WIRSBO
Life, Safety, Comfort Systems

Warm Cozy Floors

proMIX™ 212
Installation Manual

RADIANT FLOORS
COMFORT HEATING

Bringing *comfort* to life

Uponor

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Installation Manual
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INSTALLATION
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If you are only PROGRAMMING the proMIX 212, go to:

PROGRAMMING
Steps 1-2

IMPORTANT NOTE:
If you are not familiar with how the Wirsbo proMIX 212 operates or the theory behind settings for a radiant system, it is important you review the Control Function Overview. It will help with understanding the functions of the control within the hydronic radiant heating system.

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RADIANT FLOORS
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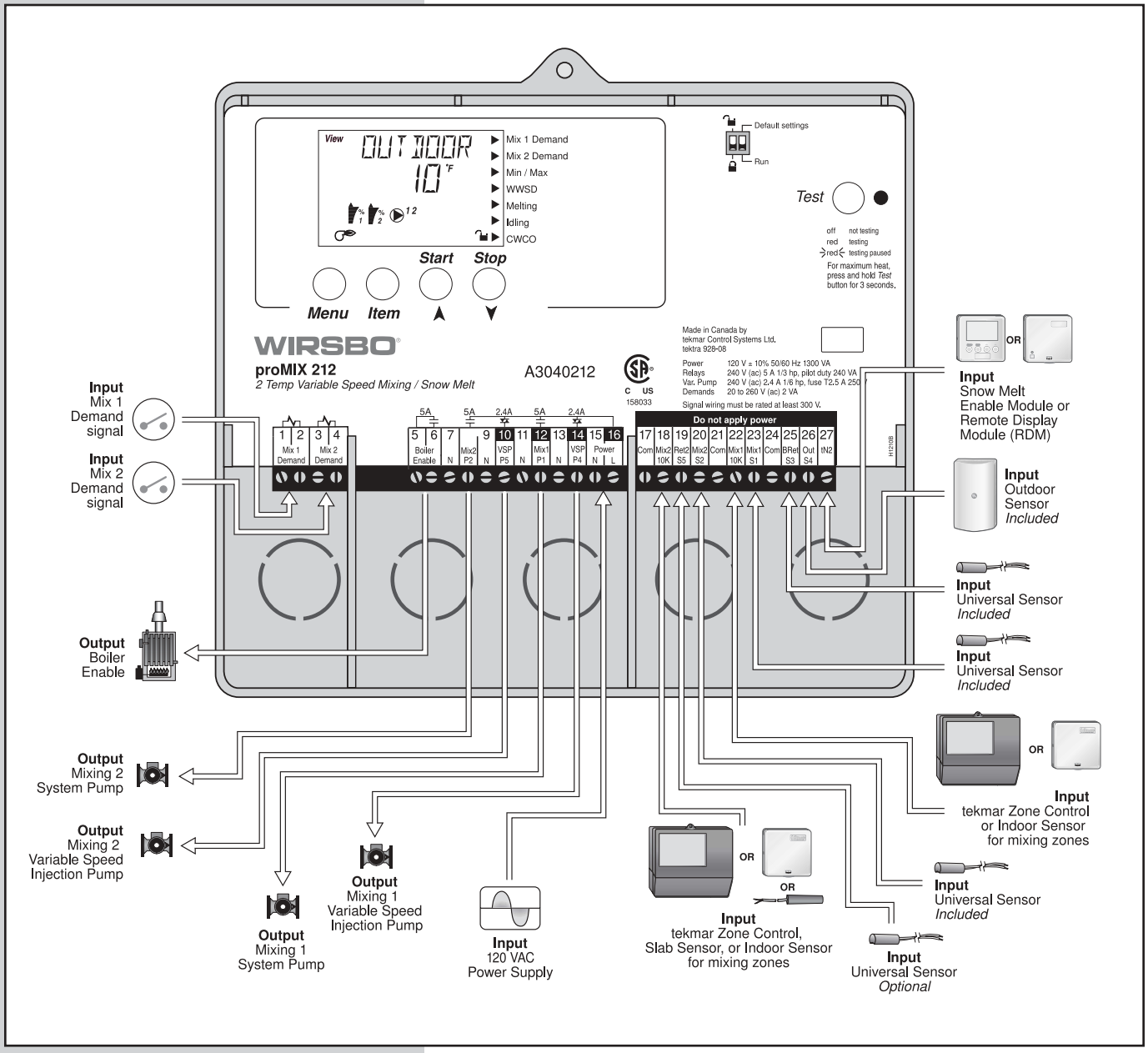


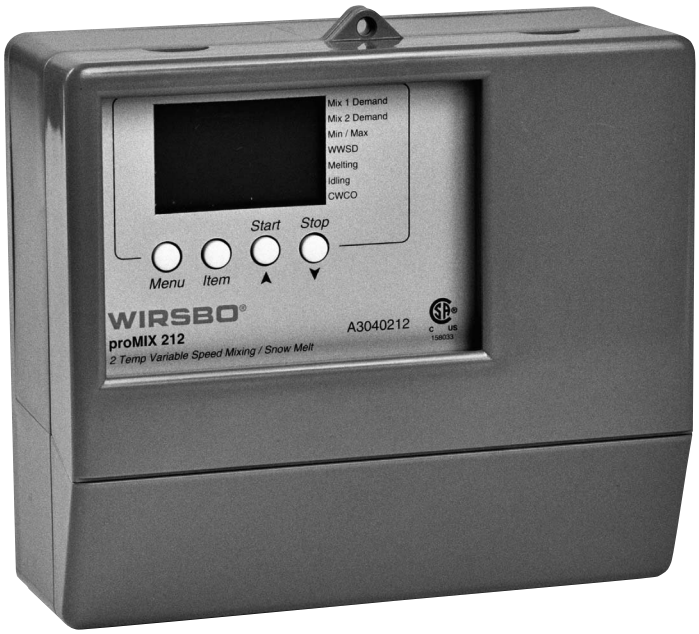
INTRODUCTION
CONTROL OVERVIEW

The WIRSBO proMIX™ 212 provides single-source, two-temperature control for Wirsbo radiant floor heating, snow and ice melting, and other hydronic radiant heating applications that require two different supply water temperatures.

This control can be used in setpoint, weather-responsive (reset) or snow-melting modes.

The control achieves proper supply water temperatures by using variable speed injection pumps between the primary boiler loop and the secondary radiant loop.

The remote display option for the control allows the owner to view system temperatures, operating status, or make system setting changes up to 250 feet from the location of the proMIX 212.



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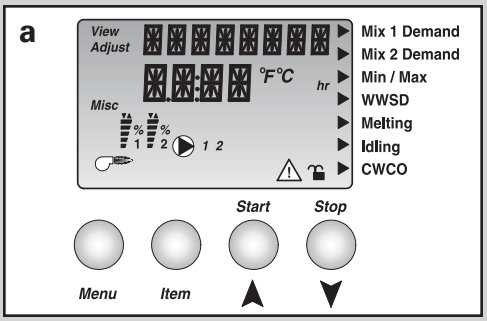

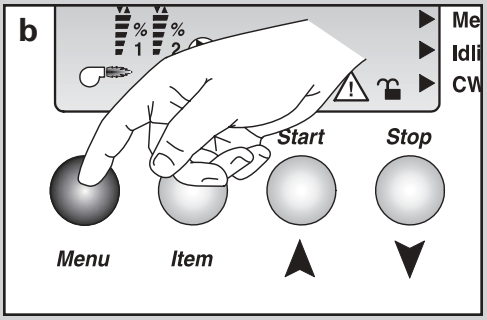

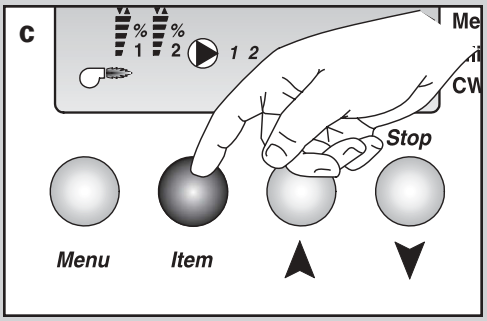

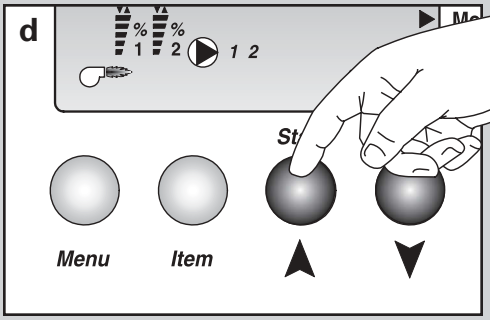

INTRODUCTION
NAVIGATING THE CONTROL

The proMIX 212 (also referred to as "control") has a Liquid Crystal Display (LCD) that lets users set up the operation of the system. The proMIX 212 has four push buttons for selecting and adjusting settings. **(See fig. a.)**

Note: It is recommended that the user record control settings (for later review) on the Program Setup Sheet provided in Appendix V.

Menu (See fig. b.)

- All items displayed by the control are organized into various menus.
- Menus are listed on the left 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.
- Within specific menu selections, a group of items can be viewed and selected.

Item (See fig. c.)

- 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, press and release the Item button to return the display to the first item in the same menu.

Adjustments (See fig. d.)

- To make an adjustment to a control setting, first select the appropriate menu with the Menu button.
- Then select the item you want using the Item button.
- Finally, use the up or down button to make the required change.

Note: You can get more information by viewing the status field of the LCD. The status field shows which of the control's outputs are active. Most symbols in the status field can only be seen when the View menu is selected.

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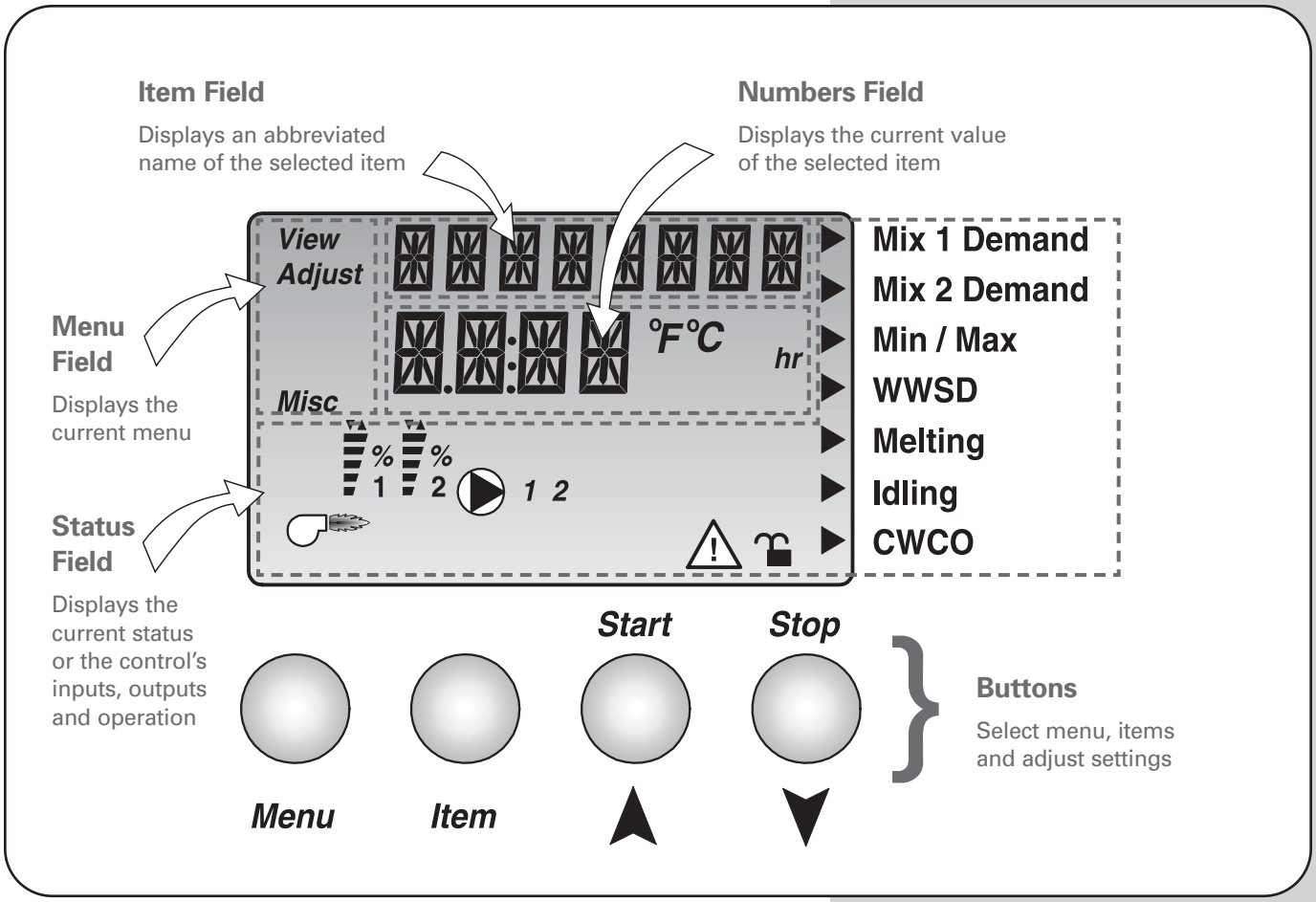
Display



Symbol Description

Pointer Displays the control operation as indicated by the text ▶	**Pump** Indicates specific pump operation. **1** - mixing pump (P1) **2** - mixing pump (P2) 1 2	**Lock/Unlock** Displays whether keypad is locked or unlocked
Variable Speed Output Scale Shows output of injection pump 1 or 2. Arrows show whether the output is increasing or decreasing % 1 % 2	**Units of Measurement** °F, °C, hr	
Burner Displays when the boiler relay is turned on	**Warning** Displays when an error exists or when a limit has been reached	

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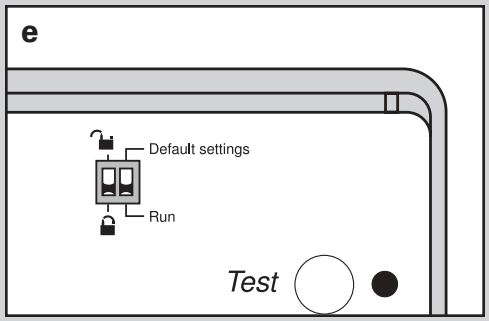
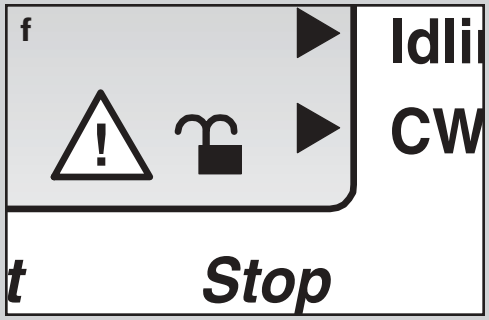
COMFORT HEATING

e



f



DIP SWITCH SETTINGS

LOCK/UNLOCK DIP SWITCH

- Lock/Unlock DIP switch is used to restrict access to the control's setting. **(See fig. e.)**
- In locked mode, settings cannot be changed.
- A small icon representing a padlock is shown in the bottom right corner of the display, indicating if control is locked or unlocked. **(See fig. f.)**
- Factory setting is UNLOCK.

DEFAULT SETTINGS/RUN DIP SWITCH

- When DIP switch is set to the Default setting, the control will operate under the factory default settings.
- When the DIP switch is set to the Run setting, the individual settings withing the control may be adjusted to meet the unique demands of the building.
- Factory setting is RUN.

INTRODUCTION

VIEWING THE STATUS OF THE SYSTEM PERFORMANCE

- The View Menu is available for viewing the current status of the system performance.
- By selecting the View Menu, and then pushing the item button, you can scroll through the available menu items showing the current settings and temperatures in the system.

OUTDOOR (See fig. a.)

Shows the actual outdoor temperature as read from the outdoor sensor (S4) location

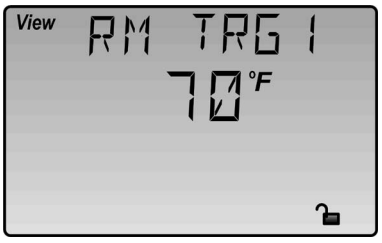
a

RM TRG 1 (See fig. b.)

This setting establishes the target room temperature as used on the heat-loss calculation. This setting is used by the control to calculate the reset ratio for the Modes 1 mixing section.

Note: This view is available only when the Mixing 10K Sensor 1 setting is set to INDR and a sensor is installed.

b

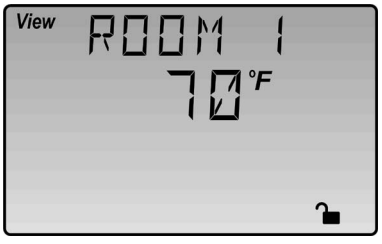


ROOM 1 (See fig. c.)

Actual room temperature as sensed by the indoor room sensor.

Note: This view is available only when the Mixing 10K Sensor 1 setting is set to INDR and a sensor is installed.

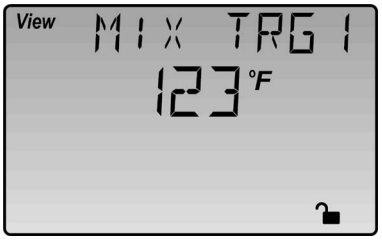
c



MIX TRG 1 (See fig. d.)

Establishes the target supply water temperature required in order to satisfy the heating system demand for Modes 1 mixing section at the current outdoor temperature

d



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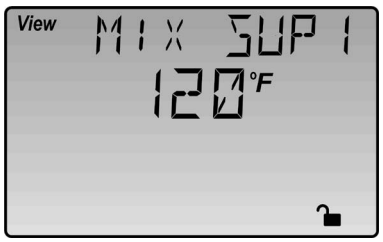
COMFORT HEATING

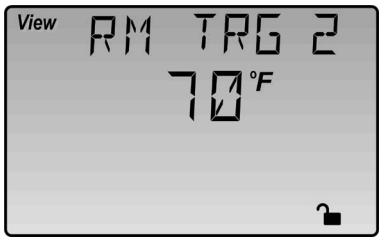
e



MIX SUP 1 (See fig. e.)

Shows actual Modes 1 mixing supply water temperature to the system at the Mix 1 supply sensor (S1) location

f

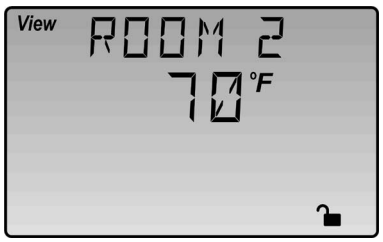


RM TRG 2 (See fig. f.)

This setting establishes the target room temperature as used on the heat-loss calculation. This setting is used by the control to calculate the reset ratio for the Modes 2 mixing section.

Note: This view is available only when the Mixing 10K Sensor 2 setting is set to INDR and a sensor is installed.

g

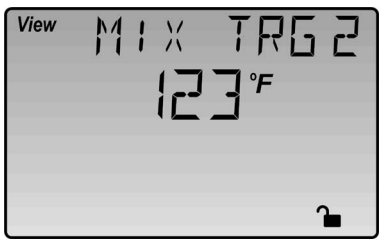


ROOM 2 (See fig. g.)

Actual room temperature as sensed by the indoor room sensor

Note: This view is available only when the Mixing 10K Sensor 2 setting is set to INDR and a sensor is installed.

h



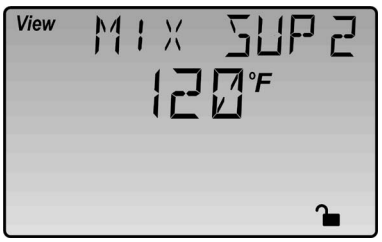
MIX TRG 2 (See fig. h.)

Establishes the target supply water temperature required in order to satisfy the heating system demand for Modes 2 mixing section at the current outdoor temperature

MIX SUP 2 (See fig. i.)

Shows actual Modes 2 mixing supply water temperature to the system at the Mix 2 supply sensor (S2) location

i

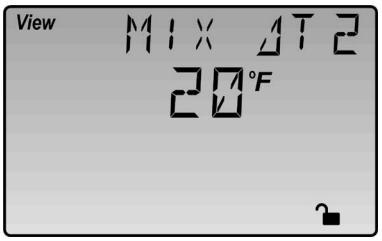


MIX ΔT 2 (See fig. j.)

Shows actual temperature differential (Δt) between Mix 2 supply sensor (S2) and Mix 2 return sensor (S5) locations

Note: This view is available only when the Modes 2 setting is set to SNOW.

j

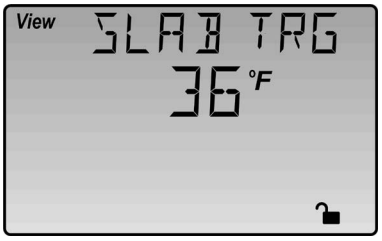


SLAB TRG (See fig. k.)

Establishes the target supply water temperature required in order to satisfy the snowmelting system demand for Modes 2 snow section at the current outdoor temperature

Note: This view is only available when the Modes 2 setting is set to SNOW.

k

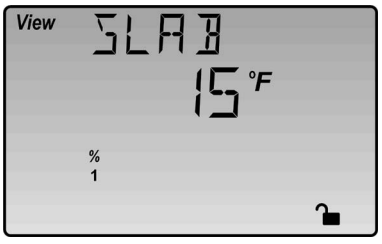


SLAB (See fig. l.)

Shows actual slab temperature at the slab sensor (S7) location

Note: This view is only available when the Modes 2 setting is set to SNOW.

l



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m

n

STATUS (See fig. m.)

Shows current snow-melting operating status. Display will show the following information: time remaining on the snow-melting cycle; if the system is in CWCO; if the system is IDLING; if the system is STOP.

> ***Note:*** **This view is only available when the Modes 2 setting is set to SNOW.**

Boil RET (See fig. n.)

Displays the actual return water temperature to the boiler

INSTALLATION

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CAUTIONS AND DISCLAIMERS

Failure to install and/or operate this control properly could result in:

- ***Damage to the equipment***
- ***Personal injury***
- ***Property damage***

It is up to you to make sure this control is installed safely in a way that meets all codes and standards that apply.
Do not use this electronic control as a primary limit control. Other controls that are meant to be used and certified to be used as safety limits must be placed into the control circuit.

Carefully read the Control Overview (page 3) to make sure you have chosen the proper control for your application.

Warning Symbol: **Indicates presence of hazards which can cause severe personal injury, death or substantial property damage if ignored**

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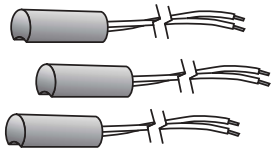
INSTALLATION - STEP 1

CHECKING CONTENTS

Check the contents of this package.
The Wirsbo proMIX 212 should have:

proMIX 212
(A3040212)

Outdoor Sensor
(A3040070)



Three Universal Sensors
(A3060071)

Product Manual

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

Control Optional Components (sold separately)

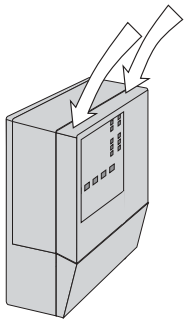
Remote Display
(A3040040)

Snow Melt Enable Kit
(A3040039)

INSTALLATION - STEP 2
THE CONTROL BASE

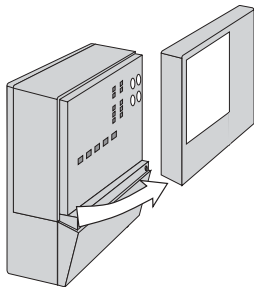
Removing the Control from the Base
Press down at the fingertip grips on top of the front cover and pull out and down. **(See fig. a.)**

a



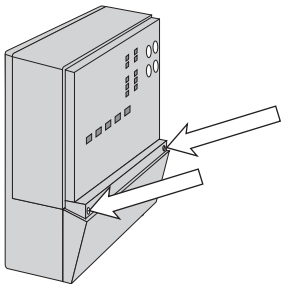
Lift the front cover up and away from the control. **(See fig. b.)**

b



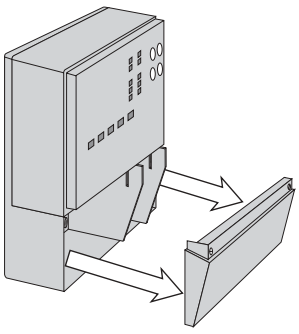
Loosen the screws at the front of the wiring cover. **(See fig. c.)**

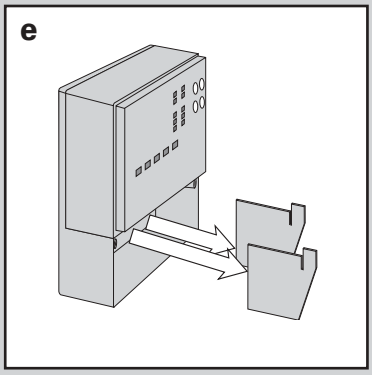
c



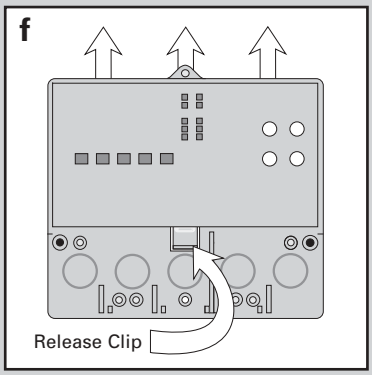
The wiring cover pulls straight out from the wiring chamber. **(See fig. d.)**

d

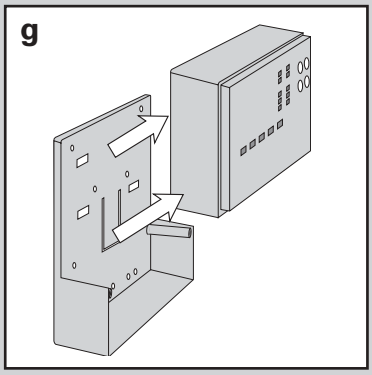




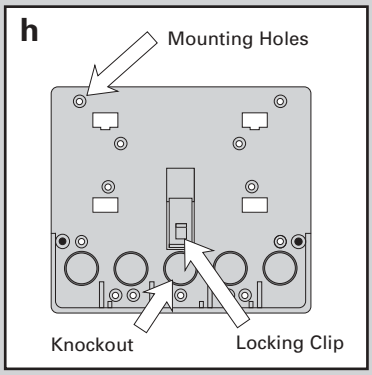
Remove the safety dividers from the wiring chamber by pulling them straight out of their grooves. **(See fig. e.)**



Press the control release clip on the base inside the wiring chamber and slide the control upward. **(See fig. f.)**



The control lifts up and away from the base. **(See fig. g.)**



Mounting the Base (See fig. h.)

1) Find a convenient and accessible location typically in the mechanical room.

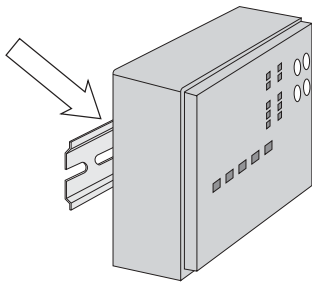
2) Following the hole pattern, mount the control base using the appropriate screws.

The control can also be mounted on a standard DIN rail. (See fig. i.)

First remove the control from its base and then, using the hooks and spring clip on the back of the control, mount it onto the DIN rail. This is a popular option for those who prefer to mount the control inside a larger electrical panel.

The wiring can enter the bottom or the back of the enclosure. Knockouts provided in the base allow the wiring to be run in conduit up to the enclosure. The base also has holes that line up with the mounting holes of most common electrical boxes.

i



CAUTION

All wiring must be performed by a licenced professional and comply with local trade practices and codes.

Wirsbo does not take responsibility for any damage caused due to failure to comply.

INSTALLATION - STEP 3
ROUGH-IN WIRING

Note Before you Start Wiring

- All electrical wiring should end in the control base wiring chamber.
- The base has standard ⅞" (22 mm) knockouts.
- Knockouts accept common wiring hardware and conduit fittings.
- Before removing knockouts, check wiring diagram and select those sections of the chamber with common voltages.
- Do not allow the wiring to cross between low and high voltage sections or else wires will interfere with safety dividers (these dividers should be installed at a later time).
- Do not apply power to any of the wires during rough-in wiring stage.
- All wires should be stripped to ⅜" (9 mm) for the correct connection to the control.

Wiring Components

1) Install the various sensors per instructions listed and run the wiring back to the control base and label all wires for later installation

Main Sensors	• Outdoor Sensor S4 • Boiler Sensor S3 • Mixing Sensor S1 • Mixing Sensor S2
Optional Sensors	• Mixing Return Sensor S5 • Slab Sensor S7
Optional Modules	• Remote Display Module (RDM) • Snow Melt Enable Kit

2) Run appropriate wire from all other system components (pump, boiler, etc.) to the control base.

3) Run wires from the 120VAC power to the control base.
   - Use a clean power source to ensure proper operation.
   - Comply with local codes for minimum gauge and breaker requirements.

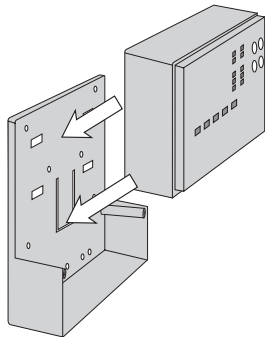
INSTALLATION - STEP 4

ATTACHING THE CONTROL TO THE BASE

1) Push the proMIX 212 control into the base you mounted in step 2. **(See fig. a.)**

2) Slide the control down until it snaps firmly into place.

a



INSTALLATION - STEP 5
MOUNTING THE SENSORS

a

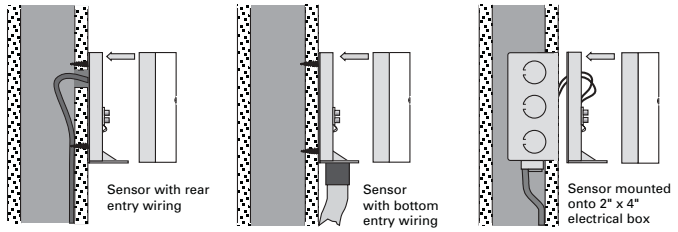
Outdoor Sensor (S4) (See fig. a.)

The Outdoor Sensor includes a 10 kΩ thermistor which provides an accurate measurement of the outdoor temperature. The sensor is protected by a white UV-resistant PVC plastic enclosure.

Step 1: Mounting (See fig. b.)

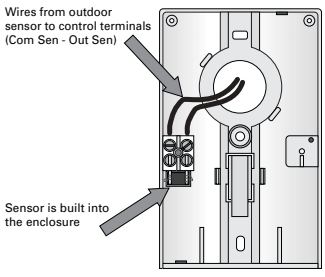
Note: The temperature sensor (thermistor) is built into the enclosure.

b



- Remove the screw and pull the front cover off the sensor enclosure.
- The outdoor sensor can either be mounted directly onto a wall or a 2" x 4" electrical box. When the sensor is wall mounted, the wiring should enter through the back or bottom of the enclosure. Do not mount the sensor with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor.
- In order to prevent heat transmitted through the wall from affecting the sensor reading, it may be necessary to install an insulating barrier behind the enclosure.
- The outdoor sensor should be mounted on an exterior wall which best represents actual outdoor temperature (a north facing wall). It should not be exposed to heat sources such as solar gain, exhaust ventilation or window openings.
- The outdoor sensor should be installed at an elevation above the ground that will prevent accidental damage or tampering. Installing the sensor in the shadow of the roof eave is common.

c



Step 2: Wiring and Testing (See fig. c.)

- Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the outdoor sensor to the control.

  CAUTION: **Do not run sensor wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used, or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com Sen terminal on the control and not to earth ground.**

- Follow the sensor testing instructions in this brochure and connect the wires to the control as per installation – **step 6**.
- Replace the front cover of the sensor enclosure.

Universal Sensors (S1, S2, S3 and S5)

(See fig. d.)

These Universal Sensors have a zinc sleeve for fast response and a wide operating range. They can be used in a multitude of applications. They are supplied with 10 inches (250 mm) of 2 conductor wire.

Step 1: Mounting (See figs. e thru g.)

Note: The Sensor is designed to mount on a pipe or in a temperature-immersion well.

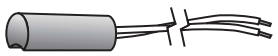
- The Universal Sensor can be strapped directly to the pipe using the cable tie provided. Insulation should be placed around the sensor to reduce the effect of air currents on the sensor measurement.
- The Universal Sensor can be installed in a well installation. **(See fig. f.)** Ensure the well components are compatible for use with the Universal Sensor.
- The Universal Sensor should be placed downstream of a pump or after an elbow or similar fitting. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor.

Step 2: Wiring and Testing

CAUTION: **Do not run sensor wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used, or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com Sen terminal on the control and not to earth ground.**

- If it is necessary to connect 18 AWG wire to the two sensor wires, wire nuts can be used to hold the wires together.
- Follow the sensor testing instructions given in this brochure and then connect the wires to the control.

d



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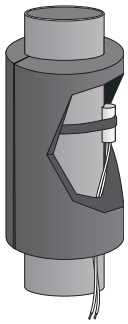

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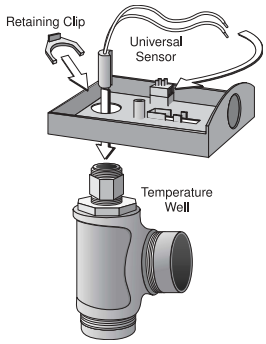

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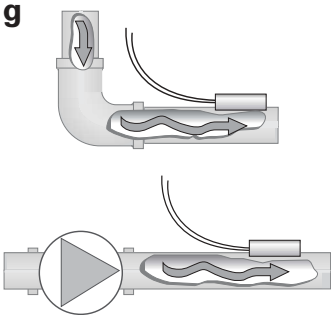

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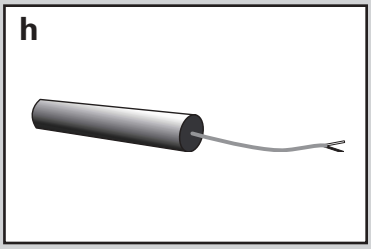

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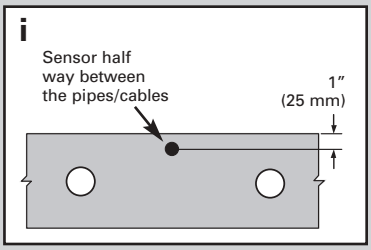

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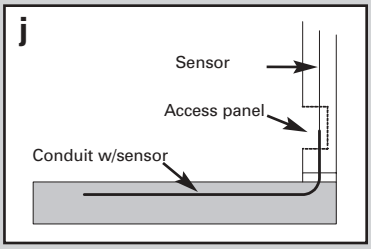


Slab Sensor (S7) (See fig. h.)

The Slab Sensor has a PVC plastic sleeve which is designed for use in soils or concrete. It is supplied with 20 feet (6 m) of 2 conductor cable.

Step 1: Mounting (See fig. i.)

Note: Proper placement of this sensor is critical for correct operation of the control.

This sensor is designed to be embedded in the slab material. It is highly recommended the sensor be installed in a plastic or metal conduit embedded in the slab. If there is ever a sensor failure, this allows the sensor to be removed and replaced. The sensor should be placed 1 inch (25 mm) below the slab surface and halfway between the pipes. Access to the conduit after leaving the slab should be available for replacing the sensor in the future if required. **(See fig. j.)**

Step 2: Wiring and Testing

CAUTION: **Do not run sensor wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference, shielded cable or twisted pair should be used, or the wires can be run in a grounded metal conduit. The ground wire should be connected to the common sensor terminal on the control and not to earth ground.**

The Slab Sensor is supplied with 20 feet (6 m) of cable. If a longer length is required, 18 AWG wire can be spliced onto the two wires from the sensor. The splices should be properly soldered and protected in an accessible, waterproof junction box. Follow the sensor testing instructions given in this brochure and then connect the wires to the control.

INSTALLATION - STEP 6
ELECTRICAL CONNECTIONS TO THE CONTROL

IMPORTANT: **Test to be certain no voltage is present in any wires.**

Powered Input Connections

120VAC Power (See fig. a.)

- Provides power to microprocessor and control display as well as power to Mix pumps P1 (terminals 8 and 9) and P2 (terminals 12 and 13) and variable speed injection pumps P4 (terminals 10 and 11) and P5 (terminals 14 and 15)
- Connect 120VAC power supply to Power N and Power L terminals (15 and 16).

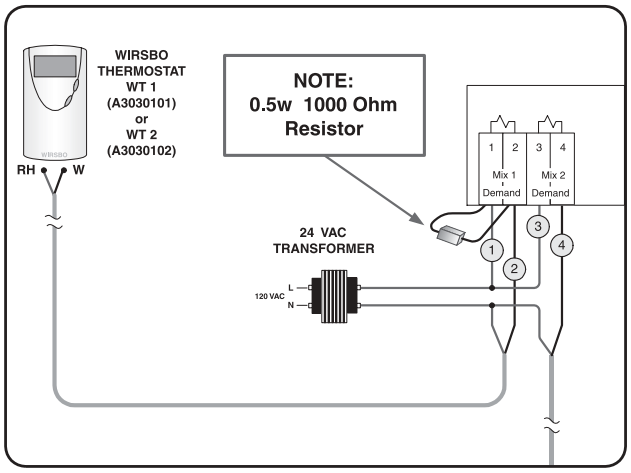
Demand Connections

Demand to the control is generated from a thermostat zone control module or external relay. This connection must have 24 VAC supplied to the demand terminals.

Mix 1 Demand (See fig. b.)

- Apply a voltage between 24 and 240VAC across Mix 1 Demand terminals (1 and 2).

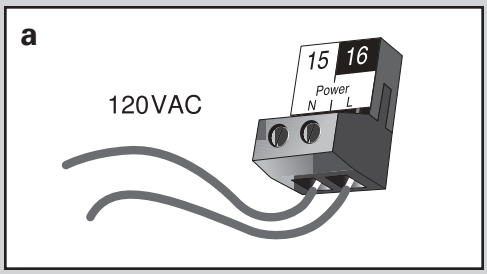
Mixing Demand with Wirsbo Thermostat

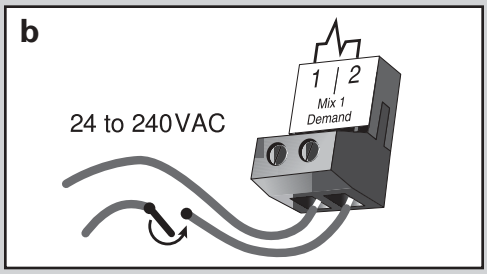


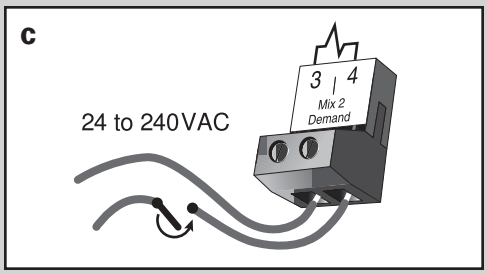
Note: When connecting a Wirsbo Thermostat WT1 or WT2 directly to the Mix Demand Terminals 1 and 2, a 0.5 watt 1000-ohm resistor needs to be installed parallel as shown. A packet with the resistor and schematic is included in the box.

Mix 2 Demand (See fig. c)

- Apply a voltage between 24 and 240VAC across Mix 2 Demand terminals (3 and 4).







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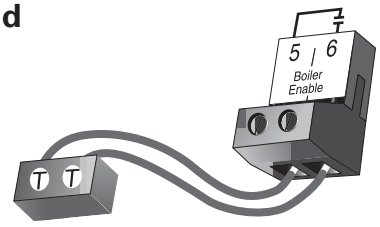

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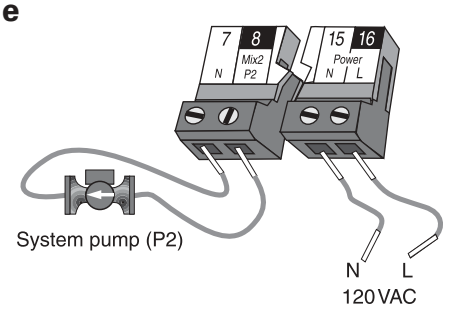

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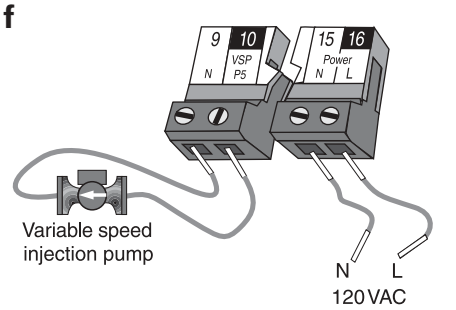

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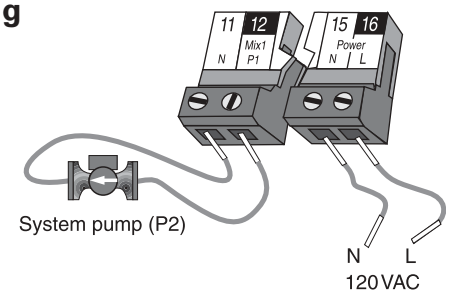


Output Connections (1-5)

1) Boiler Enable (See fig. d)

Boiler terminals (5 and 6) are isolated outputs. No power is available on these terminals from the control.

- Use terminals as switch to make or break the boiler circuit.
- When the proMIX 212 requires the boiler to fire, contact closes between terminals 5 and 6.

2) Mix 2 P2 (See fig. e.)

Mix2 P2 controls the P2 system pump off the second injection loop. When the relay in the proMIX 212 closes, 120VAC is provided to Mix2 P2 terminal (8).

- Connect the black wire from the system pump to Mix2 P2 (terminal 8).
- Connect the white wire from the system pump to the Neutral (N) connection (terminal 7).

3) VSP P5 (See fig. f.)

The VSP P5 controls the variable speed injection pump for the second injection loop or snow and melting system if used. 120VAC power is varied to the pump to control the amount of water being injected into the secondary loop.

- Connect the black wire from variable speed injection pump to VSP P5 (terminal 10).
- Connect the white wire from the variable speed injection pump to the Neutral (N) connection (terminal 9).

4) Mix 1 P1 (See fig. g.)

Mix1 P1 controls the P1 system pump off the first injection loop. When the relay in the proMIX 212 closes, 120 VAC is provided to Mix1 P1 terminal (12).

- Connect the black wire from the system pump to Mix1 P1 (terminal 12).
- Connect the white wire from the system pump to the Neutral (N) connection (terminal 11).

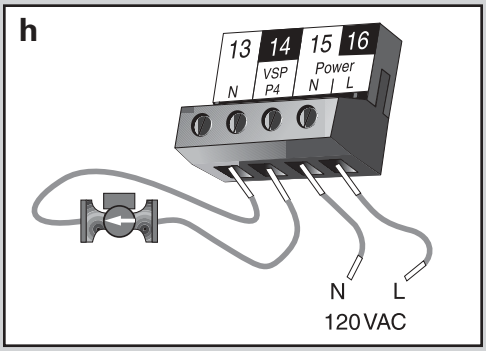
5) VSP P4 (See fig. h)

The VSP P4 controls the variable speed injection pump for the first injection loop. 120VAC power is varied to the pump to control the amount of water being injection into the secondary loop.

- Connect the black wire from variable speed injection pump to VSP P4 (terminal 14).
- Connect the white wire from the variable speed injection pump to the Neutral (N) connection (terminal 13).

Note: The proMIX 212 has an internal overload fuse rated at 2.5 A 250VAC — contact your Wirsbo sales representative for repair information if fuse is blown.

h



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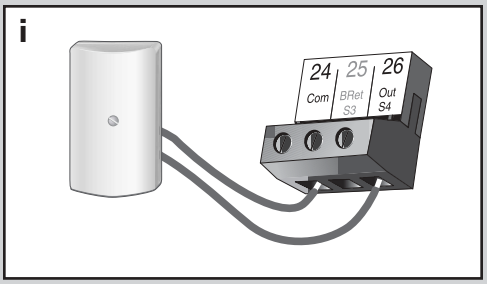

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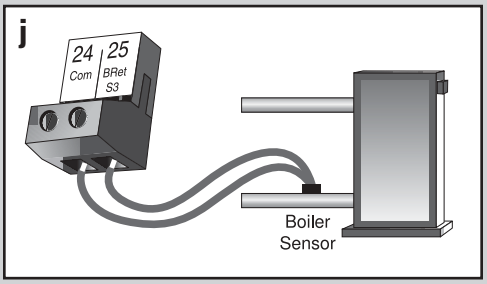

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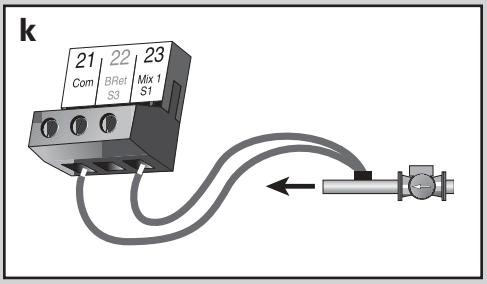

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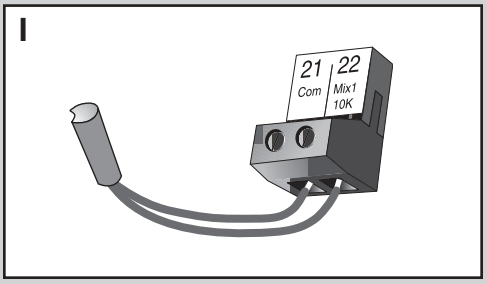

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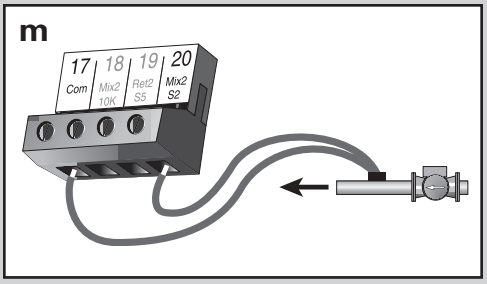

Sensor Connections (6-12)

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

Connect the two wires from sensors to terminals described below

6) Outdoor Sensor S4 Wires to Com and Out S4 Terminals (24 and 26) (See fig. i.)

- Measures outdoor air temperature

7) Boiler Return Sensor S3 Wires to Com and BRet S3 Terminals (24 and 25) (See fig. j.)

- Measures return water temp to boiler

8) Mixing Supply Sensor S1 Wires to Com and Mix 1 S1 Terminals (21 and 23) (See fig. k.)

- Measures the supply temperature after the mixing system pump 1

Note: Sensor is normally attached downstream of mixing system pump (P1).

9) 10K Sensor Wires to Com and Mix1 10K Terminals (21 and 22) (See fig. l.)

- Works with indoor sensor, slab sensor or zone-control sensor

10) Mixing Supply Sensor S2 Wires to Com and Mix2 S2 Terminals (17 and 20) (See fig. m.)

- Measures the supply temperature after the mixing system pump 2

Note: Sensor is normally attached downstream of mixing system pump (P2).

11) Mixing Return Sensor S5 wire to Com and Ret2 S5 terminals (17 and 19) (See fig. n)

- Measures fluid-return temperature from snow melting slab

Note: This sensor is only used when the Snow Mode is chosen for the second injection.

12) 10K Sensor wires to Com and Mix2 10K terminals (17 and 18) (See fig. o)

- Works with indoor sensor, slab sensor or zone control sensor

Unpowered Input Connections (13)

WARNING: **Wires from unpowered input connections are polarity sensitive. The communication of these devices will not operate correctly if the wires are reversed.**

13) Remote Display Module or Snow Enable Kit (See fig. p)

A Remote Display Module or Snow Melt Enable Module may be connected to the Net tN2 input on the proMIX 212

- Connect Com terminal from Remote Display Module or Snow Melt Enable Module to Com terminal (24) on proMIX 212
- Connect tN2 terminal from Remote Display Module or Snow Melt Enable Module to the tN2 terminal (27) on proMIX 212

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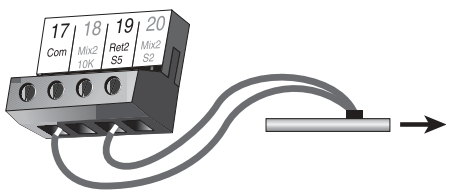

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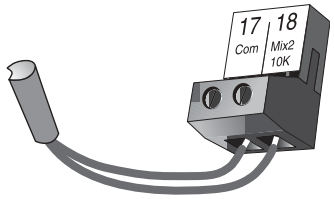

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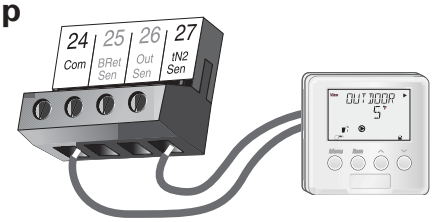

Temperature Resistance Chart

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	20	-7	46,218	90	32	7,334	160	71	1,689
-45	-43	405,710	25	-4	39,913	95	35	6,532	165	74	1,538
-40	-40	336,606	30	-1	34,558	100	38	5,828	170	77	1,403
-35	-37	280,279	35	2	29,996	105	41	5,210	175	79	1,281
-30	-34	234,196	40	4	26,099	110	43	4,665	180	82	1,172
-25	-32	196,358	45	7	22,763	115	46	4,184	185	85	1,073
-20	-29	165,180	50	10	19,900	120	49	3,760	190	88	983
-15	-26	139,402	55	13	17,436	125	52	3,383	195	91	903
-10	-23	118,018	60	16	15,311	130	54	3,050	200	93	829
-5	-21	100,221	65	18	13,474	135	57	2,754	205	96	763
0	-18	85,362	70	21	11,883	140	60	2,490	210	99	703
5	-15	72,918	75	24	10,501	145	63	2,255	215	102	648
10	-12	62,465	80	27	9,299	150	66	2,045	220	104	598
15	-9	53,658	85	29	8,250	155	68	1,857	225	107	553

INSTALLATION - STEP 7
TESTING THE WIRING

Note: The following tests are to be performed using standard testing practices and procedures. They should only be carried out by properly trained and experienced persons.

Things to Note Before you Start any Testing:

- **Before supplying power for testing, each terminal block must be unplugged from its header on the control.**
- **To remove the terminal block, pull straight down from the control (see fig. a).**
- **The following tests should only be carried out by properly trained and experienced persons.**
- **When testing, use standard testing practices and procedures.**
- **To properly test wiring and sensors, a good quality electrical test meter, capable of reading at least 0 – 300VAC and at least 0 – 2,000,000 ohms is essential.**

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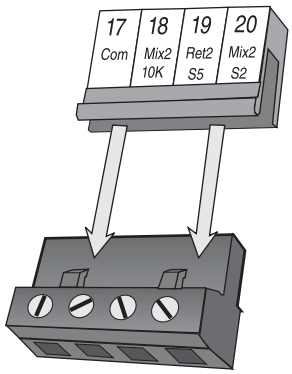


Test The Sensors

To test the sensors, the actual temperature at each sensor location must be measured.

A good quality test meter capable of measuring up to 5,000 kΩ (1 kΩ = 1000 Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with either a good quality digital thermometer, or if a thermometer is not available, a second sensor can be placed alongside the one to be tested and the readings compared.

First, measure the temperature using the thermometer and then measure the resistance of the sensor at the control. The wires from the sensor must not be connected to the control while the test is performed. Using the temperature resistance chart on **page 25**, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location.

Do not apply voltage to a sensor at any time as damage to the sensor may result.

Test The Power Supply

1) Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces.
2) Turn on the power and measure the voltage between the Power N and Power L terminals (15 and 16) using an AC voltmeter, the reading should be between 108 and 132VAC.

Test The Powered Demand Inputs

Voltage Readings for all Demand Devices (described below)

1) When any of the demand devices described previously calls for heat, you should measure between 20 and 260 VAC at the terminals.
2) When these demand devices are off, you should measure less than 5VAC.

Mix 1 Demand

• Measure voltage between Mix Demand terminals (1 and 2).

Mix 2 Demand

• Measure voltage between Mix Demand terminals (3 and 4).

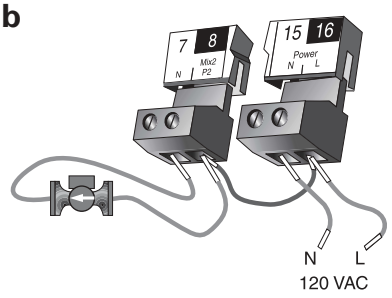
Test The Outputs

IMPORTANT NOTE FOR ALL OUTPUT DEVICES:
Once you have verified a device operates properly, shut off the power to the device and remove the jumper installed during the testing procedure. If any device fails to start, see troubleshooting information on page 30.

Mixing Pump 2 (Mix 2 P2) — Connected to Terminals 7 and 8 (See fig. b.)

1) Make sure that power to terminal block is off.
2) Install a jumper between Power L and Mix 2 P2 terminals (16 and 8).
3) When power is applied to the Power L and Power N terminals (15 and 16) the mixing pump should start.

b



Variable Speed Injection Pump (VSP P5) — Connected to Terminals 9 and 10) (See fig. c.)

- Make sure power to terminal block is off.
- Install a jumper between the Power L and the VSP P5 terminals (16 and 10).
- When the control is powered up, the variable speed pump should operate at full speed.

Mixing Pump 1 (Mix 1 P1) — Connected to Terminals 11 and 12 (See fig. d.)

1) Make sure that power to terminal block is off.
2) Install a jumper between Power L and Mix 1 P1 terminals (16 and 12).
3) When power is applied to the Power L and Power N terminals (15 and 16), the mixing pump should start.

Variable Speed Injection Pump (VSP P4) — Connected to Terminals 13 and 14) (See fig. e.)

- Make sure power to terminal block is off.
- Install a jumper between the Power L and the VSP P5 terminals (16 and 14).
- When the control is powered up, the variable speed pump should operate at full speed.

Boiler Enable — Connected to Terminals 5 and 6 (See fig. f.)

- Make sure power to the boiler circuit is off.
- Install a jumper between the terminals (5 and 6).
- When the boiler circuit is powered up, the boiler should fire.

Note: Boiler may have a flow switch that prevents firing until the primary pump (P3) is running.

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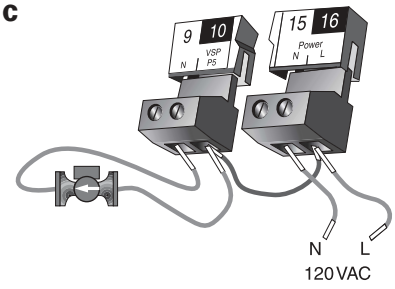

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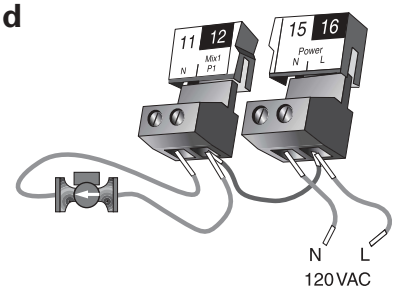

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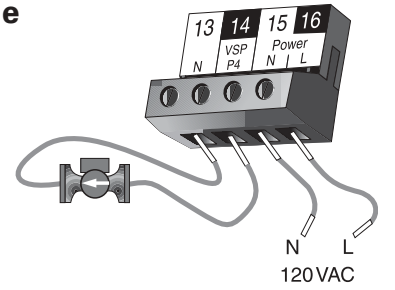

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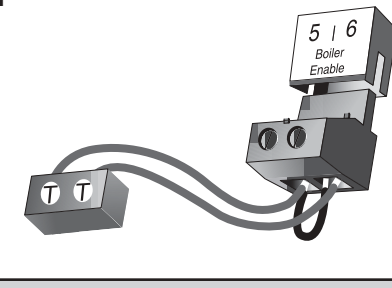


Troubleshooting for ALL Output Devices described previously:

- If the device does not start, check all wiring connections.
- If the device still fails to start, you may need to refer to any installation or troubleshooting information supplied with the device you are testing.

INSTALLATION - STEP 8
COMPLETING THE INSTALLATION

Once you have successfully tested all the wiring and found that everything is operational, you are ready to complete the installation.

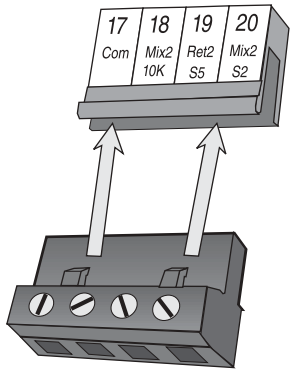
1) Make sure all power to the devices and terminal blocks is off, and remove any remaining jumpers from the terminals.
2) Reconnect the terminal blocks to the control by carefully aligning them with their respective headers on the control.
3) Push the terminal blocks into the headers — they should snap firmly into place. **(See fig. a.)**
4) Install supplied safety dividers between unpowered sensor inputs and powered or 120VAC wiring chambers.
5) Apply power to the control.

Note: The operation of the control on power up is described in the Control Function Overview section of this manual (page 54).

Cleaning the Control

- Moisten cloth with water and wring out prior to wiping control.
- Do not use solvents or cleaning solutions on the control.

a



PROGRAMMING

TABLE OF CONTENTS

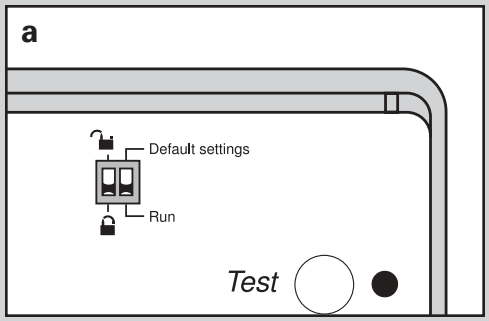
PROGRAMMING - STEP 1
PROGRAMMING THE CONTROL

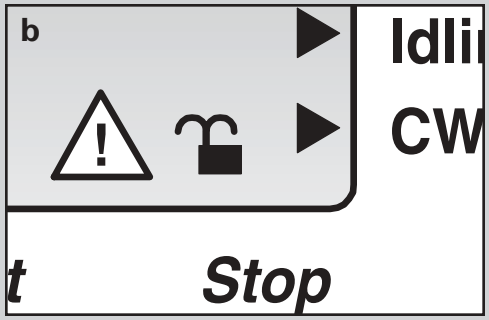
> ***Note: This section will guide you through the programming of each function in a logical order based on area of control. For more detailed functions of any particular item, please refer to the Control Overview Section.***

***IMPORTANT (PLEASE READ)*: The proMIX 212 is now fully installed and ready for a trained, qualified individual to begin entering the settings that will help it control a hydronic radiant heating system at its most efficient level.**

Before you start PROGRAMMING you should:

1) Unlock the control through the DIP switch.
2) Switch the control from Default to Run through the DIP switch.
3) Review the Control Function Overview section if you are not familiar with how the control functions operate in conjunction with the specific systems installed.





DIP SWITCH SETTINGS

LOCK/UNLOCK DIP SWITCH

- Lock/Unlock DIP switch is used to restrict access to the control's setting. **(See fig. e.)**
- In locked mode, settings cannot be changed.
- A small icon representing a padlock is shown in the bottom right corner of the display, indicating if control is locked or unlocked. **(See fig. f.)**
- Factory setting is UNLOCK.

DEFAULT SETTINGS/RUN DIP SWITCH

- When DIP switch is set to the Default setting, the control will operate under the factory default settings.
- When the DIP switch is set to the Run setting, the individual settings withing the control may be adjusted to meet the unique demands of the building.
- Factory setting is RUN.

PROGRAMMING THE "MISC" MENU

UNITS (See fig. a.)

1) Go to UNITS item field in Miscellaneous (MISC) menu.
2) Select the temperature measurement units you want all temperatures to be displayed.

RANGE: °F or °C

DEFAULT: °F

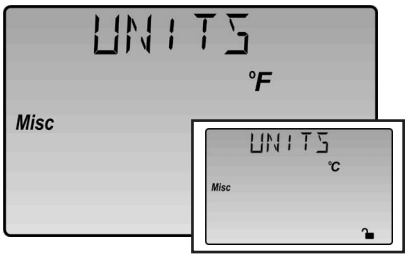
BACKLITE (See fig. b.)

1) Go to BACKLITE item field in Miscellaneous (MISC) menu.
2) Select the operating mode for the backlighting function of the LCD as well as the time of keypad inactivity until the control automatically returns to the default display.

RANGE: 90 seconds, ON, OFF

DEFAULT: ON

a

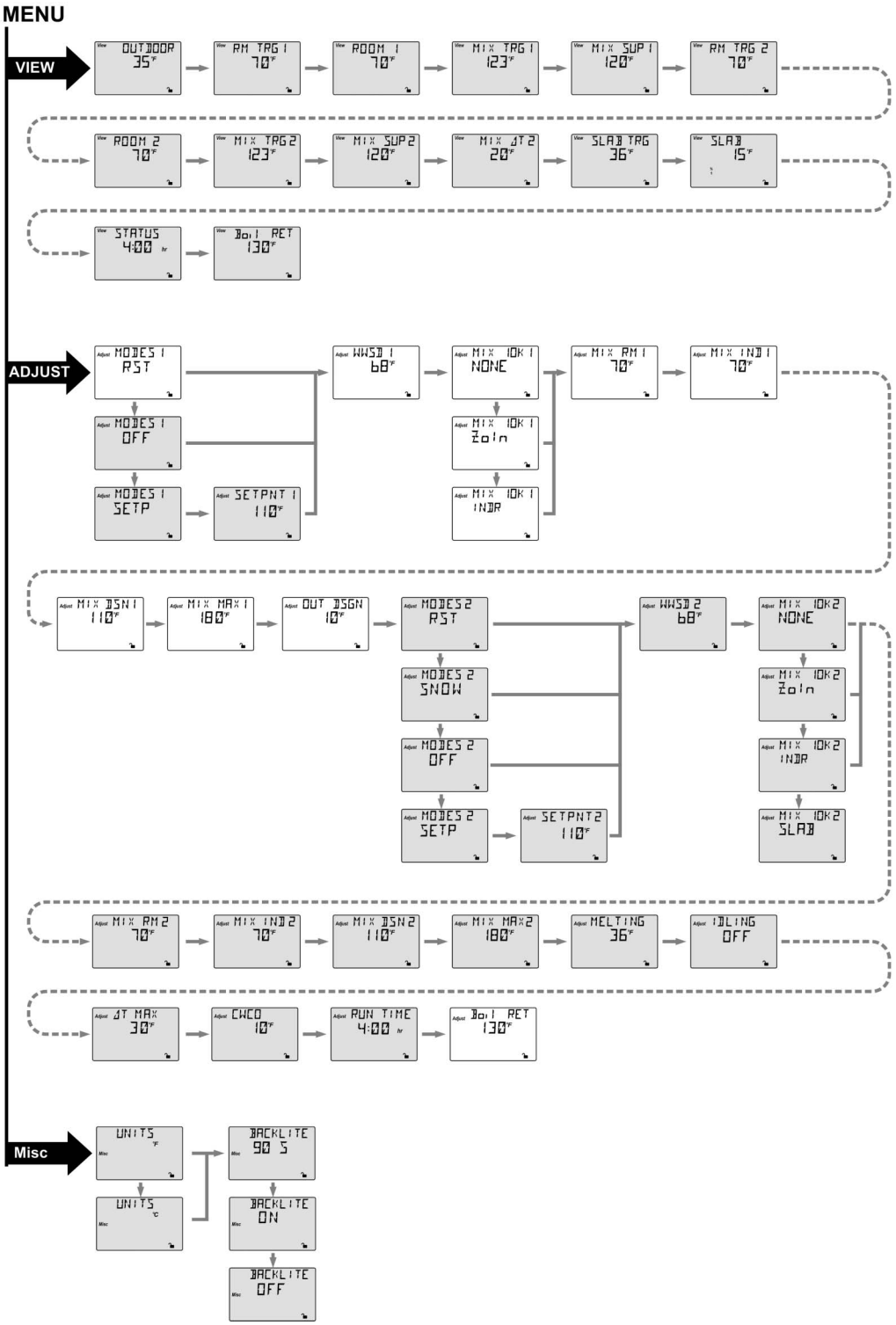


b

PROGRAMMING
THE "ADJUST" MENU

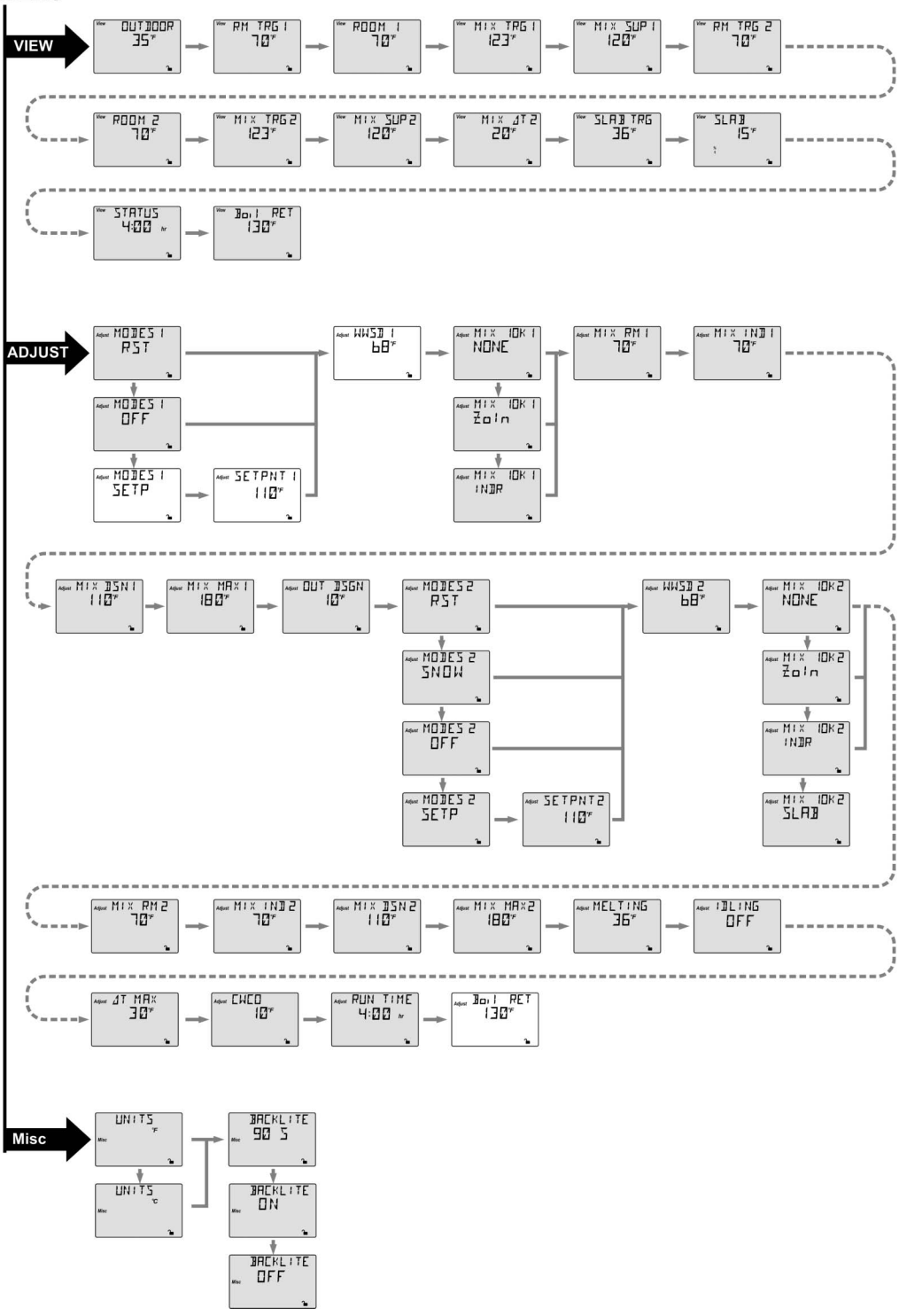
A. MODES 1 MIXING RESET/SETPOINT

proMIX 212, Modes 1 Reset Mixing



proMIX 212, Modes 1 Setpoint Mixing

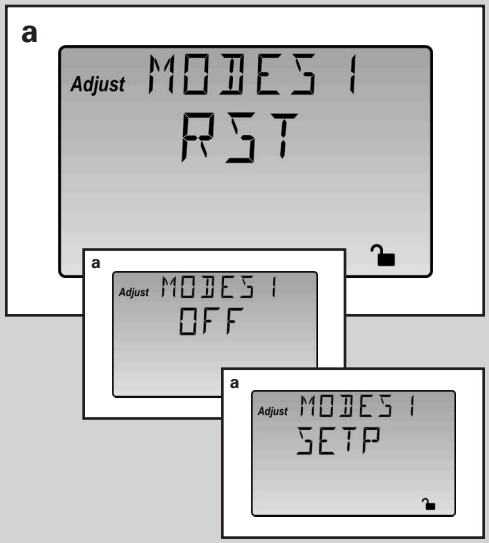
MENU



Push the Menu button until ADJUST is seen in the upper left corner of the screen. Use the Item button to scroll through the ADJUST section.

- Use the UP and DOWN arrows to make the desired selection within each Item field

a

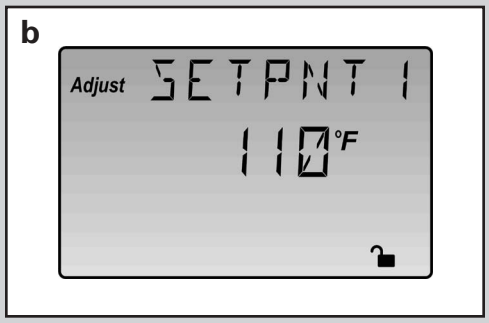


MODES OF OPERATION (MODES 1) (See fig. a.)

The MODES 1 adjustment selects the mode of operation of the Modes 1 mixing section. There are three possible settings.

RST (reset)	When using the Modes 1 mixing reset section for building space heating, the installer should select this adjustment. The proMIX 212 operates the Modes 1 mixing section to provide outdoor reset.
OFF	If the Modes 1 mixing section is not used, the installer should select this setting. The control assumes the Modes 1 mixing section is not used. All adjustments to Modes 1 mixing section will be skipped.
SETP (setpoint)	When the installer requires a fixed supply water temperature, this setting must be selected. The control operates the Modes 1 mixing setpoint section to provide a fixed setpoint temperature equal to the SETPNT 1 temperature adjustment.

b



SETPOINT 1 (SETPNT 1) (See fig. b.)

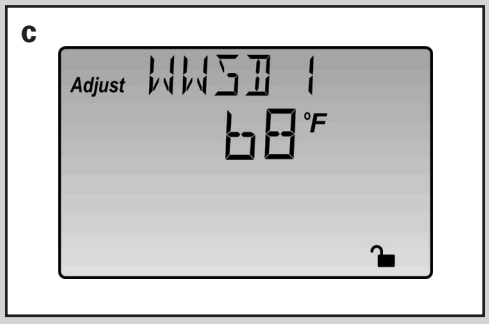
If SETP is selected under MODES 1, then this screen will be available for adjustment. If RST or OFF are selected in the MODES 1 screen, then this screen will not be available.

- Select the fixed supply water temperature calculated for the heating zones in Modes 1 mixing section.

RANGE: 70 to 200°F (21 to 93°C)

DEFAULT: 110°F (43°C)

c



WARM WEATHER SHUT DOWN (WWSD 1) (See fig. c.)

The Modes 1 mixing section will shut down when the outdoor temperature is warmer than this setting. The WWSD setting also has an effect in the setpoint mode of operation.

RANGE: 35 to 85°F, OFF (2 to 29°C), OFF

DEFAULT: 68°F (20°C)

MIXING 10K SENSOR 1 (MIX 10K 1) (See fig. d.)

The MIX 10K 1 adjustment informs the control which external device is connected to the Mix 1 10K terminal. There are three possible settings:

NONE — If no indoor sensor is connected to the Mix1 10K terminal (22), this setting must be selected.

INDR — If an indoor sensor is connected to the Mix 1 10K terminal (22), this setting must be selected. The control will provide indoor temperature feedback in order to fine-tune the supply water temperature.

ZOIN — If a tekmar Zone Control is connected to the Mix 1 10K 1 terminal (22), this setting must be selected. A tekmar Zone Control provides indoor temperature feedback from multiple zones.

RANGE: NONE, INDR, ZOIN

DEFAULT: NONE

d

MIXING ROOM 1 (MIX RM 1) (See fig. e.)

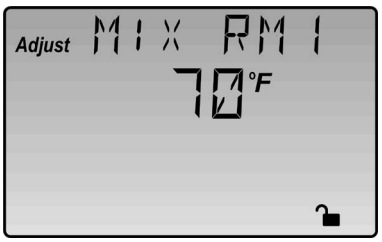
Enter the room temperature desired for the room associated with the room sensor. INDR must be selected in the MIX 10K 1 screen with a sensor installed in order for this screen to be available for adjustment.

RANGE: 35 to 95°F (2 to 35°C)

DEFAULT: 70°F (21°C)

Note: Used to shift the reset ratio parallel for temporarily higher/lower room temperature when a sensor is installed.

e



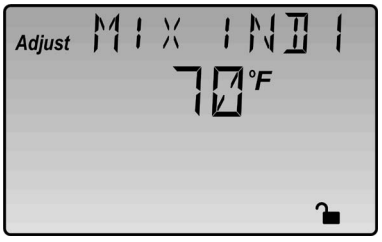
MIXING INDOOR 1 (MIX INDR 1) (See fig. f.)

Enter the highest room temperature used in the heat-loss calculations for the Modes 1 mixing section. INDR must be selected in the MIX 10K 1 screen with a sensor installed in order for this screen to be available for adjustment.

RANGE: 35 to 100°F (2 to 38°C)

DEFAULT: 70°F (21°C)

f



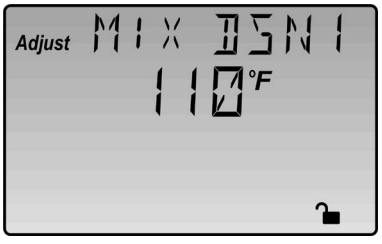
MIXING DESIGN 1 (MIX DSN 1) (See fig. g.)

This setting establishes the design supply water temperature required in order to satisfy the heating system at the outdoor design temperature. This setting is used by the control to calculate the heating curve in the Mixing 1 section.

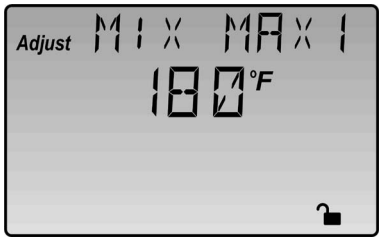
RANGE: 80 to 220°F (27 to 104°C)

DEFAULT: 110°F (43°C)

g



h



MIXING MAXIMUM 1 (MIX MAX 1) (See fig. h.)

This adjustment is used to set the highest allowable supply temperature in the Modes 1 mixing section. Refer to the construction method chart below with suggested maximum supply temperatures.

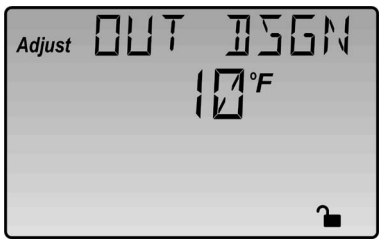
RANGE: 100 to 220°F, OFF (38 to 104°C)

DEFAULT: 180°F (82°C)

Note: Do not exceed the water temperatures shown for the following construction methods.

• **Concrete**	**150°F**	• **Joist No Plates**	**180°F**
• **Poured Underlayment**	**140°F**	• **Joist with Plates**	**165°F**
• **Radiant Wall/Ceiling** (using drywall)	**120°F**	• **Quik Trak®**	**180°F**

i



OUTDOOR DESIGN (OUT DSGN) (See fig. i.)

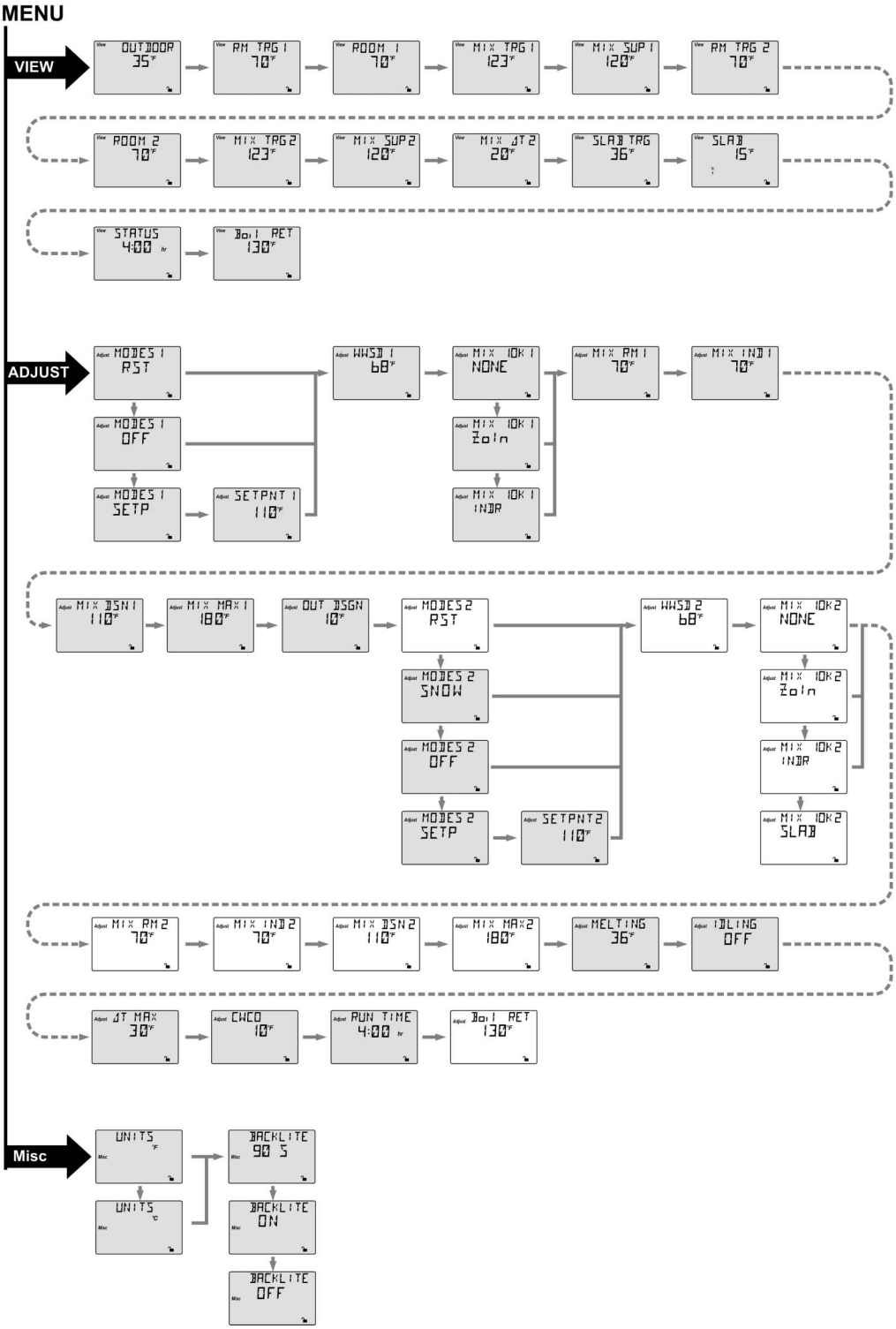
Set to the outdoor design temperature as shown in the heat-loss calculations.

RANGE: -50 to 30°F (-45 to -1°C)

DEFAULT: 10°F (-12°C)

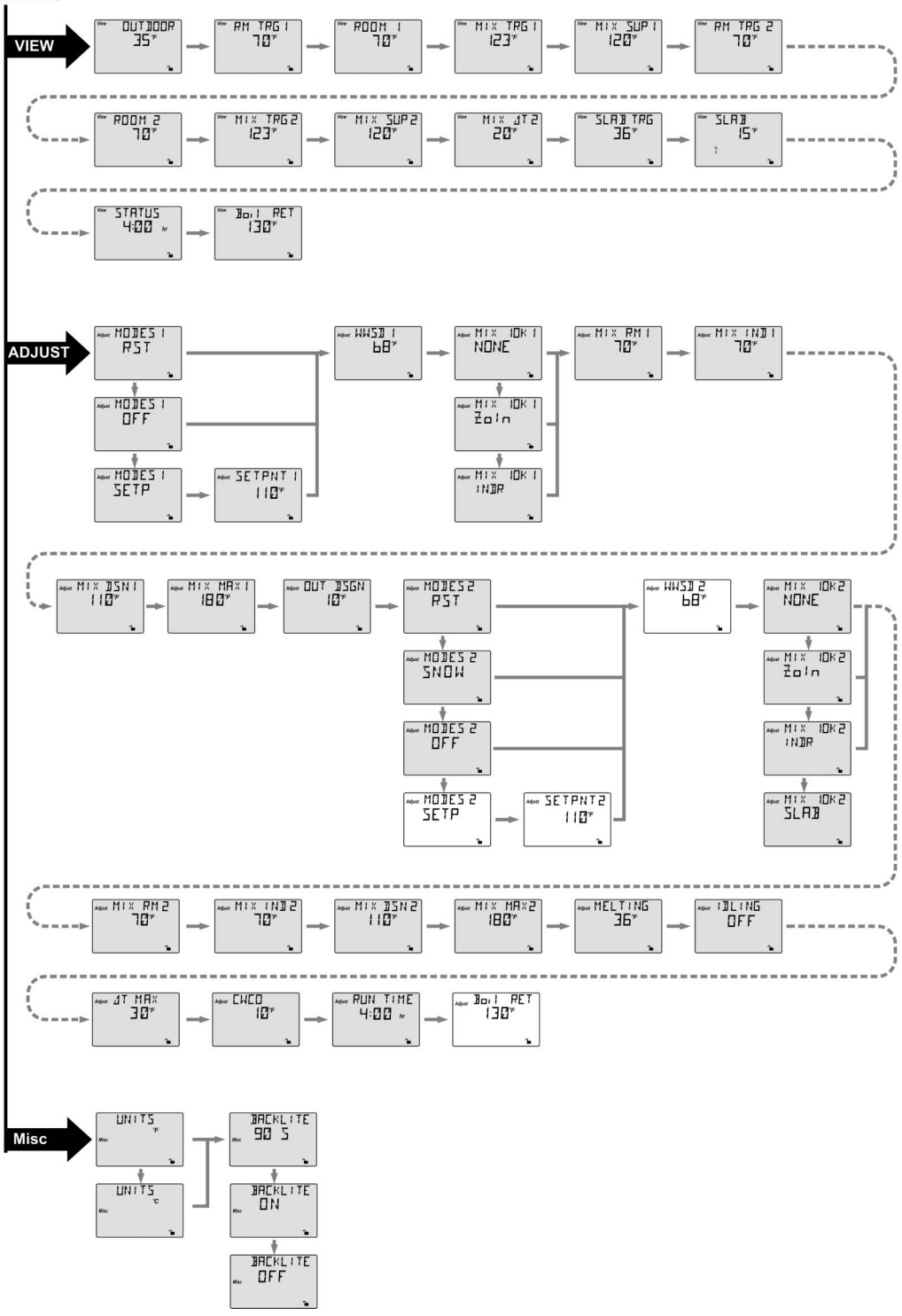
B. MODES 2 MIXING RESET/SETPOINT

proMIX 212, Modes 2 Reset Mixing



proMIX 212, Modes 2 Setpoint Mixing

MENU



MODES OF OPERATION (MODES 2) (See fig. j.)

The MODES 2 adjustment selects the mode of operation of the Modes 2 mixing section. There are four possible settings.

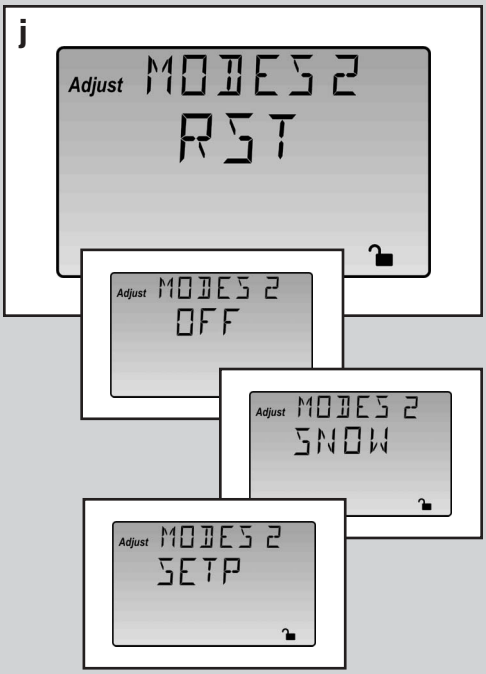
RST (reset) — When using the Modes 2 mixing section for building space heating, the installer should select this adjustment. The proMIX 212 operates the Modes 2 mixing section to provide outdoor reset.

OFF — If the Modes 2 mixing section is not used, the installer should select this setting. The control assumes the Modes 2 mixing section is not used. All adjustments to Modes 2 mixing section will be skipped.

SNOW — If Modes 2 section is used for a snow and ice melting application, the installer must select this setting. The control then operates the Modes 2 mixing section to regulate an outdoor slab. A snow melt enable kit (A3040039) is required.

SETP (setpoint) — When the installer requires a fixed supply water temperature, this setting must be selected. The control operates the Modes 2 mixing section to provide a fixed setpoint temperature equal to the SETPNT 2 temperature adjustment.

j



SETPOINT 2 (SETPNT 2) (See fig. k.)

If SETP is selected under MODES 2, then this screen will be available for adjustment. If RST, OFF or SNOW are selected in the MODES 2 screen, then this screen will not be available.

- Select the fixed supply water temperature calculated for the heating zones in Modes 2 mixing section.

RANGE: 70 to 200°F (21 to 93°C)

DEFAULT: 110°F (43°C)

k

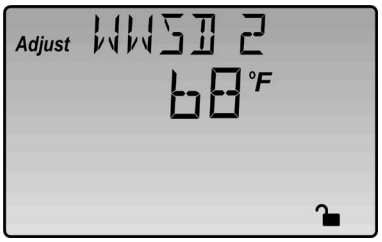
WARM WEATHER SHUT DOWN (WWSD 2) (See fig. l.)

The Modes 2 mixing section will shut down when the outdoor temperature is warmer than this setting. The WWSD setting also has an effect in the setpoint mode of operation.

RANGE: 35 to 85°F, OFF (2 to 29°C), OFF

DEFAULT: 68°F (20°C)

l



m

MIXING 10K SENSOR 2 (MIX 10K 2) (See fig. m.)

The MIX 10K 2 adjustment informs the control which external device is connected to the Mix 2 10K terminal. There are four possible settings:

NONE — If no indoor sensor is connected to the Mix 2 10K terminal (18), this setting must be selected

INDR — If an indoor sensor is connected to the Mix 2 10K terminal (18), this setting must be selected. The control will provide indoor temperature feedback in order to fine-tune the supply water temperature.

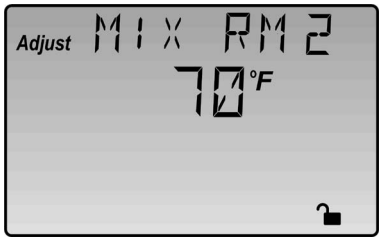
ZOIN — If a tekmar Zone Control is connected to the Mix 2 10K terminal (18), this setting must be selected. A tekmar Zone Control provides indoor temperature feedback from multiple zones.

SLAB — If a slab sensor is connected to the Mix 2 10K terminal (18), this setting must be selected. The control will provide slab temperature feedback in order to fine-tune the supply water temperature for the snow melt.

RANGE: NONE, INDR, ZOIN, SLAB

DEFAULT: NONE

n



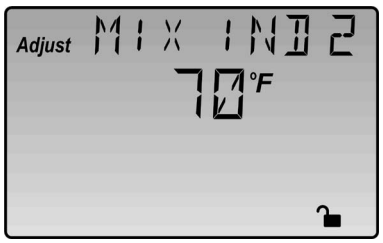
MIXING ROOM 2 (MIX RM 2) (See fig. n.)

Enter the room temperature desired for the room associated with the room sensor. INDR must be selected in the MIX 10K 2 screen with a sensor installed in order for this screen to be available for adjustment. Used to shift the reset ratio parallel for temporarily higher/lower room temperature when a sensor is installed.

RANGE: 35 to 95°F (2 to 35°C)

DEFAULT: 70°F (21°C)

o



MIXING INDOOR 2 (MIX INDR 2) (See fig. o.)

Enter the highest room temperature used in the heat-loss calculations for the Modes 2 mixing section. INDR must be selected in the MIX 10K 2 screen with a sensor installed in order for this screen to be available for adjustment.

RANGE: 35 to 100°F (2 to 38°C)

DEFAULT: 70°F (21°C)

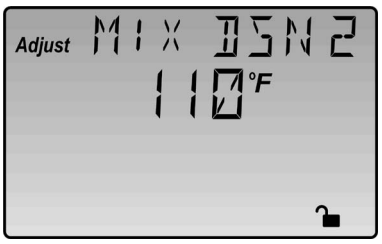
MIXING DESIGN 2 (MIX DSN 2) (See fig. p.)

This setting establishes the design supply water temperature required in order to satisfy the heating system at the outdoor design temperature. This setting is used by the control to calculate the heating curve in the Modes 2 mixing section.

RANGE: 80 to 220°F (27 to 104°C)

DEFAULT: 110°F (43°C)

p



MIXING MAXIMUM 2 (MIX MAX 2) (See fig. q.)

This adjustment is used to set the highest allowable supply temperature in the Modes 2 mixing section. Refer to the construction method chart below with suggested maximum supply temperatures.

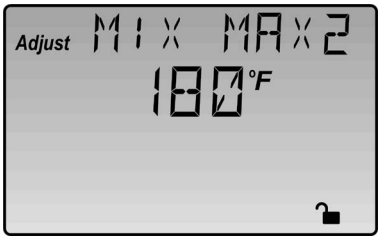
RANGE: 100 to 220°F, OFF (38 to 104°C)

DEFAULT: 180°F (82°C)

Note: Do not exceed the water temperatures shown for the following construction methods.

• **Concrete**	**150°F**	• **Joist No Plates**	**180°F**
• **Poured Underlayment**	**140°F**	• **Joist with Plates**	**165°F**
• **Radiant Wall/Ceiling** (using drywall)	**120°F**	• **Quik Trak®**	**180°F**

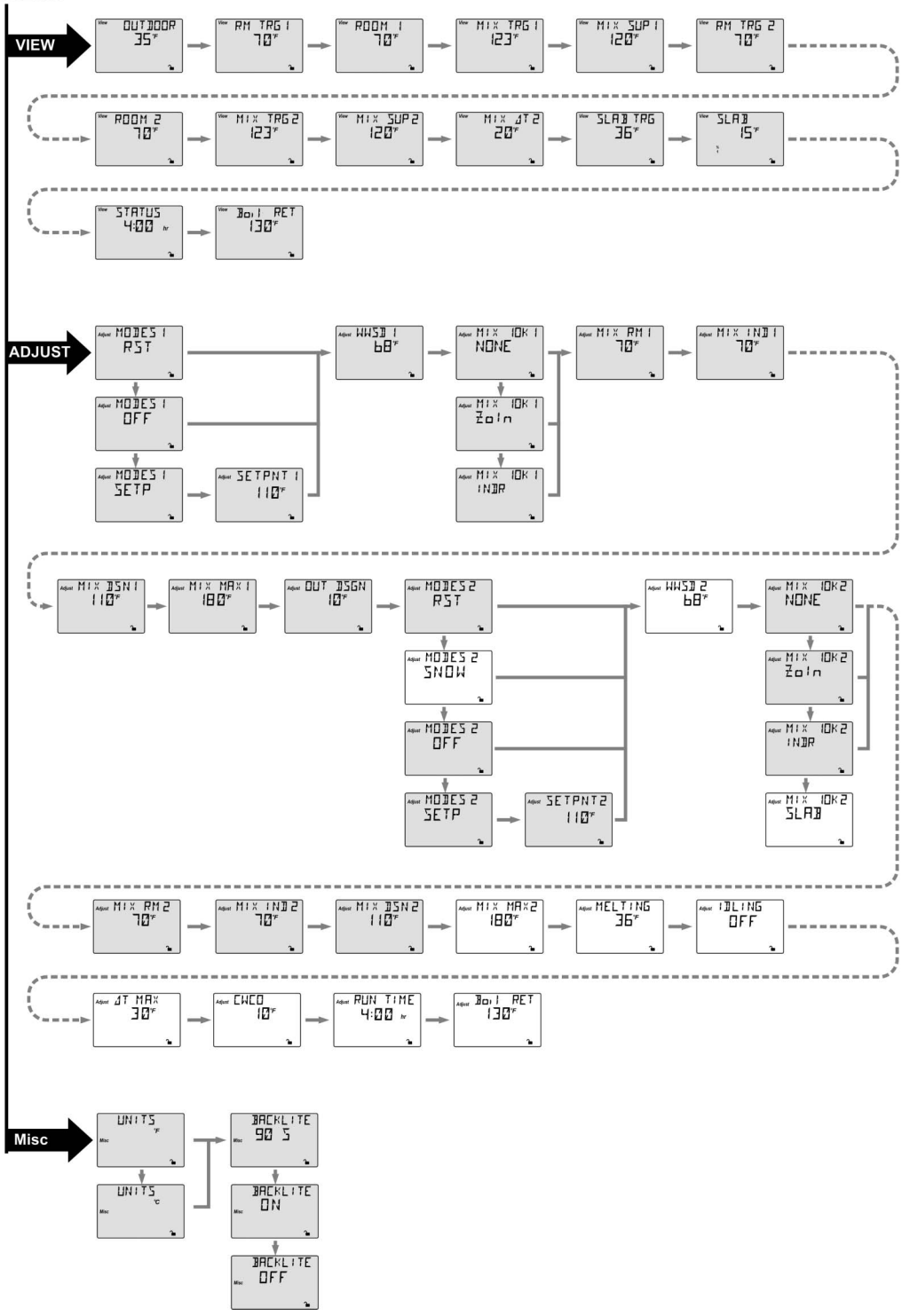
q



C. MODES 2 SNOW MELT

proMIX 212, Modes 2 Snow Melt

MENU



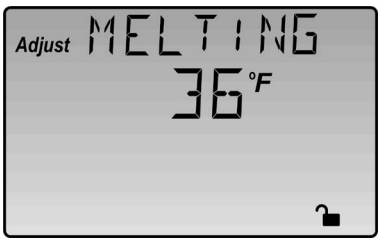
MELTING MODE (MELTING) (See fig. r.)

The MELTING setting is the desired slab temperature when snow melting is required. This screen will only be available when SNOW is selected in the MODES 2 section.

RANGE: 32 to 77°F (0 to 25°C)

DEFAULT: 36°F (2°C)

r



IDLING MODE (IDLING) (See fig. s.)

Set the slab temperature that you wish to maintain while control is in idling mode. The IDLING feature decreases snow melting start-up time by maintaining the slab at a temperature below the melting temperature. The IDLING feature can be turned off when not used. This screen will only be available when SNOW is selected in the MODES 2 section.

RANGE: OFF, 20 to 68°F, OFF (-7 to 20°C), OFF

DEFAULT: OFF

s

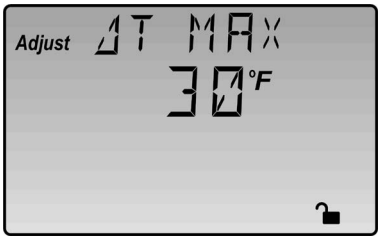
SLAB PROTECTION (ΔT MAX) (See fig. t.)

The proMIX 212 limits the rate of heat applied to a slab to prevent excessive thermal stress. The rate of heat delivery to the slab is dependant on the difference between the melting system supply and the return temperature from the slab. The control measures these temperatures and calculates the difference. If this calculated differential temperature approached the MAX ΔT, the control will adjust the variable speed injection pump for Modes 2 mixing to maintain the ΔT at the MAX ΔT. This screen will only be available when SNOW is selected in the MODES 2 section.

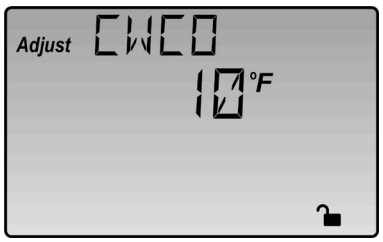
RANGE: 10 to 70°F (-5 to 39°C)

DEFAULT: 30°F (-1°C)

t



u



COLD WEATHER CUT OUT (CWCO) (See fig. u.)

CWCO is the lowest temperature at which the melting system continues to operate. This temperature is set based on the capacity of the snow and ice melting system and the economics of melting in extreme conditions. This screen will only be available when SNOW is selected in the MODES 2 section.

RANGE: OFF, -20 to 50°F, OFF (-29 to 10°C, OFF)

DEFAULT: 10°F (-12°C)

v

RUNNING TIME (RUN TIME) (See fig. v.)

The RUN TIME is set to the estimated time required to complete the snow-melting cycle. This setting may be adjusted from 30 minutes to 18 hours. For continuous operation, the RUN TIME may be set to INF (infinite). The RUN TIME starts counting down once the slab has reached the MELTING temperature. This screen will only be available when SNOW is selected in the MODES 2 section.

RANGE: 0:30 to 18:00 hr, INF (Infinite), OFF

DEFAULT: 4:00 hr

D. BOILER RETURN

BOILER RETURN (Boil RET) (See fig. w.)

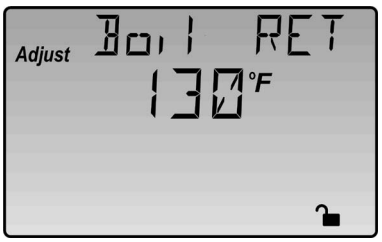
Set to the lowest return water temperature, the boiler is capable of receiving without condensing (refer to the boiler manufacturer's literature).

RANGE: OFF, 70 to 180°F (OFF, 21 to 82°C)

DEFAULT: 130°F (54°C)

Note: If boiler is designed for condensing operation, set the Boil MIN adjustment to OFF.

w



NOTE:

Before you begin testing, all appropriate settings must be entered into the control using the LCD screen. If you are unfamiliar with the theory behind a hydronic radiant heating system, please refer to the Control Function Overview for more help.

PROGRAMMING - STEP 2

TEST SEQUENCE

The proMIX 212 has a built-in test routine which is used to test the main control functions. The control continually monitors the sensors and displays an error message whenever a fault is found. Refer to **Appendix IV - Error Message Overview (page 80)** for a list of the error messages and possible causes. When the test button is pressed, the test light is turned on. The outputs and relays are tested in the following 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 abbreviation PAUS.
- If the Test button is not pressed again for five minutes while the test sequence is paused, the control exits the entire test routine.
- If the test sequence is paused, the Test button can be pressed again to advance to the next step (this can also be used to rapidly advance through the test sequence).
- To reach the desired step, repeatedly press and release the Test button until the appropriate device and segment in the display turn on.

Step 1

- The variable speed injection pump 1 (VSP P4) is ramped up to 100% over 10 seconds. If Modes 1 mixing section is not used (MODES 1 set to OFF), N/A is displayed and the pump is not operated.

Step 2

- The variable speed injection pump 1 (VSP P4) is ramped down to 0% over 10 seconds. If Modes 1 mixing section is not used (MODES 1 set to OFF), N/A is displayed and the pump is not operated.

Step 3

- The Modes 1 mixing pump 1 (Mix 1 P1) is turned on for 10 seconds. If Modes 1 mixing section is not used (MODES 1 set to OFF) N/A is displayed and the pump is not operated.

Note: The control can only be paused in step 3 if there is a mixing demand.

Step 4

- The variable speed injection pump 2 (VSP P5) is ramped up to 100% over 10 seconds. If Modes 2 mixing section is not used (MODES 2 set to OFF), N/A is displayed and the pump is not operated.

Note: The control can only be paused in step 4 if there is a boiler demand.

Step 5

- The variable speed injection pump 2 (VSP P5) is ramped down to 0% over 10 seconds. If Modes 2 mixing section is not used (MODES 2 set to OFF), N/A is displayed and the pump is not operated.

Step 6

- The Modes 2 mixing pump 1 (Mix 2 P2) is turned on for 10 seconds. If Modes 2 mixing section is not used (MODES 2 set to OFF), N/A is displayed and the pump is not operated.

Step 7

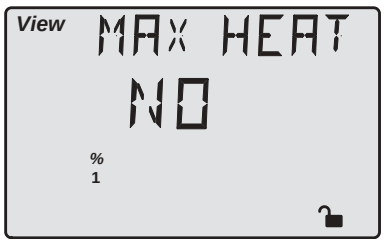
- The Boiler Enable relay is turned on for 10 seconds. The control can only be paused in this step if there is a boiler or mixing demand.

POINTERS IN THE MENU WINDOW

On the right side of the Menu window, there are several sequences listed. The control will float a pointer at the sequence currently in operation. The list below defines the operation taking place under each sequence.

Mix 1 Demand	Modes 1 mixing section requires heat.
Mix 2 Demand	Modes 2 mixing section requires heat.
Min / Max	Indicates that either the boiler return temperature is below the Boil RET setting or Modes 1 or 2 mixing sections are approaching the MAX SUP setting.
WWSD	Control is in Warm Weather Shut Down.
Melting	The control is in melting mode (snow-melting function only).
Idling	The control is in idling mode (snow-melting function only).
CWCO	The control is in Cold Weather Cut Off and will not provide heat to the snow and ice melting system.

a



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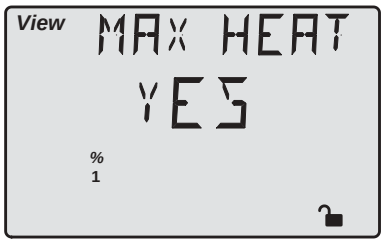


MAX HEAT (See fig. a & b)

The MAX HEAT function provides maximum heat to the system by targeting the maximum supply temperature for each mixing section. This function is useful during system start-up, manual override, or testing during the summer. When the control is in MAX HEAT and a mixing demand in the Modes 1 mixing section is present, the control turns on the mixing pump relay (Mix 1 P1), and the variable speed pump output (VSP P4) and the Boiler Enable relay. The MAX HEAT function overrides the WWSD and the boiler minimum return water temperature, but will not exceed the maximum supply setting. When a mixing demand in the Modes 2 mixing section is present, the control operates similarly as explained above.

To enable the Max Heat feature, use the following procedure:

1) Press and hold the Test button for more than three seconds. At this point, control displays the words MAX HEAT and the word NO.
2) Using the up and down buttons, select the word YES. After three seconds, the control flashes the word MANUAL and the number 100. This number represents the desired output from the variable speed injection pump.
3) Set desired output of the variable speed injection pump by using the up/down arrow buttons on the control.
4) Once started, control continues to operate in MAX HEAT mode for up to 24 hours or until either the Item, Menu or Test button is pressed.
5) Once Max Heat mode ends or is cancelled, control resumes normal operation.

CONTROL FUNCTION OVERVIEW

TABLE OF CONTENTS

CONTROL FUNCTION OVERVIEW - SECTION A

GENERAL

This section explains the operation of general function areas on the Wirsbo proMIX 212.

POWERING UP THE CONTROL

When the Wirsbo proMIX 212 is powered up, the words "Wirsbo proMIX 212" are displayed for four seconds. The control then displays the outdoor temperature and begins normal operations.

OUTDOOR RESET

The calculated heat-loss of a building or space is based on the percentage of the average coldest weather conditions the area experiences over the heating season. If the heat demand is analyzed as a percentage of the heating systems capacity, the heating system operates at or near maximum capacity for only a small portion of the heating season. If the water temperature is controlled using a non-weather responsive tempering device, the device will supply a fixed water temperature that does not fluctuate with the demand for heat. Resetting the supply water temperature allows the heating system to adjust to the varying demand loads of the structure. Lowering the supply water temperature in warmer times of the heating season will allow the radiant zones to be open and run longer, providing increased comfort and efficiency.

VARIABLE SPEED INJECTION MIXING (VSP)

Variable Speed Injection Mixing is used to transfer heat from a primary, high temperature boiler loop to a secondary, low temperature radiant heating loop. The speed of the injection circulator is automatically adjusted to inject the desired volume of hot water to the low temperature loop to achieve the required supply water temperature.

- The Wirsbo proMIX 212 has the ability to support two different supply temperatures through two variable speed injections pumps.
- The control increases or decreases power output to the injection pumps when there is a mix demand.
- Pump speed varies to maintain correct mixed supply water temperature as read at the mix supply sensor.
- A visual indication of current variable speed output is displayed in the LCD screen as a segmented bar graph. (Two small indicators at the top of the graph indicate whether the output is increasing or decreasing).
- For correct sizing and piping of the variable speed injection pumps, refer to essay in **Appendix I, Variable Speed Injection Mixing on page 69**.

INDOOR TEMPERATURE FEEDBACK

Most buildings have internal heat gains due to people, passive solar heating and mechanical or electrical equipment. If only the outdoor temperature is measured, the control cannot compensate for these internal heat gains and the building may overheat. In order to prevent overheating, indoor temperature feedback can be combined with the outdoor reset strategy. From this indoor temperature feedback, the control can match the supply temperature to the heatloss of the building. If the indoor temperature is too warm, the control reduces the supply water temperature, and if the indoor temperature is too cold, the control increases the supply water temperature.

- The increase or decrease of the supply water temperature is accomplished through shifting the reset ratio up or down.
- An indoor or room sensor connection is available for both Modes 1 and 2.
- The selection of this option is completed under the Mix 10K 1 and Mix 10K 2 screens in the ADJUST Menu.

BOILER RETURN PROTECTION

The proMIX 212 ensures the boiler return water temperature remains above Boil RET setting.

- If boiler water temperature begins to drop due to lower return temperature, the mixing device is throttled back to allow the boiler to recover
- Throttling back minimizes the time the boiler operates below its condensing temperature and prolongs life expectancy of boiler.

EXERCISING (EXERCISE)

The proMIX 212 has a built-in pump exercising function to reduce the possibility of pump seizure due to inactivity.

- If a pump output on the control has not been operated at least once during every exercising period (every 70 hours), the control turns on the output for 20 seconds.
- The exercising function will not work if power to the control or pumps is disconnected.
- During exercising, the LCD display screen flashes “EXERCISE” and the Test LED flashes. Exercising can be stopped by pressing the Test button.

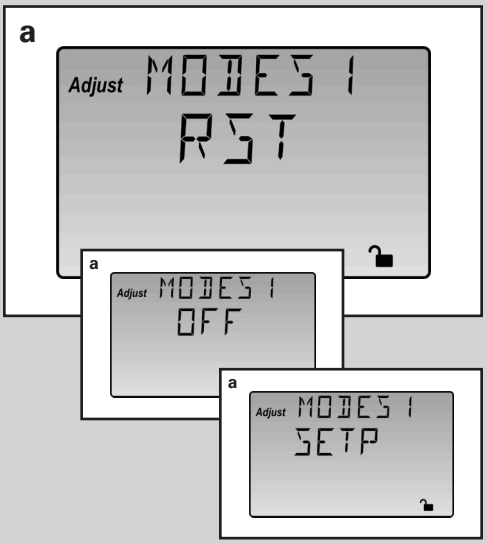
REMOTE DISPLAY

A Remote Display (A3040040) is available to allow the user remote access to the control display. All settings can be remotely adjusted.

CONTROL FUNCTION OVERVIEW - SECTION B

MODES 1 MIXING RESET/SETPOINT

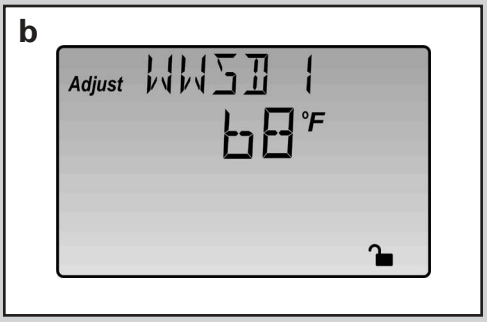
The proMIX 212 can provide a reset or setpoint supply water temperature from the primary boiler loop to a secondary mixed loop via a variable speed injection pump. Modes 1 mixing section is the first of two injection loops.



MODES 1 (See fig. a.)

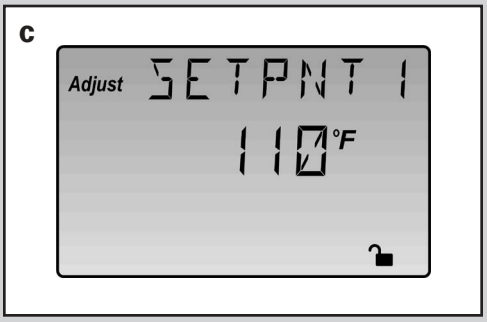
There are three options under the MODES 1 screen.

- RST (Reset) — Under this option the control will continually adjust the supply water temperature of the secondary radiant loop as it relates to the outdoor temperature.
- OFF — This option is used when the Modes 1 mixing section is not used. All adjustment for the section will be skipped.
- SETP (Setpoint) — When Setpoint is selected, the control will supply only one fixed supply water temperature to the secondary radiant loop regardless of outdoor temperature. If setpoint is selected, the next adjustment screen after WWSD 1 will be SETPNT1 to allow the installer to enter the desired setpoint temperature.



WARM WEATHER SHUT DOWN (WWSD 1) (See fig. b.)

When outdoor air temperature rises above the WWSD setting, the proMIX 212 goes into WWSD and turns on the LCD's WWSD pointer. When control is in WWSD, Mix Demand pointers are displayed if there is a demand.



SETPOINT 1 (SETPNT 1) (See fig. c.)

If SETP is selected in MODES 1, then this screen will be available to the installer in order to enter the setpoint value. Under this selection, the control will operate the variable speed injection pump to provide a consistant fixed supply water temperature to the secondary radiant loop. An external mixing demand on the Mix Demand terminal must be present for this function to operate.

MIXING 10K SENSOR 1 (MIX 10K 1) (See fig. d.)

The MIX 10K 1 adjustment informs the control which external device is connected to the Mix 10K 1 terminal. There are three allowable settings.

NONE	If no indoor sensor is connected to the Mix 10K 1 terminal (22), this setting must be selected.
INDR (Indoor)	If an indoor sensor is connected to the Mix 10K 1 terminal (22), this setting must be selected. The control will provide indoor temperature feedback in order to fine-tune the supply water temperature.
ZOIN	If a tekmar Zone Control is connected to the Mix 10K 1 terminal (22), this setting must be selected. A tekmar Zone Control provides indoor temperature feedback from multiple zones.

MIXING ROOM 1 (MIX RM 1) (See fig. e.)

- MIX ROOM is desired room temperature for mixing zones
- Provides a parallel shift of the reset ratio

Note: Room temperature desired by occupants is often different from designed indoor temperature (MIX INDR). If room temperature is not correct, adjusting MIX ROOM setting increases or decreases the amount of heat available to the building.

MIXING INDOOR 1 (MIX IND 1) (See fig. f.)

- MIX INDR is room temperature used in original heat-loss calculations for the building.
- Setting establishes beginning of reset ratio for mixing zones.

MIXING DESIGN 1 (MIX DSN 1) (See fig. g.)

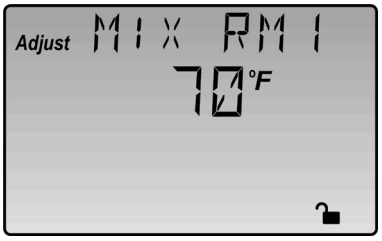
- MIX DSGN temperature is the supply water temperature required to heat mixing zones when the outdoor temperature is at OUT DSGN temperature.

MIXING TARGET TEMPERATURE (MIX TRG 1) (See fig. h.)

- MIX TRG temperature is determined from reset ratio settings and outdoor air temperature.
- The control displays the temperature it is currently trying to maintain as the Modes 1 mixing supply temperature.
- If control does not presently have a requirement for heat, it displays "---" in the LCD display.

d

e



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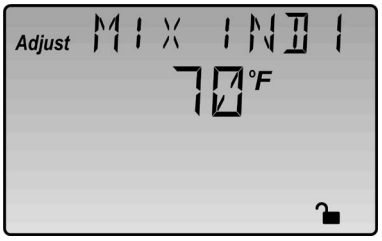

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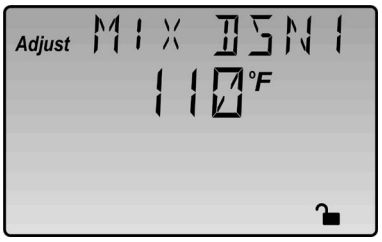

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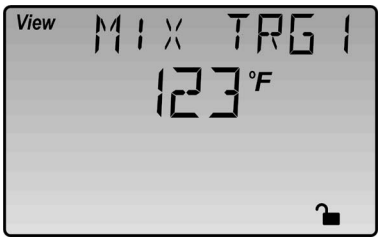

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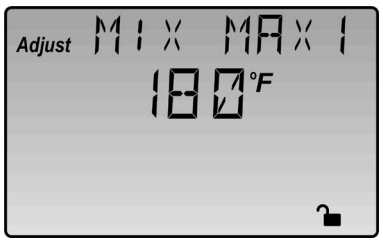


Note: If connecting a Wirsbo thermostat (WT1 or WT2) directly to the Mix Demand terminals, refer to Mixing Demand with Wirsbo Thermostat on page 21.

MIXING MAXIMUM 1 (MIX MAX 1) (See fig. i.)

- MIX MAX sets highest water temperature the control is allowed to use as MIX TRG temperature.
- If control calculates target MIX MAX setting, and MIX SUP temperature is near MIX MAX temperature, the LCD's Min/Max pointer turns on while either the MIX TRG temperature or the MIX SUP temperature is viewed.

MIXING SYSTEM PUMP (P1) OPERATION

- Mixing system pump (P1) contact (terminals 11 and 12) closes whenever there is a Mix 1 Demand and the proMIX 212 is not in WWSD.
- After mixing demand is removed, Mixing Pump P1 contact remains closed for 20 seconds.

EXTERNAL MIXING DEMAND

An external mixing demand allows use of a conventional thermostat system for zoning. Demand is generated by applying a voltage between 24 and 240VAC across the Mix 1 Demand terminals (1 and 2).

- Once voltage is applied, the Mix Demand pointer is displayed in the LCD.
- If the proMIX 212 is not in WWSD, it closes the Mixing Pmp P1 contact.
- The mixing system pump segment is displayed in the LCD.
- Control calculates a MIX TRG temperature based on outdoor air temperature and input settings.

CONTROL FUNCTION OVERVIEW - SECTION C

MODES 2 MIXING RESET/SETPOINT

Modes 2 mixing section is the second of two injection loops. The proMIX 212 can control a reset/setpoint heating temperature or a single zone snow and ice melting system.

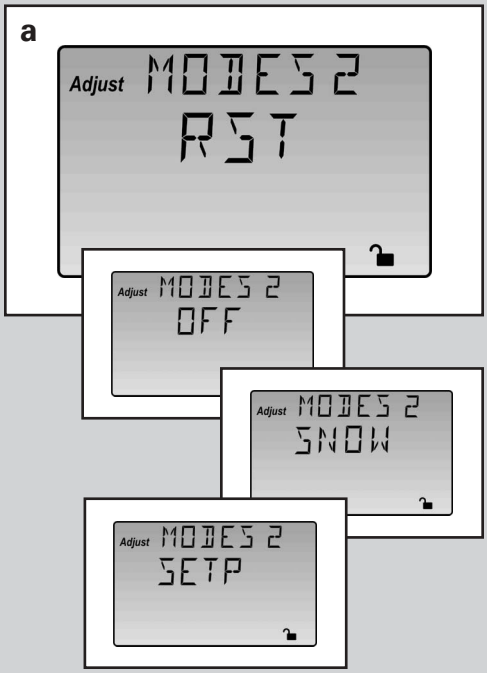
For the snow ice melting function overview, refer to **Section D (page 62)**.

MODES 2 (See fig. a.)

There are four options under the MODES 2 screen.

RST (Reset)	Under this option the control will continually adjust the supply water temperature of the secondary radiant loop as it relates to the outdoor temperature.
OFF	This option is used when the Modes 2 mixing section is not used. All adjustment for the section will be skipped.
SNOW	If an slab sensor is connected to the Mix 10K 2 terminal (18) for snow melting, this setting must be selected. The control will provide slab temperature feedback in order to fine-tune the supply water temperature for snow melting. See **Section D (page 62)**.
SETP (Setpoint)	When Setpoint is selected, the control will supply only one fixed supply water temperature to the secondary radiant loop regardless of outdoor temperature. If SETP is selected, the next adjustment screen after WWSD 2 will be SETPNT 2 to allow the installer to enter the desired setpoint temperature.

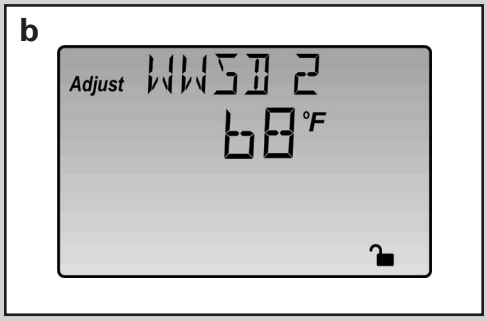
a



WARM WEATHER SHUT DOWN (WWSD 2) (See fig. b.)

When outdoor air temperature rises above the WWSD setting, the proMIX 212 goes into WWSD and turns on the LCD's WWSD pointer. When control is in WWSD, Mix Demand and Boiler Demand pointers are displayed if there is a demand.

b



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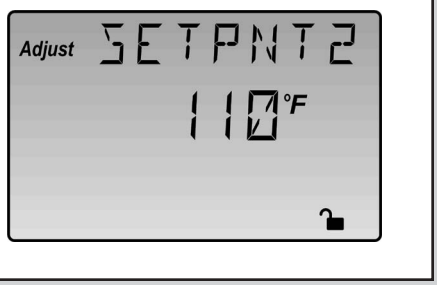

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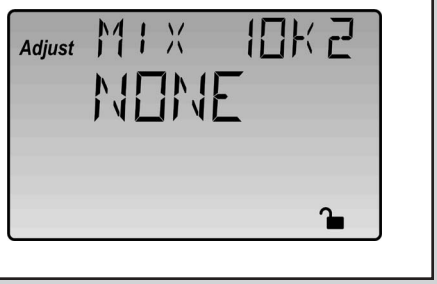

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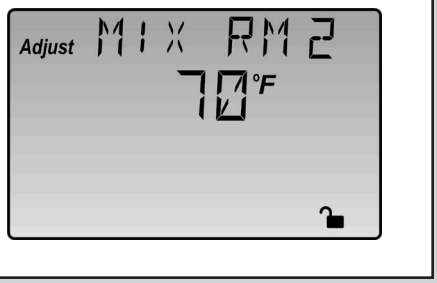

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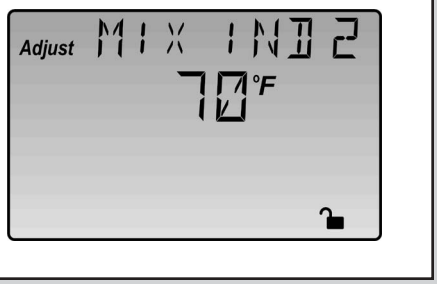


SETPOINT 2 (SETPNT 2) (See fig. c.)

If SETP is selected in MODES 2, then this screen will be available to the installer in order to enter the setpoint value. Under this selection, the control will operate the variable speed injection pump to provide a consistant fixed supply water temperature to the secondary radiant loop. An external mixing demand on the Mix 2 Demand terminal must be present for this function to operate.

MIXING 10K SENSOR 2 (MIX 10K 2) (See fig. d.)

The MIX 10K 2 adjustment informs the control which external device is connected to the Mix 10K 2 terminal. There are four allowable settings.

NONE	If no indoor or slab sensor is connected to the Mix 10K 2 terminal(22), this setting must be selected.
INDR (Indoor)	If an indoor sensor is connected to the Mix 10K 2 terminal (22), this setting must be selected. The control will provide indoor temperature feedback in order to fine-tune the supply water temperature.
ZOIN	If a tekmar Zone Control is connected to the Mix 10K 2 terminal (22), this setting must be selected. A tekmar Zone Control provides indoor temperature feedback from multiple zones.
SNOW	If an slab sensor is connected to the Mix 10K 2 terminal (18), this setting must be selected. The control will provide slab temperature feedback in order to fine-tune the supply water temperature for snow melting.

MIXING ROOM 2 (MIX RM 2) (See fig. e.)

- MIX ROOM is desired room temperature for mixing zones
- Provides a parallel shift of reset ratio

Note: Room temperature desired by occupants is often different from designed indoor temperature (MIX IND2). If room temperature is not correct, adjusting MIX RM 2 setting increases or decreases the amount of heat available to the building.

MIXING INDOOR (MIX IND 2) (See fig. f.)

- MIX INDR is room temperature used in original heat-loss calculations for the building.
- Setting establishes beginning of reset ratio for mixing zones.

MIXING DESIGN (MIX DSN 2) (See fig. g.)

- MIX DSGN temperature is the supply water temperature required to heat mixing zones when the outdoor temperature is at OUT DSGN temperature.

MIXING TARGET TEMPERATURE (MIX TRG 2) (See fig. h.)

- MIX TRG temperature is determined from reset ratio settings and outdoor air temperature.
- The control displays the temperature it is currently trying to maintain as mixing supply temperature.
- If control does not presently have a requirement for heat, it displays "---" in the LCD display.

MIXING MAXIMUM (MIX MAX 2) (See fig. i.)

- MIX MAX sets highest water temperature the control is allowed to use as MIX TRG temperature.
- If control calculates target MIX MAX setting, and MIX SUP temperature is near MIX MAX temperature, the LCD's Min/Max pointer turns on while either the MIX TRG temperature or the MIX SUP temperature is viewed.

MIXING SYSTEM PUMP (P2) OPERATION

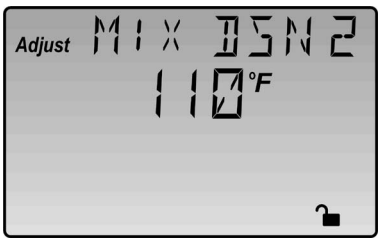
- Mixing system pump (P2) contact (terminals 7 and 8) closes whenever there is a Mix 2 Demand and the proMIX 212 is not in WWSD.
- After mixing demand is removed, Mixing Pmp P2 contact remains closed for 20 seconds.

EXTERNAL MIXING DEMAND (See note j.)

An external mixing demand allows use of a conventional thermostat system for zoning. Demand is generated by applying a voltage between 24 and 240VAC across the Mix 2 Demand terminals (3 and 4).

- Once voltage is applied, the Mix Demand pointer is displayed in the LCD.
- If the proMIX 212 is not in WWSD, it closes the Mixing Pmp P2 contact.
- The mixing system pump segment is displayed in the LCD.
- Control calculates a MIX TRG 2 temperature based on outdoor air temperature and settings.

g



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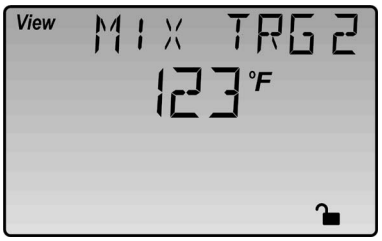

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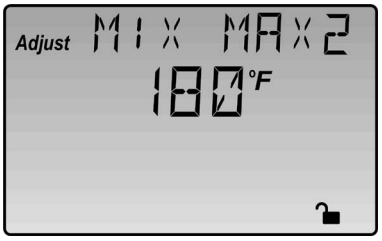


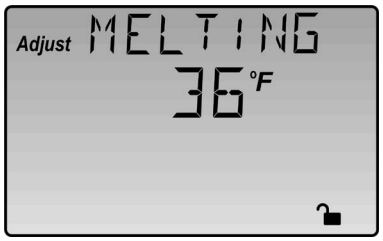
j **Note: If connecting a Wirsbo thermostat (WT1 or WT2) directly to the Mix Demand terminals, refer to Mixing Demand with Wirsbo Thermostat on page 21.**

CONTROL FUNCTION OVERVIEW - SECTION D

MODES 2 SNOW AND ICE MELTING

The proMIX 212 can control a single zone snow and ice melting system. To provide control of the snow-melting system, it must be equipped with a Slab Sensor (A3060072) and a Universal Sensor (A3060071) to measure slab and return temperatures. These can be purchased separately or as part of the Snow Melt Enable Kit (A3040039). With both sensors installed, the proMIX 212 can provide the features listed in the following section. You'll also find described in this section the different methods of starting and stopping the snow and ice melting system.

a



MELTING MODE (MELTING) (See fig. a.)

The proMIX 212 is a semi-automatic snow and ice melting control.

- For the snow-melting system to be started, one of four methods must be used (See **Enabling, page 64**).
- When the control is in melting mode, the Melting pointer is visible in View menu.
- Either EXT, INF or a running time can be read when viewing STATUS item in View menu.
- The MELTING setting in Adjust menu sets the theoretical slab surface temperature that is maintained while control is in melting mode.

b

IDLING MODE (IDLING) (See fig. b.)

Extra time may be required when the snow-melting system starts from a cold temperature.

- To decrease the start-up time, the slab can be maintained at an IDLING temperature below the MELTING temperature.
- Idle feature is also useful for preventing frost and light ice formation if maintained above freezing.
- When control is in idling mode, the word IDLE appears in the STATUS item under the View menu.
- IDLING setting in the Adjust menu sets the theoretical slab surface temperature that is kept while the control is in idling mode.

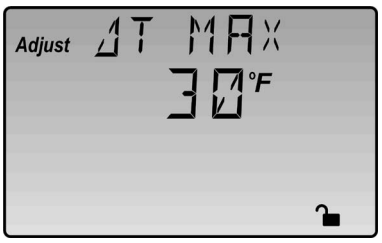
SLAB PROTECTION (ΔT MAX) (See fig. c.)

A mixing device is installed between the snow-melting slab and boiler(s) to control rate at which heat is transferred to snow-melting system and to protect slab from thermal stress damage. The control limits the rate at which heat is applied to slab through ΔT (delta T) MAX setting.

- ΔT (delta T) is the temperature difference between slab supply temperature and slab return temperature.
- The rate at which heat is applied to slab can be controlled and thermal stresses in slab can be minimized by controlling this temperature difference.
- When slab is operating, control ensures slab supply temperature does not exceed slab return temperature by more than ΔT MAX setting.

Note: When control is operating and actual ΔT is near ΔT MAX, the Maximum pointer can be seen when viewing the MIX ΔT item in the View menu.

c

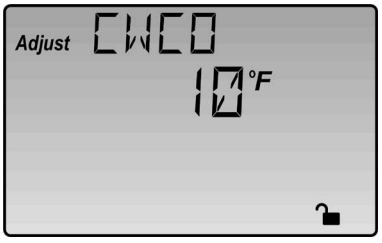


COLD WEATHER CUT OFF (CWCO) (See fig. d.)

Maintaining a slab temperature at either a melting or idling temperature when outdoor conditions has dropped below system design parameters can be both expensive and impossible. Cold Weather Cut Out (CWCO) is a feature that allows the control to automatically shut the system down at a particular outdoor temperature setting to save energy.

- When the control is not in melting mode and the outdoor temperature drops below the CWCO setting, the control goes into CWCO mode which prevents any melting events to take place until the outdoor temperature rises above the CWCO setting.
- When the control is already in melting mode, the CWCO only occurs when the outdoor temperature is less than CWCO setting and slab surface is less than 29°F. This allows the control to finish the current melting cycle and helps prevent refreezing of left over moisture on the slab surface.

d



RUNNING TIME (RUN TIME) (See fig. e.)

Run time is the length of time the snow and ice melting system operates once the slab has reached melting temperatures.

- During the time the slab takes to warm to the MELTING temperature, the RUN TIME setting is not affected.
- Once the slab has reached the MELTING temperature, the RUN TIME is started to clock the amount of time the system runs under the MELTING mode.

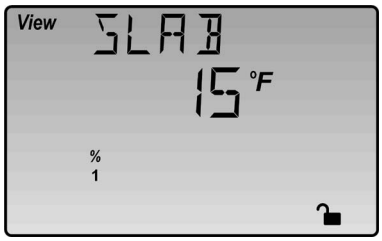
e

RAMPING OF THE ΔT

When control starts applying heat to the slab, the supply temperature to the snow and ice melting system is ramped up over a period of time until it reaches maximum allowed ΔT.

f

g



h

SLAB TARGET (SLAB TRG) (See fig. f.)

The target temperature for the snow-melting slab based on the design criteria entered into the control.

SLAB TEMPERATURE (SLAB) (See fig. g.)

The actual slab temperature as sensed from the slab sensor (S7) location.

ENABLING

There are four ways in which the snow melting system can be enabled on the proMIX 212.

- Snow Melt Enable Module
- Remote Display Module
- External Mix Demand
- Using the Start button on the proMIX 212

EXTERNAL DEMAND

An external snow-melting demand is generated when a voltage between 24 and 240VAC is applied across the Mix 2 Demand terminals (3 and 4).

- An external demand must be present for at least four seconds to start snow melting system.
- Once started, slab temperature is increased to MELTING setting and maintained at MELTING temperature until RUN TIME reaches 0:00.
- If RUN TIME reaches 0:00 and external demand is still present, control continues at MELTING temperature until external demand is removed or system is stopped.

SNOW MELT ENABLE KIT (See fig. h.)

A Snow Melt Enable Kit (A3040039) can be used to start and stop the snow-melting system. The system is enabled by pressing the button on the front of the remote start/stop module.

- This kit includes a Remote Start/Stop Module, Mixing 2 Return Sensor S5 (A3040071) and a Slab Sensor S7 (A3040072).
- As the slab is coming up to temperature, a green light flashes on the front of the remote start/stop module.
- Once the slab is at melting temperature and RUN TIME is counting down, green indicator light stop flashing and remains lit.
- To disable the snow and ice melting system when in melting mode, press the button on the face of the remote start/stop module.
- When system is stopped, a red indicator light is displayed on the face of the remote start/stop module for five seconds

- If the snow-melting system is disabled while there is still an external demand for snow melting, the remote start/stop module displays a solid red indicator light until external demand is removed.

REMOTE DISPLAY MODULE (See fig. i.)

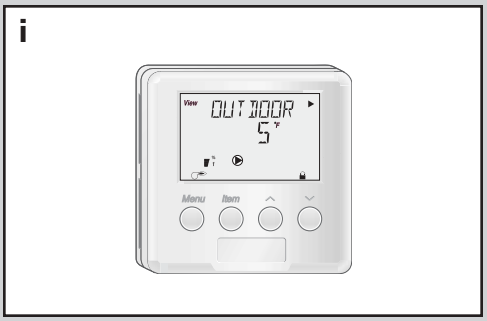
A Remote Display Module can be used to start and stop the snow-melting system.

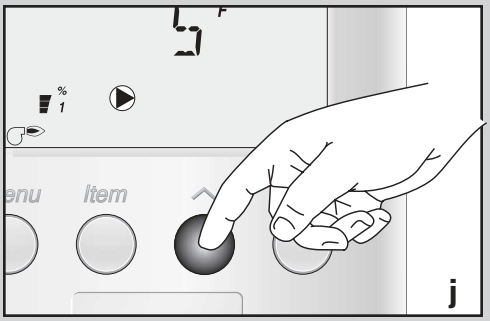
- The snow melting system is enabled by pressing the ***Start*** button on the Remote Display Module while in the View Menu **(See fig. j.)**.
- Once snow melting system is enabled, the word STRT is displayed in the LCD for at least five seconds.
- The Remote Display Module then displays RUN TIME setting to allow user to adjust it.
- To disable the snow melting system when it is in melting mode, press the ***Stop*** button on the Remote Display Module **(See fig. k.)**.
- The word STOP will display.

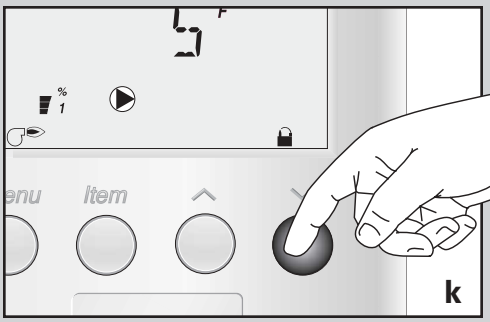
USING START/STOP BUTTONS ON THE proMIX 212

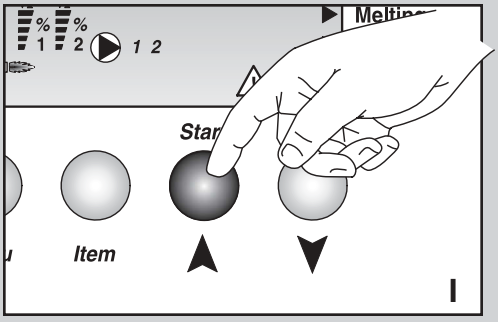
If there are no external demand modules connected to the proMIX 212, the proMIX 212 will be used to operate the snow and ice melting system.

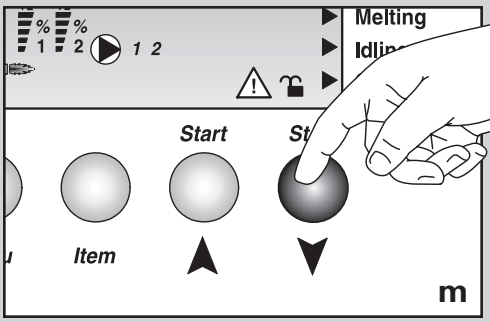
- The snow melting system is enabled by pressing the ***Start*** button on the proMIX 212 while in the View Menu **(See fig. l.)**.
- Once the snow-melting system is enabled, the word STRT is displayed in the LCD for at least five seconds.
- The proMIX 212 then displays RUN TIME setting to allow user to adjust it.
- To disable the snow-melting system when it is in melting mode, press the ***Stop*** button on the proMIX 212 **(See fig. m.)**.
- The word STOP will display.











CONTROL FUNCTION OVERVIEW - SECTION E

TROUBLESHOOTING

When troubleshooting any heating system, it is a good idea to establish a set routine to follow. Below is an example of a sequence you can use when diagnosing or troubleshooting problems in a hydronic heating system.

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 zone or does the problem affect the entire system?
- Is this a consistent problem or only intermittent?
- How long has the problem existed?

This information is critical in correctly diagnosing the problem.

Understand the Sequence of Operation of the System

If a particular zone is not receiving enough heat, check:

- Which pumps or valve in the system must operate to deliver heat to the affected zone

If the zone is receiving too much heat, check:

- Which pumps, valves or check valves must operate to stop delivery of heat

Now, press the test button on the control and follow it through the test sequence as described in the Testing section. Pause the control as necessary to make sure the correct device is operating as it should.

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. Use your sketch to:

- Note flow directions in the system — paying close attention to the location of the pumps, check valves, pressure bypass valves and mixing valves.
- Ensure the correct flow direction on all pumps.

This is also a very useful step if additional assistance is required.

Document the Control for Future Reference

Before making any adjustments to the control, write down all items that the control is currently displaying. Include items such as:

- Error messages
- Current temperatures
- Settings (use proMIX 212 Program Setup Sheet in **Appendix V - page 84)**
- Devices that 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 Between the Control and the System

Now that the sequence of operation is known and the system is sketched:

- Is the control operating proper pumps and valves at the correct times?
- Is the control receiving correct signals from the system about when it should be operating?
- Are proper items selected in menus of the control for the device that is to be operated?

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.
- Determine if the internal contacts on the control are opening and closing correctly.
- Follow the instructions in the Testing the Wiring section to simulate the closed contacts on the terminal blocks as required.
- Test the sensors and their wiring as described in previously.

APPENDIX

TABLE OF CONTENTS

NOTES:

Variable Speed Injection Mixing For Hydronic Heating Systems

The purpose of this section is to discuss the use of variable speed injection mixing to precisely transfer heat from the high temperature boiler (primary) loop to the lower temperature radiant (secondary) loop in hydronic heating systems.

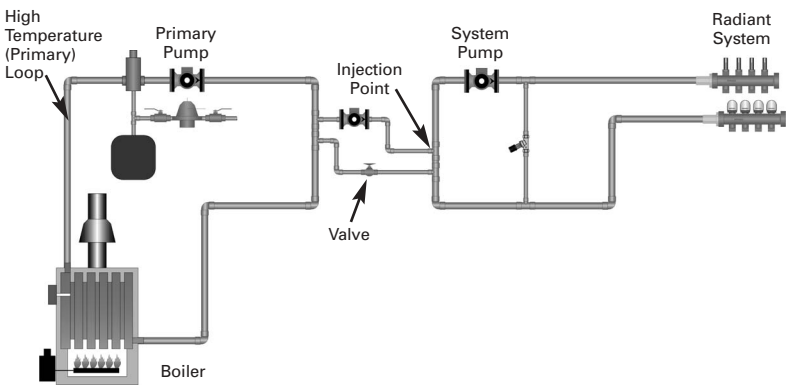
Various devices and plumbing arrangements can be used to accomplish this transfer. In the past, it was common to use a mixing valve in order to temper the water between the primary and secondary loops in a system. In some instances, the heat source (condensing or electric boiler, geo-thermal heat pump, etc.) can be operated at lower temperatures and dedicated solely to operating a low temperature radiant heating system. In the vast majority of systems, mixing is required because:

- A boiler minimum operating temperature is required
- High temperature water is required for other system needs
- Water temperatures vary over a wide range (e.g. solar heat sources, waste heat utilization, wood fired boilers, etc.)

When the available heat source produces higher water temperatures than is required by the radiant heating system, a tempering device is required. To achieve the lower water temperature required for the radiant system, the high temperature boiler water must be blended or injected into the return side of the radiant system to a level that meets the required supply water temperature for the radiant side. Technologies have evolved to the point of using small "wet rotor" pumps to accurately adjust the secondary radiant supply water temperature regardless of the flow activities on either primary or secondary loops. **(See fig. a.)**

The speed of the injection pump is automatically adjusted to deliver the desired volume of hot boiler water to the lower temperature radiant loop. The injection pump speed is constantly adjusted as the radiant heating system demand and the supply water temperature change. If the boiler return temperature becomes too cold, the injection pump can be slowed down to reduce the heat injection rate, resulting in an increased boiler return temperature.

a Mixing with variable speed pump

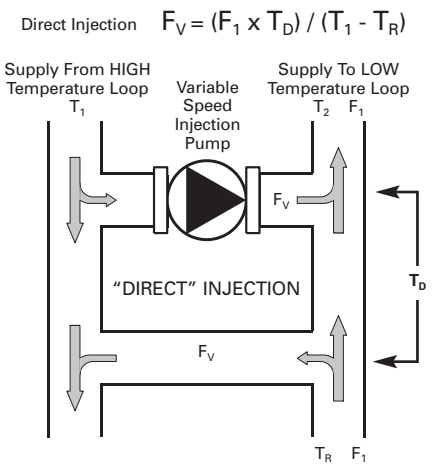


Wirsbo offers a variety of controls that utilizes variable speed injection pump output. This output modulates the power supply to the circulator to vary its rotational speed. For residential and many commercial systems, the controls have a 120VAC 50/60Hz output to directly power small circulators.

A permanent capacitor, impedance protected motor (no start switch) on the circulator is required. The maximum allowable amperage for this output is 2.2 amps, which limits the allowable circulator size to ⅓ hp.

This type of system can use a small circulator to inject a high BTU input into a relatively large system flow. Typically, the injection pump need only deliver one sixth to one fourth of the system flow for low temperature radiant panels if high temperature water is available for injection. In small hydronic systems, the smallest available circulator for variable speed injection may be too large. It is important to properly size the injection pump and use a globe valve on the return injection leg.

b Direct Injection Mixing
"F_V" to be calculated



For proper injection pump sizing, the designer must know the following information: **(See fig. b.)**

F_V = Flow Rate (Injection Loop) in gpm

F_1 = Radiant (Secondary Loop) Flow Rate in gpm

T_1 = Boiler (Primary Loop) Supply Temperature

T_2 = Radiant (Secondary Loop) Supply Temperature

T_R = Radiant (Secondary Loop) Return Temperature

T_D = Radiant (Secondary Loop) Temperature Differential (**T_2** - **T_R**)

Note: All values are to be given at design conditions. The formula used for sizing the injection pump is shown below.

$F_V = (F_1 \times T_D) / (T_1 - T_R)$

Example:

If values at design conditions are:

F_1 = Radiant (Secondary) Flow = 30 gpm

T_1 = Boiler (Primary) Supply = 180°F

T_2 = Radiant (Secondary) Supply = 140°F

T_R = Radiant (Secondary) Return = 120°F

T_D = Radiant (Secondary) Differential = 20°F

To find the injection pump flow rate:

$F_V = (30 \times 20) / (180 - 120)$

$F_V = (600) / (60)$

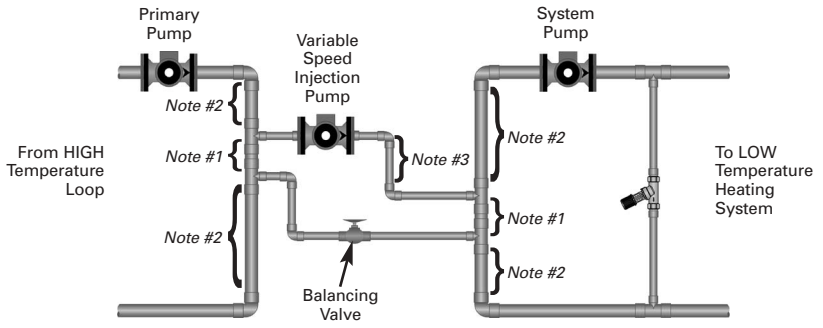
$F_V = 10$ gpm

In order to provide the proper amount and temperature of supply water on the radiant heating loop, the variable speed injection pump needs only to inject 10 gpm at design conditions.

Figures c and **d** show the two most common piping layouts for variable speed injection mixing. Pay particular attention to the drop lines (or thermal traps) shown in the injection legs. These are particularly important to prevent "thermal siphoning" from the primary loop into the secondary loop. Consult the pump manufacturers' chart (below) to assist in the selection of the proper injection pump for the project.

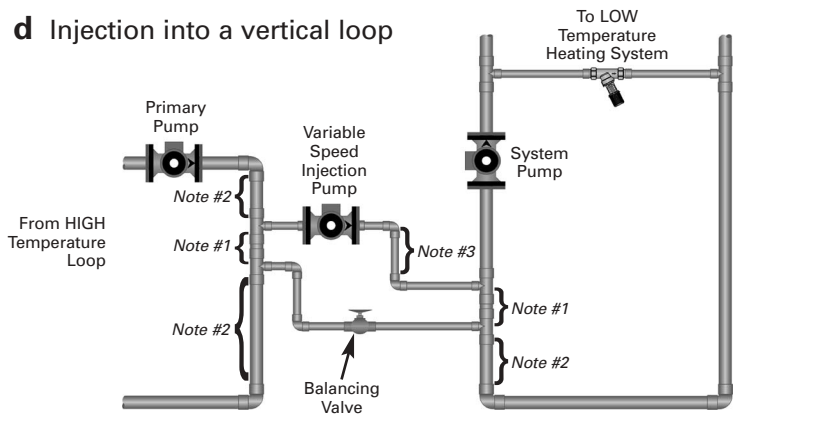
In the piping arrangement shown, the variable speed injection pumps are plumbed in such a way as to limit head pressure in the injection legs to only a few feet at most. Use standard pressure drop calculations and equivalent length of feet charts for exact calculations, if required.

c Injection into a horizontal loop



Note #1 - Maximum 4 Pipe Diameters Apart
Note #2 - Minimum 6 Pipe Diameters Apart
Note #3 - Drop line to be longer than 1 foot

d Injection into a vertical loop



Note #1 - Maximum 4 Pipe Diameters Apart
Note #2 - Minimum 6 Pipe Diameters Apart
Note #3 - Drop line to be longer than 1 foot

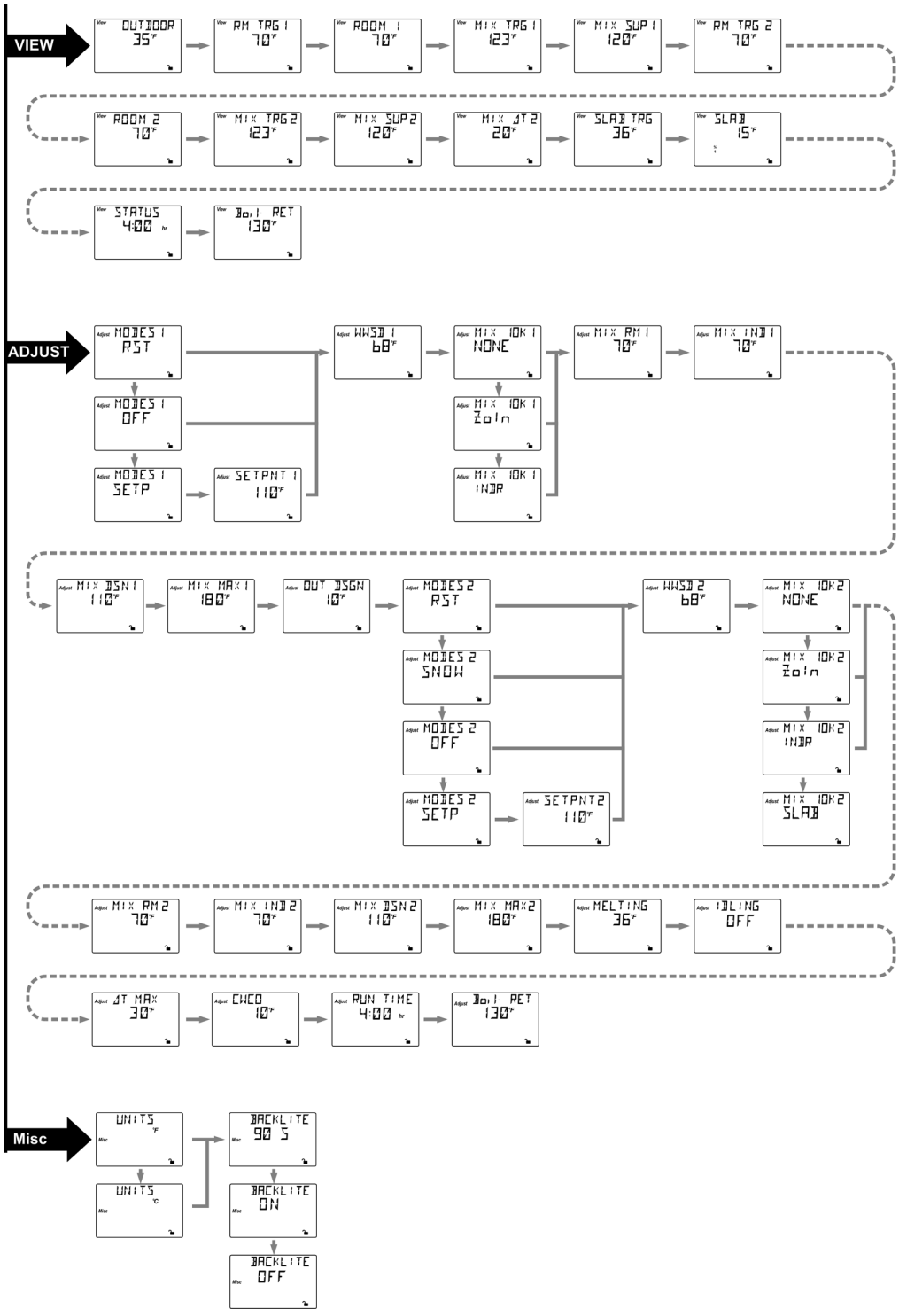
Variable Speed Injection Design Flow Rates

Design Injection Flow Rate (US GPM)		Turns open of the Globe Valve (%)	Nominal Pipe Diameter (inches)	Manufacturer Approved Pump Models												
				Grundfos (F)				Taco				B&G			Armstrong	
Without Globe Valve	With Globe Valve			15-42		26-64	43-75	003	007	0010	0012	NRF 9	NRF 22	NRF 33	Astro	
				2*	3**										30	50
–	1.5 - 2.0	20	0.5	X	X				X				X		X	
2.5	2	100	0.5					X								
4 - 5.5	3.0 - 4.5	100	0.5	X	X				X			X	X		X	
4.5 - 6.5	4 - 5.5	100	0.75					X				X				
9 - 10.5	7.5 - 8.5	100	0.75		X				X				X		X	
9	8	100	1									X				
14 - 15	12 - 13	100	1		X				X				X			
19	17	100	1.25													X
22 - 24	19 - 21	100	1.25			X				X				X		
26 - 28	–	100	1.5			X				X				X		
35 - 37	31 - 32	100	1.5				X				X					
33	30	100	2											X		
41 - 45	39 - 42	100	2				X				X					

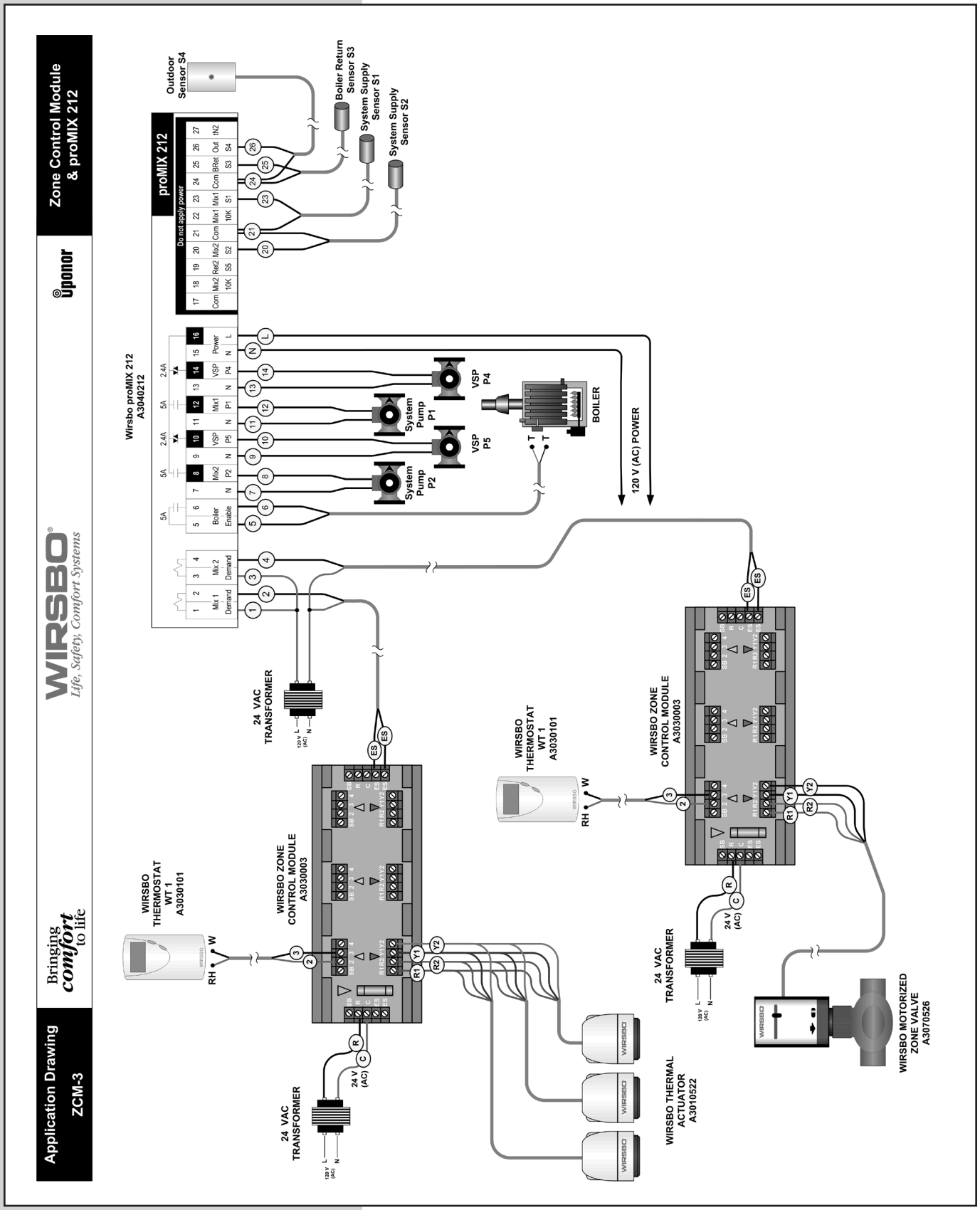
* Speed 2, ** Speed 3 (Brute)
Table courtesy of tekmar - This table assumes there are 5 feet of pipe, 4 elbows, and branch trees of the listed diameter.
These circulators have been tested and approved by the manufacturers for use with pro Series controls.

proMIX 212

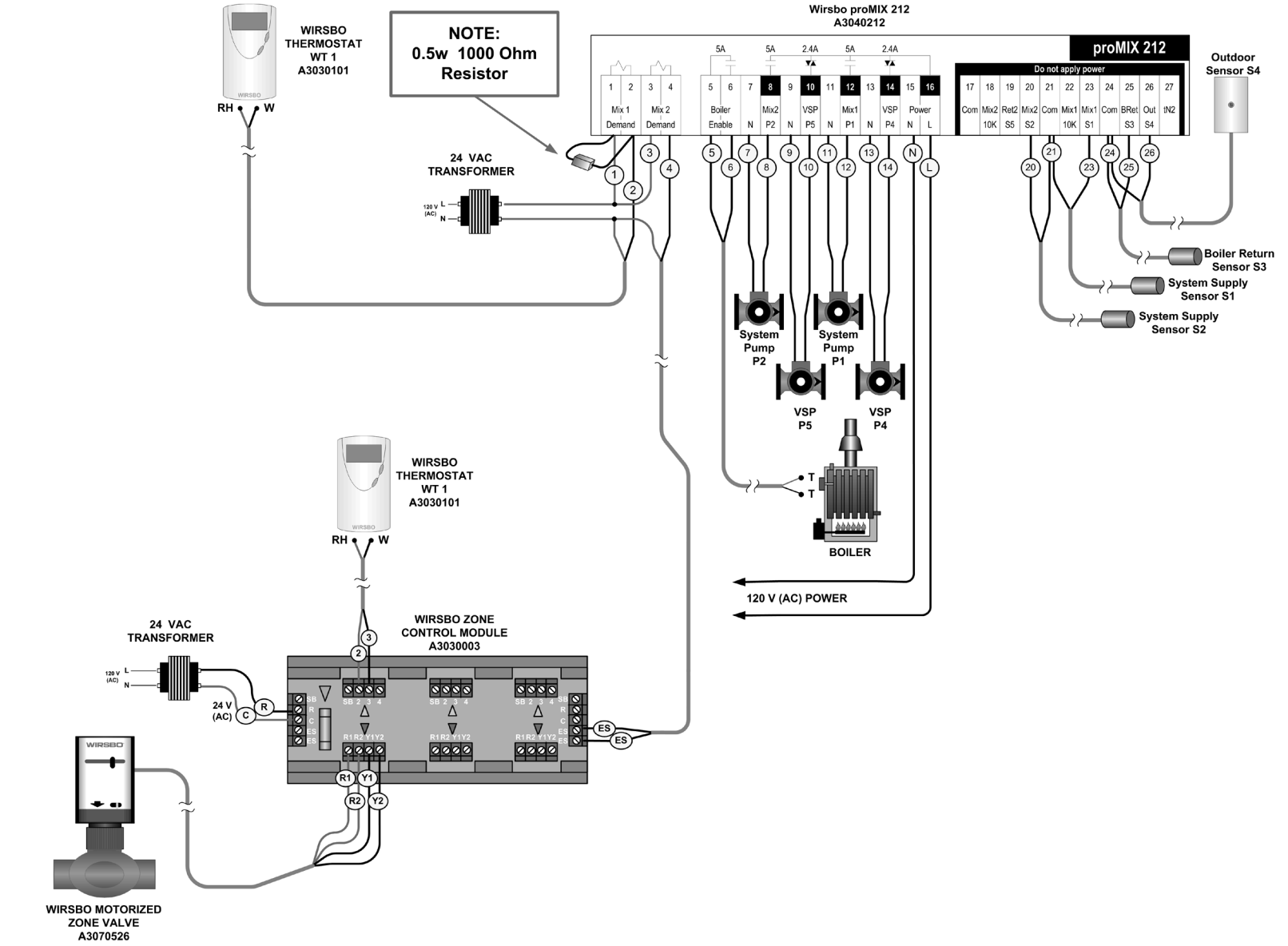
MENU



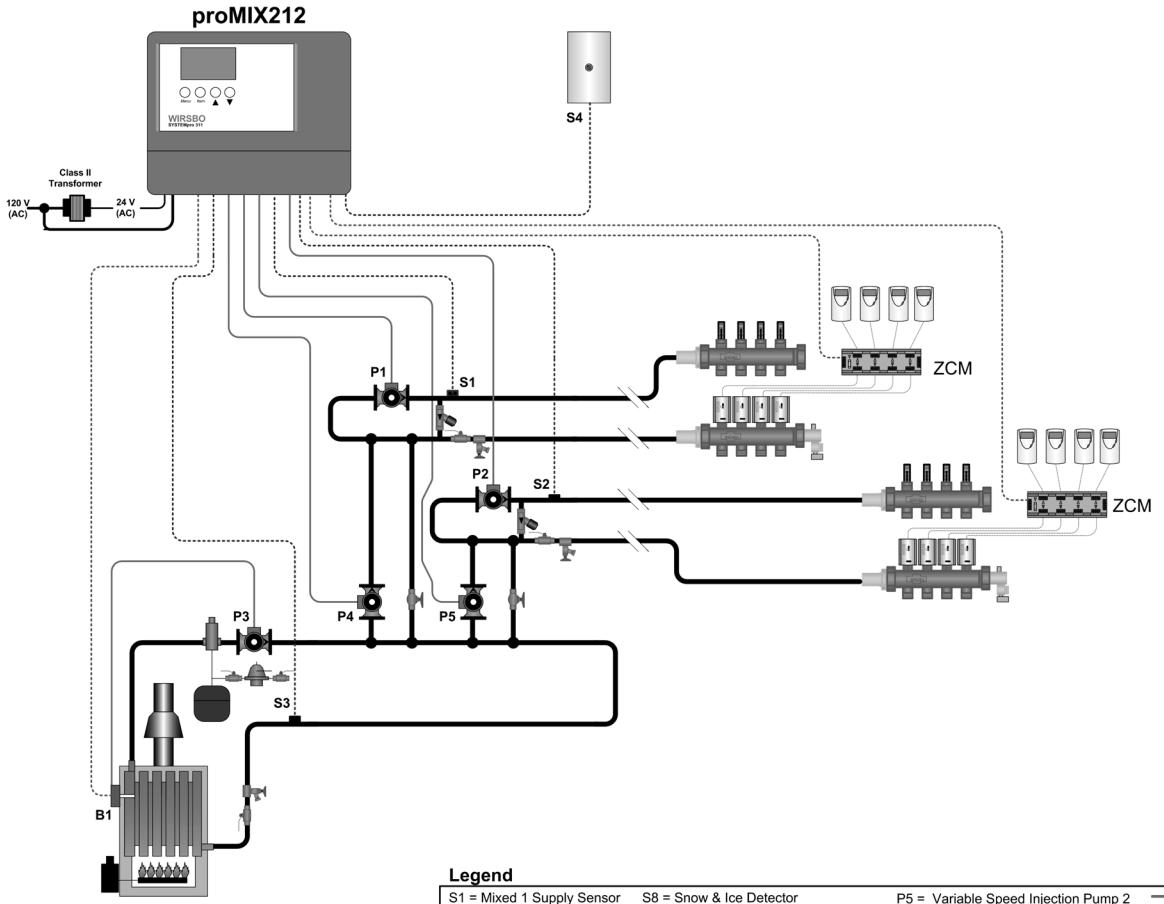
NOTE: **See Programming section (page 32) for menu trees specific to Modes 1 and 2.**


Application Drawing
ZCM-3
Bringing comfort to life
WIRSBO
Life, Safety, Comfort Systems
Uponor
Zone Control Module & proMIX 212
Outdoor Sensor S4
Boiler Return Sensor S3
System Supply Sensor S1
System Supply Sensor S2
proMIX 212
Do not apply power
Wirsbo proMIX 212 A3040212
System Pump P2
System Pump P1
VSP P5
VSP P4
BOILER
120 V (AC) POWER
24 VAC TRANSFORMER
WIRSBO THERMOSTAT WT 1 A3030101
WIRSBO ZONE CONTROL MODULE A3030003
WIRSBO THERMAL ACTUATOR A3010522
WIRSBO MOTORIZED ZONE VALVE A3070526

Application Drawing ZCM-3	Bringing comfort to life	WIRSBO Life, Safety, Comfort Systems	Uponor	Zone Control Module & proMIX 212



Application Drawing W212-1	Bringing comfort to life	WIRSBO® Life, Safety, Comfort Systems	Uponor	Mechanical Page 1 of 2



Legend

S1 = Mixed 1 Supply Sensor	S8 = Snow & Ice Detector	P5 = Variable Speed Injection Pump 2	= 120 V (AC)
S2 = Mixed 2 Supply Sensor	A1 = Aquastat	P6 = DHW Pump	= Sensor Wire
S3 = Boiler Supply or Return	B1 = Boiler	P7 = Hi-Temp Pump	= 24 V (AC)
S4 = Outdoor Sensor	P1 = MIxed 1 System Pump	V1 = Floating Action Mixing Valve	= T-stat Wire
S5 = Mixed Return Sensor	P2 = Mixed 2 System Pump	T = Thermostat or Heat Demand	= Misc.
S6 = DHW Sensor	P3 = Boiler Pump		
S7 = Slab Sensor	P4 = Variable Speed Injection Pump 1		

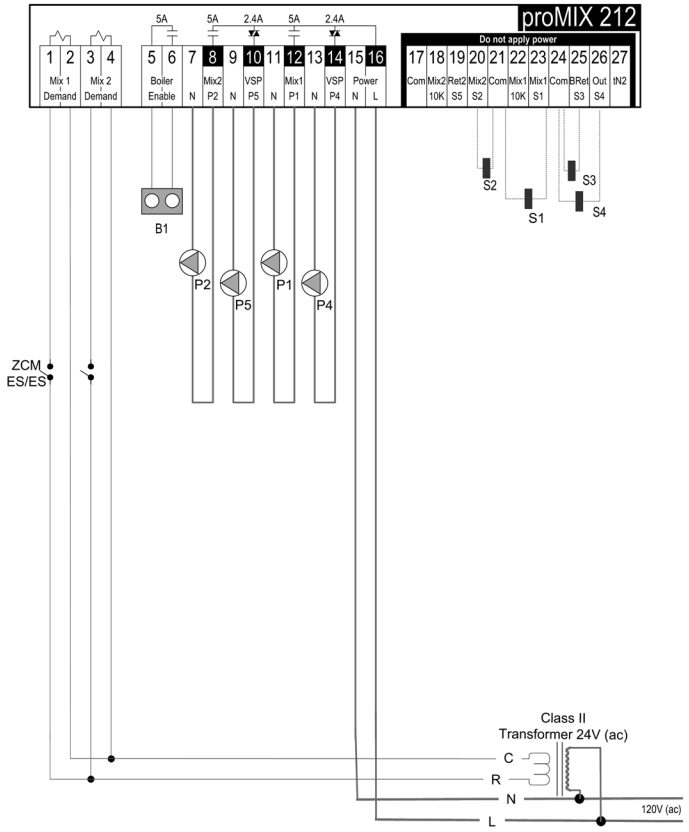
NOTE: This drawing is conceptual only, not an engineered drawing. It is up to the system designer to determine the necessary components for and configuration of the particular system designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate. Certain components may have been left out on this drawing for the purpose of clarity. Mechanical considerations such as tee spacing, flow control, pipe sizing and pump selection, is the responsibility of the installing contractor. Local codes and trade practices must be followed.

Symbols					
= Pump	= Air Separator & Expansion Tank w/ fill	= Zone Valve	= Ball Valve	= Flow Check	
= Floating Action Mixing Valve	= Tempering Valve	= Heat Exchanger	= Pressure By-Pass Valve	= Globe Valve	= Drain Valve

Project:

Uponor Wirsbo **Phone: 1-800-321-4739**
5925 148th Street W. Fax: 1-952-891-1409
Apple Valley, MN 55124 **www.wirsbo.com**

Drawn by:	Checked by:
Rep:	DATE:



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P3 = Boiler Pump
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P5 = Variable Speed Injection Pump 2
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P7 = Hi-Temp Pump
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T = Thermostat or Heat Demand

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= Sensor Wire
= 24 V (AC)
= T-stat Wire
= Misc.

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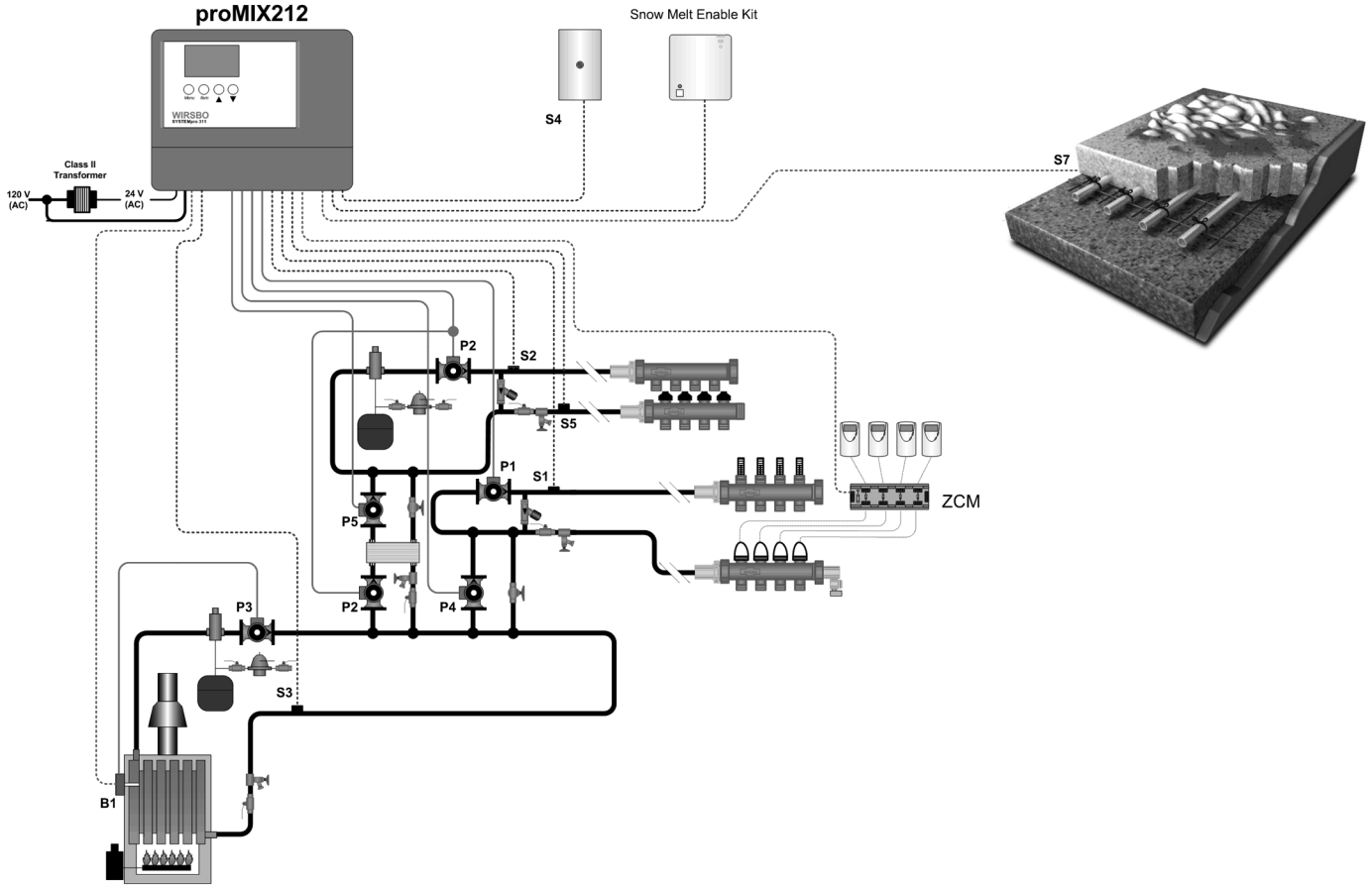
Rep:	**DATE:**

Application Drawing W212-2s	Bringing comfort to life	WIRSBO® Life, Safety, Comfort Systems	Uponor	Mechanical Page 1 of 2



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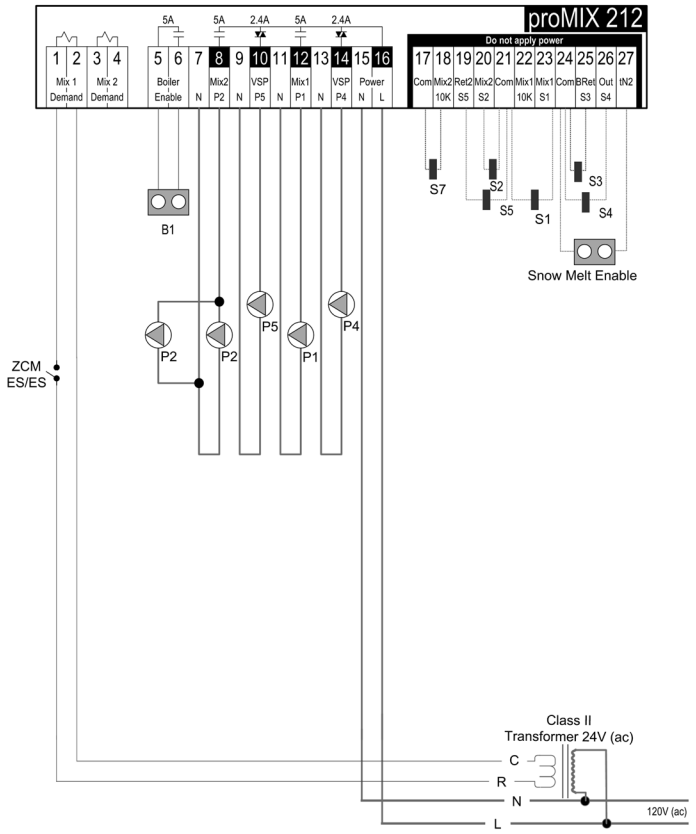

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Drawn by:	**Checked by:**
Rep:	**DATE:**

Error Messages

a

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. **(See fig. a.)**

b

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. **(See fig. b.)**

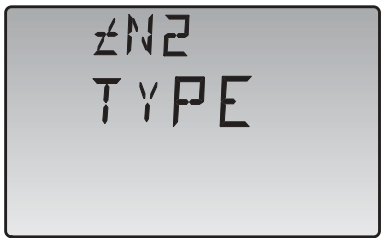
c

The control was unable to read a piece of information stored in the Miscellaneous menu. Because of this, the control was required to load factory settings into all the items in the Miscellaneous menu. The control will continue to display the error message until all the items available in the Misc menu of the control have been checked by the user or installer. **(See fig. c.)**

d

The control was unable to read a piece of information from the A/D system. This is the system that the control used to read the sensor inputs. If this error occurs, it is an indication that the sensor wires have been run in a noisy electrical environment. To clear this error, press either the Menu or Item button. **(See fig. d.)**

e

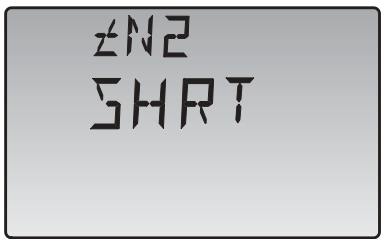


The control will stop operation until the A/D fault is corrected. An incorrect device has been connected to the (tN2) input terminal. To correct this error, ensure that the correct device is being used. Once the problem has been corrected, press either the Menu or Item button to clear the error message from the control. **(See fig. e.)**

Error Messages (cont.)

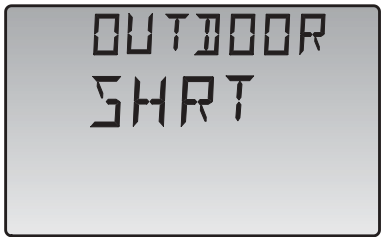
A short circuit has been read between the (tN2) input terminal and a Com terminal on the control. Either the wires leading to the (tN2) device are shorted or the polarity of the wires is reversed. Determine the cause and remove the short. The error message can be cleared by pressing either the Menu or Item button. **(See fig. f.)**

f



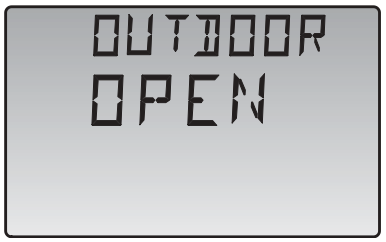
The control is no longer able to read the outdoor sensor due to a short circuit. In this case the control assumes an outdoor temperature of 32°F and continues operation. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. g.)**

g



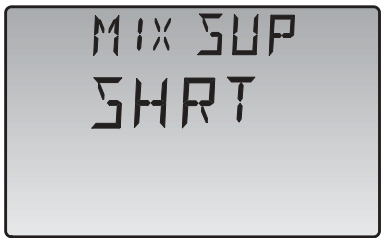
The control is no longer able to read the outdoor sensor due to an open circuit. In this case the control assumes an outdoor temperature of 32°F and continues operation. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. h.)**

h



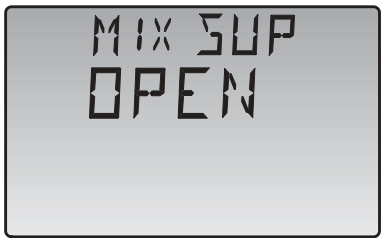
The control is no longer able to read the mix supply sensor due to a short circuit. In this case, the control operates the mixing device at a fixed output as long as there is a mixing demand. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. i.)**

i



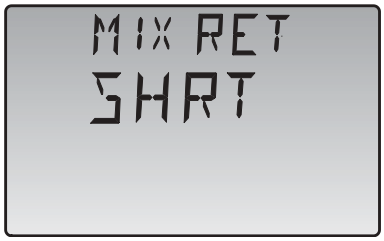
The control is no longer able to read the mix supply sensor due to an open circuit. In this case, the control operates the mixing device at a fixed output as long as there is a mixing demand. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. j.)**

j



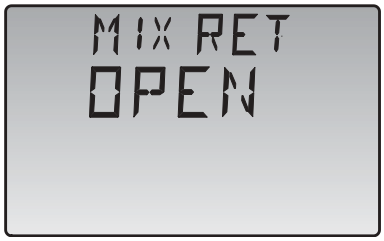
Error Messages (cont.)

k



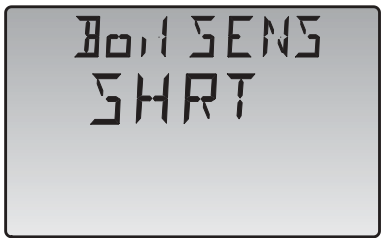
The control is no longer able to read the mix return sensor due to a short circuit. The control continues to operate without ΔT protection of the slab. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button **(See fig. k.)**

l



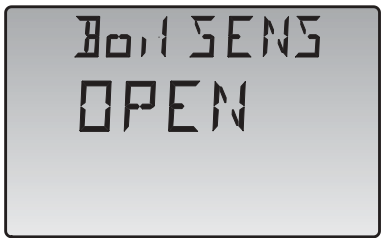
The control is no longer able to read the mix return sensor due to an open circuit. The control continues to operate without ΔT protection of the slab. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. If the mix return sensor was deliberately not installed, set the ΔT MAX item to OFF. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. l.)**

m



The control is no longer able to read the boiler sensor due to a short circuit. If the Boil MIN item is set higher than 100°F (38°C), the control closes the Boiler contact when there is a call for heat in the system. The boiler temperature is limited by the operating aquastat. If the Boil MIN is set lower than 100°F (38°C), the control does not operate the Boiler contact. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. m.)**

n



The control is no longer able to read the boiler sensor due to an open circuit. If the Boil MIN item is set higher than 100°F (38°C), the control closes the Boiler contact when there is a call for heat in the system. The boiler temperature is limited by the operating aquastat. If the Boil MIN is set lower than 100°F (38°C), the control does not operate the Boiler contact. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. If the boiler sensor was deliberately not installed, set the Boil SENS item to NONE. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button. **(See fig. n.)**

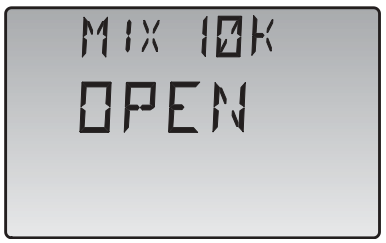
o

The control is no longer able to read the Mix 10K input because of a short circuit. The control continues to operate as if nothing is connected to the Mix 10K input. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the problem has been corrected, press either the Menu or Item button. **(See fig. o.)**

Error Messages (cont.)

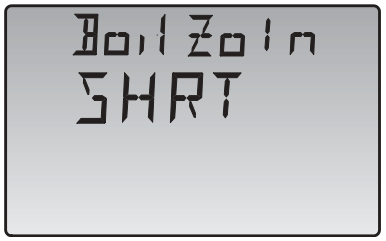
The control is no longer able to read the Mix 10K input because of an open circuit. The control continues to operate as if nothing is connected to the Mix 10K input. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. If a 10K device was deliberately not installed, set the MIX 10K item to NONE. To clear the error message from the control after the problem has been corrected, press either the Menu or Item button. **(See fig. p.)**

p



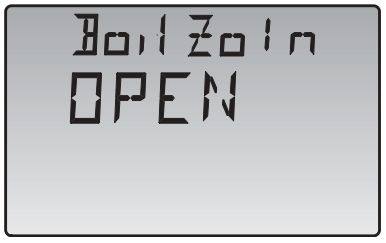
The control is no longer able to read the boiler zone control input because of a short circuit. The control continues to operate as if nothing is connected to the Boil ZoIn input. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the problem has been corrected, press either the Menu or Item button. **(See fig. q.)**

q



The control is no longer able to read the boiler zone control input because of an open circuit. The control continues to operate as if nothing is connected to the Boil ZoIn input. Locate and repair the problem as described in **Installation - Step 5 (page 18)**. To clear the error message from the control after the problem has been corrected, press either the Menu or Item button. If the boiler zone control was deliberately removed from the control, remove power from the control and repower the control to clear the error message. **(See fig. r.)**

r



proMIX 212 Program Setup

MISC. MENU

UNIT (°F or °C)		_____°F	_____°C
BACKLITE	_____OFF	_____90 sec	_____ON

MODES 1 MIXING RESET/SETPOINT

MODES 1	_____RST	_____OFF	_____SETP
WWSD 1 (Warm Weather Shut Down temperature or OFF)		_____OFF	_____°F
SETPNT 1 (setpoint temp if SETP is selected in MODES 1)			_____°F
MIX 10K 1 (select 10K sensor)	_____NONE	_____ZOIN	_____INDR
MIX RM 1 (room temperature for Mixing zones)			_____°F
MIX IND 1 (set to the room temperature from heat loss)			_____°F
MIX DSN 1 (design supply water temperature from heat loss/design)			_____°F
MIX MAX 1 (highest supply water temperature allowed)			_____°F
OUT DSGN (outdoor design temperature from heat loss)			_____°F

MODES 2 MIXING RESET/SETPOINT

MODES 2	_____RST	_____SNOW	_____OFF	_____SETP
WWSD 2 (Warm Weather Shut Down temperature or OFF)			_____OFF	_____°F
SETPNT 2 (setpoint temperature if SETP is selected in MODES 2)				_____°F
MIX 10K 2 (select 10K sensor)	_____NONE	_____ZOIN	_____INDR	_____SLAB
MIX RM 2 (room temperature for Mixing zones)				_____°F
MIX IND 2 (set to the room temperature from heat loss)				_____°F
MIX DSN 2 (design supply water temperature from heat loss/design)				_____°F
MIX MAX 2 (highest supply water temperature allowed)				_____°F

proMIX 212 Program Setup (cont.)

MODES 2 SNOW AND ICE MELTING

MELTING (slab surface temperature during melting mode)			_____°F
IDLING (slab surface temperature during idling mode)			_____°F
∆**T MAX** (max differential between supply and return or OFF)		_____OFF	_____°F
CWCO (Cold Weather Cut Off temperature or OFF)		_____OFF	_____°F
RUN TIME (melting mode time, INF or OFF)	_____OFF	_____hr/min	_____INF

BOILER OPERATION

Boil RET (minimum return water temperature to boiler)	_____°F

NOTES

NOTES

NOTES

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