KNOWLEDGE BASE

Article Type: **Instructions**

Remote Temperature Controller for Heated Mold Shoes, using a RTD/Digital Display, #601127.C (version pre-2009).

Description:

Instructions on "How to" properly set-up and operate Remote Temperature Controller using a RTD/Digital Display; part # 601127.C.
Three (3) control circuits – 230 volt/each up to 20 amps (4KW),
Total (12KW), single phase.

Typically used on Models 22HF, and 16HF machines, and (2 and 3) block Pit Model machines.

This controller version pre- February 2009.

WARNING

Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous – avoid personal injury and or death by following manufacture, Local, and OHSA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

Remote Temperature Controller for Heated Mold Shoes with RTD/Digital Display 601127.C

Columbia Machine, Inc.
Vancouver, Washington

This manual provides installation and operation information applicable to the Columbia Remote Temperature Controller for Heated Mold Shoes.

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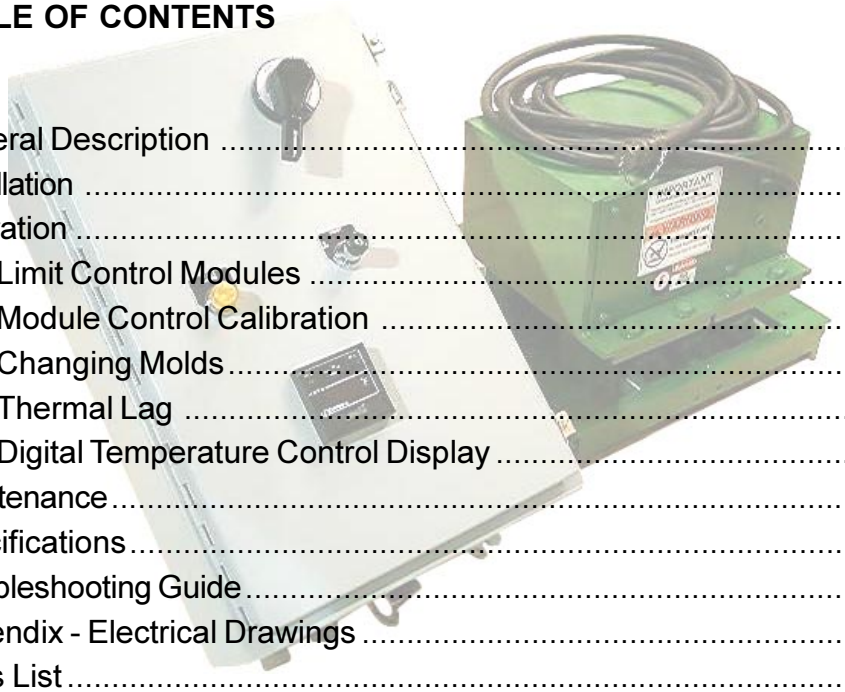
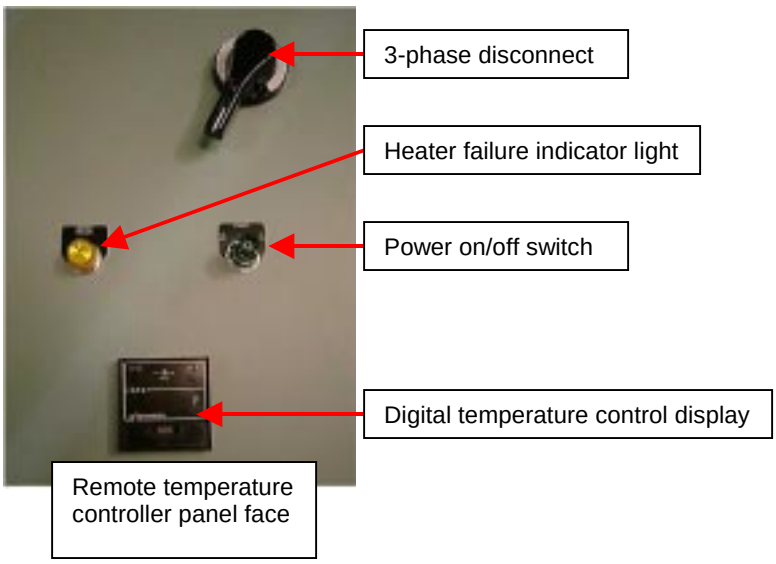


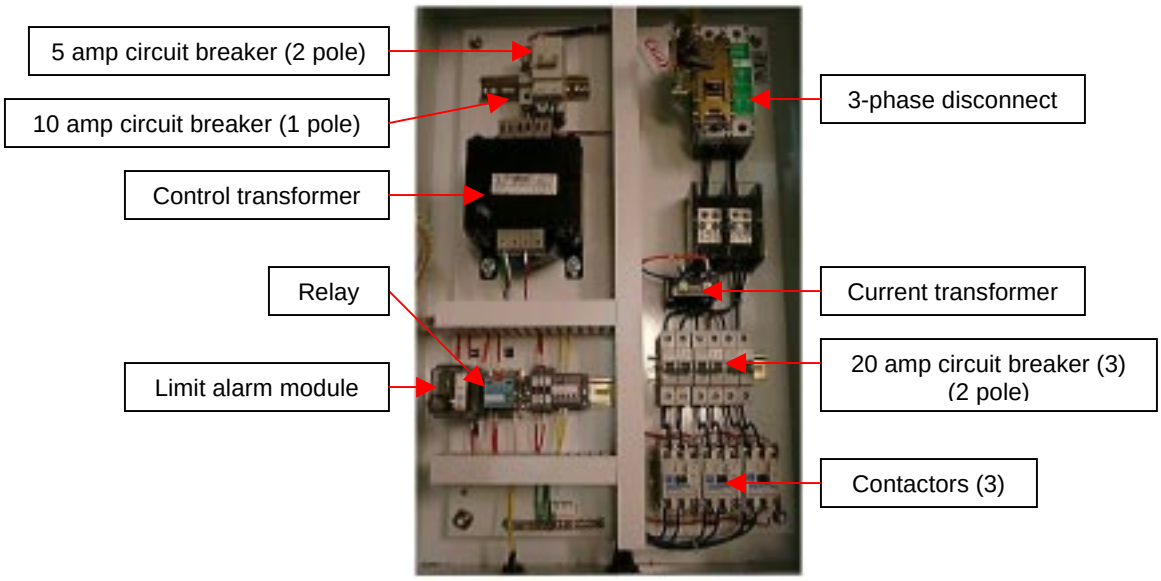
General Description

The Columbia remote temperature controller part #601127.C is designed to heat the mold shoes. Heating the mold assembly shoes prevents block material from adhering to mold shoe surfaces as block is formed in the production process. The remote temperature controller regulates the temperature of the mold shoes using temperature feedback and RTD devices.



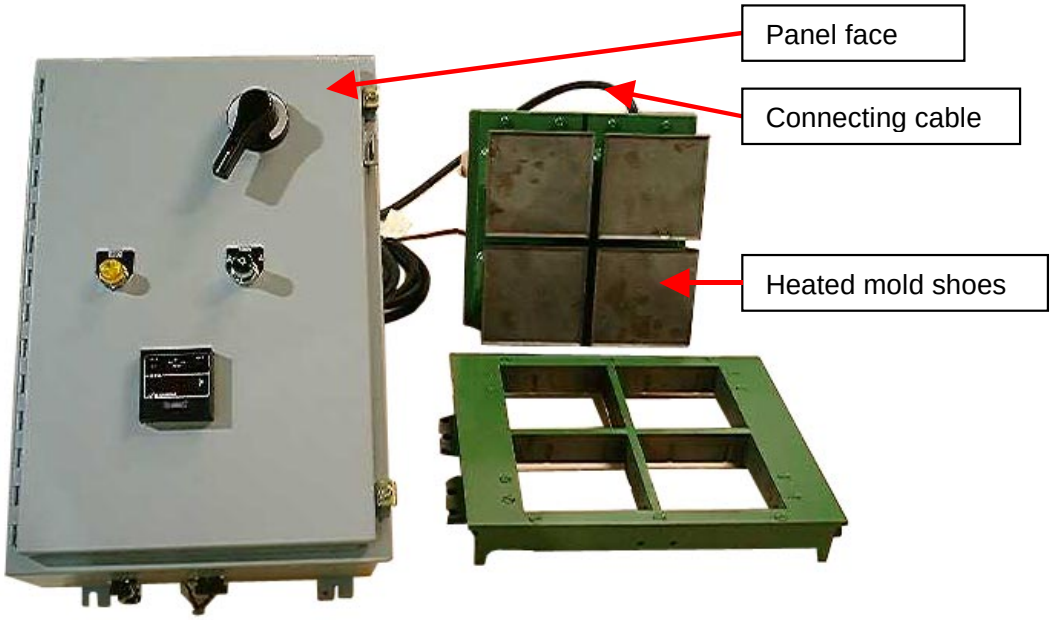
The remote temperature contoller uses two power cables. One cable connects the heated mold shoes to the control panel which supplies the necessary power to heat the mold shoes. A second cable connects the RTD to the control panel box, and supplies power to the temperature feed-back device. The heater control panel face consists of a 3-phase disconnect switch, power on/off switch, a heater failure indicator light, and a digital temperature controller display. The inside of the control panel box contains the circuit breakers, contactors, limit alarm module, current transformer (CT) necessary to operate the remote temperature controller.

The heater control panel can control three (3) 230 volt circuits, each up to twenty (20) ampere, for a total of 12KW single phase. When power is applied, a resistance temperature detector (RTD), located inside the heated shoe, indicates the current temperature sensed by the RTD. Operators can read the "set-point temperature" by pushing the toggle switch (located on the digital controller) to the right. The set-point temperature is the temperature operators should maintain during production. Operators can change the set-point by adjusting the knob labeled "SET I" while holding the toggle switch to the right.



The 601127.C heater control unit controls up to (12KW) 60 amps, divided into three (3), (4KW) circuits, at 230 volts, single (1) phase.

As areas of high temperature on the mold shoes come into contact with areas of low temperature in the mix material, temperature differences between the concrete mix and heated mold assembly shoes can approach 100 ° F. This is a normal occurrence, and the temperature will continue to rise and fall during operation as new material enters the mold, makes contact with the mold shoes, and then exits the mold.

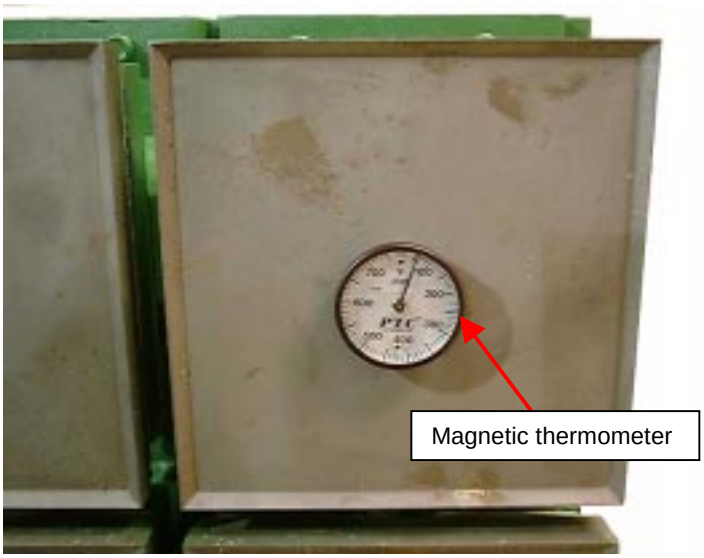


Installation

To install the Heated Mold Assembly and Mold Shoe Heater Control Panel, perform the following steps:

1. Remove the components from the crates
2. Inspect for damage
3. Ensure that all of the following items are included in shipment:

    a. Heated mold shoe control panel & box
    b. One magnetic thermometer
    c. One set of electrical drawings



4. Mount the control panel box on a wall:

    a. In an area free from high vibration
    b. At a distance where the cables can reach the mold assembly

5. Install and connect the control power

    a. Install a conduit for control power
    b. Connect 240 vac/ 60 amp single phase control circuit to the panel

6. Connect the control power cable and RTD cable from the heated mold to the panel:

    a. Locate the cables away from any moving parts
    b. Ensure that the cables have a flexible range of motion

7. Switch on power for operation

Operation

A typical remote temperature controller system contains:

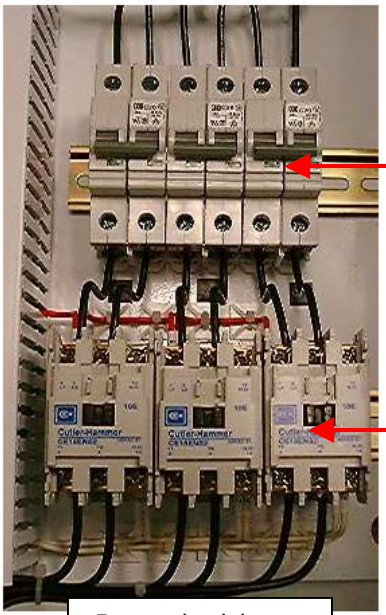
- Heat sensor (RTD)
- Digital temperature controller (4201A)
- Limit alarm (MM1604 or MM1600)
- Process load (heated mold shoes)

As the temperature of the heated shoes increases, the controller compares the set-point temperature with the temperature indicated by the RTD sensor. If the temperature sensed by the RTD falls below the set-point, the controllerapplies power tot he contactor until the temerature, which is indicated by the LED indicator on the panel face, reaches the set-point. The set-point (target) temperature is indicated by turning the "SET I" toggle switch to the right.

The remote temperature controller uses 600 watts of electric current per heater to generate heat inside the shoe. If the shoes experience a drop in current which leads to a drop in temperature below the set-point threshhold or limit, the limit alarm (MM 1604or MM 1600) and current monitor (CT) signals the yellow indicator light to illuminate.

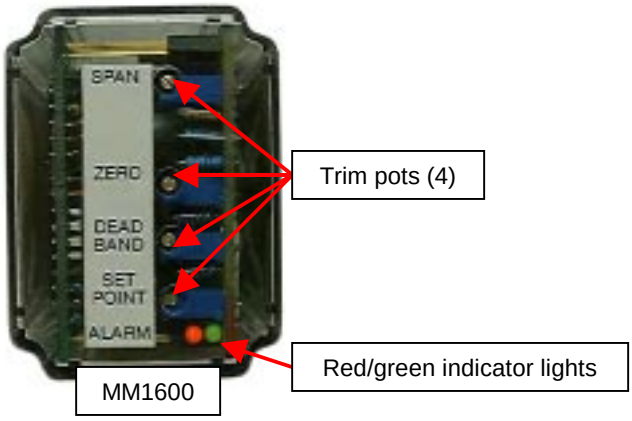
NOTE The indicator light will illuminate during failure only if the limit alarm is energized and the shoes are powered.

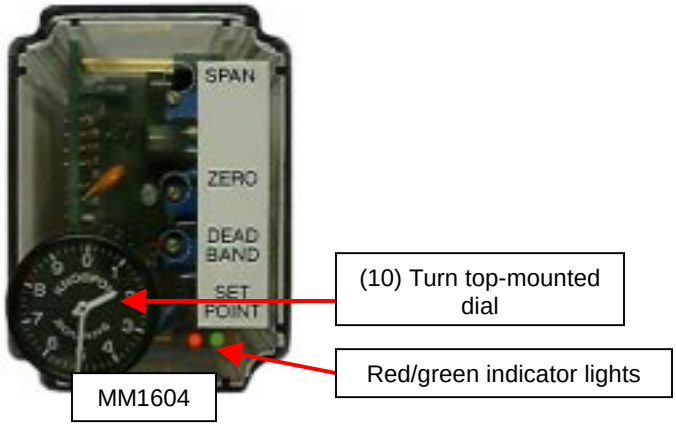
NOTE The indicator light may give a false signal when the controller initially energizes.



Power circuit layout

Limit Control Modules





Model	Specifications
MM1600	4 trim pots
MM 1604	Replaces the (25) turn trim pot with a (10) turn top-mounted dial
Both models come with zero and span calibrated trim pots at 0-50 mv. **Adjust the set-point and deadband trim pots only.** If the input range from the current transformer (C.T.) is set too low, the "span" trim pot may be adjusted counter-clockwise (CCW) for greater input swing.	

WARNING Do not adjust the span or zero trimpots.

Module Calibration

To calibrate the module:

1) Set the dead-band to zero by turning the knob full counter-clockwise.

2) Energize the contactor.

3) Turn on two of the three circuit breakers:

- If the green indicator light turns on, adjust the set-point counter-clockwise until the green light turns off, and the red indicator lightturns on. Adjust the set-point clockwise until the green indicator light turns on.

- If the red indicator light turns on, adjust the set-point clockwise until the red indicator light turns off, and the green indicator light turns on.

4) While simultaneously energizing the contactor and turning on all three circuit breakers:

- Observe if the red indicator light turns on, as it should.

NOTE Pause for 1 to 2 seconds after adjusting the set-point to allow the module's built-in delay to adjust to the new setting.

NOTE Red indicator light on = unit is de-energized/heater failure light is on.
Green indicator light on = unit is energized/ heater failure light is on.

Changing Molds

Each mold requires its own amount of wattage to sufficiently heat the shoes. When changing molds, only the set-point requires adjustment (both dial and adjustment screw) on the limit alarm module in order for the heater failure circuitry to function correctly. Record the appropriate set-point for each mold for quick reference when changing molds.

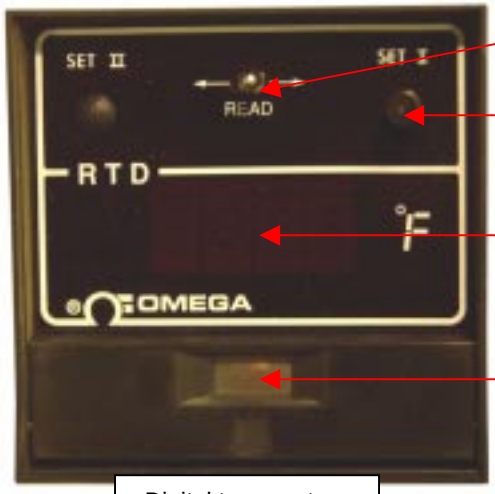
Thermal Lag

Thermal lag occurs as areas of high temperature on the mold shoes come into contact with areas of low temperature in the mix material, and temperature differences between the concrete mix and heated mold assembly shoes approach 100 ° F. This is a normal occurrence, and the temperature will continue to rise and fall during operation as new material enters the mold, makes contact with the mold shoes, and then exits the mold.

Thermal lag also occurs when the shoes reach the set-point temperature, yet slowly continues to increase in temperature, as indicated by the digital temperature controller (4201A). The temperature continues to increase because heat continues to migrate from the heaters in spite of termination of power.

CAUTION Operate the heated mold within the recommended operating temperature of 150°- 200°. Never exceed a temperature of 350°.

Digital Temperature Control Display



Set-point selector switch

Set I adjustment

3-digit display

Output light

Digital temperature control displav

Control or Indicator	Function
Set-point toggle switch	Operators can display the set-point temperature on the 3-digit display by holding the set-point toggle switch to the right
Set I knob	Operators can adjust the set-point temperature by holding the set-point toggle switch to the right while turning the Set I knob clockwise to increase the temperature setting and counter-clockwise to decrease the temperature setting
Output light	The output light illuminates when the output circuitry is actuated to apply power to the system

Maintenance

Item	Frequency	Procedure
Digital temperature controller	Prior to use	Clean and protect from dirt, oil, corrosion, and vibration
Mold head-box	Prior to use	Tighten connections
Control panel	Monthly	Inspect connections for positive contact
Digital temperature controller Electrical connections	Monthly	Inspect connections
Power cables/RTD cables	As needed	Replace when frayed or damaged

CAUTION Do not clean the front panel bezel and the meter face with solvent. Doing so will damage the plastic surface.

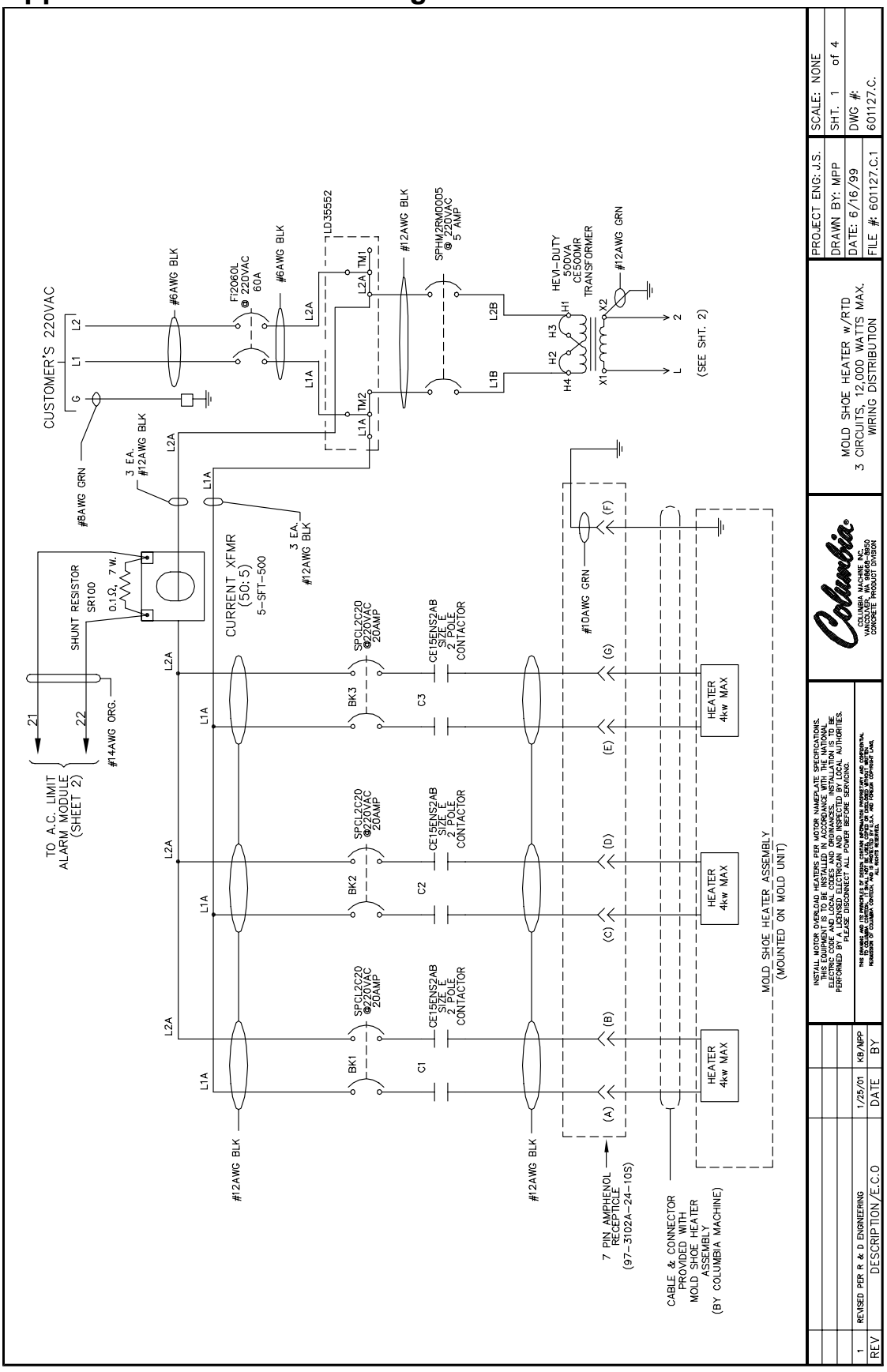
Specifications

Component	**Specifications**
Panel box	20” wide x 30" high x 8" deep
Input voltage	220 AC – single phase
Output circuit current	3 – 20 amp circuits, 4 kw/circuit
Main breaker	60 amp, 12 kw total

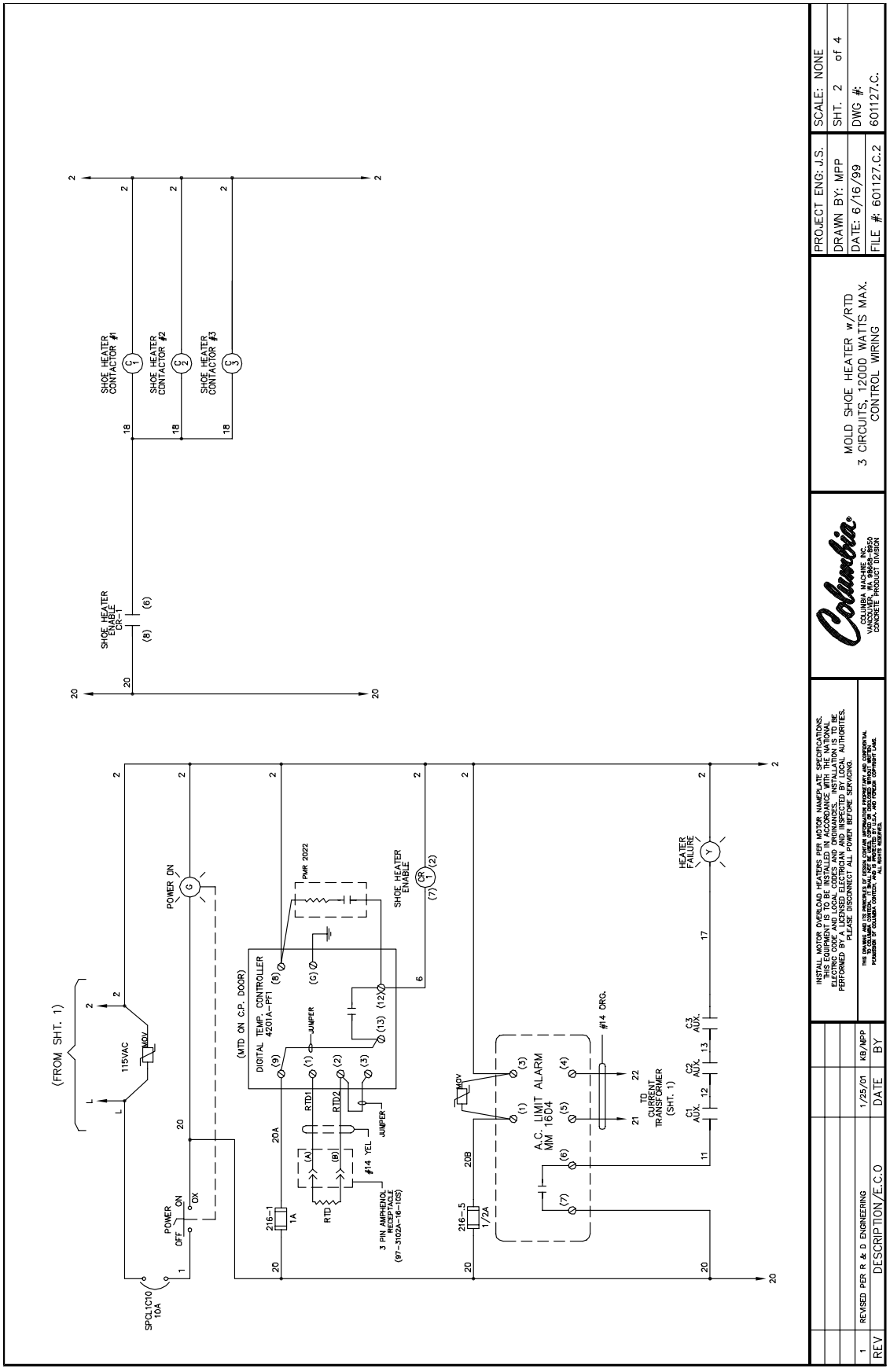
Troubleshooting

Symptom	Probable Cause	Check	Corrective Action
Mold shoes not heating	No line voltage	Verify 240 VAC voltage	Restore power
	Open main breaker	Check main breaker	Close main breaker
	Open main circuit	Check heater for shorting	Close circuit breaker
	Power cable	Check cable for cuts, damage, or tears; Check connector & plug	Replace cable; tighten or replace connector & plug
	Terminal connections	Check terminal connections inside mold head	Tighten terminals
	Failed heater	Check heater for open circuit	Replace heater
	Contactor not energized	Check 120 VAC voltage Check timer relay settings	Close 120 VAC circuit breaker Adjust T1 & T2
Digital temperature controller is inactive. No output light or digital display.	No line voltage	Check fuse Check power on/off selector switch Check circuit breaker	Replace fuse Turn switch on
Digital temperature controller reads ambient temperature	Defective heater	Heater	Replace heater
	Open heater	Heater	Replace heater
	Defective power cable	Power cable	Replace power cable
Output light not illuminated on digital temperature controller	Open RTD	RTD	Replace RTD
	Defective RTD cable	Check cable for cuts, damage, or tears Check connector and plug	Replace cable Tighten or replace connector and plug
Digital temperature controller display reads negative numbers	RTD	Check cable for proper wiring	Correct wiring
Heater failure indicator light “on”	Calibrate/setup	See calibration section of manual	Recalibrate
	Defective heater	Heater	Replace heater

Appendix: Electrical Drawings



Appendix: Electrical Drawings



Parts List

No.	Description	Columbia Part Number	No. Req'd.
1	Enclosure	201486	1
2	Wc9 Back Panel,27X17	201562	1
3	Dist Block Power 335A	2010549	1
4	Breaker 2Pole 20A Ce	2014469	3
5	Breaker 2Pole 60A Ce	2014470	1
6	Breaker,2 Pole,5A	239768	1
7	Breaker 1Pole 10A Ce	2014281	1
8	Breaker Frame F	2014332	1
9	Breaker F Frame Han	2014103	1
10	Breaker Shaft 12	2014329	1
11	Alarm,0-500Mvac,115Vac	239799	1
12	Transformer Current 50:5	2011712	1
13	Resistor, Sr100	230921	1
14	Receptacle, Socket, 7 Pin	232809	1
15	Connector Box	2010792	1
16	Cap For Receptacles	232811	1
17	Cap For Receptacles	232834	1
18	Thermometer 314F	234325	1
19	Transformer 1Phase 500	2012776	1
20	Operator Selector	201841	1
21	Contact Block 1No	200197	1
22	Unit, Basic Light	200071	1
23	Lens	201913	1
24	Operator Knob Green	200121	1
25	Controller Digital	2011713	1
26	Contact Block	201949	4
27	Contactor Iec 2P 25	2012698	3
28	Relay Dpdt	236831	1
29	Relay Base 8 Pin	236979	1
30	Relay Base 11Pin	2014226	1
31	Suppressor F	2011021	1
32	Fuse 216 1A	202725.001.000	2
33	Fuse 216 .5A	202725.000.500	2
34	Terminal Std,6mm	201580	5
35	Term,End Cover,Std	201582	1
36	End Clamp, Entrelec	201583	2
37	Terminal Fused 8mm	203656	3
38	Term End Cover 8mm	203657	1
39	Terminal Ground Lam	2010185	1
40	Grounding Kit	231110	1