tekmar® - Data Brochure

Boiler Control 262

D 262

12/08

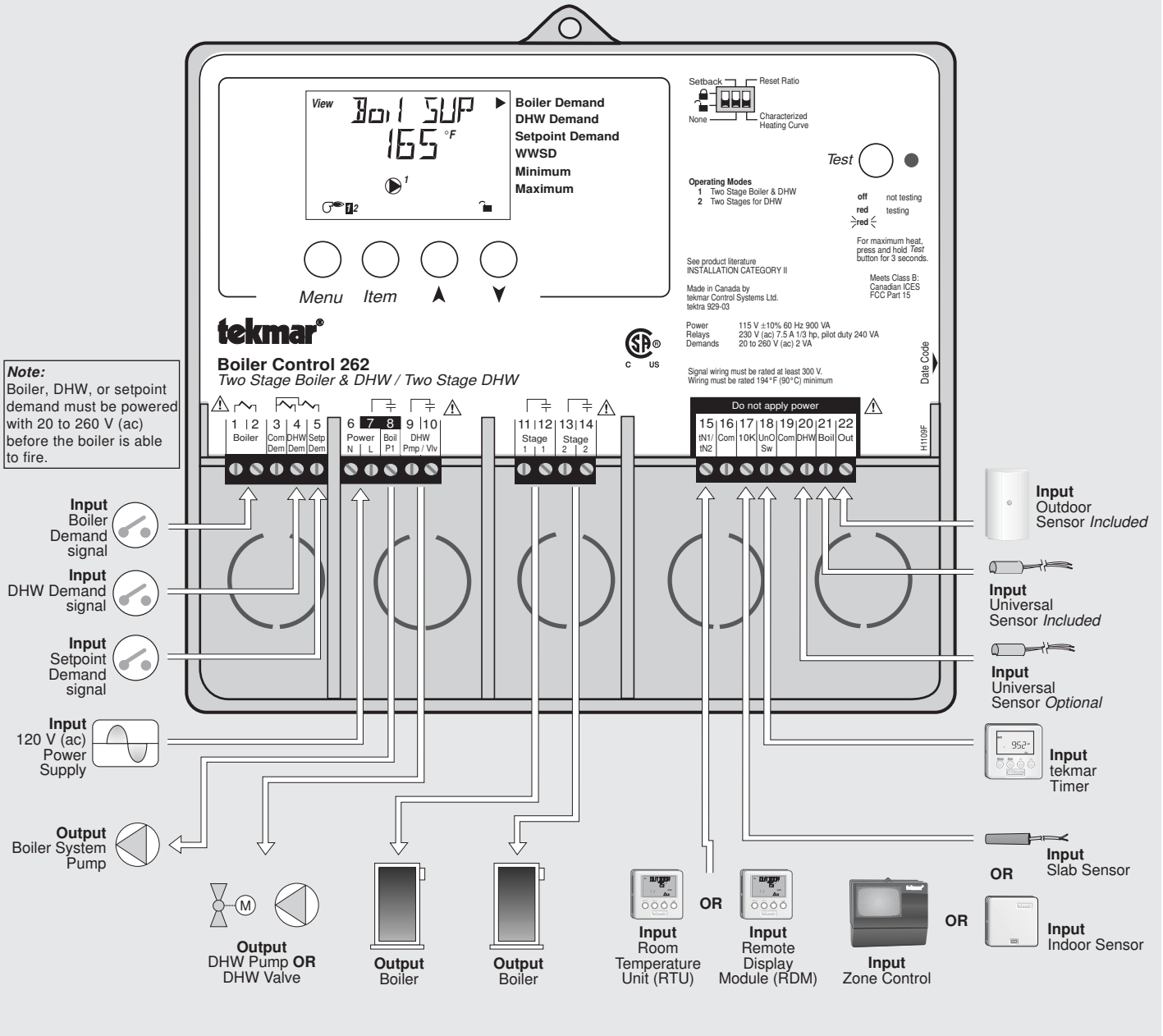
The Boiler Control 262 is a micro processor based control designed to maximize the comfort and efficiency of a hydronic heating system. The control is designed to operate in two distinct modes.

MODE —1— (Two Stage Boiler & DHW) allows for the control of two separate on /off boiler stages (or one low / high fire) based on outdoor air temperature, control for indirect Domestic Hot Water (DHW) generation and a Setpoint load. For single zone temperature control with indoor temperature feedback, a Room Temperature Unit (RTU) or indoor sensor may be connected to the 262. Multiple zone temperature control is achieved by using either a conventional thermostat system or by connecting a tekmar Zone Control to the 262.

MODE —2— is designed specifically for dedicated DHW applications. In Mode 2, the 262 can stage and rotate two on / off boiler stages (or one low / high fire) in order to provide heat to a DHW storage system.

The 262 control includes a large Liquid Crystal Display (LCD) in order to view system status and operating information. The same LCD is used when setting up and installing the control. Standard features include Equal Run Time Rotation, intelligent boiler operation, digital temperature readouts, and pump exercising. With the addition of a monitoring feature, it is now possible to track pump and boiler running hours, DHW tank temperature, outdoor and system high and low temperatures, boiler firing cycles, plus many other useful items.

Several energy saving features have been incorporated into the 262 such as Warm Weather Shut Down (WWSD), DHW post purge, system setback, DHW priority and an automatic differential for boiler operation.



How To Use The Data Brochure

This brochure is organized into four main sections. They are: 1) Sequence *of Operation*, 2) *Installation*, 3) *Control Settings*, and 4) *Troubleshooting*. The *Sequence of Operation* section has four sub sections. We recommend reading *Section A: General* of the *Sequence of Operation*, as this contains important information on the overall operation of the control. Then refer to the sub sections that apply to your installation.

The *Control Settings* section of this brochure illustrates the menu screens that are built into the control. These menu settings are referenced to the specific section in the *Sequence of Operation*.

Table of Contents

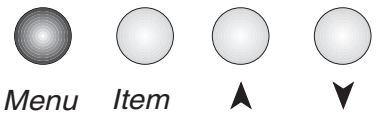
Reference Material: Essay E 003: Characterized Heating Curve and Reset Ratio

User Interface

The 262 uses a Liquid Crystal Display (LCD) as the method of supplying information. You use the LCD in order to setup and monitor the operation of your system. The 262 uses four push buttons (Menu, Item, ▲, ▼) for selecting and adjusting settings. As you program your control, record your settings in the actual settings column of the Adjust Menu. The table is found in the second half of this brochure.

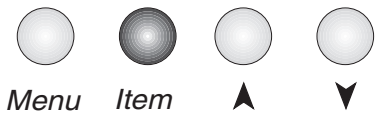
Menu

All of the items displayed by the control are organized into various menus. These menus are listed on the left hand side of the display (Menu Field). To select a menu, use the ***Menu*** button. By pressing and releasing the ***Menu*** button, the display will advance to the next available menu. Once a menu is selected, there will be a group of items that can be viewed within that menu.



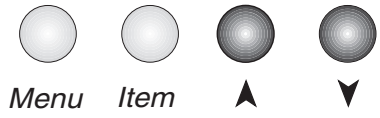
Item

The abbreviated name of the selected item will be displayed in the item field of the display. To view the next available item, press and release the ***Item*** button. Once you have reached the last available item in a menu, pressing and releasing the ***Item*** button will return the display to the first item in the selected menu.



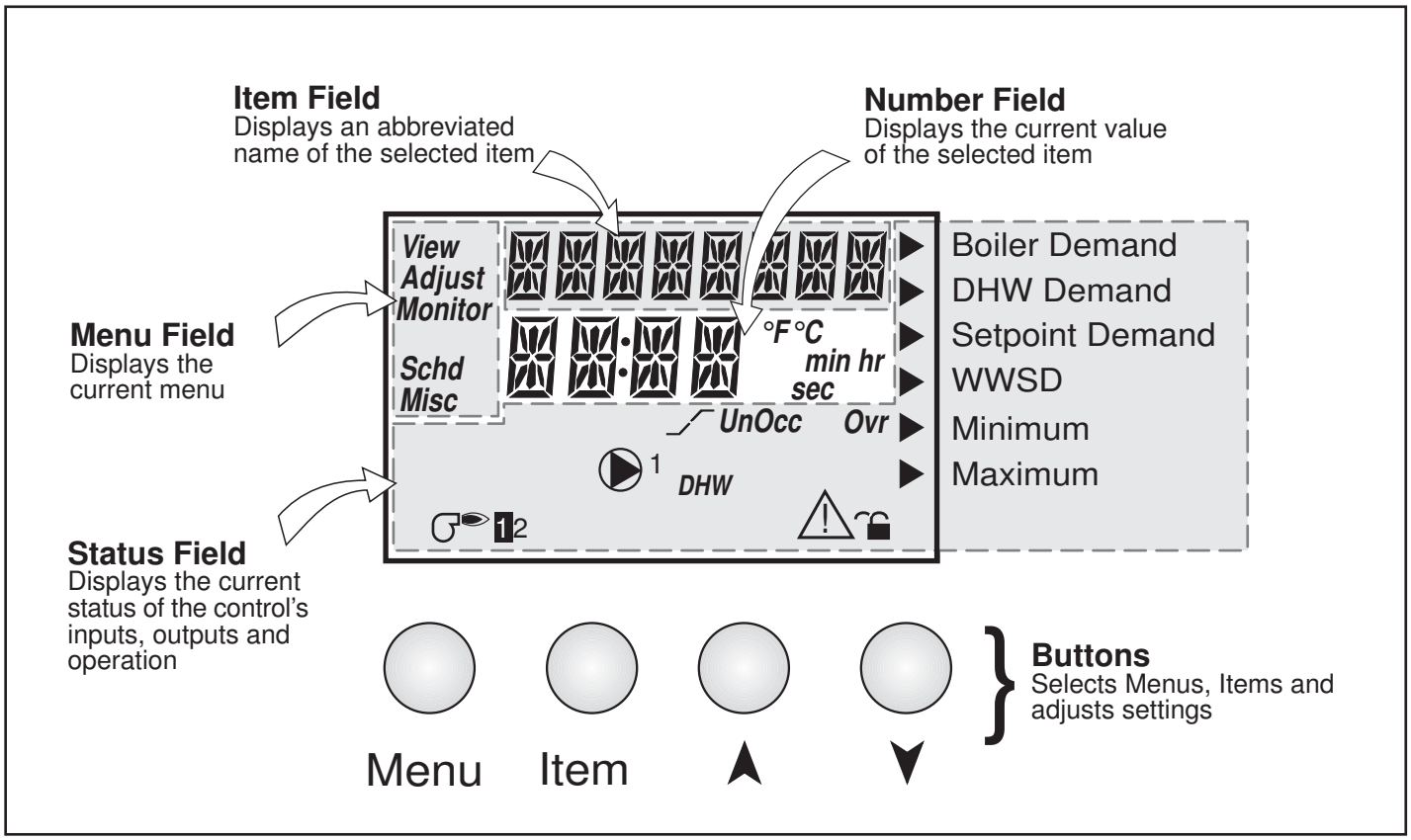
Adjust

To make an adjustment to a setting in the control, begin by selecting the appropriate menu using the ***Menu*** button. Then select the desired item using the ***Item*** button. Finally, use the ▲ and / or ▼ button to make the adjustment.



Additional information can be gained by observing the Status field of the LCD. The status field will indicate which of the control's outputs are currently active. Most symbols in the status field are only visible when the View Menu is selected.

Display



Symbol Description

1 2	**Burner** Displays when the stage 1 and / or stage 2 relay is turned on.	*Ovr*	**Override** Displays when the control is in override mode.
1	**Pump** Displays when the boiler pump is operating.	⚠	**Warning** Displays when an error exists or when a limit has been reached.
DHW	**DHW Pump** Displays when the DHW pump is on.		**Lock - Unlock** Displays whether the access levels are locked or unlocked.
	Boost Displays when the control is in boost after setback.	*°F, °C, sec, min, hr*	**°F, °C, sec, min, hr** Units of measurement.
UnOcc	**UnOccupied Schedule** Displays when the control is in unoccupied mode.	▶	**Pointer** Displays the control operation as indicated by the text.
Occ	**Occupied Schedule** Displays when the control is in occupied mode.		

Section A —General Operation

POWERING UP THE CONTROL

When the Boiler Control 262 is powered up, the control displays the control type number in the LCD for 2 seconds. Next, the software version is displayed for 2 seconds. Finally, the control enters into the normal operating mode and the LCD defaults to displaying the current outdoor air temperature.

MODES OF OPERATION (MODE)

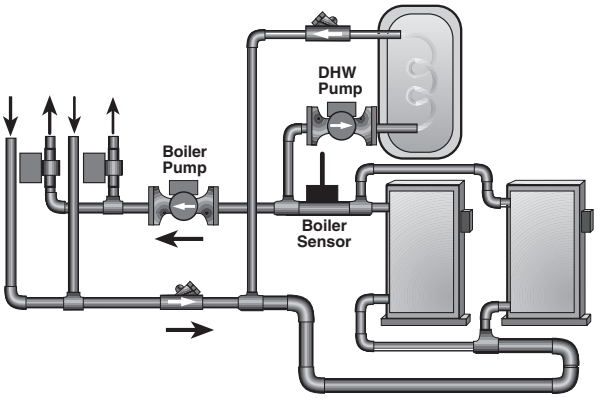
The Boiler Control 262 has two operating modes. The mode of operation for which the control is to operate is selected in the *Adjust Menu*.

Mode 1 (MODE = —1—)

Mode 1 is designed for one or two stages of Heating, Domestic Hot Water (DHW), and Setpoint operation.

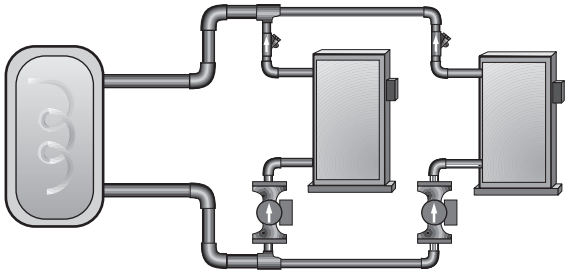
Mode 2 (MODE = —2—)

Mode 2 is designed for dedicated DHW operation. In this mode, the 262 controls one or two stages of heat for DHW generation (see Section C3 Dedicated DHW).



STAGING

The 262 controls up to two stages in order to supply the required target temperature. After each stage is turned on in the firing sequence, the control waits a minimum amount of time before turning on the next stage. The minimum time between stages is the total of the fire delay (FIRE DLY) setting plus the minimum inter-stage delay selected by the boiler mass (Boil MASS) setting. After the minimum time delay between stages has expired, the 262 examines the control error to determine when the next stage is to fire. The control error is determined using Proportional, Integral, and Derivative (PID) logic.

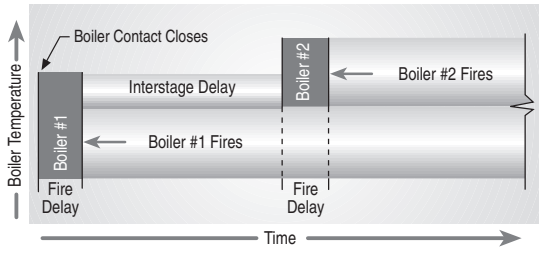


Proportional - compares the actual supply temperature to the boiler target (Boil TRG) temperature. The colder the supply water temperature, the sooner the next stage is turned on.

Integral - compares the actual supply temperature to the Boil TRG temperature over a period of time.

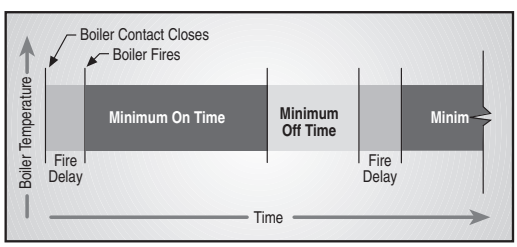
Derivative - determines how fast or slow the supply water temperature is changing. If the supply temperature is increasing slowly, the next stage is turned on sooner. If the supply temperature is increasing quickly, the next stage is turned on later, if at all.

Each stage has a minimum on time and a minimum off time.



FIRE DELAY (FIRE DLY)

The Fire Delay is the delay time that may occur between the time that the 262 closes a stage contact and the burner fires for that stage. This delay is usually the result of burner pre-purge or other forms of time delay built into the burner's safety circuits.



BOILER MASS (Boil MASS)

The Boiler Mass setting allows the installer to adjust the control to the thermal mass of different types of heat sources used.

Light (LITE)

The LITE setting is selected if the boiler(s) that is used has a low thermal mass. This means that the boiler(s) has a very small water content and has very little metal in the heat exchanger. A boiler that has a low thermal mass comes up to temperature quite rapidly when fired. This is typical of many copper fin-tube boilers. The minimum inter-stage delay for the LITE setting is two minutes.

Medium (MED)

The Medium setting is selected if the boiler(s) that is used has a medium thermal mass. This means that the boiler(s) either has a large water content and a low metal content or a low water content and a high metal content. This is typical of many modern residential cast iron boilers or steel tube boilers. The minimum inter-stage delay for the MED setting is four minutes.

Heavy (HEVY)

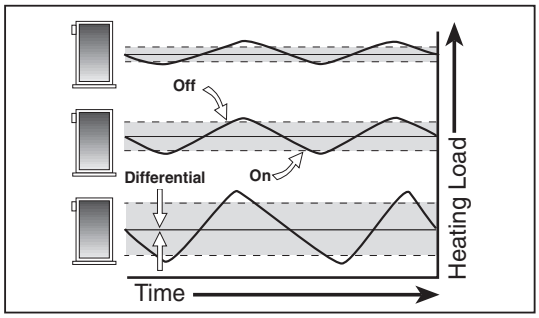
The Heavy setting is selected if the boiler(s) that is used has a high thermal mass. This means that the boiler(s) has both a large water content and a large metal content. A boiler that has a high thermal mass is relatively slow in coming up to temperature. This is typical of many commercial cast iron and steel tube boilers. The minimum inter-stage delay setting for the HEVY setting is six minutes.

BOILER DIFFERENTIAL (BOIL DIFF)

An on / off heat source must be operated with a differential in order to prevent short cycling. With the 262, either a fixed or an auto differential maybe selected.

Fixed Differential

The boiler differential is divided around the Boil TRG temperature. The first stage contact will close when the supply water temperature is 1/2 of the differential setting below the Boil TRG temperature, and will open when the supply water temperature is 1/2 of the differential setting above the Boil TRG temperature. The second stage operates if the first stage cannot bring the water temperature up to the Boil TRG temperature.

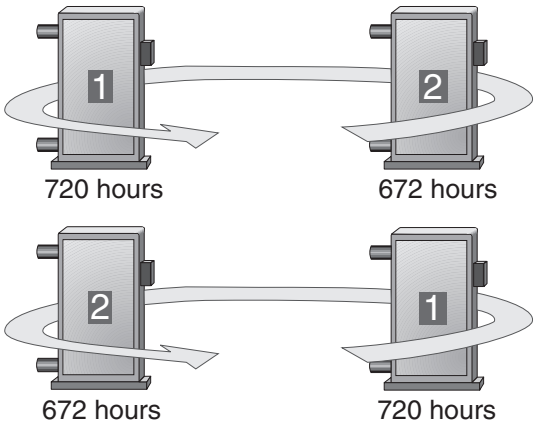


Auto Differential (AUTO)

If the Auto Differential is selected, the 262 automatically determines the best differential as the load changes. This reduces potential short cycling during light loads.

STAGE 1&2 (STAGE)

The stage 1 and 2 setting may be selected to AUTO or OFF. When AUTO is selected, the stage is activated and the control operates the appropriate boiler. When OFF is selected, the control does not fire the stage.

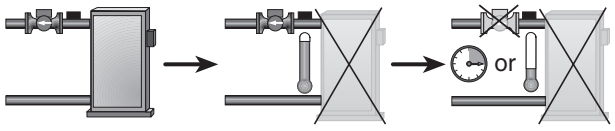


ROTATION (ROTATE)

The ROTATE item is an adjustable setting that is factory set at 48 hours. The firing order of the boilers changes whenever one stage's accumulated running time exceeds the other stage's accumulated running time by more than the ROTATE setting. After each rotation, the stage with the least running hours is the first to fire and the stage with the most running hours is the last to fire. This function ensures that both stages receive equal amounts of use. When this item is set to the OFF setting, Stage 1 is always the first stage to fire.

BOILER PURGE (PURGE)

After the boiler demand is satisfied, the 262 continues to operate the boiler pump (*Boil P1*, terminal 8) for a period of time. The length of time that the boiler pump continues to run is adjustable (PURGE). This setting allows purging of any excess heat out of the boiler after the burner is shut off. This also helps to prevent the water in the boiler from flashing into steam after the boiler is shut off. The boiler pump continues to run either until the purging time has elapsed or the boiler supply (Boil SUP) temperature drops more than a differential below the boiler minimum (Boil MIN) setting.



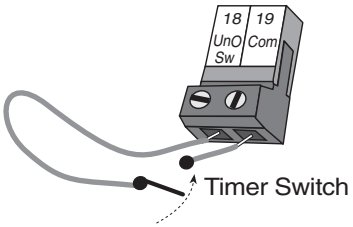
SETBACK (UNOCCUPIED)

To provide greater energy savings, the 262 has setback capability. With setback, the supply water temperature in the system is reduced when the building is not used (AWAY) or when the building is UnOccupied. By reducing water temperature, air temperature in the space can be reduced even when thermostat(s) are not turned down. This feature is enabled by setting the *Setback / None DIP* switch to the *Setback* position, and providing either an external signal or an internal override.

Note: AWAY does not require the DIP switch = Setback.

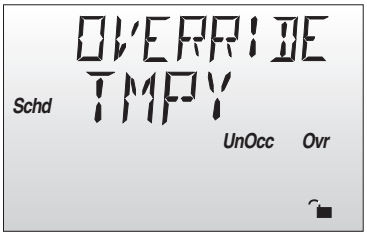
External Unoccupied

An external signal can place the 262 into an UnOccupied mode. Any time the *UnO Sw* (18) and the *Com Sen* (19) terminals are shorted together, the control operates in the UnOccupied mode. When in the UnOccupied mode, the *UnOcc* segment is displayed in the LCD. The 262 adjusts the supply water temperature based on the *UnOcc* setting made in the control.



Internal Overrides (OVERRIDE)

The 262 has a number of setback overrides that are selected through the *Schedule (Schd) Menu*. These setback overrides have priority over any external setback signal. Any time an override is in effect, the *Ovr* segment is displayed in the LCD.



Temporary (TMPY)

If a temporary OVERRIDE is selected, the 262 operates in the selected override mode for 3 hours. Once over, the control reverts to the previous operation.

Permanent (PERM)

If a permanent OVERRIDE is selected, the 262 operates in the selected override mode until a new OVERRIDE is selected.

Away (AWAY)

If the AWAY override is selected, the 262 operates with a fixed WWSD of 62˚F (17˚C) and a fixed room temperature of 62˚F (17˚C). Any DHW demand is ignored. The setpoint operation is not affected by the AWAY override.

EXERCISING (EXERCISE)

The 262 has a built in pump exercising function. The exercising period setting is adjustable and is factory set at 70 hours. If a pump output on the control has not been operated at least once during every exercising period, the control turns on the output for 10 seconds. This minimizes the possibility of the pump seizing during a long period of inactivity.

Note: The exercising function does not work if power to the control or pump(s) is disconnected.

Section B —Boiler Reset (Mode = —1—)

Section B1
General Boiler Operation

Section B2
Alternate Boiler Demands

Section B1 —General Boiler Operation

BOILER DEMAND

A boiler demand is generated by applying a voltage between 24 and 240 V (ac) across the *Boil Dem* (1&2) terminals. Once voltage is applied, the *Boiler Demand* pointer is displayed in the LCD. If the 262 is not in WWSD, it closes the *Boil P1* contact, which starts the boiler pump and the control turns on the boiler pump segment in the LCD. The 262 calculates a Boil TRG supply temperature based on the outdoor air temperature and settings. The 262 then fires the boiler(s), if required, to maintain the target supply temperature.

CHARACTERIZED HEATING CURVE OR RESET RATIO

The 262 has two methods of varying the supply water temperature based on the outdoor air temperature. The installer can select either a *Characterized Heating Curve* or a *Reset Ratio*.

Characterized Heating Curve

The *Characterized Heating Curve* is the most accurate method of controlling the supply water temperature based on outdoor air temperature and optionally indoor temperature. The control takes into account the type of terminal unit that the system is using. Since different types of terminal units transfer heat to a space using different proportions of radiation, convection and conduction, the supply water temperature must be controlled differently. Once the control is told what type of terminal unit is used, the control varies the supply water temperature according to the type of terminal unit. This improves the control of the air temperature in the building.

Reset Ratio

The *Reset Ratio* method of controlling the supply water temperature is based solely on the outdoor air temperature. This method does not take into account the type of terminal unit that the heating system is using and therefore is not as accurate as a *Characterized Heating Curve*.

BOILER START (Boil STRT) *(RESETRATIO)*

The Boil STRT temperature is the boiler supply water temperature that the heating system requires when the outdoor air temperature equals the OUT STRT air temperature setting.

OUTDOOR START (OUT STRT) *(RESET RATIO)*

The OUT STRT temperature is the outdoor air temperature at which the control provides the Boil STRT supply water temperature to the system.

OUTDOOR DESIGN (OUT DSGN)

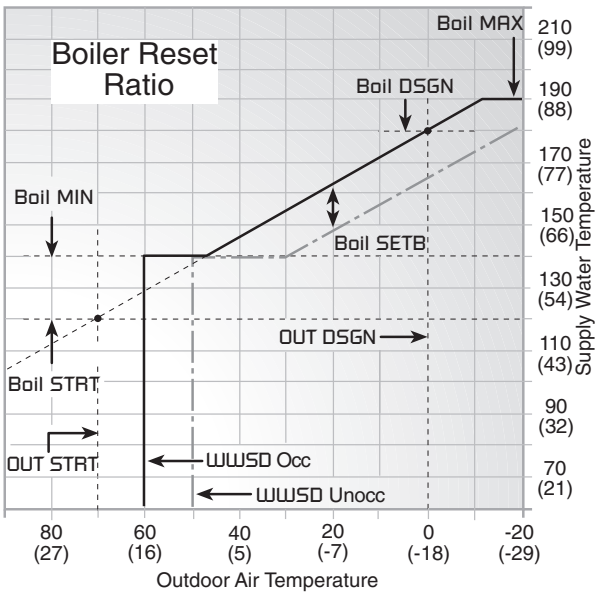
(RESET RATIO & CHARACTERIZED HEATING CURVE)

The OUT DSGN is the outdoor air temperature that is the typical coldest temperature of the year where the building is located. This temperature is used when doing heat loss calculations for the building.

BOILER DESIGN (Boil DSGN)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

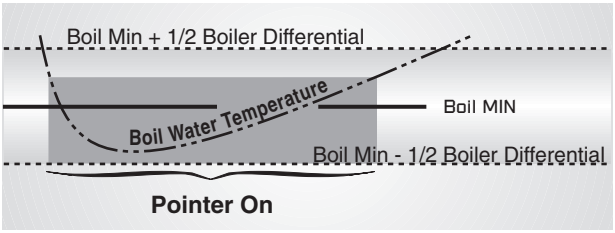
The Boil DSGN temperature is the supply water temperature required to heat the boiler zones when the outdoor air is as cold as the OUT DSGN temperature.



BOILER MINIMUM (Boil MIN)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

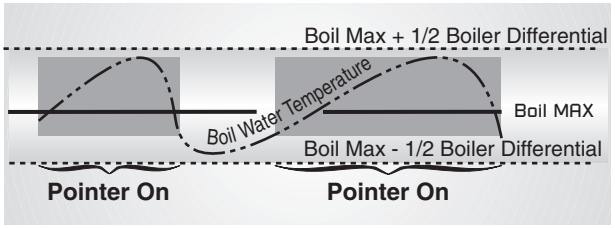
The Boil MIN is the lowest water temperature that the control is allowed to use as a Boil TRG temperature. During mild conditions, if the 262 calculates a Boil TRG temperature that is below the Boil MIN setting, the Boil TRG temperature is adjusted to at least the Boil MIN setting. During this condition, if the boiler is operating, the *Minimum* pointer turns on in the LCD while the Boil TRG or the Boil SUP temperature is viewed. If the installed boiler(s) is designed for condensing operation, set the Boil MIN adjustment to OFF.



BOILER MAXIMUM (Boil MAX)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

The Boil MAX is the highest water temperature that the control is allowed to use as a Boil TRG temperature. If the control does target Boil MAX, and the Boil SUP temperature is near the Boil MAX temperature, the *Maximum* pointer turns on in the LCD while the Boil TRG or the Boil SUP temperature is viewed. At no time does the control operate the boiler(s) above 248˚F (120˚C).



WARM WEATHER SHUT DOWN (WWSD) OCC & UNOCC

(RESET RATIO & CHARACTERIZED HEATING CURVE)

When the outdoor air temperature rises above the WWSD setting, the 262 turns on the *WWSD* pointer in the display. When the control is in Warm Weather Shut Down, the *Boiler Demand* pointer is displayed if there is a demand. However, the control does not operate the heating system to satisfy this demand. The control does respond to either a *DHW Demand* or a *Setpoint Demand* and operates as described in Section C.

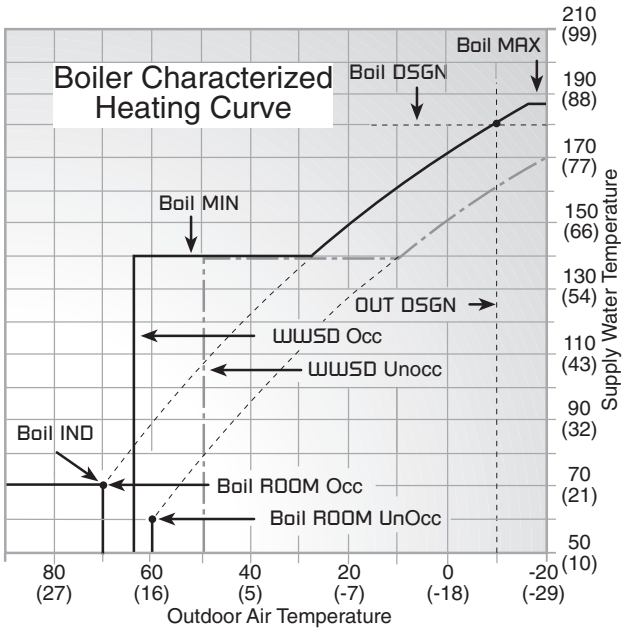
BOILER SETBACK (SETBACK) *(RESET RATIO)*

The boiler SETBACK is the amount that the boiler supply water temperature is reduced when the 262 is placed into an *UnOccupied* mode, using an internal or an external setback as described in Section A. This setting is only available if the *Reset Ratio* DIP switch is selected and *Setback / None* DIP switch is set to *Setback*.

BOILER INDOOR (Boil INDR)

(CHARACTERIZED HEATING CURVE)

The Boil INDR is the room temperature used in the heat loss calculations done for the building. This setting establishes the beginning of the *Characterized Heating Curve* for the boiler zones. This single setting replaces the Boil STRT water temperature and OUT STRT air temperature settings used by the *Reset Ratio*.



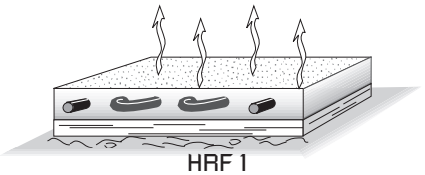
ROOM OCC & UNOCC (ROOM)

(CHARACTERIZED HEATING CURVE)

The ROOM is the desired room temperature for the boiler zone(s) and it provides a parallel shift of the *Characterized Heating Curve*. The room temperature desired by the occupants is often different from the designed indoor temperature (Boil INDR). If the room temperature is not correct, adjusting the ROOM setting increases or decreases the amount of heat available to the building. If the *Setback / None* DIP switch is set to *Setback*, a ROOM setting must be made for both the *Occupied* and *UnOccupied* modes.

TERMINAL UNITS (TERMINAL)

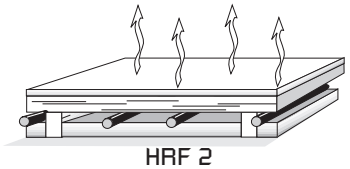
When using a *Characterized Heating Curve*, the control requires the selection of a terminal unit. The terminal unit determines the shape of the *Characterized Heating Curve* according to how the terminal unit delivers heat into the building space. The 262 provides for selection between six different terminal unit types: two types of hydronic radiant floor heat, fancoil, fin–tube convector, radiator, and baseboard.



HRF 1

Hydronic Radiant Floor (HRF 1)

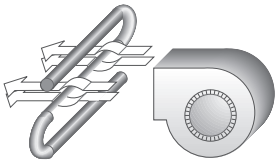
HRF 1 is a heavy, or high mass, hydronic radiant floor system. This type of a hydronic radiant floor is embedded in either a thick concrete or gypsum pour. This heating system has a large thermal mass and is slow acting.



HRF 2

Hydronic Radiant Floor (HRF 2)

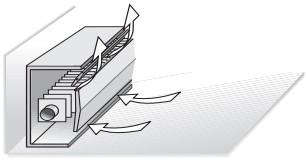
HRF 2 is a light, or low mass, hydronic radiant floor system. Most commonly, this type of radiant heating system is either attached to the bottom of a wood sub floor, suspended in the joist space, or sandwiched between the subfloor and the surface. This type of radiant system has a relatively low thermal mass and responds faster than a high mass system.



COIL

Fancoil (COIL)

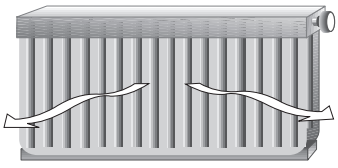
A fancoil terminal unit or air handling unit (AHU) consists of an hydronic heating coil and either a fan or blower. Air is forced across the coil at a constant velocity by the fan or blower and is then delivered into the building space.



CONV

Fin-tube Convector (CONV)

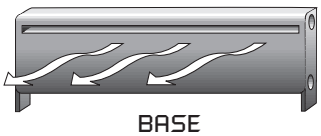
A convector terminal unit is made up of a heating element encased in fins. This type of terminal unit relies on the natural convection of air across the heating element to deliver heated air into the space. The amount of natural convection is dependant on the supply water temperature to the heating element and the room air temperature.



RAD

Radiator (RAD)

A radiator terminal unit has a large heated surface that is exposed to the room. A radiator provides heat to the room through radiant heat transfer and natural convection.



BASE

Baseboard (BASE)

A baseboard terminal unit is similar to a radiator, but has a low profile and is installed at the base of the wall. The amount of heat transferred by radiation from a baseboard is greater than that from a fin-tube convector.

BOILER TARGET TEMPERATURE (BOIL TRG)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

The Boil TRG temperature is determined from either the *Characterized Heating Curve* or the *Reset Ratio* settings and the outdoor air temperature and optionally indoor temperature feed back. The control displays the temperature that it is currently trying to maintain as the boiler supply temperature. If the control does not presently have a requirement for heat, it displays "- - -" in the LCD.

BOILER OPERATION

When the 262 determines that boiler operation is required, the *Boiler stage contact(s)* (11 and 12 and/or 13 and 14) close. While the Boiler contact(s) is closed, the burner and stage segment in the LCD is displayed.

BOILER PUMP (P1) OPERATION

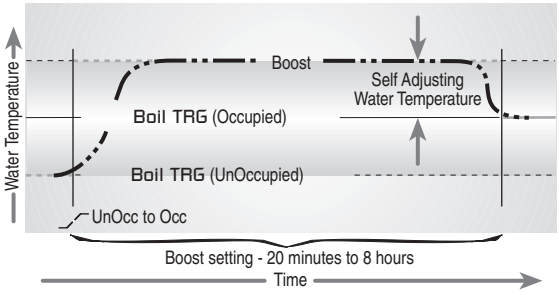
The *Boiler Pump* contact (P1, terminal 8) closes whenever there is a *Boiler demand* and the 262 is not in WWSD. If 10K = INDR or SLAB, the control receives a boiler demand and the Boil TRG temperature is below the Boil MIN setting, the boiler pump may continue to operate after the boiler demand is removed. For boiler pump contact operation during either DHW and / or Setpoint operation, refer to the DHW, and Setpoint Section D.

Soft Start (SOF STRT)

The SOF STRT function allows the 262 to slowly ramp the water temperature up to the required supply temperature. By allowing the temperature in the system to be adjusted slowly, the control reduces any thermal expansion noises and stresses that may be caused by a quick change in supply water temperature.

Boosting (BOOST)

When the control changes from the *UnOccupied* to the *Occupied* mode, it enters into a *Boosting* mode. In this mode, the supply water temperature to the system is raised above its normal values for a period of time to provide a faster recovery from the setback temperature of the building. The maximum length of the *Boost* is selected in the user interface. This setting is only available if a *Characterized Heating Curve* is selected; It is not available for a *Reset Ratio* or if a tekmar Zone Control is used.



Typical settings for the *Boost* function vary between 30 minutes and two hours for a building that has a fast responding heating system. For a building that has a slow responding heating system, a setting between four hours and eight hours is typical. After a *Boost* time is selected, the setback timer must be adjusted to come out of setback some time in advance of the desired *Occupied* time. This time in advance is normally the same as the *Boost* setting.

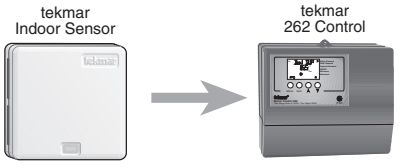
If the building is not up to temperature at the correct time, the *Boost* setting should be lengthened and the setback timer should be adjusted accordingly. If the building is up to temperature before the required time, the *Boost* setting should be shortened and the setback timer should be adjusted accordingly. If the system is operating near its design conditions or if the supply water temperatures are being limited by settings made in the control, the time required to bring the building up to temperature may be longer than expected.

Section B2 —Alternate Boiler Demands (Mode = —1—)

In addition to using conventional thermostats to provide a boiler demand as described in Section B1, the 262 can use a number of other methods to provide a *Boiler Demand*.

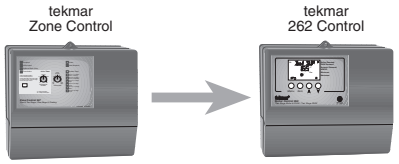
10K INDOOR SENSOR (10K = INDR)

Set the 10K item to INDR to add an indoor sensor for temperature control of a single zone boiler system. The indoor sensor is connected to the *Com* and *10K* terminals (16 and 17). In addition, power must be applied to the *Boiler Demand* terminals (1 and 2) as described in Section B1. With the indoor sensor connected, the 262 is able to sense the actual room temperature. With this information, the 262 provides a more constant water flow through the system. At the same time, indoor feedback fine tunes the supply water temperature in the system to prevent over heating or under heating. To adjust the room temperature for the zone, use the ROOM *Occupied* or *UnOccupied* setting in the Adjust menu at the control.



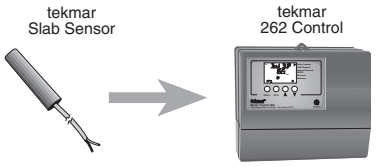
10K BOILER ZONE CONTROL (10K = ZoIn)

Set the 10K item to ZoIn to add indoor temperature feedback control of multiple zones. Control of the zones is provided by connecting a tekmar Zone Control to the *Com* and *10K* terminals (16 and 17) of the 262. The zone control provides its own internal *Boiler Demand* to the 262. In this case, there is no need to provide an external *Boiler Demand* as described earlier in Section B1. The zone control is capable of automatically adjusting the Boil TRG temperature to improve building occupant comfort and system performance.



10K SLAB SENSOR (10K = SLAB)

Set the 10K item to SLAB to add a slab sensor for temperature control of a single zone system. The 262 can use a slab sensor to control the actual slab temperature. A slab sensor is placed in the slab and connected to the *Com* and the *10K* terminals (16 and 17). Power must be applied to the *Boiler Demand* terminals (1 and 2) as described in Section B1. With the slab sensor connected, the 262 will limit the supply temperature in order to maintain the slab sensor between the SLAB MIN and SLAB MAX settings. This application is available only when Boil MIN is set to OFF.



Slab Min (SLAB MIN)

The SLAB MIN sets the minimum allowed core temperature of the slab as long as the control is not in a WWSD. Caution should be used when adjusting the SLAB MIN setting as this may lead to overheating of the zone during mild conditions. If the AWAY setting is selected in the *Schedule* menu, the 262 ignores the SLAB MIN setting.

Slab Max (SLAB MAX)

The SLAB MAX sets the maximum allowed core temperature of the slab. If the slab is to be maintained at a fixed core temperature, set SLAB MAX and SLAB MIN items to the same setting.

ROOM TEMPERATURE UNIT (RTU) (10K = NONE)

If the system consists of a single zone, temperature control of that zone can be provided by using an RTU. The RTU is connected to the *Com* and tekmar Net™ *tN1 / tN2* terminals (15 and 16). In addition, power must be applied to the *Boiler Demand* terminals (1 and

2) as described in Section B1. With the RTU connected, the 262 measures the actual ROOM temperature. Indoor temperature feedback fine tunes the supply water temperature in the system to prevent over heating or under heating. The RTU allows the user to adjust the desired room temperature at the RTU. Remote sensor capability is also available through an RTU. See the Data brochure for the RTU you are connecting.

Section C —Domestic Hot Water (DHW) and Setpoint (Mode = —1—)

Section C1
General Domestic Hot Water (DHW) Operation

Section C2
DHW Priority

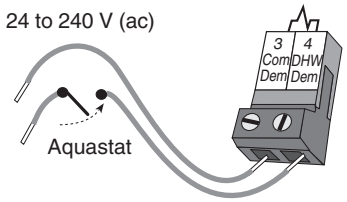
Section C3
DHW with Low Temperature Boilers

Section C4
Dedicated DHW

Section C1 —General Domestic Hot Water (DHW) Operation (Mode = —1—)

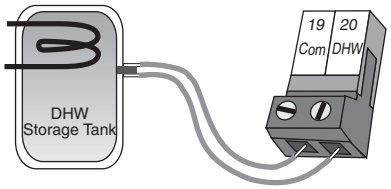
DHW DEMAND

A *DHW demand* is generated on the 262 by using one of two methods: either an external DHW demand from an aquastat or an internal demand from a 10K tekmar sensor. If an external and internal demand is present simultaneously, the control stops operation of the DHW.



External Demand (DHW SENS = NONE)

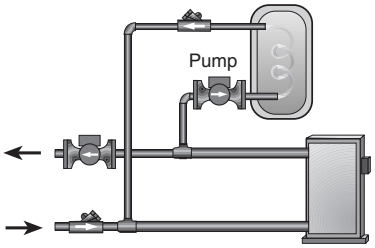
The 262 registers an external demand for DHW when a voltage between 24 and 240 V (ac) is applied across the *Com Dem* and the *DHW Dem* terminals (3 and 4). A DHW aquastat or setpoint control is used as a switch in the DHW demand circuit. Once the 262 detects a DHW demand, the *DHW Demand* pointer turns on in the LCD and the control operates as described below.



Internal Demand (DHW SENS = DHW)

The 262 registers an internal demand for DHW when a sensor is connected across the *Com* and the *DHW* terminals (19 and 20). The DHW TANK setting is used to set the desired indirect DHW tank temperature. When MODE –1– is selected, if the temperature at the DHW sensor drops 3˚F (1.5˚C) below the DHW TANK setting, the *DHW Demand* pointer turns on in the LCD and the control operates as described below.

An advantage to using the DHW sensor is that the control can display the current DHW TANK temperature and record the highest and lowest DHW TANK temperatures. Also, the 262 can control the DHW temperature with more accuracy than when using an aquastat.

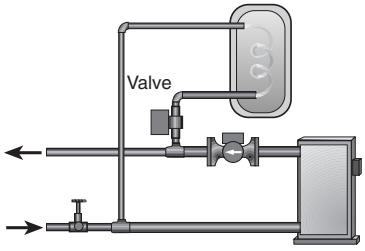


DHW DEVICE (DHW THRU)

Once the 262 receives a *DHW Demand*, the sequence of operation depends on the type of DHW device selected. The DHW device is selected using the DHW THRU item in the *Adjust* menu.

DHW Pump (DHW THRU = PUMP)

If PUMP is selected as the DHW device, the 262 assumes that the DHW pump provides adequate flow through both the DHW tank heat exchanger and the boiler(s). To provide heat to the DHW tank, the 262 closes the *DHW Pmp / Vlv* contact (9 and 10) and operates the boiler(s) to provide a sufficient boil supply temperature to the DHW tank. If using a primary loop with the DHW tank piped in primary / secondary, select DHW VALV.



DHW Valve (DHW THRU = VALV)

If VALV is selected as the DHW device and there is a *DHW Demand*, the 262 closes the *DHW Pmp / Vlv* contact (9 and 10) and the *Boil P1* contact (7 and 8). The boiler pump provides flow through the DHW tank's heat exchanger once the DHW valve is opened. The 262 operates the boiler(s) to provide a sufficient boiler supply temperature to the DHW tank.

BOILER TARGET DURING DHW GENERATION (Boil TRG)

The Boil TRG temperature during DHW operation depends on whether an external or internal demand is present. The DHW demand overrides the reset water temperature.

External Demand (DHW SENS = NONE)

If the control receives a *DHW demand* through an external device such as an aquastat, the Boil TRG temperature is at least as hot as the DHW heat exchanger setting (DHW XCHG).

Internal Demand (DHW SENS = DHW)

If the control receives a *DHW demand* from a DHW sensor attached to the *Com Sen* and the *DHW 10K* terminals (19 and 20), the Boil TRG temperature is at least as hot as the DHW TANK setting plus 40˚F (22˚C).

DHW DURING UNOCCUPIED

The DHW operation during an *UnOccupied* period depends on the type of *DHW demand* that the 262 is receiving and the type of setback that is being used. For this function to operate, the control must have the *Setback / None* DIP switch set to *Setback.*

External Demand (Aquastat)

If an external *DHW Demand* is used, the control can either continue operation of the DHW system as it would during the *Occupied* period or the control can ignore a call for DHW as long as the control is in an *UnOccupied* mode.

Internal Demand (Sensor)

If an internal *DHW Demand* is used, a DHW TANK *Unocc* temperature can be set. This is the temperature that the tank maintains as long as the control is in an *UnOccupied* mode.

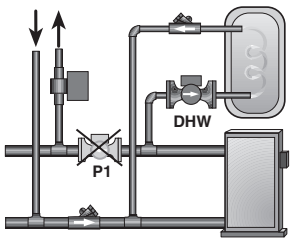
Away

If the AWAY setting is made in the *Schd* menu, any *DHW Demand* is ignored and the tank cools off. Note: AWAY does not require the DIP switch = *Setback.*

Section C2 —DHW Priority (Mode = —1—)

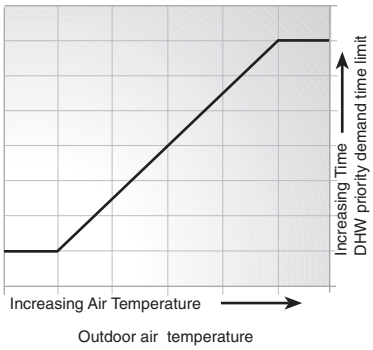
DHW PRIORITY (DHW PRI = BOIL)

It is often desirable to limit or even stop the flow of heat to the heating system when the DHW tank calls for heat. This allows for a faster recovery of the DHW tank. If DHW PRI is set to Boil, the boiler pump (P1) is turned off on a call for DHW. This setting is available only if DHW THRU = PUMP has been selected as the DHW device. If a valve is used as the DHW device, DHW priority can not be used. Caution should be taken to ensure that the flow rate of the DHW pump is adequate for both the DHW tank and the boiler(s), as this will be the only pump providing flow through the boiler(s).



DHW PRIORITY OVERRIDE

To prevent the building from cooling off too much or the possibility of a potential freeze up during DHW priority, the 262 limits the amount of time for DHW priority. As the outdoor air temperature becomes colder, the length of time that the 262 provides DHW priority is reduced. Once the allowed time for priority has elapsed, the 262 overrides the DHW priority and operates DHW and heating simultaneously.



CONDITIONAL DHW PRIORITY

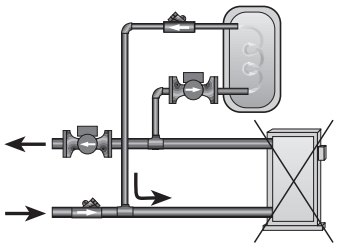
If the boiler supply temperature is maintained at or above the required temperature during DHW generation, this indicates that the boiler(s) has enough capacity for DHW and possibly heating as well. As long as the boiler supply temperature is maintained near its target, DHW and heating occurs simultaneously.

DHW POST PURGE

After the *DHW Demand* is removed, the 262 performs a purge on the boiler(s). The 262 shuts off the boiler(s) and continues to operate either the DHW pump or the DHW valve and the boiler pump. This purges the residual heat from the boiler(s) into the DHW tank. The 262 continues this purge for a maximum of four minutes or until the boiler supply water temperature drops 20˚F (11˚C) below the DHW Boil TRG temperature. The 262 also stops the purge if the boiler supply temperature drops below the current Boil TRG temperature.

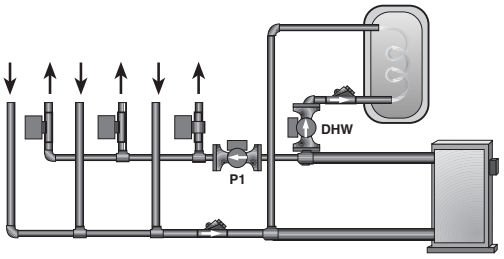
DHW MIXING PURGE

After DHW operation, the boiler(s) is extremely hot. At the same time, the heating zones may have cooled off considerably after being off for a period of time. To avoid thermally shocking the boiler(s) after DHW priority, the 262 shuts off the boiler(s), but continues to operate the DHW while restarting the heating system. This allows some of the DHW return water to mix with the cool return water from the zones and temper the boiler return water.



Section C3 —DHW with Low Temperature Boilers (Mode = —1—)

If DHW is to be incorporated into a low temperature system such as a radiant heating system, a mixing device is often installed to isolate the high DHW supply temperature from the lower system temperature. If a mixing device is not installed, high temperature water could be supplied to the low temperature system while trying to satisfy the DHW demand. This may result in damage to the low temperature heating system. The 262 is capable of providing DHW in such a system while ensuring that the low temperature in the heating system does not exceed its allowed maximum setting.



To prevent high temperature water from being introduced into the heating system, the boiler pump P1 must be turned off during a call for DHW. To do this, DHW THRU must be set to PUMP, DHW PRI must be set to Boil and Boil MIN must be set to OFF.

On a call for DHW, the 262 provides DHW priority by shutting off the boiler pump (P1) for a period of time. This time is based on the outdoor air temperature as described in the DHW Priority Override section. However, if the *DHW Demand* is not satisfied within the allotted time, the boiler(s) shuts off and the heat of the boiler is purged into the DHW tank.

Once the boiler supply temperature is sufficiently reduced, the DHW pump shuts off. The heating system is turned on for a period of time to prevent the building from cooling off. After a period of heating, if the *DHW demand* is still present, the 262 shuts off the heating system and provides heat to the DHW tank once again.

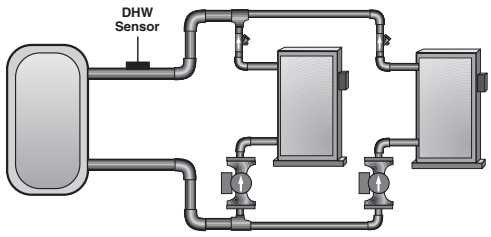
For correct operation, close attention must be paid to the mechanical layout of the system. When the 262 turns off the boiler pump (P1), flow to the heating system must stop. If flow is not stopped, the temperature in the heating system can exceed the maximum desired temperature and can result in damage to the heating system.

Section C4 —Dedicated DHW (MODE = —2—)

When MODE —2— is selected in the *Adjust* menu a number of menu and control operations change. The boiler staging logic is modified for improved response to dedicated DHW loads. Connection of the outdoor sensor is no longer mandatory. If both an external and an internal demand are used at the same time, the control displays an error message and stops DHW generation.

INTERNAL DEMAND (DHW SENS = DHW)

When the DHW SENS item is set to DHW, the 262 looks for a DHW sensor on the *Com* and the *DHW* terminals (19 and 20). When the temperature at the DHW sensor drops 1/2 of the DHW DIFF setting below the desired temperature, the *DHW Demand* pointer turns on in the LCD. The DHW TANK setting is used to set the desired DHW storage tank temperature. An advantage to using the DHW sensor is that the control is able to display the current DHW tank temperature as well as recording the highest and lowest DHW tank temperatures.



DHW DIFFERENTIAL (DHW DIFF)

When using the 262 control in MODE —2— operation, a differential setting that operates 1/2 above and below the DHW TANK is selectable. A domestic hot water sensor is required (DHW SENS = DHW) to be connected to terminals *DHW* & *Com* (19 and 20). If the differential setting is small, a more precise tank temperature will be maintained, but the boiler(s) may fire more frequently.

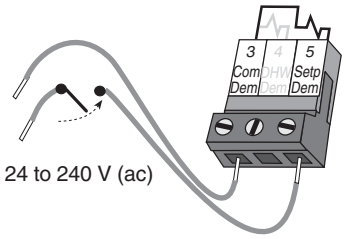
DHW DEVICE

While MODE —2— is selected, the *Boiler Pump* (Boil P1) contact is used to control the flow of heated water to the DHW tank. The DHW Pump contact may be used to control a recirculation pump. This pump will run continuously when the control is in *Occupied*, and be off during *UnOccupied*.

Section D1
Setpoint

Section D1—General Setpoint Operation (Mode = —1—)

The 262 can handle setpoint loads which are high temperature loads connected to the boiler loop that are not heating or DHW loads.



SETPOINT DEMAND

The 262 registers a *Setpoint Demand* when a voltage between 24 or 240 V (ac) is applied across the *Com Dem* and the *Setp Dem* terminals (3 and 5). Once voltage is applied, the *Setpoint Demand* pointer turns on in the LCD. The *Setpoint Demand* does not turn on the boiler pump P1. If a setpoint load is used, the installer must make sure that the setpoint device provides its own flow through the boiler(s).

BOILER TARGET DURING SETPOINT DEMAND (BOIL TRG)

The Boil TRG temperature during a *Setpoint Demand* is increased to at least the SETPOINT setting. This temperature is maintained as long as the 262 has a *Setpoint Demand*.

SETPOINT SETBACK

If the 262 is placed into setback, the *Setpoint Demand* is ignored if the SETPOINT *UnOcc* setting is set to OFF. Otherwise, the setpoint operates normally. If a system override of AWAY is selected, the 262 operates the SETPOINT load at the *Occupied* setting.

SETPOINT PRIORITY (SETP PRI = BOIL)

For setpoint loads to have priority over the boiler zone(s), set SETP PRI to Boil. If this option is chosen, the boiler pump P1 turns off during a *Setpoint Demand.*

Setpoint Priority Override

In order to prevent the building from cooling off too much or the possibility of a potential freeze up during Setpoint Priority, the 262 limits the amount of time for setpoint priority. As the outdoor air temperature becomes colder, the length of time the 262 provides Setpoint Priority is reduced. Once the allowed time for priority has elapsed, the 262 overrides the *Setpoint Priority* and operates setpoint and heating simultaneously.

Conditional Setpoint Priority

If the Boil SUP temperature is maintained at or above the required temperature during setpoint generation, this indicates that the boiler(s) has enough capacity for setpoint and possibly heating as well. As long as the Boil TRG temperature is maintained, setpoint and heating occur at the same time.

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 262 includes: One Boiler Control 262, One Outdoor Sensor 070, One Universal Sensor 071
Data Brochures D 262, D 070, D 001, User Brochure U 262, Application Brochures A 262, Essay E 003.

Note: Carefully read the details of the Sequence of Operation to ensure that you have chosen the proper control for your application.

STEP TWO — MOUNTING THE BASE

Remove the control from its base by pressing down on the release clip in the wiring chamber and sliding the control upwards. The base is then mounted in accordance with the instructions in the Data Brochure D 001.

STEP THREE — ROUGH-IN WIRING

All electrical wiring terminates in the control base wiring chamber. The base has standard 7/8" (22 mm) knockouts which accept common wiring hardware and conduit fittings. Before removing the knockouts, check the wiring diagram and select those sections of the chamber with common voltages. Do not allow the wiring to cross between sections as the wires interfere with safety dividers which should be installed at a later time.

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

- Install the Outdoor Sensor 070 and Boiler Sensor 071 according to the instructions in the Data Brochure D 070 and run the wiring back to the control.
- If a DHW Sensor 071 is used, install the DHW Sensor according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control.
- If a Room Temperature Unit (RTU) 062 or 063 is used, install the RTU according to the installation instructions in the Data Brochure D 062 and run the wiring back to the control.
- If a Slab Sensor 072 or 073 is used, install the Slab Sensor according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control or RTU.
- If a Remote Display Module (RDM) 040 is used, install the RDM according to the installation instructions in the Data Brochure D 040 and run the wiring back to the control.
- If a tekmar Zone Control is used, run the wires from the Zone Control to the 262. Refer to the instructions supplied with the Zone Control.
- Run wire from other system components (pumps, boilers, etc.) to the control.
- Run wires from the 120 V (ac) power to the control. Use a clean power source to ensure proper operation. Multi-strand 16 AWG wire is recommended for all 120 V (ac) wiring due to its superior flexibility and ease of installation into the terminals.
- 120 V (ac) to be provided from a 15 A circuit breaker and must have a circuit disconnect installed.
- Connect ground wires to ground bus bar in wiring area.

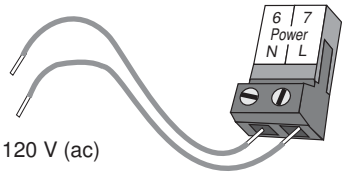
STEP FOUR — ELECTRICAL CONNECTIONS TO THE CONTROL

The installer should test to confirm that no voltage is present at any of the wires. Push the control into the base and slide it down until it snaps firmly into place.

Powered Input Connections

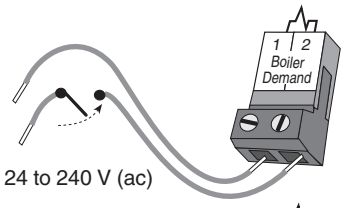
120 V (ac) Power

Connect the 120 V (ac) power supply to the *Power N* and *Power L* terminals (6 and 7). This connection provides power to the microprocessor and display of the control. As well, this connection provides power to the *Boil P1* terminals (8) from the *Power L* terminal (7).



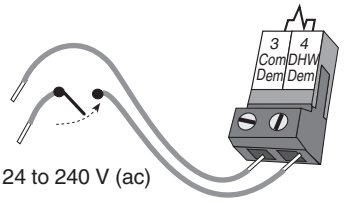
Boiler Demand

To generate a Boiler Demand, a voltage between 24 V (ac) and 240 V (ac) must be applied across the *Boiler Demand* terminals (1 and 2).



DHW Demand

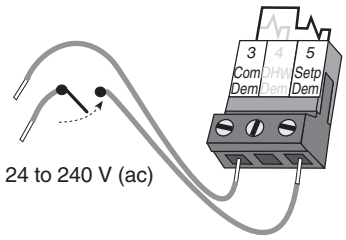
To generate a DHW Demand, a voltage between 24 V (ac) and 240 V (ac) must be applied across the *Com Dem* and the *DHW Dem* terminals (3 and 4).



Setpoint Demand

To generate a Setpoint Demand, a voltage between 24 V (ac) and 240 V (ac) must be applied across the *Com Dem* and the *Setp Dem* terminals (3 and 5).

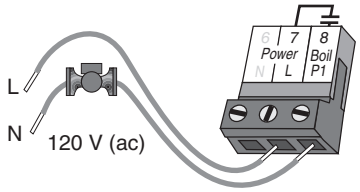
Caution: The same power supply must be used for both the DHW demand and setpoint demand circuits since they share the *Com Dem* terminals.



Output Connections

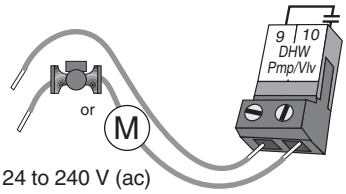
Boiler Pump Contact (Boil P1)

The boiler pump output terminal (8) on the 262 is a powered output. When the relay contact in the 262 closes, 120 V (ac) line (L) is provided to the *Boil P1* terminal (8) from the *Power L* terminal (7). To operate the boiler pump, connect one side of the boiler pump circuit to terminal 8 and the second side of the pump circuit to the neutral (N) side of the 120 V (ac) power supply.



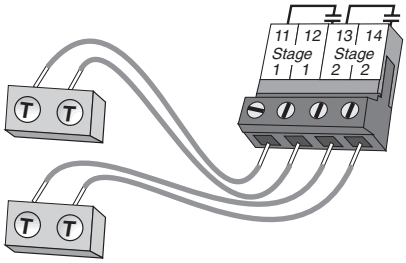
DHW Pump / Valve Contact

The *DHW Pump / Valve* terminals (9 and 10) are an isolated output in the 262. There is no power available on these terminals from the control. These terminals are to be used as a switch to either make or break power to the DHW pump or the DHW valve. Since this is an isolated contact, it may switch a voltage between 24 V (ac) and 240 V (ac).



Boiler Contacts

The *Stage 1* and *Stage 2* terminals (11, 12 and 13, 14) are isolated outputs in the 262. There is no power available on these terminals from the control. These terminals are to be used as a switch to either make or break the boiler circuit. When the 262 requires the boiler(s) to fire, it closes the contact between terminals 11 and 12 and/or 13 and 14.

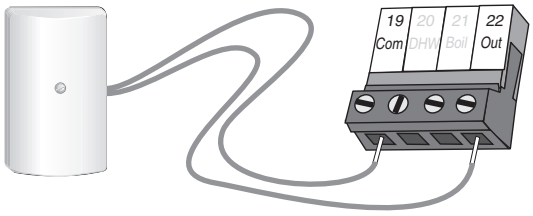


Sensor and Unpowered Input Connections

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

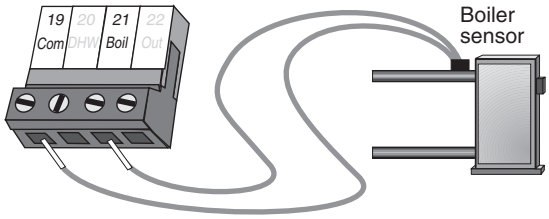
Outdoor Sensor

Connect the two wires from the Outdoor Sensor 070 to the *Com* and *Out* terminals (19 and 22). The Outdoor Sensor is used by the 262 to measure the outdoor air temperature.



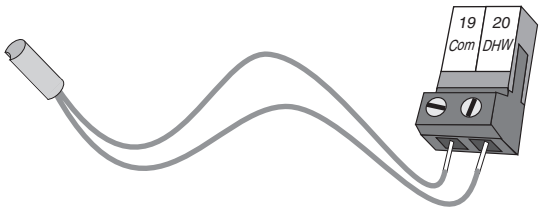
Boiler Sensor

Connect the two wires from the Boiler Sensor 071 to the *Com* and *Boil* terminals (19 and 21). The Boiler Sensor is used by the 262 to measure the supply (outlet) water temperature from the boiler(s).



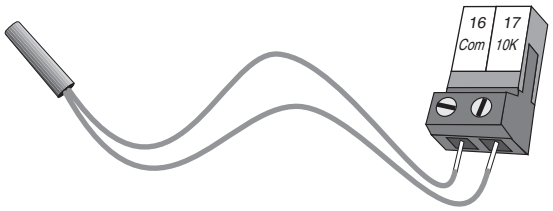
DHW Sensor

Connect the two wires from the DHW Sensor 071 to the *Com* and *DHW* terminals (19 and 20). The DHW Sensor is used by the 262 to measure the DHW tank temperature.



10K Sensor

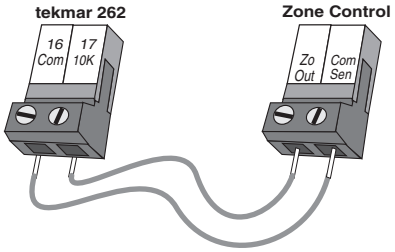
Either an Indoor Sensor, Slab Sensor, or Zone Control may be connected to the *10K* input. If a sensor is used, connect the two wires from the sensor to the *Com* and *10K* terminals (16 and 17).



Zone Control Input

If an external tekmar Zone Control is used, connect the wire from the *Com Sen* terminal on the Zone Control to the *Com* terminal (16) on the 262. Connect the *Zo Out* terminal on the Zone Control to the *10K* terminal (17) on the 262.

Note: *The wires from the Zone Control are polarity sensitive. The communication does not operate correctly if the wires are reversed.*



tekmar Net™ Device (tN1 / tN2)

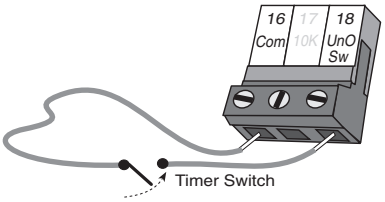
A Room Temperature Unit (RTU) 062 or 063, or a Remote Display Module (RDM) 040 may be connected to the *tekmar Net™ tN1 / tN2* input. Connect the *Com* terminal from the appropriate device to the *Com* terminal (16) on the 262. Connect the *tekmar Net™ tN1* or *tN2* terminal from the appropriate device to the *tekmar Net™ tN1 / tN2* terminal (15) on the 262.

Note: *The wires from the RTU and the RDM are polarity sensitive. The tekmar Net™ tN1 / tN2 device does not operate correctly if the wires are reversed.*

UnOccupied Switch

If an external timer (tekmar Timer 032) or switch is used, connect the two wires from the external switch to the *Com* and *UnO Sw* terminals (16 and 18). When these two terminals are shorted together, the control registers an UnOccupied signal.

Note: *The setback override in the schedule menu of the control overrides any external signal that is present at the UnOccupied Switch terminals.*

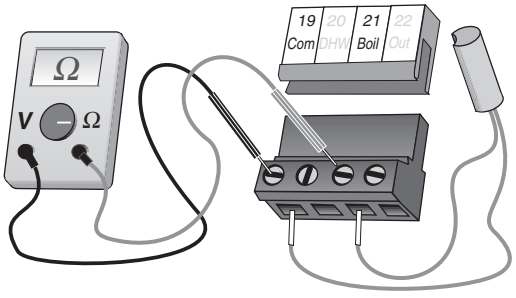


STEP FIVE — TESTING THE WIRING

Each terminal block ***must be unplugged*** from its header on the control before power is applied for testing. To remove the terminal block, pull straight down from the control.

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) and at least 0 - 2,000,000 Ohms, is essential to properly test the wiring and sensors.

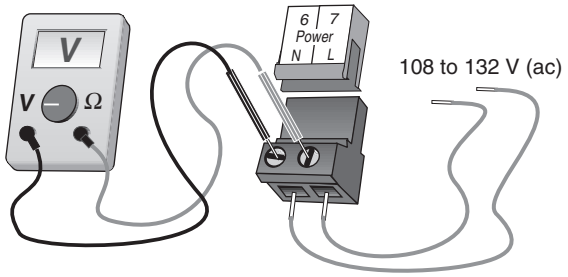


Test the Sensors

In order to test the sensors, the actual temperature at each sensor location must be measured. A good quality digital thermometer with a surface temperature probe is recommended for ease of use and accuracy. Where a digital thermometer is not available, a spare sensor can be strapped alongside the one to be tested and the readings compared. Test the sensors according to the instructions in the Data Brochure D 070.

Test the Power Supply

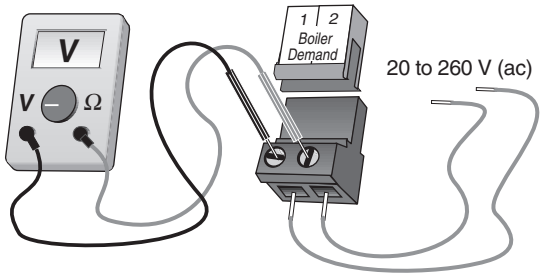
Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces. Turn on the power and measure the voltage between the N and L terminals (6 and 7) using an AC voltmeter, the reading should be between 108 and 132 V (ac).



Test the Powered Inputs

Boiler Demand

If a *Boiler Demand* is used, measure the voltage between the *Boiler Demand* terminals (1 and 2). When the *Boiler Demand* device calls for heat, you should measure between 20 and 260 V (ac) at the terminals. When the *Boiler Demand* device is off, you should measure less than 5 V (ac).

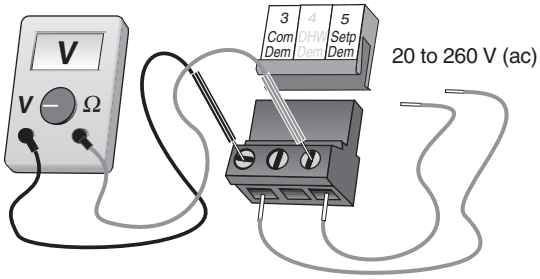


DHW Demand

If a *DHW Demand* is used, measure the voltage between the *DHW Dem* and the *Com Dem* terminals (3 and 4). When the *DHW Demand* device calls for heat, you should measure between 20 and 260 V (ac) at the terminals. When the *DHW Demand* device is off, you should measure less than 5 V (ac).

Setpoint Demand

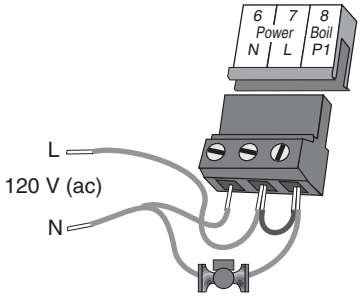
If a *Setpoint Demand* is used, measure the voltage between the *Setp Dem* and the *Com Dem* terminals (3 and 5). When the *Setpoint Demand* device calls for heat, you should measure between 20 and 260 V (ac) at the terminals. When the *Setpoint Demand* device is off, you should measure less than 5 V (ac).



Testing the Outputs

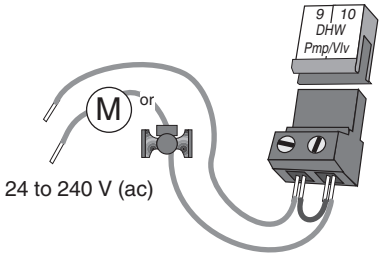
Boiler Pump (Boil P1)

If a boiler pump is connected to the *Boil P1* terminal (8), make sure that power to the terminal block is off and install a jumper between the *Power L* and the *Boil P1* terminals (7 and 8). When power is applied to the *Power N* and *Power L* terminals (6 and 7), the boiler pump should start. If the pump does not turn on, check the wiring between the terminal block and pump and refer to any installation or troubleshooting information supplied with the pump. If the pump operates properly, disconnect the power and remove the jumper.



DHW Pump OR Valve (DHW Pmp/Vlv)

If a DHW pump or DHW valve is connected to the *DHW Pmp / Vlv* terminals (9 and 10), make sure the power to the pump or valve circuit is off and install a jumper between those terminals. When the DHW circuit is powered up, the DHW pump should turn on or the DHW valve should open completely. If the DHW pump or valve fails to operate, check the wiring between the terminals and the pump or valve and refer to any installation or troubleshooting information supplied with these devices. If the DHW pump or valve operates correctly, disconnect the power and remove the jumper.



Stage 1 and 2

If the boiler is connected to the *Stage 1* terminals (11 and 12) and/or *Stage 2* terminals (13 and 14), make sure power to the boiler circuit is off and install a jumper between the terminals. When the boiler circuit is powered up, the boiler should fire. If the boiler does not turn on, refer to any installation or troubleshooting information supplied with the boiler. (The boiler may have a flow switch that prevents firing until the boiler pump (P1) is running.) If the boiler operates properly, disconnect the power and remove the jumper.

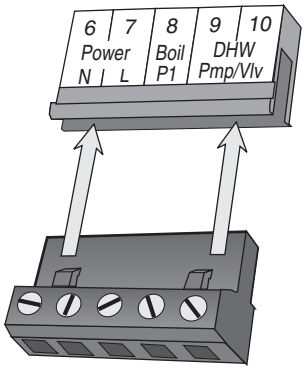
Connecting the Control

Make sure all power to the devices and terminal blocks is off and remove any remaining jumpers from the terminals.

Reconnect the terminal blocks to the control by carefully aligning them with their respective headers on the control and then pushing the terminal blocks into the headers. The terminal blocks should snap firmly into place.

Install the supplied safety dividers between the unpowered sensor inputs and the powered 120 V (ac) or 24 V (ac) wiring chambers.

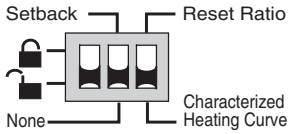
Apply power to the control. The operation of the control on power up is described in the Sequence of Operation section of this brochure.



DIP Switch Settings

The DIP Switch settings on the control are very important and should be set to the appropriate settings prior to making any adjustments to the control through the User Interface. The DIP switch settings change the items that are available to be viewed and/ or adjusted in the User Interface.

If a DIP switch is changed while the control is powered up, the control responds to the change in setting by returning the display to the View menu. This is true for all of the DIP switches except for the *Lock / Unlock* DIP switch.



LOCK / UNLOCK (FACTORY SETTING IS UNLOCK)

The *Lock / Unlock* DIP switch is used to lock and unlock the access level of the control and tekmar Net™ tN1/tN2 device. Once locked, access levels cannot be changed. To determine if the control is currently locked or unlocked, a small segment representing a padlock is viewed in the bottom right hand corner of the display. When the padlock is closed, the access level cannot be changed.

To change the access level, set the DIP switch to the *Unlocked*, or down position. The current access level of the control or tekmar Net™ tN1/tN2 device is viewed in its Miscellaneous (*Misc*) menu. While viewing the access level, use the up and down keys to select between the Limited (LTD), User (USER), Installer (INST), or Advanced (ADV) access levels.

To lock the access level, select the appropriate access level in the Miscellaneous (*Misc*) menu and move the DIP switch from the *Unlocked* position to the *Locked* position. As long as the DIP switch is in the *Locked* position, the access level of the control or tekmar Net™ tN1/tN2 device can no longer be viewed or adjusted in its Miscellaneous (*Misc*) menu.

SETBACK / NONE (FACTORY SETTING IS NONE)

The *Setback / None* DIP switch enables and disables the setback functions of the control. When the DIP switch is set to the *None* or down position, the control ignores any external setback signal, and its user interface does not display the *UnOccupied* adjustments.

When the DIP switch is set to the *Setback* position, the setback features in the control are enabled. The control responds to an external setback signal generated on the *UnO Sw* terminal.

CHARACTERIZED HEATING CURVE / RESET RATIO (FACTORY SET TO CHARACTERIZED HEATING CURVE)

The *Characterized Heating Curve* / *Reset Ratio* DIP switch determines the type of Outdoor Reset that the control uses. When the DIP switch is set to the *Characterized Heating Curve* setting, the control uses an Outdoor Reset method that matches the heating characteristics of the type of terminal unit that is being used. See Sequence Of Operation, Section B for a description of terminal units. When this setting is used, a desired indoor air setting, design outdoor setting and a design supply setting must be entered into the control.

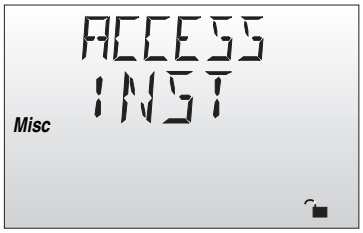
When the DIP switch is set to the *Reset Ratio* setting, the control uses an Outdoor Reset method that varies the supply setting based only on the outdoor air temperature. When this setting is used, the Boil STRT temperature and OUT STRT temperature determines the beginning point of the reset ratio. The design supply setting and the design outdoor setting determines the ending point of the reset ratio. All temperatures between these two points fall on a straight line connecting these points.

Important: Once the control is programmed, this DIP switch should not be adjusted as the settings may change.

Access Levels

The tekmar Boiler Control 262 comes with four Access Level settings. These Access Levels restrict the number of Menus, Items, and Adjustments that can be accessed by the user. The four access levels are Limited (LTD), User (USER), Installer (INST) and Advanced (ADV).

The access level of the control is found in the Miscellaneous (*Misc*) menu when the *Lock/Unlock* DIP switch is set to the *Unlocked* position. In the Advanced access level, all of the control settings are available to the user. In the User access level, only a few of the menus and items are available. The Limited access level is the most restricted of them all. The control's factory setting is Installer (INST). This access level is sufficient for the set up of the control. Once the control is set up, the appropriate access level should be selected for the people that deal with the control on a regular basis.



Notes

262 **View** Menu (1 of 1)

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range
OUTDOOR		●	●	●	●	Current outdoor air temperature as measured by the outdoor sensor. This is the default display for the control. MODE = —1—	-67 to 149°F (-55 to 65°C)
ROOM TRG	B2		●	●	●	Target room air temperature. "– – –" denotes no heat is required. 10K = INDR MODE = —1—	- - -, 35 to 100°F (2 to 38°C)
ROOM	B2	●	●	●	●	Measured room air temperature at the indoor sensor. 10K = INDR MODE = —1—	-58 to 167°F (-50 to 75°C)
Zoln	B2				●	This is the signal that is being received from a tekmar Zone Control. 10K = Zoln MODE = —1—	- - -, 35 to 110°F (2 to 43°C)
SLAB	B2			●	●	Current slab sensor temperature. 10K = SLAB MODE = —1— Boil MIN = OFF	-58 to 167°F (-50 to 75°C)
Boil TRG	B1			●	●	Target boiler supply is the temperature the control is currently trying to maintain at the boiler sensor +/- 1/2 of the differential.	- - -, 35 to 248°F (2 to 120°C)
Boil SUP	B1		●	●	●	Current boiler supply water temperature as measured by the boiler sensor.	-31 to 266°F (-35 to 130°C)
xCHG TRG	C1			●	●	Minimum boiler supply temperature during a DHW demand. DHW SENS = NONE DHW THRU ≠ NONE	- - -, OFF, 100 to 220°F (OFF, 38 to 104°C)
DHW TRG	C1		●	●	●	Target DHW tank temperature. DHW SENS = DHW DHW THRU ≠ NONE	- - -, OFF, 70 to 190°F (OFF, 21 to 88°C)
DHW	C1	●	●	●	●	Current DHW tank temperature. DHW SENS = DHW DHW THRU ≠ NONE	-31 to 266°F (-35 to 130°C)
SETP TRG	D1			●	●	Minimum boiler supply temperature during a setpoint demand. MODE = —1—	- - -, OFF, 70 to 220°F (OFF, 21 to 104°C)

Item Field	Section	Access Level: LTD	Access Level: USER	Access Level: INST	Access Level: ADV	Description	Range	Actual Setting
MODE	A			●	●	Sets the operating Mode for the control. MODE —1— = (***Heating, DHW, and Setpoint)*** MODE —2— = (***Dedicated DHW)***	—1— or —2— Default = MODE —1—	
ROOM Occ	B1	●	●	●	●	The desired room air temperature during an Occupied period. Note: There is only a 13°F adjustment in the LTD access level. **DIP switch = *Characterized Heating Curve*** **No RTU connected** MODE = —1—	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
ROOM UnOcc	B1		●	●	●	The desired room air temperature during an UnOccupied period. **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback*** **No RTU connected** MODE = —1—	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
10K	B2			●	●	The device that is to be connected to the 10K input terminal. **DIP switch = *Characterized Heating Curve*** **No RTU connected** MODE = —1—	NONE, INDR (Indoor) Zoin, SLAB Default = NONE	
SLAB MIN	B2		●	●	●	The minimum temperature at the slab sensor **DIP switch = *Characterized Heating Curve*** **No RTU connected** 10K = SLAB Boil MIN = OFF MODE = —1—	OFF, 35 to 120°F (OFF, 2 to 49°C) Default = 70°F (21°C)	
SLAB MAX	B2			●	●	The maximum temperature at the slab sensor. **DIP switch = *Characterized Heating Curve*** **No RTU connected** 10K = SLAB Boil MIN = OFF MODE = —1—	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	
BOOST	B1			●	●	The amount of morning boost. **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback*** **No RTU connected** 10K ≠ Zoin MODE = —1—	OFF, 0:20 to 8:00 hr Default = OFF	
SETBACK	B1		●	●	●	The amount the boiler supply water temperature will be reduced when the control is in the UnOccupied mode. **DIP switch = *Reset Ratio*** **DIP switch = *Setback*** MODE = —1—	0 to 50°F (0 to 28°C) Default = 15°F (8°C)	
TERMINAL	B1			●	●	The type of terminal units that are being used in the heating system. **DIP switch = *Characterized Heating Curve*** MODE = —1—	HRF1 (Heavy), HRF2 (Light), (Fan-) COIL, CONV (ector), RAD (iator), BASE (board) Default = CONV	
Boil INDR	B1			●	●	The design indoor air temperature used in the heat loss calculations for the heating system. **DIP switch = *Characterized Heating Curve*** MODE = —1—	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
Boil START	B1			●	●	The starting water temperature used in the reset ratio calculation for the heating system. **DIP switch = *Reset Ratio*** MODE = —1—	35 to 150°F (2 to 66°C) Default = 70°F (21°C)	
OUT STRT	B1			●	●	The outdoor starting temperature used in the reset ratio calculation for the heating system. **DIP switch = *Reset Ratio*** MODE = —1—	35 to 85°F (2 to 29°C) Default = 70°F (21°C)	
Boil DSGN	B1			●	●	The design supply water temperature used in the heat loss calculations for the heating system. MODE = —1—	70 to 220°F (21 to 104°C) Default = 190°F (88°C)	
OUT DSGN	B1			●	●	The design outdoor air temperature used in the heat loss calculations for the heating system. MODE = —1—	-60 to 32°F (-51 to 0°C) Default = 10°F (-12°C)	
Boil MAX	B1				●	The maximum boiler target supply water temperature.	120 to 225°F, OFF (49 to 107°C, OFF) Default = 210°F (99°C)	
Boil MIN	B1			●	●	The minimum temperature allowed for the boiler target temperature.	OFF, 80 to 180°F (OFF, 27 to 82°C) Default = 140°F (60°C)	
FIRE DLY	A			●	●	The time delay the control can expect between the time the boiler contact closes and the burner fires.	0:00 to 3:00 min (in 1 sec. increments) Default = 0:10 min	
Boil MASS	A			●	●	The thermal mass characteristics of the boilers that are being used.	LITE, MED, HEVY Default = MED	
Boil DIFF	A			●	●	The differential that the control is to use when it is operating the boiler(s).	AUTO, 2 to 42°F (AUTO, 1 to 23°C) Default = AUTO	
STAGE 1	A		●	●	●	Selects stage 1 as operational or not.	AUTO, OFF Default = AUTO	
STAGE 2	A		●	●	●	Selects stage 2 as operational or not.	AUTO, OFF Default = AUTO	
ROTATE	A			●	●	Sets the rotation time for the stages. This item is used by the *Equal Run Time Rotation* function.	10 to 72 hr, OFF Default = 48 hr	
DHW THRU	C1			●	●	The device that is being used to supply flow to the heat exchanger in the DHW storage tank. **No Indirect DHW tank** = NONE MODE = —1—	NONE, PUMP, VALV Default = PUMP	
DHW SENS	C1			●	●	Selects if a tekmar sensor is being used to measure the DHW tank temperature. DHW THRU ≠ NONE	NONE, DHW Default = NONE	

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
DHW TANK Occ	C1		●	○	●	The DHW storage tank's temperature during the Occupied period. DHW SENS = DHW DHW THRU ≠ NONE	OFF, 70 to 190°F (OFF, 21 to 88°C) Default = 140°F (60°C)	
DHW TANK UnOcc	C1		●	○	●	The DHW storage tank's temperature during the UnOccupied period. **DIP switch = *Setback*** DHW SENS = DHW DHW THRU ≠ NONE	OFF, 70 to 190°F (OFF, 21 to 88°C) Default = 120°F (49°C)	
DHW DIFF	C4				●	Sets the differential for the DHW storage tank. DHW SENS = DHW MODE = —2—	1 to 42°F (1 to 23°C) Default = 6°F (3°C)	
DHW XCHG Occ	C1			○	●	The minimum boiler supply temperature to the DHW heat exchanger during the Occupied period. DHW SENS = NONE DHW THRU ≠ NONE	OFF, 100 to 220°F (OFF, 38 to 104°C) Default = 180°F (82°C)	
DHW XCHG UnOcc	C1			○	●	Selects whether or not DHW will be generated during the UnOccupied period. **DIP switch = *Setback*** DHW SENS = NONE DHW THRU ≠ NONE	OFF, DHW XCHG ***Occ*** setting Default = OFF	
DHW PRI	C2			○	●	Enables or disables the DHW priority function over the heating load. DHW THRU = PUMP MODE = —1—	NONE, BOIL Default = BOIL	
SETPOINT Occ	D1			○	●	The minimum boiler supply temperature when a setpoint demand is present during the Occupied period. MODE = —1—	OFF, 70 to 220°F (OFF, 21 to 104°C) Default = 180°F (82°C)	
SETPOINT UnOcc	D1			○	●	Selects whether or not a setpoint demand will be responded to during the UnOccupied period. **DIP switch = *Setback*** MODE = —1—	OFF, SETPOINT ***Occ*** setting Default = OFF	
SETP PRI	D1			○	●	Selects whether or not the setpoint demand will have priority over the heating system. MODE = —1—	NONE, BOIL Default = NONE	
WWSD Occ	B1		●	○	●	The system's warm weather shut down during the Occupied period. MODE = —1—	35 to 100°F, OFF (2 to 38°C, OFF) Default = 70°F (21°C)	

262 **Adjust** Menu (4 of 4)

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
WWSD UnOcc	B1		●	●	●	The system's warm weather shut down during the UnOccupied period. **DIP switch = *Setback*** MODE = —1—	35 to 100 °F, OFF (2 to 38 °C, OFF) Default = 60 °F (16°C)	
PURGE	A				●	The maximum length of time that the boiler pump will continue to operate after the heating and DHW demands have been removed.	OFF, 0:10 to 40:00 min Default = 0:20 min	
SOF STRT	B1				●	The portions of the heating system that will use the Soft Start feature. MODE = —1—	NONE, BOIL Default = NONE	
EXERCISE	A				●	The frequency with which the control will exercise the pumps and valves that are operated by the control.	30 to 240 hr, OFF Default = 70 hr	

262 **Monitor** Menu (see pages 29 - 31)

262 **Schd** (Schedule) Menu (1 of 1)

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range
OVERRIDE	A	●	●	●	●	The type of setback override that is in effect. **DIP switch = *Setback*** AWAY is available even if DIP ≠ Setback	NONE, TMPYOcc Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, AWAY Ovr Default = NONE

262 **Misc** (Miscellaneous) Menu (1 of 1)

Item Field	Access Level: LTD	USER	INST	ADV	Description	Range
UNITS		●	●	●	The units of measure that all of the temperatures are to be displayed in by the control.	°F, °C Default = °F
BACKLITE		●	●	●	The operating mode for the back lighting on the LCD as well as the time of keypad inactivity until the control automatically returns to the default display. BACKLITE = OFF ***(returns after 10 seconds)*** BACKLITE = 30 sec **(returns after 30 seconds)** BACKLITE = ON **(returns after 90 seconds)**	OFF, 30 sec, ON Default = ON
ACCESS	●	●	●	●	The access level that is to be used by the control. **DIP switch = *Unlock***	ADV, INST, USER, LTD Default = INST

Room Temperature Units (RTUs) 062 and 063

A single RTU may be connected to the Boiler Control 262 in order to provide the control with indoor temperature feedback for the heating system in Mode = —1— (Refer to Essay E 002). When using an RTU, several items related to the heating system are no longer available in the control's User Interface. These items are available only in the RTU's User Interface. Also, the number of items that are available on the RTU depends on the type of RTU that is connected to the control.

262 RTU **View** Menu (1 of 1)

Item Field	Section	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
ROOM	B2	●	●	●	●	●	●	Current room air temperature. RTU SENS = AIR	- - -, 14 to 167°F (-10 to 75°C)
ROOM TRG	B2		●	●	●	●	●	Target room air temperature. RTU SENS = AIR	- - -, 35 to 100°F (2 to 38°C)
OUTDOOR		●	●	●	●	●	●	Current outdoor air temperature.	-67 to 149°F (-55 to 65°C)
SLAB	B2		●	●	●		●	Current slab (floor) sensor temperature. REMOTE 3 = SLAB	-58 to 167°F (-50 to 75°C)

262 RTU **Adjust** Menu (1 of 1)

Item Field	Section	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range	Actual Setting
ROOM Occ	B1	●	●	●	●	●	●	The desired room air temperature during an Occupied period for the heating zone. *Note*: There is only a ±3°F adjustment in the LTD access level.	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
ROOM UnOcc	B1	●	●	●	●	●		The desired room air temperature during an UnOccupied period for the heating zone. *Note*: There is only a ±3°F adjustment in the LTD access level. **DIP switch = *Setback***	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
BOOST	B1			●	●	●	●	The amount of morning boost. **DIP switch = *Setback***	OFF, 0:20 to 8:00 hr Default = OFF	
RTU SENS				●	●	●	●	Selects whether the RTU is to use its internal air sensor.	OFF, AIR Default = AIR	
REMOTE 1				●	●		●	This item allows for remotely adding a 10K sensor to the RTU. Applications are for temperature averaging.	NONE, AIR Default = NONE	
REMOTE 2				●	●		●	This item allows for remotely adding a second 10K sensor to the RTU. Applications are for temperature averaging.	NONE, AIR Default = NONE	
REMOTE 3				●	●		●	This item allows for remotely adding a third 10K air sensor to the RTU, or a 10K slab sensor to measure slab temperature. Boil MIN = OFF ***(for Slab Sensor only)***	NONE, AIR, SLAB Default = NONE	
SLAB MIN	B2		●	●	●		●	The minimum target temperature at the slab sensor when not in WWSD. REMOTE 3 = SLAB	OFF, 35 to 120°F (OFF, 2 to 49°C) Default = 70°F (21°C)	
SLAB MAX	B2			●	●		●	The maximum target temperature at the slab sensor. REMOTE 3 = SLAB	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	

262 RTU **Monitor** Menu (1 of 1)

Item Field	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
OUT HI	●	●	●	●	●	●	The highest outdoor air temperature recorded since this item was last cleared. **To clear, press & hold the *UP & DOWN* buttons**	-67 to 149°F (-55 to 65°C)
OUT LO	●	●	●	●	●	●	The lowest outdoor air temperature recorded since this item was last cleared. **To clear, press & hold the *UP & DOWN* buttons**	-67 to 149°F (-55 to 65°C)
ROOM HI		●	●	●	●	●	The highest room air temperature recorded since this item was last cleared. **To clear, press & hold the *UP & DOWN* buttons**	14 to 167°F (-10 to 75°C)
ROOM LO		●	●	●	●	●	The lowest room air temperature recorded since this item was last cleared. **To clear, press & hold the *UP & DOWN* buttons**	14 to 167°F (-10 to 75°C)

262 RTU **Schd** (Schedule) Menu (1 of 1)

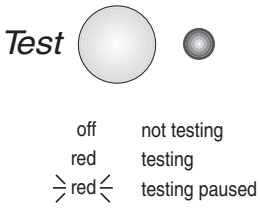
Item Field	Section	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
OVERRIDE	A		●	●	●	●	●	The type of setback override that is in effect. **DIP switch = *Setback*** AWAY is available even if DIP ≠ Setback	NONE, TMPY Occ Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, AWAY Ovr Default = NONE

262 RTU **Misc** (Miscellaneous) Menu (1 of 1)

Item Field	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
UNITS		●	●	●	●	●	The units of measure that all of the temperatures are to be displayed with in the RTU.	°F, °C Default = °F
BACKLITE		●	●	●	●	●	The operating mode for the back lighting on the LCD as well as the time of keypad inactivity until the RTU, automatically returns to the view menu. BACKLITE = OFF **(returns after 10 seconds)** BACKLITE = 30 sec **(returns after 30 seconds)** BACKLITE = ON **(returns after 90 seconds)**	OFF, 30 sec, ON Default = ON
ACCESS	●	●	●	●	●	●	The access level that is to be used by the RTU. **DIP switch = *Unlock***	ADV, INST, USER, LTD Default = INST

Testing the Control

The Boiler Control 262 has a built in test routine which is used to test the main control functions. The 262 continually monitors the sensors and displays an error message whenever a fault is found. See the following pages for a list of the 262's error messages and possible causes. When the *Test* button is pressed, the *Test* light is turned on. The individual outputs and relays are tested in the following test sequence.



TEST SEQUENCE

Each step in the test sequence lasts 10 seconds.

During the test routine, the test sequence is paused by pressing the *Test* button. While paused, the control displays the testing step as well as the word PAUS. If the *Test* button is not pressed again for 5 minutes while the test sequence is paused, the control exits the entire test routine. If the test sequence is paused, the *Test* button can be pressed again to advance to the next step. This can also be used to rapidly advance through the test sequence. To reach the desired step, repeatedly press and release the *Test* button until the appropriate device and segment in the display turn on.

Step 1 - The boiler pump *(Boil P1)* is turned on for 10 seconds.
NOTE: Only if there is a boiler demand can the control be paused in step 1.

Step 2 - The *zc* contact is turned on for 10 seconds.
NOTE: Only if there is a boiler demand can the control be paused in step 2.

Step 3 - The *Stage 2* contact is turned on for 10 seconds. After 10 seconds, the *Stage 1, Stage 2* and *Boil P1* contacts are shut off.
NOTE: Only if there is a boiler demand can the control be paused in step 3.

Step 4 - MODE —1—
If a DHW Pump is selected as the DHW device, the *DHW Pmp / Vlv* contact is turned on for 10 seconds and is then shut off.

If a DHW Valve is selected as the DHW device, the *DHW Pmp / Vlv* and *Boil P1* contacts are turned on for 10 seconds and are then shut off.

If NONE is selected as the DHW device, N/A is displayed for 1 second.

- MODE —2—
The *DHW Pmp / Vlv* contact is turned on for 10 seconds and is then shut off.

NOTE: Only if there is a *DHW demand* can the control be paused in step 4.

Step 5 - After the test sequence is completed, the word COMPLETE is displayed for 1 second and the control resumes its normal operation.

MAX HEAT (MAX HEAT)

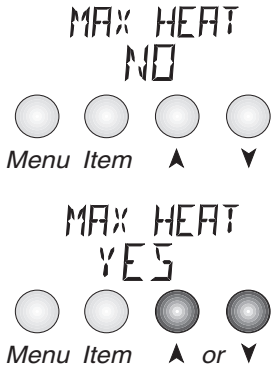
The Boiler Control 262 has a function called *Max Heat*. In this mode, the 262 turns on and operates the system up to the maximum set temperatures as long as there is a demand for heat. The control continues to operate in this mode for up to 24 hours or until either the Item, Menu or Test button is pressed. This mode may be used for running all circulators during system start-up in order to purge air from the piping. To enable the Max Heat feature, use the following procedure.

1) Press and hold the *Test* button for more than 3 seconds. At this point, the control displays the words MAX HEAT and the word NO.

2) Using the Up or Down buttons, select the word YES. After 3 seconds, the control flashes the word MANUAL and Boil MAX is the target boiler supply water temperature.

3) To cancel the *Max Heat* mode, press either the *Item, Menu, or Test* button.

4) Once the *Max Heat* mode has either ended or is cancelled, the control resumes normal operation.



Troubleshooting

When troubleshooting any heating system, it is always a good idea to establish a set routine to follow. By following a consistent routine, many hours of potential headaches can be avoided. xxcBelow is an example of a sequence that can be used when diagnosing or troubleshooting problems in a hydronic heating system.

Establish the Problem

Establish the problem. Get as much information from the customer as possible about the problem. Is there too much heat, not enough heat, or no heat? Is the problem only in one particular zone or area of the building or does the problem affect the entire system? Is this a consistent problem or only intermittent? How long has the problem existed for? This information is critical in correctly diagnosing the problem.

Understand the Sequence of Operation

Understand the sequence of operation of the system. If a particular zone is not receiving enough heat, which pumps or valves in the system must operate in order to deliver heat to the affected zone? If the zone is receiving too much heat, which pumps, valves or check valves must operate in order to stop the delivery of heat?

Use the Test Routine

Press the Test button on the control and follow the control through the test sequence as described in the Testing section. Pause the control as necessary to ensure that the correct device is operating as it should.

Sketch the Piping in the System

Sketch the piping of the system. This is a relatively simple step that tends to be overlooked, however it can often save hours of time in troubleshooting a system. Note flow directions in the system paying close attention to the location of pumps, check valves, pressure bypass valves and mixing valves. Ensure correct flow direction on all pumps. This is also a very useful step if additional assistance is required.

Document the Control

Document the control for future reference. Before making any adjustments to the control, note down all of the items that the control is currently displaying. This includes items such as error messages, current temperatures and settings, and which devices should be operating as indicated by the LCD. This information is an essential step if additional assistance is required to diagnose the problem.

Isolate the Problem

Isolate the problem between the control and the system. Now that the sequence of operation is known and the system is sketched, is the control operating the proper pumps and valves at the correct times? Is the control receiving the correct signals from the system as to when it should be operating? Are the proper items selected in the menus of the control for the device that is to be operated?

Test the Contacts Voltages & Sensors

Test the contacts, voltages and sensors. Using a multimeter, ensure that the control is receiving adequate voltage to the power terminals and the demand terminals as noted in the technical data. Use the multimeter to determine if the internal contacts on the control are opening and closing correctly. Follow the instructions in the Testing the Wiring section to simulate closed contacts on the terminal blocks as required. Test the sensors and their wiring as described in the sensor Data Brochures.

Monitor the System

Monitor the system over a period of time. Select the applicable items in the Monitor menu of the control and reset them to zero. Allow the system and the control to operate over a known period of time and then record the Monitor items. Use this information to help diagnose any remaining problems.

262 **Monitor** Menu (1 of 3)

Note: To clear the recorded information in the specific *Item* field, press and hold ▲ and ▼.

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range
OUT HI		●	●	●	●	The highest recorded outdoor air temperature since this item was last cleared. This can be used to diagnose if the Outdoor Sensor 070 has been located correctly. If this reading is too high, the 070 may be located in an area that receives direct sunlight or is influenced by an exhaust vent. MODE = —1—	-67 to 149°F (-55 to 65°C)
OUT LO		●	●	●	●	The lowest recorded outdoor air temperature since this item was last cleared. This can be used to diagnose if the Outdoor Sensor 070 has been located correctly. If this reading is too high, there may not be adequate insulation behind the 070, or there may be an exhaust vent nearby. MODE = —1—	-67 to 149°F (-55 to 65°C)
S1 FIRE				●	●	The total number of running hours for Stage 1 since this item was last cleared. This total time does not include the FIRE DLY time set in the Adjust menu.	0 - 9999 hr

262 **Monitor** Menu (2 of 3)

Note: To clear the recorded information in the specific *Item* field, press and hold ▲ and ▼.

Item Field	Access Level: Section	LTD	USER	INST	ADV	Description	Range
B1 CYCL					●	The total number of firing cycles that Stage 1 has had since this item was last cleared. This item can be used in conjunction with the B1 FIRE item to determine the average cycle length of Stage 1. If the cycle length is too short, a longer differential may allow a longer cycle length.	0 - 9999
B2 FIRE				●	●	The total number of running hours for Stage 2 since this item was last cleared. This total time does not include the FIRE DLY time set in the Adjust menu.	0 - 9999 hr
B2 CYCL					●	The total number of firing cycles that Stage 2 has had since this item was last cleared. This item can be used in conjunction with the B2 FIRE item to determine the average cycle length of Stage 2.	0 - 9999
Boil HI				●	●	The highest temperature recorded at the boiler sensor since this item was last cleared.	0 to 255°F (-18 to 124°C)
Boil LO				●	●	The lowest temperature recorded at the boiler sensor since this item was last cleared.	0 to 255°F (-18 to 124°C)
Boil PUMP				●	●	The total number of Boiler Pump (P1) running hours since this item was last cleared.	0 to 9999 hr
TANK HI			●	●	●	The highest recorded temperature of the indirect Domestic Hot Water tank since this item was last cleared. DHW SENS = DHW	0 to 255°F (-18 to 124°C)
TANK LO			●	●	●	The lowest recorded temperature of the indirect Domestic Hot Water tank since this item was last cleared. DHW SENS = DHW	0 to 255°F (-18 to 124°C)
DHW P/V				●	●	The total number of DHW pump or valve running hours since this item was last cleared. DHW THRU ≠ NONE MODE = —1—	0 to 9999 hr
DHW LONG					●	This item is an adjustable warning. If a DHW demand exists continually for longer than this warning setting, the control will display a warning message. DHW THRU ≠ NONE	0:10 to 20:00 hr, OFF Default = OFF

262 **Monitor** Menu (3 of 3)

Note: To clear the recorded information in the specific *Item* field, press and hold ▲ and ▼.

Item Field	Section	Access Level: LTD	Access Level: USER	Access Level: INST	Access Level: RDV	Description	Range
ROOM HOT				●		This item is an adjustable warning. If the air temperature measured by the indoor air sensor exceeds this setting, the control will display a warning message. 10K = INDR MODE = —I—	50 to 150°F (10 to 66°C) Default = 110°F (43°C)
ROOM CLD				●		This item is an adjustable warning. If the air temperature measured by the indoor air sensor drops below this setting, the control will display a warning message. 10K = INDR MODE = —I—	0 to 80°F (-18 to 27°C) Default = 45°F (7°C)
NO HEAT				●		This item is an adjustable warning. If the boiler supply water temperature does not begin to increase within the set time, the control displays a warning message.	3 to 40 min, OFF Default = OFF
COP				●		The number of times that the microprocessor in the control has had to reset itself since this item was last cleared. The control will reset itself if it has experienced some form of interference that has disrupted its operation. This can be used to give an indication of the quality of the electrical environment that the control has been installed in.	0 - 255
NON-COP				●		The number of times that the control has been powered up since this item was last cleared. This number will increase if there is a lowering of the input voltage beyond the control's usable range. This item can be used as an indication of the quality of the power source.	0 - 255
tN1 COMM				●		The number of times that a communication error has been detected between the control and either an RTU or RDM since this item was last cleared. If the wires between the control and the RTU or RDM are run in a noisy electrical environment, this can cause interference in communication between the control and the RTU or RDM. MODE = —I—	0 - 255

262 **Error** Messages (1 of 4)

Error Displayed	Description of Error
CTRL ERR EE W	The control was unable to store a piece of information into its EEPROM. This error can be caused by a noisy power source. The control will display the error message and will continue to operate as normal. Pressing either the Menu or Item button will clear this error.
CTRL ERR ADJS	The control was unable to read a piece of information stored in the Adjust menu. Because of this, the control was required to load the factory settings into all of the items in the Adjust menu. The control will stop operation until all of the items available in the Adjust menu of the control have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
CTRL ERR MNTR	The control was unable to read a piece of information stored in the Monitor menu. Because of this, the control was required to load the factory settings into all of the items in the Monitor menu. The control will continue to display the error message until all of the items available in the Monitor menu of the control have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.

262 **Error** Messages (2 of 4)

Error Displayed	Description of Error
CTRL ERR SCHD	The control was unable to read a piece of information stored in the Schedule menu. Because of this, the control was required to load the factory settings into all of the items in the Schedule menu. The control will continue to display the error message until all of the items available in the Schedule menu of the control have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
CTRL ERR MISC	The control was unable to read a piece of information stored in the Miscellaneous menu. Because of this, the control was required to load the factory settings into all of the items in the Miscellaneous menu. The control will continue to display the error message until all of the items available in the Miscellaneous menu of the control have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
RTU ERR EE W	The RTU was unable to store a piece of information to the EEPROM. This error can be caused by a noisy power source to the control. The control will display the error message and will continue to operate as normal. Pressing either the Menu or Item button will clear this error.
RTU ERR ADJS	The RTU was unable to read a piece of information stored in the Adjust menu. Because of this, the control was required to load the factory settings into all of the items in the Adjust menu. The control will operate based on the ***Characterized Heating Curve*** settings only until all of the items available in the Adjust menu of the RTU have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
RTU ERR MNTR	The RTU was unable to read a piece of information stored in the Monitor menu. Because of this, the control was required to load the factory settings into all of the items in the Monitor menu. The control will continue to display the error message until all of the items available in the Monitor menu of the RTU have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
RTU ERR SCHD	The RTU was unable to read a piece of information stored in the Schedule menu. Because of this, the control was required to load the factory settings into all of the items in the Schedule menu. The control will continue to display the error message until all of the items available in the Schedule menu of the RTU have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
RTU ERR MISC	The RTU was unable to read a piece of information stored in the Miscellaneous menu. Because of this, the control was required to load the factory settings into all of the items in the Miscellaneous menu. The control will continue to display the error message until all of the items available in the Miscellaneous menu of the RTU have been checked by the user or installer. *Note:* Access level must be ADV in order to clear the error.
tN 1,2 TYPE	An incorrect device has been connected to the tekmar Net™ tN1/tN2 input terminal. An RTU has been connected to the control and either the *Heating Curve/Reset Ratio* DIP switch has been set to *Reset Ratio* or the control is in Mode —2—. Once the problem has been corrected, press either the Menu or Item button to clear the error message from the control.
tN 1,2 SHRT	A short circuit has been read between the tekmar Net™ tN1 / tN2 terminal and a Com terminal on the control. Either the wires leading to the tekmar NetTM tN1 / tN2 device are shorted or the polarity of the wires is reversed. Determine the cause and remove the short. The error message can be cleared by pressing either the Menu or Item button.
tN 1 OPEN	The control is no longer able to read the information that is coming from the RTU. Reconnect the RTU and press either the Menu or Item button to clear the error. If the RTU has been deliberately disconnected from the control, remove power from the control for 10 seconds and then repower the control in order to clear the error message.
OUTDOOR SHRT	The control is no longer able to read the Outdoor sensor due to a short circuit. In this case the control assumes an outdoor temperature of 32˚F (0˚C) and continues operation. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.

262 **Error** Messages (3 of 4)

Error Displayed	Description of Error
OUTDOOR OPEN	The control is no longer able to read the Outdoor sensor due to an open circuit. In this case the control assumes an outdoor temperature of 32˚F (0˚C) and continues operation. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
Boil SUP SHRT	The control is no longer able to read the Boiler Supply sensor due to a short circuit. The control will not operate the boiler contacts. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
Boil SUP OPEN	The control is no longer able to read the Boiler Supply sensor due to an open circuit. The control will not operate the boiler contact. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K SHRT	The control is no longer able to read the 10K input because of a short circuit. The control will continue to operate as if there was nothing connected to the 10K input. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K OPEN	The control is no longer able to read the 10K input because of an open circuit. The control will continue to operate as if there was nothing connected to the 10K input. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. If the 10K terminal was deliberately left unused, set the 10K item to NONE.
DHW SHRT	The control is not able to read the DHW sensor because of a short circuit. The control does not operate the DHW while the DHW sensor is shorted. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
DHW OPEN	The control is not able to read the DHW sensor because of an open circuit. The control does not operate the DHW while the DHW sensor is open circuit. Locate and repair the problem as described in the Data Brochure D 070. If a DHW sensor was deliberately not installed, set the DHW SENS item to NONE. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
RTU SENS SHRT	The air sensor in the RTU is being read as a short circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. To clear the error message from the control, press either the Menu or Item button.
RTU SENS OPEN	The air sensor in the RTU is being read as an open circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. To clear the error message from the control, press either the Menu or Item button.
RTU REM 1 SHRT	The Remote Sensor 1 attached to the RTU is being read as a short circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 1 ≠ NONE
RTU REM 1 OPEN	The Remote Sensor 1 attached to the RTU is being read as an open circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 1 ≠ NONE

262 **Error** Messages (4 of 4)

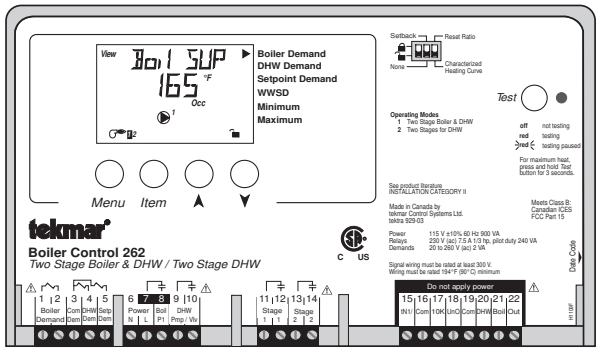
Error Displayed	Description of Error
RTU REM2 SHRT	The Remote Sensor 2 attached to the RTU is being read as a short circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 2 ≠ NONE
RTU REM2 OPEN	The Remote Sensor 2 attached to the RTU is being read as an open circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 2 ≠ NONE
RTU REM3 SHRT	The Remote Sensor 3 attached to the RTU is being read as a short circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 3 ≠ NONE
RTU REM3 OPEN	The Remote Sensor 3 attached to the RTU is being read as an open circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REM 3 ≠ NONE
DHW DMD ERR	This error message is displayed if an external DHW demand (aquastat) and an internal demand (sensor) are received at the same time. As long as this error exists, the control does not provide DHW operation. Locate and repair the problem. To clear the error message from the control after the error has been repaired, press either the Menu or Item button.
DHW DMD LONG	This warning message is displayed if a DHW demand exists continually for longer than the DHW LONG setting in the Monitor Menu. If DHW priority is set, the DHW priority is overriden. To clear this warning, press either the Menu or Item button.
ROOM HOT	This warning message will be displayed if the air temperature sensed by an indoor air sensor exceeds the setting of the ROOM HOT item in the Monitor menu. The control will continue to operate as normal with this warning. To clear this warning, press either the Menu or Item button.
ROOM COLD	This warning message will be displayed if the air temperature sensed by an indoor air sensor is below the setting of the ROOM CLD item in the Monitor menu. The control will continue to operate as normal with this warning. To clear this warning, press either the Menu or Item button.
NO HEAT Boil	This warning message will be displayed if the boiler supply does not increase to the target temperature within a set time. The time limit is set using the NO HEAT item in the Monitor menu. To clear this warning, press either the Menu or Item button.

Notes

Technical Data

Boiler Control 262 *Two Stage Boiler & DHW / Two Stage DHW*

Literature	—	D 262, A 262's, D 001, D 070, E 003, U 262.
Control	—	Microprocessor PID control; This is **not a safety (limit) control**.
Packaged weight	—	4 lb. (1810 g), Enclosure A, blue PVC plastic
Dimensions	—	6-5/8" H x 7-9/16" W x 2-13/16" D (170 x 193 x 72 mm)
Approvals	—	CSA C US, CSA/UL 61010-1, meets Class B: ICES & FCC Part 15
Ambient conditions	—	Indoor use only, 36 to 104°F (2 to 40°C) RH ≤80% to 88°F (31°C), down to 50% above 88°F (31°C) Altitude <6560 ft (2000 m) Installation Category II, Pollution Degree 2
Power supply	—	115 V (ac) ±10%, 60 Hz, 900 VA
Relays	—	230 V (ac) 7.5 A 1/3 hp, pilot duty 240 VA
Demands	—	20 to 260 V (ac) 2 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 #: 032, 040, 062, 063, 070, 071, 072, 073, 076, 077, 084, 369.



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 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.

Caution The nonmetallic enclosure does not provide grounding between conduit connections. Use grounding type bushings and jumper wires.

Attention Un boîtier nonmétallique n'assure pas la continuité électrique des conduits. Utiliser des manchons ou des fils de accord spécialement conçus pour la mise á la terre.

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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All specifications are subject to change without notice.
Printed in Canada on recycled paper. D 262 -12/08