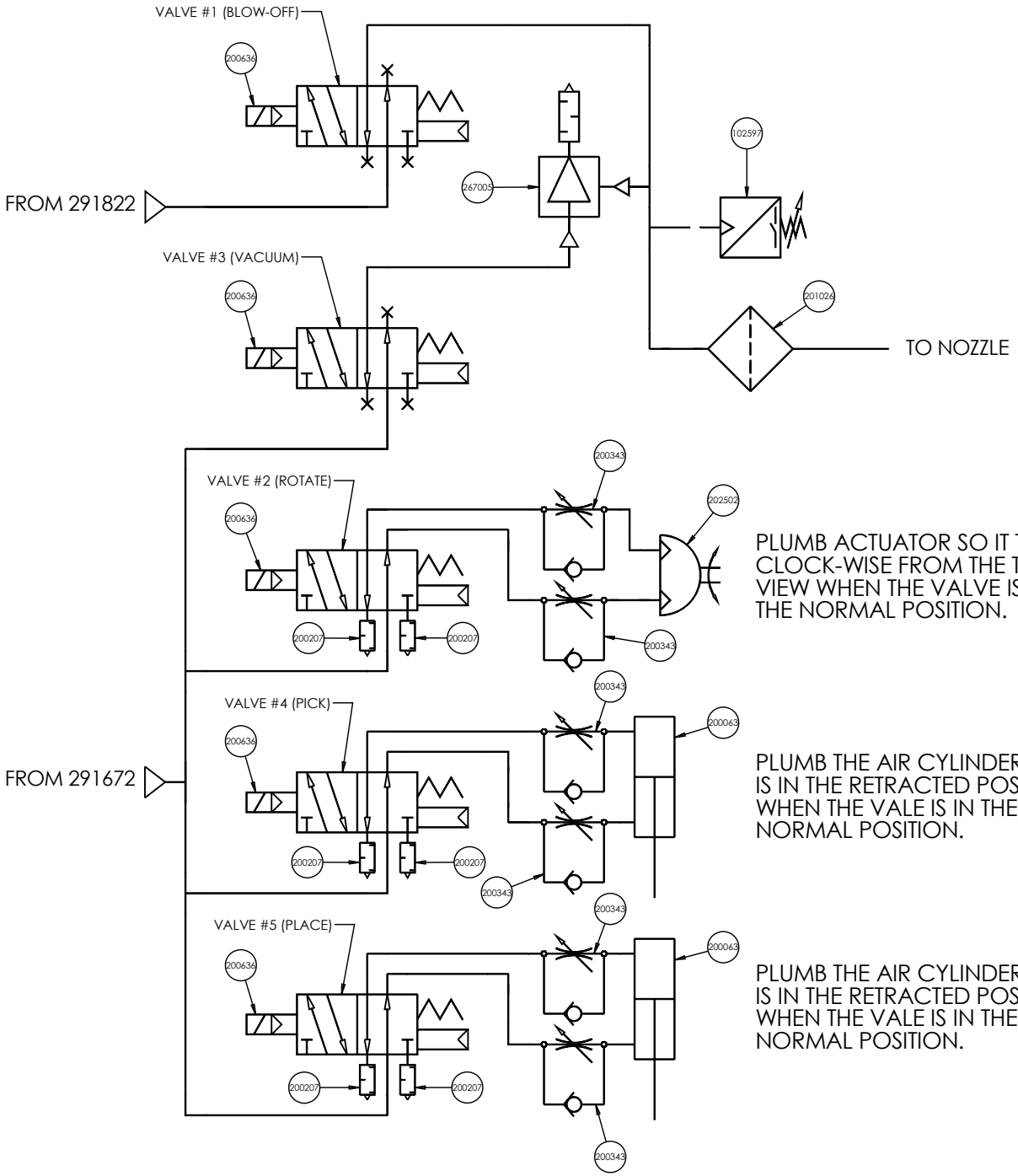
P&P HEAD ASSEMBLY

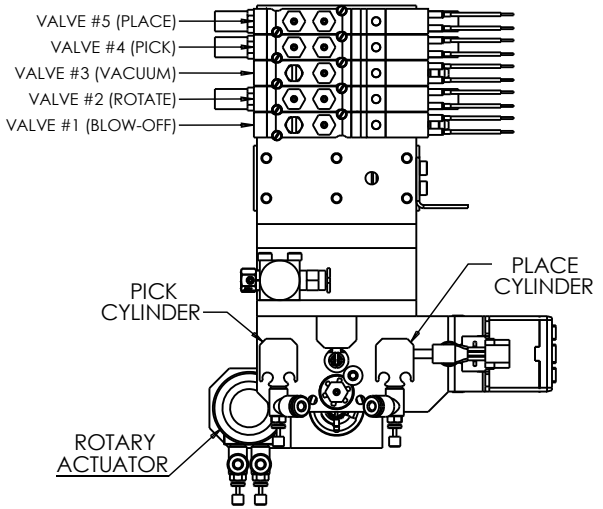
MATERIAL

FINISH

SIZE C | DWG. NO. 292752 | REV A

WEIGHT (lbs): 2.74

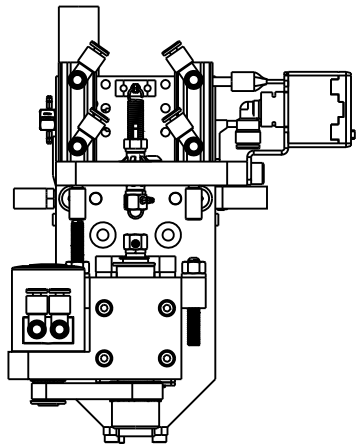




PLUMB ACTUATOR SO IT TURNS CLOCK-WISE FROM THE TOP VIEW WHEN THE VALVE IS IN THE NORMAL POSITION.

PLUMB THE AIR CYLINDER SO IT IS IN THE RETRACTED POSITION WHEN THE VALE IS IN THE NORMAL POSITION.

PLUMB THE AIR CYLINDER SO IT IS IN THE RETRACTED POSITION WHEN THE VALE IS IN THE NORMAL POSITION.



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5°
SURFACE: 32

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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	NAME	DATE
DRAWN	RH	9/4/2013
ENG APPR.	PVO	–

V-TEK INTERNATIONAL / ROYCE INSTRUMENTS

TITLE: TM400 P&P HEAD PNEUMATIC

MATERIAL

FINISH

DRAWING NO. 292752

SIZE C

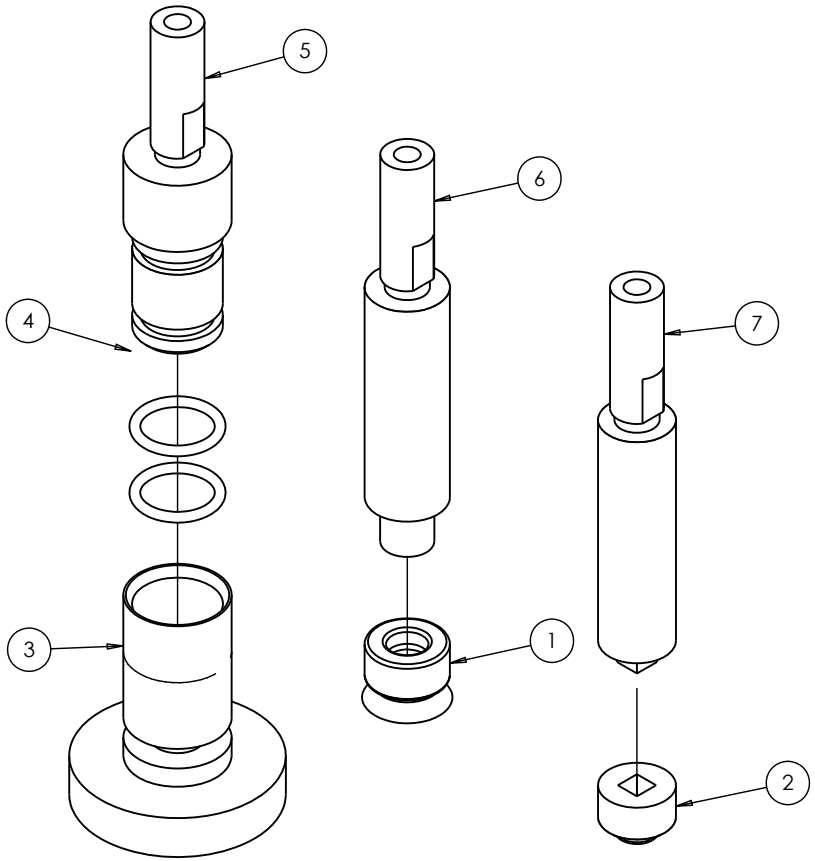
REV A

WEIGHT (lbs): 0.00

SHEET 2 OF 2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	201207	VACUUM CUP PFG-5U	1
2	201271	VACUUM CUP A1 100	1
3	201297	NOZZLE QUAD LARGE	1
4	212025	QUAD NOZZLE O-RING	2
5	270077	NOZZLE SHANK QUAD (LONG)	1
6	270078	NOZZLE SHANK CONVUM (LONG)	1
7	270079	NOZZLE SHANK SPT (LONG)	1

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	12/14/2018	PVO



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5°
SURFACE: 32

GENERAL NOTES:
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- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
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- DO NOT SCALE DRAWING

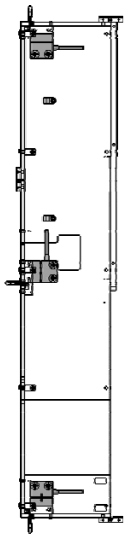
	NAME	DATE
DRAWN	PVO	2/14/2018
ENG APPR.	PVO	~

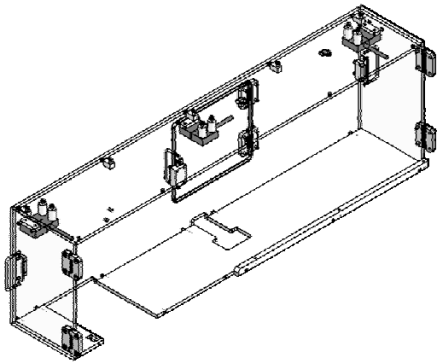
TITLE:

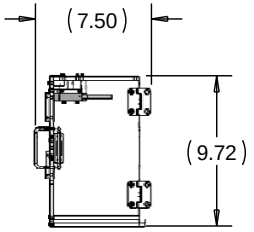
TM-400 NOZZLE SET (LONG)

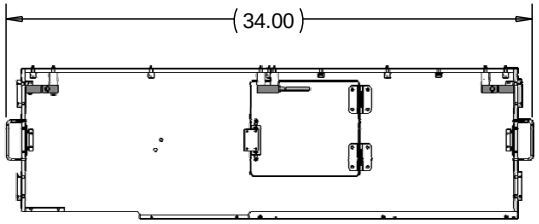
MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	292756	A
	WEIGHT (lbs): 0.02		SHEET 1 OF 1

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/11/2013	PVO









NOTE:
BUILD AS YOU GO
NOT AS OWN ASSEMBLY

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

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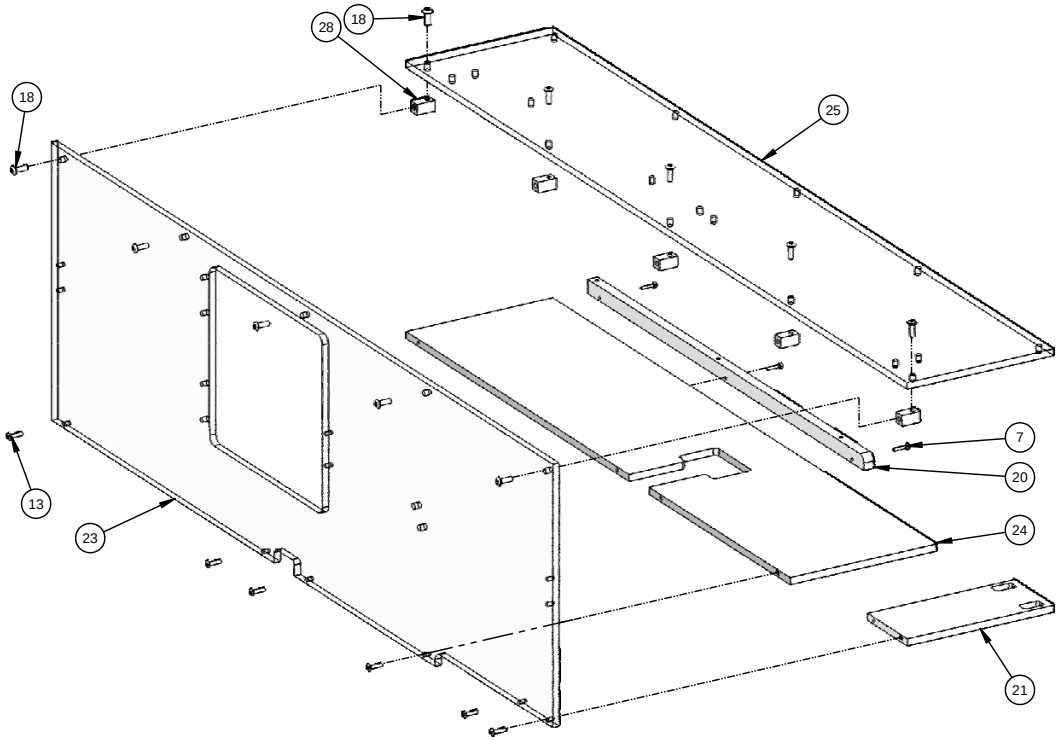
	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:
TM-402 GUARD ASSEMBLY (BOWL)

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291684	A
	WEIGHT (lbs): 10.68		SHEET 1 OF 4



NOTE:
BUILD AS YOU GO
NOT AS OWN ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
7	221706	SHCS SS M2.5 X 16	3
13	223713	BHCS SS M3 X 12	16
18	223736	BHCS SS M4 X 12	16
20	267040	P&P GUARD MOUNT	1
21	267041	P&P GUARD, FILLER, FRONT	1
23	267075	P&P ENCLOSURE SIDE, BOWL	1
24	267076	P&P ENCLOSURE FLOOR (BOWL)	1
25	267078	P&P ENCLOSURE TOP (BOWL)	1
28	267422	GUARD BRACKET	5

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

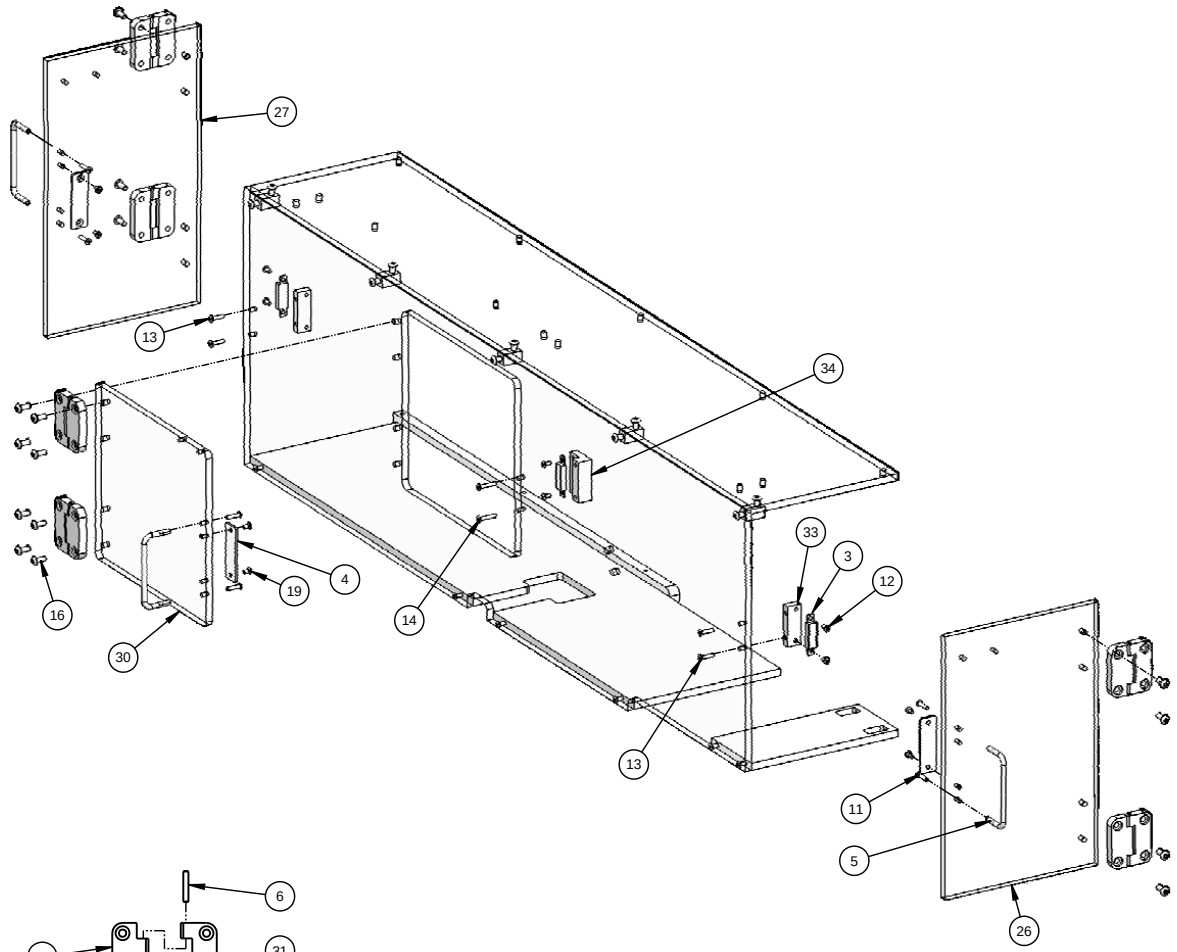
V-TEK INCORPORATED

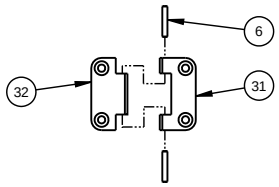
TITLE:
TM-402 GUARD ASSEMBLY (BOWL)

MATERIAL
FINISH

SIZE B | DWG. NO. 291684 | REV A

WEIGHT (lbs): 10.68 | SHEET 2 OF 4





DETAIL A
HINGE ASSEMBLY
SCALE 1:3

NOTE:
BUILD AS YOU GO
NOT AS OWN ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
3	216655 CATCH	CATCH	3
4	216655 STRIKE PLATE	STRIKE PLATE	3
5	217309	pull handle	3
6	219003	1/8 X 3/4 LG. SS DOWEL PIN	12
11	223009	BHCS SS 4-40 X 1/2	6
12	223711	BHCS SS M3 X 6	6
13	223713	BHCS SS M3 X 12	16
14	223714	BHCS SS M3 X 16	2
16	223730	BHCS SS M4 X 10	16
19	225711	FHCS SS M3 X 6	6
26	267420	P&P ENCLOSURE DOOR FRONT	1
27	267421	P&P ENCLOSURE DOOR REAR	1
30	267432	P&P ENCLOSURE DOOR SIDE, TUBE	1
31	267434	HINGE OUTER	6
32	267435	HINGE INNER	6
33	267436	CATCH MOUNT	2
34	267437	CATCH MOUNT (SIDE)	1

UNLESS OTHERWISE SPECIFIED:

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.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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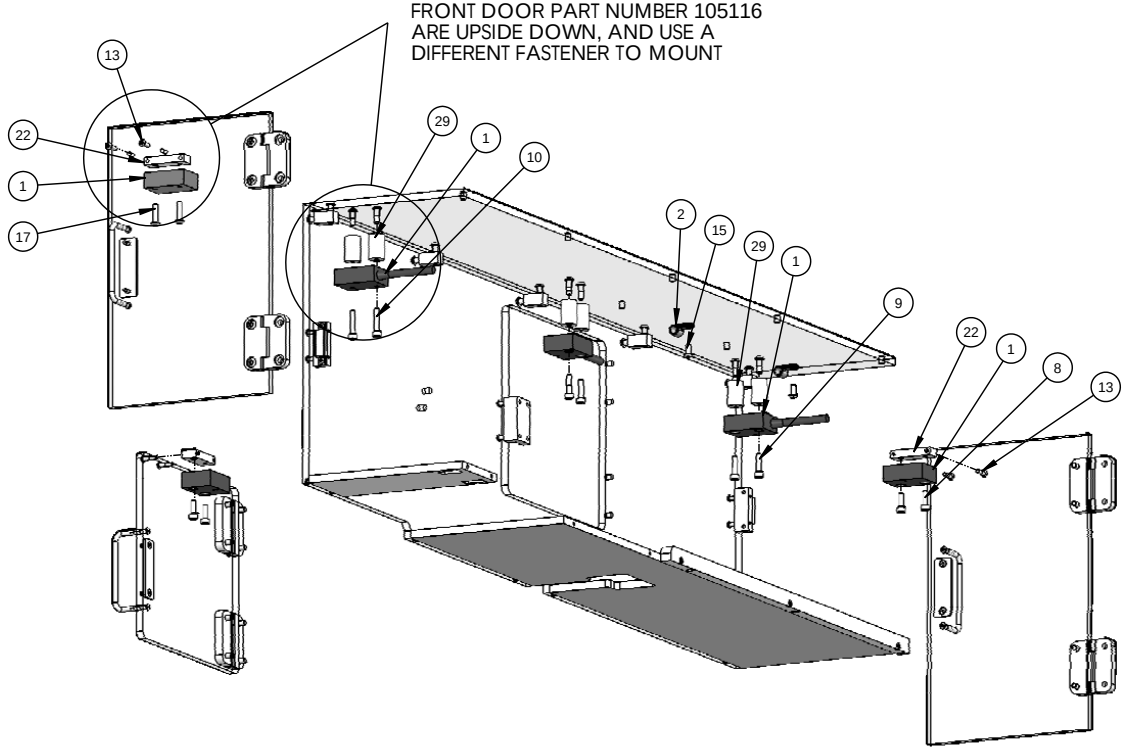
- **CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED**
- **ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART**
- **DO NOT SCALE DRAWING**

	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

TITLE:
TM-402 GUARD ASSEMBLY (BOWL)

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291684	A
	WEIGHT (lbs): 10.68		SHEET 3 OF 4

NOTE:
FRONT DOOR PART NUMBER 105116
ARE UPSIDE DOWN, AND USE A
DIFFERENT FASTENER TO MOUNT



NOTE:
BUILD AS YOU GO
NOT AS OWN ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	105116	READ HEAD FOR CM-S4; 3 METER	3
2	107106	CABLE CLAMP 1/4 - .203 HOLE	2
8	221731	SHCS SS M4 X 12	4
9	221733	SS SHCS M4X16	4
10	221735	SHCS SS M4 X 20	2
13	223713	BHCS SS M3 X 12	16
15	223729	BHCS SS M4 X 8	2
17	223733	BHCS SS M4 X 16	2
22	267049	SWITCH MOUNT, METRIC	3
29	267423	SWITCH STAND-OFF	6

UNLESS OTHERWISE SPECIFIED:

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BEND ± 0.5 °
SURFACE: 63

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	NAME	DATE
DRAWN	RH	9/11/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

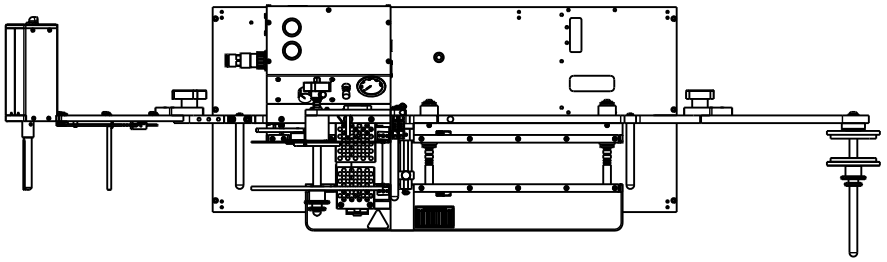
TITLE:
TM-402 GUARD ASSEMBLY (BOWL)

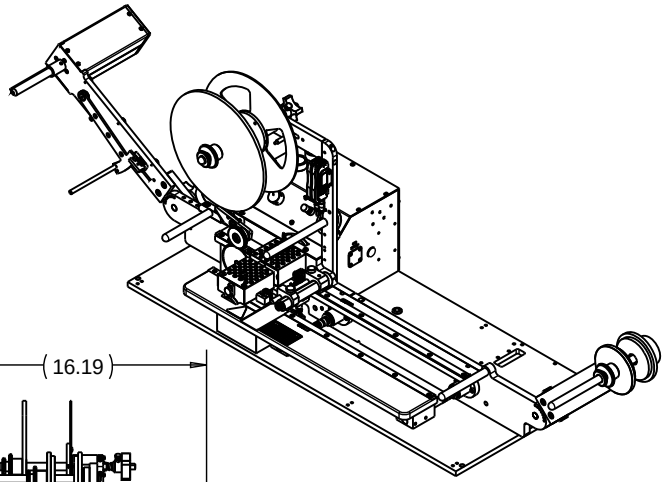
MATERIAL
FINISH

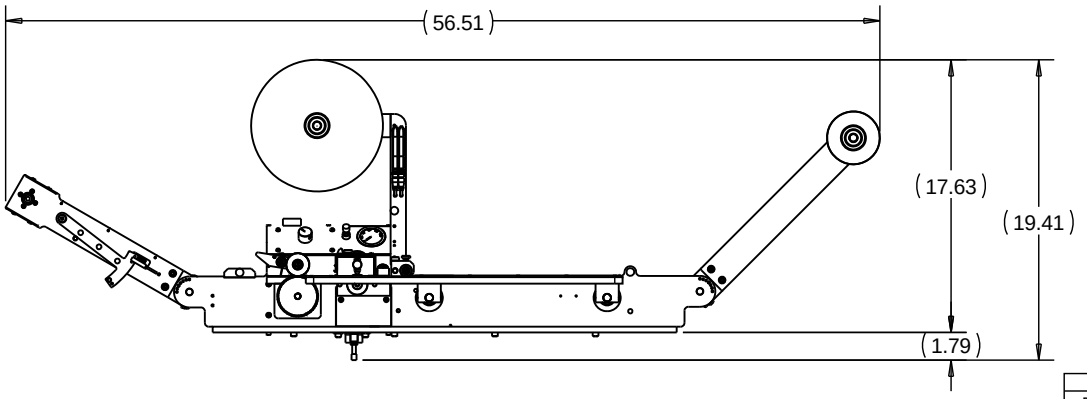
SIZE **B** | DWG. NO. 291684 | REV A

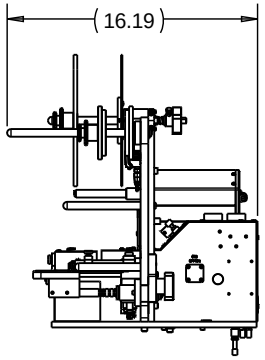
WEIGHT (lbs): 10.68 | SHEET 4 OF 4

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/6/2013	PVO
2873	B	REPLACE TAKE UP ARM (291677) WITH TAKE UP ARM WITH DANCER (292049)	8/6/2015	RH









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.XX ± 0.010
.X ± 0.015
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BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
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	NAME	DATE
DRAWN	RH	9/6/13
ENG APPR.	PVO	~

TITLE:

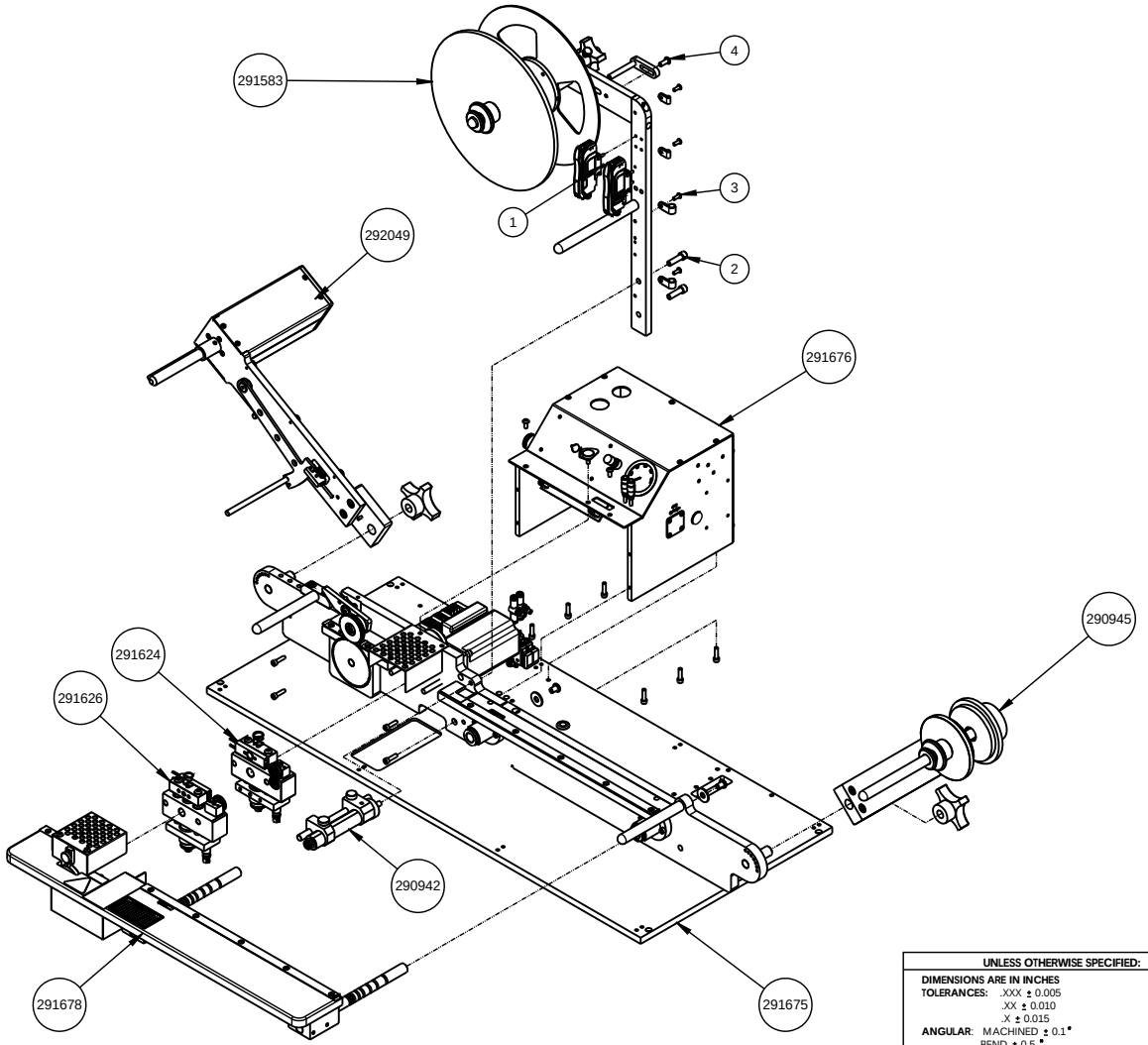
TM-400 TAPER ASSEMBLY

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291674 | REV B

WEIGHT (lbs): 41255.36 | SHEET 1 OF 3



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	221002	SHCS SS 4-40 X 3/8	4
2	221174	SHCS SS 1/4-20 X 7/8	2
3	223025	BHCS SS 6-32 X 3/8	4
4	223053	BHCS SS 10-32 X 1/2	1
5	290942	TM50 COVER TAPE GUIDE	1
6	290945	TM50 INFEED ARM CARRIER TAPE	1
7	291583	COVER TAPE ASSEMBLY	1
8	291624	TM500 INNER SEAL PSA & HEAT	1
9	291626	TM500 OUTER SEAL PSA & HEAT	1
10	291675	TM-400 TAPER BASE	1
11	291676	TM-400 TAPER MOTOR ENCLOSURE	1
12	291678	FRONT TRACK ASSEMBLY	1
13	292049	TAKE UP ARM (DANCER)	1

UNLESS OTHERWISE SPECIFIED:

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.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/6/13
ENG APPR.	PVO	~

TITLE:

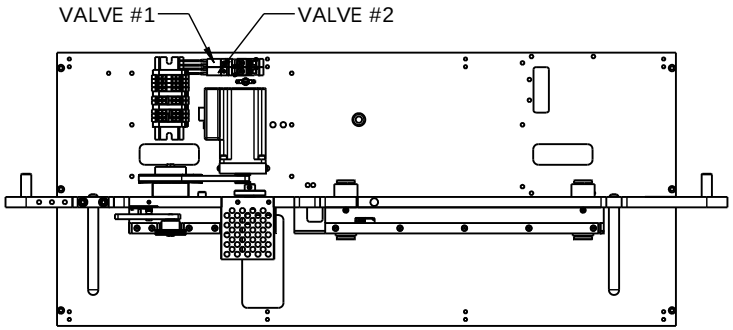
TM-400 TAPER ASSEMBLY

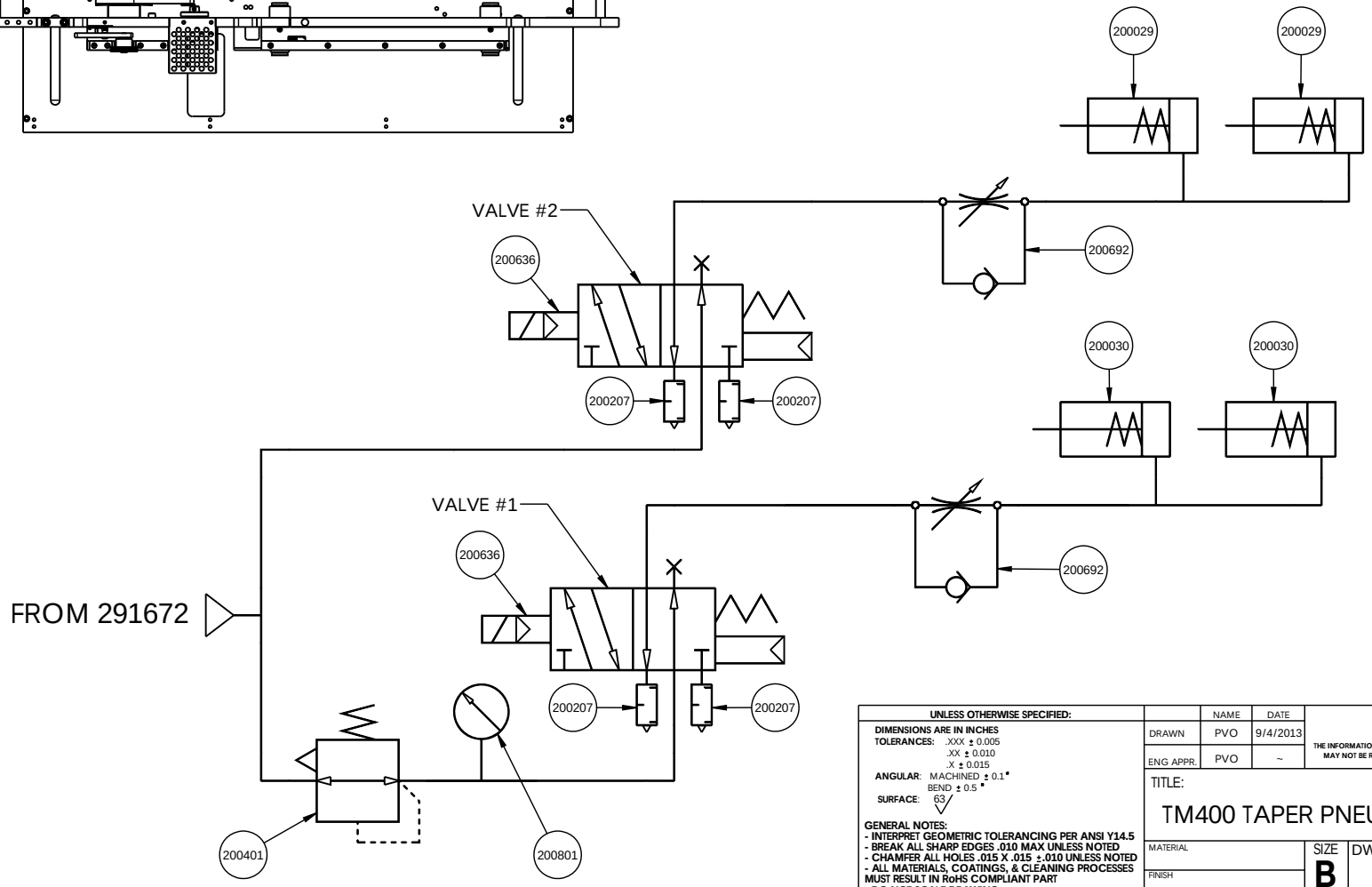
MATERIAL

FINISH

SIZE **B** | DWG. NO. 291674 | REV B

WEIGHT (lbs): 41255.36 | SHEET 2 OF 3





UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: .XXX ± 0.005 .XX ± 0.010 .X ± 0.015 ANGULAR: MACHINED ± 0.1° BEND ± 0.5 ° SURFACE: 63	DRAWN	PVO	9/4/2013
	ENG APPR.	PVO	~

GENERAL NOTES:
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- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
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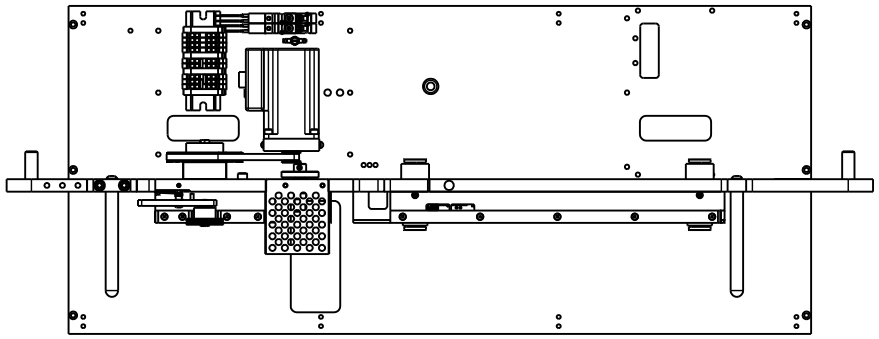
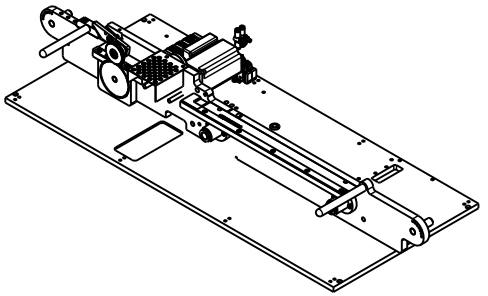
TITLE:

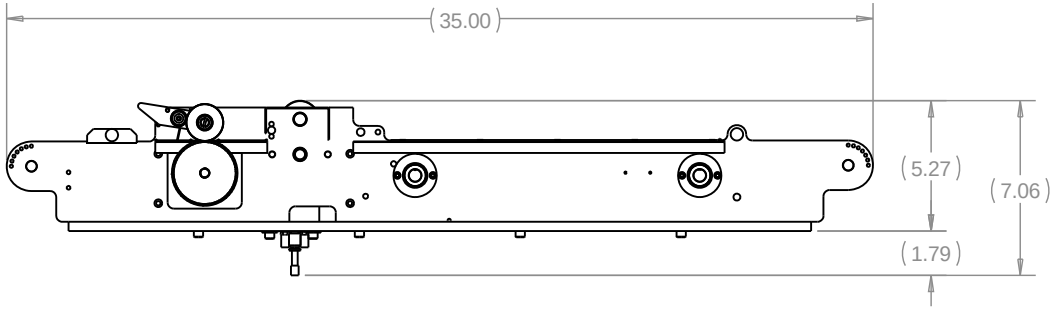
TM400 TAPER PNEUMATICS DRAWING

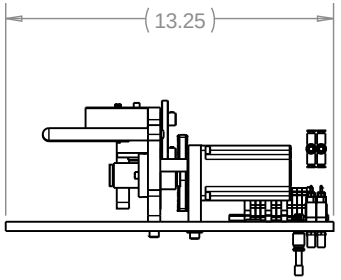
MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291674	B
	WEIGHT (lbs): 0.00		SHEET 3 OF 3

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/5/2013	PVO
2791	B	ADD GROMMET (212703)	4/16/2014	RH
2806	C	REMOVE PART #111106	6/18/2014	RH









UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
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	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

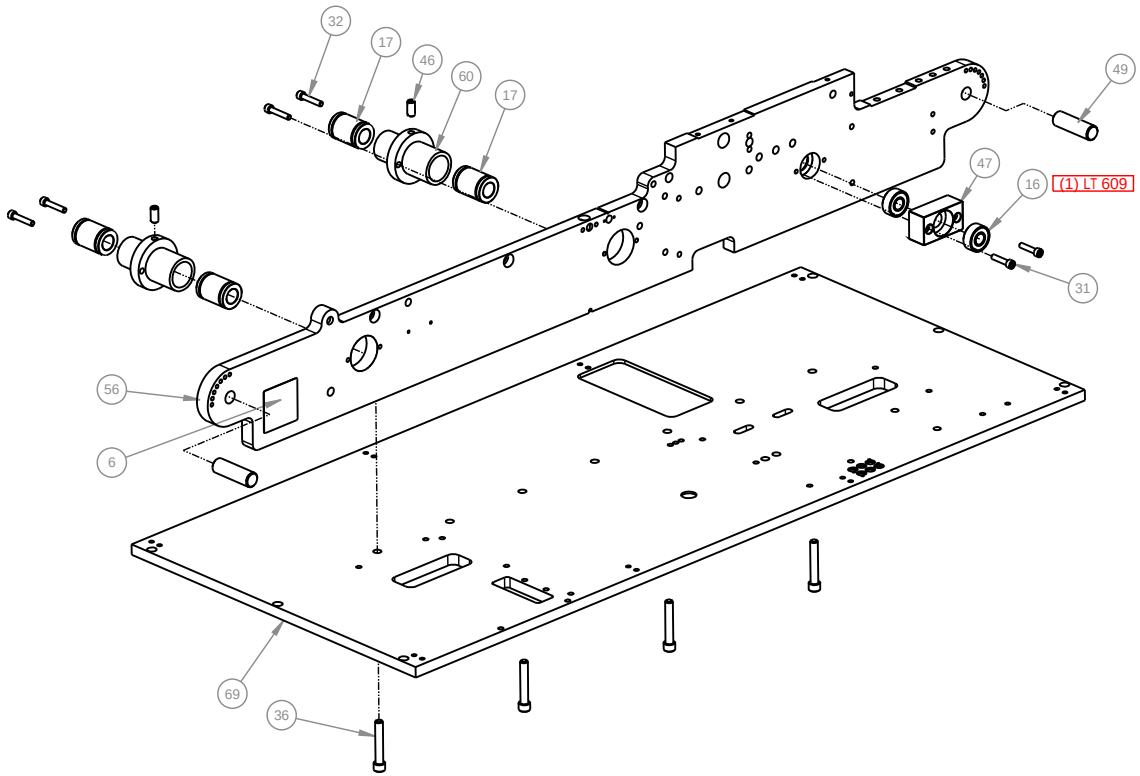
TM-400 TAPER BASE

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291675 | REV C

WEIGHT (lbs): 62.2864 | SHEET 1 OF 6



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
6	111006	SAFETY STICKER	1
16	204051	BEARING, 3/8ID X 7/8OD	2
17	204053	BEARING, SIMPLICITY FL08	4
31	221029	SHCS SS 8-32 X 3/4	2
32	221030	SHCS SS 8-32 X 3/4	4
36	221065	SHCS SS 1/4-20 X 1-1/4	4
46	241003	BALL PLUNGER 1/4-20	2
47	250015	BEARING MOUNT	1
49	250075	THREADED ROD, 1/2-13 X 1 5/8"	2
56	261043	TRACK SUPPORT BRACKET	1
60	261093	TRACK BEARING MOUNT, TM50	2
69	267069	TM-400 TAPER BASEPLATE	1

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.XX ± 0.010
.X ± 0.015
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BEND ± 0.5 °
SURFACE: 63

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	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

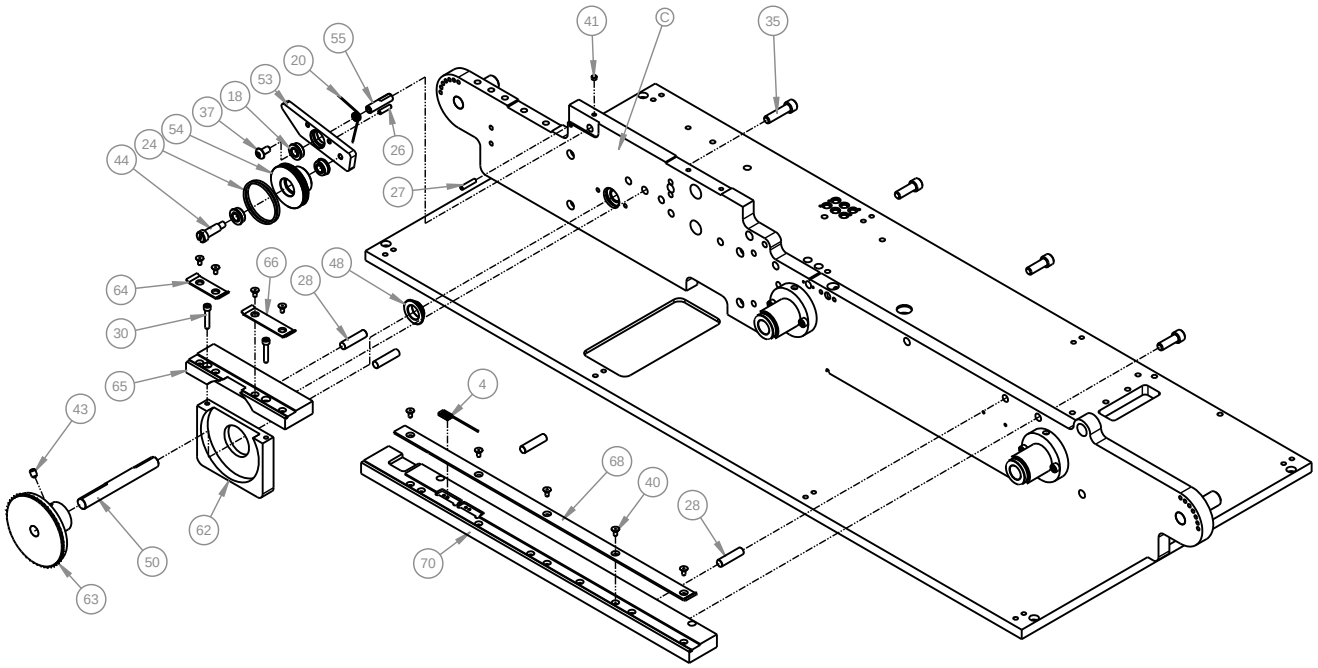
TM-400 TAPER BASE

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291675 | REV C

WEIGHT (lbs): 62.2864 | SHEET 2 OF 6



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
4	105123	FIBER OPTIC FU-57TZ	1
18	204055	BEARING SFR-188ZZEE	7
20	209022	SPRING, TORSION RIGHT HAND WOU	1
24	212008	ORING 028 NEOPRENE	2
26	219001	1/8 X 1/2 LG. SS DOWEL PIN	1
27	219002	1/8 X 5/8 LG. SS DOWEL PIN	1
28	219015	1/4 X 1 LG. SS DOWEL PIN	4
30	221017	SHCS SS 6-32 X 3/4	2
35	221064	SHCS SS 1/4-20 X 1	1
37	223044	BHCS SS 10-24 X 3/8	1
40	225001	FHCS SS 4-40 X 1/4	9
41	230016	8-32 X 1/8 STEEL SET SCREW	1
43	231019	10-24 X 1/4 SS SET SCREW	1
44	234013	1/4 X 5/8 SLOTTED SHOULDER SCREW	1
48	250016	FLANGE BUSHING MODIFICATION	1
50	255590	DRIVE SHAFT	1
53	260574	IDLER ARM	1
54	260576	DRIVE IDLER	1
55	260577	IDLER ARM SHAFT	1
62	266736	SPROCKET GUARD	1
63	266737	DRIVE SPROCKET, 50 PIN	1
64	266738	SHORT TRACK COVER	1
65	266746	SHORT REAR TRACK	1
66	266747	SHORT TRACK COVER #2	1
68	267068	TRACK COVER	1
70	267070	TM-400 TAPER REAR TRACK	1

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	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

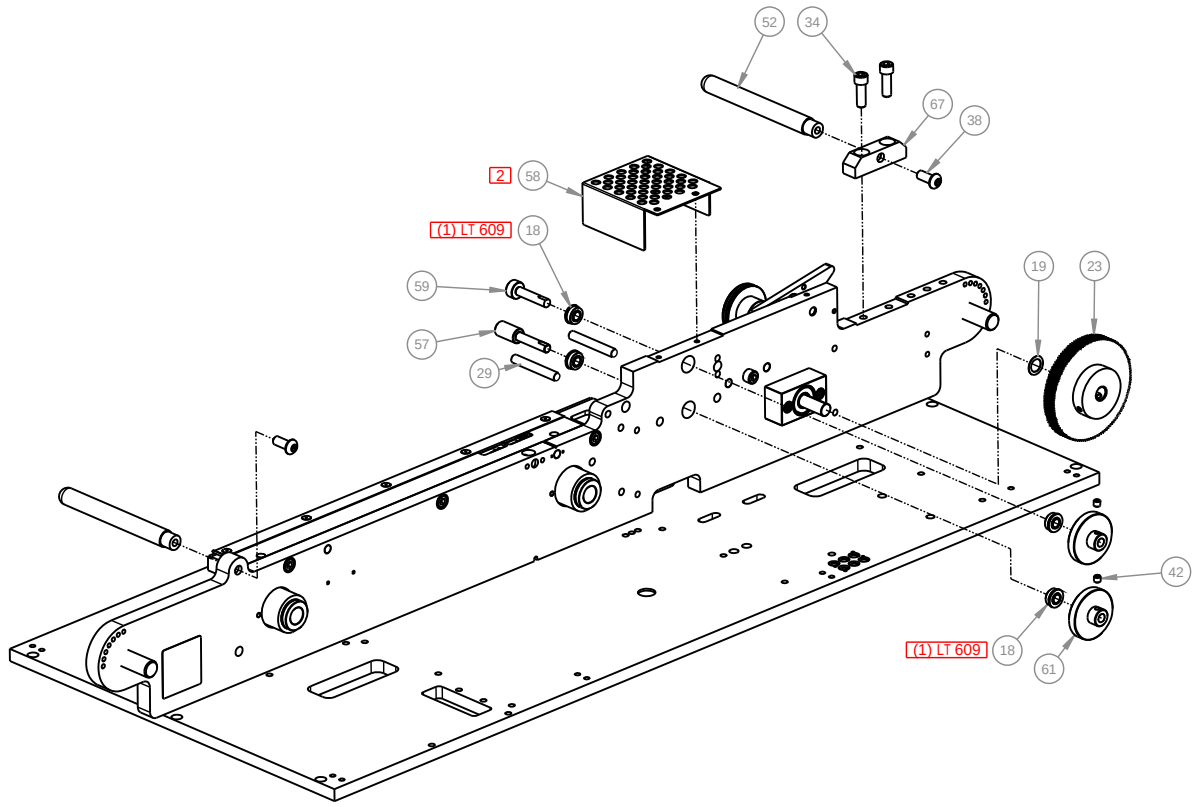
TM-400 TAPER BASE

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291675 | REV C

WEIGHT (lbs): 62.2864 | SHEET 3 OF 6



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
18	204055	BEARING SFR-188ZZEE	7
19	207025	SHIM, 3/8 ID, 9/16 OD, .010 THICK	1
23	211018	PULLEY, .080 PITCH X 120 GROOVE	1
29	219072	1/4 X 1-3/4 LG. SS DOWEL PIN	2
34	221063	SHCS SS 1/4-20 X 3/4	7
38	223061	BHCS 1/4-20 X 5/8	2
42	230023	10-24 X 3/16 STEEL SET SCREW	2
52	258574	FRONT GUIDE SHAFT	2
57	261060	SHAFT, THREADED ADJUSTER	1
58	261062	COVER, SEALER INNER	1
59	261068	SHAFT, IDLER ADJUSTER	1
61	261098	GEAR MODIFICATION, 34T	2
67	266748	TAPE GUIDE MOUNT	1

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	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

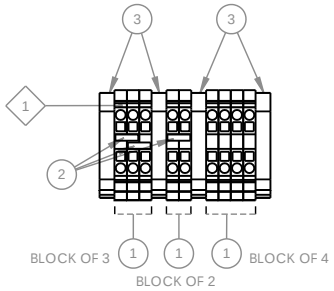
TM-400 TAPER BASE

MATERIAL

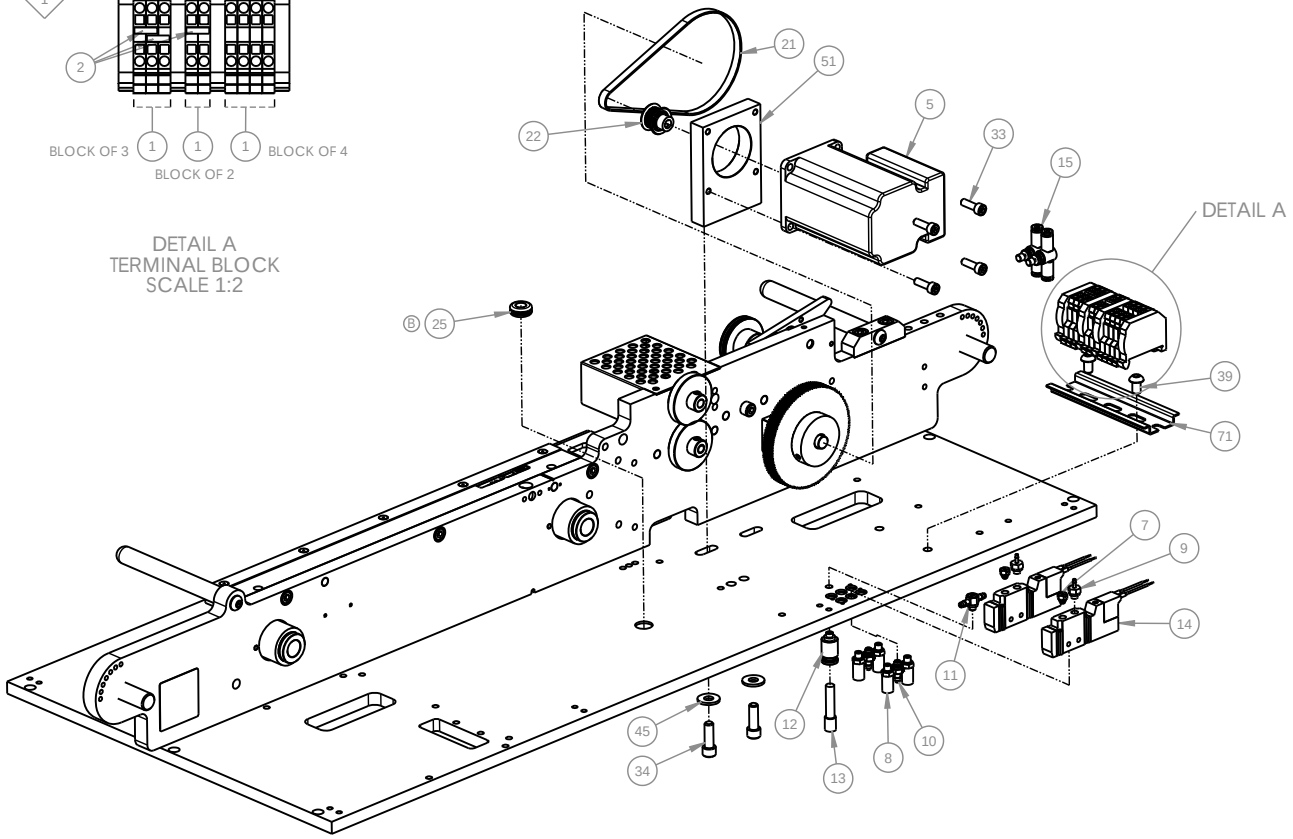
FINISH

SIZE **B** | DWG. NO. 291675 | REV C

WEIGHT (lbs): 62.2864 | SHEET 4 OF 6



DETAIL A
TERMINAL BLOCK
SCALE 1:2



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	104158	TERM BLOCK	9
2	104159	TERM JUMPER	3
3	104160	TERM END CAP	4
5	105726	STM23S-2AN	1
7	200201	FITTING	2
8	200207	AIR FIT 10-32 M SS MUFFLER	4
9	200253	10-32 x 1/16 HOSE BARB	2
10	200254	AIR FIT 1/8 BARB X 10-32MALE	2
11	200262	AIRFIT 10-32 TEETO 1/8"	1
12	200312	10-32 MALE/6MM PUSH FIT PISCO	1
13	200369	PLUG METRIC SIZE 06, SMC	1
14	200636	AIR VALVE	2
15	200692	AIR FLOW CONTROL	2
21	210019	BELT TIMING (TB20UP6-105)	1
22	211013	PULLEY, 24T	1
25	212703	GROMMET 5/16 ID 5/8 OD 1/16 TK	1
33	221045	SHCS SS 10-24 x 5/8	4
34	221063	SHCS SS 1/4-20 X 3/4	7
39	223754	BHCS SS M6X10	2
45	238024	FLAT WASHER, 1/4"	2
51	256607	MOTOR MOUNT	1
71	267071	TM-400 TAPER DIN RAIL	1

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	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

TITLE:

TM-400 TAPER BASE

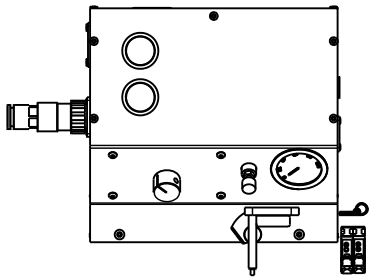
MATERIAL

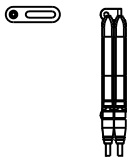
FINISH

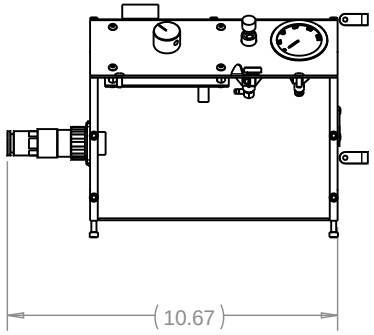
SIZE B | DWG. NO. 291675 | REV C

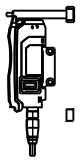
WEIGHT (lbs): 62.2864

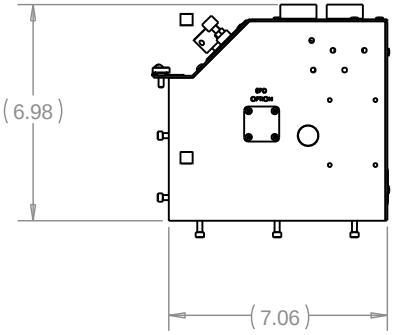
REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/6/2013	PVO

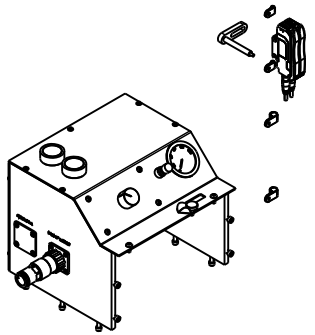












NOTE:
BUILD AS YOU GO
NOT AS OWN ASSEMBLY

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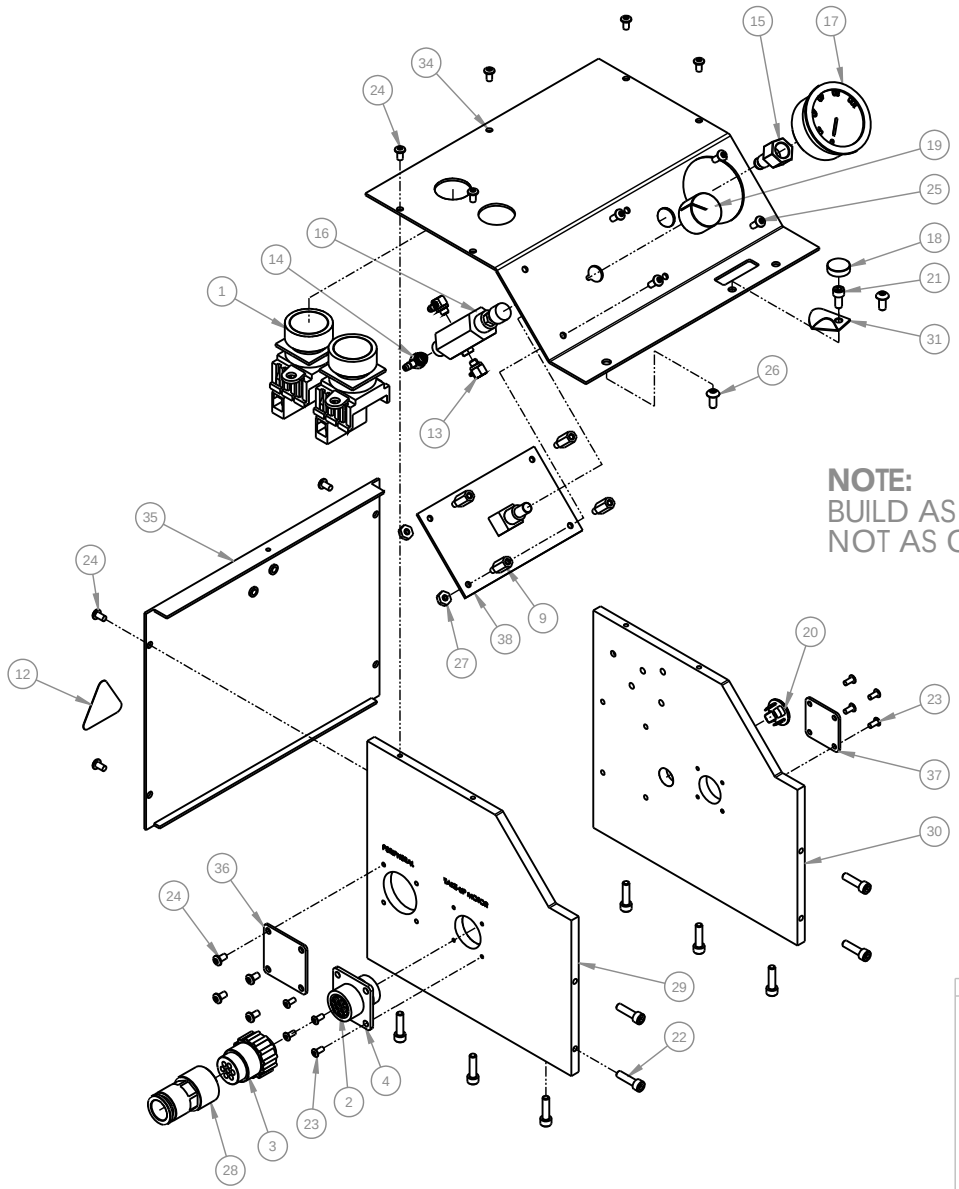
	NAME	DATE
DRAWN	RH	9/6/13
ENG APPR.	PVO	~

TITLE:
TM-400 TAPER MOTOR ENCLOSURE

MATERIAL
FINISH

SIZE **B** | DWG. NO. 291676 | REV A

WEIGHT (lbs): 3.63 | SHEET 1 OF 3



NOTE:
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102611	SWITCH PUSH SPST-NO 10A 120V	2
2	103044	PIN AMP (F) (18AWG)	7
3	103063	PLUG AMP 7 PIN	1
4	103064	RECEPT AMP 7 PIN AMP	1
9	106110	HEX STANDOFF 6-32 500 ALUM	4
12	111004	SAFETY STICKER EX. POINT	1
13	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	1
14	200260	AIR FIT 90 DEG 10-32 X 1/8 TB	2
15	200267	AIR FIT 1/8NPT FEMALE X 1/8TB	1
16	200401	AIR REGULATOR SMC ARJ210-M5	1
17	200801	GUAGE PRESSURE GP-100	1
18	217042	KNOB M4 RED	1
19	217044	KNOB BLACK	1
20	217416	HOLE PLUG 1/2" BLACK	1
21	221026	SHCS SS 8-32 X 3/8	1
22	221028	SHCS SS 8-32 x .63 LG	10
23	223008	BHCS SS 4-40 X 1/4	8
24	223024	BHCS SS 6-32 X 1/4	13
25	223025	BHCS SS 6-32 X 3/8	4
26	223034	BHCS 8-32 X 3/8	2
27	239002	6-32 SS HEX NUT	4
28	246511	CONDUIT HOUSING, SIZE 11	1
29	261050	SIDE ENCLOSURE LH, TM50	1
30	261051	SIDE ENCLOSURE RH, TM50	1
31	263063	SEAL LOCK, SPROCKET SIDE	1
34	267066	PANEL, FRONT-BASE MACHINE	1
35	267072	TM-400 TAPER REAR PANEL	1
36	267073	COVER PLATE LEFT	1
37	267074	COVER PLATE RIGHT	1
38	291719	TM-400 TAKEUP CONTROL BOARD PCBA	1

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	NAME	DATE
DRAWN	RH	9/6/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

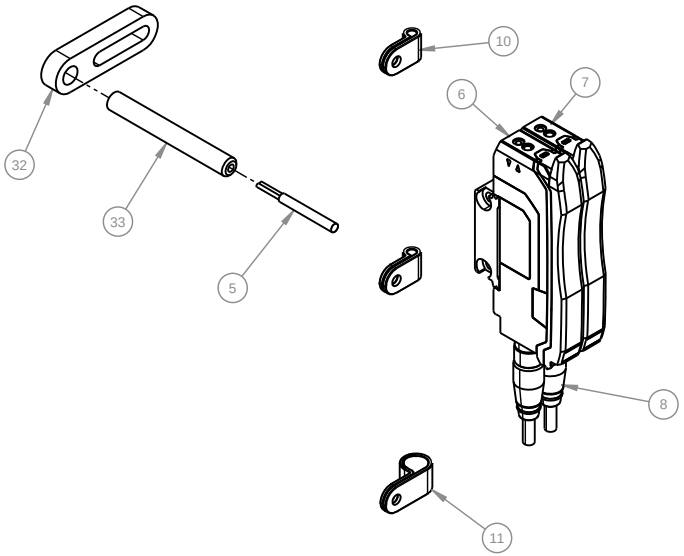
TM-400 TAPER MOTOR ENCLOSURE

MATERIAL

FINISH

SIZE B | DWG. NO. 291676 | REV A

WEIGHT (lbs): 3.63



NOTE:
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY
5	104952	FIBER OPTIC FU-35FA	1
6	104987	FS-N11CN_11CP_13CP	1
7	104988	AMPLIFIER EPD	1
8	105807	OP-73864	2
10	107101	CABLE CLAMP 1/8-.140	2
11	107107	CABLE CLAMP 5/16-.203	2
32	263370	EPD MOUNT	1
33	265739	LOW COVER FIBER MOUNT(LONG)	1

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DRAWN	RH	9/6/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-400 TAPER MOTOR ENCLOSURE

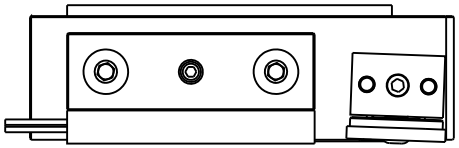
MATERIAL

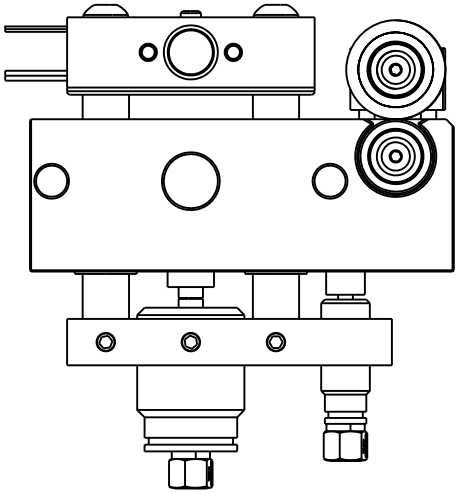
FINISH

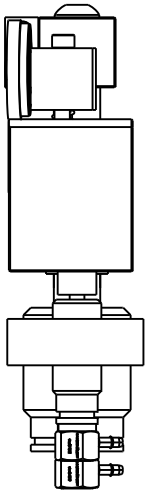
SIZE **B** | DWG. NO. 291676 | REV A

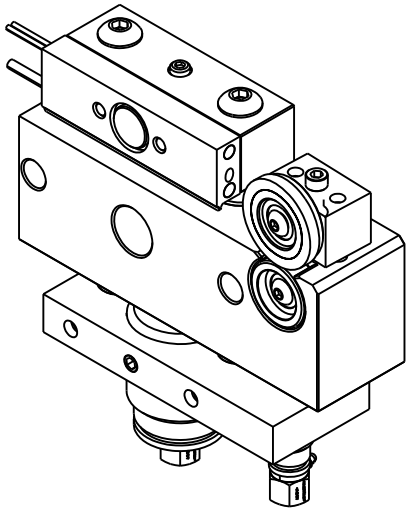
WEIGHT (lbs): 3.63 | SHEET 3 OF 3

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE		
2836	B	REPLACE PART NUMBER 250309 WITH PART NUMBER 267573	11/14/2014	RH









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- **CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED**
- **ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART**
- **DO NOT SCALE DRAWING**

	NAME	DATE
DRAWN	RH	3/19/13
ENG APPR.	X	~

TITLE:

TM500 INNER SEAL PSA & HEAT

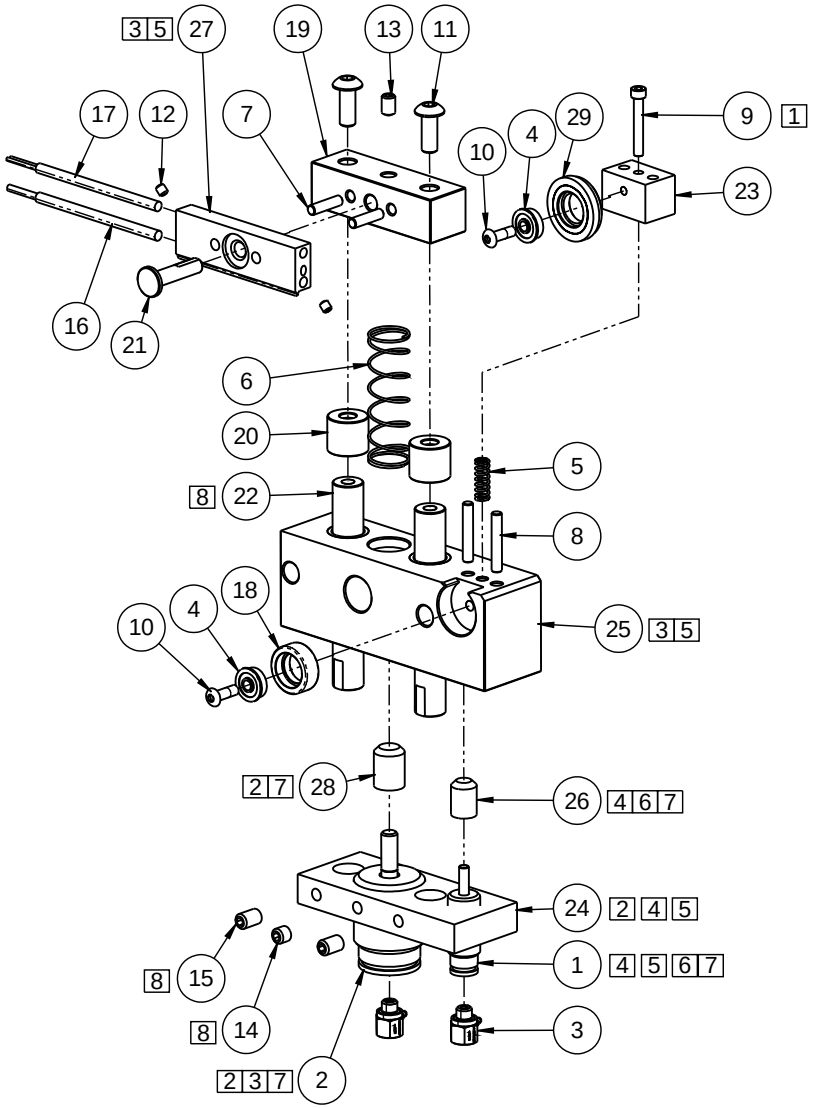
MATERIAL

FINISH

SIZE	DWG. NO.	REV
B	291624	B

WEIGHT (lbs): 1.84

SHEET 1 OF 4



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200029	AIR CYLINDER, SMC CJPB-6-10-B	1
2	200030	SMC AIR CYLINDER, CJPB-15-10	1
3	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	2
4	204056	BEARING 1/8 ID X 3/8 DIA FLANGED	2
5	209051	SPRING, STAINLESS STEEL	1
6	209244	SPRING; CUSTOM, SS	1
7	219206	DOWEL CRS .125 DIA X .50 LG.	2
8	219207	DOWEL PIN CRS 1/8 DIA x 3/4 LG	2
9	221005	SHCS SS 4-40 X .75 LG	1
10	223006	BHCS 5-40 X 3/8	2
11	223053	BHCS SS 10-32 X 1/2	2
12	230001	4-40 X 1/8 STEEL SET SCREW	2
13	230018	AS CUP SET 8-32 x 1/4	1
14	230023	10-24 X 3/16 STEEL SET SCREW	1
15	230071	10-24 X 5/16 STEEL SET SCREW	2
16	244010	THERMOCOUPLE	1
17	244012	HEATER WATTLOW 25W	1
18	250159	SEAL ROLLER, LOWER	1
19	260657	HEAT BLOCK	1
20	260666	HEAT BLOCK ISOLATOR	2
21	260669	RETAINING PIN, HEAT SHOE	1
22	261032	SLIDER SHAFT	2
23	261033	UPPER ROLLER MOUNT	1
24	261034	HEAD PLATE	1
25	261035	ANIVL - INNER	1
26	261075	BUMPER, 5MM CYLINDER	1
27	261122	HEAT SHOE, ADJUSTABLE SEALER	1
28	261753	BUMPER, 5MM CYLINDER	1
29	267573	UPPER SEALL ROLLER	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	3/19/13
ENG APPR.	X	~

TITLE:

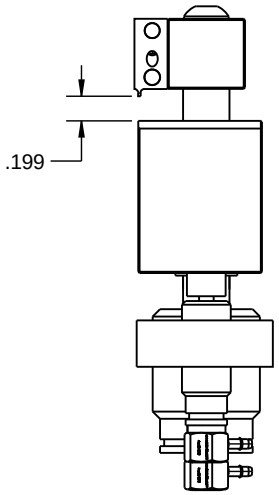
TM500 INNER SEAL PSA & HEAT

MATERIAL

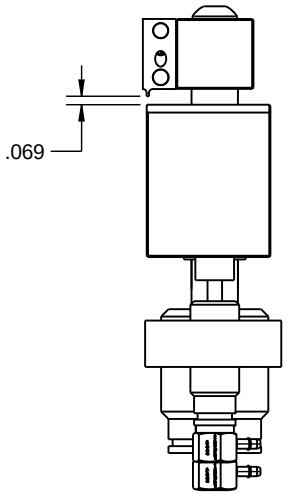
FINISH

SIZE **B** | DWG. NO. 291624 | REV B

WEIGHT (lbs): 1.84



DETAIL A
SMALL CYLINDER SETUP [3]
SCALE 1:1



DETAIL B
SMALL CYLINDER SETUP [5]
SCALE 1:1

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SURFACE: 63

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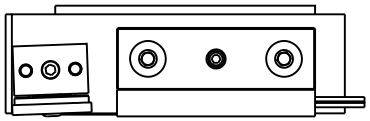
	NAME	DATE
DRAWN	RH	3/19/13
ENG APPR.		~

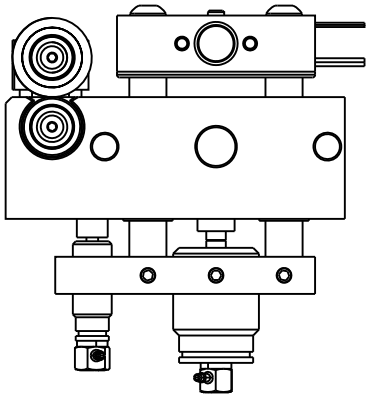
TITLE:

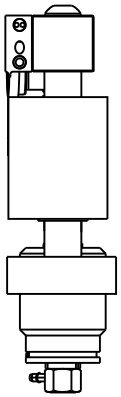
TM500 INNER SEAL PSA & HEAT

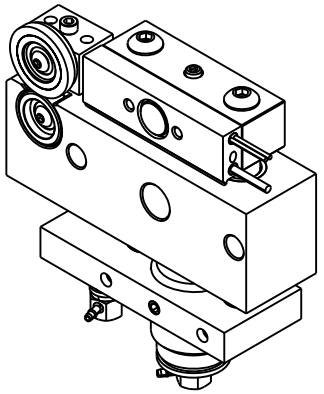
MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291624	B
	WEIGHT (lbs): 1.84		SHEET 3 OF 4

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE		
2836	B	REPLACE PART NUMBER 250309 WITH PART NUMBER 267573	11/17/2014	RH









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.XX ± 0.010
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	NAME	DATE
DRAWN	RH	3/20/13
ENG APPR.	X	~

TITLE:

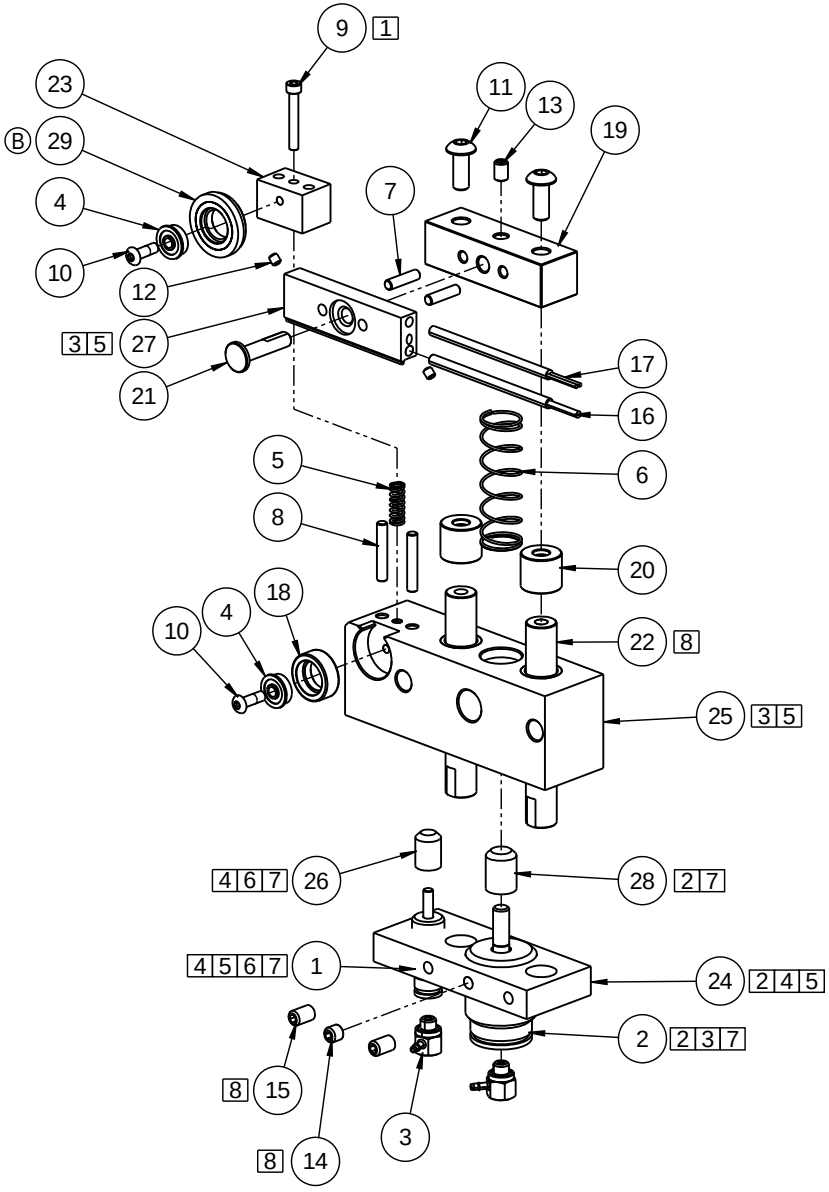
TM-500 OUTER SEAL PSA & HEAT

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291626 | REV B

WEIGHT (lbs): 838.00 | SHEET 1 OF 4



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	200029	AIR CYLINDER, SMC CJPB-6-10-B	1
2	200030	SMC AIR CYLINDER, CJPB-15-10	1
3	200259	AIR FITTING 10-32 X 1/16 TB ELBOW	2
4	204056	BEARING 1/8 ID X 3/8 DIA FLANGED	2
5	209051	SPRING, STAINLESS STEEL	1
6	209244	SPRING; CUSTOM, SS	1
7	219206	DOWEL CRS .125 DIA X .50 LG.	2
8	219207	DOWEL PIN CRS 1/8 DIA x 3/4 LG	2
9	221005	SHCS SS 4-40 X .75 LG	1
10	223006	BHCS 5-40 X 3/8	2
11	223053	BHCS SS 10-32 X 1/2	2
12	230001	4-40 X 1/8 STEEL SET SCREW	2
13	230018	AS CUP SET 8-32 x 1/4	1
14	230023	10-24 X 3/16 STEEL SET SCREW	1
15	230071	10-24 X 5/16 STEEL SET SCREW	2
16	244010	THERMOCOUPLE	1
17	244012	HEATER WATTLOW 25W	1
18	250159	SEAL ROLLER, LOWER	1
19	260657	HEAT BLOCK	1
20	260666	HEAT BLOCK ISOLATOR	2
21	260669	RETAINING PIN, HEAT SHOE	1
22	261032	SLIDER SHAFT	2
23	261033	UPPER ROLLER MOUNT	1
24	261034	HEAD PLATE	1
25	261036	ANVIL, OUTER	1
26	261075	BUMPER, 5MM CYLINDER	1
27	261122	HEAT SHOE, ADJUSTABLE SEALER	1
28	261753	BUMPER, 5MM CYLINDER	1
29	267573	UPPER SEALL ROLLER	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	3/20/13
ENG APPR.	x	~

TITLE:

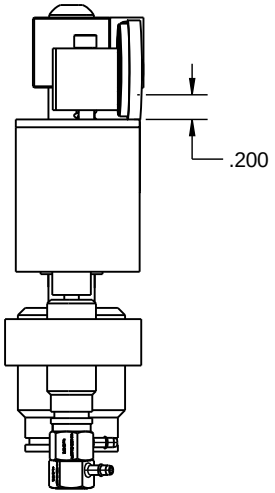
TM-500 OUTER SEAL PSA & HEAT

MATERIAL

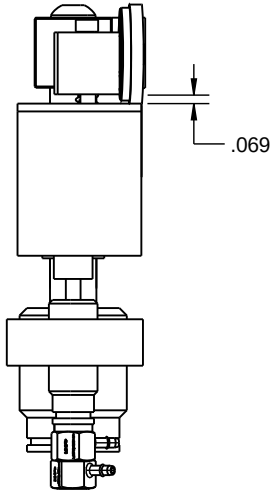
FINISH

SIZE **B** | DWG. NO. 291626 | REV B

WEIGHT (lbs): 838.00 | SHEET 2 OF 4



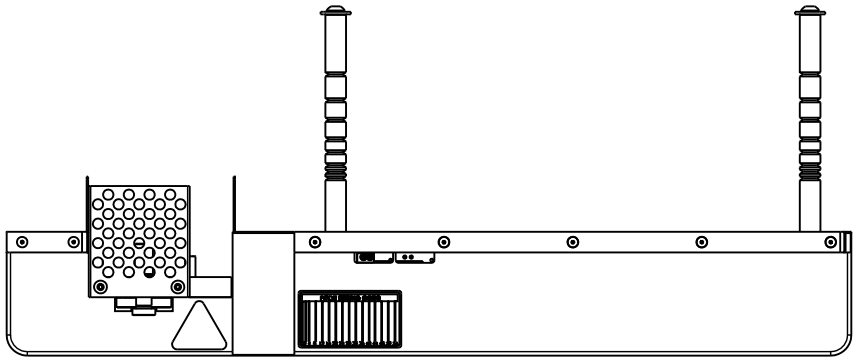
DETAIL A
LARGE CYLINDER SETUP [3]
SCALE 1:1

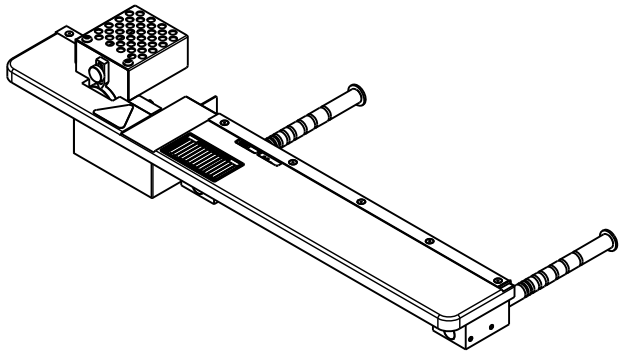


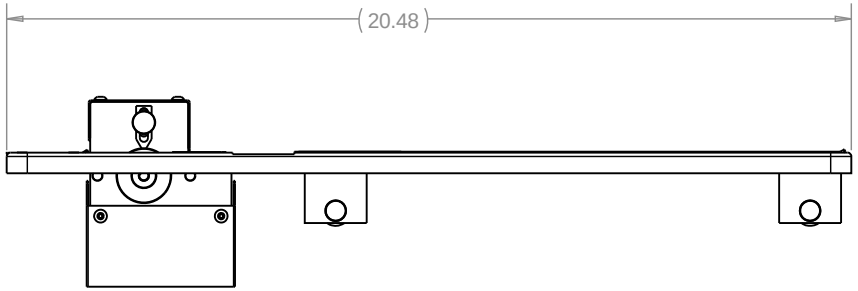
DETAIL B
SMALL CYLINDER SETUP [5]
SCALE 1:1

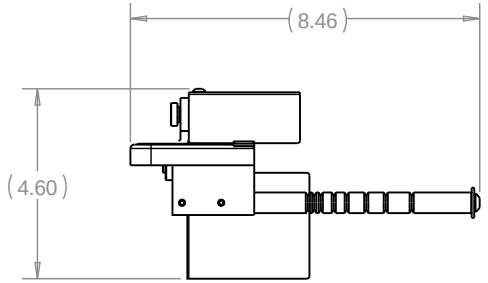
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
DIMENSIONS ARE IN INCHES TOLERANCES: .XXX ± 0.005 .XX ± 0.010 .X ± 0.015 ANGULAR: MACHINED ± 0.1° BEND ± 0.5 ° SURFACE: 63	DRAWN	RH	3/20/13	THE INFORMATION IN THIS DOCUMENT IS PROPRIETARY AND CONFIDENTIAL. IT MAY NOT BE REPRODUCED, TRANSMITTED, OR USED WITHOUT THE EXPRESS PERMISSION OF V-TEK INC., MANKATO, MN OR ROYCE INSTRUMENTS LLC, NAPA, CA.
	ENG APPR.		~	
GENERAL NOTES: - INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5 - BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED - CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED - ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART - DO NOT SCALE DRAWING	TITLE: TM-500 OUTER SEAL PSA & HEAT			
	MATERIAL / FINISH	SIZE B	DWG. NO. 291626	REV B
		WEIGHT (lbs): 838.00		SHEET 3 OF 4

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/5/2013	PVO
	B		5/15/2014	
2797	C	REMOVE FIBER OPTIC (105123) FROM BOM	5/15/2014	RH









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.X ± 0.015
ANGULAR: MACHINED ± 0.1°
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SURFACE: 32

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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

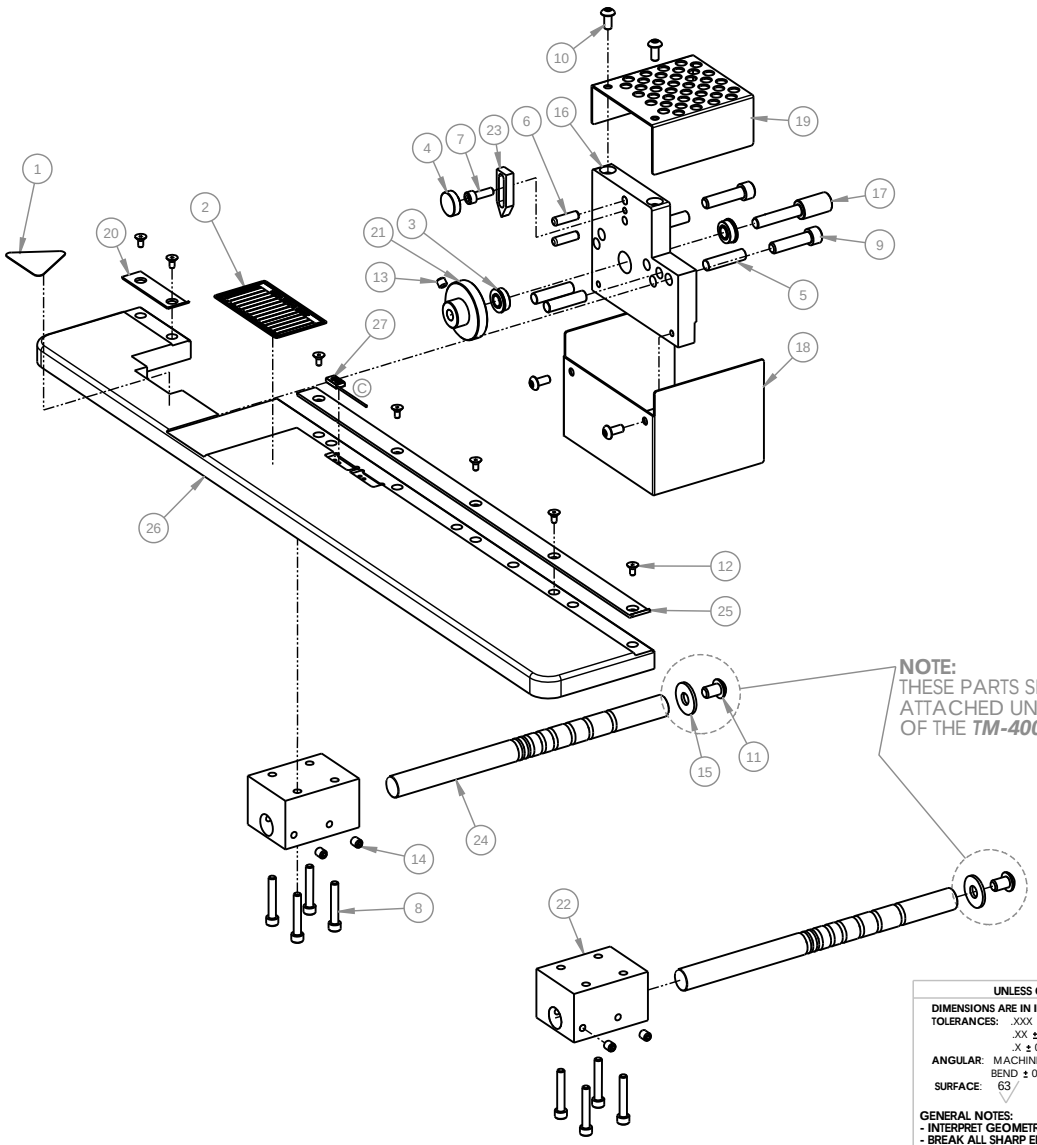
FRONT TRACK ASSEMBLY

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291678 | REV C

WEIGHT (lbs): 9.37 | SHEET 1 OF 2



NOTE:
ITEM 27, FIBER OPTIC (105123) IS PART OF THE TAPER BASE (291675) AND IS SHOWN HERE FOR LOCATION ONLY.

NOTE:
THESE PARTS SHOULD NOT BE ATTACHED UNTIL FINAL ASSEMBLY OF THE ***TM-400 TAPER*** (291674)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	111002	SAFETY STICKER HAND BURN	1
2	111124	PITCH SETTING DECAL	1
3	204055	BEARING SFR-188ZZEE	2
4	217042	KNOB M4 RED	1
5	219015	1/4 X 1 LG. SS DOWEL PIN	4
6	219043	3/16 X 5/8 LG. SS DOWEL PIN	2
7	221027	SHCS SS 8-32 X 1/2	1
8	221031	SHCS SS 8-32 X 1	8
9	221064	SHCS SS 1/4-20 X 1	2
10	223034	BHCS 8-32 X 3/8	4
11	223059	BHCS SS 1/4-20 X 3/8	2
12	225001	FHCS SS 4-40 X 1/4	7
13	230023	10-24 X 3/16 STEEL SET SCREW	1
14	231019	10-24 X 1/4 SS SET SCREW	4
15	238001	1/4 SS FLAT WASHER	2
16	261052	MOUNT, OUTER ANVIL	1
17	261060	SHAFT, THREADED ADJUSTER	1
18	261061	COVER, SEALER LOWER	1
19	261063	COVER, SEALER OUTER	1
20	261064	COVER, TRACK SHORT	1
21	261097	GEAR MODIFICATION, 30T	1
22	261429	TRACK SHAFT MOUNT	2
23	261713	ADJUSTMENT LOCK, POINT	1
24	261777	TRACK BEARING SHAFT	2
25	267068	TRACK COVER	1
26	267343	FRONT TRACK	1

UNLESS OTHERWISE SPECIFIED:

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.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/5/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

FRONT TRACK ASSEMBLY

MATERIAL

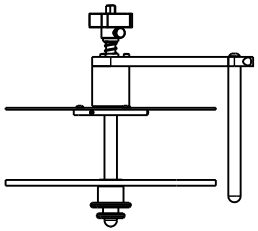
FINISH

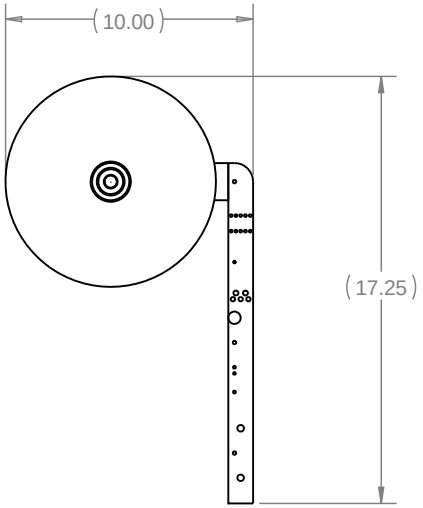
SIZE B | DWG. NO. 291678 | REV C

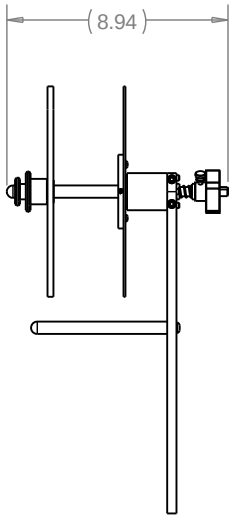
WEIGHT (lbs): 9.37

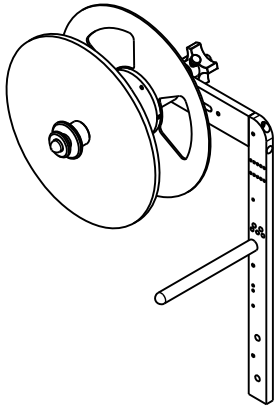
SHEET 2 OF 2

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED		









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	NAME	DATE
DRAWN	RH	10/24/13
ENG APPR.		~

TITLE:

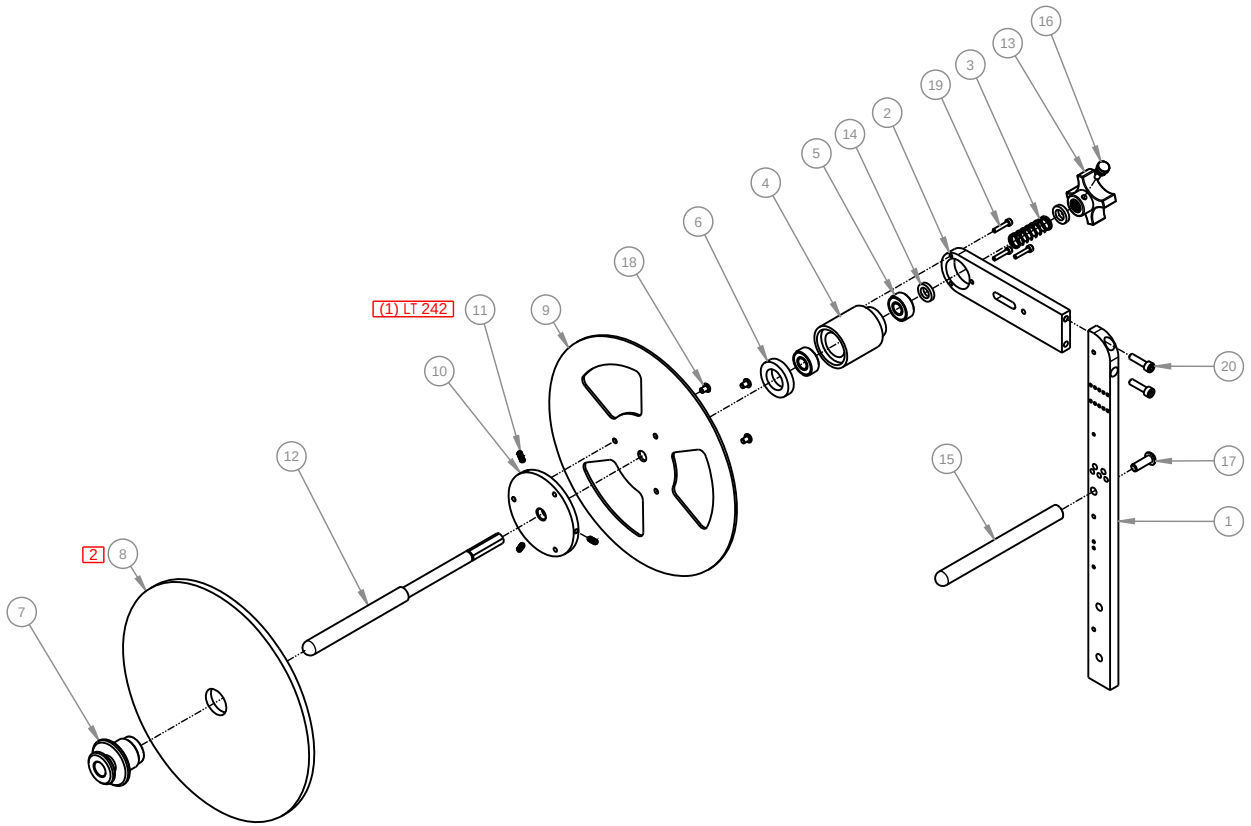
COVER TAPE ASSEMBLY

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291583 | REV A

WEIGHT (lbs): 3.07 | SHEET 1 OF 3



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	265658	COVER TAPE ARM	1
2	266749	UPPER CT ARM	1
3	209017	Compression Spring	1
4	266750	CT SPINDLE HUB	1
5	204051	BEARING, 3/8ID X 7/8OD	2
6	238011	WASHER, FLAT FELT	1
7	216505	QUIKLOC SHAFT COLLAR	1
8	265706	COVERTAPE OUTER COVER	1
9	266751	CT BACKING PLATE	1
10	266752	CT HUB	1
11	241017	BALL PLUNGER	3
12	266753	CT SPINDLE	1
13	266754	CT TENSIONING KNOB	1
14	238065	SS SHIM 3/8 ID X 1/8 THICK	2
15	265659	GUIDE SHAFT	1
16	217031	THUMB SCREW	1
17	223062	SS BHCS 1/4-20 X 3/4	1
18	223728	BHCS SS M4 X 6	3
19	221714	SHCS SS M3 X 16	3
20	221052	SHCS SS 10-32 X 3/4	2

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	NAME	DATE
DRAWN	RH	10/24/13
ENG APPR.		~

V-TEK INCORPORATED

TITLE:

COVER TAPE ASSEMBLY

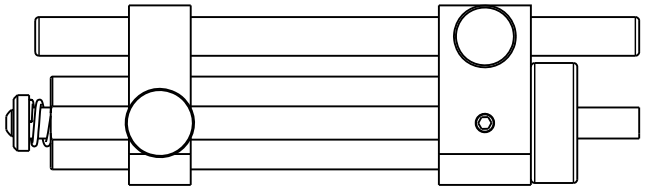
MATERIAL

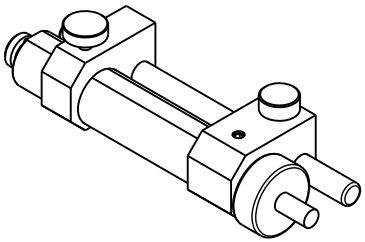
FINISH

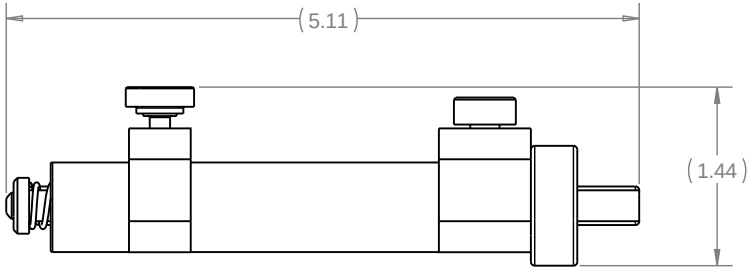
SIZE B | DWG. NO. 291583 | REV A

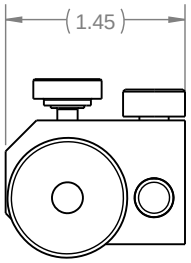
WEIGHT (lbs): 3.07

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	8/27/2008	









NOTE:
DUE TO NATURE THE ***ASSEMBLY OF THE TM-50 BASE*** (290939), ***TM-50 COVER TAPE GUIDE*** (290942), AND THE ***TM-50 MOTOR ENCLOSURE*** (290943) WILL NEED TO BE BUILT AS YOU GO DURING THE ASSEMBLY OF THE ***TM-50 INSPECTION MACHINE BASE*** (290960).

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

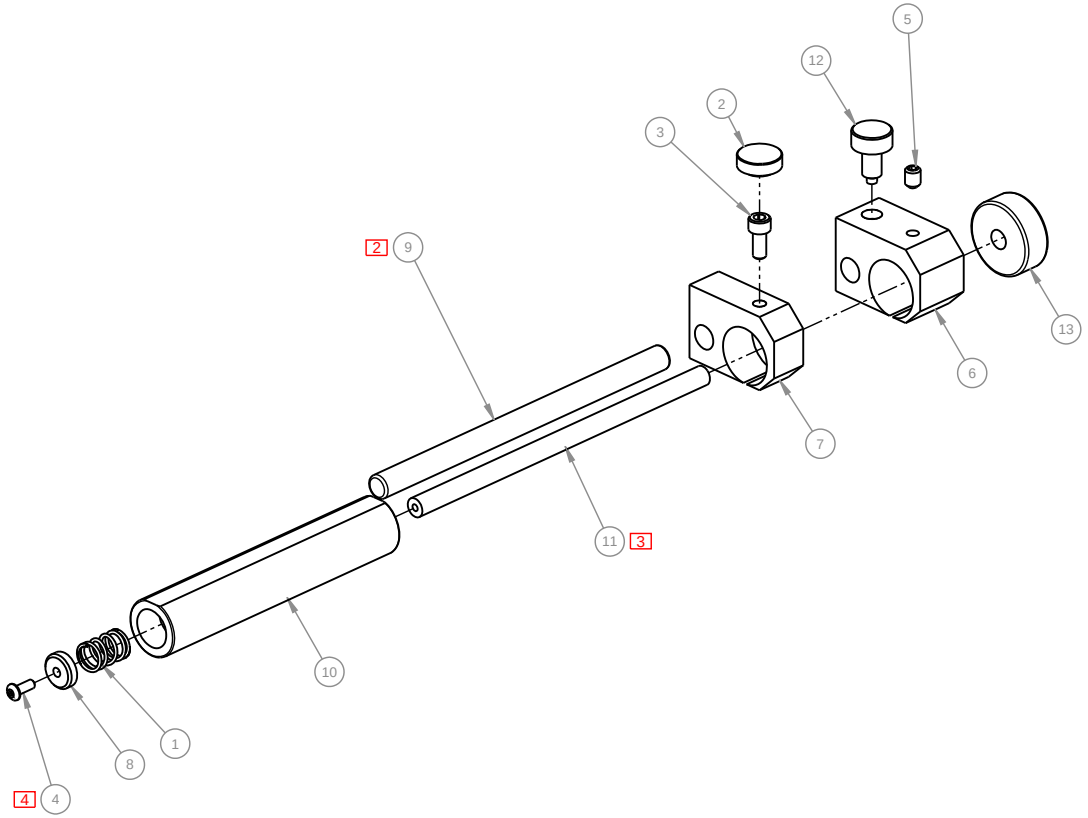
	NAME	DATE
DRAWN	RH	10/23/13
ENG APPR.		~

TITLE:
TM50 COVER TAPE GUIDE

MATERIAL
FINISH

SIZE	DWG. NO.	REV
B	290942	A

WEIGHT (lbs): 0.7934 | SHEET 1 OF 3



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	209246	SPRING, .360 DIA	1
2	217042	KNOB M4 RED	1
3	221026	SHCS SS 8-32 X 3/8	1
4	223010	BHCS SS 4-40 X 5/16	1
5	230022	10-24 X 1/4 STEEL SET SCREW	1
6	261057	GUIDE, C.T. INNER	1
7	261058	GUIDE, C.T. OUTER	1
8	261071	WASHER, C.T. GUIDE ASSEMBLY	1
9	261430	SHAFT, C.T. GUIDE ASSEM	1
10	261431	SHAFT, C.T. GUIDE	1
11	261432	ROD, THREADED, C.T. GUIDE	1
12	262795	ADJUSTMENT KNOB - .500"	1
13	263588	C.T. GUIDE ADJUSTER	1

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BEND ± 0.5 °
SURFACE: 63

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	NAME	DATE
DRAWN	RH	10/23/13
ENG APPR.		~

V-TEK INCORPORATED

TITLE:

TM50 COVER TAPE GUIDE

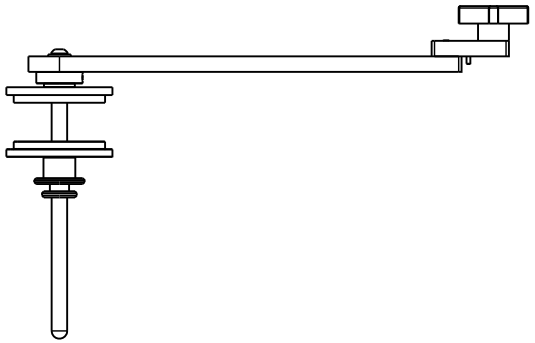
MATERIAL

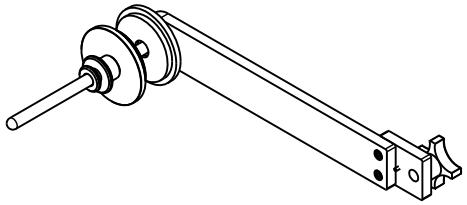
FINISH

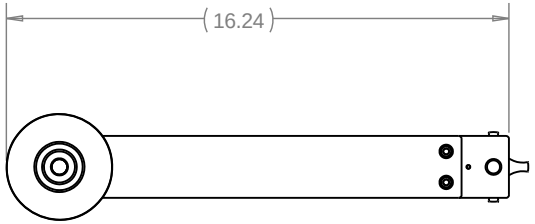
SIZE B | DWG. NO. 290942 | REV A

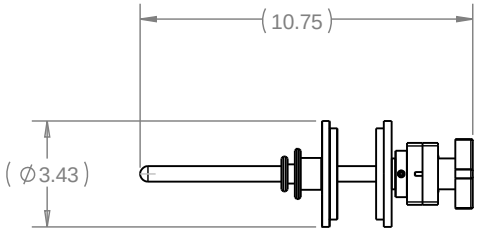
WEIGHT (lbs): 0.7934 | SHEET 2 OF 3

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	8/27/2008	
2769	B	REPLACE PART #250214 WITH PART #256087	3/18/2014	RH









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BEND ± 0.5 °
SURFACE: 32

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	NAME	DATE
DRAWN	RH	10/24/13
ENG APPR.		~

TITLE:

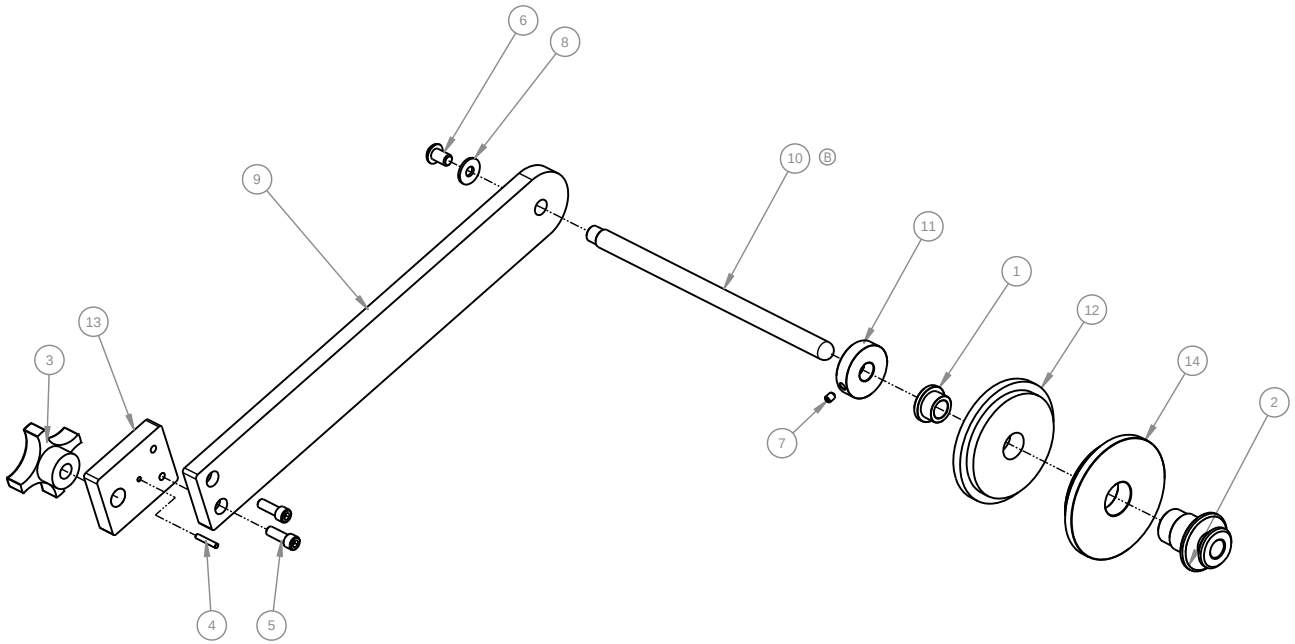
TM50 INFEED ARM CARRIER TAPE

MATERIAL

FINISH

SIZE **B** | DWG. NO. 290945 | REV B

WEIGHT (lbs): 3.32 | SHEET 1 OF 2



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	205016	BUSHING, FLANGED .5 ID, .75 OD, .5 L	1
2	216504	QUIKLOC SHAFT COLLAR	1
3	217007	KNOB, 1/2-13 FOUR LOBE	1
4	219003	1/8 X 3/4 LG. SS DOWEL PIN	1
5	221063	SHCS SS 1/4-20 X 3/4	2
6	223083	BHCS SS 5/16 X 1/2	1
7	230022	10-24 X 1/4 STEEL SET SCREW	1
8	238001	1/4 SS FLAT WASHER	1
9	254566	FEED REAL ARM	1
10	256087	REEL SUPPORT SHAFT	1
11	261086	COVER TAPE SPINDLE COLLAR	1
12	261087	22" REEL SPACER	1
13	261089	REEL EXTENSION ADAPTER	1
14	261091	22" REEL SPACER	1

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SURFACE: 63

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	NAME	DATE
DRAWN	RH	10/24/13
ENG APPR.		~

V-TEK INCORPORATED

TITLE:

TM50 INFEED ARM CARRIER TAPE

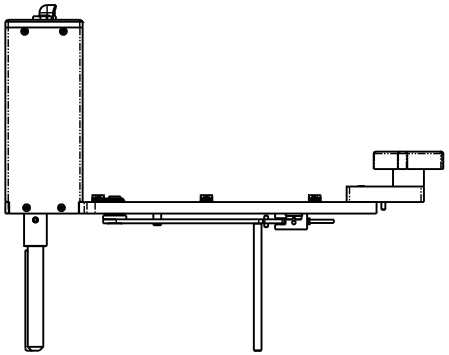
MATERIAL

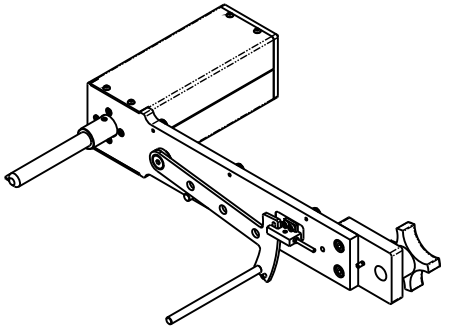
FINISH

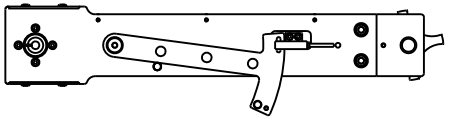
SIZE **B** | DWG. NO. 290945 | REV B

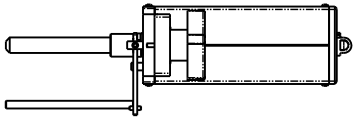
WEIGHT (lbs): 3.32 | SHEET 2 OF 2

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	8/6/2015	RH









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	NAME	DATE
DRAWN	RH	8/5/15
ENG APPR.		~

TITLE:

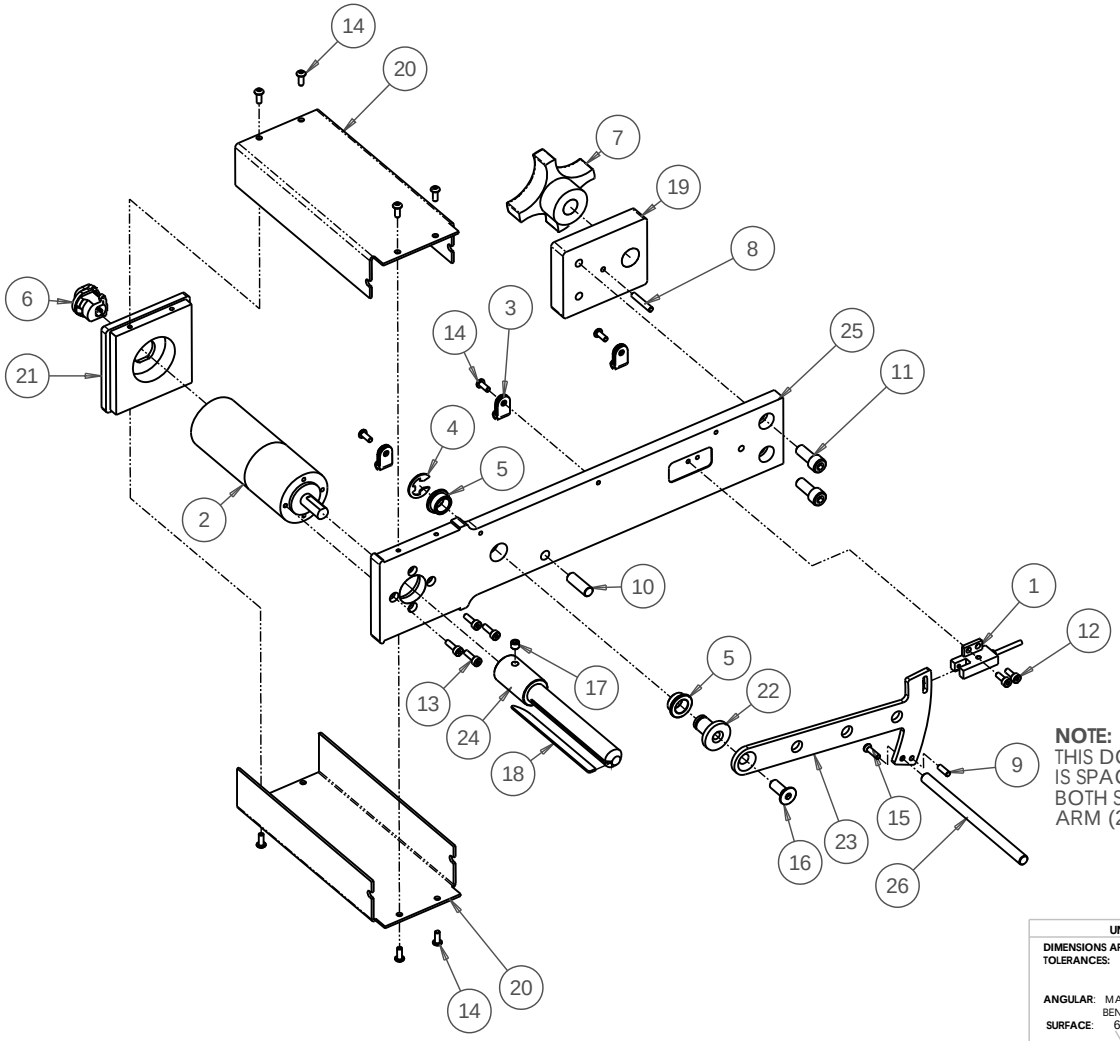
TAKE UP ARM (DANCER)

MATERIAL

FINISH

SIZE **B** | DWG. NO. **292049** | REV **A**

WEIGHT (lbs): 4.65 | SHEET 1 OF 2



NOTE:
THIS DOWEL PIN (219010) IS SPACED EQUALY ON BOTH SIDES OF DANCER ARM (266265)

ITEM NO.	PART NO.	DESCRIPTION	QTY
1	104994	SUNX PM-R44P	1
2	105786	anahiem automation bdpg-36-57-24v-4200-r27	1
3	107101	CABLE CLAMP 1/8-.140	3
4	204119	3/8" ECLIP	1
5	205033	BUSHING 3/8 ID, 1/2 OD, 1/4 L FLANG	2
6	205036	HEYCO 1818	1
7	217007	KNOB, 1/2-13 FOUR LOBE	1
8	219003	1/8 X 3/4 LG. SS DOWEL PIN	1
9	219010	1/8 X 3/8 LG. SS DOWEL PIN	1
10	219014	1/4 X 3/4 LG. SS DOWEL PIN	1
11	221062	SHCS SS 1/4-20 X 5/8	2
12	221711	SHCS SS M3 X 8	2
13	221712	SHCS SS M3 X 10	4
14	223712	BHCS SS M3 X 8	11
15	225714	FHCS SS M3 X 12	1
16	225753	FHCS SS M6 X 12	1
17	231038	M5 X 5 ALLOY SET SCREW	1
18	257999	REEL SPINDLE KEY, 72MM	1
19	261089	REEL EXTENSION ADAPTER	1
20	266216	DC MOTOR COVER	2
21	266217	DC MOTOR END CAP	1
22	266219	DANCER AXEL	1
23	266265	DANCER ARM	1
24	267063	24V TAKE UP SPINDLE	1
25	267484	TAKE-UP ARM	1
26	268036	TAPE FOLLOWER	1

UNLESS OTHERWISE SPECIFIED:

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SURFACE: 63

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- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/5/15
ENG APPR.		~

V-TEK INTERNATIONAL ROYCE Instruments

TITLE:

TAKE UP ARM (DANCER)

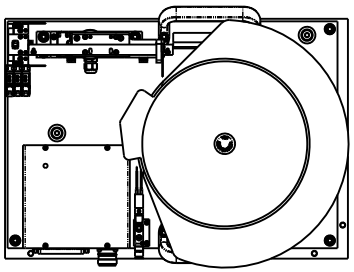
MATERIAL

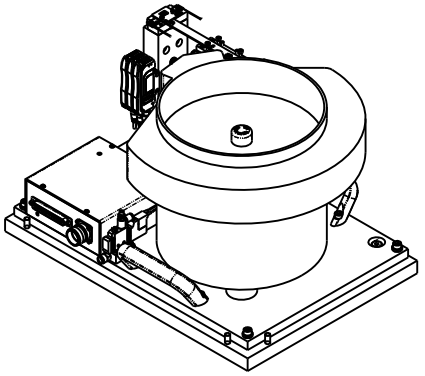
FINISH

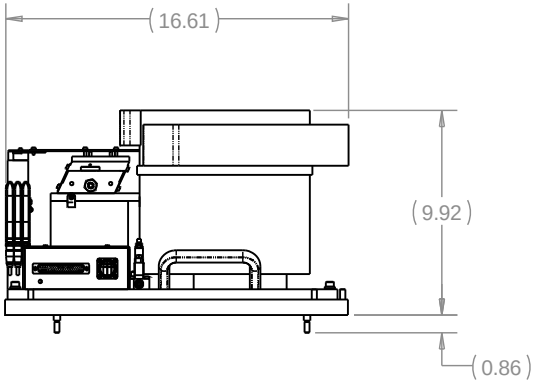
SIZE B | DWG. NO. 292049 | REV A

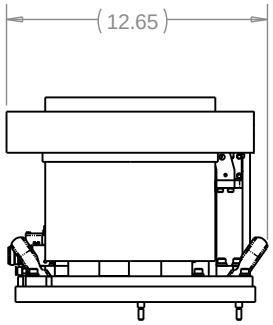
WEIGHT (lbs): 4.65 | SHEET 2 OF 2

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	7/7/2014	RH









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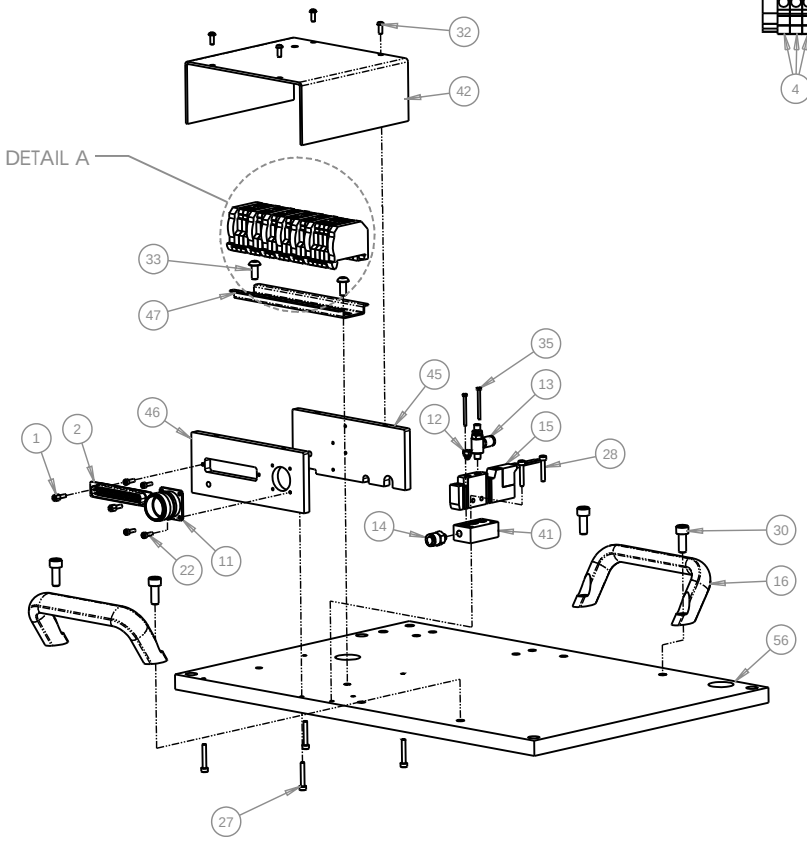
	NAME	DATE
DRAWN	RH	7/3/14
ENG APPR.	PVO	~

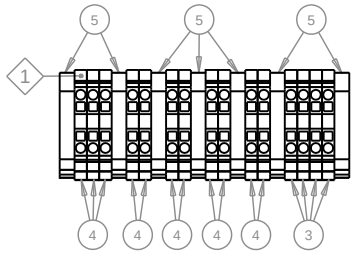
TITLE:

TM402 240V BOWL ASSY

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291765	A

WEIGHT (lbs): 146.42 SHEET 1 OF 5





DETAIL A
TERMINAL BLOCK
SCALE 1:2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	103012	D SUB MOUNTING HEX POST (2)	2
2	103019	D SUB 37 PIN	1
3	104157	TERMINAL GROUND BLOCK	4
4	104158	TERM BLOCK	11
5	104160	TERM END CAP	7
11	157030	RECEPTICAL	1
12	200201	FITTING	1
13	200280	AIR FITTING, NEEDLE VALVE	1
14	200336	SMC # KQ2 HO6-M5	1
15	200636	AIR VALVE	1
16	217311	MISUMI- HHDNFA112	2
21	221702	SHCS SS M2 X 8	4
22	221704	SHCS SS M2.5 X 8	6
27	221716	SHCS SS M3 X 20	4
28	221732	SHCS SS M3 X 18	2
30	221755	SHCS SS M6 X 16	8
32	223712	BHCS SS M3 X 8	7
33	223743	BHCS SS M5 X 12	2
35	236062	M2 X 25 SS SLOTTED CHEESE HEAD SCREW	2
41	266607	BOWL MANIFOLD	1
42	266608	BOWL ENCLOSURE COVER	1
45	266774	ENCLOSURE SIDE #1	1
46	266775	ENCLOSURE SIDE #2	1
47	266776	BOWL ASSEMBLY DIN RAIL	1
56	267468	BOWL ASSEMBLY BASEPLATE	1

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	NAME	DATE
DRAWN	RH	7/3/14
ENG APPR.	PVO	~

V-TEK INTERNATIONAL

TITLE:

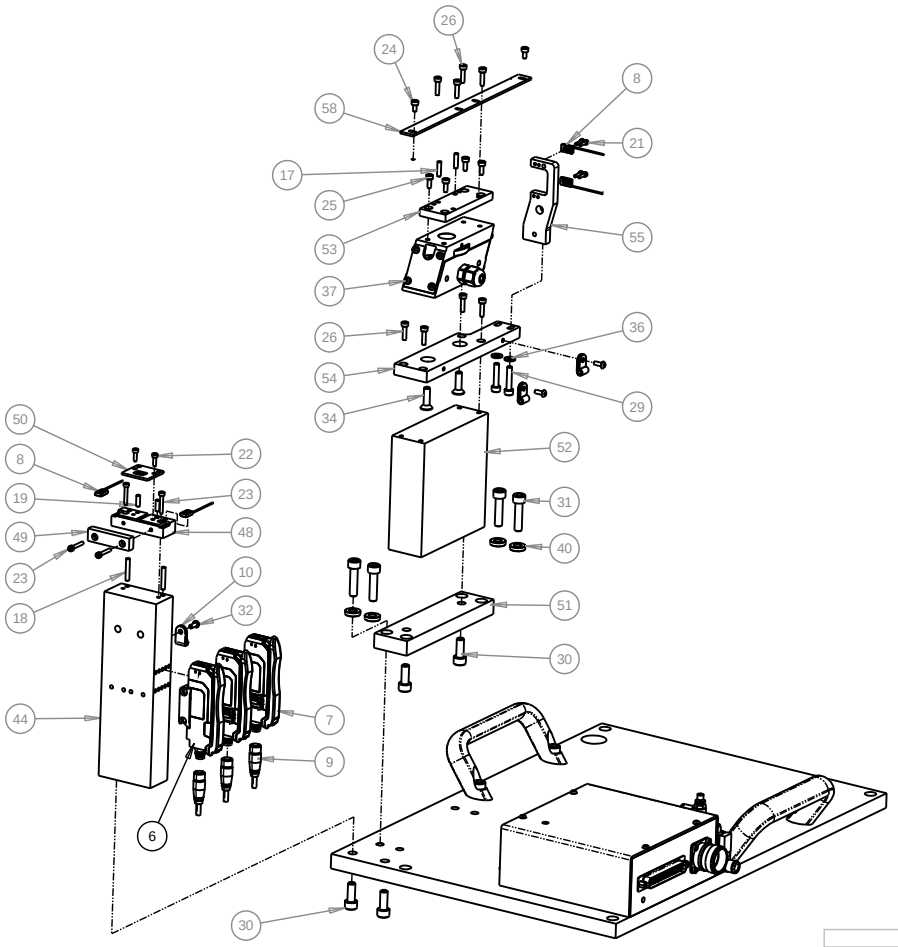
TM402 240V BOWL ASSY

MATERIAL

FINISH

SIZE **B** | DWG. NO. **291765** | REV **A**

WEIGHT (lbs): 146.42



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
6	104987	FS-N11CN_11CP_13CP	1
7	104988	AMPLIFIER EPD	2
8	105123	FIBER OPTIC FU-57TZ	4
9	105807	OP-73864	3
10	107101	CABLE CLAMP 1/8-.140	3
17	219001	1/8 X 1/2 LG. SS DOWEL PIN	2
18	219003	1/8 X 3/4 LG. SS DOWEL PIN	2
19	219010	1/8 X 3/8 LG. SS DOWEL PIN	2
21	221702	SHCS SS M2 X 8	4
22	221704	SHCS SS M2.5 X 8	6
23	221706	SHCS SS M2.5 X 16	4
24	221710	SHCS SS M3 X 6	2
25	221711	SHCS SS M3 X 8	4
26	221713	SHCS SS M3 X 12	8
29	221736	SHCS SS M4 X 20	2
30	221755	SHCS SS M6 X 16	8
31	221758	SHCS SS M6 X 25	8
32	223712	BHCS SS M3 X 8	7
34	224036	FHCS SS M5 X 18	2
36	238043	M4 SS FLAT WASHER	2
37	242048	LINEAR FEEDER LF9 230V	1
40	266512	6mm HEAVY WASHER	8
44	266767	NEST MOUNT	1
48	266779	NEST SHOW PART	1
49	266780	PART STOP SHOW PART	1
50	266781	NEST COVER SHOW PART	1
51	267440	LINEAR RISER BASE	1
52	267441	INLINE RISER	1
53	267443	TRACK ADAPTOR	1
54	267445	INLINE RISER TOP	1
55	267446	TRACK FULL SENSOR MOUNT	1
58	TOOLING COVER	TRACK COVER SHOW PART	1

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.XX ± 0.010
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	NAME	DATE
DRAWN	RH	7/3/14
ENG APPR.	PVO	~

V-TEK INTERNATIONAL

TITLE:

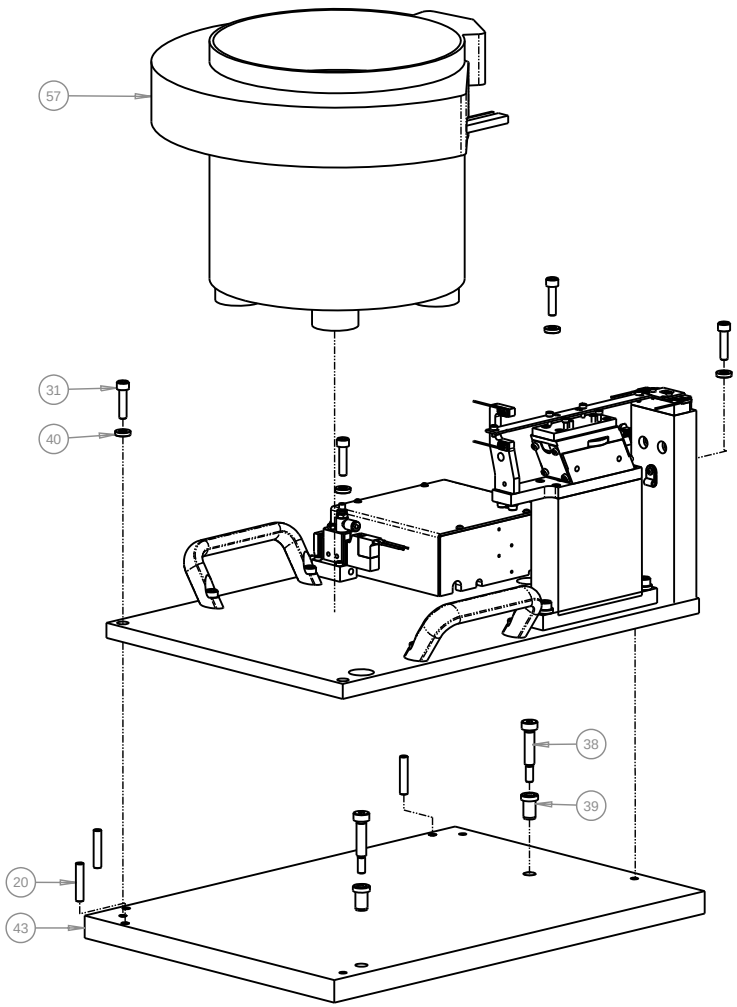
TM402 240V BOWL ASSY

MATERIAL

FINISH

SIZE B | DWG. NO. 291765 | REV A

WEIGHT (lbs): 146.42



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
20	219016	1/4 X 1-1/4 LG. SS DOWEL PIN	3
31	221758	SHCS SS M6 X 25	8
38	246497	MISUMI PART # (GDMSB8-30-F15-M6)	2
39	246499	MISUMI PART # (JBHUP8-16)	2
40	266512	6mm HEAVY WASHER	8
43	266765	BOWL ASSEMBLY SUB PLATE	1
57	CCW BOWL EXAMPLE WITH 6.625" DISCHARGE (TMS00)	SHOW 50 BOWL	1

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	NAME	DATE
DRAWN	RH	7/3/14
ENG APPR.	PVO	~

TITLE:

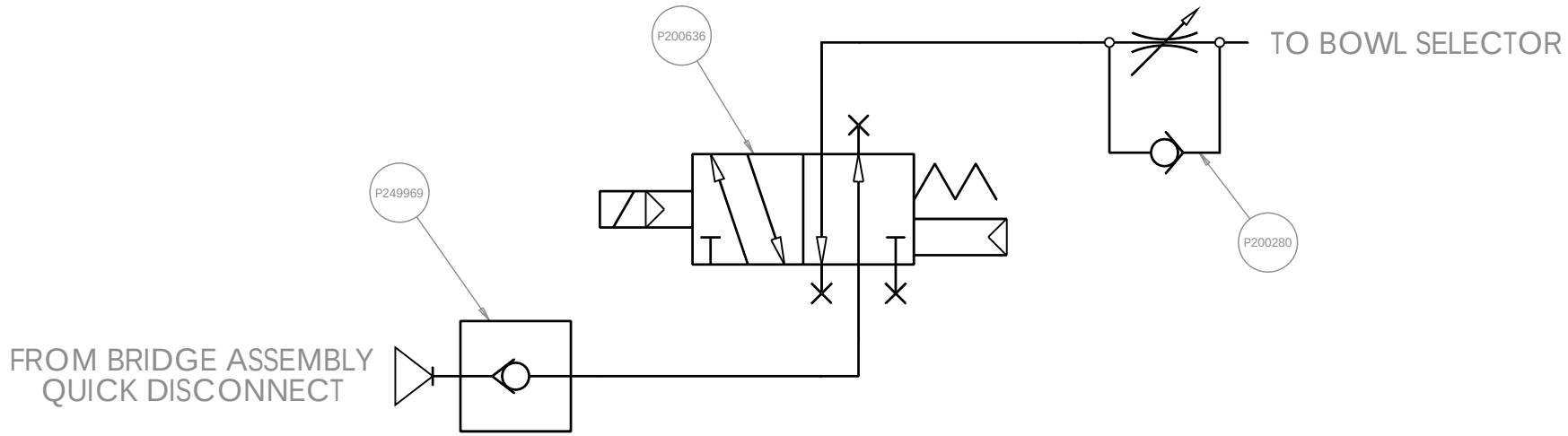
TM402 240V BOWL ASSY

MATERIAL

FINISH

SIZE **B** | DWG. NO. 291765 | REV A

WEIGHT (lbs): 146.42



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	PVO	12/7/2012
ENG APPR.		~
	PVO	

TITLE:

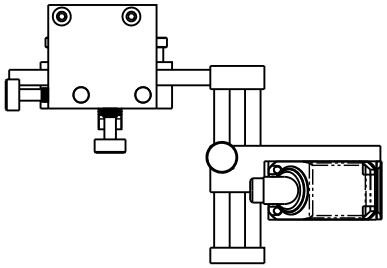
BOWL ASSEMBLY PNEUMATICS

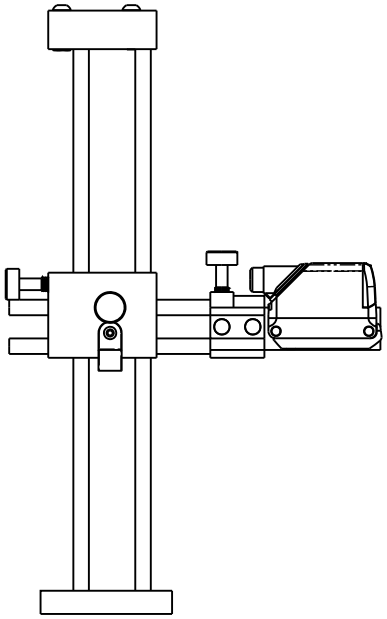
MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	291765	A

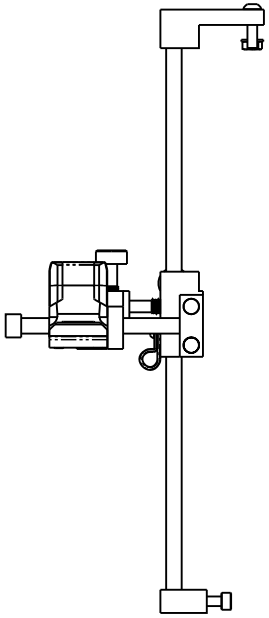
WEIGHT (lbs): "SW-Mass@P291765.SLDASM"

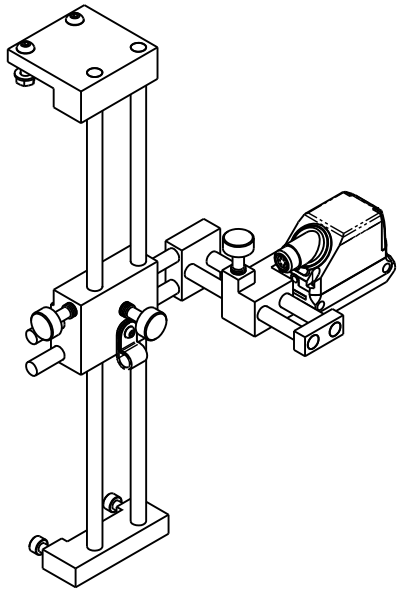
SHEET 1 OF 1

REVISIONS				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	8/6/2015	RH









UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/5/15
ENG APPR.	PVO	~

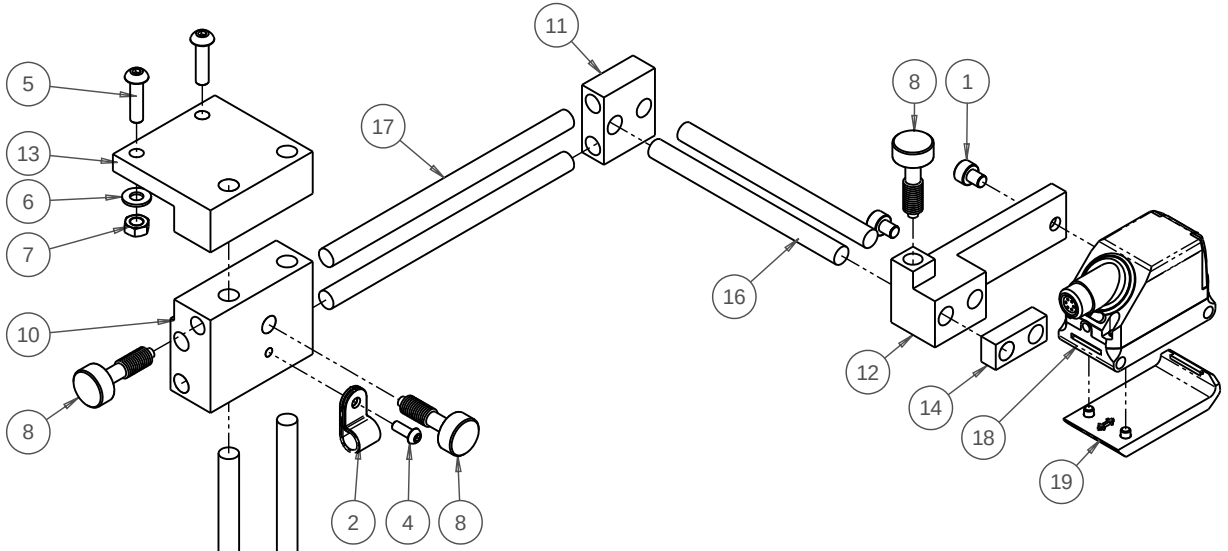
TITLE:

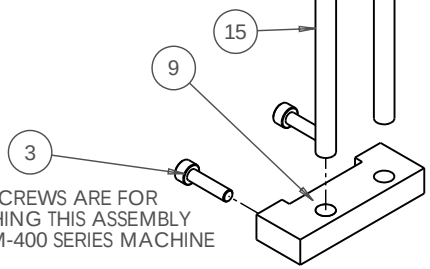
OVER TAPE CAMERA ASSEMBLY

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	292050	A

WEIGHT (lbs): 0.93 SHEET 1 OF 2

NOTE:
THESE SCREWS ARE FOR ATTACHING THIS ASSEMBLY TO A TM-400 SERIES MACHINE





NOTE:
THESE SCREWS ARE FOR ATTACHING THIS ASSEMBLY TO A TM-400 SERIES MACHINE

ITEM NO.	PART NO.	DESCRIPTION	QTY
1	02099	SS SHCS M4 x 5mm	2
2	107105	CABLE CLAMP 1/4-.140	1
3	221733	SS SHCS M4 x 16mm	2
4	223712	SS BHCS M3 x 8mm	1
5	223733	SS BHCS M4 x 16mm	2
6	238043	M4 STAINLESS WASHER	1
7	239104	SS M4 NUT	1
8	262796	ADJUSTMENT KNOB -.875	3
9	268037	400 CAMERA BRACKET #1	1
10	268038	400 CAMERA BRACKET #2	1
11	268039	400 CAMERA BRACKET #3	1
12	268040	400 CAMERA BRACKET #4	1
13	268041	400 CAMERA BRACKET #5	1
14	268042	400 CAMERA BRACKET #6	1
15	268043	400 CAMERA SHAFT #1	2
16	268044	400 CAMERA SHAFT #2	2
17	268045	400 CAMERA SHAFT #3	2
18	500439	KEYENCE IV-G15MA	1
19	500445	V.SENSOR MAGNIFYING LENS BRK	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/5/15
ENG APPR.	PVO	~

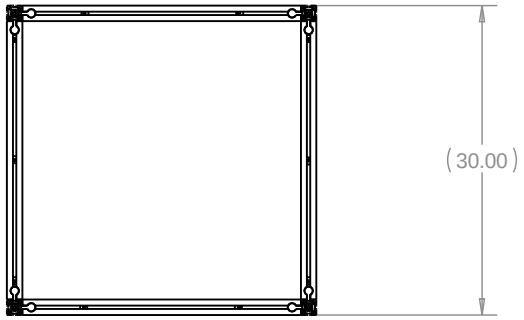
V-TEK INTERNATIONAL ROYCE Instruments

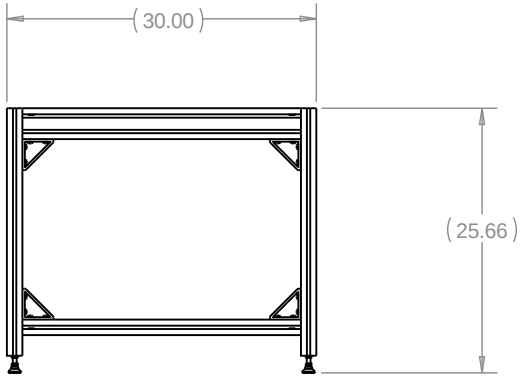
TITLE:

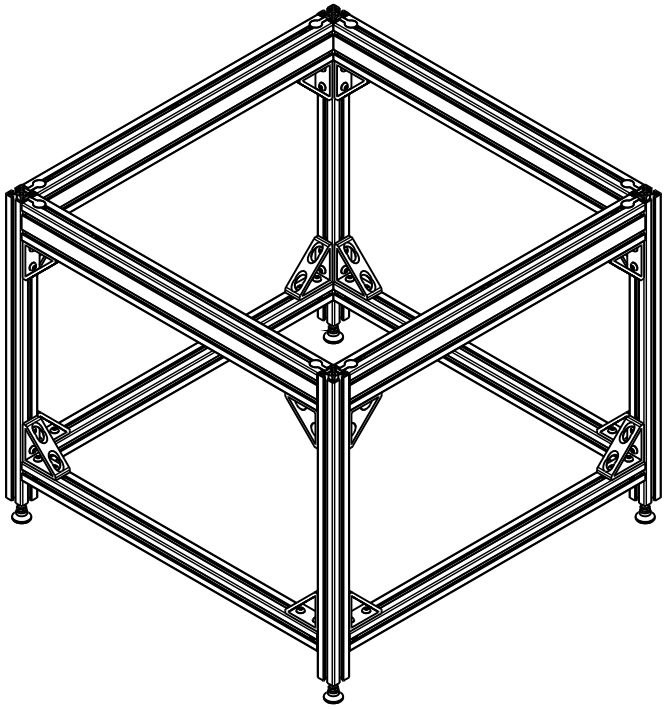
OVER TAPE CAMERA ASSEMBLY

MATERIAL	SIZE	DWG. NO.	REV
FINISH	B	292050	A
	WEIGHT (lbs): 0.93		SHEET 2 OF 2

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/16/2013	PVO







UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

TITLE:

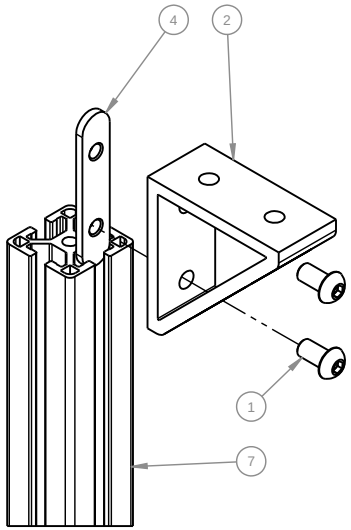
TM-400 FRAME ASSEMBLY

MATERIAL

FINISH
NA

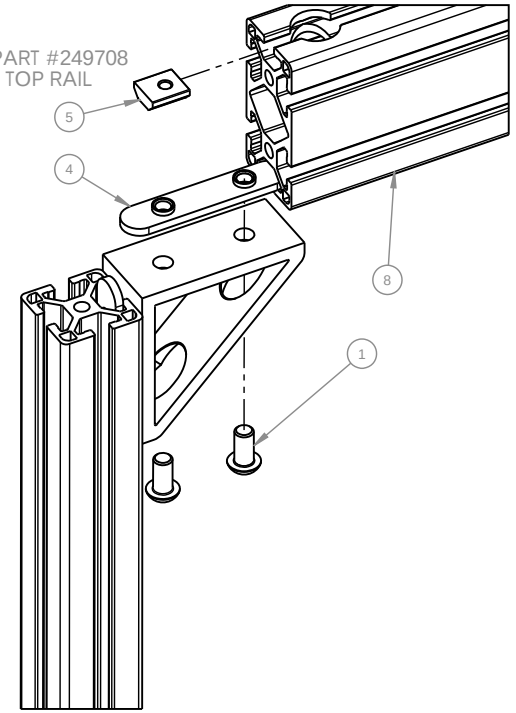
SIZE **B** | DWG. NO. 291667 | REV A

WEIGHT (lbs): 38.57 | SHEET 1 OF 6

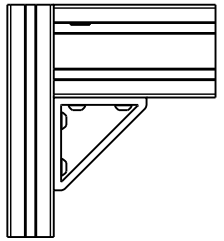


DETAIL A
TOP RAIL BRACKET TO LEG
SCALE 1:2

NOTE:
INSERT ONE PART #249708
INTO END OF TOP RAIL



DETAIL B
TOP RAIL TO LEG
SCALE 1:2



DETAIL C
COMPLETED TOP RAIL ASSEMBLY
SCALE 1:4

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	223752	BHCS SS M8 X 16	64
2	249604	80/20 PART #4336	16
4	249707	80/20 PART# 3879	32
5	249708	80/20 PART# 3866	10
7	265442	HT FRAME 3	4
8	267027	TM-400 FRAME #1	4

NOTE:
THESE STEPS ARE REPEATED AT THE
OTHER END OF EACH TOP RAIL

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

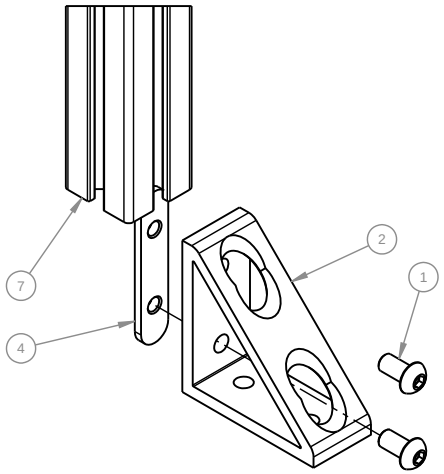
TM-400 FRAME ASSEMBLY

MATERIAL

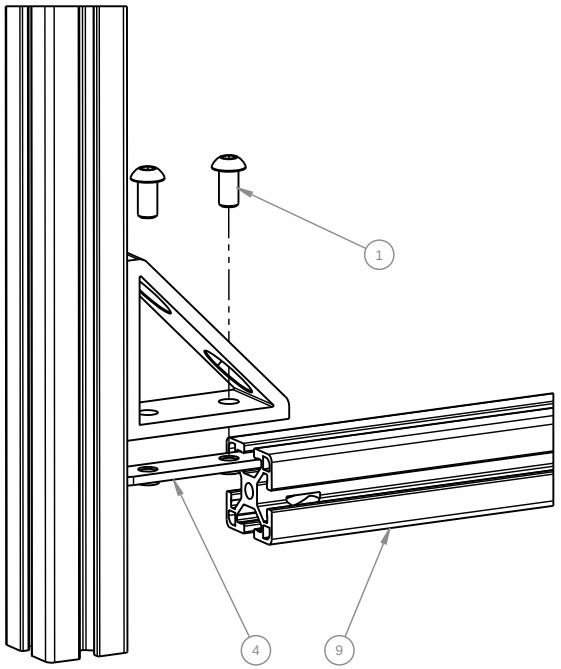
FINISH
NA

SIZE **B** | DWG. NO. 291667 | REV A

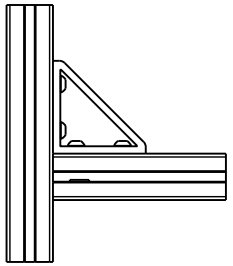
WEIGHT (lbs): 38.57



DETAIL D
BOTTOM RAIL BRACKET TO LEG
SCALE 1:2



DETAIL E
BOTTOM RAIL TO LEG
SCALE 1:2



DETAIL F
COMPLETED BOTTOM RAIL ASSEMBLY
SCALE 1:2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	223752	BHCS SS M8 X 16	64
2	249604	80/20 PART #4336	16
4	249707	80/20 PART# 3879	32
7	265442	HT FRAME 3	4
9	267028	TM-400 FRAME #2	4

NOTE:
THESE STEPS ARE REPEATED AT THE OTHER END OF EACH BOTTOM RAIL

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

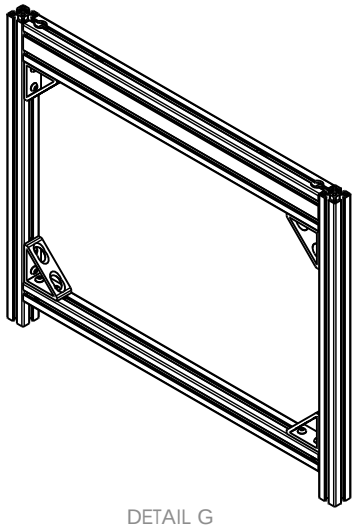
	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

TITLE:
TM-400 FRAME ASSEMBLY

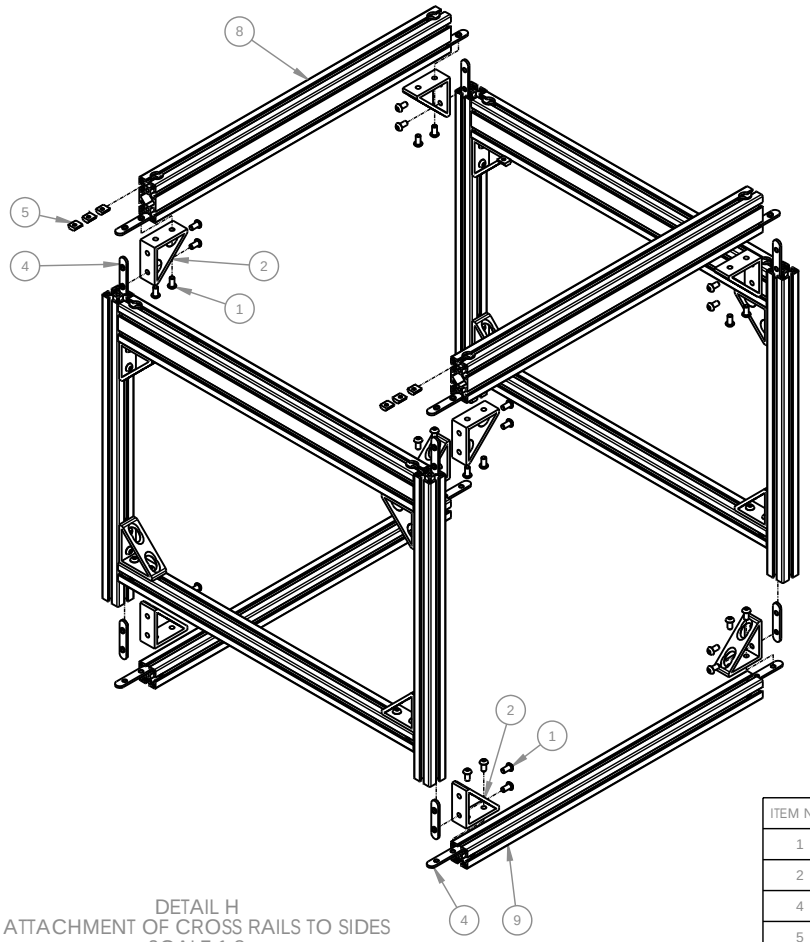
MATERIAL
FINISH NA

SIZE B | DWG. NO. 291667 | REV A

WEIGHT (lbs): 38.57



DETAIL G
COMPLETED SIDE
SCALE 1:8



DETAIL H
ATTACHMENT OF CROSS RAILS TO SIDES
SCALE 1:8

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	223752	BHCS SS M8 X 16	64
2	249604	80/20 PART #4336	16
4	249707	80/20 PART# 3879	32
5	249708	80/20 PART# 3866	10
8	267027	TM-400 FRAME #1	4
9	267028	TM-400 FRAME #2	4

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

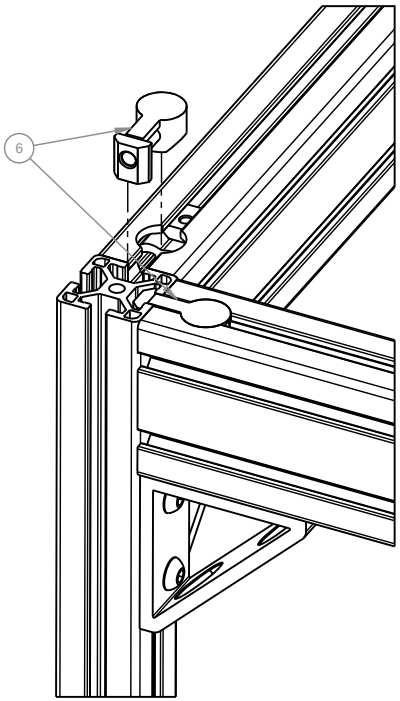
TM-400 FRAME ASSEMBLY

MATERIAL

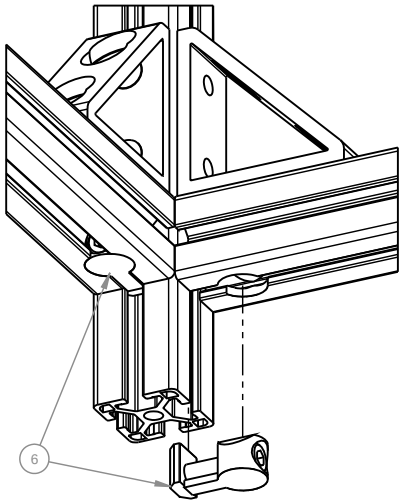
FINISH
NA

SIZE **B** | DWG. NO. 291667 | REV A

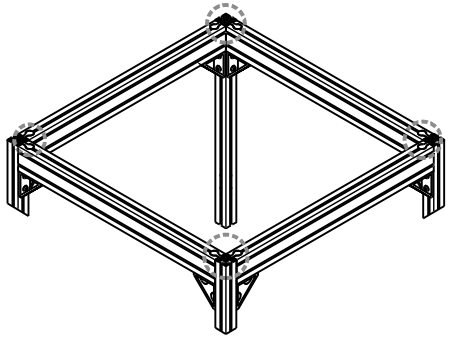
WEIGHT (lbs): 38.57 | SHEET 4 OF 6



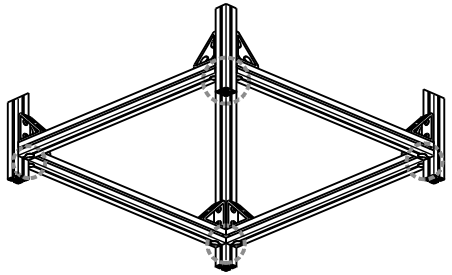
DETAIL I
TOP ANCHOR FASTENER
SCALE 1:2



DETAIL J
BOTTOM ANCHOR FASTENER
SCALE 1:2



DETAIL K
TOP ANCHOR LOCATIONS
SCALE 1:12



DETAIL L
BOTTOM ANCHOR LOCATIONS
SCALE 1:12

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
6	249709	80/20 PART# 40-3897	16

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

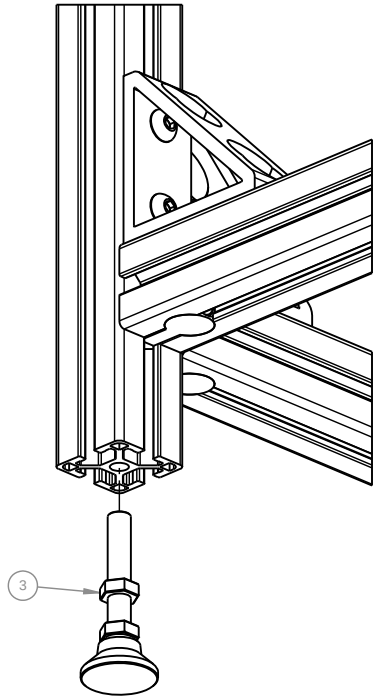
TM-400 FRAME ASSEMBLY

MATERIAL

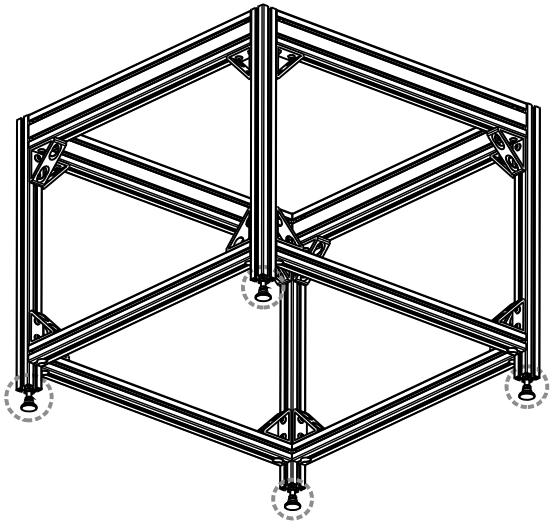
FINISH
NA

SIZE **B** | DWG. NO. 291667 | REV A

WEIGHT (lbs): 38.57



DETAIL M
FOOT TO LEG
SCALE 1:2



DETAIL N
FOOT LOCATIONS
SCALE 1:10

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
3	249616	80/20 PART # 2190	4

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	8/23/13
ENG APPR.	PVO	~

V-TEK INCORPORATED

TITLE:

TM-400 FRAME ASSEMBLY

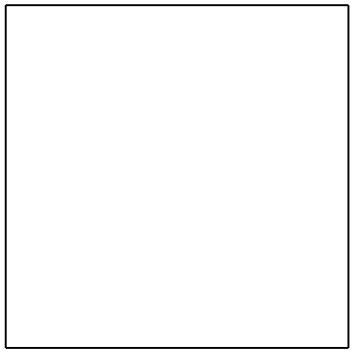
MATERIAL

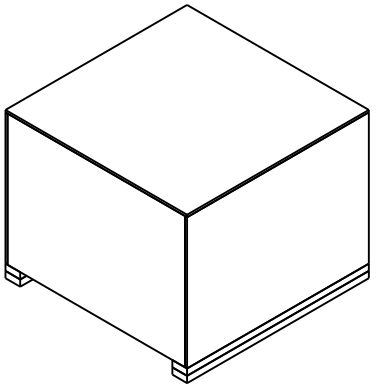
FINISH
NA

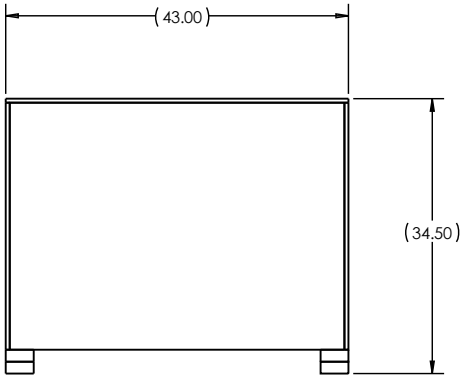
SIZE **B** | DWG. NO. 291667 | REV A

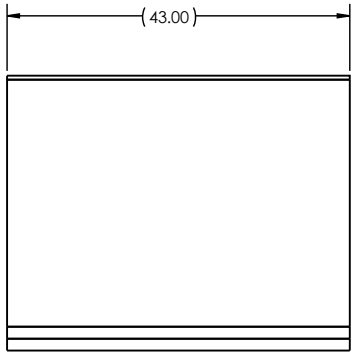
WEIGHT (lbs): 38.57 | SHEET 6 OF 6

REVISI				
ECO #	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/17/2013	PVO









NOTE:
SHIP CRATE AS COMPONENTS LISTED IN THIS BOM, FINAL ASSEMBLY OF CRATE TO BE DONE AT V-TEK

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5 °
SURFACE: 32

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

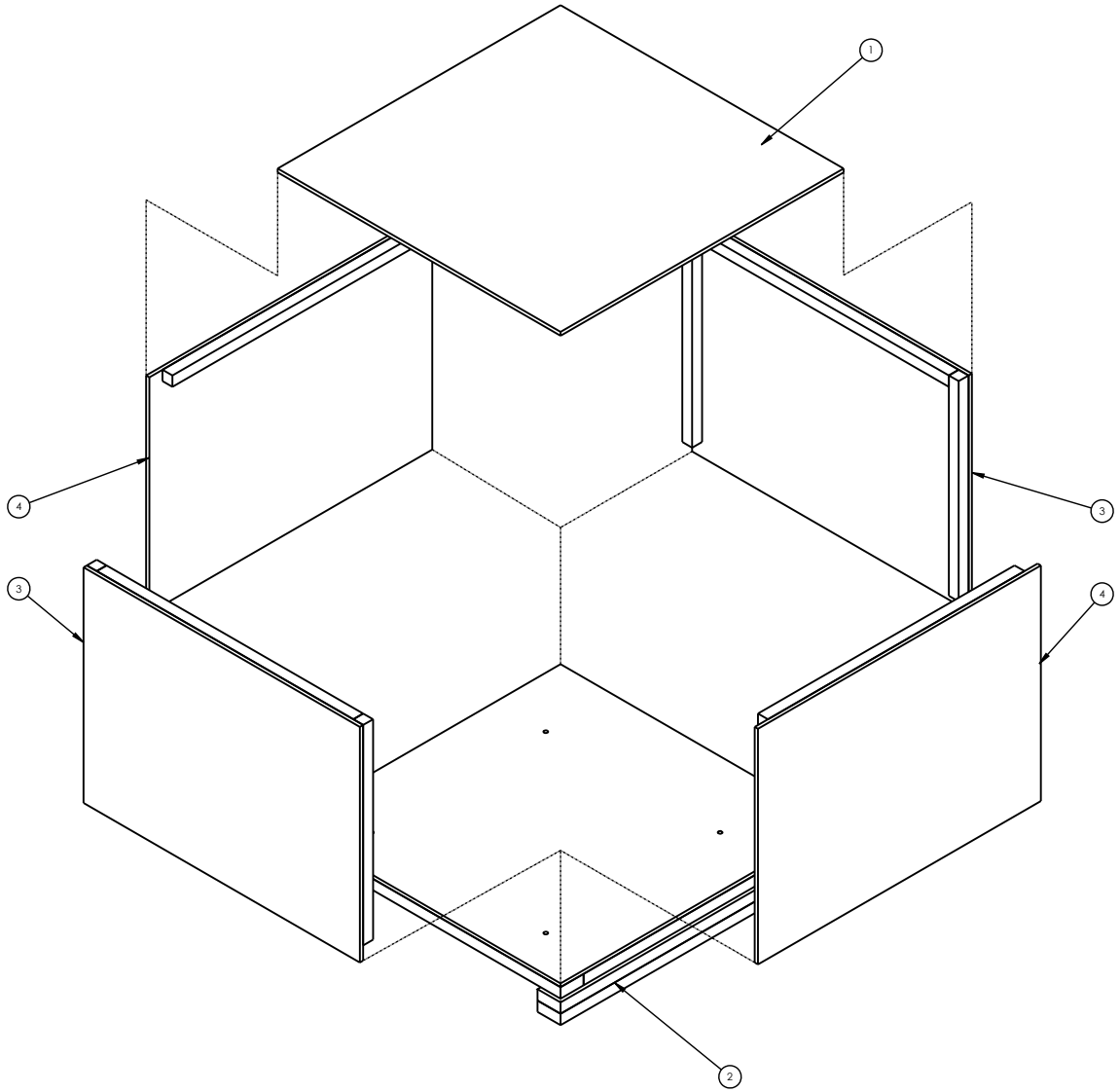
	NAME	DATE
DRAWN	RH	9/17/13
ENG APPR.	PVO	–

TITLE:
TM-400 CRATE

MATERIAL
FINISH

SIZE C | DWG. NO. 291693 | REV A

WEIGHT (lbs): 83.09 | SHEET 1 OF 2



NOTE:
SHIP CRATE AS COMPONENTS LISTED IN THIS BOM, FINAL ASSEMBLY OF CRATE TO BE DONE AT V-TEK

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	267088	TM-400 CRATE TOP	1
2	291690	TM-400 CRATE FLOOR	1
3	291691	TM400 CRATE SIDE (FRONT-BACK)	2
4	291692	TM-400 CRATE SIDE (LEFT-RIGHT)	2

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: .XXX ± 0.005
.XX ± 0.010
.X ± 0.015
ANGULAR: MACHINED ± 0.1°
BEND ± 0.5°
SURFACE: 63

GENERAL NOTES:
- INTERPRET GEOMETRIC TOLERANCING PER ANSI Y14.5
- BREAK ALL SHARP EDGES .010 MAX UNLESS NOTED
- CHAMFER ALL HOLES .015 X .015 ±.010 UNLESS NOTED
- ALL MATERIALS, COATINGS, & CLEANING PROCESSES MUST RESULT IN RoHS COMPLIANT PART
- DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	RH	9/17/13
ENG APPR.	PVO	–

TITLE: TM-400 CRATE

MATERIAL
FINISH

SIZE C | DWG. NO. 291693 | REV A

WEIGHT (lbs): 83.09 | SHEET 2 OF 2

751 Summit Avenue
Mankato, MN USA 56001

Website: www.vtekusa.com
Email: service@vtekusa.com
Phone: (507) 387-2039

For inquiries regarding spare parts, tape and reel supplies, or the service department, please call or write:

Phone: (507) 387-2039

Email: service@vtekusa.com
Please provide the machine model and serial numbers with all inquiries.

NOTES

TM-402 Document List

Section	Pages	File Name
Cover Sheet	Pages 1 - 2	D292105.1f.fm
EC Declaration of Conformity	Page 1 of 1	TM-400 DOC.pdf
Introduction	Pages i - xii	D292105.2a.fm
Table of Contents	Pages 1 - 4	D292105.3c.fm
Chapter 1: Installation & Assembly	Pages 1-1 to 1-10	D292105.4a.fm
Chapter 2: Machine Overview	Pages 2-1 to 2-12	D292105.5b.fm
Chapter 3: Human Machine Interface	Pages 3-1 to 3-30	D292105.6a.fm
Chapter 4: Set-up	Pages 4-1 to 4-26	D292105.7b.fm
Chapter 5: Vision Set-up	Pages 5-1 to 5-44	D292105.16c.fm
Chapter 6: Operation	Pages 6-1 to 6-12	D292105.8b.fm
Chapter 7: Troubleshooting	Pages 7-1 to 7-30	D292105.9b.fm
Chapter 8: Maintenance	Pages 8-1 to 8-10	D292105.10a.fm
Appendix A: Sensors	Pages A-1 to A-6	D291842.11.fm
Spare Parts List	Page 1 of 1	D292105.12a.fm
Exploded Views	Pages EV-1 to EV-84	D292105.13a.fm
Customer Service Contact Sheet	Page 1 of 1	61053915.fm
Document List	This Document	D292105.15f.fm
Warranty Document	Page 1 of 1	WI201.16, Rev.5
Back Cover	Page 1 of 1	61666111.fm

EXPRESS WARRANTY, EXCLUSION AND DISCLAIMER OF UNSTATED WARRANTIES AND LIMITATION OF LIABILITY

V-TEK Inc (V-TEK) manufactures equipment for the Royce Instruments and V-TEK International brands. The following warranty applies to both product lines.

1. V-TEK warrants for one year from date of receipt by end user that equipment manufactured by V-TEK will be free of defects in workmanship and materials.
2. All integrated products purchased by V-TEK and integrated on to V-TEK equipment shall be covered in accordance with the manufacturer's pass through warranty and limited in costs equal to the amount of the manufacturer's pass through warranty.
3. V-TEK's obligation under this warranty applies only to the original Customer and commences when V-TEK is notified of name, address of Customer, and date of receipt of equipment.
4. During the warranty period, V-TEK will replace any defective non-consumable parts returned for that purpose to the designated V-TEK Replacement Parts Center or at V-TEK's option, refund original cost of equipment.
5. Authorization to return Articles purchased from V-TEK must be obtained by Customer before return shipping commences.
6. Credit may be granted, less an appropriate restocking charge of 15 to 20% of invoice amount, depending on the reason for the return and condition of the Articles.
7. Returns should always be carefully packed in original shipping carton and sent via ground service. V-TEK does not assume any liability for damage incurred during shipment.
8. For the first 30 days that you own your V-TEK product, V-TEK will be responsible for ground shipments to and from V-TEK's facility in Mankato, MN, U.S.A. or its designate. For the remainder of your warranty V-TEK will pay freight for returning your product to you after its repair.
9. Customer shall bear all charges for customs duty fees or freight above the ground rate or for articles returned which are not defective.
10. Collect shipments will not be accepted.
11. Insurance coverage during shipping is the responsibility of the Customer. V-TEK does not assume any liability for damage incurred during shipment.
12. The warranty applies only to normal use of the equipment and shall be void if V-TEK determines that defects in or failures of the equipment were caused by the Customer's negligence including the lack of proper preventative maintenance, misuse or accident or by unauthorized repair, alteration or installation.
13. This Warranty does not extend to consumable items or mechanical parts subject to normal wear.
14. Customer's exclusive remedy for claims against V-TEK shall be the repair or replacement of defective equipment and parts.
15. Any modification to the standard configuration of this equipment as delivered will void the warranty, unless V-TEK personnel make the modification.

THIS WARRANTY IS EXPRESSLY MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL V-TEK BE LIABLE FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL PENALTIES OR DAMAGES, INCLUDING LOST PROFITS OR PENALTIES AND/OR DAMAGES FOR DELAY IN DELIVERY OR FAILURE TO GIVE NOTICE OF DELAY EVEN IF V-TEK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

PASS THROUGH WARRANTIES ARE AVAILABLE FROM THE RESPECTIVE MANUFACTURERS**.**

SERIAL NUMBER:

MODEL:

DATE OF MANUFACTURE:

751 Summit Avenue
Mankato, MN 56001

(507) 387-2039 FAX: (507) 387-2257

www.vtekusa.com
Email: info@vtekusa.com