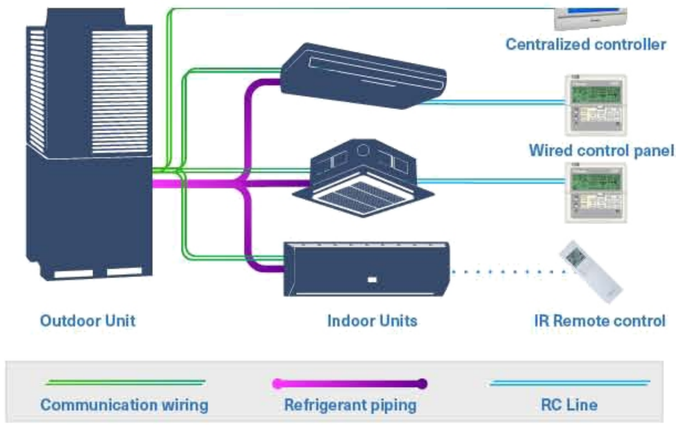
What is VRF?

VRF can easily be related to as the "Rolls Royce" of Air Conditioning Systems. It's a very sophisticated technological air conditioning system, based on several principles:

1. Refrigerant only – where refrigerant is the only coolant material in the system (in contrary to the chilled water systems, where refrigerant is used for cooling/heating the water that is circulated throughout the whole system).
2. Inverter compressors that allow lowering power consumption with partial cooling/heating loads.
3. Several air handlers (indoor units) on the same refrigerant loop / circuit.
4. Ability of modular expansion (especially applicable for large projects, that can grow in stages).

Typical VRF system structure

A typical system consists of an outdoor unit (comprising one or multiple compressors), several indoor units (often and mistakenly called "fan coils"), refrigerant piping, running from the outdoor to all indoors, using Refnet Joints (copper distributors in pipes) and communication wiring.



Communication wiring consists of a 2 wired cable, chained from the outdoor to all indoors, creating an internal closed loop network, that is an essential part of any VRF installation.

As for the Control, each indoor is controlled by its own wired control panel, while there are some possibilities for wireless remotes (IR) and centralized controllers, enabling controlling all indoors from one location.

How does VRF work?

The operation logic of the VRF is fully built-in inside the system and is proprietary for each VRF manufacturer. The system gets inputs from the user (e.g. desired comfort temperature) and from the surroundings (outside ambient temperature), and according to that data it implements its logic in order to get to the desired comfort conditions, utilizing optimal power consumptions.

The ability to adjust itself to the outdoor conditions is one of the main factors that makes VRF systems so efficient, compared to the traditional water cooled systems, based on chillers and fan coils.

Now, let's dive in, and see how it works in details. Let's take as an example a typical VRF installation, with one outdoor unit and multiple indoors.

At the beginning, the system is in standstill condition (everything is turned off).

Once a user turns one of the indoors "ON" by its local remote, the outdoor "gets noted" regarding it, and starts working. At this point, it will examine the outdoor conditions (temperature), the operating indoor requirements (operation mode, set point temperature), and will operate the compressor at the exact level, required to comply with the indoor requirements.

When another indoor unit is turned on, the outdoor recalculates the requirements from all the indoors, and will increase the compressor's output, according to the required level of demand.

This process is constantly occurring with any change, performed in the HVAC system. As described, the VRF system is fully automatic, and regulates its power consumption based on the demand arriving from the indoor units and outside prevailing conditions. User can have influence on the desired indoor comfort conditions, modifying: Operation mode (on/off), Operation state (Cool/Heat/Fan/Dry/Auto), setpoint temperature, fan speed (high/medium/low/auto). Controlling those parameters is the only thing required for proper operation, and the only thing that is required for proper integration with the VRF system.

VRF System types

Cooling only systems (less popular) – those systems can only cool. Heating is not available. Fan and Dry modes are available for each indoor unit independently.

Heat Pump systems (most popular) – all the indoor units can either heat, or cool (not at the same time). Fan and Dry modes are available for each indoor unit independently.

Heat Recovery systems (less popular) – those systems are the most sophisticated ones, where cooling and heating may be available by each indoor unit, independently, at the same time.

Have any questions ?

Want to learn more? drop us a line at info@hasheatpumps.co.nz