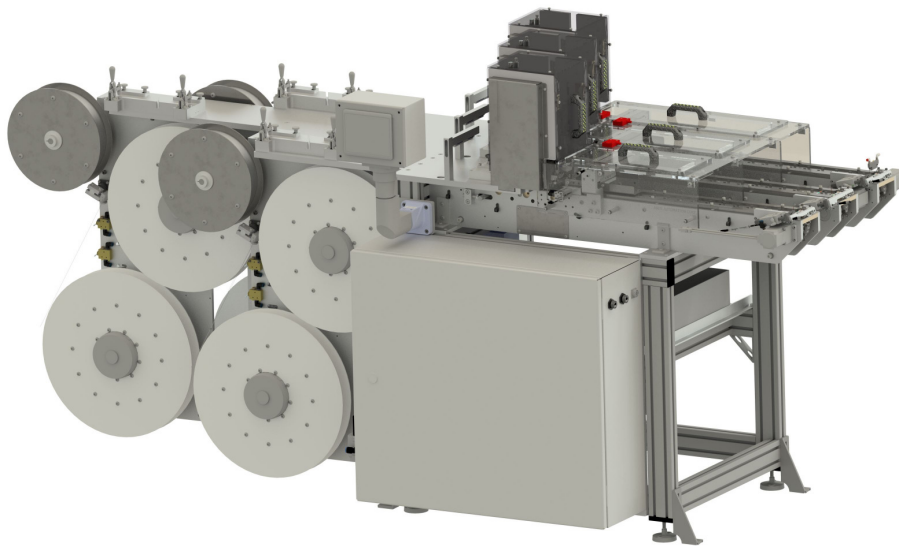




AUTOMATION CORP.



JOB # 200820

TEST STRIP MACHINE OPERATORS MANUAL

SHIP DATE: 12/22/20

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INTRODUCTION

Before you start:

- Read instruction manual thoroughly to ensure safety when operating this machine
- Make sure the machine is mounted on a stable surface
- Connect the 1/2" tubing to the machine which will supply the clean shop air (80-100 psi and minimum 5 cfm)
- Plug the power connector into a **220 Volt AC (Single Phase)** power source

Safety:

- Always disconnect the power and air before servicing the unit
- Keep hands clear from the knife assembly and moving parts while in operation
- Never wear loose article of clothing near moving parts
- Only trained personal should service the equipment

Serial # 200820

Parameters

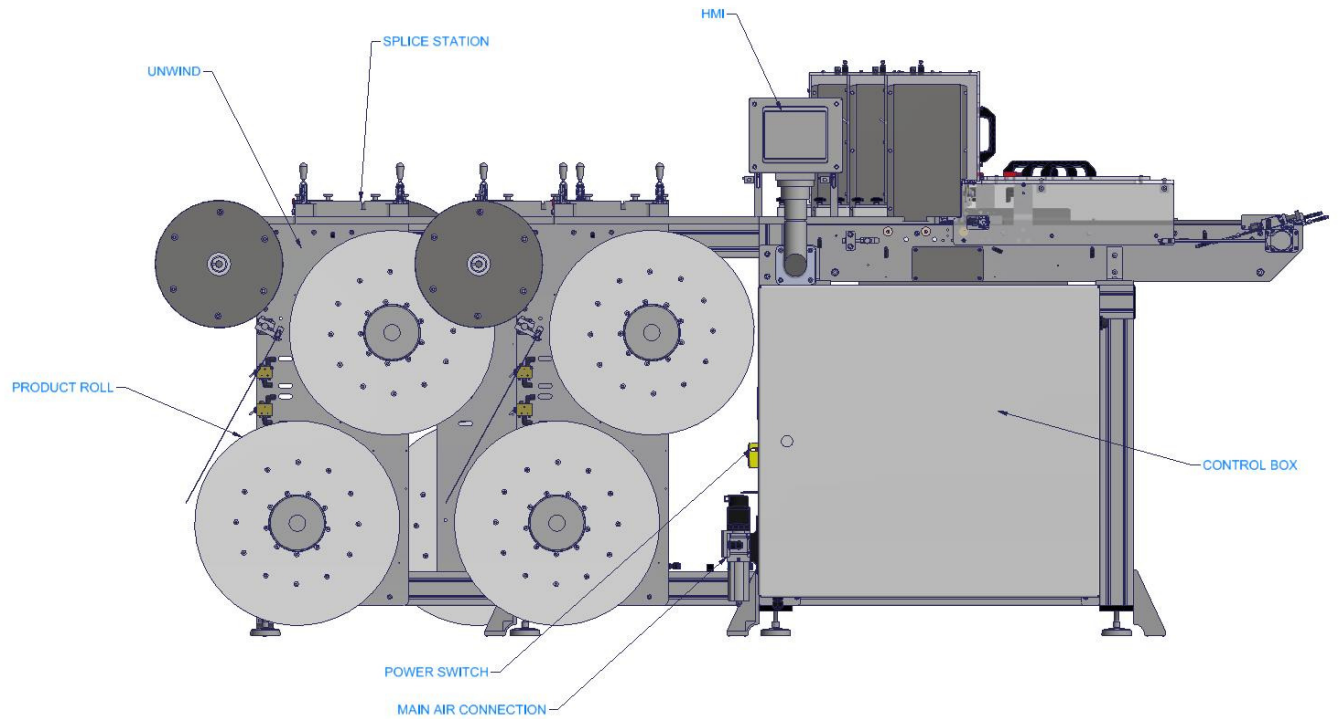
Description	Factory Set	Customer Set
Roller Diameter		
Homing Offset Length		
Feed Length		
Feed Jog Speed		
Feed Velocity		
Short Reject Piece Length		
Pinch Timer		
Knife Cut Timer		
Clamp Down Timer		
Knife Down Timer		
Clamp Return Time		
Conveyor Speed		
Conveyor Acceleration		
Conveyor Deceleration		
Conveyor Offset Length		

Main Air Pressure: 80 – 100 psi

Feeder Roller Pressure: 25 – 35 psi

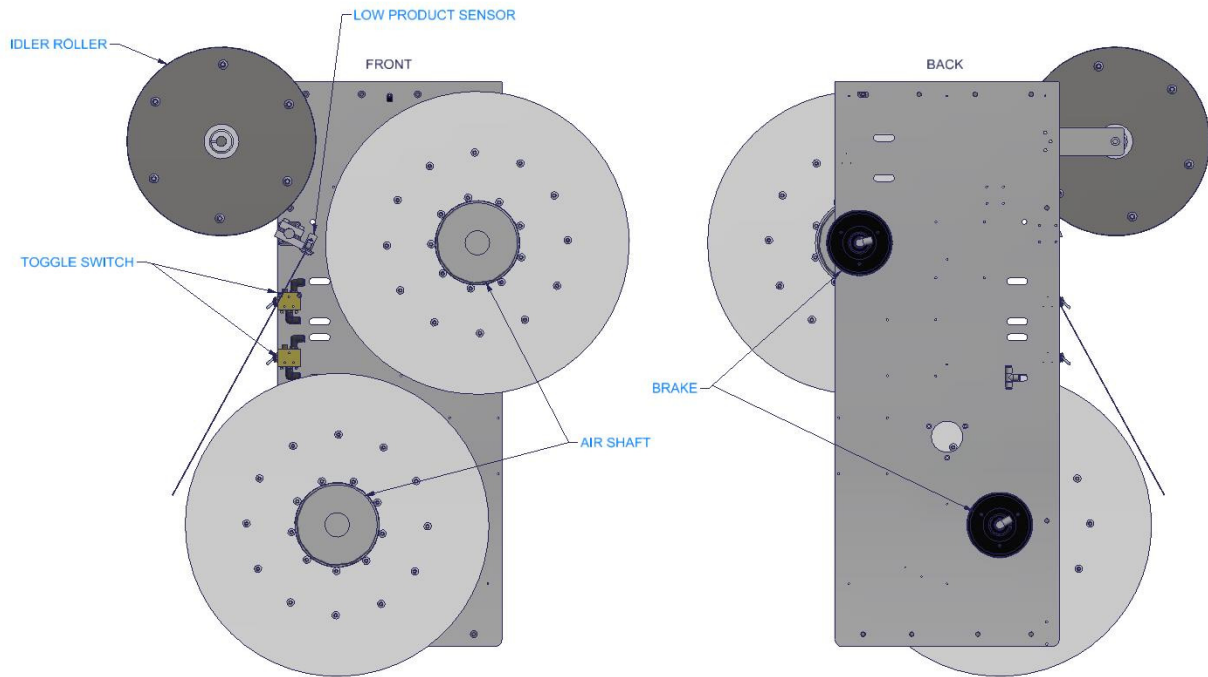
Unwind Air Pressure: 45 – 70 psi

GETTING TO KNOW YOUR MACHINE



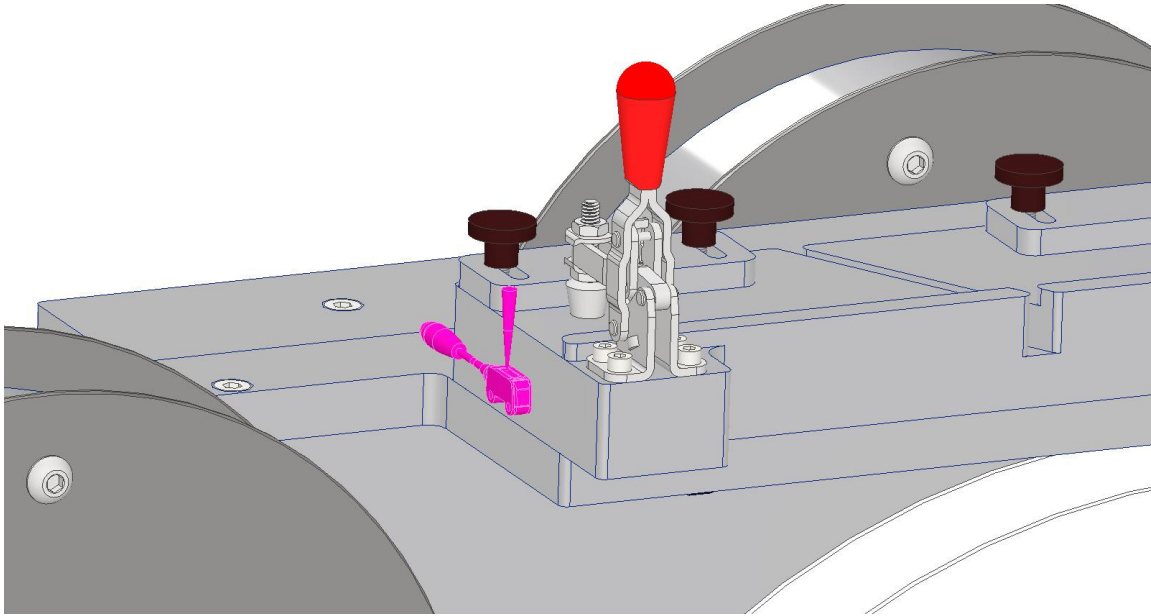
(Side view of Assembly)

You're Brand new **Cut to length Unit** is a very simple machine to operate and is ready to run in a matter of seconds after all necessary installations take place. (i.e. air hose hook-ups, power connection, etc.) But first, let's take a moment to learn the parts of the machine. As shown in the figure above, the machine consists of many different components including unwinds, feeders, cut off knives, conveyors and several other components. Each component has been specially designed to work together in order to complete the task at hand, which is to convert the test strips into predetermined lengths and deliver them to the pick and place unit. Processing the test strips starts from the master roll of product which then enters the feed unit to be indexed and cut. During the cutting process, the cut piece is placed onto the conveyor surface where it is then indexed to the lifting cradle for precise pick up of the pick and place machine.



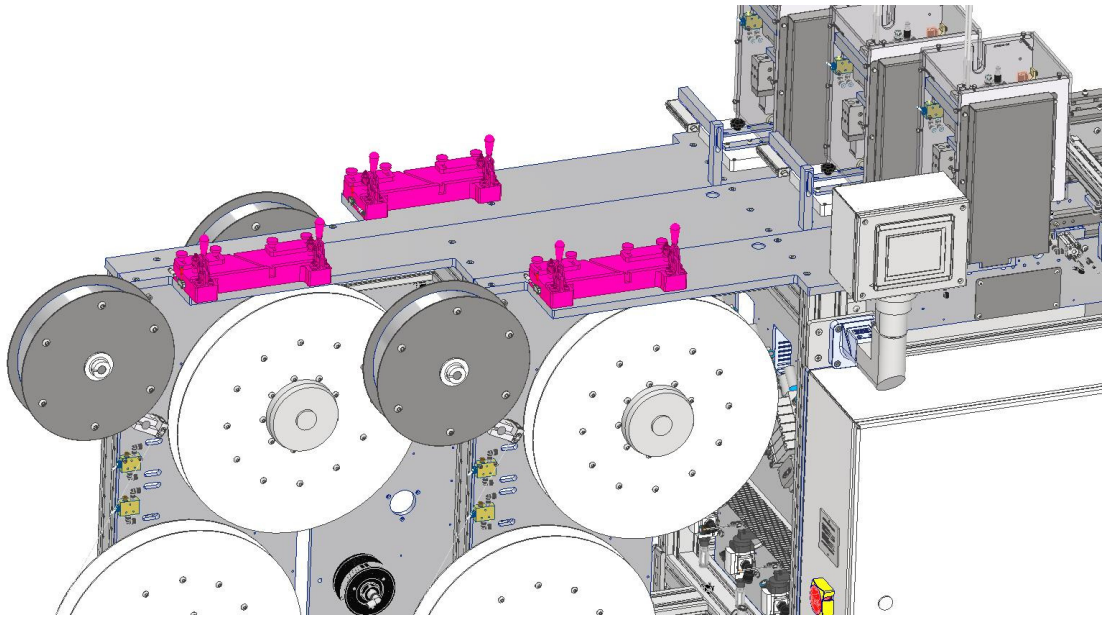
(Unwind Assembly)

Pictured above is one of the unwind assemblies which is used to support the master rolls. Each unwind consists of two positions for two master rolls of material. Each roll is easily mounted and captured by using the expanding core shafts which firmly grip the inner core of the roll. The air shafts are controlled using the two pneumatic toggle switches shown in gold above. Each switch corresponds to one expanding core shaft and when air is applied to a core shaft, the leaves expand to the inner diameter of the core. An inline pressure regulator is provided to ensure that the shafts are not over pressurized and this should be set to 45 psi. On the back side of the unwind assembly, two magnetic clutches can be found. These clutches are used to provide some back tension to the product as it is being unwound. They are adjustable which allow the torque applied to be increased or reduced depending on the need. Ideally, the clutches should only apply enough back tension to keep the roll from free spinning and maintain a constant force for the feeder unit to pull against. Too much back tension can result in slippage in the feeder rollers or premature failures of the feeding components.



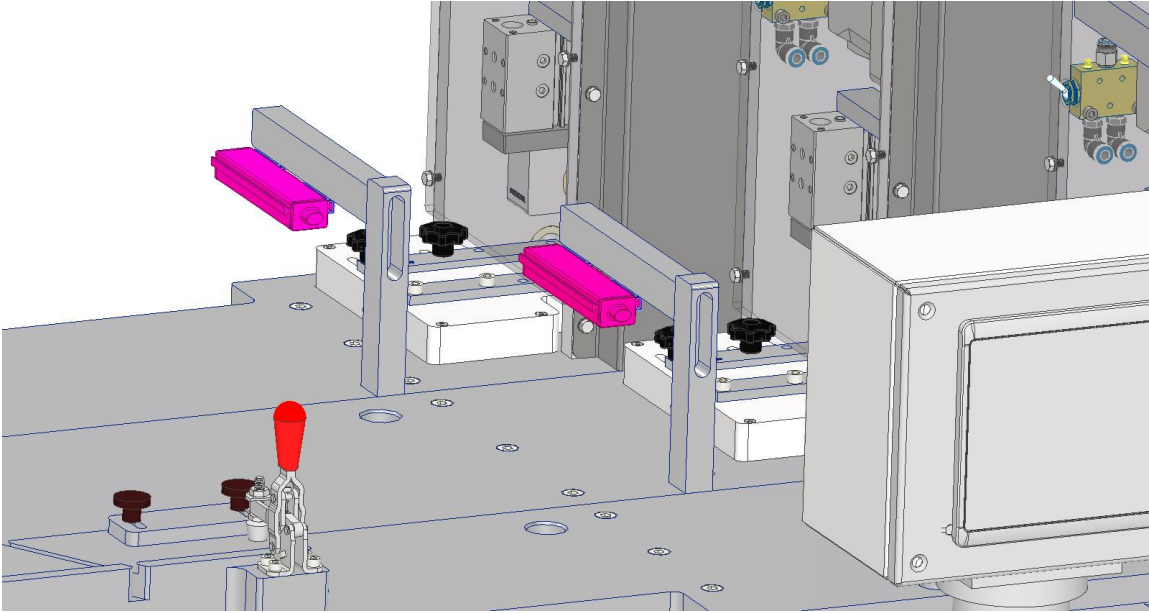
(Out of Product Sensor)

The sensor highlighted above in pink is called the out of product sensor. This sensor is used to detect when a roll of material has expired and needs to be changed. The location of this sensor is just behind the splice station for each lane allowing the machine to stop and still have material present for splicing to the next roll. An orange led indicator will be illuminated when material is sensed and a green led indicator indicates that the sensor is powered on.



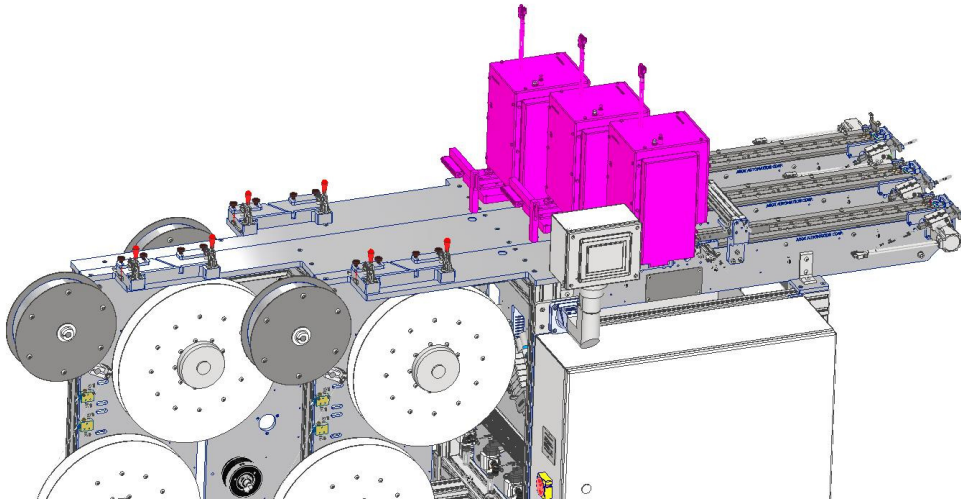
(Splice Stations)

Included in the graphic above are the three splice stations. One is present for each processing lane and can be serviced independently of each other. The splice stations are used to connect the tail end of a roll of material that has been emptied with the leading edge of the material from a new roll. The splicing of one roll to the next allows an operator to minimize the amount of waste experienced at the end of each roll. Using the splice station is not a requirement for successful operation but is available as a tool when minimizing the waste is desired.



(Static Eliminators)

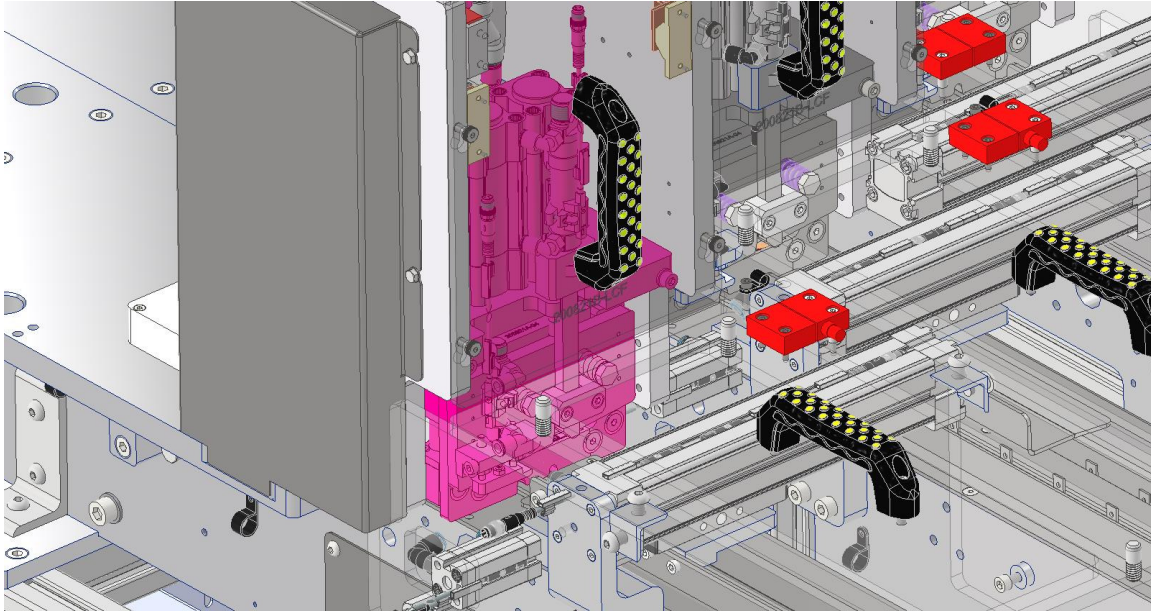
Each lane of operation includes a static eliminator that hovers just above the product flow. As the name implies, these devices send out positive and negative ions that remove the static charge from the product as it passes underneath the units. Removing any static charge will help eliminate any potential problems downstream. **The machine must be powered down before working around the Static Eliminators.**



(Feeders)

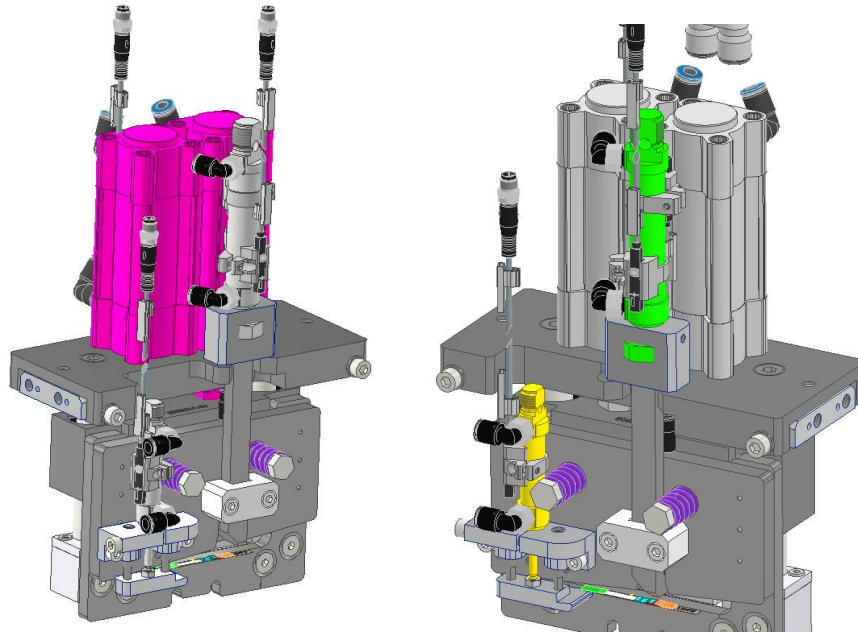
In order to index the material, each lane has a stepper driven feeder unit. The plc controller precisely controls the feed of the stepper motor which drives the feed rollers. In the HMI the operator can enter the precise length of cut required as well as enter advanced parameters for the feeder such as speed and acceleration. The feeders are equipped with silicone coated rollers with incorporated grooves that are present to prevent contact with the sensitive parts of the product. The idler rollers are also pneumatically actuated allowing for easy disengaging / loading of the product. Because the rollers are pneumatically actuated, the pressure applied can also be dialed in to prevent under / over pressuring the product. Over pressurizing can result in premature wear and tear on bearings, the silicone coating or the drive belts. Under pressurizing can result in material slippage as it is being fed through the unit. The factory recommended pressure range for the rollers is 25 – 35 psi.

Included in the feeder is also an auto feed sensor. When loading a new piece of material, the operator only has to insert the leading edge into the feed rollers and engage the idler using a pneumatic switch. Once engaged, the operator can home the lane on the HMI and the product will automatically load to the cutting edge ready for processing.



(Knife Assembly)

Located on the front of the feeder units is the cutting head assembly. This unit is a pneumatically actuated knife that is automatically controlled by the plc. It is designed to be a modular quick-change unit that can be easily swapped out for service and replaced with a spare. All pneumatic connections are push to connect and all of the cylinder positioning sensors are quick disconnect. The assembly is held in place on the feeder using two screws that are located at the front of the assembly. Access to the screws is possible by removing the lift off cover immediately in front of the knife. When the cover is removed, all air will be dumped from the air lines pertaining to that lane of operation for safety.

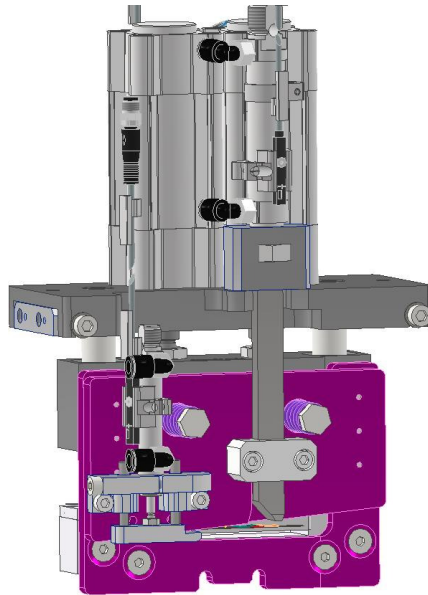


(Knife Assembly Cylinders)

On the knife assembly are various cylinders performing different operations of the cutting process. Highlighted in pink are the two main knife actuators. They are responsible for moving the blade assembly which actually produces the cut. On these cylinders are adjustable dampeners that control the speed of the cylinder at the end of stroke. Using the dampeners allows the cylinder to have a much softer or harder impact at the end of stroke, however, they do affect the output of the overall system if they are adjusted to be too slow. Also on these and all cylinders are proximity sensors which are in place to ensure that every expected motion actually is executed.

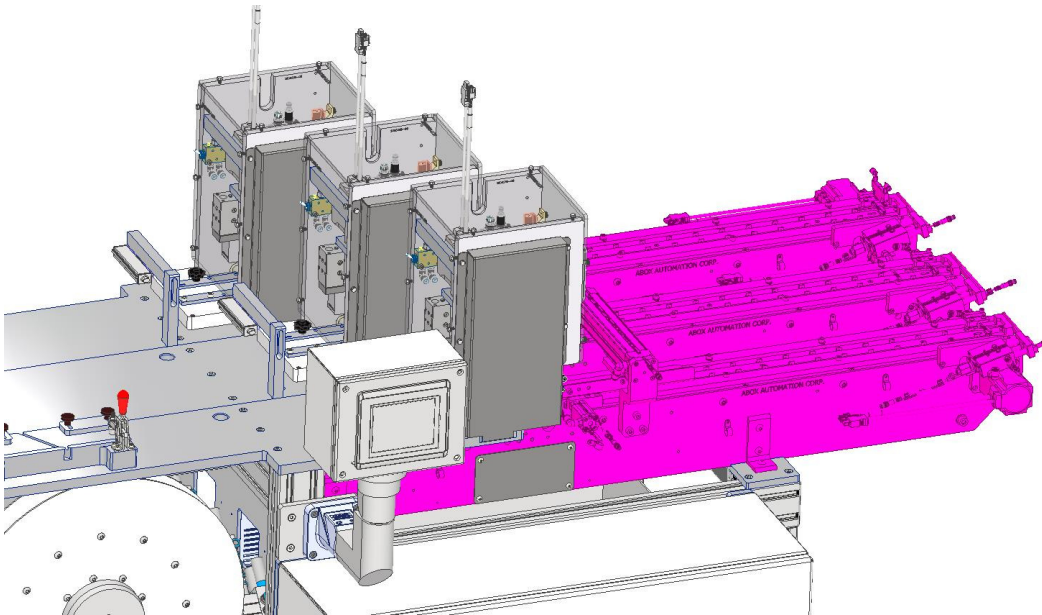
Highlighted in green above is the clamp cylinder. The function of the clamp is to hold down the cut part on the conveyor after the cut is complete and the blade retracts. This helps over come any parts from sticking to the blade as it retracts due to any glue residue or static.

Highlighted in yellow above is a pinching / gripping cylinder. During the cutting process, this cylinder actuates and clamps the part to the blade preventing any unpredictable movement of the part. This helps produce a repeatable placement of the test strip each time on the conveyor for transport to the pick and place machine.



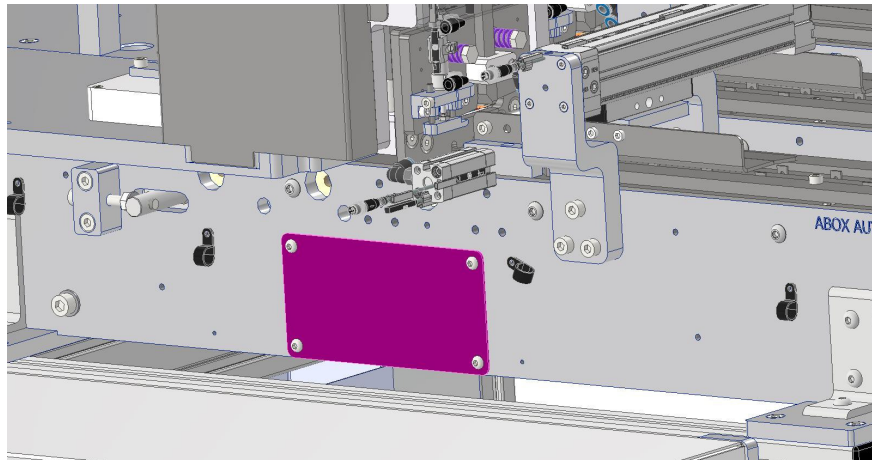
(Knife Assembly Blade Set)

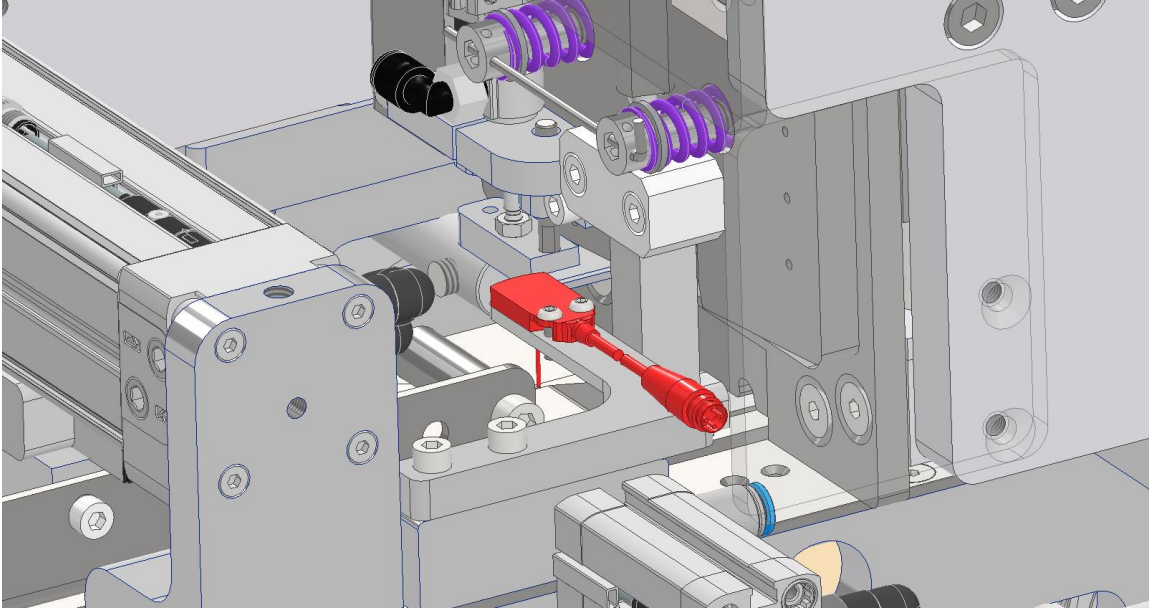
The blades that are incorporated into the knife assembly are highlighted above. They are easily replaceable and can be re-sharpened when they have dulled. It is recommended to have both a spare set of blades, and a complete spare knife assembly. Having both allows the maintenance crews to quickly return a machine to operation after any failures. It is also recommended to keep all bearings, cylinders, and hardware as spares as well to expedite refurbishment.



(Conveyor Assemblies)

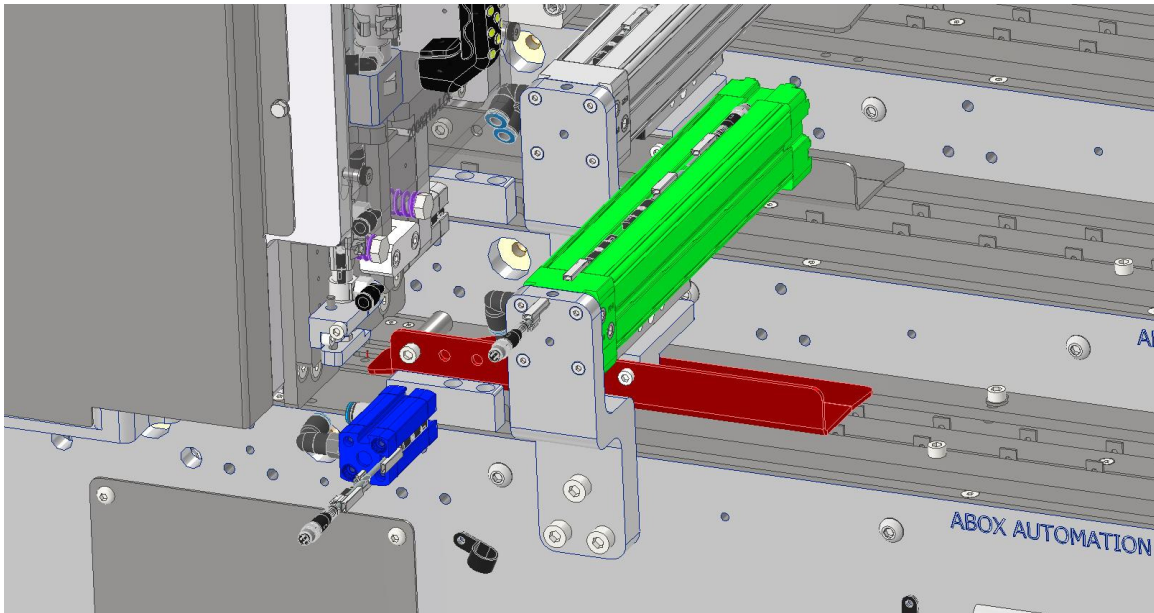
In order to deliver the cut part from the feeder to the pick and place machine, a pushing conveyor is utilized. The conveyors feature two chains that have lugs which push the cut part and maintains orientation. Each conveyor has a set of guide rails on either side of the part to keep it centered in the lugs. One of the guide rails is pinned and the other is adjustable. The pinned rail is used as a “zero” reference that all other components are built off of. The conveyor itself is driven using a geared closed loop stepper motor for precise movement. Access to the chain is possible by removing the cover on the side shown below.





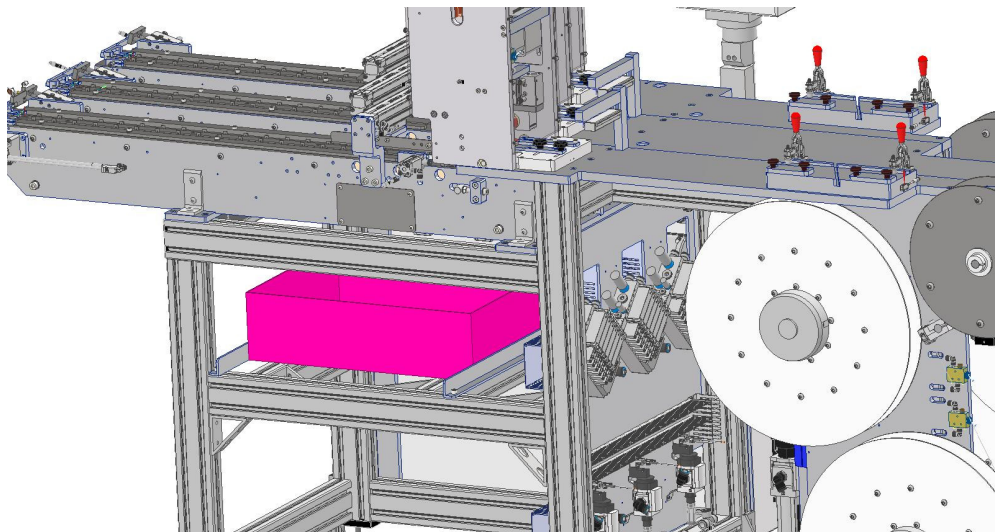
(Jam Sensor)

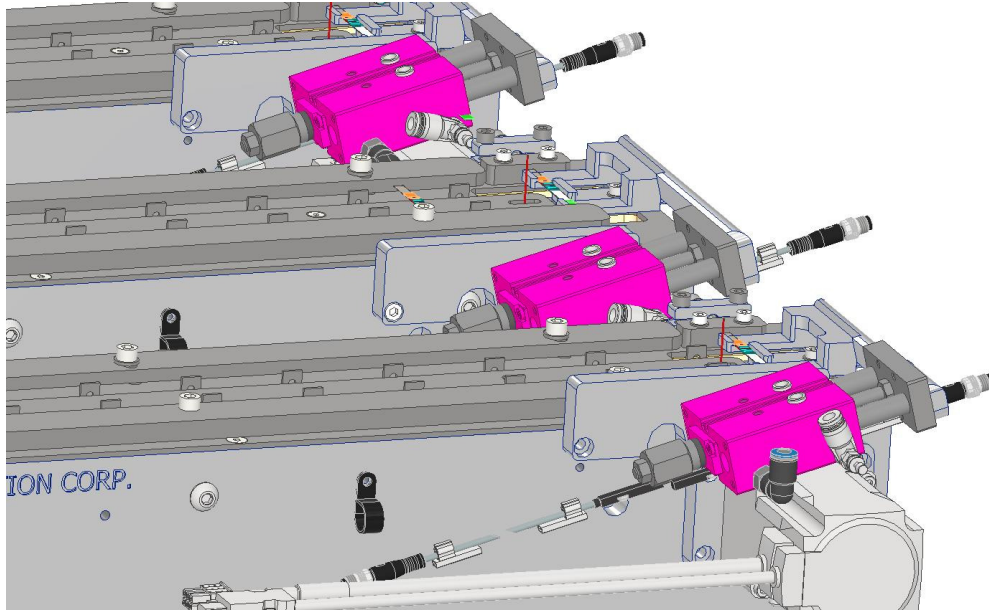
Centered in the picture above indicated in red is the jam sensor. This is found on the conveyor just in front of the knife. The sensors role is to detect if a part is placed on the conveyor after each cycle. It also verifies that the conveyor took the same piece away after each move. If at any time the sensor fails to verify a new part placed or removed, the unit will give out an alarm indicating a problem. The sensor is a fixed range sensor that requires no adjustment.



(Reject Cylinders)

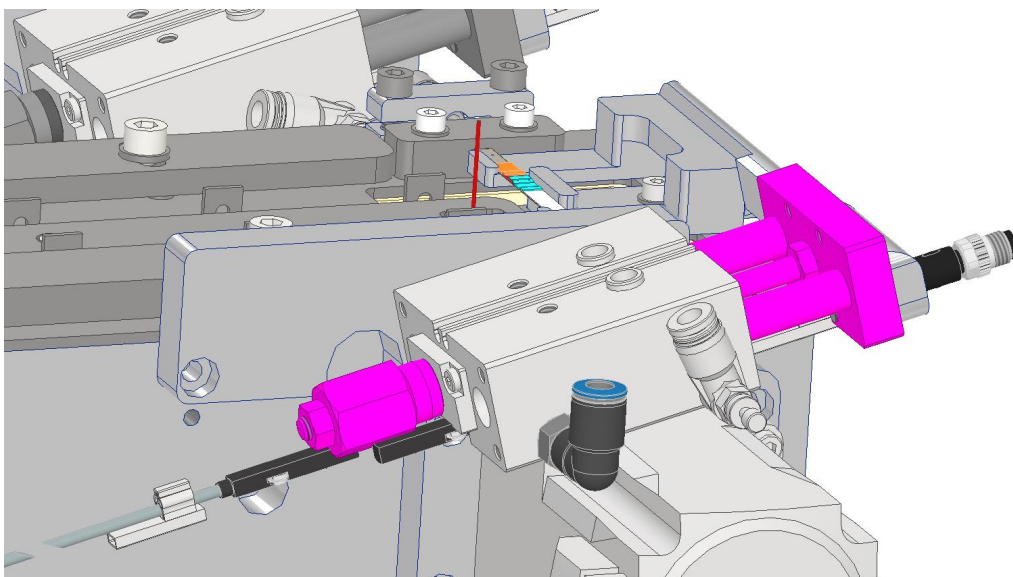
The machine has a built-in reject system to remove any parts experiencing predetermined reject criteria. One of which being the presence of a splice. Whenever the reject area is detected, the machine will then determine if the reject is considered a long reject or a short piece reject. A short reject will be placed onto the conveyor and pushed off by the cylinder shown in blue above. A long reject will feed onto the tray shown in red, the knife will cut the piece, and the cylinder shown in green will carry the reject off to the side of the conveyor. All rejects will fall into a reject bin located beneath the conveyors. This bin is highlighted below.

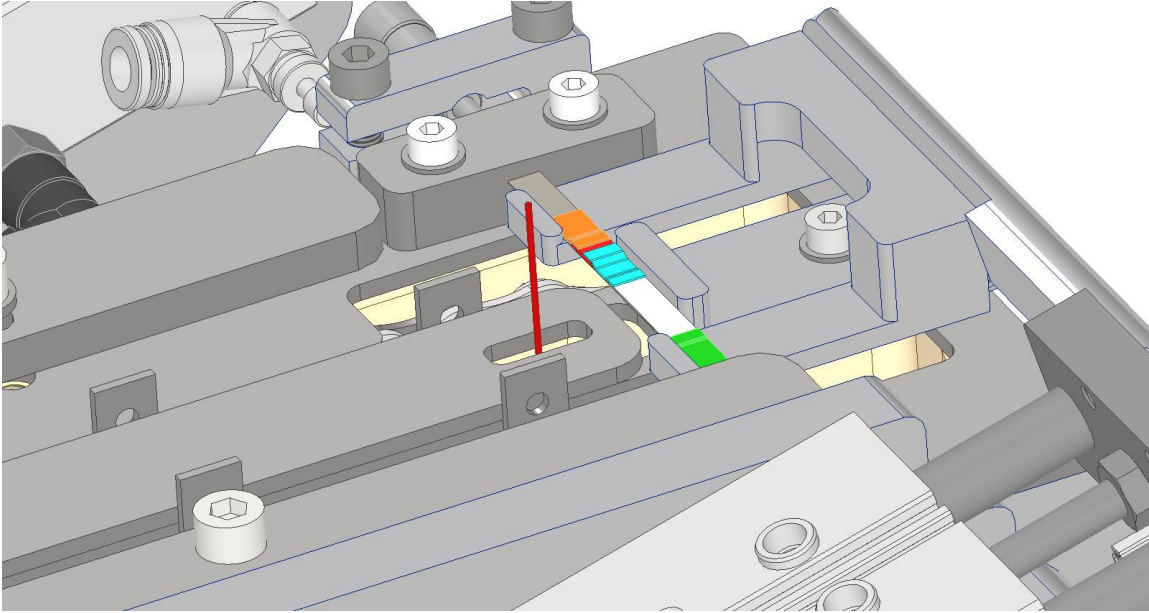




(Lifting Cylinders)

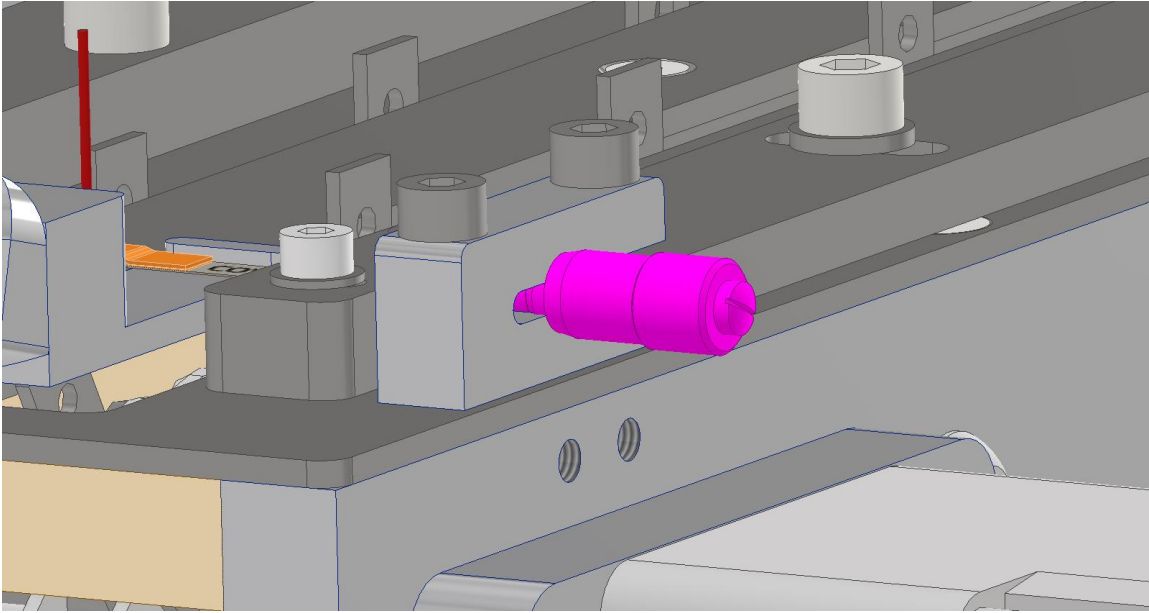
At the end of each conveyor is a lifting cradle designed to repeatably orient the part for accurate pick up by the pick and place machine. After the part is indexed above the cradle, the machine will activate the lifting cradle using the cylinders shown above. The cylinders will carry the part to a hard stop that is used as a “zero” reference point for each part. One of the pneumatic ports on these cylinders has an adjustable flow fitting that will allow the operator to control the speed at which the cylinder extends. This will prevent high speed movements that could possibly throw the part while in motion. The cylinders also have an adjustable stroke option that make it possible to precisely dial in the end of the stroke. This adjustment knob is highlighted below.





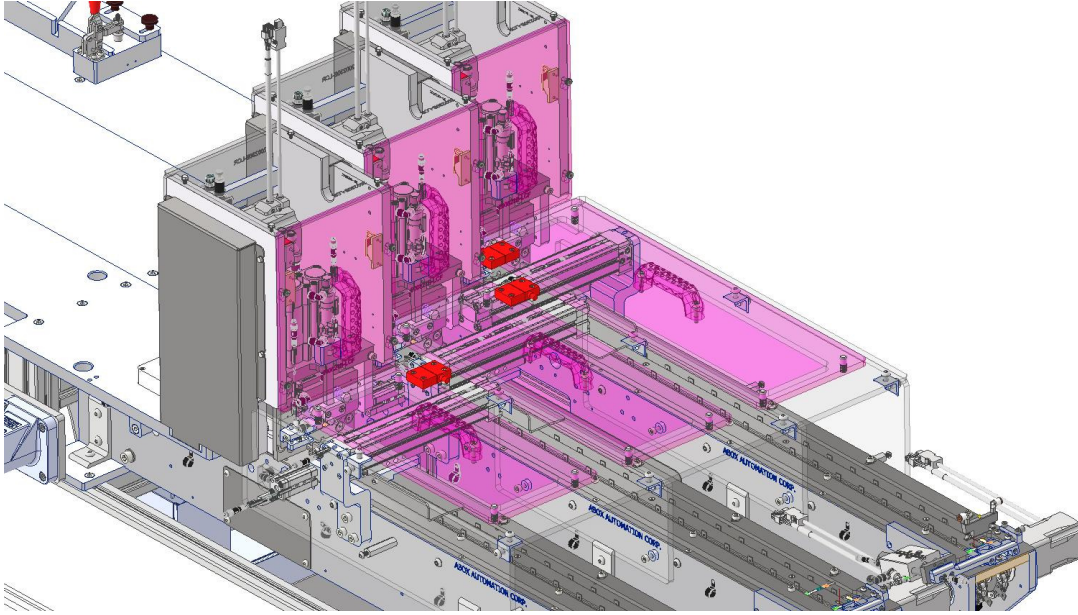
(End of Conveyor Sensor)

At the end of the conveyor is a sensor to detect the presence of a part for each cycle. The sensor is shown in the center of the picture above indicated by the red line. If the sensor does not detect a part after the conveyor index, the machine will continue to cycle/index until a part is present and ready for pick up. Some cases when a part will not be present include: Machine start up when no parts are present, empty flights due to parts being rejected, or any other errors resulting in a part not placed onto a flight. The machine will only give a ready for pick up signal to the pick and place machine when a part is present and has been presented to the pick and place on the lifting cradle.



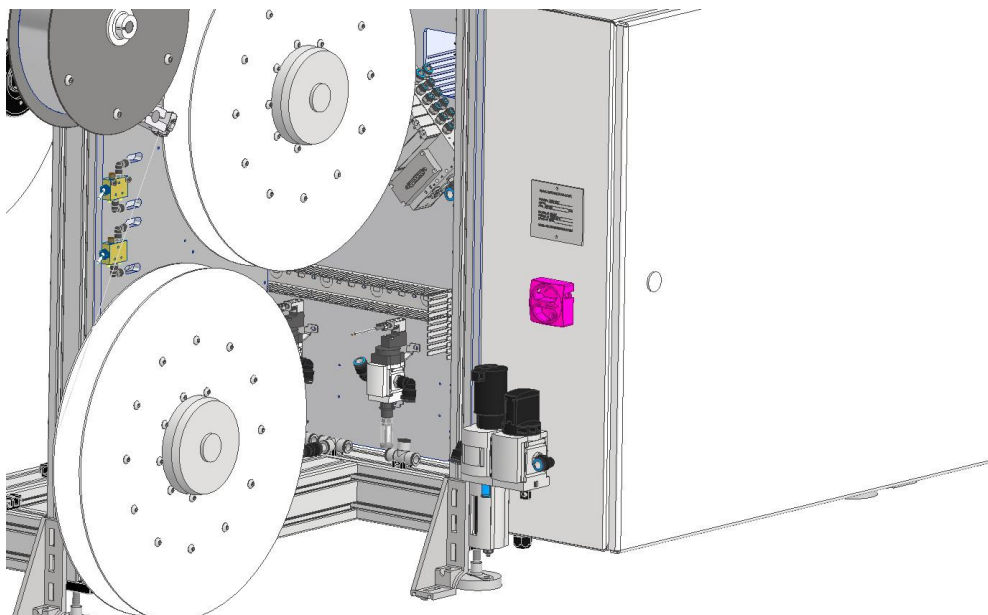
(End of Conveyor Micrometer)

On the adjustable rail side of the conveyor is an adjustable locating block that helps orient the part on the lifting cradle as it elevates the part. The block can be precisely tuned using the micrometer highlighted above. The micrometer is not physically attached to the block so it is important to press the block against the micrometer tip when tightening the hold down screws. To adjust the block, first loosen the two socket head cap screws. Dial the micrometer to the new position, press the block against the micrometer, and re-tighten the screws to lock the position. The block also has a tapered lead so the part will gradually slide over to the nominal position for pick up.



(Guards)

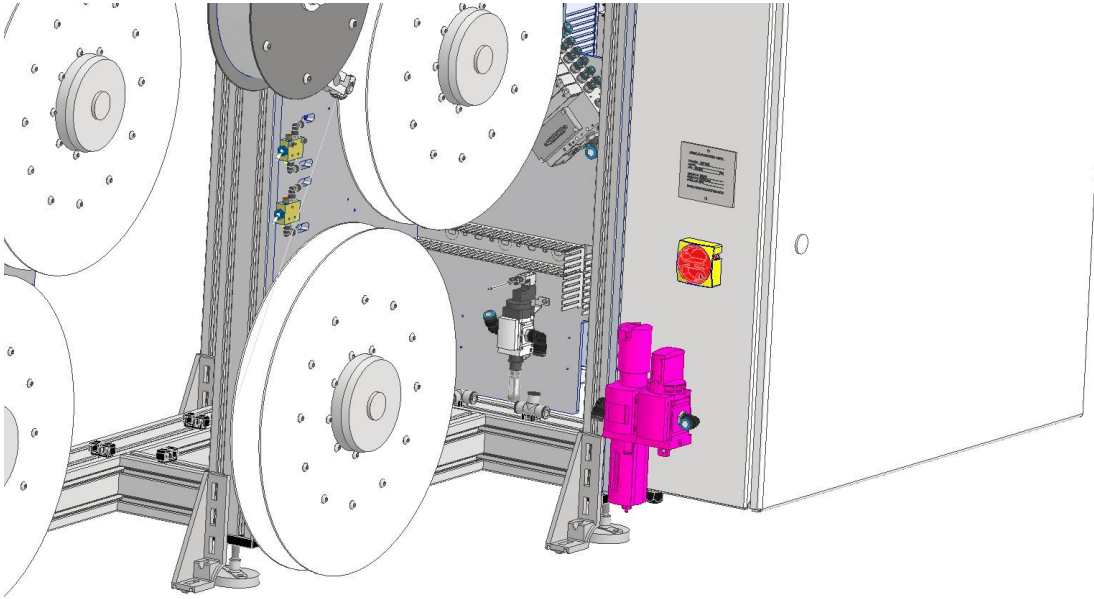
On the front of the machine, a series of lexan guards can be found which prevent access to the moving parts of the machine. Highlighted above are the six removable and switched access doors. The vertical doors allow access to the knife assembly for quick and easy removal and the horizontal doors allow for access to the conveyor unit. Whenever a door is removed, the door sensor will detect the absence of the door and in turn, de-energize all air and motor torque within the corresponding lane. The two other lanes will remain energized and functioning. This allows two lanes to continue operating and producing parts while one is being serviced. An E-stop scenario is the only case when all lanes will be de-energized at the same time. All calls for E-stop conditions will come from the master machine safety circuits.



(Main Power Switch)

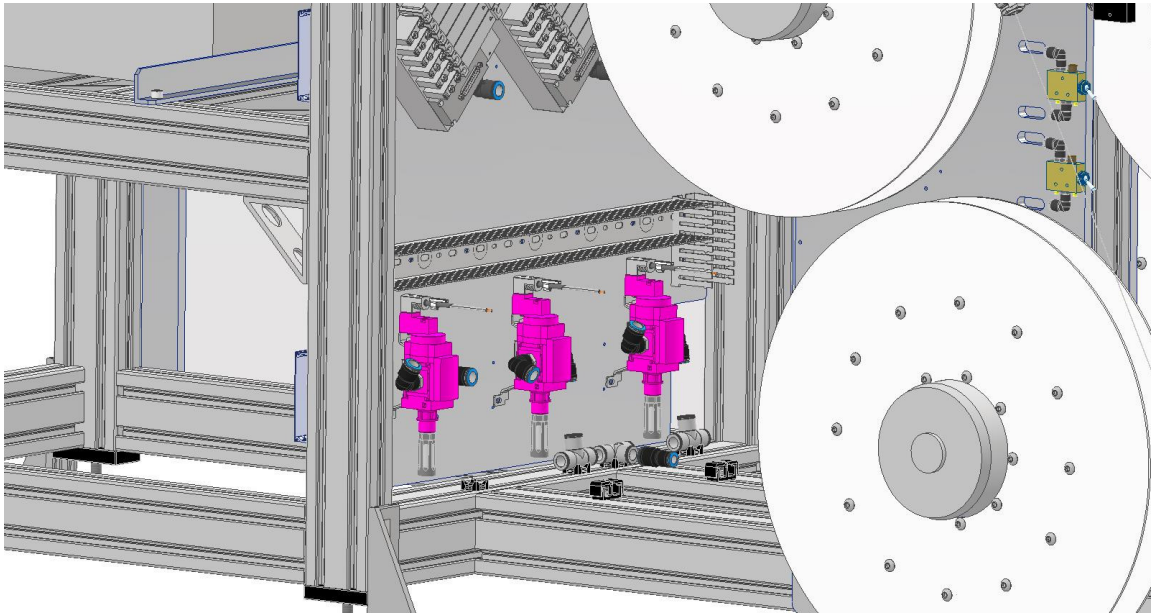
There is one main power switch which controls the power for the entire machine. It is capable of being locked out to prevent accidental cycling when service is being performed. Directly above the power switch is the name plate which includes the serial number and utility requirements.

Pneumatic Components



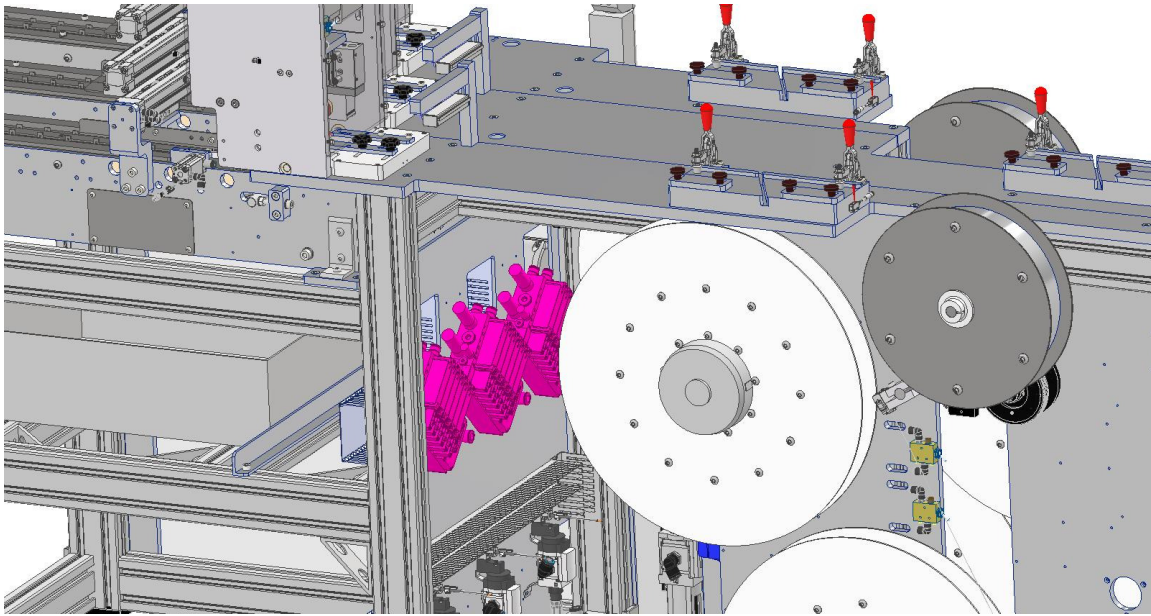
(Main Air Switch and Regulator)

The main air connection is shown above. The assembly includes both a master air switch and also a filtered air regulator. Similar to the power disconnect switch, the air valve also is capable of being locked out to prevent unexpected cycling during servicing. Switching the valve will enable / disable air to the entire machine.



(Air Dump Valves)

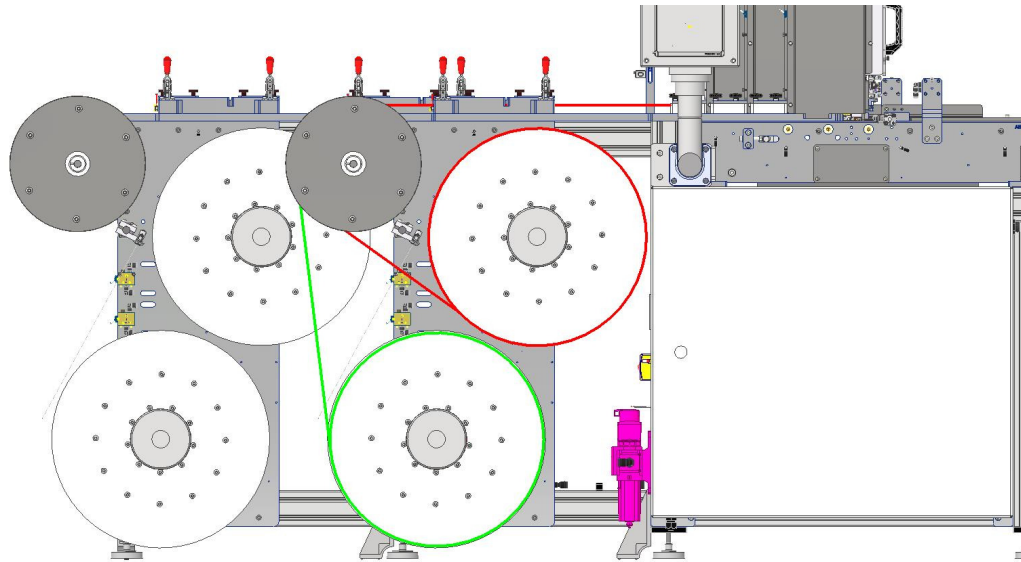
Each lane of the machine has its own air dump valve. These valves are located on the pneumatic panel shown above. Whenever a safety door is open, these solenoids will relieve pressure from the corresponding lane that has the fault condition. An E-stop condition will, however, relieve pressure from all lanes at the same time. The only other way to electronically relieve the air pressure to all lanes would be to switch off the main power switch on the machine. It is not recommended to rely on the power being off alone when servicing the equipment. Any time service is being performed, the main air valve should be switch off and locked out. For added safety, it is recommended to disconnect the service air-line completely from the unit.



(Solenoid Banks)

All of the cylinders on the machine are actuated by the solenoid banks highlighted above. Each lane of operation has its own valve bank and are all controlled via the plc. These solenoids do not control the safety air dump and are only responsible for the various actuators. It is recommended to keep some spare solenoid valves for quick replacement in the event of a failure. The valve bank itself can remain in place during a solenoid replacement.

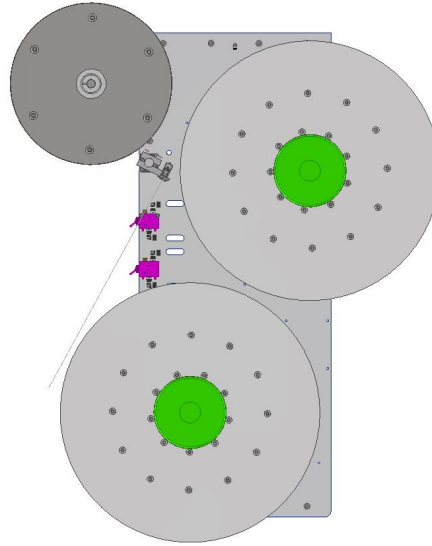
Operating Instructions



(Material Path)

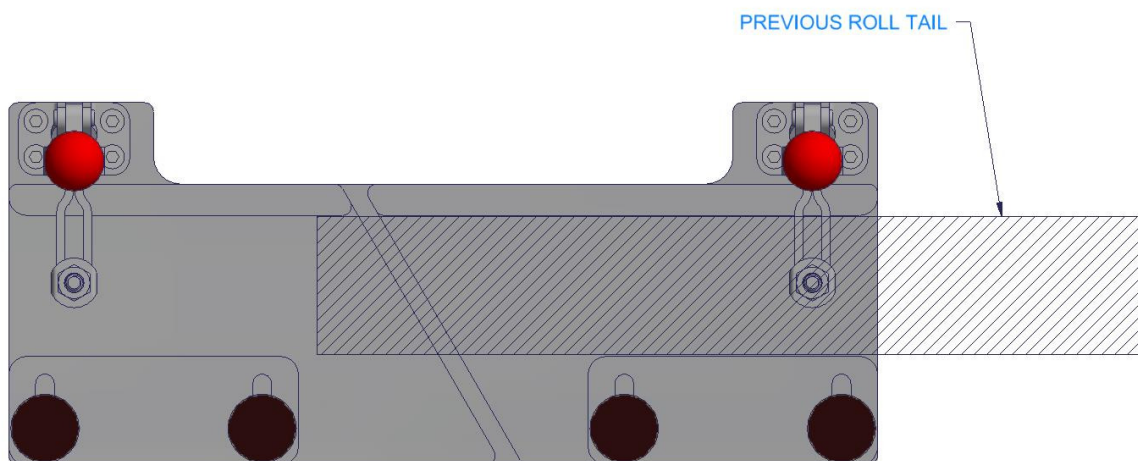
LOADING THE MACHINE

As shown in the illustration above, the material takes a path from the roll, over an idler roller and into the feeder unit. To load a new roll of product toggle the pneumatic switch shown in pink below to deflate the air shaft. Once deflated, slide a new roll onto the air shaft shown in green until the roll has reached the hard stop completely. Cycle the toggle switch to re-inflate the air shaft which will fully engage the inner diameter of the material core.

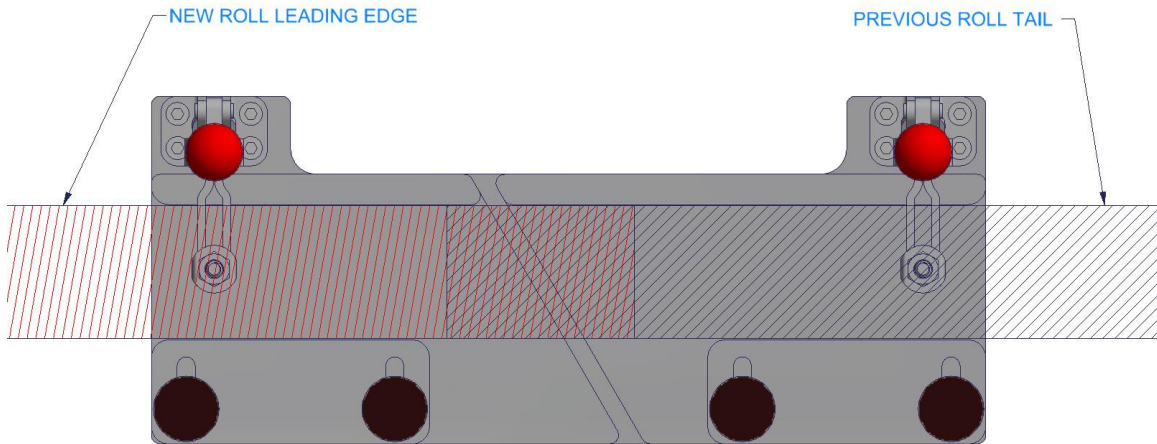


After installing the new roll of material and if no left-over material is present from a previous roll, the product can be routed directly to the feeder unit following the path shown in the previous illustration. If material is left over and a splice is desired to be made, please follow the instructions below.

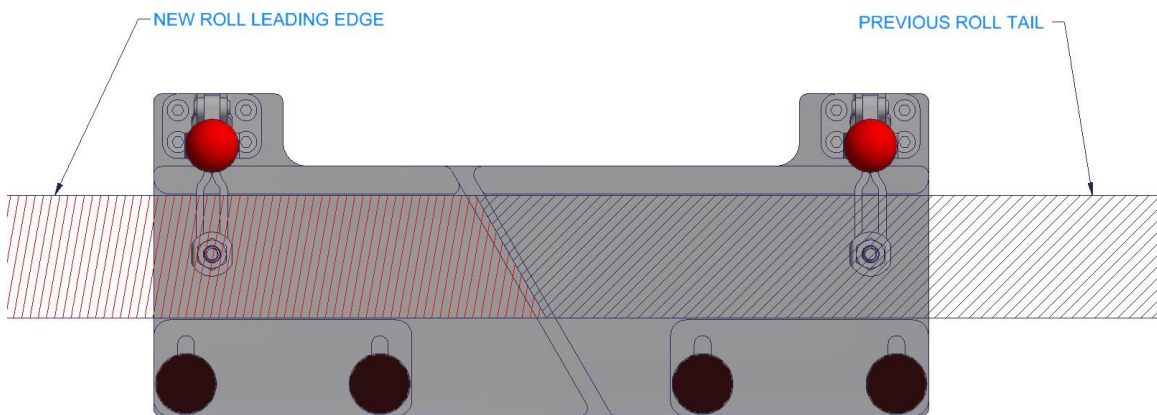
(Splicing Operation)



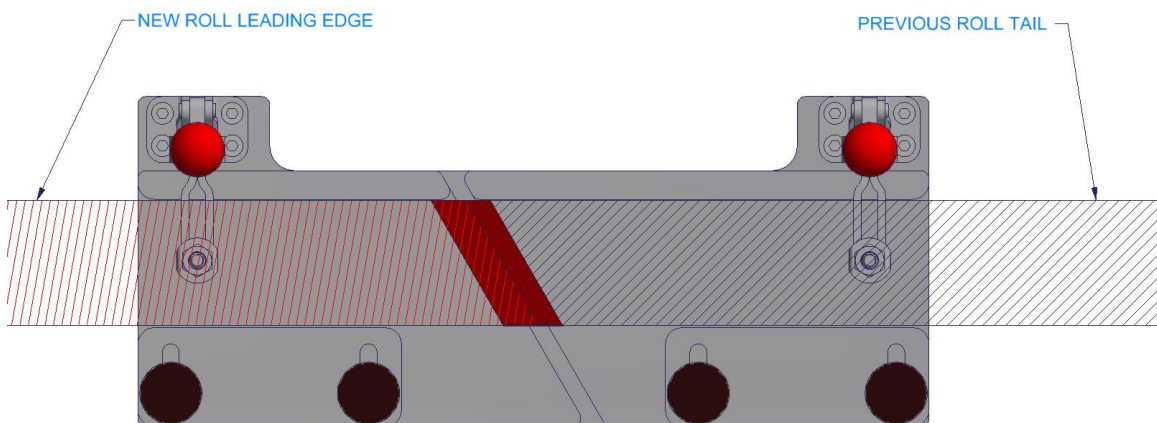
Step 1: Adjust the tail piece of the material that was previously running in the machine to the angled cut guide located near the center of the splice station. Apply the clamp onto the material to keep it from moving.



Step 2: Insert the leading edge of the new roll to overlap the tail end of the expired roll and clamp.



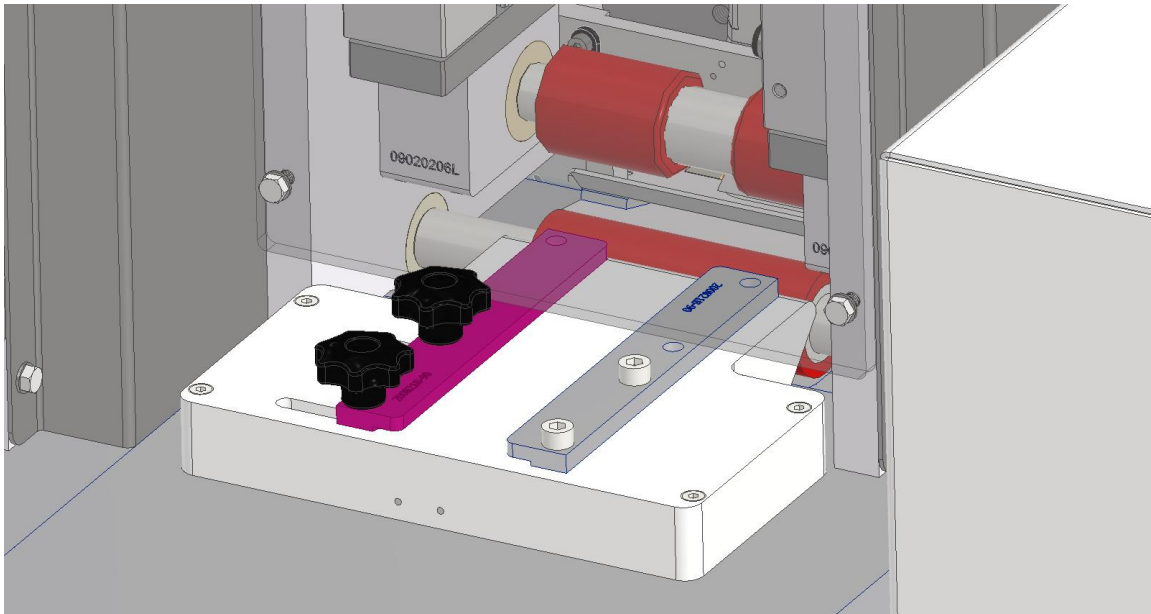
Step 3: Using scissors, cut along the provided diagonal guide cutting through both layers.



Step 4: Apply the splice tape along the cut to join the two ends together

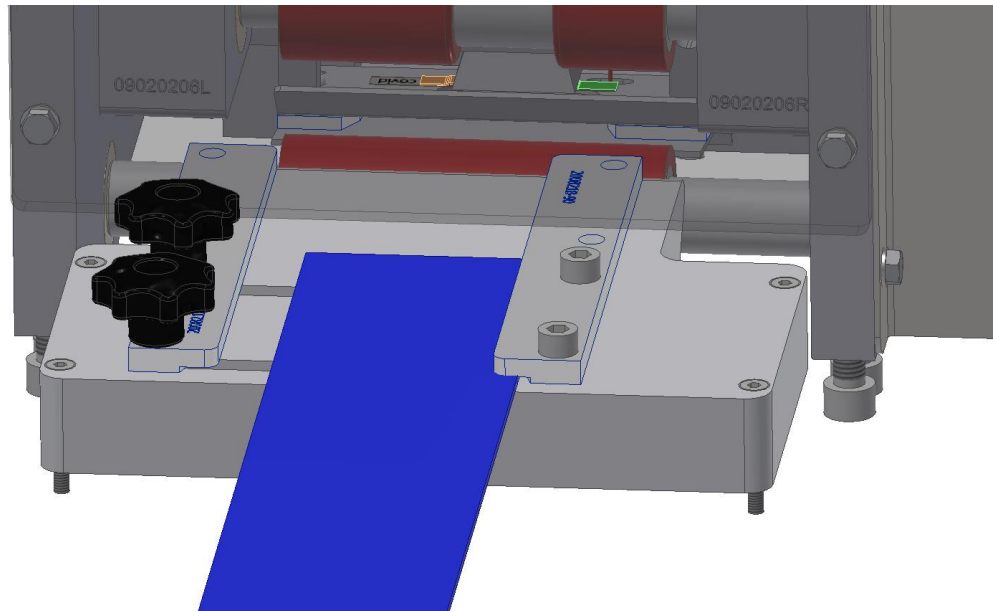
Step 5: Disengage the clamps and press the lane start button on the HMI

(Loading the Feeder Unit)

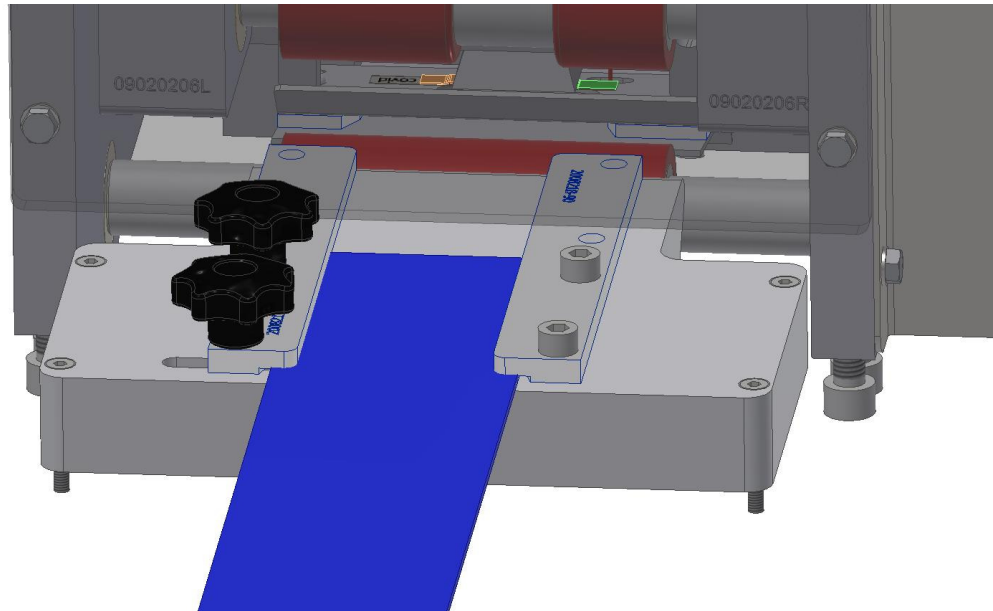


(Adjustable Guide)

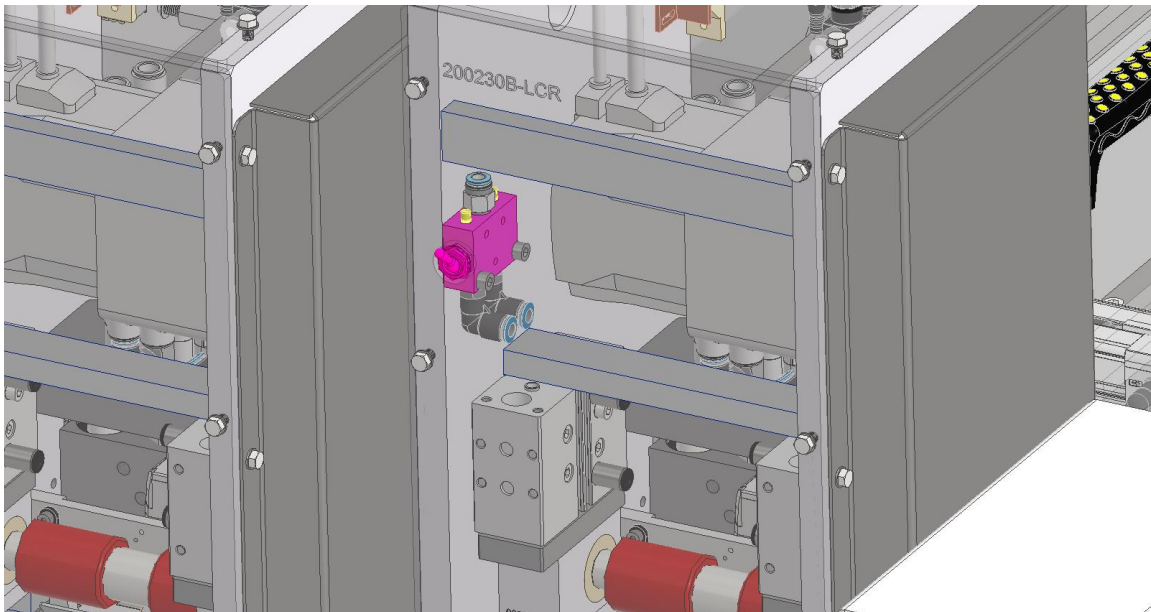
The first step required to load product into the feeder unit is to properly adjust the guide rail highlighted above. To adjust, loosen the two knobs and spread out the guide to a position wider than the product being processed.



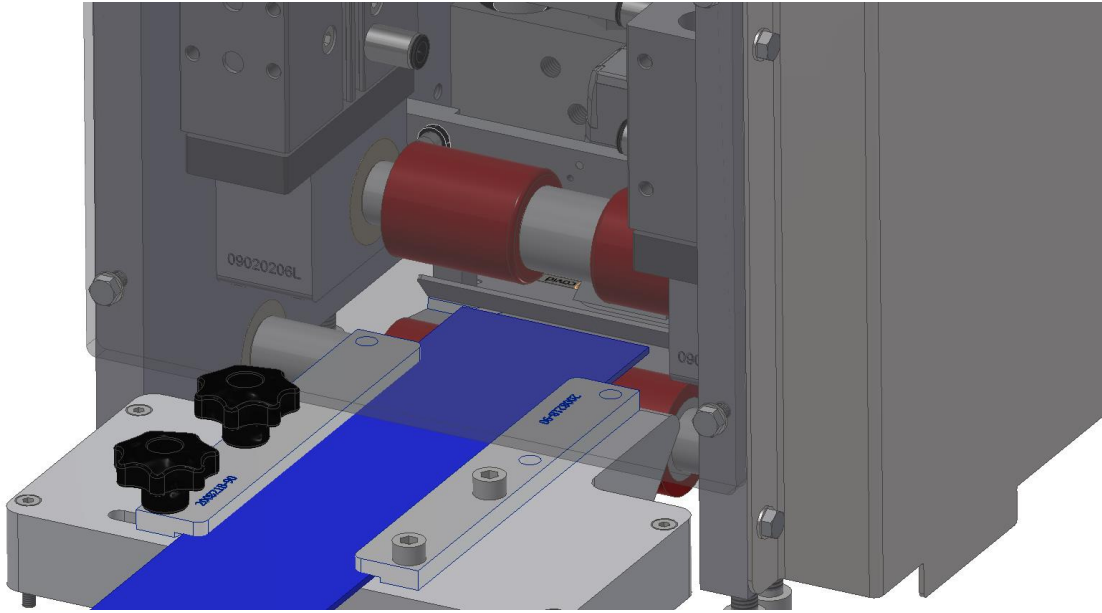
Insert the product onto the guide assembly and align one edge to the fixed guide.



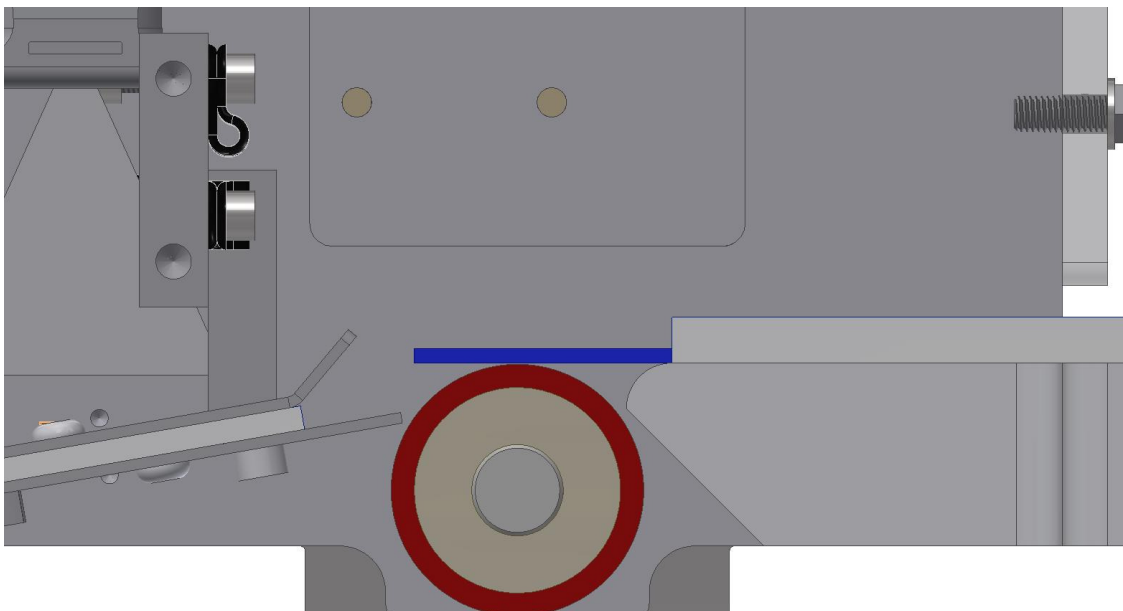
Move the adjustable guide to align with the other side of the material and fully capture the product. Do not press the rail too hard against the product as it will result in a bow or bubble in the center of the product that will affect feeding. Tighten the two thumb screws to lock the guide in place.



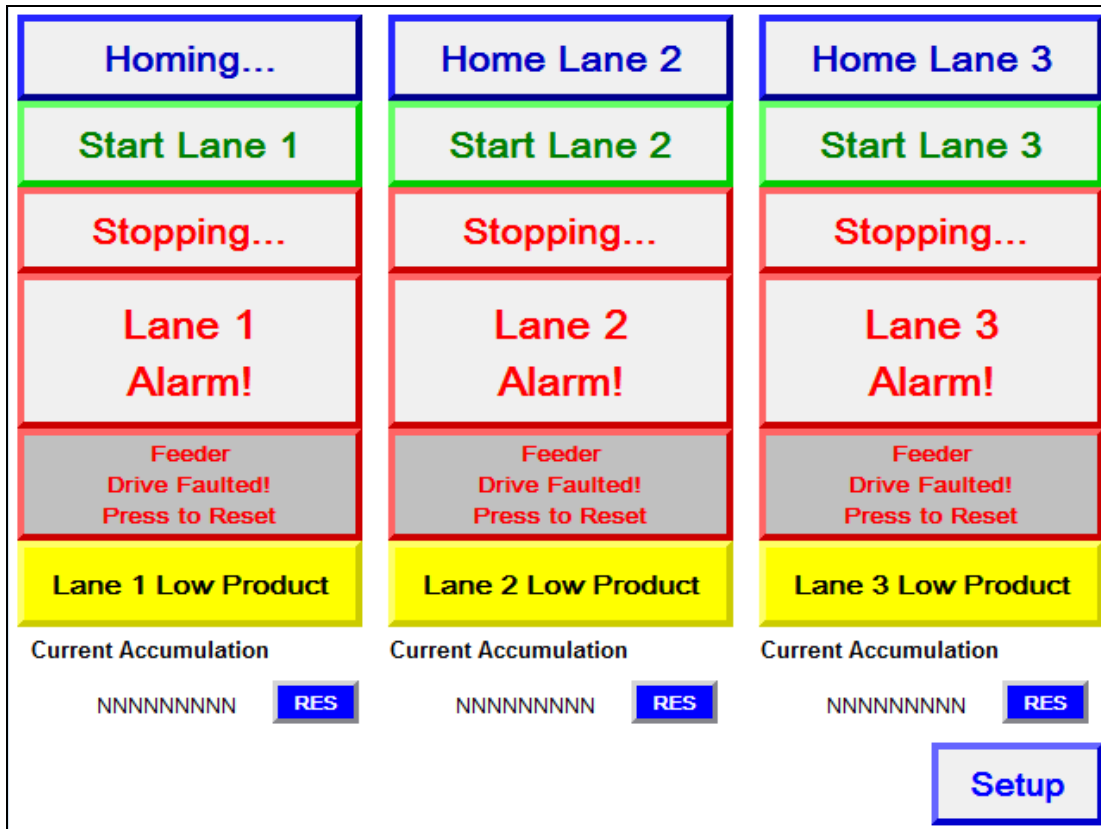
Next, toggle the pneumatic switch to the up position. This will disengage the idler roller and lift it high enough to insert the leading edge of the product. If the roller does not move, check if the main air is on and all covers / doors are closed.



Insert the product to a position just above the drive rollers so that when the idler roller is re-engaged, it will grab the material. A good position is shown below in blue. Once in this position, toggle the pneumatic switch and the idler roller will engage the product with the drive roller. The machine is now ready to run via the HMI controls. Pressing the home lane button on the HMI will automatically pull the material edge to the cut point of the knife. The unit is now primed and ready to run.



HMI Controls



Home Screen

Shown above is the main home screen that is displayed upon machine power up. This is the screen used to start and stop the machine and displays messages. (Not all labels/banners will be visible at all times. Some will only become active when related conditions exist)

On the top of the screen, the Home Lane button can be found. Pressing the home button will automatically prime material in the feeder to the blade edge and the conveyor will index to ensure it is in the proper position to receive a cut test strip. The feeder will only home if the material is not blocking the auto-feed sensor behind the knife. An example of this would be when the material is being loaded into the machine. The Home Lane button will only be visible when the conveyor position is lost such as in an e-stop condition or when material is not present over the auto-feed sensor.

Shown in green above is the Start Lane button. Each lane has its own start button and this is the primary button used to start each lane. Like the home button, this button is only visible when the lane is properly homed and ready to run. Also, when the lane is started, the button will become invisible and the stop button will appear.

The red stop button, indicated by the stopping word in the home screen, is the primary method to end a cycle and stop the lane. When depressed, the stop button will change messages to display “stopping”, which indicates the machine will stop once the current cycle is complete. The machine will always complete the current cycle before stopping to prevent any issues when restarting.

The fourth row of the home screen is where an alert for an alarm condition will be displayed. Anytime a fault is detected, the button will become visible and the lane will stop.

Any time the feeder is overloaded or jammed, the feeder motor will protect itself and go into fault mode. If the motor is faulted, the fault message will be displayed. Check the feeder for any potential problems or jams, and if all clear, press the fault button to reset the drive.

Below the fault button is the Lane Low Product banner. Whenever the low product sensor no longer sees material, the banner will pop up to alert the operator that a roll change will be shortly required.

The final item on the home screen is the current accumulation counter. This is a resettable counter that can be used to count batches or other periodic count requirements.

In the lower right hand corner is the Setup button that will bring the operator to the next screen.



Lane Selection for Setup

The second screen is a simple screen used to select a lane for advanced setup parameters. Pressing each corresponding button will take the operator to the advanced settings for that lane. Pressing the Home button will return the operator to the home screen.

Lane 1 Feeder Controls

Roller Diameter #.### mm	Feeder Forward Jog
Homing Offset Length ## mm	
Feed Length ## mm	Feeder Reverse Jog
Feed Jog Speed ##### P/S	
Feed Velocity ##### P/S	Feeder Drive Faulted! Press to Reset
Short Reject Piece Length ## mm	

Back

Home

Next

Lane 2

Lane 3

Feeder Controls

The screen above is the advanced setup screen where all of the feeder parameters can be adjusted. Also on this screen are buttons allowing the operator to jog the feeder roller forward and reverse for diagnostics or other purposes. The reset button for a feeder fault is present on this screen for convenience.

Parameter Descriptions:

Roller Diameter: In order to accurately feed the proper product cut length, the roller diameter is necessary to be a known value. This value also helps adjust the cut length if the roller becomes worn and has a reduced diameter. It is best to measure the diameter of the roller as accurately as possible to the third decimal place.

Homing Offset Length: This parameter is the distance from where the auto-feed sensor first detects the leading edge of product while priming the feeder to the edge of the knife. In order for the first piece cut length to be accurate, this offset must properly feed the material to the exact cut point of the knife.

Feed Length: The feed length is the parameter entered that defines the cut length of the product in millimeters.

Feed Jog Speed: This parameter is used to control the rate for the initial jog portion of the homing sequence. It will also be the speed of the rollers while the jog forward or jog reverse buttons are being pressed. Increasing this value will make the feeder faster and reducing the value will reduce the speed.

Feed Velocity: This parameter is similar to the feed jog speed, but this parameter relates to the feeder speed during product processing under running conditions. Since the cut length is short, it is not necessary to make this value high to increase output. Conversely, maintaining a slower speed will help ensure an accurate feed distance as well as limit the possibility of material slippage in the rollers.

Short Reject Piece Length: The length in this parameter is used to define the length of cut for a reject when it is detected. When the reject camera detects a defect, the machine will cut the reject piece out in the length defined here and eject it out the side of the conveyor.

Pressing the Lane selection buttons on the bottom of the screen allows the operator to adjust the same parameters for each individual lane.

Lane 1 Knife Controls

Pinch Timer	#### ms	<div style="background-color: blue; color: white; padding: 10px; margin: 0 auto; width: 100px;">Manual Knife Cut</div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> Current Knife Accumulation NNNNNNNNN </div> <div style="background-color: blue; color: white; padding: 2px 5px;">RES</div> <div style="text-align: center;"> Total Knife Accumulation NNNNNNNNN </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> Current Accumulation Picked NNNNNNNNN </div> <div style="background-color: blue; color: white; padding: 2px 5px;">RES</div> <div style="text-align: center;"> Total Accumulation Picked NNNNNNNNN </div> </div>	
Knife Cut Timer	#### ms		
Clamp Down Timer	#### ms		
Knife Down Timer	### ms		
Clamp Return Time	#### ms		

Back

Home

Next

Lane 2

Lane 3

Knife Controls

Pinch Timer: This parameter is the first part of the cut sequence. This timer is the time allotted for the pinch cylinder to engage the material between the pinch clamp and the movable cutting blade.

Knife Cut Timer: Once the Pinch Timer expires, the knife cylinders will begin to actuate for the amount of time indicated in this parameter. This allows the knife to begin the cutting process before the Clamp begins to actuate.

Clamp Down Timer: Once the Knife Cut Timer expires, the clamp down timer will start and maintain pressure for the duration of this timer. This timer should be set to a value higher than the knife down timer to ensure that the product is captured while the cutting blade returns to home.

Knife Down Timer: After the Knife Cut Timer expires and allows the clamp to actuate, the knife down timer takes over control of the knife and allows the cut to be fully completed as well as for the clamp to fully capture the cut part.

Clamp Return Time: When the clamp down timer expires, the clamp will begin to retract to its home position. This timer dictates how much time the clamp will be given to clear for the upcoming conveyor

move. If this timer is set too low, the conveyor may start to index and crash into the back of the clamp. Use caution when adjusting this timer to avoid damage to parts.

Lane 1 Conveyor Controls

Conveyor Speed	#####	P/S
Conveyor Acceleration	#####	kHz/s
Conveyor Deceleration	#####	kHz/s
Conveyor Offset Length	##	mm

Conveyor Forward Jog

Conveyor Reverse Jog

No Conveyor Motor Torque!

Conveyor Drive Faulted!
Press to Reset

Back

Home

Next

Lane 2

Lane 3

Lane Conveyor Controls

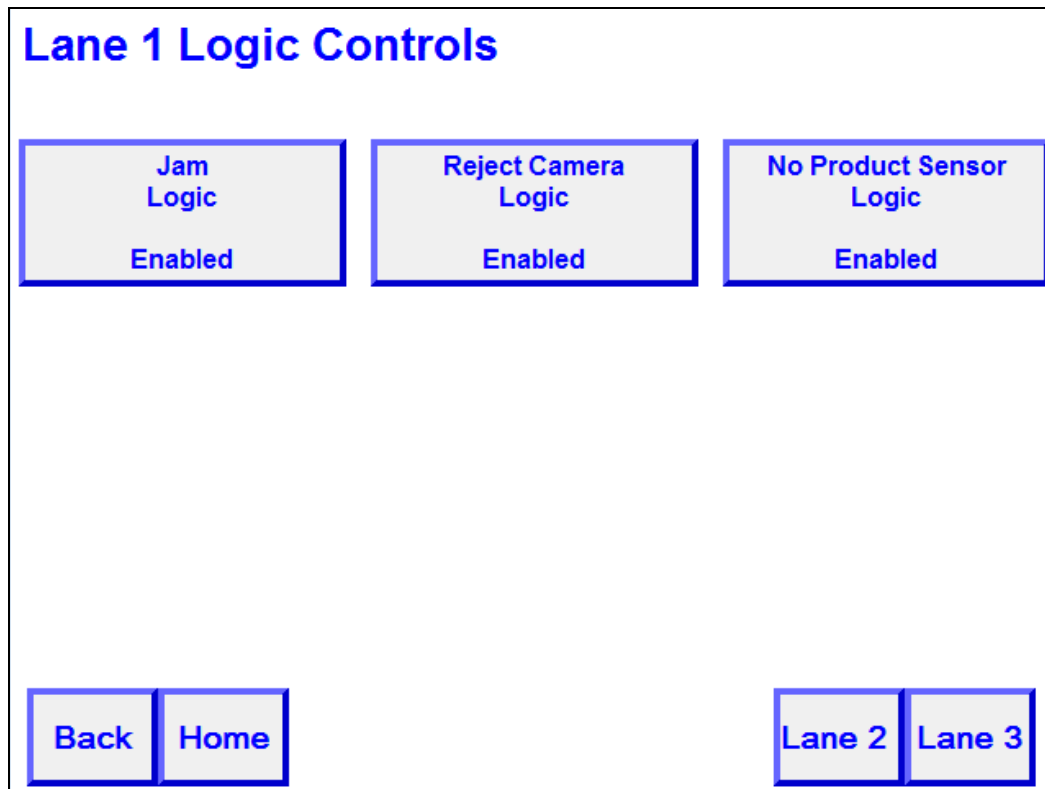
Conveyor Speed: This parameter controls the rate at which the conveyor motor rotates.

Conveyor Acceleration: This parameter is the acceleration rate at which the conveyor starts until it reaches the running conveyor speed.

Conveyor Deceleration: This parameter is the deceleration rate at which the conveyor goes from the running speed to zero.

Conveyor Offset Length: This parameter is the distance from when the conveyor lug sensor detects a pushing lug and continues to feed to the normal home position. Use caution when adjusting this offset. Going too far could cause the lug to be in the path of the cutting blade causing an impact. The position will also affect the short reject pusher clearance as well as the end of conveyor positioning.

Several buttons are also present on this screen including a conveyor forward jog, reverse jog, drive motor reset, and a button to disable the motor torque.



Lane Feature Control Menu

On the feature control menu, three buttons can be found. When the feature is functioning, the button will display “enabled”. Conversely, an inactive feature will display “disabled”.

The Jam logic feature controls the sensor located in front of the knife, over the conveyor. This sensor is inspecting the conveyor to ensure that a piece was placed on the conveyor each cycle. If the sensor does not detect the presence of a part, a jam arm will result.

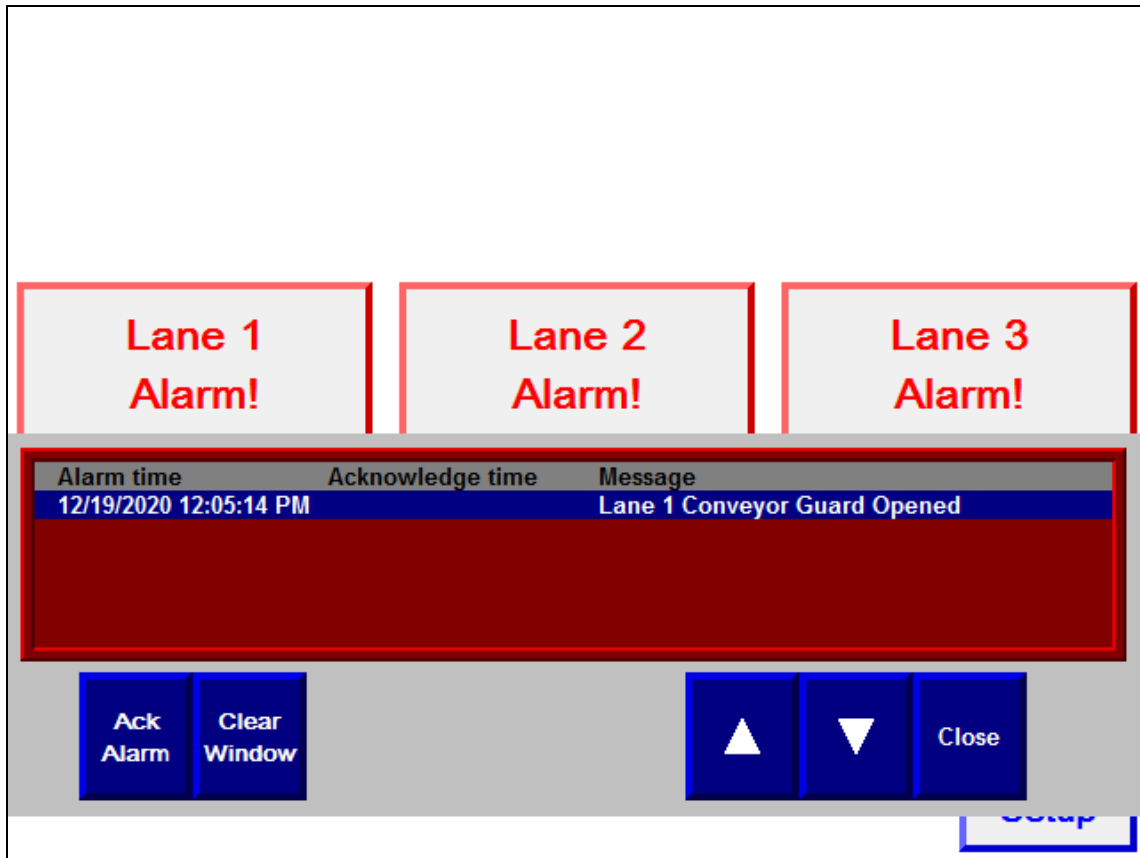
Reject Camera Logic is controlling the Keyence camera located inside the feeder unit. This unit is programmed separately via the manufacturer’s computer software. When enabled, the camera will scan the product web for marked defects. If any are found, the machine will reject the defective part via the reject system.

No Product Sensor logic is the function controlling the sensor that detects the presence of the product coming into the system. This sensor is located on the in-feed side of the splice station. When enabled, the sensor will alert the machine when the product spool has been exhausted.

Lane 1 Alarm!	Lane 2 Alarm!	Lane 3 Alarm!
Current Accumulation 2110	Current Accumulation 3597	Current Accumulation 3163
RES	RES	RES
Setup		

Main Alarm Screen

Above is the alarm message screen. Each column shows the message that will appear in each lane if an alarm condition is present. These messages and screen are integrated into the home screen so it is not a screen that can be scrolled to.

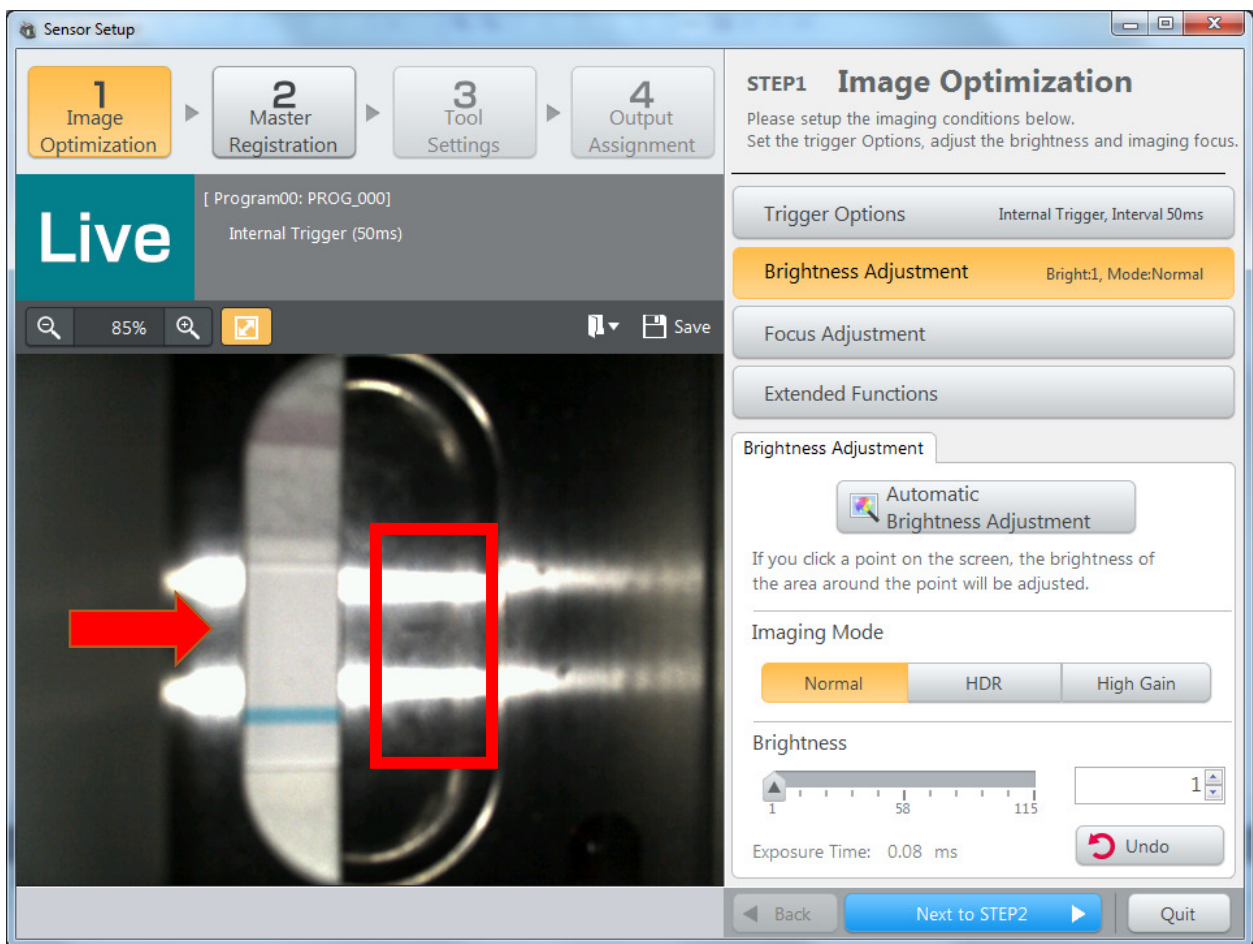


Alarm Log

Above is the alarm log that is displayed whenever an alarm is present. In order to restart the lane after an alarm condition, the alarm will first have to be acknowledged by pressing the "Ack Alarm" button followed by closing the log pop up box. To close the box, simply press the close icon. The log will keep track of the recent alarms but if desired, the list can be cleared by pressing the "Clear Window" icon.

Reject Camera

The reject camera is installed inside the feeder unit and it functions by detecting any printed mark on the material feeding into the knife assembly. If a mark indicating a reject is found, the machine will cut that section out of the web and reject the part. It is very important when setting up the camera using the Keyence software to create an inspection window in a position nearest the knife to ensure that the reject is properly fed to the knife via an offset. Shown below is an example highlighting where the inspection window should be located to ensure the reject is processed properly. The red arrow indicates the direction of flow. (Note: the material is shown with the leading edge being inserted into the machine) To set the camera: please follow all documentation provided by the manufacturer, Keyence Corp.



RUNNING CYCLES

Now that the parts of the machine are defined and an understanding of the machine exists, a pre-startup process can be implemented. First ensure all guards / doors are properly installed/closed. Power up the machine using the main power disconnect switch and wait for the system to boot up. While booting up, the operator can also ensure the units main air switch is switched on and the main air pressure is properly set to the range defined on the machine name plate. Once the HMI finishes booting up and assuming the machine has been loaded as per the instructions in a previous section, the machine is now ready to start.

The HMI is designed intuitively where on the main screen, the only visible buttons will be those that should be pressed at that time. For instance, if the machine has no material present in front of the rollers in the feeder, the start button will not be present and the homing button will be visible.

With the material loaded into the rollers, first press the home lane button. This will automatically index the material to the knife edge thereby priming the feeder. If the conveyor position is not in the “zero” home position, the conveyor will also index to ensure it is in a position ready to receive the cut part.

After homing is complete, the start button will appear. Press the start button and the machine will begin cycling. The machine will continue to cycle until the entire length of conveyor becomes primed with parts. At the end of the conveyor is a product sensor that will pause the process once a part is detected at the pick-up position. At this time, the machine will turn on a ready bit in the plc to communicate with the master machine. The machine will then wait until the pick and place has removed the part and returns a “Picked and clear” signal back to the strip cutting machine. The machine will continue to repeat the process until an error occurs or the machine has been stopped by the operator.

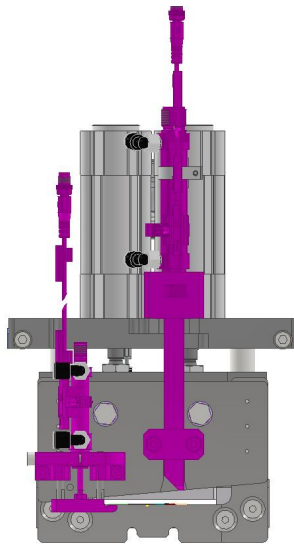
STOPPING THE MACHINE

There are three methods to stop the machine at any time:

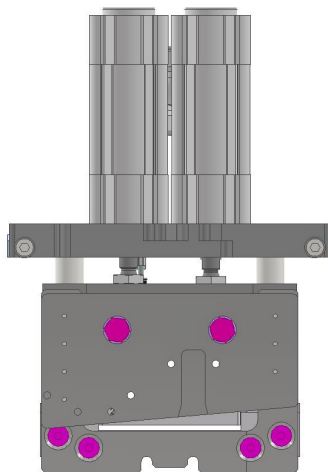
- Touch the stop icon on the display (Each lane is individually controlled)
- Activate an E-Stop
- Turn off the main power switch on the rear of the machine

BLADE CHANGES

1. Turn off main air supply and power
2. Lock out the air valve
3. Remove the lift off polycarbonate cover
4. Remove the two screws holding the knife cartridge to the feeder unit
5. Disconnect all air lines and sensor cables from knife assembly
6. Place assembly on a solid surface for safety



7. Remove the clamp and gripper assemblies highlighted above



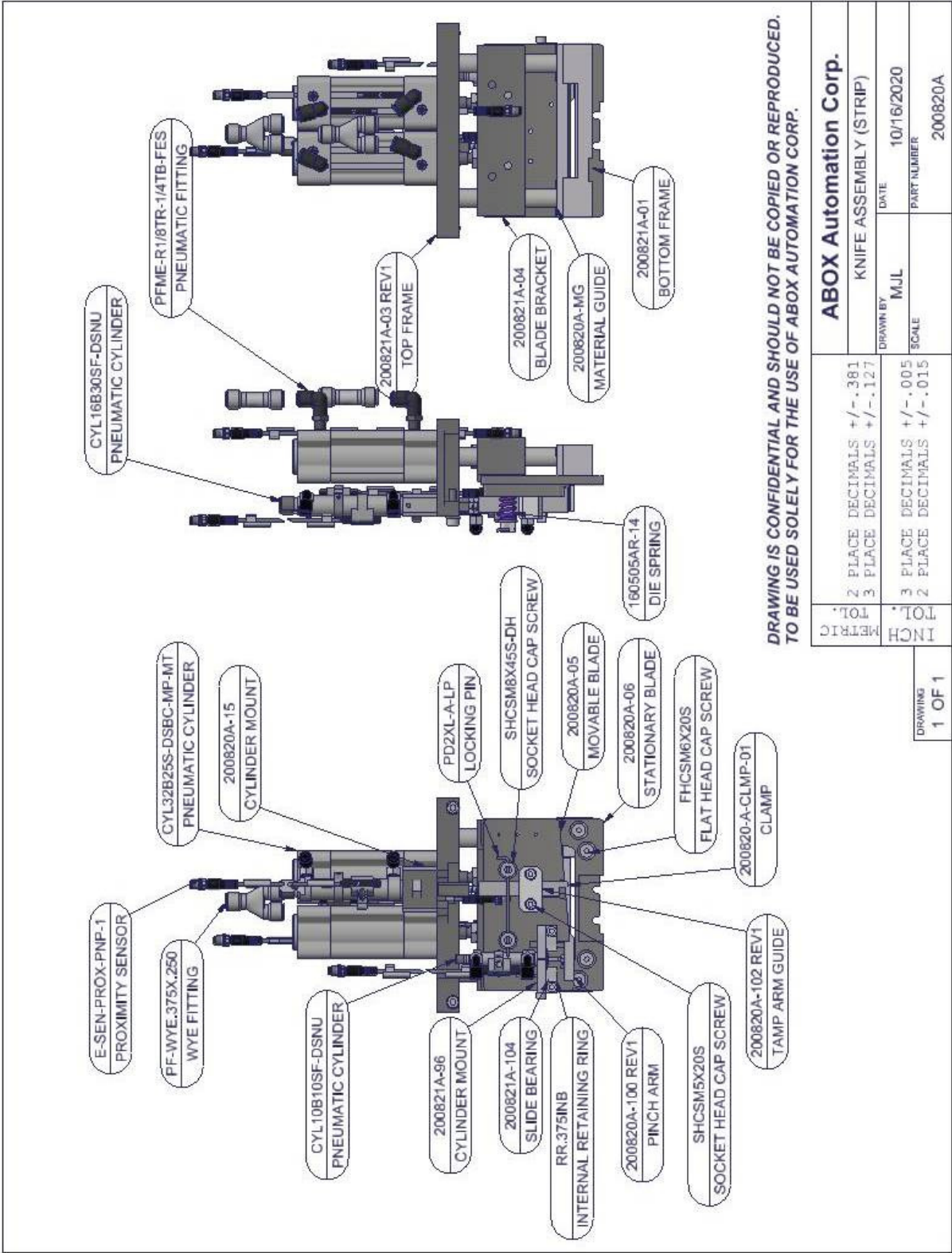
8. Remove the screws holding the blades and the blades themselves. The blades are also coupled magnetically to each other. To separate from each other, slide them apart.
9. With the blades removed, check the guide shafts, bearings, and cylinders for wear.
10. Install a new stationary blade (lower U-shaped blade) using the original hardware
11. Verify that the new movable blade (upper blade) has magnets installed and install using the original hardware and springs
12. Compress the springs by tightening the socket head screws by 3 full turns after the washer makes contact with the spring.
13. Try to manually cut your material. If the cut is complete, the blade setting is done. If the cut was incomplete, tighten the Socket Head screws more by ½ turn at a time and retest a cut. Do not over tighten the screws to prevent excessive blade wear.
14. Once a good cut is verified, re-install the locking pin on the screws to prevent loosening.
15. Re-install all removed components to the blade using the original hardware.
16. Check all screws and confirm that they are all snug
17. Reinsert/bolt the assembly back into the feeder unit and connect the air lines / sensor cables
18. Re-install the guard
19. Reconnect power and turn on main air supply
20. Run cycles

WARNING!

BLADE EDGES ARE EXTREMELY SHARP AND CAN CAUSE SERIOUS INJURY.

MAKE SURE GLOVES ARE WORN TO HELP PREVENT INJURIES.

Knife Bill of Materials



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ABOX Automation Corp.			
2 PLACE DECIMALS +/- .381		KNIFE ASSEMBLY (STRIP)	
3 PLACE DECIMALS +/- .127		DRAWN BY	DATE
3 PLACE DECIMALS +/- .005		MJL	10/16/2020
2 PLACE DECIMALS +/- .015		SCALE	PART NUMBER
			200820A

DRAWING
1 OF 1

Maintenance

Maintaining the machine primarily consists of keeping the unit clean from all glue build up, especially surrounding the components on or near the cutting assembly. Any glue buildup should be removed using a razor blade to fully remove all residue. Failing to remove any buildup could result in inconsistent placement of the test strip onto the conveyor. The easiest way to access the blades for cleaning is to fully remove the knife cartridge from the feeder unit. Otherwise, it will be difficult to implement a thorough cleaning. While cleaning the blades, they should also be inspected for any wear that would prevent a clean cut. It is recommended to have a complete knife assembly as a spare as well as spare blades for reduced down time.

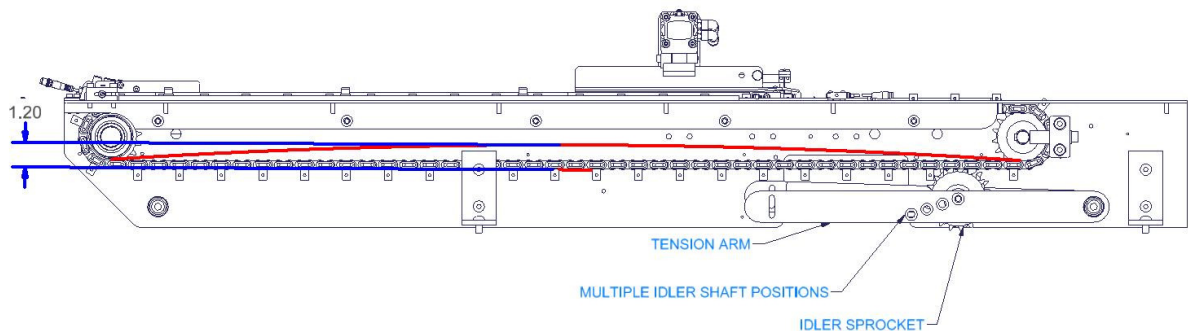
It is also important to keep all sensors clean and free of obstructions. If a sensor becomes blocked by a foreign object, it will not function properly. Blow off all sensors regularly using compressed air.

All of the bearings on the machine are either sealed or require no lubrication. Therefore, they do not require any service outside of keeping the unit clean.

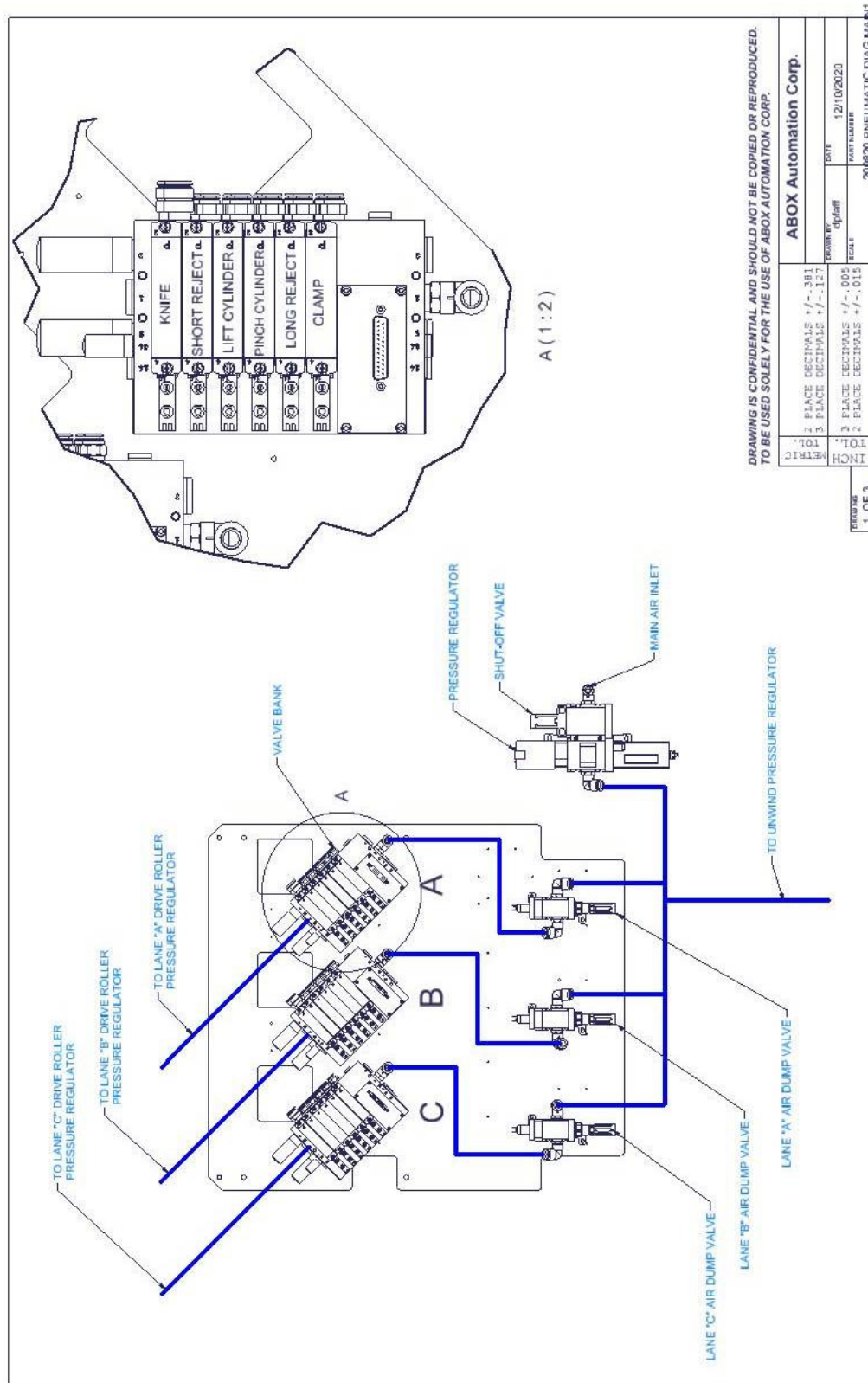
Once the machine is put into service a proper cleaning schedule can be developed based on usage and observed glue build-up.

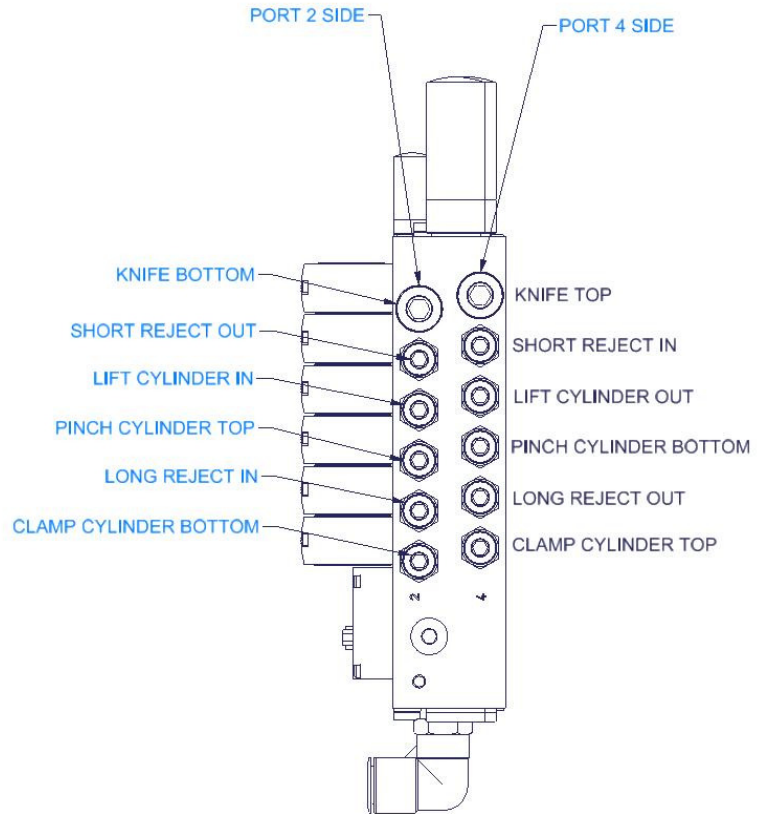
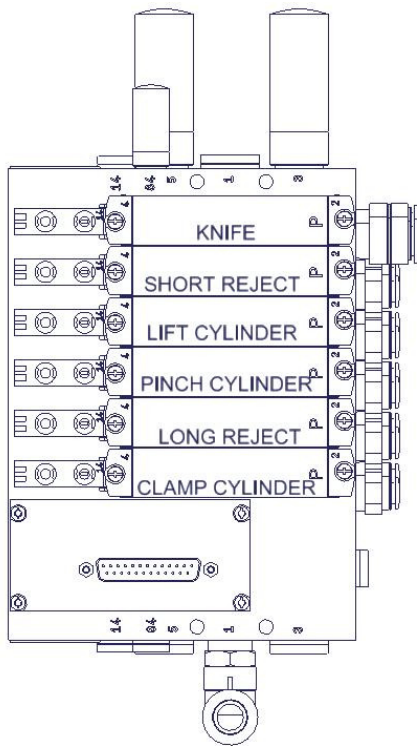
Conveyor Chain:

The conveyor chain is also a lube and oil free setup. However, the chain tension should be inspected periodically. To verify the correct tension, common practices should be observed using a tensioner gauge. The figure below shows how to measure the chain and the distance measured should be equal to about 1.2" of chain flex. To adjust the chain tension, the idler sprocket can be installed in different positions. Each position allows the tension arm to lift the chain (and tighten) to various degrees of tension. Please note that not all of the chains on each conveyor will set the same way. This is due to manufacturing variations in the chain and will result in different tension arm positions as well as idler sprocket locations.

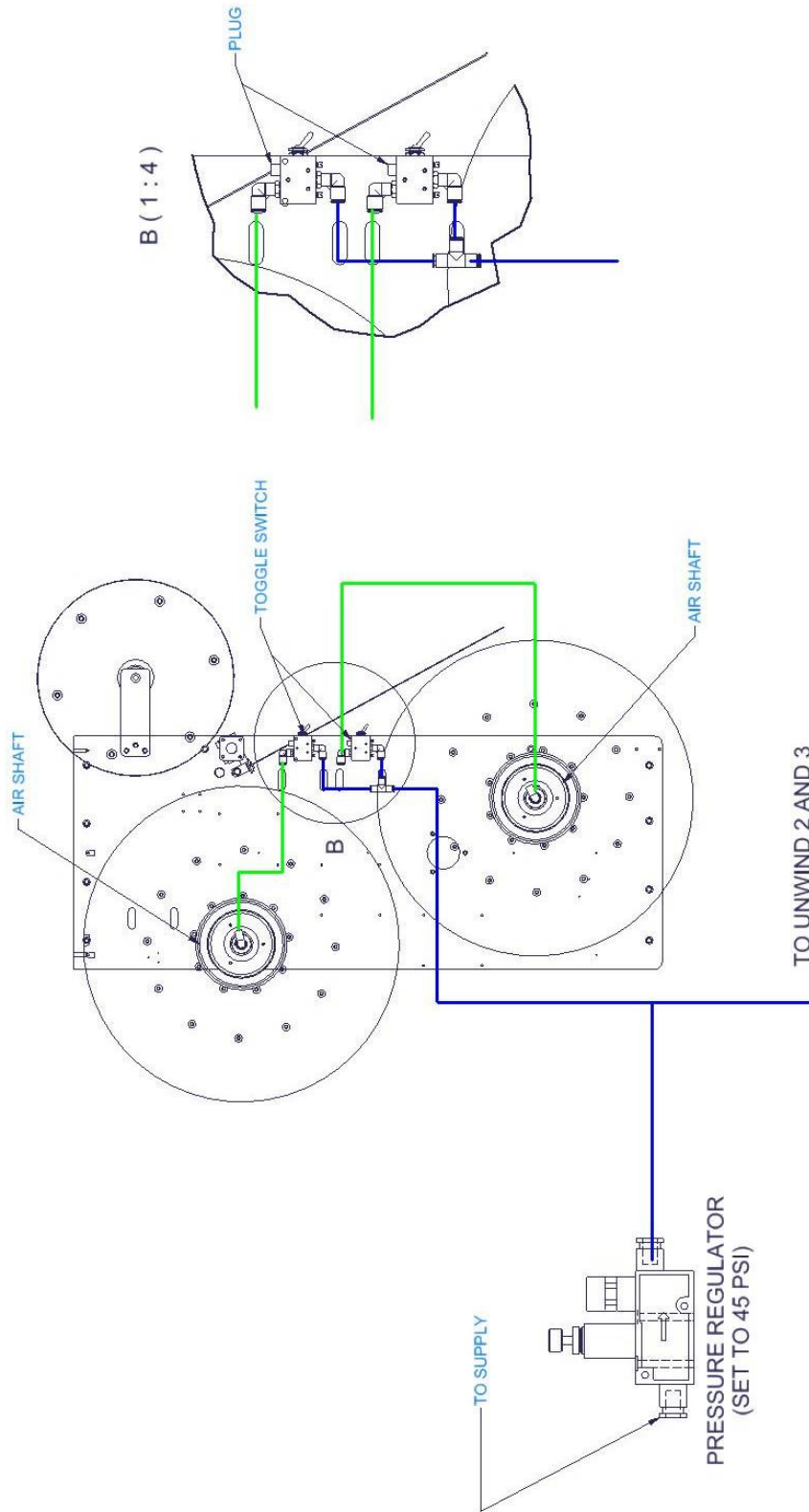


Pneumatic Diagrams

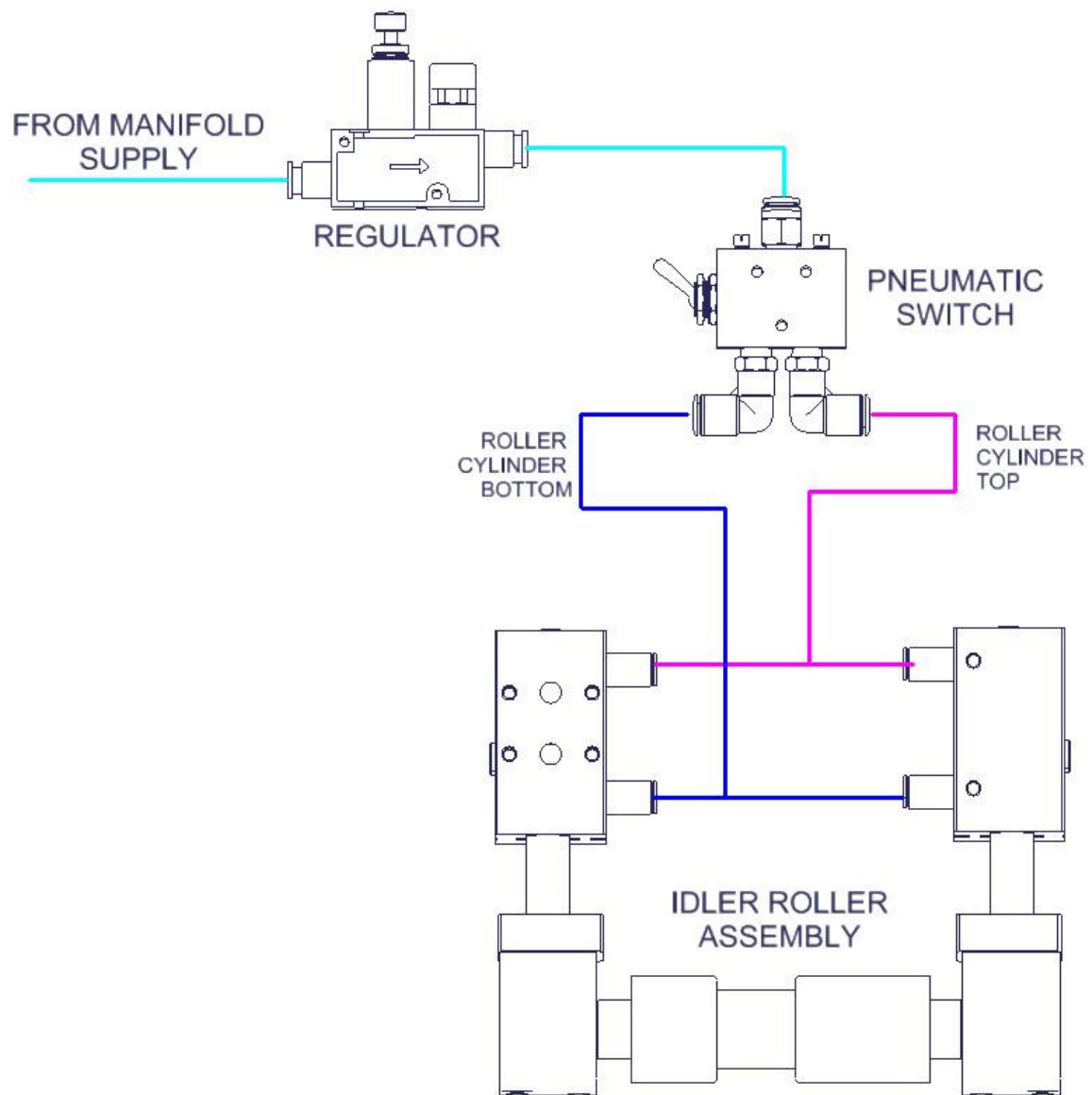




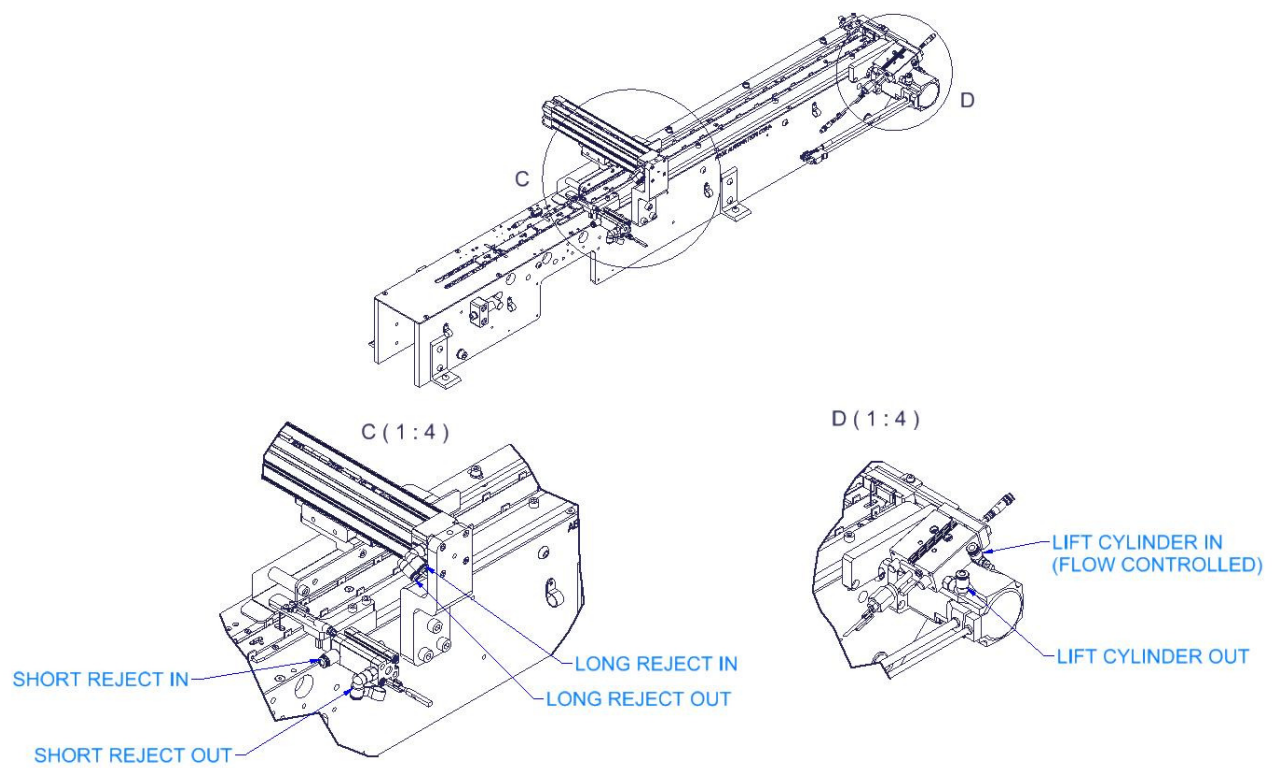
Valve Bank



Unwind Pneumatics

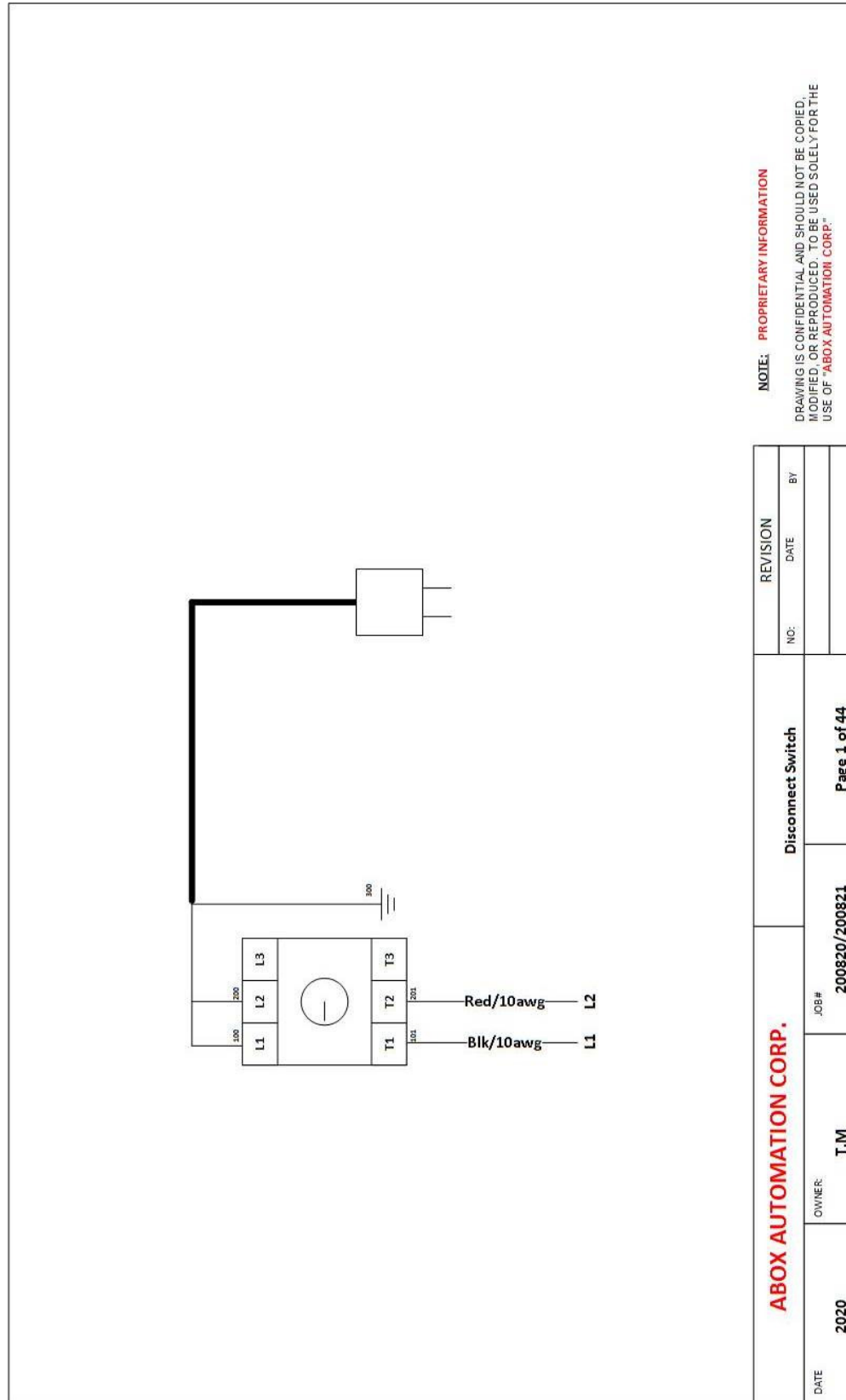


Feeder Pneumatics



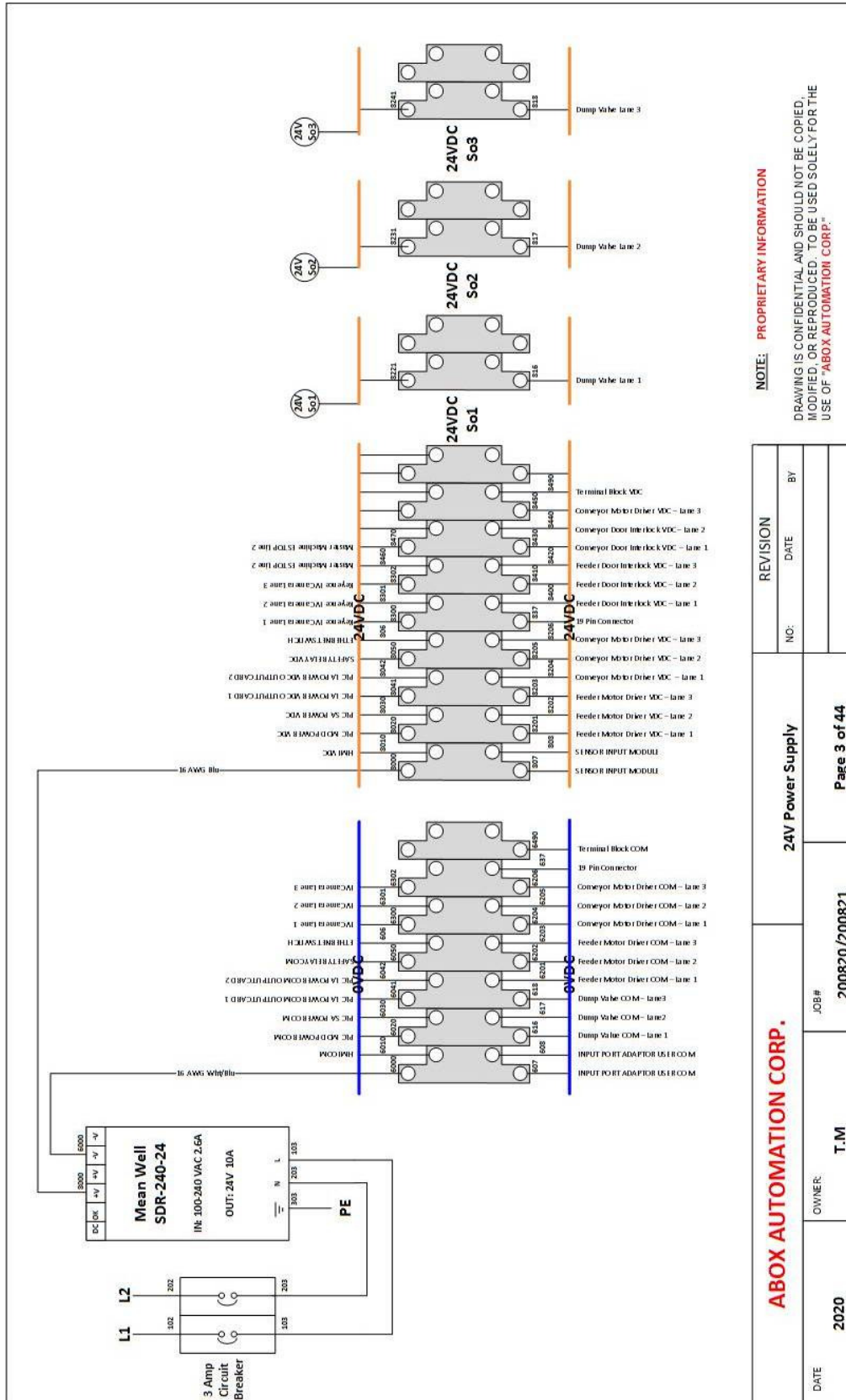
Conveyor Pneumatics

Wiring Diagrams





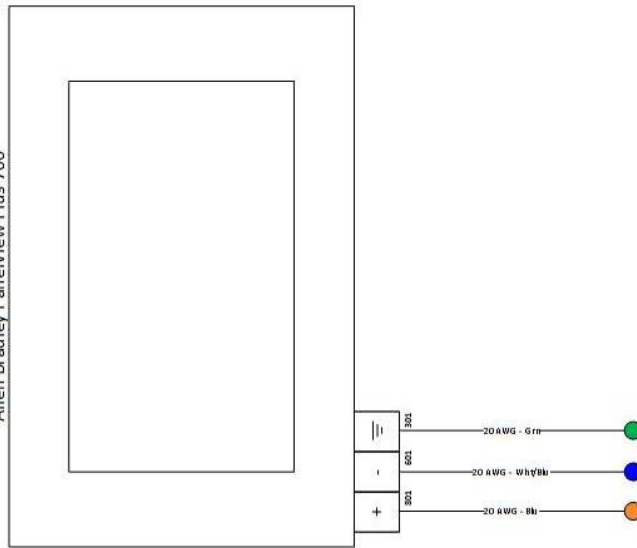
ABOX AUTOMATION CORP.				L1, L2, N		REVISION	
DATE	2020	OWNER	T.M	JOB#	200820/200821	NO:	DATE
						BY	
						Page 2 of 44	



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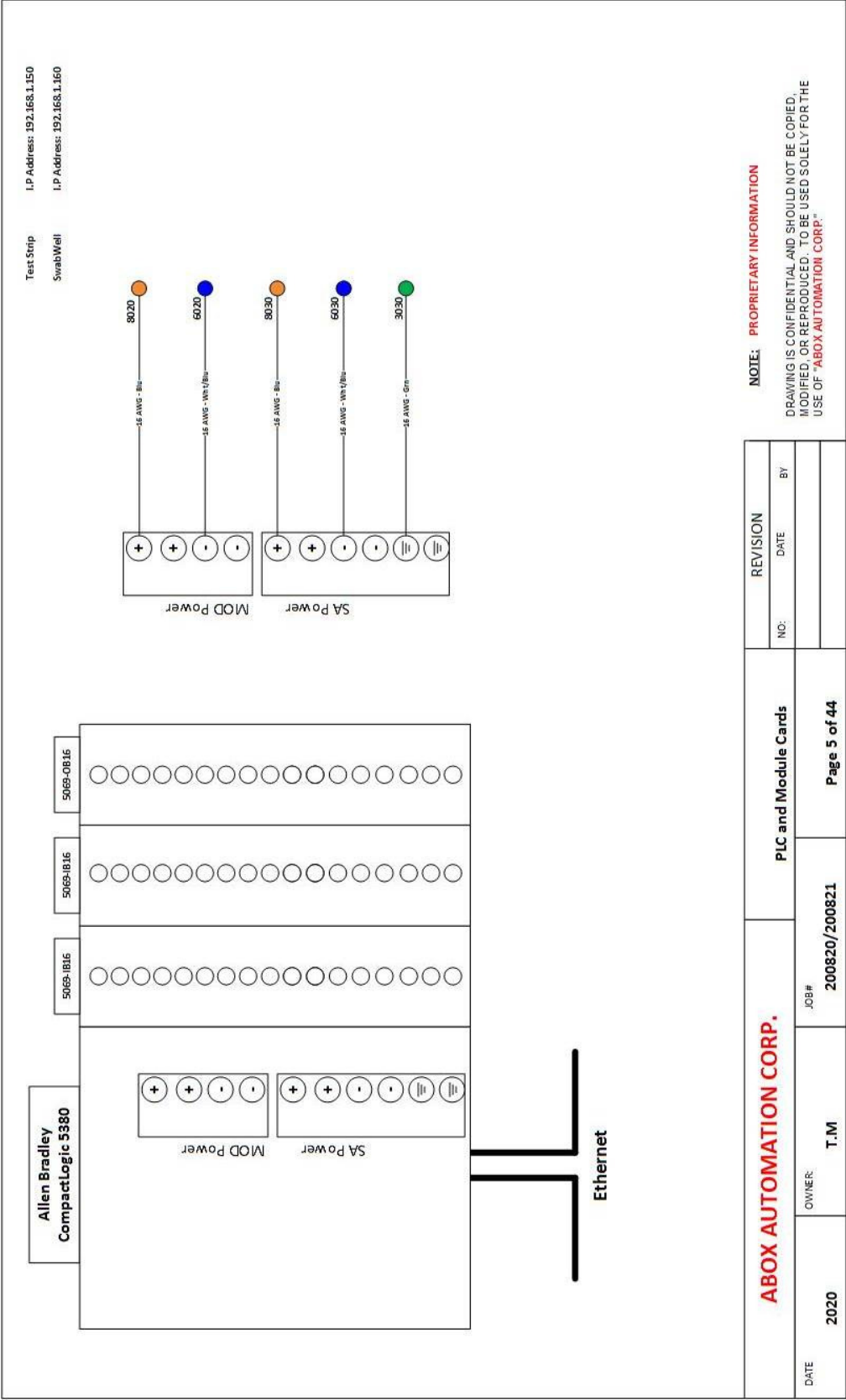
24V Power Supply		REVISION	
NO:	DATE	BY	
200820/200821		Page 3 of 44	
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OWNER:	T.M		
DATE	2020		

Allen Bradley PanelView Plus 700



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PLC and Module Cards

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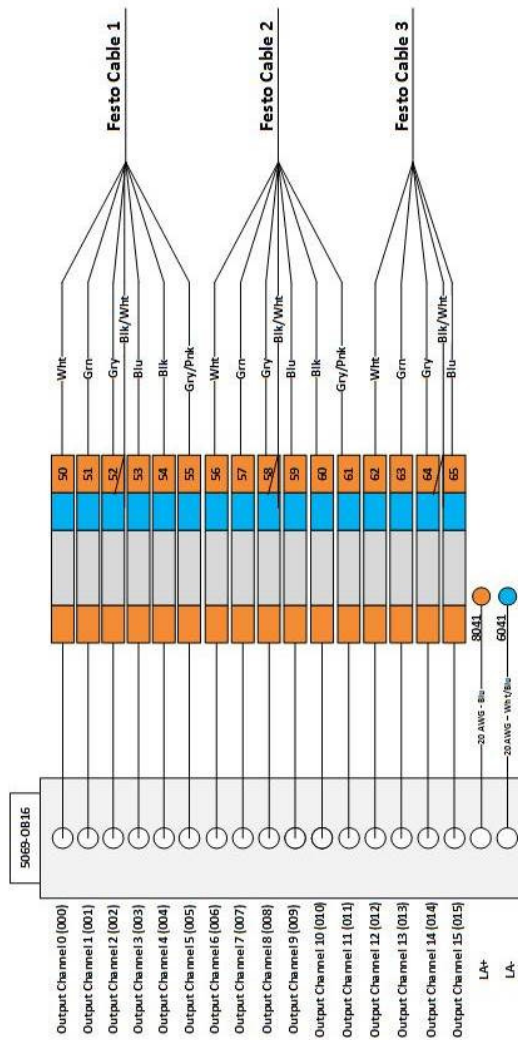
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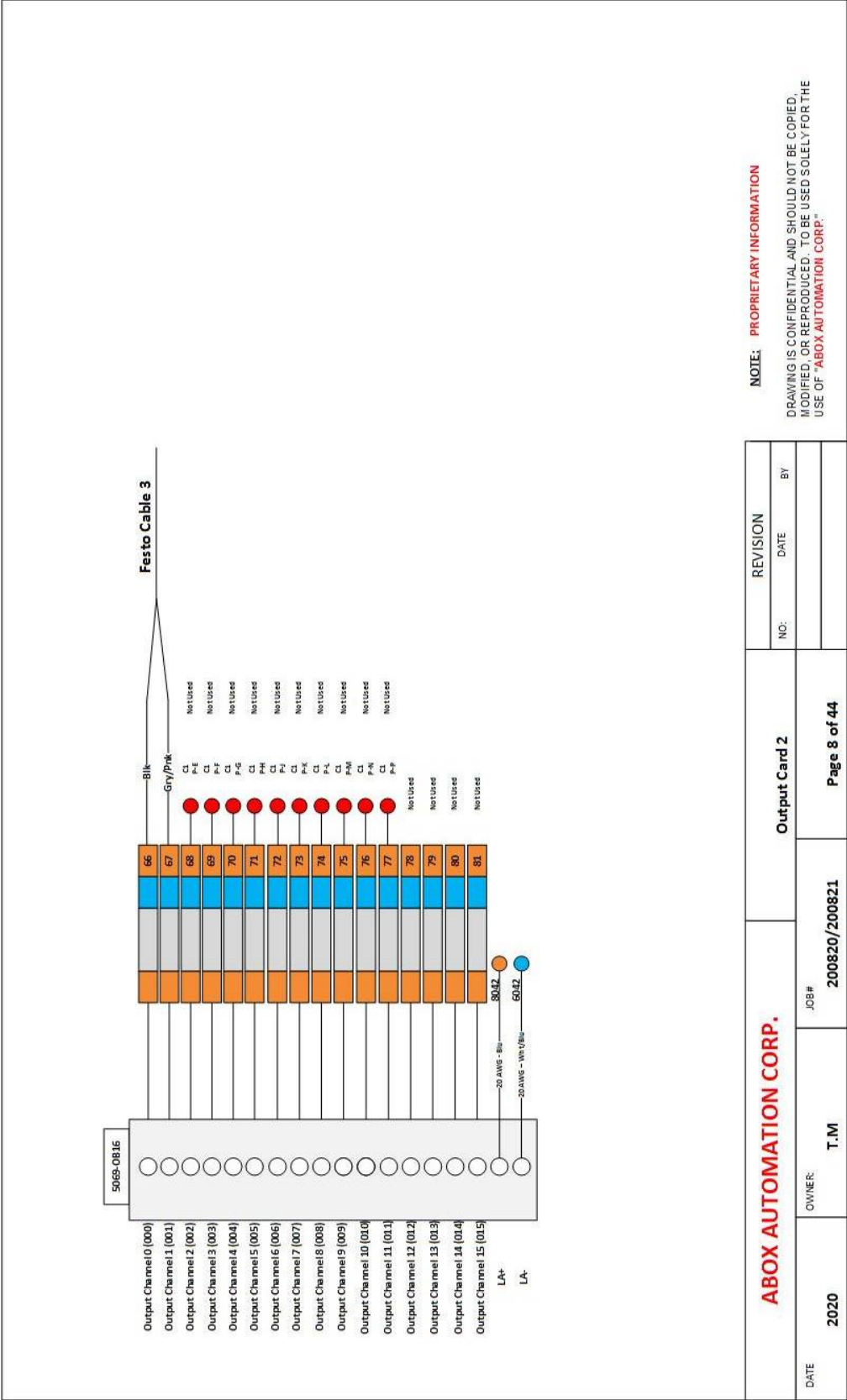


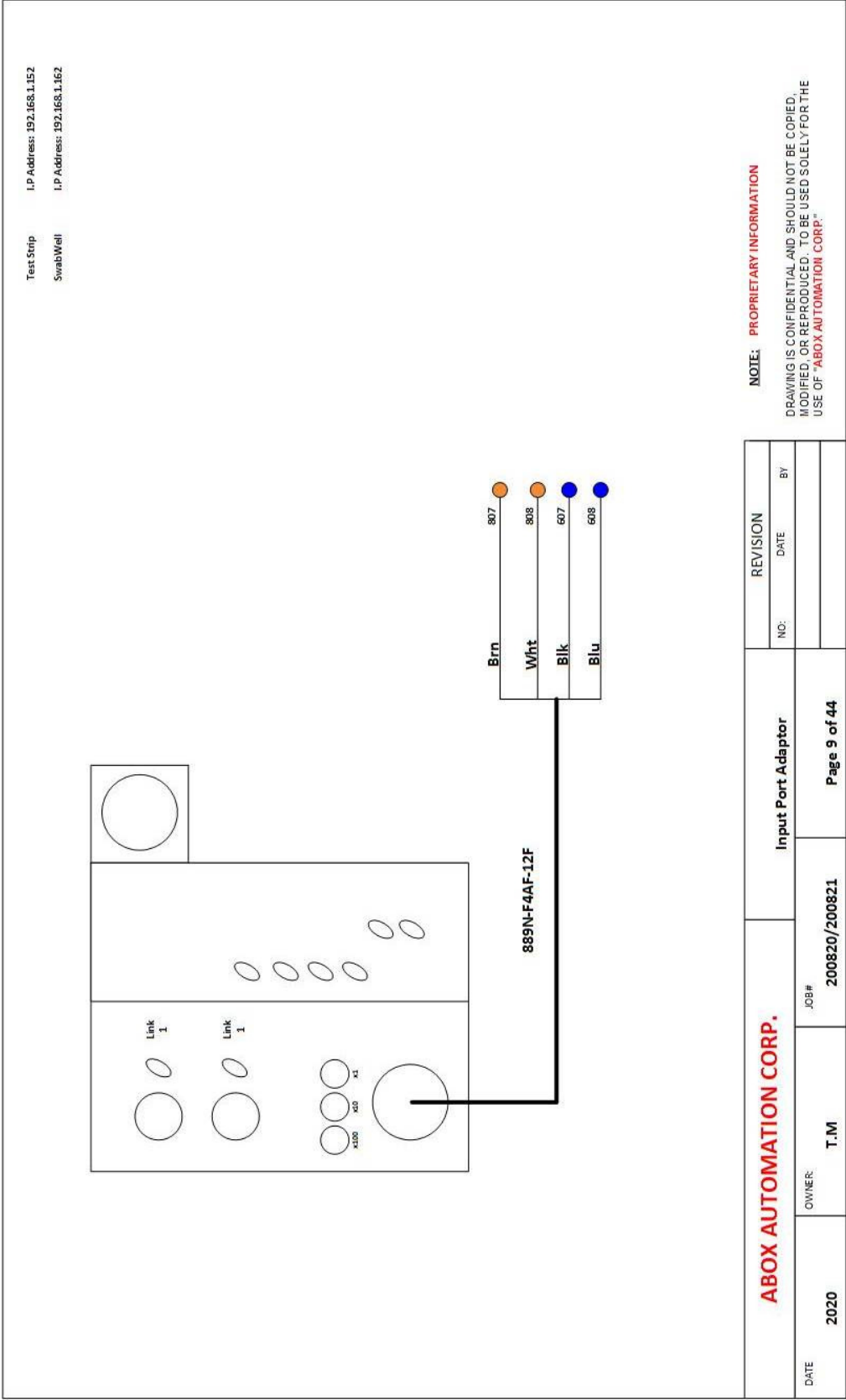
ABOX AUTOMATION CORP.						Input Card 1			
DATE 2020		OWNER: T.M		JOB # 200820/200821					
						Page 6 of 44			
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						DATE		BY	

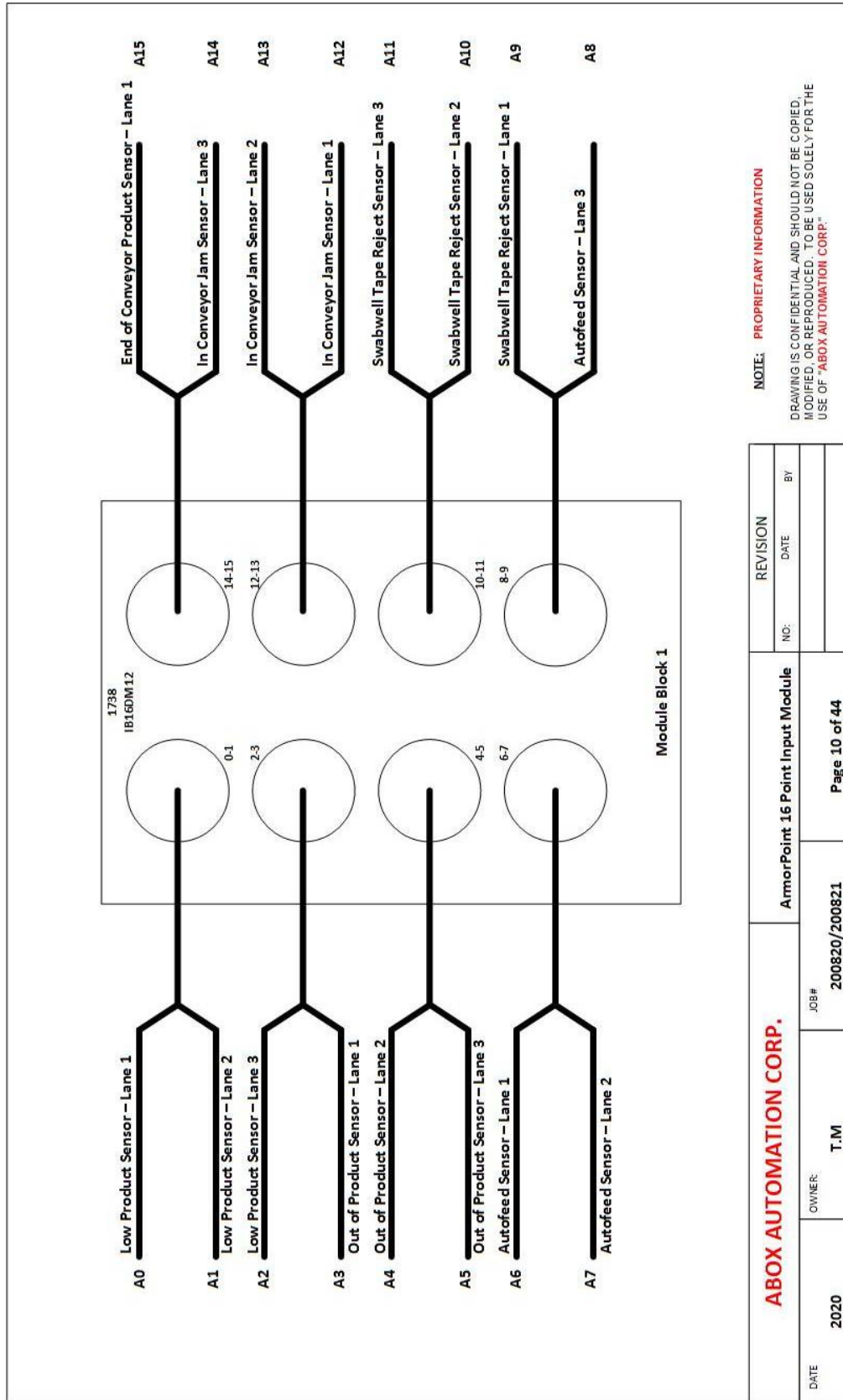


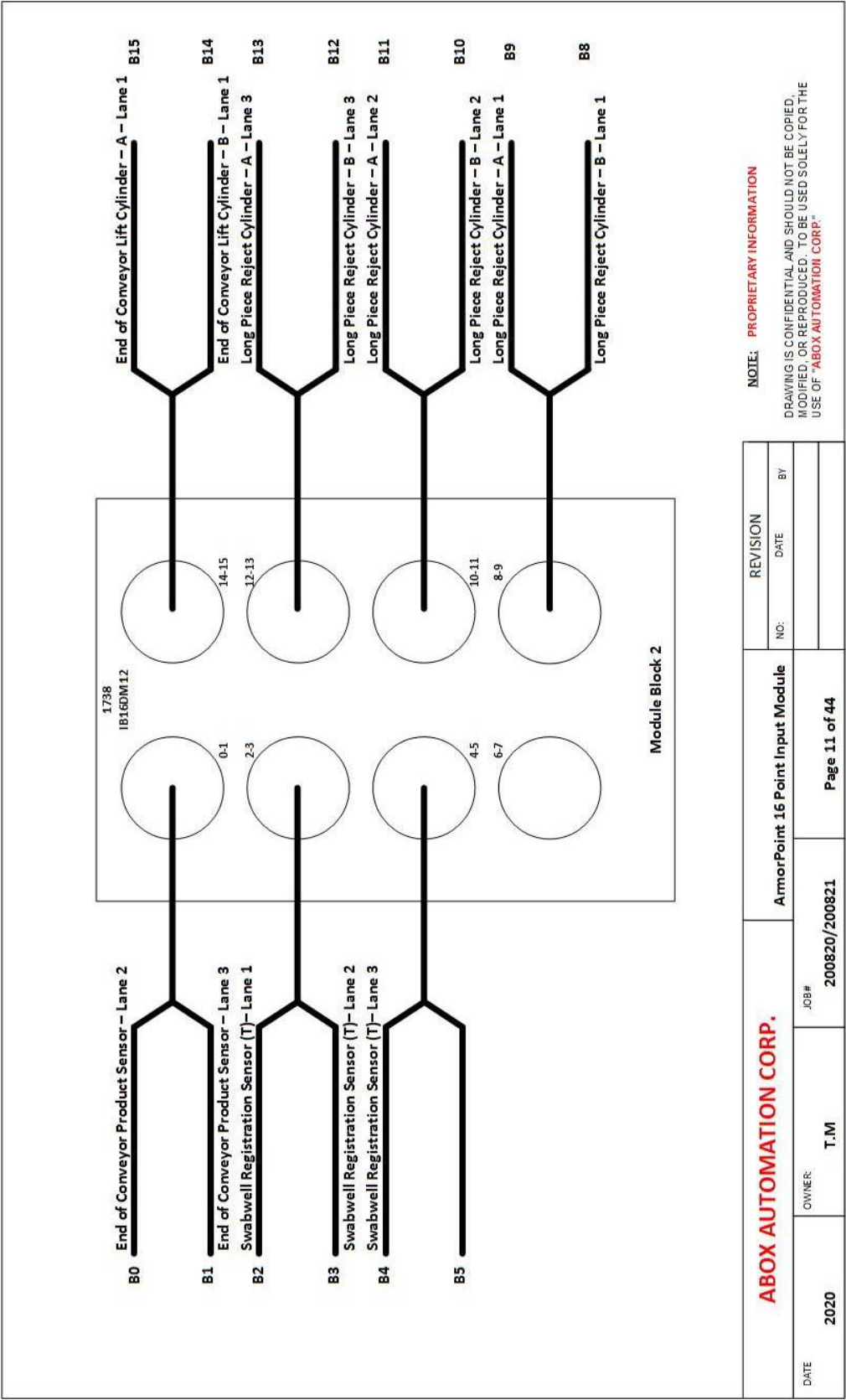
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DATE	OWNER	JOB#	NO.	BY
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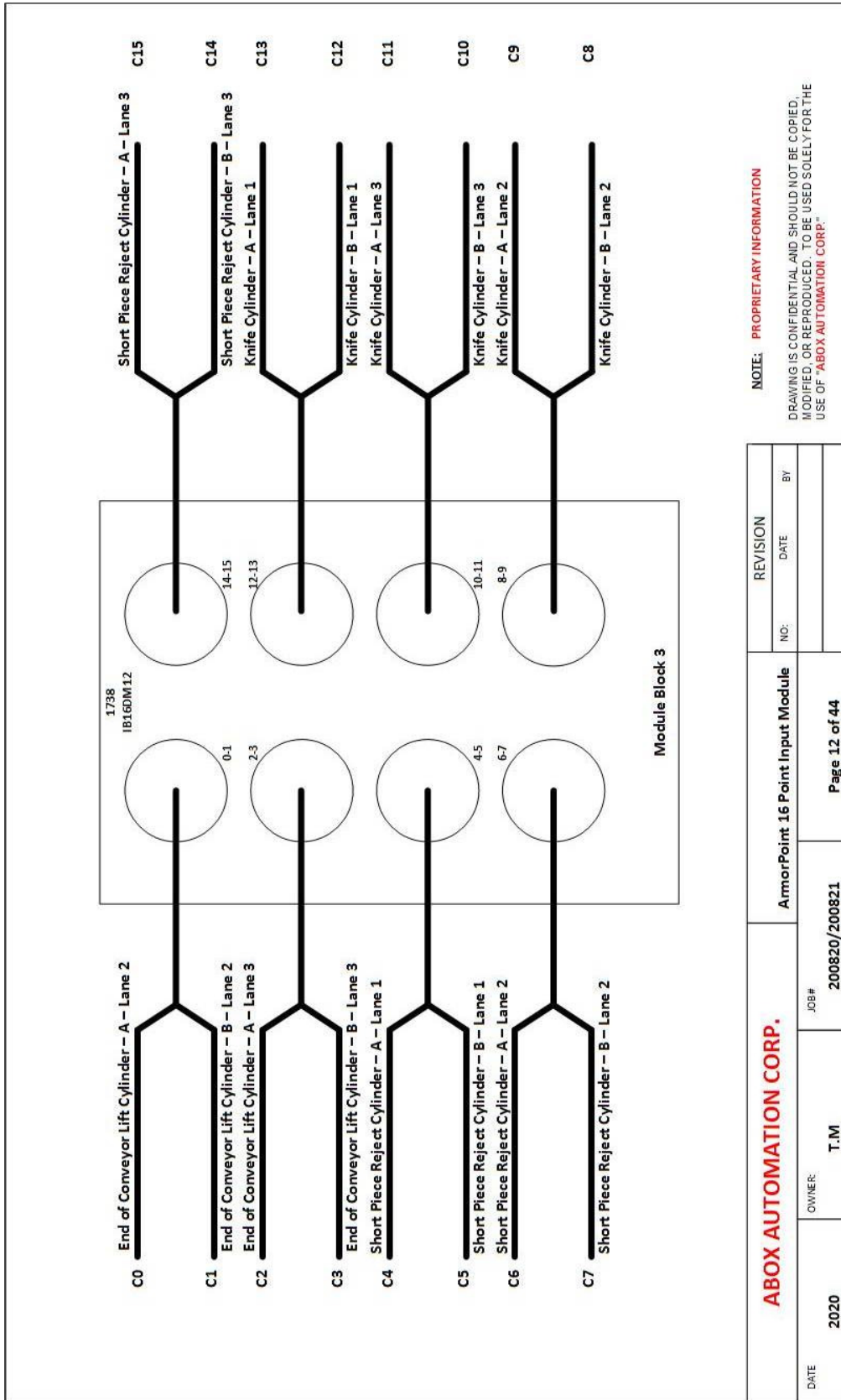




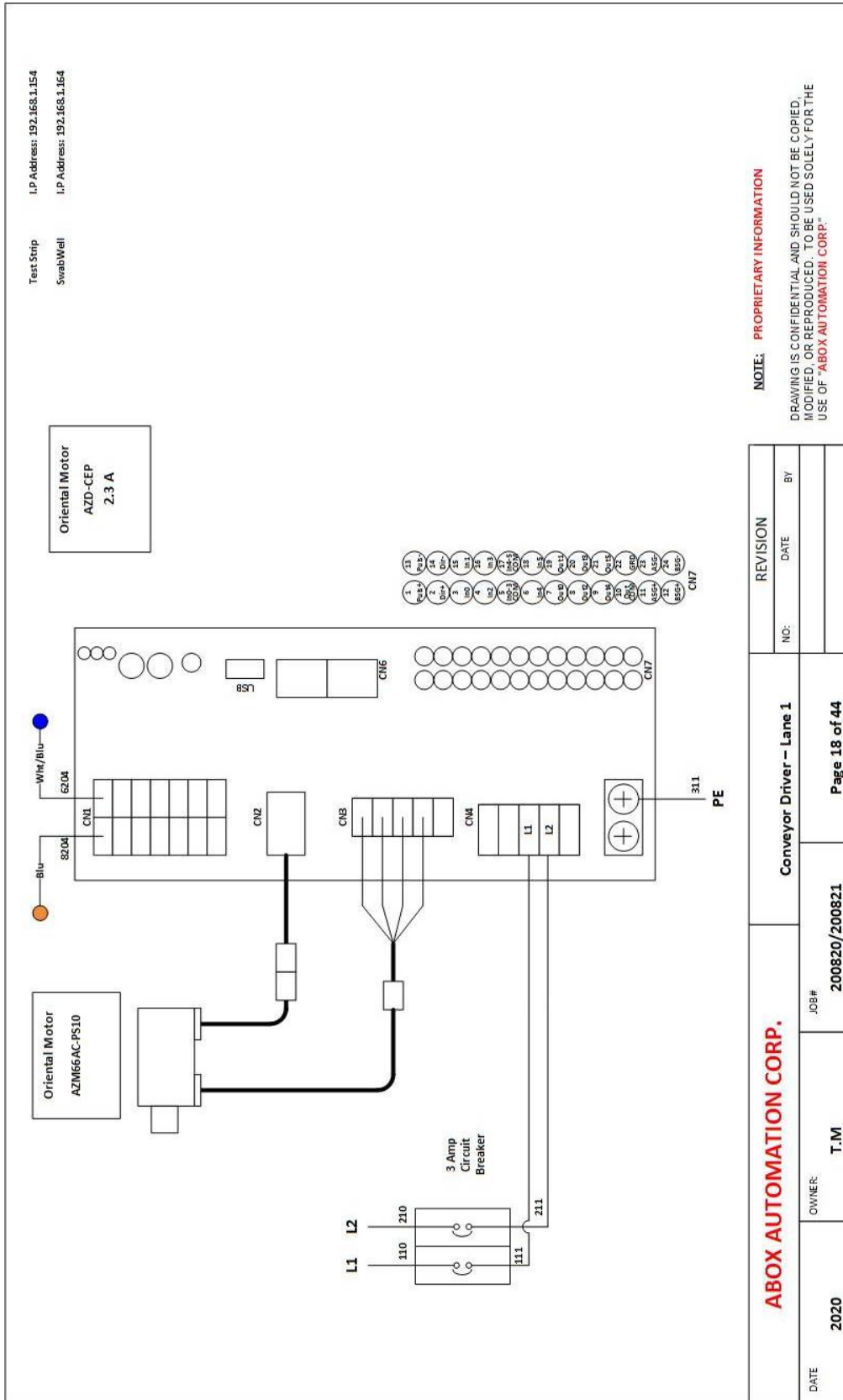
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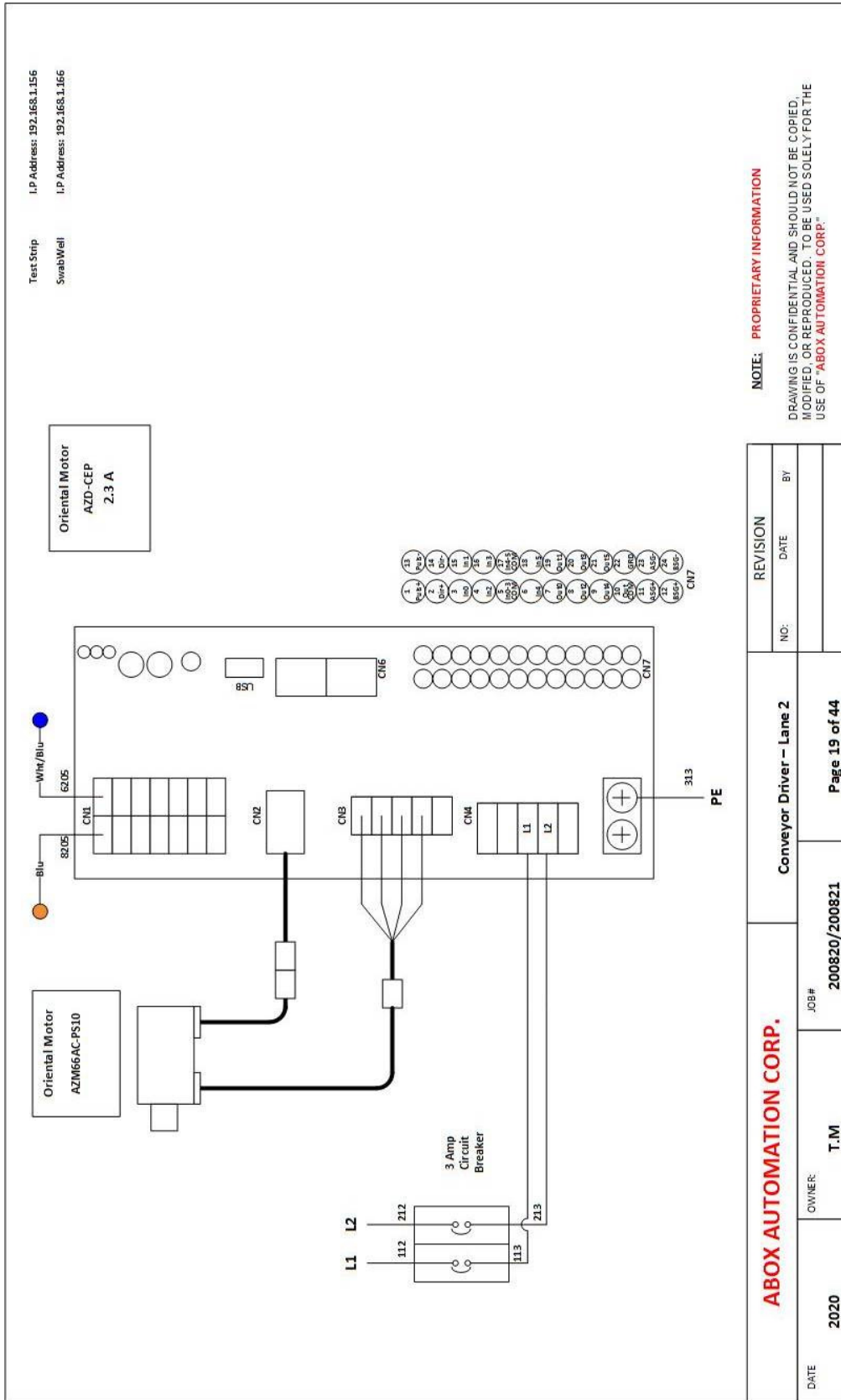
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<div>ABOX AUTOMATION CORP.</div>									<div>NOTE: PROPRIETARY INFORMATION</div>							
DATE		OWNER:	JOB#	ArmorPoint 16 Point Input Module		REVISION			NO:		DATE		BY			
2020		T.M	200820/200821	Page 14 of 44												



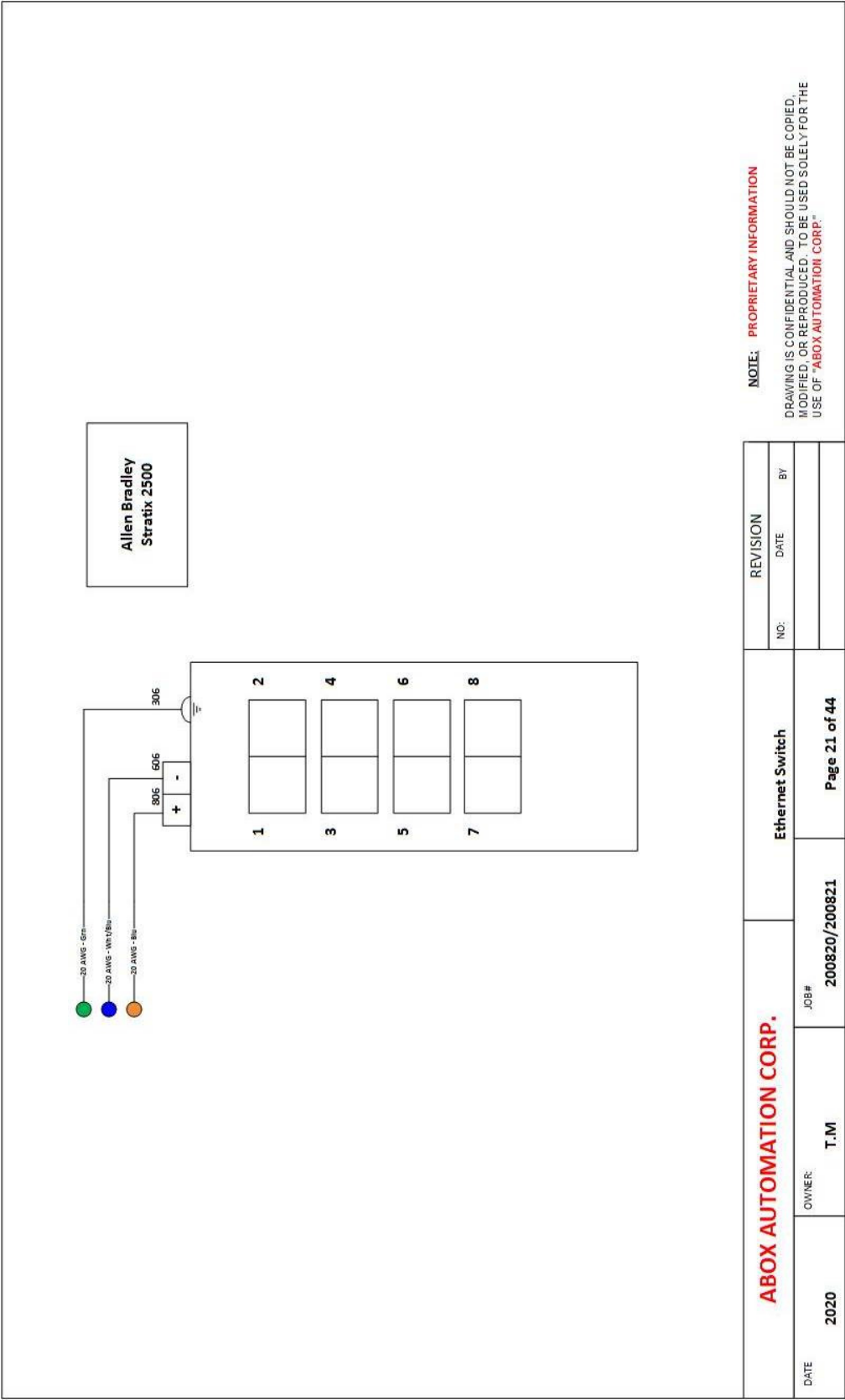
ABOX AUTOMATION CORP.		Conveyor Driver - Lane 1	
DATE	2020	JOB#	200820/200821
OWNER:	T.M	Page 18 of 44	

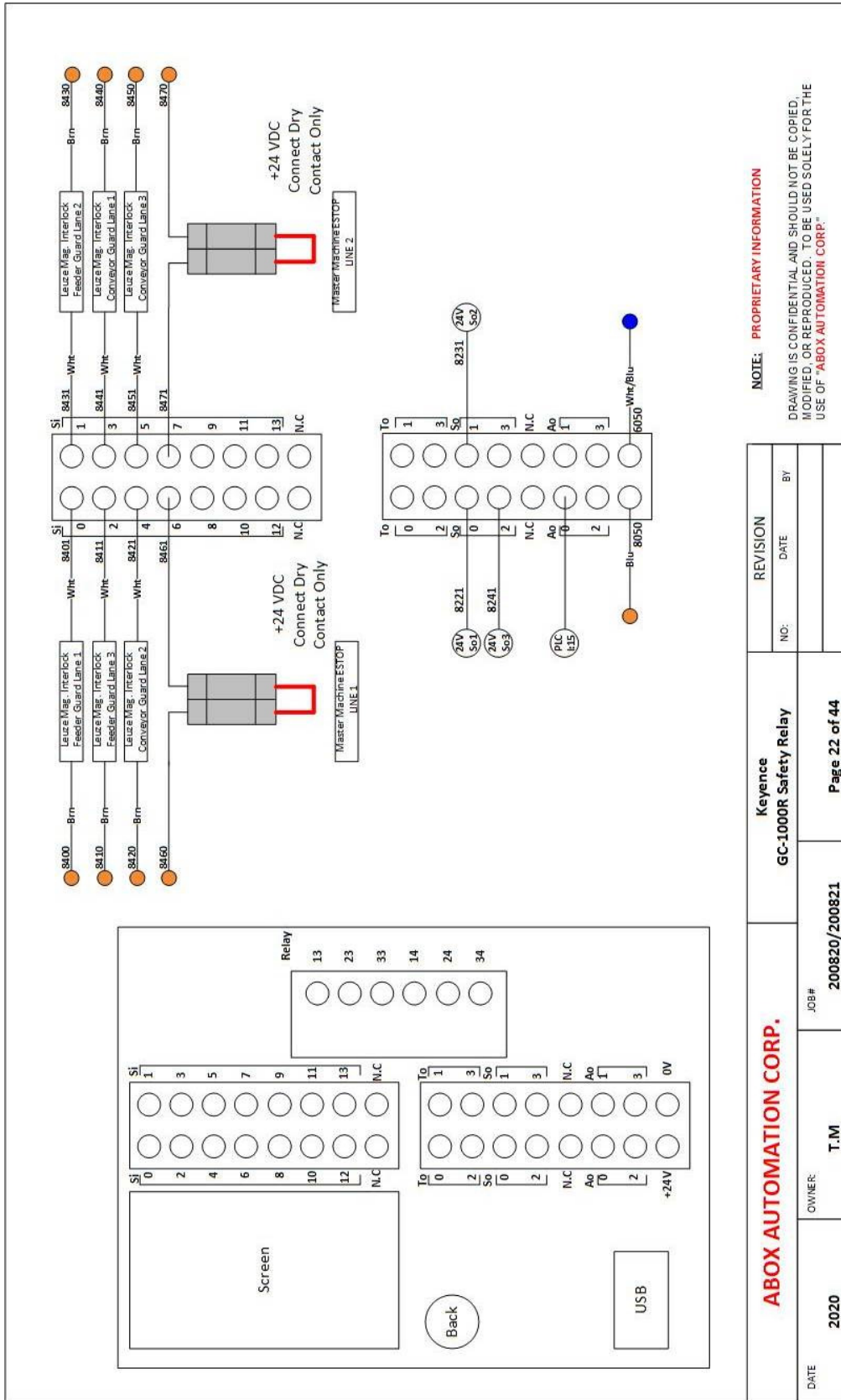
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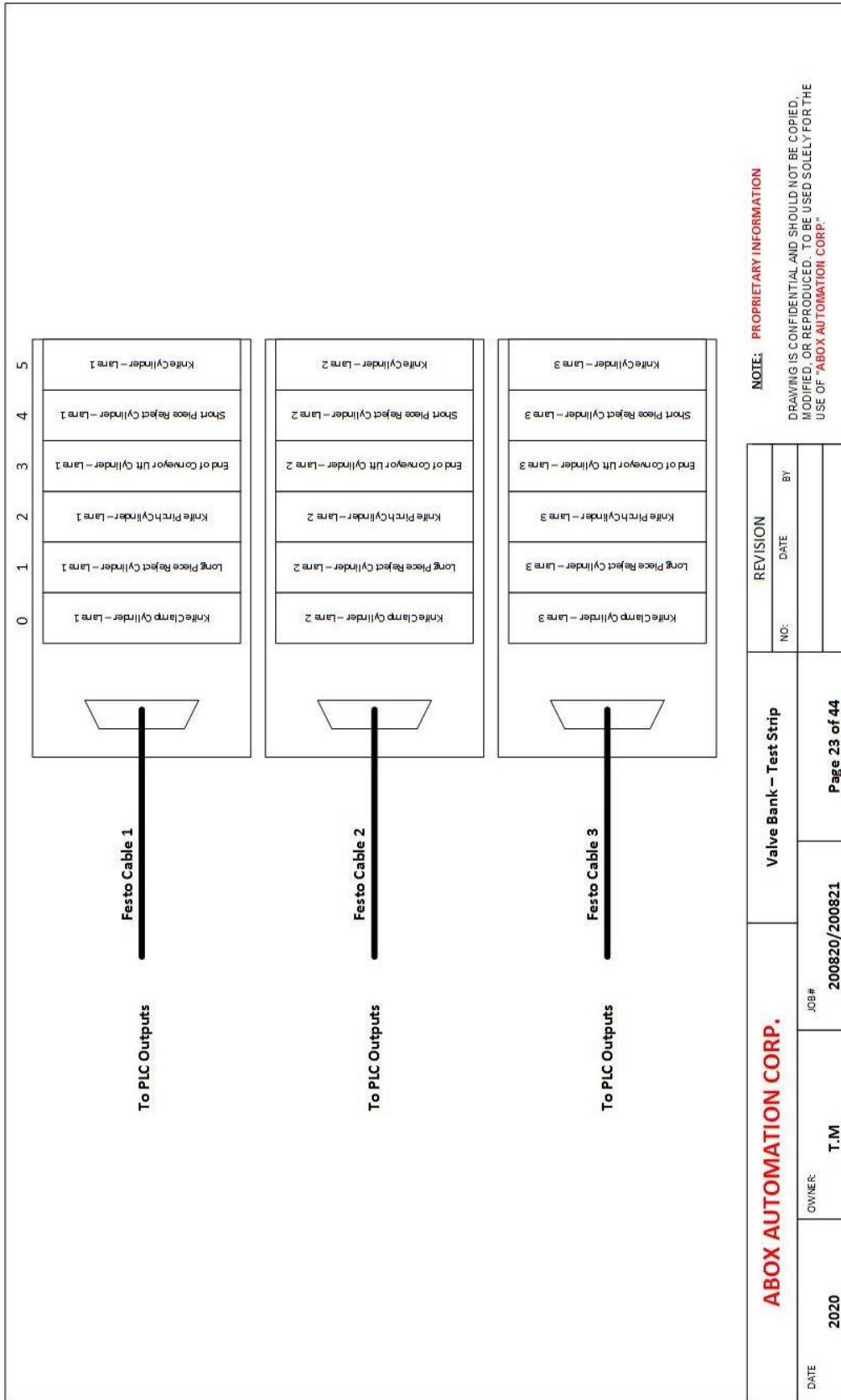
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DATE	OWNER	JOB#		NO:	DATE BY
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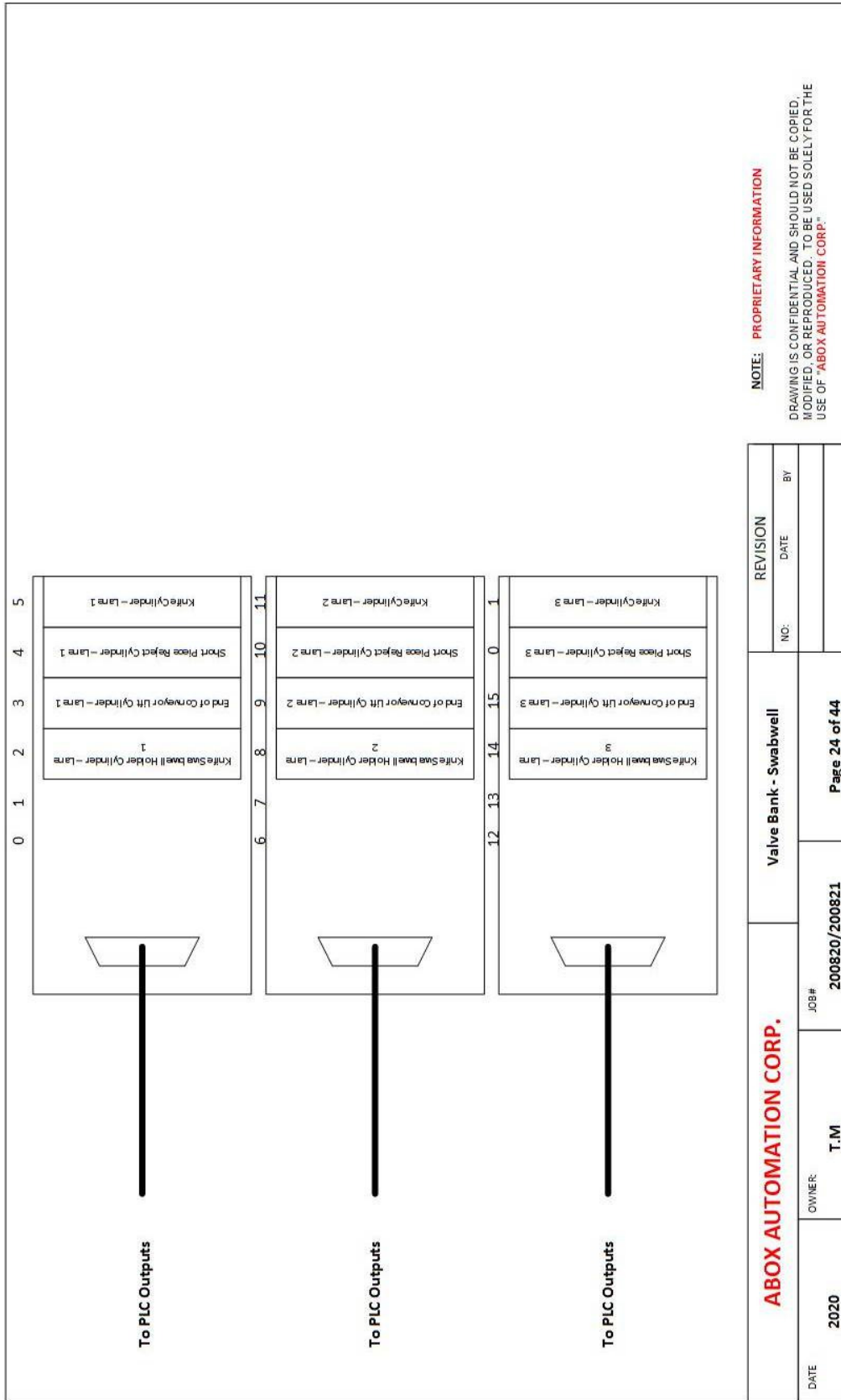




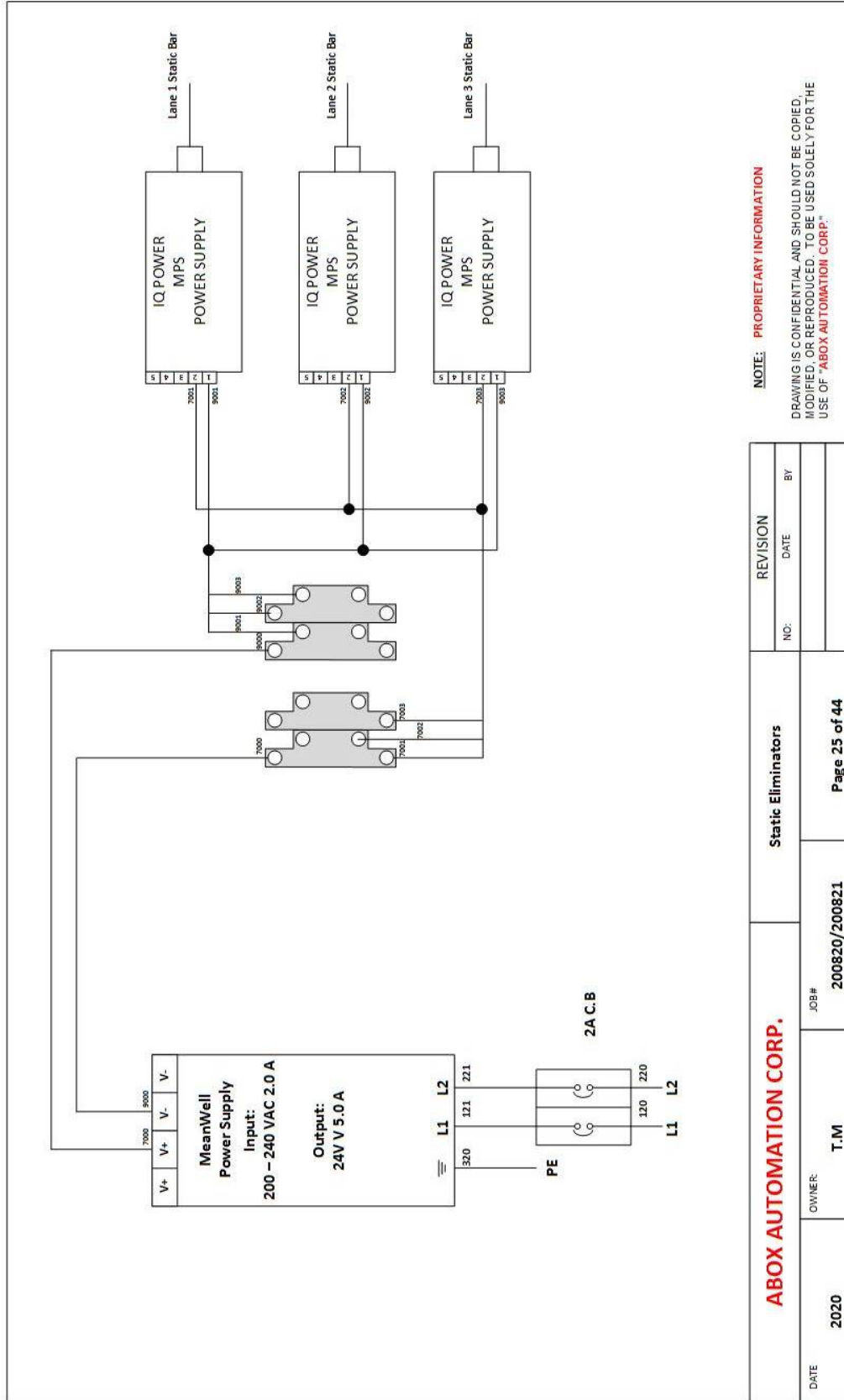


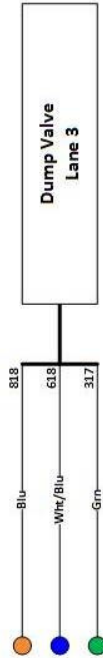
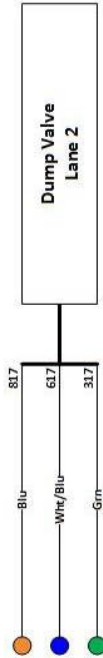
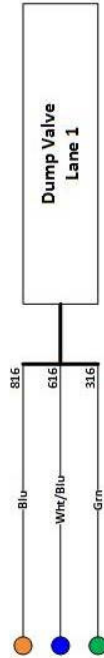
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DATE	2020	JOB#	200820/200821
OWNER:	T.M	NO:	REVISION
		DATE	BY



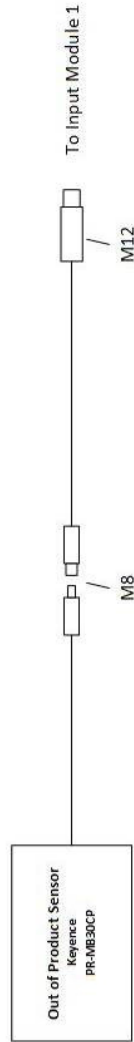
3490





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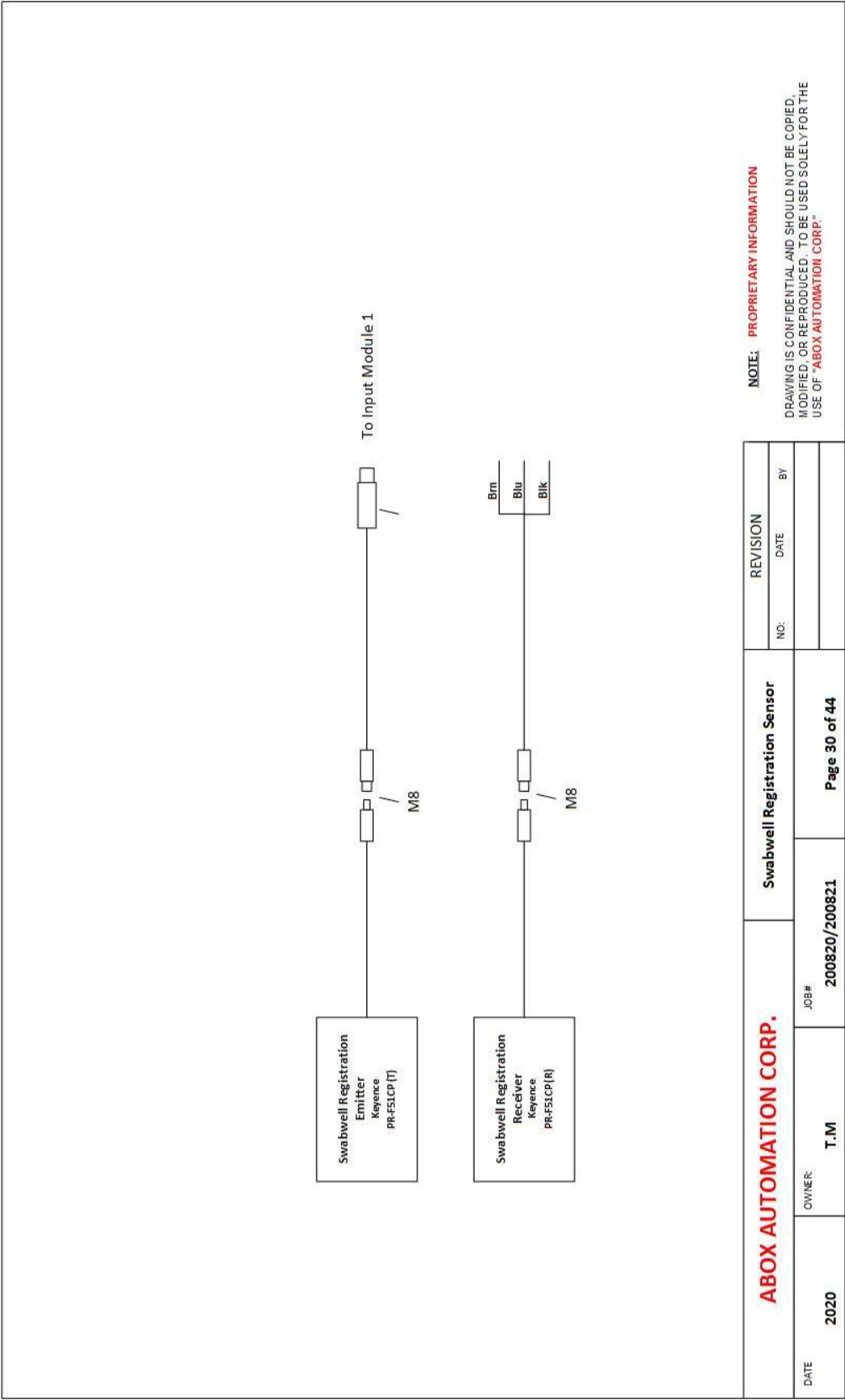
ABOX AUTOMATION CORP.			Valve Bank - Swabwell		REVISION	
DATE	OWNER:	JOB#			NO:	BY
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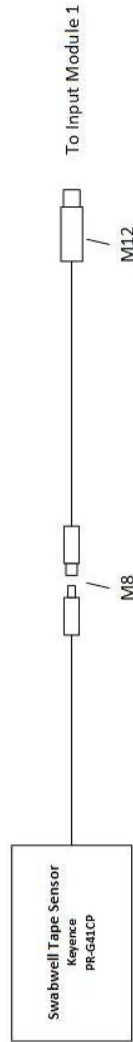


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ABOX AUTOMATION CORP.			Out of Product Sensor		REVISION	
DATE	OWNER:	JOB#			NO:	BY
2020	T.M	200820/200821	Page 28 of 44			







NOTE: Set to 262 while looking at the white in the swabwell

ABOX AUTOMATION CORP.		Swabwell Tape Sensor		REVISION	
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				NO:	DATE
				BY	
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Conveyor Home Sensor
Keyence
PR-M815CP

M8

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DATE
2020

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JOB#
200820/200821

Conveyor Home Sensor

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REVISION

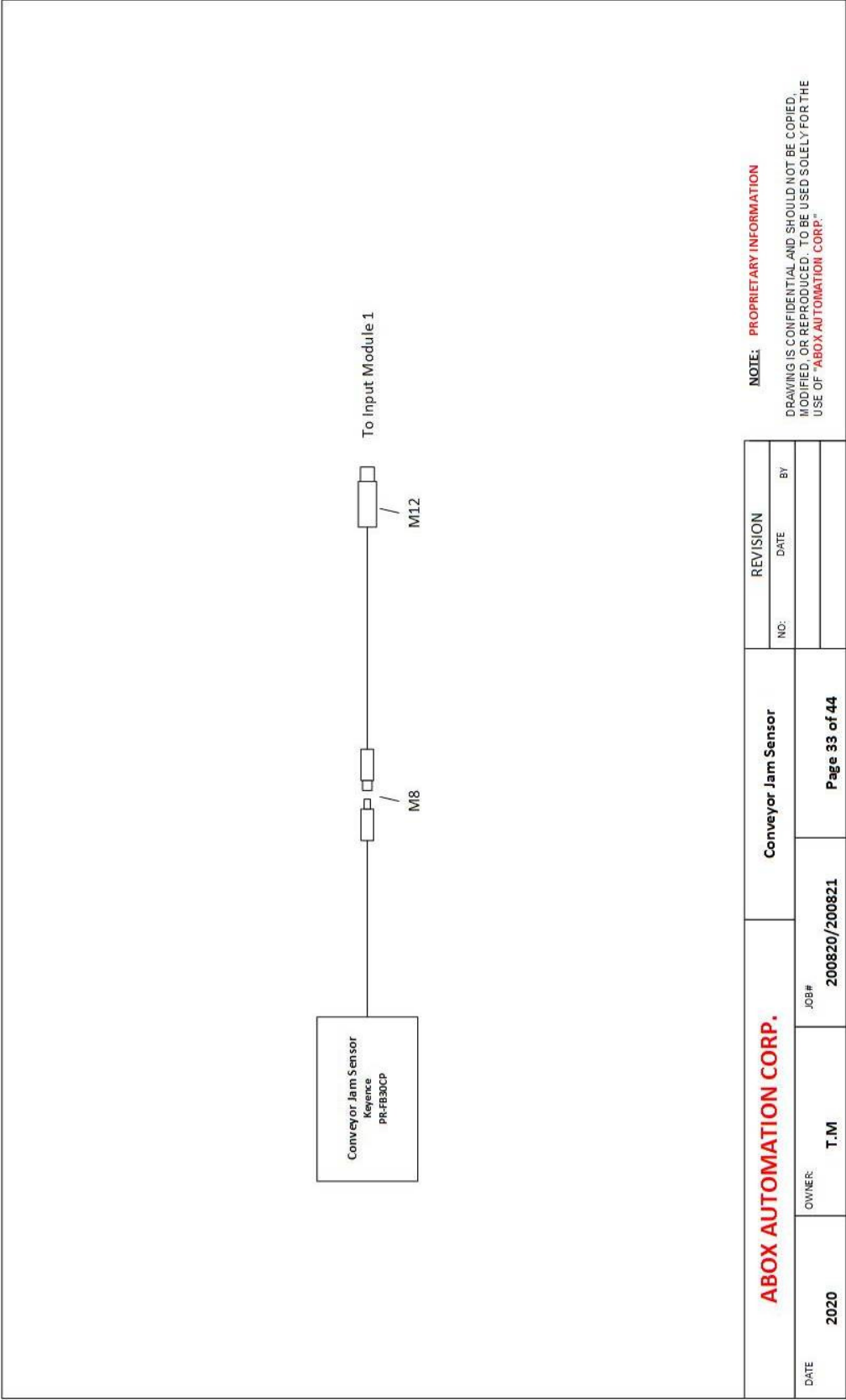
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End of Conveyor Product
Sensor
Keyence
PR-FB30CP

M8

ABOX AUTOMATION CORP.

DATE2020

OWNER:T.M

JOB#200820/200821

End of Conveyor Product Sensor

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NO:DATEBY

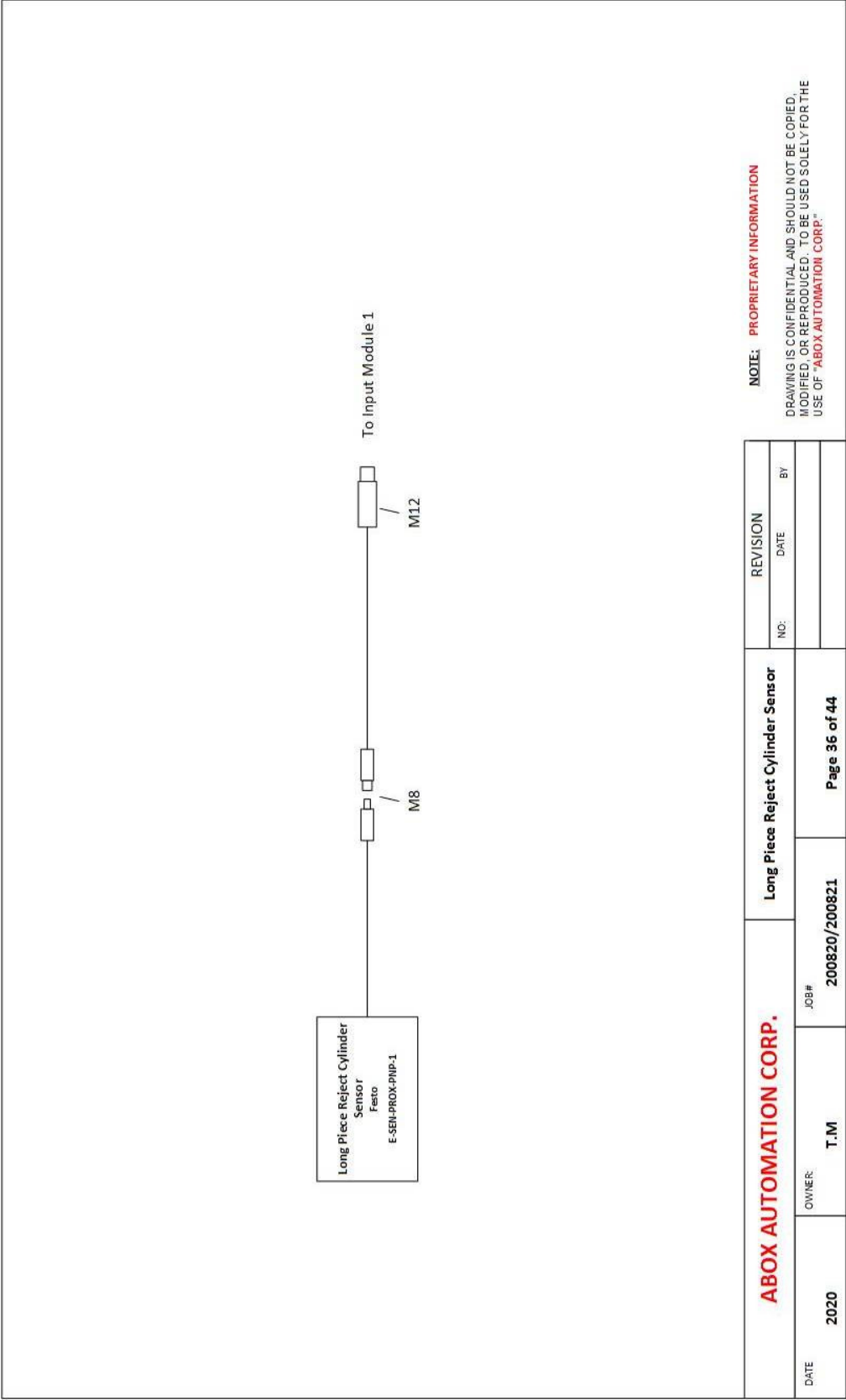
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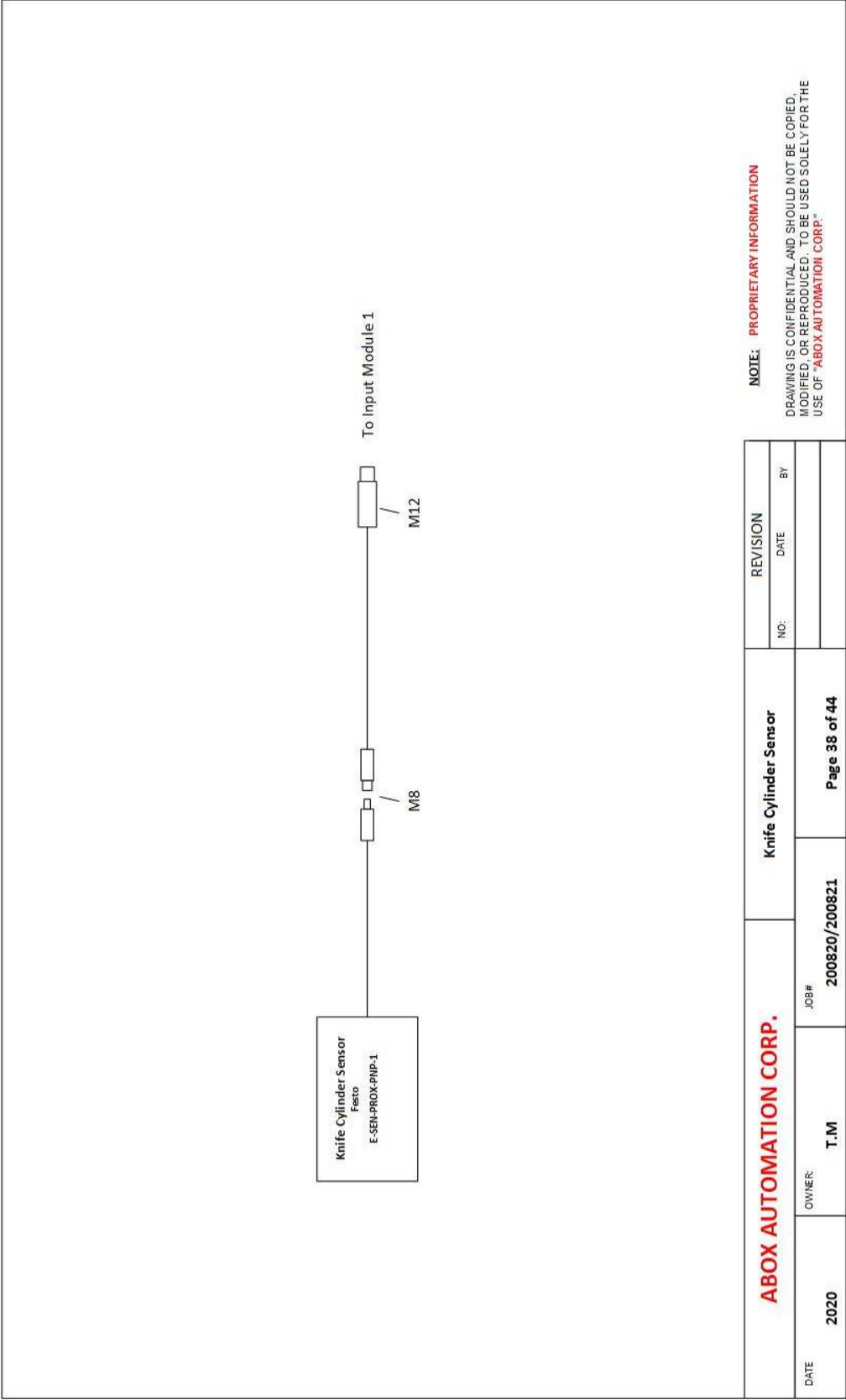
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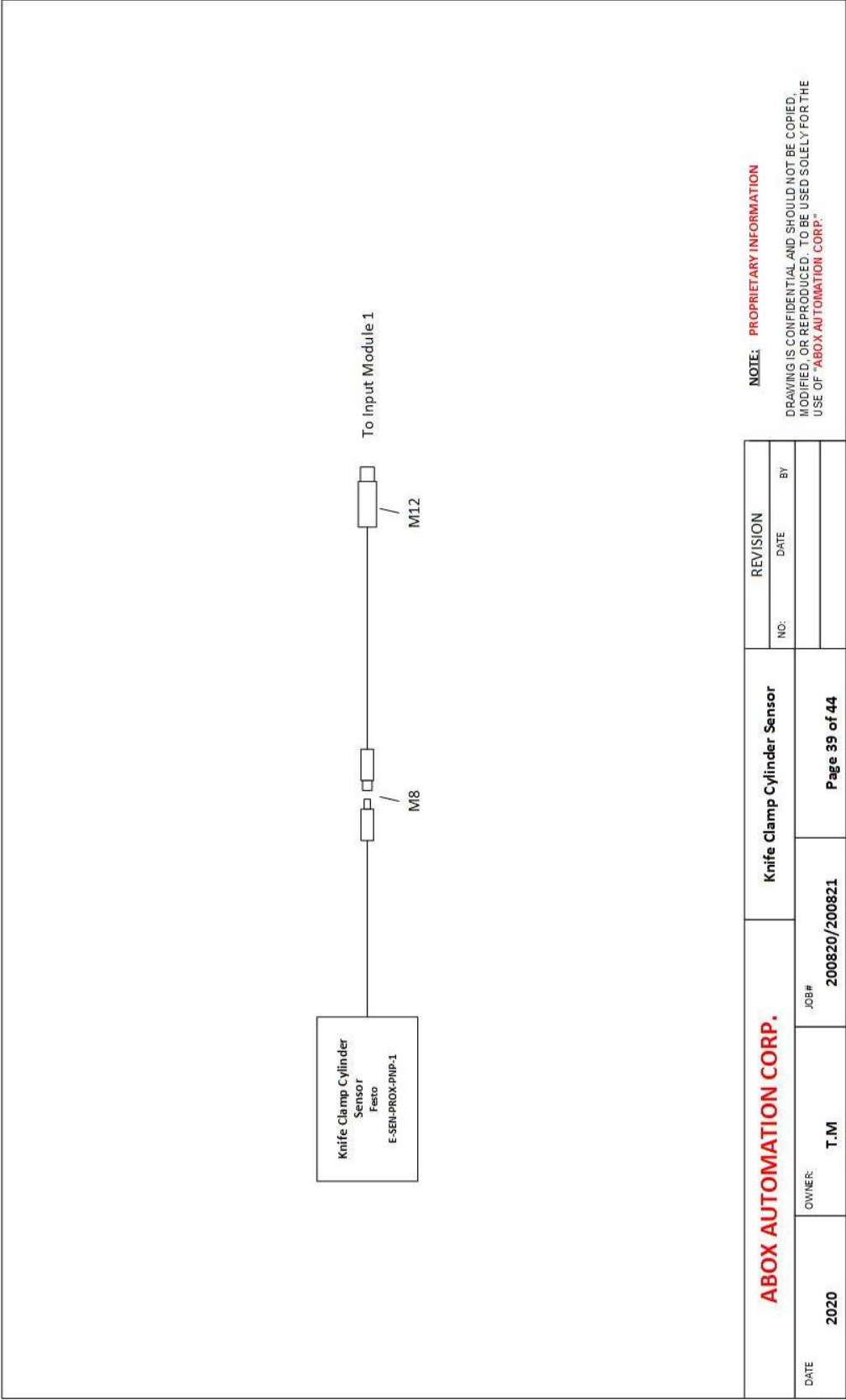
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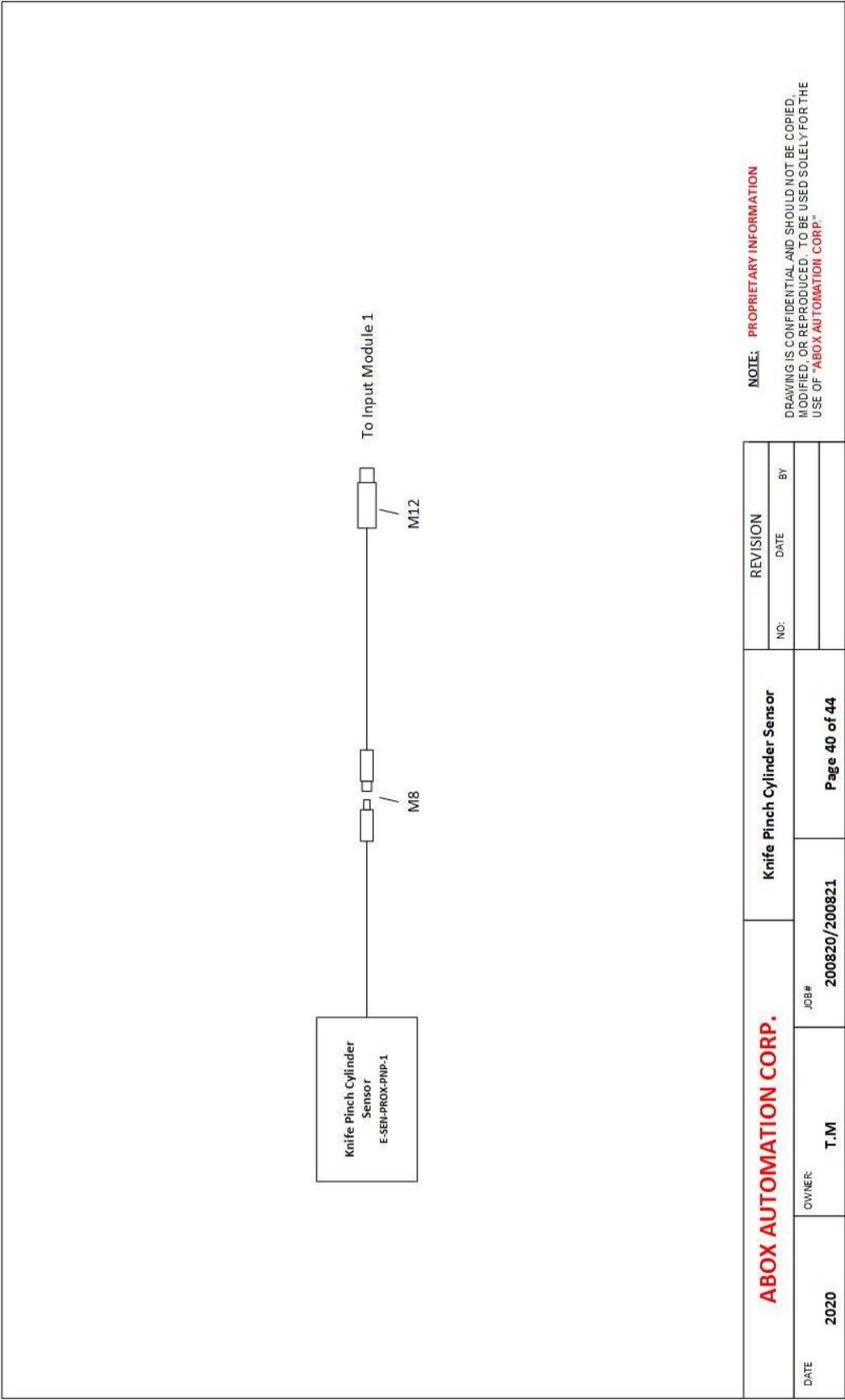
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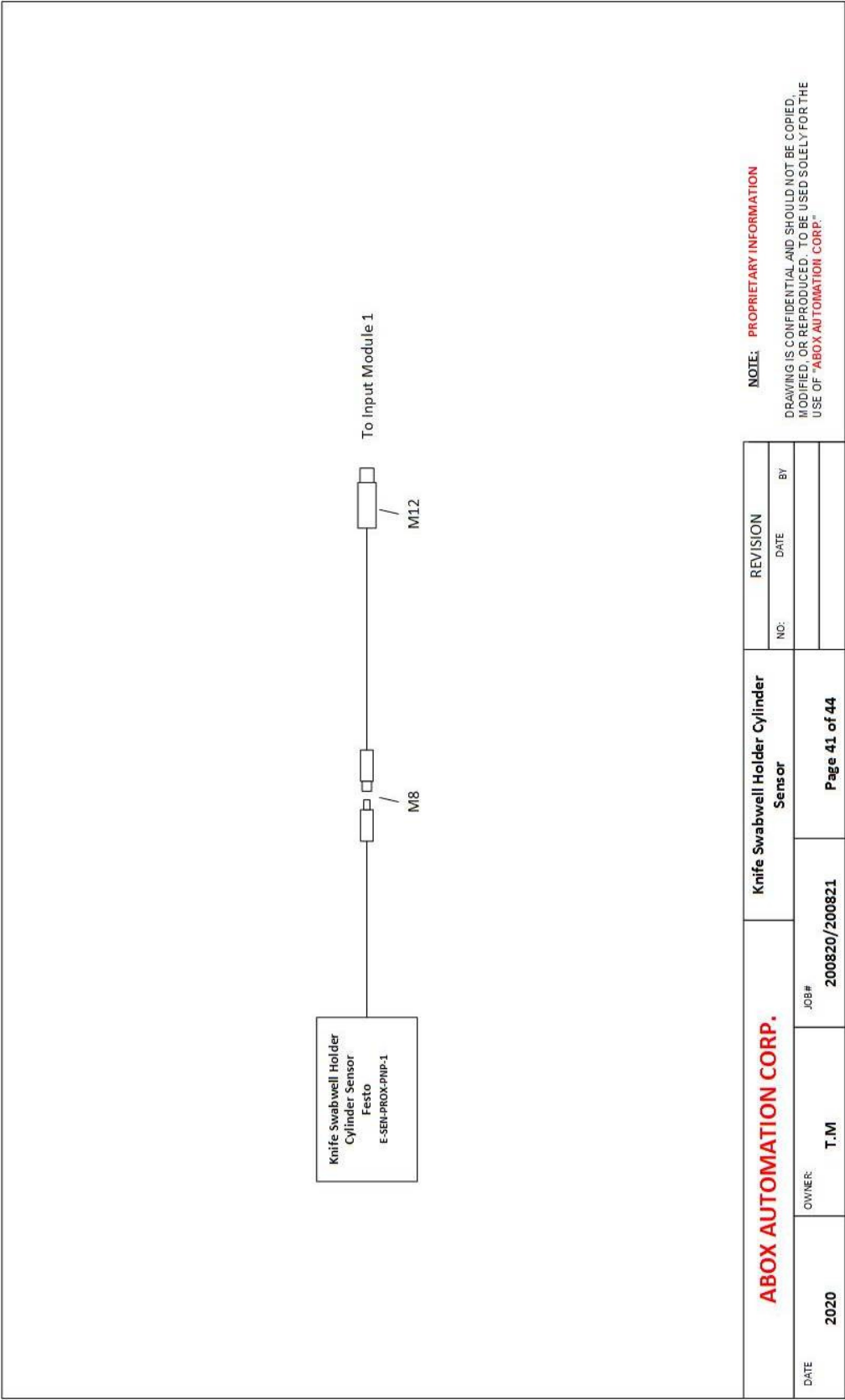


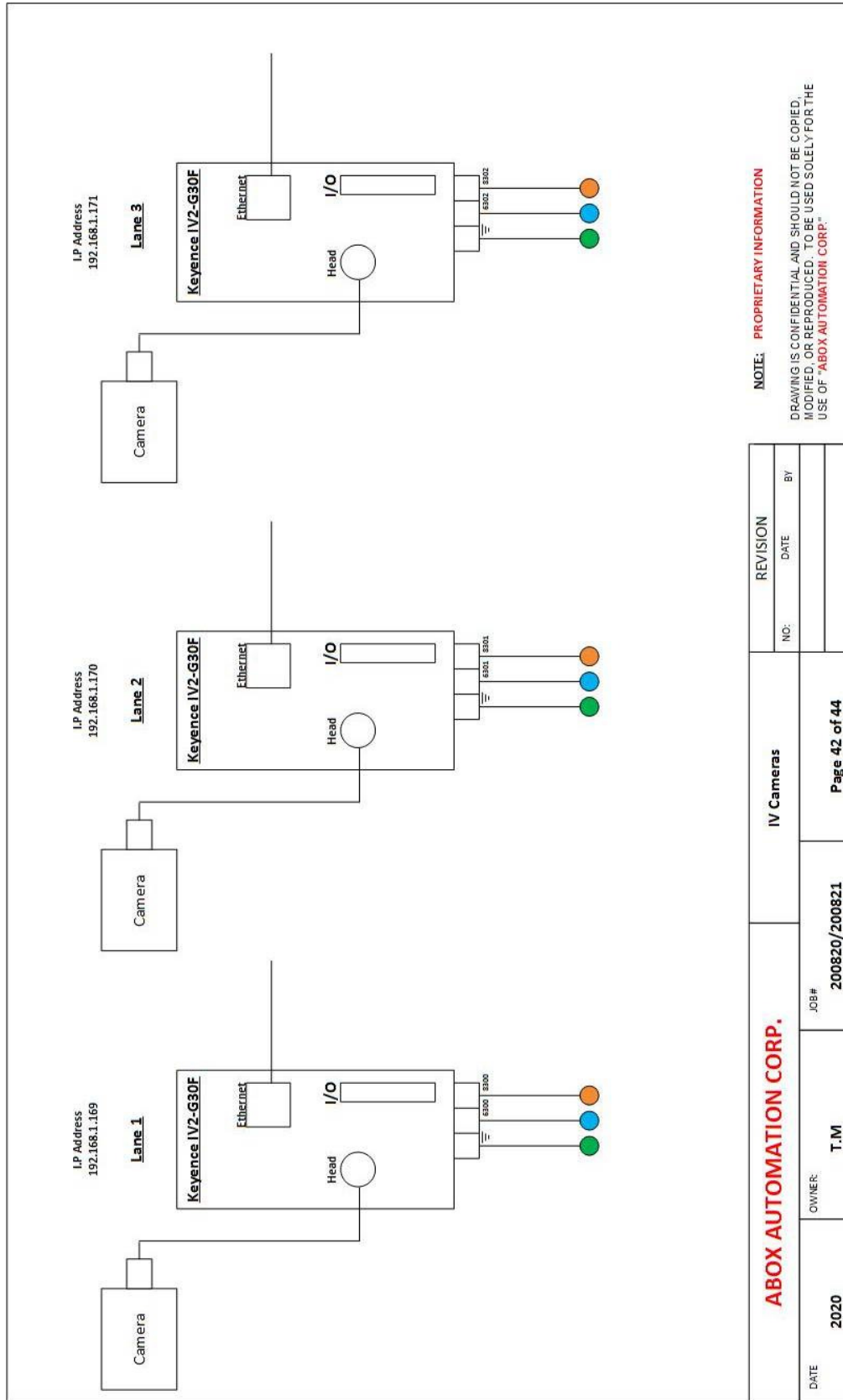


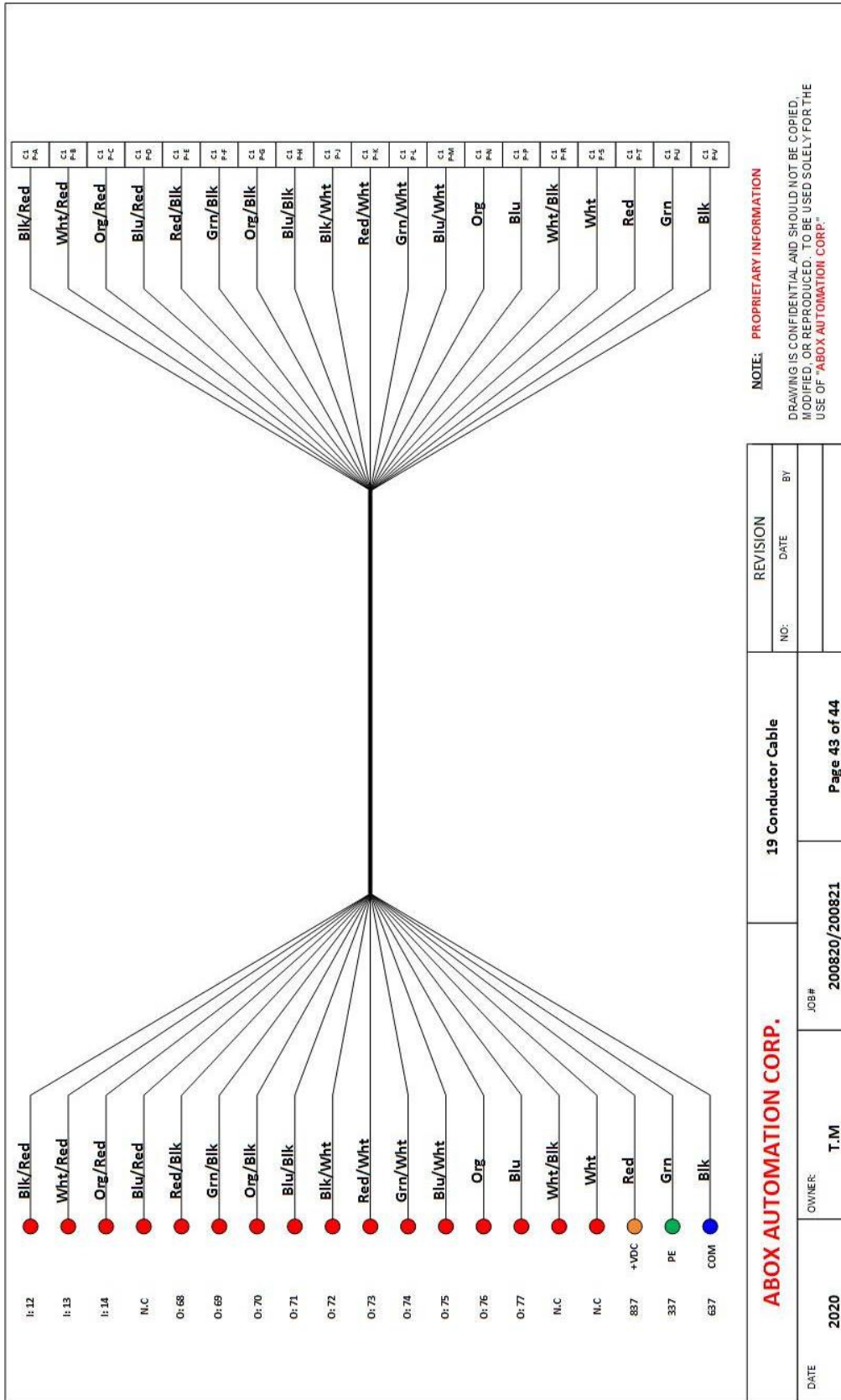


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ABOX AUTOMATION CORP.		Knife Pinch Cylinder Sensor		REVISION	
DATE	2020	OWNER:	T.M	NO:	DATE
		JOB#	200820/200821		BY
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Pin 1	Whit
Pin 2	Brn
Pin 3	Grn
Pin 4	Yel
Pin 5	Gry
Pin 6	Pnk
Pin 7	Blu
Pin 8	Red
Pin 9	Blk
Pin 10	Purp
Pin 11	Gry/Pnk
Pin 12	Red/Blu
Pin 13	Gry/Whit
Pin 14	Brn/Grn
Pin 15	Yel/Whit
Pin 16	Brn/Yel
Pin 17	Gry/Whit
Pin 18	Brn/Gry
Pin 19	Whit/Pnk
Pin 20	Brn/Pnk
Pin 21	Blu/Whit
Pin 22	Brn/Blu
Pin 23	Red/Whit
Pin 24	Brn/Red
Pin 25	Blk/Whit



ABOX AUTOMATION CORP.				NEBV-S1G25-K-5-N-LE25-S6 Cable		REVISION	
DATE		OWNER:		JOB#		NO: DATE BY	
2020		T.M		200820/200821			
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