

CX40 / CX45 Including X Models

Important Notice

Make sure to visit the Chiltrix documents page at www.Chiltrix.com/documents/ and verify that you are using the most recent version of this manual.

We are constantly improving our manual as we add features/functions/ and based on feedback from customers therefore, we do not include a printed manual with the unit.

DC INVERTER

AIR TO WATER HEAT PUMP

For Use with CX40-1/CX40X-1/CX45-1/CX45X-1 units unless superseded by a later manual revision, check the Chiltrix website documents page by serial number to confirm. www.chiltrix.com/documents

In this manual the nomenclature “CX40” will encompass the CX40-1, CX40X-1, CX45-1, and CX45X-1 unless otherwise noted.

(If unsure, contact Chiltrix technical support dept. with the serial number)

Installation and Operation Manual CX40-1/40X-1/45-1/45X-1 Options for Heating, Cooling and Domestic Hot Water



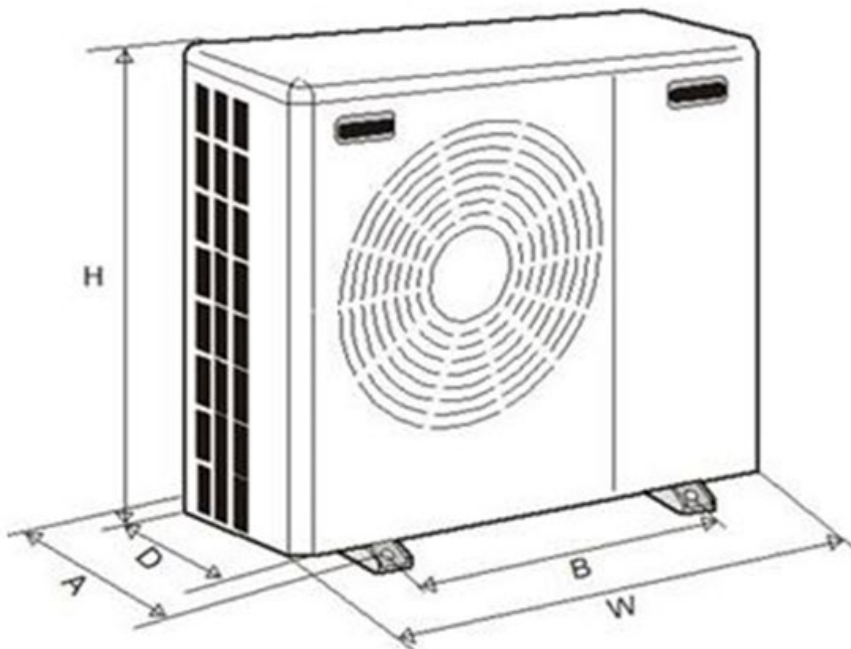
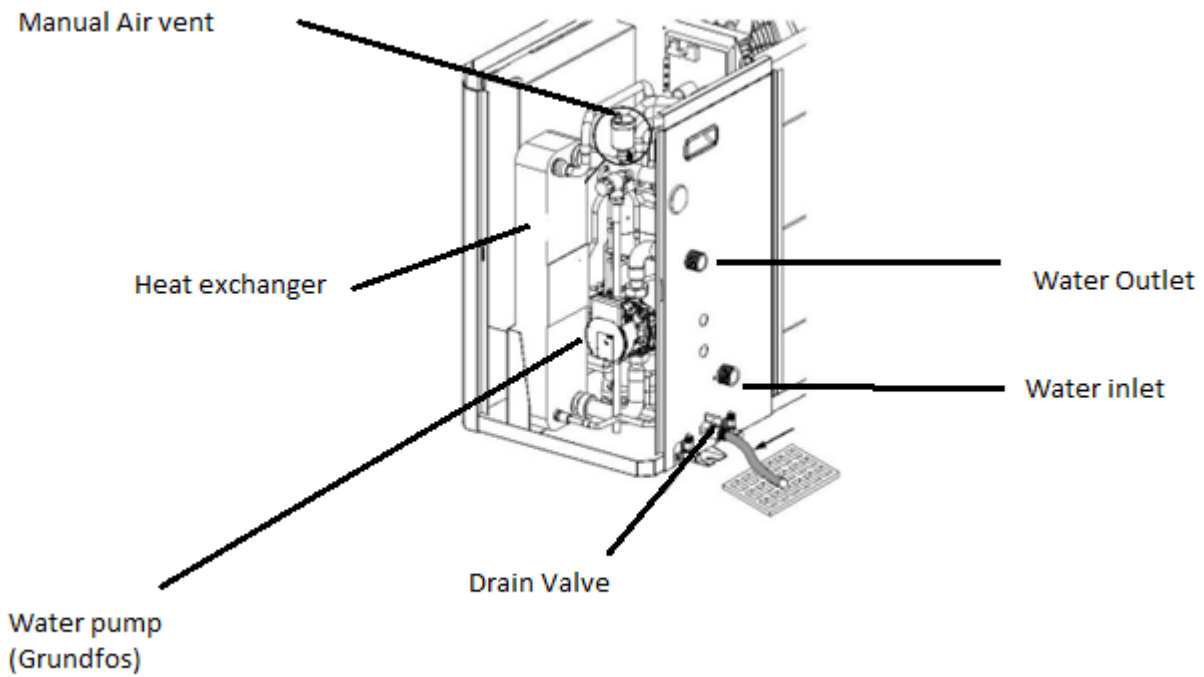
PLEASE REVIEW ENTIRE MANUAL BEFORE PROCEEDING

**PLEASE SUBMIT SYSTEM DRAWING & SCHEDULE A COMMISSIONING
CALL BEFORE STARTING THE UNIT**

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CX40 Components



W	44"
D	16.75"
H	38"
A	17.5"
B	29.5"

IMPORTANT NOTE – MAKE SURE TO PROVIDE YOUR DESIGN DRAWING FOR APPROVAL BEFORE GETTING STARTED, INCLUDING DESIRED OPERATING TEMPERATURES.

Safety Precautions

NOTE: It is required to read the Safety precautions in detail before operation. The precautions listed below are very important for safety, please follow all safety precautions.

General

•All units must have a minimum 10% glycol.

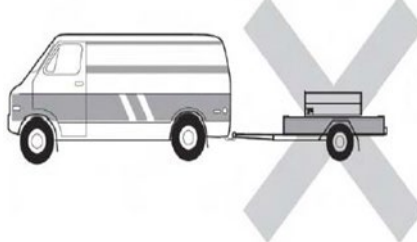
- Make sure that the ground wire in the building is securely connected to earth.
- Wiring tasks should be carried out by qualified electricians only, in addition, they should check the safety conditions of power utilization, for example, verify that the line capacity is adequate, and the power cable isn't damaged.
- Users must not install, repair or relocate the unit. Improper procedures might lead to accidents e.g. personal injury caused by fire, electrical shock or unit's falling off its base, and water leaking into the machine. Please contact a professional service department if problems arise.
- The unit shall not be installed at a spot with the potential hazard of leaking flammable gas. If gas is leaking near the machine, there might be the risk of explosion.
- Make sure that the foundation of the unit is stable. If the foundation is unstable, the outdoor unit may come loose from its base and cause injury.
- If required by electrical code, make sure that the GFCI installed at the service panel is working properly to avoid shock or fires.

Note a GFCI breaker is not required for equipment operation or warranty but is a good idea even when not required by code.

- If any abnormality occurs in the unit (such as a burning smell is noticed inside the unit), cut off the power supply immediately, and contact a professional service department.
- Please observe the follow items when cleaning the unit. Before cleaning, shut off the electric supply of the unit first to avoid injuries caused by the fan operation.
- Do not rinse the unit with water because the rinsed unit may cause electric shock.
- Make sure to shut off the electric supply before maintaining the unit.
- Please do not insert fingers or sticks into air outlet or air inlet.

Transporting and storage

The machine must be transported and stored vertically at all times.



IMPORTANT: Please refer to ALL of the appropriate documents for your system including V18 Manual, Tank Manual, etc. PLEASE SEE THE DOCUMENTS PAGE HERE <https://www.chiltrix.com/documents/>

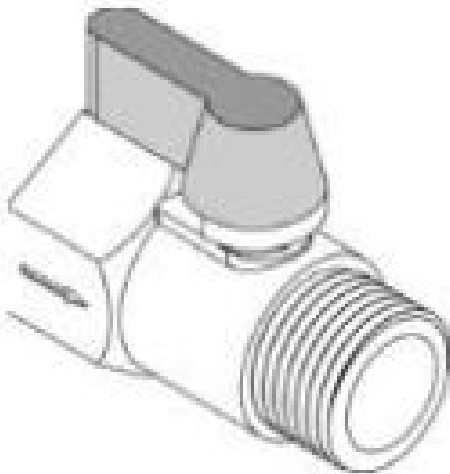
CX40 Components

Ball Valve

Located in the chiller (taped to on of the compressor legs) is a small ball valve used to drain the unit to service the pump or any other internal parts.

NOTE: You must install this valve or else the unit will leak when filled with water/glycol! Make sure you use Teflon tape on the threads.

Some of the newer units will come with a washer, if you have a valve with an internal washer, do not use Teflon tape but instead lubricated the washer with silicone grease.



Starting in 2023 units were shipped with a attachment point for the outdoor unit to attach a condensation drain. It is zip-tied along with the water drain valve attached to the compressor. This adapter is optional. **HOWEVER THE DRAIN FOR THE CONDENSATE MUST BE KEPT CLEAR OF YARD DEBRIS AND ANY OBSTRUCTION THAT CAN INTERFERE WITH PROPPER DRAINING. UNIT MUST BE LEVELED.**

To install the “fork” side of the adapter goes into the bottom of the pan from below the chiller. The male side of the hose connection will stick out as shown below in the pictures. You can elect to attach a hose to the connector if you wish to drain the water to a different location rather then directly below the unit. If you do this make sure that the hose or route the water takes is free flowing to prevent freezing in the winter months.



Figure 1: Shows location of drain hole without hose adapter



Hydronic Piping and Design Guide

Installation Methods Heating and Cooling (Heating Shown)

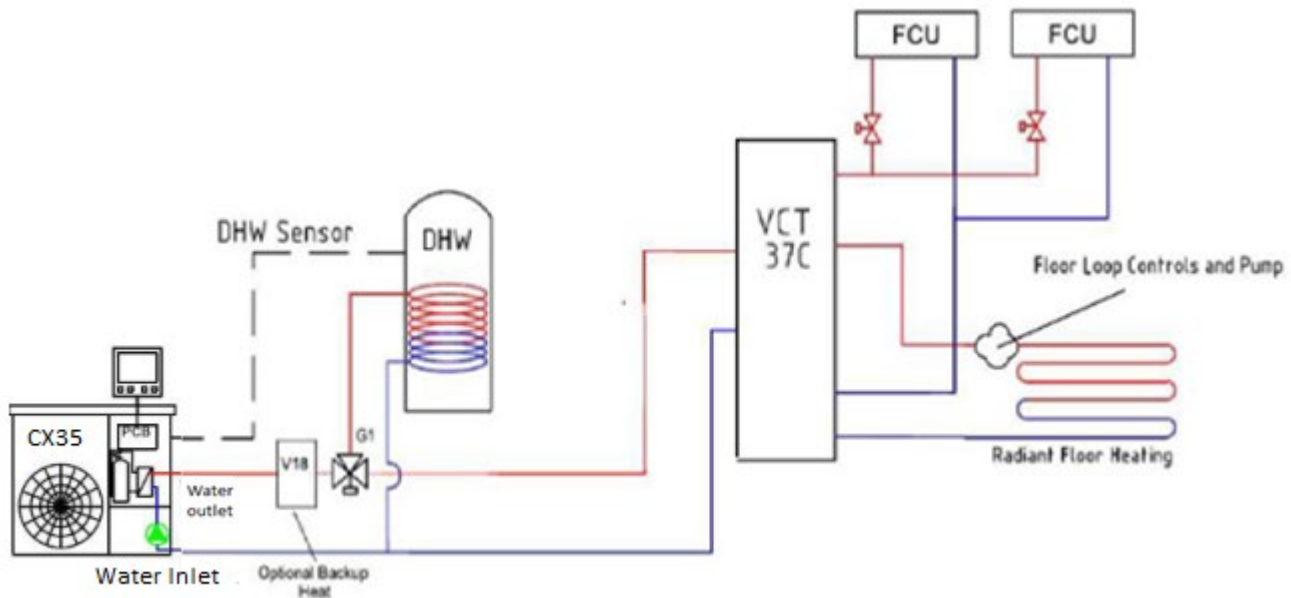
Note: Primary Secondary Piping or Closely Spaced Tees are NOT supported or recommended for use with this heat pump on the supply-side of the buffer tank, or anywhere within a system without a buffer tank.

A buffer tank must be used for radiant heating. A multi-port buffer tank such as VCT37 should be used to combine multiple heat pumps. Please do not try to balance multiple cx40 units with equal-piping or reverse return design. It will not work as expected due to having multiple variable speed pumps.

An “additional volume” in-line tank must be used when there is no buffer tank and there is less than 15 gallons of total system fluid volume.

See Design Guide Here
<https://www.chiltrix.com/documents/chiller-options.pdf>

**PLEASE ALWAYS SUBMIT YOUR DESIGN TO
 CHILTRIX FOR APPROVAL**



Minimum pipe size should be no less than 1", copper or oxygen barrier PEX, with 1.25" PEX considered standard, use larger diameter for long runs. X-Models with stainless steel pumps do not require Oxygen barrier PEX but it's still a good practice. Reverse-return will not fully balance multiple units as the variable speed pumps may not always operate at the same speed. The installer should calculate the pipe and fitting resistance to determine the head pressure. See the examples on the following pages, maximum water flow for the cx40 is 12.5 gpm, design flow is 10.6 gpm. If necessary, a second Chiltrix-provided PWM pump may be added to the loop and controlled by the cx40. Any second water pump must be in series with the internal pump and connected to the heat pump for control. The loop example above is designed with wild coils (loads). The above shows a single heat pump, with inline dynamic/variable backup, domestic hot water (with 3-way valve), a buffer tank, serving radiant and fan coil/AHU units. Not shown, a circulator is required for the FCU loop. Chiltrix is always available to provide a free custom design, we encourage you to let us do this for you or with you. At least one air discharge valve should be installed at the top of the circulation system, if possible, for easy air discharge. An automatic/manual air vent can be used inline before the pumps.

Always install a mesh water filter or wye strainer on the return side pipe before it enters the heat pump to prevent blockage of the heat exchanger or pump/flow meter problems. A blocked heat exchanger can be a costly problem and is not covered by warranty so make sure to use a filter. Wye Filter Should be a ≥ 60 mesh (≤ 250 Microns/0.25mm).

Do not use CPVC if glycol percentage will be above 25%. Do not use PVC.

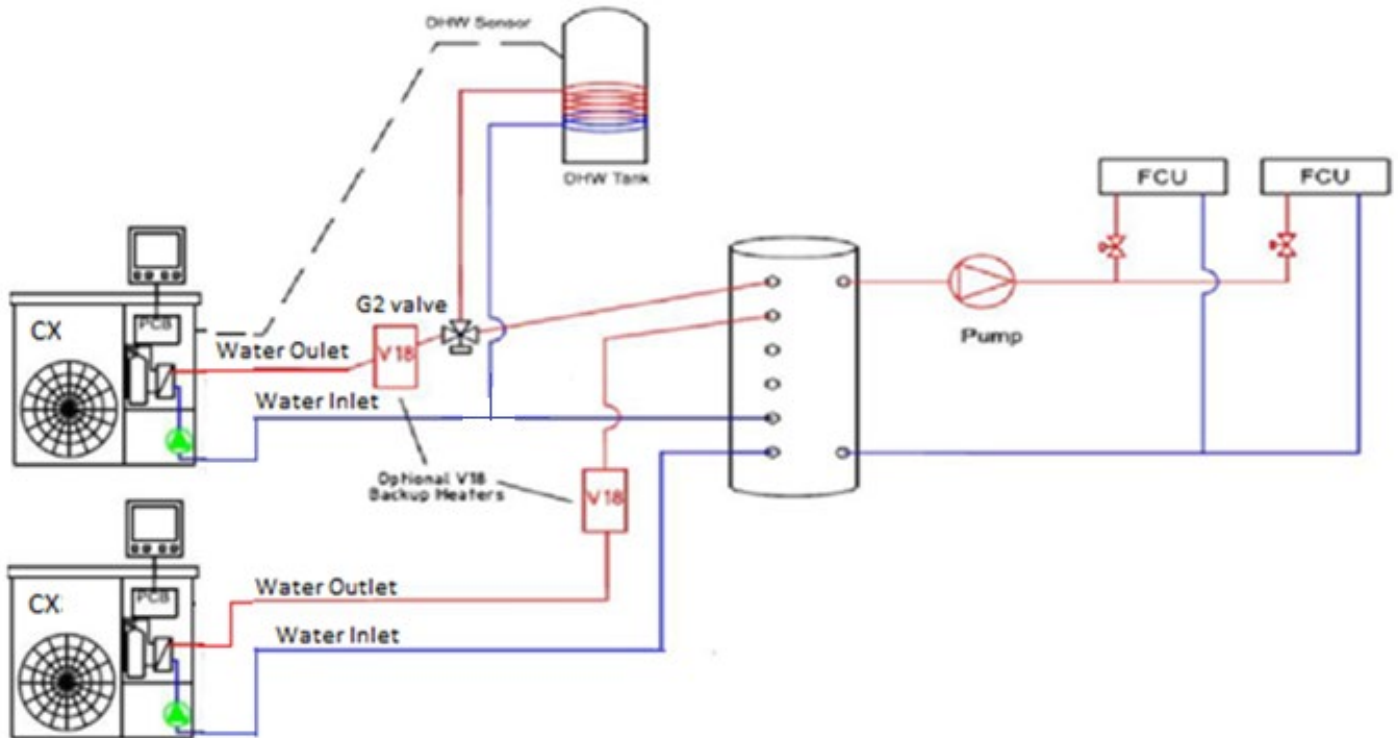
Piping Examples: Stacked Heat Pumps

Preferred Method For 2 or 3 Units: All units connect directly to buffer tank.

See Design Guide Here

<https://www.chiltrix.com/documents/chiller-options.pdf>

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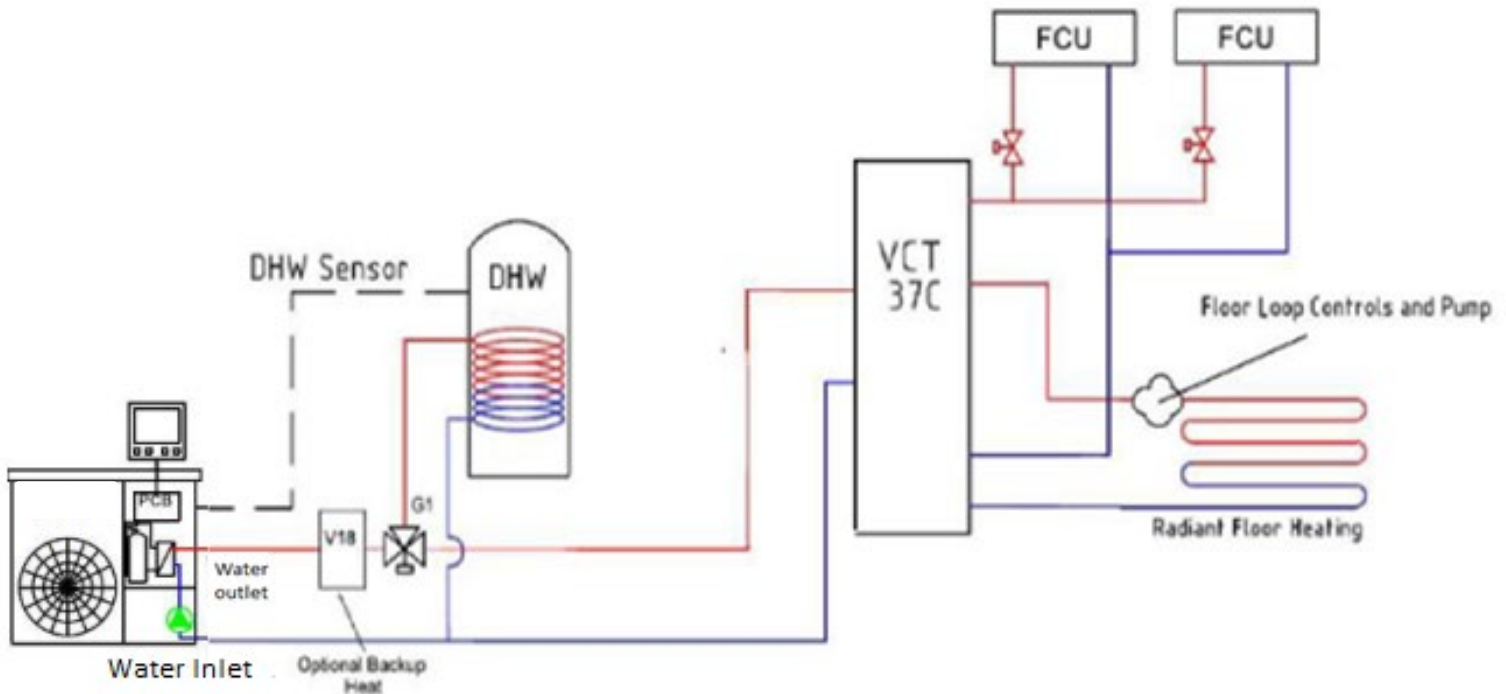
NOTE about fittings: All Chiltrix V18, tanks, etc., have stainless steel fittings. It is difficult to connect stainless to stainless, we suggest to use brass fittings for all connections.

PLEASE SEND YOUR PROPOSED FINAL DESIGN TO CHILTRIX SUPPORT DEPARTMENT FOR APPROVAL, COMMENTS, AND SUGGESTIONS

Piping Examples

See Design Guide Here
<https://www.chiltrix.com/documents/chiller-options.pdf>

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 CHILTRIX FOR APPROVAL**



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Pipe Insulation

All piping must be insulated per local and national mechanical codes. Use at least ½" closed cell insulation on all piping that is within the conditioned envelope, some applications require more than ½" of insulation, especially when not within fully conditioned space. Any piping in a system with chilled water (used for cooling) must also be sealed vapor tight to prevent condensate issues. For design tips and a thickness calculator for pipe insulation please visit <https://www.armacell.us/solutions-center/>

Piping Examples: Stacked Heat Pumps

Don't Use Primary/Secondary, Manifolds, or Closely Spaced Tees on the supply side to combine multiple outdoor units. Use a Chiltrix multiport buffer tank (VCT37 or VCT60).

ALL UNITS MUST BE "HOME RUN" TO THE BUFFER TANK.



The Chiltrix unit uses an internal variable speed pump controlled internally as part of its capacity control. It would be only by coincidence if two or more units were at the exact same pump speed, particularly if one unit cycles off due to low load or is engaged in a defrost action, etc.

Any attempt at load balancing via a manifold or reverse-return design relies on equal piping lengths, with both units having the same head loss. Since head loss varies with flow, head loss will be variable on each unit as the pump speed and flow of the individual unit changes, and balancing will fail.

Additionally, and for similar reasons as mentioned above, if one unit is off and tries to start while another other unit is at high pumping speed, the starting unit may experience NNSH (Net Negative Suction Head) and run the pump, but fail to move water, as the suction inlet pressure is "stolen" by the other unit. This can damage the pump and will produce a low-flow error code stopping the machine for self-protection.

The simple solution is to pipe them as suggested. If it's absolutely required to manifold two or more heat pumps together, contact the Chiltrix support department for alternate designs that can allow this.

Using a Buffer Tank w/ Radiant

Example below shows optional DHW with G2 3-way valve, optional V18 backup heater, and radiant. The radiant is attached to the load side of a buffer tank.

If a radiant system is to be used for cooling, please review this page <https://www.chiltrix.com/radiant-cooling/> and contact Chiltrix for assistance in evaluating your application and for design assistance.

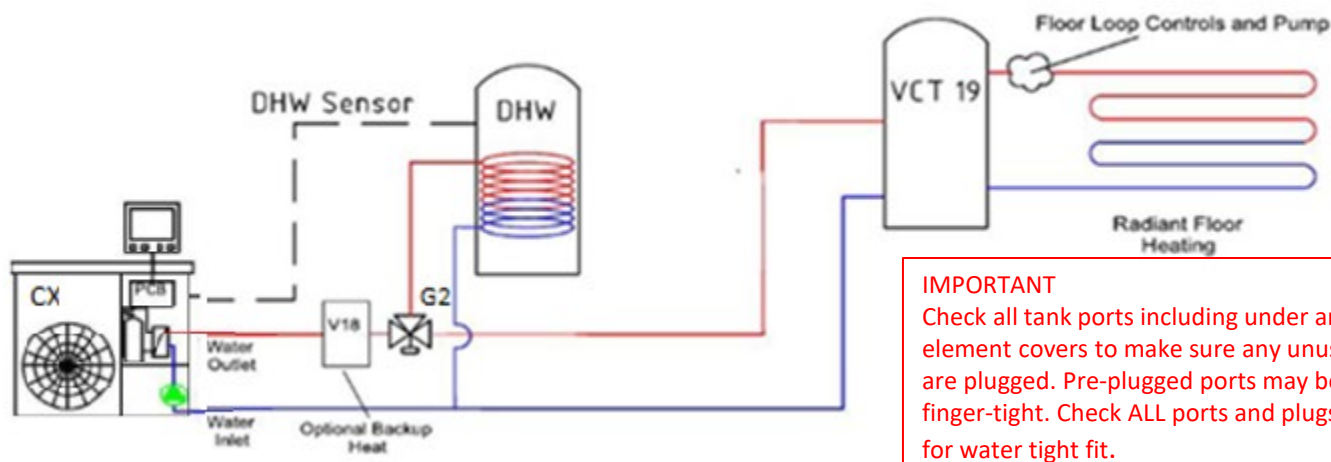
For V18b information please see the V18b Manual available on the Chiltrix website documents page.

For DHW or buffer tank installation information see the Chiltrix Tank manual.

Be sure to check all ports on the tanks to ensure each o-ring/gasket is lubricated and tight to prevent leaking.

See Design Guide Here
<https://www.chiltrix.com/documents/chiller-options.pdf>

PLEASE ALWAYS SUBMIT YOUR DESIGN TO CHILTRIX FOR APPROVAL



Primary / secondary piping is not supported when connecting to a floor heating loop, always use a buffer tank. Buffer tanks are not always needed (NOTE, for radiant they are always needed) with the Chiltrix system, however a buffer tank is needed to combine multiple heat pump outdoor units. Regardless, buffer tanks are always recommended for better performance.

IMPORTANT NOTE ABOUT BACKUP HEAT

Do not ever use heating elements in a buffer tanks for backup heat. The element capabilities of the buffer tank are provided for emergency heat only. Not “backup” heat. Contact Chiltrix with any questions about emergency or backup heat options. See explanation and details in the Chiltrix Tank Manual.

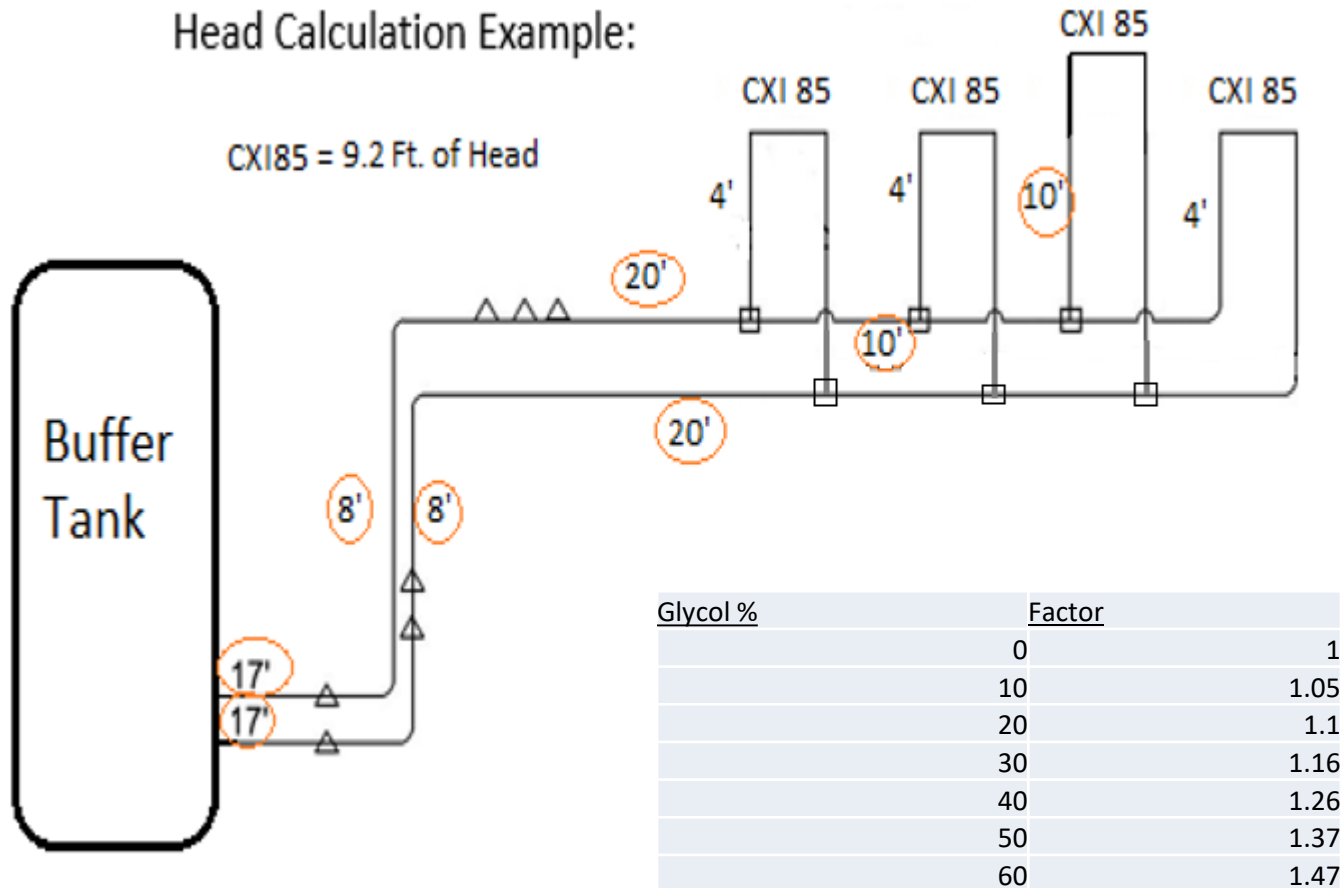
The radiant loop pump in the above drawing is controlled by the customer’s radiant controller. The buffer tank isolates the Chiltrix internal pump from other pumps, and in the case of multiple heat pumps, from each other - providing hydraulic separation and thermal buffering.

A 19 (or 37) gallon buffer tank is used generally for best performance with a single cx40. 37 or 58 gallons is used for systems of two or three cx40s, note that a VCT37 or VCT60 is always used when multiple cx40s are to be combined, with a vct60 always used for 3x cx40.

See more designs here:

<https://www.chiltrix.com/documents/chiller-options.pdf>

Head Calculation Example:



To calculate the head pressure for the correct water flow, the pipe length must be measured and all fittings counted. It is advisable to use flexible red oxygen barrier PEX piping and route it so as to avoid as many elbows as possible.

All fittings have an equivalent length of pipe already calculated, available on the next page under PEX Fittings Pressure Drops.

All measurements in feet

6 Tees @ 2.3ft. Of pipe = **13.8** ft. of pipe

7 Couplings @ 1.3 ft. of pipe = **11.7** ft. of Pipe

120' of actual 1" Pex Pipe

145.5' of equivalent Pex.

$145.5' / 100 = 1.455'$

$1.455' \times 6.67(\text{Ft of head per 100ft of 1" Pex @ 7gpm}) \times 1.05(\text{glycol factor}) = \mathbf{10.19\text{Ft}}$ of head loss based on frictional losses

CXI 85 Fan Coils = 9.2 ft. of Head

Total Head = 9.2ft + 10.19ft = **19.39 ft.**

System Accessories

The previously shown example loop has a volume of 4.5 gallons not including the buffer tank or supply-side equipment and/or piping. The volume of the cx40 is 5.5 liters. Adding a thermal expansion tank is required for all systems. There are many thermal expansion calculators on the internet, the following is an example.

<http://westank.com/calculator/>

Minimum loop pressure is 14.5 psi, maximum pressure is 43.5 psi, and ideal pressure is 20-30 psi. The lowest standard temperature is 41°F, the highest temperature is 149°F.

An inline microbubble air separator should be installed in the loop preferably in the higher part of the loop to remove any air in the circulation loop. Always install a water filter or wye strainer on the inlet pipe of the unit to prevent blockage of the heat exchanger or damage to flow meter.

Wye Filter Should be a ≥ 60 mesh (≤ 250 Microns/0.25mm).

Wye strainer should be ≥ 1.25 "

Bronze Y-Strainers from McMaster-Carr
with a stainless-steel filter.

<https://www.mcmaster.com/products/wye-strainers/low-pressure-bronze-y-strainers-8/>

Note: some versions of cx40 are shipped with a Y-strainer in the box.



Watts AS-MB
Microbubble Air Separator



Y-Strainer

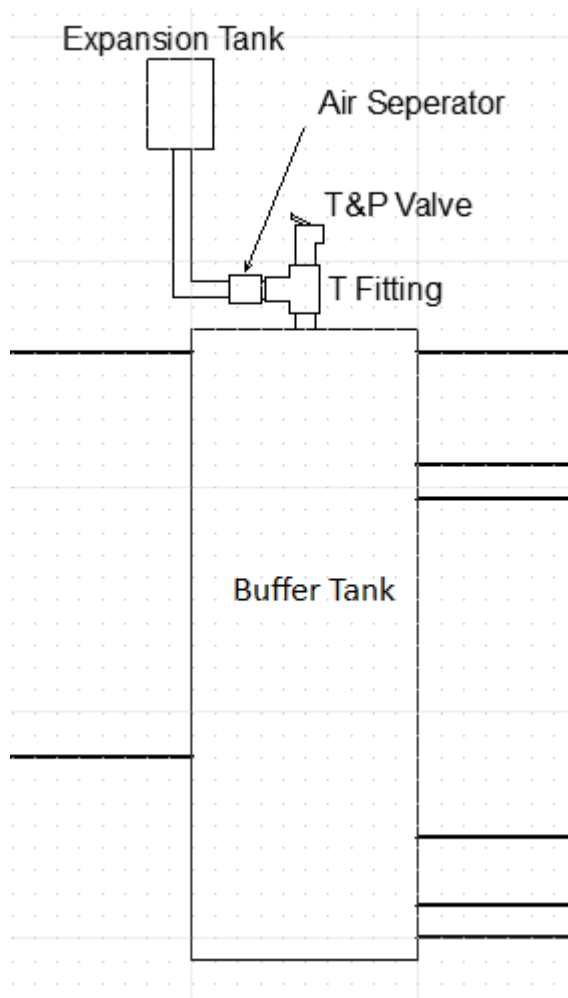
THE WYE STRAINER SHOULD BE CLEANED OUT AFTER 1-2 DAYS OF OPERATION TO REMOVE ANY COLLECTED DEBRIS REMAINING FROM INSTALLATION. It's a good idea to isolate the wye strainer with ball valves.

Install the Y-strainer on the return line before the inlet to the heat pump. Every unit installed is required to have a Y-strainer.

System Accessories

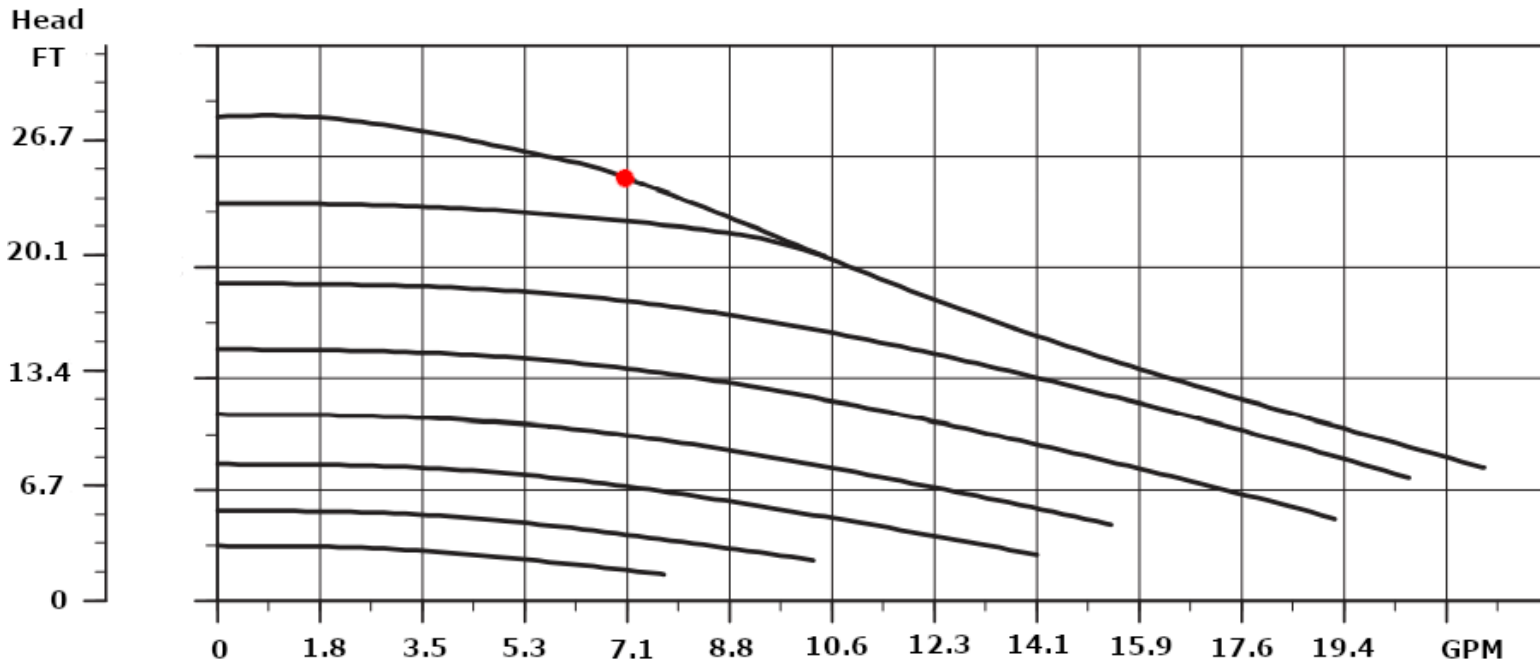
Some air separators/auto bleed valves do not go inline and can be mounted on the buffer tank or the highest point in the system. Below shows an example of how to connect an expansion tank and a T and P valve to the top of the buffer tank.

Watts makes a $\frac{3}{4}$ " air separator. Part number: FV-4M1-3/4
[One Port, Top Port, Air Vent - 46A963 | FV-4M1- 3/4 - Grainger](#)



At least one or more air separators should be installed in every system,

GRUNDFOS UPMM 15/25-95 230V PWM



This is the Grundfos pump head curve for Chiltrix cx40.

Note, the cx40 itself has 4.5ft of head.

This leaves about 19 ft of head net of the chiller.

Below is a chart to multiply head loss based on glycol percentage. Multiply the ft. of head available according to the chart above by the factor below, based on the amount of glycol in your system.

Glycol %	Pump Head Derate Factor
0	1
10	.95
20	.91
30	.86
40	.79
50	.73
60	.68

Glycol

A minimum of 10% glycol is required in every system no matter the climate. Customers in colder climates that are subject to ambient freezing should add the appropriate higher percentage of food-grade propylene glycol to the system. **NEVER USE ETHYLENE GLYCOL.** Ethylene Glycol is a poison. Propylene Glycol is a non-toxic anti-freeze also used in food, cosmetics, etc. and can safely be used. **IF YOU ARE IN AN AREA THAT MAY HAVE <32 °F WEATHER YOU MUST ADD THE PROPER % OF GLYCOL. FREEZE DAMAGE IS NOT COVERED UNDER WARRANTY.**

Food-Grade Glycol is available at Home Depot and other retailers. You may also consider HSE Corn Glycol (Biodegradable Food-Grade Glycol Made From Corn) . It is an eco-friendly glycol with no petroleum used in production. <https://www.hotspotenergy.com/corn-glycol/>

Below is a Freeze Point Chart For Propylene Glycol Mixed w/ Water

Freezing Point								
Propylene Glycol Solution (%)	by mass	0	10	20	30	40	50	60
	by volume	0	10	19	29	40	50	60
Temperature	°F	32	26	18	7	-8	-29	-55
	°C	0	-3	-8	-14	-22	-34	-48

Is Glycol Required? YES, at least 10 %.

If you are in an area where in cold weather conditions you may experience freezing temperatures, you may need more than 10% propylene glycol in the system. Consult the freeze protection chart of your glycol supplier to determine the proper mixture.

Note about cooling operation: the standard set point (AC Target) for cooling mode is 53F or 12c. This implies a leaving water temperature of 44F (7c) in steady-state operation. If you operate the unit at colder temperatures, you should add a higher level of propylene glycol to protect the heat exchanger. For example, with a setting of 50F (implies a leaving temperature in steady state operation of 41F) you should have at least 15% glycol to protect the heat exchanger.

AVOID ANY CAPACITY PENALTY OF GLYCOL by adjusting the required flow rate with the glycol %.

Note the “500” formula uses WF (Water Factor) which changes according to the glycol %, as follows. The formula assumes the default Chiltrix 9F ΔT (the difference between leaving and returning water temperatures).

Water Factors (WF)

00% glycol use 500
10% glycol use 494
20% glycol use 488
30% glycol use 480
40% glycol use 463
50% glycol use 442

The “500” Formula: $BTU = WF * \Delta T * GPM$

NOTE:

It is recommended to NOT use **CPVC piping** if your system will exceed 25% glycol to water ratio. Environmental Stress Cracking, also referred to as ESC, may occur. Do NOT use PVC piping.

Example:

Based on load calculations, an example system needs to deliver up to 43,000 BTU/h with 30% glycol:

Using the 500 formula we can make the following calculation:

$43,000 / 480 / 9 = 9.95$ with 9.95 GPM being the required maximum flow rate.

The Chiltrix variable speed pump controls will automatically adjust, however you must consider the higher speed/flow in your system design. Use the required maximum flow rate to calculate head based on the Head Flow Curve on page 17. Minimum pump operating speed can be set at P53, minimum speed setting used should not produce a flow rate in your system of less than 14 L/min and generally should not be set lower than 40%. Pump speed can be monitored at C48, 1 is lowest (idle, when compressor off) and 10 is highest speed. Actual water flow can be monitored on the desktop and at C13, liters per minute. **Test at full pump speed and record the GPM at the time of commissioning.** C13 conversion: 1 L/min = .264 GPM // 1 GPM = 3.78 L/min

Chiltrix Heat Pump Installation

Heat Pump Installation

Installation position

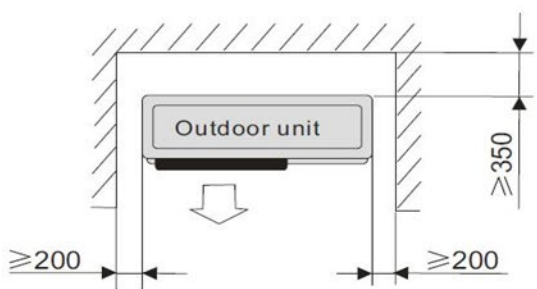
Note: Installation must be carried out by professional personnel.

The recommended mounting pad should be at least 1 ½" above ground level. If you are in an area where snow occurs, mount the unit high enough above grade to avoid blockage by drifting snow. You can consider a properly rated wall mount if desired.

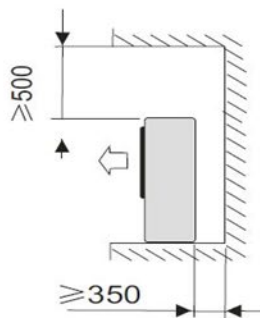
Proper drainage is required at the heat pump unit to avoid flooding the outdoor unit with water or ice. Make sure condensate has a way to rapidly and completely drain away from the unit.

To install the unit on a balcony or on top of a building, the installation site must meet the allowable load bearing capacity of the building structure without affecting the structural safety. Ensure the unit is well ventilated; the direction of air exhaust should be kept away from the windows of neighboring buildings. Adequate service clearance should be kept around the unit. The unit should not be installed in places accompanied with oil, inflammable gases; corrosive components e.g. sulfur compound, or high-frequency equipment.

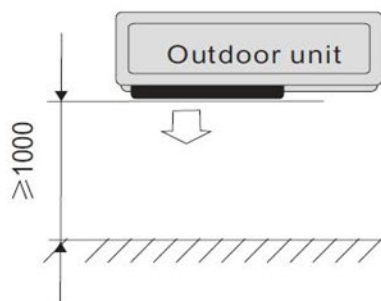
No obstacle in front of the unit



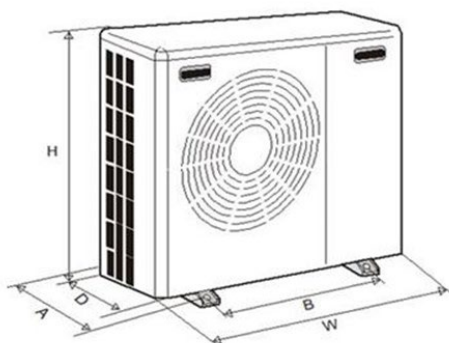
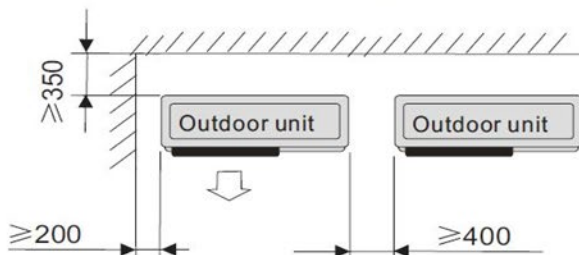
Obstacle above the unit



Obstacle in front of the unit



Several units in a row



W	44"
D	16.75"
H	38"
A	17.5"
B	29.5"

(Unit: mm) 200mm = 8" , 350mm =14 " ,
400=16" , 500=20" , 600 = 24" , 1000=40"

More about Location:

You don't want it in a "pit" or enclosed area where air flow could be impaired or where fan output could be prevented from rising away in summer, or could stratify cold output in the heating season and cause an artificial drop in ambient temp.

Chiltrix Heat Pump Installation

NOTE: The cx40 is shipped with the pump in a separate box attached to the top of the chiller. Please follow the directions below to install the “C4” Grundfos internal pump.

There is a factory installed spacer that is to be removed.

Internal Pump Installation

(Remove Top, Front, and Right Side Covers) **DO NOT BEND OR STRESS THE PIPING**, this may cause a broken joint or leak where it joins the heat exchanger. Cut the insulation and peel it back out of the way of the flange nuts. This will allow installation of the pump without bending either of the pipes. The pump will slide in between the pipes with the washers.



Peel back the insulation



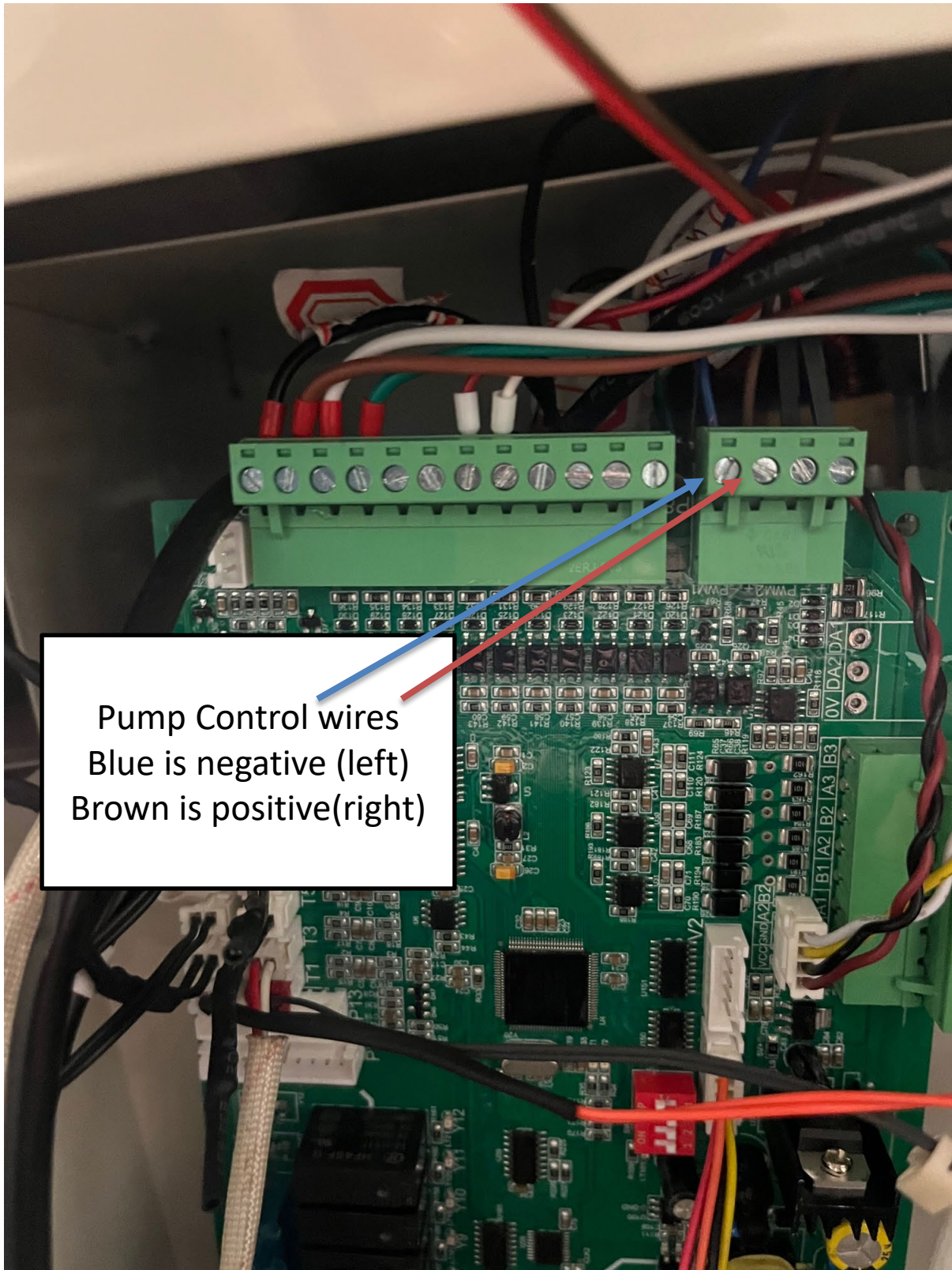
Removing the shipping spacer

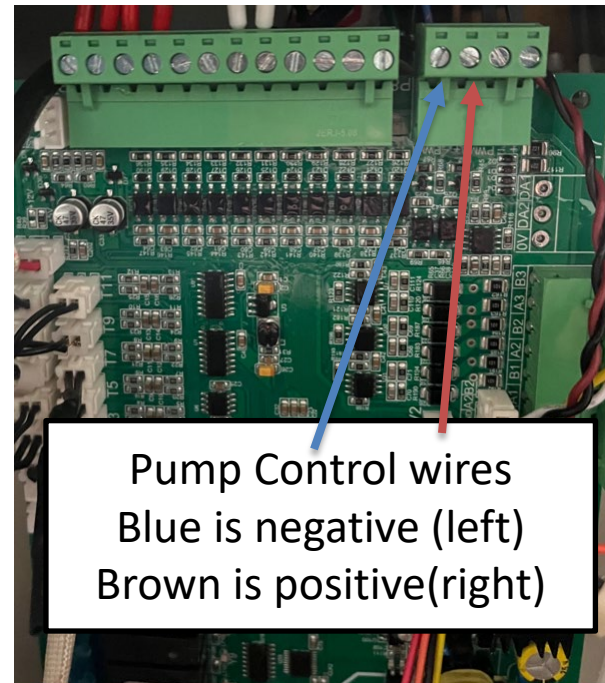
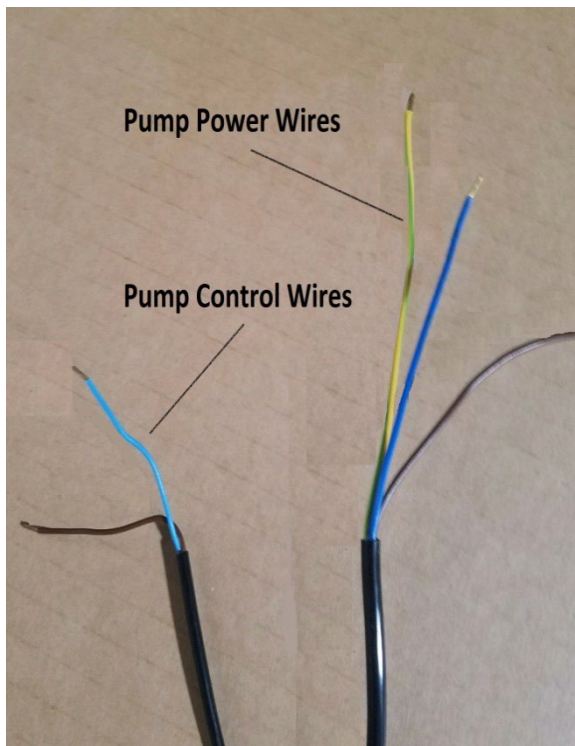


If you have ordered a special pump, for example a stainless steel model that is to be installed outside of the Chiltrix cabinet, leave the spacer intact (but check to make sure it is tight as it may only be finger-tight from factory).

Note the orientation of the arrow on the pump body, this arrow must point upwards.

Internal Pump Wiring



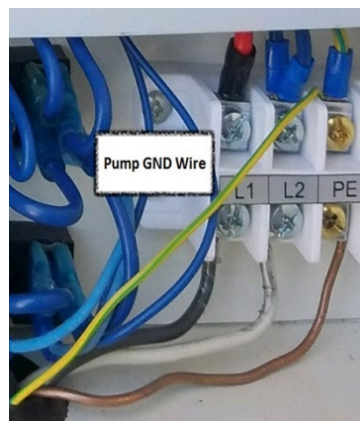


The blue and brown pump **CONTROL WIRES** are connected to the (+ & -) on the Pump PWM terminal connector at the top of the main control pcb.

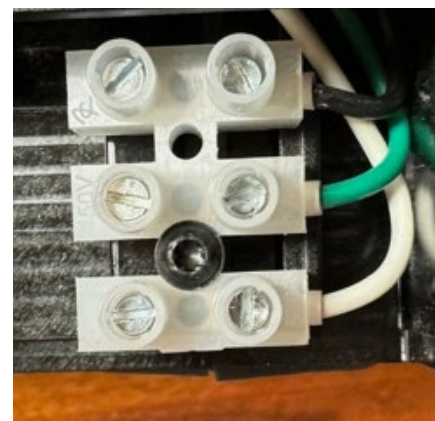


Pump **POWER** wires

Color does not matter as long as Yellow and green go to GND/PE.



Pump **GROUND** wire.



Pump Power (pump)

Note- Some Grundfos pumps may ship without the power wires installed, please see [Grundfos Pump Wiring](#) supplement if the pump shipped did not come with power wires.

Stainless Steel Pumps

Option: if the chiller was ordered with a stainless steel pump labeled “Taco Comfort Solutions 0026e” then the pump control logic will need to be changed using parameter P23. If you have the stainless steel pump “0026e”, set parameter P23 to “1”. This pump will be placed external of the cx40. Otherwise if you got the factory style pump that threads into the unit as shown above then leave P23 “0”.



Note: The stainless steel pumps will also come with a flange kit. If you order the 0026e (cx40) the flange threads are 1" NPT.



Electrical Connection

General

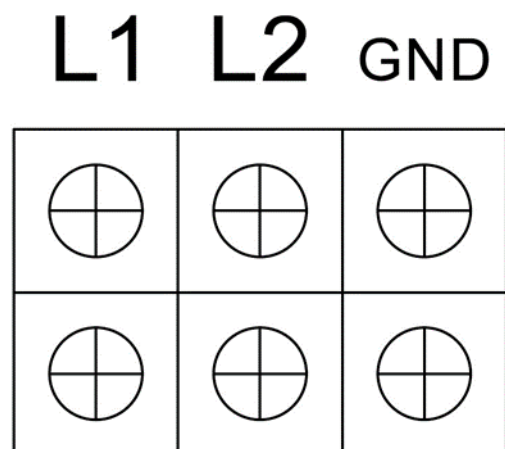
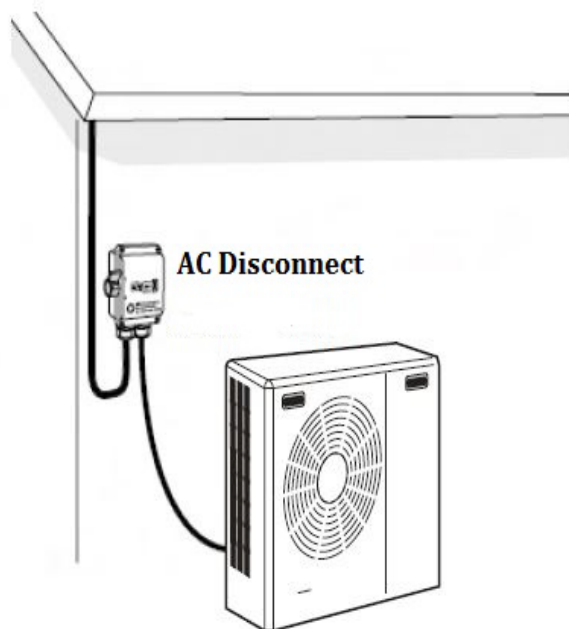
Note!

Electrical installation and service must be carried out under the supervision of a qualified electrician. Electrical installation and wiring must be carried out in accordance with the NEC.

The heat pump must be connected under the supervision of a qualified electrician. Wires, spare parts and materials etc. must satisfy the relevant standards and codes issued by the host country or region.

The heat pump does not include an AC disconnect or switch on the incoming electrical supply which will be required. The power supply cable must be connected to a circuit-breaker with at least a 3 mm breaking gap. Incoming supply must comply with the technical requirements, with a frame ground wire (neutral is not used), via a distribution box with breakers. **Allowed Voltage range is 208-240vac. Maximum wire size must be suitable to your code and meet NEC requirements, breaker size is 30 AMP, for the cx35.**

It is the responsibility of the customer to provide clean power, 208-245v 1P 60Hz without power surges. It is advisable to add surge suppression with transient voltage protection to the circuit powering the heat pump. Clamping voltage of the device should be less than 400v.

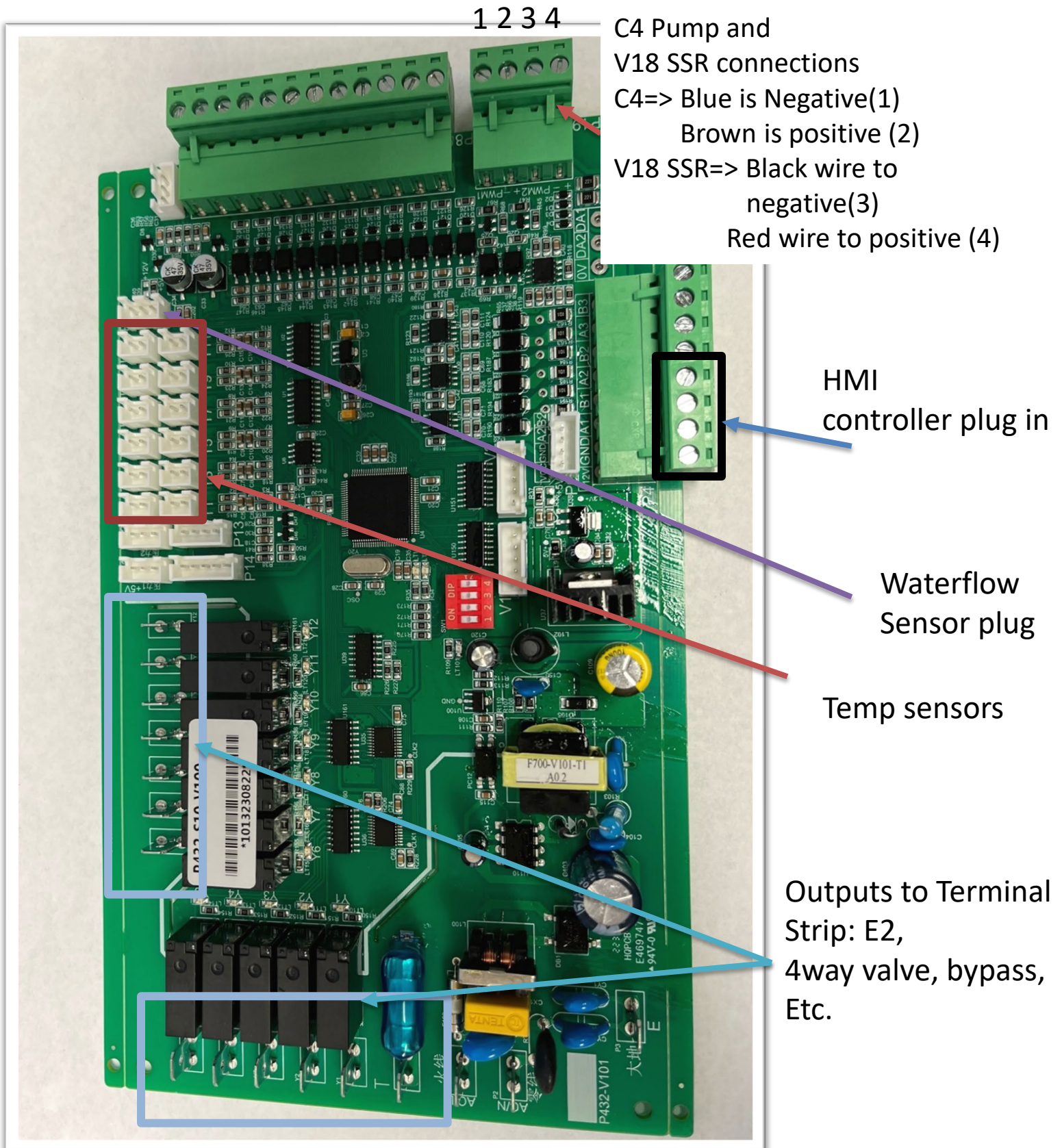


Main terminal block inside electronics box

Example MOV transient voltage suppressor

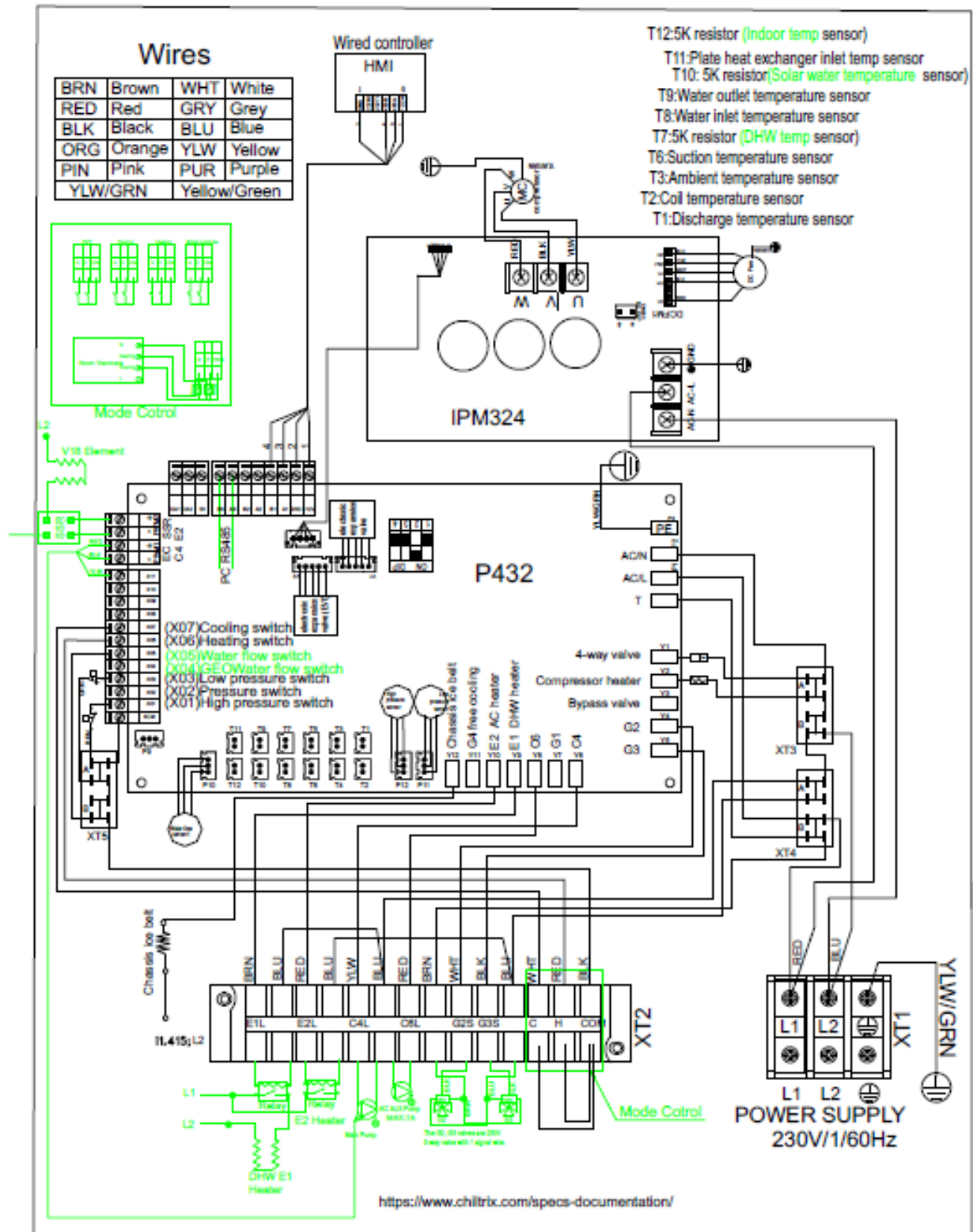
<https://www.mouser.com/?Keyword=V300LA40AP>

Electric Connections and Component Locator



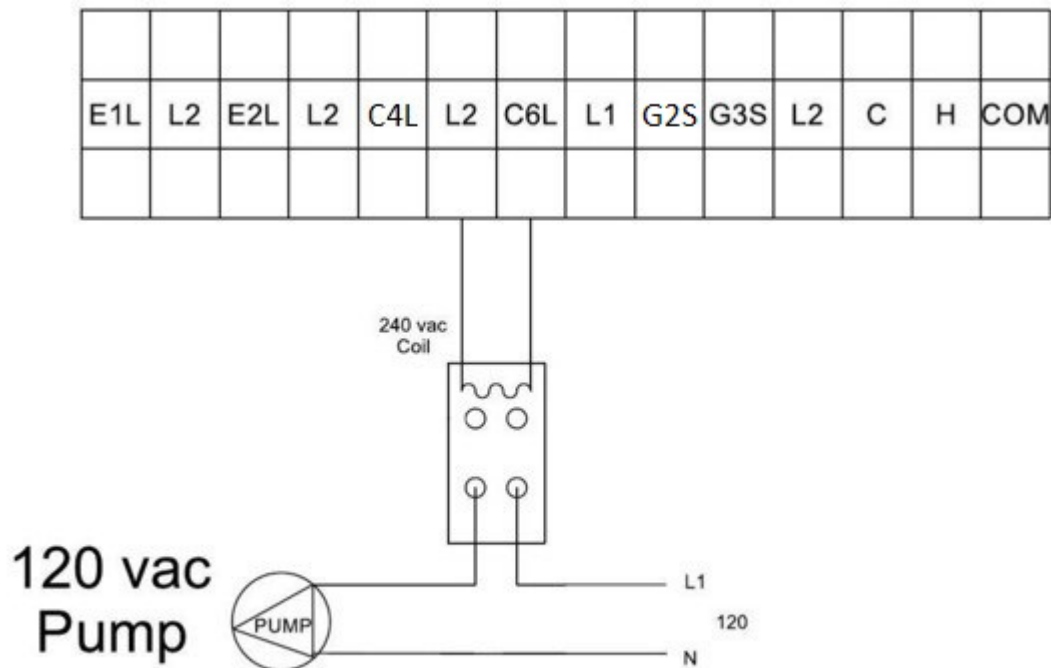
If you need to extend wires please
see the last page of this manual.

Cx40 Svsstem Wiring Diagram



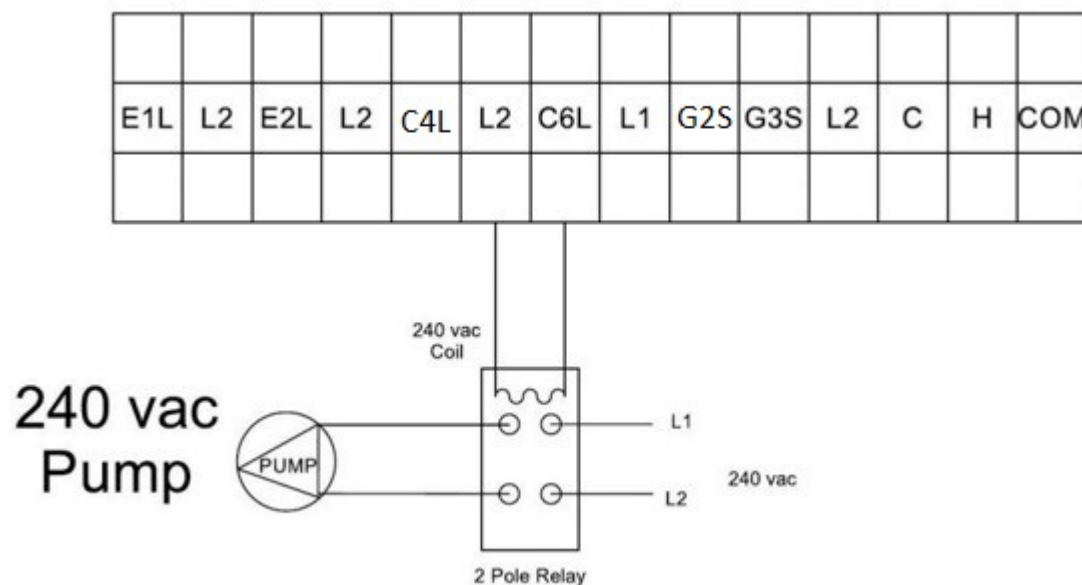
When using a second NON-PWM water pump

Generally there should be no need for this, please consult Chiltrix support dept. with any questions.



Connect the fixed speed pump to L2 and C6L.

When using a second NON-PWM water pump, use terminals L2 and C6L for relay coil power only. Do not connect a pump directly to L2 and C6L, always use a relay with a 240 vac coil. This pump will only run when the PWM pump is running. Setting P52=0, and P54=1, will shut C6 off when the chiller reaches its set point.



DHW (Domestic Hot Water)

If you do not use a Chiltrix DHW tank make sure your tank has at least 0.375 ft² per gallon of coil surface area with at least 1" ID and should accommodate a backup heating element.

NOTE: IF YOU ARE CHANGING FROM A CX34 TO A cx40 THEN YOU WILL NEED TO CHANGE THE DHW TEMP SENSOR. THEY ARE NOT THE SAME SENSORS.

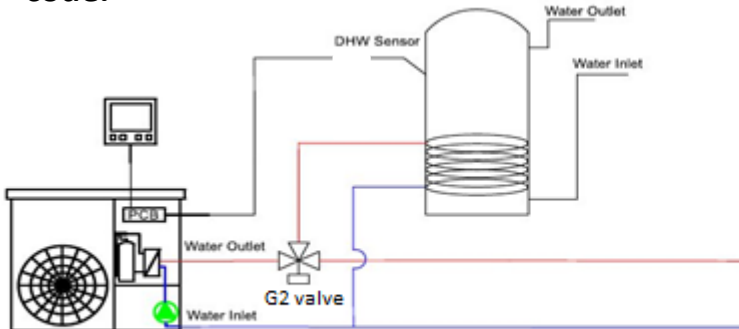
G2 Valve

G2: DHW/AC / Heating 3-Way Valve

In DHW mode, the G2 valve is powered off. In AC/space heating mode, G2 is powered on. Parameter P08 must be "0" to enable DHW.

Status Indication: G1 will be displayed yellow while DHW mode is active, G2 will be displayed yellow when heating/cooling is active.

G2 and G3 valves use 220Vac Primary from the cx40. Use conduit and install per local code.



PLEASE MAKE SURE TO CONSULT THE CORRECT VERSION OF THE TANK MANUAL FROM THE CHILTRIX DOCUMENTS PAGE <https://www.chiltrix.com/documents/>

DHW target setting temperature is the tank water temperature measured with the DHW sensor, not the cx40 inlet water temperature. If the target temperature is 120°F, and the differential is 2°C, it means, when the DHW tank reaches 120°F, DHW operation will stop. When the DHW tank temperature is lower than 116°F, DHW will restart. **See the Chiltrix Tank Manual before proceeding to install or connecting any DHW or buffer tank.** See the Chiltrix Tank Manual for important details and options for using cx40 with DHW, including backup heat options, and anti-legionella function. **READ THE CHILTRIX TANK MANUAL BEFORE DESIGNING, CONNECTING, CONFIGURING, OR USING DHW.**

The indoor ambient air temp is not used at this time, however, **do not disconnect this sensor. Leave all unused sensors plugged in and wrapped in the bundle above the compressor.**

IMPORTANT

Check all tank ports including under any element covers to make sure any unused ports are plugged. Pre-plugged ports may be only finger-tight. Check ALL ports and plugs for water-tight fit.

Note; There is a clear plastic bag taped to the cx40. It contains the mounting feet, DHW sensor, and controller cable. Controller is inside.

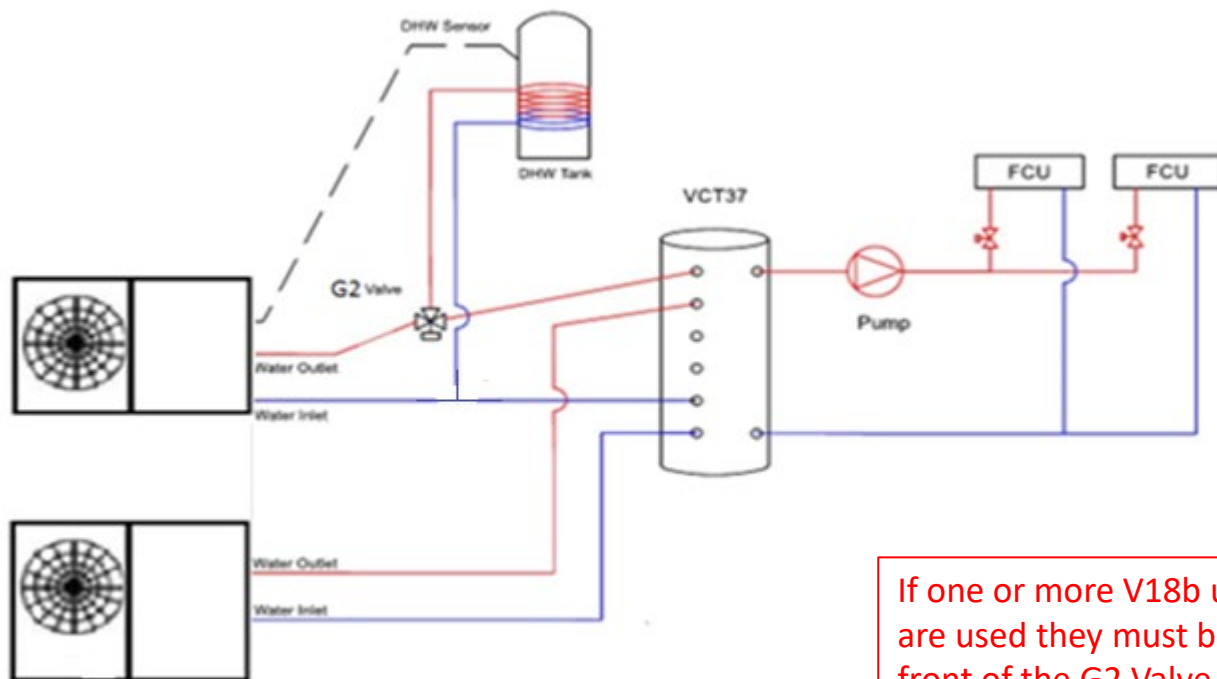


DHW (Domestic Hot Water) G2 Valve

DHW and AC / Heating with two units in Parallel

G2 and G3 valves use 220v Primary from the cx40. Use conduit and install per local code. Below shows 2x heat pumps set up so that unit 2 can continue to provide cooling or heating while unit 1 temporarily deals with any DHW load. Bottom drawing shows 1x cx40 with DHW.

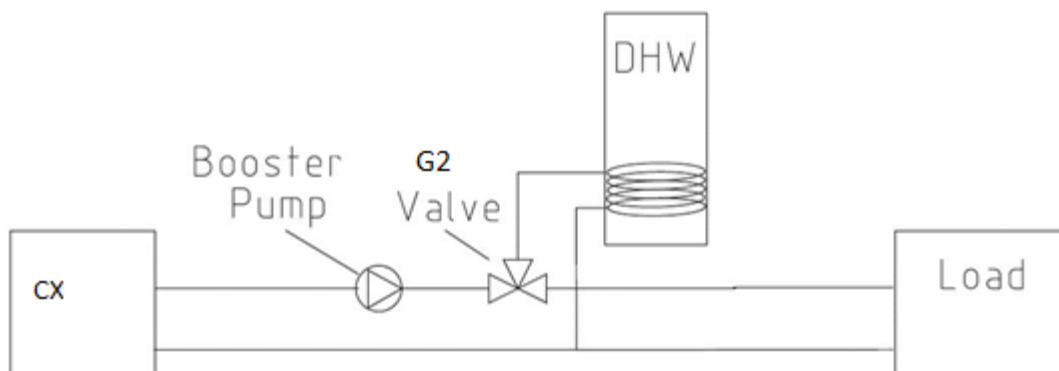
The G2 valve should be installed as close to the cx40 as practical. The DHW tank should be installed as close to the G2 valve as practical. Shorter distances will improve performance and reduce the likelihood of needing a booster pump. It is best if the cx40 can be located within 30 ft. of G valve, which should be within 30 ft. of the DHW tank. To help avoid the need for a booster pump, try to sweep corners and make minimal use of elbows, and use at least 1" PEX.



IMPORTANT

Check all tank ports including under any element covers to make sure any unused ports are plugged. Pre-plugged ports may be only finger-tight. **Check ALL ports and plugs for water tight fit.**

If one or more V18b units are used they must be in front of the G2 Valve (upstream from G2)
See V18b manual.



Any booster pump should be located between the heat pump outlet and any G2 valve or V18

G valves Continued

A booster pump may be installed in front of the G2 valve when installing the DHW option if the head, including pressure drop of the DHW tank coil, exceeds the head allowed by the pump curve when calculated at 7GPM. If a booster pump is needed for a different reason, this location should also be used. Check the DHW tank pressure drop from the Chiltrix Tank Manual or tank provider coil specs if not using a Chiltrix tank. The G2 valve should be located as close to the cx40 as practical.

G2 Valve Wiring Note; The G2 control wire is connected to G2 on the terminal strip

G2 and G3 valves use 220v Primary from the cx40. Use conduit and install per local code.

Be sure to review this document and follow the proper procedure for all rubber o-ring/gasket fittings. The recommended lubricant is silicon grease. If the rubber is not lubricated then the o-ring/gasket will tear.

<https://www.chiltrix.com/documents/Chiltrix-3-way-valve.pdf>

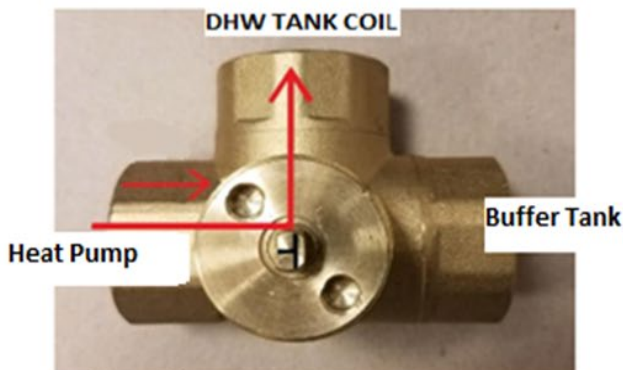
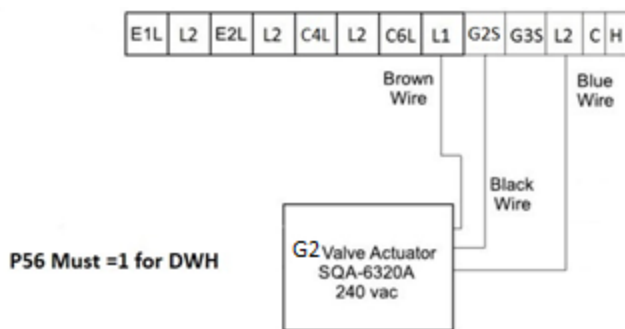


Figure 1
G1 Valve Active, DHW Mode

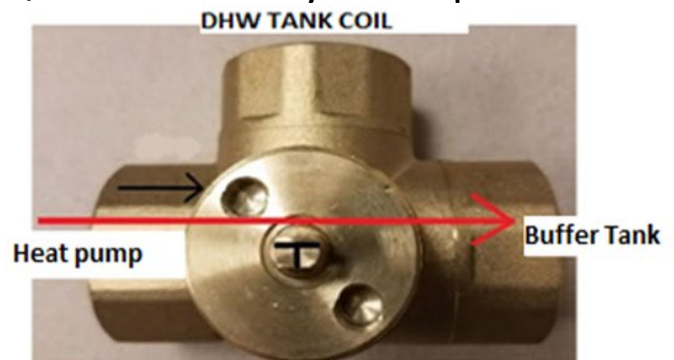


Figure 2
Heating and Cooling Only

Figure 1, this is the direction of flow when it is activated for DHW. Figure 2, this is the direction of flow when it is activated for Heating or Cooling. When the brown wire is connected to L1, the blue wire connected to L2, and the black control wire is connected to G2S the valve is controlled by voltage at L2 and G2S. Voltage at G2S activates the valve for DHW. No voltage at G2S activates the valve for Heating/Cooling. See wiring diagram above. **In order to position the dhw actuator in the correct position. You will need to turn the dhw valve to match figure 2. Connect the wires as show above and place the actuator to the side next to the dhw valve. With dhw mode off IE: the unit is in heating or cooling only. Turn the cx40 on and let the unit run for a few seconds, the actuator may or may not move depending on how it was built at the factor and what origin point the stem is in, after about 2 mins of the unit running you may place the actuator on to the dhw valve and tighten down to its final position. Verify that the dhw and heating/cooling is working.**

If one or more V18b units are used they must be in front of the G2 Valve (upstream from G2) See V18b manual.

G valves Continued

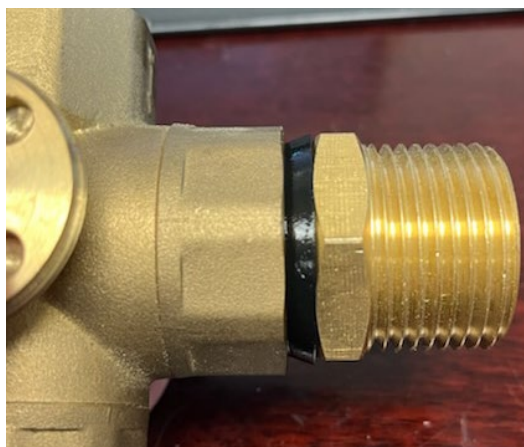
The G valves use a BSPP thread on the valve body its self. Included with each valve is a set of BSPP to 1" NPT adapters. These adapters have rubber O-rings on them. These O-rings must be lubricated with a thin coat of silicone grease. Shown below is a picture of a lubricated O-ring and non lubricated O-ring. If the O-ring is not lubricated then it may tear or deform, resulting in a leak.



Lubricated

Non Lubricated

These O-rings are not tightened the same way a NPT valve is tightened. The BSPP side must be torqued to 40-50 in/lbs.



Lightly seated



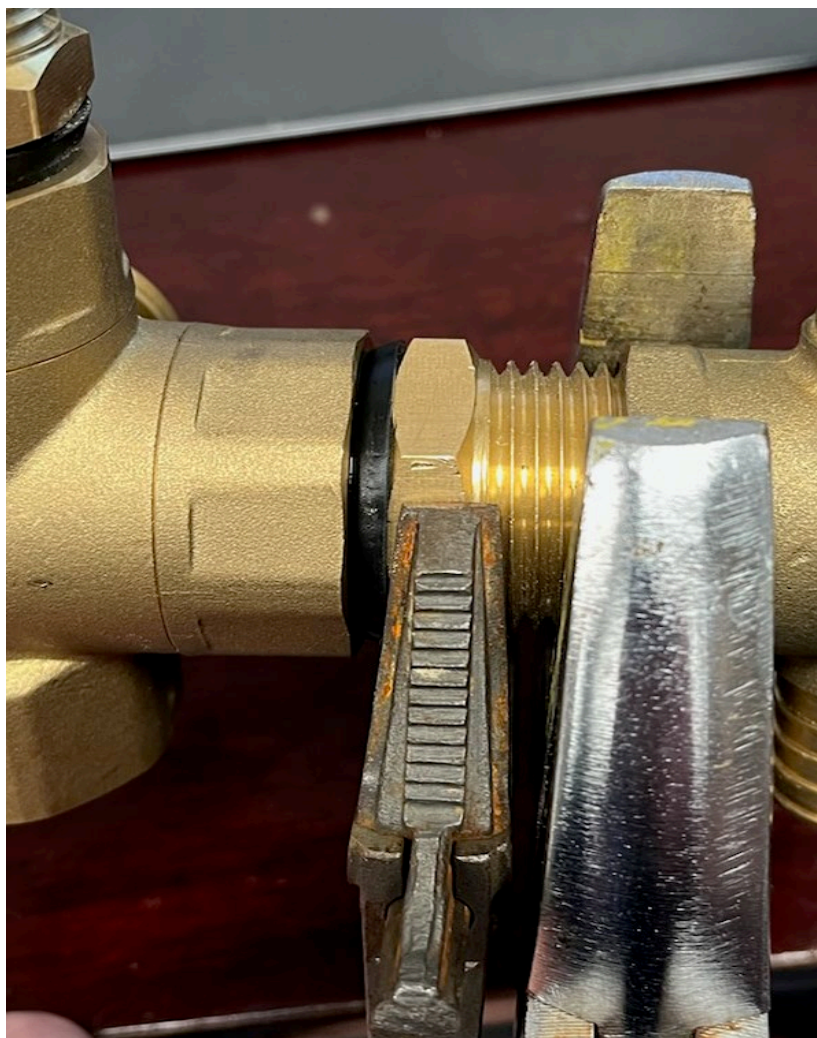
Torqued to spec

G valves Continued

When installing the NPT side, **MAKE SURE TO HOLD THE ADAPTER WITH A SECOND WRENCH WHILE TIGHTENING THE NPT FITTING AS SHOWN IN THE PICTURE BELOW.**

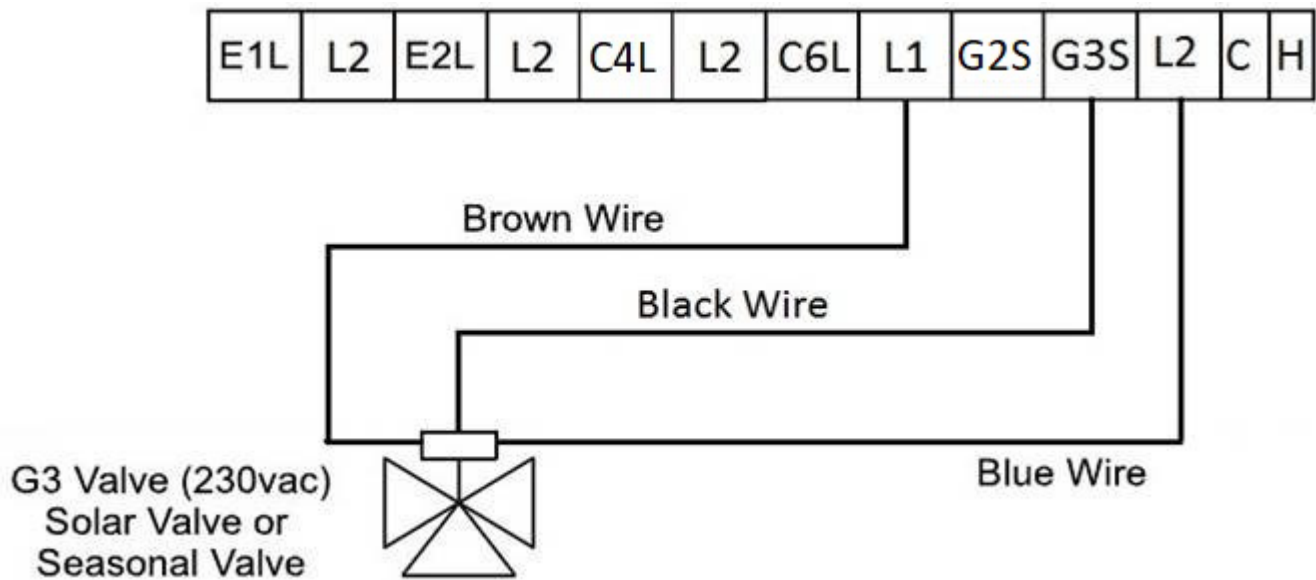
This prevents the O-ring from being crushed and squishing out. If the O-ring has been deformed too much then the BSPP threads will leak.

NOTE: this picture does not show Teflon/sealant on the NPT side of the adapter, you will need to have some type of sealant/Teflon tape on the NPT side.
Do NOT use sealant/Teflon tape on the BSPP side with the O-ring.



G3 Valve: Seasonal Switch Valve

G2 and G3 valves use 220v Primary from the cx40. Use conduit and install per local code.

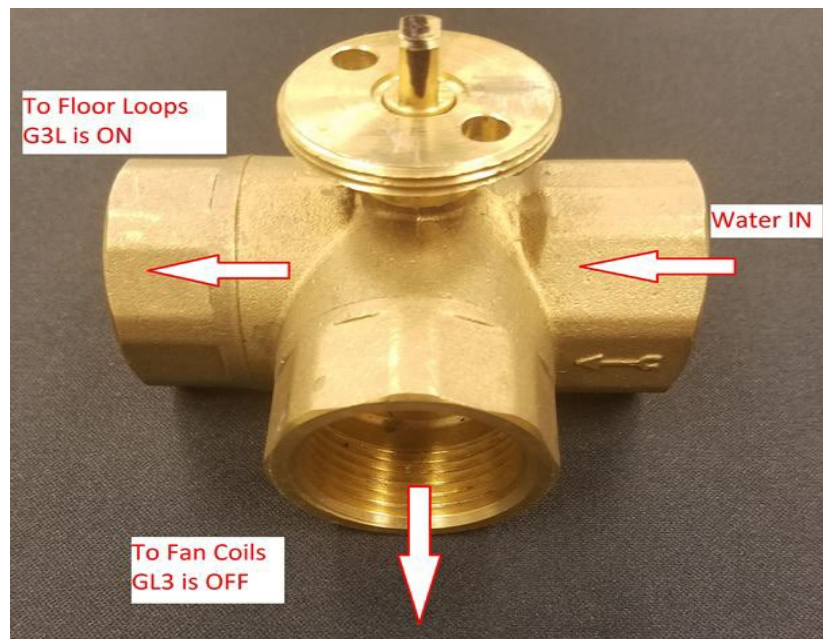
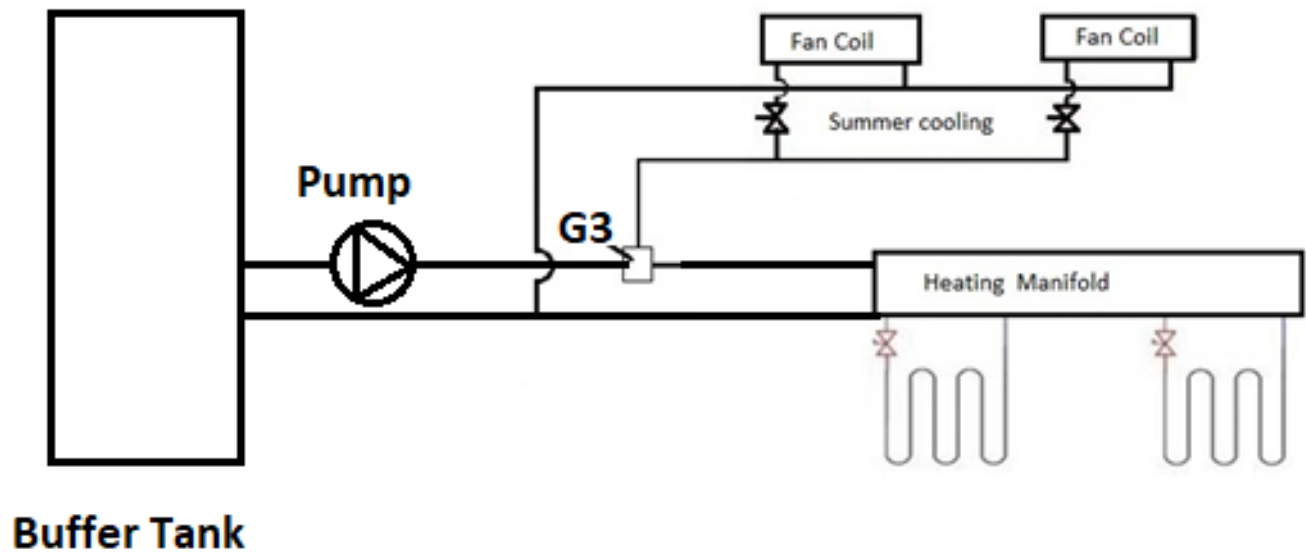


The G3 port can be used to control a seasonal switch valve and can be used in a hot-tank-cold-tank setup. The G3 valve will change position when the heat pump changes to or from heating and cooling. The seasonal switch valve may also be used on the load-side to isolate the floor coils from the fan coils when switching over from heating to cooling. The seasonal switch valve is controlled by parameter P50. When parameter P50 is 0, the valve is configured as a seasonal Switch.

When parameter P50 is 1, the valve is configured as a solar differential or pre-heat valve. The cx40 compares a tank temp and AC returned temp. When the pre-heat tank temp subtracted from the AC return temp is $\geq 5^{\circ}\text{C}$, the 3-way valve G3S will be on; when solar or preheat water tank temperature minus the returned temperature is less than 2°C , G3S will be turned off.

G3 VALVE

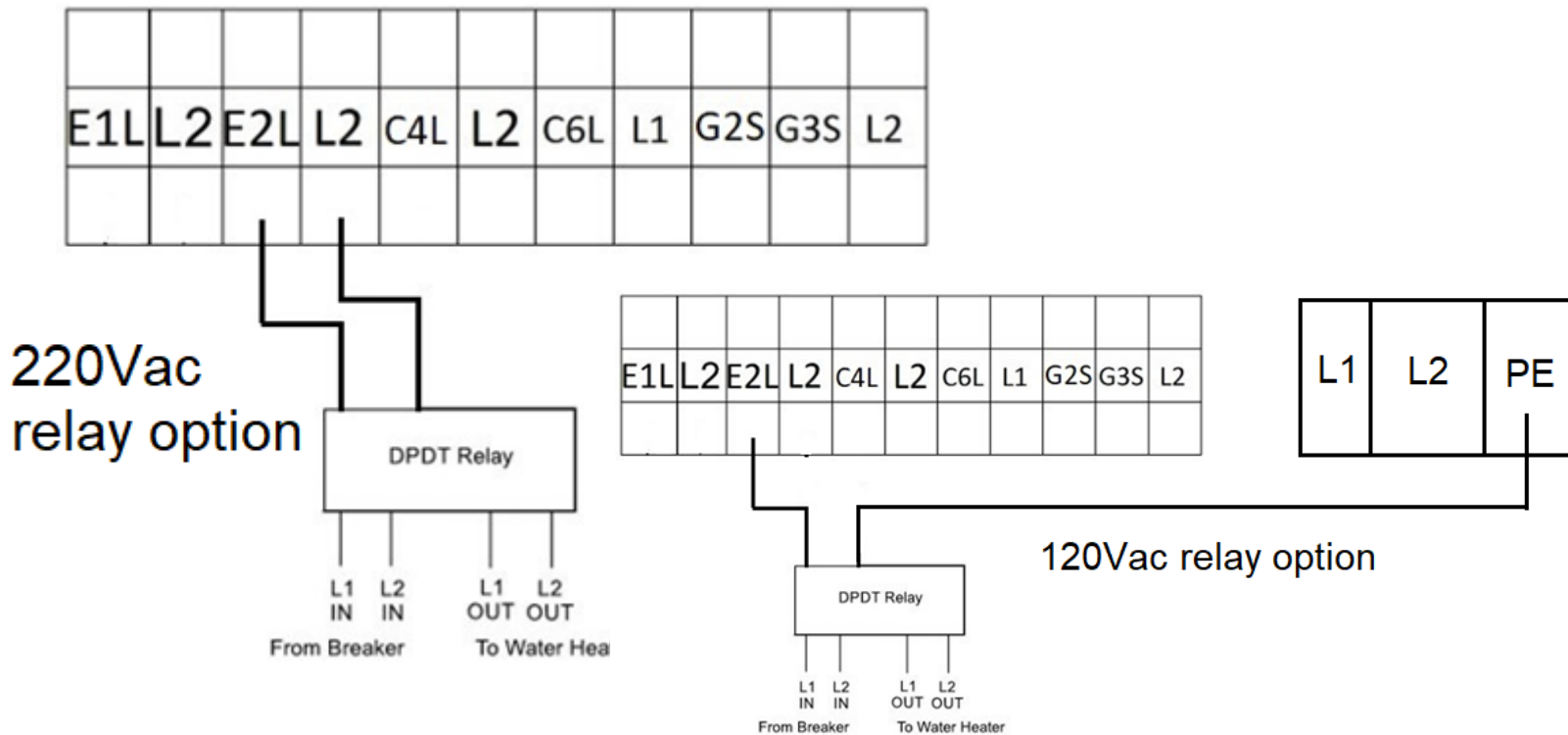
Seasonal Switch Valve



G3 Ports

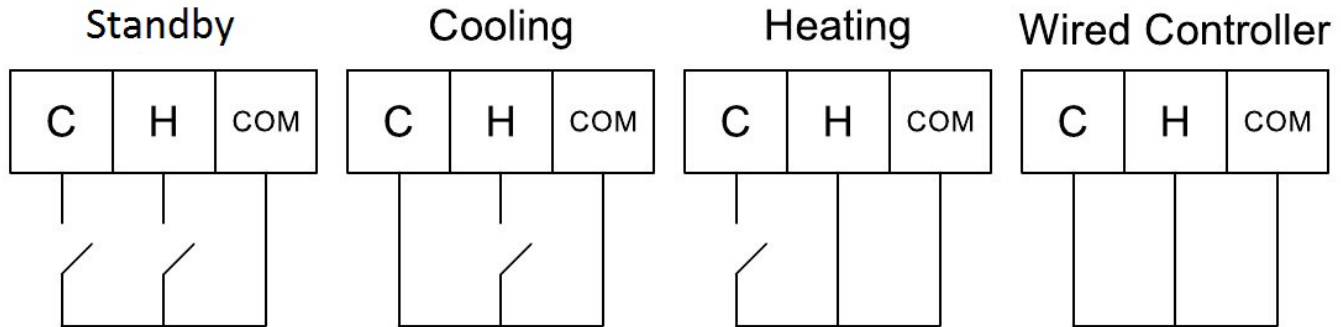
The same installation and configuration issues explained for the G2 valve can be applied the G3 valve.

Second Heat Source



- P56 value=0 is for when using dynamically variable SSR output to a V18.
- P56 value = 1 is for when using a relay on the E2 terminals to start a 2nd heat source such as a boiler.
- P56 value = 2 is for when no backup heating is used or being controlled by the unit.
- If no backup of any kind is used, change it to 2.
- DO NOT USE ELEMENTS IN A BUFFER TANK FOR BACKUP HEATING. SEE CHILTRIX TANK MANUAL. Elements would be used in a buffer tank for *emergency heat* not for backup heat.
- NOTE* THE PREFERRED WAY TO ADD BACKUP HEAT IS TO USE THE CHILTRIX V18 DYNAMIC VARIABLE BACKUP HEATER. "SECOND HEAT SOURCE" IS AN OLDER AND MORE COMMON METHOD, BUT IS NOT AS EFFICIENT AS A V18.
- P57 is E2 activation air temperature. Outdoor air temp must less than P57 for E2 to be activated. P57 default is 0°C (P57 range is -20~20°C)
P40= the E2 start delay time. If ambient is below P57 AND compressor cannot meet its target for P40 minutes, then E2 will start.
- See page 72 for more options and additional details

Onboard External Relay Control



Above shows the C-H-COM terminals logic.

IMPORTANT: The C,H, Com terminals are DRY CONTACTS. Do NOT apply Voltage to the terminals.

This optional feature allows you to control the mode (heating or cooling, standby) of the Chiltrix heat pump from a standard single stage heat pump thermostat. There are two options explained below, with instructions, drawings and configuration settings on the next page.

Option 1

With this option, a standard single stage heat pump thermostat can be used to select the cool-heat-off (standby) mode of the heat pump. When the thermostat makes a call for heating or cooling the compressor starts with the reversing valve in the correct position, according to the mode you have set on the thermostat and will target the user-defined preset tank target temperature. Note, this option does not maintain a temperature in a buffer tank between “calls” so the tank temperature may drift from target if it has been a significant amount of time since the last call. However, after a short lag the target tank temperature will be restored. This methods is similar to the on-off control of a typical heat pump (but it operates as a variable speed unit when running) and may be a good shoulder-season selection.

Option 2

This option leaves the heat pump in its last used operating mode, the heat pump continuously monitors the buffer tank temperature, running the compressor as needed at a variable speed to replace any standby losses as they occur, maintaining the tank at the target temperature. With this mode, the thermostat selector can only choose heating or cooling. To turn the system off, you would select off at the thermostat and then also use the Chiltrix controller to stop the heat pump. This option allows the heat pump to keep the tank at the target temperature, so it is immediately ready when needed, this eliminates any thermal lag caused by any standby loss.

Either of the above options allow a standard single stage heat pump thermostat or other external controller to control switching the heating, cooling (and in option 1, standby) modes of the heat pump via relay and operate as a variable speed unit when running. These methods of control generally require a single-stage standard heat pump thermostat, an installer provided 24 vac transformer and two relays, (Eg. Tyco K10P-11A15-24, w/ two relay sockets, 27E487). The relays can be located in the unit next to the IPM or indoors.

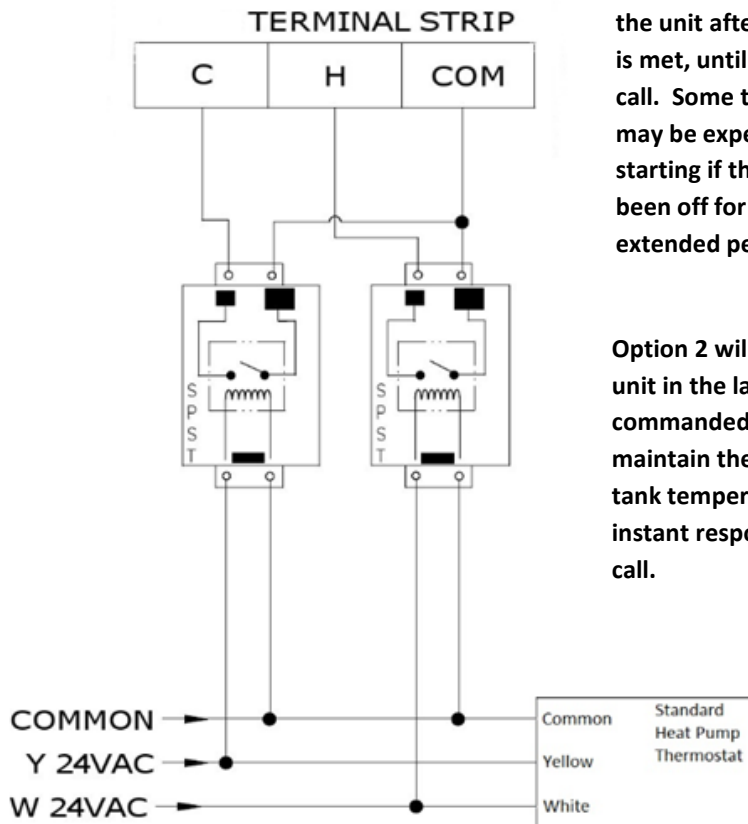
Onboard External Relay/T-Stat Control

NOTE: Before removing any jumper or connecting any relays, make sure of the following:

1. Enable/disable DHW, as applicable, at P08. Your selection will follow along with a change between heating and cooling. If DHW is active (Parameter P08=0) DHW will work even when external relay control has the system "off" (standby).
2. Use the controller Mode button to switch modes and set the target temperatures of each mode Heat, Cool and DHW, before proceeding.
3. Auto-switchover (based on outdoor temp) at P42/P43 cannot be used when using this feature.
4. In order to use this function you must enable P111.

IMPORTANT: The C,H, Com terminals are DRY CONTACTS. Do NOT apply Voltage to the terminals.

OPTION 1 (NO Relays)



OPTION 2 (NC Relays)

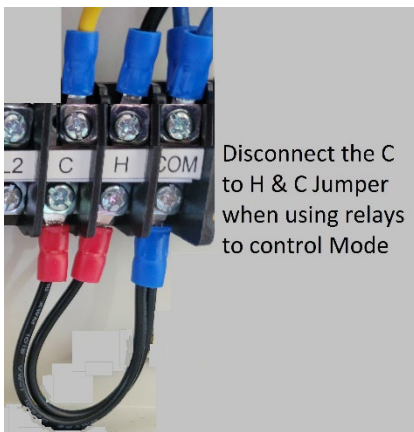
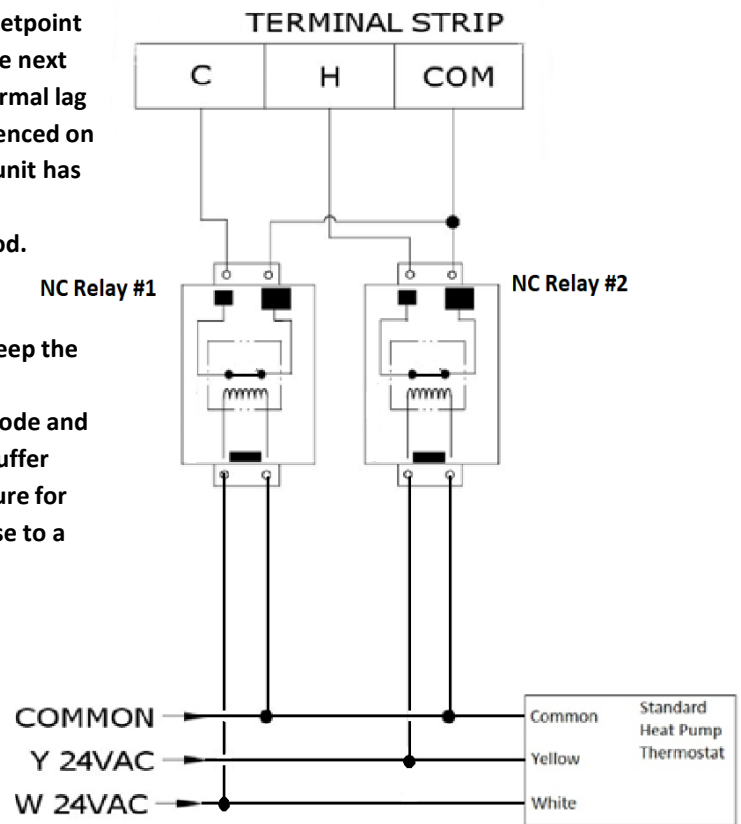


Figure 1

The switch status can be displayed in the C parameters
 C63 is X06 AC heating switch mode status refer to the diagram at the top of the previous page. 0=OPEN(Disconnected) ;
 1=CLOSE(Connected);
 C64 is X07AC cooling switch mode status; 0=OPEN(Disconnected);
 1=CLOSE(Connected);

NOTE: Using this relay control option will NOT override inputs from the Chiltrix standard wired controller unless p111 is enabled. See the Psychrologix manual for important additional information if this applies to you. Timers as explained elsewhere in this manual will NOT be available when relay control is used.

System filling with Propylene Glycol and water

At or near the cx40 a flush/fill valve assembly must be installed. This can be made with three ball valves and a couple hose fittings. If you don't already have a fill kit for use with solar thermal, hydronic, or chiller systems, you can easily create one with the following Bill of materials: All Pex fittings are available at www.supplyhouse.com

2 ea. Pex 1" x 3/4" Tee SKU: H051175LF Brand: Rifeng

1 ea. Pex 1" Ball Valve SKU: H081000LF Brand: Rifeng

2 ea. Pex 3/4" Ball Valve SKU: H080750LF Brand: Rifeng

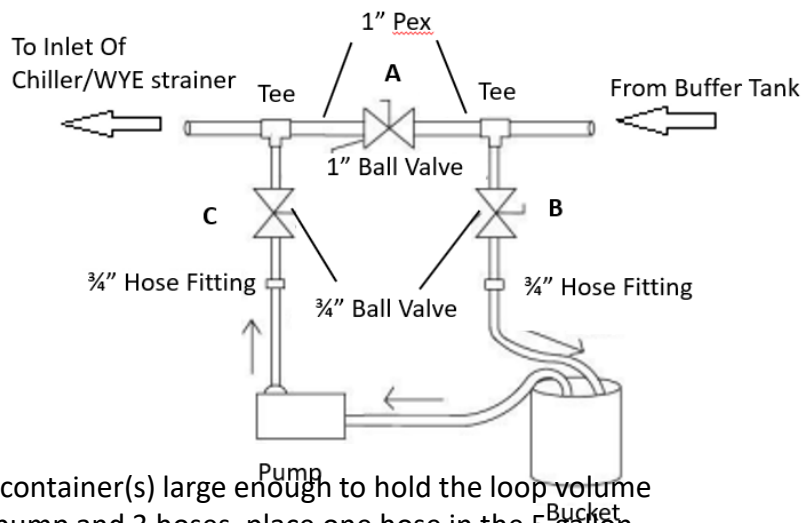
2 ea. 3/4" Hose Fitting SKU: G20103 Brand: Jones Stephens

2 ea. Pex 3/4" x 3/4" NPT Female Adaptor SKU: H040750LF Brand: Rifeng

10' of Garden Hose Home Depot

5 Gallon Bucket Home Depot

High Head Fill Pump Grainger



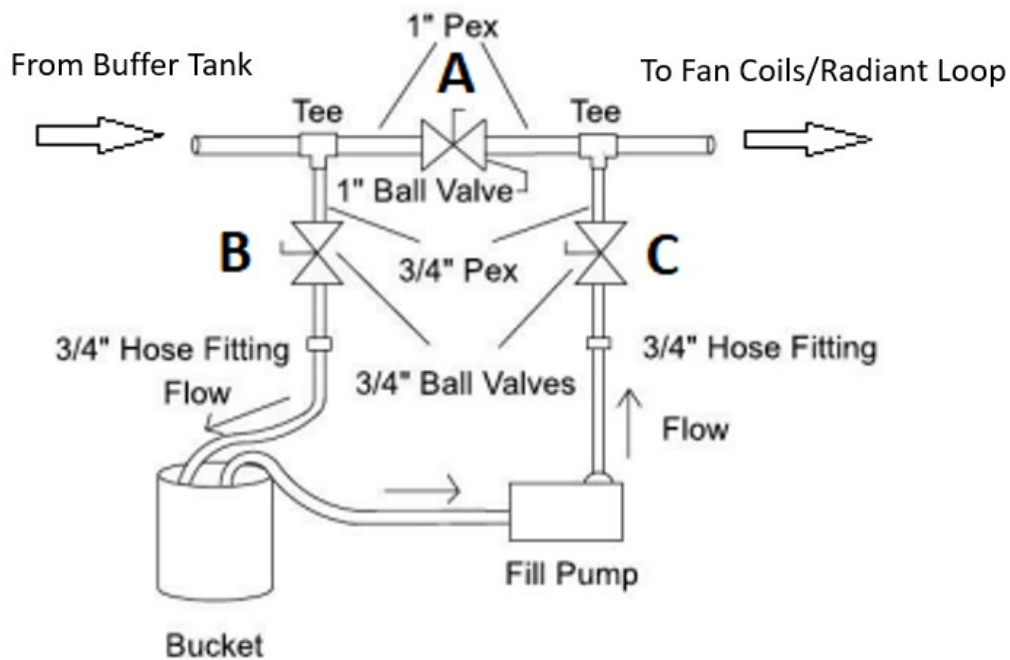
Pre-mix the propylene glycol in a container(s) large enough to hold the loop volume plus a few gallons. Using a filling pump and 3 hoses, place one hose in the 5 gallon bucket and connect it to the suction side of the pump. Connect the second hose to the pump discharge and the other end to valve "C". Using a third hose, connect it to valve "B", and leave the open end in the glycol bucket. Close the middle ball valve "A". Close the middle ball valve "A". Add water/glycol etc. to the bucket keeping the fluid level above the lower end of the hoses. The pump should be pumping toward the cx40 unit. Open and close valve "A" a few times to remove trapped air.

Run the pump until there are no more air bubbles coming out of the loop. After all air is expelled from the loop, close valve "B" and then open valve "A" with the pump running. It is suggested to run this for at least 15 minutes after you see the last air bubble. When the pressure gage on the cx40 shows at least 30 psi close valve "C" and turn off the pump. Minimum loop pressure is 14.5 psi, maximum pressure is 43.5 psi, and ideal pressure is 20-30 psi.

See more info on Isolation valves used with the flush fill system here

<https://www.chiltrix.com/documents/Charging-Fill-Kit.pdf>

System filling with Propylene Glycol and water

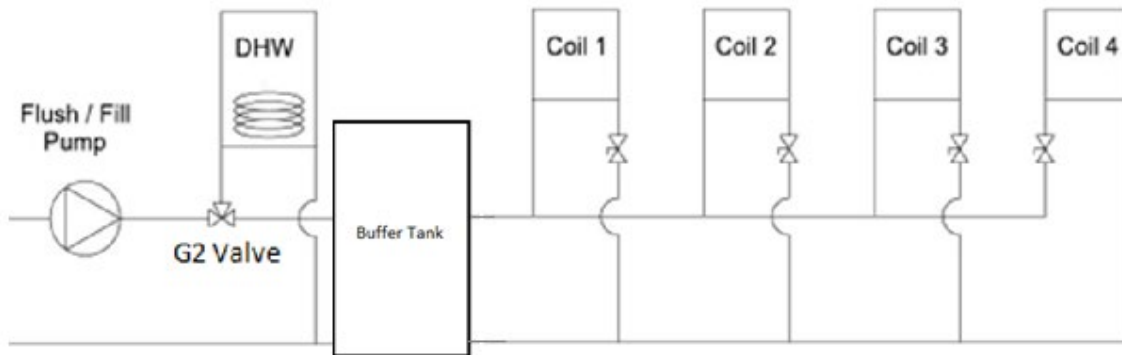


In many cases, there may be a need for a flush fill kit on the load side of the buffer tank. The diagram/parts lists is the same as the approach for the supply-side. The only difference is that you will be pumping from the bucket to the fan coils/radiant and through the buffer tank.

It is not a good idea to rely on air-purge valves for the initial bleeding of the system.

See more info on Isolation valves used with the flush fill system here
<https://www.chiltrix.com/documents/Charging-Fill-Kit.pdf>

Purging Air From DHW Tank & Fan Coils



Previously we showed the flush/fill connections on the return line from the load pumping towards the heat pump. Above we show the flush/fill on the outlet (supply line) of the heat pump. Either side is fine. If a DHW tank is installed, the G valve should be the first device on the loop as shown, unless there is a V18 (which would always be in front of the G valve. The G2 valves should always be as close to the cx40 as possible. The DHW tank should be as close to the G2 valve as possible.

To purge the air from its coil, remove the actuator from the G2 valve body and rotate the valve stub 90° clockwise to match figure 1 on page 31. Return the valve stub back to its original position when all of the air is purged. Close the input valve to each fan coil except the first coil (1). Turn the pump on and run it, when the bubbles stop coming out of the discharge hose turn on the ball valve on coil (2), wait for the bubbles to stop, then do the same for coil number (3), then (4). All CX Heat pumps have a flow switch installed in the loop. Air in the system may cause a flow switch alarm; the controller will display a P05 error code. This will not show an error if there is no water flow on the load side (fan coil side) of the buffer tank as the flows are separated.

All CXI fan coils have an air purge screw near the water inlet port, always purge the fan coils before starting the unit. The cx40 unit also has a bleeder valve with a ¼" clear tube attached to it located near the brazed plate heat exchanger. Be careful to not over-tighten the purge valve on the CXI fan coil units, these should not exceed 8 lbs./ft. of torque.

Fan Coil Flow Balancing (Performed at or after time of commissioning)

Proper and even flow through each fan coil is important for both heating and cooling. (Coil inlet temperature can be displayed by pressing the up and down temperature arrow keys at the same time), This can be done with balancing valves or ball valves installed at each fan coil supply or return pipe. This must be done with the cx40 in heating mode, temporarily set loop AC target to at least 120F setting for balancing.

DO NOT DO THIS IN COOLING MODE OR DAMAGE MAY OCCUR.

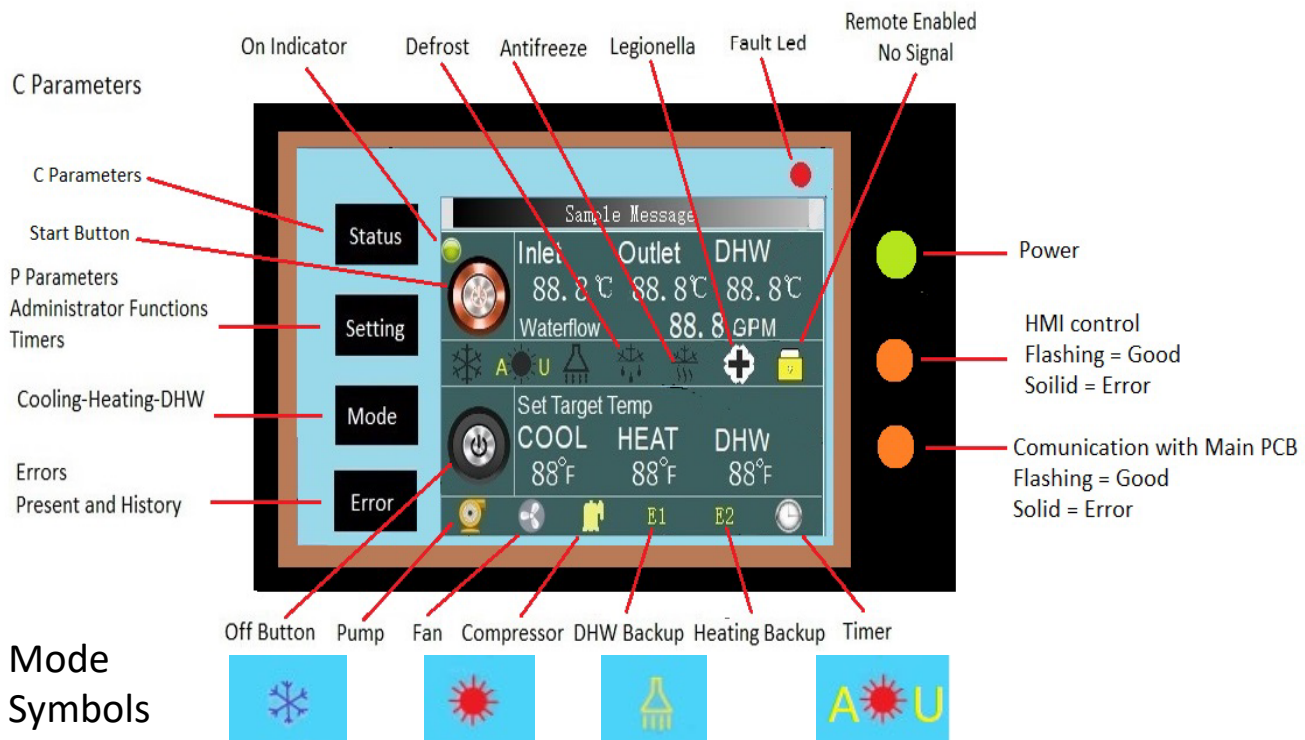
Use a laser thermometer or clamp-on pipe sensors that can measure the outlet pipe temperature of the CXI units. Adjust valve positions until each fan coil has the same leaving fluid temperature, with all CXIs set to max manual fan speed and in heating mode. When all leaving fluid temps are the same, the units are properly balanced. If a fan coil is powered on but the fan isn't running, there is a good possibility that there is air trapped in that particular part of the loop. Also verify the parameters with the CXI FCU manual, page 35. <http://www.chiltrix.com/documents/Chiltrix-hydronic-FCU-ver-1.5.pdf>

Note – while only one ball valve per CXI is needed for balancing, best-practice would be to use 2 valves, one on supply and one on return, so that the fan coil unit could be isolated if needed.

Standard Controller (Included with all cx40 Units)

Cooling, Heating, DHW, cooling + DHW, heating + DHW mode of operation options, automatic fault detection, alarm processing, and energy control.

1. The 4-conductor control cable can be extended up to 300 feet of 20 AWG or larger.
2. The controller handles all input and output signals, and system status.
3. Full-touch color LCD display. **MUST BE INSTALLED INDOORS.**
4. Modes, set points and other factory parameter settings are entered directly on the LCD screen. Note, for heating and cooling, the set target refers to the return water temperature, in steady-state operation, the leaving temper will be +/- 5C (9F). The normal cooling set target is 53F which implies a leaving steady-state temperature of 44F. Heating, for radiant, is normally set for 86F (implies leaving at 95F). Heating, for fan coils, is normally set at 96F (implies steady-state temp of 104F). **The cx35 can achieve a leaving temp of 131F under most but not all conditions. The maximum supported target set point is 111F (implies a 120F leaving temp.**
5. 100 fault records can be stored and retrieved to show the details of each fault that may occur.
6. All of the switch input / outputs can be directly observed on the LCD control panel making commissioning convenient.
7. The LCD display is wall-mountable.

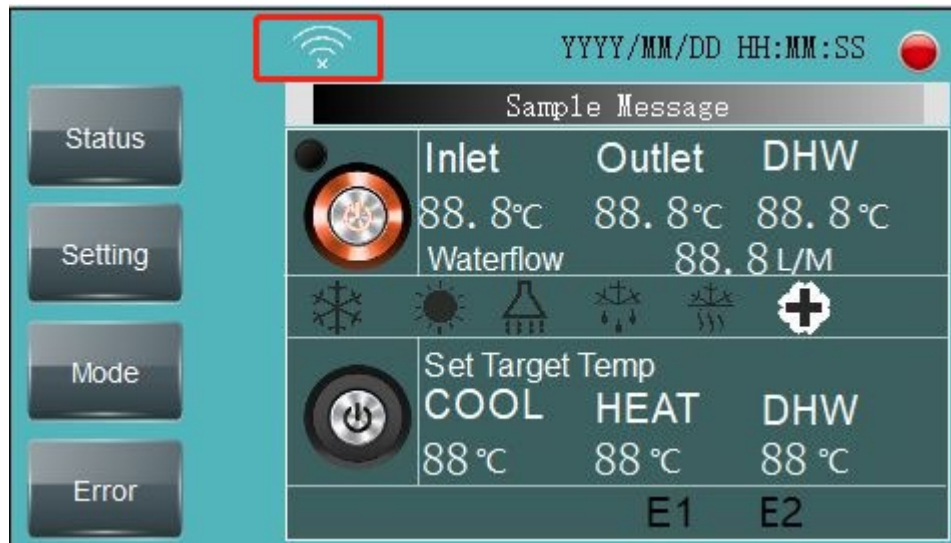


- (1) **Taskbar:** shows the current running applications, and the time. Clicking on the different application boxes will switch to different applications.
- (2) **Main window:** Displays the main window of the application that is currently running.
- (3) **Application icon:** A desktop application that first highlights the icon when it is first clicked, and then clicked again to launch the application.

Indoor Controller!
This controller must be installed indoors.

Wifi Units: if your unit comes with a wifi enabled HMI controller, please connect it to WiFi if possible.

If enabled, your unit will show a wifi symbol in the upper left-hand corner as shown below in the red box.



WIFI Connection Instructions.

<https://www.chiltrix.com/documents/Chiltrix-WIFI-Instructions.pdf>

Order Number/Serial Number: Upon first start up, select settings, and then Ver, and then select change user level. Enter “20220906”. Please fill out the following slots and then press “Log off user level” this will help future diagnosis and prevent the customer from changing settings in the future.

Order No Example: 24035, 24 represents the year it was produced. 035 represents the order number.

Model Code Example: 11456, 11 represents the model of the unit. 456 represents the last 3 digits of the serial number.

11= cx34
12= cx35
16= cx50
19= cx65
20= cx75



Settings:

Chiltrix heat pump setting for space heating/cooling are always set for return temperature, with a steady-state leaving temperature +/- 9F

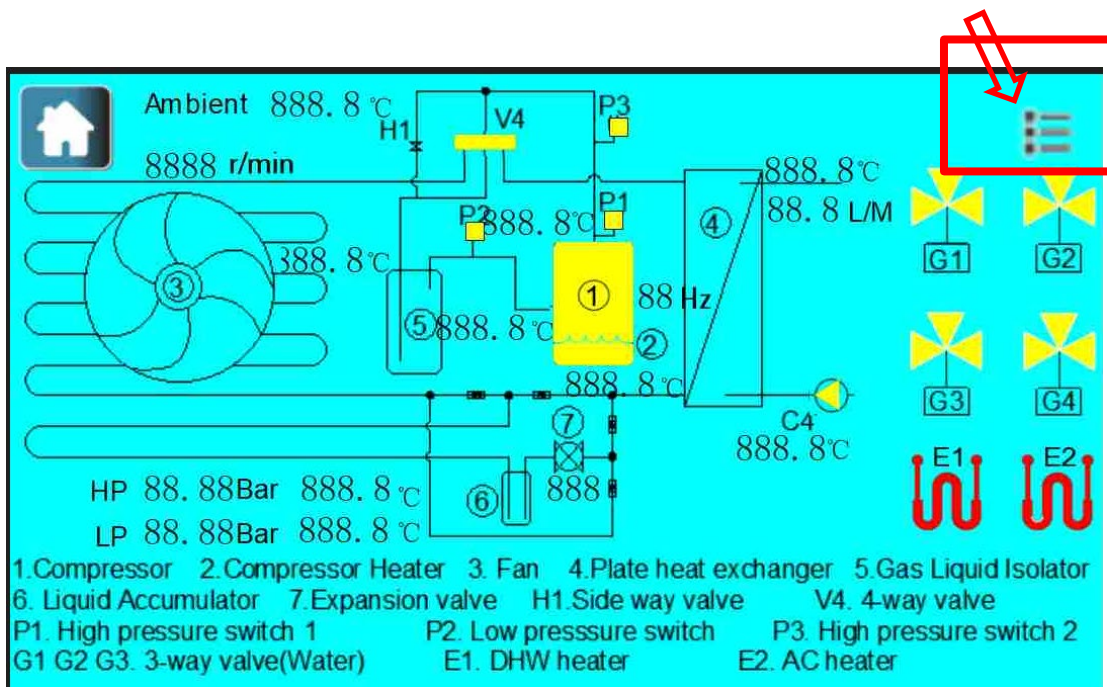
Standard Settings:

Space cooling: 54F (note, this implies a leaving temperature of 45F)

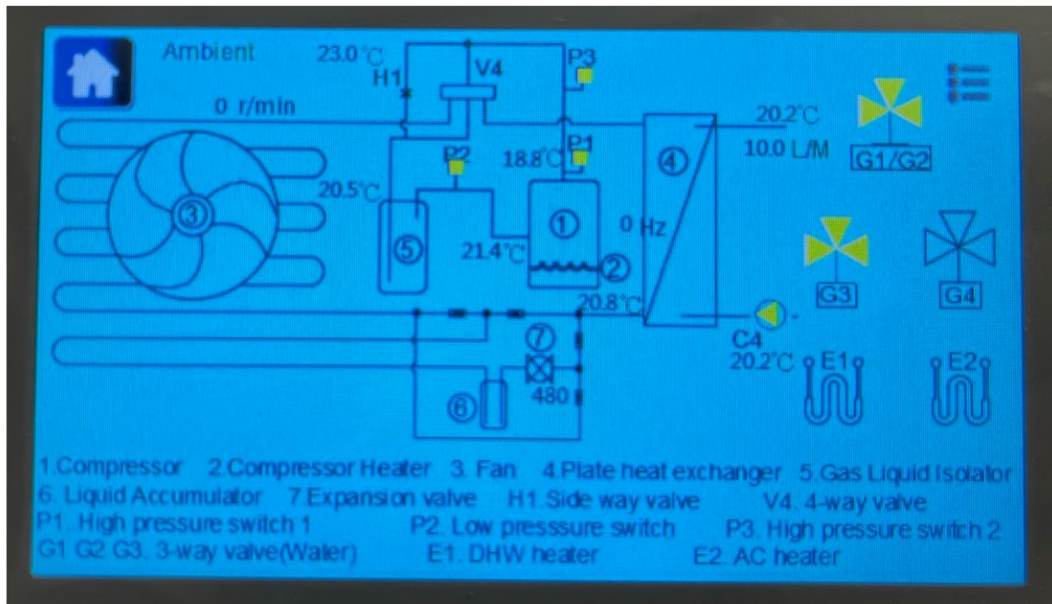
Space heating: For Chiltrix supplied AHU/FCU use 96F (Note this implies a 105F leaving temperature. Max recommended temp 111F (120F leaving temperature. DHW: For best operation use Max 120F target.

Status

Click "Status" icon at the home page to enter the status diagram, press the upper right hand corner where the 3 dashed lines are to get into the C parameters page as shown on the next page.



cx40 Status Page Pre Software Version 108.1



cx40 Status Page Pre Software Version 108.1 is shown above



Note the changes for different software's. It only changes how G1 and G2 are displayed, does not change any hardware or requirements.

Status

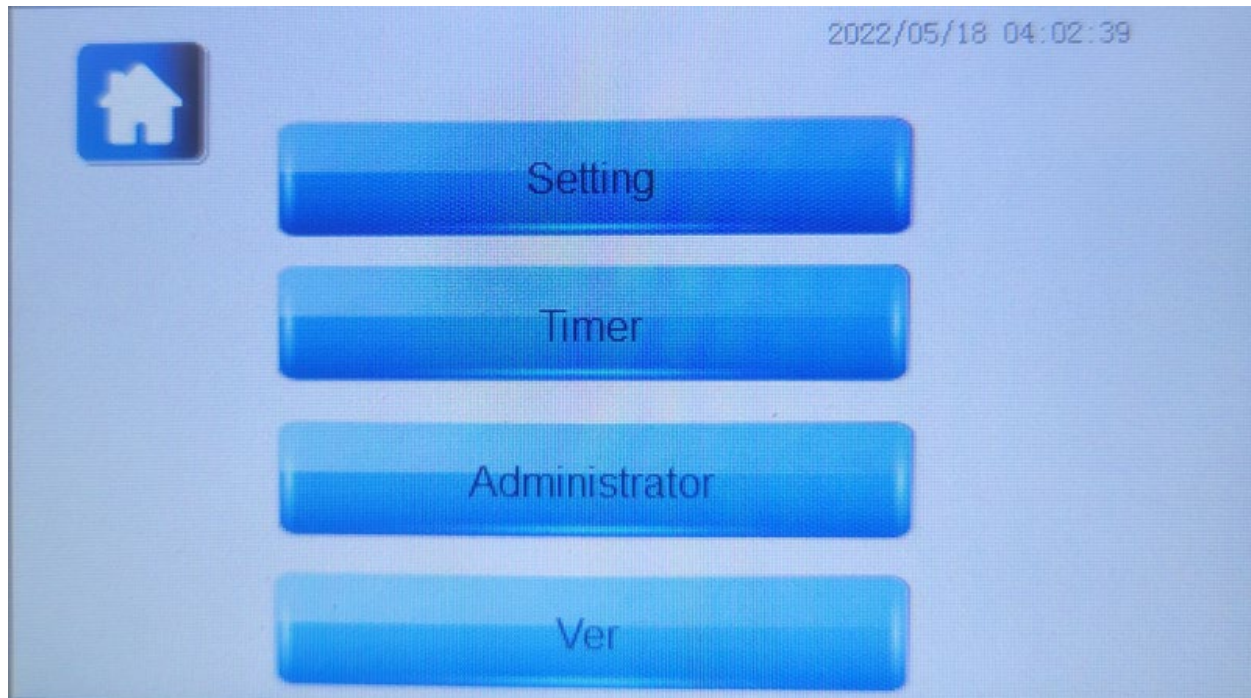
Click "Status" at the home page to enter the status screen (system diagram), and then click the three lines at the right top to get into the "C parameters" below. Click the arrow ">" button to scroll to next page.

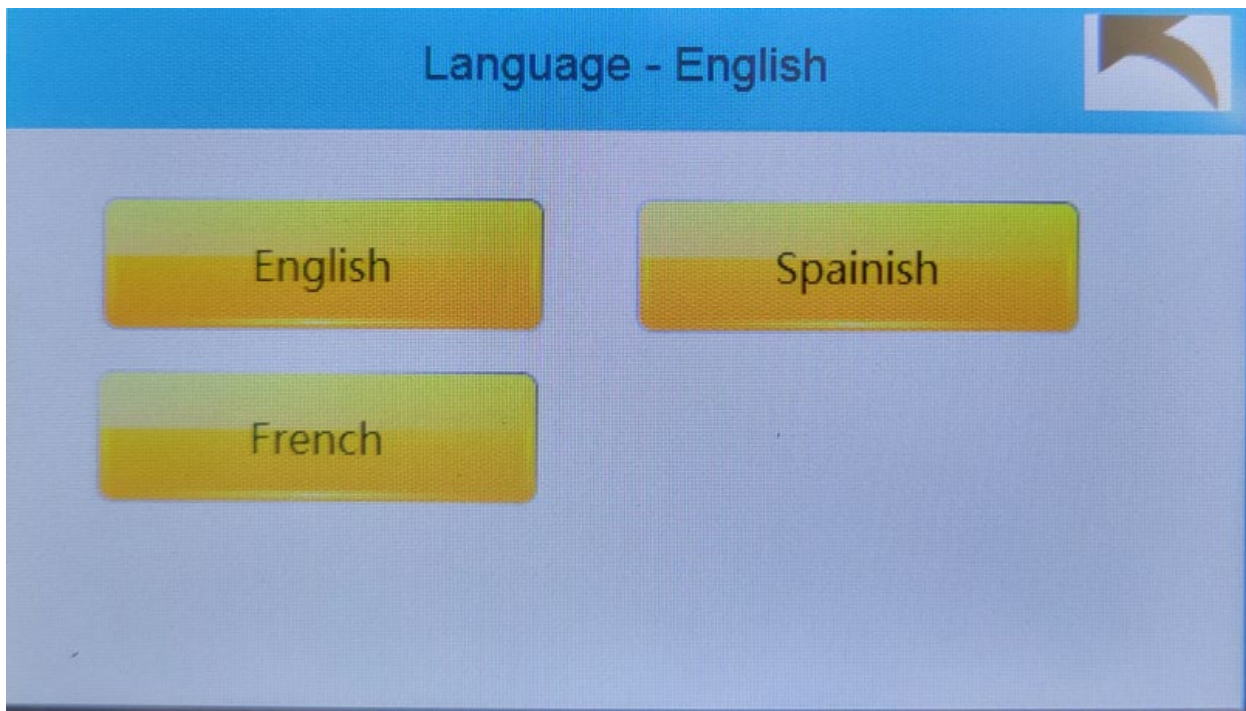
All operating parameters can be viewed from these screens.

 2022/11/04 17:26:29	
Item	Value
C00 Coil temp	0.0 °C
C01 Compressor discharge temp(AIN1)	0.0 °C
C02 Ambient temp	0.0 °C
C03 Suction temperature	0.0 °C
C04 Plate heat exchanger inlet temperature	0.0 °C
 1/15 	

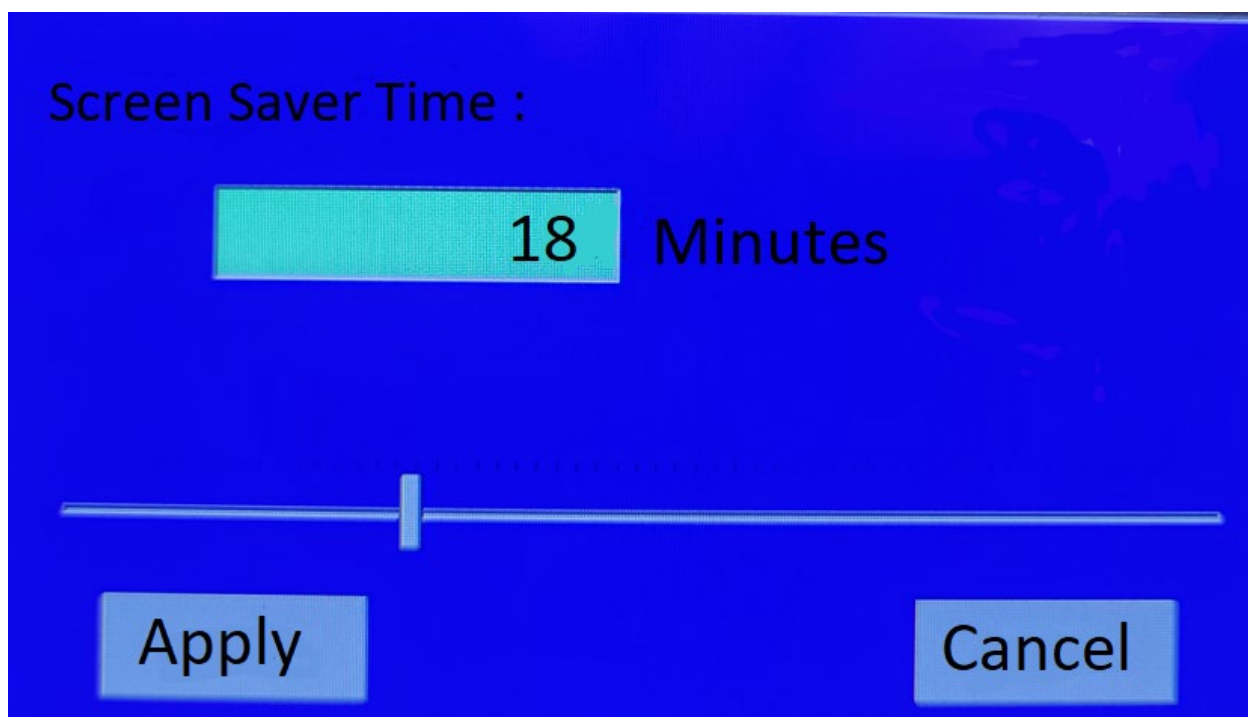
Settings Menu

From choices on the left-side of the Main Screen, click the **“Setting”** button, and you will enter the system setting page. On this page, again select “Setting” where you can select the language, set time and Administrator settings as shown below.

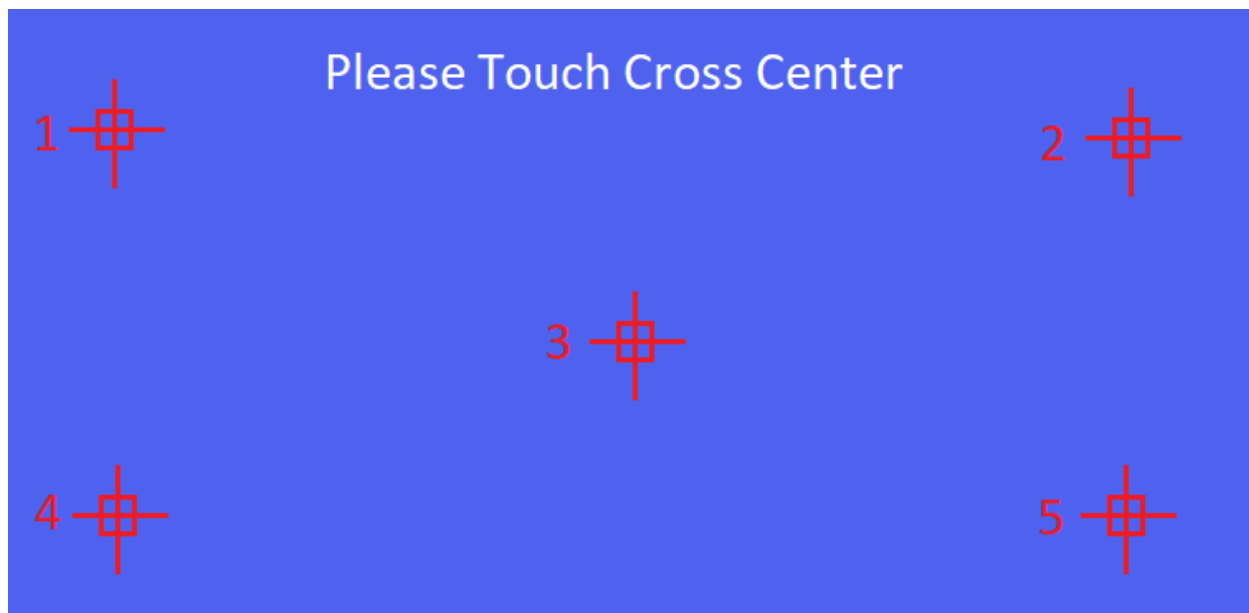




Language Screen



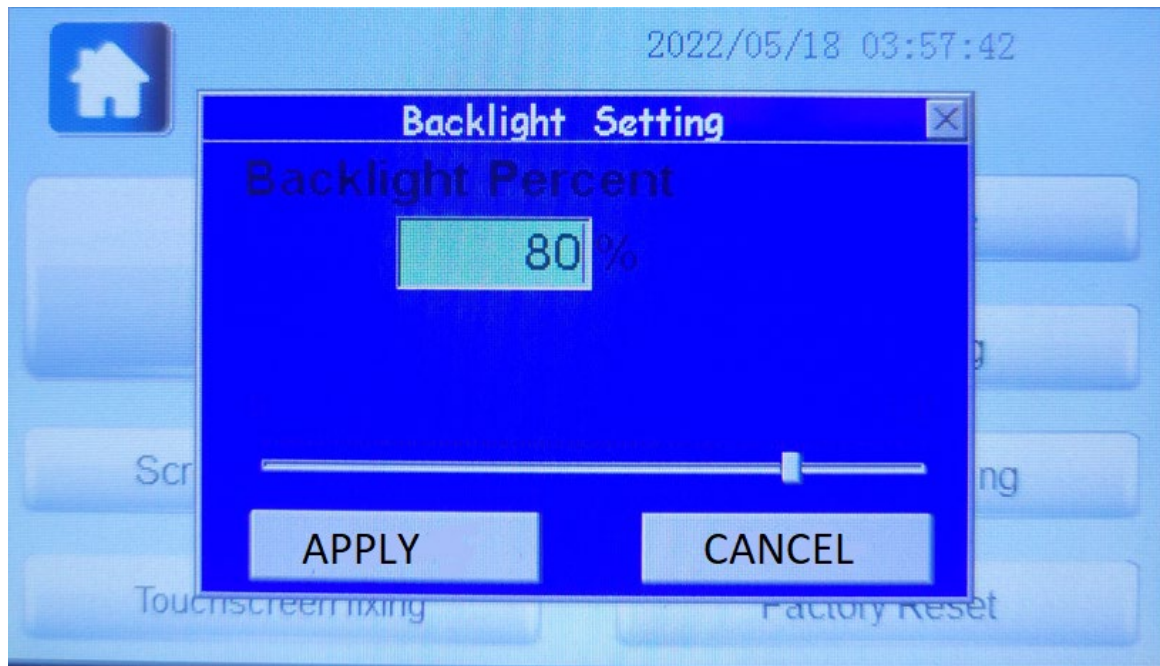
Screen Saver



Touch Screen Fixing (Calibration)

Year	Month	Day
2022	6	4
Hour	Minute	Seconds
3	55	11
APPLY		Cancel

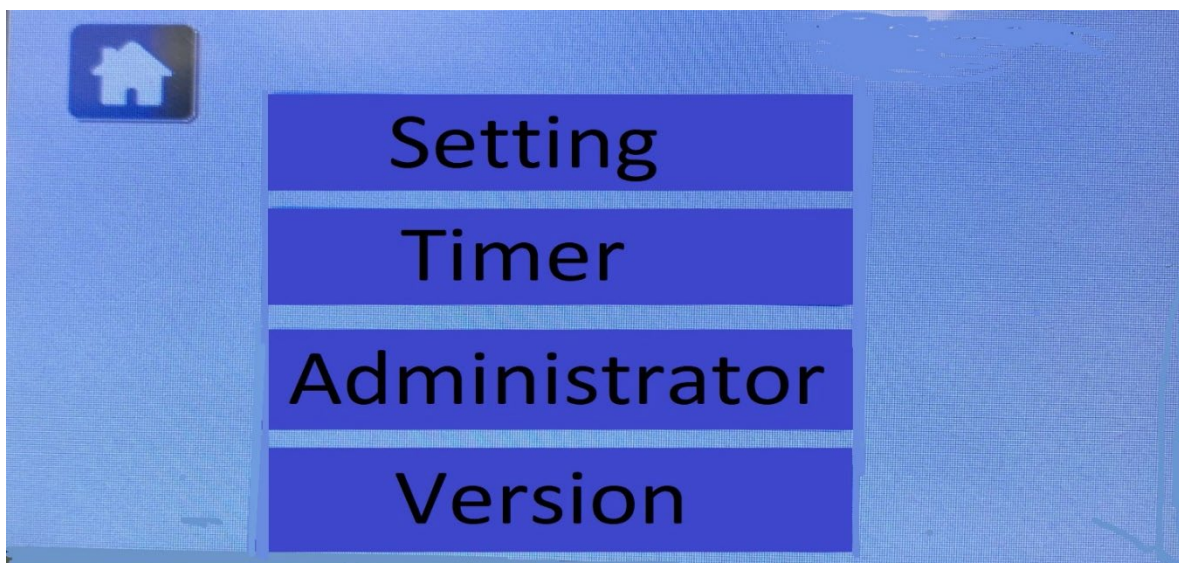
Time Setting



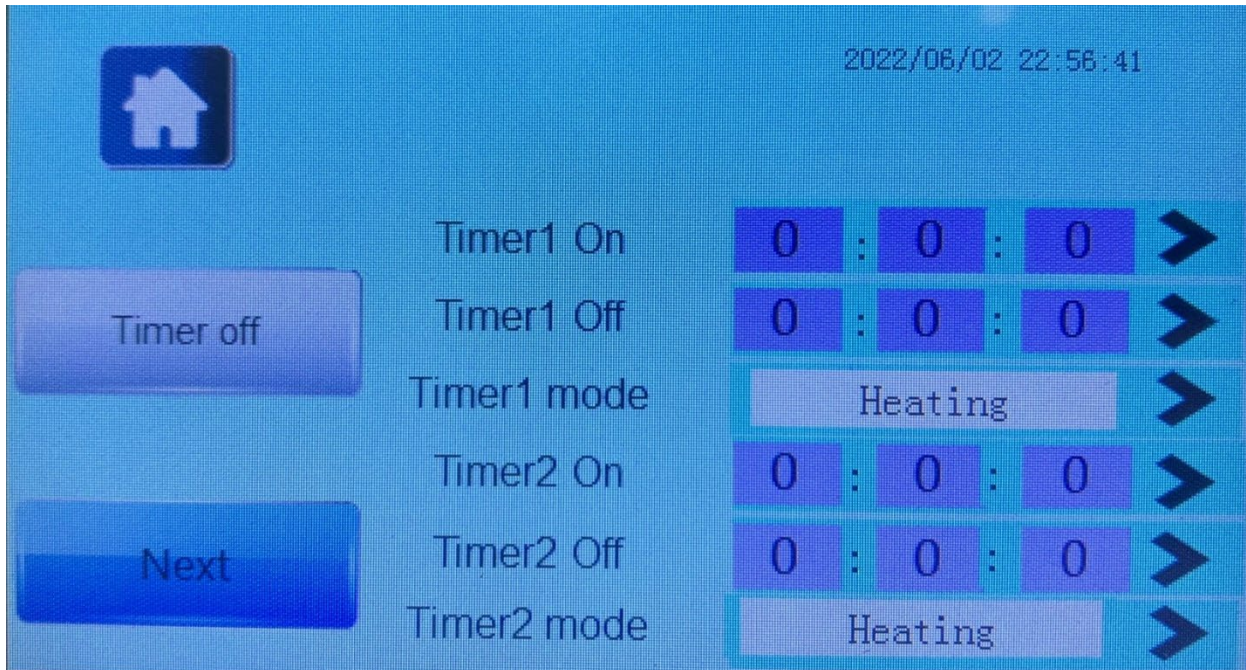
Back Light Setting

Timer Function

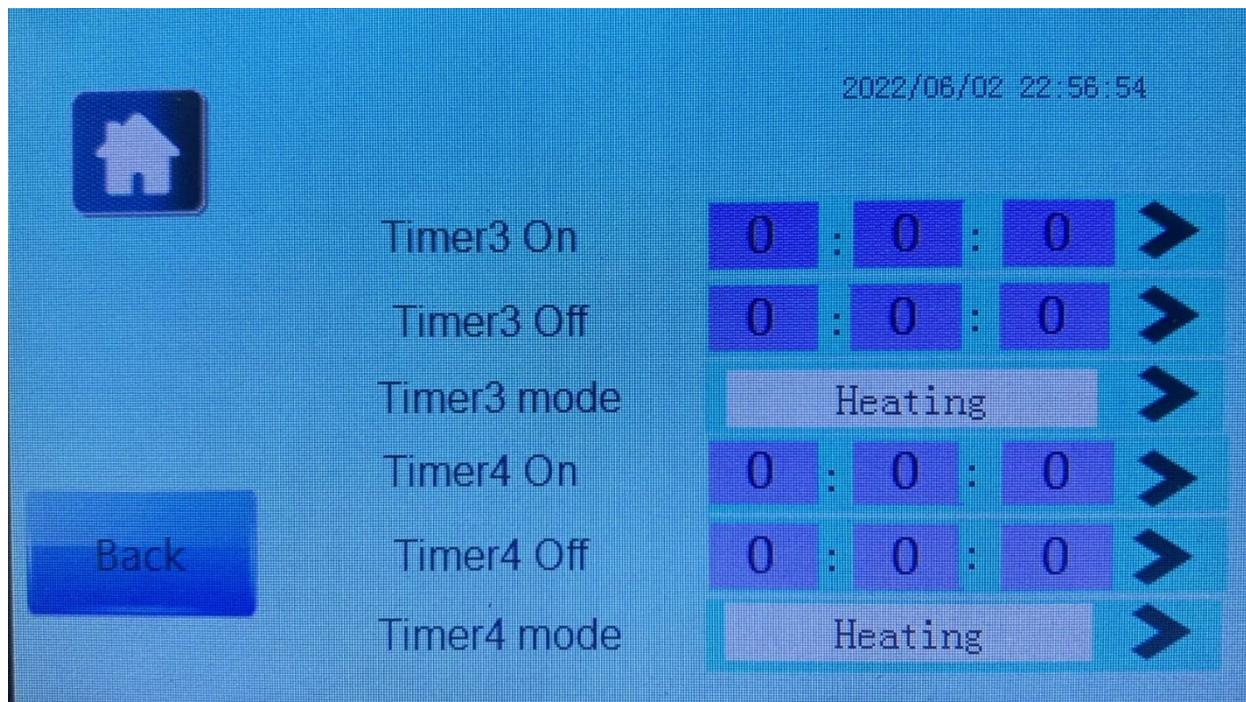
Click “**Timer**” button, you can set the heat pump to turn on and off times, you can select different working modes for different time periods. There are total 4 periods, (8 points), in the timer setting.



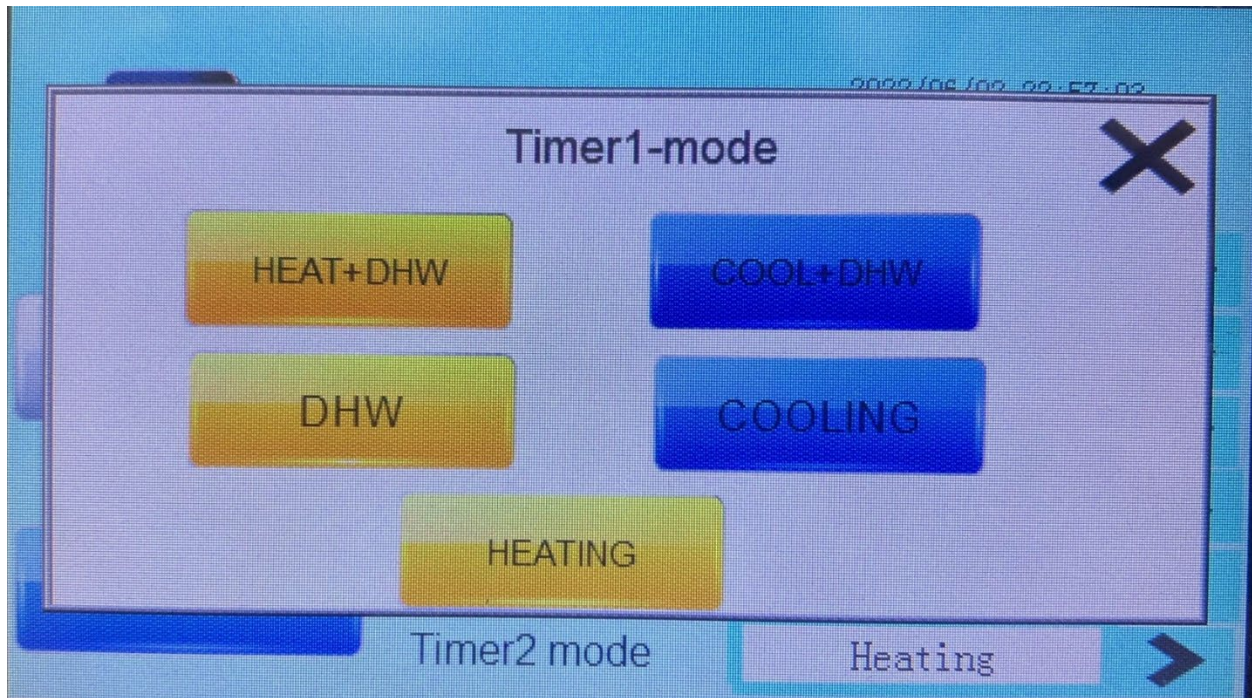
Press Timer to access the timer functions



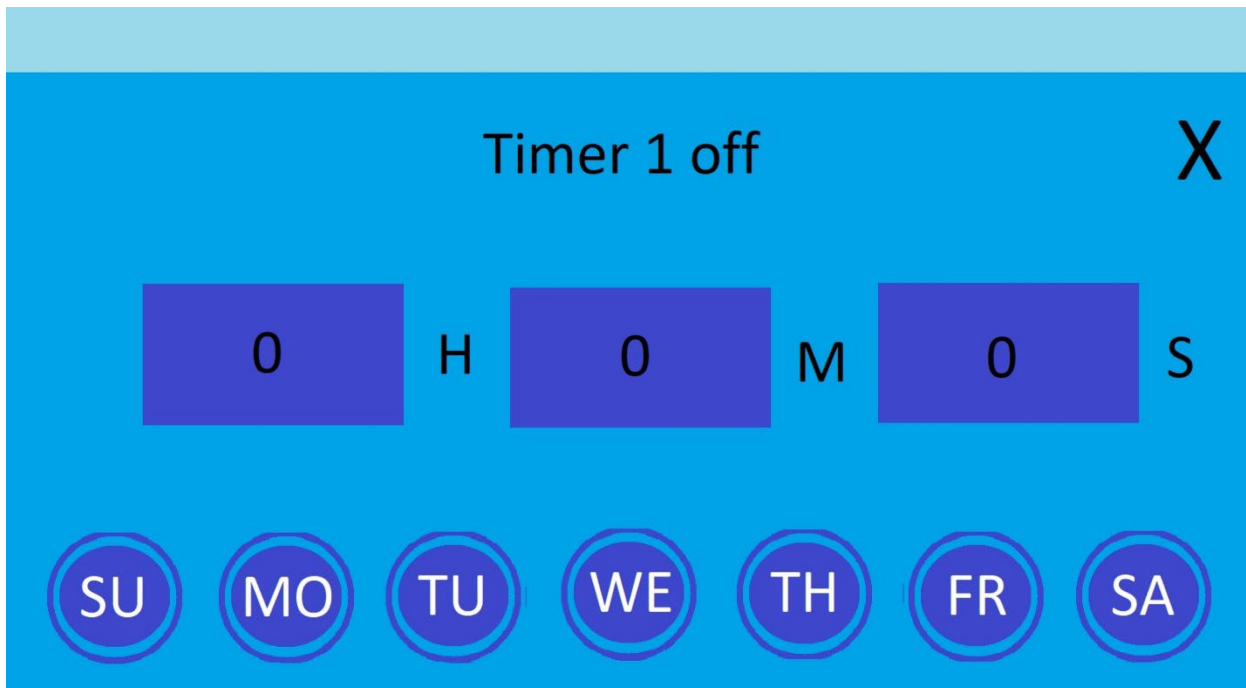
Timers 1 and 2 set to Heating Mode with no times set



Timers 3 and 4 set to Heating mode with no times set

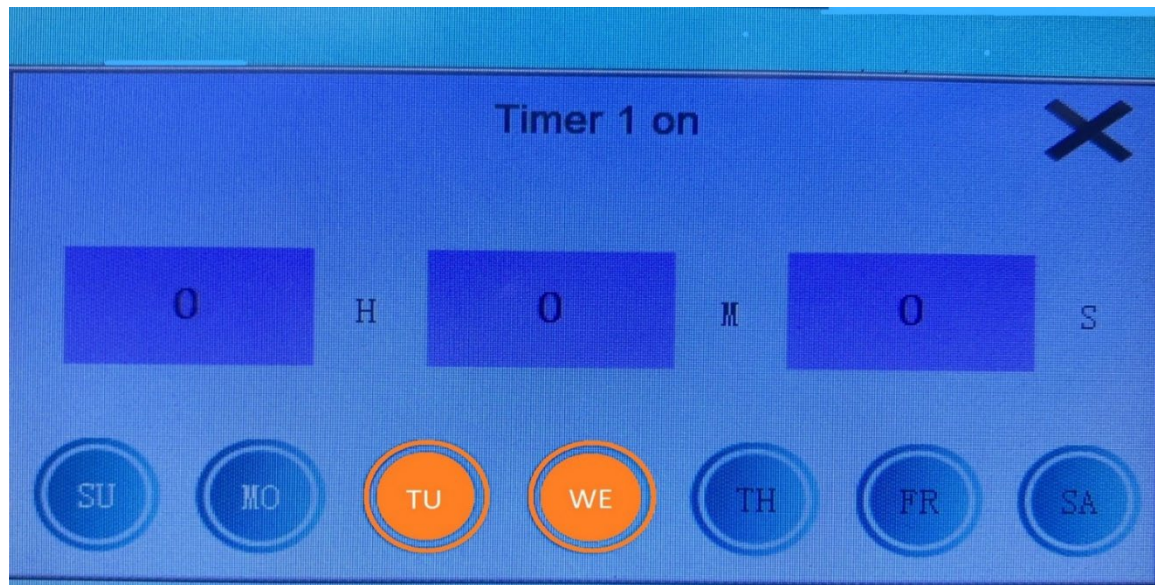


Setting the mode for timer 1, same menu for timers 1-4



Timer 1 turned off, timers 1-4 use the same menu

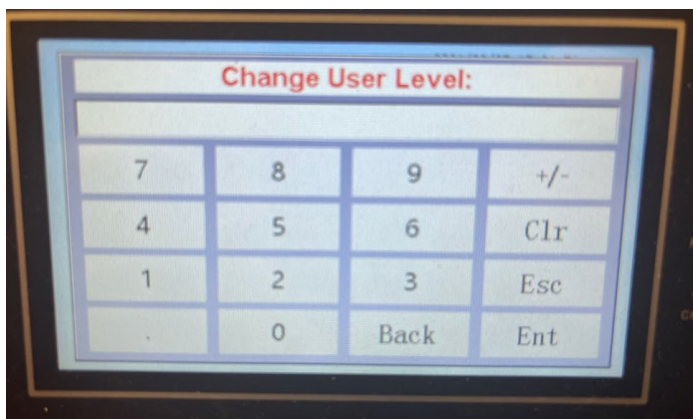
Timers available using the WiFi option have many more features and configurability. It is suggested to use the WiFi feature for the best application of timers



Timer 1 Start time and Days of the week selected (TU and WE), timers 1-4 use the same menu

Administrator Functions

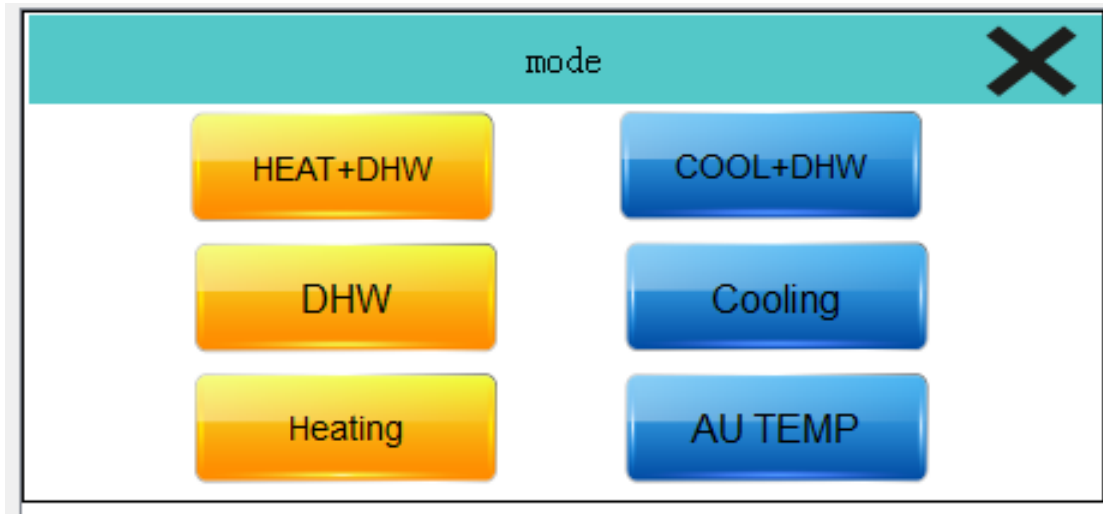
Once you Click **“Settings> Administrator”** from the home page, you need to enter the password for Change User Level “2222” to enter the “P” parameters setting page as shown below. Refer to “P” parameter section for parameter list. After you press “Ent” you will now be able to access the P parameters.



Item		Value
P00	Power-down recovery function	0.0 >
P01	Single/Three phase selection	0
P02	Power frequency	0
P03	Heat source selection	0.0 >
P04	Heating temperature control method	0
		1/23

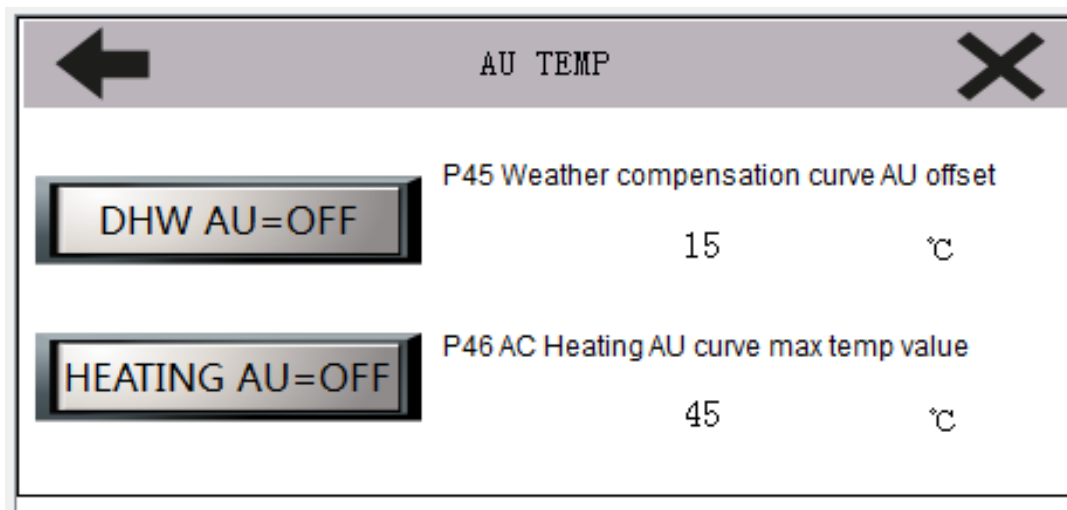
Mode

Click “Mode” at homepage, you will enter mode selection page. To select the desired mode, press the corresponding button.



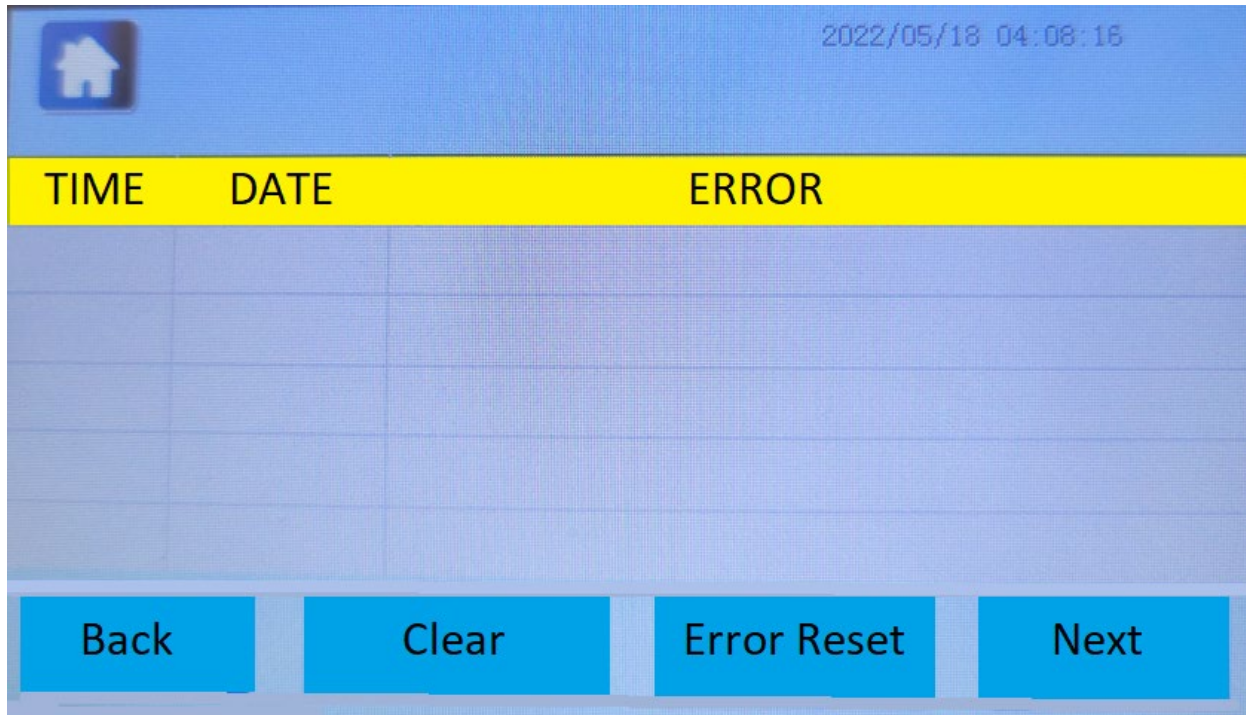
There are 5 standard modes available with DHW enabled, plus an AU Setting.

Auto Heating Target Curve Function



For HEATING AU configuration see
<https://www.chiltrix.com/dynamic-heat-reset/>

Error Log

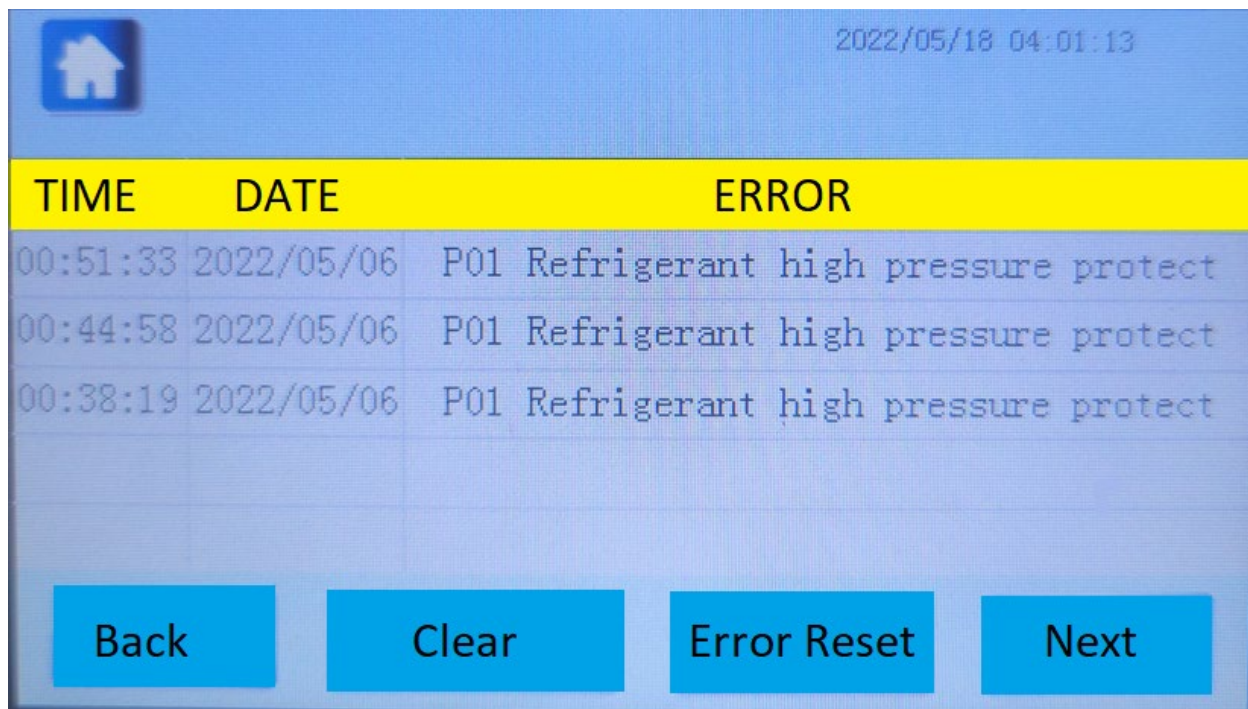


2022/05/18 04:08:16

TIME	DATE	ERROR

Back Clear Error Reset Next

Error Log above shown with no errors

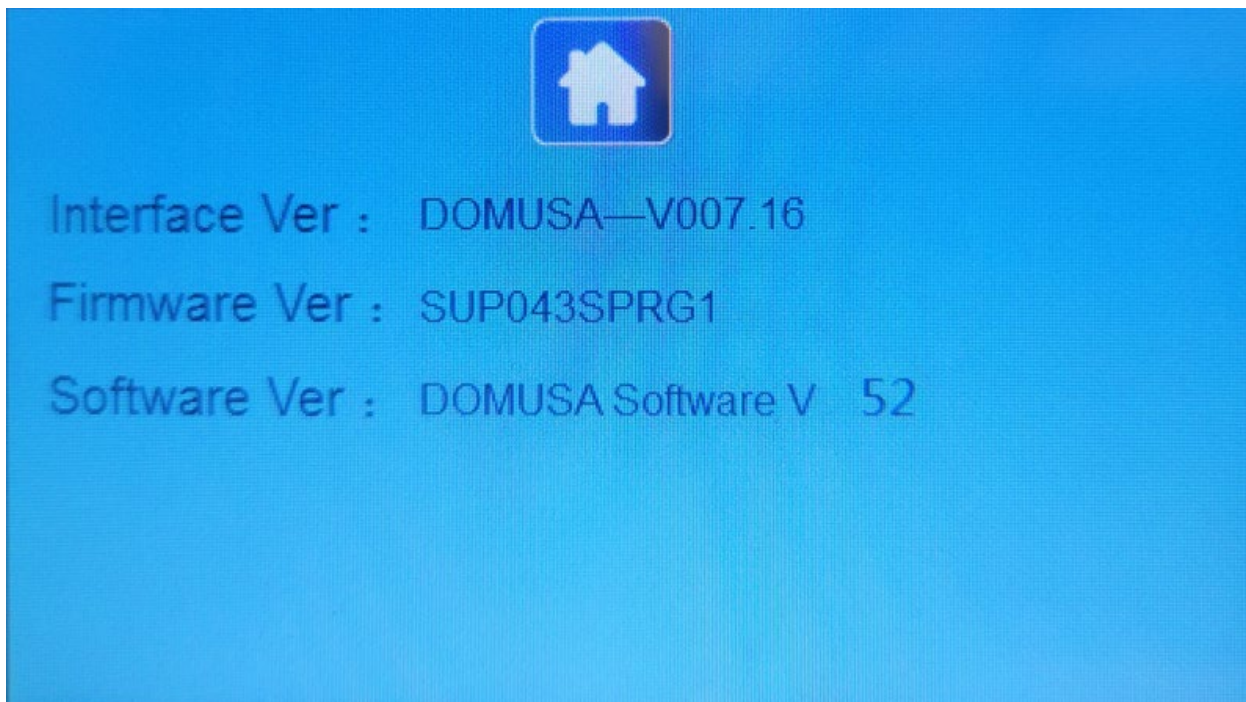


2022/05/18 04:01:13

TIME	DATE	ERROR
00:51:33	2022/05/06	P01 Refrigerant high pressure protect
00:44:58	2022/05/06	P01 Refrigerant high pressure protect
00:38:19	2022/05/06	P01 Refrigerant high pressure protect

Back Clear Error Reset Next

Error Log above shown with sample errors



Software Versions

The following pages contain the (LCD) C-Parameters, P-Parameters, and Error Codes.

To access the C-Parameters (read only), touch the “STATUS” button from the desktop.

To access the P-Parameters touch the “SETTINGS” button from the desk top.

To access the Error Codes touch the “ERROR” button from the desktop.

Suggested/supported Settings:

Space cooling: 53F (note, this implies a leaving temperature of 44F)

Space heating: For Chiltrix supplied AHU/FCU 96F (Note this implies a 105F leaving temperature. Max recommended temp 111F (120F leaving temperature))

DHW: Max 120F

Note that all heat pumps including Chiltrix will have higher capacity and better efficiency when you limit the temperature targets to no more than the minimum that is needed.

P- Parameters

P00	Power-down recovery function	0: off; 1: on	1
P01	Single / three phase selection	0: Single-phase power supply Three-phase power supply	0
P02	Power frequency	5: 50HZ; 6: 60HZ	1
P03	Heat source selection	0: Geo; 1: Air source	1
P04	Heating temperature control method	0: Method 1; 1: Method 2	0
P05	Defrost method selection	0: Method 1; 1: Method 2	0
P06	FREECOOLING validation	0: valid; 1: invalid	1
P07	Frequency control method	0: Method 1; 1: Method 2	0
P08	DHW validation (Note: only for software ver 109 and greater) A is a hard error. B means it will automatically reset the P18 error after 2 Parameter P18 minutes. It will reset 2 times with a soft error and then on the 3rd time it will hard error out.	0= valid, normal 1= invalid 2 2A= valid, with escape function, with E1 3 2B= valid, with escape function, with E1 4 3A=valid, with escape function, no E1 5 3B=valid, with escape function, no E1 6 4=valid, Direct Tank, with E1 7 5A= valid, Direct Tank, with escape function, with E1 8 5B= valid, Direct Tank, with escape function, with E1 9 6A=valid, Direct Tank, with escape function, no E1 10 6B=valid, Direct Tank, with escape function, no E1	1
P09	AC Heating Validation	0: valid; 1: invalid	0
P10	AC Cooling Validation	0: valid; 1: invalid	0
P11	DHW hot water temp hysteresis	2 ~ 15°C, minus hysteresis	2°C
P12	AC temp hysteresis	2 ~ 15°C, minus hysteresis	2°C
P15*	Comp Disabled for DHW below this ambient Temp (Note: only for software ver 108.1 and greater)	"-30-60°C"	2°C
P17*	Electric heater E1/DHW start delay minutes (Note: only for software ver 109 and greater)	0-180	10
P18*	DHW Mode Operating time (Note: only for software ver 109 and greater)	"10-180minutes" If using escape function, if the dhw temp is not reached within this amount of minutes then a p18 error is triggered.	180
P19	During Defrost, E2 Disable Temp (Note: only for software ver 109.10 and greater)	While in defrost, the unit will not allow E2 unless the water temp gets below this setting.	0 C
P23*	C4 PWM Pump Control Method (Note: only for software ver 108.1 and greater)	0: Normal 1: SS Pump	0
P24	Start Au Outdoor Temp	-10~20	5
P25	Start Au Min_Temp	20~45	20
P26	Ramp Au	1~5	4
P27	Max speed of compressor %	55~100%	100%
P30	fan motor Category	0: AC Fan; 1: EC Fan1 2:EC Fan2	1

P- Parameters

P31	Maximum speed of the fan	1-10 (10=100%)	10
P32	DC fan Heat Speed Control Temp Difference	2 ~ 15°C	4
P33	DC fan Cool Speed Control Temp Difference	5 ~ 18°C	6
P34	Reserved	0: Method 1; 1: Method 2	0
P35	defrost starting temp	-5~5°C	-1°C
P36	defrost interval time multiple rate	0: Not defrost; 1; 2; 3; 4: (intervalX4)	1
P37	The first defrost interval	15~99minute (1st interval after repower on)	50
P38	defrost exist temp	10~35°C	30°C
P39	Start Defrost air-coil difference	0-40°C	8
P40	Electric heater (E2) start delay minute	5-30min	10
P41	SSR Ramp Up rate	1-20min	5
P42*	Automatic heating temperature (Note: software ver 108.1 and lower default to 0)	0-23°C	15

P-Parameters

P43*	Automatic cooling temperature (Note: software ver 108.1 and lower default to 0)	0~29°C	23
P45	Allowed defrost coil temperature	-20~5°C	-4
P47	hot water frequency limitation	4~10= max frequency 40~100%	10
P48	AC heating AU mode highest temp	30~50°C	45°C
P49	AC Heating AU mode offset temperature	-10~10°C	0°C
P50	solenoid valve function parameters	0: G3 is seasonal valve; 1: G3 is solar valve; 2: G3=Pool heating valve	0
P51	Manual speed of the c4 water pump (Note: ONLY software ver 109.1 and greater will allow you to do this.)	0-11: 0-10 is 0-100% of the pump speed and 11 is automatic.	11
P52	water pump working mode	0(Not stop)、 1.stop after reach target temp、 2 (start 1 minute after each stop 15 minutes)	0
P53	EC Water pump C4 Minimum speed	20-80%	40
P54	C5 Water pump type selection	0: AC Water pump; 1:EC water pump	0
P55	DHW e-heater activated ambient temp	"-20~50°C"	0°C
P56*	Electric heating function (Note: only software ver 109.1 and greater allow for setting "1B")	0 SSR 1 2nd heat source without C4 Pump 1B 2nd heat source with C4 Pump 2 Invalid	0
P57	AC e-heater activated ambient temp	-20~20°C	0°C
P58*	Ambient temp to disable comp (Note: ONLY software ver 108.1 and greater will allow you to do this.)	-30~15°C	-15°C
P59	AC anti-freezing temperature	-15~5°C	3°C
P60	Virus killing interval days	7~99 day	7day
P61	Start virus killing time	1~24 hour	1
P62	Virus killing holding time	5~360 Min	10
P63	Target temperature of virus killing	55~80°C	65°C
P64	AC water flow switch type selection	0: Normal Water flow switch; 1: Water flow volume meter sensor 2:DN50 water flow sensor 3: New flow sensor SEN-HZG1WA	1
P65	AC minimum water flow	3-80L/m	cx40: 8 cx65: 14
P68	Free Cooling Start Air temp	-16~20°C	5°C
P69	Free Cooling Temp Difference	3~15°C	5°C
P71	Cooling Maximum set temperature	15~35°C	25°C
P72	Heating maximum set temperature	25~55°C	55°C
P73	DHW The highest set temperature	25~60°C	60°C
P74	Debugging fixed operating frequency	10~100 HZ	50HZ
P75	run setting frequency	0: Manual frequency; 1: Auto frequency	1
P76	EEV manually open degree (heating)	70~480	200

P-Parameters

P77	EEV manually open degree (cooling)	70~480	250
P78	EEV control mode	0—No; 1—tabel list; 2—manually; 3—automatically	1
P79	target overheat degree (heating)	-5~10°C	1°C
P80	target overheat degree (cooling)	-5~10°C	1°C
P81	night mode validation	0 (not start) 、 1 (start)	0
P82	night mode starting point	0-23 (for relative time)	22
P83	night mode ending point	0-23 (for relative time)	6
P87	Model selection	0~255	3
P94	Whether to use high and low pressure transmitter	0 Disabled; 1 Used	1
P95	temperature difference to control C4 water pump speed	2~8	5
P96	EEV min open degree		70
P97	Forced Sterilization	0,normal;1,forced;(Automatic recovery of 0 after execution)	0
P98	Reset Factory Parameter	0 normal; 1 Recovery (automatically reset 0 after one execution)	0
P99	Compressor manufacturer 2		101
P100	Virus killing function validation	P100=0 Invaidd; 1 valid	0
P101	EEV Max manual open	300-500 default:430	480
P102	Defrosting EEV manual open		350
P103	AC electric heater Power W	0-99999w default:5500	5500
P104*	C or F degree (Note: only software version 108.1 and greater default to F)	0:C degree; 1:F degree	1: F
P105	Heat recovery function validation	0:Invalid; 1:valid	
P106	AC heater rated voltage	0-500V	220
P107	AC heater transfer coefficient	100-600WF	500
P108	AC Voltage compensation		0
P109	Cooling Inlet Target temp range	P109=0:10~25C. P109=1:5~25C(Must use glycol that will not freeze at -15C).	0
P110	AC heating minimum frequency	30~50hz	30hz
P111	DIN6 DIN7 switch		Disable
P112*	Automatic Switch Over Mode (Note: only software ver 108.1 and greater have two buttons for cooling and heating)	Cooling Disabled:Heating Disabled	Both Disabled

P-Parameters

P113	Weather E1/E2 is valid (Note: ONLY software ver 109.9 and greater will allow you to do this.)	Red = Disabled. Yellow= Enabled	Disabled
P114	DHC The maximum set humidity in the room (Note: ONLY software ver 109.9 and greater will allow you to do this.)	0-100%	0
P115	DHW Maximum indoor set Temperature (Note: ONLY software ver 109.9 and greater will allow you to do this.)	10-32°C	0°C
P116	DHC ref defaults to target temp (Note: ONLY software ver 109.9 and greater will allow you to do this.)	10-21°C	0°C
P117	DHC ref maximum target temp (Note: ONLY software ver 109.9 and greater will allow you to do this.)	10-24°C	0°C
P118	DHC ref min target temp (Note: ONLY software ver 109.9 and greater will allow you to do this.)	4-12°C	0°C
P119	Whether DHC function is effective (Note: ONLY software ver 109.9 and greater will allow you to do this.)	On/Off	DHC OFF
P120	Local Modbus Address (A3B3)	1~99	1
P121	Modbus Address (A0B0)	1~8	1
P122	Room Temperature Sensor Failure Enable	0: invalid, 1: valid	0
P123	C4 Operating Speed after NNSH Activation	10~100	40
P124	NNSH - Number of Slave Units	1~8	1



C Parameters

C00	Coil Temp	-30~97°C
C01	compressor discharge temp	-30~128°C
C02	ambient temp	-30~97°C
C03	Suction temperature	-30~97°C
C04	Plate heat exchanger inlet temperature	-30~97°C
C05	AC outlet water temp	-30~97°C
C06	Solar temperature	-30~97°C
C09	Compressor current value(Tested by main PCB)	0.00~30.00A(show P4 if C09>16A)
C10	High pressure value	0.00~50.00bar
C11	Low pressure value	0.00~26.00bar
C12	Water Source side water flow volume	NA
C13	Usage side water flow volume	0~100L/m
C14	Low pressure check meter temp	-40~150
C15	High pressure check meter temp	-40~150
C16	Defrost status	1 (on) ; 0 (off)
C17	Anti-freeze Status	1 (on) ; 0 (off)
C18	Sterilization Status	1 (on) ; 0 (off)
C19	E1 Status	1 (on) ; 0 (off)
C20	E2 Status	1 (on) ; 0 (off)
C21	A3B3 Modbus Role Selection (X08)	0 Modbus Slave; 1 Modbus master
C22	high pressure switch status	1 (on) ; 0 (off)
C23	low pressure switch status	1 (on) ; 0 (off)
C24	second high pressure switch status	1 (on) ; 0 (off)
C25	inner water flow switch	1 (on) ; 0 (off)
C27	Compressor Frequency	Show actual frequency
C28	Thermal Switch Status	1 (on) ; 0 (off)
C29	outdoor fan motor	1 (on) ; 0 (off)
C30	electrical valve 1	1: run; 0: stop
C31	electrical valve 2	1: run; 0: stop
C32	electrical valve 3	1: run; 0: stop
C33	electrical valve 4	1: run; 0: stop
C34	C4water pump	1: run; 0: stop
C35	C5water pump	1: run; 0: stop
C36	C6water pump	1: run; 0: stop
C37	The accumulative days after last virus killing	0-99 (from the last complete sterilization to the present cumulative number of days)
C38	Compressor Model	0-500
C39	Expansion valve 1 opening degree	0~500
C40	Expansion valve 2 opening degree	0~500
C41	Expansion valve 3 opening degree	0~500

C Parameters

C42	Heating Method 2 target temperature	-30~97°C
C43	Running returning lubrication oil function.	1: On; 0: Off
C44	fan type	0: AC fan; 1: EC fan
C45	EC fan motor 1 speed	0~3000
C46	EC fan motor 2 speed	0~3000
C47	Manual Speed of the c4 water pump	0-11
C48	water pump1 speed	10~100 (100 means 100%)
C49	water pump2 speed	10~100 (100 means 100%)
C50	Inductor AC Current value	0~50A
C51	Driver working status value	Hexadecimal values
C52	Compressor shut down Code	Hexadecimal values
C53	Driver allowed highest frequency	30-120Hz
C54	Reduce frequency temperature setting	55~200°C
C55	input AC Voltage value	0~550V
C56	input AC current value	0~50A (IPM Check, if C56>18A, show F5)
C57	Compressor phase current value(Compressor U,V,W wire DC current)	0~50A (IPM Check, show F4 on error)
C58	Bus line voltage	0~750V
C59	Fan shutdown Code	Hexadecimal values
C60	IPM temp	55~200°C
C61	Compressor total running time	0~65000 hour
C62	Ac Assistant heater compensation power (V18)	0~65000W
C63	din6 AC heating mode switch	0=OPEN; 1=CLOSE.
C64	din7 AC cooling mode switch	0=OPEN; 1=CLOSE.
C65	Target temperature of air conditioning heating	0~60°C
C66	Target temperature of DHW	20~70°C
C67	Target temperature of air conditioning cooling	5~60°C
C68	Indoor temperature (P119 must be 1)	-30~97°C
C69	Indoor humidity (P119 must be 1)	0-100%
C70	Indoor dew point temperature (P119 must be 1)	-30~97°C

C Parameters

C71	Unit Address (0=Master, Others=Slave)	0~8
C72	Activate NNSH function on this device	0, off 1. on
C73	Defrosting is prohibited on this machine	0
C74	Activate NNSH function for other devices	0, off 1. on

Error Codes

Description	Error Code
Compressor discharge high temp protection	E1
Outdoor air temp sensor error	E2
Outer coil pipe temp sensor error	E3
Pipe returned gas sensor error	E4
indoor refrigerant pipe temp sensor error	E5
Coil high temp protection	E6
solar water temp sensor error	E7
AC inlet water temp sensor error	E8
AC outlet water temp sensor error	E9
DHW temp sensor error	E10
Indoor ambient sensor error	E11
water source inlet water temp sensor error	E12
water source outlet temp sensor	E13
system anti freeze twice	E14
DHW anti freeze twice	E15
discharge Probe error	E16
AC system antifreeze twice	E17
high pressure protection	P1
low pressure protection	P2
compressor overheat protection	P3
over current protection	P4
indoor unit water flow error	P5
outdoor water flow error	P6

Error Codes

Description	Error Code
miss phase	P7
wrong phase	P8
communication error	P9
water source anti freeze	P10
water source water flow not enough	P11
Control board and inverter communication fault	P13
Inlet and Outlet water temp difference is too big	P14
Current limitation error	P15
DHW Temp Sensor Position	P17
DHW mode operation timeout	P18
High Pressure Sensor Fault	P19
Low Pressure Sensor Fault	P20
Voltage protection	F1
IMP Fault	F2
Compressor Drive Fault	F3
Compressor over current protection	F4
IPM overheat	F6
PFC Fault	F7
DC Bus Overvoltage	F8
DC Bus Undervoltage	F9
AC Input Over Voltage	F10
AC input current protection(AC current of compressor+fan motor+water pump, checked by IPM)	F11
Temperature sensor Fault	F12
DSP and mainboard communication Fault	F13
EC fan 1 Fault	F14
EC fan 2 Fault	F15
Temperature and Humidity sensor error	F16

Dynamic Outdoor Reset Control (AU of HEAT)

The Chiltrix heat pump unit is equipped with an automatic outdoor reset function that can be accessed via the onboard controller.

Advantages & Misconceptions of Using Outdoor Reset

Most people in the radiant heating industry will tell you that outdoor reset is used to get more BTU delivery from the radiant system on a day when the radiant system can't deliver enough BTUs to keep up with the load, and they use outdoor reset to crank up the radiant heat operating temperature to 120F, or higher. While that's true, it's also true that the best designed air to water radiant systems will be able to deliver what's needed at a fairly low temperature even with severe outdoor design conditions.

So if you can't get enough radiant capacity into the floor, then if possible, add some to the walls or ceiling. Note that radiant heat works just as well from the ceiling or walls as it does from a floor. And in some cases, it works better from the ceiling.

Why does keeping the operating temperature low matter so much?

With a fossil fuel burning boiler, it doesn't matter. Gas, propane, and oil efficiency does not vary with outdoor temperature. But that's not the case with a heat pump.

Here's why:

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

For a real-world example, at 0F outdoor temperature, an air to water heat pump such as the cx40 will have >20% higher capacity when used with an operating temperature of 95F compared to operating at 122F. And COP at 95F will be >30% higher at 95F than at 122F.

So why use outdoor reset?

You can use reset when it is simply not possible to design the indoor side of a system to handle the peak BTU load using a low operating temperature. **But the best use of reset is as a strategy for extra energy savings**, by designing the indoor side of the system to handle the peak load at the lowest possible operating temperature, **and then letting the system automatically reset to an even lower and even more efficient temperature at times when weather is milder!**

How to Use Chiltrix Dynamic Outdoor Reset Control

Use With or Without V18-B Backup Heat

Use the free Excel curve development worksheet tool to create the proper curve and discover correct parameter settings for P24, P25, P26, P48 and P49. The tool is located at

<https://www.chiltrix.com/dynamic-heat-reset>

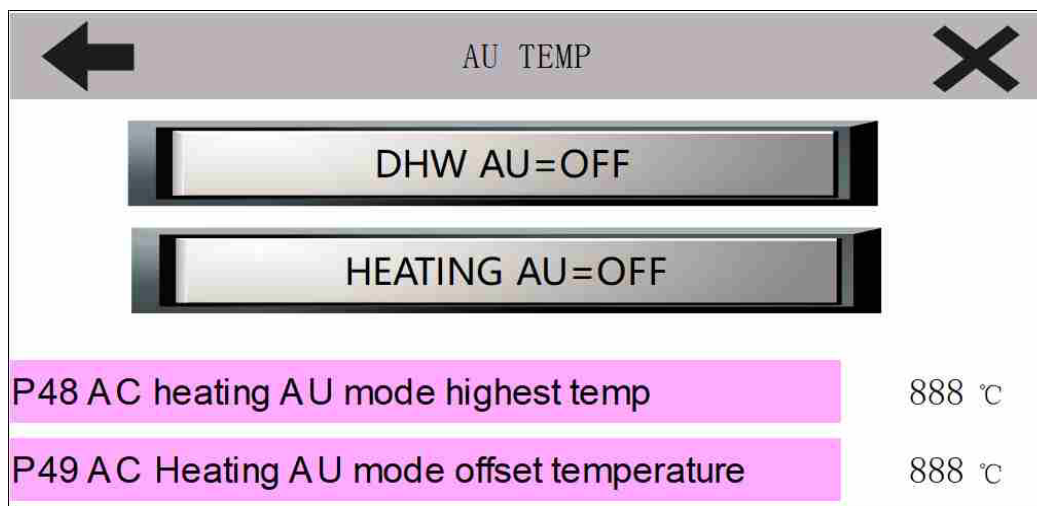
Make sure to select the correct tool for your model.

Set parameter P24, P25, P26, P48 and P49 in cx40 controller according to the values used in your curve worksheet. Use the worksheet to play with the curve you want.

There is an "AU TEMP" icon inside of the mode section of the main screen of the controller. If you press on it then you will enter the AU TEMP mode screen. You will need to enable "HEATING AU" to ON. With AU Heating on, it will be displayed as an orange/red color.

From there you can adjust the "weather compensation curve AU offset" and the "AC Heating AU curve max temp value". The "AU" will also be illuminated on the main screen around the heat mode.

DO NOT USE DHW AU



How to Use Automatic Switch-Over

This is an on-board function and does not require a separate add-on controller to operate. This function allows the cx to automatically select its mode, either heating, cooling, or standby (off), according to outdoor temperature. This can be particularly useful for example, if a single cx40 is shared by two different tenants, allowing the property manager to (automatically) select the mode according to the actual outdoor weather conditions.

There is a minimum of 4C (7.2F) deadband built-in so as to limit daily switching. A suggested setting would be to run in heating mode when outdoor temperature is 60F or below, use cooling when outdoor temperature is 69F or above, and between 60-69 the system will be in standby (off) mode.

If your cx40 unit is used with a Psychrologix controller, please make sure the Psychrologix auto-switchover function is disabled and only use the on-board automatic switchover function. Or, vice-versa. Only one method of external control can be used on the same system. Likewise, this function cannot be used on either controller if you are using C-H-COM remote relay mode control.

To use this function, follow these 6 steps:

1. Make sure that C-H-Com are NOT being used. The jumpers that are supplied should remain in place as shown on page 36
2. You must enable P112.
3. Note that P42 and P43 temperatures are in C not F.
4. The settings P42 and P43 must be at least 4C different between each other.
5. Result: If outdoor air drops below P42 the system will switch to heating.
6. If outdoor temperature rises above P43 the system will switch to cooling.
7. P112 must be enabled on both heating and cooling to operate auto switch over.

Dynamic Humidity Control

The indoor humidity sensor should be located in central location using the same placement logic as when locating a central thermostat. In a 2-floor building, location at the top of the stairwell is suggested.

Starting with software 109.9 there is an option to have dynamic humidity control inside the conditioned space. This is the same type of DHC control as defined by the Psychrologix. Read about the Psychrologix DHC function here <https://www.chiltrix.com/documents/Chiltrix-Psychrologix-TS.pdf>

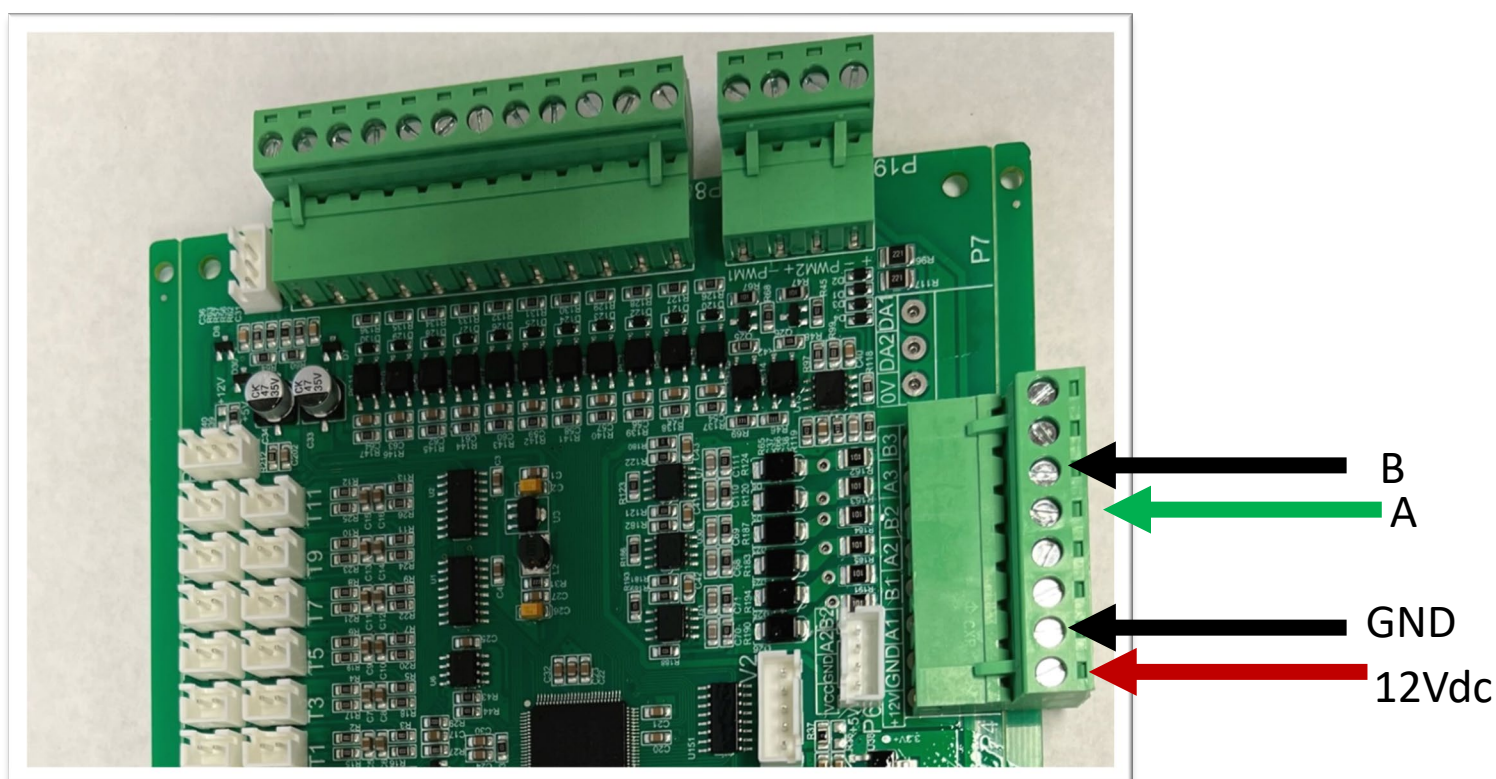
Connecting the humidity sensor: The humidity sensor has 4 wires which will connect to the main logic board as shown below.

Humidity sensor B will connect to terminal P4 slot B2.

Humidity sensor A will connect to terminal P4 slot A2

Humidity sensor + will connect to terminal P4 slot +12V

Humidity sensor - will connect to terminal P4 slot GND



Dynamic Humidity Control



12vdc
GND A B

Location of the sensor: indoors, centrally located, using the logic as when locating a normal thermostat. For example not under a vent or in direct sunlight. In a 2-story home we suggest location at top of stairway.

In order to use DHC you will need to enable the following parameters and set it the desired valued (or use defaults).

P114 = 55%– this is the maximum allowed humidity as read from the sensor before the cx unit will start to lower its temperature to remove humidity.

P115 =27– this is the maximum allowed temperature read from the sensor before the cx unit will start to lower its temperature to improve sensible cooling.

P116=– this is the default target water temp that the cx unit will return to when it is not actively trying to control the temperature or humidity.

P117- this is the maximum allowed target (return) water temperature.

P118- this is the minimum allowed target (return) water temperature.

P119- this will allow or disallow DHC, if this is red then none of the settings listed above mater.

Status Parameters related to DHC:

C67 - Target temperature of air conditioning cooling

C68 - Indoor temperature, P119 must be set to 1 to read this.

C69 - Indoor humidity, P119 must be set to 1 to read this.

C70 - Indoor dew point temperature, P119 must be set to 1 to read this.

Commissioning **“To Be Performed In Heating Mode Only”**

An as-built design will need to be provided to Chiltrix by email before the commissioning call.

Set up your Wifi connection:

<https://www.chiltrix.com/documents/Chiltrix-WIFI-Instructions.pdf>

For Commissioning please arrange a commissioning call with Chiltrix Support Dept. +1 757-410-8640 Ext. 112

PLEASE MAKE SURE TO CALL CHILTRIX BEFORE COMMISSIONING

Preparation

After finishing the installation tasks, please check the items below:

1. Check the Wired Controller P Parameters for the most updated settings.
2. Check that the power cable is securely connected and the screws are tight.
3. Is the display lit on the wired controller after the power is applied?
4. Verify that all the shut off valves and manual valves are open.
5. Complete all air purging and verify proper water pressure.
6. Verify Wye filter is installed.
7. Insulate all water supply and return pipes.
8. Test only in **heating mode** to verify proper water flow.

Water or Glycol Filling & Purging (See page 39) A 10% minimum glycol mixture is required to protect the unit and provide corrosion inhibition regardless of your outdoor climate or location. Refer to the chart on page 18.

To avoid damaging the heat pump in cooling mode you must use at least 10% glycol and water mixture. If ambient temperatures can ever drop below 32F in your area you must also adjust with additional glycol as appropriate for your area. We recommend biodegradable non-toxic HSE Corn Glycol, but any Propylene Glycol (PG) can be used.

Running a Test- Call tech support if this is your first time commissioning a cx40.

Apply power to the cx40 and select **heating mode** using the wired controller. If there is not enough flow in the system or air in the lines and you will get P5 and possibly P1 errors. Call tech support if any error codes are displayed on the wired controller.

Chiltrix Tech Support hours of operation, M-F, 9 am-6 pm EST, 757-410-8640 x112

PLEASE DON'T PLAN TO BEGIN A NEW COMMISSIONING CALL AFTER 5 PM EASTERN TIME

MOST IMPORTANT!

Initial test should be done in **heating mode**. Failure to do so may damage the heat exchanger and will not be covered under warranty.

Extending Wires

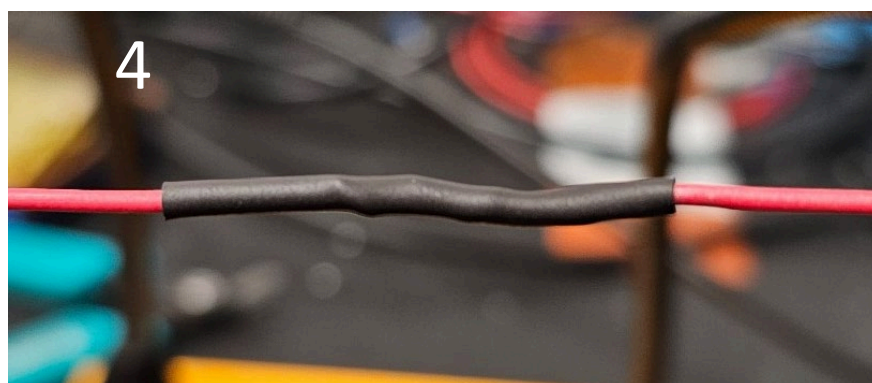
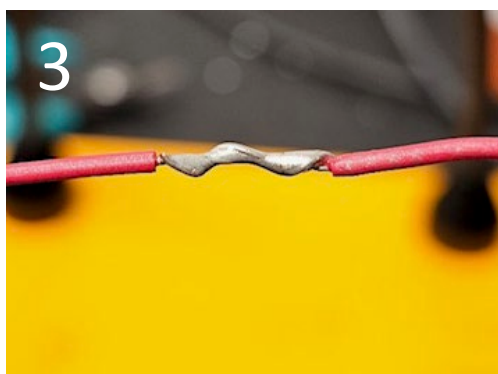
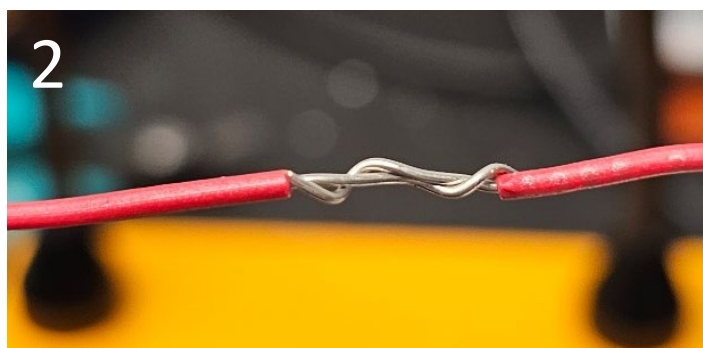
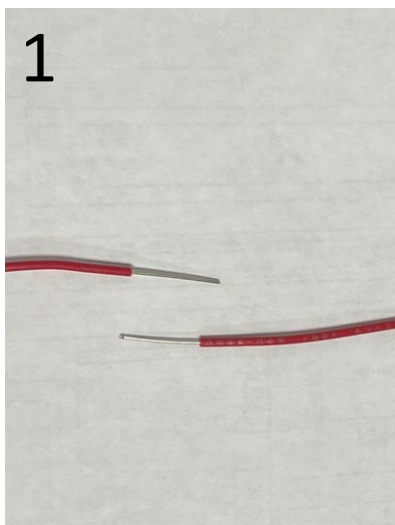
If you need to extend any of the sensor wires, control wires, MODBUS wires, please follow the instructions below as the wires are very sensitive to resistance and EMF.

Cut and strip the wire ends (1) that you wish to extend.

Twist the wires together (2) and then solder the wires (3) to create a good connection. Then cover the exposed solder and wire with heat shrink (4) and make sure you have a solid connection.

DO NOT use crimp style butt connectors, the small gauge wire tends to get cut when you crimp down on the connector.

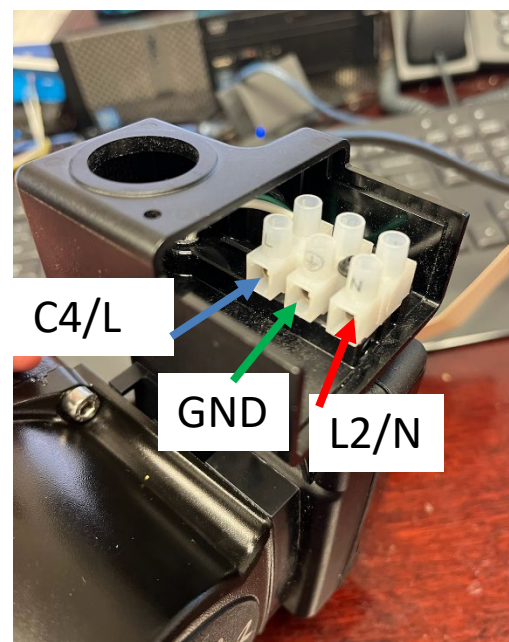
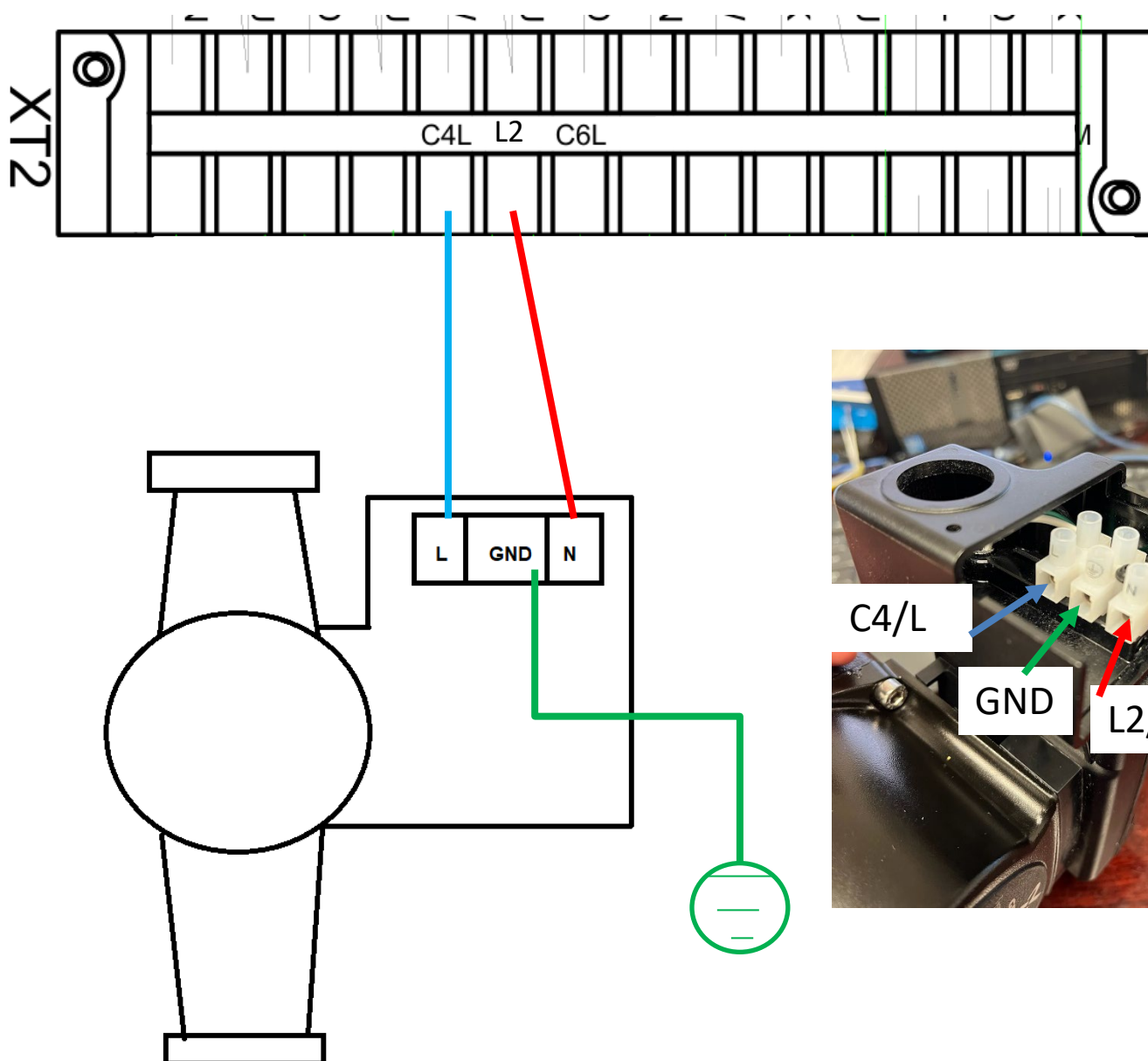
For extending Psychrologix cable, make sure to follow the twisted pair twist pattern.



DO NOT Run the modbus, temp sensor, dhw sensor, controller wires, or any logger wires in the same conduit as high voltage wires (120VAC or more). This will impede the accuracy and will cause communication problems. AVOID PASSING CONTROL WIRES NEAR ANY MOTORS OR INDUCTIVE LOADS OR DEVICES THAT EMIT EMF

Some Grundfos pumps will ship with a power cable already attached. Some models you will need to run your own power wire. Wire from the chiller terminal block to the pump should be at least 20 Gauge or larger. The pump draws very low amps. You should also install ferrule crimps on the pump side wires and fork or eyelet connectors on the terminal block side.

Below is a schematic of how to run the power wires from the outdoor logic board to the pump. You will also need to run the control wires as stated earlier. Gnd is common to the ground coming into the unit and chassis ground.



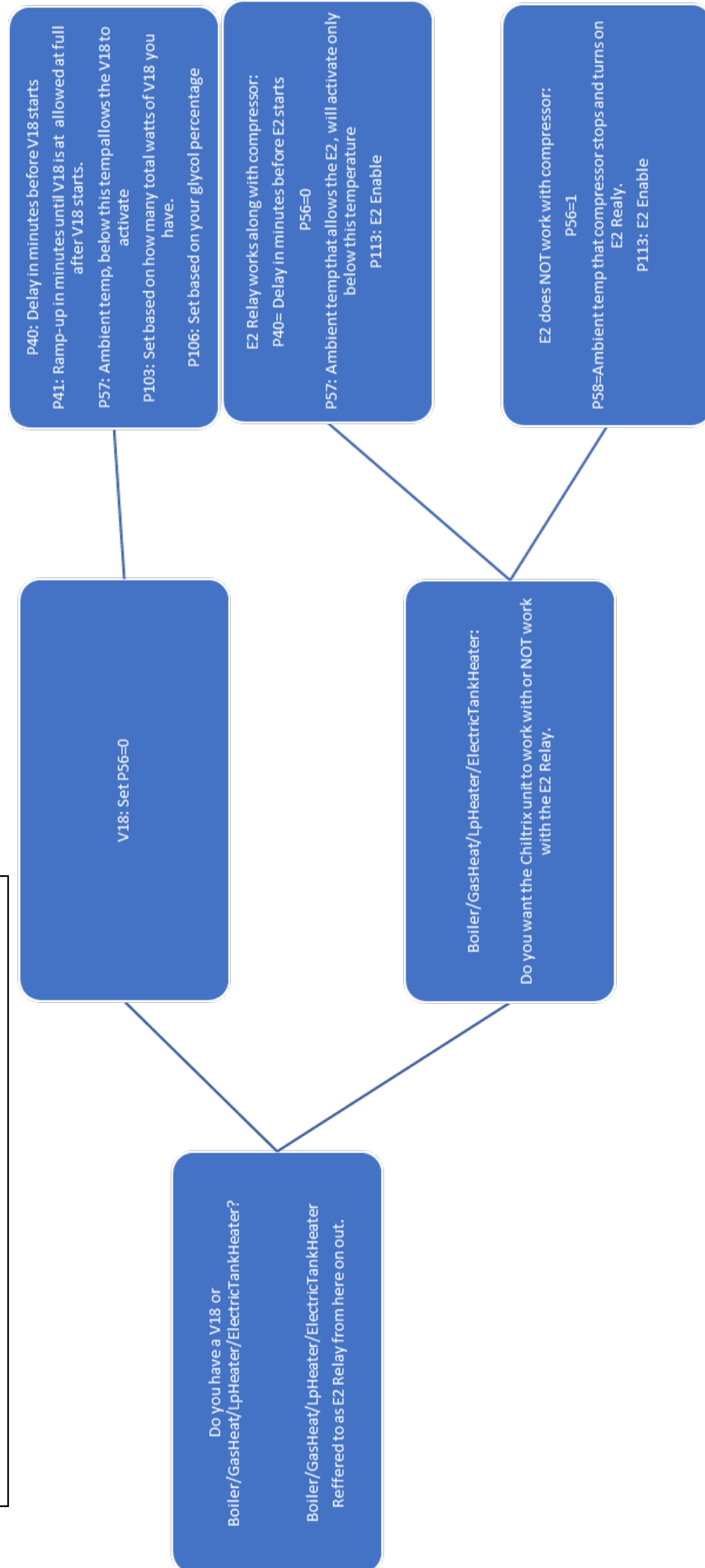
These settings are only available on CX50-2 and cx40 with software version P432s10-V109.10/ HMI version V1.9.6W and greater.

If you are using a prior software version please use the settings from the normal parameter list in the manual.

Note: E2 will come on in defrost if the water temperature inlet or outlet drops below P19 then E2 will come on and the ambient temp is below p57.

E2 will not be allowed to activate if the ambient temp is above P57.

Note: P58 setting will disable the compressor at any point if the ambient temp drops below P58 setting, no matter the setting of P56.

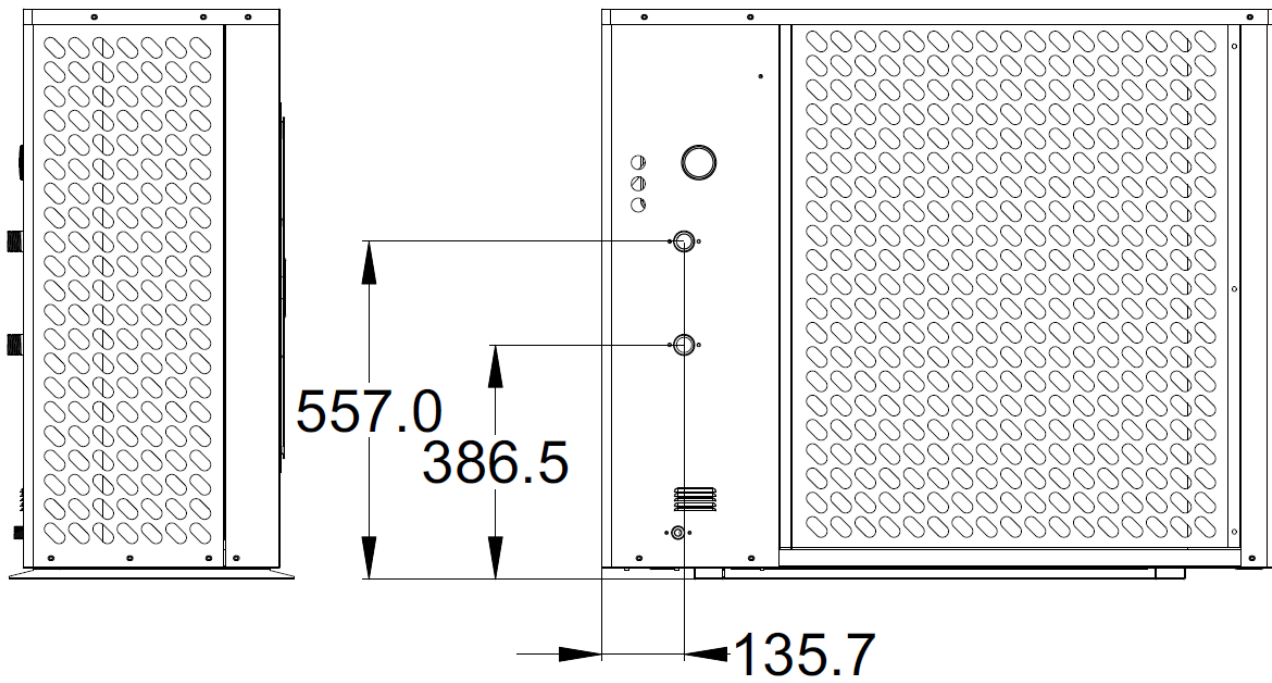


Water Connections

Units below are in mm.

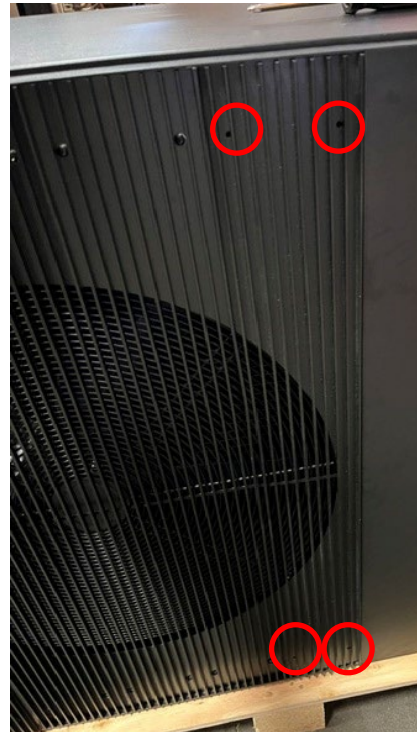
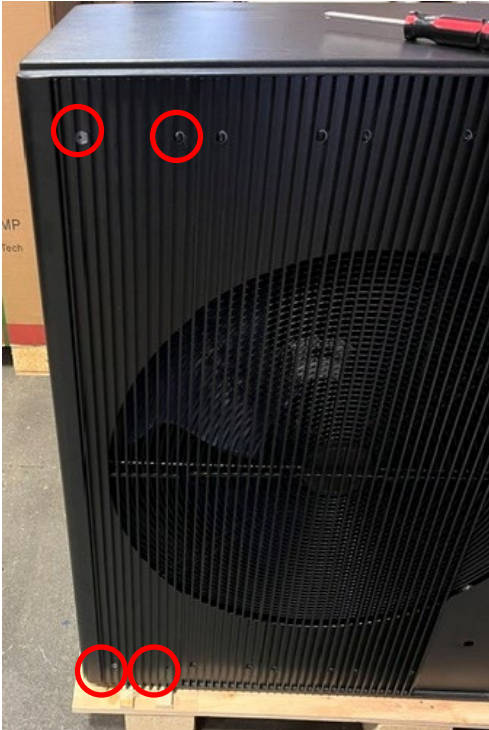
Side of unit

Back of Unit



Removal of front grille and top cover

To remove the top panel on the first generation of the cx40s you must remove the front cover, to remove the front cover you must remove the 8 screws holding the grill on. Circled in red below.



Once you remove the front grills you can remove the front cover. There are 4 screws in the front and then 4 on each side.



Removal of front grille and top cover

Once you remove the 4 screws on the front remove the 4 on each side. Then the front cover will come off and it will look like the picture below. From there you can remove the top cover, remove all of the screws from the top cover to remove it.

It is suggested to cover/protect the front grills and move them to a protected location and not reinstall them until a commissioning is completed. It is a little time wasting if you have to take them off and reinstall a 2nd time.

