GEO-FLO

www.geo-flo.com

Geo-Flo HCT Buffer Tank
Installation, Operating, and Maintenance Manual

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NOTES:

This guide provides the installer with instructions specific to the Geo-Flo Hydro-Connect System. Please refer to your heat pump manufacturer's instructions or IGSHPA guidelines for additional detailed application and installation information. Please review the entire document before proceeding with the installation.

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Overview

A buffer tank is used in heat pump and boiler hydronic systems to prevent equipment short-cycling, reduced system efficiency, and reduced equipment life due to a mismatch between the equipment output (BTUs) when operating and the system load (BTUs) at any point in time. A buffer tank “de-couples” the heat pump flow requirements from the hydronic system flow requirements.

A geothermal water-to-water heat pump almost always needs a buffer tank to allow for heat pump flow rates that are different from hydronic system flow rates. For example, a 3 ton water-to-water heat pump typically requires about 9 GPM (34 l/min) for the ground loop (“source” heat exchanger) and for the hydronic side (“load” heat exchanger). Dropping below 7 GPM (26 l/min) could cause refrigeration circuit problems. However, the hydronic heating or cooling system connected to the load heat exchanger may require much less flow, especially multi-zone systems like radiant floor heating, where a singlel zone using 1/2” (13mm) PEX piping may require only 1.5 GPM (6 l/min).

Modulating-condensing boilers can also benefit from a buffer tank to reduce short cycling. For example, when a mod-con has a 150,000 BTU/hour (44 kW) capacity with a 5:1 turn down ratio, it could be firing at 30,000 BTU/hour (9 kW) to satisfy a load of just 10,000 BTU/hour (3 kW) when the heat loss is lower at warmer outdoor temperatures (or when only one radiant zone is calling), causing the boiler to short cycle. The two worst times in the combustion cycle are startup and shutdown, when the flue gas is at its dirtiest. The boiler will burn more fuel and create wear and tear on all components, shortening the life expectancy of the heat exchanger when installed without a buffer tank.

The HCT buffer tanks are of composite construction consisting of a fiberglass reinforced polypropylene tank that is lightweight and will not corrode. The tank is insulated with closed-cell foam for a high R-value, and finished with a durable polypropylene shell that resists scratches and dents, and will not rust. The HCT buffer tanks ship standard with union connections installed into the tank, an auto air vent and vacuum breaker assembly, a drain valve with garden hose connection, and a thermal well (except for HCT-R2).

Models

Geo-Flo provides 5 buffer tank sizes with three choices of piping for each tank size. Each tank size is available in 3-pipe (direct to load) with or without an air vent and 4-pipe (standard) configurations. The Installation and Operation sections of this manual describe these configurations.

Nomenclature

1-3 4-5 6-7

HCT - R5 - SA

Type
HCT= Hydro-Connect Buffer Tank

Tank
R= Round Tank

Tank Size (Gallons)
2= 22 Gal
4= 40 Gal
5= 55 Gal
8= 80 Gal
9= 119 Gal

Connection Options
SA= Standard with Air Vent (4-PIPE)
D= Direct to Load (3-PIPE)
DA= Direct to Load with Air Vent (3-PIPE)

Available Models

MODEL PART NUMBER	DESCRIPTION (4-PIPE)	VOLUME GALLONS	CONNECTIONS	THERMAL WELL
HCT-R2-SA	22 GAL, STANDARD, AIR VENT (NO THERMOWELL)	22	1-1/4“	NO
HCT-R4-SA	40 GAL, STANDARD, AIR VENT	40	1-1/4“	YES
HCT-R5-SA	55 GAL, STANDARD, AIR VENT	55	1-1/4“	YES
HCT-R8-SA	80 GAL, STANDARD, AIR VENT	80	2“	YES
HCT-R9-SA	119 GAL, STANDARD, AIR VENT	119	2“	YES

MODEL PART NUMBER	DESCRIPTION (3-PIPE)	VOLUME GALLONS	CONNECTIONS	THERMAL WELL
HCT-R2-D	22 GAL, DIRECT (NO THERMOWELL)	22	1-1/4“	NO
HCT-R4-D	40 GAL, DIRECT	40	1-1/4“	YES
HCT-R5-D	55 GAL, DIRECT	55	1-1/4“	YES
HCT-R8-D	80 GAL, DIRECT	80	2“	YES
HCT-R9-D	119 GAL, DIRECT	119	2“	YES

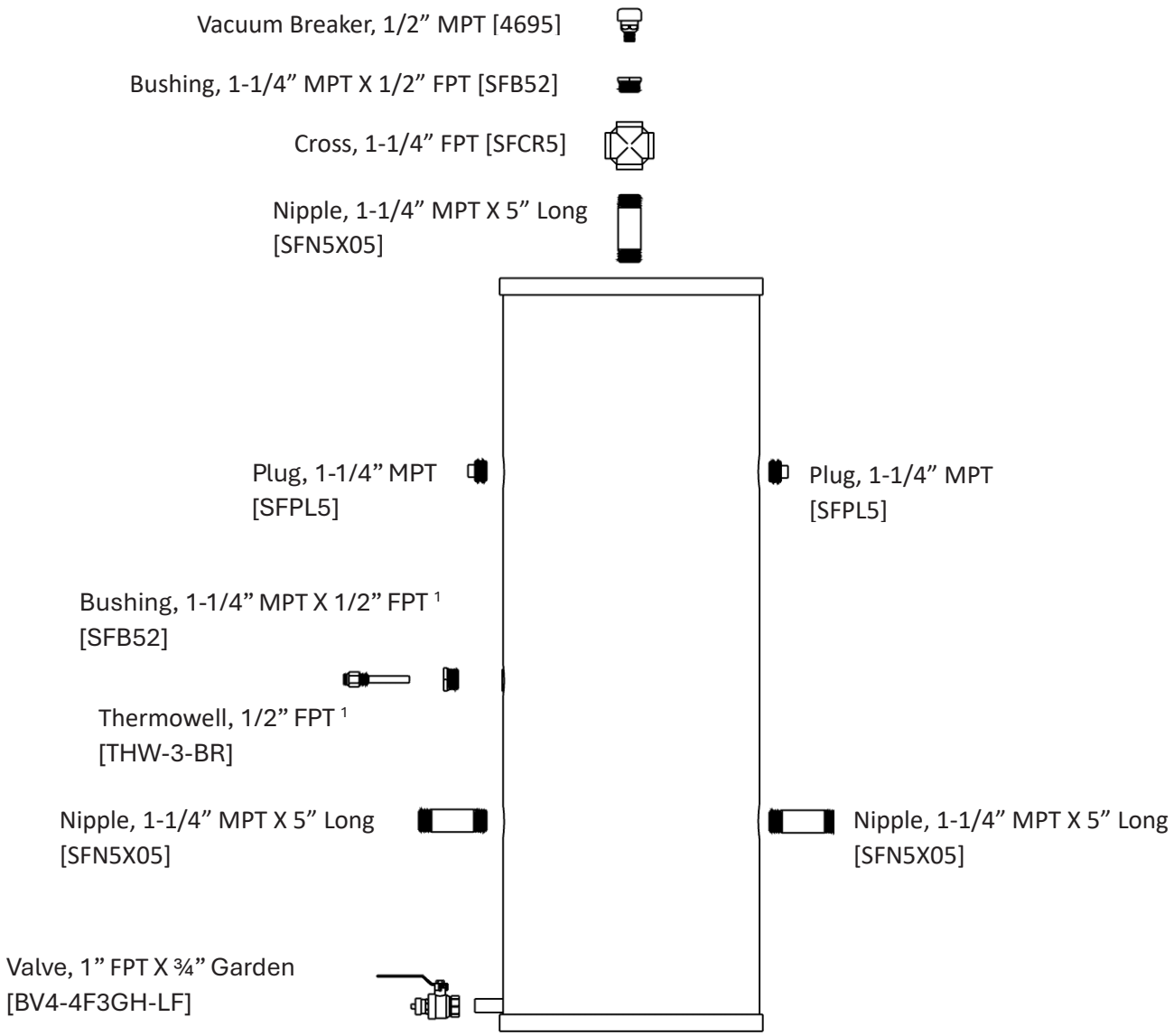
MODEL PART NUMBER	DESCRIPTION (3-PIPE)	VOLUME GALLONS	CONNECTIONS	THERMAL WELL
HCT-R2-DA	22 GAL, DIRECT, AIR VENT (NO THERMOWELL)	22	1-1/4“	NO
HCT-R4-DA	40 GAL, DIRECT, AIR VENT	40	1-1/4“	YES
HCT-R5-DA	55 GAL, DIRECT, AIR VENT	55	1-1/4“	YES
HCT-R8-DA	80 GAL, DIRECT, AIR VENT	80	2“	YES
HCT-R9-DA	119 GAL, DIRECT, AIR VENT	119	2“	YES

Figure 1A. HCT-R_-D Direct to Load (3-Pipe) Assembly Buffer tank components.

Direct to Load (3-Pipe) Assembly Diagram

HCT-R2-D, HCT-R4-D, & HCT-R5-D

22 Gallon, 40 Gallon, and 55 Gallon Buffer Tanks



[1] HCT-R2-D 22 gallon buffer tank does not have a thermowell port.

Figure 1B. HCT-R_-D Direct to Load (3-Pipe) Assembly Buffer tank components.

Direct to Load (3-pipe) Assembly Diagram

HCT-R8-D & HCT-R9-D

80 Gallon, and 119 Gallon Buffer Tanks

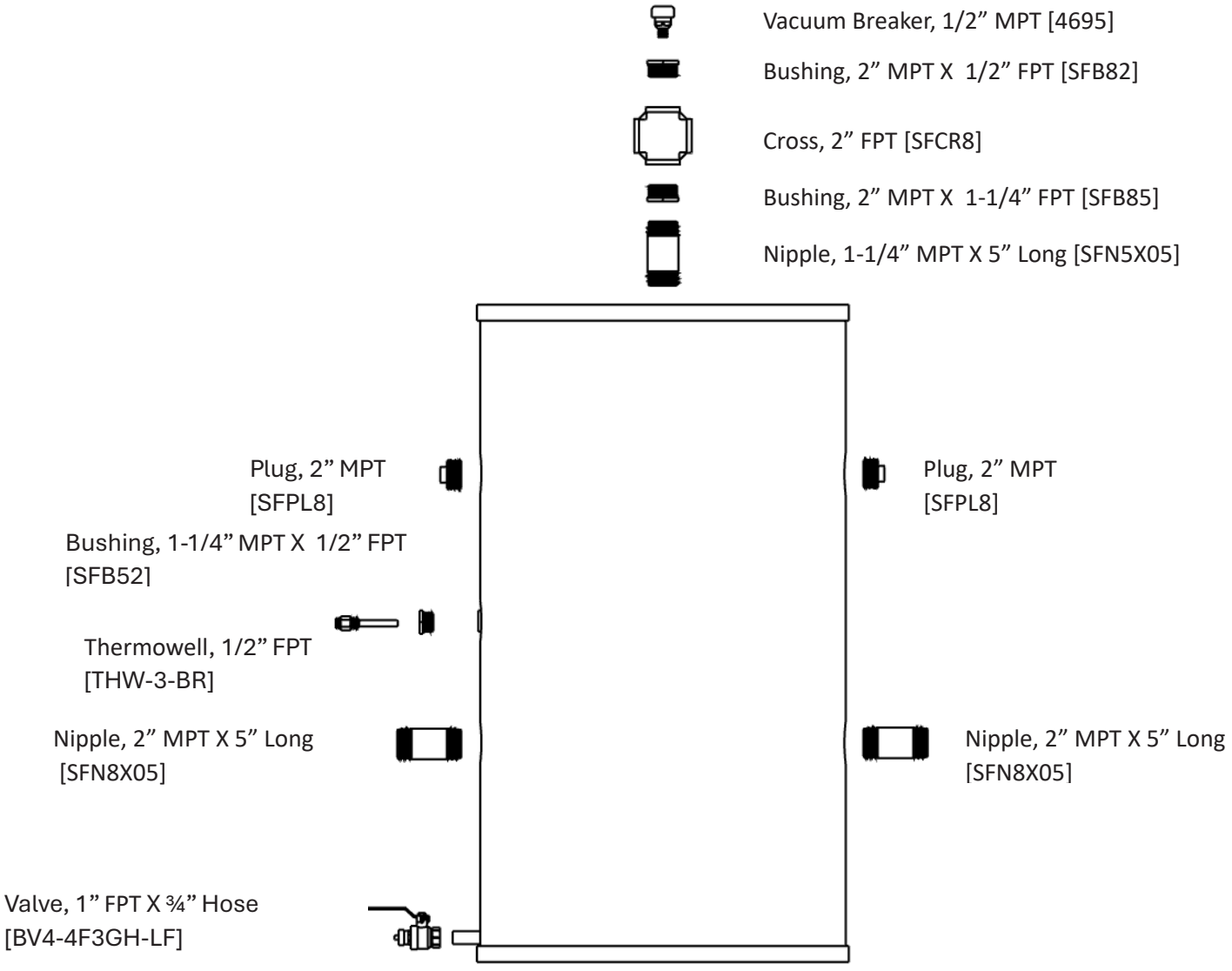
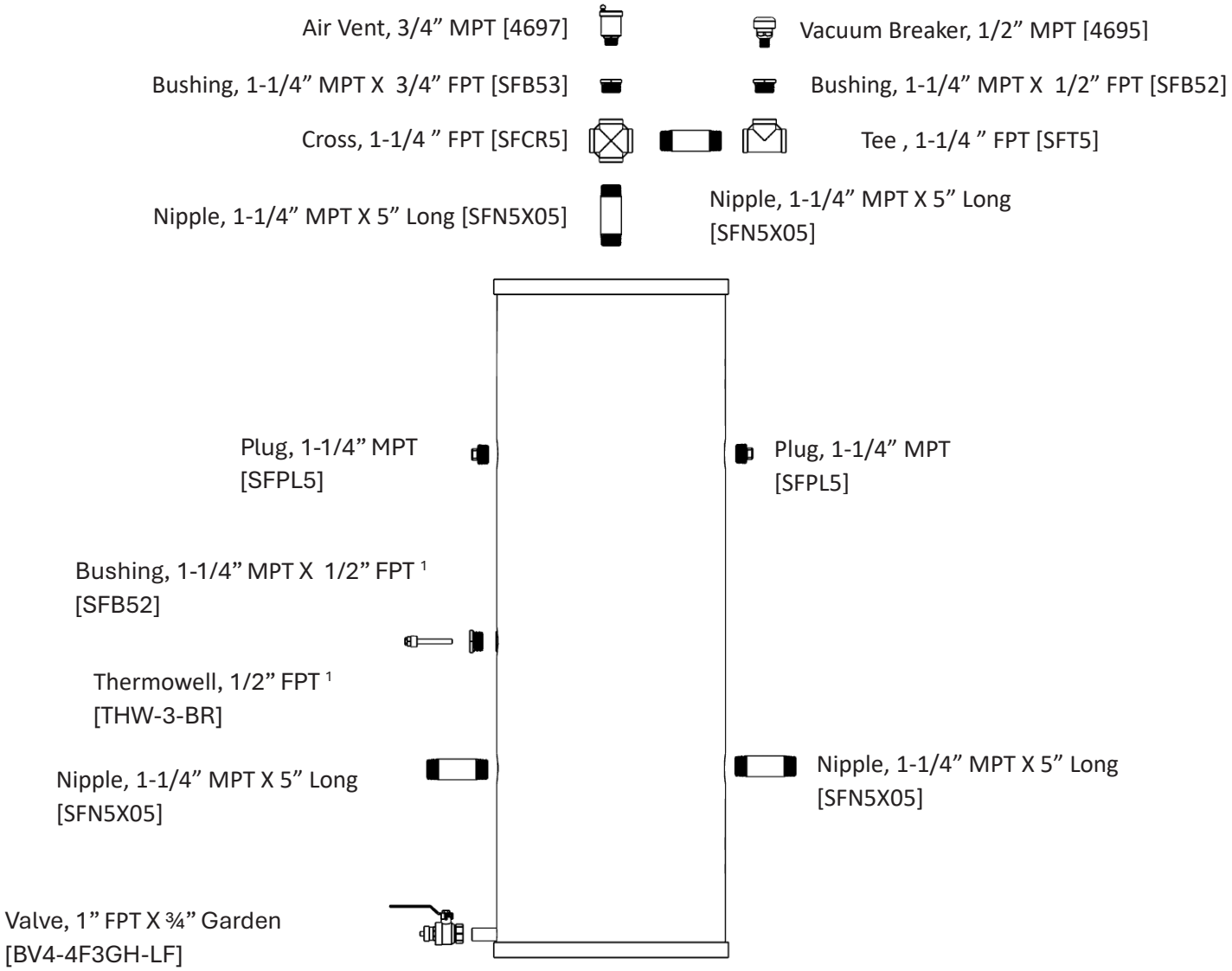


Figure 1C. HCT-R_-DA Direct to Load with Air Vent (3-Pipe) Assembly Buffer tank components.

Direct to Load (3-Pipe) with Air Vent Assembly Diagram

HCT-R2-DA, HCT-R4-DA, & HCT-R5-DA

22 Gallon, 40 Gallon, and 55 Gallon Buffer Tanks



[1] HCT-R2-DA 22 gallon buffer tank does not have a thermowell port.

Figure 1D. HCT-R_-DA Direct to Load with Air Vent (3-Pipe) Assembly Buffer tank components.

Direct to Load (3-pipe) with Air Vent Assembly Diagram

HCT-R8-DA & HCT-R9-DA

80 Gallon, and 119 Gallon Buffer Tanks

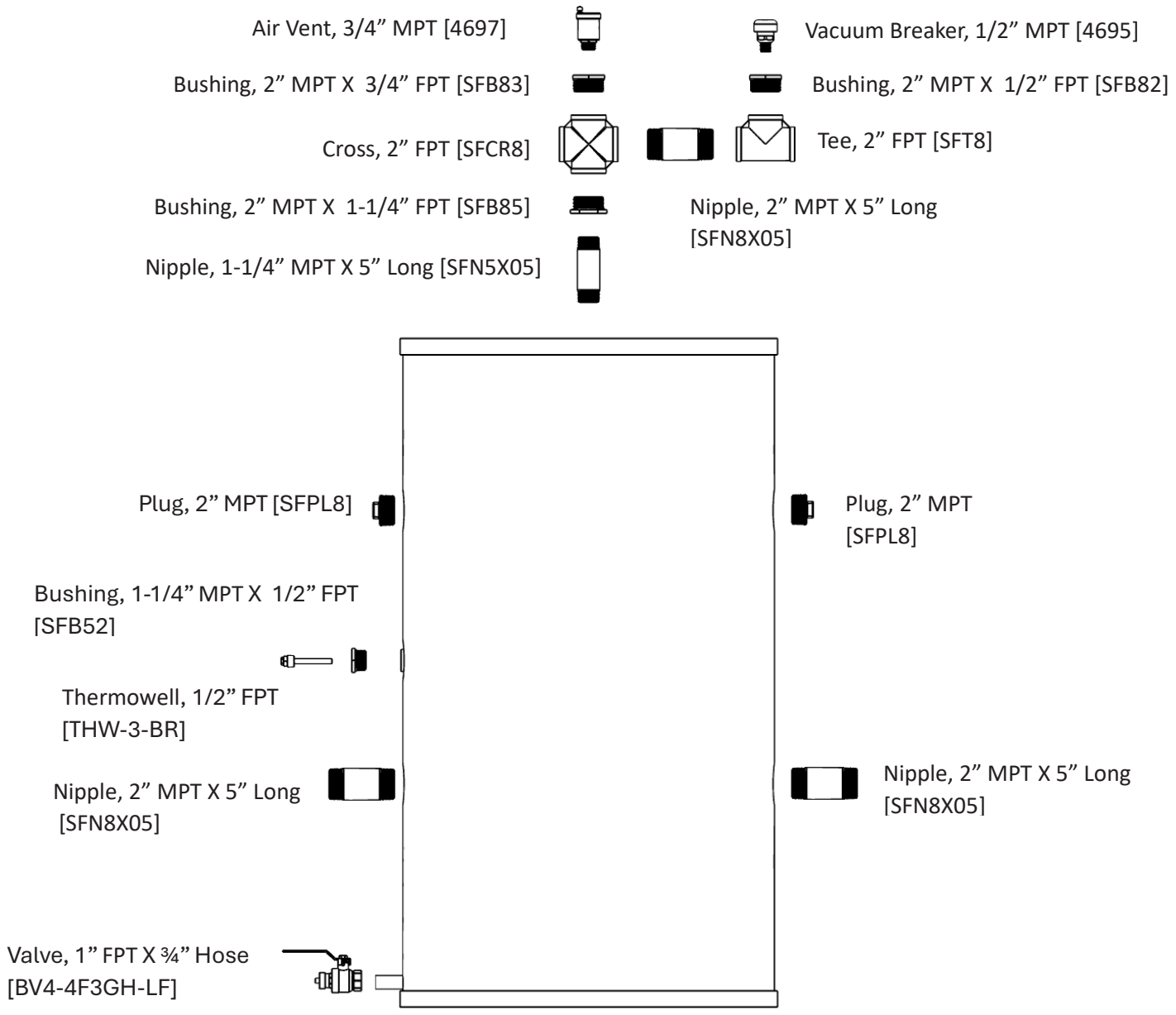
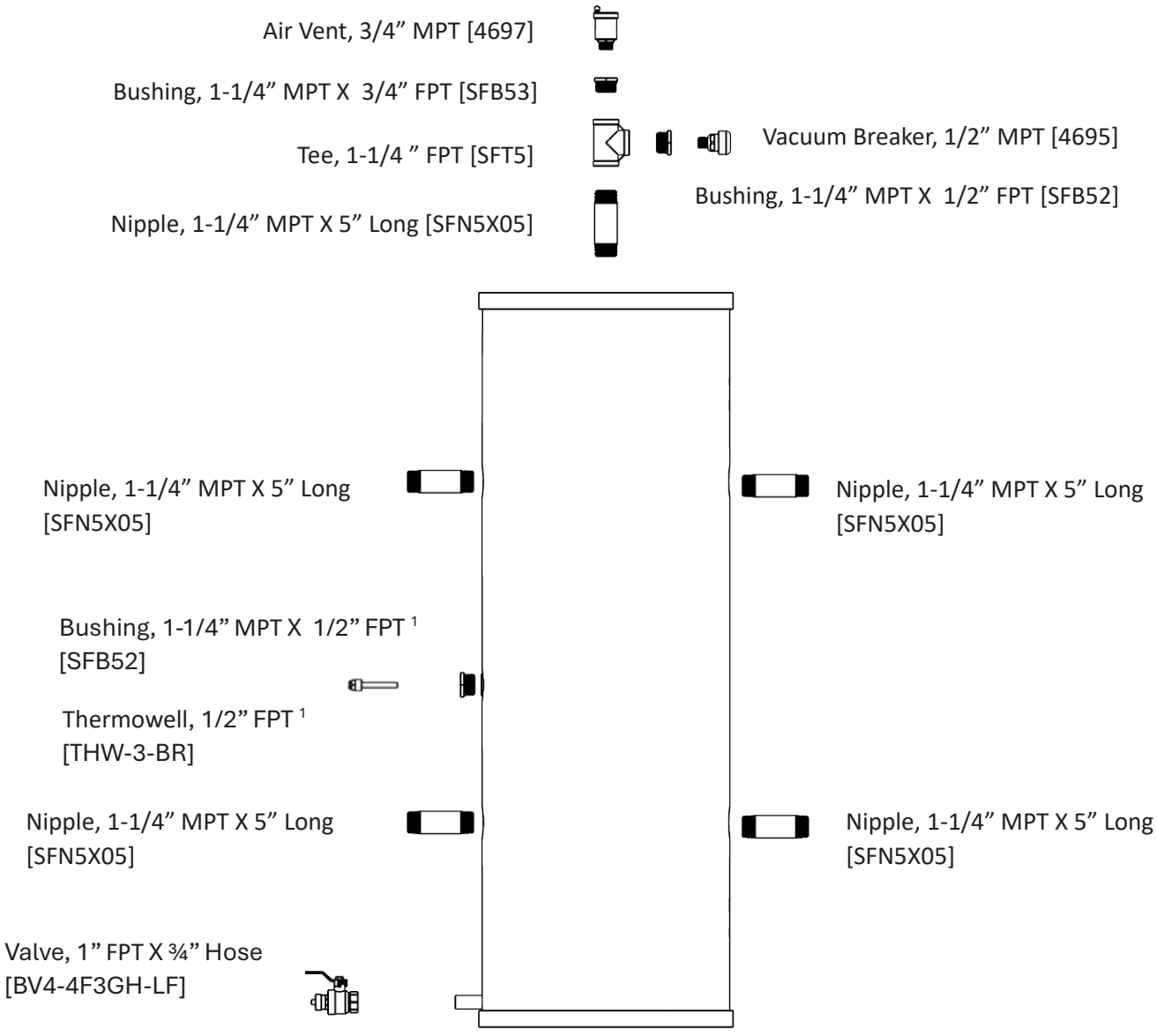


Figure 1E. HCT-R_-SA Standard with Air Vent (4-Pipe) Assembly Buffer tank components.

Standard (4-Pipe) with Air Vent Assembly Diagram

HCT-R2-SA, HCT-R4-SA, & HCT-R5-SA

22 Gallon, 40 Gallon, and 55 Gallon Buffer Tanks



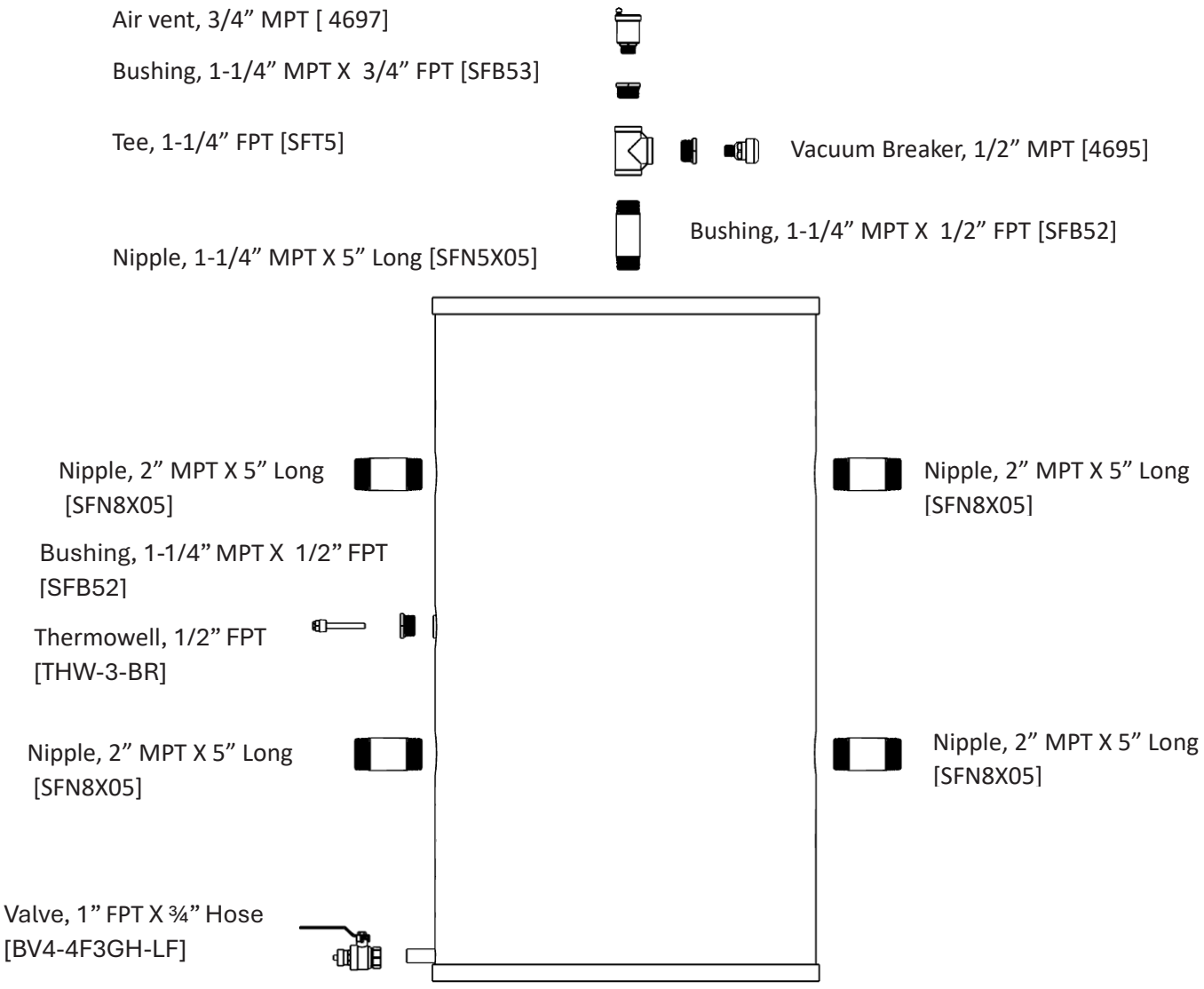
[1] HCT-R2-SA 22 gallon buffer tank does not have a thermowell port.

Figure 1F. HCT-R_-SA Standard with Air Vent (4-Pipe) Assembly Buffer tank components.

Standard (4-pipe) Assembly Diagram

HCT-R8-SA & HCT-R9-SA

80 Gallon, and 119 Gallon Buffer Tanks



Buffer Tank Sizing

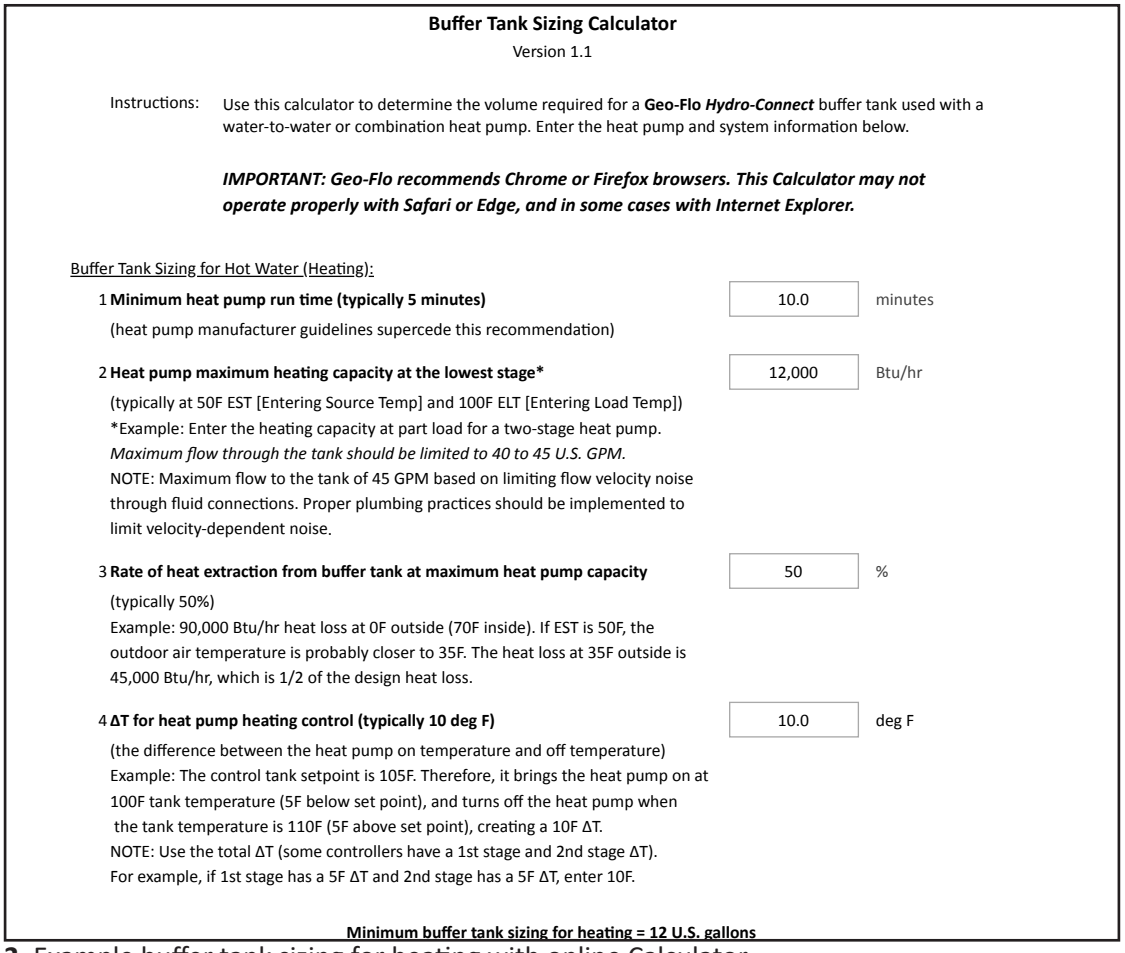
The Geo-Flo Hydro-Connect buffer tank (HCT) is available in five sizes to accommodate a variety of heat pump and boiler/chiller applications. Table 1 below provides general sizing recommendations for heat pump applications. However, it is good design practice to verify the tank is properly sized for each application. Geo-Flo has an online buffer tank sizing Calculator available at www.geo-flo.com which is based on John Siegenthaler's Modern Hydronics, and is explained below. Note that a larger tank is not harmful to a system, but too small of tank could lead to unit short-cycling and equipment issues as discussed previously.

Heat Pump nominal capacity (Tons)	2 Ton		3 Ton		4 Ton		5 Ton		6 Ton	
	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage
Hot Water Only	HCT-R4	HCT-R2	HCT-R4	HCT-R4	HCT-R5	HCT-R4	HCT-R8	HCT-R4	HCT-R8	HCT-R5
Chilled Water	HCT-R4	HCT-R4	HCT-R5	HCT-R4	HCT-R8	HCT-R5	HCT-R9	HCT-R5	HCT-R9	HCT-R8
Heat Pump nominal capacity (Tons)	7 Ton		8 Ton		10 Ton		15 Ton		20 Ton	
	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage	Single Stage	Two Stage
Hot Water Only	HCT-R9	HCT-R5	HCT-R9	HCT-R8	HCT-R9	HCT-R8	See Note 2	HCT-R9	See Note 2	See Note 2
Chilled Water	HCT-R9	HCT-R8	See Note 2	HCT-R9	See Note 2	HCT-R9	See Note 2	See Note 2	See Note 2	See Note 2

Table 1. Recommended tank sizing for heat pumps.

1. Tank sizing is based on the following assumptions: minimum heat pump run time is 10 minutes , heat of extraction ratio is 50% and heat of rejection rate is 45%, and delta-T= 10 F in heaiting and 8 F in cooling. Other assumptions may yield different results, and are not necessarily incorrect.

2. Tank size is larger than available from Geo-Flo in this line of HCT tanks. Use two tanks, or provide a larger tank from another line of tanks. Contact Geo-Flo for more information.



Buffer Tank Sizing Calculator

Version 1.1

Instructions: Use this calculator to determine the volume required for a **Geo-Flo *Hydro-Connect*** buffer tank used with a water-to-water or combination heat pump. Enter the heat pump and system information below.

IMPORTANT: Geo-Flo recommends Chrome or Firefox browsers. This Calculator may not operate properly with Safari or Edge, and in some cases with Internet Explorer.

Buffer Tank Sizing for Hot Water (Heating):

1 **Minimum heat pump run time (typically 5 minutes)** — 10.0 minutes

(heat pump manufacturer guidelines supercede this recommendation)

2 **Heat pump maximum heating capacity at the lowest stage*** — 12,000 Btu/hr

(typically at 50F EST [Entering Source Temp] and 100F ELT [Entering Load Temp])
*Example: Enter the heating capacity at part load for a two-stage heat pump.
Maximum flow through the tank should be limited to 40 to 45 U.S. GPM.
NOTE: Maximum flow to the tank of 45 GPM based on limiting flow velocity noise through fluid connections. Proper plumbing practices should be implemented to limit velocity-dependent noise.

3 **Rate of heat extraction from buffer tank at maximum heat pump capacity** — 50 %

(typically 50%)
Example: 90,000 Btu/hr heat loss at 0F outside (70F inside). If EST is 50F, the outdoor air temperature is probably closer to 35F. The heat loss at 35F outside is 45,000 Btu/hr, which is 1/2 of the design heat loss.

4 **ΔT for heat pump heating control (typically 10 deg F)** — 10.0 deg F

(the difference between the heat pump on temperature and off temperature)
Example: The control tank setpoint is 105F. Therefore, it brings the heat pump on at 100F tank temperature (5F below set point), and turns off the heat pump when the tank temperature is 110F (5F above set point), creating a 10F ΔT.
NOTE: Use the total ΔT (some controllers have a 1st stage and 2nd stage ΔT).
For example, if 1st stage has a 5F ΔT and 2nd stage has a 5F ΔT, enter 10F.

Minimum buffer tank sizing for heating = 12 U.S. gallons

Figure 2. Example buffer tank sizing for heating with online Calculator

BUFFER TANK SIZING FORMULA:

$$V = \frac{t \times (Q-q)}{(500*\Delta T)}$$

where:
V = volume (U.S. gallons)
t = minimum "on" cycle (minutes)
Q = output of heat source or chilled water source (Btu/hr)
q = rate of Heat of Extraction or Heat of Rejection (Btu/hr)
ΔT = temperature difference from when heat/chilled water source is turned on to when turned off (deg. F)

BUFFER TANK VOLUME IS BASED UPON FOUR FACTORS, NAMELY:

1. Minimum "on" time (t): Most heat pump controls have a built-in five minute anti-short cycle timer to keep the compressor from restarting more often than every five minutes. However, most do not have a min. run time setting. For practical purposes, assuming a 10 minute minimum run time for tank sizing is reasonable. This will prevent a situation where the system is calling for heating or cooling, but the heat pump will not start due to the anti-short cycle timer. Using a lower minimum run time such as 5 minutes may result in a smaller tank and may work well in a specific system design, but the heat pump manufacturer's guidelines for minimum run time should be verified before using a lower minimum run time.

2. Output capacity of heat pump/boiler in heating or heat pump/chiller in cooling (Q) -- input to the tank: Buffer tank selection for heating is based upon the heat pump capacity at the maximum entering source water temperature (EST) and the minimum entering load water temperature (ELT), the point at which the water-to-water unit has the highest heating capacity, usually 50-70°F EST and 90-100°F ELT. In cooling, the tank is sized at the minimum EST and the maximum ELT, the point at which the water-to-water unit has the highest cooling capacity, usually 50-70°F EST and 50-60°F ELT. Select the tank based upon the larger of the calculations (heating or cooling). Using the highest heat pump capacity for buffer tank sizing will ensure that the heat pump will not short cycle when the heat loss/heat gain is less than design conditions. At design conditions buffer tank sizing is much less critical, as the heat pump will require longer operation time to maintain tank temperature.

INSTALLATION/ DESIGN TIP

When determining the heat pump capacity, use the minimum heat pump stage. For example, a two-stage heat pump needs a smaller buffer tank that a single speed heat pump of the same capacity. Likewise, two 5 ton heat pumps connected to a single buffer tank requires sizing for 5 tons of capacity, whereas a single speed 10 ton heat pump must be sized for 10 tons of capacity. Although a larger tank will not adversely affect the system, it may add unnecessary cost.

3. The heat removed from (heating mode) or rejected to (cooling mode) the tank (q): The heat removed/rejected should be considered when the heat pump is at its maximum capacity, as this will be the point where short cycling could most likely occur. As stated in item #2, above, the heat pump maximum capacity is at the mildest ground loop temperatures, which generally occur in the Spring or Fall when the building load is lower than design conditions. A value of 50% is typical for heating at this condition. However, some buildings may be slightly different, depending upon infiltration, passive/active design, solar gain, and other construction factors. In cooling, 40% to 50% is typical, and is also dependent upon construction factors.

4. Temperature difference (ΔT): The temperature difference (in °F) is the difference between the tank temperature when the hot water/chilled water source (e.g. water-to-water heat pump) is turned on and when it is turned off. A value of 10 °F is typical for most control systems. A temperature difference setting that is too low can require a much larger tank and/or potentially cause the heat pump to short cycle. However, a temperature difference that is too high could create comfort issues. ***NOTE: Controller set point must be considered as well as temperature difference to avoid a condition that could result in water temperature returning to the heat pump that is hotter than allowed by the heat pump manufacturer.***

Assembly

Geo-Flo provides several models of buffer tanks to fit a range of installation options. **Verify the model you purchased and review the exploded views below for suggested component assembly (pages 4-9).** Note that there are alternative assembly and installation configurations beyond what is presented in this manual. The entire manual should be reviewed prior to commencing assembly and installation.

Tools Required

Thread sealant (included)
Pipe wrenches & adjustable wrench
Socket wrench with extension and 3/4" socket to install thermowell bushing
Square drive installation tool to install plugs (required and included with 3-pipe/direct to load models only)
Thermal paste for sensor/thermowell installation (included)
Personal protective equipment including cut resistant gloves and eye protection.

Sensors, controls, pressure relief valves, purge valves, union fittings and isolation valves are not included and must be purchased separately.

Stainless steel fittings assembly recommendations

Assembling stainless steel fittings is more challenging than brass fittings due to the high hardness of the material and susceptibility of the threads to gall and seize, particularly when assembling parts of the same grade (i.e. 304 SS to 304 SS). All HCT buffer tanks come with special thread sealant tape and thread compound that is formulated for assembling stainless steel fittings. The thread compound should be used on all stainless-steel threaded fittings and is also approved for use with other metals and plastics including polypropylene, ABS, and CPVC. The buffer tank female pipe thread ports are constructed of polypropylene with a stainless-steel backup ring. Care should be taken to avoid over-torquing fittings into these ports. When connecting additional fittings to nipples already installed in the tank be sure to use a backup wrench to avoid transmitting additional torque to the tank.

Torque on plugs and nipples installed into the female ports on the tanks should not exceed 70 ft-lbs. When assembling other fittings to these tank connections, be sure that the torque transmitted to the tank fittings does not exceed 70 ft-lbs. When in doubt, use a back-up wrench on the tank fittings to prevent over-tightening

Thread Seal Tape & Thread Compound

Geo-Flo recommends the use of thread seal tape and thread compound on 1) stainless to stainless fittings, 2) stainless to brass/cooper fittings, 3) stainless to HCT buffer tank (poly) on 2" FPT connections 4) connections that leak after using thread seal tape or thread seal compound only. We have found the 1-1/4" FPT ports on the buffer tank typically only require thread compound. However, both tape and compound may be used on these joints as well.

1. Wrap the male pipe thread with two to three thicknesses as described below.

2. Apply thread compound as described below.
3. Make up joint with a pipe wrench (typically, 1-2 turns past hand-tight); be careful not to over-tighten.
4. Test for leaks. If a leak occurs, slowly torque the fitting an additional 1/8 to 1/4 turn. If necessary, remove the fitting, reapply thread compound, and reassemble.

Thread Seal Tape, PTFE, Gray

1. Inspect the male and female threads on the parts being connected. Clean any foreign substance from the threads. Replace fittings that have heavily damaged threads in the sealing area.
2. Place the end of the tape on the second thread of the male fitting. While securing the end and keeping the tape under tension, wrap the tape clockwise around the threads three revolutions. If the threads are poor quality, you may need more than 3 wraps.
3. Make up joint with a pipe wrench (typically, 1-2 turns past hand-tight); be careful not to over-tighten.
4. Test for leaks. If a leak occurs, slowly torque the fitting an additional 1/8 to 1/4 turn. If necessary, remove the fitting, reapply thread seal tape, and reassemble.

Thread Compound

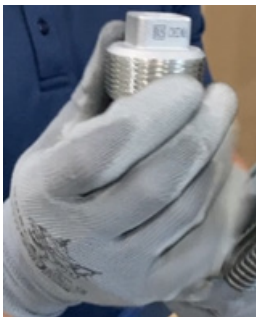
1. Inspect the male and female threads on the parts being connected. Clean any foreign substance from t the threads. Replace fittings that have heavily damaged threads in the sealing area.
2. Stir thread compound.
3. Brush liberally onto male threads starting behind the first thread and extending to the 4th or 5th thread.
4. Make up joint with a pipe wrench (typically, 1-2 turns past hand-tight); be careful not to over-tighten.
5. Test for leaks. If a leak occurs, slowly torque the fitting an additional 1/8 to 1/4 turn. If necessary, remove the fitting, reapply thread compound, and reassemble.

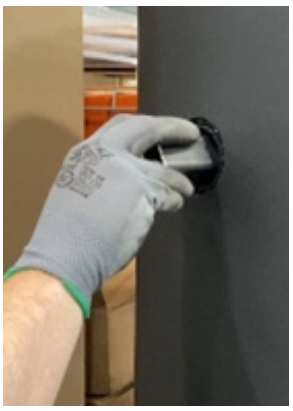
Stainless steel threads can be sharp, so careful handling and the use of cut resistant gloves is recommended.

Installing plugs into HCT ports

A square drive installation tool to install plugs into the female ports of 3-pipe/direct to load system is included with the tanks that require them.

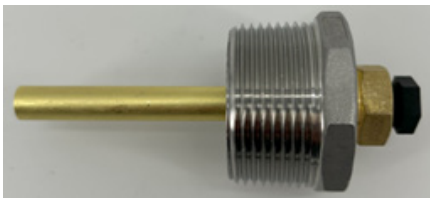
1. Locate plug with square drive
2. Insert plug into square drive tool
3. Hand thread plug into female port using the tool
4. Tighten with pipe or adjustable wrench.
5. Remove the tool. Plugged ports should be insulated with elastomeric insulation (Armaflex, K-Flex, etc.).



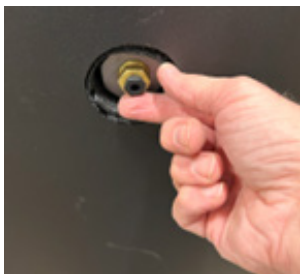



Installing thermowell and thermowell bushing

1. Assemble the thermowell into the 1-1/4” X 1/2” FPT bushing.



2. Hand thread the thermowell/bushing assembly into the 1-1/4” FPT port on the tank.



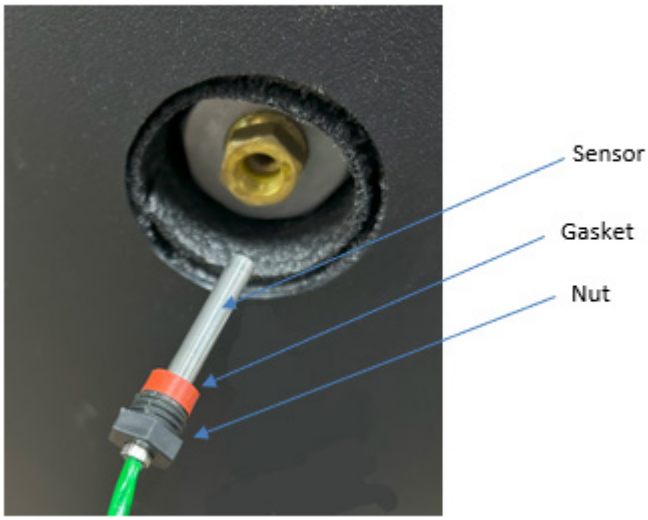
3. Using a 3/4” socket, complete the joint (typically 1-2 turns past hand-tight); be careful not to over-tighten

Installing a sensor into the thermowell

Thermal grease ensures good thermal contact between the temperature sensor (not included) and the thermal well. This ensures that you will get the fastest response time and most accurate readings possible.

1. Remove the compression nut and gasket from the thermowell.

2. Slide the compression nut and gasket onto the sensor.



3. Squeeze thermal grease into the thermowell by inserting the syringe into the 7mm hole. It is desirable that grease surrounds the tip and sides of the sensor (i.e. no air gaps between the sensor and the well).

4. Insert the sensor all the way to the bottom of the thermowell.

5. Clean any grease that is pushed out of the well.

6. Secure the thermowell by tightening the compression nut.

7. Insulate the port behind the sensor to mitigate the thermal affects of the ambient air temperature.

Installation

NOTE: The HCT composite buffer tank must be installed following all local and national pumping codes.

WARNING: Fluid temperature should not exceed 180°F at 75 PSI. Pressure should not exceed 100 PSI at 140°F. A properly sized pressure relief valve must be installed (not included).

WARNING: The HCT vacuum breaker must be installed on the tank, and must remain on the tank at all times, to prevent sub-atmospheric pressure (i.e. a vacuum) inside the tank. The tank's construction allows for a 100 PSI maximum pressure, but the tank will implode under vacuum.

1. Position the tank on a level surface in an area not subject to freezing and out of direct sunlight.

Note: When installed in an area that may be damaged from leaks, extreme caution dictates installing the tank in a drain pan plumbed to a sump well or other safe location. Installing the tank in direct sunlight will cause the black outer shell to warm and expand causing a wavy or wrinkled appearance. Removing the tank from this condition will allow the shell to cool and shrink which may remove some of the wavy appearance.

2. Ensure that the air vent assembly is open. The vent must remain open during operation.

3. Complete the plumbing to the heat pump and circuit headers to the remaining tank connections. Figures 3-5 show typical plumbing for 3- and 4- pipe systems. See Appendix A for plumbing material considerations.

4. Flush and fill the system using appropriate equipment and filtering. The tank should be bypassed during high velocity/pressure flushing. The tank may be filled by connecting the water source to the garden hose fitting at the bottom of the tank. Air will exit through the air vent at the top of the tank as the tank fills. If the system is to be used for both heating and cooling, antifreeze should be added to achieve the desired freeze protection level.

NOTE: The HCT-R2 (22 gallon tank) does not have a thermowell due to its size. If a sensor/ thermistor is required for this tank, you may need to install a tee and thermowell. If you are using a 3-pipe system, one of the top 1-1/4" ports can be used for the thermowell.

5. Test system for leaks.

6. Insulate all exposed piping. Insulation tape may be used to seal the insulation to the tank. Insulation is particularly important to prevent condensation when buffer tank is intended for chilled water applications.

Piping Diagrams

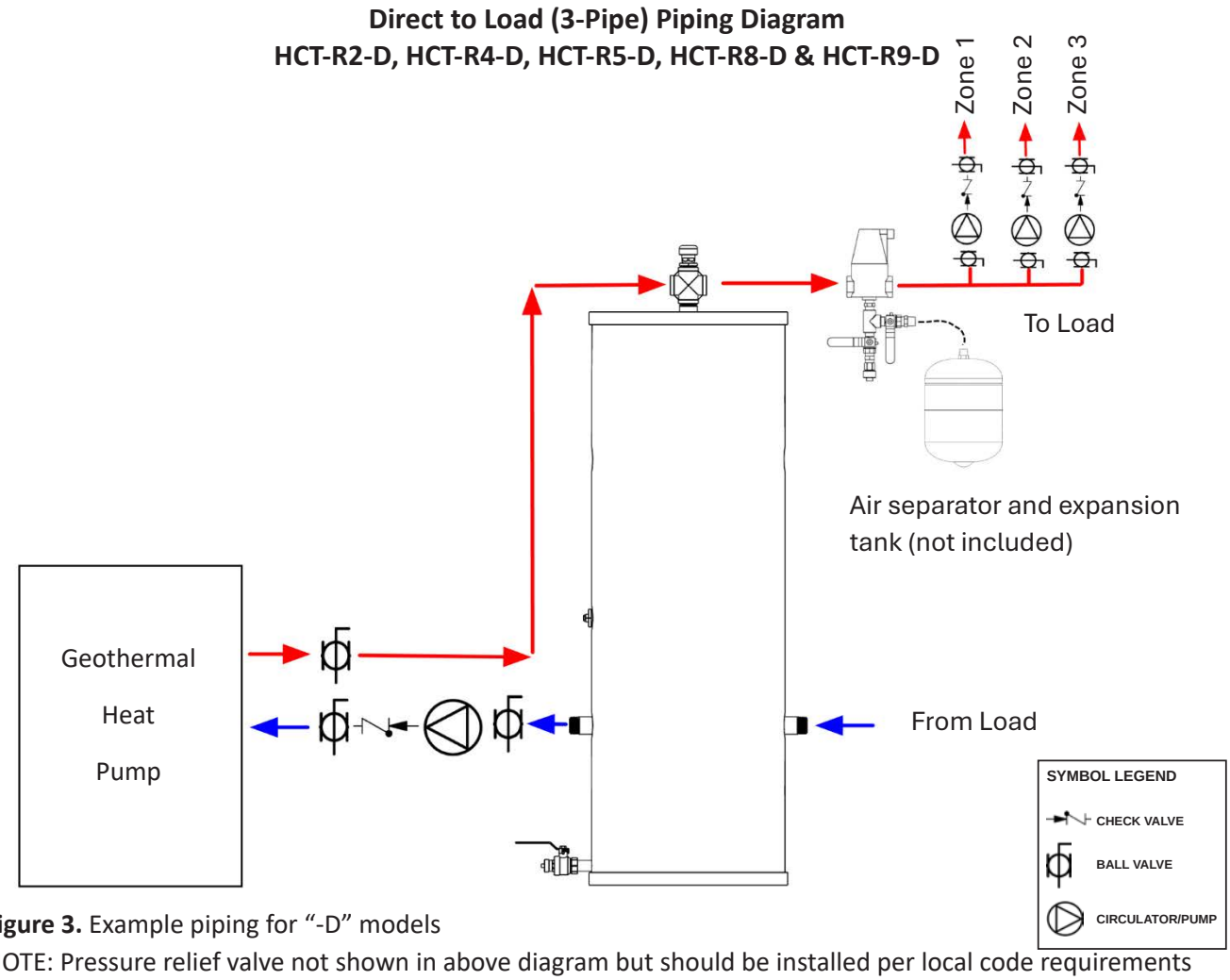


Figure 3. Example piping for "-D" models

NOTE: Pressure relief valve not shown in above diagram but should be installed per local code requirements

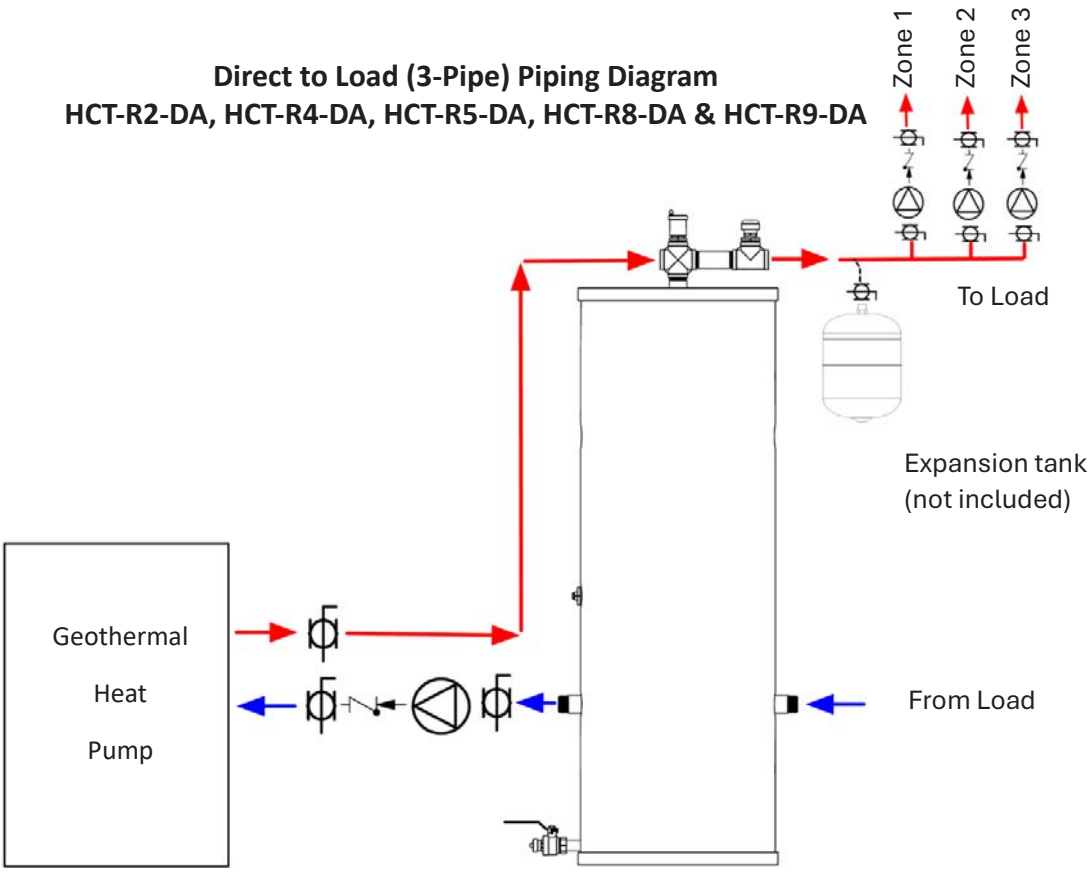


Figure 4. Example piping for "-DA" models

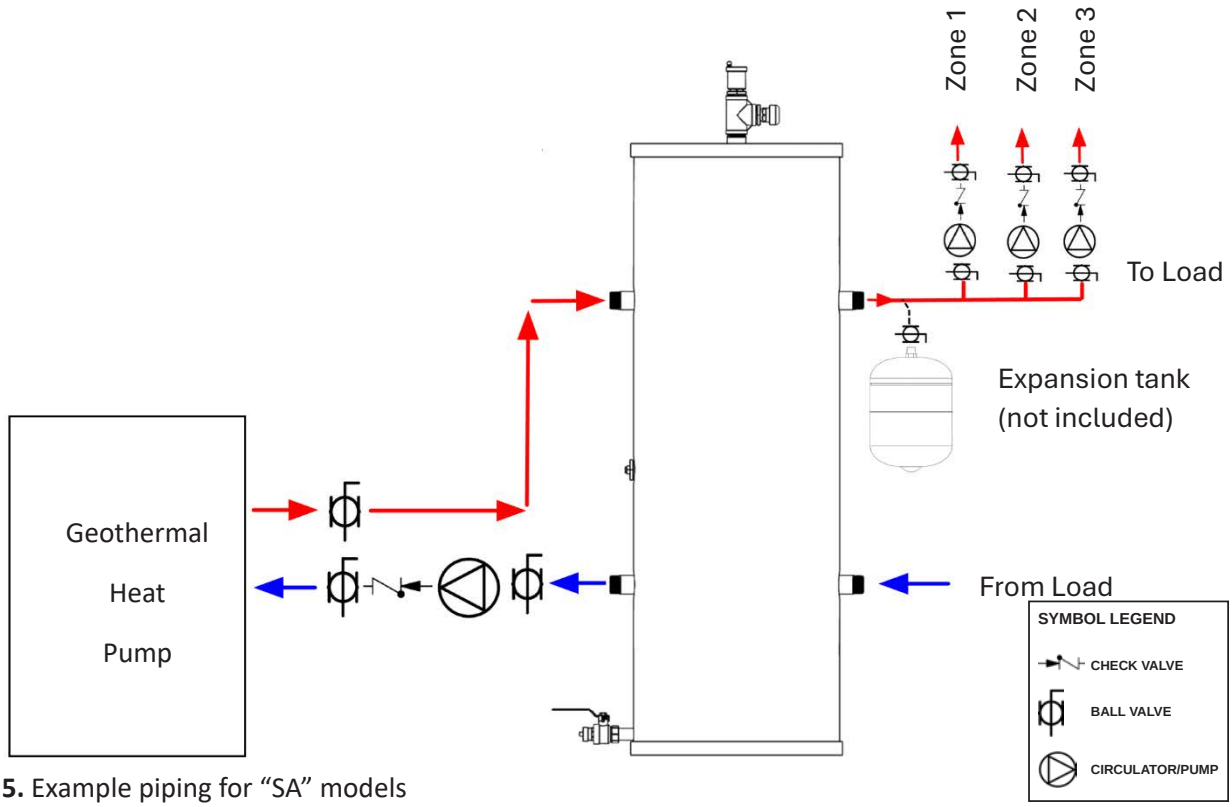


Figure 5. Example piping for "SA" models

NOTE: Pressure relief valve not shown in above diagrams but should be installed per local code requirements

Operation

The ground source heat pump system should be operated according to the heat pump manufacturer's instructions with system controls properly configured. Geo-Flo endorses the direct-to-load (3-pipe) configuration since it allows the hottest (or coolest) water to be delivered to the load and allows the most temperate water to be delivered to the heat pump. The controls should be configured to allow the heat pump to run ONLY 1) when there is a call from one or more zones, and 2) when the buffer tank is below (in heating mode, or above in cooling mode) the set point. These two conditions along with a properly configured tank temperature differential prevent heat pump short cycling and ensure a long compressor life. Short cycling (i.e. short duration starts and stops) of the heat pump must be avoided.

Maintenance

Regular maintenance is not required on the buffer tank itself. In some cases fluid may need to be removed or added to the system. Fluid may be added or removed from the drain/fill valve at the base of the tank. When removing fluid caution must be taken to prevent vacuum in the tank. The vacuum breaker in the top must be present and functioning to prevent a vacuum in the tank and tank collapse.

Appendix A: Plumbing Materials

Plumbing Materials

The following factors should be considered when selecting material for piping:

- Code requirements
- Working fluid in the pipe
- Pressure and temperature of the fluid
- External environment of the pipe
- Installation cost

Table 2 lists materials used for heating and air-conditioning piping. The pressure and temperature rating of each component selected must be considered; the lowest rating establishes the operating limits of the system.

Pipe Material	Weight	Joint Type	Fitting Material	Max. Temp.,[1] °F	Max. System Press. at Temp.,[1,2] psig
Steel	Standard	Thread	Cast iron	250	125
Copper, hard	Type L	Braze or silver solder[3]	Wrought copper	250	200
PVC	SCH 40/80	Solvent	PVC	75	166/243[4]
CPVC	SCH 40/80	Solvent	CPVC	150	275/400[5]
HDPE	SDR 11	Fusion	HDPE	140	160/80[6]
PEX	CTS	Mechanical[7]	Varies[7]	210	160/100/80[8]

Table 2: Application of Pipe, Fittings, and Valves for Heating and Air Conditioning for piping 2” and Smaller

1 Data for steel, copper, PVC, and CPVC from *2012 ASHRAE Handbook—HVAC Systems and Equipment*; data for HDPE from PPI (Plastics Pipe Institute) *Handbook of Polyethylene Piping*, 2nd Edition; data for PEX piping from PPI *Design Guide, Residential PEX Water Supply Plumbing Systems*, 2nd Edition.

2 Maximum allowable working pressures have been derated in this table. Higher system pressures can be used for lower temperatures and smaller pipe sizes. Pipe, fittings, joints, and valves must all be considered.

3 Lead- and antimony-based solders should not be used for potable-water systems. Brazing and silver solders should be used.

4 166 psig for 2" SCH 40 and 243 psig for 2" SCH 80 (higher for smaller sizes) at 73.4°F

5 275 psig for 2" SCH 40 and 400 psig for 2" SCH 80 (higher for smaller sizes) at 73.4°F. At 140°F, the strength is derated to approximately 20% of the strength at 73.4°F.

6 160 psig at 73.4°F; 80 psig at 140°F

7 All PEX pipe is joined with mechanical fittings; type varies by piping manufacturer. Cold expansion fittings with PEX reinforced rings, cold expansion fittings with metal compression sleeves, metal or plastic insert fittings, and push type fittings are common types of mechanical joining methods.

8 160 psig at 73.4°F; 100 psig at 180°F; 80 psig at 200°F

Technical Specifications

Tank: Fiberglass reinforced Polypropylene

Shell: Polypropylene

Maximum Working Pressure: 100 PSI at 140°F

Maximum Working Temperature: 180°F at 75 PSI

R-Value: 15

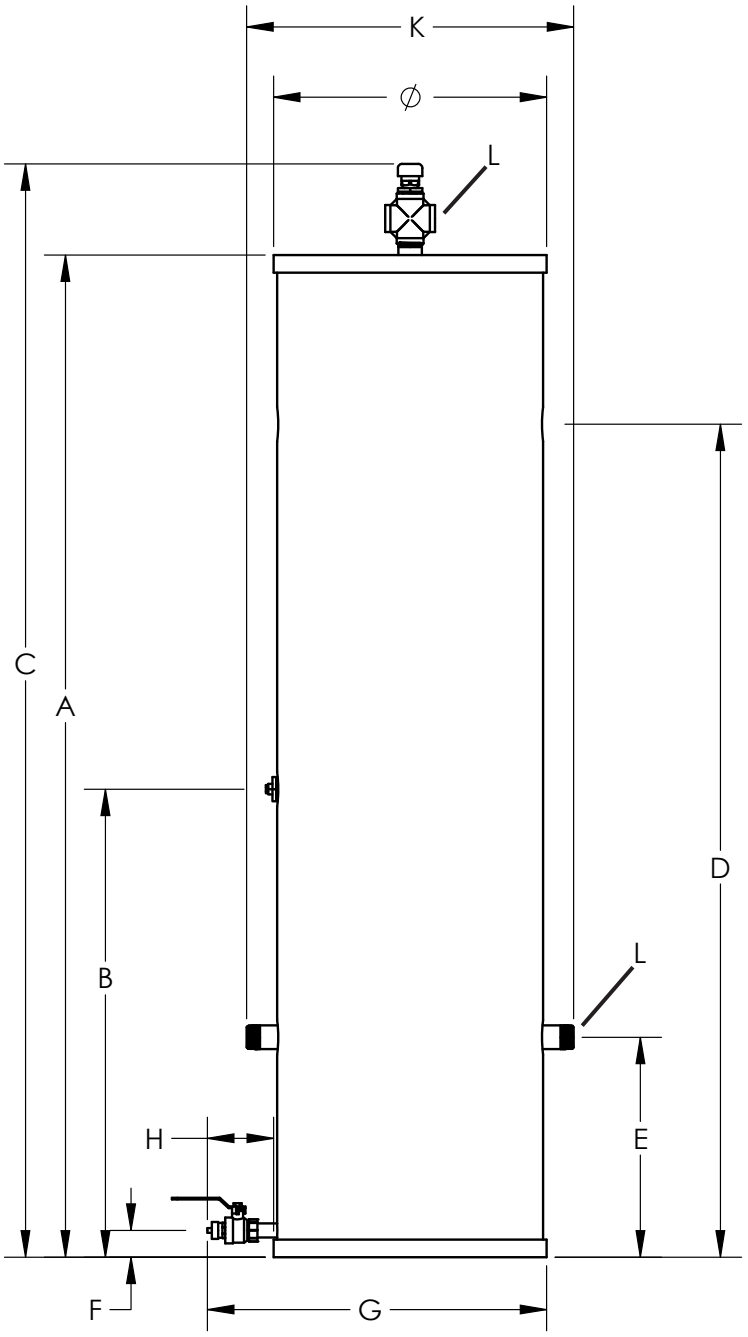
Replacement Parts

	PN	DESCRIPTION	U.O.M
ALL MODELS	SFB52	BUSHING, 1-1/4" x 1/2", 304 SS	EACH
	BV4-4F3GH-LF	VALVE, 1" FPT X HOSE W/ CAP, LF BRASS	EACH
	4695	VACUUM BREAKER, 1/2" MPT	EACH
	4697***	AUTO AIR VENT, 1/2" FPT AND 3/4" NPT	EACH
	5230	THREAD SEAL TAPE, SS, 1/2" X 250" ROLL	EACH
	5231	THREAD SEAL COMPOUND, SS, 2 OZ	EACH
	5232	HEAT TRANSFER PASTE, 1 GRAM	EACH
	5293	SENSOR, NTC 10K-2 THERMISTOR, 0.24 DIA 4" SS PROBE, 6.5' CABLE	EACH
	THW-3-BR**	THERMOWELL, 1/2“ MPT X 3" INSERTION, BRASS	EACH
1-1/4" R2/R4/R5	SFB52	BUSHING, 1-1/4" x 1/2", 304 SS	EACH
	SFB53	BUSHING, 1-1/4" x 3/4", 304 SS	EACH
	SFT5	TEE, 1-1/4", 304 SS	EACH
	SFCR5	CROSS, 1-1/4", 304 SS	EACH
	SFPL5	PLUG, 1-1/4", 304 SS	EACH
	SFN5X05	NIPPLE, 1-1/4" X 5" LONG, 304 SS	EACH
	SFU5	UNION, 1-1/4" FPT, 304 SS	EACH
	5233	1-1/4" SQUARE PLUG TOOL	EACH
2" R8/R9	SFB82	BUSHING, 2" x 1/2", 304 SS	EACH
	SFB83	BUSHING, 2" x 3/4", 304 SS	EACH
	SFB85	BUSHING, 2" x 1-1/4", 304 SS	EACH
	SFT8	TEE, 2", 304 SS	EACH
	SFCR8	CROSS, 2" 304 SS	EACH
	SFPL8	PLUG, 2", 304 SS	EACH
	SFN8X05	NIPPLE, 2" X 5" LONG, 304 SS	EACH
	SFU8	UNION, 2" FPT, 304 SS	EACH
	5234	2" SQUARE PLUG TOOL	EACH

**NOT INCLUDED WITH HCT-R2 VERSIONS

***NOT INCLUDED WITH HCT-R_-D VERSIONS

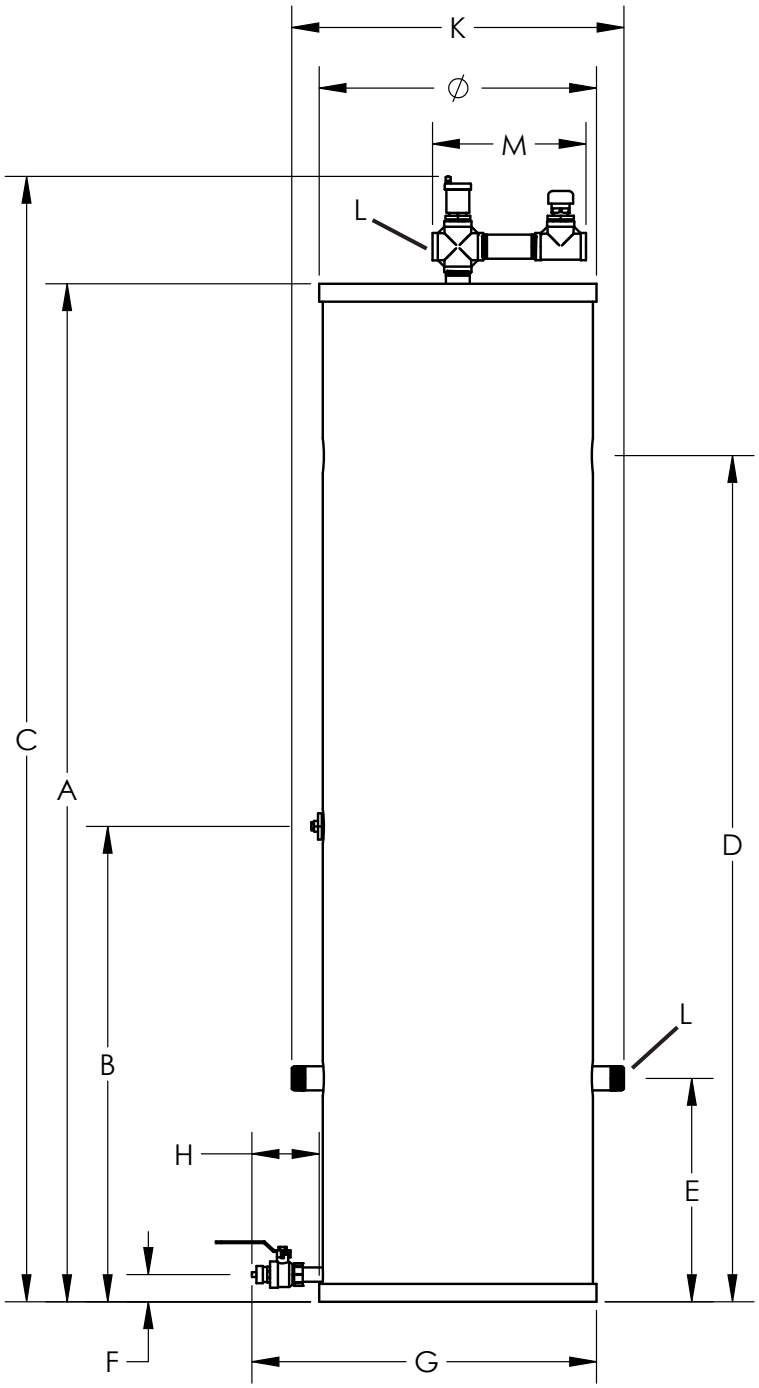
Dimensional Data[1]



MODEL PN	DIAMETER Ø	A	B	C	D	E	F	G	H	K	L	Weight (Lbs)
HCT-R2-D	21	35	NA	40	24	14	1-7/8	24	3-3/4	25	1-1/4" NPT	48.5
HCT-R4-D	21	56	26	62-1/2	41-1/2	15-5/8		24	4-5/8	23-1/8		56.75
HCT-R5-D	21	73	33-1/4	77-1/2	59	15-5/8		24	4-5/8	23-1/8		76.75
HCT-R8-D	29	54	26-5/8	59-1/2	38-1/8	17-1/8	2-1/2	33-3/4	4-5/8	32-7/8	2" NPT	129.25
HCT-R9-D	29	74	33-7/8	82-1/8	57-1/2	18-1/2		33-3/4	4-5/8	32-7/8		154.25

1.Dimensional data provided for informational purposes and is rounded to nearest ⅛”

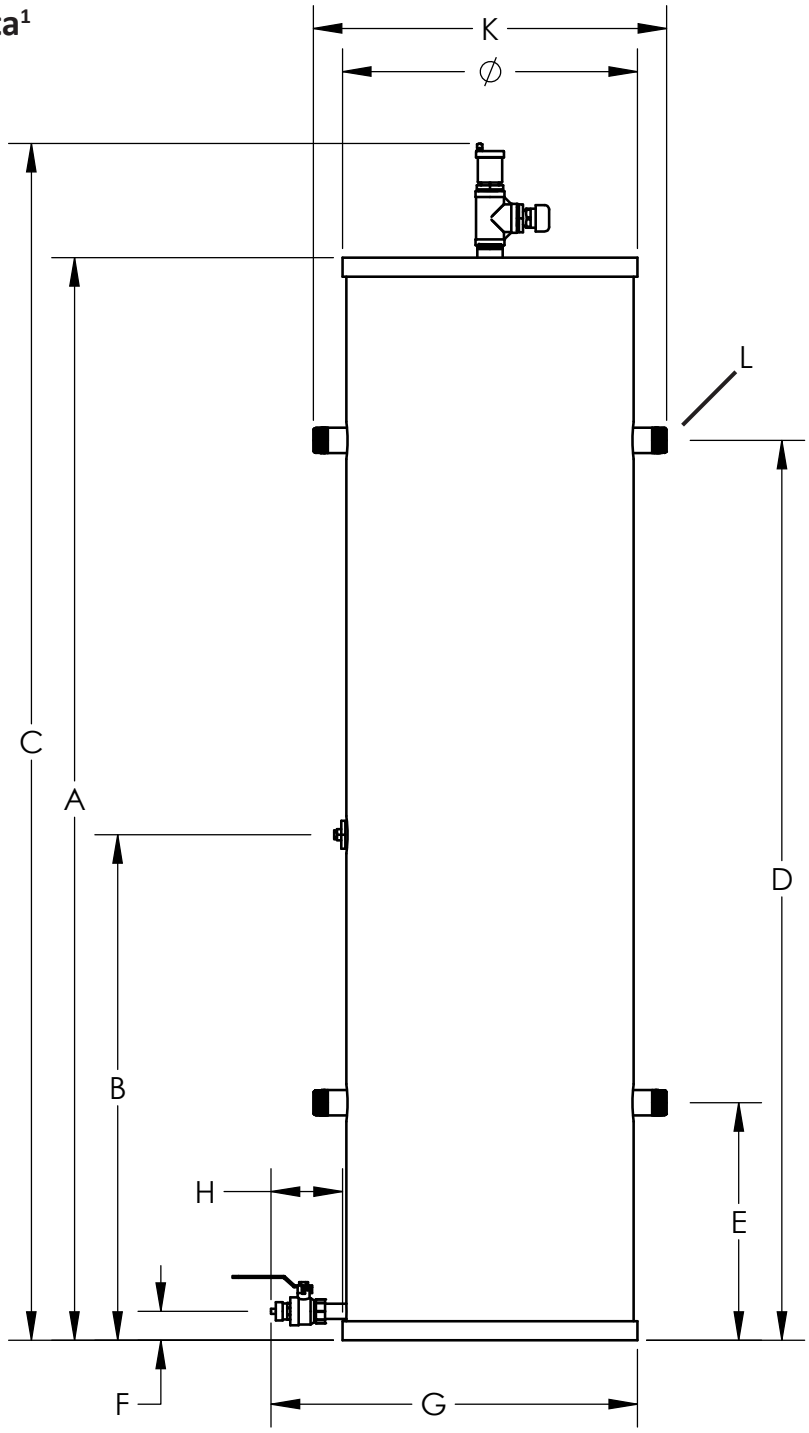
Dimensional Data[1]



MODEL PN	DIAMETER Ø	A	B	C	D	E	F	G	H	K	L	M	Weight (Lbs)
HCT-R2-DA	21	35	NA	41	24	14	1-7/8	24	3-3/4	23-1/8	1-1/4" NPT	10-3/4	50.7
HCT-R4-DA	21	56	26	63-1/2	41-1/2	15-1/2		24	4-5/8	23-1/8			58.8
HCT-R5-DA	21	73	33-1/4	78-1/2	59	15-5/8		24	4-5/8	23-1/8			78.8
HCT-R8-DA	29	54	26-5/8	60-1/2	38-1/8	17-1/8	2-1/2	33-3/4	4-5/8	32-7/8	2" NPT		133
HCT-R9-DA	29	74	33-7/8	83-1/8	57-1/2	18-1/2		33-3/4	4-5/8	32-7/8			158

1.Dimensional data provided for informational purposes and is rounded to nearest ⅛”

Dimensional Data[1]



MODEL PN	DIAMETER Ø	A	B	C	D	E	F	G	H	K	L	Weight (Lbs)
HCT-R2-SA	21	35	NA	41	24	14	1-7/8	24	3-3/4	25	1-1/4"NPT	50
HCT-R4-SA	21	56	26	63-1/2	41-1/2	15-1/2		24	4-5/8	23-1/8		58.25
HCT-R5-SA	21	73	33-1/4	78-1/2	59	15-5/8		24	4-5/8	23-1/8		78.25
HCT-R8-SA	29	54	26-5/8	58-3/4	38-1/8	17-1/8	2-1/2	33-3/4	4-5/8	32-7/8	2" NPT	129.85
HCT-R9-SA	29	74	33-7/8	85-1/2	57-1/2	18-1/2		33-3/4	4-5/8	32-7/8		154.85

1.Dimensional data provided for informational purposes and is rounded to nearest ⅛”

Manual Updates Table

Date	**Description of Changes**	Pages
27MAR2025	Updated Manual to reflect buffer tank redesign	All
29AUG2019	First published	All

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