SSIC2-0226

W30-WG1714

SPACE PAK®

SPACEPAK SYSTEM INTERFACE CONTROL

INSTALLATION, OPERATION & MAINTENANCE MANUAL

C ETL LISTED US

Intertek

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Section 1: Introduction

Product development and continuous improvement are at SpacePak's core. As such, there may be changes or modifications to products, without notice. In addition, the information and specifications presented in this document are provided as is, without guarantee or warranty of any kind, expressed or implied. For the most up-to-date information regarding our products, you may contact our Customer Service group at custservice@spacepak.com.

Unit Description

The SpacePak System Interface Control (SSIC) is an accessory designed to provide enhanced communication between indoor Heating and/or Cooling needs, up to 5 Zones, and SpacePak Inverter Air to Water Heat Pumps.

The SSIC can operate in one of two modes. Either Direct Communication where the Heat Pump is enabled and the Reversing Valve is controlled by a 24V signal, or Modbus Mode, where the SSIC communicates with one or more Air to Water Heat Pump(s) via RS485 protocol and can manage up to 20 individual Air to Water Heat Pumps for precise load matching and runtime sharing of large systems.

Standard Equipment Included: Ensure all items are accounted for before discarding the packaging

- SSIC Control Module
- Outdoor Air Temperature Sensor (OAT)
  - part number 2202-4280
- Buffer Tank Temperature Sensor
  - part number 45W55-WG0609-01
  Must order 2nd for two tank operation
- Terminating resistor
  - part number 45W09-WG1719-01
  (for use when connecting Modbus vis RS485)
- Heat Transfer Paste
  - part number 45Y08-WG1719-01

Operation

The base system has two modes of operation: Auto and Master.

- Auto: The first zone to call is treated as the master zone and the system mode will reflect the type of call (heat/cool) coming from that zone. Any calls from other zones of the opposing type will be ignored until all calls of the original type are satisfied.
- Master: The user can define a master zone that will always determine the system mode if it is calling. When the master zone is not calling, calls are treated as in Auto mode.

Any zone that is calling will be shown on the controller's LCD, showing the corresponding zone number and call type. If the call matches the current system mode, there will be a capital H or C next to the zone number. If not, the letter will be lowercase.

SYSTEM MODE:HEAT
ZONE:1H 2c 5H
OUTPUTS:B
OA: 46°F TANK:105°F

Table 1: Example screen shot.

Buffer Tank

An available option to the Spacepak Control is buffer tank control that can provide hot or cold water to the zones faster than a system without the buffer tank. Depending on the outside air temperature, the controller maintains a water temperature in the tank that can provide fast cooling or heating to any of the system's zones. An available bypass valve option can also be installed for even more control on days when zone demands do not match the predicted temperature demands based on the outside temperatures.

Buffer Tank Operation

If the buffer tank is installed and enabled in the firmware, it is treated as the master zone for the system. Any calls for hot or cold water by the buffer tank are serviced before opposite calls from the zones. Buffer tank demand is determined by:

Outside Air Temperature		System Mode
°F	°C	
< 50°F	< 10°C	Heating
> 65°F	> 18.3°C	Cooling
50°F > OAT > 65°F	10°C > OAT > 18.3°C	Idle

Table 2: Temperatures shown are default values and are adjustable.

If the system mode is IDLE, any calls from zones are serviced on a first come first served basis.

When in either BUFFER HEATING or BUFFER COOLING mode, the control will continue to call until the water temperature in the tank reaches the setpoint for that mode. Once the temperature in the buffer tank has reached its setpoint, the buffer mode switches to SATISFIED and the temperature is allowed to change by an amount determined by the DIFF (Differential) settings (default 2° for HI and 6° for LO for heating, 6° for HI and 2° for LO for cooling), after which point the heating/cooling will again work to satisfy the buffer demand.

There are 2 potential sources for heating depending on how each system is set up (boiler or heatpump) so there are 2 different set points for heating (160°F and 120°F [71.1°C and 48.9°C]). Setpoints can be adjusted in the buffer tank setpoints menu as shown later in this document. If the buffer tank option is used an OAT and buffer tank sensor are both required regardless of operating mode.

System Mode	Buffer Tank Temperature		Buffer Mode
	°F	°C	
Heating	<160°F	<71.1°C	Heating
	>160°F	>71.1°C	Satisfied
Cooling	>48°F	>8.9°C	Cooling
	<48°F	<8.9°C	Satisfied

Table 3: Temperatures shown are default boiler values and are adjustable.

Buffer Bypass

The buffer tank may be bypassed with the installation of bypass valves (see example piping diagrams later in the document). If conditions allow the buffer tank demand to remain IDLE there is no need to maintain a temperature in the tank. Calls would be serviced directly from the heatpump or boiler instead, saving energy by not having to heat up the water in the tank.

Buffer Override

Buffer override allows the buffer tank demand to be overridden if the right conditions are met. If the buffer tank's temperature demand has been satisfied and there is a call for the opposite mode from the system and there are no other zone calls, the buffer tank can be overridden so the zone may be satisfied directly from the sources. For the buffer override feature to work the system must have bypass valves installed (shown in plumbing diagram) and the Buffer Bypass and Buffer Override must be enabled on the controller.

Note: If bypass valves are not installed and enabled the system will never service calls from zones that oppose the buffer tank's calls even if the buffer tank is satisfied. For example, if the OAT is below 50°F(10°C) (default) any cool calls from zones will not be serviced.

Dual Buffer Tank

Version 1.8 and later of the SSIC firmware offers support for dual buffer tank control, with supply from heatpumps controlled by a valve. Bypass and override features are not available when using the dual buffer tank feature. Control of each buffer tank is the same as normal, each having their own set of setpoints accessible in the Buffer Tank menu. Tank 1 always has priority and will override Tank 2's demands.

ThinWall Control

If a Spacepak ThinWall unit is installed in a zone, the control needs to be configured to accommodate it. The ThinWall fan coil unit has one control output and uses the OAT to predict if the zone needs heating or cooling. Each zone with a ThinWall unit must have ThinWall control enabled from the ThinWall menu on the SSIC to properly set the heating or cooling mode as necessary. In addition to an enable for each zone, the user can set the OAT switchover, hysteresis, and a control timeout for systems with a mix of ThinWall and non-ThinWall units.

ThinWall inputs must be connected to the W terminal of the appropriate zone to operate. The control will not recognize anything connected to Y if ThinWall is enabled for that zone.

Modbus Connected Heatpumps

Firmware version V1.8 and later offer the ability to communicate with up to 20 Modbus connected heatpump units via RS-485. Supported heatpump units include HP0275, ILAHP, SIM036, SIM060, CC32-18/-40/-60, and HT454B-04/-60. Once set up, the SSIC will automatically handle heating and cooling with the added features of advanced communication and staging. Staging of heatpump units is based on runtime, which is calculated and stored in the SSIC. This feature is only available when using a buffer tank. See heatpump unit documentation for wiring of communication lines.

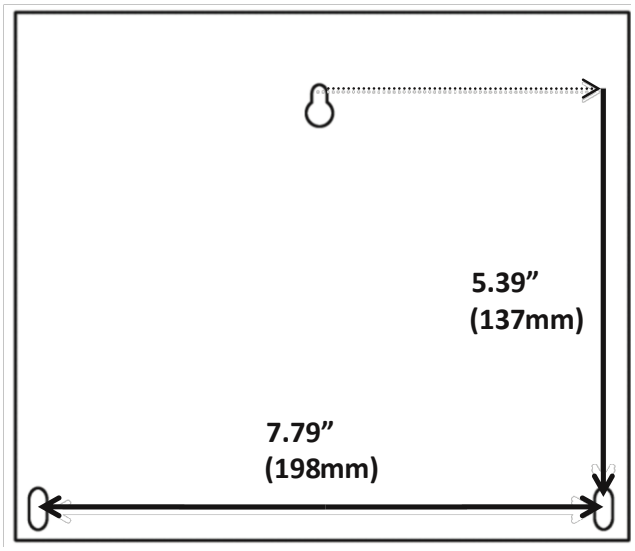
Section 2: Installation

Mounting

SSIC Mount the control box in a dry indoor location that has easy wiring access from the air handler(s), and the outside heatpump.

There are three hole locations for mounting the SSIC (see below).

1. Use a #8 wood screw and corresponding wall anchor to mount the SSIC. Secure wood screw into anchor leaving 3/16" (5mm) between screw head and the wall. Hook the unit and slide into place.
2. Remove lower front panel. Use two #5 wood screws in the bottom hole locations to secure the unit to the wall.



Wiring

⚠WARNING **Electrical shock hazard** - Disconnect all electrical power before wiring the unit.

1. Remove the lower access panel to gain access to the wire terminals.
2. Pass the wires from the Air Handlers, Pump, Heatpump, etc. through the grommets at the bottom of the unit and plug into their corresponding connector (see below or for more detailed information see the wire diagram on page 6)
3. When all wiring between the air handlers, pumps, and heatpumps is completed, connect the power.
4. When connecting 115V, connect the line (hot) wire to L; connect the neutral wire to N, and connect the ground wire (bare copper or green) to G.

Outdoor Air Temperature Sensor

• Avoid areas subject to excessive vibration, electrical noise, direct sunlight, or the effects of radiant heat.
• Keep electrical wiring as short as possible to minimize temperature error.

Buffer Tank Temperature Sensor

1. Coat sensing bulb liberally with heat transfer paste. (SpacePak part number 45Y09-WG1719-01. Supplied in box)
2. Insert sensor into well of the buffer tank.
3. Slide plastic locknut over the lead and hand tighten only onto the threads of the bulb well.
4. Route lead back to the heatpump and connect to terminals X+Y (as indicated in the heatpump IOM).

Modbus Wiring

1. Shielded communication cables with at least 3 conducting wires should be used for optimal communication. Shielding should be attached to earth ground only.
2. When using Modbus communication, connect the 120 ohm Terminating Resistor, SpacePak part number 45Y08-WG1719-01, supplied in box, between the RS485 A and B terminals of the last, or only, heat pump in the circuit.
3. For control boards marked Rev. 1.3 or earlier, place an additional 120 ohm resistor between terminals A2 & B2 of the COM2 plug. For those marked 1.4 or later, move the DIP switch marked HP to the ON position.

SSIC Terminal Blocks

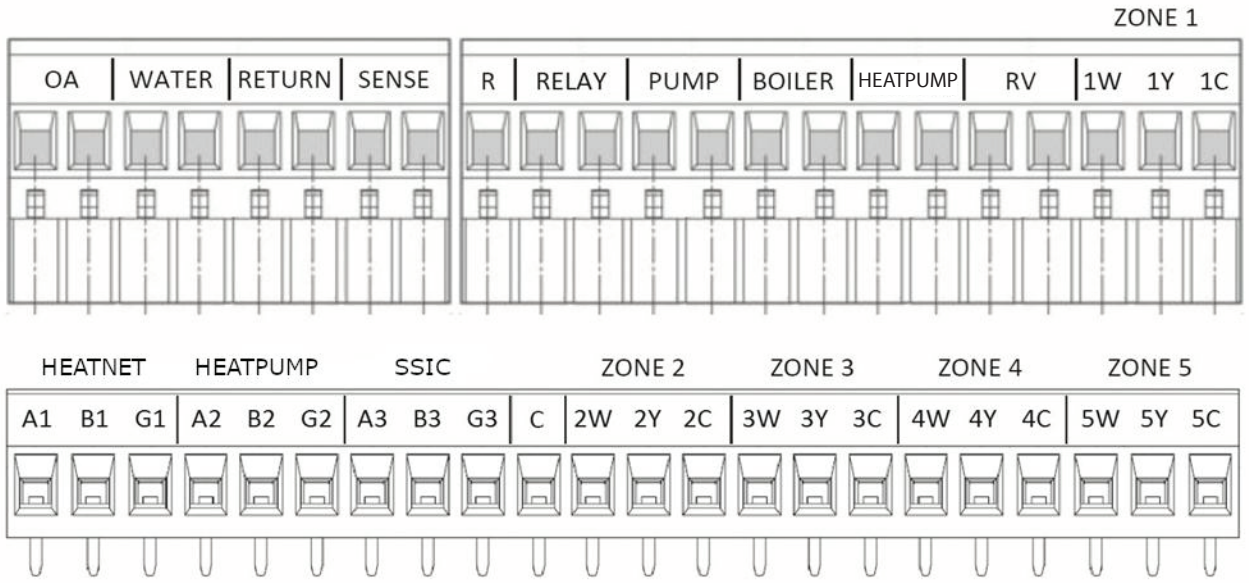


Figure 1: Wiring Connectors

OA	Outdoor Air Temperature Sensor (included)	ZONE X	Connection from Zone X (1-5) Air Handler
WATER	Buffer Tank 1 Temperature Sensor (included)	XW	24VAC Heating Signal from Air Handler
RETURN	Return Water Temperature (For future consideration, not currently used)	XY	24VAC Cooling Signal from Air Handler
SENSE	Buffer Tank 2 Temperature Sensor	XC	Ground from Air Handler
R	24VAC	HEATNET	RS485 communication to Heat Net (for future consideration, not currently used)
RELAY	Relay contact to enable the bypass valves or other dedicated load.	HEATPUMP	RS485 communication to Solstice Heat Pump(s)
PUMP	Enable signal for a Secondary circulator (buffer tank to emitters) in the system. Do not use for the Primary (heat pump to buffer tank) circulator.	SSIC	General RS485 communication (for future consideration, not currently used)
BOILER	Relay contact to enable the Boiler.	C	24VAC Common
HEATPUMP	Relay contact to enable the Heat Pump.		
RV	Relay contact to energize the Reversing Valve.		

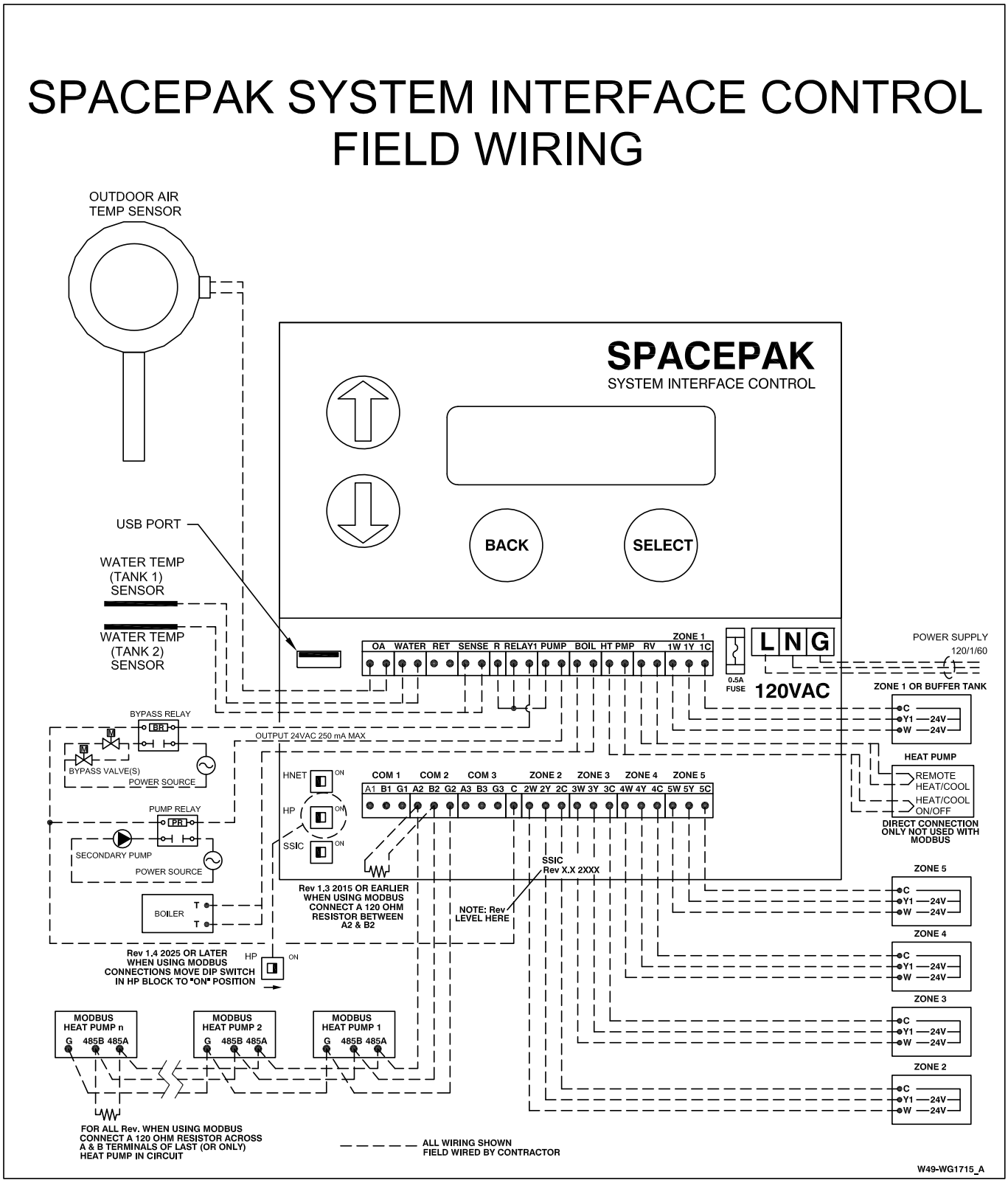


Figure 2: Example system wiring diagram.

Buffer Tank Bypass

Buffer Tank Bypass is a function available within the SSIC that allows a hydronic system to store thermal energy in the form of heated or chilled water. The Heat Pump simultaneously reverses cycle to satisfy a temporary demand that is the opposite of the prevailing operating mode (i.e., a cooling call when the system is operating in heating mode, or a heating call when the system is operating in cooling mode)

Four Pipe Buffer Tank

This is the most common buffer tank installation. The primary loop is routed through one side of the buffer tank, the secondary loop through the other. When the Bypass feature is engaged, each of the four three-way valves transfers, isolating the buffer tank and creating two runaround paths linking the Heat Pump directly to the emitters.

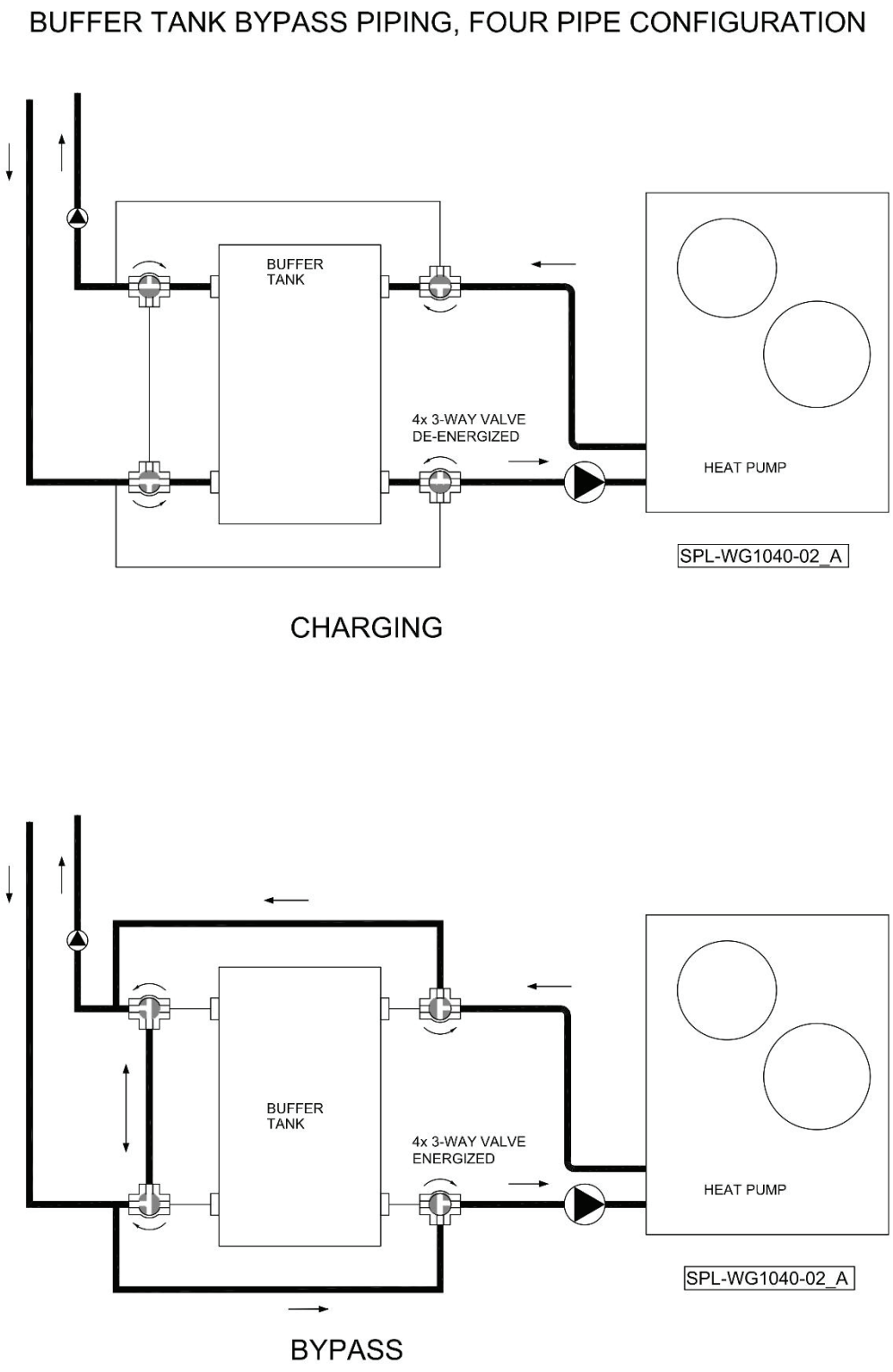
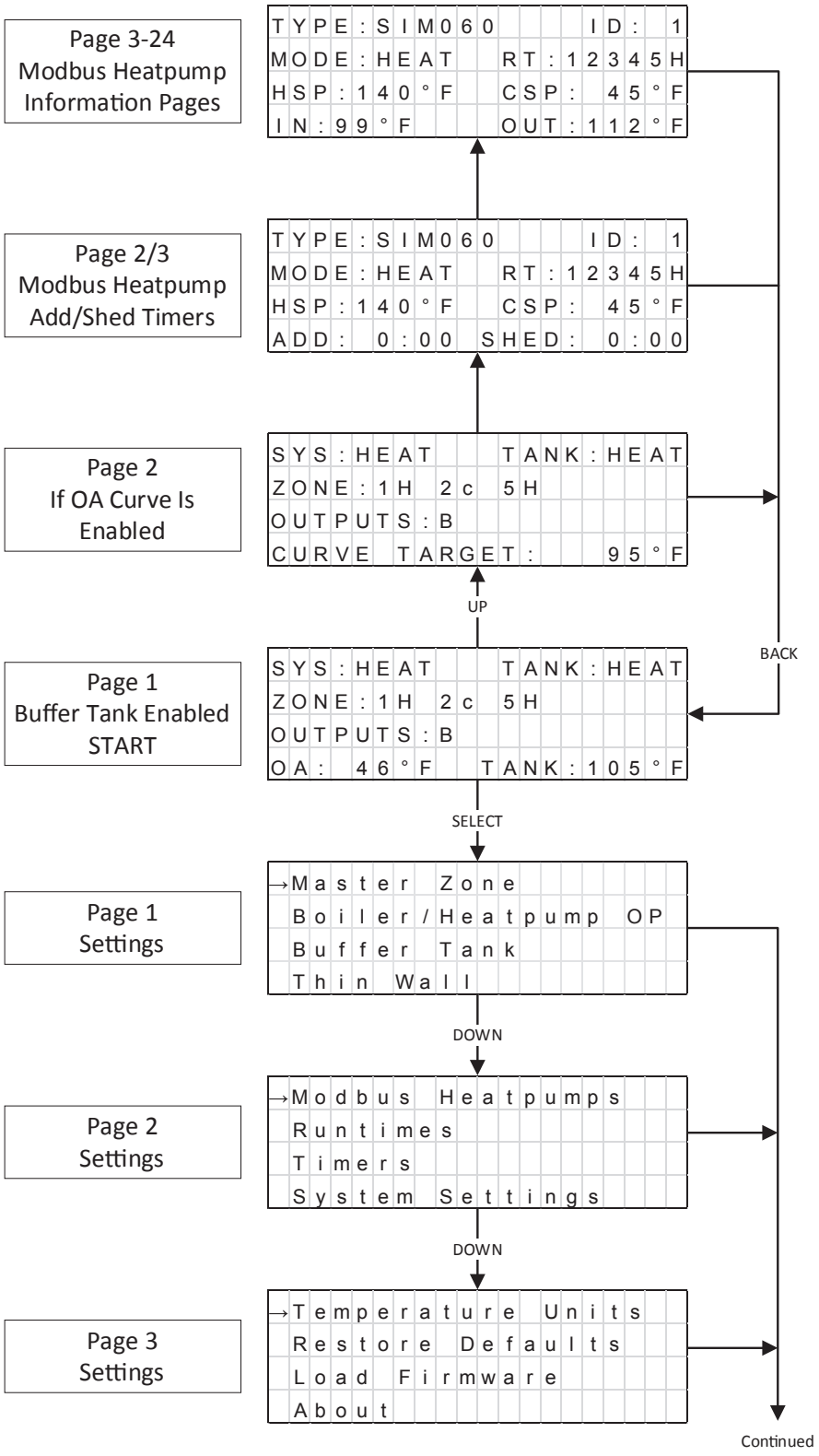
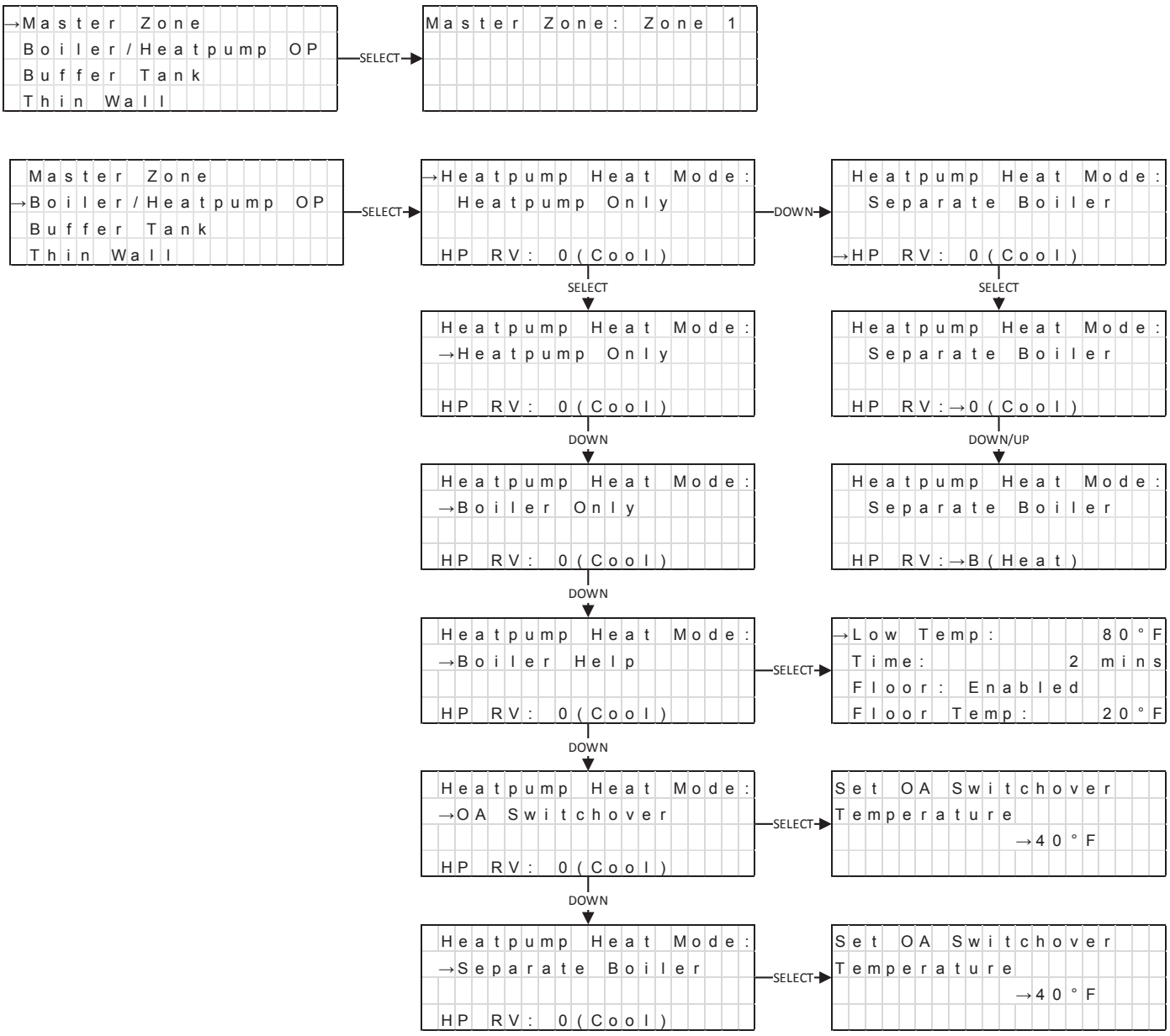


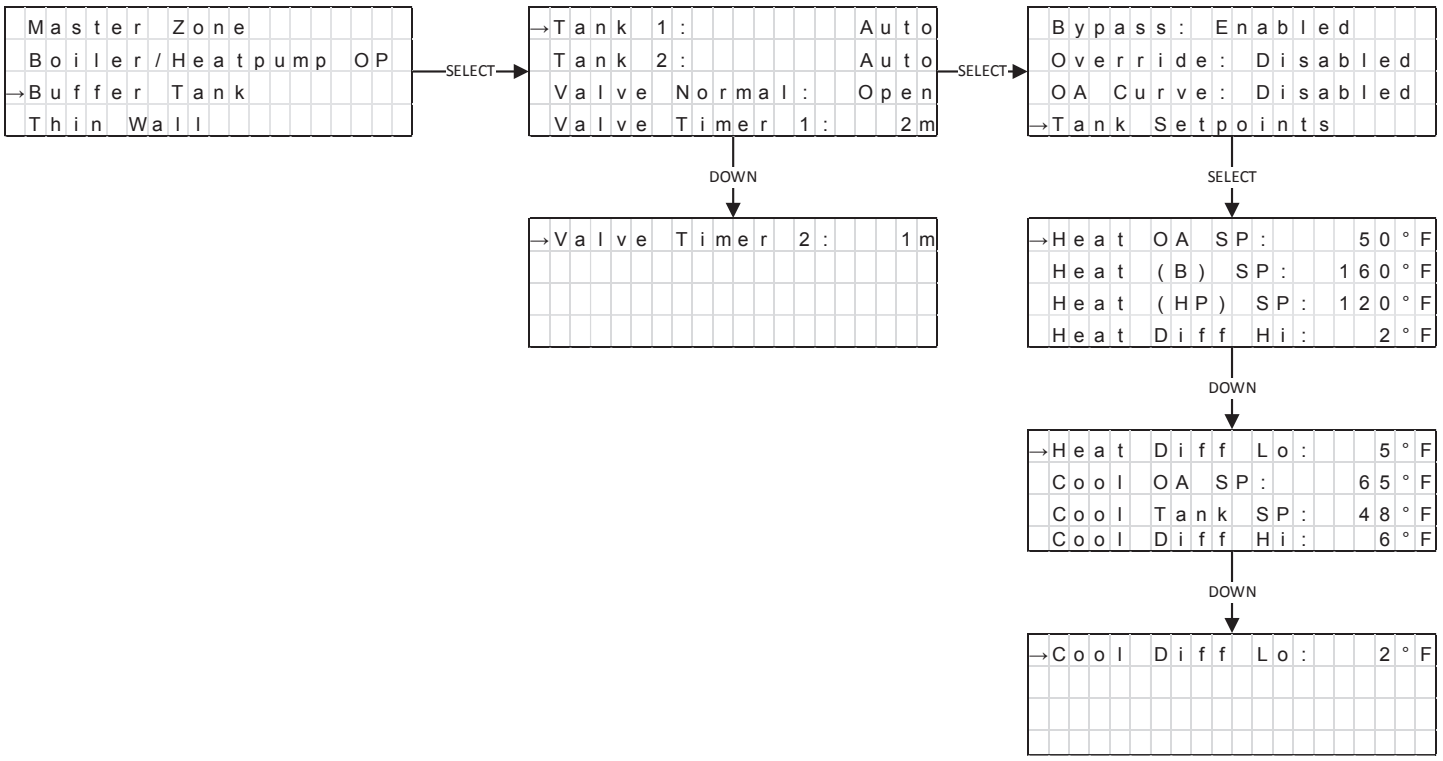
Figure 3: Four Pipe Buffer Tank

Figure 4: Hybrid Piped Buffer Tank

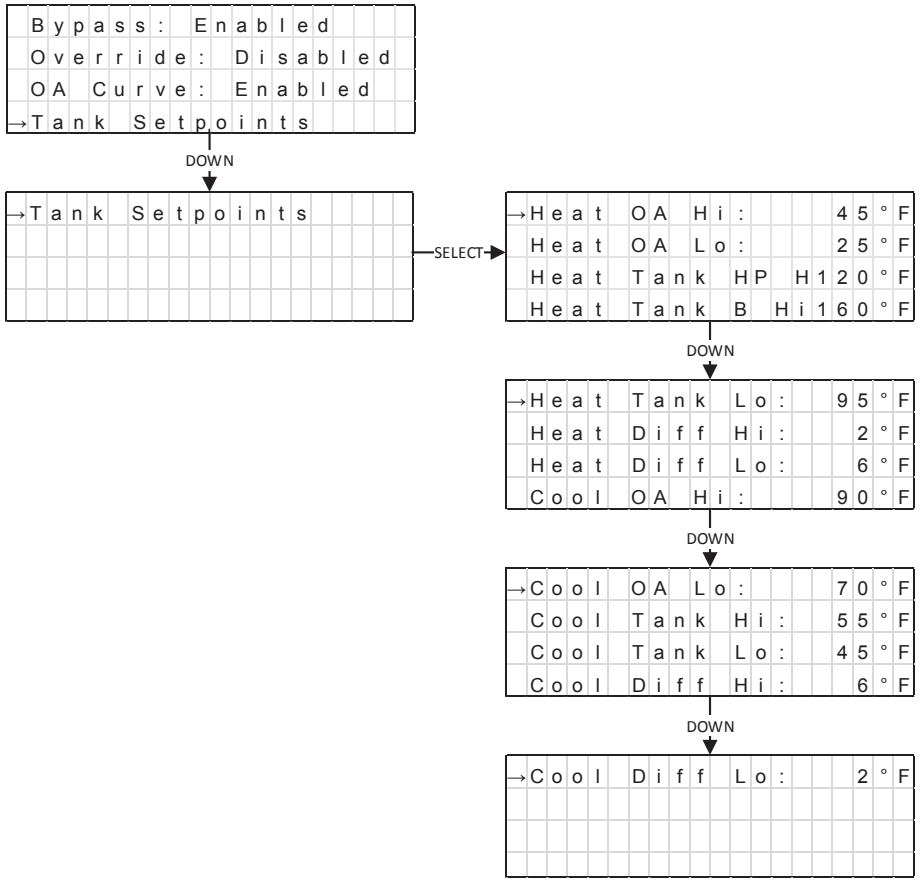
Section 3: SSIC Menu Tree

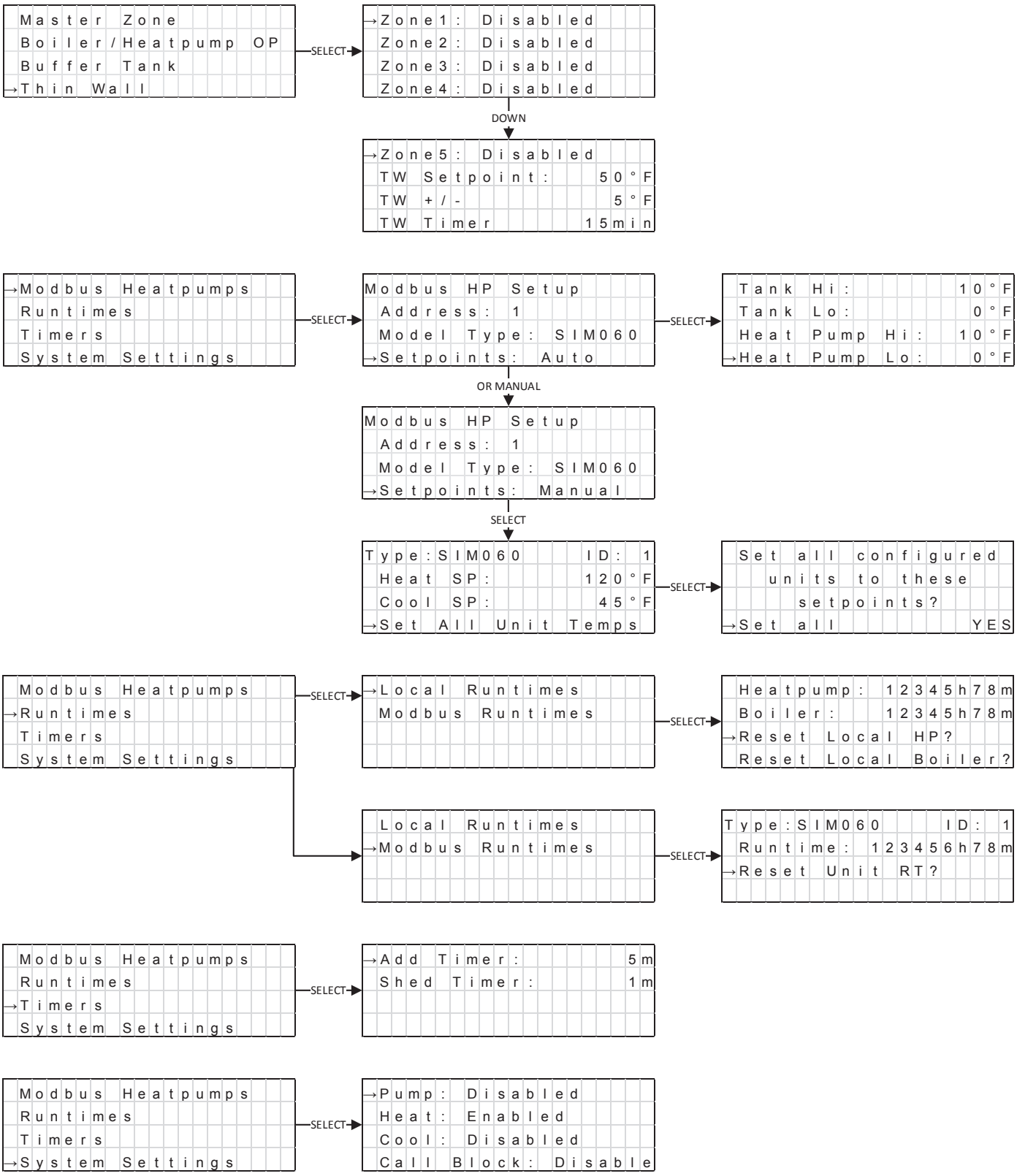


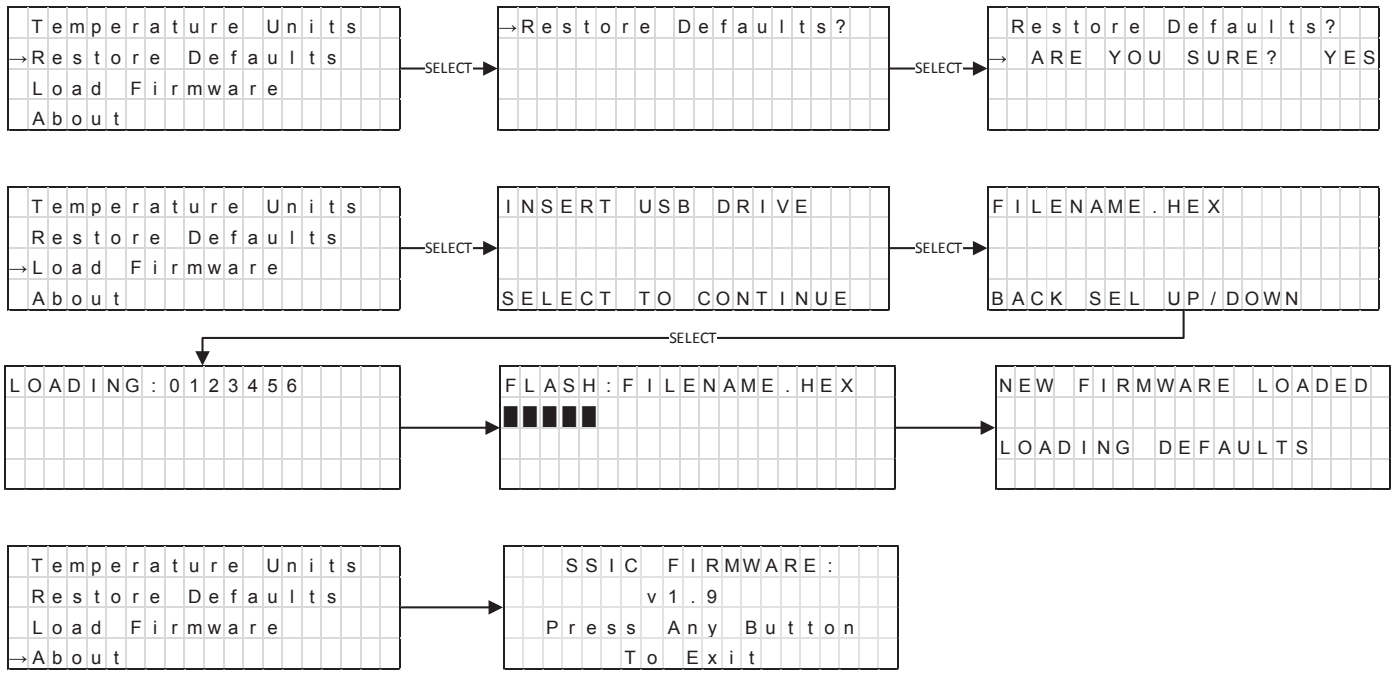

→Master Zone
Boiler/Heatpump OP
Buffer Tank
Thin Wall
SELECT
Master Zone: Zone 1
Master Zone
→Boiler/Heatpump OP
Buffer Tank
Thin Wall
SELECT
→Heatpump Heat Mode:
Heatpump Only
HP RV: 0(Cool)
DOWN
Heatpump Heat Mode:
Separate Boiler
→HP RV: 0(Cool)
SELECT
SELECT
Heatpump Heat Mode:
→Heatpump Only
HP RV: 0(Cool)
Heatpump Heat Mode:
Separate Boiler
HP RV:→0(Cool)
DOWN
DOWN/UP
Heatpump Heat Mode:
→Boiler Only
HP RV: 0(Cool)
Heatpump Heat Mode:
Separate Boiler
HP RV:→B(Heat)
DOWN
Heatpump Heat Mode:
→Boiler Help
HP RV: 0(Cool)
SELECT
→Low Temp: 80°F
Time: 2 mins
Floor: Enabled
Floor Temp: 20°F
DOWN
Heatpump Heat Mode:
→OA Switchover
HP RV: 0(Cool)
SELECT
Set OA Switchover
Temperature
→40°F
DOWN
Heatpump Heat Mode:
→Separate Boiler
HP RV: 0(Cool)
SELECT
Set OA Switchover
Temperature
→40°F



Tank setpoints when OA Curve is enabled




Master Zone
Boiler/Heatpump OP
Buffer Tank
→Thin Wall
SELECT
→Zone1: Disabled
Zone2: Disabled
Zone3: Disabled
Zone4: Disabled
DOWN
→Zone5: Disabled
TW Setpoint: 50°F
TW +/- 5°F
TW Timer 15min
→Modbus Heatpumps
Runtimes
Timers
System Settings
SELECT
Modbus HP Setup
Address: 1
Model Type: SIM060
→Setpoints: Auto
SELECT
Tank Hi: 10°F
Tank Lo: 0°F
Heat Pump Hi: 10°F
→Heat Pump Lo: 0°F
OR MANUAL
Modbus HP Setup
Address: 1
Model Type: SIM060
→Setpoints: Manual
SELECT
Type:SIM060 ID: 1
Heat SP: 120°F
Cool SP: 45°F
→Set All Unit Temps
SELECT
Set all configured
units to these
setpoints?
→Set all YES
Modbus Heatpumps
→Runtimes
Timers
System Settings
SELECT
→Local Runtimes
Modbus Runtimes
SELECT
Heatpump: 12345h78m
Boiler: 12345h78m
→Reset Local HP?
Reset Local Boiler?
Local Runtimes
→Modbus Runtimes
SELECT
Type:SIM060 ID: 1
Runtime: 123456h78m
→Reset Unit RT?
Modbus Heatpumps
Runtimes
→Timers
System Settings
SELECT
→Add Timer: 5m
Shed Timer: 1m
Modbus Heatpumps
Runtimes
Timers
→System Settings
SELECT
→Pump: Disabled
Heat: Enabled
Cool: Disabled
Call Block: Disable


Temperature Units
→Restore Defaults
Load Firmware
About
SELECT
→Restore Defaults?
SELECT
Restore Defaults?
→ ARE YOU SURE? YES
Temperature Units
Restore Defaults
→Load Firmware
About
SELECT
INSERT USB DRIVE
SELECT TO CONTINUE
SELECT
FILENAME.HEX
BACK SEL UP/DOWN
SELECT
LOADING:0123456
FLASH:FILENAME.HEX
NEW FIRMWARE LOADED
LOADING DEFAULTS
Temperature Units
Restore Defaults
Load Firmware
→About
SSIC FIRMWARE:
v1.9
Press Any Button
To Exit

Section 4: Operation

Control Logic (Firmware V1.94)

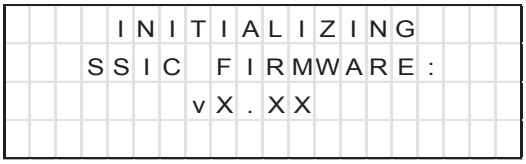
The following sections outline how the SSIC can be configured using the menus that appear on its display. Menus are navigated using the UP, DOWN, BACK, and SELECT keys on the keypad.

The user navigates to the setting they want to change by using the UP and DOWN keys. Pressing SELECT will move the cursor in front of the selectable options. Pressing the UP and DOWN keys will change the state from disabled to enabled or vice versa. Pressing the SELECT key saves the setting and pressing BACK will revert to its original setting. While navigating the main screen pressing BACK at any time will return to page 1 where applicable.

In an ongoing effort to provide the customer with the best performance possible, SpacePak may make minor upgrades to the SSIC operating software at any time.

These changes may provide additional functionality to the device, but will never remove any features, and are often transparent to the user. Therefore, this document may not require updating with every change. It is current at the time of publishing but may not reflect the most recent software version.

Your software version can be seen in the Startup Screen immediately after powering up the device. This will remain visible for a few seconds before proceeding to the Home Screen. Alternately, for units with v1.8 or later, scroll down to the bottom of the screen menu and the ABOUT screen. The installed software version is visible here.



If you would like to see if there are any notes related specifically to your device's software version or learn if there are later versions that you may download and install, you can view the QR code below and follow the link to the list of software revisions, effective dates, and description of the change. You can also select the option to download the software, which can be loaded onto a portable USB drive and installed in the SSIC. Instructions are provided in the **Load Firmware** section of this manual.

Note: Upgrading the firmware can be done at your discretion. It is not mandatory, and your choice to do so or not will not affect your service and support, or the warranty coverage on the SSIC.

SCAN QR CODE

Main Screen – No Buffer Tank

This is the display screen that shows the status of the system. The UP, DOWN, and BACK keys have no function in this setup.

```
SYSTEM MODE:HEAT
ZONE:1H 2c 5H
OUTPUTS:B
OA: 46°F TANK:N/A
```

Figure 5: Main screen when the buffer tank option is disabled. Zone 2's call is being ignored by the system.

SYSTEM MODE*:* The general operation of the entire system. If the system is sending no outputs, then the system mode will display 'IDLE'. If the system is cooling then the system mode will display 'COOL', and if it is heating, then 'HEAT' will be displayed.

ZONE CALLS*:* All zone calls are displayed here with their corresponding call type. Calls that match the current system mode show as a capital letter, conflicting calls show a lower case letter.

OUTPUTS*:* The systems outputs to the boiler, heatpump, and pump are here. Each output is represented by the following:

B: Boiler
HP: Heatpump
RV: Heatpump Reversing Valve
P: Pump
BY: Bypass valves

TEMPERATURES*:* Shows the outside air and water temperatures. The fourth line will also show if there is a sensor error detected.

Main Screen – Buffer Tank

When the buffer tank is enabled, the main screen also shows the buffer mode and the tank's temperature.

```
SYS:HEAT TANK:HEAT
ZONE:1H 2c 5H
OUTPUTS:B
OA: 46°F TANK:105°F
```

Figure 6: Main screen Page 1 when the buffer tank is enabled.

If OA Curve is enabled pushing the UP arrow once while on Page 1 will show the curve target temperature on Page 2. Pushing DOWN or BACK will bring the screen back to Page 1.

```
SYS:HEAT TANK:HEAT
ZONE:1H 2c 5H
OUTPUTS:B
CURVE TARGET: 95°F
```

Figure 7: Main screen Page 2 when OA Curve is enabled.

Main Screen – Modbus Heatpumps

When Modbus Heatpumps are enabled configured, each will have an information page on the main screen of the SSIC, accessible by pushing UP (starting on Page 4 if OA Curve is enabled, Page 3 otherwise). Page 2 or 3 shows Add and Shed timers depending on OA curve settings. Temperature setpoints and Mode all show current status from the heatpump, runtime is calculated internally on the SSIC. Any faults or errors with each heatpump would show on the 4th line of this screen and should be addressed by a technician.

```
TYPE:SIM060 ID: 1
MODE:HEAT RT:12345H
HSP:140°F CSP: 45°F
IN:99°F OUT:112°F
```

Figure 8: Example Modbus Heatpump information page.

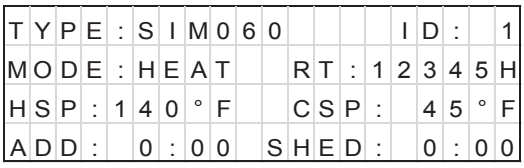


Figure 9: Modbus Heatpump Add/Shed Timers.

TYPE: The type of heatpump configured at that address.

ID: The address of the unit (1-20). ID must match the address on the unit.

MODE: The current mode of the unit.

RT: Runtime of the unit, calculated by the SSIC.

HSP: Heat set point.

CSP: Cool set point.

IN: Inlet water temperature.

OUT: Outlet water temperature.

Settings Menu

The following sections will explain in detail each of the configuration settings.

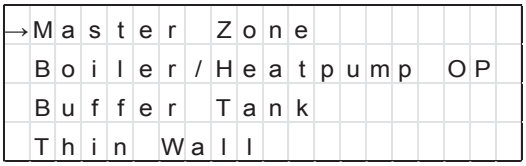


Figure 10: Settings Page 1.

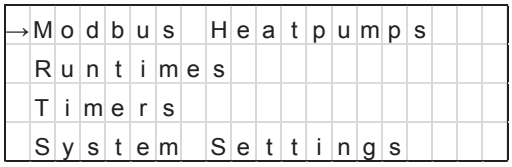


Figure 11: Settings Page 2

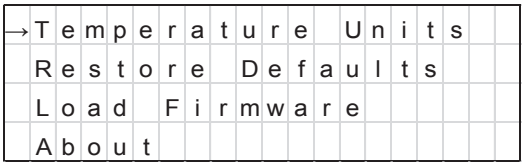


Figure 12: Settings Page 3.

Master Zone

Setting the master zone determines what zone call takes priority.

Auto: First zone to call governs the mode of the system (heating or cooling). It stays in this mode until all zones making the same call have been satisfied.

Zones 1 – 5: The chosen zone acts as the master and governs the mode of the system. If the master zone is not calling then the other zones can have their calls satisfied.

The master zone is only settable by the user if the buffer tank is disabled. See the description in the introduction for more details.

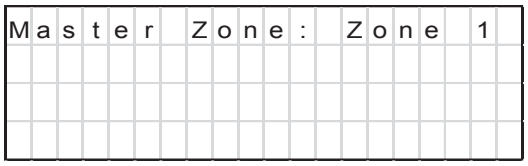


Figure 13: Master Zone.

Boiler/Heatpump OP

This menu allows the user to configure the system's heating operation.

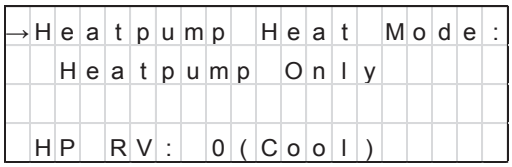


Figure 14: Boiler/Heatpump OP Menu.

Heatpump Only Mode

The boiler is not used and only the heatpump is used to supply heating and cooling. The heatpump's heating and cooling operation is governed by how the RV is energized which is user configured.

Required Sensors: OA and buffer tank if buffer tank is enabled, none otherwise.

Boiler Only Mode

The heatpump is never used for heating, and only the boiler supplies the heat. The heatpump's cooling outputs are based on the RV configuration.

Required Sensors: OA and buffer tank if buffer tank is enabled, none otherwise.

Boiler Help

Boiler Help uses both the Boiler and the Heatpump to provide heat when the system load is too much for heatpumps alone to handle. When heat is called for all available heatpumps are turned on to provide the hot water. If the water temperature has not risen to the low temperature setpoint (80°F [26.7°C] default) within the defined time period (2 minutes default), the boiler enable is turned on to assist and remains on until the heat call is satisfied or the Boiler Help Shutoff setpoint is reached, depending on settings. When a buffer tank is actively being managed (not in the OA deadband) the boiler enable will shut off according to buffer tank temperature settings (Heat (B) SP – Heat Diff Lo for the tank to be Satisfied). If there is no buffer tank or the OA is in the deadband the boiler enable will shut off at the Boiler Help Shutoff setpoint. BH Shutoff is available in firmware versions 1.92 and up.

An OA temperature floor can also be enabled (it is disabled by default) that will immediately switch to the Boiler as a source if the OAT is below the setpoint (20°F [-6.7°C] by default). If the floor option is disabled, the 4th line on the display will be blank. As of firmware version 1.92 the OA Floor settings are in a submenu as shown below.

If multiple Modbus heatpumps are enabled and configured in the system all heatpumps will attempt to satisfy the heat demand before the boiler will be enabled to help. The floor option should not be used in this instance.

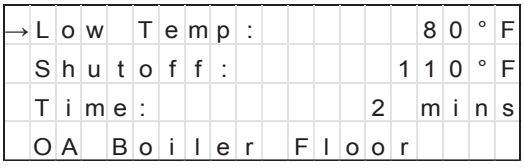


Figure 15: Boiler Help settings.

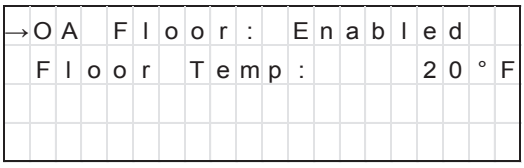


Figure 16: OA Floor settings.

Required Sensors: Buffer, OA

Outdoor Air (OA) Switch Over

OA switchover will change the heat source between the heatpump and boiler depending on the outside air temperature. If the OAT is below or equal to the setpoint (40°F [4.4°C] default) the boiler will provide the hot water, above the setpoint the heatpump will provide the heat.

Required Sensors: OA and buffer tank if buffer tank is enabled, OA otherwise.

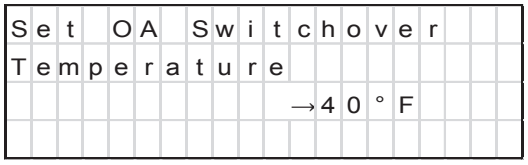


Figure 17: OA Switchover Settings.

Separate Boiler

If the system has a boiler feeding directly into the serviced loop and bypassing a buffer tank the Separate Boiler option can be enabled. The system will maintain a buffer tank as explained in the buffer tank sections of this document using the heatpump as the source until the OAT drops to or below the setpoint (40°F [4.4°C] default). Once below that SP the boiler services any calls for heat, while the heatpump would still service any calls for cool. Zones are serviced on a first come first served basis. Buffer override and buffer bypass are disabled until the OAT rises above the SP. When the OAT is below the setpoint and there is a call for heat, the system pump is disabled regardless of the pump setting.

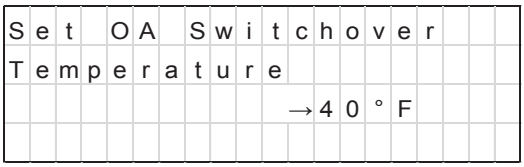


Figure 18: Separate Boiler Settings.

Required Sensors: OA and buffer tank if buffer tank is enabled, OA otherwise.

Heatpump RV

The user can change the heatpump's reversing valve to be energized in either Cooling (O) or Heating (B) operation depending on system requirements.

Buffer Tank

All buffer tank options can be found here, including enables, disables, and temperature settings.

When the buffer tank option is disabled, no other menu options appear on the buffer tank menu.

Figure 19: Buffer Tank 1 disabled.

Tank 1 and Tank 2 have 4 run modes:

- Auto: Buffer tank heat and cool settings are determined by the OAT as shown in Tables 2 and 3.
- Heat Only: Buffer tank will only run in heating mode, following the OAT settings in Table 2.
- Cool Only: Buffer tank will only run in cooling mode, following the OAT settings in Table 2.
- DHW: Buffer tank only runs in heating mode and only maintains the buffer tank according to the buffer tank setpoint. Does not use the OAT.

Once Tank 1 is enabled, the Tank 2 line option is enabled.

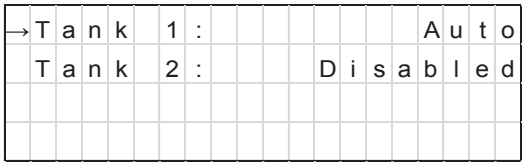


Figure 20: Tank 1 and Tank 2 options. Default shown.

With Tank 2 enabled, more options become available for controlling the valve that switches between the tanks.

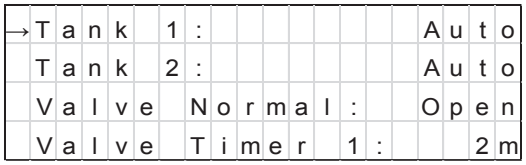


Figure 21: Valve options. Defaults shown.

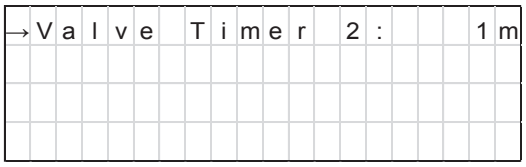


Figure 22: Valve options continued.

Once the Tank 1 option has been enabled, the Bypass option is shown. Default is enabled. In this case the buffer tank can be used but there are no bypass or override functions available. The buffer tank is always treated as the master and conflicting calls are never serviced.

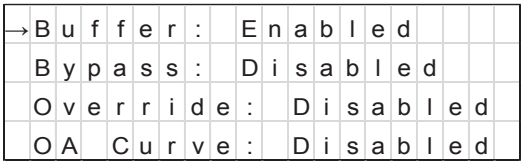


Figure 23: Buffer enabled; bypass disabled (Default).

If the bypass is enabled but override is disabled, the energy saving features of the buffer tank bypass will function but the buffer tank is always treated as the master and conflicting calls are never serviced.

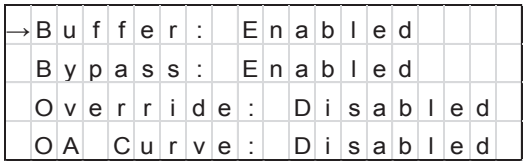


Figure 24: Buffer and bypass enabled, override disabled.

Enabling the bypass and the override opens all options for the buffer tank.

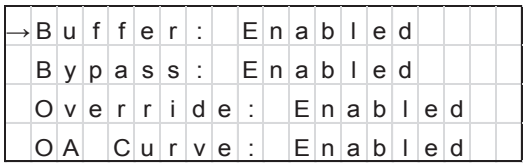


Figure 25: All buffer tank options enabled.

Using a buffer tank always requires the use of a buffer tank sensor and OA sensor regardless of Boiler/Heatpump OP settings.

OA Curve

An Outdoor Reset curve is available for use with a Buffer Tank. This feature will change the buffer tank setpoint depending on the OAT. It may only be enabled when the buffer tank option is enabled.

OA curve heating example: if the OAT < Heat OA Lo, the tank setpoint will be either Heat Tank B or C (depending upon op mode) Hi. If the OAT > Heat OA Hi, the tank setpoint will be Heat Tank Lo. If the OAT is between those setpoints, the tank setpoint will scale linearly between the Hi and Lo setpoints.

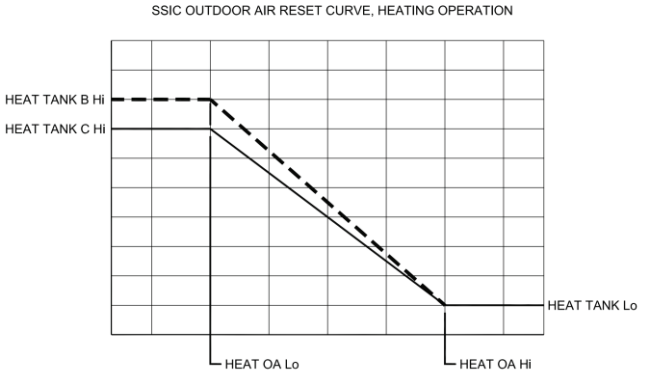


Figure 26: Example heat curve

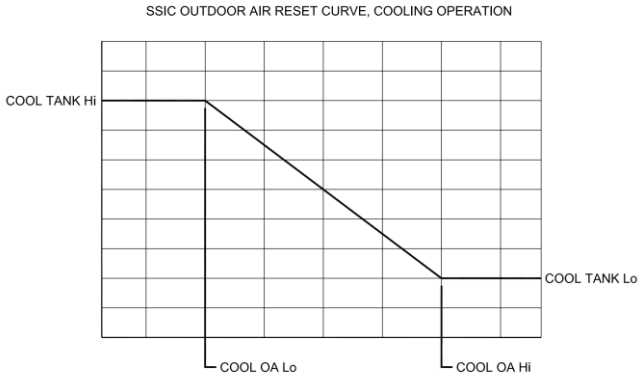


Figure 27: Example cool curve

Tank Setpoints

Temperature setpoints for the buffer tank can be found on the second page of the buffer options. Pressing the UP or DOWN arrow off the page will scroll to the next page.

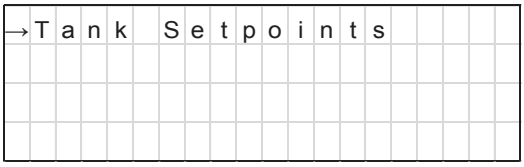


Figure 28: Buffer option menu continued.

If the OA Curve is disabled the options will be as follows:

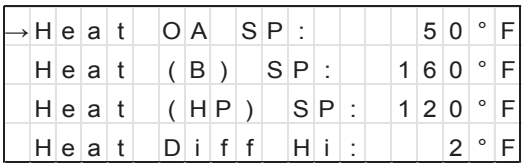


Figure 29: Tank setpoints page 1. Default values shown.

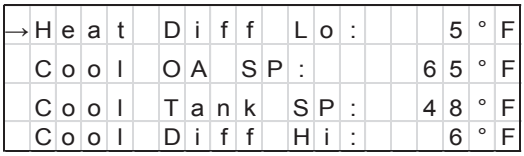


Figure 30: Tank setpoints page 2. Default values shown.

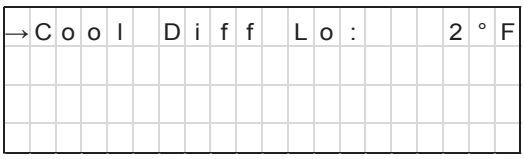


Figure 31: Tank setpoints page 3. Default values shown.

If the OA Curve option is enabled the options will show as follows:

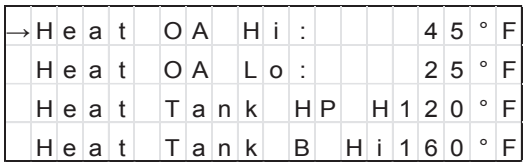


Figure 32: OA Curve setpoints page 1. Default values shown.

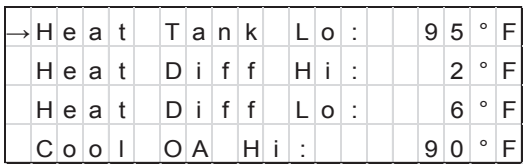


Figure 33: OA Curve setpoints page 2. Default values shown.

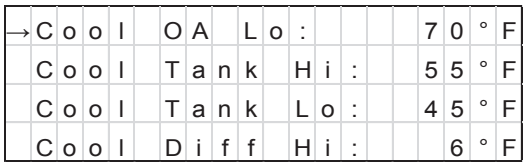


Figure 34: OA Curve setpoints page 3. Default values shown.

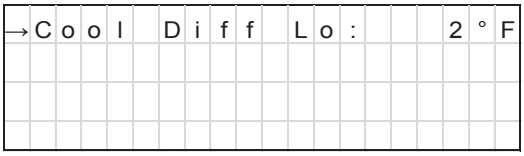


Figure 35: OA Curve setpoints page 3. Default values shown.

Dual Tank

Dual Tank features the ability to supply 2 buffer tanks in whichever mode is desired, switched by a valve with setup shown in Figure 21 and 22. Tank 1 is always the priority and will override Tank 2 demand so the system should be setup appropriately. Bypass and override features are no longer available when using Dual tank. OA Curve operates the same as described above.

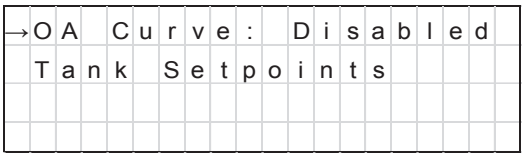


Figure 36: Tank 2 options. Defaults shown.

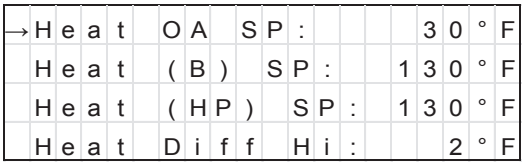


Figure 37: Tank 2 setpoints page 1. Defaults shown.

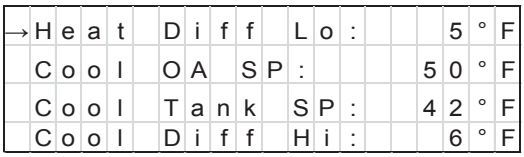


Figure 38: Tank 2 setpoints page 2. Defaults shown.

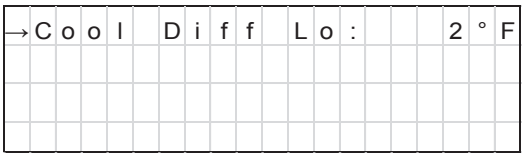


Figure 39: Tank 2 setpoints page 3. Defaults shown.

Dual Tank Operation

Buffer tank operation is largely the same as described above. Tank 1 will work to achieve its setpoint based on whatever mode is chosen. Once Tank 1 temperature has passed the setpoint and enters the SHED state, Tank 2 will be allowed to begin operation. The sequence of events is as follows:

1. Sources that were servicing Tank 1 are turned off.
2. Valve timer 1 starts to allow time for the heatpump to turn off (2 min default).
3. Once valve timer 1 expires, the valve will activate (based on the setting in the Tank 2 menu) and valve timer 2 starts.
4. Once valve timer 2 expires, sources will begin turning on to satisfy tank 2.

While valve timer 1 and valve timer 2 are counting down, the main screen will show the time remaining in the upper right corner.

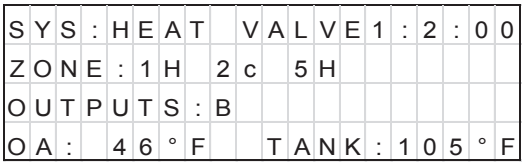


Figure 40: Example screen showing the Valve 1 timer.

ThinWall

ThinWall unit settings can be found here. Enable any zone that has a ThinWall fan coil unit. Set the desired OAT switchover temperature and the hysteresis. Then set the timer.

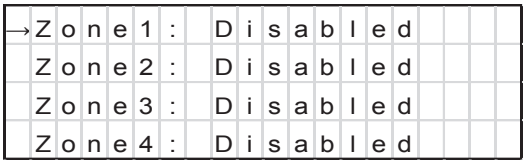


Figure 41: ThinWall settings page 1. Default values shown.

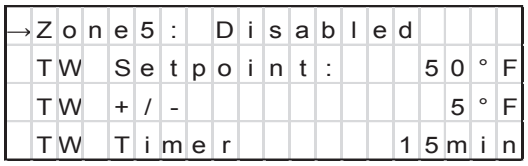


Figure 42: ThinWall settings page 2. Default values shown.

When the ThinWall unit's internal thermostat sends a call to the SSIC, the SSIC checks the OAT. If the OAT is above the setpoint, the system will call for cool; below the setpoint, it will call for heat. Once the OAT reaches the setpoint +/- the hysteresis setpoint, the call will switch to the opposite type.

Example using default settings: OAT is 40°F (4.4°C) when the zone calls. Heat is provided. OAT rises to 55°F (12.8°C), system switches to cooling.

The timer is provided for installations that have 1 or more zones with a ThinWall unit and 1 or more standard fan control units. If all zones are idle and a TW zone calls first, the TW zone will set the system mode. If a standard zone calls for the opposite mode while the TW zone is actively calling, the timer will start. The TW mode will continue to be serviced until the timer expires. The system then switches over to service the standard zone. Normal operation resumes from this point.

The timer can be disabled by setting the value to 0 minutes. If all zones are TW zones, this setting can be ignored.

Modbus Heatpumps

Modbus Heatpump settings can be found here. Use this menu to set up address (1-20), unit type, and heat and cool setpoints if desired. The address must be set using each heatpump unit's interface before adding to the SSIC. See heatpump documentation for more details on setting the address.

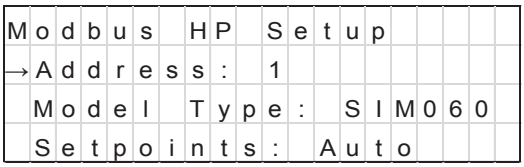


Figure 43: First page of the Modbus Heatpump Setup menu, SIM060 at address 1 shown as example.

Setpoints can be either be set automatically, set for all heatpumps at once, or adjusted for each heatpump individually. The automatic setting can be used in most cases and works in a similar fashion to outdoor reset; the further away the tank temperature is to its target, the higher the heatpump setpoints are.

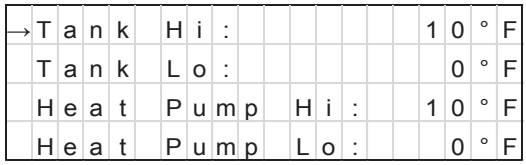


Figure 44: Auto setpoint default settings.

For example, with the default settings, if the tank temperature is more than 10°F (-12.2°C) away from its target temperature, the heatpump will be set at 10°F (-12.2°C) higher/lower than the tank's target temperature and is scaled between setpoints if below the Tank Hi setpoint.

NOTE: Temperatures displaying on the SSIC may be rounded or truncated due to unit conversion between Modbus connected units and the SSIC.

Alternately, the temperatures can be set manually for either all units at once or for each individual unit.

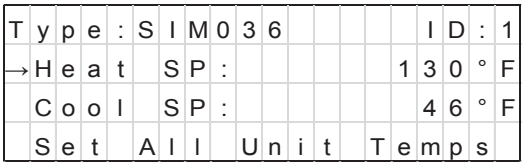


Figure 45: Setting heat and cool setpoints on Unit 1 manually.

Choose the unit ID from the first page in the Modbus HP Setup menu (Figure 34), then set the setpoints as desired. To use those setpoints for every connected unit select Set All Unit Temps on line 4, then select Set all on the next page to confirm.

Modbus Staging

Having multiple Modbus configured heatpumps in the system allows for the SSIC to choose which unit to turn on given current conditions, as well as stage the heatpumps to provide more heating or cooling as necessary.

Status reads from the heatpumps tell the SSIC if anything is preventing the unit from providing heating or cooling, such as if the unit is defrosting or if there are other faults or errors. The SSIC would then attempt to turn on a different unit while the condition on the first unit is cleared. Any errors or status conditions may be found on the unit's information page on the main screen.

For available units, staging is done primarily by lowest runtime (see Runtimes section for details). Once a unit is confirmed by the SSIC to be running, the Add Timer (see Timers section) is started. Once the Add Timer has counted down to 0 the next lowest runtime available unit is added. This process repeats until either the demand is satisfied or all units are on.

Once the demand is satisfied, the units are shed based on the highest runtime. The Shed Timer is started once the first unit is removed. When that timer has counted down to 0 the next highest runtime unit is turned off.

If the buffer tank temperature reaches Heat Setpoint + Heat Diff Hi or Cool Setpoint – Heat Diff Lo all units are turned off immediately.

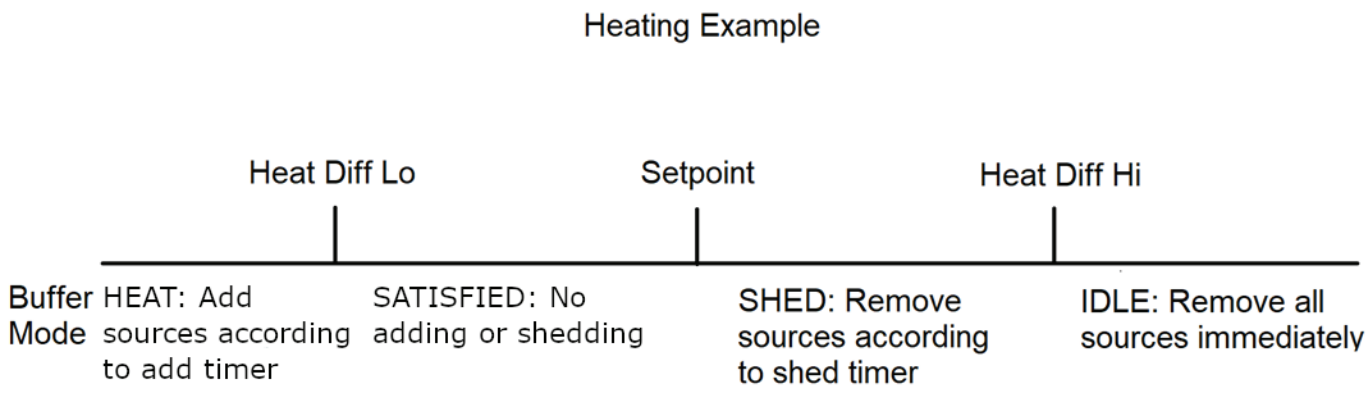


Figure 46: Heating Example showing what happens at different temperatures. Cooling follows the same logic but instead adding cooling sources at high temps and removing all sources at Cool Diff Lo.

Runtimes

The SSIC calculates and stores runtimes, both with locally connected heatpumps and Modbus connected units. Resets can be performed from this menu by selecting the Reset menu option and confirming the reset on the next window. Change Modbus unit address with the up and down arrow keys to view each configured unit.

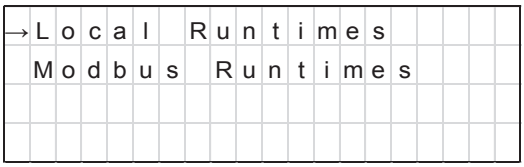


Figure 47: Runtime Menu.

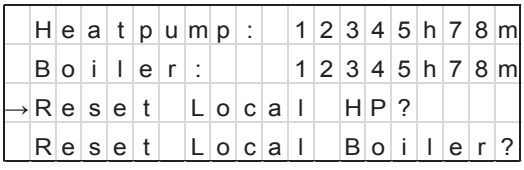


Figure 48: Local Runtime Menu.

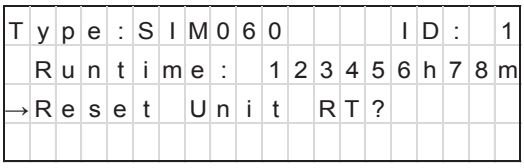


Figure 49: Modbus Runtime Menu.

Timers

Add and Shed timers for Modbus connected units can be found and changed here. Timers are only used with Modbus connected units.

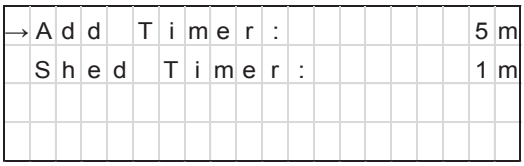


Figure 50: Timer menu. Default values shown.

System Settings

The user can enable or disable any of the following settings outlined below.

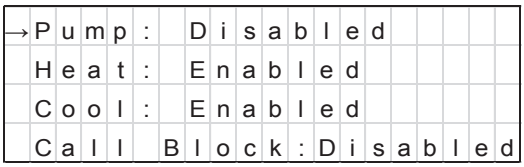


Figure 51: System settings. Defaults shown.

Pump*:* Disable or enable the system pump. If enabled, the system pump will activate alongside any serviceable zone call.

Heat*:* Disable or enable heating operations. When disabled, all heating calls are ignored, and no heating outputs are generated. When enabled, all heating operations function as normal.

Cool*:* Disable or enable cooling operations. When disabled, all cooling calls are ignored, and no cooling outputs are generated. When enabled, all cooling operations function as normal.

Call Block*:* Enable or disable off season calls regardless of any other system settings. Only available in Buffer Tank Mode. For example, if the OAT < Heat OA SP, any cool calls will be blocked.

Temperature Units

Select the units in which the temperature is displayed. Pressing the SELECT key will move the cursor in front the units. The user can use the UP or DOWN keys to select either Fahrenheit or Celsius. Pressing SELECT will save the setting, and pressing BACK will restore it to its previous value.

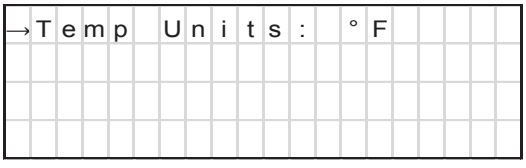


Figure 52: Temperature unit selection.

Restore Defaults

This setting allows the user to restore all settings to the factory defaults. Press SELECT to restore default values. Use UP and DOWN to change your answer and SELECT to confirm.

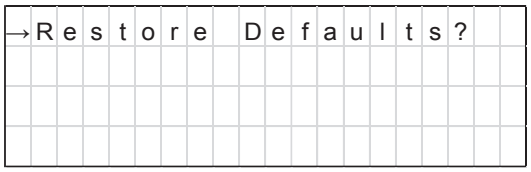


Figure 53: Restore defaults menu.

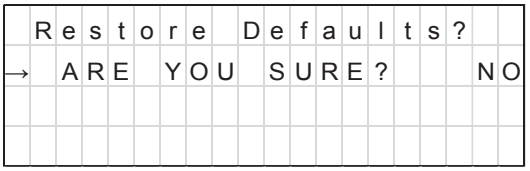


Figure 54: Restore defaults confirmation.

Load Firmware

This setting walks the user through the process of updating new firmware into the control via a USB drive. USB drives must contain a directory called “firmware” and have the .hex file in this directory. USB drives must be formatted as FAT32 for firmware loading to work. Contact Mestek support for a pre-configured drive, or format a clean USB drive if so desired.

1. With the control powered on, press SELECT and scroll down to the menu option “Load Firmware” as shown in the menu tree in Section 3.

2. The user will be prompted to insert their USB drive into the USB terminal.

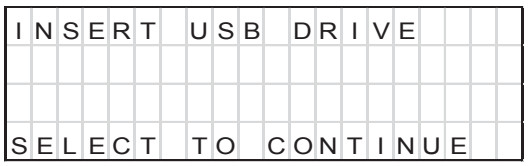


Figure 55: Update firmware first screen.

3. Once the USB drive is in place and the user hits the SELECT key, a brief “PLEASE WAIT…” response will be displayed. After a brief wait, the user will be prompted to select the firmware .hex file they wish to load. Use the UP and DOWN keys to navigate to the file if there is more than one file, press the SELECT key to select the file, and the BACK key to abort.

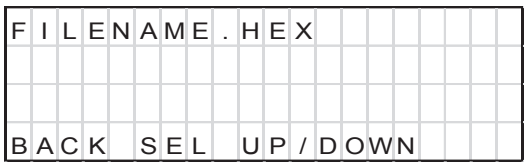


Figure 56: Update firmware second screen.

If no USB drive is detected or it is not the correct format, the following will be displayed:

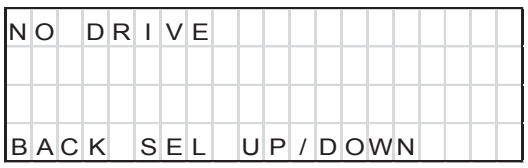


Figure 57: Update firmware no drive.

If no firmware is found or there is no “firmware” directory, the following will be displayed:

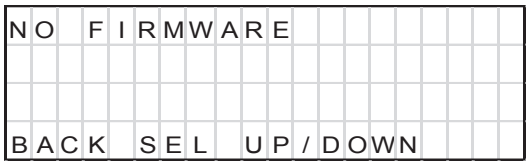
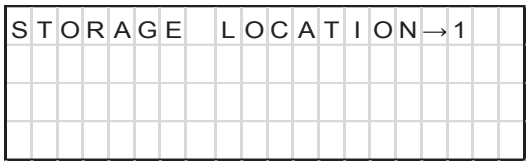


Figure 58: Update firmware no firmware.

4. After selecting the file, the user may be asked to select the storage location. If prompted, select storage location 1. This screen is skipped when updating from version 1.2 or later.



4. A loading screen will appear with a number that increases quickly, indicating the process of the file data transfer. After it is complete, a “SAVING FILE” message will appear.

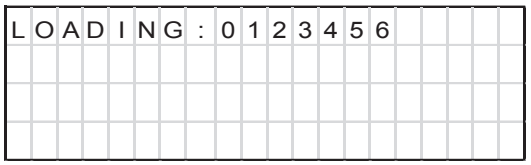


Figure 59: Loading screen.

5. The “UPDATE ON REBOOT” screen asks the user if they would like to commit to the firmware they just loaded. Pressing the UP or DOWN keys will cycle between the ‘Yes’ and ‘No’ options. If ‘YES’ is selected then the firmware will be loaded into flash and the control will reboot with the new firmware. If ‘NO’ is selected then the new firmware will not be loaded and the user will be returned to the menu screen. This screen is skipped when updating from version 1.2 or later.

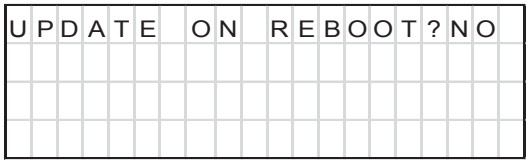


Figure 60: Reboot option.

6. A flash screen will appear with a loading bar indicating the progress of the flash process.

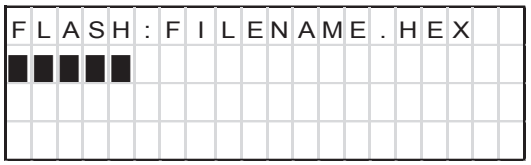


Figure 61: Flashing.

7. After the flash process completes a message will appear indicating that the new firmware has been loaded. The control will then reboot itself with the new firmware. All the settings will return to their defaults.

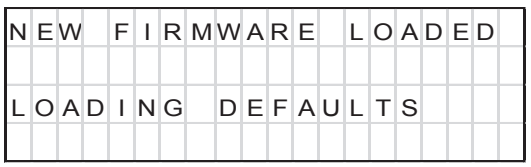


Figure 62: Firmware loaded.

About

Shows firmware build version.

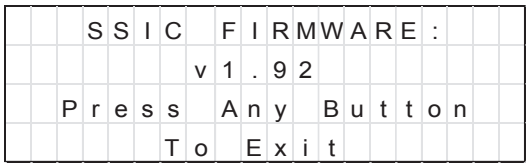


Figure 63: Firmware version.

Section 5: Variable Descriptions and Defaults

Section	Name	Description	Default Value	Max Value	Min Value
Boiler Help	Low Temp	Boiler will help the heatpump provide heat if the heatpump has not been able to raise the temperature above this value. When using Boiler Help and Outdoor Reset, be sure the Boiler Help Low Temp is below the Hot Tank Low value.	80°F 26.7°C	140°F 60°C	40°F 4.4°C
	Time	Time limit for the boiler to start assisting the heatpump provide heat	2 min	100 min	0 min
	Boiler Help Shutoff	Boiler enable will turn off at this water/tank temperature depending on settings	110°F 43.3°C	140°F 60°C	40°F 4.4°C
	OA Floor	In Boiler Help mode boiler will turn on immediately if the OA is below this OA temperature	20°F -6.7°C	80°F 26.7°C	0°F -17.8°C
OA Switchover	Temp	Outside air temperature value where the system will switch the heat source	40°F 4.4°C	200°F 93.3°C	-10°F -23.3°C
OA Switchover – Separate Boiler	Temp	Outside air temperature value where the system will switch the heat source	40°F 4.4°C	200°F 93.3°C	-10°F -23.3°C
Buffer Tank 1	Buffer Enable	Enables/disables the buffer tank option	Enabled	N/A	N/A
	Bypass Enable	Enables/disables the bypass valves	Disabled	N/A	N/A
	Override Enable	Enables/disables the override function	Disabled	N/A	N/A
	Heat OA SP	Buffer tank starts calling for heat if the outside air is below this value	50°F 10°C	70°F 21.1°C	20°F -6.7°C
	Heat (B) SP	Water temperature target for the buffer tank when the boiler is the heat source	160°F 71.1°C	180°F 82.2°C	50°F 10°C
	Heat (HP) SP	Water temperature target for the buffer tank when the heatpump is the heat source	120°F 48.9°C	140°F 60°C	50°F 10°C
	Heat Diff Hi	Upper limit of the target heat band above setpoint	2°	20°	0°
	Heat Diff Lo	Lower limit of the target heat band below setpoint	5°	20°	0°
	Cool OA SP	Buffer tank starts calling for cool if the outside air is above this value	65°F 18.3°C	80°F 26.7°C	-20°F -28.9°C

	Cool Tank SP	Water temperature target for the buffer tank in cooling mode.	42°F 5.6°C	80°F 26.7°C	35°F 1.7°C
	Cool Diff Hi	Upper limit of the target heat band above setpoint	6°F -14.4°C	20°F -6.7°C	0°F -17.8°C
	Cool Diff Lo	Lower limit of the target heat band below setpoint	2°	20°	0°
Buffer Tank 2	Buffer Enable	Enables/disables the buffer tank option	Disabled	N/A	N/A
	Bypass Enable	Enables/disables the bypass valves	Disabled	N/A	N/A
	Override Enable	Enables/disables the override function	Disabled	N/A	N/A
	Heat OA SP	Buffer tank starts calling for heat if the outside air is below this value	30°F -1.1°C	70°F 21.1°C	20°F -6.7°C
	Heat (B) SP	Water temperature target for the buffer tank when the boiler is the heat source	160°F 71.1°C	180°F 82.2°C	50°F 10°C
	Heat (HP) SP	Water temperature target for the buffer tank when the heatpump is the heat source	120°F 48.9°C	140°F 60°C	50°F 10°C
	Heat Diff Hi	Upper limit of the target heat band above setpoint	2°	20°	0°
	Heat Diff Lo	Lower limit of the target heat band below setpoint	5°	20°	0°
	Cool OA SP	Buffer tank starts calling for cool if the outside air is above this value	50°F 10°C	80°F 26.7°C	-20°F -28.9°C
	Cool Tank SP	Water temperature target for the buffer tank in cooling mode.	42°F 5.6°C	70°F 21.1°C	35°F 1.7°
	Cool Diff Hi	Upper limit of the target heat band above setpoint	6°F -14.4°C	20°F -6.7°C	0°F -17.8°C
	Cool Diff Lo	Lower limit of the target heat band below setpoint	2°	20°	0°

Section	Name	Description	Default Value	Max Value	Min Value
DHW	Heat (B) SP	Water temperature target for the buffer tank when the boiler is the heat source	130°F 54.4°C	160°F 71.1°C	50°F 10°
	Heat (HP) SP	Water temperature target for the buffer tank when the heatpump is the heat source	130°F 54.4°	140°F 60°C	50°F 10°C
	Heat Diff Hi	Upper limit of the target heat band above setpoint	2°	20°	0°
	Heat Diff Lo	Lower limit of the target heat band below setpoint	5°	20°	0°
OA Curve	Heat OA Hi	High OA heat setpoint used for determining OA Curve	45°F 7.2°C	80°F 26.7°C	Heat OA Lo
	Heat OA Lo	Low OA heat setpoint used for determining OA Curve	25°F -3.9°C	Heat OA Hi	-10°F -23.3°C
	Heat Tank HP Hi	High heat tank setpoint for the OA Curve, Heatpump source	120°F 48.9°C	140°F 60°C	Heat Tank Lo
	Heat Tank B Hi	High heat tank setpoint for the OA Curve, Boiler source	160°F 71.1°C	180°F 82.2°C	Heat Tank Lo
	Heat Tank Lo	Low heat tank setpoint for the OA Curve	95°F 35°C	140°F 60°C	86°F 30°C
	Heat Diff Hi	Upper limit of the target heat band above setpoint	2°	20°	0°
	Heat Diff Lo	Lower limit of the target heat band below setpoint	5°	20°	0°
	Cool OA Hi	High OA cool setpoint used for determining OA Curve	90°F 32.2°C	110°F 43.3°C	Cool OA Lo
	Cool OA Lo	Low OA cool setpoint used for determining OA Curve	70°F 21.1°C	Cool OA Hi	60°F 15.6°C
	Cool Tank Hi	High cool tank setpoint for the OA Curve	55°F 12.8°C	70°F 21.1°C	45°F 7.2°C
	Cool Tank Lo	Low cool tank setpoint for the OA Curve	45°F 7.2°C	Cool Tank Hi	45°F 7.2°C

Section	Name	Description	Default Value	Max Value	Min Value
	Cool Diff	After reaching the SP the system will allow the temperature to rise by this value before cooling begins again	6°F -14.4°C	20°F -6.7°C	0°F -17.8°C
Thin Wall	Zone 1-5 Enables	Enables Thin Wall control for each zone	Disabled	N/A	N/A
	TW Setpoint	OAT setting that determines if the system will be heating or cooling when a Thin Wall enabled zone calls	50°F 10°C	100°F 37.8°C	0°F -17.8°C
	TW +/-	Hysteresis setting. System will not switch heating/cooling modes until an OAT of SP+/- is reached	5°F -15°C	10°F -12.2°C	1°F -17.2°C
	TW Timer	Timer for preventing the system from potentially getting stuck in one mode based on TW calls and OAT	15min	30min	1min (0min to disable timer)
Modbus	Address	Address index for the heatpump unit	1	20	1
	Model Type	Unit type to match the address setting. Choose from list of compatible units.	N/A	N/A	N/A
	Heat SP	Heating setpoint for the connected unit.	Initial values are read from the unit	Max and min temperature settings are determined by the max and min settings in the unit	
	Cool SP	Cooling setpoint for the connected unit.	Initial values are read from the unit	Max and min temperature settings are determined by the max and min settings in the unit	
Timers	Add Timer	Timer used for staging with Modbus connected units.	5min	90min	1min
	Shed Timer	Timer used for staging with Modbus connected units.	1min	90min	1min
System Settings	Pump Enable	Enables/disables the system pump output	Disabled	N/A	N/A
	Heat Enable	Enables/disables the heat output	Enabled	N/A	N/A
	Cool Enable	Enables/disables the cool output	Enabled	N/A	N/A
	Call Block	Enables/Disables off season calls	Disabled	N/A	N/A
Temperature Units	Temp Units	Switch between F and C	F	N/A	N/A

Condition	Possible cause	Solution
Heatpump, Boiler or Pump does not respond to call for conditioning.	Disconnected or broken wire.	Physically inspect the condition of the wires between the thermostat, air handler and the interface module, and between the interface module and the heatpump, boiler, or pump.
Heatpump gives a call for cooling when called upon for heating, or heating when called upon for cooling.	Reversing Valve Mode is set to the wrong mode.	Check the Heatpump RV and make sure it is set to the right mode Cooling (O) or Heating (B).
Unit is not working correctly	Settings or wiring could have been installed incorrectly.	Review all system settings and make sure module is wired properly.
Sensor error is showing on the LCD	Sensor input is either shorted or open.	Check sensor wiring and connections
N/A is showing for a temperature	Sensor input is either shorted or open but the sensor is not required for the current mode.	Check wiring if the sensor is supposed to be connected, or disregard otherwise.