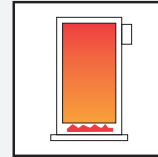


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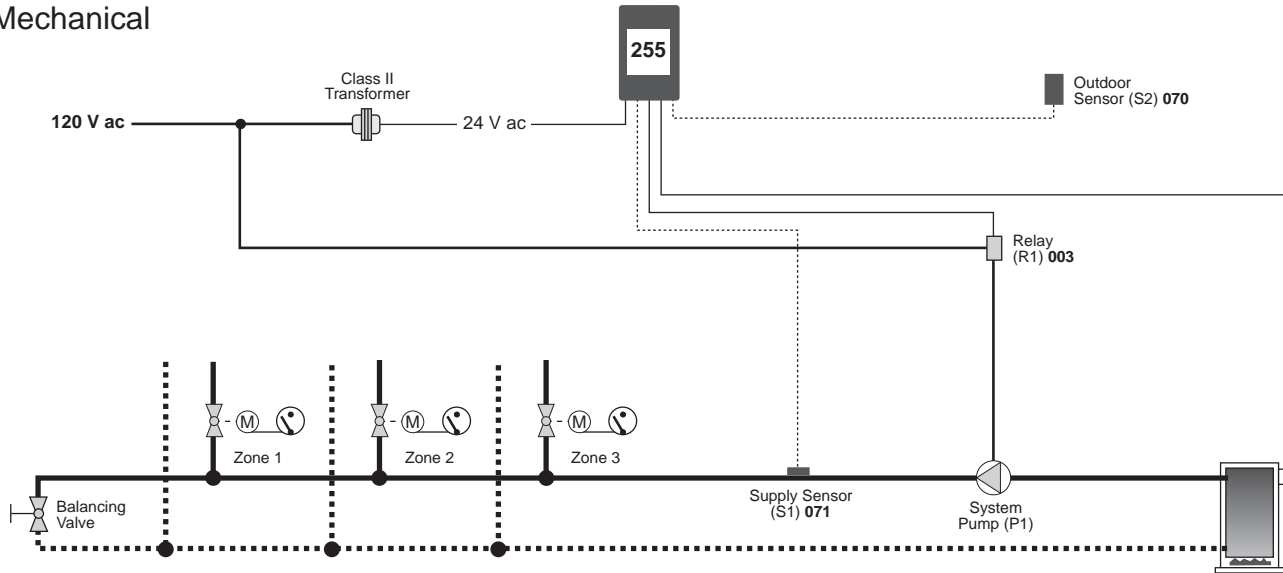
Two Stage Boiler Control 255



A 255-1

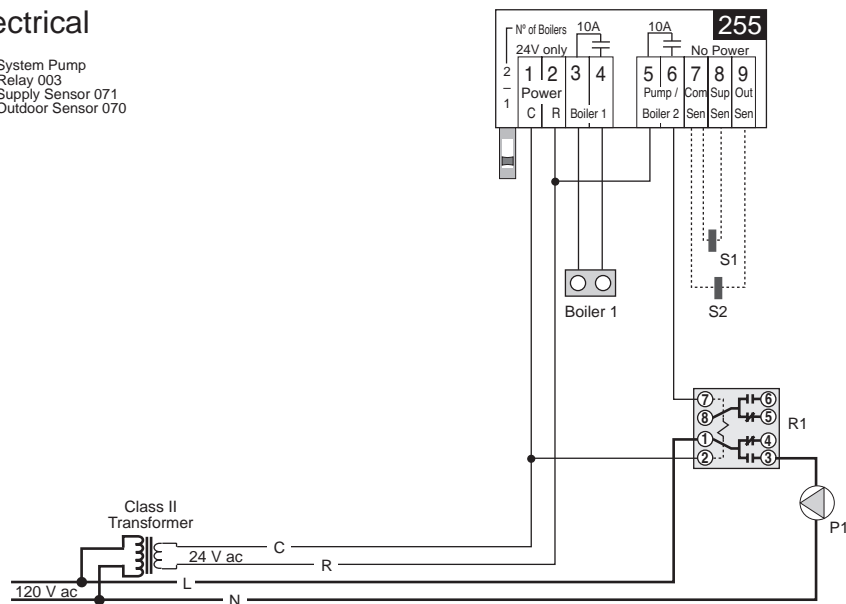
06/94

Mechanical



Electrical

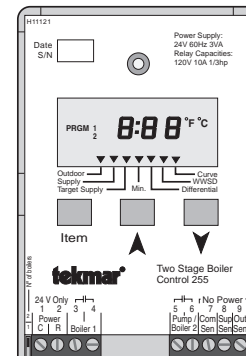
P1 = System Pump
 R1 = Relay 003
 S1 = Supply Sensor 071
 S2 = Outdoor Sensor 070



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.

Two Stage Boiler Control 255

Literature	— D 255, A 255, D 001, E 000, E 200
Control	— Microprocessor PI control; This is not a safety (limit) control .
Packaged weight	— 1.0 lb. (450 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	— Meets DOC regulations for EMI/RFI.
Ambient conditions	— Indoor use only, 15 to 120°F (-10 to 50°C), < 90% RH non-condensing.
Power supply	— Class 2, 24 V ac ±10% 50/60 Hz 3 VA
Relays	— 120 V ac 10 A 1/3 hp, pilot duty 240 VA 2 A
Sensors	— NTC thermistor, 10 kΩ @ 25°C ±0.2°C β=3892
included:	Outdoor Sensor 070 and Universal Sensor 071.
Control accuracy	— ±0.5°F (±0.25°C) with up to 1000 feet (300m) of 18 AWG wire to sensors.
<i>Min. Boiler Supply</i>	— Off, 70 to 170°F (Off, 21 to 77°C)
<i>Differential</i>	— 2 to 45°F (1 to 25°C)
<i>WWSD</i>	— 35 to 105°F (2 to 41°C)
<i>Heating Curve</i>	— 0.4 to 3.6
<i>Stage 2 Delay</i>	— 0:30 to 4:00 minutes



System Operation & Specifications

The tekmar Two Stage Boiler Control 255 regulates the heating system supply water temperature by cycling on and off the boiler. The system pump runs continuously until the outdoor temperature exceeds the Warm Weather Shut Down (WWSD) temperature. The balancing valve must be adjusted to provide adequate flow to each zone when all zone valves operate. Also, when all zones are closed, adequate flow through the boiler must be maintained.

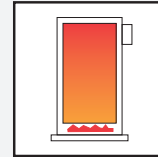
The control shall meet the technical specifications listed above and shall provide the following functions.

- The heating system supply water temperature shall be based on the outdoor air temperature, and the control's Heating Curve (reset ratio), WWSD (starting temperature point) and Minimum Supply water temperature settings.
- The pump and boiler shall be turned off whenever the outdoor temperature is warmer than the control's Warm Weather Shut Down (WWSD) setting. During WWSD, the system pump (P1) shall be operated for 20 seconds every three days to help prevent seizure during long idle periods.
- The control shall have an adjustable Minimum Supply water temperature setting to help prevent condensation of flue gases and subsequent corrosion and blockage of the boiler heat exchanger and/or chimney.
- The control shall prevent short cycling of the boiler by providing a minimum 30 second delay between firing cycles. The normal cycling of the boiler shall be governed by the adjustable Differential.
- The control shall display the outdoor, supply and target supply temperatures in °F or °C.
- The control shall continuously monitor its sensors and provide an LCD error message if a sensor is short or open circuit.
- The installer must ensure that the control and it's wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- **Order the following tekmar products for this application:** one Two Stage Boiler Control 255 and one Relay 003.

In North America:	tekmar Control Systems Ltd., Canada tekmar Control Systems, Inc., U.S.A. Head Office: 4611 - 23rd Street Vernon, B.C. Canada V1T 4K7 Tel. (604) 545-7749 Fax. (604) 545-0650
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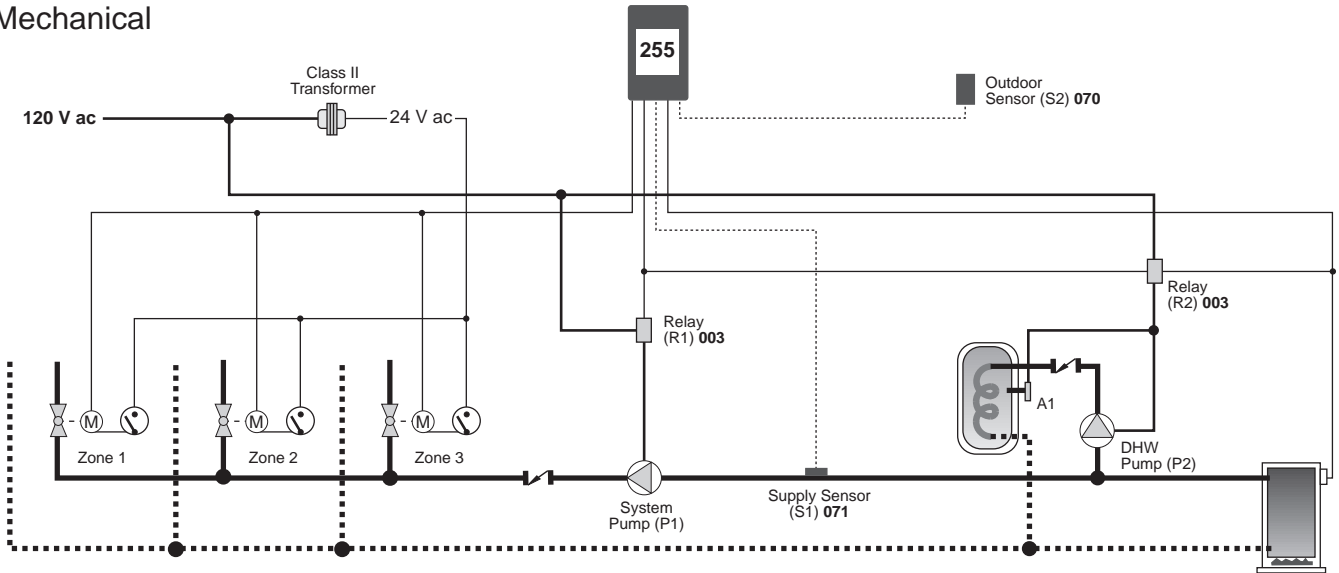
Two Stage Boiler Control 255



A 255-2

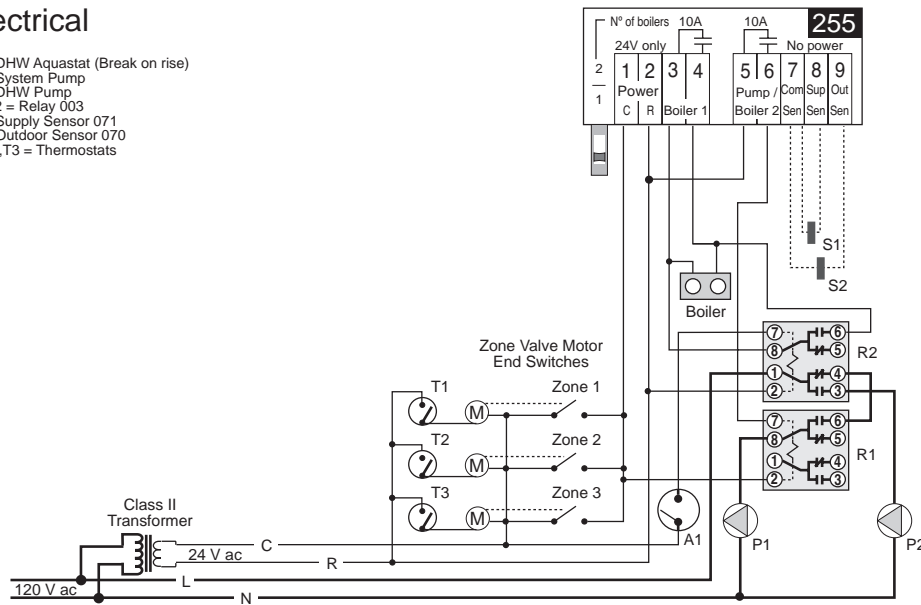
06/94

Mechanical



Electrical

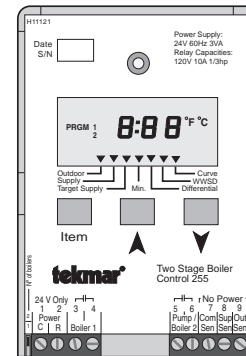
- A1 = DHW Aquastat (Break on rise)
- P1 = System Pump
- P2 = DHW Pump
- R1, R2 = Relay 003
- S1 = Supply Sensor 071
- S2 = Outdoor Sensor 070
- T1, T2, T3 = Thermostats



Note: This is only a concept drawing. The designer must determine whether this system 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.

Two Stage Boiler Control 255

Literature	— D 255, A 255, D 001, E 000, E 200
Control	— Microprocessor PI control; This is not a safety (limit) control .
Packaged weight	— 1.0 lb. (450 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	— Meets DOC regulations for EMI/RFI.
Ambient conditions	— Indoor use only, 15 to 120°F (-10 to 50°C), < 90% RH non-condensing.
Power supply	— Class 2, 24 V ac ±10% 50/60 Hz 3 VA
Relays	— 120 V ac 10 A 1/3 hp, pilot duty 240 VA 2 A
Sensors included:	— NTC thermistor, 10 kΩ @ 25°C ±0.2°C β=3892 Outdoor Sensor 070 and Universal Sensor 071.
Control accuracy	— ±0.5°F (±0.25°C) with up to 1000 feet (300m) of 18 AWG wire to sensors.
Min. Boiler Supply	— Off, 70 to 170°F (Off, 21 to 77°C)
Differential	— 2 to 45°F (1 to 25°C)
WWSD	— 35 to 105°F (2 to 41°C)
Heating Curve	— 0.4 to 3.6
Stage 2 Delay	— 0:30 to 4:00 minutes



System Operation & Specifications

The tekmar Two Stage Boiler Control 255 regulates the heating system supply water temperature by cycling on and off the boiler. The heating system is zoned with zone valves and Domestic Hot Water (DHW) is generated using a pump. The control is powered whenever a zone valve end switch is closed. This application shows DHW Priority with the system pump turned off and the DHW pump and the boiler turned on when there is a call for DHW.

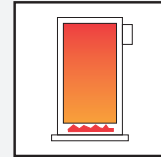
The control shall meet the technical specifications given above and shall provide the following functions.

- The heating system supply water temperature shall be based on the outdoor air temperature, and the control's Heating Curve (reset ratio), Warm Weather Shut Down (WWSD, starting temperature point) and Minimum Supply water temperature settings.
- On a call for "DHW", the DHW pump (P2) shall be turned on, the boiler shall be turned on and the system pump (P1) shall be turned off.
- The system pump and boiler shall not provide heat to the heating zones whenever the outdoor air temperature is warmer than the control's WWSD setting.
- The control shall have an adjustable Minimum Supply water temperature setting to help prevent condensation of flue gases and subsequent corrosion and blockage of the boiler heat exchanger and/or chimney.
- The control shall prevent short cycling of the boiler by providing a minimum 30 second delay between firing cycles. The normal cycling of the boiler shall be governed by the adjustable Differential.
- The control shall display the outdoor, supply and target supply temperatures in °F or °C.
- The control shall continuously monitor its sensors and provide an LCD error message if a sensor is short or open circuit.
- The installer must ensure that the control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- **Order the following tekmar products for this application:** one Two Stage Boiler Control 255 and two of Relay 003.

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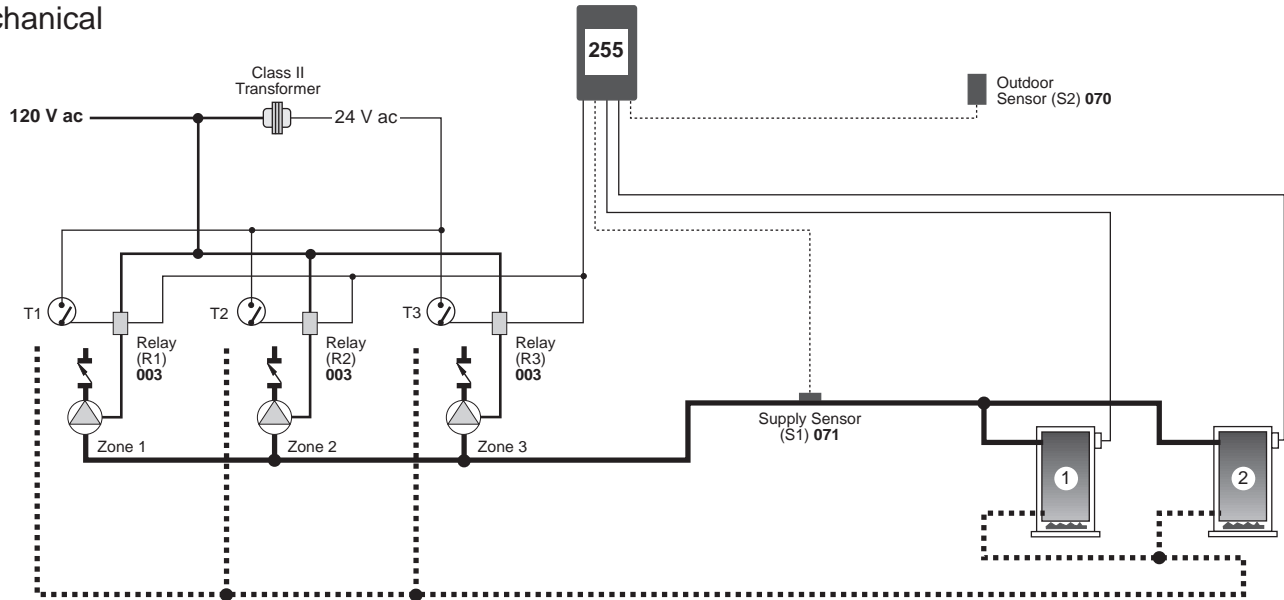
Two Stage Boiler Control 255



A 255-3

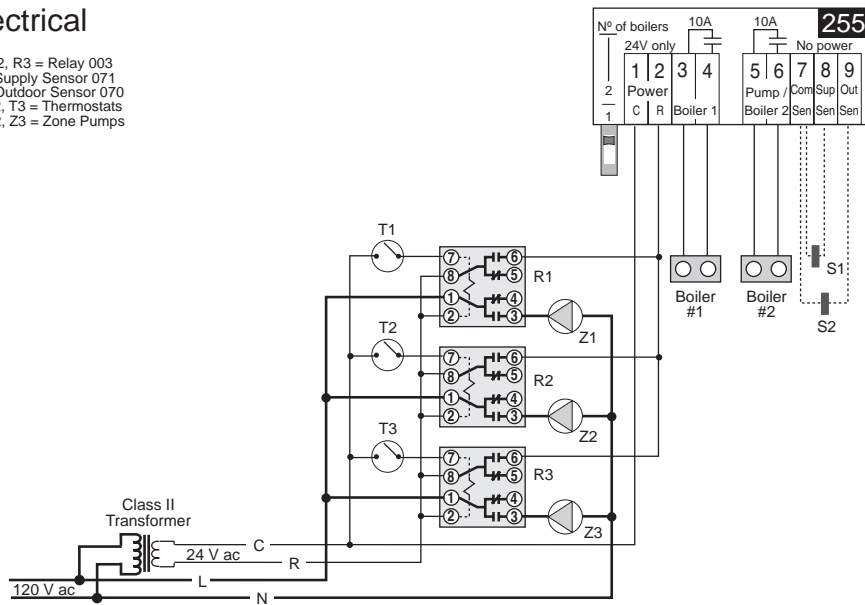
06/94

Mechanical



Electrical

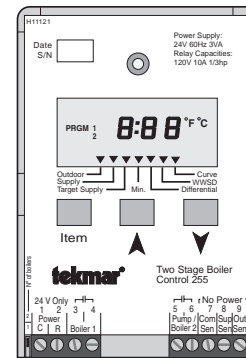
R1, R2, R3 = Relay 003
 S1 = Supply Sensor 071
 S2 = Outdoor Sensor 070
 T1, T2, T3 = Thermostats
 Z1, Z2, Z3 = Zone Pumps



Note: This is only a concept drawing. The designer must determine whether this system 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.

Two Stage Boiler Control 255

Literature	— D 255, A 255, D 001, E 000, E 200
Control	— Microprocessor PI control; This is not a safety (limit) control .
Packaged weight	— 1.0 lb. (450 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	— Meets DOC regulations for EMI/RFI.
Ambient conditions	— Indoor use only, 15 to 120°F (-10 to 50°C), < 90% RH non-condensing.
Power supply	— Class 2, 24 V ac ±10% 50/60 Hz 3 VA
Relays	— 120 V ac 10 A 1/3 hp, pilot duty 240 VA 2 A
Sensors	— NTC thermistor, 10 kΩ @ 25°C ±0.2°C β=3892
included:	Outdoor Sensor 070 and Universal Sensor 071.
Control accuracy	— ±0.5°F (±0.25°C) with up to 1000 feet (300m) of 18 AWG wire to sensors.
<i>Min. Boiler Supply</i>	— Off, 70 to 170°F (Off, 21 to 77°C)
<i>Differential</i>	— 2 to 45°F (1 to 25°C)
<i>WWSD</i>	— 35 to 105°F (2 to 41°C)
<i>Heating Curve</i>	— 0.4 to 3.6
<i>Stage 2 Delay</i>	— 0:30 to 4:00 minutes



System Operation & Specifications

The tekmar Two Stage Boiler Control 255 regulates the heating system supply water temperature based on outdoor air temperature by cycling on and off the boilers. The heating system is zoned with zone pumps. The control is powered up whenever a zone thermostat calls for heat. When the outdoor air temperature rises above the Warm Weather Shut Down (WWSD) temperature, the boilers will not fire.

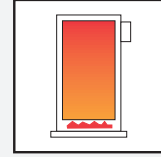
The control shall meet the technical specifications given above and shall provide the following functions.

- Each zone shall be controlled by a thermostat operating a zone pump to provide heat to the zone when required.
- The heating system supply water temperature shall be based on the outdoor air temperature, and the control's Heating Curve (reset ratio), WWSD (starting temperature point) and Minimum Supply water temperature settings.
- The control shall provide time delays between boiler cycles and stages to prevent short operating cycles of the boilers. The normal cycling and staging of the boilers shall be governed by the adjustable Differential setting.
- The boilers shall be kept off whenever the outdoor temperature is warmer than the control's Warm Weather Shut Down (WWSD) setting.
- The control shall have an adjustable Minimum Supply water temperature setting to help prevent condensation of flue gases and subsequent corrosion and blockage of boiler heat exchangers and/or chimneys.
- The control shall display the outdoor, supply and target supply temperatures in °F or °C.
- The control shall continuously monitor its sensors and provide an LCD error message if a sensor is short or open circuit.
- The installer must ensure that the control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- **Order the following tekmar products for this application:** one Two Stage Boiler Control 255 and three of Relay 003.

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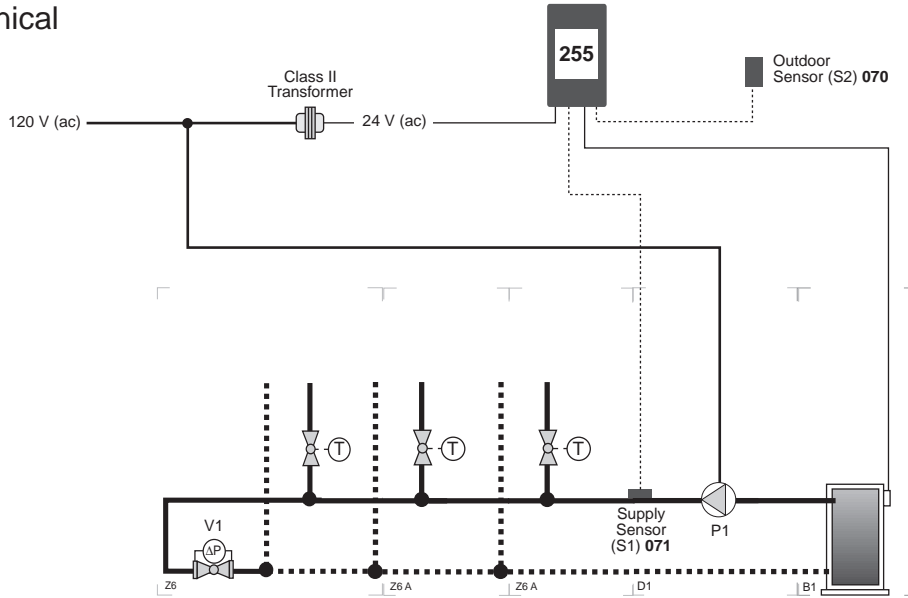
Two Stage Boiler Control 255



A 255-4

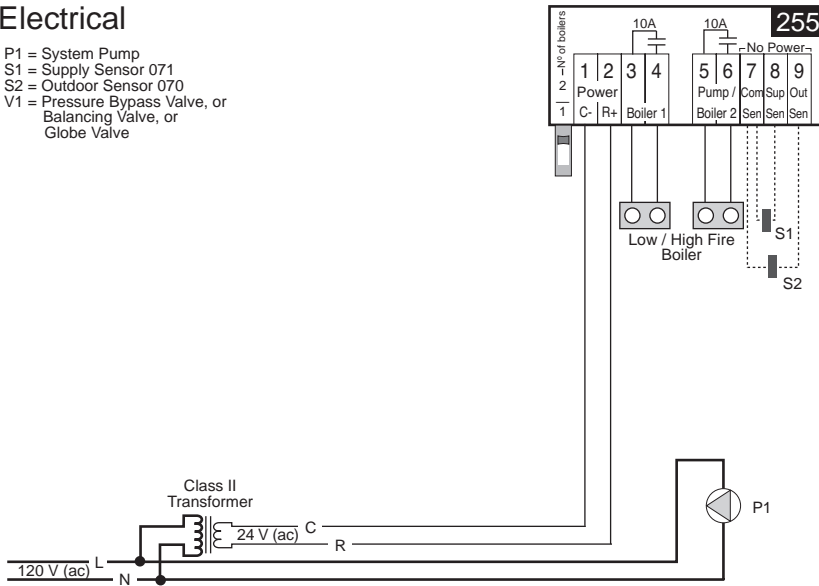
12/96

Mechanical



Electrical

- P1 = System Pump
- S1 = Supply Sensor 071
- S2 = Outdoor Sensor 070
- V1 = Pressure Bypass Valve, or Balancing Valve, or Globe Valve

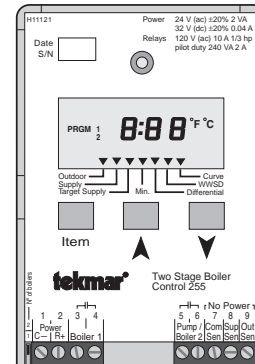


Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety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

Technical Data

Two Stage Boiler Control 255

- Literature — A 000, A 255's, D 255, D 001, D 070
- Control — Microprocessor PI control; This is **not a safety (limit) control**.
- Packaged weight — 1.0 lb. (450 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 — Meets ICES & FCC regulations for EMI/RFI.
- Ambient conditions — Indoor use only, 15 to 120°F (-10 to 50°C), < 90% RH non-condensing.
- Power supply — Class 2, 24 V (ac) ±10% 50/60 Hz 2 VA or 30 V (dc) ± 20% 0.04 A
- Relays — 120 V (ac) 10 A 1/3 hp, pilot duty 240 VA 2 A
- Sensors — NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
 included: Outdoor Sensor 070 and Universal Sensor 071.
- Min. Boiler Supply — Off, 70 to 170°F (Off, 21 to 77°C)
- Differential — 2 to 45°F (1 to 25°C)
- WWSD — 35 to 105°F (2 to 41°C)
- Heating Curve — 0.4 to 3.6
- Stage 2 Delay — 0:30 to 4:00 minutes
- Temperature display — Fahrenheit / Celsius



System Operation & Specifications

The Two Stage Boiler Control 255 controls a single low / high fire boiler in order to provide Outdoor Reset to a constant circulation loop.

Piping and Heat Source Details This system consists of three parallel zones controlled by thermostatic radiator valves. The system pump (P1) operates continuously to provide flow through the system. The pressure bypass valve provides a relatively constant pressure drop between the supply and return of each zone as well as preventing the pump from dead heading.

Warm Weather Shut Down (WWSD) When the outdoor air temperature rises above the WWSD setting, the control enters the Warm Weather Shut Down mode of operation. In this mode of operation, the control continues to monitor its sensors but does not operate the boiler until the outdoor temperature falls below the WWSD point.

Boiler Operation The 255 stages a single low / high fire boiler based on an Outdoor Reset strategy. The installer / operator is required to set the *Minimum Supply* temperature, *Differential*, *Heating Curve*, *Time Delay* and *Warm Weather Shut Down (WWSD)* point for the 255. The 255 uses the input from the Outdoor Sensor 070 (S2) in order to calculate a reset boiler temperature based on the installer / operator adjusted *Heating Curve*, *Minimum Supply* temperature and *WWSD* point. The input from the Supply Sensor 071 (S1) allows the 255 to monitor the supply water temperature and operate the low / high fire boiler based on PI control logic.

Additional Functions Additional control functions are listed in the table in the Boiler / DHW Controls section of the Product Catalog I 000 and the Application Catalog A 000.



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