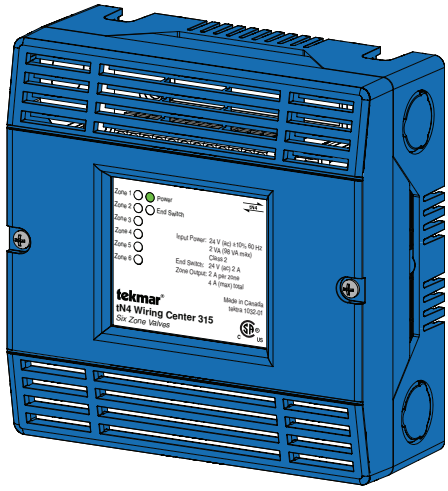
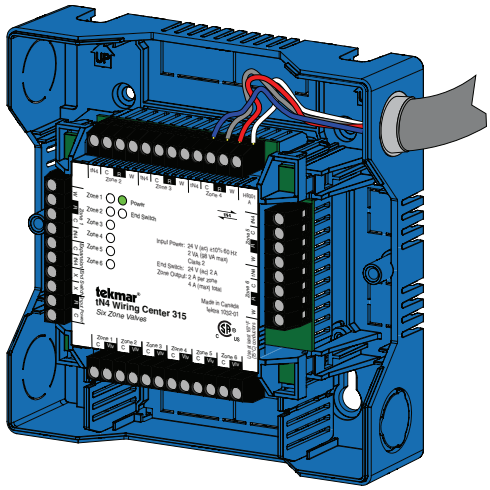
Installation & Operation Manual

Introduction

The tekmarNet®4 (tN4) Wiring Center 315 is designed to operate up to six zone valves in a hydronic heating system. It can be mounted near a remote zone manifold, providing a convenient location to wire both thermostats and zone valves while only requiring two wires to be run back to the mechanical room. When combined with tekmarNet®4 Thermostats, all devices communicate to provide a synchronized end switch that reduces cycling of equipment.





Features

- Six 24 V (ac) powered zone outputs
- For use with tekmarNet®4 Thermostats
- tN4 expansion terminals
- Isolated end switch
- External diagnostic LEDs
- CSA C US Certified for use in USA and Canada

Benefits

- Simple, convenient wiring location
- Compact enclosure for flexible installation
- Reduce equipment cycling when combined with tekmarNet®4 Thermostats

Note

- Not for use with tekmarNet®2 Thermostats

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⚠ 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 use 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. 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.

Control Location

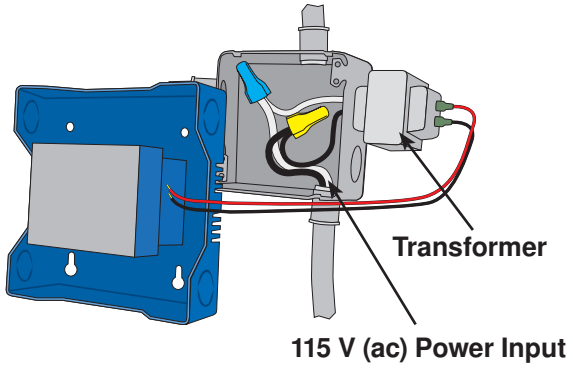
When choosing the location for the control, consider the following:

- Keep dry. Avoid potential leakage onto the control. RH ≤ 90 % in a non-condensing environment.
- Do not expose to temperatures beyond 32 to 122°F (0 to 50°C).
- Provide adequate ventilation.
- Keep away from equipment, appliances or other sources of electrical interference.
- Locate the control near the zone valves.

Mounting the Control

- Remove the front cover of the Wiring Center by removing the two screws in the cover.
- There are four holes in the back of the enclosure that allow for mounting to a 4”x4” electrical box or directly to wall.
- Ensure that the enclosure is securely fastened in place, using #10 screws if fastening to a wall.
- The conduit knockouts provided on the sides of the Wiring Center can be used to neatly route wiring to and from the control. Wiring can also enter through the back of the enclosure.

Note: The nonmetallic conduit entries on the sides of the enclosure do not provide grounding between conduit connections. Use bonding bushings and jumpers to provide a continuous path to ground.



Sizing the Transformer

The tN4 Wiring Center 315 requires an external transformer. A tekmar Transformer 009 (or 009K which includes a 4”x4” electrical box) can supply up to 40 VA each, and includes an in-line fuse to protect the transformer. These transformers can also be wired in parallel to increase VA.

In order to correctly size the external transformer, all loads connected to the control must be taken into account.

- The tN4 Wiring Center 315 draws about 2 VA (control load).
- tekmarNet®4 Thermostats draw between 2 VA and 4 VA each. Refer to the thermostat labels for exact thermostat loads.
- Each zone valve must be sized for peak load. This can be obtained by multiplying the peak current draw (in Amps) by 24 V (ac). A typical zone valve draws 6 to 8 VA.

Note: The total power capacity of the power supply should be larger than the total load of all the devices connected to the tN4 Wiring Center. This total load must not exceed 98 VA.

The following chart is provided to simplify transformer sizing:

Zone	1	2	3	4	5	6	
Thermostat Load							
Zone Valve Load							**Control Load (VA)**
Total Zone Load	____ +	____ +	____ +	____ +	____ +	____ +	2 =

Transformer must exceed: **____ VA**

Wiring the Control

External Power Supply

It is strongly recommended that a transformer with an in-line fuse be used in order to protect the transformer from high currents. The tekmar Transformer 009 includes a fuse. Once the transformer has been correctly sized as described on page 2, connect the 24 V (ac) leads from the transformer to the R and C terminals marked “Input Power” on the Wiring Center.

tekmarNet®4 Thermostats

The tN4 Wiring Center 315 is designed to operate with tekmarNet®4 Thermostats. They provide a synchronized end switch on the Wiring Center and communicate with any other tN4 device on the system.

- Connect the tN4, C, R and W terminals from each thermostat to the corresponding terminals for each zone on the Wiring Center.
- Ensure the tN4 and C wires are not reversed.

Conventional Thermostats

The tN4 Wiring Center 315 may be used with conventional and ‘power stealing’ type thermostats. However, the end switch synchronization feature will not be available.

- Install the thermostat to the appropriate R and W terminals on the 315.

Zone Valves

- Wire the zone valves to the Vlv and C terminals on the 315.
- End switches on zone valves are not required when using the 315.

tN4 Expansion

The Wiring Center acts as a link between tekmarNet®4 Thermostats and other tN4 devices, such as tN4 Boiler Control, Zone Manager or Reset Module.

- Connect the tN4 and C expansion terminals to the corresponding terminals on the external tN4 device.

End Switch

The tN4 Wiring Center 315 can be used to provide a call for heat to an external device that doesn’t have tN4 connections. The end switch is an isolated dry contact relay rated for 2 A at 24 V (ac).

Important Note: Thermostat Selection

Any tekmarNet®4 Thermostats can be used with the Wiring Center 315. However, **do not mix tekmarNet®4 thermostats with conventional thermostats** on the same Wiring Center.

Sequence of Operation

- When a thermostat calls for heat, it connects ‘W’ to ‘R’. The zone LED turns on and power is supplied to the corresponding zone valve output (Vlv).
- The end switch relay (‘XX’) closes and the end switch LED turns on. The switch remains closed as long as any zone is calling for heat. This can provide a boiler demand to a reset control such as a tekmar Boiler Control 260.

Synchronized End Switch

When using tekmarNet®4 Thermostats, the Wiring Center has a synchronized end switch feature. This ‘synchronizes’ the start times of zones and reduces short cycling of equipment connected to the Wiring Center’s end switch. The net effect is increased system efficiency and reduced wear on equipment.

- If the Wiring Center is connected to a tN4 bus, all communication messages will pass through the Wiring Center tN4 Expansion connection. tN4 messages are required in order to create a boiler demand on a device such as a tekmar Boiler Reset Module 420. The end switch is not required in such systems.

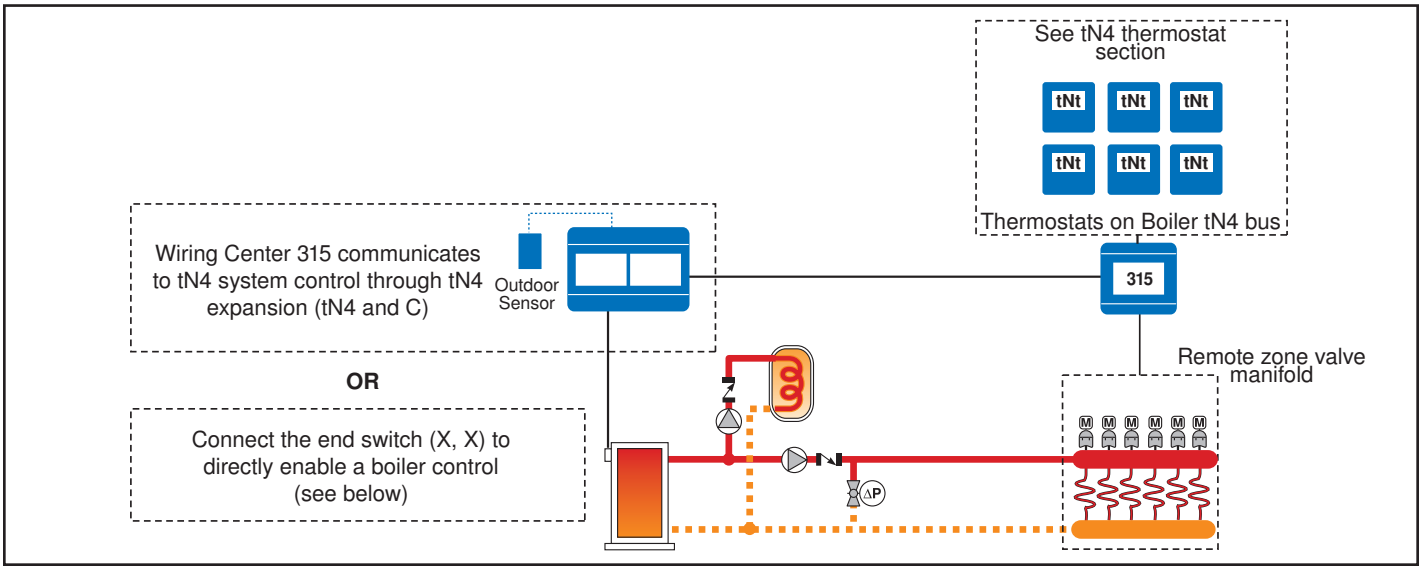
Electrical Drawings

⚠ The electrical drawing examples on the following pages show the 315 in common applications. These drawings have a brief explanation of what is being operated in each system. Choose the components in your system and use the drawings as a guide to aid in wiring your system.

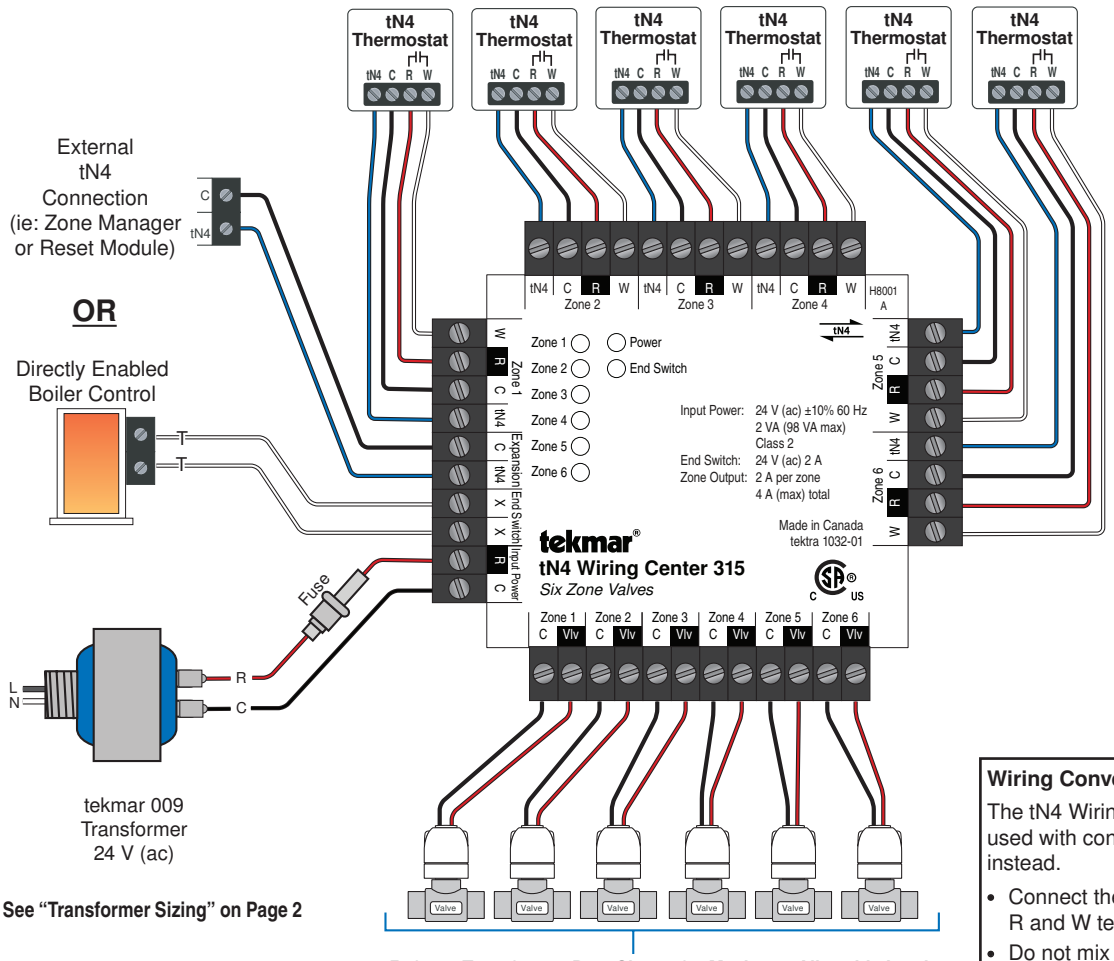
These are only concept drawings, not engineered drawings. They are not intended to describe a complete system nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed including additional equipment isolation 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.

Application Drawing 315 A1

Description: tN4 Wiring Center 315, six tekmarNet®4 Thermostats, and six zone valves wired into a tekmar tN4 Zone Manager and tN4 Boiler Reset Module.



Use tekmarNet®4 Thermostats to achieve better system performance



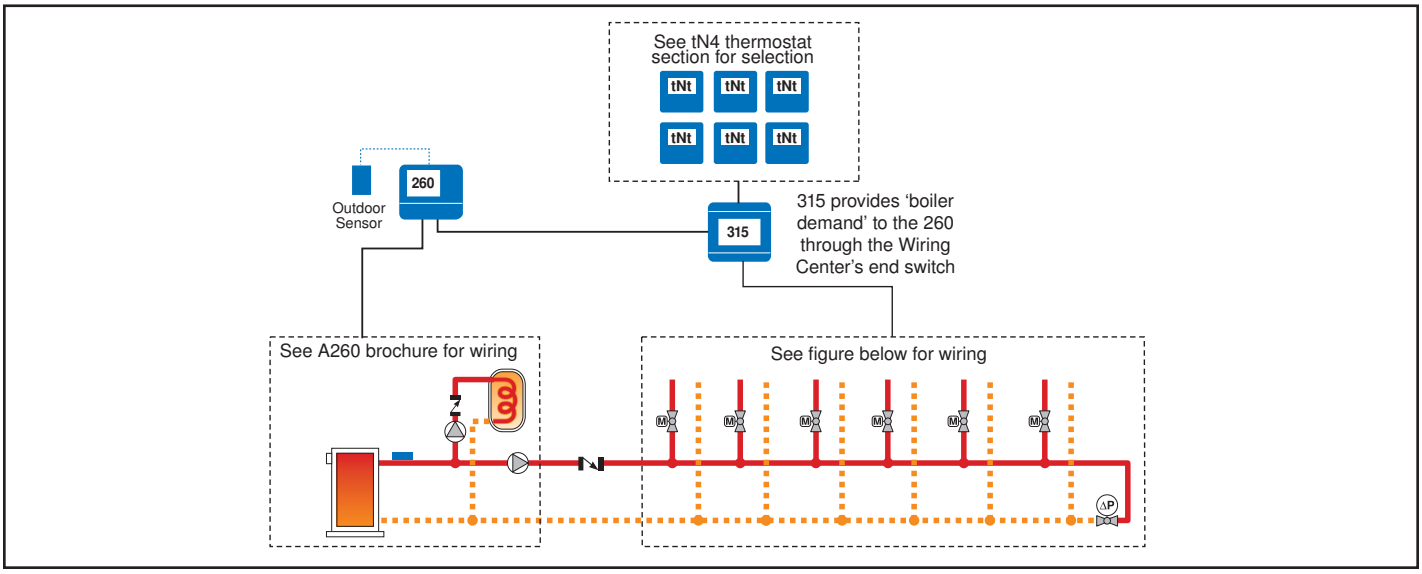
Wiring Conventional Thermostats:

The tN4 Wiring Center 315 may be used with conventional thermostats instead.

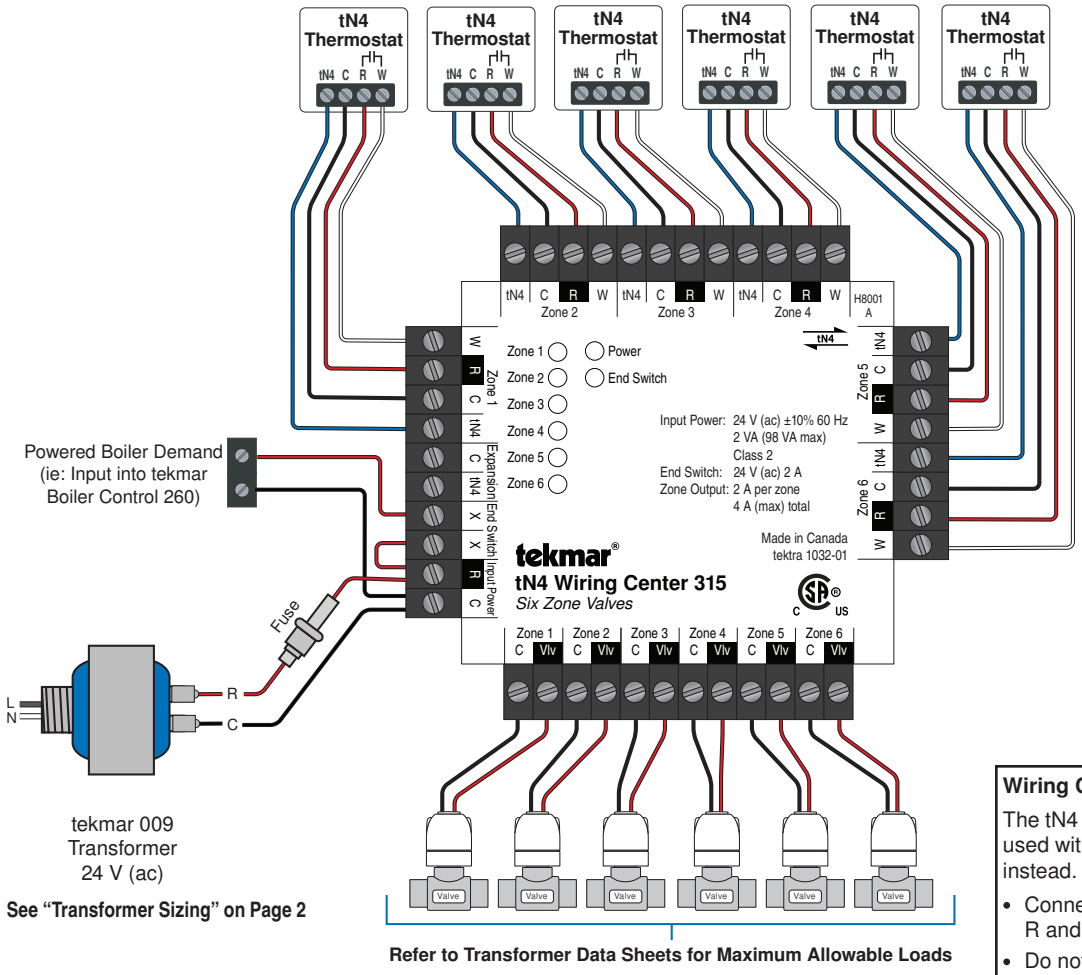
- Connect the thermostat wires to the R and W terminals of the 315.
- Do not mix conventional and tekmarNet® Thermostats on the same Wiring Center.
- See page 3 for more detailed wiring information.

Application Drawing 315 A2

Description: tN4 Wiring Center 315, six tekmarNet®4 Thermostats, and six zone valves wired into a powered boiler demand input on a device such as a tekmar Boiler Control 260.



Use tekmarNet®4 Thermostats to achieve better system performance



See "Transformer Sizing" on Page 2

Refer to Transformer Data Sheets for Maximum Allowable Loads

Wiring Conventional Thermostats:

The tN4 Wiring Center 315 may be used with conventional thermostats instead.

- Connect the thermostat wires to the R and W terminals of the 315.
- Do not mix conventional and tekmarNet® Thermostats on the same Wiring Center.
- See page 3 for more detailed wiring information.

Troubleshooting Guide

We expect your tekmarNet® system to operate trouble-free. If an error should occur, simply follow these steps:

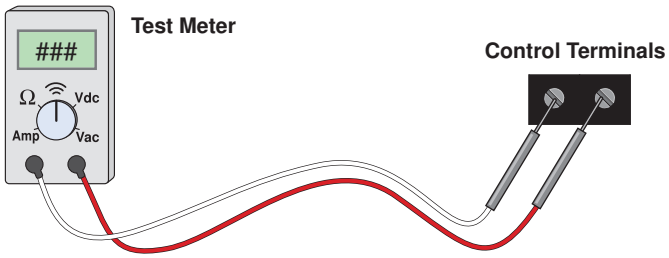
1. **Find:** If a tekmarNet® Thermostat flashes ⓘ on the bottom of the screen, it is indicating a problem on the system.
2. **Identify:** Match what is showing on the thermostat screen with one of the error messages shown in its manual.
3. **Solve:** The error could be a result of improper wiring at the Wiring Center. Follow the tests below for testing steps and solutions.

The following information, in addition to any error messages found on a tekmarNet® system, can be used to locate problems in the system. Please refer to the thermostat manual for error code information.

⚠ 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), 0-300 V (dc), 0-2,000,000 Ohms, and testing for continuity is essential to properly test the wiring.



⚠ Step 1: Testing the Input Power

1. Remove the front cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the input power R and C terminals. The reading should be 24 V (ac) + / – 10% and the power LED should be lit green.
3. If power is not present and the light is off:

- Check the circuit that supplies power to the tN4 Wiring Center.

4. If the transformer is being powered with line voltage and the power LED is not lit:

- If using the tekmar Transformer 009 check the field replaceable transformer fuse in line with the 24 V (ac) output of the 009.
- If the fuse is blown, determine the cause of the failure before replacing the fuse.
- If a transformer other than the tekmar 009 is used then a fuse may not be present. Verify that the transformer is being fed the proper voltage. If the input voltage is correct, and there is no output voltage, then the transformer is likely damaged and should be replaced. Find the cause of the overload before replacing the transformer. Ensure transformer is sized for the entire load (See “Transformer Sizing” on Page 2).

⚠ Step 2: Testing the Thermostat Connections

tekmarNet®4 Thermostats

1. To test the tN4 Network, check the tN4 and C wires for continuity.

- Disconnect the tN4 and C wires from the tekmarNet®4 Wiring Center and twist them together.
- Go to the thermostat and disconnect the tN4 and C wires.
- Using an electrical test meter, check for continuity. If continuity exists, then proceed to next step, if not, verify that correct wires are in place prior to continuing to next step
- Reconnect the wires to the proper terminals.

2. To test the call for Heat (W), a continuity test is used between terminals R and W.

- Disconnect the wire from terminal W on the 315.
- When the thermostat calls for heat, the resistance between R and the disconnected W wire should be 0 ohms or tone indicating continuity.
- When there is no call for heat the resistance between R and W should be infinite, O.L. or no tone should be heard.

⚠ Step 2: Testing the Thermostat Connections (Continued)

Conventional Thermostats

To test the call for Heat (W), a continuity test is used between terminals R and W.

1. Disconnect the wire from terminal W.
2. When the thermostat calls for heat, the resistance between R and the disconnected W wire should be less than 7 ohms or tone indicating continuity.
3. When there is no call for heat the resistance between R and the disconnected W wire should be infinite, O.L., or no tone should be heard.

Power-Stealing Thermostats

The tN4 Wiring Center 315 can also accept 'power-stealing' type thermostats. They must output less than 5 V (ac) when not calling for heat, or the 315 may detect a false heat call and open the corresponding zone valve.

1. Connect the R & W wires from the thermostat to the desired zone R and W terminals on the 315.
2. When the thermostat is not calling for heat, the corresponding zone LED should not be lit.

- If the zone LED is lit, then a resistor may have to be added to reduce the trickle voltage through the thermostat. See the thermostat installation manual for details.

⚠ Step 3: Testing the Zone Valve Outputs

1. Use an electrical test meter to measure the (ac) voltage between the C and the Vlv terminals for each zone valve output.

- When the zone LED is off, the reading should be 0 V (ac) and the valve should be closed.
- When the zone LED is on, the reading should be 24 V (ac) + / – 10% and the valve should be open.

Note: If power to the zone valve is present but the zone valve does not operate properly, refer to any troubleshooting information supplied by the zone valve manufacturer.

⚠ Step 4: Testing the tN4 Expansion Terminals

To test the tN4 Network, check the wires for continuity and shorts.

1. Disconnect the two tN4 expansion wires (tN4 and C) at one end and twist them together.
2. Go to the other end of the wires and disconnect them.
3. Using an electrical test meter, check for continuity. Resistance should read 0 ohms, or continuity should produce a tone. If not, this indicates that there are damaged wires connecting the tN4 control to the 315. Repair or replace them as necessary.
4. Go back to the original end of the wires and, using a wire nut, cap each expansion wire individually so that these ends cannot touch another conductor.
5. Go to the other end of the wires and again, test for shorts. Resistance should be infinite, or O.L. and there should be no tone. If tone exists or less than 50 000 ohms is found, then the wires are not insulated from one another. This is generating a short on the wires connecting the tN4 control to the tN4 Wiring Center.
6. Replace the damaged wires, test, and reconnect them to their proper terminals.

⚠ Testing the End Switch

If the tN4 expansion terminals are not used to connect the tN4 Wiring Center to the system, the end switch may be used.

1. Remove the wires from the end switch terminals.
2. Use an electrical test meter to measure continuity across the XX end switch terminals on the 315.

- When the end switch LED is off, no continuity should be present (no tone).
- When the end switch LED is on, continuity should be present (tone).

Technical Data

tN4 Wiring Center 315; *Six Zone Valves*	
Packaged weight	1.37 lbs (0.62 kgs)
Enclosure	O-Enclosure, blue PC+ABS UL94-5VA plastic
Dimensions	5.5” H x 5.5” W x 2.25” D (140 x 140 x 57 mm)
Approvals	CSA C US, CSA 22.2 N°24 and UL 873, meets class B: ICES & FCC Part 15
Ambient conditions	Indoor use only, 32 to 122°F (0 to 50°C). RH ≤ 90% Non-condensing
Power Supply	24 V (ac) ±10% 60 Hz, 98 VA max, Class 2
Zone Valve Load	24 V (ac) 2 A, maximum combined current (zones 1 to 6): 4 A
End Switch Relay Rating	24 V (ac) 2 A

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.

Limited Warranty and Product Return Procedure

Limited Warranty ***The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product (“Product”), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.***

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer’s pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar’s instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar’s sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and / or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser’s agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser’s sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar’s instructions and / or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar’s instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

Product Warranty Return Procedure All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser’s customers, regarding a potential warranty claim, tekmar’s sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.

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