

*User Guide*

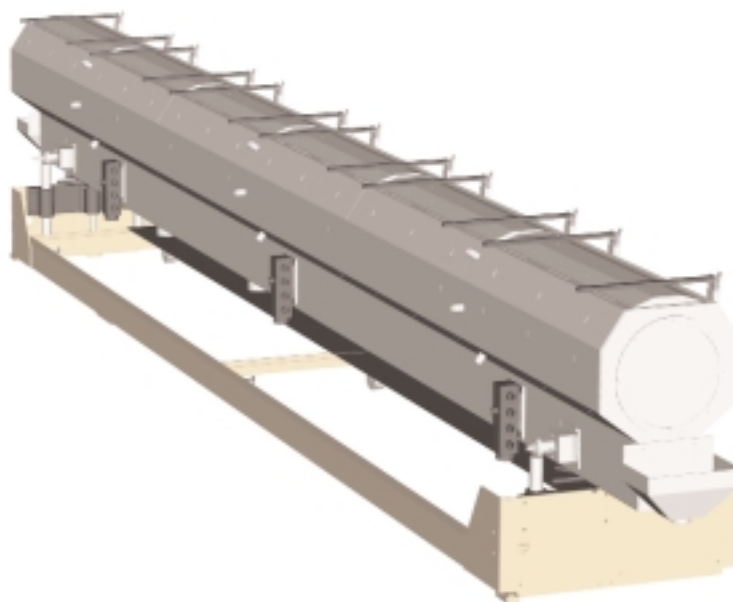
# MSBHI High Intensity Spray Tanks

*Installation*

*Operation*

*Maintenance*

*Troubleshooting*



*Instant Access  
Parts and Service  
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UGE053/1202

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*Please record your equipment's model and serial number(s) and the date you received it in the spaces provided.*

It's a good idea to record the model and serial number(s) of your equipment and the date you received it in the User Guide. Our service department uses this information, along with the manual number, to provide help for the specific equipment you installed.

Please keep this User Guide and all manuals, engineering prints and parts lists together for documentation of your equipment.

<b>Date:</b>	
<b>Manual Number:</b>	<b>UGE053/1202</b>
<b>Serial number(s):</b>	..... .....
<b>Model number(s):</b>	..... .....

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## PARTS/DIAGRAMS

This section has been provided for you to store spare parts lists and wiring, plumbing or assembly diagrams.

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# INTRODUCTION

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## PURPOSE OF THE USER GUIDE

This User Guide describes the Conair MSBHI High Intensity Spray Tanks. It explains step-by-step how to install, operate, maintain and repair this equipment.

Before installing this product, please take a few moments to read the User Guide and review the diagrams and safety information in the instruction packet. You also should review manuals covering associated equipment in your system. This review won't take long, and it could save you valuable installation and operating time later.

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## HOW THE GUIDE IS ORGANIZED

Symbols have been used to help organize the User Guide and call your attention to important information regarding safe installation and operation.



Symbols within triangles warn of conditions that could be hazardous to users or could damage equipment. Read and take precautions before proceeding.



Numbers within shaded squares indicate tasks or steps to be performed by the user.



A diamond indicates the equipment's response to an action performed by the user.



An open box marks items in a checklist.



A shaded circle marks items in a list.

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## YOUR RESPONSIBILITY AS A USER

You must be familiar with all safety procedures concerning installation, operation and maintenance of this equipment. Responsible safety procedures include:

- Thorough review of this User Guide, paying particular attention to hazard warnings, appendices and related diagrams.
- Thorough review of the equipment itself, with careful attention to voltage sources, intended use and warning labels.
- Thorough review of instruction manuals for associated equipment.
- Step-by-step adherence to instructions outlined in this User Guide.

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We design equipment with the user's safety in mind. You can avoid the potential hazards identified on this machine by following the procedures outlined below and elsewhere in the User Guide.

 **ATTENTION:  
READ THIS SO NO  
ONE GETS HURT**



**WARNING: Improper installation, operation or servicing may result in equipment damage or personal injury.**

This equipment should be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation and potential hazards of this type of machine.

All wiring, disconnects and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the the machine serial tag and data plate.

You should keep the area around the tank clean and free from pooling water. We recommend installing a grate or drain system beneath this equipment to prevent water from pooling around the tank.



**WARNING: Voltage hazard**

This equipment is powered by three-phase alternating current, as specified on the machine serial tag and data plate.

A properly sized conductive ground wire from the incoming power supply must be connected to the chassis ground terminal inside the electrical enclosure. Improper grounding can result in severe personal injury and erratic machine operation.

Always disconnect and lock out the incoming main power source before opening the electrical enclosure or performing non-standard operating procedures, such as routine maintenance. Only qualified personnel should perform troubleshooting procedures that require access to the electrical enclosure while power is on.

# HOW TO USE THE LOCKOUT DEVICE



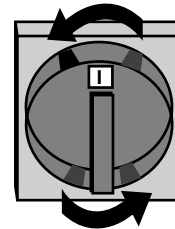
**⚠ CAUTION:** Before performing maintenance or repairs on this product, you should disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

Lockout is the preferred method of isolating machines or equipment from energy sources. Your Conair product may be equipped with the lockout device pictured below. To use the lockout device:

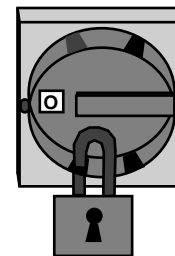
**1** Stop or turn off the equipment.

**2** Isolate the equipment from electrical power.

Turn the rotary disconnect switch to Off, or **O** position.



**3** Secure the device with an assigned lock or tag.



**4** The equipment is now locked out.

**⚠ WARNING:** Before removing lockout devices and returning switches to the ON position, make sure that all personnel are clear of the machine, tools have been removed and all safety guards reinstalled.



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## DESCRIPTION

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## WHAT IS THE MSBHI SERIES HIGH INTENSITY SPRAY AND SIZING TANK?

The MSBHI High Intensity Spray Tank optimizes cooling of plastic profiles, and pipe through the use of high intensity spraying systems. What separates it from conventional tanks is the integral water reservoir built into the bottom of the octagon shaped tank. The octagon shaped tank enhances the location of spray nozzles for complete coverage of the extrudate. With this system, evaporative cooling enhances the cooling rates. With the spray nozzles located on all sides of the extrudate complete coverage is provided. Water pumps have been designed for the proper gallons per minute and pressure to match extrudate throughput rates. With water pressure at the spray nozzles of 30-45 PSI, the droplet size is optimized thus allowing optimum flash off to steam and thus optimum heat transfer rates.

MSBHI tanks, when purchased with the optional vacuum system, use an air/water separation process, which provides extremely stable vacuum over wide vacuum ranges, improves product tolerances, minimizes scrap, allows for repeatability and improves surface finishes.

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## TYPICAL APPLICATIONS

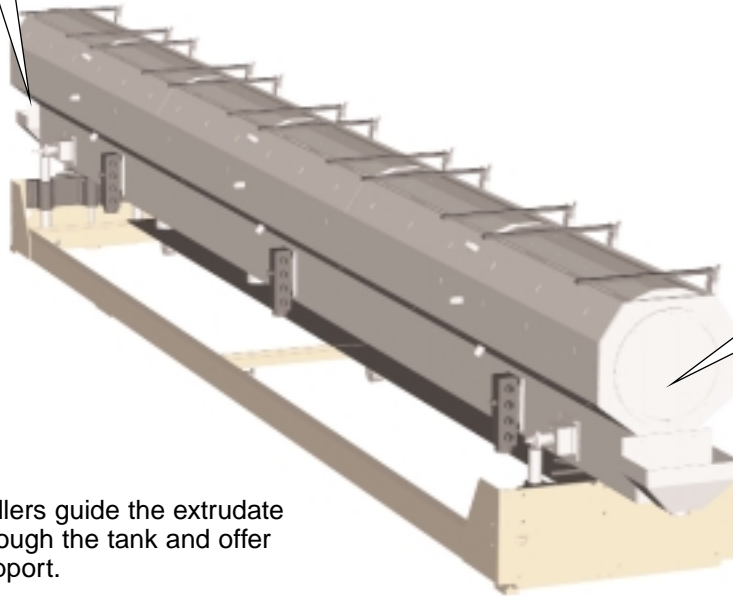
The MSBHI High Intensity Spray Tanks are available in 4 configurations, as well as right-to-left or left-to-right orientation, to meet your application needs. These tanks can be used successfully to cool or optionally, size or calibrate and cool any extruded product in applications that require:

- 0-12 inch tube or profile capacity (this is a diameter dimension)
- 16 and 24 foot tank lengths
- Longitudinal load of up to 1500 lbs (680 kg) to withstand the pull of extrudate through a calibration tool
- MSBHI tanks are designed for use with regular shop water. While you may elect to treat the water to prevent algae build-up, do not use de-ionized water, brine or other corrosive water mixtures unless your tank is special ordered for such mixtures.

Right-to-left (R-L) and left-to-right (L-R) tanks essentially mirror each other's design, and function the same way, except that the downstream process is to the left of the operator on an R-L unit and to the right of an operator on an L-R unit. The process descriptions and illustrations in this document assume that you are using an R-L unit.

## HOW IT WORKS: PRODUCT FLOW

**4** An overflow tray catches runoff at the exit of the tank. The runoff water is either plumbed to the lower reservoir if a vacuum pump option is purchased or back to a central drain.



**1** Extruded plastic enters the tank into the first chamber. An overflow tray catches runoff.

**3** Rollers guide the extrudate through the tank and offer support.

**2** The extrudate moves through the optional vacuum calibration tool. Water enters the chamber through the spray bars and the optional vacuum pump exerts vacuum over the chamber.

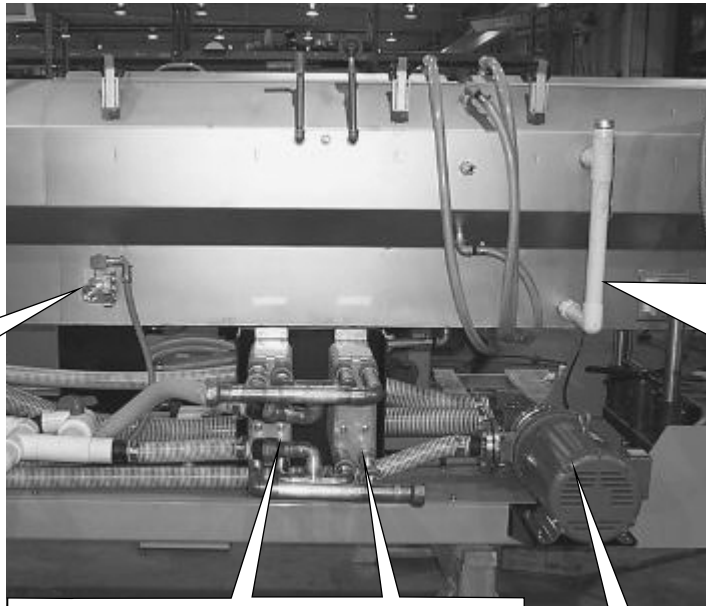
# HOW IT WORKS: WATER SYSTEM

(INCLUDES OPTIONAL FEATURES)

The MSBHI tank is one component in your tubing/profile production line.

**2** An electronic level sensor operates a solenoid valve to automatically control the reservoir level. Note: On initial start up, allow the reservoir to completely fill prior to turning on the water circulation pump. At that time only open up the ball valves to the spray bars 1/4 open for the first 3-5 minutes to give the system time to make up the water into the reservoir through the solenoid valve. The plumbing system; hoses, filters, heat exchanges will use approximately 20-30 gallons initially to prime.

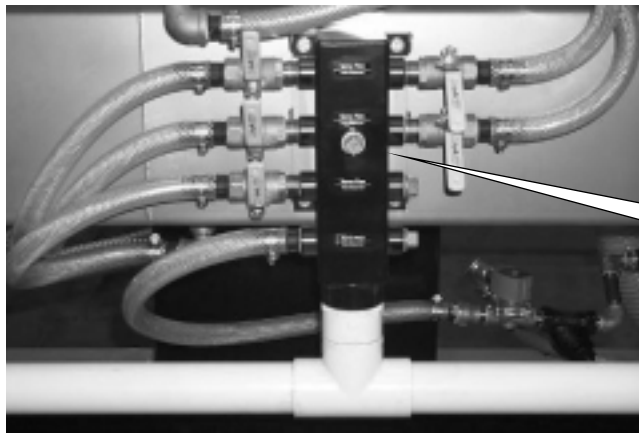
**1** Customer's water enters the integral reservoir.



**4** Water passes through the (optional) heat exchangers, which removes heat (BTU's) carried into the system by the extrudate.

**3** The (optional) water pump removes water from the reservoir and sends it to the filter and then heat exchanger. A bypass valve controls a percentage of the water around the heat exchanger, based on the system purchased, to minimize pressure drop through the heat exchangers.

**5** Water flows into the manifold and through spray bars. 3/4 inch ball valves control water flow into the spray bars individually for total control of the cooling process.

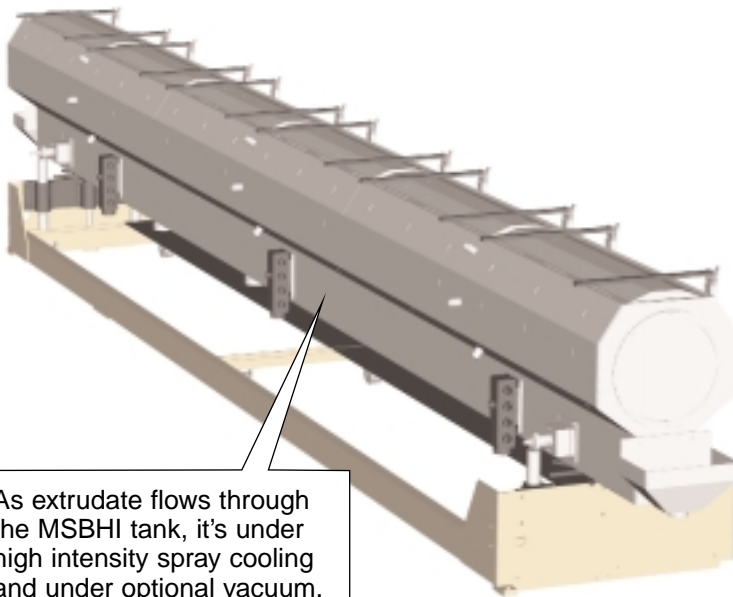


The optional vacuum pump is directly connected to the cooling tank. The reservoir is built into the tank, which is water level controlled, therefore the only water which passes through the pump is the water required to create the seal in the pump. Typically 2-3 gallons per minute. With this system, the vacuum pump operates optimally with consistent CFM's over the entire operating range.

## HOW IT WORKS: VACUUM (OPTIONAL)

- 2** The vacuum causes a pressure differential to perform sizing. The air inside the product expands to equalize the pressure created by the vacuum, pushing the product out against the calibration tool.

**NOTE:** Optional vacuum unit shown in the photo below would be located on the back side of the tank nearest the entrance of the extrudate. The illustration to the left does not show the vacuum system.

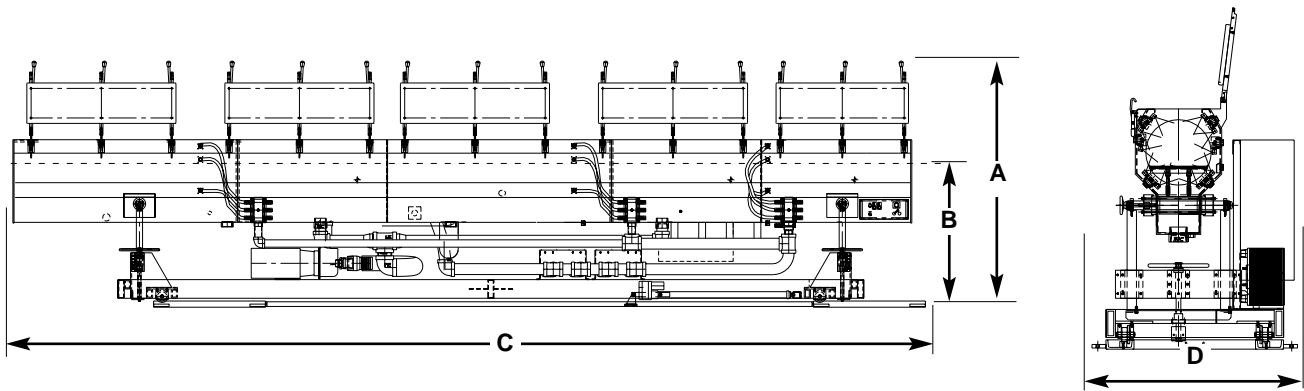


- 1** As extrudate flows through the MSBHI tank, it's under high intensity spray cooling and under optional vacuum.



- 3** Through a process called air/water separation, the MSBHI tank provides the most stable vacuum possible. The vacuum pump exhausts only air, not water. This minimizes surging in vacuum levels.

# SPECIFICATIONS: MSBHI SERIES WATER SPRAY TANKS



MODEL	MSBHI			
TANK STYLE	16-9	24-9	16-12	24-12
<b>Performance characteristics</b>				
Tube/profile capacity inches {mm}	up to 9 in. {229 mm}		up to 12 in. {305 mm}	
Number of compartments	1	1	1	1
Length of compartments feet {cm}	16 {488}	24 {731}	16 {488}	24 {731}
Tank movement inches {mm}				
Width	± 1.5 {45.7}	± 1.5 {45.7}	± 1.5 {45.7}	± 1.5 {45.7}
Height	± 2.5 {76.2}	± 2.5 {76.2}	± 2.5 {76.2}	± 2.5 {76.2}
<b>Dimensions</b>				
Overall length (with air wipe) ft {cm}	17 {518}	25 {762}	17 {518}	25 {762}
A - Overall height in {mm}	60 {1524}	60 {1524}	60 {1524}	84 {1524}
B - Height to centerline* in {mm}	39 {991}	39 {991}	39 {991}	39 {991}
C - Tank length ft {cm}	16 {488}	24 {731}	16 {488}	24 {731}
D - Overall width in {mm}	53 {1346}	53 {1346}	53 {1346}	53 {1346}
Tank compartment width in {mm}	12 {305}	12 {305}	12 {305}	12 {305}
Tank compartment height in {mm}	8 {203}	8 {203}	8 {203}	8 {203}
Bulk head diameter in {mm}	12 {305}	16 {406}	12 {305}	16 {406}
<b>Weight lb {kg}</b>				
Shipping	3800 {1724}	4600 {2087}	4000 {1814}	4800 {2177}
<b>Electrical requirement</b> Full load amps <sup>†</sup>				
230V/3 phase/60 Hz			14.2	
460V/3 phase/60 Hz			7.1	
<b>Water requirement ‡</b>				
	100 gpm {379 liters/min} (if purchased without pumps) main supply line 1inch NPT fitting			
<b>SPECIFICATION NOTES:</b>				
* Centerline height is adjustable - 2 or + 3 inches.				
† Amp draws will increase with the addition of an optional pump(s).				
‡ With the optional recirculation system, models 16-9 and 16-12 can pump up to 180 gpm and models 24-9 and 24-12 can pump up to 340 gpm. One main supply line with a 1 inch NPT fitting would be required for all models.				
This table defines standard configurations only. Specifications can change without notice. Contact a Conair representative for the most current information.				

## OPTIONS



Increase cooling rates with a process pump and heat exchanger:  
5 Hp pump (100 gpm);  
7.5 Hp (180 gpm); and  
15 Hp (340 gpm).



Process filter system for a 5 Hp, 7.5 Hp or 15 Hp pump.



Motorized forward and reverse tank movement.



Roller system for composite products.



Vacuum system for pipe and hollow profiles.

## APPLICATION NOTES:

The base unit is supplied without pumps. Using plant supplied water nearly 100 gpm can be pushed through the tank. The tank is drained by gravity.

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Liquid Ring Vacuum Pump

Water circulation systems

Additional turbo filter with 3-way valve and two check valves enabling in-line switching of filters for cleaning.

Built in rail system with electronic actuator

AC inverter and selector switch when added to the built in rail system option allows slow and fast speed via selector switch

Left to right extrusion direction.

Thermometer for upper tank or reservoir.

Bolt on air wipe changer (includes lock-line nozzles).

Special roller rack system for solid profiles.

UHMW pipe supports

SS clevis and shaft for conventional type rollers

Single vacuum system

## **AVAILABLE OPTIONS**

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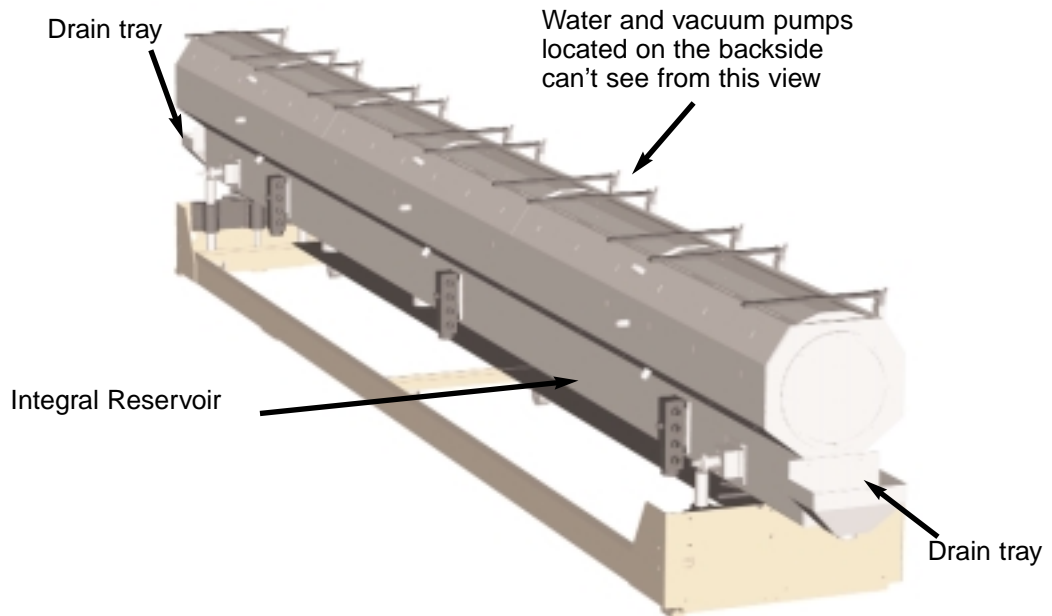
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# INSTALLATION

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- *Connecting a chiller . . . . .3-8*
- *Testing the installation (with optional water circulation system) . . . .3-9*

# UNPACKING THE BOXES

The MSBHI Series tank comes fully assembled in a single crate.



**CAUTION:** Exercise caution when moving the MSBHI tank. The tank may be lifted with a fork-lift or hoist and straps that have been positioned at the tank's center of gravity.

- 1 Carefully uncrate the MSBHI tank** and its components.
- 2 Remove all packing material**, protective paper, tape, and plastic. Compare contents to the shipping papers to ensure that you have all the parts.
- 3 Carefully inspect all components** to make sure no damage occurred during shipping.
- 4 Take a moment to record serial numbers** and specifications in the blanks provided on the back of the User Guide's title page. The information will be helpful if you ever need service or parts. The User Guide is inside the tank.
- 5 You are now ready to begin installation.** Complete the preparation steps on the next page.

## **Installation Hardware:**

- one plumb bob or laser bore sight
- one hex key wrench
- one flathead screwdriver
- flexible hose with 1 inch NPT coupling

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You will install the MSBHI tank on the extrusion line, downstream of the extruder.

**1** Make sure the installation area provides:

- A source of water.** City, tower or chilled water may be used.
- A grounded 3-phase power source supplying the correct current and voltage for your MSBHI tank.** Check the serial tag for the correct amps and voltage.
- Minimum clearance for safe operation and maintenance.** Determine the requirements for minimum clearance above and on both sides of the tank based on the extruder space requirements, which will exceed that of the tank.
  
- Floor drains as required.**

**2** **Determine the correct position for the MSBHI tank on the extrusion line.** The distance, or air gap, between the face of the die and the upstream end of the tank may be up to 12 inches, depending on the process. Allow at least 6 inches between the downstream end of the v-rails, if included with your unit. The vacuum tank is then rolled down the rail far enough for this operation and the upstream end of the puller. There may be an additional cooling tank or tanks or an optional laser gauge/diameter gauge between the downstream end of the tank and the puller.

**3** **Install v-rails.** If your unit comes with groove casters, follow the instructions on the next page to install the rails.

## PREPARING FOR INSTALLATION

**NOTE:** We recommend a grate or drain system below or near the tank for maintenance.

# INSTALLING CASTER RAILS

(OPTIONAL FEATURE)

## Installation Hardware:

- one plumb bob or laser bore sight
- drilling or lagging equipment
- bolts

**Tip:** The upper tank slides side to side +/- 1.5 inches on its frame. Extend the tank upstream as far from the frame as it can go, then move the frame so that the tank almost touches the face of the die. Position the frame here. Once it's locked down, you can move the tank as far as 12 inches away from the die face or have it right up against it.

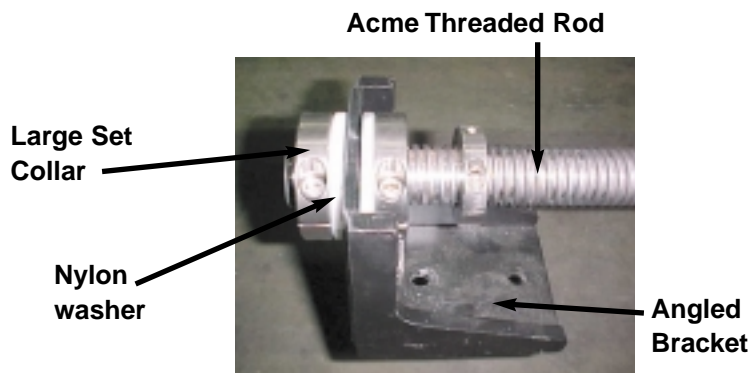
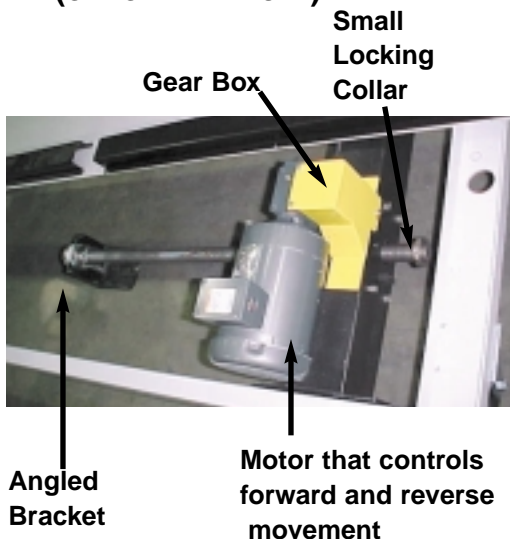
- 1 Determine where to position the rail system.**  
You will want to position the rail system so that the tank and any additional cooling tanks align correctly between the extruder and the puller. And so that the upstream end of the tank is the correct distance from the die face of the extruder. Use a plumb bob or a laser to align the tank with other components on the extrusion line.
- 2 Bolt the rails to the floor.**  
**IMPORTANT:** The rail system is 5 inches off center (toward the operator side) from the center line of the tank.

# ANCHORING THE MOTORIZED FORWARD AND REVERSE MOVEMENT BRACKET

(OPTIONAL FEATURE)

If your unit has the motorized forward and reverse movement option after the rails are attached to the floor you will need to follow these steps.

- 1 Move the tank as close as you require it to be to the die face.**
- 2 Locate the angled bracket for bolting the loose end of the acme threaded rod to the floor.**
- 3 Loosen the large set collar on the Acme threaded rod and remove one set collar and one nylon washer.**
- 4 Place the angled bracket on the acme threaded rod.**



continued on the next page.

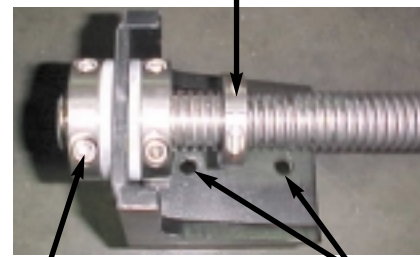
**5** Reinstall the nylon washer and set collar and tighten the socket head cap screws of the locking collar.

**6** With the angle bracket on the Acme threaded rod make marks on the floor through the bolt holes in the angle bracket. Be sure the angle bracket is all the way at the far end of the acme threaded rod farthest away from the gear box end.

**7** Bolt the angled bracket to the floor. (two bolts)

**8** Align the two smaller locking collars on both sides of the threaded rod with the two proximity sensors to stop the forward and reverse motion. Do not use the motor until you have manually aligned the locking collars with the proximity sensors. Failure to align the locking collars with the proximity switches could result in injury or damage to the die face.

Small Locking Collar  
(second small collar located at the other end of the Acme threaded rod.)



Socket head cap screws

Bolt Holes



**CAUTION:** Do not use the motor until you have manually aligned the locking collars with the proximity sensors. Failure to align the locking collars with the proximity switches could result in injury or damage to the die face.



**CAUTION:** To avoid personal injury or damage to the tank, you should lift and move the tank with a forklift or hoist and straps positioned at the tank's center of gravity.

## SETTING UP AND ALIGNING THE MSBHI TANK

**1** Position the tank downstream of the extruder. If the tank has groove casters, set the casters on the rails.

**2** Mount the entrance plate of optional vacuum calibration tool to the bolt pattern inside the first chamber.

**3** Adjust the side-to-side position of the MSBHI tank. Use a plumb bob or laser and turn the hand wheel to align the unit with other components in the extrusion line.

**4** Adjust the height of the MSBHI tank to match the extruder's centerline height. Use a level and turn the hand wheels to adjust height at both ends of the tank.

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# CONNECTING THE MAIN POWER



**CAUTION:** Before performing maintenance or repairs on this product, you should disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.



**WARNING:** Improper installation could result in equipment damage and severe personal injury from electrical shock .


Electrical connections should be made only by qualified personnel. Make sure there is a well-grounded circuit. A poorly grounded circuit or floating ground can cause premature failure of internal electrical devices, and may lead to personal harm (electrical shocks).

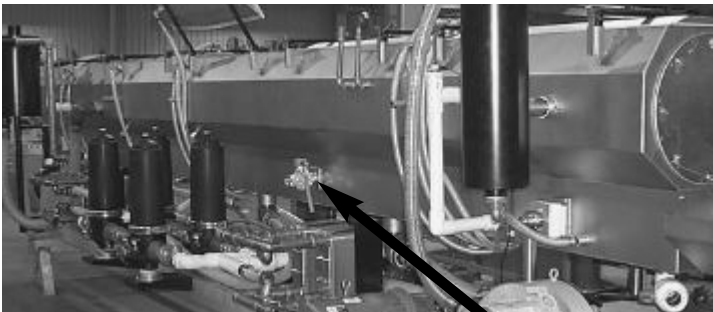
**IMPORTANT:** Always refer to the wiring diagrams that came with your MSBHI tank before making electrical connections. The diagrams show the minimum size main power cable required for your tank, and the most accurate electrical component information. Have a qualified electrician check the tank's data plate that gives voltage and amperage and make sure it matches your circuitry.

- 1 Disconnect and lock out the incoming main power source** before making electrical connections.
- 2 Open the MSBHI tank's electrical enclosure.** Turn the disconnect dial to the Off position, turn the captive screw and swing the door open.
- 3 Insert the main power wire** through the knockout in the side of the enclosure. Secure the wire with a rubber compression fitting or strain relief.
- 4 Connect the power and ground wires** to the three terminals at the top of the disconnect holder, indicated on the wiring diagram that came with your machine.
- 5 Check every terminal screw** to make sure wires are secure. Gently tug each wire. If a wire is loose, use a screwdriver to tighten the screws.

The MSBHI tanks are designed for use with city, tower or chilled water supplies. You may choose to treat the water to prevent algae build-up.

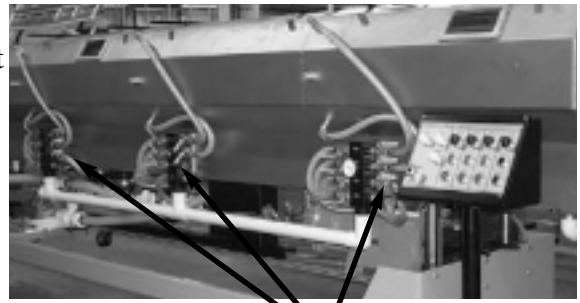
## CONNECTING THE WATER SUPPLY

 **WARNING:** Do not use deionized water, brine or other corrosive water mixtures for the main water supply unless your tank has been specially designed for such mixtures. Consult a water treatment specialist for the best way to prevent algae build-up without damaging the equipment.



Water supply inlet

- 1 Connect the main water supply** to the 1.5-inch NPT fitting on the side of the upper tank. A solenoid valve is located at this point which is automatically controlled by an electronic level sensor. Note: This is only applicable if the unit you have was purchased with the optional water circulation system. **If you do not have the optional water circulation system**, connect your shop water directly to the water manifolds on the front of the tank.



Water manifolds

- 2 Connect hose and NPT fittings to the main 3-inch drain/overflow line.**
- 3 Prime the reservoir system.** Turn on the shop water supply to fill the reservoir system. Note: Only if water circulation option is purchased.
- 4 Open water valves to the upper tank one quarter of the way**, turn the water pump on.
- 5 Run for 2-3 minutes** to be sure the reservoir has made up the water used to fill the hoses, filters, and heat exchangers initially. And then, open the ball valves to the position required for your application. Note: Once this initial priming is complete, you may start the system with the valves fully open.

---

## CONNECTING A CHILLER

You can connect a chiller to the tank's heat exchanger to remove heat from the extrudate more efficiently. Typically, the vacuum sizing tank comes with the 3/4 inch tube ends of the heat exchanger plumbed to the tank's water manifold and pump. The 1½ inch inlet and outlet of the heat exchanger can be used for the chiller.

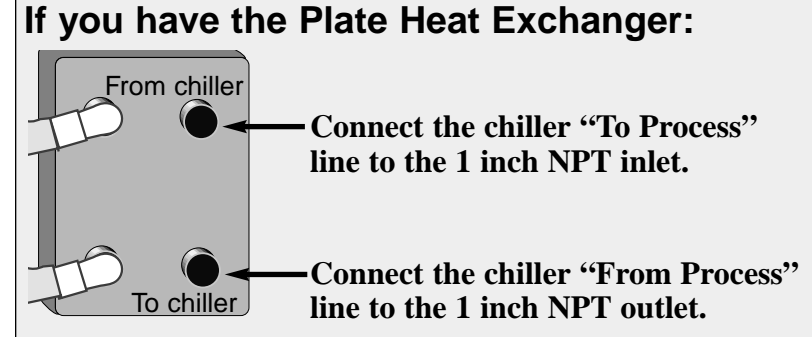
### **For maximum cooling efficiency:**

Connect the chiller "To Process" and "From Process" lines to the 1½ inch NPT fittings of the heat exchanger.

### **For maximum water flow:**

Connect the chiller "To Process" and "From Process" lines to the 3/4 inch NPT tube ends of the heat exchanger.

**TIP:** If you have a water supply with high mineral content, connect the chiller to the 3/4 inch tube ends of the heat exchanger.



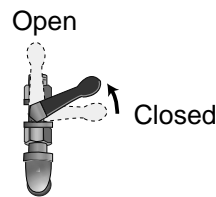


# TESTING THE INSTALLATION

(NOTE: WITH OPTIONAL WATER CIRCULATION SYSTEM)

- 1 Turn water supply on and fill the reservoirs.** Make sure the water level in the reservoir is above the pump input before proceeding.
- 2 Check the pump(s) for proper rotation.** Compare the pump rotation to the arrow stamped on the pump housing. If the pump's rotation is incorrect, swap any two of the three power source wires on the main power disconnect in the electrical enclosure to correct rotation for all pumps. Let the water pump run for two minutes to bleed air from the system.

- 3 Open water valves to the upper tank one quarter of the way, turn the water pump on.**



- 4 Run for 2-3 minutes** to be sure the reservoir has made up the water used to fill the hoses, filters, and heat exchangers initially. Then, open the ball valves to the position required for your application. Note: Once this initial priming is complete, you may start the system with the valves fully open.

- 5 Close the lids and press the push button to start the vacuum pump.** Note: Only if the optional vacuum system is purchased.

- 6 Close the ball valves** on the upper tank of each vacuum chamber. Note: A pressure relief valve is also provided on each chamber which is preset to 22 inches of mercury vacuum level. Measure the vacuum at its highest level. This is the maximum vacuum the system can attain. Note: Only if the optional vacuum system is purchased.

- 7 Open vacuum adjustment valves.** If your model has manual controls, open the fine and medium adjustment valves on each chamber.

- 8 Press the VAC start button to start the vacuum pump.** You will hear the vacuum pump come on and will notice the lid pulling down as the vacuum is increased.




**WARNING: Voltage**  
Always disconnect and lock out the main power sources before making electrical adjustments. Electrical adjustments should be made only by qualified personnel.


**TIP:** To get a better seal, especially with the optional vacuum system, wet your finger and wet the surface of the tank before closing the lid.

Steps continued on page 3-10

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# TESTING THE INSTALLATION (NOTE: WITH OPTIONAL WATER CIRCULATION SYSTEM)

 **WARNING:** If a pump rotates in the wrong direction for more than a very short time, damage will occur.

 **WARNING: Voltage**  
Always disconnect and lock out the main power sources before making electrical adjustments. Electrical adjustments should be made only by qualified personnel.

**NOTE:** An electrical interlock prevents the vacuum pump from starting unless the water pump is running.

**9 Slowly close vacuum adjustment valves.**  
If your model has manual controls, close the coarse, fine and medium adjustment valves on each chamber.

◆ If there are no leaks in the system, the vacuum will go to the maximum level of 14.7 inches of mercury or 200 inches of water.

**IMPORTANT:** Do not open or close the 1½-inch coarse adjustment valve. This valve was adjusted at the factory to provide optimum vacuum pump performance.

**10 Familiarize yourself with adjustment levels.**  
Slowly open and close the adjustment valves to familiarize yourself with the level of adjustment gained through the use of each valve. Adjust the upper valves up and down to familiarize yourself with that level of adjustment.

**11 The test is over.** If the vacuum sizing tank performed as indicated in the test, you can go to the OPERATION section. If the tank did not perform as indicated, see the TROUBLESHOOTING section of this manual.

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# OPERATION

- *Operation with optional vacuum system . . . . .4-2*
- *Operation with optional water circulation system . . . . .4-4*
- *Starting the MSBHI tank . . . . .4-5*
- *Stopping the MSBHI tank . . . . .4-6*

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# OPERATION

(NOTE: WITH OPTIONAL VACUUM SYSTEM)

**⚠ CAUTION:** Always disconnect and lock out the main power sources before making electrical adjustments. Electrical adjustments should be made only by qualified personnel.

**TIP:** To get a better seal, especially with the optional vacuum system, wet your finger and wet the surface of the tank before closing the lid.

- 1 Rotate the 3-way valve below the tank to by-pass water for start-up.** Note: With the valve in by-pass position, all the individual ball valves to the spray bars may be temporarily shut off without dead-heading the water pump. In order for the system to return the water from the lower vacuum reservoir depends on the water pump operating in a normally non-dead-head condition. Additionally, with the 3-way valve in by-pass position, the water is passing through the filter and heat exchanger, which will bring it to the desired temperature.
- 2 Open all the lids enabling access to the inside of the tank.**
- 3 Adjust the tank height.** Note: Use a tape measure to compare the center height of the extruder die to the tank. You will need to further adjust once the product is running through the tank and tooling.
- 4 Adjust the side-to-side.** Note: Move the tank up to the die. While looking down from above the tank, adjust the tank side-to-side. You will need to further adjust once the product is running through the tank.
- 5 Move the tank away from the extruder die to give room for the string-up procedure.** Typically, 1-3 feet between extruder die and tank entrance is best.
- 6 Turn off all the individual spray bar ball valves.**
- 7 Turn on the water pump by depressing the water pump ON button.** Note: Looking down into the tank, you should see water being directed down the tank through a 90 degree fitting (2 inches @ approximately 100 gallons per minute).
- 8 Pass the extrudate through the tank (calibration tooling, templates, rollers) and start through the puller.** Note: Be sure the extrudate is properly positioned on all rollers or supports.
- 9 Close all the tank lids and secure lid latches if your unit was purchased with latches.** Note: Wet lid gaskets or top sealing surface of tank prior to closing lids to enhance sealing.

---

## OPERATION

(NOTE: WITH OPTIONAL VACUUM SYSTEM)

- 10** **Open the water valves to the upper tank spray bars to provide cooling to the extrudate.** Note: It may be necessary to vary the valve positions around the extrudate to optimize cooling, especially with profiles with different wall thickness.
- 11** **Open the ball valves on the upper tank for vacuum bleed.** Note: A separate 2-inch ball valve may be provided below the tank for coarse vacuum bleed when a vacuum manifold is provided. It is always recommended to open all vacuum valves prior to turning on the vacuum pump. If this is not done, the vacuum system will attain full level within 1 minute.
- 12** **Push the Start Vacuum Pump button to start the pump.** Note: The provided vacuum gauges should register very little vacuum, if any, because the bleed valves are open.
- 13** **Adjust the vacuum levels with the ball valves to obtain the desired outside diameter and roundness with pipe or size and finish with profiles.**  
Note: Increasing the vacuum level typically increases diameter on tubular products. Increasing vacuum can also enhance roundness and surface finish. Too much vacuum can however, lead to chatter marks and surface imperfections.
- 14** **Follow these steps when shutting down the tank:**
  - A. Turn off vacuum pump.** Note: You may open the vacuum bleed ball valves first, depending on the process.
  - B. Cut off extrudate at die face.** Note: In some cases, it may be desirable to leave the part inside the tank to help string up the line on start up. If this is the case, simply turn off the puller while stopping the extruder.
  - C. Turn off water pump.**
  - D. After extrudate has exited the tank, shut off the puller.**
  - E. Open tank lids.**

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# OPERATION: (NOTE: WITH OPTIONAL WATER CIRCULATION SYSTEM)



## **WARNING: Voltage**

Always disconnect and lock out the main power sources before making electrical adjustments. Electrical adjustments should be made only by qualified personnel.

- 1 Turn on rotary disconnect.**
- 2 Auto-fill valve will open, allowing the reservoir to fill.** Note: Auto-fill light will go out when filled.
- 3 Open water ball valves one quarter of the way.** Note: This is to prevent a “Dead Head” condition to the water pump.

**4 Thread extrudate through tank.**

**5 Close lids.** Secure lids latches if your unit was purchased with latches..

**TIP:** To get a better seal, especially with the optional vacuum system, wet your finger and wet the surface of the tank before closing the lid.

**6 Run for 2-3 minutes** to be sure the reservoir has made up the water used to fill the hoses, filters, and heat exchangers initially. And then, open the ball valves to the position required for your application. Note: Once this initial priming is complete, you may start the system with the valves fully open.

**7 Familiarize yourself with adjustment levels of the individual spray bar ball valves.** Slowly open and close the adjustment valves to familiarize yourself with the level of adjustment gained through the use of each valve.

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# MAINTENANCE

- ***Preventative maintenance  
schedule . . . . .5-2***
- ***Inspecting gaskets . . . . .5-4***
- ***Replacing gaskets . . . . .5-4***
- ***Cleaning the turbo disc filter . . .5-5***
- ***Cleaning the basket strainer . . .5-5***
- ***Lubricating tank components . .5-6***
- ***Cleaning the spray/vacuum  
tank . . . . .5-6***
- ***Cleaning the spray bars . . . . .5-7***
- ***Checking electrical  
connections. . . . .5-8***

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# PREVENTATIVE MAINTENANCE SCHEDULE

Normal operation of the MSBHI tank involves extended exposure of many components to minerals and other water system contaminants. These minerals and contaminants can produce deposits, scales, slime or algae that will reduce sizing tank performance.

To maintain the best performance, you should follow this maintenance schedule and develop an effective water treatment program.

## ● Daily

### Inspect vacuum chamber gaskets.

Gaskets between the vacuum chambers and at the ends of the tank must be in good condition to maintain vacuum stability. Replace any gaskets that are excessively worn, cracked or torn.

## ● Weekly, or as often as needed.

### Clean the basket strainers.

Remove the basket strainers from the reservoir and rinse. Replace if damaged.

### Clean the turbo disc filter.

Remove the turbo disc filter and rinse. You may need to clean the filter more often than weekly, depending upon the quality of your water supply.

### Drain and clean the spray tank.

Remove any particles and wipe all surfaces thoroughly.

## ● Monthly

### Lubricate all threads, shafts, sliding components, linear actuator and bearings.

Lubricate not only the grease fittings but coat shafts and other sliding surfaces with a seize-resistant bearing compound to prevent corrosion. You may need to lubricate more often than monthly.

### Drain and clean the reservoir.

Remove any particles and wipe all surfaces thoroughly.

### Clean the spray bars.

Remove particles and clear any clogs in holes.

### Inspect the lid gaskets.

Damaged gaskets decrease vacuum stability. Replace any gaskets that appear torn or cut or do not seal properly.



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# PREVENTATIVE MAINTENANCE SCHEDULE

## ● Monthly

### Clean the plate heat exchanger.

The optional plate heat exchanger is a sealed unit and can only be cleaned by backflushing. Depending on the quality of your water supply, you may want to backflush the heat exchanger more frequently. Once the unit becomes fouled with deposits, you must replace it.

## ● Every three months

### Lubricate water pump bearing frame, motor and coupling.

Refer to manufacturer's instructions. Recheck pump alignment after performing any maintenance that requires moving the unit.

## ● Every 6 months

### Inspect power cords, wires and electrical connections.

Check for loose wires, burned contacts, and signs of overheated wires. Check exterior power cords to the main power source and from the electrical box to the pumps. Check the ground wire. Replace any wire that appears damaged or has worn or cracked insulation.

## ● Every 20,000 operating hours or third year

### Service the bearing in the liquid-ring vacuum pump (if tank is equipped with vacuum pump).

Refer to manufacturer's instructions for complete details. Recheck pump alignment after any performing maintenance that requires moving the unit.

---

## INSPECTING GASKETS

A tight compartment seal is essential to stable vacuum pressure. Leaks between vacuum chambers, through the lids or at the ends of the tank reduce vacuum pressure stability.

- 1 Open the tank compartment lids.**
- 2 Inspect each lid gasket thoroughly for cuts, tears or other damage.**
- 3 Inspect the vacuum chamber gaskets.** Examine the gaskets between chambers and at the ends of the tank for cuts tears or other damage.
- 4 Replace a gasket if you see evidence of damage or notice hissing during operation.**

---

## REPLACING GASKETS

**To replace a lid gasket on the standard stainless steel lids:**

- 1 Remove the damaged gasket.** Glue the new gasket around the outside edge exactly where you removed the damaged gasket from.

**To replace a lid gasket on the optional clear lid:**

- 1 Remove the damaged gasket,** from the groove in the tank lid. Insert the new gasket material into the groove, tapping into place with a mallet. Silicone the ends of the gasket material together.

**To replace vacuum chamber or end gaskets:**

- 1 Remove the retaining rings.** Loosen the wing nuts and lift off the ring that holds the gasket in place.
- 2 Remove the damaged gasket and slide a new gasket over the studs.** No sealant is required.
- 3 Reassemble.** Slip the retaining ring over the studs to cover the gasket. Tighten the wing nuts.

---

The turbo disc filter removes particles from the water before it passes to the vacuum tank. Water contaminants can also leave deposits or algae in the filter. You may need to clean the filter more often than weekly, depending upon the quality of your supply water.

## CLEANING THE TURBO DISC FILTER

- 1 Open valve in the plumbing to the turbo disc filter to drain.**
- 2 To remove the upper canister release the strap clamp to drop bottom of turbo disc filter.**
- 3 Remove the disc filter.** Twist the disc filter counterclockwise and pull it out. Lift the filter up and out of the cover.
- 4 Clean the filter.** Rinse the filter thoroughly using water. Replace the disc filter if it is damaged or cannot be cleaned.
- 5 Lubricate the filter cover o-ring.**  
You can use a thin layer of petroleum jelly to help prevent the o-ring from drying and cracking. A slight leak could cause water pump cavitation.
- 6 Reassemble by repeating the steps in reverse order.**

---

The integral reservoir of the 16 foot MSBHI is equipped with (1) basket screen, and the 24 foot is equipped with (2) basket screens. The screens prevent large particles from being drawn into the water pump. You may need to clean the suction screen more often than weekly, depending upon the quality of your water supply.

## CLEANING THE BASKET STRAINER

- 1 Remove the center bolt from the basket strainer cover.**
- 2 Remove the cover from the basket strainer.**
- 3 Rotate the basket strainer counterclockwise and remove it. To clean the strainer rinse it thoroughly. If the strainer is damaged or worn, replace it.**
- 4 Reassemble by repeating the steps in reverse order.**

---

# LUBRICATING THE TANK COMPONENTS

## **Tools required:**

- grease gun
- seize-resistant bearing compound

Normal operation of the MSBHI tank creates many wet surfaces. We recommend generous monthly lubrication of any threaded or sliding components involved in positioning the tank. Those components include the positioning mechanisms such as the up/down vertical support shafts, side-to-side cross thread, and the linear actuator. You may need to lubricate more often than monthly.

- 1** **Locate the vertical support shaft grease fittings.**
- 2** **Lubricate the shafts and fittings.** Apply bearing compound to the fittings until it overflows. Apply a coating of the compound to the shafts as well.
- 3** **Lubricate threads and fittings.** Apply bearing compound to the fittings until it overflows. Apply a coating of the compound to the thread as well.
- 4** **Lubricate the linear actuator according to manufacturer's instructions.**

---

# CLEANING THE SPRAY/VACUUM TANK

The spray/vacuum tank chambers should be thoroughly cleaned weekly to remove particles that can accumulate.

- 1** **Drain the tank.** Open the quick-dump valves to release water to the plant drain.
- 2** **Clean the tank.** Remove particles from the tank chambers and wipe thoroughly.
- 3** **Check the quick-dump valves for any signs of leakage.** Scratches or other damage can cause vacuum leaks.
- 4** **Close all quick-dump valves.**

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Each tank chamber contains spray bars that can become clogged with residue. Clean the spray bars monthly.

## **CLEANING THE SPRAY BARS**

- 1** **Open the chamber lid.**
- 2** **Remove the spray bars.** Twist each spray bar counterclockwise and pull it out.
- 3** **Clean the spray bars.** Flush each bar with water. Use a soft brush to remove any particles clogging the small holes.
- 4** **Reassemble by repeating the steps in reverse order.**
- 5** **Repeat the procedure for each chamber.**

---

# CHECKING ELECTRICAL CONNECTIONS



## **WARNING: High voltage**

This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit or servicing.

Normal operation of the MSBHI tank produces many wet surfaces. We recommend that you carefully check all electrical wires for signs of damage that could result in a serious shock.

- 1 Stop the MSBHI tank.** Press the STOP button on the control pod.
- 2 Disconnect and lock out the main power source.** Turn the disconnect dial on the electrical enclosure to the O or off position.
- 3 Open the electrical enclosure.** A safety device prevents you from opening the door unless the power is shut down.
- 4 Inspect the wires and connections.** Look for loose wires, burned contacts, and signs of over-heated wires. Have a qualified electrician make any repairs or replacements necessary.
- 5 Replace and lock the control pod cover.**
- 6 Close the electrical enclosure door.**
- 7 Inspect the exterior power cords.** Carefully check the power cords from the electrical enclosure to the pumps. Cords should not be crimped, exposed or rubbing against the frame. Also check the power cord to the machine. If the main power cord runs along the floor, make sure it is not positioned where it could rest in pooling water or could be run over and cut by wheels or casters.

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# TROUBLESHOOTING

- *Before beginning* . . . . .6-2
- *A few words of caution* . . . . .6-2

## DIAGNOSTICS

- *How to identify the cause of a problem* . . . . .6-3
- *Water system problems* . . . . .6-4
- *Vacuum system problems* . . . . .6-6
- *Electrical problems* . . . . .6-9
- *Product quality problems* . . . . .6-9

## REPAIR

- *Checking electrical connections* . . . . .6-10
- *Checking and resetting motor starters* . . . . .6-12

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## BEFORE BEGINNING

You can avoid most problems by following the recommended installation, operation and maintenance procedures outlined in this User Guide. If you do have a problem, this section will help you determine what caused it and tell you how to fix it.

### Before you begin troubleshooting:

**Find the wiring, plumbing and assembly diagrams that were shipped with your equipment.**

These diagrams are the best reference for correcting a problem. The diagrams also will note any custom features, such as special wiring, control or plumbing options, not covered in this User Guide.

**Verify that you have all instructional materials related to the MSBHI tank.** Additional details about troubleshooting and repairing specific components of the tank, including pumps, heat exchanger and motor drives, can be found in the manufacturers manuals included in this instruction packet.

**Verify that you have manuals for other equipment located on the extrusion line.** Solving problems related to extrudate quality may require troubleshooting malfunctions or incorrect operating procedures on other pieces of equipment in the extrusion line.

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## A FEW WORDS OF CAUTION



**WARNING:** This machine should be adjusted and serviced only by qualified technical personnel who are familiar with construction and operation of this type of equipment.



**DANGER: Voltage hazard.**

Troubleshooting the electrical system of this equipment requires use of precision electronic measuring equipment, as well as access to the electrical enclosure while power is on. Exposure to potentially fatal voltage levels is unavoidable. These troubleshooting procedures should be performed only by qualified electrical technicians who know how to use this precision electronic equipment and who understand the hazards involved.



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The TROUBLESHOOTING section has been divided into:

☐ **MSBHI Tank Operation Problems**, which focuses on problems that are clearly related to the operation of the water, vacuum or electrical/control systems of the tank.

☐ **Plastic Product Quality Concerns**, which deals with product characteristics that **may** be related to MSBHI tank operation. Of course, other sections of the extrusion line also influence the quality of the extruded product. This section does not provide solutions to problems that originate with other equipment on the extrusion line.

Additional troubleshooting help can be found in manuals supplied by manufacturers of tank components and included in this instruction package.

## HOW TO IDENTIFY THE CAUSE OF A PROBLEM

# WATER SYSTEM PROBLEMS



**WARNING: High voltage** This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit for servicing. Only qualified electrical technicians should perform tests that require electrical power to be on.

Problem	Possible cause	Solution
The water pump will not start.	Is the correct power reaching the pump?	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check all connections and voltages. See <b>Checking Electrical Connections</b>.</li> <li><input type="checkbox"/> Make sure the emergency stop is disabled. If necessary, pull out the Emergency Stop button, then press the Reset button on the control panel.</li> </ul>
	Has the pump motor overload tripped?	Check the trip indicator on the pump overload module. If necessary, manually reset the overload. Verify the overload is set to 125% of the full load amps specified on the motor data plate. See <b>Checking and Resetting Motor Starters</b> .
	Is the pump damaged?	If the correct power is reaching the pump but it does not run, refer to the pump instructions found in the <i>APPENDIX</i> .
There is no or low water flow, even though the pump is running.	Is the pump rotating in the wrong direction?	If the pump is turning opposite the arrow stamped on its housing, turn off and lock out the main power supply. Open the electrical enclosure door, and reverse any two leads connecting the main power to the vacuum sizing tank.
	Is the path of the water flow blocked?	Locate the blockage: <ul style="list-style-type: none"> <li><input type="checkbox"/> Check the turbo disc filter and basket strainer. See <b>Cleaning the turbo disc filter</b> and <b>Cleaning the basket strainer</b>.</li> <li><input type="checkbox"/> Check water piping and the heat exchanger for blockages. Clean or backflush, as needed.</li> <li><input type="checkbox"/> Check for a restriction in the spray bars. Clean, if necessary.</li> </ul>



**WARNING: High voltage** This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit for servicing. Only qualified electrical technicians should perform tests that require electrical power to be on.

## WATER SYSTEM PROBLEMS

Problem	Possible cause	Solution
<b>There is no or low water flow, even though the pump is running.</b> <i>(continued)</i>	<b>Is the makeup water supply on?</b>	The system may have run dry. Check the water level in the reservoir. Make sure the makeup water supply is on.

# VACUUM SYSTEM PROBLEMS



**WARNING: High voltage** This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit for servicing. Only qualified electrical technicians should perform tests that require electrical power to be on.

Problem	Possible cause	Solution
Vacuum pump will not start.	Is the water pump off?	A safety interlock prevents the vacuum pump from starting if the water pump is off. Turn on the water pump.
	Is the correct power reaching the vacuum pump?	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check all connections and voltages. See <b>Checking Electrical Connections</b>.</li> <li><input type="checkbox"/> Make sure the emergency stop is disabled. If necessary, pull out the Emergency Stop button, then press the Reset button on the control panel.</li> </ul>
	Is the vacuum pump damaged?	If the correct power is reaching the pump but it does not run, refer to the pump instructions in the <i>APPENDIX</i> .
The vacuum pump is running, but there is no vacuum.	Is the pump rotating in the wrong direction?	If all pumps are turning opposite the arrows stamped on their housings, turn off and lock out the main power supply. Open the electrical enclosure door, and reverse any two leads connecting the main power source to the tank. If only one pump is rotating the wrong direction, turn off and lock out the main power supply. Then reverse any two leads connecting the pump to the power supply.
Vacuum pump is running, but cannot attain the desired vacuum level.	Is there a leak in the vacuum system?	<ul style="list-style-type: none"> <li><input type="checkbox"/> Verify that all lids are seated correctly to allow for a seal.</li> <li><input type="checkbox"/> Check for holes or tears in all gaskets. Replace any damaged gaskets.</li> <li><input type="checkbox"/> Make sure the gross bleeder valve on the vacuum pump has not been opened.</li> </ul>



**WARNING: High voltage** This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit for servicing. Only qualified electrical technicians should perform tests that require electrical power to be on.

## VACUUM SYSTEM PROBLEMS

Problem	Possible cause	Solution
Vacuum pump is running, but cannot attain the desired vacuum level. (continued)	Are the correct valves or devices being used to adjust the vacuum level?	<b>For manual controls only:</b> Make sure you use the coarse adjustment valve (1½" ball valve) to bring the vacuum into the proper operating range. Use the medium and fine adjustment valves to make only small changes in vacuum level.
The vacuum level has been attained, but it fluctuates.	Is there a leaking gasket?	Check the gaskets between chamber, on the chamber lids. Replace any gasket that is defective.
	Is water trapped in the water return line overflow?	Straighten any loops in the hose. Clear water from other trap areas.
	Is the vacuum pump running smoothly?	If the pump is not running smoothly, refer to the pump manual in the <i>Appendix</i> .
	Are there any loose fittings or bushings?	Check for loose fittings or bushings on the tank, including the vacuum adjustment valves on manual control models. Loose fittings and bushings can cause vacuum instability.

# ELECTRICAL PROBLEMS



**WARNING: High voltage** This equipment is powered by three-phase main voltage. Always disconnect and lock out the main power source before opening the unit for servicing. Only qualified electrical technicians should perform tests that require electrical power to be on.

Problem	Possible cause	Solution
Pump turns on, but won't stay on.	Has the overload tripped?	See <b>Checking and Resetting Motor Starters</b> .
	Is the pump overheating?	Check power, amps and connections to the pump.

# PRODUCT QUALITY PROBLEMS

This section contains product quality problems that may be related to MSBHI tank operation. This section does not provide solutions to product quality problems that originate with other equipment on the extrusion line.

Problem	Possible cause	Solution
Outside dimensions of the extruded product are wrong.	Has the vacuum level drifted?	Check the vacuum level. Adjust as necessary. See <b>Vacuum System Problems</b> if the desired vacuum level cannot be maintained.
Poor surface quality: chatter marks	Is the vacuum level too high?	If the vacuum level is too high, die swell can occur leading to chatter marks.
Poor surface quality: swirls on the surface.	Is the water well pressure too high?	Reduce the water well pressure.
	Is the extrudate rubbing or dragging against the calibration tool?	Check alignment.
Poor surface quality: dimples on the surface	Are air bubbles adhering to the extrudate surface, causing uneven cooling?	<input type="checkbox"/> Increase spray ring flow. <input type="checkbox"/> Increase agitation in the first chamber. <input type="checkbox"/> Add mineral or baby oil at the water well. <input type="checkbox"/> Add an anti-static agent to the water. <input type="checkbox"/> Add non-sudsing soapy water at the water well.

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# CHECKING ELECTRICAL CONNECTIONS



## **DANGER: Voltage hazard.**

Troubleshooting the electrical system of this equipment requires use of precision electronic measuring equipment, as well as access to the electrical enclosure while power is on. Exposure to potentially fatal voltage levels is unavoidable. These troubleshooting procedures should be performed only by qualified electrical technicians who know how to use this precision electronic equipment and who understand the hazards involved.



## **DANGER: Shock hazard.**

Make sure that a properly-sized ground wire runs from the incoming power supply to the chassis ground terminal in the electrical enclosure.



**IMPORTANT:** Always refer to the wiring diagrams that came with your unit to locate specific electrical components. Illustrations in the User Guide are intended to be representative only.

There are several types of problems that may be present within the electrical system: improper grounding; loose connections, incorrect voltages, and defective components. This procedure addresses the first three. Defective components are usually identified by a process of elimination, followed by testing of the suspect component.

### **Loose connections**

- 1 Disconnect and lockout power.**
- 2 Reattach and tighten all electrical connections.**
- 3 Verify the electrical disconnect switch is turned on.**
- 4 Check fuses and breakers in the disconnect.**  
Replace or reset as required. Identify the cause of the ground fault and correct it.

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# CHECKING ELECTRICAL CONNECTIONS

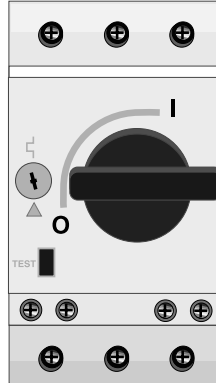
- 1** Verify that the voltage of the incoming power supply at the disconnect matches the voltage specified on the nameplate.
- 2** Verify 110VAC at the input and 12VDC at the output of the DC power supply.
- 3** Verify line voltages at T1, T2, and T3 of the pump motor starter. If the expected voltage is not present, check for defective components or loose electrical connections.



The pump motor starters are located in the electrical enclosure. If the motor starter overload has tripped, the dial will be pointing to the O or off position.

To reset the motor starter:

- 1** Disconnect and lockout the main power source.
- 2** Open the electrical enclosure.
- 3** Locate the motor starter.
- 4** Turn the dial to the I or on position.
- 5** Close the electrical enclosure.



## CHECKING AND RESETTING MOTOR STARTERS

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Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

## WE'RE HERE TO HELP

To contact Customer Service personnel, call:



## HOW TO CONTACT CUSTOMER SERVICE

**From outside the United States, call: 814-437-6861**

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

### **If you do have a problem, please complete the following checklist before calling Conair:**

- Make sure you have all model, serial and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- Make sure power is supplied to the equipment.
- Make sure that all connectors and wires within and between control systems and related components have been installed correctly.
- Check the troubleshooting guide of this manual for a solution.
- Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- Check that the equipment has been operated as described in this manual.
- Check accompanying schematic drawings for information on special considerations.

## BEFORE YOU CALL ...

*Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Departments for a nominal fee.*

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## EQUIPMENT GUARANTEE

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

## PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

## WARRANTY LIMITATIONS

**Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.**