tekmar® - Data Brochure

Universal Reset Control 363

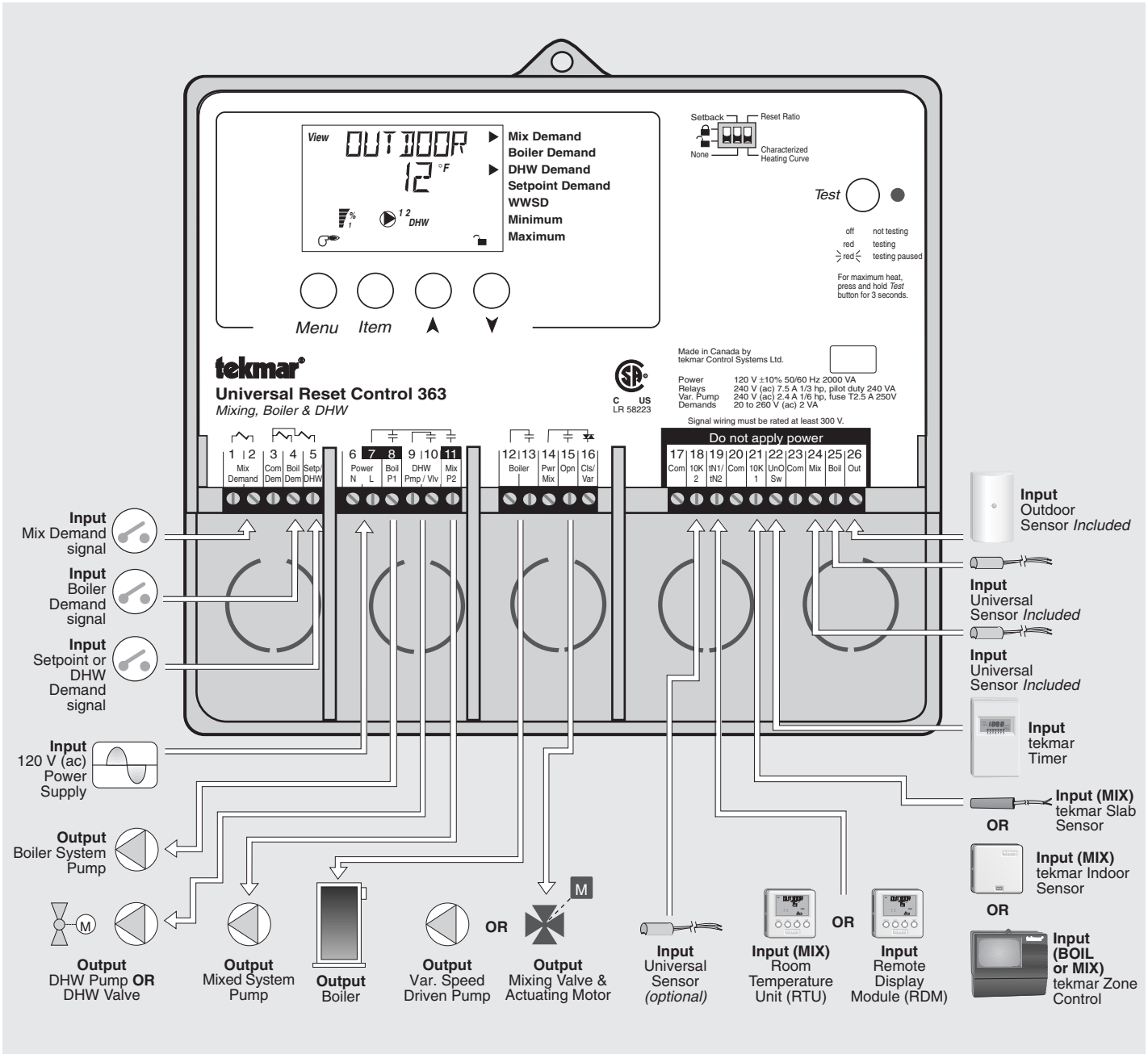
D 363

06/99

The Universal Reset Control 363 is a microprocessor based control designed to maximize the comfort and efficiency provided by a hydronic heating system. The control automatically adjusts the boiler and mixed loop water temperatures that are delivered to the heating system by using outdoor reset. For a mixing device, the 363 can use a variable speed driven wet-rotor circulator or a floating action driven mixing valve. The 363 is capable of controlling an indirect Domestic Hot Water (DHW) storage tank and / or a setpoint load. The temperature of individual zones can be controlled by connecting a conventional thermostat system or a tekmar Zone Control to the 363.

The 363 control includes a large Liquid Crystal Display (LCD) in order to view system status and operating information. The LCD and user key pad are used to set the control's adjustment and to monitor pump and boiler running hours, DHW tank temperatures, outdoor and system high and low temperatures, boiler firing cycles, plus many other useful items.

Several energy saving features have been incorporated into the 363 such as Warm Weather Shut Down (WWSD), DHW post purge, system setback, DHW priority, Morning Boost, Soft Start and an automatic differential for boiler control. The 363 also has a unique feature that allows the control to supply heat to the mixed system from either the boiler or a thermal storage tank.



tekmar Copyright © D 363 -06/99

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 five 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 read the sub sections that apply to your installation.

The *Control Settings* section (starting at DIP Switch Settings) of this brochure describes the various items that are adjusted and displayed by the control. The control functions of each adjustable item are described in the *Sequence of Operation*.

Table of Contents

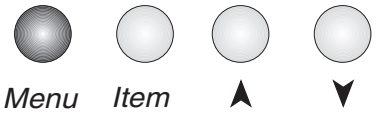
Reference Material: Essay E 003: Characterized Heating Curve and Reset Ratio
E 021: Mixing Methods and Sizing of Variable Speed Injection Pumps

User Interface

The 363 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 363 has four push buttons (Menu, Item, ▲, ▼) for selecting and adjusting settings. As you program your control, record your settings in the Adjust Menu table which is found in the second half of this brochure.

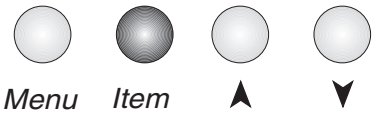
Menu

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.



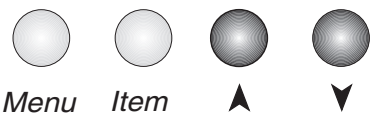
Item

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.



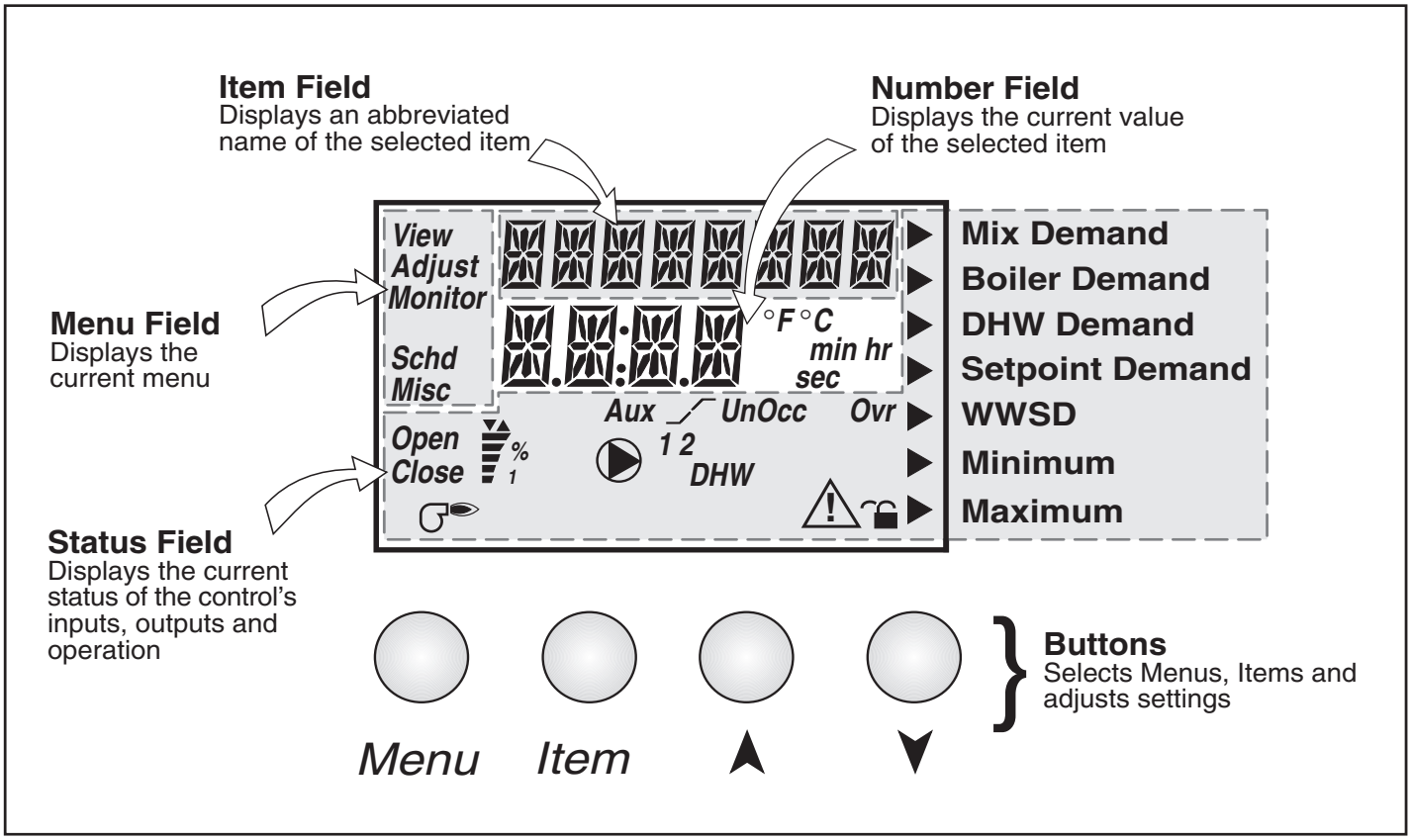
Adjust

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 and Pointers fields 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

Open *Close*	**Open / Close** Displays when the actuator is opening or closing the mixing valve.	*UnOcc*	**UnOccupied Schedule** Displays when the control is in unoccupied mode.
% 1	**Mixing Device Output Scale** Shows output of injection pump or mixing valve. Arrows show whether the output is increasing or decreasing.	*Occ*	**Occupied Schedule** Displays when the control is in occupied mode.
	Burner Displays when the boiler relay is turned on.	*Ovr*	**Override** Displays when the control is in override mode.
1 2	**Pump** Displays when the boiler pump 1 and / or mixing pump 2 is operating.		**Warning** Displays when an error exists or when a limit has been reached.
DHW	**DHW Pump / Valve** Displays when the DHW pump or valve is on.		**Lock - Unlock** Displays whether the access levels are locked or unlocked.
Aux	**Storage Operation** Displays when the variable speed driven injection pump is drawing heat from the storage tank.	*°F, °C, sec, min, hr*	**°F, °C, sec, min, hr** Units of measurement.
	Boost Displays when the control is in boost after setback.	▶	**Pointer** Displays the control operation as indicated by the text.

tekmar Copyright © D 363 -06/99

Section A —General Operation

POWERING UP THE CONTROL

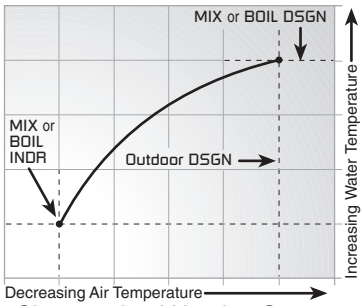
When the Universal Reset Control 363 is powered up, the control displays the control type number in the LCD for 2 seconds. Next, the software version is displayed for 2 seconds. Finally, the control enters into the normal operating mode and the LCD defaults to displaying the current outdoor air temperature.

CHARACTERIZED HEATING CURVE OR RESET RATIO

The 363 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

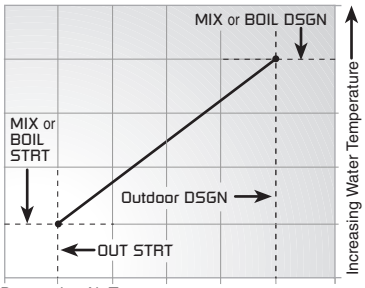
The *Characterized Heating Curve* method of controlling the supply water temperature based on outdoor air temperature and optionally indoor temperature is the most accurate. The control takes into account the type of terminal unit that the system is using. Since different types of terminal units transfer 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.



Characterized Heating Curve

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*.



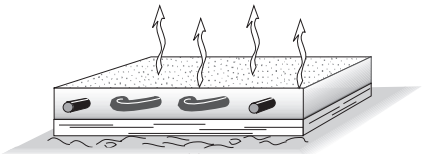
Reset Ratio

TERMINAL UNITS (Boil TERM / MIX TERM)

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 363 provides for selection between six different terminal unit types: two types of hydronic radiant floor heat, fancoil, fin–tube convector, radiator, and baseboard.

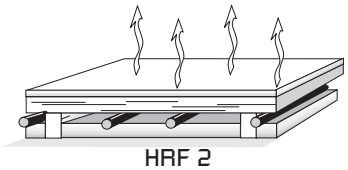
Hydronic Radiant Floor (HRF 1)

HRF1 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 1

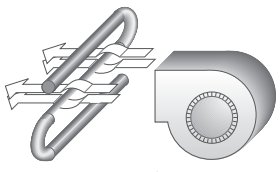
Hydronic Radiant Floor (HRF 2)

HRF2 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.


HRF 2

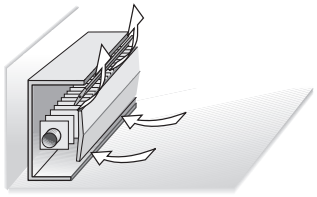
Fancoil (COIL)

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.


COIL

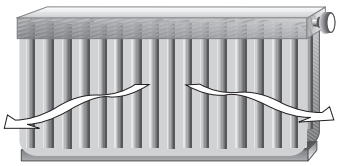
Fin–tube Convector (CONV)

A convector terminal unit is made up of a heating element with fins on it. 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.


CONV

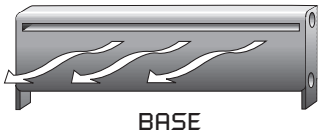
Radiator (RAD)

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.


RAD

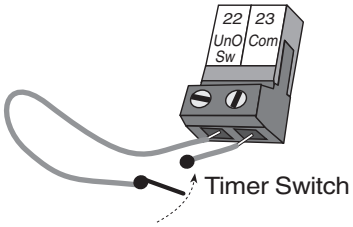
Baseboard (BASE)

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


BASE

SETBACK (UnOccupied)

To provide greater energy savings, the 363 has a setback capability. With setback, the supply water temperatures in the system are reduced when the building is not used (AWAY) or when the building is UnOccupied. By reducing water temperatures, 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 363 into an UnOccupied mode. Any time the *UnO Sw* (22) and the *Com* (23) 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 363 adjusts the supply water temperature(s) based on the *UnOcc* settings made in the control.

Internal Overrides

The 363 has a number of setback overrides that are selected through the *Schd* Menu. These setback overrides have priority over any external setback signal. Any time an override is in effect, the *Ovr* segment displays in the LCD.

Temporary (TMPY)

If a temporary override is selected, the 363 operates in the selected override mode for 3 hours. Once completed, the control reverts to the previous operation.

Permanent (PERM)

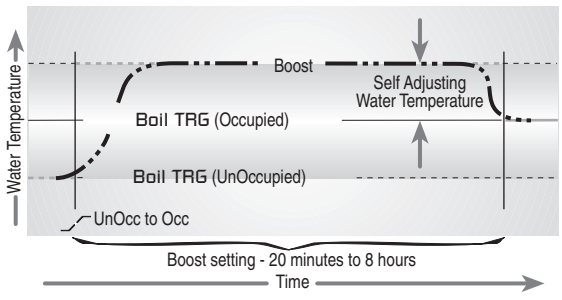
If a permanent override is selected, the 363 operates in the selected override mode until a new override is selected.

Away (AWAY)

If the AWAY override is selected, the 363 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.

BOOSTING (Boil BST / MIX BST)

When the control changes from the *UnOccupied* to the *Occupied* mode, it enters into a *Boosting* mode. In this mode, the supply water temperatures to the system are raised above their normal values for a period of time to provide a faster recovery from the building's setback temperature. 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*, and not needed or available 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.

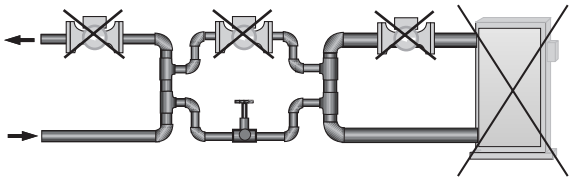
tekmar Copyright © D 363 -06/99

SOFT START (SOF STRT)

The SOF STRT function allows the 363 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.

WARM WEATHER SHUT DOWN (WWSD)

When the outdoor air temperature rises above the WWSD setting, the 363 turns on the *WWSD* pointer in the display. When the control is in Warm Weather Shut Down, the *Mixing Demand* and *Boiler Demand* pointers are displayed if there is a demand. However, the control does not operate the heating system to satisfy these demands. The control does respond to either a *DHW Demand* or a *Setpoint Demand* and operates as described in Section C.



EXERCISING (EXERCISE)

The 363 has a built-in pump and valve exercising function. The exercising period is adjustable and comes factory set at 70 hours. If a pump or valve 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 a pump or valve seizing during a long period of inactivity. In the case where a mixing valve is being used as the mixing device, the 363 ensures that the valve operates over its entire range at least once each exercising period.

Note: The exercising function does not work if power to the control, valves or pumps 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* (4) and *Com Dem* (3) terminals. Once voltage is applied, the *Boiler Demand* pointer is displayed in the LCD. If the 363 is not in WWSD, it closes the Boiler Pump contact which starts the boiler pump. The control turns on the Boil Pl segment in the LCD. The 363 calculates a Boil TRG supply temperature based on the outdoor air temperature and settings. The 363 then fires the boiler, if required, to achieve and / or maintain the target supply temperature.

BOILER START (Boil STRT) *(RESET RATIO)*

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.

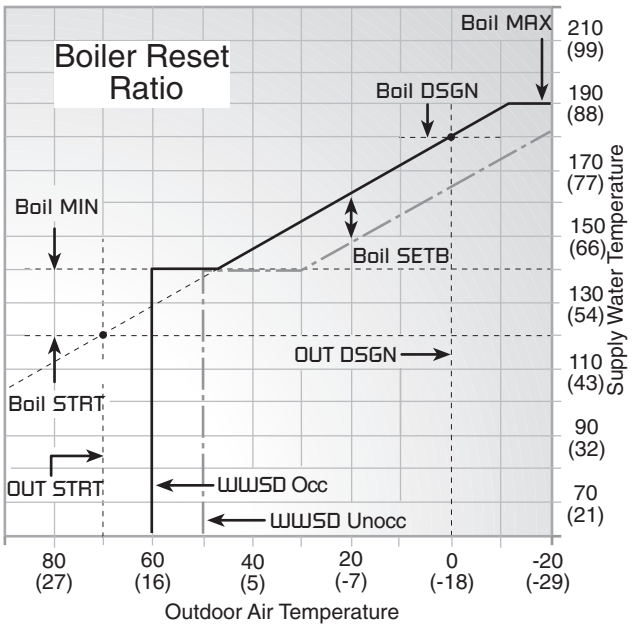
OUTDOOR START (OUT STRT) *(RESET RATIO)*

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.



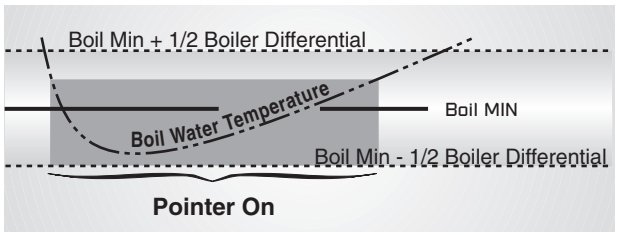
BOILER DESIGN (Boil DSGN) (*RESET RATIO & CHARACTERIZED HEATING CURVE*)

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

BOILER MINIMUM (Boil MIN)

(*RESET RATIO & CHARACTERIZED HEATING CURVE*)

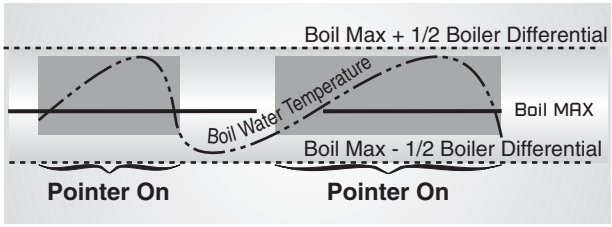
The Boil MIN is the lowest water temperature that the control is allowed to use as a boiler target (Boil TRG) temperature. During mild conditions, if the 363 calculates a Boil TRG temperature that is below the Boil MIN setting, the Boil TRG temperature is adjusted to be at least the Boil MIN setting. 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 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 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 363 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 (Boil SETB) (*RESET RATIO*)

The Boil SETB is the amount that the boiler supply water temperature is reduced when the 363 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 original heat loss calculations 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*.

BOILER ROOM OCC & UNOCC (Boil ROOM)

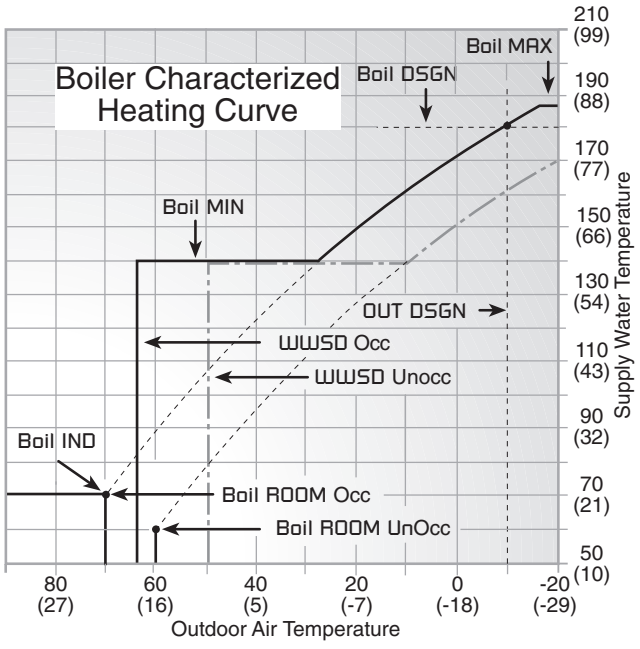
(*CHARACTERIZED HEATING CURVE*)

The Boil ROOM is the desired room temperature for the boiler zones 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 Boil ROOM setting increases or decreases the amount of heat available to the building. If the *Setback / None* DIP switch is set to *Setback*, a Boil ROOM setting must be made for both the *Occupied* and *UnOccupied* modes.

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. 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.



tekmar Copyright © D 363 -06/99

DIFFERENTIAL (Boil DIFF)

An on / off heat source such as a boiler must be operated with a differential to prevent short cycling. This differential is centered around the Boil TRG temperature. If the boiler supply temperature drops 1/2 of the differential setting below the Boil TRG temperature, the 363 closes the boiler contact to fire the boiler. If the boiler supply temperature rises 1/2 of the differential setting above the Boil TRG temperature, the 363 opens the boiler contact to turn off the boiler. With the 363, either a fixed or automatic differential setting is selected. If the AUTO differential is selected, the 363 automatically adjusts the boiler differential setting under the current load conditions to minimize short cycling.

BOILER OPERATION

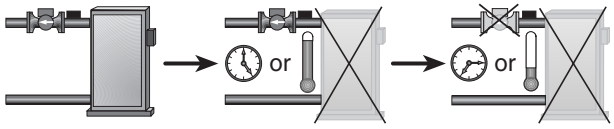
When the 363 determines that boiler operation is required, the *Boiler* contact terminals (12 and 13) close. While the boiler contact is closed, the burner segment in the LCD is displayed.

BOILER PUMP (P1) OPERATION

The *Boiler Pump* contact (P1, terminal 8) closes whenever there is a boiler demand and the 363 is not in WWSD. The boiler pump contact also closes whenever the 363 receives a *Mixing Demand* and is not in WWSD. Refer to the Mixing Reset Section D for more information. For boiler pump contact operation during either DHW or Setpoint operation, refer to the DHW / Setpoint Section C.

BOILER PURGE (PURGE P1)

After the boiler demand is satisfied, the 363 continues to operate the *Boiler Pump* (P1, terminal 8) for a period of time. The length of time that the boiler pump continues to run is adjustable (PURGE P1). This setting allows any excess heat to be purged 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 Boil SUP temperature has dropped more than a differential below the Boil MIN setting. However, there must not be any motorized valves that will restrict water flow through the pump and boiler.



FIRE DELAY (FIRE DLY)

The FIRE DLY is the delay time that may happen between the time that the 363 closes the boiler contact and the burner fires. This delay is usually the result of a burner pre-purge or other forms of time delay built into the burner's safety circuits.

BOILER MASS (Boil MASS)

The Boil MASS setting allows the 363 to adjust to different types of heat sources depending on their thermal mass.

Light (LITE)

The LITE setting is selected if the boiler that is being used has a low thermal mass. This means that the boiler 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. This is typical of many copper fin-tube boilers.

Medium (MED)

The MED setting is selected if the boiler that is being used has a medium thermal mass. This means that the boiler 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.

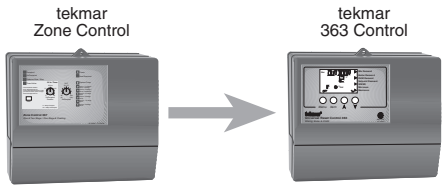
Heavy (HEVY)

The HEVY setting is selected if the boiler that is being used has a high thermal mass. This means that the boiler 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.

Section B2 —Alternate Boiler Demands

10K 1 ZONE CONTROL (10K 1 = Boil)

The 10K 1 item selects the type of device to be connected. Set the 10K 1 item to Boil to add a tekmar Zone control to the boiler loop. Control of boiler zones is then provided by a tekmar Zone Control connected to the 363. The Zone Control provides its own internal boiler demand to the 363. In this case, there is no need to provide an external boiler demand as described earlier in Section B1. The Zone Control is also capable of adjusting the Boil TRG temperature, if required, to provide improved building occupant comfort and system performance.

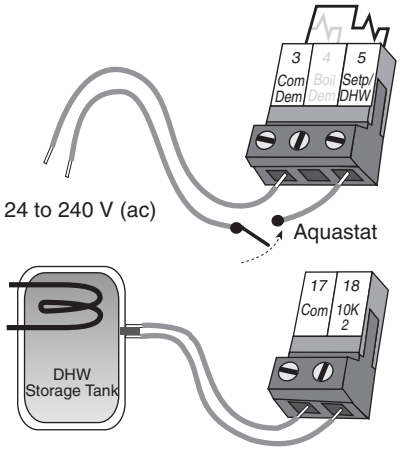


Section C —Domestic Hot Water (DHW) and Setpoint

Section C1 —Domestic Hot Water (DHW)

DHW DEMAND

A *DHW demand* is generated on the 363 by one of two methods: either an external DHW demand from an aquastat or an internal demand from a tekmar sensor.



External Demand (10K 2 = NONE)

The 363 registers an external demand for DHW when a voltage between 24 and 240 V (ac) is applied across the *Setp/DHW* and the *Com Dem* terminals (5 and 3). Either a DHW aquastat or setpoint control is used as a switch in the DHW demand circuit. Once the 363 detects a DHW demand, the *DHW Demand* pointer turns on in the LCD and the control operates as described below.

Internal Demand Sensor (10K 2 = DHW)

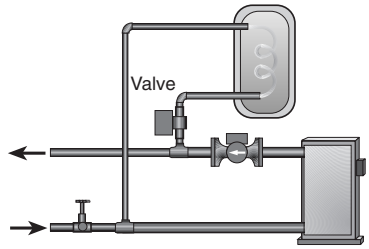
If the 10K 2 setting is selected as DHW, the 363 looks for a DHW sensor connected to the *10K 2* and the *Com Sen* terminals (18 and 17). The DHW TANK setting is used to set the desired indirect DHW tank temperature.

When 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 363 can control the DHW temperature with more accuracy than when using an aquastat.

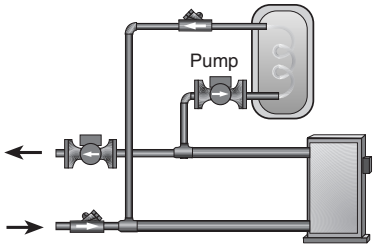
DHW DEVICE (DHW THRU)

Once the 363 has received 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 Valve (VALV)

If VALV is selected as the DHW device and there is a *DHW demand*, the 363 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 363 operates the boiler to provide a sufficient boiler supply temperature to the DHW tank.



DHW Pump (PUMP)

If PUMP is selected as the DHW device, the 363 assumes that the DHW pump provides adequate flow through both the DHW tank heat exchanger and the boiler. To provide heat to the DHW tank, the 363 closes the *DHW Pmp / Vlv* contact (9 and 10) and operates the boiler to provide a sufficient Boil SUP temperature to the DHW tank. If using a primary loop with the DHW tank piped in primary / secondary, select DHW VALV.

BOILER TARGET DURING DHW GENERATION (Boil DTRG)

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

External Demand (10K 2 = 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 (10K 2 = DHW)

If the control receives a *DHW demand* from a DHW sensor attached to the *10K 2* and the *Com Sen* terminals (18 and 17), 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 363 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*.

tekmar Copyright © D 363 -06/99

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*.

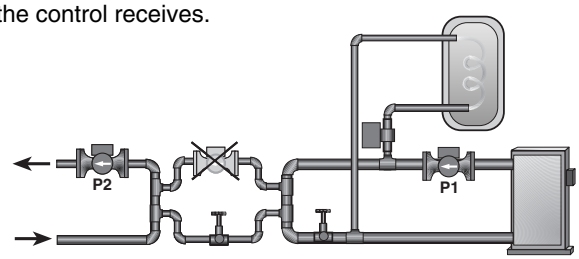
Section C2 —DHW Priority

DHW PRIORITY

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 faster recovery of the DHW tank. The 363 has a number of features that it can use when dealing with DHW priority. The features available depend on the type of DHW device that is being used and the type of *DHW Demand* the control receives.

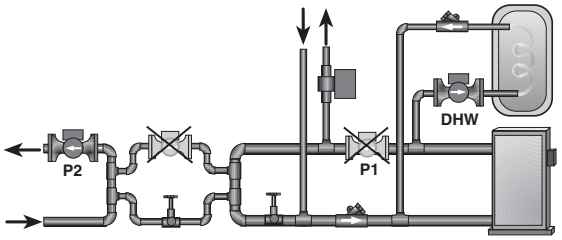
Mixing Priority **(DHW PRI = MIX)**

It can be selected that the DHW tank has priority over the mixing zones. If this option is chosen, the mixing device is throttled back on a call for DHW. The *Mix P2* pump continues to operate based on the *Mix Demand*. By reducing the mixing device output, more heat is directed to the DHW tank. The boiler zones continue to operate without change. This setting is available if DHW THRU is set to PUMP or VALV.



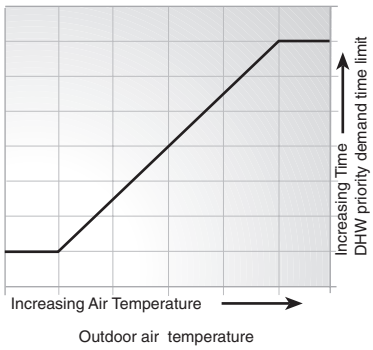
Boiler and Mixing Priority **(DHW PRI = B+M)**

It can be selected that the DHW tank has priority over the boiler and mixing zones. If this option is chosen, the mixing device is throttled back and the boiler pump (P1) turns off on a call for DHW. This setting is available only if a pump is selected as the DHW device (DHW THRU set to PUMP). Ensure that the flow rate of the DHW pump is adequate for both the DHW heat exchanger and the boiler.



DHW PRIORITY OVERRIDE

To prevent the building from cooling off too much or the possibility of a potential freeze up during DHW priority, the 363 limits the amount of time for DHW priority. As the outdoor air temperature becomes colder, the length of time that the 363 provides DHW priority is reduced. Once the allowed time for priority has elapsed, the 363 overrides the DHW priority and operates DHW and heating simultaneously.

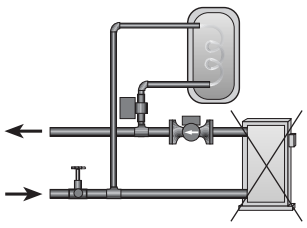


CONDITIONAL DHW PRIORITY

If the boiler supply temperature is maintained at or above the required temperature during DHW generation, this indicates that the boiler 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.

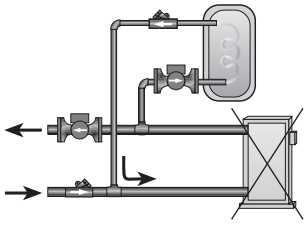
DHW POST PURGE

After the *DHW Demand* is removed, the 363 performs a purge on the boiler. The 363 shuts off the boiler and continues to operate either the DHW pump or the DHW valve and the boiler pump. This purges the residual heat from the boiler into the DHW tank. The 363 continues this purge for a maximum of four minutes or until the boiler supply temperature drops 20˚F (11˚C) below the DHW Boil TRG temperature. The 363 also stops the purge if the boiler supply temperature drops below the current Boil TRG temperature.



DHW MIXING PURGE

After DHW operation, the boiler 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 after DHW priority, the 363 shuts off the boiler, 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.

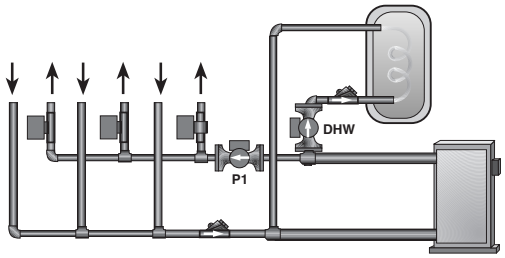


Section C3 —DHW with Low Temperature Boilers (without Mixing)

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 supply 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 363 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 B + M, and Boil MIN must be set to OFF.

On a call for DHW, the 363 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. If the *DHW Demand* is not satisfied within the allotted time, the boiler shuts off and the boiler's heat is purged into the DHW tank.



Once the boiler supply temperature is sufficiently reduced, the DHW pump shuts off. Then 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 363 shuts off the heating system and provides heat to the DHW tank once again.

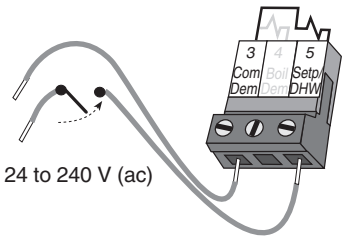
For correct operation, close attention must be paid to the mechanical layout of the system. When the 363 turns off the Boiler Pump (P1), flow to the heating system must stop. If flow is not stopped, the temperature in the heating system can exceed the maximum desired temperature and can result in damage to the heating system.

Section C4 —Setpoint

The 363 can handle setpoint loads which are high temperature loads connected to the boiler loop that are not heating loads or DHW. For this feature to be available, either a DHW sensor must be used or the DHW THRU item is set to NONE. If an external DHW demand is used as described in Section C1, you cannot use the setpoint feature.

SETPOINT DEMAND

The 363 registers a *Setpoint Demand* when a voltage between 24 and 240 V (ac) is applied across the *Setp / DHW* and the *Com Dem* terminals (5 and 3). Once voltage is applied, the setpoint demand pointer turns on in the LCD. The control operates the boiler to maintain at least the boiler supply temperature as set by the SETPOINT *Occ* setting. 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.



BOILER TARGET DURING SETPOINT (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 363 has a *Setpoint Demand*.

SETPOINT SETBACK (SETPOINT UnOcc)

If the 363 is placed into setback, the *Setpoint Dem* 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 363 operates the SETPOINT load at the *Occupied* setting.

SETPOINT PRIORITY (SETP PRI = B+M)

For setpoint loads to have priority over the Boiler and Mixing zones, set SETP PRI to B + M. If this option is chosen, the output from the mixing device is suspended and the Boiler Pump (P1) turns off during a *Setpoint Demand*.

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 363 limits the amount of time for setpoint priority. As the outdoor air temperature becomes colder, the length of time the 363 provides setpoint priority is reduced. Once the allowed time for priority has elapsed, the 363 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 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.

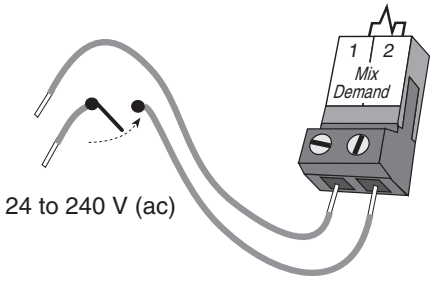
tekmar Copyright © D 363 -06/99

Section D —Mixing Reset

Section D1—General Mixing Operation

MIXING DEMAND

A mixing demand is generated by applying a voltage between 24 and 240 V (ac) across the *Mix Demand* terminals (1 and 2). Once voltage is applied, the *Mix Demand* pointer is displayed in the LCD. If the 363 is not in WWSD, the 363 closes the *Mix P2* contact and the *Boil P1* contact. The *c*ontrol turns on the boiler pump and mixing pump segments in the LCD. The 363 calculates a MIX TRG supply temperature based on the outdoor air temperature and settings. If required, the 363 operates the boiler in order to provide heat to the mixing device.



MIXING START (MIX STRT) *(RESET RATIO)*

The MIX STRT temperature is the mixing supply water temperature that the heating system requires when the outdoor air temperature equals the OUT STRT air temperature.

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

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

OUTDOOR DESIGN (OUT DSGN)

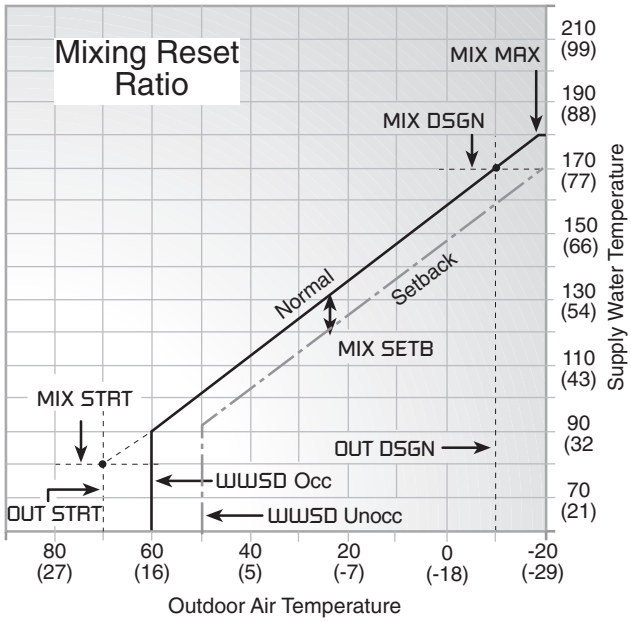
(RESET RATIO & CHARACTERIZED HEATING CURVE)

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.

MIX DESIGN (MIX DSGN)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

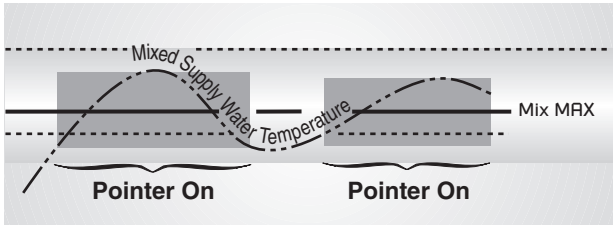
The MIX DSGN temperature is the supply water temperature required to heat the mixing zones when the outdoor air is as cold as the Outdoor Design temperature.



MIXING MAXIMUM (MIX MAX)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

The MIX MAX sets the highest water temperature that the control is allowed to calculate as the MIX TRG temperature. If the control does target the MIX MAX setting, and the MIX SUP temperature is within 5˚F (3˚C) of the MIX MAX, the *Maximum* pointer is displayed in the LCD while either the MIX TRG temperature or the MIX SUP temperature is being viewed.



WARM WEATHER SHUT DOWN (WWSD) OCC & UNOCC

(RESET RATIO & CHARACTERIZED HEATING CURVE)

When the outdoor air temperature rises above the WWSD setting, the 363 turns on the *WWSD* pointer in the display. When the control is in Warm Weather Shut Down, the *Mix 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.

MIXING SETBACK (MIX SETB)

(RESET RATIO)

The MIX SETB is the amount that the mixing supply water temperature is reduced when the 363 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*.

MIXING INDOOR (MIX INDR)

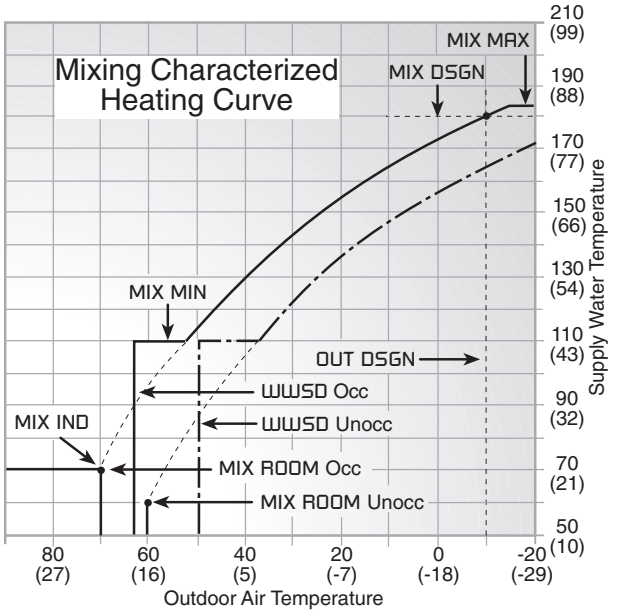
(CHARACTERIZED HEATING CURVE)

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

MIXING MINIMUM (MIX MIN)

(CHARACTERIZED HEATING CURVE)

The MIX MIN is the lowest temperature that the control is allowed to use as a MIX TRG temperature. During mild conditions, if the 363 calculates a MIX TRG temperature that is below the MIX MIN setting, the MIX TRG temperature is adjusted to match the MIX MIN setting. During this condition, the *Minimum* pointer turns on in the LCD when either the MIX TRG temperature or the MIX SUP temperature is being viewed.



If either an Indoor Sensor or a Room Temperature Unit (RTU) are used and the 363 is operating at the MIX MIN temperature, the Mixing Pump (P2) is cycled using Pulse Width Modulation (PWM) with a 15 minute cycle length. By cycling the Mixing Pump (P2) and controlling the flow of supply water, the control provides an average supply water temperature to the mixing system. This average temperature is equal to the original MIX TRG. This minimizes overheating of the zone while the control is operating at the MIX MIN temperature.

MIX ROOM OCC & UNOCC (MIX ROOM)

(CHARACTERIZED HEATING CURVE)

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

MIXING TARGET TEMPERATURE (MIX TRG)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

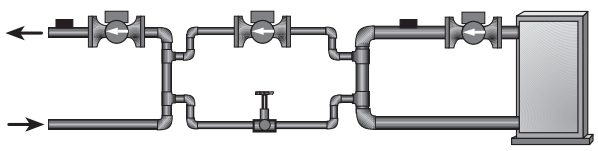
The MIX TRG temperature is determined from either the *Characterized Heating Curve* or the *Reset Ratio* settings and the outdoor air temperature. The control displays the temperature that it is currently trying to maintain as the mixing supply temperature. If the control does not presently have a requirement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

MIXING PUMP (P2) OPERATION

The Mixing Pump (P2) contact (terminal 11) closes whenever there is a *Mixing Demand* and the 363 is not in WWSD. During WWSD, the Mixing Pump is operated based on the EXERCISE setting in the *Adjust* Menu .

BOILER MINIMUM PROTECTION (Boil MIN)

The 363 is capable of providing boiler protection from cold mixing system return water temperatures. If the boiler supply temperature is cooler than the Boil MIN setting while the boiler is firing, the 363 reduces the output from the mixing device. This limits the amount of cool return water to the boiler and allows the boiler supply temperature to recover.



Section D2 —Mixing Device

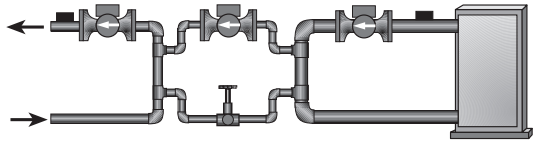
MIXING DEVICE SELECTION (MIXING)

The 363 can supply a lower water temperature to part of the heating system by varying the speed of an injection pump or modulating a mixing valve. This selection is made under the MIXING item in the *Adjust Menu*.

tekmar Copyright © D 363 -06/99

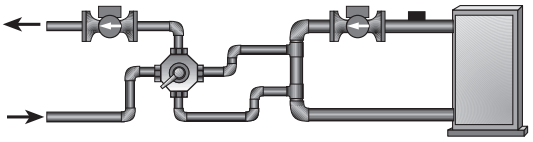
VARIABLE SPEED INJECTION (MIXING = VAR)

A standard wet rotor circulator is connected to the 363 on the *Cls / Var* terminal (16). The 363 increases or decreases the power output to the circulator when there is a *Mix Demand*. The circulator speed varies to maintain the correct mixed supply water temperature at the mix sensor. For correct sizing and piping of the variable speed injection driven circulator, refer to essay E 021. A visual indication of the current variable speed output is displayed in the LCD in the form of a segmented bar graph. Two small indicators at the top of the graph indicate whether the output is increasing or decreasing.



FLOATING ACTION (MIXING = FLOT)

A floating action actuator motor is connected to the 363 on the *Opn* and *Cls / Var* terminals (15 and 16). The 363 pulses the actuator motor open or close to maintain the correct supply water temperature at the mix sensor when there is a *Mix Demand*. The mixing valve that the actuator is connected to can be either a 2-way, 3-way or 4-way valve. A visual indication as to whether the control is currently opening or closing the mixing valve is displayed in the LCD with the words **Open** and **Close**. Also, a visual indication of the current position of the valve is displayed in the LCD in the form of a segmented bar graph.



STORAGE (MIXING = STOR)

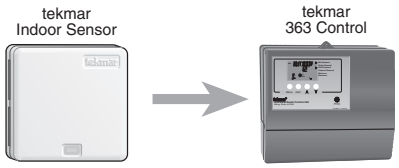
Refer to Section E on storage systems for a description of this selection.

Section D3 —Alternate Mixing Demands

In addition to using conventional thermostats to provide a mixing demand as described in Section D1, the 363 can use a number of other methods to provide a *Demand*.

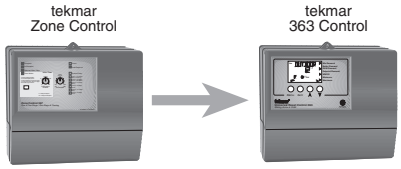
10K 1 INDOOR SENSOR (10K 1 = INDR)

Set the 10K 1 item to INDR to add an indoor sensor for temperature control of a single zone mixing system. The indoor sensor is connected to the *Com* and *10K 1* terminals (20 and 21). In addition, power must be applied to the *Mix Demand* terminals (1 and 2) as described in Section D1. With the indoor sensor connected, the 363 is able to sense the actual room temperature. With this information, the 363 provides a more constant water flow through the mixing system. At the same time, indoor feedback fine tunes the supply water temperature in the mixing system to prevent over heating or under heating. To adjust the room temperature for the mixing zone, use the MIX ROOM *Occupied* or *UnOccupied* setting in the Adjust menu at the control.



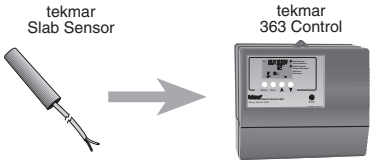
10K 1 ZONE CONTROL (10K 1 = MIX)

Set the 10K 1 item to MIX to add indoor temperature feedback control of multiple mixing zones. Control of mixing zones is provided by connecting a tekmar zone control to the 363. The zone control provides its own internal mixing demand to the 363. In this case, there is no need to provide an external *Demand* as described earlier in Section D1. The zone control is capable of automatically adjusting the MIX TRG temperature to improve building occupant comfort and system performance.



10K 1 SLAB SENSOR (10K 1 = SLAB)

Set the 10K 1 item to SLAB to add a slab sensor for temperature control of a single zone mixing system. The 363 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 1* terminals (20 and 21). Power must be applied to the *Mix Demand* terminals (1 and 2) as described in Section D1. With the slab sensor connected, the 363 will limit the mixing supply temperature in order to maintain the slab sensor between the SLAB MIN and SLAB MAX settings.



Slab Minimum (SLAB MIN)

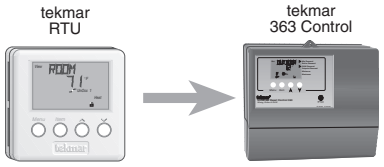
The SLAB MIN sets the minimum allowed core temperature of the slab as long as the control is not in a WWSD. Caution should be used when adjusting the SLAB MIN setting as this may lead to overheating of the zone during mild conditions. If the AWAY setting is selected in the Schedule menu, the 363 ignores the SLAB MIN setting.

Slab Maximum (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) 062, 063

If the mixing 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 (17 and 19). In addition, power must be applied to the *Mix Demand* terminals (1 and 2) as described in Section D1. With the RTU connected, the 363 measures the actual room temperature. With this information, the 363 provides a constant water flow through the mixing system. At the same time, indoor temperature feedback fine tunes the supply water temperature in the mixing 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 as described in the RTU data brochure.



Section E —Storage

Section E1
General Storage Operation

Section E2
With a Tank Sensor

Section E3
Without a Tank Sensor

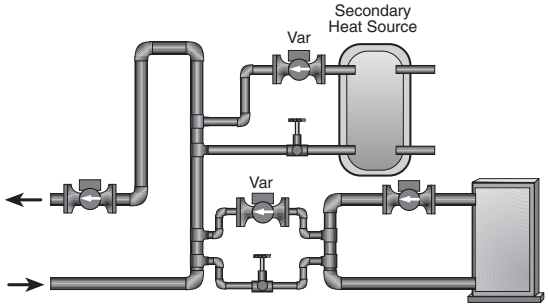
Section E1 —General Storage Operation

MIXING STORAGE (MIXING = STOR)

By using the 363, it is possible to incorporate a thermal storage tank into the mixed side of the heating system. This storage tank could be charged with heat using an alternate heat source such as solar, wood, or off peak electrical.

Set the MIXING item to STOR. When using the STOR selection, it is not possible to use a floating action actuator as the mixing device; Variable speed injection pumps must be used. A variable speed injection pump is used to draw heat from the storage tank and inject it into the mixed system loop. Pipe the storage tank and boiler loop variable speed driven mixing pump as illustrated. Whenever possible, the 363 uses the heat in the storage tank to satisfy the mixing system. However, if the storage tank is not able to satisfy the mixing system, the 363 uses the variable speed injection pump connected to the boiler loop. This pump provides heat to the mixing system from the boiler.

Note: A relay must be installed as described in the wiring section for the 363 to switch the variable speed output signal between the storage tank injection pump and the boiler loop injection pump.



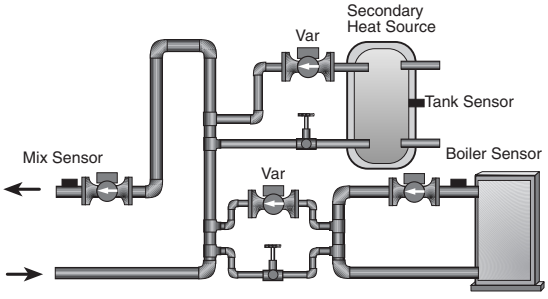
Section E2 —With a Tank Sensor

10K 2 STORAGE (10K 2 = STOR)

For the best operation of a system that has a thermal storage tank, it is recommended to use a tekmar 10K sensor in the storage tank. The sensor measures the tank temperature and connects to the 363 on the *Com* and *10K 2* terminals (17 and 18). Set the 10K 2 setting to the STOR item. With the sensor installed, the 363 learns the required temperature difference between the current tank temperature and the mixing target temperature that still allows heat transfer.

If the tank temperature is sufficient to satisfy the system, the 363 operates the storage tank's variable speed pump. If the tank temperature is not sufficient, the 363 switches to the boiler variable speed pump. Whenever the 363 is using the boiler variable speed pump, the 363 continues to monitor the tank temperature. If the tank temperature increases enough to satisfy the mixing requirements, the 363 switches back to the storage tank's variable speed pump for as long as possible.

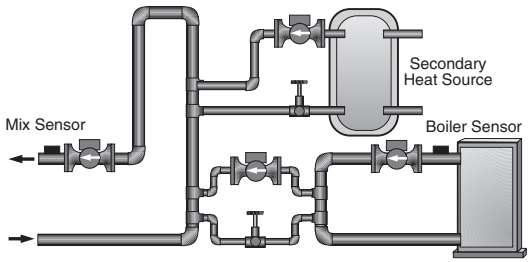
Use of the tank sensor allows the control to display the current storage tank temperature in the *View* menu and record the highest and lowest tank temperatures.



tekmar Copyright © D 363 -06/99

Section E3 —Without a Tank Sensor

The 363 is capable of operating the storage tank system without a storage tank sensor. In this situation, once the 363 receives a *Mixing Demand* the control begins operation by trying to satisfy the system using the storage tank. If the storage tank's injection pump runs at a high percentage of output and is still unable to satisfy the system, the 363 switches to the boiler's variable speed injection pump.



POLLING TIME (POLL TIME)

Once the 363 has switched to the boiler's variable speed injection pump, it must periodically check to see if the storage tank has accumulated a usable amount of heat. This periodic checking is called polling. The polling period is an adjustable setting between 20 minutes and 12 hours. At the end of every polling period, the 363 switches to the storage tank's variable speed pump. As long as the storage tank is capable of satisfying the system, the 363 operates the storage tank's variable speed pump. If the storage tank is not capable of satisfying the system, the 363 switches back to the boiler's variable speed pump. The control checks the storage tank at the end of the next polling time.

Installation

CAUTION

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. This electronic control is not intended for use as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit.

STEP ONE — GETTING READY

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

Type 363 includes: One Universal Reset Control 363, One Outdoor Sensor 070, Two Universal Sensors 071
Data Brochures D 363, D 070, D 001, User Brochure U 363, Application Brochures A 363
Essays E 003, E 021

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, Boiler Sensor 071, and Mixing 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 Storage Tank Sensor 071 is used, install the Storage Tank 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.
- 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 363. Refer to the instructions supplied with the Zone Control.
- Run wire from other system components (pumps, boiler, actuator motors, 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.

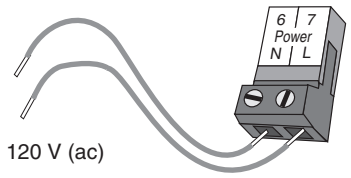
STEP FOUR — ELECTRICAL CONNECTIONS TO THE CONTROL

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

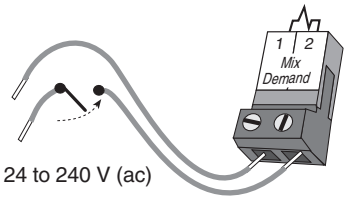
120 V (ac) Power

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* and *Mix P2* terminals (8 and 11) from the *Power L* terminal (7).



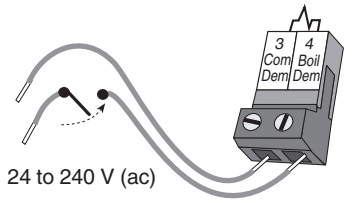
Mixing Demand

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



Boiler Demand

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

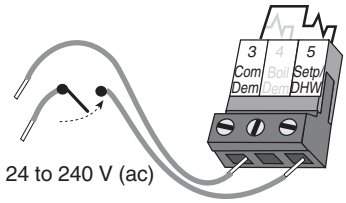


DHW Demand

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

Setpoint Demand

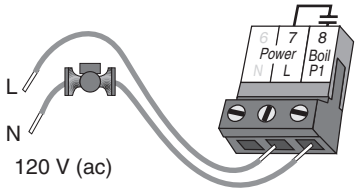
To generate a Setpoint Demand, a voltage between 24 V (ac) and 240 V (ac) must be applied across the *Setp / DHW* and the *Com Dem* terminals (5 and 3).
Caution: The same power supply must be used for both the DHW demand and setpoint demand circuits since they share the *Com Dem* terminals.



Output Connections

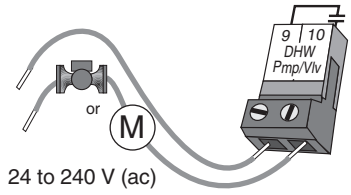
Boiler Pump Contact (Boil P1)

The boiler pump output terminal (8) on the 363 is a powered output. When the relay contact in the 363 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.



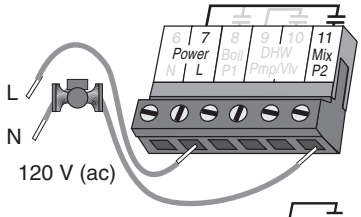
DHW Pump / Valve Contact

The *DHW Pump / Valve* terminals (9 and 10) are an isolated output in the 363. 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).



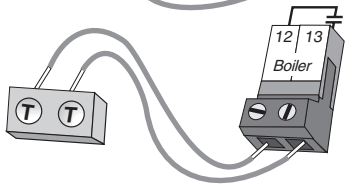
Mixing Pump Contact (Mix P2)

The mixing pump output terminal (11) on the 363 is a powered output. When the relay contact in the 363 closes, 120 V (ac) line (L) is provided to the *Mix P2* terminal (11) from the *Power L* terminal (7). To operate the mixing pump, connect one side of the mixing pump circuit to terminal 11 and the second side of the pump circuit to the neutral (N) side of the 120 V (ac) power supply.



Boiler Contact

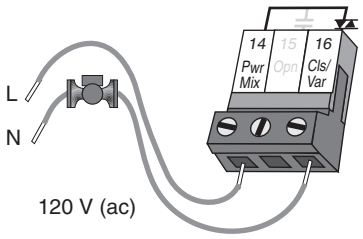
The Boiler terminals (12 and 13) are an isolated output in the 363. There is no power available on these terminals from the control. These terminals are to be used as a switch to either make or break the boiler circuit. When the 363 requires the boiler to fire, it closes the contact between terminals 12 and 13.



tekmar Copyright © D 363 -06/99

Variable Speed Injection Pump

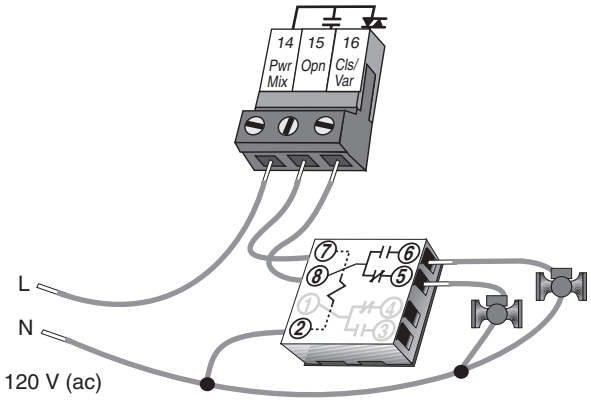
The 363 can vary the speed of a permanent capacitor, impedance protected or equivalent pump motor that has a locked rotor current of less than 2.4 A. Most small wet rotor circulators are suitable as described in Essay E 021. The 363 has an internal overload protection fuse which is rated at 2.5 A 250 V (ac). Contact your tekmar sales representative for details on the repair procedure if this fuse is blown.



Connect one of the wires from the variable speed injection pump to the *Cls / Var* terminal (16) on the 363. Connect the *Pwr Mix* terminal (14) to the live (L) side of the 120 V (ac) power source. The other wire on the variable speed injection pump must be connected to the neutral (N) side of the 120 V (ac) power supply.

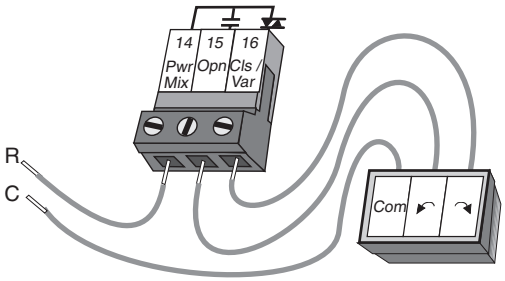
Variable Speed Injection Pump (STORAGE)

If using the STORAGE function in the control, the variable speed signal from the control must be wired through an external relay. This relay must have a 120 V (ac) coil and at least one normally open and one normally closed contact (e.g. tekmar relay 004). The relay's coil is to be connected between the *Opn* terminal (15) on the 363 and the 120 V (ac) neutral (N). The common pole of the relay is to be connected to the *Cls / Var* terminal (16) on the 363. The storage tank's injection pump is to be connected between the normally open contact and the 120 V (ac) neutral (N). The boiler's injection pump is to be connected between the normally closed contact and the 120 V (ac) neutral (N). An example of the correct wiring using a 120 V (ac) double pole, double throw (DPDT) relay is shown to the right.



Mixing Valve Actuator

Connect one side of the 24 V (ac) power to the *Pwr Mix* terminal (14) on the control. The output relay *Opn* terminal (15) is then connected to the open terminal of the actuating motor and the output relay *Cls / Var* terminal (16) is connected to the close terminal of the actuating motor. Connect the second side of the 24 V (ac) power to the common terminal of the actuating motor.

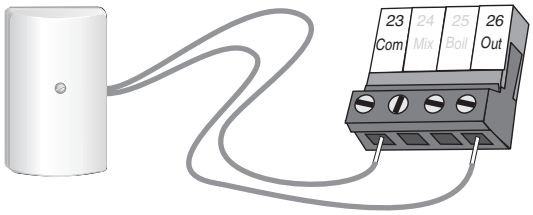


Sensor and Unpowered Input Connections

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

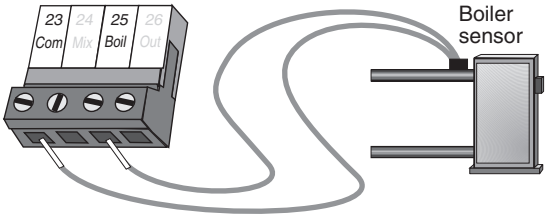
Outdoor Sensor

Connect the two wires from the Outdoor Sensor 070 to the *Com* and *Out* terminals (23 and 26). The Outdoor Sensor is used by the 363 to measure the outdoor air temperature.



Boiler Sensor

Connect the two wires from the Boiler Sensor 071 to the *Com* and *Boil* terminals (23 and 25). The Boiler Sensor is used by the 363 to measure the supply (outlet) water temperature from the boiler.



Mixing Sensor

Connect the two wires from the Mixing Sensor 071 to the *Com* and *Mix* terminals (23 and 24). The Mixing Sensor is used by the 363 to measure the supply water temperature after the mixing device. Normally the sensor is attached to the pipe downstream of the mixing pump (P2).

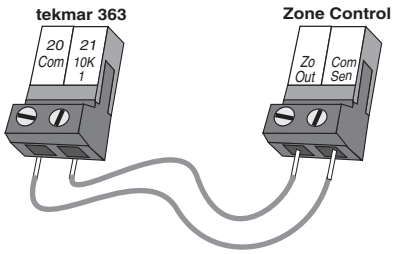
10K 1 Sensor

Either an Indoor Sensor, Slab Sensor, or Zone Control may be connected to the *10K 1* input. If a sensor is used, connect the two wires from the sensor to the *Com* and *10K 1* terminals (20 and 21).

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 (20) on the 363. Connect the *Zo Out* terminal on the Zone Control to the *10K 1* terminal (21) on the 363.

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 (17) on the 363. Connect the tN1 or tN2 terminal from the appropriate device to the *tN1 / tN2* terminal (19) on the 363.

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

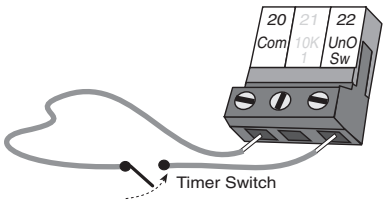
10K 2 Sensor

Either a DHW Sensor 071 or a Storage Tank Sensor 071 can connect to the *10K 2* input. Connect the two wires from the appropriate sensor to the *Com* and *10K 2* terminals (17 and 18).

UnOccupied Switch

If an external timer (tekmar Timer 031) or switch is used, connect the two wires from the external switch to the *Com* and *UnO Sw* terminals (20 and 22). 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 on the UnOccupied Switch terminals.*

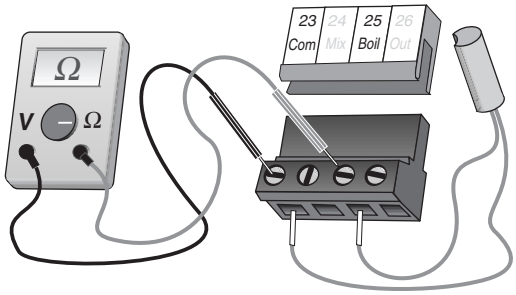


STEP FIVE — TESTING THE WIRING

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.

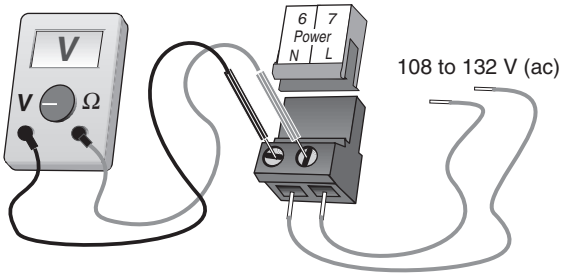


Test the Sensors

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

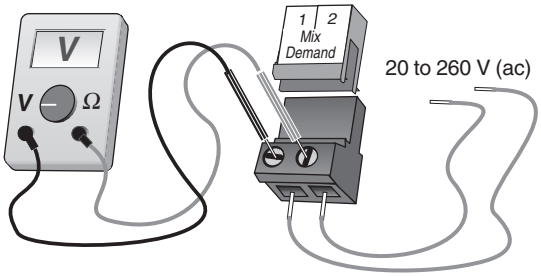
Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces. Turn on the power and measure the voltage between the N and L terminals (6 and 7) using an AC voltmeter, the reading should be between 108 and 132 V (ac).



Test the Powered Inputs

Mixing Demand

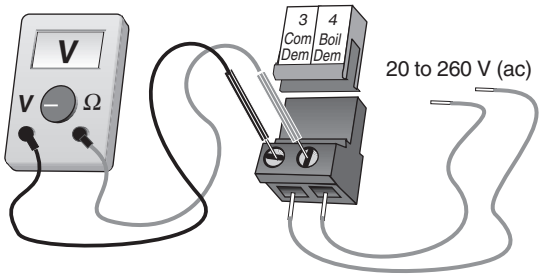
If a mixing demand is used, measure the voltage between the *Mix Demand* terminals (1 and 2). When the mixing demand device calls for heat, you should measure between 20 and 260 V (ac) at the terminals. When the mixing demand device is off, you should measure less than 5 V (ac).



tekmar Copyright © D 363 -06/99

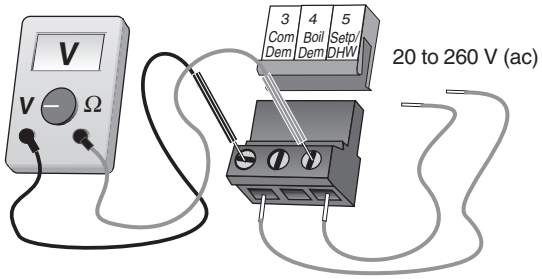
Boiler Demand

If a *Boiler Demand* is used, measure the voltage between the *Boil Dem* and the *Com Dem* terminals (4 and 3). 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 *Setp / DHW* and the *Com Dem* terminals (5 and 3). 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).



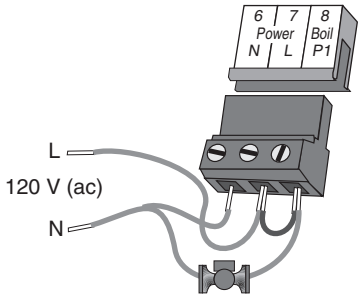
Setpoint Demand

If a *Setpoint Demand* is used, measure the voltage between the *Setp / DHW* and the *Com Dem* terminals (5 and 3). 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

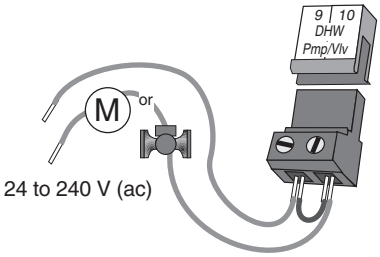
Boiler Pump (Boil P1)

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.



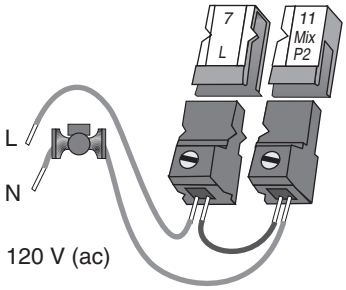
DHW Pump OR Valve (DHW Pmp/Vlv)

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 operate correctly, disconnect the power and remove the jumper.



Mixing Pump (Mix P2)

If a mixing pump is connected to the *Mix P2* terminal (11), make sure that power to the terminal block is off and install a jumper between the *Power L* and the *Mix P2* terminals (7 and 11). When power is applied to the *Power N* and *Power L* terminals (6 and 7), the mixing 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.



Boiler

If the boiler is connected to the *Boiler* terminals (12 and 13), 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.

Variable Speed Injection Pump

If a variable speed injection pump circuit is connected to the *Pwr Mix* and *Cls / Var* terminals (14 and 16), make sure the power to the terminal block is off and install a jumper between the *Pwr Mix* and *Cls / Var* terminals (14 and 16). When the variable speed pump circuit is powered up, the variable speed pump should operate at full speed. If the pump does not operate, check the wiring between the terminal block and the 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.

Variable Speed Injection Pump (Storage)

If the storage feature is used in the control, the two variable speed injection pumps must be wired as shown in the wiring section. To test that the wiring is done correctly, make sure the power to the terminal block is off. Install a jumper between the *Pwr Mix* and *Cls / Var* terminals (14 and 16). When the variable speed pump circuit is powered up, the boiler's variable speed pump should operate at full speed. If the pump does not operate, check the wiring between the terminal block and the pump. Refer to any installation or troubleshooting information supplied with the pump. If the pump operates properly, disconnect the power.

With the first jumper still in place, insert a second jumper between the *Pwr Mix* and *Opn* terminals (14 and 15). When the variable speed pump circuit is powered up, the switching relay should energize and the storage tank's variable speed pump should operate at full speed. If the relay does not energize, check the wiring between the terminal block and the relay. If the storage tank's injection pump does not operate, check the wiring between the terminal block and the pump. Refer to any installation or troubleshooting information supplied with the pump. If the pump and relay operate properly, disconnect the power and remove both jumpers.

Mixing Valve Actuator

If a floating action actuating motor circuit is connected to the *Pwr Mix*, *Opn*, and *Cls / Var* terminals (14, 15, and 16), make sure power to the motor circuit is off and install a jumper between the *Pwr Mix* and *Opn* terminals (14 and 15). When the circuit is powered up, the actuator should move in the opening direction. If it does not, check the wiring between the terminals and the actuating motor. Refer to any installation or troubleshooting information supplied with the motor. If the motor closes instead of opening, the wiring of the actuating motor must be reversed. If the valve opens correctly, turn off the power to the circuit and remove the jumper. Install a jumper between the *Pwr Mix* and *Cls / Var* terminals (14 and 16). When the circuit is powered up, the valve should move in the closing direction. If it does not, check the wiring between the terminals and the actuating motor. Refer to any installation or troubleshooting information supplied with the motor. If the motor closes correctly, turn off the power to the circuit and remove the jumper.

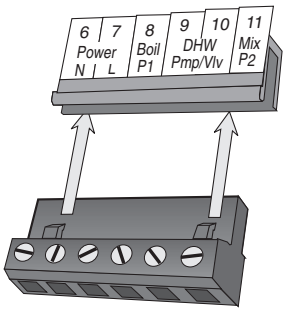
Connecting the Control

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.

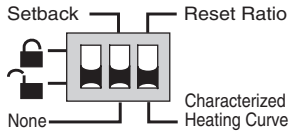


tekmar Copyright © D 363 -06/99

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.

HEATING CURVE / RESET RATIO (FACTORY SETTING IS 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 A 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.

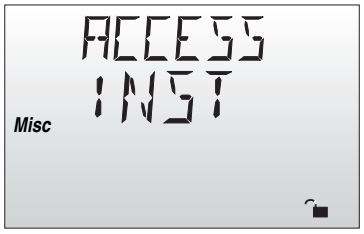
When the DIP switch is set to the *Reset Ratio* setting, the control uses an Outdoor Reset method that varies the supply setting based only on the outdoor air temperature. When this setting is used, the starting water setting and OUT STRT temperature determines the beginning point of the reset ratio. 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 Universal Reset Control 363 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 normal 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.



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.	-67 to 149°F (-55 to 65°C)
ROOM TRG	D3		●	●	●	Target room air temperature. "– – –" denotes no heat is required. 10K 1 = INDR	- - -, 35 to 100°F (2 to 38°C)
ROOM	D3	●	●	●	●	Measured room air temperature at the indoor sensor. 10K 1 = INDR	-58 to 167°F (-50 to 75°C)
MIX Zone	D3				●	This is the signal that is being received from a tekmar Zone Control that is operating mixing zones. 10K 1 = MIX	- - -, 35 to 110°F (2 to 43°C)
Boil Zone	B2				●	This is the signal that is being received from a tekmar Zone Control that is operating the boiler zones. 10K 1 = Boil	- - -, 35 to 110°F (2 to 43°C)
SLAB	D3			●	●	Current slab sensor temperature. 10K 1 = SLAB MIX MIN = OFF	-58 to 167°F (-50 to 75°C)
MIX TRG	D1			●	●	Target mixed supply is the temperature the control is currently trying to maintain at the mixing sensor.	- - -, 35 to 248°F (2 to 120°C)
MIX SUP	D1		●	●	●	Current mixed supply water temperature as measured by the mixing sensor.	-31 to 266°F (-35 to 130°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)
STORAGE	E2	●	●	●	●	Current storage tank temperature as measured by the storage tank sensor. 10K 2 = STOR	-31 to 266°F (-35 to 130°C)
xCHG TRG	C1			●	●	Minimum boiler supply temperature during a DHW demand. 10K 2 ≠ DHW DHW THRU ≠ NONE	- - -, OFF, 100 to 220°F (OFF, 38 to 104°C)
DHW TRG	C1		●	●	●	Target DHW tank temperature. 10K 2 = DHW DHW THRU ≠ NONE	- - -, OFF, 70 to 190°F (OFF, 21 to 88°C)
DHW	C1	●	●	●	●	Current DHW tank temperature. 10K 2 = DHW DHW THRU ≠ NONE	-31 to 266°F (-35 to 130°C)
SETP TRG	C4			●	●	Minimum boiler supply temperature during a setpoint demand. 10K 2 = DHW, *OR* DHW THRU = NONE	- - -, OFF, 70 to 220°F (OFF, 21 to 104°C)

tekmar Copyright © D 363 -06/99

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
MIX ROOM Occ	D1	●	●	●	●	The desired room air temperature during an Occupied period for mixing zone(s). *Note:* There is only a ±3°F adjustment in the LTD access level. **DIP switch = *Characterized Heating Curve*** **No RTU connected**	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
MIX ROOM UnOcc	D1		●	●	●	The desired room air temperature during an UnOccupied period for mixing zone(s). **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback*** **No RTU connected**	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
10K 1	D3 B2			●	●	The device that is to be connected to the 10K 1 input when an RTU is not connected. **DIP switch = *Characterized Heating Curve*** **No RTU connected**	NONE, INDR (Indoor), MIX (Mixing zone control), Boil (Boiler zone control), SLAB Default = NONE	
10K 1	B2			●	●	The device that is to be connected to the 10K 1 input when an RTU is connected. **DIP switch = *Characterized Heating Curve*** **RTU is connected**	NONE, Boil (Boiler zone control) Default = NONE	
SLAB MIN	D3		●	●	●	The minimum temperature at the slab sensor **DIP switch = *Characterized Heating Curve*** **No RTU connected** 10K 1 = SLAB	OFF, 35 to 120°F (OFF, 2 to 49°C) Default = 70°F (21°C)	
SLAB MAX	D3			●	●	The maximum temperature at the slab sensor. **DIP switch = *Characterized Heating Curve*** **No RTU connected** 10K 1 = SLAB	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	
MIX BST	A			●	●	The amount of morning boost. **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback*** **No RTU connected** 10K 1 ≠ MIX	OFF, 0:20 to 8:00 Hr. Default = OFF	
MIX SETB	D1		●	●	●	The amount the mixing supply water temperature will be reduced when the control is in the UnOccupied mode. **DIP switch = *Reset Ratio*** **DIP switch = *Setback***	0 to 50°F (0 to 28°C) Default = 9°F (5°C)	
MIX TERM	A			●	●	The type of terminal units that are being used for the mixing side of the system. **DIP switch = *Characterized Heating Curve***	HRF1 (Heavy), HRF2 (Light), (Fan-) COIL, CONV (ector), RAD (iator), BASE (board) Default = HRF1	
MIX MIN	D1				●	The minimum supply water temperature for the mixing system. **DIP switch = *Characterized Heating Curve***	OFF, 35 to 150°F (OFF, 2 to 66°C) Default = OFF	

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
MIX INDR	D1		○	●		The design indoor air temperature used in the heat loss calculation for the mixing system. **DIP switch = *Characterized Heating Curve***	35 to 100°F (2 to 38°C) Default =70°F (21°C)	
MIX STRT	D1		○	●		The starting water temperature used in the reset ratio calculation for the mixed supply. **DIP switch = *Reset Ratio***	35 to 150°F (2 to 66°C) Default = 70°F (21°C)	
OUT STRT	D1		○	●		The outdoor starting temperature used in the reset ratio calculation for the heating system. **DIP switch = *Reset Ratio***	35 to 85°F (2 to 29°C) Default =70°F (21°C)	
MIX DSGN	D1		○	●		The design supply temperature used in the heat loss calculation for the mixing system.	70 to 220°F (21 to 104°C) Default = 120°F (49°C)	
OUT DSGN	B1 D1		○	●		The design outdoor air temperature used in the heat loss calculation for the heating system.	-60 to 32°F (-51 to 0°C) Default = 10°F (-12°C)	
MIX MAX	D1		○	●		The maximum supply temperature for the mixing system.	80 to 210°F, OFF (27 to 99°C, OFF) Default = 140°F (60°C)	
MIXING	D2		○	●		The type of mixing device that is to be used in the heating system.	FLOT (Floating), VAR (Variable speed), STOR (Storage) Default = VAR	
MOTR SPD	D2		○	●		The time that the actuating motor requires to operate from fully closed to fully open. MIXING = FLOT	30 to 230 sec Default = 160 sec	
10K 2	C1		○	●		The device that is to be connected to the 10K 2 input terminal.	NONE, DHW, STOR (Storage tank) Default = NONE	
Poll TIME	E3		○	●		The polling time that is to be used for a storage tank. MIXING = STOR 10K 2 ≠ STOR	0:20 to 12:00 hr Default = 1:00 hr	

tekmar Copyright © D 363 -06/99

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	
Boil ROOM Occ	B1	●	●	●	●	The desired room air temperature during an Occupied period for the boiler zone(s). *Note:* There is only a ±3°F adjustment in the LTD access level. **DIP switch = *Characterized Heating Curve***	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
Boil ROOM UnOcc	B1		●	●	●	The desired room air temperature during an UnOccupied period for boiler zone(s). **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback***	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
Boil BST	A			●	●	The amount of morning boost. **DIP switch = *Characterized Heating Curve*** **DIP switch = *Setback*** 10K 1 ≠ Boil	OFF, 0:20 to 8:00 Hr. Default = OFF	
Boil SETB	B1		●	●	●	The amount that the boiler supply temperature will be reduced when the control is in an UnOccupied mode. **DIP switch = *Reset Ratio*** **DIP switch = *Setback***	0 to 50°F (0 to 28°C) Default = 15°F (8°C)	
Boil TERM	A			●	●	The type of terminal units that are being used for the boiler side of the system. **DIP switch = *Characterized Heating Curve***	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 calculation for the boiler system. **DIP switch = *Characterized Heating Curve***	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
Boil STRT	B1			●	●	The starting water temperature used in the reset ratio calculation for the boiler supply. **DIP switch = *Reset Ratio***	35 to 150°F (2 to 66°C) Default = 70°F (21°C)	
Boil DSGN	B1			●	●	The design supply temperature used in the heat loss calculation for the boiler system.	70 to 220°F (21 to 104°C) Default = 190°F (88°C)	
Boil MAX	B1				●	The maximum temperature allowed for the boiler target 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)	

tekmar Copyright © D 363 -06/99

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
FIRE DLY	B1			○	●	The time delay the control can expect between the time the boiler contact closes and the burner fires.	0:00 to 3:00 min (1 sec. increments) Default = 0:10 min	
Boil MASS	B1			○	●	The thermal mass characteristics of the boiler that is being used.	LITE, MED, HEVY Default = MED	
Boil DIFF	B1			○	●	The differential that the control is to use when it is operating the boiler.	AUTO, 2 to 42°F (1 to 23°C) Default = AUTO	
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	NONE, PUMP, VALV Default = PUMP	
DHW TANK Occ	C1		●	○	●	The DHW storage tank's temperature during the Occupied period. 10K 2 = 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*** 10K 2 = DHW DHW THRU ≠ NONE	OFF, 70 to 190°F (OFF, 21 to 88°C) Default = 120°F (49°C)	
DHW XCHG Occ	C1			○	●	The minimum boiler supply temperature to the DHW storage tank during the Occupied period. 10K 2 ≠ DHW DHW THRU ≠ NONE	OFF, 100 to 220°F (OFF, 38 to 104°C) Default = 180°F (83°C)	
DHW XCHG UnOcc	C1			○	●	Selects whether or not DHW will be generated during the UnOccupied period. **DIP switch = *Setback*** 10K 2 ≠ DHW DHW THRU ≠ NONE	OFF, DHW XCHG Occ Default = OFF	
DHW PRI	C2			○	●	The portions of the heating system that the DHW will have priority over. DHW THRU ≠ NONE	NONE, MIX, B+M (Boiler+Mixing) Default = NONE	
SETPOINT Occ	C4			○	●	The minimum boiler supply temperature when a setpoint demand is present during the Occupied period. 10K 2 = DHW, *OR* DHW THRU = NONE	OFF, 70 to 220°F (OFF, 21 to 104°C) Default = 180°F (82°C)	

tekmar Copyright © D 363 -06/99

363 **Adjust** Menu (5 of 5)

Item Field	Section	Access Level: LTD	USER	INST	ADV	Description	Range	Actual Setting
SETPOINT UnOcc	C4			●	●	Selects whether or not a setpoint demand will be responded to during the UnOccupied period. **DIP switch = *Setback*** 10K 2 = DHW, *OR* DHW THRU = NONE	OFF, SETPOINT Occ Default = OFF	
SETP PRI	C4			●	●	Selects whether or not the setpoint demand will have priority over the heating system. 10K 2 = DHW, *OR* DHW THRU = NONE	NONE, B+M (Boiler + Mixing) Default = NONE	
WWSD Occ	A		●	●	●	The system's warm weather shut down during the Occupied period.	35 to 100°F, OFF (2 to 38°C, OFF) Default = 70°F (21°C)	
WWSD UnOcc	A		●	●	●	The system's warm weather shut down during the UnOccupied period. **DIP switch = *Setback*** **DIP switch = *Setback***	35 to 100°F, OFF (2 to 38°C, OFF) Default = 60°F (16°C)	
PURGE P1	B1				●	The maximum length of time that the boiler pump will continue to run after the boiler demands have been removed.	OFF, 0:10 to 40:00 min Default = 0:20 min	
SOF STRT	A				●	The portions of the heating system that will use the Soft Start feature.	NONE, MIX, B+M (Boiler + Mixing) 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	

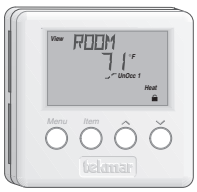
363 **Schd** (Schedule) Menu (1 of 1)

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, TMPY Occ Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, AWAY Ovr Default = NONE

363 **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 Universal Reset Control 363 in order to provide the control with indoor temperature feedback for the mixing side of the heating system (Refer to Essay E 002). When using an RTU, several items related to the mixing side of 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.

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

Item Field	Section	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
ROOM	D3	●	●	●	●	●	●	Current room air temperature. RTU SENS = AIR	- - -, 14 to 167°F (-10 to 75°C)
ROOM TRG	D3		●	●	●	●	●	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	D3		●	●	●		●	Current slab (floor) sensor temperature. REMOTE 3 = SLAB	-58 to 167°F (-50 to 75°C)

tekmar Copyright © D 363 -06/99

363 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 D1	●	●	●	●	●	●	The desired room air temperature during an Occupied period for the mixing zones. *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 D1	●	●	●	●	●	●	The desired room air temperature during an UnOccupied period for the mixing zones. *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	A			●	●	●	●	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. MIX MIN = OFF ***(for Slab Sensor only)***	NONE, AIR, SLAB Default = NONE	
SLAB MIN	D3		●	●	●		●	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	D3			●	●		●	The maximum target temperature at the slab sensor. REMOTE 3 = SLAB	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	

363 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)

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

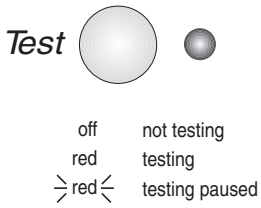
Item Field	Section	Access Level: LTD	USER	INST	ADV	RTU 062	RTU 063	Description	Range
OVERRIDE	A		●	●	●	●	●	The type of setback override that is in effect. **DIP switch = *Setback*** AWAY is available even if DIP ≠ Setback	NONE, TMPY Occ Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, AWAY Ovr Default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

363 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 in by 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 = 30 sec
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 Universal Reset Control 363 has a built in test routine which is used to test the main control functions. The 363 continually monitors the sensors and displays an error message whenever a fault is found. See the following pages for a list of the 363'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 - If FLOT is selected in the MIXING item, the mixing valve is run fully open. If VAR is selected in the MIXING item, the injection pump is ramped up over 10 seconds to 100%.

Step 2 - If STOR is selected in the MIXING item, the switching relay is energized and the storage tank injection pump is operated. At the same time, the Storage segment is displayed in the LCD. Otherwise, N/A is displayed for 1 second.

Step 3 - If FLOT is selected in the MIXING item, the mixing valve is run fully closed. If VAR is selected in the MIXING item, the injection pump is ramped down over 10 seconds.

tekmar Copyright © D 363 -06/99

Step 4 - The mixing pump *(Mix P2)* is turned on for 10 seconds and then shuts off.
NOTE: Only if there is a mixing demand can the control be paused in step 4.

Step 5 - The boiler pump *(Pump P1)* is turned on and remains on.
NOTE: Only if there is a boiler demand can the control be paused in step 5.

Step 6 - The *Boiler* contact is turned on for 10 seconds. After 10 seconds, the *Boiler* and *Boil P1* contacts are shut off.
NOTE: Only if there is a boiler demand can the control be paused in step 6.

Step 7 - If PUMP is selected in the DHW THRU item, the *DHW Pmp/Vlv* contact is closed for 10 seconds. If VALV is selected in the DHW THRU item, the *DHW Pmp/Vlv* and *Boil P1* contacts are closed for 10 seconds. If NONE is selected in the DHW THRU item, N/A is displayed in the LCD for 1 second.
NOTE: Only if there is a DHW demand can the control be paused in step 7.

Step 8 - 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 Universal Reset Control 363 has a function called *Max Heat*. In this mode, the 363 turns on and operates the system up to the maximum set temperatures, and the mixing device at the set percentage, 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.

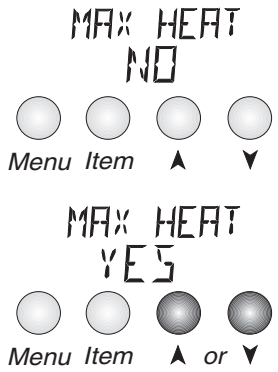
1) Press and hold the Test button for more than 3 seconds. At this point, the control displays the words MAX HEAT and the word NO.

2) Using the Up or Down buttons, select the word YES. After 3 seconds, the control flashes the word MANUAL and the number 100. This number represents the desired output from the mixing device.

3) Set the desired output of the mixing device by using the Up and / or Down buttons on the control.

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

5) 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. Below 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.

tekmar Copyright © D 363 -06/99

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 in diagnosing a consistent problem.

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.

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

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

Item Field	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 a location that receives direct sunlight or is influenced by an exhaust vent.	-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 it may be located too close to an exhaust vent.	-67 to 149°F (-55 to 65°C)
Boil FIRE			●	●	The total number of hours the boiler has been firing since this item was last cleared. The boiler running time may be longer since this firing time does not include the FIRE DLY time set in the Adjust menu. This item can be used to determine if the boiler has been oversized or undersized for the attached heating load. If the boiler does not run for a high percentage of time when the outdoor temperature is near the design temperature, the boiler has most likely been oversized. If the boiler runs constantly but does not maintain the building temperature at design conditions, the boiler has been undersized.	0 to 9999 hr
Boil CYCL				●	The total number of firing cycles that the boiler has had since this item was last cleared. This item can be used in conjunction with the Boil FIRE item to determine the average cycle length of the boiler. The cycle length of the boiler is related to the differential that the boiler is operating with. If the cycle length is too short, a larger differential may allow a longer cycle length.	0 to 9999

tekmar® Copyright © D 363 -06/99

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

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

Item Field	Access Level: LTD	USER	INST	ADV	Description	Range
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
MIX HI			●	●	The highest temperature recorded at the mixing sensor since this item was last cleared.	0 to 255°F (-18 to 124°C)
MIX LO			●	●	The lowest temperature recorded at the mixing sensor since this item was last cleared.	0 to 255°F (-18 to 124°C)
MIX PUMP			●	●	The total number of Mixing Pump (P2) running hours since this item was last cleared.	0 to 9999 hr
TANK HI		●	●	●	The highest recorded temperature of the domestic hot water or thermal storage tank since this item was last cleared. This information can be used to monitor the performance of the alternate heat source for the mixing system.	0 to 255°F (-18 to 124°C)
TANK LO		●	●	●	The lowest recorded temperature of the domestic hot water or thermal storage tank since this item was last cleared.	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.	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.	0:10 to 20:00 hr, OFF Default = OFF
ROOM HOT				●	This item is an adjustable warning, that can only be viewed if the 10K 1 item has been set to INDR. If the air temperature measured by the indoor air sensor exceeds this setting, the control will display a warning message.	50 to 150°F (10 to 66°C) Default = 110°F (43°C)
ROOM CLD				●	This item is an adjustable warning, that can only be viewed if the 10K 1 item has been set to INDR. If the air temperature measured by the indoor air sensor drops below this setting, the control will display a warning message.	0 to 80°F (-18 to 27°C) Default = 45°F (7°C)
NO HEAT				●	This item is an adjustable warning. If either the boiler or mixing supply temperature does not begin to increase within the set amount of time when required, the control will display a warning message.	3 to 40 min, OFF Default = OFF

363 **Monitor** Menu (3 of 3)

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

Item Field	Access Level: LTD	USER	INST	ADV	Description	Range
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 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
±N 1 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 either the RTU or RDM are run in a noisy electrical environment, this can cause interference in the communication between the control and the RTU or RDM.	0 - 255

363 **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.
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.
CTRL ERR A/D	The control was unable to read a piece of information from the A/D system. This is the system that the control uses to read the sensor inputs. If this error occurs, it is an indication that the sensor wires have been run in a noisy electrical environment. To clear this error, press either the Menu or Item buttons. The control will stop operation until the A/D fault is corrected.
RTU 1 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.

tekmar Copyright © D 363 -06/99

Error Displayed	Description of Error
RTU 1 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 only the ***Characterized Heating Curve*** settings 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 1 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 1 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 1 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	Either an incorrect device has been connected to the tekmar Net™ (tN1 / tN2) input terminal, or an RTU has been connected to the control and the *Heating Curve / Reset Ratio* DIP switch has been set to *Reset Ratio*. 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 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 D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
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 D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX SUP SHRT	The control is no longer able to read the Mixing Supply sensor due to a short circuit. In this case the control will operate the mixing device at a fixed 15% of output as long as there is a Mixing Demand. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX SUP OPEN	The control is no longer able to read the Mixing Supply sensor due to an open circuit. In this case the control will operate the mixing device at a fixed 15% of output as long as there is a Mixing Demand. Locate and repair the problem as described in the Data Brochure D070. 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. If the Boiler Minimum setting is higher than 100˚F (38˚C) the control will close the boiler contact when there is a call for heat in the system and the boiler temperature will be controlled by the boiler's operating aquastat. If the Boiler Minimum setting is lower than 100˚F (38˚C) the control will not operate the boiler contact. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.

Error Displayed	Description of Error
Boil SUP OPEN	The control is no longer able to read the Boiler Supply sensor due to an open circuit. If the Boiler Minimum setting is higher than 100˚F (38˚C) the control will close the boiler contact when there is a call for heat in the system and the boiler temperature will be controlled by the boiler's operating aquastat. If the Boiler Minimum setting is lower than 100˚F (38˚C) the control will not operate the boiler contact. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K 1 SHRT	The control is no longer able to read the 10K 1 input because of a short circuit. The control will continue to operate as if there was nothing connected to the 10K 1 input. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K 1 OPEN	The control is no longer able to read the 10K 1 input because of an open circuit. The control will continue to operate as if there was nothing connected to the 10K1 input. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. 10K 1 ≠ NONE
10K 2 SHRT	The control is no longer able to read the 10K 2 input because of a short circuit. If a DHW sensor was being used, the control will no longer operate the DHW system. If a Storage sensor was being used, the control will continue to operate as described in Section E3. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K 2 OPEN	The control is no longer able to read the 10K 2 input because of an open circuit. If a DHW sensor was being used, the control will no longer operate the DHW system. If a Storage sensor was being used, the control will continue to operate as described in Section E3. Locate and repair the problem as described in the Data Brochure D070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. 10K 2 ≠ NONE
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
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

tekmar® Copyright © D 363 -06/99

363 **Error** Messages (4 of 4)

Error Displayed	Description of Error
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 LONG	This warning message will be displayed if the DHW demand has exceeded the setting of the DHW LONG item in the Monitor menu. If this warning occurs, any DHW priority features that the control is currently using will be cancelled and the control will continue to supply heat to both the DHW tank and the heating system. 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.
NO HEAT MIX	This warning message will be displayed if the mixing device operates continuously at full output for a set time limit. 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.

tekmar Copyright © D 363 -06/99

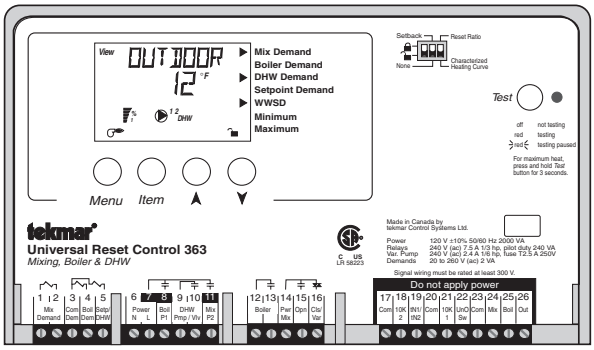
Notes

tekmar Copyright © D 363 -06/99

Technical Data

Universal Reset Control 363 *Mixing, Boiler & DHW*

Literature	—	D 363, A 363's, D 001, D 070, E 003, E 021, U 363.
Control	—	Microprocessor PID control; This is **not a safety (limit) control**.
Packaged weight	—	3.9 lb. (1760 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 NRTL/C, meets ICES & FCC regulations for EMI/RFI.
Ambient conditions	—	Indoor use only, 32 to 122°F (0 to 50°C), < 95% RH non-condensing.
Power supply	—	120 V ±10% 50/60 Hz 1800 VA
Relays	—	240 V (ac) 7.5 A 1/3 hp, pilot duty 240 VA
Var. Pump	—	240 V (ac) 2.4 A 1/6 hp, fuse T2.5 A 250 V
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 2 of Universal Sensor 071.
Optional devices	—	tekmar type #: 011, 031, 040, 062, 063, 070, 071, 072, 073, 076, 077, 367, 368.



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

tekmar Control Systems Ltd., Canada
tekmar Control Systems, Inc., U.S.A.
Head Office: 4611 - 23rd Street
Vernon, B.C. Canada V1T 4K7
Tel. (250) 545-7749 Fax. (250) 545-0650
Web Site: www.tekmarcontrols.com

Product design, software and literature are Copyright © 1999 by:
tekmar Control Systems Ltd. and tekmar Control Systems, Inc.

All specifications are subject to change without notice.
Printed in Canada on recycled paper. D 363 -06/99.