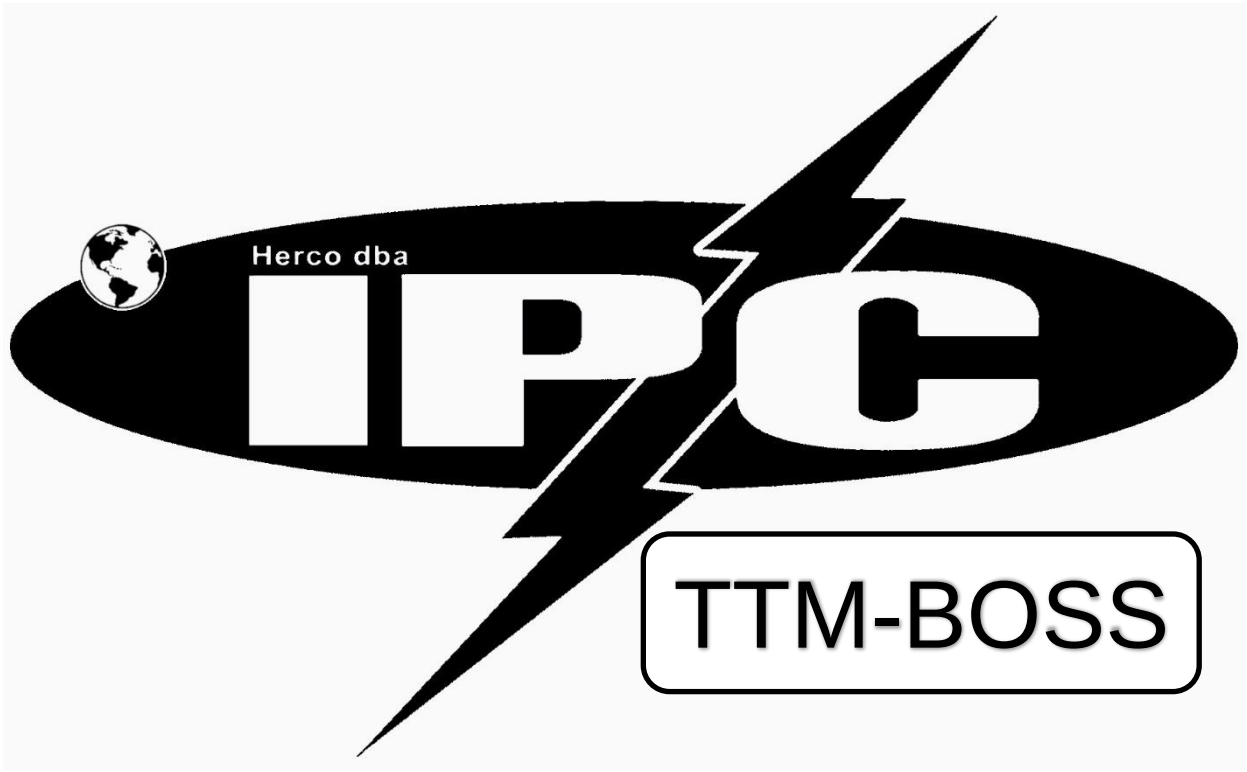

Medical Devices Injection Molder
Setup & Operational Manual

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NOTES

Rev 1	12/22/2020	Joshua W. George
Rev 2	05/04/2021	Tyler J. Wyatt

INTRODUCTION

The TTM-BOSS IPC injection mold press utilizes an Omron PLC, color touch screen display, and Yaskawa Servo Drive.

It is recommended that the production engineer read this manual and become familiar with the overall machine operation.

Any machine subjected to continuous production work may develop malfunctions.

Section 1 – UNCRATING & INSTALLATION

MACHINE INSPECTION

After uncrating, visually inspect machine for possible shipping damages. If damage is found, notify your carrier immediately. The machine should be stored in a dry area of the plant until installation. A plastic tarp to cover is recommended.

MACHINE PLACEMENT AND LEVELING

The machine should be placed in position to allow access to all sides, and to allow all doors and panels to be opened completely and/or be removed, if needed. Optional air oil cooler needs at least two feet of clearance to allow for proper air flow. Rubber type mats/squares or industrial leveling legs, neither included, can be used under the machines base to help alleviate rocking and vibration transfer to floor, as well as help with leveling.

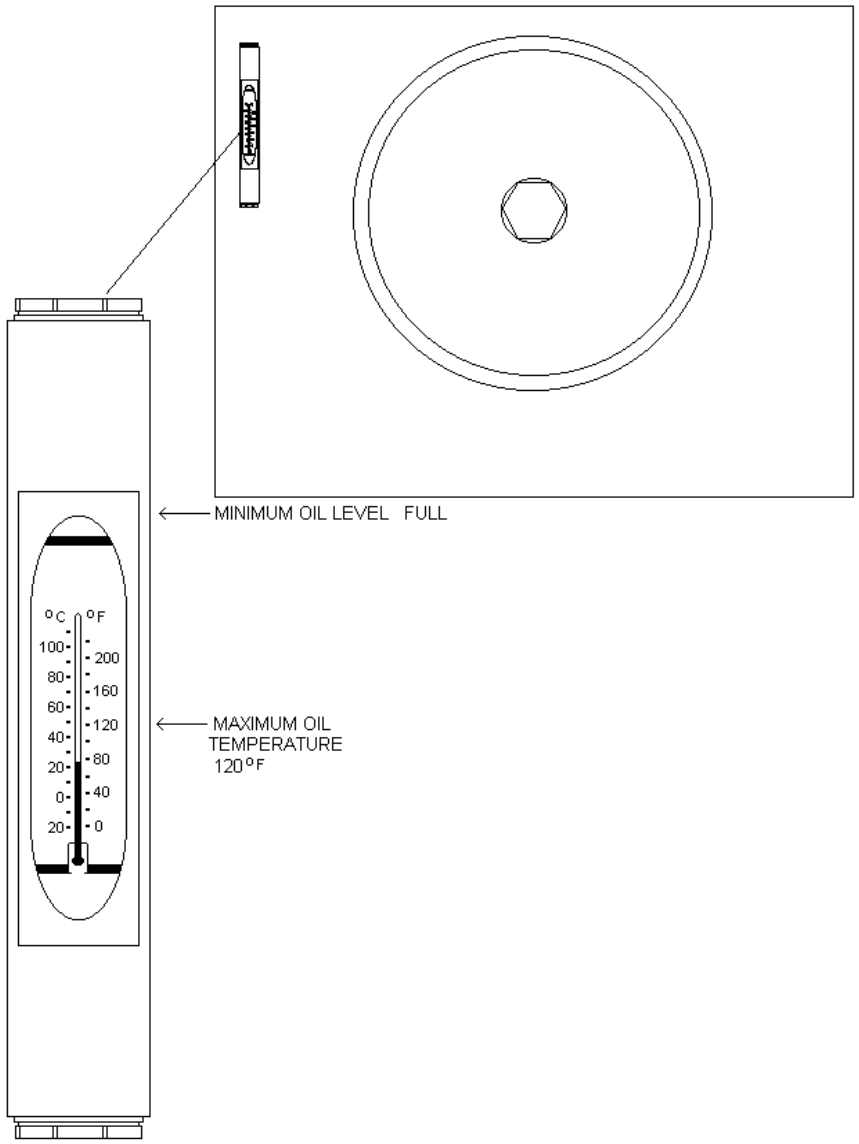
HYDRAULIC FLUID

Each machine has been thoroughly tested at the factory under actual operating conditions. However, prior to shipping, the hydraulic oil was drained.

The oil filler cap is located at the rear of the machine. Add approximately 40 gallons of an anti-wear hydraulic oil with a grade rating of 46.

The dual function oil gauge measures both oil level and oil temperature. It is located at the front lower left side of the machine.

The pump must be primed before starting the motor.



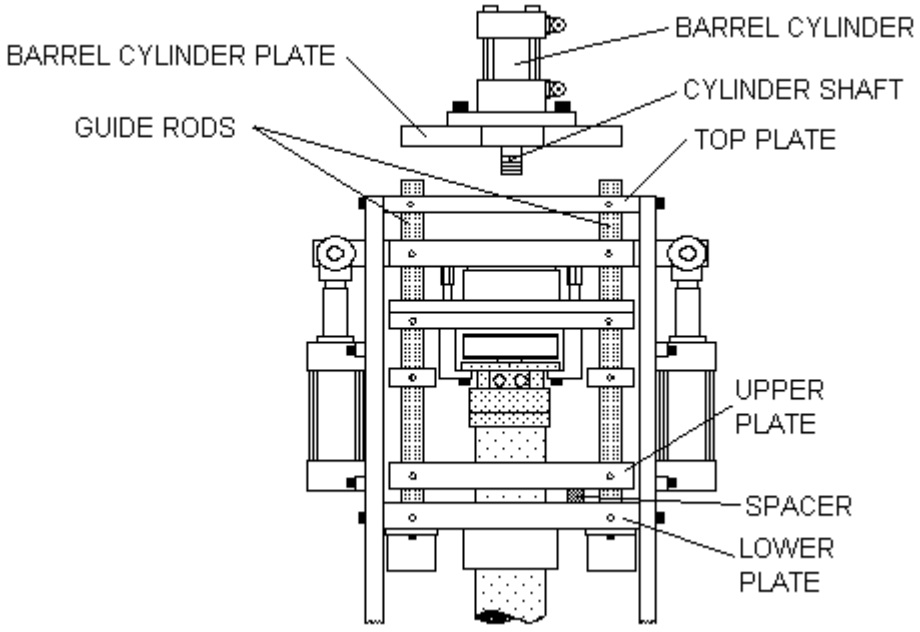
WARNING:
Never operate machine when the oil level gauge shows less than 3/4 full.

BARREL CYLINDER INSTALLATION (OPTIONAL)

- Position the barrel cylinder on the top plate so that the cylinder shaft lines up with the threaded hole.

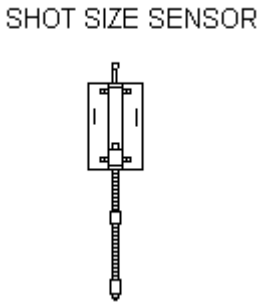
- Tighten the cylinder shaft onto the top plate with a 7/8” open end wrench. Make sure that the small 5/16” holes in the barrel cylinder plate lines up with the guide rods.

- Now install and tighten the two 5/16” screws through the barrel cylinder plate and into the end of the guide rods.

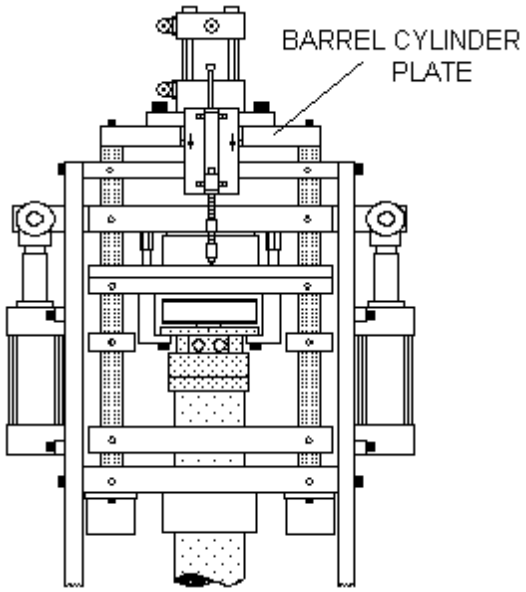


SHOTSIZE SENSOR INSTALLATION

- Carefully unpack the shotsize sensor.



- Attach the shotsize sensor to the barrel cylinder plate, with two 10/32” screws and two washers.



- Attach the cable to the shotsize sensor connector. Make sure the cable is not in the way of the hoses.

- Adjust the shotsize sensor so that it is square with the machine and that the tip is just touching the screw housing plate.

POWER REQUIREMENTS

This BOSS model requires 208VAC or 240VAC 40-amp 3 phase service with a neutral and a ground.

If your facility uses a 380VAC 30-amp 3 phase or 480VAC 25-amp 3 phase service with ground, a 208VAC or 240VAC line will need to be run to your facility or use an external disconnect with fuses at the amp rating of the specific service, an appropriate transformer to output at a supported voltage, and 60-amp fuses for the internal main disconnect.

ELECTRICAL INSTALLATION

Electrical installation should be performed by a qualified individual who is familiar with all local electrical codes for standard industrial installation.

INSTALLATION WITH 208V

- Connect the 3 phases to the top of the main disconnect.
- The motor controller setting should be adjusted to 21 amps.
- Connect ground to the ground terminal lug at the top of the electrical panel.
- Connect neutral to the neutral terminal, position E100025, on terminal strip TS2.
- Follow the procedures on "TESTING ELECTRICAL INSTALLATION".

INSTALLATION WITH 240V

- Connect the 3 phases to the top of the main disconnect.
- The B phase (wild phase) should be connected to the center of the disconnect.
- The motor controller setting should be adjusted to 21 amps.
- Connect ground to the ground terminal lug at the top of the electrical panel.
- Connect neutral to the neutral terminal, position E100025, on terminal strip TS2.
- Follow the procedures on "TESTING ELECTRICAL INSTALLATION".

TESTING ELECTRICAL INSTALLATION

ELECTRICAL START UP

When starting the machine for the first time, or when moving the machine to a new location, the following procedures should be followed:

- Ensure all the circuit breakers are in the off position.
- Turn the main disconnect switch to the on position.
- The pump must be primed before the next step.
- Bump the motor around by pressing the white contact pins on the motor starter and then releasing them. At the same time use a flashlight to observe the rotation of the fan on the motor. **It must rotate in a counterclockwise direction.**
- If the motor is rotating backwards, turn off power going to the machine and then reverse the outer two wires of the mains connected to the main disconnect. And re-prime the pump. Turn on power. Repeat step 4 to observe proper operation of the motor.

CIRCUIT BREAKER START UP

- The first breaker to turn on is power supply circuit breaker (CBE20004A, 10A). After turning it on, the light on the power supply should be on. Once it is on, check for 24VDC between any wire E200181 (+) and wire E200182 (-).
- You may now turn the remaining circuit breakers on.

Section 2 - SYSTEMS

DISPLAY

As delivered, the controller will power up displaying the LOGO screen.

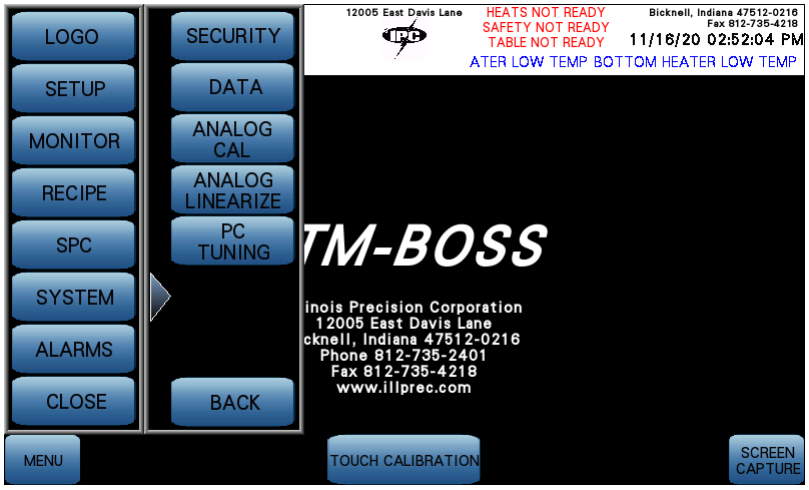
SCREEN TOUCH CALIBRATION

This toggle will allow you to run a touch screen calibration to better fine tune the touch screen system. You may use a stylus or finger for the calibration, or standard machine operation. If a stylus is to be used it is recommended to use a soft tip stylus and/or utilizing a screen protector that allows touch screen operation via stylus or finger.

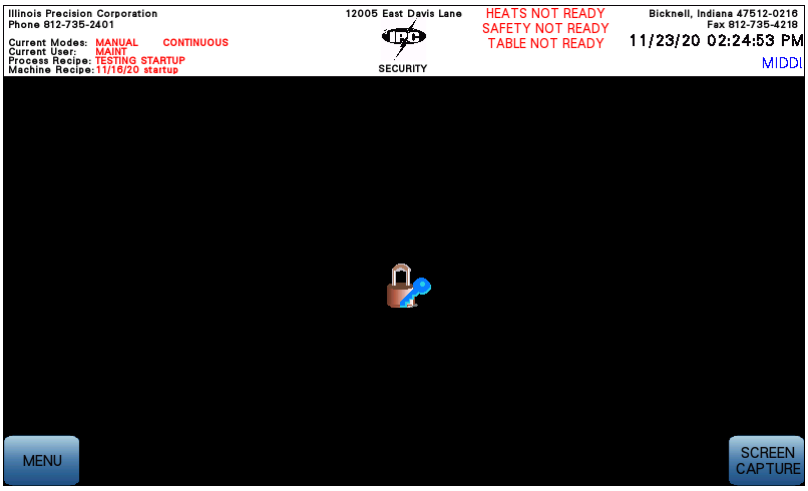
SECURITY

On power up, security is at the default level (Current User-Blank). Factory set security levels are established when programming screens and cannot be erased or changed.

The setpoint entry area for the security code is located by selecting MENU>SYSTEM>SECURITY.



On the SECURITY screen select the lock and key on the middle of the display.

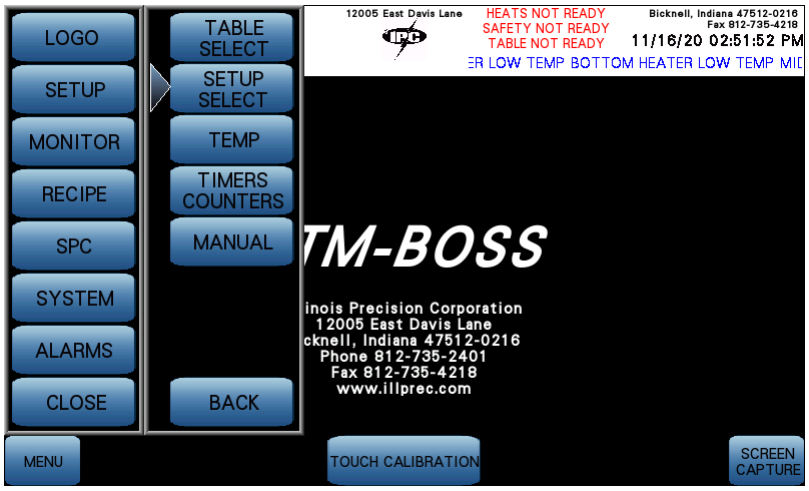


Current User-Blank is the lowest security level. Operating at this level allows the least access to the controller. Current User-MAINT is the highest user security level. Operating at Current User-MAINT allows all access to the controller.

Only variables with a security level equal to or less than the operating security level will be accessible.

If operating at security (Blank), only minimum variables can be accessed.
If operating at security (1) USER, only USER variables and below can be accessed.
If operating at security (2) ENG, only ENG variables and below can be accessed.
If operating at security (3) MAINT, all variables can be accessed.

MOVING THROUGH SCREENS



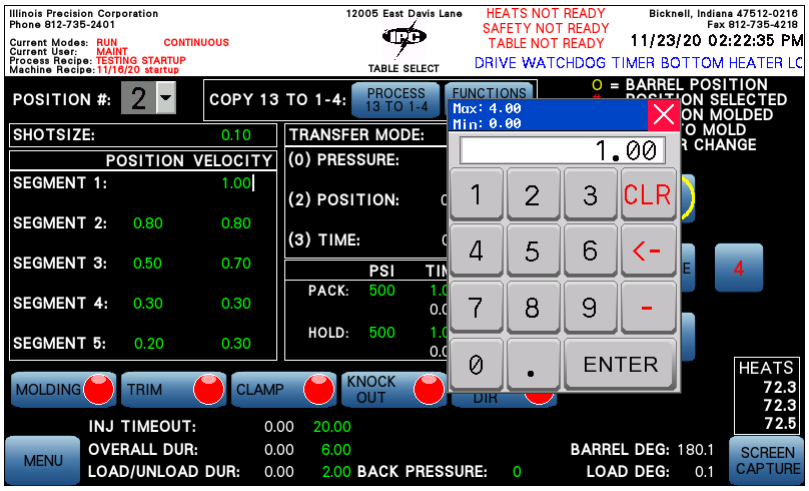
Screens can be accessed by selecting the MENU button on the bottom left-hand corner of the display. Select the BACK button to go back in the MENU hierarchy. Select CLOSE to close the MENU bar.

SCREEN CAPTURE

The screen capture key is used to take a complete screenshot of the active screen and all variables. To capture screens a USB memory stick must be inserted in the HMI. USB memory stick not included.

NUMBER KEYPAD INPUT

When a variable value (Green) is selected on the display, a number keypad input box pops up at the best position on the screen. Across the top of the box is the Min/Max limit of the variable selected. By inputting the new value and selecting enter, the input box will disappear, and your variable will be updated to the new value.

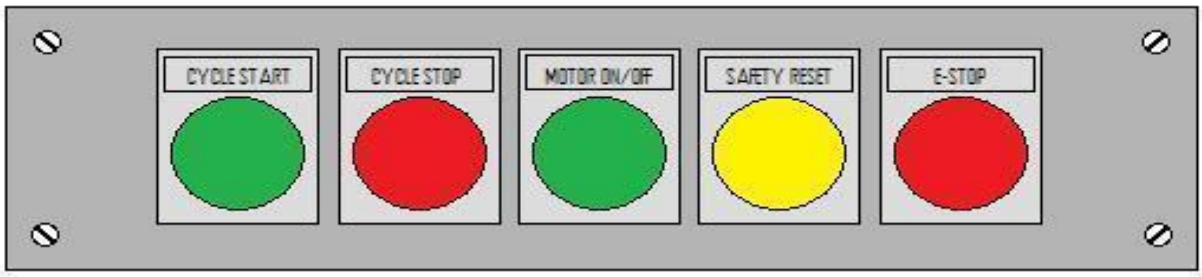


USB PORT

There is one USB port located on the HMI for added ease of access to files and recipes, or for loading and unloading programs. The USB port is located on the rear of the HMI inside the HMI box. Controller specs recommend that you use a 2GB through 8GB USB stick. To safely remove the USB, it is recommended to use the CLICK TO REMOVE toggle on the DATA screen.

OPERATOR CONTROLS

The operating controls are grouped in a separate box as well as on the operator station. Both have the same operation.



CYCLE START

Pressing cycle start will activate the table rotation and production in run mode, table rotation in standby mode, incremental jog in manual mode, and purge function in purge mode. During purge mode the cycle start will engage the purge function for as long as the pushbutton is pressed, and the screw rotation will begin after the button is released.

CYCLE STOP

Pressing cycle stop will stop table rotation at the next table position, if pressed after rotation begins. If pressed before table rotation begins the table will not move from that location.

MOTOR ON/OFF

Pressing the motor on/off pushbutton will active/deactivate the motor, a LED pushbutton light corresponds with the activation/deactivation.

SAFETY RESET

Before beginning any production or turning on the hydraulic pump, the safeties must be verified and set. Pressing safety reset will latch the safety blocks of the system if all safeties are cleared. Anytime a safety is tripped the safety reset button must be pressed.

EMERGENCY STOP

Press the emergency stop pushbutton any time an emergency shut down of the hydraulic system, table, or injection unit must occur. It can also be used in conjunction with lockout systems to ensure the hydraulics will not start. The emergency stop pushbutton is a twist to release pushbutton and must be twisted to release the latch.

HYDRAULIC CONTROLS

The hydraulic valves and gauges are grouped on the right side of the machine. Each machine is shipped with hydraulic settings calibrated for a typical operation. Adjustment is normally not necessary.

SNUBBER VALVES

The snubber valve on the back of each gauge should only be opened when making adjusting or performing troubleshooting. This will help extend the life of the gauges.

FACTORY PRESSURE SETTINGS

SYSTEM	PRESSURE (PSI)
PUMP LOW/HIGH	500/1800
KNOCKOUTS (EJECTORS)	150
CLAMP	600 (Note 1)
SCREW	600-1500 (Note 2)
LOW PRESSURE MOLDING (BARREL)	350

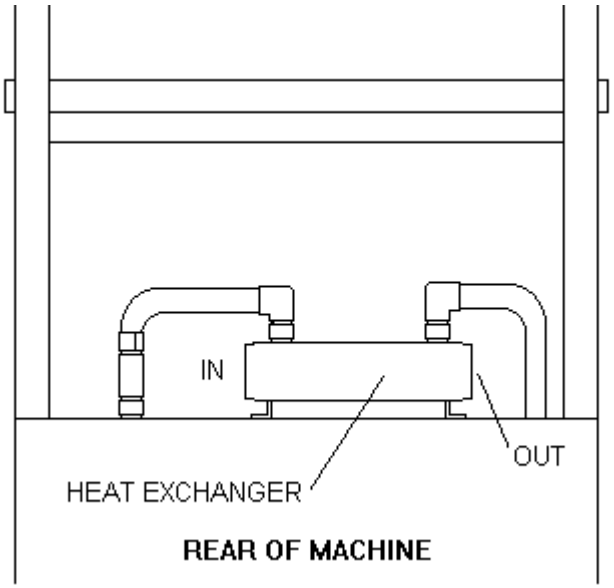
Note 1 – Clamp pressure will be dependent on mold and process design. 900 PSI Maximum.

Note 2 – Screw pressure will fluctuate with adjustment of the screw motor flow control and viscosity of the material.

CAUTION - ANY DRASTIC DEVIATIONS FROM THESE SETTINGS MAY CAUSE MACHINE MALFUNCTIONS, COMPONENT/MOLD DAMAGE, OR SEVERE BODILY HARM AND/OR DEATH.

WATER HEAT EXCHANGER FOR OIL COOLING (STANDARD)

This system cycles the hydraulic oil from the machines internal bypass system through porting that is being cooled via an external water or chiller system. The water heat exchanger should be connected to a water-cooling system if the oil temperature exceeds 120°F.

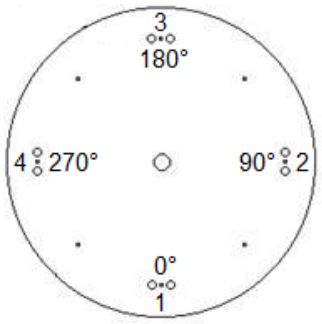


AIR HEAT EXCHANGER FOR OIL COOLING (OPTIONAL)

The air heat exchanger is an optional installation that requires no additional water/chiller hookups and operates the same as the water heat exchanger but utilizes a fan and radiator to provide the required cooling.

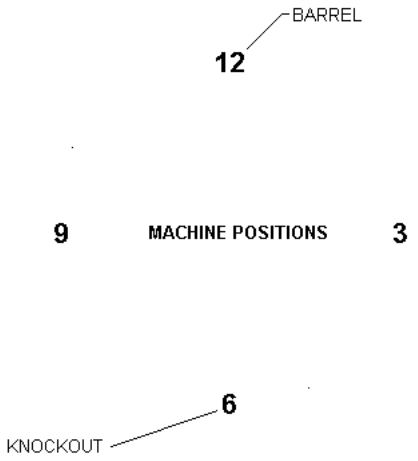
ROTARY MOLD TABLE

The rotary mold table is divided into four areas or positions, referred to as table or molding positions, where one or more molds may be mounted. The positions are referenced by degrees, positions 1, 2, 3, and 4 being 0, 90, 180, and 270 degrees, respectively. These table positions are fixed and rotate as the table rotates, normally in a CCW direction. Each table position has pre-drilled holes for mold mounting and mold knockout pins.



MACHINE POSITION VS TABLE POSITION

An important difference must be made between table position as defined above and machine position, which refers to the *location of equipment on the machine or location of the rotating mold* when the operator is standing directly in front of the machine.

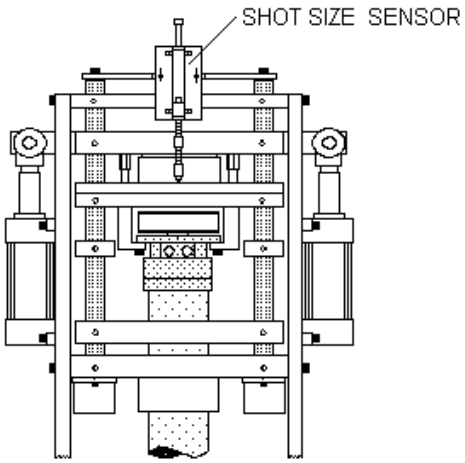


For example:

- The barrel or injection position is referred to as machine position 12.
- The knock-out position is referred to as machine position 6.

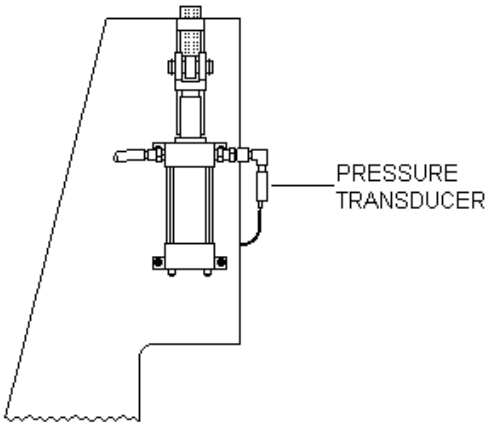
SHOTSIZE SENSOR

The shotsize sensor is mounted on the top rear of the machine. This sensor provides the OMRON controller linear position feedback for open loop control. Please see "SHOTSIZE SENSOR INSTALLATION" for adjustment procedures.



PRESSURE TRANSDUCER

The pressure transducer is mounted on the injection cylinder on the left side of the machine, as viewed from the operator. This sensor allows the OMRON controller feedback of the injection pressure for controlled closed loop operation.



SAFETY SWITCHES

There are three hardwired safety switches installed on the machine: safety flag, barrel down limit, and barrel up limit. These three switches are all tied to the hydraulic system and will deactivate the hydraulic pump if tripped. A trait of these three switches that is unique for troubleshooting purposes is that when they are tripped the hydraulic system will enable but only as the motor on/off pushbutton is pressed. When the pushbutton is released, the hydraulic system will deactivate again. This allows you to properly clear the issue, if possible, by using the hydraulic pressure. Once the issue is cleared the switch will properly reset and by pressing motor on/off pushbutton the hydraulic system will be allowed to stay latched on.

SAFETY FLAG

The plexiglass safety flag and its components are used to protect the barrel, barrel guarding, top frame, and mold from crashing if the mold is accidentally left open, not fully closed, is too large, or has some other build up that otherwise would not fit into the space provided under the injection unit.

It is adjusted so that a mold will clear underneath it with minimum spacing allotted, and preferably at a slight angle forward. Follow the procedures on "HOW TO ADJUST THE SAFETY FLAG".

BARREL DOWN LIMIT

The barrel down limit switch is located on the rear of the top frame just above the barrel bushing housing plate. This safety switch will be engaged if the machine tries to inject or purge over a position that has no mold or purge block, or if the mold or purge block is designed too short. In some instances, it may also engage if there is inadequate grease in the top frame or if the barrel springs are weak or broken.

Adjustment of the switch only requires that the switch roller be set approximately 5/8” away from the barrel housing bushing plate. Follow the procedures on "HOW TO ADJUST THE BARREL DOWN LIMIT SWITCH".

BARREL UP LIMIT

The barrel up limit switch is located just above the left injection cylinder, as viewed from the operators work zone. It will be located underneath the injection clevis guard.

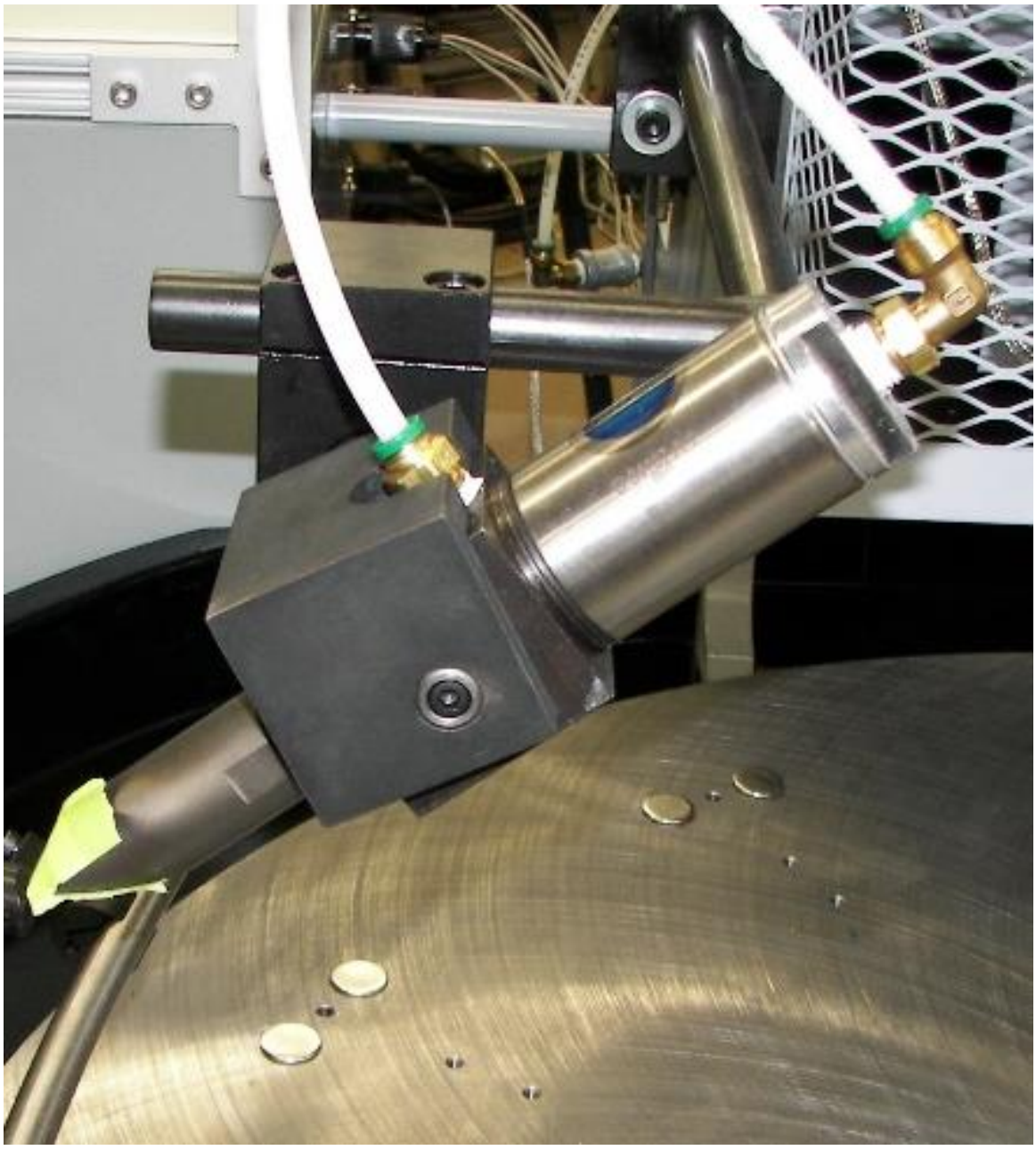
This switch is usually adjusted either by setting the switch arm just below the machine’s maximum allowed shotsize, 4 inches/101.6 millimeters, or slightly above the process designed shotsize maximum. Follow the procedures on "HOW TO ADJUST THE BARREL UP LIMIT SWITCH".

If the machines screw rotation goes above setpoint this switch will restrict the system from reaching its maximum height, which could possibly lockup the screw/barrel system. When the screw rotates further than allowed, 4 in/101.6 mm travel of the injection cylinders, the added plastic that is building up in front of the screws check ring will push the barrel system down. This could result in both the screw and barrel being locked in their opposite directions.

To relieve this error, you may have to pull the screw from the barrel system. But, if the pressure of the plastic is relieved from the barrel the barrel would release back upward. This can be done by first correcting the issue of why the screw went further up than expected by either: removing the nozzle nut from the end cap to relieve pressure buildup, or inserting a purge block under the barrel, manually or otherwise, hold in the motor on/off pushbutton to engage the hydraulic system, reset the safeties, and purge the machine. Once the pressure is released the barrel will move back up and the screw back down, resetting the safety switches. Once the safety switches are reset the motor on/off pushbutton can be released and the hydraulic system will stay latched on.

SPRUE TRIMMER (OPTIONAL)

The sprue trimmer uses an air cylinder with a tool steel blade to remove plastic residue left at the top of the mold sprue opening.

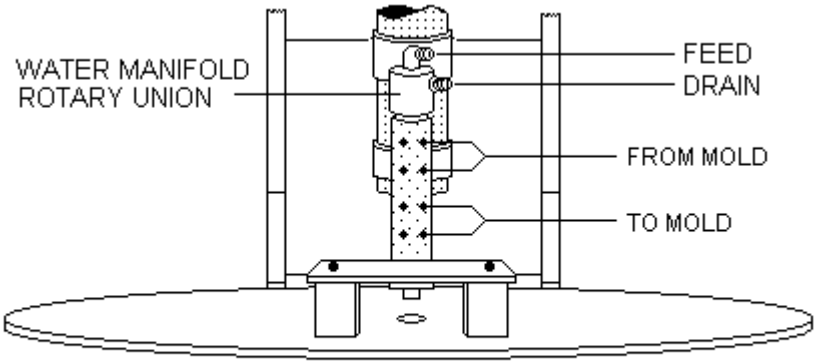


WATER MANIFOLD WITH ROTATING UNION (OPTIONAL)

The water manifold can be added to provide the molds water/oil-based heating and/or cooling. The molds will have to be designed with the proper porting to utilize this option and an external chiller/heater system installed.

Do not use solid pipe when installing water lines from molds to water ports. Only flexible hose should be used and quick disconnects are recommended.

Do not install hose taut, and do not use any exterior bracing which would prevent the housing from moving.



Connect a water feed to the hose labeled feed, and a water drain to the hose labeled drain.

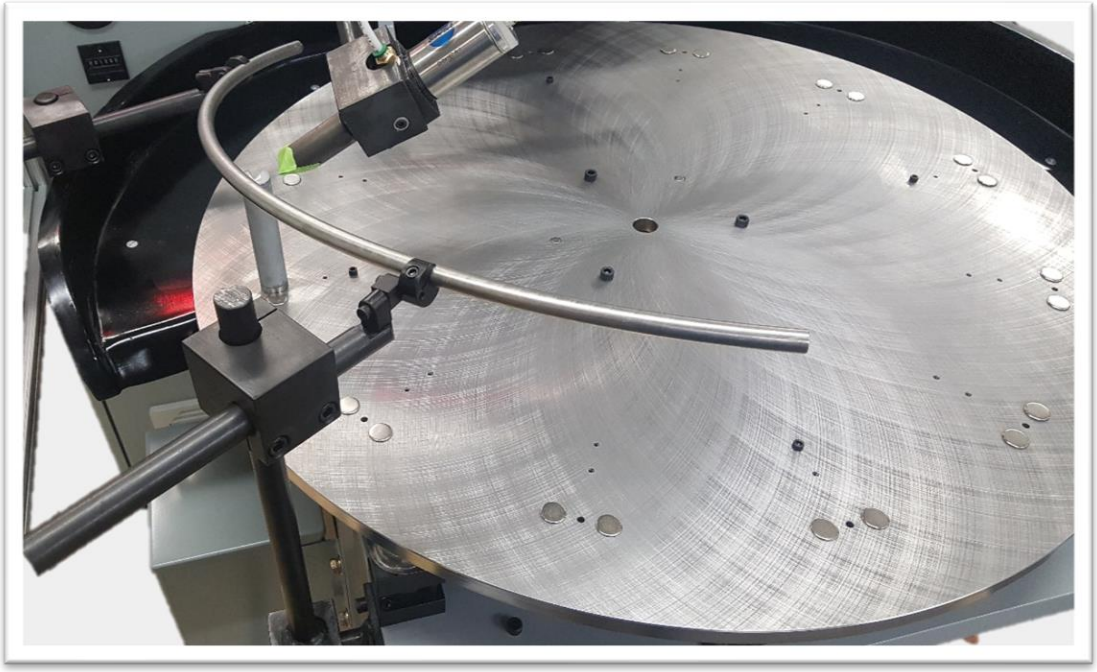
WARNING: Do not turn the water on until the water union is connected to the necessary devices.

DISCONNECTING DEVICES FROM WATER

1. Turn off water.
2. Relieve pressure from water lines.
3. Blow out water lines. This is necessary to prevent water from leaking down into the table.
4. Disconnect water lines from device/s.

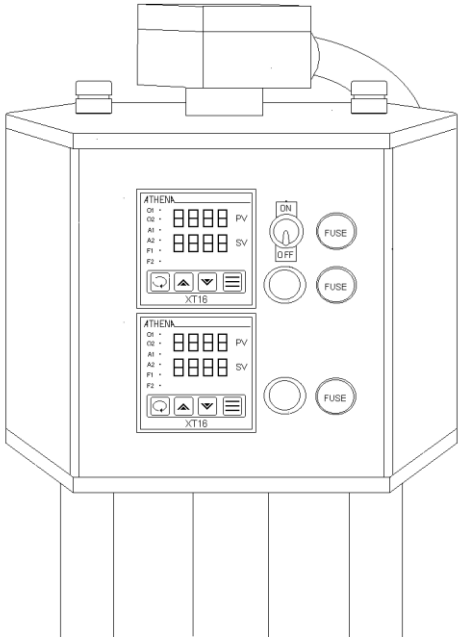
MOLD OPENING RAMP (OPTIONAL)

The optional mold opening ramp is used to open our book style type molds before the mold reaches the operator position. Utilizing roller bearing handles on the mold and this ramp system, a mold can be fully opened or partially opened and closed, hands free. Half ramp systems stop prior to the operator position and requires that the operator close the mold before continuning table rotation, pictured below. A full ramp system runs from the machines 8 o'clock position to the 3 o'clock position and allows the mold top be opened and closed without operator assistance. Full ramp systems requre that the core of the mold, or insert, be small enough for installation/removal without fully opening the mold and to be stable enough during any table movement. A core, or insert, that needs exact placement and stable holding may require the mold to be closed before any movement of the table. No ramp or a half ramp system may be more appropriate for this type of setup.



MOLD HEATING CARROUSEL (OPTIONAL)

The mold heating carrousel can independently heat and control up to 4 molds. Each mold has its own power on/off control switch. Depending on the chosen option, each mold could have one or two temperature controllers. Molds need to be designed with the proper porting to utilize 240VAC cartridge type heaters.



When the control switch is moved to the on position, the temperature controllers will control the heat of the mold.

Pressing the temperature controller's up arrow button will raise the temperature setting. Likewise, pressing the down arrow button will lower the temperature setting. For more information, refer to the temperature controller manual.

MOLD HEATER CAROUSEL DISCONNECT (OPTIONAL)

The mold heater carousel disconnect cabinet is located on the right side of the upper frame.

- Connect a 240VAC 30-amp 3 phase service to L1, L2, and L3.
- Connect ground to cabinet.

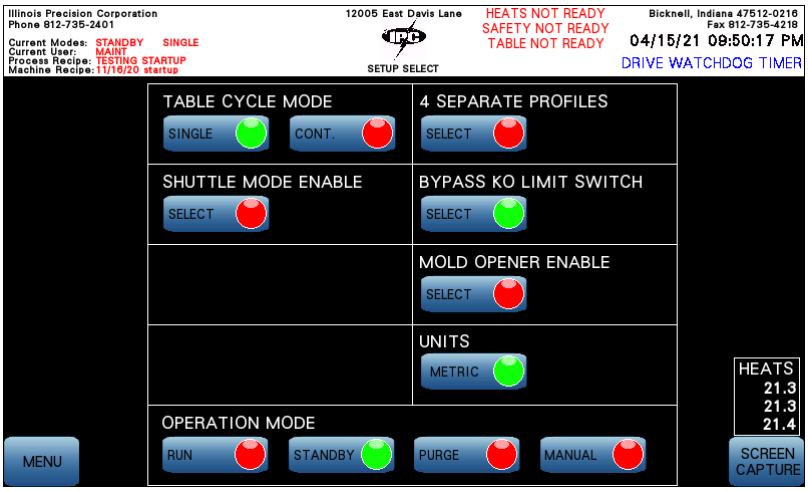
240VAC 30-amp
3-phase

Section 3 – SCREENS AND SET-UP PROCEDURES

MODES OF OPERATION

Before any table movement or operation is possible, both a table cycle mode and an operation mode must be selected.

TABLE CYCLE MODES



The machine can run in two types of cycle modes: single or continuous.

SINGLE

Single cycle rotates the table one position with each press of the cycle start button. This operation is best used if you are running four molds and must stop for an undetermined amount of time at each mold. Otherwise using continuous mode is optimal.

CONT (CONTINUOUS)

Continuous cycle rotates the table automatically. With the activation of the cycle start button the table will rotate continuously until the cycle stop is pressed or the light curtain is broken outside of the load/unload time. When in run mode and the heats up to their setpoint the machine will automatically start running its production cycles.

OPERATION MODES

The machine has five types of operational modes: standby, run, purge, manual, and shuttle.

STANDBY

In standby mode, the machine will not inject, but all table functions are still active. You may cycle the table safely without any flow of plastic.

RUN

In run mode, the machine will inject plastic when a selected position is under the barrel. It will follow the injection profile for that position and set the shotsize for the next position selected to mold. Upon exiting from the barrel position, the mold will trim and knockout, if selected to, and stop at the load/unload (operator) position for time specified by the load/unload timer.

PURGE

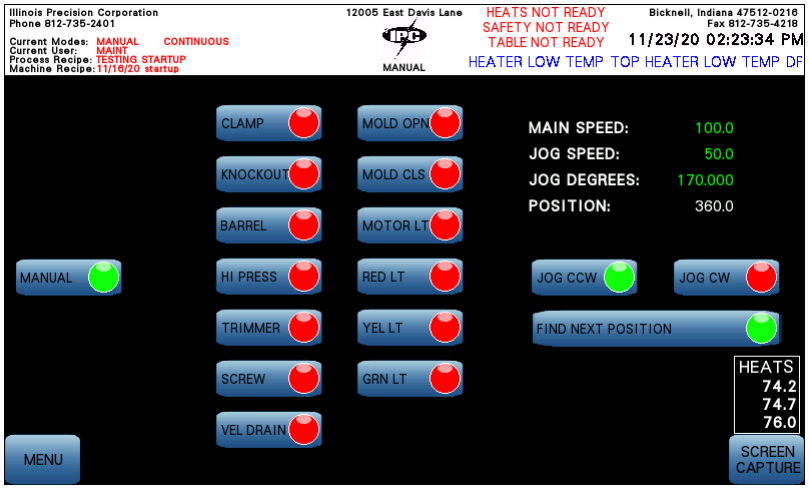
In purge mode, all table functions cease and upon pressing of the cycle start button the machine will cycle through the injection profile of the current position under the barrel. The shotsize will return to the position of the mold under the barrel.

***** Usually performed on the purge block supplied *****

MANUAL

Upon selection of manual mode, pressing cycle start will move the table in increments of a rotation defined by JOG DEGREES and JOG CCW/JOG CW toggle, at the defined JOG SPEED.

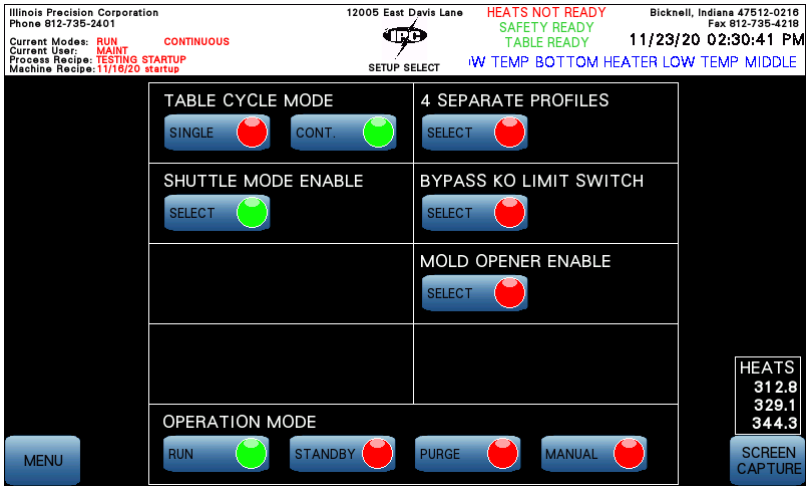
While in manual mode, selecting and holding the individual output toggles on the Manual Functions screen will activate that specific solenoid for the duration of the hold.



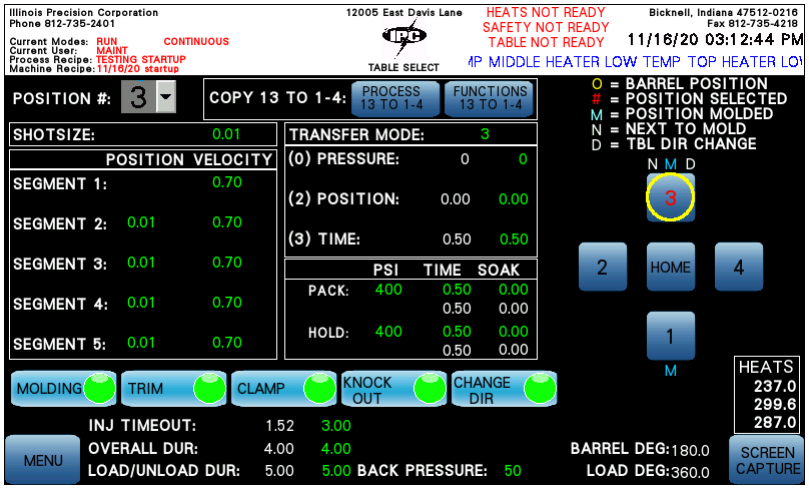
SHUTTLE MODE

Shuttle mode is a setup that allows the machine to rotate 180° to the barrel (CCW) and then back to the load/unload (operator) position following the reverse path (CW). It is beneficial if your leads, molds, or inserts are too long to safely rotate past the top frame. You may only use shuttle mode across two mold positions 180° apart and may only shuttle them on the right side of table rotation. Trimmer and ramp function, if installed, is nonoperational during shuttle setup. Knockouts (Ejectors) are still operational.

To set up shuttle mode you must first turn on the shuttle function by selecting the shuttle toggle on the SETUP SELECT screen.



The point of pivot will be the mold position. Select POSITION # and then the molds position. Select CHANGE DIR. A “D” on the daisy dial represents the point of pivot. In standby mode, check your rotation and function of shuttle. Be sure that the rotation is utilized on the right side of the machine and that shuttle is working properly.



ALL SCREENS HEADER

Each screen shares a header displaying IPC's contact information, the date and time, current settings, and safety information.

The left side of the header shows: Current Modes showing the current selected operation and table cycle mode, Current User showing what level of security is currently signed in, Process Recipe showing the current loaded process recipe, and Machine Recipe showing the current loaded machine recipe.

To the right of the IPC logo are the Ready/Not Ready prompts for the machine. These will change depending on whether the conditions for each are met: Heats for if the temperature falls within the low and high settings, Safety for if all safeties are clear, and Table for if the table is clear to move.

Below the IPC logo displays the current screens name.

Along the bottom right of the header any alarms that affect the current operation modes will scroll across the screen.

SETUP SCREENS

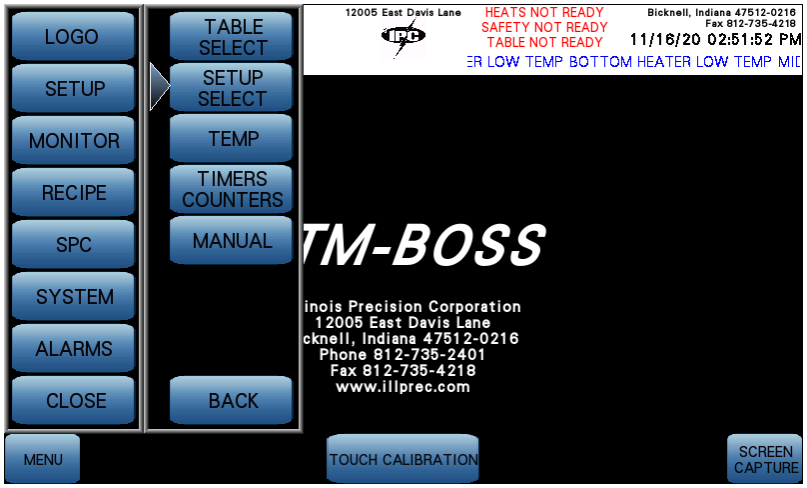
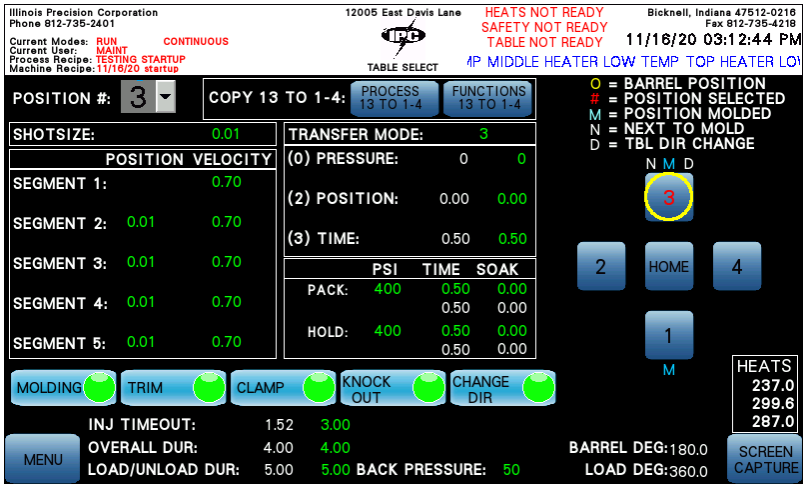


TABLE SELECT

All BOSS machines are setup for four position operation, you may only run up to four individual molds.



The TABLE SELECT screen is the main screen for mold set ups and while running. The daisy dial and other variables provides you information and toggles for properly setting up your machine.

DAISY DIAL

The daisy dial located on the TABLE SELECT screen is a call back to the display on our model HS2V machine and operates relatively the same, to aid for easy integration for customers with operational knowledge of those units.

The number representation equals a mold position. Positions can easily be turned off/on by selecting the number of the desired mold.

By selecting the mold # the # will turn red. The red # will be displayed showing that mold is selected to mold (on state).

The yellow O denotes what position currently resides under the barrel.

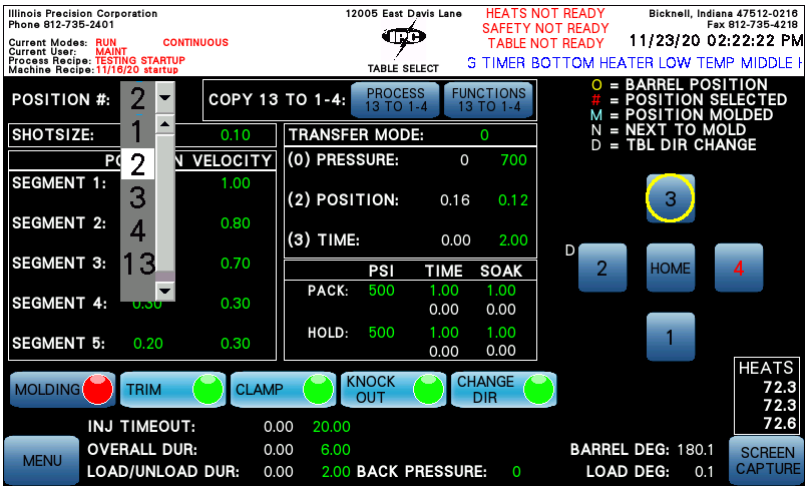
The blue M denotes the position has molded and will trim and knockout, if that function is enabled for that position. It also activates the load/unload timer when in the load/unload position. The M will not clear until that position load/unloads.

Also, on this screen and relative to table position selection is the next to mold "N". This "N" will cycle around from position to position, keeping track of the next mold selected. This aids the operator and the controller in determining the next position selected and the next shotsize to recover to. The machine will set shotsize to the shotsize of the next mold selected.

The home toggle, center of the daisy dial, will reset the position under the barrel to degree 180 (Position 3), operator position to degree 0 (Position 1). Follow the procedures on "HOW TO HOME THE TABLE".

POSITION 1-4

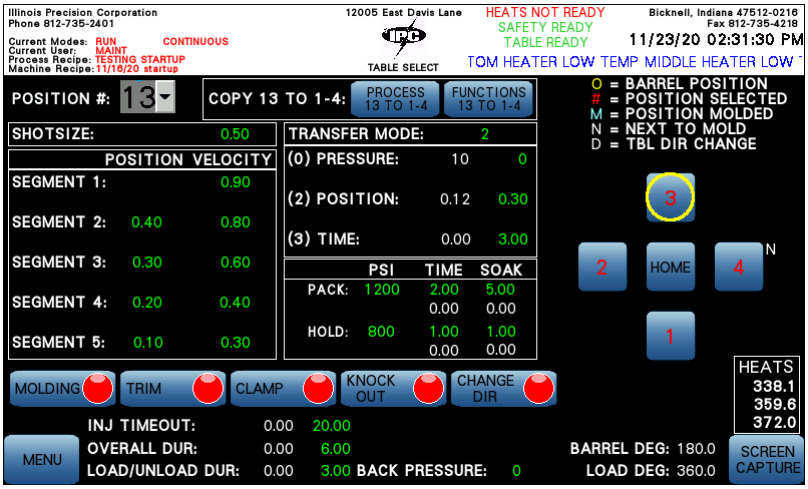
The process of setting up the injection profile is like our BCCL model injection molders. There are five segments of injection positions and speeds that can be utilized before leading into pack and/or hold.



Each mold position on the table has a corresponding injection process screen. The POSITION # drop down describes which positions profile is currently being viewed.

POSITION 13

In the POSITION # drop down there is an extra position toggle labeled position 13. This position is beneficial in quick process changes across multiple molds with the same variables. Any values/functions entered on the Position 13 screen page will be subsequently copied to all molds upon selecting the PROCESS 13 to 1-4 or FUNCTIONS 13 to 1-4 toggle.



PROCESS 13 TO 1-4

This toggle will copy all process variables to all four molding positions. Process variables does not include enabling/disabling clamp, molding, knockout, or trimmer.

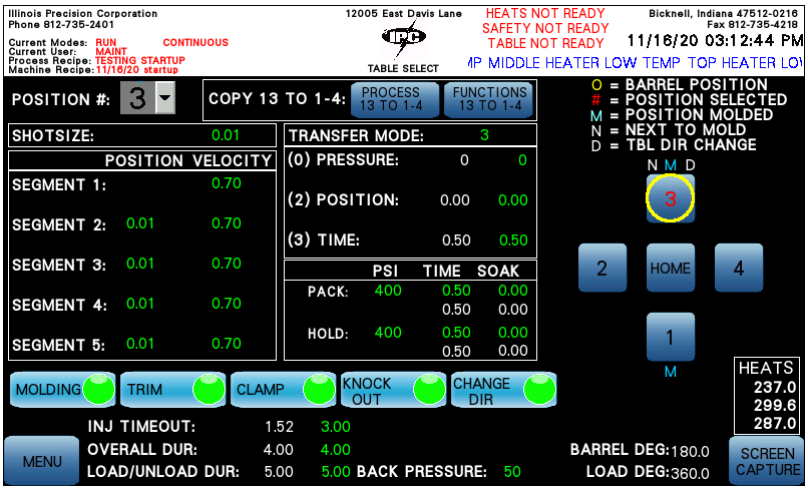
FUNCTIONS 13 TO 1-4

This toggle will copy the selected states of the four molding functions to all four molding positions. Molding functions does not include process variables.

SETTING UP A PROFILE

Calibrations of positions, pressures, and speeds should be performed regularly at scheduled intervals. Being out of calibration will not affect machine operation, only your process variables. Calibration will be discussed in "ANALOG CALIBRATION".

Broken down into 3 stages, the injection profile has stage 1 along the left side of the screen in the segments profile and stage 2 and 3 across the right labeled pack and hold.



The process at which injection runs is as follows:

The process will run from shotsize following segment 1's velocity until it reaches segment 2's position at which time it will switch to segment 2's velocity. It will follow this pattern across the segments until the transfer mode is reached. Once the transfer mode is reached the process will switch to pack mode. Once pack mode is completed hold mode will operate. When hold mode is completed the injection process will cease and the screw will recover. Screw recovery resets the shotsize to the shotsize of whatever position is selected to mold next.

Optimally, this entire process must happen before the INJ TIMEOUT, found on the bottom of the screen, or the OVERALL DURATION timer times out. If the injection timeout or overall duration times out, before the entire process is ran, the screw will retract to its setpoint and production will resume, but the process never fully completed as designed.

The process can be designed with the number of segments you prefer and either pack or hold or neither. But generally, at least one segment and one pressure pack are recommended.

SHOTSIZE

This value is your linear position of the screw and references inches or millimeters depending on the unit selected. 4.00 in / 101.60 mm maximum is equivalent to 5670 centigrams maximum for a 2-ounce machine and 2835 centigrams maximum for a 1-ounce.

Segment Positions are a marker reference of the shotsize to enable that specific segments velocity at the positions setpoint.

VELOCITY

This value is the injection speed referenced in inches per second (in/s) or millimeters per second (mm/s). 4.00 in/s or 101.60 mm/s maximum. Although this value references in/s or mm/s, the value relates to the output of the injection cylinder, 0.00 being 0% output and 4.00/101.60 being 100% output. Use this value to increase/decrease the speed of injection per segment positions.

PACK/HOLD

The two stages after your segment profile to utilize for precise pressure processing. Pack always initializes before hold.

PACK/HOLD PRESSURE

The pressure destination of the stage utilized. This value can be referenced via the injection gauge. It represents Pounds per Square Inch (PSI) or kilograms per centimeter squared (kg/cm²) depending on the unit selected. General maximum value is 1800 PSI / 126 kg/cm², factory max machine pressure.

PACK/HOLD TIME

Total amount of time the stage will operate.

PACK/HOLD SOAK TIME

The amount of time pack/hold pressure will be held constant at the beginning of its pack/hold time. After this timer ends the pack/hold pressure will ramp up or down, depending on the pressure setting of the next stage of the operation, for the remaining duration of the pack/hold time. Pack will ramp to hold pressure and hold pressure will ramp to zero pressure. If pack/hold time and its soak time are equal then pack/hold pressure will stay constant throughout pack/hold time and will jump instantly to the next pressure stage, or zero pressure if in the hold stage.

TRANSFER MODE

There are three different modes of transferring from the segment profile to pack/hold stage: 0=Pressure, 2=Position, 3=Time. Select a preferred transfer indicator by entering the number corresponding to the transfer indicator in the transfer mode selection setpoint. Enter a value into that specific transfer indicator setpoint. As the process is running when the value of the transfer indicator is met the process will transfer from the segment profile to the pack/hold stages.

0=PRESSURE

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the injection pressure reaches its transfer indicator setpoint.

2=POSITION

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the shotsize position reaches its transfer indicator setpoint.

3=TIME

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the injection time reaches its transfer indicator setpoint.

*** Note on process setup *** When setting process positions, velocities, transfers, and pack/hold variables you must remember to have adequate times setup in the injection timeout and clamp duration timers. These two timers will cease all process variables when timed out.

MOLDING/TRIMMER/CLAMP/KNOCKOUT

These toggles enable/disable that specific function on individual molds.

CHANGE DIR (CHANGE TABLE DIRECTION)

If running in shuttle mode, this toggle designates if this position is a pivot point. If activated, a corresponding “D” will display on the Table Selection screen beside the position toggles that represent that position.

INJ TIMEOUT

The maximum allotted time for an injection profile to go through its process before injection is halted and the screw begins to retract, whether the whole process was achieved or not. Usually set up as a safety to ensure the injection process does not continue for too long.

OVERALL DUR

Clamp duration (OVERALL DUR) gives you a value and a setpoint for the time the clamp will be engaged during a molding process. This time is individual and can be different for every mold individually. Think of this time as your overall process time. Injection occurs within this time and the table will not rotate until this time expires unless the clamp is not enabled. If the clamp is not enabled, then the injection time denotes the overall process time.

LOAD/UNLOAD DUR

The load/unload time designates how long an operator can be within the light curtain during the load/unload process without tripping an alarm. The load/unload position is at the operator position. This time is only beneficial in continuous mode. Pressing cycle start while the safeties are clear will cancel this time and allow the table to continue rotating back to the injection position. When a position is molded and rotates to the operator position you must wait for the green tower light before entering the work area, and you must be out before the timer counts down completely. Otherwise, you must reset the safeties before resuming production.

BACK PRESSURE

This setpoint will put added pressure on the injection cylinders while the screw is recovering. The max pressure setting for back pressure is 100 PSI / 7 kg/cm^2.

SETUP SELECT

The Setup Select screen gives you access to several bypasses and setup toggles.

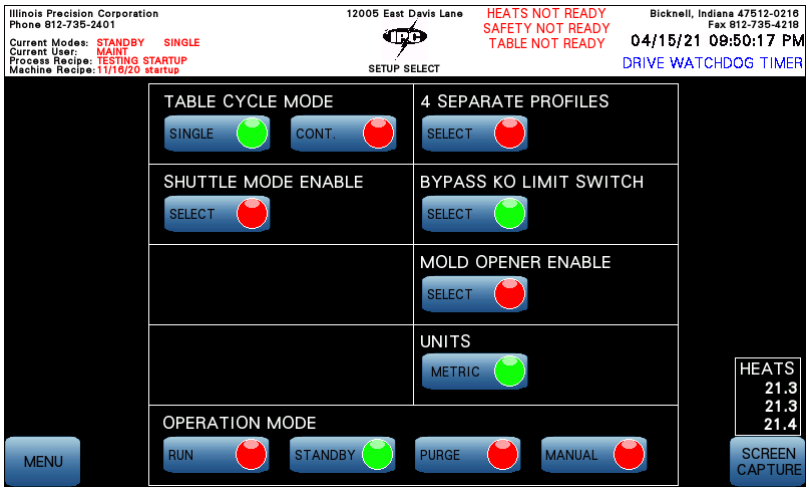


TABLE CYCLE MODES

These two toggles, SINGLE and CONT., enable which cycle mode, detailed in MODES OF OPERATION, is used.

4 SEPARATE PROFILES

Selecting this toggle will enable/disable the ability to run four unique individual molds or for all molds to run the same profile, position 13. When enabled, positions 1-4 are setup per their individual screens. When disabled position 13 is the process screen and all adjustments made to 13, other than changes to mold functions, will affect all positions selected to mold.

SHUTTLE MODE ENABLE

This is the toggle to enable/disable shuttle mode, detailed in MODES OF OPERATION .

BYPASS KO LIMIT SWITCH

This toggle bypasses the knockout limit switch, located on the knockout cylinders, if it malfunctions. If bypassed, the knockouts will run for the time specified by the knockout duration timer located on the TIMERS/COUNTERS screen. When not bypassed, the knockout duration timer becomes an error timer for this switch.

MOLD OPENER ENABLE (OPTIONAL)

If option is installed, this toggle will enable a mold opening sequence that provides two additional 24VDC outputs, two delays, and two duration timers running concurrently at the machines 9 o'clock position. Specifically designed for a mold opening hydraulic cylinder, extend and retraction.

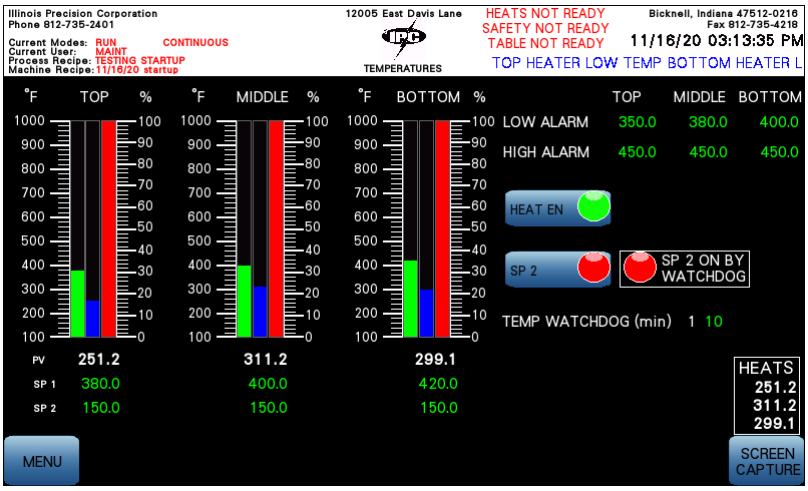
UNITS

The METRIC toggle will enable/disable metric units, converting temperature to Celsius, pressure to kg/cm², position (inches) to millimeters and velocity (in/s) to mm/s when toggled on. When switching between units, pressure and temperature values will automatically convert, but position and velocity values must be manually changed to the corresponding measurement.

OPERATION MODE

These are the 4 toggles for the modes of operation, RUN, SINGLE, PURGE, and MANUAL, detailed in MODES OF OPERATION.

TEMPERATURES



There are three zones of heats: top, middle and bottom, feed, metering and nozzle, respectively. Each zone has a settable low, high, and second setpoint.

HEAT EN (HEATERS ENABLE)

To enable/disable the heats select the HEAT EN or heaters enable toggle. Once the heats are enabled, they will start to climb to setpoint, visually referenced by the bar graphs and heat values.

SP1/SP2

There are two setpoints for the heats. SP1 is the main setpoint and should be set at the main operational heat. SP2 is a secondary setpoint that is utilized when operation is suspended but allowing the heats to drop to room temperature is not desired. Toggle between the two setpoints by the SP2 toggle.

If the machine sits idle, without injecting, for the time specified by the temp watchdog timer the system will switch from SP1 to SP2 automatically and the heats will begin to drop to SP2. The yellow tower light will flash to alert the operator this has occurred. This is a safety setting so by selecting the reset safety pushbutton it will automatically revert to SP1 and begin reheating the system. If you manually select the SP1/SP2 toggle then the safety reset will not revert the heats to SP1, you must manually select the SP2 toggle to revert to SP1.

TEMP WATCHDOG

This counter allows for the disabling of SP1 after an extended period. It is based in minutes and will toggle the heats setpoint from SP1 to SP2 if no injection occurs within its time base. Upon selecting safety reset SP2 will reset back to SP1.

LO ALARM

This setpoint is a low alarm warning for the heats that restricts the operation of an injection/purge cycle from beginning until its setpoints are reached across all heat zones.

HI ALARM

This setpoint is a high alarm warning for the heats that restricts the operation of an injection/purge cycle from beginning until its setpoints are reached across all heat zones.

TEMP MONITOR

Most screens display the current temperatures in a HEATS list at the bottom right of the screen for easy monitoring of the temperatures.

TIMERS/COUNTERS

This page allows for adjustment of machine function timers and machine molding timers. ***The above picture shows the factory settings for this machine***

Production Counters and System Counters are also displayed.

FUNCTION TIMERS

KNOCKOUT DELAY

Delay before the knockout cylinders will activate once in position.

KNOCKOUT DURATION

How long the knockout cylinders are given to activate the knockout limit switch before an alarm is tripped. If the knockout limit switch is bypassed, it is utilized as an actual duration timer for the knockout cylinders.

KO COMP TBL DELAY

How long after activating the knockout limit switch or timing out the duration timer before the table can move, used to allow the knockouts to be fully retracted before the table rotates.

TRIMMER DELAY

Delay before the trimmer cylinder will activate once in position.

TRIMMER DURATION

How long the trimmer cylinder will stay activated.

CLAMP DELAY

Delay before the clamp cylinder will activate once in position.

CLAMP COMP TBL DELAY

How long after deactivating the clamp cylinder before the table can move, used to allow the clamp cylinder to be fully retracted before the table rotates. If the clamp is not enabled, this timer is used for a delay after the injection cycle before the table rotates.

MOLDING TIMERS

INJECT DELAY

Delay before the injection cycle will activate once in position. This timer activates after the clamp duration activates unless the clamp is not enabled.

HI PRESSURE DELAY

Delay before the pump is spooled to high pressure during an Injection cycle. This timer activates before the injection cycle begins.

SCREW DELAY

Delay before the screw motor will activate after the injection cycle ends or injection timeout or overall duration is reached.

SCREW OVERTIME

How long the screw is given to reach shotsize before an alarm is tripped.

MO EXTEND DELAY(OPTION)

Delay before the mold opener cylinder will activate once in position.

MO EXTEND DURATION(OPTION)

How long the mold opener cylinder will stay activated.

MO RETRACT DELAY(OPTION)

Delay before the mold opener cylinder will begin to retract.

MO RETRACT DURATION(OPTION)

How long the mold opener cylinder is given to retract.

PRODUCTION COUNTERS

These counters keep track of how many injection cycles each individual mold position has gone through as well as an overall count of all positions (Position 13). Each counter can be cleared with their corresponding toggle to the right of the counter.

SYSTEM COUNTERS/HRS

These counters keep track of the various run times of the machine, measured in hours.

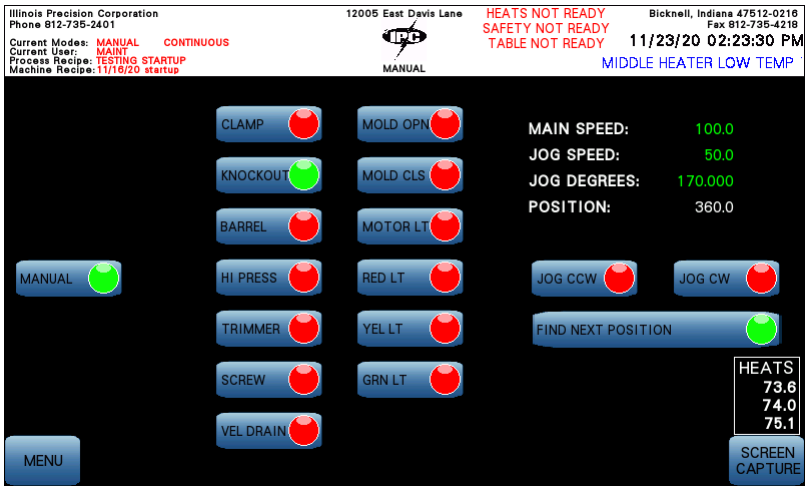
Power On shows the time the machine has been turned on.

Pump On is the time the motor has been running.

Oil Filter is the time the motor has been running with the current oil filter. This counter allows you to input a set-point for the maximum time you would like the oil filter to be used before replacement. Once the set time has been met, an alarm warning will be shown letting you know it is time to replace the oil filter. This alarm will not restrict any operation. The clear toggle allows this counter to be reset when needed.

Cycle On is the time the servo drive has been in in motion.

MANUAL



To access the manual mode, you must first select the manual toggle either on the SETUP SELECT or MANUAL screen. Upon selection of the manual toggle, selecting cycle start will move the table the degrees specified by JOG DEGREES in the direction specified by the JOG CCW/JOG CW toggles at the speed specified by JOG SPEED, all located on the MANUAL screen. This is beneficial in offsetting the table. Once jog is completed, select the FIND NEXT POSITION toggle to relocate the table in position.

Note. The table can also be moved by hand safely while the light curtain is tripped.

FIND NEXT POSITION is used to realign the table from an offset position or move the table to the next position. The indicator on the right of the button shows whether it is properly aligned, green, or misaligned, red.

Note. Depending on your setup, FIND NEXT POSITION could move the table quickly and unexpectedly. Be cautious that all molds and table items are clear and accounted.

While in manual mode, selecting and holding the individual output toggles on the MANUAL screen will activate that specific solenoid or light for the duration of the hold.

MAIN SPEED

Sets the speed of the table during normal rotation.

JOG SPEED

Sets the speed of the table during jog rotation or interrupt rotation.

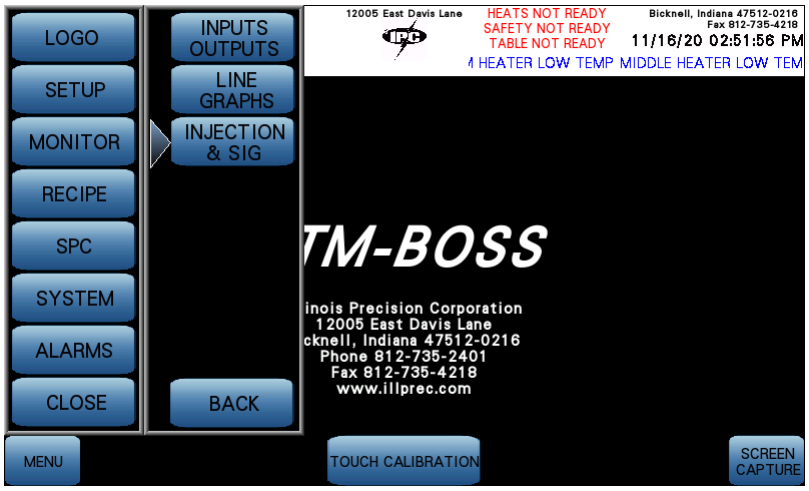
JOG DEGREE

Degree of rotation when jogging.

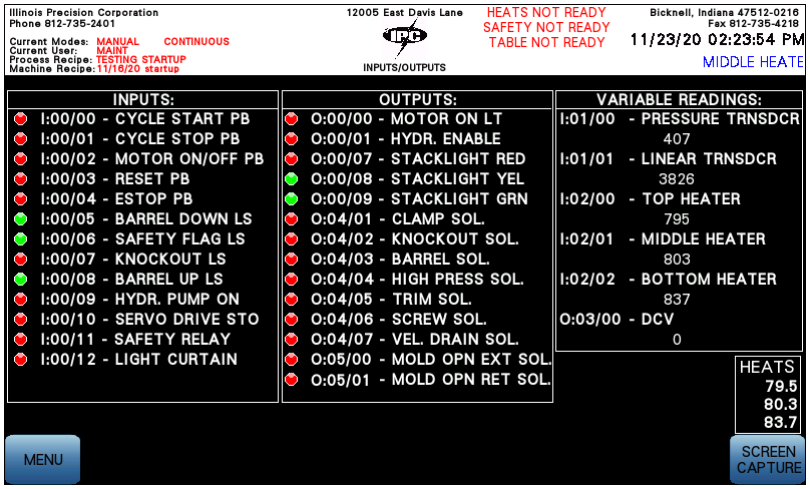
POSITION

Current degree of the table located at the operator position.

MONITOR SCREENS



INPUTS/OUTPUTS



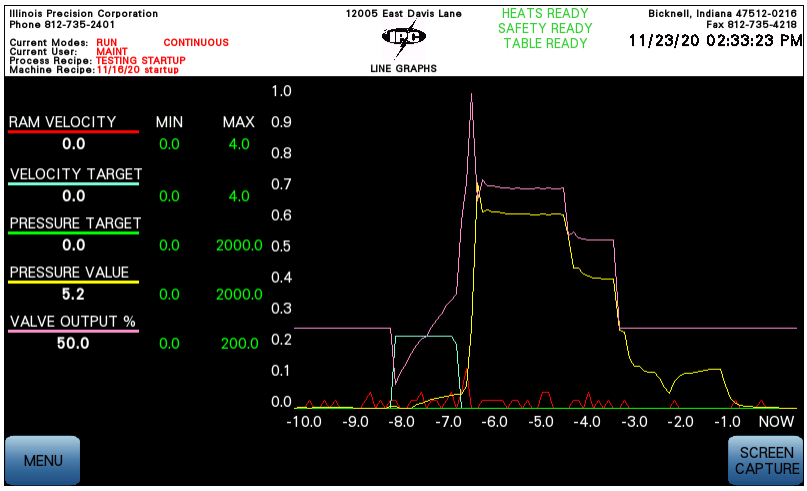
Specifically designed for troubleshooting and verification purposes, this screen gives the operator access to current on/off states of the inputs and outputs in the system, as well as logic address #'s

Each line contained in the inputs/outputs columns provides you a description of all the available functions on the machine, the address number for that function, and a green/red sprite corresponding with an on/off state of that function.

Variable Readings is the raw data the logic uses to produce the actual values for each of the listed inputs/outputs in this column.

LINE GRAPH

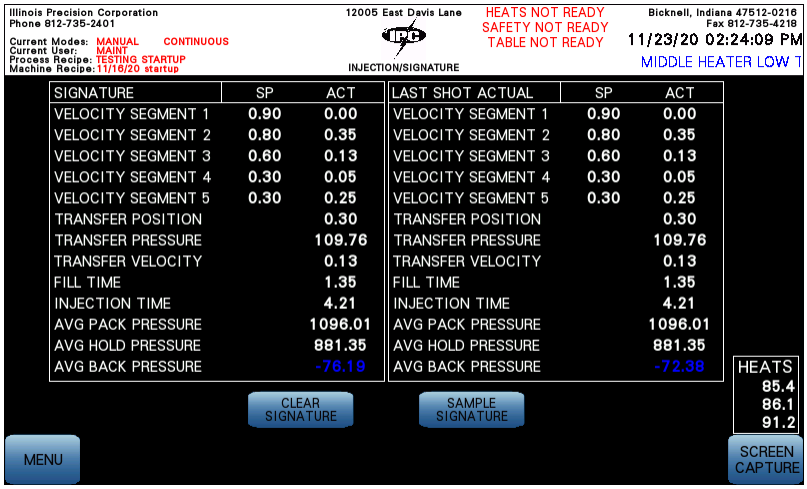
Line graphs can be used to display the active profile setpoints and the actual process value on the screen in comparison.
The MIN and MAX values relate to the 0.0 and 1.0 on the left of the graph respectively.



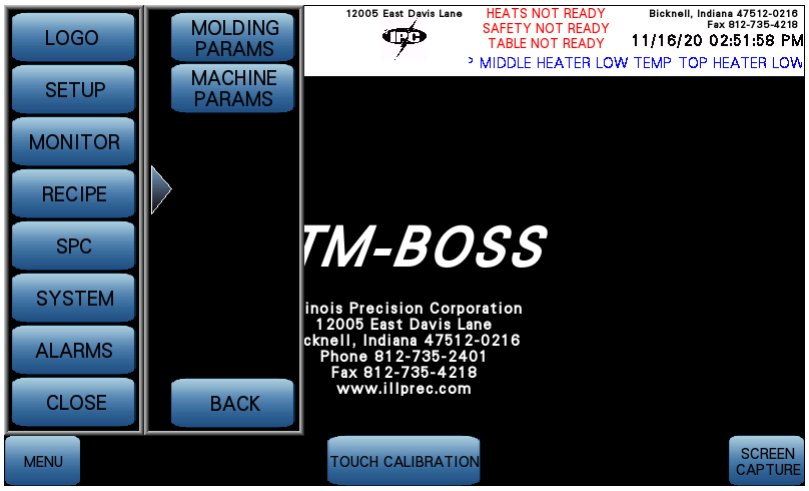
INJECTION SIGNATURE

The Injection Signature screen can capture and sample the values of the last shot produced, the left panel, and then show every actual shot, right panel, thereafter for comparison.

After a known good produced part, select the SAMPLE SIGNATURE toggle and the left panel will be popluted with all the values available for that specific parts process. Further production will constantly update and repopulate the right panel. Compare each process with a known good process. If you want to clear the sample then select the CLEAR SIGNATURE toggle.

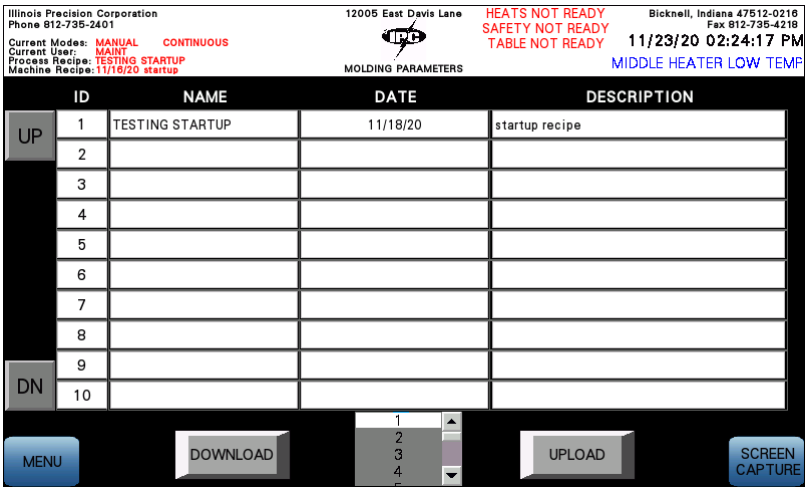


RECIPE SCREENS

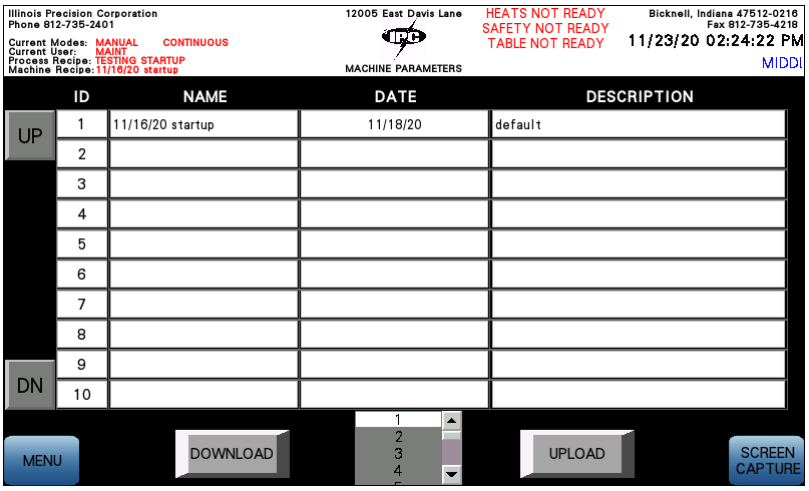


MOLDING/MACHINE PARAMETERS

Process Recipe is the current loaded process recipe on the system. There are 100 lines available to save process recipes.



Machine Recipe is the currently loaded machine recipe on the system. There are 20 lines available to save machine recipes on the MACHINE PARAMETERS screen.



The recipes do not automatically save. Any process changes made throughout production must be resaved into the recipe database via the MOLDING PARAMETERS screen and changes done to machine timers resaved via the MACHINE PARAMETERS screen.

A distinction that needs to be made is the difference between a Process Recipe and a Machine Recipe. A process recipe is all process specific variables: mold parameters, heats, molding timers, etc. Machine recipes are machine specific parameters, such as calibrations and timers related to the machine that do not change with process changes. If changes are accidentally made to machine settings, then that machine recipe can be reloaded to revert the changes. If calibration is redone on the machine, the old machine recipe should be deleted and a new resaved.

DOWNLOAD/UPLOAD

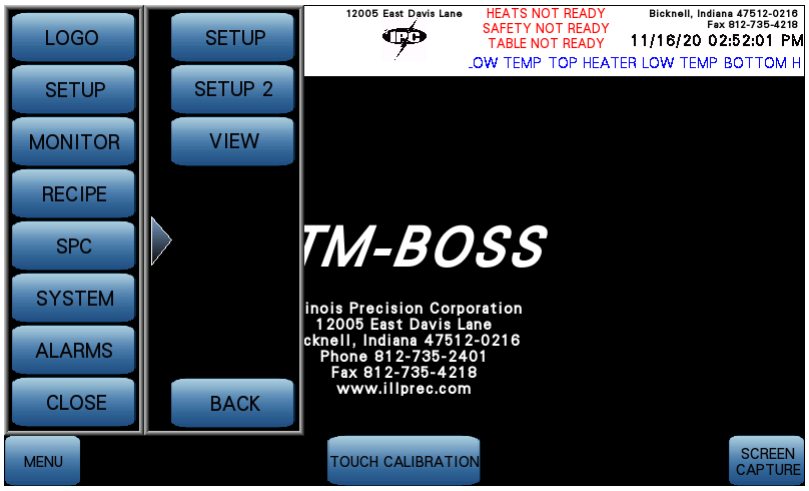
Choose the database line # in the scroll menu at the bottom of the screen and then select the DOWNLOAD toggle to load the selected recipe or the UPLOAD toggle to save the current settings to the selected recipe line #.

NAME/DATE/DESCRIPTION

Selecting these fields bring up an appropriate text entry box allowing proper text entry for their respected description.

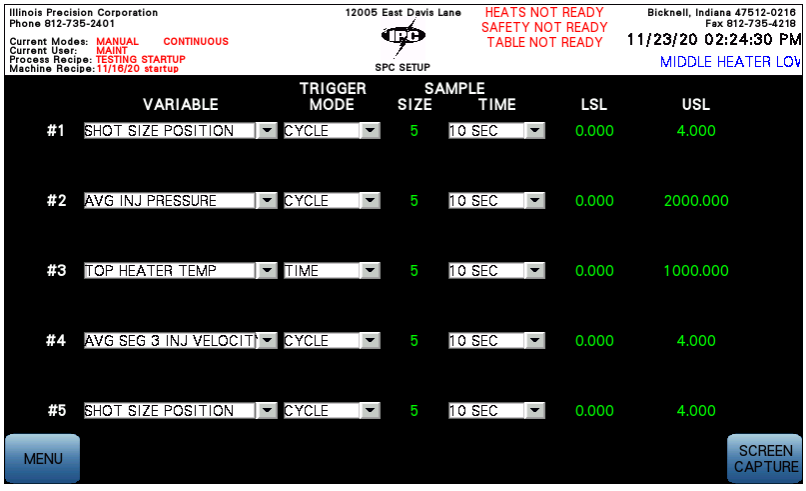
If updating one of these fields, the change will not be saved unless the UPLOAD toggle is used.

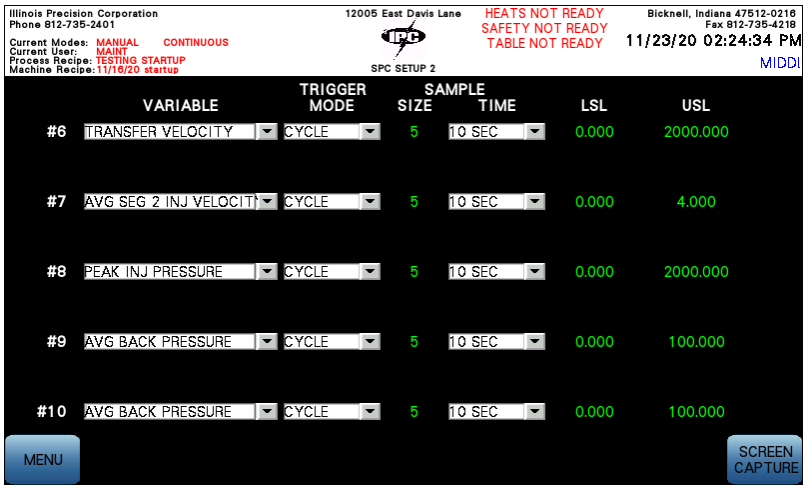
SPC SCREENS AND SETUP



Statistical Process Control (SPC) provides for the simultaneous calculation of ten different user selectable parameters. Select process values from the system can be selected as an SPC parameter via the VARIABLE drob down. Each of the ten parameters allows selection of time or event based triggering, time between readings, time between sample groups, and upper and lower control specification limits. Calculated X-Bar, R, X-BarBar, R-Bar,Standard Deviation, LCLX, UCLX, Cr, Cp, and CpK values are displayed on the SPC VIEW screen for each of the variables selected.

To record SPC values a USB stick must be inserted into the back of the HMI. Once inserted the values will be loaded onto the USB automatically until it is removed.




Illinois Precision Corporation
Phone 812-735-2401
Current Modes: MANUAL CONTINUOUS
Current User: MAINT
Process Recipe: TESTING STARTUP
Machine Recipe: 11/16/20 startup
12005 East Davis Lane
SPC SETUP 2
HEATS NOT READY
SAFETY NOT READY
TABLE NOT READY
Bicknell, Indiana 47512-0216
Fax 812-735-4218
11/23/20 02:24:34 PM
MIDDI
VARIABLE
TRIGGER MODE
SAMPLE SIZE
TIME
LSL
USL
#6 TRANSFER VELOCITY CYCLE 5 10 SEC 0.000 2000.000
#7 AVG SEG 2 INJ VELOCIT CYCLE 5 10 SEC 0.000 4.000
#8 PEAK INJ PRESSURE CYCLE 5 10 SEC 0.000 2000.000
#9 AVG BACK PRESSURE CYCLE 5 10 SEC 0.000 100.000
#10 AVG BACK PRESSURE CYCLE 5 10 SEC 0.000 100.000
MENU
SCREEN CAPTURE


Illinois Precision Corporation
Phone 812-735-2401
Current Modes: MANUAL CONTINUOUS
Current User: MAINT
Process Recipe: TESTING STARTUP
Machine Recipe: 11/16/20 startup
12005 East Davis Lane
SPC VIEW
HEATS NOT READY
SAFETY NOT READY
TABLE NOT READY
Bicknell, Indiana 47512-0216
Fax 812-735-4218
11/23/20 02:24:40 PM
MIDDLE HEAT
VARIABLE
1
Xbar 0.000
R 0.000
Xbarbar 0.000
Rbar 0.000
Std. Dev. 0.000
LCLX 0.000
UCLX 0.000
Cr 0.000
Cp
Cpk nan
MENU
SCREEN CAPTURE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SPC VIEW
HEATS NOT READY
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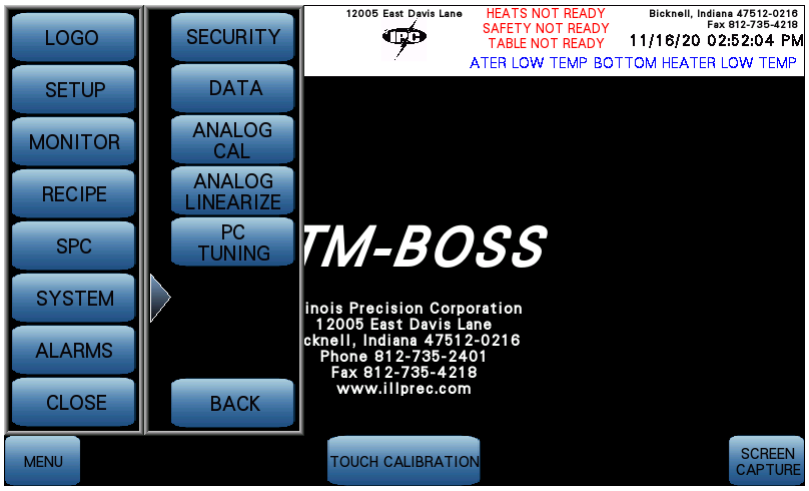
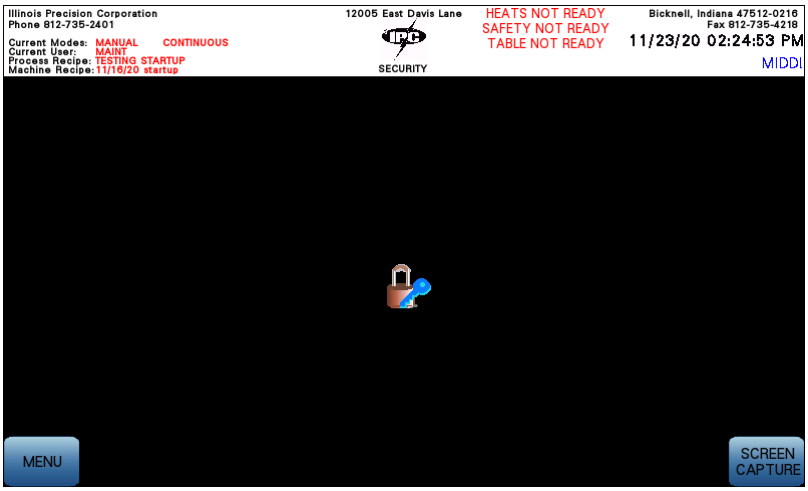
Bicknell, Indiana 47512-0216
Fax 812-735-4218
11/23/20 02:24:43 PM
MIDDLE HEATER LOW TEMP TOP H
VARIABLE
1
1
2
3
4
5
Xbar 0.000
R 0.000
Xbarbar 0.000
Rbar 0.000
Std. Dev. 0.000
LCLX 0.000
UCLX 0.000
Cr 0.000
Cp inf
Cpk nan
MENU
SCREEN CAPTURE

SYSTEM SCREENS



SECURITY

The SECURITY screen gives you access to login to different security levels. Select the lock and key at the center of the screen brings up access to the security login box. Enter in the appropriate login User/Password as described below and select Login. Current User will reflect the user level logged in. When the Current User is blank then the system has reverted back to Current User Level 0 with limited access.

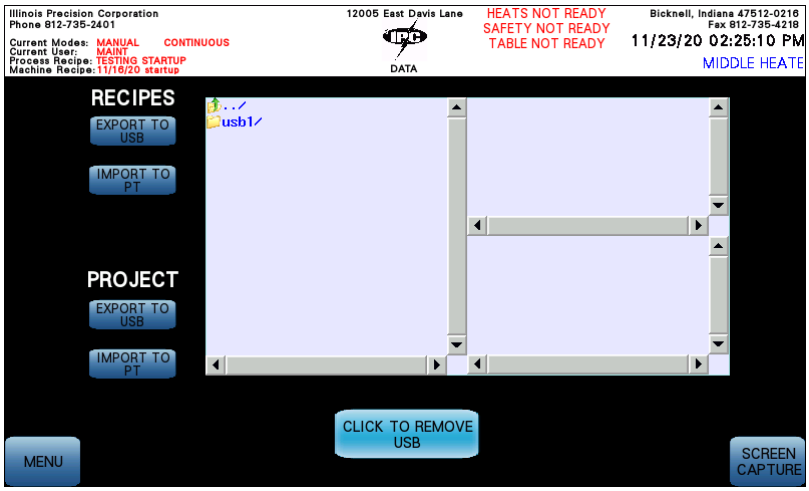


PASSWORDS

Current User level 0	(Blank)		
Current User level 1	USER	1234	240 min time limit
Current User level 2	ENG	1397	30 min time limit
Current User level 3	MAINT	2401	30 min time limit

DATA

The DATA Screen allows copying of recipes across the internal storage and external storage devices. Use EXPORT TO USB toggle to load recipes onto the USB and IMPORT TO PT toggle to load recipes from the USB onto the HMI.



It is recommended to use the CLICK TO REMOVE USB toggle at the bottom of the screen to safely remove the USB from the HMI.

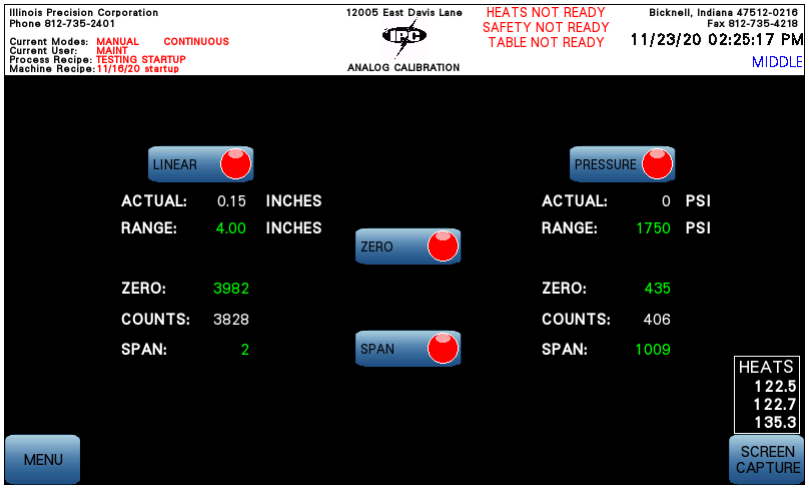
ANALOG CALIBRATION

Calibrations of positions and pressures should be performed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.

Being out of calibration will not affect machine operation, only your process variables.

Only qualified maintenance personnel should perform calibrations.

All calibration setup values are set at the factory and should not be altered FOR ANY REASON!



The following procedure will adjust the zero and span values of the linear line. The values zero and span displayed will change as the calibration is performed. Range (4.00 and 101.6 for metric) is factory set and should not be adjusted.

1. Locate the purge block under the barrel.
2. Bring heats up to temperature.
3. Select purge mode.
4. Purge the machine by pushing the cycle start button.
5. While purging and the stroke of the screw is in the fully down position disable the pump by pressing the E-stop button. When the screw mounting plate is against the black rings on the guide rod the machine has reached its bottomed-out position.
6. Verify that the shotsize sensor is installed correctly: adjust the shotsize sensor so that it is square with the machine and that the tip is "just" touching the screw housing plate.
7. With the shotsize sensor in the fully down position, select the LINEAR toggle.
8. With the LINEAR toggle "ON", hold the zero toggle.

9. The zero counts will change to reflect the current counts on the Counts line.
10. Verify that the linear toggle is still “ON”.
11. Have an assistant span the shotsize sensor to its full travel, 4 inches, and hold it there, a 4” gauge block can also be used to hold up the sensor.
12. Hold the span toggle.
13. The span counts will change to reflect the current counts on the Counts line.

Calibration for the Analog Linear Shotsize Sensor is complete.

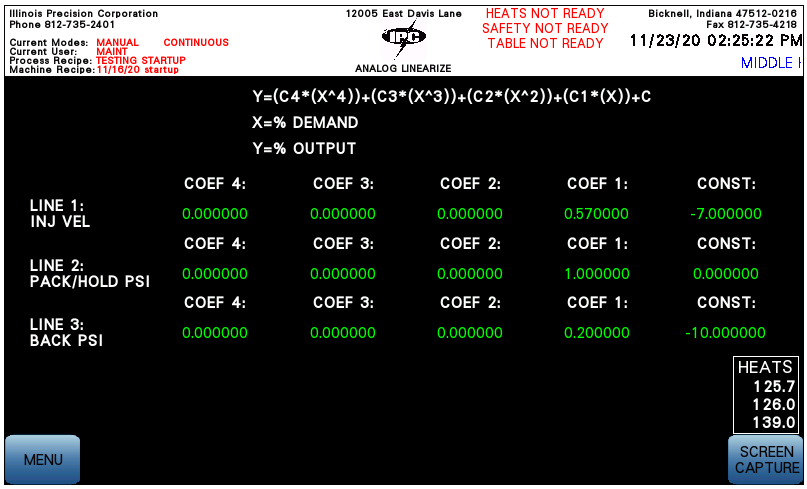
The following procedure will adjust the zero and span screen values of the pressure line. The values zero and span displayed will change as the calibration is performed. Range (1750 and 123 for metric) is factory set and should not be adjusted.

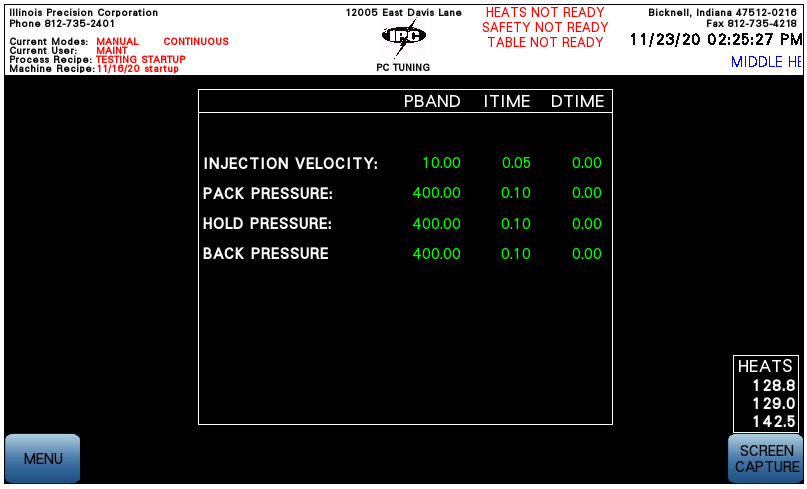
1. Locate the purge block under the barrel.
2. Bring heats up to temperature.
3. Go to the TABLE SELECT screen and adjust the running process, be it 13 or 1-4, to run a Pack and Hold pressure of 1750 PSI or 123 kg/cm² depending on the current units in use.
4. Purge the machine and verify the process is designed to reach the set PACK/HOLD pressures.
5. Return to the ANALOG CALIBRATION screen
6. Select the PRESSURE toggle.
7. With the PRESSURE toggle “ON”, system idle, hold the zero toggle.
8. The zero counts will change to reflect the current counts on the Counts line.
9. Verify that the pressure toggle is still “ON”.
10. Purge the machine and let the systems injection process stabilize.
11. Hold the span toggle.
12. The span counts will change to reflect the current counts on the Counts line.
13. Test the system by changing the PACK/HOLD variables to see the injection gauge change accordingly.

Calibration for the Analog Pressure is complete.

ANALOG LINEARIZATION AND PC TUNNING

Two other screens that are calibration specific are pictured below: ANALOG LINEARIZATION and PC TUNING. These screens are set at the factory and should not be adjusted. Values displayed are factory set values.





ALARMS

The ALARM screen gives you access to all the alarm descriptions.

Each alarm is documented in a chronological order and are automatically stored and erased as space provides.

Each line of the alarm log screen provides the following information:
Date – Time – Acknowledged Time – Cleared Time – Description

If an alarm exists and has not been reset, you will see the alarm scroll across the top right of the screen within the screen header.

Section 4 – MACHINE SET-UP

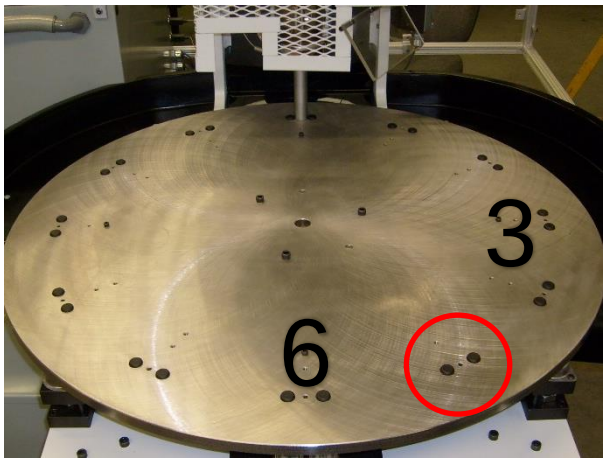
HOW TO INSTALL A MOLD

All our molding machines are designed to work in accordance with our book mold design. And the operational aspects of our machines ensure that the sprue hole is always center to our injection nozzle. Our book mold design ensures this by having one mount hole for a 10-32 FHCS directly inline of the mold sprue hole. Twisting of the book mold is usually not an issue, but if need be, the bottom of the mold can be slotted to accept an added bolt head for the rear of the mold allowing two points of contact and zero twisting. This alignment also ensures that the knockouts are always contacting the underside of the mold correctly.

To mount a new mold in a molding position, first define the molding positions by placing the machine in standby mode and cycle the table. The four positions that stop under the barrel are the current selected molding positions. When the molding position you desire is at the machines 6 o'clock position, place the machine in manual mode and JOG the table CCW so that the center mount hole is clear of the knockouts and is easily accessible. Mount your mold to the table using the appropriately sized 10-32 FHCS. Now use the FIND NEXT POSITION toggle to realign the table. Place the machine back in standby mode and continue your setup or keep the machine in manual mode and start setting up the next position for a mold.

A faster way to access molding positions is to break the light curtain during rotation when the molding position is halfway between the 6 o'clock and 3 o'clock machine position. This will allow the molding position to clear the knockouts enough to allow you access to the mounting hole underneath the table. Once installed, resetting the safeties and selecting cycle start will automatically realign the table to its correct molding position.

The table can also be moved by hand safely while the light curtain is tripped for easy access to the molding positions.



HOW TO HOME THE TABLE

The table must be properly homed for injection processes to be executed properly.

To HOME the table:

- Place the machine in manual mode and JOG the table so that an empty molding position is close to the operator position.

- Move the table by hand so that the ejector pins are lined up in the center of the ejector holes in the table.

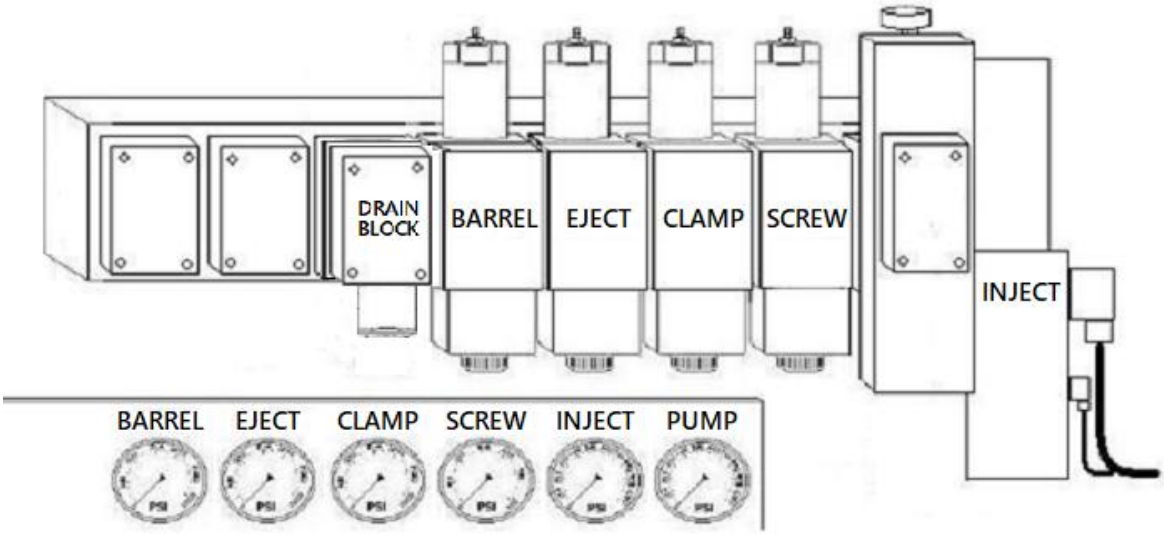
- Hold the KNOCKOUT toggle while in manual mode to ensure the ejectors can properly come up through the table. If ejectors are unable to come up repeat last step until they come up through the table.

- Navigate to the TABLE SELECT screen. Hold the HOME toggle for 3 seconds, located in the center of the Daisy Dial. The BARREL DEG and LOAD DEG should update to 180.0 and 0.0, respectively.

Once the table is homed, the position information will save in the servo drive and should not require the machine to be homed again unless an error occurs or the battery on the servo drive has become faulty.

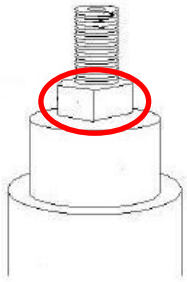
HOW TO ADJUST/SET PRESSURES

Open the right-side panel on the base of the machine to gain access to the necessary hydraulic controls.



To adjust machine pressures:

- On the reducing valve for the solenoid, loosen the jam nut and adjust the stud to the desired pressure.
- Tighten jam nut.



NOTE - Clamp & screw reducing valves must be adjusted while the system is in high pressure. This can be accomplished by using manual mode or by manually spooling the solenoids.

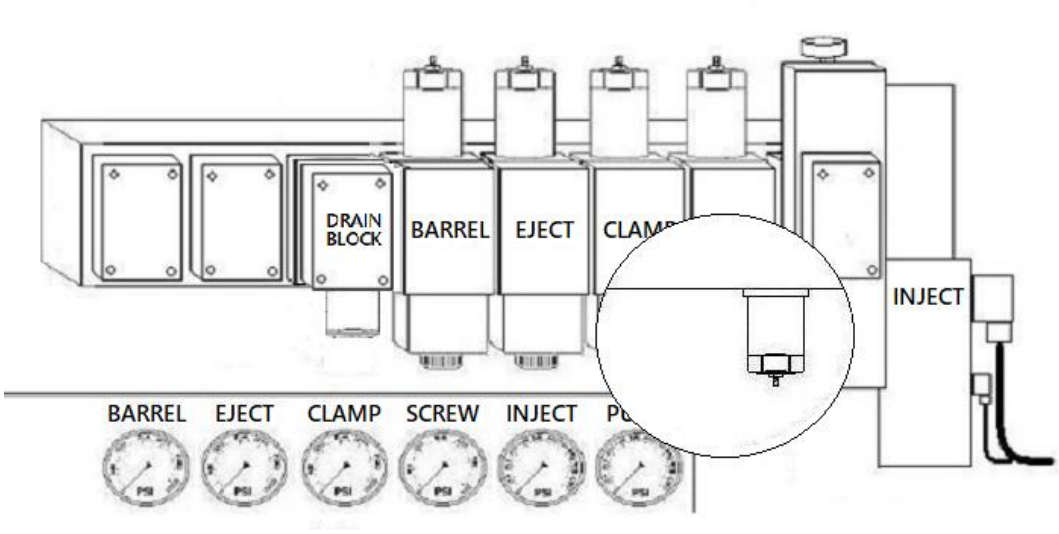
The snubber valves on the back of each gauge should only be opened when adjusting or troubleshooting. This will help extend the life of the gauges.

HOW TO ADJUST THE MAIN RELIEF VALVE

There is one relief valve on this machine. It is utilized for directing pressure spikes to the tank. If this valve is adjusted wrong or is not working correctly it will cause a loss of pump pressure and elevated oil temperatures.

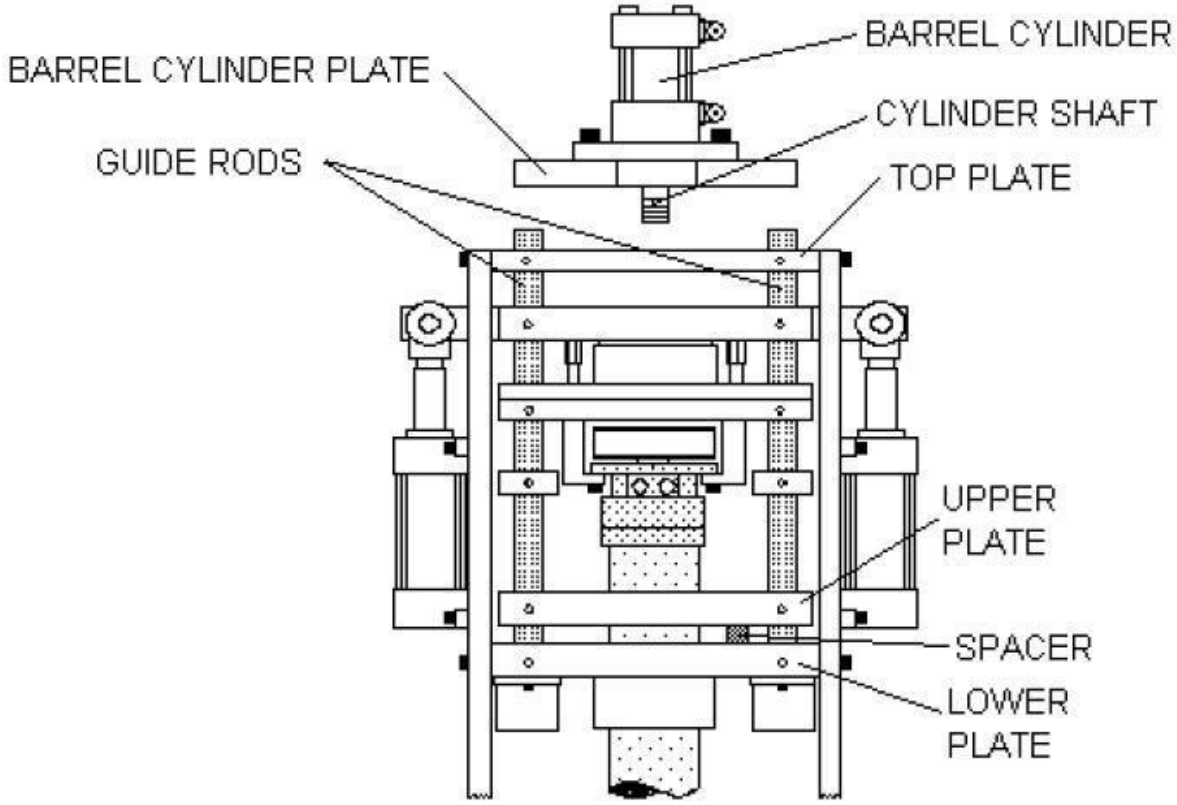
Open the right-side panel on the base of the machine to gain access to the necessary hydraulic controls. The main pressure relief valve is located on the bottom of the hydraulic manifold towards the right end of the manifold closest to the injection valve.

- Loosen the jam nut and turn the stud all the way clockwise (highest pressure).
- Place pump in high pressure.
- Check the pump high pressure setting.
- Adjust the high pressure setting if needed via the pump's compensator valve.
- Adjust the stud counterclockwise until the pump gauge starts to drop.
- Adjust the stud clockwise back to peak pressure.
- Turn stud two turns clockwise and tighten jam nut.



HOW TO REMOVE THE BARREL CYLINDER (OPTIONAL)

- Remove the two 5/16” screws that attach the barrel cylinder plate to the end of the guide rods.
- Completely loosen the cylinder shaft from the top plate with a 7/8” open end wrench.
- Remove the barrel cylinder from the top plate.

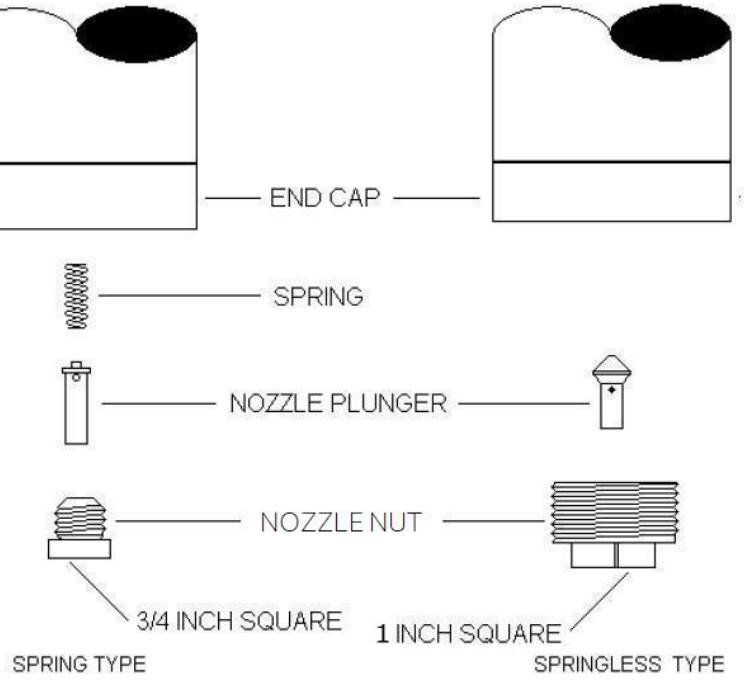


CLEANING THE NOZZLE - THERMOPLASTICS ONLY

After prolonged use, the nozzle may develop a leak of drool, indication that cleaning is necessary.

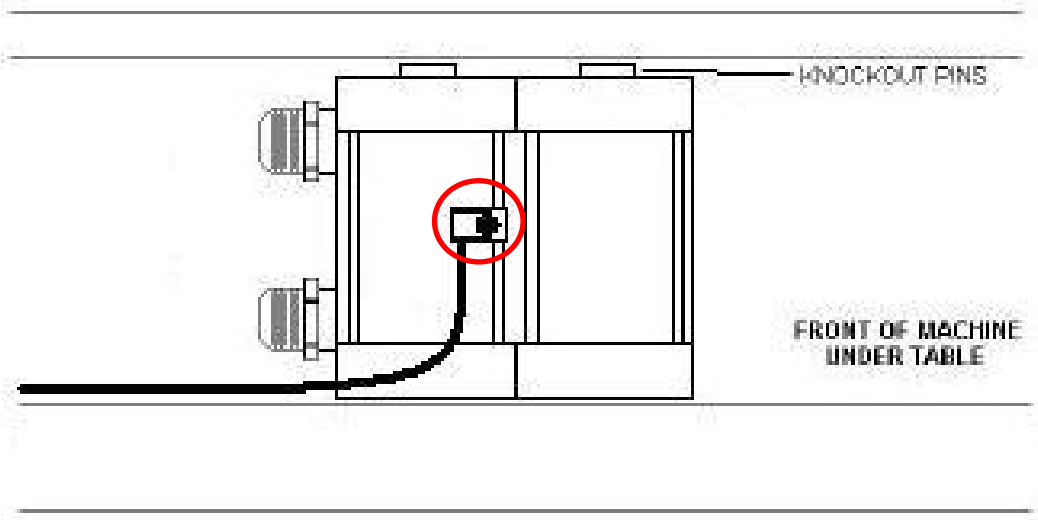
CAUTION - All necessary safety precautions should be in effect before proceeding, gloves and safety glasses. During the following procedure it is possible for hot material to spray out.

- It is first necessary to bring system heat almost up to molding temperature.
- Unscrew the nozzle nut from the end cap.
- If spring type, remove the nozzle die spring from up inside the end cap.
- Clean all material from nozzle nut, separating the nozzle plunger and nozzle nut. Clean parts thoroughly with wire brush or emery cloth. Be sure the nozzle plunger will slide freely up and down in the nozzle nut.
- If spring type clean nozzle die spring. Or replace spring, if weak.
- Apply anti-seize to thread of nozzle nut.
- If spring type, place spring on nozzle assembly and then replace in end cap.



HOW TO ADJUST THE EJECTOR CYLINDER SENSOR

- Loosen the ejector sensor mount screw.
- With ejector pins fully retracted, move the sensor to its lowest position.
- Move the sensor up after a molded part is ejected until the desired height is achieved.
- Tighten down the sensor once an adequate position is reached.



NOTE - If more travel is needed than the sensor allows either an adjustment must be made to the ejector plate in the mold, or the sensor must be bypassed and the activation duration of the ejectors must be properly adjusted.

LIGHT CURTAIN

CAUTION - BECAUSE THE LIGHT CURTAIN IS A SAFETY DEVICE IT MUST BE WORKING CORRECTLY IN ORDER FOR THE MACHINE TO RUN. THE LIGHT CURTAIN SHOULD NEVER BE DISABLED, BECAUSE IT COULD CAUSE BODILY INJURY. REFER TO THE LIGHT CURTAIN MANUAL FOR MORE INFORMATION.

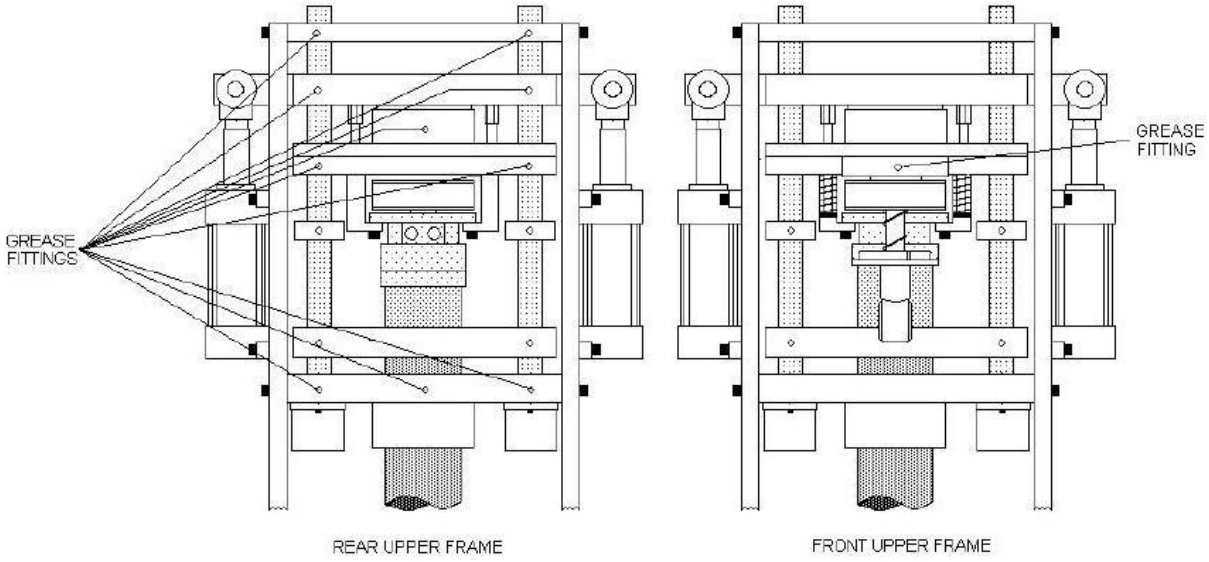
HOW TO LINE UP LIGHT CURTAIN

- Loosen all brackets associated with the light curtain.
- Get both the transmitter and the receiver in line by line of sight, use a laser pointer if available.
- Verify alignment and slowly re tighten associated bracketing in a crisscross pattern.
- Once the alignment is finished, verify that the light curtain LED output activates/deactivates properly.
- When properly aligned both regional lights should be green 

LUBRICATION

NOTE - Machine lubrication should be performed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.

GREASING THE UPPER FRAME



There are 11 grease fittings on the upper frame. Ten (10) are found from the back of machine and one (1) from the front.

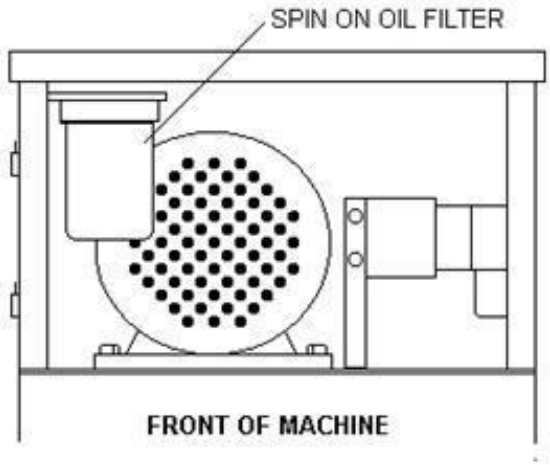
HYDRAULIC OIL

NOTE - Machine oil/oil filters should be changed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.

The hydraulic oil should be tested every year for one shift operations. Based on the results of testing the oil should be changed.

LOCATION OF THE OIL FILTER

The spin-off oil filter is located on the left side under the table, as seen from the operator position. Removing of some machine components may be needed to remove and reinstall the oil filter.

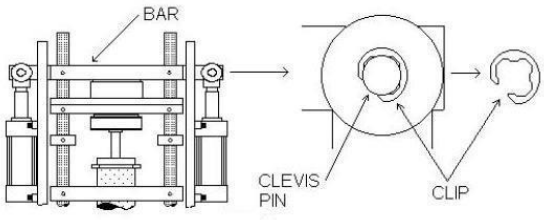


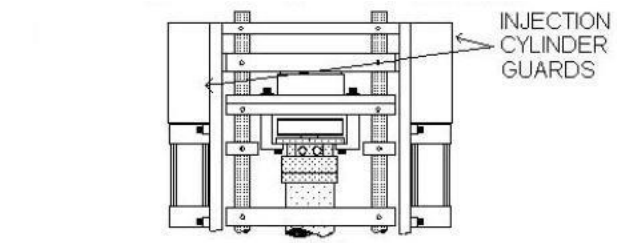
SCREW OR BARREL REMOVAL

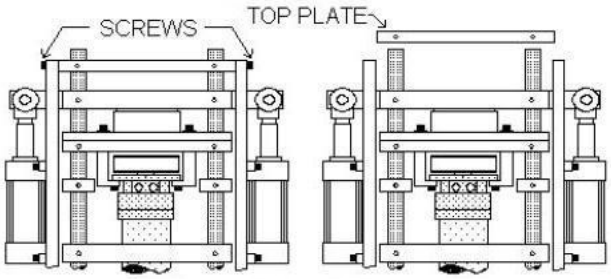
The following shows the components that must be disassembled to remove the screw. If possible, purge through a purging compound or polypropylene material first.

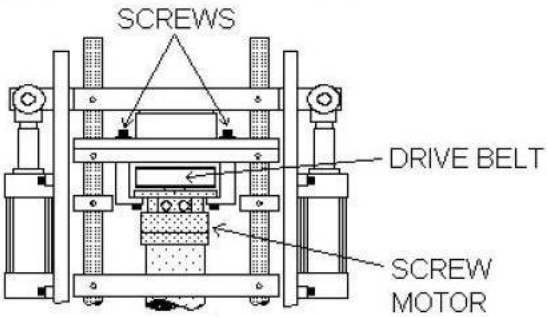
PRELIMINARY PROCEDURE

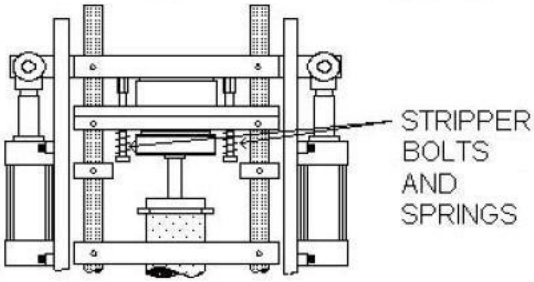
- Remove the Shotsize sensor.
- Remove the barrel cylinder. (If installed)
- Remove the injection cylinder guards.
- Remove the top plate by removing the 4 screws holding the top plate to the upper frame.
- Holding the screw motor, remove the 2 screws holding the motor to the motor plate.
- Slip off the drive belt and place motor on floor or on a table.
- Remove the 2 stripper bolts and springs.
- Remove the 2 clips from the rear of clevis pins.
- Remove the 2 clevis pins.











- Remove the bar.

NOTE - The barrel must be hot enough to melt the molding material.

CAUTION: All necessary safety precautions should be in effect before proceeding, gloves and safety glasses. During the next steps it is possible for hot material to spray out.

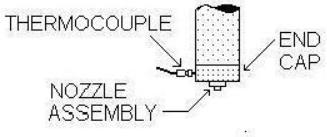
If the molding material was successfully purged, continue with SCREW REMOVAL PROCEDURE.

If molding material is burnt, follow BARREL AND SCREW REMOVAL PROCEDURE.

For removing barrel continue with BARREL AND SCREW REMOVAL PROCEDURE.

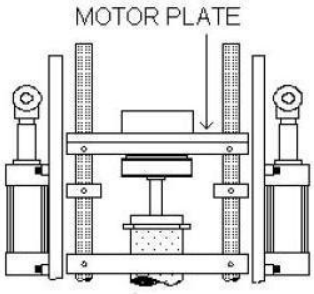
SCREW REMOVAL PROCEDURE

- Remove the nozzle assembly and spring (if spring type).
- Unplug the bottom heater band and remove the bottom thermocouple.
- Remove the end cap.



- Pull the motor plate and screw up and out together. If the screw hangs up, push the assembly back down and allow it to heat up more.

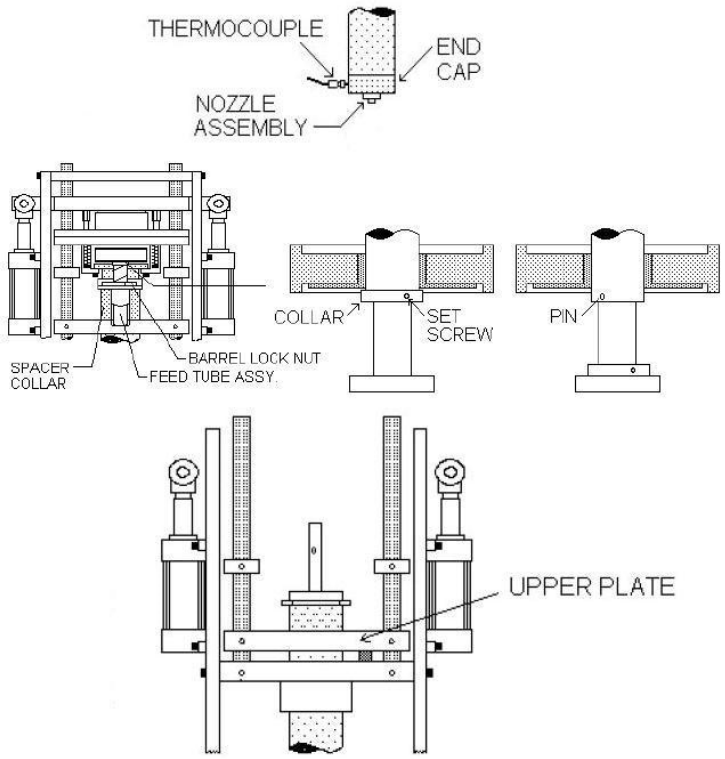
  If this does not work, you may have to continue with the BARREL AND SCREW REMOVAL PROCEDURE.



- When you are ready to reassemble you need to apply anti-seize compound on the material check valve ring retainer, the six screws that hold the end cap on, and the thermocouples. (Any thread component that will be heated up.)
- To reassemble just reverse the order.

BARREL AND SCREW REMOVAL PROCEDURE

- Turn off heat.
- Remove the nozzle assembly and spring (if spring type).
- Unplug the bottom heater band and remove the bottom thermocouple.
- Remove the end cap.
- Loosen the setscrew on the collar.
- Slide the collar down and remove the pin from under the former collar position.
- Lift off the motor plate assembly.
- Allow the barrel to cool down.
- Remove the thermocouples and the heater bands.
- Clean off the surface of the barrel.



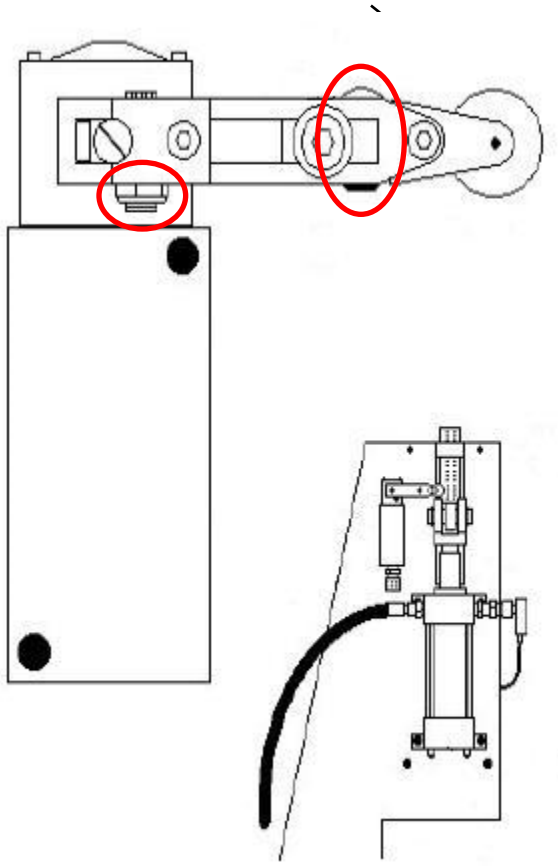
- Remove barrel by pulling up on the upper plate with the barrel still attached.
- Secure the barrel in a vise.
- Apply heat.
- Push out screw from lower end of barrel.
- When you are ready to reassemble you need to apply anti-seize compound on the material check valve ring retainer, the six screws that hold the end cap on, and the thermocouples. (Any threaded component that will be heated up.)
- To reassemble just reverse the order.

CLEANING OF SCREW AND BARREL

Clean all parts with copper gauze, and brass putty knife. Propane heat can also be used if care is used not to overheat screw as this could warp it.

HOW TO ADJUST THE BARREL UP LIMIT SWITCH

- Turn the heats on
- Set shotsize to its maximum setting (4.00 or 101.60).
- Remove the left injection cylinder guard.
- Loosen the roller arm on barrel up limit switch.
- Turn on the motor.
- Purge the machine, allowing the screw to retract to its highest shotsize. If the screw retracts too high and a counter action pushes the barrel down purge the machine out and set the shotsize lower.
- Once the screw stops rotating at its highest peak, purge the machine slightly and then stop the motor.
- Adjust the roller arm so that the roller is contacting the ram bar.



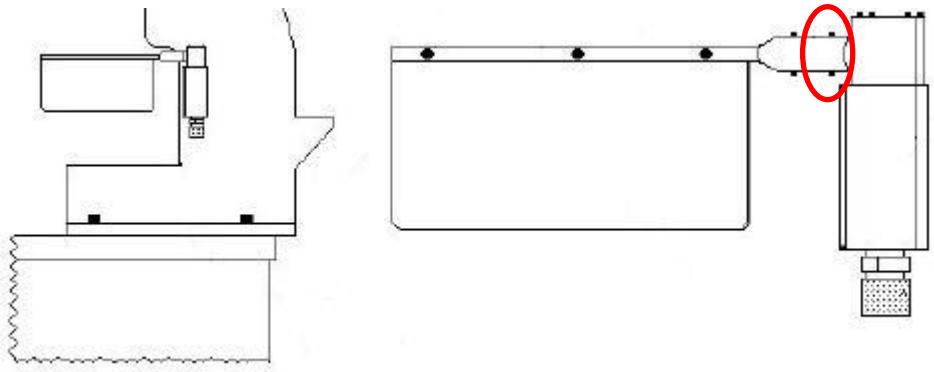
- Turn on the motor and purge the machine again. Verify that the pump is deactivated once the switch is made before the machine's highest capabilities.
- Repeat the roller arm adjustment until the switch trips adequately.
- Reinstall the left injection cylinder guard and reset the shotsize back to the process parameters.

HOW TO ADJUST THE SAFETY FLAG

There are two adjustments relating to the flag position: height of the flag from the table and the angle of the flag tilt.

ANGLE

The angle of the flag arm can be adjusted by loosen the two set screws on the back end of the flag mount.

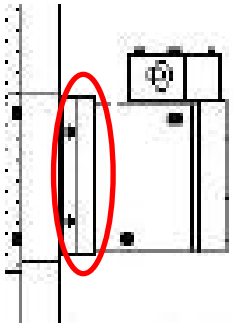


Set the angle of the flag so that it deactivates the pump adequately before the mold hits the barrel guard or upper frame.

HEIGHT

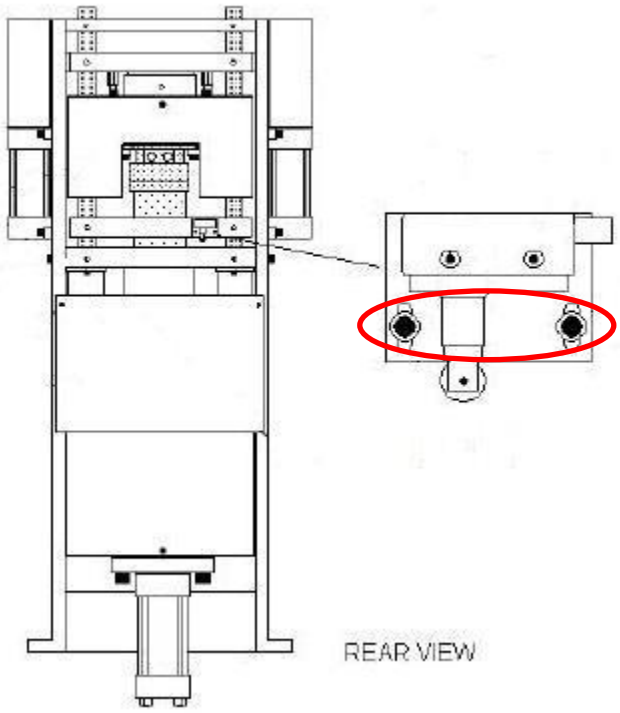
The height of the flag is adjusted by the two 10--32 screws that mounts the flat flag bracket to the upper frame flag bracket.

Adjust the height of the flag so that if the mold is held open slightly by debris or an insert, it deactivates the pump before the mold hits the nozzle assembly.



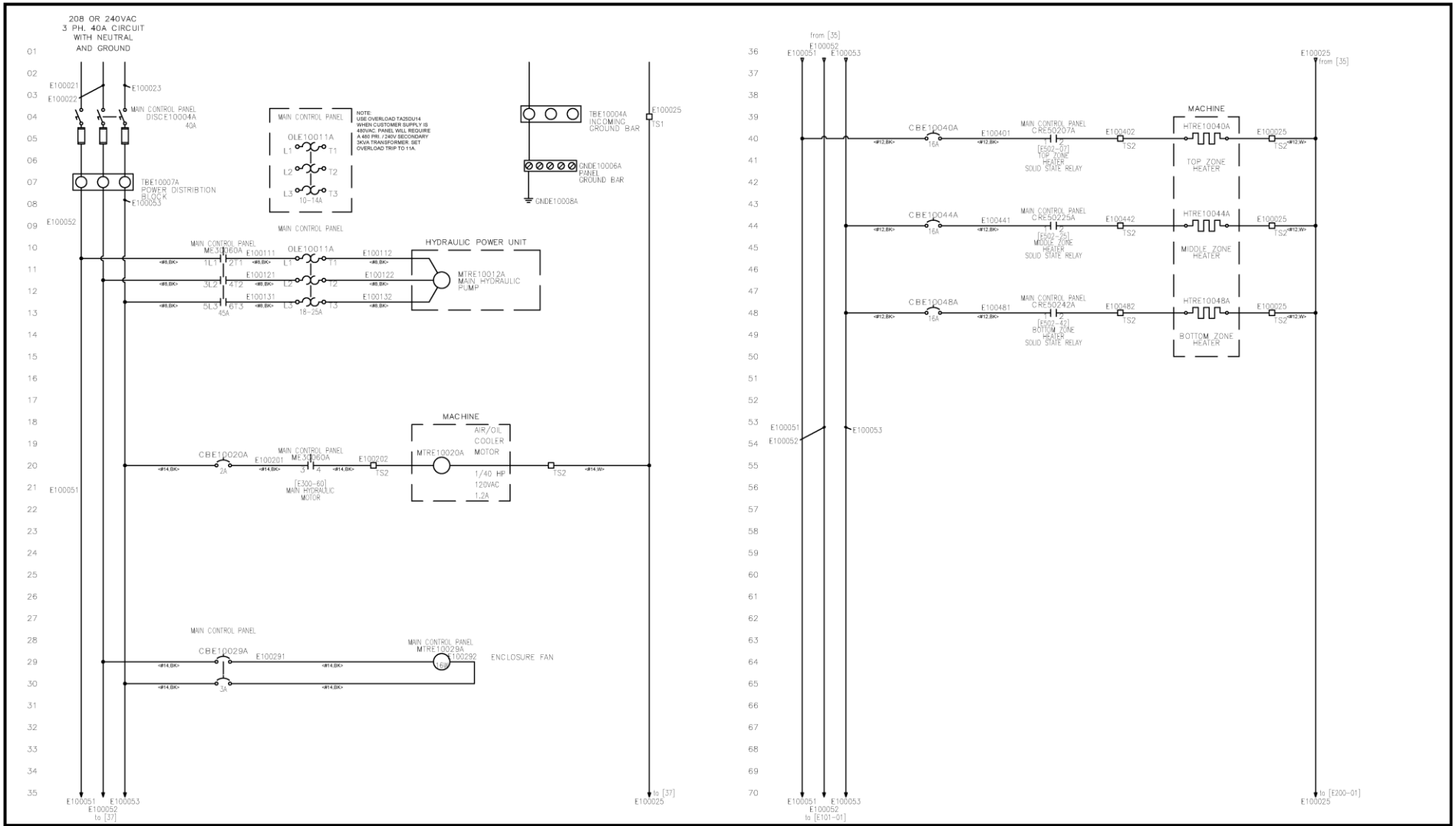
HOW TO ADJUST BARREL DOWN LIMIT SWITCH

- Verify that the barrel assembly is in the proper upper position and purge block is under barrel.
- Turn off motor and electrical.
- Loosen the two screws of barrel down limit switch bracket.
- Position bracket so that switch roller is 5/8” from the barrel housing plate.
- Tighten the two screws of the barrel down limit switch bracket.



NOTE - Do not adjust the barrel down limit switch to where it is “on the ragged edge” of tripping, as this could cause problems when the screw is recovering.

Section 5 – BOSS/OMRON WIRE SCHEMATICS



PROKUMA
ENGINEERING · AUTOMATION · PROCESS CONTROL

RECORD OF DRAWING REVISIONS

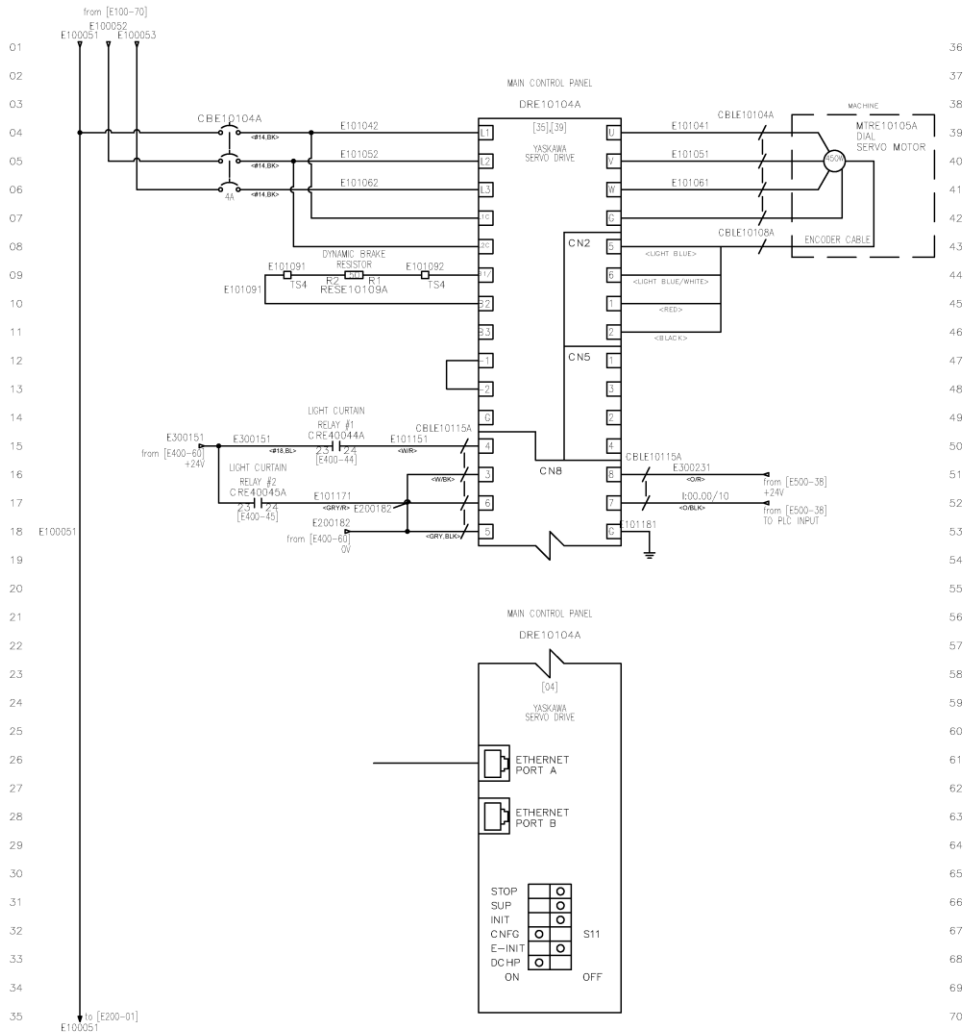
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
208V DISTRIBUTION

DRAWING NUMBER: 2009231-E100
SHEET: E100
CONT. ON: E101



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RECORD OF DRAWING REVISIONS

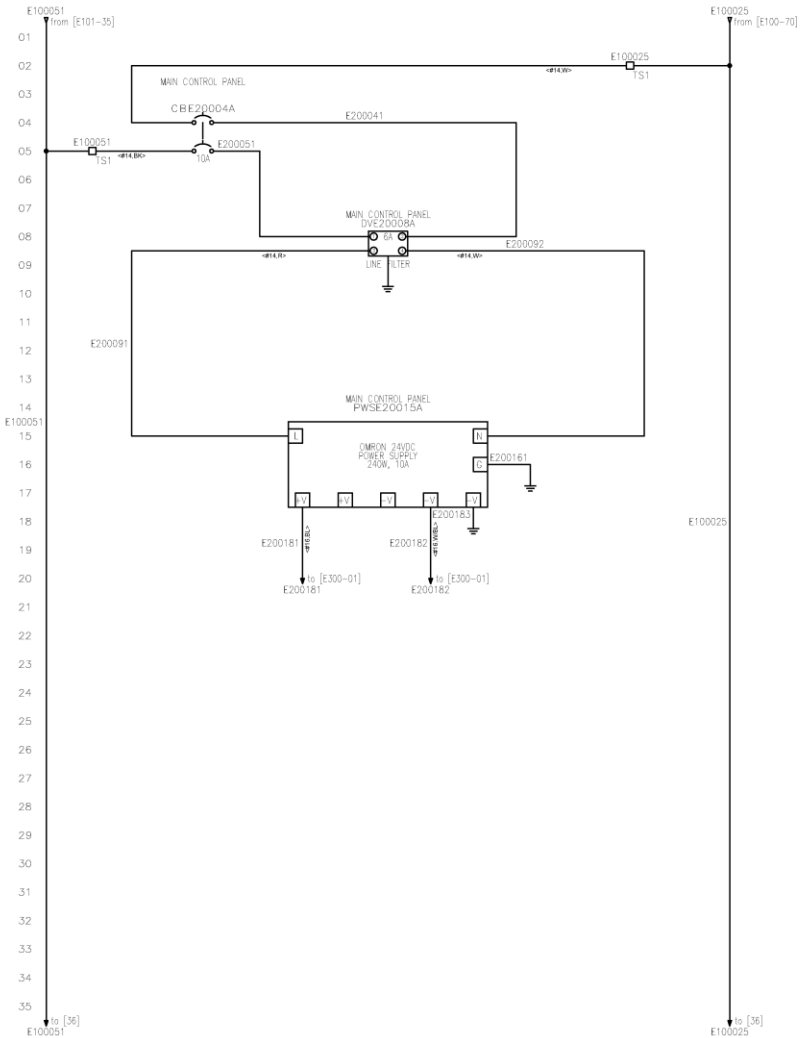
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

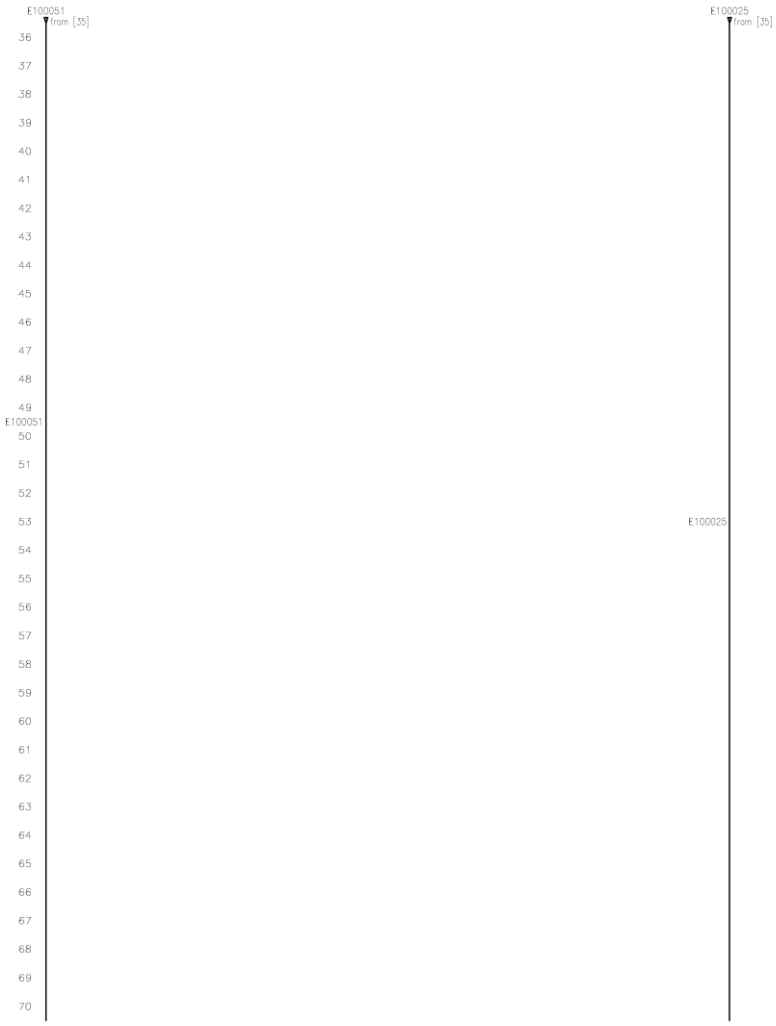
DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
SERVO DRIVE

DRAWING NUMBER: 2009231–E101
SHEET: E101
COUNT OF: E200





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RECORD OF DRAWING REVISIONS

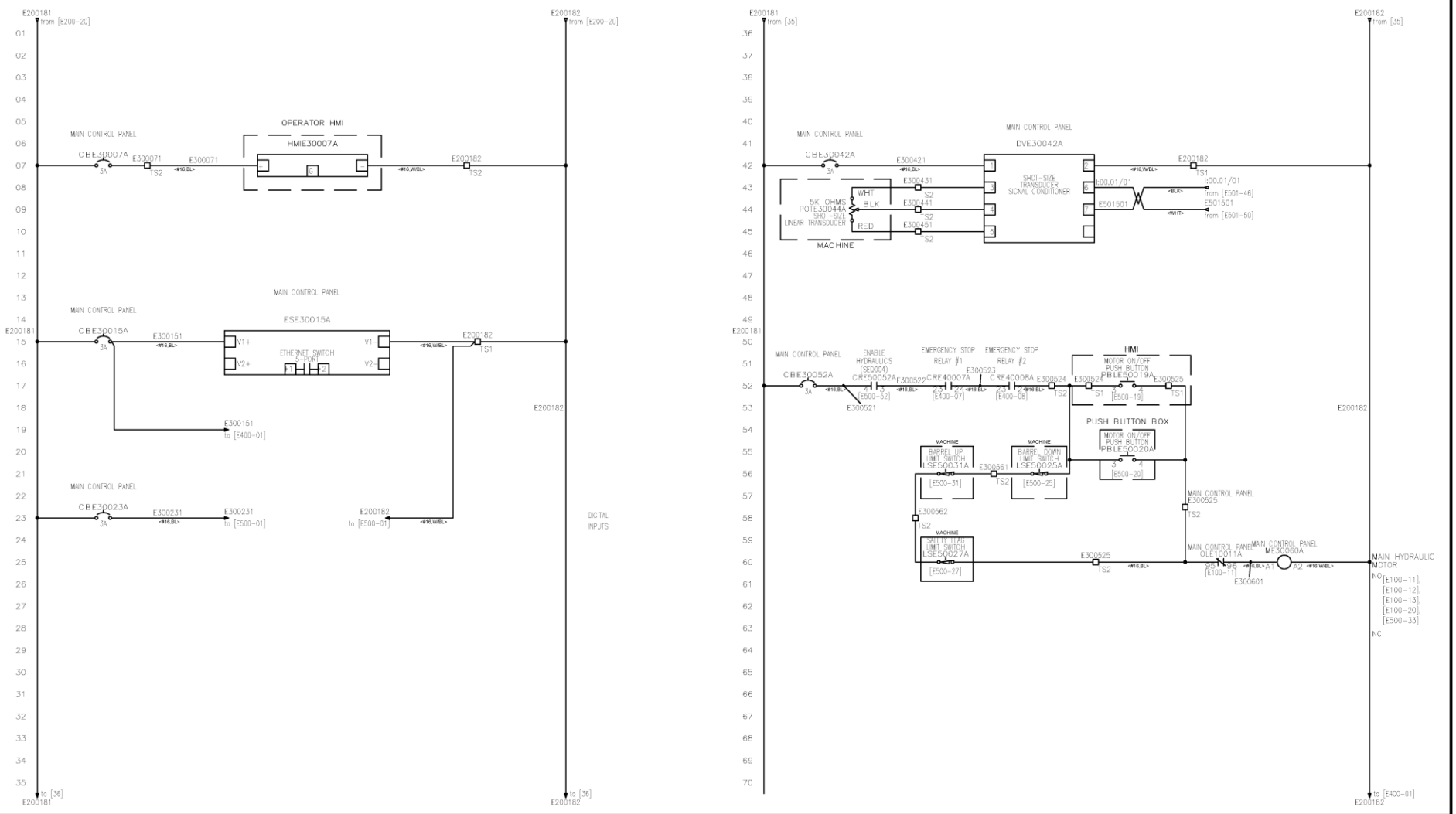
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED: E. ROBINSON
DATE DRAWN: 11/16/20
CHECKED: C. WEINZAPFEL
CHECKED DATE: 11/16/20
SCALE:

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
120V POWER DISTRIBUTION

DRAWING NUMBER: 2009231–E200
SHEET: E200
COUNT OF: E300



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RECORD OF DRAWING REVISIONS		
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

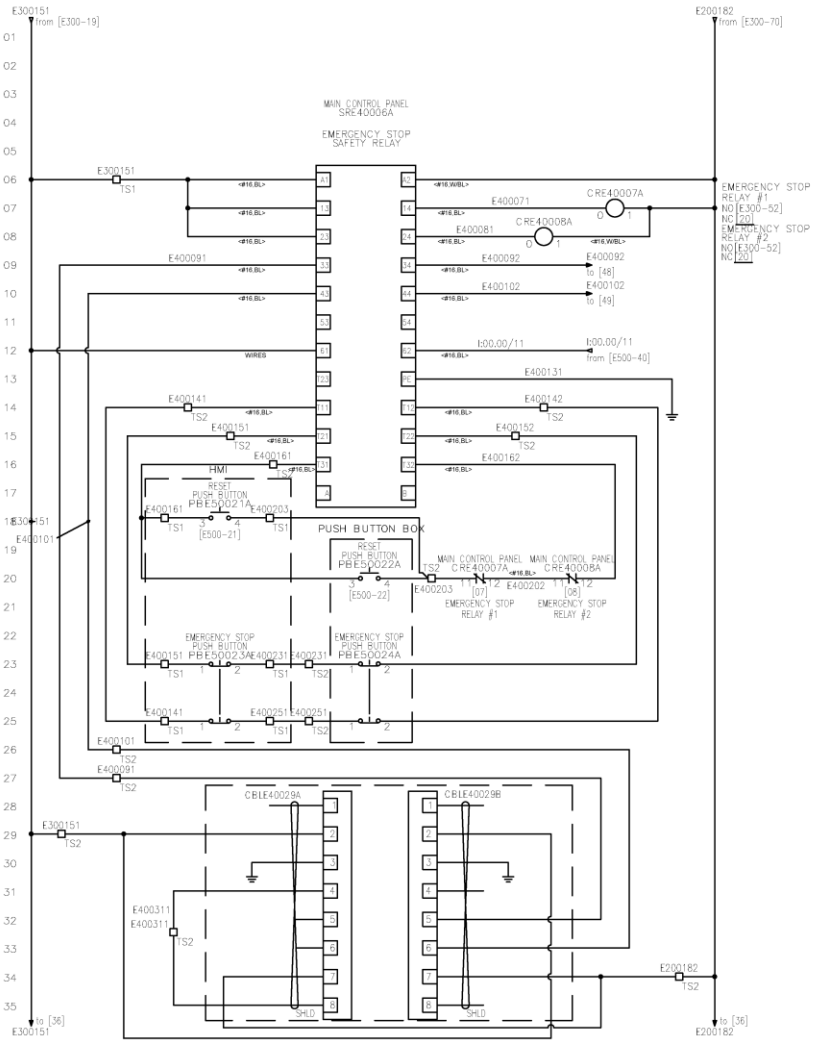
DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

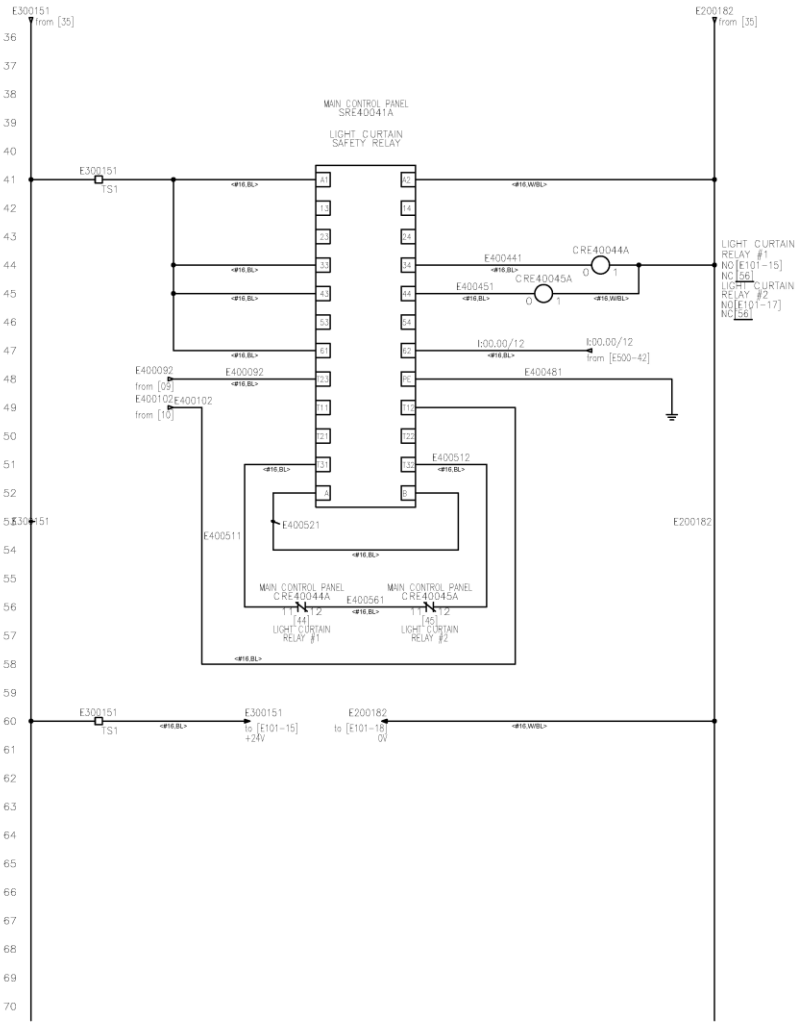
DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
24VDC POWER DISTRIBUTION

DRAWING NUMBER: 2009231–E300

SHEET: E300
COUNTER NO: E400





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RECORD OF DRAWING REVISIONS

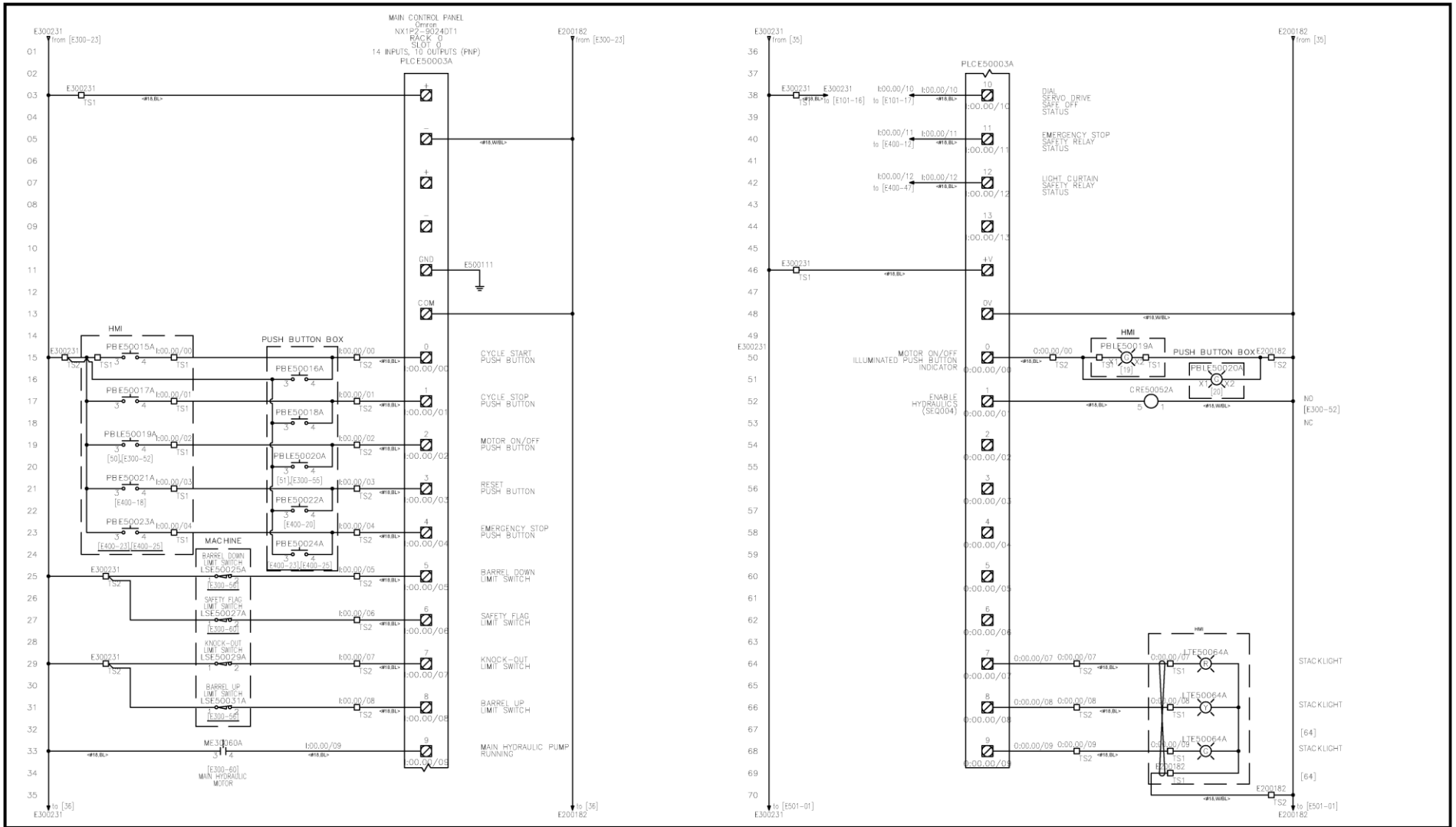
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20
D	LIGHT CURTAIN MODIFICATION	10/13/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
SAFETY CIRCUITS

DRAWING NUMBER: 2009231–E400
SHEET: E400
COUNT OF: E500



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RECORD OF DRAWING REVISIONS

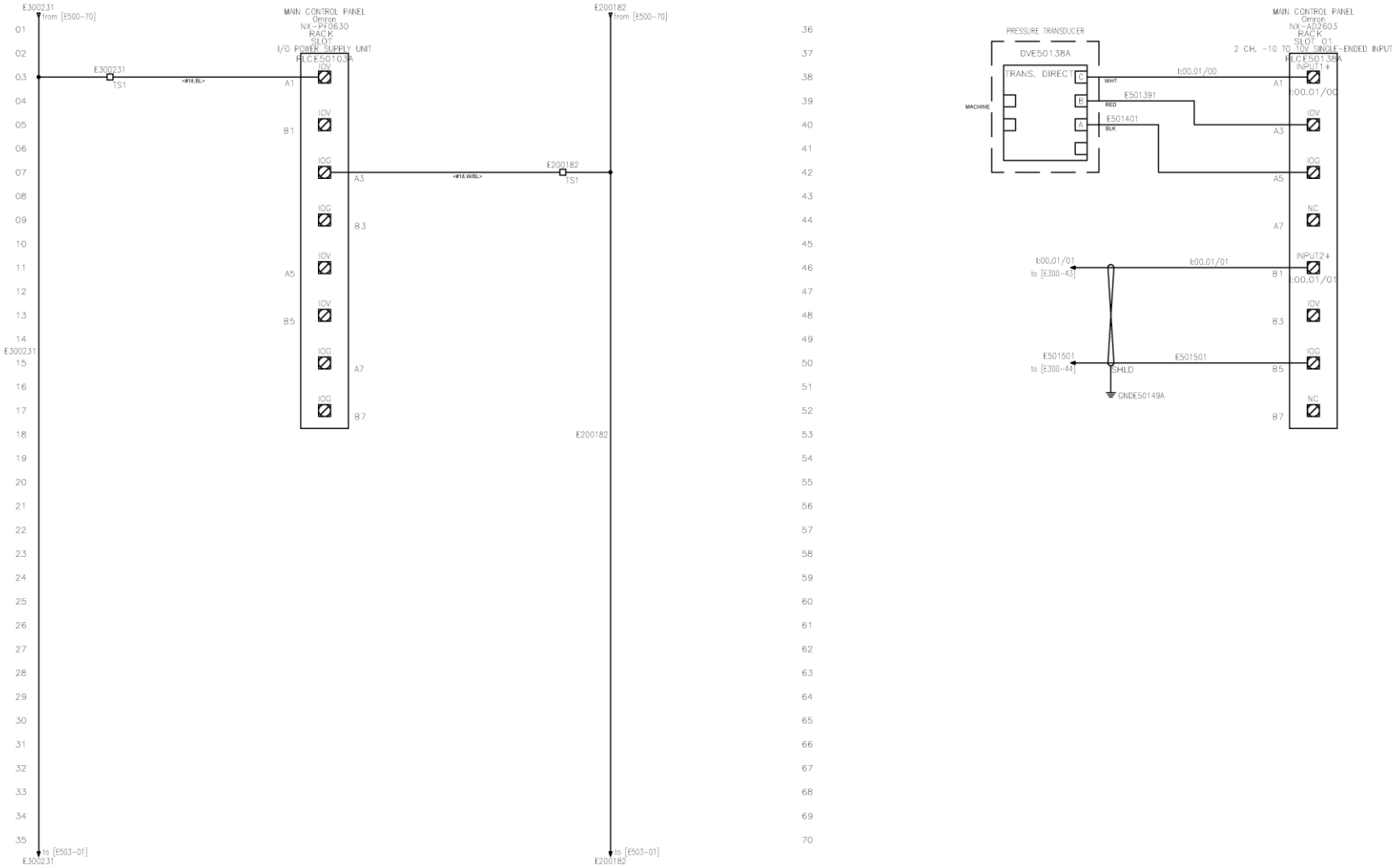
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED: E. ROBINSON
DATE DRAWN: 11/16/20
CHECKED: C. WEINZAPFEL
CHECKED DATE: 11/16/20
SCALE:

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
PLC BASE I/O

DRAWING NUMBER: 2009231–E500
SHEET: E500
COUNT OF: E501



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RECORD OF DRAWING REVISIONS

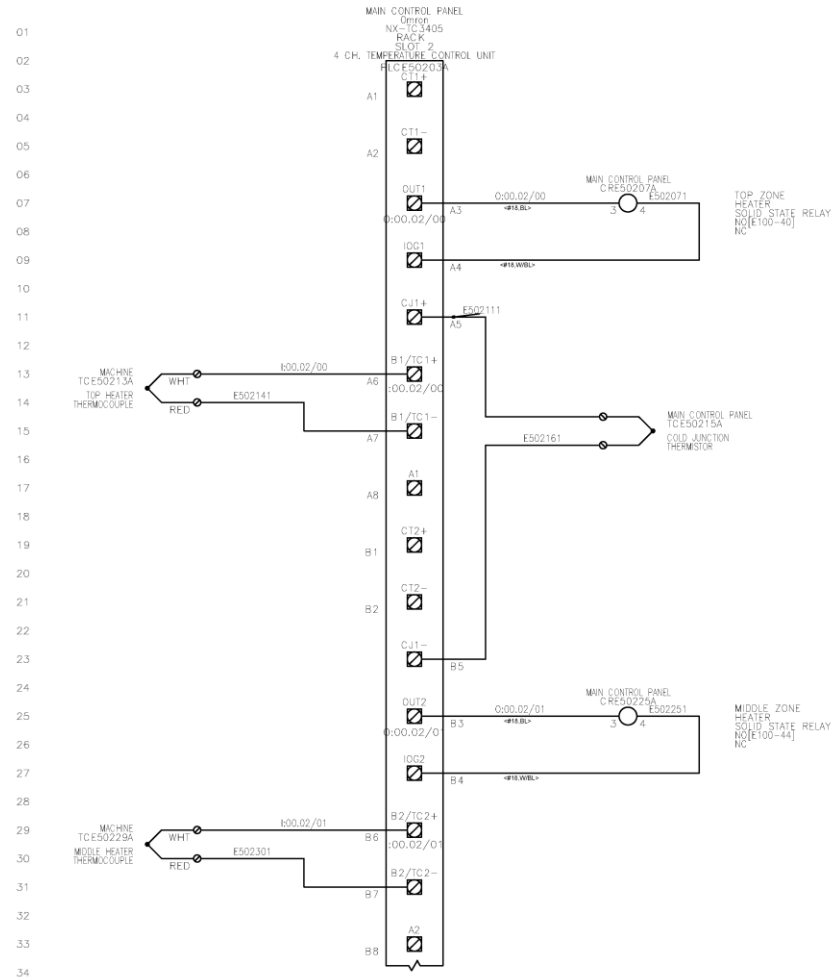
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20
D	PRESS. XDCR SUBSTITUTION	10/13/20

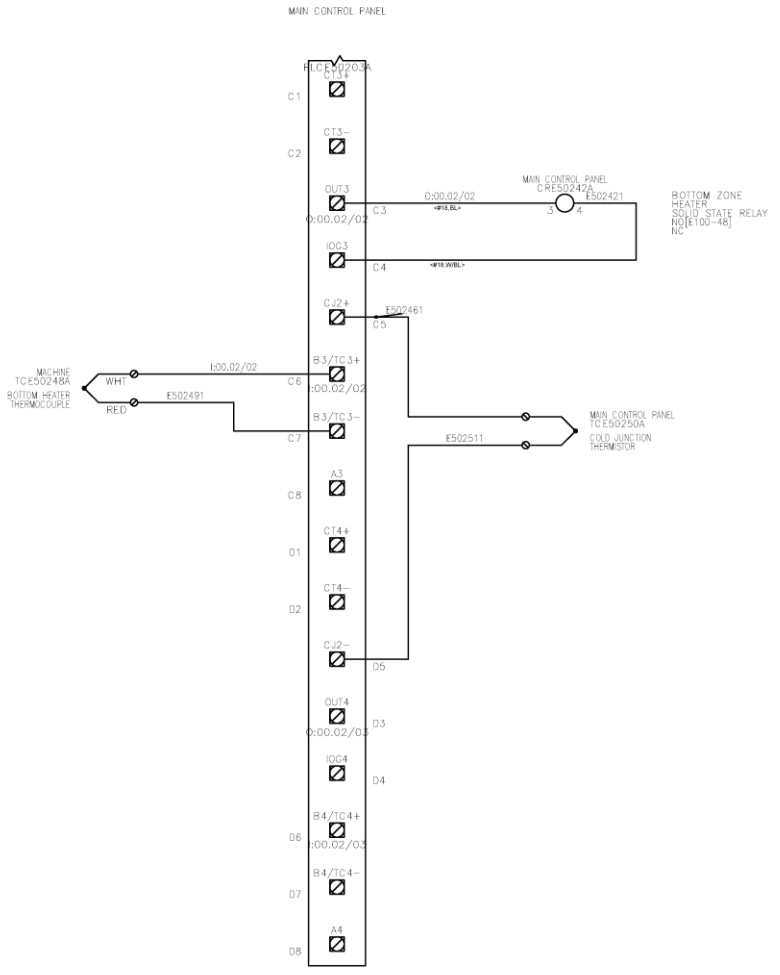
DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
PLC SLOT 1 ANALOG INPUTS

DRAWING NUMBER: 2009231–E501
SHEET: E501
COUNT OF: E502





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RECORD OF DRAWING REVISIONS

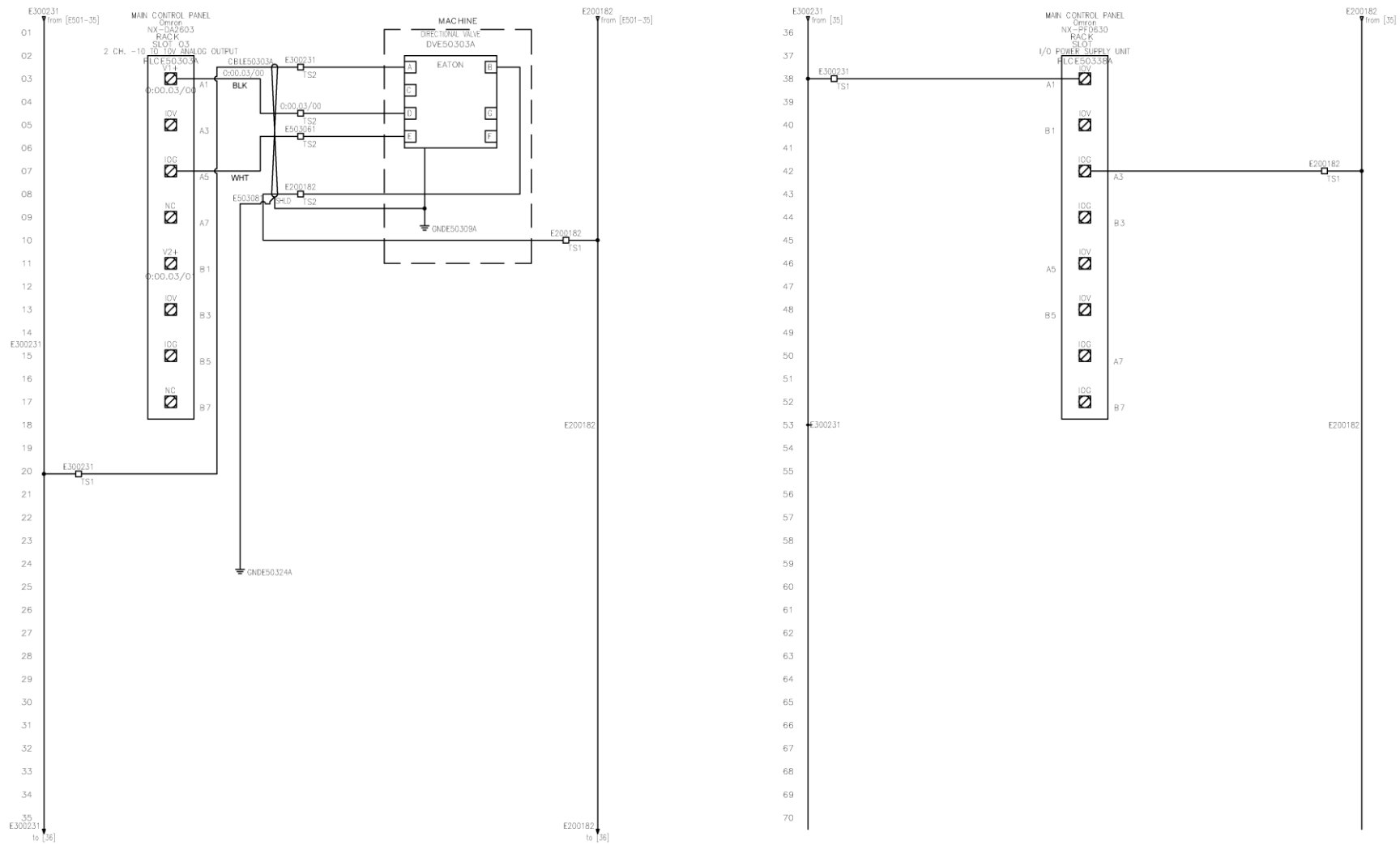
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED: E. ROBINSON
DATE DRAWN: 11/16/20
CHECKED: C. WEINZAPFEL
CHECKED DATE: 11/16/20
SCALE:

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
PLC SLOT 2 TEMPERATURE CONTROLLERS

DRAWING NUMBER: 2009231–E502
SHEET: E502
COUNT OF: E503



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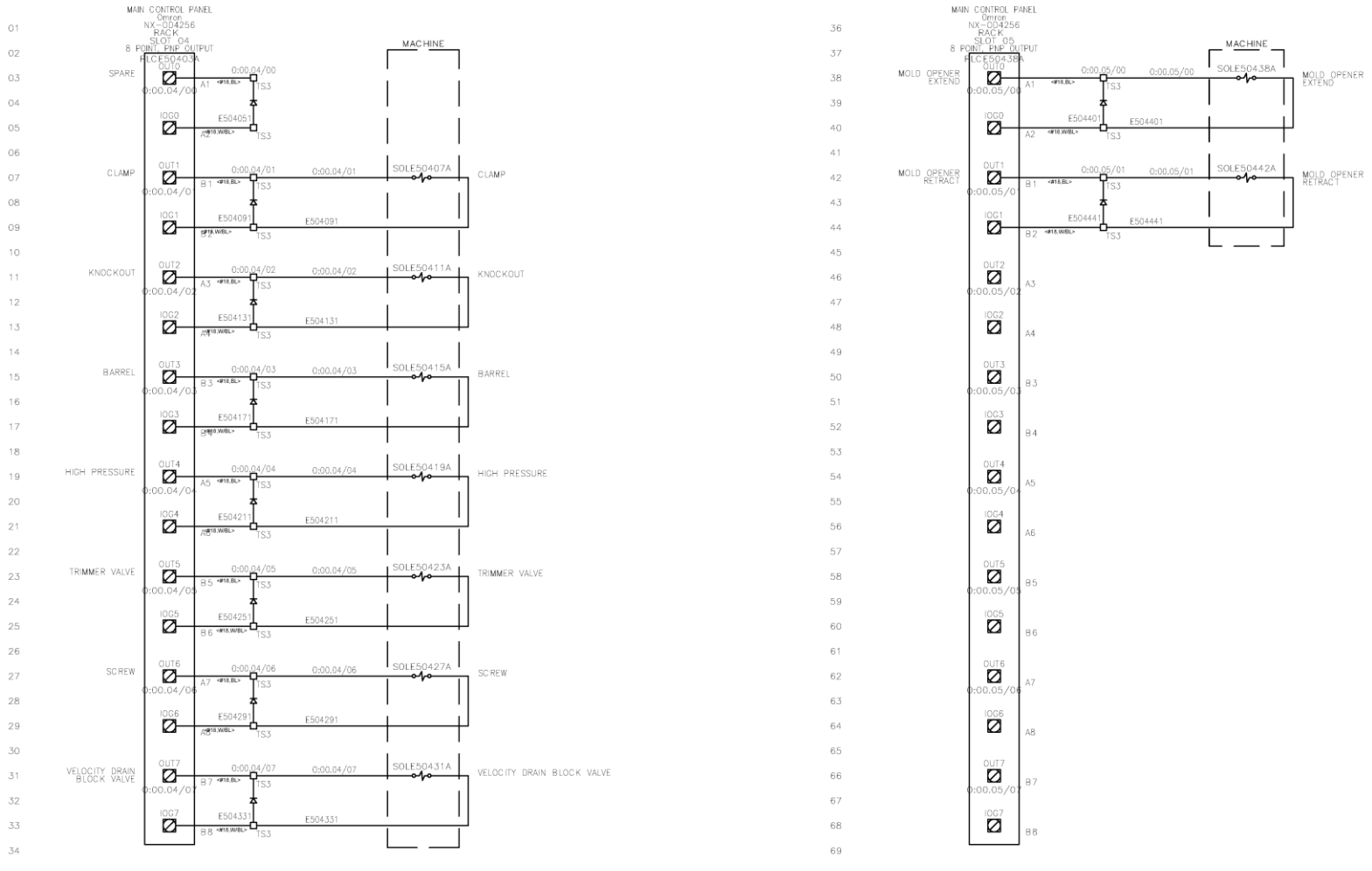
RECORD OF DRAWING REVISIONS		
REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
PLC SLOT 3 ANALOG OUTPUTS

DRAWING NUMBER: 2009231-E503
SHEET: E503
COUNT OF: E504



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RECORD OF DRAWING REVISIONS

REV	DESCRIPTION	DATE
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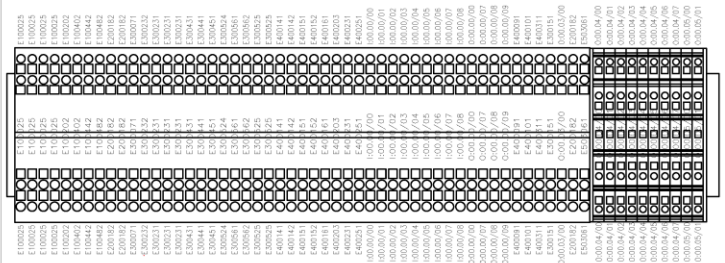
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
PLC SLOTS 4 & 5 DIGITAL OUTPUTS

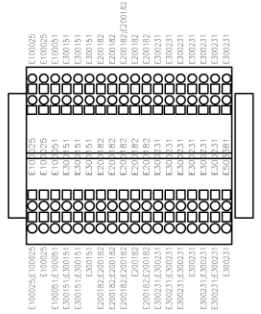
DRAWING NUMBER: 2009231–E504
SHEET: E504
CONTINUED: E505

TS2

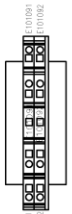


TS3

TS1



TS4



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RECORD OF DRAWING REVISIONS

REV	DESCRIPTION	DATE
A	FOR FABRICATION	11/16/20
B	AS BUILT	12/11/20

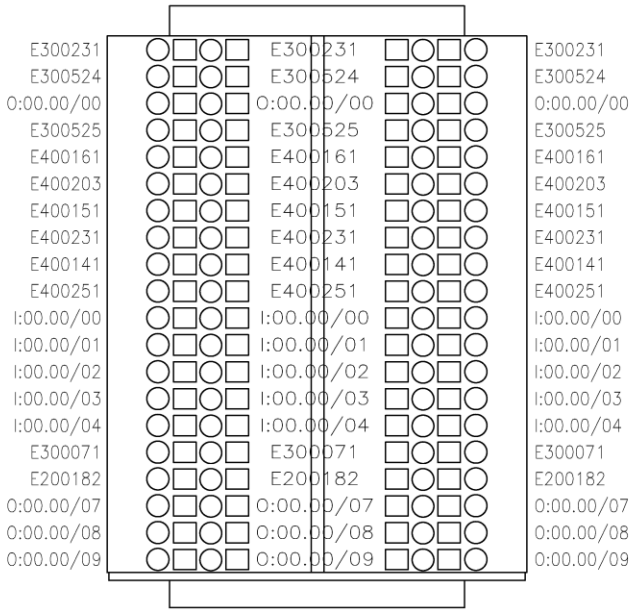
DIMENSIONAL TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XX ±.01 FRACTIONAL ±1/64
ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED: E. ROBINSON
DATE DRAWN: 11/16/20
CHECKED: C. WEINZAPFEL
CHECKED DATE: 11/16/20
SCALE:

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
MAIN CONTROL ENCLOSURE TERMINAL STRIP LAYOUTS

DRAWING NUMBER: 2009231–E902
SHEET: E902
CONT. ON: E910

HMI
TS1



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REV	DESCRIPTION	DATE
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DIMENSIONAL TOLERANCES
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ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED

DESIGNED:	E. ROBINSON
DATE DRAWN:	11/16/20
CHECKED:	C. WEINZAPFEL
CHECKED DATE:	11/16/20
SCALE:	

ILLINOIS PRECISION CORP. – BICKNELL, IN
LINE 3
INJECTION MOLDING DIAL MACHINE
HMI ENCLOSURE TERMINAL STRIP LAYOUT

DRAWING NUMBER: 2009231–E912
SHEET:
CONT. ON:

NOTES