

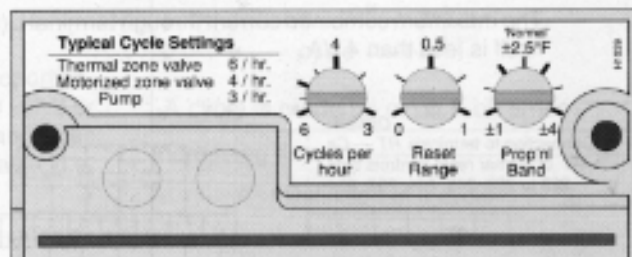
tekmar® - Data Brochure

Multi-Zone Control 240

D 50

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The tekmar® Multi-Zone Control regulates the heat delivered to four zones of a hydronic heating system. The regulation of heat delivered is accomplished by varying the length of time a particular zone valve / pump is on versus the length of time it is off. The control also includes logic for the operation of a system pump or boiler. An input is provided for a setback timer, and an adjustment allows the user to determine the amount of setback the zones will have relative to their normal temperatures. A proportional output signal from the coldest room is provided for connection to tekmar controls 228 to 233, 245, 251, 252 or 354.



Included with the 240: 1x Electronic Control 1x Plug-in base **Note:** the control does not include the Room Temperature Units (RTUs). An RTU is required for each zone that will be in operation. **For application examples, see brochure A 240.**

Technical Data

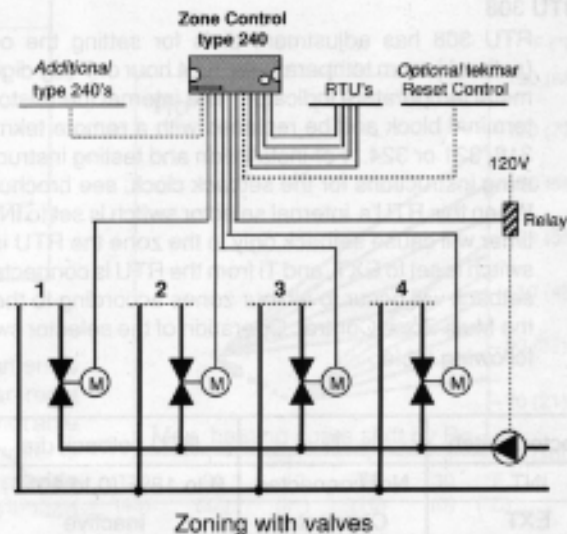
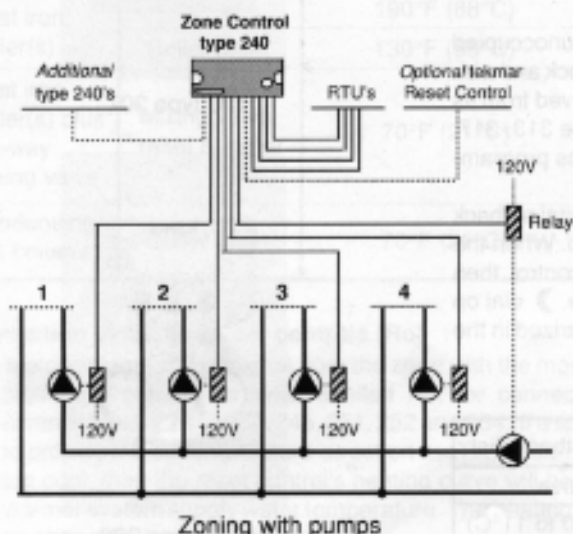
Technical specifications

Dimension (h x w x d)	— 2-1/2 x 4-1/4 x 2-7/8" (64 x 108 x 73mm)
Weight	— 0.9 lbs (0.4 kg)
Ambient	— 30 - 120°F (0 - 50°C) <95% RH non - condensing
Power supply	— 24Vac ± 10%, 60 Hz, 4VA, Class 2 Transformer
Relay capacity	— 24Vac, 6 Amp (SPST)

Features

Control output signal	— 24Vac On/Off
Plug-in system	— Wires terminate in a plug-in base
System status indicator lights	— Power, four zones, setback
Number of heating zones	— 4
Type of Room Temperature Units to be used	— RTU's type 307, 308 or 309
Cycles/hour (adjustable)	— 3 to 6 cycles/hour
Proportional band (adjustable)	— ±1 to ±4°F (±0.5 to ±2°C)
Reset Range (adjustable)	— 0 to 100% reset
Night setback (adjustable)	— 0 to 20°F (0 to 11°C) setback from occ. temp.
Warm Weather Shut Down (WWSD) for the pumps, valves or boiler	— When all zones are satisfied
Feedback signal to tekmar reset controls 228 to 233, 245, 251, 252, 354	— yes
Maximum wire length to the Room Temperature Units (RTU's)	— 500ft (150 m) 18AWG

Applications



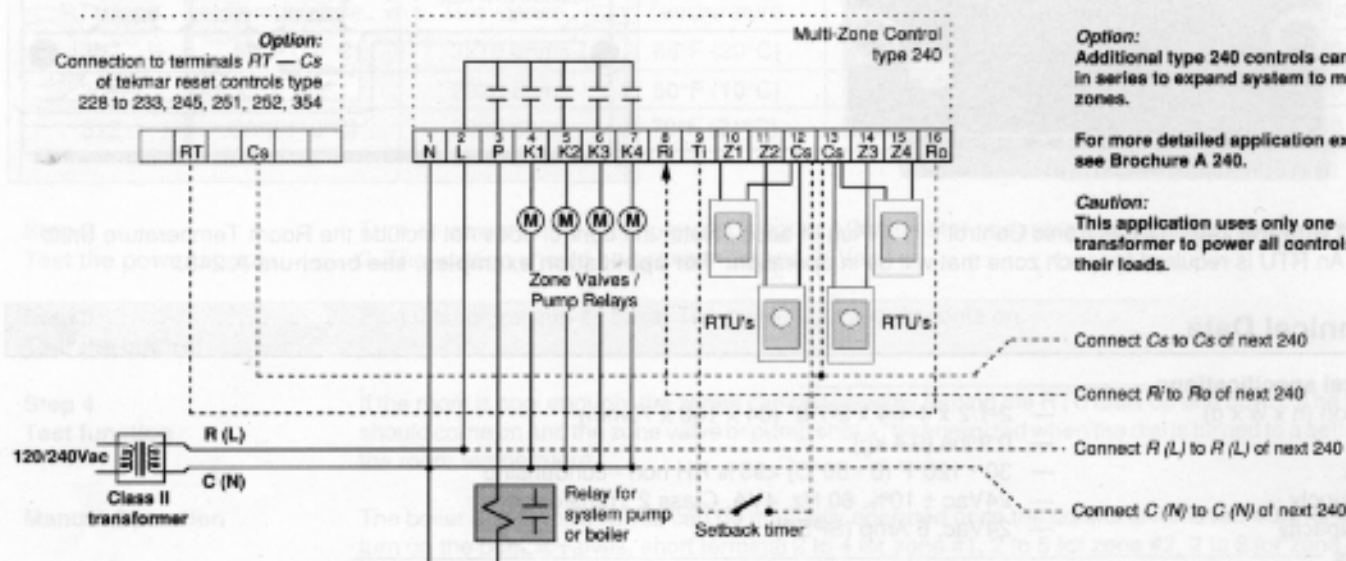
Installation

Electrical

All wires to the control are terminated in a plug-in base; no wires are directly connected to the control. This plug-in system simplifies installation and troubleshooting procedures. Terminals N & L (1 & 2) of the base must be connected to the secondary side of a 24 Vac class 2 transformer.

If more than 4 zones are required, multiple 240 controls can be connected together. Detailed installation instructions for connecting the controls can be found in brochure A 240. If there are several controls in the system, they all must be powered from one transformer and the transformer must have sufficient VA capacity to operate the total combined load of the controls as well as all of the zone valves or pump relays and system pump relays.

The maximum combined current through terminal L (2) of each control is 6 amps. (i.e. 150 VA @ 24 V). The total load of the control itself is less than 4 VA.



Room Temperature Unit Selection

RTU's 307, 309 and 312

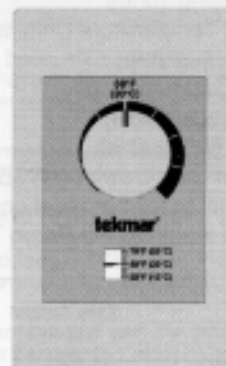
Each Room Temperature Unit has an adjustment dial for setting the desired room temperature and an internal thermistor which senses the actual room temperature. RTU type 307 has a bi-metal temperature indicator which shows the actual room temperature. The internal thermistor can be removed from its terminal block and be replaced with a remote tekmar sensor type 313, 317, 318, 321 or 324. For RTU installation and testing instructions see brochure D 05.

RTU 308

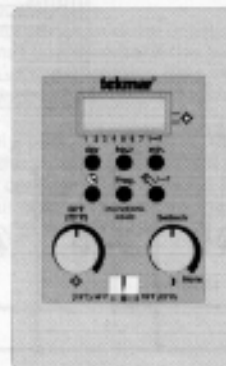
RTU 308 has adjustment dials for setting the occupied and unoccupied (setback) room temperatures, a 24 hour or 7 day digital setback clock and a bi-metal temperature indicator. The internal thermistor can be removed from its terminal block and be replaced with a remote tekmar sensor type 313, 317, 318, 321 or 324. For installation and testing instructions as well as programming instructions for the setback clock, see brochure D 06.

When this RTU's internal selector switch is set to INT, then the digital setback timer will cause setback only in the zone the RTU is connected to. When the switch is set to EXT, and Ti from the RTU is connected to Ti of the control, then setback will occur to all four zones according to the setting of the dial on the Multi-Zone Control. Operation of the selector switch is summarized in the following table.

Selector switch	Ti	RTU setback dial	Control setback dial
INT	Not connected	0 to 18°F (0 to 10°C)	Inactive
EXT	Connected	Inactive	0 to 20°F (0 to 11°C)



RTU type 307



RTU type 308

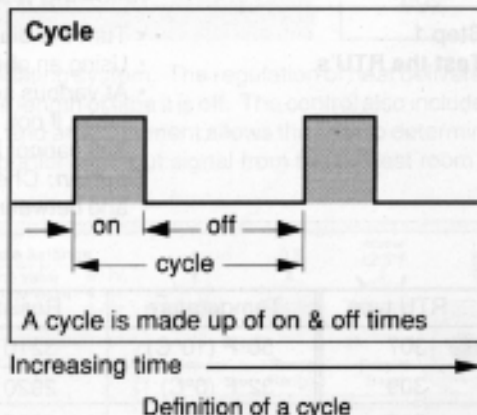
Settings

Cycles per hour

The regulation of heat delivered to a zone is accomplished by varying the length of time the zone valve / pump is on versus the time it is off. The on time plus the off time add up to one cycle. Increasing the number of cycles per hour gives a more steady zone temperature, but also causes greater wear on the zone valves or pumps.

Proportional Band

The proportional band is the range in which the control operates proportionally about its setpoint. Outside this range, the control will drive the valve or pump either continually on or continually off. A small proportional band gives close regulation of the room air temperature but may be unstable (i.e. undershoot and overshoot). A typical setting is $\pm 2^\circ\text{F}$ ($\pm 1.1^\circ\text{C}$).



Reset Range

This dial must be set in order to tell this control how much reset range the heating system has. In general:

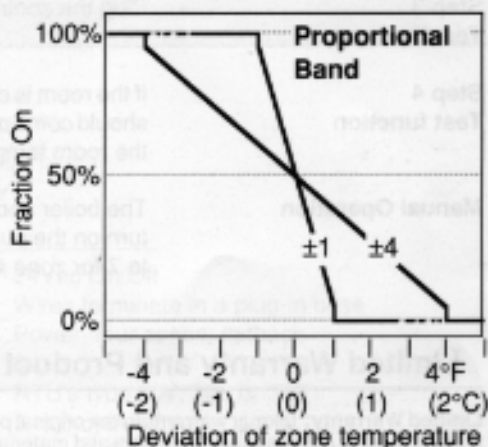
- 0 = no reset (supply water temperature = design temperature)
- 1 = full reset (reset down to 70°F (21°C))

The correct adjustment of the reset range is defined by the following formula:

$$\text{Reset range} = 1 - \frac{\text{lowest supply water temp.} - \text{average room temp.}}{\text{design supply water temp.} - \text{average room temp.}}$$

Example: Find the reset range setting for a system where the lowest supply water temperature available is 130°F (55°C) and the design supply water temperature is 190°F (88°C). The average room temperature is to be 70°F (21°C).

$$\text{Reset range} = 1 - \frac{130^\circ\text{F} (55^\circ\text{C}) - 70^\circ\text{F} (21^\circ\text{C})}{190^\circ\text{F} (88^\circ\text{C}) - 70^\circ\text{F} (21^\circ\text{C})} = 0.5$$



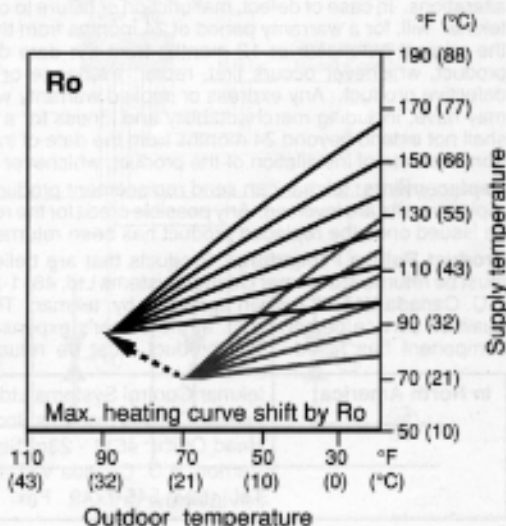
Proportional band adjustment range

Some typical systems

System	tekmar reset control(s)	Lowest supply water temperature available	Reset range setting used
Cast iron boiler(s)	-	190°F (88°C)	0
	Boiler reset	130°F (55°C)	0.5
Cast iron boiler(s) plus a 4-way mixing valve	Mixing valve reset & motor	70°F (21°C)	1.0
Condensing gas boiler(s)	Boiler reset	70°F (21°C)	1.0

Connection to tekmar reset controls (Ro)

A proportional output signal from the zone with the most heat requirement is provided from the terminal labelled Ro, for connection to tekmar reset controls types 228—233, 245, 251, 252 and 354. If a specific zone is not able to provide the air temperature as set on its RTU because the supply water is too cool, then the reset control's heating curve will be shifted up to provide warmer system supply water temperature. The heating curve's shift is limited as shown in the adjacent diagram.



Testing and Troubleshooting

Step 1

Test the RTU's

Do not plug the control into its base until the following tests have been performed. If any of the following tests fail, check the wiring to and from the base.

- Turn the dial of the RTU to its **mid-range position** and unplug the tekmar control from its base.
- Using an ohmmeter, measure the resistance between terminals 10 & 12, 11 & 12, 13 & 14, and 13 & 15
- At various sensor (room) temperatures the ohmmeter readings should be as listed in the following table; if not, then check that the thermistor or sensor is properly connected in its terminals. Type 308 cannot be tested with an ohmmeter.

Caution: Check for voltage on the RTU terminals by measuring between the RTU terminals themselves and between the RTU terminals and ground. Voltage should never be present under these conditions.

RTU type	Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
307	50°F (10°C)	3210 ohms	68°F (20°C)	2420 ohms	86°F (30°C)	1870 ohms
309	32°F (0°C)	2920 ohms	50°F (10°C)	2470 ohms	68°F (20°C)	2050 ohms
312	50°F (10°C)	3000 ohms	70°F (21°C)	2420 ohms	90°F (32°C)	1960 ohms

Step 2

Test the power supply

Turn on power to the transformer. Using an AC voltmeter, measure the voltage between terminals 1 & 2. The voltage should be between 20 and 28Vac.

Step 3

Test the control

Plug the control into its base. The power light should come on.

Step 4

Test function

If the room is cool enough, the zones can be tested by turning the RTU dials up and down. The zone light should come on and the zone valve or pump should be energized when the dial is turned to a setting above the room temperature.

Manual Operation

The boiler and pumps/valves can be manually operated once the control is removed from its socket. To turn on the pumps/valves, short terminal 2 to 4 for zone #1, 2 to 5 for zone #2, 2 to 6 for zone #3, and 2 to 7 for zone #4. To turn on the boiler/main pump short terminal 2 to 3.

Limited Warranty and Product Return Procedure

Limited Warranty: tekmar warrants to the original purchaser each tekmar product against defects in workmanship and materials when the product is installed and used in compliance with tekmar's instructions. This limited warranty covers the cost of parts and labour provided by tekmar to correct defects in materials and/or workmanship. Returned products that are fully operational are not considered a warranty case. tekmar also does not cover parts or labour to remove, transport or reinstall a defective product. tekmar will not be liable for any damage other than repair or replacement of the defective part or parts and such repair or replacement shall be deemed to be the sole remedy from tekmar. This warranty shall not apply to any defects caused or repairs required as a result of unreasonable or negligent use, neglect, accident, improper installation, or unauthorized repair or alterations. In case of defect, malfunction or failure to conform to warranty, tekmar will, for a warranty period of 24 months from the date of invoice to the original purchaser or 12 months from the date of installation of the product, whichever occurs first, repair, exchange or give credit for the defective product. Any express or implied warranty which the purchaser may have, including merchantability and fitness for a particular purpose, shall not extend beyond 24 months from the date of invoice or 12 months from the date of installation of the product, whichever occurs first.

Replacements: tekmar can send replacement products if requested. All replacements are invoiced. Any possible credit for the replacement will only be issued once the replaced product has been returned to tekmar.

Product Return Procedure: Products that are believed to have failed must be returned to tekmar Control Systems Ltd. 4611-23rd Street, Vernon B.C. Canada V1T 4K7 when agreed to by tekmar. The installer or other qualified service person must, at the owner's expense, determine which component has failed. The product must be returned complete with

all of its components (sensors, base, etc.). Products must be returned together with the proof of purchase to the original purchaser who then returns the product to tekmar after receiving a Return Goods Authorization (RGA) number from tekmar.

Please include the following information with the product. The full address of the original purchaser, the RGA number and a description of the problem.

From the U.S.A., in order to avoid customs charges, products must be returned via US Post with the package clearly marked with the RGA number, product type and the statement "Canadian Product returned for repair". For shipping purposes the product can be valued at one half list price.

- 1) If returned during the warranty period and the product is defective, tekmar will issue full credit for the returned product less cost of missing parts.
- 2) If returned during the warranty period and the product is fully operational, tekmar will return the product to the original purchaser for a testing cost of \$30.00 plus postage.
- 3) If returned during the warranty period and the product is not damaged and is fully operational, tekmar can take back the product for a return charge of 40% of the product's net value. This request has to be specified otherwise the product will be returned with a testing cost of \$30.00 plus postage.
- 4) If returned after the warranty period and the product needs repair, tekmar will repair and return the product. Repair and postage costs will be invoiced. tekmar's repair costs are calculated at \$30.00 / hour plus the cost of parts. If the repair costs will be more than \$60.00 a repair estimate will be sent to the original purchaser.

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