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MOLDMAN™ 8000

Low-Pressure Injection Molding Technology

Operations Manual

For machines with serial numbers starting with 04-. . . .

We design them. We build them. We supply them. We support them.

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1.0 Introduction

1.1 Introduction

Moldman Systems would like to thank you for purchasing a **Mold-man™ 8000** single station injection molding machine for low-pressure molding. This machine is designed specifically for low-pressure molding with high performance polyamide resins. This unit offers both standard injection mode as well as advanced injection profiles that can be custom tailored for demanding molding applications. All inputs are through touch screens and the user can select metric or imperial units.

The Mold-man™ 8000 is designed for safe and simple operation. When the relevant molding parameters such as pressure and timers have been set in the self explanatory set-up screens, the key switch is used to switch to production mode. In production mode, no values can be changed. However, the cycle counter can be reset from the production screen.

The molding machines for low-pressure molding melt the raw materials completely prior to injecting into the mold-set. It is critical that operators and maintenance personnel familiarize themselves with the relevant portions of this manual. Please pay special attention to the maintenance and cleaning guidelines for the equipment. They are key to successful, long-term operation of these machines.

Moldman Systems will support you with technical support. Please contact us when we can be of service. Congratulations with your purchase of a **Mold-man™ 8000** and good luck with your low-pressure molding applications!

Moldman Systems

NOTE!
All personnel involved in set-up, operation and maintenance of this machine must familiarize themselves with the guidelines in this manual. Read and follow the safety guidelines herein .

NOTE!
Keep this manual near the machine and available to anyone involved in the installation, set-up, operation or maintenance of the equipment. The guidelines in this manual must be followed to ensure safe working conditions. Injury or death could result from not following the guidelines herein.

1.2 Type and origin

Machine model:	Mold-man™ 8000
Type:	Integrated low-pressure injection molding machine
Weight:	950 lbs [430 kg].
Overall dimensions:	41.0" W x 32.0" D x 64.0" H [1041 x 813 x 1626 mm]
Manufacturer:	Moldman Systems 4649 Aircenter Circle Reno, Nevada 89502 Phone: (775) 332-1600 www.moldmanmachines.com

1.3 Intended use

The Mold-man™ 8000 insert molding machine is designed for encapsulation of various electronic components, molding of molding of wiring harness components, grommets, connectors and plugs utilizing low-pressure molding.

WARNING!

The machine should only be used with thermoplastic polyamide hot melt resins such as Macromelt material.

WARNING!

The unit is designed for and only intended for use as described within this manual. Using the machine for any other applications or in a manner not consistent with this manual will void the warranty of the machine and could lead to injury or death.

Moldman Systems cannot be liable for any incident resulting from unintended use. Please contact Moldman Systems if you have any questions. Phone #: (775) 332-1600.

1.4 Mold-man™ 8000 overview

The Mold-man™ 8000 machine is designed for low-pressure molding. This high capacity production machine for insert molding is easy and safe to operate. When the machine is ready, operation simply consists of inserting components and activating the Zero Force actuation buttons to initiate a molding cycle.

The machine has a 22 lb. (10 kg) melt reservoir located to the left side. The molten material flows by gravity into a gear pump, though a filter and into the mold-set via the injection nozzle assembly. The Mold-man™ 8000 utilizes a patented permanent engagement system, for the injection nozzle. The nozzle stays engaged in the lower mold half. This is made possible through the use of materials with different heat transfer coefficients. (Inside the nozzle assembly is a heated aluminum core, which keeps the flowing material hot and around that is a Teflon sleeve, which offers excellent insulation to the cold mold-set.) The lower mold-set is pushed onto the nozzle during set-up of the machine. The lower mold platen has a pneumatic ejector system with 10 mm stroke.

The upper and lower mold platens are cross-drilled for water-cooling. It is normally not necessary to drill cooling lines and install couplings in the individual aluminum mold-sets. The mold-sets are cooled directly by the mold platens. Cooling water connections are on the right hand base plate of the machine. Consistent supply of chilled water is required.

The pneumatic system is located under the top cover of the machine on top of the upper frame member. The pneumatic system actuates the mold clamp, the ejector, the valve at the injection nozzle and also controls injection pressure via an electronic/pneumatic regulator. Air supply connection is located behind the water connection on the right side base plate.

The right hand side is where the electrical components and controls are located. The touch screen is located on the electrical enclosure. The PLC controls machine operation including temperatures in the reservoir and manifold at temperatures up to 475ºF (245ºC).

Note that the machine is equipped with an automatic temperature turn-down feature. If the machine has not been operated for 2 hours, the temperature set-point will automatically be reduced to 275ºF. This is done to minimize degradation of the raw material. The machine resets to the original set-point temperatures when the actuation buttons, the E-stop button or the key switch is actuated.

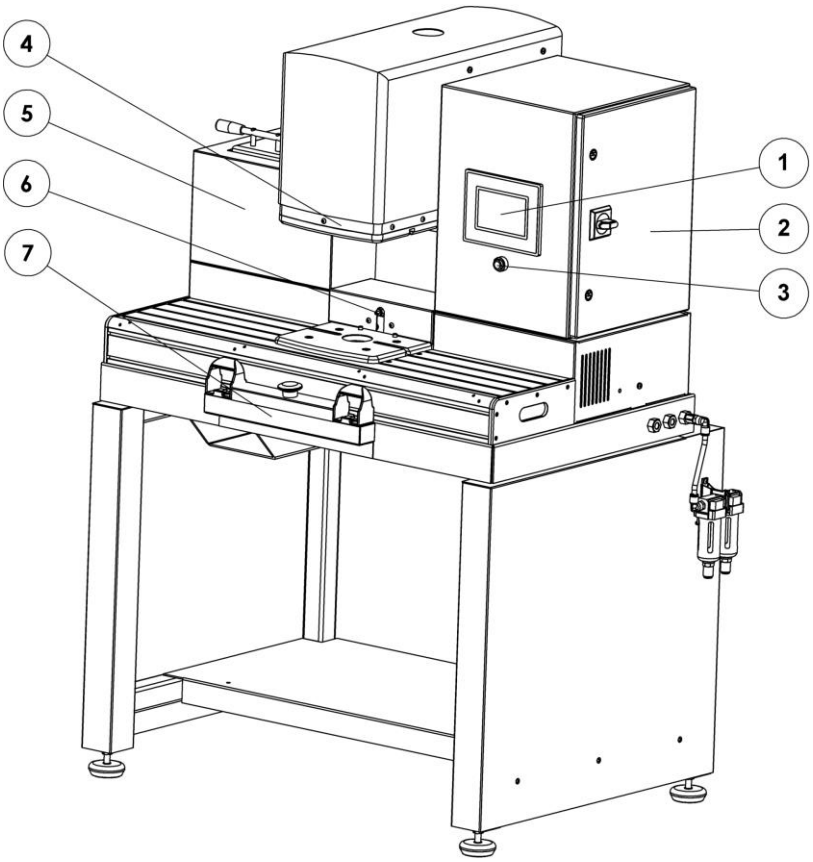


Fig. 1-1 Machine overview

1. Touch screen
2. Electrical enclosure
3. Key switch
4. Clamp
5. Melt reservoir
6. Injection nozzle
7. Zero force actuation & emergency stop button(s)

WARNING!

The machine is equipped with safety shields and safety interlocking devices. Do not remove these or in any other way modify the machine from the original design.

2.0 Safety

Operation of the Mold-man™ 8000 machine is simple. However, safety must be a prime concern. Strictly adhere to the Warning messages and Notes contained in this manual.

WARNING!

The equipment processes materials at temperature up to 475°F. The melt reservoir, manifold and nozzle are HOT! The hot molten material can cause severe burns! Always wear protective, heat resistant gloves and protective clothing! Always use safety glasses! Do not touch molten material! Even hardened material can still be very hot! Parts of the machine can remain hot for up to 4 hours after machine is turned off.

NOTE!

In case of burns the exposed body parts must be cooled with water immediately. Hold the burned area under cold, running water for at least 30 minutes. Seek medical attention.

WARNING!

The machine is equipped with safety shields and safety interlocking devices. Do not remove these or in any other way modify the machine from the original design.

WARNING!

Prior to performing any maintenance on the machine, all utilities must be turned off and disconnected. This includes electrical power, air and water supply. Parts of the machine are pneumatically operated and contain fluid under pressures even after the machine has been disconnected from all utilities. Fluid pressure must be safely bled off prior to any maintenance or injury could occur.

WARNING!

Turn off the machine main power supply immediately in case of malfunction – the main power switch is located on the right hand side of the electrical enclosure.

WARNING!

Only qualified personnel should perform maintenance and repairs on machine.

3.0 Installation

WARNING!
Transportation, lifting and installation of the equipment may only be performed by qualified and authorized personnel.

3.1 Lifting

The Mold-man™ 8000 machine may only be lifted by using a forklift of sufficient capacity. The weight of the machine is 950 lbs. [430 kg]. Engage the forklift into the built-in lifting receptacles found on the lower frame [fig. 3-1]. Ensure that the forks support the entire length of the lifting receptacles.

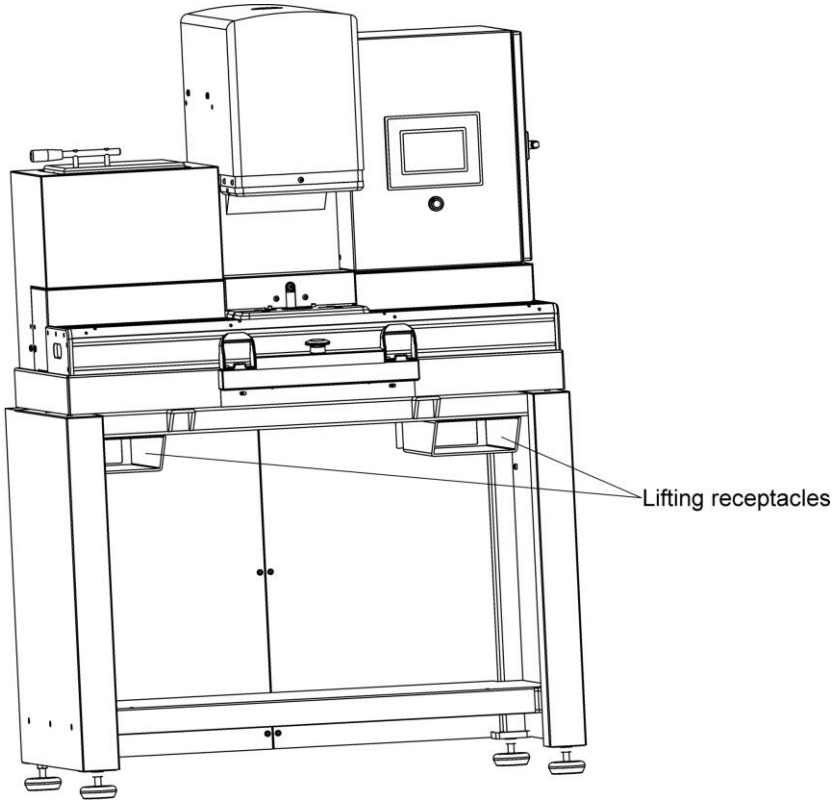


Fig. 3-1

The Machine must be set up on a flat and level surface. There are four adjustable leveling feet to level the machine.

3.2 Utility connections

WARNING!

To minimize the risk of potential safety problems, please follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and may change with time. Please determine which codes should be followed, and verify that the equipment, installation, and operation is in compliance with the latest revision of these codes.

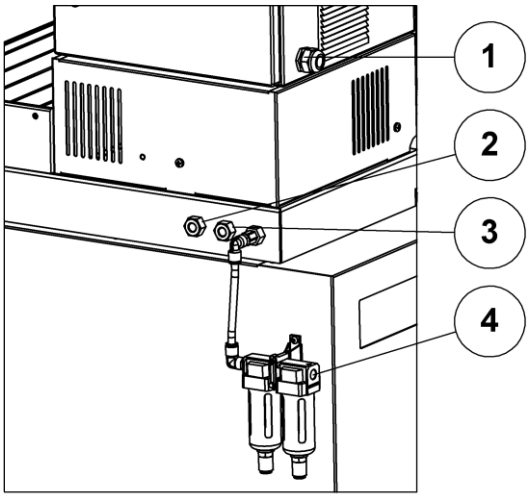


Fig. 3-2 Utility connection points

1. Strain relief fitting for electrical power cable
2. ¼" FNPT fitting for cooling fluid return
3. ¼" FNPT fitting for cooling fluid supply
4. ¼" FNPT fitting for air supply

3.2.1 Electrical connection

The back of the electrical enclosure of the Mold-man 8000 is equipped with a strain relief fitting (1) to feed the main power cable into the electrical enclosure. The machine requires a power supply of the following capacity: 230 VAC, single phase, 50/60 Hz, 30 Ampere.
Ground is connected to terminal marked with grounding symbol and 230 VAC is connected to terminals "L1" and "L2".

3.2.2 Air supply

Dry, filtered instrument air at 115 PSI – 145 PSI [8 – 10 bar] and 4 SCFM [120 lpm] is connected to the ¼" FNPT thread on the air filter (4).

3.2.3 Water supply

Consistent chilled water supply is required for the operation of the machine. A re-circulating water chiller with temperature variation of no more than 2ºF is required. The chiller is connected to the two 1/4" FNPT connections (2) (3), located on the right side of the machine. The chiller outlet port is connected to the cooling fluid supply port (3) and the chiller return port is connected to the cooling fluid return port (2).
Inlet pressure to the cooling fluid supply port should be between 8 PSI [0.5 bar] and 30 PSI [2 bar].

4.0 Operation

4.1 Introduction

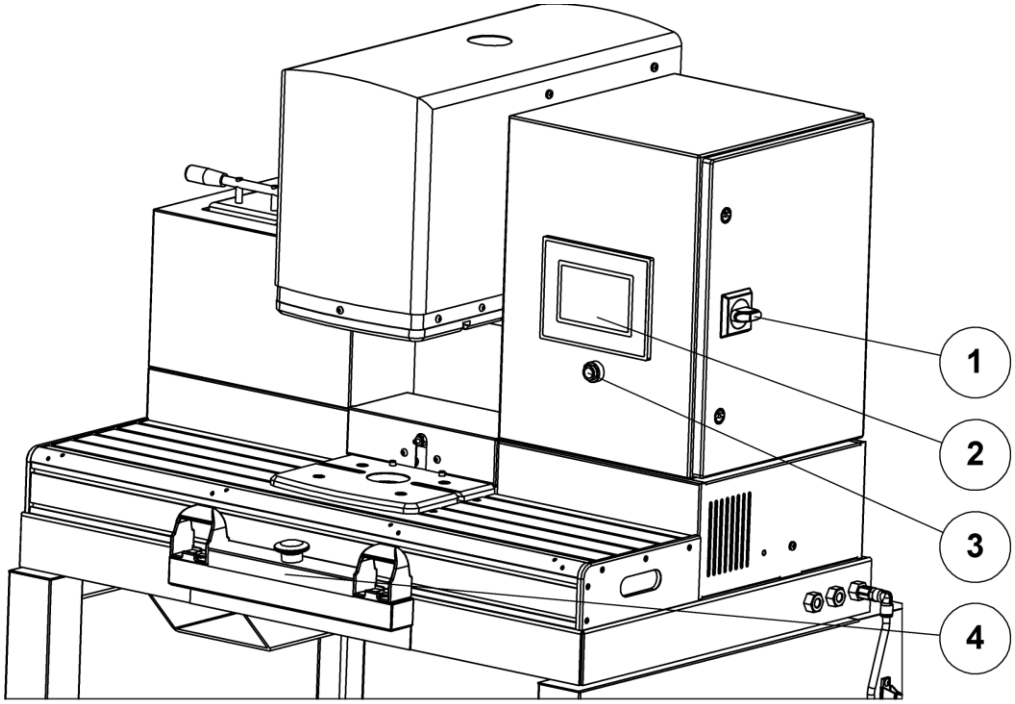


Fig. 4-1 Operator station

1. Main power switch
2. Touch screen
3. Key switch
4. Zero force actuation buttons and emergency stop button

WARNING!

The Mold-man 8000 is designed for single person operation only. Ensure that the equipment is only operated by one operator and no other persons are in the close proximity during operations.

The Mold-man 8000 operator station is designed for easy setup of your molding operations. It consists of the two zero force touch buttons and the emergency stop button at the front of the machine (4), a touch-screen for parameter entry and machine status information (2), a key-switch for operating mode selection (3), and a main power switch (1).
Once the machine is setup and ready, operation simply consists of inserting components into the mold-set and activating the Zero Force actuation buttons to initiate a molding cycle.

4.2 Touch screen navigation

The key switches on the Mold-man™ 8000 changes the machine between Production and Set-up modes. Production mode is set by turning the switch counter clockwise, setup mode by turning it clockwise. The screen displayed during the production mode is with the exception of a reset able cycle counter an information only screen. It gives molding sequence and machine status information during standard operation. The setup screen is your link to setting of all machine parameters.
All screens feature a certain commonality. All screens that accept a user input have outline boxes (a) (b) for the values that can be changed. Depending on the type of value, numeric or alphanumeric, the numeric or alphanumeric keypad is displayed by touching the corresponding value in the outline box. A new entry can be made and be entered by pressing the ENT button. Pressing the ESC button will retain the original value disregarding any new entries. Pressing either button will also close the keypad and return to the original screen.

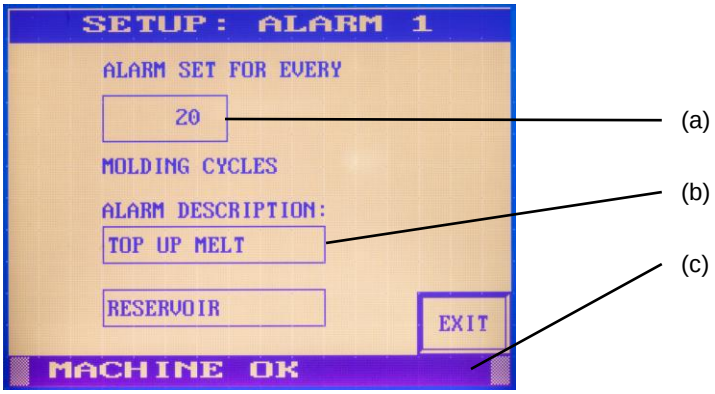


Fig. 4-2 Sample screen

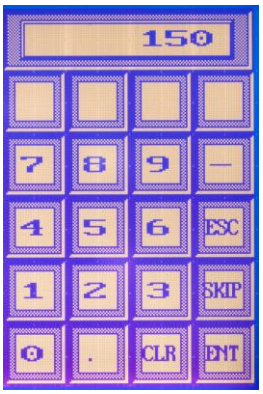


Fig. 4-3 Numeric keypad

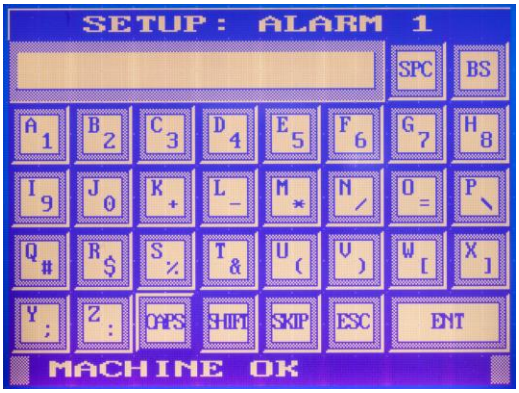


Fig. 4-4 Alphanumeric keypad

In addition all screens have a common status bar at the bottom (c), which can display the following messages:

MACHINE OK……No alarms are present and machine can be operated.

EMERGENCY STOP……...The emergency stop button is activated. Button must be manually reset by pulling it up.

TEMPERATURE LOW……This message is displayed for temperatures below 360ºF [182ºC]

TEMP OUT OF RANGE……... This message is displayed when the temperature is 10ºF [5ºC] or more from the set-point.

VFD FAULT……...Error message from the Variable Frequency Drive.

PLC BATTERY LOW……The memory battery in the PLC needs replacement. It is located under the front cover of the PLC.

STAND BY TEMP……The automatic temperature turn-down is actuated. Activate actuation buttons, E-stop or key switch to reset to original set-point temperatures.

ZERO IS SET…… Displayed after mold-set height has been set.

NO ENABLE INPUT……Displayed if enable input function is activated and the machine does not receive an external signal to start an injection cycle.

4.2.1 Production mode

The machine is in production mode when the key-switch is turned to the left. The screen as shown in fig. 4-5 is displayed.

Fig. 4-5 Production mode screen

Fig. 4-6 Reset cycle counter screen

RESERVOIR TEMP…… Indicates the current reservoir temperature.

MANIFOLD TEMP…… Indicates the current manifold temperature.

INJ. PRESSURE…….. Indicates the pressure during injection.

TIME REMAINING……Indicates the remaining time in current molding cycle.

INJECTION…… Indicates the type of injection cycle, advanced or standard.

CYCLE COUNTER…….. Shows the number of molding cycles since the last reset.

RESET……Displays the reset cycle counter screen.

Pushing the Reset button will bring up the screen shown in fig. 4-6. Push the value in the outline box to set the counter to zero or desired value. Press the exit button in the lower right hand corner to save the entered value and exit the screen. Note: This is the only parameter that can be accessed and changed from the Production Screen.

4.2.2 Setup mode navigation

Explanation of screen details on following pages.

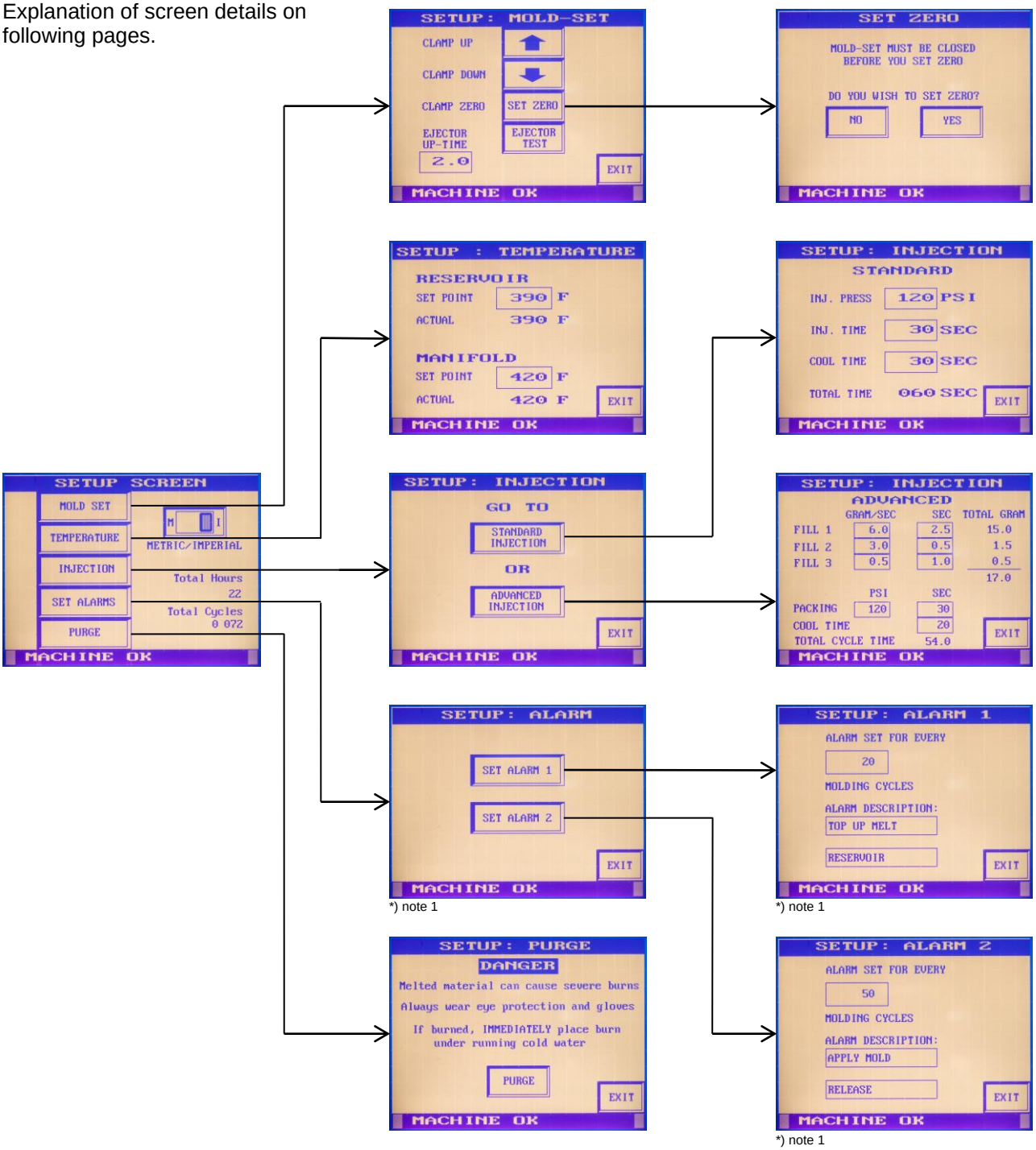


Fig. 4-7 Setup screen flowchart

*) Note 1: Alarm screen functionality from machine serial number 04-0140 onwards.

4.2.3 Setup screen

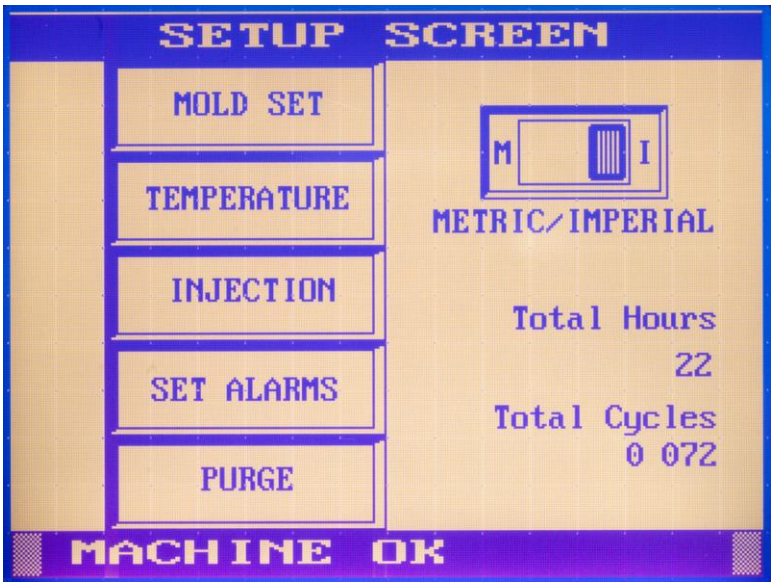


Fig. 4-8

This set-up screen is your link to setting of all machine parameters.

MOLD SET……Advances to the Mold Set setup screen.
TEMPERATURE……...Advances to the Temperature setup screen.
INJECTION…… Advances to the Standard or Advanced Injection setup screen.
SET ALARMS*)……Advances to the Alarms setup screen.
PURGE…….. Advances to the Purge screen.
*) Alarm screen functionality is a standard feature from machine serial number 04-0140 onwards

In addition the Setup Screen displays a Total Hour and Total Cycle counter. The upper right hand corner contains a selection button to display all values in Metric or Imperial units.

4.2.4 Mold-set and ejector setup screen

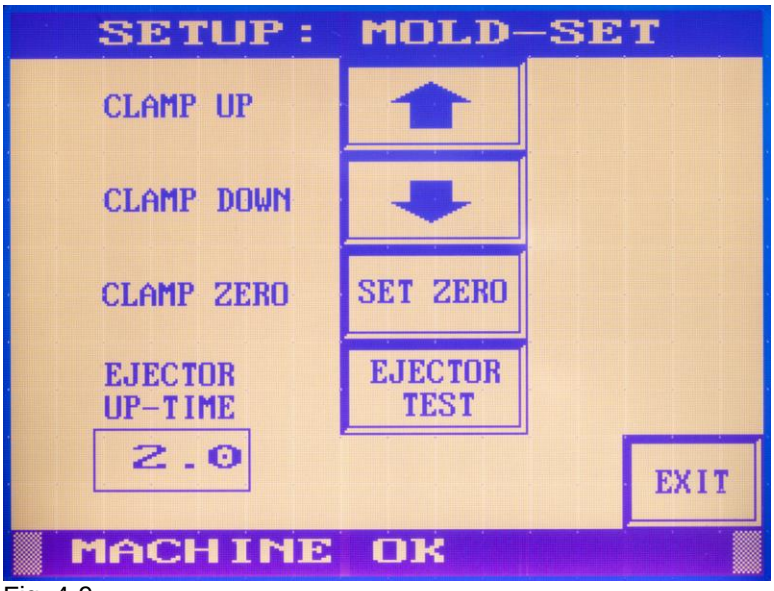


Fig. 4-9

CLAMP UP……Pushing and holding button opens mold clamp –by low pressure.

CLAMP DOWN…… Pushing and holding button closes mold clamp – by gravity only for safety.*)

SET CLAMP ZERO……..Advances to the “Set Clamp Zero” screen shown in fig. 4-10.

EJECTOR UP-TIME……Time that the ejector remains in the upper position.

EJECTOR TEST……...Activates ejector for the time specified in ‘Ejector Up-time’.

*) Note that some mold clamp stiction can be experienced on new machines. If the upper mold clamp does not descent by itself, it may require a downwards push to get the movement started. Grab the mold platen at the back on the left side to pull down.

4.2.5 Set clamp zero screen

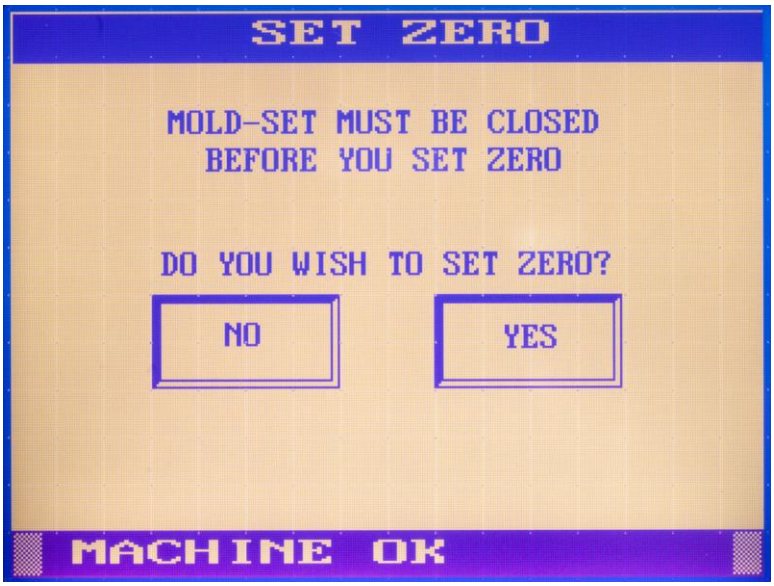


Fig. 4-10

IMPORTANT!
Before the set clamp zero function is used the installed mold-set must be completely closed!

After it is verified that the installed mold set is completely closed, the clamp can be set to its closed or zero position by pushing the “Yes” button. The message “Clamp Zero Is Set” is displayed briefly in the status bar to acknowledge the setting. Pushing the No button will not set a new clamp zero position.

4.2.6 Temperature screen

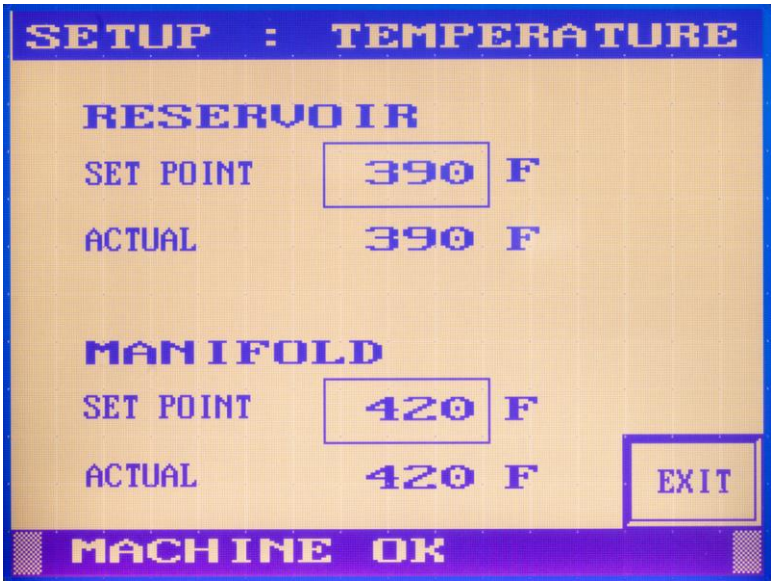


Fig. 4-11

The temperatures are adjustable from 360ºF (180ºC) up to 475ºF (245ºC). Temperatures below 360ºF (180ºC) can be set, however the machine will not start an injection cycle.

RESERVOIR

SET POINT……. Push to set reservoir temperature in pop-up screen.

ACTUAL……. Current reservoir temperature.

MANIFOLD

SET POINT……. Push to set manifold temperature in pop-up screen.

ACTUAL……. Current manifold temperature.

When both temperatures are within 10 degrees of set-point, “MACHINE OK” will be displayed in the status bar.

4.2.7 Automatic temperature turn-down

The machine is equipped with an automatic temperature turn-down feature. If the machine has not been operated for 2 hours, the temperature set-point will automatically be reduced to 275ºF and “STAND BY TEMP” will be displayed in the status bar. On earlier machines the message will alternate between “MACHINE OK” and “TEMPERATURE LOW”. The machine resets to the original set-point temperatures when the actuation buttons, the E-stop button or the key switch is actuated.

IMPORTANT!

Please observe and follow manufactures recommendations for setting correct temperatures to process molding materials.

4.2.8 Injection mode selector screen

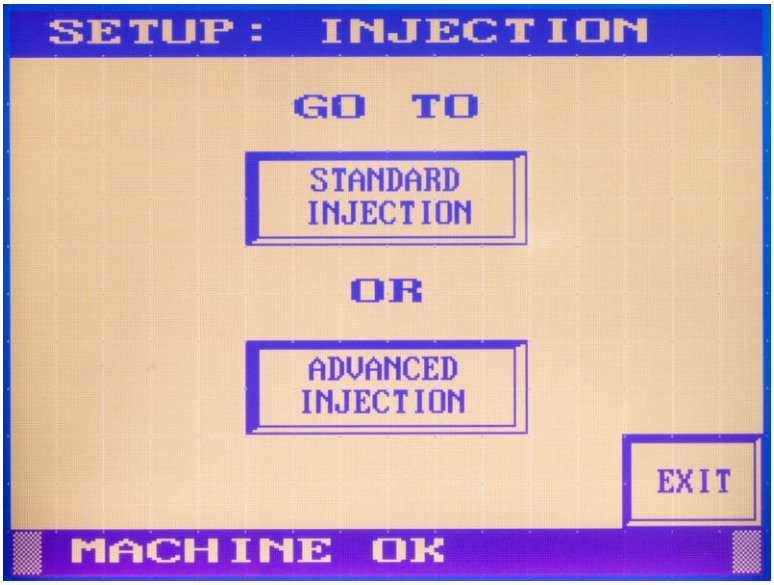


Fig. 4-12

In this screen you select either standard injection mode at constant flow and pressure or advanced injection mode with custom made injection profiles.

4.2.9 Standard injection setup screen

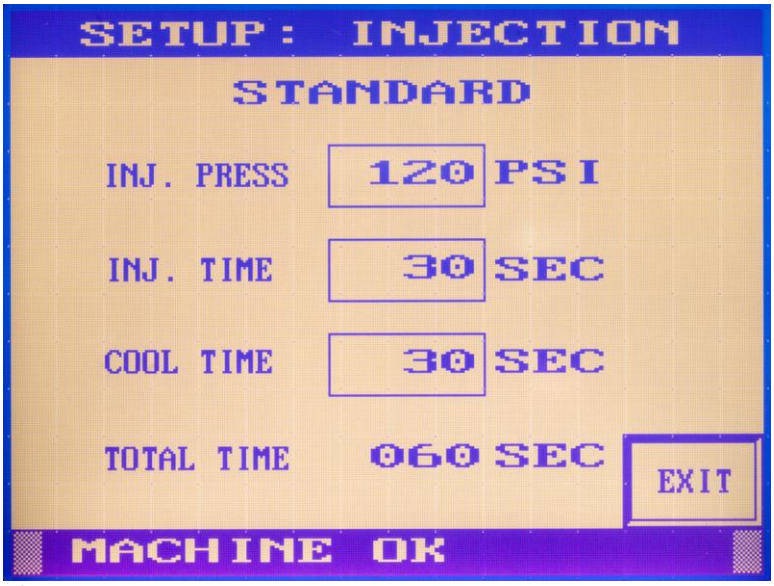


Fig. 4-13

Standard injection will inject material at pre-set flow rates for various pressures. Maximum pressure is 500 PSI [35.5 bar]. Maximum timer setting is 300 seconds.

INJ. PRESS……...Push to set injection pressure in pop-up screen.
INJ. TIME……...Push to set injection time in pop-up screen.
COOL TIME……...Push to set cooling time in pop-up screen.
TOTAL TIME……. Displays the sum of injection and cooling time.

4.2.10 Advanced injection setup screen

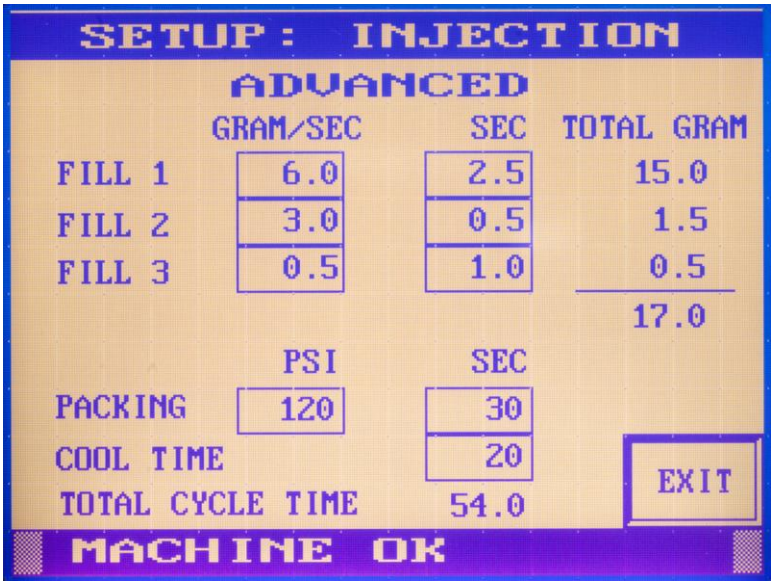


Fig. 4-14

FILL 1, FILL 2, FILL 3…….. Set the flow rate for a specified amount of time by pushing the appropriate outline boxes and editing the values in the corresponding pop-up screens.

PACKING……...Set the injection pressure and duration by pushing the appropriate outline boxes and edit the values in the corresponding pop-up screens.

COOL TIME……...Push to set cooling time in pop-up screen.

TOTAL CYCLE TIME……...Displays the sum of all fill steps, the packing step and the cooling time.

This screen allows for custom designed injection profiles. This mode can be used to encapsulate very fragile components or connectors that are prone to bleed-through. It is also very useful for making a nicer surface on larger components as you can fill the cavity very fast and reduce chance of nit lines etc. Maximum flow rate is 9.9 gram/second *). Maximum pressure is 500 PSI [35.5 bar]. Maximum timer setting is 99.9 seconds for each of the three fill steps. Maximum timer setting for the packing and cool time is 300 seconds each.
All values are entered in pop-up screen after pushing outline box. One, two or three steps of filling the cavity can be utilized. After filling, the cavity is packed at the packing pressure for the set time. The cooling time completes the cycle.
*) Note 1: From machine serial number 04-0140 onwards.

NOTE!

Actual flow rate may vary depending on material viscosity.

NOTE!

Most applications will only require the use of FILL 1. The molding cycle will automatically skip FILL 2 and FILL 3 and go directly to PACKING.

4.2.11 Alarm selector screen

*) Alarm screen functionality is a standard feature from machine serial number 04-0140 onwards

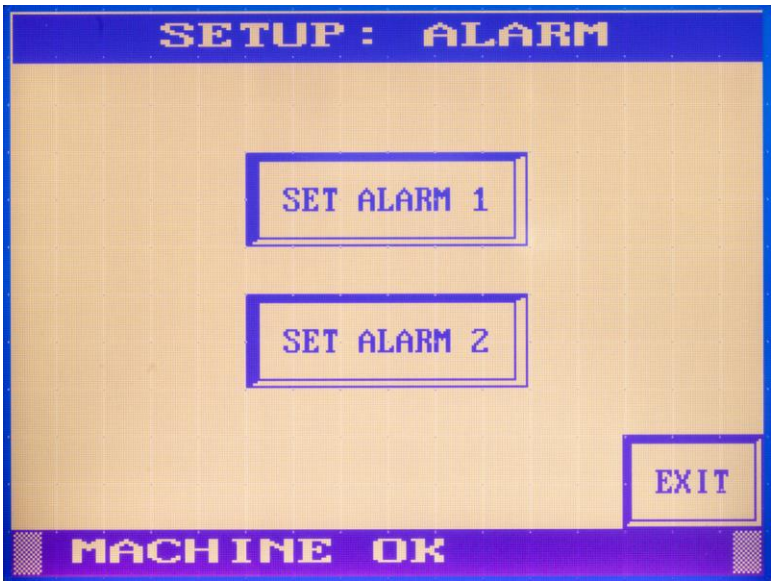


Fig. 4-15

In this screen Fig. 4-15 you select to edit the alarm counts and the alarm message for either “alarm 1” or “alarm 2”.

4.2.12 Alarm 1 and alarm 2 setup screen

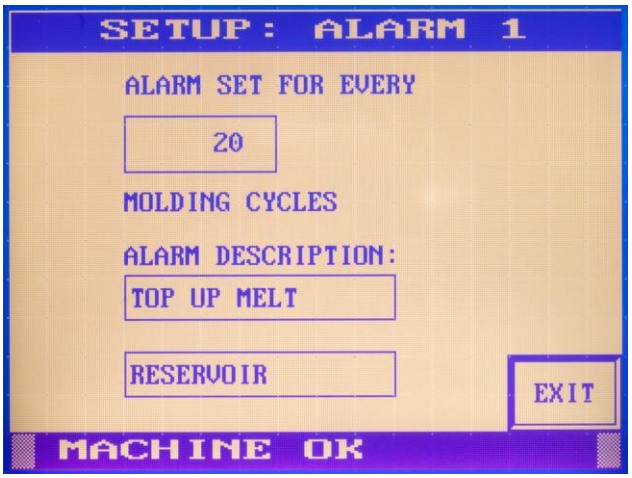


Fig. 4-16

Fig. 4-17

ALARM SET…….. Set the number of molding cycles before the alarm message entered below appears during production mode. The machine will not allow an injection cycle until the alarm is acknowledged on a pop-up screen.

ALARM DESCRIPTION…….Enter the alarm message to be displayed after the number of cycles set in the alarm count above is reached. To lines of alphanumeric characters are available.

4.2.13 Purge setup screen

Fig. 4-18

WARNING!
Molten material is hot and can cause severe burns. When reservoir is empty, the nozzle may sputter because of air. Always wear eye protection, gloves and protective clothing when handling hot material!

PURGE…….. Starts pumping material through the nozzle for the duration the button is pushed.

NOTE!
Ensure that the purged material is captured by supplied stainless steel drain pan .

4.3 Mold-set installation

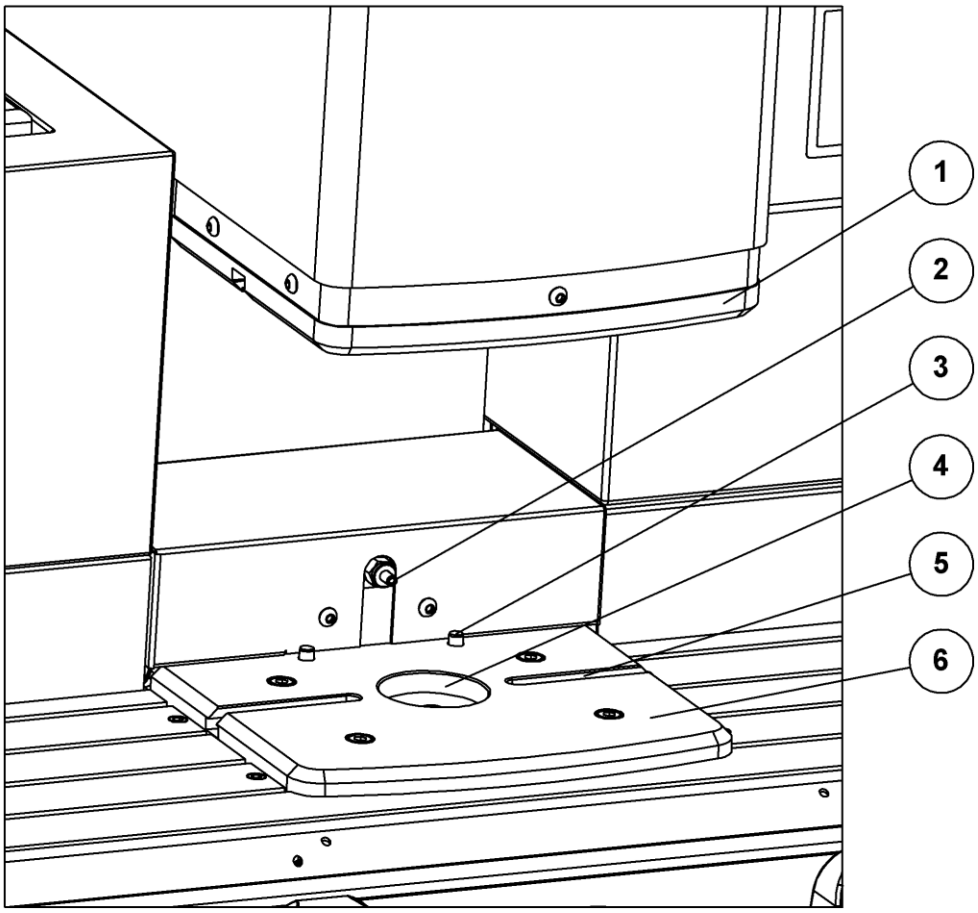


Fig. 4-19 Clamp layout

1. Upper mold-platen
2. Injection nozzle
3. Mold-set stops
4. Ejector well
5. T-slot nut
6. Lower mold-platen

If a mold-set is already installed, see mold-set removal below. If no mold-set is installed, please follow these guidelines:

Before installing the mold-set:

- Ensure that the upper mold-platen (1) is fully retracted. (see section 4.2.4)
- Inspect the upper (1) and lower (6) mold-platen for damage to the mounting surfaces
- Inspect the injection nozzle (2) for damage
- Use a lint-free rag to wipe and clean the mounting surfaces of the upper and lower mold platen.

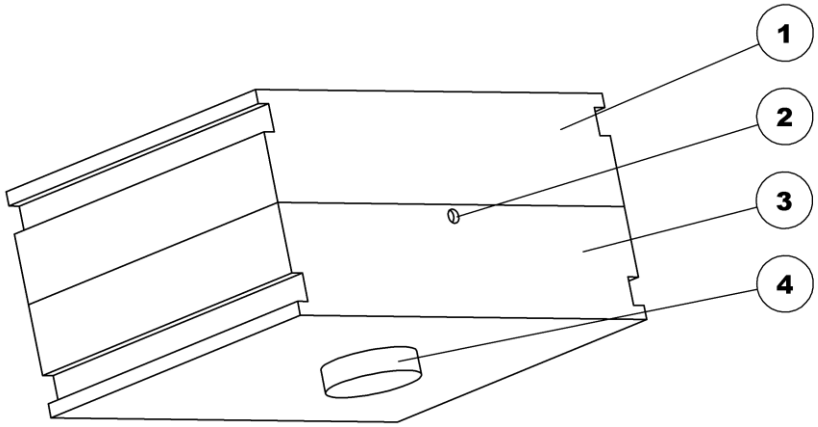


Fig. 4-20 Typical Mold-set

1. Upper mold-half
2. Injection nozzle engagement hole
3. Lower mold-half
4. Ejector boss [on mold-sets with built-in ejector system]

- Mold-set installation starts with upper and lower mold halves separated
- Use a lint-free rag to wipe and clean the mounting surfaces of the upper and lower mold half.

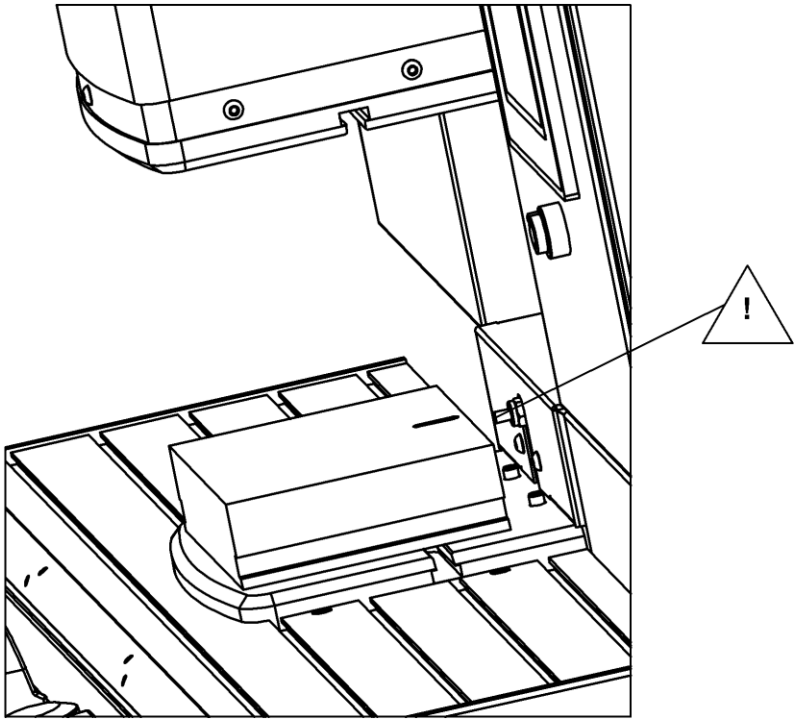


Fig. 4-21

- Place the lower mold-half carefully onto the lower mold-platen. If a mold-set with ejectors is used, make sure the boss for mold-set ejectors fits into the ejector well.
- Align the injection nozzle with the nozzle engagement hole in the lower mold half.
- Carefully push the mold-set injection nozzle engagement hole (!) over the Teflon nozzle. This is best done with a cold nozzle.

NOTE!

If injection nozzle is hot when installing mold-set extra care must be exercised to avoid damage to the nozzle.

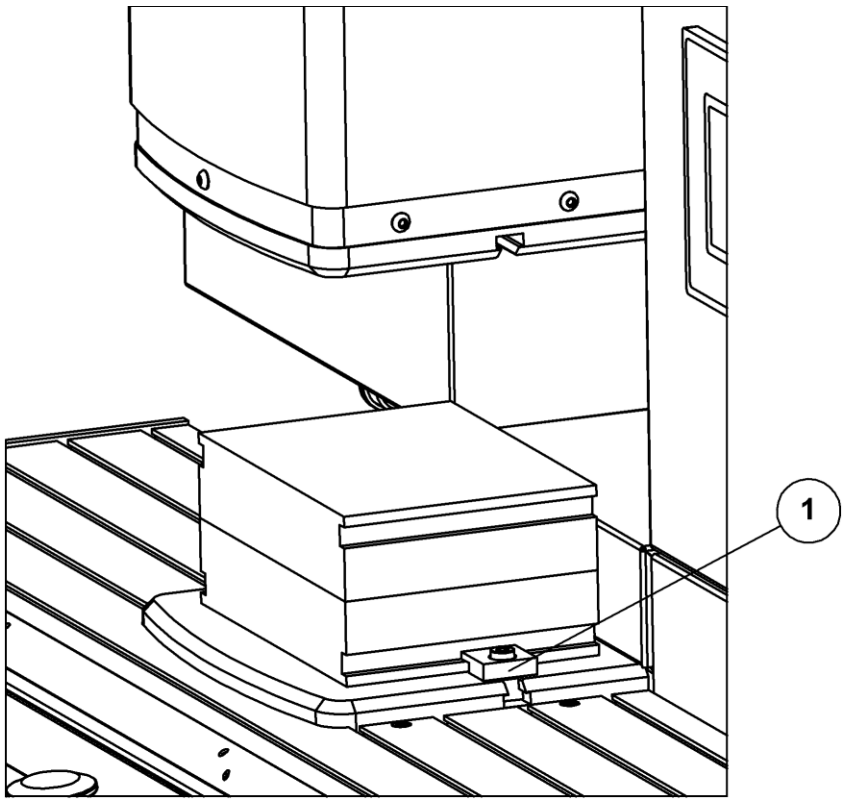


Fig. 4-22

1.	Mold fastener

- Position two mold fasteners (1) on either side of the lower mold-half in the T-slots. Secure them over the lip on the lower mold half mounting slots. The 8mm socket head cap screws are tightened with a 6 mm Allen key to 11 ft-lb (15 Nm) torque.
- Place the upper mold-half onto the previously installed lower mold-half by carefully engaging the mold-set guide-pins [typically in the upper mold-half] into the guide bushings [typically in the lower mold half].

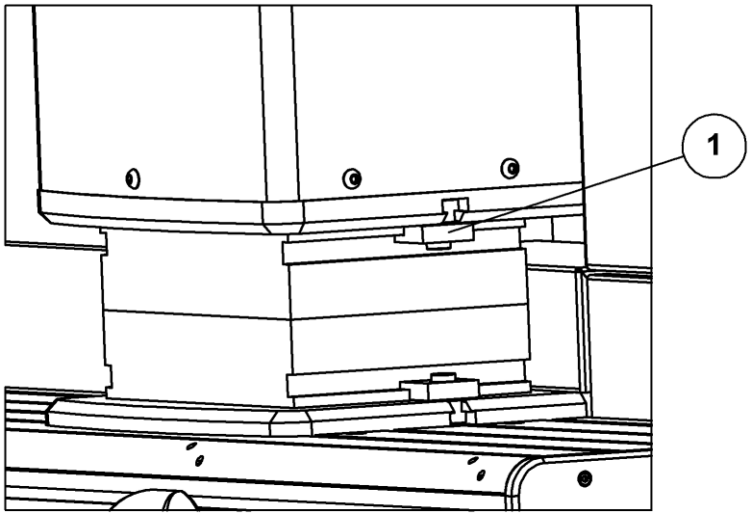


Fig. 4-23

1. Mold fastener

- Lower the upper mold platen until it rests on upper half of mold-set. (see section 4.2.4)
- Position two mold fasteners (1) on either side of the upper mold-half in the T-slots. Secure them over the lip on the upper mold half mounting slots. The 8mm socket head cap screws are tightened with a 6 mm Allen key to 11 ft-lb (15 Nm) torque.
- Open and close mold-set several times with the mold clamp up and down arrow buttons to ensure that the mold-set halves engage correctly. Make any adjustments by repeating the previous steps.
- With the mold halves completely closed, set the mold-set zero height (see section 4.2.5)
- Enter pressure, temperature and timer values in the relevant screens. (see section 4.2.6 to 4.2.9)

Mold-set removal:
- Lower the upper mold-platen until mold-set is fully closed. (see section 4.2.4)
- Loosen the two mold fasteners in the T-slots and slide them away from the upper mold half
- Open mold clamp by pushing the up arrow.
- Loosen the two mold fasteners in the T-slots and slide them away from the lower mold half.
- Carefully pull the mold-set away from the Teflon nozzle.
- Remove assembled mold-set. If mold-set has ejectors, take care to clear the ejector well.

4.4 Using the enable input*)

The Mold-man 8000 is equipped with an enable input. This function can be used to start or abort a molding cycle after the clamp is closed based on the presence of an external signal. For example, a sensor integrated in a mold-set can be used in conjunction with this function to allow a molding cycle to only occur when a part is detected by the sensor. Important: To enable this function a jumper in the electrical enclosure needs to be removed and a signal from a sensor connected to the enclosure.

*) Enable input functionality is a standard feature from machine serial number 04-0140 onwards

5.0 Production

5.1 Processing guidelines for thermoplastic polyamide materials

Thermoplastic polyamide materials have a relatively low viscosity and can be injected into the mold-set at temperatures that typically range from 370°F to 475°F.

WARNING!
Read Material Safety Data Sheets prior to handling of raw materials. Do not breathe hot vapors! Ensure good ventilation of work area

These raw materials must be fully molten prior to injection into the mold-set. The following processing guidelines must be observed:

- The reservoir should only be filled with enough material for one shift or maximum one day's usage.
- Do not exceed the recommended application temperature or the material could char and degrade.
- Ensuring that the heating fins are covered can minimize charring of material in the reservoir.
- Avoid prolonged periods of 'idle' time with no material usage and the reservoir at elevated temperature.
- The machine is equipped with an automatic temperature turn-down feature. If the machine has not been operated for 2 hours, the temperature set-point will automatically be reduced to 275ºF and "STAND BY TEMP" will be displayed in the status bar. On earlier machines the message will alternate between "MACHINE OK" and "TEMPERATURE LOW". The machine resets to the original set-point temperatures when the actuation buttons, the E-stop button or the key switch is actuated.

If material degrade the viscosity will initially increase, which could result in incomplete over-molding of components – "short shots". Further degradation of the molding material can cause it to "gel up" and make it difficult to remove from the reservoir. Prolong inactive periods of high temperature can cause build-up of charred material causing poor heat transfer from reservoir and manifold and ultimately charred material could cause blockage of filter.

5.2 Machine start up

Starting up the Mold-man™ 8000 molding machine is very simple. Please follow these guidelines:

- Confirm air and water supply to the machine.
- Turn on main power switch on right hand side of machine.
- Ensure that there is enough material in the reservoir for the intended production. Observe the guidelines given in chapter 5.1.
- Reservoir and manifold typically take approximately 45 minutes to heat up before the machine is ready for production. During that phase the Mold-man™ 8000 will display the message "Temperature low" or "Temp Out Of Range" in the status bar of the touch screen.
- Once all components have reached operating temperatures the message will change to "Machine OK".

5.3 Production

When the machine has reached the molding temperature the production starts as follows:

- Position components to be molded in the lower mold half cavity.
- Touch the two zero force buttons simultaneously (within 0.5 seconds of each other).
- Keep the buttons activated until the mold halves are clamped together.
- The injector nozzle will open and start filling the cavity. After injection time is complete, the cooling cycle starts.
- When cooling cycle is completed, the mold-set will open and the ejector will push out the molded parts, if activated.
- The parts and runner can be carefully removed from the mold set.

5.4 Normal stop

Turn off the main power switch and the machine will vent off air and cool down.

5.5 Emergency stop

Push the red E-STOP button in any emergency situation. The machine will vent off the air. After the emergency situation has been remedied by competent personnel, pull the E-STOP button up to reset the machine.

5.6 Automatic Shut Down

The Mold-man 8000 machine is equipped with thermal switches that will automatically shut the machine down if reservoir or manifold temperature exceeds 500ºF. This temperature will trigger the main breaker inside the electrical enclosure via a shunt. The machine will display “TEMPERATURE OUT OF RANGE” for several minutes and then shut down. The breaker can not be reset until the machine has cooled down to below 475ºF. The cause of such shut down must be identified and rectified before machine can be operated again.

6.0 Maintenance

6.1 General guidelines

WARNING!

Qualified personnel must carry out all maintenance. Maintenance personnel must be familiar with the operation and maintenance of this equipment. They should furthermore be familiar with general safety regulations at the work location.

WARNING!

Maintenance personnel must wear appropriate personnel protection equipment including heat resistant gloves and safety glasses.

WARNING!

Prior to performing any maintenance on the machine, all utilities must be turned off and disconnected this includes electrical power, air and water supply. Parts of the machine are pneumatically operated and contain fluids under pressure even after the machine has been disconnected from all utilities. Fluid pressure must be safely bled off prior to any maintenance or injury could occur.

WARNING!

The equipment processes materials at temperature up to 475°F. The melt unit, manifold and nozzle are HOT! The hot molten material can cause severe burns! Always wear protective, heat resistant gloves and protective clothing! Always use safety glasses! Do not touch molten material! Even hardened material can still be very hot! Parts of the machine can remain hot for up to 4 hours after machine is turned off.

6.2 Recommended maintenance intervals

Machine part	Maintenance procedure	Interval*
Reservoir	**Cleaning the melt surfaces inside the melt reservoir. Removing charred and degraded material.**	**300 hours**
Material filter	**Replace material filter after each reservoir cleaning.**	**300 hours**
Pressure plunger	**Clean and lubricate pressure plunger, replace o-rings**	**300 hours**
Injection nozzle	**Inspect nozzle daily, replace as necessary**	**As necessary**
Air filter and water separator	**Replace air filter and water separator cartridge**	**Yearly**
External panels	**Clean with soap water. Molding material vapors can be removed with denatured alcohol.**	**Monthly**
Enclosure air filters	**Blow out with compressed air**	**Yearly**

*) Depending on the operating conditions of the machine these intervals may need to be shortened

6.3 Access to frequent maintenance items

The Mold-man™ 8000 is designed with simple maintenance in mind. It is essential for the successful operation of the machine that a few maintenance items are performed regularly as outlined in section 6.2.This section describes how to gain access to the most frequently performed maintenance procedures.

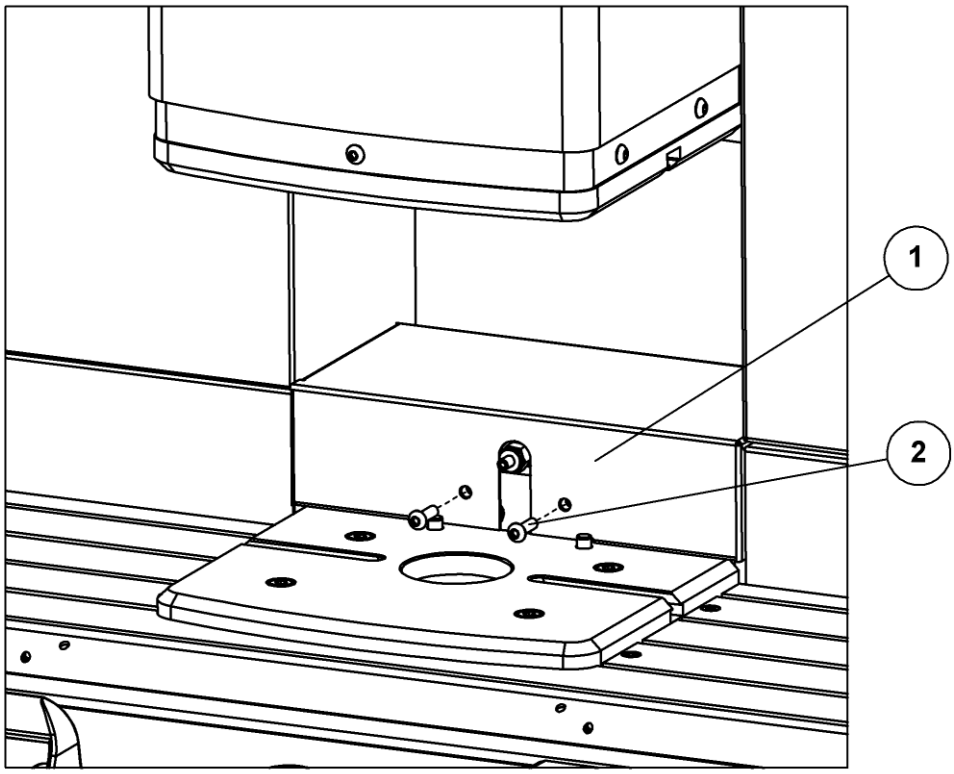


Fig. 6-1 Manifold cover removal

1. Manifold cover
2. Fastener BHCS M6 x 20

- If a mold-set is installed remove it now (see section 4.3)
- Remove two BHCS M6 x 20 (2) with a 4mm allen key
- Lift the manifold cover (1) up and then out towards you

WARNING!

Covers may be hot! Maintenance personnel must wear appropriate personnel protection equipment including heat resistant gloves and safety glasses.

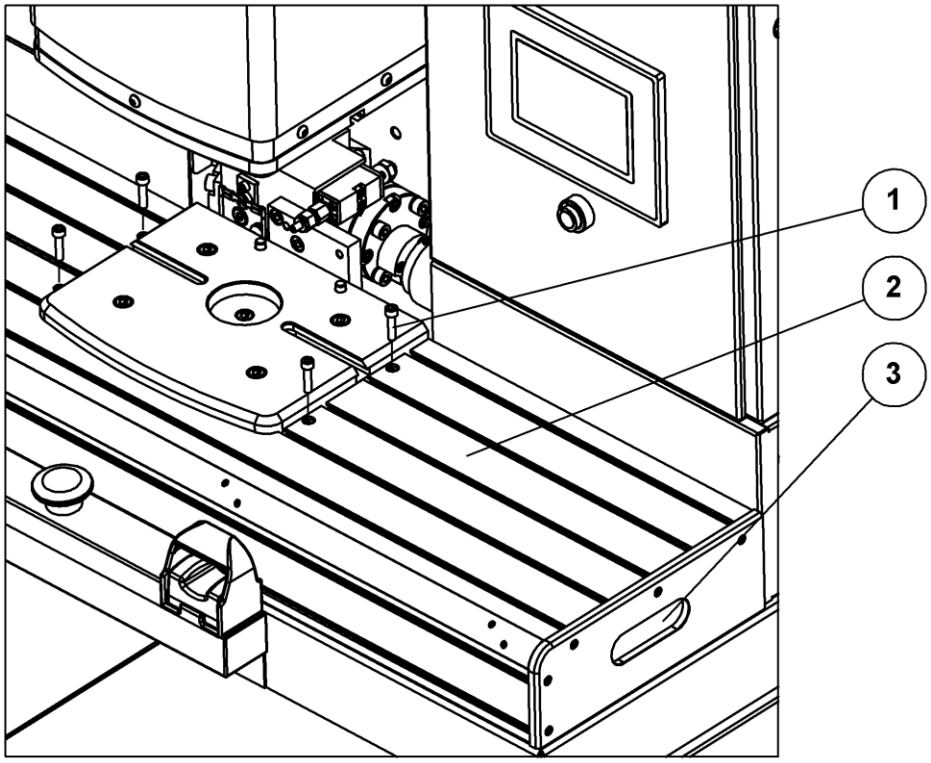


Fig. 6-2 Machine table removal

1. Fastener SHCS M6 x 30
2. Machine table
3. Lifting aid cutout

- Remove four SHCS M6 x 30 (1) with a 5mm allen key
- Grip the machine table by the two cutouts (3) on either side of the table
- Lift the machine table (2) up and then out towards yourself

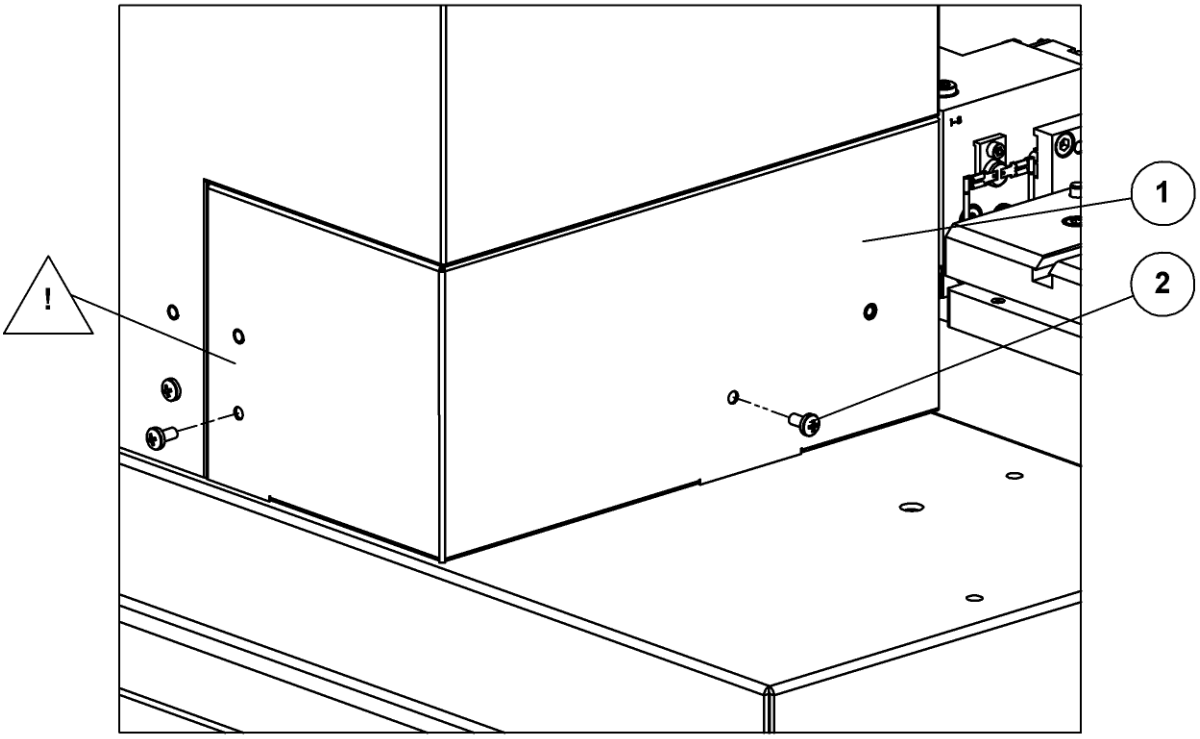


Fig. 6-3 Left service cover removal

1. Left service cover
2. Phillips head fastener

- Remove the machine table (see above)
- Remove two Phillips head fasteners (2) with a screw driver
- Slide the left service cover (1) towards the left side of the machine and then towards the front
- Before removing it completely disconnect the ground wire connected on the inside of the cover (!) by pulling the quick disconnect connector from the quick disconnect tab.

WARNING!

Covers may be hot! Maintenance personnel must wear appropriate personnel protection equipment including heat resistant gloves and safety glasses.

6.4 Cleaning of melt reservoir

Cleaning of the melt reservoir is critical to successful operation of the machine and must be preformed regularly as outlined in section 6.2. It is largely a manual operation and is performed as follows:

- Turn the machine on and set the manifold and reservoir temperatures to melt the material (refer to section 4.2.6)
- Use the purge function to empty the reservoir (refer to section 4.2.12)

WARNING!

Molten material is hot and can cause severe burns. When reservoir is empty, the nozzle may sputter because of air. Always wear eye protection, gloves and protective clothing when handling hot material!

NOTE!

Ensure that the purged material is captured by the supplied stainless steel drain pan.

- Reduce the reservoir temperature to the softening point of the molding material, typically 275°F (135°C) to 290°F (143°C).
- Remove the machine table and the left service cover (refer to section 6.3)
- Position the drain pan under drain plug on front side of reservoir behind service cover.
- Carefully remove the drain plug (2) and the sealing washer (1) from the reservoir using a 12 mm allen wrench.
- Clean reservoir using wooden or high temperature plastic spatula to remove any charred material. Note that the reservoir has a plug (3) on the left side also. This is to facilitate pushing charred material along the bottom of the reservoir towards the drain plug on front.
- Clean the threaded holes and the plugs of molted material. The plugs are carefully reinstalled along with the sealing washer and tightened to 8 ft-lb (11 Nm) torque.

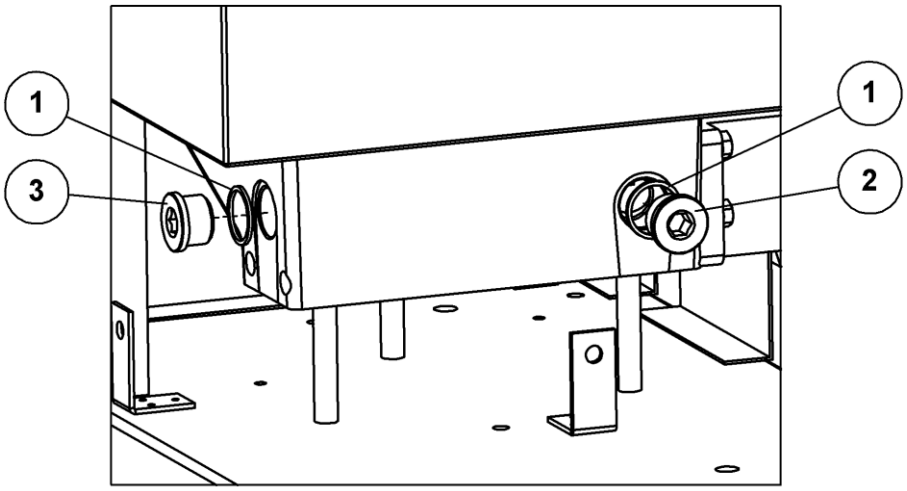


Fig. 6-4 Reservoir drain plug locations

1. Sealing washer
2. Front drain plug
3. Side drain plug

6.5 Changing of filter

Changing the filter is critical to successful operation of the machine and must be preformed regularly as outlined in section 6.2. It is performed as follows:

- For filter change, first heat manifold and reservoir to the material softening point typically around 275°F (135°C) to 290°F (143°C), then position the drain pan under hot manifold drain lip.
- Remove four bolts (4) and carefully remove the filter lid (3) with Viton O-ring (2)
- Pull out old filter (1) with needle-nose pliers or by engaging screwdriver into small filter opening.
- After carefully cleaning out any excess material, install new filter with large opening (!) inwards.
- Wipe off mating surfaces, install a new o-ring (2) in filter lid (3)
- Use high temperature anti seize compound on clean threads of bolts (4) and tighten them to 15 ft-lb (20 Nm) torque.

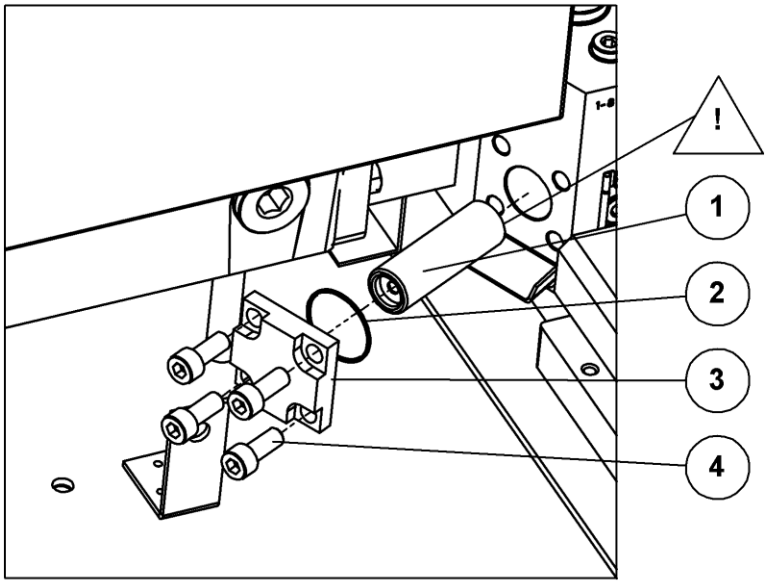


Fig. 6-5 Filter change

1. Filter [part number: 80101159]
2. Filter lid o-ring [part number: 80100368]
3. Filter lid [part number: 80100161]
4. Fastener SHCS M8 x 20 [part number: 80100603]

WARNING!

The equipment processes materials at temperature up to 475°F. The melt unit, manifold and nozzle are HOT! The hot molten material can cause severe burns! Always wear protective, heat resistant gloves and protective clothing! Always use safety glasses! Do not touch molten material! Even hardened material can still be very hot! Parts of the machine can remain hot for up to 4 hours after machine is turned off.

6.6 Changing injection nozzle

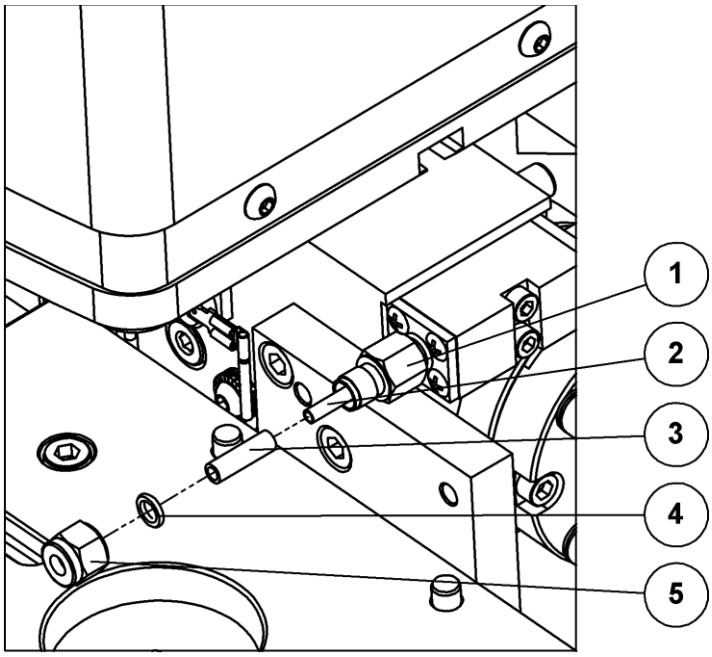


Fig. 6-6 Injection nozzle

1. Nozzle body
2. Nozzle inner tube
3. Teflon sleeve
4. O-ring
5. Outer sleeve nut

(6.) Injection nozzle tip, item 3 & 4 [part number: 80101245]
(7.) Injection nozzle assembly, item 1 thru 5 [part number: 80101244]

The injection nozzle consists of an aluminum inner tube (2) with a Teflon outer sleeve (3). The sleeve is secured with a Teflon O-ring (4) and can be changed out as follows:

- Remove manifold cover (refer to section 6.3)
- Using two 9/16” wrenches, hold stainless nozzle body (1) in place and unscrew outer sleeve nut (5)
- Remove sleeve nut (5)
- With a set of pliers, very carefully pull off Teflon sleeve (3) and O-ring (4), taking care not to compress or damage aluminum inner tube.
- If aluminum tube is damaged, a complete nozzle assembly must be installed.
- Gently push new Teflon sleeve onto inner tube taking care not to bend tube. Sleeve should protrude no more than 1/64” (0.4 mm) from tip of inner tube.
- Install new Teflon O-ring over sleeve
- Install sleeve nut finger tight and tighten 1/4 turn more with wrench

6.7 Cleaning and lubricating of pressure plunger

Cleaning and re-greasing of the pressure plunger is critical to good flow and pressure control of the Mold-man 8000 machine. It must be performed regularly as outlined in section 6.2. This service is performed as follows:

- Air supply to machine is disconnected and manifold heated to 275°F (135°C). Note that the manifold temperature MUST be below the material softening point. If the material is liquid it is not possible to perform this service. Note that it may take 45 minutes to cool down to this temperature after changing the set-point.
- Remove the mold-set (section 4.3) and the manifold cover (section 6.3)
- The pressure plunger is located under the larger plug (1) on top of manifold. Unscrew plug (1) with a 10mm allen key to access plunger (3).

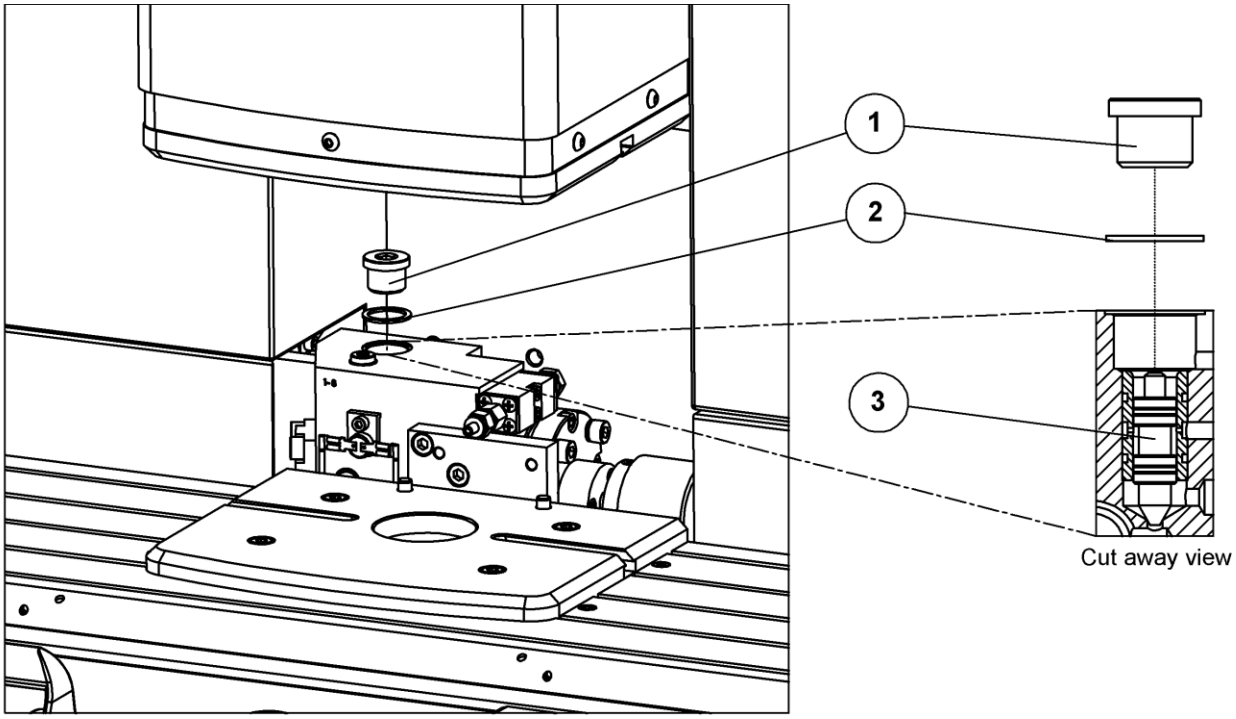


Fig. 6-7 Pressure plunger access

1. Plug [part number: 80100020] (S/N 04-0161 forward)
2. Pressure plunger plug O-ring [part number: 80100663] (S/N 04-0161 forward)
3. Pressure plunger [part number: 80100162]

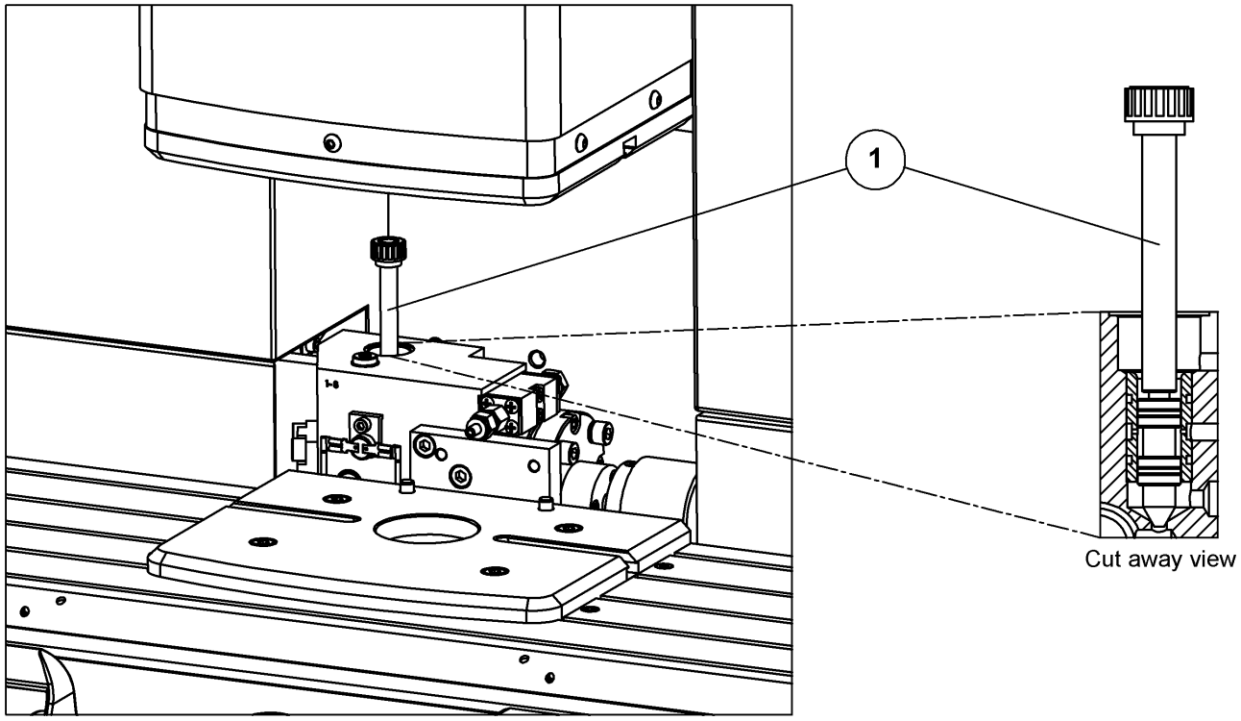


Fig. 6-8 Extracting pressure plunger

1. Plunger extraction tool [part number: 80101247]

- The plunger has a M6 treaded boss on top. Use a plunger extraction tool (1) or a 10 mm diameter rod with a M6 threaded hole to screw onto the plunger, remove the plunger by pulling the plunger upwards.

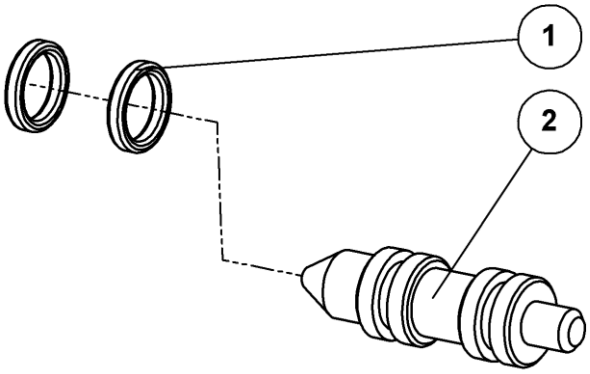


Fig. 6-9 Pressure plunger

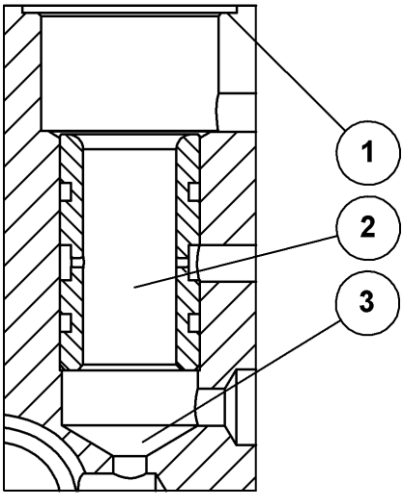


Fig. 6-10 Pressure plunger- bore

1. Kalrez O-ring [part number: 80100366]
2. Pressure plunger [part number: 80100663]

- The two Kalrez O-rings (Fig. 6-9 item 1) are removed and the plunger (2) cleaned with denatured alcohol.
- An alcohol soaked rag is used to clean the plunger-bore (Fig. 6-10 item 2) in the manifold.
- Inspect the pressure plunger seat (Fig. 6-10 item 3) and the O-ring (Fig. 6-10 item 1) for damage. A dental style mirror is very useful to aid in the inspect the pressure plunger seat.

- Using Krytox GPL-206 high temp grease from Dupont, new Kalrez O-rings (Fig. 6-9 item 1) are carefully installed.
- The plunger is liberally lubricated with the high temperature grease filling the space between the o-rings only.
- The greased plunger is carefully pushed down into the clean bore.
- Apply anti seize compound to the threads before tightening the plug to 15.0 Nm.
- Install manifold cover.

After completed service it is recommended to purge at least half pound of material through the machine to purge out any excess grease. Please note that the new O-rings will seat over the next few hours depending on the processing temperature.

6.8 Cleaning of external panels

- External panels are cleaned with lukewarm soapy water using a soft sponge. Rinse off with clean water and dry with absorbing cloth.
- Difficult spots can be removed with rubbing alcohol on a soft rag and then cleaned with soapy water as described above.
- Thermoplastic polyamide material that has been spilt is easily removed with a wooden spatula. Never use screwdrivers or other metal parts.

6.9 Cleaning enclosure air filters

- Air filters must be cleaned regularly as outlined in section 6.2.
- The air filters for the electrical closure are removed from back of closure and cleaned with compressed air. A small screwdriver is inserted into the slot to release the louvered filter lid as shown in figure 6-11. Push the screwdriver up to release the filter lid.

Fig. 6-11 Enclosure air filter

7.0 Troubleshooting

7.1 Troubleshooting matrix

ISSUE	POSSIBLE CAUSES	CORRECTIVE ACTION
Machine injects too little/no material	Pressure Plunger not moving freely	Service pressure plunger → see section 6.7
	Defective electronic pressure regulator	Check electronic pressure regulator → see section 7.2.1 replace if necessary
	Air leak or blockage in Pressure Plunger air supply	Check for leaks or blockage → see section 7.2.2 Locate and fix leak / blockage
	Material filter contaminated Filter installed the wrong way	Replace/clean material filter → see section 6.5
	Material jelled/degraded	Purge old material, clean reservoir → see section 6.4, refill with new material
	Pump suction blocked by foreign object or jelled material	Purge material from reservoir → see section 6.4, refill with new material. Locate and remove foreign object
	Wrong injection settings	Enter correct injection settings
	Air supply pressure to machine low	Supply machine with correct air pressure → see section 3.2.2
	Nozzle Valve drooling	Check for drooling nozzle valve → see section 7.2.3 Replace nozzle valve if necessary
	Nozzle Valve obstructed	Replace nozzle valve
	Nozzle Valve not opening	Check nozzle valve air supply
	Pump motor not turning	Check wiring to pump motor
Machine injects too much material	Pressure Plunger not moving freely	Service pressure plunger → see section 6.7
	Defective electronic pressure regulator	Check electronic pressure regulator → see section 7.2.1 replace if necessary
	Wrong injection settings	Enter correct injection settings
Mold flashes	Pressure Plunger not moving freely	Service pressure plunger → see section 6.7
	Defective electronic pressure regulator	Check electronic pressure regulator → see section 7.2.1 replace if necessary
	Air supply pressure to machine low	Supply machine with correct air pressure → see section 3.2.2
	Wrong injection settings	Enter correct injection settings
	Loose wiring	Tighten connections
Clamp closes and immediately opens again	Clamp 'zero' setting not correct	Enter correct 'zero' setting
	Enable input not activated [only if enable input function is used]	Activate enable input [depends on particular application]
Clamp does not move down in production mode	Linear Potentiometer defective or out of adjustment	Replace or re-adjust linear potentiometer

Continued on next page….

ISSUE	POSSIBLE CAUSES	CORRECTIVE ACTION
Manifold temperature not rising/rising slowly	Fuses blown	Check fuses → see section 7.2.6
	Solid state relay defective	Replace solid state relay
	Heater cartridge defective	Check heater cartridge → see section 7.2.5
Manifold temperature rising above set-point	Solid state relay defective	Replace solid state relay
Reservoir temperature not rising/ rising slowly	Fuses blown	Check fuses → see section 7.2.6
	Solid state relay defective	Replace solid state relay
	Heater cartridge defective	Replace heater cartridge
Reservoir temperature rising above set-point	Solid state relay defective	Replace solid state relay
Machine shuts off by itself	Over-temperature condition occurred	Check thermal switches → see section 7.2.4

7.2 Troubleshooting procedures

7.2.1 Verifying electronic pressure regulator operation

The electronic pressure regulator is located under the top cover of the machine. It generates variable air pressure depending on the injection pressure set point entered on the touch-screen. The electronic pressure regulator only generates air pressure during the injection cycle. Pressure will drop to zero after the injection cycle is completed. The easiest way to verify correct operation is to install an inline pressure gauge at the output port of the electronic pressure regulator. Remove the air hose from the output port of the pressure regulator as shown in figure 7-1.

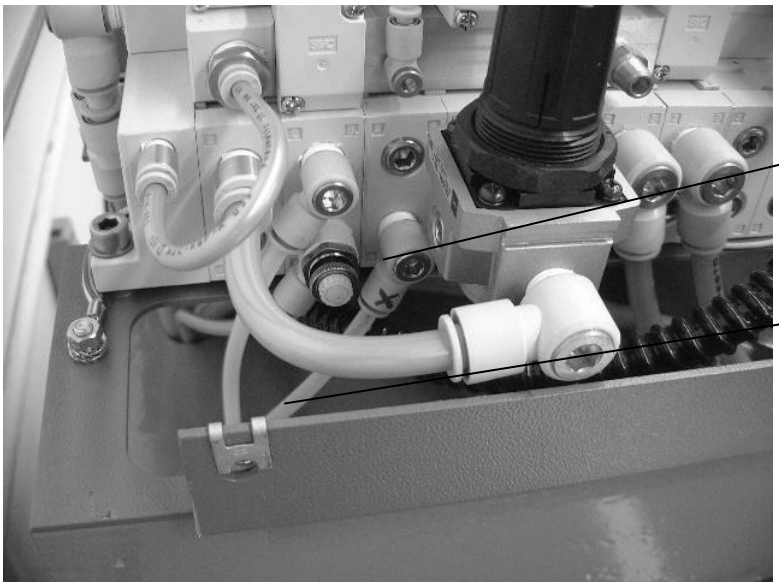


Fig. 7-1 Electronic pressure regulator output port.

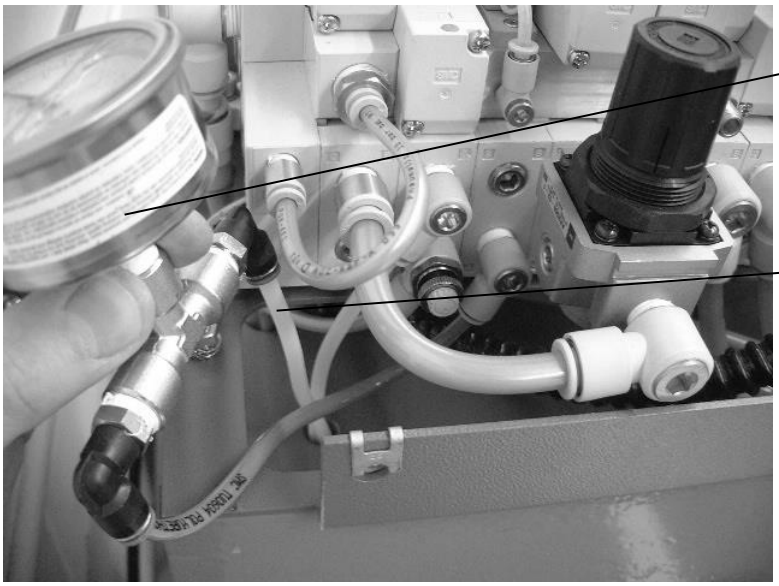


Fig. 7-2 Inline pressure gauge

Install a pressure gauge with a minimum range of 160 PSI [11.0 bar] inline between the electronic pressure regulator output port and the air hose as shown in figure 7-2. The pressure regulator output port size accepts a 6 mm diameter hose.
This procedure is best performed with a mold-set installed. During this procedure you will inject small amounts of material into the mold-set using the standard and advanced injection mode. Enter the injection pressures listed in the table below with an injection time of 5 seconds and a cool time of 60 seconds using the standard injection mode for the first three pressures listed. The last test is performed in advanced injection mode. Enter the values from the table in fill 1 time should be 5 seconds as well. Set the packing pressure & time to zero and the cooling time to 60 seconds. Verify that the indicated air pressure on the gauge corresponds to the values listed in the table below.
The ratio between the output pressure of the electronic pressure regulator and the injection pressure set-point entered on the touch-screen is 1 to 8. I.e. an injection pressure of 200 PSI [13.8 bar] results in an air pressure of 25 PSI [1.7 bar].

Injection pressure [Touch-screen]	Air pressure [Pressure gauge]	Voltage [terminal #2 & #13]
100 PSI [6.7 bar]	12.5 PSI [0.9 bar]	1.00 V
200 PSI [13.8 bar]	25 PSI [1.7 bar]	2.00 V
400 PSI [27.6 bar]	50 PSI [3.4 bar]	4.00 V
2 grams / sec 800 PSI [55.2 bar] *)	100 PSI [6.9 bar]	8.00 V

Ensure that the supply air pressure is at least 115 PSI [7.9 bar] when performing this procedure. Lower supply air pressures will result in reduced high pressures and performance from the electronic pressure regulator. The electronic pressure regulator should adjust to 90 % of the pressure listed in the table within 2 seconds.

In addition, to verify that the electronic pressure regulator receives the correct voltage signals to generate the according air pressures a digital voltmeter can be hooked up to main I/O terminals #2 [10VDC+] and #13 [com]. The values should correspond to the voltages listed in the table above.

7.2.2 Checking for air-leaks and/or blockage in pressure plunger air supply piping

It is important to ensure that the air supply line and the air fitting from the electronic pressure regulator to the manifold as well as the pressure plunger plug in the manifold are air tight. Most air leaks occur on the manifold side due to the thermal cycling and at the pressure plunger plug.
It is recommended to perform this procedure while both, the manifold and the reservoir are at room temperature. Disconnect the air hose at the pneumatic manifold as shown in figure 7-3 and hook up a separate shop air supply of 100 PSI [6.9 bar]. Use a spray bottle with a soap water mixture to spray the areas indicated in figure 7.4 to check for leaks. Re-tighten the fitting / plug as necessary.

There is a chance that molding material can plug up the pressure plunger air supply line at the indicated location in figure 7-4. This typically occurs when the pressure plunger services was not performed according to section 6.7 and molding material was allowed to flow out through the pressure plunger bore. A blocked pressure plunger air supply line can be identified by a dark discoloration that is visible from the outside at the indicated area. Replace the air line if blockage is detected.

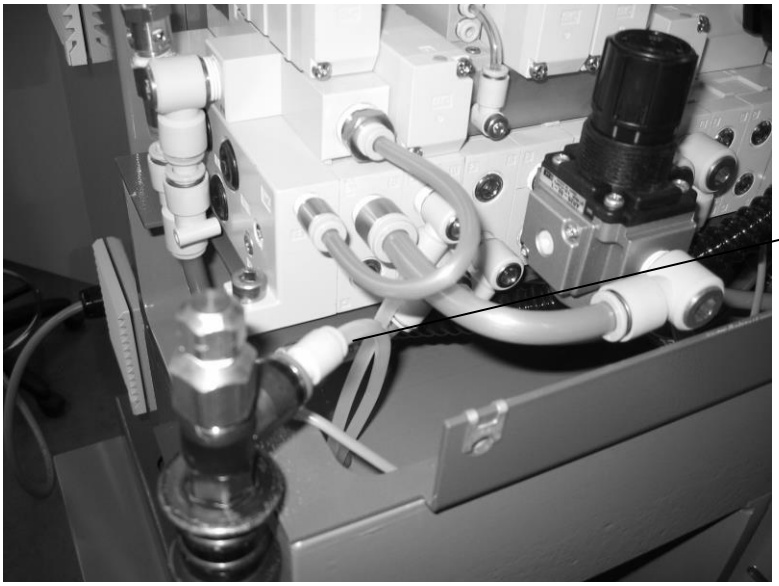


Fig. 7-3 Air supply to pressure plunger

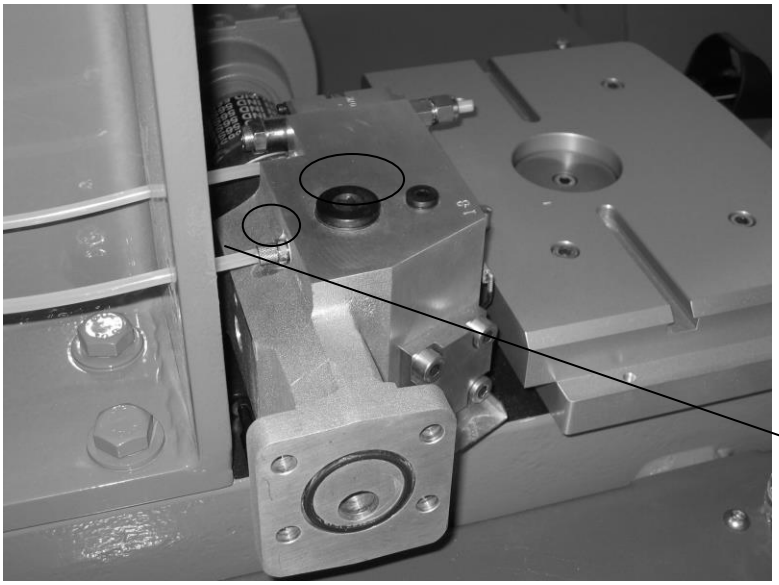


Fig. 7-4 Leak testing [reservoir not shown for clarity]

7.2.3 Drooling nozzle valve

A drooling nozzle valve produces small extruded slugs of material even when the machine is not currently in a molding cycle. The material slugs tend to block mold-set gates in subsequent injection cycles. A multi cavity tool that exhibits one cavity that is not or only partially filled is a strong indication of a drooling nozzle valve*). Replace the nozzle valve if it is determined that drooling is occurring.

*) This assumes that molding with the installed mold-set and corresponding injection settings was successful in the past. Use of a new mold-set and/or different injection settings can also result in cavities that are not or only partially filled.

7.2.4 Verifying thermal switch operation

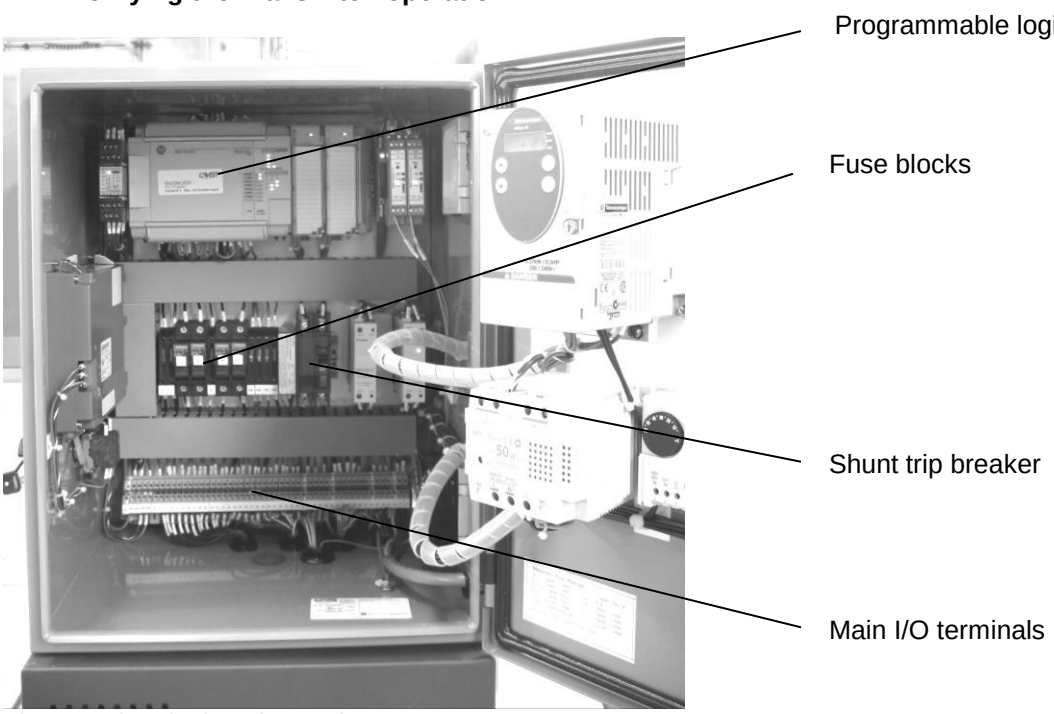


Fig. 7-5 Electrical enclosure layout

Locate the PLC input status lights 0.0 and 0.1 inside electrical enclosure as shown in figure 7-6. Input status light 0.0 indicates the status of the reservoir thermal switch and 0.1 indicates the status of the manifold thermal switch. If the status light is on the thermal switch is operational and the temperature is below 500ºF [260ºC]. If the light is off the temperature is above 500ºF [260ºC] and/or the thermal switch is faulty. To prevent damage to the machine the shunt breaker is tripped [turned off] if either one of the thermal switches indicate a temperature above 500ºF [260ºC]. This automatically shuts down the machine.

A thermal switch is very likely to be malfunctioning if it is confirmed that both the manifold and the reservoir temperature are below 500ºF [260ºC] and the shunt breaker is tripped, causing the machine to automatically shut down.

To indentify the faulty thermal switch turn the machine off by using the main switch on the electrical enclosure door. Reset the shunt trip breaker by first pushing the handle down and then up. Turn the machine on and observe the two PLC input status lights 0.0 and 0.1. The light that does not turn on just before the machine shuts down will indentify the faulty thermal switch. Replace the thermal switch.

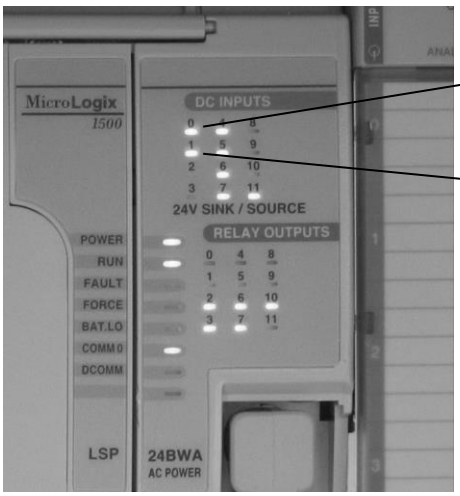


Fig. 7-6 PLC DC input status lights

7.2.5 Verifying heater cartridge operation

The easiest way to determine if a heater cartridge is operational is to measure the terminal resistance at the main I/O terminals inside the electrical enclosure.

WARNING!

Prior to performing the tasks outlined in this section, electrical power to the machine must be turned off and disconnected.

The resistance for the manifold heater cartridges is measured between terminals 27 and 28. The resistance for the reservoir heater cartridges is measure between terminals 32 and 35. If the measured resistance falls outside the value listed in the table below, the defective heater cartridge must be identified and replaced.

Location	Terminal*)	Resistance
Manifold heater cartridges	27	96.0 Ohms +/- 10%
	28	
Reservoir heater cartridges	32	19.2 Ohms +/- 10%
	35	

*) Important: These terminal assignments are only valid for machines with serial numbers starting with 04-. . .

If any of the measurements yields results that are outside the specifications listed above remove the heater wires from the terminal blocks and measure the resistance of the individual heater cartridges. Refer to the table below for resistance values of the individual heater cartridges.

Heater	Individual resistance
Manifold heater cartridge	192.0 Ohms +/- 10%
Reservoir heater cartridge	76.8 Ohms +/- 10%

Please also refer to:
Section “9.1 Electrical enclosure input and output assignment” and section “9.4 Mold-man 8000 Electrical Schematic MM8000-E-02-01 Sheet 1 of 4”.

7.2.6 Checking for blown fuses

WARNING!

Prior to performing the tasks outlined in this section, electrical power to the machine must be turned off and disconnected.

The fuse blocks for fuses FU 1, FU 2, FU 5, FU 9, FU 10, FU 11 and FU 12 have an integrated light that turns on when the fuse is blown.

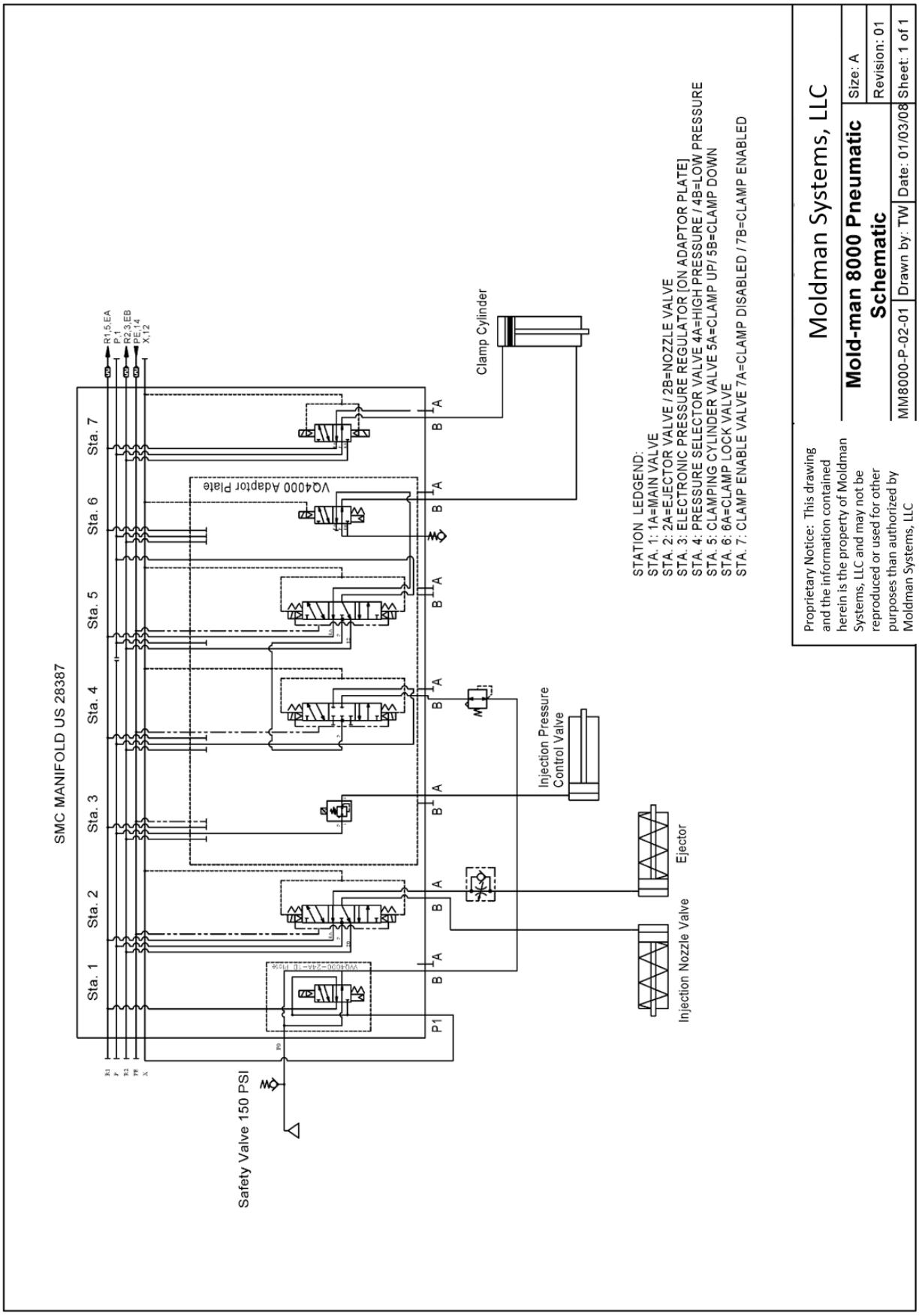
Fuses FU 3, FU 4, FU 6 and FU 7 are checked by measuring the resistance between the top and bottom terminal on each fuse block.

IMPORTANT!

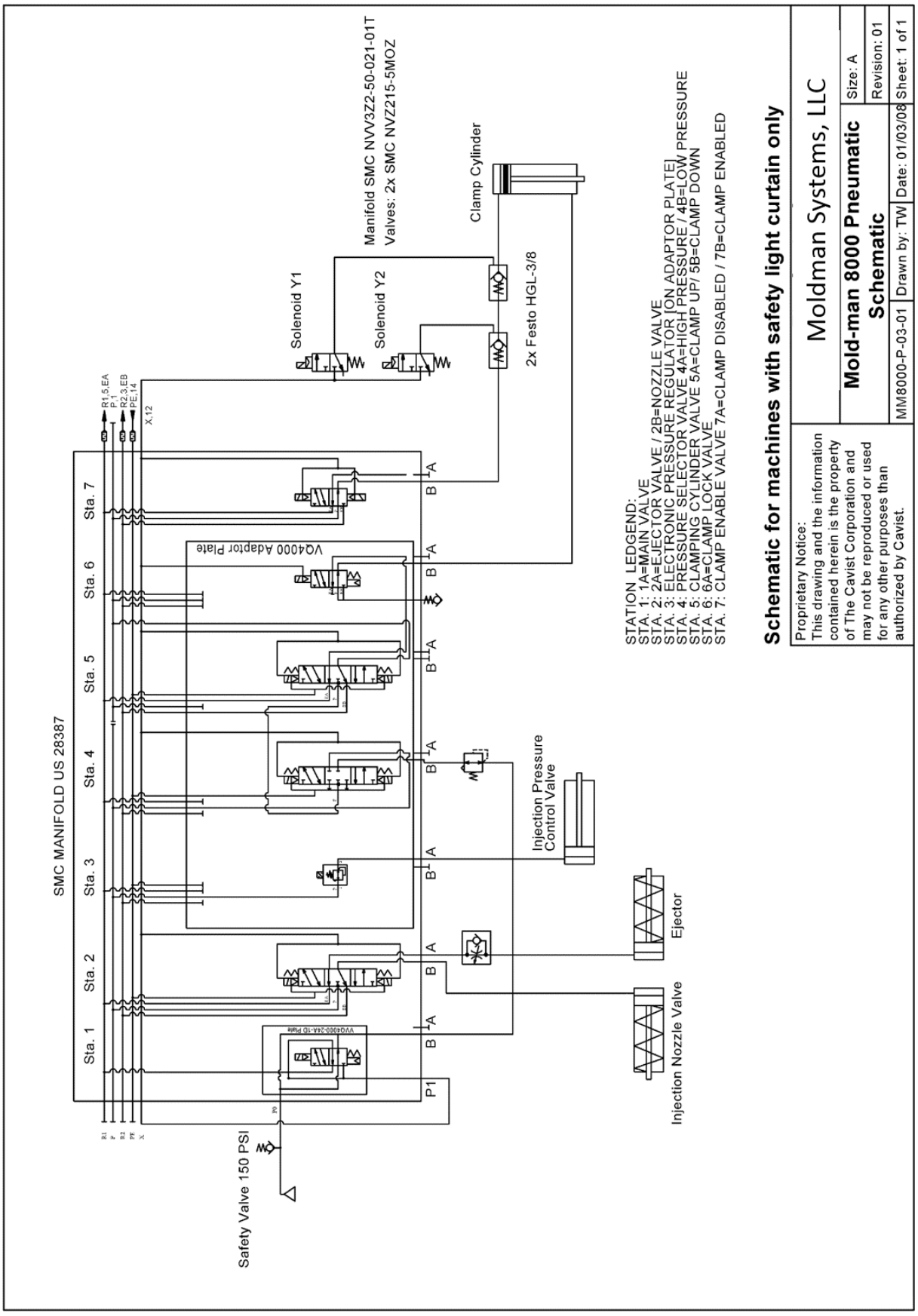
The cause of the blown fuse must be identified and rectified before machine can be operated again

8.0 Pneumatic system

8.1 Mold-man 8000 Pneumatic Schematic MM8000-P-02-01 Sheet 1 of 1



8.2 Mold-man 8000 Electrical Schematic MM8000-P-03-01 Sheet 1 of 1



9.0 Electric system

9.1 Electrical enclosure input and output assignment

Terminal	Device	
GND	Ground	
P/S-	Internal use	
P/S-	Internal use	
P/S+	Internal use	
P/S+	Internal use	
0	Enable Input [Field removable jumper from P/S+] ***Note 1**	
1	10VDC + supply for linear transducer	
2	10VDC + for electronic pressure regulator	
3	24VDC + For main valve & electronic pressure regulator	
4	24VDC + for pressure selector valve [low]	
5	24VDC + for pressure selector valve, [high]	
6	24VDC + for clamping cylinder valve [down]	
7	24VDC + for clamping cylinder valve, [up] & Disable Clamp	
8	24VDC + for ejector valve	
9	24VDC + for nozzle valve	
10	24VDC + for clamp lock valve	
11	24VDC + Enable clamp	
12	Cursor signal from linear transducer	
13	24 VDC -	
14	24VDC + signal supply for E-stop button (FU10)	
15	24VDC + signal supply for E-stop button (FU11)	
16	24VDC + signal return form E-stop button (Contact 1/FU10)	
17	24VDC + signal return from E-stop button (Contact 2/FU11)	
18	24VDC + for Zero Force Actuation Buttons	
19	24VDC - for Zero Force Actuation Buttons	
20	Relay common form right button	
21	N.O. contact form right button	
22	N.C. contact form right button	
23	Relay common form left button	
24	N.O contact form left button	
25	N.C. contact form left button	
26	Ground	
27	230VAC L1 phase for Manifold heater cartridges	
28	230VAC L2 phase for Manifold heater cartridges	
29	24VDC+ return manifold temperature switch	
30	24VDC+ supply for manifold temperature switch	
31	Ground	
32	230VAC L1 phase for Reservoir heater cartridge	
33	230VAC L2 phase for Reservoir heater cartridge	
34	230VAC L1 phase for Reservoir heater cartridge	
35	230VAC L2 phase for Reservoir heater cartridge	
36	24VDC+ supply for reservoir temperature switch	
37	24VDC+ return from reservoir temperature switch	
38	Ground	
39	230VAC L1 phase for Gearmotor	
40	230VAC L2 phase for Gearmotor	
41	230VAC L3 phase for Gearmotor	
GND	Ground	**Customer Supplied Power**
L1	230VAC L1 phase main power	
L2	230VAC L2 phase main power	

* Note 1: Machines prior to serial number 04-0140 have a ‘P/S+’ terminal instead of the ‘0’ terminal.

Terminal	Device
50	Solenoid 1
51	Solenoid 2
52	BN +24VDC
53	Or/Bk EDM2
54	Or EDM1
55	Wh OSSD 2
56	Bk OSSD 1
57	Bu 0VDC
58	Vi Reset
59	Ground

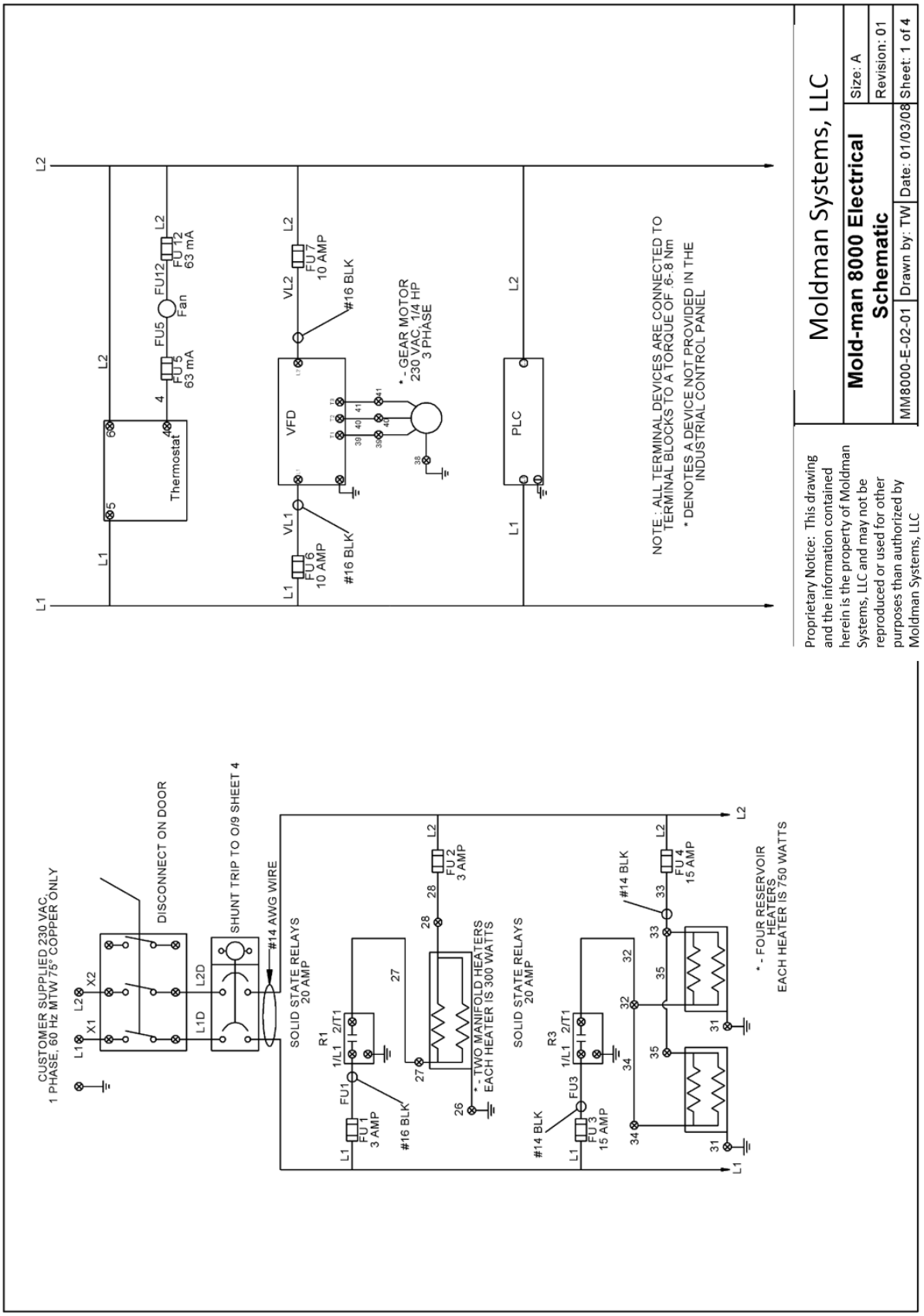
Terminals 50 to 59 are installed on machines with safety light curtain only.

9.2 Pneumatic manifold terminal box input and output assignment

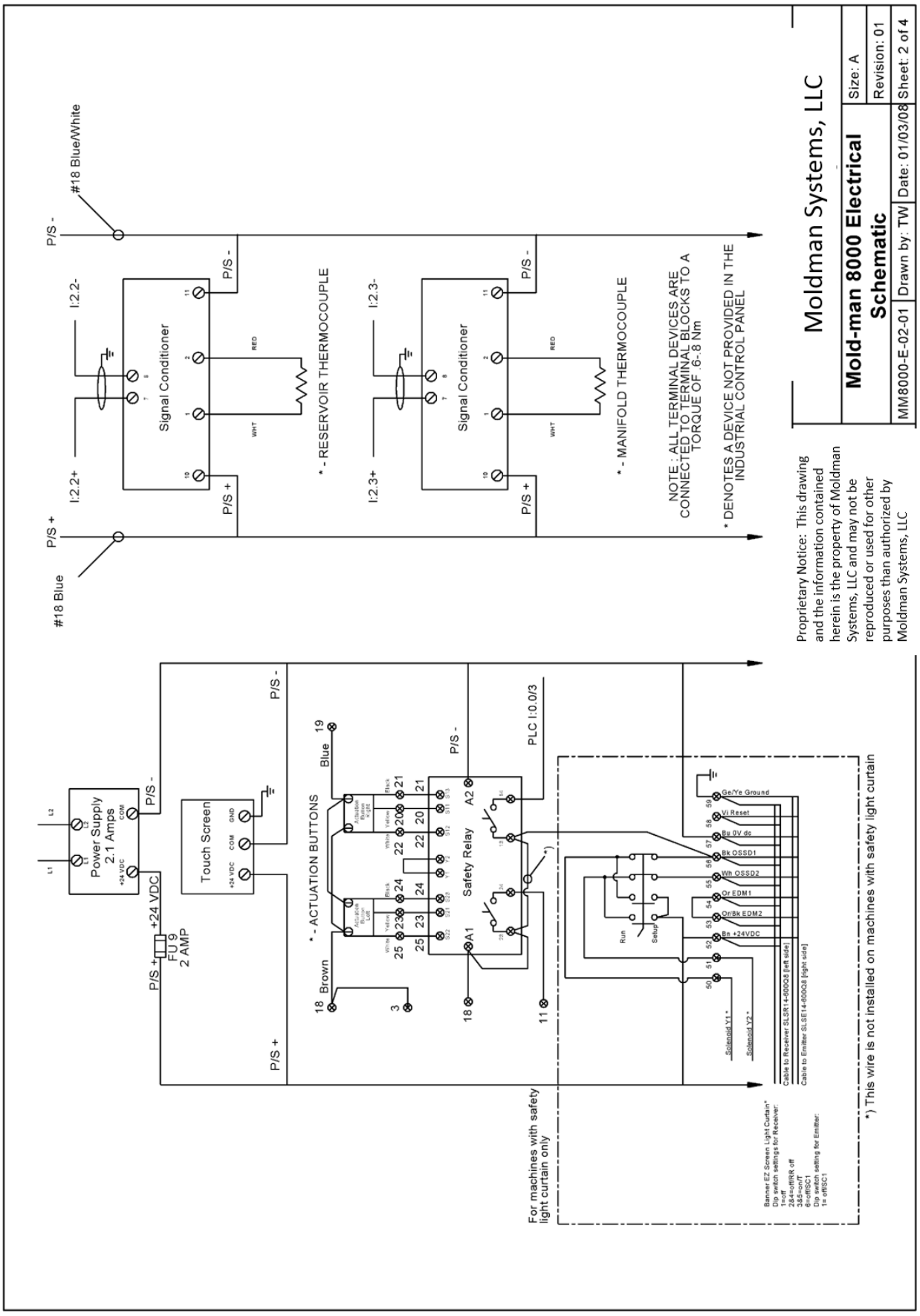
Terminal	Device
1A	24VDC + Main Valve & electronic pressure regulator
1B	not used
2A	24VDC + for ejector valve
2B	24VDC + for nozzle valve
3A	Jumper from terminal 1A
3B	10VDC + for electronic pressure regulator
4A	24VDC + for pressure selector valve, [high]
4B	24VDC + for pressure selector valve [low]
5A	24VDC + for clamping cylinder valve, [up] & Disable Clamp
5B	24VDC + for clamping cylinder valve [down]
6A	24VDC + for clamp lock valve
6B	not used
7A	Jumper from terminal 5A
7B	24VDC + Enable clamp
8A	Solenoid valve 1 24VDC+ ***Note 1**
8B	Solenoid valve 2 24VDC+ ***Note1**
9A	COM for Solenoid valve 1 and 2 ***Note1**
9B	10VDC + supply for linear transducer
10A	not used
10B	Cursor signal from linear transducer
COM	24 VDC -

*Note 1: Installed on machines with safety light curtain only.

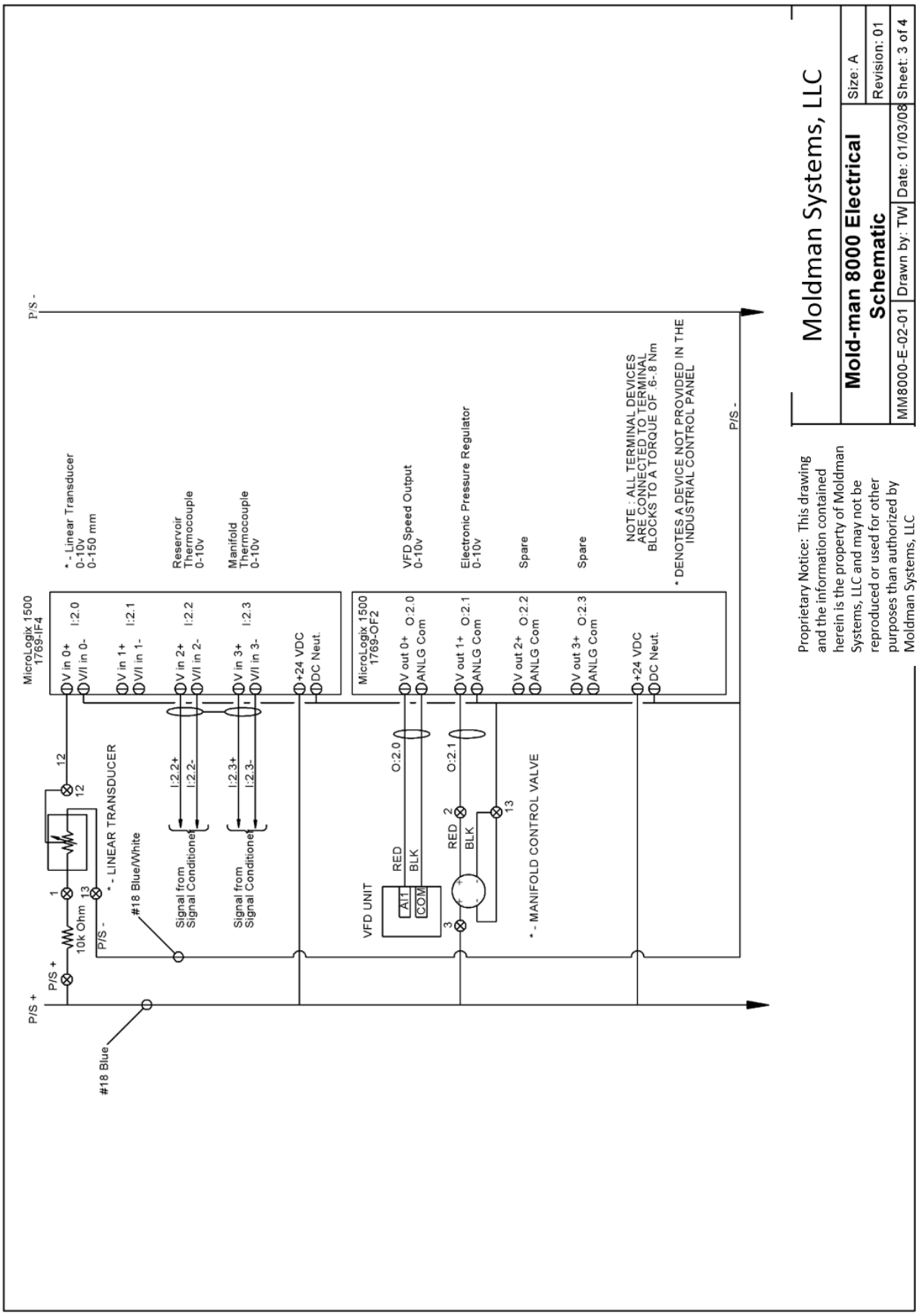
9.3 Mold-man 8000 Electrical Schematic MM8000-E-02-01 Sheet 1 of 4



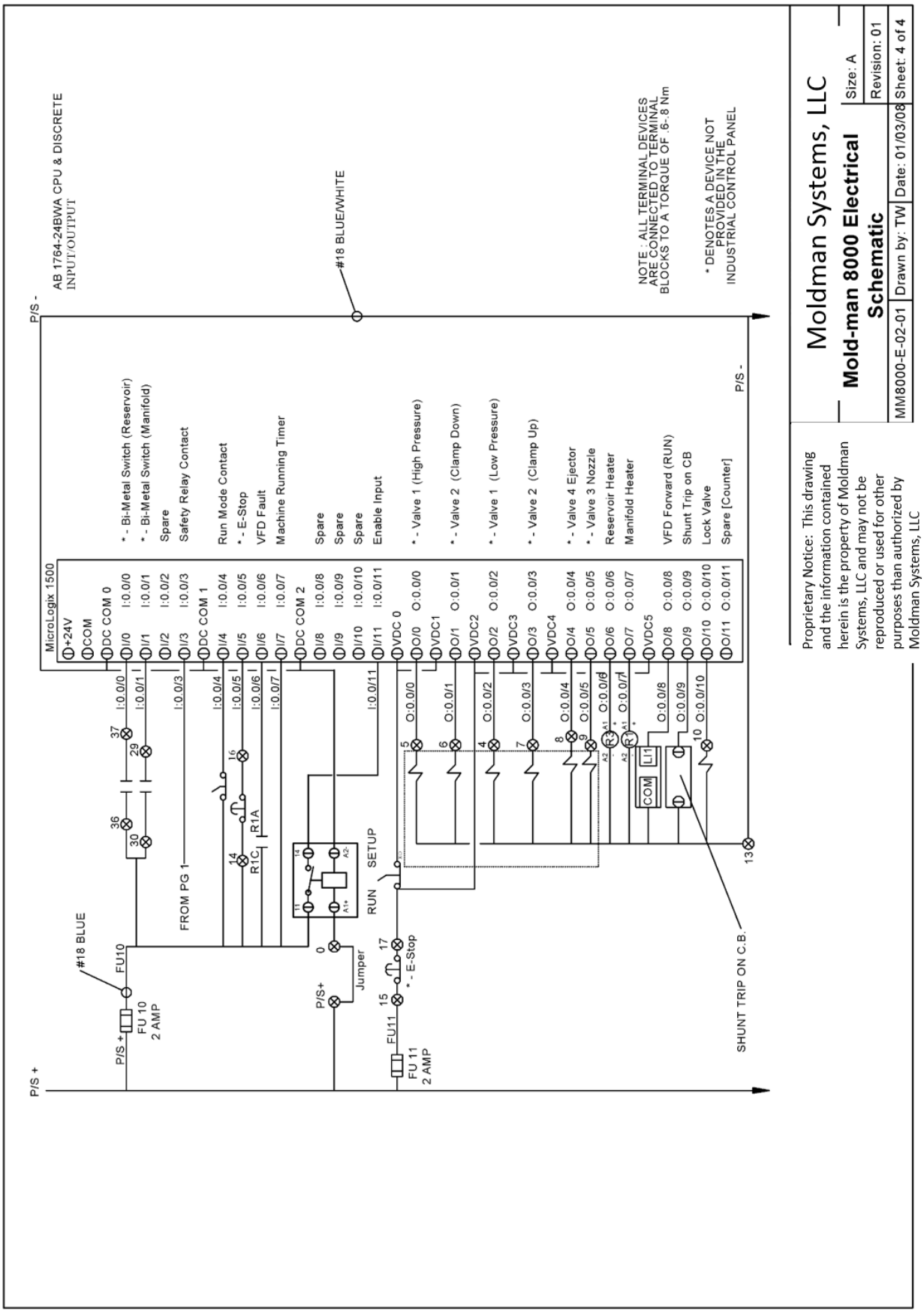
9.4 Mold-man 8000 Electrical Schematic MM8000-E-02-01 Sheet 2 of 4



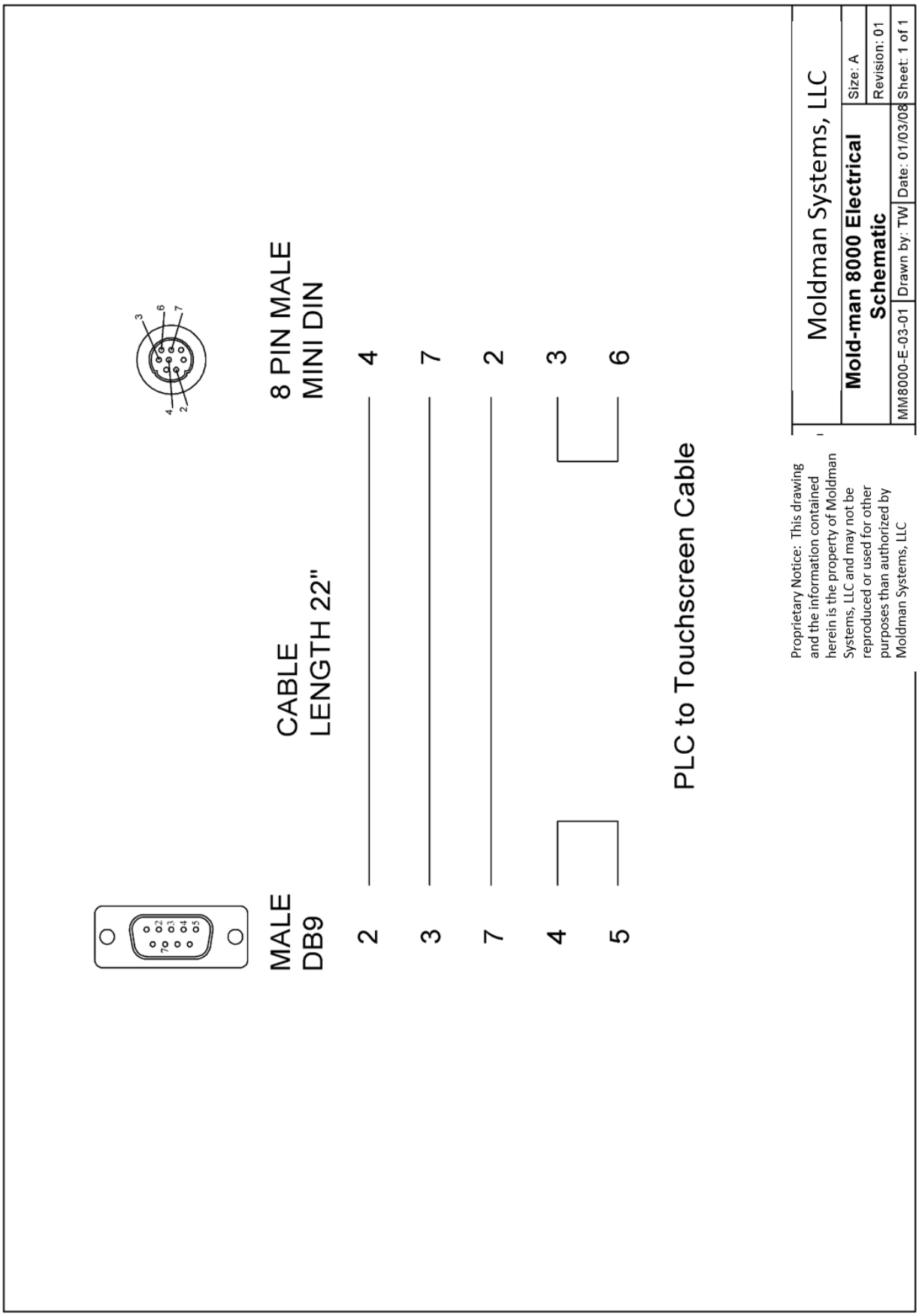
9.5 Mold-man 8000 Electrical Schematic MM8000-E-02-01 Sheet 3 of 4



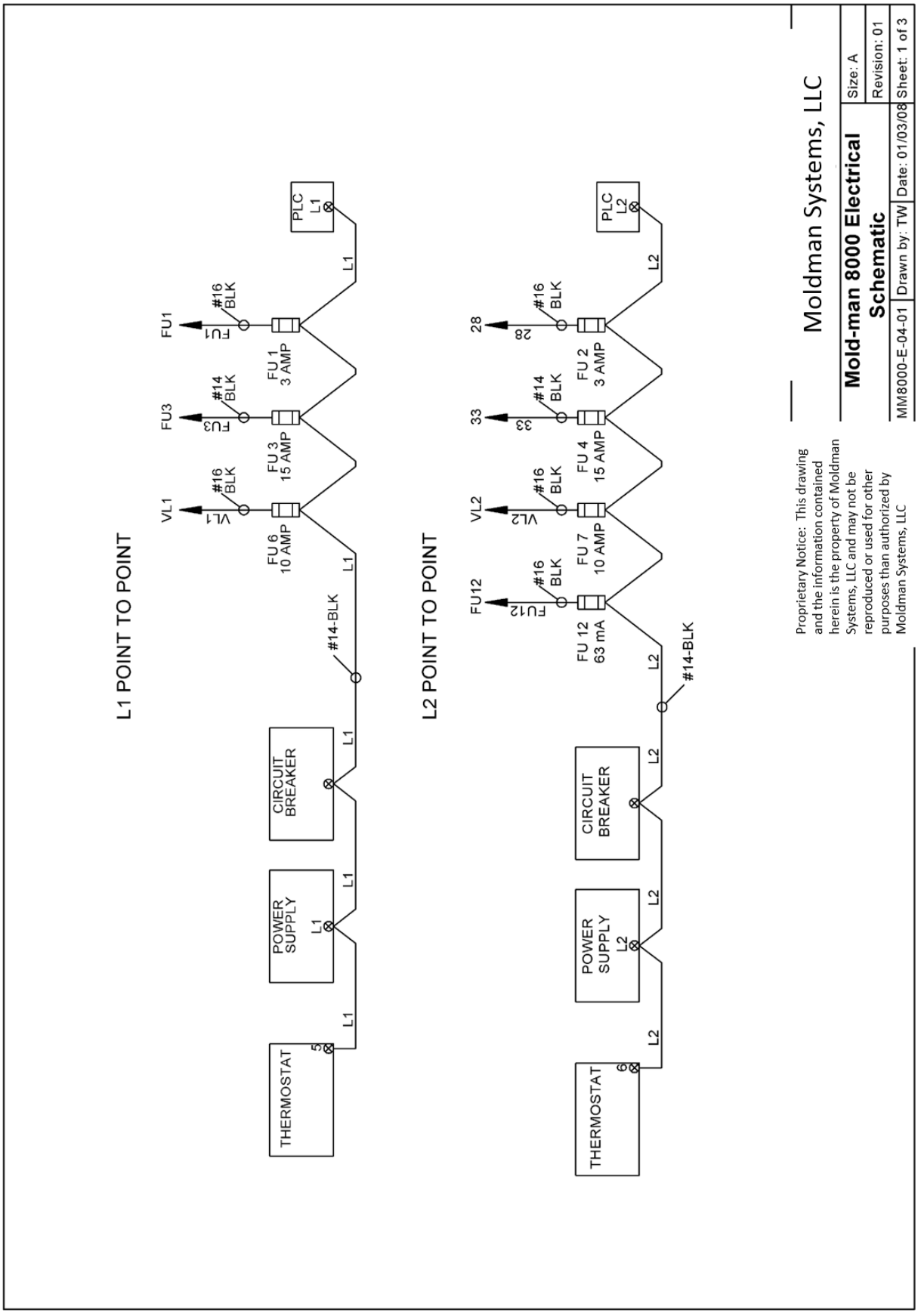
9.6 Mold-man 8000 Electrical Schematic MM8000-E-02-01 Sheet 4 of 4



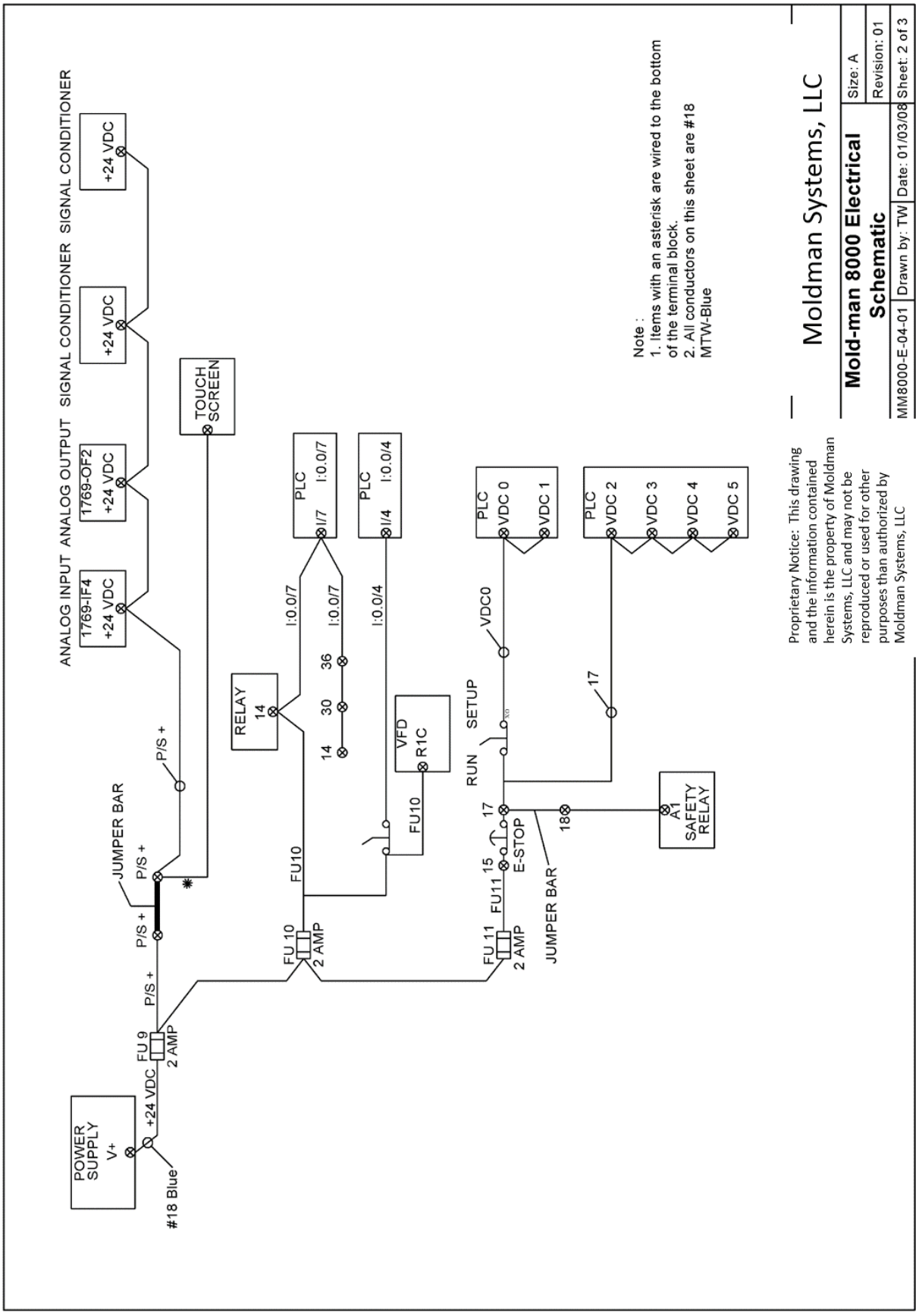
9.7 Mold-man 8000 Electrical Schematic MM8000-E-03-01 Sheet 1 of 1



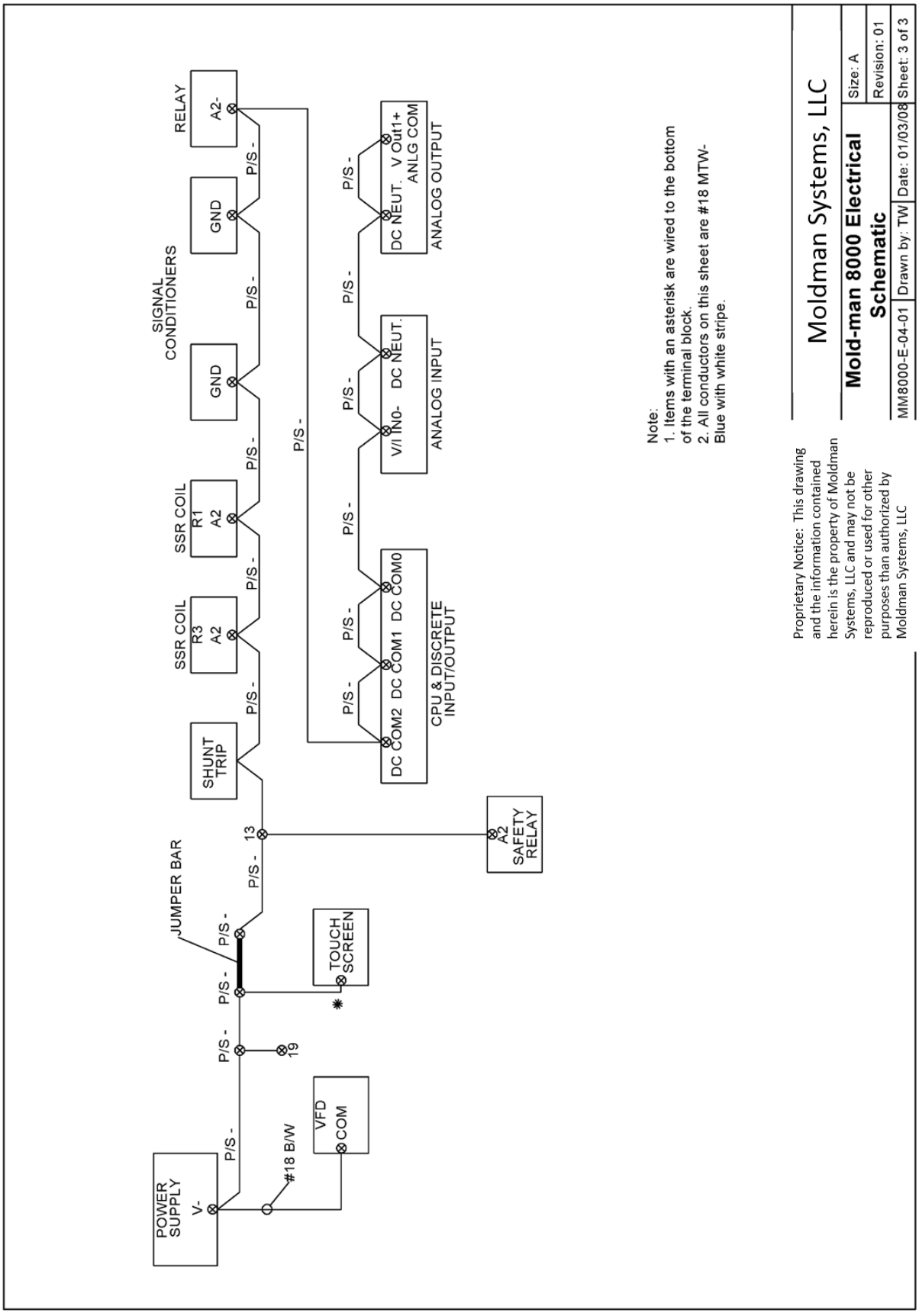
9.8 Mold-man 8000 Electrical Schematic MM8000-E-04-01 Sheet 1 of 3



9.9 Mold-man 8000 Electrical Schematic MM8000-E-04-01 Sheet 2 of 3

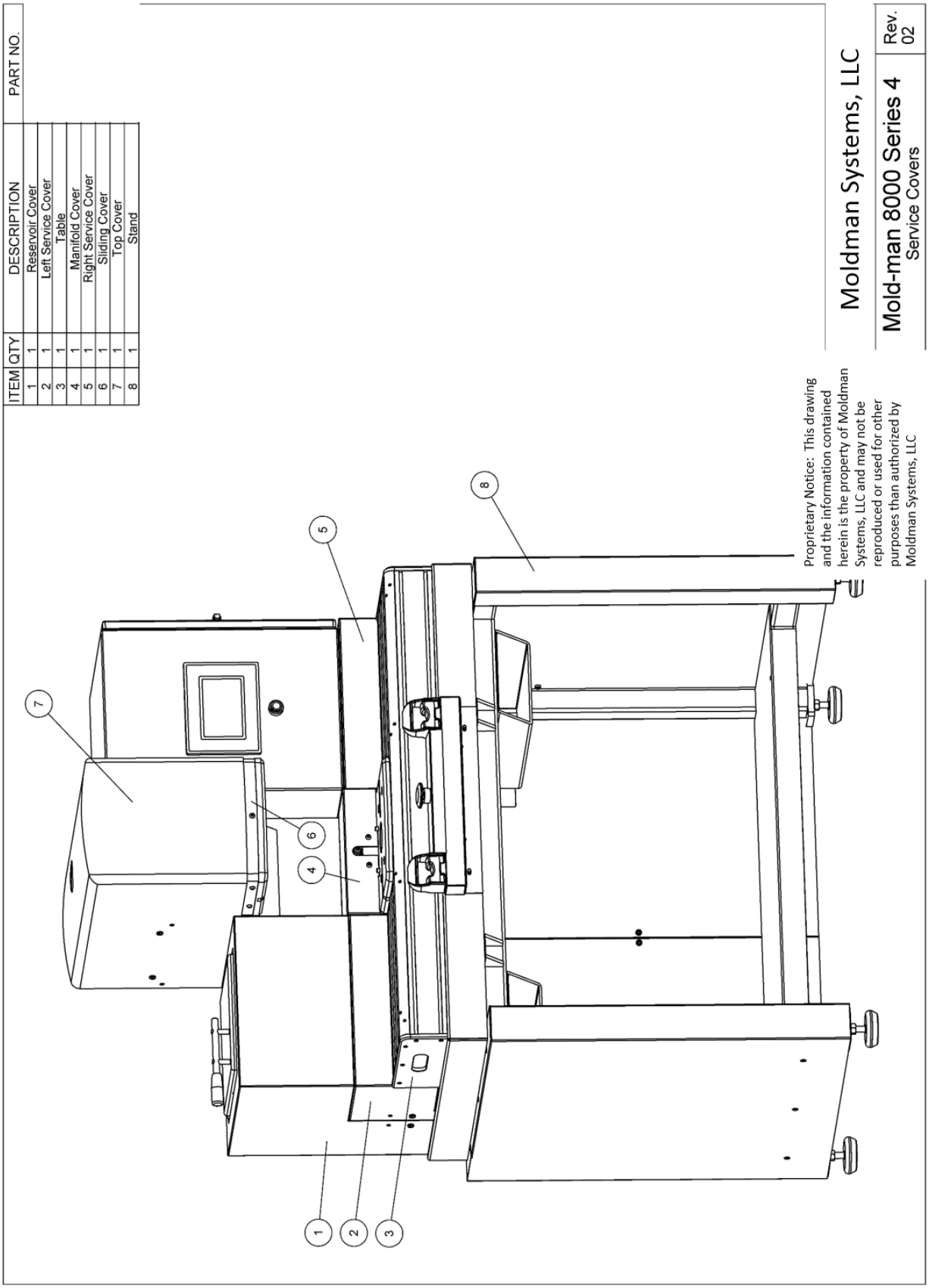


9.10 Mold-man 8000 Electrical Schematic MM8000-E-04-01 Sheet 3 of 3



10.0 Mechanical Sub-Assemblies

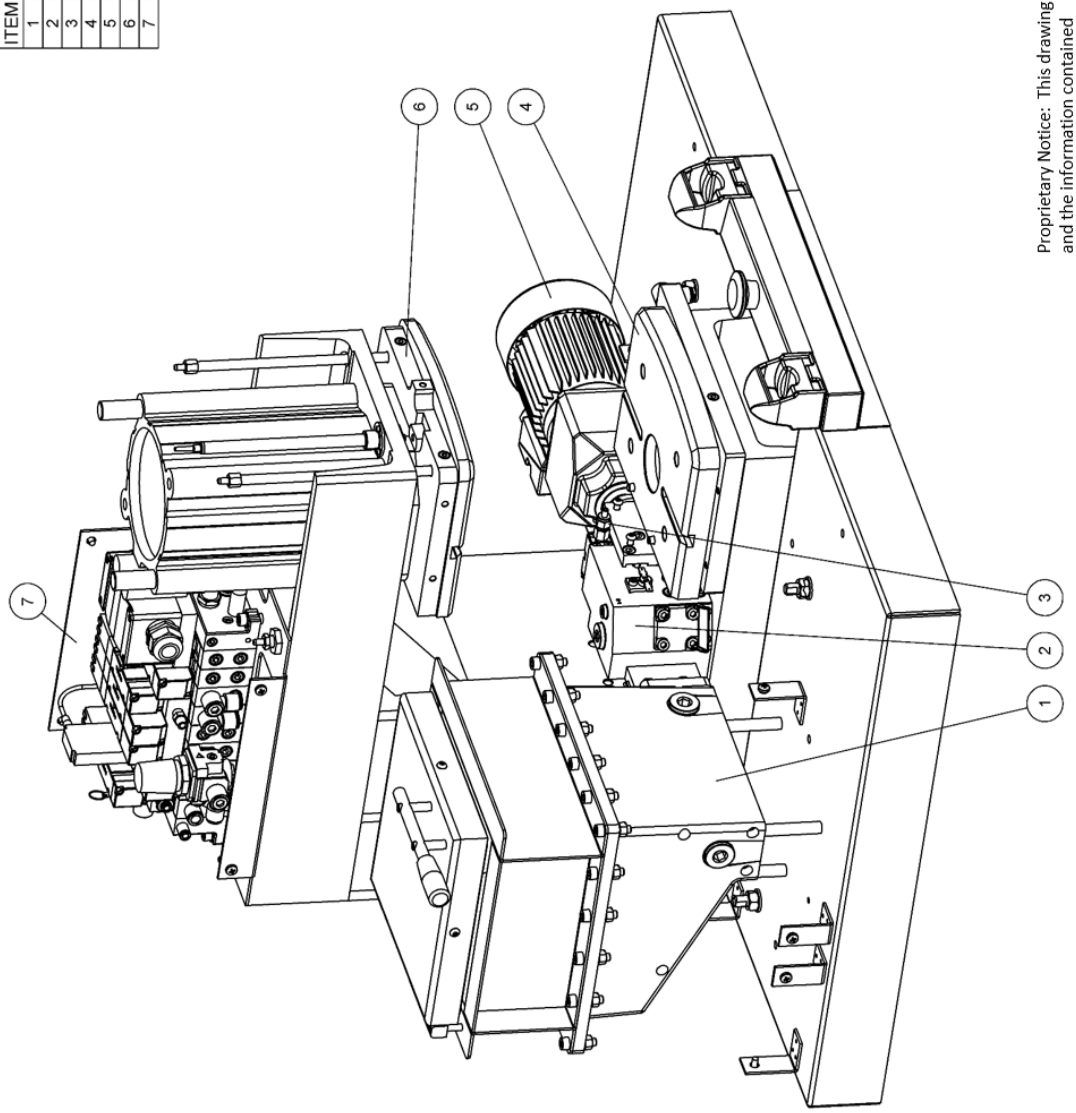
10.1 Mold-man 8000 Series 4 Service Covers



10.2 Mold-man 8000 Series 4 Sub-Assemblies

General Table

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Reservoir Sub-Assembly	
2	1	Manifold Sub-Assembly	
3	1	Injection Nozzle Sub-Assembly	
4	1	Lower Clamp Sub-Assembly	
5	1	Gearmotor Sub-Assembly	
6	1	Upper Clamp Sub-Assembly	
7	1	Pneumatic Plate Sub-Assembly	



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Mold-man 8000 Series 4 Sub-Assemblies

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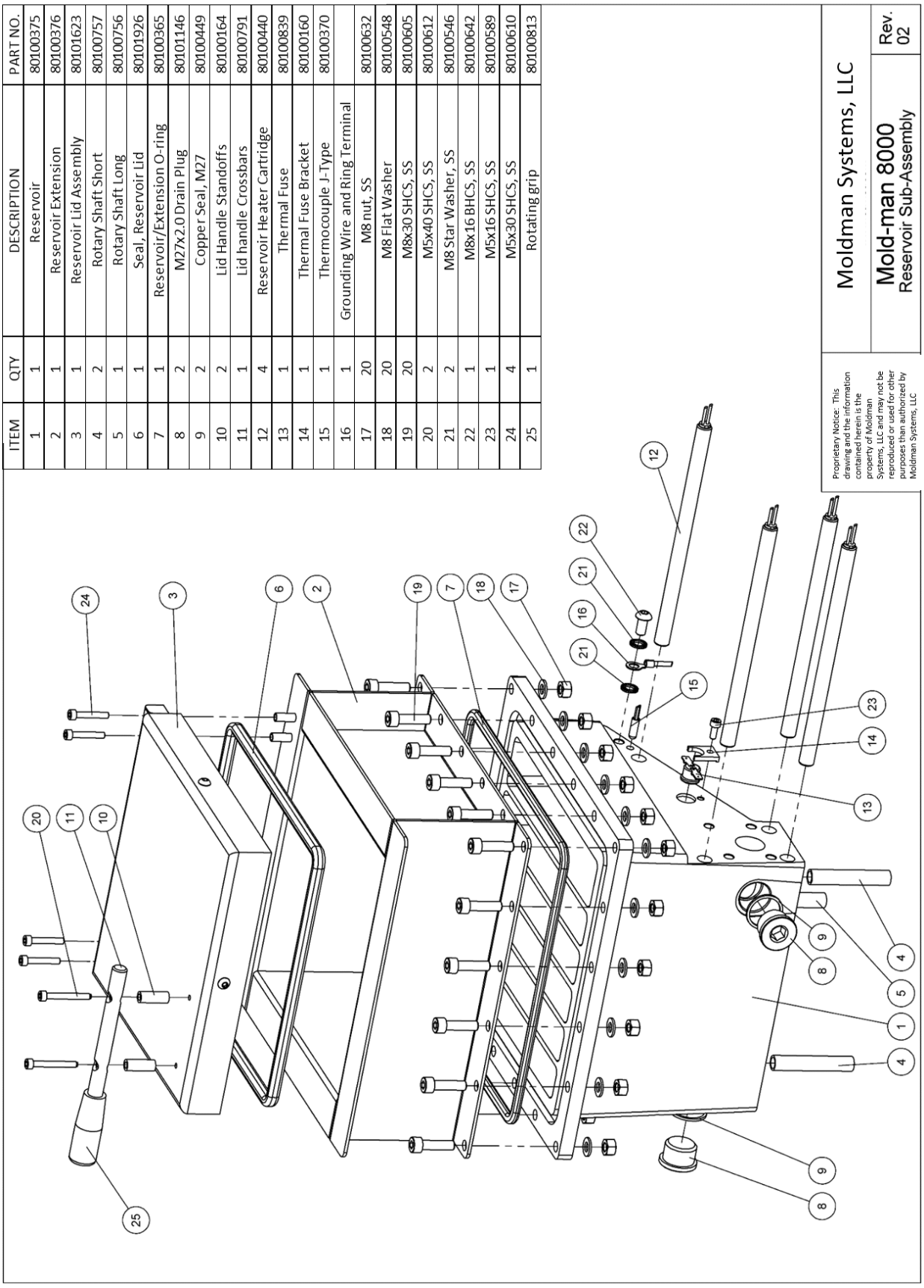
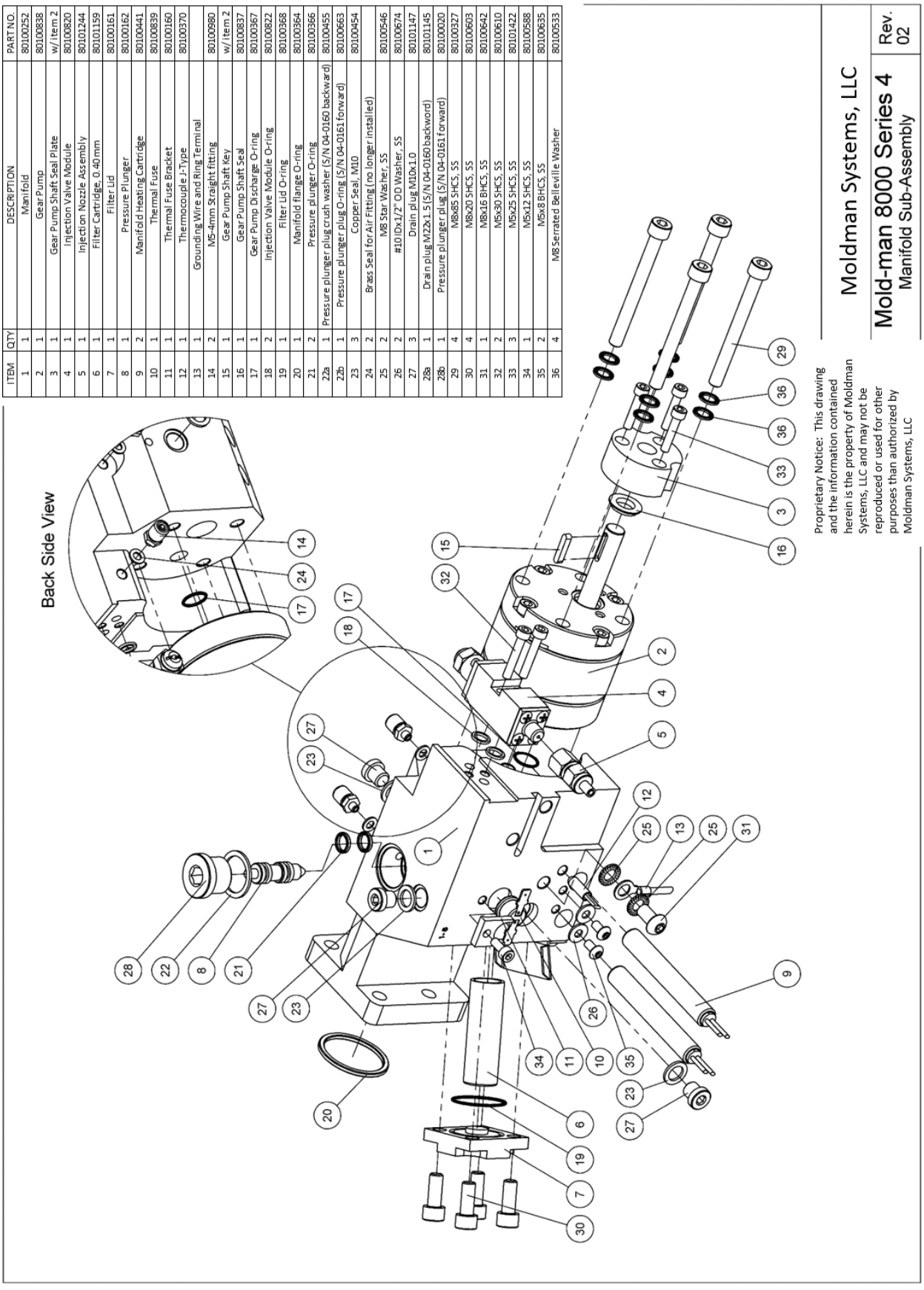
10.3 Mold-man 8000 Series 4 Reservoir Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Reservoir	80100375
2	1	Reservoir Extension	80100376
3	1	Reservoir Lid Assembly	80101623
4	2	Rotary Shaft Short	80100757
5	1	Rotary Shaft Long	80100756
6	1	Seal, Reservoir Lid	80101926
7	1	Reservoir/Extension O-ring	80100365
8	2	M27x2.0 Drain Plug	80101146
9	2	Copper Seal, M27	80100449
10	2	Lid Handle Standoffs	80100164
11	1	Lid handle Crossbars	80100791
12	4	Reservoir Heater Cartridge	80100440
13	1	Thermal Fuse	80100839
14	1	Thermal Fuse Bracket	80100160
15	1	Thermocouple J-Type	80100370
16	1	Grounding Wire and Ring Terminal	
17	20	M8 nut, SS	80100632
18	20	M8 Flat Washer	80100548
19	20	M8x30 SHCS, SS	80100605
20	2	M5x40 SHCS, SS	80100612
21	2	M8 Star Washer, SS	80100546
22	1	M8x16 BHCS, SS	80100642
23	1	M5x16 SHCS, SS	80100589
24	4	M5x30 SHCS, SS	80100610
25	1	Rotating grip	80100813



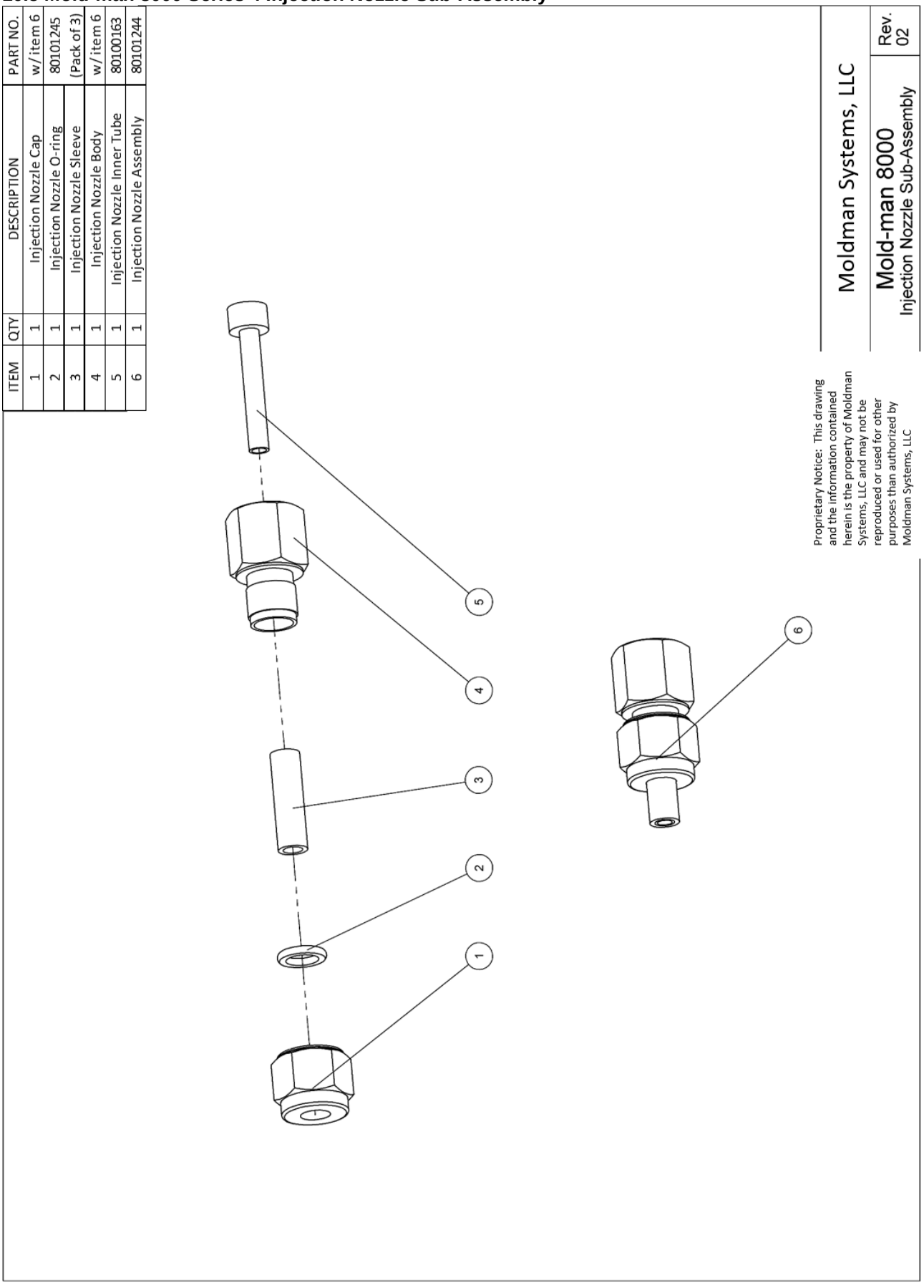
10.4 Mold-man 8000 Series 4 Manifold Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Manifold	80100252
2	1	Gear Pump	80100838
3	1	Gear Pump Shaft Seal Plate	w/ Item 2
4	1	Injection Valve Module	80100820
5	1	Injection Nozzle Assembly	80101244
6	1	Filter Cartridge, 0.40mm	80101159
7	1	Filter Lid	80100161
8	1	Pressure Plunger	80100162
9	2	Manifold Heating Cartridge	80100441
10	1	Thermal Fuse	80100839
11	1	Thermal Fuse Bracket	80100160
12	1	Thermocouple J-Type	80100370
13	1	Grounding Wire and Ring Terminal	
14	2	M5-4mm Straight fitting	80100980
15	1	Gear Pump Shaft Key	w/ Item 2
16	1	Gear Pump Shaft Seal	80100837
17	1	Gear Pump Discharge O-ring	80100367
18	2	Injection Valve Module O-ring	80100822
19	1	Filter Lid O-ring	80100368
20	1	Manifold flange O-ring	80100364
21	2	Pressure plunger O-ring	80100366
22a	1	Pressure plunger plug crush washer (S/N 04-0160 backward)	80100455
22b	1	Pressure plunger plug O-ring (S/N 04-0161 forward)	80100663
23	3	Copper Seal, M10	80100454
24	2	Brass Seal for Air Fitting (no longer installed)	
25	2	M8 Star Washer, SS	80100546
26	2	#10 IDx1/2" OD Washer, SS	80100674
27	3	Drain plug M10x1.0	80101147
28a	1	Drain plug M22x1.5 (S/N 04-0160 backword)	80101145
28b	1	Pressure plunger plug (S/N 04-0161 forward)	80100020
29	4	M8x85 SHCS, SS	80100327
30	4	M8x20 SHCS, SS	80100603
31	1	M8x16 BHCS, SS	80100642
32	2	M5x30 SHCS, SS	80100610
33	3	M5x25 SHCS, SS	80101422
34	1	M5x12 SHCS, SS	80100588
35	2	M5x8 BHCS, SS	80100635
36	4	M8 Serrated Belleville Washer	80100533



10.5 Mold-man 8000 Series 4 Injection Nozzle Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Injection Nozzle Cap	w/item 6
2	1	Injection Nozzle O-ring	80101245 (Pack of 3)
3	1	Injection Nozzle Sleeve	w/item 6
4	1	Injection Nozzle Body	80100163
5	1	Injection Nozzle Inner Tube	80101244
6	1	Injection Nozzle Assembly	



10.6 Mold-man 8000 Series 4 Lower Clamp Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Lower Frame Section	
2	1	Lower Mold Platen	80101618
3	1	Ejector Cylinder	80100808
4	1	Ejector Plate	80100254
5	2	Elbow Male, 3/8" x 1/4"	80100972
6	1	Fitting FNPT/ISO adapter	80100390
7	1	1/8" NPT Short Plug,PTFE coated	80100472
8	4	Extra Precision Washer (80x)	80100695
9	4	M8x70 SHCS, SS	80100616
10	1	M8x20 SHCS, SS	80100603
11	4	M6x30 SHCS, SS	80100600

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Mold-man 8000 Series 4
Lower Clamp Sub-Assembly

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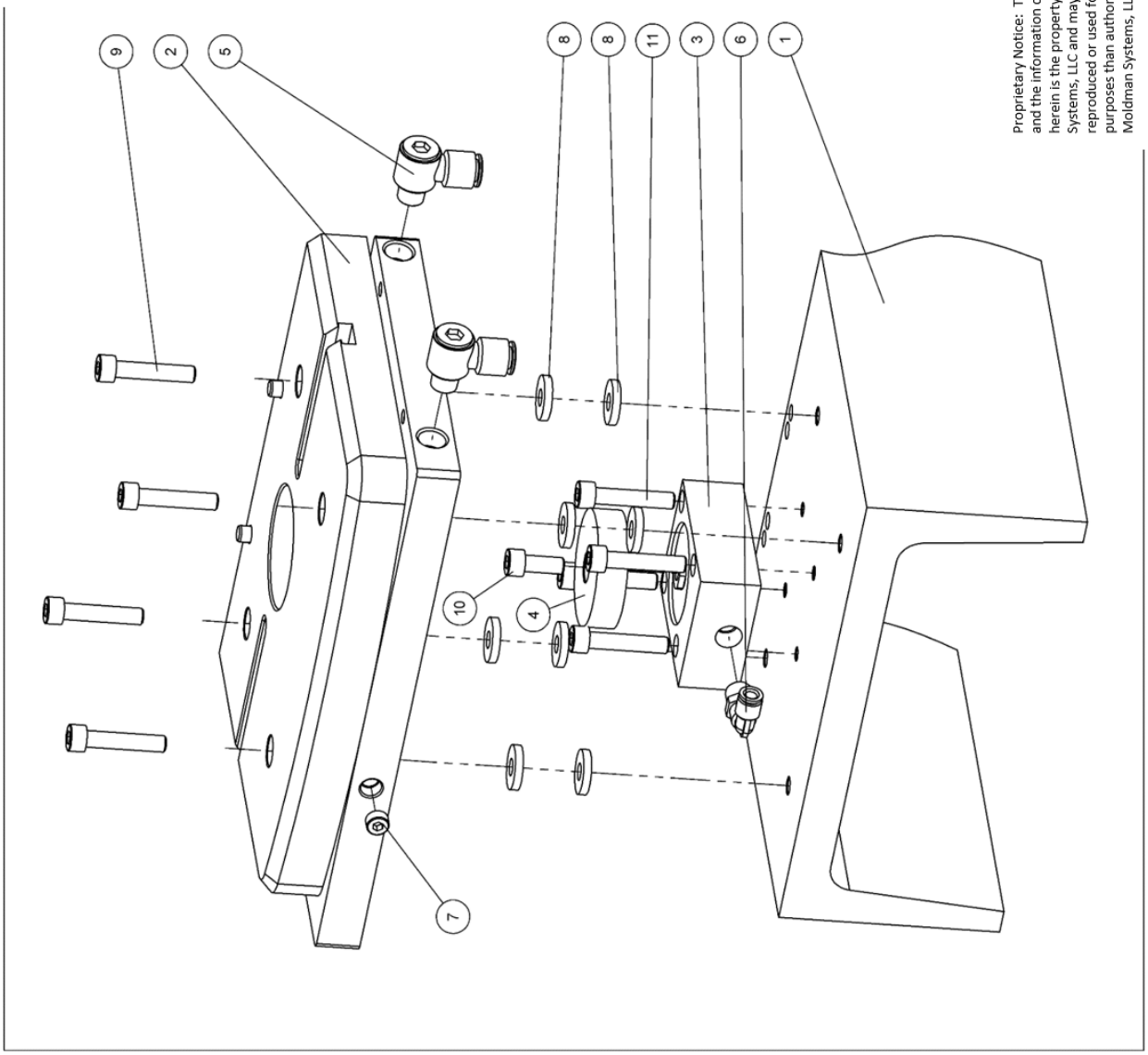
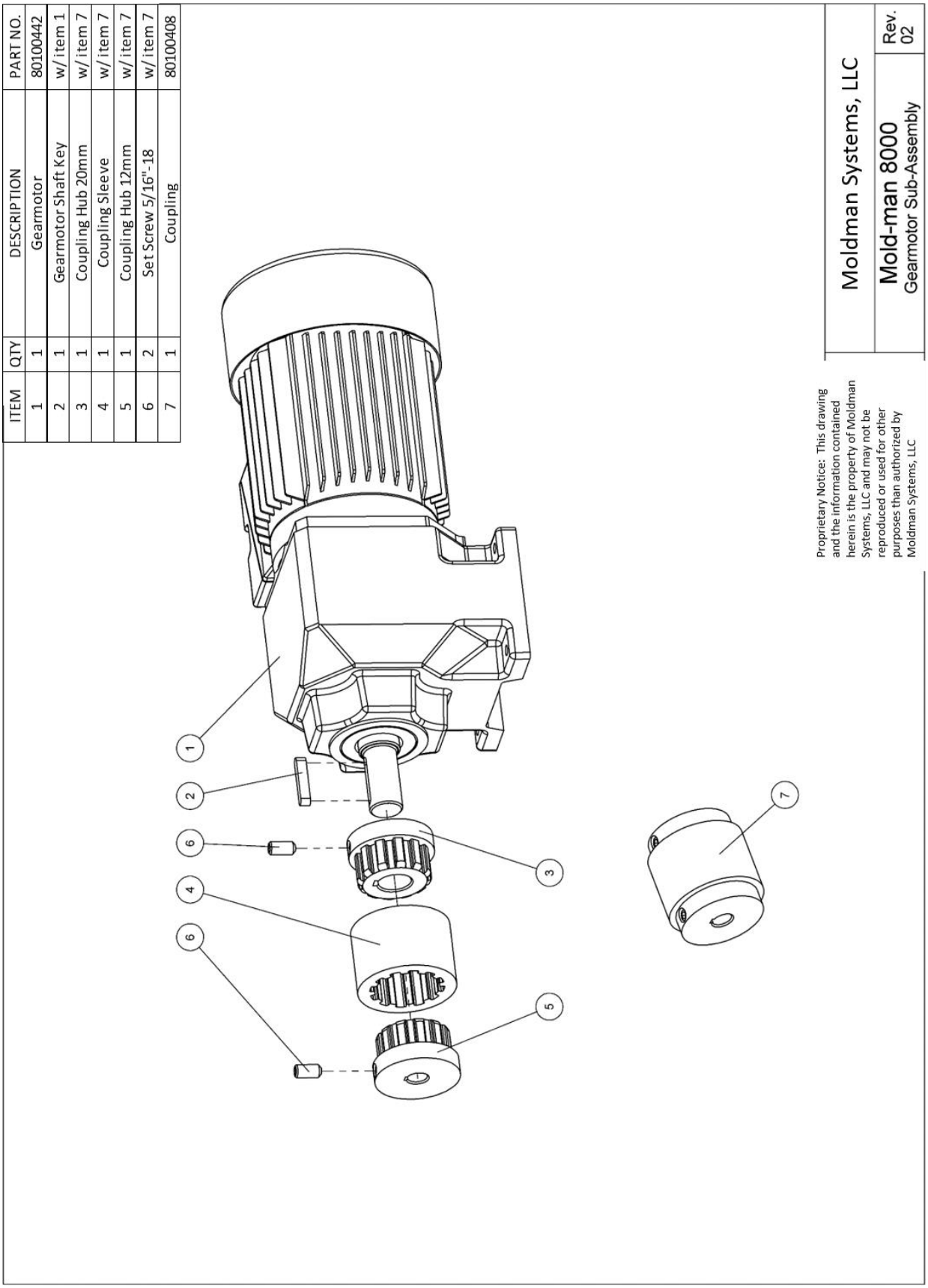


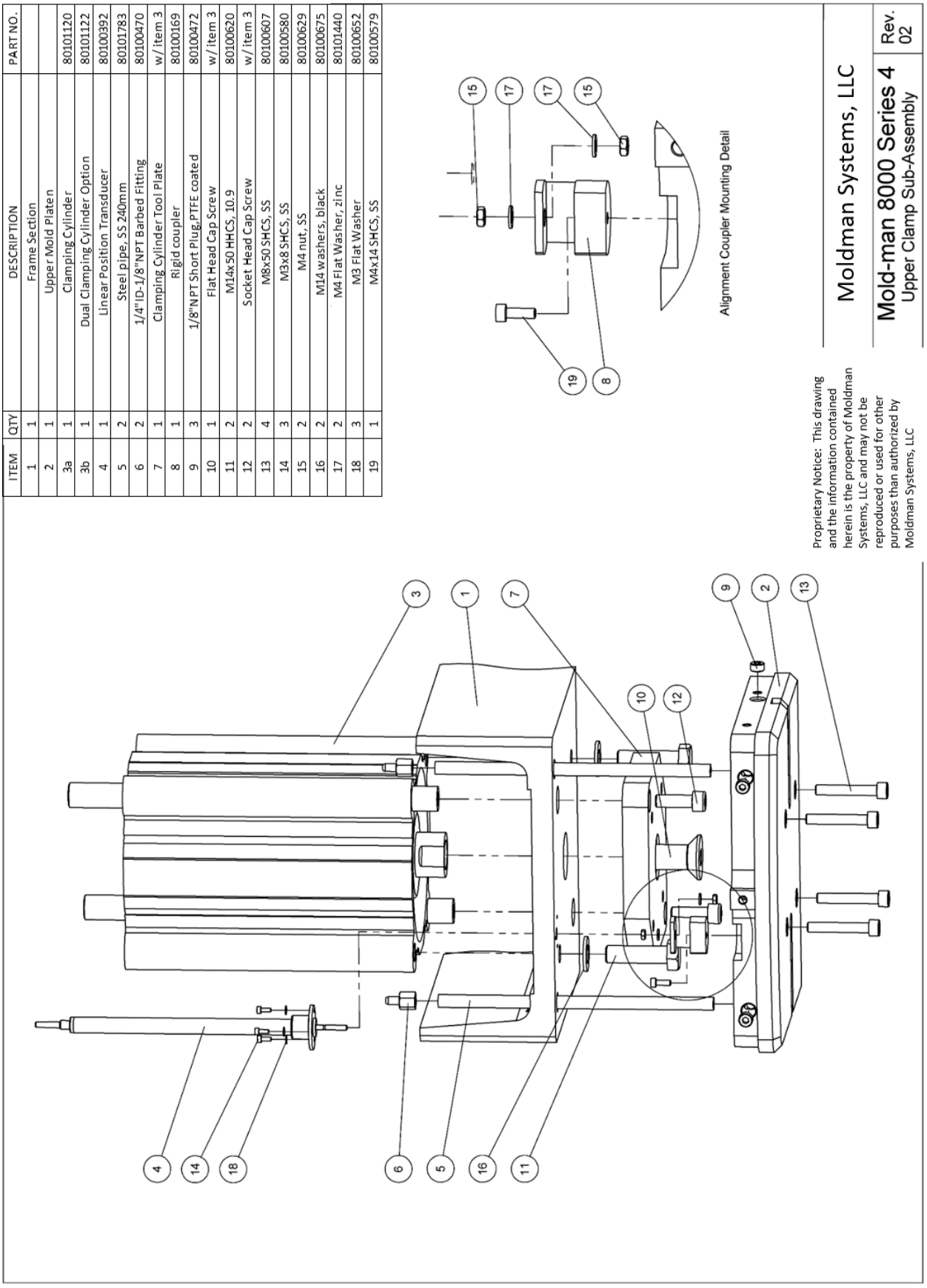
10.7 Mold-man 8000 Series 4 Gearmotor Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Gearmotor	80100442
2	1	Gearmotor Shaft Key	w/ item 1
3	1	Coupling Hub 20mm	w/ item 7
4	1	Coupling Sleeve	w/ item 7
5	1	Coupling Hub 12mm	w/ item 7
6	2	Set Screw 5/16"-18	w/ item 7
7	1	Coupling	80100408



10.8 Mold-man 8000 Series 4 Upper Clamp Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Frame Section	
2	1	Upper Mold Platen	80101120
3a	1	Clamping Cylinder	80101122
3b	1	Dual Clamping Cylinder Option	80100392
4	1	Linear Position Transducer	80101783
5	2	Steel pipe, SS 240mm	80100470
6	2	1/4"ID-1/8"NPT Barbed Fitting	w/ item 3
7	1	Clamping Cylinder Tool Plate	80100169
8	1	Rigid coupler	80100472
9	3	1/8"NPT Short Plug,PTFE coated	w/ item 3
10	1	Flat Head Cap Screw	80100620
11	2	M14x50 HHCS, 10.9	w/ item 3
12	2	Socket Head Cap Screw	80100607
13	4	M8x50 SHCS, SS	80100580
14	3	M3x8 SHCS, SS	80100629
15	2	M4 nut, SS	80100675
16	2	M14 washers, black	80101440
17	2	M4 Flat Washer, zinc	80100652
18	3	M3 Flat Washer	80100579
19	1	M4x14 SHCS, SS	



10.9 Mold-man 8000 Series 4 Pneumatic Plate Sub-Assembly

ITEM	QTY	DESCRIPTION	PART NO.
1	1	Pneumatic Carrier	80100280
2	1	VQ4000 Manifold Pre-assembled	80101032
3	1	Main Valve	80100651
4	1	Ejector Nozzle Main Valve (Same as Clamp Valve	80101770
5	1	Electro-Pneumatic Regulator	80100933
6	1	Pressure Selector Valve	80101771
7	1	Clamp Valve (Same valve as Ejector Nozzle Main Valve)	80101770
8	1	Clamp Lock Valve	80101772
9	1	Safety Valve	80101773
10	1	Main Valve Spacer	w/ item 2
11	1	Adaptor Plate	w/ item 2
12	1	Terminal Box	w/ item 2
13	1	Check Valve	w/ item 2
14	1	Safety Relief Valve	80101773
15	1	Low Pressure Regulator	w/ item 2
16	10	VQ4000 Gasket	w/ item 2
17	1	VQ4000 Flat Gasket	w/ item 2