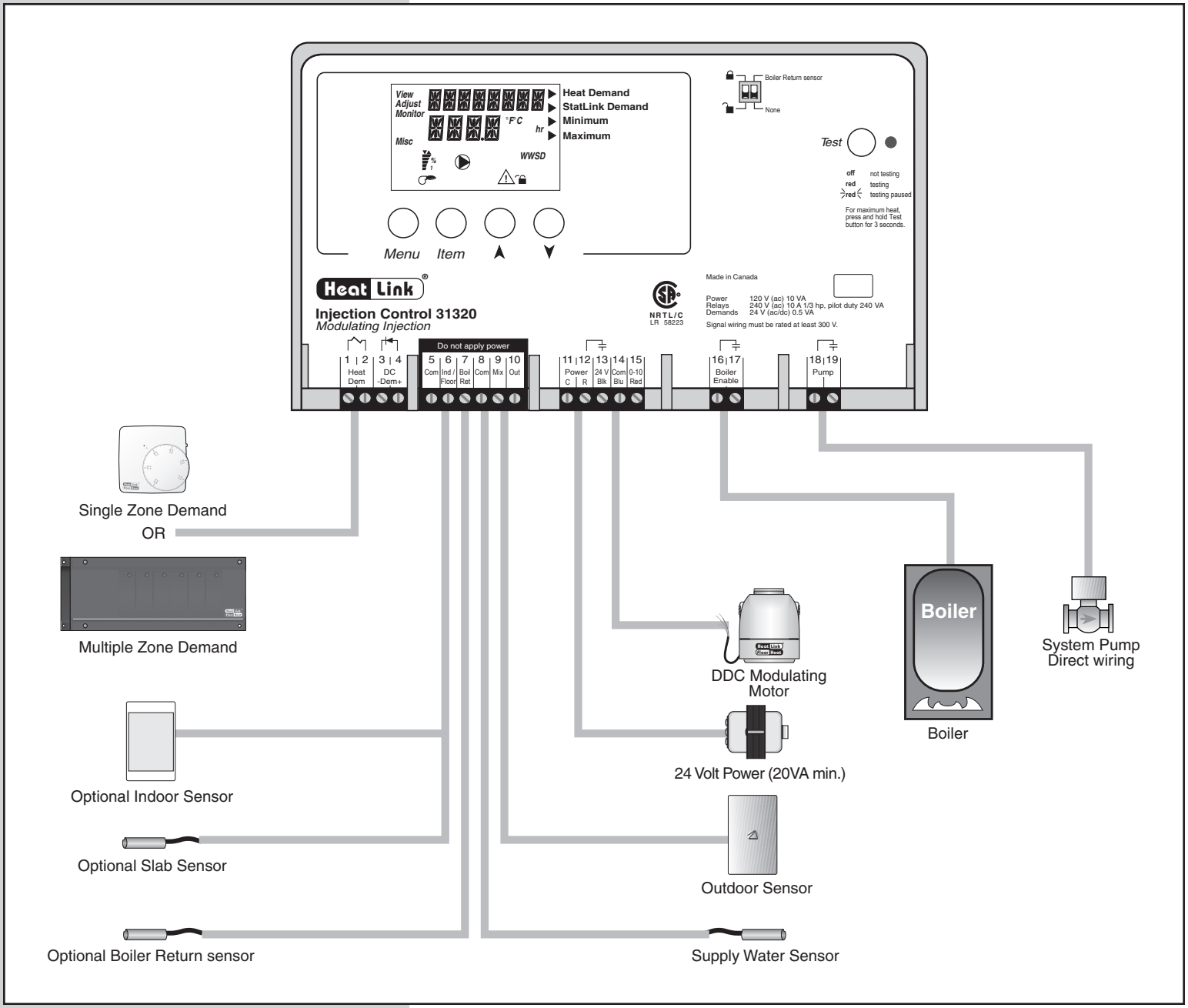
Heat Link®
The Floor Heat System

Injection Mixing Control
Stk# 31320

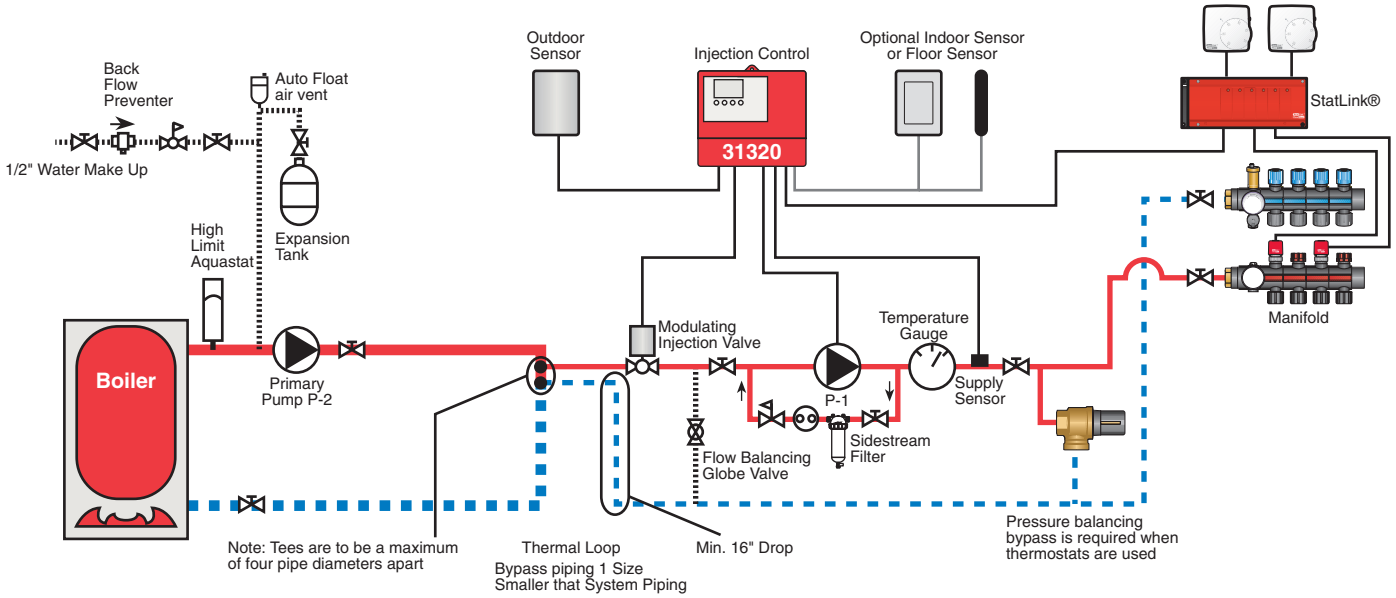


L631320
September 26, 2006

Mechanical Schematic (TECH 6.4)
Injection Mixing Control Stk# 31320

Application: **Electronic Injection**

Small Heat Source or Domestic Hot Water Heater (where approved) and 1 circuit
(one low temp. injection circuit - automatic tempering/modulating of the water temperature for floor heating)



Note:

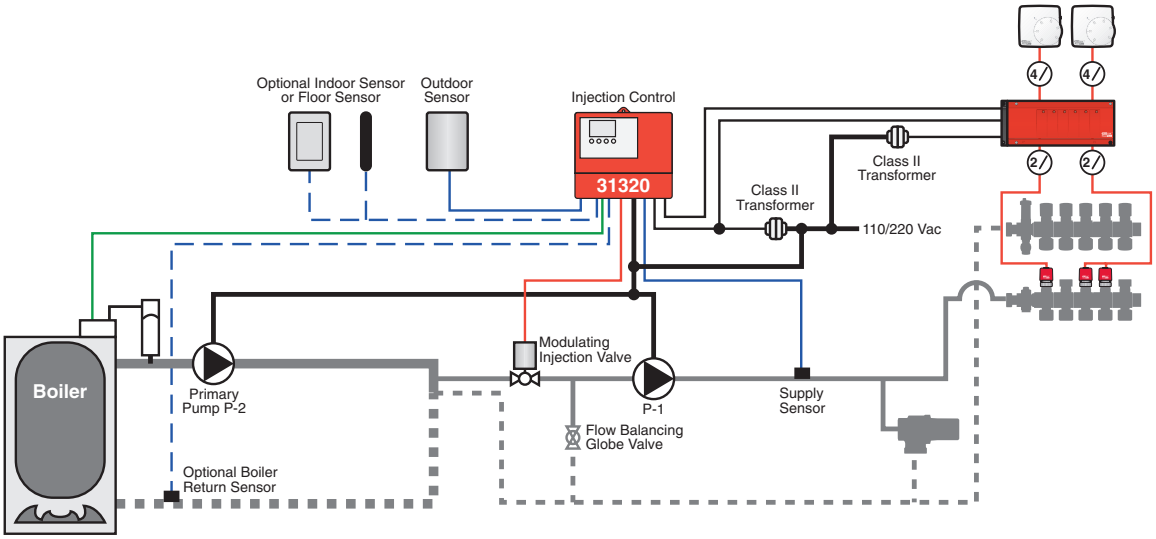
- Air vents, expansion tanks, pressure relief valves etc. For boiler as per local codes.
- Drawings are for HeatLink® suggested system layout only. User must determine if system layout will work for their particular application!
- Use isolation ball valves for all circuits and components.
- Thermal loop offset must be 16" drop minimum.
- Injection branch from primary loop to be a minimum 6" drop.
- Balancing valve should be a globe valve.

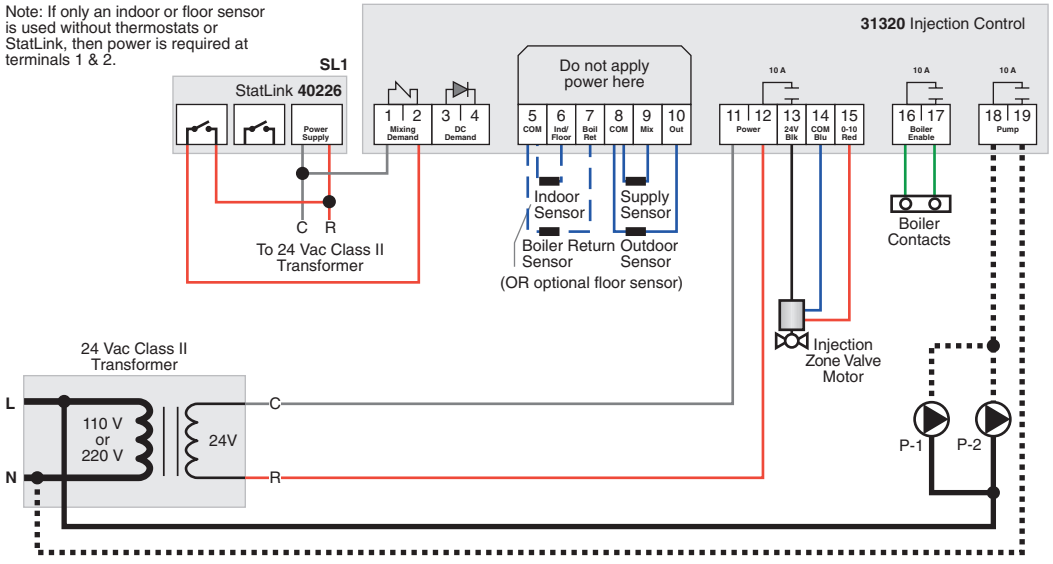
Control Sequence:

- Indoor/outdoor injection control unit provides the correct water temperature for the HeatLink® radiant floor system. By correlating outside air temperature, supply water temp. & room temperature the control unit then operates the injection valve & motor which in turn modulates the supply water temperature to the floor. For electrical rough in instructions use either ELECT 1.4 & 1.5 (for Standard 3 Wire) or ELECT 1.8 & 1.9 (for StatLink Wiring). (Note: when using ELECT 1.8 & 1.9 instructions, ignore 4-way mixing valve requirements).
- Temperature balancing bypass to be adjusted as per manufacturer's instructions.
- System pump (P-1) to be activated by the indoor/outdoor injection control. Primary pump (P-2) to be opened by the internal boiler relay. Allow for a separate disconnect switches.

Electrical Schematic (ELECT 6.4)
Injection Mixing Control Stk# 31320

Application: **Injection mixing control activating secondary pump for the low temperature manifold circuit. Boiler c/w system pump (P-1), and primary pump (P-2).**





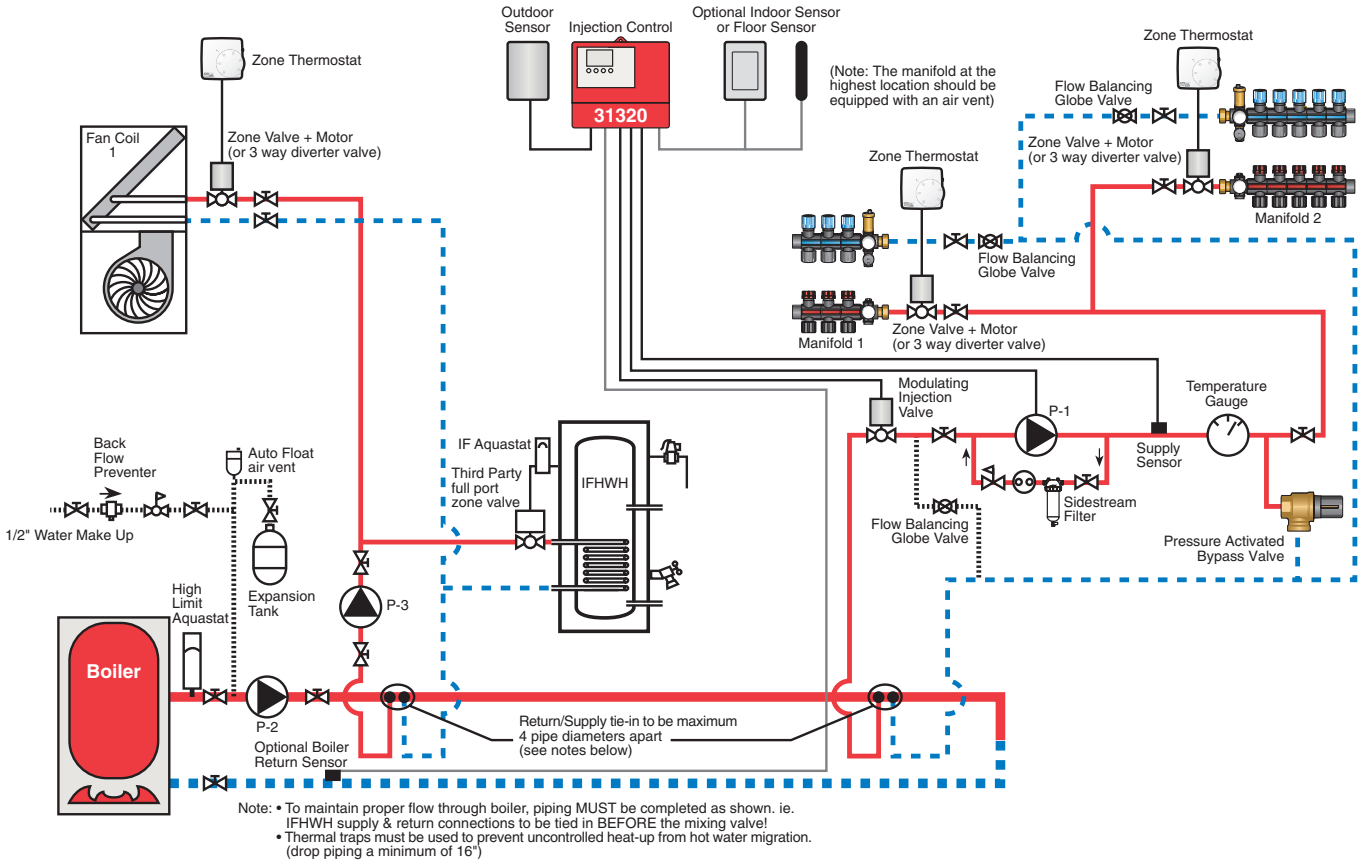
Note:

- Drawings are for HeatLink® <u>suggested</u> electrical diagrams only! User must determine if electrical diagram will work for their particular application. User must also confirm all HeatLink® diagrams with manufacturer diagrams of each particular control chosen.
- In all cases manufacturer equipment diagrams will take precedence over HeatLink® electrical diagrams.
- All wiring as per applicable electrical codes!
- If only the indoor/floor sensor is used without thermostats or StatLink® then power is required at terminals 1 & 2.

Mechanical Schematic (TECH 6.5)
Injection Mixing Control Stk# 31320

Application: **Electronic Injection**

Cast iron high mass boiler c/w 3 circuits (Fully-automatic)
(one low temp. injection circuit - automatic tempering of the water temperature for floor heating plus end switch zone motors)
(two high temp. circuits; fan coil and domestic indirect fired hot water heater)



Note:

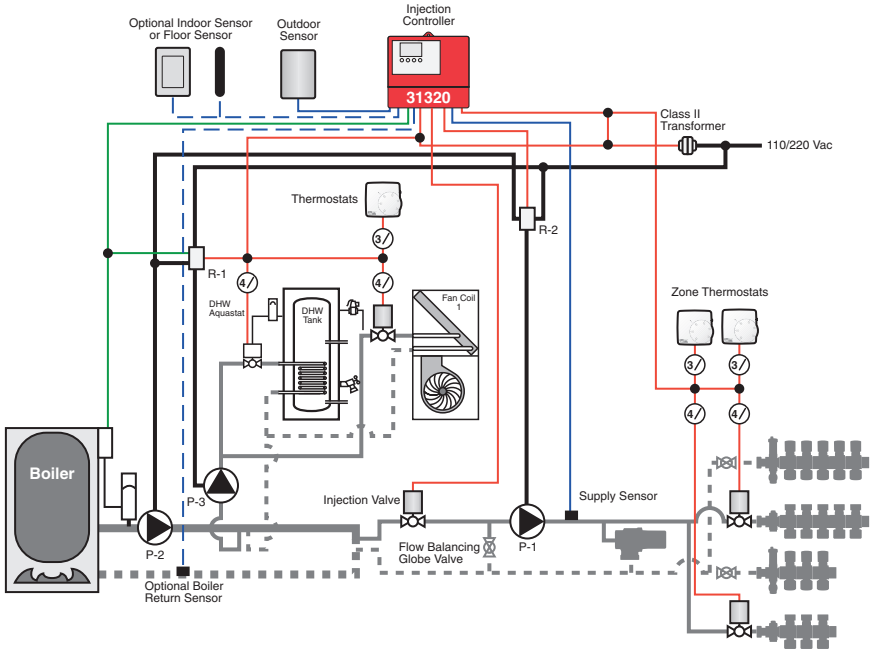
- Air vents, expansion tanks, pressure relief valves etc. For boiler as per local codes.
- Drawings are for HeatLink® suggested system layout only. User must determine if system layout will work for their particular application!
- Use isolation ball valves for all circuits and components.

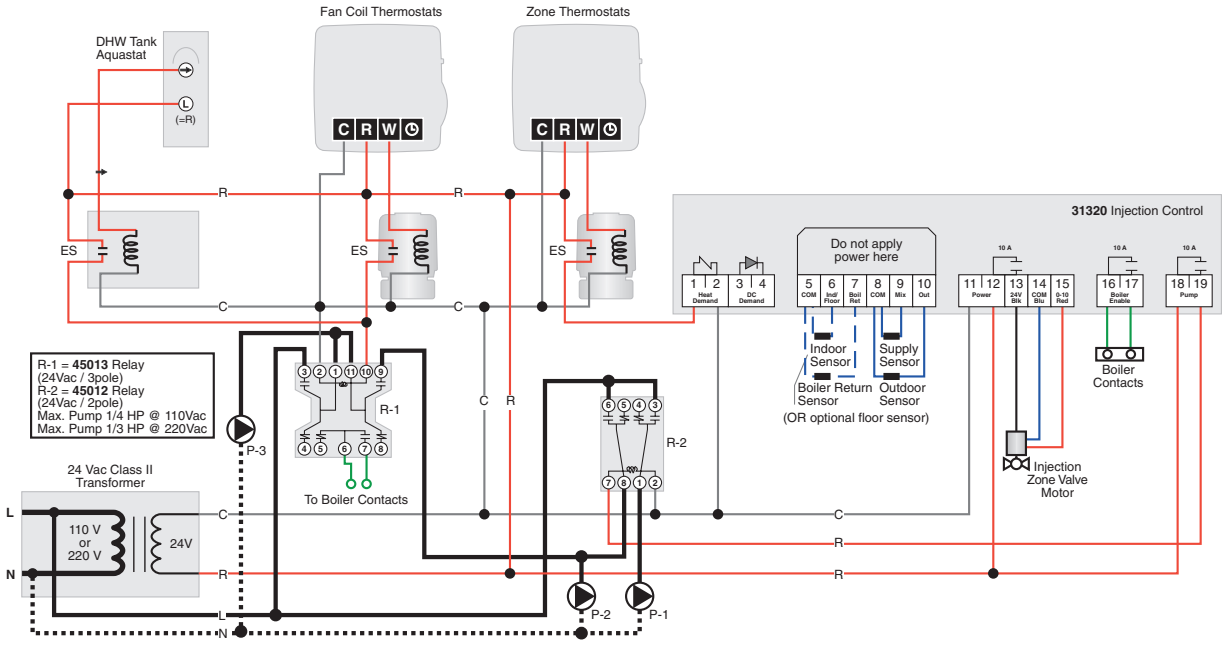
Control Sequence:

- Indoor/outdoor injection control unit provides the correct water temperature for the HeatLink® radiant floor system. By correlating outside air temperature, supply water temp. & room temperature the control unit then operates the injection valve & motor which in turn modulates the supply water temperature to the floor. For electrical rough in instructions use ELECT 1.4 & 1.5 (for Standard 3 Wire).
- Temperature balancing bypass to be adjusted as per manufacturer's instructions.
- System pump (P-1) to be activated by the indoor/outdoor injection control. Primary pump (P-2) to be opened by the internal boiler relay. P-3 to be operated by relay. Allow for a separate disconnect switches. (Note: Pressure activated bypass for P-1 is required to maintain consistent flow through manifolds.

Electrical Schematic (ELECT 6.5)
Injection Mixing Control Stk# 31320

Application: **Injection Mixing Control activated by individual end switch zone motors and valves for the low temperature manifold circuit. End switch contacts activate the high temperature DHW tank & Fan Coil circuit.**
Domestic Hot Water Tank and Fan Coil on Primary Circuit.
High mass boiler c/w primary (P-2) and system (P-1) and (P-3) pumps.





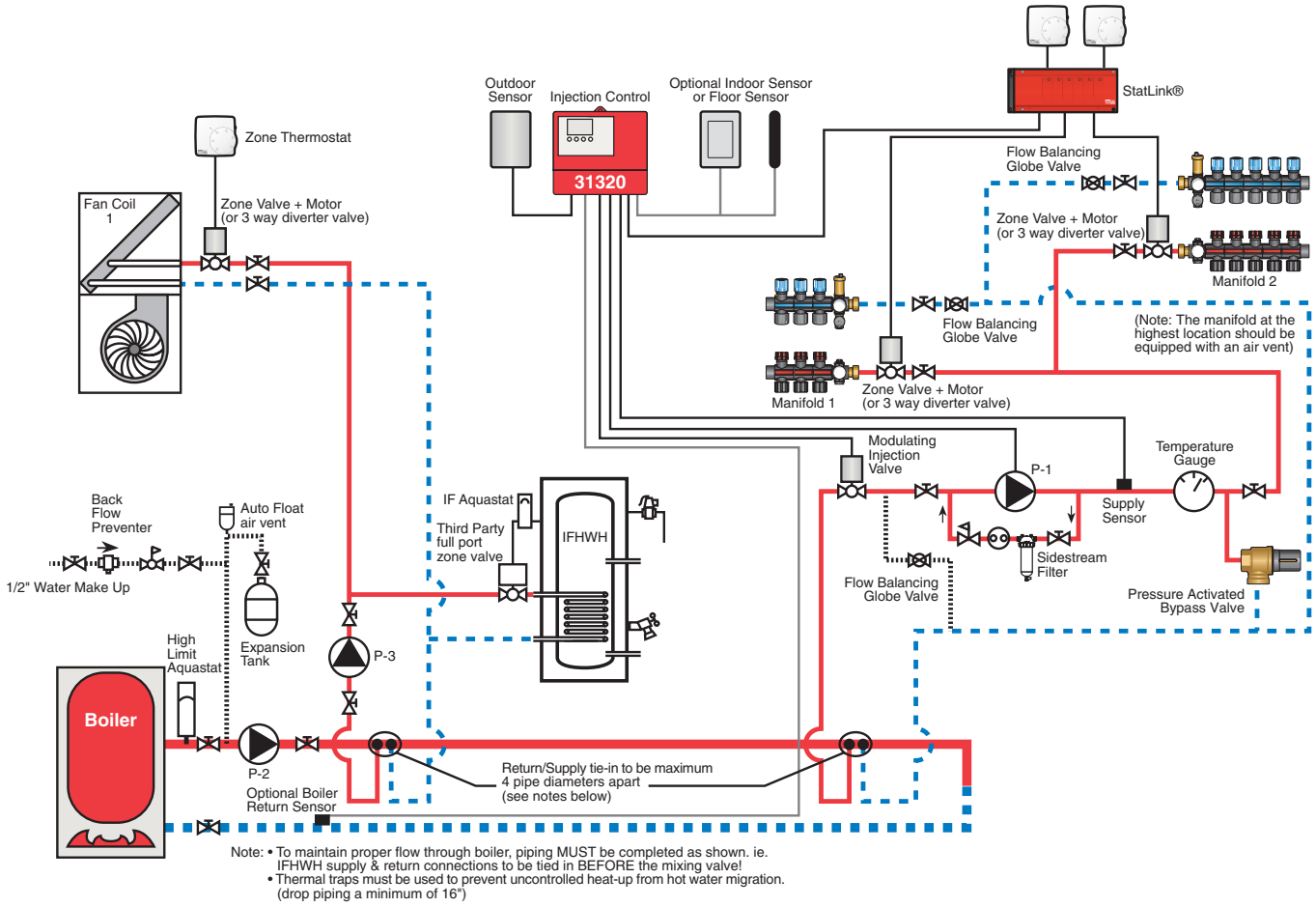
Note:

- Drawings are for HeatLink® suggested electrical diagrams only! User must determine if electrical diagram will work for their particular application. User must also confirm all HeatLink® diagrams with manufacturer diagrams of each particular control chosen.
- In all cases manufacturer equipment diagrams will take precedence over HeatLink® electrical diagrams.
- All wiring as per applicable electrical codes!

Mechanical Schematic (TECH 6.6)
Injection Mixing Control Stk# 31320

Application: **Electronic Injection**

Cast iron high mass boiler c/w 3 circuits (Fully-automatic)
(one low temp. injection circuit - automatic te mpering of the water temperature for floor heating plus StatLink® controls)
(two high temp. circuits; fan coil and domestic indirect fired hot water heater)



Note:

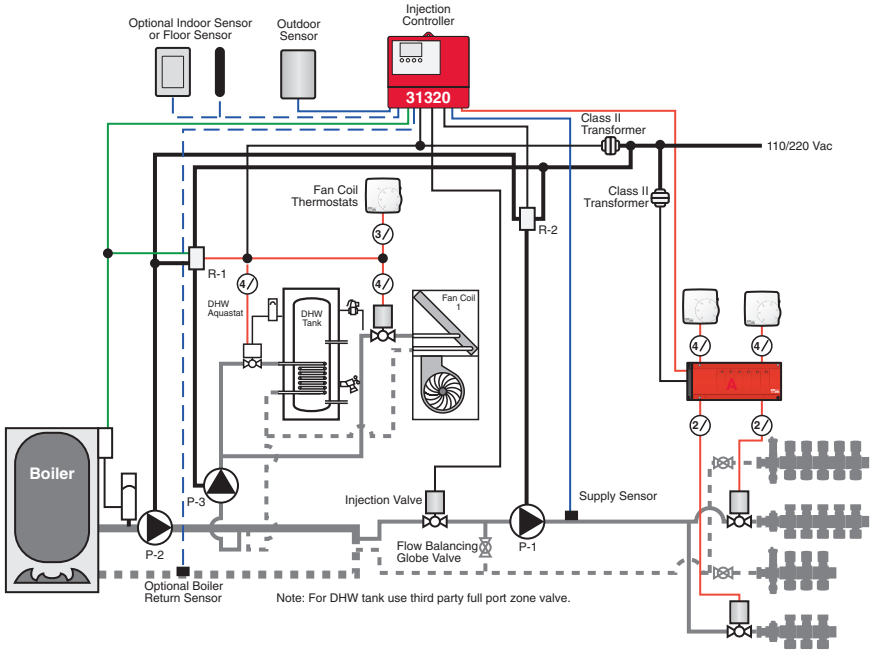
- Air vents, expansion tanks, pressure relief valves etc. For boiler as per local codes.
- Drawings are for HeatLink® suggested system layout only. User must determine if system layout will work for their particular application!
- Use isolation ball valves for all circuits and components.

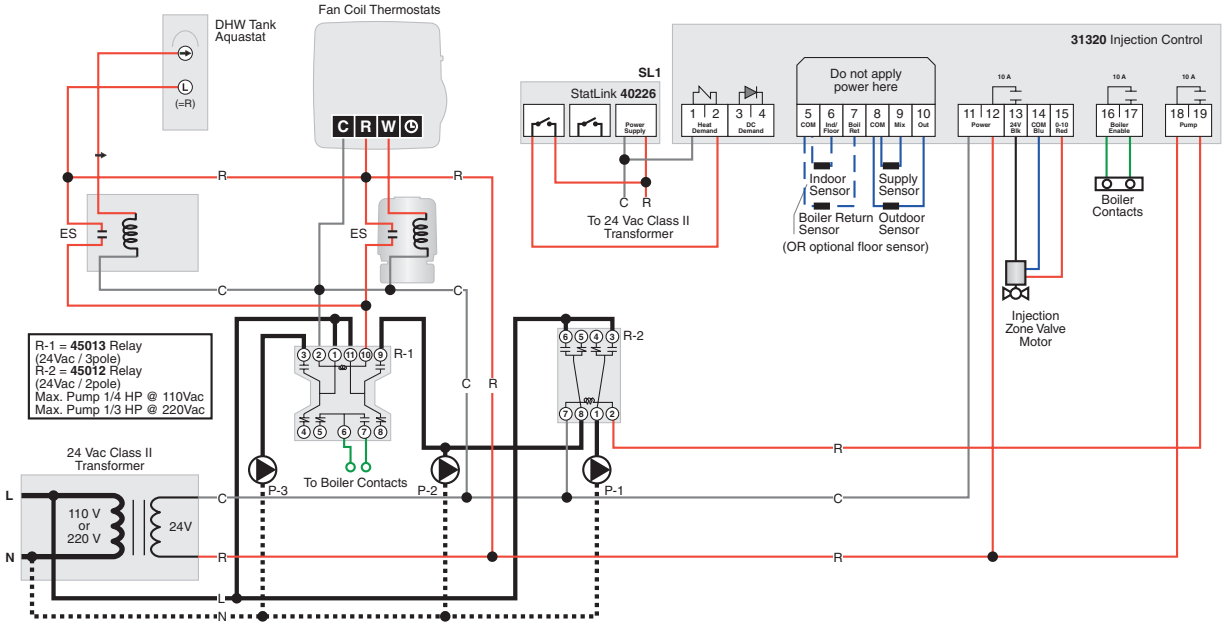
Control Sequence:

- Indoor/outdoor injection control unit provides the correct water temperature for the HeatLink® radiant floor system. By correlating outside air temperature, supply water temp. & room temperature the control unit then operates the injection valve & motor which in turn modulates the supply water temperature to the floor. For electrical rough in instructions use either ELECT 1.4 & 1.5 (for Standard 3 Wire) or ELECT 1.8 & 1.9 (for StatLink Wiring). (**Note:** when using instructions ELECT 1.8 & 1.9, ignore 4-way mixing valve requirements).
- Temperature balancing bypass to be adjusted as per manufacturer's instructions.
- System pump (P-1) to be activated by the indoor/outdoor injection control. Primary pump (P-2) to be opened by the internal boiler relay. P-3 to be operated by relay. Allow for a separate disconnect switches. (Note: Pressure activated bypass for P-1 is required to maintain consistent flow through manifolds.

Electrical Schematic (ELECT 6.6)
Injection Mixing Control Stk# 31320

Application: **Injection Mixing Control activated by StatLink® for the low temperature manifold circuit. End switch contacts activate the high temperature DHW tank & Fan Coil circuit.**
Domestic Hot Water Tank and Fan Coil on Primary Circuit.
High mass boiler c/w primary (P-2) and system (P-1) and (P-3) pumps.





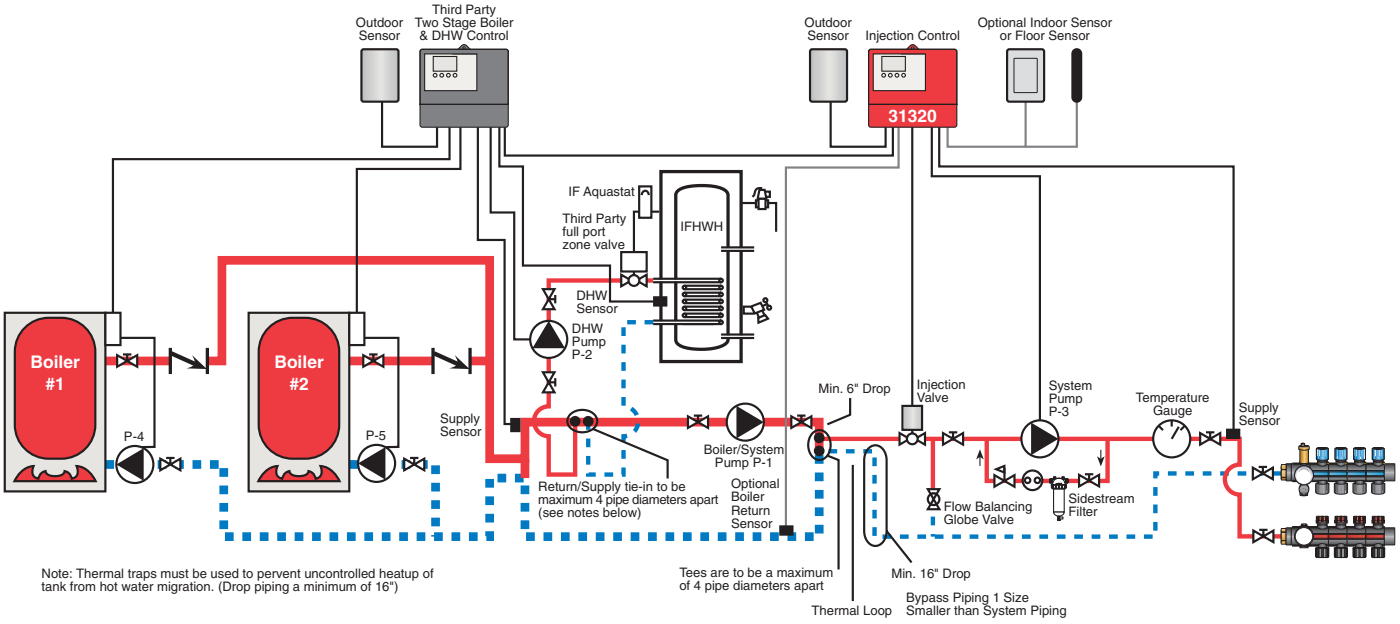
Note:

- Drawings are for HeatLink® suggested electrical diagrams only! User must determine if electrical diagram will work for their particular application. User must also confirm all HeatLink® diagrams with manufacturer diagrams of each particular control chosen.
- In all cases manufacturer equipment diagrams will take precedence over HeatLink® electrical diagrams.
- All wiring as per applicable electrical codes!

Mechanical Schematic (TECH 6.7)
Injection Mixing Control Stk# 31320

Application: **Electronic Injection Plus Boiler Staging Control**

Multiple cast iron high mass boilers c/w 2 circuits (Fully-automatic)
(one low temp. injection circuit - automatic tempering of the water temperature for floor heating)
(one high temp. circuit; domestic indirect fired hot water heater)



Note:

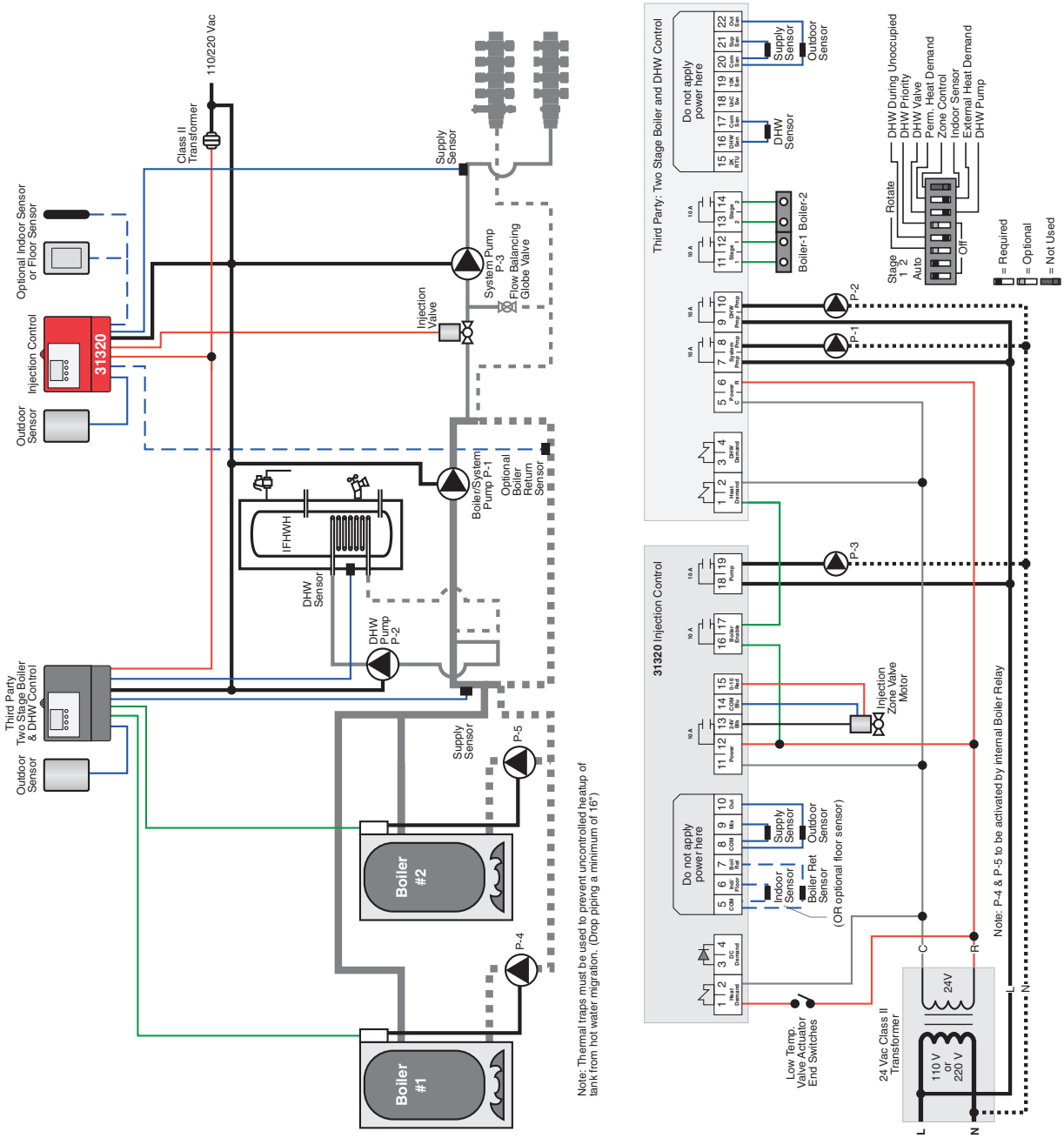
- Air vents, expansion tanks, pressure relief valves etc. For boiler as per local codes.
- Drawings are for HeatLink® suggested system layout only. User must determine if system layout will work for their particular application!
- Use isolation ball valves for all circuits and components.

Control Sequence:

- Indoor/outdoor injection control unit provides the correct water temperature for the HeatLink® radiant floor system. By correlating outside air temperature, supply water temp. & room temperature the control unit then operates the injection valve & motor which in turn modulates the supply water temperature to the floor. For electrical rough in instructions use ELECT 1.4 & 1.5 (for Standard 3 Wire).
- Temperature balancing bypass to be adjusted as per manufacturer's instructions.
- System pump (P-3) to be activated by the indoor/outdoor injection control. Boiler / system pump (P-1) to be activated by the boiler staging & IFHWH staging control. (P-4) and (P-5) boiler pumps to be activated by internal boiler relays. Allow for a separate disconnect switches. (Note: If multiple manifolds are used with multiple thermostats & zone drive motors, then a pressure activated bypass for P-1 is required to maintain consistent flow through manifolds.

Electrical Schematic (ELECT 6.7)
Injection Mixing Control Stk# 31320

Application: **Injection Mixing Control activated by StatLink® for the low temperature manifold circuit. Boiler staging & DHW control activates the high temperature DHW tank & Fan Coil circuit.**
Domestic Hot Water Tank and Fan Coil on Primary Circuit.
High mass boiler c/w primary (P-2) and system (P-1) and (P-3) pumps.



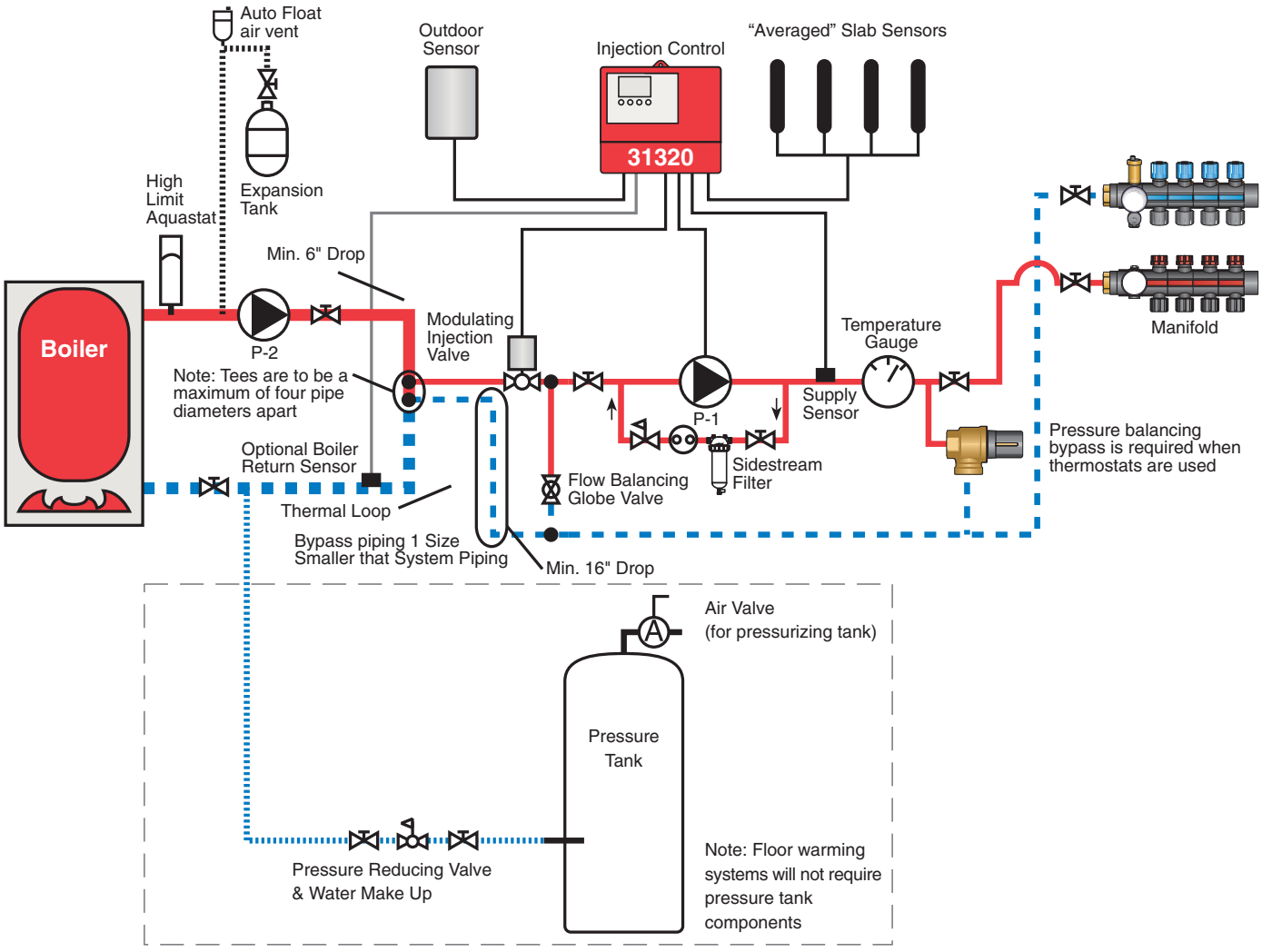
Note:

- Drawings are for HeatLink® suggested electrical diagrams only! User must determine if electrical diagram will work for their particular application. User must also confirm all HeatLink® diagrams with manufacturer diagrams of each particular control chosen.
- In all cases manufacturer equipment diagrams will take precedence over HeatLink® electrical diagrams.
- All wiring as per applicable electrical codes!

Mechanical Schematic (TECH 6.8)
Injection Mixing Control Stk# 31320

Application: **Floor Warming / Subsoil Frost Protection**

Modulating Condensing Boiler and 1 circuit (Fully-automatic)
(one low temp. injection circuit - automatic tempering of the water temperature for floor heating)



Note:

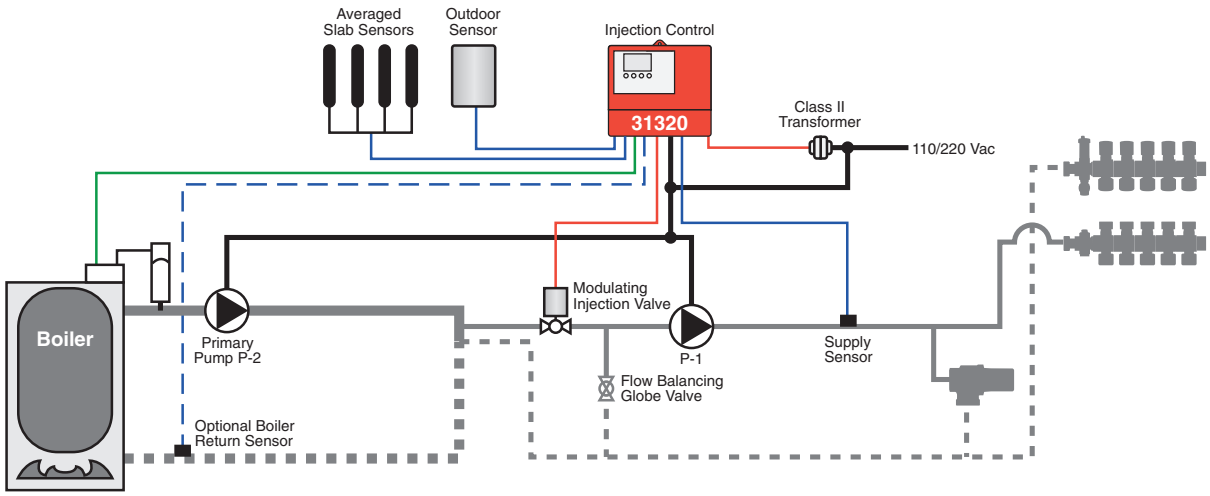
- Air vents, expansion tanks, pressure relief valves etc. For boiler as per local codes.
- Drawings are for HeatLink® suggested system layout only. User must determine if system layout will work for their particular application!
- Use isolation ball valves for all circuits and components.

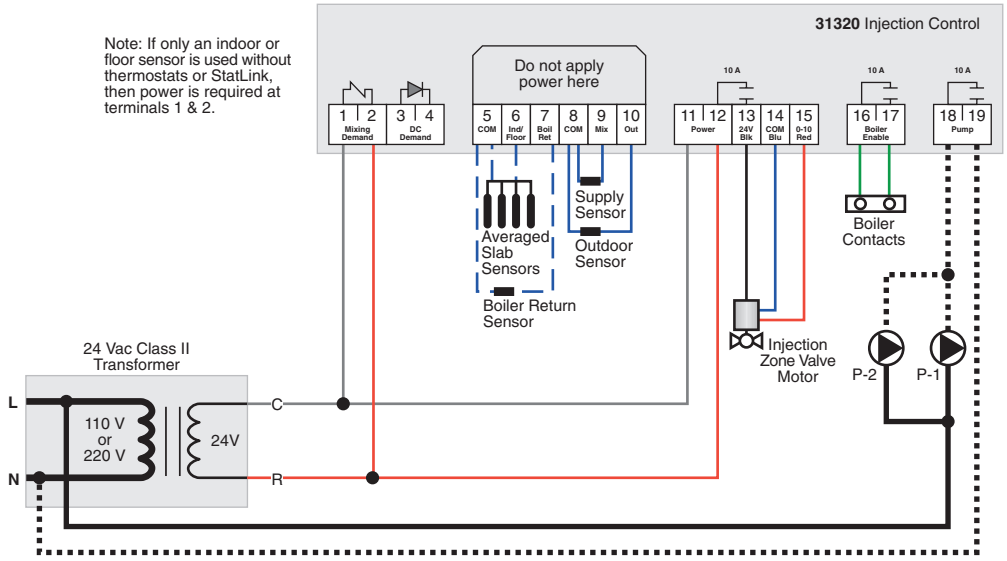
Control Sequence:

- Indoor/outdoor injection control unit provides the correct water temperature for the HeatLink® radiant floor system. By correlating outside air temperature, supply water temp. & room temperature the control unit then operates the injection valve & motor which in turn modulates the supply water temperature to the floor. For electrical rough in instructions use either ELECT 1.4 & 1.5 (for Standard 3 Wire) or ELECT 1.8 & 1.9 (for StatLink Wiring). (Note: when using instructions ELECT 1.8 & 1.9, ignore 4-way mixing valve requirements).
- Temperature balancing bypass to be adjusted as per manufacturer's instructions.
- System pump (P-1) to be activated by the indoor/outdoor injection control. Primary pump (P-2) to be opened by the internal boiler relay. P-3 to be operated by relay. Allow for a separate disconnect switches. (Note: Pressure activated bypass for P-1 is required to maintain consistent flow through manifolds.

Electrical Schematic (ELECT 6.8)
Injection Mixing Control Stk# 31320

Application: **Injection Mixing Control maintaining setpoint for the low temperature floor warming or subsoil frost protection manifold circuit.**
High mass boiler c/w primary (P-2) and system (P-1) pumps.





Note:

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- In all cases manufacturer equipment diagrams will take precedence over HeatLink® electrical diagrams.
- All wiring as per applicable electrical codes!

Injection Valve Sizing
Injection Mixing Control Stk# 31320

Determine which chart is appropriate for your system, based on the amount of glycol to be used. Calculate the difference between the boiler design operating temperature (T_b) and system return temperature (T_r), see diagram on next page.

$$\Delta T_i = T_b - T_r$$

Read down the chart to find the ΔT_i and then read across to the BTU/h output required. This will give you the injection valve size to use.

0% Glycol

ΔT_i °F (°C)	BTU/h															
	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	130,000	140,000	150,000	160,000	170,000	180,000	190,000	200,000
60 (33)	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"
55 (31)	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–
50 (28)	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–
45 (25)	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–
40 (22)	1/2"	3/4"	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–
35 (19)	1/2"	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–
30 (17)	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–
25 (14)	3/4"	1"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–
20 (11)	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–	–
15 (8)	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

30% Glycol

ΔT_i °F (°C)	BTU/h															
	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	130,000	140,000	150,000	160,000	170,000	180,000	190,000	200,000
60 (33)	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–
55 (31)	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–
50 (28)	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–
45 (25)	1/2"	1/2"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–
40 (22)	1/2"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–
35 (19)	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–
30 (17)	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–
25 (14)	1"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–
20 (11)	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–	–

50% Glycol

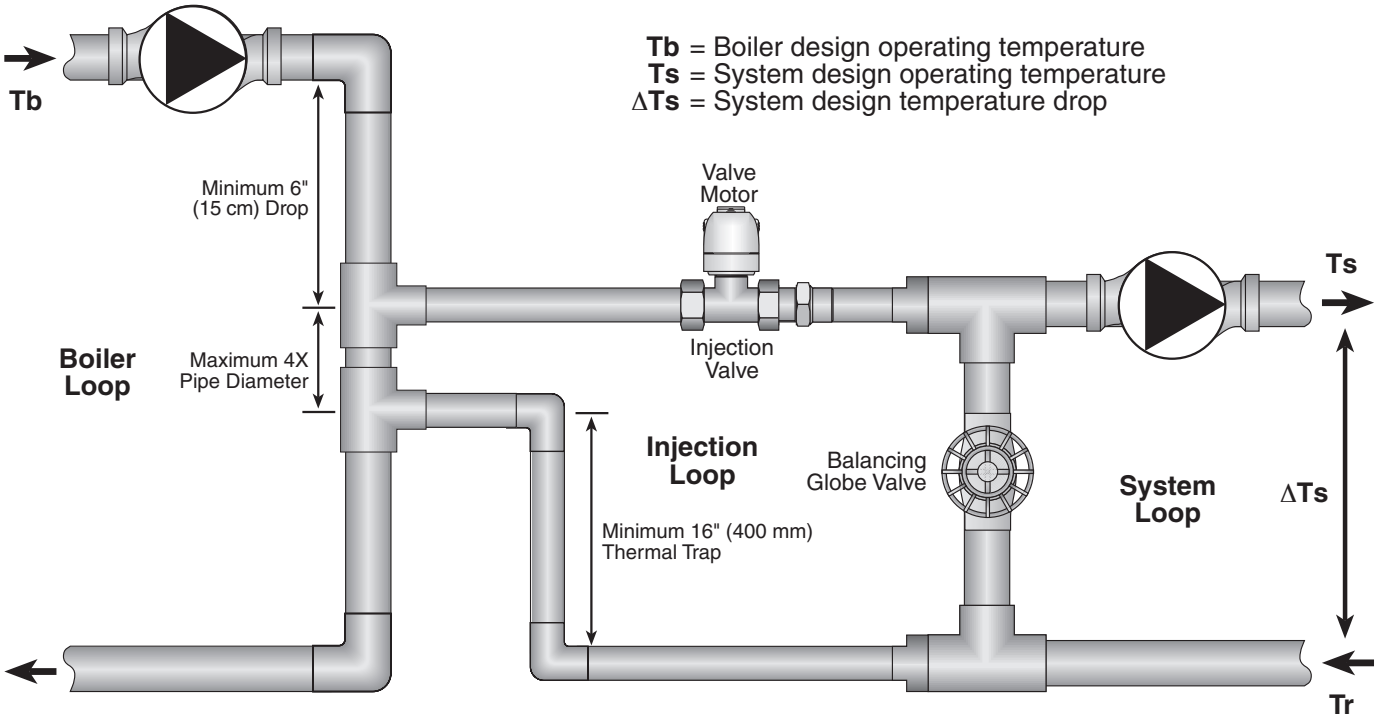
ΔT_i °F (°C)	BTU/h															
	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	130,000	140,000	150,000	160,000	170,000	180,000	190,000	200,000
60 (33)	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–
55 (31)	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–
50 (28)	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–
45 (25)	1/2"	3/4"	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–
40 (22)	1/2"	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–
35 (19)	3/4"	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–
30 (17)	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–
25 (14)	1"	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–
20 (11)	1-1/4"	1-1/4"	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Setting up 31320 controller injection system

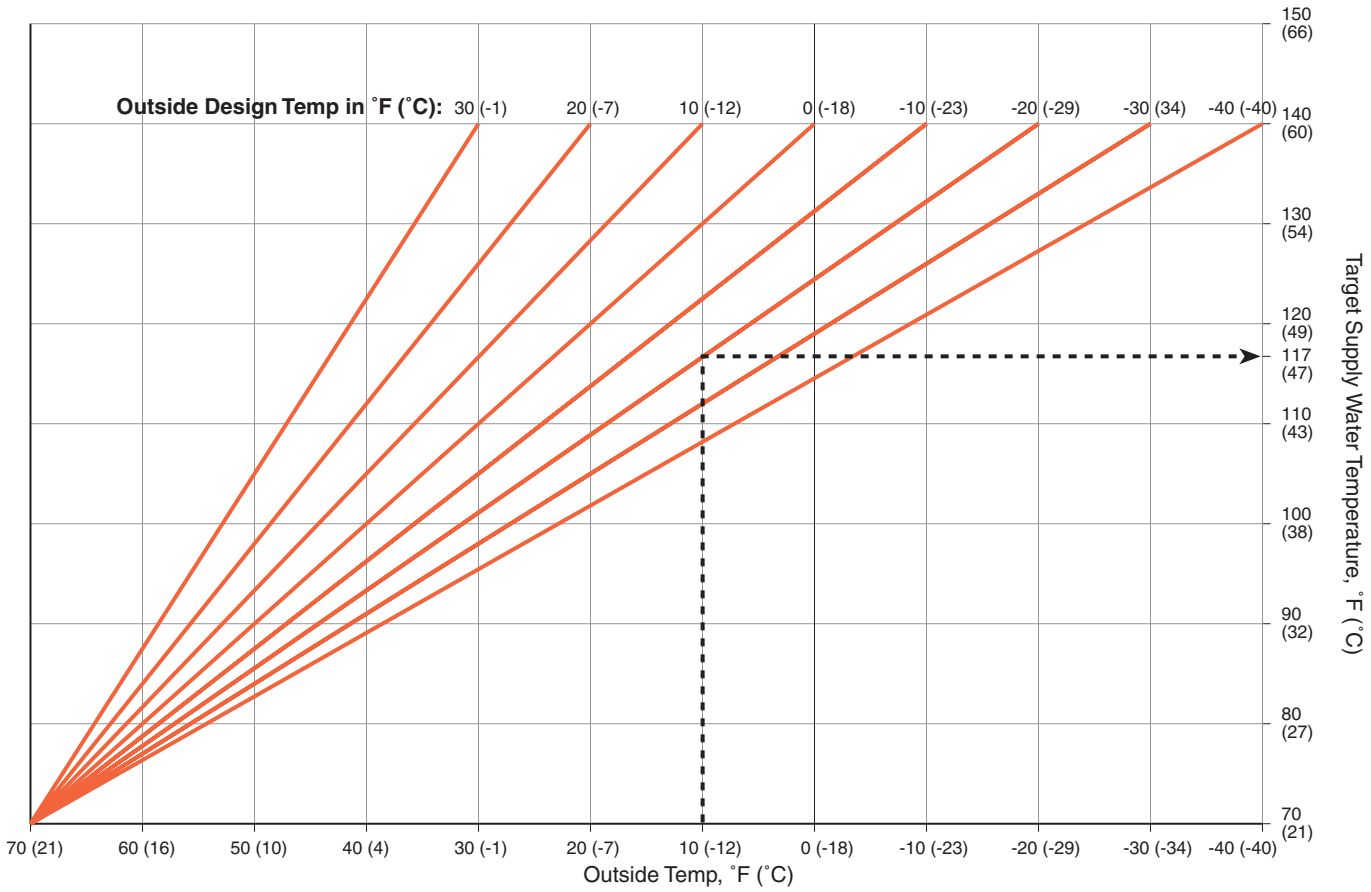
1. Ensure the slab is up to temperature before setting the balancing valve for the injection circuit.
2. Ensure boiler is at operating temperature
3. Create heat demand situation at the controller by turning up thermostats or opening window etc.
4. Calculate the target supply water temperature using the graph on page 14.
5. Remove the motor from the injection zone valve
6. Ensure there are some wild loops in the system so the mixed water is being cooled.
7. Fully close the balancing globe valve and then gradually open the balancing valve until you obtain the target supply water temperature. The supply water temperature can be read on the controller display.
8. Replace motor on injection zone valve and remove handle from the balancing valve.

The following items are essential for creating a balanced system

1. The balancing pipe size must be the same size as the system loop.
2. You must always use a globe valve for balancing.
3. The pressure drop across the injection loop should be as low as possible. This is achieved by ensuring that the distance between the supply and return on the injection loop are no more than 4 pipe diameters apart and that the injection loop is perpendicular to the boiler and system loops.
4. There should always be thermal drop (minimum 16" / 400 mm) on the injection loop return.



Calculating the Target Supply Water Temperature



To find the target temperature for a 31320 controller:

1. Select the appropriate outdoor design temperature for your location.
2. From the controller check the current outside temperature.
3. Draw a line from the current outside temperature to where it intersects the outdoor design temperature for your location.
4. Draw a line horizontally to read the target water temperature for these conditions.

Example:

Outside design temperature = -20˚F (-29˚C)
Current outside temperature = 10˚F (-12˚C)
Target supply water temperature = 117˚F (47˚C)

The HeatLink 31320 provides full outdoor reset through a modulating injection valve to a hydronic heating system. The 31320 may obtain a heat demand from the StatLink control or from common thermostats to provide mixing to the system. The control provides boiler return protection through the mixing device, in order to prevent boiler flue gas condensation.
The 31320 has capabilities of controlling the room temperature of a single zone through an indoor sensor, or provide slab temperature limitation through a slab sensor.

Heat Demands:
In order to provide a heat demand to the HeatLink 31320, 24 V (ac) must be present in terminals 1 and 2 (Heat Dem) or 24 V (dc) must be present in terminals 3 and 4 (DC Dem). Once the control registers a heat demand and the outdoor temperature is below the WWSD (warm weather shut down), the system pump is turned on and the injection valve may be modulated in order to provide full outdoor reset. The boiler relay turns on, once the valve is 25% open, or the boiler return temperature is below the Boil RET setting. Once enabled, the boiler relay will stay on for at least 3 minutes or until the heat demand is removed.

Indoor sensor operation:
The HeatLink control may control the room temperature of a single zone through an indoor sensor. The control must have 24 V (ac) in the Heat Demand terminals or 24 V (dc) in the DC Demand terminals. An indoor sensor should not be used together with multiple zones and thermostats as the indoor sensor is the controlling factor.
The IND/FLOR setting must be set to the IND position in order for the control to operate in this mode. Once the outdoor temperature drops below the WWSD setting and the zone requires heat, the control will turn on the system pump. The injection valve will be modulated based on the ROOM, INDR DSN, OUT DSGN, and DSGN WTR settings. (These settings establish the starting and design conditions of the heating curve. The control then automatically calculates the heating curve ratio). If the zone requires more heat the supply water temperature is shifted upward and if it needs less heat the temperature is shifted down.

Slab temperature limiting:
If the IND/FLOR setting is set to FLOR, the control assumes a slab sensor has been installed in a slab. When a heat demand is present and the control is not in WWSD, the control will maintain the slab temperature between the FLOR MAX and FLOR MIN settings. The supply water temperature fluctuates based on the outdoor temperature.

Boiler return protection:
The control has an optional boiler return sensor input in order to provide boiler return protection. When the return temperature is below the Boil RET setting, the control modulates the injection valve towards the closed position in order to allow the boiler temperature to raise and prevent flue gas condensation.

Maximum Supply:
The control has a maximum supply setting which limits the supply water temperature to the system.

Boiler ON:
The percentage that the injection valve is open before activating the boiler.
High Mass = 50-60%
Low Mass = 10-50%
Can be adjusted to suit system (10-70 %).

Boiler OFF:
The percentage that the injection valve is open before deactivating the boiler. Normally 30%; can be adjusted to suit system (0-60 %).

Minimum On Time:
This is the minimum time the boiler enable will send a signal to activate the boiler. This should be 3 min for a high mass boiler and 0 min for a low mass boiler. This is a guide only and should be confirmed with the boiler manufacturer. Normally 3 min; can be adjusted to suit system (0 to 8 min).

Minimum Off Time:
This is the minimum time before the boiler can be fired again after the boiler enable has been deactivated. This should be 3 min for a high mass boiler and 0 min for a low mass boiler. Again, check with the boiler manufacturer.Normally 3 min; can be adjusted to suit system (0 to 8 min).

Purge:
A purging time may be set in order to keep the system pump running for an additional period of time after a demand is removed. This setting may also be set to Off if no purging is required.

Exercise:
The control includes an exercising feature which exercises the system pump for about 20 seconds. The injection valve is also exercised, however not during pump exercising. The frequency in which the system pump and valve are exercised is adjusted through the EXERCISE adjustment.

Flush:
Some applications which use a DHW tank for dual purpose (heating and DHW generation), require flushing of the heating system in order to prevent bacteria growth. The HeatLink 31320 will flush the system by turning on the system pump as well as the injection valve for 20 minutes every 6 days. The FLUSH setting must be set to ON.
Note: HeatLink recommends isolation of domestic water through a heat exchanger. Direct DHW discharge into the floor may not be allowed in some jurisdictions. Please confirm your local codes!

Monitor Menu:
The HeatLink 31320 has a Monitor menu which displays Hi and Lo temperatures, pump running time, and some misc. messages.

- OUT HI / LO - Hottest and coldest outdoor temperature
- MIX HI / LO - Hottest and coldest supply temperature
- PUMP - Number of hours the pump has run
- BOILER - Number of hours the boiler has been called for heat
- ROOM HI / LO - Hottest and coldest room temperature. Only displayed when using an indoor sensor
- COP ERR - This message appears in areas where electromagnetic noise may be interfering with the control, and refers to the number of times the control had to reset itself.
- NON-COP - This message shows the number of times the power has been interrupted.

Each of these above values may be cleared by pressing the up and down keys simultaneously.

Units:
The HeatLink 31320 may display temperatures in °C or °F.

Contrast:
The contrast on the new LCD (Liquid Crystal Display) may be adjusted.

Backlight:
The backlight of the display may be turned on, off, or may be on for 30 seconds after a button has been pressed. This setting also affects the amount of time before the control defaults to the View menu after having adjusted a setting.

Time to default back to the View menu is:
BACKLITE setting = OFF ..... 10 seconds
BACKLITE setting = 30 seconds ..... 30 seconds
BACKLITE setting = ON ..... 90 seconds

Test button:
When the Test button is pressed, the control operates each device (pump, injection valve, boiler) for 10 seconds. Each step may be skipped by pressing the Test again.

Max heat:
The control has a max heat feature which operates the system at maximum settings. This feature is typically helpful during system start up. When the Test button is pressed for 3 seconds the control flashes the Test light and displays MAX HEAT NO. The user should then select through the arrow keys --> YES. If a heat demand is present, the control will turn on the system pump, the boiler relay and will increase the mixing output to target the Maximum Supply temperature. Boiler minimum temperature is ignored. This feature will be enabled for 24 hrs or until either the Menu, Item, or Test button is pressed.
The amount percent output may be adjusted through the Up and Down keys. The Test light will flash during max heat operation.

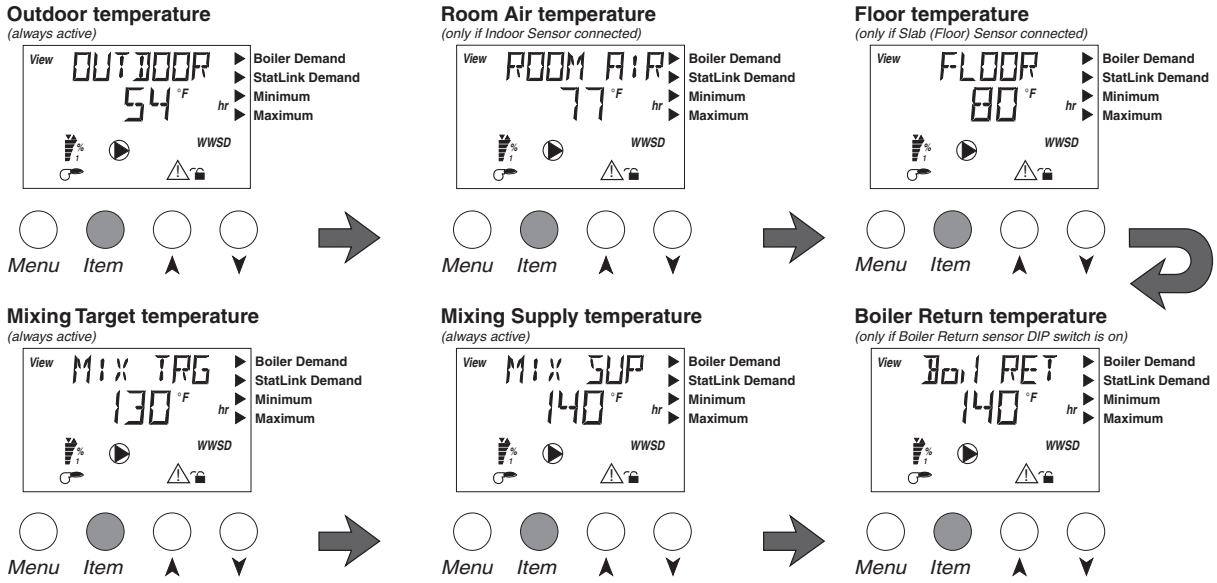
Display operation:
By pressing the Menu button, the display scrolls through the different menus.
By pressing the Item button, the display scrolls through the different items.
By pressing the Up and Down buttons, the adjustments may be set.
By pressing the Item and Up buttons simultaneously the control displays the previous item.

DIP switches:
Lock - Unlock - When the DIP switch is set to the lock position, the user is capable of viewing the settings but is not capable of changing any of the programmed settings.
Boiler Return Sensor - If a boiler return sensor is connected to the HeatLink 31320, this DIP switch must be set to Boiler return Sensor.

Display Menu

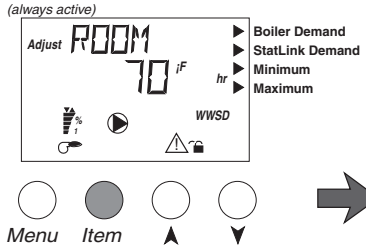
Menu	Item	Description	Adjustment	Default	When Active
View	OUTDOOR	Outdoor air temperature	-67 to 149°F		Always
	ROOM AIR	Actual room air temperature	-58 to 167°F		IND/FLOR = INDR
	FLOOR	Temperature of the Slab (floor) sensor	-58 to 167°F		IND/FLOR = FLOR
	MIX TRG	Target mixed supply water temperature	-31 to 266˚F		Always
	MIX SUP	Actual mixed supply water temperature	-31 to 266˚F		Always
	Boil RET	Actual boiler return water temperature	-31 to 266˚F		Boiler Return DIP = on
Adjust	ROOM	Target room temperature	35 to 85°F	70°F	Always
	IND / FLR	Connection to Ind / Floor terminal	None, Indr, Flor	None	Always
	FLOR MIN	Minimum slab (floor) sensor temperature	Off, 35 to 150°F	70°F	IND/FLOR = FLOR
	FLOR MAX	Maximum slab (floor) sensor temperature	35 to 150°F	95°F	IND/FLOR = FLOR
	INDR DSN	Design indoor air temperature used in the heat loss calculations	35 to 85°F	70°F	Always
	DSGN WTR	Design heating system supply water temperature	70 to 220°F	110°F	Always
	OUT DSGN	Design outdoor air temperature used in the heat loss calculations	-50 to 32°F	10°F	Always
	MAX SUP	Maximum mixing target supply at any time	100 to 200°F, Off	180°F	Always
	Boil ON	% injection valve open before activating boiler	10 to 70 %	60 %	Always
	Boil OFF	% injection valve open before deactivating boiler	0 to 60 %	30 %	Always
	MINONTM	Minimum on time for boiler	0 to 8:00 min	3:00 min	Always
	MINOFFTM	Minimum off time before firing boiler again	0 to 8:00 min	3:00 min	Always
	Boil RET	Minimum boiler target return water temperature	Off, 70 to 170°F	135°F	Boiler Return DIP = on
	WWSD	System shut down during warm weather	35 to 85°F, None	70°F	Always
	PURGE	Delay after heat demand is removed until pump is turned off	Off, 0:10 to 40:00 min	0:20	Always
	EXERCISE	Frequency of exercising pump and valve	30 to 240 hours, Off	70 hours	Always
	FLUSH	Flushing of open system every 6 days for 20:00 minutes	Off, On	Off	Always
Monitor	OUT HI	Highest outdoor temperature recorded	-67°F to 149°F	0°F	Always
	OUT LO	Lowest outdoor temperature recorded	-67°F to 149°F	0°F	Always
	MIX HI	Highest Mixed temperature recorded	-31°F to 266°F	0°F	Always
	MIX LO	Lowest Mixed temperature recorded	-31°F to 266°F	0°F	Always
	PUMP	Number of hours the pump has run	0-9999 hours	0	Always
	BOILER	Number of hours the boiler has been called for heat	0-9999 hours	0	Always
	ROOM HI	Highest Room temperature recorded	-58°F to 167°F	0°F	IND/FLOR = INDR
	ROOM LO	Lowest Room temperature recorded	-58°F to 167°F	0°F	IND/FLOR = INDR
	COP ERR	Counter of number of COP resets since this was last cleared (see p. 16)	0-255	0	Always
	NON-COP	Counter of number of non-COP resets (see p. 16)	0-255	0	Always
Misc.	UNITS	Change from °F to °C	°F < > °C	°F	Always
	CONTRAST	Adjustment from Minimum to Maximum	Min (0) to Max (3)	(3)	Always
	BACKLITE	Adjustment from off to partial to full on	Off< > 30s < > On	30s	Always

View Menu using HeatLink display

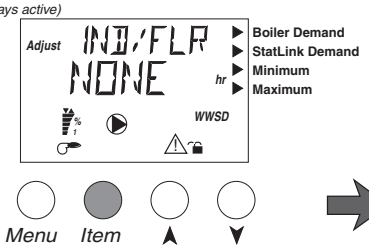


Adjust Menu displays

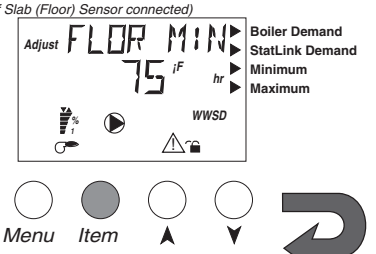
Room
(always active)



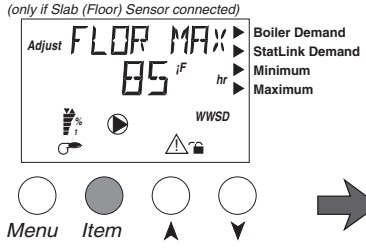
IND/FLOOR
(always active)



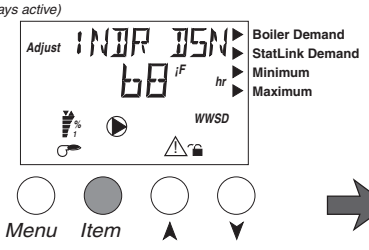
FLOOR MIN
(only if Slab (Floor) Sensor connected)



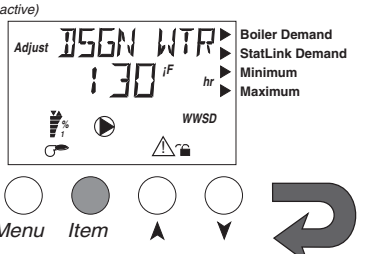
FLOOR MAX
(only if Slab (Floor) Sensor connected)



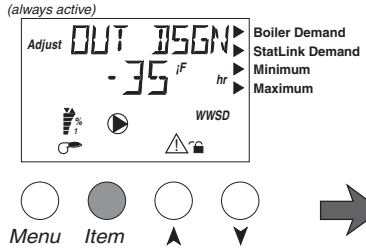
INDOOR DESIGN
(always active)



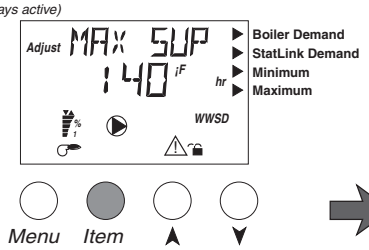
DESIGN WATER
(always active)



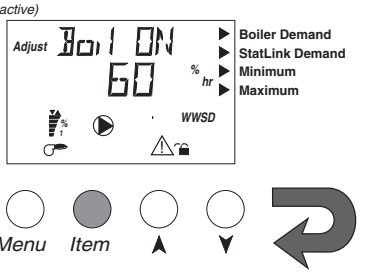
OUTDOOR DESIGN
(always active)



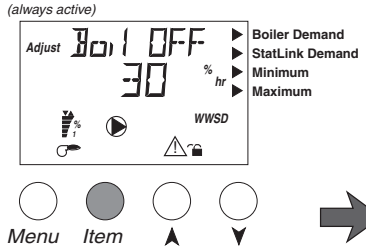
MAX SUPPLY
(always active)



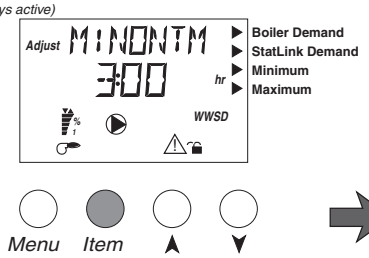
BOILER ON
(always active)



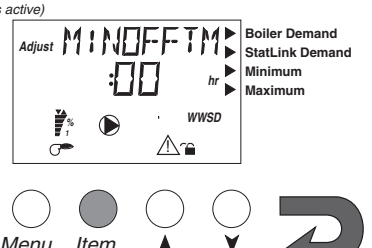
BOILER OFF
(always active)



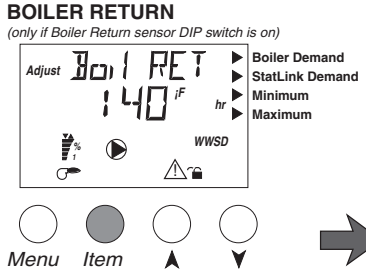
MINIMUM ON TIME
(always active)



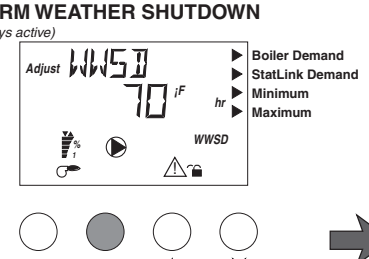
MINIMUM OFF TIME
(always active)



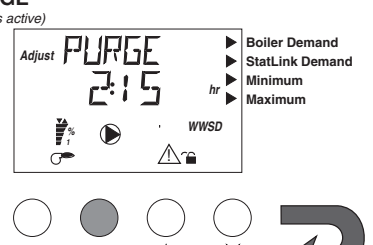
BOILER RETURN
(only if Boiler Return sensor DIP switch is on)



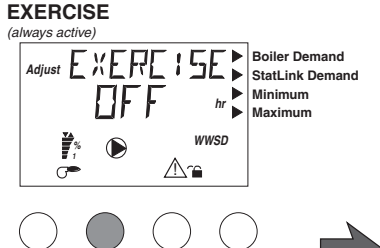
WARM WEATHER SHUTDOWN
(always active)



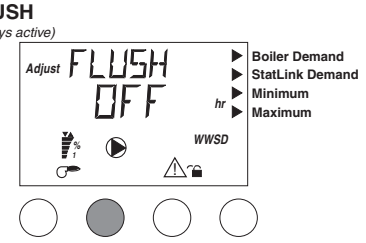
PURGE
(always active)



EXERCISE
(always active)



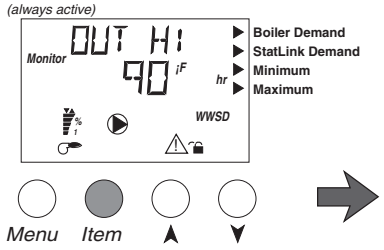
FLUSH
(always active)



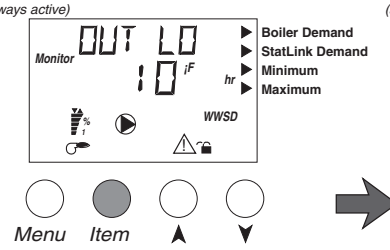
Use the ▲ and ▼ buttons to adjust setting

Monitor Menu Displays

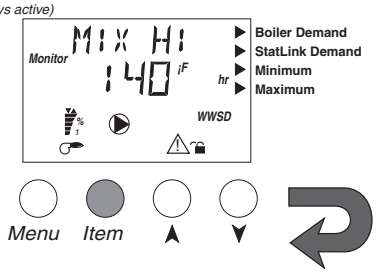
OUTDOOR TEMPERATURE HIGH
(always active)



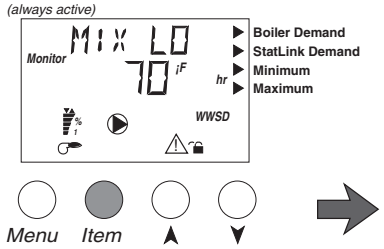
OUTDOOR TEMPERATURE LOW
(always active)



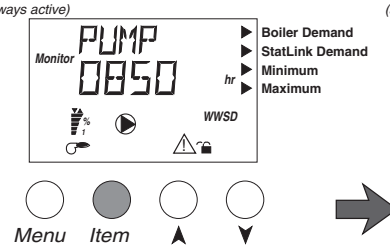
MIXED TEMPERATURE HIGH
(always active)



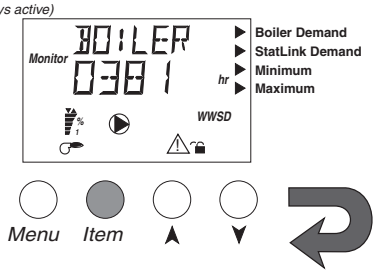
MIX TEMPERATURE LOW
(always active)



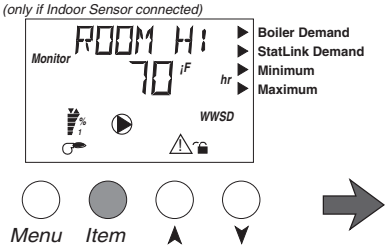
PUMP
(always active)



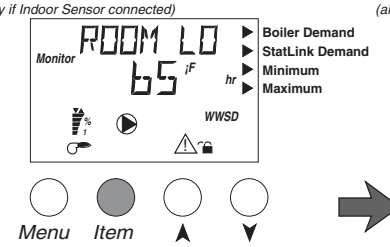
BOILER
(always active)



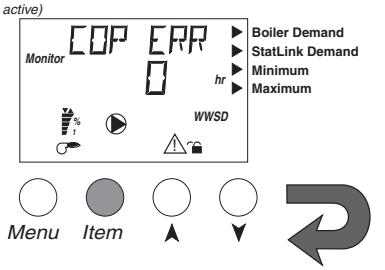
ROOM TEMPERATURE HIGH
(only if Indoor Sensor connected)



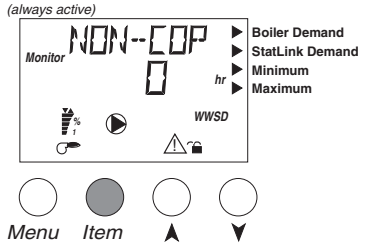
ROOM TEMPERATURE LOW
(only if Indoor Sensor connected)



COP ERR
(always active)



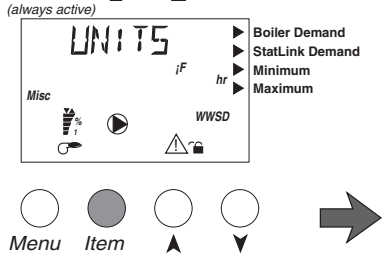
NON - COP
(always active)



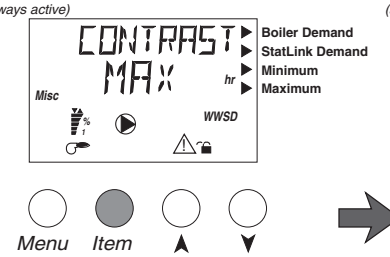
Press the ▲ and ▼ buttons simultaneously to reset value

Misc. Menu displays

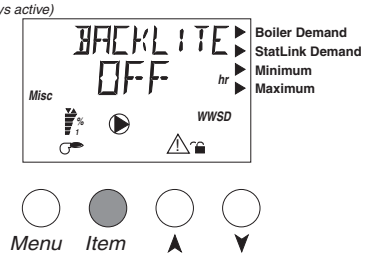
UNITS °F < > °C
(always active)



CONTRAST MIN (0) T0 MAX (3)
(always active)



BACKLITE OFF< > 30s < > ON
(always active)



Use the ▲ and ▼ buttons to adjust setting

	Modulating Output Scale Shows output of injection valve. Arrows show whether valve is opening or closing.		**Lock** Displays if control is locked or unlocked
	Pump Displays pump operation.	⚠	**Warning** Displayed when an error exists or when limit has been reached
	Burner Displayed when boiler relay is turned on	WWSD	**Warm Weather Shut Down** Displayed if control is in WWSD.

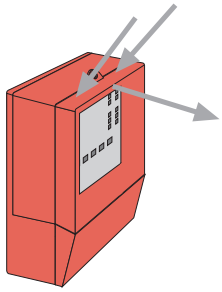
Error Displayed	Description of Error
CTRL ERR EE W	The control was unable to store a piece of information to the EEPROM. This error can be caused by a noisy power source. The control will display the error message and will continue to operate as normal. Pressing either the Menu or Item button will clear this error.
CTRL ERR ADJS	The control was unable to read a piece of information stored in the Adjust menu. Because of this, the control was required to load the factory settings into all of the items in the Adjust menu. The control will stop operation until all of the items in the Adjust menu at the control have been checked by the user.
CTRL ERR MNTR	The control was unable to read a piece of information stored in the Monitor menu. Because of this, the control was required to load the factory settings into all of the items in the Monitor menu. The control will continue to display the error message until all of the items in the Monitor menu at the control have been checked by the user.
CTRL ERR MISC	The control was unable to read a piece of information stored in the Miscellaneous menu. Because of this, the control was required to load the factory settings into all of the items in the Miscellaneous menu. The control will continue to display the error message until all of the items in the Miscellaneous menu at the control have been checked by the user.
CTRL ERR A/D	The control was unable to read a piece of information from the A/D hardware. This is the hardware that the control uses to read the sensor inputs. If this error occurs, it is an indication that the sensor wires may have been run in a noisy electrical environment. The control stops operation. To clear this error, press either the Menu or Item buttons.
OUTDOOR SHRT	The control is no longer able to read the Outdoor sensor 30070 due to a short circuit. Locate and repair the problem as described on page 22. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
OUTDOOR OPEN	The control is no longer able to read the Outdoor sensor 30070 due to an open circuit. In this case the control assumes an outdoor temperature of 32˚F (0˚C) and continues operation. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX SUP SHRT	The control is no longer able to read the Mixing sensor 30071 due to a short circuit. In this case the control will operate the mixing device at a fixed 15% of output as long as there is a Mixing Demand. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
MIX SUP OPEN	The control is no longer able to read the Mixing sensor 30071 due to an open circuit.The control stops operating. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item
Boil RET SHRT	The control is no longer able to read the Boiler sensor 30071 due to a short circuit.The control will not provide boiler return protection when error exists. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
Boil RET OPEN	The control is no longer able to read the Boiler sensor 30071 due to an open circuit. The control will not provide boiler return protection when error exists. To clear the error message from the control after the sensor has been repaired, press either the Menu or Item button.
INDR/FLOR SHRT	The control was unable to read the indoor or slab sensor due to a short circuit. The control operated on the heating curve only. The indoor sensor or slab sensor is ignored.
INDR/FLOR OPEN	The control was unable to read the indoor or slab sensor due to a open circuit. The control operated on the heating curve only. The indoor sensor or slab sensor is ignored.

Additional Troubleshooting

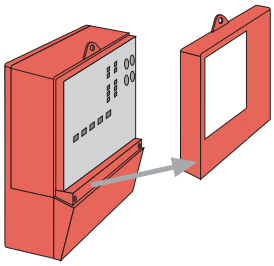
If the air temperature in the room is too cold, the control will shift the heating curve (and WWSD point) up, which raises the supply water temperature until the room warms up. If the air temperature in the room is too warm, the control will shift the heating curve (and WWSD point) down, which lowers the temperature until the room cools down. A very cool room temperature can shift the curve far enough to bring the control out of WWSD at warm outdoor temperatures. A very warm room temperature can shift the curve far enough down to put the control into WWSD at cool outdoor temperatures.

In an injection system it is important to maintain flow past the supply water sensor so that the reset control will be able to read the correct temperature and the pump will keep the water well mixed. See drawing on page two for locations of all the sensors and piping sequence. Other variations of this control can be acquired from your local HeatLink® Rep or from the three main HeatLink® offices (see back cover).

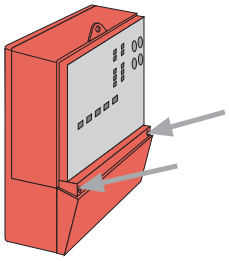
Enclosure - Assembly Instructions



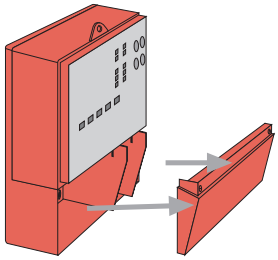
Press down on the fingertip grips on top of the front cover and pull out and down.



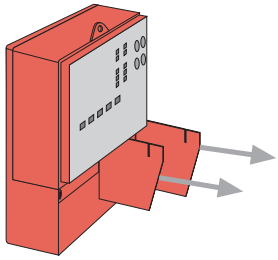
Lift the front cover up and away from the control.



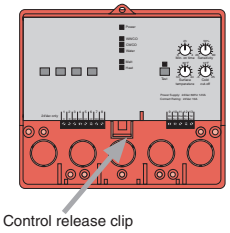
Loosen the screws at the front of the wiring cover.



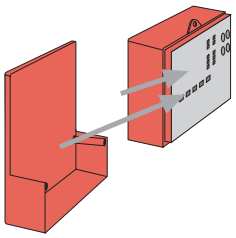
The wiring cover pulls straight out from the wiring chamber.



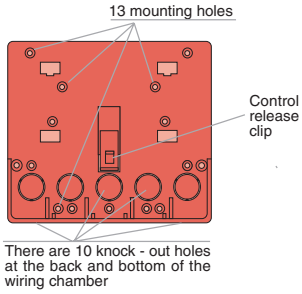
Remove the safety dividers from the wiring chamber by pulling them straight out of their grooves.



Press the control release clip on the base inside the wiring chamber and slide the control upward.



The control lifts up and away from the base.



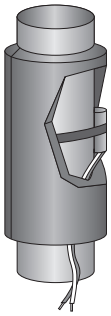
The base is ready for mounting.

Mounting the Sensor

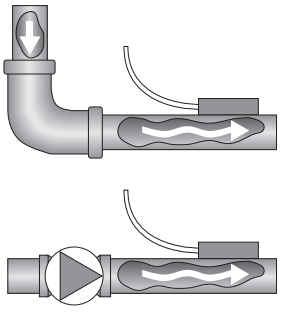
Universal Sensor 30071

Note: *this sensor is designed to mount on a pipe or in a temperature immersion well.*

The sensor can be strapped directly to the pipe using the cable tie provided. Insulation should be placed around the sensor to reduce the effect of air currents on the sensor measurement.



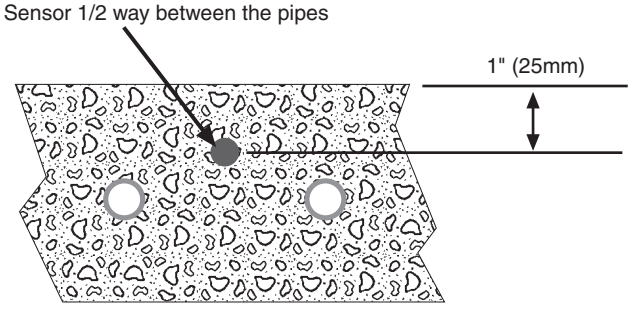
The Universal Sensor 30071 should be placed downstream of a pump or after an elbow or similar fitting. This is especially important if a large diameter pipes are used as the thermal stratification within the pipe can result in erroneous sensor readings. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor. If possible, the sensor should be placed 12" to 16" (300 to 400 mm) downstream of the pump discharge.



Slab Sensors 30072 & 30073

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

This sensor is designed to be embedded in the slab material. The sensor can also be installed an a plastic or metal conduit embedded in the slab. If there is ever a sensor failure, this allows the sensor to be removed and replaced. The sensor should be placed 1" (25mm) below the slab surface and 1/2 way between the pipes.



Indoor Sensor 30076

The Indoor Sensor 30076 includes a 10 kΩ thermistor which provides an accurate measurement of indoor temperature. The 30076 sensor can be mounted directly on the wall using two #6 - 1" screws.

Outdoor Sensor 30070

The Outdoor Sensor 30070 includes a 10 kΩ thermistor which provides an accurate measurement of the outdoor temperature. The 30070 sensor is protected by a white U.V. resistant PVC plastic enclosure.

Universal Sensor 30071

The 30071 Universal Sensor has a zinc sleeve for fast response and a wide operating range. This sensor can be used in a multitude of applications.

Slab Sensors 30072 and 30073

The Slab Sensors 30072 and 30073 have a PVC plastic sleeve which is designed for use in soils or concrete. The 30072 is supplied with 20 ft (6m) and the 30073 is supplied with 40 ft (12m) of 2 conductor cable.

Sensor Testing Instructions

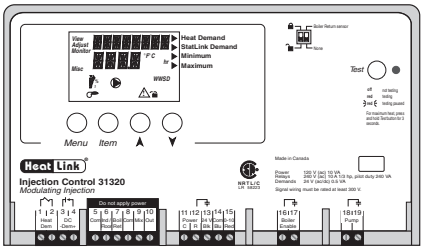
A good quality test meter capable of measuring up to 500 kΩ (1 kΩ = 1000 Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with either a good quality digital thermometer, or if a thermometer is not available a sensor can be placed alongside the one to be tested and the readings compared.
First measure the temperature using the thermometer and then measure the resistance of the sensor at the control. The wires from the sensor must not be connected to the control while the test is performed. Using the chart below, estimate the temperature measured by the sensor. The sensor and thermometer reading should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location.

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

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

Technical Data

Control	- Microprocessor PID control; This is not a safety limit control.
Packaged weight	- 3.0 lb. (1350 g), Enclosure A, red PVC plastic
Dimensions	- 6-5/8" H x 7-9/16" W x 2-13/16" D (170 x 193 x 72 mm)
Approvals	- CSA NRTL, meets DOC & FCC regulations for EMI/RFI.
Ambient condition	- Indoor use only, 32 to 122°F (0 to 50°C), < 90% RH non-condensing.
Power supply	- 24 V (ac) 10 VA (includes thermal 0 - 10V motor)
Relays	- 240 V (ac) 10 A 1/3 hp, pilot duty 240 VA
Demands: Heat	- 24 to 240 V (ac) 2 VA
DC	- Off @ 0 to 10 V (dc), On @ 15 to 35 V (dc) 0.05 W
Sensors:	- NTC thermistor, 10 kΩ @ 77°F (25°C ± 0.2°C) ß=3892
Included:	- Outdoor Sensor 30070 and Universal Sensor 30071.



This electronic control is not intended for use as a primary limit control. Other controls that are intended and certified as limit controls must be placed into the control circuit where required.

The installer must ensure that this control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise. Conversely, this Class B digital apparatus complies with Part 15 of the FCC Rules and meets all requirements of the Canadian interference-Causing Equipment Regulations. However, if this control does cause harmful interference to radio or television reception, which can be determined by turning the control off and on, the installer is encouraged to try to correct the interference by reorienting or relocating the receiving antenna, relocating the receiver with respect to this control, and/or connecting the control to a different circuit from that to which the receiver is connected.

Limited Warranty and Product Return Procedure

HeatLink® warrants to the original purchaser each HeatLink® product against defects in workmanship and materials when the product is installed and used in compliance with HeatLink's instructions. This limited warranty covers the cost of parts and labour provided by HeatLink® to correct defects in the materials and/or workmanship. Returned products that are fully operational are not considered warranty cases. HeatLink® also does not cover parts and labour to remove, transport or reinstall a defective product. HeatLink® will not be liable for any damage other than repair or replacement of the defective part or parts and such repairs or replacement shall be deemed to be the sole remedy from HeatLink®. This warranty shall not apply to any defects caused or repairs required as a result of unreasonable or negligent use, neglect, accident, improper installation, or unauthorised repair or alterations. In case of defect, malfunction or failure to conform to warranty, HeatLink® will for a warranty period of 18 months from the date of invoice to the original purchaser or 12 months from the date of installation of the product, whichever occurs first, repair, exchange or give credit for the defective product. Any express or implied warranty which the purchaser may have, including merchantability and fitness for a particular purpose, shall not extend beyond 18 months from date of invoice or 12 months from the date of installation of the product, which ever occurs first.

Replacements: HeatLink® can send replacement product if requested. All replacements are invoiced. Any possible credit for the replacement will only be issued once the replaced product has been returned to HeatLink®.

Product Return Procedure: Product that are believed to have failed must be returned to HeatLink®. When agreed to by HeatLink®. The installer or other qualified service person must, at the owners expense, determine which component has failed. The product must be returned complete with all of its components (sensors, base, etc.) Products must be returned together with the proof of purchase to the original purchaser who then returns the product to HeatLink® After receiving a returned goods authorisation (RGA) number from HeatLink®.

Please include the following information with the product: The full address of the original purchaser, the RGA number and description of the problem.

For returns in Canada or the U.S.A., please have product returned to HeatLink Group Inc., 4603E 13th Street N.E., Calgary, Alberta, Canada, T2E 6M3, Ph. 1-800-661-5332.
For returns in Ireland, please have product returned to HeatLink Ireland, Cappincur, Tullamore, Co. Offaly., Ph. 057 - 932 4062.

- If returned during the warranty period and the product is defective, HeatLink® will issue full credit for the returned product less cost of missing parts.
- If returned during the warranty period and the product is fully operational, HeatLink® will return the product to the original purchaser for a testing cost of $40.00 plus shipping.
- If returned during the warranty period and the product is not damaged and is fully operational, HeatLink® can take back the product for a return charge of 50% of the product's net value. This request has to be specified otherwise the product will be returned with a testing cost of $40.00 plus shipping.
- If returned after the warranty period and the product needs repair, HeatLink® will repair and return the product. Repair and shipping costs will be invoiced. HeatLink's repair costs are calculated at $40.00 / hour plus the cost of parts. If the repair costs will be more than $60.00 a repair estimate will be sent to the original purchaser.

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