

POLYMAX SERIES EPS HANDLING SYSTEMS

Operator Manual Revision 2500.4



Installation, Operation, and Maintenance Instructions

MATRIX MANUFACTURING
HEADQUARTERS: UTAH, USA
THE ORIGINAL IN EPS DENSIFICATION SYSTEMS
www.PolyMax5000.com

8 – Troubleshooting

- With the system shut down, turn the clamp pressure to OFF and pry open the extrusion tube.
- Remove the densified material from the tube and compression chamber using some safe means.
- After removing the foam from these areas repeat STEP 2.
- Proceed to STEP 4: Restart Operation.

STEP 4: Restart Operation

Check input EPS material composition. Material may be “green” EPS with small amounts of residual pentane, modified EPS that has a low melting point or resists creep, or “FR” type EPS just to name a few.

After unplugging the machine, restore all systems to operating condition. Before adding material to the machine, allow it to run through several cycles to assure it is running properly. Assure that all hands and other body parts are free from the extrusion tube, and then reactivate the clamp pressure by turning the clamp pressure knob clockwise. After assuring that the system is operating properly, add material and resume normal operation.

Technical Questions

If you are unable to fix the problem by following this basic troubleshooting guide or if you need further assistance please submit a request for support on our website at www.polymax5000.com. Additional contact information is also available on this website.

8 – Troubleshooting

8.5 Plugged Machine

If “PUSH 3” becomes stuck and material cannot be pushed out of the machine into the extrusion tube, then the following procedure is recommended:

STEP 1

The Polymax is equipped with automatic unplug feature. This system becomes active if the cycle is not completed in a specified time period set by the manufacturer. The unplug feature operates in the following sequence:

1. Third push is stuck.
2. Second push retracts momentarily.
3. Third push retracts and extends.
4. During this time if the system becomes unplugged, the system will return to the normal automatic operating cycle.
5. If the system is unable to unplug itself it will automatically shut down.

STEP 2

- In “MANUAL” mode retract the second push slightly (only about an inch) and third push all the way.
- Relieve the clamp pressure. This is accomplished by rotating the clamp valve knob counter-clockwise into the OFF position.
- Let the machine sit idle for 30minutes to an hour. During this time the material has time to cool down and loose it’s shape, and will become easier to push from the machine.
- Next, retract “PUSH 3” and then extend it. Repeat this procedure several times. If this process proves successful, jump to the restart section.

STEP 3

- Switch the control switch to “MANUAL”.
- Using the manual push switches; retract all pushes 1-3.
- Disconnect power and install a power lockout device.
- Remove all obstacles and material from the hopper. Using some safe means, remove the jammed material from the machine.

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8 – Troubleshooting

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Problem	Cause	Solution
Pre-Breaker will not turn on.	Overhead bag is full.	Run densifier to lower the level in bag.
	Door interlock tripped.	Check back maintenance door is fully shut.
	Motor starter tripped.	Check both blower and main drive motor starter overload heaters. Reset tripped heater.
	No 460V input power.	Check main supply power.
	Bad relay on PLC.	Check #9 output on PLC.
Pre-Breaker runs but turns off frequently. (Bag is not full)	Vibrations causing door interlock to trip.	Check that maintenance door is securely shut.
Blower motor starter continues to trip.	Blower and vent ducting to bag is plugged.	Undo duct from blower and dump out material.
Vacuum hose plugged.	Sucking up too large of pieces.	Remove hose and unplug. Do not suck up EPS foam larger than 1inch diameter.
	Inlet into blower box plugged.	Bang on vacuum hose with hand near the blower box to dislodge plug.

8 – Troubleshooting

8.4 Basic Troubleshooting

Problem	Cause	Solution	
The SYSTEM ACTIVE switch will not illuminate.	No power to the control box.	Check incoming power.	
	Light is burnt out.	Replace light module	
	120 V Control Fuse opened.	Replace fuse.	
	Emergency Stop	Release E-Stop.	
SYSTEM ACTIVE light is illuminated but no power to PLC.	Oil level in hydraulic tank is low.	Add oil till sight glass is ¾ full.	
Densifier will not turn on when in AUTOMATIC	Overhead bag is not filled to the top.	Fill bag full or push the green start button.	
	If bag is full, faulty upper monitor.	Check monitor for function ability.	
	No power to PLC.	No incoming power to Control Box.	
		Fuse blown in Control Panel.	
		PLC transformer bad	
Oil level too low			
Motor starter tripped.	Reset overload heater on motor starter.		
Densifier turns off when bag is not empty.	Bag chute is plugged and EPS will not flow into machine hopper.	Push on chute of bag to dislodge material.	
		Adjust height of bag so that chute does not buckle.	
Hydraulic cylinder will not move.	No power to solenoid valve.	Replace PLC. Low voltage on incoming 120 Volt supply line.	
	Bad Solenoid Valve.	Replace faulty parts.	
	Densifier is plugged.	Run unplug sequence as outlined in the troubleshooting section of this manual.	
In AUTOMATIC, 2 nd push extends then pauses before continuing to cycle.	Too much material is being compressed into the compression chamber.	Change FOAM DENSITY mode to higher setting.	
	2 nd push is not contacting the lower limit switch.	Adjust limit switch to contact striker when push is in fully extended position.	

1- Safety



RECOGNIZE SAFETY INFORMATION

The symbols shown in this section are used to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.

- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

DANGER WARNING CAUTION



FOLLOW SAFETY INSTRUCTIONS

Read carefully all safety messages in this manual and safety labels on your machine.

- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.

A signal word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.

- DANGER and WARNING safety labels are located on your machine near specific hazards.
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety messages precede related instructions in this manual that may result in damage to equipment if not followed correctly.



NOISE CAN DAMAGE HEARING

CAUTION!

Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Matrix Manufacturing for replacement.

All operators involved with this equipment must be aware of the locations of the emergency stop buttons. The emergency stop on the Densifier will stop the densifier and the pre-breaker. The emergency stop on the pre-breaker will only stop the pre-breaker (not the densifier).

2 - Specifications

2.1 Densifier

2.1.1 Electrical

Input voltage requirement:

460 Volts 3 phase 60hz (all models)

30 amp Service

120 Volts 1 phase 60hz

10 amp Service

2.1.2 Hydraulic

Hydraulic oil:

Weight = ISO 46

Type = Anti-wear, anti-foam

Gallons= 40

2.1.3 Size

PolyMax 2500

Height = 6ft 4in

Width = 8ft 11in

Length = 5ft 11in

Shipping Weight= 2500 lbs

2.1.4 Output

PolyMax 2500HO

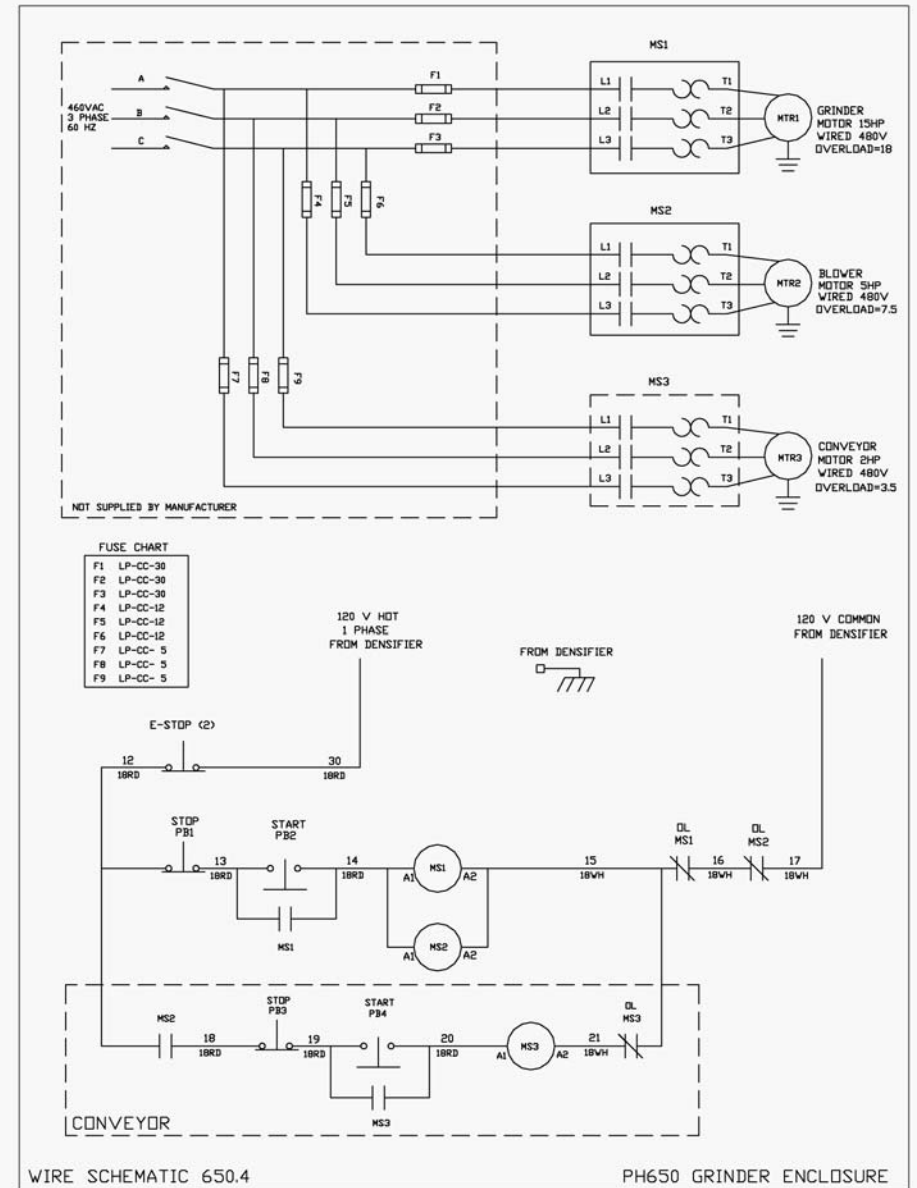
Average output = 150 pounds per hour*

Block Density = 15-40 lbs/ft³ Adjustable

Block Size = 3 1/2" x 3 1/2" x Variable length

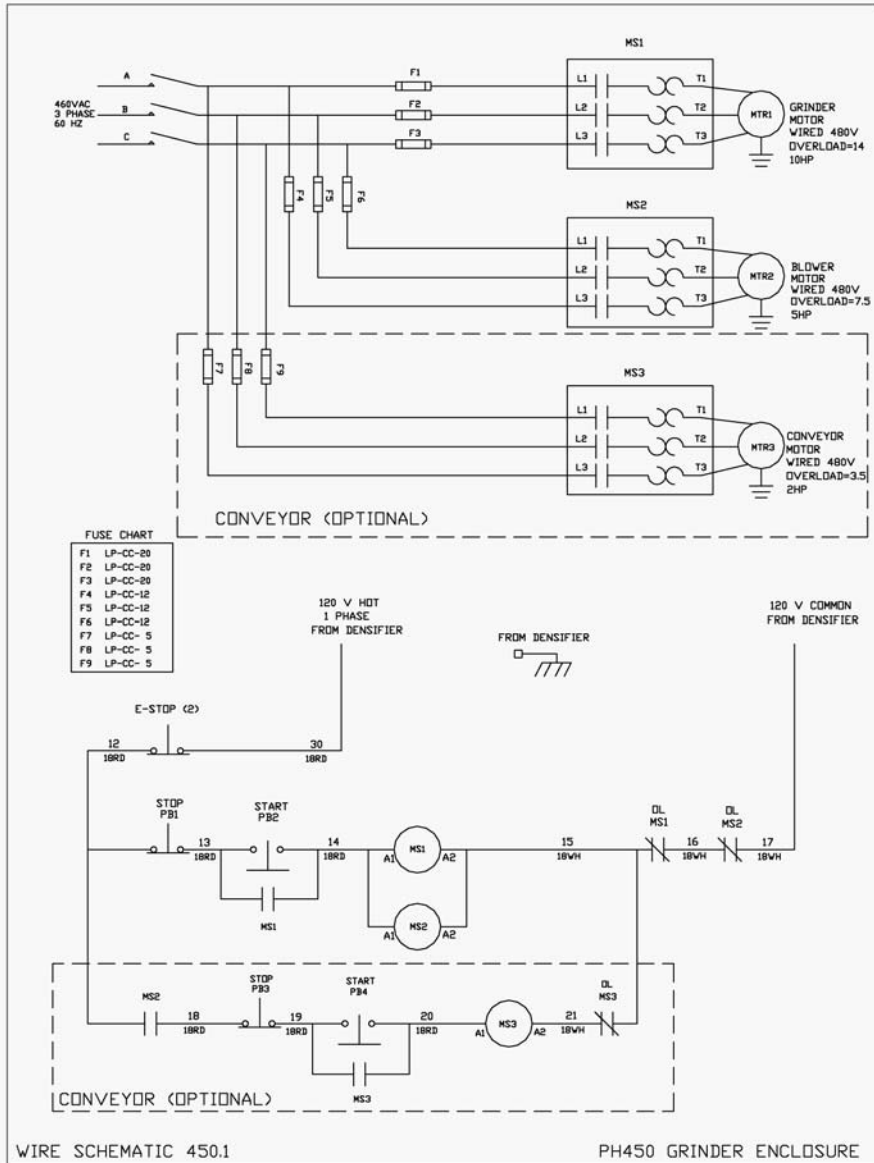
* Actual output of each machine varies with the condition and weight of EPS. Outputs are higher the finer the material is ground. Outputs are higher with heavier density EPS. The output ratings given are calculated with an input density of 0.7lbs/ft³ ground (1in diameter) EPS material.

8 – Troubleshooting



8 – Troubleshooting

8.3 Pre-Breaker



2 - Specifications

2.2 Pre-Breaker

2.2.1 Electrical

Input voltage requirement:

- 460 Volts 3 phase 60hz (all models)
- 30 amp Service (PolyHog 450)
- 60 amp Service (PolyHog 650)
- 60 amp Service (PolyHog 750)

2.2.2 Size

PolyHog 450

- Height = 5ft 2in
- Width = 4ft 3in
- Length = 4ft 0in
- Shipping Weight= 1900 lbs

PolyHog 650

- Height = 5ft 10in
- Width = 4ft 7in
- Length = 4ft 6in
- Shipping Weight= 2100 lbs

PolyHog 750

- Height = 5ft 10in
- Width = 4ft 7in
- Length = 4ft 6in
- Shipping Weight= 2600 lbs

2.2.3 Output

PolyHog 200

- Approx. 150 lbs/hour**
- Size of grind = 1inch diameter

PolyHog 450

- Approx. 220 lbs/hour**
- Size of grind = 1inch diameter

PolyHog 650

- Approx. 400 lbs/hour**
- Size of grind = 1inch diameter

PolyHog 750

- Approx. 500 lbs/hour**
- Size of grind = 1.5 inch diameter

**Output of pre-breakers is dependent on the size of blower used and initial density of input EPS. Numbers given are for stock blowers.

2 - Specifications

2.3 Overhead Storage Bag

2.3.1 Size

PolyBag 2500

Height = 5ft
 Width = 5ft
 Length = 5ft
 Cubic Feet = 125

PolyBag 5500

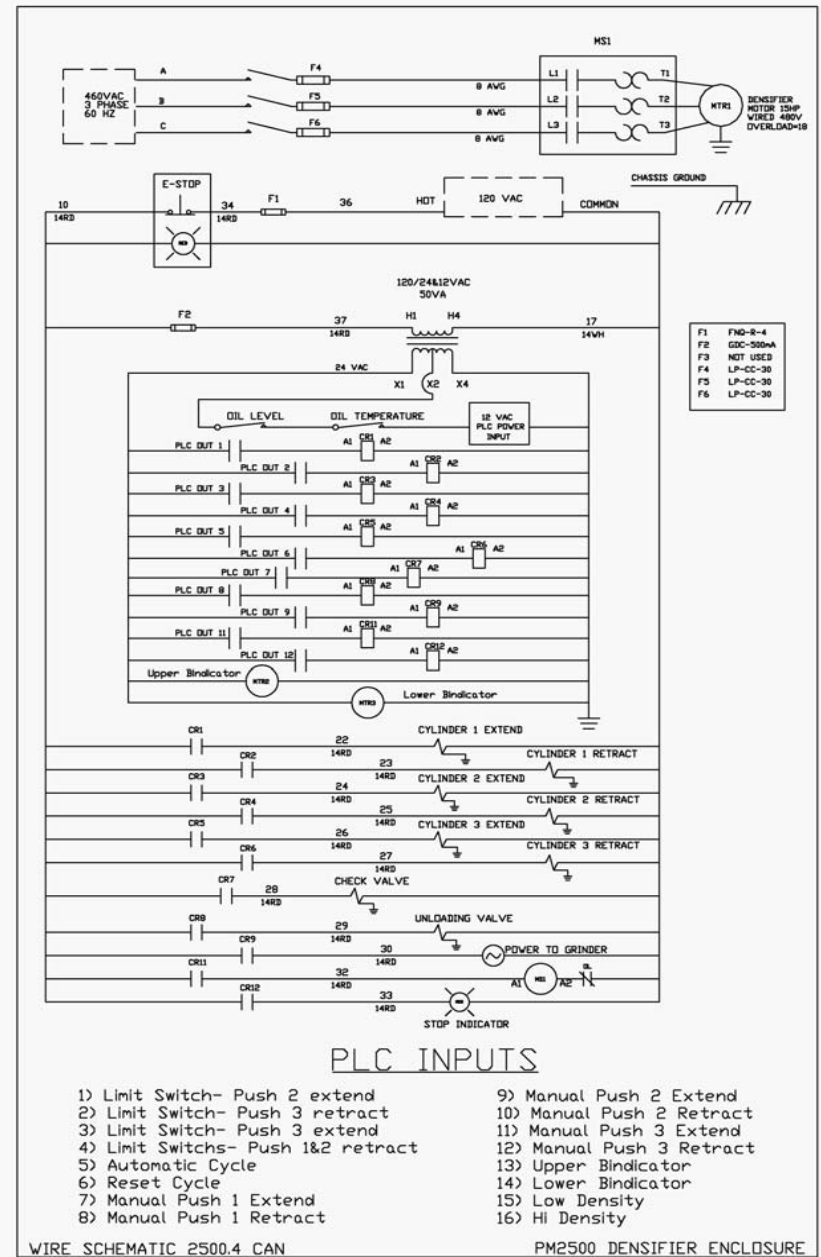
Height = 7ft
 Width = 7ft
 Length = 6ft 2in
 Cubic Feet = 300

PolyBag 6500

Height = 10ft
 Width = 8ft
 Length = 7ft 2in
 Cubic Feet = 570

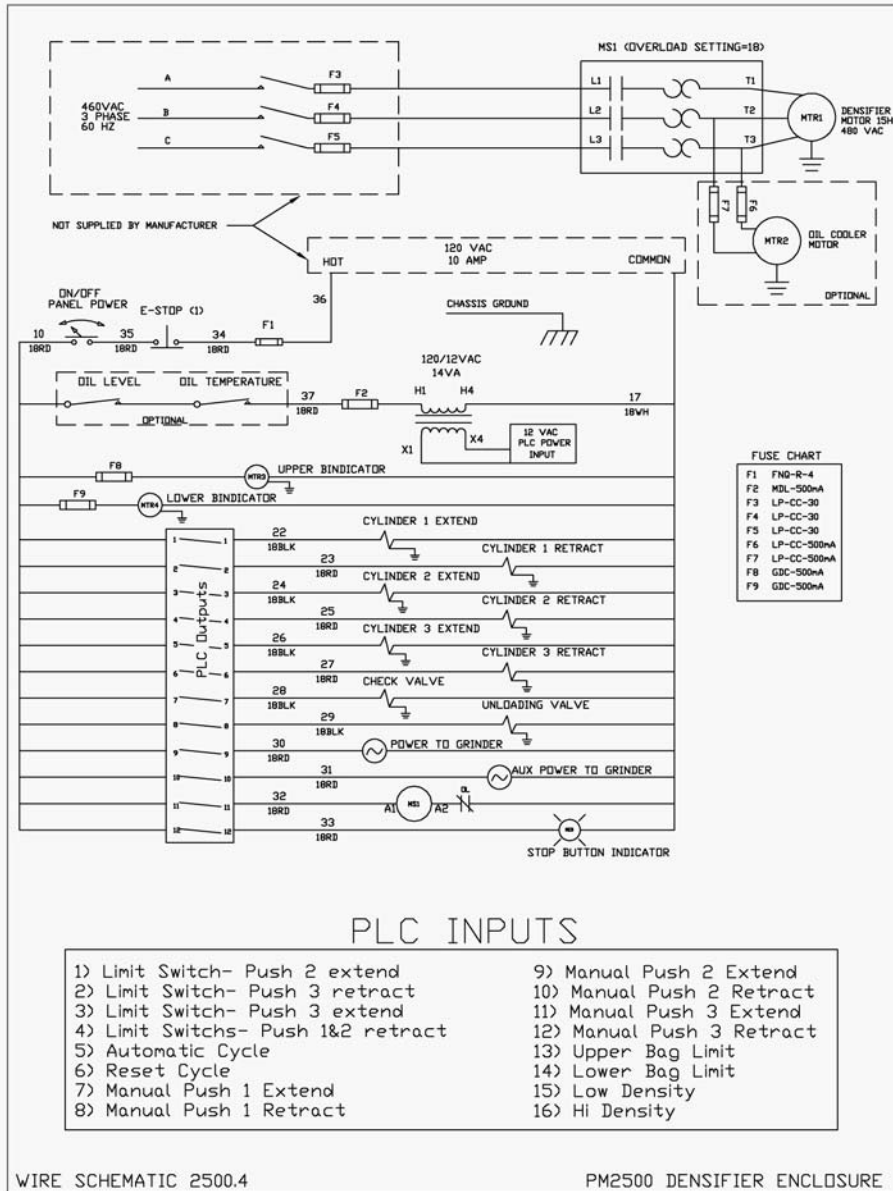
NOTE: These specifications apply to stock equipment. Custom orders may reflect different specifications than what is shown in this manual. Matrix Manufacturing reserves the right to change any of the required specifications at any time without notice.

8 – Troubleshooting



8 – Troubleshooting

8.2 Wiring Diagrams



3 - Installation Caution!!

The PolyMax EPS Densification series equipment is manufactured to high standards to allow for continuous duty and long service life. In order to prevent unnecessary failures and repairs it is imperative that the installer follows the guidelines outlined in this manual. **The details and procedures for adjusting the equipment are important and must be followed so that the equipment will continue to run as designed.**

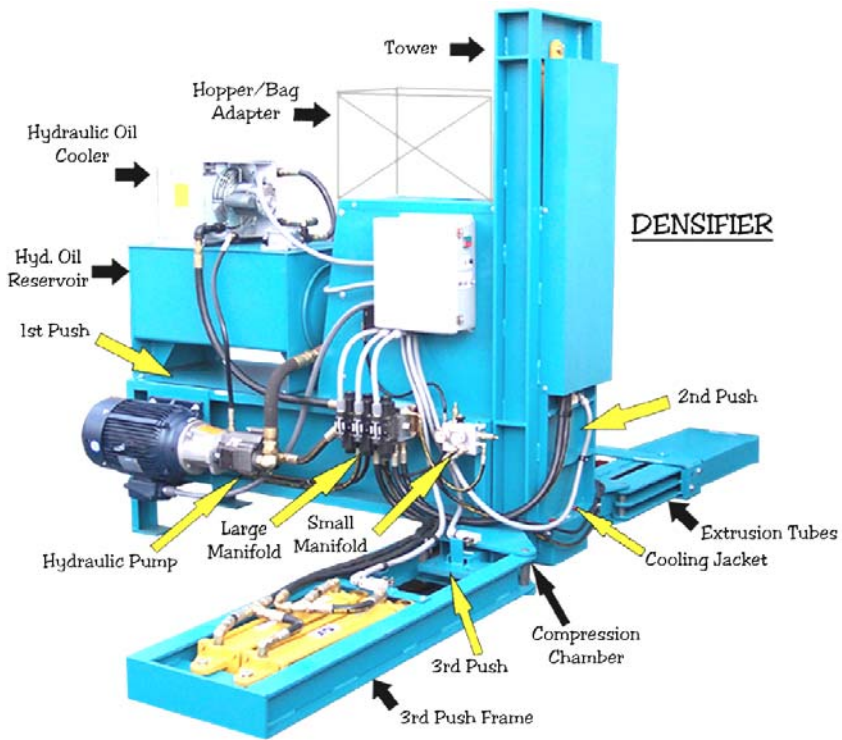
EPS extrusion type densifiers are extremely sensitive to different types of input material. Damage to vital components of the machine can occur if the proper personnel training are not performed. Becoming familiar with EPS and its variations is essential to proper operation of this equipment. (See section 6 of this manual.) Proper alignments of the rams and pushes during installation will decrease the risk of damage to the machine by reducing friction which causes enough heat to liquefy the EPS and cause undue forces to push on the components of the equipment leading to extensive repairs.

Please read all of the instructions for installation and operation of the PolyMax Series equipment before operation. Damages that occur due to improper machine installation and/or improper input material are not covered by the regular warranty. Taking extra time in the installation/operation process is worthwhile because it leads to reliable operation.

4 - Mechanical Installation

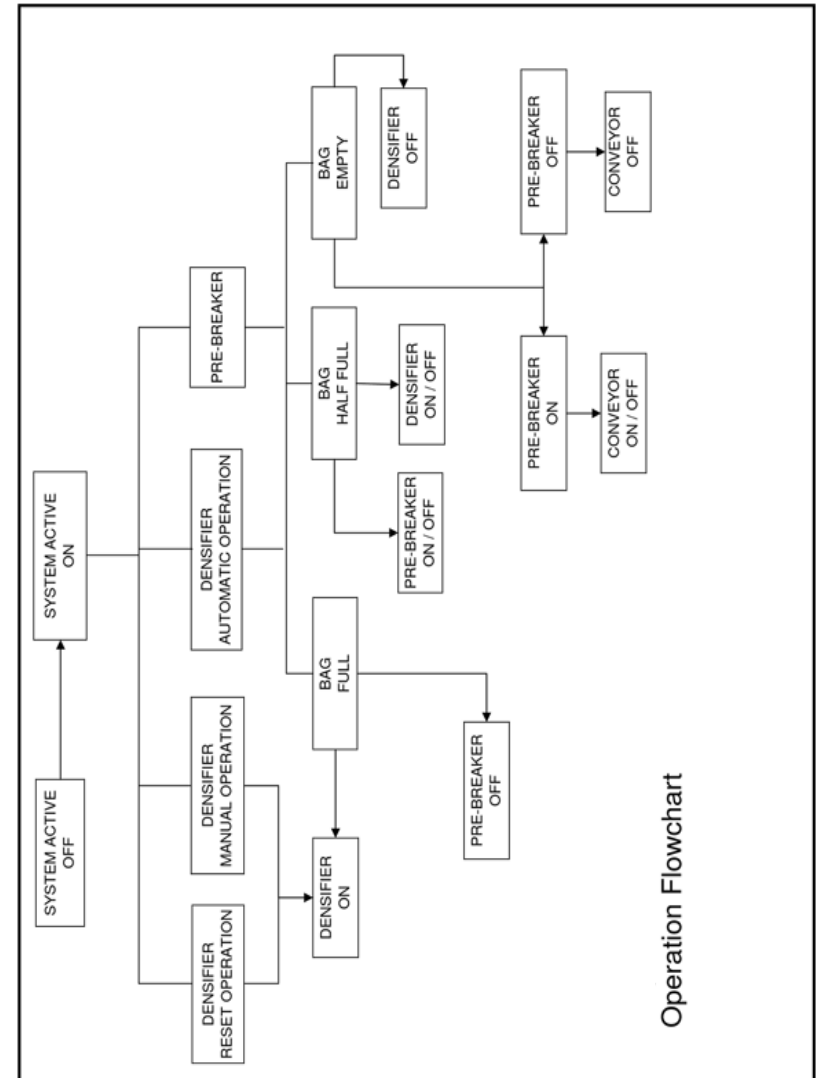
4.1 Terminology

FIGURE 1



8 – Troubleshooting

8.1 Operation Flowchart



7 – Maintenance and Parts

7.1.5 Grinder

With the Polyhog grinder, the following maintenance is required:

- The four large bearings need to be greased every 200 hours.
- All set screws used on the shafts and bearings should be checked regularly because they can loosen over time due to the vibration of the machine.
- The main drive motor needs grease every 150 - 200 hours. (See *Electric Motors* in this section.)
- If any of the beater pins become bent or broken contact the manufacturer to acquire the appropriate steel alloy for your grinder model.

WARNING!

- **ALWAYS** use a power lock out device when servicing either the Polymax densifier or the Polyhog grinder.
- **NEVER** run either machine without the guards in place.
- **ALWAYS** wear proper eye and ear protection when using this equipment

Matrix Manufacturing will not be held liable for any bodily injury or machine damage that occurs from failure to adhere to these instructions and safety guidelines as well as all other standard shop safety guidelines. Warranty is not valid when a part fails due to misuse or use of the wrong material.

7.2 Parts

Though a complete parts catalog is not available in this manual, all replacement parts can be ordered through Matrix Manufacturing. See www.polymax5000.com.

4 - Mechanical Installation

4.2 Densifier

4.2.1 Assembly

The following is a list of assembly requirements and the order in which they should be performed:

- Place the Polymax in the desired location.
- Remove the packaging from the Polymax.
- Install the support leg to the end of the third push frame and adjust to the floor level. Tighten the locknut after adjustment. This adjustment should be readjusted when the Densifier is started to prevent the push frame from lifting up during the compression stroke. The support leg (See Figure 2) is designed to take the weight of the third push frame and cylinders.

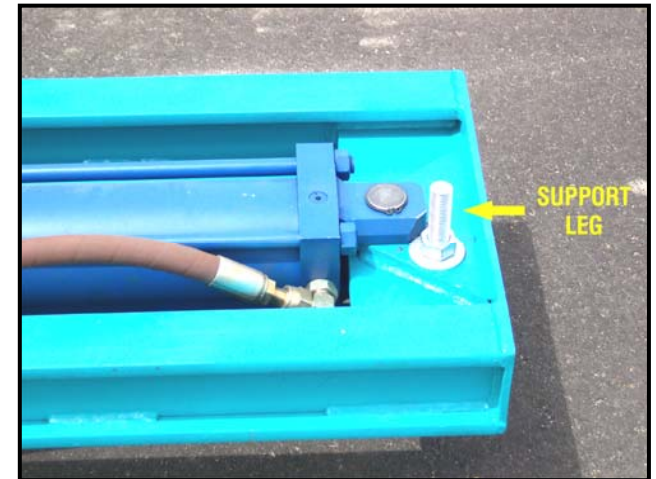
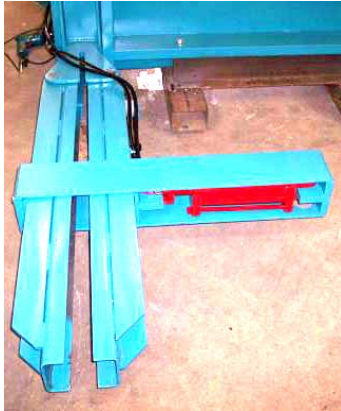


FIGURE 2

- Attach the extrusion tubes. First, place the hydraulic clamp in front of the extrusion outlet and support it so that the extrusion tubes can slide through. Make sure that the tube with the lug welded on it is pointing to the long end of the Polymax. Place half the tube in place by sliding it in through the clamp and into the pinned slot, then drive the connecting pin into place. See Figure 3.

4 - Mechanical Installation

FIGURE 3



- Repeat this process for the other tube half.
- Place a densified block of foam or a small 4 x 4 wood block into the end of the extrusion tube to prevent it from over-closing during startup, as shown in Figure 4.



FIGURE 4

- With the hydraulic cylinder of the clamp slid to the side, attach the remaining clevis using the pin and cotter pin provided.
- Slide the clamp into place on the extrusion tubes.
- Use the four bolts to attach the clamp to the extrusion tube.

7 – Maintenance and Parts

7.1.3 PolyMax Body

Each of the pushes with sliding surfaces is lined with low friction, high wear resistant nylon. If any of this becomes worn or broken it can be replaced. (See parts section for proper material.)

- Due to the severe application of pressure on the 3rd push, it is highly recommended that it be removed every 4 months and inspected for damage. Replace all screws holding on the plastic and brass at this time. Use RED Loctite on all screws to prevent loosening.
- The 2nd push should be inspected once a year and it is recommended that the screws be replaced at that time. RED Loctite compound is to be used.

7.1.4 Electrical System/Control Circuits

The main components of the system are limit switches, PLC controller, and solenoid valves.

The limit switches require no maintenance and should only be replaced if failure occurs.

Solenoid valves require no maintenance and can be repaired if they fail or stick.

7 – Maintenance and Parts

7.1 Regular Maintenance

7.1.1 Hydraulics

The hydraulic power unit will require the following maintenance:

- Replace the hydraulic filter after 500 hours of use or every three months of 8 hours per day use.
- If your machine has a filler breather cap this should be replaced at the same time as the filter minimum.
- The hydraulic fluid should be drained and replaced after 2000 hours of use or after 1 year of 8 hours per day use. Hydraulic oil should be ISO 32 weight.
- If hydraulic cylinders are leaking, reseal kits are available.

7.1.2 Electric Motors

- The electric motor coupled to the hydraulic pump has two grease fittings that should be greased every 150 – 200 hours. One zerk is located near the front of the motor and the other is located near the back. Once the zerk is located on the motor, locate the plug exactly 180 degrees opposite the zerk on the other side of the motor. This plug must be removed to allow the grease to flow through the bearing. The plug is for sealing the bearing area from dirt and water. Not removing the zerk could allow too much pressure to accumulate in the bearing and damage the seals.
- The main drive motor on the pre-breaker has two grease fittings that should be greased every 150 – 200 hours. See the above paragraph on proper greasing techniques for this motor.
- The drive motor for the blower fan on the pre-breaker is service free.
- During greasing of the densifier, the motor/pump coupler should be checked for signs of wear and replaced if loose.
- During greasing of the pre-breaker, the pulley belts and sheaves should be checked for loose tension, wear, and cracks. Tighten or replace as necessary.

4 - Mechanical Installation

- Tighten the bolts.
- Fix the cylinder hoses with the hose clamps.
- Unbolt and remove the metal fork pockets used for shipping.
- Remove the filler plugs from the cooling jacket.
- Fill the cooling jacket with 5 gallons of antifreeze** (for corrosion protection) and the rest with water, leaving about 1/2 inch of the top unfilled, to allow for expansion.
- Fill the hydraulic reservoir with ISO 46 hydraulic oil until the site gauge shows approximately 3/4 filled.
- Complete the electrical installation as outlined in the electrical section (Section 5 of this manual), and then continue with the next step.
- VERIFY THAT OIL IS IN THE HYDRAULIC TANK AND THAT THE VALVE TO THE PUMP IS OPEN!** Place the switch on the panel into the "Automatic" position. Turn on the System Active button on. Momentarily switch from Automatic to Manual then back to Automatic to turn the motor on and check the motor rotation.

4.2.2 Hydraulics

See section 2 of this manual for specifications on the types and amounts of hydraulic oil to use.

Due to potential shipping hazards the hydraulic oil reservoir is shipped empty. The consumer must provide the necessary oil to fill the reservoir prior to starting the equipment.

Add enough oil to the hydraulic reservoir to fill the sight glass on the tank about ¾ of the way to the top.

Verify that the ball valve going from the tank to the pump is in the opened position. (The valve handle should be parallel with the hose.)

4 - Mechanical Installation

4.2.3 Cooling System

Each densifier has a cooling jacket to help dissipate heat away from the compression chamber. The cooling medium is water and antifreeze. The antifreeze acts as a corrosion inhibitor for the steel parts. It should be mixed at ratio no less than 3 parts water 1 part antifreeze.

The PolyMax 2500 has a stagnant water reservoir. The water level should be filled to the top and checked every month or as needed to replenish any water that has evaporated due to normal use.

4.2.4 Positioning

Positioning the Densifier is more critical when using an overhead storage bag that is *to be hung from the ceiling*.

- Approximate the desired location and place the densifier there.
- Go to Section 4.3 for installing the overhead bag.
- Once the bag is hanging level from the ceiling it is possible to fine tune the placement of the densifier so that it is directly underneath the bottom opening of the bag.
- Once the densifier is lined up with the properly hung bag, it can be anchored to the cement using $\frac{1}{2}$ " diameter anchor bolts through at least two of the densifier foot pads.

4.3 Overhead Storage Bag

4.3.1 Positioning/Hanging

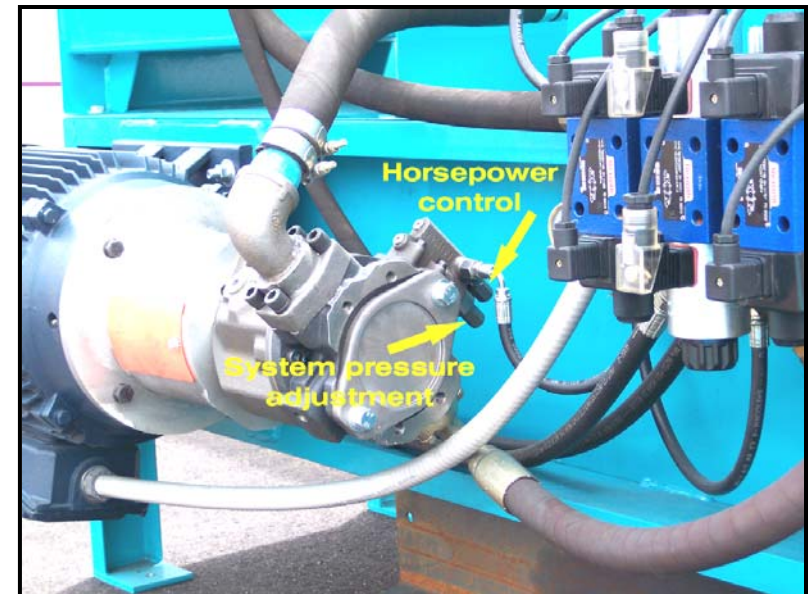
There are multiple arrangements possible for the overhead bag depending on what was ordered. If you have a PolyBag 2500 the proceed to step 4.3.1.1. If you have any bag other than the PolyBag 2500 then use instructions 4.3.1.2.

6 - Operation

4400 psi. Adjustment of the system pressure is rarely necessary, but it is accomplished by adjusting the hex head screw under the hex cap on the pump. (See Figure 8.) Care should be taken not to lose the small washer between the cap and the jam nut.

The horsepower control adjustment should **not** be adjusted under any circumstances. Horsepower control is adjusted through the use of sophisticated equipment at the factory. It is used to calibrate the pump to the horsepower of the motor.

FIGURE 8



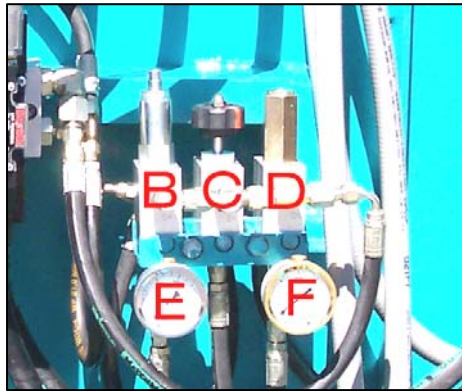
6 - Operation

- Now the clamp will read the newly set pressure every time the third push extrudes a block.

NOTE: Make only small adjustments (50 psi or less) and allow the Densifier to run 10 to 20 cycles to stabilize. If more adjustments are necessary, repeat the procedure. Being impatient and making too many adjustments too quickly will not give accurate feedback to the newly set pressure.

The density of the blocks should be measured around 20-25 lbs. per cubic foot. At this density, a semi trailer can be fully loaded with the blocks stacked on pallets. Higher densities should be avoided due to undue wear and stress on the machine and less efficient output.

FIGURE 7



6.9.2 Other Valves

In Figure 7 there is a valve labeled D. Valve D is used for automatic opening of the extrusion tubes when system pressure reaches a set value. Valve D is set from the factory; it is not recommended that it be readjusted.

6.9.3 System Pressure

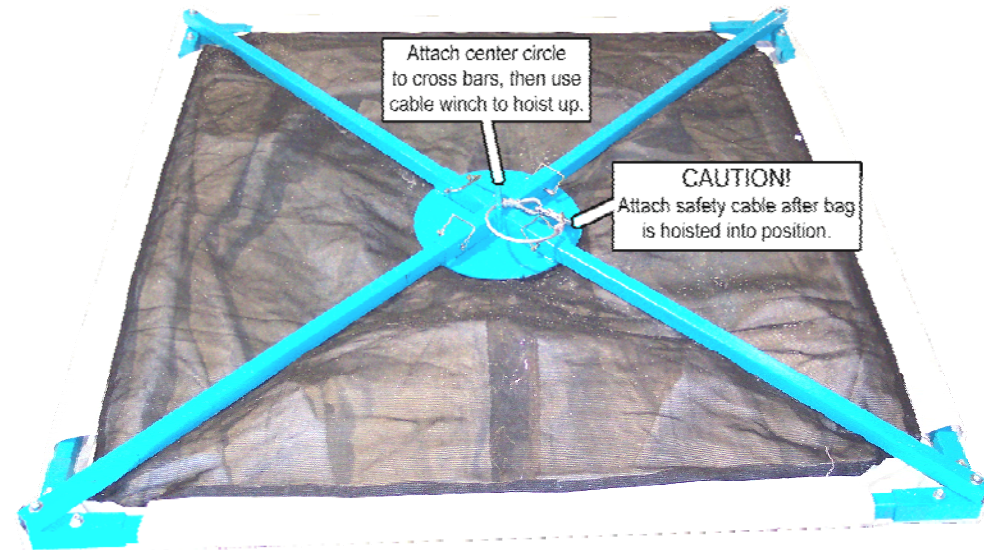
System pressure is the maximum oil pressure that the hydraulic pump is set to put out. For the PolyMax 2500 and 5500 system this value is 2300 psi. For the PolyMax 6500 system this value is

4 - Mechanical Installation

4.3.1.1

This section describes assembly of a PolyBag 2500.

-
- Install the handle to the winch on the main bag mast.
- Take the circle plate with the 3/16" cable and the main bag mast and run the cable through the two pulleys and to the winch at the bottom.
- Install the main bag mast into the holding slot on the side of the densifier. The top – end of the mast should be directly over the center of the hopper. (The center mounting circle should be hanging down on top of the densifier.
- Tighten the two bolts that secure the mast in place.
- Preassemble the bag and frame as shown in the below picture.



- Once the center mounting circle and bag frame parts are all assembled hoist the bag all the way up with the winch system.

4 - Mechanical Installation

- Attach the safety cable through the loop at the top of the main mast and the center circle. This secures the bag in the event of a failure at the winch.
- Proceed to 4.3.2.

4.3.1.2

The location of the bag will determine the ultimate location of the densifier. If the bag is to be hung from the ceiling rafters, it may “float” to a slightly different location than planned. This is due to the nature of hanging the bag from four corners and keeping it level. **The height of the bag is critical.** A bag hanging too low will cause the chute to buckle and not allow material to flow freely into the densifier hopper. A bag hanging too high will stretch the seams and cause them to burst.

- Assemble the bag frame by pushing the square tubes through the loops on top of the bag. (The bag is rectangular so one must match the two long bars to the long sides of the bag and the two short bars to the short side of the bag.)
- With the square tube through the bag loops, push all for corner joints onto the ends of the bars. (Keep the hanger loops upward to tie rope through later.)
- Using the hardware provided, match the holes in each corner assembly and install the bolts, washers, and lock-nuts.
- It is only needed to *snug* the nuts tight. Excessive tightening will collapse the tubing.
- Ceiling mount bags only: With the frame bolted together it is now possible to use 3/8” minimum diameter nylon rope to tie the bag to the ceiling. **NOTE:** It is recommended to have 4 ropes long enough to go over the ceiling rafters and fall back down to the ground where they can be temporarily tied off for later adjustment.
- Bags Mounted with a freestanding frame: Assemble the freestanding frame and position over the center of the densifier hopper. Hoist the bag up using some safe means and attach to the tie loops at the top of the frame using 3/8” diameter rope minimum or chain. (See cover picture on manual for clarification).

6 - Operation

6.9 Adjustments

Once set for the type of EPS used, few adjustments will be needed during normal operation of the Polymax.

6.9.1 Clamp Adjustments

Adjustments can be made to the extrusion clamp in order to vary the density of the exiting material. The normal clamp pressure settings are 300 psi for ground EPS and dry pre-puff.

Turning the clamp off:

- Sometimes it may be desirable to deactivate the clamp cylinder so that it will not apply pressure to the extrusion tubes. This may be the case when setting up the machine, adjusting pressures, or running temperamental foam. Deactivating the clamp so that it remains in the retracted position is done by turning the knob (Letter C in Figure 7) counterclockwise.
- The fully open position is obtained by holding down PUSH 1 and PUSH 2 EXTEND switches simultaneously with the machine in MANUAL mode.

Pressure to the clamp can be adjusted by using the following procedure:

- With the three-position switch in the “MANUAL” position, hold down the “PUSH 1” extend switch to extend the 1st push until completed with step 4. (This allows the pump to give maximum pressure to the system while adjusting the clamp pressure.)
- Read the clamp pressure on the left-hand gauge. (Letter E in Figure 7)
- Adjust the clamp pressure by loosening the jam-nut on the pressure reducing valve and turning the center portion with an Allen wrench, clockwise to increase the clamp pressure, or counterclockwise to reduce the clamp pressure. (The pressure reducing valve is letter B in Figure 7. It is also labeled PRV on the machine.)
- When the desired pressure is reached, release the 1st Push switch, hold the Allen wrench in place, and tighten the jam-nut.

6 - Operation

WARNING!!

- **NEVER** run the machine without knowing where others are at around the machine.
- **NEVER** climb into the hopper without first locking out the incoming power to the machine.
- **NEVER** trust your coworkers when dealing with your own personal safety.
- **ALWAYS** follow normal safety practices.

6.8.1 Function of the level indicators

The purpose of this section is to describe the functions of the two indicator switches, one in the hopper/bag adapter and the other at the top of the bag.

Upper Indicator

The purpose of the upper indicator located near the top of the bag is twofold. One function of this indicator is to shut the pre-breaker off when the bag is full. Due to static cling, it is not always possible to see the level of material in the bag through the sight glass. For this reason, when the upper indicator senses a full bag, power to the grinder is shut down. This prevents the frustration of plugging up the vent ducting and grinder blower.

The other function of the upper indicator is to tell the densifier to turn on automatically when the bag is full. **In this condition, it is not possible to turn off the densifier with the red stop switch.** If it is desired to turn the densifier off with a full bag, one must turn the System Active switch off.

Lower Indicator

The lower indicator is located in the hopper/bag adapter. The function of this indicator is to tell the densifier to turn off when empty. This function prevents the unnecessary cycling of the densifier if no material is in the hopper.

4 - Mechanical Installation

- The inlet to the bag needs to be directed toward the final position of the grinder.
- Hoist the whole bag and frame up to the ceiling and run the ropes around a secure area on the ceiling rafters.
- Have someone on the ground tie the ropes off so that the bag can hang freely.
- With the bag hanging freely in the air, adjust the ropes so that the bag hangs level and overlaps the *hopper/bag adapter* by about 5 inches.
- Adjust the densifier location to be directly underneath the bag. (see section 4.2.4)

4.3.2 Securing Bag to Densifier

- On each of the sides of the *hopper/bag adapter* is a 4-inch wide metal strip bolted on with acorn nuts. Unbolt all of the strips from the adapter.
- Pull the bag over the *hopper/bag adapter* by about 4 inches.
- Using one of the 4-inch metal strips as a measuring guide and a black marker, mark where the studs locate on the bag and use a knife to make a small incision at each of the stud locations so that the bag can be sandwiched between the metal strip and the hopper/bag adapter.
- Repeat the previous step with all four sides of the bag until properly secured.

4.3.3 Upper Level Indicator

The upper level indicator will kill power to the pre-breaker when the bag is full to prevent plugging of the grinder and ductwork.

- The upper indicator should be located approximately 18" below the top of the bag. It is necessary to cut a hole in the canvas bag in the desired location and install the two mounting halves at the hole.
- Take the rotary level indicator with the curved polycarbonate bayonet and screw it into the mounting device located at the top of the bag.
- Attach the yellow control cord to the appropriate plug on top of the main control box of the densifier.
- Secure yellow cable with cable ties as necessary.

4 - Mechanical Installation

4.4 Pre-Breaker

4.4.1 Positioning

The position of the pre-breaker is the least critical. It can be positioned anywhere in the general vicinity of the densifier and bag. Just keep in mind that the material must be blown through vent ducting to the top inlet in the bag.

- Determine the desired location of the pre-breaker.
- Place pre-breaker in location.
- Hook up vent ducting from pre-breaker to bag before anchoring to concrete.
- After hooking up vent ducting, install a minimum of two anchor bolts through the mounting tabs provided on the pre-breaker.

4.4.2 Connecting the Overhead Bag to the Pre-breaker

6-inch round HVAC duct and elbows work well to connect the pre-breaker to the bag. These items are not provided with the equipment due to the many different placement configurations possible.

- Determine the route and amount of duct needed to connect the pre-breaker to the bag.
- Cut and assemble as needed.
- Attach the ducting to the pre-breaker by simply sliding the open (non-crimped) end over the bracket attached to the blower.
- Slide the other end of the ducting into the hole near the top of the bag and use a standard hose clamp to secure to the bag.
- Tape off any joints in the assembly to prevent dust escaping and to reinforce the joints. (It is recommended to reinforce the joints with screws and supplementary supports)
- NOTE:** If other material is used to connect the pre-breaker to the bag, it is important to use conductive material that is grounded. Static sparks are generated at a high rate if non-grounded material is used. *Sparking can ignite explosive gasses present in EPS material.*

6 - Operation

6.8 Automatic Operation

For normal use of the PolyMax Densifier:

- Place mode selector switch in “AUTOMATIC”
- Switch the System Active button on.
 - **NOTE:** At this point the pump and motor may not turn on.
- To begin cycling the machine, depress the “Start” button. This causes the machine to turn on the motors and begin cycling.
- Determine which setting of FOAM DENSITY is best for the material being run. The output of the machine will be maximized by running it in the *lowest* foam density setting and still have it cycle without hesitation or triggering the unplug cycle.
 - The FOAM DENSITY switch controls how far the first push extends, thus controlling the total amount of foam entering the final compression chamber.
 - The “LOW” density setting will run the first and second pushes twice to every one stroke of the third push. This allows more material to be forced into the compression chamber area. The limiting factor for this setting is whether the second push will extend fully each time.
 - The Foam Density selector describes the original density of the input EPS, *not* the density of the blocks exiting the machine.
- To stop the machine for any reason *other* than in an emergency, use the red “STOP” Button. By depressing this switch, a request is made to the PLC to stop the machine only when all three pushes are extended. Simply depress the switch and then let go. ***The machine will continue to run until all three pushes are extended, then it will kill the motor and pump.***
 - **NOTE:** To begin cycling again simply depress the green “START” button.
- When the machine will not respond to the “START/STOP” buttons, use the reset switch to allow all the pushes to reset to “home position”, then switch back to “AUTOMATIC” and press the “START” button.

6 - Operation

- ❑ Depress the red stop button on the control panel of the densifier. This will activate the red indicator light on the front of the panel. This light indicates that a request has been made to stop the densifier. Once the densifier reaches the appropriate cycle position it will turn off.
- ❑ Let the machine sit for about 10 minutes before starting again. This will allow the material in the extrusion tubes to take set. **NOTE:** At this time the exiting material may not appear to be densified.
- ❑ After the waiting period, start the densifier again and allow to cycle.
- ❑ Start the pre-breaker and continue to fill the bag.
- ❑ It will take some time for the exiting material to clean up and exit smoothly.
- ❑ Throw away the first block(s) that come out that are not fully densified. **NOTE:** *It is very important that partially densified blocks are not thrown back into the pre-breaker. These blocks will cause damage to the pre-breaker.*

5 - Electrical Installation

5.1 Densifier

Only qualified personnel with the appropriate training should perform the electrical installation per NEC and local codes.

- ❑ Disconnect service power and lock out where applicable before performing any of the following steps.
- ❑ The PolyMax can be wired for 460 volts/3 phase, or 230 volts/3 phase electricity. (Contact manufacturer for 230V hook-up). The motor starter is sized for 460 volts/3 phase electricity from the factory.
- ❑ An opening for the incoming power is not provided due to the many different configurations possible. When drilling the hole for the incoming conduit, place a rag or piece of cardboard over the motor starter and PLC to deflect the metal shavings from the drill. After drilling, use an air hose or other means to blow out any remaining metal chips. Be sure to use eye protection to avoid injury.
- ❑ 460-volt/3 phase connections are made at L1, L2, and L3 on top of the motor starter.
- ❑ A 115-volt/single phase 10 AMP line is also required in the enclosure. (see wire diagram)
- ❑ VERIFY THAT OIL IS IN THE HYDRAULIC TANK AND THAT THE VALVE TO THE PUMP IS OPEN! After wiring is complete, motor rotation must be checked. This is done by selecting the MANUAL mode selector switch and turning the SYSTEM ACTIVE switch to the ON position then back OFF. This will “bump” the motor enough to see which direction the motor is spinning. The motor rotation is marked by arrows on the motor fan shroud, and can be viewed by looking at the fan on the back of the motor. The motor rotation can be changed by exchanging any two input power legs (L1, L2, and L3). Proper motor rotation is in the clockwise direction as viewed when standing behind the motor and facing the fan.
- ❑ Once the machine is running, press the emergency stop switch to verify that the machine shuts off.

5 - Electrical Installation

5.2 Pre-Breaker

All electrical power connections are made in the enclosure panel located on the side of the machine.

- ❑ Disconnect service power and lock out where applicable before performing any of the following steps.
- ❑ The PolyHog can be wired for 460 volts/3 phase, or 230 volts/3phase electricity. (Contact manufacturer for 230V hook-up). The motor starters are sized for 460 volts/3 phase electricity from the factory.
- ❑ An opening for the incoming power is not provided due to the many different configurations possible. When drilling the hole for the incoming conduit, place a rag or piece of cardboard over the motor starters to deflect the metal shavings from the drill. After drilling, use an air hose or other means to blow out any remaining metal chips. Be sure to use eye protection to avoid injury.
- ❑ 460-volt/3 phase connections are made at L1, L2, and L3 on top of the motor starter.
- ❑ The 115 Volt control voltage for the motor starters comes from the densifier. The appropriate connections must be made according to the wire diagram.
- ❑ After wiring is complete, motor rotation must be checked. Start the pre-breaker by depressing the green start switch on the side of the machine. Then kill the power by depressing the red stop button. Watch the motor rotations and verify that they are rotating according to the markings on the machine. Keep in mind that the pre-breaker can seem as though it is functioning even though it is running in reverse. The motor rotation can be changed by exchanging any two input power legs (L1, L2, and L3). Proper motor rotation is in the counter-clockwise direction as viewed when standing behind the motor and facing the fan.
- ❑ Once the machine is running, press the emergency stop switch to verify that the machine shuts off.

6 - Operation

position and the machine will remain idle until switched to “MANUAL” or “AUTOMATIC” modes.

6.6 Automatic Selector Switch

Under normal operation, the mode selector switch should be in Automatic. In this condition, the sensors in the bag and hopper/bag adaptor will sense when the machine needs to turn on or off. In the Automatic mode, the hydraulic system on the densifier may or may not be on. If there is some material in the overhead bag but not enough to turn the densifier on automatically and it is desired that it begin cycling, press the green start button.

6.7 Initial Startup

Once the machine has been installed properly by following the installation sections of this manual, it is time to run an initial startup.

- ❑ Mechanical *and* Electrical installation has been performed in accordance to this manual.
- ❑ Incoming 115 volt power is properly connected and the Emergency Stops work properly.
- ❑ Hydraulic reservoir is full with ISO 32 hydraulic oil.
- ❑ Polymax control is switched into the “AUTOMATIC” mode.
- ❑ Verify that the foam density selector is set to medium.
- ❑ System is free of foreign objects, including human body parts.
- ❑ Hands are free from extrusion tube.
- ❑ Material to be densified is free to flow into the hopper.
- ❑ Place a block of densified foam, or small 2x4 block of wood into the end of the extrusion tube, to prevent the tube from closing too far.
- ❑ Switch the system active button located on the densifier to the “on” position.
- ❑ Start the pre-breaker and fill the bag ¼ full.
- ❑ Stop the pre-breaker.
- ❑ Verify that the ON/OFF knob for the clamp is *on*.
- ❑ Start the densifier by depressing the green start button. The densifier will begin to cycle automatically.
- ❑ Allow the densifier to cycle about 4 to 5 times. During this time, the material being pushed out may make a significant amount of noise.

6 - Operation

FIGURE 6

6.3 Foam Density Mode Switch

The foam density mode switch relates to the relative density of the *INPUT* foam into the densifier. *This is NOT a selector switch controlling the density of the exiting blocks.*

The purpose of this switch is to fine tune the cycle time of the densifier to the type and density of EPS that is being fed into the machine.

Hi setting: This setting will force the least amount of material through the system per cycle. This setting will decrease the overall output of the machine but may be necessary if running heavier-weighted EPS.

Medium setting: This is the normal setting for standard EPS material. It runs each push the full stroke each cycle.

Low setting: This setting can be used for extremely fluffy or light material. It will run the first and second push twice for every block that is pushed out. It may seem to take an overall longer time to cycle but each block will be double the length.

If the machine seems to struggle through its cycles, the system pressures seem to climb high, and/or the clamp opens a lot while pushing out a block, run at a higher density setting.

6.4 Manual Selector Switch

The manual mode selector switch is mainly used for troubleshooting. When the switch is in manual, the three momentary toggle switches at the bottom of the control panel are active. Each one can be used to extend or retract the respective push. This can be very helpful, but keep in mind that it is possible to cram too much material into the compression chamber and plug the machine. Take care when running the pushes in manual with a hopper full of material.

6.5 Reset Selector Switch

The reset switch is used if the PLC becomes confused or frozen. By activating the "RESET" switch, all three pushes will move to their "home"

6 - Operation

6.1 PolyMax: System Overview

The Polymax Densifiers are designed to increase the density of expanded and extruded *polystyrene foam* using no heat or chemicals. Densification occurs with a three-axis compression:

The FIRST compression stroke captures a volume of material and compresses it until the push reaches a set pressure. This pressure controls how much material will be in a single block. If this pressure is too high, too much material will be loaded and the machine will plug.

The SECOND push compresses the material into the extrusion tube opening. This push *MUST* fully extend every cycle. If the first push pressure is set too high, then too much material will be loaded for the second push to handle. This would prevent the second push from fully extending and cause the machine to stall.

The THIRD push further compresses the material, and then forces the material out the extrusion tube. In the extrusion tube, the material is held under pressure from other material both from in front and from behind and by the clamp pressure from the sides. Due to the friction of the moving foam, heat is created. The cooling tank straddles the outer wall of the third push chamber and is designed to remove heat and prevent the material from melting.

The Polymax densifier is designed to run automatically, requiring only that material be fed into the machine. The material is fed into the hopper through the use of an overhead storage bag. Using an overhead storage system is convenient and economical, as many facilities have dead space located above their equipment. The PolyMax system utilizes that space for storage instead of taking up valuable floor space for the scrap material coming off of the production line. This provides a quick and easy way to maintain a clean work area.

The final densified product leaves the extrusion tube on its own, and can be fed onto a conveyer system, or manually picked up and placed in boxes or on pallets. For optimum loading, it is recommended that blocks be stacked. Any number of optional adapters can be utilized to help handle the extruded blocks. Learn more about these options at www.polymax5000.com.

6 - Operation

WARNING!! Material fed into the Polymax Densifier and the Polyhog Grinder should be clean and dry **POLYSTYRENE FOAM ONLY**.

Pre-puff polystyrene or initially expanded beads must be allowed to age or air out, so that the pentane can dissipate. Failure to do this creates tremendous pressures that will plug, damage, and void warranty of the machine. The larger the EPS shape the longer the time it will take for all of the pentane to evaporate from the core. This can be days or weeks. Some additives to EPS can also cause adverse effects. Just for example, flame retardant (FR EPS) lowers the melting point of the EPS plastic and will cause liquefaction during the densification process. This will cause a chain reaction of events that will ultimately result in machine damage and downtime.

Moisture in the foam will not compress. As the moisture levels in the foam increase, the pressures needed to compress the foam exceed the capacity of the machine. When this happens, the machine will make a chattering noise and will eventually plug and/or become damaged.

The Polymax densification system is designed solely for use with expanded polystyrene. Any variation of this product is not recommended and the use of such will void the warranty of the machine. It is recommended that the manufacturer be contacted before any questionable material is fed into the machine.

Caution is to be taken around the area of the extrusion tubes. Exiting blocks can be projected from the end of the extrusion chamber. **DO NOT STAND IN THE PATH OF THE EXITING BLOCKS.**

CAUTION!! KEEP HANDS AND FINGERS CLEAR OF THE EXTRUSION TUBES AT ALL TIMES. The extrusion tubes open and close automatically during operation of the densifier.

6 - Operation

6.2 Control Panel

The Polymax control panel consists of: (See Figure 6)

A three-position switch for "AUTOMATIC", "MANUAL", and "RESET" modes.

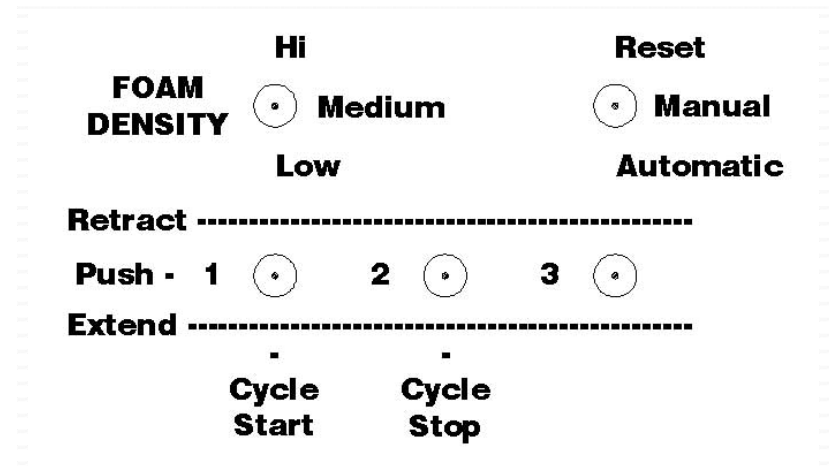
Three two-position momentary switches, for PUSH 1, PUSH 2, and, PUSH 3, which can be used to manually operate each of the three primary compression strokes when in manual mode. The center position for these switches is the normal position during "AUTOMATIC" and "RESET" mode operation.

A three-position switch for "HI", "MEDIUM", "LOW" density foam.

A 120 volt fuse for the control circuit power service in the control panel.

A Start/Stop switch which controls starting and stopping the densifier properly in Automatic Mode. (An indicator light used in conjunction with the stop switch)

A SYSTEM ACTIVE selector switch with indicator light.



POLYMAX SERIES EPS HANDLING SYSTEMS

Operator Manual Revision 1500.3



Installation, Operation, and Maintenance Instructions

MATRIX MANUFACTURING
THE ORIGINAL IN EPS DENSIFICATION SYSTEMS
www.PolyMax5000.com

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1- Safety



RECOGNIZE SAFETY INFORMATION

The symbols shown in this section are used to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.



FOLLOW SAFETY INSTRUCTIONS

Read carefully all safety messages in this manual and safety labels on your machine.

- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.

- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

DANGER WARNING CAUTION

A signal word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.

- DANGER and WARNING safety labels are located on your machine near specific hazards.
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety messages precede related instructions in this manual that may result in damage to equipment if not followed correctly.



NOISE CAN DAMAGE HEARING

CAUTION!

Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Matrix Manufacturing for replacement.

All operators involved with this equipment must be aware of the locations of the emergency stop buttons. The emergency stop on the Densifier will stop the densifier and the pre-breaker. The emergency stop on the pre-breaker will only stop the pre-breaker (not the densifier).

2 - Specifications

2.1 Densifier

2.1.1 Electrical

Input voltage requirement with grinder module:

460 Volts 3 phase 60hz

30 amp service

Input voltage requirement with out grinder module:

460 Volts 3 phase 60hz

15 amp service

Hydraulic motor:

5hp

Grinder module motor

3hp

*Other power requirements available upon request

2.1.2 Hydraulic

Hydraulic oil:

Weight = ISO 46

Type = Anti-wear, anti-foam

Gallons =18

Hydraulic pump:

13gpm Hi/Low gear pump

2.1.3 Size

Height = 7ft

Width = 5ft 8in

Length = 10ft 10in

Shipping Weight= 2000 lbs

2.1.4 Output

PolyMax 1500

Average output = 80 pounds per hour*

Block Density = 15-40 lbs/ft³ Adjustable

Block Size = 3 1/2" x 3 1/2" x Variable length

* Actual output varies with the condition and weight of EPS. Outputs are higher the finer the material is ground. Outputs are higher with heavier density EPS. The output ratings given are calculated with an input density of 0.7lbs/ft³ ground (1in diameter) EPS material.

NOTE: These specifications apply to stock equipment. Custom orders may reflect different specifications than what is shown in this manual. Matrix Manufacturing reserves the right to change any of the required specifications at any time without notice.

3 - Installation Caution!!

The PolyMax EPS Densification series equipment is manufactured to high standards to allow for continuous duty and long service life. In order to prevent unnecessary failures and repairs it is imperative that the installer follow the guidelines outlined in this manual. **The details and procedures for adjusting the equipment are important and must be followed so that the equipment will continue to run as designed.**

EPS extrusion type densifiers are extremely sensitive to different types of input material. Damage to vital components of the machine can occur if the proper personnel training are not performed. Becoming familiar with EPS and its variations is essential to proper operation of this equipment. (See section 6 of this manual.)

Please read all of the instructions for installation and operation of the PolyMax Series equipment before operation. Damages that occur due to improper machine installation and/or improper input material are not covered by the regular warranty. Taking extra time in the installation/operation process is worthwhile because it leads to reliable operation.

Your PolyMax 1500 densifier received a thorough inspection before shipment. At time of delivery, examine the Densifier, note any damage that occurred in transit and promptly notify your PolyMax sales representative of any such damage.

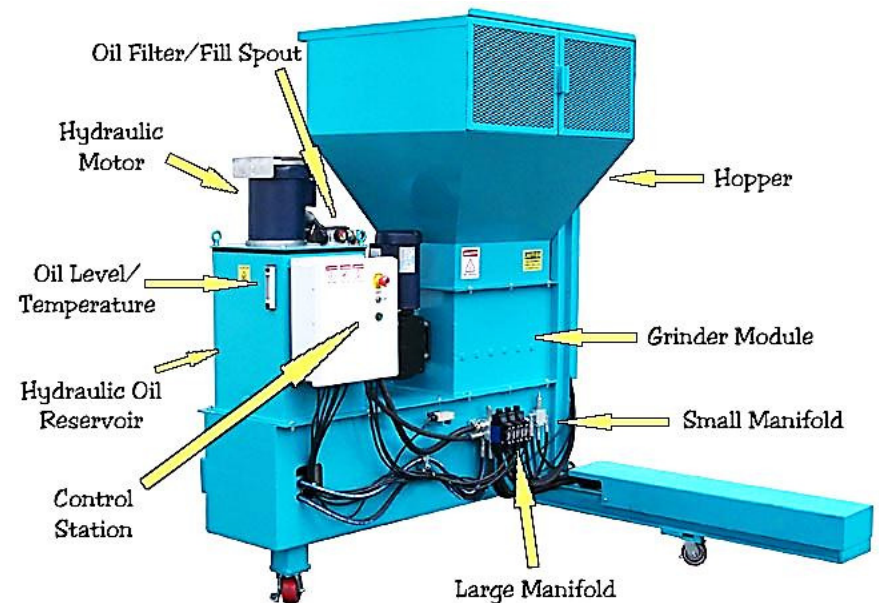
Your densifier has been prepared for the requested electrical service. Use only qualified personnel to connect the incoming power to the densifier supplying appropriate power disconnects as dictated by local and state codes.

Please note that the main electrical enclosure is equipped to be locked out. Please provide locks for this and any other electrical lockout locations and use them to protect against unauthorized use of or access to the densifier.

4 - Mechanical Installation

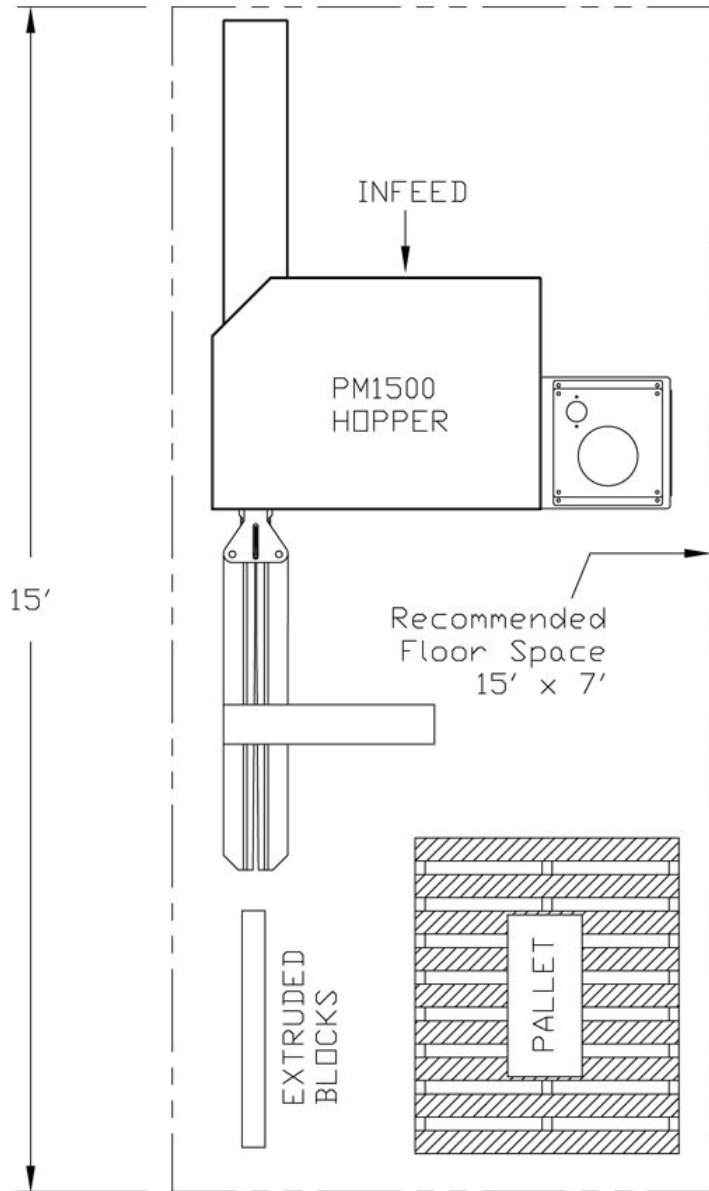
4.1 Terminology

FIGURE 1



4 - Mechanical Installation

4.2 Floor Plan



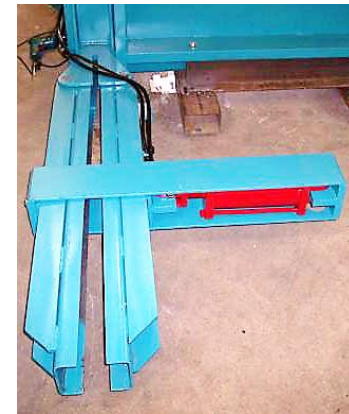
4 - Mechanical Installation

4.3 Installation

4.3.1 Assembly

The following is a list of assembly requirements and the order in which they should be performed:

1. A forklift with a minimum of 2000 pound capacity is needed.
2. Carefully place the Polymax 1500 in the desired location.
3. Remove the packaging from the Polymax.
4. Using some safe means, elevate the machine enough to bolt on the 3 caser wheels to the mounting plates.
5. If your machine is shipped with the extrusion tubes and clamping cylinder removed then reinstall these items at this point as depicted in the following picture.



6. Unbolt and remove the metal forklift pocket assembly from underneath the machine body.

Caution! Leaving the forklift pocket assembly attached to the machine creates a tripping hazard for the worker.

4 - Mechanical Installation

4.3.2 Hydraulics

1. See section 2 of this manual for specifications on the types and amounts of hydraulic oil to use.
2. Due to potential shipping hazards the hydraulic oil reservoir is shipped empty. The consumer must provide the necessary oil to fill the reservoir prior to starting the equipment.
3. Add enough oil to the hydraulic reservoir to fill the sight glass to about 1" from the top mark in the sight glass.



5 - Electrical Installation

5.1 Densifier and Grinder Module

All electrical power connections are made in the enclosure panel located on the side of the oil reservoir.

WARNING! ELECTRICAL SHOCK CAN KILL. ONLY QUALIFIED PROFESSIONALS SHOULD ATTEMPT TO HOOK UP POWER TO THIS MACHINE

1. Use a "Lock-Out / Tag-Out" procedure for this section of installation.
2. The Polymax 1500 densifier and grinder module comes wired from the factory with the customer specified voltage. The required input voltage, however, needs to be verified by the installer prior to hookup.
3. An opening for the incoming power is not provided due to the many different configurations possible. When drilling the hole for the incoming conduit, place a rag or piece of cardboard over the motor starter and PLC to deflect the metal shavings from the drilling process.
4. Incoming 3 phase power should be connected into the inlet side of the appropriate fuse holder (as marked by L1, L2, L3). A bonding lug is provided inside the control box for the grounding wire. (Even though the machines are tested at the factory it is always good practice and recommended that a check be made to ensure that the motor wiring matches the input voltage being used.)
5. **VERIFY THAT OIL IS IN THE HYDRAULIC TANK!** After wiring is complete, the hydraulic motor rotation must be checked. Motor rotation is clockwise when looking at the fan from the opposite end of the output shaft.
6. With the motor rotating in the correct manner the start button may now be depressed allowing the machine to turn on. The Polymax 1500 controls will automatically retract all 3 pushes (if not already) and then shut off.

6 - Operation

6.1 PolyMax: System Overview

The Polymax Densifiers are designed to increase the density of expanded and extruded *polystyrene foam* using no heat or chemicals. Densification occurs with a three-axis compression:

The FIRST compression stroke captures a volume of material and compresses it until the push reaches a set pressure. This pressure controls how much material will be in a single block. If this pressure is too high, too much material will be loaded and the machine will plug.

The SECOND push compresses the material into the extrusion tube opening. This push *MUST* fully extend every cycle. If the first push pressure is set too high, then too much material will be loaded for the second push to handle. This would prevent the second push from fully extending and cause the machine to go into unplug mode. If the unplug mode is activated frequently then adjustments should be made to the input feed rate into the hopper.

The THIRD push further compresses the material, and then forces the material out the extrusion tube. In the extrusion tube, the material is held under pressure from other material both from in front and from behind and by the clamp pressure from the sides.

The Polymax densifier is designed to run automatically, requiring only that material be fed into the machine.

The final densified product leaves the extrusion tube on its own, and can be fed onto a conveyer system, or manually picked up and placed in boxes or on pallets. For optimum loading, it is recommended that blocks be stacked. Any number of optional adapters can be utilized to help handle the extruded blocks. Learn more about these options at www.polymax5000.com.

WARNING!! Material fed into the Polymax Densifier and the Polyhog Grinder should be clean and dry POLYSTYRENE FOAM ONLY.

Pre-puff polystyrene or initially expanded beads must be allowed to age or air out, so that the pentane can dissipate. Failure to do this creates

6 - Operation

tremendous pressures that will plug, damage, and void warranty of the machine. The larger the EPS shape the longer the time it will take for all of the pentane to evaporate from the core. This can be days or weeks. Some additives to EPS can also cause adverse effects. For example, flame retardant (FR EPS) lowers the melting point of the EPS plastic and will cause liquefaction during the densification process. This will cause a chain reaction of events that will ultimately result in machine damage and downtime.

Moisture in the foam will not compress. As the moisture levels in the foam increase block compression can suffer and rust can build up in the compression chamber causing the machine to make a chattering noise and can eventually plug. If rust is detected, as seen by the light brown coloring on the blocks, proceed to use the machine as normal but observe the pressures on the pressure gauge that they do not exceed 2800psi for extended periods. It may be necessary to reduce the clamping pressure to facilitate block extrusion. If wet material is suspected, it is best to save the driest material for last so that it can push the wetter material out of the compression chambers and minimize rusting.

The Polymax densification system is designed solely for use with expanded polystyrene. Any variation of this product is not recommended and the use of such will void the warranty of the machine. It is recommended that the manufacturer be contacted before any questionable material is fed into the machine.

Caution is to be taken around the area of the extrusion tubes. Exiting blocks can be projected from the end of the extrusion chamber.
WARNING! DO NOT STAND IN THE PATH OF THE EXITING BLOCKS.

CAUTION!! KEEP HANDS AND FINGERS CLEAR OF THE EXTRUSION TUBES AT ALL TIMES. The extrusion tubes open and close automatically during operation of the densifier.

6 - Operation

6.2 Control Panel

The Polymax control panel consists of:

An “EMERGENCY STOP” push button. To stop the machine for any reason, one must hit the emergency stop button to kill power to the controls and the machine will shut off.

A key selector switch. The function of this switch is to enable or disable function of the machine. With the switch in the “OFF” position, the controls to the machine are deactivated, thus, pressing the start button will have no effect. With the switch in the “ON” position, normal operation of the machine can be performed. This allows the manager to have control over the operation of the unit.

A green start button. This button is used to begin the cycling process of the machine.

6.3 Initial Startup

Once the machine has been installed properly by following the installation sections of this manual, it is time to run an initial startup as outlined in the following:

1. Ensure that the mechanical *and* electrical installation has been performed in accordance to this manual.
2. Ensure that the Emergency Stop works properly.
3. Hydraulic reservoir is full with ISO 46 hydraulic oil.
4. The key selector switch is turned to the “ON” position.
5. System is free of foreign objects, including human body parts.
6. Hands are free from extrusion tube.
7. Material to be densified ready to be placed into the hopper.
8. Place a block of densified foam, or small 4x4 block of wood into the end of the extrusion tube, to prevent the tube from closing too far.
9. Pull the emergency stop button out so that the red indicator light is on.
10. Start the densifier by depressing the green start button. The densifier will begin to cycle automatically.

6 - Operation

11. Place a small amount of the selected EPS shapes into the hopper. As the machine cycles the grinder module will turn on and off automatically. The input material will be ground up and fall into the compression area of the machine.
12. Material will begin to build in the extrusion tubes. Keep adding material into the hopper.
13. It will take some time for the exiting material to clean up and exit smoothly.
14. Throw away the first block(s) that come out that are not fully densified. **NOTE:** *It is very important that partially densified blocks are not thrown back into the hopper. These blocks will cause the grinder/densifier to plug.*

6.4 Automatic Operation

6.4.1 Starting the Machine

Start the machine by pressing the green start button.

1. If the pushes are fully retracted then the machine will begin to cycle.
2. If any of the pushes are not fully retracted then the machine will first retract the pushes needed and then shut off. To begin automatic cycling of the machine push the green start button again and the machine will begin to cycle.
3. The programming is set to “sense” whether or not there is material being compressed. It is programmed to run 5 complete cycles (total) without any material being compressed at which time it will automatically shut off. In order to run the machine efficiently, enough material needs to be feed into the hopper to allow the machine to sense a load. This will allow it to cycle continually.
4. NOTE: Please see the “ADJUSTMENTS” section of this manual for information on proper clamping pressure.

6.4.2 Stopping the Machine

1. Given there is no emergency and it is desired to shut off the machine, proper procedure is to stop feeding material into the hopper and allow the machine to cycle until it shuts off by itself.
2. If more immediate shut off is needed either depress the emergency stop switch or turn the key selector to off. This is

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not recommended under normal circumstances or partially densified material will harden in the compression chamber until the next startup and can cause the machine to plug. It is always best to shut the machine off after a block has been pushed out.

WARNING!!

- **NEVER** run the machine without knowing where others are at around the machine.
- **NEVER** climb into the hopper without first locking out the incoming power to the machine.
- **NEVER** trust your coworkers when dealing with your own personal safety.
- **ALWAYS** follow normal safety practices.

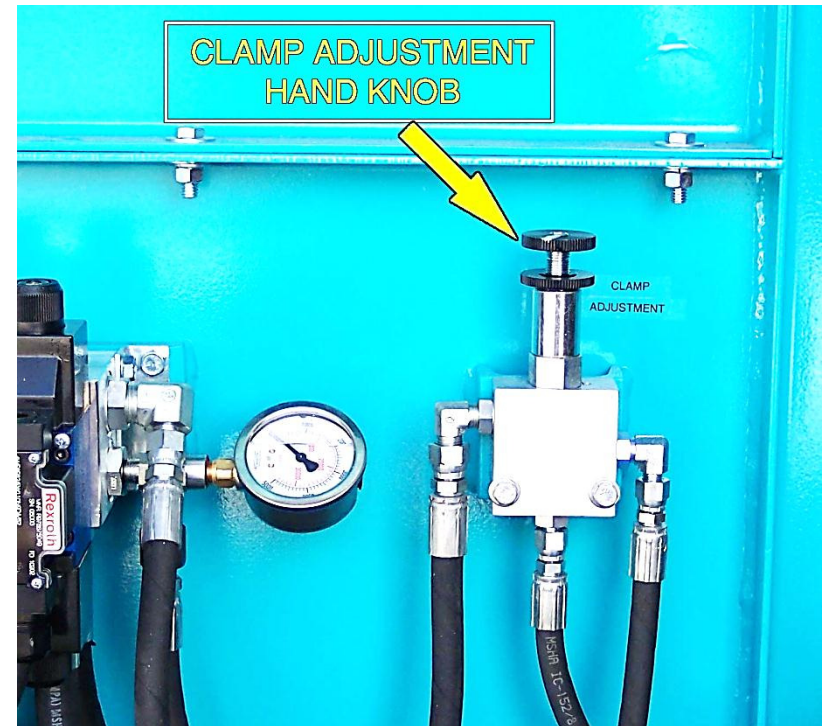
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6.5 Adjustments

Once set for the type of EPS used, few adjustments will be needed during normal operation of the Polymax.

6.5.1 Clamp Adjustments

Adjustments can be made to the extrusion clamp in order to vary the density of the exiting material by turning the hand knob as depicted in the below picture:



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Pressure to the clamp can be adjusted by using the following procedure:

1. Adjust the clamp pressure by loosening the lower jam-nut on clamp adjustment knob and turning upper adjustment screw clockwise to increase the clamp pressure, or counterclockwise to reduce the clamp pressure.

NOTE: Use only small adjustments (1/4 turn at a time) and allow the machine to cycle several times to allow stabilization of the new block density. A false impression can be given if adjusted too much and/or too quickly without allowing stabilization in between adjustments.

2. The appropriate pressure is determined by observing the amount of force required to push out a block. This is done by watching the pressure gauge *while the machine is pushing out a block*. The pressure should go up at a steady pace, peak out (just before the blocks begin to move outward), and then reduce slightly as the blocks in the extrusion tubes move outward. The ideal extrusion pressure is read at the peak moment of the extrusion stroke. ***This pressure should be between 1200psi and 1600psi.***

NOTE: Make only small adjustments (1/2 turn) and allow the Densifier to run 10 to 20 cycles to stabilize. If more adjustments are necessary (as indicated by the pressure required to push out a block), repeat the procedure. Being impatient and making too many adjustments too quickly will not give accurate feedback to the newly set pressure.

The density of the blocks should be measured around 20-25 lbs. per cubic foot. At this density, a semi trailer can be fully loaded with the blocks stacked on pallets. Higher densities should be avoided due to undue wear and stress on the machine and less efficient output.

Turning the clamp off:

1. Sometimes it may be desirable to deactivate the clamp cylinder so that it will not apply pressure to the extrusion tubes. This may be the case when setting up the machine, adjusting pressures, or running temperamental foam. Deactivating the

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clamp so that it remains in the retracted position is done by turning the clamp adjustment knob counterclockwise until it stops.

6.5.2 System Pressure

System pressure is the maximum oil pressure that the hydraulic pump is set to put out. This pressure should be set at a maximum of 2800psi. This is set using the relief valve on top of the large manifold.

6.6 Temperature

1. The hydraulic oil temperature should not be allowed to run at or over 150° F as read on the "Oil Level/Temperature gauge" (see picture below).
2. If the maximum oil temperature is reached, *shut the machine off* and allow the oil to cool down before restarting.
3. Hot ambient temperatures will reduce the overall running time of the PM1500 due to excessive heat buildup. Try to avoid direct sunlight on the oil reservoir on hot days.



7 – Maintenance and Parts

7.1 Regular Maintenance

7.1.1 Hydraulics

The hydraulic power unit will require the following maintenance:

1. Replace the hydraulic oil filter every 2000 hours or every two years.



Step 1 – Remove filter cap



Step 2 – Pull out filter and install new

7 – Maintenance and Parts

2. If the machine is placed outside in the weather the oil will absorb moisture and should be replaced every 2 years. If the machine is located indoors and protected from the elements oil replacement should be performed every 5 years.
3. If hydraulic cylinders are leaking, reseal kits are available.

7.1.2 Electric Motors

The electric motor coupled to the hydraulic pump requires no service.

The drive motor on the grinder module requires no service.

7.1.3 PolyMax Body

Each of the pushes with sliding surfaces is lined with low friction, high wear resistant nylon. If any of this becomes worn or broken it can be replaced.

7.1.4 Electrical System/Control Circuits

The main components of the system are limit switches, PLC controller, and solenoid valves.

The limit switches require no maintenance and should only be replaced if failure occurs.

Solenoid valves require no maintenance and can be repaired if they fail or stick.

7.1.5 Grinder

1. There are two large bearings that need to be greased every 200 hours. Use general purpose #2 grease.
2. All set screws used on the shafts and bearings should be checked regularly for tightness. They can loosen over time due to the vibration of the machine.
3. The gearbox that powers the grinder shaft uses 90W gear oil. This oil should be replaced every 200 hours of operation.

7 – Maintenance and Parts

WARNING!

- **ALWAYS** use a power lock out device when servicing either the Polymax densifier or the Polyhog grinder.
- **NEVER** run any machine without the guards in place.
- **ALWAYS** wear proper eye and ear protection when using this equipment

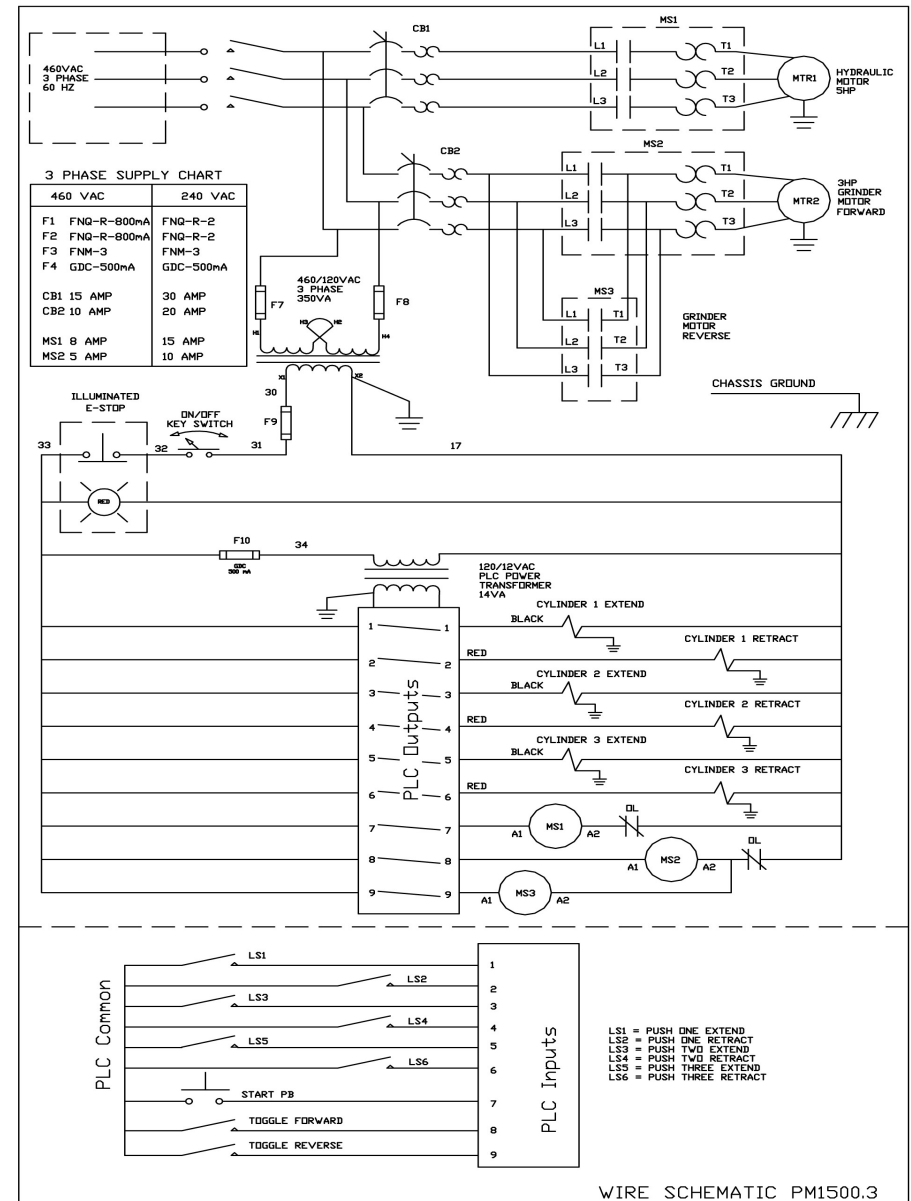
Matrix Manufacturing will not be held liable for any bodily injury or machine damage that occurs from failure to adhere to these instructions and safety guidelines as well as all other standard shop safety guidelines. Warranty is not valid when a part fails due to misuse or use of the wrong material.

7.2 Parts

Though a complete parts catalog is not available in this manual, all replacement parts can be ordered through Matrix Manufacturing. See www.polymax5000.com.

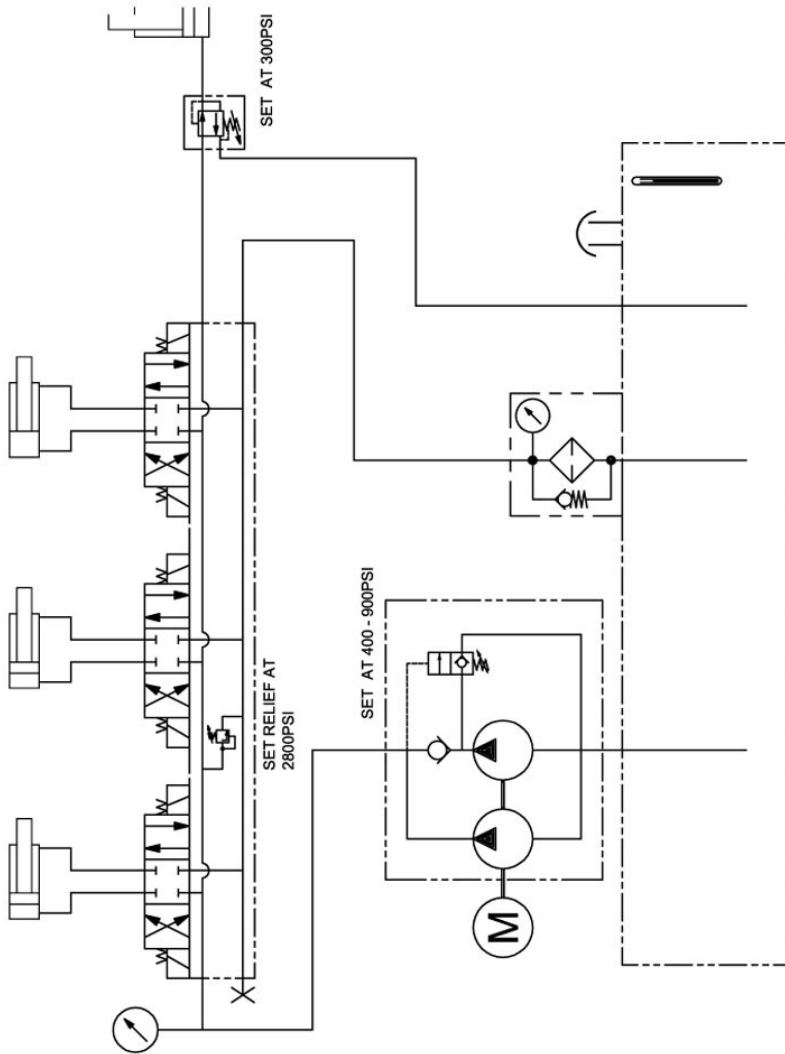
8 – Troubleshooting

8.1 Wiring Schematic



8 – Troubleshooting

8.2 Hydraulic Schematic



8 – Troubleshooting

8.3 Basic Troubleshooting

Problem	Cause	Solution
The red light on the E-Stop switch will not illuminate.	No power to the control box.	Check incoming power
	Light is burnt out.	Replace light module
	Fuse(s) on control transformer burnt out.	Replace blown fuse(s)
	Emergency Stop depressed	Release E-Stop.
Pre-Breaker will not turn on.	Motor starter tripped.	Check both blower and main drive motor starter overload heaters. Reset tripped heater.
	No 460V input power.	Check main supply
	Bad relay on PLC.	Check #9 output on PLC.
Hydraulic cylinder will not move.	No power to solenoid valve.	Replace PLC. Low voltage on incoming 120 Volt supply line.
	Failed Solenoid Valve.	Replace faulty parts.
	Densifier is plugged.	Run unplug sequence as outlined in the troubleshooting section of this manual.
In AUTOMATIC, 2 nd push extends then pauses before continuing to cycle.	Too much material is being compressed into the compression chamber.	Change FOAM DENSITY mode to higher setting.
	2 nd push is not contacting the lower limit switch.	Adjust limit switch to contact striker when push is in fully extended position.

8 – Troubleshooting

8.4 Plugged Machine

If “PUSH 3” becomes stuck and material cannot be pushed out of the machine into the extrusion tube, then the following procedure is recommended:

STEP 1

The Polymax is equipped with automatic unplug feature. This system becomes active if the cycle is not completed in a specified time period set by the manufacturer. The unplug feature operates in the following sequence:

1. Third push is stuck.
2. Second push retracts momentarily.
3. Third push retracts and extends.
4. During this time if the system becomes unplugged, the system will return to the normal automatic operating cycle.
5. If the system is unable to unplug itself it will automatically shut down.

STEP 2

1. With the machine stopped, activate the retract procedure by pressing the green start button.
2. Relieve the clamp pressure. Turn the adjustment screw on the small manifold counterclockwise until it stops.
3. Let the machine sit idle for 30 minutes to an hour. During this time the material has time to cool down and lose its shape, and will become easier to push from the machine.
4. Press the green start button to begin cycling of the machine. If this process proves successful, jump to the restart section.

STEP 3

1. Retract all pushes.
2. Disconnect power and install a power lockout device.
3. Remove all obstacles and material from the hopper. Using some safe means, remove the jammed material from the machine.

8 – Troubleshooting

4. With the system shut down, turn the clamp pressure off and pry open the extrusion tube.
5. Remove the densified material from the tube and compression chamber using some safe means.
6. After removing the foam from these areas repeat STEP 2.
7. Proceed to STEP 4: Restart Operation.

STEP 4: Restart Operation

1. Check input EPS material composition. Material may be “green” EPS with small amounts of residual pentane, modified EPS that has a low melting point or resists creep, or “FR” type EPS just to name a few.
2. After unplugging the machine, restore all systems to operating condition. Before adding material to the machine, allow it to run through several cycles to assure it is running properly. Assure that all hands and other body parts are free from the extrusion tube, and then reactivate the clamp pressure by turning the clamp pressure knob clockwise. After assuring that the system is operating properly, add material and resume normal operation.
3. Return to 6.3 Initial Start Up in this manual.

