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I.O.M. #149 updated : 03/24/2021

INSTRUCTION MANUAL • INSTALLATION • OPERATION • MAINTENANCE

REGAL

TEMPERATURE CONTROLLER

For Units with the G500 Series Control Instrument

ADVANTAGE
MAKING WATER WORK™

ADVANTAGE ENGINEERING, INC.
525 East Stop 18 Road Greenwood, IN 46142
317-887-0729 fax: 317-881-1277
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Model: _____

Serial Number : _____

REGAL

TEMPERATURE CONTROLLER

INSTRUCTION MANUAL

Regal RK with
G500 Series Instrument

COVERING

INSTALLATION
OPERATION
MAINTENANCE

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1.0 GENERAL

1.1 RECEIVING INSTRUCTIONS

A. Temperature control units are generally shipped skid mounted, boxed and wrapped in plastic prior to shipment.

B. Unbox the unit before accepting delivery. Check for visible damage and document any evident damage on the delivery receipt or refuse the shipment. Shipping damage is the responsibility of the carrier.

C. In order to expedite payment for damages, should they occur, follow proper procedures and keep detailed records. Take photographs of any suspected damage.

1.2 INTRODUCTION

A. This manual covers temperature control units from 12 to 48 kW of heating capacity using the G500 Series microprocessor control instrument. The standard fluid operating temperature range for this temperature control unit is 100°F to 500°F. Consult the factory if you have questions about the operating range of your temperature control unit.

B. The intent of this manual is to serve as a guide in the installation, operation and maintenance of your temperature control unit. Improper installation can lead to equipment damage and poor performance. Failure to follow the installation, operation and maintenance instructions may result in damage to the unit that is not covered under the limited warranty. This manual is for standard products. The information contained in this manual is intended to be general in nature. The information is typical only and may not represent the actual unit purchased.

C. When calling for assistance from the Manufacturer's Service Department, it is important to know the model and serial number of the particular unit. The model number includes critical unit information which is helpful when troubleshooting operating difficulties. The serial number allows the service team to locate manufacturing and testing records which can have additional information relating to a particular unit.

WARNING: *This equipment contains hazardous voltages that can cause severe injury or death. Disconnect and lock out incoming power before installing or servicing the equipment.*

1.3 SAFETY

A. It is important to become thoroughly familiar with this manual and the operating characteristics of the unit.

B. It is the owner's responsibility to assure proper operator training, installation, operation, and maintenance of the unit.

C. Observe all warning and safety placards applied to the unit. Failure to observe all warnings can result in serious injury or death to the operator and severe mechanical damage to the unit.

D. Observe all safety precautions during installation, startup and service of this equipment due to the presence of high voltage. Only qualified personnel should install, startup and service this equipment.

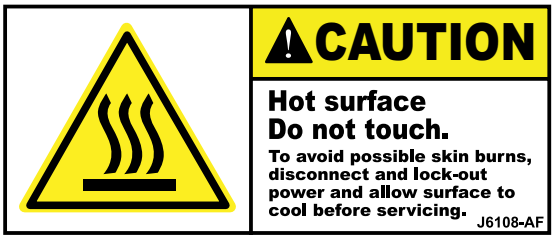
E. When working on this equipment, observe precautions in literature and on tags, stickers and labels located on the equipment. Wear work gloves and safety glasses.

F. Before installing and operating the unit, be aware of and follow any local laws and codes that apply to the installation.

G. Samples of Warning Labels applied to typical temperature control units.

1. Alerts users to the danger of high voltage.

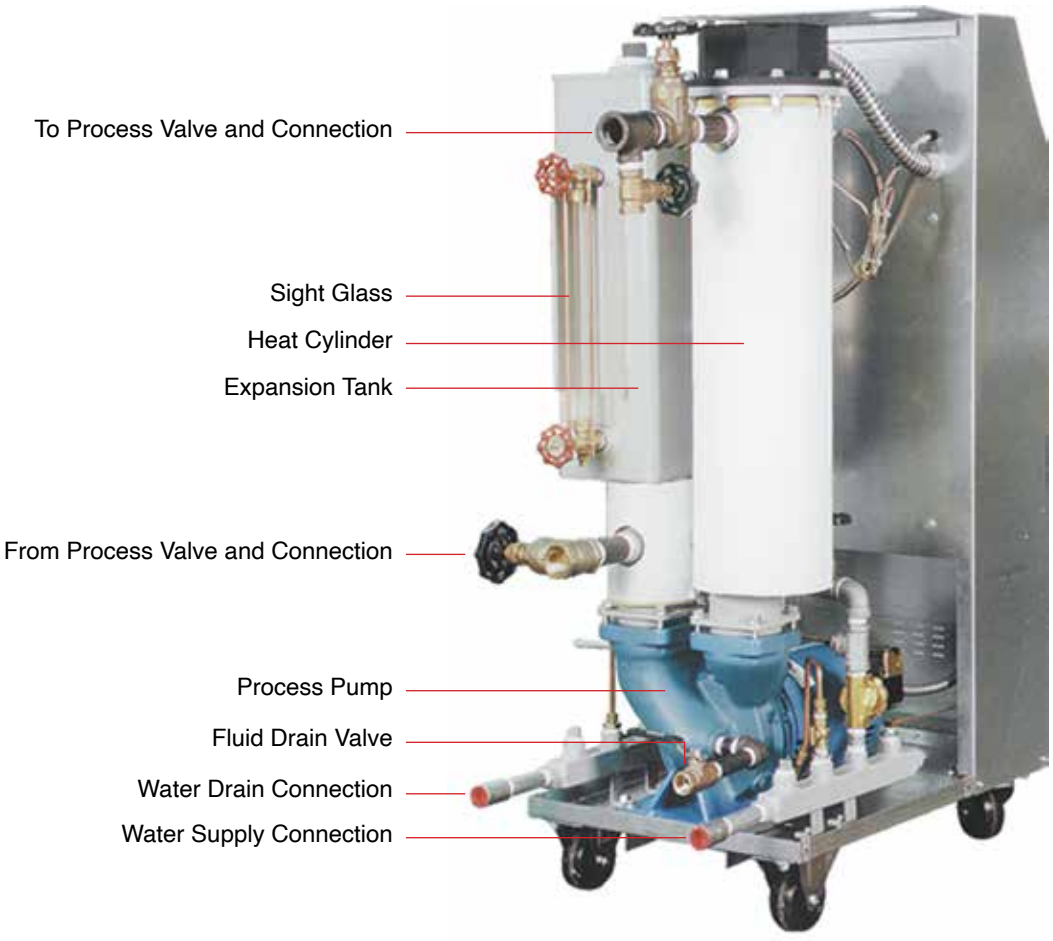
2. Alerts the user to possible explosive danger.



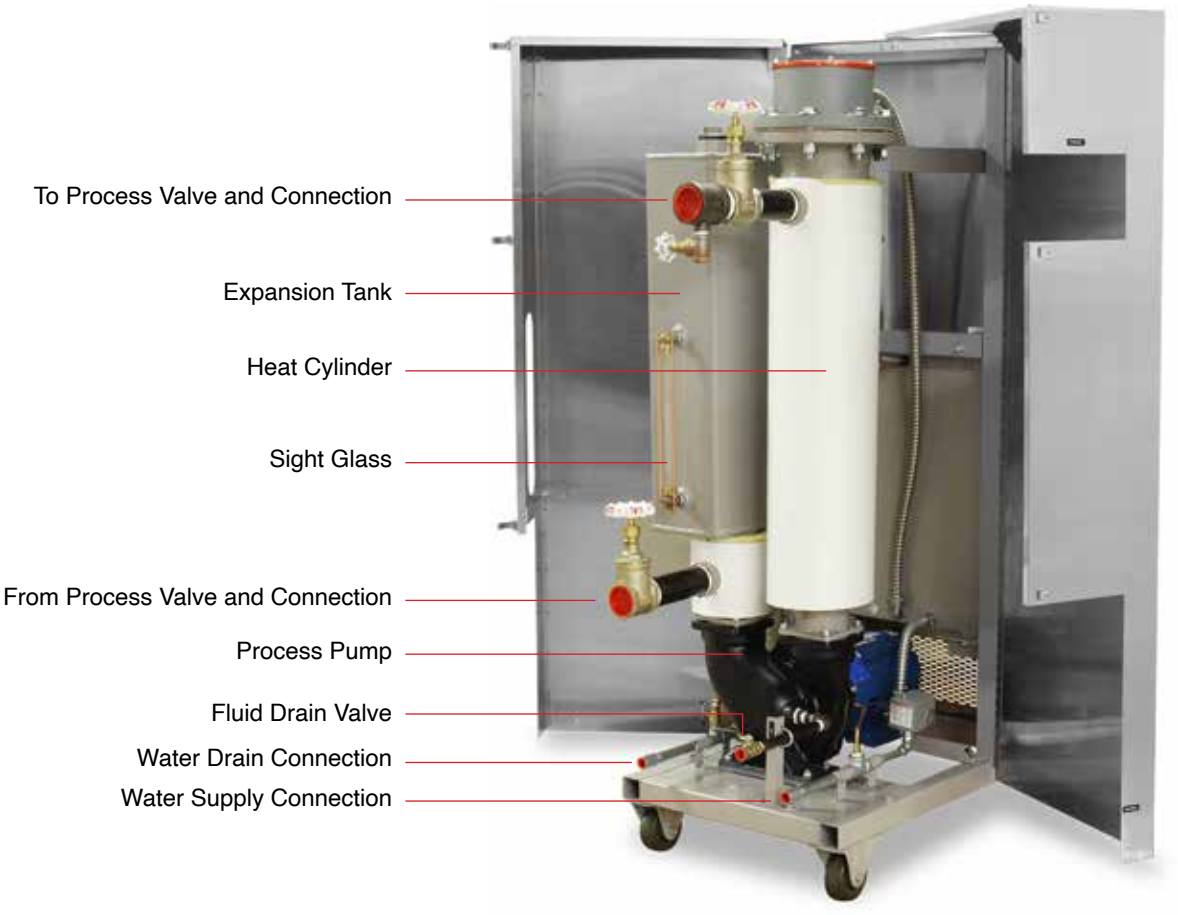
3. Alerts the user to a hot surface danger due to high operating temperatures.

WARNING: *Improper fluid quality will void unit warranty.*

1.4 COMPONENTS



Typical unit with lift-off cabinetry.



Typical unit with clam shell cabinetry.

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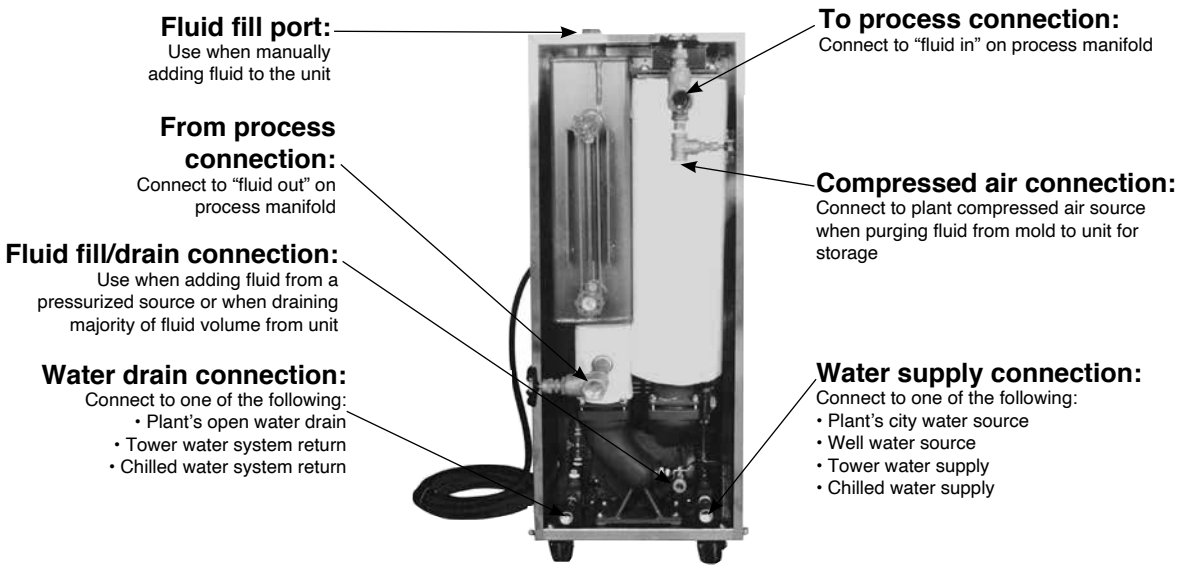
2.0 INSTALLATION

2.1 General
2.2 To and From Process Connections
2.3 Water Supply Connection
2.4 Drain Connection
2.5 Electrical Connection

2.1 GENERAL

A. Care should be taken to use materials (hose, rigid piping, valves or filters) rated for the temperature and pressure duty of your unit. Most units have a maximum operating temperature of 500°F or less and a maximum pressure of 75 PSI. The unit is most efficient when full size plumbing is run from the unit connections to and from the process. If necessary, reduce the plumbing size at your process, not at the unit.

B. Be certain all process piping materials have the equivalent or larger diameter of the particular process connection.



2.2 TO AND FROM PROCESS CONNECTIONS

A. Connect the unit's *To Process* port to the *Fluid In* port on the process manifold.

B. Connect the unit's *From Process* port to the *Fluid Out* port on the process manifold.

C. **Please note:** Process piping circuitry should be designed to avoid an excessive use of elbows and/or lengths of pipe or hose. If hose is the material of choice, avoid tight twists or curls and excessive lengths.

.

2.3 WATER SUPPLY CONNECTION

A. Connect the unit's *Water Supply* port to the plant's city water, well water, tower water or chilled water supply.

B. If unit is a Heating Only Unit, the water supply must be a minimum of 1/2 GPM at a maximum temperature of 100°F for efficient component cooling. If the unit is a Heating and Cooling Unit including a heat exchanger, the water supply must be a minimum of 3 GPM at a minimum temperature of 100°F. High water flow may be required for your application depending on the process cooling requirement.

C. The factory recommend minimum operating water supply pressure requirement is a minimum of 20 PSI**.** To protect the unit from operating without adequate supply water, a water pressure switch is plumbed into the supply manifold. If the supply pressure is not sufficient, the pressure switch will prevent unit operations.

D. On all units, cooling water circulates to the supply manifold, through the pump adapter cooling jacket, and is then rejected to the drain manifold. This action maintains proper pump seal cavity temperatures.

E. On units with the installed cooling option, a tube and shell heat exchanger for process fluid cooling is supplied and mounted to the expansion tank.

1. The purpose of the heat exchanger is to cool the process fluid. Cooling water from plant water supply circulates through the “tube” side of the heat exchanger. The process fluid circulates through the “shell” side. Cooling water flow is controlled by the solenoid valve.

2. A 1/2” ball valve is placed in the heat exchanger water supply line after the solenoid valve. The ball valve should be open during operations from 100°F to 200°F. During operations with temperatures over 200°F, this valve should be closed. In such cases, the necessary cooling water is proportioned to the heat exchanger through the small capillary line, which some water “steams off” to cool the process fluid. The steam and water mixture is then rejected to drain.

2.4 WATER DRAIN CONNECTION:

A. Connect the unit’s *Water Drain* port to one of the following, determined by the water supply source:

1. Open water drain for well or city water supply.

2. Tower water system return for tower system water supply.

3. Chilled water system return for chilled water system supply.

B. The factory recommends a minimum of 20 psi pressure differential between the water supply and water drain line for proper cooling.

1. For units equipped with the cooling feature, the amount of cooling provided by the unit depends on:

a. Cooling heat exchanger size.

b. The cooling valve size

c. The pressure differential across the valve

d. The temperature difference between the unit set point and the cooling water temperature

2. Consult factory when selecting the correct cooling valve for your application.

3. In general, the cooling capacity of the standard 3.5 sq ft heat exchanger is 6,000 Bth/hr (2 kW) for every 20°F difference between the cooling water temperature and the fluid temperature.

C. **CAUTION:** The unit must never be operated with a closed drain line valve. A closed drain line valve prevents adequate system cooling and will lead to unit overheating. Overheating of the unit may lead to unit damage and/or serious personal injury.

WARNING: *Never operate the Temperature Control Unit with a closed water drain.*

2.5 ELECTRICAL CONNECTION

A. Standard Models

1. Electrical power supply requirements for standard units are identified on the equipment data tag. Verify that available voltage supply is the same as the unit's voltage requirements.

WARNING: DO NOT CONNECT THE UNIT TO A VOLTAGE SUPPLY SOURCE NOT EQUAL TO THE UNIT'S VOLTAGE REQUIREMENTS AS SPECIFIED ON THE UNIT'S DATA PLATE.

WARNING: *Do not connect the unit to a voltage supply not equal to the unit's voltage requirements as specified on the unit's data plate. Use of incorrect voltage will void the unit's warranty and cause a significant hazard that may result in serious personal injury and unit damage.*

Use of incorrect voltage will void the unit's warranty and cause a significant hazard that may result in serious personal injury and/or unit damage.

2. For standard units with 12 kW heaters and up to 3 horsepower pumps, a four conductor cable, 10 foot in length, is provided for connection to an operator supplied fused disconnect.

3. For units with 16 kW to 48 kW heaters, the owner must provide a four conductor power cable and the fused disconnect.

4. The owner supplied fused disconnect must be sized and installed according to the unit's power supply requirements and local electrical codes.

B. Models With Factory Included Disconnect Switch and Other Custom Features

1. Some units may be customized and include a factory supplied power disconnect switch and/or higher specification electrical enclosure. Electrical power supply requirements are identified on the equipment data tag. Verify that available voltage supply is the same as the unit's voltage requirements.

WARNING: *Electric Shock Hazard. High Voltage is present in the electrical cabinet. Disconnect power before servicing. Follow all facility lock-out tag-out procedures.*

WARNING: DO NOT connect the unit to a voltage supply source not equal to the unit's voltage requirements as specified on the unit's data plate. Use of incorrect voltage will void the unit's warranty and cause a significant hazard that may result in damage to the unit or serious personal injury.

2. Appropriate conduit and fittings should be selected which will maintain the integrity of the cabinet.

3. Supply a power conductor sized according to the unit's power supply requirements. Connect the power conductor to the unit's power supply entry terminal block.

C. Control Circuit Wiring

1. The unit's supplied control circuit is 110 volt, 1 phase, 60 cycle. The control circuit is supplied by the factory installed transformer. A control circuit fuse is provided.

D. General

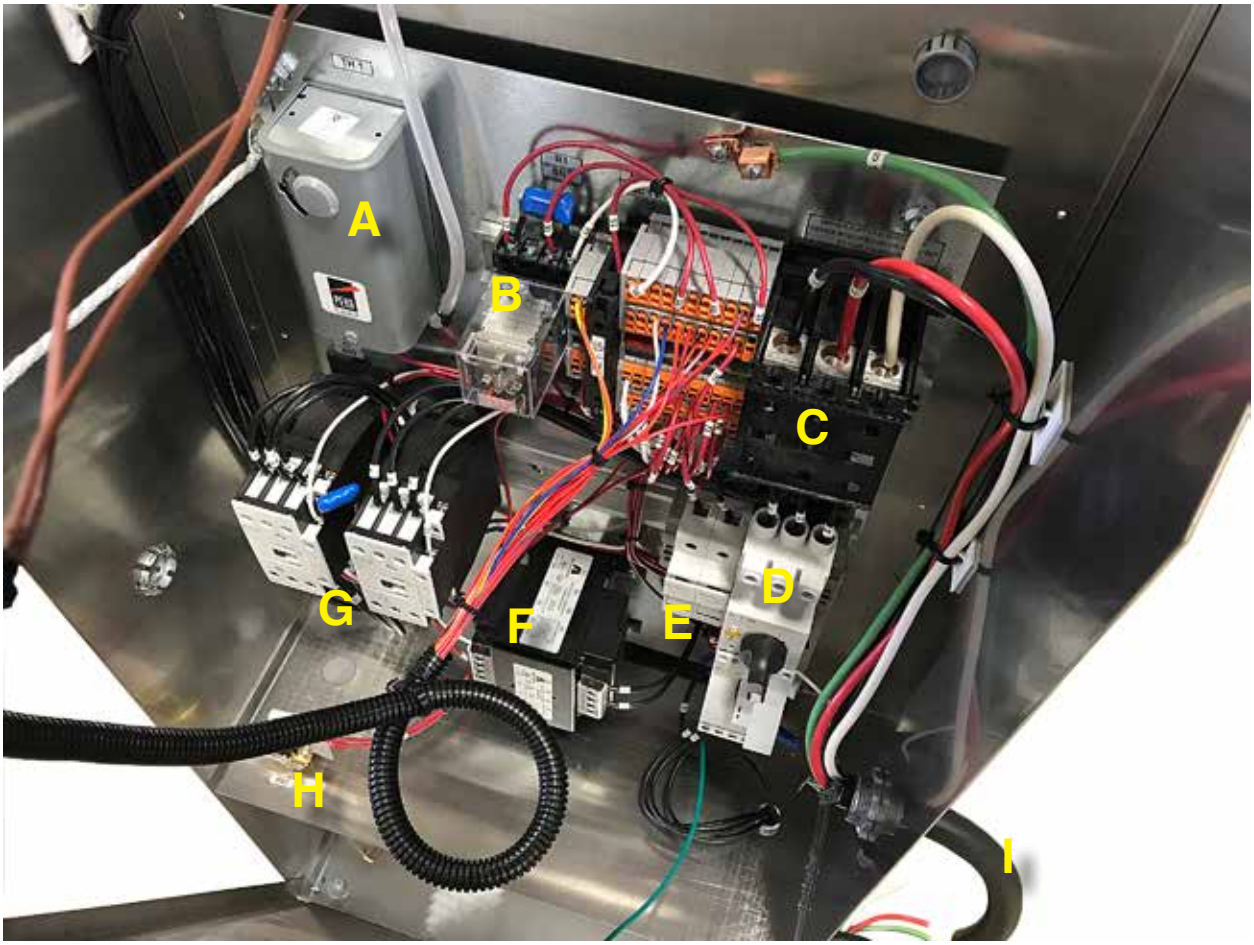
1. Make certain all ground connections to the unit are properly affixed. A proper connection to earth ground is required. A conduit ground is not a reliable conductor!

2. Make certain the power conductor, disconnecting means, and fusing are properly sized according to the unit's power supply requirements.

3. Make certain all electrical connections are tightly affixed. Any loose wiring connections must be tighten before engaging the power supply.

4. Make certain no moisture or standing water is present inside the electrical cabinet.

WARNING: *Check that all electrical connections are tight before starting. Disconnect power before servicing. Follow all facility lock-out tag-out procedures.*



Typical Electrical Panel shown as reference of a RK-1230H model. Refer to the electrical drawing available for specific model.

A	High temperature limit. Factory set to 515°F.
B	High temperature limit instrument relay.
C	Power entry terminal block.
D	Motor starter and overload block.
E	Transformer fuses.
F	Control transformer
G	Heater contactors
H	Water supply pressure switch
I	Power Cord. Note : typically included on most 12 kW models with up to 3 HP pumps. Units with 16 kW to 48 kW heaters and pumps do not include a power cord.

3.0 OPERATIONS

3.1 GENERAL

A. Failure to follow the factory required operation procedures may adversely affect the unit's ability to adequately control process temperature and may create a hazardous operating condition which may result in unit damage or serious operator injury.

B. The Operations segment of this manual is outlined below:

WARNING: *Follow all Factory operations procedures. Failure to do so may create a hazardous operating condition which may result in serious operator injury and/or unit damage.*

3.2 **Machine start-up/operations procedure** - follow this segment to start the unit after the initial installation or to restart the unit after reinstallation to the same or different process. This section includes information on system fill, electric motor phasing (pump rotation) and process flow adjustments.

3.3 **Instrument Operation** - follow this segment to start up and operate the instrument. This section includes information on setpoint selection and adjustment and feature explanations.

3.4 **Shut down procedure** - follow this segment to shut down the unit. This segment includes information on system cool down, shut down, electrical power supply precautions, and disconnection from the system.

3.2 MACHINE START UP AND OPERATION

A. System Fill

1. Use only approve high temperature heat transfer fluids in this unit such as Paratherm NF or an equivalent fluid (www.paratherm.com). Never use water in this unit.

List of Approved Heat Transfer Fluids

- Paratherm OR (https://www.paratherm.com/heat-transfer-fluids/paratherm-or-heat-transfer-fluid/)
- Paratherm NF (https://www.paratherm.com/heat-transfer-fluids/paratherm-nf-heat-transfer-fluid/)
- Multitherm PG-1 (http://www.multitherm.com/multitherm-pg-1.html)
- Calflo FG (https://lubricants.petro-canada.com/productoverview/brand/calflo)

2. The primary method of system fill is through the fill port located on the top of the unit. Simply remove the cap plug and add fluid. Replace the cap plug and tighten when the fill is complete.

3. The alternate method of system fill is through the fill/drain valve. If a pressurized source is available, simply connect to the fill/drain valve, open the valve and engage the supply source. Close the valve when the fill is complete.

4. Proper unit fill is essential for efficient and safe operation. An oil level sight glass is provided to determine unit fill. For initial fill: units up to 12 KW - fill until

the sight glass is 1/2 full; for units up from 27 to 48 KW fill until the sight glass is completely full. When the pump is first started, the oil level will drop as the heater tank and process are filled. After which, the operator may need to top off as necessary to maintain oil level near the bottom of the sight glass. Check the system for any leaks and repair if necessary.

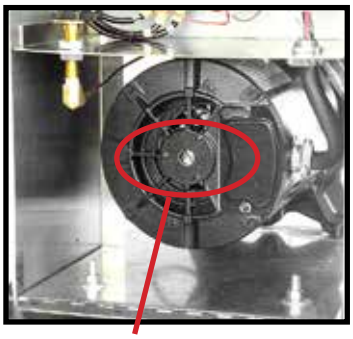
WARNING: *Electrical power is engaged and caution should be employed while the cabinet is open.*

B. Electric Motor Phasing (Pump Rotation)

1. The operator must determine the electric motor is phased correctly. This is done by visually inspecting the rotation of the motor shaft as outlined below. Incorrect phasing of the unit results in poor operation and eventual damage.

a. Supply electrical power to the unit by engaging the unit's disconnect switch. Once the correct voltage is supplied to the unit, the *Power* light on the display will illuminate.

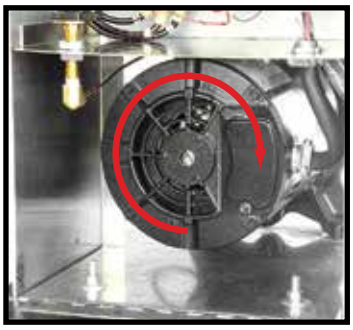
b. Open the hinged electrical cabinet panel cover. **Note that the electrical power is engaged at this point and caution must be observed while the electrical supply is engaged and the cabinet panel is open.**



Remove shaft cover to view the motor shaft.

c. Locate the electric motor and identify the motor shaft inside the electric motor housing. The motor shaft can be seen through the vent slots in the motor housing or by removing the shaft cover.

d. Toggle the *On / Off* buttons. This will cycle the motor "on" and then "off".



Correct rotation is clockwise when viewed from the rear of the motor.

e. Observe the motor shaft as it slows to a stop to identify the rotation. Correct rotation is "clockwise", when viewed from the rear of the motor. Incorrect rotation is "counter-clockwise" when viewed from the rear of the motor. If the shaft does not rotate when the unit is started, the operator must identify the cause as outlined in this manual's troubleshooting and repair section.

f. If the unit is phased correctly, continue with the start up procedure at step C. If the unit is phased incorrect, continue with step 2.

2. To correct unit phase:

a. Disengage the electrical power supply to the unit at the unit's disconnect switch. Follow proper lockout procedures before proceeding.

b. Once the electrical power supply is disengaged, reverse any two power leads of the power cord at the fused disconnect terminals.

c. **Note: The operator must reverse the power leads at the disconnect only and *not* at the power entry terminals on the unit's electrical panel**. The unit's internal electrical system wiring is phased correctly at the factory and must not be altered in the field.

WARNING: *To correct phase ... switch power leads at the disconnect switch only.*

C. Process Flow Adjustments

1. The operator must determine and set proper fluid flow rate for the most efficient and trouble free operation.

a. Fluid flow rate through the process is determined by the pressure losses in the process loop. Generally, higher flow rates result in turbulent flow achieving maximum temperature control and lower maintenance.

b. If the flow rate exceeds the motor horsepower capacity, the electric motor will draw excessive amps. This is a result of the process loop's ability to flow fluid at a greater rate than can be provided by the pump. This will eventually result in tripping the motor overload relay (overload relays open) and the unit will shut down and the instrument will indicate an alarm condition.

2. If an excessive flow situation is encountered and the motor overload circuit has tripped, the operator must manually reset the overload relay before operations can continue. Disconnect from power and follow proper lock out tag out procedures prior to opening the electrical panel cover and identifying the overload relay.

Overload relays have a switch (pictured below). This switch will be positioned with the indicator pointing up when in normal operation. The indicator will be pointing to the left when the overloads are tripped. To reset, simply turn the

Normal Operating Position

Tripped Position

WARNING: *Electrical power is engaged and caution should be employed while the cabinet is open.*

switch to where the indicator points up.

Some older models have overload relay where a red button that pops out if the overloads are tripped. Simply push the button in until the overloads are reset.

3. If a motor overload situation persists, the operator must adjust the flow rate to match the system pressure loss (reduce flow rate) to prevent continual tripping of the overload relay.

a. Open electrical cabinet panel door. The panel cover is hinged and held open by a support cable. **Note that the electrical power is engaged at this point and caution must be observed while the cabinet panel is open.**

b. Identify the motor starter block. This block consists of the motor starter contactor and the overload relay.

c. Place an amp meter on a single power lead coming from the overload relay.

d. Locate the motor name plate on the pump motor housing. The full load amp rating for the motor is listed on the name plate.

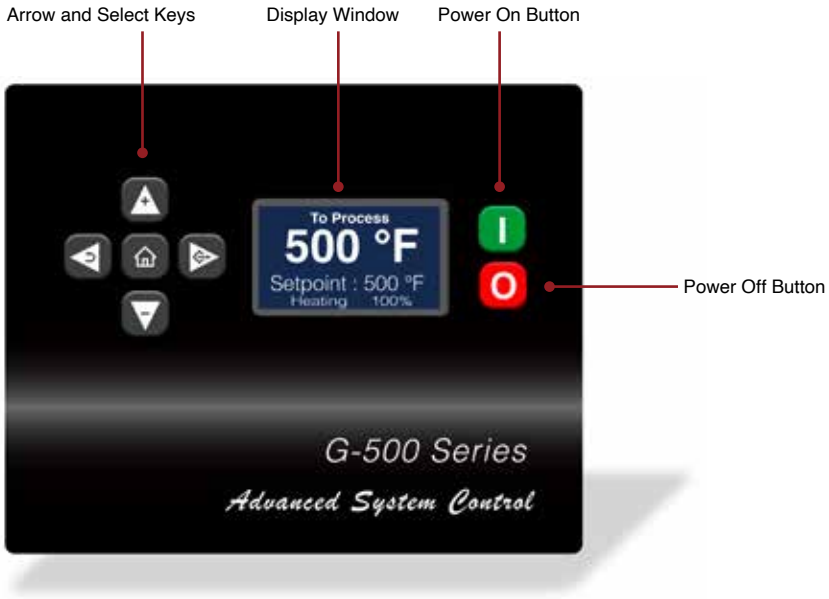
e. Engage the electrical power supply and start the unit.

f. The amp meter will display the motor amps. Compare the actual motor amps as displayed on the amp meter to the full load amp rating as listed on the motor name plate.

g. If the amp draw is excessive (higher than the listed name plate amp rating), a throttling valve must be installed in the “from process” line. The throttling valve can be a gate valve or a ball valve.

h. With the throttling valve installed, fully close the valve and then engage the pump motor. Slowly open the throttling valve and monitor the motor amps as displayed on the amp meter until the actual motor amps equal the listed full load amp rating of the motor. The process flow is now correctly adjusted. The valve should remain in this position during operation.

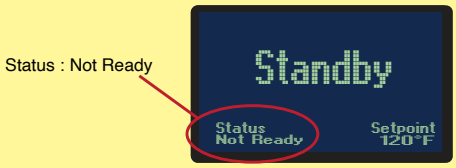
6. **LOW PROCESS FLOW:** The minimum recommended process flow rate is 50% of unit rated flow. Process restrictions may limit the flow to less than 50%. We recommend the addition of bypass lines to raise the flow rate to 50%. The best place to add bypass lines are on the extra ports on the process manifold. If extra ports are not available, add a tee in the *To Process* and *From Process* lines, install a bypass line between the two tees with a throttling valve. Adjust the valve for a minimum of 50% of unit rated flow.



3.3 INSTRUMENT : QUICK START

1. Apply power. The Standby screen will illuminate. When Standby is displayed on the screen, the unit is not running.

2. After applying power a screen that reads “Not Ready” typically indicates the presence of a sensor probe fault, pressure switch fault or motor overload fault. See the troubleshooting portion of the manual for additional information. The fault must be corrected in order to continue operation of the unit.

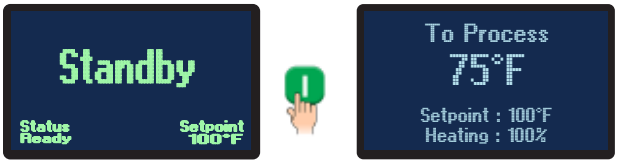


3. This unit features an LCD screen. Use the five soft touch buttons to navigate the available screens and select parameters.

4. A System Safety Fault may prevent startup. Probe, water supply pressure, pump overload or high temperature limit may display once power is applied and must be corrected prior to operation.

5. Adjust the setpoint to the desired value by pressing the Increment or Decrement buttons.

6. The unit is ready to start when no errors are shown on the screen. Press the green start button.



7. The unit will heat or cool to maintain the setpoint temperature.

3.4 INSTRUMENT : BASIC NAVIGATION

A. The instrument has 5 soft keyed buttons.

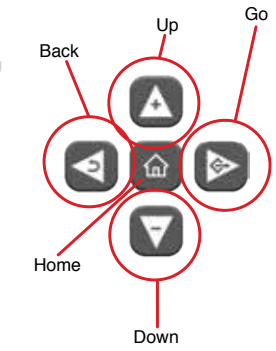
1. The Home button, when pressed , shows the Home screen.

2. The Up button, when pressed, will add one unit of value or will scroll up through a menu.

3. The Down button, when pressed, will subtract one unit of value or will scroll down through a menu.

4. The Go button, when pressed, will advanced through a series of screens or save a value.

5. The Back button, when pressed will go backwards through a series of screens.

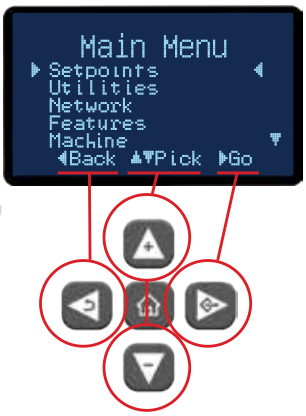


B. Prompts on Selection Screens. Selection screens display a menu of selectable items.

1. The Up button will scroll up through the menu items. The screen indicators will scroll along with the pressing of the button.

2. The Down button will scroll down through the menu items. The screen indicators will scroll along with the pressing of the button.

3. The Go button will advance to the value screen of the selected parameter.

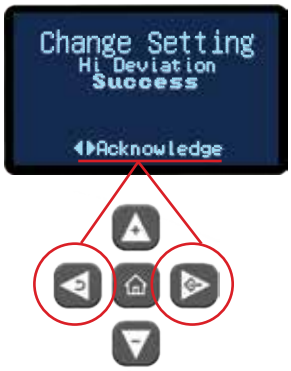


4. The Back button will return to the previous screen. Successive pressing of the Back button will eventually end at the Home screen.

C. **Prompts on Value Screens.** Value screens allow the user to set or change parameter values.

1. The Up button will add to the value of the parameter.
2. The Down button will subtract value from the parameter.
3. The Go button will save the new value to memory.
4. The Back button will cancel the transaction and will return to the parent screen.

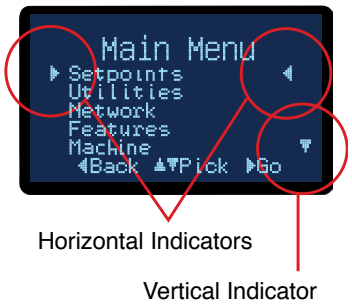
D. **Prompts on Success Screens.** Success screens appear once a value is changed and the new value is successfully saved. The screen shows the name of the parameter and displays “Success” as indication the value was saved.



1. Use the Go or Back buttons to acknowledge the prompt.
2. After acknowledging the success, the screen returns to the parent screen.

E. **Screen Indicators.**

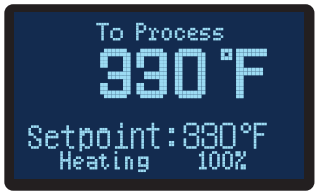
1. Small indication triangles are used as on screen pointers.
2. The horizontal indicators point to the current selection. By pressing the Go button, the screen advances to that selection.
3. The vertical indicator shows that some menu items are not currently shown on the screen. By pressing the Down button, the menu will scroll down to display the menu items not currently visible. By pressing the Up button, the menu will scroll up.



3.5 INSTRUMENT : OPERATING SCREENS

A. The instrument displays several operating screens to indicate what the unit is doing as far as heating, cooling and other functions if available. In most operating screens, the To Process temperature is shown with the operation indicated under the setpoint temperature, as shown in the example below.

B. **Heating.** The amount of heating applied to the process is indicated in the Heating Screen.



3.6 INSTRUMENT : FAULT SCREENS

A. **Faults Preventing Start Up or Operation :**

1. System Safety. This fault screen appears if the following occurs:

a. **Water Pressure.** The unit will not operate without adequate water supply pressure. Sufficient water supply pressure must be present to close the water pressure switch. Recommended water supply pressure is 20 PSI. Water supply pressure should not exceed 55 PSI. If water supply pressure exceeds 55 PSI, a pressure reducing valve must be installed in the water supply line.

b. **Motor Overload.** The unit will not start or run if the motor overload is tripped. During operations, this error is triggered by excessive flow causing the pump to draw more amps then it is rated for. A throttling valve should be placed in the from process line to control flow.

2. **High Temp.** If process temperature exceed 515°F, the high temperature limit switch opens and the unit shuts down. High temperature conditions are generally caused by inadequate water supply pressure, a defective cooling valve, an obstructed drain line or high back pressure in the drain. Determine the cause and correct. See the troubleshooting section of this manual for more information. The high temperature limit switch will automatically reset as the unit cools.

B. **Faults Not Preventing Start Up or Operation :**

1. **To Process Sensor.** This fault screen will appear if the To Process temperature sensor is defective and needs to be replaced or if the sensor connection is wet or loose.

2. **Phase.** This fault screen appears if the unit is incorrectly phased to the plant power. A phase issue is usually detected at first start up. The unit will operate if the green Power button is pressed. However, the unit's pump will operate backwards and there will be minimal flow to process.

To correct, follow all lock out tag out policies to shut down power to the unit at the disconnect. Reverse any two power wires at the disconnect to correct phase.

Do not reverse the unit's internal wiring to correct a phase condition.

3.7 INSTRUMENT : MAIN MENU

A. The Main Menu offers the ability to set and change values in the following areas:

1. Setpoints.
2. Utilities.
3. Network.
4. Features.
5. Machine.

B. The Main Menu is accessible from the Standby screen by pressing the Go button.

C. The Main Menu is also accessible from any Operating screen by pressing the Go button. In the example below, while on the Cooling screen, pressing the Select button will advance to the Main Menu.

3.8 INSTRUMENT : SETPOINTS MENU

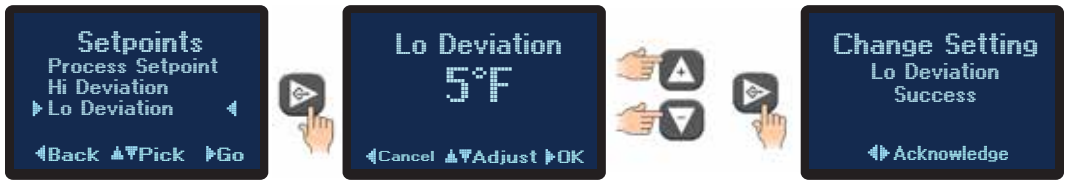
A. Under the Setpoints menu item, the values for the Process Setpoint, Hi Deviation, Low Deviation can be set or changed.

B. **Process Setpoint.** Use the Up or Down buttons to change the process setpoint.

1. The Setpoint range is from 100°F to 500°F. Please note, the unit can not reduce process temperature below the provided water supply temperature.

2. Once acknowledged, the unit will control to the new setpoint temperature. Press the Back button repeatedly to return to the Setpoints screen or press the home button to return to the Home screen.

C. **Hi Deviation.** The High Deviation value programs the controller to sound the alarm if the process temperature exceeds the set difference from setpoint. For example, Hi Deviation = 5°F, Setpoint = 200°F. Hi deviation alarm will sound if the temperature reaches 205°F.



1. The factory default is 10°. The range for the Hi Deviation is from 0°F - 50°F.

2. Once acknowledged, press the Back button repeatedly to return to the Setpoints screen or press the home button to return to the Home screen.

D. **Lo Deviation.** The Lo Deviation value programs the controller to sound the alarm if the process temperature exceeds the set difference from setpoint. For example, Lo Deviation = 5°F, Setpoint = 200°F. Lo deviation alarm will sound if the temperature cools to 195°F.

1. The factory default is 10°. The range for the Lo Deviation is from 0°F - 50°F.

2. Once acknowledged, press the Back button repeatedly to return to the Setpoints screen or press the home button to return to the Home screen.

3.9 INSTRUMENT : UTILITIES MENU

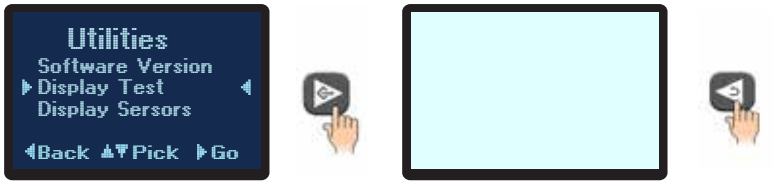
A. Items in the Utilities menu include the operations for the Software Version, Display Test and Display Sensors.

B. **Software Version.** The software version number is the current version of the controller's software. This number came be useful when troubleshooting at times.

1. Select the Software Version item from the Utilities Menu to advance to the software version screen.

2. Press the Back button to return to the Utilities menu.

C. **Display Test.** The Display Test will test the entire for bad pixels or sectors.



1. Select the Display Test item from the Utilities Menu to advance to the Display Test screen.

2. The test will show a blank screen. If any bad pixels or sectors are detected, those pixels or sectors will be dark. If dark pixels or sectors are indicated, contact the factory repair or replacement options.

D. **Display Sensors.** Not active on this unit

3.10 INSTRUMENT : NETWORK MENU

A. Items in the Network menu include Protocol, Address and Baud Rate

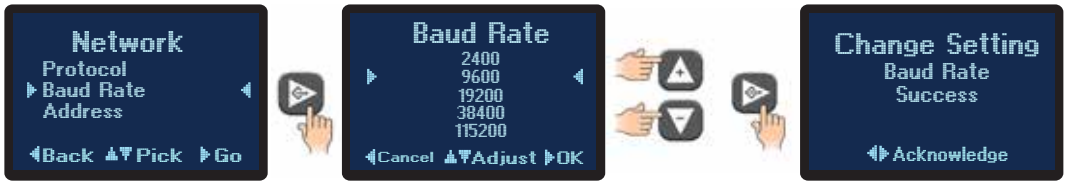
B. **Protocol:** This is the data format for communication between the unit and the host computer. Available values are

- SPI CCP
- Modbus RTU
- CAMAC.

SPI is the standard Society of Plastics Industry, Inc. protocol. CAC is the CAMAC protocol used on older Milacron machines. Modbus RTU is used in serial communication and is a common serial communications protocol for industrial equipment.

1. Press the Select button to select Protocol.
2. Use the Up or Down arrow buttons to select the preferred protocol.
3. Use the Select button to save the selection and confirm success.

C. **Baud Rate:** This is the data transfer rate of between the unit and the host computer.



1. Press the Select button to select Baud Rate.
2. Use the Up or Down arrow buttons to select the baud rate. The available rate units are 1200, 2400, 9600, 19200 and 38400.
3. Press the Select button to save the selection and confirm success.

D. **Address:** This is the number assigned to the unit in a network.

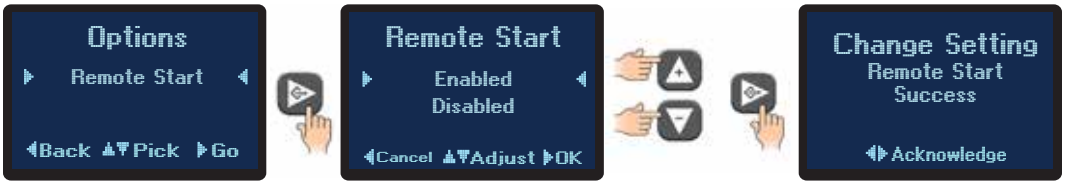
1. Press the Select button to select Address.
2. Use the Up and Down arrow keys to select the address for this unit. The factory default is 1. The selection range is from 1 - 10.
3. Press the Select button to save the address and confirm success.

3.11 INSTRUMENT : OPTIONS MENU

A. One selections is available under the Options menu : Remote and Auto Start.

B. Please note: this option requires factory or field installation of optional equipment.

C. Remote Start (optional features not included on all units) :



1. Select Remote Start from the Options menu.

2. Advance to the Remote Start Enable / Disable scree. Select Enabled to enable the remote start feature. Select Disabled to disable the feature.

3. Once acknowledged, press the Back button repeatedly to return to the Options screen or press the home button to return to the Home screen.

3.12 INSTRUMENT : MACHINE MENU

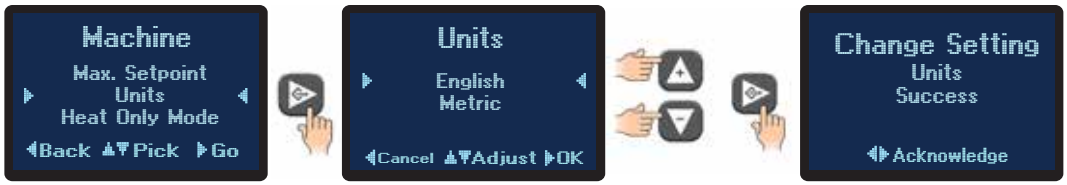
A. The Machine Menu allows the units to set values for the Max Setpoint, Units and Heat Only Mode.

B. **Max Setpoint.** This feature is useful in some application where the setpoint must never be changed above a certain temperature. The Maximum Setpoint can never exceed 500°F in the unit.

1. Use the Up or Down arrow keys to select the Max Setpoint and then press the Select button to save and confirm success.

2. The value range for the Max Setpoint is 100°F to 500°F. The factory default is 500°F.

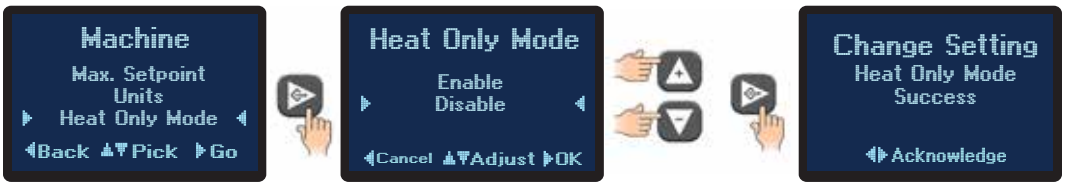
C. **Units.** This screen controls how the temperature is displayed. The options are English (°F) or Metric(°C).



1. Use the Up or Down arrow keys to select the Unit display and then press the Select button to save and confirm success.

2. The factory default value is English.

D. Heat Only Mode. This limits the unit to only the Heat Mode. This feature is useful when



the unit has an installed heat exchanger for cooling.

1. Use the Up or Down arrow keys to select the Heat Only Mode and then press the Select button to save and confirm success.

2. The factory default value is Disabled.

3.13 SHUT DOWN - DISCONNECT

A. UNIT SHUT DOWN

1. Decrease the setpoint temperature lower than 100°F and allow the unit to cool to the temperature.

2. Press the stop button.

3. Relieve residual static pressure before disconnecting or servicing the unit.

4. Follow all lock-out tag-out requirements.

5. Confirm that no voltage is going to the unit heater.

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4.0 TROUBLESHOOTING

4.1 UNIT WILL NOT START (DISPLAY IS NOT ILLUMINATED)

A. One or more fuses at the main disconnect device are open (blown). Determine continuity at each fuse. If continuity is not determined, replace the fuse. Then determine cause of blown fuse.

B. Control circuit transformer fuse is open (blown). Determine continuity at the control circuit transformer fuse. If continuity is not determined, replace the fuse.

4.2 UNIT WILL NOT START (DISPLAY ILLUMINATED)

A. **Power supply is ON.** The operator can determine that electrical power supply to the unit is "on" when the instrument display is illuminated. Even with the main power supply on, the unit is prevented from operating by one of the following conditions:

1. ***Water supply pressure inadequate.*** The display shows a Fault : System Safety screen. The unit is prevented from operation without adequate water supply pressure by the pressure switch. Sufficient water supply pressure must be present to close the switch.

System Fault Screen. Indiacates a water supply or a pump overload fault.

2. ***Motor overload switch opened.*** This display shows a Fault : System Safety screen. The electric motor is protected from overload conditions by a set of thermal overload relays. These relays will open (trip). If the overload relay is open, it must be reset before operation can continue. An excessive flow condition must be isolated and corrected immediately.

3. ***High temperature limit switch open.*** The display shows a Fault : System Safety screen. The unit is prevented from operations at temperatures exceeding 515°F by a "high temperature limit switch". This switch is installed in the *To Process* temperature sensor. If this switch is open (due to a high temperature condition), the unit cannot be started and must "cool down" before the "high temperature limit switch" will automatically reset.

High Temp Limit Fault Screen.

4.3 UNIT STOPS

A. The operator should determine the main power supply to the unit is **ON** by an illuminated display. With the main power supply "on", the unit will be prevented from starting by the following conditions:

1. ***Water supply pressure inadequate.*** The display shows a Fault : System Safety screen. The unit is prevented from operation without adequate water supply pressure by the electrical panel mounted pressure switch. Sufficient water supply pressure must be present to close the switch.

System Fault Screen. Indiacates a water supply or a pump overload fault.

2. ***Motor overload switch opened.*** The display shows a Fault : System Safety screen. The electric motor is protected from overload conditions by a set of thermal overload relays. These relays will open (trip). If the overload relay is open, it must be reset before operation can continue. An excessive flow condition must be isolated and corrected immediately.

3. ***High temperature limit switch open.*** The display shows a Fault : System Safety screen. The unit is prevented from operations at temperatures exceeding 515°F by a “high temperature limit switch”. If this switch is open (due to a high temperature condition), the unit cannot be started and must “cool down” before the “high temperature limit switch” will automatically reset.

High Temp Limit Fault Screen.

4.4 UNIT OVERHEATS

A. This is evidenced by To Process temperatures consistently above the selected setpoint temperature.

B. On units equipped with the cooling heat exchanger, check for :

1. **Inadequate water supply pressure.** The unit must be supplied with adequate water flow to provide cooling when required. The minimum pressure differential between the water supply and water drain to achieve full cooling capacity is 20 PSI. The minimum water supply pressure is 20 PSI.

2. **Cooling valve defective.** On units with the cooling heat exchanger, the instrument opens and closes the cooling valve as prescribed by the current process load. If the valve becomes clogged with process water debris or scaled with mineral deposits, its operation is hindered or fully prevented and adequate process water discharge to drain is prevented. The operator must service the cooling valve and remove any loose debris. Massive debris or scale deposits may necessitate replacement of the internal valve.

3. Heat exchanger is fouled or undersized for duty. Clean or replace heat exchanger.

C. On all units, check for :

1. **Water drain line obstruction.** The operator must determine if the water drain line is obstructed by the following conditions. Section 2.4 outlines the parameters of correct drain line installation.

   a. **Closed drain line valve.** An installed but partially or fully closed valve in the drain line prevents full discharge to drain and contributes to an overheating condition. The operator should determine the drain line is open.

   b. **High drain back pressure.** Pressurized plant drain lines will prevent flow to drain if the differential between the water supply pressure and the drain line pressure is inadequate. The factory recommended minimum differential is 20 psi. If the differential is less than the factory

recommendation, plant service personnel should take measures to reduce drain line pressure.

4. **Instrument defective.** The instrument is life-tested and found to be field reliable. However, in the case where the instrument is determined to be defective, the operator contact the Service Department for information. The instrument is not a field serviceable component.

4.5 UNIT UNDERHEATS

A. This is evidence by operations with To Process temperatures consistently below the selected setpoint temperature.

1. **Process water leakage.** On units equipped with the cooling heat exchanger, a defective cooling valve allows water to circulate through the heat exchanger providing unwanted cooling. A defective cooling valve should be repaired immediately.

2. **More flow than necessary being supplied to pump seal cooling.** Throttle pump seal cooling to 1/2 GPM at 100°F maximum temperature.

3. **Heater element failure.** A failed heater element will not input adequate heat into the process to elevate the process water temperature. The operator must check the amps at the heater contactor with the contactor energized. Zero amps at the contactor indicate a failed heater or burnt wire connections. The operator should remove the failed heater and replace with a new heater according to the procedure outlined in section 5.2.

4. **Unit capacity too low.** This occurs when the process requires more heat than the unit is capable of producing. The only option in such cases is to install a unit with an adequate heater kW rating for the load.

5. **Instrument defective.** The instrument is life-tested and found to be field reliable. However, in the case where the instrument is determined to be defective, the operator contact the Service Department for information. The instrument is not a field serviceable component.

4.6 WATER PRESSURE RELIEF VALVE LEAKS

A. The unit has a 150 psi pressure relief valve mounted in the water circuit. If the valve is found to be leaking, the operator should check the following:

1. **Back flow prevention device in water supply line.** If a back flow prevention device (check valve, pressure regulator, closed valve) is installed in the water supply line, increased pressures from thermal expansion are unable to move into the water supply line. This will increase the unit's internal pressure causing the pressure relief valve to leak.

2. **Valve contamination.** The pressure relief valve may become contaminated with water debris causing the valve not to close properly. If this is the case, flushing the valve for a moment will cleanse the seat and allow it to work properly. If flushing the valve does not remedy the leaking, the valve must be replaced.

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5.0 SERVICE/MAINTENANCE

5.1 PREVENTIVE MAINTENANCE

A. The following is a general guide to preventive maintenance. The frequency of maintenance will vary with each application, installation conditions, flow rates, hours of use and operating temperatures.

B. Preventive maintenance:

1. Tighten all wiring connections.

2. Check plumbing. Repair any leaks. The factory recommends using a high temperature graphite paste and teflon tape on all plumbing connections.

3. Descale water cooling channels in the pump seal cooling adapter.

4. Descale water cooling channels in the heat exchanger (if installed).

5. Check process fluid for degradation. The operating conditions affects the usable life of the process fluid. Most heat transfer fluid manufacturers have an analysis program where a sample of process fluid can be sent to the manufacturer to determine when the fluid should be replaced. Some manufacturers even have reclamation programs of the spent fluid.

6. Check sight glass for proper operation. Due to oil degradation, the sight glass feeder tubes may become clogged. In such cases, the sight glass may show an inaccurate level. Follow proper shut down procedures before removing sight glass to check feeder tubes.

7. Tighten heater contactor terminals.

5.2 PUMP SEAL REPLACEMENT

A. Most units use a pump seal that is a carbon/ceramic shaft seal assembly including a stationary member, rotating member and tension spring.

B. The life cycle of the pump seal is determined by hours of use, operating temperature and water quality. Poor water quality is the primary reason for premature pump seal failure.

C. The operator should follow this procedure to replace the pump seal:

1. Disengage process operations and relieve all system pressure.

2. Disengage main power supply following all lock out tag out requirements. Verify the display is off.

3. Remove the lift-off access panel and set aside (Figure 5.1B).

4. Drain machine by removing the pump casing drain plug.

5. Remove the three motor wire leads from the motor wiring terminals. The operator should “map” the wire terminal locations to ensure correct rewiring. The power cord should be removed from the motor housing.

6. Locate and remove the 4 pump casing bolts. These bolts secure the motor and motor adapter to the pump casing.

7. Separate the motor and adapter from the pump casing to expose the pump impeller. Remove the motor and adapter from the unit and place on a workbench to continue the procedure.

8. Locate and remove the dust cap from the motor to expose slotted motor shaft. The motor shaft is free to rotate, but must be secured to remove the impeller. To secure the motor shaft, insert a flat bladed screw driver in slot to hold the shaft stationary.

9. Locate and remove impeller locking screw. Using a socket and ratchet, the impeller retaining screw can be removed. Once removed, the impeller can be “unthreaded” from the motor shaft to expose the pump seal assembly.

10. Remove all seal parts. Note seal component arrangement to facilitate reassembly.

11. Clean the motor shaft and lubricate with a mild soap solution.

12. Install new stationary seal member in pump casing cavity. Be certain the stationary seal member is fully squared and seated in cavity.

13. Slide the rotating member onto the lubricated pump shaft. Be certain not to damage or tear the rubber bellows assembly.

14. Place the spring onto the rotating member.

15. Align the tension spring and rotating member before reinstalling the impeller. Be certain the spring and rotating member are aligned before the impeller is fully tightened and the impeller retaining screw is reinstalled.

16. Clean the pump casing, cavities, impeller and O-ring before reassembly.

17. Mate the motor and adapter to the pump casing. Reinstall the 4 pump casing bolts.

18. Reconnect the motor power cord and leads.

E. When this procedure is complete, the operator may restart the unit. In many cases, a new pump seal will experience a small amount of leakage for a short time. This is normal. After a few moments, the new seal will take seat and the leak will stop.

5.3 HEATER REPLACEMENT

A. The heater is a flange mounted assembly and inserted into the cylinder tank and secured by bolts.

B. The operator can determine if the heater requires replacement when the heater draws “0” amps or when a continuity check of each heater element is negative.

C. Generally, heaters fail due to low fluid flow, low fluid pressure, air in the system or defective heating elements.

D. The operator should follow this procedure to replace the heater:

1. Disengage operations and be certain all system pressure is relieved and the unit’s pressure gauges read “0”.

2. Disengage main power supply. Follow all lock out tag out requirements.

3. Remove the access panel and set aside

4. Drain machine. The machine can be drained by removing the pump casing drain plug.

5. Remove heater’s junction box cover to locate wiring connections. The operator should note the wiring connections to ensure correct reinstallation.

6. Disconnect the three power leads from the heater terminals. Remove the power cord from the junction box.

7. Remove the heater mounting bolts.

8. Remove heater.

9. Before the new heater is installed, the mating surface of the tank should be cleaned. Once cleaned, place the new heater gasket onto the tank mating surface. Coat the mating surface with a high temperature gasket sealant.

10. Set new heater into tank. Aligning the bolt pattern of the heater and tank flanges.

11. Replace the heater mounting bolts. Alternate to the opposite bolt while tightening.

12. Reconnect the power cable to the heater terminals. Be certain to tighten the power cord junction box connector. Replace the junction box cover and the lift-off cover panel.

E. When complete, restart the unit.

5.4 COOLING VALVE SERVICE

A. Units equipped with the cooling heat exchanger uses a solenoid valve as the cooling valve. The solenoid valve is controlled by the instrument.

B. Generally, the cooling valve may fail due to poor water quality, low water flow, or defective valve components.

C. The operator should follow this procedure to service the valve.

1. Disengage process operations. The operator must be certain process fluid temperature is under 100°F and pressure is relieved.

2. Disengage main power supply. Follow all lock out tag out requirements.

3. Remove or open any access cover panel and set aside to gain access to the solenoid valve.

4. Identify the retaining screw on the solenoid valve coil. Remove the screw. Keeping all electrical connections intact, lift the coil off of the enclosure tube and set aside.

5. Use a pair of channel lock pliers or a pipe wrench to separate the bonnet assembly from the valve body. The plunger is “loose” inside the enclosing tube. Be certain it is retained in the enclosure tube as the bonnet is removed.

6. Identify the diaphragm assembly. Gently remove the assembly from the valve body.

7. Identify the mesh screen. Gently remove the mesh screen and clean or replace as necessary.

8. Clean the valve body.

9. Reset the mesh screen into the valve body.

10. If a new diaphragm assembly was obtained, continue with step 12. If not, disassemble the diaphragm assembly and note component order. Clean the valve port, plate, collar and O-ring. Once cleaned, reassemble the diaphragm.

11. Set the reassembled diaphragm assembly or the new assembly back into the valve body. The stem should be facing out of the valve body.

12. Insert the plunger with spring first into the enclosing tube of the top bonnet. Holding the plunger in the enclosure tube, set the top bonnet onto the valve body and tighten.

13. Place the coil onto the top bonnet and replace the retaining screw.

14. Open the water supply to circulate water to the system. Check the solenoid valve for leakage. Restart the unit as outlined in **section 3.**

5.5 WATER PRESSURE SWITCH SERVICE

A. Water is used for pump seal cooling and for the optional cooling heat exchanger. It is important to have an adequate water supply. Water pressure is used as an indication adequate water supply to the unit. The unit is protected from low pressure operations by a water pressure switch. This switch is mounted on the water supply manifold.

B. The switch will close and consent the control circuit when sufficient water supply pressure is presented. The switch is factory set to 20 psi.

C. If insufficient water supply pressure is present, the switch will open and prevent operations.

1. Shut down unit operations. Be certain proper lock-out procedures are followed. Also, be certain system pressure is eliminated and the unit's pressure gauges read "0" pressure.

2. Drain unit by removing the pump casing drain plug.

3. A capillary runs from the cooling cylinder to the pressure switch. Remove the capillary connection.

4. The brass elbow mounted on the pressure switch must be removed.

5. Remove the electrical connections to the pressure switch.

6. The pressure switch is mounted onto the electrical cabinet with two 1/2" nuts in series. Remove the nuts to remove the pressure switch. A new pressure switch from the factory should be installed by continuing with step 7.

7. Thread one 1/2" nut onto the pressure switch and then place the pressure switch through the panel in the original mounting hole. Thread the second 1/2" nut from the bottom of the pressure switch. Tighten to lock the pressure switch in place.

8. Install the brass elbow fitting. Teflon tape and leak preventative paste should be used to prevent water leakage. Install the capillary tube and resume operations.

5.6 ELECTRONIC INSTRUMENT REPAIR POLICY AND PROCEDURE

A. All control instruments used in Advantage temperature control units are covered by the machine's warranty. Proprietary 'tailor made' instrument are manufactured specifically for Advantage.

B. In Warranty Service Incident

1. Call the factory for diagnostic assistance.

2. If a control instrument is determined to be at fault, a new or reconditioned instrument will be sent as a replacement.

3. Return the defective instrument freight pre-paid for full credit. If the defective instrument is not returned you will need to pay for it.

C. Out of Warranty Service Incident

1. Call the factory for diagnostic assistance.

2. If a control instrument is determined to be at fault, there are 3 options.

a. Purchase a new instrument as a replacement.

b. Send your instrument back for repair, freight prepaid. For a nominal fee, your instrument will be repaired and returned.

c. Purchase a new instrument and repair the old one as a back up.

3. If you are sending your instrument back for repair, call the Service Department for more information. Do not disassemble the instrument.

D. Other Information:

1. Call the factory for current repair charges.

2. Repair warranty: 1 year.

3. Ship to Advantage Engineering, 525 East Stop 18 Road, Greenwood, IN 46143. Attention: Repairs (317-887-0729). Include in the shipping box: Part, purchase order, contact name, phone number, and symptom (if available).

6.0 COMPONENTS

6.1 Mechanical System
6.2 Electrical System

6.1 MECHANICAL SYSTEM

A. **MOTOR/PUMP ASSEMBLY.** The unit pump is a multi-component assembly serving to circulate water through the process system. The pump will increase the system pressure between 35 - 50 PSI over the plant water supply pressure. The pump is driven by an electrical motor.

1. **Pump casing.** The pump casing is an exclusive design. The casing is cast of iron and flanged to accept the heater/discharge and cooling tanks. The casing is the support element in the pump/motor assembly and is secured to the unit base.

2. **Pump adapter.** The pump adapter is the mating element between the pump casing the electric motor. The adapter is machined to accept the pump seal flush line. The stationary pump seal member is set in the seal cavity of the pump adapter.

3. **Electrical motor.** The electric motor is a dual voltage, 3 phase, ODP motor. The motor serves to turn the pump impeller creating process flow.

4. **Impeller.** The impeller is custom designed for the unit and creates the higher flow (gpm) from standard HP ratings.

5. **Pump Seal.** The pump seal prevents water leakage from the pump adapter. The seal is made up of three items: The stationary member (seated in the seal cavity), the rotating member (placed on the motor shaft) and the tension spring.

B. **HEATER.** The heater is a single voltage, flange mounted immersion heater set in the pump discharge cylinder. The heater elements have a stainless steel sheath. Electrical supply to the heater is provided via a mechanical contactor.

C. **PRESSURE RELIEF VALVE.** The cooling water pressure relief valve is a 150 psi relief valve serving to discharge excessive cooling water pressure to atmosphere. The valve can be manually activated by lifting the actuating lever. Use caution. Be sure that the system is cool or high temperature water or stream may be released.

D. **COOLING VALVE.** Found on units with the cooling heat exchanger, the cooling valve is a microprocessor controlled solenoid valve use to provide cooling to the process fluid by allowing cooling water to enter the heat exchanger.

E. **PRESSURE GAUGE.** The pressure gauge displays the system fluid pressure.

6.2 ELECTRICAL SYSTEM

A. **INSTRUMENT.** The control instrument is designed specifically for operating fluid circulating temperature control units. The microprocessor based control instrument operates all the functions of the unit including cycling the heater and cooling valve for temperature control.

B. **TRANSFORMER.** The transformer supplies 110 volts to the controlling instrument.

C. **PUMP MOTOR CONTROLLER.** The electrical motor is engaged when the motor starter

contacts close, on command by the instrument.

D. **HEATER CONTACTOR.** The standard heater contactor is a mechanical style contactor. On command from the instrument, the contactor will close and voltage will be supplied to the heater. The contactor use should be monitored and the contactor should be replaced as needed based on duty cycle. Some units are provided with a solid state contactor rather than the standard mechanical contactor.

E. **PRESSURE SWITCH.** The water pressure switch will close when sufficient pressure is supplied to the unit (20 psi). A closed pressure switch will consent the control circuit to the instrument controller to allow process operations.

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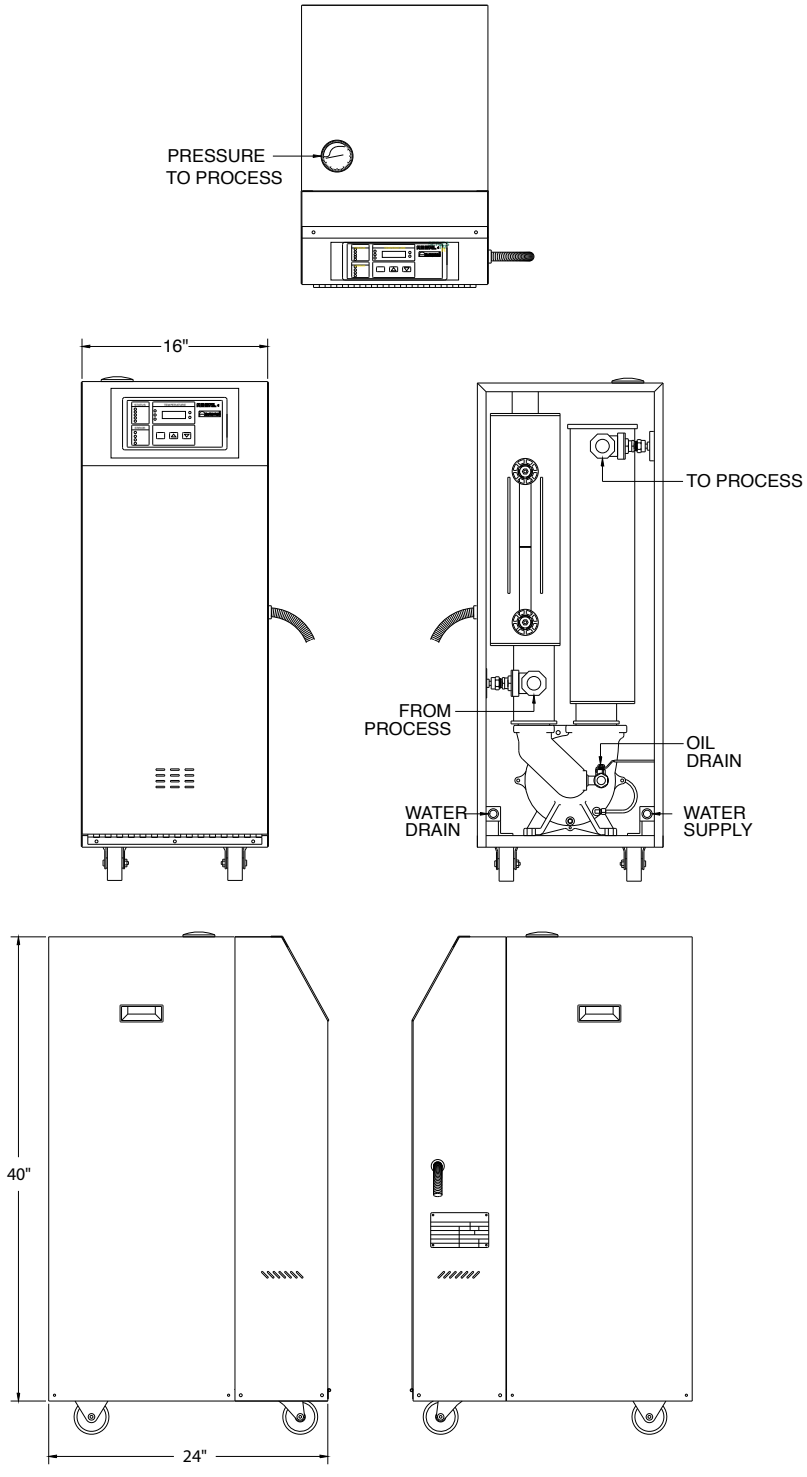
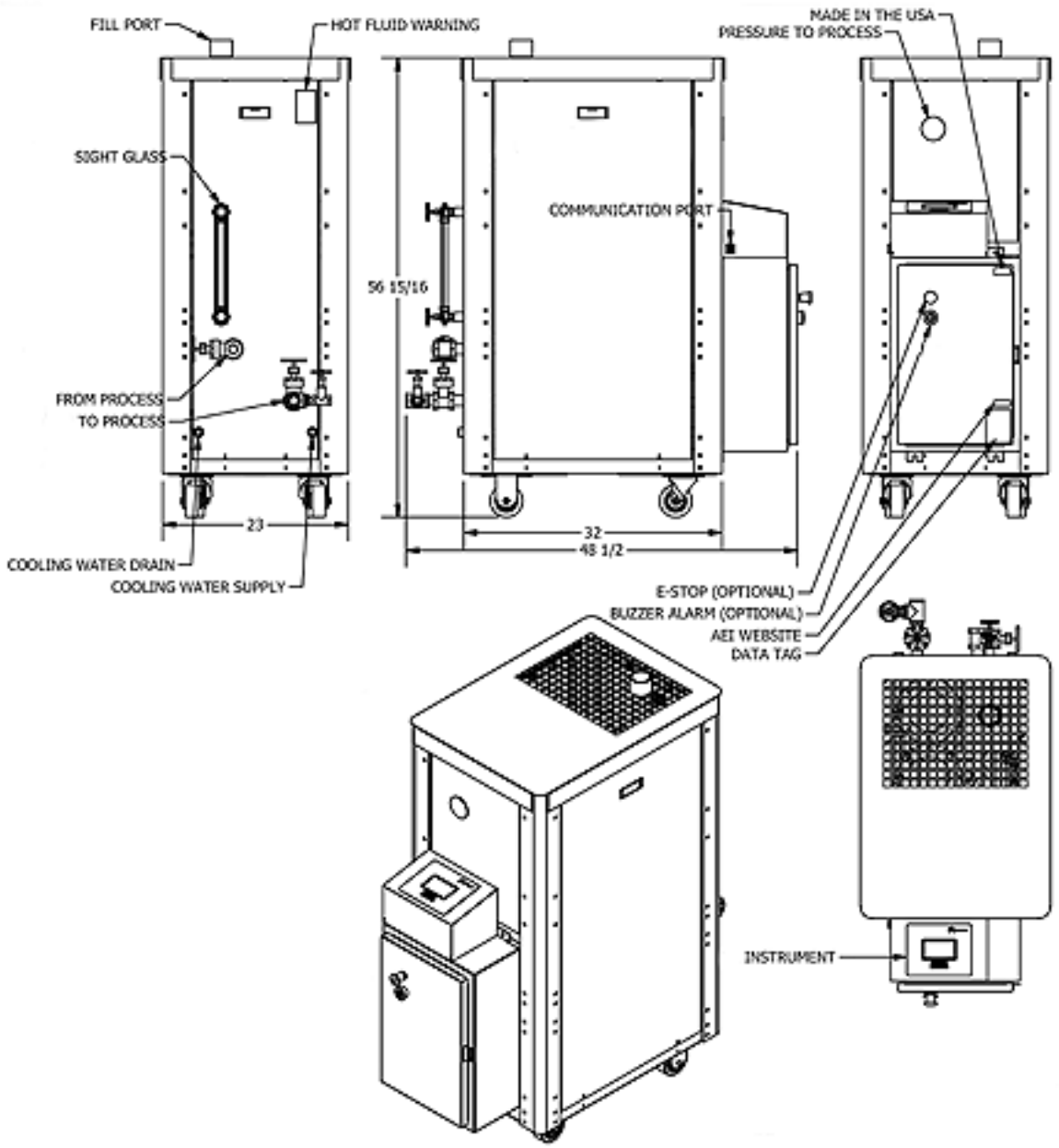
7.0 RELATED DRAWINGS

7.1 Physical 12-27 kW Heaters & 1 - 3 HP Pumps
7.2 Physical 16-24 kW Heaters & 1 - 3 HP Pumps
7.3 Physical 27-48 kW Heaters & 5 - 7.5 HP Pumps
7.4 Circuit Schematic with Cooling Circuit

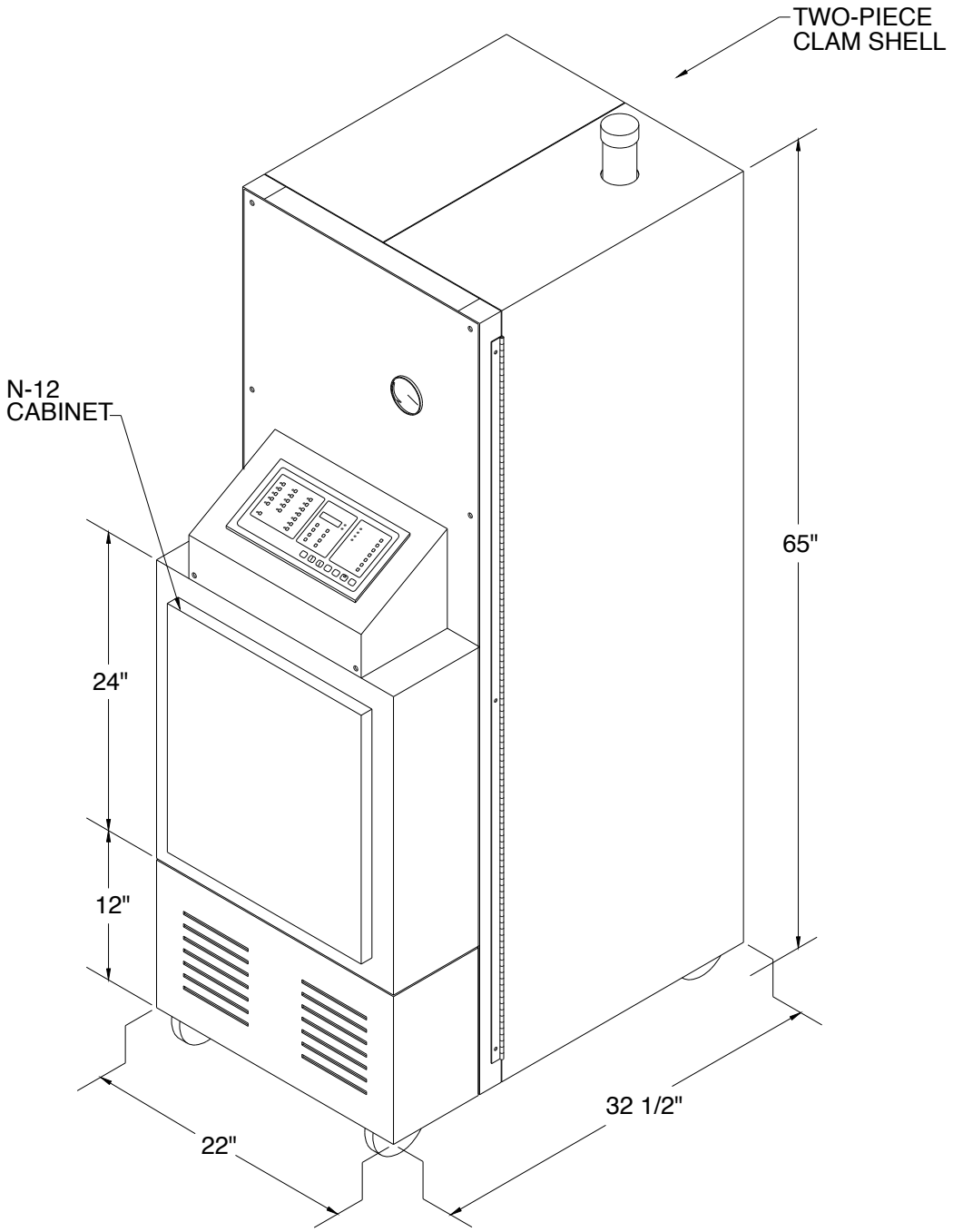
7.1 PHYSICAL 12 KW HEATERS & 1-3 HP PUMPS



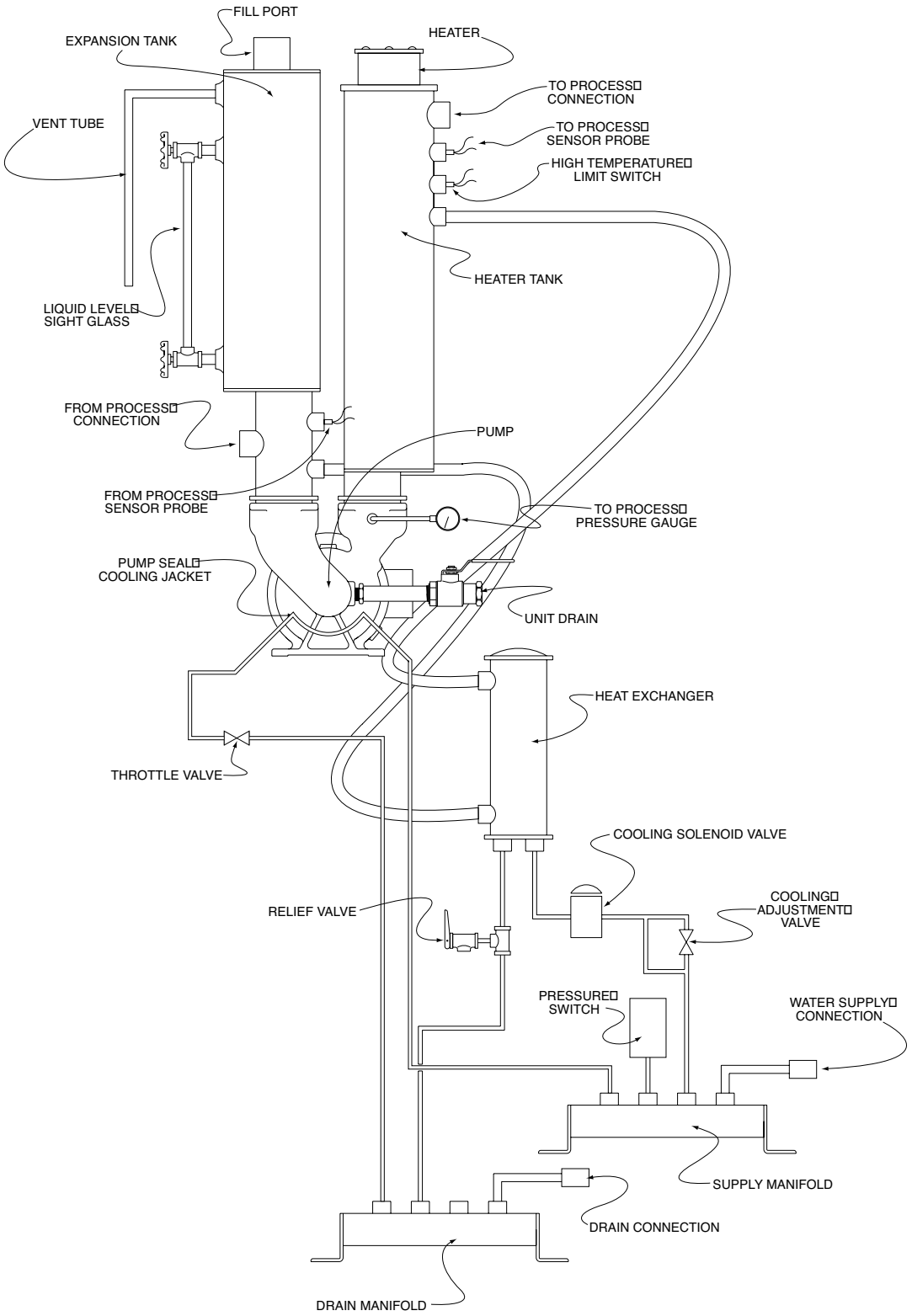
7.2 PHYSICAL 16 - 24 KW HEATERS & 1-3 HP PUMPS



7.3 PHYSICAL 27-48 KW HEATERS & 5-7.5 HP PUMPS



7.4 CIRCUIT SCHEMATIC WITH COOLING CIRCUIT



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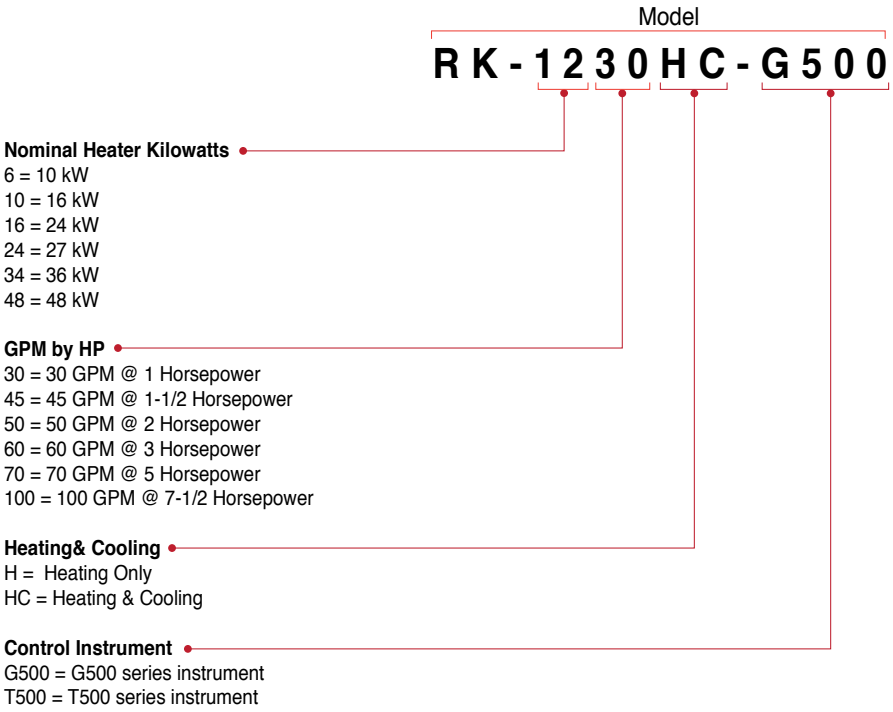
8.0 APPENDIX

8.1 Model # Coding
8.2 Water Cooled Process Pumps
8.3 Mold Purge

8.1 MODEL NUMBER & SUFFIX CODING

The data tag on your Sentra Temperature Control Unit provides general information about the unit. Compare the information below with your data tag for more information about your unit. Some data tags may have other or different information. If you need specific information about the configuration of your unit contact the factory with the serial number from your unit.



8.2 WATER COOLED PROCESS PUMPS

A. The centrifugal pumps used on oil temperature control units employ a water circuit to cool the mechanical seal.

B. The exclusive hot oil pump has a “hidden” channel cavity molded into the casing. This channel circumscribes the seal area. The channel is fed cooling water from the plant’s supply source. As the unit pumps hot oil (up to 500°F) to process, the cooling circuit serves to “protect” the seal by “spot” cooling the area immediately around the seal (see photograph below).

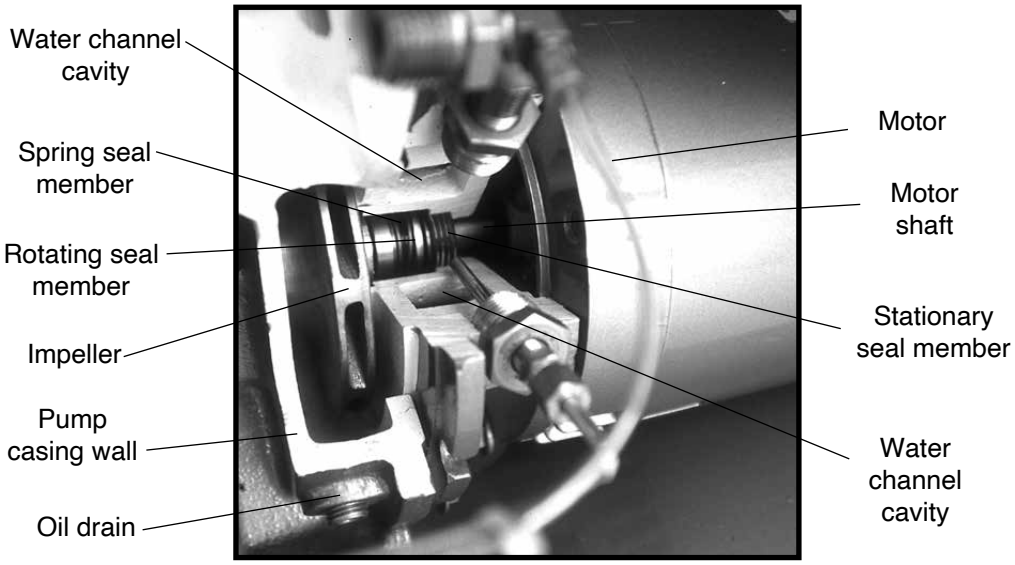
C. As a safety precaution, a pressure switch is installed in the supply line to monitor the water source. If the pressure falls below 10 psi, the switch cuts the control circuit and the unit stops. Thus, the hot oil temperature controller can only operate when there is adequate cooling supply water.

D. Normally, this temperature is well below 150°F, even when the unit is heating oil to 500°F.

E. The advantages to the water cooled hot oil pump are:

1. Lower shaft seal temperatures for longer seal life (less maintenance!)

2. Motor bearings run cooler for longer motor life (less maintenance!)



Pump casing has been “cut away” for this photograph

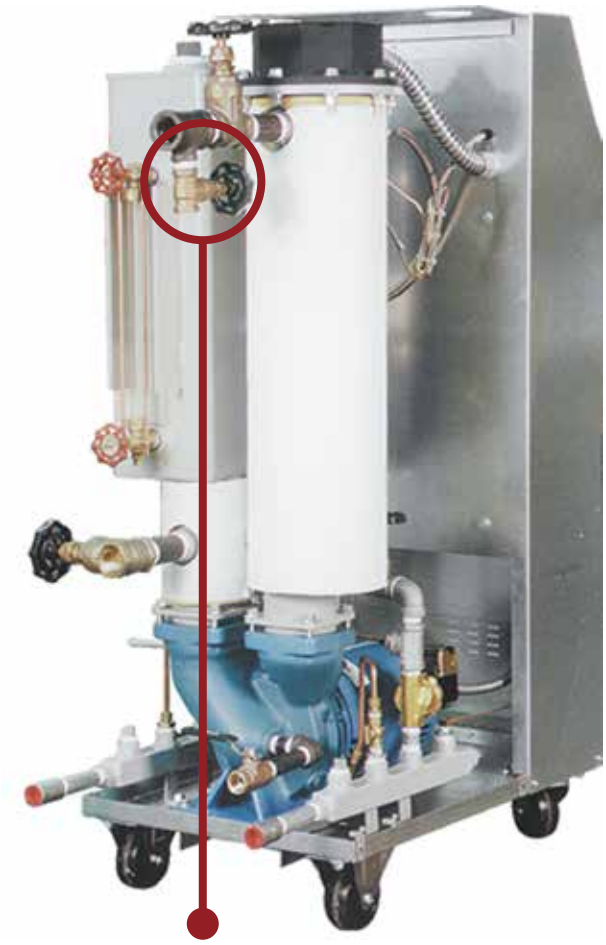
8.3 MOLD PURGE PROCEDURE

A. The Regal temperature controller is equipped with a mold purge feature. This enables the operator to change molds without losing a substantial amount of process fluid.

B. Caution: the expansion reservoir is sized to allow the purging of most process systems. Oversized, extra long process lines or oversized process fluid channels could cause an overflow of the expansion reservoir during the mold purge procedure.

C. **Warning:** never attempt to purge hot fluid back to the unit. Damage to the unit and personal injury could result. Always cool the process fluid to below 100°F before beginning the mold purge procedure.

D. To use the mold purge system:



Typical placement of the Mold Purge Valve.

1. Cool the process fluid to 100°F or below for safety.

2. Turn off the unit and disconnect the power supply as outlined in this manual.

3. Fully close the “to process” shut-off valve. Please note, the “from process” valve remains open at this time.

4. Connect a compressed air line to the mold purge valve. The compressed air source must be regulated to a maximum of 10 psi. Note: the air supply for mold purging must be completely dry! Introduction of moisture to the oil supply may cause the unit to discharge oil and steam through the vent tube when reheated above 220°F.

5. Slowly open the “mold purge” valve. The compressed air will push the process fluid back to the expansion tank in the unit.

6. When the purge is complete as revealed by a completely filled sight glass, close the “mold purge” valve.

7. Close the “from process” line shut-off valve.

END

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