Variable Refrigerant Volume Systems

Agenda

- System Layout
- Refrigerants and Equipment
- Efficiencies
- Service, Installation and Reliability
- Controls
- Tools to get the job done

WHAT IS VRV ?

Variable -

Refrigerant -

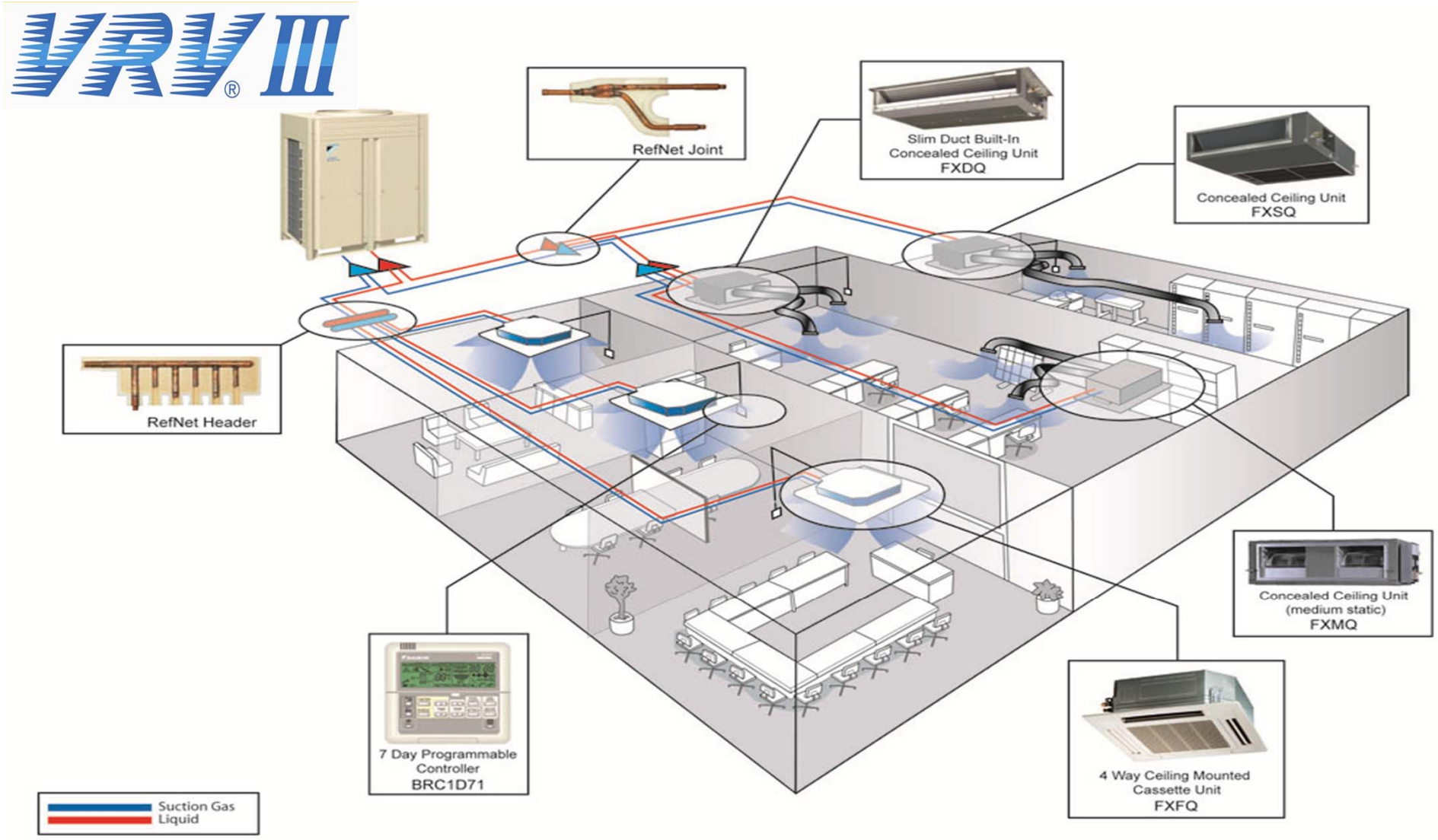
Volume -

VRV® SYSTEM

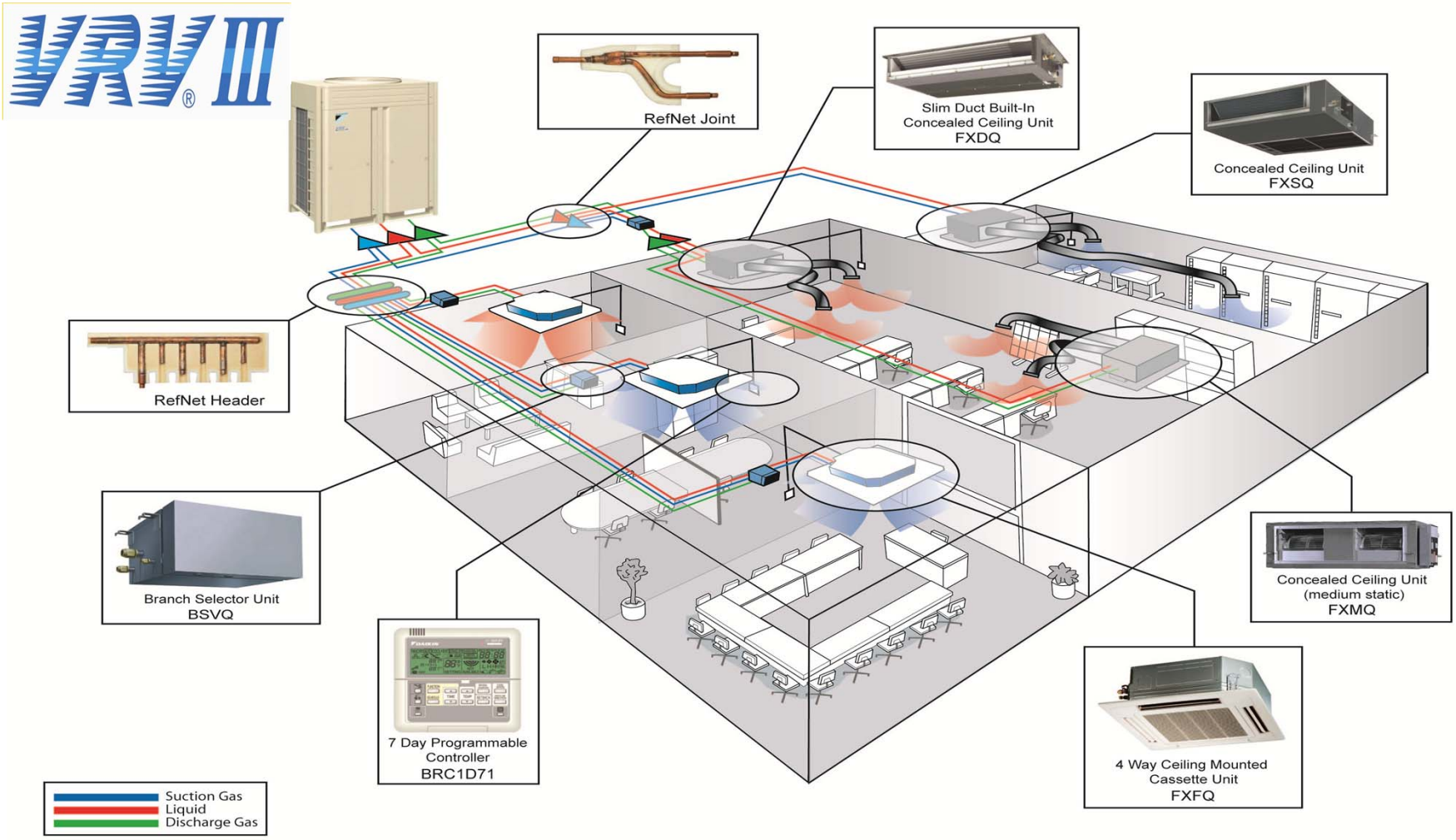
THE INTELLIGENT AIR CONDITIONING SYSTEM

First Installation - 25 years ago
Now approaching 1,000,000 Worldwide

VRV Heat Pump Components



Heat Recovery System



- One system can provide simultaneous cooling and heating.
- Heat absorbed by Indoor Units in Cooling Mode is used in areas that require Heating.
- EER of over 20 can be expected in Total Heat Recovery mode.

VRV & VRV-s Models

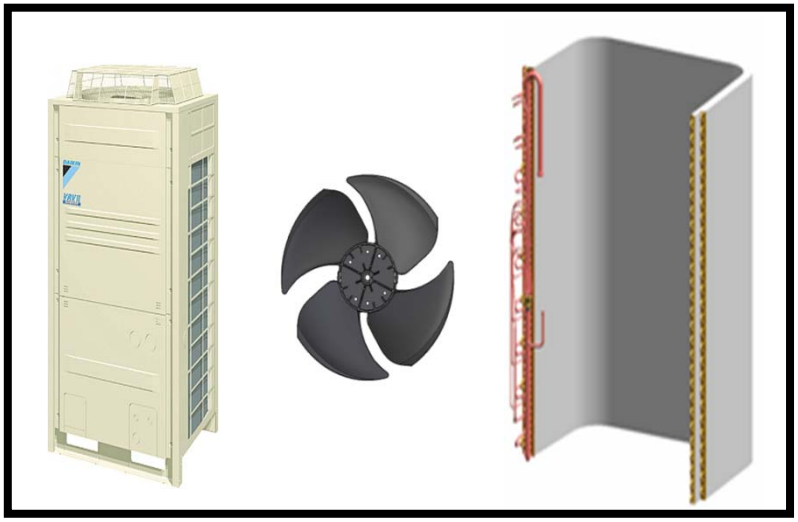
3,4 Ton
HP only

Water cooled

5, 6, & 7 Ton
Multi piped 12 to 21 ton

6,8,10, 12 Ton

12, 14, 16, 18, 20 Ton
Dual Piped Systems



Air cooled

Water cooled

Largest Units = Easy to Move

66 inches

As low as 560 LBS

61 db

30 inches

Can be moved in a freight elevator

36 inches

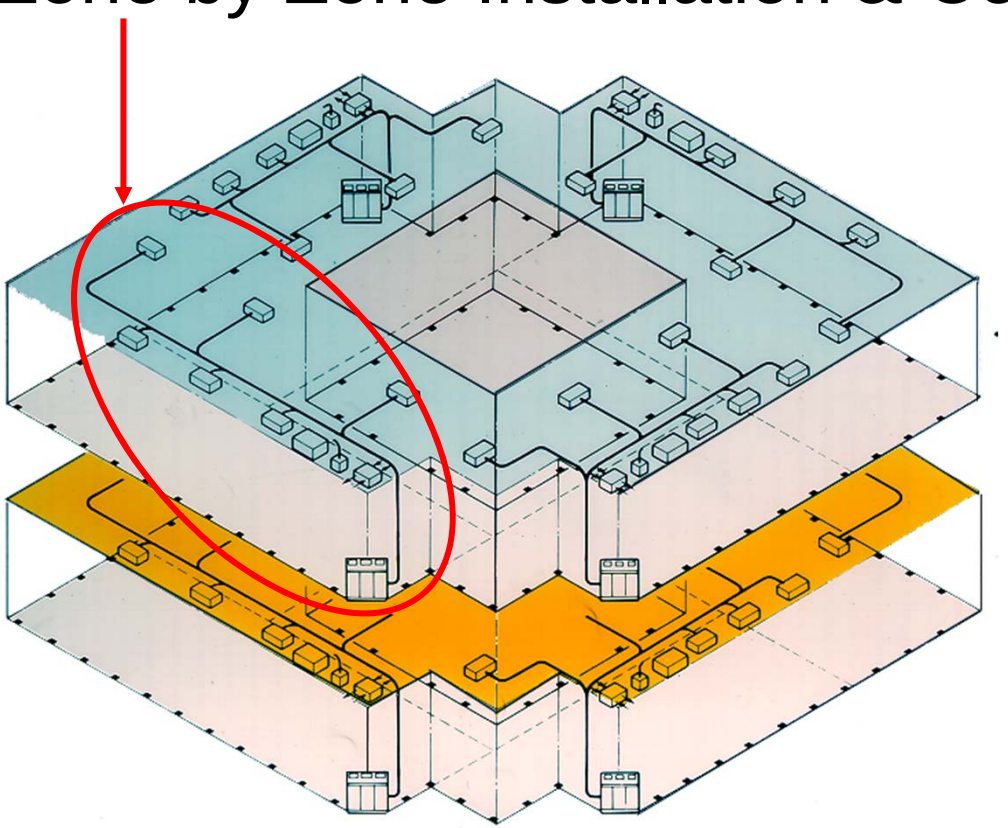
6 - 10 Ton

12 - 20 Ton

VRV Concept

Floor by Floor or

Zone by Zone Installation & Commissioning



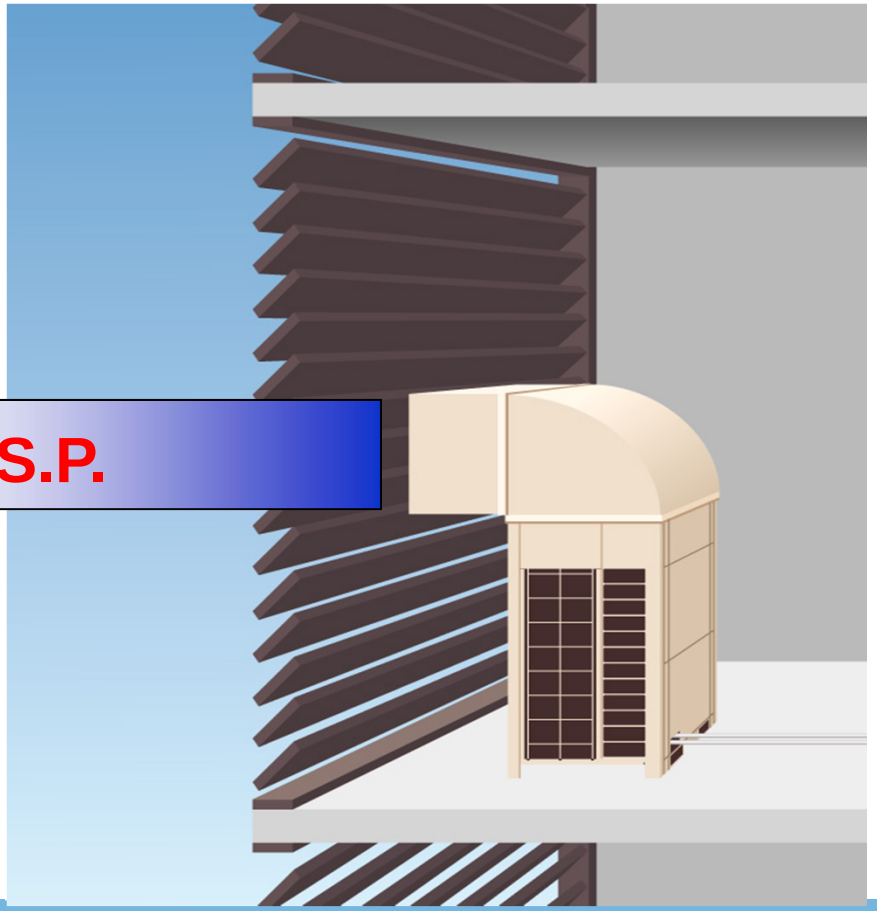
Time and Cost Saving

Mounting the VRV Condensing Unit
Suitable for floor by floor installation

0.12” w.g. factory set

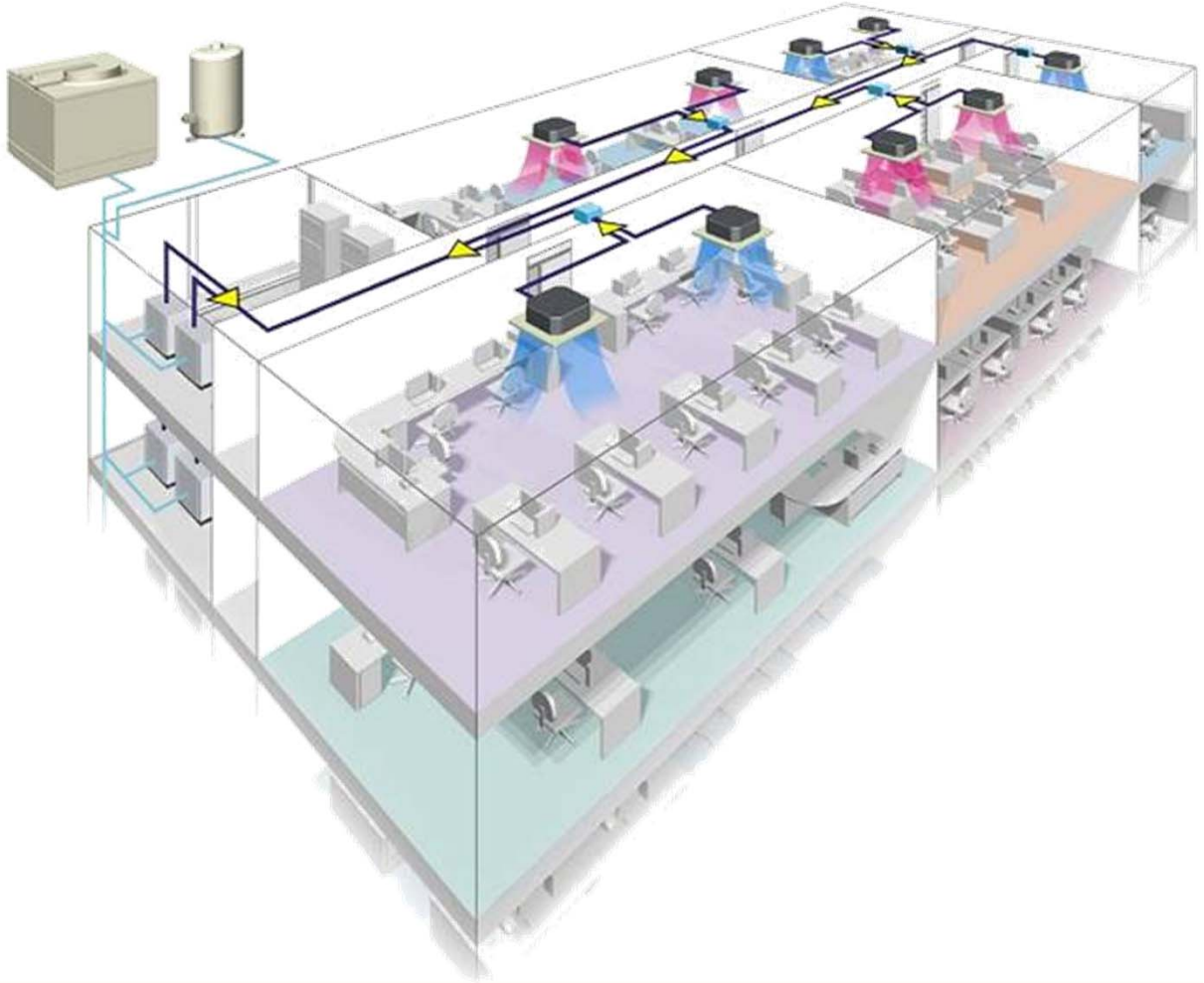
0.32” w.g. by field setting

0.32” w.g. E.S.P.

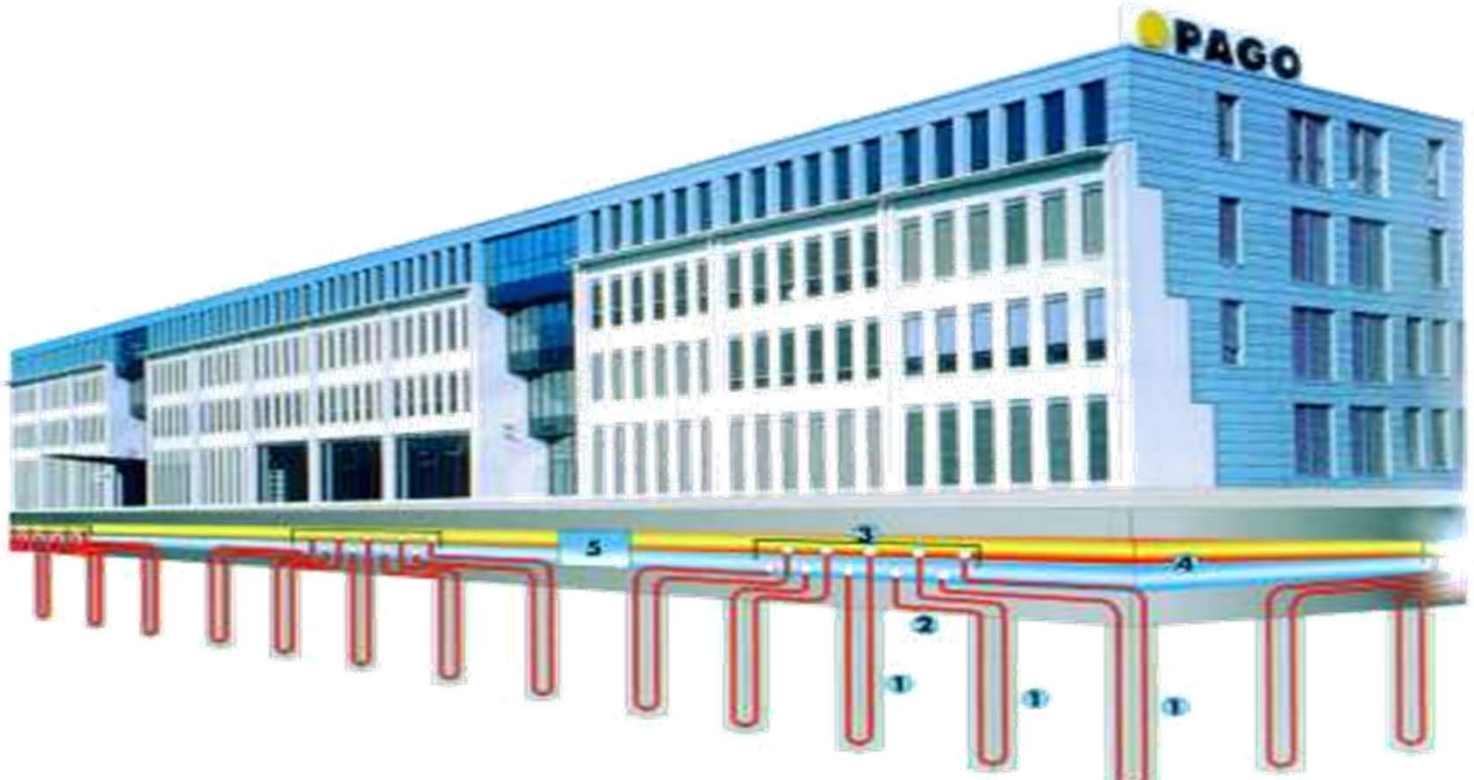


- Reduced Ambient
- Reduced Vandalism
- Easy Serviceability
- Auxiliary heat - one location

Water-Cooled VRV



Water-Cooled VRV



Possible to have efficiently of geothermal heat pumps with centralized maintenance

Ductless Air Handlers

Eliminating efficiency losses!!!

•No duct cost
•Fast, easy installation
•Each unit with individual control
•Fast, easy service
•No air lost into attics or plenum
•No hot return air infiltration
•No duct heat gain from attic or plenum space
•Filter cleaned at each indoor unit
No looking for filter in ceiling
•No crawling through ceilings for service
•Variety to fit any decor

Ducted Air Handlers

Reducing efficiency losses!!!

•Reduced duct design time and cost
•Shorter duct runs
•Minimal duct cost
•Fast easy installation
•Each unit area with individual control
•Fast easy service
• Minimal air loss into attics or plenum
•No hot return air infiltration
•Minimal duct heat gain from attic or plenum space
•Filter position close to each indoor unit
Variety to fit any design needs

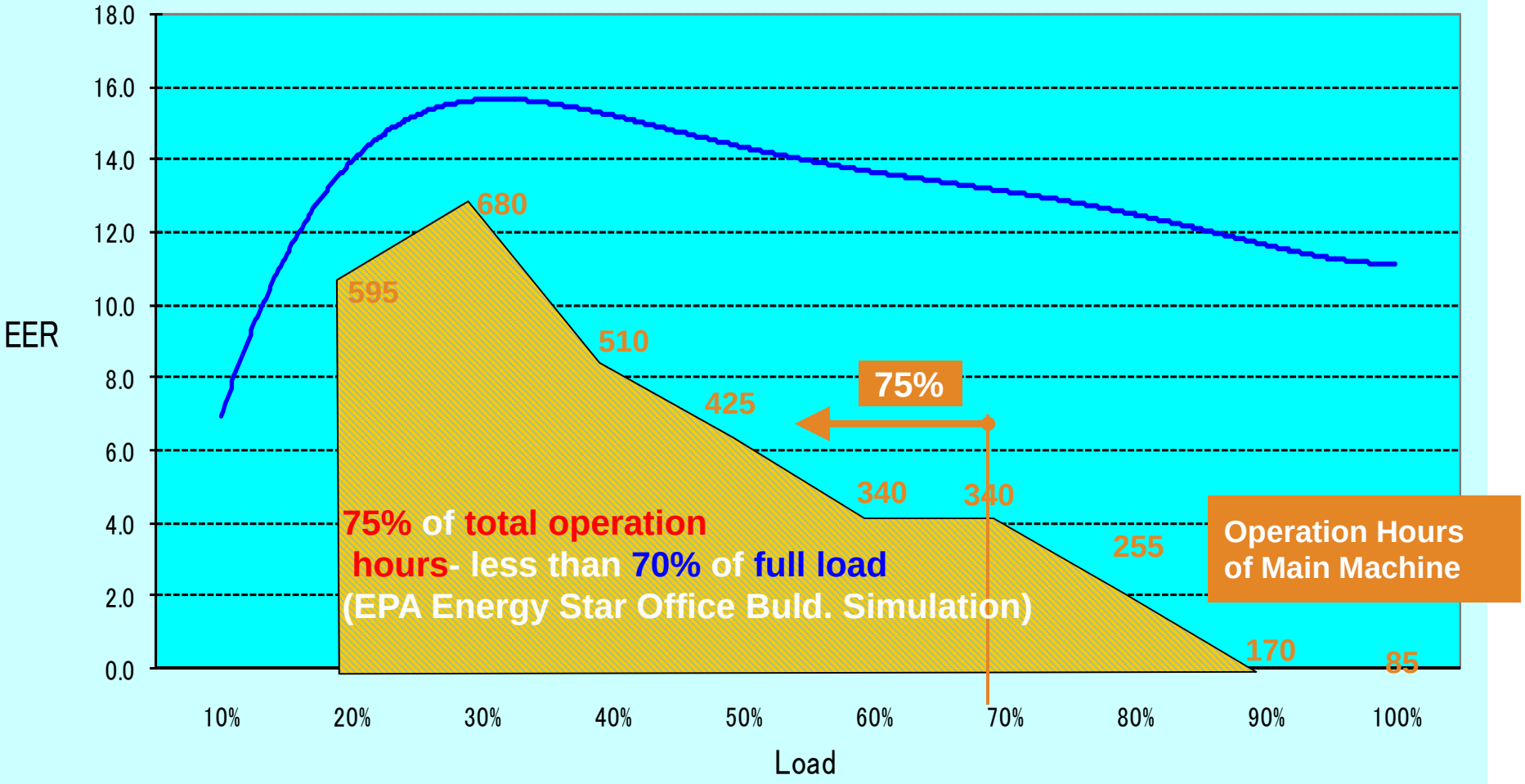
Why Use Refrigerant?

TRANSFER ENERGY CONSUMPTION

FROM AIR HANDLER TO CONDITIONED SPACE

VAV	V W V	VRV
AIR	WATER	REFRIGERANT
6.4 kW	4.1 kW	2.2 kW

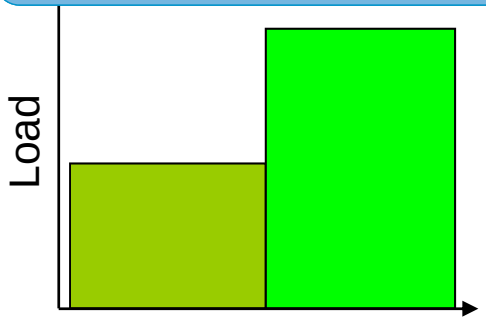
Partial Load Performance (VRV)



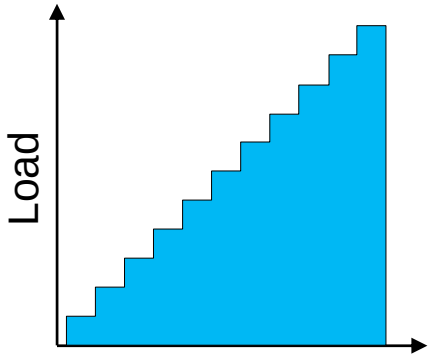
Multiple Step Control

- Standard HVAC system
  - 1 to 2 stages of capacity
    - Uses mechanical unloading techniques
- VRV uses inverter technology
  - Electronic inverter varies compressor rotational speed in steps

Unloader, Two Speed or Two Compressors



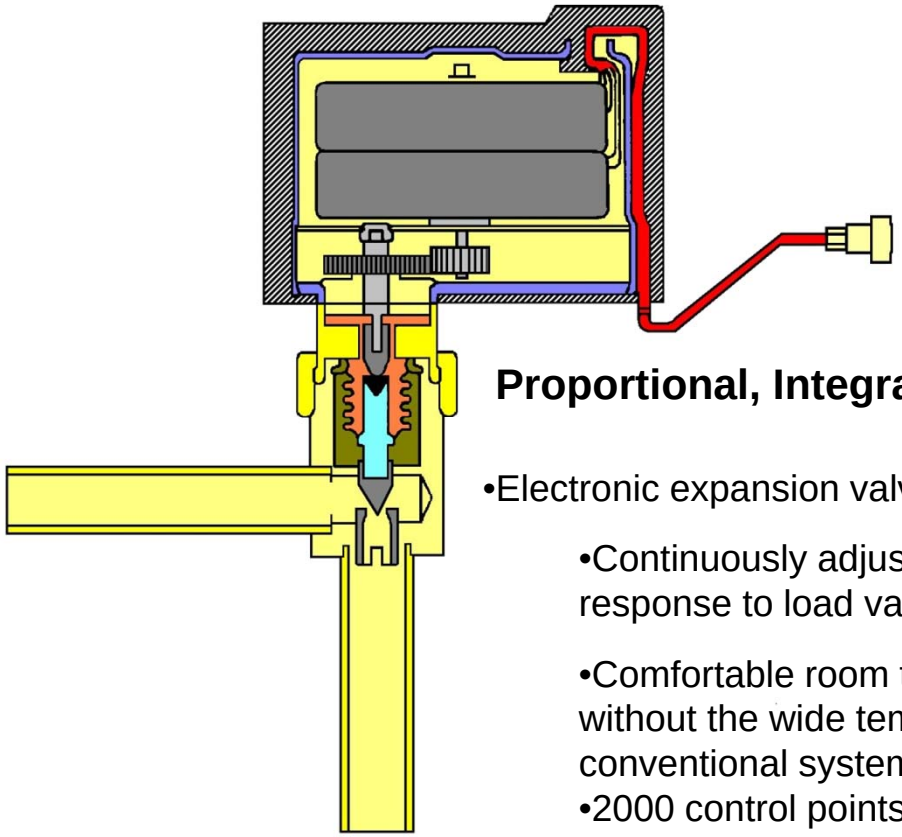
Daikin Multi-Step Control Principle

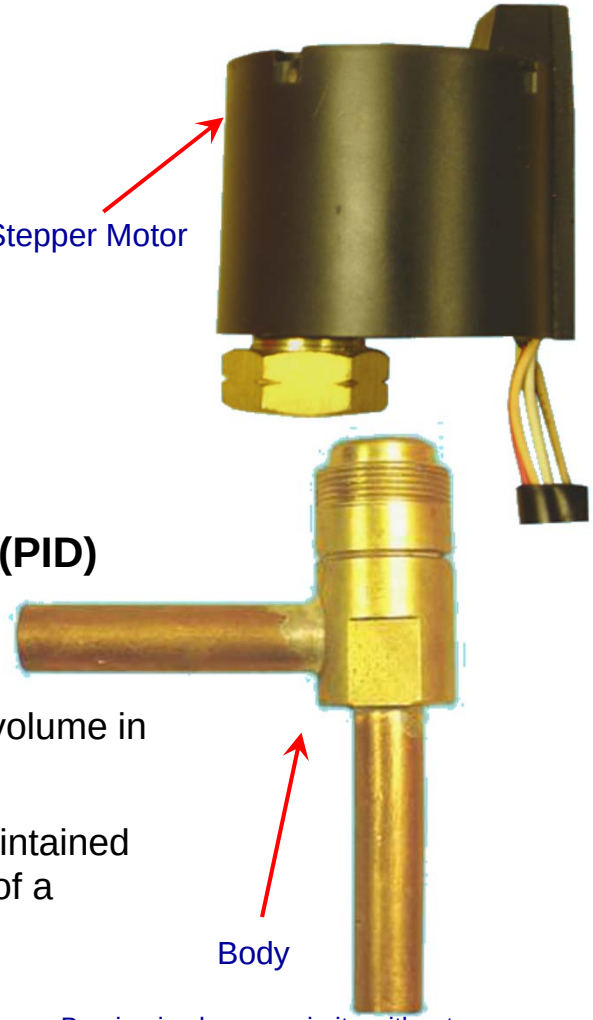


25 capacity steps in one compressor

Electronic Expansion Valves in all units

- Continual management of flow rate controls super heat and coil capacity for optimum performance and energy efficiency



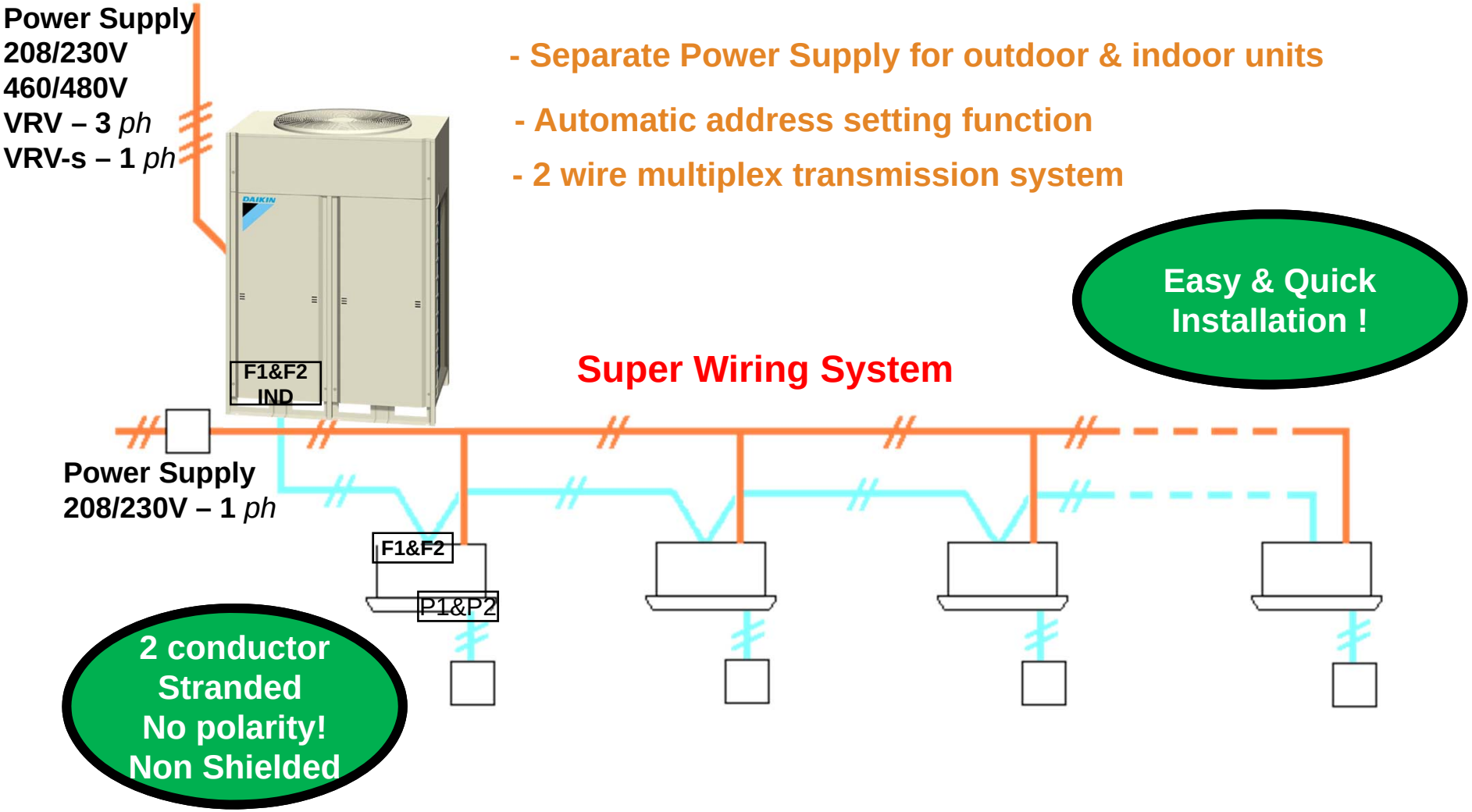


Proportional, Integral & Derivative (PID)

- Electronic expansion valve using PID
  - Continuously adjusts the refrigerant volume in response to load variations
  - Comfortable room temperature is maintained without the wide temperature swings of a conventional system
  - 2000 control points

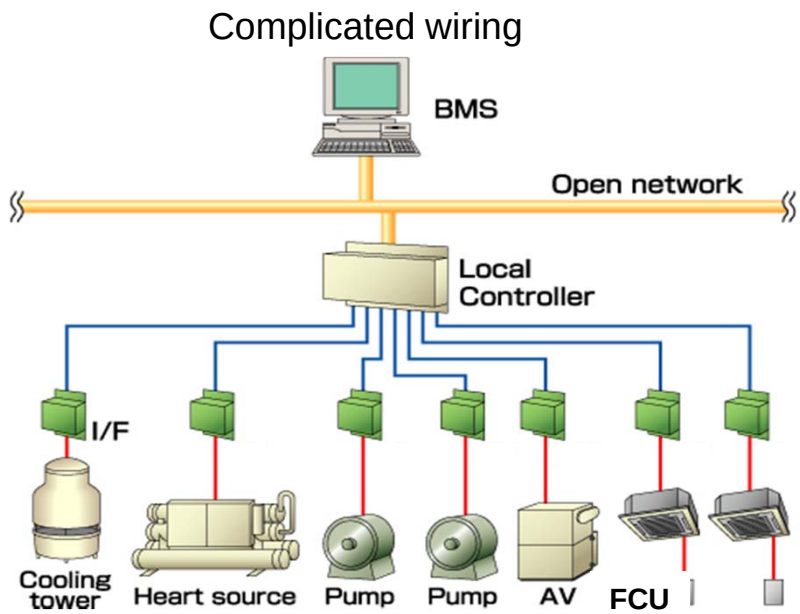
Brazing in close proximity without cooling will permanently damage it. Keep below 100ºC

System Wiring



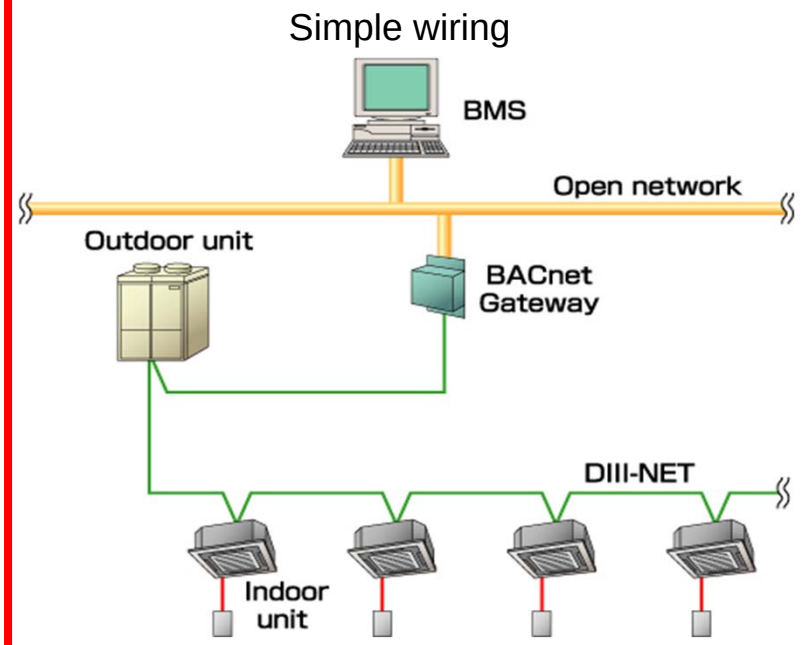
Easy Network Wiring

Central A/C System



$ 200 to 300 / point
2-6 points / piece of equipment

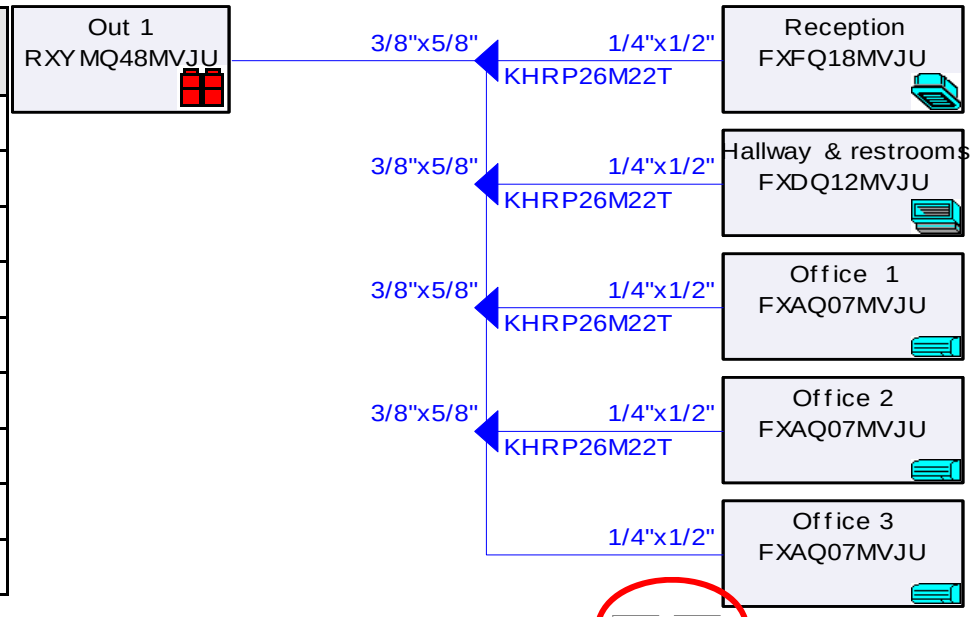
VRV System

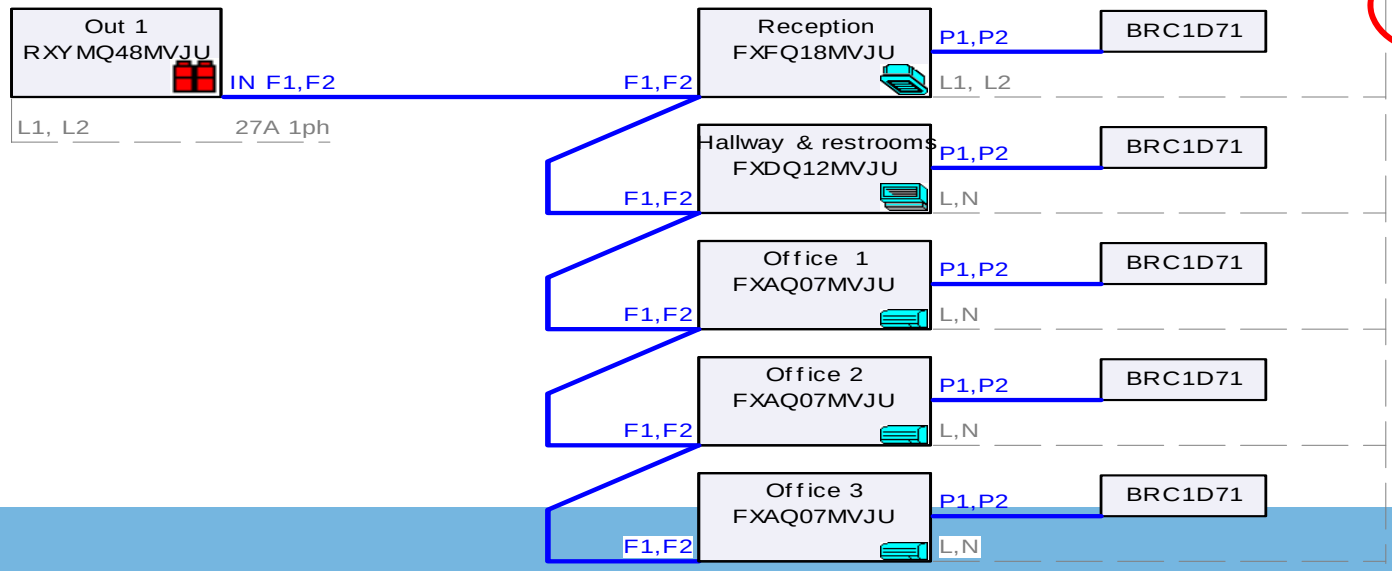


All monitoring points
included at no cost

VRV Xpress Software

Model	Qty	Description
RXYMQ48MVJU	2	Heat pump VRV S R410A
FXAQ07MVJU	4	A - Wall mounted unit
FXDQ12MVJU	1	DN - Ceiling slim duct
FXFQ12MVJU	2	F - 4-way blow ceiling mounted cassette
FXFQ18MVJU	2	F - 4-way blow ceiling mounted cassette
KHRP26M22T	7	REFNET branch piping kit
BRC1D71	8	7 Day Programmable Controller
BYC125K-W1	4	Decoration panel - All FXFQ
KRC19-26A	1	Cool/Heat selector





5 indoor units on one 20 amp circuit

DAIKIN AC
absolute comfort™

DAIKIN® AC™

absolute comfort™

Thank you for your attention.