tekmar® - Wiring Brochure

Boiler Reset Module 420

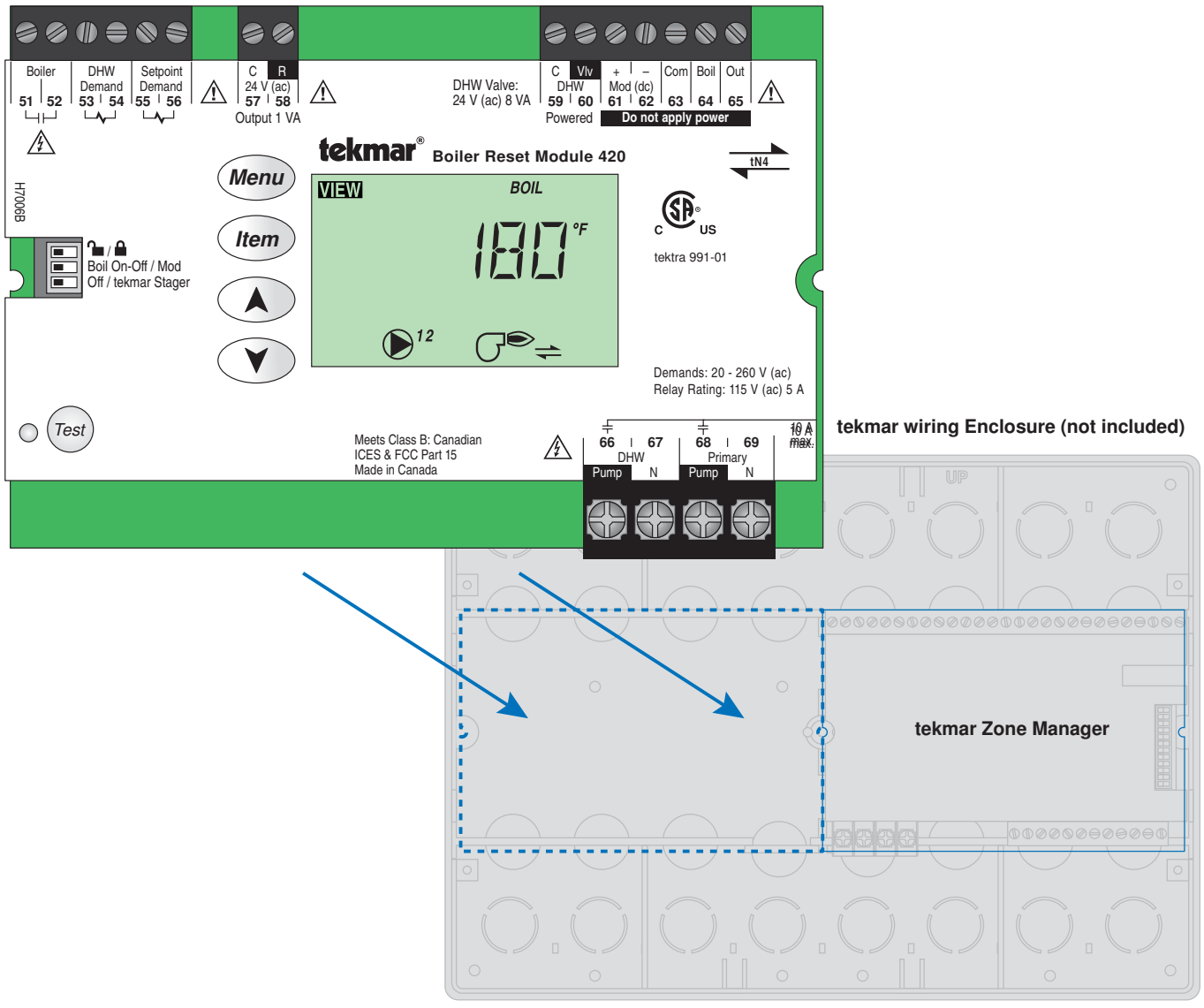
tN4

W420
03/09

1 Information Brochure	2 Application Brochure	3 Rough-in Wiring	4 Wiring Brochure	5 Data Brochure	6 Job Record
Choose controls to match application	Design your mechanical applications	Rough-in wiring instructions	Wiring and installation of specific control	Control settings and sequence of operation	Record settings & wiring details for future reference

Overview

The following wiring brochure describes how to wire the tekmar Boiler Reset Module 420. The 420 is to be installed in an enclosure together with a tekmar Zone Manager. The 420 controls one boiler (on-off or modulating), DHW and setpoint. The wiring of tekmarNet®4 (tN4) components is simple and cost effective.



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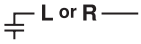
Wiring Symbols

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

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

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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 Boiler Reset Module 420 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 420:

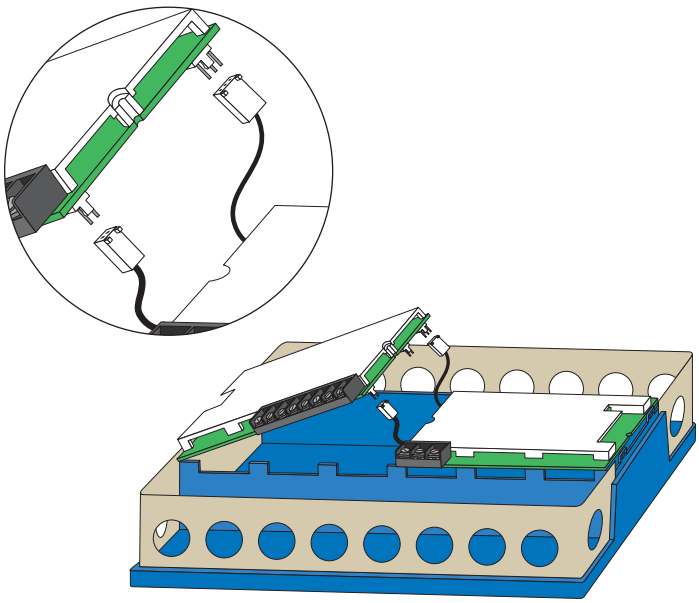
To Install the 420

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 420 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 420.

- 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 420 into the enclosure at an angle. Insert the two tabs on the left side of the 420 in to the corresponding slots in the left side of the wiring enclosure.
7. Lower the 420 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.

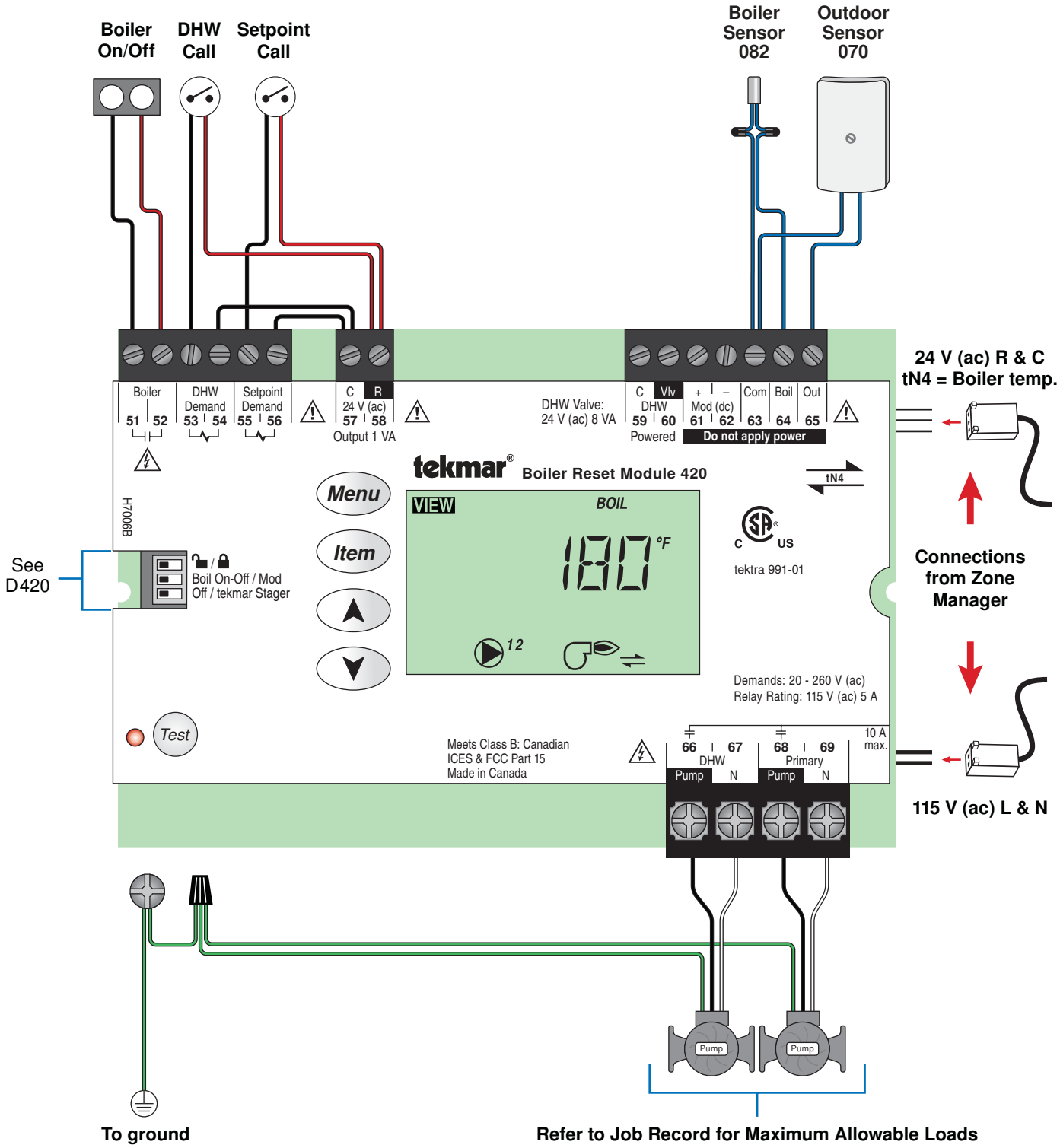


Electrical Drawings

⚠ The electrical drawing examples on the following pages show the 420 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.

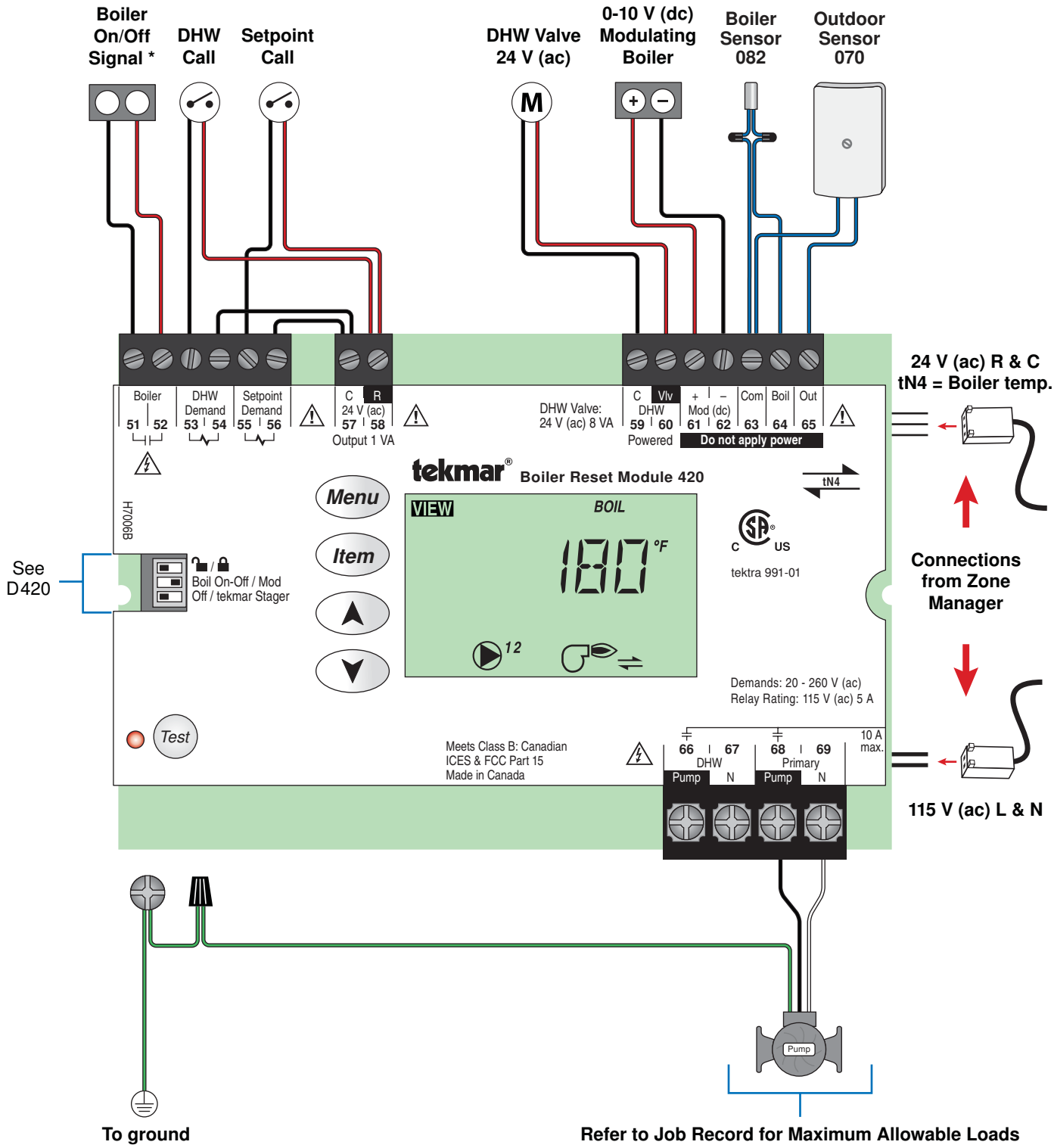
These are only concept drawings, not engineered drawings. They are not intended to describe a complete system nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed including additional equipment isolation 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: Outdoor Reset, DHW Pump, Setpoint, Single On / Off Boiler.



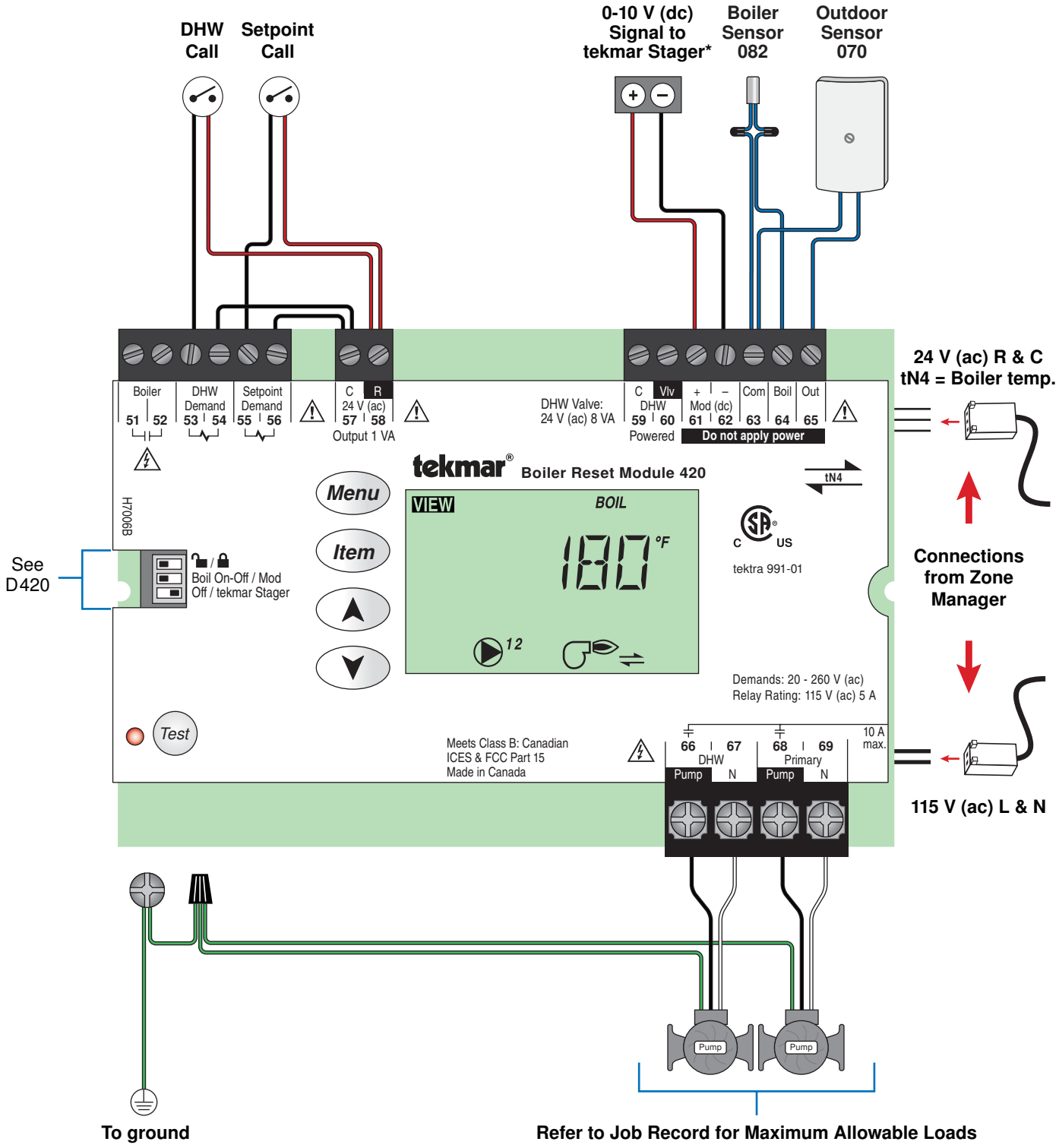
Description: Outdoor Reset, DHW Valve, Setpoint, Single 0-10 V (dc) Modulating Boiler.

***May be required for modulating boiler**



Description: Outdoor Reset, DHW Pump, Setpoint, Multi-stage Boiler Control.

***Refer to boiler staging control info**



Wiring the Control — *Terminals 51-69*

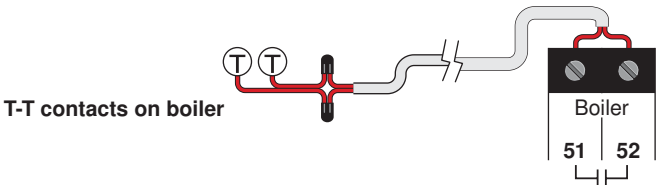
⚠ The following section explains how to wire individual devices to the Boiler Reset Module 420. For step by step wiring refer to the terminal number on the right of the page.

- 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. 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 51-52*

Terminals 51-52 are a dry contact. No power is available from this switch. When the switch at 51-52 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 two terminals are typically connected to the boiler's control circuit (commonly labeled as T-T). Connect these two terminals directly to the boiler T-T connections.

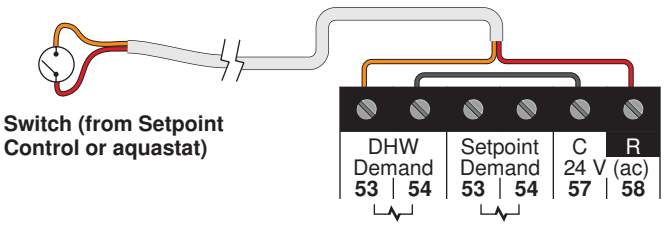


⚠ Wiring the Demands (DHW, Setpoint) — *Terminals 53-58*

- To generate a DHW Demand a voltage between 20 and 260 V (ac) must be applied across the DHW Demand terminals (53-54).
- To generate a Setpoint Demand, a voltage between 20 and 260 V (ac) must be applied across the Setpoint Demand terminals (55-56).

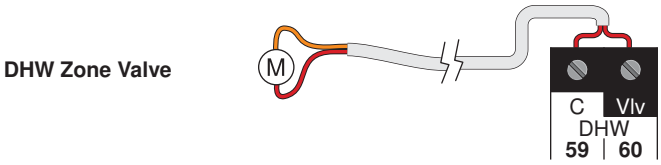
24 V (ac) is provided on terminals 57 and 58 to power the DHW Demand and the Setpoint Demand. Each demand uses approximately 0.1 VA

The example below shows the wiring to generate a DHW Demand.



⚠ Wiring a DHW Zone Valve — *Terminals 59-60*

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 motor to terminals 59 and 60 where terminal 59 is 24 volt C (neutral) and terminal 60 is 24 V R (hot).

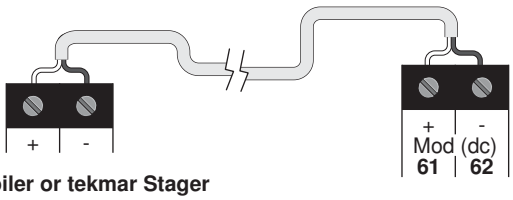


⚠ Wiring the Modulating Boiler Output

Terminals 61-62

- The control provides a 0-10 V (dc) modulating output to a single modulating boiler or to a tekmar boiler 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 61 and the – wire from the boiler or staging control to terminal 62.

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

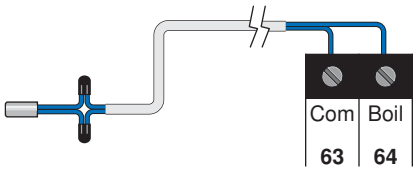


Modulating Boiler or tekmar Stager

⚠ Boiler Sensor (tekmar 082)

Terminals 63-64

Connect the two wires from the Boiler Sensor 082 to the Com and Boil (63-64) terminals. The Boiler Sensor is used by the control to measure the boiler water temperature.



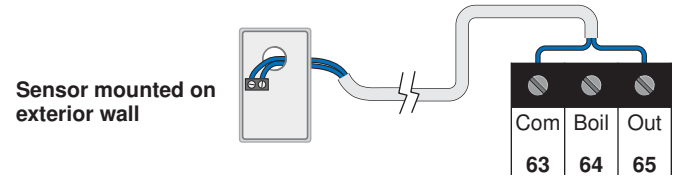
Do Not Apply Power

⚠ Outdoor Sensor (tekmar 070)

Terminals 63-65

Connect the two wires from the Outdoor Sensor 070 to the Com and Out (63-65) 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.



Do Not Apply Power

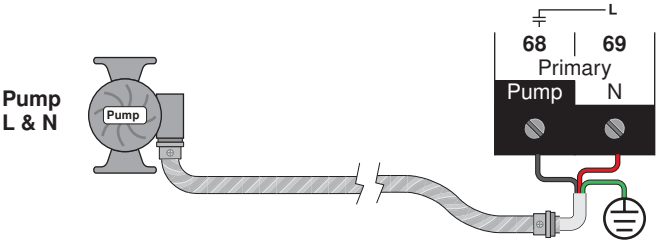
⚠ Primary and DHW Pump

Terminals 66-67, 68-69

The control operates a Primary Pump and a DHW Pump.

- If a Primary Pump is used, the pump is wired directly to terminals 68 and 69.
- If a DHW Pump is used, the pump is wired directly to terminals 66 and 67.
- 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.

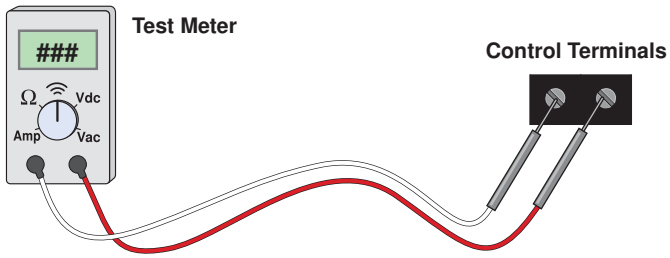


Troubleshooting the Wiring

⚠ 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 51-59*

⚠ Testing the Boiler Contact — *Terminals 51-52*

1. Shut off power to the control and the boiler circuit.
2. Remove the front cover from the control. Disconnect the wires from the boiler contact (terminals 51-52).
3. Apply power to the control and press the Test button.
4. Use an electrical test meter and check for continuity between terminals 51 and 52.

- When the burner symbol is displayed in the LCD, there should be continuity.
- When the burner symbol is not displayed in the LCD, there should be no continuity.

5. Reconnect the wires to the boiler contact (51-52), install the front cover on the control and apply power to the boiler circuit.

⚠ Testing the DHW or Setpoint Demand — *Terminals 53-56*

1. Remove the front cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the DHW Demand terminals (53-54) or the Setpoint Demand terminals (55-56).

- 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.

⚠ Testing Auxiliary 24 V Power Supply — *Terminals 57-59*

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 57 and 58 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 Zone Valve

Terminals 59-60

1. Ensure that the control is set to operate the DHW Zone Valve.
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 (59-60). 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 (59-60). The reading should be 0 V (ac).

⚠ Testing Modulating Action (0-10 V dc)

Terminals 61-62

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 (61-62). 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.

⚠ Testing tekmar Sensors

Terminals 63-65

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 and Primary Pump

Terminals 66-67, 68-69

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 (68-69).
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 (66-67). 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.

Notes

Technical Data

Boiler Reset Module 420*; One tekmarNet®4, Boiler, DHW & Setpoint*	
Control	Microprocessor PID control; This is **not a safety (limit) control**
Packaged weight	1.59 lb. (720 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 Zone Valve	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) ß=3892
–Included	Outdoor Sensor 070 and 1 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.

tekmar® Control Systems

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