



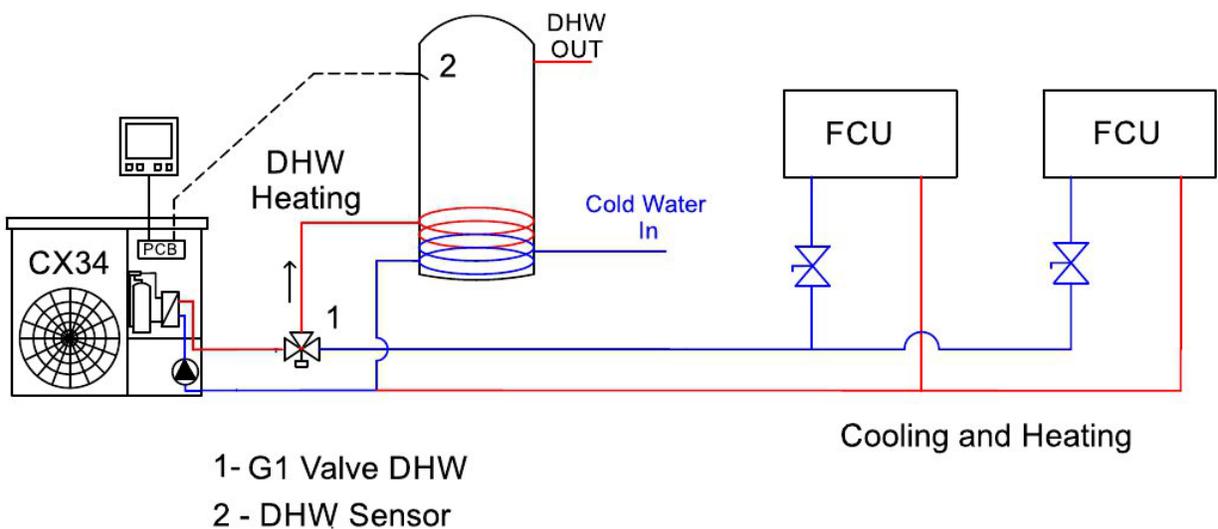
Air To Water Heat Pump Design Options

VERSION 2

Updated 8/10/2021

#1

This shows a Chiltrix CX34 heat pump chiller used for DHW (domestic hot water), fan coils for heating/cooling. Water heating capacity is up to 36000 BTU (~9000w) of water heating depending on tank temperature and outdoor temperature. Basic diagram, not all components are shown.



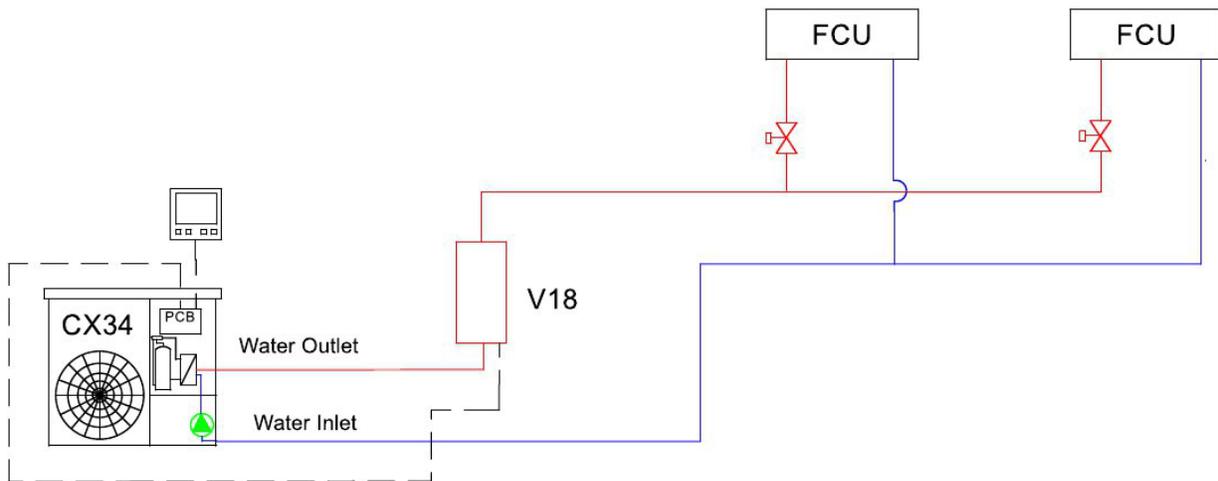
This fan coil loop may need extra volume (see example #15). The total volume of the active system should be above 15 gallons.



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#2

This shows a Chiltrix CX34 heat pump chiller used for heating/cooling with fan coils and has an optional inline V18 backup heater. The CX34 can control the V18 backup heater. The V18 is dynamically variable and only adds “just the right amount” of heat, it is controlled by the CX34 to match any heating shortfall, if such exists. Basic diagram, not all components are shown, fan coil loop may need extra volume (see example #15).

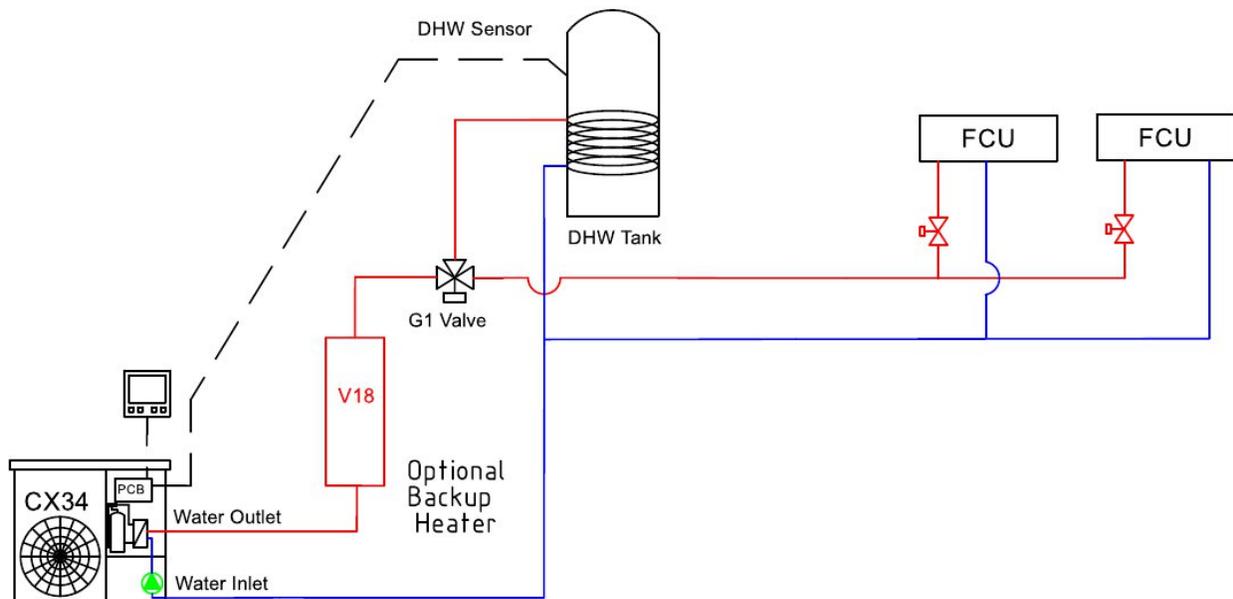




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#3

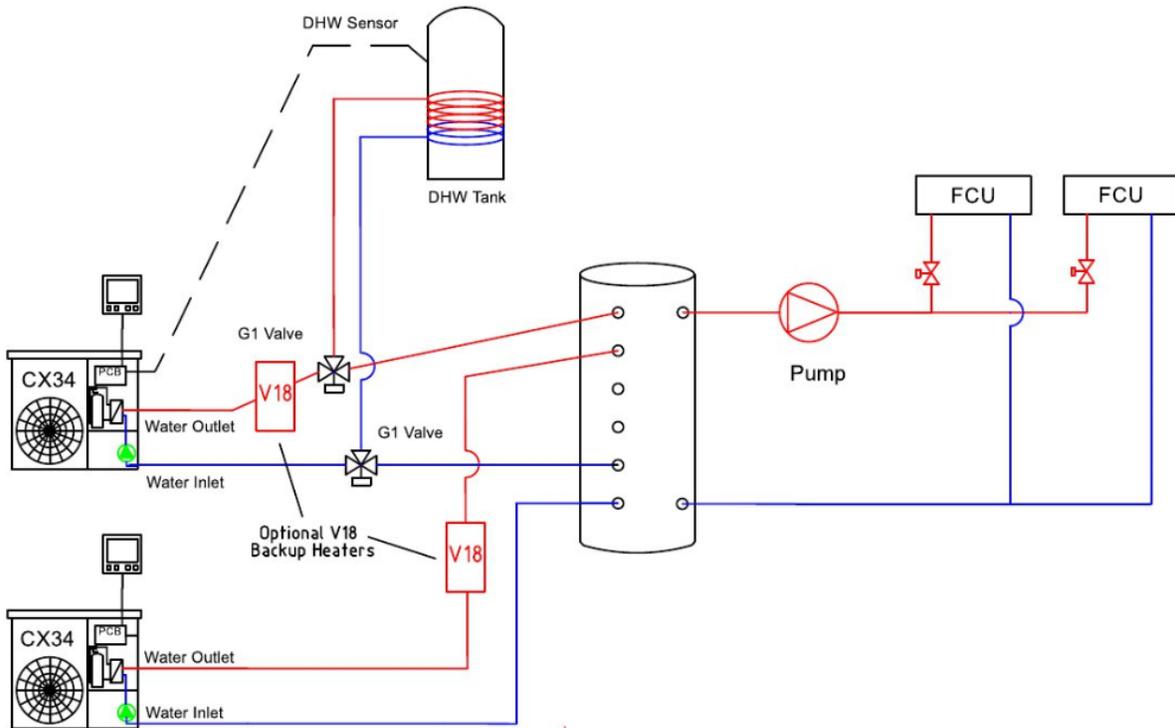
This is a Chiltrix CX34 air to water heat pump chiller used for heating/cooling with fan coils and domestic hot water and also has a V18 for optional backup electric heat. The DHW tank also has an internal electric backup, if needed. Basic diagram, not all components are shown, fan coil loop may need extra volume (see example #15).



Note, no booster pump for DHW is shown above. This may be needed if you use a DHW tank with a small diameter coil or if the DHW tank is not close enough to the CX34. Otherwise, a booster pump is generally not needed for DHW.

#4

Two Chiltrix CX34 heat pump chillers are shown in parallel for fan coil heating/cooling and domestic water heating. The system is available with the optional V18 backup heater(s) as shown. A vct37 buffer tank is used to balance the CX34s. Basic diagram, not all components are shown.



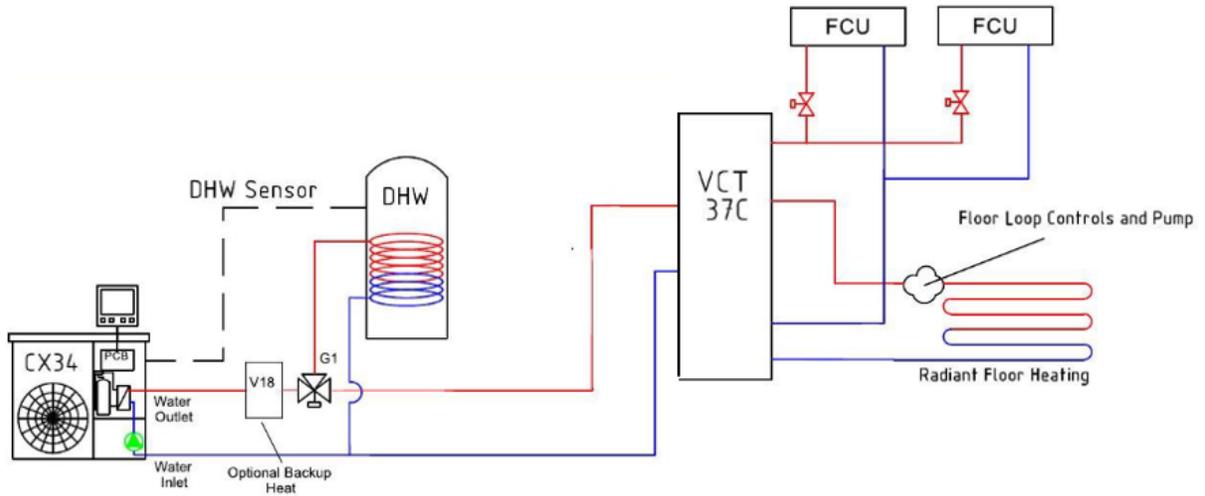
A hot water heating function is shown connected to one CX34. A loop pump (as shown above) is used on the load side of the buffer tank. 2x 3way valves are used with multiple CX34 when DHW is used.



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#5

Shows 1 CX34 with DHW supporting both radiant and a fan coil loop, two fan coils shown, can be more as needed. Basic diagram, not all components are shown.

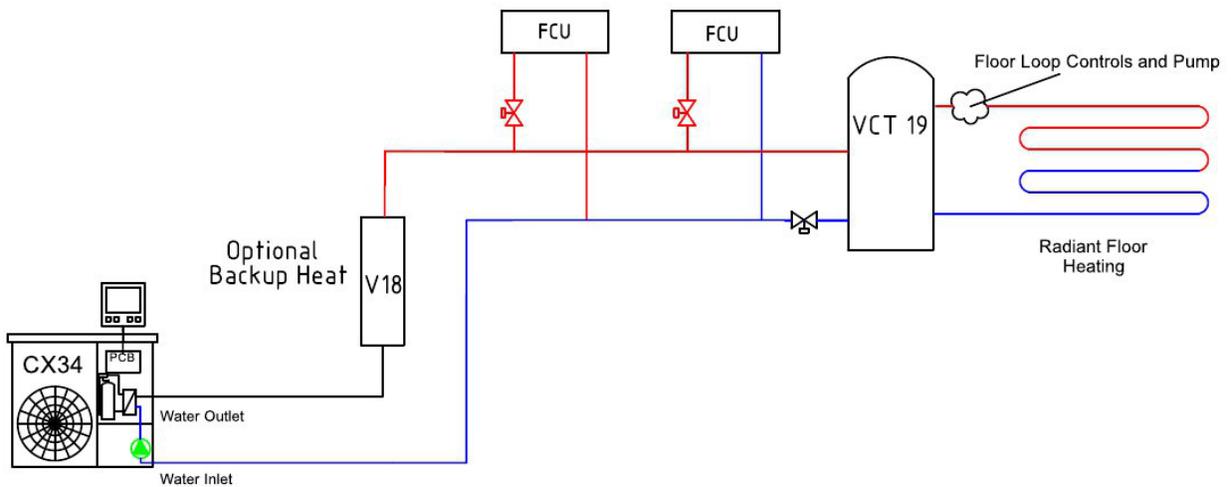




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#6

This shows a Chiltrix CX34 unit used for heating/cooling with fan coils and with radiant heat zone(s) interfaced with a VCT19 configured as a buffer tank, it also shows an optional V18 backup heater controlled by the CX34. Do not use this configuration if using more than two fan coil units, for more than two fan coils see how the load side is handled in #5. Basic diagram, not all components are shown.

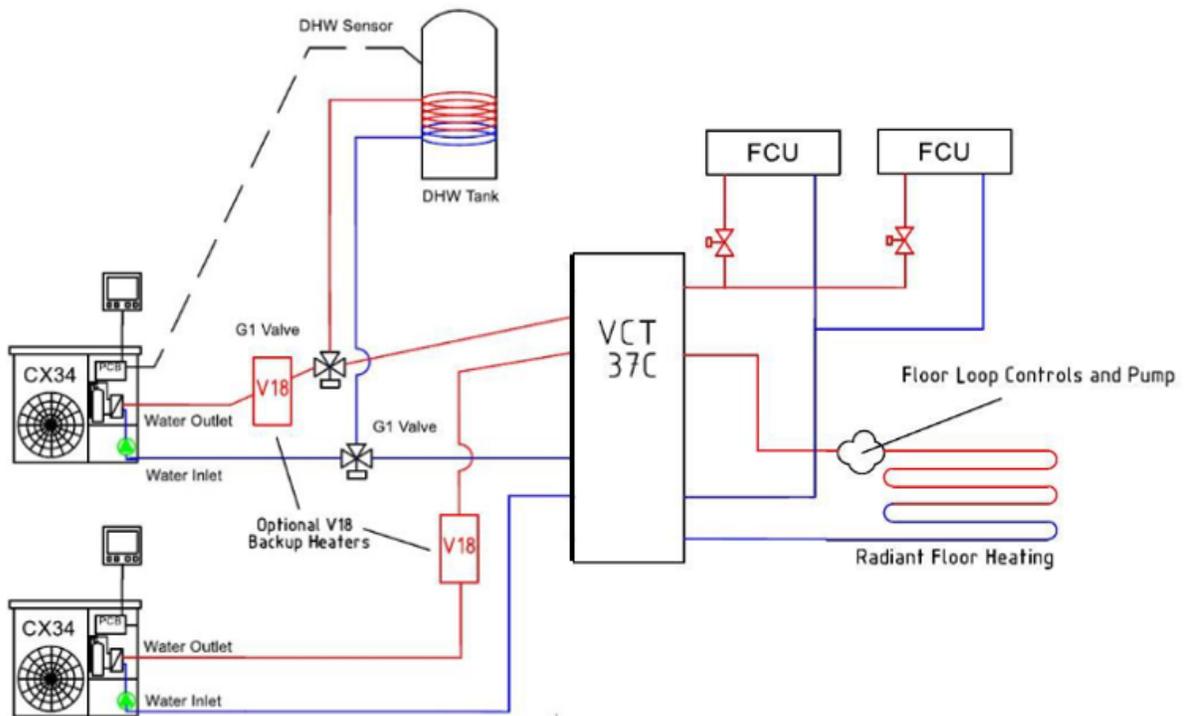




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#7

This shows 2x Chiltrix CX34 units used with DHW, shows two fan coil units available for both heating and cooling, can use up to 16 fan coil units. Shows 2x optional V18 backup heaters, and supports radiant zone(s) for heating with a VCT37 buffer tank. Basic diagram, not all components are shown.

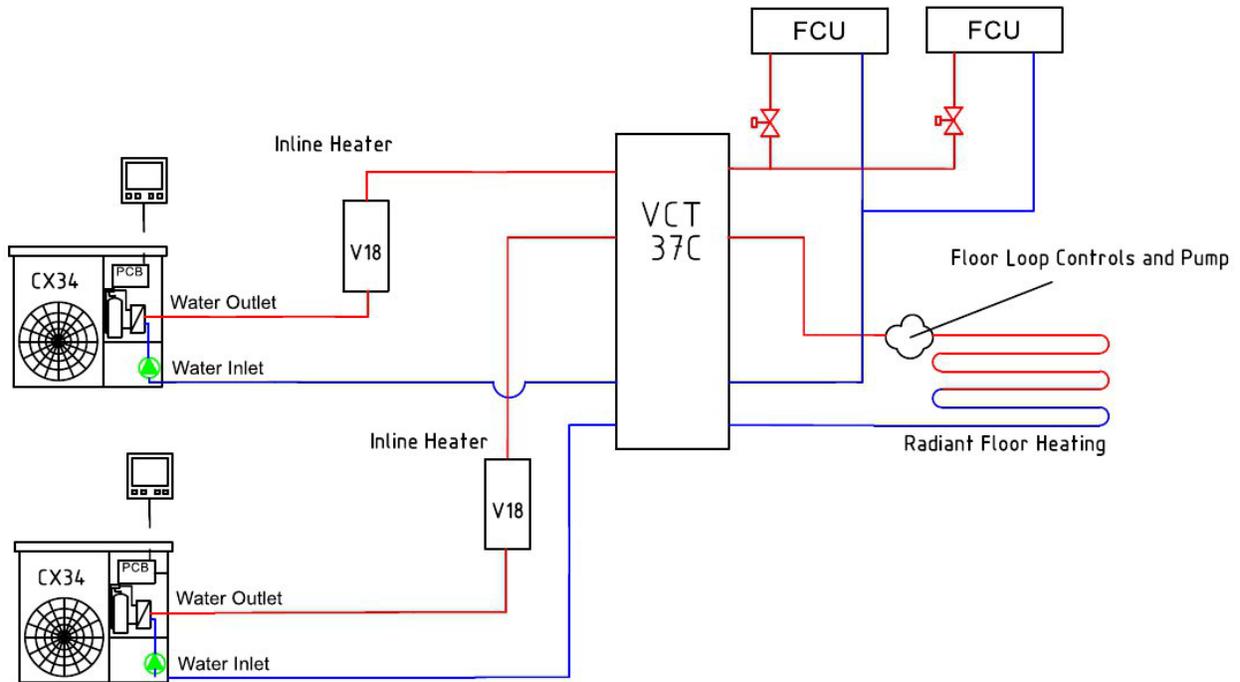




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#8

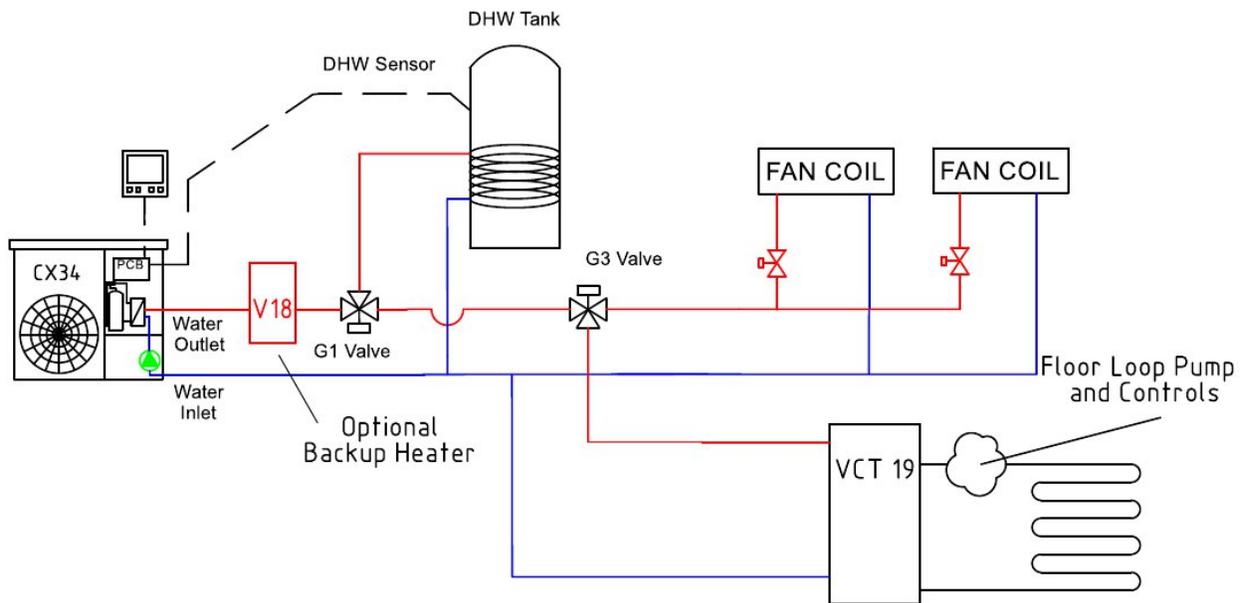
This shows dual Chiltrix CX34 chiller systems in parallel, each has a V18 backup heater, and is configured with a VCT37 for balancing the CX34 units, serves fan coils for heating/cooling and serves a radiant loop for heating. Basic diagram, not all components are shown.



The radiant system can also be used for cooling with proper controls added.

#9

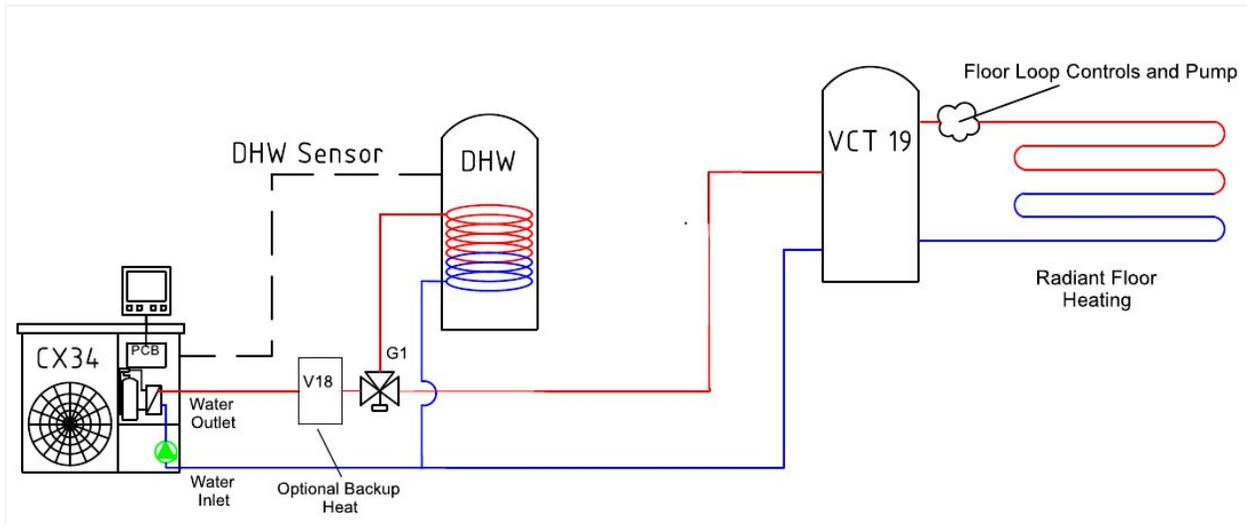
This shows a Chiltrix CX34 unit used with fan coils for cooling only, a radiant heat loop with buffer tank, and domestic hot water. The G3 seasonal valve isolates the heating system out of the main loop when the system is operating in cooling mode and locks out the fan coils during heating mode. An optional V18 can be used for backup heat and isolates the fan coils during heating mode. Basic diagram, not all components are shown, fan coil loop may need extra volume (see example #15).



The above example is used when you want to isolate the heating (radiant) from cooling (fan coils). This also means that in this example, the fan coils would not be available for heating. For that reason, using the G3 seasonal valve design is not commonly used.

#10

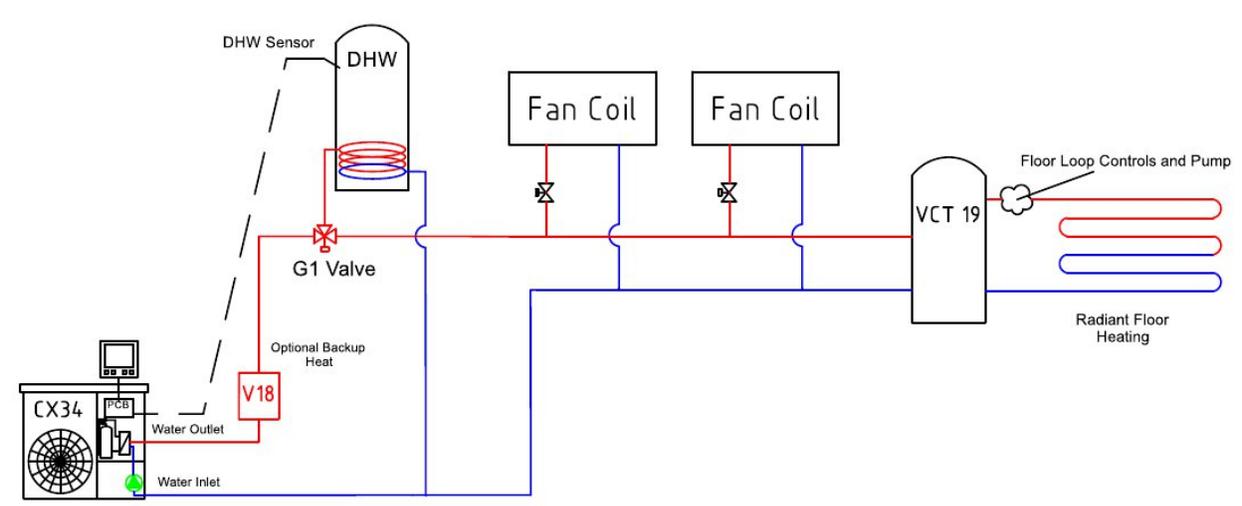
CX34 used for radiant heat and domestic hot water, no fan coils. Shows optional V18 backup heater.



Radiant cooling can also be used in conjunction with proper radiant loop controls such as a Tekmar 406 with dew point sensor and mixing valve (provided by Tekmar).

#11

Shows a CX34 set up for domestic hot water, fan coils for both heating and cooling, and radiant heating. This configuration is for two or less fan coil units, for >two fan coils see example of #5.



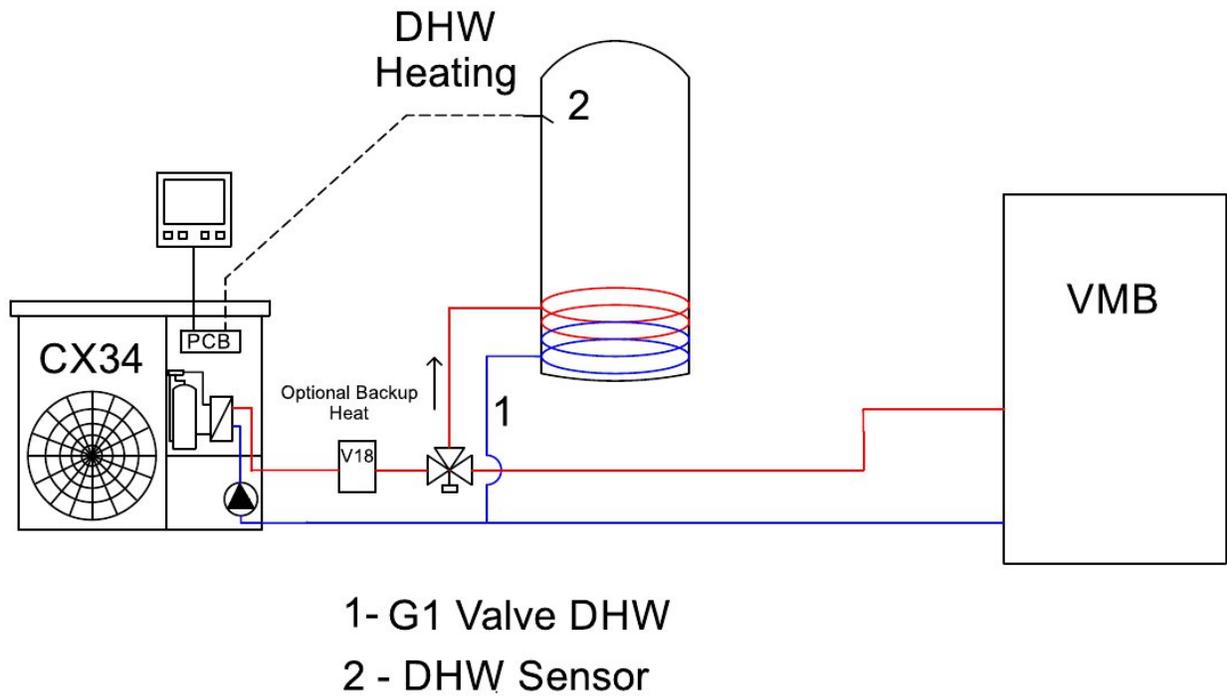
Basic diagram, not all components are shown, fan coil loop may need extra volume (see example #15).



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#12

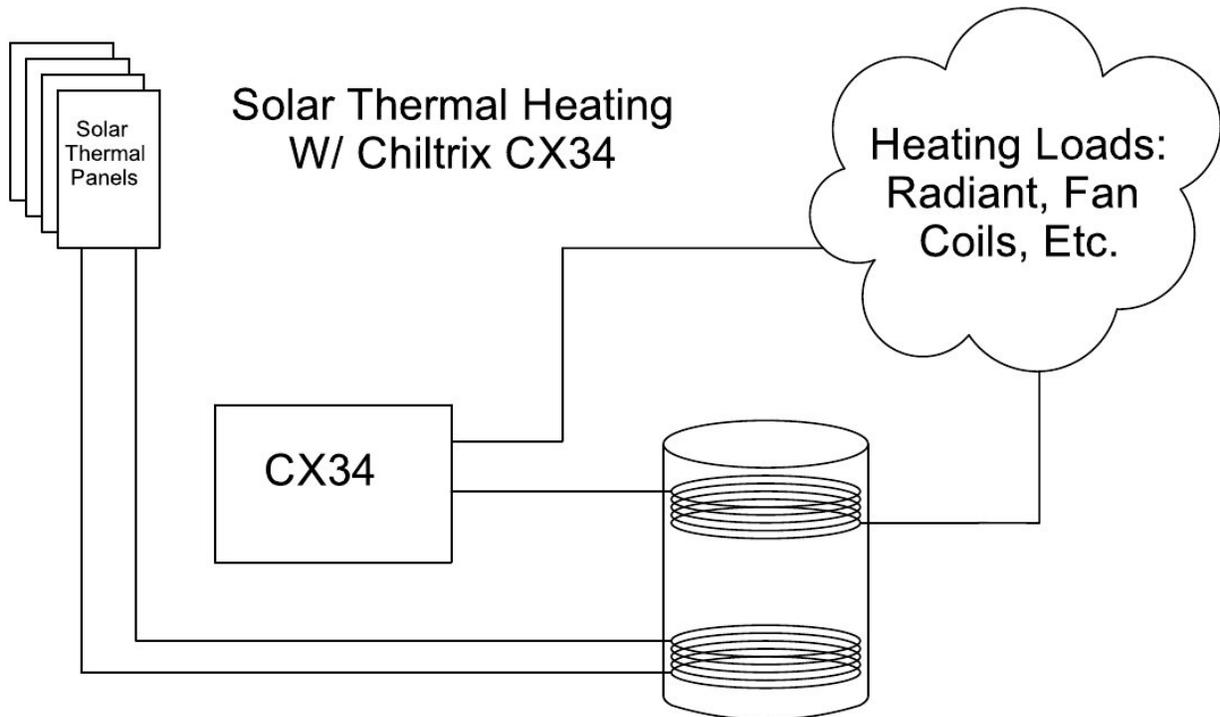
This shows a CX34 set up for domestic hot water and a Firstco VMB unit (central air handler for ducted forced air heating/cooling). Basic diagram, not all components are shown, fan coil loop may need extra volume (see example #15).





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#13 Drawing shows one of several ways to integrate solar thermal space heating with CX34. This design allows all solar heat to be used with the CX34 taking over as thermal storage is depleted.

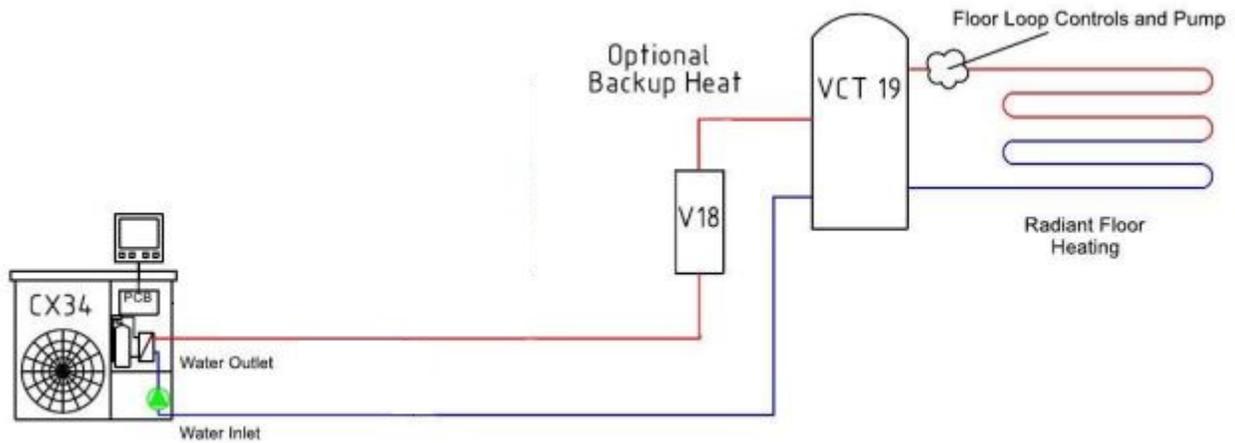


Please consult with a Chiltrix sales engineer to obtain a design that is perfect for your solar thermal application.



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#14 Drawing shows a radiant-only system with (optional) backup heater.



Backup heat can be provided by a V18 dynamic backup units, as desired. Backup heat may be needed in certain applications per your Manual J report.



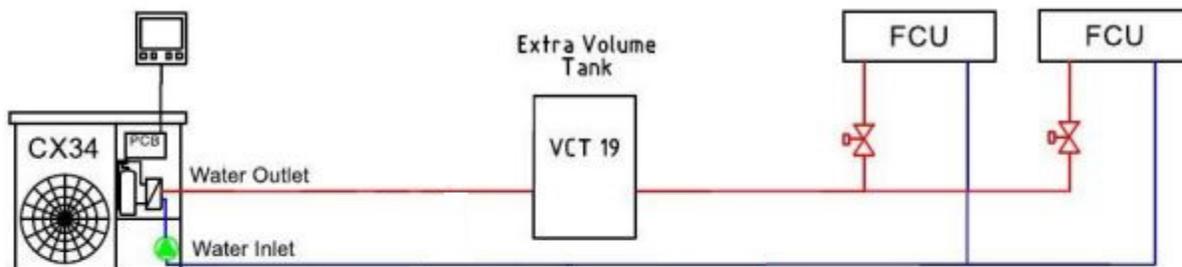
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#15 Drawing shows an FCU-only application where a 19-gallon VCT19 “additional volume” tank was added to bring the total system volume up to the minimum size (15 minimum with 20 or more gallons ideal).

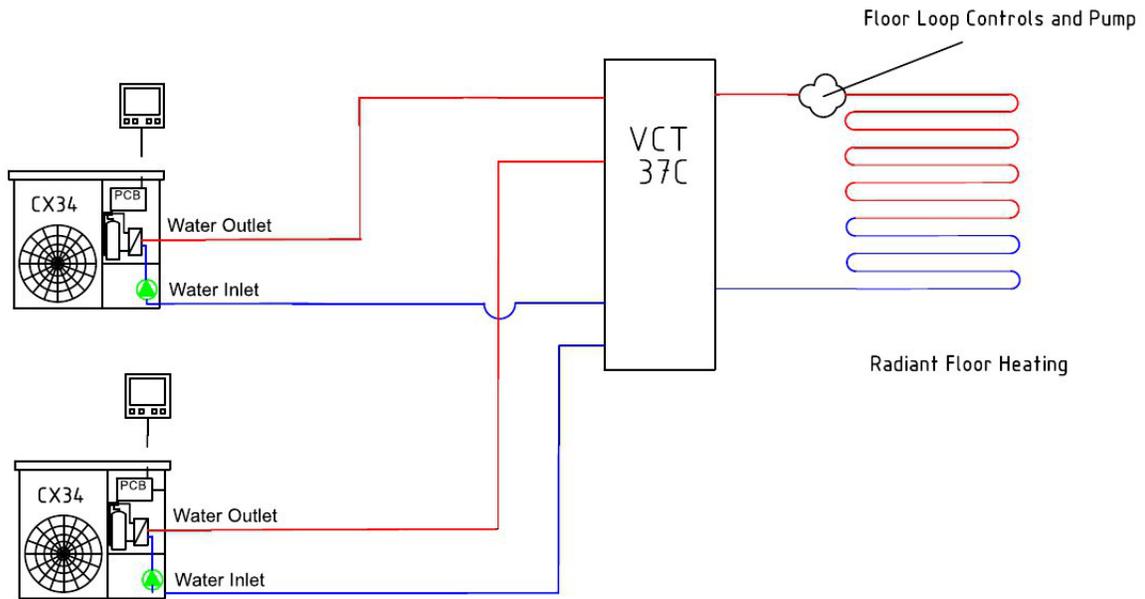
Note – An extra volume tank is not at all the same thing as an “expansion tank”. The CX34 has a built-in (internal) expansion tank that can handle total fluid volume up to 25 gallons. Additional expansion tanks of 1-2 gallons etc. will be needed in some applications

The VCT19 shown below adds fluid volume to the loop to ensure smooth operation (avoid compressor speed “hunting”) and improve performance during low-load operation. In this example it is not a “buffer tank”, it is configured as an in-line tank, you can think of it as a wide place in the piping used for the purpose of adding fluid volume. Basic diagram, not all components are shown.

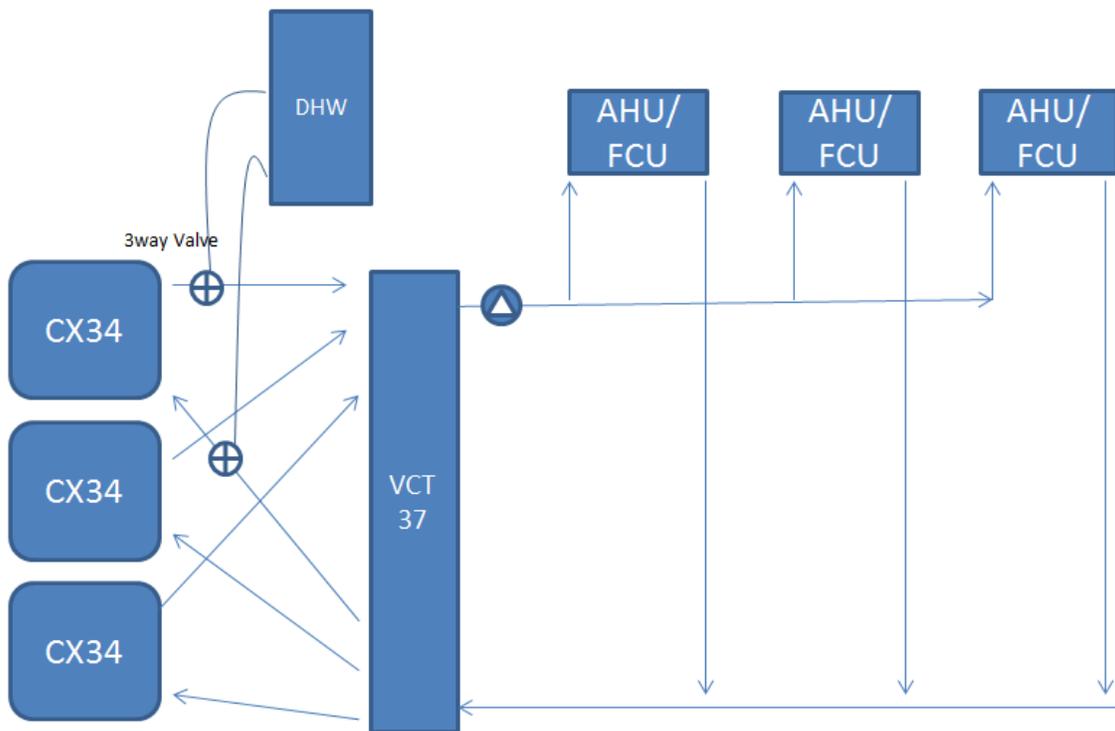
The VCT19 is an all-stainless steel heavily insulated tank. You can also add volume in this manner using most any small water heater tank like from Home Depot etc. (a small electric tank, without any electrical connections made), it does not have to be Chiltrix tank.



#16 Drawing shows a radiant heating-only (could also be used for radiant cooling) application using 2x CX34 units. Basic diagram, not all components are shown.



#17 Drawing shows 3x CX34 units combined with DHW and multiple FCU or AHU etc. Can also support a radiant system (not shown).

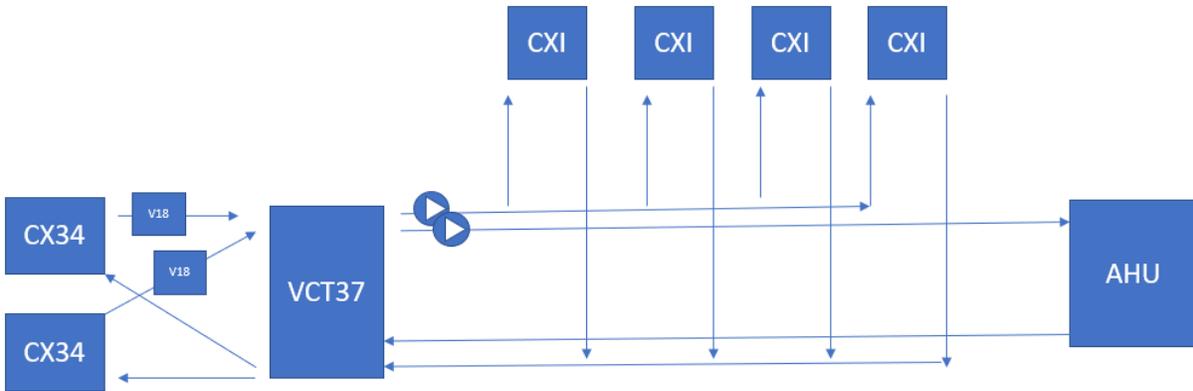




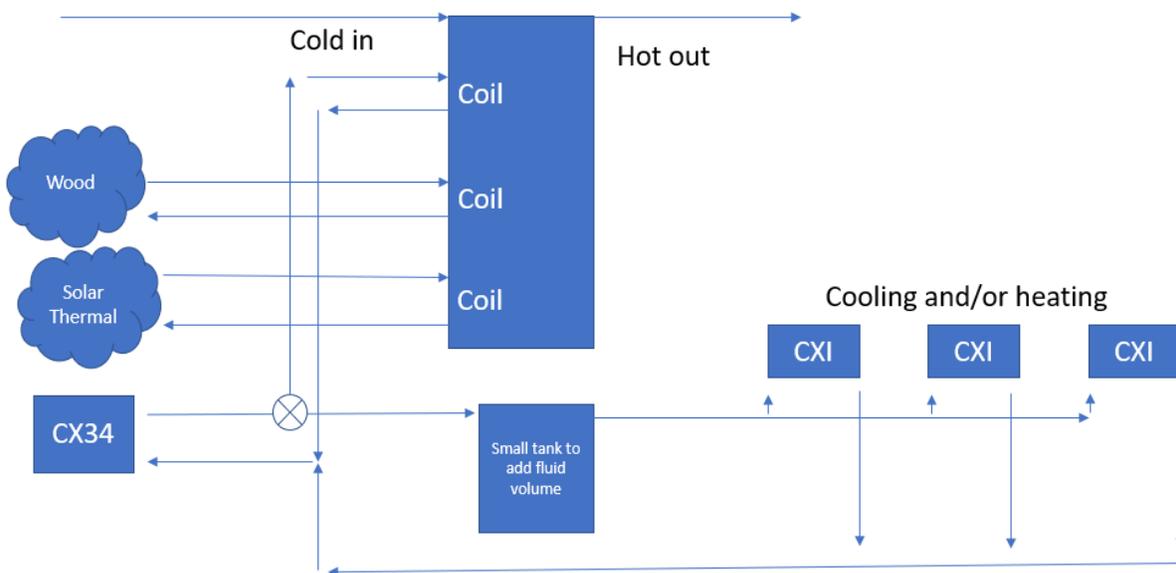
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More random designs...

Below shows a basic drawing of 2x CX34s supporting CXI ductless room fan coils and a central air handler unit (AHU).



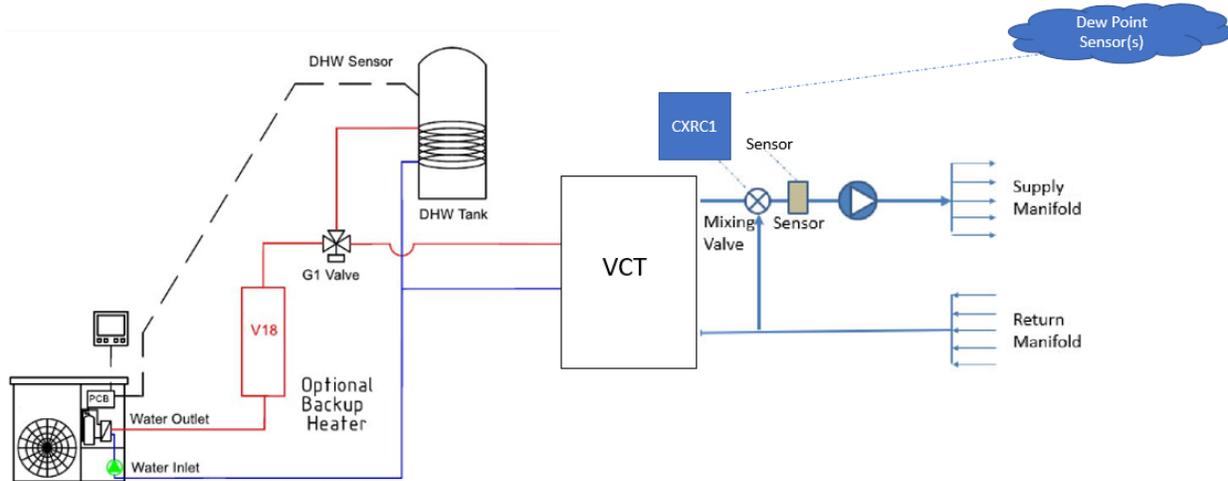
Below shows a basic drawing of something one of our customers did, shown here as an example of flexibility. In this example there is a 3-coil indirect tank with Chiltrix used for heating and/or cooling, and with two additional heat sources.





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Below shows an example radiant cooling application. See <https://www.chiltrix.com/radiant-cooling/>



There are hundreds (actually, thousands) of ways to configure Chiltrix award-winning, record-setting heat pump applications, we only show a few examples in this document.

Chiltrix engineering team is available for full design assistance, please let us help. At a minimum, please submit your design for approval.

Any or all of DHW, ductless room fan coils for heating and/or cooling, radiant heating, radiant cooling, ducted air handlers, domestic hot water, can all be used together in the same system if desired. One, two, or more Chiltrix heat pumps can be combined. For more heating or cooling capacity consider CX50 with astonishing (Seasonal Average COP) SCOP 4.55.

DO NOT ATTEMPT TO COMBINE TWO OR MORE CHILTRIX HEAT PUMPS USING REVERSE RETURN BALANCING, P/S PIPING, OR CLOSE SPACED TEES. ALWAYS USE A VCT37 OR OTHER MULTIPORT BUFFER TANK WHEN BONDING DOUBLE OR TRIPLE CX34 UNITS. If that is not possible, contact our engineering department for alternative configurations.