

tekmar® - Data Brochure

D 362

12/08

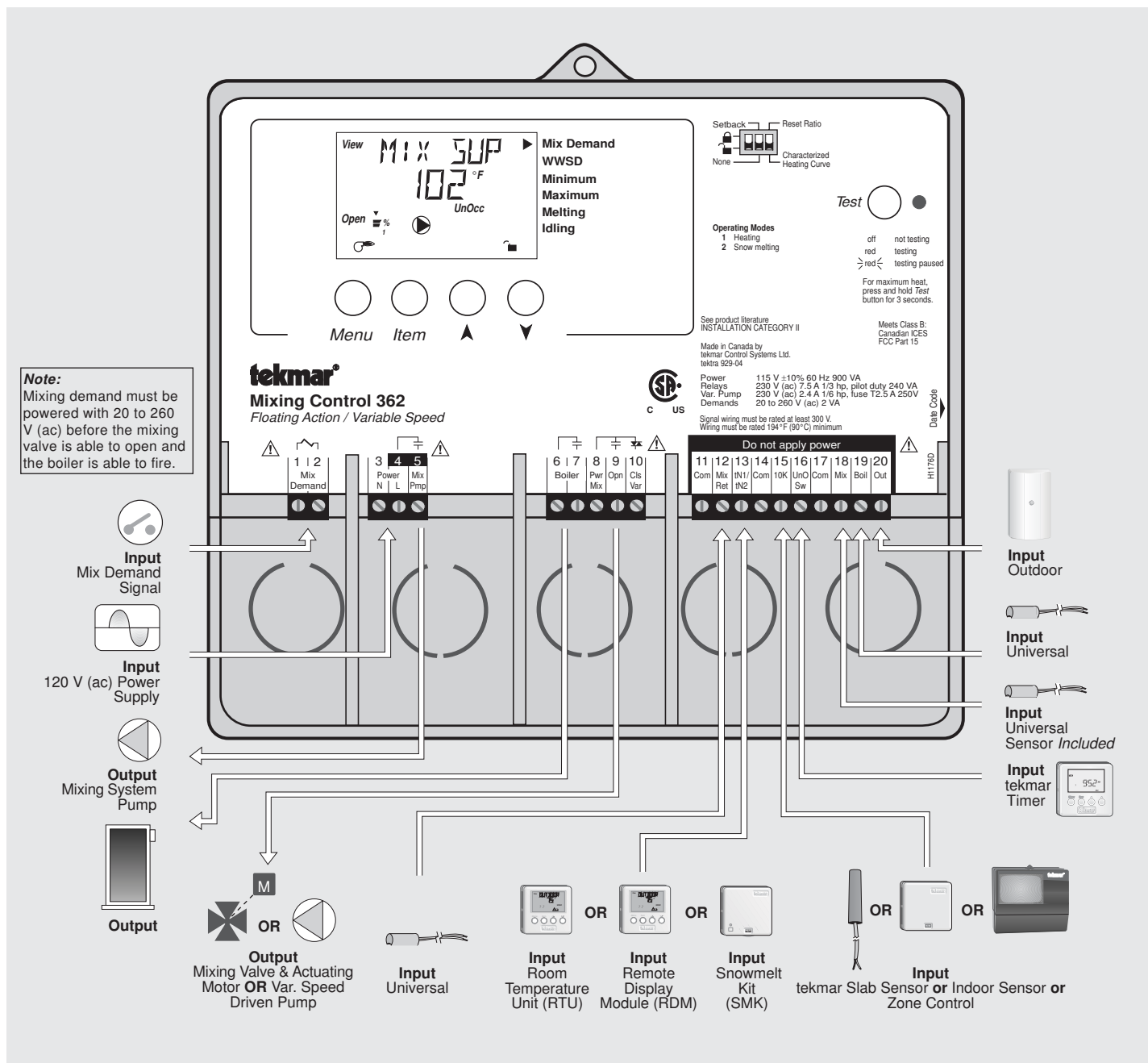
Mixing Control 362

The Mixing Control 362 is a microprocessor based control with two distinct operating modes.

MODE —1— allows the control to provide a reset mixed supply water temperature to a heating system based on outdoor air temperature. Multiple zone temperature controls can be achieved by using either a conventional thermostat system or by using tekmar Zone Controls attached to the 362. For single zone heating applications, a single Room Temperature Unit (RTU) can be connected directly to the 362 for zone temperature control.

MODE —2— allows the control to provide a single zone of snow melting. With the addition of a Snow Melting Kit 092, the 362 can provide slab temperature control and slab ΔT protection. The melting mode is initiated manually either with a demand signal or from the Snow Melting Kit enabling device.

The 362 incorporates a large Liquid Crystal Display (LCD) in order to provide system status and operating information. The same LCD is used when setting up and installing the control. Standard features for both modes of operation include boiler return protection, intelligent boiler operation, Warm Weather Shut Down (WWSD), and pump exercising. As well, with the addition of a new Monitor feature, it is now possible to track pump and boiler running hours, boiler cycles and high and low sensor temperatures. The 362 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.



How To Use The Data Brochure

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

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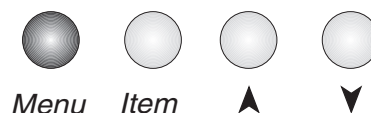
Reference Material: Essay E 003: Characterized Heating Curve and Reset Ratio
E 021: Mixing Methods and Sizing of Variable Speed Injection Pumps

User Interface

The 362 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 362 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.

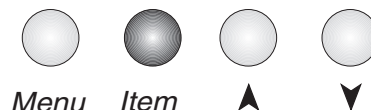
Menu

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.



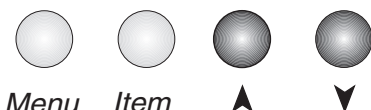
Item

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.

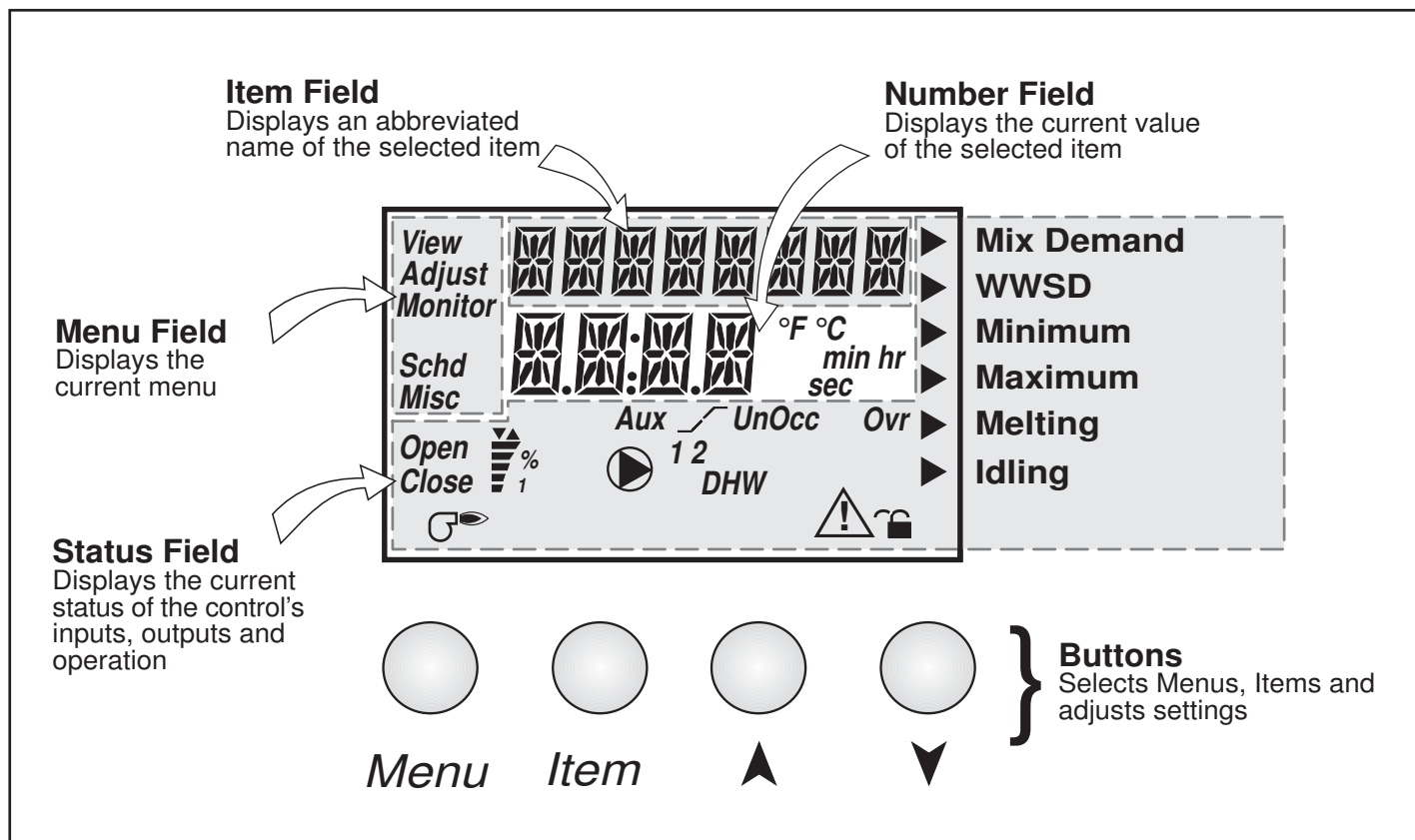


Adjust

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.



Symbol Description

	Mixing Device Output Scale Shows output of injection pump or mixing valve. Arrows show whether the output is increasing or decreasing.		Lock - Unlock Displays whether control is locked or unlocked.
	Pump Displays when mixing pump is in operation.		Boost Displays when control is in morning boost after setback.
	Burner Displays when the boiler relay is turned on.	Occ	Occupied Schedule Displays when the control is in occupied mode.
	Warning Displays when an error exists or a specific limit has been reached.	UnOcc	UnOccupied Schedule Displays when the control is in unoccupied mode.
°F, °C, sec, min, hr	°F, °C, sec, min, hr Units of measurement.	Ovr	Override Displays when the control is in override mode.
Open / Close	Open / Close Displays when floating actuator is opening or closing.		Pointer Displays the control operation as indicated by the text.

Sequence of Operation

Section A

General

Page 4 - 5

Section B

Mode 1:

Heating

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Section C

Mode 2:

Snow Melting

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Section D

Boiler Operation

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Section A —General Operation

POWERING UP THE CONTROL

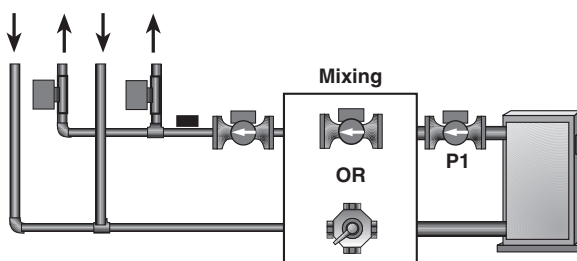
When the Mixing Control 362 is powered up, the control displays the control type number in the LCD for 2 seconds. Next, the software version is displayed for 2 seconds. Finally, the control enters into the normal operating mode and the LCD defaults to displaying the current outdoor air temperature.

MODES OF OPERATION

The Mixing Control 362 has two distinct operating modes. The mode of operation for the control is selected in the Adjust Menu.

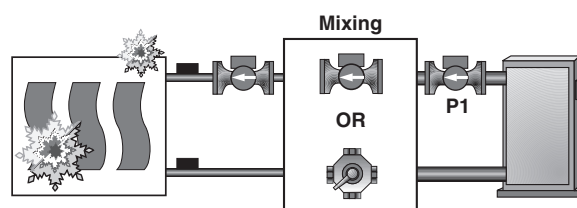
MODE 1 (Heating)

Mode 1 is the Heating mode of operation. In this mode, the 362 is an Outdoor Reset control for a building heating system. The 362 uses a mixing device to vary the supply water temperature to the building heating system according to the outdoor conditions.



MODE 2 (Snow Melting)

Mode 2 is the Snow Melting mode of operation. In this mode, the 362 is a Slab Outdoor Reset control for a single zone of snow melting. The 362 uses a mixing device to vary the supply water temperature to a single zone snow melting system. In the Snow Melting mode, the 362 uses a slab sensor and mixing return sensor in order to provide slab temperature control and slab protection. It is recommended to purchase a Snow Melt Enable Kit 092 when using this mode of operation.

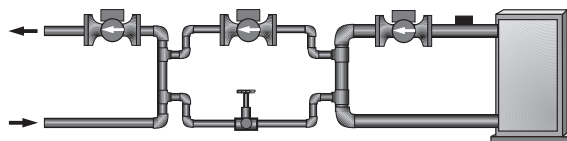


MIXING DEVICE SELECTION (MIXING)

The 362 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*.

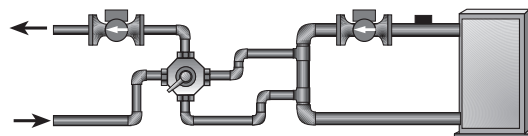
VARIABLE SPEED INJECTION (VAR)

A standard wet rotor circulator is connected to the 362 on the *Pwr Mix* and *Cls / Var* terminals (8 and 10). The 362 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 (FLOT)

A floating action actuator motor is connected to the 362 on the *Pwr Mix*, *Opn*, and *Cls / Var* terminals (8, 9 and 10). The 362 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.



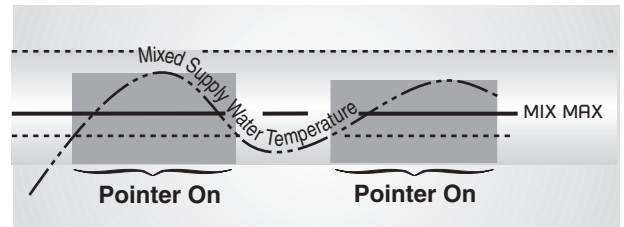
MIXING TARGET TEMPERATURE (MIX TRG)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

When in Mode 1, the MIX TRG temperature is determined from either the *Characterized Heating Curve* or the *Reset Ratio* settings and the outdoor air temperature. When in Mode 2, the MIX TRG temperature is determined from either the outdoor air temperature and the desired slab temperature or the *Melting* and *Idling* settings. 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.

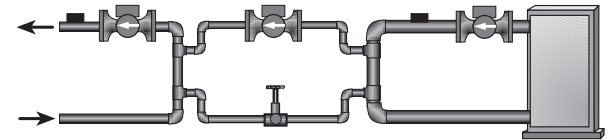
MIXING MAXIMUM (MIX MRX)

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



BOILER PROTECTION (Boil MIN)

The 362 is capable of providing boiler protection from cold mixing system return water temperatures. If the boiler sensor temperature is cooler than the Boil MIN setting while the boiler is firing, the 362 reduces the output from the mixing device. This limits the amount of cool return water to the boiler and allows the boiler temperature to recover. This feature can only be used if the Boil SENS item is not set to NONE.



EXERCISING (EXERCISE)

The 362 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 362 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 or pumps is disconnected.

Section B: Mixing Reset (Mode —1—)

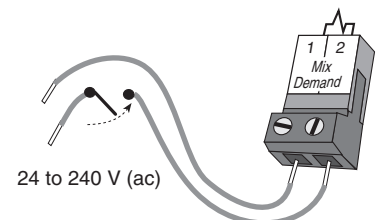
Section B1
General Mixing
Operation

Section B2
Alternate Mixing
Demands

Section B1: General Mixing Operation (Mode —1—)

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 362 is not in *WUSD*, the 362 closes the *Mix Pmp* contact. The Mixing Pump segment is displayed in the LCD. The 362 calculates a MIX TRG supply temperature based on the outdoor air temperature and settings. If required, the 362 operates the boiler in order to provide heat to the mixing device.



CHARACTERIZED HEATING CURVE OR RESET RATIO

When used as a mixing reset control (MODE 1), the 362 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.

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*.

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)

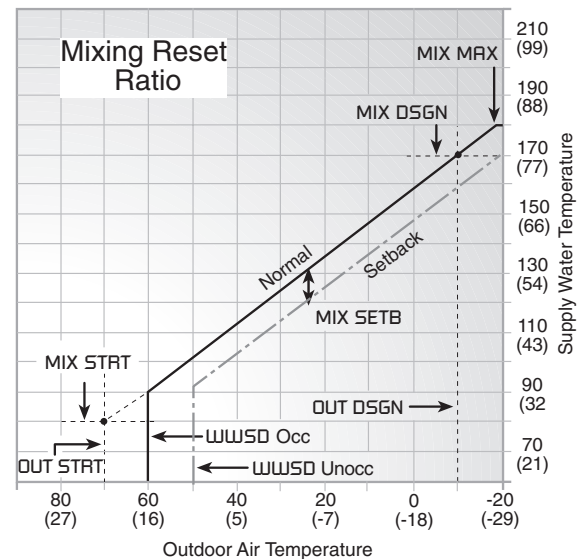
(RESET RATIO & CHARACTERIZED HEATING CURVE)

The OUT DSGN is the outdoor air temperature that is typically the 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 MRX)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

The MIX MRX sets the highest water temperature that the control is allowed to calculate as the MIX TRG temperature. If the control does target the MIX MRX setting, and the MIX SUP temperature is within 5°F (3°C) of the MIX MRX, 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 362 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.

SETBACK (SETBACK)

(RESET RATIO)

The SETBACK is the amount that the mixing supply water temperature is reduced when the 362 is placed into an *UnOccupied* mode, using an internal or an external setback as described later in this section. 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)

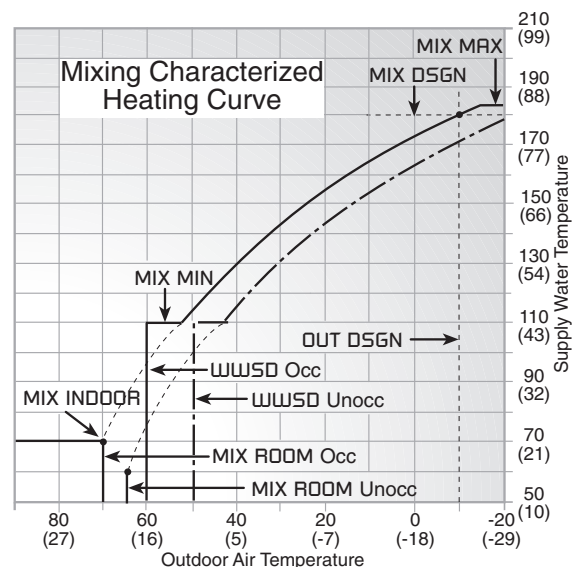
The MIX INDR is the room temperature used in the original heat loss calculations for the building. This setting establishes the beginning of the *Characterized Heating Curve* for the mixing zones. This single setting replaces the MIX STRT water temperature and OUT STRT air temperature settings used by 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 362 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) is used and the 362 is operating at the MIX MIN temperature, the Mixing Pump is cycled using Pulse Width Modulation (PWM) with a 15 minute cycle length. By cycling the Mixing Pump 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.



ROOM OCC & UNOCC (ROOM)

(CHARACTERIZED HEATING CURVE)

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

MIXING TARGET TEMPERATURE (MIX TRG)

(RESET RATIO & CHARACTERIZED HEATING CURVE)

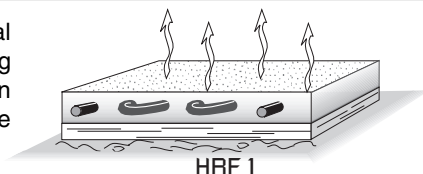
The MIX TRG temperature is determined from either the *Characterized Heating Curve* or the *Reset Ratio* settings and the outdoor air temperature. The control displays the temperature that it is currently trying to maintain as the mixing supply temperature. If the control does not presently have a requirement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

TERMINAL UNITS (TERMINAL)

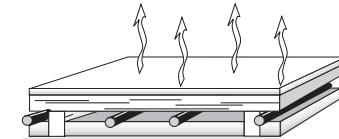
When using a *Characterized Heating Curve*, the control requires the selection of a terminal unit. The terminal unit determines the shape of the *Characterized Heating Curve* according to how the terminal unit delivers heat into the building space. The 362 provides for selection between six different terminal unit types: two types of 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.



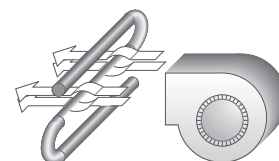
HRF 1



HRF 2

Hydronic Radiant Floor (HRF 2)

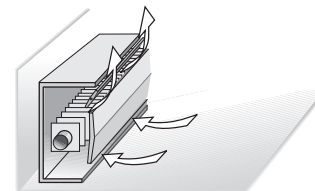
HRF2 is a light, or low mass, hydronic radiant floor system. Most commonly, this type of radiant heating system is either attached to the bottom of a wood sub floor, suspended in the joist space, or sandwiched between the subfloor and the surface. This type of radiant system has a relatively low thermal mass and responds faster than a high mass system.



COIL

Fancoil (COIL)

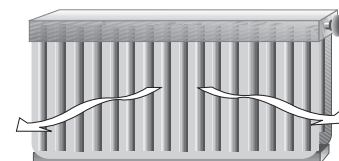
A fancoil terminal unit or air handling unit (AHU) consists of an hydronic heating coil and either a fan or blower. Air is forced across the coil at a constant velocity by the fan or blower and is then delivered into the building space.



CONV

Fin-tube Convector (CONV)

A convector terminal unit is made up of a heating element 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 to the space is dependant on the supply water temperature to the heating element and the room air temperature.



RAD

Radiator (RAD)

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

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

MIXING PUMP OPERATION (Mix Pmp)

The Mixing Pump contact (*Mix Pmp*, terminal 5) closes whenever there is a *Mixing Demand* and the 362 is not in WWSD. During WWSD, the mixing pump is operated based on the EXERCISE setting in the *Adjust* Menu.

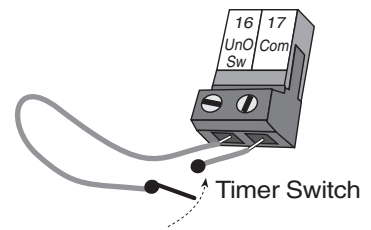
PURGE (PURGE)

After the *Mixing Demand* has been satisfied, the 362 can continue to operate the Mixing Pump for a period of time. The length of time that the Mixing Pump continues to run is an adjustable time setting. This setting allows any excess heat to be purged out to the heating system. The Mixing Pump continues to run until the Purging time has elapsed or the mixing supply temperature drops below the MIX MIN setting. This setting should not be used if the mixing system is zoned using either zone pumps or fast acting zone valves.

SETBACK (UnOccupied)

To provide greater energy savings, the 362 has a setback capability. With setback, the supply water temperature in the system is reduced when the building is not used (AWAY) or when the building is UnOccupied. By reducing the supply water temperature, air temperature in the space may 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 362 into an UnOccupied mode. Any time the *UnO Sw* (16) and the *Com* (17) 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 362 adjusts the supply water temperature(s) based on the *UnOcc* settings made in the control.



Internal Overrides

The 362 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 is displayed in the LCD.

Temporary (TMPY)

If a temporary override is selected, the 362 operates in the selected override mode for 3 hours. Once completed, the control reverts to the previous operation.

Permanent (PERM)

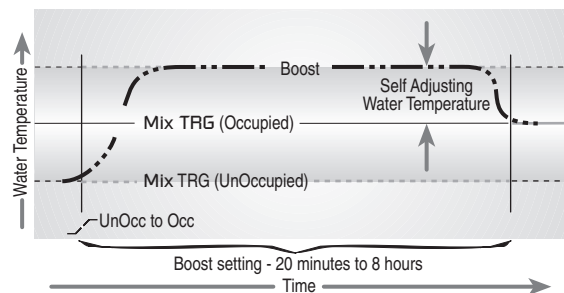
If a permanent override is selected, the 362 operates in the selected override mode until a new override is selected.

Away (AWAY)

If the AWAY override is selected, the 362 operates with a fixed WWSD of 62°F (17°C) and a fixed room temperature of 62°F (17°C).

BOOSTING (BOOST)

When the control changes from the *UnOccupied* to the *Occupied* mode, it enters into a *Boosting* mode. In this mode, the supply water 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.

SOFT START (SOF STRT)

The *SOF STRT* function allows the 362 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.

Section B2: Alternate Mixing Demands (Mode —1—)

In addition to using conventional thermostats to provide a mixing demand as described in Section B1, the 362 can use a number of other methods to provide a mixing demand.

10K INDOOR SENSOR (10K = INDR)

Set the 10K 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* terminals (14 and 15). In addition, power must be applied to the *Mix Demand* terminals (1 and 2) as described in section B1. With the indoor sensor connected, the 362 is able to sense the actual room temperature. With this information, the 362 provides a more 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. To adjust the room temperature for the mixing zone, use the *ROOM Occupied* or *UnOccupied* setting in the Adjust menu at the control.



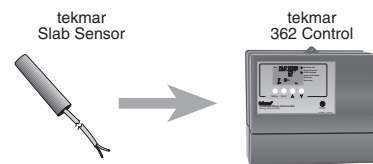
10K ZONE CONTROL (10K = ZoIn)

Set the 10K item to ZoIn to add indoor temperature feedback control of multiple mixing zones. Control of mixing zones is provided by connecting a tekmar zone control to the 362. The zone control provides its own internal *mixing demand* to the 362. In this case, there is no need to provide an external *Mix Demand* as described earlier in Section B1. The zone control is capable of automatically adjusting the MIX TRG temperature to improve building occupant comfort and system performance.



10K SLAB SENSOR (10K = SLAB)

Set the 10K item to SLAB to add a slab sensor for temperature control of a single zone mixing system. The 362 can use a slab sensor to control the actual slab temperature. A slab sensor is placed in the slab and connected to the *Com* and the *10K* terminals (14 and 15). Power must be applied to the *Mix Demand* terminals (1 and 2) as described in Section B1. With the slab sensor connected, the 362 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)

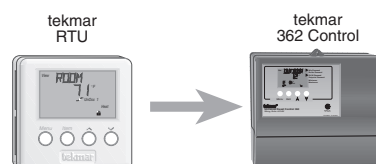
The SLAB MIN sets the minimum allowed core temperature of the slab as long as the control is not in a WWSD. Caution should be used when adjusting the SLAB MIN setting as this may lead to overheating of the zone during mild conditions. If the *AWAY* setting is selected in the Schedule menu, the 362 ignores 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 (11 and 13). In addition, power must be applied to the *Mix Demand* terminals (1 and 2) as described in Section B1. With the RTU connected, the 362 measures the actual room temperature. With this information, the 362 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 C: Snow Melting (Mode —2—)

Section C1
General Snow
Melting

Section C2
Snow Melting
Enable / Disable

Section C3
With Slab Sensor

Section C4
Without Slab
Sensor

Section C1: General Snow Melting

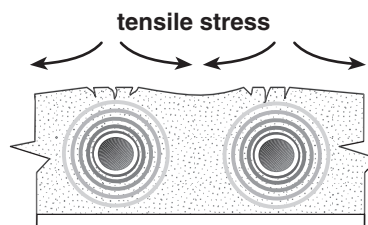
The Mixing Control 362 is capable of controlling a single zone snow melting system. In order to provide the best control of the snow melting system, the 362 should be equipped with an optional tekmar Slab Sensor 072 or 073 and an optional Universal Sensor 071 that measures the slab return temperature. These can be purchased separately or as part of the Snow Melt Enable Kit 092. The Kit also includes alternate Start / Stop module 039. With these installed, the 362 is capable of providing the features listed in the following section. Also described in this section are several different methods of starting and stopping the snow melting system.

NOTE: When operating in the Snow Melting mode, the *Reset Ratio / Characterized Heating Curve DIP switch* has no effect on the operation of the control.

SLAB PROTECTION (ΔT MAX)

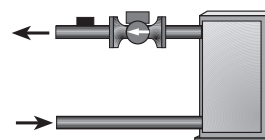
Boiler Sensor on the Return or No Boiler Sensor (NON-DEDICATED HEAT SOURCE)

If the snow melting system is one of several loads on a boiler or boiler plant, the amount of heat available to the system can potentially damage the snow melting slab. The 362 controls a mixing device that is installed between the snow melting slab and the boiler(s). The control limits the rate at which heat can be applied to the slab through the ΔT MAX setting. The ΔT is the temperature difference between the slab supply temperature and the slab return temperature. By limiting this temperature difference, the rate at which heat is applied to the slab can be controlled and thermal stresses in the slab can be minimized. When the control is operating at the ΔT MAX, the *Maximum* pointer can be seen when viewing the MIX ΔT item in the View menu. This mode of operation only works when the Boil SENS item is set to RET or NONE.



Boiler Sensor on the Supply (DEDICATED HEAT SOURCE)

If the snow melting system consists of a snow melting slab and a dedicated boiler, a mixing device is installed between the snow melting slab and the boiler to protect the boiler from low operating temperatures. In a dedicated snow melting system with a properly sized boiler, it is not necessary for the control to provide ΔT protection of the snow melting slab; Since the boiler output is matched to the slab requirements, it is not possible to heat the slab too rapidly and cause thermal stresses that will result in damage to the slab. Therefore, the ΔT MAX item in the *Adjust* menu and the MIX ΔT item in the *View* menu are not available. When operating a dedicated snow melting system, the 362 is designed to operate the boiler as efficiently as possible. This mode of operation only works when the Boil SENS item is set to SUP.



VISCOSITY COMPENSATION (EXCEEDING ΔT MAX)

At low temperatures, the glycol solutions used in snow melting systems become very viscous and difficult to pump. In order to overcome this condition during a cold start of a snow melting system, the 362 is allowed to exceed the ΔT MAX setting for a period of time in order to warm the glycol solution. This allows the control to compensate for the high viscosity of the glycol solution and is used when the supply temperature is below 30°F (-1°C). When the control exceeds the ΔT MAX setting, the *Maximum* pointer will flash when viewing the MIX ΔT item in the *View* menu.

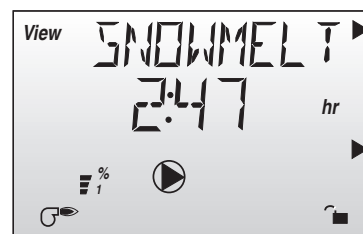
RAMPING OF THE ΔT

When the control starts applying heat to the slab, the supply temperature to the snow melting system is ramped up over a period of time until it reaches the maximum allowed ΔT . This function does not occur when the boiler sensor is on the supply.

OPERATING STATUS (SNOWMELT)

While in the Snow Melting mode (Mode 2), an additional item is available in the *View* menu called SNOWMELT. This item displays the current operating status of the snow melting system.

- **STRT** The word **STRT** is displayed after the snow melting system has been enabled. It is displayed until the slab reaches the melting temperature. If the slab is at the melting temperature, **STRT** is displayed for five seconds after the snow melting system has started operation. This is to verify that the control has entered into the snow melting mode.
- **STOP** The word **STOP** is displayed for five seconds after the snow melting system has stopped operation. The word **STOP** is also displayed if either a Remote Start/Stop Module 039 or Remote Display Module 040 stops the snow melting system and an external demand is still present.
- **IDLE** The word **IDLE** is displayed as long as the control is operating the slab at the idling temperature.
- **EXT** The word **EXT** is displayed when the **RUN TIME** has reached 0:00 and the control still has an external demand for melting. In this situation, the control continues melting until the snow melting demand is removed or the control is stopped.
- **0:00 to 17:00 hr** While the slab is up to temperature, and the control is melting, the remaining **RUN TIME** is displayed.
- **INF** If an infinite **RUN TIME** is selected and the control is melting, **INF** is displayed.
- **WWSD** When the control is in a Warm Weather Shut Down, **WWSD** is displayed.
- **CWCO** When the control is in a Cold Weather Cut Off, **CWCO** is displayed.

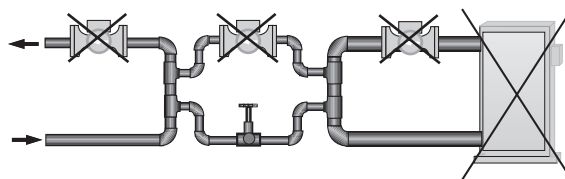


RUNNING TIME (RUN TIME)

The running time is the length of time that the snow melting system operates once the slab has reached the melting temperature. During the time that the slab is approaching the melting temperature, the RUN TIME does not decrease. Once the slab has reached the melting temperature, the RUN TIME begins counting down. When the RUN TIME reaches 0:00 as displayed by the SNOWMELT item in the View menu, the 362 has finished Melting.

WARM WEATHER SHUT DOWN (WWSD)

When both the slab temperature and the outdoor temperature exceed the Melting temperature by more than 1.5°F (1°C), the control enters into a WWSD. In a WWSD, the snow melting system is shut down in order to conserve energy.



COLD WEATHER CUT OUT (CWC0)

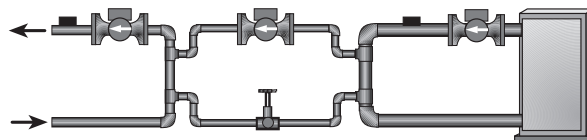
Maintaining the slab at either the Melting or Idling temperature during extremely cold temperatures can be expensive or impossible. The control shuts off the snow melting system once the outdoor air temperature drops below the Cold Weather Cut Out (CWC0) temperature. While the control is in a CWC0, the word CWC0 is displayed in the SNOWMELT item in the View menu. If the control had been started prior to the CWC0, it resumes the melting mode once the outdoor air temperature rises above the CWC0 temperature.

BOILER OPERATION

Refer to section D for a description of the boiler operation.

BOILER PROTECTION (Boil MIN)

The 362 ensures that the boiler supply water temperature remains above the Boil MIN setting. If the boiler supply water temperature begins to drop due to the slab return temperature, the mixing device is throttled back to allow the boiler to recover. This minimizes the time that the boiler operates below its condensing temperature and prolongs the life of the boiler. The 362 can only provide boiler protection if the Boil SENS item is set to SUP or RET. The 362 cannot provide boiler protection if the Boil SENS item is set to NONE.



SNOW MELTING OVERRIDE

Internal Override

If the ALWAYS setting is selected in the Schedule menu, the system is shut down. Both the Melting and Idling temperatures are ignored as long as the control remains in the ALWAYS mode. The Setback / None DIP does not matter for internal overrides.

External Override

While in Mode 2, any signal received on the UnO Sw and COM terminal (16 and 17) is ignored and does not affect the operation of the control.

MIXING PUMP OPERATION (Mix Pmp)

The Mixing Pump (Mix Pmp) contact closes and remains closed as long as the control is either in the Melting or Idling mode. The Mixing Pump contact shuts off if the control is in WWSD, CWC0, or if there is no call for Melting or Idling.

PURGE (PURGE)

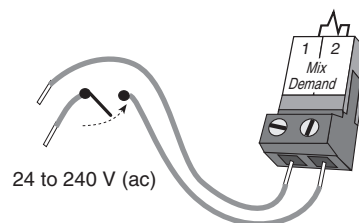
The Mixing Pump (Mix Pmp) continues to operate for the set PURGE time after the control finishes operation.

Section C2: Snow Melting Enable (Mode —2—)

There are three methods in which the snow melting system can be enabled on the Mixing Control 362. Either an External Demand, a Remote Start / Stop Module 039 or a Remote Display Module 040 can be used to start the snow melting system.

EXTERNAL DEMAND

An external snow melting demand is generated when a voltage between 24 and 240 V (ac) is applied across Mix Demand (1 and 2) terminals. An external demand must be present for at least 4 seconds in order to start the snow melting system. Once started, the slab temperature is increased to the MELTING setting and maintained at the melting temperature until the Run Time reaches 0:00. If the Run Time reaches 0:00 and the external demand is still present, the control continues at the melting temperature until the external demand is removed or the system is otherwise stopped.



REMOTE START / STOP MODULE 039

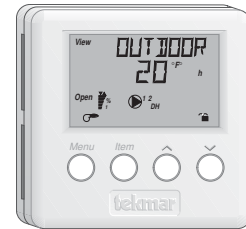
A Remote Start / Stop Module 039 can be used to start and stop the snow melting system and adjust the running time. Refer to data brochure D 039 for details of operation.



REMOTE DISPLAY MODULE 040

A Remote Display Module 040 can be used to start and stop the snow melting system. The snow melting system is enabled by pressing the Up button on the 040 while in the View menu. Once the snow melting system is enabled, the word **STRT** is displayed in the LCD for at least five seconds. The 040 then displays the Run Time setting to allow the user to adjust it.

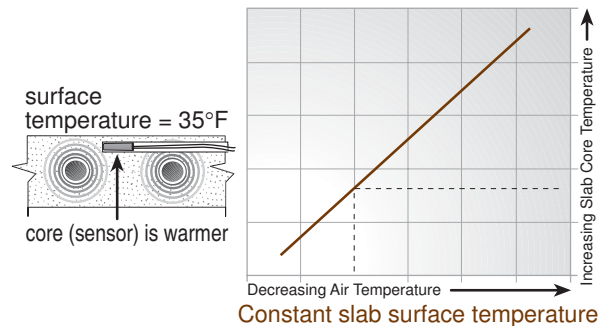
To disable the snow melting system when it is in the melting mode, press the Down button on the 040 while in the View menu. The word **STOP** is displayed for five seconds.



Section C3: With Slab Sensor (Mode —2—)

SLAB OUTDOOR RESET

A slab sensor may be installed to provide more accurate temperature control. The control assumes that the sensor is approximately 1 inch below the surface of the snow melting slab. Since this point is closer to the source of the heat, this point is warmer than the surface of the slab. Therefore, the sensor must be maintained at a higher temperature in order to ensure that the surface of the slab is maintained at the correct temperature. The amount of temperature difference between the surface of the slab and the slab sensor changes with the outdoor air temperature. Therefore, the slab core temperature is increased as the outdoor air temperature drops. The temperature displayed as the slab temperature is the temperature of the slab sensor. This sensor temperature is higher than the surface temperature of the slab.



IDLING MODE (IDLING)

When the snow melting system starts from a cold temperature, the time required for the slab to reach the "Melting" temperature may be excessive. To decrease this start up time, the slab can be maintained at an "Idling" temperature. The idle feature is also useful for preventing frost and light ice formation. When the control is in idling mode, the *Idling* pointer is visible in the View menu and the word **IDLE** can be read when looking at the SNOWMELT item in the View menu. The IDLING setting in the Adjust menu sets the slab surface temperature that is maintained while the control is in the idling mode.

MELTING MODE (MELTING)

The Mixing Control 362 is a manual snow melting control. In order for the snow melting system to be started, one of the three methods described in section C2 must be used. When the control is in the melting mode, the *Melting* pointer is visible in the View Menu and either **EXT**, **INF** or a running time can be read when viewing the SNOWMELT item in the View menu. The MELTING setting in the Adjust Menu sets the slab surface temperature that is maintained while the control is in the melting mode.

Section C4: Without Slab Sensor

In cases where a slab sensor has not been or cannot be installed in the snow melting slab, it is possible for the Mixing Control 362 to operate the snow melting system. This mode of operation is not recommended since the control can no longer regulate the slab temperature. This method of operation can cause the slab to operate at surface temperatures that are higher than required. A higher surface temperature can lead to excessive energy usage and fuel costs. The sequence of operation for the control when it is operating without a slab sensor is the same as described in sections C1 and C2.

However, the following items change as described:

RUN TIME

As there is no slab sensor, the RUN TIME clock does not wait for the slab to reach MELTING temperature to start counting down, but instead starts counting down as soon as the control starts the melting operation.

WARM WEATHER SHUT DOWN (WWSD)

Since a slab sensor is not in use, the Warm Weather Shut Down is determined only from the outdoor air temperature. Once the outdoor air temperature rises above the WWSD setting, the control goes into a WWSD and ignores any demand for Idling or Melting. Also the word WWSD is displayed when viewing the SNOWMELT item in the View Menu.

IDLING MODE (IDLING)

When the snow melting system starts from a cold temperature, the time required for the slab to reach the Melting temperature may be excessive. To decrease this start up time, the slab can be maintained at an Idling temperature. The Idle feature is also useful for preventing frost and light ice formation. When the control is in idling mode, the Idling pointer is visible in the View menu and the word IDLE can be read when looking at the SNOWMELT item in the View menu. The IDLING setting in the Adjust menu sets the desired slab sensor temperature.

MELTING MODE (MELTING)

The Mixing Control 362 is a manual snow melting control. In order for the snow melting system to be started, one of the three methods described in Section C2 must be used. When the control is in the melting mode, the Melting pointer is displayed in the View Menu and either EXT, INF or a running time can be read when viewing the SNOWMELT item in the View menu. The MELTING setting in the Adjust menu sets the desired slab surface temperature.

Section D: Boiler Operation (Mode —1— and —2—)

Section D1
Boiler Supply
Sensor

Section D2
Boiler Return
Sensor

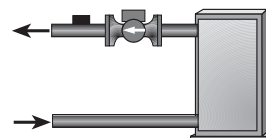
Section D3
No Boiler Sensor

Section D1: Boiler Supply Sensor

BOILER SENSOR ON THE SUPPLY (Boil SENS = SUP)

Mode 1: Heating

The boiler sensor can be located on the boiler supply if the 362 is the only control that is operating the boiler. When in the supply mode, the 362 determines the required operating temperature for the boiler supply and cycles the *Boiler* contact in order to maintain the correct boiler supply water temperature. If this mode of operation is selected, the boiler pump should either operate continuously or be operated in parallel with the Mixing Pump contact (Mix Pmp). The boiler pump should not be operated by the operating aquastat as this may lead to improper cycling of the boiler because of inconsistent flow past the boiler supply sensor. This mode of operation only works if the Boil SENS item is set to SUP.



Mode 2: Snow Melting

When operating a boiler that is dedicated to a snow melting system, the 362 is designed to operate the boiler as efficiently as possible. The boiler is cycled based on the mixing supply water temperature. This is to provide longer and more efficient boiler cycles. This mode of operation only works if the Boil SENS item is set to SUP.

BOILER TARGET TEMPERATURE (Boil TRG)

Mode 1: Heating

When operating in Mode 1, the Boiler Target temperature is determined by the operation of the mixing device. The Mixing Control 362 uses a method called *Boiler Load Reset* in order to determine the required boiler supply water temperature. The 362 operates the boiler at a supply temperature that is sufficient to satisfy the requirements of the mixing device. If the boiler supply water temperature is not sufficient, the 362 increases the boiler target temperature. If the boiler supply water temperature is more than sufficient, the 362 decreases the boiler target temperature. If the control does not have a requirement for heat from the boiler, it does not show a boiler target temperature. Instead, - - is displayed in the LCD.

Mode 2: Snow Melting

When operating in Mode 2, the boiler target temperature is determined by the mixing target temperature. The mixing target temperature is automatically determined by the control.

DIFFERENTIAL

Mode 1: Heating (Boil DIFF)

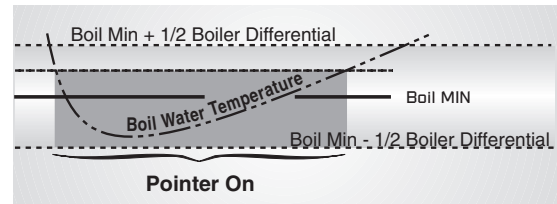
When operating in Mode 1, an on / off heat source such as a boiler must be operated with a differential to prevent short cycling. This differential is centered around the Boil TRG temperature. If the boiler supply temperature drops 1/2 of the differential below the Boil TRG temperature, the 362 closes the boiler contact to fire the boiler. If the boiler supply temperature rises 1/2 of the differential above the Boil TRG temperature, the 362 opens the boiler contact to turn off the boiler. With the 362, either a fixed or automatic differential setting is selected. If the AUTO differential is selected, the 362 automatically adjusts the boiler differential setting under the current load conditions to avoid short cycling.

Mode 2: Snow Melting (DIFF)

When operating in Mode 2 with the boiler sensor on the boiler supply, it is necessary to set a differential for the boiler. This differential is centered around the MIX TRG temperature. If the mixing supply temperature drops 1/2 of the differential below the MIX TRG temperature, the 362 closes the boiler contact to fire the boiler. If the mixing supply temperature rises 1/2 of the differential above the MIX TRG temperature, the 362 opens the boiler contact to turn off the boiler.

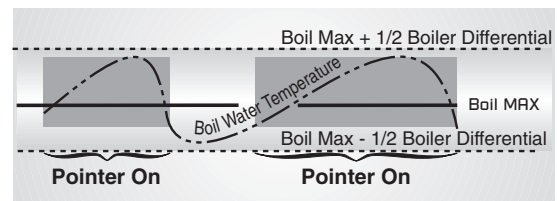
BOILER MINIMUM (Boil MIN)

The Boil MIN is the lowest water temperature that the control is allowed to use as a Boil TRG temperature. During mild conditions, if the 362 calculates a Boil TRG temperature that is below the Boil MIN setting, the Boil TRG temperature is adjusted to at least the Boil MIN setting. During this condition, if the boiler is operating, the *Minimum* pointer turns on in the LCD while the Boil TRG or the Boil SUP temperature is viewed. If the installed boiler is designed for condensing operation, set the Boil MIN adjustment to OFF.



BOILER MAXIMUM (Boil MAX)

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).



BOILER PROTECTION

Refer to section A for a description of boiler protection.

BOILER OPERATION

When the 362 determines that boiler operation is required, the *Boiler* contact terminals (6 and 7) close. While the boiler contact is closed, the burner segment in the LCD is displayed.

FIRE DELAY (FIRE DLY)

The FIRE DLY is the delay time that may happen between the time that the 362 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 362 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)

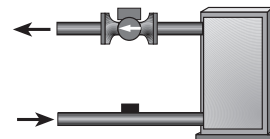
The HEVY setting is selected if the boiler that is being used has a high thermal mass. This means that the boiler has both a large water content and a large metal content. A boiler that has a high thermal mass is relatively slow in coming up to temperature. This is typical of many commercial cast iron and steel tube boilers.

Section D2: Boiler Return Sensor

BOILER SENSOR ON THE RETURN (Boil SENS = RET)

The boiler sensor should be located on the boiler return if the 362 is one of many controls that can call for boiler operation. When in the return mode, the 362 provides a boiler enable. The 362 no longer tries to control the boiler supply water temperature directly but allows the boiler to operate at its operating aquastat setting. If this mode of operation is selected, the boiler pump should either operate continuously or be operated in parallel with the Mixing Pump. The boiler pump should not be operated by the boiler's aquastat as this may lead to improper cycling of the boiler because of inconsistent flow past the boiler return sensor.

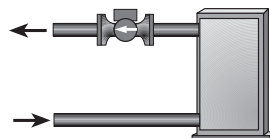
When the mixing device begins to ramp up, the boiler contact on the 362 closes. The boiler contact remains closed until the mixing device no longer requires heat. With the sensor on the boiler return, the 362 is still capable of providing boiler return protection as described in section A.



Section D3: No Boiler Sensor

NO BOILER SENSOR (Boil SENS = NONE)

The 362 is capable of operating without a boiler sensor if desired. Without a boiler sensor, the 362 is unable to provide boiler return protection. The boiler contact still functions without the boiler sensor. When the mixing device begins to ramp up, the boiler contact on the 362 closes. The boiler contact remains closed until the mixing device no longer requires heat. This type of application is typical if the 362 is drawing heat from a heat source that already incorporates some form of boiler return protection.



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 362 includes: One Mixing Control 362, One Outdoor Sensor 070, Two Universal Sensors 071, Data Brochures D 362, D 070, D 001, User Brochure U 362, Application Brochures A 362, 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" (22mm) 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 will 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 D070 and run the wiring back to the control.
- If a Room Temperature Unit (RTU) 062 or 063 is used, install the RTU according to the installation instructions in the Data Brochure D 062 and run the wiring back to the control.

- If a Slab Sensor 072 or 073 is used, install the Slab Sensor according to the installation instructions in the Data Brochure D 070 and run the wiring back to the control or RTU.
- If a Remote Display Module (RDM) 040 is used, install the RDM according to the installation instructions in the Data Brochure D 040 and run the wiring back to the control.
- If a Remote Start / Stop Module 039 is used, install the module according to the installation instructions in the Data Brochure D 039 and run the wiring back to the control.
- If a tekmar Zone Control is used, run the wires from the Zone Control to the 362. 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.
- 120 V (ac) to be provided from a 15 A circuit breaker and must have a circuit disconnect installed.
- Connect ground wires to ground bus bar in wiring area.

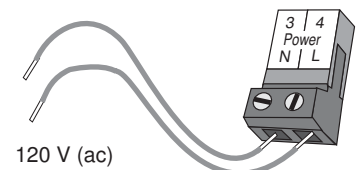
STEP FOUR ————— ELECTRICAL CONNECTIONS TO THE CONTROL —————

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

Powered Input Connections

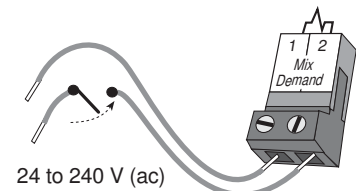
120 V (ac) Power

Connect the 120 V (ac) power supply to the *Power N* and *Power L* terminals (3 and 4). This connection provides power to the microprocessor and display of the control. As well, this connection provides power to the *Mix Pmp* terminal (5) from the *Power L* terminal (4).



Mixing Demand

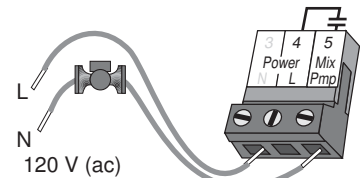
To generate a Mixing Demand, a voltage between 24 V (ac) and 240 V (ac) must be applied across the *Mix Demand* terminals (1 and 2).



Output Connections

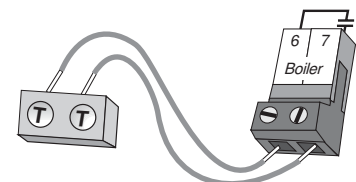
Mixing Pump Contact (Mix Pmp)

The *Mix Pmp* output terminal (5) on the 362 is a powered output. When the relay in the 362 closes, 120 V (ac) is provided to the *Mix Pmp* terminal (5) from the *Power L* terminal (4). To operate the mixing pump, connect one side of the mixing pump circuit to terminal 5 and the second side of the pump circuit to the neutral (N) side of the 120 V (ac) power supply.



Boiler Contact

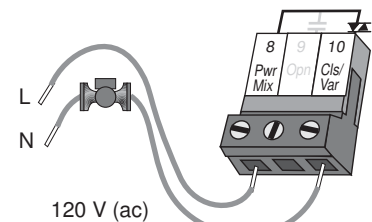
The boiler terminals (6 and 7) are an isolated output in the 362. There is no power available on these terminals from the control. These terminals are to be used as a switch to either make or break the boiler circuit. When the 362 requires the boiler to fire, it closes the contact between terminals 6 and 7.



Variable Speed Injection Pump

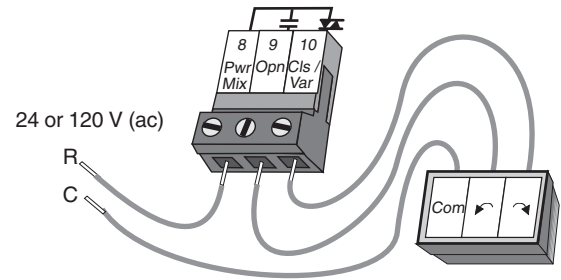
The 362 can vary the speed of a permanent capacitor, impedance protected or equivalent pump motor that has a locked rotor current of less than 2.4 A. Most small wet rotor circulators are suitable as described in Essay E 021. The 362 has an internal overload protection fuse which is rated at 2.5 A 250 V (ac). Contact your tekmar sales representative for details on the repair procedures if this fuse is blown.

Connect one of the wires from the variable speed injection pump to the *Cls / Var* terminal (10) on the 362. Connect the *Pwr Mix* terminal (8) 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.



Mixing Valve Actuator

Connect one side of the 24 V (ac) power to the *Pwr Mix* terminal (8) on the control. The output relay *Opn* (9) is then connected to the open terminal of the actuating motor and the output relay *Cls / Var* (10) is connected to the close terminal of the actuating motor. Connect the second side of the 24 V (ac) circuit to the common terminal of the actuating motor.

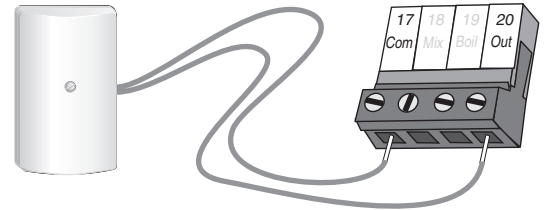


Sensor and Unpowered Input Connections

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

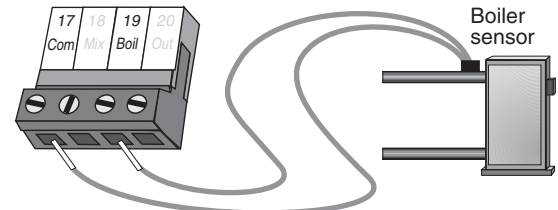
Outdoor Sensor

Connect the two wires from the Outdoor Sensor 070 to the *Com* and *Out* terminals (17 and 20). The Outdoor Sensor is used by the 362 to measure the outdoor air temperature.



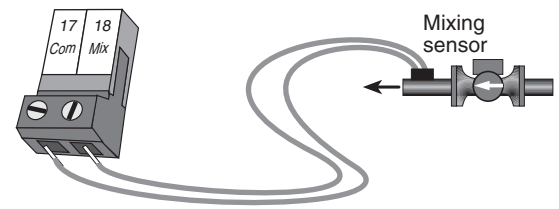
Boiler Sensor

Connect the two wires from the Boiler Sensor 071 to the *Com* and *Boil* terminals (17 and 19). The Boiler Sensor is used by the 362 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 (17 and 18). The Mixing Sensor is used by the 362 to measure the supply water temperature after the mixing device. Normally the sensor is attached to the pipe downstream of the mixing pump.



Mixing Return Sensor

Connect the two wires from the Mixing Return Sensor 071 to the *Com* and *Mix* terminals (11 and 12). The Mixing Return Sensor is used by the 362 to measure the fluid return temperature from the snow melting slab.



10K Sensor

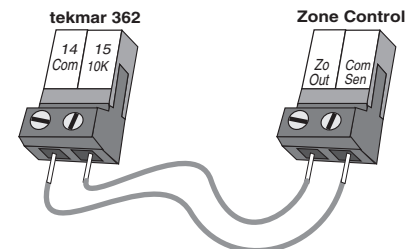
Either an Indoor Sensor, Slab Sensor, or Zone Control can be connected to the *10K* input. If a sensor is used, connect the two wires from the sensor to the *Com* and *10K* terminals (14 and 15).



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 (14) on the 362. Connect the *Zo Out* terminal on the Zone Control to the *10K* terminal (15) on the 362.

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, Remote Display Module (RDM) 040, or a Remote Start / Stop Module 039 can be connected to the tekmar Net™ (*tN1* / *tN2*) input. Connect the *Com* terminal from the appropriate device to the *Com* terminal (11) on the 362. Connect the *tN1* or *tN2* terminal from the appropriate device to the *tN1* / *tN2* terminal (13) on the 362.

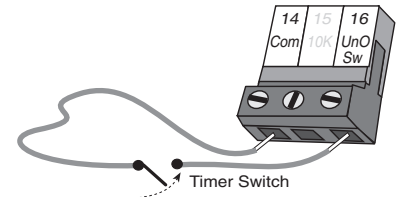
Note: The wires from the RTU, the RDM, and Remote Start / Stop Module are polarity sensitive. The *tN1*/*tN2* device does not operate correctly if the wires are reversed.



UnOccupied Switch

If an external timer (tekmar Timer 032) or switch is used, connect the two wires from the external switch to the *Com* and *UnO Sw* terminals (14 and 16). 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

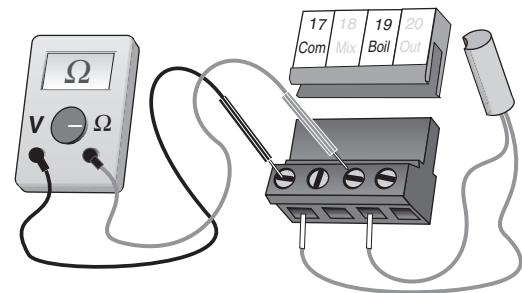
Each terminal block **must be unplugged** from its header on the control before power is applied for testing. To remove the terminal block, pull straight down from the control.

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.

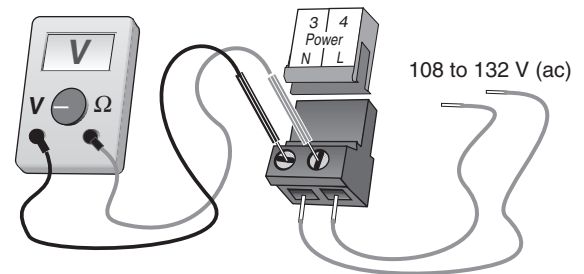
Test The Sensors

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

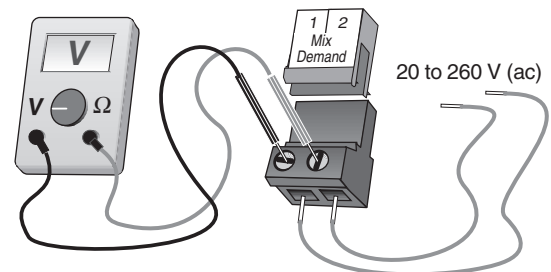
Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces. Turn on the power and measure the voltage between the *N* and *L* terminals (3 and 4) using an AC voltmeter, the reading should be between 108 and 132 V (ac).



Test The Powered Inputs

Mixing Demand

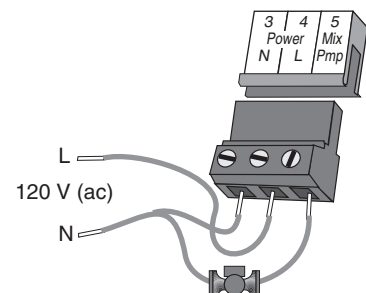
If a mixing demand is used, measure the voltage between the *Mix Demand* terminals (1 and 2). When the mixing demand device calls for heat, you should measure between 20 and 260 V (ac) at the terminals. When the mixing demand device is off, you should measure less than 5 V (ac).



Testing The Outputs

Mixing Pump (Mix Pmp)

If a mixing pump is connected to the terminal (5), make sure that power to the terminal block is off and install a jumper between the *Power L* and the *Mix Pmp* terminals (4 and 5). When power is applied to the *Power N* and *Power L* terminals (3 and 4), 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 (6 and 7), 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 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 (8 and 10), make sure the power to the terminal block is off and install a jumper between the *Pwr Mix* and *Cls / Var* terminals (8 and 10). 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.

Mixing Valve Actuator

If a floating action actuating motor circuit is connected to the *Pwr Mix*, *Opn*, and *Cls / Var* terminals (8, 9, and 10), make sure power to the motor circuit is off and install a jumper between the *Pwr Mix* and *Opn* terminals (8 and 9). 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 (8 and 10). 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.

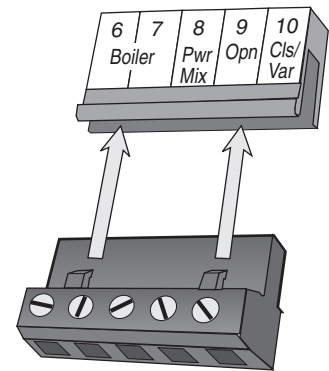
Connecting The Control

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.

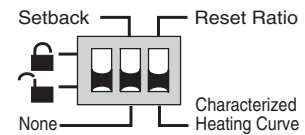
Apply power to the control. The operation of the control on power up is described in the Sequence of Operation section of this brochure.



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 Mixing Control 362 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	Access Level					Description	Range
	Section	LTD	USER	INST	ADV		
OUTDOOR		●	●	●	●	Current outdoor air temperature as measured by the outdoor sensor. This is also the default display for the control.	-67 to 149°F (-55 to 65°C)
ROOM TRG	B2		●	●	●	Target room air temperature. “— —” denotes no heat is required. 10K = INDR MODE = —1—	— —, 35 to 100°F (2 to 38°C)
ROOM	B2	●	●	●	●	Measured room air temperature at the indoor sensor. 10K = INDR MODE = —1—	-58 to 167°F (-50 to 75°C)
ZoIn	B2			●		This is the signal that is being received from a tekmar Zone Control. 10K = ZoIn MODE = —1—	— —, 35 to 110°F (2 to 43°C)
SLAB TRG	C3			●		Slab sensor target temperature. This is the temperature that the control is trying to maintain at the slab sensor. 10K = SLAB MODE = —2—	— —, -58° to 167°F (-50 to 75°C)
SLAB	B2		●	●		Current slab sensor temperature. 10K = SLAB MIX MIN = OFF	-58 to 167°F (-50 to 75°C)
SNOWMELT	C1	●	●	●	●	Current operating status of the snow melting system. MODE = —2—	STRT, STOP, IDLE, EXT, 0:00 to 17:00 hr, — —, INF, WWSD, CWCO
MIX TRG	B1 A		●	●		Target mixed supply is the temperature the control is currently trying to maintain at the mixing sensor.	— —, -25 to 248°F (-32 to 120°C)
MIX SUP	B1 C1		●	●	●	Current mixed supply water temperature as measured by the mixing sensor.	-31 to 266°F (-35 to 130°C)
MIX ΔT	C1		●	●		Current mixed ΔT difference between the mixed supply sensor and the mixed return sensor. ΔT MAX ≠ OFF Boil SENS ≠ SUP MODE = —2—	-85 to 170°F (-65 to 77°C)
Boil TRG	D1		●	●		Target boiler supply is the temperature the control is currently trying to maintain at the boiler sensor +/- 1/2 of the differential. BOIL SENS = SUP	— —, -31 to 266°F (-35 to 130°C)
Boil SUP	D1		●	●	●	Current boiler supply water temperature as measured by the boiler sensor. BOIL SENS = SUP	-31 to 266°F (-35 to 130°C)
Boil RET	D2		●	●	●	Current boiler return water temperature as measured by the boiler sensor. BOIL SENS = RET	-31 to 266°F (-35 to 130°C)

Item Field	Access Level					Description	Range	Actual Setting
	Section	LTD	USER	INST	ADV			
MODE	A		●	●		The operating Mode for the control. MODE 1 is for Heating. MODE 2 is for Snow Melting.	—1— (Heating) —2— (Snow Melting) Default = —1—	
MELTING	C3 C4		●	●	●	This item is the desired slab surface temperature while in the Melting Mode. MODE = —2—	32 to 95°F (0 to 35°C) Default = 36°F (2°C)	
IDLING	C3 C4			●	●	This item is the desired slab surface temperature while in the Idling Mode. MODE = —2—	OFF, 20 to 95°F or 120°F (OFF, -7 to 35°C) Default = OFF	
RUN TIME	C1	●	●	●	●	The time for which the slab is operated once it has reached the MELTING temperature. Without slab sensor, countdown starts immediately. This item cannot be viewed if a Remote Start / Stop Module 039 has been connected. MODE = —2—	OFF, 0:30 to 17:00 hr INF (Infinity) Default = 4:00 hr	
CWCO	C1			●	●	The Cold Weather Cut Off temperature for the snow melting system. MODE = —2—	OFF, -30 to 50°F (OFF, -34 to 10°C) Default = 10°F (-12°C)	
ROOM Occ	B1	●	●	●	●	The desired room air temperature during an Occupied period. <i>Note:</i> There is only a ±3°F adjustment in the LTD access level. DIP switch = Characterized Heating Curve RTU = NONE MODE = —1—	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
ROOM UnOcc	B1		●	●	●	The desired room air temperature during an UnOccupied period. DIP switch = Characterized Heating Curve DIP switch = Setback RTU = NONE MODE = —1—	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
10K	B2			●	●	The device that is to be connected to the 10K input terminal. DIP switch = Characterized Heating Curve RTU = NONE MODE = —1—	NONE, INDR, ZoIn, SLAB (only if MIX MIN = Off) Default = NONE	
10K	C3 C4			●	●	Selects if a slab sensor is connected to the control. MODE = —2—	NONE, SLAB Default = SLAB	
SLAB MIN	B2		●	●	●	The minimum temperature at the slab sensor as long as the control is not in WWSD. DIP switch = Characterized Heating Curve 10K = SLAB MIX MIN = OFF RTU = NONE MODE = —1—	OFF, 35 to 120°F (OFF, 2 to 49°C) Default = 70°F (21°C)	
SLAB MAX	B2			●	●	The maximum temperature at the slab sensor. DIP switch = Characterized Heating Curve 10K = SLAB RTU = NONE MODE = —1—	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	

Item Field	Access Level				Description	Range	Actual Setting
	Section	LTD	USER	INST			
BOOST	B1		●	●	The maximum length of morning boost. DIP switch = Characterized Heating Curve DIP switch = Setback No RTU Connected 10K ≠ ZoIn MODE = —1—	0:20 to 8:00 hrs Default = OFF	
SETBACK	B1	●	●	●	The amount the mixing supply temperature is reduced when the control is in the UnOccupied Mode. DIP switch = Reset Ratio DIP switch = Setback MODE = —1—	0 to 50°F (0 to 28°C) Default = 15°F (-9°C)	
TERMINAL	B1		●	●	The type of terminal units that are being used in the heating system. DIP switch = Characterized Heating Curve MODE = —1—	HRF1 (Heavy), HRF2 (Light), (Fan-) COIL, CONV (ector), RAD (iator), BASE (board) Default = HRF1	
MIX MIN	B1			●	The minimum supply water temperature for the mixing system. DIP switch = Characterized Heating Curve MODE = —1—	OFF, 35 to 150°F (OFF, 2 to 66°C) Default = OFF	
MIX INDR	B1		●	●	The design indoor air temperature used in the heat loss calculations for the heating system. DIP switch = Characterized Heating Curve MODE = —1—	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
MIX START	B1		●	●	The starting water temperature used in the Reset Ratio calculation for the heating system. DIP switch = Reset Ratio MODE = —1—	35 to 150°F (2 to 66°C) Default = 70°F (21°C)	
OUT START	B1		●	●	The outdoor starting temperature used in the reset ratio calculation for the heating system. DIP switch = Reset Ratio MODE = —1—	35 to 85°F (2 to 29°C) Default = 70°F (21°C)	
MIX DSGN	B1		●	●	The design supply water temperature used in the heat loss calculation for the heating system. MODE = —1—	70 to 220°F (21 to 104°C) Default = 120°F (49°C)	
OUT DSGN	B1		●	●	The design outdoor air temperature used in the heat loss calculation for the heating system MODE = —1—	-60 to 32°F (-51 to 0°C) Default = 10°F (-12°C)	
MIX MAX	A B1		●	●	The maximum supply temperature allowed for the mixing system.	80 to 210°F, OFF (27 to 99°C, OFF) Default = 140°F (60°C)	
MIXING	A		●	●	The type of mixing device that is to be used.	FLOT (Floating), VAR (Variable speed) Default = VAR	

Item Field	Access Level					Description	Range	Actual Setting
	Section	LTD	USER	INST	RDV			
MOTR SPD	A		●	●		The time that the actuating motor requires to operate from fully closed to fully open. MIXING = FLOT	30 to 230 sec Default = 160 sec	
Boil SENS	D1 D2 D3		●	●		The location of the boiler sensor. This affects operation of the boiler contact.	SUP (Supply) RET (Return) NONE Default = SUP	
ΔT MAX	C1		●	●		The maximum ΔT for the snow melting slab. Boil SENS ≠ SUP MODE = —2—	10 to 70°F, OFF (5 to 39°C, OFF) Default = 40°F (22°C)	
Boil MAX	D1			●		The maximum temperature allowed for the boiler target temperature. Boil SENS = SUP MODE = —1—	120 to 225°F, OFF (49 to 107°C, OFF) Default = 210°F (99°C)	
Boil MIN	D1		●	●		The minimum temperature allowed for the boiler target temperature. Boil SENS ≠ NONE	OFF, 80 to 180°F (OFF, 27 to 82°C) Default = 140°F (60°C)	
FIRE DLY	D1		●	●		The time delay the control can expect between the time the boiler contact closes and the burner fires. Boil SENS = SUP	0:00 to 3:00 min (1 sec. increments) Default = 0:10 min	
Boil MASS	D1		●	●		The thermal mass characteristics of the boiler that is being used. Boil SENS = SUP	LITE, MED, HEVY Default = MED	
Boil DIFF	D1		●	●		The differential that the control is to use when it is operating the boiler. Boil SENS = SUP MODE = —1—	AUTO, 2 to 42°F (AUTO, 1 to 23°C) Default = AUTO	
DIFF	D1		●	●		The differential for the snow melting system. Boil SENS = SUP MODE = —2—	AUTO, 2 to 42°F (AUTO, 1 to 23°C) Default = AUTO	
WWSO _{Occ}	B1 C4	●	●	●		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)	
WWSO _{UnOcc}	B1		●	●		The system's warm weather shut down during the UnOccupied period. DIP switch = Setback MODE = —1—	35 to 100°F, OFF (2 to 38°C, OFF) Default = 60°F (4°C)	

362 Adjust Menu (4 of 4)

Item Field	Access Level					Description	Range	Actual Setting
	Section	LTD	USER	INST	ADV			
PURGE	B1 C1			●		The maximum length of time that the mixing pump continues to operate after the mix demand is removed.	OFF, 0:10 to 40:00 min Default = 0:20 min	
SOFT START	B1			●		Enables or disables the Soft Start feature in the control. MODE = —1—	NONE, MIX Default = NONE	
EXERCISE	A			●		The frequency with which the control exercises the pumps and valves that are operated by the control.	30 to 240 hr, OFF Default = 70 hr	

362 Monitor Menu (see pages 30 - 32)

362 Schd (Schedule) Menu (1 of 1)

Item Field	Access Level					Description	Range
	Section	LTD	USER	INST	ADV		
OVERRI:DE	B1	●	●	●	●	The type of setback override that is in effect for the heating system. DIP switch = Setback MODE = —1— AWAY is available even if DIP ≠ Setback	NONE, TMPYOcc Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, AWAY Ovr Default =NONE
OVERRI:DE	C1	●	●	●	●	The override that is in effect for the snow melting system. MODE = —2—	NONE, AWAY Default =NONE

362 Misc (Miscellaneous) Menu (1 of 2)

Item Field	Access Level				Description	Range
	LTD	USER	INST	ADV		
UNITS		●	●	●	The units of measure that all of the temperatures are to be displayed in by the control.	°F, °C Default = °F

362 Misc (Miscellaneous) Menu (2 of 2)

Item Field	Access Level				Description	Range
	LTD	USER	INST	RDV		
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 = <i>Unlock</i>	RDV, INST, USER, LTD Default = INST

Room Temperature Units (RTUs) 062 and 063



A single RTU may be connected to the Mixing Control 362 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.

362 RTU View Menu (1 of 1)

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

362 RTU Adjust Menu (1 of 1)

Item Field	Section	Access Level					Description	Range	Actual Setting
		LTD	USER	INST	ADV	RTU 062			
ROOM Occ	B1	●	●	●	●	●	The desired room air temperature during an Occupied period for the mixing zones. <i>Note:</i> There is only a $\pm 3^{\circ}\text{F}$ adjustment in the LTD access level.	35 to 100°F (2 to 38°C) Default = 70°F (21°C)	
ROOM UnOcc	B1	●	●	●	●	●	The desired room air temperature during an UnOccupied period for mixing zones. <i>Note:</i> There is only a $\pm 3^{\circ}\text{F}$ adjustment in the LTD access level. DIP switch = Setback	35 to 100°F (2 to 38°C) Default = 65°F (18°C)	
BOOST	B1			●	●	●	The amount of morning boost. DIP switch = Setback	OFF, 0:20 to 8:00 hr Default = OFF	
RTU SENS				●	●	●	Selects whether the RTU is to use its internal air sensor.	OFF, AIR Default = AIR	
REMOTE 1				●	●	●	This item allows for remotely adding a 10K sensor to the RTU. Applications are for temperature averaging.	NONE, AIR Default = NONE	
REMOTE 2				●	●	●	This item allows for remotely adding a second 10K sensor to the RTU. Applications are for temperature averaging.	NONE, AIR Default = NONE	
REMOTE 3				●	●	●	This item allows for remotely adding a third 10K air sensor to the RTU, or a 10K slab sensor to measure slab temperature. MIX MIN = OFF (for Slab Sensor only)	NONE, AIR, SLAB Default = NONE	
SLAB MIN		●	●	●	●	●	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			●	●	●	●	The maximum target temperature at the slab sensor. REMOTE 3 = SLAB	40 to 150°F (4 to 66°C) Default = 90°F (32°C)	

362 RTU Monitor Menu (1 of 1)

Item Field	Section	Access Level					Description	Range
		LTD	USER	INST	ADV	RTU 062		
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)

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

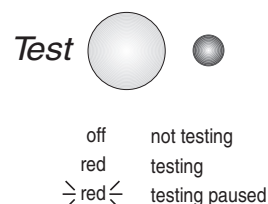
Item Field	Access Level						Description	Range
	Section	LTD	USER	INST	RDV	RTU 062 RTU 063		
OVERRI DE	B1		●	●	●	●	The type of setback override that is in effect. DIP switch = Setback Away is available even if DIP ≠ Setback	NONE, TMPY Occ Ovr, PERM Occ Ovr, TMPY UnOcc Ovr, PERM UnOcc Ovr, ALWAYS Ovr Default = NONE

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

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

Testing the Control

The Mixing Control 362 has a built in test routine which is used to test the main control functions. The 362 continually monitors the sensors and displays an error message whenever a fault is found. See the following pages for a list of the 362'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 FLDT 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 FLDT 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.
- Step 3** - The mixing pump (*Mix Pmp*) is turned on for 10 seconds. **NOTE:** Only if there is a mixing demand can the control be paused in step 3.

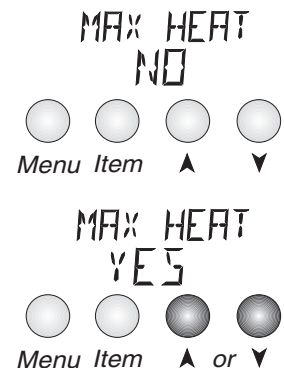
Step 4 - The *Boiler* contact is turned on for 10 seconds. After 10 seconds, the *Boiler* and *Mix Pmp* contacts are shut off.
NOTE: Only if there is a boiler demand can the control be paused in step 4.

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

MAX HEAT (MAX HEAT)

The Mixing Control 362 has a function called Max Heat. In this mode, the 362 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.

Sketch the Piping in the System

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

Document the Control

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

Isolate the Problem

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

Test the Contacts Voltages & Sensors

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

Monitor the System

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

362 Monitor Menu (1 of 3)

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

Item Field	Access Level				Description	Range
	LTD	USER	INST	RDV		
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 sun light 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)
SLAB HI	●	●	●	●	The highest recorded temperature at the slab sensor since this item was last cleared. 10K = SLAB	-58 to 167°F (-50 to 75°C)
SLAB LO	●	●	●	●	The lowest recorded temperature at the slab sensor since the item was last cleared. 10K = SLAB	-58 to 167°F (-50 to 75°C)

362 Monitor Menu (2 of 3)

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

Item Field	Access Level				Description	Range
	LTD	USER	INST	RDV		
MIX HI		●	●		The highest recorded temperature at the mixing sensor since this item was last cleared.	-31 to 266°F (-35 to 129°C)
MIX LO		●	●		The lowest recorded temperature at the mixing sensor since this item was last cleared.	-31 to 266°F (-35 to 129°C)
PUMP		●	●		The total number of mixing pump (<i>Mix Pmp</i>) running hours since this item was last cleared.	0 to 9999 hr
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. Boil SENS = SUP	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. Boil SENS = SUP	0 to 9999
Boil HI		●	●		The highest temperature recorded at the boiler sensor since this item was last cleared. Boil SENS ≠ NONE	-31 to 266°F (-35 to 130°C)
Boil LO		●	●		The lowest temperature recorded at the boiler sensor since this item was last cleared. Boil SENS ≠ NONE	-31 to 266°F (-35 to 130°C)
ROOM HOT			●		This item is an adjustable warning that can only be viewed if the 10K 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. 10K = INDR MODE = — —	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 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. 10K = INDR MODE = — —	0 to 80°F (-18 to 27°C) default = 45°F (7°C)

362 Monitor Menu (3 of 3)

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

Item Field	Access Level				Description	Range
	LTD	USER	INST	ADV		
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. MODE = 1 & 2	3 to 40 min, OFF default = OFF
COP			●		The number of times that the microprocessor in the control has reset since this item was last cleared. The control will reset itself if it has experienced some form of interference that has disrupted its operation. This can be used to give an indication of the quality of the electrical environment that the control has been installed in.	0 - 255
NON-COP			●		The number of times that the control has been powered up since this item was last cleared. This number will increase if there is a lowering of the input voltage beyond the control's usable range. This item can be used as an indication of the quality of the power source.	0 - 255
tN1 COMM			●		The number of times that a communication error has been detected between the control and either an RTU, RDM or Remote Start / Stop Module since this item was last cleared. If the wires between the control and the tekmar Net™ (tN1/tN2) device are run in a noisy electrical environment, this can cause interference in the communication between the control and the tN1/tN2 device.	0 - 255

362 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. <i>Note:</i> 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. <i>Note:</i> 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. <i>Note:</i> 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. <i>Note:</i> Access level must be ADV in order to clear the error.

Error Displayed	Description of Error
RTU ERR EE W	The RTU was unable to store a piece of information to the EEPROM. This error can be caused by a noisy power source to the control. The control will display the error message and will continue to operate as normal. To clear this error, press either the Menu or Item buttons.
RTU ERR ADJS	The RTU was unable to read a piece of information stored in the Adjust menu. Because of this, the control was required to load the factory settings into all of the items in the Adjust menu. The control will operate based on 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. <i>Note:</i> Access level must be ADV in order to clear the error.
RTU ERR MNTR	The RTU was unable to read a piece of information stored in the Monitor menu. Because of this, the control was required to load the factory settings into all of the items in the Monitor menu. The control will continue to display the error message until all of the items available in the Monitor menu of the RTU have been checked by the user or installer. <i>Note:</i> Access level must be ADV in order to clear the error.
RTU ERR SCHD	The RTU was unable to read a piece of information stored in the Schedule menu. Because of this, the control was required to load the factory settings into all of the items in the Schedule menu. The control will continue to display the error message until all of the items available in the Schedule menu of the RTU have been checked by the user or installer. <i>Note:</i> Access level must be ADV in order to clear the error.
RTU ERR MISC	The RTU was unable to read a piece of information stored in the Miscellaneous menu. Because of this, the control was required to load the factory settings into all of the items in the Miscellaneous menu. The control will continue to display the error message until all of the items available in the Miscellaneous menu of the RTU have been checked by the user or installer. <i>Note:</i> Access level must be ADV in order to clear the error.
EN 1/2 TYPE	An incorrect device has been connected to the tekmar Net™ tN1/tN2 input terminal. An RTU has been connected to the control and either the <i>Heating Curve/Reset Ratio</i> DIP switch has been set to <i>Reset Ratio</i> or the control is in MODE —2—. Once the problem has been corrected, press either the Menu or Item button to clear the error message from the control.
EN 1/2 SHRT	A short circuit has been read between the 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. To clear this error, press either the Menu or Item buttons.
EN 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 re-power 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, if the Boil SENS item is set to SUP, the control will operate the mixing device at a fixed 15% of output as long as there is a Mixing Demand. If the Boil SENS item is set to RET or NONE, the control operates the mixing device at a fixed 30% 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.

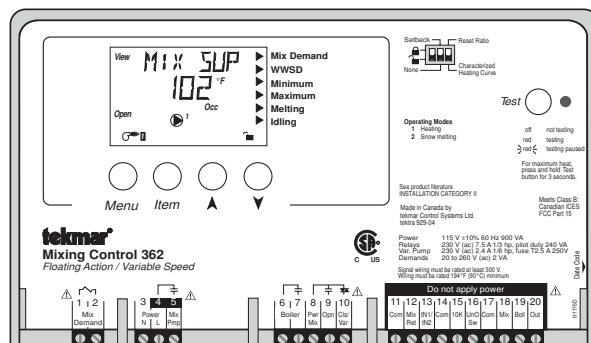
Error Displayed	Description of Error
MIX SUP OPEN	The control is no longer able to read the Mixing Supply sensor due to an open circuit. In this case, if the Boil SENS item is set to SUP, the control will operate the mixing device at a fixed 15% of output as long as there is a Mixing Demand. If the Boil SENS item is set to RET or NONE, the control operates the mixing device at a fixed 30% of output as long as there is a Mixing Demand. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX RET SHRT	The control is no longer able to read the Mix Return sensor due to an short circuit. If the MIXING item is set to FLDT, the control will operate without ΔT protection of the slab. If the MIXING item is set to VAR, the control operates the snow melting system as required. In order to provide ΔT protection, the control periodically shuts off the injection pump and uses the Mix Supply sensor to determine the Mix Return temperature. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX RET OPEN	The control is no longer able to read the Mix Return sensor due to an open circuit. If the MIXING item is set to FLDT, the control will operate without ΔT protection of the slab. If the MIXING item is set to VAR, the control operates the snow melting system as required. In order to provide ΔT protection, the control periodically shuts off the injection pump and uses the Mix Supply sensor to determine the Mix Return temperature. Locate and repair the problem as described in the Data Brochure D 070. If the Mix Return sensor was deliberately not installed, set the MAX ΔT item to OFF. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
Boil SENS SHRT	The control is no longer able to read the Boiler sensor due to an short circuit. If the Boiler Minimum setting is higher than 100°F (38°C) the control closes the boiler contact when the mixing device starts to operate. The boiler temperature is limited by the operating aquastat. If the Boiler Minimum setting is lower than 100°F (38°C) the control does not operate the boiler contact. Locate and repair the problem as described in the Data Brochure D070. To clear the control after the sensor has been repaired, press either the Menu or Item button.
Boil SENS OPEN	The control is no longer able to read the boiler sensor due to an open circuit. If the Boiler Minimum setting is higher than 100°F (38°C) the control closes the boiler contact when the mixing device starts to operate. The boiler temperature is limited by the operating aquastat. If the Boiler Minimum setting is lower than 100°F (38°C) the control does not operate the boiler contact. Locate and repair the problem as described in the Data Brochure D 070. If the Boiler Sensor was deliberately not installed, set the Boil SENS item to NONE. To clear the control after the sensor has been repaired, press either the Menu or Item button.
10K SHRT	The control is no longer able to read the 10K input because of a short circuit. The control will continue to operate as if there was nothing connected to the 10K input. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
10K OPEN	The control is no longer able to read the 10K input because of an open circuit. The control will continue to operate as if there was nothing connected to the 10K input. Locate and repair the problem as described in the Data Brochure D 070. If a 10K sensor was deliberately not installed, set the 10K item to NONE. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. 10K \neq 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 \neq NONE.

Error Displayed	Description of Error
RTU REM1 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. REMOTE 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. REMOTE 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. REMOTE 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. REMOTE 3 ≠ NONE
RTU REM3 OPEN	The Remote Sensor 3 attached to the RTU is being read as an open circuit. The RTU will continue operation using all remaining sensors. If all of the sensors are unavailable, the control will continue to operate as if the RTU was not connected to the control. This error message can be cleared once the sensor has been repaired. Locate and repair the problem as described in the Data Brochure D 070. To clear the error message from the control, press either the Menu or Item button. REMOTE 3 ≠ NONE
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.

Technical Data	
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Mixing Control 362 *Floating Action / Variable Speed* _____

Literature	— D 362, A 362's, D 001, D 070, E 003, E 021, U 362.
Control	— Microprocessor PID control; This is not a safety (limit) control .
Packaged weight	— 3.7 lb. (1690 g), Enclosure A, blue PVC plastic
Dimensions	— 6-5/8" H x 7-9/16" W x 2-13/16" D (170 x 193 x 72 mm)
Approvals	— CSA C US, CSA/UL 61010-1, meets Class B: ICES & FCC Part 15
Ambient conditions	— Indoor use only, 36 to 104°F (2 to 40°C) RH ≤80% to 88°F (31°C), down to 50% above 88°F (31°C) Altitude <6560 ft (2000 m) Installation Category II, Pollution Degree 2
Power supply	— 115 V (ac) ±10%, 60 Hz, 900 VA
Relays	— 230 V (ac) 7.5 A 1/3 hp, pilot duty 240 VA
Var. Pump	— 230 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) B=3892 Outdoor Sensor 070 and 2 of Universal Sensor 071.
Optional devices	— tekmar type #: 032, 040, 062, 063, 070, 071, 072, 073, 076, 077, 084, 092.



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 non métallique n'assure pas la continuité électrique des conduits. Utiliser des manchons ou des fils de accord spécialement conçus pour la mise à 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.



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