“World’s Most Efficient”

Chiltrix

Air To Water Heat Pumps

(a/k/a Reverse Cycle Chillers or
Hydronic Heat Pumps)

AHRI CERTIFIED®

ENERGY STAR 2019
Emerging Technology Award

Welcome to Chiltrix!

The Ultra-Efficiency Solution to “All Electric Home” HVAC systems and Net Zero energy.

Why all-electric? Because there are no panels you can install on the roof that make gas or oil.

In this presentation we will focus on the Chiltrix technology. The “World’s Most Efficient Air To Water Heat Pump”

ENERGY STAR 2019
Emerging Technology Award

The Chiltrix ultra-high efficiency air-to-water heat pump CX34 has been awarded the EPA **ENERGY STAR 2019/2020 Emerging Technology Award**

Chiltrix Air-To-Water Heat Pumps

Basic System Overview - Features

- Ultra-High Efficiency IPLV EER 23 / COP 3.92
- IPLV is Similar to SEER but not SEER
- Capacity 2 Tons Cooling, 2.7 Tons Heating
- Modular for "Stacking" up to Three Systems
- DC Inverter Variable Speed – Compressor, Fan, Pump
- Best of Breed Components
- Dynamic Humidity Control Option
- Dynamic Backup Heat Option
- Dynamic Outdoor Reset Control

Chiltrix Air-To-Water Heat Pumps

Basic System Overview - Features

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Suitable For Any Combination of:

- Cooling
- Heating
- Domestic Hot Water (DHW)

Install With Any Combination of:

- Radiant System
- Room Fan Coil Units (Up to 8 per CX34)
- Ducted Air Handler
- Concealed Ceiling Fan Coil Units
- Indirect Water Heater Tank
- Solar Thermal or PV

Chiltrix Air-To-Water Heat Pumps

Basic System Overview - Equipment

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1. Best-Of-Breed Component Selection – All Key Components are OTS (Off The Shelf). But only from the absolute "TOP" shelf.

2. Compressor: Variable Speed Mitsubishi DC Inverter
   Outdoor Fan: Variable Speed Panasonic DC Inverter
   Air Coil: MULTISTACK
   Water Coil: SWEP BPHE
   Valves: Emerson/Danfoss
   Pump: Variable Speed WILO

3. AHRI-Certified / CEC-Certified Title 24 / UL 60335-1-40 / UL 60335-2-40 / CSA 22.2

4. Unique High-Efficiency Capacity Controls

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Chiltrix Capacity Control
Patent-Pending

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1. Manages capacity (compressor & pump speed) to match load based on ΔT between LWT (Leaving Water Temperature) and EWT (Entering Water Temperature) and GPM.

2. System targets ~2.4 - 2.8 GPM per ton and a ~10 °F ΔT

3. Real-Time BTU Calculation / BTU = 500 x GPM x ΔT

4. Does not "chase and overshoot" a set point.

5. 500 is the WF (Water Factor) of pure water:
   8.33 (lbs. per gallon) x 60 (minutes per hour) x 1.0 (specific heat of water) x 1.0 (specific gravity of water) = 499.8 (500)

   <u>WF Adjustment for Propylene Glycol Mix</u>:
   10% Glycol, WF=494
   20% Glycol, WF=488
   30% Glycol, WF=480
   40% Glycol, WF=463
   50% Glycol, WF=442
   60% Glycol, WF=421

- Example in Cooling Mode: (Pure Water)
  12,000 BTU = 500 x 2.4 GPM x 10F ΔT

  If EWT were to rise 1 °F, ΔT would be increased to 11 °F, and the new load would be as follows:
  500 x 2.4 x 11=13,200 BTU.

  Based on this the CX34 will target a new compressor speed and a new pump speed and return the ΔT to ~10, as follows:
  New Load = 13,200 BTU = 500 x 2.64 x 10

- CX34 automatically adjusts to the actual glycol percentage.

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Air-To-Water Heat Pumps & IPLV & SEER

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Per AHRI, a properly sized air to water heat pump system needs to run at 100% about 1% of the time, runs at 75% capacity about 45% of the time, runs at 50% capacity about 42% of the time, and runs at about 25% capacity 12% of the time. IPLV uses a weighted average of EER at each of these conditions. Below is the AHRI formula for IPLV:

- IPLV = 0.01*A+0.42*B+0.45*C+0.12*D @ 44 °F LWT*
  (NPLV uses the same formula, at 54 °F LWT*)

  Where:
  A = COP or EER @ 100% Load
  (About 1% of the time the unit needs to run at around 100% capacity).
  B = COP or EER @ 75% Load
  (About 42% of the time the unit needs to run at around 75% capacity).
  C = COP or EER @ 50% Load
  (About 45% of the time the unit needs to run at around 50% capacity).
  D = COP or EER @ 25% Load
  (About 12% of the time the unit needs to run at around 25% capacity).

*LWT=Leaving Water Temperature (Supply temp, leaving the heat pump)

Chiltrix Psychrologix™ Controller w/ Dynamic Humidity Control (DHC)

- DHC Manages Dehumidification (Latent Heat Rejection) & Disables Dehumidification When It's Not Needed.
- Can Provide >34% Additional Energy Savings Above The Official IPLV Rating When Dehumidification is Disabled.
- DHC sensor monitors indoor relative humidity
- Increased EER when running in >/= NPLV conditions
- Chiltrix Official IPLV is EER 23.02
- When DHC is active, NPLV is EER 30.7 or Higher
- When DHC is Active, efficiency can be as high as EER 35
- Patent Pending

Humidity Control w/ Psychrologix™ Controller

- In a standard AC/cooling system, the unit has no control over the coil temperature - "it is what it is".

- Only Chiltrix patent-pending DHC technology can proactively and dynamically control the coil temperature.

- When indoor humidity is in the "good" range (user defined), the Chiltrix w/ Psychrologix Controller runs at ~NPLV saving a large amount of energy, well above it's record-setting IPLV EER rating.

- If humidity enters the space (from a door opening, hot shower, etc.) the DHC controller immediately sees the increase in humidity and drops the coil temperature to its IPLV settings, well below the dew point, to get rid of the humidity.

- When the humidity is under control and stable, the Chiltrix air to water heat pump w/ Psychrologix Controller will slowly recover back to NPLV settings.

- That means that some of the time, the unit runs at its record-setting official EER 23 rating.

- And at many other times, when indoor humidity is under control, it can run with an enhanced EER of up to 31 or higher.

- DHC prevents over-dehumidification and wasted energy in humid climates, dry climates, variable climates, server rooms, etc.

Psychrologix™ Controller

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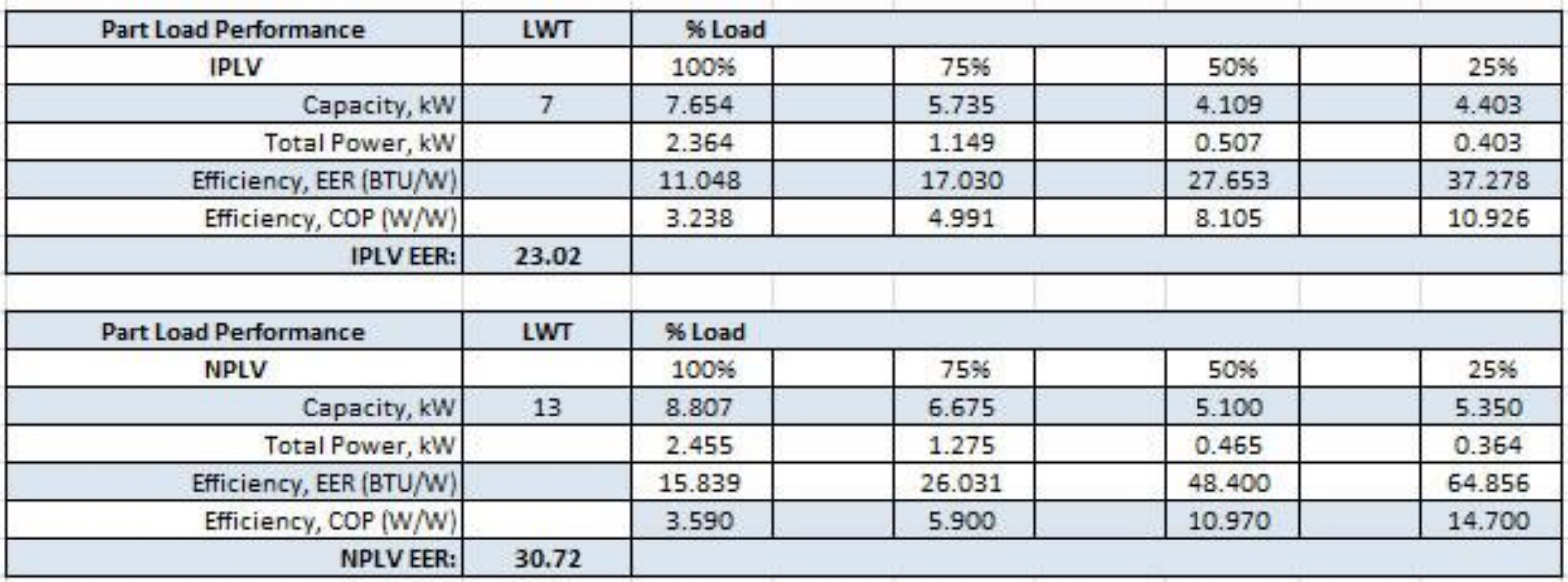
Below, the top chart shows IPLV, the bottom chart shows NPLV. Both are results from the same official CX34 AHRI lab test and are based on identical ambient conditions.

The difference – IPLV shows cooling EER at loop (coil) temperature 44 °F (7 °C) w/ Strong Dehumidification Active. NPLV shows cooling EER at coil temperature 54 °F (13 °C) w/ Dehumidification Reduced or Disabled. Properly sized FCUs can still manage the sensible cooling load at NPLV (Dynamic Humidity Control Active) Conditions.

As you can see, running the loop 9 °F (5 °C) warmer has a profound effect on EER, increasing the rating from EER 23 to EER 30.72. A few more ^{0}F difference can raise it to EER 35.



Part Load Performance	LWT	% Load						
IPLV		100%		75%		50%		25%
Capacity, kW	7	7.654		5.735		4.109		4.403
Total Power, kW		2.364		1.149		0.507		0.403
Efficiency, EER (BTU/W)		11.048		17.030		27.653		37.278
Efficiency, COP (W/W)		3.238		4.991		8.105		10.926
IPLV EER:	23.02							

Part Load Performance	LWT	% Load						
NPLV		100%		75%		50%		25%
Capacity, kW	13	8.807		6.675		5.100		5.350
Total Power, kW		2.455		1.275		0.465		0.364
Efficiency, EER (BTU/W)		15.839		26.031		48.400		64.856
Efficiency, COP (W/W)		3.590		5.900		10.970		14.700
NPLV EER:	30.72							

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Compare Air-To-Water Heat Pumps

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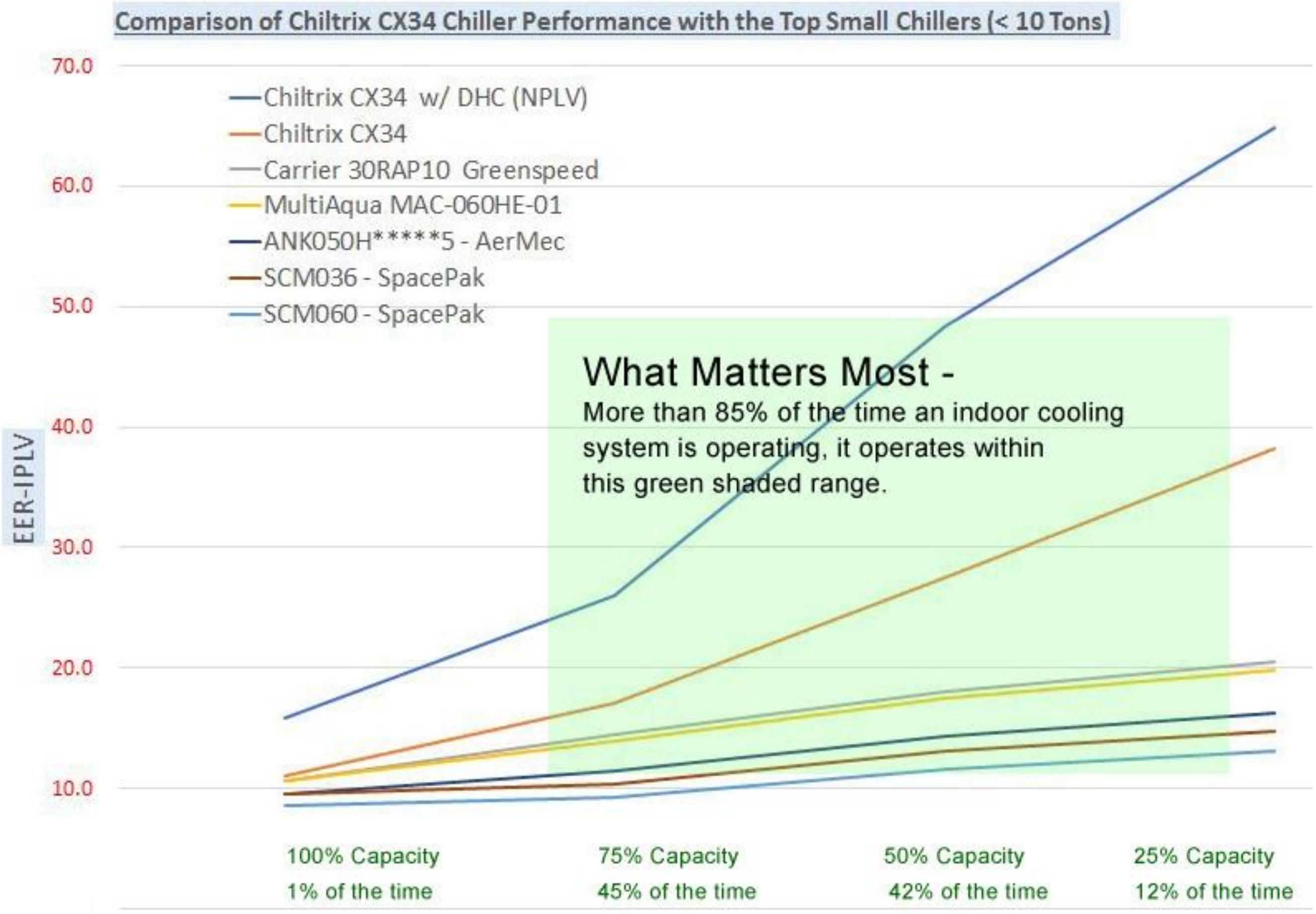
The cart below shows Chiltrix CX34 EER (Both IPLV and NPLV) compared to the top competitors.


Comparison of Chiltrix CX34 Chiller Performance with the Top Small Chillers (< 10 Tons)

What Matters Most -

More than 85% of the time an indoor cooling system is operating, it operates within this green shaded range.

The top blue line shows Chiltrix running w/ DHC at NPLV.

The orange line shows Chiltrix running at it's official IPLV.

These other lines show various competitors running at their official IPLV.

Only Chiltrix can dynamically shift between IPLV and NPLV.

Heating Operation

1. Heating control: As with cooling mode, capacity is controlled based on ΔT and GPM flow rate. Compressor and pump speed vary to match the load.

2. Typical running temperature of an air to water heat pump for radiant is 95 °F. Fan coil units should be sized for 104 °F entering water temp. Combo FCU-radiant design should be designed for 104 °F. Note that Chiltrix Fan Coil Units and Ducted Air Handlers are rated for 104 °F entering fluid temperature.

3. Radiant heating always requires a buffer tank. Fan coil-only installations can run without a buffer tank with 15-20 gallons minimum loop volume.

4. Optional integrated V18 dynamically variable power backup heater targets an exact match to any heating shortfall.

5. Onboard dynamic outdoor reset with user-customizable curve.

Heating Operation
Proper Low-Temp Heating Design

1. With All Heat Pumps, “Lift” Drives the COP. (Same as IPLV Vs.NPLV)

2. Lift = ΔT between Ambient and Supply Temp.

1. Carnot Efficiency: $W = \frac{Q_1}{COP_p} = \frac{Q_1(T_1 - T_2)}{\eta_{mech} T_1}$

2. Always Design For The Lowest Possible Heating Supply Temperature.

3. Example: at 0 ^{o}F outdoor temperature, an air to water heat pump such as the CX34 will have >20% higher capacity when used with an operating supply temperature of 95 ^{o}F compared to operating at 122 ^{o}F. And COP at 95 ^{o}F will be >30% higher at 95 ^{o}F than at 122 ^{o}F.

4. Help Your Customer Get The Highest COP: Use Closer PEX Spacing, Larger FCUs, add PEX in Walls, Ceiling if Needed.

Heating Operation
Proper Design

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$$W=\frac{Q_1}{COP_p}=\frac{Q_1(T_1-T_2)}{\eta_{mech}T_1}$$

Carnot efficiency equation for a heat pump.

Radiant

Always design PEX (or panels etc.) for lowest operating temp, typically 95-104F.

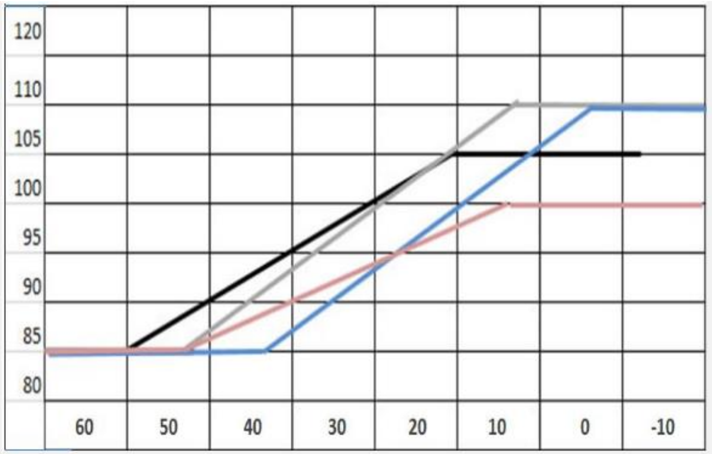
AHU or Fan Coil Units

Size fan coils or air handler for 104F.

Always design indoor-side equipment for the lowest temperature possible.

See Heating Data on next slide.

Dynamic Outdoor Reset Control



Design the indoor side of the system to handle the peak load at the lowest possible operating temperature, **then let the system automatically reset to an even lower and more efficient temperature at times when weather is milder!**

See reset curve development tool to create a custom curve

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Heating Operation

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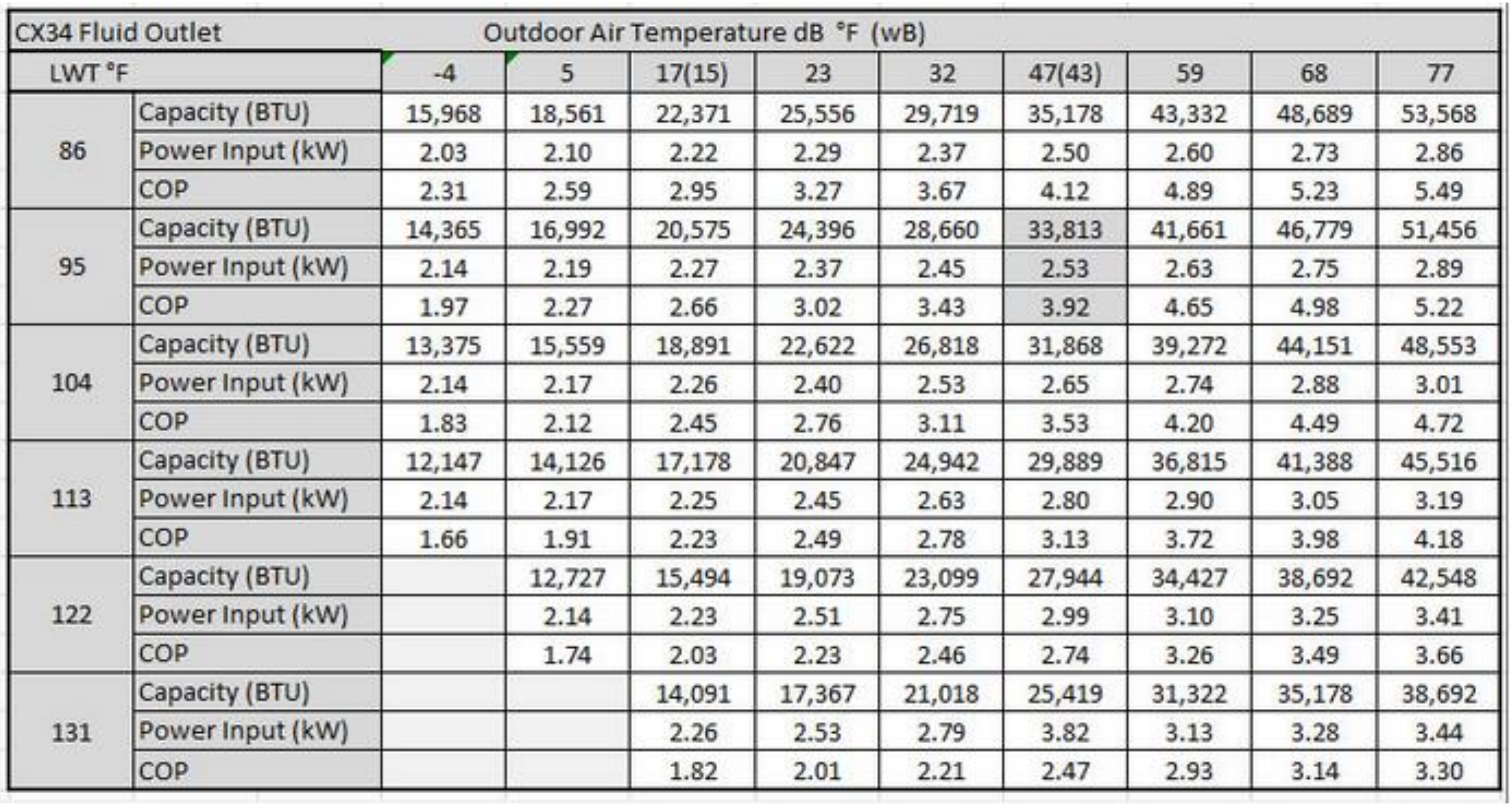
Capacity and COP of a heat pump varies as a function of both outdoor ambient temperature and leaving water temperature. See Chiltrix CX34 heating performance map below.



CX34 Fluid Outlet		Outdoor Air Temperature dB °F (wB)								
LWT °F		-4	5	17(15)	23	32	47(43)	59	68	77
86	Capacity (BTU)	15,968	18,561	22,371	25,556	29,719	35,178	43,332	48,689	53,568
	Power Input (kW)	2.03	2.10	2.22	2.29	2.37	2.50	2.60	2.73	2.86
	COP	2.31	2.59	2.95	3.27	3.67	4.12	4.89	5.23	5.49
95	Capacity (BTU)	14,365	16,992	20,575	24,396	28,660	33,813	41,661	46,779	51,456
	Power Input (kW)	2.14	2.19	2.27	2.37	2.45	2.53	2.63	2.75	2.89
	COP	1.97	2.27	2.66	3.02	3.43	3.92	4.65	4.98	5.22
104	Capacity (BTU)	13,375	15,559	18,891	22,622	26,818	31,868	39,272	44,151	48,553
	Power Input (kW)	2.14	2.17	2.26	2.40	2.53	2.65	2.74	2.88	3.01
	COP	1.83	2.12	2.45	2.76	3.11	3.53	4.20	4.49	4.72
113	Capacity (BTU)	12,147	14,126	17,178	20,847	24,942	29,889	36,815	41,388	45,516
	Power Input (kW)	2.14	2.17	2.25	2.45	2.63	2.80	2.90	3.05	3.19
	COP	1.66	1.91	2.23	2.49	2.78	3.13	3.72	3.98	4.18
122	Capacity (BTU)		12,727	15,494	19,073	23,099	27,944	34,427	38,692	42,548
	Power Input (kW)		2.14	2.23	2.51	2.75	2.99	3.10	3.25	3.41
	COP		1.74	2.03	2.23	2.46	2.74	3.26	3.49	3.66
131	Capacity (BTU)			14,091	17,367	21,018	25,419	31,322	35,178	38,692
	Power Input (kW)			2.26	2.53	2.79	3.82	3.13	3.28	3.44
	COP			1.82	2.01	2.21	2.47	2.93	3.14	3.30

Dynamically Variable V18 Backup Heater

Patent Pending

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- Typical ATW heat pump backup is a water heater tank installed on the supply side of the loop.

- Typical tank backup element runs at full power to chase and overshoot a set point, stops, and a few moments later, repeats. Thermostat hysteresis results in temperature swings and wasted energy.

- The V18 is instead controlled by the CX34 to target a BTU shortfall, dynamically matching its variable output to match any heating capacity shortfall.

- V18 backup heat output is continuously adjusted in real time to avoid over-providing backup heat, allowing the compressor to always produce the highest possible % of total heat.

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V18 Dynamically Variable Backup Heating

Patent Pending

- V18 is a powerful small footprint wall mounted in-line backup heat solution.
- Practically No Pressure Drop:
  @ 7 GPM = 0.000427775 ft. / @ 14 GPM= 0.001438843 ft.
- Offered as a kit with all UL-Listed high voltage electrical components. Assembly required. Licensed electrician required for installation.
- 18,000 BTU (Variable 0-18,766 BTU) Per V18. Use up to three per CX34.
- Uses SSR Technology with 100 Power Level Steps, 0-100% Dynamic Power
- Each V18 requires 208v-240v, 30 amp GFCI breaker.

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Compare V18 to Standard Hydronic Backup Heating Approach

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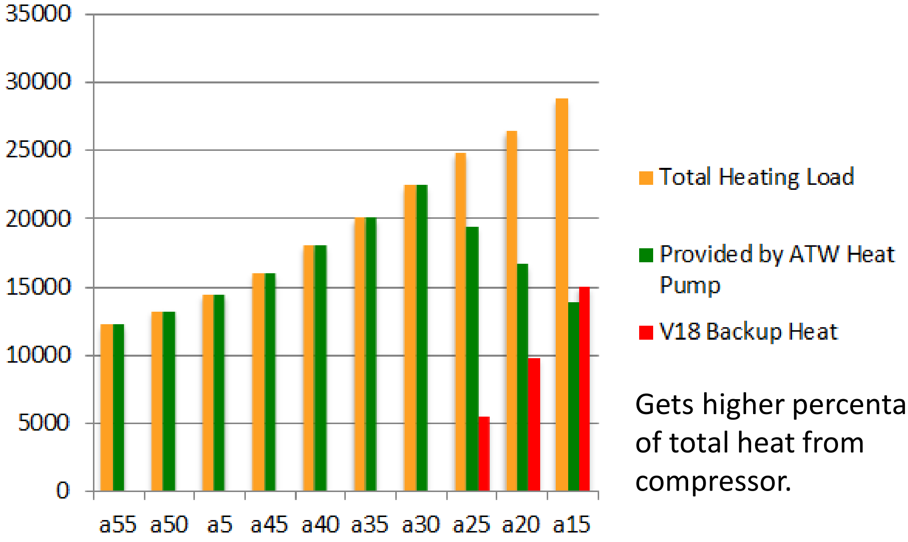
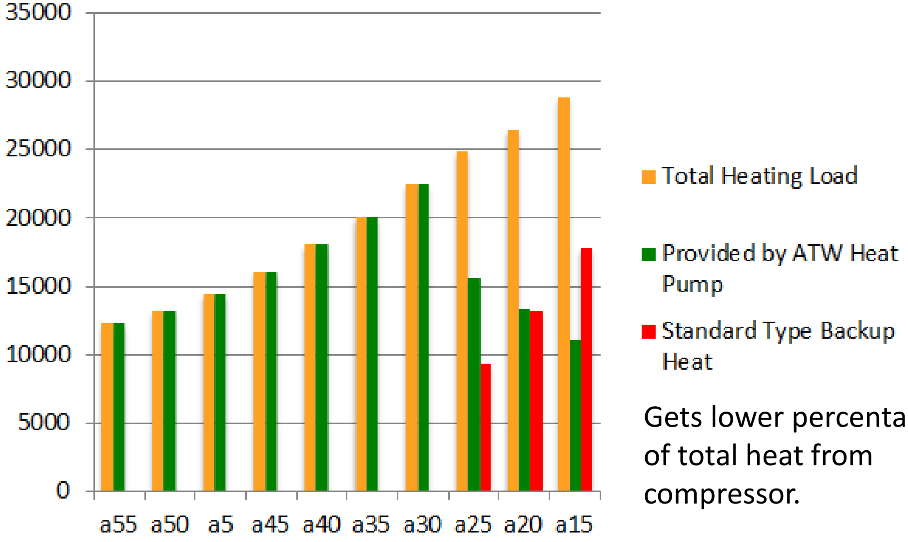
Variable capacity V18 backup heater modulates to provide only the missing heat (BTU shortfall). Controlled by real time BTU calculation, V18 keeps compressor at highest speed to minimize use of backup heat, achieves higher average COP.

Charts at right from ICF reference building, ACCA Manual J Version 2.5 run at multiple ambient design temperatures 15 ^{o}F to 55 ^{o}F.

Standard backup heat is controlled by the element thermostat. It chases a set point, overshoots, stops, falls behind, then repeats. Standard solutions overshoot and produce "apparent" load reduction, slowing or stopping the compressor, reducing the percentage of heat supplied by the compressor, and lowering the average system COP.



Gets higher percentage of total heat from compressor.



Gets lower percentage of total heat from compressor.

Heating Performance Modeling

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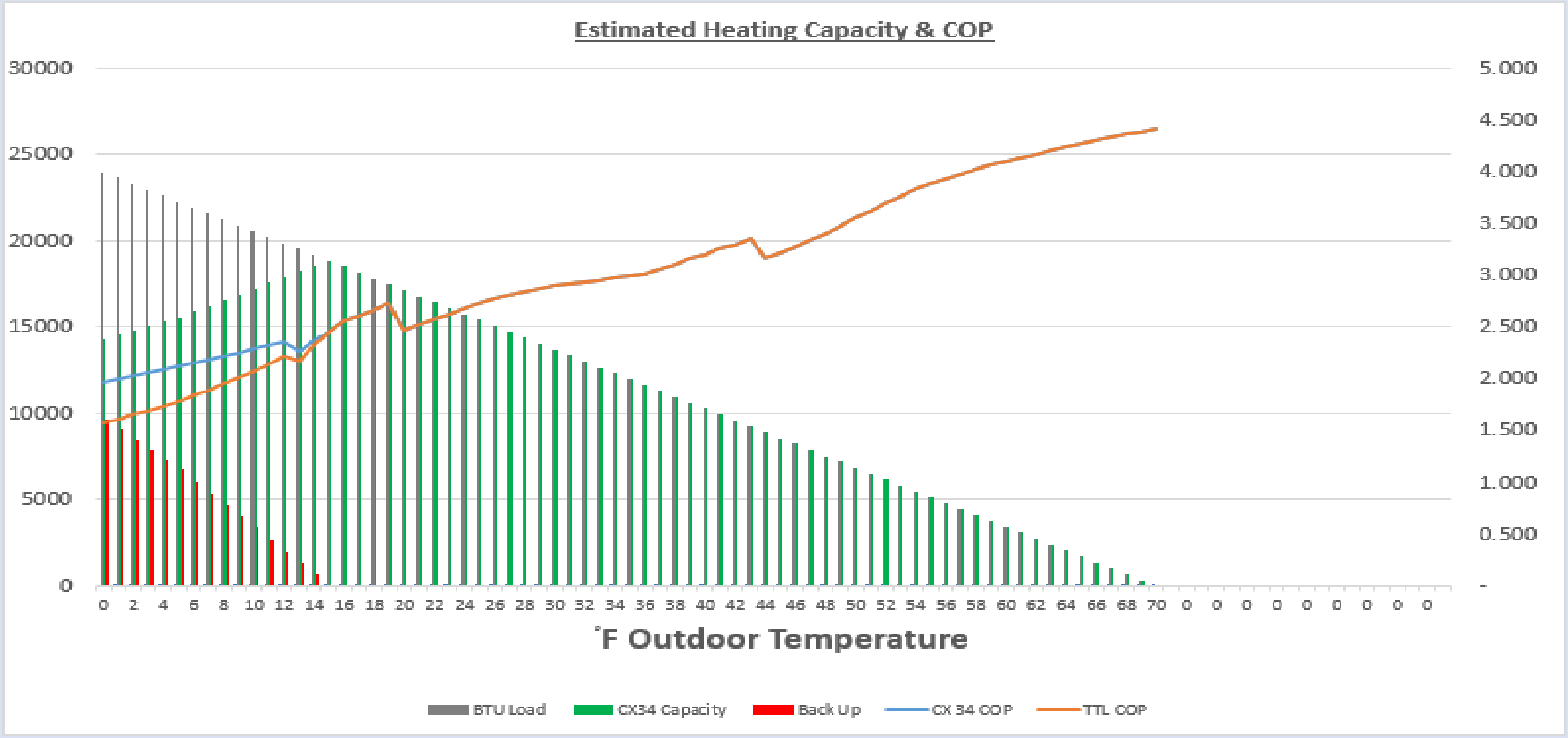
Chiltrix is able to provide heating performance projections that can help understand the estimated COP, annual energy costs, and backup heat requirements to help w/ system design & modeling, etc. Below, see example COP & Capacity Chart showing 1x CX34, Windsor, Ontario, Canada WMO 712980 w/ Manual J Heating Load 24,000 BTU @ Outdoor Design 0 ^{o}F / Radiant LWT105 / Per AHRI 550/590 Heating Test Data



Vertical grey lines are the load, vertical green lines are heat provided by compressor, vertical red lines are heat provided by backup. BTU load is down the left side, COP is down the right side, and across the chart the orange line is TTL COP (net including backup heat at COP 1), blue line is compressor-only COP, outdoor temps are across the bottom.

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Heating Performance Modeling

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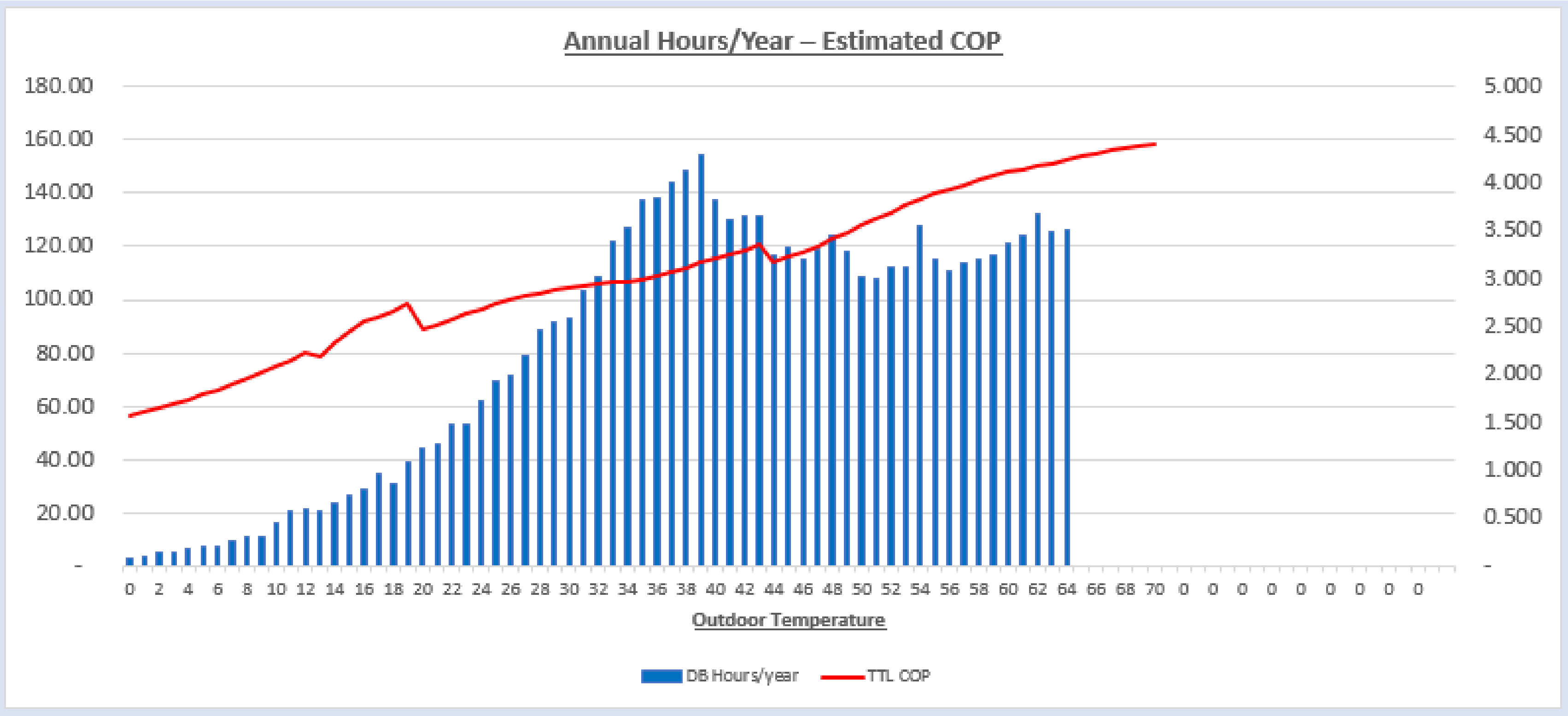
Example Annual Hours & COP Chart (1x CX34, Windsor, Ontario, Canada WMO 712980 w/ Manual J Heating Load 24,000 BTU @ Outdoor Design 0 ^{o}F / Radiant LWT105 / Per AHRI 550/590 Heating Test Data. Shows the COP at each temperature and the number of annual hours at each temperature. Data per ASHRAE Weather Data Viewer v6.0. ©ASHRAE 2018. Used under License.



Annual hours at each temperature are down the left side, COP is down the right side, outdoor temperatures are across the bottom. Orange line crossing the chart is TTL (net) COP including backup heat at COP 1.

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Chiltrix Air-To-Water Heat Pumps Used w/ Fan Coil Units (FCU)

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4 Sizes: 5.1" Thin Euro-Style Fan Coil Units
¼ ton, ½ ton, ¾ ton, 1 ton
DC Inverter Fan Motors – Nearly Silent
Universal Mounting – Wall, Floor, Ceiling

Sizing Considerations:
Select based on the higher of heating or cooling load.
Capacity Rating depends on entering water temperature.
Designed for "wild coil" operation without valve.
WiFi Option Available.

For cooling, all fan coil units including CXI series are typically rated at 44 ^{o}F entering Temperature. Use Chiltrix CXI sizing guide for heating capacity.

Customers using the Psychrologix™ DHC (Dynamic Humidity Control) controller should size based on 54 °F or higher entering water temperatures.

Chiltrix Air-To-Water Heat Pumps Sizing FCUs. Example, CXI-34:

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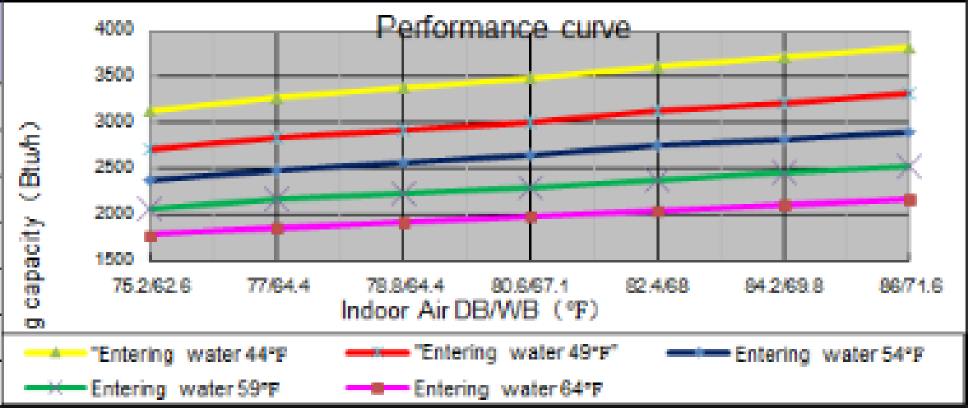
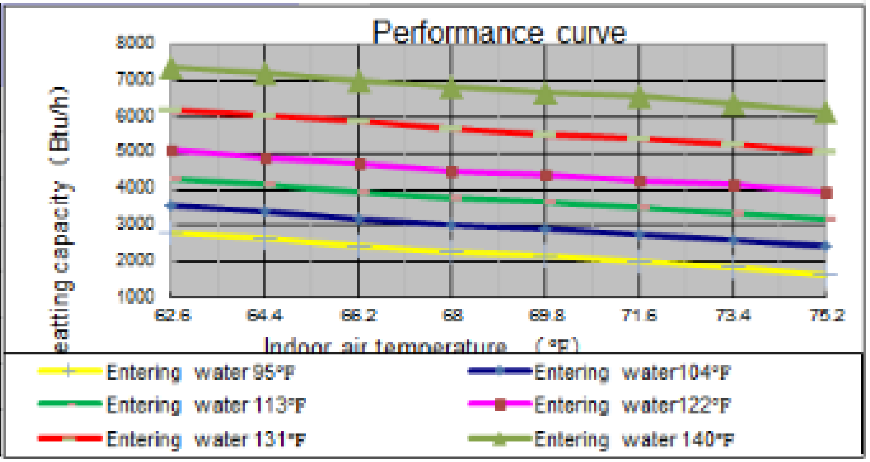
Cooling capacity performance data and curve

Indoor air \ Entering water	44	49	54	59	64
75.2/62.6	3135	2712	2381	2067	1778
77/64.4	3271	2830	2484	2156	1855
78.8/64.4	3376	2920	2564	2225	1914
80.6/67.1	3480	3010	2643	2294	1973
82.4/68	3615	3127	2746	2383	2050
84.2/69.8	3717	3215	2823	2450	2107
86/71.6	3828	3311	2907	2523	2170



Heating capacity performance data and curve

Indoor air \ Entering water	95	104	113	122	131	140
63	2802	3556	4309	5062	6205	7348
64	2626	3375	4124	4873	6043	7214
66	2441	3194	3947	4701	5857	7014
68	2260	3013	3767	4520	5667	6814
70	2152	2897	3643	4388	5534	6680
72	2035	2778	3521	4264	5405	6546
73	1843	2599	3354	4109	5228	6346
75	1661	2417	3174	3930	5038	6146



The yellow shaded areas are generally used for CXI sizing. For cooling, use the 44 °F for standard cooling. Use 54 °F column when using DHC controller. For heating, use 104 °F column.

Complete sizing guide here http://www.chiltrix.com/documents/CXI-capacity-test.pdf

Chiltrix Air-To-Water Heat Pumps

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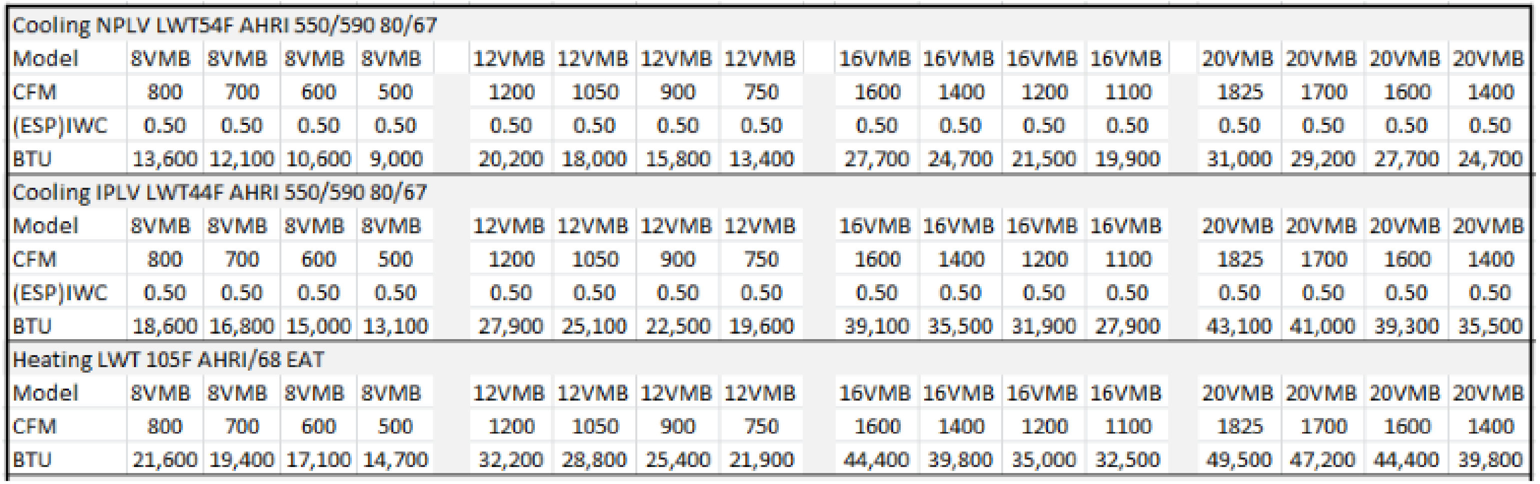
Ducted System Air Handler Options
Extended Performance Data of Firstco Variable Speed VMB Series



Cooling NPLV LWT54F AHRI 550/590 80/67																
Model	8VMB	8VMB	8VMB	8VMB	12VMB	12VMB	12VMB	12VMB	16VMB	16VMB	16VMB	16VMB	20VMB	20VMB	20VMB	20VMB
CFM	800	700	600	500	1200	1050	900	750	1600	1400	1200	1100	1825	1700	1600	1400
(ESP)IWC	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
BTU	13,600	12,100	10,600	9,000	20,200	18,000	15,800	13,400	27,700	24,700	21,500	19,900	31,000	29,200	27,700	24,700
Cooling IPLV LWT44F AHRI 550/590 80/67																
Model	8VMB	8VMB	8VMB	8VMB	12VMB	12VMB	12VMB	12VMB	16VMB	16VMB	16VMB	16VMB	20VMB	20VMB	20VMB	20VMB
CFM	800	700	600	500	1200	1050	900	750	1600	1400	1200	1100	1825	1700	1600	1400
(ESP)IWC	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
BTU	18,600	16,800	15,000	13,100	27,900	25,100	22,500	19,600	39,100	35,500	31,900	27,900	43,100	41,000	39,300	35,500
Heating LWT 105F AHRI/68 EAT																
Model	8VMB	8VMB	8VMB	8VMB	12VMB	12VMB	12VMB	12VMB	16VMB	16VMB	16VMB	16VMB	20VMB	20VMB	20VMB	20VMB
CFM	800	700	600	500	1200	1050	900	750	1600	1400	1200	1100	1825	1700	1600	1400
BTU	21,600	19,400	17,100	14,700	32,200	28,800	25,400	21,900	44,400	39,800	35,000	32,500	49,500	47,200	44,400	39,800

Customers can use ducted, ductless, or radiant and can use all of these in the same application if desired.

For example, an open area (living/dining/kit) might be served by a ducted system, while bedrooms, office, den, may be served by room fan coils, and bathrooms (or even the entire home) may have radiant heating.

Above shows proper ratings for VMB series using low temp heat pump heating.

Other brands of AHUs used will require the extended performance data from the manufacturer in order to properly size for the Chiltrix standard water temperatures.

Chiltrix Air-To-Water Heat Pumps

"World's Most Efficient"

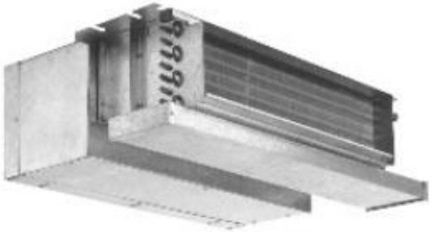
Concealed Ceiling Air Handler Options
Variable Speed "X" DC Inverter Motor Series

In addition to or in combination with Radiant, Central Ducted or Room Fan Coil Units ("FCU" CXI-series models) customers can use Concealed Ceiling Fan Coil Units.

Chiltrix can provide the BTU ratings for each model after we know how you will operate them. Or use the sizing guide. Note, these units must be professionally specified by the customers HVAC contractor as Chiltrix does not offer duct design or calculations for static pressure or CFM.

Cooling Range to 36,000 BTU / Heating Range to 32,000 BTU.

Ceiling Recessed



Ceiling Concealed with Plenum

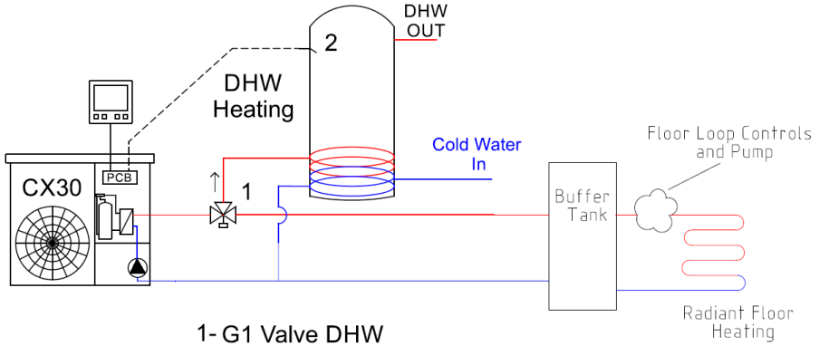
Ceiling Concealed (Un-Cased)

Heating BTUs Are Non-Standard – Use Chiltrix Sizing Guide

Domestic Hot Water

"World's Most Efficient"

- DHW Function requires a heat exchanger tank (indirect coil or solar type tank).
- Requires a G1 (DN25) 3-way valve, controlled by CX34.
- When the DHW tank needs heat, the CX34 switches to DHW mode (Full Speed Heating) and switches the G1 to the tank. Space heating/cooling are paused temporarily.
- Generally, the G1/tank should be close to the CX34. A booster pump may be needed depending on the pressure drop of the coil (if 3rd party tank used) and piping design to the tank.
- Max tank set point is 120 °F (Except when anti-legionella function is active).
- Domestic Water Heating may be disabled and tank heated by backup element when V18 is active.
- Automatic Anti-Legionella Function



1- G1 Valve DHW
2 - DHW Sensor

Chiltrix

DHW & Buffer Tanks

AHRI CERTIFIED®
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DHW (Domestic Hot Water) Chiltrix DHW80:
70 Gallons Net / Well Insulated Poly 50mm
GIANT Coil: 72 ft. x 1.25" Convoluted Coil 32 ft^2 Surface Area
Inner Tank & Coil: Duplex 2205 Stainless Steel
Outer Tank: 304 Stainless Steel

VCT19 Buffer Tank: 304 Stainless Steel
19 Gallons Net / Well Insulated Poly 50mm
2x 1" NPT Ports Supply Side
2x 1" NPT Ports Load Side
Element-Ready For Emergency Heat

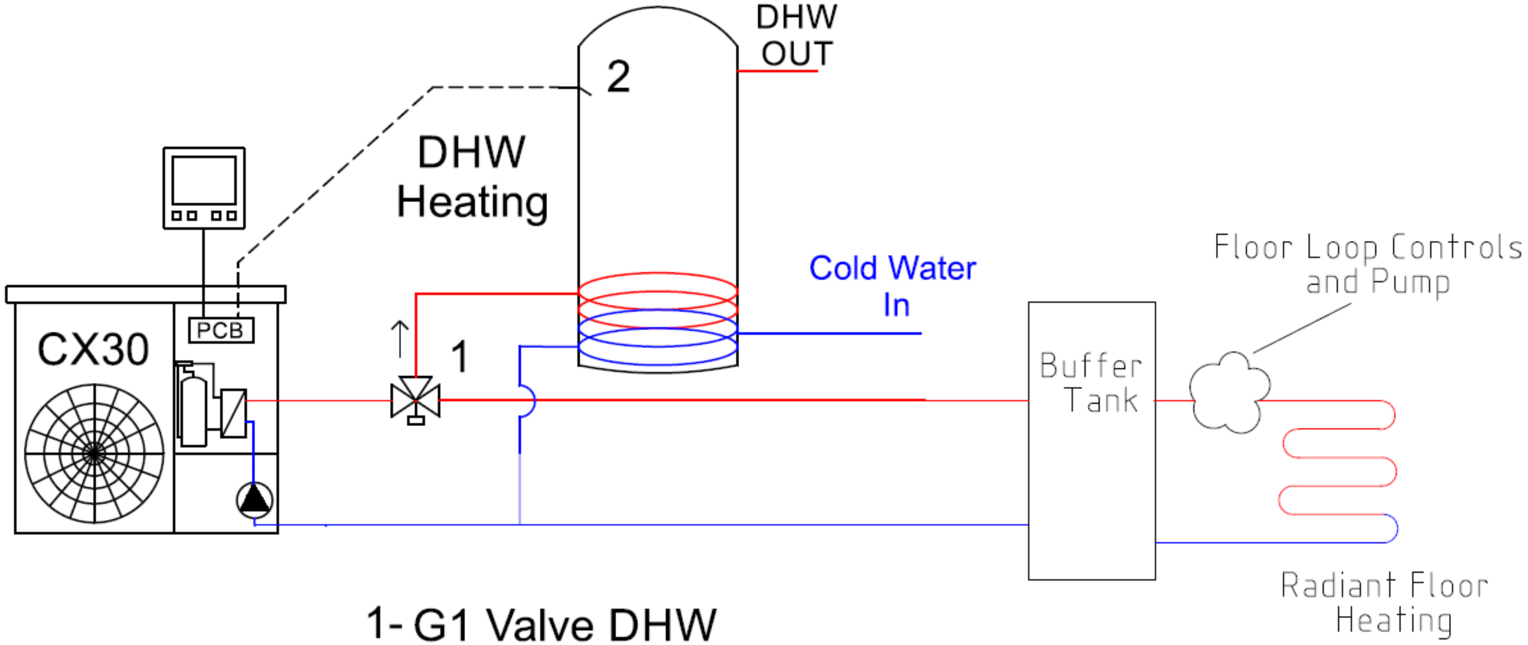
VCT37 Buffer Tank: 304 Stainless Steel
37 Gallons Net / Well Insulated Poly 50mm
6x 1" NPT Ports Side 1
4x 1.5" NPT Ports Side 2
Element-Ready For Emergency Heat
Designed For Either Vertical or Horizontal Installation

Use a VCT37 when combining 2 or 3 CX34 Units.

IMPORTANT: Read the DHW & Buffer Tank Manual:
https://www.chiltrix.com/heat-exchanger-tanks/chiltrix-tank-manual.pdf

CX34 Air-To-Water Heat Pump (Shown w/ DHW & Radiant System)

"World's Most Efficient"



1- G1 Valve DHW

2 - DHW Sensor

Simplified concept drawing –
not all components shown

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CX34 Air-To-Water Heat Pumps (Shown w/ DHW & Fan Coil Units)

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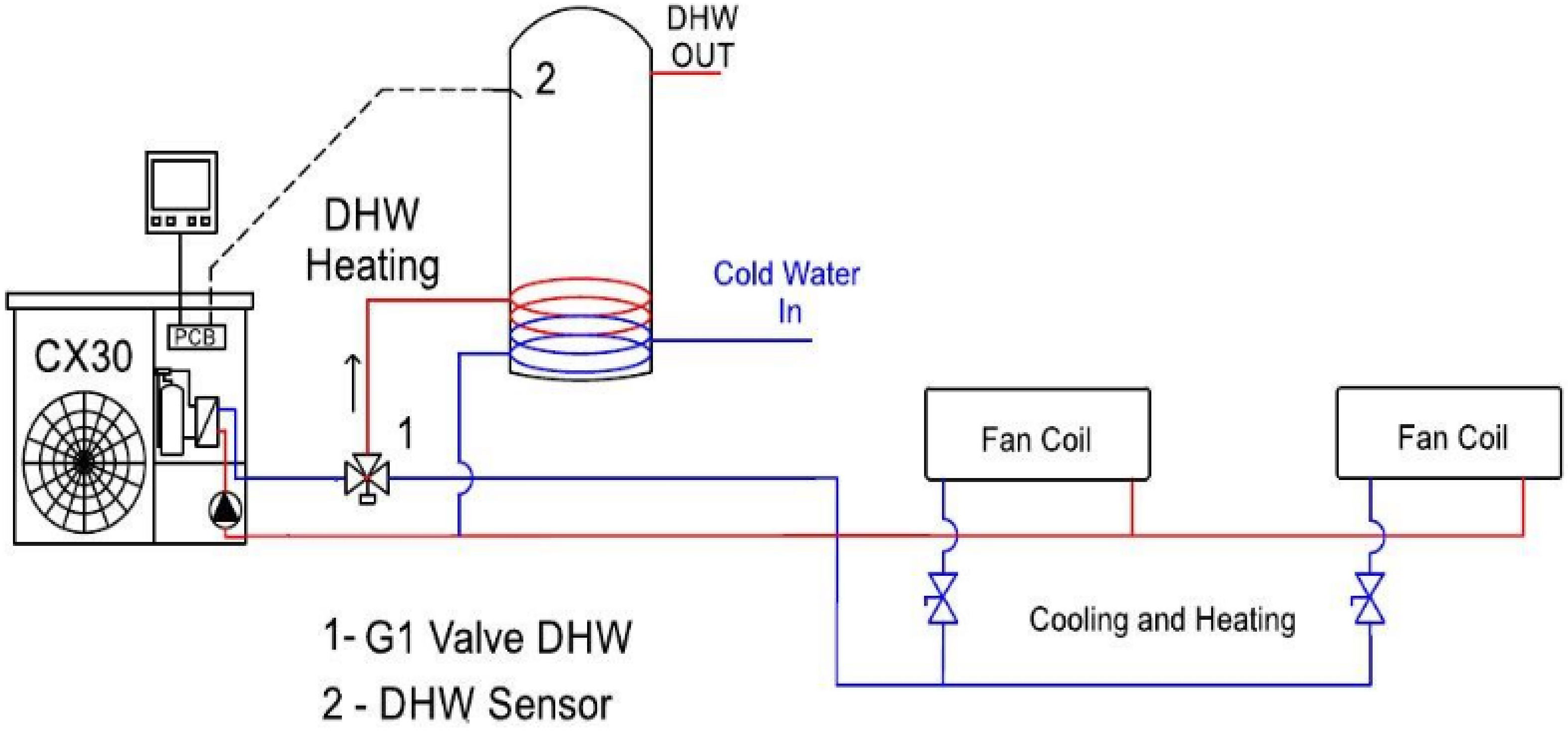

Simplified concept drawing – not all components shown

Chiltrix

CX34 Air-To-Water Heat Pump (Shown w/ Radiant, V18 & Fan Coils)

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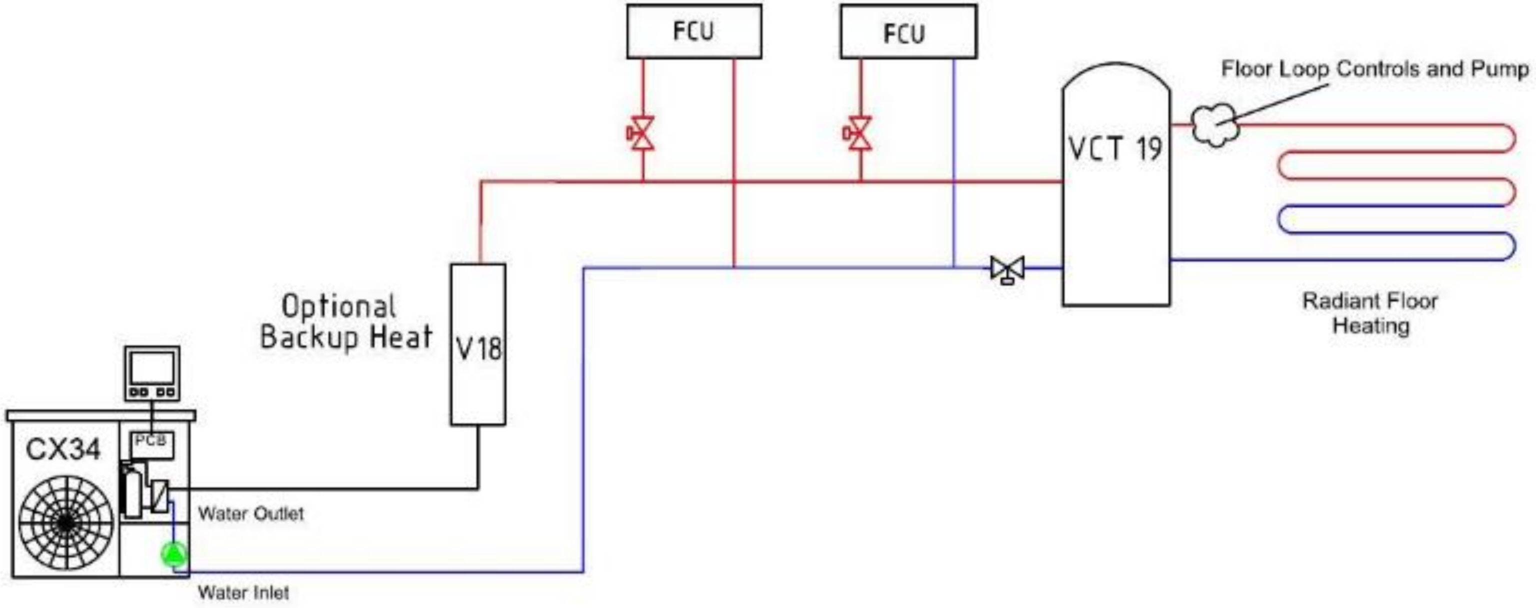
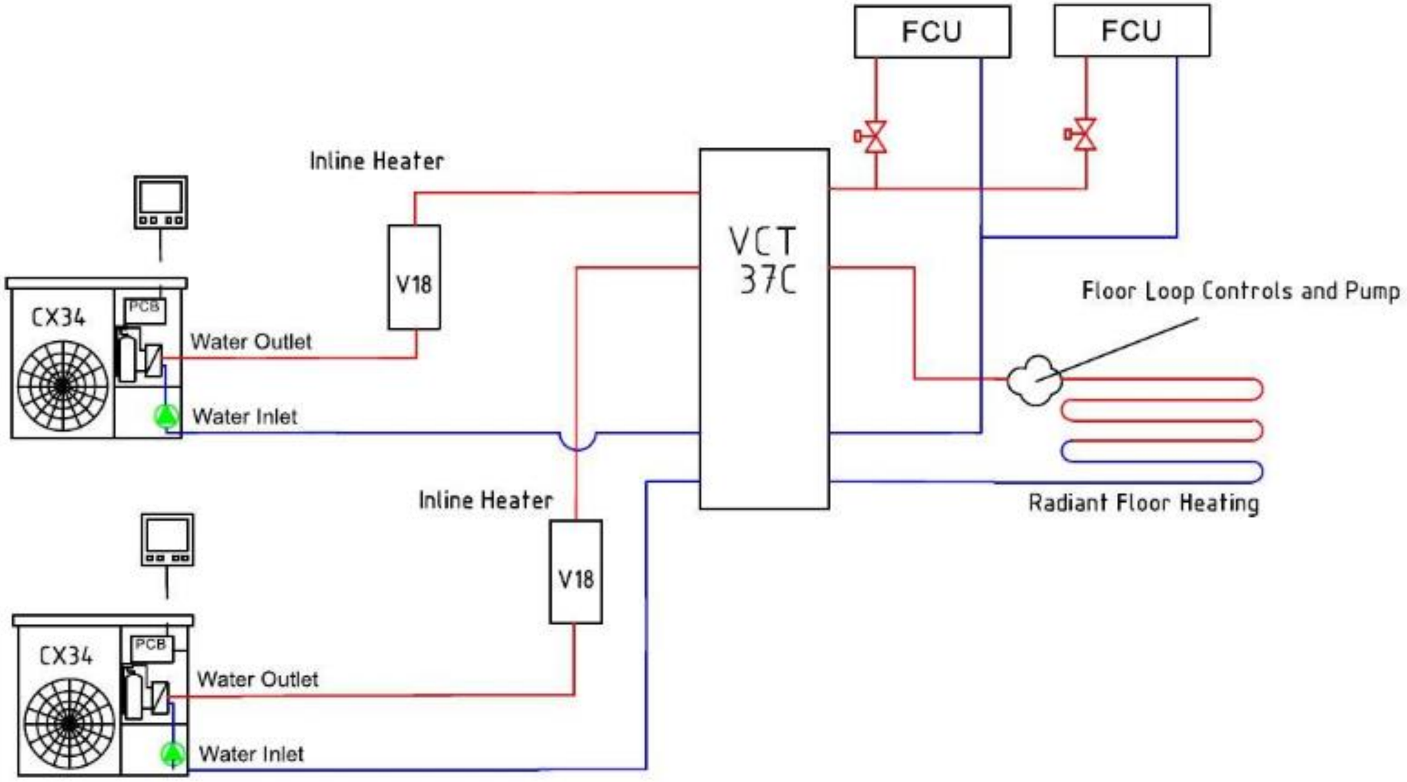


Simplified concept drawing – not all components shown

Hundreds or even thousands of designs are possible.

CX34 Air-To-Water Heat Pump (Shown 2x CX34s w/ 2x V18s, Radiant & Fan Coils)

"World's Most Efficient"



Simplified concept drawing – not all components shown

Hundreds or even thousands of designs are possible.

Design & Installation Notes

"World's Most Efficient"

If you understand boiler powered radiant systems you will be able to design and install Chiltrix air to water water heat pump systems but there are a few differences and some new things you will need to know. Chiltrix engineers are available to assist with designs & more. Please review the following items with Chiltrix in advance, as needed. We want to help! Let us be involved in your pre-sales, design, and commissioning!

- When a Buffer or Volume Tank is Needed
- Backup vs. Emergency Heat – What is the difference and how to use.
- Proper System Design - Operating Temperature vs. Capacity/Efficiency
- Using & Sizing 3rd Party Fan Coils/Air Handlers
- Don't Use Primary/Secondary or Closely Spaced Tees! If hydraulic separation is needed, use a buffer tank.
- Variable Speed Pump Inside/ Autonomous Control / Wild Coil Design
- CX34 Additional Control Options (Standard Thermostats, Relays, Modbus, WiFi/internet, BACnet, LonWorks, Metasys, and more…

Thank You!

John Williams
Chiltrix Inc.

More Questions? Please call or email:
john@chiltrix.com / 757-410-8640 Ext. 152

And please visit https://www.chiltrix.com/

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Additional Resources:

Understanding IPLV Ratings:
https://www.chiltrix.com/documents/IPLV-NPLV-Explained-Comparison.pdf

White Paper – Detailed explanation of DHC/Psychrologix™ Controller
https://www.chiltrix.com/documents/Chiltrix-Psychrologix-TS.pdf

Compare Chiltrix CX34 to Leading Brands (With and without DHC)
https://www.chiltrix.com/documents/Chiltrix-Compare-IPLV-Chart.pdf

Chiltrix Home Page
https://www.chiltrix.com/