uponor

UPONOR RADIANT HEATING
AND COOLING SYSTEMS

**CLIMATE CŎNTROL™
MULTIFUNCTION
HYDRONIC CONTROL**

**INSTALLATION AND
OPERATION MANUAL**

Climate Cŏntrol™ Multifunction Hydronic Control Installation and Operation Manual

uponor

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Glossary of Terms

Actual Supply Return Average: This is the current real-time average of the supply and return temperature sensors for the water channel.

Average = $\dfrac{\text{Supply Temp. + Return Temp.}}{2}$

Design Day: This refers to the coldest day of the heating season.

Design Delta T: This is the expected Delta-T (change in temperature) of the water being supplied to and returning from the service area of a water channel on Design Day.

Design Indoor Temperature: This is the indoor target temperature to be met on Design Day.

Design Mix Supply Temperature: This is the required temperature of the water supplied to the service area of a water channel on Design Day needed to meet the heating load for that area.

Design Outdoor Temperature: This is the outdoor temperature on the Design Day (coldest daytime temperature).

Idle Enable: This enables the idle function of the system.

Idle Slab Target: This is the minimum temperature that the system will maintain the snow melt slab if idle is enabled.

Max Delta T: This is the maximum change in temperature between the supply and return water temperatures that the system will allow.

Max Supply Water Temperature: This is the maximum supply water temperature that the system will allow to enter the snow melt slab.

Maximum Supply Water Temperature: This is the protection limit for the output (supply) water temperature of the water channel. The water temperature from this channel will never exceed this value.

Melting Slab Target: When the snow melt zone recieves a melting call, either automatic or semi-automatic, it will heat to and stay at this temperature until the snow is melted (automatic call) or until the semi-auto runtime expires.

Mix Channel: This is a numeric reference for individual mixing devices.

Minimum Supply Water Temperature: This is the minimum water temperature that this channel will produce (other than at cold start).

Port: This is a term for the RJ45 or Cat5 connectors on the right-hand side of the control.

Primary Loop: A segment or portion of the mechanical piping in the mechanical system connected to the boiler(s). This is often considered the "high temperature" side of the system.

Secondary Loop: A segment or portion of the mechanical piping of the mechanical system connected to the primary loop. These loops have lower temperature requirements than the primary loop. A mixing device (modulating valve or injection pump) is required.

Secondary Pump: This refers to a single pump that is used after a mixing device. It circulates water to RFH manifolds or snow melt.

Semi-automatic Runtime: This is the length of time the snow melt system will run if a "semi-auto call" has been initiated.

Target Supply Return Average: The Climate Cŏntrol Multifunction controls to the average of the supply and return temperature sensors for a water channel. This is the targeted average temperature.

User Interface: This is used to configure and interface with the Multifunction. Connects via an RJ-9, 4-conductor cable.

WWODT: (Warm Weather Outdoor Temperature) This is the outdoor temperature at the Warm Weather point of the temperature graph of the water channel.

Warm Weather Mix Temperature: This is the temperature of the water channel required to meet the heat demand at the Warm Weather Outdoor Temperature.

WWWT: (Warm Weather Water Temperature) This is the water temperature needed at the Warm Weather Outdoor Temperature.

Section 1

Introduction

Control Overview

The Uponor Climate Cŏntrol Multifunction Hydronic Control (A8020000) is the first field configurable control in the industry that supports all mechanical system functionality required in the hydronic heating systems of today. (For convenience, we will refer to the Climate Cŏntrol Multifunction Hydronic Control system as "Multifunction" throughout this manual.)

Designed to simplify installations, the installer determines the functionality that the Multifunction provides verses manually selecting a control (or controls) to perform these same functions.

The Multifunction offers the following standard functionality and operation:

- Boiler Operation
- Boiler Staging and Rotation
- Boiler Modulation Control
- Primary Pump
- Domestic Hot Water
- Snow Melting
- Zone Pumping

The architecture of the Multifunction system supports up to eight (8) outputs or devices (e.g., pumps, modulating valves, boilers, etc.). Unused ports can support additional zone pumps rather than adding other control boxes.

Sequence of Operation

Boiler Functionality

Boiler functionality includes operation, protection, staging and rotation.

Boiler Operation — Multifunction uses both a supply and return sensor for sensing temperatures (temperature rise) across the boiler or differential across the primary loop. Multifunction uses this information to make "smart" decisions about how to fire the boiler(s). The differential information provides a clearer snapshot of the system load conditions and allows the control to make better decisions over a single sensor. While this methodology does not follow "conventional" boiler reset strategies, it will manage the boiler to fire at the lowest water temperature possible, based on outdoor, supply and return temperature while assessing system requirements. This provides an advantage for system start up, changes within the space, climatic changes, etc.

Boiler Protection — Multifunction can provide temperature protection of cast iron boilers and other heating plants from cold-return water temperatures.

Boiler Staging — Multifunction provides the ability to stage up to four ON/OFF boilers.

Boiler Rotation — Multifunction has built-in functionality to rotate up to four ON/OFF boilers, as well as monitor and keep the run times for each boiler equal.

Primary Pump Functionality

Primary Pump Operation — Multifunction will provide ON/OFF control of a single primary pump up to 3A maximum.

Domestic Hot Water (DHW) Functionality

DHW Operation — Multifunction provides control of one (1) DHW tank through a tank sensor (10K) or dry-switched demand (aquastat or tank control). Multifunction also provides ON/OFF control of the DHW pump up to 3A maximum.

DHW Priority — Multifunction provides the following DHW priority options:

- **Mixing** — If the system design incorporates a modulating valve or injection pump, Multifunction will not turn off mixing functionality while the DHW tank is heating. Mixing will continue as long as the boiler or primary target temperature (internally calculated) is maintained. If the primary loop temperature falls below the target, Multifunction will ramp down the mixing to aid in the recovery of the DHW tank. If the DHW tank does not reach its set temperature in 60 minutes, the control will continue to try to heat the tank, but will allow normal mixing. The port for the DHW will begin to flash.

- **Condensing** — Modulating condensing boilers (ModCons) have the ability to control both space heating (lower temperature, reset) and DHW demand (higher temperature >160˚F). Multifunction provides the ability to turn off the primary pump to prevent higher temperature water from reaching the radiant floor as the boiler is providing the mixing.

DHW Post Purge — Multifunction uses any latent heat within a boiler to heat the DHW tank rather than lose that heat to the surrounding mechanical room.

Mixing Functionality

Mixing Operation — Multifunction provides control of up to three (3) mixed water temperature channels for space heating or snow melting, using modulating valves or injection pumps or a combination of both. The mixing function utilizes both a supply and return sensor for sensing temperatures (temperature rise) across the secondary loop. The differential information provides a clearer snapshot of the secondary load conditions and allows Multifunction to provide appropriate responses over a single supply sensor and quality management of the mixing along with boiler operation.

Mixing Options — Multifunction provides the following mixing options from a single control:

- **Modulating Valve** — Multifunction provides mixing to 3-way modulating valves through a 0-10VDC single motor. Uponor stocks preassembled valves (¾" through 1½") but is compatible with other valve and 0-10VDC motors.
- **Injection Pumping, PWM** — Multifunction provides injection mixing to any pump less than 3A maximum.
- **Injection Pumping, Proportional** — Multifunction provides injection mixing to any pump that will accept a 0-10VDC control signal (e.g., Grundfos VS, VFD, etc.).

Snow Melt Functionality

Snow Melt Operation — Multifunction provides up to two (2) zones of snow melting. Each snow melt zone or area has different settings to customize its operation. For any of the following modes or functions, the outdoor temperature must be within the minimum and maximum settings. Multifunction allows the following modes of operation:

- **Idle** — Multifunction provides an idle mode to maintain a minimum slab temperature. Maintaining an idle temperature allows the slab to reach its "melting" temperature faster when performance is critical.
- **Semi-automatic** — This mode allows the user to start the snow melt zone manually when snow is present on the surface of the driveway, sidewalk, etc. Once the snow melt function begins, the slab or area will heat until reaching the slab setpoint. When the snow melt function starts, a timer will begin to count down the timeout setting (user adjustable in hours).
- **Automatic** — This mode provides automatic operation through the snow melt sensor, which detects the presence of snow or ice. If snow is present, the snow melt function will start and heat until the sensor is clear from ice or snow. Once the melting function begins, the snow melting will run for a minimum of one hour.
- **Snow Melt Interrupt** — If at any time during a melting cycle the outdoor temperature falls outside the range of minimum and maximum settings, the snow melt function will stop. In semi-automatic mode, the snow melt operation will not automatically resume and you must manually restart. In automatic mode, snow melt will restart when the outdoor temperature comes back into range. However, the fixed minimum duration (one hour) will restart.

Zone Pumping Functionality

Zone Pumping Operation — Multifunction allows unused ports to be assigned for use with zone pumps for ON/OFF control, up to 3A maximum per pump.

Section 2
Navigating the Control

There are two main sections on the Multifunction:

- The display unit
- The wiring connections

Display Unit — The display unit features a five-button interface for easy navigation through the menu system to configure the control.

Wiring Connections — The wiring connections are as follows:

- **Power Supply** — This connection provides the power source for the Multifunction display unit. It allows Multifunction to control the outputs and power the input demand terminals. Use a 24VAC, 50VA transformer to power the control.

- **Demand Inputs** — There are eight (8) demand inputs. These connections are two-button terminals that do not require a screwdriver for connecting. Wire connections (typically 18/2 AWG) are stripped back ⅜" and the bare wire is pressed into the access. To remove, press the button directly behind the wire and pull the wire out of the connection. These connections provide 24VAC power to thermostat, dry relay contacts or zone control modules.

Important: Do not apply 24V power to these terminals.
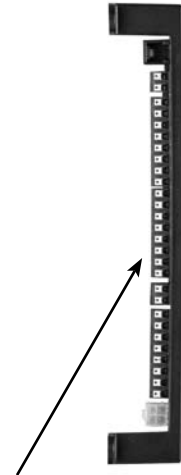
Wiring Connections (left side of the main controller)

Backplate for Display Unit

Display Unit

Front Cover Display Unit

Cover for Inputs

Backplate for Main Control

Main Controller

Cover for Outputs (RJ45)
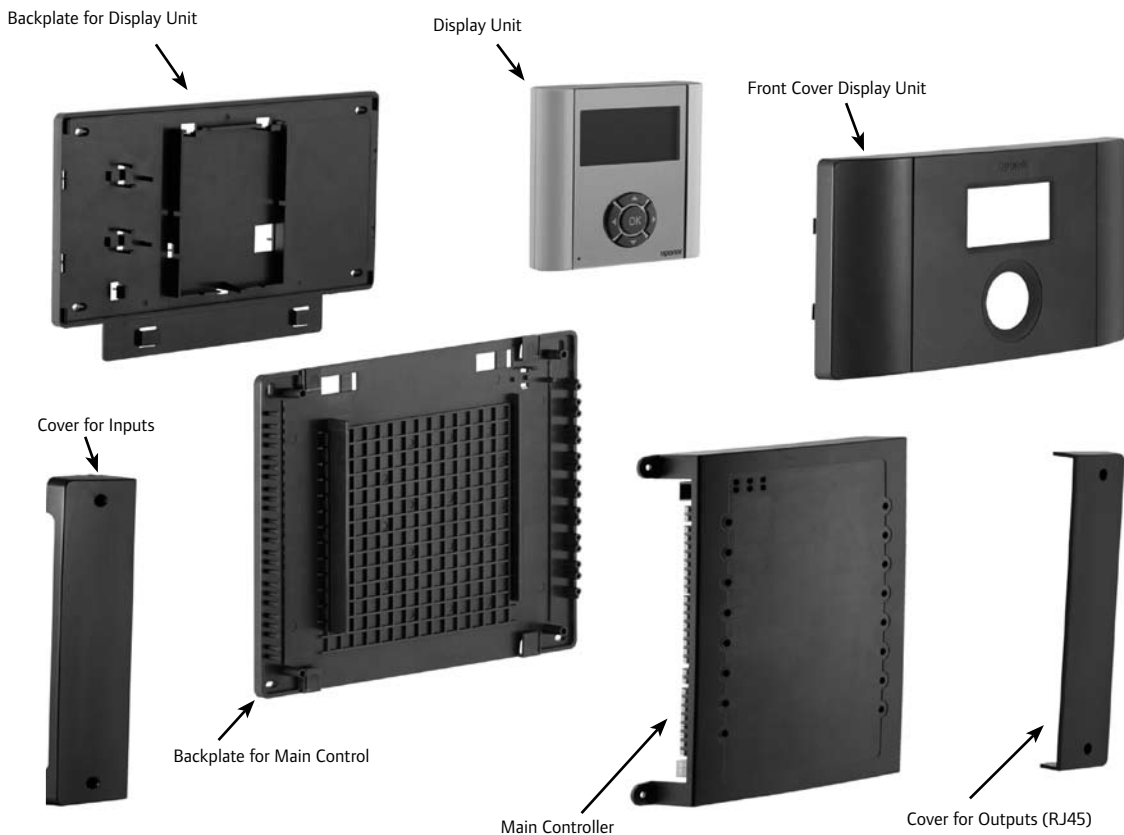
Figure 2-1: Multifunction Parts
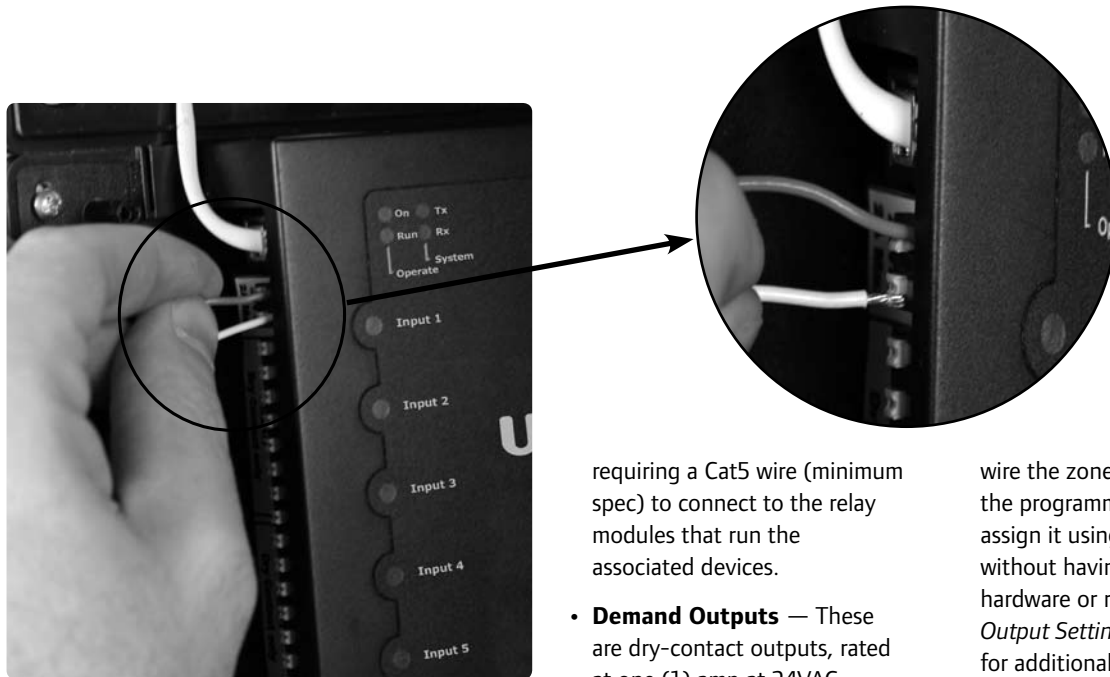
Figure 2-2: Removing Wire from Terminal Block

• **Device Outputs** — These connections on the right side of the control provide control of boilers, pumps, modulating valves, snow melt devices, etc. These connections all have the RJ45 female connection requiring a Cat5 wire (minimum spec) to connect to the relay modules that run the associated devices.

• **Demand Outputs** — These are dry-contact outputs, rated at one (1) amp at 24VAC. These contacts are located on the lower left side of the Multifunction. These contacts can be "linked" to operation of a single demand output. For example, when a pump connected to Port 5 turns on, the system requires a zone valve to open also. The installer can wire the zone valve to one of the programmable outputs and assign it using the software without having to add additional hardware or relays. See *Demand Output Settings* in **Section 9** for additional information on demand outputs.
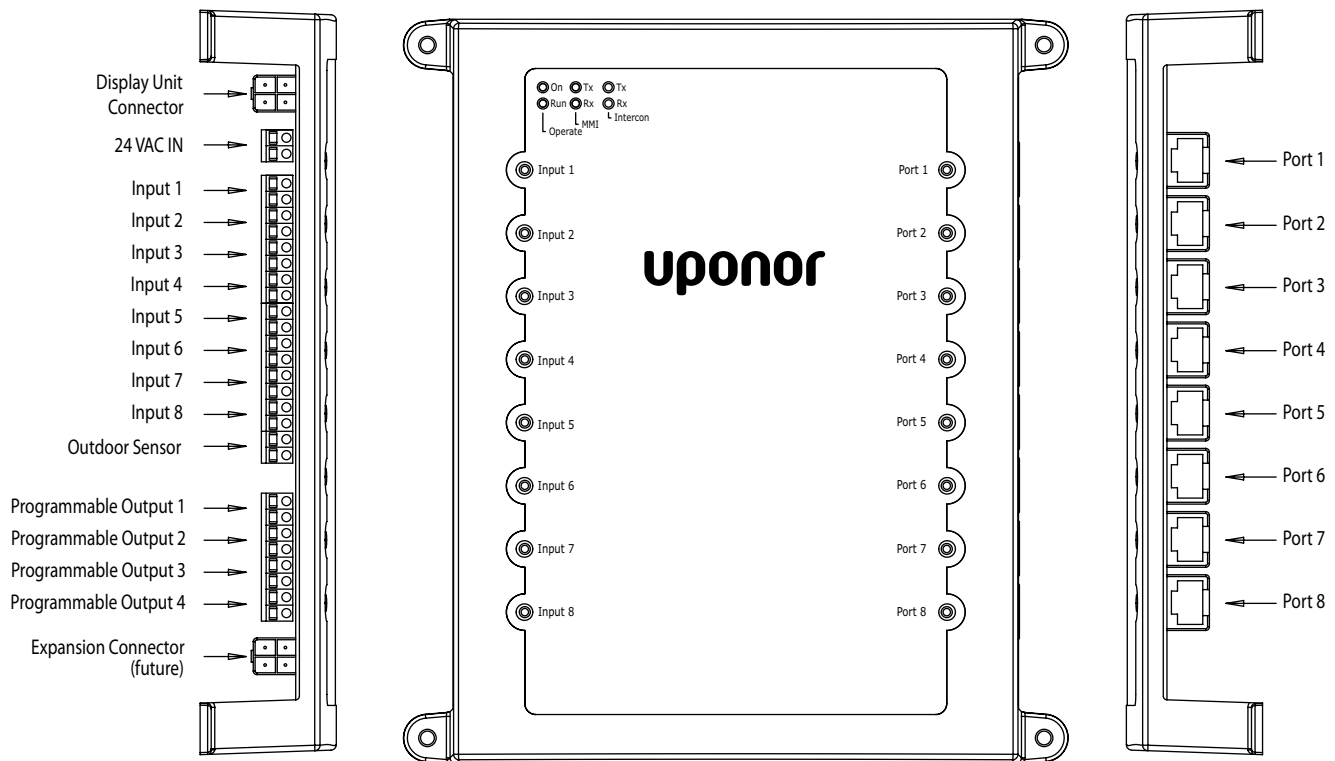
Figure 2-3: Cat5 Wire and Connector

Section 3
Installation

Multifunction Package Components

The contents of this package include:

One Multifunction (A8020000)

One Outdoor Sensor (A9012005)

One Product Manual
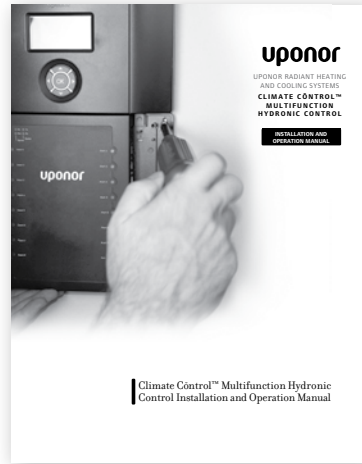
Note: If any of the contents listed are missing or damaged, please contact your distributor or Uponor sales representative for assistance.

Optional Control Components (sold separately)

Boiler Relay, ON/OFF
(A9012010)

Pump Relay (A9013030)

Pump Relay, Modulating, 0–10VDC (A9013040)

Dual Supply and Return Sensor
(A9013001)

Domestic Hot Water (DHW) Sensor (A9012002)

Snow Melt Control (A9013051)

Automatic Snow Melt Sensor
(A9013052)

A9013052

3-way Modulating Valve:

· ¾" Three-way Modulating Valve with Control (Cv = 4.7) (A9013021)

· 1" Three-way Modulating Valve with Control (Cv = 10.0) (A9013022)

· 1¼" Three-way Modulating Valve with Control (Cv = 19.0) (A9013023)

· 1½" Three-way Modulating Valve with Control (Cv = 29.0) (A9013024)

A9013021

Modulating Valve Control, 0–10VDC (A9063020)

A9063020

Figure 3-2: Mark for Anchors

Figure 3-3: Remove Cover

Tools Required

Following is a list of tools and hardware required to complete this installation:

· Screws and/or anchor hardware for mounting (4 minimum)

· Flathead or Phillips screwdriver (to anchor hardware)

· Wire cutter/wire strippers

· Level

· Cat5 wire for connecting devices

· RJ45 connectors for Cat5 wire (if not using Uponor premade cables)

· Cat5 cable tester

Mounting the Control Panel

1. Locate a smooth, flat, uniform surface.

2. Select the proper screws and/or anchors for the surface. Four screws or anchors will secure the unit.

3. Remove the side wings of the main control by loosening the four screws on the control unit. This will expose holes necessary to mount to the selected surface.

4. Fasten the first screw semi-tightly, allowing rotation of the control. (See **Figure 3-1**.)

Figure 3-4: Secure the Panel

5. Level the control prior to fastening additional screws. Mark the location with a pencil or pen if using anchors. (See **Figure 3-2**.)

6. Install the remaining screws to finish mounting the control.

Additional Control Panel Mounting (Optional)

7. Remove the display cover by applying downward pressure and pulling the bottom of the display away from the backing. (Place a thumb on the bottom of the display and fingers on top of the display.) (See **Figure 3-3**.)

8. Use the access holes in the back of the panel to secure to the wall or surface. (See **Figure 3-4**.)

9. Replace the front enclosure.

Figure 3-1: Installing Initial Screw

Connecting the Devices

The layout of the control and the wiring connections make installation quick and simple. On the right side of the control, use the Cat5 cable and RJ45 connectors to make all connections to boilers, pumps, modulating valves and snow melting. A tested cable plugs into the female connector on the right side of the board for ports labeled 1 through 8, and clicks into place for a secure connection. You can easily move this connection to another port by pressing down on the top of the tab on the clear connector (RJ45) and disconnecting from the control.

Important: Test all Cat5 cables, whether they are site-built or manufactured cables, to ensure they work properly.

Use the following drawing (**Figure 3-5**) as reference for connecting the devices contained in this section.

This drawing shows a single boiler with domestic hot water, a mixed water temperature for radiant floor heat along with a single snow melt zone. **Note:** This drawing is for reference only.

Boiler Connection

1. Mount the Boiler Relay (A9012010) directly to the boiler jacket, using a ½" electrical knockout or install on a 4" x 4" electrical box and cover plate with a ½" opening.
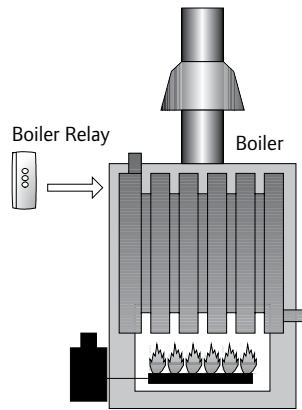
Figure 3-6: Mount Boiler Relay

2. Run a Cat5 cable from the Multifunction to the Boiler Relay.

3. Using the cable tester, test the cables to ensure you have terminated the connectors properly (whether purchased as a complete cable or built on site).

4. Insert one end of the cable into the RJ45 connector on the Boiler Relay. Push in until you hear a click.
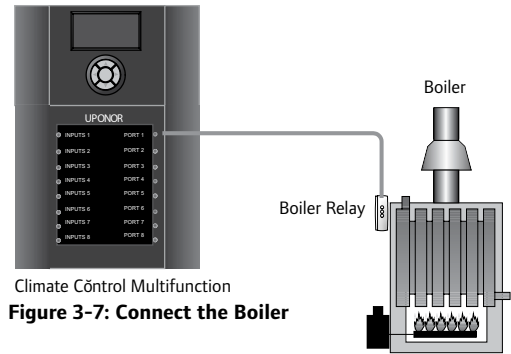
Climate Cöntrol Multifunction
Figure 3-7: Connect the Boiler

5. Connect the other end into Port 1 on the Multifunction. Push in until you hear a click.
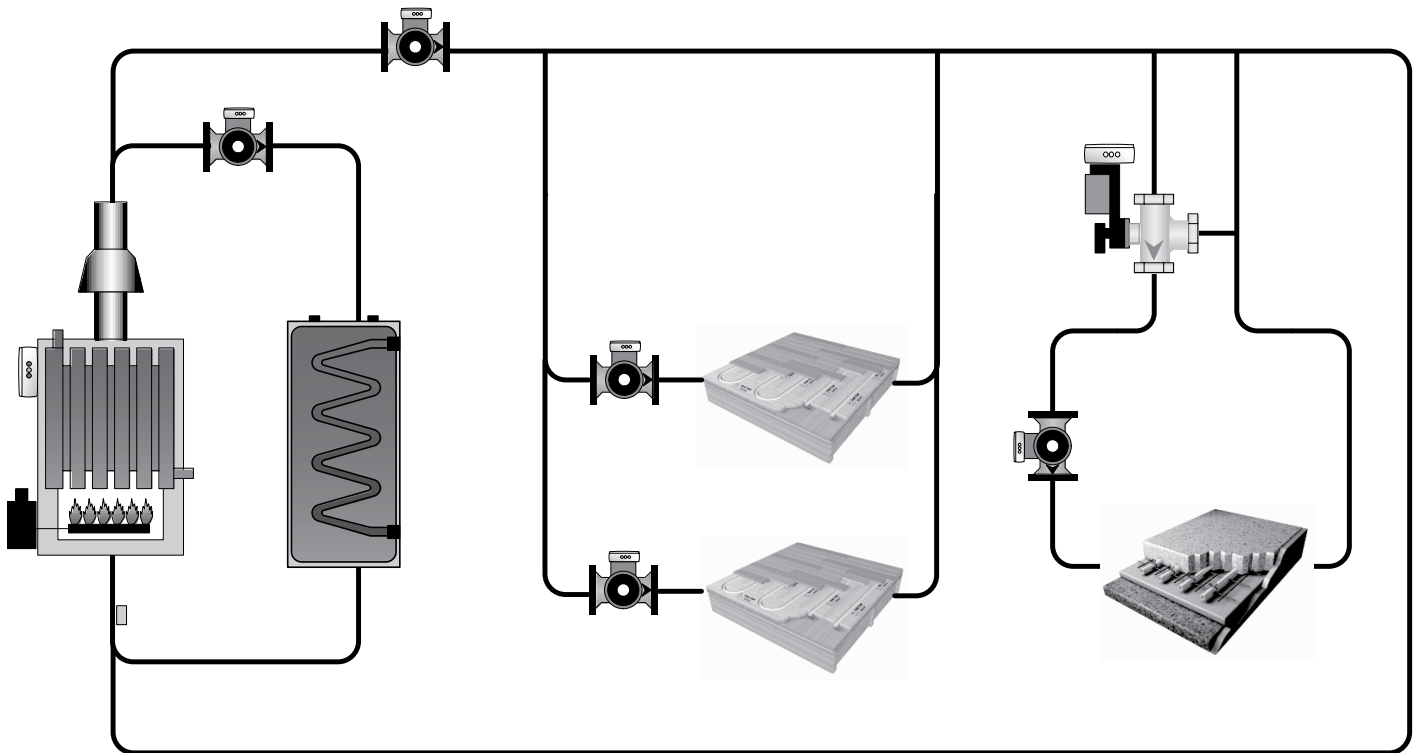
Figure 3-5: Typical Heating System

Note: Ports 1 and 2 are reserved for boiler connections. Always connect Port 1 first, then Port 2 if using more than two boilers.

6. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3									
Port 4									
Port 5									
Port 6									
Port 7									
Port 8									

Figure 3-9: Record Boiler Connection Port
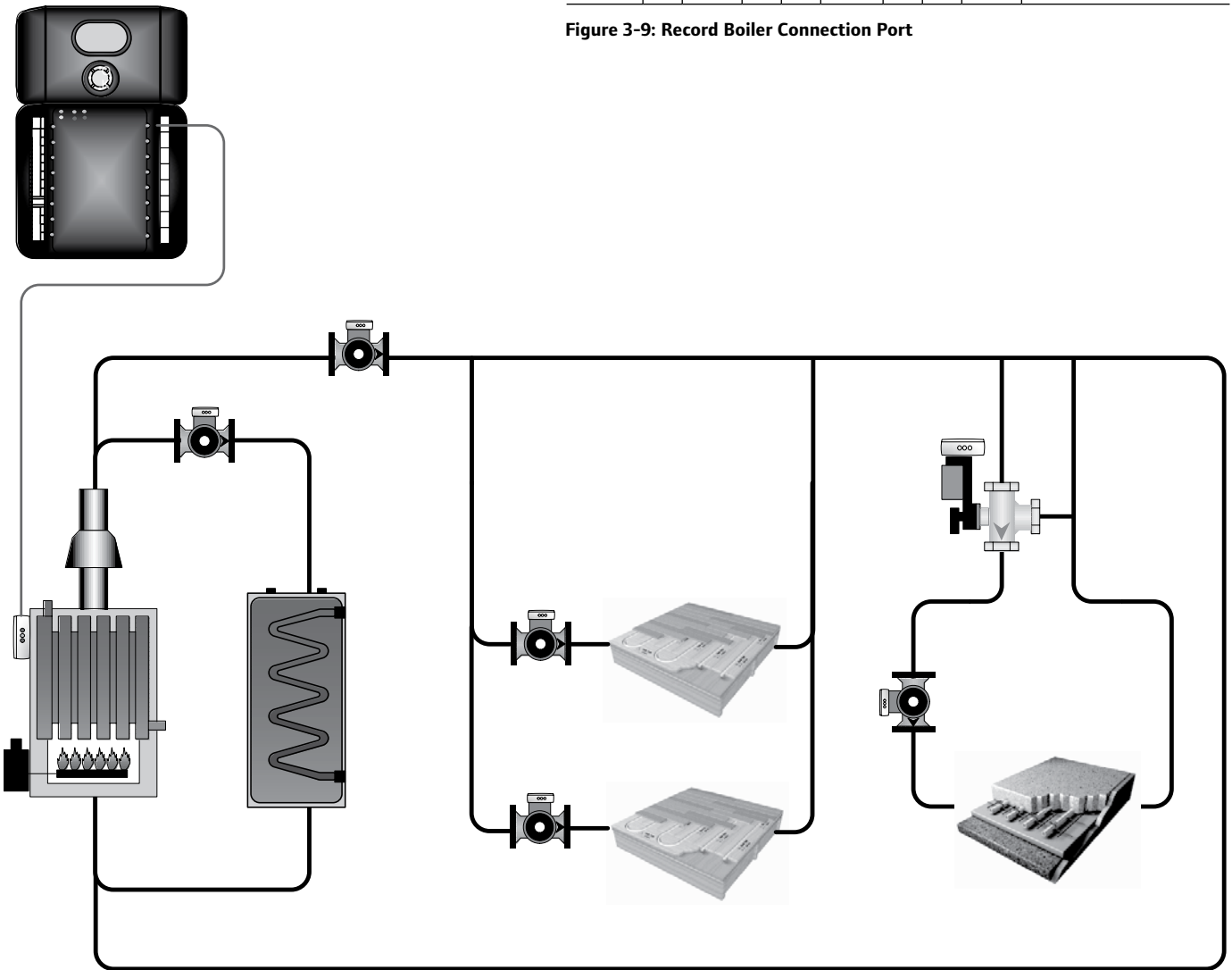
Figure 3-8: Completed Boiler Connection

Connecting the Primary Pump

1. Mount a Pump Relay (A9013030) directly to the pump if possible. Manufacturers, such as Grundfos, leave spare electrical connections to make mounting pump relays easy.

Figure 3-10: Install Pump Relay

Important: Maximum amp rating for the A9013030 is 3A and should never be wired or connected to pumps that exceed this rating.

2. If that option is not available, use a 2" x 4" or 4" x 4" electrical box with a blank plate to cover the wiring connections.

3. Run a Cat5 cable from the Multifunction to the Pump Relay for the Primary Pump.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly (whether purchased as a complete cable or built on site).

5. Insert one end of the cable into the RJ45 connector on the Pump Relay. Push in until you hear a click.

Figure 3-11: Connect the Primary Pump

Figure 3-12: Completed Primary Pump Connection

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3									
Port 4									
Port 5									
Port 6									
Port 7		X							
Port 8									

Figure 3-13: Record Primary Pump Connection Port

6. Connect the other end into Port 7 on the Multifunction. Push in until you hear a click.

Note: After making the boiler connections, you can use any unassigned port for the primary pump.

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.

Connecting the Domestic Hot Water (DHW) Pump

1. Mount a Pump Relay (A9013030) directly to the pump if possible. Manufacturers, such as Grundfos, leave spare electrical connections to make mounting pump relays easy.

Figure 3-14: Install Pump Relay

Important: Maximum amp rating for the A9013030 is 3A and should never be wired or connected to pumps that exceed this rating.

Figure 3-15: Completed DHW Pump Connection

2. If that option is not available, use a 2" x 4" or 4" x 4" electrical box with a blank plate to cover the wiring connections.

3. Run a Cat5 cable from the Multifunction to the Pump Relay for the DHW Pump.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly. Always test cables whether purchased as a complete cable or built on site.

5. Insert one end of the cable into the RJ45 connector on the pump relay. Push in until you hear a click.

Figure 3-17: Connect the DHW Pump

6. Connect the other end into Port 8 on the Multifunction. Push in until you hear a click.

   Note: After making the boiler connections, you can use any unassigned port for the DHW Pump.

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3									
Port 4									
Port 5									
Port 6									
Port 7		X							
Port 8			X						

Figure 3-16: Record DHW Pump Connection Port

Connecting the Zone Pump(s)

1. Mount a Pump Relay (A9013030) directly to the pump if possible. Manufacturers, such as Grundfos, leave spare electrical connections to make mounting pump relays easy.
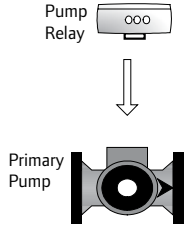
Pump Relay

Zone Pump
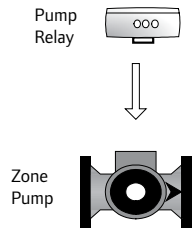
Figure 3-18: Install Pump Relay

Important: Maximum amp rating for the A9013030 is 3A and should never be wired or connected to pumps that exceed this rating.

2. If that option is not available, use a 2" x 4" or a 4" x 4" electrical box with a blank plate to cover the wiring connections.

3. Run a Cat5 cable from the Multifunction to the Pump Relay for the Zone Pump.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly (whether purchased as a complete cable or built on site).

5. Insert one end of the cable into the RJ45 connector on the pump relay. Push in until you hear a click.
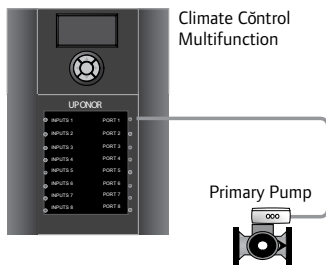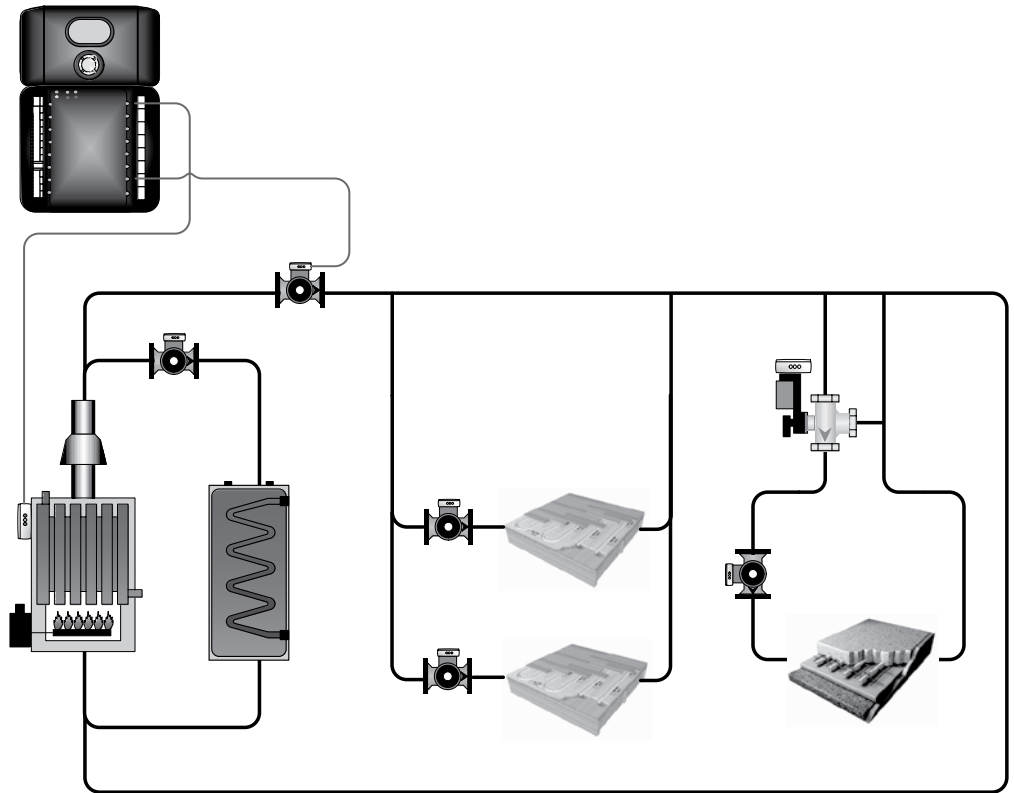
Climate Cöntrol Multifunction
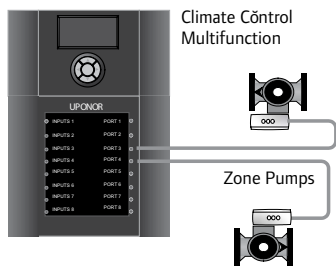
Zone Pumps

Figure 3-19: Connect the Zone Pumps

6. Taking the other end, connect the other end into Port 5 on the Multifunction. Push in until you hear a click.

Note: After making the boiler connections, you can use any unassigned port for the zone pumps.

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.
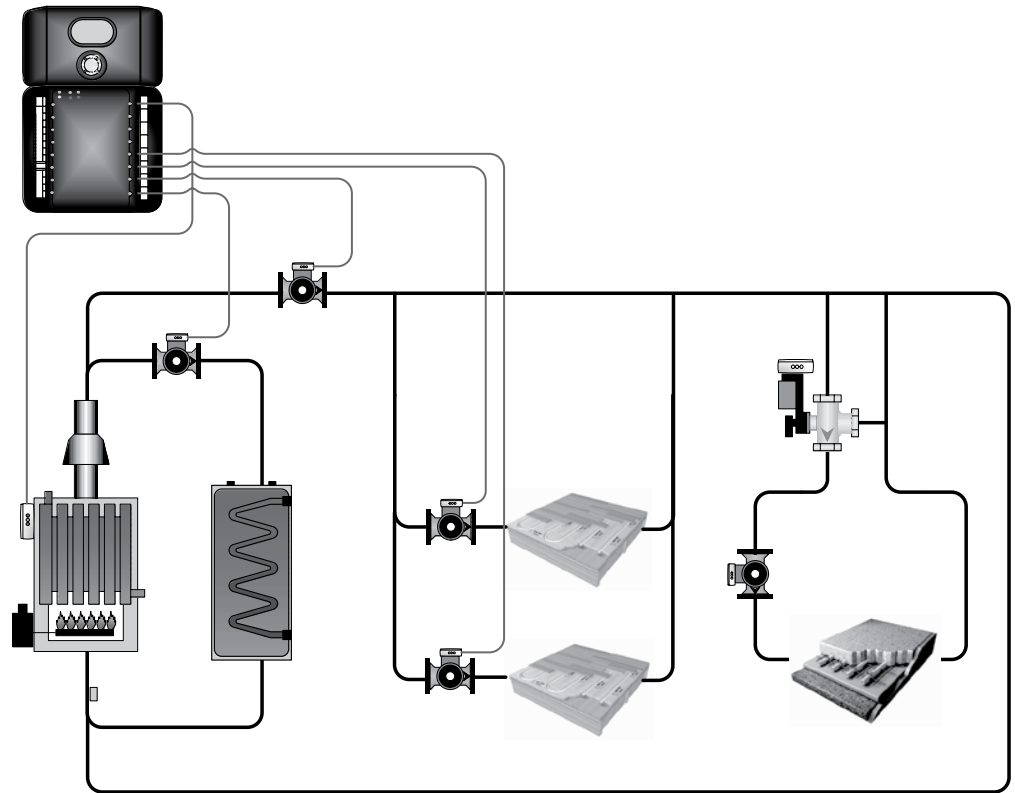
Figure 3-20: Completed Zone Pump Connections

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3									
Port 4									
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 3-21: Record Zone Pump Connection Ports and Notes

Connecting the Secondary Pump(s)

1. Mount Pump Relay (A9013030) directly to the pump if possible. Manufacturers, such as Grundfos, leave spare electrical connections to make mounting pump relays easy.
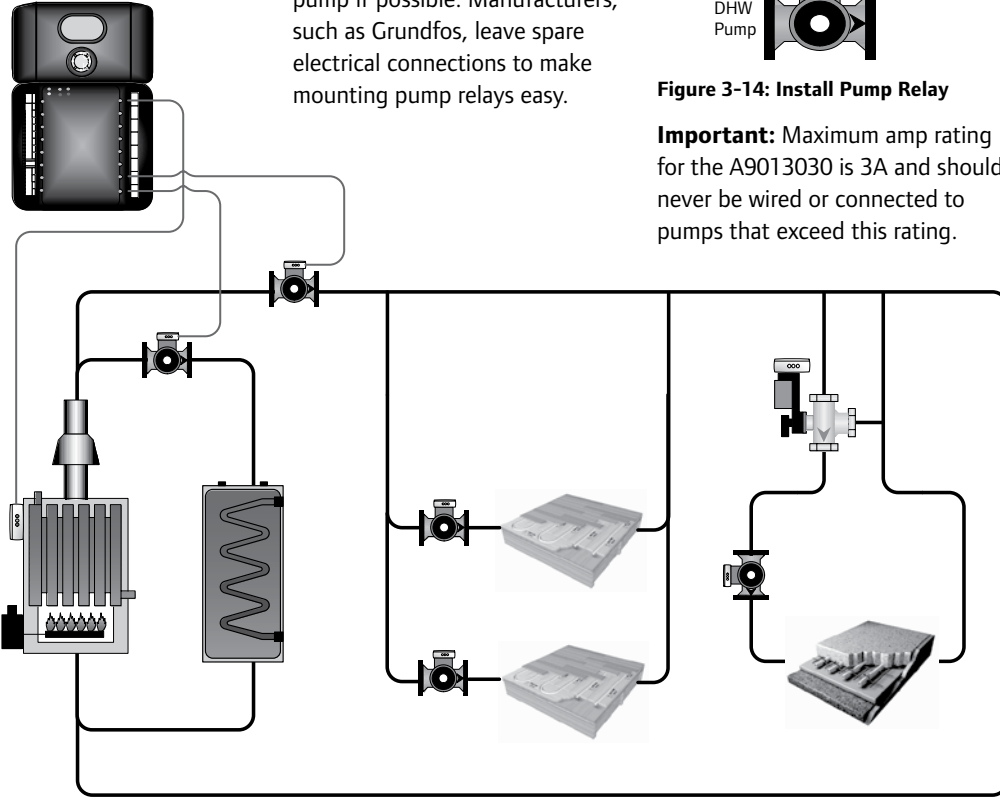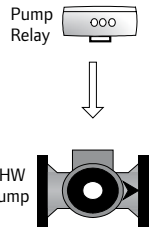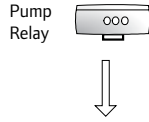

Figure 3-22: Install Pump Relay

Important: Maximum amp rating for the A9013030 is 3A and should never be wired or connected to pumps that exceed this rating.

2. If that option is not available, use a 2" x 4" or 4" x 4" electrical box with a blank plate to cover the wiring connections.

3. Run a Cat5 cable from the Multifunction to the Pump Relay for the Secondary Pump.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly. Test cables whether purchased as a complete cable or built on site.

5. Insert one end of the cable into the RJ45 connector on the Pump Relay. Push in until you hear a click.
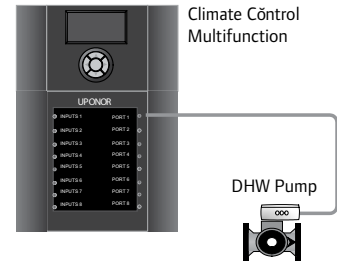

Figure 3-23: Connect the Zone Pumps

6. Taking the other end, connect the other end into Port 4 on the Multifunction. Push in until you hear a click.

   Note: After making the boiler connections, you can use any unassigned port for the Secondary Pump(s).

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.

Figure 3-24: Completed Secondary Pump Connection

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3									
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 3-25: Record Secondary Pump Connection Ports and Notes

UPONOR

Connecting the Modulating Valve

1. Uponor provides a variety of three-way valves with the Modulating Relay installed and wired for operation. Available sizes are:

   a. ¾" Three-way Modulating Valve with Control (Cv = 4.7) (A9013021)

   b. 1" Three-way Modulating Valve with Control (Cv = 10.0) (A9013022)

   c. 1¼" Three-way Modulating Valve with Control (Cv = 19.0) (A9013023)

   d. 1½" Three-way Modulating Valve with Control (Cv = 29.0) (A9013024)

Figure 3-26: Assembled Three-way Modulating Valve

2. For other third-party valves and 0-10 VDC motors, part number A9063020 is required to operate with Multifunction. Consult the valve and motor manufacturers information for wiring.

   Note: Multifunction does NOT support floating action motors.

3. Run a Cat5 cable from the Multifunction to the Modulating Relay for the three-way valve used for mixing.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly. Test cables whether purchased as a complete cable or built on site.

5. Insert one end of the cable into the RJ45 connector on the pump relay. Push in until you hear a click.

Figure 3-27: Connect the Modulating Valve

6. Connect the other end into Port 3 on the Multifunction. Push in until you hear a click.

   Note: After making the boiler connections, you can use any unassigned port for a mixing device connection.

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.
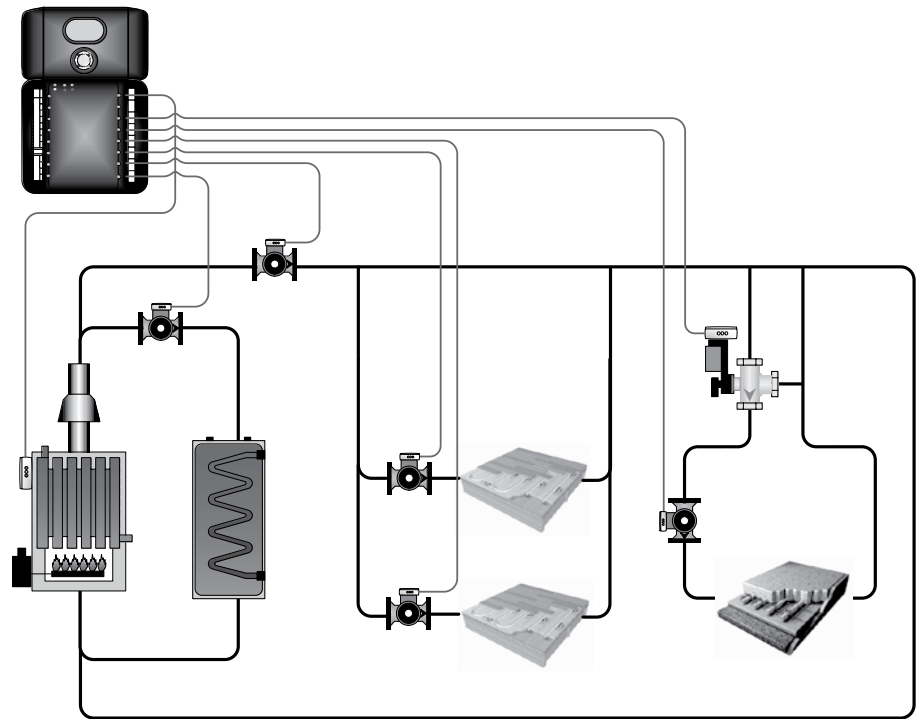
Figure 3-28: Completed Modulating Valve Connection

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2									
Port 3				X					Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 3-29: Record Modulating Valve Connection Port and Notes

Connecting the Snow Melt Control

1. Mount the Snow Melt Control (A9013051) directly to a 2" x 4" or 4" x 4" electrical box with a blank plate to cover the wiring connections.

   Tip: One Snow Melt Control will be required for each zone of snow melting. This will provide the minimum operation — semi-automatic.

Tip: For full automatic snow melting, add Automatic Snow Melt Sensor (A9013052) for each zone that requires this level of operation.

2. Run a Cat5 cable from the Multifunction to the Snow Melt Control.

3. Using the cable tester, test the cables to ensure you have terminated the connectors properly. Test cables whether purchased as a complete cable or built on site.

4. Insert one end of the cable into the RJ45 connector on the pump relay. Push in until you hear a click.
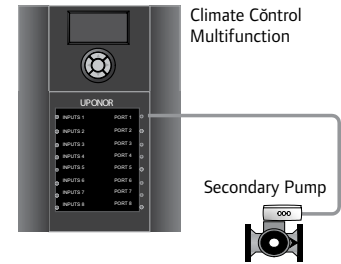

Figure 3-30: Connect the Snow Melt Control

5. Connect the other end into Port 2 on the Multifunction. Push in until you hear a click.

   Note: After making boiler connections, use any unassigned port for a snow melt connection.

6. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.
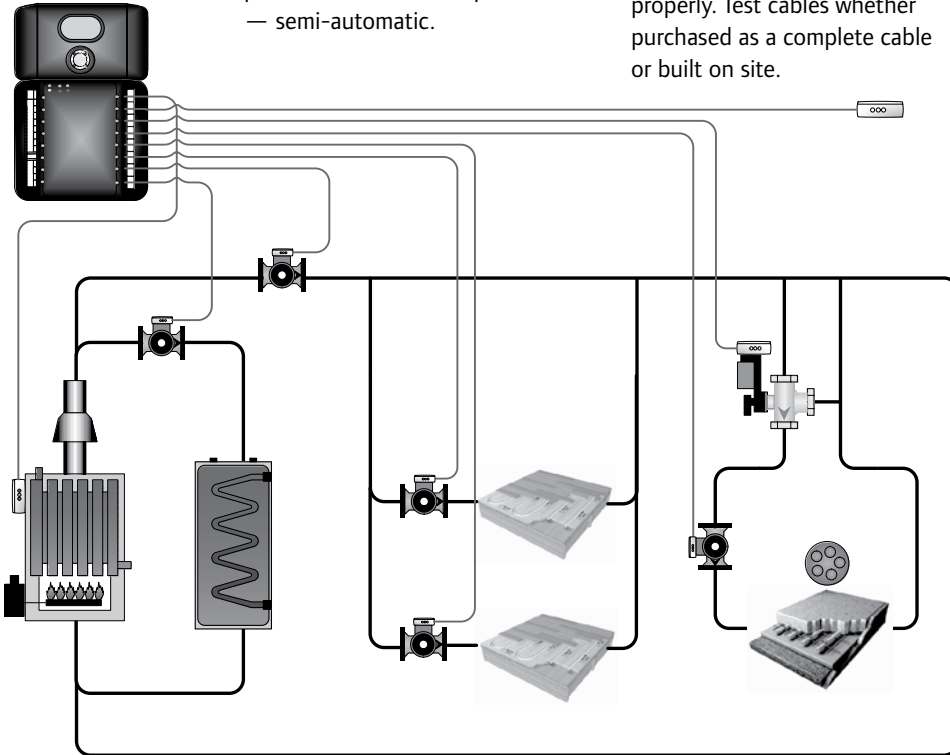
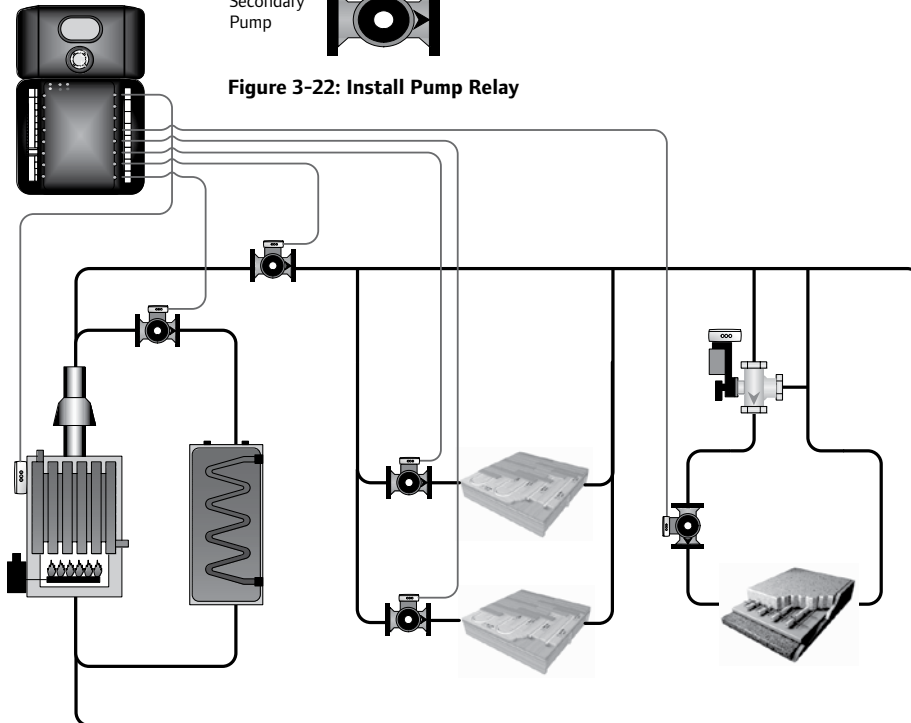**Figure 3-31: Completed Snow Melt Connection**

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3				X					Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 3-32: Record Snow Melt Connection Port and Notes

Uponor

Connecting Injection Pumps

Multifunction is able to control injection mixing. Multifunction provides the following options:

- **Injection Pumping, PWM** — Multifunction will "pulse" the pump operation to provide accurate mixing control over secondary water temperatures. For PWM (Pulse Width Modulated) control, use the Pump Relay (A9013030).

- **Injection Pumping, Proportional** — As an alternative, Multifunction can provide a 0-10 VDC control signal injection mixing to any pump that will accept that input (e.g., Grundfos VS, VFD, etc.). Depending on the conditions, Multifunction will calculate the percentage of mixing required. If the target is 40%, the control will send the pump a 4VDC signal. For proportional control, use the Modulating Network Variable Speed Pump Control (A9013040).

  Note: Be aware that different manufacturers have minimum operation speeds (25%) so even though Multifunction is targeting 18% mixing (1.8V signal), the pump may not run.

1. Mount a Pump Relay (A9013030 or A9013040) directly to the pump if possible. Manufacturers, such as Grundfos, leave spare electrical connections to make mounting pump relay easy.
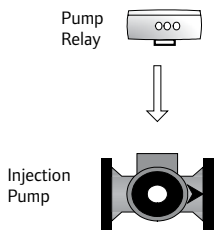
Figure 3-33: Install Pump Relay

Important: Maximum amp rating for the A9013030 is 3A and should never be wired or connected to pumps that exceed this rating.

2. If that option is not available, use a 2"x 4" or 4" x 4" electrical box with a blank plate to cover the wiring connections.

3. Run a Cat5 cable from the Multifunction Control to the Pump Relay for the Mixing Pump.

4. Using the cable tester, test the cables to ensure you have terminated the connectors properly. Test cables whether purchased as a complete cable or built on site.

5. Insert one end of the cable into the RJ45 connector on the pump relay. Push in until you hear a click.
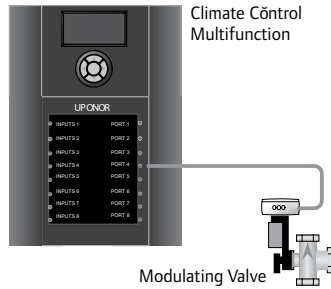
6. Taking the other end, connect the other end into Port 3 on the Multifunction Control. Push in until you hear a click..
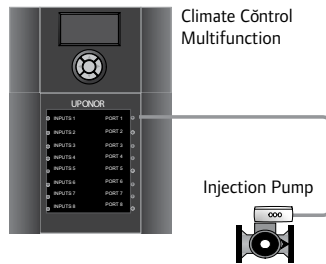
Figure 3-34: Connect the Pump

Note: After making the boiler connections, you can use any unassigned port for the DHW Pump.

7. Make a record or note of the port to which the device is connected. A label is included on the inside of the display cover.

Connecting to Uponor proPANEL®

Multifunction allows for easy integration and connection to the following Uponor proPANEL units:

- A3509000 proPANEL 90
- A3509002 proPANEL 90Z
- A3509500 proPANEL 90M
- A3509502 proPANEL 90MZ

Multifunction connects to the proPANEL using simple Cat5 cables and connections.

The number of cables required depends on the type of proPANEL. See **Appendix A** for additional wiring schematics for connecting the Multifunction to proPANEL units.

Section 4
Installing and Connecting Sensors

Temperature feedback or input is required for Multifunction to control boiler operation, boiler staging, secondary mixing and snow melting.

This section will cover the different types of sensors used by the Multifunction Control along with how they are mounted and connected.

Outdoor Sensor

The Outdoor Sensor (A9012005) includes a 10K thermistor that provides an accurate measurement of the outdoor temperature. A UV-resistant PVC enclosure protects the sensor.

Mounting the Outdoor Sensor

1. Remove the screw and remove the front cover.
2. Mount the outdoor sensor directly to the outside exterior of the house or building. The wiring should enter through the back of the sensor enclosure.
3. 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.
4. The installer should mount the outdoor sensor on an exterior wall that reflects actual outdoor conditions (a north-facing wall). It should not be exposed to heat sources such as direct solar exposure, exhaust or ventilation openings.

5. The installer should mount the outdoor sensor 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.

Wiring the Outdoor Sensor

1. Connect 18 AWG or similar wire to the two (2) terminals provided in the enclosure.
2. Run the wires from the outdoor sensor to the control location. Distance should not exceed 150 feet.
3. If distance from the outdoor sensor to the control exceeds 150 feet, use shielded cable or twisted pair.
4. Connect the wires run to Multifunction marked "(10K) Outdoor"

⚠ **Caution:** Do not run sensor wires parallel to telephone or power lines. If the sensor wires are located in areas with strong sources of electromagnetic interference (EMI), a shielded cable or twisted pair should be used, or the wires can be run in a grounded metal conduit.

Testing the Outdoor Sensor

To test the outdoor sensor, it is necessary to measure the actual temperature at the sensor. A good quality test meter capable of measuring up to 5,000k'Ω (1k'Ω = 1000'Ω) is required to measure sensor resistance. In addition, it is important that you measure the actual temperature with a good quality digital thermometer.

1. Measure the temperature using the thermometer and then measure the resistance of the sensor at the control.

⚠ **Caution:** Ensure that you have no wires from the sensor connected to the control while performing the test.

   Important: An accurate sensor reading must take into account the total wiring distance between the sensor and the control.

2. Estimate the resistance if the temperature read by the thermometer falls between the values listed the flowchart in **Appendix B: Temperature Sensor Resistance Table**.
3. Using the test meter, set the meter to Ohms resistance (Ω) and touch one probe to each of the wire leads coming from the outdoor sensor, then compare the values. The readings should be close:
   a. If the meter reads very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor.
   b. If the resistance is very low, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, repeat the above test directly at the sensor location with the wires disconnected.

Supply and Return Sensors (A9013001)

The dual sensor includes a pair of strap-on or surface-mounted 10K thermistors that provide an accurate measurement of the Supply and Return pipes. Wire each sensor to the connector with 10' of wire.

The following applications use this sensor:
- Primary Pump
- Modulating Valves
- Injection Pumps

Mounting the Supply and Return Sensors

1. Determine the best location for sensing the Supply and Return temperatures for the control using this specific sensor (e.g., Primary Loop, Secondary Loop, etc.).
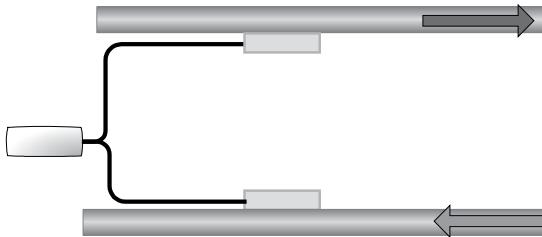
Mounting the Supply and Return Sensor

2. Make sure the surface of the piping is smooth and clean.
3. Each sensor has a label on the sensor end of the wire marked "Supply" and "Return". Find the Supply sensor and place on the surface of the pipe.

4. Using a plastic zip tie or other suitable attachment hardware, secure the sensor tightly to the surface of the pipe.
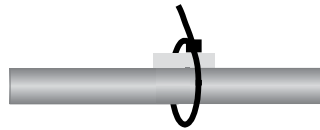
Securing the Sensor

5. Repeat the above steps for the Return sensor.

   Note: To ensure the highest accuracy, use a 6" length of insulation to cover each sensor and pipe.

Wiring the Supply and Return Sensors

Using a Cat5 cable, connect one end of the wire into the connector for the sensors and the other into the connector on the device that will use the sensor information. (See **Figure 4-1**).

Option: If a Primary Pump is not used in the mechanical system but the sensor information is needed to operate multiple boilers, assign a port for the Primary Pump and connect the wire from the sensors directly into the Multifunction Control. (See **Figure 4-1**).
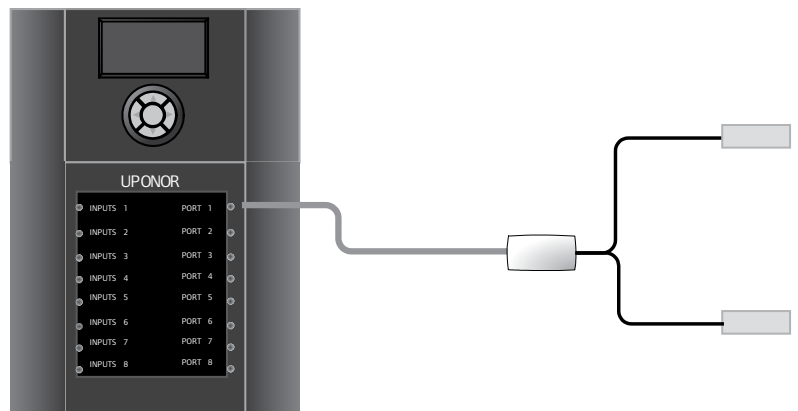
Note: You can plug the wire from the sensors into either of the connections on the pump relay.
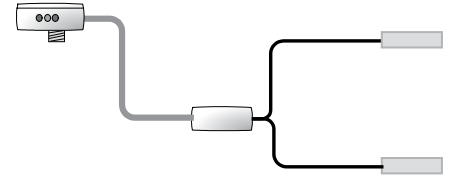
Figure 4-1, shows the sensors for primary loop and boiler operation connected to the pump relay for the primary pump. It also shows the sensors used for the secondary or "mixed" loop. These connect directly to the mixing valve.
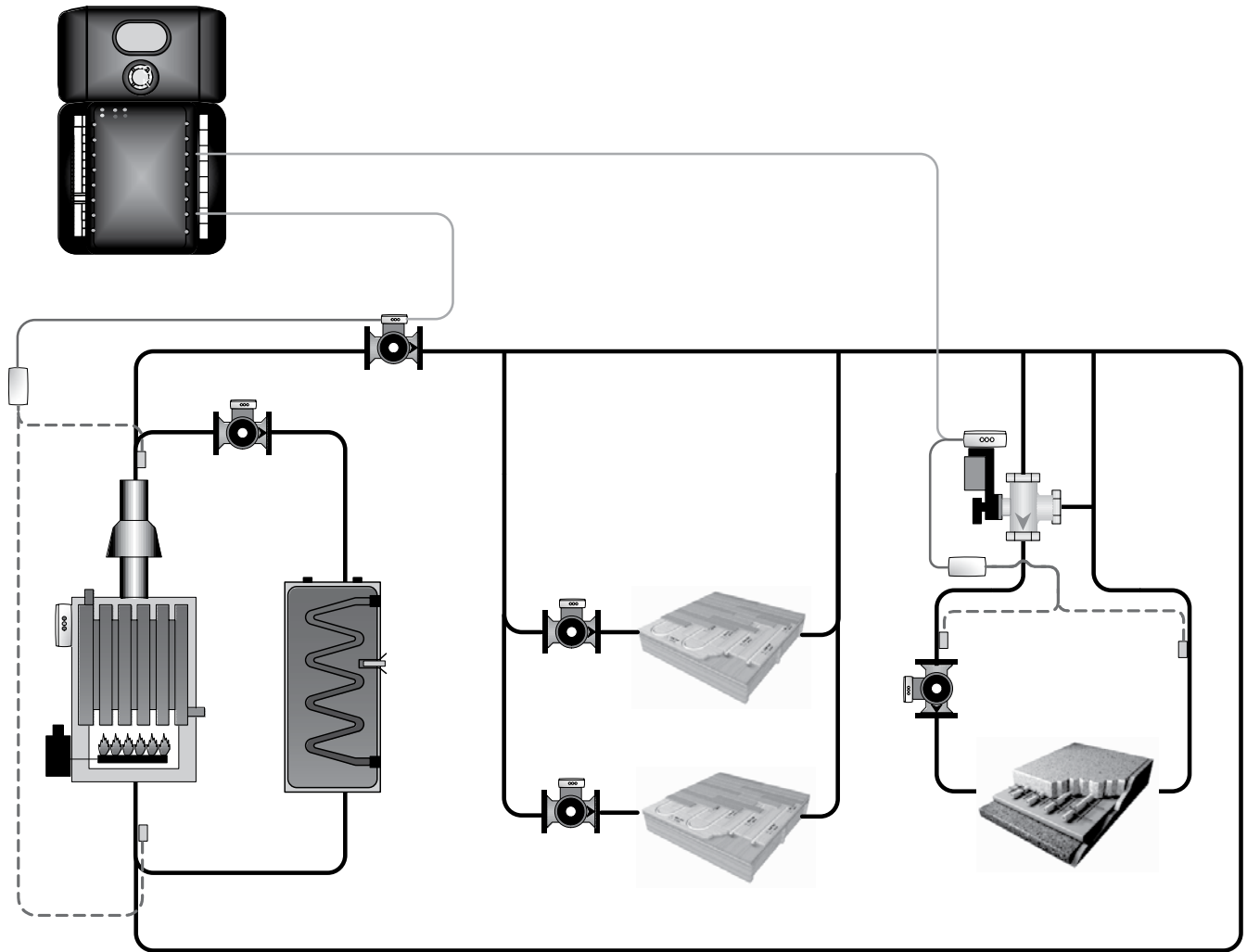
Figure 4-1: Wiring to Supply and Return Sensors

Domestic Hot Water (DHW) Sensor (A9012005)

The DHW Sensor is a bulb-style, 10K thermistor that provides an accurate measurement of the DHW tank temperature. The sensor is ⅜" diameter and 3" in length and is wired to the connector with 10' of wire.

Mounting the DHW Sensor

1. Determine if the sensor diameter will fit inside the tube or well for the domestic hot water tank.

   Note: If the sensor diameter is too large to fit the well, other 10K sensors can be used in its place. Cut the sensor wire and a leave a minimum of 6" wire length on both ends. This will allow sufficient wire to connect the new 10K sensor or re-attach the old sensor if needed.

2. Insert the sensor (sealed end first) into the well or opening on the tank. Ensure that the sensor is placed at the proper depth as recommended by the tank manufacturer.
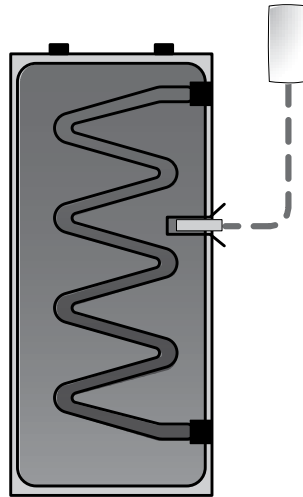
3. To get the most accurate temperature from the sensor, make sure the sensor fits snuggly inside the well and there are no air gaps. Use suitable heat conductive compounds to fill voids and air gaps.

Wiring the DHW Sensor

Using a Cat5 cable, connect one end of the wire into the connector for the DHW sensor and the other into the connector on the Pump Relay (A9013030) wired to the DHW Pump.

Note: You can plug the wire from the sensor into either of the connections on the Pump Relay.

Option: If using a temperature switch or contact (tank control or aquastat) instead of a sensor, wire the contact to an input demand on the Multifunction Control. See section entitled **"Setting the Domestic Hot Water (DHW) Port"** for DHW setup information.
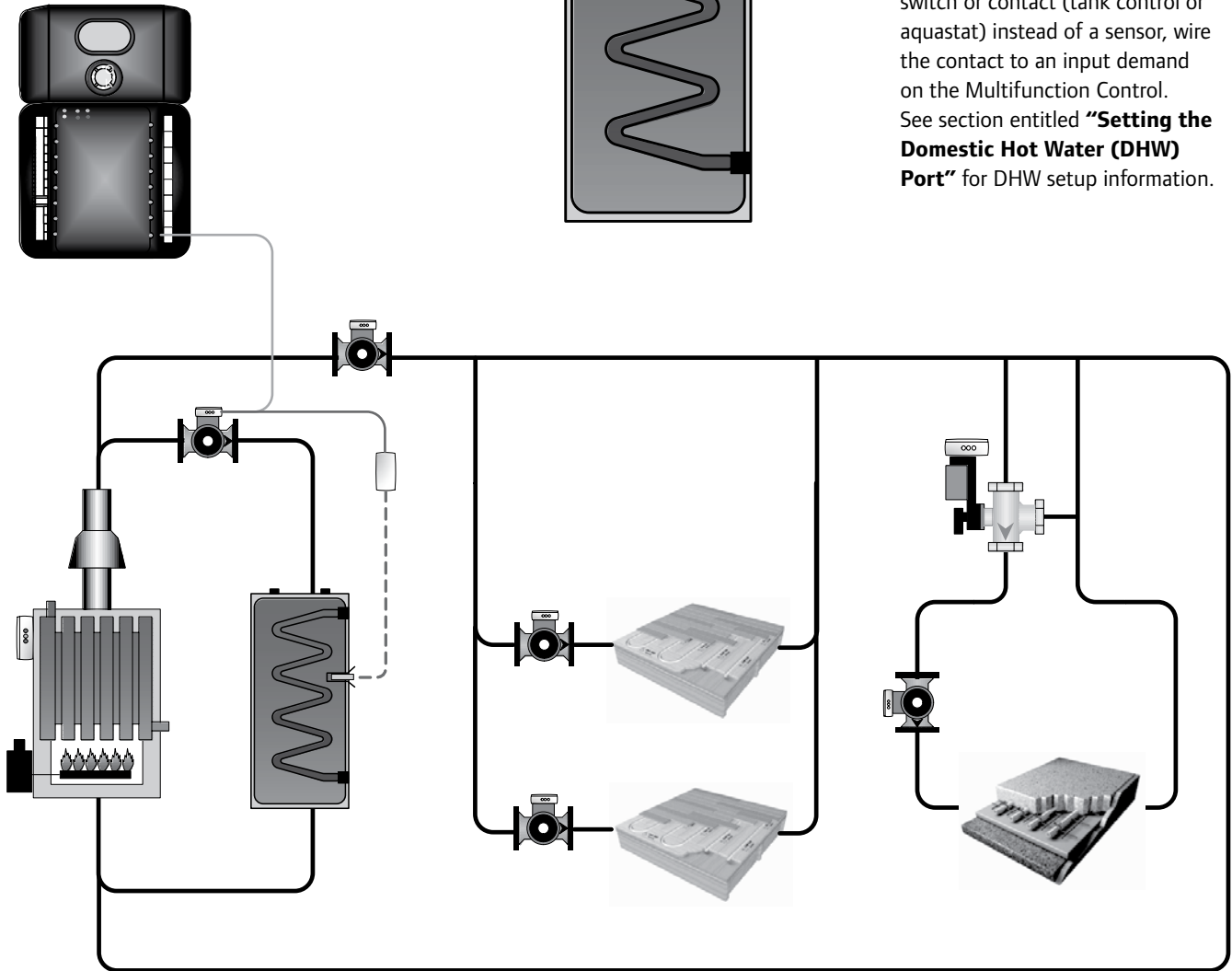
Figure 4-2: Wiring to DHW Sensor

Snow Melt Sensor (10K)

Two different sensors are used by Multifunction to provide snow melt functionality; 10K slab sensor and the Automatic Snow Melt sensor. For either option, sensor conduit and sensor placement are critical to the operation.

Conduit for Sensor Cable

1. Use ¾" (20mm) rigid conduit for the entire length of the sensor cable.
2. Ensure that you have sealed all buried or embedded connections properly to prevent water or moisture from entering the conduit.
3. Do not share the conduit with other than what is required snow melt sensor wiring.
4. Do not route conduit across pavement expansion joints or control joints. Route the conduit underneath pavement as necessary.

Sensor Placement

Determine the best location for sensing snow and ice conditions for snow melting. For optimal sensing, preferable locations to place the sensor are:

· Centered between tubing runs
· Locate in the tubing loops and not the Supply and Return lines
· Where the sensor is exposed to snow and ice along with pedestrian or vehicle traffic (Auto Sensor)
· When possible, kept clear of tire traffic (ex: edge of driveways) (Auto Sensor)
· Away from external heat sources greater than 185˚F (85˚C)

Snow Melt Sensor (10K)

The snow melt 10K sensor is the minimum requirement for performing any snow melting function. This 10K is included in the Snow Melt Control (A9013051) and comes with 60′ of wire (not suitable for direct burial). Using this 10K sensor will only provide semi-automatic snow melt operation (manual on, timed off).

Installing the Snow Melt Sensor (10K)

1. Determine the best location for the slab sensor placement
2. Install the 10K sensor in conduit or Pex tubing so that the sensor can be replaced in the event of failure.
3. Run all outdoor wires in sealed conduit

Wiring the Snow Melt Sensor (10K)

1. The snow melt sensor (10K) can be wired up to 500′ away from the control.
2. Use minimum 18/2 AWG wire
3. If additional wire is required to extend the 60′ lead, use suitable connectors and ensure connections are tight
4. Connect the non-sensor end of the wire to the snow melt control to the terminals marked, "slab sensor"

Snow Melt Sensor (Automatic)

The automatic snow melt sensor (A9013052) comes with the snow/ice detector (sensor) and sensor cup or socket for installation for driveway or sidewalk surfaces. The snow and ice sensor comes with a 60′, 4 conductor wire.

Installing the Snow Melt Sensor (Automatic)

The Automatic Snow and Ice Sensor (A9013052) comes installed in the sensor enclosure. Prior to installation, remove the sensor from the enclosure. Take care to ensure the sensor and three (3) machine screws are not lost or damaged.

1. Install the sensor enclosure on a firm, smooth surface (ex: patio block, paver, etc.).
2. Set the elevation for the top of the enclosure at (or near) the final grade level for the concrete or pavers. This will ensure the sensor is flush to the surface.
3. To stabilize the final location and height of the sensor prior to paving, insert reinforcement or wood dowels on opposite sides of the ¾" (20mm) rigid conduit and secure with wire ties or zip ties.
4. Use the sheet metal cover supplied with the sensor to protect the housing during the installation of the paving.
5. Do not install the sensor until after the paving is complete and you have removed the sheet metal cover.
6. Caulking may be required between the sensor housing and the pavement.

Wiring Snow Melt Sensor (Automatic)

1. The Automatic Snow and Ice Melt Sensor can be located up to 120 feet away from the control.
2. Use 4 conductor 18AWG wire for distances up to 500 feet (152 meters).
3. Insulate and waterproof all splices and connections.
4 . The Uponor Snow and Ice Melt Sensor comes with 60 feet of wire so that you do not have to make the connections inside the pavement enclosure.

Note: Uponor does NOT recommend cutting the wire provided to make connections more accessible within the enclosure. The enclosure is not watertight.

Wiring the Snow Melt Control

1. Install the snow melt control in a location that provides functional operation.
2. Using a Cat5 cable, connect one end into the Snow Melt Control.
3. Connect the other into the Multifunction port that was, or will get configured for, "Snow Melt".
4. Terminate the wires from the slab sensor in the Snow Melt Control labeled "Slab Sensor."

All sensors, 10K or Automatic, get wired back to the terminals on the Snow Melt control. In **Figure 4-3**, this shows how the snow melt control and sensors get connected back to the Multifunction. See **Appendix C** for detailed information about sensor wiring.

Snow Melt Sensor (Automatic)

The Automatic Snow and Ice Sensor comes with a slab sensor well for optimal surface-temperature sensing. The Snow and Ice Sensor has a 60' 4 conductor wire.

Testing the Snow Melt Sensor (Automatic)

If paving material or other residue is present on the sensing surface, clean the surface with a Scotch™ Brite Pad.

Important: Do NOT use metallic or course abrasives or cleaners. Thoroughly check the system before making it operational.

Independent of weather conditions, you can check the functional operation of the Snow Melt Sensor with a digital voltmeter and a ten (10) pound (4.54kg) bag of crushed ice using the following steps:

1. If you do not want the mechanical system to turn on (boiler, pumps, etc.), then disconnect the yellow wires from the Snow Melt Control (A9013051).
2. Using the voltmeter, set the range to VAC, connect the negative (-) test lead to the black sensor wire and connect the positive (+) test lead to the red sensor wire — this will verify the supply voltage to the sensor. A reading between 22 and 28 volts is required.
3. Remove the positive (+) test lead and connect the red sensor wire and one of the yellow wires together.
4. Reconnect the positive (+) test lead to the second yellow sensor wire and confirm there is less than 10VAC present on the voltmeter.
5. Place the entire bag of crushed ice over the sensor and allow 20 minutes before the voltmeter reads between 22 and 28 volts. The sensor comes with an internal lockout of 38°F (3°C). If the sensor is reading temperatures above 38°F (3°C) when starting the test, it will be necessary to extend the "cool-down" by an additional 20 minutes.
6. Once the test is complete, disconnect the voltmeter and correctly wire the sensor connections.
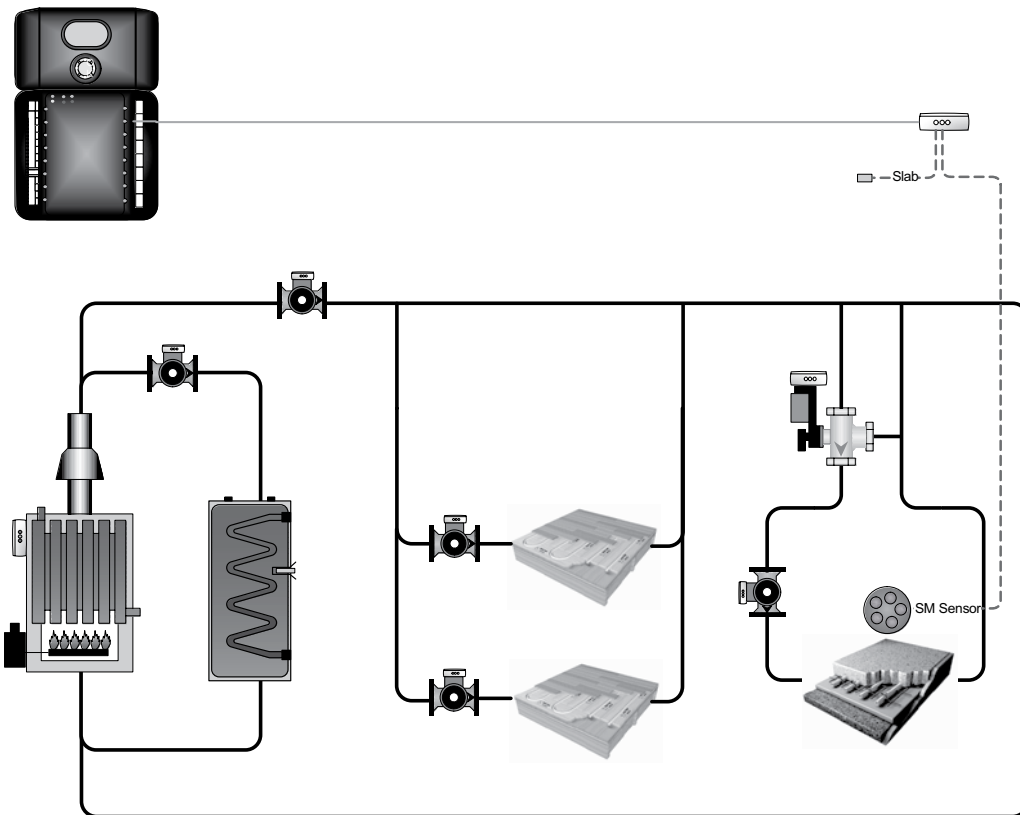

Slab

SM Sensor

Figure 4-3: Wiring to Snow Melt Sensor

Section 5
Wiring Inputs to the Multifunction

This section covers wiring inputs to the Multifunction Control. The left side of the Multifunction Control uses push-style wire connectors — small tip screwdrivers are not required. These connectors require dry contact inputs from Uponor thermostats, zone control modules, relays or any other similar devices. The bottom four (4) connectors are programmable outputs (demand outputs).

When any of the inputs activate or the circuit has closed, the LED for the input will light up green and this is viewable through the front enclosure. At the same time, the port or device assigned to the input will turn on and light up green. See **Figure 5-1** for a side view of the wiring connections.
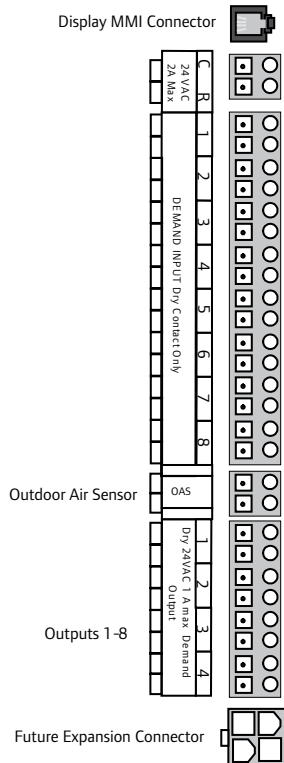
Figure 5-1: Side View of Wiring Connections

Inserting a Wiring Connection

With the exception of the Display Unit and the Expansion Connector, all other terminals are push-style connectors. These connectors are suitable for 18 to 22 AWG wires. Large gauge wires will not fit into the opening and wires with smaller gauges will be too small for the clamping mechanism to secure it firmly to the control.

In preparation, strip the wire exposing a minimum of ⅜" of the copper or aluminum conductor. Insert the wires into the proper connector. Make sure that you connect both wires to the same input.

Push until the wire is all the way in so that the bare conductor wire is not exposed. This will prevent any potential shorts. Pull on the wire gently to make sure the wire is securely connected. If the wire pulls out, strip away additional wire jacket and try again.
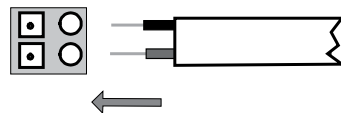
Figure 5-2: Push Wire in for Secure Connections

Removing a Wiring Connection

The push-style connectors make it easy to disconnect wires and reconnect. To release a wiring connection previously installed, locate the wire-release button below the wire being removed. (See **Figure 5-3**.) With the control mounted on the wall, the wire release is located directly behind the wire.
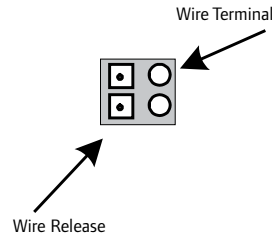
Figure 5-3: Position of Wire Release and Wire Access

Move the wire(s) out of your way as needed and use your finger to press the button. Press and hold in the wire-release button at the same time you apply gentle pressure to pull the wire away from the control. If the wire will not release using your finger, it may be necessary to use a small screwdriver to depress the wire-release button.
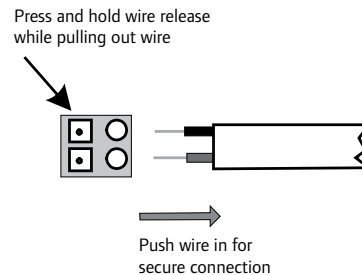
Figure 5-4: Press and Hold While Pulling Out Wire

Tip: If the wire is connected to the incorrect input terminals, it is not necessary to remove the wires. Use the Multifunction display unit to go to the port menu that uses this demand and change the input assignment (range = 1 to 8).

Applying Power to the Multifunction Control

The Multifunction Control is a low-voltage device with the exception of line voltage wiring for the pumps and pump relays. At minimum, a 24VAC 50VA transformer is required for each control. This specification provides power for a fully loaded control, with all outputs in use.

If you want to use the Multifunction power supply (transformer) to provide power for the dry, programmable outputs, increase the transformer VA size for the additional loads.
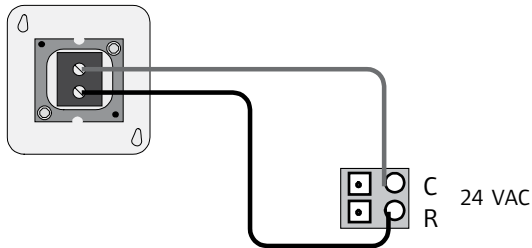
Figure 5-5: Applying Power to Multifunction Control

⚠ Important: Never apply power to the input connections (1 through 8) on the Multifunction Control.

Wiring Inputs or Demands

In all control systems, devices will not turn on or off without a demand or call for heat. On the simplest of levels, this is a switch closure. Multifunction is no different and, in most instances, requires a switch or demand to turn on devices connected to outputs and start the heating operation. The exceptions are automatic Snow Melt, Primary Pump, Secondary Pump and DHW using a sensor.

To operate a device connected to one of the output ports, there are two requirements:

1. The device must be setup on that port.
2. The device must point to the input that will activate it.

You can wire any of the following compatible components to Inputs 1 through 8 of the Multifunction Control:

- Uponor Power Stealing Thermostats (A3030101, A3030102)
- Uponor Zone Control Modules (A3030003, A3030004)
- Any dry contact switch

⚠ Warning: 24VAC is present on the input connections. Do not apply another power source to these terminals, as this will damage the control.

Wiring Device Output — Zone Pumps

The Multifunction Control allows the use of zone pumps in a variety of applications, from High Temperature, Snow Melt and secondary or radiant heating pumps. Using zone pumps in one of these applications requires a "special wiring" condition to enable these pumps to operate correctly.

Important: For each zone pump installed or connected to Multifunction, the installer MUST specify a device output.

Note: You can assign multiple zone pumps to the same device (programmable) output. See the following examples.
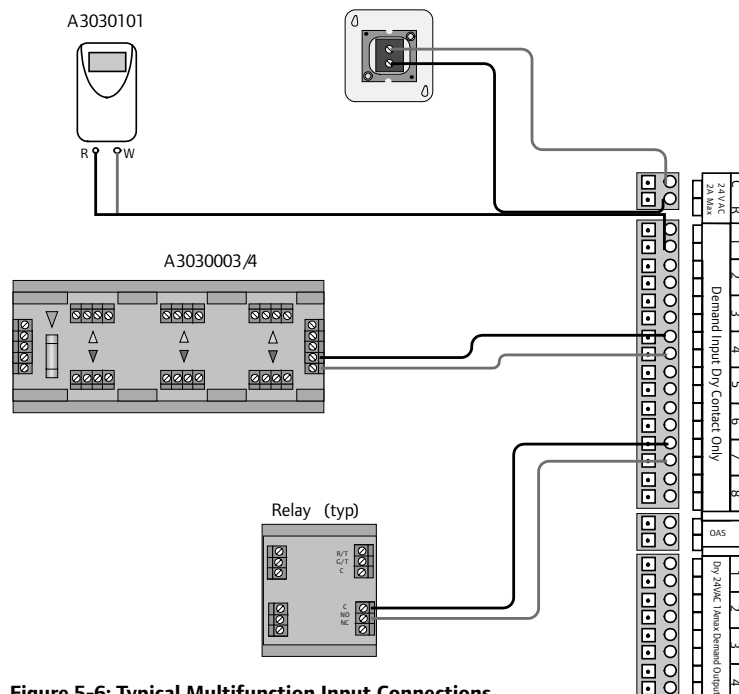
Figure 5-6: Typical Multifunction Input Connections

Example 1 — Zone Pumps and Mixing Activation

Figure 5-7 shows two zone pumps and a mixing valve. The pumps are installed after the mixing valve. They provide water circulations to different areas or manifolds. In this example, both zone pumps (1 & 2) are assigned to Device Output 1 and the mixing valve input is assigned to Input 8. A wire is installed between programmable Output 1 and Input 8 (as shown by the arrow in **Figure 5-7**).

The assigned pump will start when a switch closes for zone pump activation (heat demand). These switches could be the ES terminals on a Zone Control Module. Once the pump starts, the output closes to start the water channel (mixing valve) activation.
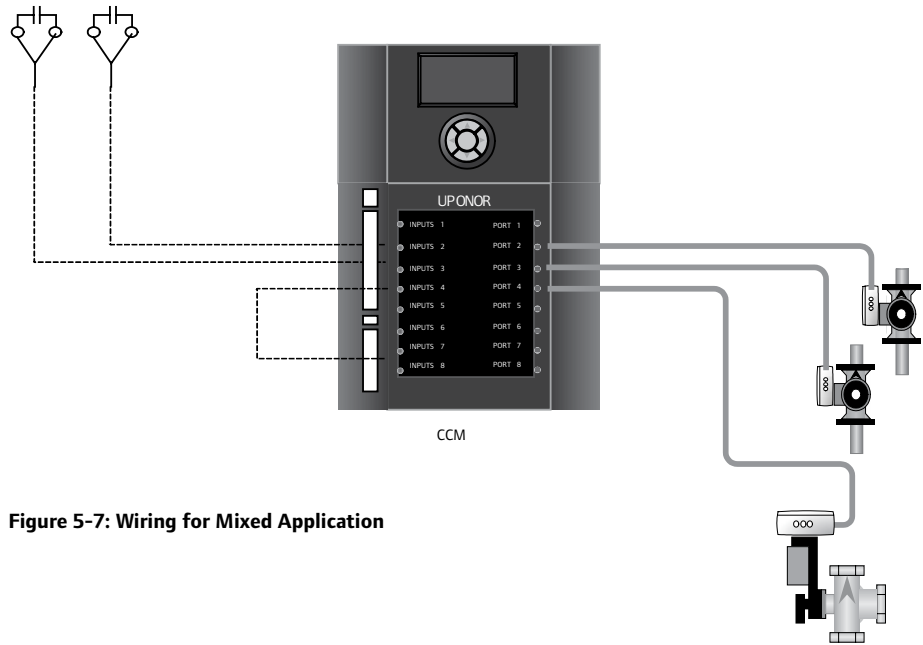
Figure 5-7: Wiring for Mixed Application

Section 6
Getting to Know the Display Unit

The display unit features an LCD display and five-button interface. Whether setting up the Multifunction control parameters or viewing system operation, these functions will all be performed through this interface.

The display unit is a menu-driven system. After selecting the device to control, the next display provides additional settings for that device and its properties.

Navigation Symbols

This section provides systematic instructions for navigating the menu, viewing information, setting up port assignments and other operational parameters for controlling the system. Following is a guide for moving through the different menu settings with the navigation button.

This symbol shows the display buttons without any activity.

This symbol indicates that the OK button is pressed.

This symbol indicates that you should use the up and down arrows to highlight the correct selection.

This symbol indicates that you should:

1. First, use the down arrow to highlight the correct selection.
2. Then press OK to continue.

This symbol indicates the use of the forward and back (left and right) arrows to get to the proper menu:

1. First, press the desired direction arrow.
2. Then press OK to continue.

Figure 6-1: The Display Unit

Interface Keys

Right Arrow	►	Displays the next menu	or	Goes to the next field
Left Arrow	◄	Displays the previous menu	or	Goes to the previous field
Up Arrow	▲	Goes to the line above	or	Increases the value
Down Arrow	▼	Goes to the line below	or	Decreases the value
Center Button	OK	Displays the next screen	or	Confirms selection and/or displays the screen of the current menu

Figure 6-2: Display Button Directions

Section 7
Viewing System Operation

Through the Display Unit, all current system operation conditions are available for viewing in the LCD display. For demonstration purposes, we will use the example in **Figure 7-1** for connecting the devices. Do not forget, the user has complete flexibility to assign any port for any functionality, with the exception of boilers (reserved for Ports 1 and 2 for up to four boilers).

Note: Keep in mind that if a certain condition is not available for viewing, it may not be setup in the port assignment.

Viewing Boiler Operation

The Display Unit allows the user to view the status of the boiler(s). The following sequence (flow chart) illustrates the necessary steps to navigate from the Main Menu to the Boiler Activity screen. From the worksheet (**Figure 7-1**), the boiler connects to Port 1.

To view the status of the boiler (to see whether it is running or not), use the following steps from the opening screen:
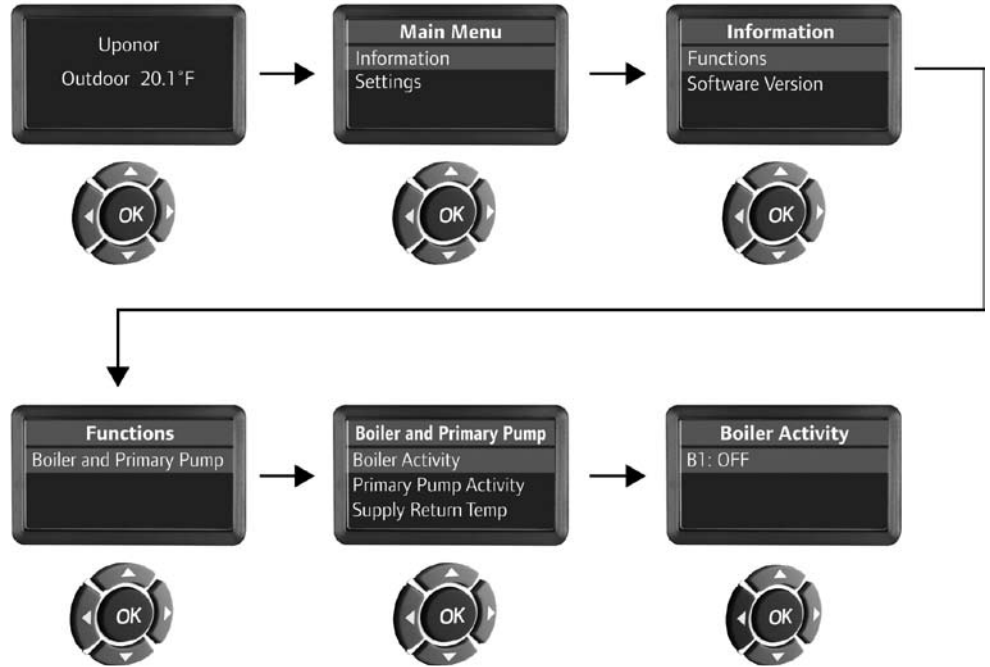
Figure 7-2: Boiler Activity View

1. On the Uponor (opening) screen, press OK on the navigation button to access the Main Menu.

2. Press OK to select "Information" — the default selection.*

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press OK to select the default selection.

5. On the Boiler and Primary Pump menu, press OK to select the default selection, "Boiler Activity."

6. The Boiler Activity screen indicates that this boiler is in the OFF mode (not running).

*Highlighted (bold) font on the display screen indicates the default selection in these examples.

This example shows the status of one (1) boiler. However, if you have installed and set up more than one boiler (2 to 4) in the system, the status of all the boilers would appear on the final screen. To return to previous screens, press the "back" or left arrow button on the display.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3			X						
Port 4				X					
Port 5							X		
Port 6							X		
Port 7		X							
Port 8			X						

Figure 7-1: Worksheet for Connecting Devices

Viewing Primary Pump Operation

The Display Unit allows the user to view the status of the Primary Pump whether it is running or not.

The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Primary Pump Activity screen:

1. On the opening screen, press OK to access the Main Menu.
2. Press OK to select the default selection, "Information."
3. On the Information menu, press OK to select the default selection, "Functions."
4. On the Functions menu, press OK to select the default selection, "Boiler and Primary Pump."
5. On the Boiler and Primary Pump menu, press the down arrow to select "Primary Pump Activity."
6. The status of Primary Pump and will read either "ON" or "OFF".
7. Press the "back" or left arrow button on the display to return to previous menus.
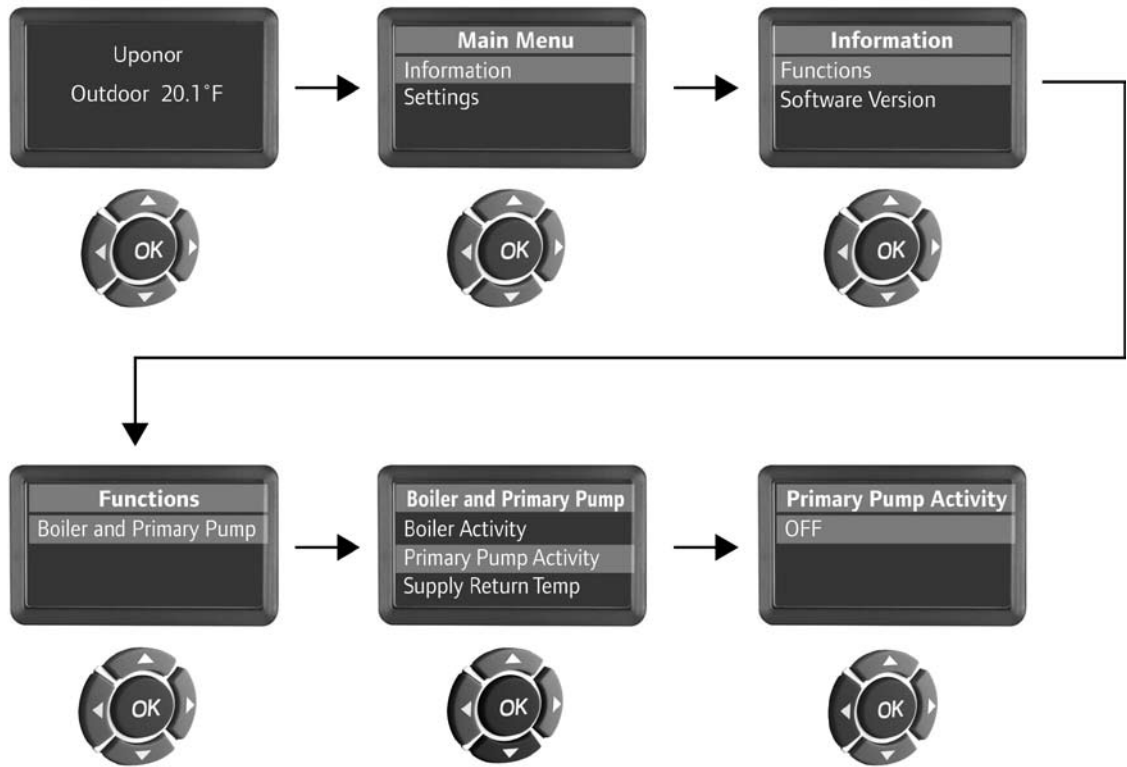
Figure 7-3: Primary Pump Activity View

Viewing Primary Supply and Return Temperatures

The Display Unit allows the user to view the current reading of the Supply and Return sensor for the primary loop if installed. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Supply and Return Temperature viewing screen. To view current temperatures for the Supply and Return, use the following steps from the main screen:

1. On the opening screen, press OK to access the Main Menu.
2. Press OK to select the default selection, "Information."
3. On the Information menu, press OK to select the default selection, "Functions."
4. On the Functions menu, press OK to select the default selection, "Boiler and Primary Pump."
5. On the Boiler and Primary Pump menu, press the down arrow twice to select "Supply Return Temp."

6. The Supply Return Temp screen shows current temperatures. A reading of -58°F (50°C) will indicate that the sensors are not connected or there is an issue with the connecting wire(s).
7. Press the "back" or left arrow button on the display to return to previous menus.
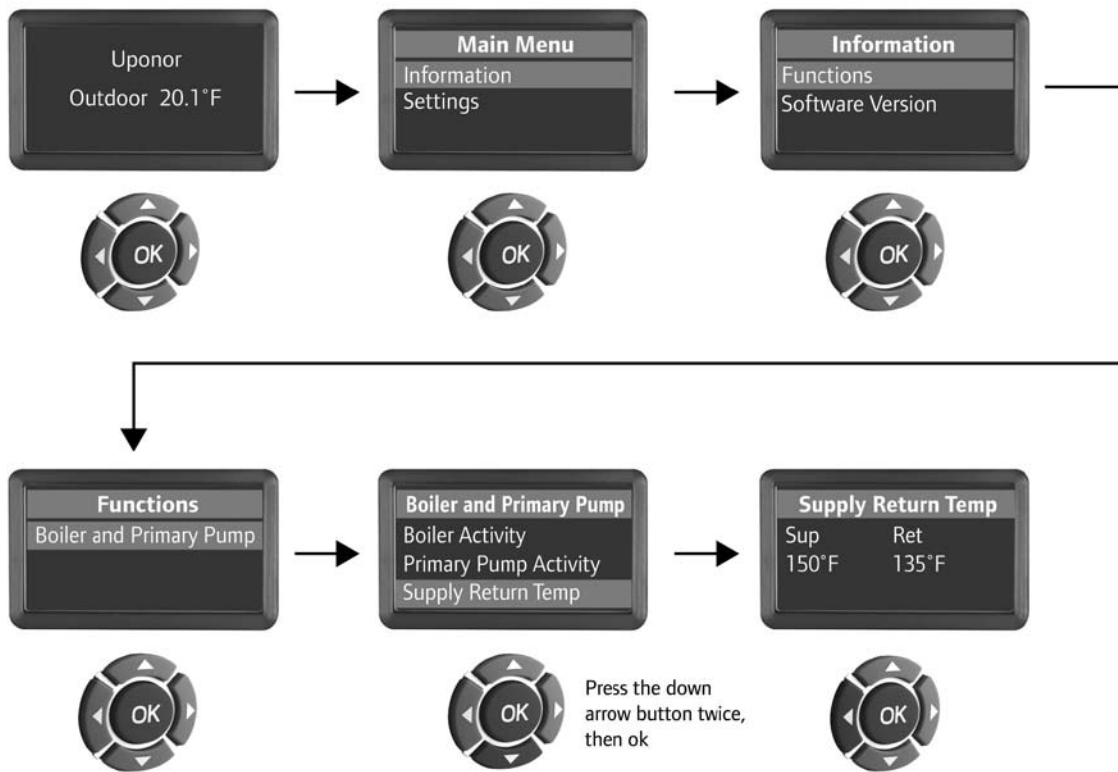
Figure 7-4: Supply and Return Temperature View

Viewing the Domestic Hot Water (DHW) Operation — Calling

The Display Unit allows the user to view the status of the DHW tank (and pump) whether it is running or not. The Display Unit allows the user to view the following information for DHW operation:

• DHW Port
• DHW Call
• DHW Temperature

The following sequence (flow chart) illustrates how to navigate from the Main Menu to the DHW Activity screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the highlighted default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow until "DHW" is selected, and press OK.

5. On the DHW screen, press the down arrow to select "DHW Call."

6. The status of DHW will read either "ON" or "OFF." ON indicates that the tank is heating and OFF indicates that the tank temperature is not heating.

7. Press the "back" or left arrow button on the display to return to previous menus.

Note: Multifunction will not start to heat the DHW tank until the actual tank temperature falls 9°F (5°C) below the desired setting. A reading of -58°F (-50°C) indicates that the DHW is not connected or there is an issue with the connecting wire(s). If the DHW function was set up incorrectly and a sensor is not used, see **Section 9** for additional information to change the settings.
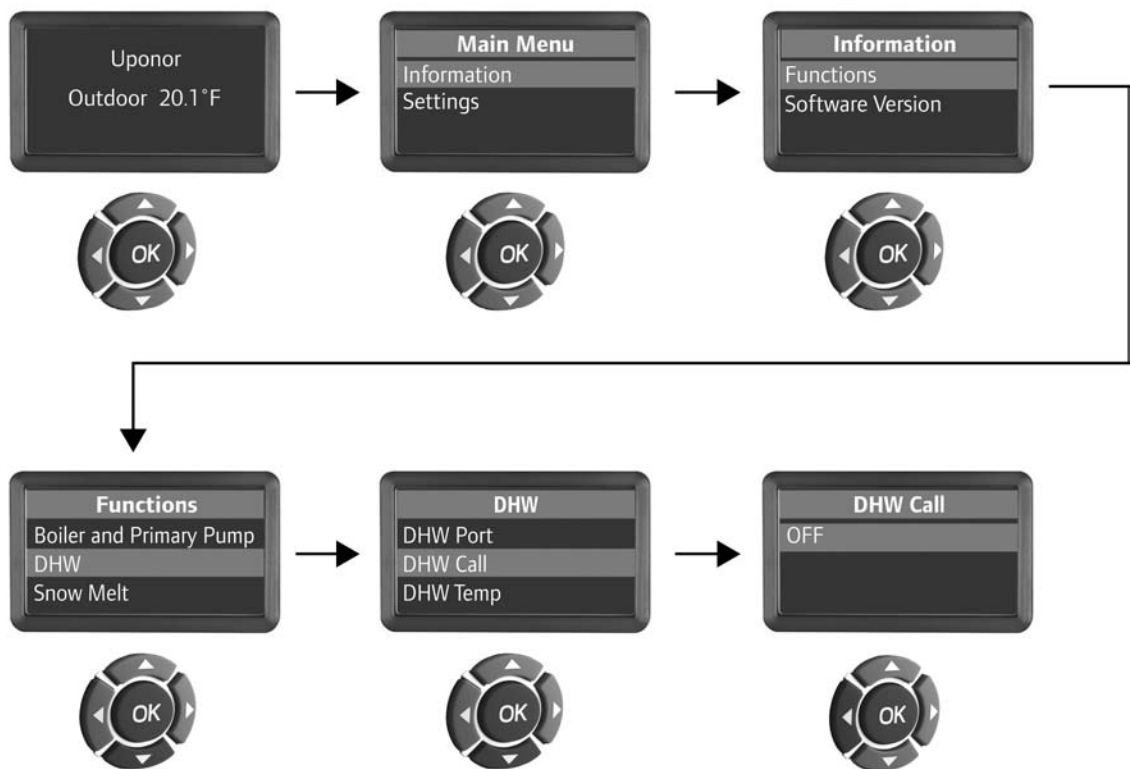
Figure 7-5: Viewing DHW Call Status

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Viewing the Domestic Hot Water (DHW) Operation — Tank Temperature

The Display Unit allows the user to view the current temperature of the DHW tank. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the DHW Tank Temperature screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow to select "DHW" and press OK.

5. On the DHW screen, press the down arrow to select "DHW Temp."

6. The DHW Temp displays current temperature of the domestic hot water tank.

7. To return to previous screens, press OK and then the "back" or left arrow button on the display.

Note: A reading of -58°F (-50°C) indicates that the DHW is not connected or there is an issue with the connecting wire(s). If the DHW function was set up incorrectly and a sensor is not used, see **Section 9** for additional information to change the settings for DHW.

Figure 7-6: Viewing DHW Temperature

Viewing the Domestic Hot Water (DHW) Operation — Tank Setting

The Display Unit allows the user to view the current temperature setting for the DHW tank. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the DHW Tank Temperature screen for viewing the current temperature setting of the DHW tank:

1. On the opening screen, press OK to access the Main Menu.
2. Press OK to select the default selection, "Information."
3. On the Information menu, press OK to select the default selection, "Functions."
4. On the Functions menu, press the down arrow to select "DHW" and press OK.
5. On the DHW screen, press the down arrow to select "DHW Setting."
6. The DHW Setting displays the current temperature of the domestic hot water tank.
7. To go back, press OK and then the "back" or left arrow button on the display to return to previous menus.

Note: A reading of -58°F (-50°C) indicates that the DHW is not connected or there is an issue with the connecting wire(s). If the DHW function was set up incorrectly and a sensor is not used, see **Section 9** for additional information to change the settings for DHW.
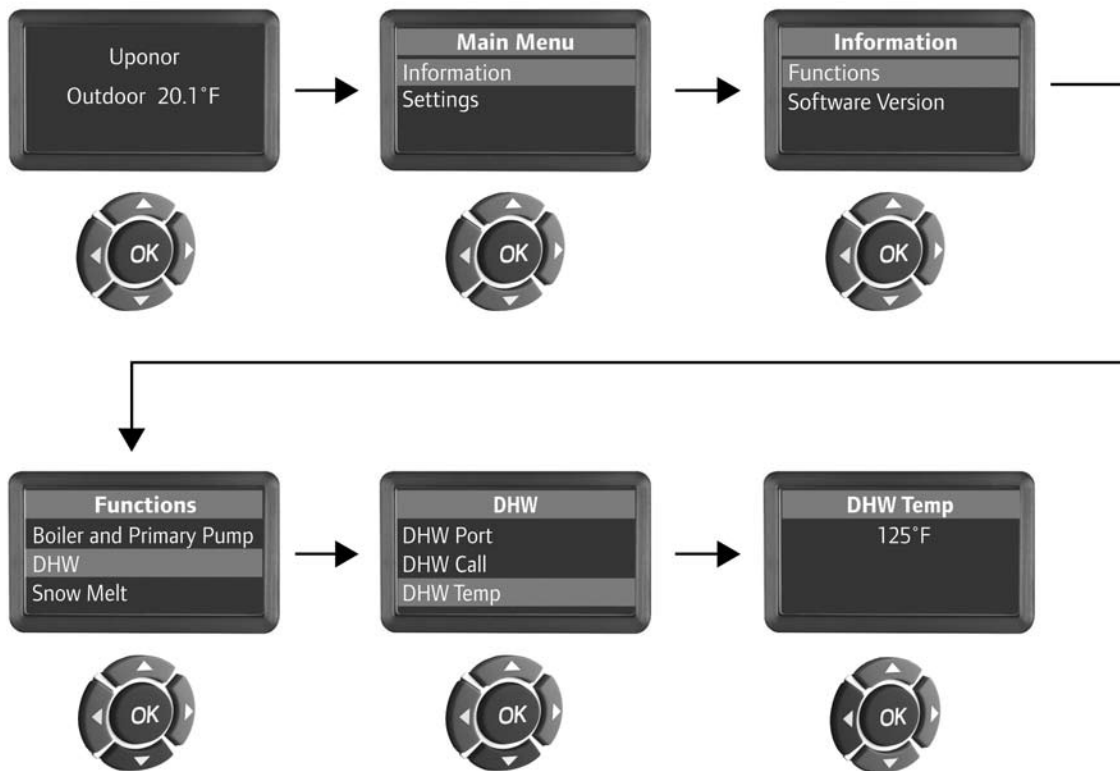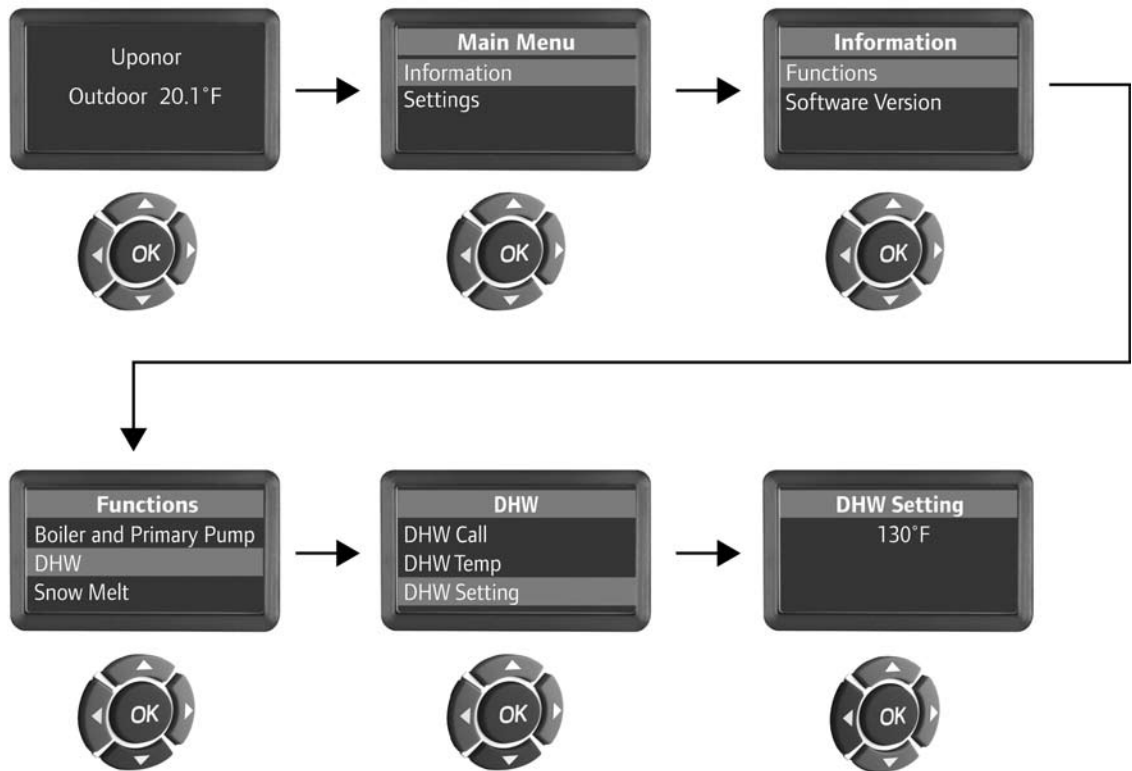

Figure 7-7: Viewing DHW Setting

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Viewing the Snow Melt Operation

The Display Unit allows the user to view the status of the Snow Melt zones. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Snow Melt Call screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow until "Snow Melt" is selected, and press OK.

5. On the Snow Melt screen, press the down arrow twice to select "Snow Melt Call."

6. The Snow Melt Call screen shows the status of the snow melting system. This screen will show whether the different modes of operation are in the ON or OFF mode. For definition purposes:

   • **Sensor Call** — Indicates that snow or ice is present on the automatic sensor if one is installed for the Snow Melt zone.

      Note: This setting displays OFF when above or below outdoor temperature limits are reached, whether or not snow is present on the sensor.

   • **Semi-auto Call** — Indicates that the Snow Melt is manually activated by the button on the Snow Melt control or a remote switch.

7. Press OK and then the "back" or left arrow button on the display to return to previous menus.
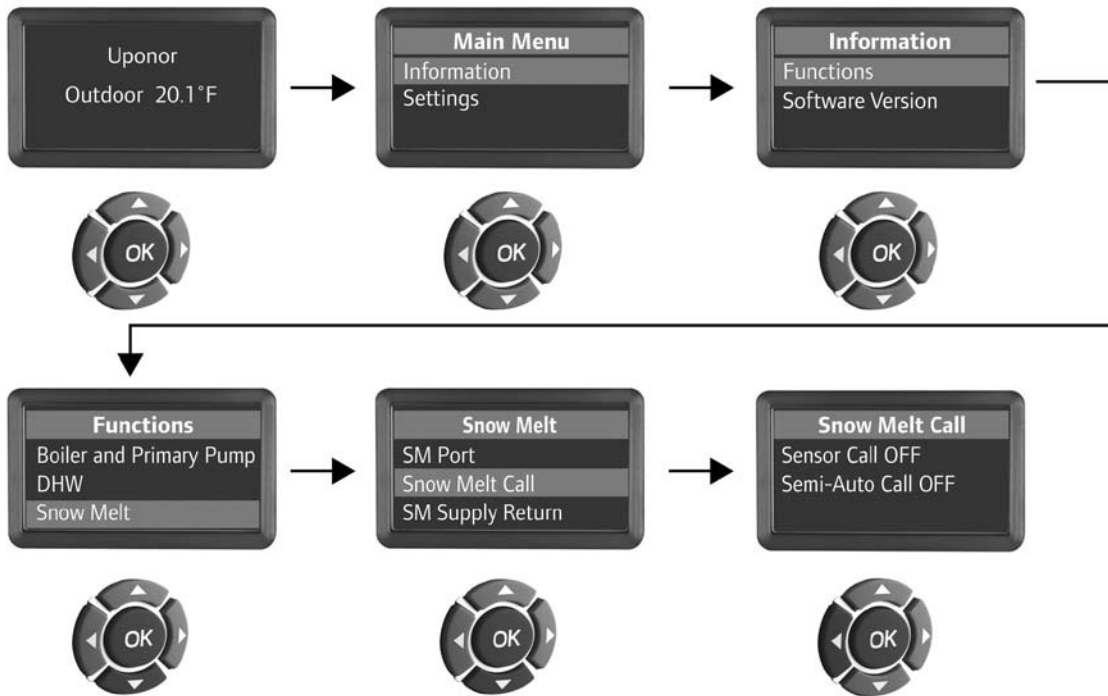
Figure 7-8: Viewing Snow Melt Call Status

Viewing the Snow Melt Operation — Sensor Information

The Display Unit allows the user to view the current water temperatures of the Supply and Return lines feeding the Snow Melt zone. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Snow Melt Call screen:

1. On the opening screen, press OK to access the Main Menu.
2. Press OK to select the default selection, "Information."
3. On the Information menu, press OK to select the default selection, "Functions."
4. On the Functions menu, press the down arrow until "Snow Melt" is selected, and press OK.
5. On the Snow Melt screen, press the down arrow to select "SM Supply Return" and press OK.

6. The SM Supply Return screen shows the water temperature readings of the Supply and Return lines. Readings of -58°F (-50°C) indicate that the dual sensors are not connected or there is an issue with the connecting wire(s).
7. Press OK and then the "back" or left arrow button on the display to return to previous menus.
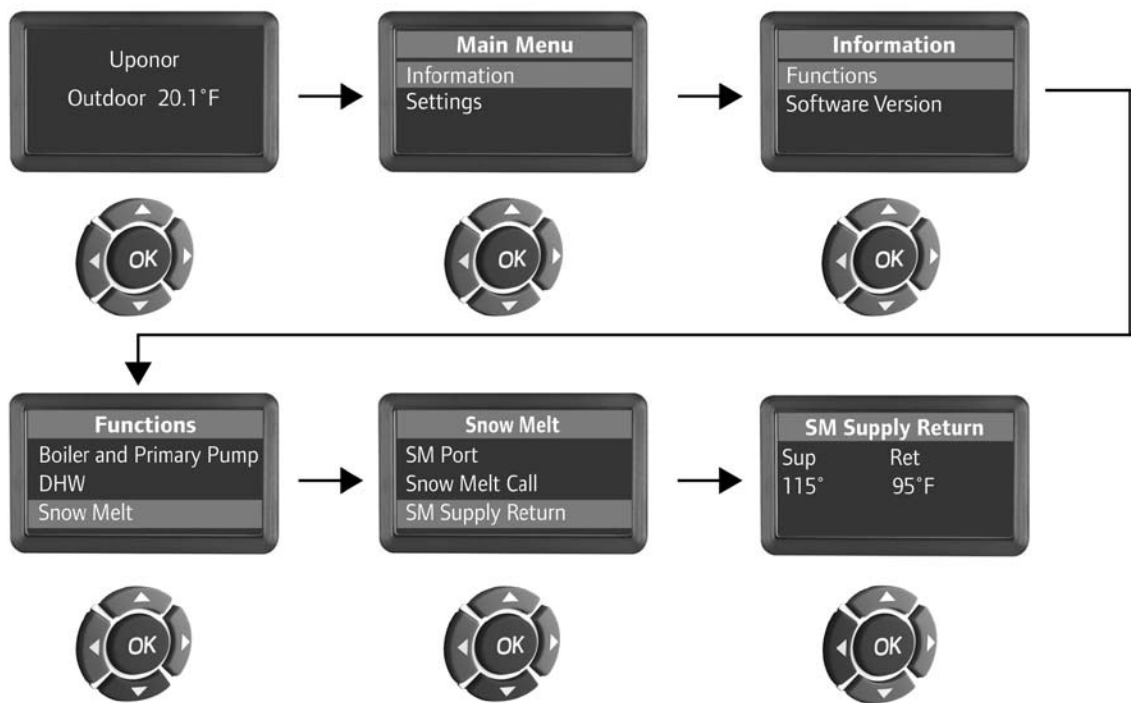
Figure 7-9: Viewing Snow Melt Supply and Return Temperature

Viewing the Mix Channel Operation

The Display Unit allows the user to view the current activity of the devices that are mixing or controlling water temperatures for secondary loops of radiant floor heating and snow melting. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Mix Channel Operation screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow until "Mix Channel" is selected, a nd press OK.

5. On the Mix Channel screen, press the down arrow to select "Mix Channel Activity" and press OK.

6. The Mix Channel Activity screen will show Active or Inactive. Active indicates there is a call for heating on that mix channel.

   Note: The Mix Channel can be active but the mixing device (valve or pump) might not be running or moving — the channel may have already reached its mixed target or stopped due to the minimum boiler return temperature.

7. Press OK and then the "back" or left arrow button on the display to return to previous menus.
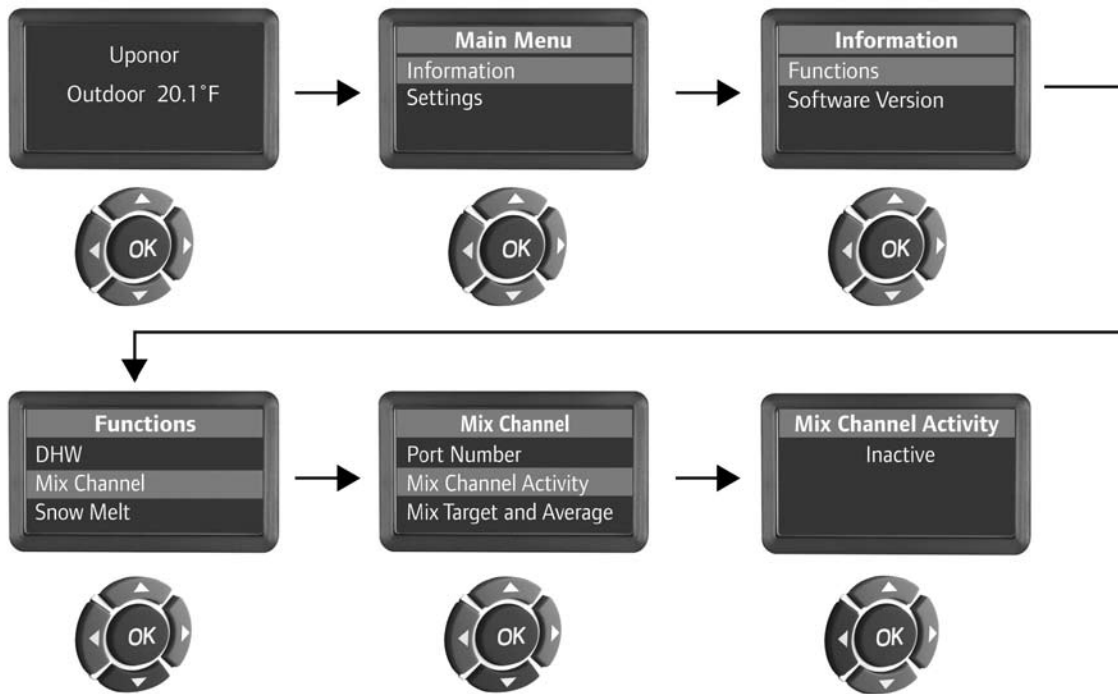
Figure 7-10: Viewing Mix Channel Activity

Viewing the Mix Channel Operation — Target Temperature

The Display Unit allows the user to view the current water temperature Multifunction is calculating to supply the secondary heating (UFH or Snow Melt). The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Mix Channel Sensor Information screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow to select "Mix Channel" and press OK.

5. On the Mix Channel screen, press the down arrow to select "Mix Target and Average" and press OK.

6. The Mix Target and Average screen displays target temperature and average temperature readings. A target temperature of 0°F (-17.7°C) indicates that the Mix Channel is not active or there is no call for heat.

   Note: Multifunction uses an average water temperature (Supply – Return / 2) to calculate the average. This is based on user setup information.

7. Press OK and then the "back" or left arrow button on the display to return to previous menus.
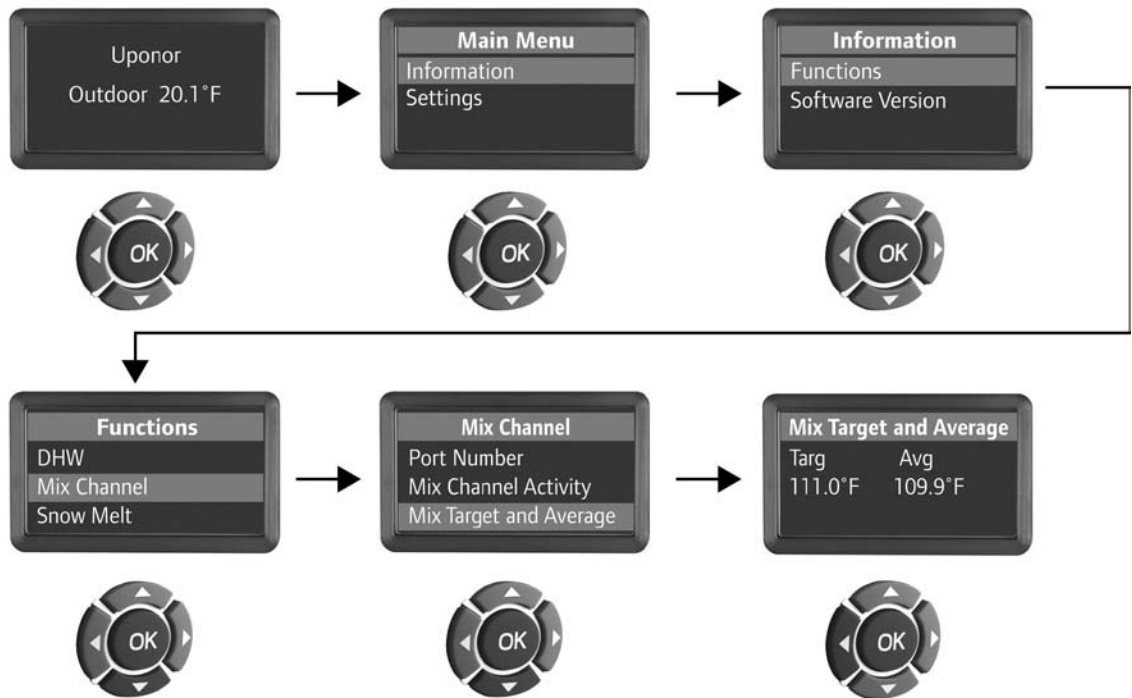
Figure 7-11: Viewing Mix Target and Average

Viewing the Mix Channel Operation — Sensor Information

The Display Unit allows the user to view current water temperatures of the Supply and Return lines feeding the secondary loops (Radiant Floor Heating or Snow Melt). The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Mix Channel Sensor Information screen:

1. On the opening screen, press OK to access the Main Menu.

2. Press OK to select the default selection, "Information."

3. On the Information menu, press OK to select the default selection, "Functions."

4. On the Functions menu, press the down arrow until "Mix Channel" is selected, and press OK.

5. On the Mix Channel screen, press the down arrow until "Mix Supply Return" is selected and press OK.

6. The Mix Supply Return screen displays current temperature readings. Readings of -58°F (-50°C) indicates that the dual sensors are not connected or there is an issue with the connecting wire(s). Note: Mix Supply and Return temperatures are only shown when the Mix Channel is active (or heating).

7. Press OK and then the "back" or left arrow button on the display to return to previous menus.
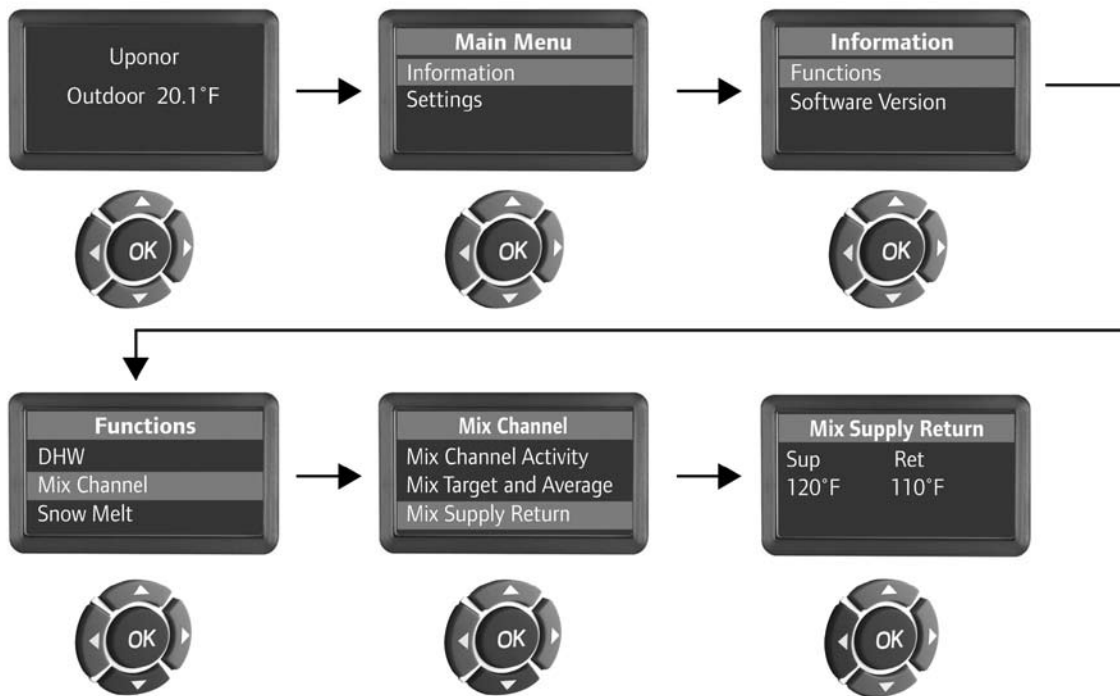
Figure 7-12: Viewing Mix Channel Supply and Return Temperature

Section 8
General Settings

Adjusting System Settings — Unit

The Display Unit allows the user to view the current water temperature Multifunction is calculating to supply the secondary heating (UFH or Snow Melt). The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Mix Channel Sensor Information screen. To change the Units from Fahrenheit (°F) to Celsius (°C) or vice versa, use the following steps from the main screen:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, press the down arrow to select "Settings" and press OK.
3. On the Settings menu, press the down arrow to select "System Settings" and press OK.
4. On the System Settings menu, press OK to select the default selection, "Units."

5. On the Units screen press the left or right arrow buttons to select the type of temperature reading desired, Fahrenheit (°F) or Celsius (°C).
6. Press OK and then the "back" or left arrow button on the display to return to previous menus.
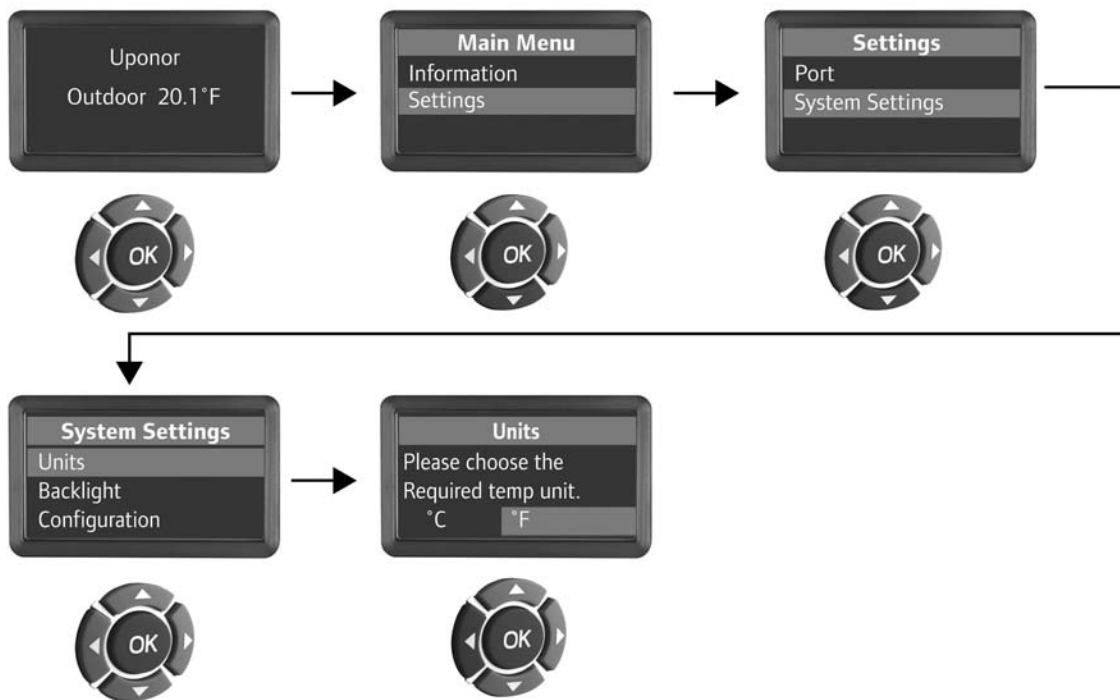
Figure 8-1: Adjusting System Setting Units

Adjusting System Settings — Backlighting

The Display Unit allows the user to view and adjust system settings for backlight. The following sequence (flow chart) illustrates how to navigate from the Main Menu to the Backlighting screen. To adjust the backlight settings, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press the down arrow to select "System Settings" and press OK.

4. On the System Settings menu, press the down arrow to select "Backlight" and press OK.

5. On the Backlighting screen, press the down arrow button to select your backlighting preference (On, Dimmed, or Off).

6. Press OK and then the "back" or left arrow button on the display to return to previous menus.

Configuration Save and Load Feature

Multifunction allows the user to save and load configuration files for system setup or configuration. Each Multifunction unit uses two different parts of memory to operate, Flash and RAM. Under normal conditions, the control operates out of RAM memory.

Flash memory is used a couple of different ways. When a user is performing port setup or system configuration, within 10 seconds of the last button press, the new settings are saved automatically to Flash. Multifunction has an internal clock that automatically saves information at midnight each day. As a result, if the power goes out or the system is reset, Multifunction pulls the configuration and settings from Flash and moves this data into RAM for normal operation use when it powers up.

In using the different types of memory this way (similar to a computer), it allows the user to save the settings in another location other than the control itself. Each display unit comes with a data key secured to the attached back cover plate.

Note: This is a data key, not to be confused with a USB key. The data key will only work with the Multifunction unit. The data keys used for the Climate C̆ontrol Zoning system are formatted differently and cannot be interchanged between the products. No damage will occur if you plug in the wrong data key — Multifunction simply will not recognize it.
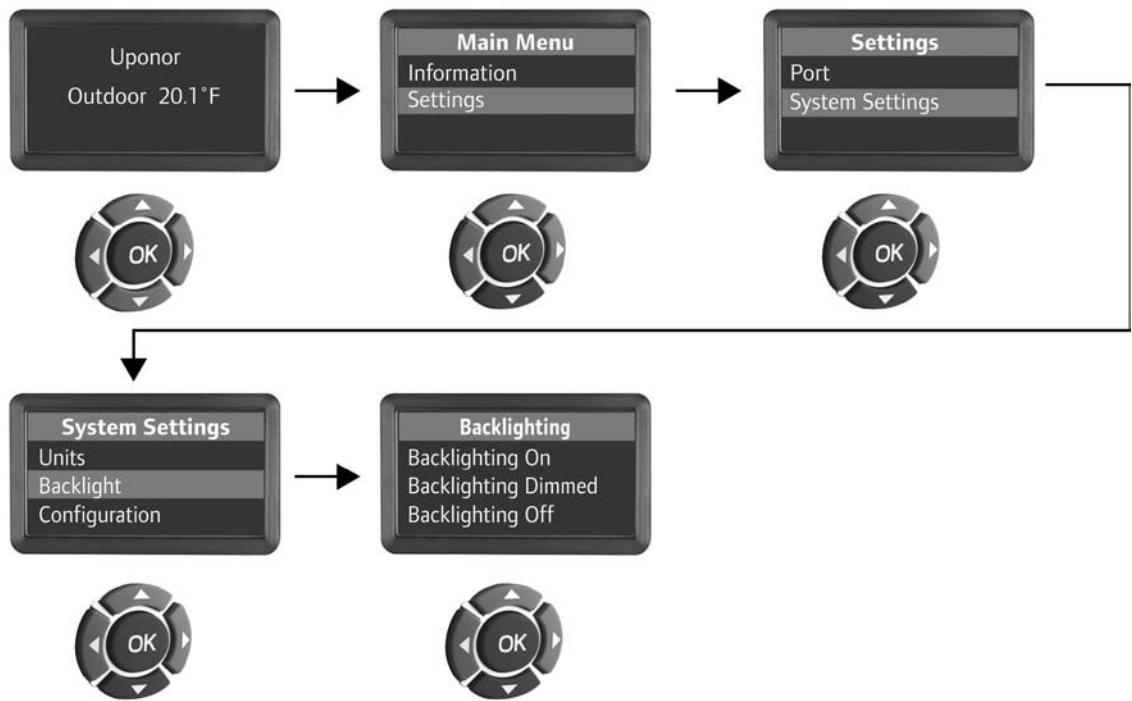

Figure 8-2: Adjusting System Setting Backlighting

This Save and Load feature of Multifunction provides the following functions:

- **Save Function** — The Save function allows you to save all of the setup and setting information on the data key for later use.

- **Load Function** — The Load Configuration function allows you to transfer setup and setting information from the data key to the control. Use this function when replacing a control or when configuring multiple systems with similar design. This lets you perform system setup in a fraction of the time.

  Note: The data key does NOT come with a preconfigured setup.

To use the Save and Load Configuration feature, you need to remove the Display Unit from the back enclosure to access the data stick slot.

1. Remove the front enclosure for the Display Unit.
2. Grab the bottom of the display, and gently apply pressure to pull the bottom of the display away from the back plate.
3. Once the bottom of the display is clear from the lower snaps, rotate it toward you and lift up. Then separate the display from the back plate.
4. The cable between the display and the main control must remain connected for this feature to operate correctly.
5. Turn the display unit over so that the cable connection and the back of the display are viewable.
6. Remove the cover hiding the data stick slot.
7. Insert the data stick into the connection until it bottoms out. The stick and the insert opening are "keyed" so that the data stick will only go in only one way. Do not use force.

Refer to the following two sections, **Adjusting System Settings (Saving and Loading)** to see how to navigate to this function using the menu system of the Display Unit.

Adjusting System Settings — Saving Configurations

The Display Unit allows the user to save any setup information, including port assignments, input assignments, temperature settings and other parameters such as backlighting and units. This provides a simple and easy method to reload or transfer system setup information to other like systems.

To save the current configuration in the Multifunction Control:

1. On the opening screen, press OK to access the Main Menu.
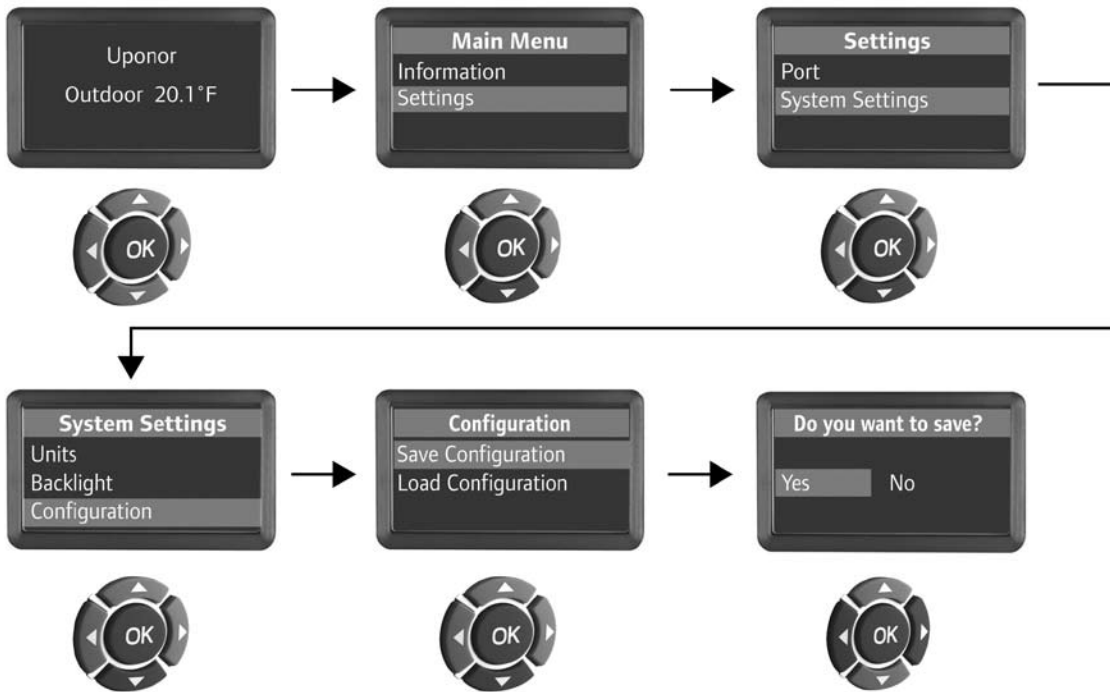2. On the Main Menu, press the down arrow to select "Settings" and press OK.

Figure 8-3: Saving Configuration

If the following screen appears, check to make sure that the data stick in correctly inserted into the slot on the back of the display unit:

Invalid Data or Missing Key

Press OK to return to the previous screen.

Figure 8-4: Error Message Screen

3. On the Settings menu, press the down arrow to select "System Settings" and press OK.

4. On the System Settings menu, press the down arrow to select "Configuration" and press OK.

5. On the Configuration screen, press OK to select "Save Configuration."

6. Confirm the save operation by pressing OK for YES or cancel the save operation by navigating to the NO option and pressing OK.

Adjusting System Settings — Load Configurations

The Display Unit allows the user to load any setup information previously saved to a data stick, including port assignments, input assignments, temperature settings and other parameters such as backlighting and units. This provides a simple and easy method to reload or transfer system setup information to other like systems.

To load a configuration setup in the Multifunction Control:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, scroll using the down arrow to select "System Settings" and press OK.

4. On the System Settings menu, scroll using the down arrow to select "Configuration" and press OK.

5. On the Configuration screen, scroll down to select "Load Configuration" and press OK.

6. Confirm the load operation by pressing OK for YES or cancel the load operation by navigating to the NO option and pressing OK.
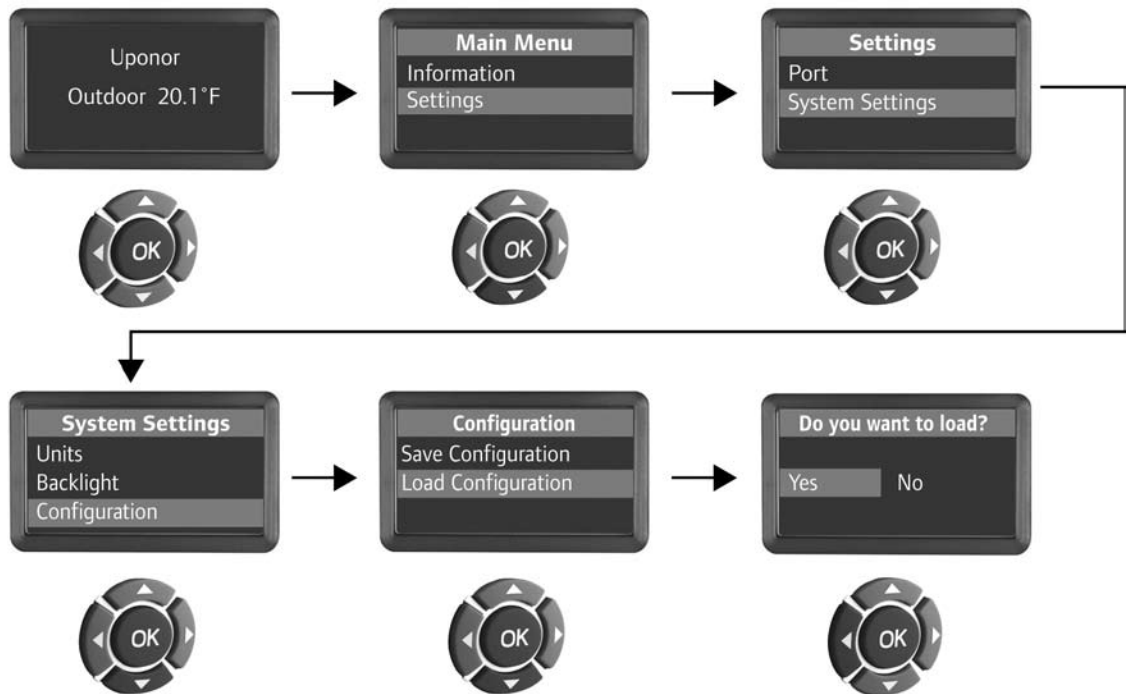
Figure 8-5: Loading Configuration

If the following screen appears, check to make sure that the data stick in correctly inserted into the slot on the back of the display unit:

Press OK to return to the previous screen.

Figure 8-6: Invalid or Missing Key Message

Checking the Software Version

The Display Unit allows the user to verify the software version currently installed on the control.

Multifunction can be upgraded in the field only if performed by qualified installers or factory representatives.

To verify the current software version to see if an upgrade is available, use the following steps from the main screen:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll down to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Information."

4. On the Information menu, scroll down to select "Software Version" and press OK.

5. After viewing the Software Version screen, press OK to return to the previous menu.

Note: At the time of this publishing (May 2009), the current software versions are:

- Interface:
  0.0.11 (1.0.7)
- Database:
  0.0.16 (0.0.0)
- Firmware (FW) Version:
  65.53.8 (0.0.0)

If you have questions or need to find out if the displayed version is the most current, contact our Technical Services for additional information:

- US: 888.594.7726
- Canada: 888.994.7726
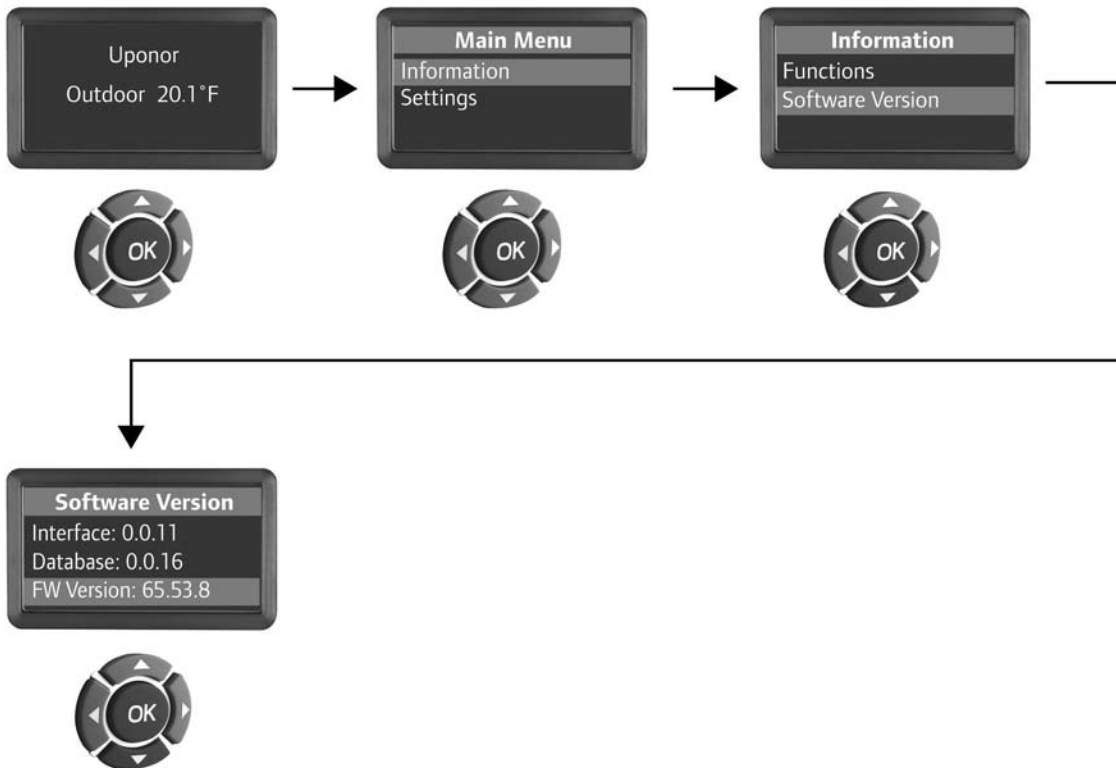
Figure 8-7: Checking Software Version

Uponor

Section 9
Setting up the Multifunction

This section takes you through the procedure for setting up the Multifunction Control. We will use the example below as an exercise for programming and setup. However, the possible combinations and configurations available for optimizing your system are endless. This section covers the setup and menu information necessary to utilize the full power and flexibility of the control.

As a suggestion, it is recommended that you complete the wiring for the "any demand" inputs prior to setting up the control.

Slab

SM Sensor

Figure 9-1: Setting up Multifunction

Setting the Boiler Port

Prior to adjusting any settings, it is necessary to assign a port (or ports) for the boilers before Multifunction can provide proper control.

Important: Boiler connections MUST be assigned to Ports 1 and 2. Always start with Port 1 for 1 to 2 boilers; then use Port 2 for boilers 3 and 4.

In our example, the boiler is set up on Port 1. To assign Port 1 for the boiler connection, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
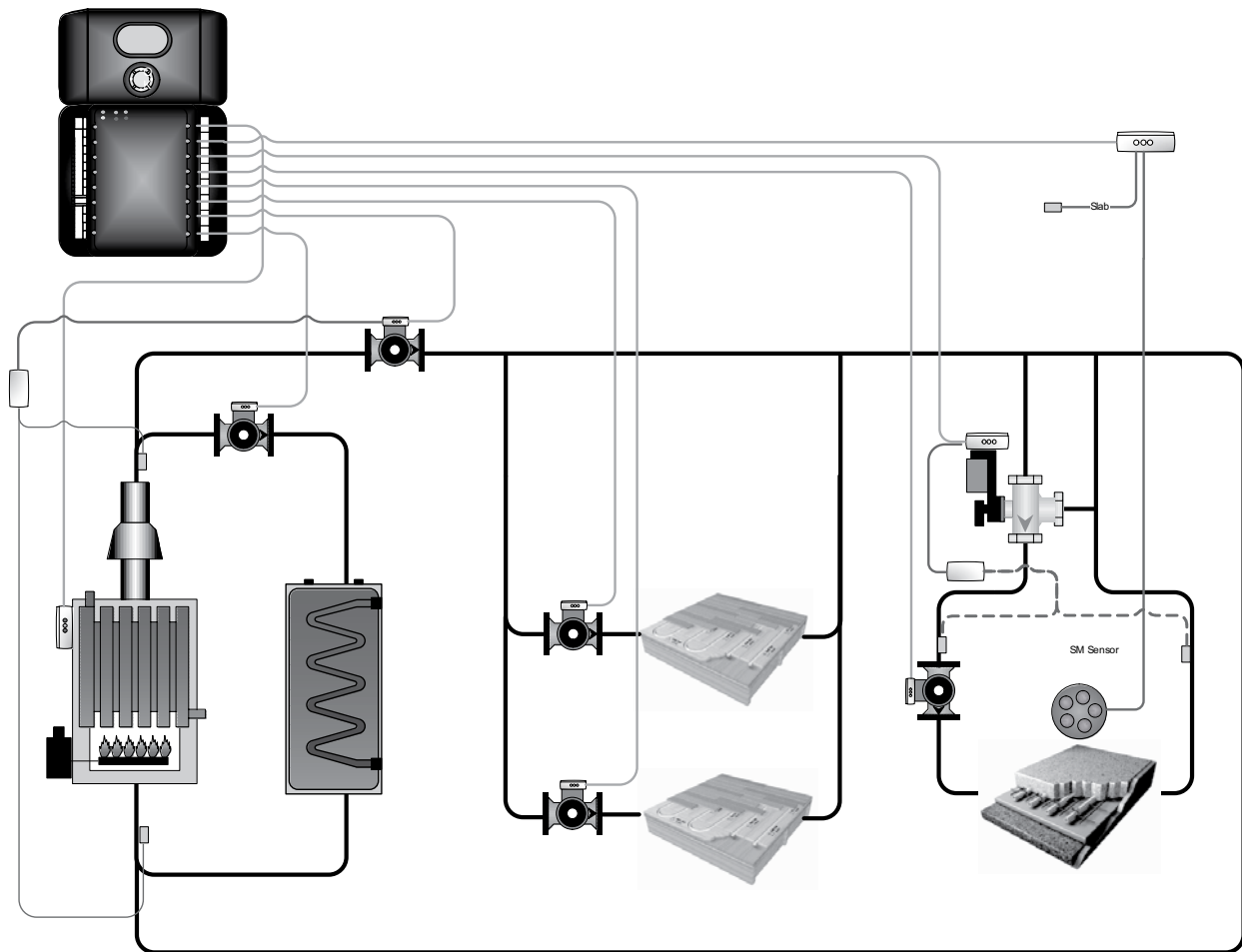
2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press the down arrow to select "Ports" and press OK.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3			X						
Port 4				X					
Port 5							X		
Port 6							X		
Port 7		X							
Port 8			X						

Figure 9-2: Connection Ports Worksheet

4. On the Ports menu, press the down arrow to select "Port1" and press OK. Once the OK button is pressed, Port 1 is assigned and the control now has input that boiler function is required.

Now that the boiler has a port assigned, additional settings are available in the Display Unit for optimizing boiler functionality. The following pages lead you through the steps for optimizing the boiler operation.
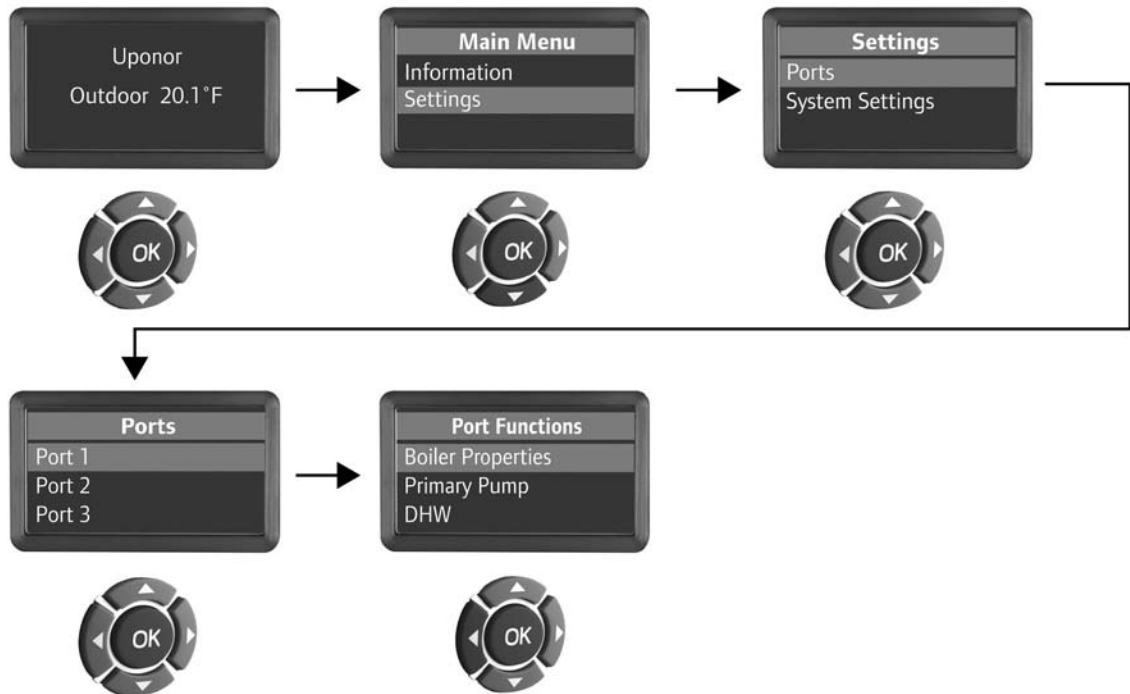
Figure 9-3: Assigning Boiler to Port 1

Boiler(s) Settings — Number of Boilers

Multifunction provides the ability to control and stage up to four (4) ON/OFF boilers. Important: Boiler connections and settings MUST be assigned to Ports 1 and 2. Always start with Port 1 for 1 to 2 boilers, then use Port 2 for boilers 3 and 4. The boiler-selection feature will not be available on any other ports.

To facilitate the proper functioning of Multifunction to turn ON and OFF the boilers and maintain equal runtimes, you must set the number of boilers used in the system.

To set the number of boilers that Multifunction will manage, use the following steps:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, select "Port 1." This will open the Port Functions screen for Port 1.

5. On the Port Functions screen, press OK to select the default selection, "Boiler Properties."

6. On the Boiler Properties press OK to select "Number of Boilers."

7. On the Number of Boilers screen use the up and down arrows to set the number of boilers. For our example, we only have one boiler so the value will be set to "1."

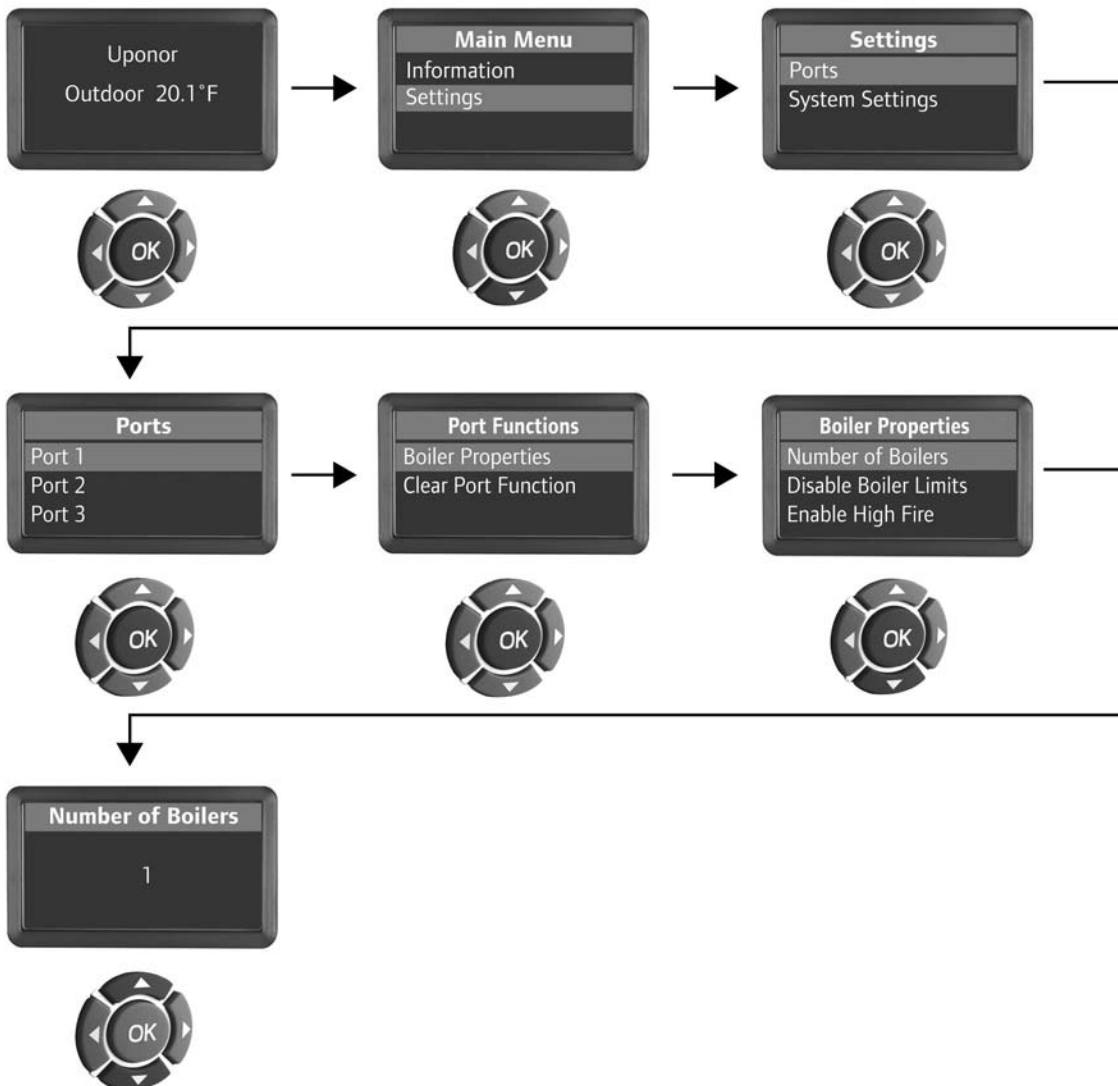8. Press OK to accept the setting and return to the previous menu.

Figure 9-4: Specifying the Number of Boilers

Boiler Settings — Disabling Boiler Limits

With the increase in Modulating Condensing (ModCon) boilers that have built-in controls for self-management, it is no longer necessary for Multifunction to ensure minimum return temperatures. When a boiler has this ability, the Boiler Limits setting can be turned off, as follows:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, select "Port 1" to open the Port Functions screen for Port 1.

5. On the Port Functions screen, press OK to select the default selection, "Boiler Properties."

6. On the Boiler Properties screen, scroll using the down arrow to select "Disable Boiler Limits" and press OK.

7. On the Disable Boiler Limits screen, use the up and down arrows to set the value to Yes or No. In this case, select "Yes" to disable the boiler limits.

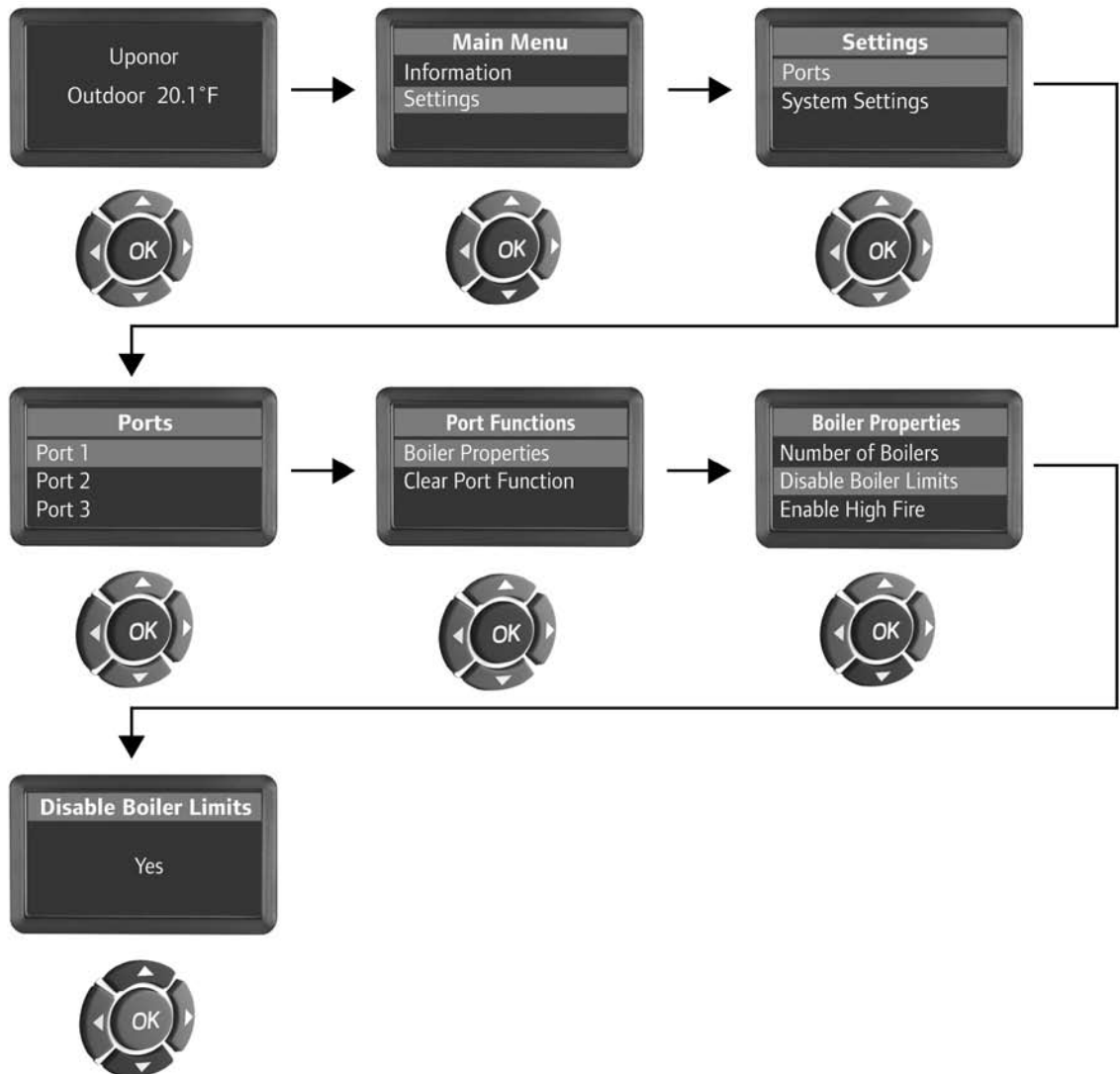8. Press OK to accept the setting and return to the previous menu.

Figure 9-5: Disable Boiler Limits

Boiler(s) Settings — Enabling High Fire

This setting should only be used with Modulating Condensing (ModCon) boilers or other types of boilers that have a second set of contacts that will bring on a second stage (max heat) or place the device into 100% fire rate for the boiler.

⚠️ **Caution:** This feature is only available on single boiler installations. In ModCon boilers, when a space heating call is made, the boiler will modulate to provide a delivered water temperature to the system based on the setting on the boiler. However, if DHW is a component of the system, when the tank needs to be reheated, it is more efficient and effective to reheat the tank with 180°F (82°C) water versus a temperature that is potentially lower than the tank setting [e.g., 120°F (49°C)] . In setting this parameter to ON, the control now has the ability to override the boiler control.

Important: Check the boiler manufacturer to ensure they allow a dry contact connection to the DHW sensor input on the boiler control. The Buderus GB series does NOT allow this and will only accept a 10K sensor input.

4. On the Ports menu, select "Port 1" to open the Port Functions screen for Port 1.

5. On the Port Functions screen, press OK to select the default selection, "Boiler Properties."

6. On the Boiler Properties menu, scroll using the down arrow to select "Enable High Fire" and press OK.

7. On the Enable High Fire screen, use the up and down arrows to set the operation to Yes (for On) and No (for Off). In this case, select "Yes" to enable the high fire.
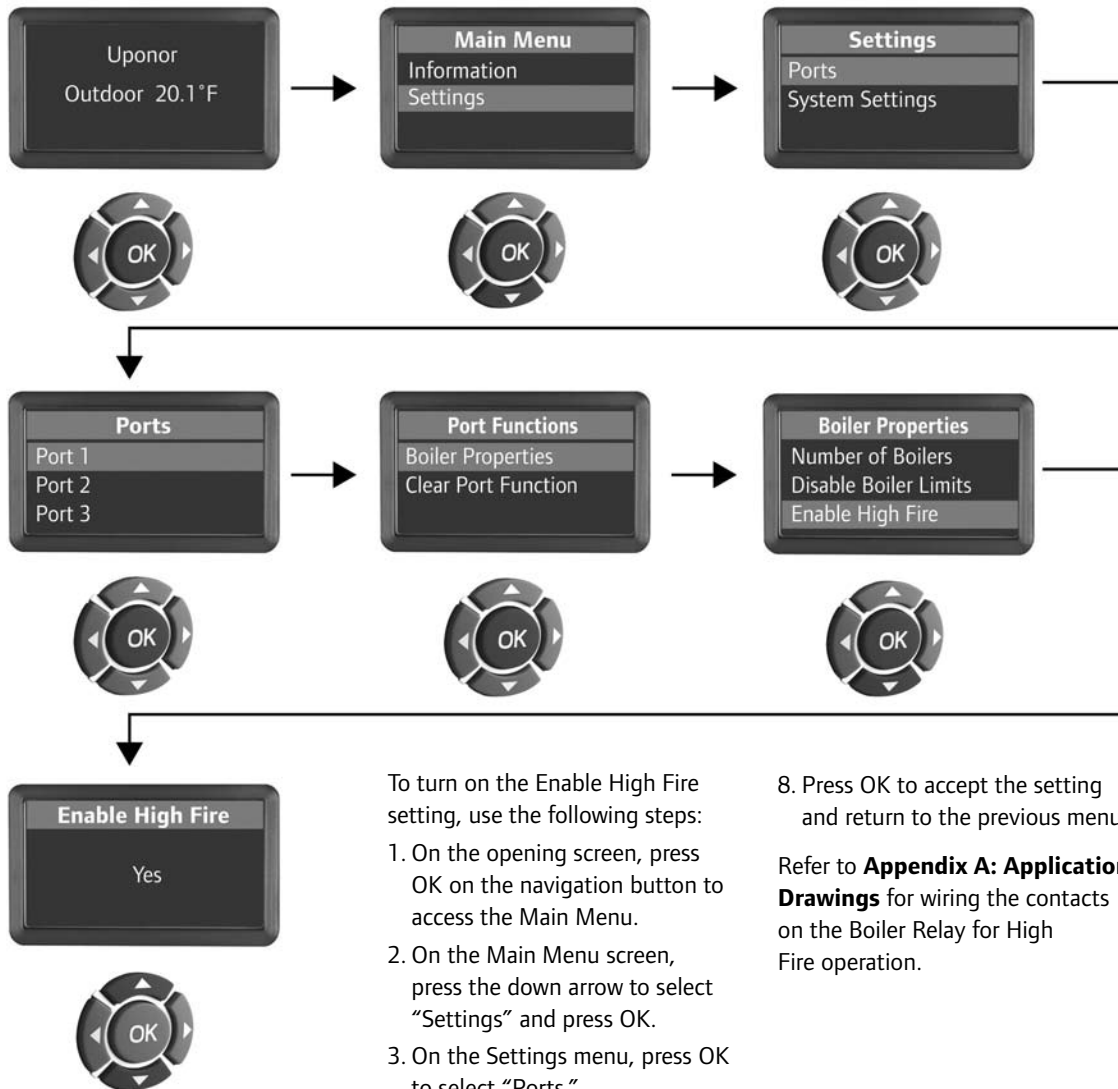
To turn on the Enable High Fire setting, use the following steps:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu screen, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

Figure 9-6: Enabling High Fire

8. Press OK to accept the setting and return to the previous menu.

Refer to **Appendix A: Application Drawings** for wiring the contacts on the Boiler Relay for High Fire operation.

Boiler Settings — Setting Boiler Maximum and Minimum Limits

Certain boilers and heating devices require minimum return temperatures to keep the flue gases from condensing and damaging the boiler. A minimum temperature can also be used to ensure that a correct water temperature is provided during the warmer portions of the heating season. Inversely, a maximum temperature is used for either protecting the device from running too hot or for ensuring that a maximum temperature is not exceeded for the specific heating application.

The temperature information is provided by the dual sensor connected to a port setup for the Primary Pump, whether a physical Primary Pump is installed or not — making this setting usable in single and multiple boiler installations. **Note:** If you have disabled boiler limits, Multifunction will ignore these settings.

Important: This feature should NOT be used in place of the boiler safety limit.

To set the minimum and maximum boiler limits, use the following steps:

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, select "Port 1" to open the Port Functions screen for Port 1.

5. On the Port Functions screen, press OK to select the default selection, "Boiler Properties."

6. On the Boiler Properties menu scroll using the down arrow to select "Boiler Max Min" and press OK.

7. On the Boiler Max Min screen, use the up and down arrows to change the temperature for the Min and Max values. Press the left and right arrow buttons to move back and forth between the settings.
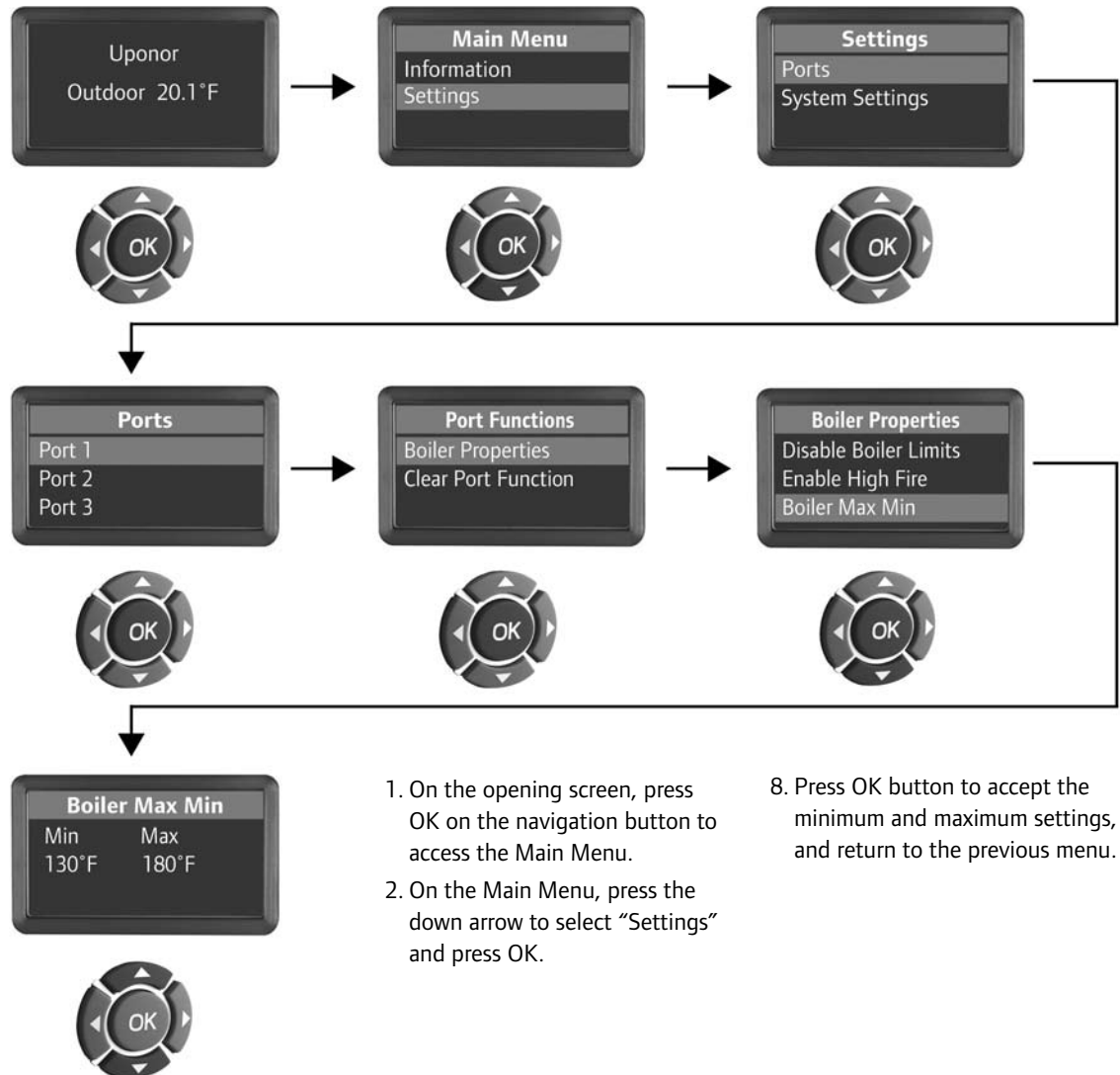
1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

8. Press OK button to accept the minimum and maximum settings, and return to the previous menu.

Figure 9-7: Set Minimum and Maximum Boiler Limits

Boiler Settings — Demand Input

After adjusting all of the other boiler settings, the last remaining piece of data you need to set tells the control how to identify a heat demand. Whether this input comes from a pump relay, an end switch, etc., the demand input needs to be set in order for Multifunction to run the boiler(s).

Note: Functions like Mixing, DHW, Zone Pumps, etc., are linked internally to enable boiler operation. You only need to set this demand input value for a wiring connection that requires boiler

operation (e.g., high temperature, baseboard, fan coils, etc.). The value for the demand input correlates to the number of the wiring connection on the lower left side of the Multifunction Control.

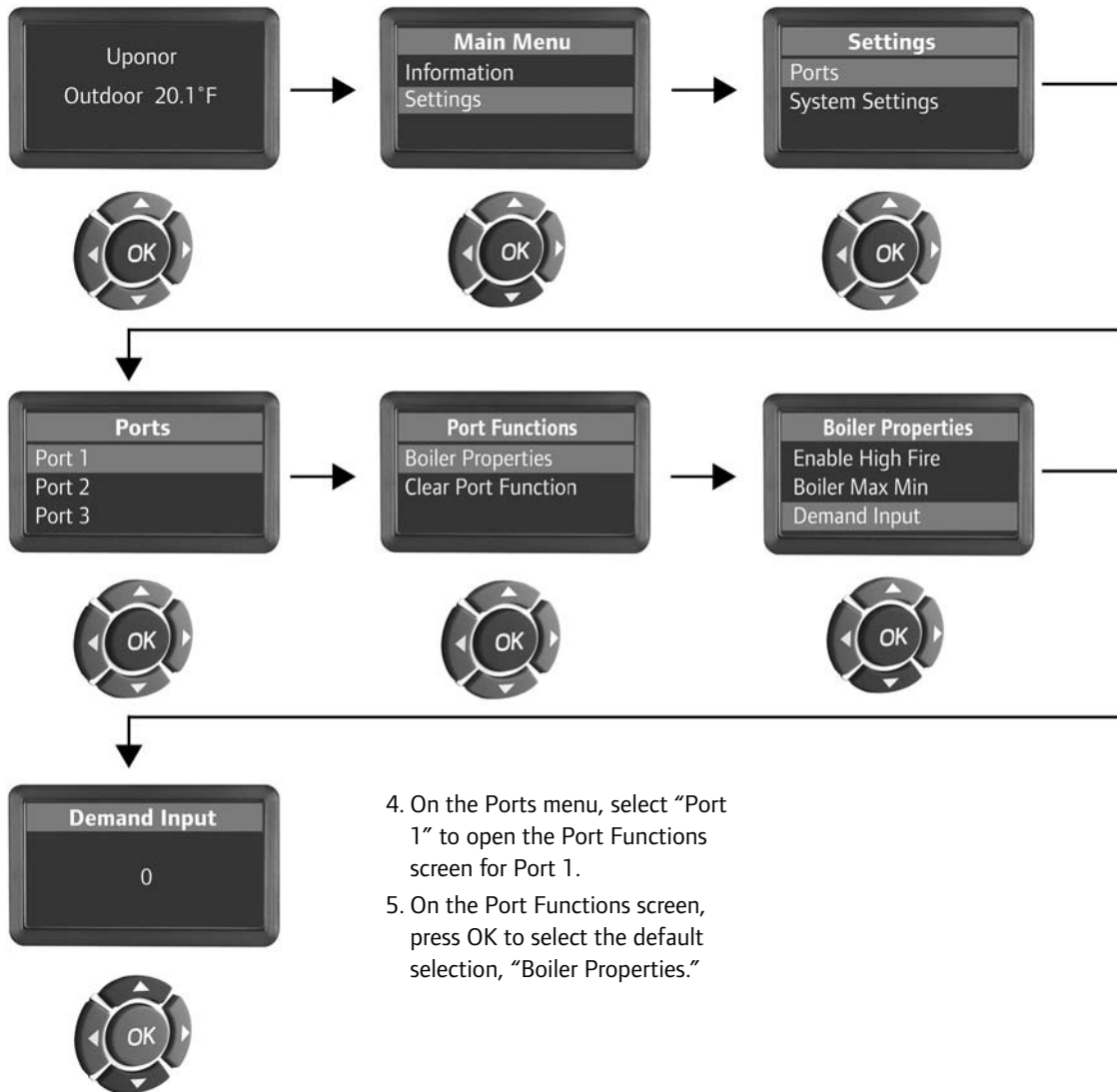To set this demand input, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

6. On the Boiler Properties menu scroll using the down arrow to select "Demand Input" and press OK.

7. Use the up and down arrows to change the value for the input connection (range = 0 – 8).

   Note: it is not necessary to have the input connection across from the port or device that the demand will operate.

8. Press OK to accept the setting and return to the previous menu.

4. On the Ports menu, select "Port 1" to open the Port Functions screen for Port 1.

5. On the Port Functions screen, press OK to select the default selection, "Boiler Properties."

Figure 9-8: Boiler Demand Input

Setting the Primary Pump Port

Prior to adjusting any settings, it is necessary to assign a port (or ports) for the Primary Pump in order for Multifunction to recognize the sensors regardless of whether the pump is installed.

In our example (see **Figure 9-9**), the Primary Pump is set up on Port 7. To assign Port 7 for the Primary Pump connection, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll with the up and down arrows to select "Port 7" and press OK.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3			X						Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 9-9: Worksheet Example

5. On the Port Functions screen, select "Primary Pump" and press OK. When the OK button is pressed, Port 7 is assigned and the control has input that the Primary Pump function and/or the Supply and Return sensor are installed.

With a port assigned to the Primary Pump, the Display Unit provides additional settings for optimizing Primary Pump operation. The following pages lead you through steps to optimize Primary Pump functionality.

Note: Unlike other devices, the Primary Pump does not require demand input settings. If you have set it up in Display Unit, it will start whenever there is a heat demand (e.g., space, DHW, Snow Melt, etc.).
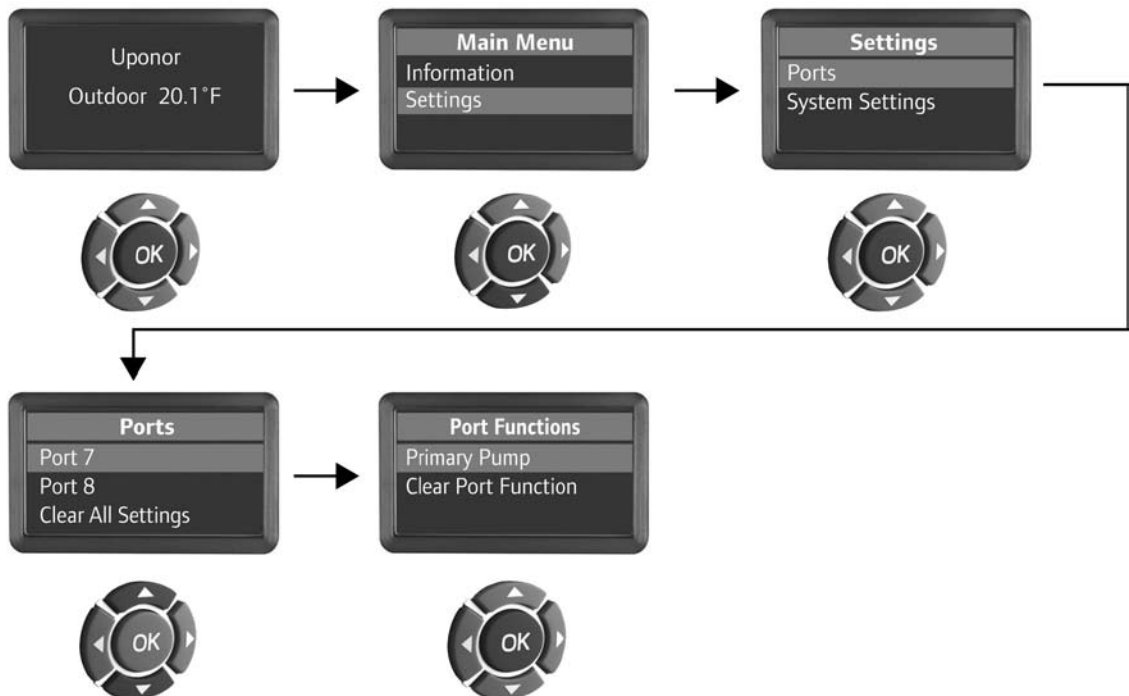

Figure 9-10: Assigning Port 7 to the Primary Pump

Primary Pump Settings — Turning Off for DHW

Depending on how the system is piped, it may be necessary for the Primary Pump to turn off when the DHW tank is heating. This provides the following benefits:

· It efficiently uses all boiler outputs to heat the tank.

· It prevents higher temperature water (from either UFH or Snow Melt functions) that could cause potential damage.

To turn off the Primary Pump during DHW operation, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 7" and press OK.

5. On the Port Functions screen, select "Primary Pump" and press OK.

6. On the Primary Pump screen, select "Turn Off for DHW" by pressing OK.

7. On the Turn Off for DHW screen, use the up and down arrows to change the value (Yes or No).

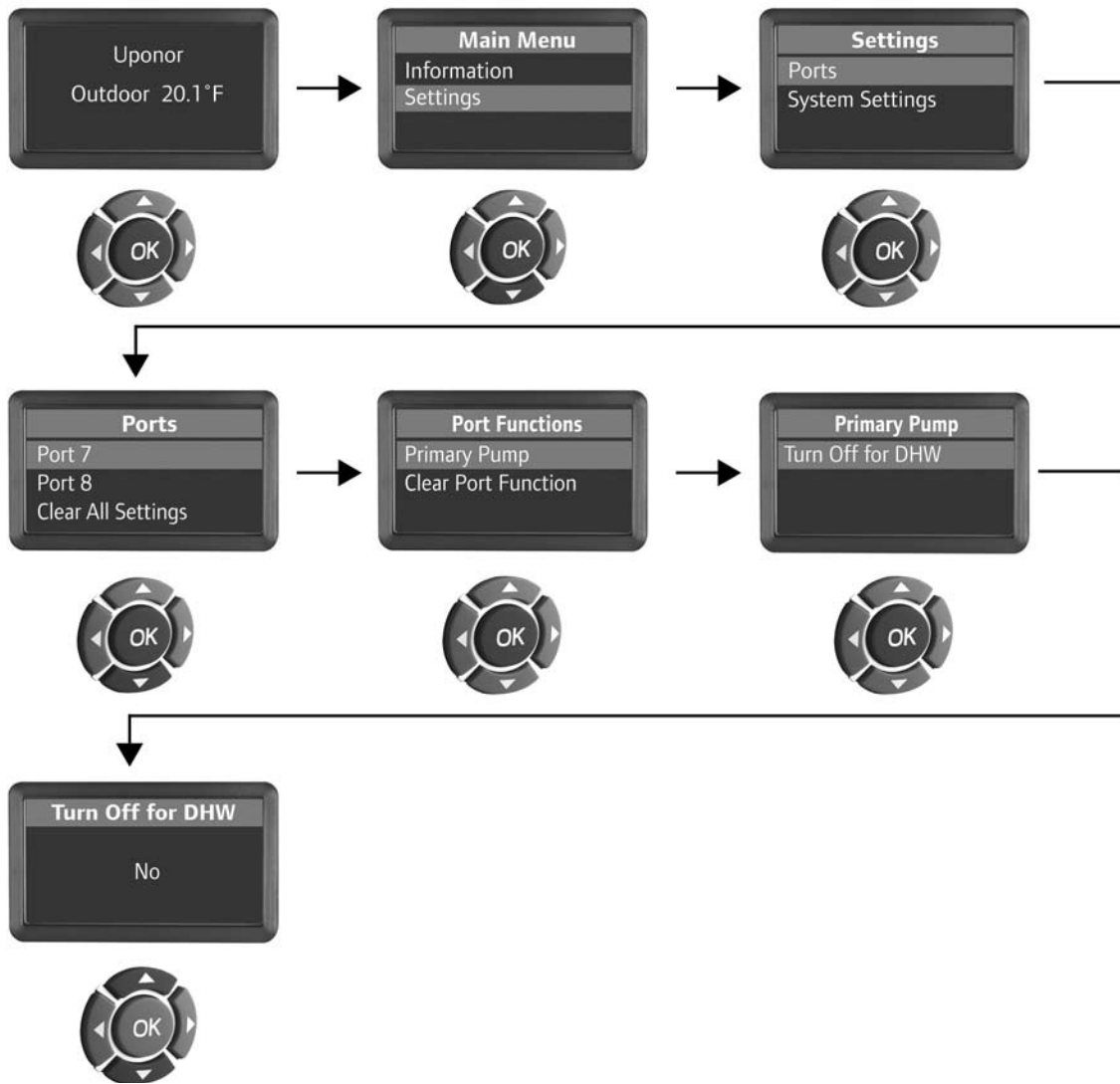8. Press OK to accept the setting and return to the previous menu.

Figure 9-11: DHW Priority — Turning Off Primary Pump

Setting the Domestic Hot Water (DHW) Port

For Multifunction to provide proper control, it is necessary to assign a port (or ports) for the DHW Pump prior to adjusting any settings. Multifunction has the flexibility to setup a DHW control with a tank sensor or an aquastat input.

In our example, the DHW Pump is set up on Port 6. To assign Port 8 for the DHW Pump connection, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll with the down arrow to select "Port 8" and press OK.

5. Once the OK button is pressed, Port 8 is assigned and the control "knows" (has input) that a DHW Pump function and/or DHW tank sensor is installed. Additional settings are now available for DHW operation. The following pages show settings for optimizing DHW operation.
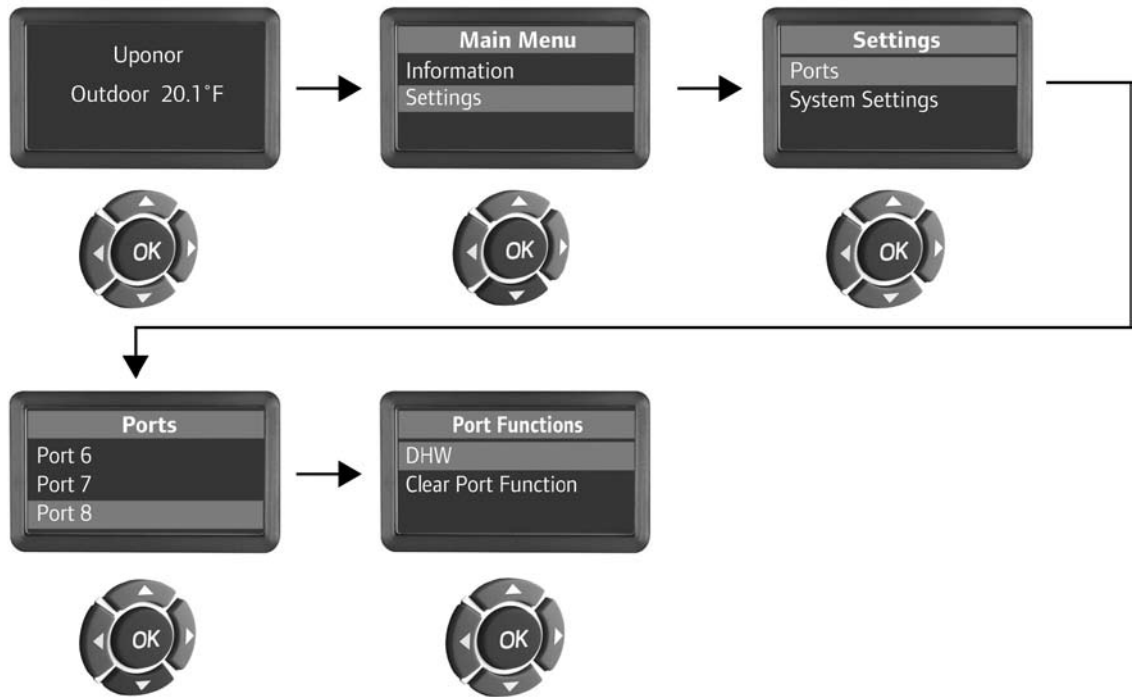

Figure 9-12: Assign Port 8 to DHW Pump

DHW Settings — DHW Tank Setpoint

If a Domestic Hot Water (DHW) Tank Sensor, 10K (A9012002) is installed within the tank well, Multifunction provides the functionality to set the desired temperature for the DHW tank. You can easily adjust this setting based on the needs of the occupants.

To set the DHW Tank Setpoint, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll using the down arrow to select "Port 8" and press OK.

5. On the Port Functions screen, select "DHW" and press OK.

6. On the DHW screen, select "DHW Setting" and press OK.

7. On The DHW Setting screen, use the up and down arrows to change the value.

⚠️ **Warning:** Do not set above 140°F (60°C) without a tempering valve or anti-scald device. Always follow local codes and jurisdiction.

8. Press OK to accept the setting and return to the previous menu.
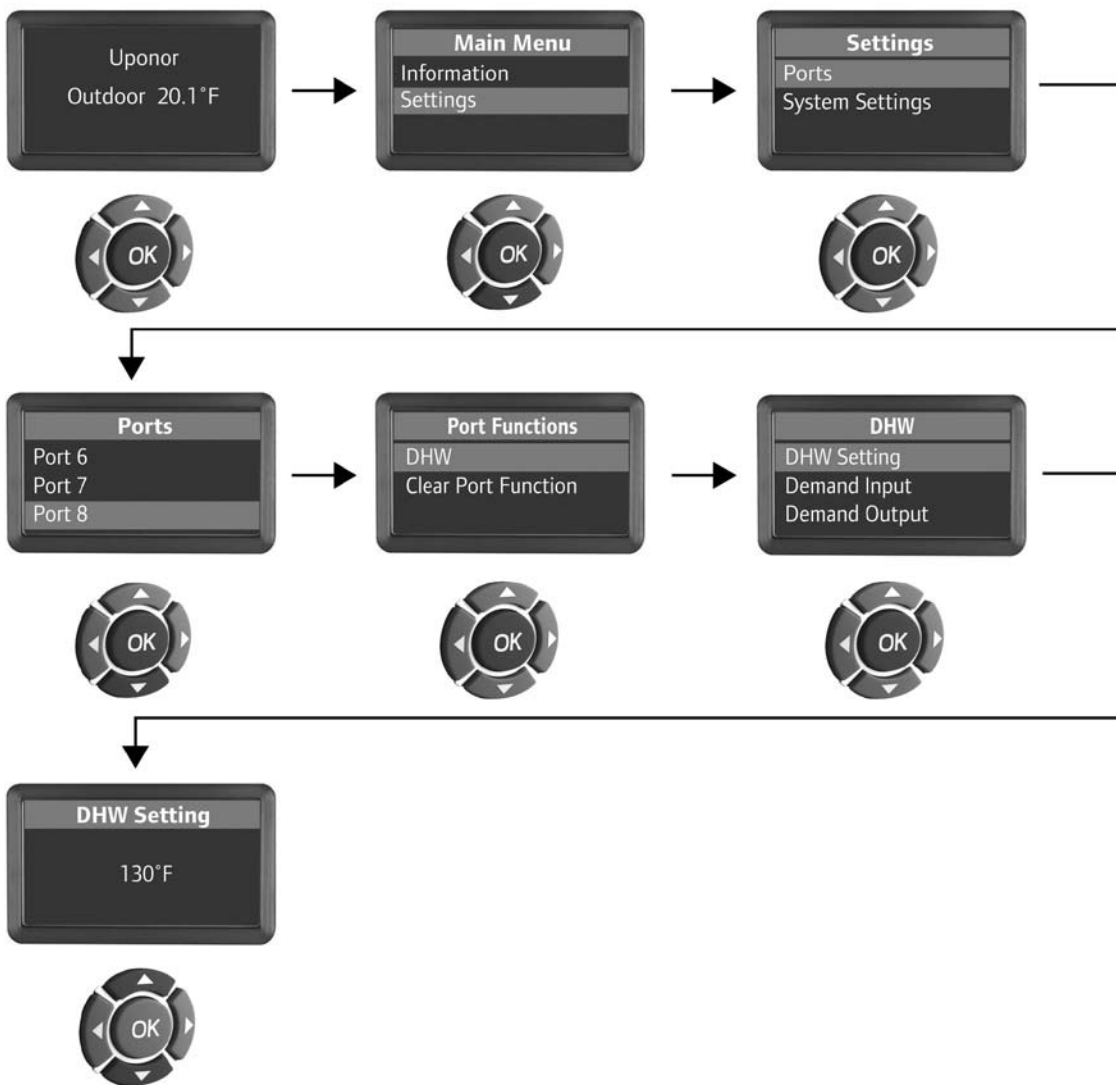

Figure 9-13: Set DHW Tank Setpoint

DHW Settings — Demand Input

If a tank sensor is not installed within the DHW tank, Multifunction requires an external input from an aquastat or the operating control of the DHW tank (dry contact closure) to reheat the DHW tank. If an input is used to control the DHW, the DHW setting becomes irrelevant.

To set the demand input for the DHW, use the following steps:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, press the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll with the down arrow to "Port 8" and press OK.

5. On the Port Functions screen, select "DHW" and press OK.

6. On the DHW screen, use the down arrow to select "Demand Input" and press OK.

7. On the Demand Input screen, use the up and down arrows to change the value (range = 0 to 8).

   Note: It is not necessary to have the input connection across from the port or device that the demand will operate.

8. Press OK to accept the setting and return to the previous menu.
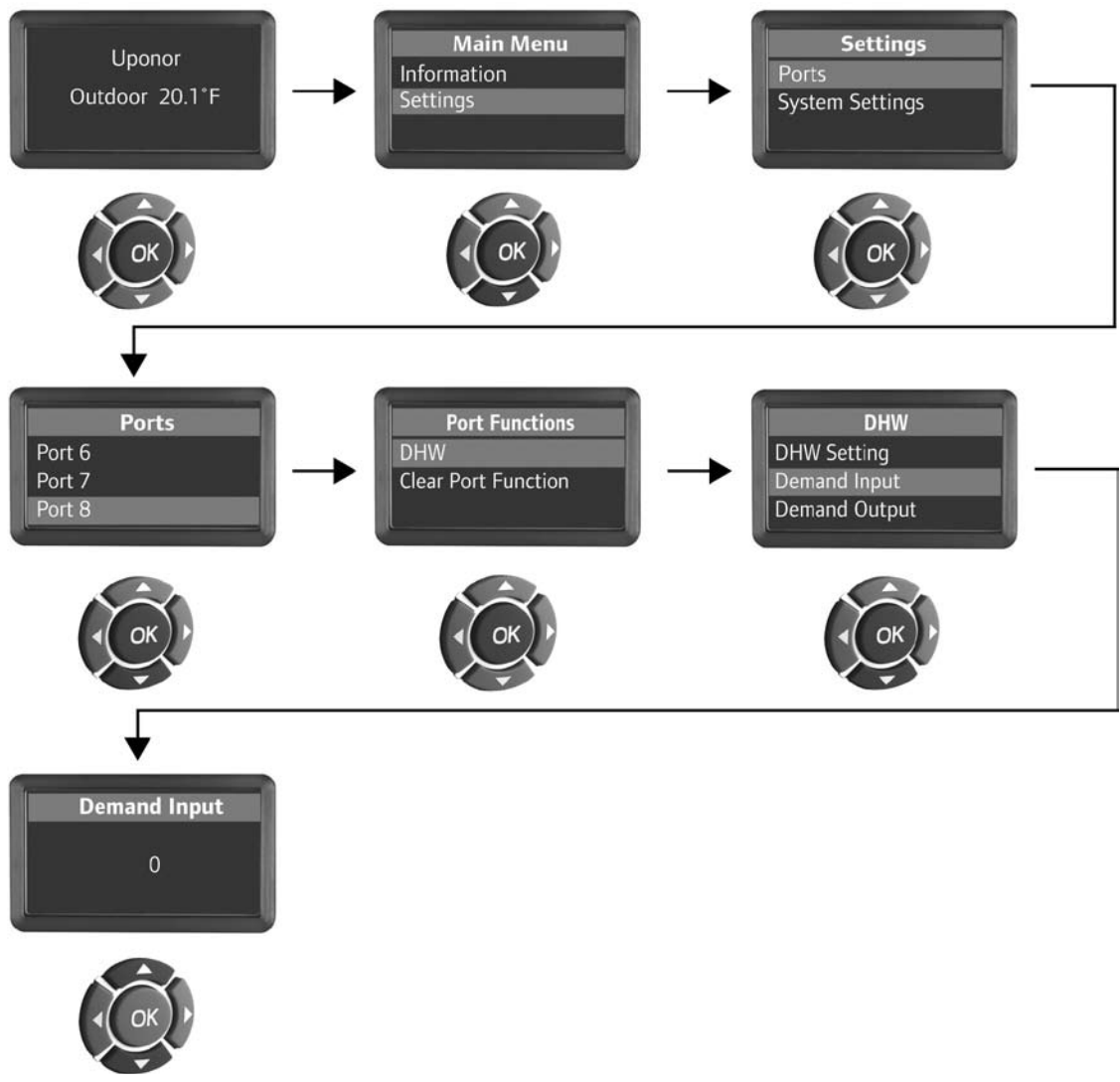

Figure 9-14: Set DHW Demand Input

Setting up Mix Port(s)

For Multifunction to provide proper control, it is necessary to assign a port (or ports) for Mixing prior to adjusting any settings. In certain installations, Multifunction has the flexibility to control up to three (3) different water temperatures. This is a combination of up to three (1 to 3) for space heating and two (1 to 2) for snow melting.

In our example, the mixing valve is set up on Port 3 (in our example, for Snow Melt). To assign Port 3 for the mixing valve connection, use the following steps:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3				X					Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 9-15: Worksheet (Mix Ports)

4. On the Ports menu, scroll using the down arrow to select "Port 3."

5. On the Port Functions menu, select "Mix Device" and press OK to select.

When the OK button is pressed, Port 3 is assigned and the control has input that the modulating or mixing valve is installed. At this time, additional settings will be available for Mixing setup and operation. The following pages lead you through the steps for optimizing the Mix Setting operations.
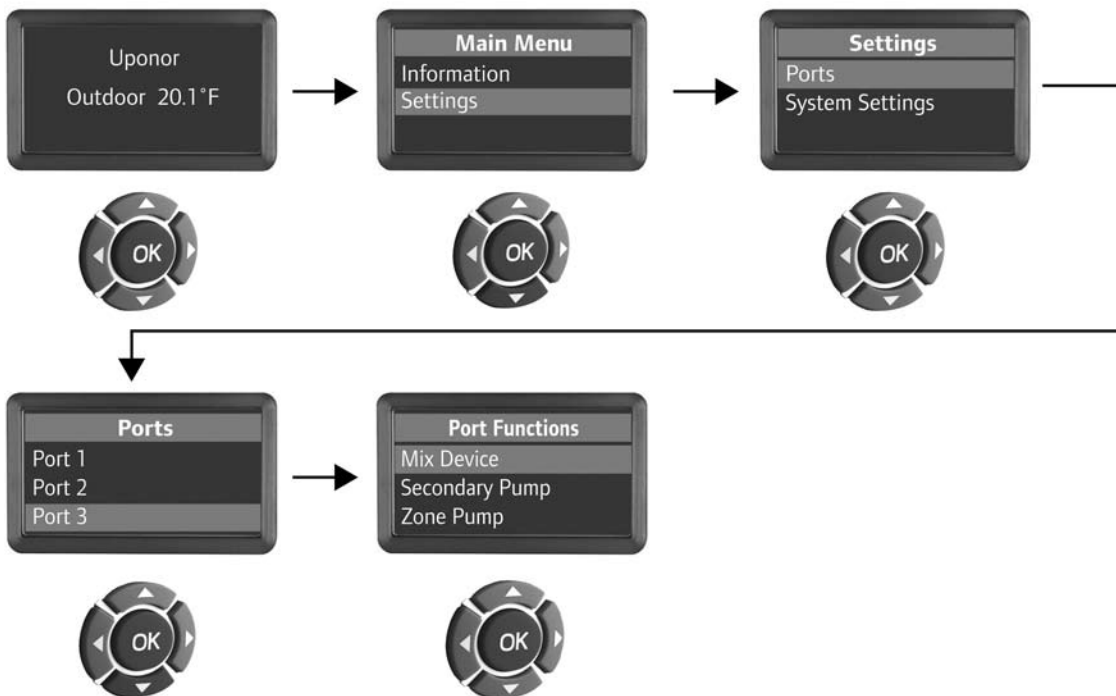

Figure 9-16: Set Ports for Mix Devices

Mix Settings — Heating or Snow Melt

When setting up a port for mixing (mix channel), Multifunction needs to know if the mixing is for inside the building (heating) or outside (snow melting) as the control algorithm is different due to the loads. For our example, we are using Port 3 for Mixing.

To set the mix channel for heating or snow melt, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, scroll to select "Mix Device" and press OK.

6. On the Mix Device menu, use the up and down arrows to scroll to the desired setting (heating or snow melt).

7. Press OK to accept the setting and return to the previous menu.

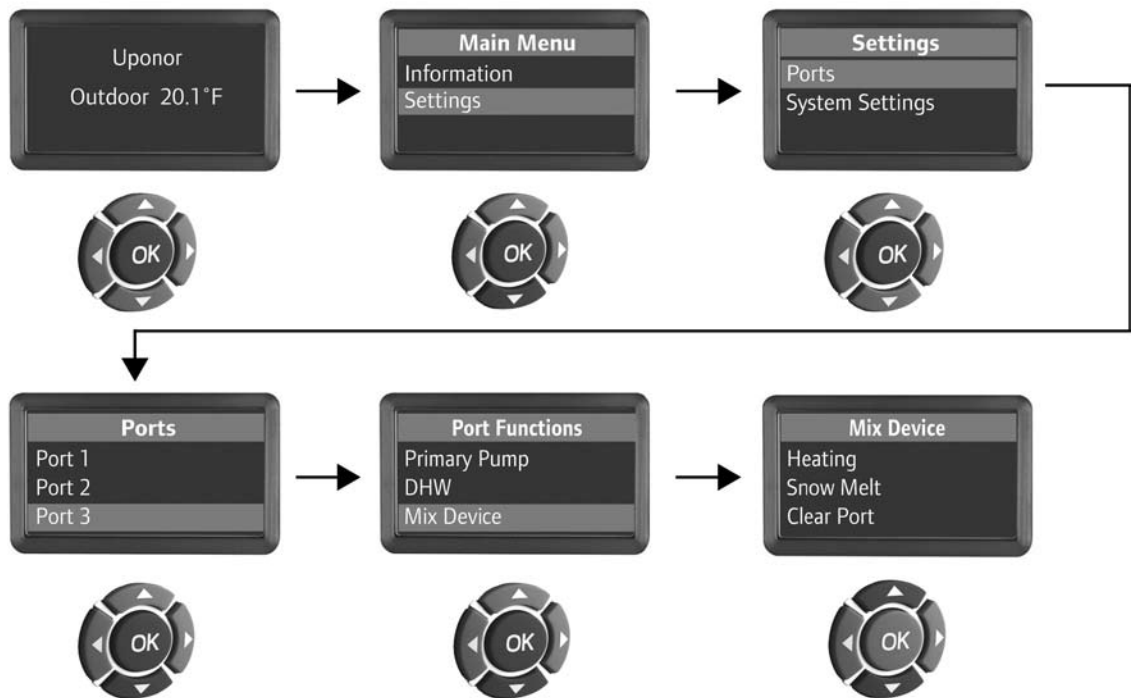**Note:** This setting will be required for each port assigned to Mixing.

Figure 9-17: Assigning Mix Device Function

Mix Settings, General — Mix Channel Number

When setting up a mix channel, the user is required to set a number reference for each of the channels. Multifunction will support up to three (3) total mix channels, automatically assigned by the control. It is important to keep track of the areas each mix channel references. Write down the number of each mix channel and the area it controls.

Note: This number will be required when performing setup of the secondary and zone pumps.

To view the mix channel number for a mix device, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, use the up and down arrows to scroll to the desired mix device (heating or snow melt). Press OK

to see the mix channel number for that device.

7. The last screen allows the user to view the number assigned to the water channel of selected mix device ("Heating" or "Snow Melt").

Note: You will notice a slight difference between the Heating and the Snow Melt descriptions. Regardless of which mode (Heating or Snow Melt) is chosen, the mix channel is set in the same manner. Ensure that when the number is set, the menu header reads "Mix Channel Number" for heating and "Mix SM Device" for snow melting.
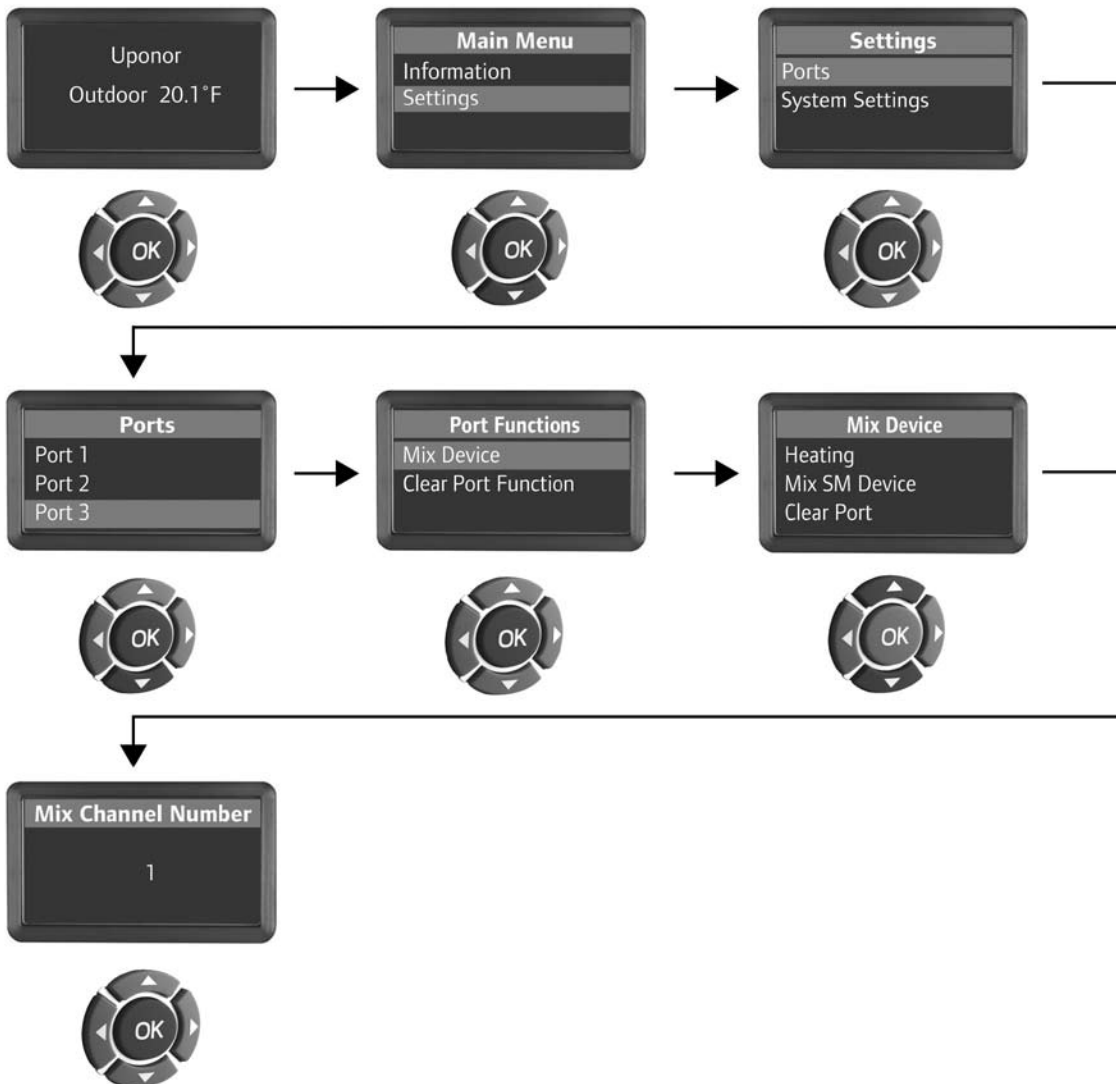

Figure 9-18: MIx Channel Number for a Mix Device

Mix Settings, General — Mix Device

When setting up a mix channel, the user must set the type of device that Multifunction controls so that it can mix the correct water temperature. Multifunction will support both modulating valves (0-10VDC) and injection pumps (< 3 Amps) for both heating and snow melting or a combination of both. For our example, the device type will be set to "Valve."

To set the mix device type, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll down to select "Port 3" and press OK.
5. On the Port Functions menu, select "Mix Device" and press OK.
6. On the Mix Device menu, use the up and down arrows to scroll to the desired mix device, in this case, "Mix SM Device" and press OK.
7. On the Mix SM Device menu scroll using the down arrow to select "Mix Device" and press OK.
8. Use the up and down arrows to change the device for the Mix Channel (Valve or Pump).
9. Press OK to accept the setting and return to the previous menu.

   Important: When using zone pumps after a mixing device for snow melting, set this up in the following manner:

   · Select "Heating" verses "Mix SM Device."
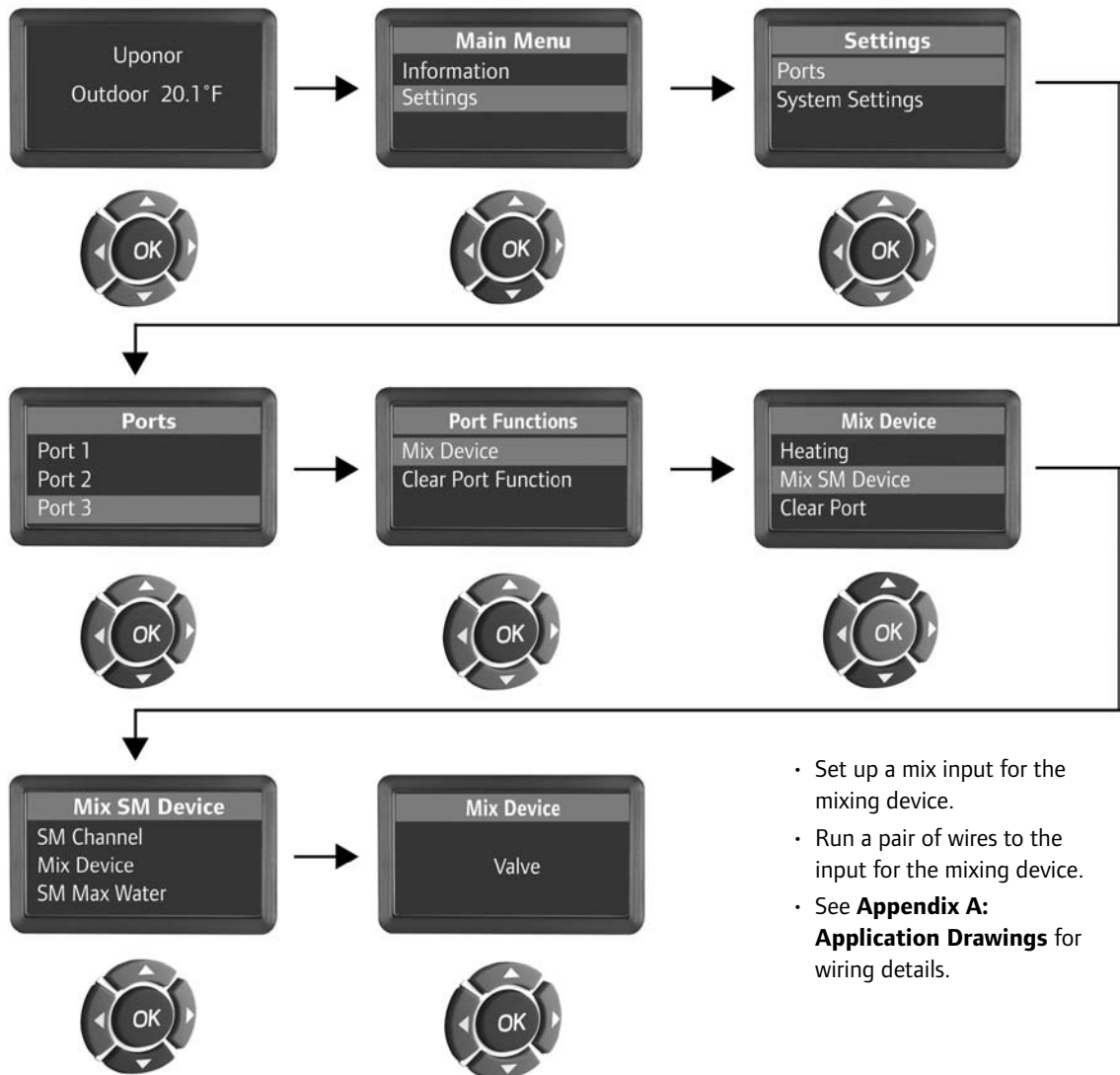   · Set up the demand output for the zone pumps.

· Set up a mix input for the mixing device.
· Run a pair of wires to the input for the mixing device.
· See **Appendix A: Application Drawings** for wiring details.

Figure 9-19: Setting the Mix Device

Mix Settings, Heating — Design Room Temperature

When setting up a mix channel for space heating (inside), the user needs to set the Design Room Temperature for Multifunction to mix the correct water temperature. The Design Room Temperature is the setting (thermostat) the system is designed to maintain during the coldest parts of the heating season [typical setting = 65°F to 70°F (18°C to 21°C)]. Use ADS design software or other equivalent heat loss programs. The Design Room Temperature is one of the many settings required. See the following pages for information on additional settings.

To set the Design Room Temperature, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, scroll with the down arrow to "Heating" and press OK.

7. On the Heating menu, scroll using the down arrow to select "Design Room Temp" and press OK.

8. On the Design Room Temp menu, use the up and down arrows to change the Design Room Temperature.

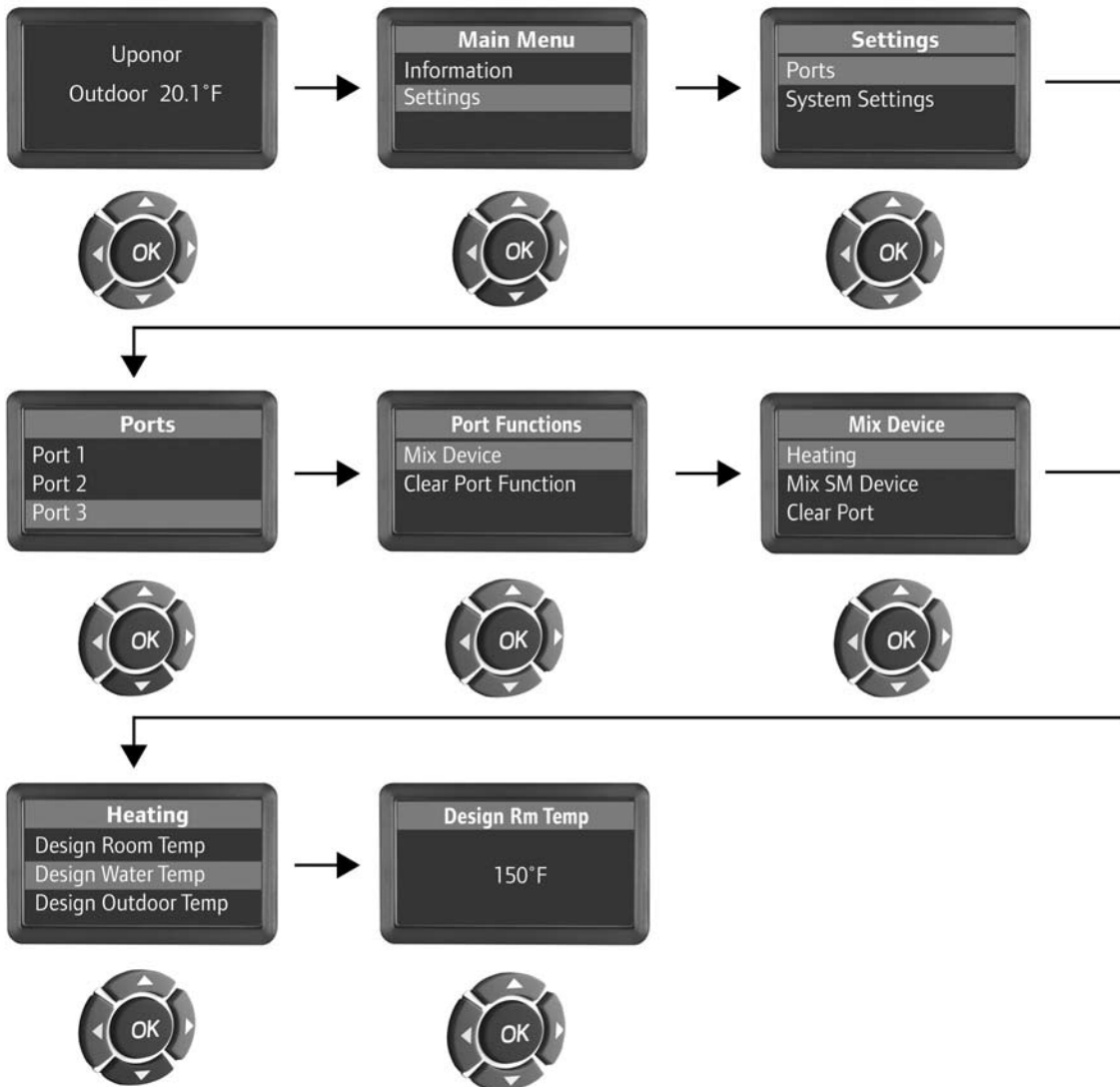9. Press OK to accept the setting and return to the previous menu.

Figure 9-20: Mix Settings (Heating) for Design Room Temperature

Mix Settings, Heating — Design Water Temperature

When setting up a mix channel for space heating (inside), the user must set the Design Water Temperature to enable Multifunction to mix the correct water temperature. The Design Water Temperature is the temperature required to maintain the Design Room Temperature during the coldest parts of the heating season. The Design Water Temperature is one of many settings required.

See the following pages for information on additional settings.

To set the Design Water Temperature, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll down to select "Port 3" and press OK.
5. On the Port Functions menu, select "Mix Device" and press OK.
6. On the Mix Device menu, use the down arrow to select "Heating" and press OK.
7. On the Heating menu, scroll using the down arrow to select "Design Water Temp" and press OK.
8. On the Design Water Temp menu, use the up and down arrows to change the Design Water Temperature.
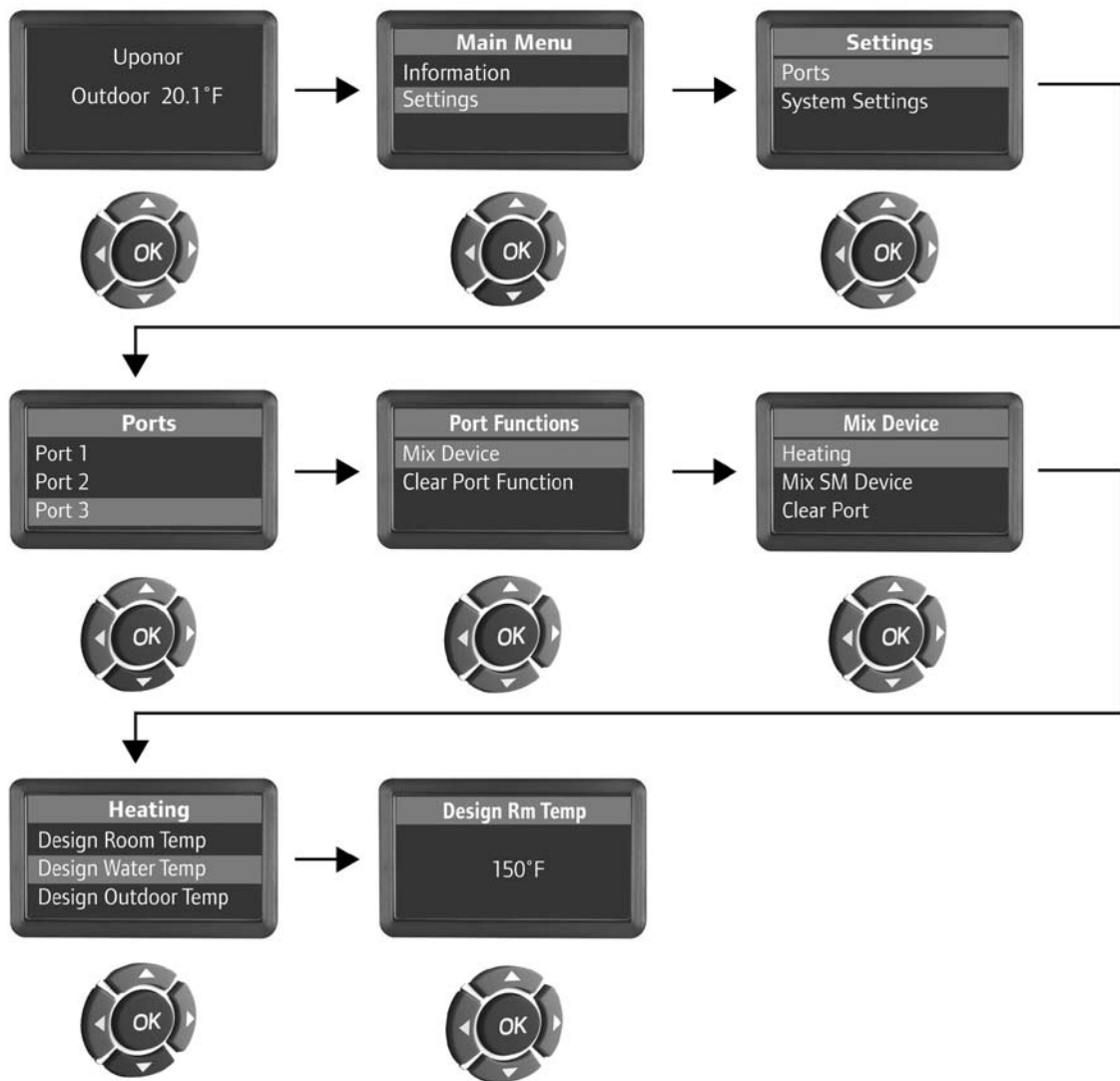9. Press OK to accept the setting and return to the previous menu.

Figure 9-21: Mix Settings (Heating) for Design Room Temperature

Mix Settings, Heating — Design Outdoor Temp

When setting up a mix channel for space heating (inside), the user must set the Design Outdoor Temperature for Multifunction to mix the correct water temperature. The Design Outdoor Temperature is the temperature that reflects temperature during the coldest parts of the heating season. The Design Outdoor Temperature is one of many settings required. See the following pages for information on additional settings.

To set the Design Outdoor Temperature, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, use the down arrow to select "Heating" and press OK.

7. On the Heating menu, scroll using the down arrow to select "Design Outdoor Temp" and press OK.

8. On the Design Outdoor Temp menu, use the up and down arrows to change the Design Outdoor Temperature to the desired setting.

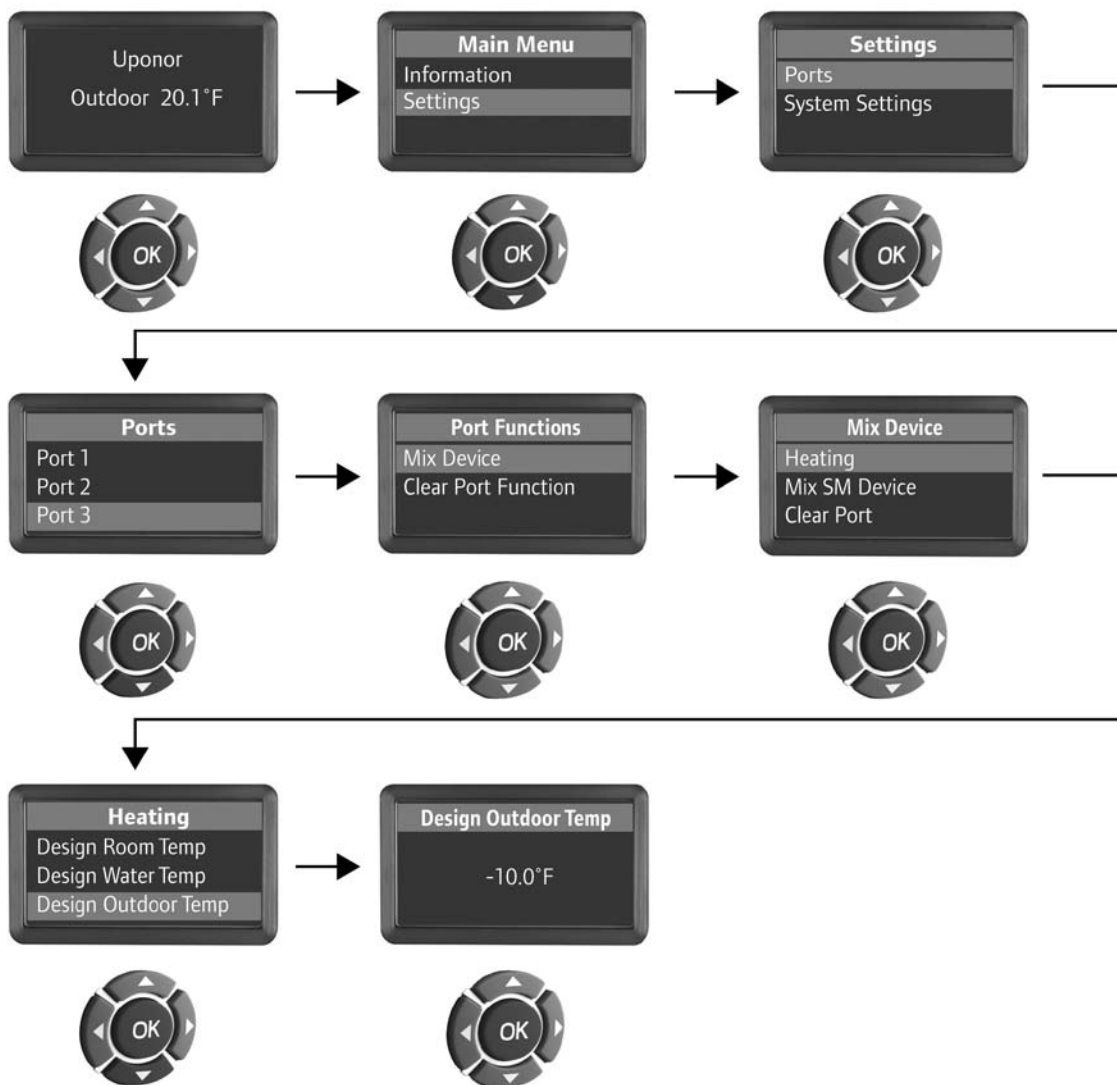9. Press OK to accept the setting and return to the previous menu.

Figure 9-22: Mix Settings (Heating) for Design Outdoor Temperature

Mix Settings, Heating — Warm Weather Outdoor Temperature (WWODT)

When setting up a mix channel for space heating (inside), the user can set an outdoor temperature where heating is no longer required. Once the outdoor temperature reaches this setting, DHW will continue to operate but other devices used for space heating will turn off until the outdoor temperature falls below this setting.

To set the WWODT, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll down to select "Port 3" and press OK.
5. On the Port Functions menu, select "Mix Device" and press OK.
6. On the Mix Device menu, use the up and down arrows to select "Heating" and press OK.
7. On the Heating menu, scroll using the down arrow to select "WWODT" and press OK.
8. On the WWODT screen, use the up and down arrows to change to the desired Warm Weather Outdoor Temperature setting.
9. Press OK to accept the setting and return to the previous menu.

Note: The WWODT is used for water-temperature-curve calculation; it will NOT prevent heating when this limit is reached.
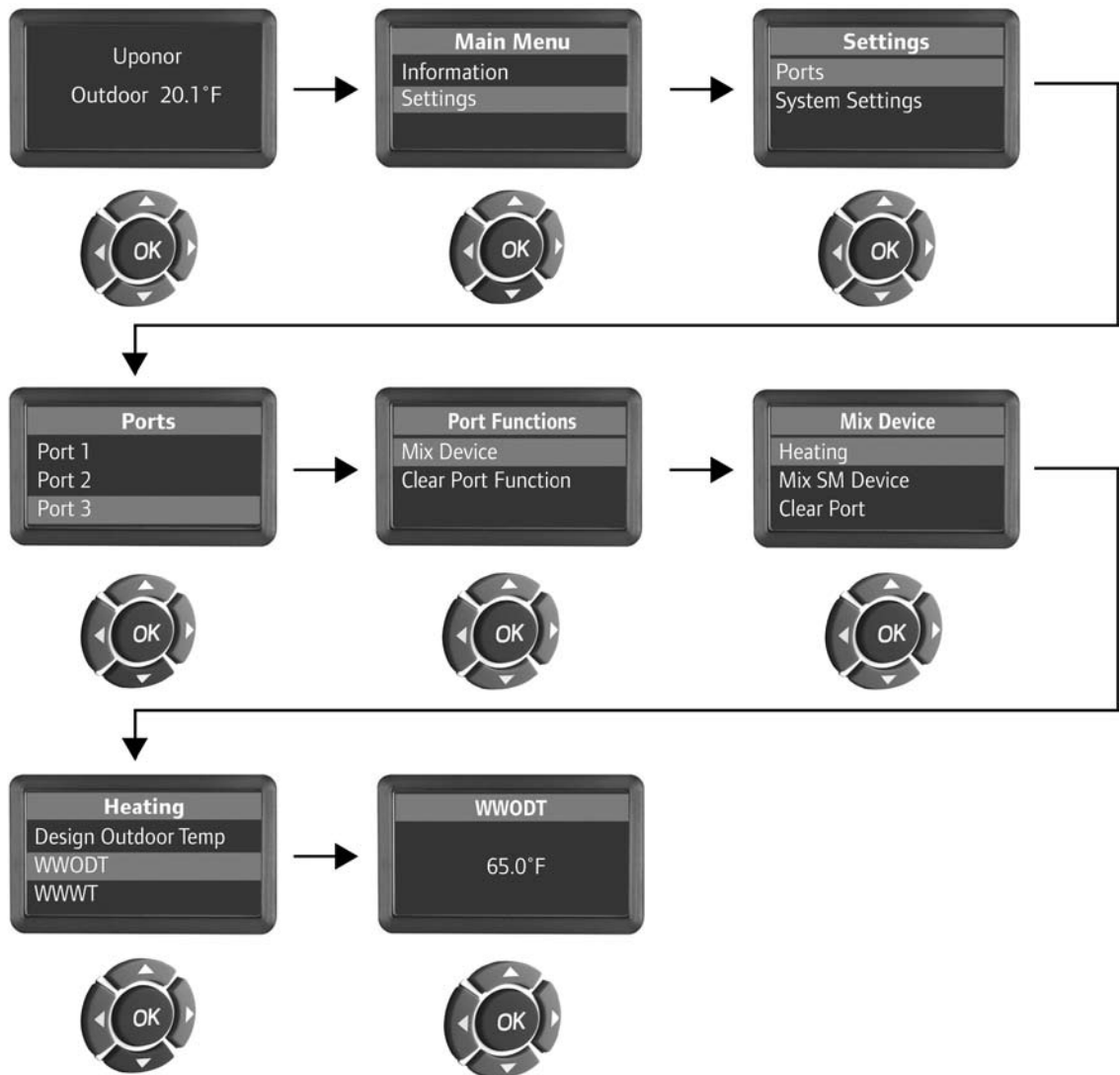

Figure 9-23: Mix Settings (Heating) for WWODT

Mix Settings, Heating — Warm Weather Water Temperature (WWWT)

When setting up a mix channel for space heating (inside), the user can set a water temperature at WWWT (a temperature with no heating required). Multifunction uses this setting to adjust or shape the reset curve for the mix channel. If there is not enough heat output at the warm parts of the heating season, you can raise the WWWT to increase the heat output. Use the following steps to set the WWWT:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, use the up and down arrows to select "Heating" and press OK.

7. On the Heating menu, scroll using the down arrow to select "WWWT" and press OK.

8. On the WWWT screen, use the up and down arrows to change to the desired Warm Weather Temperature setting.

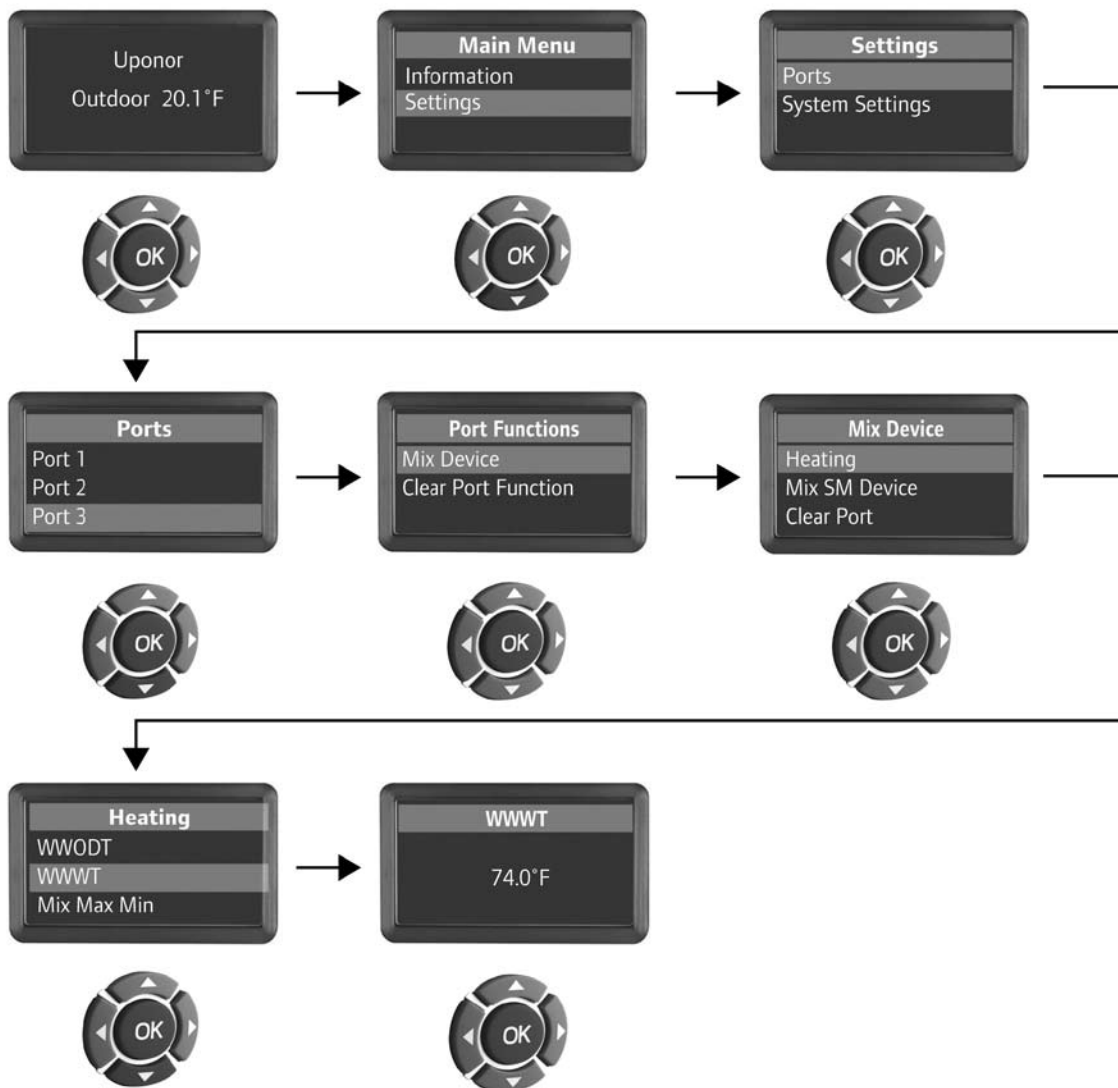9. Press OK to accept the setting and return to the previous menu.

Figure 9-24: Mix Settings (Heating) for WWT

Mix Settings, Heating — Mix Max/Min Temperatures

When setting up a mix channel for space heating (inside), the user can set maximum and minimum temperatures for that mix channel. Multifunction uses this setting to provide a minimum temperature, or protect the application without changing the shape of the reset curve.

Use the following steps to set the Min and Max for a mix channel:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll down to select "Port 3" and press OK.
5. On the Port Functions menu, select "Mix Device" and press OK.
6. On the Mix Device menu, use the up and down arrows to select "Heating" and press OK.
7. On the Heating menu, scroll using the down arrow to select "Mix Max Min" and press OK.
8. On the Mix Max Min screen, use the up and down arrows to change to the temperature for the Min and Max values. Press the left and right arrow buttons to move back and forth between the settings.
9. Press OK to accept the setting and return to the previous menu.
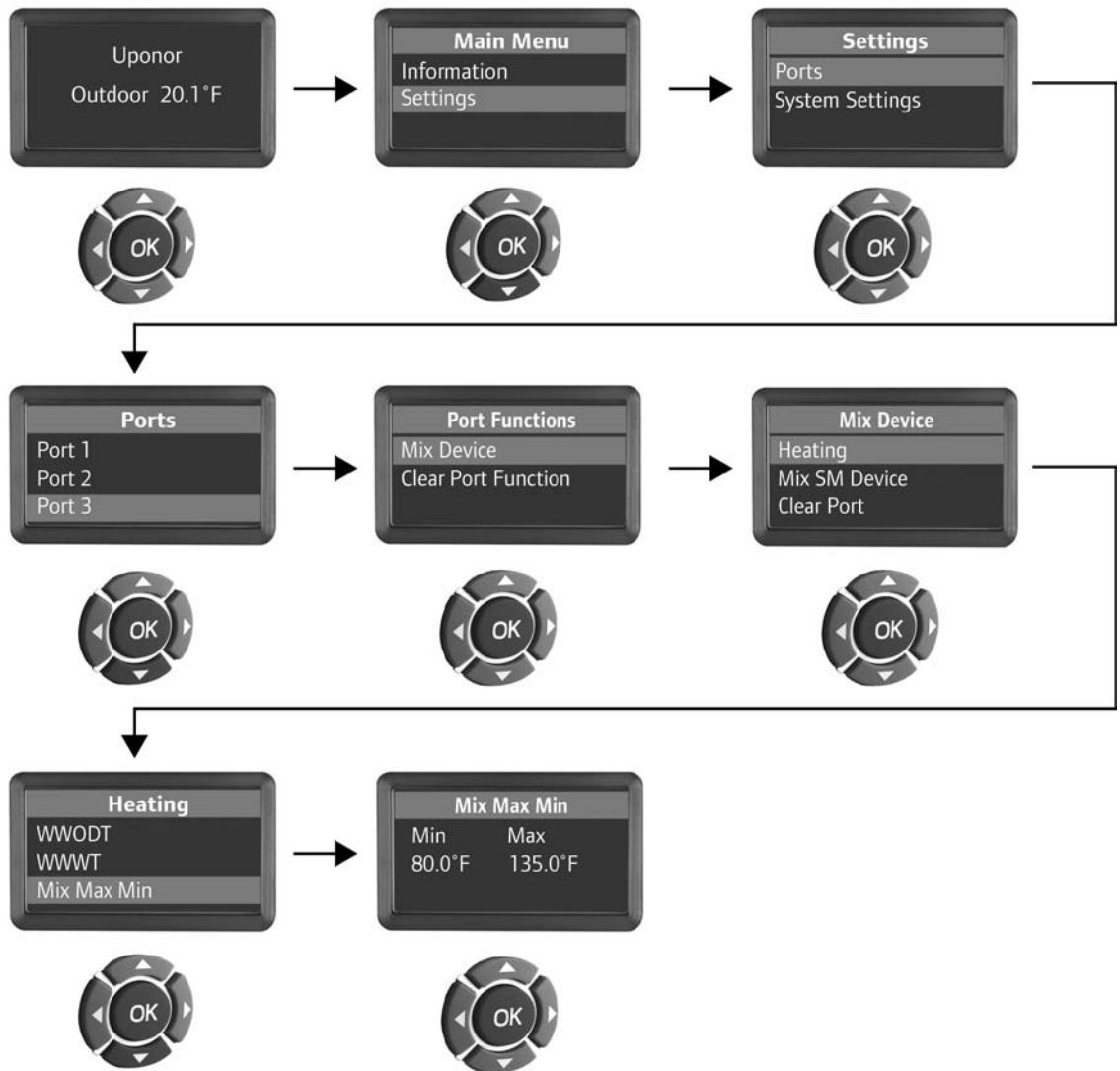
Figure 9-25: Mix Settings Max/Min Temperatures for the Mix Channel

Mix Settings, Heating — Mix Delta T

When setting up a mix channel for space heating (inside), the user can set Delta T for that mix channel. Multifunction uses this setting to provide more optimal control of the mixed temperature based on the design information. Delta T is a requirement for proper pump or circulator sizing. To set the Delta T for the mix channel, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, use the up and down arrows to select "Heating" and press OK.

7. On the Heating menu, scroll using the down arrow to select "Mix Delta T" and press OK.

8. On the Mix Delta T screen, use the up and down arrows to change to the temperature for the Delta T.

   Note: Typical Delta T settings:

   a. Residential Slab/Lightweight: 10˚F (5.5˚C)

   b. QuikTrak: 20˚F (11˚C)

   c. Commercial: 20˚F (11˚C)

   d. Snow Melt: 25˚F (14˚C)

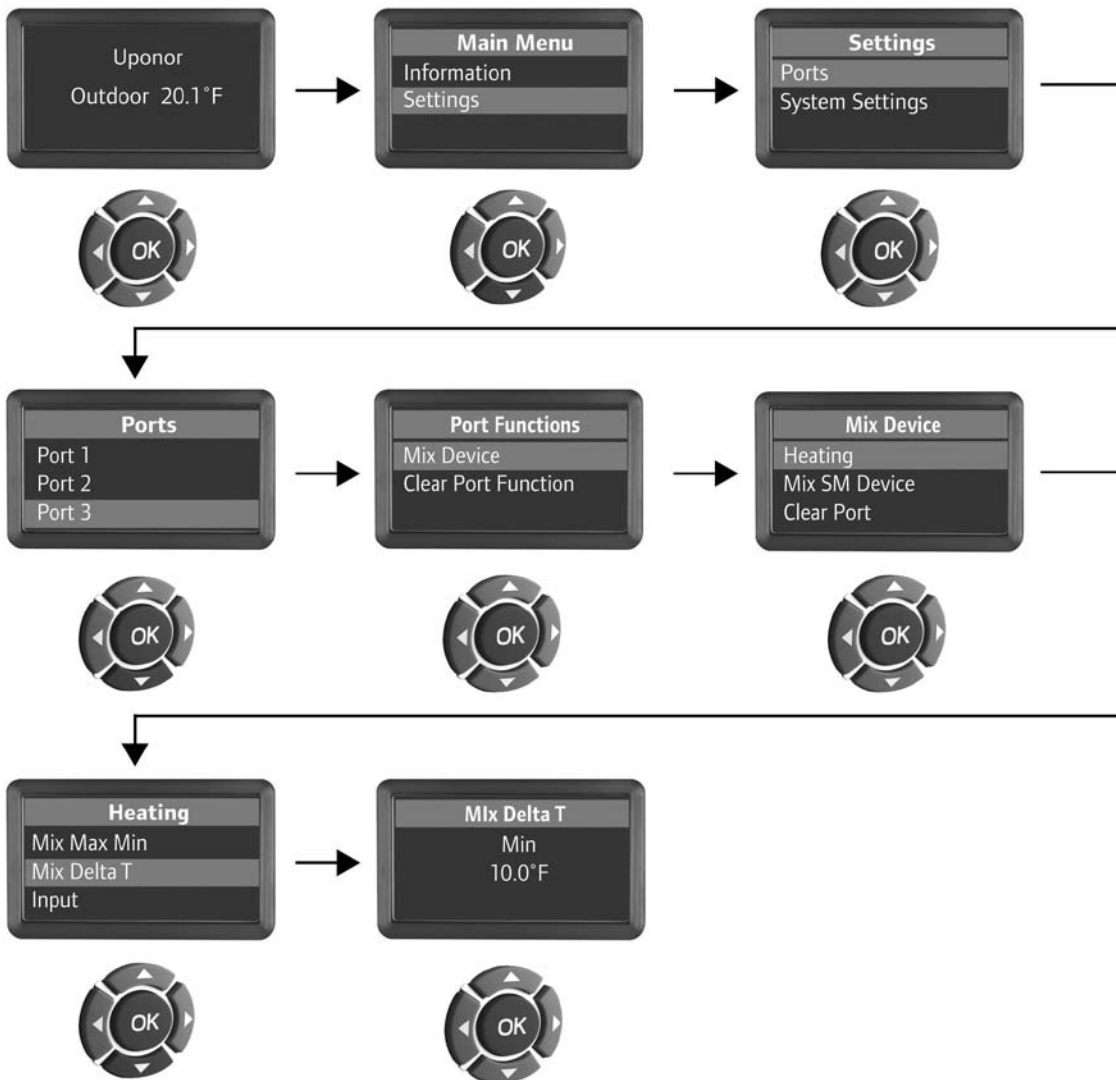9. Press OK to accept the setting and return to the previous menu.

Figure 9-26: Mix Settings (Heating) for Mix Delta T

Mix Settings, Heating — Demand Input

Multifunction requires a demand input (dry contact) from an external output such as a thermostat, zone control module, pump relay, etc., for it to activate the mix channel and other devices to control the right water temperature. The boiler(s) will automatically activate from this input.

Use the following steps to set the demand input for Mixing:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, use the up and down arrows to select "Heating" and press OK.

7. On the Heating menu, scroll using the down arrow to select "Input" and press OK.

8. On the Input screen, use the up and down arrows to change to the value for the input connection (range = 0 to 8).

   Note: It is not necessary to have the input connection across from the port or device that the demand will operate.

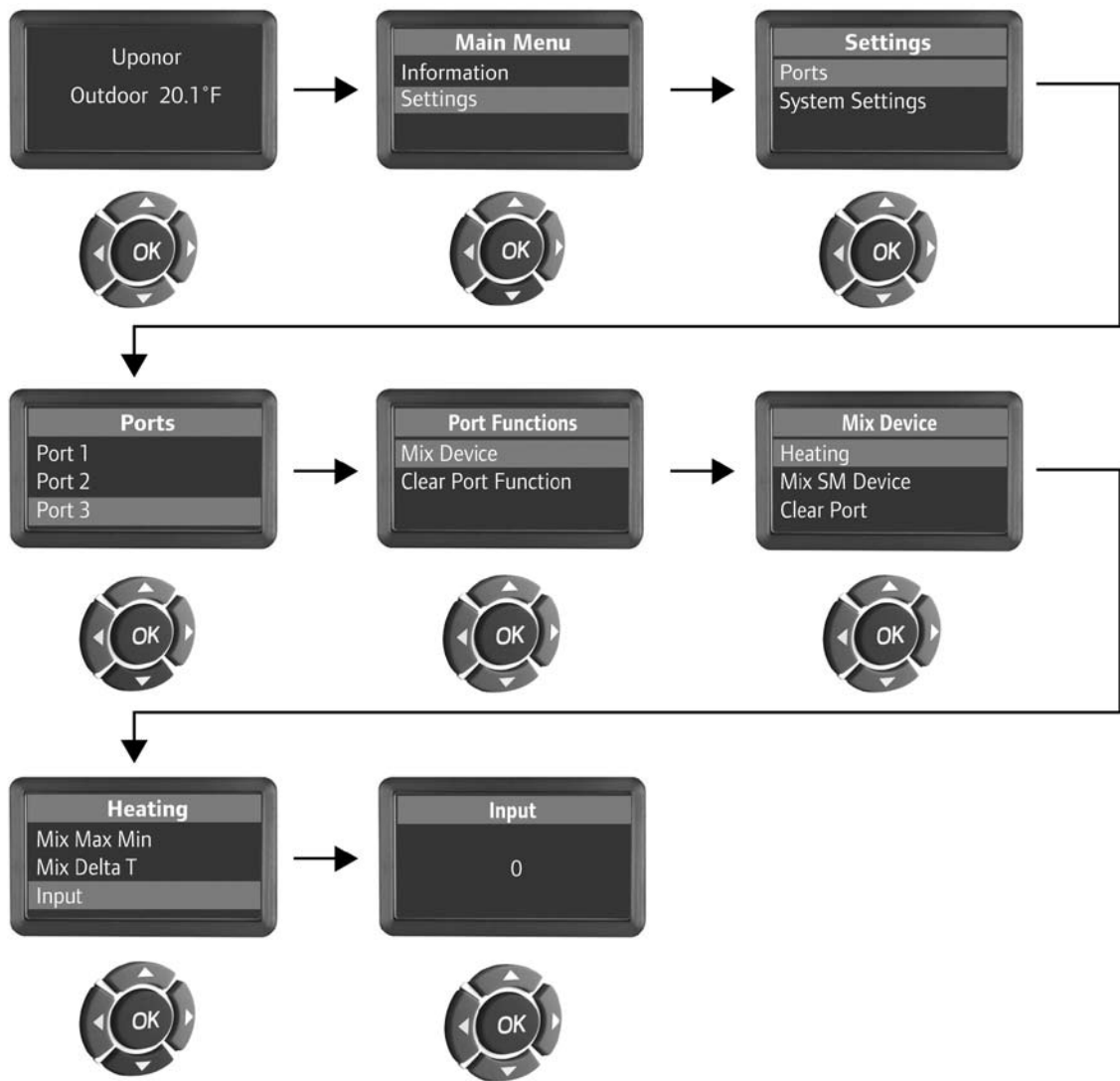9. Press OK button to accept the setting and return to the previous menu.

Figure 9-27: Mix Settings for Heating Demand Input

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Mix Settings, Snow Melt — Maximum Water Temperatures

When setting up a mix channel for snow melting, the user can set maximum water temperatures for that mix channel. Multifunction uses this setting to provide a limit to protect the Snow Melt slab or application from high water temperatures. In our example, the mixing for the Snow Melt is on Port 3.

To set the max water temperature for a mix channel on Snow Melt, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 3" and press OK.

5. On the Port Functions menu, select "Mix Device" and press OK.

6. On the Mix Device menu, scroll down to select "Mix SM Device" and press OK.

7. On the Mix SM Device menu, scroll with the down arrow to select "SM Max Water Temp" and press OK.

8. On the SM Max Water Temp screen, use the up and down arrows to change the temperature for the Max value.

9. Press OK to accept the setting and return to the previous menu

Note: This menu just addresses water temperature limits. Refer to **Appendix A: Application Drawings** for wiring details.
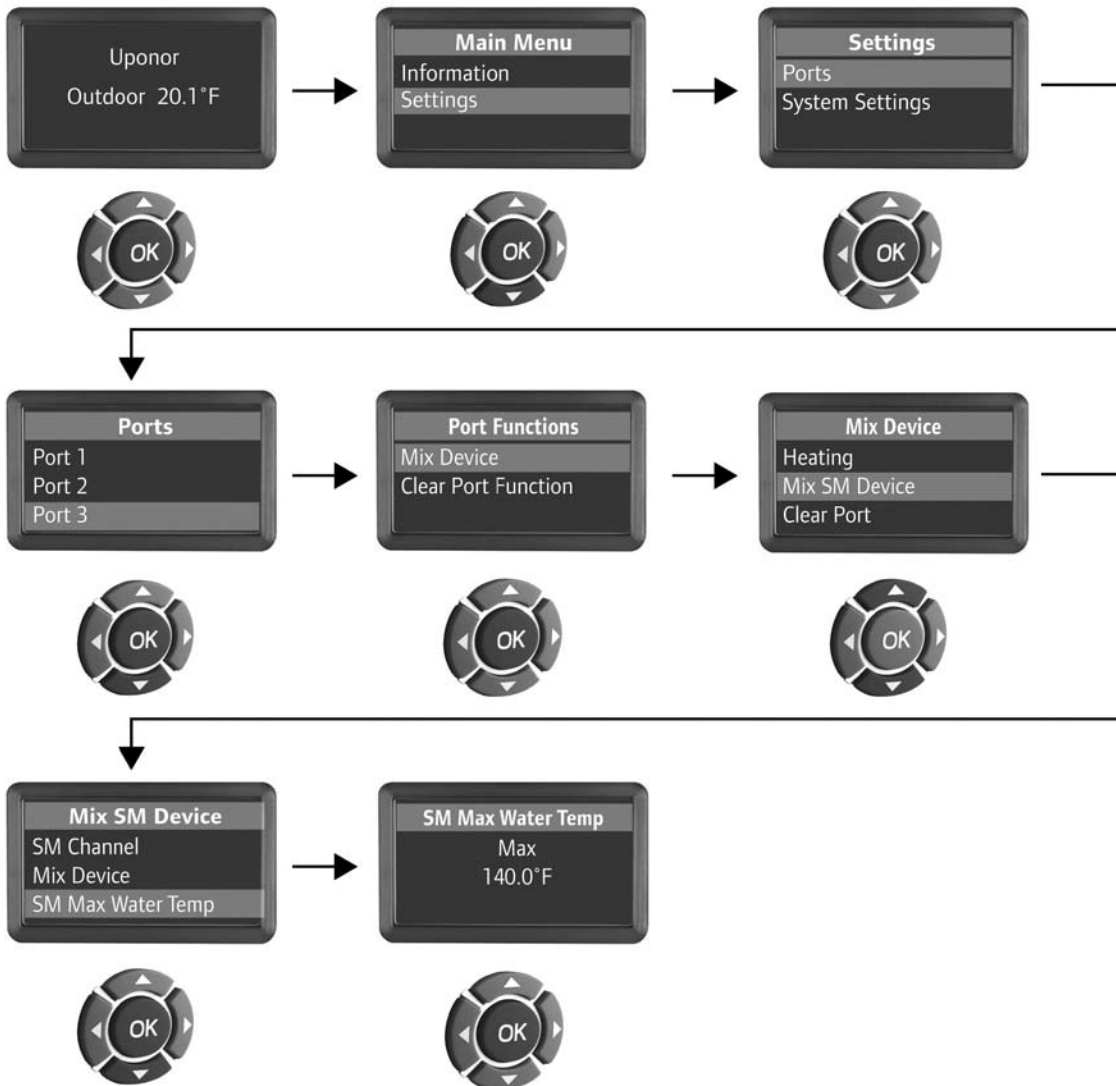
Figure 9-28: Mix Settings for Snow Melt Maximum Water Temperatures

Setting the Port for the Secondary Pump

For Multifunction to provide proper control, it is necessary to assign a port (or ports) for the Secondary Pump prior to adjusting any settings. As shown in our example, a Secondary Pump is used when only one pump is installed after a mixing device.

Note: If multiple pumps are used, use the Zone Pump setting instead of the Secondary Pump setting.

In our example, a Secondary Pump is set up on Port 4. To assign Port 4 for the Secondary Pump connection, use the following steps from the main screen:

1. On the opening screen, press OK on the navigation button to access the Main Menu.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3				X					Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 9-29: Worksheet for Secondary Pump

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, use the down arrow to select "Port 4."

5. On the Port Functions menu, use the down arrow to select "Secondary Pump" and press OK to select.

Once the OK button is pressed, Port 4 is assigned and the control now has input that the Secondary Pump is installed. Additional settings will now be available to assign this pump for either heating or snow melting. The following pages illustrate how to use these additional settings to optimize the system.
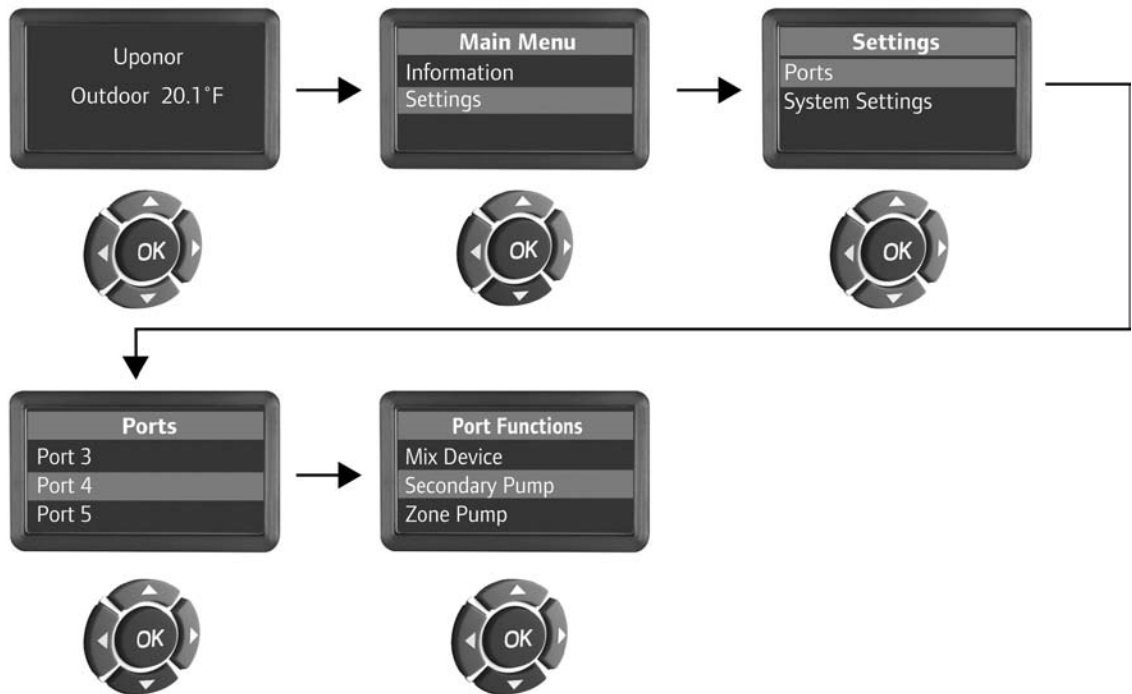

Figure 9-30: Setting the Port for Secondary Pump

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Secondary Pump Settings — Heating or Snow Melt

When setting up a port for Secondary Pump operation, Multifunction needs to know whether it is for use inside the building (heating) or outside (snow melting). For our example, we are using Port 4 for the Secondary Pump for snow melting.

To set the application type for the Secondary Pump for heating or snow melting, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll down to select "Port 4" and press OK.

5. On the Port Functions menu, scroll down to select "Secondary Pump" and press OK.

6. On the Secondary Pump menu, use the up and down arrows to change the setting for either Heating or Snow Melt.

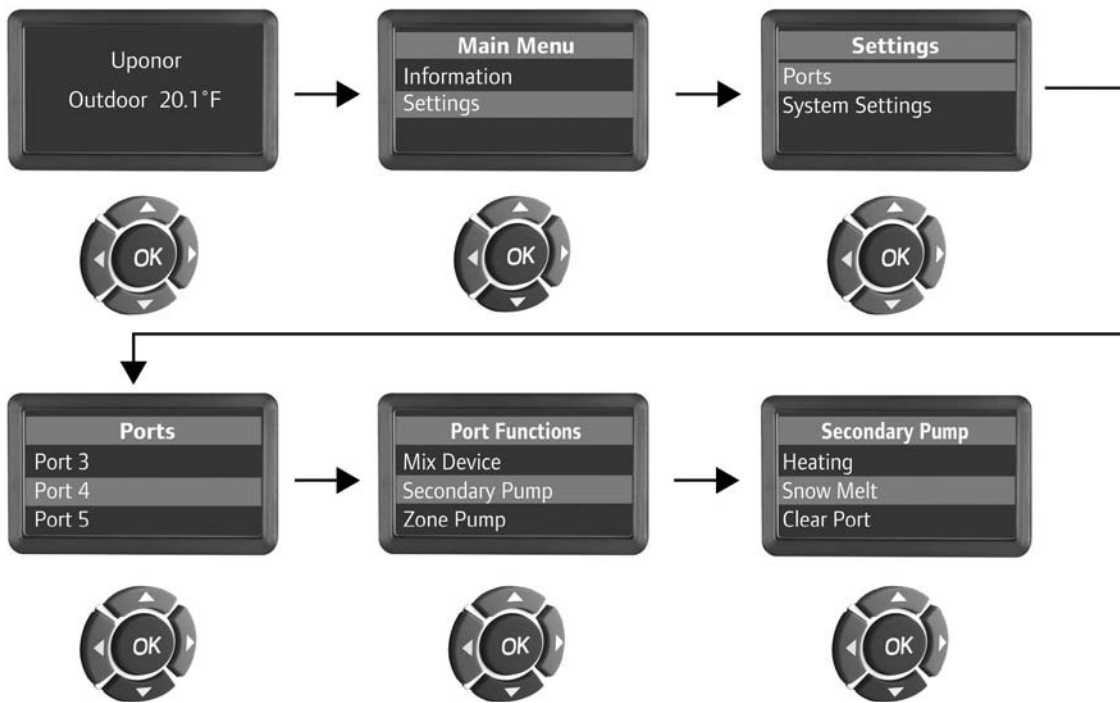7. Press OK to accept the setting and return to the previous menu. For our example, "Snow Melt" is selected (highlighted) but if this Secondary Pump is used after a mixing device for space heating, "Heating" should be selected.

Figure 9-31: Secondary Pump Settings for a Heating or Snow Melt

Setting Zone Pump Port(s)

Multifunction is able to support zone pumping for Heating and Snow Melt applications. By definition, a zone pump is used to control flow to a manifold or manifolds. If a single pump is used after a mixing device, this is considered a Secondary Pump and it should be set up in this manner. See Setting the Port for the Secondary Pump earlier in this section for setup information on Secondary Pumps.

In our example, Zone Pumps are set up on Port 5 and 6. To assign ports for the Zone Pump connections, use the following steps from the main screen:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3				X					Mix for SM
Port 4					X				Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 9-32: Worksheet (Zone Pump Ports)

3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 5" and press OK.
5. On the Port Functions menu, scroll down to select "Zone Pump" and press OK. Once the OK button is pressed, Port 5 is assigned and the control has input that the zone pump function is installed.

6. From the example, repeat the above steps to set up the zone pump connected to Port 6. If other zone pumps were installed in the system, set them up in the same manner.
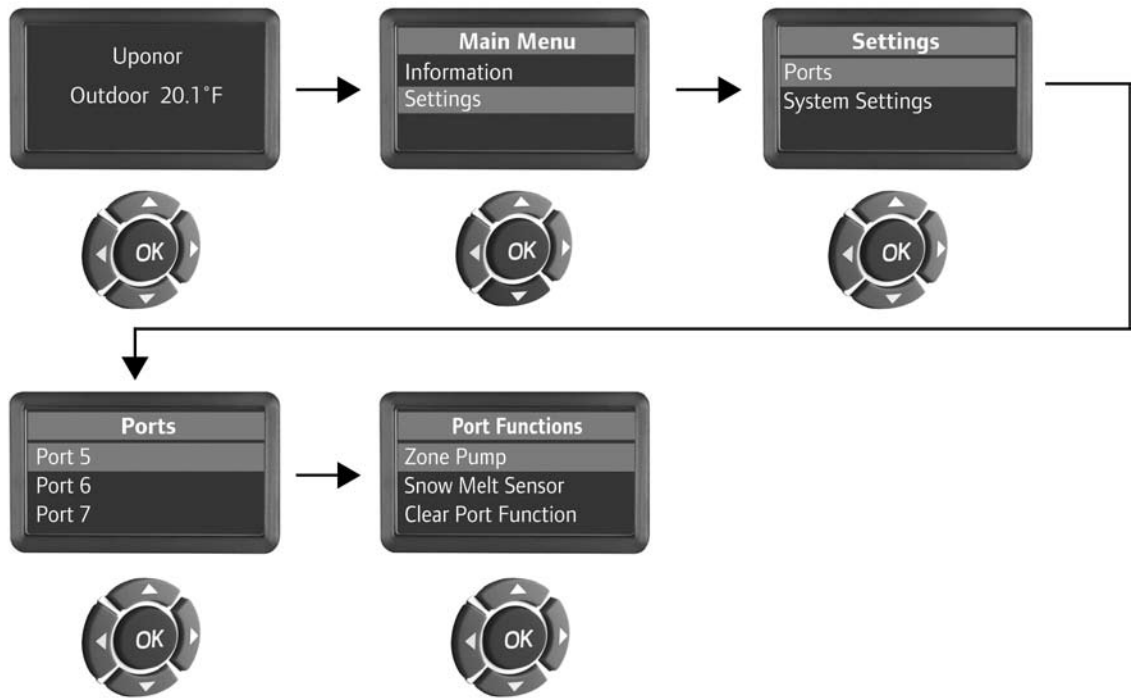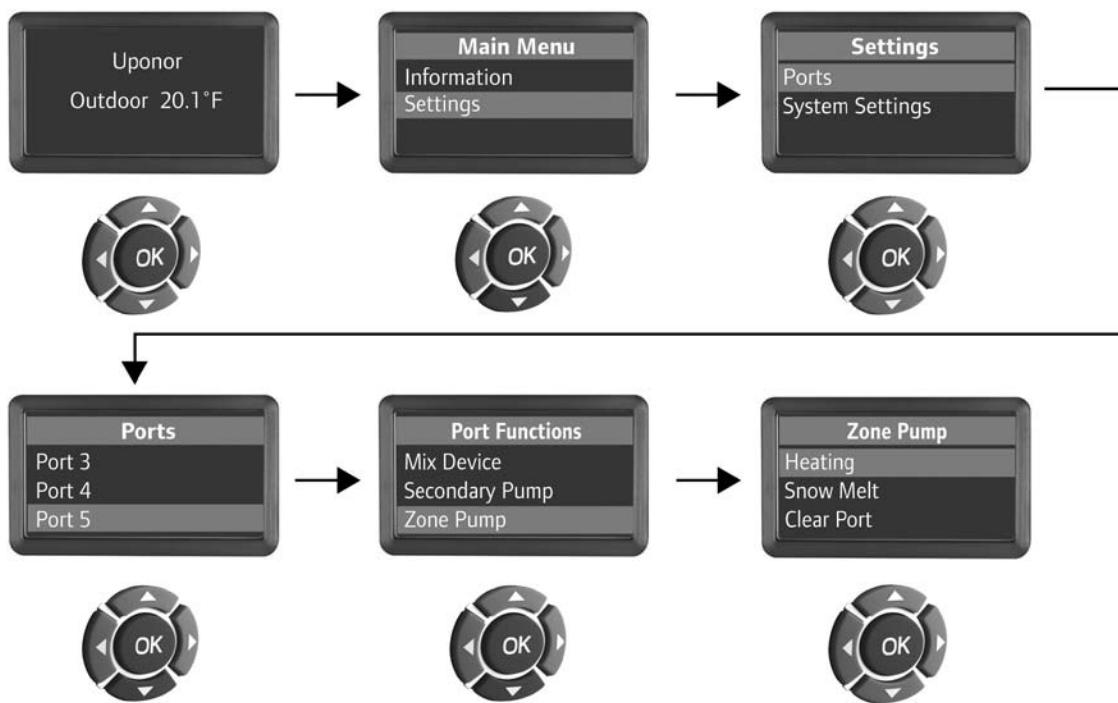
Figure 9-33: Setting up Zone Pumps

Zone Pump Settings — Heating or Snow Melt

When setting up a port for Zone Pump operation, Multifunction needs to know whether it is for use inside the building (heating) or outside (snow melting).
For our example, we are using Ports 5 and 6 for the Zone Pump for space heating.

To set the Zone Pump application type for Heating or Snow Melt, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 5" and press OK.
5. On the Port Functions menu, scroll down to select "Zone Pump" and press OK.

6. Use the up and down arrows to change the setting for either Heating or Snow Melt.
7. Press OK to accept the setting and return to the previous menu. For our example, Heating is highlighted, however if this Zone Pump is used for Snow Melt, change the selection to "Snow Melt."

Figure 9-34: Zone Pump Settings (Heat or Snow Melt)

Setting the Snow Melt Port(s)

For Multifunction to provide proper control, it is necessary to assign a port (or ports) for the Snow Melt Control prior to adjusting any settings. Multifunction has the flexibility to set up to two (2) control zones of snow melting for full automatic or semi-automatic operation (or one of each).

From our example, the Snow Melt Control is set up on Port 2. To assign Port 2 for a Snow Melt connection, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow Melt	Zone Pump	Input Demand	Notes:
Port 1	X								
Port 2						X			
Port 3			X						Mix for SM
Port 4				X					Secondary for SM
Port 5							X		Main Floor
Port 6							X		2nd Floor
Port 7		X							
Port 8			X						

Figure 9-35: Worksheet for Snow Melt Ports

4. On the Ports menu, scroll to select "Port 2" and press OK.

5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

Once the OK button is pressed, Port 2 is assigned and the control is now "virtually aware" via data input that Snow Melt functionality is required and the appropriate sensors are installed. Additional settings are now available for Snow Melt operation. The following pages show you how to optimize Snow Melt functionality via these additional settings.
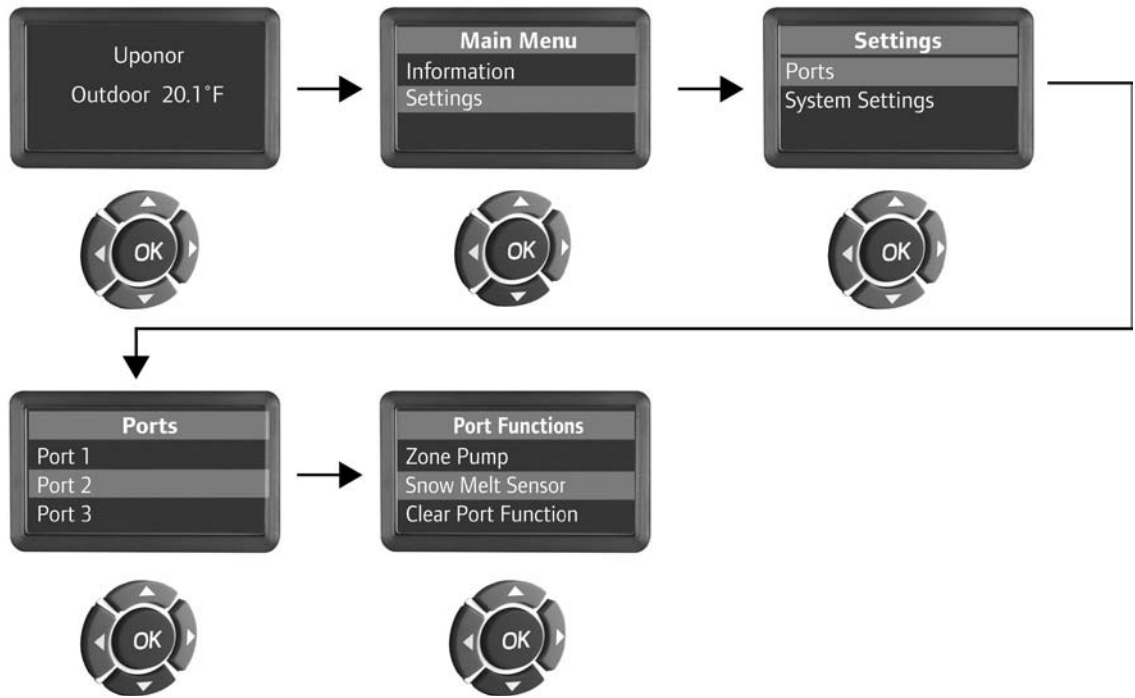

Figure 9-36: Setting up Snow Melt Port

Snow Melt Settings — Idle Enable

To set up a port for Snow Melt operation, Multifunction allows the user to turn ON or OFF the Idle Enable. The Idle Enable setting, if set to ON, will maintain a minimum slab temperature. This feature allows a slab or Snow Melt area to come up to the melting temperature faster in critical areas.

To set the Idle Enable, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 2" and press OK.
5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

6. On the Snow Melt Sensor screen, scroll down to "Idle Enable" and press OK.
7. Change the value to "Yes" or "No" using the up and down arrows. "Yes" will maintain a minimum slab temperature as set by the Idle Setpoint. "No" will turn off the idle feature and will allow the snow area to cool to outdoor temperatures when not melting snow.
8. Press OK to accept the setting and return to the previous menu.
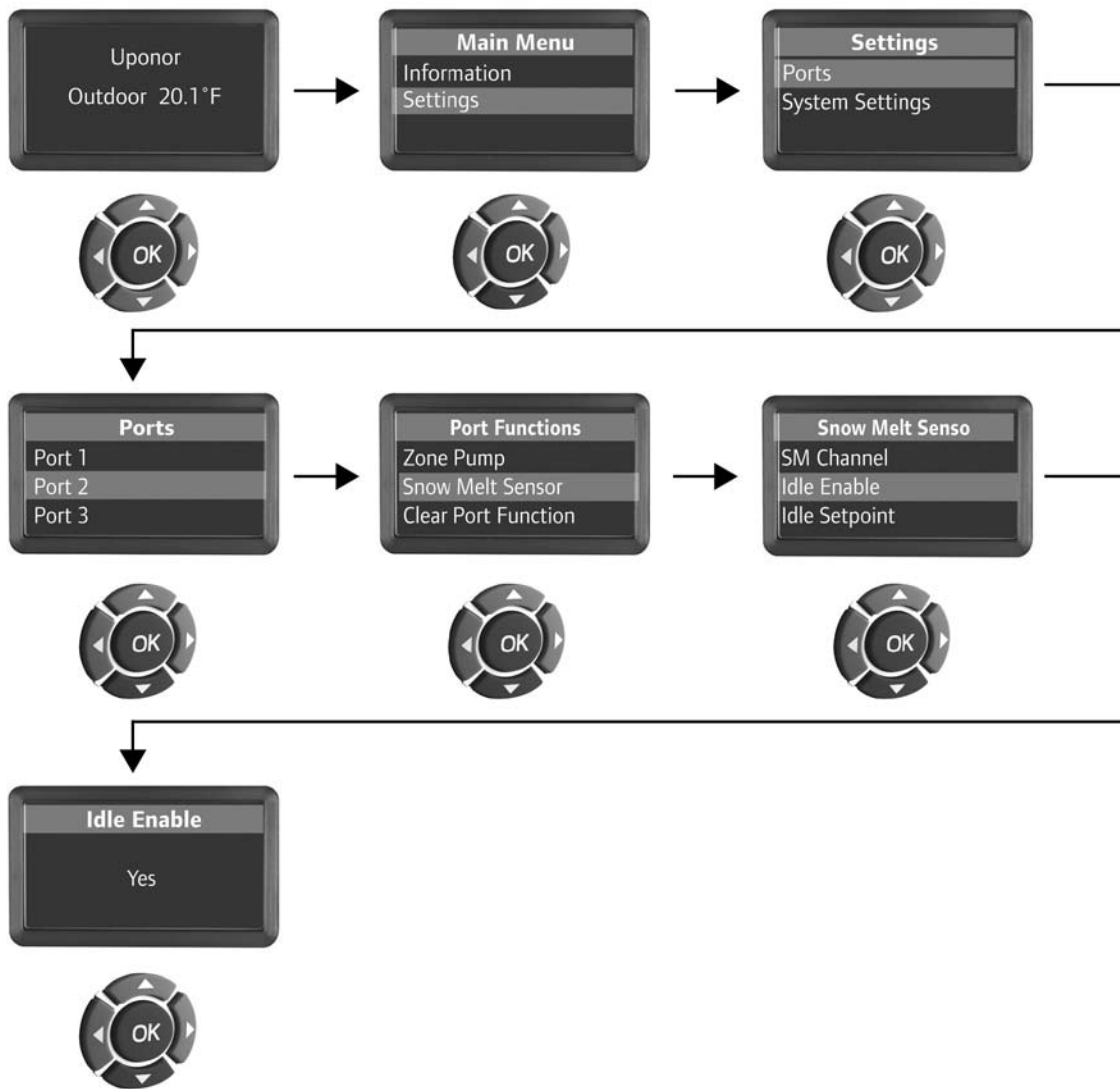
Figure 9-37: Setting Snow Melt Idle Enable

Snow Melt Settings — Idle Setpoint

In the setup of the Snow Melt function, if the Idle Enable is set to Yes (turned on), Multifunction lets the user adjust the minimum temperature that the slab will maintain during idling, or when the zone is not melting snow.

To set the Idle Setpoint, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll to select "Port 2" and press OK.

5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

6. On the Snow Melt Sensor screen, scroll down to "Idle Setpoint" and press OK.

7. Use the up and down arrows to change the value of the temperature. The adjustable range of setting is -4.0°F to 50.0°F (-20°C to 10°C).

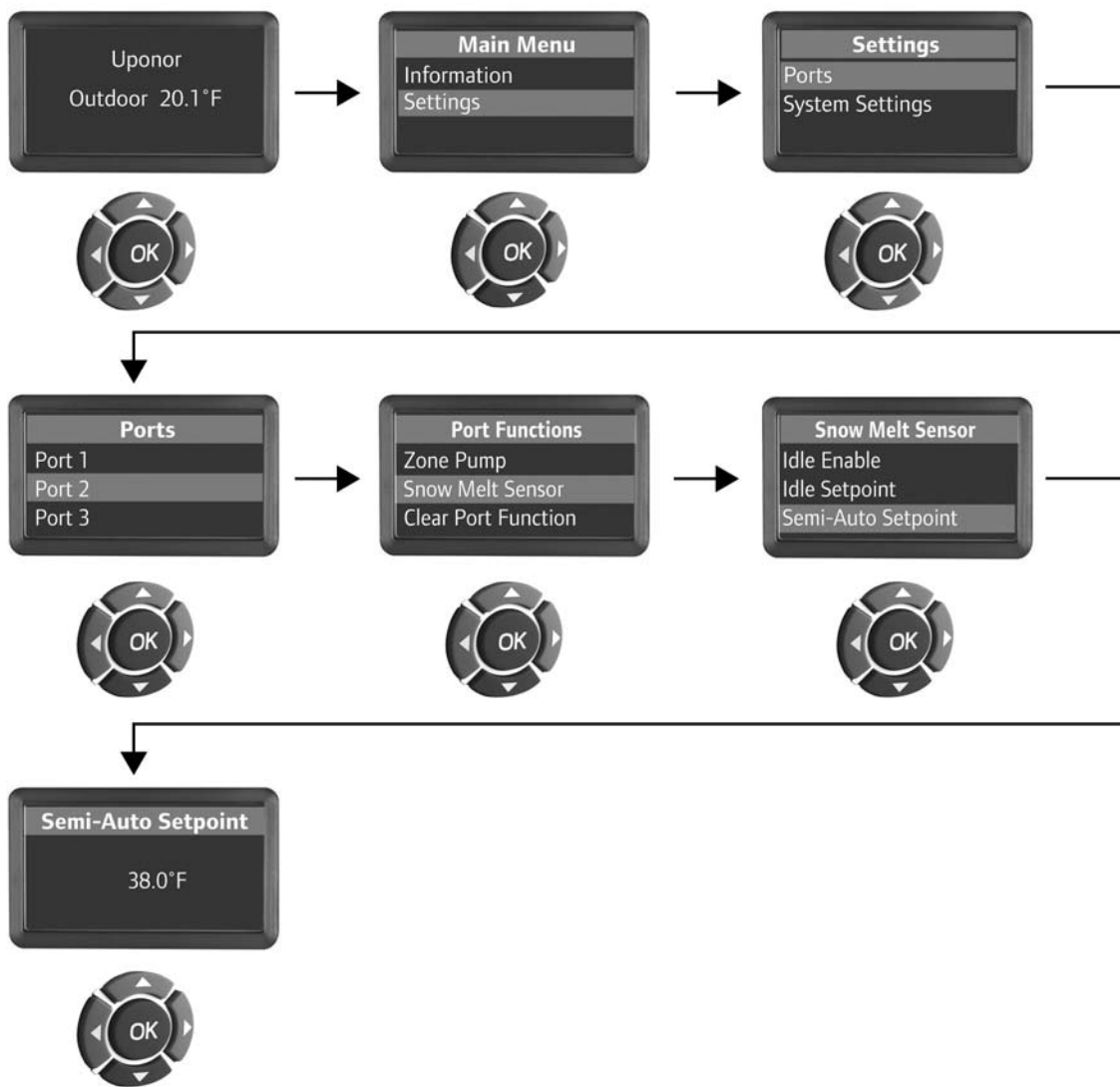8. Press OK to accept the setting and return to the previous menu.
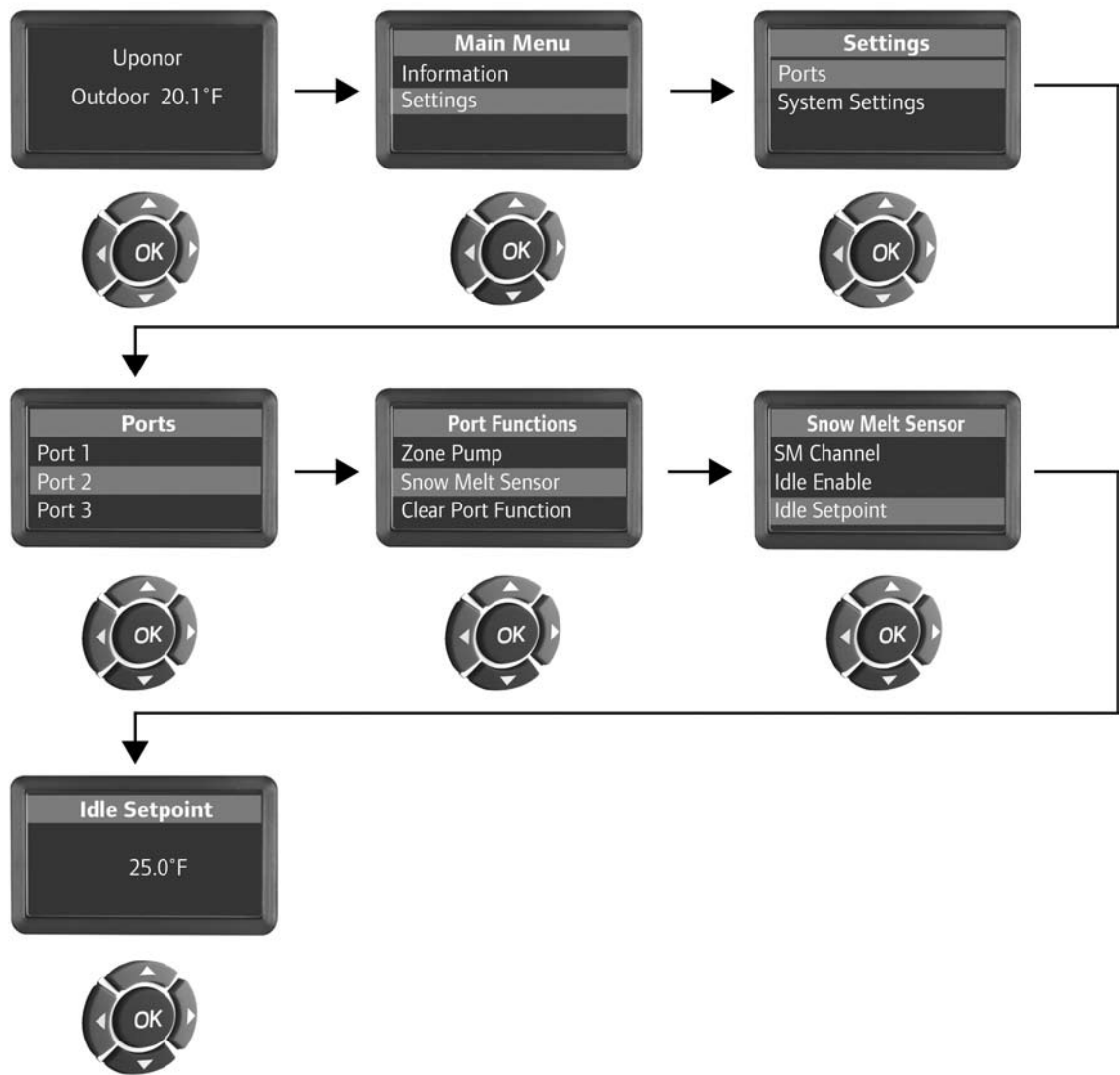
Figure 9-38: Setting Snow Melt Idle Setpoint

Snow Melt Settings — Semi-auto Setpoint

In the setup of the Snow Melt function, Multifunction allows the user to adjust or set the semi-automatic or automatic setpoints of the slab temperature. This value is the temperature required in the slab or Snow Melt zone. When a Snow Melt call initiates, automatically or manually, the heating system will apply heat until reaching this temperature. To set this, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 2" and press OK.
5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.
6. On the Snow Melt Sensor screen, scroll down to "Semi-auto Setpoint" and press OK.
7. Use the up and down arrows to change the value of the setpoint temperature. The adjustable range of setting is 14.0°F to 68.0°F (-10°C to 20°C).
8. Press OK to accept the setting and return to the previous menu.

Figure 9-39: Setting "Semi-auto" Setpoint

Snow Melt Settings — Semi-auto Timeout

In the setup of the Snow Melt function, Multifunction allows the user to adjust or set the semi-automatic timeout. This is the time duration the heating system will continue to maintain the "Semi-auto" setpoint in the slab or Snow Melt zone. Once the slab has started to heat, the timer begins to count backwards from the set time until it reaches zero (0). Once the timer reaches zero, the Snow Melt function turns off. If Idle is enabled, the control will continue to maintain the idle setpoint temperature. To set the "Semi-auto Timeout", use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll to select "Port 2" and press OK.

5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

6. On the Snow Melt Sensor screen, scroll down to "Semi-auto Timeout" and press OK.

7. Use the up and down arrows to change the value of the setting of the semi-automatic timeout.

   Note: The units are displayed in "hour" increments. The adjustable setting range is from 1 to 72 (hours).

8. Press OK to accept the setting and return to the previous menu.
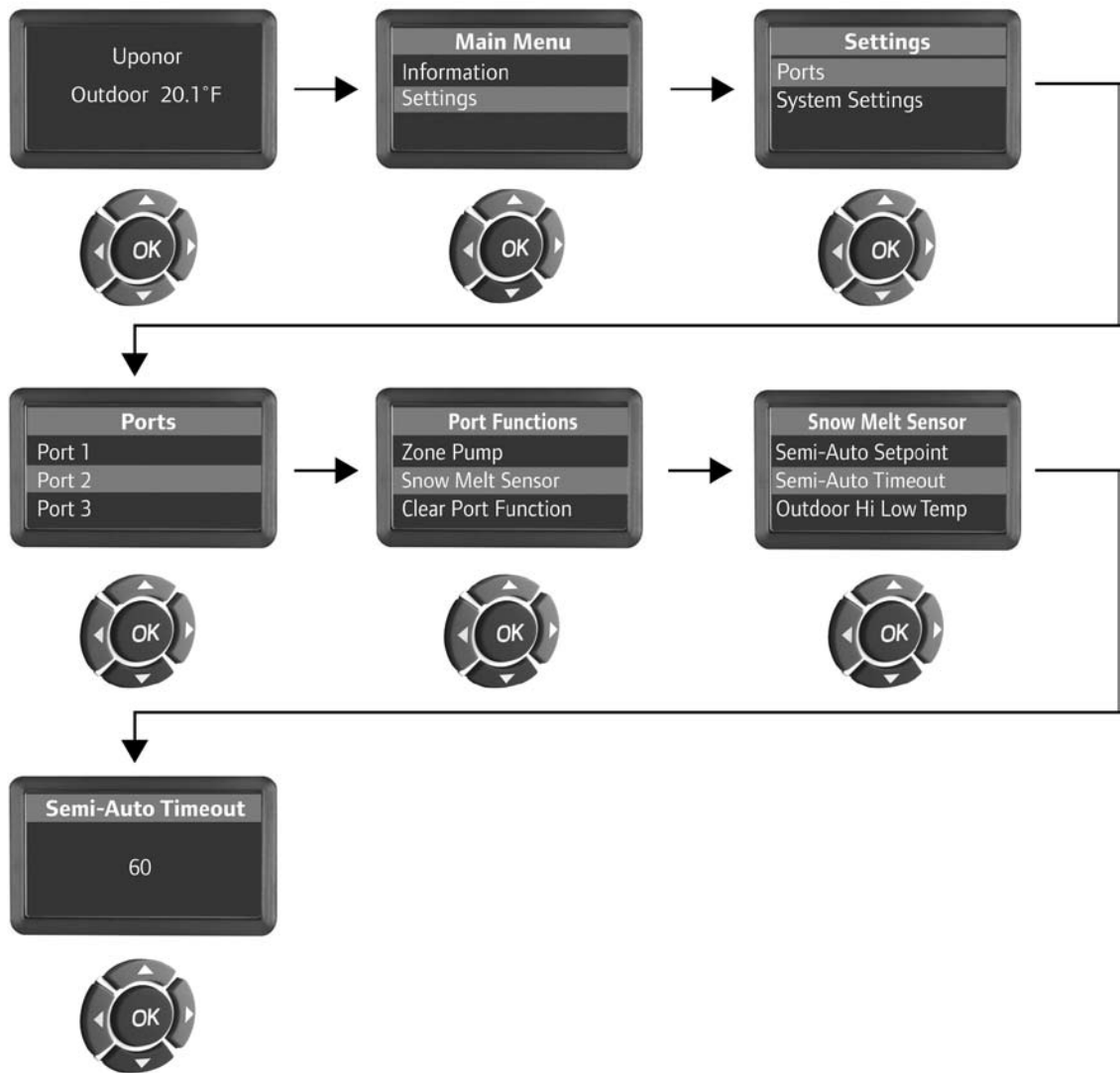
Figure 9-40: Setting "Semi-auto Timeout"

Snow Melt Settings — Outdoor High/Low Temperatures

In the setup of the Snow Melt function, Multifunction allows the user to define a range of outdoor temperatures in which Snow Melt will operate, Outdoor High and Low Temperatures. Set the High Temperature at an outdoor temperature that does not require a Snow Melt operation. Set the Low Temperature at an outdoor temperature at which either snowfall no longer occurs or exceeds the design of the system.

To set the Outdoor High and Low Temperatures, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll to select "Port 2" and press OK.

5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

6. On the Snow Melt Sensor screen, scroll down to "Outdoor Hi Low Temp" and press OK.

7. Use the up and down arrows to change the value change the temperature of the outdoor high and low temperature settings (Min and Max values). Use the left and right arrows to move back and forth between settings.

8. Press OK to accept the setting and return to the previous menu.
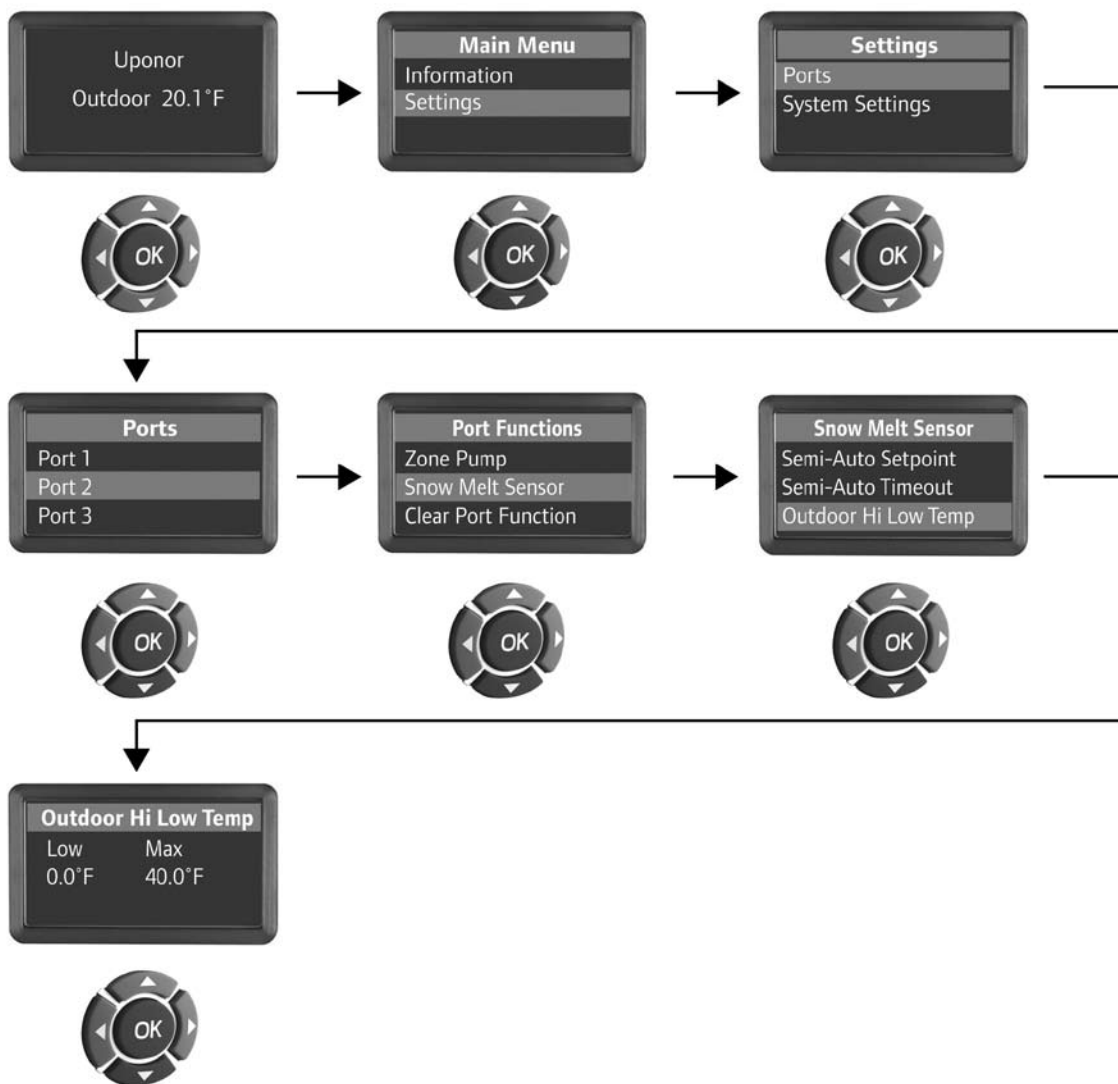
Figure 9-41: Setting Outdoor High and Low Temperatures

Snow Melt Settings — Snow Melt Delta T (ΔT˚F)

In the setup of the Snow Melt function, Multifunction allows the user to adjust the Delta T for the Snow Melt area or slab. Setting this value prevents a wide differential from the supply to the return, which could ultimately lead to slab damage due to expansion. If the differential (or Delta T) increases above the setting, the mixing device will not allow the supply temperature to increase until the return temperature rises, and the actual Delta T is lower than this setting. To set the Snow Melt Delta T, use the following steps:

1. On the opening screen, press OK to access the Main Menu.

2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.

3. On the Settings menu, press OK to select "Ports."

4. On the Ports menu, scroll to select "Port 2" and press OK.

5. On the Port Functions menu, scroll down to select "Snow Melt Sensor" and press OK.

6. On the Snow Melt Sensor screen, scroll down to "SM Delta T" and press OK.

7. Use the up and down arrows to change the Snow Melt Delta T value. The adjustable range of setting is 9.0˚F to 54.0˚F (-13˚C to 12˚C).

8. Press OK to accept the setting and return to the previous menu.

Note: If Multifunction is not controlling a mix channel to the Snow Melt area, this setting is irrelevant, as the differential cannot be affected.
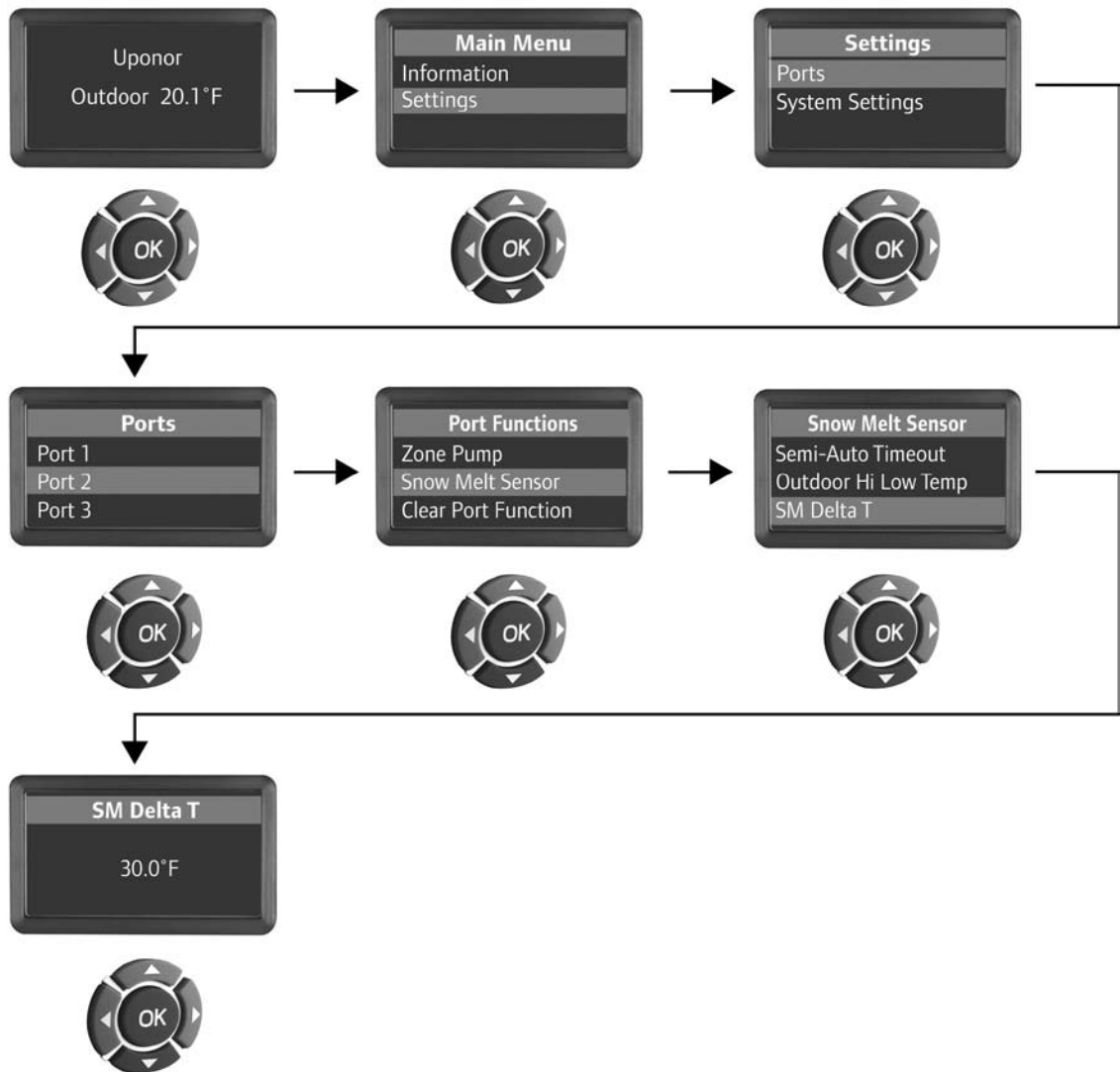
Figure 9-42: Setting the Snow Melt Delta T

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Clear Port Function

Multifunction allows the user to clear or delete an individual port assignment using the Clear Port Function. This feature is useful when a device is not connected to the correct Multifunction port and wires cannot be lengthened, for example.

To clear a device previously setup for a specific port, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 2" and press OK.
5. On the Port Functions menu, scroll down to select "Clear Port Function" and press OK.

6. A screen will appear asking you to confirm. Use the left and right arrow to select "Yes" to confirm that you want to clear the port, or "No" if you wish to keep this port setting.
7. Press OK to accept the setting and return to the previous menu. Once cleared, the port will be available for assigning another connection type.
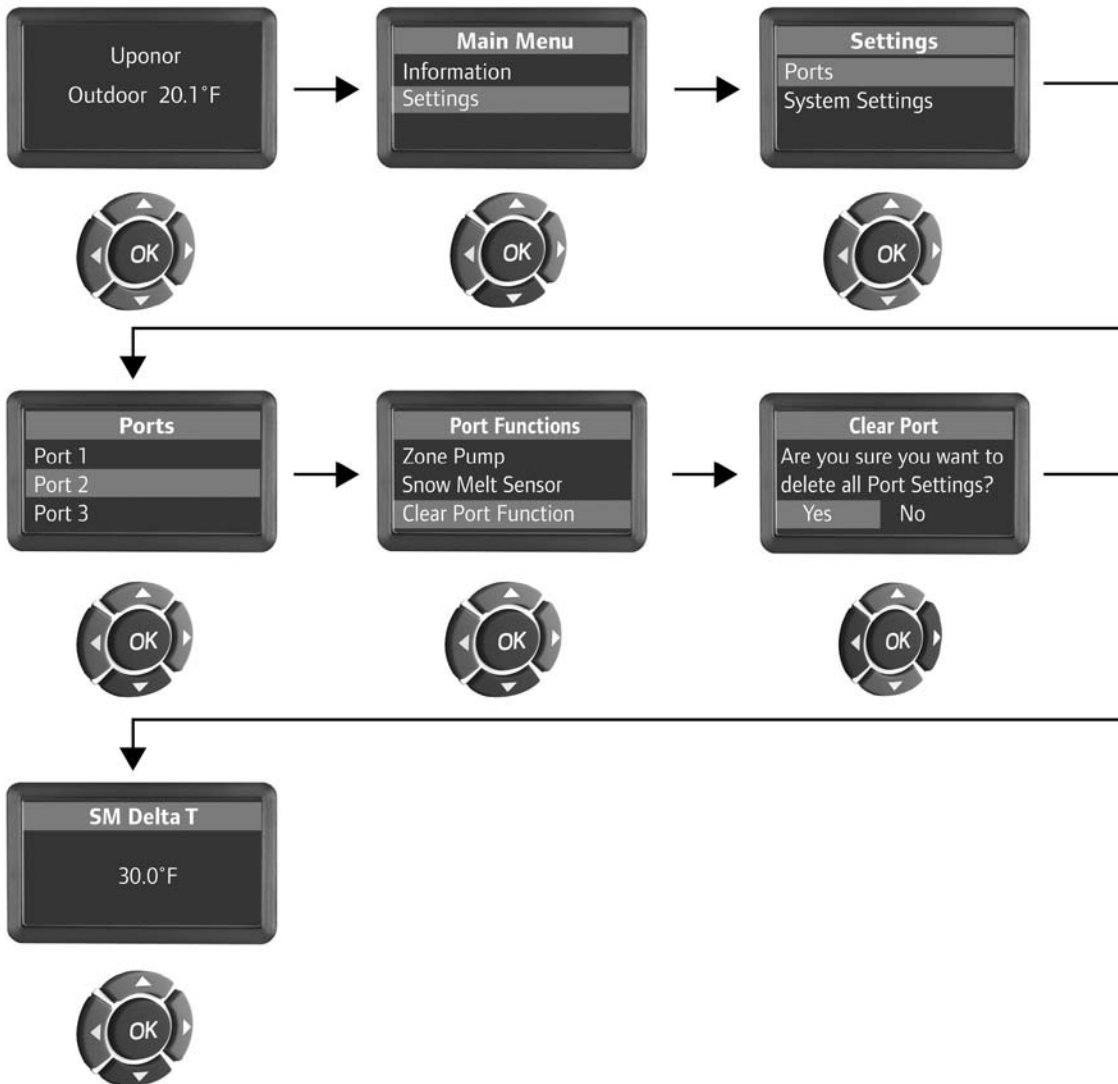
Figure 9-43: Clearing a Port

Clear All Settings Function

Multifunction allows the user to clear or delete all ports and assignments that were previously setup. This feature is useful and more efficient than going port by port to delete all of the assignments.

To clear all ports and devices previously setup, use the following steps:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Clear All Settings" and press OK.
5. On the Port Functions menu, scroll down to select "Clear Port Function" and press OK.

6. A screen will appear asking you to confirm. Use the left and right arrow to select "Yes" to confirm that you want to clear all settings or "No" if you wish to keep these settings.
7. Press OK to accept the decision and return to the previous menu. Once cleared, all ports will be available for assigning device connections.

Caution: Once "Yes" is selected and the OK button is pressed, the information will be lost and cannot be retrieved.
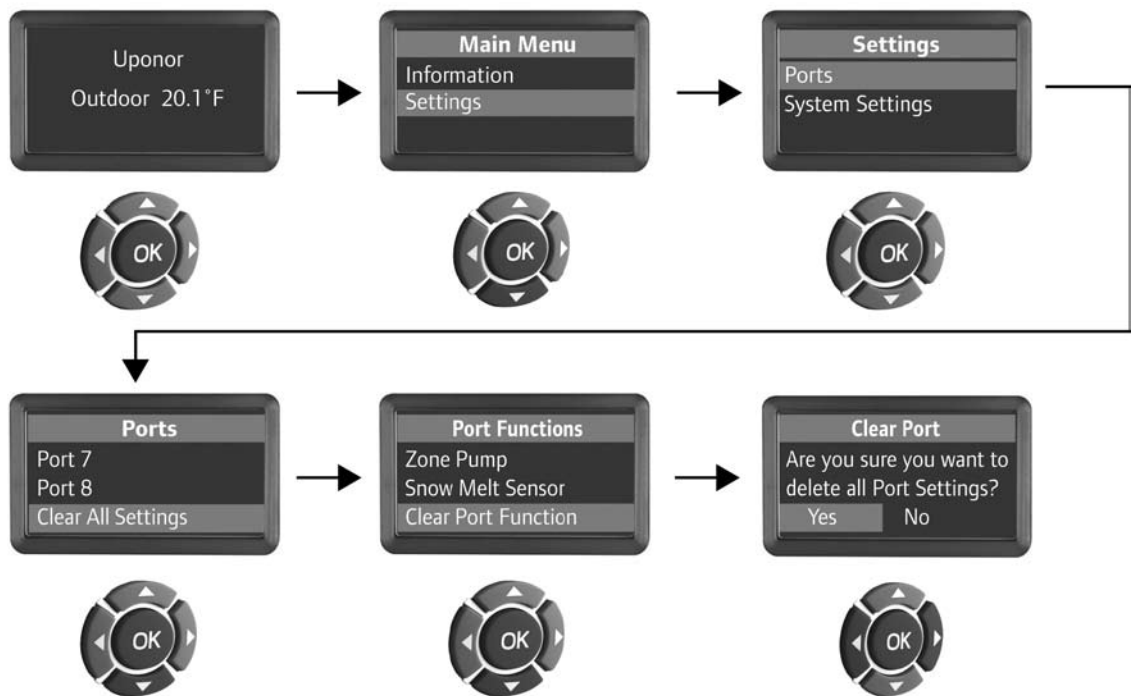
Figure 9-44: Clearing All Settings

Demand Output Settings

Multifunction has the ability to assign a demand output (programmable output) for a device along with the port outputs discussed earlier in this manual. This feature allows for a second control output when another device activates — whenever the input for that device closes and signals a heat demand, not only will the port activate (e.g., mixing) but also the demand output.

An example would be an inline hot water coil in use with an air handler — when the zone pump starts for the air handler, the device output will start the fan terminals on the air handler. Refer to the following section for more examples of this feature: **Demand Output Examples**.

You can find this setting in the menu system for the following devices:

- Domestic Hot Water
- Zone Pump
- Mixing Output

The following example shows how to set a demand output for the DHW:

1. On the opening screen, press OK to access the Main Menu.
2. On the Main Menu, scroll using the down arrow to select "Settings" and press OK.
3. On the Settings menu, press OK to select "Ports."
4. On the Ports menu, scroll to select "Port 8" and press OK.
5. On the Port Functions menu, select "DHW" and press OK.
6. On the DHW menu, scroll using the down arrow to select "Demand Output."
7. On the Demand Output screen, use the up and down arrows to change the value for the demand output connection (range is from 0 to 4).

   Note: You must assign one of the above functions to the port for the settings to become available. In addition, you can only assign one demand output to each port.
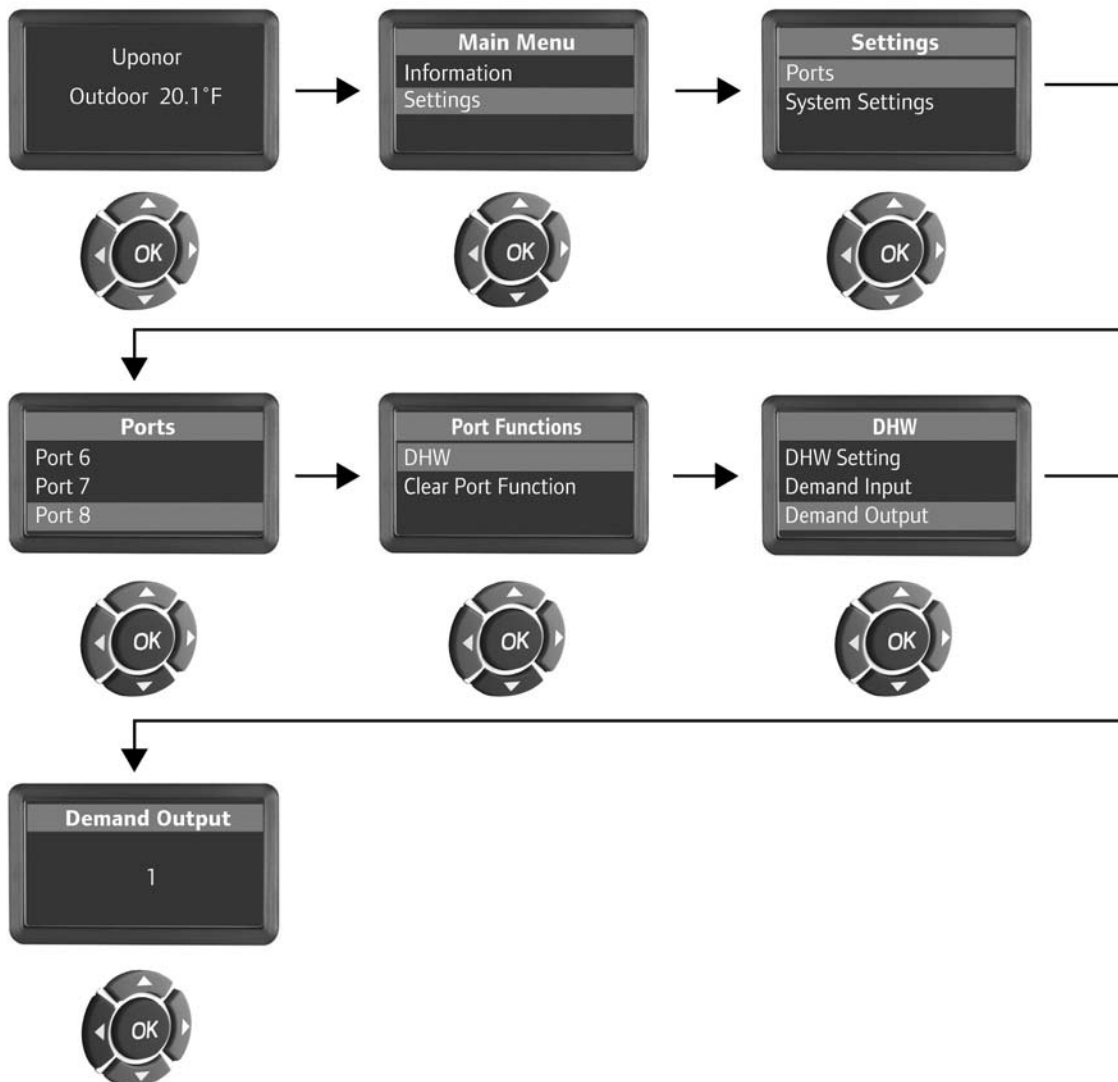
Figure 9-45: Setting Demand Outputs (DHW)

Demand Output Examples

The following are some examples showing how these demand outputs can be used.

Example 1 — Shows a DHW tank using both a pump and a zone valve. In some cases, due to piping or gravity flow, it becomes necessary to add a zone valve to prevent overheating without adding another relay.

Note: These are dry contact outputs so you will need a 24V power source. You can use the transformer for Multifunction for these demand outputs (not shown in this illustration) — see **Section 5: Applying Power to the Multifunction Control**.

Example 2 — Shows an inline hot water coil in use with an air handler. In this application, once the zone pump comes on for the air handler, the demand output is wired to the fan terminals on the air handler.

Example 3 — Shows Multifunction using the demand outputs for a mixing device (modulating valve) and a couple of zone pumps to signal a Building Automation System (or BAS). While Multifunction cannot directly talk to a BAS with the demand outputs, the status of these devices (ON/OFF) can be read through the dry contact outputs.

There are numerous ways that these demand outputs (or programmable outputs) can be used. These are just a few examples to get you thinking about how to use the full power of the control without adding additional wiring, relays or other controls.
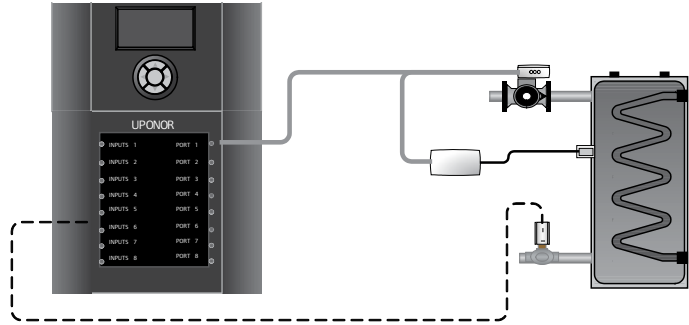
Example 1 — DHW Tank and Zone Valve
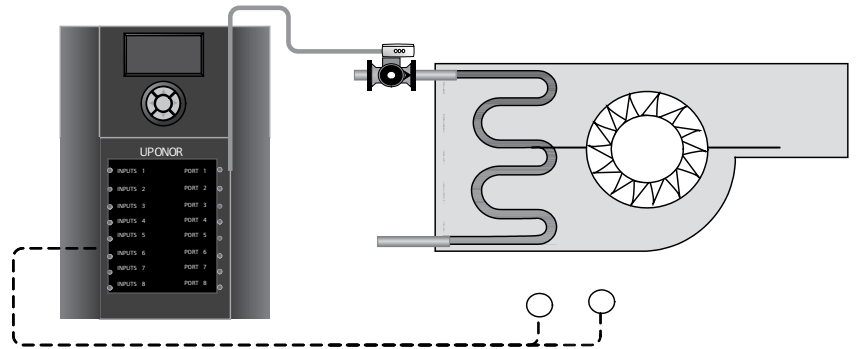
Example 2 — Hot Water Coil and Fan Operation

Output 3 to BAS
Output 2 to BAS
Output 1 to BAS
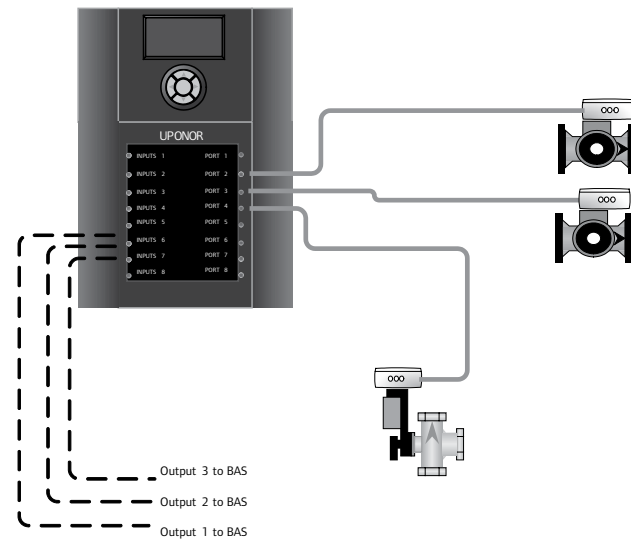
Example 3 — Device Status to BAS

Appendix A

Application Drawings

Drawing 1M — Boiler, Single Mix Valve, Secondary Pump

ZCM

S

R

SP

PR

DT

V1

PR

PP

DT

R

S

BR

B1

CCM

UPONOR

PORT 1 PORT 2 PORT 3 PORT 4 PORT 5 PORT 6 PORT 7 PORT 8

INPUTS 1 INPUTS 2 INPUTS 3 INPUTS 4 INPUTS 5 INPUTS 6 INPUTS 7 INPUTS 8

Relays	DualSensor	Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor	
Pump					

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)
= Sensor Wire
= 24 V (AC)
= T-stat Wire
= Cat5 Cable

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.

Drawing 1E — Boiler, Single Mix Valve, Secondary Pump
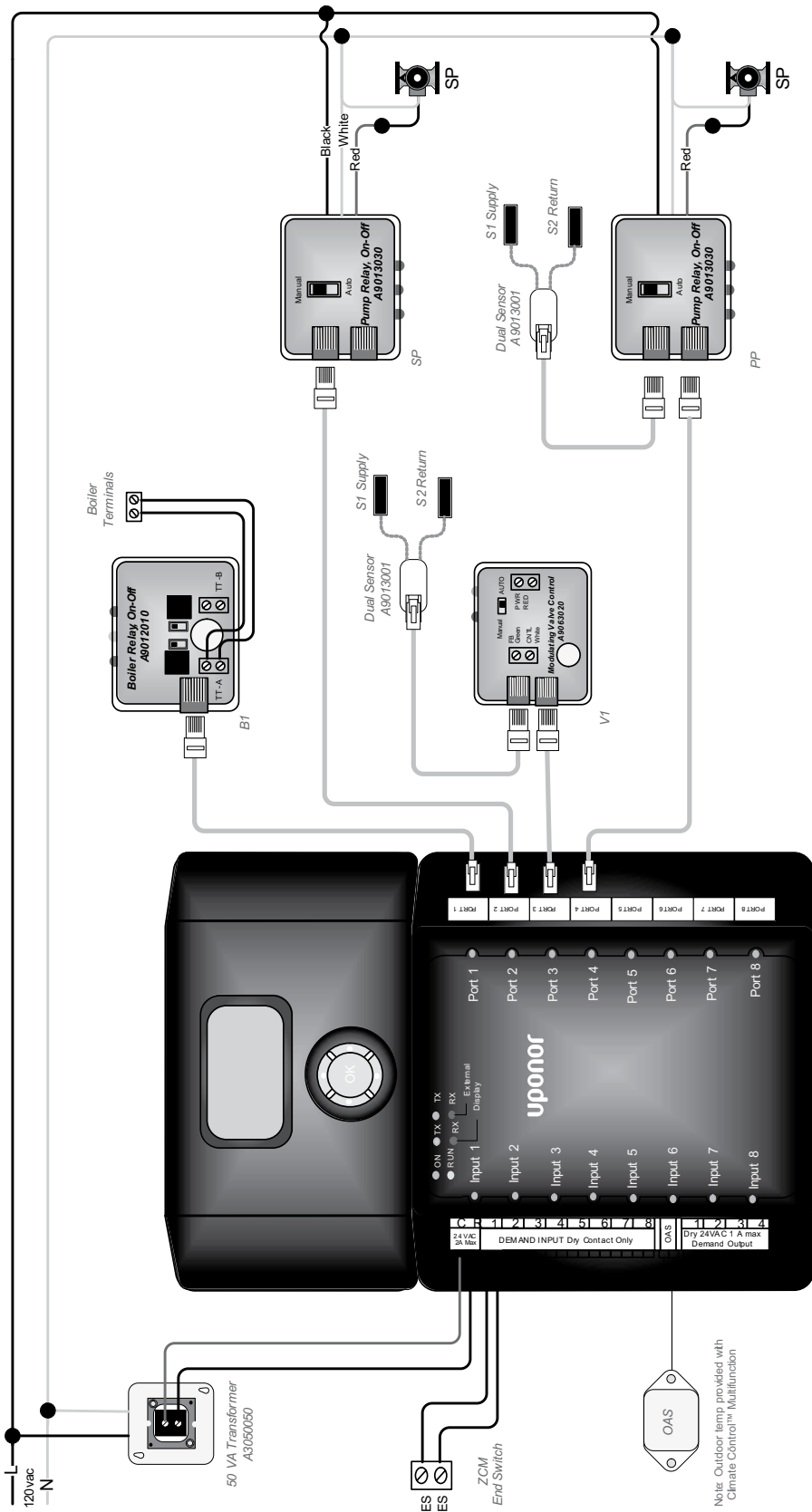
Climate Cöntrol™ Multifunction
A 802000

Drawing 2M — Boiler, Single Mix Valve, Zone Pumps

Project:

Uponor, Inc.
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Uponor Ltd.
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Drawn by :

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───── = 120 V (AC)
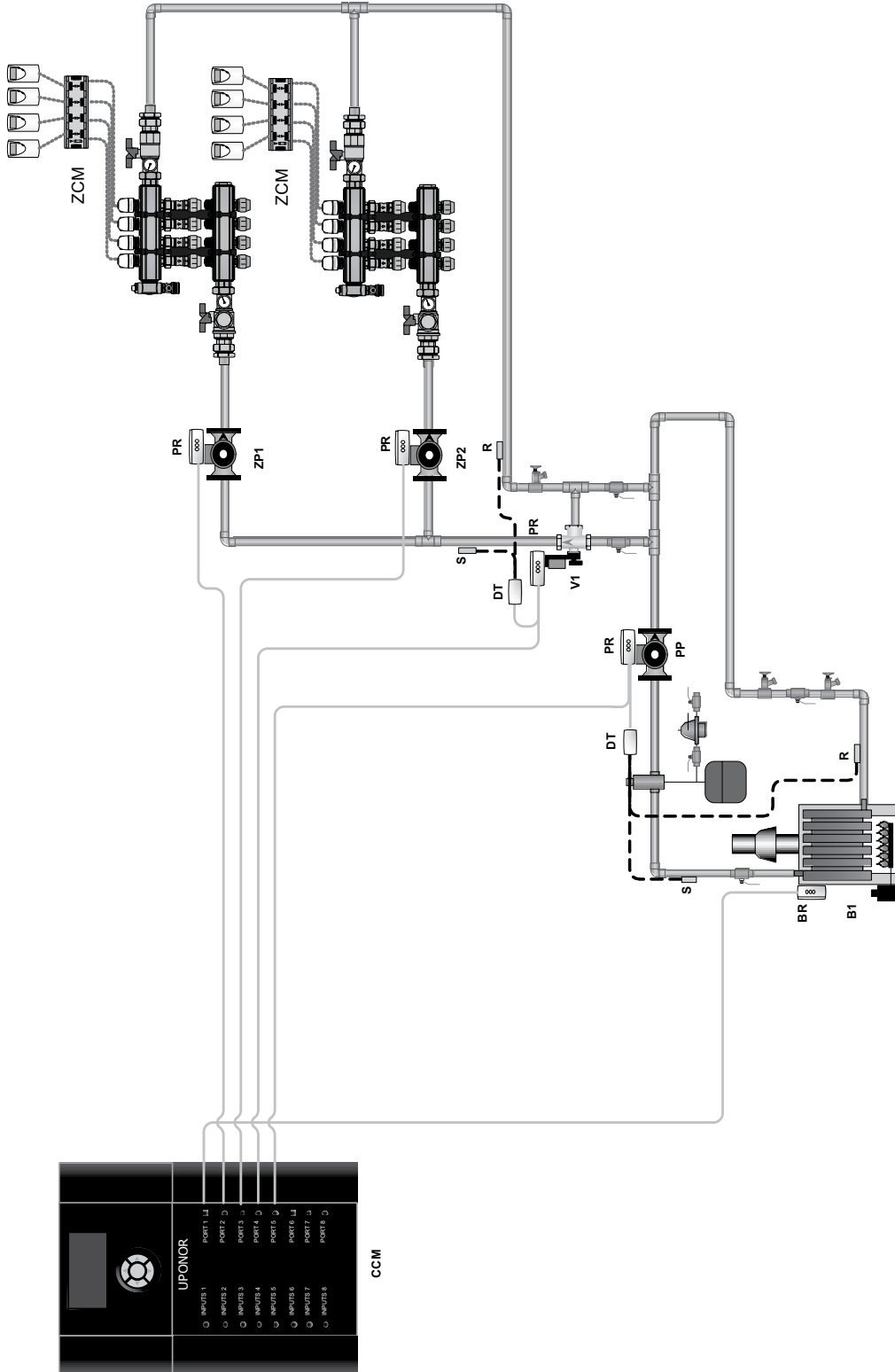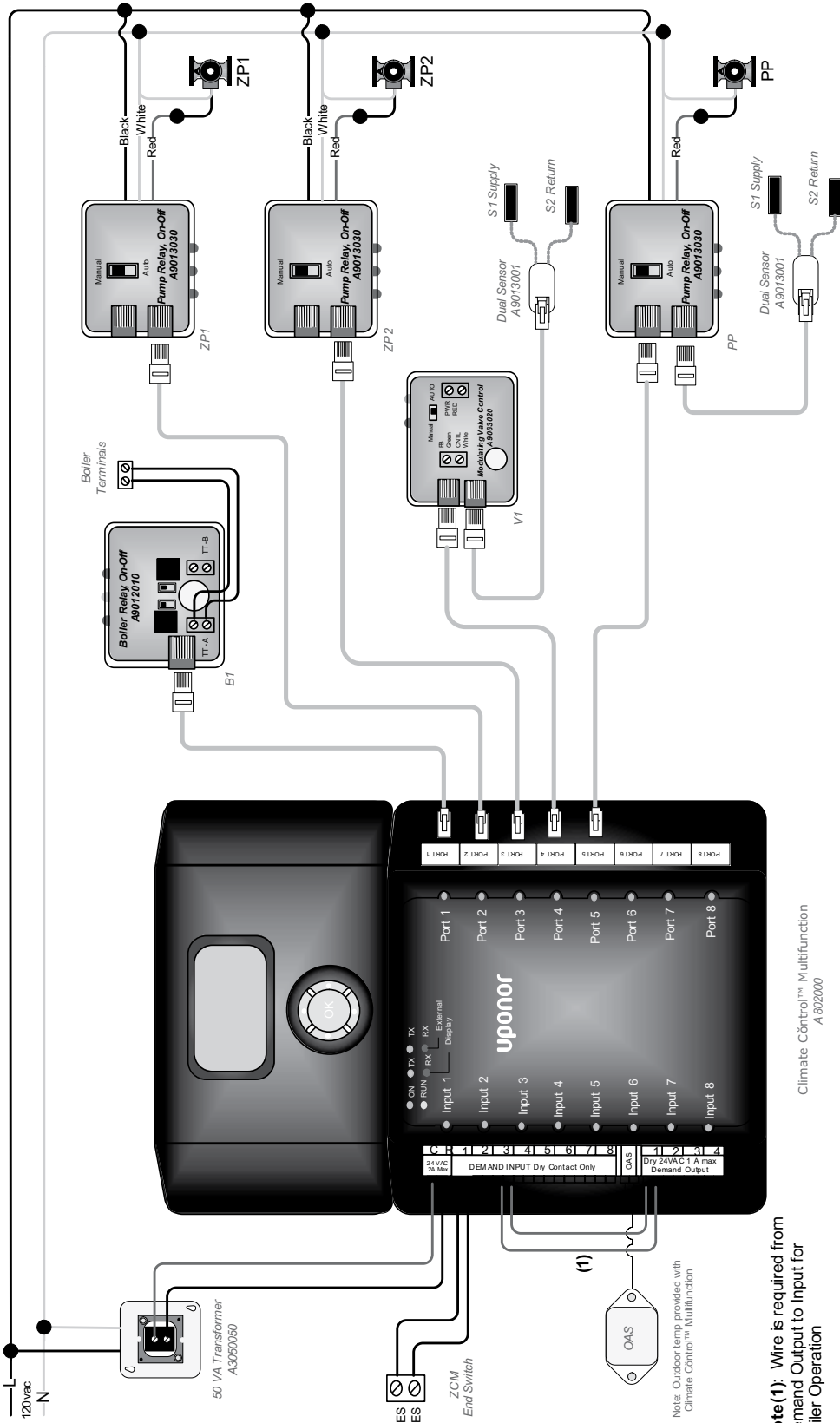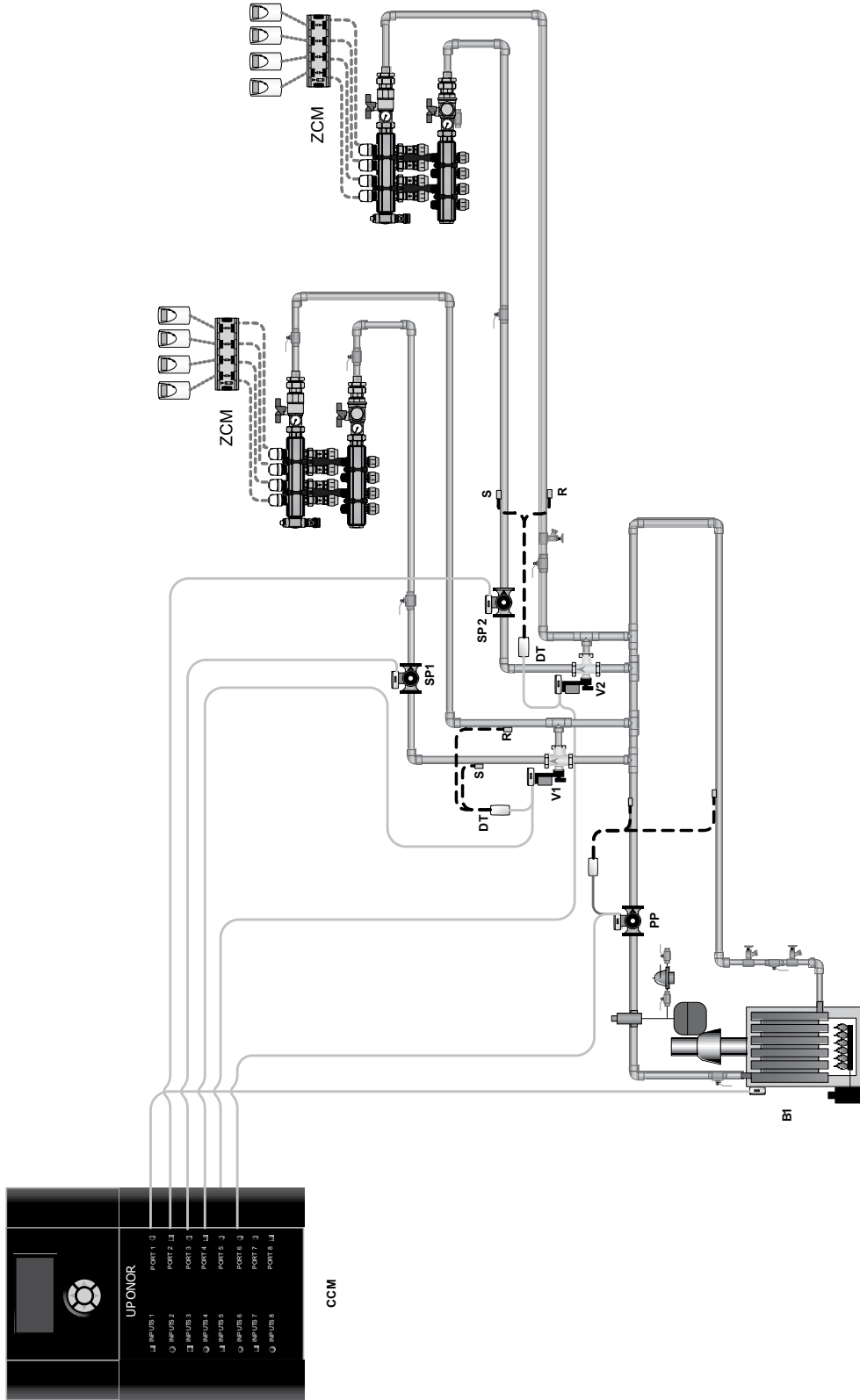- - - - = Sensor Wire
───── = 24 V (AC)
•••••• = T-stat Wire
───── = Cat 5 Cable

Snow Melt Sensor

DHW Sensor

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

Modulating Mixing Valve

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

Dual Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

Pump

Relays

ZCM

ZCM

PR   ZP1

PR   ZP2

R

PR

S

DT   V1

PR   PP

DT

R

S

BR   B1

CCM

UPONOR

PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8

INPUTS 1
INPUTS 2
INPUTS 3
INPUTS 4
INPUTS 5
INPUTS 6
INPUTS 7
INPUTS 8

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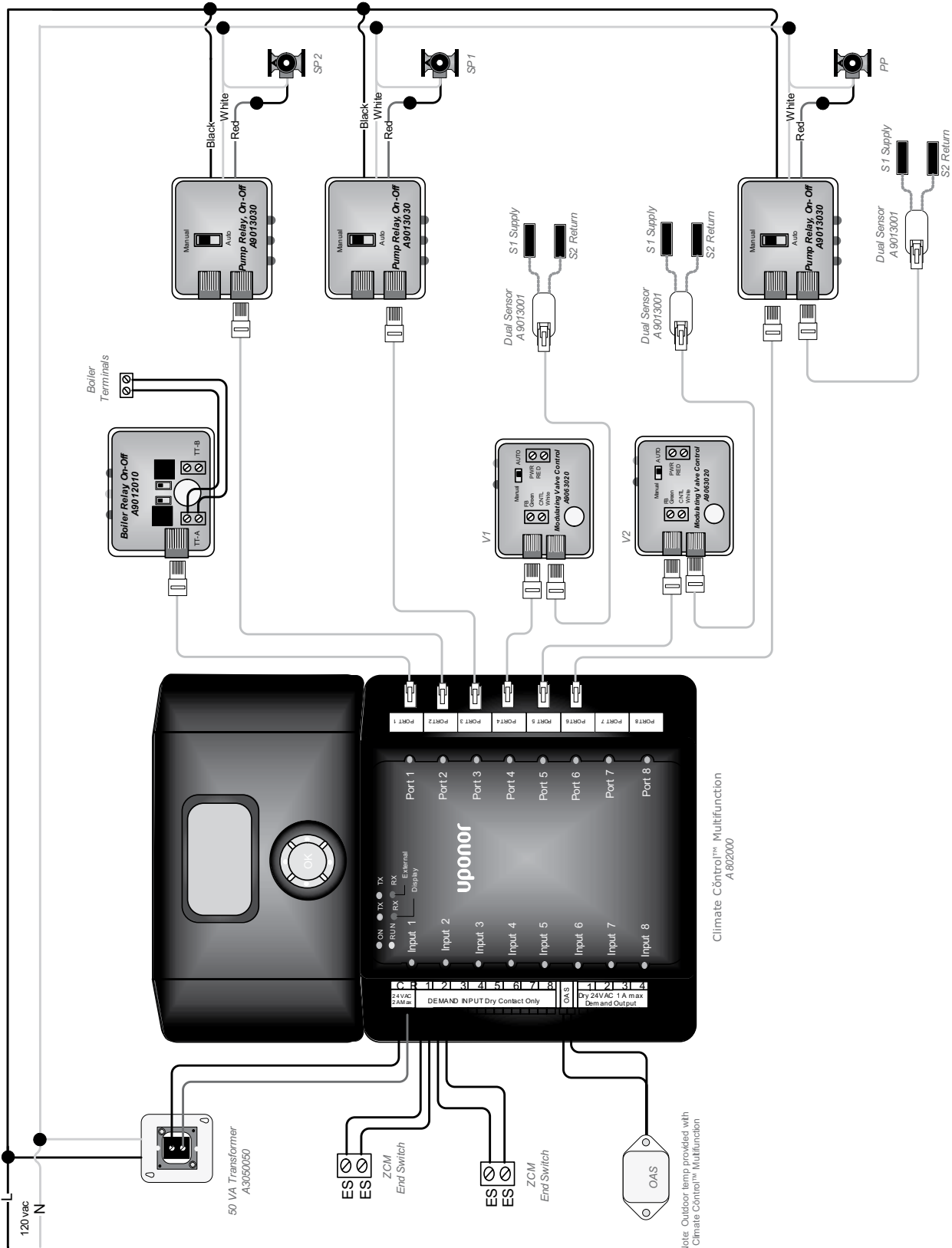
Drawing 2E — Boiler, Single Mix Valve, Zone Pumps

Note(1): Wire is required from Demand Output to Input for Boiler Operation
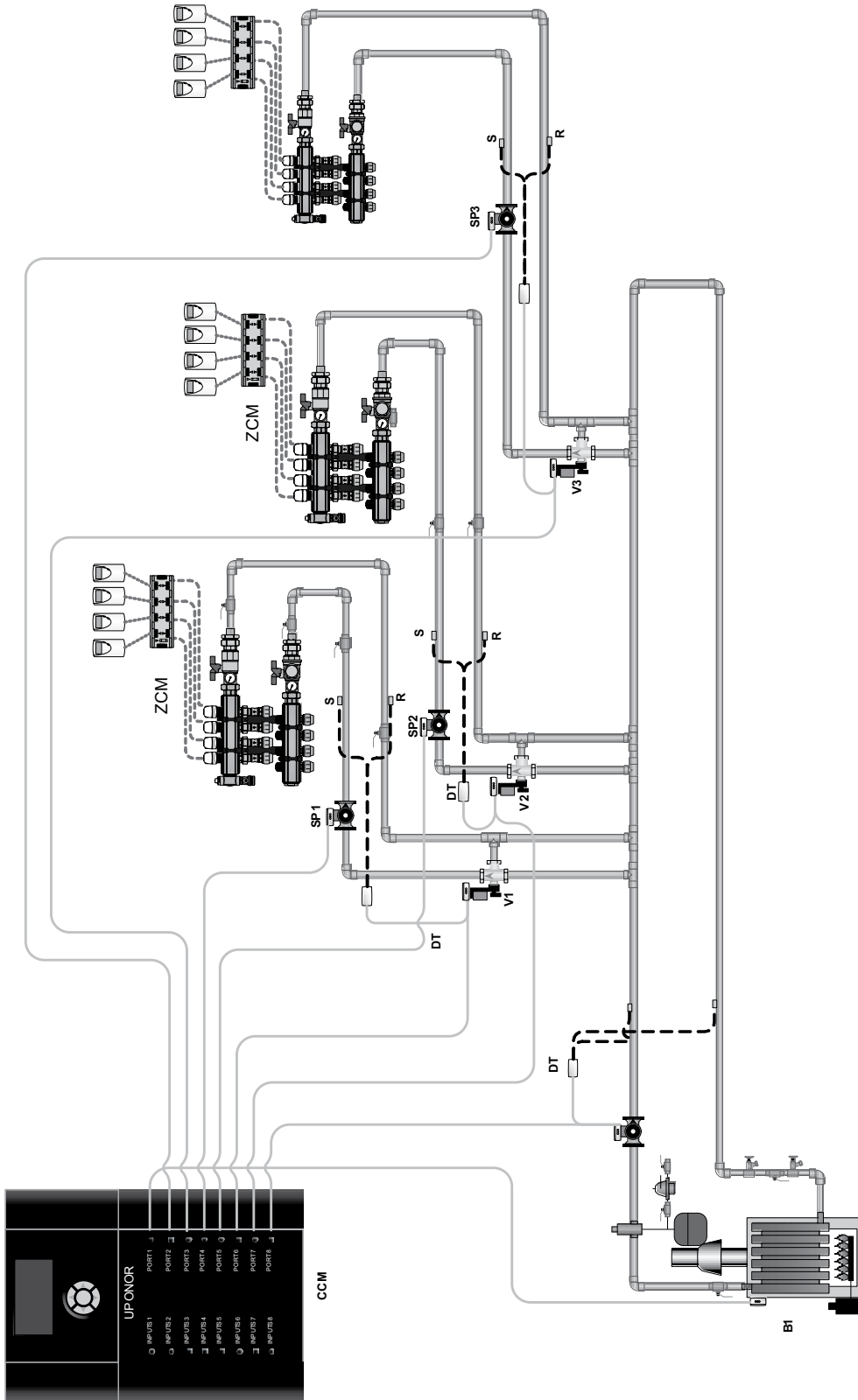
Drawing 3M — Boiler, Two Mix Valves, Secondary Pumps

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────────	= 120 V (AC)
─ ─ ─ ─	= Sensor Wire
═════	= 24 V (AC)
••••••	= T-stat Wire
────────	= Cat5 Cable

Relays

DualSensor

Pump

Modulating Mixing Valve

DHW Sensor

Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

ZCM

ZCM

S   R

SP 2

DT

V2

R

S

V1

DT

SP1

PP

B1

CCM

UPONOR

INPUTS 1   PORT 1
INPUTS 2   PORT 2
INPUTS 3   PORT 3
INPUTS 4   PORT 4
INPUTS 5   PORT 5
INPUTS 6   PORT 6
INPUTS 7   PORT 7
INPUTS 8   PORT 8

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.

Drawing 3E — Boiler, Two Mix Valves, Secondary Pumps

Drawing 4M — Boiler, Three Mix Valves, Secondary Pumps

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DATE:

Legend:

= 120 V (AC)
= Sensor Wire
= 24 V (AC)
= T-stat Wire
= Cat5 Cable

Relays	Pump
DualSensor	Modulating Mixing Valve
DHW Sensor	Snow Melt. Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1= Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
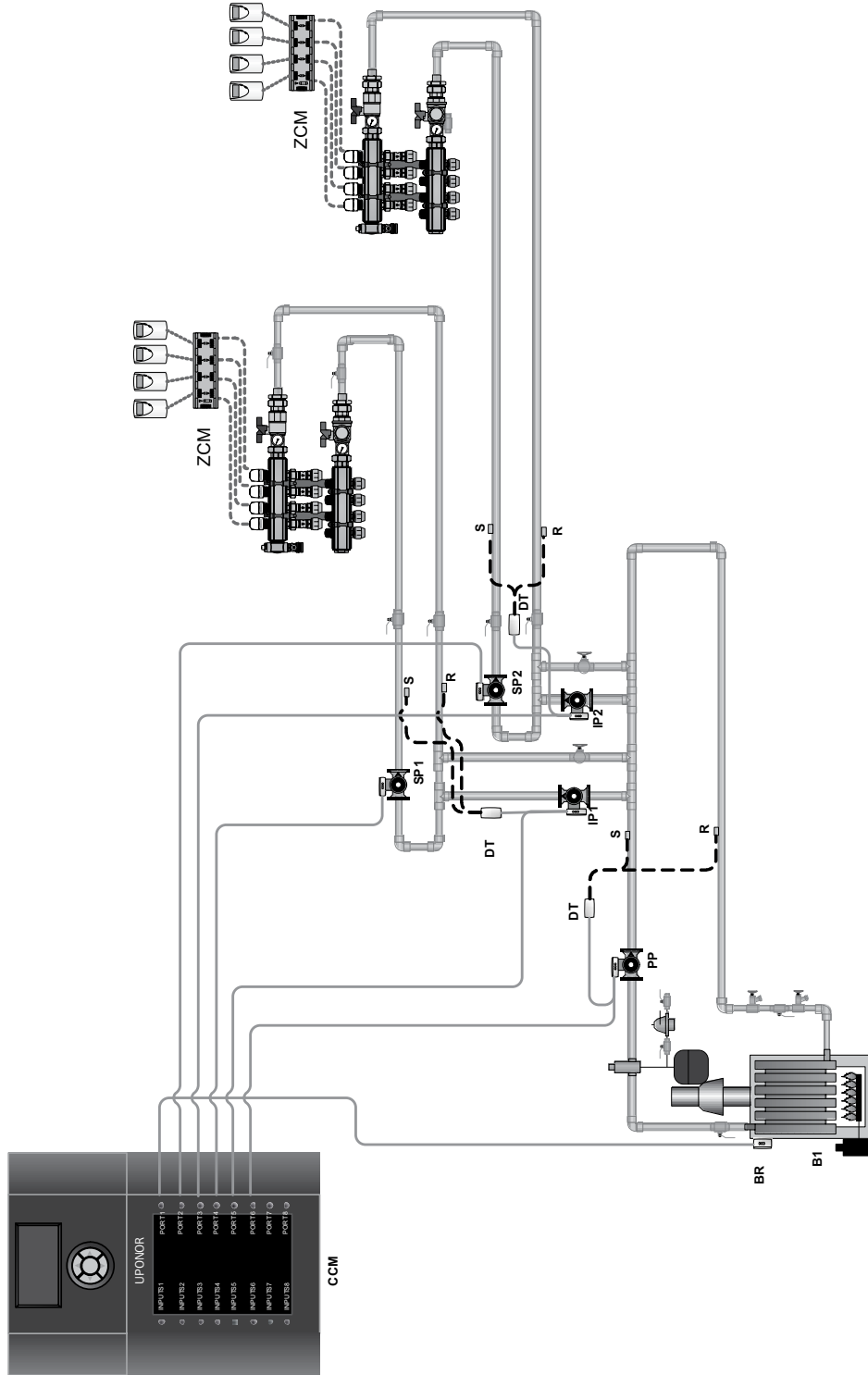BP = Boiler Pump

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Drawing 4E — Boiler, Three Mix Valves, Secondary Pumps
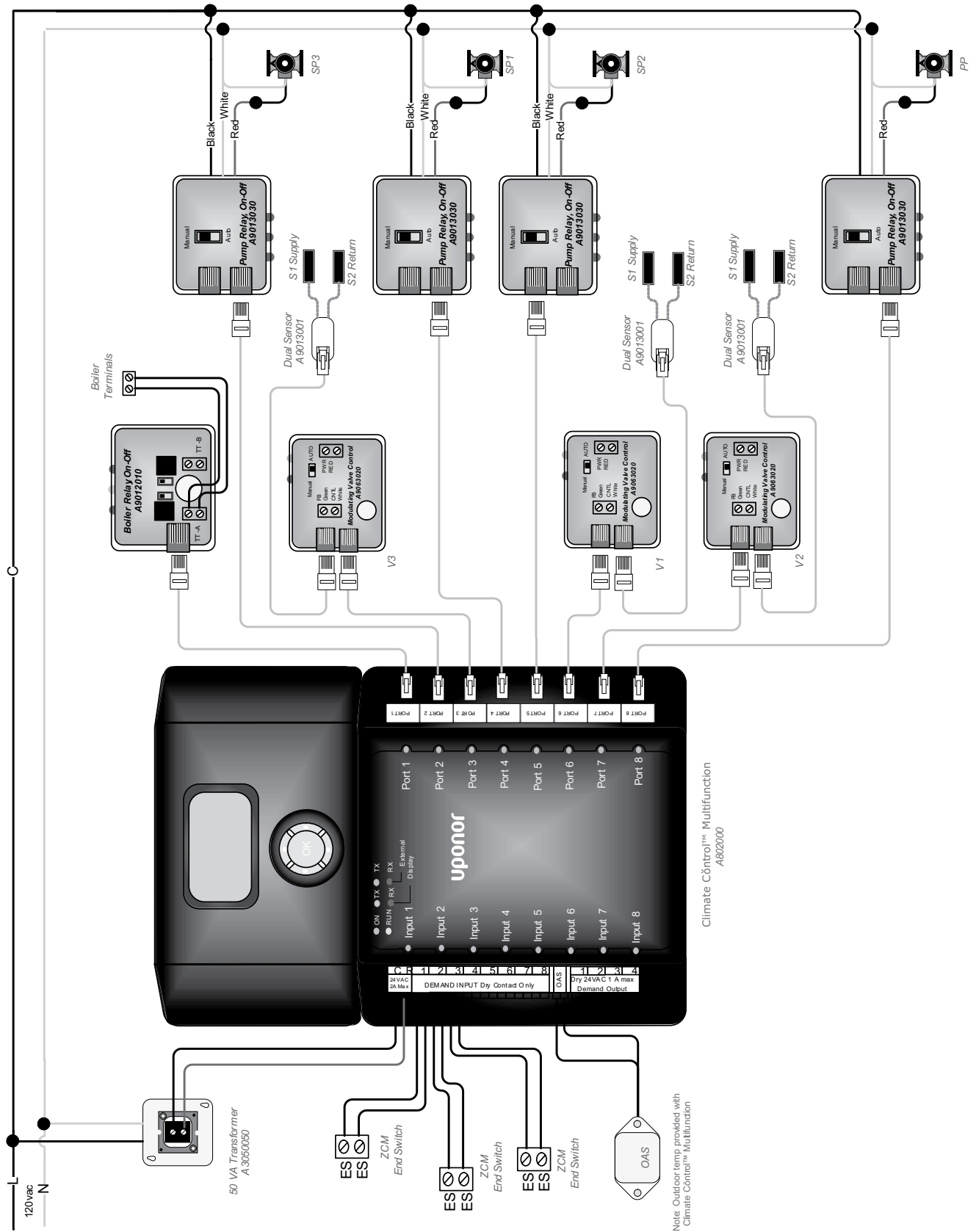
Drawing 5M — Boiler, Injection Pump, Secondary Pump

ZCM

PR
SP
S
R
DT

PR
IP

PR
PP
R
DT
S

B1

BR

CCM

UPONOR

PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8

INPUTS 1
INPUTS 2
INPUTS 3
INPUTS 4
INPUTS 5
INPUTS 6
INPUTS 7
INPUTS 8

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Relays	Pump	DualSensor	Modulating Mixing Valve	Snow Melt Sensor
			DHW Sensor	

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1= Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

——— = 120 V (AC)
– – – = Sensor Wire
——— = 24 V (AC)
•••••• = T-stat Wire
——— = Cat5 Cable
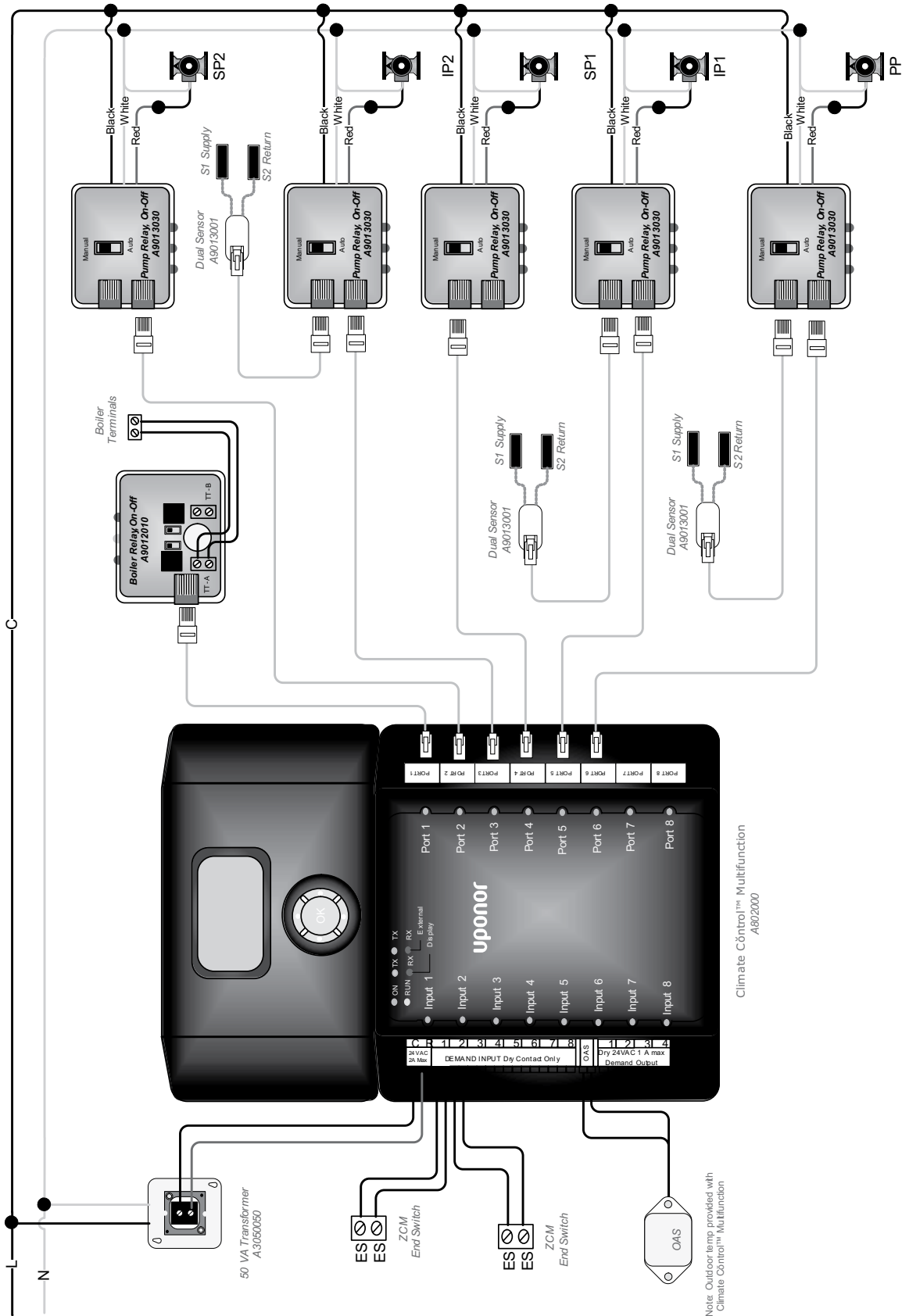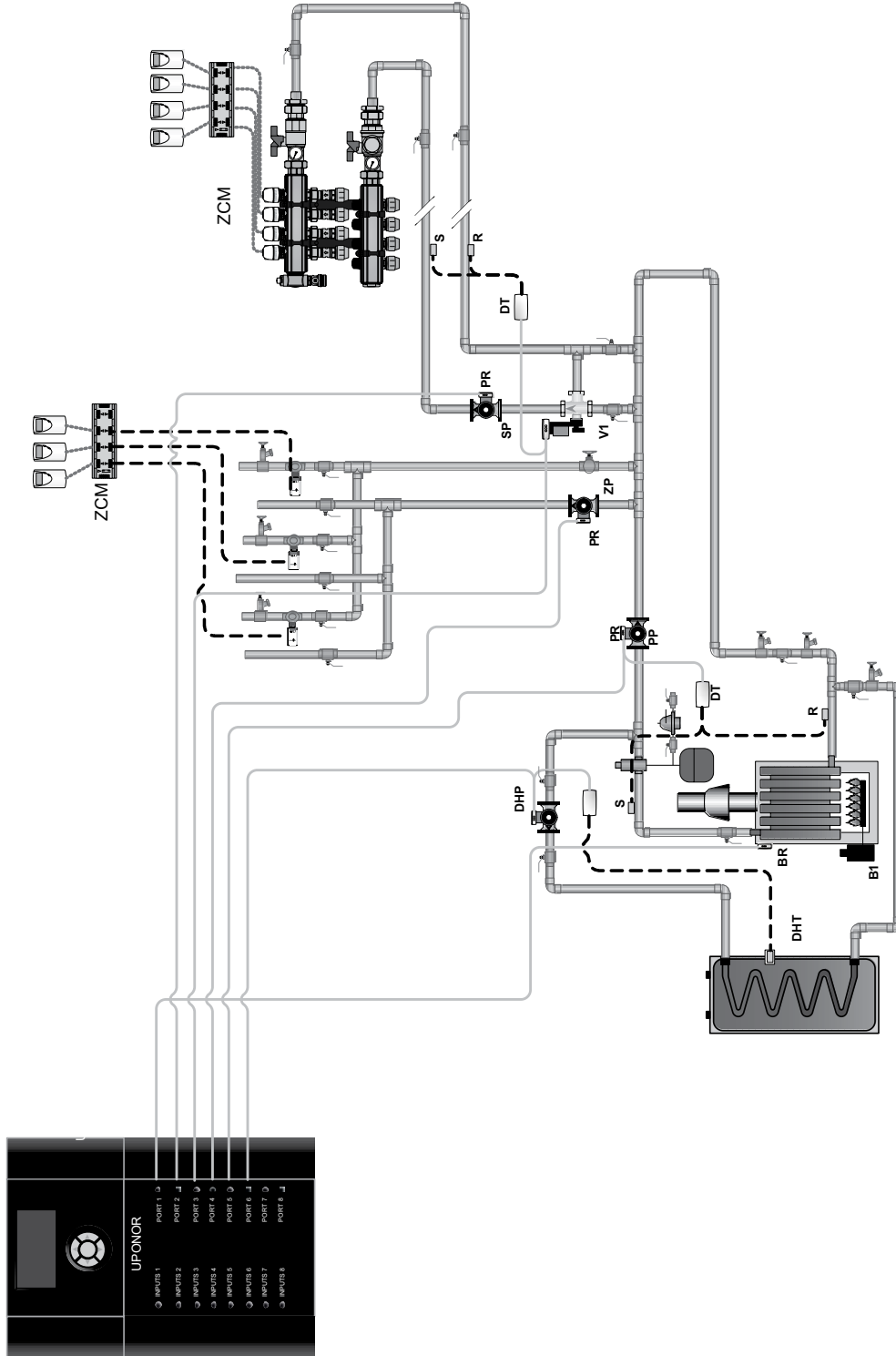
Drawing 5E — Boiler, Injection Pump, Secondary Pump
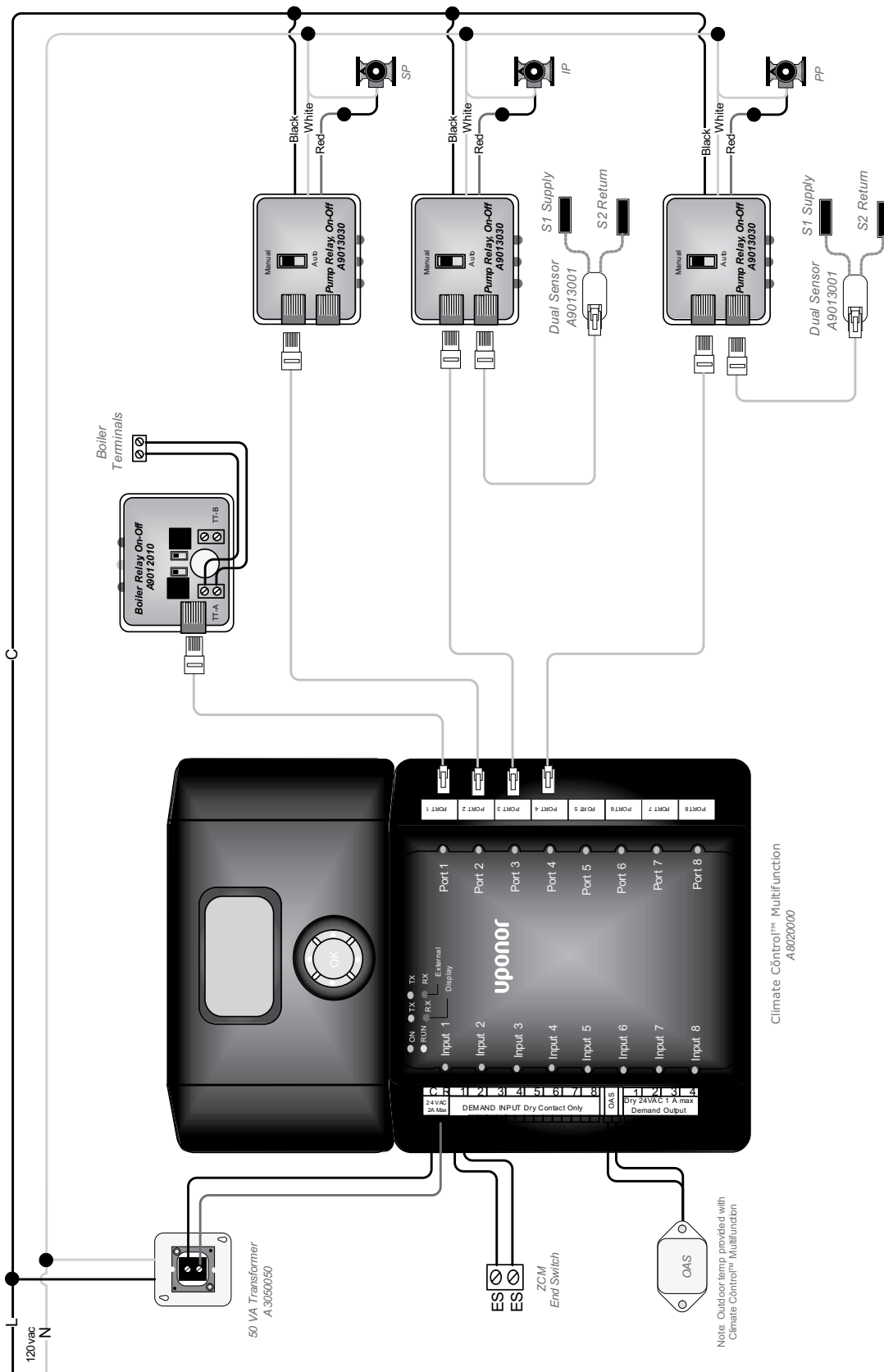
Drawing 6M — Boiler, Two Injection Pumps, Secondary Pumps

ZCM

ZCM

S
R
DT

S
R
SP2
IP2

S
SP1

DT
IP1

S

DT

R

PP

R

B1

BR

CCM

UPONOR

PORT1 PORT2 PORT3 PORT4 PORT5 PORT6 PORT7 PORT8
INPUTS1 INPUTS2 INPUTS3 INPUTS4 INPUTS5 INPUTS6 INPUTS7 INPUTS8

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.

Relays	Pump	DualSensor	Modulating Mixing Valve

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

DHW Sensor	Snow Melt Sensor	

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)
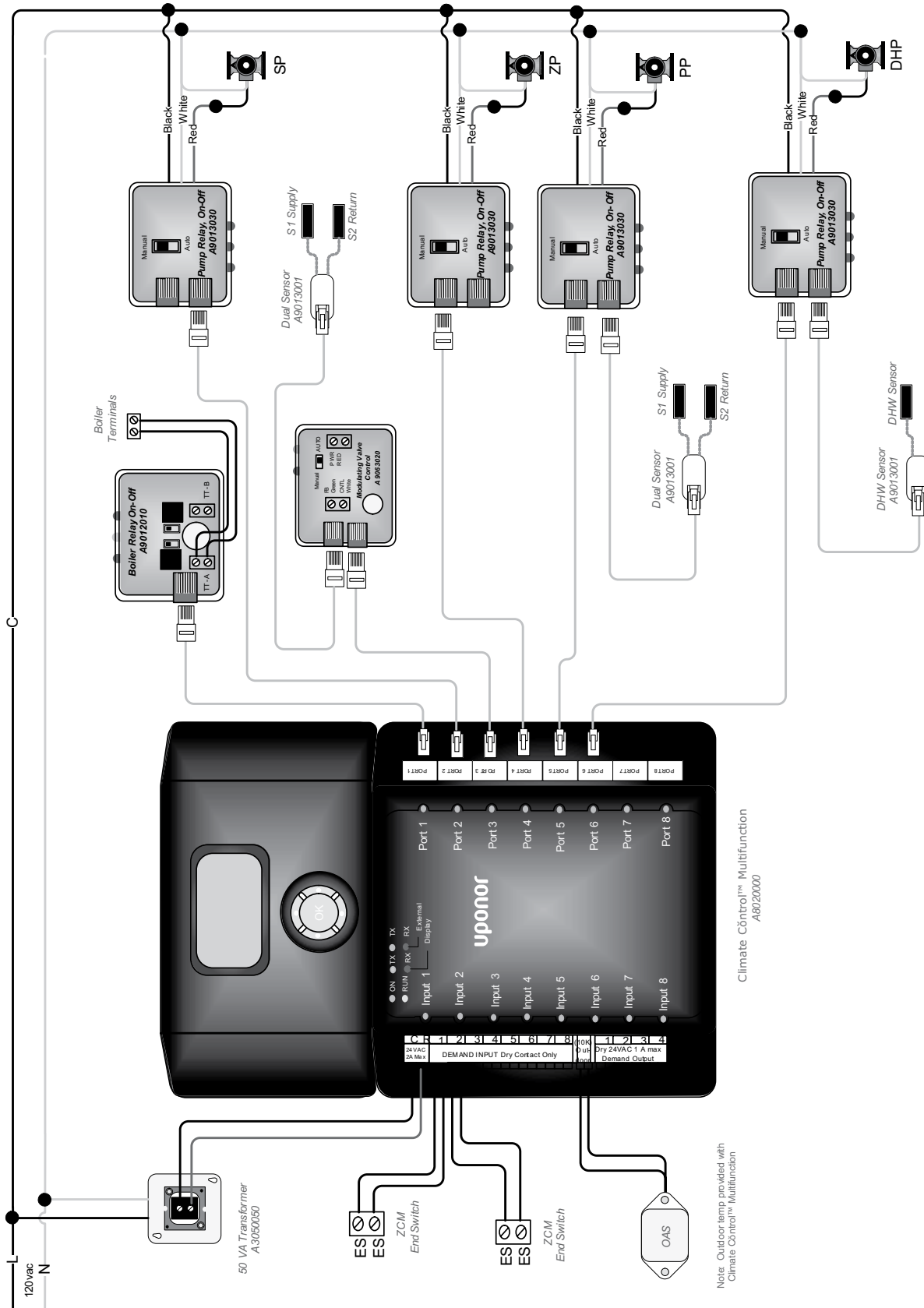= Sensor Wire
= 24 V (AC)
= T-stat Wire
= Cat5 Cable

Drawing 6E — Boiler, Two Injection Pumps, Secondary Pumps

Drawing 7M — Boiler, DHW, Mix Valve, Secondary and High Temp

ZCM

ZCM

S
R

DT

PR
SP

V1

ZP

PR

PR
PP

DT

R

DHP

S

BR

B1

DHT

UPONOR

INPUTS 1	PORT 1
INPUTS 2	PORT 2
INPUTS 3	PORT 3
INPUTS 4	PORT 4
INPUTS 5	PORT 5
INPUTS 6	PORT 6
INPUTS 7	PORT 7
INPUTS 8	PORT 8

Relays	Pump	DualSensor	Modulating Mixing Valve

DHW Sensor	Snow Melt Sensor	

= 120 V (AC)
= Sensor Wire
= 24 V (AC)
= T-stat Wire
= Cat5 Cable

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

Drawing 7E — Boiler, DHW, Mix Valve, Secondary and High Temp

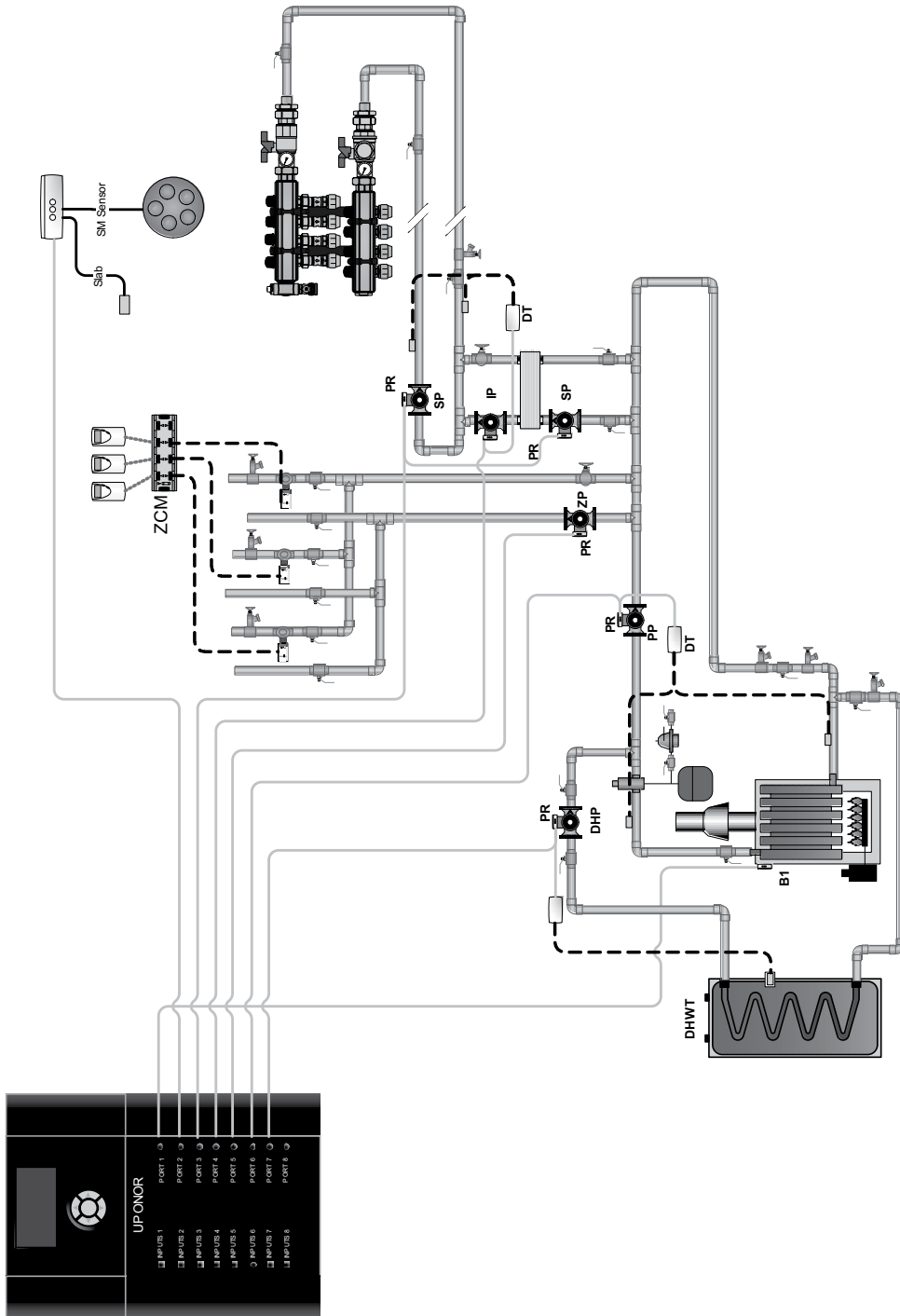# Drawing 8M — ModCon Boilers, DHW, Mix Valve, Secondary and High Temp

= 120 V (AC)

= Sensor Wire

= 24 V (AC)

= T-stat Wire

= Cat 5 Cable

Relays	Pump	Dual Sensor	Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

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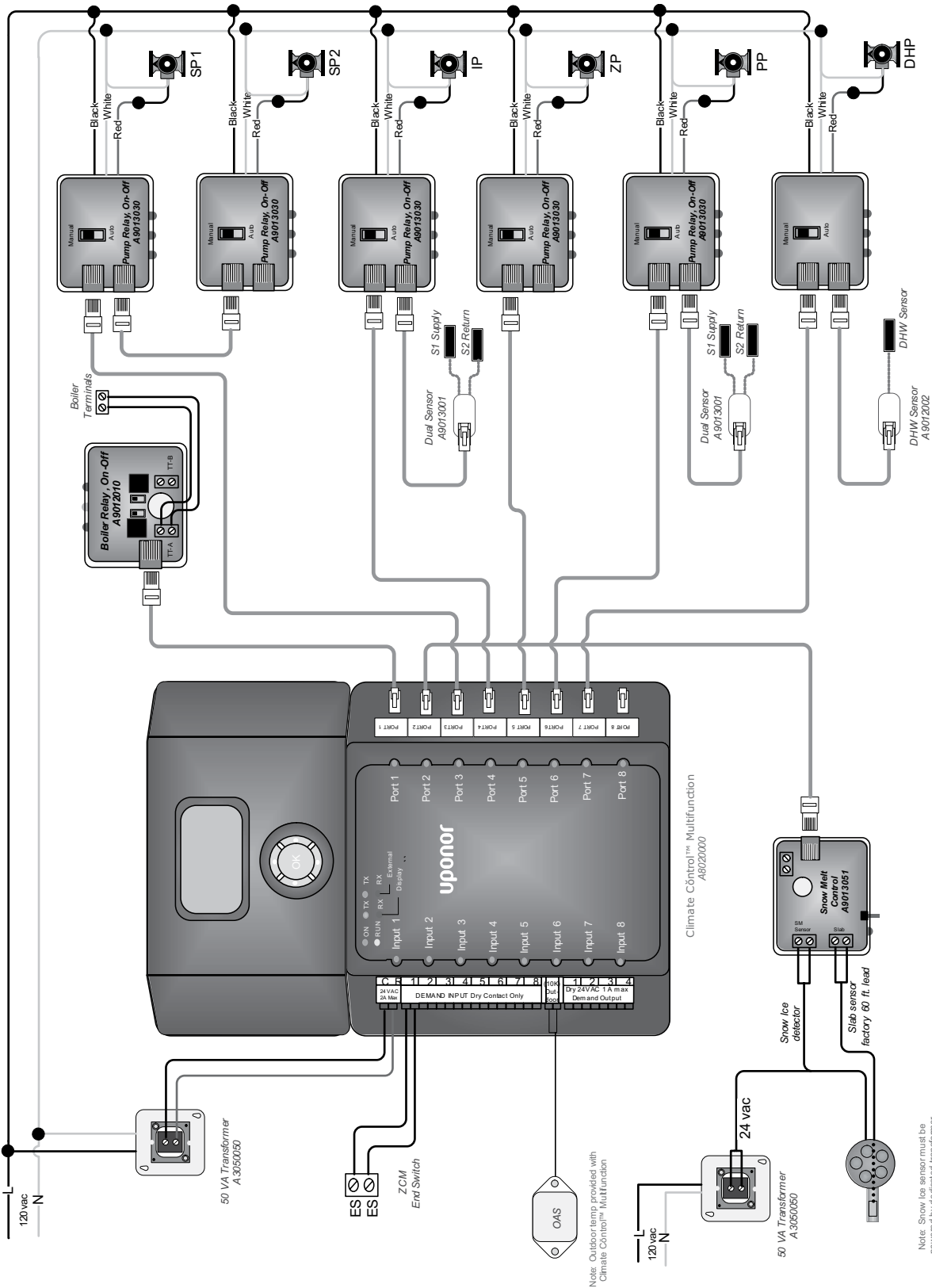
Drawing 8E — ModCon Boilers, DHW, Mix Valve, Secondary and High Temp
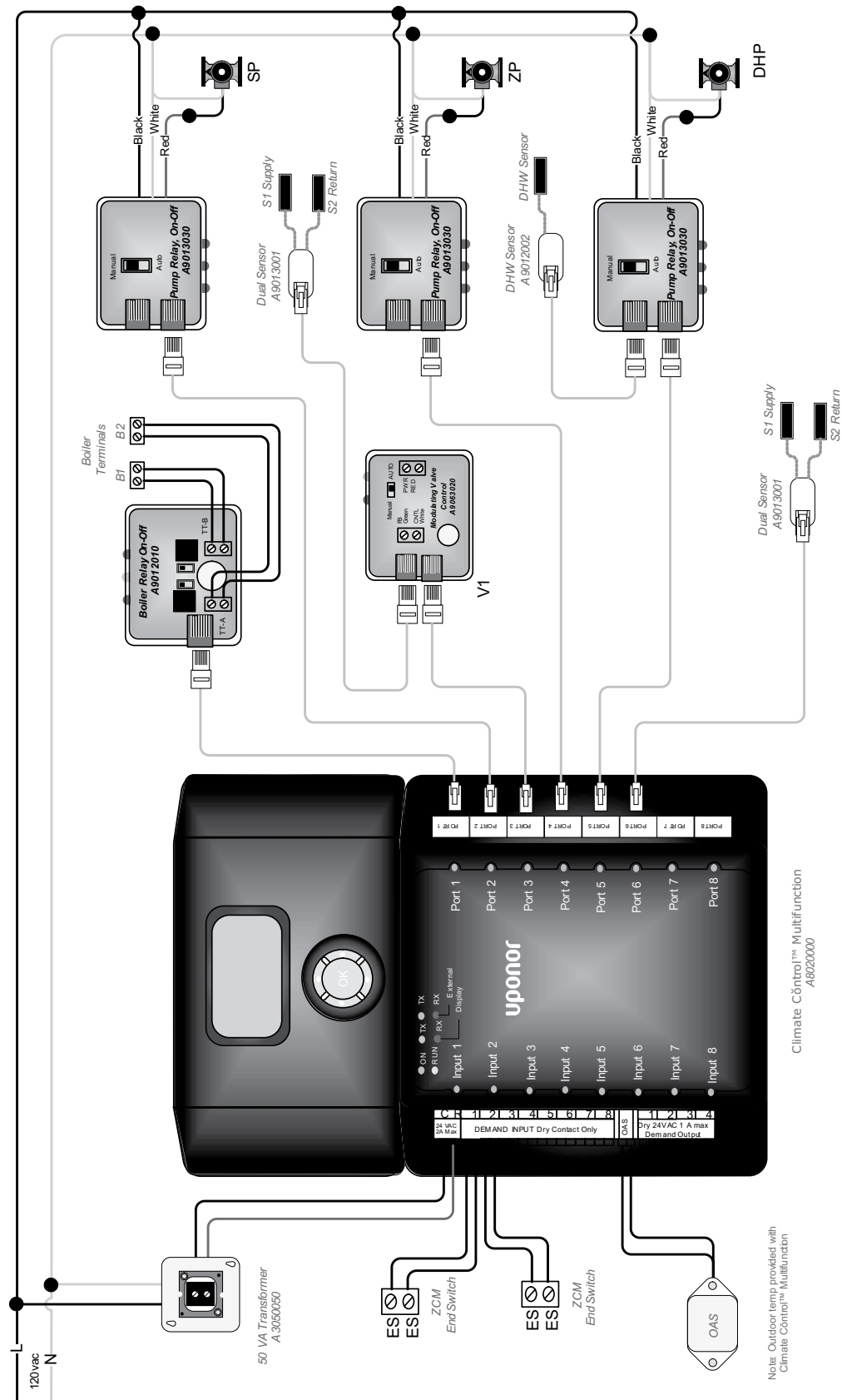
Drawing 9M — Boiler, DHW, Injection, Snow Melt and High Temp

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= 120 V (AC)	= Sensor Wire
= 24 V (AC)	= T-stat Wire
= Cat5 Cable	

Relays	DualSensor	Modulating Mixing Valve
Pump	Snow Melt Sensor	DHW Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
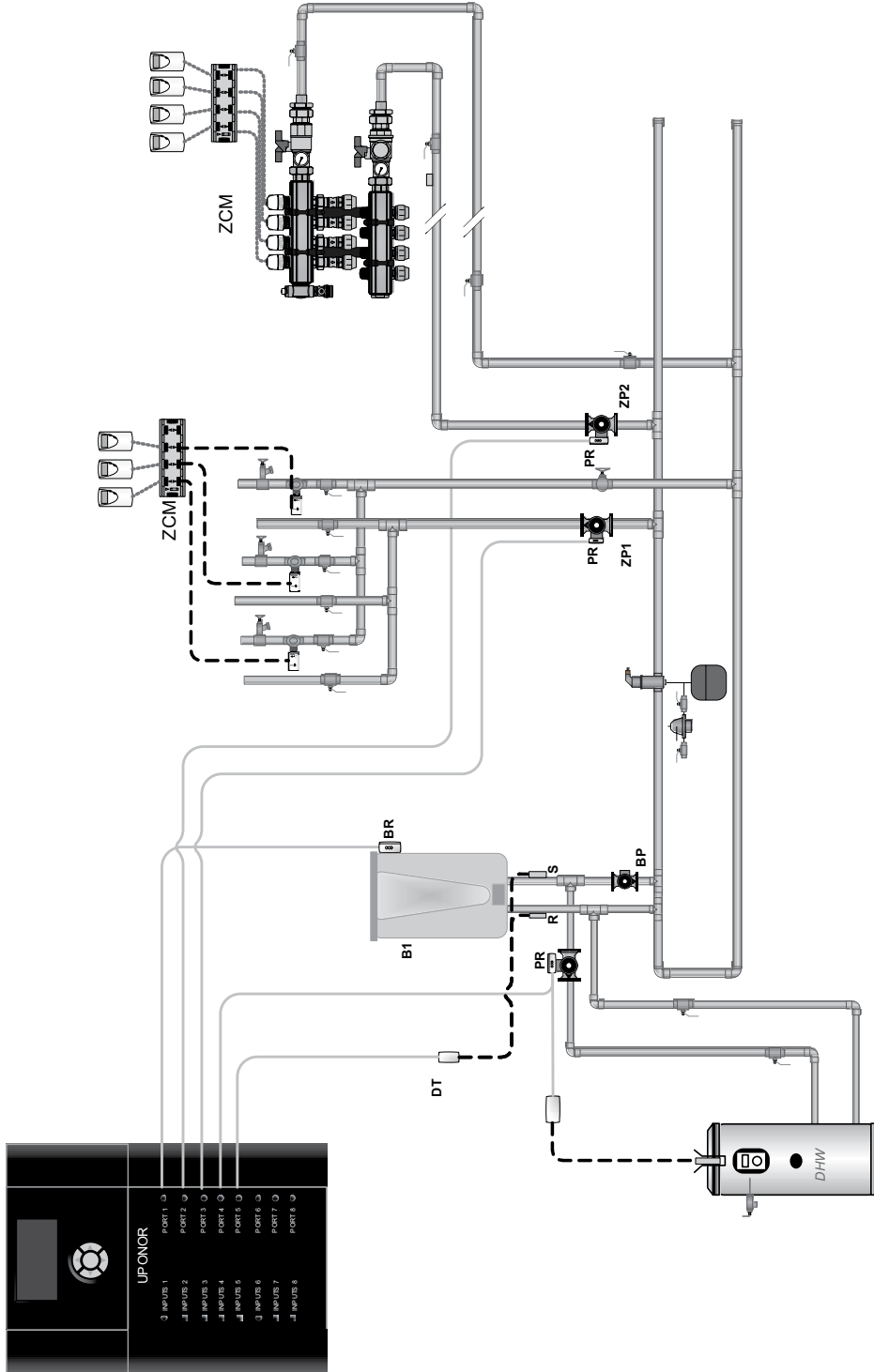ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

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.

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Drawing 9E — Boiler, DHW, Injection, Snow Melt and High Temp

Drawing 10M — ModCon, DHW and Zone Pumps

ZCM

ZCM

ZP2

PR

PR

ZP1

BR

B1

S

BP

R

PR

DT

DHW

UPONOR

PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8

INPUTS 1
INPUTS 2
INPUTS 3
INPUTS 4
INPUTS 5
INPUTS 6
INPUTS 7
INPUTS 8

Relays	Pump	DualSensor	Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)

= Sensor Wire

= 24 V (AC)

= T-stat Wire

= Cat5 Cable

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.

Drawing 10E — ModCon, DHW and Zone Pumps
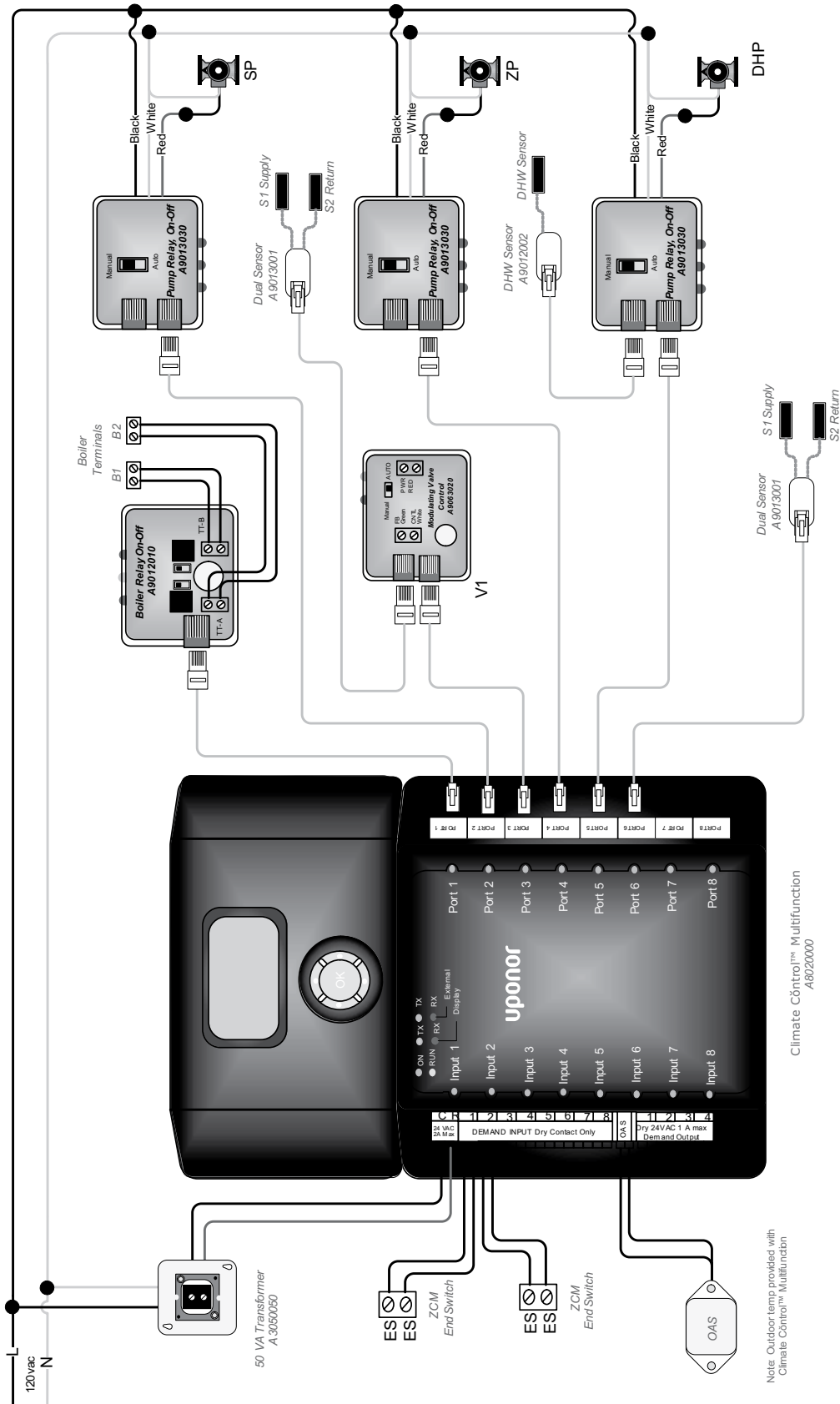
Drawing 11M — Four Boilers, DHW, Multiple Snow Melt Zones

SM Sensor

Slab

SM Sensor

Slab

PR
ZP2

PR
ZP1

PR

DHW

S

R

B4

B3

B2

B1

BR

DT

BP

BP

BP

UPONOR

PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8

INPUTS 1
INPUTS 2
INPUTS 3
INPUTS 4
INPUTS 5
INPUTS 6
INPUTS 7
INPUTS 8

Relays	Pump	Dual Sensor	Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
VT = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)

= Sensor Wire

= 24 V (AC)

= T-stat Wire

= Cat5 Cable

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Drawn by: Checked by:
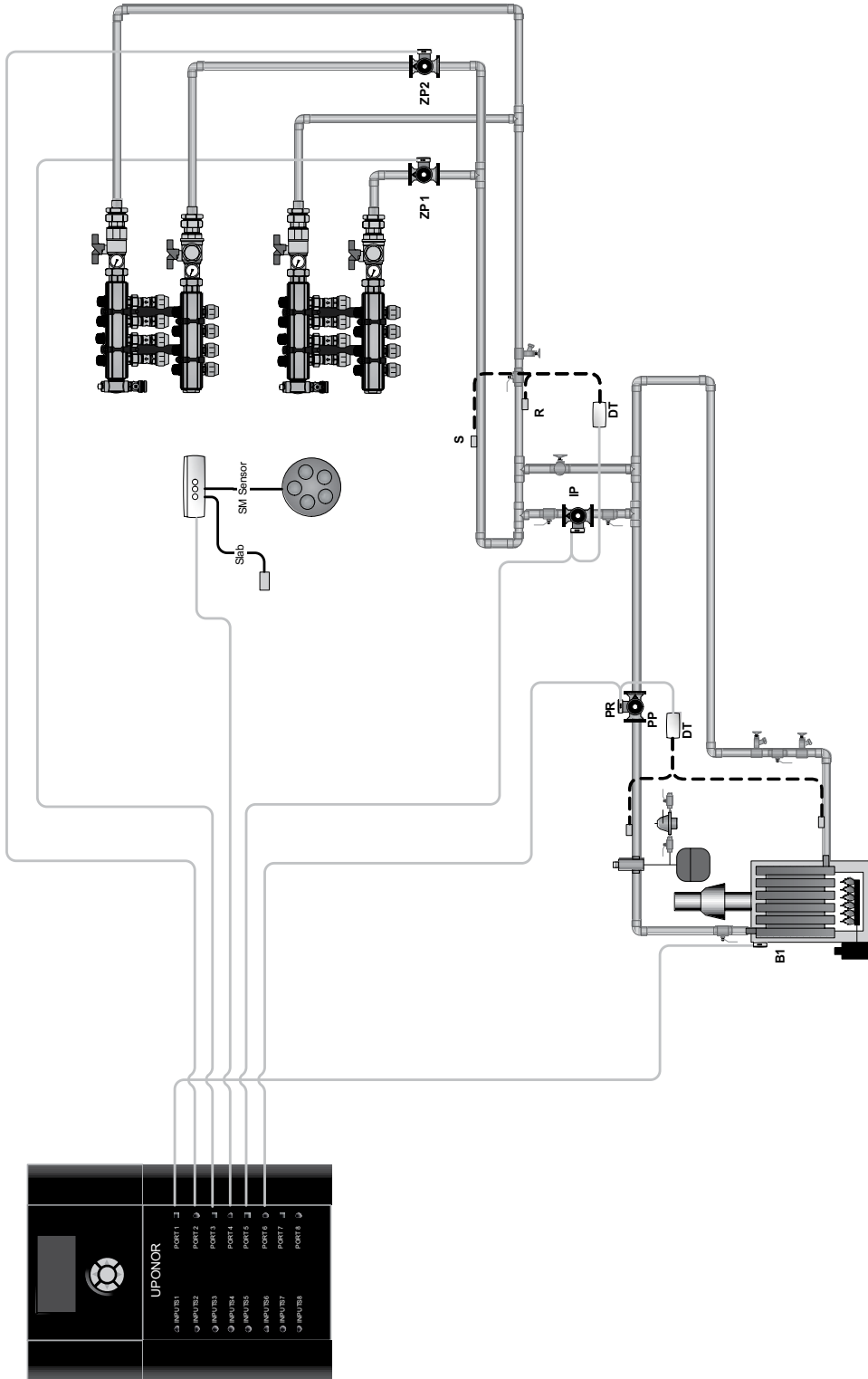
Rep: DATE:

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.

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Drawing 11E — Four Boilers, DHW, Multiple Snow Melt Zones
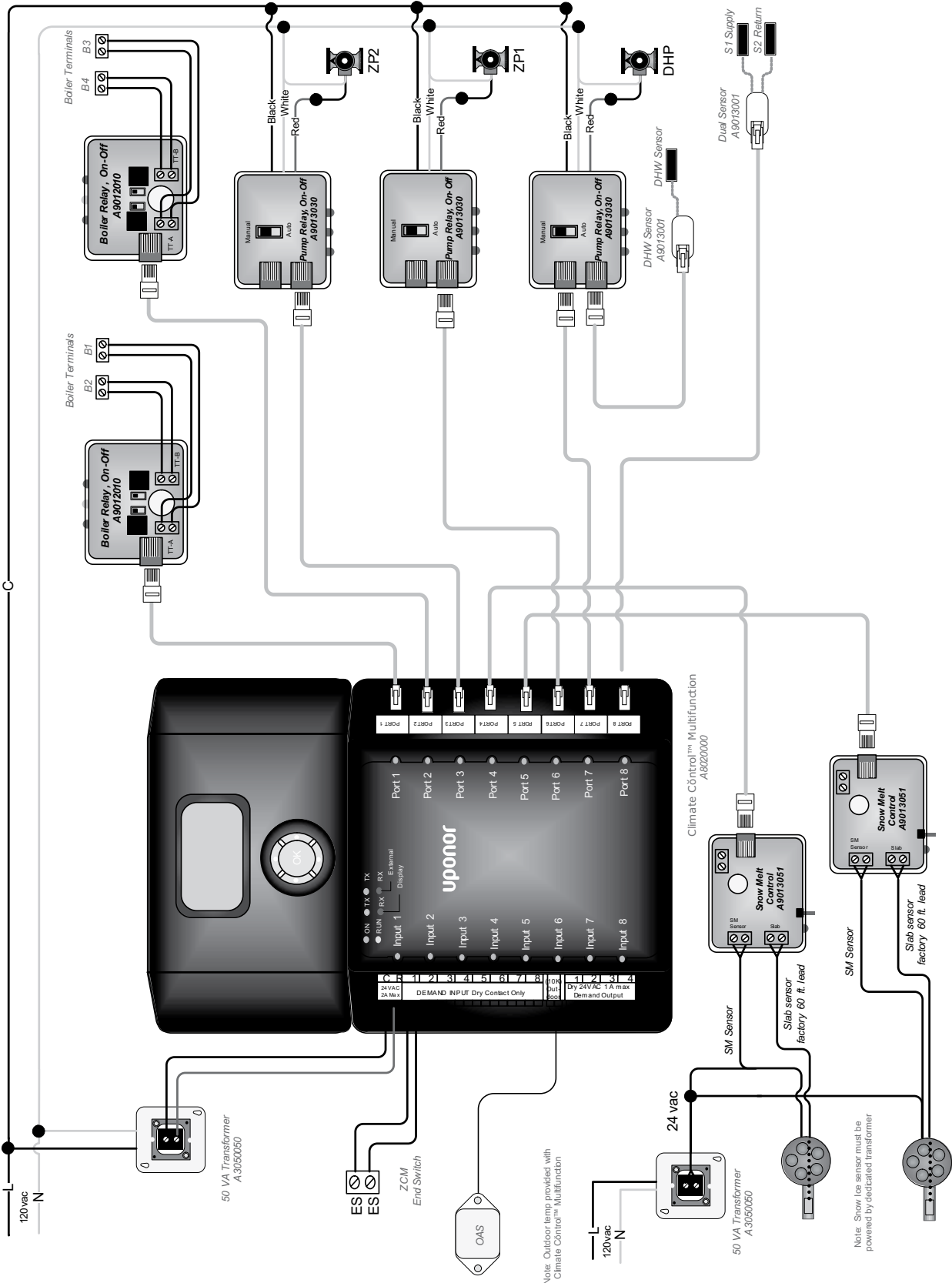
Drawing 12M — Boiler, Injection Mixing and Snow Melt with Zone Pumps

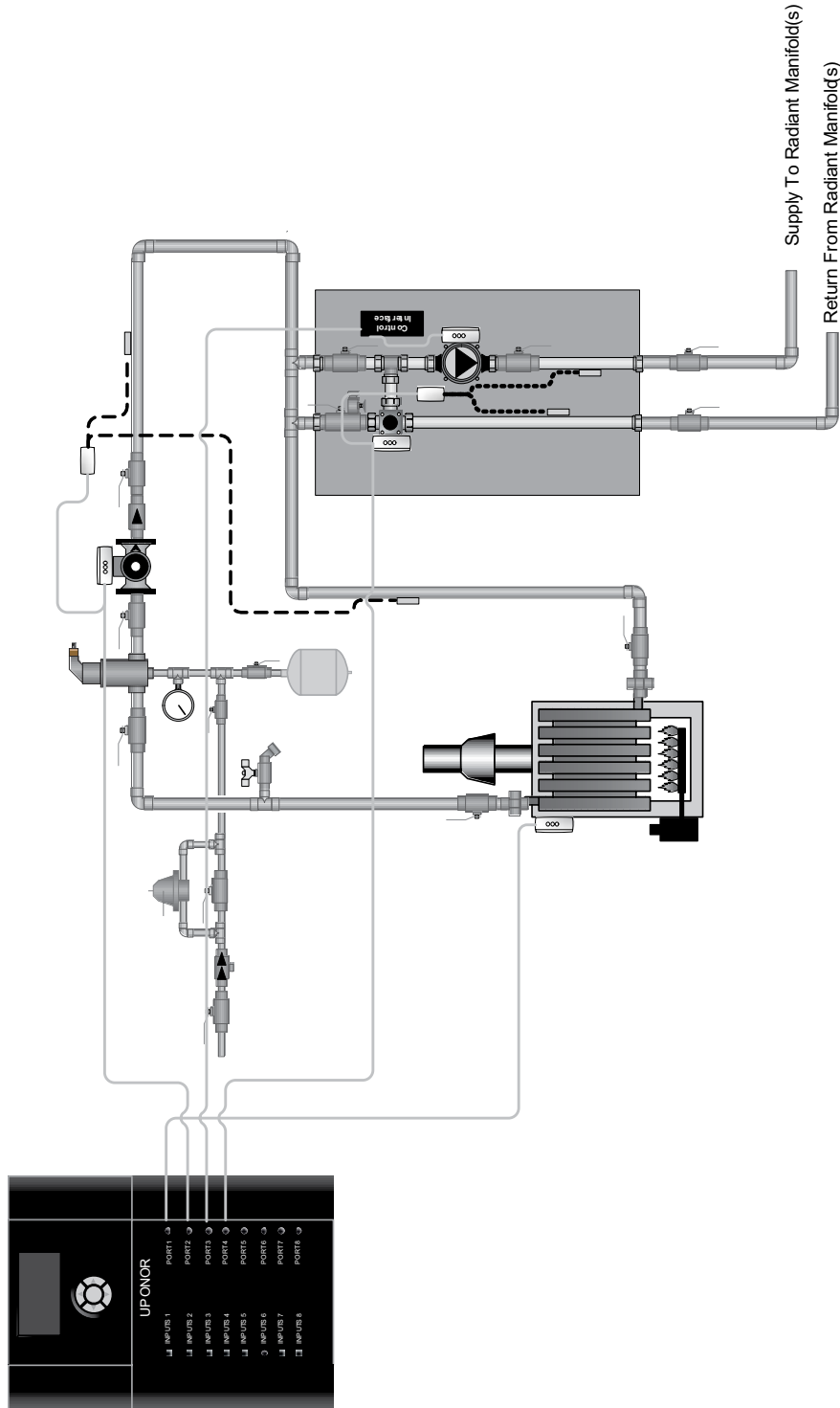| Relays	Pump	DualSensor	Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)

= Sensor Wire

= 24 V (AC)

= T-stat Wire

= Cat5 Cable

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.

Drawing 12E — Boiler, Injection Mixing and Snow Melt with Zone Pumps
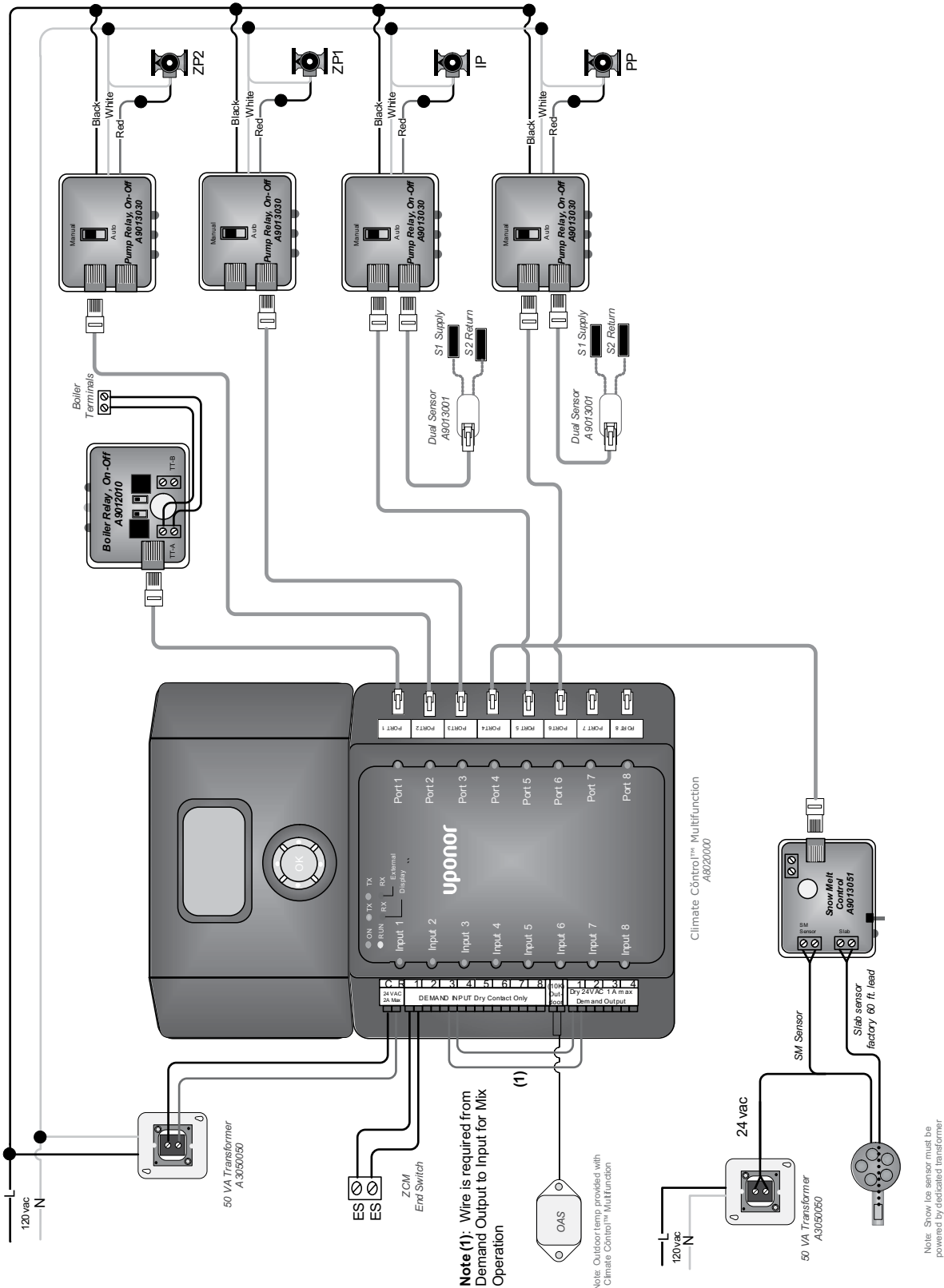
Drawing 13M — Boiler, with 90M proPANEL

Supply To Radiant Manifold(s)

Return From Radiant Manifold(s)

Control Interface

UPONOR

PORT1 PORT2 PORT3 PORT4 PORT5 PORT6 PORT7 PORT8

INPUTS 1 INPUTS 2 INPUTS 3 INPUTS 4 INPUTS 5 INPUTS 6 INPUTS 7 INPUTS 8

Legend

Relays	DualSensor	DHW Sensor
Pump	Modulating Mixing Valve	Snow Melt Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

= 120 V (AC)	= Sensor Wire
= 24 V (AC)	= T-stat Wire
= Cat5 Cable	

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.
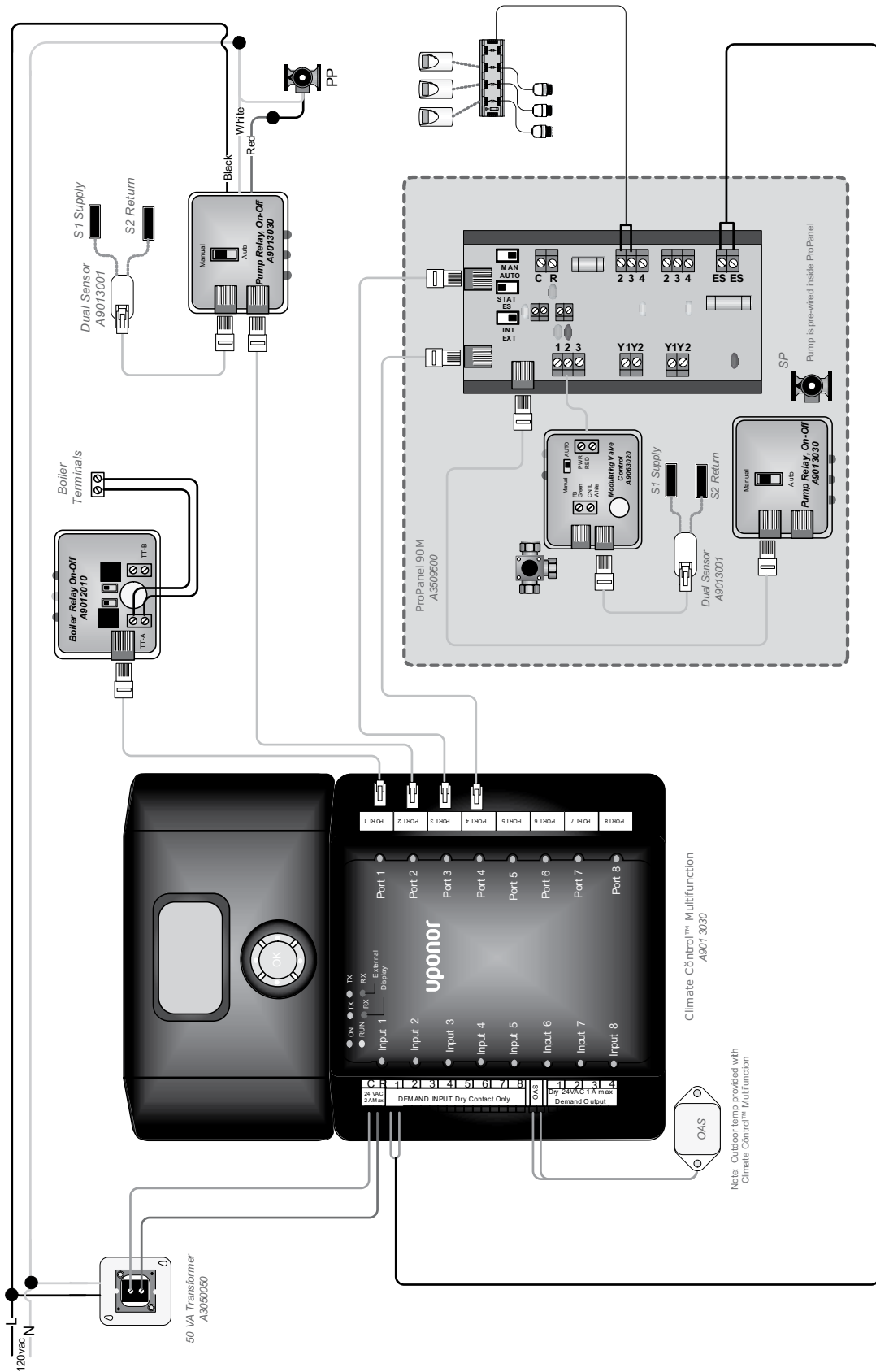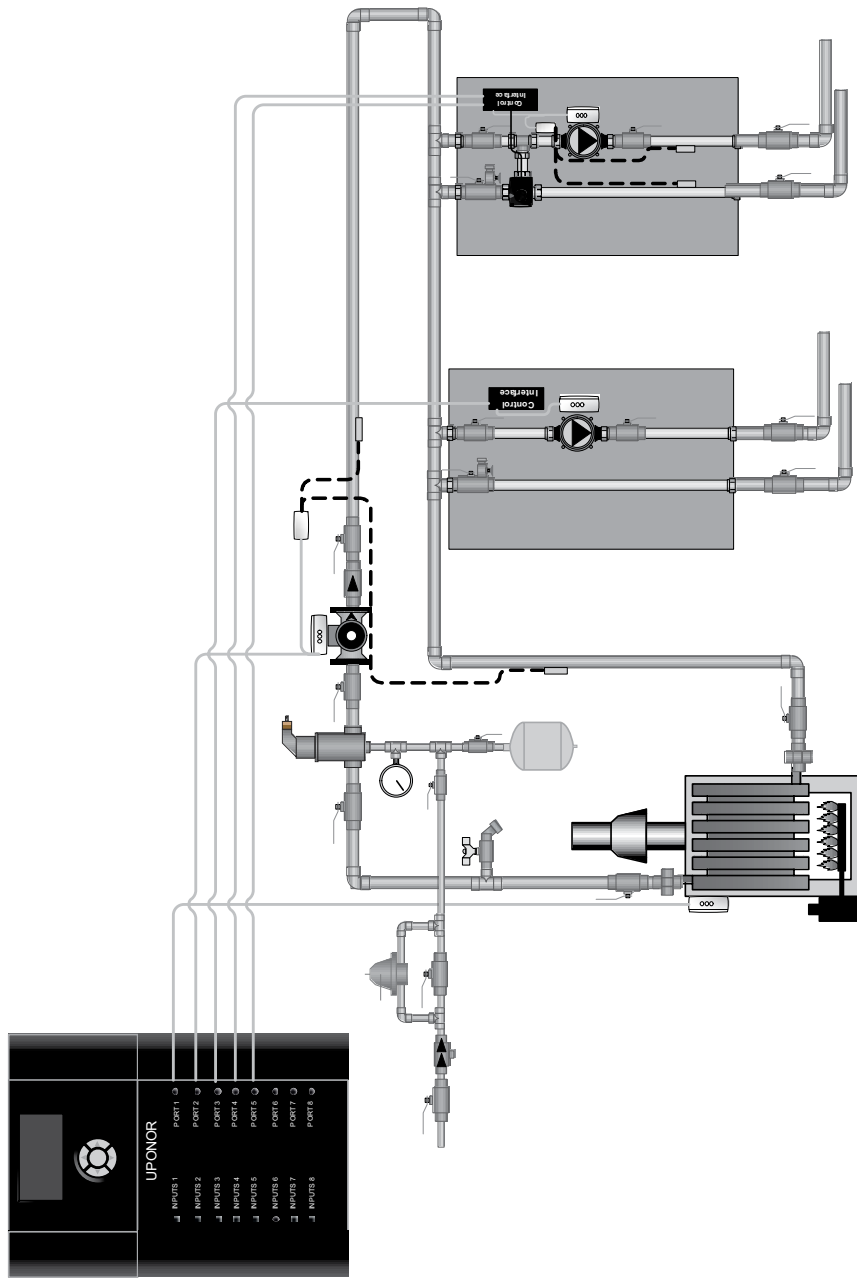
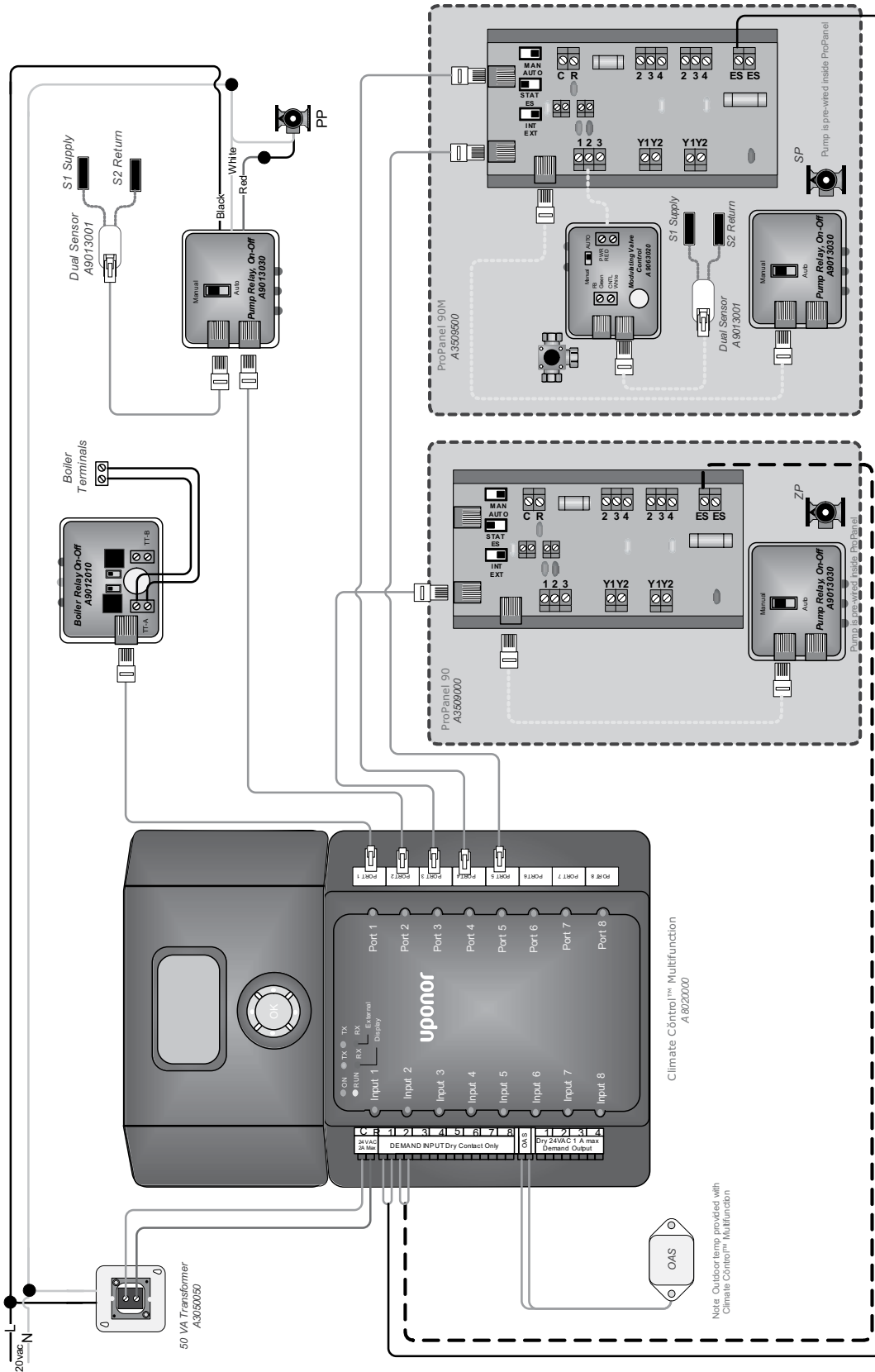# Drawing 13E — Boiler, with 90M proPANEL

Drawing 14M — Boiler, 90M and 90 proPANELs

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Relays	Pump	Dual Sensor

OAS = Outdoor Air Sensor
DT = Dual Sensor Supply & Return
S = Supply Temp
R = Return Temp
SM = Snow Melt Sensor

BR = Boiler Enable Relay
PR = Pump Relay
V1 = Modulating Valve w / Actuator
ZMC = Zone Control Module

Modulating Mixing Valve	DHW Sensor	Snow Melt Sensor

B1 = Boiler
CCM = Climate Control™ Multifunction
PP = Primary Pump
ZP = Zone Pump
SP = Secondary Pump
BP = Boiler Pump

— = 120 V (AC)
--- = Sensor Wire
= 24 V (AC)
= T-stat Wire
= Cat5 Cable

Drawing 14E — Boiler, 90M and 90 proPANELs

Appendix B
Temperature Sensor Resistance Table

The outdoor sensor for Multifunction is a 10K, J-curve sensor.

If a sensor is reporting a value that does not seem accurate, test the sensor with the data in **Table 3**. Note that the sensors maintain a tolerance of +/− 0.54°F (+/− 0.3°C).

Temperature		R	Temperature		R	Temperature		R
˚C	˚F	Ω	˚C	˚F	Ω	˚C	˚F	Ω
-45.0	-49.0	471985.0	9.0	48.2	20882.0	63.0	145.4	2235.0
-42.0	-43.6	384703.0	12.0	53.6	18090.0	66.0	150.8	2011.0
-39.0	-38.2	314904.0	15.0	59.0	15712.0	69.0	156.2	1813.0
-36.0	-32.8	258838.0	18.0	64.4	13681.0	72.0	161.6	1637.0
-33.0	-27.4	213610.0	21.0	69.8	11942.0	75.0	167.0	1480.0
-30.0	-22.0	176974.0	24.0	75.2	10450.0	78.0	172.4	1340.0
-27.0	-16.6	147177.0	27.0	80.6	9165.0	81.0	177.8	1215.0
-24.0	-11.2	122847.0	30.0	86.0	8057.0	84.0	183.2	1104.0
-21.0	-5.8	102906.0	33.0	91.4	7098.0	87.0	188.6	1005.0
-18.0	-0.4	86501.0	36.0	96.8	6267.0	90.0	194.0	915.5
-15.0	5.0	72957.0	39.0	102.2	5545.0	93.0	199.4	835.4
-12.0	10.4	61736.0	42.0	107.6	4917.0	96.0	204.8	763.5
-9.0	15.8	52407.0	45.0	113.0	4368.0	99.0	210.2	698.7
-6.0	21.2	44626.0	48.0	118.4	3888.0	102.0	215.6	640.3
-3.0	26.6	38115.0	51.0	123.8	3468.0	105.0	221.0	587.6
0.0	32.0	32650.0	54.0	129.2	3099.0	108.0	226.4	539.9
3.0	37.4	28052.0	57.0	134.6	2774.0	111.0	231.8	496.7
6.0	42.8	24170.0	60.0	140.0	2488.0	114.0	237.2	457.5

Table 3: Temperature Resistance Chart for 10K J-Curve Sensors

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Appendix C
Connection Record Template

Output Ports	Boiler	Primary Pump	DHW	Mix	Secondary Pump	Snow-melt Sensor	SM WTC*	Zone Pump	Demand Input	Demand Output
Port 1										
Port 2										
Port 3										
Port 4										
Port 5										
Port 6										
Port 7										
Port 8										

Input Ports	Description	
Port 1		
Port 2		
Port 3		
Port 4		
Port 5		
Port 6		
Port 7		
Port 8		
Outdoor Sensor		

Programmed Output Ports	Description	
Port 1		
Port 2		
Port 3		
Port 4		

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