I.O.M. #129 *updated 09/30/2019*

INSTRUCTION MANUAL • INSTALLATION • OPERATION • MAINTENANCE

Model: _____

Serial Number : _____

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INSTRUCTION MANUAL
TOUGH TANK 'PPT'
for TOWER WATER SYSTEMS
and CHILLED WATER SYSTEMS

With Checkmate Controller

COVERING

INSTALLATION
OPERATION
MAINTENANCE

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1.0 GENERAL

1.1 Safety

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1.3 Component Placement

1.1 SAFETY

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

B. Several important references are made to safety considerations in this manual. It is the owner's responsibility to assure proper operator training, installation, operation, and maintenance of the equipment.

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

1.2 EFFICIENCY

A. Long term efficiency of operation is largely determined by proper maintenance of the mechanical parts of the unit and the water quality.

B. The Factory accepts no responsibility for inefficient operation or damage caused by improper installation of the unit or foreign materials in the process fluid.

C. A water treatment system must be part of any pump tank system installation. The services of a professional qualified water treatment company is required to prevent scale, corrosion, bacterial and biological growth.

The Factory highly recommends the services of a competent water treatment specialist be obtained and his recommendations be followed. The Factory accepts no responsibility for inefficient operation, or damage caused by foreign materials or failure to use adequate water treatment.

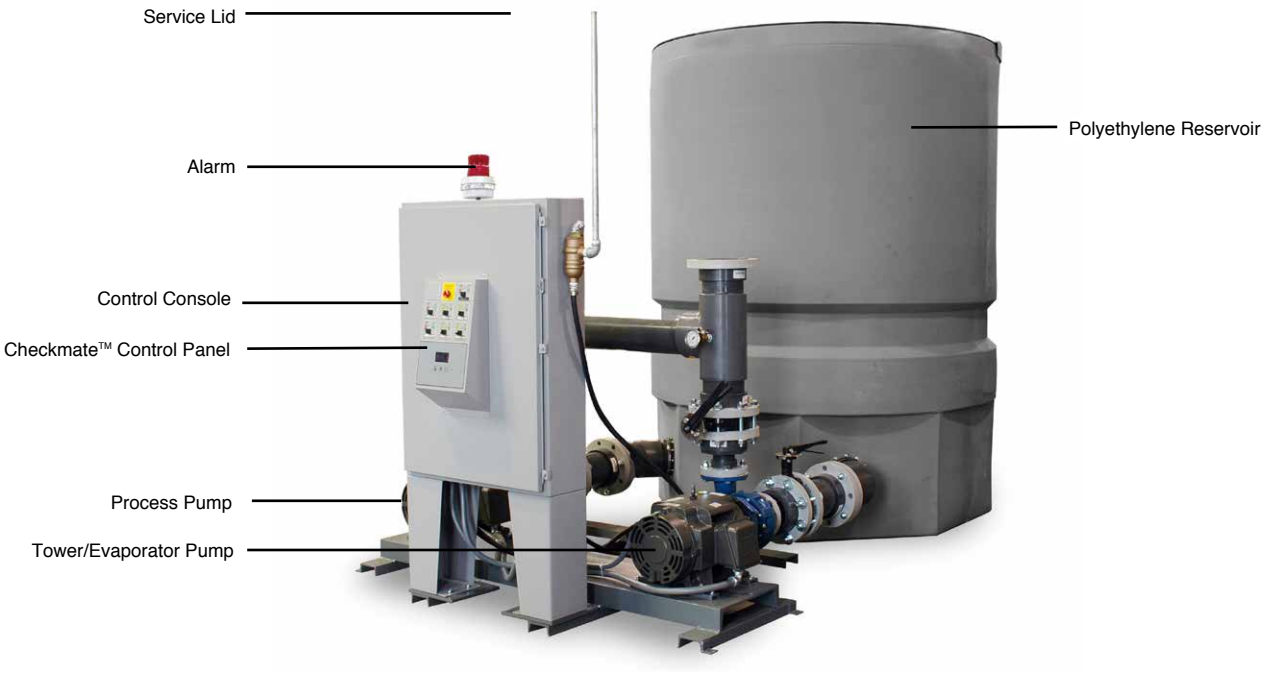
1.3 COMPONENT PLACEMENT

A. The TTK polyethylene pump tank station is designed to circulate temperature stabilized fluid through the process resulting in process temperature control.

B. The ability of the equipment to do this is significantly affected by the method of installation. The picture on the following page will give the reader an overview to the major components of the unit.

C. If any questions arise, please contact The Factory Sales Representative or Service Department.

D. TTK pump tank systems are designed for a specific duty. The configuration of your system may differ from those in this manual. Contact the factory for additional information about your specific system.



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2.0 INSTALLATION

2.1 INSTALLATION DRAWINGS

A. A number of typical drawings have been provided within this manual and with the unit. It is necessary to review all drawings supplied to assure proper installation.

B. Contact the factory for the electrical diagram that is specific to your unit.

C. You will need the unit serial number when contacting the factory.

2.2 PUMP BASE TO TANK MATING INSTRUCTIONS

A. The following instructions detail the mating of the pump base to the polyethylene tank. Refer to the drawing on the next page.

B. Unless otherwise noted, all necessary parts have been supplied by the factory.

C. Optional standby pump, alarm automatic water make-up and control console are shown in the drawing. Not all systems are supplied with these options.

D. Please note that the control console is shown ‘off base’ for drawing purpose’s only.

E. Pump discharge manifold and sight glass are not shown in the drawing.

F. Mate the pump base to the tank.

2.3 PLANT WATER DISTRIBUTION

A. Please note that all material used in the installation should be rated for 150°F and 200 psi minimum. Also note that the materials should have the equivalent diameter or larger of their process connections.

B. Plant water distribution system design is critical to maximum performance of the system. Careful attention should be paid to the pipe sizing, length of runs, number of elbows, tees and valving, as specified. Normally, the most successful installations are those which insure maximum flows and minimum pressure drops.

C. All water distribution piping should be properly braced to prevent sway and undue stress. Brace all pipes to assure no excess loads or strains are applied to the unit. Insulate all pipes to control excessive condensation and to help maintain set temperature to the process (on chilled water systems).

2.4 WATER TREATMENT

A. **A water treatment system must be part of any cooling tower or chilled water system installation. The services of a professional qualified water treatment company is required. A water treatment system typically consists of a plan to control scaling, corrosion and biological growth. Failure to control the quality of the water can result in premature unit failure, fouling of plant wide heat transfer surfaces and biological growth that can cause sickness and even death.**

B. **Keeping the water in a cooling tower or chilled water system clean has benefit by reducing scale and fouling and ensuring that the cooling process is operating**

efficiently. Fouling can lead to a loss of plant performance.

C. The Manufacturer assumes no responsibility for equipment failures or other results from untreated or improperly treated water.

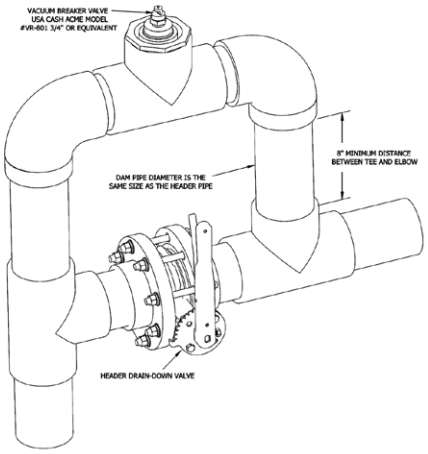
D. **Legionella.** Cooling towers must be treated for and protected from Legionella. Follow ASHRAE Standard 188P and/or CTI Guidelines WTB-14B, and /or OSHA Guidelines Section III Chapter 7 and/or the recommendation of your professional water treatment expert to prevent Legionella in your tower. Failure to prevent Legionella may result in sickness or death.

2.5 VACUUM BREAKERS

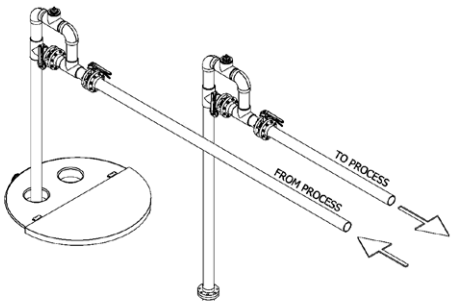
A. Vacuum breakers are required in all systems where overhead piping is used. Vacuum breakers keep the main header system full of fluid and prevent tank overflow during shut down periods.

B. The purpose of the vacuum breaker/anti-siphon (also called a drain-back dam) is to retain water in the header system during shut-down periods and to allow for air purge which eliminates shock to plumbing during start-up.

C. It is necessary to install vacuum breakers in the ‘supply’ and ‘return’ lines. The vacuum breaker must be installed at the highest point in the system, nearest to the tanks to be most effective. A nipple length of 8 inches minimum is required to create sufficient vacuum to open the Cash Acme model VR-801.



Typical Vacuum Breaker System



2.6 PROCESS CONNECTIONS

A. Connect equipment process pump discharge port to main header supply line.

B. Connect equipment chiller or tower pump discharge port to chiller to tower cell inlet.

C. Install return line from the chiller or tower cell into the back 1/3 section of the cold tank through the provide opening. Return line from tower is gravity induced flow and sloping of this pipe is critical to proper flow rates (minimum 10% slope).

D. Install 'from process" line into the back 1/3 section of the hot side of the tank through the provided opening.

E. Note: all lines returning to the tank should extend below the water level, approximately 1.5 feet from the bottom of the tank.

F. Note: on a single pump system, the return line will connect directly to the chiller or tower cell inlet. The line exiting out of the chiller or tower cell should be installed into the back 1/3 section of the cold side of the tank through the provided opening.

2.7 WATER MAKE-UP SUPPLY CONNECTION

A. Connect the unit's 'WATER SUPPLY' port to the plant's city water or well water supply.

B. The factory recommend minimum operating water supply pressure requirement is identified on the unit's data pate. This is normally 20 psi.

C. For units with electric automatic water make-up the water supply connection is located on the reservoir. The make-up solenoid valve provides the water supply connection.

D. For units with mechanical automatic water make-up the water supply connection is located on the reservoir. A bulk-head fitting attached to a float valve located inside the tank provides the water supply connection.

E. Local codes normally require a back flow prevention device be installed in the water make-up line (customer supplied).

2.8 DRAIN AND OVERFLOW CONNECTIONS

A. Connect the drain and overflow ports to the plant's drainage system. This is normally a sanitary sewer. Consult local codes.

2.9 ELECTRICAL CONNECTION

A. Electrical power supply requirements are identified on the equipment data plate.

B. VERIFY THAT THE 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. 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.

C. For units with the optional central control console... a customer supplied four conductor cable is required for connection to a customer supplied fused disconnecting means. The fused disconnecting means shall be sized and installed according to the unit's power supply requirements and local electrical codes. Connect the power cable to the terminal L-1, L-2, L-3 and the ground lug (see figure 2.9A). Some models may require a power supply entry hole be made in the electrical cabinet.

D. For units without the optional central control console separate high voltage power with customer supplied disconnecting means is required at each motor starter. Select a four

conductor cable rated for the motor's power requirements and install according to local codes. Some motor starters may require a separate 110 volt line be installed.

E. GENERAL

1. Make certain all ground connections to the unit are properly affixed.

2. Make certain 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.

2.10 PROBE INSTALLATION

A. For systems with the Checkmate control panel, two probes are shipped inside the electrical cabinet and must be installed into the return distribution piping. These probes are encased in a threaded bulb well.

B. P2 - From Process Probe: Install this probe into the from process return piping.

C. P4 - Tower/Evaporator Out Probe: Install this probe into the return line from the tower or evaporator piping.

3.0 OPERATIONS

3.1 General
3.2 Start Up/Operations Procedure
3.3 Instruments And Controls

3.1 GENERAL

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

B. The operator must verify that all plumbing and electrical connections are in accordance to section 2 of this manual and local codes.

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

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

3.3 **Instrument and controls** - follow this segment to start up and operate the instrument and controls. This section includes feature explanations of PTS and CPTS instruments.

3.2 START UP / OPERATIONS

A. System Checks

1. Before operating the pump tank station, verify the unit piping installation and unit electrical installation is correct as outlined in section 2 of this manual.

2. System should be leak checked prior to pump tank system operation.

B. System Fill

1. All systems have automatic make-up. Some have mechanical and some system use a float switch that activates an electric solenoid valve.

2. **For units with electric automatic water make-up.** Turn on plant water supply to the tank and activate power supply to the tank. The water make-up solenoid will open and begin filling the tank. **Note:** if electrical service is not connected the tank will not fill, manually fill the tank until the water level is even with the location of the external level switch tank.

3. **For units with mechanical water make-up...** turn on the plant water supply to the tank. The tank will fill until the water level reaches the make-up float.

4. **For all units...** when the water level has nearly reached the top of the baffle, the unit is ready to start.

C. Valve Placement

1. Open to 100% the suction valves on the process and tower/evaporator pumps.

2. Open to 50% the discharge valves on the process and tower/evaporator pumps.

3. Open to 100% the main 'to' and 'from' process header valves.

4. Open as many process connection valves as possible to establish a water flow path.

D. Motor Rotation for Process Pump.

1. Activate the electrical power to the unit.

2. Turn the process pump 'on' momentarily and then 'off' again. Observe the shaft of each motor. As the shaft slows to a stop, its rotation can be determined. Correct rotation is clockwise when viewed from the rear of the motor.

3. If rotation for a motor is incorrect, disconnect power and reverse any two wires at the motor's starter block.

E. Motor Rotation For Tower / Evaporator Pump and Tower Fan

1. Activate the electrical power to the unit.

2. **For tower system applications.** It may be necessary to lower the setpoint on the Checkmate control instrument.

3. Turn the pump or fan 'on' momentarily, then 'off' again. Observe the shaft of the motor. As the shaft slows to a stop, its rotation can be determined. For pump motors, correct rotation is clockwise when viewed from the rear of the motor. As for the cooling towers, correct rotation is counter clockwise or air should be drawn from the bottom of the tower and out the top. For other tower cells, check the tower cell manual for instructions on correct rotation.

4. If rotation for a motor is incorrect, disconnect power and reverse any two wires at the motor's starter block.

F. Pump Flow Adjustments

1. When starting a centrifugal pump, it is important to properly set the flow rate to prevent overloading of the pump motor. The following example is the start up procedure for a two pump system.

2. Fully open the suction valves to the process and tower/evaporator pump. **Note: never allow the pumps to operate 'dry', as this can cause shaft seal failure.**

3. Close the discharge valves of the process and tower/evaporator pumps. Note: a centrifugal pump can be operated with no flow without damage, although this should not be for an extended period of time. Internal friction will cause the water in the pump case to overheat.

4. Place an amp meter on one leg of the process pump wires at the motor starter. Start the motor. Slowly open the discharge valve, allowing the process piping to fill with water. After flow is established, continue to open the discharge valve. The amp draw will increase as the flow increase. Once the run-load amp rating, as listed on the motor data tag, is reached, leave the valve in that position.

5. **Note...** in initial start up, the water use points may not be sufficient to fully load the motor. As you add use points, you should recheck the amp draw on the motor and adjust the discharge valve as needed to prevent overloading the motor.
6. Repeat the procedure with the tower/evaporator pump.

7. **On tower systems...** the back pressure is very low on most tower cells. The discharge valve may only be open one or two notches at full load.

8. **Note...** never operate a centrifugal pump without water in the case. Also, never operate a centrifugal pump without checking for proper amp draw.

9. **Note...** always operate a centrifugal pump with the suction valve fully open. Adjust the amp draw with the discharge valve starting from a closed position. Starting from a wide open position can give a false reading and result in motor overload.

10. **Note...** if during operations, the motor overload trips, the overloads will need to be manually reset to restart operations. Once the pump is restarted, check for excessive motor amps at the motor start block and throttle back the discharge valve as needed.

G. Pump Tank Cycle

1. **Two pump operation...** the pump tank set is divided into two sections by a baffle. The sections are referred to as the 'hot side' and the 'cold side'. The 'process pump' suction is connected to the cold side and pumps water through the distribution system. The water removes heat from the processes and returns to the hot side of the tank. The 'evaporator pump' or 'tower pump' receives water from the hot side of pumps the water through the chiller(s) or tower(s) and returns the cooled water to the cold side of the tank.

2. **One pump operation...** the process pump suction is connected to the tank and pumps water through the distribution system. The water removes heat from the processes and passes through the chiller(s) or tower(s). The cooled water then returns to the tank.

3. **Standby pump operation...** standby pumps are supplied as an option. If installed on the system, they are supplied valved and wired such that switching to back-up will take only a few minutes. A valve orientation guide is provided in section 8 of this manual.

H. Valve Orientation for Normal and Standby Pump Operation

1. Refer to the following chart for proper position of the valves for normal and standby operations:

I. Temperature and Pressure Gauges

1. **Pressure gauges.** The 'to process' pressure gauges is mounted on the discharge side of the 'to process' pump and indicates pressure to the distribution system. The 'tower/evaporator' pressure gauge is mounted on the discharge side of the tower/evaporator pump and indicates pressure to the tower cell or chiller evaporator.

2. **Temperature gauges.** On systems without the digital annunciator display, temperature gauges are mounted on both sides of the tank. On systems with the Checkmate display, temperature is indicated on the digital display window.

3.3 INSTRUMENT AND CONTROLS

A. Instrument and Control Operation

1. Determine power is supplied to the unit, (note the illuminated 'power' led). Moving the power switch to the On position will activate the system.

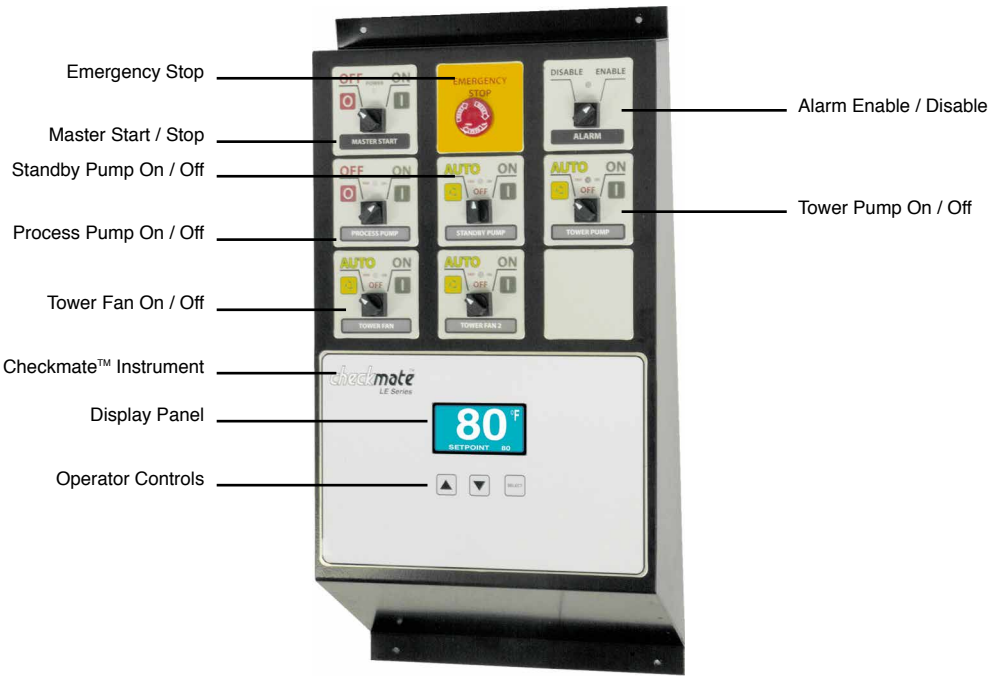
2. Each motor has a Top Operator™ switch or on/off operator which must be 'on' for the pump to activate. These switches allow for selecting primary or standby pumps as needed. To turn off a selected pump simply switch 'off' the pump. Moving the power switch to the Off position will activate the system and will deactivate all pumps that have been switched 'on' by their individual toggles.

3. Each pump is controlled by dedicated motor starters. To activate the pump, move the power switch to the On position. To deactivate the pump move the power switch to the Off position.

B. CHECKMATE™ Control Panel

1. The Checkmate™ control panel is divided into two sections: the Top Operators™ and the Checkmate™ instrument control.

2. The Checkmate™ control panel is mounted to the central control console cabinet door on most installations.



3. Top Operators™ are provided for pump, fan control, and system start and stop.

4. An emergency stop operator is provided for emergency system shut down.

C. Top Operator for Pump Control

1. To start the pump turn the switch to "ON".

2. To stop the pump turn the switch to "OFF".

3. Normal pump operation is indicated by the "GREEN" light. Overload condition is indicated by a "RED" light.

D. Top Operator for Tower Fan Control

1. To start the fan turn the switch to "ON".

2. To stop the pump turn the switch to "OFF".

3. To auto control the tower fan turn the switch to "AUTO". The fan will be controlled by the system instrument.

4. Normal fan operation is indicated by the "GREEN" light. Overload condition is indicated by a "RED" light.

E. Checkmate™ Instrument Operation

1. System information is displayed in the center screen. Use the "SELECT" button to scroll through the different screens. Use the "UP" or "DOWN" arrow buttons to set different operational parameters.

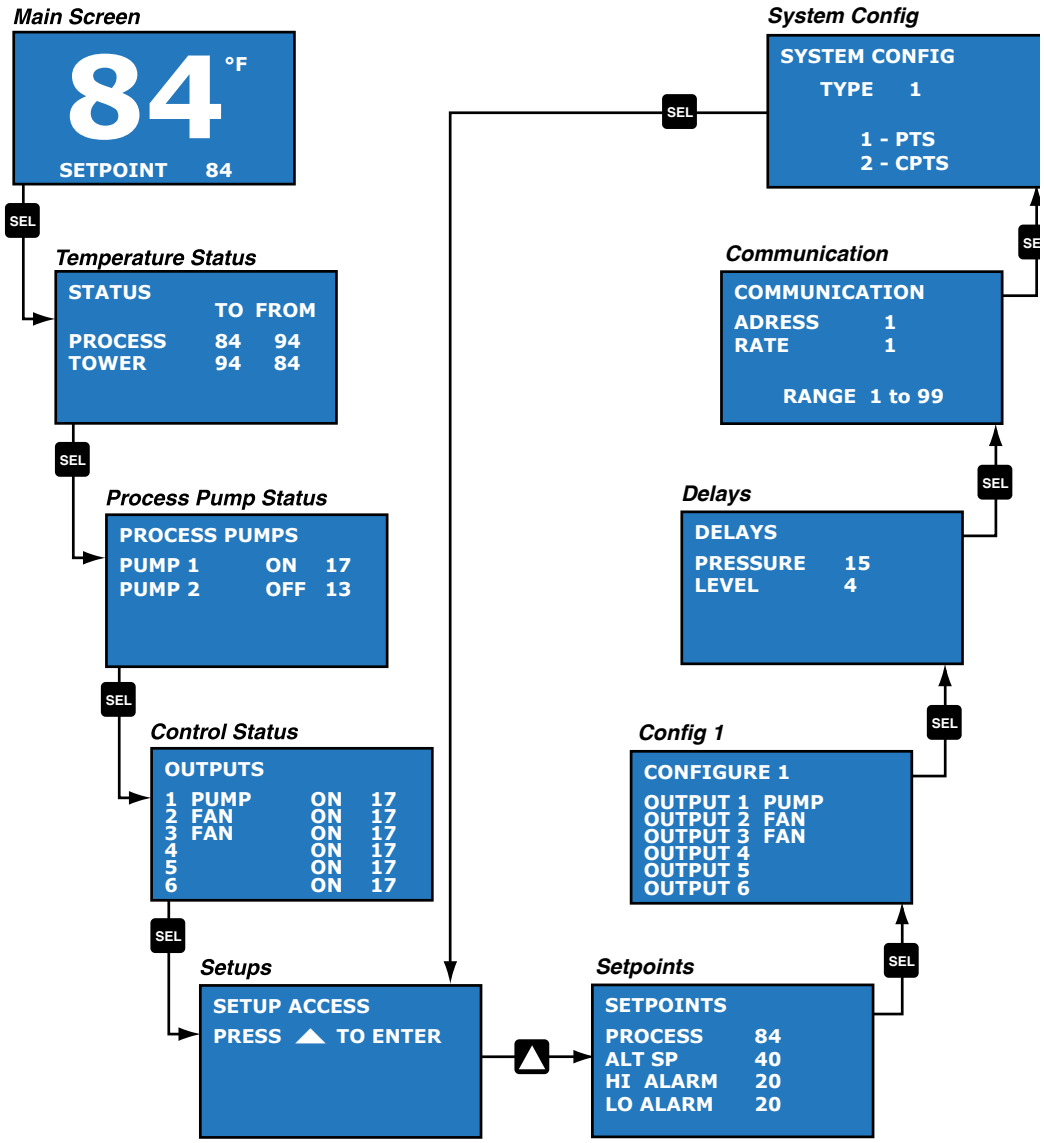
2. **MAIN SCREEN.** Displays the current To Process temperature in °F. The setpoint temperature is also displayed.

3. **TEMPERATURE STATUS SCREEN.** Displays the From Process, To Process and From Tower temperatures. On chilled water installations, there is a From Chiller display instead of the From Tower display (as shown in the photo).

4. **PROCESS PUMP STATUS SCREEN.** Displays the on / off status of the process pumps.

5. **CONTROL STATUS SCREEN.** Display the on / off status of the fans and process pumps.

6. **SETUP SCREENS.** The operator can select this screen to enter the Setpoint Temperature, the Hi Alarm and Low Alarm values. The Hi Alarm value is the number of degree above the setpoint when the alarm will sound. The Lo Alarm temperature is the number of degrees below the setpoint when the alarm will sound.



F. Alarm system operation

1. The audible / visual alarm system is an optional component. If installed, there is a visual and audible alarm beacon mounted on the control cabinet (typical).

2. **Low pump pressure...** the 'to process' pressure falls below the pressure switch setting. The default is 40 PSI to open the contacts and 20 PSI to close the contacts and trigger the alarm).

Causes of low pump pressure are: pump not operating due to tripped overloads; impeller damaged or some internal pump obstruction; excessive gpm.

3. **Low water level...** the low water level alarm can be adjusted from 1 - 30 minutes. If you set to 0, the alarm is disable.

Possible causes: defective makeup solenoid, defective level switch, makeup water supply insufficient.

4.0 MAINTENANCE

4.1 PREVENTIVE MAINTENANCE

A. The following is a 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. Lubricate all motors. Note: some motors are supplied with sealed bearings.

2. Tighten all wire terminations.

3. Clean and check motor starter and contactor contacts.

4. Check safety switch settings (ie. alarm thermostat).

5. Check all motors for correct amperage.

6. Clean water make-up solenoid valve.

7. Clean and flush unit.

4.2 PUMP SEAL REPLACEMENT

A. The unit pump seal is a carbon/niresist shaft seal assembly including a stationary member, rotating member and tension spring (figure 4.2A).

Figure 4.2A

B. The operator can determine the pump seal is leaking when fluid is identified leaking from the pump case adapter.

C. Generally, a pump seal will leak due to inadequate unit pressure, excessive flow and poor fluid quality.

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

1. Disengage process operations. The operator must be certain process fluid pressure is relieved (pressure gauge reads “0”) and water system flow is shut off and all pressure relieved.

2. Disengage main power supply. The operator must verify the Power light on the display is off.

3. Close the suction and discharge valves.

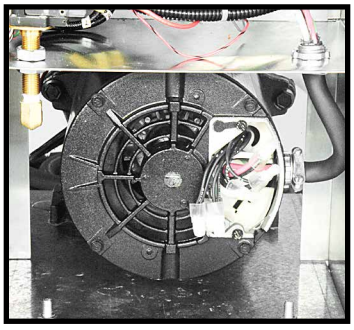
4. Drain pump. The pump can be drained by using the drain plug located on the pump case.

5. Locate and remove the three motor wire leads from the motor wiring terminals. The operator should note the wire terminal locations to ensure correct rewiring. The power cord should be removed from the motor housing (figure 4.2B).

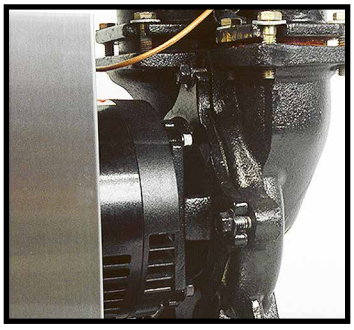
6. Locate and remove the pump casing bolts. These bolts secure the motor and motor adapter to the pump casing (figure 4.2C).

7. Separate the motor and motor adapter from the pump casing to expose the pump impeller (figure 4.2D). Remove the motor and motor adapter from the unit and place on a workbench to continue the procedure.

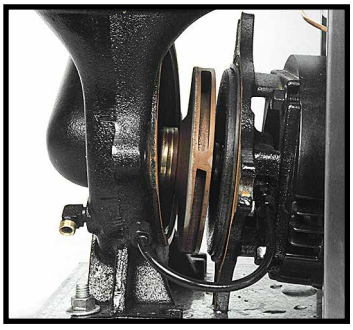
8. Locate and remove the dust cap from motor end to expose slotted motor shaft.



Motor leads Figure 4.2B



Pump casing bolts Figure 4.2C



Impeller Figure 4.2D

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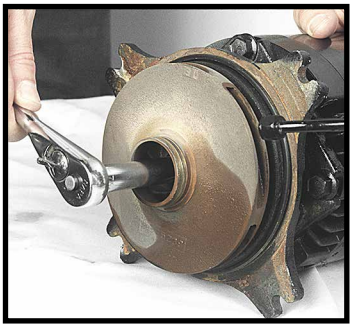
The motor shaft is free to rotate, but must be secured to remove the impeller. To secure the motor shaft, insert a flat bladed screw driver in slot to hold the shaft stationary (figure 4.2E).

9. Locate and remove impeller locking screw (figure 4.2F). Using a socket and ratchet, the impeller retaining screw can be removed. Once the retaining screw is removed, the impeller can be “unthreaded” from the motor shaft to expose the pump seal assembly.

10. Remove all seal parts (figure 4.2G). Note seal component arrangement to facilitate reassembly.

Motor shaft Figure 4.2E



Impeller locking screw Figure 4.2F

Seal components Figure 4.2G

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

12. Install new stationary seal member in pump casing cavity (figure 4.2H). The operator must be certain the stationary seal member is fully squared and seated in cavity.

13. Slide the rotating member onto the lubricated pump shaft (figure 4.2I). The operator must be certain not to damage or tear the rubber bellows assembly.

14. Place the spring onto the rotating member.

15. Align the impeller, spring and rotating member before reinstalling the impeller (figure 4.2J). The operator must be certain the spring and rotating member are aligned before the impeller is fully tighten and the impeller retaining screw is reinstalled.

Stationary member Figure 4.2H

Rotating member Figure 4.2I

Impeller and spring Figure 4.2J

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

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

18. Reconnect the water cooling lines to the pump adapter (if applicable).

19. Reconnect the motor power cord and leads.

20. Restore all cover panels as were removed.

E. When the pump seal replacement procedure is complete, the operator may restart the unit according the **section 3**. In some cases, a new pump seal will experience a small amount of leakage for a short time. This is normal. After operating a few moments, the new seal will take action and the leak will stop.

4.3 SOLENOID VALVE SERVICE

A. Units with the optional electric water make-up system use a solenoid valve controlled by the float switch for water make-up.

B. The operator can determine the solenoid valve requires service when the tank does not 'make-up' as required.

C. Generally, solenoid valves fail due to poor water quality, low water flow, or defective valve elements.

D. The operator should follow this procedure to service the cooling solenoid valve:

1. Disengage main power supply. Follow proper lock out tag out procedures.

2. The operator must be certain all water system pressure is relieved from the supply line.

3. If necessary, 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 removed the mesh screen and clean or replace as necessary. Clean the valve body.

8. Reset the mesh screen into the valve body.

9. If a new diaphragm assembly was obtained, continue with step 11. If not, disassemble the diaphragm assembly and note component order. Clean the valve port, plate, collar and O-ring. Once cleaned, reassemble the diaphragm.

10. Set the reassembled diaphragm assembly into the valve body. The stem should be facing out of the valve body.

11. Inset 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.

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

13. Open the water supply valve (if installed) to circulate water. Restart the unit.

4.4 DISPLAY CALIBRATION

A. There are two calibration potentiometers on the back of Checkmate instrument. One potentiometer calibrates the To Process probe and the other potentiometer calibrates the other probes (From Process, To Tower, From Tower).

B. The procedure described here avoids the necessity of removing any of the probes from the pipes or manifolds. It requires that you are able to independently determine the temperature of the water on the 'Cold' side of the system water tank. This is the side of the tank that receives cooled water from the tower cell.

C. Preparation.

1. You will need the following to complete the calibration procedure.

a. A small screw driver to adjust the potentiometers on the circuit board.

b. A temperature measuring meter with a probe long enough to be immersed on the system tank.

2. Warning. The system must be powered to perform the calibration. Some of the components on the Checkmate controller board are connected to 110 VAC. Toughing any components (other than the potentiometers) carries the risk of serious electrical shock. Calibration should only be performed by a qualified technician.

D. To Process Probe Calibration

1. Observe the temperature of the independent temperature meter. Ensure that it is stable.

2. Configure the Checkmate Display to show the To Process Temperature.

3. Adjust the 'Probe Cal' potentiometer by 1/4 turn. Wait 30 seconds for the adjustment to take effect.

4. Repeat step 3 until the temperature displayed by the Checkmate agrees with the independent temperature meter.

Note: This potentiometer only affects the To Process temperature.

E. From Process Probe Calibration

1. Observe the temperature of the independent temperature meter. Ensure that it is stable.

2. Configure the Checkmate Display to show the From Process temperature.

3. Adjust the 'All Other' potentiometer by 1/4 turn. Wait 30 seconds for the adjustment to take effect.

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Email: service@Temptek.com

4. Repeat Step 3 until the temperature displayed by the Checkmate agrees with the independent temperature meter.

Note: When the From Tower probe is calibrated all the remaining probes are calibrated.

E. Using A Spare Probe to Perform the Calibration

If you do not have an independent temperature measuring device then using a spare probe in an ice bath can be used.

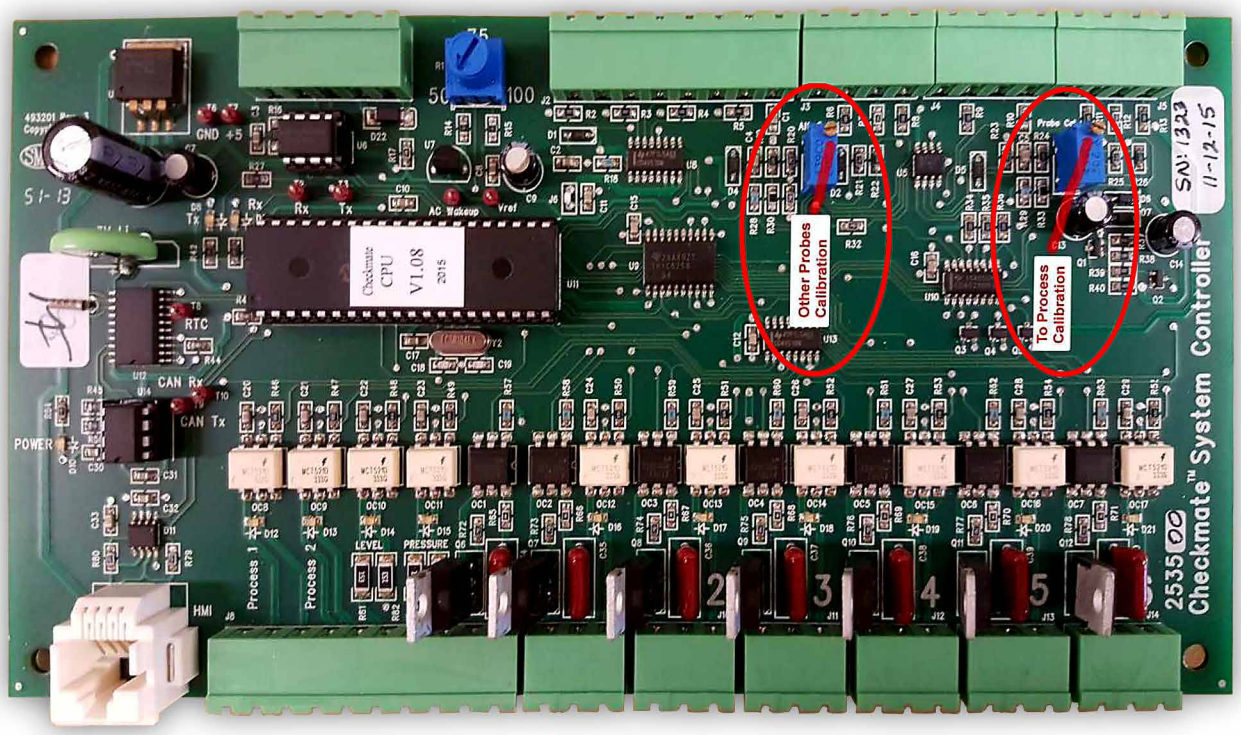
1. Disconnect the To Process probe from the cable and connect the spare probe to the cable.

2. Submerge the probe into an ice bath for a few minutes to establish temperature. An agitated probe in an ice bath is generally a good 'physical standard' and can be assumed to be at or very close to 32°F. The ice bath should be about 75% ice.

3. Calibrate the Checkmate instrument 'Probe Cal; potentiometer to this temperature.

4. When complete, re-connect the To Process probe and connect the spare probe to the From Tower cable.

5. Calibrate the Checkmate instrument 'All Other' potentiometer with the From Tower temperature displayed.



5.1 ELECTRICAL

A. A specific electrical drawing has been prepared for your system. The drawing is generally included with manual.

B. If you need a copy of your electrical drawing, contact the Service Department at 317-887-0729. You will need your model and serial numbers to obtain the proper drawing.

6.0 APPENDIX

6.1 Typical Press Drop

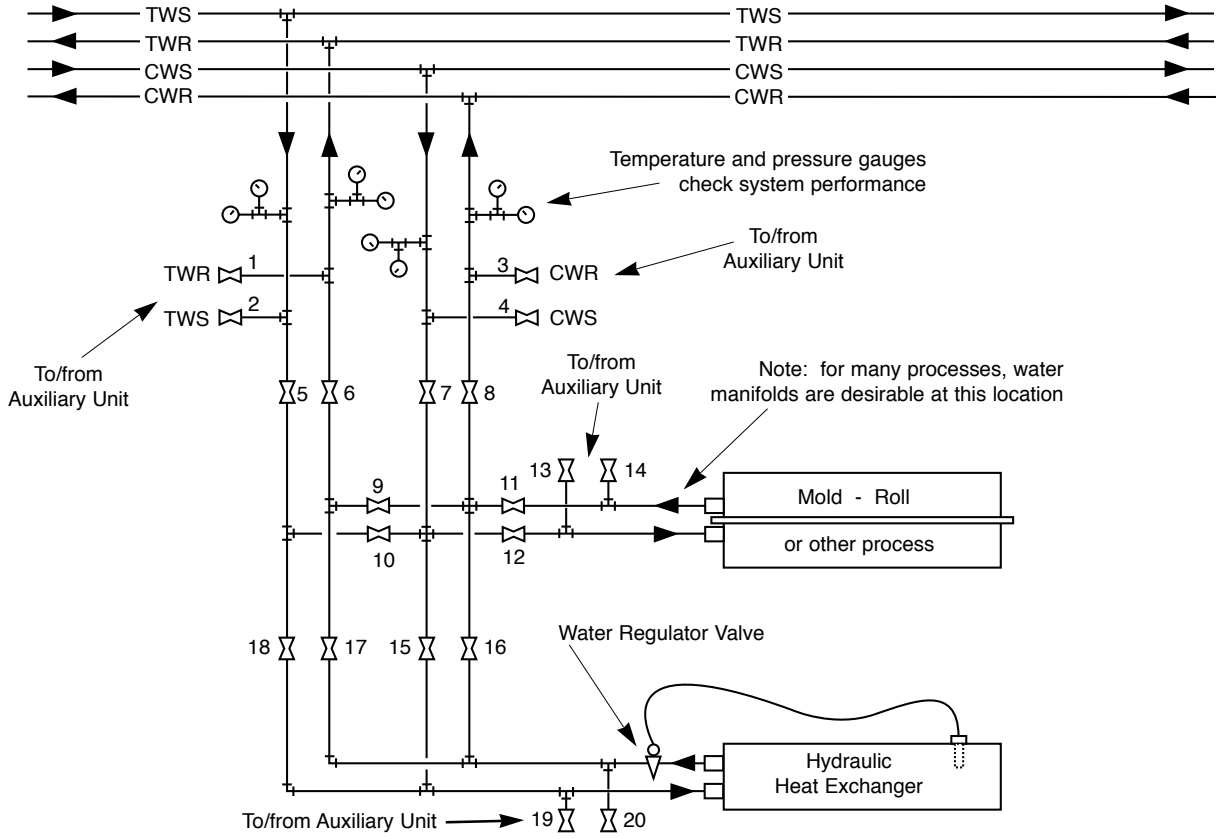
6.2 Checkmate Second Setpoint Guide

6.1 TYPICAL PRESS DROP

A. The design of the unit-to-process hook up is key to optimizing the capability of the heating/cooling system. Selecting proper pipe ID's, minimum run lengths, minimum elbows, tees are all important to creating a low pressure drop thus a high flow rate.

B. This diagram schematically contains piping and valving details which may not be needed in all cases. However, for molding installations requiring maximum flexibility, a relatively minor increase in original piping costs can have great efficiency paybacks in the future.

C. Select pipe sizes for 5-7 feet per second flow velocity and 5-10 psi pressure drop. Consult engineering department for assistance when needed.



KEY

TWS - Tower Water Supply
TWR - Tower Water Return
CWS - Chilled Water Supply*
CWR - Chilled Water Return*
***INSULATE ALL CHILLED WATER PIPING**

	VALVE POSITION
Tower supply for auxiliary	Open: 1 - 2
Chilled water for auxiliary	Open: 3 - 4
Tower on mold	Open: 5 - 6 - 9 - 10 - 11 - 12
Chilled water on mold	Open: 7 - 8 - 11 - 12
Auxiliary on mold	Open: 13 - 14
Tower on heat exchanger	Open: 5 - 6 - 17 - 18
Chilled water on heat exchanger	Open: 7 - 8 - 15 - 16
Auxiliary on heat exchanger	Open: 19 - 20

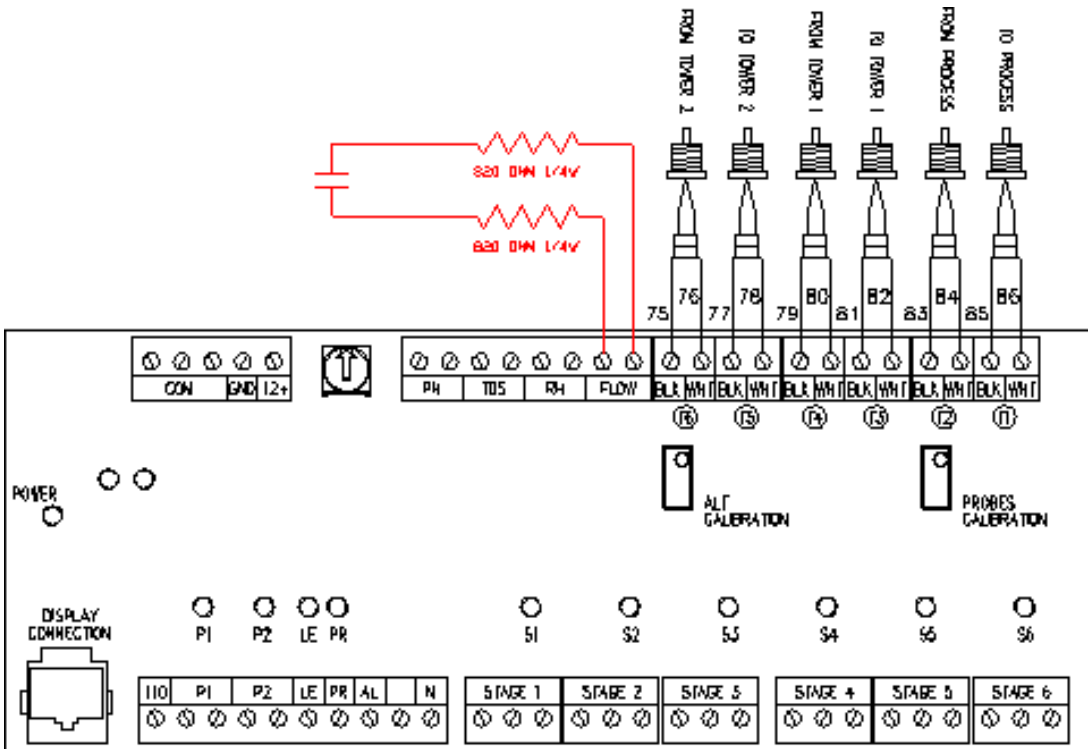
6.2 CHECKMATE SECOND SET POINT GUIDE

A. All Checkmate CPU boards with firmware version 1.07 or later have the second set point function (displayed as ALT SP). Second setpoint allows for an alternate setpoint from the primary setpoint to be initiated from a remote point. And example is lowering the setpoint in the winter to use as chilled water and bypassing the chiller system.

B. The second set point is adjusted on the Checkmate setup screen just below the primary set point. In order to use the second set point, an input to the board must be added. This can be done with two 820 ohm 1/4W resistors and a dry contact closure. See below schematic outlined in red.

C. The second set point input is located on J3. This is the 8-position green Phoenix header next to the large blue potentiometer (with an arrow on the dial). Pin 1 of this header is the pin farthest from the large blue potentiometer. ON the circuit board pins 1 and 2 are labeled “+” and “FLOW” respectively. To connect the second set point input, one resistor should be connected between J3 pin 1 and a dry contact terminal. The other resistor should be connected from the other dry contact terminal to J3 pin 2.

D. When the dry contact is closed for 30 seconds, the Checkmate will begin using the second set point to control temperature. The Checkmate display will show “2ND SP” at the bottom of the screen. After the dry contact is opened for 30 seconds, the Checkmate will revert to the primary set point to control temperature.



END

RE 09/30/2019