CONAIR
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USERGUIDE
UGH007/1989

Thermolator

Water Temperature Controller
microTrac 1, 2 Control

⚠ **WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!**

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

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INTRODUCTION

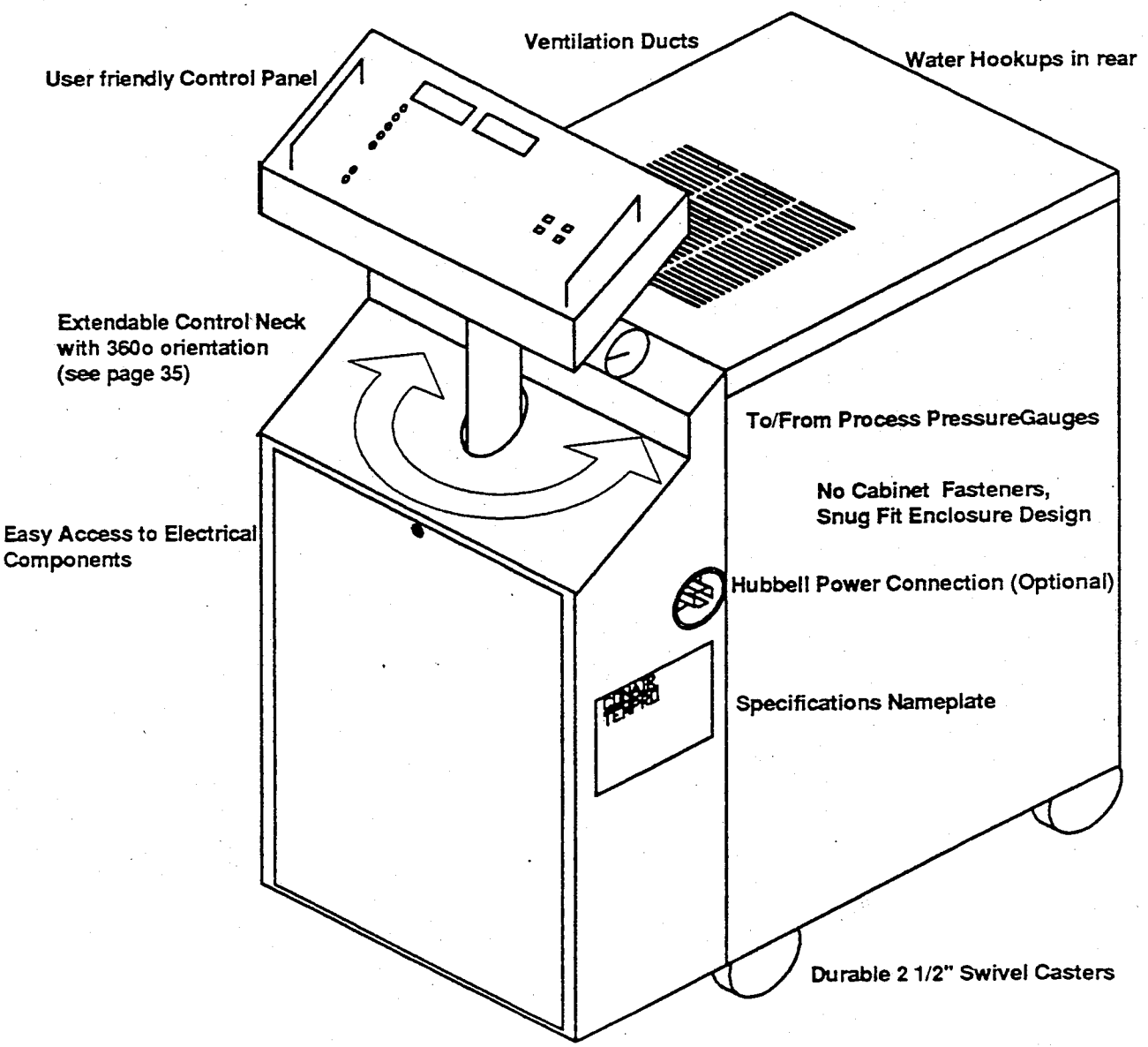
!! Congratulations !!

YOU NOW OWN THE FINEST IN WATER TEMPERATURE CONTROLLERS!

The team at Conair Tempro is dedicated to providing unparalleled products that meet your total auxiliary process control needs for today and tomorrow.

This manual is intended to provide an in-depth overview of the THERMOLATOR® Temperature Control Unit, and the microTrac 1 Controller. It is strongly recommended that it is read in its entirety to realize the full capabilities provided by this control system. However, the unit can be set up properly by reading Chapter 3, Step - By - Step Set up Procedure.

This is the THERMOLATOR®

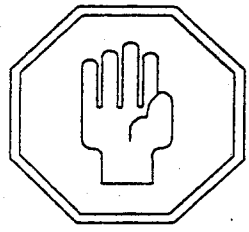


Conventions

The following conventions are used throughout this manual:

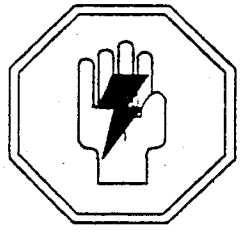
- **BOLD type is used to highlight important information in the text.**
- ***ITALIC type is used for titles that refer to other documentation.***
- Shading is used to set off all tasks and lessons.
- Control panel buttons, such as RAISE and LOWER are placed in all tasks and lessons. Everywhere else, the buttons are noted with uppercase letters, (RAISE,LOWER).

CAUTION!



Caution messages appear before procedures which, if not followed, could result in damage to the equipment.

WARNING!

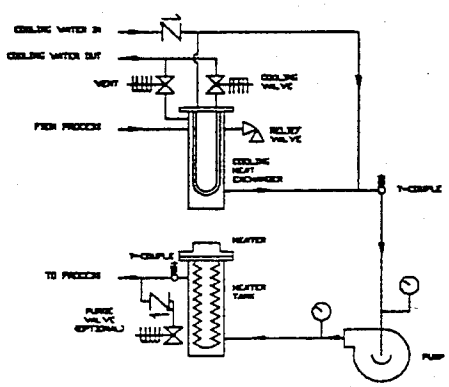


Warning messages indicate when a procedure, if not followed correctly, could result in personal injury.

Intended Uses & Limitations

Certain materials and processes require water to be supplied for precise control of the process temperature. In these types of applications water temperature controllers are used to circulate water at temperatures higher than the available water supply, to add or remove heat as needed to maintain a uniform heat balance in the process.

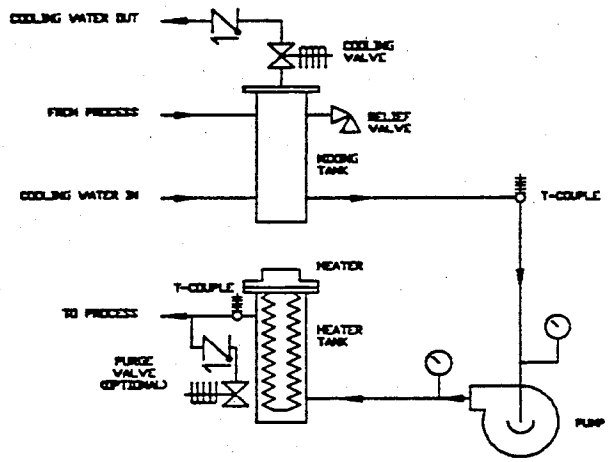
Temperature controllers are self-contained units which have the capability to heat and cool the circulating water. The heaters are electric and cooling is normally supplied by a chiller or cooling tower system. Sensors in the circulating system control the heating and cooling of the water to maintain the process at the required temperature.



CLOSED CIRCUIT

CHECK VALVES INCLUDED ONLY WITH OPTIONAL HOLD PURGE

Direct injection temperature controllers, (Series number TC-DI), circulate water at temperatures up to 250oF (120oC). The temperature of the water is maintained by discharging heated process water and adding cooling water to the circulation loop. This type of unit is recommended for use with chillers, where water quality is generally maintained in a closed loop system.



DIRECT INJECTION

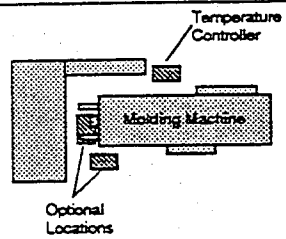
CHECK VALVES INCLUDED ONLY WITH OPTIONAL HOLD PURGE

Closed circuit temperature controllers, (Series number TC-CC), incorporate a heat exchanger in the process loop to maintain water temperature of these units which range from 20oF (11oC) above the cooling water temperature, up to 250oF (120oC). Closed circuit units are recommended for use with cooling towers and wherever water fouling of process equipment is undesirable.

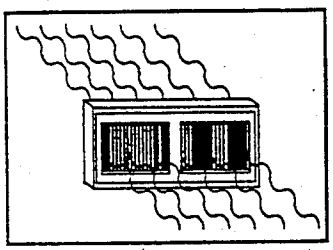
2

GETTING STARTED
Requirements for Installation

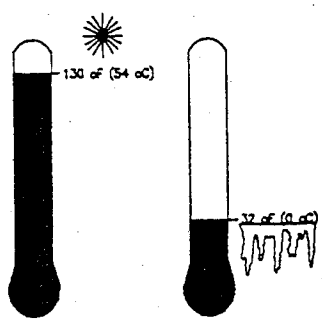
Environmental



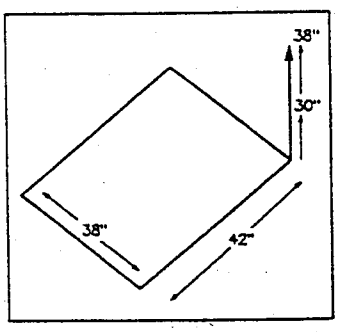
The Thermolator® is designed for machine side use and should be placed as close to the host machine as possible.



The unit will require an operating environment which is clean and well ventilated. **Nothing should be placed on top of the unit while operating, due to the location of the required ventilation ducts.**

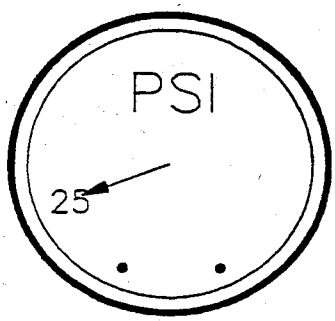


The ambient operating temperature of the Thermolator® must not exceed 130oF (54oC) with 95% relative humidity, noncondensing, or fall below 32oF (0oC). In storage or shipment the unit can withstand a minimum of -40oF (-40oC) if the unit has been drained.

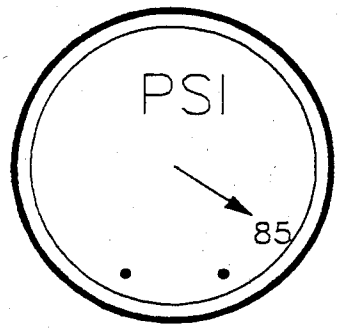


The Thermolator® will require an operating footprint, on level ground, of; 42" long, 38" wide, and a minimum of 28" and a maximum of 38" high for extension of the operator panel neck. Rear clearance is only required to make the necessary water hookups.

Water



Minimum



Maximum

The Thermolator® temperature control unit requires a minimum of 25 PSI on the cooling source feed and can accommodate up to a maximum of 85 PSI. The piping connection sizes for Direct Injection and Closed Circuit units are listed as follows:

DIRECT INJECTION
(TC-DI)

Process Supply.....1 1/4"NPT
Process Return.....1 1/4"NPT
Cooling Water In.....3/4"NPT
Cooling Water Out.....3/4"NPT

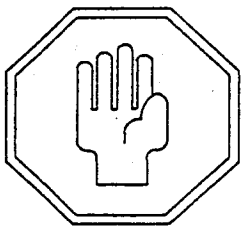
CLOSED CIRCUIT
(TC-CC)

Process Supply.....1 1/4"NPT
Process Return.....1 1/4"NPT
Cooling Water In.....3/4"NPT
Cooling Water Out.....3/4"NPT

Larger size lines are acceptable as long as they are reduced at the Thermolator® connections. **Smaller lines are not recommended.**

Cooling water connections are in different locations on the Direct Injection and Closed Circuit Models. See page 19 & 20 for locations.

Electrical

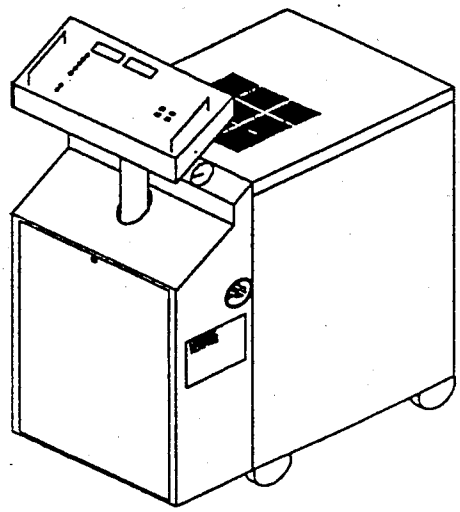


It is strongly recommended that when installing the electrical portion of the Thermolator®, all wiring ,disconnects, and fusing follow the National Electrical Code and any local electrical codes for your area.

ALWAYS maintain a safe GROUND and ALWAYS disconnect the incoming power BEFORE an attempt is made to open the unit or perform nonstandard operating procedures, such as routine maintenance.

The electrical specifications are located on the nameplate mounted on the side of the unit, (see figure below). This will indicate the required voltage, number of phases, frequency, full load amps, disconnect fuse size, and minimum wire connection size for this unit. The electrical hookup should be identical, with a maximum of a +/- 10% variance in voltage.

The electrical hookup should also run through a fused disconnect, sized in accordance with the nameplate amperage and conforming to *Article 250 of the National Electrical Code.*



CONAIR TEMPRO

1173 DAVIS ROAD
ELGIN, ILLINOIS U.S.A.
60123
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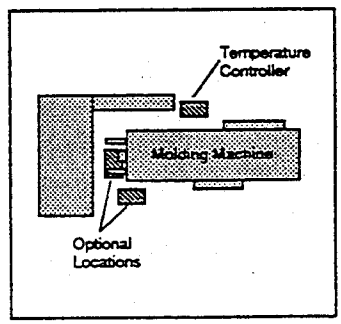
MODEL		SERIAL #	
VOLTS	PHASE		HZ
FLA	DISCONNECT FUSE SIZE		
MIN. WIRE CONNECTION SIZE			
WIRING SCHEMATIC #			
CONTROL MODEL		REV	
PUMP MODEL	HP		FLA
HEATER KW		FLA	
COOLING SOLENOID SIZE			
OPERATING TEMP. RANGE			
TESTED BY			

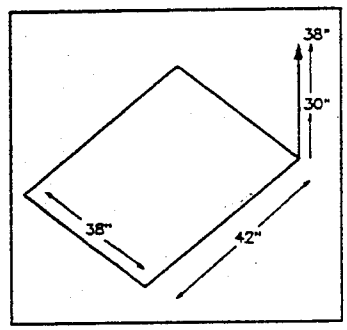
3

STEP - BY - STEP SET UP PROCEDURE

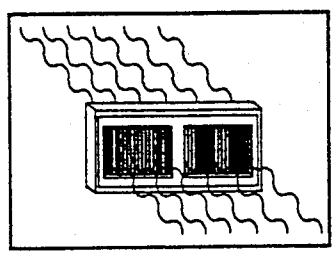
Location

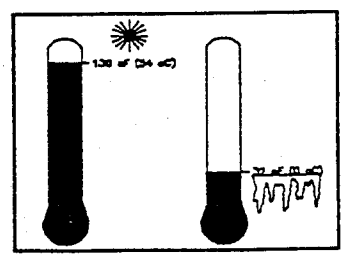
Locate the Thermolator® as close to the process machine as possible. The Thermolator® will require an operating footprint of 42" long, 38" wide, and a minimum of 33" and a maximum of 38" high for extension of the operator panel neck. Rear clearance is only required to make the necessary water line hookups.

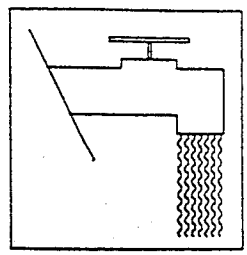




Make sure the unit is in a clean well ventilated environment with the maximum ambient temperature not to exceed 120oF (48oC) with 95% relative humidity, non-condensing, or fall below 32oF (0oC).





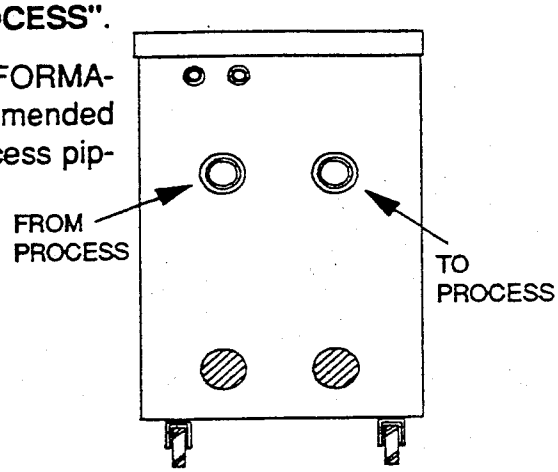


Water

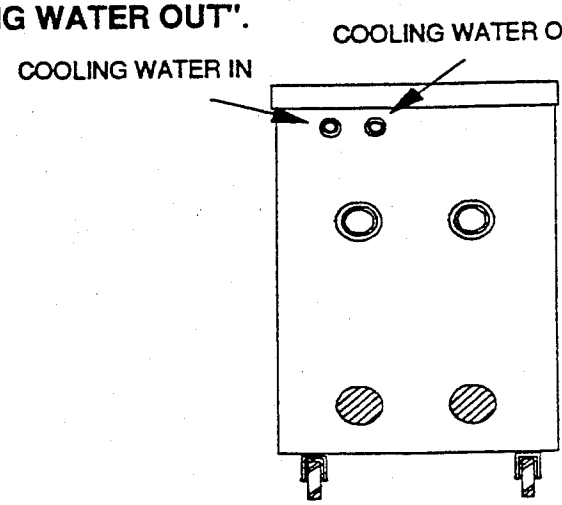
CLOSED CIRCUIT WATER HOOKUPS

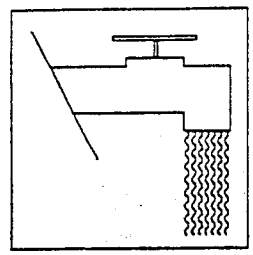
Connect the FROM PROCESS and TO PROCESS hookups to the rear of the Thermolator® using 1 1/4" NPT piping. Viewed from the rear, the FROM PROCESS hookup is the left most fitting of the two larger fittings and is clearly marked **"FROM PROCESS"**. The TO PROCESS hookup is the right most fitting of the two larger and is clearly marked **"TO PROCESS"**.

See the "TECHNICAL INFORMATION" chapter for recommended mold circulation and process piping.



Connect the COOLING WATER IN and COOLING WATER OUT hookups to the rear of the Thermolator® using 3/4" NPT piping. Viewed from the rear, the COOLING WATER IN fitting is the upper most left, and is clearly marked **"COOLING WATER IN"**. The COOLING WATER OUT is the upper most right fitting and is marked **"COOLING WATER OUT"**.

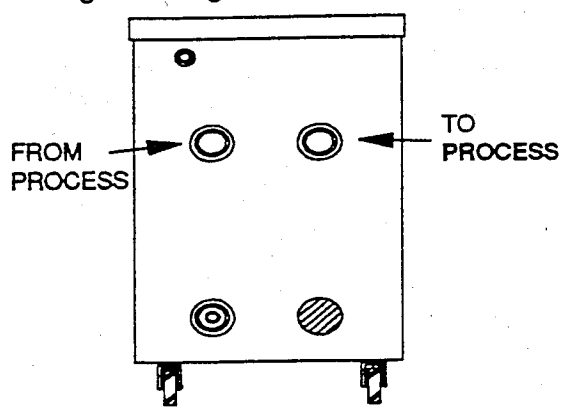




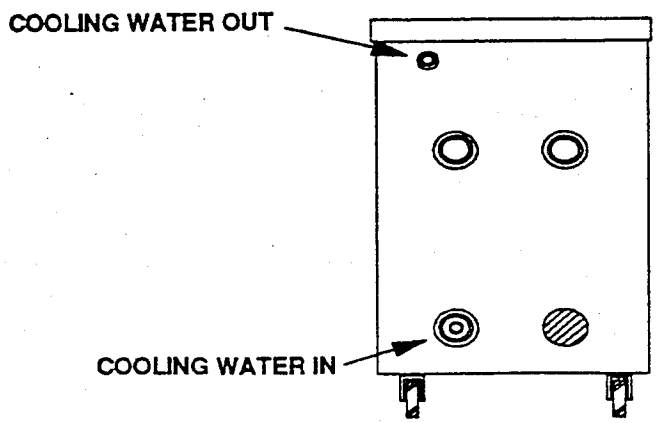
Water

DIRECT INJECTION WATER HOOKUP

Connect the FROM PROCESS and TO PROCESS hookups to the back of the Thermolator using 1 1/4" NPT piping. Viewed from the rear, the FROM PROCESS hookup is the larger fitting to the left, and is clearly marked **"FROM PROCESS"**. The TO PROCESS hookup is the larger fitting to the right, and is clearly marked **"TO PROCESS"**.



Connect the COOLING WATER IN and COOLING WATER OUT hookups to the rear of the Thermolator® using 3/4" NPT piping. Viewed from the rear, the COOLING WATER IN hookup is the smaller fitting in the lower left corner and is clearly marked **"COOLING WATER IN"**. The COOLING WATER OUT hookup is the smaller fitting in the upper left corner and is clearly marked **"COOLING WATER OUT"**.



Electrical

Before power is initiated to the unit, make sure the proper voltage, phase, frequency, full load amps, disconnect fuse size, and minimum wire size meet the specifications stated on the nameplate mounted on the outside of the unit. Improper power supply could result in damage to the unit as well as serious injury to the operator.

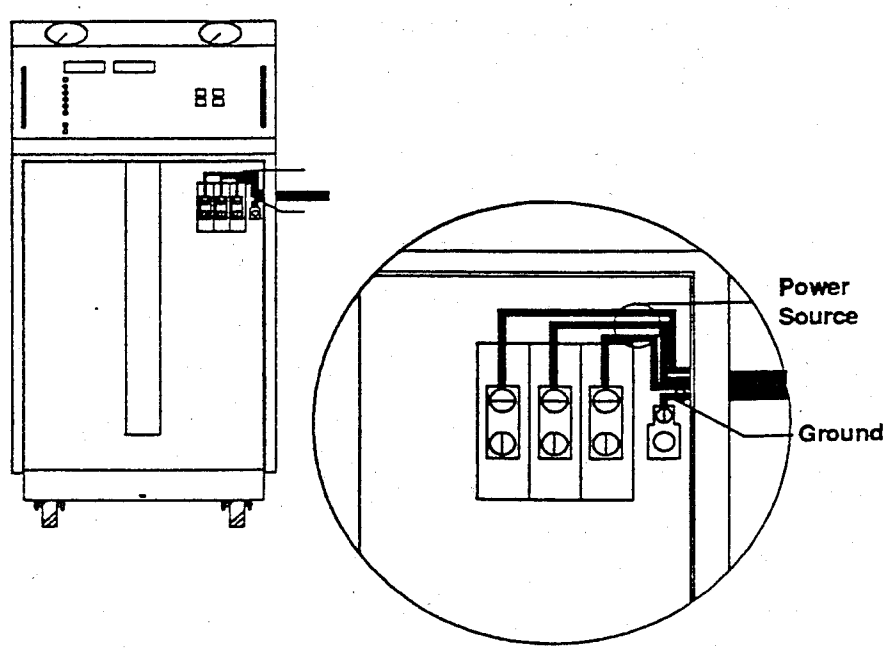
✓ Connect the power feed to the right side of the unit.

Bring the four wires into the electrical enclosure through the hole on the right side. Connect the three hot wires to L1, L2, and L3 on the terminal block in the upper right corner of the electrical enclosure. Connect the ground wire to the copper grounding mount to the right of the terminal block.

OPTIONAL

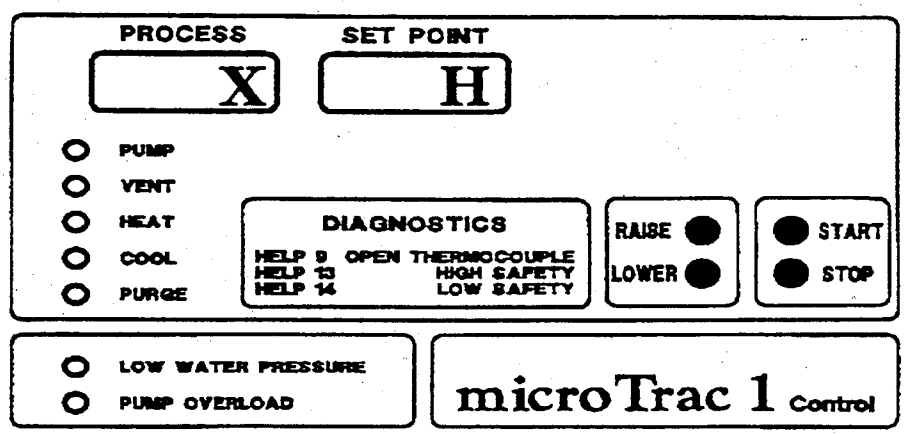
If the optional Hubbell power connection has been installed, simply connect the power feed to the right side of the unit.

✓ Initiate power from the fused disconnect.

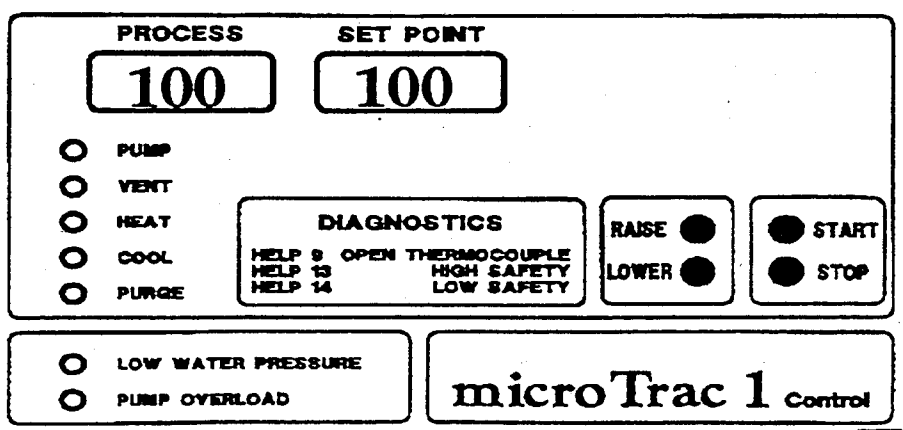


Electrical

Upon power hookup, the control display will indicate the hours the unit has been in operation by displaying "X" in the Process Screen, "X" being the number of hours, and "H" in the SET POINT Screen indicating hours.

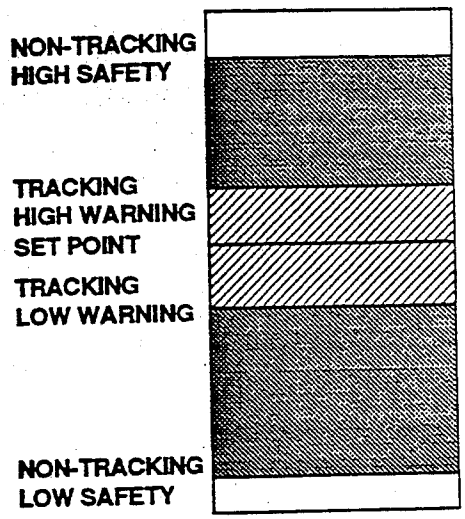


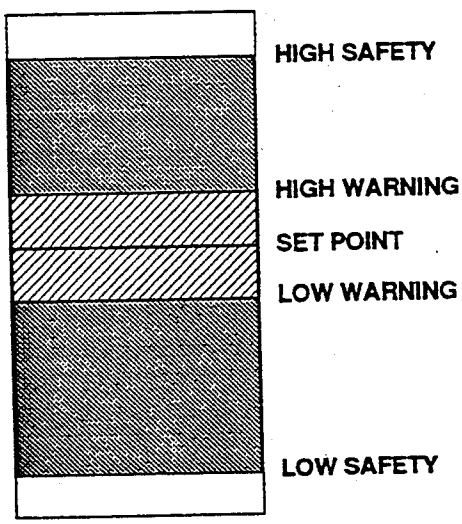
The Thermolator® will next show the Process Temperature in the PROCESS Screen. If the unit is empty of water this will be the ambient temperature of the unit itself. The SET POINT Screen will show the Temperature Set Point which will either be the factory default of 100oF or the most recent set point remaining in the control memory.



Settable Parameters

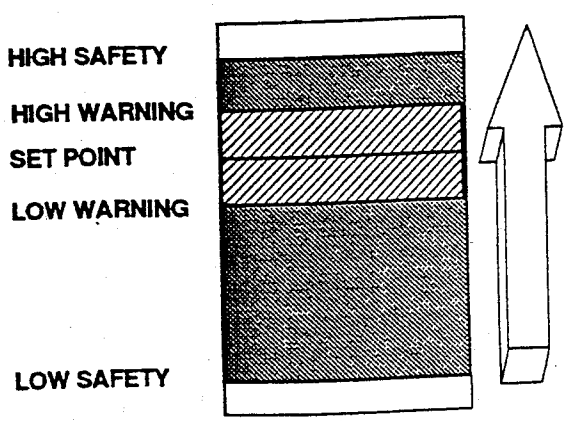
The Set Point, Warnings and Safeties are all relative to one another, meaning, one point cannot exceed another in either direction. In the figure to the right, the Set Point is in the middle of the operational range with the Warning parameters closest to the Set Point, and the Safeties positioned farthest from the Set Point. The slanted shading ▨ indicates the normal operating temperature zone of the process. The unit will function normally while the process temperature remains within this zone. If the process temperature enters a zone shown with gray shading, ▩ ,the process display will flash, indicating that the process temperature has exceeded allowable limits.

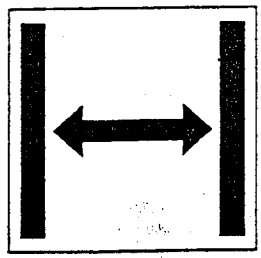




The operational parameters of the microTrac 1 are factory set and have limited user interface. While the Set Point can be adjusted, the Warnings and Safeties can not. The High and Low Warnings are set at +/- 5o from the Set Point. The High Safety is set at either 210oF or 260oF depending on the model. The Low Safety is set at 25oF.

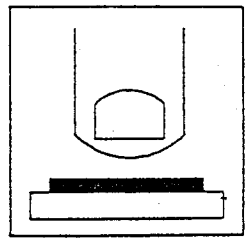
When the set point is moved the warnings will track their relative distance from the set point and move along with the set point. If the set point is being moved and a warning encounters, (comes within 1o of), a safety, the set point will not move anymore in the desired direction.



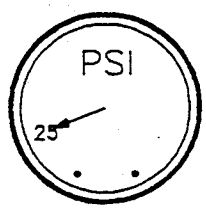


Settable Parameters

Keeping the previously mentioned rules on settable parameters in mind, use the RAISE (Orange) and LOWER (Blue) buttons to enter the desired operating temperature of the process water. This will be stored in the non-volatile memory and will remain even through a power down. The factory default for the set point is 100oF.



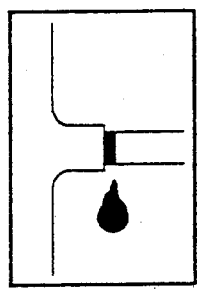
Start up



MINIMUM

Initiate the cooling water supply. The cooling water must be at least 25 P.S.I. or the unit will not function and the LOW WATER PRESSURE L.E.D. indicator will light.

Check for leaks in your cooling water connections.

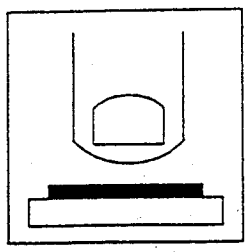


Press the START (Green) button to start the unit. The unit will go into the auto vent sequence to replace the confined air with cooling water. This may cause the process temperature to drop, but the unit will regain the temperature when the vent sequence is completed.

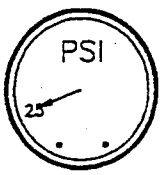
The venting sequence is 1 minute long and is divided into two phases, each of 30 seconds in length. The first phase consists of the cooling and vent solenoids opening. This is indicated by the COOL L.E.D. activating. The second phase consists of the cooling, and vent solenoids opening and the pump will start. This will be indicated by the COOL and PUMP indicator L.E.D.s activating. If the Thermolator® is the Closed Circuit model (TC1-CC) the VENT L.E.D. will also be activated in both phases.

To bypass the venting sequence press the START (Green) button a second time and the unit will go into standard operation.

This is not recommended on initial start-up unless you are certain that there is not any air in the system.



Start up

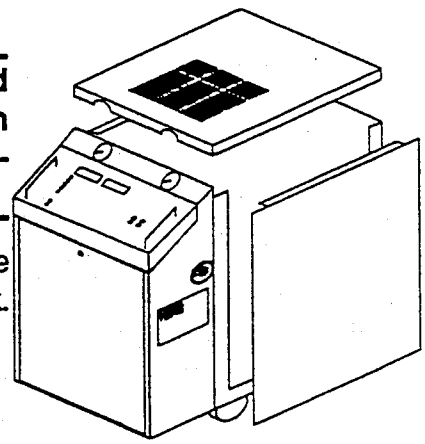


MINIMUM

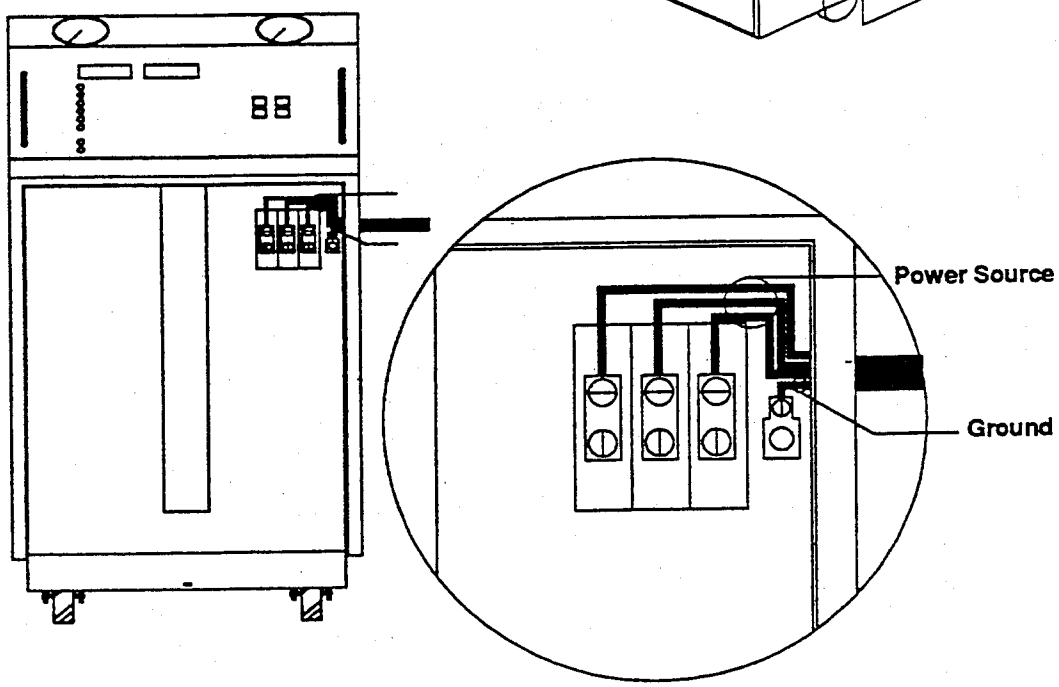
If inadequate cooling water pressure exists, below 25 P.S.I. as indicated on the right analog gauge, the machine will not start and the LOW WATER PRESSURE indicator will light. Once adequate water pressure exists the light will extinguish and the unit will start itself, as long as the STOP (Red) button has not been pressed.

Check the pump rotation. Remove the top access panel and look down upon the pump. The pump rotation should match the direction marked by the rotation sticker on the top of the pump.

Make sure the Thermolator® has stopped operation and the power supply has been disconnected before attempting this procedure.



If the rotation is incorrect, swap any two of the three power source wires on the entrance block.

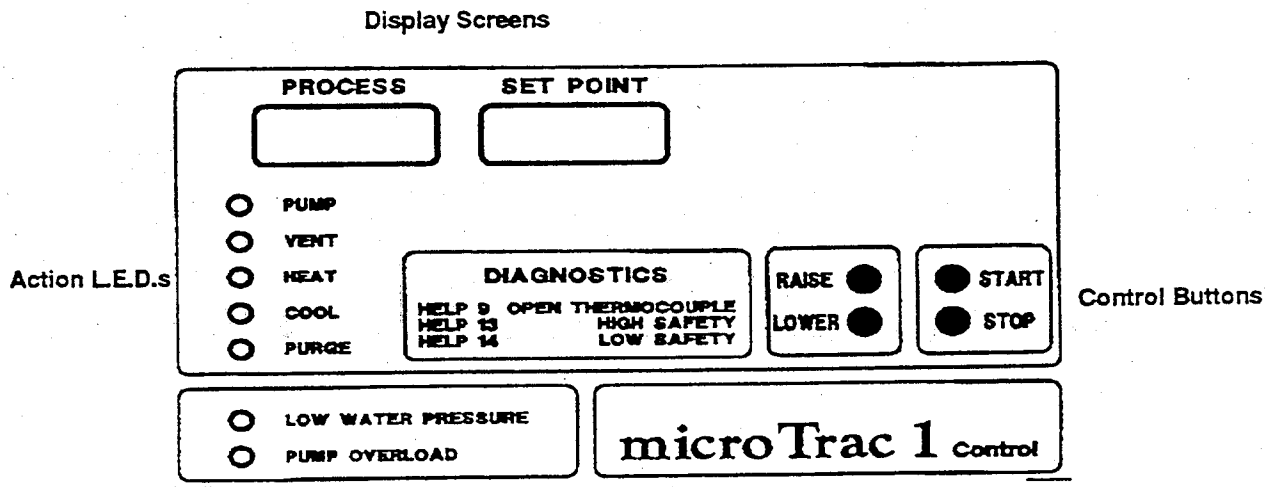


4

LAYOUT & FUNCTIONS of the CONTROL PANEL

Control Panel

The microTrac 1 control panel consists of 3 main areas that provide process information and control. These 3 areas are:



Display Screens

Process Display
This screen will continuously monitor and display the process temperature of the Thermolator®.

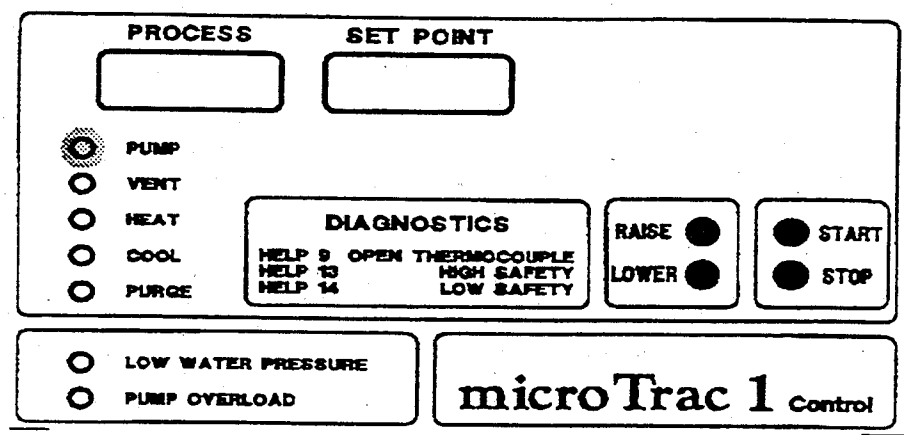
Set Point Display
This screen will display the temperature set point selected by the operator through the use of the Raise (Orange) and Lower (Blue) buttons.

Action L.E.D.s
There are two catagories of L.E.D.s on the microTrac1. L.E.D.s that monitor the action of the Thermolator® and L.E.D.s that indicate a problem has occured.

The action monitoring L.E.D.s include; the PUMP, VENT, HEAT, COOL, and PURGE.

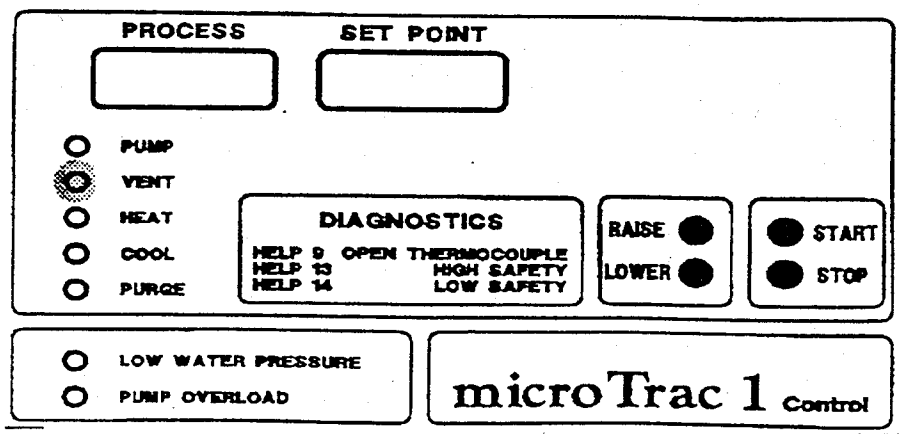
Control Panel

PUMP
The PUMP L.E.D. indicator will light when the Thermolator's pump is turned on by the microTrac1 controller.



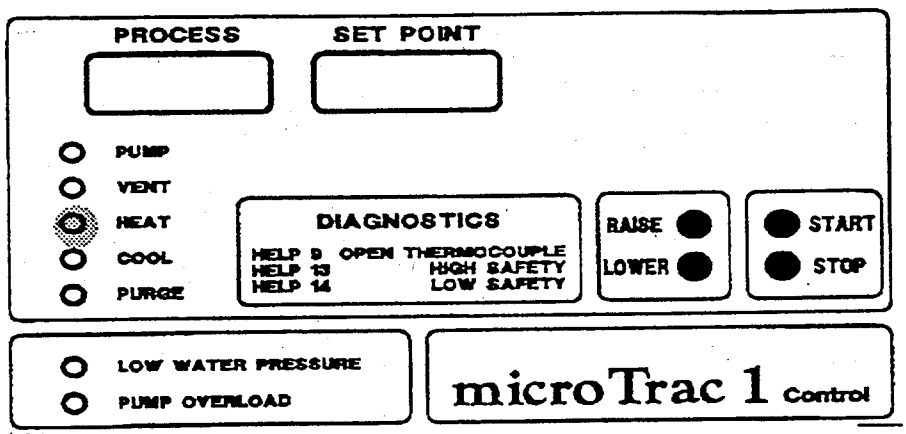
VENT
The VENT L.E.D. will indicate the unit has gone into the vent mode on closed circuit models. This purpose of the vent mode is to remove all air from the Thermolator®. This mode is enabled upon start up. The vent sequence is 1 minute in length and is divided into two phases, each 30 seconds in length. The first phase consists of the cooling and vent solenoids opening. Consequently the COOL and VENT indicators will light. In the second phase the pump is turned on, therefore the COOL, VENT and PUMP indicators will be lit.

NOTE On Direct Injection Models (TC1-DI) the VENT indicator will never light, there is no vent solenoid.. The Vent indicator will only light on the Closed Circuit Models (TC1-CC).

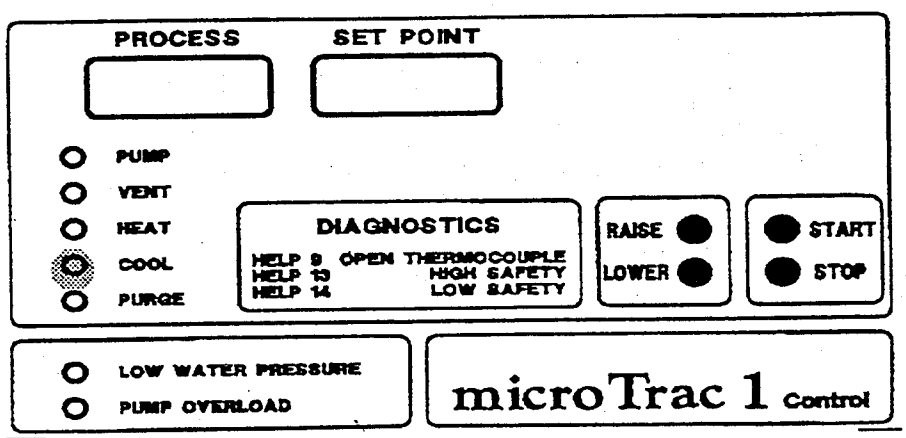


Control Panel

HEAT
The HEAT L.E.D. will light indicating the heater has been turned on by the microTrac1 controller.



COOL
The COOL L.E.D. will light indicating the cooling solenoid has been opened by the microTrac1 controller.

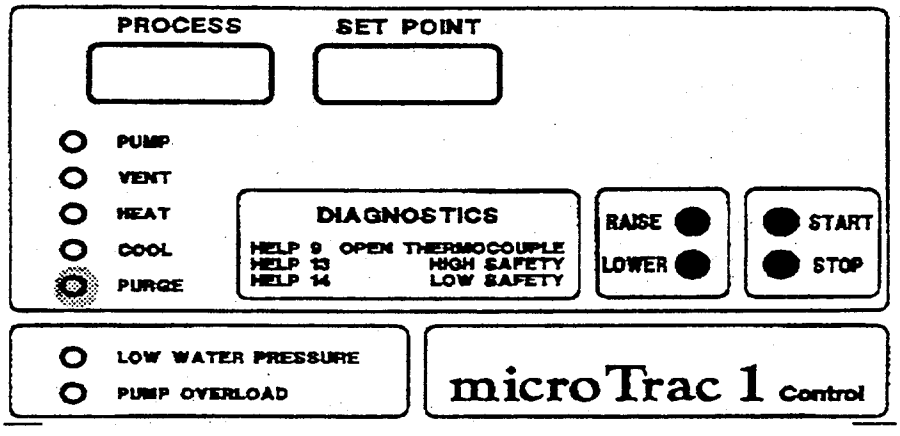


Control Panel

PURGE (OPTIONAL)

The PURGE L.E.D. will light when the purge mode has been initiated. This mode is mode evacuates all water from the Thermolator® and from the mold process. It is recommended that air pressure of 80 to 100 p.s.i. be hooked up to the Thermolator®. The purge mode is activated **when the unit is shut off** and the PURGE (White) button is pressed. The purge mode will last as long as the PURGE (White) button is held down. The PURGE button is located on the left side of the electrical enclosure.

When initiating the purge, the cooling water in line must be closed, or air may enter the cooling water source or water may enter the air line.



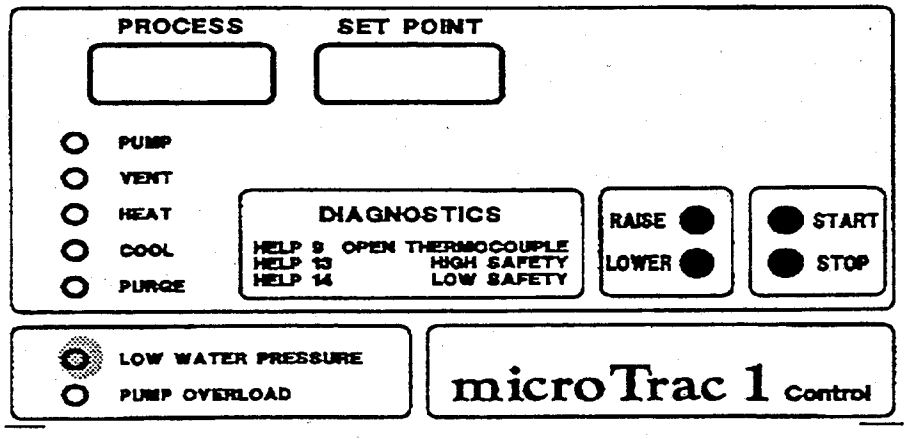
NOTE The VENT and COOL L.E.D.s will also light when the purge mode is initiated.

Control Panel

The L.E.D.s that indicate a problem has occured with the Thermolator® are: LOW WATER PRESSURE, and PUMP OVERLOAD.

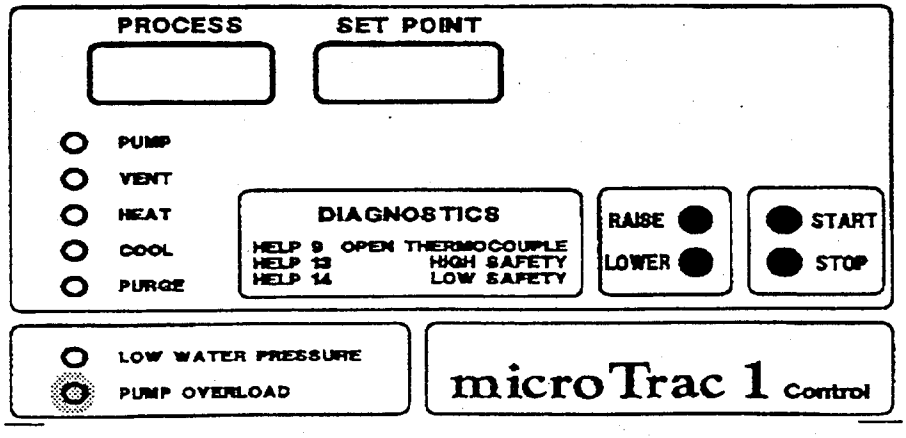
LOW WATER PRESSURE

The LOW WATER PRESSURE L.E.D. will light indicating the cooling water in pressure has dropped below 25 p.s.i., causing the Thermolator® to cease operation. Once adequate water pressure exists, the light will extinguish and the Thermolator® will start itself, as long as the STOP (Red) button has not been pressed.



PUMP OVERLOAD

The PUMP OVERLOAD L.E.D. will light indicating that the amperage on any three phase circuits has exceeded the factory setting.

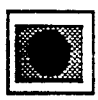


Control Panel

Control Buttons

There are 4 control buttons on the microTrac1 controller. When a button is depressed you will feel a click to confirm your action. When a button is held down the button will repeat its function until the button is released. No two buttons should be pressed at the same time.

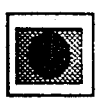
Raise (Orange)
The Raise button is used to raise the temperature set point. The temperature set point will be raised 1 degree each time the button is depressed.



Lower (Blue)
The Lower button is used to lower the temperature set point. The temperature set point will be lowered 1 degree each time the button is depressed.

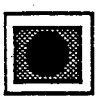
Start (Green)
The Start button is used to activate the Thermolator® into normal operation. Pressing the Start button once will cause the Thermolator® to enter its venting sequence. Pressing the Start Button again will bypass the venting sequence and the Thermolator® will go into normal operation.

Bypassing the venting sequence is not recommended unless you are certain that there is not any air in the system.



Stop (Red)
The Stop button is used to stop the operation of the Thermolator®; however, the Process and Set Point Screens will still show their respective values.

Control Panel



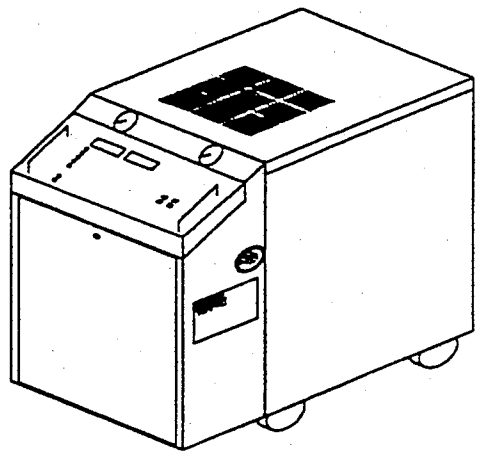
Purge (White) (Optional)
When the Purge button is depressed the water in the Thermolator® and the tooling will be forced into the cooling water return. To initiate this procedure the Thermolator® must first be turned off, by pressing the Stop button (Red), and the cooling water in feed must be closed. Then press and hold the Purge button for as long as the operator believes necesary. The time required to clear the Thermolator® and the tooling will vary, based upon the size of the tooling and length of the process piping to and from the tooling, as well as from the cooling water source.

Be sure that the cooling water source feed is closed when the Purge button is depressed. If the cooling water source feed is open and the air line has a higher pressure than the cooling water, air may be injected into the cooling water system. If the cooling water pressure is higher than the air line, cooling water may be injected into the air line.

Control Panel

Control Panel Orientation

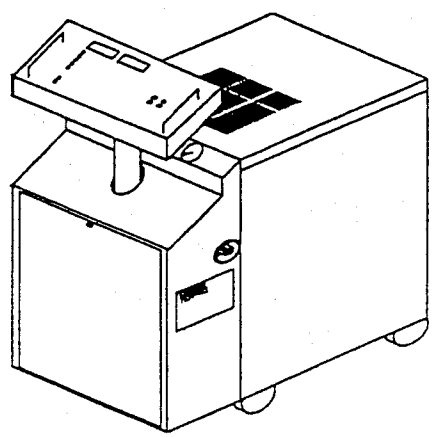
The control panel has two different ways that it can be used. The first is the standard orientation where the control panel is resting flush with the unit on its pedestal.



The second orientation is with the control panel extended. This will allow the panel to turn 360o. To extend the control panel, grasp the black handles, and lift up. The panel will stop when it has reached full height.

Do not continuously turn the control panel around in a 360o fashion. This will cause the cable connection from the control panel to twist-up and possibly break.

Do not use the black control handles to move the Thermolator®. They are designed only for the orientation of the control panel.



5

BASIC OPERATIONS & EXTRA FEATURES

Shut Down Procedures

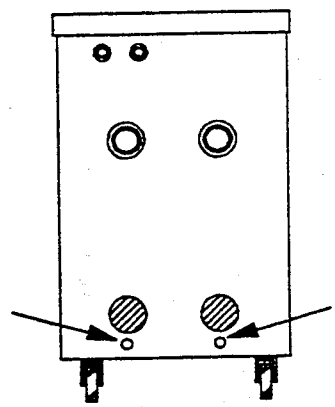
Shut Down of the Thermolator®

There are seven reasons to shut down the Thermolator® Temperature Control Unit: to change the hookups, when the process machine is shut down, to purge the system of water, to run diagnostic tests on the unit, to relocate or ship the unit, to perform routine or preventative maintenance, and if a trouble condition occurs.

When attempting maintenance of any kind on the Thermolator®, press the Stop (Red) button and then disconnect the power supply and let the unit cool to less than 125oF before any other action is taken.

Shut Down for Hookup Change

To shut down the Thermolator® to change the water hookups, press the Stop (Red) button, to cease operation of the unit. The unit should also be drained of all water. This can be accomplished through use of the two drain plugs, located on the back of the unit, or through the optional mold purge. The mold purge option will be discussed later in this chapter. Once the unit is cool and drained the water hookups can be removed.



Shut Down for Purge (Optional)

To prepare for a purge, all that is required is that the Stop (Red) button be pressed, to cease operation of the unit, and the cooling water feed is closed.

Shut Down for Diagnostic Testing

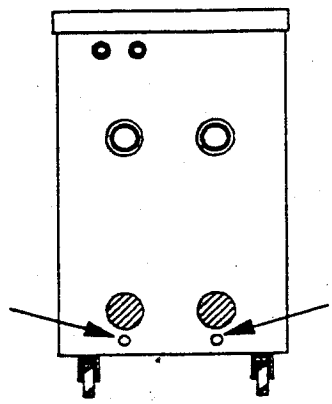
Press the Stop (Red) button and disconnect the power supply. All diagnostic testing can be run with all water hookups open. Directions on diagnostic testng are in Chapter 8, System Tests.

Shut Down for Relocation or Shipment

When relocating the Thermolator® within the same general area, press the Stop (Red) button, to cease operation of the unit. The water feeds may or may not need to be disconnected, depending on the relocation.

Shut Down Procedures

If the Thermolator® is to be shipped or stored, the unit must be disconnected from the power supply and all water feeds. The unit must also be drained of all water through the use of the two drain plugs, located on the back of the unit. The control panel should be resting flush with the unit. In shipment or storage the Thermolator® can withstand an environment between -40oF (-40oC) and 150oF (65oC) with 95% relative humidity non-condensing.



Shut Down for Routine / Preventative Maintenance

When attempting maintenance of any kind on the Thermolator®, press the Stop (Red) button and then disconnect the power supply and let the unit cool to less than 125oF before any other action is taken.

The water feed may or may not need to be disconnected, depending on the type of maintenance preformed. Chapter 6 of this manual gives step by step instructions on routine and preventative maintenance procedures.

Shut Down for Trouble Shooting

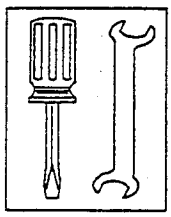
When shutting down the Thermolator® due to a trouble condition, the very first step is to press the Stop (Red) button and disconnect the power supply. Make a note of the units action prior to the trouble and any error message. Chapter 7, Trouble Shooting, details trouble conditions and suggested courses of action.

6

PREVENTATIVE & ROUTINE MAINTENANCE

Preventative & Routine Maintenance

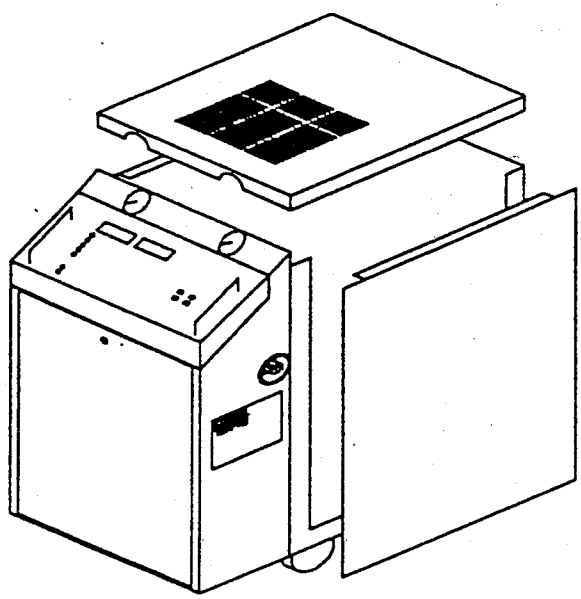
The only preventative maintenance that the Thermolator® requires is greasing of the motor bearings on the 3,5, and 7 1/2 hp. pump models. These bearings should be greased once every three months.



The tools that are required for this operation are: a grease gun.

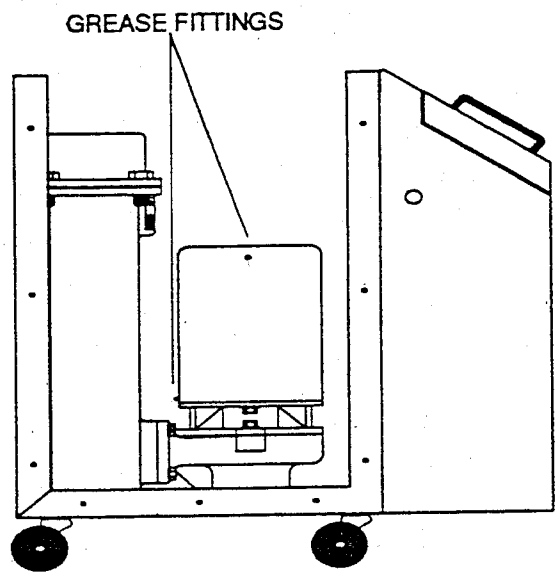
Make sure the Thermolator® has stopped operation and the power supply has been disconnected.

Remove the top, and side access panels by lifting straight up.



Preventative & Routine Maintenance

There are two grease fittings, viewed from the front of the unit, one is on the upper left side of the pump, the other is on the lower back of the pump.



- ✓ Place the grease gun connector over the first grease fitting and pump 1 or 2 times. Do not over pump.
- ✓ Place the grease gun connector over the second grease fitting and pump 1 or 2 times. Do not over pump.
- ✓ Replace the side panels, the inside of the panels have a lip that rests on the main enclosure assembly.
- ✓ Replace the top panel.
- ✓ Reconnect the power supply and start the unit.

7

TROUBLE SHOOTING

Trouble Shooting

UNIT SYMPTOM	PROBABLE CAUSE	REMEDY
Nothing happens, display does not light up.	Unit not plugged in, or wired in.	Check power supply wiring.
	Disconnect switch not in "ON" position.	Turn disconnect to the "ON" position.
	One or more fuses "OPEN" in disconnect.	Check fuse, and check for wiring problems
	Wrong voltage applied to unit.	Check power supply.
	Circuit board failure.	Call CONAIR TEMPRO Customer Service number.
Display lights, but unit will not start.	No "Cooling Water In", or less than 25 P.S.I.	Initiate "Cooling Water In" above 25 P.S.I.
	Pump overload.	Determine cause of overload and reset.
	Transformer	Call CONAIR TEMPRO Customer Service number.
Unit will not start, low water pressure L.E.D. is on.	No "Cooling Water In", or less than 25 P.S.I.	Initiate "Cooling Water In" above 25 P.S.I.
Unit will not heat to set point.	Solenoid valve fouled or heater contact failure.	Check for cooling water out when cool solenoid is not open.
PUMP OVERLOAD L.E.D. is on.	Pump Overload.	Determine cause of overload and reset.
INCORRECT ROTATION	Incoming phase reversed.	Swap any two phases at incoming power.

Trouble Shooting

UNIT SYMPTOM	PROBABLE CAUSE	REMEDY
HIGH SAFETY - "HELP 13"	Heater contactor stuck, Insufficient cooling water, Unit not running.	Replace heater contactor, Ensure adequate supply, Start unit.
LOW SAFETY - "HELP 14"	Cooling valve stuck open, Heater defectve.	Clean out valve or replace, replace heater.

8

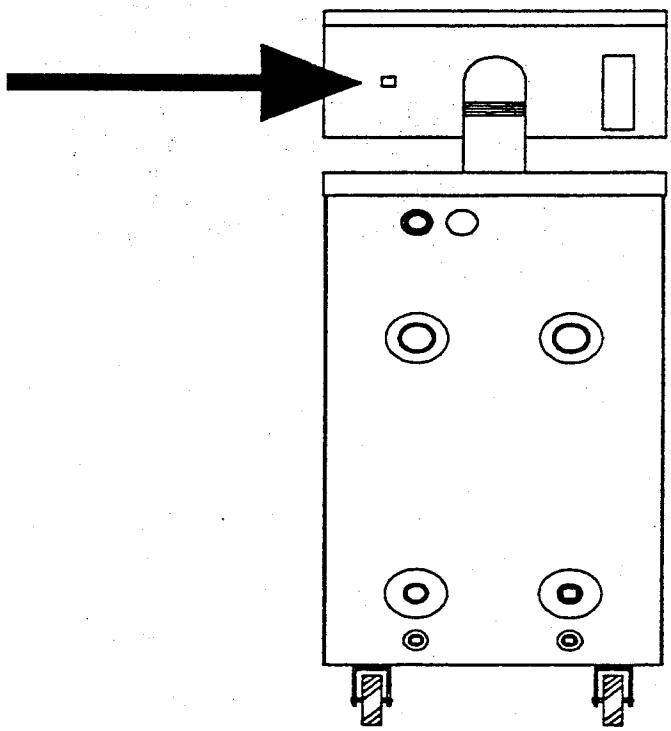
SYSTEM TESTS

System Tests

This chapter is provided for the operator to perform simple diagnostic tests on the microTrac 1 controller.

Press the STOP (Red) button to stop the operation of the Thermolator®.

Raise the microTrac 1 control panel and press the TEST (Black) button on the underside of the control panel.



System Tests

The display on the operator panel should now read "SEL 0", meaning that the test number 0 has been selected. All available test may be selected by pressing the RAISE and LOWER buttons until the desired test number is displayed. To start a test, press the START button. To STOP a test, press the STOP button. The following is a list of the currently available test routines:

TEST NUMBER	DESCRIPTION
0	Watchdog Test
1	RAM Test
2	L.E.D. Test
3	Button Test
4	Solid State Relay Test
7	Hour Meter

Test 0, Watchdog Test

The display will increment by tens. A failed test is indicated when the microTrac 1 performs a hardware reset before the count of 90 is reached on the display. A failed test is also indicated when the microTrac 1 does not perform a hardware reset before the count of 150 is reached on the display.

Test1, RAM Test

The Random Access Memory is pattern tested. During the test, the "SEL" portion of the display is blanked. If the RAM was found to be good, "SEL 1" will return to the display, otherwise "HELP XXXX" will be displayed, with "XXXX" representing the address in the Display Hex Notation of the bad address. If a bad address is encountered, the controller must be powered down to exit the test. Note: A similar test is executed every time the controller is turned on, displaying "HELP 102" if test failed.

Test 2, L.E.D. Test

The digits are incremented from "0" to "9" followed by "-", "E", "H", "L", and "P". The digits are all turned to "8" and are turned off sequentially.

System Tests

Test 3, Button Test

When the controller detects a button pressed, the coresponding L.E.D. in the display section of the operation panel is lit. To exit the test, the STOP button must be pressed twice consecutively.

It is necessary to test the button repeat on only one of the four buttons.

Test 4, Solid State Relay Test

The operator panel display reads "SOL X" where "X" is the number of the solid state relay that is on. The SSR selected may be changed by pressing the RAISE and LOWER buttons. The selected SSR will stay on for 30 seconds. The START button will turn on the same SSR for 30 more seconds.

Test 7, Hours On, Pump Hours, Heater Hours, Cool Cycles

Select test 7 using the RAISE and LOWER buttons. Press the START button and "XX" will be displayed in the Process Screen, and "OH" will be displayed in the Display Screen. The "XX" represents the number of hours the unit has been turned on, while the "OH" represents On Hours.

With the test running, press the RAISE button and the screens will now display the hours that the pump has been running. "XX" will be displayed in the Process Screen, and "PH" will be displayed in the Display Screen.

Press the RAISE button again and the heater hours will be displayed. "XX" will be displayed in the Process Screen and "HH" will be displayed in the Set Point Screen.

Press the RAISE button again and the Cool Cycles, how many times the cooling solenoid has been opened and closed, will be displayed. "XX" will be displayed in the Process Screen, and "LS" will be displayed in the Set Point Screen. The number of cooling cycles is displayed in thousands of cycles.

System Tests

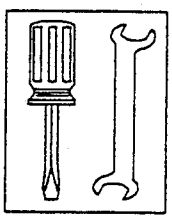
Test numbers other than those indicated should be performed only by qualified CONAIR TEMPRO Service Personel. Performance of these tests by other than CONAIR TEMPRO Service Personel may cause serious damage to the equipment and void the warranty.

Power the unit down and then power on again to restore the Thermolator® to normal operating mode.

9

DISASSEMBLY & REASSEMBLY PROCEDURES

Disassembly & Reassembly Procedures



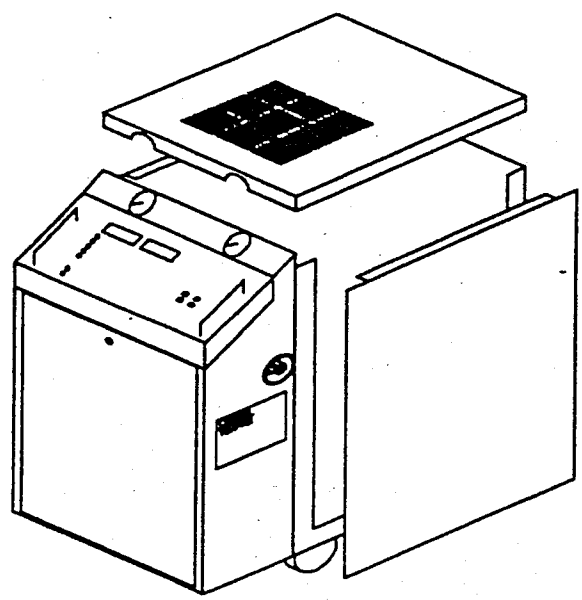
The Thermolator® can be disassembled and reassembled using the following tools:

Medium blade type screw driver
1/4" open end wrench
1/2" open end wrench
9/16" open end wrench
1/4" box wrench
9/16" crows foot wrench
3/8" socket with 1/4" drive
15/16" socket with 1/2" drive
1/4" allen key

Make sure the Thermolator® has stopped operation, and has cooled below 125oF, and the power supply has been disconnected before any atempt is made to disassemble.

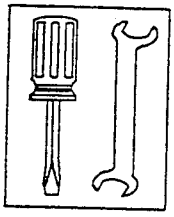
Enclosure Access

Remove the top access panel by lifting straight up. Remove the side panels by also lifting straight up.



Disassembly & Reassembly Procedures

Wiring Harness Removal



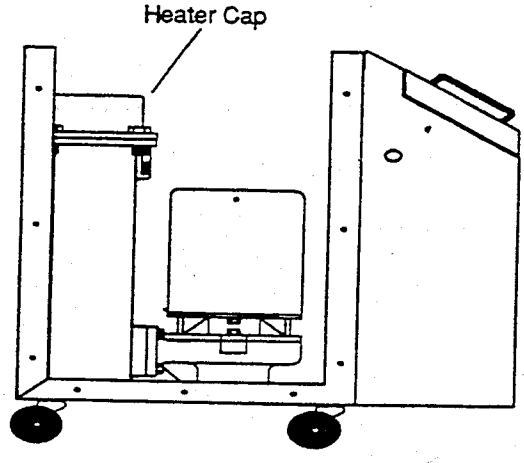
The tools required for this procedure are:

Medium size blade type screw driver
1/4" open end wrench

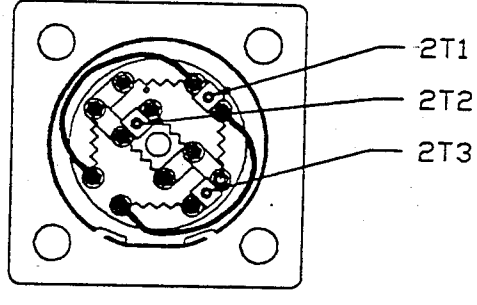
Using the 1/4" open end wrench remove the three bolts that hold the orange heater cap.

Remove the heater cap.

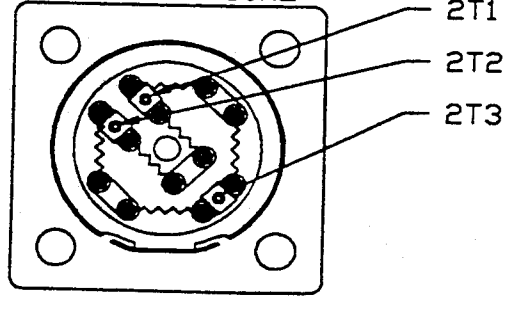
Mark down your wiring layout of the heater, the wires are labeled; 2T1, 2T2, 2T3. It will be one of the following.



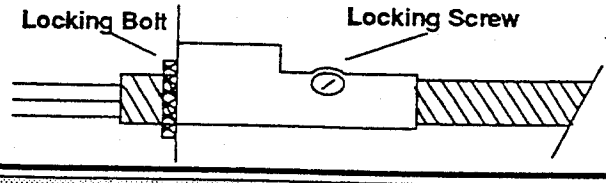
TERMINAL CONNECTIONS
208-230V/3PH/60HZ



TERMINAL CONNECTIONS
460V/3PH/60HZ



Unscrew the locking screw on the wiring harness. Using the same screw driver release the locking bolt opposite the locking screw just removed.



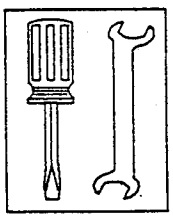
Disassembly & Reassembly Procedures

Using the 3/8" socket and 1/4" drive, loosen the bolts holding the heater wires, 2T1, 2T2, 2T3, and disconnect the wires.

Remove the wiring harness and move it clear of the unit.

To reassemble the wiring harness, reverse this procedure.

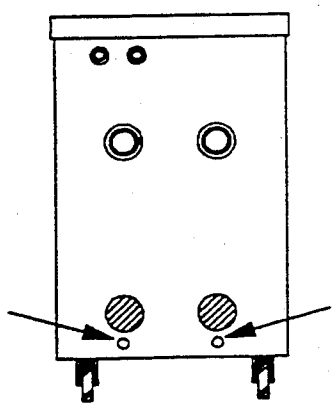
Heater Removal



The tools required for this procedure are:

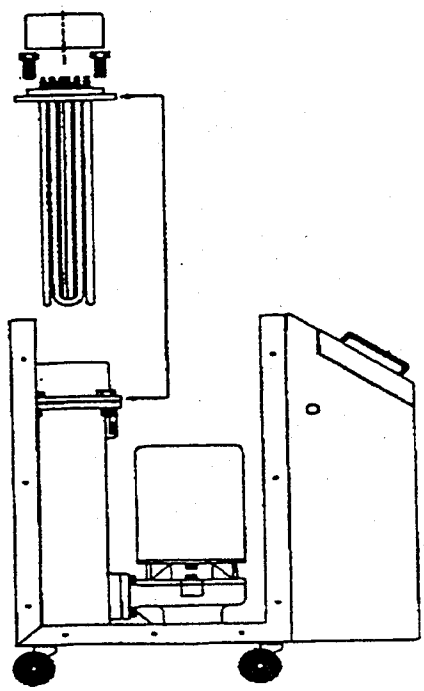
1/4" allen key
15/16" socket with 1/2" drive

Remove the wiring harness as previously stated.



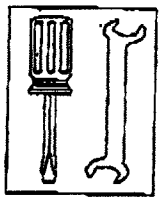
Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.

Using the 15/16" socket and 1/2" drive remove the four bolts that secure the heater. Lift the heating element straight up out of the heater tube. Be sure not to misplace the heater gasket.



To reassemble the heater, reverse this procedure

Disassembly & Reassembly Procedures



Solenoid Removal

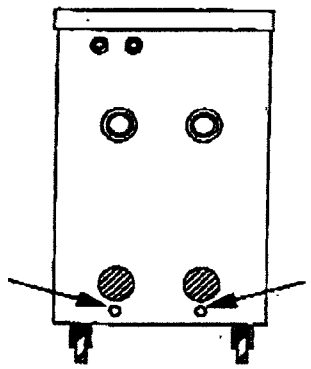
The tools required for this procedure are:

10" pipe wrench
Medium blade type screw driver
1/4" allen key

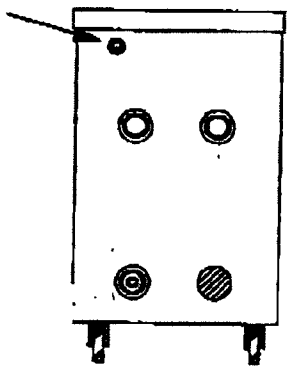
Direct Injection, Model TC-DI

Shut off the cooling water in feed.

Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.

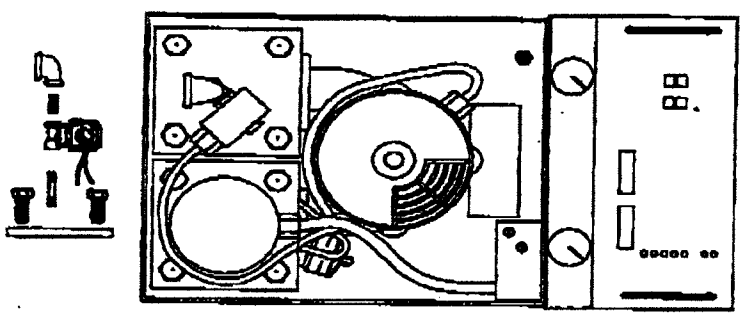


Using the 10" pipe wrench, remove the cooling water out feed.

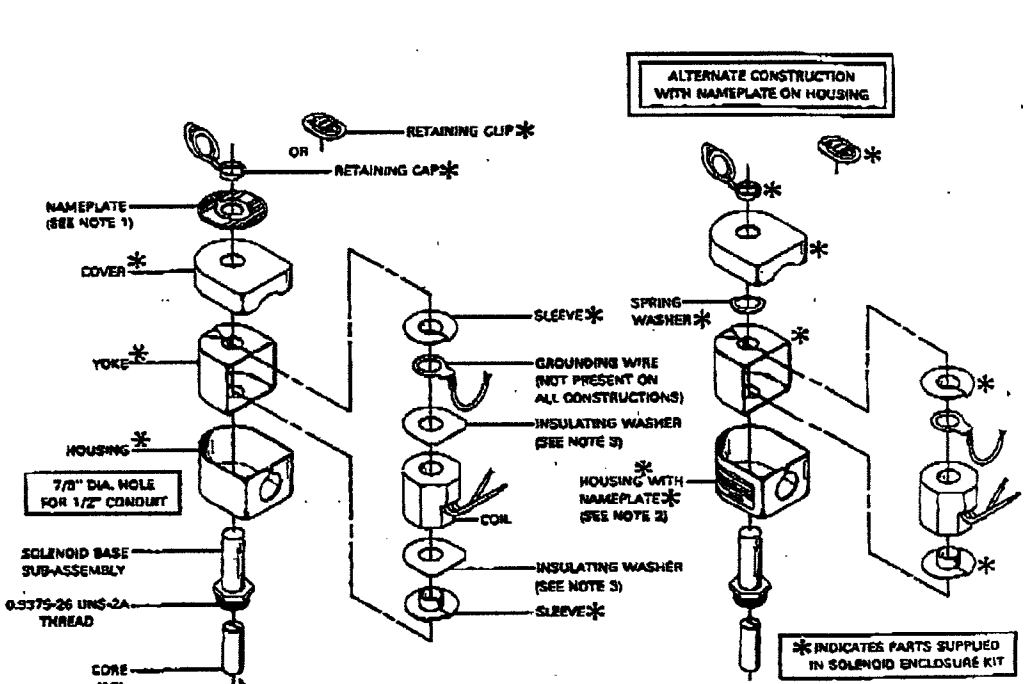


Using the 10" pipe wrench, disassemble the selenoid assembly as per the drawing below.

The solenoid valve itself may be disassembled using the screw driver as per the exploded drawing below.



Disassembly & Reassembly Procedures



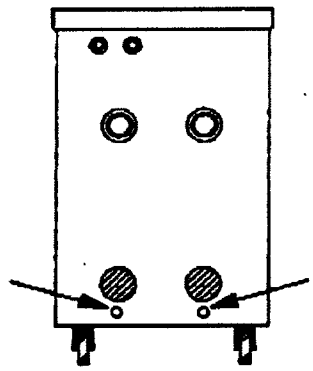
To reassemble, reverse this procedure. Make sure all pipe fittings are properly sealed with pipe dope. Check your connections for leaks upon startup.

Disassembly & Reassembly Procedures

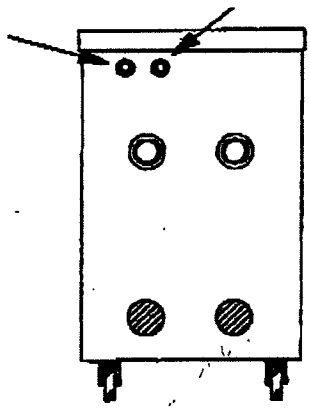
Closed Circuit, Model TC-CC

Shut off the cooling water in feed.

Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.

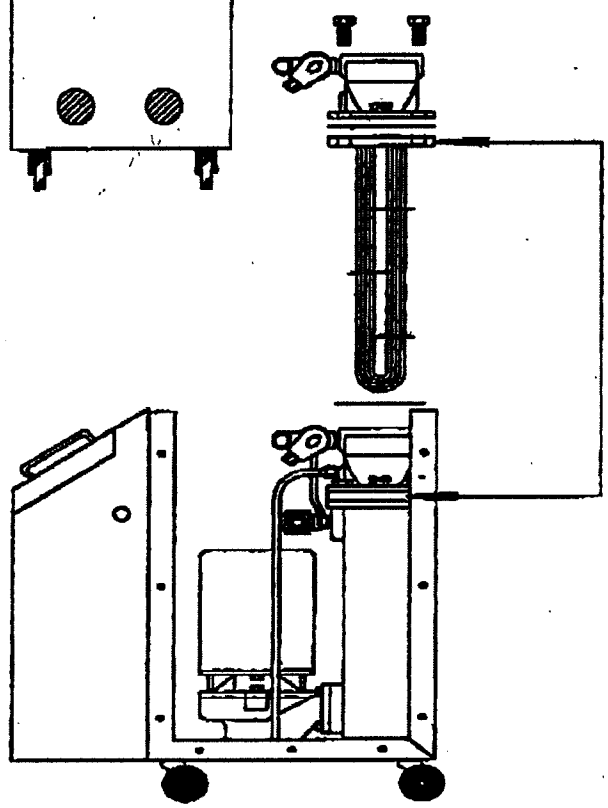


Using the 10" pipe wrench, remove the cooling water in and cooling water out feed.

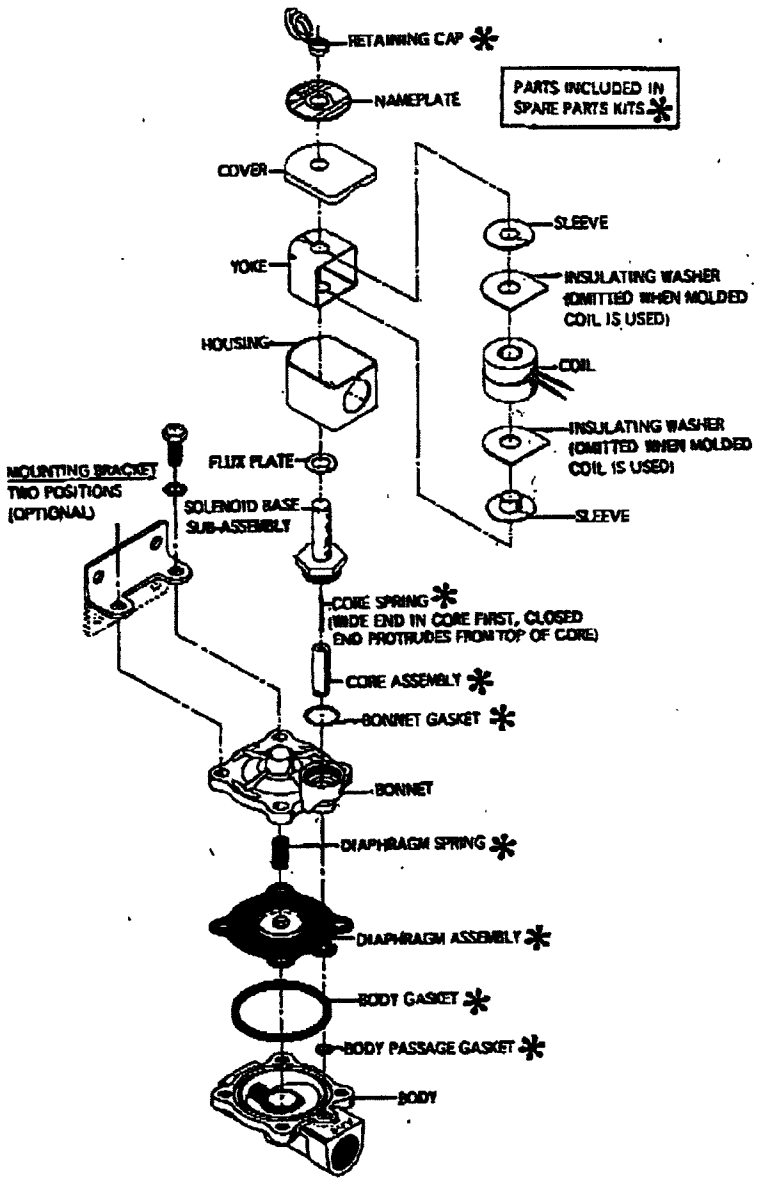


Using the 10" pipe wrench, disassemble the solenoid assembly as per the drawing below.

The solenoid valve itself may be disassembled using the screw driver as per the exploded drawing below.



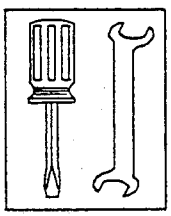
Disassembly & Reassembly Procedures



To reassemble, reverse this procedure. Make sure all pipe fittings are properly sealed with pipe dope. Check your connections for leaks upon startup.

Disassembly & Reassembly Procedures

Pump Removal

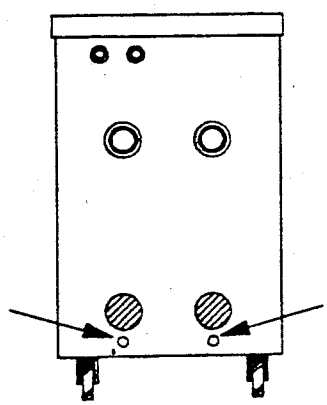


The tools required for this procedure are:

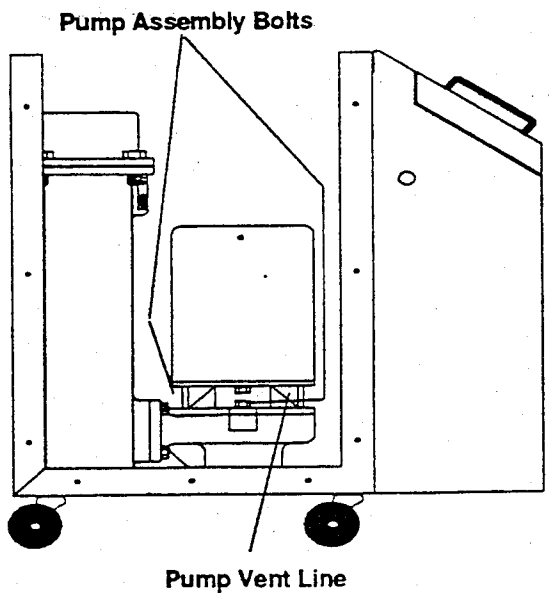
2 medium blade type screw drivers
1/2" open end wrench
9/16" open end or box wrench
9/16" crows foot wrench
assorted sockets with 1/4" drive
1/4" allen key
10" Pipe wrench

✓ Shut off the cooling water in feed.

✓ Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.



✓ Use the 1/2" open end wrench to remove the vent line connected to the pump adapter.



✓ Use the 9/16" open end box wrench to remove the four bolts securing the pump assembly to the volute case. The one bolt in the rear will require a 9/16" crows foot wrench.

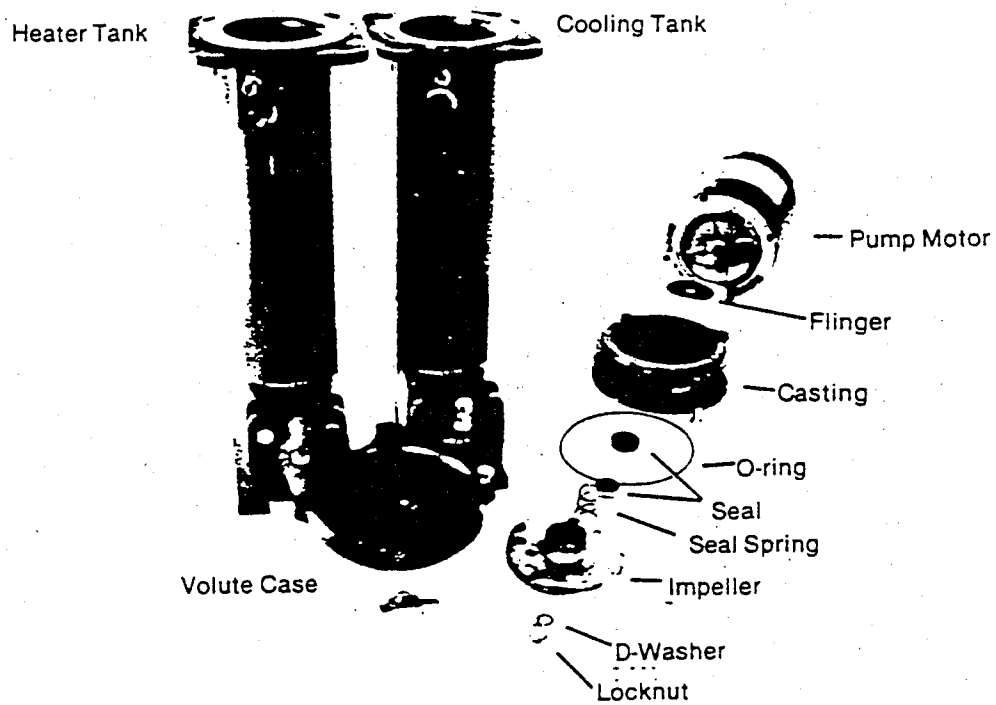
✓ Remove the pump assembly by lifting straight up.

Disassembly & Reassembly Procedures

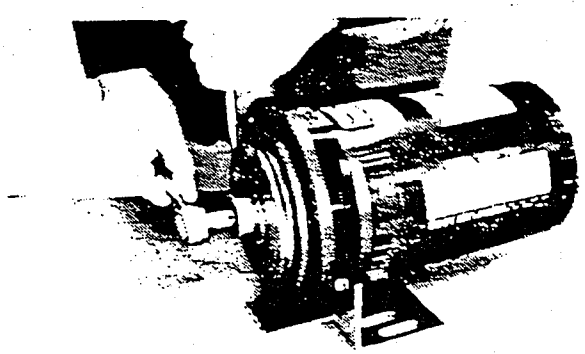
Disassembly and Reassembly of 3/4, 1.0, & 2.0 H.P. Pumps

Remove the four bolts holding the pump to the casting.

Remove the pump motor and rotating element from the casting.

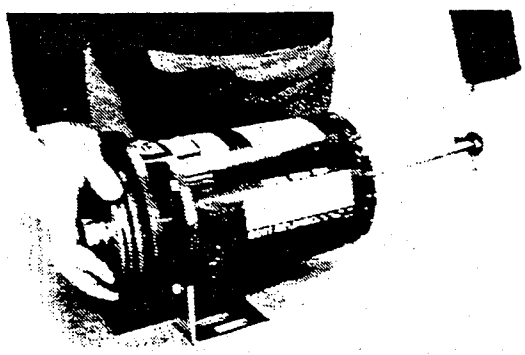


Insert a screwdriver in one of the impeller waterway passages and back off the impeller nut as shown.

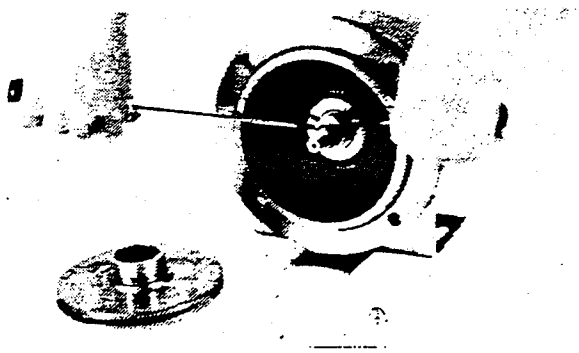


Disassembly & Reassembly Procedures

Remove the motor shaft end cap. Insert a screwdriver in the slot of motor shaft. While holding shaft against rotation, unscrew impleller from shaft by turning counterclockwise when facing impleller.



Pry off rotating member of mechanical seal from shaft by using two screw drivers.



Remove bolts holding adapter to motor and take off adapter.

Place adapter on a flat surface and push out stationary part of mechanical seal.

Disassembly & Reassembly Procedures

Reassembly of the Pump

- ✓ Clean gasket and flange faces, seal seat cavity and shaft, in particular, shaft shoulder fitting against impeller.
- ✓ Lubricate seal seat cavity of adapter and rubber cup or O-ring of stationary seal with soapy water solution. Press the stationary seat in seal seat cavity squarely and evenly. Use caution not to chip or scratch the lapped face of seat.

Remount the adapter on motor, making sure the motor shaft does not dislocate or chip the stationary seat of the seal.

- ✓ Apply a soapy water solution to the motor shaft and the rubber bellows of the rotary seal. Set the rotating member of the mechanical seal on the motor shaft. Be sure the rotating seal face stays in the holding collar durring installation. Also take extra care not to chip or scratch the lapped seal faces.
- ✓ Hold the shaft against rotation as descibed previously in the disassembly procedure, and thread the impeller on the shaft unril it is tight against the shaft shoulder.
- ✓ Replace D-Washer and impeller nut holding the impeller against rotation as previously indicated in the disassembly procedure. (3 phase motors only)
- ✓ Remove any burrs caused by the screwdriver on the vane of the impeller in the waterway passage.
- ✓ Replace the motor and rotation element in the casting. Be sure that any damaged O-ring or gasket is replaced.
- ✓ Tighten casting bolts alternately and evenly.
- ✓ Replace hold-down bolts.
- ✓ Check for free rotation after assembly is completed.
- ✓ Replace the motor shaft end cap.

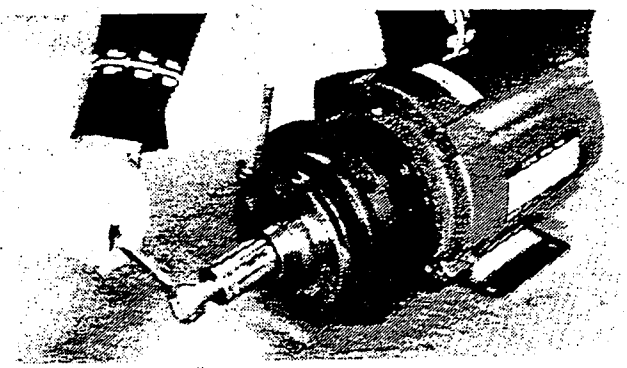
Disassembly & Reassembly Procedures

Close all drain openings using pipe sealant on threads.

Reprime before starting. Do not start until pump is completely filled with water.

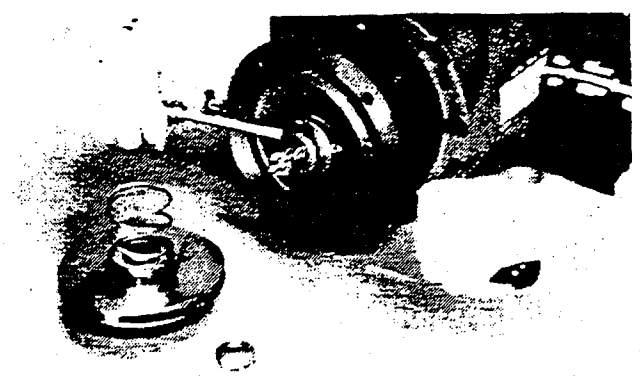
Disassembly and Reassembly for the 50C pump.

Insert a screwdriver in one of the impeller waterway passages and back off the impeller retaining assembly with a socket wrench, as shown.



Remove impeller from shaft, being careful not to lose the impeller key, spring and seal retainer. The the impeller is difficult to remove, it may be necessary to use a bearing puller to pull off the impeller.

Pry off rotating member of mechanical seal from sleeve or stub shaft by using two screw drivers.



Disassembly & Reassembly Procedures

- Remove bolts holding casting adapter to motor and take off casting adapter.
- Place casting adapter on a flat surface and push out stationary part of mechanical seal.
- Inspect the shaft sleeve or stub shaft. If damaged, or worn, remove from the shaft and replace with a new one.

Reassembly of 50c pump.

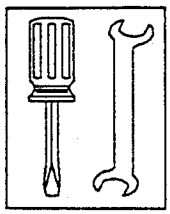
- Clean gasket and flange faces, seal seat cavity, shaft sleeve or stub shaft and motor shaft.
- Lubricate the seal seat cavity squarely and evenly, with caution not to chip or scratch the lapped face of the seat.
- With the motor preferably in vertical position, remount the casting adapter on the motor, making sure the motor shaft does not dislocate or chip the stationary seat of the seal.
- Apply a soapy water solution to the sleeve or stub shaft and the rubber bellows of the rotary seal. Slide the rotating member of the mechanical seal over the sleeve or stub shaft. Replace the seal spring and seal retainer. Be sure the rotating seal face stays in the holding collar during installation. Also take extra care not to chip or scratch the seal lapped faces.
- Place key in key seat and slide the impeller on the shaft. Replace the impeller retaining nut.
- Insert a screw driver in a waterway passage of the impeller holding it against rotation and tighten nut.
- Remove any burrs caused by screw driver on the vane of the impeller in the waterway passage.
- Slide the motor and rotating element in casing. Be sure that any damaged O-ring or gasket is replaced.

Disassembly & Reassembly Procedures

- Tighten casing bolts alternately and evenly.
- Replace hold-down bolts.
- Check for free rotation after assembly is completed.
- Close all drain openings, using pipe sealant on threads.
- Reprime before starting. Do not start untill pump is competely filled with water.

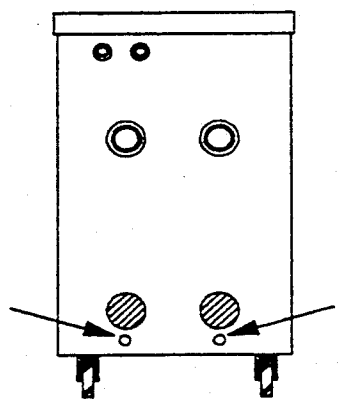
Disassembly & Reassembly Procedures

Volute Removal

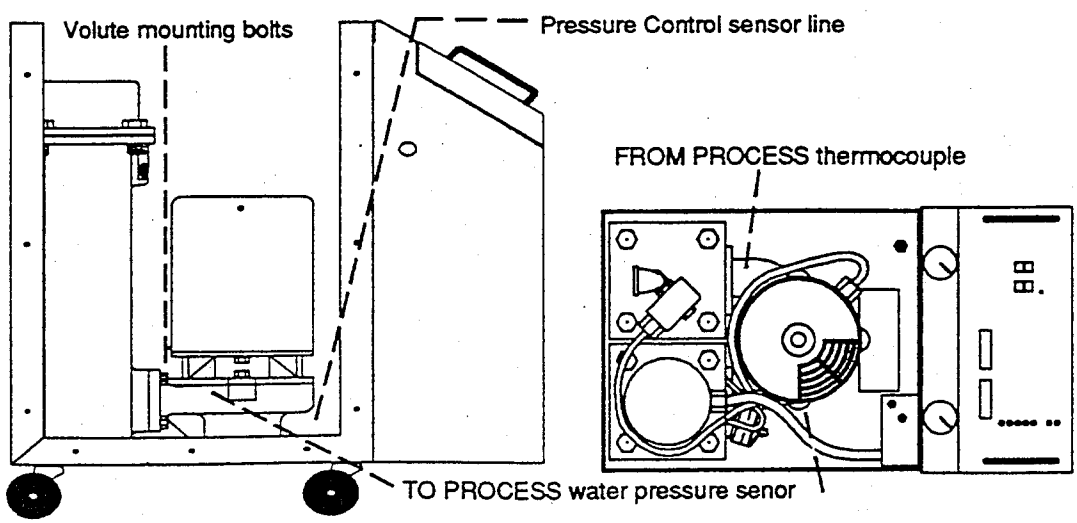


The tools required for this procedure are:

1/2" open face wrench
9/16" open face wrench
9/16" socket with 1/2" drive
1/4" allen key



- Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.
- Remove the pump assembly as previously stated.
- Remove the "TO PROCESS" water pressure sensor line using the 9/16" open face wrench.
- Remove the pressure control sensor line using the 9/16" open face wrench.
- Remove the "FROM PROCESS" thermocouple using the 1/2" wrench.
- Remove the 8 bolts mounting the volute to the heater and cooling tubes. Be careful not to misplace the O-rings mounted on the tubes.



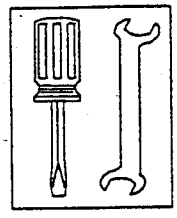
Disassembly & Reassembly Procedures

Reassembly of the volute.

Make sure the O-rings are in place on the tubes and reverse the previous procedure.

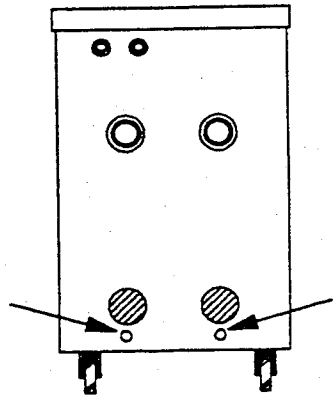
Disassembly & Reassembly Procedures

Tube Removal



The tools required for this procedure are:

1/2" open face wrench
9/16" open face wrench
1/4" allen key



Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.

Remove the pump assembly as previously stated.

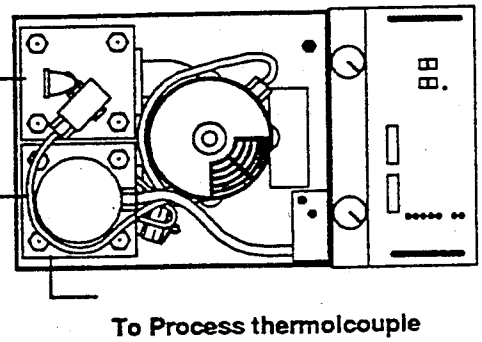
Remove the volute assembly as previously stated.

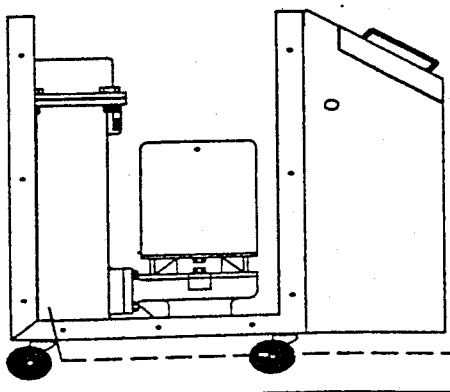
To remove the heater tube;

Remove the wiring harness and heater as previously stated.

Remove the "TO PROCESS" thermocouple using the 1/2" open face wrench.

The heater tube is released by removing the bolt in the far left corner. This bolt also mounts the left rear caster to the body.





Disassembly & Reassembly Procedures

To reassembly the heater tube, reverse this procedure. Make sure all gaskets and O-rings have been replaced and are in good condition.

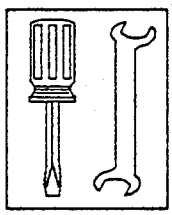
To remove the Cooling Tube;

Remove the cooling solenoid assembly as previously stated. On the closed circuit model, TC-CC, remove the cooling solenoid flange along with the heat exchanger. This is removed like the heater in the heater tube.

The cooling tube is released by removing the bolt in the far right corner. This bolt also mounts the right rear caster to the body.

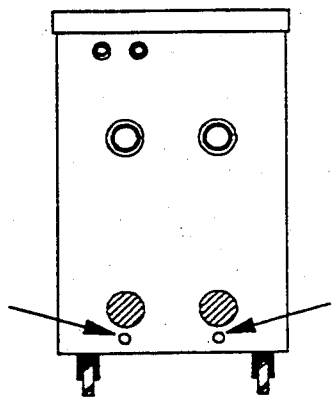
Disassembly & Reassembly Procedures

Process pressure gauge removal



The tools required for this procedure are:

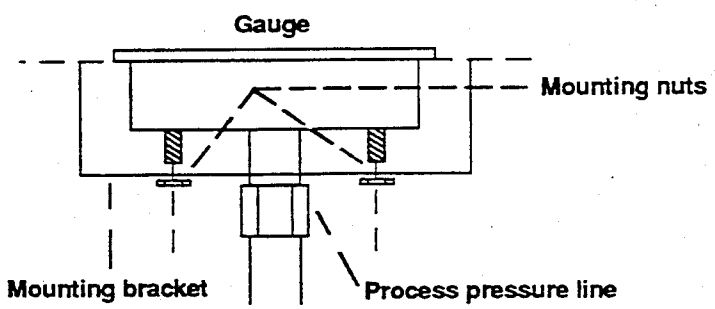
1/4" open face wrench
9/16" open face wrench
1/4" allen key



Drain the unit of all water through the drain plugs located in the rear of the unit. The drain plugs are removed using the 1/4" allen key.

The process pressure gauges can be removed by releasing the pressure line on the respective gauge with the 9/16" open face wrench.

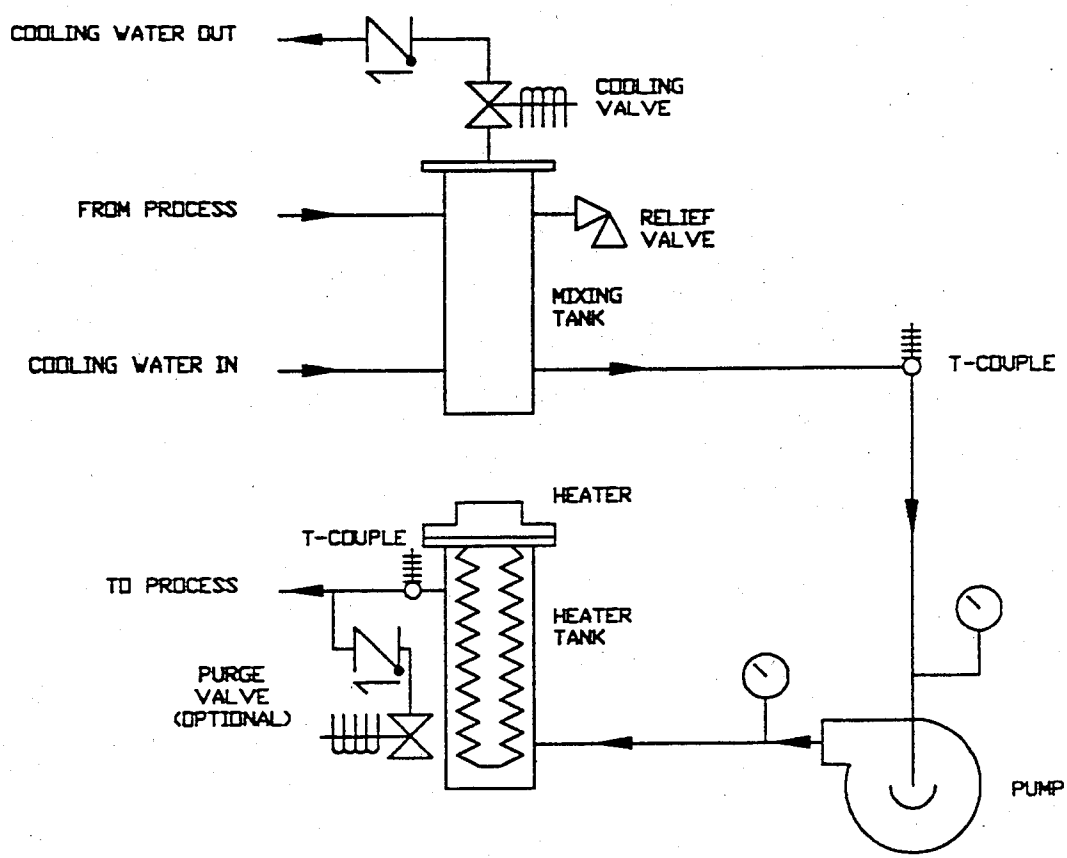
The mounting bracket is removed by removing the two nuts on the underside of the gauge. The gauge can then be removed through the top of the unit.



10

PLUMBING DIAGRAMS

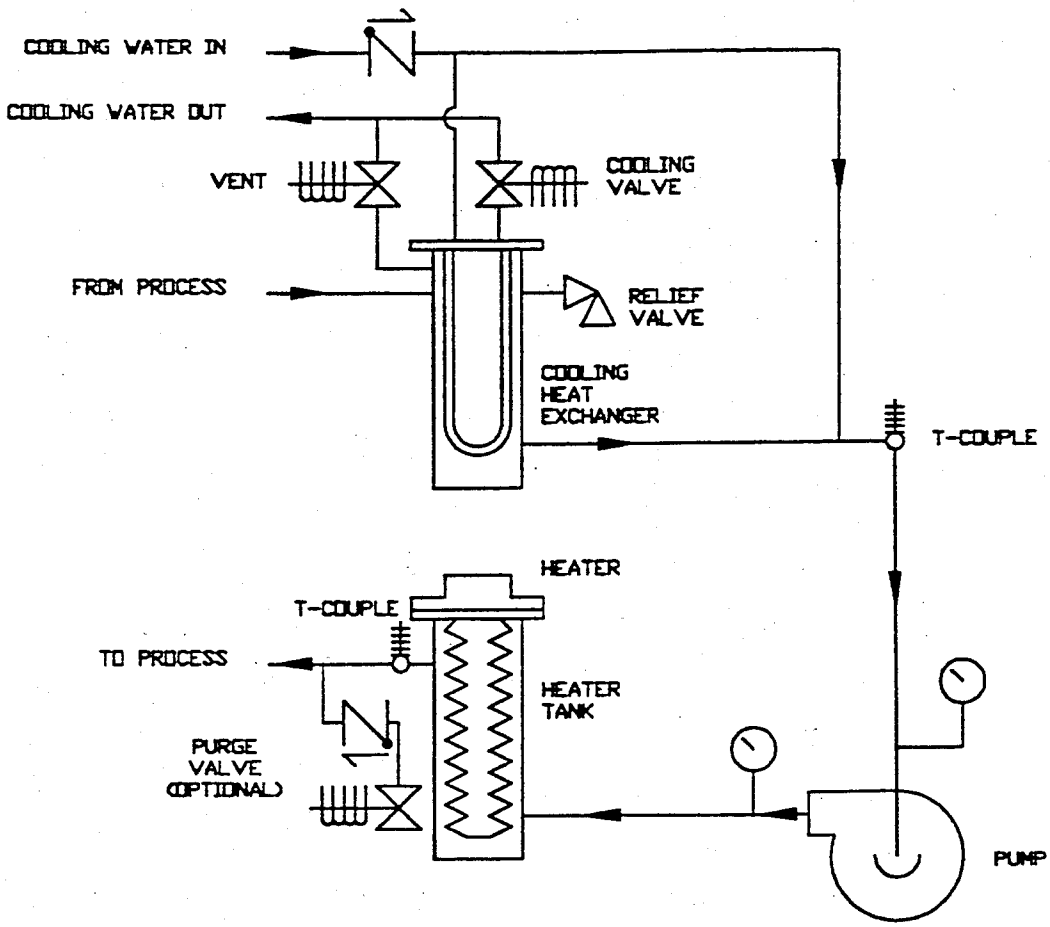
Plumbing Diagrams



DIRECT INJECTION

CHECK VALVES INCLUDED ONLY WITH OPTIONAL MOLD PURGE.

Plumbing Diagrams



CLOSED CIRCUIT

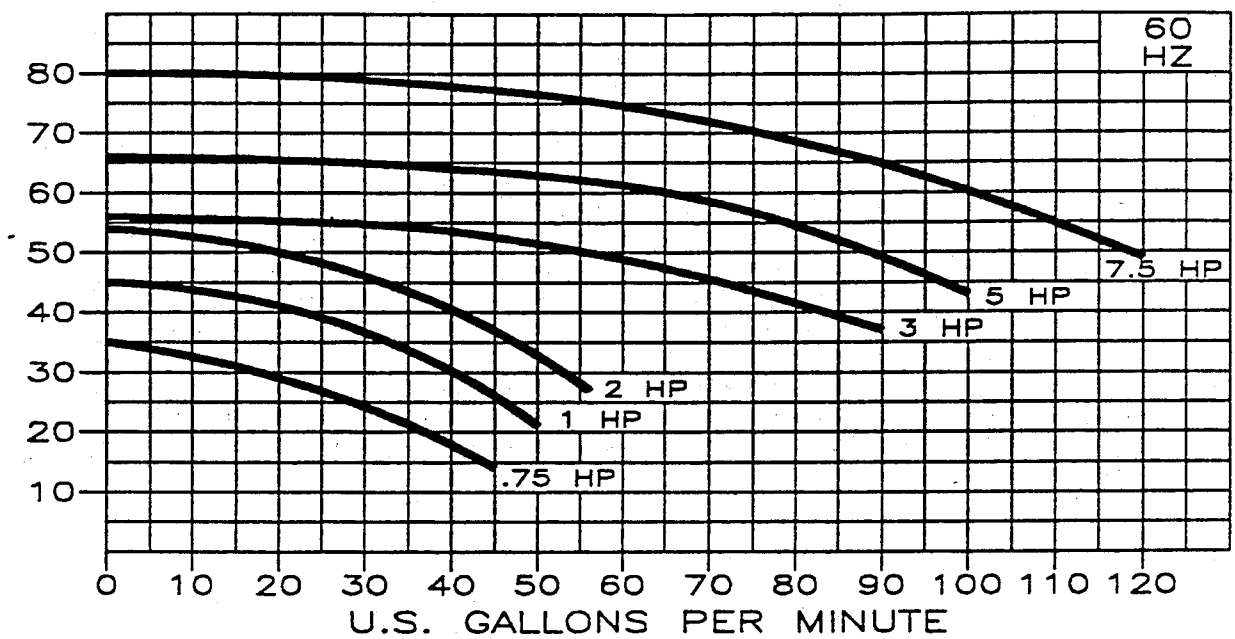
CHECK VALVES INCLUDED ONLY WITH OPTIONAL MOLD PURGE.

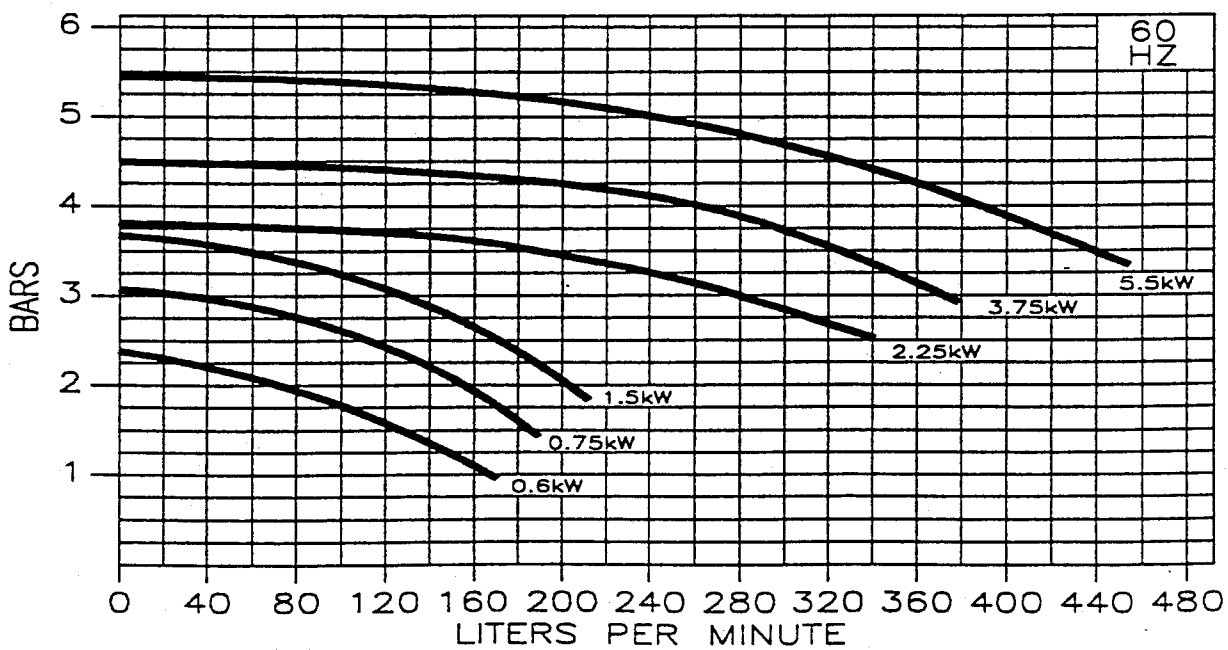
11

TECHNICAL INFORMATION

Technical Information

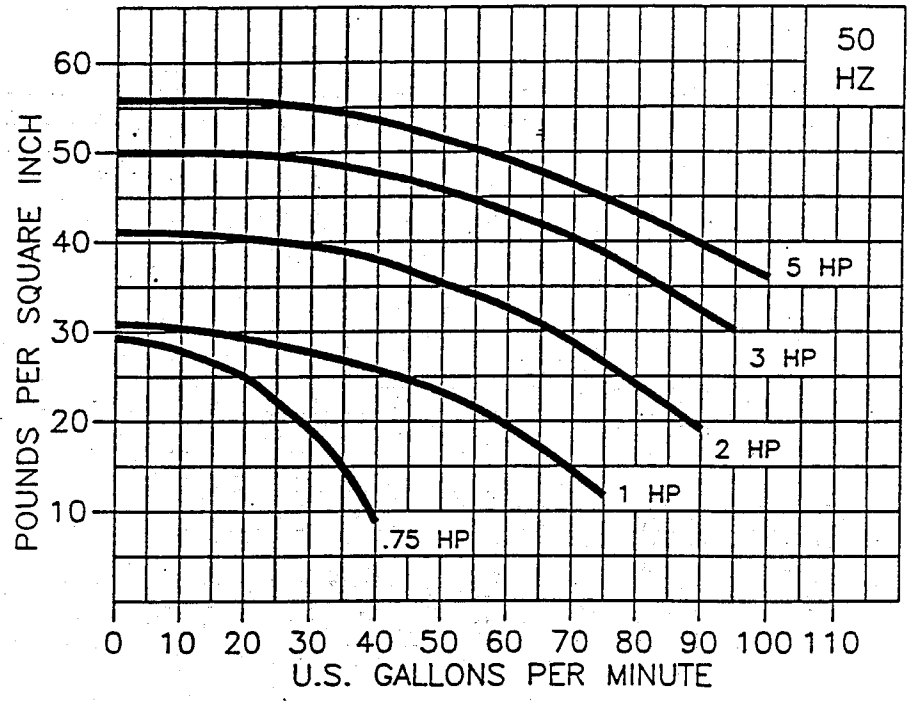
Pump Curves
60 HZ Units

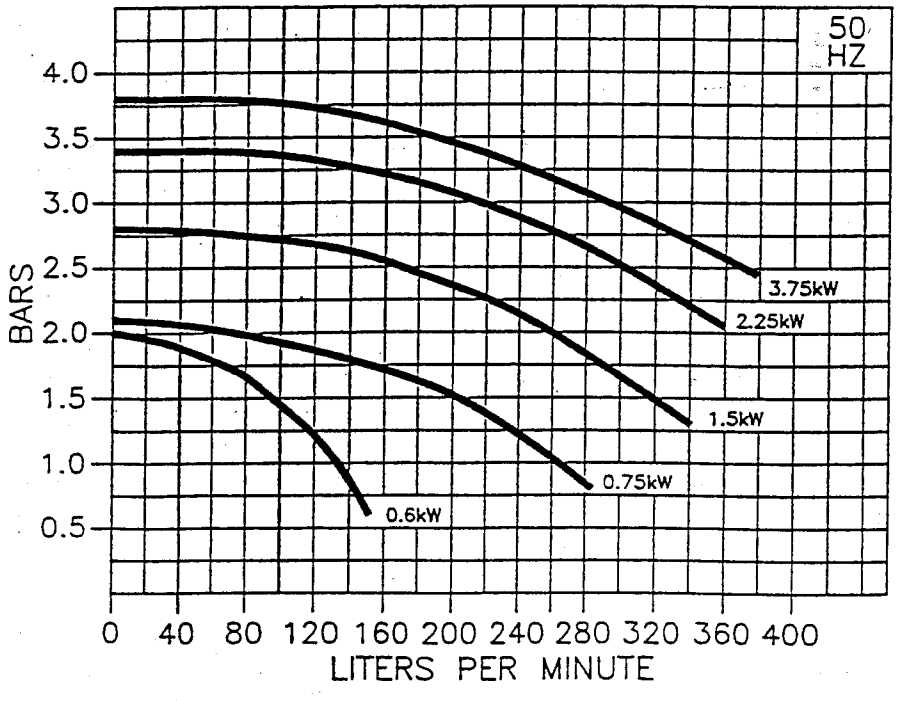




Technical Information

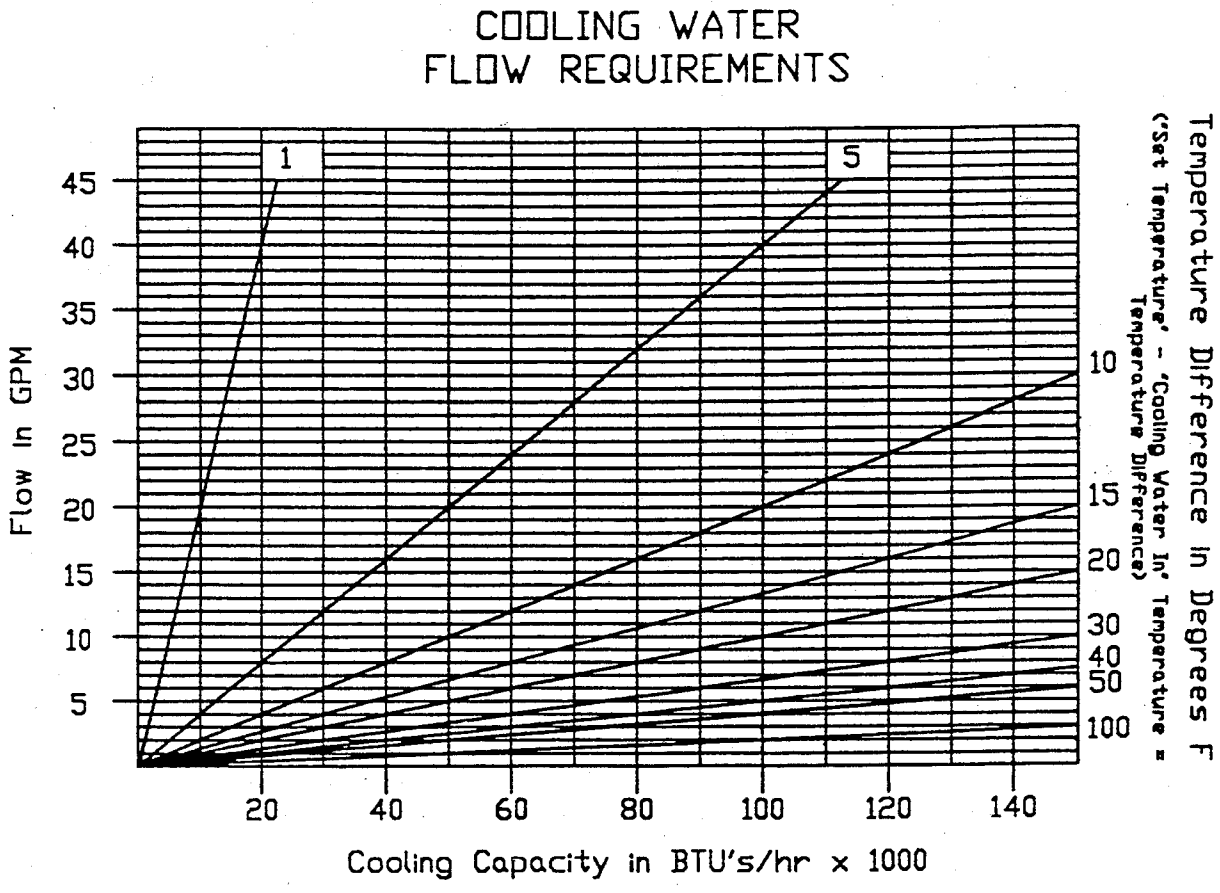
Pump Curves
50 HZ Units



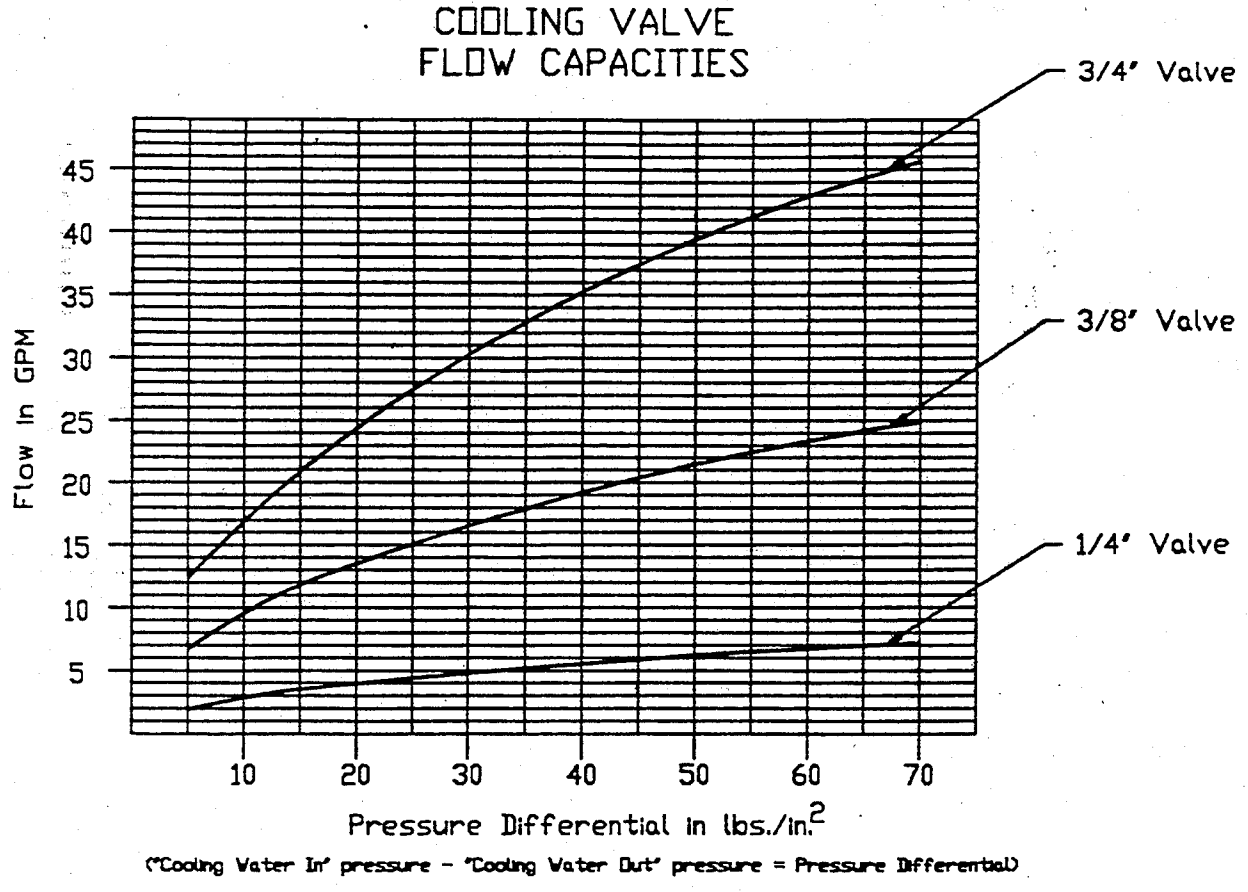


Technical Information

COOLING CURVES

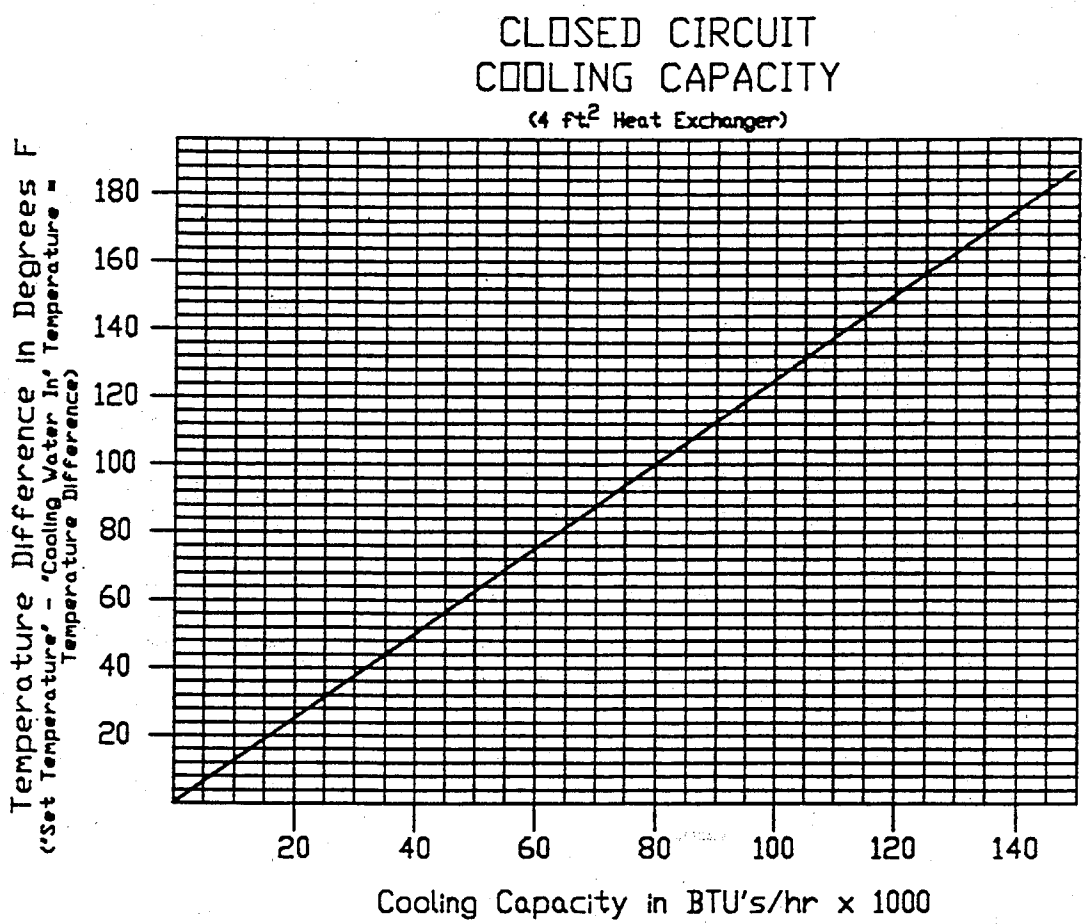


Technical Information

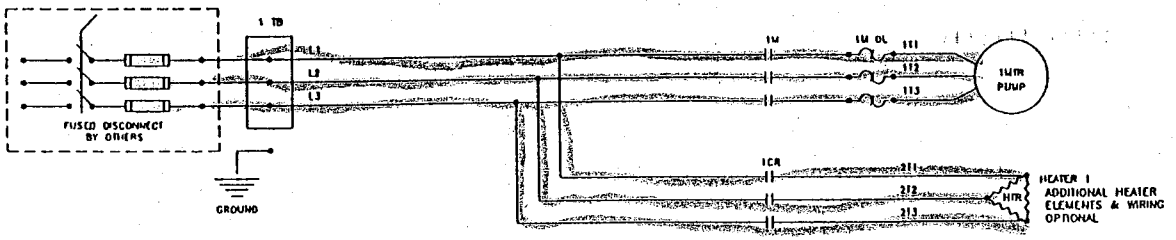


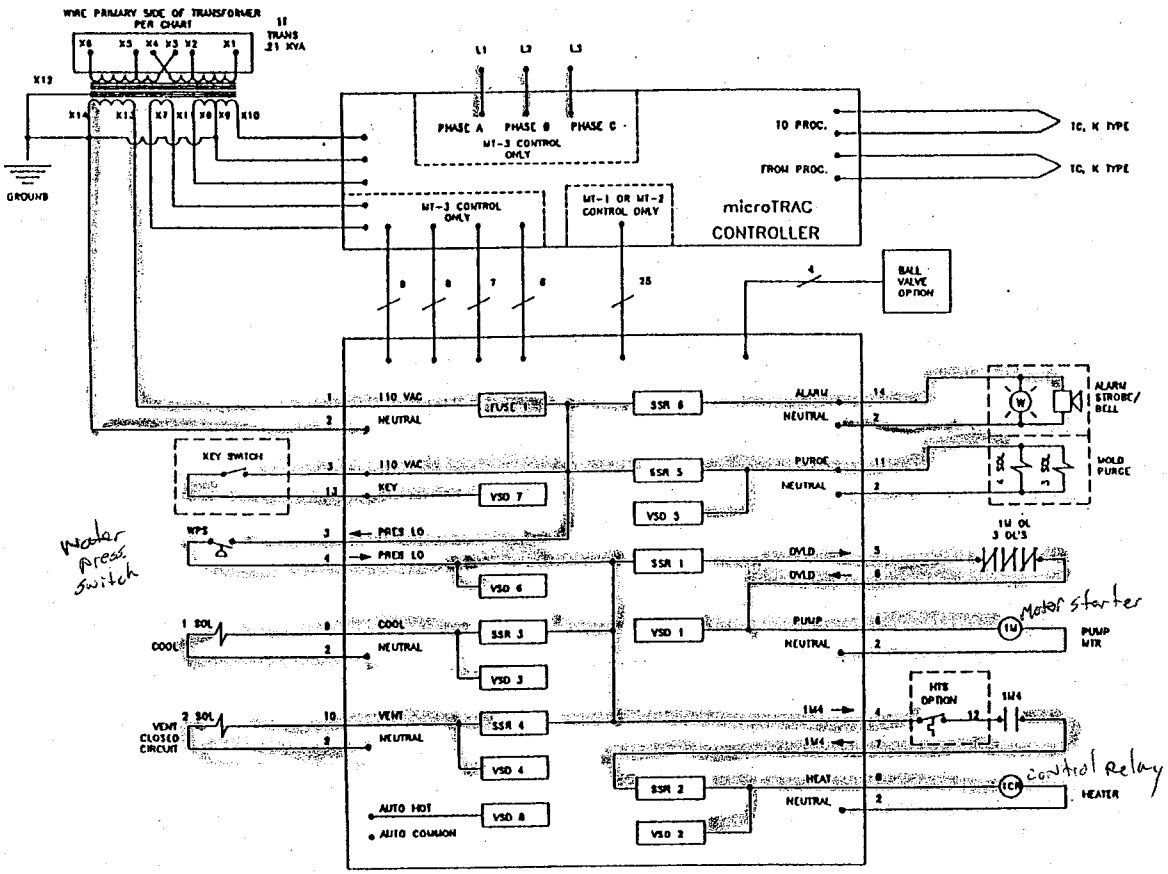
("Cooling Water In" pressure - "Cooling Water Out" pressure = Pressure Differential)

Technical Information



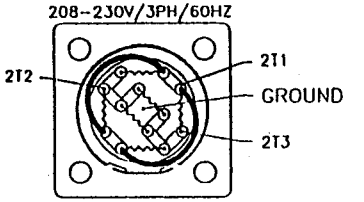
* Note: Minimum pressure differential between "Cooling Water In" and "Cooling Water Out" MUST be 30 PSI



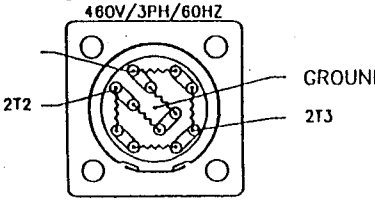


HEATER TERMINAL CONNECTIONS

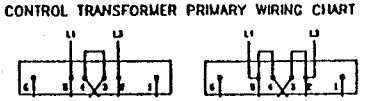
TERMINAL CONNECTIONS
208--230V/3PH/60HZ



TERMINAL CONNECTIONS
460V/3PH/60HZ



CONTROL TRANSFORMER PRIMARY WIRING CHART



NOTES

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PARTS LIST

Parts List

Thermolator® Temperature Control Units Recommended Spare Parts	Part Number
1. Pump Seal Overhaul Kit	
1.A 3/4 through 2 H.P.	09000358
1.A.1 Seal, silicon carbide	
1.A.2 O-ring, volute	
1.A.3 O-ring, suct./disch. - qty.2	
1.B 3 through 7.5 H.P.	09000359
1.B.1 Seal, silicon carbide	
1.B.2 Gasket, volute	
1.B.3 O-ring, suct./disch. - qty.2	
2. Cooling / Vent solenoid overhaul kits	09000360
2.A 1/4" valve (includes)	
Plunger	
O-ring	
Spring	
2.B 3/8" valve (includes)	09000361
Plunger	
O-ring	
Spring	
2.C 3/4" valve (includes)	09000362
Plunger	
O-ring	
Spring	
Diaphragm	

Parts List

3. Heaters (specific to unit)	
9kw 460 & 230/3/60	11009000
12KW 460 & 230/3/60	09000363
12KW 208/3/60	09000364
12KW 200/3/50	09000365
12KW 380/3/50	09000366
12KW 575/3/60	09000367
(All of the above include necessary gasket)	
4. Heat Exchanger Overhaul Kit (includes)	09000368
Bonnet Gasket	
Flange Gasket	
1/4" vent valve overhaul kit	
3/4" cooling valve overhaul kit	
5. Heat Exchanger replacement kit (includes)	09000369
Heat Exchanger, 4 sq. ft.	
Bonnet Gasket	
Flange Gasket	
1/4" vent valve overhaul kit	
3/4" cooling valve overhaul kit	
6. Spare Control Kit	09000370
6.A microTrac 1, 2 (includes)	
Control Board	
Control Enclosure	
Ribbon Cable set	
Thermocouple & half union (qty. 2)	
Fuse (qty. 2)	

Parts List

6.B	microTrac 3 (includes) Operator interface panel Mother Board RFI shield panel Operator interface cord Ribbon cable set Thermocouple & half union (qty. 2) Fuse (qty. 4)	09000371
7.	Water pressure switch	11000050
8.	Motor starter (specific to unit)	
9.	Heater contactor (specific to unit)	
10.	Control transformer	11001213
11.	Pressure gauge	09030006
12.	Relief valve	09000328
13.	Castor	09040000
14.	Control lock	09000300
15.	Printer cable	09000372
16.	Control extension cable	11000900
17.	RS485 network receptacle	09000373

Parts List

18. Pumps (includes suct./disch. O-ring - qty.2)	
3/4 H.P. 208-230-460/3/60	09000393
3/4 H.P. 575/3/60	09000394
3/4 H.P. 200-380/3/60	09000395
1 H.P. 208-230-460/3/60	09000396
1 H.P. 575/3/60	09000397
1 H.P. 200-380/3/60	09000398
2 H.P. 208-230-460/3/60	09000399
2 H.P. 575/3/60	09000400
2 H.P. 200-380/3/60	09000401
3 H.P. 208-230-460/3/60	09000402
3 H.P. 575/3/60	09000403
3 H.P. 200-380/3/50	09000404
5 H.P. 208-230-460/3/60	09000405
5 H.P. 575/3/60	09000406
5 H.P. 200-380/3/50	09000407
7.5 H.P 208-230-460/3/60	09000408
7.5 H.P. 575/3/60	09000409
7.5 H.P. 200-380/3/50	09000410
19. Pump motors	
3/4 H.P. 208-230-460/3/60	09000375
3/4 H.P. 575/3/60	09000376
3/4 H.P. 200-380/3/60	09000377
1 H.P. 208-230-460/3/60	09000378
1 H.P. 575/3/60	09000379
1 H.P. 200-380/3/60	09000380
2 H.P. 208-230-460/3/60	09000381
2 H.P. 575/3/60	09000382
2 H.P. 200-380/3/60	09000383
3 H.P. 208-230-460/3/60	09000384
3 H.P. 575/3/60	09000385
3 H.P. 200-380/3/50	09000386
5 H.P. 208-230-460/3/60	09000387
5 H.P. 575/3/60	09000388
5 H.P. 200-380/3/50	09000389
7.5 H.P 208-230-460/3/60	09000390
7.5 H.P. 575/3/60	09000391
7.5 H.P. 200-380/3/50	09000392

Parts List

20. Cooling Modulating Valves		
20.A	Valve Actuator	09002890
20.B	Valve Linkage	09001533
20.C	Valve Body, 1/2", 1.3 cv	09002890
20.D	Valve Repair Kit, 1/2", 1.3 cv (includes stem and packing)	09003227
20.E	Valve Body, 3/4", 5.0 cv	09002931
20.F	Valve Repair Kit, 3/4", 5.0 cv (includes stem and packing)	09003228
20.G	Valve Body, 1", 11.0 cv	09003058
20.H	Valve Repair Kit, 1", 11.0 cv (includes stem and packing)	09003229

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SPI COMMUNICATION
microTrac 2 Control

MT2 SPI Communication

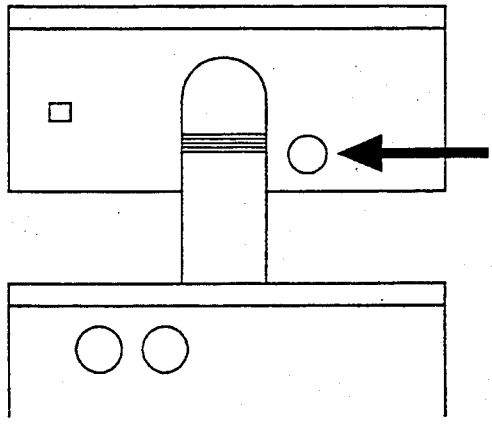
The microTrac 2 provides SPI compatible communication with a host machine. Events that are capable of being monitored and/or changed are:

Alarms
Temperature settings
Starting the unit
Stopping the unit

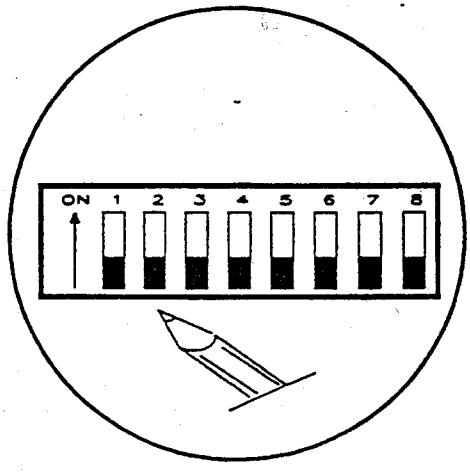
The following are the steps to take to activate SPI communication.

Make sure the Thermolator® has stopped operation and the power supply has been disconnected.

Raise the operator panel. In the rear of the panel is a round hole exposing the communication setting switches.



There is a bank of eight switches. They are set to the "OFF" position upon leaving the factory.



MT2 SPI Communication

Using the chart below, set the baud rate, and address for the unit. Every unit on the network must have a different address.

Switches 1 thru 5 determine the network address.

"X" = ON
" " = OFF

	Switches				
Address	1	2	3	4	5
32	X	X	X	X	X
33		X	X	X	X
34	X		X	X	X
35			X	X	X
36	X	X		X	X
37		X		X	X
38	X			X	X
39				X	X
40	X	X	X		X
41		X	X		X
42	X		X		X
43			X		X
44	X	X			X
45		X			X
46	X				X
47					X
48	X	X	X	X	
49		X	X	X	
50	X		X	X	
51			X	X	
52	X	X		X	
53		X		X	
54	X			X	
55				X	
56	X	X	X		
57		X	X		
58	X		X		
59			X		
60	X	X			
61		X			
62	X				
63					

Switches 6 and 7 determine the baud rate.

Baud Rate	6	7
1200	X	X
2400		X
4800	X	
9600		

Plug the male DB9 connector from your host machine into the SPI communications port located on the front of the operator panel. Reconnect the power supply and start the unit.

The Thermolator® now has SPI communication enabled.

We're Here to Help

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.

How to Contact Customer Service

To contact Customer Service personnel, call:

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.

Before You Call ...

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 loading control 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.

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

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.