

# VRV Basics

This tech tip is written by experienced tech and VRV specialist Ryan Findley. Thanks Ryan.

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**This is a quick overview not a substitute for taking proper manufacturer training**

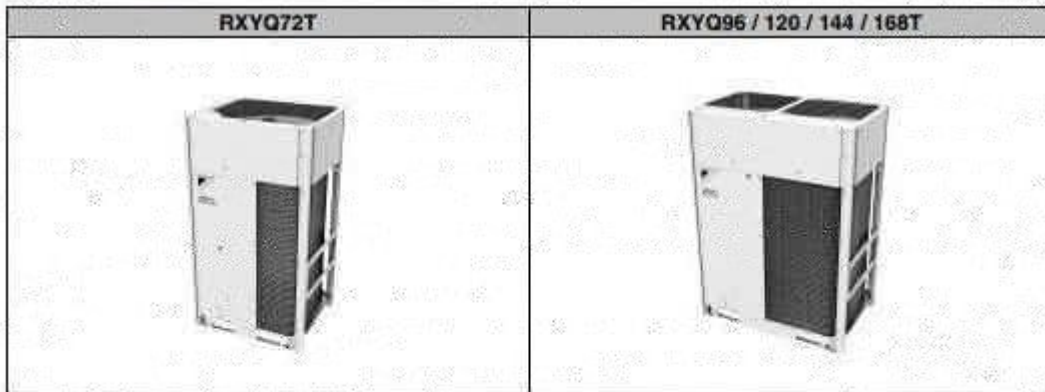
This tech tip is geared towards the mechanic who is fairly new to VRV systems. As with anything, the ability to install or service anything we first must understand the basic fundamentals. Even though some VRV systems might feel like a bit of overwhelming, but they still function the same as a standard heat pump.

Let's start at the beginning. There are two product lines in VRV, heat pump and heat recovery. The heat pump is simply the same setup as your residential heat pump running 2 pipes from the indoor units to the outdoor units. Heat recovery is running 3 pipes from the outdoor units to the indoor units allowing the machine the ability to run heat and cooling simultaneously. Daikin Heat pump model #s are RXYQ where heat recovery will be REMQ or REYQ.

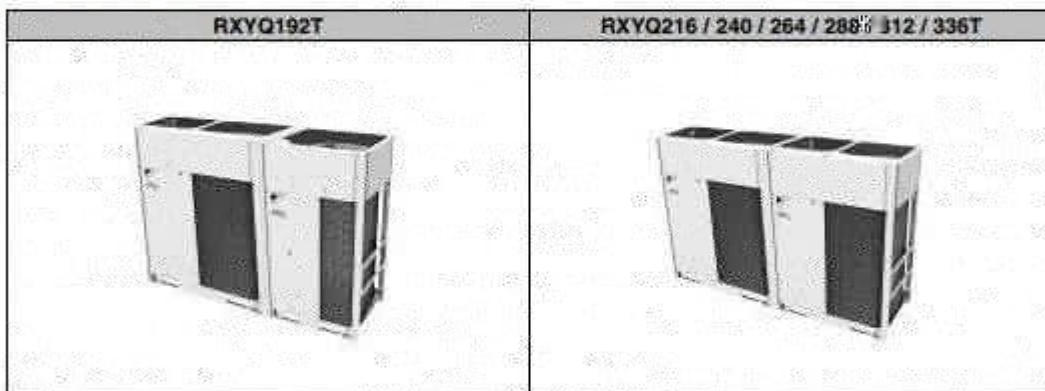
First, let's identify some components. In a VRV system we have the outdoor units, which are also commonly referred to as modules. Modules come in various sizes ranging from 6-12 ton in heat pump and 6-10 ton in heat recovery in the VRV 3 line. VRV 4 ranges from 6-14 tons. Modules can be combined in tandem up to a total of 4 outdoor modules.

## 2.3 Outdoor Units

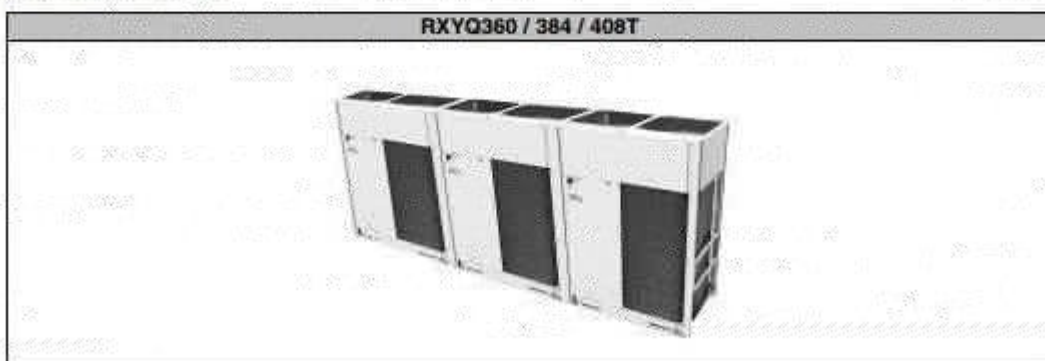
### Single Outdoor Units



### Double Outdoor Units



### Triple Outdoor Units



## Indoor units

Indoor units (or fan coils) come in many different types, but the most common ones used are the ceiling cassette and the ducted units.

## Refnets

Refnets are a Y type fitting designed to provide equal flow to both the main piping continuing on and also the branch piping that is taking off of the main. Refnet installation is critical. Follow manufacturers recommended install practices of keeping the angle of the refnet below 15 degrees for outdoor unit piping and 30 degrees for indoor piping. To visually show what the adverse effects of improper installation, see this [video](#).

### REFNET

REFNET Joints distribute correct flow of refrigerant in every branch of the piping network.



REFNET Joint



REFNET Header

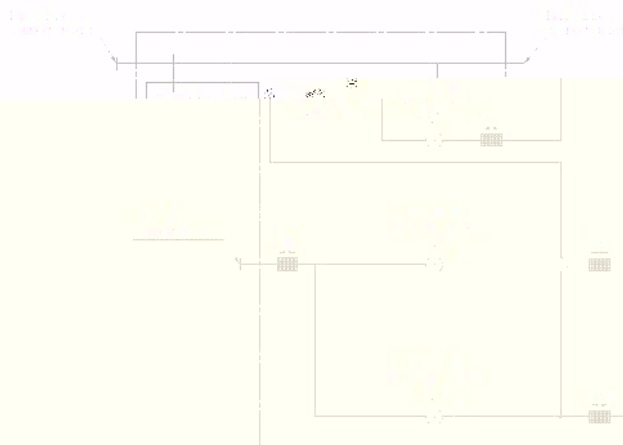
## Branch selector boxes

Branch selector boxes or BS boxes for short are only used in heat recovery applications. BS boxes will have the 3 pipes coming from the outdoor units piped directly to them. They are made up of solenoids and EEVS. The fan coils determine the mode of operation but the actual change of the mode of operation occurs in the bs box.

**Single Branch Selector Unit  
BSQ36-96TVJ**

No.	Name	Electric symbol	Function
1	Electronic expansion valve (EVH)	Y2E	Opens while in heating operation or all indoor units are in cooling. (Max : 760 pulse)
2	Electronic expansion valve (EVL)	Y3E	Opens while in cooling. (Max : 760 pulse)
3	Electronic expansion valve (EVS0)	Y1E	In simultaneous cooling and heating operation, it is used to subcooling liquid refrigerants when an indoor unit downstream of this Branch Selector Unit is in heating. (Max : 480 pulse)

Note: Factory setting of all EV opening: 60 pulse



**Branch Selector Boxes**

Providing flexibility and minimizing mechanical and electrical installation costs, Daikin's branch selector boxes that are used in Heat Recovery systems, are ideal for spaces that require individual heating and cooling control.

NUMBER OF BRANCHES / MAXIMUM TOTAL CAPACITY INDEX (KBTU/H)							
							
BSQ36TVJ	BSQ60TVJ	BSQ96TVJ	BS4054TVJ	BS6054TVJ	BS8054TVJ	BS10054TVJ	BS12054TVJ
1/36	1/60	1/96	4/144	6/216	8/290	10/290	12/290

**Communication wiring**

VRV systems are basically one giant communicating residential variable speed heat pump. Information is shared from the fan coils to the outdoor units across a daisy chain of communication wiring. The wire should be 18/2 non-shielded

stranded. The system should also be wired as shown in your submittal documents from your sales engineer.

**PVE 01**

## **Differences between VRV 3 and VRV 4**

There are a few big differences between the two product lines. First is VRV 3 uses a crossover line that runs between all of the modules, if there are more than one. VRV 4 does not have that. VRV 3 has 1 inverter compressor and 1 standard compressor (in modules that have more than 1 compressor). VRV 4 has 2 inverter compressors, again if it is a module that has more than one compressor. Both product lines have different inverter boards and different cabinets. VRV 4 also has a split outdoor heat exchanger that allows ½ of the coil to be in one mode of operation while the other ½ could be in another mode of operation. VRV 4 inverter boards are cooled by subcooled refrigerant that runs on the back of the heat sync. VRV 3 inverter boards are air cooled from the inside of the cabinet near the outdoor fan motor.

## **Filter Driers**

Filter driers are not used unless there is burnout of a

