BC NPHA

Operator Training Manual

Variable Refigerant Flow

source: https://canadacoolandheat.com/

How To Use This Guide

This guide is designed to make sure that when your Variable Refrigerant Flow (VRF) System installation is complete, you have all the information you need to operate and maintain it effectively and confidently.

It includes references and checklists you can use directly, as well as items you should request from your contractor before the project is finished. The checklist below shows everything covered in this guide:

- ☑ Items already included here
- ☐ Items you'll need to ask your contractor for

Contents

	Item	Notes/Description	Status
1. Equipment Overview			
1.1	Description	A brief explanation of how the system works	☑
1.2	How It Works	A high-level overview of system operation *General overview has been provided, but model specific details should be provided by the contractor during your training session or handoff process.*	☐
1.3	Labeled Diagram	A labeled diagram of the system and its primary components *A general diagram is provided here; ask your contractor for a model-specific version.*	☐
1.4	Key Benefits and Limitations	Key benefits and limitations of the system	☑
1.5	System Operation	A summary of operating limits, recommended setpoints, back-up heating considerations and seasonal mode switchover recommendations *These should be provided to occupants to improve efficiency and ensure comfort.*	☑
2. Commissioning and Project Handoff			
2.1	Equipment Spec Sheets	Equipment specification sheets (spec sheets) or manuals for each piece of equipment – Including make, model and serial number	☐
2.1	Equipment O&M Manuals	These provide details on how to operate and maintain the equipment	☐
2.2	Key Contacts List	A list of all key people to contact for questions, issues, warranty etc.	☐
2.3	Warranty Details	Warranty terms and expiry date	☐
2.4	Commissioning Report	The completed record showing the results of commissioning tests. It provides proof that the systems work.	☐
2.5	Training Session	This is not always done as part of a project handoff and likely needs to be requested *A sample training agenda is provided for reference.*	☐
2.6	Simplified User Guide	Simplified version of the information found in the equipment manuals *This is not standard and will need to be specifically requested. It can be an output of the training session.*	☐
2.7	Maintenance Requirements	This consists of a maintenance schedule and a troubleshooting guide *General examples for both documents have been provided, but the contractor should provide model specific details in the handoff documentation.*	☐
-	Digital Copies	Digital copies (USB / shared folder) of all above	☐

1. Equipment Overview

1.1. Description

A VRF (Variable Refrigerant Flow) or VRV (Variable Refrigerant Volume) system is essentially a larger, more flexible version of a split heat pump. Instead of one outdoor unit connected to one or a few indoor units, a VRF system connects one or more outdoor units to many indoor units through refrigerant piping. Each indoor unit can be controlled separately, so occupants can set their own comfort levels in their space.

The “variable” part of VRF refers to the outdoor unit’s ability to adjust the flow of refrigerant to each indoor unit depending on how much heating or cooling that room needs. This makes the system more efficient and allows it to handle many spaces at once.

The biggest difference from a standard split system is scale and flexibility; VRF systems can handle many spaces at the same time, and models with heat recovery can even do heating in one room while cooling another.

1.2. How It Works

A VRF system works much like a split heat pump, but on a larger scale. The outdoor unit contains the compressor, which moves heat between the outside air and the building through refrigerant piping. Inside, the units are essentially fans with refrigerant coils that connect back to the outdoor unit to deliver heating or cooling directly to each room or suite. Each occupant can control the temperature in their own space using a wall thermostat or remote control.

But wait, how does it MOVE heat?

The heat pump uses a refrigerant with a boiling point that is roughly -50°C. This means that the refrigerant liquid absorbs heat from outside air, converting it to a gas even in cold winter conditions. Because heat always flows from warm to cold, the refrigerant absorbs that heat, the system then compresses the refrigerant gas, making it very hot (hotter than the inside temperature), which is then ‘pumped’ to the indoor units through piping, and fans transfer the heat from the hot coil to the room.

Glossary of Terms

Branch Selector Boxes - The VRF branch selector box manages flow of the refrigerant, directing refrigerant flow to the indoor units and outdoor unit as required.

Capacity (BTU / Tons) - A measure of how much heating or cooling the system can provide.

Cold Climate Heat Pump (ccASHP) – A specially designed heat pump that maintains high efficiency and heating capacity in very cold outdoor temperatures (down to about –20 °C or lower).

Condensate Drain / Pan - The pipe and tray that carry away water produced during cooling. If blocked, water can drip inside.

Coefficient of Performance (COP) - A measure of efficiency — how much heating or cooling is delivered per unit of electricity. Higher is better.

Fan Coil (Indoor Unit) - The indoor part of the system that delivers conditioned air to a room or zone.

Heat Recovery VRF - A VRF system that can heat some areas and cool others at the same time by reusing heat energy.

Louvers / Diffusers - Adjustable fins or vents on the indoor unit that direct airflow.

Mode (Heating / Cooling / Auto) - The operating setting of the system. In 2-pipe VRF, the whole system runs in one mode at a time; in heat recovery VRF, zones can run differently.

Refrigerant - The fluid that moves heat between the indoor and outdoor units. VRF systems use refrigerant piping instead of ductwork.

Variable Refrigerant Flow (VRF) System – an advanced HVAC technology that uses one or several outdoor units to service multiple indoor units, modulating the flow of refrigerant to each zone for individual temperature control with high efficiency and comfort.

Variable Refrigerant Volume (VRV) - VRV means the same thing as VRF. The term VRV was first used by Daikin, the company that developed the technology, while other manufacturers use the term VRF. Both refer to the same type of system and work in the same way.

Zone – An area or room in the building controlled by its own indoor unit, allowing different spaces to have different temperature settings.

It's not creating heat — it's just moving and concentrating the heat that's already in the air. Think of it like a sponge soaking up even small amounts of water and squeezing them out somewhere else. That's why a heat pump can still work in sub-zero temperatures: there's always at least a little heat in the air to capture.

1.2.1. Standard VRF

A standard heat pump VRF system works like a bigger version of a split system. The outdoor unit sends refrigerant through two pipes to all indoor units.

This design in simpler, easier to install, and usually less costly, but it means all indoor units must operate in the same mode at the same time — either all heating or all cooling.

Controlling the Mode: There are typically two ways the system's heating/cooling mode is decided:

- **Manual Switch (Recommended):** A physical switch or central control allows building staff to manually select heating or cooling based on the season. This setup gives better comfort and control, since operators can plan the changeover for the entire building and prevent individual units from affecting others.
- **First Unit Dictates the Mode:** In this configuration, the first thermostat that turns on decides the mode for the entire system. For example, if the first occupant to wake up in a sunny apartment turns on cooling, the rest of the building is locked into cooling — even if most other residents need heating. This approach can cause comfort problems and is **not recommended** for multi-unit or shared buildings.

1.2.2. Heat Recovery VRF

A heat recovery VRF allows some indoor units to heat while others cool, at the same time, by transferring heat between different spaces. For example, the heat removed from a sunny apartment that needs cooling can be reused to warm a shaded apartment that needs heating.

This makes the system more efficient and flexible, especially in mixed-use or larger buildings, but it is more complex and comes with higher installation costs.

There are two main ways to achieve heat recovery in a VRF system detailed below.

Three-Pipe Design:

- Uses three separate refrigerant pipes (heating, cooling and return)
- Well-established design, straightforward to understand, but requires more copper piping and higher installation cost.

Two-Pipe with Branch Controller:

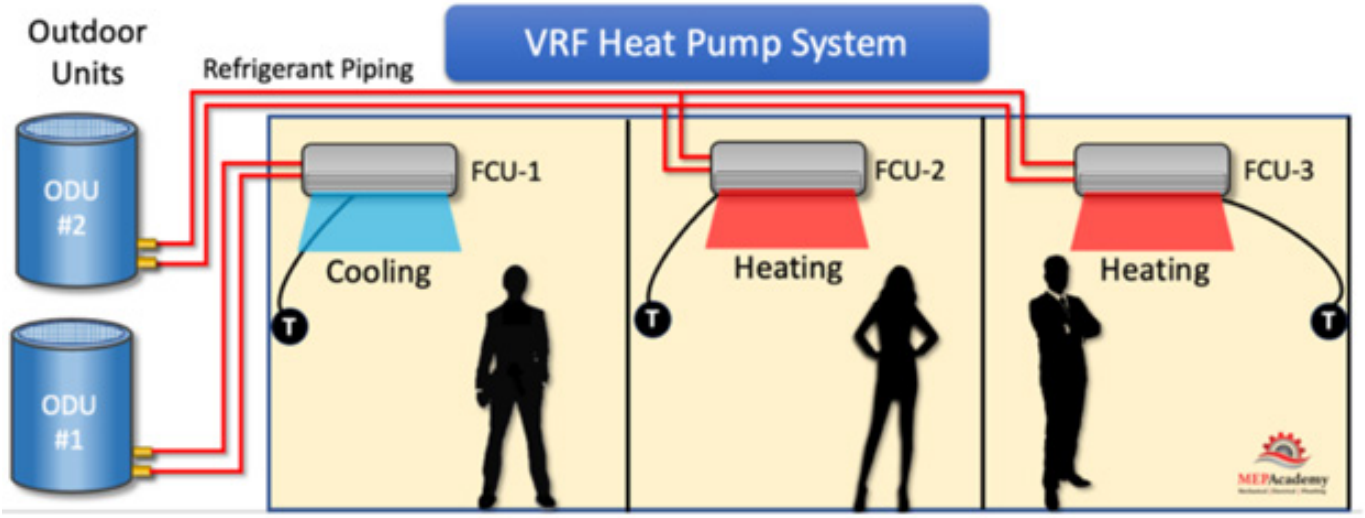
- Uses only two main refrigerant pipes.
- A **branch controller (or selector box)** inside the building directs refrigerant flow so some units can heat while others cool.

The two-pipe system reduces piping runs and material costs but adds complexity since the branch box requires power and maintenance.

1.3. Labeled Diagram

1.3.1. Standard VRF

This diagram shows a two-pipe, non heat recovery VRF system. In the example below, there are two separate VRF systems, each with its own outdoor unit (ODU #1 and #2) connected to several indoor fan coil units (FCUs). While different VRF systems can operate in different modes, all the indoor units connected to the same outdoor unit must run in the same mode — either all heating or all cooling.

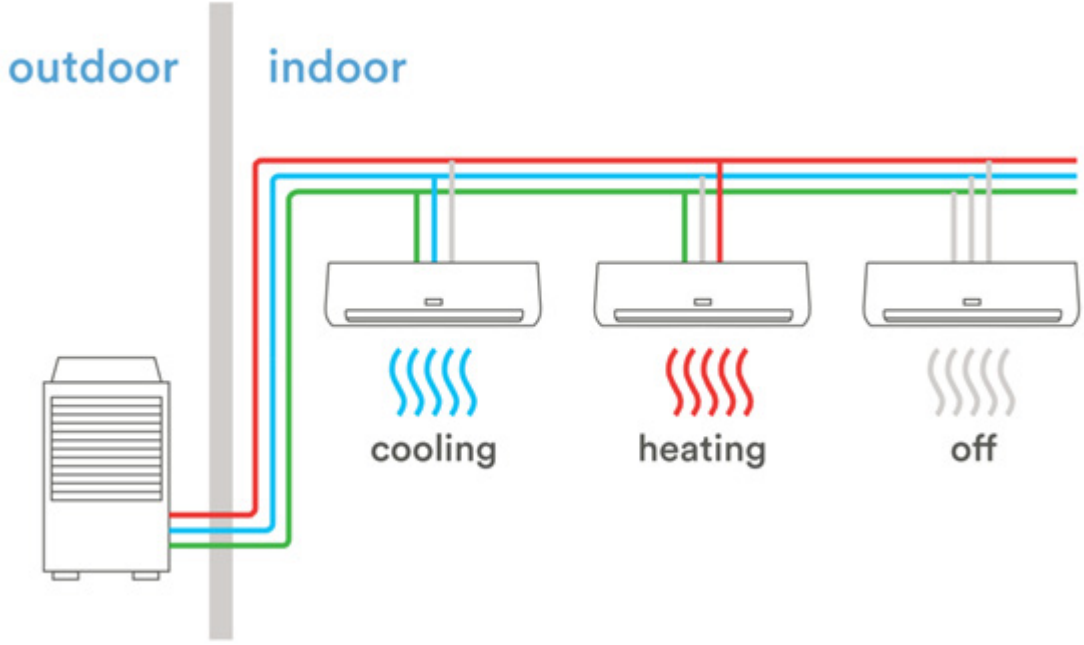


source: https://mepacademy.com/vrf-heat-recovery-vs-vrf-heat-pump/

1.3.2. Heat Recovery VRF

1.3.2.1. Three Pipe Design

In a three-pipe VRF heat recovery system, each indoor unit is connected to the outdoor unit by three refrigerant lines: one carrying hot gas for heating, one carrying liquid refrigerant for cooling, and one acting as the common return line.

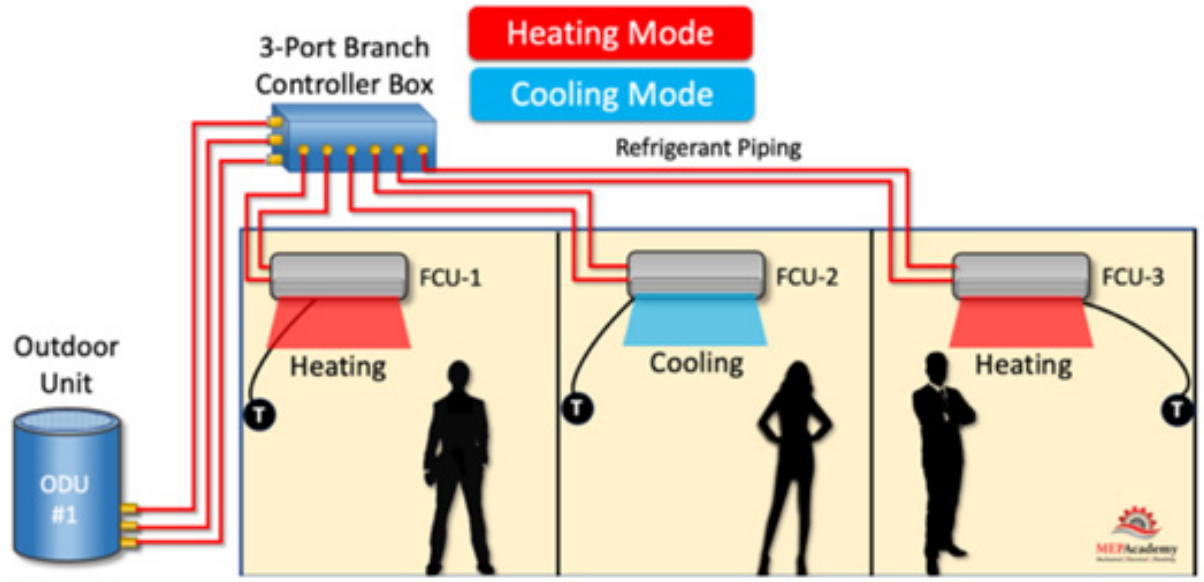


source: https://www.miracleref.com/blog/how-does-a-vrf-system-work/

1.3.2.2. Two Pipe with Branch Controller

In this design, instead of running separate hot and cold refrigerant lines to every indoor unit in the building, the system uses two main refrigerant pipes that connect to a branch controller (also called a selector box). The branch controller acts as a "traffic director" for refrigerant.

The outdoor unit sends both heating and cooling refrigerant to the branch controller, and the controller decides what each indoor unit gets, depending on what that room needs.



source: https://mepacademy.com/vrf-heat-recovery-vs-vrf-heat-pump/

1.3.3. Performance Rating Metrics

Unit	Use	What It Means
COP (Coefficient of Performance)	Heating	Instant measure of heat output per unit of electricity. (COP 3 = 3 units of heat out for every 1 unit of electricity in) *Most used for heating performance of VRFs.*
Efficiency (%)	Heating	COP shown as a percentage (COP 3 = 300%).
HSPF (Heating Seasonal Performance Factor)	Heating	Average heating efficiency over an entire heating season (main rating for heat pumps in heating).
EER (Energy Efficiency Ratio)	Cooling	Cooling efficiency at one fixed condition (like a snapshot test). It measures the full load under high temperature conditions.
SEER (Seasonal Energy Efficiency Ratio	Cooling	Measures the average cooling efficiency over an entire season. SEER tends to be higher than EER because it includes part load operation (which is more efficient). *Typically used for smaller residential or light commercial systems (Range from Low SEER of 12 to High of 23).*
IEER (Integrated Energy Efficiency Ratio)	Cooling	Measures cooling efficiency at four part-load conditions (100%, 75%, 50%, 25%) with weighting to reflect typical building operation. *Primarily used for commercial systems like VRFs and rooftop units, since they operate at part load most of the time.*

1.4. Key Benefits and Limitations

1.4.1. Benefits

- **Energy Efficient:** VRF systems use inverter-driven compressors that adjust their speed up or down instead of simply turning on and off. Combined with variable refrigerant flow that matches the exact heating or cooling demand, this allows the system to run more efficiently and use less energy.
- **Zoned Comfort:** Each indoor unit can be independently controlled, providing tailored heating and cooling for different zones within a building. This flexibility improves comfort and reduces wasted energy.
- **Quiet Indoor Operation:** Indoor fan coils are small and quiet, with the louder compressors kept outdoors.
- **Design Flexibility:** Indoor units come in many styles — wall-mounted, ceiling cassettes, ducted, or floor-mounted — making it easy to fit them into almost any building.
- **Year-Round Use:** VRF can both heat and cool, so one system does the job all year. Cold climate VRF systems can provide heating down to -20°C.
- **Heat Recovery Option:** Some VRF systems can heat some rooms while cooling others at the same time, reusing energy that would normally be wasted.

1.4.2. Limitations

- **Higher Upfront Cost:** VRF systems require more upfront investment compared to splits or packaged units, both for equipment and specialized installation. Heat recovery adds even more of a capital cost premium.
- **Installation and Maintenance:** Proper design and installation are critical. Long refrigerant piping runs, branch selectors, and correct sizing must be carefully planned. Ongoing service also requires trained technicians for troubleshooting, leak detection, and refrigerant handling. Refrigerant leaks also have a large environmental impact, so regular maintenance is required to avoid and quickly repair leakage in the system.
- **Exterior Space Needs:** Outdoor VRF units are typically larger and heavier than those for split systems and can require significant roof or ground space. These outdoor units can also be noisy, so it is important to locate them in a place that does not disturb the neighbors.
- **Refrigerant Safety Limits:** VRF systems circulate larger volumes of refrigerant, so building codes set limits on piping length and indoor charge in occupied spaces. Designers must account for these restrictions during system design.
- **Vibration:** Outdoor units located on the roof or mounted to the wall can cause vibration that can be felt inside the building. Depending on the type of building construction, this can be quite annoying for some residents. Care should be taken in selecting the location to minimize this aspect of the unit operation.

1.5. System Operation

1.5.1. Operating Range and Back-Up Heating

VRF systems provide efficient heating and cooling across a wide range of outdoor temperatures. Many modern cold-climate VRF models can operate reliably down to –20 °C (–4 °F).

As outdoor temperatures drop, the heating capacity decreases, and in very cold conditions the system may not fully meet the building's heating needs. In mild climates such as Vancouver, temperatures rarely fall below this range, so a well-designed VRF system should maintain indoor comfort year-round without backup heat.

In more extreme climates, or where a supplemental gas heating system is still available, it may be more economical or practical to use that system during extreme cold or if the VRF cannot keep up with heating demand.

It should be noted that standard VRF systems do not include built-in electric resistance heat. If additional heating is required, it must come from a separate source such as duct heaters, hydronic systems, coils, or electric baseboards.

1.5.2. Defrost Cycle

In cold, damp conditions, frost can build up on the outdoor heat exchanger of a VRF system. When this happens, airflow is restricted, and efficiency drops. To clear the frost, the system automatically enters a defrost cycle, where it temporarily reverses operation to warm the outdoor coil and melt the ice.

- During defrost, indoor heating may pause for several minutes.
- Some systems reduce the impact using heat recovery from other zones.
- Defrost is normal and necessary, but it uses energy without providing heat to the space, so overall efficiency is slightly lower in cold weather.
- Published efficiency ratings do not include defrost, so actual seasonal performance will be slightly lower than the rated value.

1.5.3. Recommended Indoor Temperature Setpoints

For comfort and efficiency, we recommend:

- **Heating:** 19–21 °C (66–70 °F)
- **Cooling:** 22–24 °C (72–75 °F)

1.5.4. Seasonal Heating and Cooling Switchover

For VRF systems that require the entire building to operate in either heating or cooling mode at one time, the mode can be controlled by either a manual switch or by the first unit to turn on (see section 1.2 - How It Works section for more details).

The manual switch option is recommended for better comfort and control, as it allows operators to plan the seasonal changeover for the whole building.

Typical switchover recommendations:

- **Heating mode:** October – April
- **Cooling mode:** May – September

Actual timing may vary depending on the building's design, internal heat gains, and occupant needs.

For heat recovery VRF systems, operators do not need to switch the entire system at once. Each zone can independently call for heating or cooling, and the system automatically balances energy use across the building.

Note: *Systems where the first unit to turn on determines the building mode can lead to occupant discomfort and inconsistent operation. This configuration is* **not recommended** *for multi-unit or shared buildings.*

2. Commissioning and Project Handoff

2.1. Spec Sheets and Manuals

Your contractor should provide a spec sheet and manual for each piece of equipment that's installed. Because manuals often cover several different models, make sure you know the exact make and model of your unit. You can usually find this in the commissioning reports.

While these manuals are helpful, they're often long and hard to follow. That's why it's a good idea to also ask your contractor for a training session and a simplified user guide. These guides are shorter and can be helpful to understand how to operate and take care of your system day-to-day, see section 2.6- Simplified User Guides for examples.

2.2. Key Contact List

Contact Type	Contact When?	Company / Name	Phone / Email
VRF System Manufacturer	For warranty questions or if you need information about the equipment. **Warranty end date: mmddyyyy** **Unit warranty must be registered with the manufacturer*		
Controller or Thermostat Manufacturer	For warranty questions or if you need information about the equipment.		
General Contractor (Installer)	For any questions about the system or if something isn't working within the warranty period (Typically one year after install).		
Service Contractor (If different)	For repairs or issues that come up more after the warranty period.		

2.3. Warranty Details

Make sure you know when warranty expires as well as how to reach the manufacturer if you need to submit a warranty claim.

2.4. Commissioning Report

2.4.1. Overview

When a new VRF is installed, the contractor follows a process to make sure everything is set up and working the way it should. This process involves two key parts:

- **Commissioning Checklist:** A step-by-step list the contractor uses to confirm the system is installed correctly and operating as intended.
- **Commissioning Report:** The completed record showing the results of those checks and tests. It confirms the system works properly, provides key details like model and serial numbers, and documents that the owner/operator has been shown how to use and maintain the system.

While only the **commissioning report** will be provided to you at the end of the project, we've included examples of both the checklist and the report so you can understand the process. If the contractor does not have a clear commissioning checklist, or if the report is unclear, this reference can help you know what types of checks they should be performing and documenting.

2.4.2. Commissioning Checklist Example

Section	What To Check	Why It Matters
Before Start-Up		
Install Details	• Outdoor unit level, secured, and clearances maintained per manufacturer's guidelines. • Refrigerant piping sizes and lengths within design limits; properly supported, brazed, leak-tested. • Ensure indoor units are labeled by zone/suite and mounted level. • Electrical power supply matches unit nameplate.	Ensures proper system performance, longevity, and safety.
Refrigeration Lines Insulation	• All copper refrigerant lines should be insulated with closed foam insulation and covered with aluminum, PVC or other durable cladding to resist UV damage and bird/rodent interference.	Copper piping is a common theft target, and exposed insulation can attract birds that peck or pull it apart for nesting material. Protective jacketing prevents physical damage, insulation degradation, and potential exposure of copper piping.
Condensate	• Inspect indoor unit condensate drain: ensure drain pan is clean, drain line has proper slope, and water flows freely to a safe discharge point without leaks. • Confirm drain lines are inside, insulated, or heat traced to prevent freezing and blockages (if applicable). • Inspect outdoor unit drain path: check that the base pan drain holes are clear, that the unit is installed on a surface where water can drain safely, and that any drain pan heaters (if installed) are connected and functional.	Condensate forms on the indoor unit during cooling and drains through a pan and line, and on the outdoor unit during defrost where it drains through the base pan or to the ground. Both must be checked to avoid leaks, pooling, or icing.
When The System Is Turned On		
Control	• Confirm local zone controllers can adjust temperature and fan speed with remote or wall control for each indoor unit. • Check central VRF controller or BAS interface shows all zones correctly and responds to commands. • Test heating and cooling mode switchover. • Review safety indicators and error messages.	Confirms both tenant-level and operator-level controls are working as intended, reducing future occupant complaints.
Indoor Unit Operation	• Verify airflow is steady and quiet at each indoor unit. • Confirm louvers/diffusers respond to controller settings. • Check filters are properly seated.	Ensures proper comfort and low noise levels in each space.
Outdoor Unit Operation	• Confirm outdoor units power up with no unusual vibration or noise. • Verify operating sound level is below relevant city noise limits (Ex. City of Vancouver bylaw noise limits are 55 dB daytime, 45 dB nighttime).	Confirms safe and quiet operation outdoors, avoiding disturbance and equipment strain.
Heat Recovery Function (if applicable)	• Test one zone in cooling and another in heating simultaneously. • Confirm branch selector box (BS box/controller) directs refrigerant correctly. • Verify both zones maintain set temperatures.	Confirms the heat recovery feature is functioning.
Performance Tests	• Record refrigerant charge, pressures, and temperatures per manufacturer specs. • Verify system responds smoothly to part-load and full-load conditions. • Document baseline performance values for future reference.	Confirms the VRF is set up to run at peak efficiency and gives operators data for troubleshooting later.

2.4.3. Commissioning Report Example

2.4.3.1. System Information

- **Manufacturer / Model:** Daikin VRV IV (outdoor) / Daikin FXAQ indoor units
- **Serial Numbers:**
  - Outdoor Unit-1: 123456789 / 10 Indoor Units: Zone A: 987654321, Zone B: 987654322
  - Outdoor Unit-2: 123456789 / 15 Indoor Units: Zone C: 987654321, Zone D: 987654322
- **Capacity:** 12 tons cooling / 140,000 BTU heating
- **Refrigerant:** R410A

2.4.3.2. Key Checks

Item	Status
Outdoor units level, secured, and clear of obstructions	☐
Indoor units labeled by zone and mounted level	☐
Refrigerant piping insulated, sealed, leak-tested, and protected with bird/rodent-resistant jacketing	☐
Branch selector box installed and accessible (if heat recovery)	☐
Electrical connections correct and tight	☐
Outdoor unit base pan and drain holes clear for defrost water	☐
Drain lines from indoor units clear, sloped correctly, and tested	☐
Local zone controllers operating	☐
Central VRF controller/BAS interface operating	☐

2.4.3.3. Functional Tests

Test	Status
System running – no errors and no special setting to run it	☐
Heating and cooling modes tested in at least two zones	☐
Fan speed and airflow respond to controller commands	☐
Indoor noise levels within acceptable limits	☐
Outdoor sound measured – below Vancouver Noise Bylaw 6555 limits (55 dBA daytime, 45 dBA nighttime)	☐
Heat recovery tested (one zone heating, one zone cooling)	☐
No leaks from condensate drains (better test in warm days)	☐
Baseline refrigerant pressures and temperatures recorded	☐

2.5. Training Session

As part of hand-off, ask your contractor(s) to conduct a formal training session for facilities, maintenance staff and tenants (if possible). This has proven to be the best way to make sure everyone understands the system.

A sample agenda for a training session is laid out below. Consider recording the training for future reference or for new staff.

- System overview and walkthrough
  - Labeled diagrams should be presented here
- Controls and operation
  - Explain how the unit works, how to control it – live demo
- Maintenance schedule and requirements
  - Provide details on maintenance requirements
- Documentation review, including manuals and warranty information
  - Make it clear where to find all the information
- Operational quirks and seasonal tips
  - Mode change delays between heating and cooling
  - Heat recovery operation common errors and trouble shooting
  - Typical error codes operators may see and when to escalate to contractors
- Training session deliverables
  - Simplified user guides (see section 2.6 Simplified User Guides)
  - Simplified maintenance guides

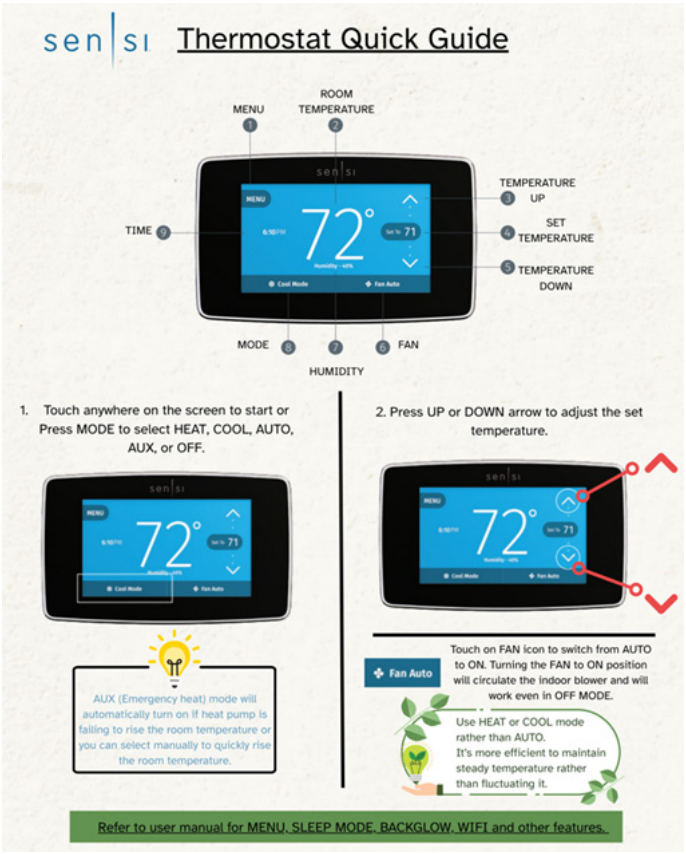
2.6. Simplified User Guides

Most equipment comes with an installation or user manual, but these can be difficult to follow. A good practice is to ask your contractor for a simplified operator or user guide during the training session or handoff.

Simplified guides are handy as quick references – they can be posted on the wall or shared with occupants once the project is complete.

Some example guides developed for previous Non-Profit Resilient Retrofit Grant (NRRG) program participants are presented below.

2.6.1. Remote and Thermostat User Guide (Examples)



2.7. Maintenance Requirements

The operation and maintenance information for your system is usually included in the equipment manual and should also be covered during your training session and project handoff. Be sure to review this information carefully and confirm that clear instructions are provided – either in the documents you receive, during training, or ideally in both places. This will help you feel confident in operating and maintaining your equipment. You'll want to make sure that both a maintenance schedule and a troubleshooting guide are provided.

2.7.1. Maintenance Schedule

The maintenance schedule should outline the types of checks and service tasks needed to keep your equipment running efficiently. General monthly, quarterly and annual examples of VRF maintenance schedules developed by Homes and Community Renewal is presented below.

Monthly Preventative Maintenance Recommendations

Maintenance Task	Checked	Not Applicable	Notes
Indoor Unit			
Clean or Replace Air Filters Check the air filters and clean or replace as needed. Mini split filters will either be disposable or cleanable. For cleanable filters use warm water and mild detergent. Ensure filters are completely dry before replacement.	☐	☐	

Quarterly Preventative Maintenance Recommendations

Maintenance Task	Checked	Not Applicable	Notes
Indoor Unit			
Check the Condensate Drain Pipe Clean the drain line with a mixture of bleach and water to prevent algae or mold growth.	☐	☐	

Annual Preventative Maintenance Recommendations

Maintenance Task	Checked	Not Applicable	Notes
Indoor Unit			
Inspect and Clean the Condensate Drain Pan Check the condensate drain pan for any clogs. Ensure the drain is clear and water flows freely.	☐	☐	
Check and Clean the Fan Blades Inspect the blower fan blades for any dirt or debris on indoor units. If necessary, use a brush or cloth to clean. Ensure the blades are balanced and not damaged.	☐	☐	
Clean the Heat Exchanger Fins Visually inspect the evaporator fins inside units. These coils should be free from dirt, debris, and buildup. If necessary, use a soft brush or vacuum to remove contaminants.	☐	☐	
Clean Condensate Pump Check if drain pump in terminal units has any dirt or accumulations. If so, use a cloth to wipe off.	☐	☐	
Inspect Refrigerant Piping Visually inspect refrigerant piping for cracks or leaks. Ensure insulation surrounding piping is in good condition.	☐	☐	
Inspect Branch Controller Visually inspect the piping connections to the port connections on the box. Ensure insulation is in good condition.	☐	☐	
Outdoor Unit			
Check and Clean the Fan Blades Inspect the blower fan blades for any dirt or debris on outdoor units. If necessary, use a brush or cloth to clean. Ensure the blades are balanced and not damaged.	☐	☐	
Inspect Refrigerant Piping Visually inspect refrigerant piping for cracks or leaks. Ensure insulation surrounding piping is in good condition.	☐	☐	

2.7.2. Troubleshooting Guide

The troubleshooting guide should list common problems you may encounter and simple steps to resolve them. A general example is provided below.

An example trouble shooting guide for a VRF system, developed by New York State Homes and Community Renewal program, is presented below.

POSSIBLE CORRECTIVE ACTIONS

The following chart is provided as an example of possible corrective actions and is not to be considered an exhaustive list of problems, causes, or solutions. HCR does not represent that the actions guarantee correction of the problem, they are intended as examples of corrective actions. Corrective actions must only be conducted by qualified operators/technicians under the express permission of building management/ownership. Operators/technicians must confirm that the proposed work will not void any underlying maintenance agreement or warranty prior to starting the work.

Problem	Possible Causes	Actions
The room has a peculiar smell	Verify that the smell is not coming from carpets, furniture, or other soft surfaces in the room	If smell is not caused by room, clean air filter and heat exchanger fins.
Does not cool or heat effectively	Air filter is dirty and does not allow air to pass through.	Clean or replace air filter, as necessary.
	Outdoor temperature exceeds the equipment's capacity and/or rating.	Reduce the room demand and refer to equipment manual for operating temperatures.
Unit does not operate	A fuse has blown, or a circuit breaker has tripped.	Replace fuse or reset circuit breaker.
	Batteries are depleted or incorrectly installed.	Replace remote batteries with manufacturer's recommendation.
Excessive Condensation	Condensate lines are clogged or leaking.	Verify the condensate line is properly attached to the unit. Clean condensate line using 1 cup of bleach and let sit for 30 minutes or until clog clears. If the clog does not clear, use a wet-dry vacuum to suck the clog out of the line.
Leaking Refrigerant	Refrigerant may be leaking through the pipes or equipment. Indicators of a leak include: unit not providing adequate cooling, smell of sweet/musty odor, ice buildup on condensing unit, unusual sounds, or high indoor humidity.	Contact a VRF system maintenance professional.