Water Cooled Mold Circulator
Model MC90WC
#162713 / #162714
Instruction Manual

November, 2013
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INSERTS

SPECIFICATIONS

Temperature Range	250°F maximum with ethylene glycol/water mixture; minimum can be as low as plant water supply, but also depends on how much heat energy the mold is putting into the circulating water
Line Voltage	230/60/3 or 460/60/3 VAC see serial # tag on machine
Amps	26 @ 230V; 13 @ 460V
Controls:	
Type	Self-tuning PID-Type MicroProcessor
Control Voltage	120 VAC
Accuracy	±1°F of setpoint
Pump/Motor	1-hp, 3500-rpm centrifugal pump rated at 30 gpm @ 38 psi; coupled to AC motor; air-cooled.
Heater	9kw
Tank	14-gallon
Mold Connections	1” NPT
Mold Supply Outlet	1” NPT
Cooling Water Inlet	½” NPT
Cooling Water Outlet	½” NPT
Overall Size	24" L x 24" W x 28-1/2" H
Shipping Size (crated)	32" L x 32" W x 40" H
Shipping Weight	200 lbs. (crated)

SAFETY SUMMARY

This manual uses the following words to show different levels of danger:

DANGER indicates that you are very likely to be killed or injured if you don't take the needed steps to avoid the hazard. This is the highest level of warning.

WARNING indicates that you could be killed or injured if you don't avoid the hazard.

CAUTION indicates you could receive moderate or minor injuries, or equipment could be damaged if you don't avoid the hazard.

DANGER

LIVE ELECTRIC PARTS could cause DEATH or SHOCK.

Lock out and tag out power before doing wiring.

Only qualified electricians are to do electrical work.

WARNING

OIL in this machine could cause FIRE.

Do not use any oil in this machine.

CAUTION

FITTINGS that are too tight could DAMAGE PUMP.

WEIGHT OF PIPES could DAMAGE PUMP.

Do not overtighten fitting on pump discharge.

DESCRIPTION

The Model MC90WC water cooled circulator controls mold temperature by circulating a mixture of water and glycol through channels in the mold. It can maintain temperatures as low as the plant water supply or as high as 250°F.

The Model MC90WC consists of a stainless steel tank, pump and motor, an electric heater with a submersed copper cooling coil, and electrical controls, all mounted on a welded stainless steel frame with casters for portability.

INSTALLATION

Installation must be done only by qualified plumbers and electricians.

1. Inspect Shipment

Inspect carton containing unit. Remove machine from carton. Inspect machine for damage. Report any damage to carrier.

2. Move Circulator into Position

Position the circulator as close to mold as possible; shorter hoses lose less heat. Make sure heat from this unit will not damage any other machine or material.

3. Connect Discharge Line

Run a hose to mold from 1" NPT pump discharge. (See photo on page 11 to identify parts.)

Hose must be rated for 250°F and 100 psi with hot water and ethylene glycol. IMS stocks several hoses that work well for this purpose. For additional information concerning a hose that suits your needs, contact an IMS customer service representative at 1-800-537-5375 (U.S.A. & Canada).

If mold has more than one inlet, use a manifold near mold, and a single line to feed manifold. This will help prevent heat-loss. IMS also stocks manifolds for this purpose. For further information, contact an IMS customer service representative.

Waterline insulation is also available and encouraged.

INSTALLATION (continued)

4. Connect Return Line

Run the same type of hose used on the discharge line between 1" NPT tank inlet and mold outlet or manifold.

5. Fill Tank

a. Use only a mixture of water and inhibited ethylene glycol (or inhibited propylene glycol) in this circulator. The fluid flow pattern through the tank is not designed for thick fluids like oil.

Other reasons to use only glycol and water are:

- Straight water is too corrosive for this application.
- Pure ethylene glycol without inhibitors becomes acidic and corrosive in operation and will not transfer heat well.
- Automotive anti-freeze also becomes acidic when used in a relatively open system such as this machine. Its inhibitors break down in a short time, forming a gel that prevents heat transfer. Also, automotive anti-freeze contains abrasives that will destroy the pump seal.

NOTE

A low fluid level switch is present to protect the heater and pump. This unit will not start if the fluid level is not satisfied.

b. Decide on the ratio of ethylene (or propylene) glycol to water.

(1) The *higher* the glycol concentration the better the corrosion resistance and the higher the temperature at which the circulator can be run.

(2) The *lower* the glycol concentration the better the heat transfer ability.

(3) Use the lowest glycol concentration that will reach the temperature you need, but use at least 30% for corrosion resistance.

INSTALLATION (continued)

(4) 80% ethylene glycol will reach about 250°F.

30% ethylene glycol will reach about 219°F, but will have almost twice the heat transfer ability that 80% would have.

6. Optional

Make any other connections your application requires. Installing insulating wrap around hoses will help prevent heat loss. For information concerning hose insulation, contact an IMS customer service representative at 1-800-537-5375.

7. Connect to Power

DANGER

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Lock out and tag out power before doing wiring.

Only qualified electricians are to do electrical work.

a. Connect only to voltage listed on machine's serial number tag.

b. Install power cord that meets local codes. Heater is 9kW, pump motor is 1 hp. See serial tag for full-load amp rating.

b. Connect to a fused disconnect or circuit breaker with a minimum amp capacity of 40 amps for 230 volts and 25 amps for 460 volts.

c. Lock out / tag out power to circuit where you are going to connect circulator. Hard wire to fused disconnect or install plug so machine can be moved easily.

d. Do not turn power on to circuit until doing checks in INITIAL STARTUP, below.

INITIAL START-UP

> **DANGER**
>
> LIVE ELECTRIC PARTS could cause DEATH or SHOCK.
>
> Lock out and tag out power before doing wiring.
>
> Only qualified electricians are to do electrical work.

1. Power must be locked out and tagged out.
3. Check plumbing installation.
4. Check wiring installation.
5. Turn on plant power to circuit. Turn machine's main disconnect circuit breaker on (P. 11, Figure 1).
6. Check direction of pump rotation. It must be clockwise when viewed from end of motor. Press START button and let pump run for a few seconds; then shut it off and use a flashlight to observe motor rotation. If direction is reversed, have qualified electrician lock out / tag out power and reverse any two power leads.
8. Press START button again and let unit run.
9. Check for plumbing leaks while machine is running. If there are leaks:
   a. Stop machine. Lock out and tag out power.
   b. Correct leaks before starting up again.
10. Check fluid level. Ensure that fluid level satisfies low fluid level switch after mold and lines are filled with fluid.

Do not fill to maximum level – fluid will expand when heated, and could overflow the tank.

NORMAL OPERATION

DANGER

LIVE ELECTRIC PARTS could cause DEATH or SHOCK.

Lock out and tag out power before doing service.

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1. Circulator must have been installed according to INSTALLATION and must have gone through checks detailed in INITIAL START-UP.

2. Turn on power to circuit. Turn circuit breaker on.

3. Press PUMP ON button. The SYSTEM ON light will come on. The pump must remain on at all times. The heater will not work if the pump is turned off.

   The RETURN TEMPERATURE display will show the temperature of the water returning from the mold.

   The controller will show the TANK TEMPERATURE as the *top* set of numbers on the PROCESS CONTROLLER.

   The SETPOINT will be shown as the *bottom* set of numbers on the PROCESS CONTROLLER.

4. Turn HEATER switch on. (If you know that you will not be using heat, you can leave this switch off.) The HEATER “ON” light will turn on whenever the heating circuit is on. When lit, this means that the controller is calling for heat, and the heating element is currently on.

5. Set temperature setpoint to the necessary temperature.

   Keep in mind that the mold temperature does not match the fluid temperature you set. When heating, the mold is usually cooler than the fluid; when cooling, the mold is usually a little hotter. Controller will turn on power to heater or will turn on water cooling to maintain temperature.

   To adjust the setpoint (see figure 3 on page 8), press the UP arrow to increase the setpoint or the DOWN arrow to decrease the setpoint.

6. If the tank temperature falls below the setpoint:

   - The OP1 light on the controller will come on, indicating that the control relay is sending power to the heater power relay.
   - If the heating circuit is on, the heater will come on.
   - You will see the tank temperature rise until it meets the setpoint.

NORMAL OPERATION (continued)

7. If the tank temperature rises above the setpoint:
   - The OP2 light on the controller will come on, indicating that the control relay is sending power to the cooling water power relay.
   - The cooling water will flow through.
   - You will see the tank temperature fall until it meets the setpoint (or reaches the lowest temperature that the ambient temperature allows.)
8. To shut down circulator:
   a. Turn down temperature, to allow heaters to cool.
   b. After about 5 minutes, push red stop button.

MAINTENANCE

1. Check tank level often; the water should satisfy the low fluid level switch. Always check when water is cold.
2. See component manuals for repair procedures. All replacement parts are available from IMS.

TROUBLESHOOTING

1. Motor and Heater Not Working:

   - Check water level. The low-level float switch interrupts control voltage to the machine if the water level drops too low.
   - Is main disconnect ON?
   - Is machine plugged in?
   - Is there power to circuit that machine is plugged into?
   - Turn machine circuit breaker OFF then ON.
   - Press STOP switch fully. Then press START switch.
   - Have qualified electrician check function of float switch.

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Only qualified electricians are to do electrical work.

2. Tank temperature *below* setpoint and not rising. Pump is on.

   - Is HEATER CIRCUIT switch ON?
   - Is controller's OP1 light on?
   - Is the Heater Light ON?
   - Compare tank temperature reading to return temperature reading.
   - Have qualified electrician check controller output relay.
   - Have qualified electrician check heater power relay.
   - Have qualified electrician check heater elements.

TROUBLESHOOTING (continued)

3. Tank temperature above setpoint and not falling. Pump is on.
   - Is the COOLING light on?
   - Is controller's OP2 light on?
   - Compare tank temperature reading to return temperature reading.
   - Have qualified electrician check controller output relay.
   - Is plant water on?
   - Is machine getting cooling water?
   - Is cooling solenoid getting voltage?

Figure 1

FRONT AND LEFT SIDE VIEW

Figure 2

REAR AND RIGHT SIDE VIEW

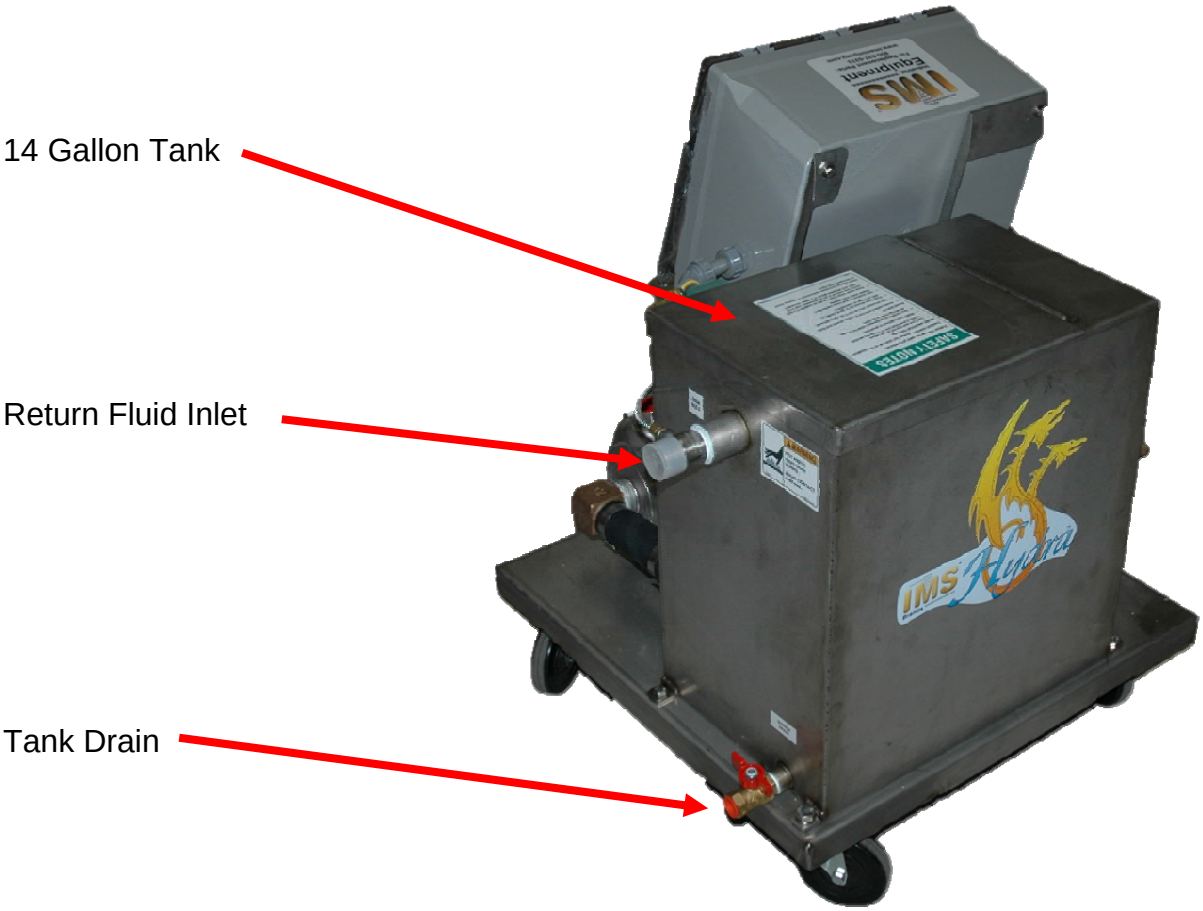


Figure 3

CONTROL PANEL

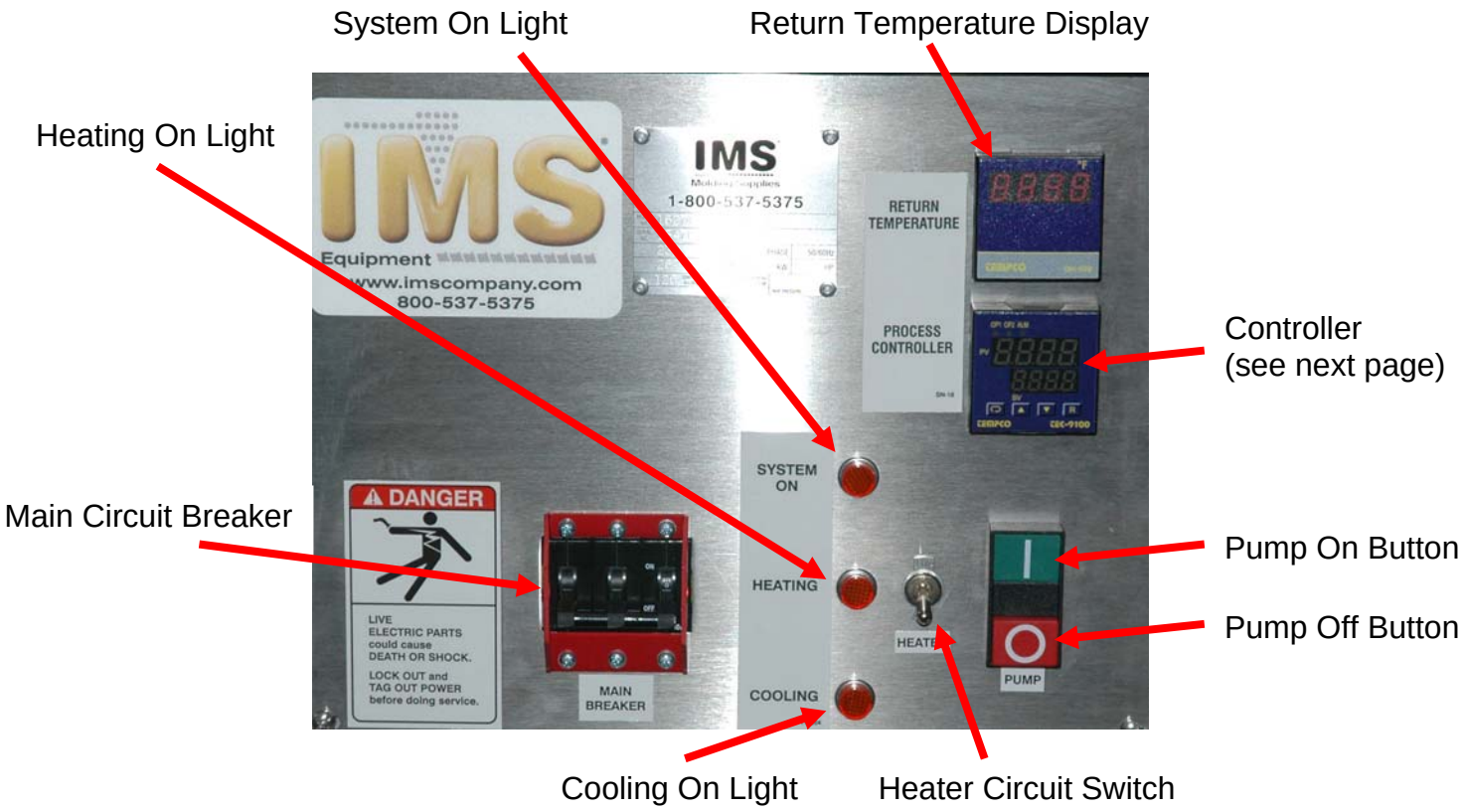
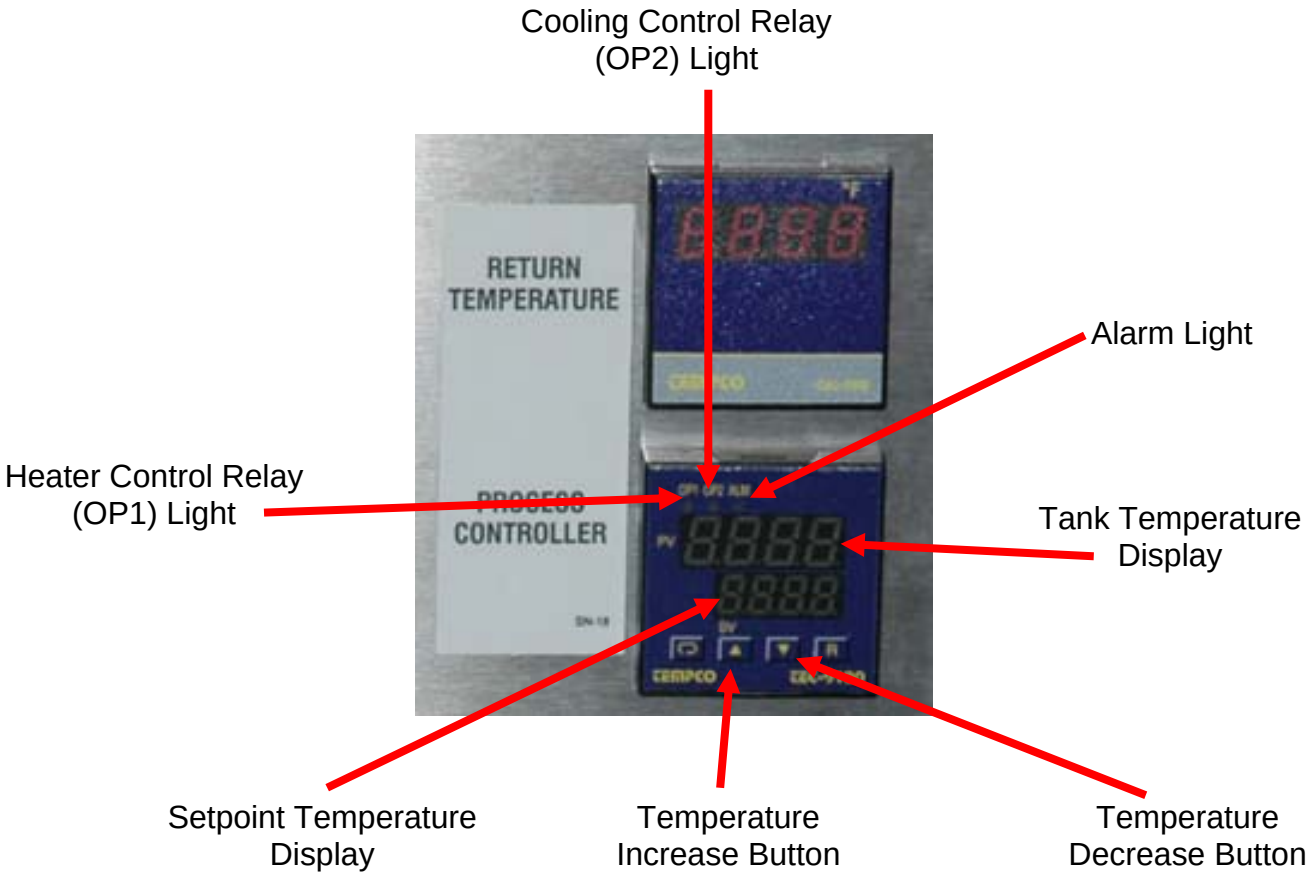
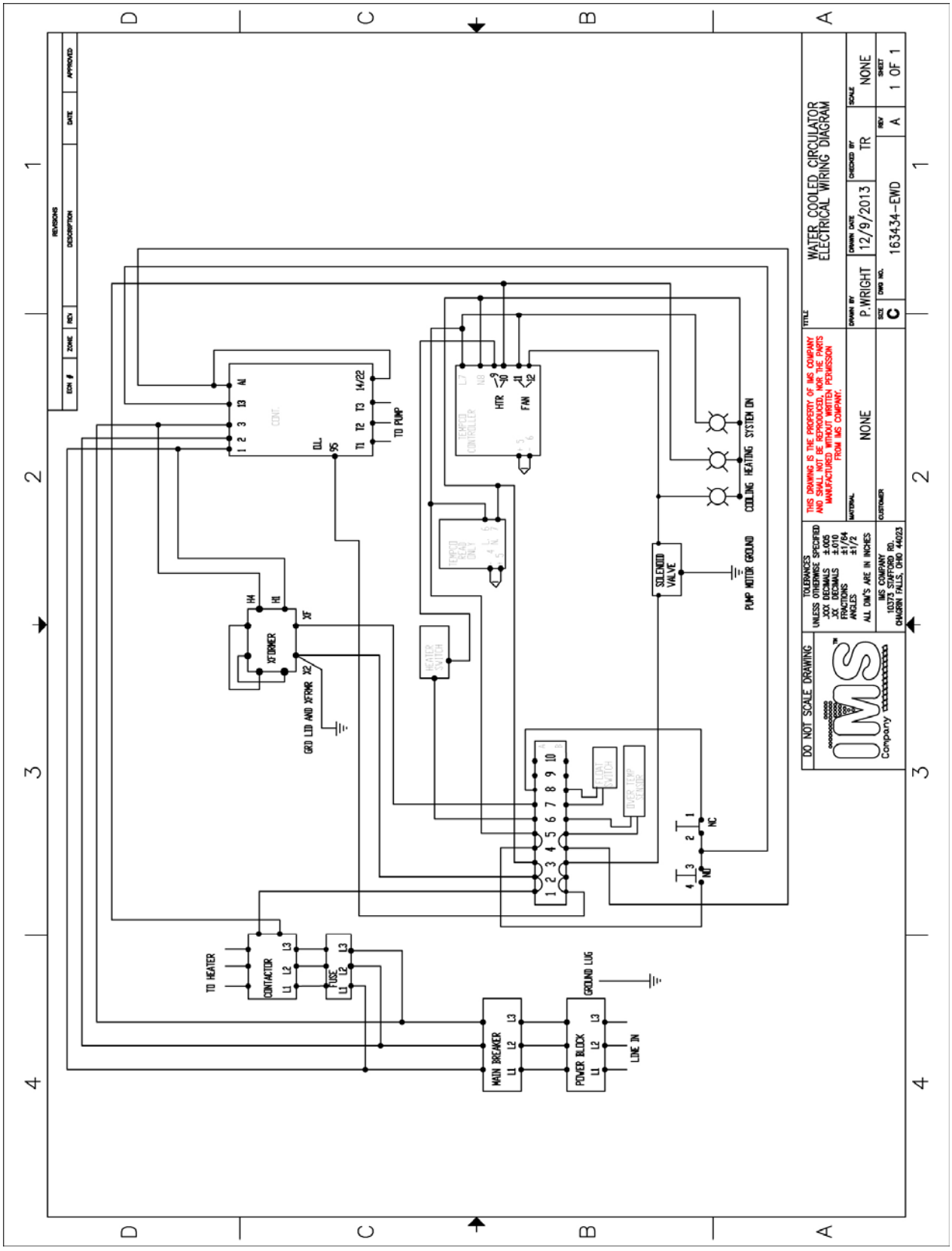


Figure 4

PROCESS TEMPERATURE CONTROLLER




WATER COOLED CIRCULATOR
ELECTRICAL WIRING DIAGRAM
DRAWN BY P.WRIGHT
DRAWN DATE 12/9/2013
CHECKED BY TR
SCALE NONE
SIZE C
DWG NO. 163434-EWD
REV A
SHEET 1 OF 1
MATERIAL NONE
CUSTOMER
TOLERANCES
UNLESS OTHERWISE SPECIFIED
.XXX DECIMALS ±.005
.XX DECIMALS ±.010
FRACTIONS ±1/64
ANGLES ±1/2
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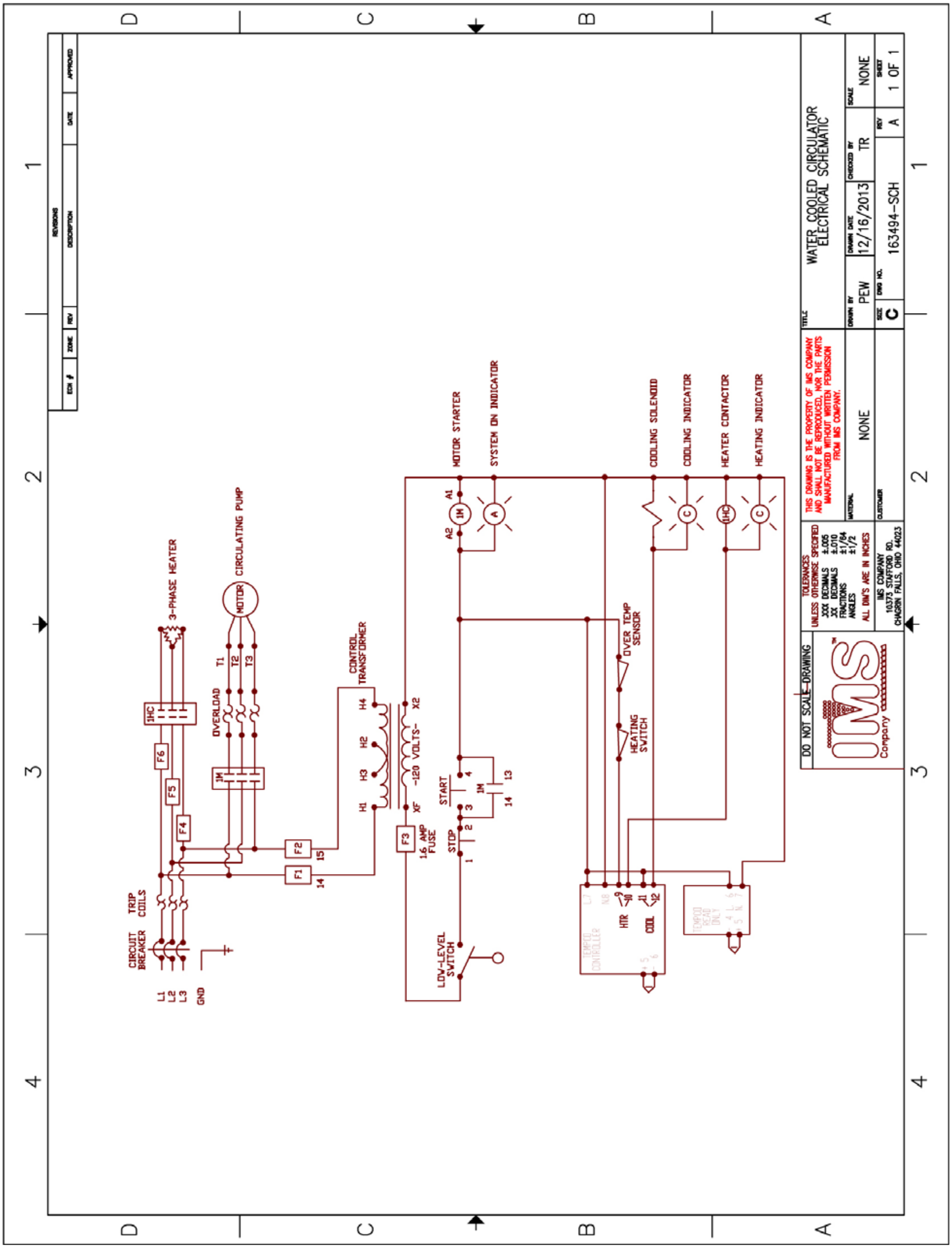
REVISIONS
ECN # ZONE REV DESCRIPTION DATE APPROVED
TO HEATER
CONTACTOR
FUSE
MAIN BREAKER
POWER BLOCK
GROUND LUG
LINE IN
TO PUMP
XFORMER
GRD LUG AND XFRMR X2
HEATER SWITCH
OVER TEMP SENSOR
SOLENOID VALVE
COOLING HEATING SYSTEM ON
PUMP MOTOR GROUND


WATER COOLED CIRCULATOR
ELECTRICAL SCHEMATIC
DRAWN BY PEW
DRAWN DATE 12/16/2013
CHECKED BY TR
SCALE NONE
SIZE C
DWG NO. 163494-SCH
REV A
SHEET 1 OF 1
MATERIAL NONE
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FRACTIONS ±1/64
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MOTOR STARTER
SYSTEM ON INDICATOR
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COOLING INDICATOR
HEATER CONTACTOR
HEATING INDICATOR
3-PHASE HEATER
CIRCULATING PUMP
MOTOR
CONTROL TRANSFORMER
-120 VOLTS-
OVERLOAD
OVER TEMP SENSOR
HEATING SWITCH
START
STOP
1.6 AMP FUSE
LOW-LEVEL SWITCH
CIRCUIT BREAKER
TRIP COILS
L1
L2
L3
GND
HTR
COOL

REPLACEMENT PARTS

Pump	161851
Heating element, 230 volt	148639
Heating element, 460 volt	148812
Mercury Contactor	106192
Controller	161838
Return Temperature Display	161839
Motor Starter Contactor	160234
Motor Starter Overload, 230 volt	162061 (4 - 6 amp)
Motor Starter Overload, 460 volt	158978 (1 - 1.6 amp)
Pump On/Off Switch	158874
Breaker, 240/60/3, 40 AMP	106156
Breaker, 460/60/3, 25 AMP	106234
Indicator Lights (Pump, Heater, Fan)	106263
Thermocouple, Tank/Process (36”)	160317
Thermocouple, Return (48”)	163316
Low Level Switch	161770
Heat ON Toggle Switch	158902
High Temperature Limit Switch	162549
Sacrificial Anode	162082
Primary Line Fuses, 230VAC	158914
Primary Line Fuses, 460VAC	158917
Primary Transformer Fuses 230/460VAC	158916
Control Transformer Fuse	158921

MAINTENANCE RECORD AND NOTES