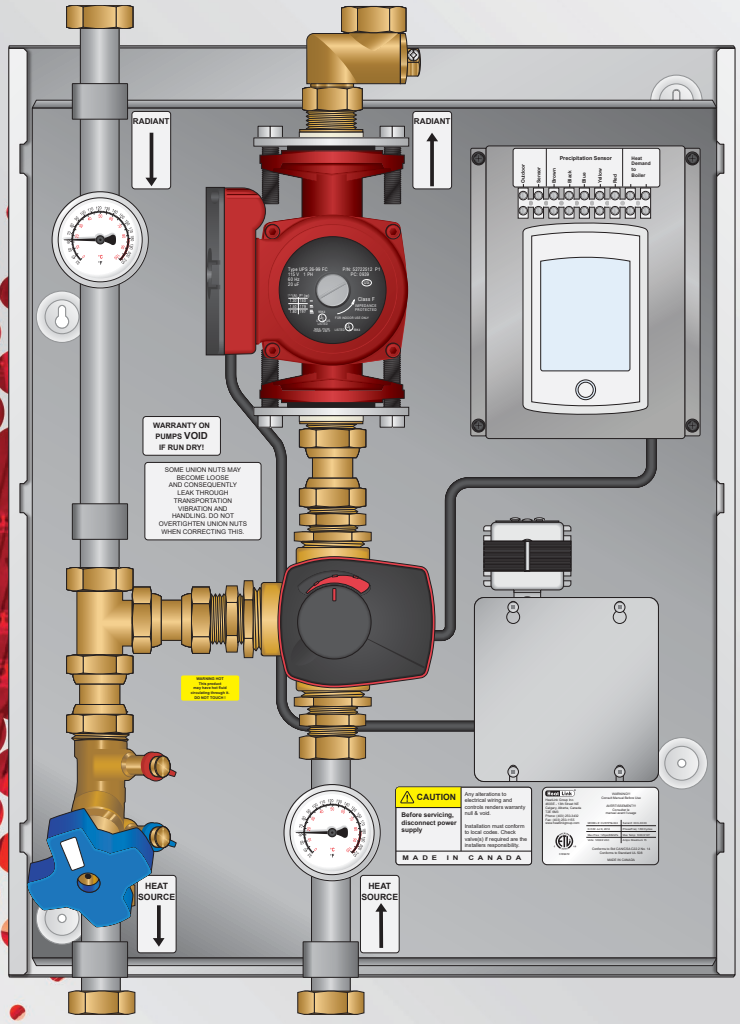
3WMIX-654

Installation, Operation, and Maintenance Manual



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Disclaimer

Product Safety Information

Warnings

The zone control panel is for indoor use only and must be installed by a qualified installer/service technician. This product must be installed and operated in strict accordance with the terms set out in this manual and in accordance with the relevant requirements of the Local Authority Having Jurisdiction. Failure to comply will result in a void of warranty, and may also result in property damage, serious injury, or death.

Servicing

Prior to commencing installation of this panel it is necessary to read and understand all sections of this manual. The symbols below are used throughout this document to ensure proper operation of the panel, and your safety. Please pay attention to these symbols.

Warning
Possible Hazard

Warning
Live Power

Warning
Hot Pipes

Warning
Treated Water

In order to avoid injury or death, switch off the power to the panel prior to inspecting or making connections to the terminal strip.

Function

This zone control panel can provide mixing, distribution, and zoning for a wide variety of hydronic heating applications.
The effectiveness of the system is dependant on the system being designed and installed correctly. Proper consideration of factors such as BTU loads, outdoor design temperature, indoor design temperature, room set-point temperature(s), differential fluid temperatures, head loss, flow rates, and transfer capacities of the heat emitters is critical.
Once these factors have been considered and the system requirements determined, these can then be evaluated and compared to the panel capabilities.

Note:

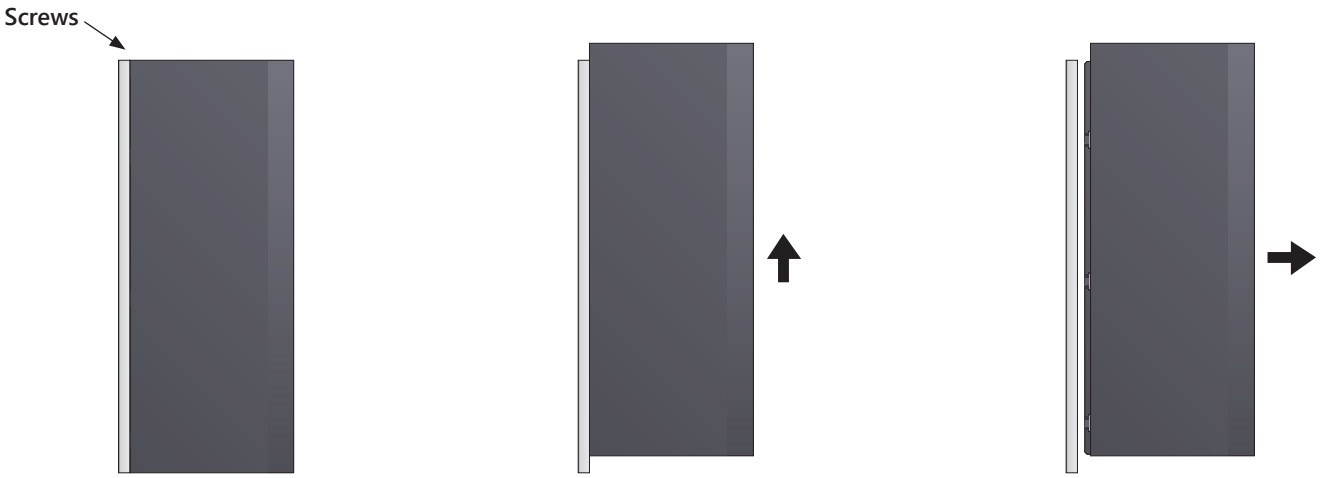
Unpacking

Step 1 Examine carton for any damage that may have occurred during shipping. If damage is visible notify your courier and supplier immediately.

Step 2 Open the carton by removing the staples.

Step 3 Remove the cardboard spacers from the carton, then remove the panel from the carton. Lift the panel by the base, not the enclosure.

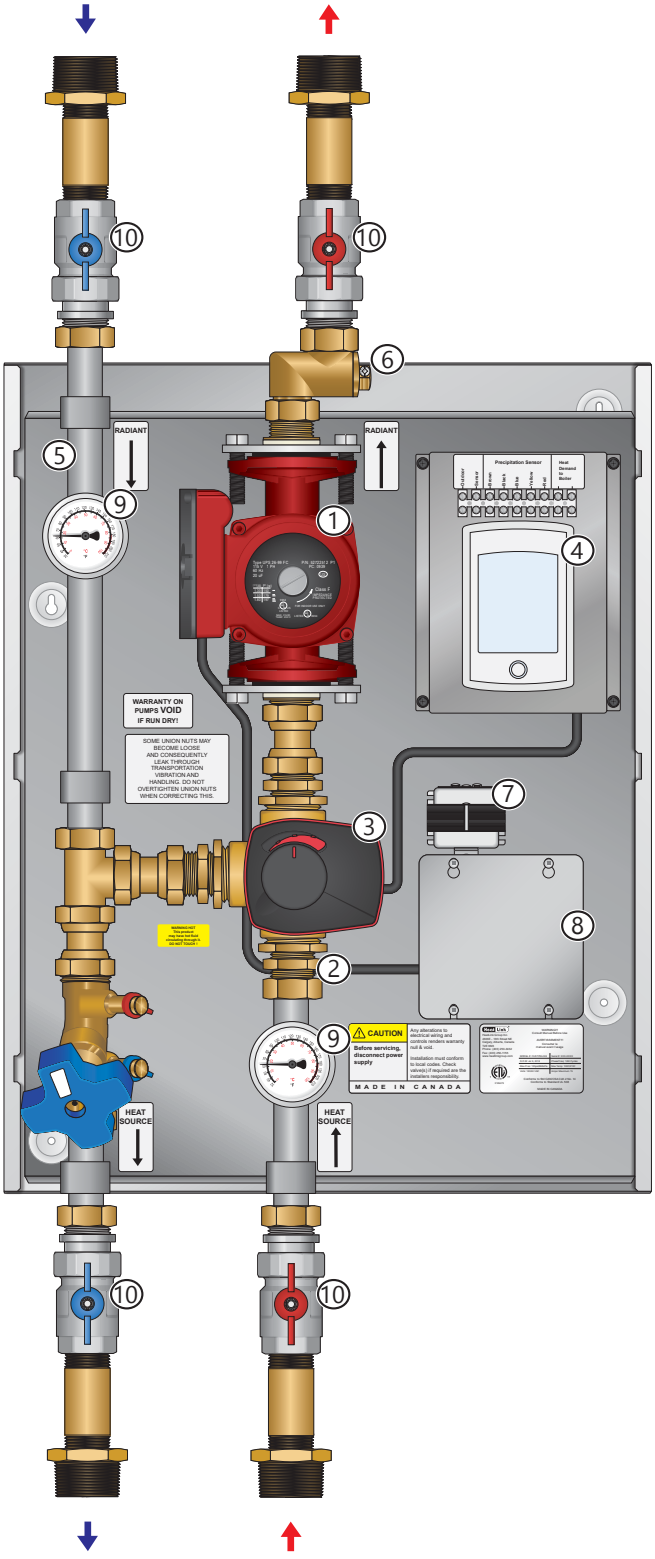
Step 4 Remove the enclosure from the panel [panel specific instructions].

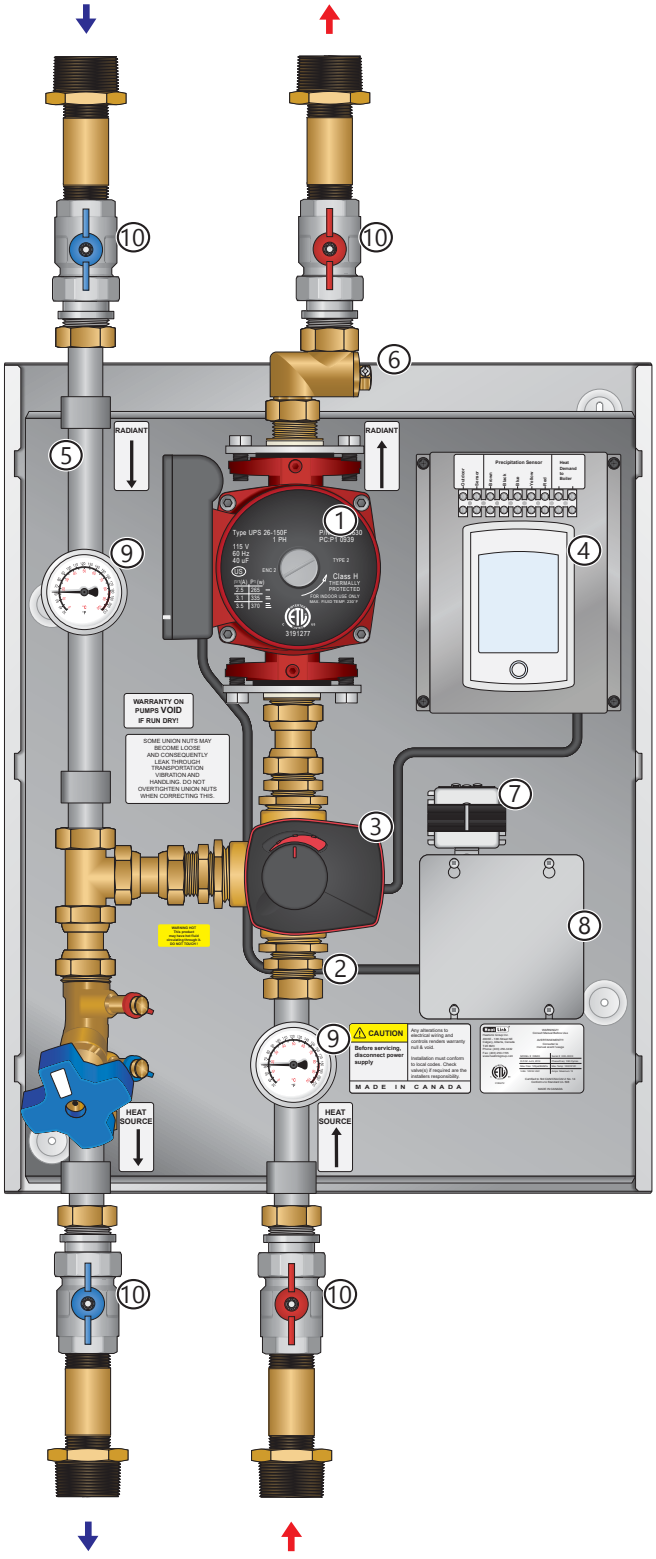


Installation Tools Needed

- Level
- Screwdriver or power drill
- Flat head bit
- Phillips head bit # 2
- 2 adjustable wrenches (or 2 × 30mm wrenches)

Panel Components





Panel Components

#	Components	Component Description	Part Number	
			3WMIX-654	3WMIXHH-654
1	Secondary pump	Moves the heated fluid through the system when there is a call for heat from the system controller.	UPS26-99	UPS26-150
2	1¼" Mixing valve (hidden)	3-way brass mixing valve regulates the temperature in the hydronic system with the help of the electric motor actuator and system controller.	63539	
3	DDC Mixing Valve Motor	Mounted to the control valve and moves the valve appropriately to allow the heated fluid to enter. Works in conjunction with the system controller.	58132	
4	Snow Melt control	The system controller regulates the panel operation.	30654	
5	Return sensor	Temperature sensor on the system return piping.		
6	Supply sensor	Temperature sensor on the system supply piping.		
7	24V(ac) transformer	Coverts power for the Snow Melt Control.	n/a	
8	Electrical Box	Houses transformer wiring.	n/a	
9	Balancing valve	Adjusts flow.	n/a	
10	Thermometer	Shows system temperature.	n/a	
11	Isolation valve assemblies*	Zone valve used to isolate the panel from the system during fill & purge, and maintenance.	n/a	

*Packaged in accessory box for shipping. See page 10 for piping hookup instructions.

Panel Component Specifications

	3WMIX-654	3WMIXHH-654
Listing	cETLus	
Conforms to	CAN/CSA-C22 No.14, UL508	
Dimensions	24"H ×18¾"W × 8"D	
Weight		
Max ambient temperature	120ºF	
Max water temperature	200ºF	
Settable fluid temperature range	100-145ºF	
Power supply	120V(ac)	
Pump	Ferrous, Grundfos UPS26-99FC	Ferrous, Grundfos UPS26-150F
Auxiliary terminal	none	
Temperature control method	1-1⁄4" 3-Way Mixing Valve and DDC Motor	
Temperature control range		
Mixing valve Cv	18.7	
Piping	1" 304 stainless steel tubing, 1" brass	
Piping connections	1½" MNPT	
Backplate	Galvanized steel	
Enclosure	Powder coated steel	

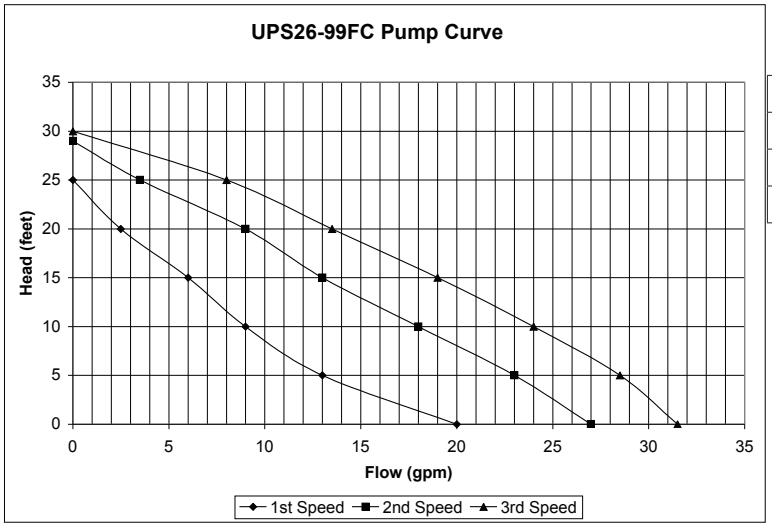
Pump Technical Data

	Model Number	
	UPS 26-99FC	UPS 26-150F
Material		
Inlet cone, bearing plate, bearing retainers, rotor can, rotor cladding, shaft retainer	Stainless steel	
Stator housing	Aluminum	
Shaft, upper and lower radial bearings	Aluminum oxide ceramic	
Thrust bearing	Carbon bearing and EPDM retainer	
Check valve	ACETA with 302 SS spring and nitrile rubber seats	
Pump housing (volute)	Cast iron	
O-ring and gaskets	EPDM	
Impeller	PES composite (30% glass filled)	
Terminal box	Noryl® with EPDM gasket	
Flow range	0-33 US gpm (0-7.5 m^3/h)	0-53 US gpm (0-12 m^3/h)
Head range	0-29 ft(0-8.8 m)	0-46 ft (0-14 m)
Motors	2-pole, single phase	
Max. liquid temperature	230ºF (110ºC)	
Min. liquid temperature	36ºF (2ºC)	
Max. system temperature	145 psi (10 bar)	

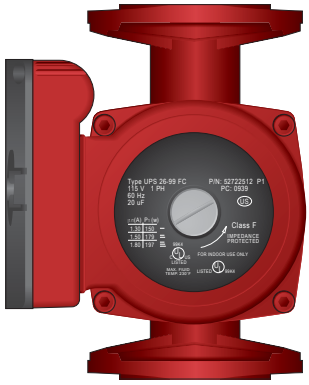
Pump Curves

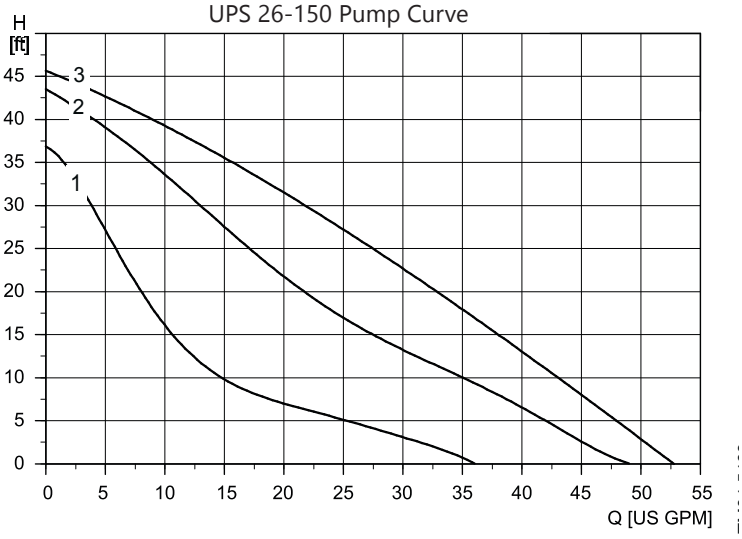
The pump moves the heated fluid through the system when there is a call for heat from the system controller.

The addition of glycol to the system will result in higher demand from the pump due to the change in viscosity of the fluid.

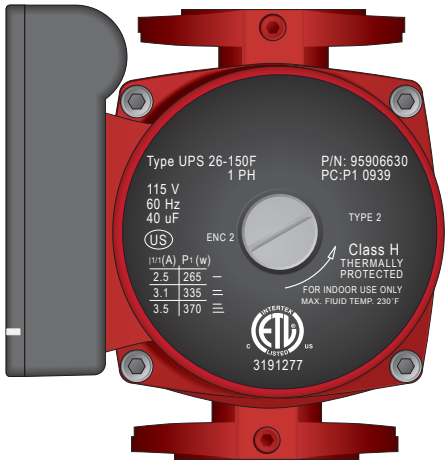


Speed	Volts	Amps	Watts	Hp	Capacitor
3	115	1.8	197	1/6	20 µF/180V
2		1.5	179	1/6	
1		1.3	150	1/6	



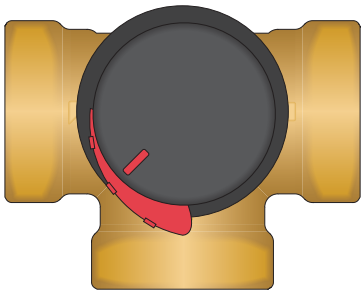


Speed	Volts	Amps	Watts	Hp	Capacitor
3	115	3.5	370	1/6	40 µF/180V
2		3.1	335	1/6	
1		2.5	265	1/6	



Control Valve

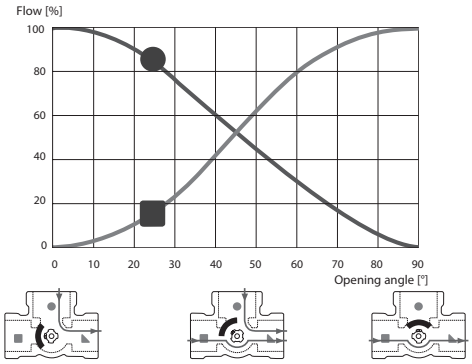
3-way brass mixing valve regulates the temperature in the hydronic system with the help of the electric motor actuator and system controller.



Technical Data - 3-way Mixing Valve

Mixing Valve Nominal Size:	1-¼"
Mixing Valve Cv:	18.7
Material - Valve Body & Slide:	Brass DZR
Material - Shaft & Bushing:	PPS composite
Material - O-ring:	EPDM
Max. Operating Temperature:	230°F (110°C)
Min. Operating Temperature:	-15°F (-10°C)
Max. Operating Pressure:	145 psi (10 bar)
Max. Differential Pressure:	Mixing - 14.5 psi (1 bar)
	Diverting - 20 psi (2 bar)
Leaking in % of flow*:	Mixing - <0.05%
	Diverting - <0.02%
Max. Torque:	<44lbf*in (<5Nm)

*based on diff. pressure of 14.5 psi (1 bar)



Mixing Valve Motor

The mixing valve motor is mounted to the control valve and moves the valve appropriately to allow the heated fluid to enter. This motor works in conjunction with the system controller.

Manual Operation of Mixing Valve Motor

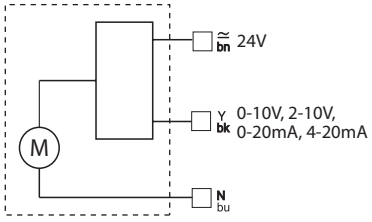
NOTE: Mixing Valve Motor should not be placed in manual mode for an extended period of time.

- Pull knob out on motorized actuator.
- Rotate knob clockwise or counter-clockwise.
- To return to automatic mode, push the knob in.

Technical Data - DDC Mixing Valve Motor

Ambient Temperature:	max. 131°F (55°C)
	min. 23°F (-5°C)
Power Supply:	24±10% Vac/dc, 50/60 Hz
Enclosure Rating:	IP41
Protection Class:	II
Torque:	6 Nm
Power Consumption - Operation:	AC: 5W
	DC: 2.5W
Power Consumption - Dimensioning:	AC: 8 VA
	DC: 4 VA
Rating Auxiliary Switch:	6(3)A 250Vac
Running Time 90°:	45/120 sec
Control Signal	0-10V, 2-10V, 0-20mA, 4-20mA

The motor should be preceded by a multi-pole contact breaker in the fixed installation.



CE LVD 2006/95/EC
EMC 2004/108/EC
RoHS 2002/95/EC

Panel Mounting

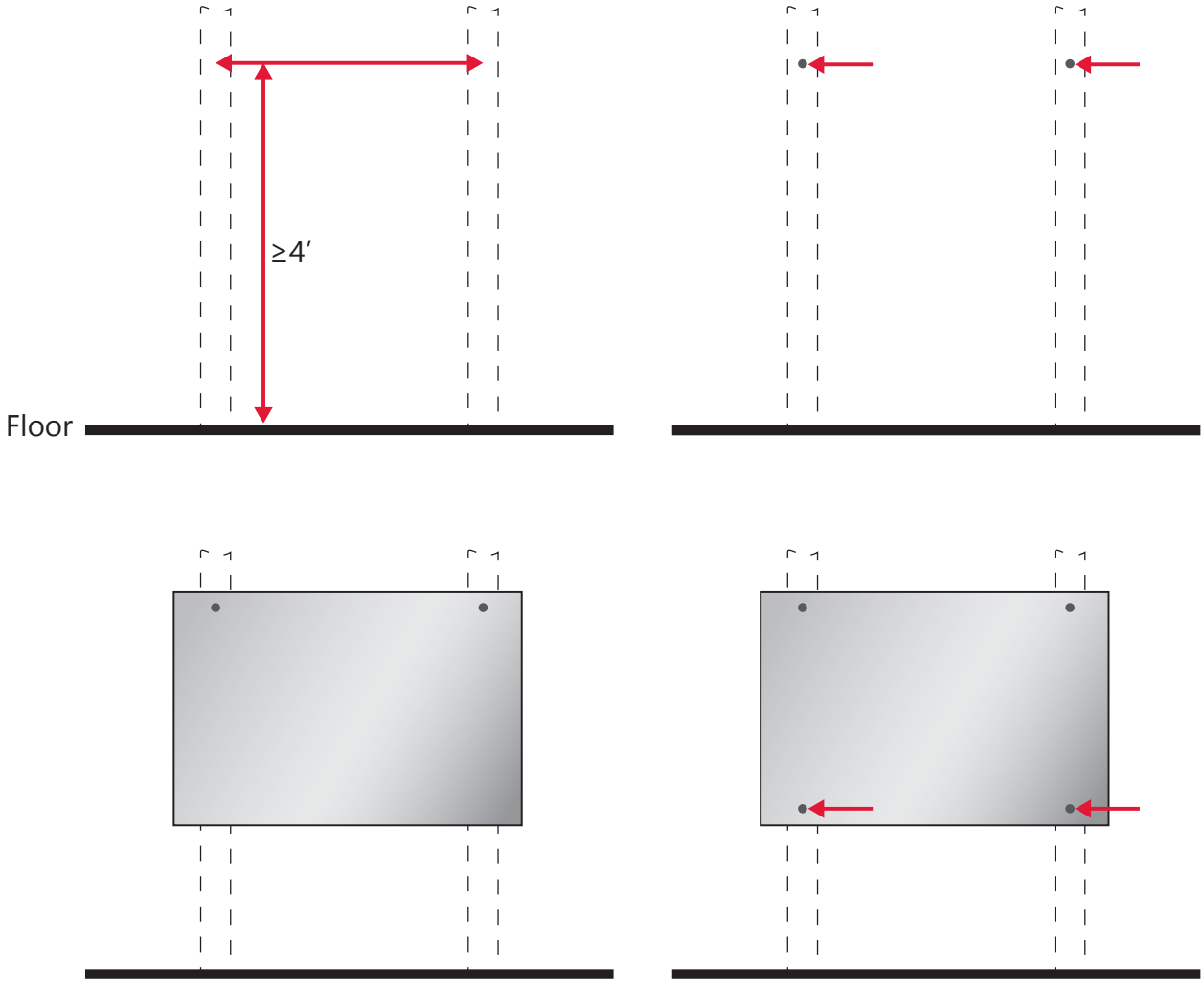
Prior to mounting the panel, ensure the wall is capable of supporting the weight of the panel, and that all required power outlets and/or wiring is available at the installation location.

Step 1 Determine the location and distance beteen the wall studs. With a level at a minimum height of 4' from the floor, draw a straight line and mark the stud locations. If the panel cannot be secured directly to the studs, or suitable backing boards, plywood may need to be installed behind the panel to properly secure it in place.

Step 2 Screw two of the supplied mounting screws into the wall studs (or backing plywood) 3/4" and 61/2" from the top of the desired height, and 16" apart, leaving 1/4"of the screw out from the wall.

Step 3 Lift and place the panel onto the mounting screws. Two person lift may be required.

Step 4 Screw the remaining mounting screws into the holes at the bottom of the panel, and tighten the top two screws.

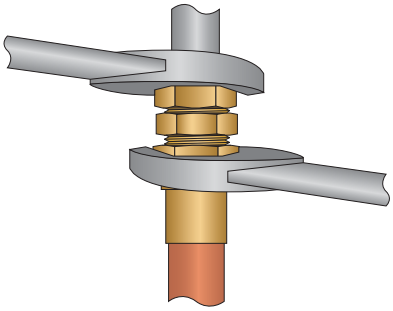


Piping Hookup

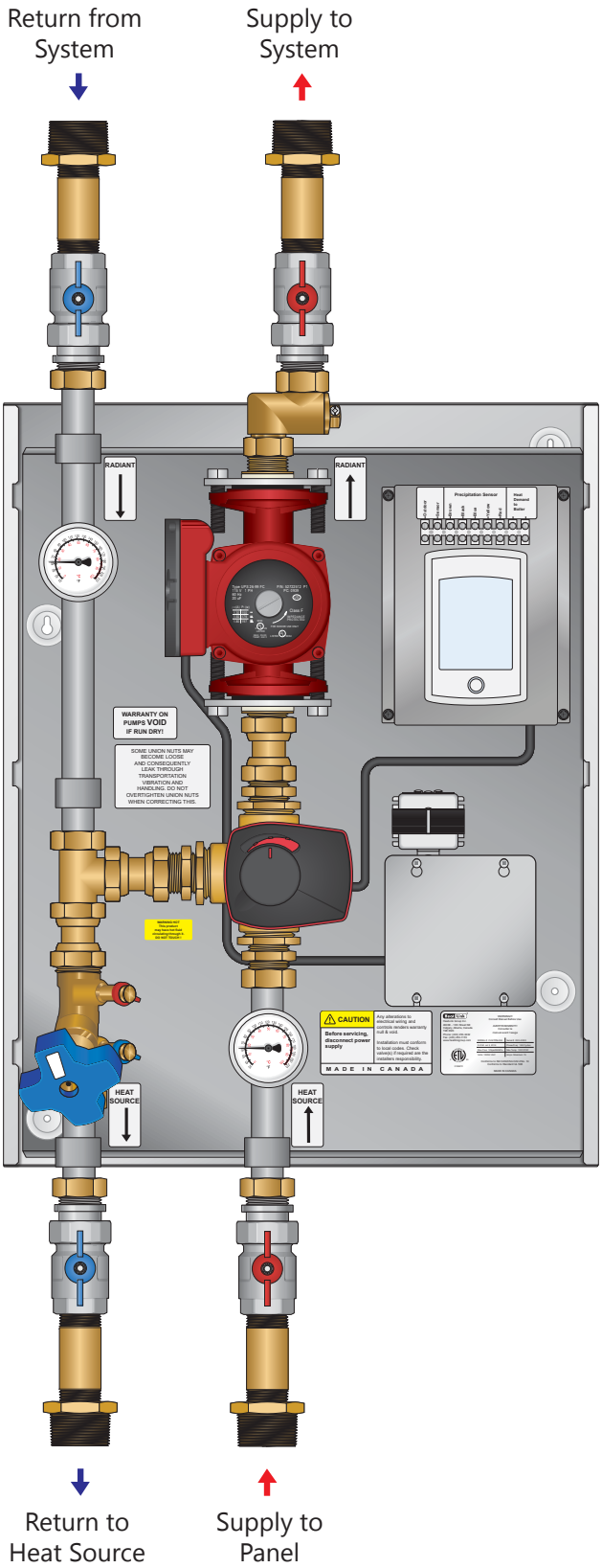
The 3WMIX-SMCP ships with the adapter assemblies packaged in the accessory pack, and must be connected to the panel *after* the system connections have been made.

Step 1 Piping connections are 1-1/2" MNPT. Use appropriate thread sealant and backup wrench when making connections.

Step 2 Connect adapter assemblies to the panel. The supplied washers must be used, and nuts must not be overtightened as this may damage the washers.



Always use a Backup Wrench
Do not overtighten brass nuts!



Fill & Purge

Step 1 Ensure the panel is not connected to the power source.

Step 2 Fuly open the mixing valve.

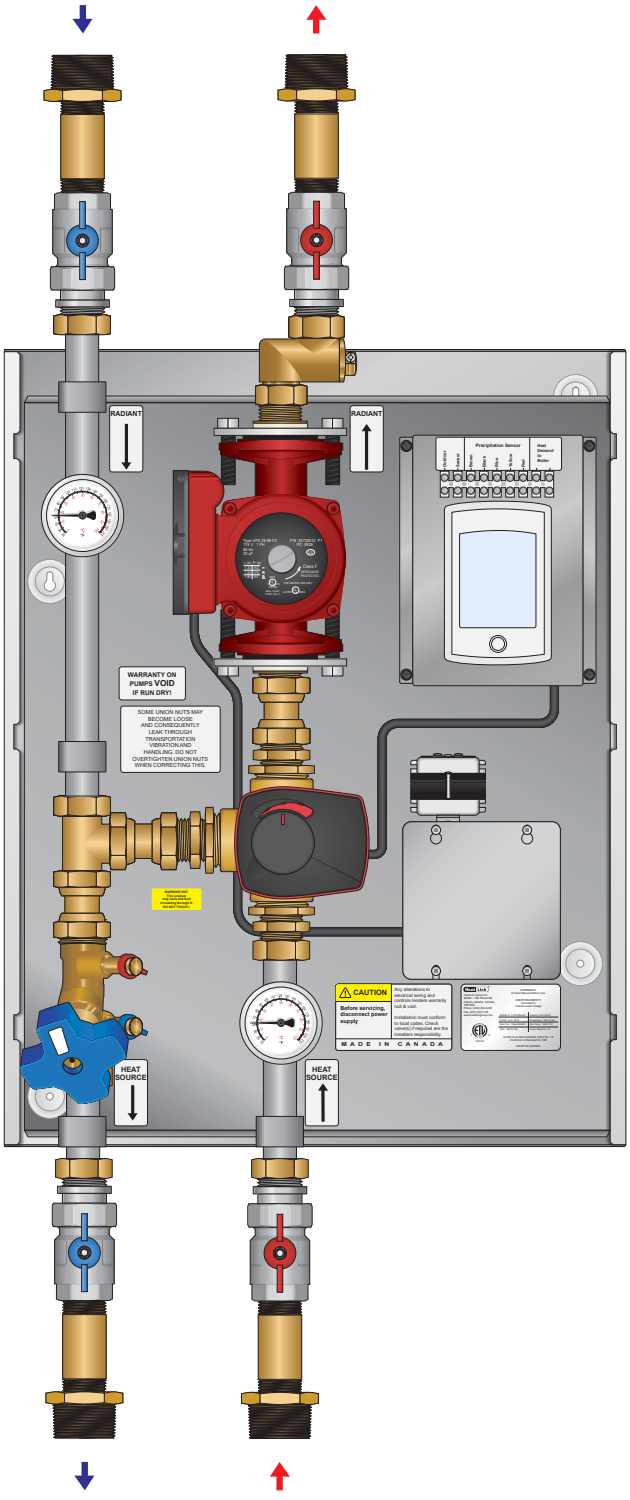
Step 3 Close all isolation ball valves, and attach the fill and purge hoses (not included) to the system fill and purge valves. Open valves.

Step 4 Open isolation valves and allow water to run until it is free of bubbles.

Step 5 Close system fill and purge valves.

Step 6 Detach fill and purge hoses.

Step 7 Check for leaks at connections. If any leaks are found, use a back-up wrench and carefully tighten until the leak stops. ***Do not overtighten!***



Piping Options

For all options hot water migration/gravity flow is possible in the supply riser. Unless the load has a positive shut off, a Flow check or Spring loaded check valve is required.

Option #1: Low Loss Header

Low Loss Header - default (using 3rd party low loss header)

Pros:

- Supply water temperature the same for each load
- Simple piping, reduced installation labour
- No dissimilar pump interference

Cons:

- Premanufactured header cost
- Requires check valve to prevent reverse flow in loop with pump off. (The above mentioned measures to prevent heat migration/gravity flow in the supply riser will at the same time prevent reverse flow.)

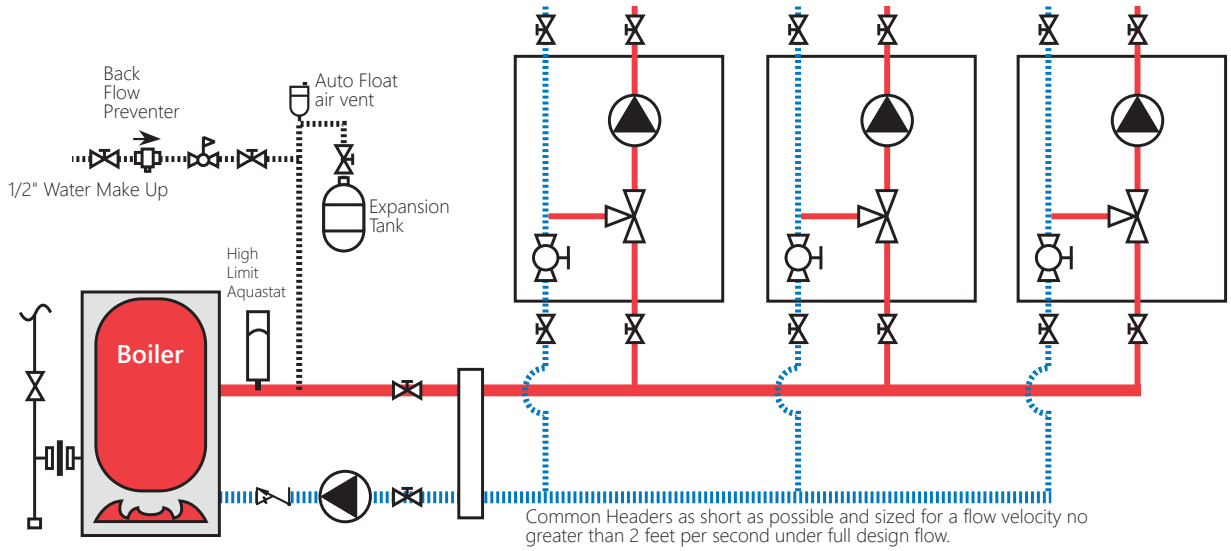
Low Loss Header - alternative (job site piped low loss header)

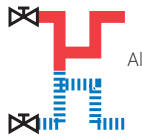
Pros:

- Supply water temperature the same for each load
- No dissimilar pump interference

Cons:

- Critical on site installation (Tee spacing and pipe sizing)
- Requires check valve to prevent reverse flow in loop with pump off. (The above mentioned measures to prevent heat migration/gravity flow in the supply riser will at the same time prevent reverse flow.)





Alternative Parallel Primary Secondary Piping

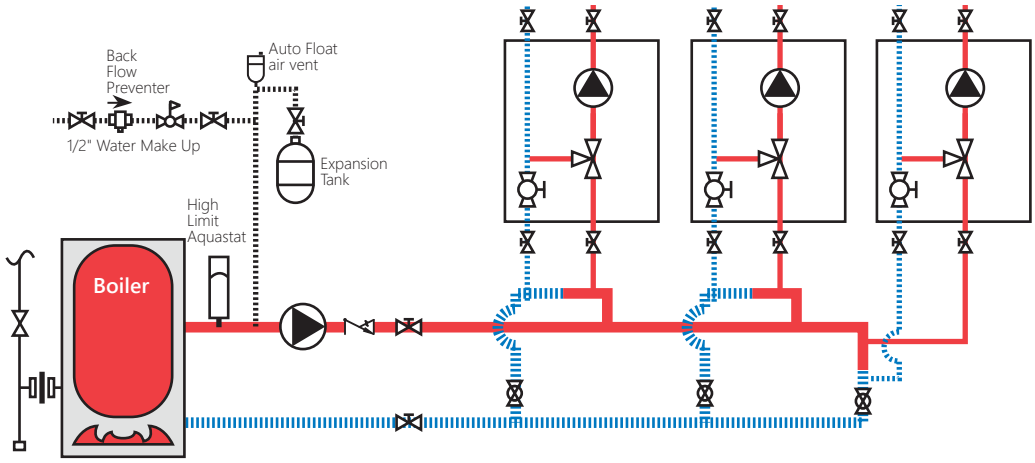
Option #2: Parallel Primary/Secondary

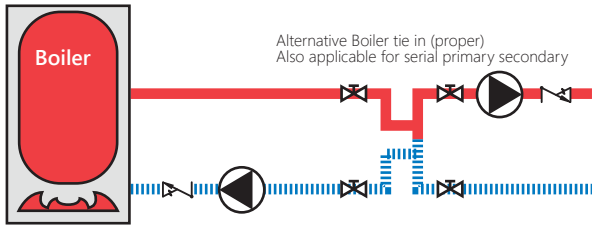
Pros:

- Supply water temperature the same for each load
- No possible pump interference

Cons:

- Requires additional balancing valves for each load take off.
- Hot water migration/gravity flow possible in return riser. Flow check, Spring loaded check valve or thermal trap required in return riser.
- Critical on site installation (Tee spacing and pipe sizing)
- Complex piping





Proper Primary/Secondary piping (shown as alternative boiler tie in), requires an additional pump and triple (rather then the much more common double) pole relays (see page 22).

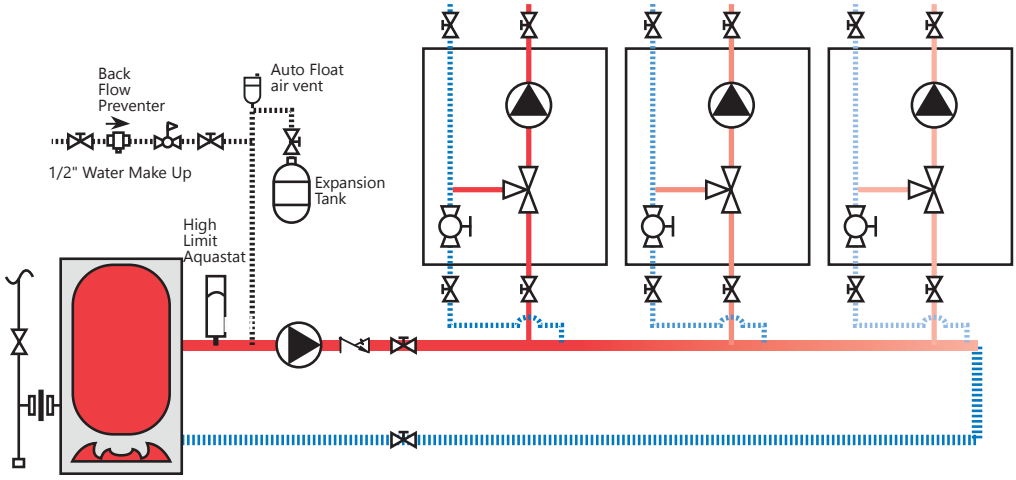
Option #3: Series Primary/Secondary

Pros:

- Automatic priority
- No possible pump interference

Cons:

- Supply water temperature lowers for each load, this change of temperature is not constant. Some loads may not function if temperature is too low.
- Very expensive to alter priority sequence (note: all loads are prioritized)
- Hot water migration/gravity flow possible in return line. Flow check, Spring loaded check valve or thermal trap required in return riser.
- Critical on site installation (Tee spacing and pipe sizing)

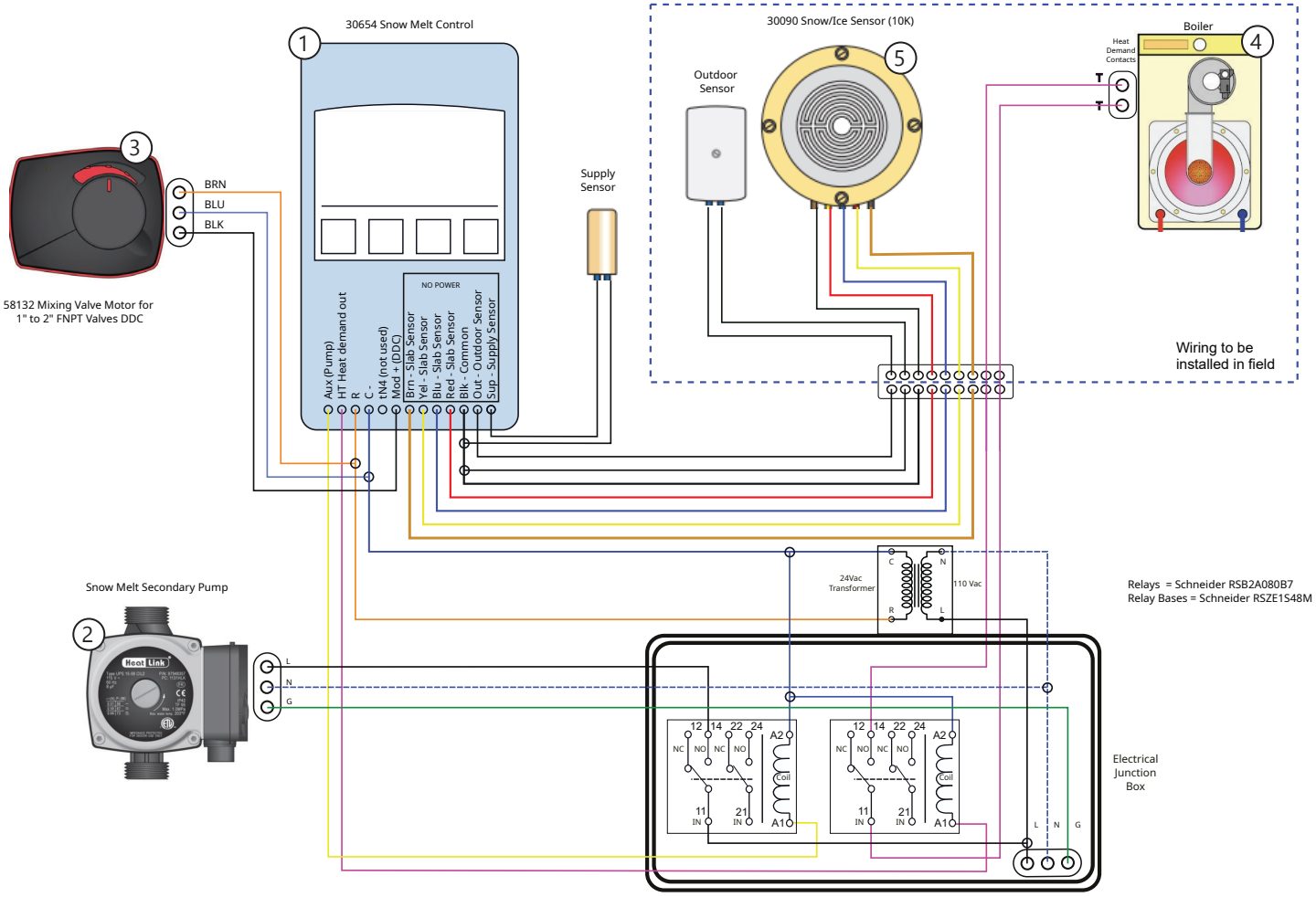


Panel Wiring

- Wiring should be done by a qualified electrician and should meet local codes and jurisdictions.

The panel comes with an optional boiler return sensor which can be used instead of an outdoor sensor. If used the mixing valve will provide boiler return protection to the boiler inlet by closing the valve when the boiler return temperature falls below the Boiler Minimum setting. Boiler return protection requires the installation of a boiler return sensor 082 on the inlet to the boiler and the Outdoor/Boiler Return Sensor setting must be set to Boiler Return.

Wiring Diagram

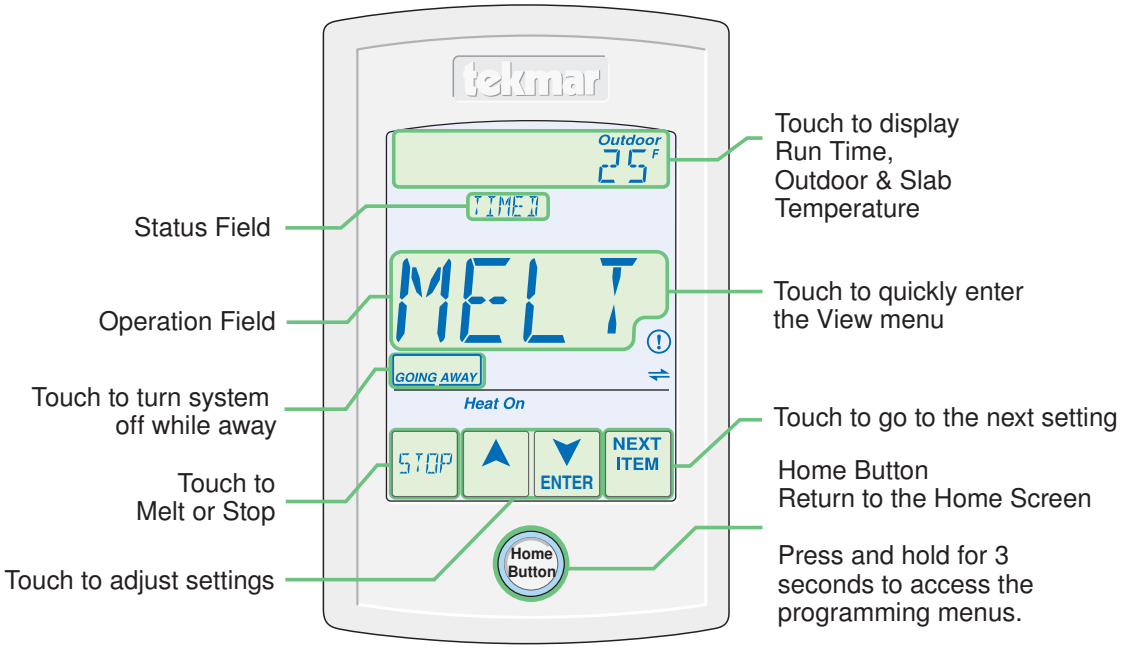


Panel Control Sequence

1) The 30654 Snow Melt Control (1) operates the Mixing Valve (3) and Secondary Pump (2). The heat source is hot water/glycol from a boiler (4).
2) The slab temperature is controlled by adjusting the mixing valve position using an analog 0 to 10V (dc) signal. The slab is heated to maintain the slab target temperature. When a Snow/Ice Sensor 30090 (5) is installed, the system automatically starts when a snow or ice is detected and continues to run until the slab is dry.
3) When a snow Sensor 30090 (5) is installed together with a slab sensor 30072 or 30073 the system automatically starts when snow is detected and runs on a timer before shutting off. All systems can be manually started and shut off using a timer when either a Snow/Ice Sensor 30090 or 30094 or a Slab Sensor 30072 or 30073 is installed.

Snowmelt Controls

Display



Operation Field

MELT	System is melting snow or ice.	STRM	System is in storm operation.
IDLE	System is idling.	OFF	System is off.

Status Field

WWSD	Warm Weather Shut Down. The slab is naturally warm enough to melt snow or ice.	PEND	Pending. The system has detected water but it is too cold to operate or the schedule is in Idle or Off.
CWCO	Cold Weather Cut Out. Too cold to melt.	WAIT	Zone priority in effect. Zone must wait until higher priority zone finishes melting.
TIMED	Timed melting operation. System operates until time has elapsed.	SENSOR	Tandem 090 sensor.
WARM	Slab is warming up to the melting temperature.	TRACK	This zone tracks the melting operation of zone 1.
AWAY	Away scene. No melting until the away scene is exited.		

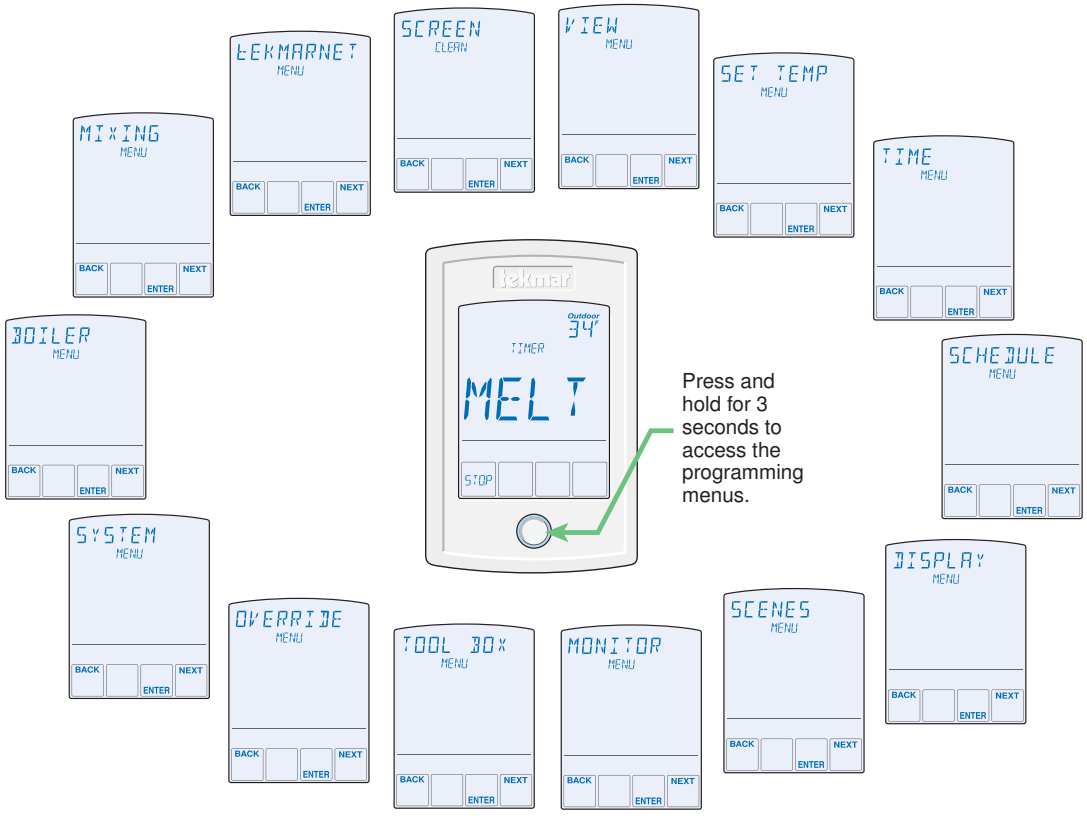
Symbols

Heat On	**HEAT ON** Heat is turned on.	ⓘ	**WARNING SYMBOL** Indicates an error is present.
⇌	**tekmarNet®** Communication is present.	▲▼	**ARROWS** Adjust the displayed setting.

Programmable Settings

Programming Menus

Press and hold the Home button for 3 seconds to enter the programming menus. The control returns to the last programming menu previously used.



Select a Programming Menu

- Touch “NEXT” to advance (clockwise in above illustration) to the next menu.
- Touch “BACK” to go backwards (counterclockwise in above illustration) through the menus.
- Touch “ENTER” to enter a menu.

Setting Items

- Touch ▲ or ▼ arrow to adjust the setting if required.
- Touch “NEXT ITEM” to advance to the next item within the menu.
- Touch “BACK ITEM” to go backwards to the previous item within the menu.
- To return to the parent menu after changing a setting, press and release the Home button.
- To return to the Home screen, press and release the Home button twice or wait 30 seconds to automatically return to the Home screen.

Access Levels and Access Level Lock

The control is shipped pre-programmed with common settings. The control has an “Installer” access level that allows full access to all settings and a “User” access level that restricts the number of settings available. The control defaults to the “User” access level after 12 hours of operation.

Notice: tekmarNet® system controls include a Global Lock that locks all connected snow melting controls and thermostats. Set the tekmarNet® system control to unlock to allow access level adjustment on all connected devices.

To change to the “Installer” access level:

- In the Toolbox menu, locate Access
- Adjust the access level to “Installer” by pressing the up or down button. This will permit setting changes to the control.

View Menu (1 of 2)

The View menu items display the current operating temperatures and status information of the system.

Item Field	Range	Access	Description	Set to
SNOW ZONE	1 to 12	User Installer	**SNOW ZONE** The snow melt zone number on the tekmarNet® system. Conditions: tekmarNet® communication available.	
OUTDOOR	– – –, -76 to 149°F (-60 to 65°C)	User Installer	**OUTDOOR** Current outdoor air temperature as measured by the local or remote outdoor sensor. The outdoor air temperature is shared to all devices in the tekmarNet® system. "– – –" is displayed when no outdoor sensor is available. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	
SLAB TARG	– – –, -76 to 149°F (-60 to 65°C)	Installer	**SLAB TARGET** The calculated slab target of the snow melting system. "– – –" is displayed when the snow melt control is off. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and a snow/ice sensor or slab sensor is installed.	
SLAB	-76 to 149°F (-60 to 65°C)	User Installer	**SLAB** Current slab temperature as measured by the control. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and a snow/ice sensor or slab sensor is installed.	
SENSOR WATER	DRY or WET	User Installer	**WATER SENSOR** Current status of the water detection sensor. Conditions: A snow/ice sensor or snow sensor is installed.	
BoilTARGET	---, 70 to 200°F (21.0 to 93.5°C)	Installer	**BOILER TARGET** The calculated boiler target of the snow melt system. "– – –" is displayed when the snow melt control is not operating the boiler. Conditions: Application Mode is set to Boil.	
MixTARGET	---, 70 to 200°F (21.0 to 93.5°C)	Installer	**MIX TARGET** The calculated mix target of the snow melt system. "– – –" is displayed when the snow melt control is not operating the mixing valve or mixing injection pump. Conditions: Application Mode is set to Mix.	
SUPPLY	-58 to 212°F (50.0 to 100.5°C)	Installer	**SUPPLY** Current system supply temperature as measured by the control. Conditions: Application Mode is set to PWM, Boil or Mix.	
BoilRETURN	-58 to 212°F (50.0 to 100.5°C)	Installer	**BOILER RETURN** Current boiler return temperature as measured by the control. Conditions: Application Mode is set to PWM, Boil or Mix and Out/Bret Sensor is set to Bret (boiler return sensor).	
Mix RATE	0 to 100%	Installer	**MIX RATE** Current position of the mixing valve or mixing injection pump speed. Conditions: Application Mode is set to Mix.	
Boil RATE	0 to 100%	Installer	**BOILER RATE** Current firing rate of the modulating boiler. Conditions: Application Mode is set to Boil and Boiler Type is set to Mod (modulating boiler).	

View Menu (2 of 2)

Item Field	Range	Access	Description	Set to
HEAT RELAY	OFF or ON	User Installer	**HEAT RELAY** Current status of the heat relay. The boiler, pump or electric cable is on when ON is displayed. The boiler, pump or electric cable is off when OFF is displayed. Conditions: Application Mode is set to PWM, Boil, Mix, or Elec.	
PWM RATE	0 to 100%	Installer	**PWM RATE** Current duty cycle rate of the zone or boiler for each 20 minute cycle. Conditions: Application Mode is set to PWM or Elec. Not visible when Manual Override is not Auto.	
SYS PUMP RELAY	OFF or ON	User Installer	**SYSTEM PUMP RELAY** Current status of the system pump relay. Conditions: Application Mode is set to PWM, Boil or Mix and Auxiliary Relay is set to SYS (system pump).	
ALERT RELAY	OFF or ON	User Installer	**ALERT RELAY** Current status of the alert relay. Conditions: Application Mode is set to PWM, Boil or Mix and Auxiliary Relay is set to ALRT (alert) or Application Mode is set to Elec.	
MAN MELT HOURS	00:00 to 24:00 hours	User Installer	**MANUAL MELT TIME** When manually started, the display shows the remaining run time before shutting off. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	
ADD MELT HOURS	00:00 to 6:00 hours	User Installer	**ADDITIONAL MELT TIME** When automatically started by a Snow/Ice Sensor 090 or 094, the display shows the remaining run time before shutting off. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and a snow / ice sensor 090 or 094 is installed.	

Display Menu

The Display menu items select the temperature units and backlight options.

Item Field	Range	Access	Description	Set to
UNITS IN	°F or °C Default = °F	User Installer	**UNITS** Select Fahrenheit or Celsius as the temperature units.	°C
BACKLIGHT	ON, ON MELT, OFF Default = ON MELT	User Installer	**BACKLIGHT** Select how the display backlight operates. ON = Always on. ON MELT = On when melting, off when not melting. This provides a visual indicator to occupants that the snow melting system is currently melting. OFF = Always off.	ON

Set Temp Menu

The Set Temp menu items select the operating temperatures of the snow melt system.

Item Field	Range	Access	Description	Set to
MELTING	32 to 95°F (0.0 to 35.0°C) Default = 36°F (2.0°C)	User Installer	**MELTING** Select the desired surface temperature of the snow melt surface when melting. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	5 °C
IDLING	OFF, 20 to 95°F (-6.5 to 35.0°C) Default = OFF	Installer	**IDLING** Select the desired surface temperature of the snow melt surface when idling. Idling pre-heats the slab when the slab is dry but cold and allows faster reaction time to reach the melting temperature. Recommended for commercial use only. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	OFF
STORM	OFF, 20 to 95°F (-6.5 to 35.0°C) Default = 28°F (-2.0°C)	Installer	**STORM** Select the desired surface temperature of the snow melt surface while operating in the storm operation. Storm operation temporarily pre-heats the slab to allow faster reaction time to reach the melting temperature. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	-2.0 °C
MAN MELT HOURS	0:30 to 24:00 hours Default = 4:00 hours	User Installer	**MANUAL MELT RUN TIME** Select the amount of running time when manually starting the system. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	4:00
ADD MELT HOURS	0:00 to 6:00 hours Default = 0:00 hours	Installer	**ADDITIONAL MELT TIME** Select the amount of additional melting time after the Snow / Ice Sensor 090 or 094 is dry. This allows low spots on the slab to fully dry before the snow melting system is shut off. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and a 090 or 094 Snow / Ice Sensor is installed or Track Zone is set to On.	0:00
STORM RUN HOURS	0:30 to 24:00 hours Default = 8:00 hours	Installer	**STORM RUN TIME** Select the amount of storm run time to pre-heat the slab when advised of a winter storm warning. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and Storm is set to a temperature.	8:00
SENSITVTY WATER	AUTO, MIN, -2, -1, MID, +1, +2, MAX Default = AUTO	Installer	**WATER SENSITIVITY** Select how sensitive the Snow / Ice Sensor 090 or 094, or the Snow Sensor 095 is to water detection. Conditions: Snow / Ice Sensor is set to 090 or 095.	AUTO
WWSD	AUTO, 32 to 95°F (0.0 to 35.0°C) Default = AUTO	Installer	**WARM WEATHER SHUT DOWN** Select the temperature at which to shut down the snow melting system during warm weather. This allows the snow or ice to melt off the slab naturally. Conditions: Application Mode is set to PWM, Boil, Mix or Elec.	AUTO
CWCO	OFF, -30 to 50°F (-34.5 to 10.0°C) Default = 10°F (-12.0°C)	Installer	**COLD WEATHER CUT OUT** Select the temperature at which to shut down the snow melting system during extremely cold weather. Below this temperature, the heat loss of the slab exceeds the capacity of the boiler or heating appliance.	OFF

System Menu

The System Menu provides settings on how to configure and operate the mechanical equipment.

Item Field	Range	Access	Description	Set to
APP MODE	PWM, BOIL, MIX, ELEC, 090 Default = PWM	Installer	**APPLICATION MODE** Select the control application mode. PWM = Hydronic Pulse Width Modulation. BOIL = Hydronic boiler heats snow melting system. MIX = Hydronic mixing valve or injection pump heats snow melting system. ELEC = Electric snow melt. 090 = Tandem Snow/ Ice Detection using 090 or 094	MIX
SNOW/ICE SENSOR	NONE, 090 (or 094), 095 Default = 090	Installer	**SNOW / ICE SENSOR** Select if a Snow / Ice Sensor 090 or 094, or Snow Sensor 095 is installed.	090
SLAB SENSOR	OFF or ON Default = ON	Installer	**SLAB SENSOR** Select if a Slab Sensor 072 or 073 is installed to measure the slab temperature. Conditions: Application Mode is set to PWM, Boil, Mix or Elec and Snow / Ice Sensor is set to None or 095.	ON
PROTECT SLAB	OFF or ON Default = ON	Installer	**SLAB PROTECTION** Select if the slab should be protected from large temperature differentials to avoid cracking the concrete due to high tensile stress. Conditions: Application Mode is set to Boil or Mix and Snow / Ice Sensor is set to 090 or Slab Sensor is set to On.	ON
OUT/BRET SENSOR	OFF, OUT (Outdoor) or BRET (Boiler Return) Default = OUT	Installer	**OUTDOOR OR BOILER RETURN SENSOR** Select if the Out/Bret wiring terminal is connected to an outdoor sensor or a boiler return sensor. Conditions: Application Mode is set to PWM, Boil or Mix or Elec.	OUT
ECONOMELT	OFF or ON Default = OFF	Installer	**ECONOMELT** EconoMelt allows the user to mechanically remove snow then manually start the system to melt the thin snow layer or ice. Conditions: Application Mode is set to PWM, Boil or Mix or Elec.	OFF
AUXILIARY RELAY	SYS (System Pump) or ALRT (Alert) Default = SYS	Installer	**AUXILIARY RELAY** Select if the auxiliary relay should function as system pump or as an alert. Conditions: Application Mode is set to PWM, Boil or Mix.	SYS
MAX MELT DAYS	0.5 to 7.0 days, OFF Default = 3.0 days	Installer	**MAXIMUM MELT TIME** Select to limit the amount of melting run time after snow is automatically detected by a Snow / Ice Sensor 090 or 094, or a Snow Sensor 095. Conditions: Application Mode is set to PWM, Boil or Mix or Elec.	3.0

Boiler Menu

The Boiler Menu provides settings on how to configure and operate the boiler.

Item Field	Range	Access	Description	Set to
Boil TYPE	*App Mode = Boil* MOD, 1STG, EMS1, EMS2 Default = MOD *App Mode = Mix* OFF, ENBL, CTRL Default = OFF *App Mode = PWM* OFF, CTRL Default = OFF	Installer	**BOILER TYPE** The type of boiler connected to the control. MOD = Modulating boiler. 1STG = Single one-stage on-off boiler. EMS1 = tekmar boiler staging controls. EMS2 = Viessmann modulating boilers with 0-10 V OpenTherm Module. CTRL = tekmarNet® System Control operates boiler. The control must be connected to tekmarNet® to support this option. ENBL = When operating a mixing valve or mixing injection pump, the heat relay is closed to fire the boiler.	ENBL

Mix Menu

The Mix Menu provides settings on how to configure and operate the mixing valve or mixing injection pump. The Mix menu is only available when the Application Mode is set to Mix.

Item Field	Range	Access	Description	Set to
Mix TYPE	0-10 or 4-20 Default = 0-10	Installer	**MIX TYPE** Select the type of mixing analog signal. 0-10 = 0 to 10 V (dc) 4-20 = 4 to 20 mA	0-10
MOTOR SPD SEC	30 to 230 seconds Default = 105 seconds	Installer	**MIX MOTOR SPEED** The time that the mix actuating motor requires to operate from fully closed to fully open. Mixing Injection Pump = 30 seconds tekmar Actuator Motor 742 = 105 seconds Refer to actuating motor for correct setting.	120
Mix MAX	80 to 180°F (26.5°C to 82.0°C), OFF Default = 140°F (60°C)	Installer	**MIX MAXIMUM** Select the maximum operating temperature of the system supply water.	60 °C

Troubleshooting - Error Messages

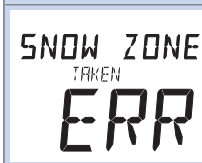
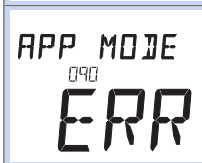
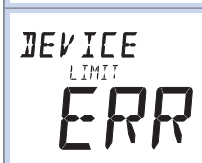
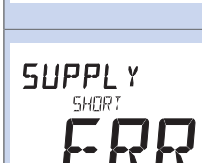
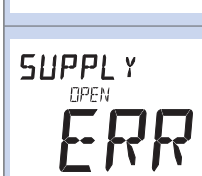
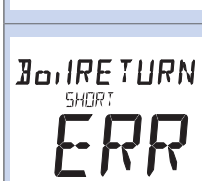
It is recommended to complete all wiring to ensure trouble free operation. Should an error occur, simply follow these steps:

1. **Find:** If the control flashes ⓘ on the screen, it is indicating a problem on the system.
2. **Identify:** Hold the Home button for 3 seconds, touch the NEXT key to locate the Toolbox Menu, then touch the ENTER key. The error code should appear as the first item.
3. **Solve:** Use the chart below to match the error code to the one on the control. Use the description to solve the problem.

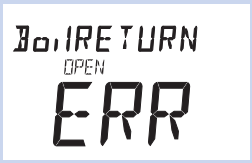
Error Messages (1 of 4)

Error Message	Description
	**SET TEMP MENU SAVE ERROR** The control failed to read the Set Temp menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Set Temp menu are checked. To clear the error, set the access level to Installer and check all settings in the Set Temp menu.
	**SYSTEM MENU SAVE ERROR** The control failed to read the System menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the System menu are checked. To clear the error, set the access level to Installer and check all settings in the System menu.
	**BOILER MENU SAVE ERROR** The control failed to read the Boiler menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Boiler menu are checked. To clear the error, set the access level to Installer and check all settings in the Boiler menu.
	**MIXING MENU SAVE ERROR** The control failed to read the Mixing menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Mixing menu are checked. To clear the error, set the access level to Installer and check all settings in the Mixing menu.
	**tekmarNet® MENU SAVE ERROR** The control failed to read the tekmarNet® menu settings from memory and has reloaded the factory default settings. The control continues to operate but does not provide any tekmarNet® features until all settings in the tekmarNet® menu are checked. To clear the error, set the access level to Installer and check all settings in the tekmarNet® menu.
	**SCHEDULE MENU SAVE ERROR** The control failed to read the Schedule menu settings from memory and has reloaded the factory default settings. The control operates with the programmable schedule disabled until all settings in the Schedule menu are checked. To clear the error, set the access level to Installer and check all settings in the Schedule menu.
	**SCENES MENU SAVE ERROR** The control failed to read the Scenes menu settings from memory and has reloaded the factory default settings. The control operates with the away scene disabled until all settings in the Scenes menu are checked. To clear the error, set the access level to Installer and check all settings in the Scenes menu.
	**MAXIMUM MELT TIME ERROR** The control has operated in melting for the time set by Maximum Melt Days setting located in the System menu. This error is usually created when there is a mechanical system failure resulting in the snow melt slab not heating correctly. Clear the error message by touching the Cancel key while viewing the error message. Use the Manual Override menu to manually check that each component of the mechanical system is operating correctly. If necessary, change the Maximum Melt Days setting to a longer time period or to Off.
	**tekmarNet® COMMUNICATION ERROR** The tekmarNet® communication bus has either an open or a short circuit. The result is that there are no communications. Check for loose wires between tN4 and C. Check for short circuits between the tN4 and C wires on the House Control, Wiring Center, or Zone Manager. Check for correct polarity between the C and R wires. The error clears automatically once the wiring fault has been corrected. To force the error to clear while allowing a short or open circuit to continue, touch the Cancel key.

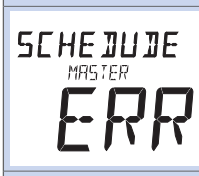
Error Messages (2 of 4)

Error Message	Description
	**ADDRESS TAKEN ERROR** Two devices (thermostats, setpoint controls, snow melting controls) have been manually set to the same address. The device continues to operate with this error but does not communicate with the tekmarNet® system. To clear this error, select an unused tekmarNet® address or select automatic addressing.
	**SNOW ZONE TAKEN ERROR** Two snow melting controls have been manually set to the same snow zone number and one of the controls is NOT set to App Mode 090. The control continues to operate with this error. To clear this error, select an unused snow zone number or set the App Mode to 090. Once the error has been corrected, press the "Cancel" key to clear the error message.
	**APP MODE 090 ERROR** Two snow melting controls have been manually set to the same snow zone number and both of the controls are set to App Mode 090. To clear this error, select an unused snow zone number or set the App Mode to anything other than 090.
	**TANDEM 090 ERROR** There are two Snow / Ice Sensors 090 or 094 installed in the zone and the other snow melting control's 090 or 094 has a sensor problem. Locate the other snow melting control and navigate to the Toolbox menu to determine and correct the problem. The control continues to operate with this error.
	**DEVICE LIMIT** More than 24 devices (thermostats or setpoint controls) have been connected to the tekmarNet® communication bus. To clear the error, remove and relocate devices to other available buses until the device count is 24 or less.
	**OUTDOOR SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Outdoor Sensor 070. The control continues to operate and assumes an outdoor temperature of 32°F (0°C). Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are disabled. Check the outdoor sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the outdoor sensor. Once the error has been corrected, the error message automatically clears.
	**OUTDOOR SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Outdoor Sensor 070. The control continues to operate and assumes an outdoor temperature of 32°F (0°C). Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are disabled. Check the outdoor sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the outdoor sensor. Once the error has been corrected, the error message automatically clears.
	**SUPPLY SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Supply Sensor 082. When set to App Mode Boiler or Mixing the control stops operation and does not provide any heat. Check the supply sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the supply sensor. Once the error has been corrected, the error message automatically clears.
	**SUPPLY SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Supply Sensor 082. When set to App Mode Boiler or Mixing the control stops operation and does not provide any heat. Check the supply sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the supply sensor. Once the error has been corrected, the error message automatically clears.
	**BOILER RETURN SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Boiler Return Sensor 082. The control continues operation but does not provide any boiler return protection. Check the boiler return sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the boiler return sensor. Once the error has been corrected, the error message automatically clears.

Error Messages (3 of 4)

Error Message	Description
	**BOILER RETURN SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Boiler Return Sensor 082. The control continues operation but does not provide any boiler return protection. Check the boiler return sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the boiler return sensor. Once the error has been corrected, the error message automatically clears.
	**SLAB SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Slab Sensor 072 or 073. Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are operate using the outdoor temperature only. Check the slab sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the slab sensor. Once the error has been corrected, the error message automatically clears.
	**SLAB SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Slab Sensor 072 or 073. Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are operate using the outdoor temperature only. Check the slab sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the slab sensor. Once the error has been corrected, the error message automatically clears. If the slab sensor has been intentionally removed, set the slab sensor setting in the System menu to Off.
	**YELLOW WIRE OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the yellow wire connected to the Snow / Ice Sensor 090 or 094, or the Snow Sensor 095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor or Snow Sensor yellow and black wires and any wire splices for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BLUE WIRE SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the blue wire connected to the Snow / Ice Sensor 090 or 094, or the Snow Sensor 095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. First check the Snow / Ice Sensor or Snow Sensor for dirt or debris. The ring structure of the sensor may need cleaning with hot soapy water and a nylon brush. Rinse with water. Secondly, check the Snow / Ice Sensor or Snow Sensor blue and black wires and any wire splices for short circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BLUE WIRE OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the blue wire connected to the Snow / Ice Sensor 090 or 094, or the Snow Sensor 095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor or Snow Sensor blue and black wires and any wire splices for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BROWN WIRE SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the brown wire connected to the Snow / Ice Sensor 090 or 094. Idling and Storm is disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are operate using the outdoor temperature only. Check the Snow / Ice Sensor brown and black wires for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**SNOW / ICE SENSOR ERROR** The control is unable to properly detect the Snow / Ice Sensor 090 or 094. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor brown, yellow, red and black wires according to the sensor installation manual. It is important to check any cable splices for loose wiring connections. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.

Error Messages (4 of 4)

Error Message	Description
	**SNOW SENSOR ERROR** The control is unable to properly detect the Snow Sensor 095. The control can no longer automatically detect snow but manual start of the snow melting system is still available. Check the Snow Sensor yellow, red and black wires according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**SCHEDULE MASTER ERROR** Two devices on the tekmarNet® system have been set to the same Schedule Master number. The control operates according to the local programmable schedule while this error is present. To clear the error, select a different Schedule Master number, set a different Schedule Member number, set the Schedule to Zone, or set the Schedule to None.
	**SCHEDULE MEMBER ERROR** The control can no longer detect its schedule master. The control operates as if the programmable schedule is in idle or off operation while this error is present. To clear the error, select a different Schedule Member number, set the Schedule to Zone, or set the Schedule to None.
	**ERROR AT THERMOSTAT** There is an error on a different thermostat or setpoint control connected to the tekmarNet® system and not on this control. 01 to 24 = There is an error on a thermostat or setpoint control with this tekmarNet® address.
	**ERROR AT THERMOSTAT** There is an error on a different thermostat or setpoint control connected to the tekmarNet® system and not on this control. b:01 to b:24 = There is an error on a thermostat or setpoint control wired to the boiler communication bus with this tekmarNet® address.
	**ERROR AT THERMOSTAT** There is an error on a different thermostat or setpoint control connected to the tekmarNet® system and not on this control. 1:01 to 1:24 = There is an error on a thermostat or setpoint control wired to communication bus 1 with this tekmarNet® address.
	**ERROR AT THERMOSTAT** There is an error on a different thermostat or setpoint control connected to the tekmarNet® system and not on this control. 2:01 to 2:24 = There is an error on a thermostat or setpoint control wired to communication bus 2 with this tekmarNet® address.
	**ERROR AT THERMOSTAT** There is an error on a different thermostat or setpoint control connected to the tekmarNet® system and not on this control. 3:01 to 3:24 = There is an error on a thermostat or setpoint control wired to the mix 3 bus with this tekmarNet® address.
	**ERROR AT SYSTEM CONTROL** There is an error on the tekmarNet® system control connected to the tekmarNet® system and not on this control.
	**INTERNAL FAULT** To determine and clear the error, go to the Toolbox menu 1. Hold the Home button for 3 seconds 2. Press Next Item until Toolbox Menu is found 3. Press Enter There are four conditions that will generate an "Internal Fault" message: Max Melt Days Error, System Save Error, Boiler Save Error or Mixing Save Error Go to the respective error message in this manual to correct the error condition

Troubleshooting

Problem	Check / Verify	Possible Cause
LCD Display is Off	Control has power	Use electrical meter to measure 24V (ac) voltage on input power R and C terminals.
System pump is always on	Display shows idle	Idle operation requires that the system pump operate continuously while below the melting temperature setting.
Blue short	Dirt or salt on snow/ice sensor	The snow/ice sensor requires regular cleaning. Avoid using road salt on the snow melting slab.
Slab is above melt temperature	Slab target temperature	The slab is heated to the slab target temperature.
	Heat On not shown	Check wiring of the system pump. Yje system pump operates continuously during melt, idle or storm operation. The heat source must be wired to operate together with the heat relay.
System running with no snow	Idle	Idling heats the slab when the temperature falls below the Idle temperature.
	Melt	During Cold Weather Cut Out (CWCO), the system is shut off. If shut off during a melt cycle, the system resumes melting once the outdoor temperature is above CWCO.
	Timed Melt	System manually started.
	Scheduled Melt	System started on a programmable schedule.
Snow on slab but system did not start	Off	System has a programmable schedule and is in event 2 or 4 (unoccupied).
	Off	System has been manually stopped and the automatic snow/ice sensor never dried, thereby preventing the system from automatically starting.

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