tekmar® - Data Brochure

House Control 352

D 352

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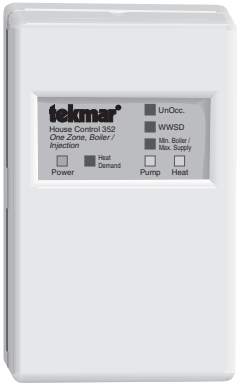
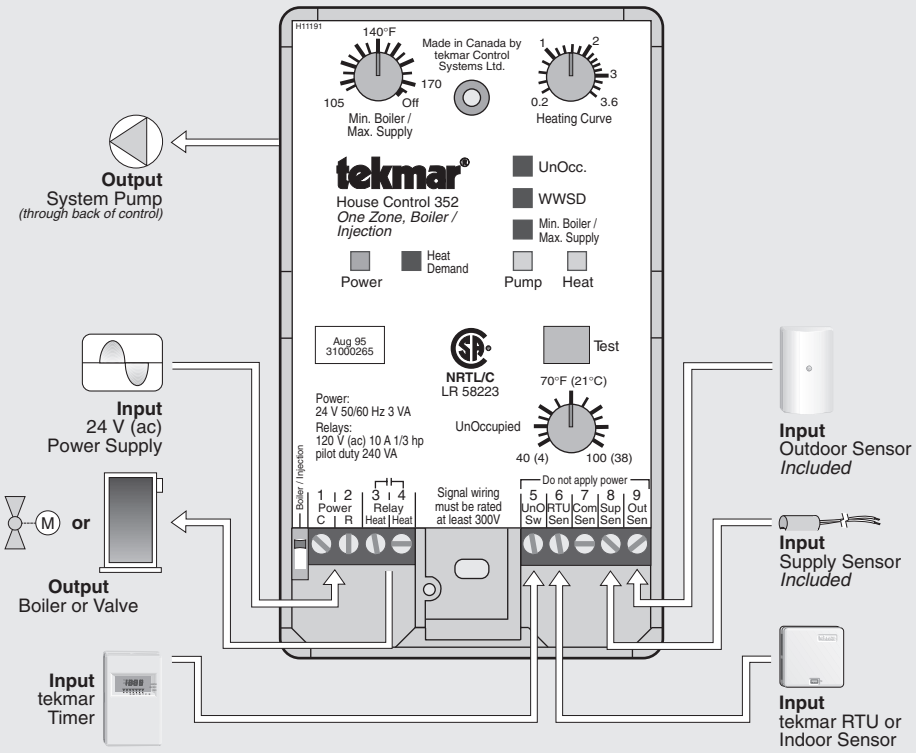


The House Control 352 is a microprocessor-based outdoor reset control designed to control the temperature of a single zone hydronic heating system. The 352 regulates the supply water temperature based on the outdoor air temperature and optionally the indoor air temperature. The 352 can either operate a boiler and a system pump, or an injection valve and a system pump. To avoid boiler short cycling and large temperature swings, the 352 has a built in function which continuously adjusts the boiler differential.

The 352 includes features such as Warm Weather Shut Down (WWSD), system pump exercising, Night Setback (UnOccupied period), minimum boiler supply temperature setting (Boiler mode) and maximum supply water temperature setting (Injection mode). A Room Temperature Unit (RTU) 054 or an Indoor Sensor 076 can be connected to the 352 to provide indoor temperature feedback.

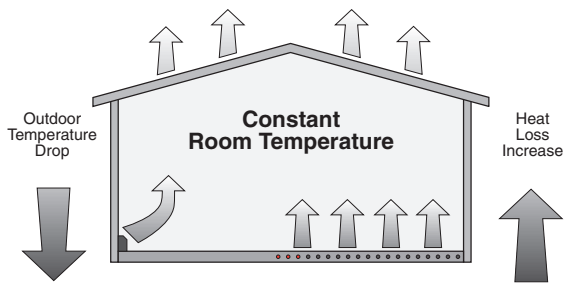


Control Strategy

OUTDOOR RESET

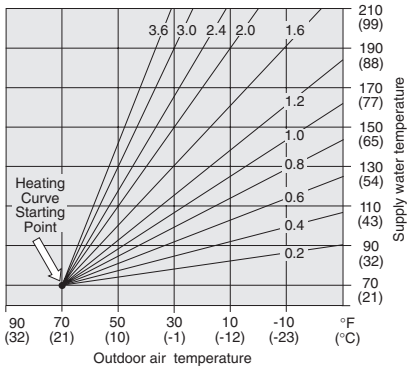
In order to properly control a hot water heating system, the heat supplied to the building must equal the heat lost by the building.

- The heat supplied to a building is proportional to the temperature of the water and the surface area of the heating element. A small surface area such as baseboard radiators requires a higher water temperature than a larger surface area such as radiant floors.
- The heat lost from a building is dependent on the outdoor temperature. As the outdoor temperature drops, the building heat loss increases.



Heating Curve

A hot water heating system can be accurately controlled by modulating the supply water temperature as the outdoor temperature changes. Using this approach the heat lost from the building is exactly matched by the heat input to the building. A tekmar reset control utilizes a heating curve to set the relationship between outdoor temperature and supply water temperature. The heating curve determines the amount the supply water temperature is raised for every 1° drop in outdoor air temperature. The heating curve is sometimes called an outdoor reset ratio.

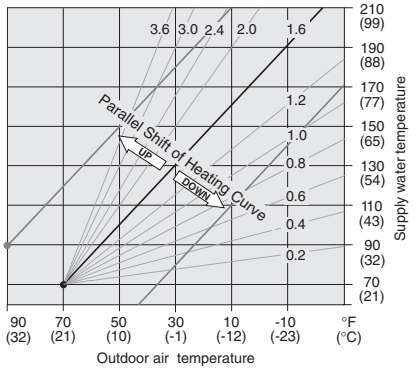


Heating Curve Parallel Shift

All heating curves begin at the heating curve starting point. If the heating curve starting point is adjusted, the heating curve will be parallel shifted. The heating curve starting point is either set manually through a dial, or it is determined automatically by the control through indoor temperature feedback.

Indoor Temperature Feedback

Most buildings have internal heat gains due to people, passive solar heating and mechanical or electrical equipment. If only the outdoor temperature is measured, the control cannot compensate for these internal heat gains and the building may overheat. In order to prevent overheating, indoor temperature feedback should be combined with the outdoor reset strategy. From this indoor temperature feedback, the control can change the heating curve starting point in order to match the supply water temperature to the heat loss of the building. If the indoor temperature is too warm, the control automatically shifts the starting point and the heating curve down. If the indoor temperature is too cold, the control shifts the starting point and heating curve up.

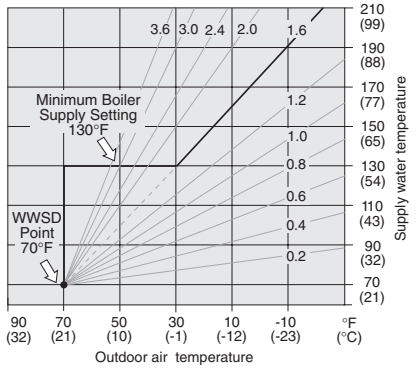


Warm Weather Shut Down (WWSD)

When the outdoor temperature is equal to the heating curve starting point, no additional heat is required in the building and therefore the heating system can be shut down. The WWSD point is normally the same as the heating curve starting point.

BOILER OPERATION

The supply water temperature from a boiler can be controlled by cycling the boiler on and off. Modulation of the boiler's operating temperature in hot water heating systems not only provides more comfort but also offers significant energy savings. The cooler the boiler runs, the more efficient it is due to less heat losses up the flue and reduced boiler jacket losses.

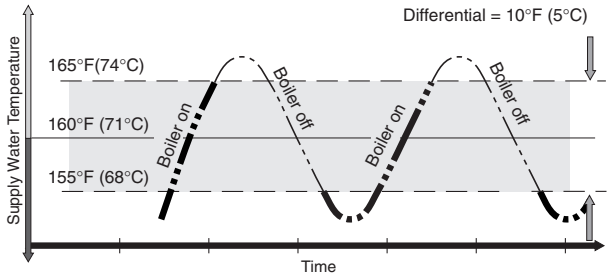


Minimum Boiler Supply

Most boilers require a minimum supply water temperature in order to prevent corrosion from flue gas condensation. The control should therefore only modulate the boiler supply water temperature down to the boiler manufacturer's minimum recommended operating temperature. Some boilers are designed to condense and should be operated at low water temperatures as much as possible for maximum efficiency.

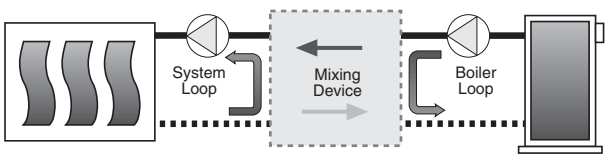
Boiler Differential

An on / off boiler must be operated with a differential in order to prevent short cycling. When the supply water temperature drops below the bottom rail of the differential, the boiler is turned on. The boiler is then kept on until the supply water temperature rises above the top rail of the differential. If the differential is too wide, there can be large supply water temperature swings; however, if the differential is too narrow, the boiler short cycles and operates inefficiently. Some controls automatically calculate the boiler differential in order to achieve an appropriate balance between temperature swings and boiler efficiency. This also permits the control to adapt to changing loads and conditions.



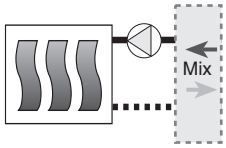
MIXING OPERATION

The full range of water temperatures required through a heating season can be provided with a standard (non-condensing) boiler by incorporating a mixing device into the system. An On / Off Injection Valve or Pump can be used to modulate the system supply water temperature to improve comfort in the building and provide a maximum target supply water temperature limit. For more detailed information on mixing methods consult Essay E 021.



Maximum System Supply

Some systems, such as hydronic radiant floor heating, usually operate at water temperatures that are below the minimum boiler supply temperature. This is due to the large surface area of the floors which radiate a significant amount of heat at low water temperatures. Floor heating systems and flat panel convectors also have a maximum surface temperature limit for occupant health reasons. In such systems a mixing device is normally required to limit the supply water temperature.



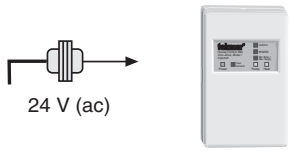
UNOCCUPIED (NIGHT SETBACK)

During the night, or at times when people are not within the building, energy can be saved by lowering the building temperature for an UnOccupied (Night Setback) period.

Sequence of Operation

POWERING UP THE CONTROL

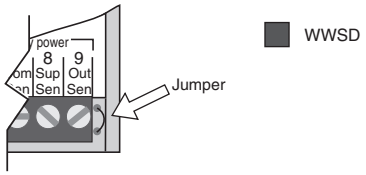
After the 352 is powered up a certain combination of red LEDs are turned on for 2 seconds indicating the software version. All red LEDs are then held on for 4 seconds. When the control is powered up, the green *Power* light remains on continuously.



WARM WEATHER SHUT DOWN (WWSD)

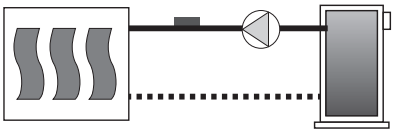
When the outdoor temperature rises above the heating curve starting point, the 352 turns the *WWSD* light on and shuts down the system pump and the *Heat* relay.

If the control is in *Boiler* mode and the jumper is cut, the control ignores the WWSD feature and keeps the boiler warm.



BOILER OPERATION

If the DIP switch is set to *Boiler*, the system supply water temperature is controlled by turning the boiler on and off. The 352 calculates the target supply water temperature based on the outdoor temperature and optionally the indoor air temperature. In order to prevent boiler short cycling, the 352 has a minimum time delay of 30 seconds before turning the boiler on or off. The 352 calculates the boiler differential automatically. The *Heat* light turns on whenever the boiler is on.

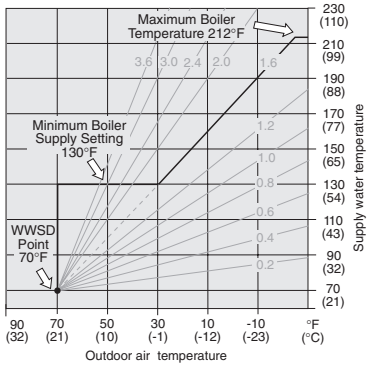


Maximum Boiler Supply

The 352 does not allow the target boiler supply water temperature to exceed 212°F (100°C). If the supply water temperature approaches 212°F (100°C), the 352 turns off the boiler.

Minimum Boiler Supply

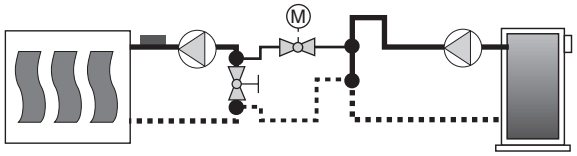
The 352 has a *Min. Boiler* dial which sets a minimum target boiler supply temperature in order to prevent corrosion from flue gas condensation. This dial has an *Off* position for condensing and electric boilers. If an RTU or Indoor Sensor is connected to the 352 and the required system supply temperature needs to be lower than the *Min. Boiler* dial setting, the 352 turns on the boiler until the minimum boiler temperature is reached. It then keeps the boiler off for a calculated off time in order to prevent overheating of the zone. The *Heat Demand* light turns on when operation of the boiler is required.



MIXING OPERATION

If the DIP switch is set to *Injection*, the system supply water temperature is controlled by turning an injection device, such as a zone valve, on and off. The 352 calculates the target supply water temperature based on the outdoor temperature and optionally the indoor air temperature. To prevent short cycling of the valve, the 352 uses a minimum time delay of 30 seconds. The *Heat Demand* light turns on when heat is required.

If the jumper beside the outdoor sensor terminal is cut, the control will ensure the injection device and system pump are turned on for at least 17 minutes every 7 days. This flushing function prevents bacteria growth in applications where a water heater is used for DHW and heating.

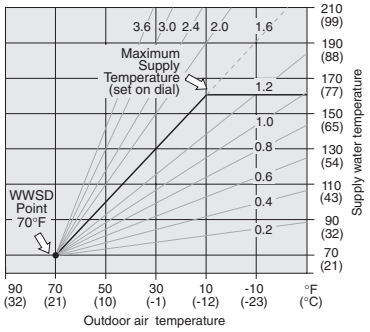


Boiler Control

During mixing operation the boiler can be enabled using the end switch of the zone valve. The boiler aquastat should be set at least 20°F (11°C) above the system design water temperature.

Maximum System Supply

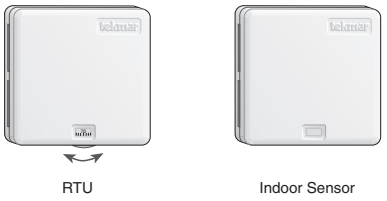
The 352 has a *Max. Supply* dial that can be used to set an upper limit to the system supply water temperature. If the system supply temperature approaches the *Max. Supply* dial setting, the 352 turns on the *Max. Supply* light and closes the injection valve.



ZONING OPERATION

Single Zone with Indoor Temperature Feedback

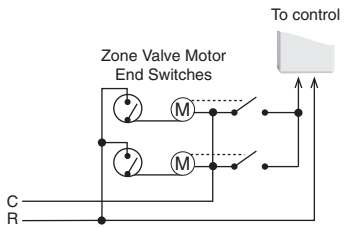
The 352 can directly control the space temperature of one heating zone. In order to measure the indoor temperature and provide indoor temperature feedback, the control requires either a Room Temperature Unit (RTU) 054 or an Indoor Sensor 076. With an RTU, the desired indoor temperature is set using the RTU dial; with an Indoor Sensor, the desired zone temperature is fixed at 70°F (21°C).



RTU Indoor Sensor

Multiple Zones with no Indoor Temperature Feedback

For systems where no indoor temperature feedback is provided, zone valve end switches may be used to power up the 352. Since no indoor temperature is available to the control, the 352 sets the starting point of the heating curve at 70°F (21°C).



UNOCCUPIED MODE (NIGHT SETBACK)

The 352 can be switched into UnOccupied mode by closing an external switch or a timer relay wired into the control. When the 352 is in UnOccupied mode and an RTU or Indoor Sensor is connected, the *UnOcc* light turns on and the desired temperature in the zone is set using the *UnOccupied* dial on the control. If no indoor temperature feedback is provided, the *UnOccupied* dial sets the heating curve starting point.

SYSTEM PUMP OPERATION

The *Pump* light turns on every time the system pump relay at the back of the control closes. The system pump turns on whenever the control is not in WWSD.

Pump Exercising

The system pump is exercised to help prevent corrosion from building up and subsequently jamming the equipment. Every three days the 352 runs the pump for at least 10 seconds.

Installation

Caution

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury. 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.

STEP ONE GETTING READY

Check the contents of this package. If any of the contents listed are missing or damaged, please contact your wholesaler or tekmar sales representative for assistance.

Type 352 includes:
- One Control 352
- One Outdoor Sensor 070
- One Universal Sensor 071
- Data Brochures D 352, D 070, D 001
- Application Brochures A 352

Other information available:
- Essays

Note *Carefully read the details of the Sequence of Operation section in this brochure to ensure that you have chosen the proper control for your application.*

STEP TWO MOUNTING

Install a 2" x 4" duplex electrical box in accordance with the instructions in the Data Brochure D 001. Determine whether the low voltage wiring enters the wiring chamber through the back or the bottom of the control. Ensure the depth of the electrical box is enough to house all the wiring that will be in it.

STEP THREE ROUGH-IN WIRING

The system pump wiring terminates in the electrical box. All other electrical wiring terminates in the two wiring chambers on the control. The wiring is roughed-in to the electrical box prior to installation of the control (See Brochure D 001). Standard 18 AWG solid wire is recommended for all low voltage wiring.

Power must not be applied to any of the wires during the rough-in wiring stage.

- Install the system pump and run the wiring to the electrical box.
- Install the Outdoor Sensor 070 and the Supply Sensor 071 according to the instructions in the Data Brochure D 070 and run the wiring back to the control mounting location. If indoor temperature feedback is desired, install the RTU 054 or Indoor Sensor 076 according to the installation instructions provided in the Data Brochure D 054 or D 070 and run the wiring back to the control mounting location.
- Run the wiring from the other system components (boiler, injection valve, etc.) to the control mounting location.

- Run the wires from the 24 V (ac) power source or heat demand to the control mounting location. *Use a clean power source to ensure proper operation.*
- If a tekmar Timer 031 is used, follow the installation procedure provided in the Data Brochure D 031 and run the wiring back to the control mounting location.

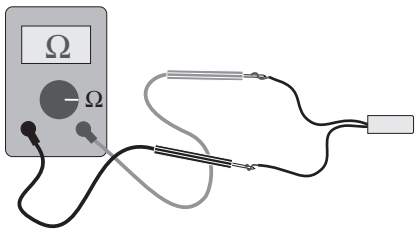
STEP FOUR — TESTING THE WIRING

No wires should be connected to the control during testing.

A good quality electrical test meter, capable of reading from at least 0 — 200 V (ac) and at least 0 — 2,000,000 Ohms, is essential to properly test the wiring and sensors.

Test the Sensors

Test the sensors and RTU according to the testing procedure in Data Brochures D 070 and D 054.



Test the Power Supply

Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces. Turn on the power and measure the voltage across the 24 V (ac) power supply. The voltmeter should read between 22 and 26 Volts.

Test the Outputs

- Short the system pump wires and power up the pump circuit; the system pump should turn on. Remove the power from the system pump circuit.
- If the control is in *Boiler* mode, short the boiler wires and power up the boiler circuit; the boiler should fire. Remove the power from the boiler circuit.
- If the control is in *Injection* mode, short the valve wires and power up the valve circuit; the valve should open. Remove the power from the valve circuit and the valve should close.

STEP FIVE — ELECTRICAL CONNECTIONS TO THE CONTROL

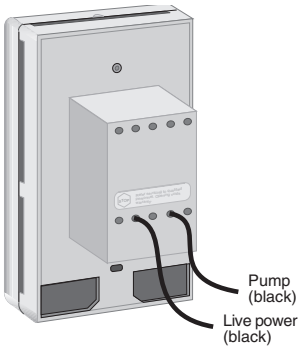
The installer should confirm that no voltage is present at any of the wires.

Output Connections

System Pump

Connect one of the wires from the system pump to one of the wires from the back of the control. Connect the second wire from the back to the live (L) side of the 120 V (ac) power source. The other wire on the system pump must be connected to the neutral (N) side of the 120 V (ac) power supply. Refer to application brochures A 352.

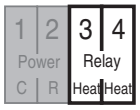
Insert the low voltage wiring into the wiring chambers on the control and mount the 352 on the electrical box.



Heat Relay

If the DIP switch is set to *Boiler*, connect the 120 V (ac) or 24 V (ac) boiler circuit directly to the *Heat* relay (3 and 4) terminals.

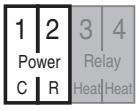
If an injection valve or pump is used, connect one of the wires from the valve or pump to the *Heat* relay (4) terminal and the other wire to the common or neutral side (C for 24 V (ac) or N for 120 V (ac)) of the power supply. Connect the *Heat Relay* (3) terminal to the live (R for 24 V (ac) or L for 120 V (ac)) side of the power supply.



Powered Input Connections

24 V (ac) Power

Connect the 24 V (ac) power supply to terminals *Power C— R* (1 and 2) on the control.

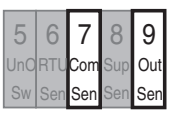


Sensor and Unpowered Input Connections

Do not apply power to these terminals as this will damage the control.

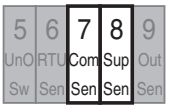
Outdoor Sensor

Connect the two wires from the Outdoor Sensor 070 to the terminals *Com Sen — Out Sen* (7 and 9). The Outdoor Sensor measures the outdoor air temperature.



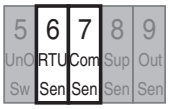
Supply Sensor

Connect the two wires from the Supply Sensor 071 to the terminals *Com Sen — Sup Sen* (7 and 8). The Supply Sensor measures the supply water temperature to the system.



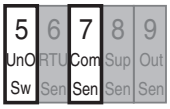
Room Temperature Unit (RTU) and Indoor Sensor

Connect the two wires from either the RTU 054 or the Indoor Sensor 076 to the *RTU Sen — Com Sen* (6 and 7) terminals. The RTU or Indoor Sensor provides indoor temperature feedback.



Unoccupied Switch

If an external timer or switch is used, connect the two wires from the external dry contact switch to the *UnO Sw — Com Sen* (5 and 7) terminals. When these terminals short together, the control registers an UnOccupied signal. For more information on the tekmar Timer 031 consult its Data Brochure D 031.



Settings

Before adjusting the dial settings, read through the sequence of operation to ensure that you understand how the control operates.

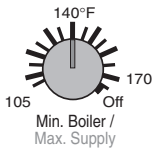
STEP SIX — ESSENTIAL CONTROL SETTINGS

Minimum Boiler Supply

Most boilers require a minimum operating temperature to prevent corrosion from flue gas condensation. If the 352 is in *Boiler* mode, the *Min. Boiler* Supply dial should be set to the lowest supply water temperature at which the boiler can operate without causing the boiler flue gases to condense. Consult the boiler manufacturer for recommended minimum boiler supply temperatures. Some typical settings are given below. If a condensing or electric boiler is used, the *Min. Boiler* Supply dial should be set to *Off*.

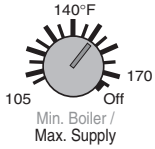
Typical settings:

- Steel fire tube boilers .....140 to 160°F (60 to 71°C)
- Cast iron boilers .....135 to 160°F (57 to 71°C)
- Copper tube boilers .....135 to 150°F (57 to 66°C)



Maximum System Supply

If the 352 is used in *Injection* mode, the 352 helps prevent the mixed supply water temperature from rising above the *Max. Supply* dial setting. The *Max. Supply* dial should be set to the maximum temperature allowed in the system loop. There are many factors which may limit the allowable supply temperature in a radiant floor heating system. A few of these are provided below.



- Some tubing manufacturers recommend that their products not be maintained at temperatures exceeding 140°F (60°C). Consult the tubing manufacturer for specific details.
- No where in the concrete should the temperature be maintained above 170°F (77°C).
- The surface temperature of a radiant floor heating slab should normally not exceed 85°F (29°C). The slab surface temperature is affected by the slab thermal resistance, the heating load, and the supply water temperature to the slab.

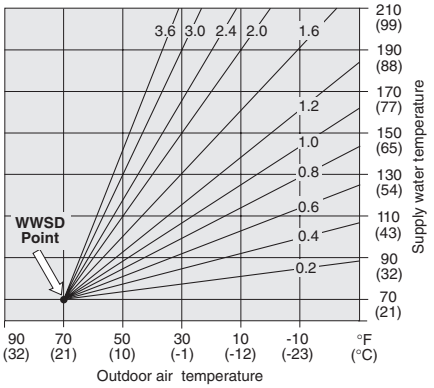
Heating Curve

The Heating Curve setting determines the number of degrees the supply water temperature is raised for every one degree drop in outdoor temperature. The *Heating Curve* dial position can be calculated from the following formula.

$$\text{Heating Curve} = \frac{\text{design supply temperature} - \text{desired room temperature}}{\text{desired room temperature} - \text{design outdoor temperature}}$$

Example: A system is designed to supply 120°F water when the outdoor temperature is 10°F. The desired room temperature is 70°F.

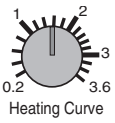
$$\text{Heating Curve} = \frac{120\,°F - 70°F\ (49°C - 21°C)}{70°F - 10°F\ (21°C - (-12°C))} = \frac{50°F\ (28°C)}{60°F\ (33°C)} = 0.8$$



If the design supply water temperature is unknown, the *Heating Curve* dial can be set to a trial value using the typical design supply temperatures given below.

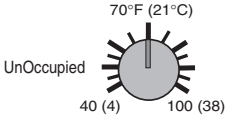
Typical design supply temperatures:

- Hydronic radiant floors ... 100 to 130°F (38 to 54°C)
- Baseboard convectors ... 160 to 190°F (71 to 88°C)
- Fan coils ..... 180 to 210°F (82 to 99°C)



Unoccupied Temperature

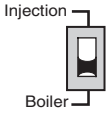
The *UnOccupied* dial sets the desired indoor temperature during UnOccupied (Night Setback) mode. If no indoor temperature feedback is used, the dial determines the heating curve starting point during the UnOccupied period.



DIP Switch Setting

Boiler — Injection

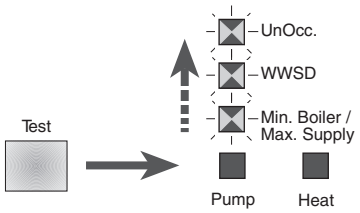
If boiler operation is required, the DIP switch must be set to *Boiler*. If mixing operation is required, the DIP switch must be set to *Injection*.



Testing the Control

STEP SEVEN — OPERATIONAL TEST OF CONTROL FUNCTIONS

The main control functions on the 352 can be tested by pressing and holding the *Test* button. While the *Test* button is pressed, the system pump and the *Heat* relay turn on. Once the *Test* button is released the output relays return to normal operation. If an RTU is connected to the control and the *Test* button is pressed the *UnOcc.*, *WWSD*, and the *Min. Boiler / Max. Supply* lights will cycle on and off in an upward direction.



Indicator Lights "On"

Power	• 24 V (ac) power is applied to the control and the control is energized.
Heat Demand	• Heat is required in the system.
UnOcc.	• The control is in UnOccupied (Night Setback) mode.
WWSD	• Heat is not required in the heating system.
Min. Boiler / Max. Supply	• The supply water temperature is approaching the *Min. Boiler* dial setting. • The system supply water temperature is approaching the *Max. Supply* dial setting.
Pump	• The system pump is on.
Heat	• The relay contacts between *Heat — Heat* (3 and 4) are closed.

STEP EIGHT — TROUBLESHOOTING

As in any troubleshooting procedure, it is important to isolate a problem as much as possible before proceeding. The Error Messages and *Test* button greatly simplify troubleshooting of the 352. When the control is flashing an error message, identify the fault from the look-up table below and follow standard testing procedures to confirm the problem. If you suspect a wiring fault, return to steps three, four and five and carefully check all external wiring and wiring connections.

Sensor and Internal Faults

- If an outdoor sensor fault occurs, the 352 will assume a fixed outdoor temperature of 32°F (0°C), and will supply the appropriate supply water temperature. An error message is displayed.
- If the RTU or Indoor Sensor short circuits, the 352 displays an error message and operates as if no RTU or Indoor Sensor is connected.
- If a supply sensor fault occurs, the 352 displays an error message and turns the system pump and the *Heat* relay off.
- If an internal control fault occurs, the 352 displays an error message. Press the *Test* button to clear the error message. If the error message remains, the control must be returned for repair.

Adjustment of Settings

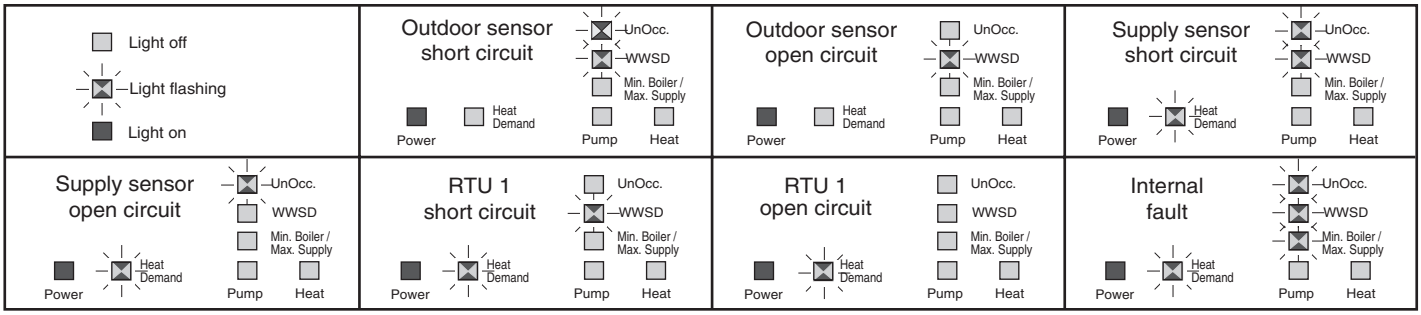
- If the outdoor temperature is cold and the rooms are cold, increase the *Heating Curve* dial setting by 0.1 per day.

STEP NINE — BEFORE YOU LEAVE

- Install the wiring cover over the wiring chamber and secure it with the screw provided.
- Place the front cover on the control to cover the setting dials and snap it into place.
- Place this brochure, and all other brochures relating to the installation, in the protective plastic bag supplied with the control.
- Place the bag in a conspicuous location near the control for future reference.
- It is important to explain the operation of this control within the system to the end user, and to anyone else who may be operating the system.

Error Messages

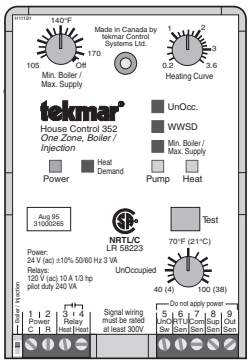
Whenever a fault is detected in any of the sensors, the indicator lights will flash in specific ways to indicate the location of the problem. For detailed Sensor and RTU testing instructions see Data Brochures D 070 and D 054.



Technical Data

House Control 352 *One Zone, Boiler / Injection*

Literature	—	D 352, A 352's, D 001, D 070.
Control	—	Microprocessor PID control; This is **not a safety (limit) control**.
Packaged weight	—	1.0 lb. (450 g), Enclosure D, white PVC plastic
Dimensions	—	4-3/4" H x 2-7/8" W x 1-7/8" D (120 x 74 x 48 mm)
Approvals	—	CSA NRTL / C, meets ICES & FCC regulations for EMI/RFI.
Ambient conditions	—	Indoor use only, 32 to 122°F (0 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
Sensors included	—	NTC thermistor, 10 kΩ @77°F (25°C ±0.2°C) ß=3892 Outdoor Sensor 070 and Universal Sensor 071
Optional devices	—	tekmar type #: 031, 054, 055.
UnOccupied	—	40 to 100°F (4 to 38°C)
Heating Curve	—	0.2 to 3.6
Min. Boiler / Max. Supply	—	105 to 170°F, Off (40 to 77°C, Off)



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 can be determined by turning the control off and on, the user is encouraged to try to correct the interference by reorienting 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 Control Systems Ltd. and tekmar Control Systems, Inc. ("tekmar") under this warranty is limited. The purchaser, by taking receipt of the tekmar product ("product"), acknowledges receipt of the terms of the warranty and acknowledges that it has read and understands same.

tekmar warrants each tekmar product against defects in workmanship and materials, if the product is installed and used in compliance with tekmar's instructions. The 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 this 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 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.

This warranty applies only to those products returned to tekmar during the warranty period. This 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. Returned products that are not defective are not covered by this warranty.

This warranty does not apply if the 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 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 (being the law of British Columbia) allows parties to contractually exclude, including, without limitation, warranties of merchantability, 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 Return Procedure 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 for that territory. If the address of the representative is not known, please request it from tekmar at the telephone number listed below**.**

tekmar® Control Systems

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