



# **Installation Manual - Classic**

# **1. Installation Manual**

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# 1. Installation Manual

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A PDF copy of this manual can be obtained using the download icon (📄) above.

## ✓ Before You Begin

1. System Overview
2. Compatibility
3. Safety

## ✓ **Components**

1. Heat Pump Water Heater - SANCO2
2. Tank
3. Harvest Pod
4. Airscape Air Handler Unit
5. (Deprecated) Optional ECOer Heat Pump AC
6. Integrating DHW Recirculation

## ✓ **Plumbing System Diagrams**

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3. Airflow Sensing
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## ✓ **Start Up**

1. Hydronic System Start Up
2. ECOer Heat Pump A/C Start Up
3. Thermal Battery System Start Up

## ✓ Troubleshooting

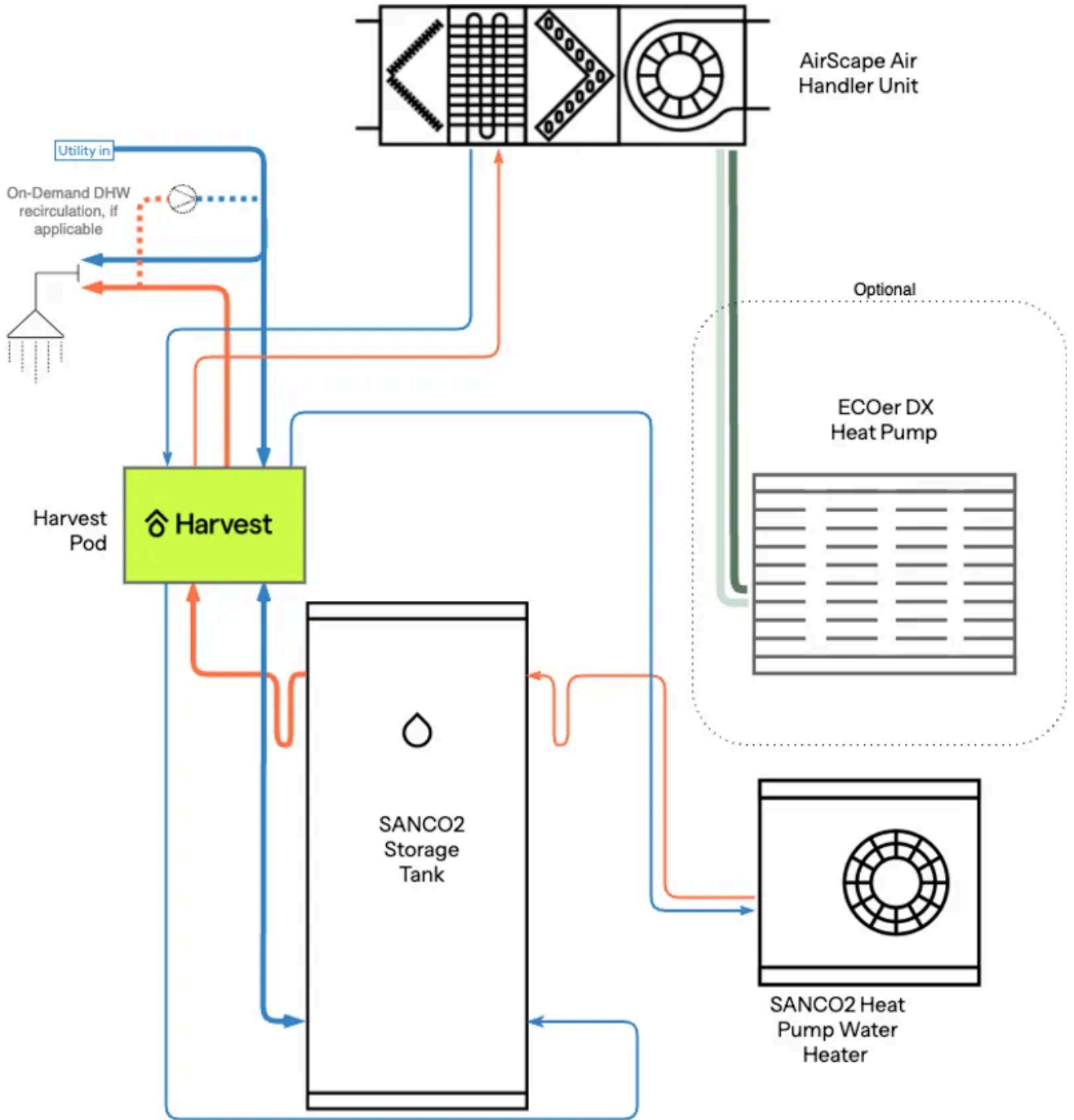
# 1.1. Before You Begin

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**i** Always check for the most up-to-date installation information, which can be found at <http://docs.harvest-thermal.com/>. Similarly, all SANCO2 installation material provided in this manual is for convenience only. Refer to SANCO2 for the most up-to-date and complete installation information on the SANCO2 heat pump water heater and tank.

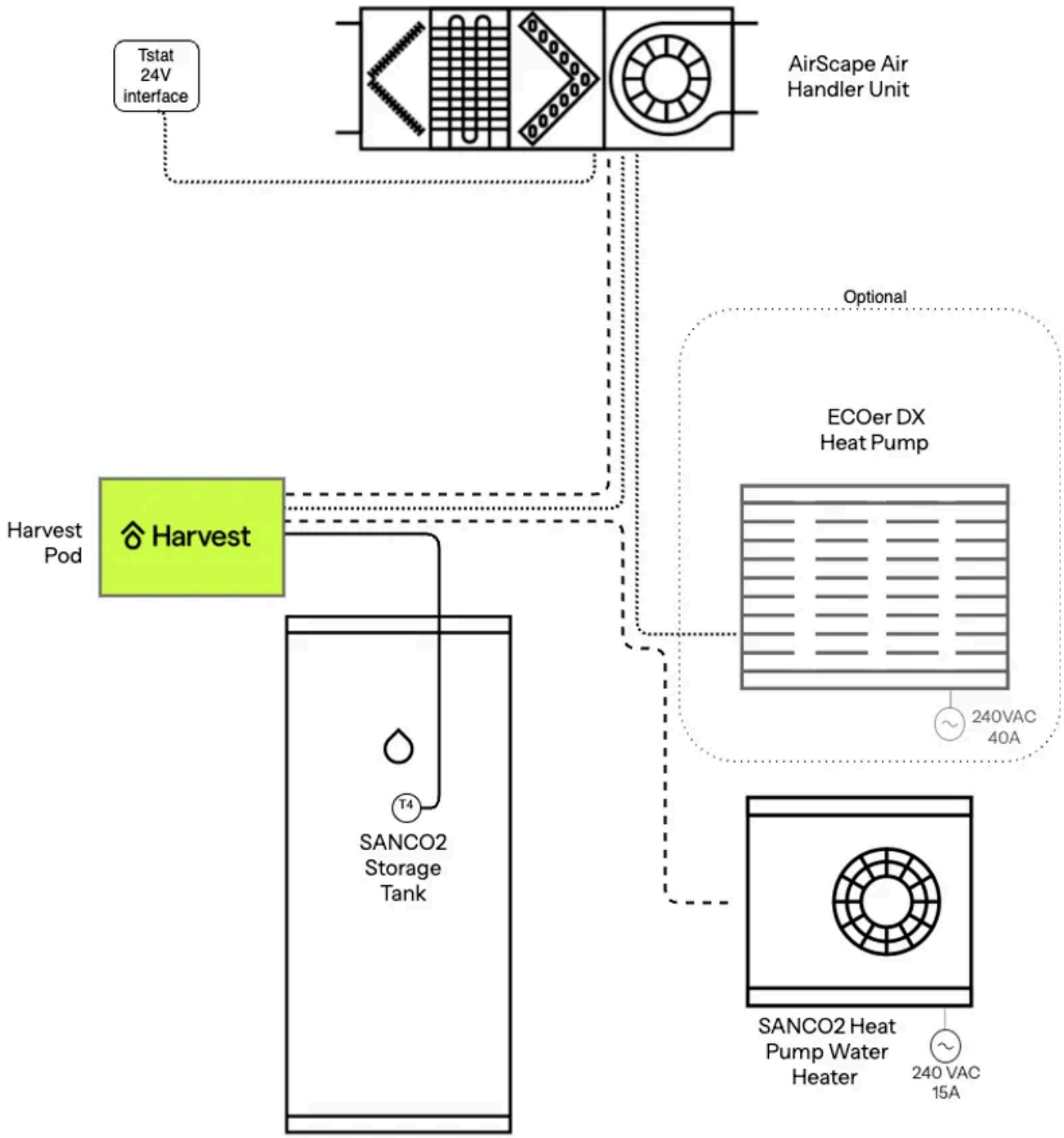
# 1.1.1. System Overview

## Plumbing Overview



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## Wiring Overview



Tstat  
24V  
interface

AirScape Air  
Handler Unit

Optional

ECOer DX  
Heat Pump

Harvest  
Pod

Harvest

T4  
SANCO2  
Storage  
Tank

SANCO2 Heat  
Pump Water  
Heater  
240 VAC  
15A

240VAC  
40A

## 11.2. Compatibility

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### **Harvest Classic is compatible with:**

SanCO<sub>2</sub> heat pumps and tanks for hydronic heating and hot water

Up to two SanCO<sub>2</sub> heat pumps

Up to two thermal storage tanks

ECOer DX heat pump for cooling and supplemental heat

On-demand hot water recirculation pumps

Solar PV, batteries, smart electric panels (not required)

### **Harvest Classic is NOT compatible with:**

Non-SANCO<sub>2</sub> heat pumps and tanks for hydronic heat and hot water

Continuous or timer-controlled hot water recirculation pumps

Solar thermal integrated with the Harvest system

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Refer to [Harvest Classic Technical Specifications](#) for equipment specifications and to aid in full system design.

## 1.1.3. Safety

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**⚠️⚡☠️ HAZARD WARNINGS:** These symbols call attention to warnings, electric shock hazards, and gas hazards respectively, and directions that must be followed for safety reasons.

**⚠️ WARNING:** The installation manual instructions are intended as an aid to qualified service personnel for proper installation, adjustment and operation. Read these safety requirements thoroughly before attempting installation or operation. It is the responsibility of the installer to follow all national codes, standards and local ordinances. The installation must comply with regulations of the local building, heating, plumbing, and other codes. where local codes are not applicable, the installation must comply with the national codes and any and all authorities having jurisdiction. Failure to follow these requirements may result in improper installation, adjustment, service or maintenance, possibly resulting in fire, electrical shock, carbon monoxide poisoning, explosion, property damage, personal injury or death.

**⚠️ California Proposition 65 WARNING:** This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm

## Safety Requirements

### General

**⚡ELECTRICAL SHOCK HAZARD:** Confirm all circuits are de-energized before performing any wiring activity

## Heat Pump/Tank

⚠ WARNING: Use caution when installing heavy equipment. To avoid injury, follow the manufacturer's installation instructions regarding all safety protocols.

## Air Handler/Hydronic Coil

⚠ WARNING: Do not operate the air handler system without filters for extended periods. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. This residue can soil ceilings, walls, drapes, carpets, and other household articles.

⚠ WARNING: Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing. Failure to follow this warning may result in personal injury.

## Radio Interference

⚠ WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet of on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Harvest Thermal  
1831 Solano Avenue  
#8611  
Berkeley, CA 94707  
<https://www.harvest-thermal.com/>

declare under our sole responsibility that the product

Harvest Pod

complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation

# 1.2. Components

## 1.2.1. Heat Pump Water Heater - SANCO2

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**!** WARNING: Installation instructions in this manual are not meant to encompass 100% of SANCO2 installation guidelines and requirements. Refer to the manufacturer for complete instructions.

Single SANCO2 Heat Pump Setup

Twin-SANCO2 Additional Setup Information

## 1.2.11. Single SANCO2 Heat Pump Setup

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### Location

The SANCO2 heat pump should:

- Be located **no further than 66ft (20m) from the tank**, and **no more than 23ft (7m) above it**. Additionally, minimizing pipe length to the tank/pod maximizes efficiency
- Maximum **6 bends**, use **long-radius elbows**, not "street Ls"
- Be installed outside, with adequate ventilation (see [Required Unit Clearances](#))
- Be installed in such a way where water can drain without damaging the heat pump

**i** The SANCO2 heat pump operates most efficiently when located on the East or South side of the property.

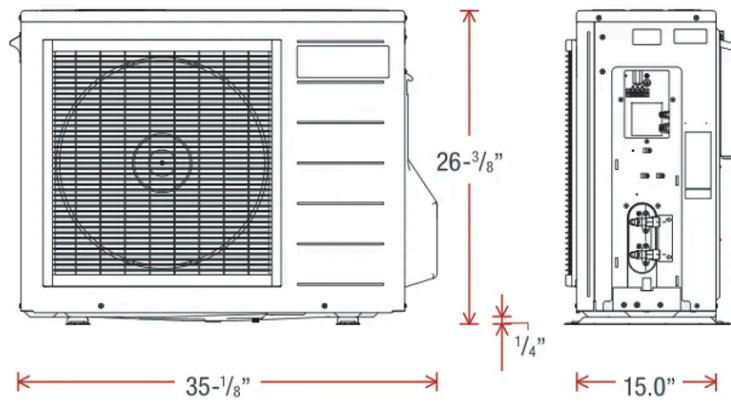
The heat pump can be installed either on a:

- Preferably a pad or other firm base, or
- On wall-mounted brackets.

**!** WARNING: While the SANCO2 is rated max 37dB, noise due to unit vibration may be a nuisance when wall-mounted.

**!** WARNING: If ground-mounted, mount it on risers or pump-ups, to enable access to the drain valve under the unit.

### Dimensions

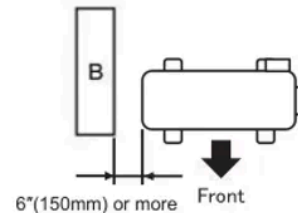
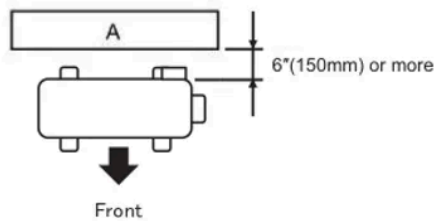


Source: SANCO2 GS4 Installation Manual

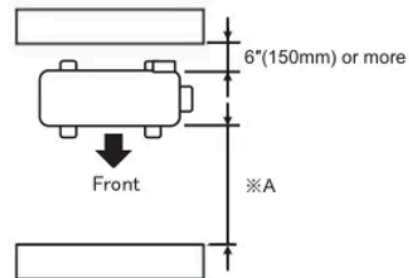
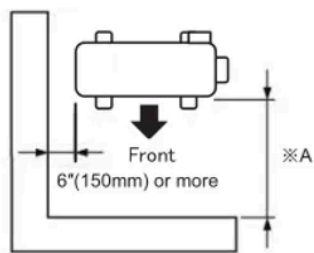
## Required Unit Clearances

### Flat wall installation

**Caution:** Water fitting side must have 12" clearance. 24" is desirable



### Corner installation



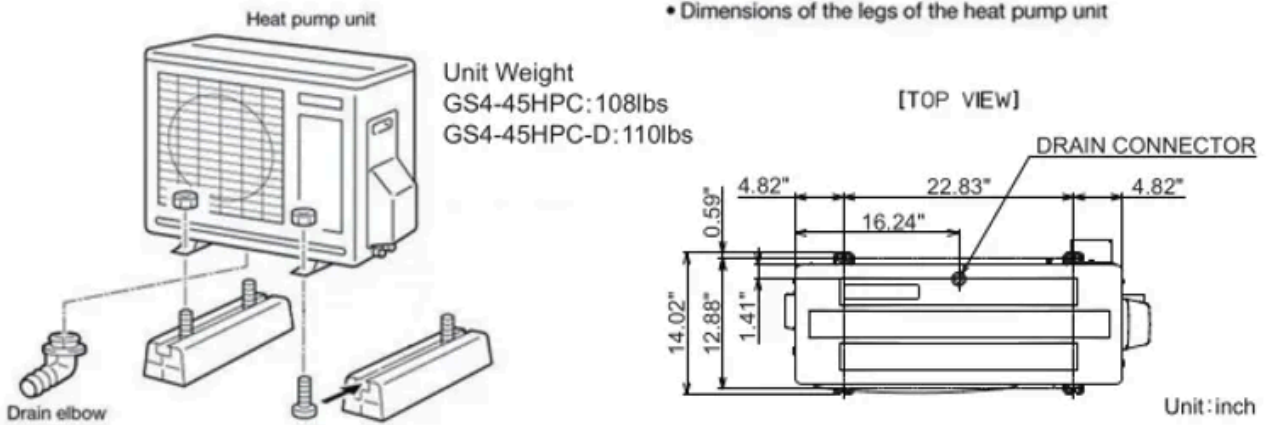
※A 14"(350mm) or more in case of the height of wall is less than 47"(1200mm)  
24"(600mm) or more in case of the height of wall is more than 47"(1200mm)

Source: Source: SANCO2 GS4 Installation Manual

Allow 4" of clearance below the heat pump for the drain plug.

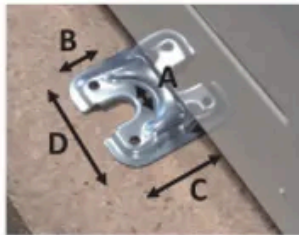
**!** WARNING: Failure to allow proper clearances and ventilation can negatively impact system performance. Additionally, be cognizant of environmental conditions such as vents or other mechanical equipment when selecting the location.

## Installation Example and Additional Dimensions



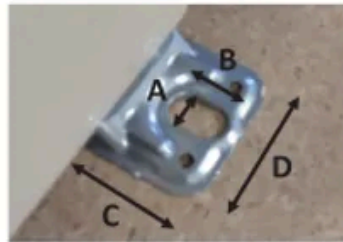
### Front Foot

Use 3/8" Diameter Screws



### Rear Foot

Use 3/8" Diameter Screws



"A" 7/16"

"B" 3/4"

"C" 1"

"D" 2"

Source: SANCO2 GS4 Installation Manual

❗ Mounting solutions are available directly from ECO2.

❗ Spring isolators ([example](#)) and vibration isolator pads ([example](#)) should be used if the SANCO2 heat pump is being mounted on a wall connected to the home.

## Powering the SANCO2

❗ **WARNING:** Installation instructions in this manual are not meant to encompass 100% of SanCO2 installation guidelines and requirements. Refer to the manufacturer for complete instructions.

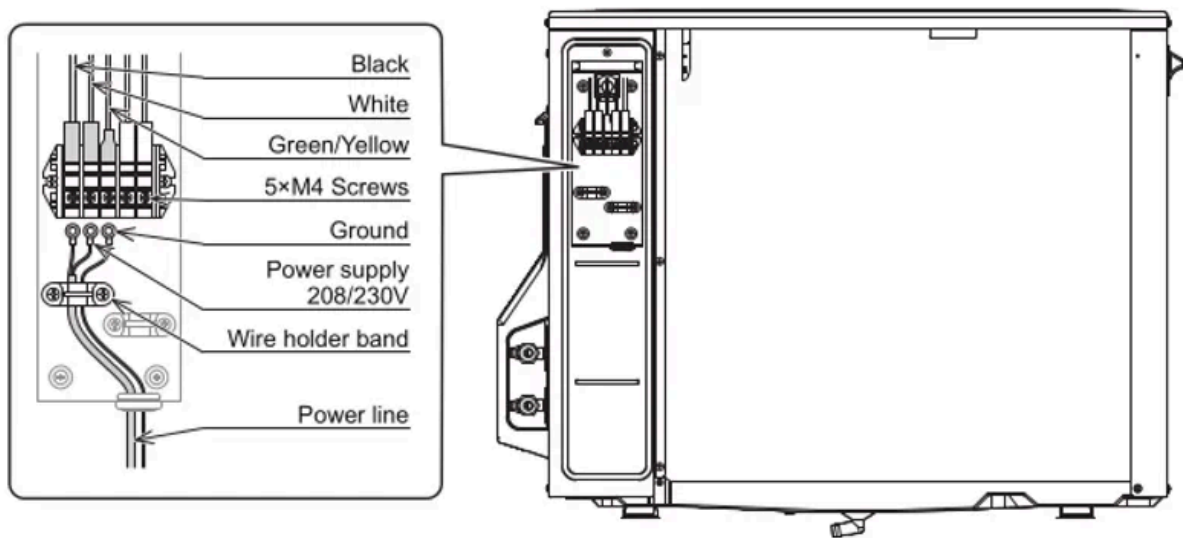
⚡ **HAZARD:** Installation must be carried out by a qualified technician. All Electrical Wiring should be done in accordance with the latest edition of the National Electrical Code (NEC) and all local State/Province and Municipality codes.

## Electrical Requirements:

Power Supply:	240V-1Ph-60Hz
Breaker Size:	15A
MCA:	7.2A

A quick disconnect must be installed adjacent to heat pump in accordance to NEC and local codes

## Main Power Connection



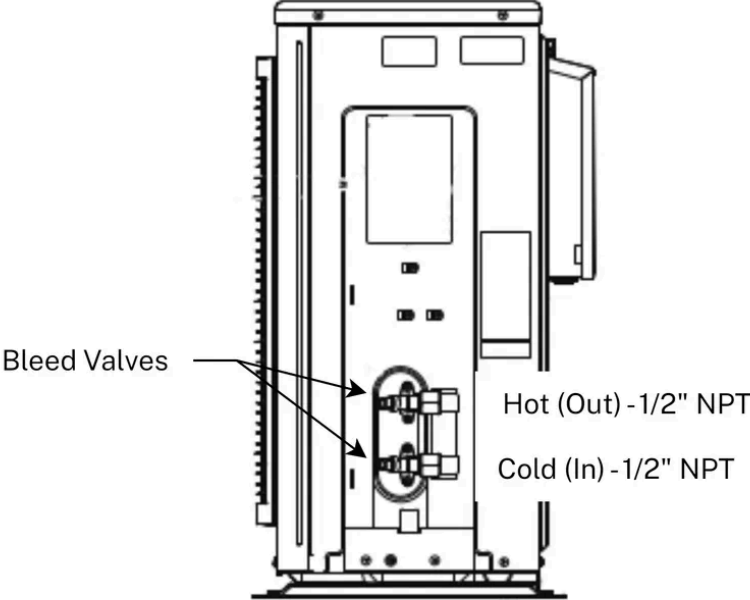
Source: SANCO2 GS4 Installation Manual

Ensure all power wires (including ground) are securely connected

**⚠ WARNING: DO NOT** power heat pump until wiring and plumbing are complete and system has been completely filled and primed. Refer to Start Up.

Refer to Wiring for low voltage wiring.

## Plumbing Connections

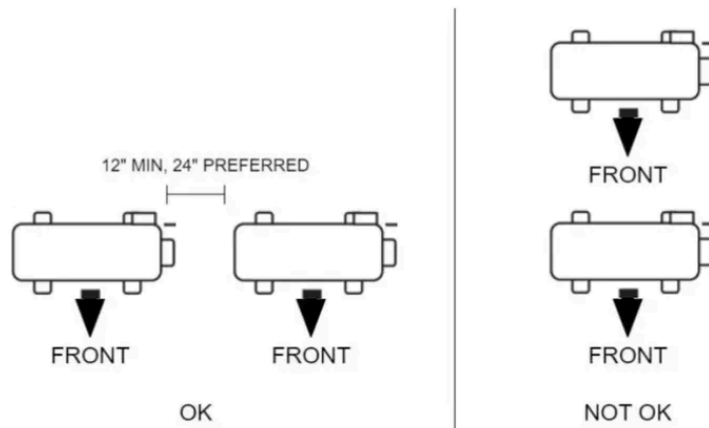


# 1.21.2 Twin-SANCO2 Additional Setup Information

**i** A Twin-SANCO2 install kit is required for installation

## Required Unit Spacing and Orientation

Heat Pumps should be located such that the air exhausted from one heat pump is not pulled in by the other (see below).



## Electrical Requirements:

Provide a subpanel within reach of the twin-SANCO2 units in accordance to NEC and local codes

Power Supply:	240V-1Ph-60Hz
Main Breaker Size:	30 A
Breaker Size for each SANCO2 unit	15 A

## Functional Description

This setup enables the twin heat pumps to function as if there was only one heat pump, but with twice the capacity of a normal SANCO2 unit.

- The two heat pumps are **plumbed in parallel**.

- A common 3/4" cold supply pipe will run from the pod to a tee with 1/2" connections to each heat pump.
- On the hot return, each heat pump plumbs 1/2" lines to a combining tee with a 3/4" outlet routed to the hot port of the tank.
- Additionally, the heat pumps are **wired to always run at the same time**.

The Harvest Thermal Pod directly controls one heat pump -- the primary heat pump -- while the second heat pump is controlled by a current sensing switch. This current sensing switch is located only on the power line of primary heat pump, and switches on (turning on SANCO2 - 2) after a minimum amount of current flows to primary heat pump

The thermistor connection to primary heat pump will be typical of a Harvest Thermal single heat pump system, and the secondary heat pump will have a simple resistor installed on its thermistor connection that matches the resistance of the thermistor measuring a "cold" tank temperature.

! Swing check valves must be installed on the return (cold) side of both heat pumps.

i It is best practice to make the pipe lengths between the tee's and the heat pumps be as even as possible.

## 1.2.2. Tank

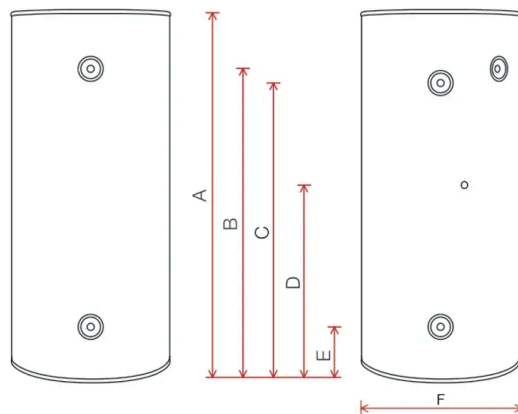
**! WARNING:** Installation instructions in this manual are not meant to encompass 100% of SANCO2 installation guidelines and requirements. Refer to the manufacturer for complete instructions.

### Location

The tank can be located **no further than 66ft (20m) from the SANCO2 heat pump**, and **no more than 27ft (7m) below it**.

Tank must be installed in an area not subjected directly to outside weather.

### Dimensions



Source: SANCO2 GS4 Installation Manual

Dimension	83 Gal	119 Gal
A: Height	68-7/8"	63-3/8"
B: Hot Water Outlet and PRV	60-1/4"	56"
C: Heat Pump Return	60-1/4"	60-1/4"
D: Sensor Port	40-5/8"	56"
E: Hydronic Return & Cold Water to HP	8-3/4"	4"
F: Diameter	24-1/2"	28"
Dry Weight	115 lbs	

**i** NOTE: Allow space between the tank and the wall for tank insulation to be added later.

## Mounting

The tank is a passive storage vessel (no internal heating element). Therefore, there is no required:

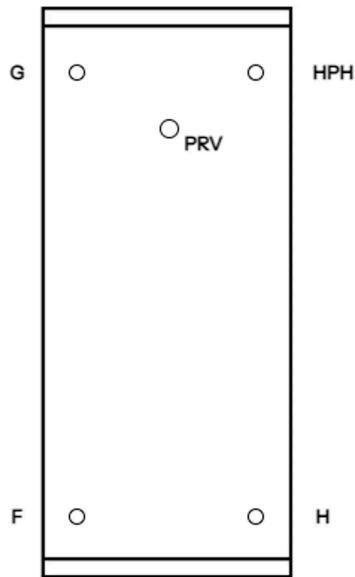
- Pedestal
- Flue, or
- Condensing section

**i** NOTE: Min. 1" high-density insulation below the tank is required (see Insulation section) for good system performance

**i** NOTE: It is required to wrap R6, or greater, insulation (see Insulation section) around the tank. It is easiest to do this prior to plumbing it.

**!** WARNING: Follow all local jurisdiction codes for bracing of tank

## Plumbing Connections



	83 Gal	119 Gal
F: Air Handler Return	3/4" NPT	1-1/2" NPT
G: Hot Water Outlet	3/4" NPT	1-1/2" NPT
HPH: Hot Water Return from HP	3/4" NPT	3/4" NPT
H: Cold Water Inlet/Return to Heat Pump	3/4" NPT	3/4" NPT
PRV: Pressure Relief Valve	Valve Provided	Valve Provided

**i** NOTE: Dielectric unions or 6" brass couplings are required at all 119 Gal tank connections. Heat Traps (see Plumbing System Diagrams) required for top connections.

## 1.2.3. Harvest Pod

### Location

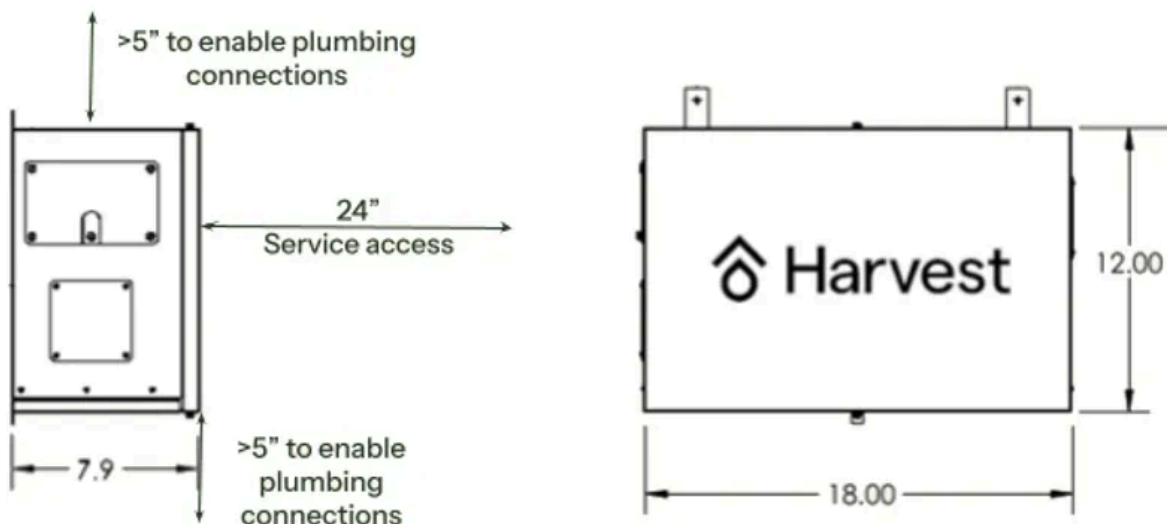
The Pod is required to be installed in weather-protected space at a minimum, such as a garage, basement, crawlspace, indoor closet, or outdoor closet where there is no risk of freezing.

- ⚠️ **WARNING:** The Pod is not intended to be fully waterproof. Install in dry location and take care while modifying plumbing near Pod so as not to damage the Pod's electrical components with water.
- ⚠️ **WARNING:** Always put Pod cover on when soldering to avoid solder splatter on electronic components

Recommended to be installed as close to tank as reasonable, and can be:

- Wall-hung near tank, or
- above the tank in closet

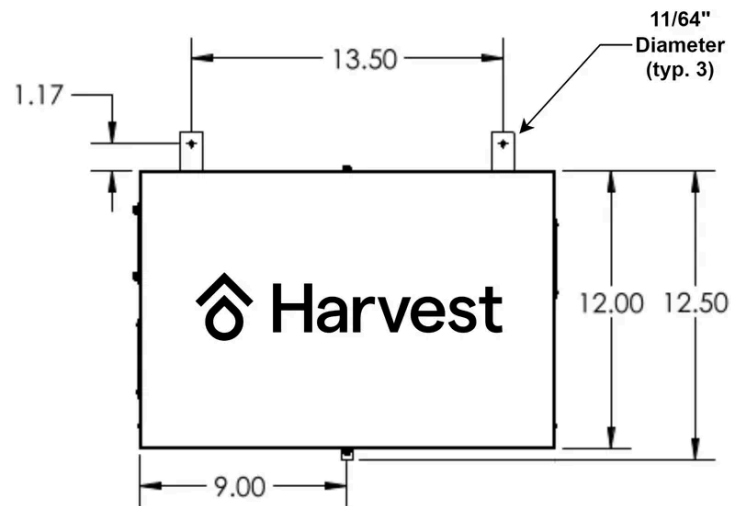
### Dimensions and Clearances



Minimum 24" of clearance is required in front of pod for wiring installation and future service access.

## Mounting

Mount to studs or sturdy surface with screws using provided mounting holes.



Dry Weight: 33 lbs

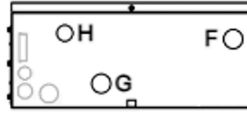
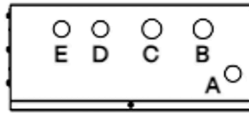
## Power

The pod will require a 120V power outlet for the included 24 VDC power supply (refer to [SANCO2 Low Voltage Wiring](#)).

## Internet

The Harvest Pod will require either an Ethernet or WiFi connection. This enables over-the-air updates, access to weather forecasts, and remote monitoring of the system. Ethernet is the most robust and therefore recommended option. See [Start Up](#) for more info.

## Plumbing Connections



	Size
A: Heat Pump Cold	1/2" NPT
B: Utility In	3/4" NPT
C: DHW Hot	3/4" NPT
D: Air Handler Supply	1/2" NPT
E: Air Handler Return	1/2" NPT
F: Cold Water to Tank	3/4" NPT
G: Hot from Tank	3/4" NPT
H: AHU Return to Tank	1/2" NPT

## 1.2.4. Airscape Air Handler Unit

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### Location

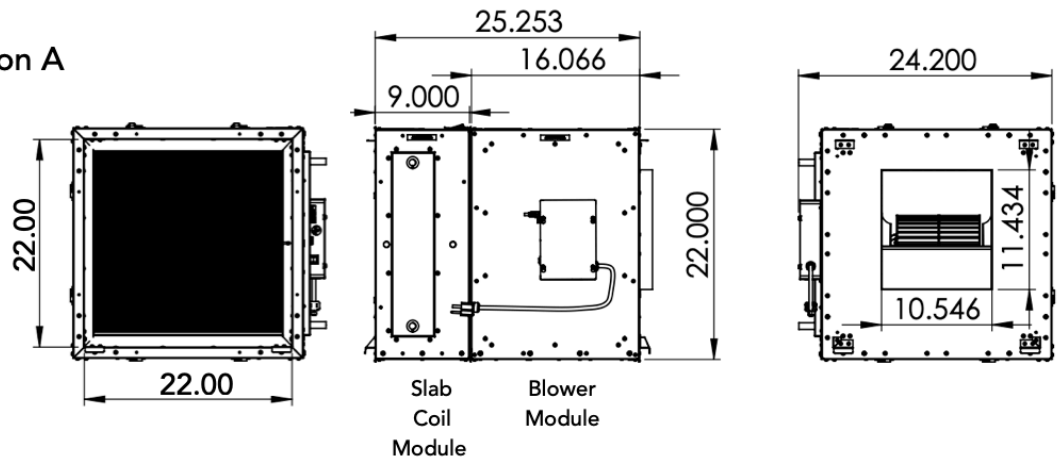
Piping to the AHU from the Pod must be < 100 ft in equivalent length, with < 35 ft of lift.

### Configuration & Dimensions

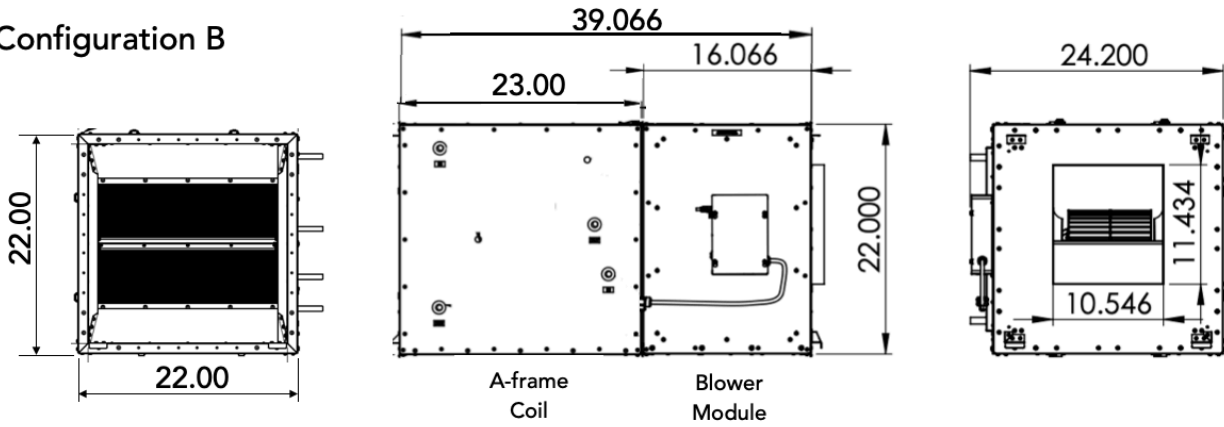
The Airscape air handler units come in three configurations; A, B, and C. All configurations require an additional MERV 13 filter module, and an A/C economizer/Night Cooling damper can be added to all configurations.

**i** The AHU can be pulled apart into individual modules to make it easier to move the unit into a crawl space or attic.

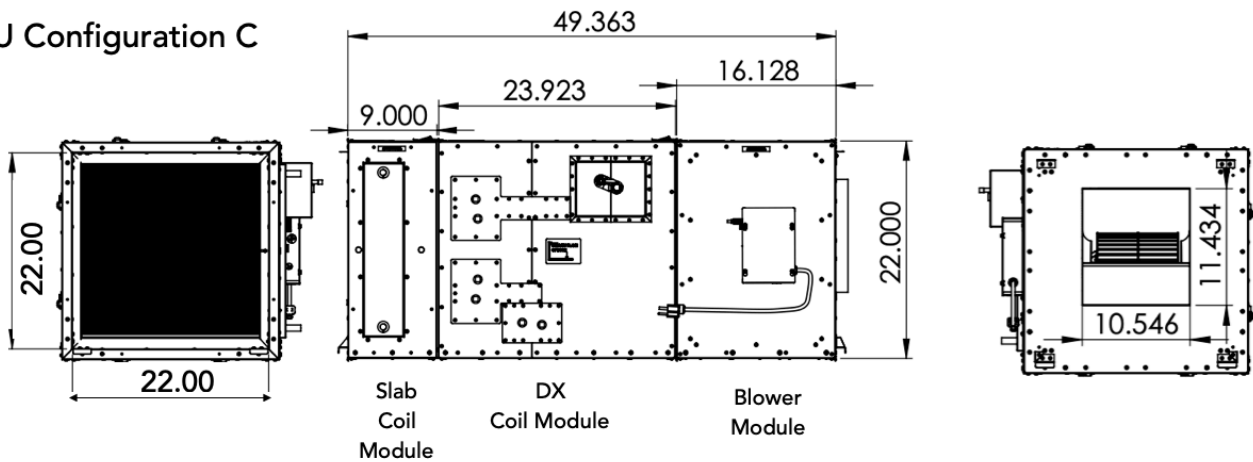
### AHU Configuration A



### AHU Configuration B



### AHU Configuration C



- Ensure duct transitions to and from the AHU are adequate for proper, even air flow
- The AHU can be installed vertically or horizontally

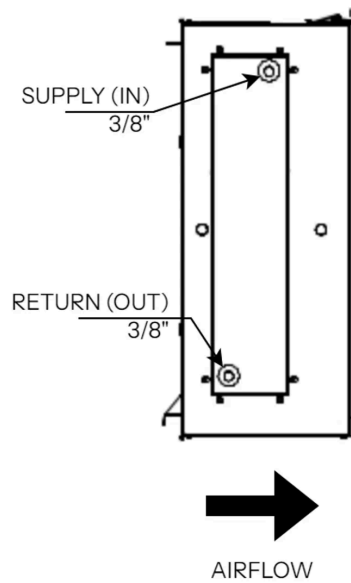
**! WARNING:** Hydronic coil and A/C coil must be installed downstream of air filters, or the performance will be heavily degraded.

## Power

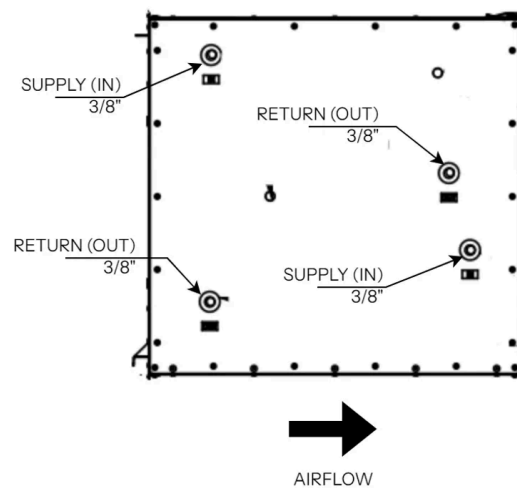
The Airscape AHU will require a 120V power outlet, which will power the blower motor and provide 24VAC power for the thermostat.

! A standard residential GFCI plug will trip when the motor starts up. Use a hardwired switch with fuse, or a heavy-duty industrial GFCI such as the Hubbell Wiring Device-Kellems GFSG8200I

## Plumbing Connections



Slab Coil Plumbing Connections

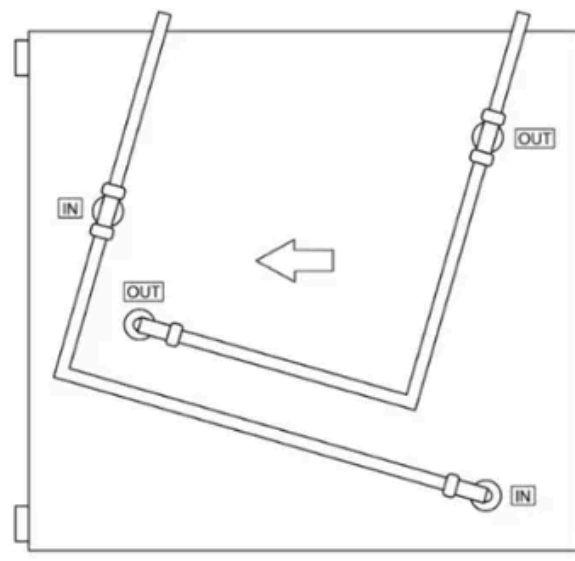
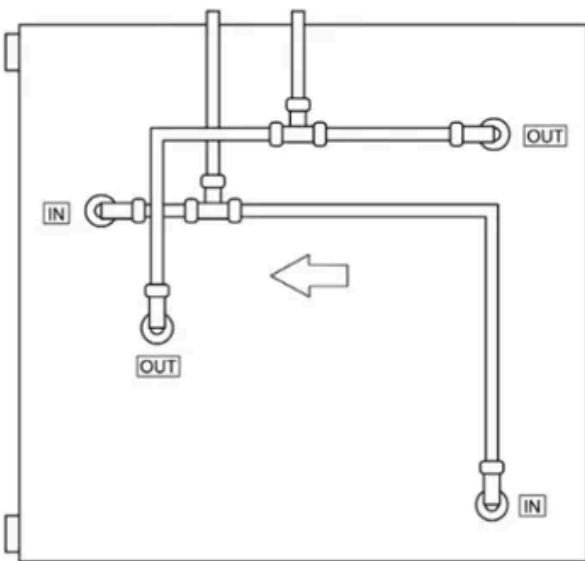
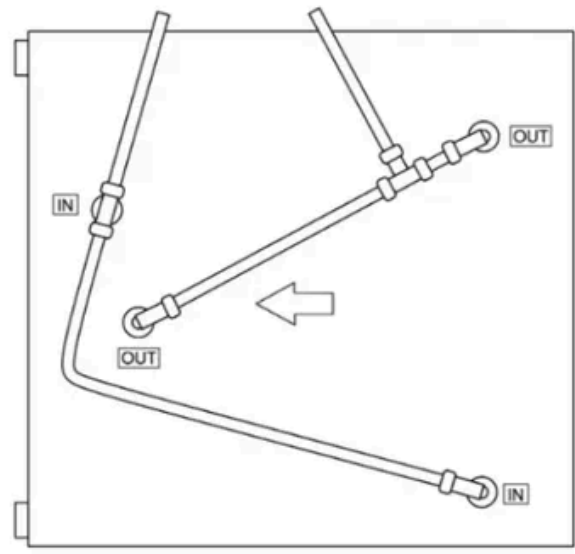
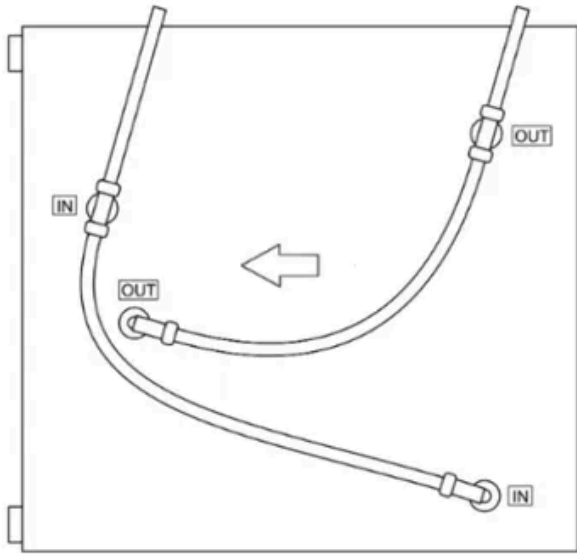


A-Frame Coil Plumbing Connections

A-Frame coil connections should be plumbed in **parallel**, not series.

⚠ WARNING: Failure to plumb coil in regard to orientation to airflow can significantly degrade performance.

## Possible piping configurations for the A-frame coil

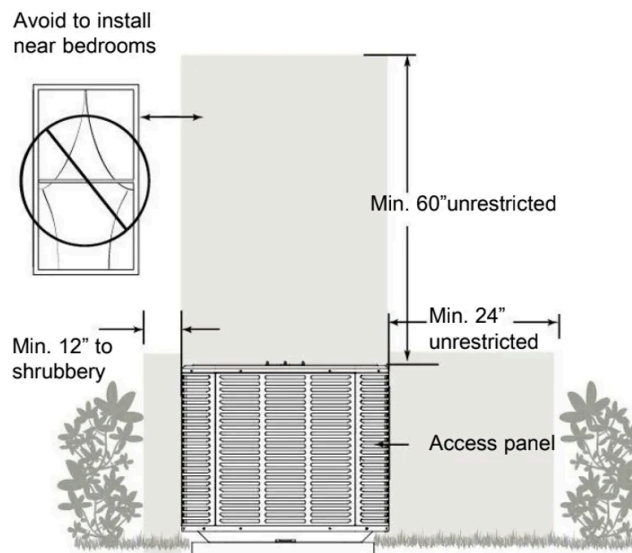


## 1.2.5. (Deprecated) Optional ECOer Heat Pump AC

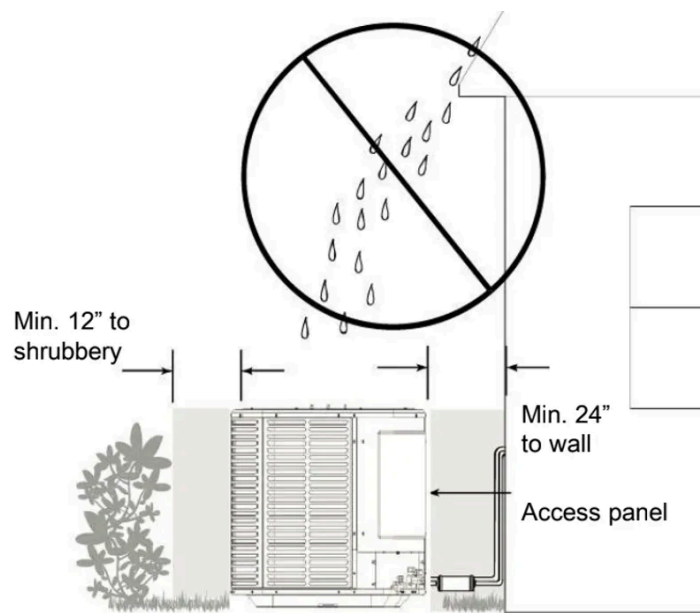
Please see the [ECOer ESi Decades Extreme ODU instruction manual](#) for installation directions. The Integration of the ECOer HPAC with the Harvest Pod is covered in the [Low Voltage Wiring Diagram](#) section.

**i**. An A/C install kit is required for installation

### Location



Source: ECOer ESi Decades Extreme ODU instruction manual



Source: ECOer ESi Decades Extreme ODU instruction manual

## Powering the ECOer Heat Pump A/C

**⚠ WARNING:** Installation instructions in this manual are not meant to encompass ECOer installation guidelines and requirements. Refer to the manufacturer for complete instructions.

**⚡ HAZARD:** Installation must be carried out by a qualified technician. All Electrical Wiring should be done in accordance with the latest edition of the National Electrical Code (NEC) and all local State/Province and Municipality codes.

## Electrical Requirements:

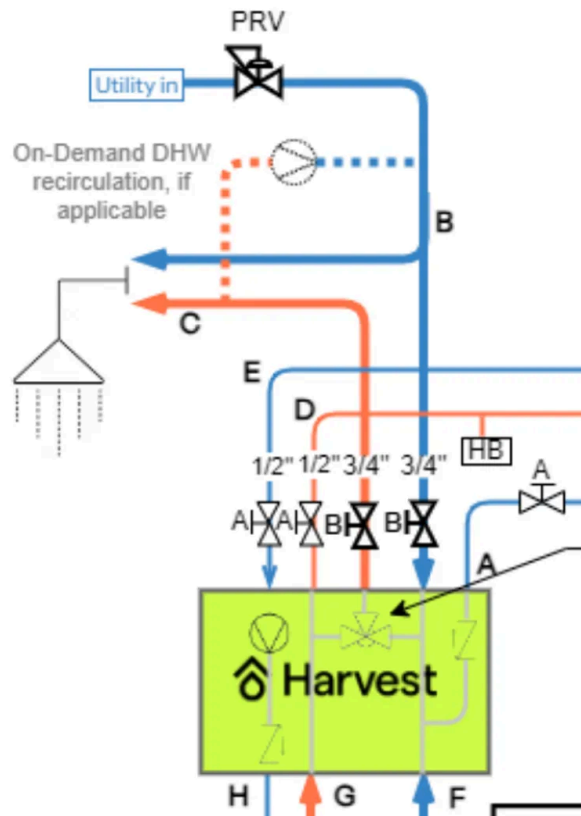
Power Supply:	240V-1Ph-60Hz
Breaker Size:	40A
RLA:	17.5A
LRA:	27.9A

A quick disconnect must be installed adjacent to the heat pump in accordance to NEC and local codes

## 1.2.6. Integrating DHW Recirculation

The Harvest Thermal Battery system works well with **on-demand DHW recirculation**.

As shown in the [Plumbing Diagram](#), a DHW recirculation pump must be connected "outside" of the Harvest Pod Thermal Battery system, between the utility cold water coming into the Pod (B) and the DHW exiting the Pod (C).



**! WARNING:** Always-On and Timer-Based DHW recirculation systems will destratify the storage tank and cripple the Thermal Battery system operation. ONLY use On-Demand DHW recirculation.

Here are some examples of on-demand DHW recirculation systems that work well with the Harvest Thermal Battery System.

### For homes with a dedicated return line:

[Smart Aquastat Control 32](#), from Lerdian Dynamics, is a controller that will sense when a DHW call is made and turn on the pump. This means that a short use of any hot water tap is

equivalent to pushing a button to start the recirculation pump. Choose a recirculation pump that will move 2-4 gpm of water, so that once a hot water tap is initially turned on and off, water is recirculated as quickly as possible.

## Smart Aquastat 32 Controller Settings

- Temperature Range: 80F - 90F. When the temperature is below 80F at the recirculation pump, the pump will turn on when triggered by the flow sensor, and will then turn off when the temperature reaches 90F at the recirculation pump.
- Max Pump Run Time: 3 min. It rarely takes longer than 3 minutes to circulate water in the dedicated return line, and this setting helps to minimize any issues if the temperature sensor is not reading accurately.

## Instructions on how to reconfigure a Smart Recirculation Control 32 as a Smart Aquastat Control 32

- The firmware can be updated via the smartphone app
  - Start the app and connect to your controller
  - There is a Firmware menu button at the bottom right of the app.
  - There is an option on the firmware update screen to “Show All Firmware Versions” which will display the firmware from our entire product line.
  - Select the Smart Aquastat 32 firmware and install that.
- One of the temperature sensors needs to be disconnected.
  - There are two temperature sensors plugged into an RJ-14 splitter.



- Disconnect the temperature sensor that is on the plumbing line C, coming out of the Pod.
  - The remaining temperature sensor should be on the dedicated return line right next to the recirculation pump.
- Follow the instructions above to apply the right Settings for the Smart Aquastat 32 Controller

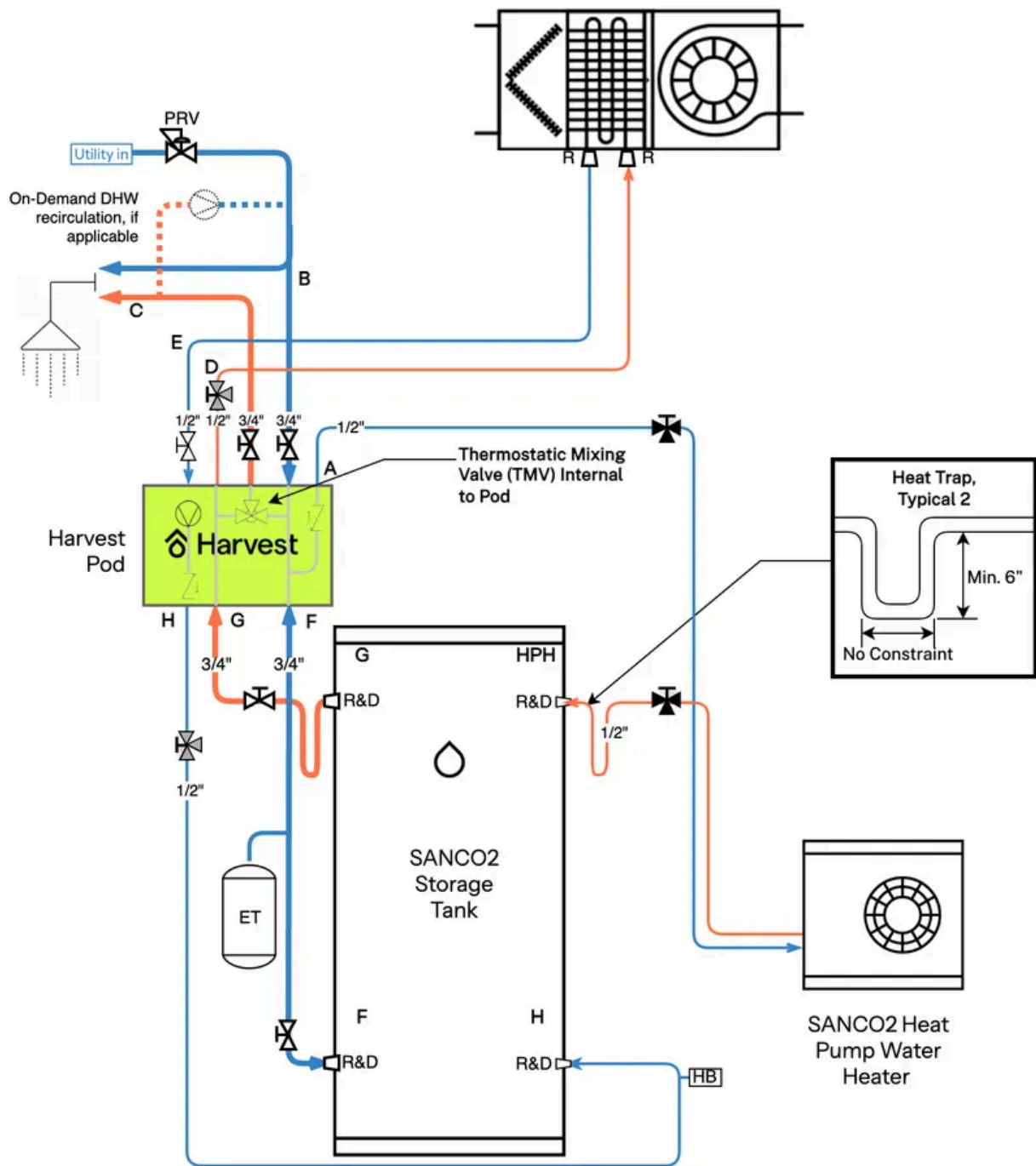
## For homes without a dedicated return line

The Smart Thermostatic Control, from Leridian Dynamics, is good option for an on-demand recirculation pump which works with the included high flow cross-over valve kit which gets installed under a remote kitchen or bath fixture.

# 13. **Plumbing System Diagrams**

## 13.1. **Single SANCO2 Plumbing Diagram**

---



Legend			
	1/2" Ball Valve		R&D Reducer and Dielectric Union
	3/4" Ball Valve		R Reducer
	Harvest 1/2" Service Valve with drain (provided)		ET Expansion Tank
	SANCO2 1/2" Service Valve with drain		[HB] Hose Bibb
	PRV Pressure Regulating Valve		Supply Piping
			Return Piping

⚠ Only install additional plumbing features, such as DHW recirculation pumps, on plumbing lines B and C.

⚠ WARNING: Maximum incoming pressure not to exceed 75 PSI with pressure reducing valve.

⚠ WARNING: Be sure to include all valves, meters, sensors and heat traps shown in the drawings in this manual. The system will not operate properly without these, and in some cases, may not operate safely.

⚠ WARNING: Before performing any plumbing work, ensure the Pod is completely powered off and the front cover is securely in place. Failure to do so may result in water damage to the Pod's electronics, which is **not covered under warranty**.

ℹ NOTE: See [Harvest Classic Tech Specs](#) for full plumbing schedule

See links for the:

[Plumbing Connections for the SANCO2 Heat Pump](#)

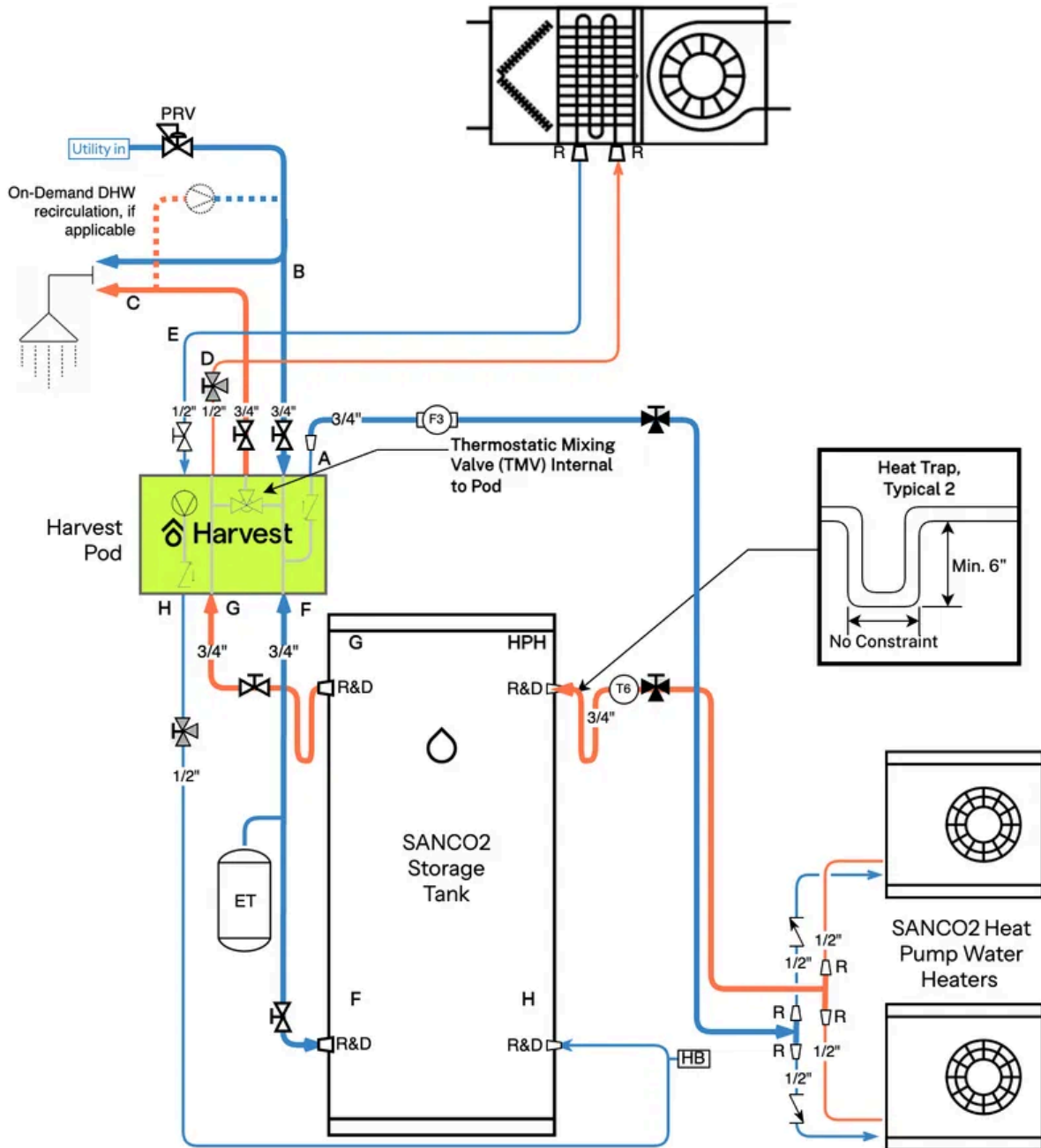
[Plumbing Connections for the Tank](#)















[Plumbing Connections for the Harvest Pod](#)

[Plumbing Connections for the Hydronic Coil](#)

## 1.3.2. Twin SANCO2 Plumbing Diagram

**i** A Twin-SANCO2 install kit is required for installation.



Legend					
	1/2" Ball Valve		R&D Reducer and Dielectric Union		Supply Piping
	3/4" Ball Valve		R Reducer		Return Piping
	Harvest 1/2" Service Valve with drain <i>(provided)</i>		ET Expansion Tank		F3 Flow Meter <i>(provided)</i>
	SANCO2 1/2" Service Valve with drain		HB Hose Bibb		T6 Temperature Sensor <i>(provided)</i>
	PRV Pressure Regulating Valve				1/2" Swing Check Valve <i>(provided)</i>

A Twin SANCO2 system changes the plumbing only around the SANCO2 heat pumps.

- **Calculate line effective length:** add up the length of 1/2" and 3/4" pipe from heat pump to Pod/heat pumps, and add 1/2 ft per short-radius elbow (large-radius elbows don't count): this should be **60' or less**.

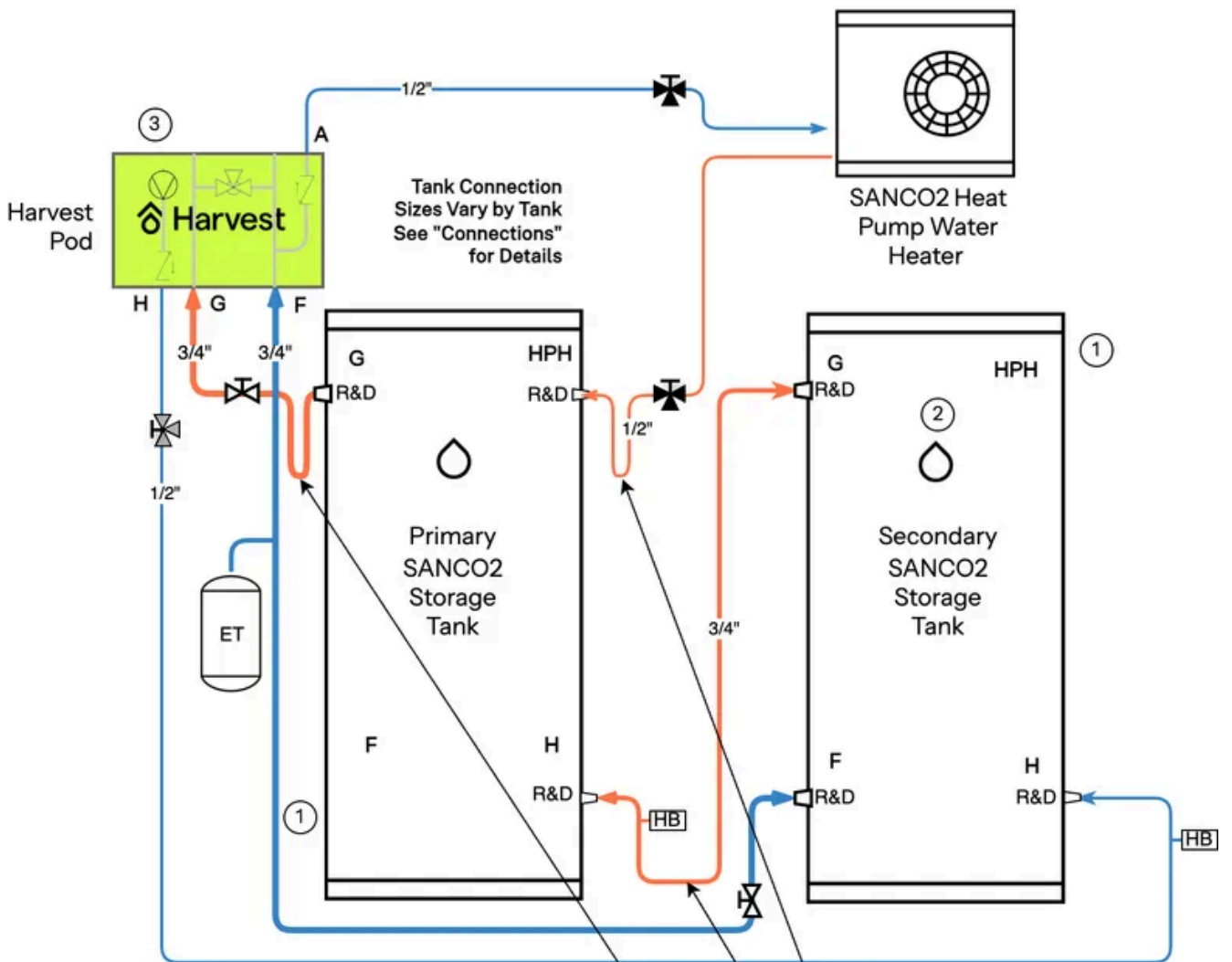
$$L_{\text{Effective}}(\text{ft}) = L_{3/4} + 0.5 * (\text{qty } 3/4" \text{ elbows}) + L_{1/2} + 0.5 * (\text{qty } 1/2" \text{ elbows})$$

- The effective lengths for each heat pump should be maintained within 10% of each other.
- Install swing check valves on cold side of each 1/2" heat pump line
- Install flow meter near pod connection A (on HP cold line) on the common 3/4" line, oriented to measure flow out of the pod.
- Install thermistor T6 on the common heat pump hot line
  - Attach thermistor to pipe using foam tape or tie down with zip tie
  - Insulate the thermistor generously to ensure it is not affected by air temperature

# 1.3.3. Double-Tank Plumbing Diagram

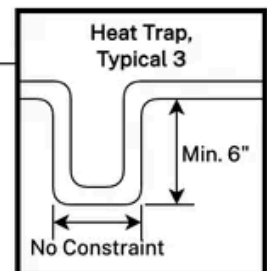
**⚠ WARNING:** Failure to minimize fittings and bends of the "bridge pipe" between the primary and secondary tank may significantly impact system performance.

It is **HIGHLY** recommended to use either a single piece of 3/4" PEX, or 3/4" copper with a long radius elbows to minimize the pressure drop along this bridge pipe.














## Notes:

1. Cap unused tank connection
2. No TPV valve is needed on the secondary tank if no valves are placed on the bridge pipe between H of the primary tank and G on the secondary tank
3. Heating loop, utility in, and DHW plumbing not shown for clarity. Refer to overall plumbing diagram



Legend

	1/2" Ball Valve	R&D 	Reducer and Dielectric Union		Supply Piping
	3/4" Ball Valve	R 	Reducer		Return Piping
	Harvest 1/2" Service Valve with drain <b>(provided)</b>		Expansion Tank		
	SANCO2 1/2" Service Valve with drain		Hose Bibb		
	Pressure Regulating Valve				

# 14. Insulation

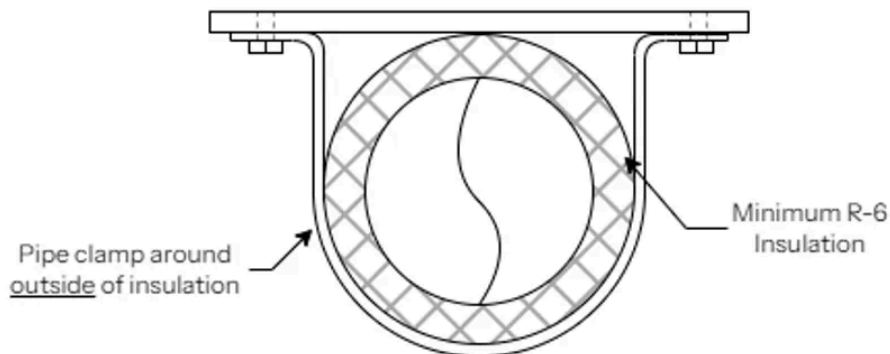
**NOTE:** Proper insulation is required to achieve good system performance

## Tank

- 1+” polyiso (min. R-6) insulation required under tank
- Insulate tank with min. R-8 insulation around sides and top of tank.
- Insulate pressure relief valve with min. R-6 insulation

## Pipes

- All pipes, excluding the Cold Supply pipe (line B), are required to be insulated with minimum 1” (R-6) insulation.
- Include insulation on all valves and couplings.
- Pipes should be clamped outside of the insulation.



## SANCO2

- All requirements above apply to SANCO2 piping.
- Piping inside of SANCO2 cover should also be insulated.
- Ensure all outside piping is weatherized.

## 1.5. Cold Climate Installations

---

Water will circulate to the SANCO2 heat pump, which is mounted outside. It's important to take appropriate actions for cold-climate installations to mitigate the risk of water freezing in the pipes and the heat pump. Failure to do so could lead to damage and operational issues.

### SANCO2 Freeze Protection Approaches

SANCO2 provides the following approaches to mitigate water freezing in the heat pump. The SANCO2 documentation of these approaches can be found [here](#):

- Minimize the length of piping outside
- Automated freeze protection control program built into the heat pump
- Heat tape on exterior pipework
- Automated freeze protection via drain valves when there is a power outage
- Manual freeze protection when there is a power outage.

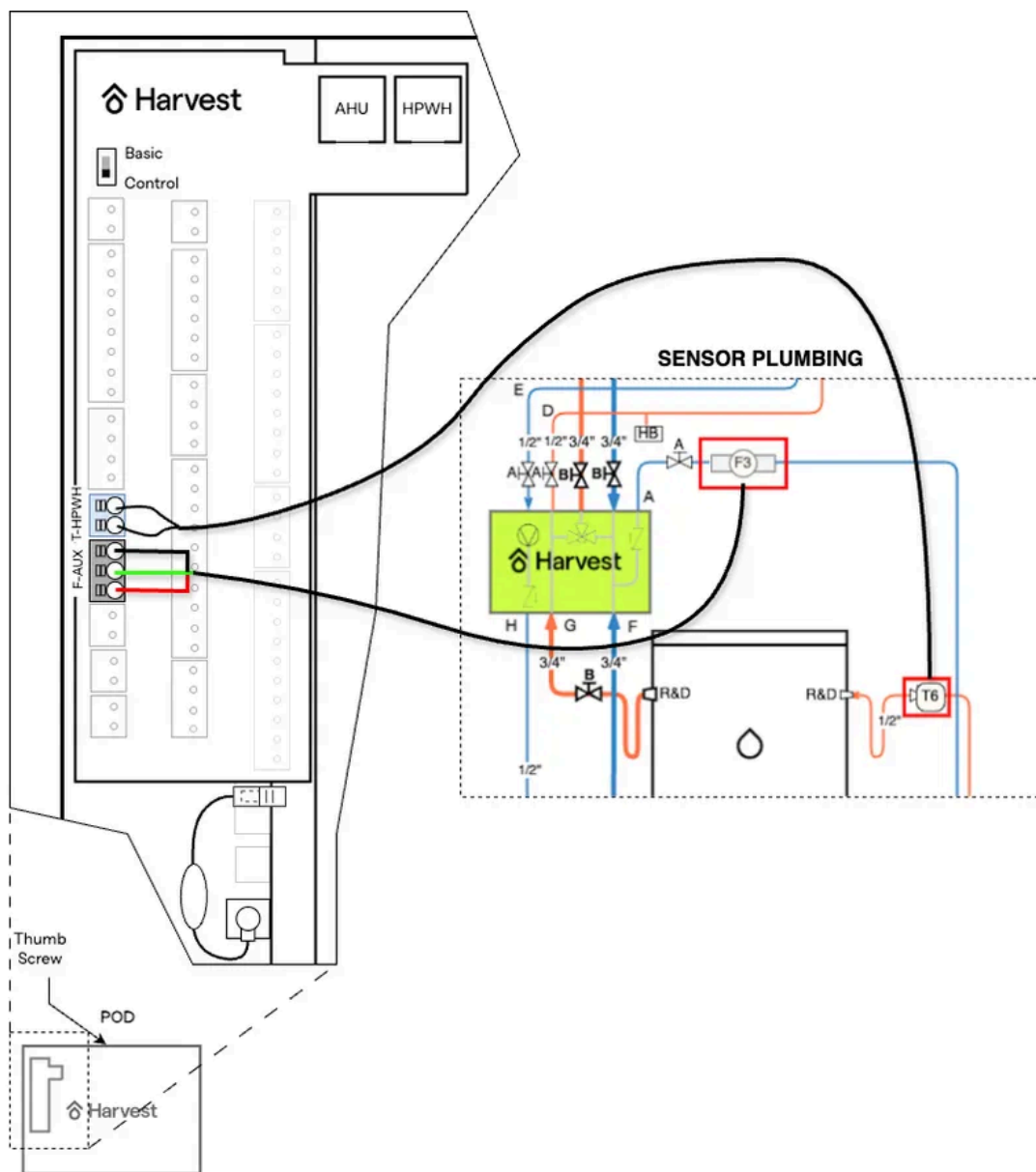
Submittal sheets for the recommended heat tape (FG2-6L or FG2-12L) and drain valves (ECO-FPVKT-SMTW) can be found [here](#).

### Cold Climate sensors

**i** A Sensor kit is required for installation

In a cold climate, directly measuring the heat output of the SANCO2 enables better control of the state of charge of the thermal battery.

Install and wire the flow meter (F3) and the temperature sensor (T6), provided as part of the sensor kit, as shown in the figure below.



! The flow meter has a flow direction marked. It should point towards the SANCO2 heat pump.

i Use tstat wire (18/x) to extend the thermistor or flow meter wires if needed

## Using an Electric Tank Booster

A tank booster may be added to the Harvest system to help maintain warm water in the hydronic system if the outdoor temperature drops below  $-25^{\circ}\text{F}$ , at which point the SANCO2 heat pump will no longer be able to produce hot water.

In addition, an electric tank booster can be used to extend the hydronic storage capacity of a Harvest system. This can be beneficial to meet the home heating load if the capacity of the

auxiliary DX heat pump drops due to low outdoor temperatures.

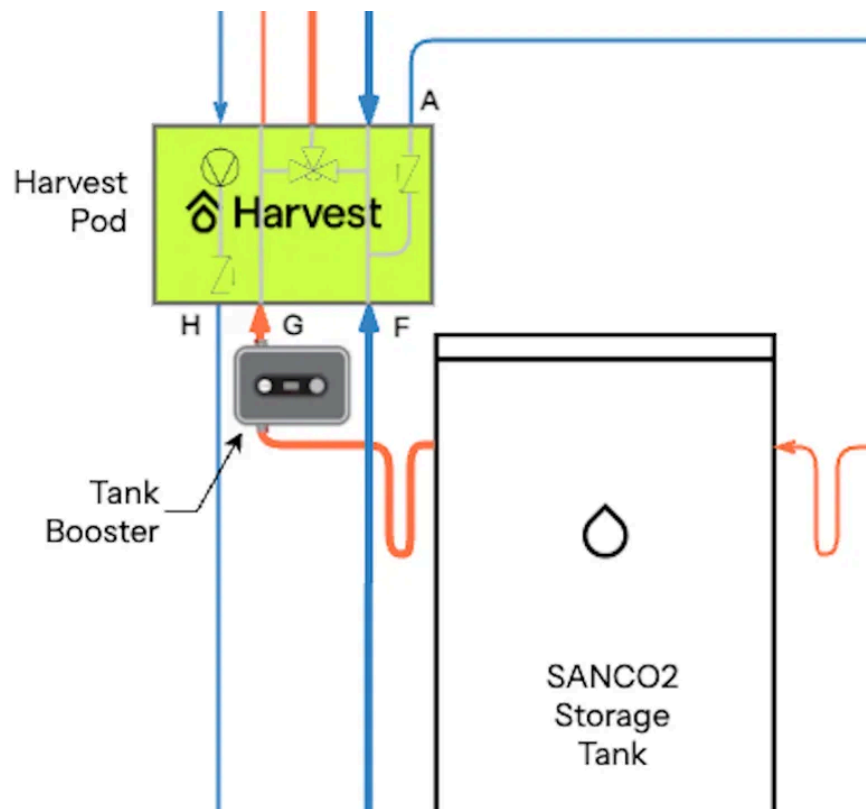
The booster will turn on when tank thermal storage is depleted (specifically, whenever flow > 0.30 gpm and inlet temperature < 115°F).

There are two primary choices for an electric tank booster:

- RHEEM RTEX-AB7 7.2 kW booster - 30A breaker and 50°F temperature rise at 1gpm
- RHEEM RTEX-11 11 kW booster - 50A breaker, and a 50°F temperature rise at 1.5gpm

**i** A Booster kit is required for installation

## Plumbing Diagram



- 14 in. of straight pipe clearance is required for installation below the Harvest Thermal Pod.
- 6 in. of clearance is required on the front and sides of the booster for service maintenance.

**i** Make sure there are no leaks. FAILURE TO DO THIS BEFORE ENERGIZING THE BOOSTER CAN CAUSE PERMANENT DAMAGE.

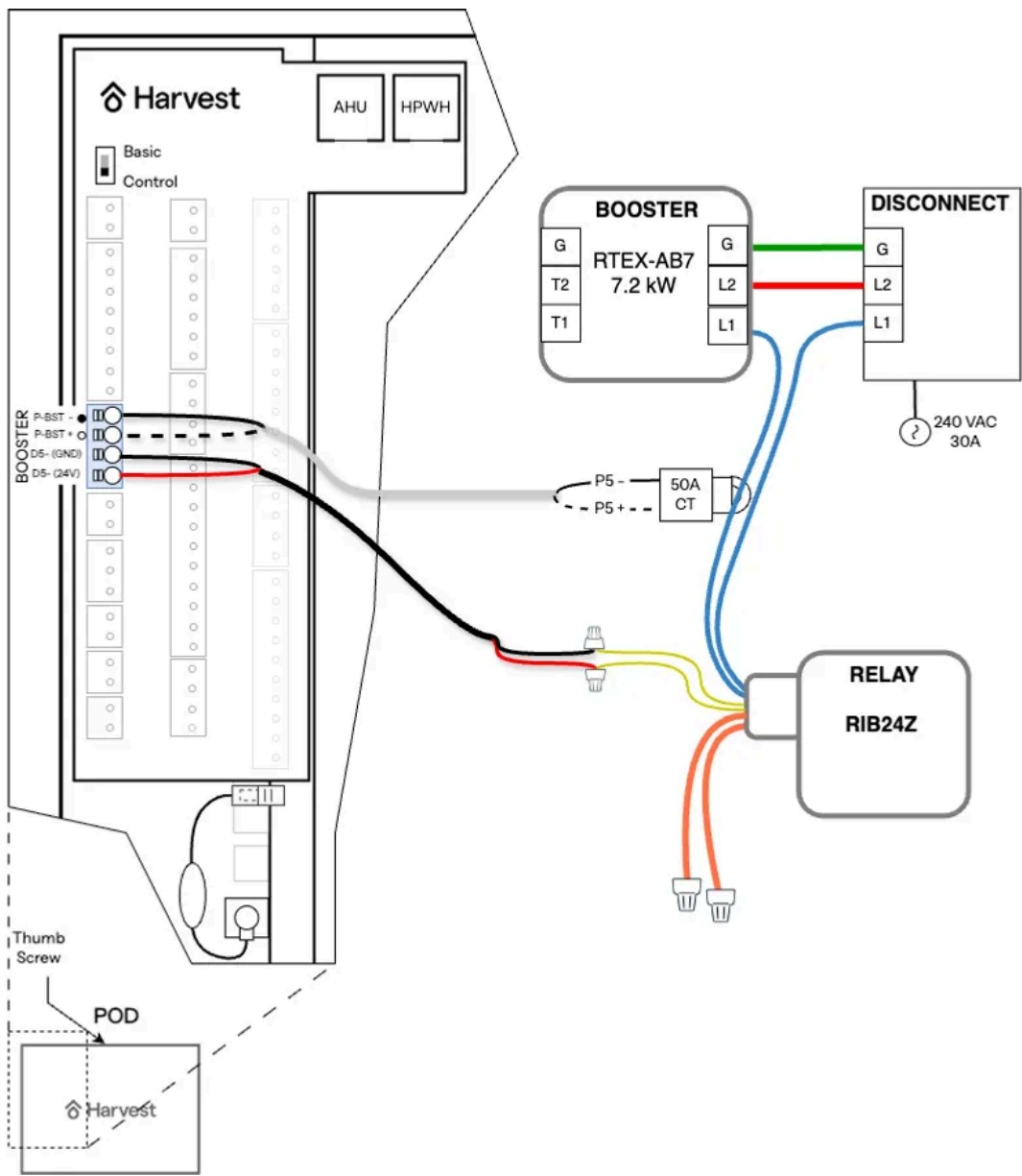
# High Voltage Electrical Wiring

**⚡ ELECTRICAL SHOCK HAZARD - CONFIRM ALL CIRCUITS ARE DE-ENERGIZED BEFORE PERFORMING ANY WIRING ACTIVITY.**

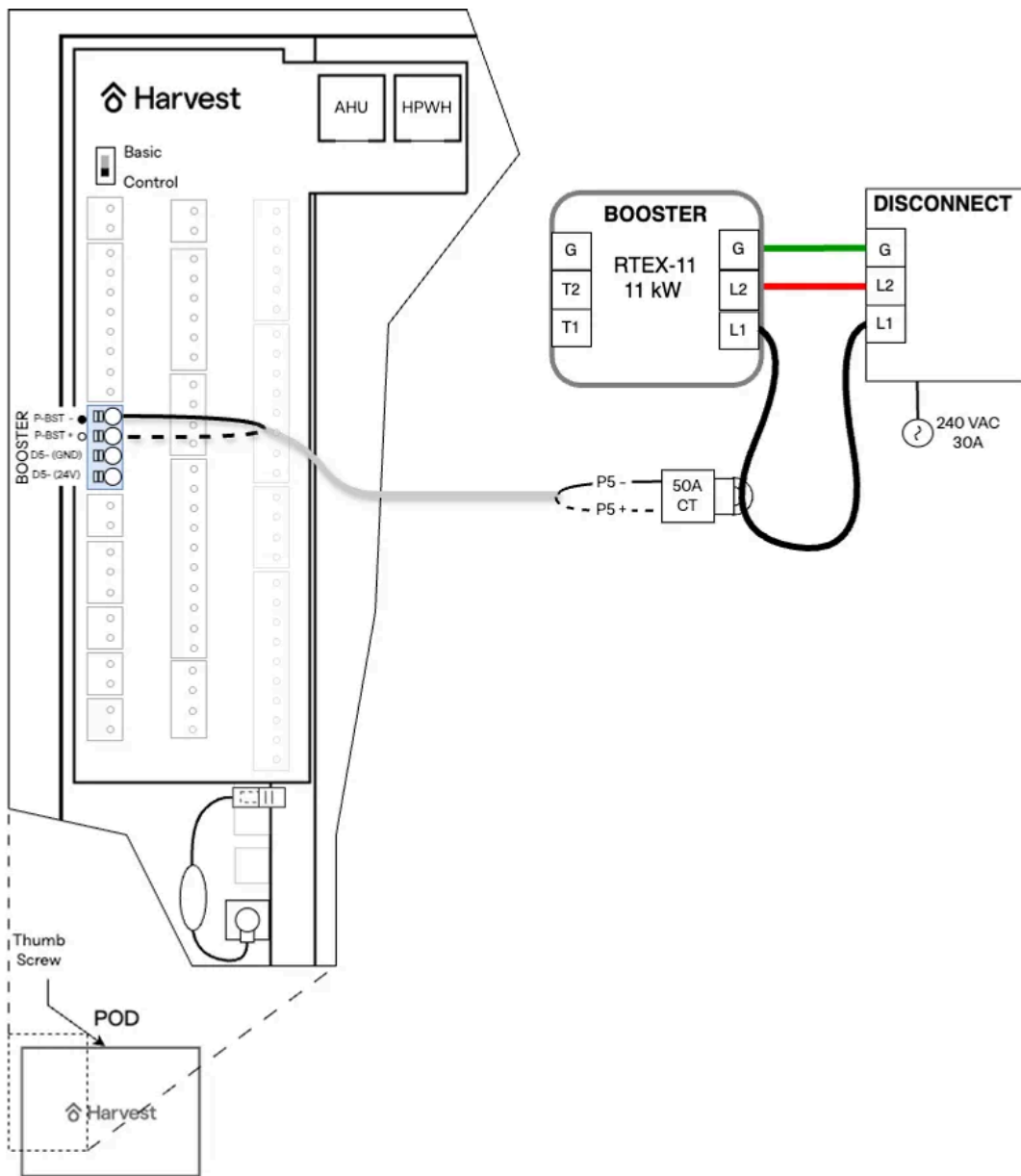
- 1 Install a new disconnect box connected to the main panel and located near the booster
- 2 Connect booster L1, L2, G terminals to the disconnect box. Do not use the T1 or T2 terminals.

If you are using the RTEX-AB7 booster, the Harvest Pod can provide additional control of when this unit is powered by installing the RIB24Z relay provided as part of the Booster install kit:

- Splice L1 with one of the RIB24Z relay's blue wires (blue wires are the NC relay connections).
- Connect the other RIB24Z relay blue wire to the disconnect.
- Do not use the orange wires (NO relay connection)



RHEEM RTEX-AB7 7.2 kW booster wiring



RHEEM RTEX-11 11kW booster

## Low Voltage Electrical Wiring

- 1 Install the 50A CT, provided in the Harvest Booster Install kit around the wire going to the L1 terminal.
- 2 Using 18-4 AWG wire, follow the figure below to connect the CT to the Pod
 

If you are using the RTEX-AB7 booster, the Harvest Pod can provide additional control of when this unit is powered by wiring the RIB24Z relay as follows:

  - Use the other two wires from the 18-4 AWG wire to connect the RIB24Z relay yellow control wires to the Pod.

## Booster Setup

Energize the booster and program it with the settings below.

- To cycle through menu options or adjust a setting, rotate the knob on the front of the booster.
- To enter a menu option press the control knob.

Setting	Value
ACTIVATE	115
MAX TEMP	130
VACATION	No
ECO MODE	No

Don't forget to set the cold climate dip switch (STD/CLD) inside the Harvest Pod when doing the low-voltage wiring.

# 1.6. Low Voltage Wiring and Sensors

## 1.6.1. SANCO2 Low Voltage Wiring

---

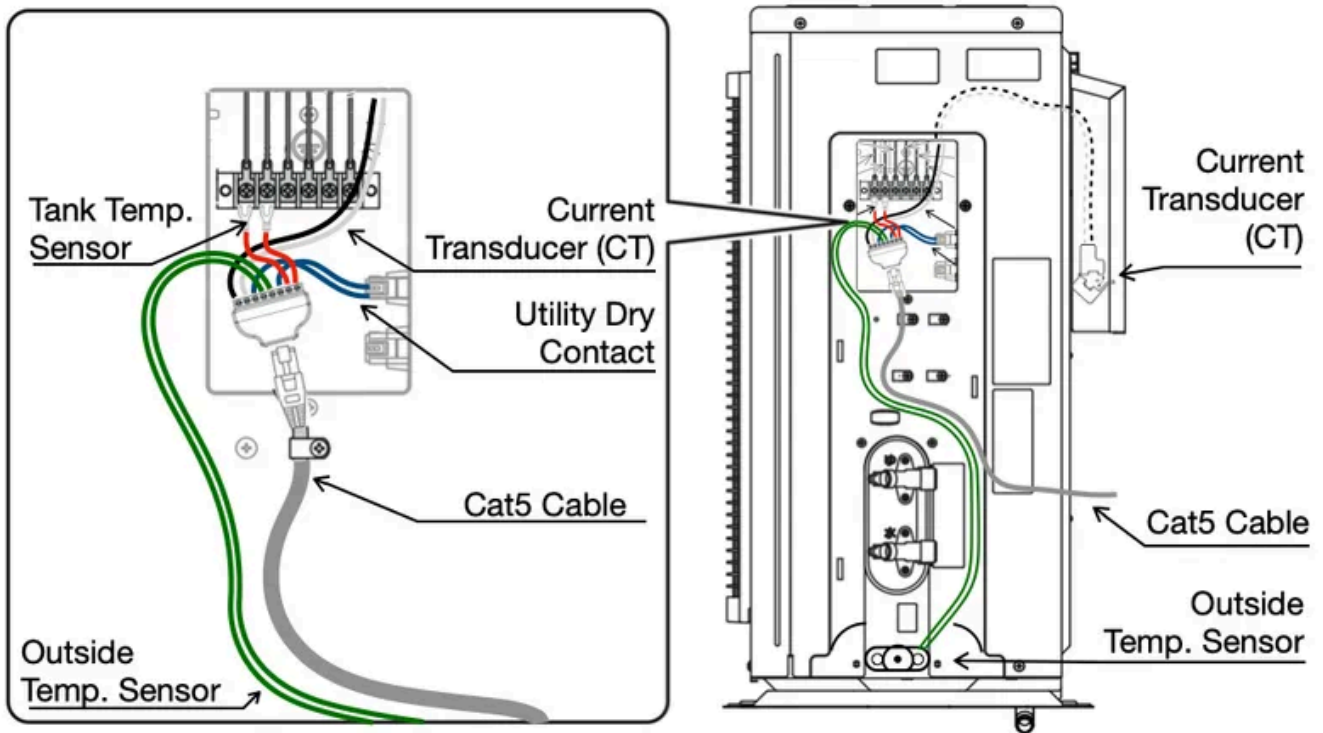
**i** The Harvest Install kit includes a wiring harness to connect the Cat5 cable from the Pod to the SANCO2 Heat pump.

Single SANCO2 wiring

Twin-SANCO2 wiring

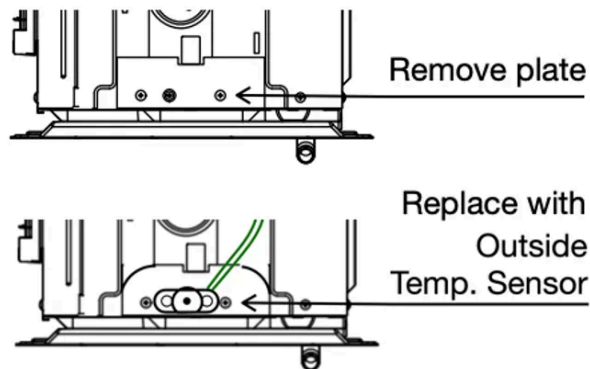
## 1.6.11. Single SANCO2 wiring

### Harvest wiring harness connections inside the signal box of the SANCO2



SANCO2 Gen5

Replace the existing plate directly below the plumbing fixtures of the SANCO2 heat pump with the Outdoor Temperature Sensor plate that comes connected to the wiring harness.

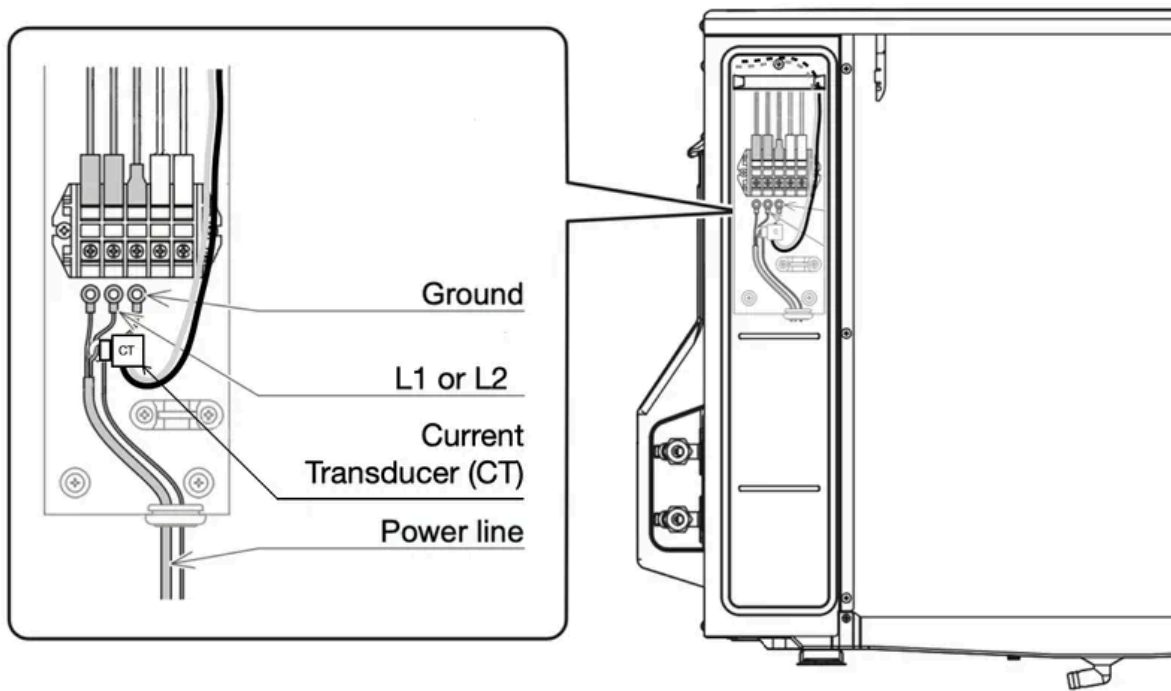


SANCO2 Gen5

## Current Transducer inside the power box

The current transducer is clipped around **either** the L1 or L2 power line. The CT leads can be threaded through the inside of the SANCO2 to enter the signal box, and reconnected to the wiring harness.

- i** The polarity of the CT leads matters. The **black** CT lead connects to **pin 8** of the wiring harness.



Background Source: SANCO2 GS4 Installation Manual

- i** NOTE: see Powering the SANCO2 documentation for high voltage wiring.

## Harvest OPEN: Wiring the SANCO2

Harvest



Watch on

## 1.6.1.2. Twin-SANCO2 wiring

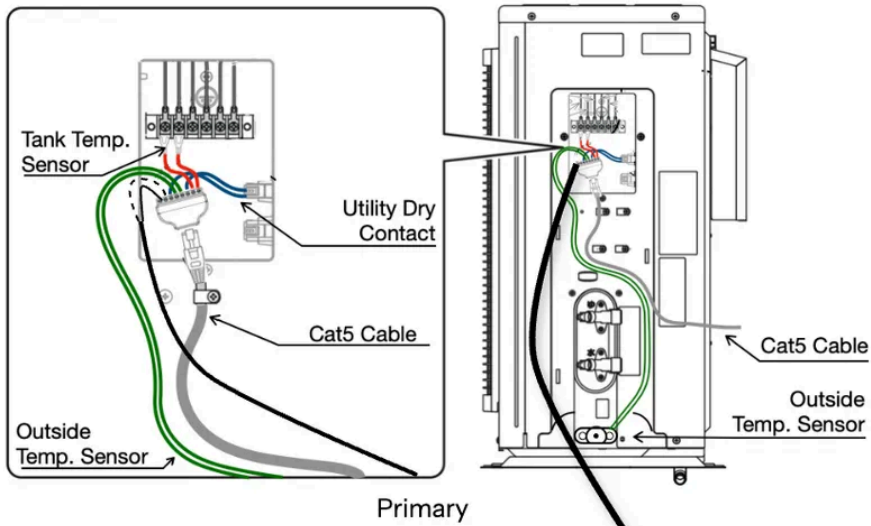
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### Harvest wiring harness connections inside the signal box of the primary SANCO2 heat pump

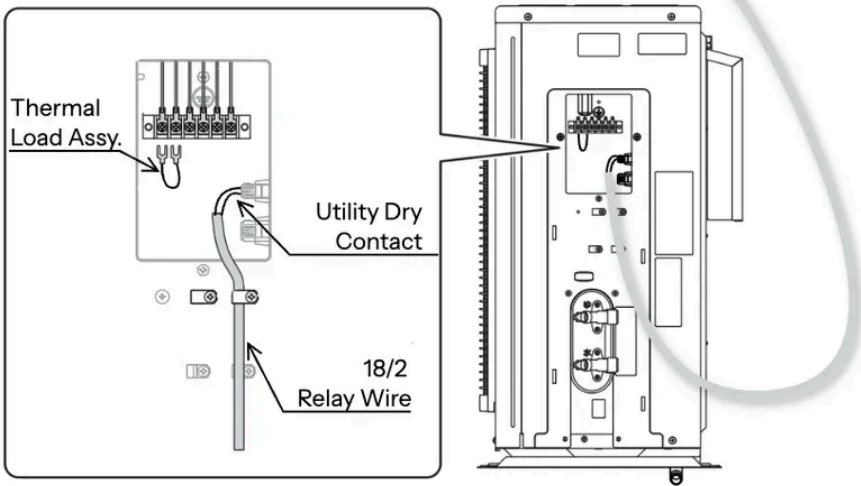
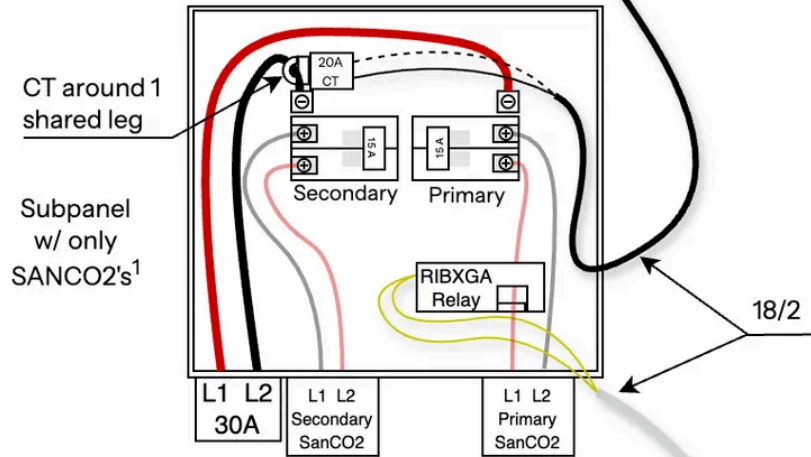
Follow the diagram for the Single SANCO2 wiring setup, except for the 20 A CT.

#### Current Transducer inside the electrical subpanel box

- 1** Install the 20A CT on either the L1 or L2 incoming 30A power wires within the subpanel. This will require extending the length of the CT wires which can be done with 18/2 thermostat wire.
- 2** Install current sensing switch (RIBXGA Relay) within electrical subpanel on **one** 15A power wire powering the primary SANCO2 heat pump.
- 3** Cut the dry contact loop (white wire) inside the signal box of the secondary heat pump, and connect up to the current sensing switch. This will require extending the length of the current sensing switch, which can be done with 18/2 thermostat wire.
- 4** Connect the thermistor load assembly (7.5k ohm resistor) to the “temperature” terminals within the secondary SANCO2's signal box.



Primary



Secondary

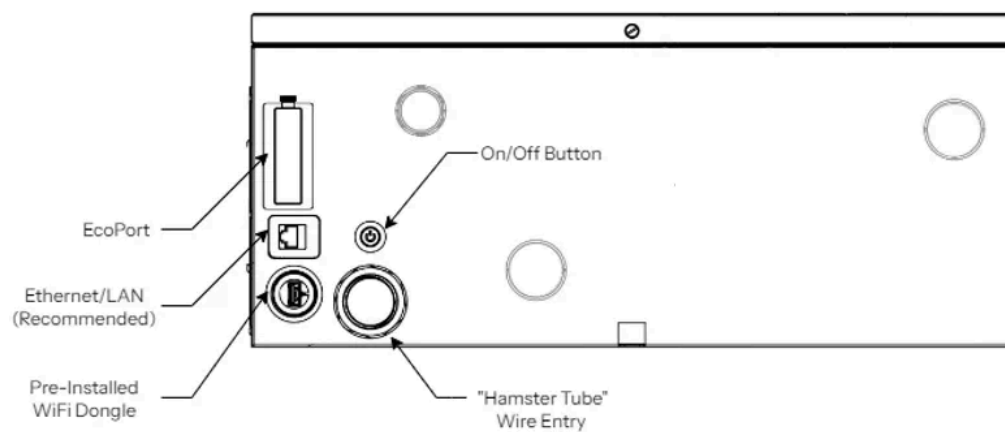
## Notes:

1. SANCO2 power wires to SANCO2's not shown for clarity. Refer to "Powering the SANCO2".

## 1.6.2 Low Voltage Wiring Diagram

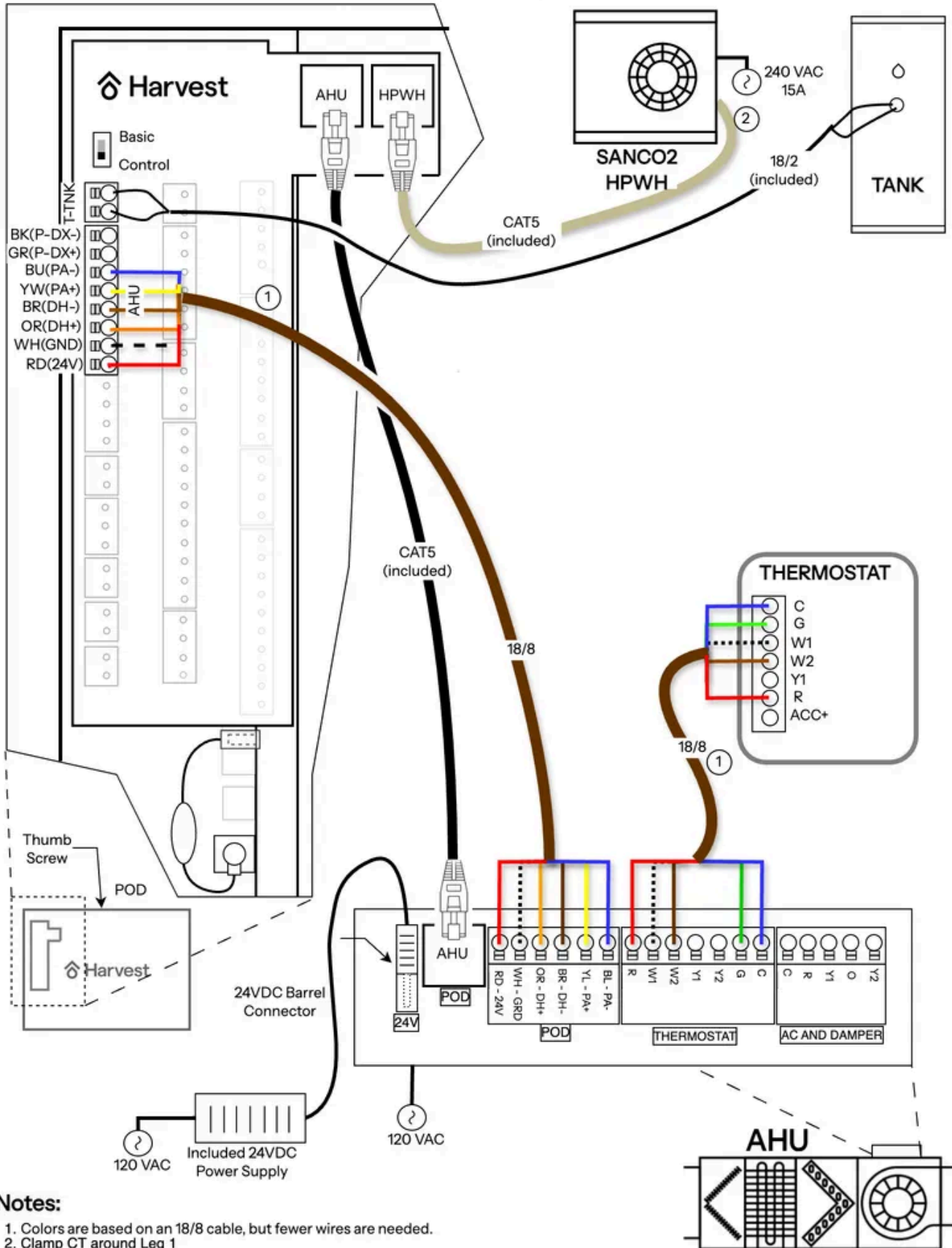
**⚠ WARNING:** Do not power the Harvest Pod or 3rd Party Air Handler until all wiring is complete and correct. Wiring the Harvest Pod incorrectly may damage it.

- 1 Remove the thumb screws at the top and bottom of the pod to remove the front panel of the Pod and access the wiring connections.
- 2 To make internal wiring connections, push wires through the "hamster tube" from underside of the pod.



- 3 Wire the Pod according to one of the diagrams below:

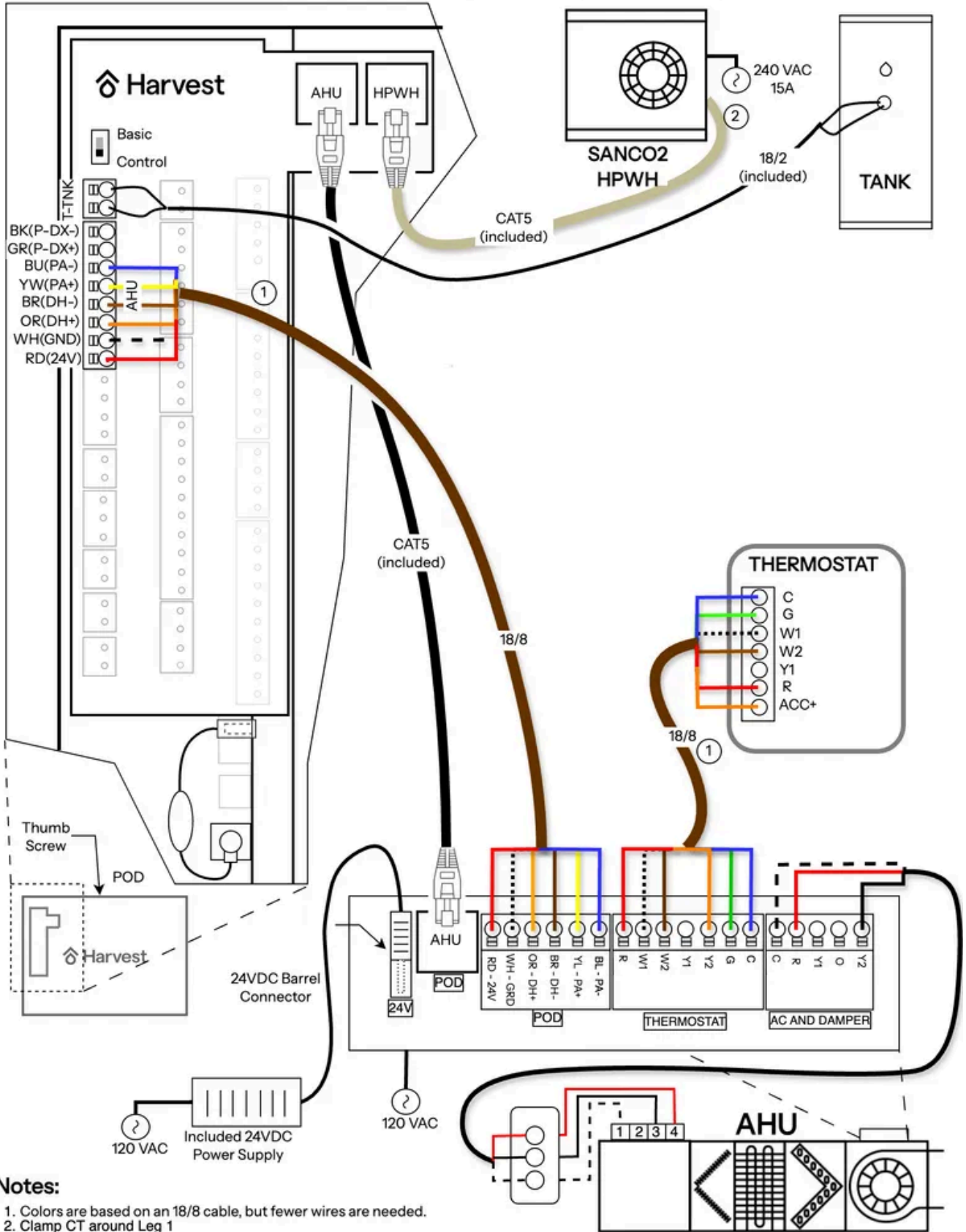
# Hydronic Heating only



## Notes:

1. Colors are based on an 18/8 cable, but fewer wires are needed.
2. Clamp CT around Leg 1

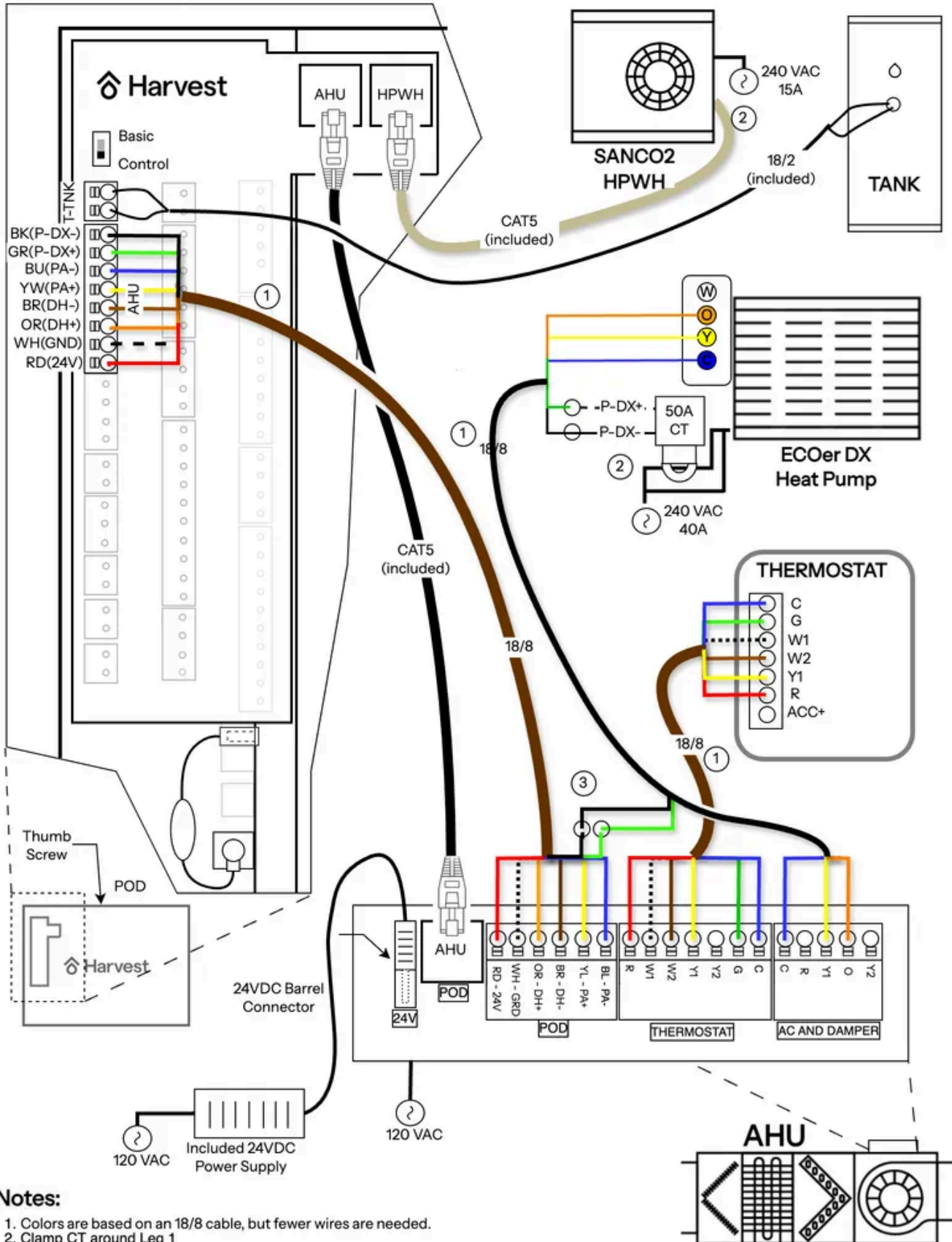
# Hydronic Heating with Night Cooling



## Notes:

1. Colors are based on an 18/8 cable, but fewer wires are needed.
2. Clamp CT around Leg 1

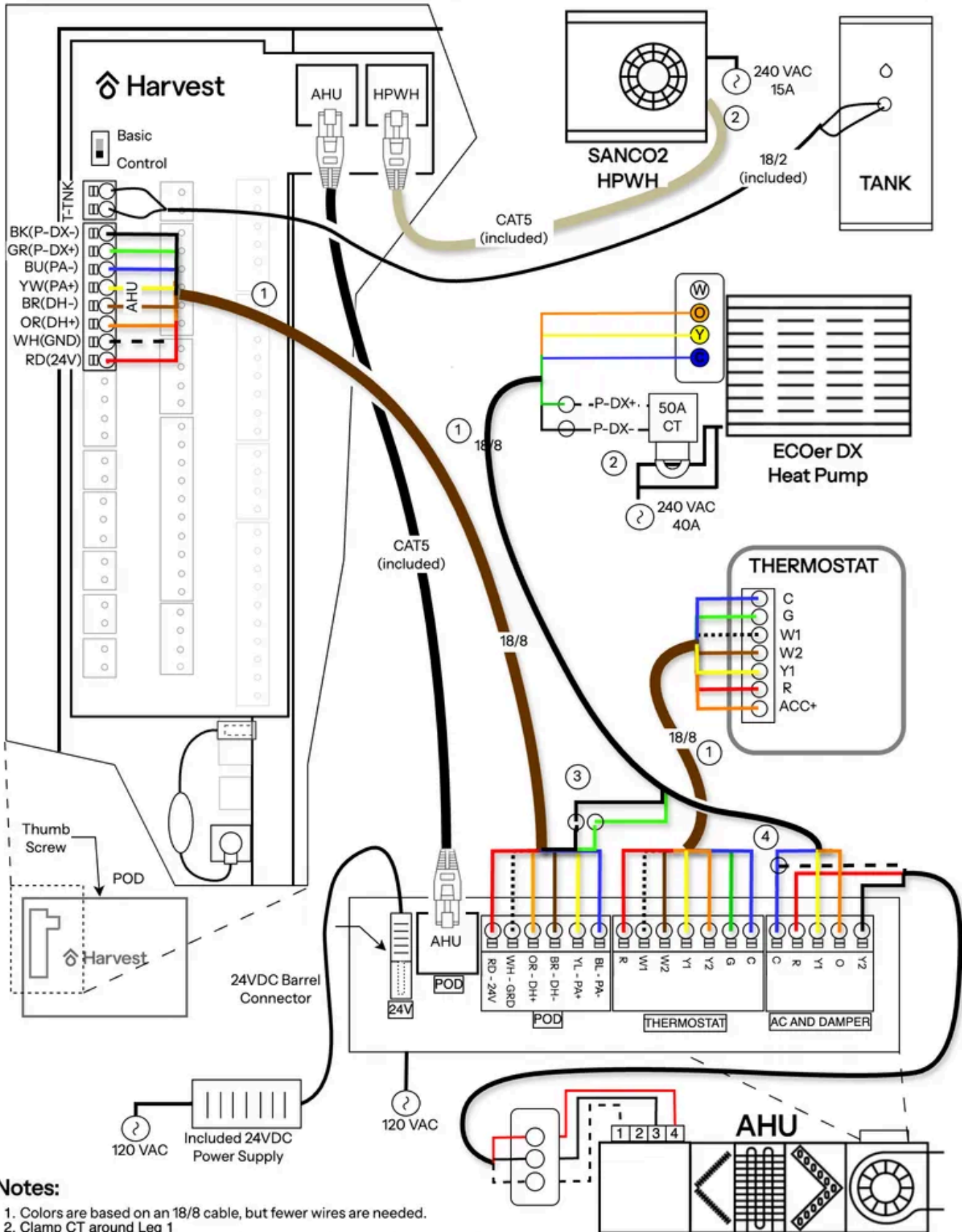
# Hydronic Heating with Heat Pump Cooling (HPAC)



## Notes:

1. Colors are based on an 18/8 cable, but fewer wires are needed.
2. Clamp CT around Leg 1
3. A splice of the black and green wires are made between these two cables.

# Hydronic Heating with Heat Pump Cooling (HPAC) and Night Cooling



## Notes:

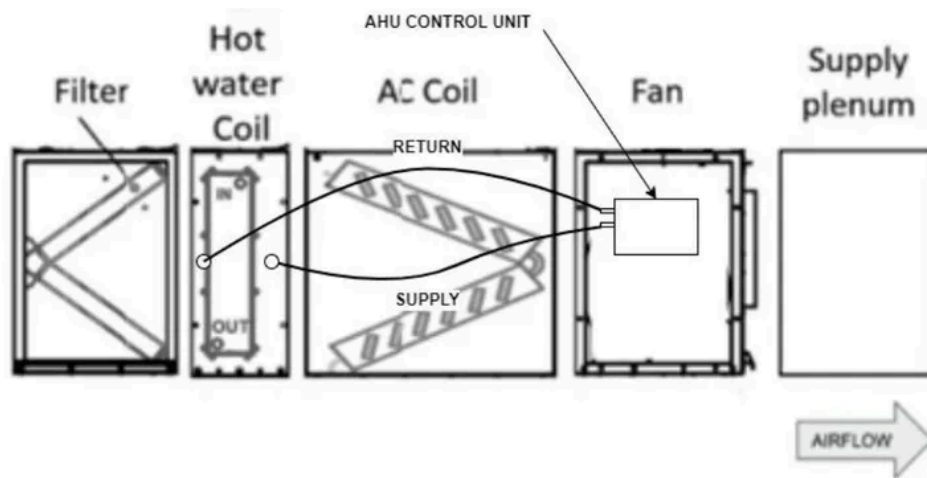
1. Colors are based on an 18/8 cable, but fewer wires are needed.
2. Clamp CT around Leg 1
3. A splice of the black and green wires are made between these two cables.
4. A splice of the two C wires

## 1.6.3. Airflow Sensing

### Connect the hydronic coil pressure-sensing tubing

This enables the system to measure airflow volume through the AHU.

- This enhances the commissioning process, as the system can directly measure the airflow achievable through the duct system.
- It provides a longer-term tracking of air flow, which can highlight issues such as clogged filters or zone controllers that have stopped working.



- Remove the plastic barb caps on either side of the AHU's hydronic coil.

**i** To see the black barbs that are inset visually, it might be necessary to push away some of the insulation with a small screwdriver.

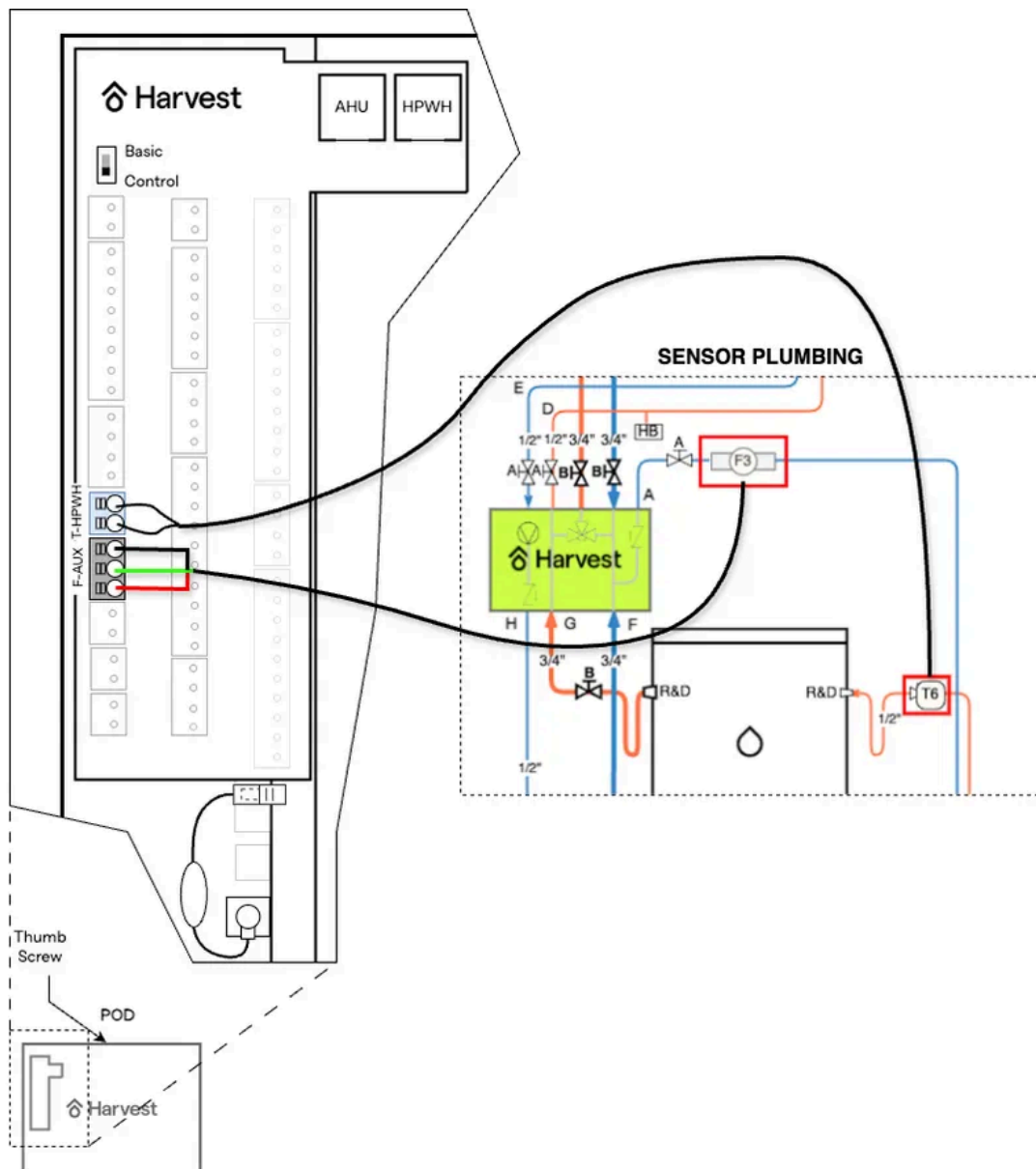
- Connect the “Supply” barb of the AHU control board to the barb on the supply side of the AHU hydronic coil.
- Connect the “Return” barb of the AHU control board to the barb on the return side of the AHU hydronic coil.

## 1.6.4. Twin SANCO2 Additional Sensor Wiring

**i** A Twin-SANCO2 install kit is required for installation

Directly measuring the heat output of the combined SANCO2 heat pumps enables better control of the state of charge of the thermal battery.

Install and wire the flow meter (F3) and the temperature sensor (F6), provided as part of the kit, as shown in the figure below.



! The flow meter has a flow direction marked. It should point towards the SANCO2 heat pump.

i Use tstat wire (18/x) to extend the thermistor or flow meter wires if needed

# 1.7. Start Up

## 1.7.1. Hydronic System Start Up

---

⚠ **WARNING:** Failure to properly bleed air from the SANCO2 heat pump, Pod, and hydronic coil may prevent the system from operating correctly and lead to damage to the SANCO2 Heat Pump.

### Domestic Hot Water

- 1 Ensure all plumbing and wiring involving the SANCO2 and the Pod are correct and complete. Do **NOT** power the Harvest Pod at this time.
- 2 Fill the tank by opening valves on lines B and F (see [Plumbing System Diagrams](#)).
- 3 Open PRV to allow air to exit the system. Leave open until water comes out of the relief valve.
- 4 Open the remaining valves (see [Plumbing System Diagrams](#)).
- 5 Open the hot water faucets to bleed air from the house piping system. Close the hot water faucets after no air is seen in the water.
- 6 Open the three water bleed valves on the SANCO2 Heat Pump. Two are on the water connections, and the third is underneath the heat pump. Close the bleed valves after no

air is seen in the water.

- 7 Power the SANCO2 outdoor unit.

Upon powering on, SANCO2 undergoes a 5-minute air bleed cycle, displays "12:00" on the screen, and begins to run.

✓ At this point, hot water will accumulate in the tank. It will take ~1 hour for the hot water tank to accumulate enough hot water for domestic hot water service to be usable.

## Hydronic Coil

For the hydronic coil to operate, all air must be purged from the hydronic coil loop.

**i** NOTE: A check valve inside the Pod means that purging the hydronic coil plumbing loop at the highest point of the system will not be effective.

- 1 Close the shut-off valve at the tank on line H (see Plumbing System Diagrams).
- 2 Open the Hose Bib (HB) drain on line H for at least 5 minutes, ensuring no air is visible in the water.
- 3 Close the drain and **re-open** the shut-off valve at the tank on line H.

## 1.7.2. ECOer Heat Pump A/C Start Up

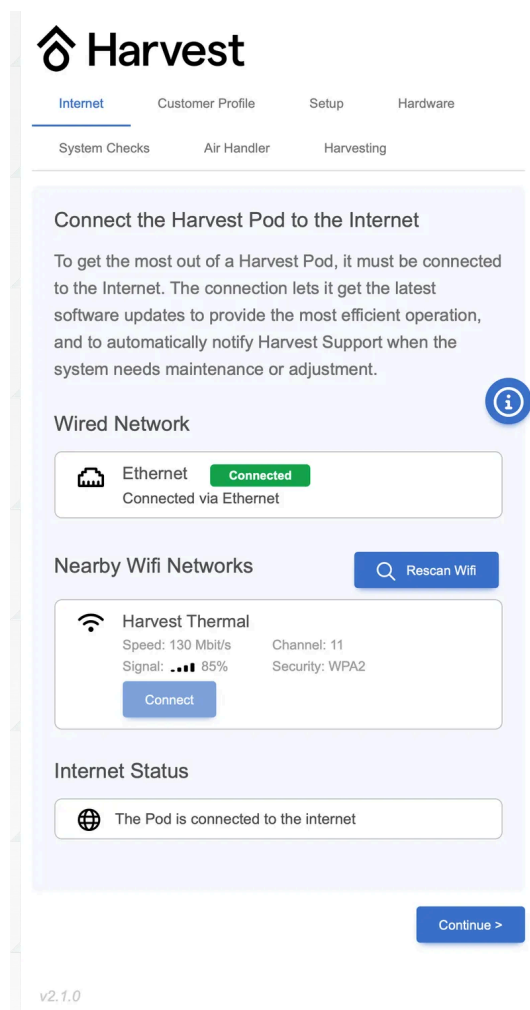
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- 1 Follow ECOer Heat Pump manufacturer manual for heat pump refrigerant charging and start-up instructions.
- 2 Plug in the 24 VDC power supply to provide power to the Pod. Switch the Pod On by pressing the power button underneath the Pod. The power button will light up.
- 3 Using the thermostat, confirm that both heating and cooling calls cause the ECOer heat pump A/C to operate as expected.

# 17.3. Thermal Battery System Start Up

## System Commissioning with the Harvest Tech App

- 1 Power on the Harvest Pod.
- 2 Connect your phone/tablet/laptop to the Harvest Pod's WiFi access point
  - The network name (HarvestPodXXXX) and password can be found on the label on the bottom of the Pod
  - Wait at least 5 minutes after powering the pod before attempting to access the Harvest Tech App.
- 3 Navigate to "http://harvestpodXXXX.local" using an internet browser, where "XXXX" is the same as the name of the network.
- 4 Configure the Internet Connection, and look for a green "Connected" indicator:



5

Fill in the customer profile and time zone (password can be found on the label on the bottom of the pod):

The screenshot shows the Harvest application interface. At the top, the Harvest logo is displayed. Below the logo, there are navigation tabs: Internet, Customer Profile (which is selected and underlined), Setup, and Hardware. Underneath these, there are sub-tabs: System Checks, Air Handler, and Harvesting. The main content area is divided into two sections: 'Customer Information' and 'Installer Information'. The 'Customer Information' section includes a text block explaining that address information is used for optimization, followed by input fields for First Name, Last Name (Required), Street Address (Required), City (Required), State (Required), and ZIP (Required). A Time Zone dropdown menu is set to 'US Mountain'. The 'Installer Information' section includes a text block and a 'Company (Required)' input field. At the bottom right, there are two buttons: 'Save' and 'Save & Continue >'. In the bottom left corner, the version number 'v2.2.0' is visible, and in the bottom right corner, there is an information icon (a blue circle with a white 'i').

6

Setup the pod:

1. Confirm you have installed the SANCO2 heat pump and the tank
2. Fill in the correct Optional DX heat pump and Air Handler Protocol
3. Tap "Apply"

**Harvest**

Internet Customer Profile **Setup** Hardware

System Checks Air Handler Harvesting

### 1. Confirm Installation Prerequisites

The SANCO2 heat pump and tank must be installed and plumbed before commissioning the system.

I have installed the SANCO2 heat pump  
 Yes

I have installed the tank  
 Yes

### 2. Select the System Type

The system type determines key configuration parameters.

Harvest Open  
 Third-party air handler + Optional DX heat pump or A/C

Harvest Radiant  
 Flat plate heat exchanger + Radiant zone controller

Harvest Classic  
 Airscape air handler + Optional Ecoer heat pump

Optional DX heat pump  
 Heat pump  
 None

Is economizer (night cooling) installed?  
 Not Installed

Apply

Save Save & Continue >

v2.2.0

**7** Select the appropriate installed hardware:

- The generation can be found in the model number shown on the nameplate of the SANCO2.
- "Number of heat pumps" refers to the number of SANCO2 Heat Pump Water Heaters installed.
- F-SAN and T-SAN are optional sensors included in the Harvest Cold Weather Kit and/or the Twin SANCO2 Kit.

## SANCO2 Heat Pump Water Heater

The SANCO2 is the primary heat pump in the Harvest system.

Generation

GS3 GS4 **GS5**



Number Of Heat Pump Water Heaters

One ▾

## Storage Tanks

The Harvest system stores energy in one or two hot water tanks. Indicate how many storage tanks and their capacity. For a secondary tank, just indicate its capacity (in gallons).

Primary Tank

SanCO2 83 ▾

Diameter Outer  
24.5 Inches

Height Outer  
68.875 Inches

Volume  
83 Gallons

Volume Above T4  
29 Gallons

Secondary Tank

Installed

Volume  
83 Gallons

## Air Handler

Provide Air Handler (AHU) configuration details.

Harvest Air Handler Controller

Gen 2 **Gen 3**

## Hydronic Coil

Select the model / capacity of the hydronic coil.

Model / Capacity

HT-CB-MA-4-1 (Slab) ▾

Air Handler Pipe Diameter

3/8" 1/2" **3/4"**

Total Pipe Length (Pod-Coil-Pod)

25 Feet

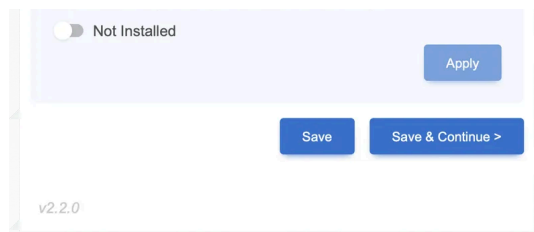
## Optional SANCO2 Sensors

These sensors are installed when accurate SANCO2 performance measurements are needed. When not installed, SANCO2 performance is estimated.

Heat Pump Flow Sensor (F-SAN)

Not Installed

Heat Pump Output Temperature Sensor (T-SAN)



**8** Check sensors and thermostat for proper function:

1. Ensure all listed sensors are indicated as "OK"

**1. Sensor Check**

Use this information to validate that sensors are reading properly.  
Sensors update every 64 seconds.  
Next Update in 48s

**TEMPERATURE (F)**

T-CAL	Calibration	89.6	OK
T-HOT	Hot water to heating and pre-mix DHW	143.1	OK
T-CLD	Cold water from main	49.9	OK
T-RTN	Cold water return from heating	77.3	OK
T-TNK	Mid-tank water temperature		Cannot be read in Basic mode
T-SCW	Cold water to SANCO2	50.0	OK
T-OAT	Outdoor air temperature	49.7	OK
T-DHW	Post-mix DHW supply temp	106.9	OK

**FLOW (GAL)**

F-DHW	Domestic hot water (DHW) usage	0.00	OK
F-HTR	Hot water flow to heating	6087.90	OK

**POWER (W)**

P-SAN	Power draw by SANCO2	944	OK
P-AHU	Power draw by air handler	116	OK
P-HPAC	Power draw by heat pump A/C	2537	OK

**9** Test the SANCO2 wiring:

1. Select "Enable Manual Control"
2. Toggle the SANCO2 on

The SANCO2 should turn on, and the power draw should read over 500 W. This will take 3-5 minutes.

### 2. SANCO2 Wiring Check

Validate that the wiring to the SANCO2 is all good and that the SANCO2 responds to control signals.

[Start Wiring Check](#)

1. Toggle the SANCO2 on or off  
 On  
0 sec / 256 sec (0%)
2. The SANCO2 will draw about 1000 W when on; 0 W when off  
Current power draw: ---  
Next Update in 48s

10

Test the hydronic circulator pump to ensure it is fully purged of air:

1. Ensure Manual Control is enabled.
2. Enter 40 and select "Start". The circulator pump inside of the Pod should turn on, and the app should display flow after 1-2 minutes.
3. If no flow is displayed, check that the loop is fully purged and that all valves are open.

### 3. Pod Circulator Purge Check

Use this section to validate that the circulator pump has been properly purged of air and is running when set to run.

[Start Purge Check](#)

1. Measure water flow rate in heating loop  
Set pod circulator pump speed to a value between 40% and 50%. Wait for up to 2 minutes for the flow rate to stabilize.  
 [Stop](#)
2. The flow rate should be greater than 0.1 GPM after stabilizing  
Current flow rate: ---  
Next Update in 48s

[Save](#) [Save & Continue >](#)

v2.2.0

Note: particularly long pipe runs may require a higher pump speed to produce flow

**11** Configure the air handler:

Enter home Design Heating Temperature (99% coldest temperature in Farenheit) and heating load at the design temperature (in kBTU/h) in order to configure the hydronic variable heat output.

## 1. Configure Heat Output

Per ASHRAE, design heating temperature is 99% of the coldest hourly temperature. Design heating load for this home is the Manual J heating load at design temperature.

Design Heating Temperature

40 °F



Design Heating Load

24 kBTU/h

## 2. Calibrate Fan

Run the fan at two test points to determine the fan pressure curve for this duct system.

Start Calibration

### 1. Measure pressure deltas for different fan speeds

Press the 0 PWM button to calibrate pressure drop measurements, and 80 PWM to measure air flow. Wait up to 64 seconds for the measurements to update for each button.

Fan Control	Pressure Delta (in.w.c.)	Air Flow (CFM)
0 PWM	0.00	0
80 PWM	0.35	1065

### 2. Adjust Air Flow Parameters

Default air flow parameters are calculated based on the measurements and inputs from the previous sections. They can be adjusted here based on customer air flow or noise preferences. Use the Override column to override calculated values from air flow calibration.

Test Max Heat CFM	▼
Test Min Heat CFM	▼
Test Fan CFM	▼
Test Cool CFM	▼

### 3. Save Fan Calibrating Settings

Complete Fan Calibration

## 3. Calibrate Basic Mode

Basic mode is a fallback mode in case of an electronics or sensor issue. It uses a fixed fan speed that needs to be calibrated.

Start Calibration

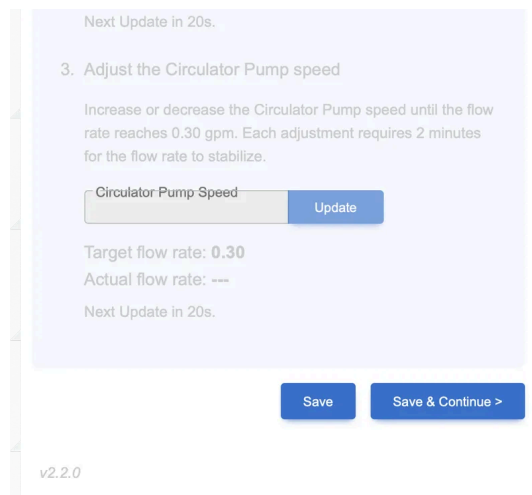
### 1. Manually set the thermostat to call for Heat

### 2. Manually adjust the fan power

Adjust the fan on the AHU board until the power is in the 70-90 W range. Wait 15 seconds between adjustments.

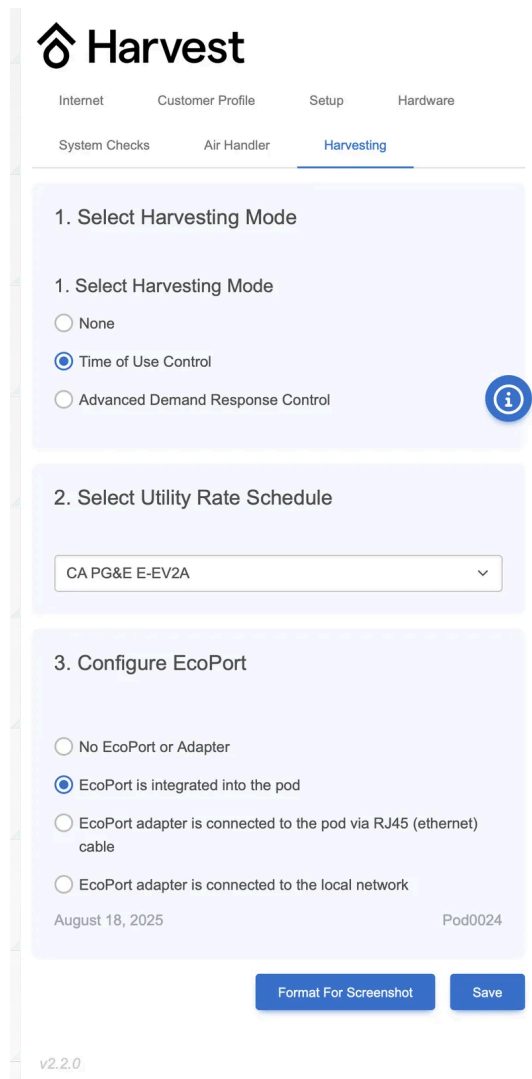
Target Fan Power: **80 W**

Actual Fan Power: ---



## 12 Configure Energy Harvesting

1. Select Time of Use Control
2. Select Utility Rate Schedule based on customers' current or requested utility rate.
3. Select "EcoPort is integrated into the pod."



## 1.8. Troubleshooting

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**⚡ELECTRICAL SHOCK HAZARD:** Confirm all circuits are de-energized before performing any wiring activity

✓ **Check All Wiring, Particularly Any Connections. Gently Pull On Wire Connections To The Pod And Heat Pump To Make Sure They Are Tight.**

✓ **Check That The Water Is On, All Valves Are Open, And There Are No Leaks**

✓ **The SANCO2 Heat Pump Does Not Turn On**

- Check that the heat pump is powered on (red dot blinking on display)
- Check that all isolation valves are open
- Thoroughly purge the heat pump from all three purge valves (cold line, hot line, and circulator pump valve underneath the unit)
- Ensure there is no debris obstructing flow
- Ensure there is no spring check valve on the SANCO2
- Check all wiring connections are good at the heat pump and pod

✓ **SANCO2 Control Panel Displays H7**

This indicates a wiring error with the tank temperature sensor

- Check all of the temperature sensor connections
- Ensure all IDC's are completely crimped and the heads are flush with the casing
- Check for any cuts or defects in the cat5 cable between the pod and the SANCO2
- Check wiring connections of terminals 1 & 2 in the SANCO2 heat pump signal box

✓ **Tank Temperature Sensor Reading Above 120°F After Heat Pump Has Completed A Full Charge (Heat Pump Has Stopped):**

- Ensure the tank temperature sensor is fully inserted into the back of the thermowell, and use a plug of insulating material to reduce thermal losses and prevent tension on the wire from pulling the sensor.

WARNING: DO NOT use a clip to secure the sensor as it can cut into the wire insulation and create an electrical short.

✓ **Chemical Smell In Water**

From SANCO2 GS4 Installation Manual:

If any bond or flux has entered the tank unit and the hot water has a chemical/acrid smell, take the following countermeasures.

- a) After heating the water in the tank unit, drain it and clean inside the tank unit. Fill the tank unit with 26 gallons of water and exchange twice.
- b) Fill up the tank unit.
- c) Drain water from the the relief valve for one to two minutes
- d) Run water from all the hot water supply faucets in the house for about ten minutes to clean inside the pipes

✓ **For Issues Relating To Units Within The System Such As The Air Handler, Refer To The Manufacturer's Documentation And/Or Website For Guidance**