

tekmar® - Wiring Brochure

Universal Reset Module 423



W423

03/09

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Overview

The following wiring brochure describes how to wire the tekmar Universal Reset Module 423. The 423 is to be installed in an enclosure together with a tekmar Zone Manager. The 423 controls two boilers (on-off or modulating), DHW, and setpoint. The wiring of tekmarNet®4 (tN4) components is simple and cost effective.

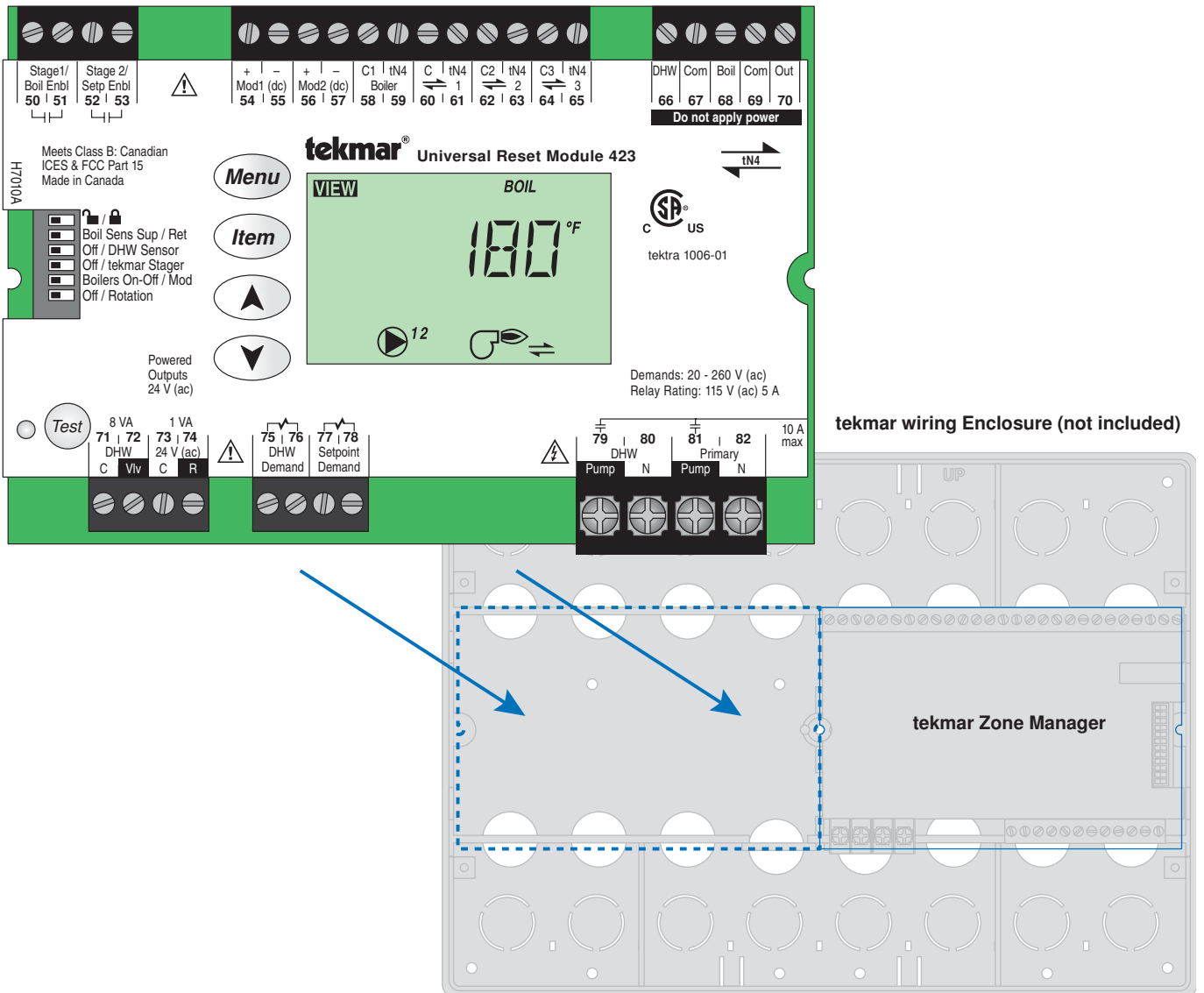




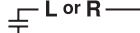



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Wiring Symbols

	Demand, signals control to operate. Requires a power and neutral connection. Use 24 to 260 V (ac), usually switched externally. Example: DHW Demand		tekmarNet®4
	Dry contact switch. Operates a device. Example: Boiler		Earth ground
	Powered switch. 24-115 V (ac) power, switched output to valve, pump, etc.		Do not apply power to these terminals. Serious control damage will result.

Definitions

The following defined terms and symbols are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.



– Caution: Refer to accompanying documents



– Caution: Refer to accompanying documents

**INSTALLATION
CATEGORY II**

– Local level appliances

Caution

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. This electronic control is not intended for uses as a primary limit control. Other controls that are intended and certified as safety limits must be placed into

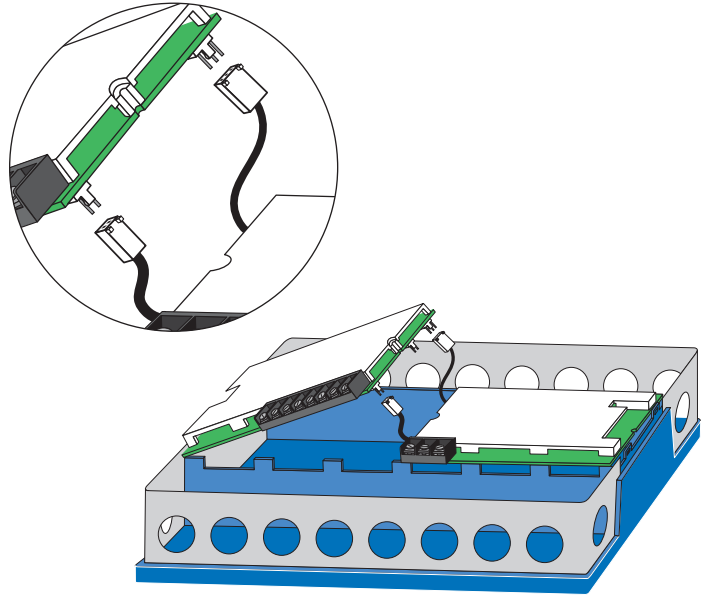
the control circuit. Do not attempt to service the control. Refer to qualified personnel for servicing. Apart from any field replaceable fuse(s) there are no user serviceable parts. Attempting to do so voids warranty and could result in damage to the equipment and possibly even personal injury or death.

Module Installation


Install the Universal Reset Module 423 in the left side of a tekmarNet®4 (tN4) wiring enclosure. The enclosure comes with a Zone Manager pre-installed in the right side. Review the figure below to understand the installation of the 423.

To Install the 423

1. Remove the front cover of the wiring enclosure by removing the two screws.
2. Remove the left side blank by removing the centre screw holding the blank and the Zone Manager in place. Make sure the Zone Manager stays in place.
3. Discard the blank.
4. The 423 has connector pins protruding from the underside of the board. The Zone Manager has wiring harnesses with plugs that connect to these pins. Remove the required wiring harnesses from their retaining clips in the enclosure.
5. Carefully connect the Zone Manager's plugs onto the pins on the underside of the 423.
 - There is one smaller gauge connector with three pins and one larger gauge connector with 2 pins. These connectors can be installed only one way. Take care to ensure a good connection and avoid bending the pins.
6. Lower the 423 into the enclosure at an angle. Insert the two tabs on the left side of the 423 into the corresponding slots in the left side of the wiring enclosure.
7. Lower the 423 toward the center of the enclosure until the two halves fit together. Make sure that the connector wires are placed underneath without pinching the wire.
8. Replace the center screw to hold the two controls in place.
9. Strip all wiring to a length of 3/8 in. or 10 mm for all terminals.



Electrical Drawings

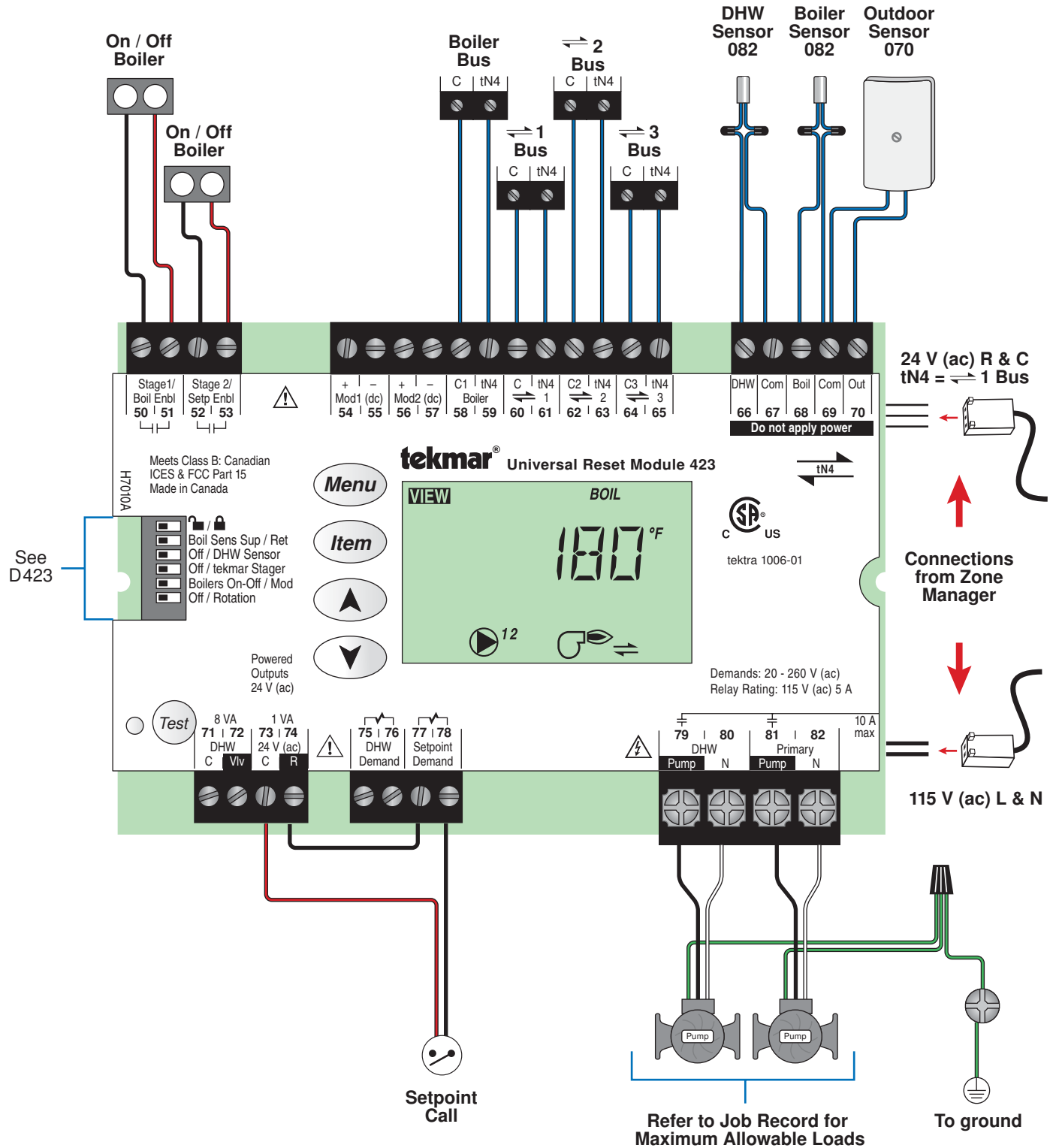
 The electrical drawing examples on the following pages show the 423 in common applications. Choose the drawing that most accurately depicts the components in your system and use that drawing as a guide to aid in wiring your system.

These are only concept drawings, not engineered drawings. They are not intended to describe a complete system nor any particular system. It is up to the system designer to

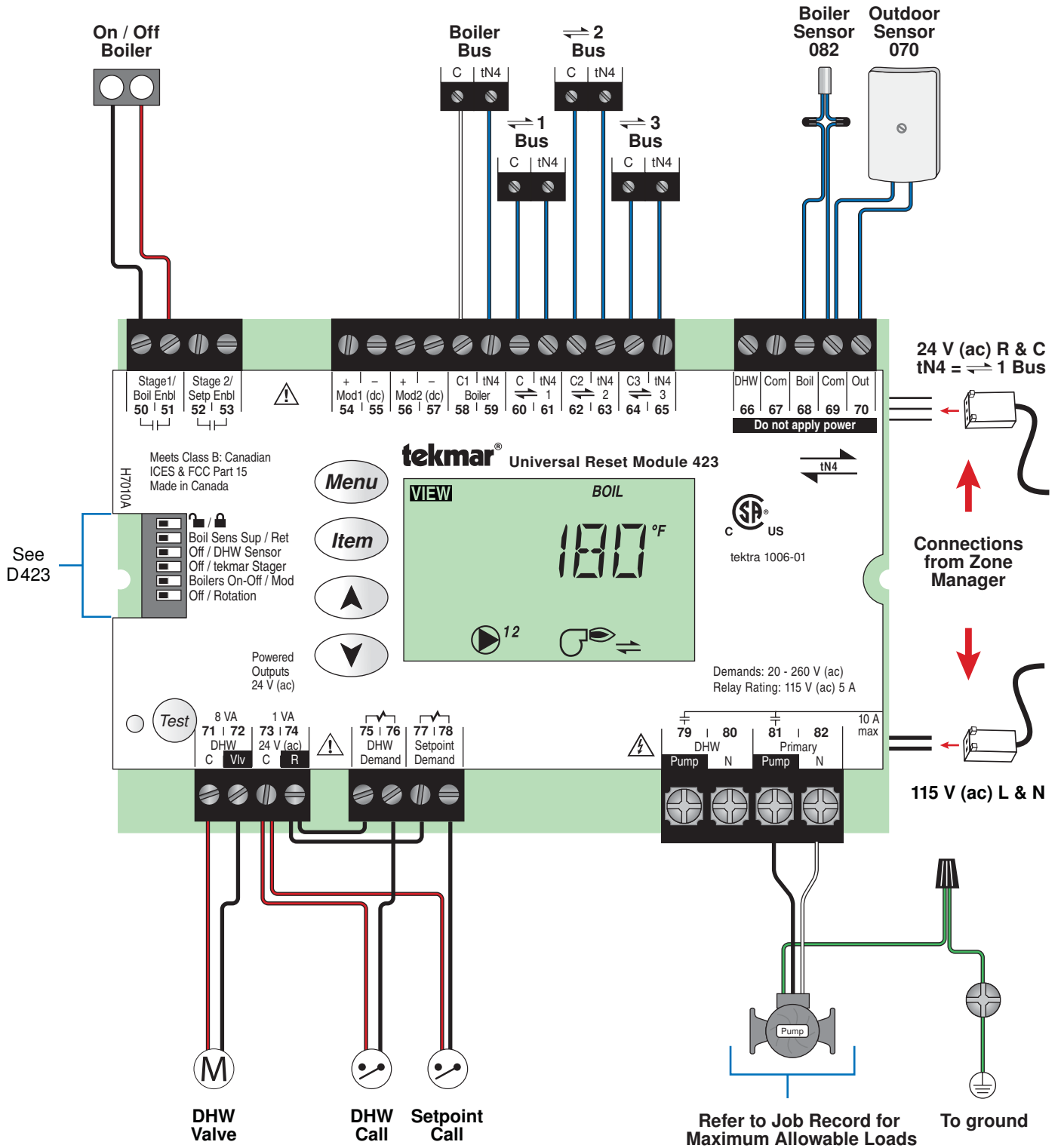
determine the necessary components for and configuration of the particular system being designed including additional equipment isolation relays (for loads greater than the controls specified output ratings) and any safety devices which in the judgement of the designer are appropriate in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.

Description:

DHW with Sensor and Pump, Setpoint, Two On / Off Boilers.

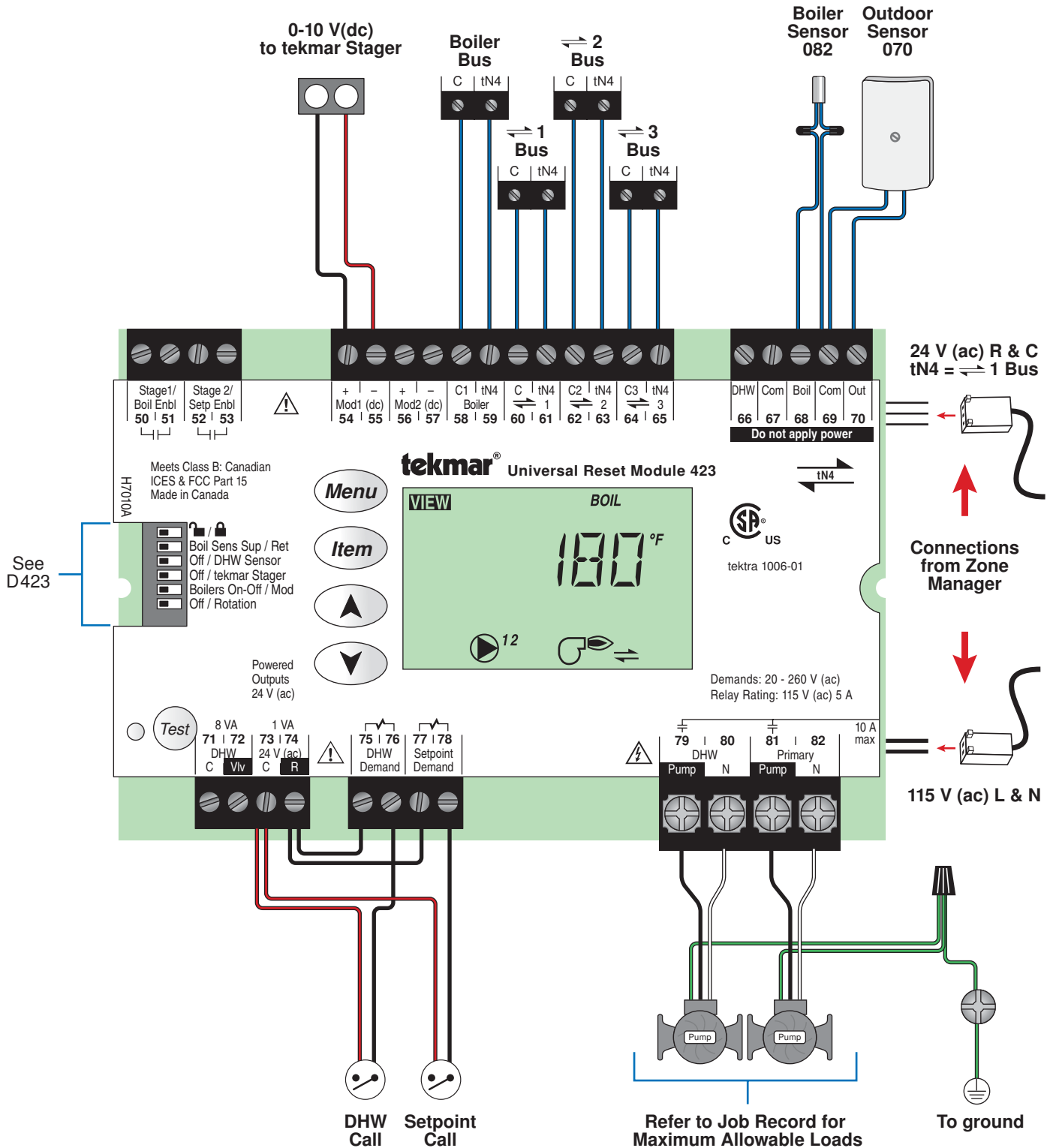


Description:
 DHW with Aquastat and Valve, Setpoint, Single On / Off Boiler.

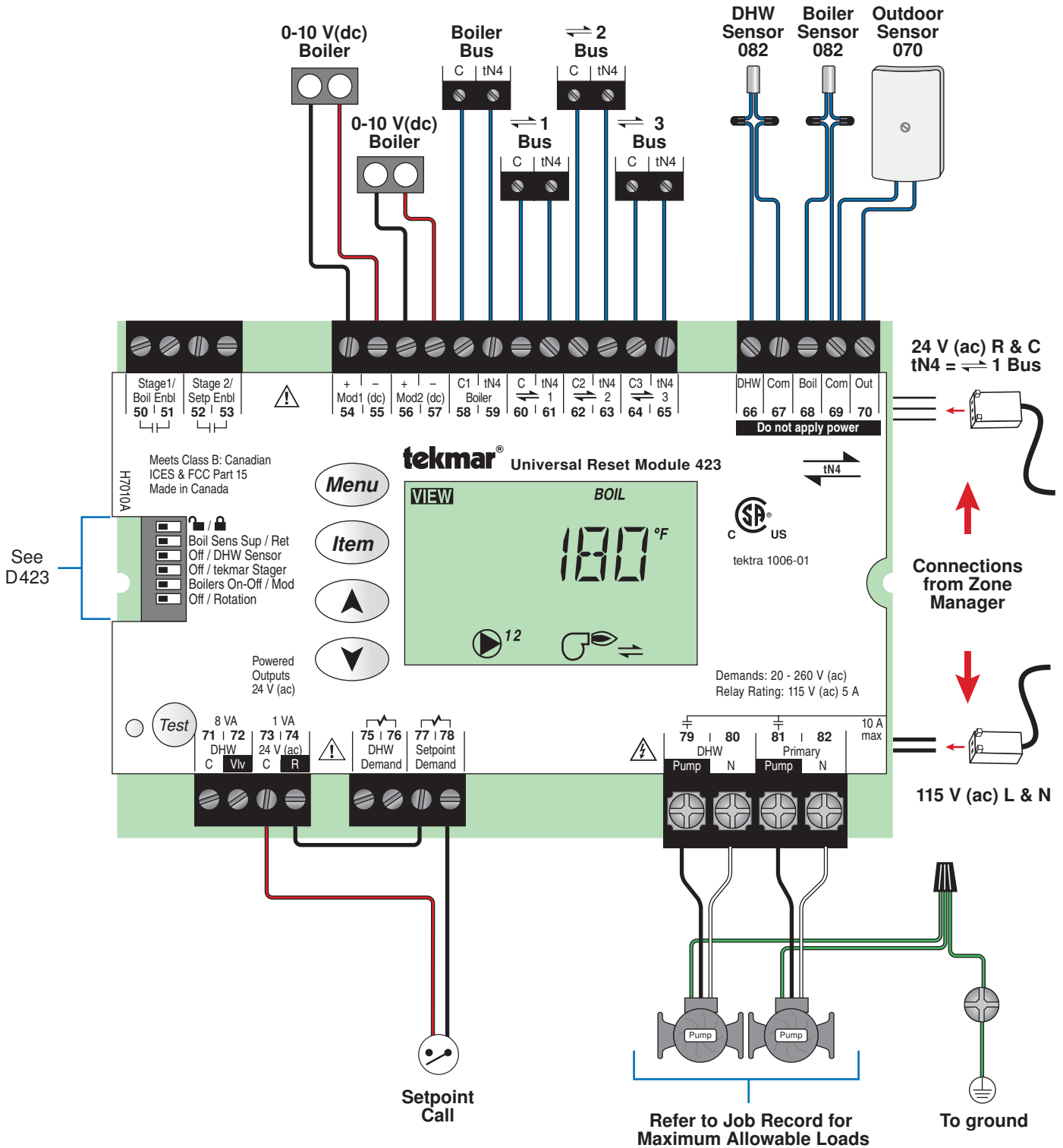


Description:

DHW with Aquastat and Pump, Setpoint, Multi-stage Boiler Control.



Description:
 DHW with Sensor and Pump, Setpoint, Two Modulating Boilers.



⚠ The following section explains how to wire individual devices to the Universal Reset Module 423. For step by step wiring refer to the terminal number on the right of the page.

- Before wiring ensure all power is turned off and take all necessary precautions.

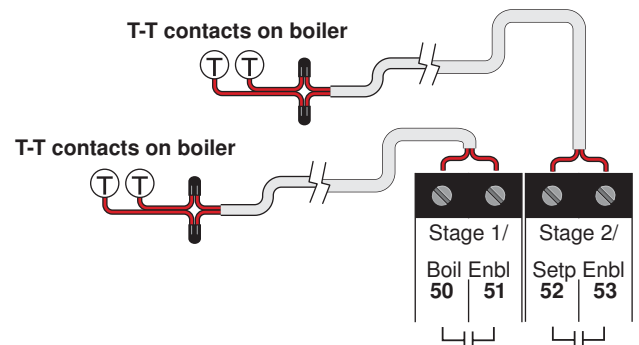
- Install the supplied wiring compartment barriers by sliding them into the grooves provided as to isolate the low and high voltage wiring.
- Strip all wiring to a length of 3/8 in. or 10 mm for all terminals.
- Refer to the current and voltage ratings at the back of this brochure before connecting devices to this control.

⚠ Wiring the Boiler

Terminals 50 - 51, 52 - 53

Terminals 50-51 and 52-53 are dry contacts. No power is available from these switches. When the switch at 50-51 or 52-53 is closed the boiler is to turn on. The boiler gets no power from these terminals and the boiler must be wired to power as per the manufacturers' directions.

These terminals are typically connected to the boiler's control circuit (commonly labeled as T-T). Connect these terminals directly to the boiler T-T connections.

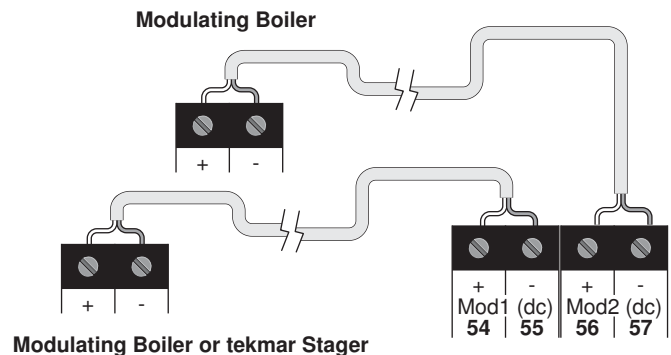


⚠ Wiring the Modulating Boiler Output

Terminals 54 - 57

- The control provides a 0-10 V (dc) modulating output to two modulating boilers or to a tekmar staging control that accepts an External Input Signal in place of an outdoor sensor. (Example: 264, 265 and 268)
- Polarity is important.
- Connect the + wire from the boiler or staging control to terminal 54 and the - wire from the boiler or staging control to terminal 55.
- Connect the + wire from the boiler to terminal 56 and the - wire from the boiler to terminal 57.

Note: Some modulating boilers may also require an on / off signal in addition to the modulating signal. See terminals 50-51 and 52-53.



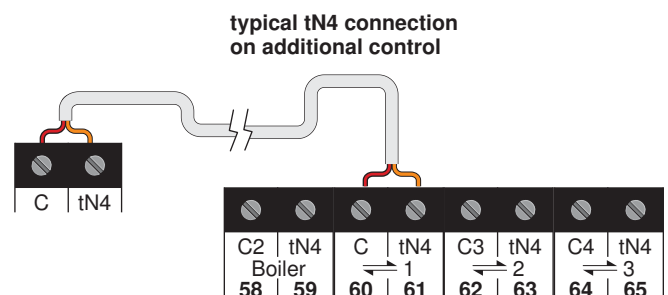
⚠ Wiring tekmarNet®4 (tN4) Between Devices

Terminals 58 - 65

Terminals 58 through 65 provide four tN4 connections for tN4 devices on either the Boiler bus, tN4 bus 1, tN4 bus 2, or tN4 bus 3.

- Connect terminals 58 (C) and 59 (tN4) to the corresponding terminals on other tN4 devices on the Boiler Bus.
- Polarity is important.
- Connect terminals 60 (C) and 61 (tN4) to the corresponding terminals on other tN4 devices on the Bus 1.
- Polarity is important.
- Connect terminals 62 (C) and 63 (tN4) to the corresponding terminals on other tN4 devices on the Bus 2.
- Polarity is important.

- Connect terminals 64 (C) and 65 (tN4) to the corresponding terminals on other tN4 devices on the Bus 3.
- Polarity is important.

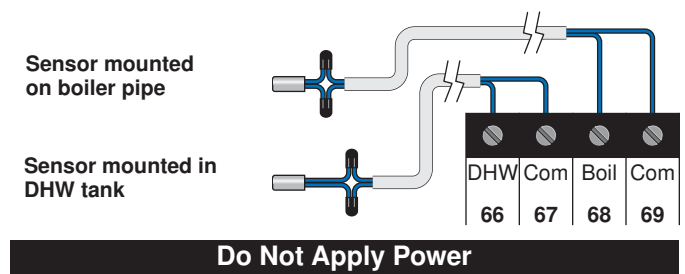


⚠ DHW and Boiler Sensor (tekmar 082)

Terminals 66 - 69

Connect the two wires from the DHW Sensor 082 to the DHW and Com (66-67) terminals. The DHW Sensor is used by the control to measure the DHW water temperature.

Connect the two wires from the Boiler Sensor 082 to the Boil and Com (68-69) terminals. The Boiler Sensor is used by the control to measure the boiler supply temperature.

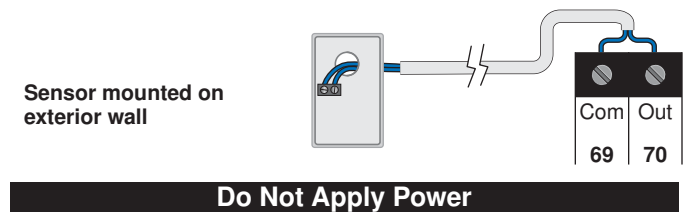


⚠ Outdoor Sensor (tekmar 070)

Terminals 69 - 70

Connect the two wires from the Outdoor Sensor 070 to the Com and Out (69-70) terminals. The outdoor sensor is used by the control to measure the outdoor air temperature.

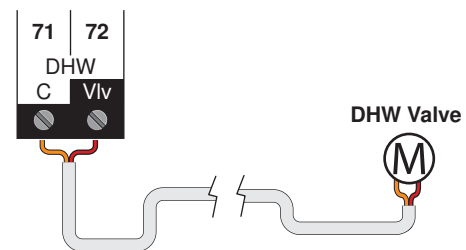
Note: If an Outdoor Sensor 070 is connected to a tekmarNet[®]4 thermostat in the system, it is not required to be connected to the control.



⚠ Wiring a DHW Valve

Terminals 71 - 72

The control operates a 24 volt DHW zone valve. Power is provided through an internal transformer to a maximum of 8 VA. Connect the wiring from the zone valve terminals 71 and 72 where terminal 71 is 24 volt C (neutral) and terminal 72 is 24 V R (hot) for opening the valve.



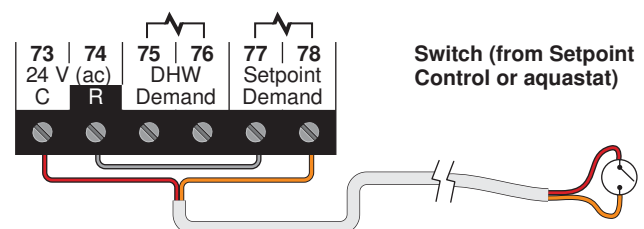
⚠ Wiring the Demands (DHW, Setpoint)

Terminals 73-78

- To generate a DHW Demand a voltage between 20 and 260 V (ac) must be applied across the DHW Demand terminals (75-76).
- To generate a Setpoint Demand, a voltage between 20 and 260 V (ac) must be applied across the Setpoint Demand terminals (77-78).

24 V (ac) is provided on terminals 73 and 74 to power the DHW Demand and the Setpoint Demand. Each demand uses approximately 0.1 VA.

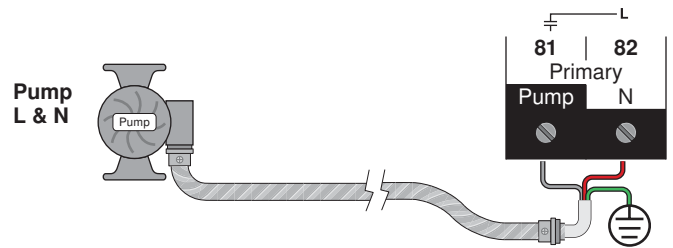
The example shows the wiring to generate a Setpoint Demand.



The control operates a Primary Pump, and a DHW Pump.

- If a Primary Pump is used, the pump is wired directly to terminals 81 and 82.
- If a DHW Pump is used, the pump is wired directly to terminals 79 and 80.
- The pumps' ground wires are connected to the ground screw provided in the wiring chamber.

Note: For pumps larger than the control's rated capacity, an external isolation relay must be used.

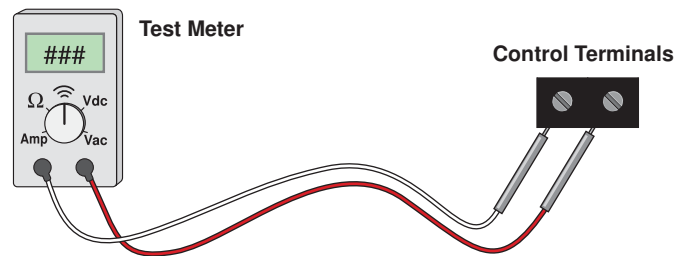


Troubleshooting the Wiring

⚠ General

The following tests are to be performed using standard testing practices and procedures and should only be carried out by properly trained and experienced persons.

A good quality electrical test meter, capable of reading from at least 0-300 V (ac), 0-30 V (dc), 0-2,000,000 Ohms, and testing for continuity is essential to properly test the wiring and sensors.



For an explanation on the use of the Test Button, the 'Test' sequence or any error messages, refer to the Data Brochure.

Testing the Control

Terminals 50 - 82

⚠ Test the Stage 1 and Stage 2 Contacts

Terminals 50-53

1. Shut off power to the control and the boiler circuit.
2. Remove the front cover from the control. Disconnect the wires from the Stage 1 and Stage 2 contacts (terminals 50-51, 52-53).
3. Apply power to the control and press the Test Button.
4. Use an electrical test meter and check for continuity between terminals 50-51 and 52-53.
5. When each stage symbol is displayed in the LCD, there should be continuity.
5. When the stage symbol is not displayed in the LCD, there should be no continuity.
5. Reconnect the wires to the Stage 1 and Stage 2 contacts (50-51 and 52-53), install the front cover on the control and apply power to the boiler circuit.

⚠ Testing Modulating Action (0 - 10 V dc)

Terminals 54 - 57

1. Ensure that the control is set to operate the modulating output.
2. Remove the front cover from the control.
3. Press the Test Button.
4. When the % output graph and the burner symbol are displayed in the LCD, use an electrical test meter to measure the (dc) voltage between the Mod (dc) + and the Mod (dc) - terminals (54-55, 56-57). The reading should vary between 0 V (dc) and 10 V (dc).
5. If power is not present:
 - Check the power supply to the Zone Manager and the field replaceable fuse for the transformer on the Zone Manager.
 - If the fuse is blown, determine the cause of the failure before replacing the fuse.
 - Also check the Plug in connections on the underside of the control.

To test each tN4 Network, check the wires for continuity.

1. Disconnect the two wires (tN4 and C) at one end and connect them together.
2. Go to the other end of the wires and disconnect them.
3. Using an electrical test meter, check for continuity.

Testing tekmar Sensors

To test the sensors, the actual temperature at each sensor location must be measured.

- Use a good quality digital thermometer with a surface temperature probe for ease of use and accuracy. Where a digital thermometer is not available, strap a spare sensor alongside the one to be tested and compare the readings.
- Disconnect each sensor from the control.
- Test the sensors resistance according to the instructions in the sensor Data Brochure D 070.

Testing DHW Zone Valve

1. Ensure that the control is set to operate the DHW zone valve output.
2. Remove the front cover from the control.
3. Press the Test Button.
4. When "DHW" is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the C and Vlv terminals (71-72). The reading should be 24 V (ac) + / - 10%.
5. If power is not present:
 - Check the power supply to the Zone Manager and the field replaceable fuse for the transformer on the Zone Manager.
 - If the fuse is blown, determine the cause of the failure before replacing the fuse.
 - Also check the Plug in connections on the underside of the control.
6. When "DHW" is not displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the C and Vlv terminals (71-72). The reading should be 0 V (ac).

Testing Auxiliary 24 V Power Supply

1. Remove the front cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the Power R and Power C terminals 74 and 73 The reading should be 24 V (ac) + / - 10%.
3. If power is not present:
 - Check the power supply to the Zone Manager and the field replaceable fuse for the transformer on the Zone Manager.
 - If the fuse is blown, determine the cause of the failure before replacing the fuse.
 - Also check the Plug in connections on the underside of the control.

Testing the DHW or Setpoint Demand

1. Remove the front cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the DHW Demand terminals (75-76) or the Setpoint Demand terminals (77-78).
 - When the demand device is on a voltage between 20 and 260 V (ac) should be measured between terminals and the LCD should display "DEM" and "DHW" or "SETP".
 - When the demand device is off, less than 5 V (ac) should be measured between the terminals.

1. Remove the front cover from the control.
2. Press the Test Button.
3. When the Primary Pump symbol is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the Primary Pump terminals (81-82).
4. When the DHW Pump symbol is displayed in the LCD, use an electrical test meter to measure the (ac) voltage between the DHW Pump terminals (79-80). The reading should be 115 V (ac) + / - 10%.

Note: The proper DHW mode must be selected before testing the DHW pump output. If power is not present:

- Check the power supply to the Zone Manager.
- Also check the Plug in connections on the underside of the control.

Technical Data

Universal Reset Module 423; Four tekmarNet[®]4, Boiler, DHW & Setpoint	
Control	Microprocessor PID control; This is not a safety (limit) control
Packaged weight	1.83 lb. (830 g)
Dimensions	3-5/8" H x 5-3/8" W x 9/16" D (92 x 137 x 14 mm)
Approvals	CSA C US, CSA/UL 61010-1, meets Class B: ICES and FCC Part 15
Ambient conditions	Indoor use only, 32 to 122 °F (0 to 50 °C)
	RH ≤ 80% to 88 °F (31 °C), down to 50% from 104 to 122 °F (40 to 50 °C)
	Altitude <6560 feet (2000 m), Installation Category II, Pollution Degree 2
Power Supply	Provided by interconnected Zone Manager
DHW Pump Relay	115 V (ac) 5 A
Primary Pump Relay	115 V (ac) 5 A
Combined Load	10 A Maximum (for DHW and Primary Pump)
DHW Valve Output	24 V (ac) 8 VA Maximum
Modulation Output	0-10 V Minimum 2500 Ω
Boiler Relay	115 V (ac) 5 A
Demands	20-260 V (ac) / 0.1 VA @ 24 V
Sensors	NTC thermistor, 10k Ω @ 77 °F (25 °C ± 0.2 °C) B=3892
-Included	Outdoor Sensor 070 and Universal Sensor 082

The installer must ensure that this control and its wiring are isolated and / or shielded from strong sources of electromagnetic noise. Conversely, this Class B digital apparatus complies with Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Regulations. However, if this control does cause harmful interference to radio or television reception, which is determined by turning the control off and on, the user is encouraged to try to correct the interference by re-orientating or relocating the receiving antenna, relocating the receiver with respect to this control, and / or connecting the control to a different circuit from that to which the receiver is connected.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.



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