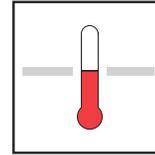


# tekmar® - Application

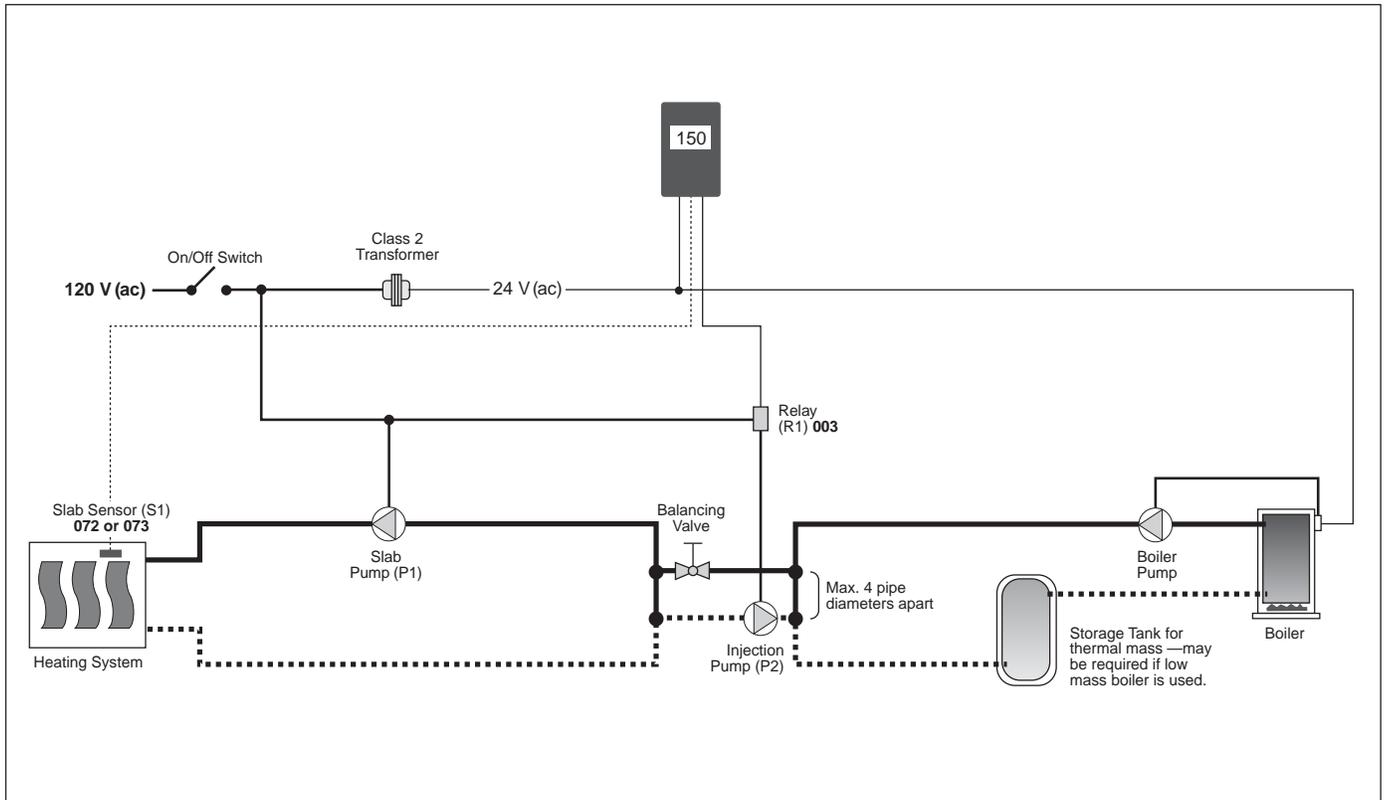
One Stage Setpoint Control 150



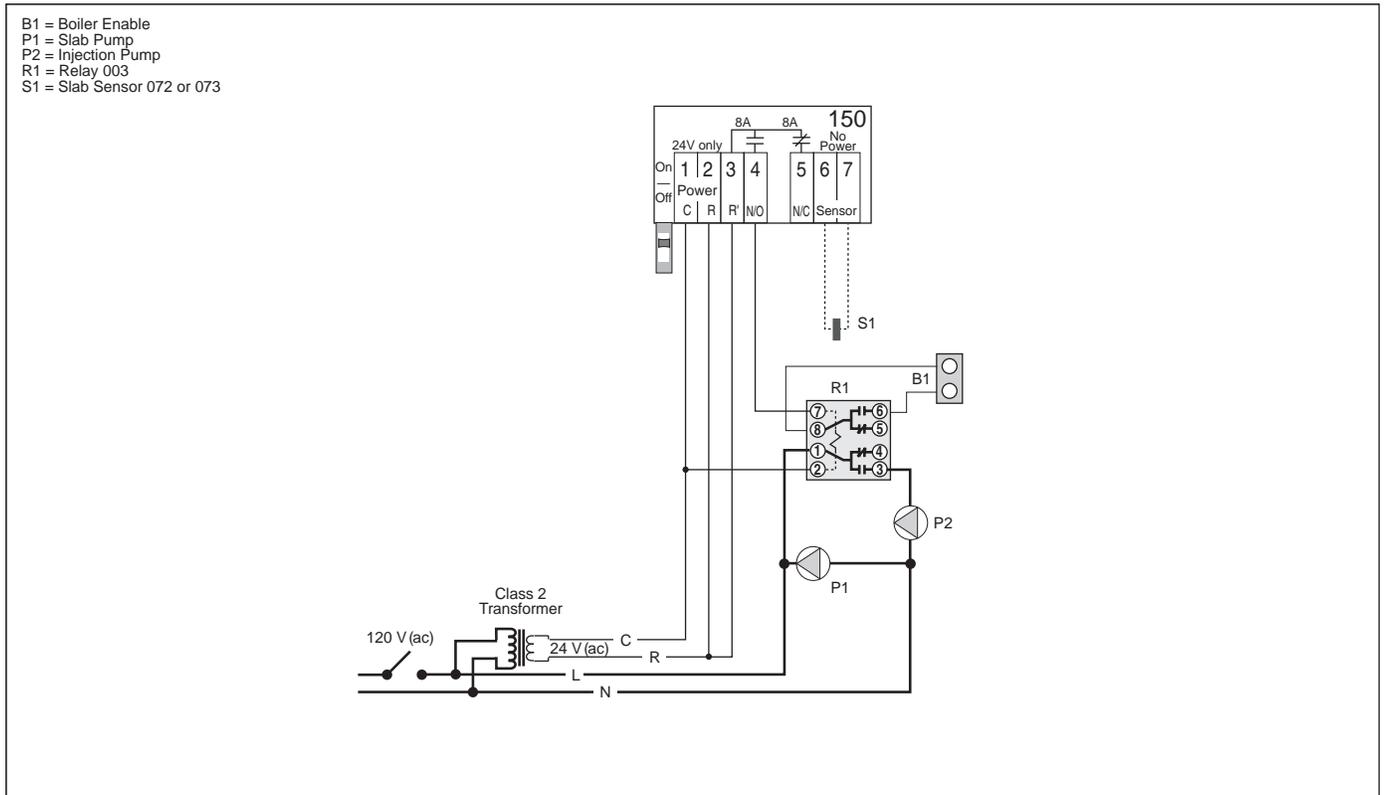
A 150-1

12/08

## Mechanical



## Electrical



**Note:** This is only a concept drawing. Designers must determine whether this system will work in each application and must ensure compliance with code requirements. Necessary auxiliary equipment and safety devices must be added.

## Operation

The One Stage Setpoint Control 150 regulates the temperature of the slab by turning the injection pump on and off in response to temperature changes at the slab sensor.

*Note:* For optimum control, the supply temperature from the boiler should be constant. This will allow the system to be balanced so that the supply fluid to the slab is just hot enough to maintain the slab temperature at design conditions.

## Specifications

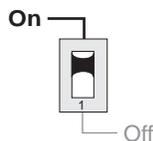
The following are minimum recommended specifications for the control in this application.

- The slab temperature shall be maintained based on the programmed setpoint temperature.
- The slab pump must run continuously with the injection pump cycling on and off to provide heat input into the slab.
- The control shall operate the injection pump using Pulse Width Modulation (PWM) action.
- The control shall be able to display and adjust the setpoint temperature, differential and delay or cycle length.
- The control shall have an adjustable cycle length of 30 sec. to 19 min. 50 sec (10 second increments).
- The control shall be microprocessor-based and have an internal SPDT relay with 8 amp (resistive) isolated contacts for outputs.
- The installation location must be maintained within the ambient temperature and humidity ranges specified in the D 150 Brochure for this control, with the installer ensuring that the control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- The control shall continuously monitor its temperature sensors and provide an error message upon sensor failure.
- The control components required from tekmar are a One Stage Setpoint Control 150, one Slab Sensor 072 or 073 and one Relay 003. (The Supply Sensor 071 included with this control should not be used if the sensor is to be poured directly into a concrete slab without using conduit.)

## Settings

One Stage Setpoint Control 150	Adjustment Range	Recommended Initial Setting
Temperature Display	-85 to 302 °F (-65 to 150 °C)	
Setpoint	-40 to 239 °F (-40 to 115 °C)	
Differential range (PWM)	3 to 40 °F (2 to 22 °C) (10 second increments)	
Cycle Length (PWM)	30 sec. to 19 min. 50 sec. (10 second increments)	
Operating Mode	Heating/Cooling	Heat

**One Stage Setpoint Control 150 DIP switch setting for this application.**



PWM — DIP switch should be in the up position

## Additional Information

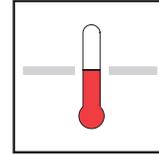
- For control installation and testing instructions see Brochures D 150 and D 001.
- For control theory and system integration details see Essays E 001 and E 002.



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# tekmar® - Application

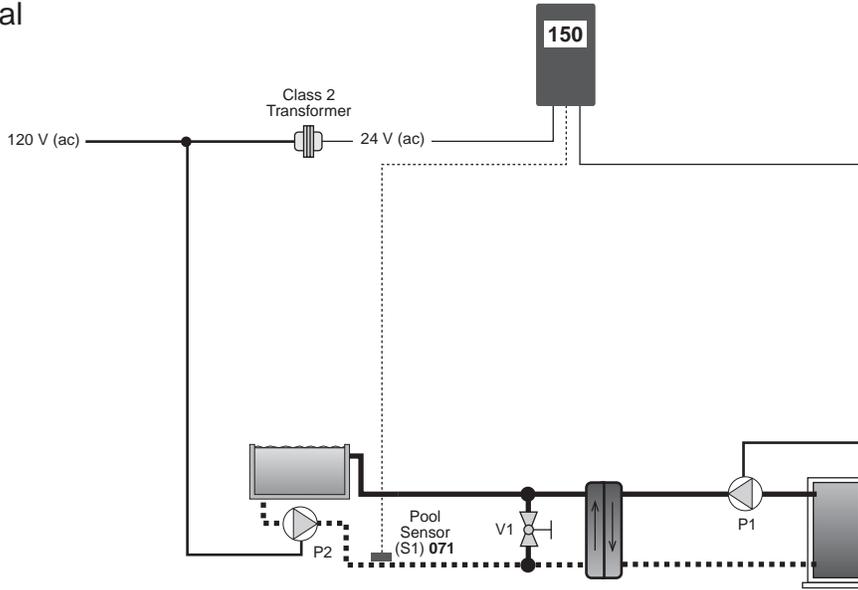
One Stage Setpoint Control 150



A 150-2

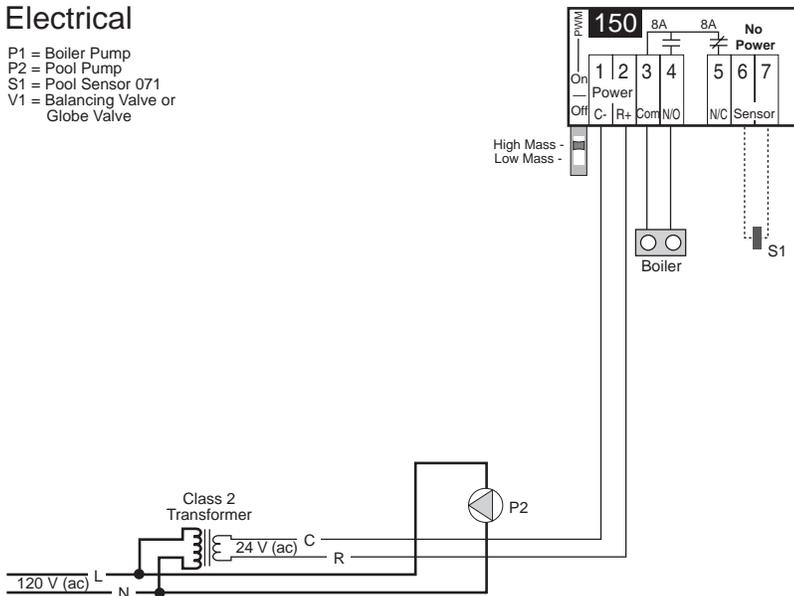
12/08

## Mechanical



## Electrical

P1 = Boiler Pump  
 P2 = Pool Pump  
 S1 = Pool Sensor 071  
 V1 = Balancing Valve or  
 Globe Valve



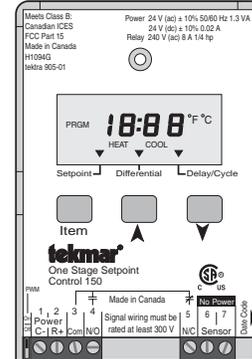
**Note:** This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

**Technical Data**

**One Stage Setpoint Control 150**

- Literature — A 150's, D 150, D 001, D 070
- Control — Microprocessor control; This is **not a safety (limit) control**.
- Packaged weight — 0.7 lb. (330 g), Enclosure C, PVC plastic
- Dimensions — 4-3/4" H x 2-7/8" W x 7/8" D (120 x 74 x 22 mm)
- Approvals — CSA C US, CSA 22.2 No 24 and UL 873, meets class B: ICES & FCC Part 15
- Ambient conditions — Indoor use only, -20 to 120°F (-30 to 50°C), < 90% RH non-condensing.
- Power supply — 24 V (ac) ±10%, 50/60 Hz, 1.3 VA or 24 V (dc) ± 10% 0.02 A
- Relays — 240 V (ac) 8 A, 1/4 hp
- Sensors included: — NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892 Universal Sensor 071.
- Programmed settings — Ten year memory backup
- Control accuracy — ±0.5°F (±0.3°C) with up to 500 feet (150 m) of 18 AWG wire to sensors.
- Temperature display — -85 to 302°F (-65 to 150°C)
- Setpoint — -40 to 239°F (-40 to 115°C)
- Differential (Bang/Bang) — 1 to 40°F (1 to 22°C)
- Differential (PWM) — 3 to 40°F (2 to 22°C)
- Time Delay (Bang/Bang) — 0 to 19 min. 50 sec.
- Cycle Length(PWM) — 30 sec. to 19 min. 50 sec.

- Operating mode — Heating / Cooling
- Temperature display — Fahrenheit / Celsius



**System Operation & Specifications**

The One Stage Setpoint Control 150 is used to enable a boiler in a pool heating system. The boiler is enabled using a Pulse Width Modulation control logic. The boiler water temperature is controlled by the boiler's operating aquastat.

**Piping and Heat Source Details** The boiler loop and the pool loop are isolated from each other through the use of a heat exchanger. The boiler loop pump (P1) is run by the boiler control and provides flow through the boiler side of the heat exchanger whenever the boiler is enabled. The pool loop pump (P2) operates continuously and circulates a portion of the pool water through the pool side of the heat exchanger according to the set up of the balancing valve (V1).

**Setpoint Operation** The 150 enables the boiler based on a Pulse Width Modulation logic. Once the 150 is powered up, the installer / operator is required to set the *Setpoint*, *Differential* and *Cycle* settings on the 150. The 150 will monitor the pool return temperature using the Universal Sensor 071 (S1) and will use this information in conjunction with the user input settings to enable the boiler. For a description of Pulse Width Modulation, refer to Data Brochure D 150.

**Additional Functions** Additional control functions are listed in the table in the Setpoint Controls section of the Product Catalog I 000.

Note: For optimum system operation, high thermal mass systems such as pools should use the Pulse Width Modulation mode of operation. Low thermal mass systems such as hot tubs and spas should use the On / Off Differential mode of operation.

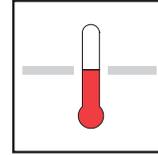


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# tekmar® - Application

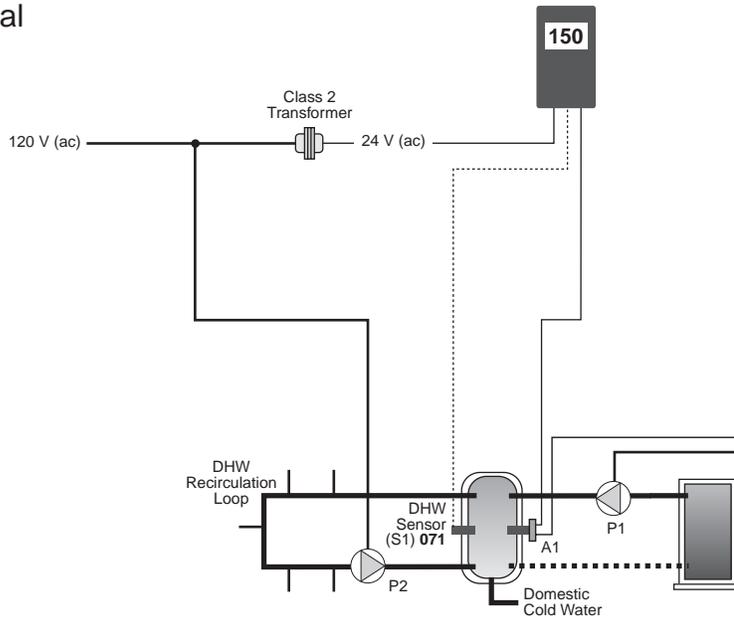
One Stage Setpoint Control 150



A 150-3

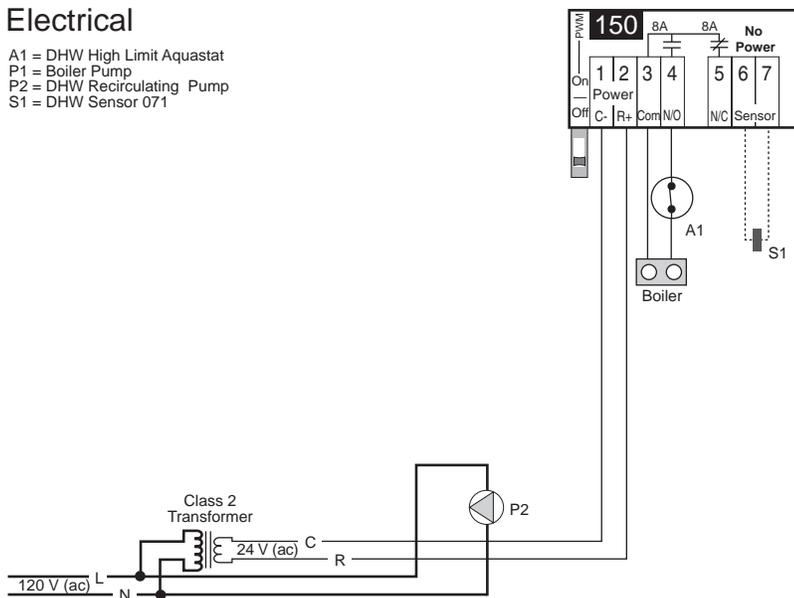
12/08

## Mechanical



## Electrical

A1 = DHW High Limit Aquastat  
P1 = Boiler Pump  
P2 = DHW Recirculating Pump  
S1 = DHW Sensor 071



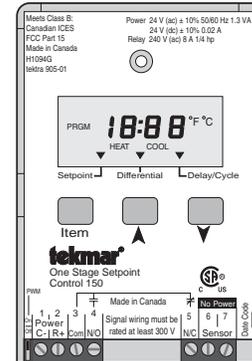
**Note:** This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

**Technical Data**

**One Stage Setpoint Control 150**

- Literature — A 150's, D 150, D 001, D 070
- Control — Microprocessor control; This is **not a safety (limit) control**.
- Packaged weight — 0.7 lb. (330 g), Enclosure C, PVC plastic
- Dimensions — 4-3/4" H x 2-7/8" W x 7/8" D (120 x 74 x 22 mm)
- Approvals — CSA C US, CSA 22.2 No 24 and UL 873, meets class B: ICES & FCC Part 15
- Ambient conditions — Indoor use only, -20 to 120°F (-30 to 50°C), < 90% RH non-condensing.
- Power supply — 24 V (ac) ±10%, 50/60 Hz, 1.3 VA or 24 V (dc) ± 10% 0.02 A
- Relays — 240 V (ac) 8 A, 1/4 hp
- Sensors — NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892  
included: Universal Sensor 071.
- Programmed settings — Ten year memory backup
- Control accuracy — ±0.5°F (±0.3°C) with up to 500 feet (150 m) of 18 AWG wire to sensors.
- Temperature display — -85 to 302°F (-65 to 150°C)
- Setpoint — -40 to 239°F (-40 to 115°C)
- Differential (Bang/Bang) — 1 to 40°F (1 to 22°C)
- Differential (PWM) — 3 to 40°F (2 to 22°C)
- Time Delay (Bang/Bang) — 0 to 19 min. 50 sec.
- Cycle Length(PWM) — 30 sec. to 19 min. 50 sec.

- Operating mode — Heating / Cooling
- Temperature display — Fahrenheit / Celsius



**System Operation & Specifications**

The One Stage Setpoint Control 150 is used to enable a boiler in order to maintain a constant temperature in a DHW recirculation loop and storage tank.

**Piping and Heat Source Details** A dedicated boiler provides hot water to a continuously circulating domestic hot water loop and storage tank.

**Setpoint Operation** Once the 150 Control is powered up, the installer / operator is required to set the *Setpoint*, *Differential*, and *Delay* settings on the 150. The control operates in an On / Off Differential mode. The 150 uses the input from the Universal Sensor 071 (S1) to determine the temperature of the domestic hot water. Once the water temperature drops below the *Setpoint* minus half of the *Differential* setting, the 150 enables the boiler. Once the water temperature rises above the *Setpoint* plus half the *Differential* setting, the 150 turns the boiler off and if the installer / operator has set a Delay length, the 150 then starts its Delay timer. During the time that the Delay is counting down, the 150 will not turn on its relay. This feature allows the boiler a minimum off time between cycles.

**Additional Functions** Additional control functions are listed in the table in the Setpoint Controls section of the Product Catalog I 000.



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