

CHEAKAMUS CROSSING NEIGHBOURHOOD DISTRICT ENERGY SYSTEM (DES)

Residential Heating System
Homeowners Quick Reference Guide

Unit:

Address:

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REVISION 1

Homeowners Quick Reference Guide

This Quick Reference Guide is provided by DEC Engineering on behalf of the Resort Municipality of Whistler (RMOW) to help homeowners understand their heat pump heating system and provide answers to frequently asked questions along with troubleshooting tips.

For additional information on maintenance and service procedures, please refer to the Technical Service Guide available online at: www.Whistler.ca/DES, The Technical Service Guide provides additional photos and component descriptions, as well as a recommended service schedule.

Disclaimer

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TYPICAL DES RESIDENTIAL HEATING SYSTEM

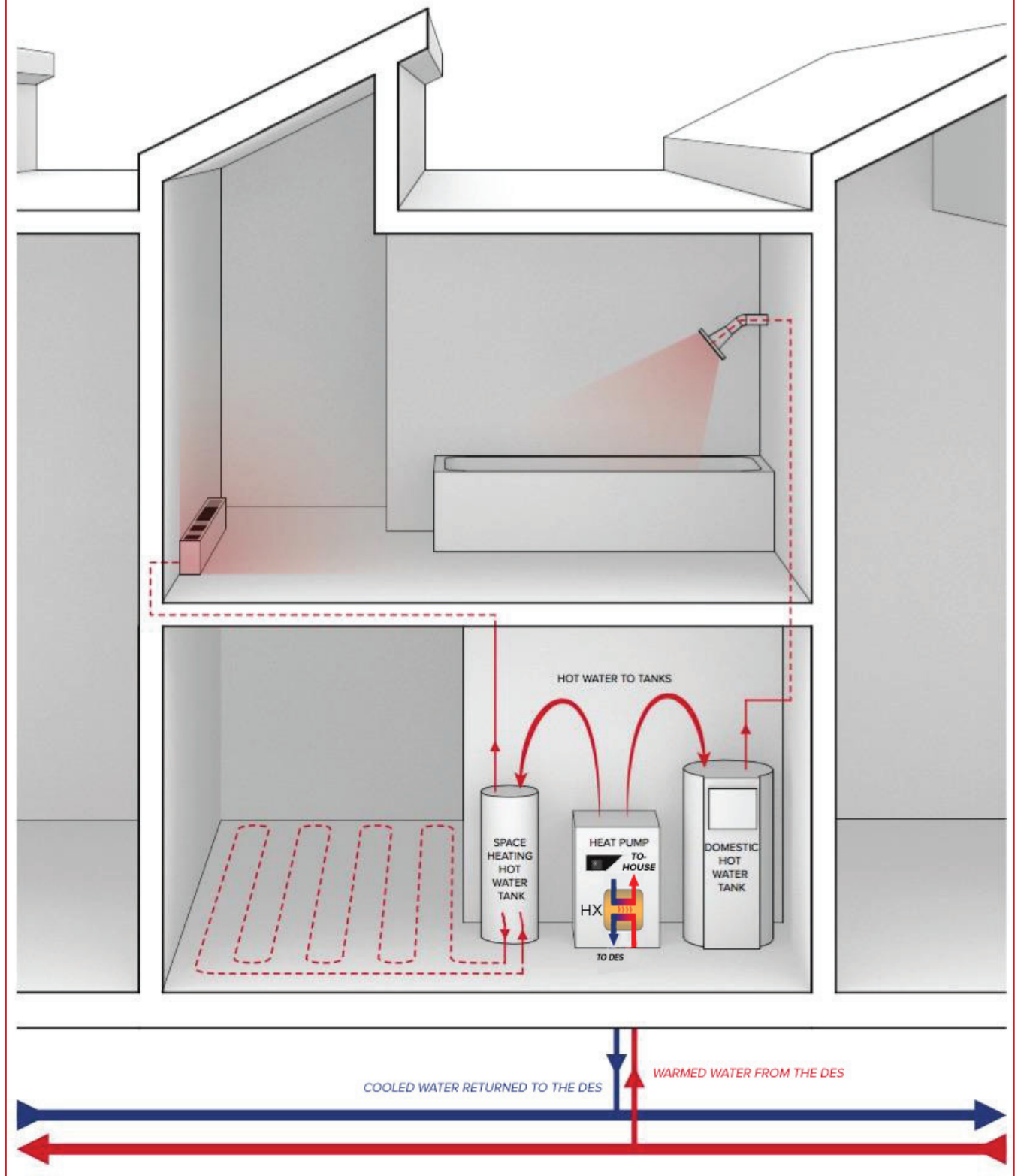


Figure 1. Mechanical Room and Home Heating Equipment

Heating System Overview

Your home heat pump heating system is part of the Cheakamus Crossing neighbourhood District Energy System (DES). This sustainable energy system extracts heat from the clean water leaving the Wastewater Treatment Plant and circulates that heat energy, in the form of tempered water, through a network of buried pipes to a heat exchanger (HX) located at your home. The HX allows the DES heat energy to be transferred to your heat pump without mixing the DES water with your heating system water. Your heat pump then takes this heat energy and elevates its temperature to provide you with comfortable room heating and hot water.

A heat pump is much more efficient than traditional heating systems such as boilers, furnaces, or electric baseboard heaters. While gas furnaces and boilers may be up to 95 per cent efficient and electric baseboards are considered to be 100 per cent efficient, heat pump systems are typically three to four times more efficient.

Your heat pump heating system was designed to use the renewable energy provided by the Cheakamus Crossing neighbourhood DES so that it uses less energy than typical homes with conventional heating systems and hot water tanks.

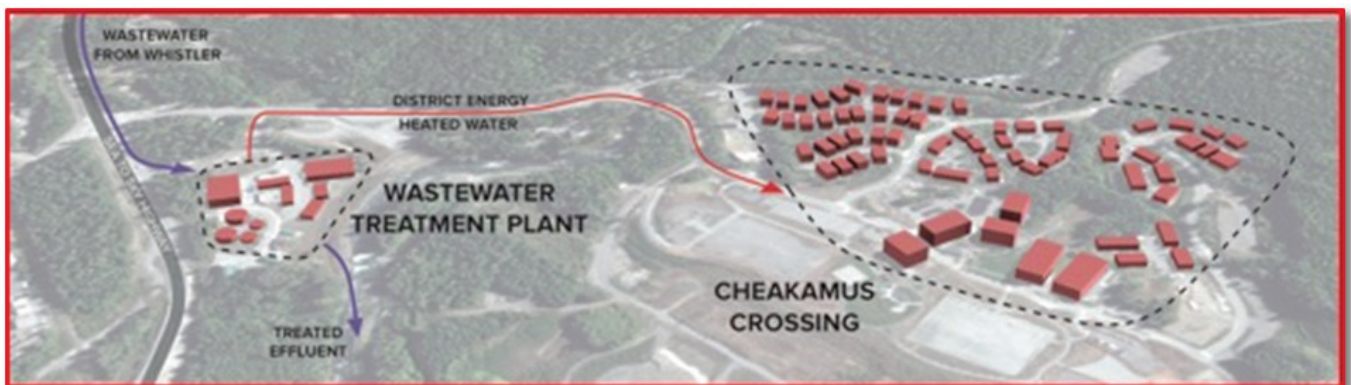


Figure 2. Cheakamus Crossing DES Site Map

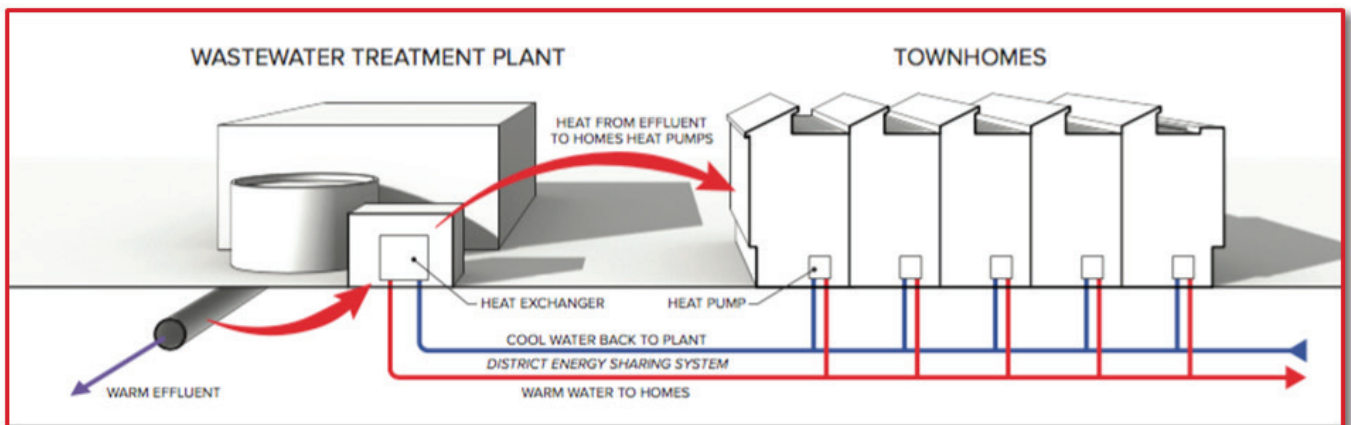


Figure 3. Energy Movement from DES Energy Centre to Homes

Heating System Components Descriptions

Most of the components of your home heating system can be found in the mechanical closet off your garage or in your basement. This equipment should only be serviced or modified by trained service technicians.

2.1 Heat Pump

Your heat pump extracts heating energy from the DES loop and increases the water temperature that heats the rooms in your home and the water in your shower. Much like a refrigerator (which is cold on the inside and warm on the outside), the heat pump uses the same principles to cool the DES water and heat the water in the Domestic Hot Water and Space Heating storage tank.

2.2 DES Control Valve

This valve regulates the flow of DES water into your heat pump.

2.3 Domestic Hot Water (DHW) Tank

This tank stores potable hot water needed for showering, washing, or other uses.

2.4 DHW Heat Exchanger

This heat exchanger contains metal plates that allow the non-potable heating water loop to safely transfer heat to the potable domestic hot water.

2.5 DHW Circulating Pump

This pump circulates the water from the DHW tank to the DHW heat exchanger for heating.

2.6 Heating Water Tank

This is a buffer tank that stores the hot water used for space heating.

2.7 Expansion Tank

This tank contains an air bladder that expands or contracts to absorb pressure changes in the system caused by temperature changes in the heating water.

2.8 Backflow Preventer Devices

Each residential DES system has two backflow devices that require annual testing (CSA standard B64.10 -11 a requirement of the provincial plumbing code) to confirm that they are functioning properly. Backflow is an undesirable reverse of flow of water back into the water supply and Backflow devices prevent this from occurring.



Figure 4. Heat Pump



Figure 5. DHW Heat Exchanger



Figure 6. Backflow Preventer Devices

Frequently Asked Questions

3.1 What is the Cheakamus Crossing District Energy System and how does it provide heating energy for my home?

Your home heat pump system is part of the Cheakamus Crossing District Energy System (DES). The DES recovers usable heating energy from the treated effluent water leaving the Wastewater Treatment Plant. This recovered heating energy is transported to your home in the form of tempered water that is supplied at a minimum of 10°C through a network of buried pipes. In your home's mechanical room, your heat pump then converts this low-temperature energy into the high-temperature heat that keeps your home warm and provides hot water for your faucets. The DES piping network consists of pairs of pipes connecting most buildings in Cheakamus Crossing. The supply pipe carries the warmed water from the DES Energy Centre to your home, while the return pipe returns the cooled water back to the Energy Centre for reheating.

The heat pump in your home operates very efficiently. While traditional electric baseboard heaters are 100 per cent efficient, your heat pump is 300 to 400 per cent efficient and uses only a fraction of the electricity. The majority of the energy heating your home is recovered from within your own community.

3.2 What is a heat pump and how does it work?

A heat pump uses the physics of fluid compression and condensation (also known as the refrigeration cycle) to move heat from low temperature areas to high temperature areas. This is the same principle that makes an air conditioner or refrigerator work. Like an air conditioner running in reverse, the heat pump cools the DES water—pulling out the heat energy—and concentrating that extracted heat energy to heat your home.

3.3 How long should my heat pump last?

Just like many other common home heating systems, a typical residential heat pump should last 10 to 15 years, and may even last much longer, subject to proper care and maintenance.

3.4 Why do I have two hot water tanks?

One tank stores potable hot water for domestic uses such as showers, laundry, and sinks. In Cheakamus Crossing townhomes, the domestic hot water tank typically has a square electrical box on the side and is connected to the heat pump through a heat exchanger (see Figure 5). The other tank is a buffer tank that stores heating water for the infloor radiant system and the fan coils.

3.5 What are the best thermostat settings?

It is recommended that once you find a temperature setting that is comfortable, simply set the thermostat and leave it there. Infloor radiant heating systems are designed to maintain a stable room temperature and therefore work best with minimal thermostat temperature changes. A radiant floor may take several hours to respond to changes in thermostat settings. The same general guideline applies to heat pumps. They work best when maintaining a constant temperature. Your heating system is less likely to activate its auxiliary electric heater(s) if increases in thermostat settings are gradual, such as only 1°C or 2°C. Turn down the thermostat only in unoccupied rooms or for absences that may exceed several days.



Figure 7. Tekmar 537 Thermostat

To maximize the efficiency of your system, avoid turning up multiple thermostats at the same time—doing this may engage the auxiliary electric heaters that are less efficient than your heat pump. Similarly, avoid turning up the thermostat and immediately taking a shower – your heat pump is designed to prioritize the heating of domestic hot water and may subsequently engage the auxiliary electric heaters to try and satisfy the simultaneous demand to increase the space heating.

3.6 How should I maintain my fan coils?

Fan coils rely on moving air through the unit to provide heat. Dust and lint can build up inside over time but a gentle vacuuming every three to four months will quickly remove most of it. If you have active furry pets consider vacuuming more frequently. Remove the air filter cover panel (see Figure 7) for access to vacuum.

The fan coils also have a washable air filter which can be removed for cleaning (see Figure 7). Simply remove and wash the filter in a mild solution of dish soap and water. Rinse well, remove as much of the excess water as you can and then reinstall the air filter.

Also, make sure to keep your fan coil speed control (black rotary knob on the left side of the unit) turned up at least 40 per cent to ensure the fan will turn on when the unit heats up.

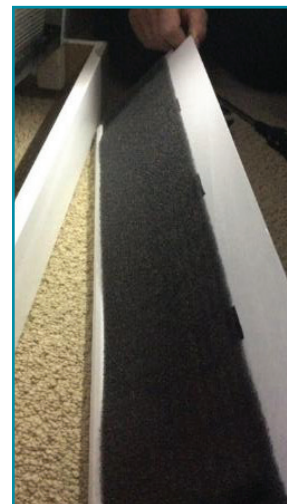


Figure 8. Washable Air Filter

3.7 What are the best settings for my heating system when I Go away on vacation?

Be sure to leave your thermostats set high enough to keep pipes from freezing. Reducing thermostat settings by 3 to 4°C for extended absences while traveling can help to save energy.

3.8 Should I upgrade my thermostat?

The thermostat that was selected for installation with your heating system was specifically chosen to enable the heating system to work efficiently and interface correctly with the heating system controller. If your thermostat requires repair or replacement, contact a qualified service provider.

3.9 How often should I have my heating system professionally serviced?

Bi-annual service visits completed by a qualified technician are recommended to maintain your heat pump in good operating condition and prolong the life of your unit. DEC Engineering also recommends that service technicians follow the detailed servicing guidelines in the Residential Heating System - Technical Service Guide available at www.whistler.ca/DES.

3.10 How do I find a qualified service contractor?

An updated list of qualified service contractors will be provided the RMOW website. Navigate to www.whistler.ca/DES for more information and a list of Qualified Service Providers.

Troubleshooting Tips

4.1 One room is cold

If other rooms are warm but one room is not, check the thermostat setting for that room and turn it up if necessary. If the radiator, fan coil, or floor in that room still is not getting warm but the other areas are, call your service technician.

4.2 Entire house is cold and the heating system will not start

Check the mechanical room where your heat pump is installed and note any unusual conditions such as odd noises, water leaks, or heat pump powered off.

- If there is no evidence of power to your heat pump, check your electric breaker panel to see if the breaker for the heat pump has been tripped. If you find that it has, before attempting to reset the breaker, turn down all room thermostats to avoid any immediate heating demands on the heat pump, then reset the breaker and wait several minutes to see if the heat pump will restart.
- If the breaker immediately trips off again that could indicate a serious electrical problem. For your safety, **DO NOT attempt to reset the breaker again**. Immediately call a qualified service technician or an electrician to investigate and correct any issues that may pose a safety concern.
- If the heat pump restarts, allow it to run and stabilize for approximately 15 minutes before turning up any room thermostat. After 15 minutes, return all of your room thermostats to the desired room temperature.
- If the same breaker should regularly trip, please contact your qualified service technician to investigate.
- If your heat pump has power but is not operating, check the display screen and note any messages or fault codes that are displayed. Contact your service technician and relay this information. It will assist in diagnosing the problem and determining the best corrective action.
- If you see signs of water leaking, contact your service technician and report the location of the water leak.
- If you hear odd noises, try to determine the source. If you can determine the source, carefully check for any evidence of excessive heat where the noise is originating. **USE CAUTION - hot surfaces can cause painful burns.**

Contact your service technician and report your findings. This will assist in diagnosing the problem and determining the best corrective action.

4.3 No hot water at the faucets

The ClimateMaster heat pump can operate in either space heating or domestic water heating mode. By design, domestic water heating has priority over space heating. Check the “Hot Water” and “Hot Water Setpoint” values on your heat pump display screen. The “Hot Water Setpoint” should be 52°C and the “Hot Water” temperature should be within a few degrees of this setpoint temperature. If it is not, proceed to the following steps or contact your service technician.

- Check your electrical breaker panel to see if any breaker associated with your heating system has been tripped. If you find any, try resetting them and see if that corrects the problem. If any

breaker immediately trips after resetting, **for your safety DO NOT attempt to reset the breaker again.** Immediately contact your service technician or an electrician to ensure there are no electrical safety concerns.

- The heat pump transfers heat to the potable hot water tank through a heat exchanger (see Figure 5). Carefully check the heat exchanger. It should be warm or hot. **USE CAUTION - hot surfaces can cause painful burns.**
- If the heat exchanger is cold, that indicates that heat from the heat pump is not being circulated or transferred to the heat exchanger.
- If the heat exchanger is warm or hot, carefully check the pipes connecting the heat exchanger to the hot water tank. If one or both of these connecting pipes are cold, that indicates that the circulating pump between the heat exchanger and the hot water tank has stopped working.
- Check for a noisy circulating pump. This indicates an internal component of the pump has failed or is failing. It will need to be either repaired or replaced by a qualified service technician.
- Check for closed valves on the water lines coming to and leaving the tank. All valves should be in the open position for normal operation.

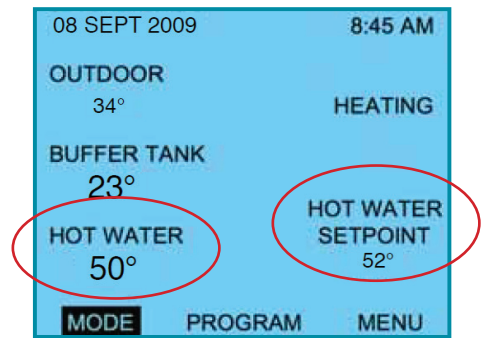


Figure 9. Example Heat Pump Display Screen

4.4 Heat pump panel is displaying a warning/fault code (e.g., red screen)

Note whether the system was in “Heating” or “Hot Water” mode when the error occurred. Pressing the reset button may restart your system. If red screens or other faults are frequent, try to keep a log of what they are and provide this information to a qualified service technician. Your observations will assist the technician in diagnosing the problem and determining the best corrective action.

4.5 There was a power outage while I was away on vacation

This should not cause any problems for your heating system. The heat pump should automatically restart after power is restored. The system may wait up to 80 seconds after power is restored before the compressor starts.

In case the heat pump does not restart automatically, follow the breaker resetting procedure noted above in Section 4.2 through Section 4.6 of the troubleshooting section.

4.6 My recent electricity utility bill is much higher than the previous one

Higher than normal electricity bills can be an indication that the auxiliary electric heating elements in your heating system are being activated more than they should.

- This can be triggered by large and frequent changes in thermostat settings. Heat pumps are designed to gradually provide heat and work best accommodating minor changes, e.g., 1°C or 2°C in room thermostats. If a thermostat setting is increased too quickly, the heat pump may be unable to satisfy the heating demand quickly enough and the auxiliary electric heating elements will be automatically activated to compensate.

NOTE: Refer to Section 3.5 for the best thermostat settings recommendations.

- Any time the heat pump is unable to satisfy a demand for heating—either from the room thermostats or from the hot water tank thermostat—the heating system is designed to automatically activate the auxiliary electric heating elements to try and compensate. This will also happen if a malfunction or a fault condition causes the heat pump to shut down.

NOTE: In some systems, auxiliary hot water elements must be enabled by a manual switch on the side of the hot water tank (See Figure 8). The manual switch is typical of most installations, however not all systems will have a manual switch option.

Example only.

Switch style and location may vary.
Not all systems have the manual switch option.

**Domestic hot water
manual backup switch**

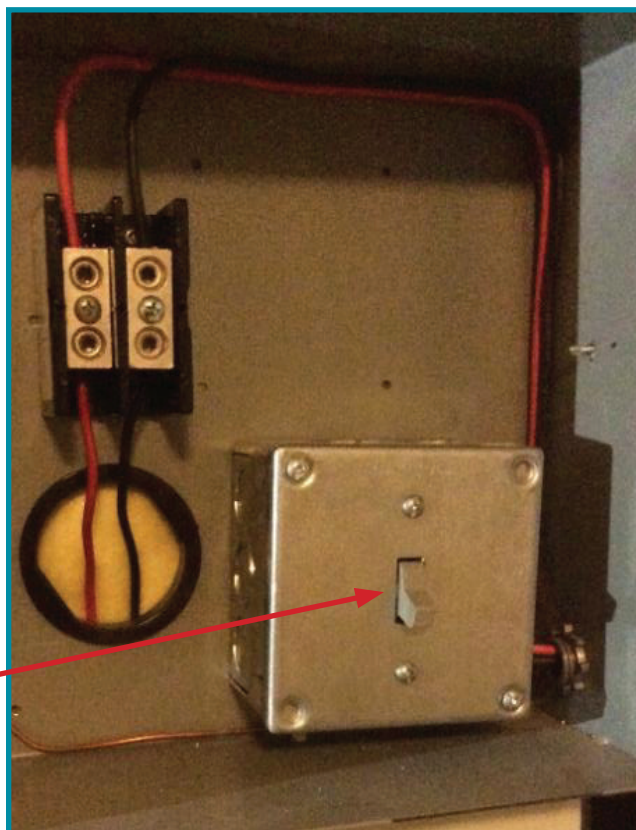


Figure 10. DHW Backup Heater Enable Switch

The thermostat settings on the auxiliary electric tank elements may require adjustment. These thermostats should be at least 4°C and up to 15°C lower than the heat pump temperature setpoint. The key purpose for keeping the DHW return temperature at least 4°C below the HP temp set point is to reduce the risk of a high pressure fault in the HP that can lead to red screens and shut down. The water is returning to the HP to be reheated. If the temperature of the returning water is too high, the HP will still attempt to add more heat. The HP adds heat by running its compressor to compress or pressurize the refrigerant; the higher the returning DHW temperature is, the higher the pressure the compressor has to achieve. If the pressure exceeds the HP's operating limit it will shut itself down to prevent internal damage; a red screen and a high pressure fault will result. Note: If the DHW auxiliary manual back up is not turned on the returning DHW set-point is not applicable.

Contact a qualified service technician to check these setpoints as part of your regular heat pump maintenance program. For further information please refer to the Technical Services Guide available at www.whistler.ca/DES

Notes

