WL4 HEATED STRIP TANK

Installation & Operations Manual

240VAC Single-Phase Heating Control System

with Genesis Wizard WHMC Temperature Controller

Document Information	
System	WL4 Heated Strip Tank
Controller	Genesis Wizard WHMC (44-0371) — Custom Variant
Heater Load	2000W @ 240VAC (two 1000W heaters)
Revision	1.0
Date	January 2026

1. Safety Warnings

⚠ DANGER — RISK OF ELECTRIC SHOCK

This equipment operates at 240VAC. Contact with live circuits can cause serious injury or death. Disconnect ALL power before servicing. Verify with a meter that circuits are de-energized before touching any wiring.

⚠ CAUTION — HIGH TEMPERATURE

Heater elements operate at temperatures exceeding 200°F. Allow cool-down before servicing. Use appropriate PPE.

⚠ RED FLASHING LED = SSR STUCK CLOSED

If the RED LED is FLASHING, current is flowing when it should not. DISCONNECT POWER IMMEDIATELY. The solid-state relay has failed shorted and will heat uncontrollably.

⚠ WARNING — DO NOT LIFT OR MOVE TANK WHEN FILLED

The tank must NOT be lifted or moved when it is more than one-third (1/3) filled with liquid. Moving a partially or fully filled tank creates serious risk of injury from spills, structural damage to the tank, and damage to heating elements and electrical connections. Always drain the tank to below 1/3 capacity before repositioning.

Critical Safety Procedures

1. Always use Main Disconnect (DC) to isolate entire system before work.
2. Use Heater Disconnect (HD) to isolate heater circuit when controller access needed.
3. Verify zero voltage with meter before touching any wiring.
4. Never bypass snap disc high-limit safety or any protective device.
5. Never lift or move the tank when it is more than 1/3 filled.

2. Tank Operation

This section describes procedures for filling, operating, and draining the WL4 Heated Strip Tank safely and effectively.

Before First Use

1. Verify the tank is positioned in its final operating location. The tank must NOT be lifted or moved when it is more than one-third (1/3) filled.
2. Ensure the tank is on a level, stable surface capable of supporting the weight of the tank plus liquid.
3. Confirm all electrical connections are complete and the Main Disconnect (DC) is in the OFF position.
4. Verify the drain valves are closed.
5. Inspect the tank interior for debris or foreign objects.

Filling the Tank

1. Ensure the Main Disconnect (DC) is OFF before filling.
2. Fill the tank slowly with the process liquid to the desired operating level. Do not exceed 26” of fill depth.
3. Ensure the tank is filled to the specified level before turning on the heaters, the heaters sit 6” above the base of the tank.

Starting the Heating System

1. Confirm the tank is filled to the proper operating level.
2. Close the Main Disconnect (DC) to energize the system.
3. Close the Heater Disconnect (HD) to enable the heater circuit.
4. Set the desired temperature on the Genesis Wizard WHMC controller.
5. Set the Genesis Wizard – low temp alarm – to a temp below the ambient temp of the process fluid you are heating (this alarm temp will need to be raised after the solution is heated up to the desired temp)
6. Observe the LED indicators: GREEN indicates normal heating operation with both heaters active.
7. Monitor the system during initial heat-up. See Section 6 (LED Indicator Guide) for status interpretation.

Normal Operation

During normal operation, the PID controller automatically maintains the setpoint temperature. The LED indicator will cycle between GREEN (heating) and OFF (standby) as the controller modulates the heaters.

1. Maintain liquid level above the heater elements at all times during operation.
2. Monitor the LED indicators periodically. A YELLOW LED indicates one heater has failed and requires attention.
3. If a RED flashing LED appears, disconnect power immediately — this indicates a stuck SSR fault.

Shutting Down the System

1. Set the controller setpoint to a low value or use the controller’s OFF function if available.
2. Open the Heater Disconnect (HD) to de-energize the heater circuit.
3. For complete shutdown, open the Main Disconnect (DC).
4. Allow the tank and liquid to cool before draining or performing maintenance.

Draining the Tank

1. Shut down the heating system and allow the liquid to cool to a safe handling temperature.
2. Position a suitable collection container beneath the 1” maintenance drain valve.
3. Open the drain valve slowly to control flow rate.
4. Allow the tank to drain completely before closing the drain valve.

5. Store the liquid for refilling the tank once maintenance is complete.

Sludge Removal

1. Once tank is cooled down to a safe temperature attach a 1-2” double diaphragm pump or drum vacuum to the 2” ball valve at the base of the tank.
2. Make sure that connection between fittings is firm and open the 2” ball valve.
3. Turn on double diaphragm pump or drum vac and transfer waste sludge to appropriate disposal container (tote or drum).
4. Use a hose or pressure washer to clean the remnants use the pump or vacuum to transfer this rinse solution to waste water for PH balancing before release if appropriate.
5. Once sludge is cleaned out, close the 2” ball valve, remove fittings, and carefully refill the tank with the previously removed solution and top off with fresh chemical if necessary.

Moving or Repositioning the Tank

IMPORTANT: The tank must NOT be lifted or moved when it is more than one-third (1/3) filled with liquid.

If the tank must be relocated:

1. Shut down the heating system completely.
2. Allow the liquid to cool to a safe temperature.
3. Drain the tank until it contains no more than one-third (1/3) of its capacity.
4. Disconnect all electrical connections.
5. Use proper lifting techniques and equipment rated for the tank weight plus remaining liquid.
6. Position the tank in its new location before reconnecting electrical service and refilling.

3. System Overview

The WL4 Heated Strip Tank is a 240VAC single-phase heating control system with PID temperature control, comprehensive safety monitoring, and multi-state LED diagnostics.

System Architecture

Two-rung electrical architecture:

- **Rung 1 (5A Breaker):** Control circuit — always-on power for controller, sensors, relays, indicators.
- **Rung 2 (13A Breaker):** Heater circuit — isolated via manual disconnect (HD) for safe controller access.

Key Features

- Genesis Wizard WHMC PID controller with scheduling
- 100K NTC high-temperature sensor rated to 572°F
- Dual current sensing (CSA @ 1A, CSB @ 6A) for load monitoring
- SSR-stuck detection via hardwired relay logic (independent of controller)
- Five-state LED indication: GREEN, YELLOW, RED solid, RED flash, OFF
- Snap disc high-limit safety (N.C. @ 200°F)

4. Specifications

Electrical Specifications

Parameter	Value
Input Voltage	240VAC Single-Phase
Total Heater Power	2000W
Total Heater Current	8.33A (2000W ÷ 240V)
Per-Heater Power	1000W each
Heater Configuration	2 heaters in parallel
Control Breaker (BR)	5A double-pole
Heater Breaker (BH)	13A double-pole

Controller — Genesis Wizard WHMC

Parameter	Value
Part Number	44-0371 (Custom Variant)
Variant	10A relay contacts/5A fuses; 100K thermistor
Power	100-240VAC, 50/60Hz, 1.0A
Enclosure	NEMA 4X, 16×24×8 in 304 Stainless Steel – WHMC is within this enclosure
Relay Outputs	5× SPDT, K2 used for heater control
12VDC Output	Onboard — powers indicator circuit
Scheduling	20 setback + 9 holiday schedules

Temperature Sensor — Genesis 80-0319

Parameter	Value
Type	100K NTC Thermistor, ±3% @ 78°F
Range	-58°F to 572°F (-50°C to 300°C)
Accuracy	±0.5°F (±0.3°C)
Housing	Aluminum, 3/8" hole for lug mount
Lead Length	15 feet standard

5. Theory of Operation

Temperature Control Loop

The WHMC monitors temperature via the 100K NTC thermistor. When temperature falls below setpoint, K2 (CTRH) energizes. The K2 N.O. contact provides 240VAC to RL1 coil (via T1B) and SSR control input. SSR conducts, powering heaters through snap disc safety.

Current Sensing Logic

Two current sensors monitor L2 return path:

- **CSA (1A trip):** Detects ANY current. N.C. opens, N.O. closes when ≥1A.
- **CSB (6A trip):** Detects FULL load. N.C. opens, N.O. closes when ≥6A.

This distinguishes: no load (0A), partial (4.17A), full load (8.33A).

Relay Logic

- **RL1 (DPDT):** Energizes when heat called. Routes 12V to LED paths based on heat call state.
- **RL2 (SPST-NO):** Energizes when heat NOT called. Routes CSA signal through flasher for SSR-stuck detection.

Safety Independence

The hardwired relay logic (RL1, RL2, CSA, CSB) operates independently of controller firmware. SSR-stuck detection functions even if controller malfunctions.

6. LED Indicator Guide

LED State	Heat?	Current	Meaning / Action
GREEN	YES	8.33A	Normal — both heaters running
YELLOW	YES	~4.17A	Degraded — one heater out; schedule replacement
RED solid	YES	0A	Fault — SSR open OR snap disc tripped
OFF	NO	0A	Standby — normal idle state
RED flash	NO	≥1A	DANGER — SSR stuck! Disconnect immediately

State Details

GREEN: Both heaters drawing 8.33A. CSA trips, RL1 energized, CSB trips → GREEN LED.
YELLOW: One heater only (4.17A). CSA trips but CSB doesn't → YELLOW via CSB N.C.
RED solid: Heat called but 0A. SSR failed open, snap disc tripped, or wiring fault.
OFF: No heat call, no current. Normal standby.
RED flash: Current flowing but no heat call! SSR stuck closed. DISCONNECT POWER.

7. Wiring Reference

Main Power Distribution

MAIN INCOMING POWER				
Wire Label	**From**	**To**	**Gauge**	**Notes**
L1-DC-12	Incoming L1	Main Disconnect	12 AWG	Hot leg
L2-DC-12	Incoming L2	Main Disconnect	12 AWG	Hot leg
L1-DC-T1-12	Main Disconnect	Terminal 1 (L1)	12 AWG	
L2-DC-T1-12	Main Disconnect	Terminal 1 (L2)	12 AWG	
G-GM	Incoming Ground	Ground Bus	10 AWG	Main ground

RUNG 1: CONTROL CIRCUIT (5A BREAKER)				
Wire Label	**From**	**To**	**Gauge**	**Notes**
L1-T1-BR-18	Terminal 1 (L1)	Breaker Control	18 AWG	5A breaker
L1-BR-T1A-18	Breaker Control	Sub-Term 1A	18 AWG	Always-on
L1-T1A-CT-18	Sub-Term 1A	Controller (L)	18 AWG	WHMC power
L1-T1A-CNO-18	Sub-Term 1A	CTRH COM	18 AWG	K2 common
L1-CNO-T1B-18	CTRH N.O.	Sub-Term 1B	18 AWG	Heat signal
L1-T1B-RL1-18	Sub-Term 1B	RL1 Coil (A1)	18 AWG	Heat Called
L1-T1A-CNC-18	Sub-Term 1A	CTRH N.C.	18 AWG	K2 N.C.
L1-CNC-RL2-18	CTRH N.C.	RL2 Coil (A1)	18 AWG	Fault Detect
L1-T1B-SSR-18	Sub-Term 1B	SSR Control (+)	18 AWG	SSR gate

RUNG 2: HEATER CIRCUIT (13A BREAKER)				
Wire Label	**From**	**To**	**Gauge**	**Notes**
L1-T1-HD-12	Terminal 1	Heater Disconnect	12 AWG	Isolation
L1-HD-BH-12	Heater Disconnect	Breaker Heater	12 AWG	13A breaker
L1-BH-SSR-12	Breaker Heater	SSR Load Input	12 AWG	Power in
L1-SSR-SD-12	SSR Load Output	Snap Disc (in)	12 AWG	Switched
L1-SD-CE-12	Snap Disc (out)	Ceramic Terminal	12 AWG	200°F safety
L1-CE-H1-14	Ceramic Terminal	Heater 1	14 AWG	~4.17A
L1-CE-H2-14	Ceramic Terminal	Heater 2	14 AWG	~4.17A
L2-BH-CSA-12	Breaker Heater (L2)	CSA Sense (in)	12 AWG	Return
L2-CSA-CSB-12	CSA Sense (out)	CSB Sense (in)	12 AWG	Daisy-chain
L2-CSB-CE-12	CSB Sense (out)	Ceramic Terminal	12 AWG	

12V DC INDICATOR CIRCUIT				
Wire Label	**From**	**To**	**Gauge**	**Notes**

CT12-F1-22	Controller 12V+	Fuse 1 (in)	22 AWG	1A protection
F1-CSC-22	Fuse 1 (out)	CSA Relay COM	22 AWG	12V to CSA
CT12-T2R-22	Controller 12V-	Terminal 2R	22 AWG	Return bus
CNN-RL1C-22	CSA N.C.	RL1 Pole 1 COM	22 AWG	No current
CSN-T2A-22	CSA N.O.	Terminal 2A	22 AWG	Current det
RL1P1O-T2B-22	RL1 P1 N.O.	Terminal 2B	22 AWG	Red solid
T2A-RL2C-22	Terminal 2A	RL2 COM	22 AWG	To fault relay
RL2O-FL-22	RL2 N.O.	Flasher In	22 AWG	LSC-100B
FL-T2B-22	Flasher Out	Terminal 2B	22 AWG	Flash output
T2A-RL1C-22	Terminal 2A	RL1 P2 COM	22 AWG	To RL1
RL1P2O-CBC-22	RL1 P2 N.O.	CSB COM	22 AWG	To CSB
CBN-G-22	CSB N.O.	Green LED (+)	22 AWG	Full load
CBC-Y-22	CSB N.C.	Yellow LED (+)	22 AWG	Partial
T2B-R-22	Terminal 2B	Red LED (+)	22 AWG	Fault
T2R-R/G/Y-22	Terminal 2R	All LEDs (-)	22 AWG	Returns

8. Troubleshooting

Symptom	Possible Cause	Corrective Action
Controller no power	Main Disconnect open	Close Main Disconnect
	Breaker (BR) tripped	Reset BR
GREEN but not heating	Snap disc tripped	Cool-down; check airflow
	Heater Disconnect open	Close HD
YELLOW instead of GREEN	One heater burned out	Test resistance; replace
RED solid	SSR failed open	Replace SSR
	Snap disc tripped	Check overtemp
RED flashing	SSR failed shorted	DISCONNECT; replace SSR
All LEDs off	12V fuse (F1) blown	Replace F1
	12V output failed	Check controller
SENSOR OPEN alarm	Broken thermistor wire	Check cable continuity
SENSOR SHORT alarm	Damaged cable	Replace sensor

Appendix: Thermistor Resistance Table

100K NTC Sensor (Genesis 80-0319) — measure with sensor disconnected.

Temp (°F)	Temp (°C)	Resistance (KΩ)
-58	-50	1127
32	0	353.7
77	25	100.0
122	50	33.49
167	75	15.44
212	100	7.686
302	150	2.298
392	200	0.841
482	250	0.359
572	300	0.174

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