

**PART 1: GENERAL****1.01 SYSTEM DESCRIPTION**

- A. The variable capacity, heat pump heat recovery air conditioning system shall be a Daikin VRF (Variable Refrigerant Flow) AURORA system for cold climate installation, Daikin or approved substitute. Daikin is described below and is the basis of design. If another manufacturer is used the contractor shall be responsible for re-engineering the refrigerant system.

**1.03 QUALITY ASSURANCE**

- A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.
- B. All wiring shall be in accordance with the National Electric Code (NEC).
- C. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- D. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2010 and installed to resist the wind pressures on the equipment and the supports.
- E. The condensing unit will be factory charged with R-410A.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. Unit shall be stored and handled according to the manufacturer's recommendations.

**1.05 STANDARD LIMITED WARRANTY**

- A. Daikin North America LLC warrants original owner of the non-residential building, multifamily residence or residence in which the Daikin products are installed that under normal use and maintenance for comfort cooling and conditioning applications such products (the "Products") will be free from defects in material and workmanship. This warranty applies to compressor and all parts and is limited in duration to ten (10) years starting from the "installation date" which is one of the two dates below:
  - 1. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit's rating plate.
  - 2. If the date the unit is originally commissioned cannot be verified, the installation date is three months after the manufacture date.

Complete warranty details available from your local Daikin representative or at [www.daikincomfort.com](http://www.daikincomfort.com).

**1.06 HVAC SYSTEM DESIGN**

- A. SYSTEM DESCRIPTION:
  - 1. The variable capacity heat recovery air conditioning system shall be a Daikin Variable Refrigerant Volume Series (heat and cool model) system as specified.

2. The system shall consist of multiple evaporators, branch selector boxes, REFNET™ joints and headers, a three-pipe refrigeration distribution system using PID control and Daikin VRV® condenser unit.
3. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant.
4. The condensing unit may connect an indoor evaporator capacity up to 200% of the condensing unit nominal capacity. All zones are each capable of operating separately with individual temperature control.
5. A dedicated hot gas pipe shall be required to ensure optimum heating operation performance
  - a. Two-pipe, heat recovery systems utilizing a lower temperature mixed liquid/gas refrigerant to perform heat recovery are not acceptable due to reduced heating capabilities.
6. The Daikin condensing unit shall be interconnected to indoor unit models FXFQ, FXHQ, FXMQ, FXLQ, FXNQ, FXTQ, FXDQ, FXZQ, FXUQ, FXEQ, FXAQ and FXMQ\_MF, and shall range in capacity from 7,500 Btu/h to 96,000 Btu/h in accordance with Daikin's engineering data book detailing each available indoor unit.
  - a. The indoor units shall be connected to the condensing unit utilizing Daikin's REFNET™ specified piping joints and headers to ensure correct refrigerant flow and balancing. T style joints are not acceptable for a variable refrigerant system.
7. Operation of the system shall permit either individual cooling or heating of each indoor unit simultaneously or all of the indoor units associated with each branch of the cool/heat selector box (BSQ\_T / BS\_Q54T). Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface.
8. Branch selector boxes:
  - a. The branch selector boxes shall have the capacity to control up to 290 MBH (cooling) downstream of the branch selector box.
  - b. Each branch of the branch selector box shall consist of three electronic expansion valves, refrigerant control piping and electronics to facilitate communications between the box and main processor and between the box and indoor units.
  - c. The branch selector box shall control the operational mode of the subordinate indoor units. The use of three EEV's ensures continuous heating during defrost (multiple condenser systems), no heating impact during changeover and reduced sound levels.
  - d. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
9. The RELQ\_TA condensing unit model numbers and the associated number of connectable indoor units per RELQ\_TA condensing unit is indicated in the following table. Each indoor unit or group of indoor units shall be independently controlled.

MODEL NUMBER	NOMINAL CAPACITY (Tons)	MAXIMUM NUMBER OF INDOOR UNITS
RELQ72TATJU	6	12
RELQ96TATJU	8	16
RELQ120TATJU	10	20
RELQ144TATJU	12	25
RELQ192TATJU	16	33
RELQ240TATJU	20	41

**B. VRV Aurora Series FEATURES AND BENEFITS**

1. Voltage Platform - Heat Recovery condensing units shall be available with a 208-230V/3ph/60Hz power supply.
2. Low Ambient Heating – Unit shall provide air cooled heating operation down to -22°F WB (-30°C WB) as standard.

3. Enhanced Heating Capacity – System shall provide 100% heat capacity up to 0°FWB (-18°CWB), up to 85% of nominal capacity in heating operation at -13°FWB (-25°CWB) and up to 60% of nominal capacity in heating operation at -22°FWB (-30°CWB).
4. Stable operation – System shall provide stable inverter operation at varied ambient conditions.
5. No drain pan heater – System shall be capable of heating operation at temperatures below 0°FWB (-18°CWB) without the need of a drain pan heater.
6. Auto Auxiliary Heat Changeover – System shall, below the field selected outdoor ambient temperature, provide signal to initiate auxiliary or back up heat.
7. Advanced Zoning - A single system shall provide for up to 41 zones.
8. Independent Control - Each indoor unit shall use a dedicated electronic expansion valve with up to 2000 positions for independent control.
9. VFD Inverter Control and Variable Refrigerant Temperature - Each condensing unit shall use high efficiency, variable speed all “inverter” based flash vapor injection compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions.
  - a. Indoor shall use PID to control superheat to deliver a comfortable room temperature condition and optimize efficiency.
10. Configurator software - Each system shall be available with configurator software package to allow for remote configuration of operational settings and also for assessment of operational data and error codes.
  - a. If this software is not provided by an alternate manufacturer, for each individual outdoor unit the contractor shall do the settings manually and keep detailed records for future maintenance purposes.
11. Defrost Heating – Multiple condenser VRV Aurora systems shall maintain continuous heating during defrost operation. Reverse cycle (cooling mode) defrost operation shall not be permitted due to the potential reduction in space temperature.
12. Oil Return Heating – VRV Aurora systems shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.
13. Low Ambient Cooling - Each system shall be capable of low ambient cooling operation to -4°FDB (-20°CDB).
14. Flexible Design –
  - a. Systems shall be capable of up to 540ft (165m) [623 ft. (190m) equivalent] of linear piping between the condensing unit and furthest located indoor unit.
  - b. Systems shall be capable of up to 1640ft (500m) total “one-way” piping in the piping network.
  - c. Systems shall have a vertical (height) separation of up to 295ft (90m) between the condensing unit and the indoor units.
  - d. Systems shall be capable of up to 295ft (90m) from the first REFNET™ / branch point.
  - e. The condensing unit shall have the ability to connect an indoor unit evaporator capacity of up to 200% of the condensing unit nominal capacity.
  - f. Systems shall be capable of 98ft vertical separation between indoor units.
  - g. Condensing units shall be supported with a fan motor ESP up to 0.32” WG as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
15. Oil return – Each system shall be furnished with a centrifugal oil separator and active oil recovery cycle.
16. Simple wiring – Systems shall use 16/18 AWG, 2 wire, stranded, non-shielded and non-polarized daisy chain control wiring.
17. Space saving – Each system shall have a condensing unit module footprint no larger than 66-11/16” x 48-7/8” x 30-3/16” (1694mm x 1242mm x 767mm).

18. Advanced diagnostics – Systems shall include a self-diagnostic, auto-check function to detect a malfunction and display the type and location.
19. Each condensing unit shall incorporate contacts for electrical demand shedding with optional 3 stage demand control with 12 customizable demand settings.
20. Advanced controls – Each system shall have at least one remote controller capable of controlling up to 16 indoor units.
21. Each system shall be capable of integrating with open protocol BACnet or LonWorks or Modbus building management systems.
22. Low sound levels - Each system shall use indoor and condensing units with quiet operation as low as 27 dB(A).

C. PERFORMANCE:

1. The VRV RELQ\_TA system shall perform as indicated below:

MODEL NUMBER	SYSTEM IEER (Ducted)	SYSTEM IEER (Non-Ducted)
RELQ72TATJU	20.80	24.00
RELQ96TATJU	19.10	24.80
RELQ120TATJU	19.60	23.40
RELQ144TATJU	18.60	22.50
RELQ192TATJU	19.00	22.10
RELQ240TATJU	18.60	21.10

MODEL NUMBER	SYSTEM SCHE (Ducted)	SYSTEM SCHE (Non-Ducted)
RELQ72TATJU	22.60	26.10
RELQ96TATJU	19.70	25.70
RELQ120TATJU	21.40	26.70
RELQ144TATJU	23.80	25.50
RELQ192TATJU	21.20	25.50
RELQ240TATJU	20.80	24.90

MODEL NUMBER	SYSTEM EER (Ducted)	SYSTEM EER (Non-Ducted)
RELQ72TATJU	13.70	15.80
RELQ96TATJU	12.50	15.30
RELQ120TATJU	12.40	13.70
RELQ144TATJU	12.60	12.90
RELQ192TATJU	12.70	12.50
RELQ240TATJU	11.70	12.30

MODEL NUMBER	SYSTEM COP@47°F (Ducted)	SYSTEM COP@47°F (Non-Ducted)
RELQ72TATJU	3.68	4.30
RELQ96TATJU	3.44	4.25
RELQ120TATJU	3.51	3.98
RELQ144TATJU	3.55	3.81
RELQ192TATJU	3.59	3.85
RELQ240TATJU	3.52	3.68

MODEL NUMBER	SYSTEM COP@17°F (Ducted)	SYSTEM COP@17°F (Non-Ducted)
RELQ72TATJU	2.30	2.50
RELQ96TATJU	2.25	2.50
RELQ120TATJU	2.25	2.25
RELQ144TATJU	2.20	2.20
RELQ192TATJU	2.15	2.20
RELQ240TATJU	2.13	2.20

2. Performance Conditions:
  - a. Cooling: Indoor temperature of 80°FDB (26.7°CDB), 67°FWB (19.5°CWB) and outdoor temperature of 95°FDB (35°CDB).
  - b. Heating: Indoor temperature of 70°FDB (21.1°CDB) and outdoor temperature of 47°FDB (8.3°CDB), 43°FWB (6.1°CDB).
  - c. Equivalent piping length: 25ft (7.5m)
3. Cooling or Cooling Dominant Operation:
  - a. The operating range in cooling or cooling dominant simultaneous cooling/heating will be 23°FDB (-5°CDB) ~ 122°FDB (50°CDB).
  - b. Cooling mode indoor room temperature range will be 57-77°FWB (13.8 - 25°CWB).
  - c. Each system as standard shall be capable of onsite reprogramming to allow low ambient cooling operation down to -4°FDB (-20°CDB).
4. Heating or Heating Dominant Operation:
  - a. The operating range in heating or heating dominant simultaneous cooling/heating will be -22° – 61°FWB (-30 – 16°CWB).
    - 1) If an alternate equipment manufacturer is selected, the mechanical contractor shall provide, at their own risk and cost, all additional material and labor to meet low ambient operating condition and performance
  - b. Heating mode indoor room temperature range will be 59°FDB - 80°F DB (15°CDB – 26.7°CDB).

## 1.07 EQUIPMENT

- A. Electrical:
  1. The power supply to the condensing unit shall be:

POWER SUPPLY VOLTAGE	VOLTAGE RANGE
208-230V / 3ph / 60 Hz	187V – 253V (±10%)

MODEL	MCA	MOP	COMPRESSOR RLA
RELQ72TATJU	60.8	70	20.7
RELQ96TATJU	76.5	80	36.8
RELQ120TATJU	83.4	90	39.3
RELQ144TATJU	60.8 + 60.8	70 + 70	21.6 + 21.6
RELQ192TATJU	76.5 + 76.5	80 + 80	38.1 + 38.1
RELQ240TATJU	83.4 + 83.4	90 + 90	40.4 + 40.4

## B. Wiring:

1. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable.
2. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.
3. The control wiring maximum lengths shall be as shown below:

	CONDENSER TO INDOOR UNIT	CONDENSER TO CENTRAL CONTROLLER	INDOOR UNIT TO REMOTE CONTROL
CONTROL WIRING LENGTH	6,560ft (2,000m)	3,280ft (1,000m)	1640 ft. (500m)
WIRE TYPE	16/18 AWG, 2 wire, non-polarity, non-shielded, stranded		

## C. Refrigerant Piping:

1. The system shall be capable of refrigerant piping lengths up to 540ft (165m) actual or 623ft (190m) equivalent from the condensing unit to the furthest indoor unit, a total combined liquid line length of 1640ft (500m) of piping between the condensing and indoor units with 295ft (90m) maximum vertical difference, without any oil traps or additional components.
2. REFNET™ piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance.
  - a. T style joints shall not be acceptable as this will negatively impact proper refrigerant balance and flow for optimum system capacity and performance.

## D. Paint/Corrosion Resistance:

1. Paint and corrosion resistance shall be at a minimum per the table below:

COMPONENT	VRV		
	BASE MATERIAL	SURFACE TREATMENT	COATING THICKNESS
			External & Internal Surface
EXTERNAL PANEL BASE	Galvanized steel	POLYESTER	≥1.5 mils
EXTERNAL FRONT PANEL	Galvanized steel	POLYESTER	≥1.5 mils
PILLAR	Galvanized steel	POLYESTER	≥1.5 mils
COMPRESSOR COVER	ASTM material	Resin Paint	≥0.78 mils
FIN GUARD	Iron wire	Resin Paint	≥0.79 mils
FAN GUARD AND DRUM	Polypropylene	No treatment required	N/A
FAN	Acrylonitrile - glass	No treatment required	N/A
FAN MOTOR FRAME	Resin	No treatment required	N/A
FAN MOTOR SHAFT	Carbon steel	No treatment required	N/A
FAN MOTOR SUPPORT	Galvanized steel	POLYESTER	≥1.5 mils
HEAT EXCHANGERS (FIN ONLY)	Aluminum	Polymer Anti-corrosion surface treatment	Salt Spray 1000 hours, blister rating 10
ELECTRICAL	Hot-dip zinc-	No treatment required	N/A

PARTS BOX	coated steel		
ELECTRICAL PARTS BOARD	Glass cloth / Glass nonwoven cloth material	Insulation Varnish	No specific thickness
SCREWS	Carbon steel wire rods	High corrosion resistance treatment	≥0.28 mils

## PART 2 PRODUCTS

### 2.01 OUTDOOR/CONDENSING UNIT

#### A. General:

1. The condensing unit is designed specifically for use with VRV series components.
2. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls.
3. The refrigeration circuit of the condensing unit shall consist of Daikin inverter flash vapor injection scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports, liquid receiver and suction accumulator.
4. High/Low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.
5. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
6. The connection ratio of indoor units to condensing unit shall be permitted up to 200% of nominal capacity.
7. Each condensing system shall be able to support the connection of up to 41 indoor units dependent on the model of the condensing unit.
8. The sound pressure level standard shall be that value as listed in the Daikin engineering manual for the specified models at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during night time or via an external input.
9. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
10. The condensing unit shall be modular in design and should allow for side-by-side installation.
11. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
12. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
13. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.
14. The condensing unit shall be capable of heating operation at -22°F WB (-20°C WB) ambient temperature without additional low ambient controls or an auxiliary heat source.
15. The multiple condenser VRV Aurora systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.

#### B. Unit Cabinet:

1. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

#### C. Fan:

- The condensing unit shall consist of one or more propeller type, direct-drive 350, 400 or 800W fan motors that have multiple speed operation via a DC (digitally commutating) inverter. Reference table below.

MODEL NUMBER	FAN MOTOR OUTPUT (W) & QUANTITY
RELQ72TATJU	800 x 2
RELQ96TATJU	800 x 2
RELQ120TATJU	800 x 2
RELQ144TATJU	(800 x 2) x 2
RELQ192TATJU	(800 x 2) x 2
RELQ240TATJU	(800 x 2) x 2

- The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.
- The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 7283 CFM to 17612 CFM dependent on model specified.
- The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
- The fan motor shall be provided with a fan guard to prevent contact with moving parts.

D. Sound:

- Nominal sound pressure levels shall be as shown below.

MODEL NUMBER	SOUND PRESSURE LEVEL dB(A)
RELQ72TATJU	60
RELQ96TATJU	61
RELQ120TATJU	63.5
RELQ144TATJU	63
RELQ192TATJU	64
RELQ240TATJU	67

- Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature. Operation sound level shall be selectable from 3 steps.

OPERATION SOUND dB(A)	NIGHT MODE SOUND PRESSURE LEVEL dB(A) APPROX.
Level 1	55
Level 2	50
Level 3	45

E. Condenser Coil:

- The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
- The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
- The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
- The fins shall be coated with an anti-corrosion hydrophilic blue coating as standard from factory with a salt spray test rating of 1000hr per ASTM test standards.



5. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for a drain pan heater. The lower part of the coil shall be used for inverter cooling and be on or off during heating operation enhancing the defrost operation.
  - a. An alternate manufacturer must provide a drain pan heater to enable adequate defrosting of the unit in defrost operation.
6. The condensing unit shall be factory equipped with condenser coil guards on all sides.

F. Compressor:

1. The Daikin inverter Flash Vapor injection scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit.
  - a. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value.
    - 1) Non –inverter-driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
2. The inverter driven compressors in the condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “K-type”.
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type.
  - a. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be as low as 4.3% to 100%.
5. The compressor’s motor shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
8. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insulation.
9. In the event of compressor failure, the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be manually activated to specifically address this condition for single module and manifold systems.
10. In the case of multiple condenser modules, combined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours. When connected to a central control system sequential start is activated for all system on each DIII network.
11. Compressor configurations:

MODEL NUMBER	COMPRESSOR MOTOR OUTPUT (W) & QUANTITY	QUANTITY	COMPRESSOR TYPES
RELQ72TATJU	3,900	1	Inverter controlled
RELQ96TATJU	5,100	1	Inverter controlled
RELQ120TATJU	6,600	1	Inverter controlled
RELQ144TATJU	3,900 + 3,900	2	All inverter controlled
RELQ192TATJU	5,000 + 5,000	2	All inverter controlled
RELQ240TATJU	6,500 + 6,500	2	All inverter controlled

## 2.02 BRANCH SELECTOR UNITS

### A. General:

1. The BSQ36TVJ, BSQ60TVJ, BSQ96TVJ, BS4Q54TVJ, BS6Q54TVJ, BS8Q54TVJ, BS10Q54TVJ and BS12Q54TVJ branch selector boxes are designed specifically for use with VRV Aurora series heat recovery system components.
  - a. These selector boxes shall be factory assembled, wired, and piped.
  - b. These BSQ\_T / BS (4/6/8/10/12)Q54T branch controllers must be run tested at the factory.
  - c. These selector boxes must be mounted indoors.
  - d. When simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.
  - e. The number of connectable indoor units shall be in accordance with the table below:

MODEL NUMBER	MAXIMUM CONNECTABLE COOLING CAPACITY	MAXIMUM NUMBER OF CONNECTABLE INDOOR UNITS PER BRANCH
BSQ36TVJ	36,000 Btu/h	4
BSQ60TVJ	60,000 Btu/h	8
BSQ96TVJ	96,000 Btu/h	8
BS4Q54TVJ	144,000 Btu/h	5
BS6Q54TVJ	216,000 Btu/h	5
BS8Q54TVJ	290,000 Btu/h	5
BS10Q54TVJ	290,000 Btu/h	5
BS12Q54TVJ	290,000 Btu/h	5

### B. Unit Cabinet:

1. These units shall have a galvanized steel plate casing.
2. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch.
3. The cabinet shall contain one subcooling heat exchanger per branch.
4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.
5. Nominal sound pressure levels must be measured and published on the submittals by the manufacturer. These sound levels must not exceed the values below.
  - a. If an alternative manufacturer is selected, the mechanical contractor shall provide, at their own cost and expense, any additional material and labor to meet the published sound levels above.

MODEL NUMBER	SOUND LEVEL dB(A) OPERATION	SOUND LEVEL dB(A) MAX
BSQ36TVJ	35	40
BSQ60TVJ	41	45
BSQ96TVJ	41	45
BS4Q54TVJ	38	45
BS6Q54TVJ	39	47
BS8Q54TVJ	39	47
BS10Q54TVJ	40	48
BS12Q54TVJ	40	48

### 6. Dimensions (H x L x W)

- a. BSQ\_T unit shall be no larger than 8-1/8" x 15-1/4" x 12-13/16" (206.4mm x 387.4mm x 325.4mm).

- b. BS4Q\_T shall be no larger than 11-3/4" x 18-15/16" x 14-9/16" (298.5mm x 481mm x 370mm).
  - c. BS(6/8)Q\_T shall be no larger than 11-3/4" x 22-13/16" x 18-15/16" (298.5mm x 579.4mm x 481mm).
  - d. BS(10/12)Q\_T shall be no larger than 11-3/4" x 32-5/16" x 18-15/16" (298.5mm x 821mm x 481mm).
7. Refrigerant Valves:
- a. The unit shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
  - b. The refrigerant connections must be of the braze type.
  - c. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.
  - d. Each circuit shall have at least one (36,000 Btu/h indoor unit or smaller for the BSQ36TVJ, 54,000 Btu/h indoor unit or smaller for the BS(4/6/8/10/12)Q54TVJ, 60,000 Btu/h indoor unit or smaller for the BSQ60TVJ and 96,000 Btu/h indoor unit or smaller for the BSQ96TVJ) branch selector box.
  - e. Multiple indoor units may be connected to a branch selector box with the use of a REFNET™ joint provided they are within the capacity range of the branch selector.
8. Condensate Removal:
- a. The unit shall not require provisions for condensate removal. A safety device or secondary drain pan shall be installed by the mechanical contractor to comply with the applicable mechanical code, if an alternate manufacturer is selected.
9. Electrical:
- a. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
  - b. The unit shall be capable of operation within the limits of 187 volts to 255 volts.
  - c. The minimum circuit amps (MCA) shall be 0.1 and the maximum overcurrent protection amps (MOP) shall be 15.
  - d. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded 2 conductor cable.

### 2.03 VRV INDOOR UNITS

### 2.04 FXFQ\_T – ROUND FLOW SENSING CEILING CASSETTE UNIT

- A. General: Daikin indoor unit model FXFQ\_T shall be a round flow ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, direct drive DC (ECM) type fan, for installation into the ceiling cavity equipped with an air panel grill. It shall be available in capacities from 7,500 Btu/h to 48,000 Btu/h. Model numbers are FXFQ07TVJU, FXFQ09TVJU, FXFQ12TVJU, FXFQ15TVJU, FXFQ18TVJU, FXFQ24TVJU, FXFQ30TVJU, FXFQ36TVJU, FXFQ48TVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a round flow air distribution type, fresh white, impact resistant decoration panel, or optional self-cleaning filter panel. The supply air is distributed via four individually motorized louvers. To save energy and optimize occupancy comfort, the indoor unit shall be equipped with built in occupancy sensor and surface temperature sensor. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73, BRC2A71 and BRC1E52B7. The indoor units sound pressure shall range from 30 dB(A) to 45 dB(A) at High speed measured at 5 feet below the unit.
- B. Performance: As scheduled.

## C. Indoor Unit:

1. The Daikin indoor unit FXFQ\_T shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The round flow supply air flow can be field modified to 23 different airflow patterns to accommodate various installation configurations including corner installations.
5. Return air shall be through the concentric panel, which includes a resin net, mold resistant, antibacterial filter.
6. The indoor units shall be equipped with a condensate pan with antibacterial treatment and condensate pump. The condensate pump provides up to 33-1/2" of lift from bottom of unit to top of drain piping and has a built in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
9. The voltage range will be 253 volts maximum and 187 volts minimum.
10. To save energy and optimize occupancy comfort, the indoor unit shall be equipped with built in occupancy sensor and surface temperature sensor.
11. Supplied air shall be directed automatically by four individually controlled louvers.

## D. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. Four auto-adjusted louvers shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns allowing for simpler installation in irregular spaces.
4. Fresh air intake shall be possible by way of Daikin's optional fresh air intake kit.
5. A branch duct knockout shall exist for branch ducting of supply air.
6. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
7. Optional high efficiency air filters are available for each model unit.

## E. Fan:

1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.08 to 0.16 HP.
3. The airflow rate shall be available in three manual settings.
4. The DC fan shall be able to automatically adjust the fan speed in 5 speeds based on the space load.
5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings to allow operation with the high efficiency air filter options.
6. The fan motor shall be thermally protected.

## F. Filter:

1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin and antibacterial treatment.
2. Optional high efficiency disposable air filters shall be available.
3. Optional Self-Cleaning Filter Panel, which performs automatic filter cleaning up to once a day, with dust collection box that indicates when to be emptied.

## G. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 2, or 3-row cross fin copper evaporator coil with up to 21 FPI design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/4 inch outside diameter PVC.
  5. A condensate pan with antibacterial treatment shall be located under the coil.
  6. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
  4. For the Sensing functions and the optional Self-Cleaning Filter functions, Remote controller BRC1E73/BRC1E52B7 shall be used. Consult with Daikin prior to applying controls.

## **2.05 FXZQ – 4 WAY CEILING CASSETTE UNIT (2'X2')**

- A. General: Daikin indoor unit model FXZQ shall be a ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity equipped with an air panel grill. It shall be available in capacities from 7,500 Btu/h to 18,000 Btu/h. Model numbers are FXZQ07MVJU9, FXZQ09MVJU9, FXZQ12MVJU9, FXZQ15MVJU9, FXZQ18MVJU9 to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a four-way air distribution type, white (RAL9010), impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. The indoor units sound pressure shall range from 29 dB(A) to 34 dB(A) at low speed measured at 5 feet below the unit.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXZQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.

3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations.
  5. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.
  6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 21" of lift and has a built in safety shutoff and alarm.
  7. The indoor units shall be equipped with a return air thermistor.
  8. All electrical components are reached through the decoration panel, which reduces the required side service access.
  9. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  10. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be space saving and shall be located into the ceiling.
  2. Three auto-swing positions shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
  3. The airflow of the unit shall have the ability to shut down one or two sides allowing for simpler corner installation.
  4. Fresh air intake shall be possible by way of direct duct installation to the side of the indoor unit cabinet.
  5. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be direct-drive turbo fan type with statically and dynamically balanced impeller with high and low fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.06 to 0.12 HP.
  3. The airflow rate shall be available in high and low settings.
  4. The fan motor shall be thermally protected.
- F. Filter:
1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin.
- G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/32 inch outside diameter PVC.
  5. A condensate pan shall be located under the coil.
  6. A condensate pump with a 21 inch lift shall be located below the coil in the condensate pan with a built in safety alarm.
  7. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).

3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

## **2.06 FXMQ\_M – CONCEALED CEILING DUCTED UNIT (MED. STATIC)**

- A. General: Daikin indoor unit FXMQ\_M shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available in capacities from 72,000 Btu/h to 96,000 Btu/h. Model numbers are FXMQ72MVJU and FXMQ96MVJU to be connected to outdoor unit model RXYQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height cabinet making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. The indoor units sound pressure shall be 48 dB(A) at low speed measured 5 feet below the ducted unit.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXMQ\_M shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have an adjustable external static pressure switch.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. The indoor units shall be equipped with a return air thermistor.
  5. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  6. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
  2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be direct-drive Sirocco type fan, statically and dynamically balanced impeller with high and low fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz, with a motor output of 0.51 HP.
  3. The airflow rate shall be available in high and low settings.
  4. The fan motor shall be thermally protected.
  5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.

6. Fan motor external static pressure for nominal airflow:
- F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 3 row cross fin copper evaporator coil with 13 fpi design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1-5/16 inch outside diameter PVC.
  5. A thermistor will be located on the liquid and gas line.
- G. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- H. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

## **2.07 FXMQ\_PB - CONCEALED CEILING DUCTED UNIT (MED. STATIC)**

- A. General: Daikin indoor unit FXMQ\_PB shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, direct-drive DC (ECM) type fan with auto CFM adjustment at commissioning, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available in capacities from 7,500 Btu/h to 48,000 Btu/h. Model numbers are FXMQ07PBVJU, FXMQ09PBVJU, FXMQ12PBVJU, FXMQ15PBVJU, FXMQ18PBVJU, FXMQ24PBVJU, FXMQ30PBVJU, FXMQ36PBVJU, FXMQ48PBVJU, and FXMQ54PBVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height cabinet making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. Included as standard equipment, a condensate drain pan and drain pump kit that pumps to 18-3/8" from the drain pipe opening. The indoor units sound pressure shall range from 29 dB(A) to 43 dB(A) at low speed measured 5 feet below the ducted unit.
- B. Performance: As Scheduled.
- C. Indoor Unit:



1. The Daikin indoor unit FXMQ\_PB shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipment with automatically adjusting external static pressure logic that is selectable during commissioning. This adjusts the airflow based on the installed external static pressure.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 18-3/8" of lift from the center of the drain outlet and has a built in safety shutoff and alarm.
  5. The indoor units shall be equipped with a return air thermistor.
  6. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  7. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
  2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
  2. The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
  3. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range of 0.12 to 0.47 HP respectively.
  4. The airflow rate shall be available in three settings.
  5. The fan motor shall be thermally protected.
  6. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
  7. Fan motor external static pressure range for nominal airflow:
- F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 3 row cross fin copper evaporator coil with 15 fpi design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1-1/4" outside diameter PVC.
  5. A condensate pan shall be located under the coil.
  6. A condensate pump with an 18-3/8" lift shall be located below the coil in the condensate pan with a built in safety alarm.
  7. A thermistor will be located on the liquid and gas line.
- G. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- H. Control:

1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

## **2.08 FXDQ – SLIM DUCT CONCEALED CEILING UNIT**

- A. General: Daikin indoor unit model FXDQ shall be a Slim, built-in ceiling concealed fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity. The unit shall be constructed of a galvanized steel casing. It shall be available in capacities from 7,000 Btu/h to 24,000 Btu/h. Model numbers are FXDQ07MVJU, FXDQ09MVJU, FXDQ12MVJU, FXDQ18MVJU, and FXDQ24MVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a horizontal discharge air with horizontal return air or bottom return air configuration. All models feature a very low height (7-7/8") making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. Included as standard equipment, a long-life filter that is mold resistant and a condensate drain pan and drain pump kit that pumps to 23-5/8" from the drain pipe opening. The indoor units sound pressure level shall range from 29 dB(A) to 32 dB(A) at low speed and 33 dB(A) to 36 dB(A) at high speed 5 feet below the suction grille.
- B. Performance: As scheduled.
- C. Indoor Unit:
1. The Daikin indoor unit FXDQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have adjustable external static pressure capabilities.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. Return air shall be through a resin net mold resistant filter.
  5. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 23-5/8" of lift from the center of the drain outlet and has a built in safety shutoff and alarm.
  6. The indoor units shall be equipped with a return air thermistor.
  7. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  8. The voltage range will be 253 volts maximum and 187 volts minimum.
  9. Switch box shall be reached from the side or bottom for ease of service and maintenance.
- D. Unit Cabinet:
1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
  2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be direct-drive Sirocco type fan, statically and dynamically balanced impeller with high and low fan speeds available.

2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 62W to 130W.
  3. The airflow rate shall be available in high and low settings.
  4. The fan motor shall be thermally protected.
  5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
  6. Fan motor external static pressure range for nominal airflow:
- F. Filter:  
The return air shall be filtered by means of a washable long-life filter with mildew proof resin.
- G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 2 or 3-row cross fin copper evaporator coil with 14 FPI design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1-1/32" outside diameter PVC.
  5. A condensate pan shall be located under the coil.
  6. A condensate pump with a 23-5/8" lift shall be located below the coil in the condensate pan with a built in safety alarm.
  7. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
- J. Optional Accessories Available:
1. Remote "in-room" sensor kit KRCS01-1B (recommended).
    - a. The Daikin wall mounted, hard wired remote sensor kit is recommended for ceiling-embedded type fan coils, which often result in a difference between set temperature and actual temperature. The sensor for detecting the temperature can be placed away from the indoor unit (branch wiring is included in the kit).

**2.09 FXHQ - CEILING SUSPENDED CASSETTE UNIT**

- A. General: Daikin indoor unit FXHQ shall be a ceiling suspended fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, for installation onto a wall or ceiling within a conditioned space. This compact design with finished white casing shall be available in capacities from 12,000 Btu/h to 36,000 Btu/h. Model numbers are FXHQ12MVJU, FXHQ24MVJU and FXHQ36MVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. A mildew-proof, polystyrene condensate drain pan and resin net mold resistant filter shall be included as standard equipment. The indoor units sound pressure shall range from 32 dB(A) to 38 dB(A) at low speed measured at 3.3 feet below and from the unit.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXHQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have an auto-swing louver which ensures efficient air distribution, which closes automatically when the unit stops. The remote controller shall be able to set five (5) steps of discharge angle. The front grille shall be easily removed for washing. The discharge angle shall automatically set at the same angle as the previous operation upon restart. The drain pipe can be fitted to from the rear, top or left and right sides of the unit.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. Return air shall be through a resin net mold resistant filter.
  5. The indoor units shall be equipped with a condensate pan.
  6. The indoor units shall be equipped with a return air thermistor.
  7. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  8. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be affixed to a factory supplied wall/ceiling hanging brackets and located in the conditioned space.
  2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be a direct-drive cross-flow fan, statically and dynamically balanced impeller with high and low fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range 62W to 130W.
  3. The airflow rate shall be available in high and low settings.
  4. The fan motor shall be thermally protected.
- F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.

3. The coil shall be a 2-row cross fin copper evaporator coil with 15 fpi design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1 inch outside diameter PVC.
  5. A thermistor will be located on the liquid and gas line.
  6. A condensate pan shall be located in the unit.
- G. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- H. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
- I. Optional Accessories:
1. A condensate pump (DACA-CP3-1).

## 2.10 FXAQ – WALL MOUNTED UNIT

- A. General: Daikin indoor unit FXAQ shall be a wall mounted fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, for installation onto a wall within a conditioned space. This compact design with finished white casing shall be available in capacities from 7,500 Btu/h to 24,000 Btu/h. Model numbers are FXAQ07PVJU, FXAQ09PVJU, FXAQ12PVJU, FXAQ18PVJU and FXAQ24PVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71. A mildew-proof, polystyrene condensate drain pan and resin net mold resistant filter shall be included as standard equipment. The indoor units sound pressure shall range from 31 dB(A) to 41 dB(A) at low speed measured at 3.3 feet below and from the unit.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXAQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have an auto-swing louver which ensures efficient air distribution, which closes automatically when the unit stops. The remote controller shall be able to set five (5) steps of discharge angle. The front grille shall be easily removed for washing. The discharge angle shall automatically set at the same angle as the previous operation upon restart. The drain pipe can be fitted to from either left or right sides.

2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. Return air shall be through a resin net mold resistant filter.
  5. The indoor units shall be equipped with a condensate pan.
  6. The indoor units shall be equipped with a return air thermistor.
  7. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  8. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be affixed to a factory supplied wall mounting template and located in the conditioned space.
  2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be a direct-drive cross-flow fan, statically and dynamically balanced impeller with high and low fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range 0.054 to 0.058 HP.
  3. The airflow rate shall be available in high and low settings.
  4. The fan motor shall be thermally protected.
- F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 2-row cross fin copper evaporator coil with 14 fpi design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 11/16 inch outside diameter PVC.
  5. A thermistor will be located on the liquid and gas line.
  6. A condensate pan shall be located in the unit.
- G. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- H. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
- I. Optional Accessories:
1. A condensate pump (DACA-CP3-1)

**2.11 FXTQ – VERTICAL AIR HANDLING UNIT**

- A. General: Daikin indoor unit FXTQ\_PA shall be a floor mounted vertical or horizontal right air handling unit, operable with refrigerant R-410A, equipped with an electronic expansion valve and direct-drive ECM type fan with auto CFM adjustment, for installation within a conditioned space. When installed in a vertical configuration it shall have top discharge air and bottom return air. When installed in a horizontal right configuration it shall have a horizontal discharge air and horizontal return air. This compact design with pre-painted heavy-gauge steel casing shall be available in capacities from 12,000 Btu/h to 54,000 Btu/h. Model numbers are FXTQ12PAVJU, FXTQ18PAVJU, FXTQ24PAVJU, FXTQ30PAVJU, FXTQ36PAVJU, FXTQ42PAVJU, FXTQ48PAVJU and FXTQ54PAVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. A KRCS01-4B remote temperature sensor kit shall be required for all FXTQ indoor units not utilizing the thermistor in the Daikin remote controller BRC1E72. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73 and BRC2A71.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXTQ\_PA components shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, brazed connections, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. Return air shall be through an optional or field supplied filter.
  5. Condensate draining shall be made via gravity or external condensate pump.
  6. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  7. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be constructed with sound absorbing, foil-faced insulation to control air leakage.
  2. Select an installation location with adequate structural support, space for service access and clearance for air return and supply duct connections.
  3. A field supplied secondary drain pan must be installed.
- E. Fan:
1. The fan shall be a direct-drive Sirocco type fan, statically and dynamically balanced impeller with high and low fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range 0.2 to 0.5 HP.
  3. The airflow rate shall be available in high setting.
  4. The fan motor shall be thermally protected.
  5. Fan motor external static pressure for nominal airflow:
- F. Filter:
1. The return air shall be filtered by means of a field supplied filter.
- G. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 4-row cross fin copper evaporator coil with 15 fpi design completely factory tested.
  4. The refrigerant connections shall be brazed connections and the condensate will be 3/4 inch outside diameter PVC.
  5. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

## 2.12 FXUQ – 4 WAY CEILING SUSPENDED CASSETTE UNIT

- A. General: Daikin indoor unit model FXUQ shall be a ceiling suspended cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation onto a ceiling within a conditioned space. It shall be available in capacities from 18,000 Btu/h to 36,000 Btu/h. Model numbers are FXUQ18PVJU, FXUQ24PVJU, FXUQ30PVJU, FXUQ36PVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a four-way air distribution type, fresh white, impact resistant with a washable panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 60°. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E73. The indoor units sound pressure shall range from 36 dB(A) to 40 dB(A) at low speed measured at 5 feet below the unit.
- B. Performance: As scheduled
- C. Indoor Unit:
1. The Daikin indoor unit FXUQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
  2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  3. Both refrigerant lines shall be insulated from the outdoor unit.
  4. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations.



5. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.
  6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 23-5/8" of lift and has a built in safety shutoff and alarm.
  7. The indoor units shall be equipped with a return air thermistor.
  8. All electrical components are reached through the decoration panel, which reduces the required side service access.
  9. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  10. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
1. The cabinet shall be space saving and shall be located into the ceiling.
  2. Three auto-swing positions shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
  3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns allowing for simpler installation in irregular spaces.
  4. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- E. Fan:
1. The fan shall be direct-drive turbo fan type with statically and dynamically balanced impeller with three fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.06 to 0.14 HP.
  3. The airflow rate shall be available in three settings.
  4. The fan motor shall be thermally protected.
- F. Filter:
1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin.
- G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coil shall be a 3-row cross fin copper evaporator coil with 21 FPI design completely factory tested.
  4. The refrigerant connections shall be flare connections and the condensate will be 1 inch outside diameter PVC.
  5. A condensate pan with antibacterial treatment shall be located under the coil.
  6. A condensate pump with a 23-5/8 inch lift shall be located below the coil in the condensate pan with a built-in safety alarm.
  7. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.

3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

### 2.13 FXEQ – ONE WAY BLOW CASSETTE UNIT

- A. General: Daikin indoor unit model FXEQ shall be a ceiling suspended cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation onto a ceiling within a conditioned space. It shall be available in capacities from 7,500 Btu/h to 24,000 Btu/h. Model numbers are FXEQ07PVJU, FXEQ09PVJU, FXEQ12PVJU, FXEQ15PVJU, FXEQ18PVJU, FXEQ24PVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a one-way air distribution type, fresh white, impact resistant with a washable panel. The supply air is distributed via motorized vertical and horizontal louvers which can be adjusted from 0° to 45° and 20° to 70° respectively. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E73. The indoor units sound pressure shall range from 26 dB(A) to 38 dB(A) at low speed measured at 3.3 feet below the unit.
- B. Performance: As scheduled
- C. Indoor Unit:
  1. The Daikin indoor unit FXEQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate lift pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
  2. The indoor unit shall be able to process up to 15% fresh air
  3. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  4. Both refrigerant lines shall be insulated from the outdoor unit.
  5. Return air shall be through the flat back panel, which includes a white resin net mold resistant filter.
  6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 33-716" of lift and has a built in safety shutoff and alarm.
  7. The indoor units shall be equipped with a return air thermistor.
  8. Motor and some of the electrical components shall be reachable through the decoration panel.
  9. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  10. The voltage range will be 253 volts maximum and 187 volts minimum.
- D. Unit Cabinet:
  1. The cabinet shall be space saving and shall be located into the ceiling.
  2. The cabinet shall have a built in 4" knock-out to connect fresh air intake
  3. The cabinet shall be constructed with sound absorbing foamed polyurethane noise insulation.
  4. The cabinet shall be equipped with foamed polystyrene and foamed polyethylene heat insulation.
- E. Fan:
  1. The fan shall be direct-drive Sirocco fan type with statically and dynamically balanced impeller with five selectable fan speeds available.
  2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.11 to 0.15 HP.
  3. The airflow rate shall be available in five settings.

4. The fan motor shall be thermally protected.
- F. Filter:
1. The return air shall be filtered by means of a mold resistant Resin net filter.
  2. The filter shall be accessible from the decoration panel.
- G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  3. The coils for units up to 1 ton shall be a 2-row cross fin copper evaporator coil with 20.5 FPI design completely factory tested for the
  4. The coils for units from 1.25 ton to 2.0 ton shall be 2-row cross fin copper evaporator coil with 20.5 FPI and an additional row with 15.9 FPI.
  5. The refrigerant connections shall be flare connections and the condensate will be 1-1/32 inch outside diameter PVC.
  6. A condensate pan with antibacterial treatment shall be located under the coil.
  7. A condensate pump with a 33-7/16 inch lift shall be located below the coil in the condensate pan with a built-in safety alarm.
  8. A thermistor will be located on the liquid and gas line.
- H. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
  2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- I. Control:
1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
  2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
  3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
- J. Standard Accessories Required:
1. Decoration panel BYEP40AW1 shall be required for operation of FXEQ07 PVJU thru FXEQ15PVJU
  2. Decoration panel BYEP63AW1 shall be required for operation of FXEQ18PVJU and FXEQ24PVJU.
- K. Optional Accessories Available:
1. Remote controller wire type (BRC1E73)

### **PART 3 PERFORMANCE**

#### **3.01 THE VRV IV REYQ\_T SYSTEM SHALL PERFORM AS SCHEDULED**

### 3.02 OPERATING RANGE

- A. The operating range in cooling or cooling dominant simultaneous cooling/heating will be (-4°F) 23°F DB ~ 122°F DB.
- B. Each system as standard shall be capable of onsite reprogramming to allow low ambient cooling operation down to -4°F DB.
- C. The operating range in heating or heating dominant simultaneous cooling/heating will be -13°F WB – 60°F WB.
- D. If an alternate equipment manufacturer is selected, the mechanical contractor shall provide, at their own risk and cost, all additional material and labor to meet low ambient operating condition and performance.
  - 1. Cooling mode indoor room temperature range will be 57°F-77°F WB.
  - 2. Heating mode indoor room temperature range will be 59°F-80°F DB.

## PART 4 VRV CONTROLS

### 4.01 VRV CONTROLS

- A. The VRV Controls Network is made up of local remote controllers, multi-zone controllers, advanced multi-zone controllers, and open protocol network devices that transmit information via the communication bus. The VRV Controls Network shall also have the ability to be accessed via a networked PC. The VRV Controls Network supports operation monitoring, scheduling, error e-mail distribution, general user software, tenant billing, maintenance support, and integration with Building Management Systems (BMS) using open protocol via BACnet<sup>®</sup> interface, Lonworks<sup>®</sup> interface or Modbus<sup>®</sup> adapter; all of which blend to provide the optimal control strategy for the best HVAC comfort solution. Third party equipment shall be able to be controlled as detailed and needed.
- B. General: The advanced multi-zone controller will require 24 VAC to power the controller. The advanced multi-zone controller shall supply 16 VDC to the communication bus on the F1F2 (out-out) terminal of the outdoor unit. The voltage may rise or fall in relation to the transmission packets that are sent and received.
- C. Wiring: The advanced multi-zone controller communication wiring shall be terminated in a daisy chain design at the outdoor unit, which is then daisy chained to branch selector (Heat Recovery system), then daisy chained to each indoor unit in the system and terminating at the farthest indoor unit. The termination of the wiring shall be non-polar. The remote control wiring shall run from the indoor unit control terminal block to the remote controller connected with that indoor unit.
- D. Wiring size: Wiring shall be non-shielded, 2-conductor sheathed vinyl cord or cable, and 18 AWG stranded copper wire.

### 4.02 ADVANCED MULTI-ZONE CONTROLLERS

- A. The Daikin AC VRV advanced multi-zone controllers are compatible with all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. The advanced multi-zone controller wiring consist of a non-polar two-wire connection to the outdoor unit. The advanced multi-zone controllers may be wall-mounted and can be adjusted to maintain the optimal operation of up to 64 connected indoor unit groups and 128 indoor units. Set temperatures can be adjusted in increments of 1°F. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address.

- B. DCM601A71: intelligent Touch Manager (iTM) V2.XX.XX
1. The intelligent Touch Manager (version 2.04) shall provide control for all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of controlling a maximum of 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The intelligent Touch Manager shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
  2. The controller wiring shall consist of a non-polar two-wire connection to the indoor unit at terminals F1F2 (out-out) of the outdoor unit. The intelligent Touch Manager is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).
  3. The intelligent Touch Manager can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface, and Modbus adapter to control the same indoor unit groups. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each remote controller group associated with the intelligent Touch Manager. DIII-NET address can be set for one (1) indoor unit or each indoor unit in the remote controller group. No more than 2 remote controllers can be placed in the same group.
  4. The intelligent Touch Manager shall be equipped with two RJ-45 Ethernet ports for 100 Mbps network communication to support interconnection with a network PC via the Internet, Local Area Network (LAN), or connection with a non-networked PC after completed installation.
  5. Web access functions shall be available so that facility staff can securely log into each Intelligent Touch Manager via the PC's web browser to support monitoring, scheduling, error recognition, and general user functions. Error emails are also sent to designated email addresses. An additional optional software function Power Proportional Distribution (PPD) tenant billing shall also be available. The optional software shall require advanced purchase and can only be activated upon receipt of a license activation key from Daikin AC.
  6. Mounting: The intelligent Touch Manager shall be mounted on the wall or into the mounting fixtures included with the intelligent Touch Manager.
  7. Display Features:
    - a. The intelligent Touch Manager shall be approximately 11.42" x 9.57" x 1.97' in size with a backlit 10.4" LCD display.
    - b. Display information shall be selectable from English, French, Italian, Korean, Dutch, Portuguese, Chinese, Japanese, German, or Spanish.
    - c. Featured backlit LCD with auto off after 30 minutes (default) is adjustable between 1 to 60 minutes, or the choice of 3 different screen savers.
    - d. Area and Group configuration
      - 1) Area contains one (1) or more Area(s) or Group(s)
      - 2) A Group may be an indoor unit, Di, Dio point that has a DIII-Net address
      - 3) A Group may be an external management point such as a Di, Do, Bi, Bo, Bv, Ai, Ao, Av, Mi, Mo, Mv that does not have a DIII-Net address
    - e. An Area is a tiered group where management points (indoor unit, digital input/output, and analog input/output groups) can be monitored and controlled by global settings. Up to 650 Areas can be created. Area hierarchy can have up to 10 tiered levels (ex. top level: 1<sup>st</sup> floor West, 2<sup>nd</sup> level: offices, hallways, 3<sup>rd</sup> level: Office 101, 102, and 103, etc.). Area configuration shall classify levels of monitoring and control for each management point
      - 1) Areas and Groups may be assigned names (ex. Office 101, Lobby, North Hallway, etc.)
    - f. The Controller shall display On/Off, Operation Mode, Setpoint, Space Temperature, Louver Position, Fan Speed for each Area or Group.

- g. The Controller shall display Date (mm/dd/yyyy, yyyy/mm/dd, or dd/mm/yyyy format selectable) and day of the week along with the time of day (12hr or 24hr display selectable).
  - h. The Controller shall adjust for daylight savings time (DST) automatically.
  - i. Display information shall be updated every 3 seconds to show the latest status of the indoor unit groups.
  - j. System status icons shall display On/Off (color coded), Malfunction/Error (color coded), Forced Stop, Setback, Filter, Maintenance, and Screen Lock.
  - k. The controller shall display the temperature setpoint in one degree increments with a range of 60°F – 90°F, 1°F basis (16°C – 32°C, 0.1°C basis).
    - 1) Display of temperature setpoint information shall be configurable for Fahrenheit or Celsius
  - l. Display shall reflect room temperature in one tenth degree increments with a range of 58°F – 248°F, 0.1°F basis (-50°C – 120°C, 0.1°C basis) with 0.1°C accuracy.
    - 1) Display of room temperature information shall be configurable for Fahrenheit or Celsius
  - m. The Menu List shall be used to configure options and display information for each Area or Group.
  - n. Error status shall be displayed in the event of system abnormality/error with one of three color coded icons placed over the indoor unit icon or lower task bar.
    - 1) System errors are generated when the intelligent Touch Manager system with other VRV controls systems are combined incorrectly or power proportional distribution calculation errors occur. The intelligent Touch Manager shall display the error with a red triangle placed on the lower task bar.
    - 2) Unit errors occurring within the VRV system shall be displayed with a yellow triangle placed over the indoor unit icon
    - 3) Limit errors are based upon preconfigured analog input upper and lower limit settings and are generated when the limits have been met. When limit error is generated a yellow triangle will be placed over the unit icon.
    - 4) Communication errors between the intelligent Touch Manager and the indoor units shall be displayed with a blue triangle placed over the indoor unit icon
    - 5) Error history shall be available for viewing for up to 500,000 errors/abnormality events with operation events.
  - o. Layout View
    - 1) Capable of displaying site floor plan or graphical user interface (GUI) as the background for visual navigation. Indoor unit, DIII-Net Di and Dio, and External Di, Do, Ai, Ao, Av, Mi, Mo, Mv icons with operational status can be placed on the floor layout or GUI
      - a) Up to 4 status points can be assigned to the indoor unit icon (room name, room temperature, setpoint, and mode)
      - b) Digital input and output icons will display On/Off status
      - c) Analog icons will display Ai, Ao and Av.
      - d) Multistate icons will display Mi, Mo and Mv.
    - 2) Up to 60 floor layout sections can be created
9. Basic Operation:
- a. Capable of controlling by Area(s) or Group(s)
  - b. Controller shall control the following group operations:
    - 1) On/Off
    - 2) Operation Mode (Cool, Heat, Fan, Dry, and Auto)
    - 3) Independent Cool and Heat dual Setpoints or single Setpoint for current mode in the occupied period
    - 4) Controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Area or Group configurations
    - 5) Independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode adjustable to 50 - 95°F

- a) Setup and Setback setpoints can only be set outside of the occupied setpoint range
    - b) The Setup and Setback setpoints will automatically maintain a 2°F fixed differential from the highest possible occupied setpoints
    - c) The recovery differential shall be 4°F (default) and adjustable between 2 – 10°F
    - d) Settings shall be applied based upon the Area or Group configurations
  - 6) Fan Speed
    - i. Up to 3 speeds (dependent upon indoor unit type)
  - 7) Airflow direction (dependent upon indoor unit type)
    - ii. 5 fixed positions or oscillating
  - 8) Remote controller permit/prohibit of On/Off, Mode, and Setpoint
  - 9) Lock out setting for Intelligent Touch Manager display
  - 10) Indoor unit Group/Area assignment
  - c. Capable of providing battery backup power for the clock at least 1 year when no AC power is applied.
    - 1) The battery can last at least 13 years when AC power is applied
    - 2) Settings stored in non-volatile memory
10. Programmability:
- a. Controller shall support weekly schedule settings.
    - 1) 7 day weekly pattern (7)
    - 2) Weekday + Weekend (5 + 2)
    - 3) Weekday + Saturday + Sunday (5 + 1 + 1)
    - 4) Everyday (1)
    - 5) The schedule shall have the capabilities of being enabled or disabled
    - 6) 100 independent schedules configurable with up to 20 events settable for each days schedule
      - a) Each scheduled event shall specify time and target Area or Group
      - b) Each scheduled event shall include On/Off, Optimum Start, Operation Mode, Occupied Setpoints, Setback Setpoints, Remote Controller On/Off Prohibit, Remote Controller Mode Prohibit, Remote Controller Setpoint Prohibit, Timer Extension Setting, Fan Speed, and Setpoint Range Limit
      - c) Time setting in 1-minute increments
      - d) Timer Extension shall be used for a timed override (settable from 30 – 180 minutes) to allow indoor unit operation during the unoccupied period.
    - 7) A maximum of 40 exception days can be schedule on the yearly schedule (repeats yearly)
      - a) Exception days shall be used to override specified days on the weekly schedule based upon irregular occupied/unoccupied conditions
      - b) Exception days can be configured on a set date (Jan 1) or floating date (1<sup>st</sup> Monday in September)
11. Controller shall support auto-changeover.
12. Auto-change shall provide Fixed (default), Individual, Averaging, and Vote changeover methods for both Heat Pump and Heat Recovery systems based upon the changeover group configuration. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint. The following changeover scheme shall be applicable to the Fixed, Individual, and Averaging methods.
- a. Changeover to cooling mode shall occur at cooling setpoint + 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
    - 1) Configurable from 1 – 4°F (0.5 – 2°C)
  - b. Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1°F (0.5°C) as the secondary changeover deadband.
    - 2) Configurable from 1 – 4°F (0.5 – 2°C)

- c. Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration  
3) Configurable from 1 – 4°F (0.5 – 2°C)
  - d. Changeover to heating mode shall occur at the primary changeover deadband to heating - 1°F (0.5°C) as the secondary changeover deadband.  
4) Configurable from 1 – 4°F (0.5 – 2°C)
  - e. A weighted demand shall be configurable for the Averaging and Vote methods.
13. Fixed Method
- a. Changeover evaluated by room temperature and setpoint of the representative indoor unit (first registered indoor unit in changeover group) in the changeover group even when it is not operating (must be in Cool, Heat, or Auto mode)
  - b. Changeover affects all indoor unit groups in the changeover group.
14. Individual method (recommended for Heat Recovery Systems)
- a. Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the changeover group
  - b. Changeover affects individual indoor unit group in the changeover group
15. Average method
- a. Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints operating in Cool, Heat, or Auto mode in the changeover group list
  - b. If none of the indoor units in the group meet the above requirements the Fixed method of changeover will be applied
  - c. A weighted demand (0 – 3) can be configured for each indoor unit in the changeover group.
  - d. Changeover affects all indoor unit groups in the changeover group.
16. Vote Method
- a. In each indoor unit, the cooling demand is calculated based upon the difference between the room temperature and cooling setpoint. If the room temperature falls below the primary cool changeover point (cool setpoint plus the primary changeover deadband) the cooling demand is considered as 0 (zero). Then the total cooling demand is calculated as the sum of each indoor unit's cooling demand
  - b. The opposite is true for the total heating demand
  - c. A weight (0-3) can be added to each indoor unit's demand in the changeover group. The default setting is 1
  - d. The weight 0 (zero) means the indoor unit's demand is not added in the total demand, so the indoor unit's demand is considered to be 0 (zero)
  - e. The weight 2 or 3 means the indoor unit's demand is added 2 or 3 times in the total demand, respectively
  - f. Changeover to cooling mode shall occur when the total cooling demand is greater than the total heating demand.
  - g. The opposite is true for changeover to heating
  - h. Vote supports a Heating Override option, which prioritizes switching to the heating mode if at least one room temperature falls below the secondary heat changeover point (heat setpoint minus the secondary changeover deadband) even if the total cooling demand is greater than the total heating demand.
  - i. Changeover affects all indoor unit groups in the changeover group.
17. Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained to the same outdoor unit in the Heat Pump system or branch selector box in the Heat Recovery system.
18. Guard timer
- a. Upon changeover, guard timer will prevent another changeover during the guard timer activation period (15, 30, 60 (default) min).



- b. Guard timer is ignored by a change of setpoint manually from either intelligent Touch Manger or Remote Controller, by schedule, or the room temperature meets or exceeds the secondary changeover deadband of the mode opposite of the current mode setting
- 19. Interlock feature for use with 3<sup>rd</sup> party equipment (DOAS, dampers, occupancy sensing, etc...) to automatically control Groups or Areas corresponding to the change of the operation states or the On/Off states of any Group.
- 20. WAGO I/O unit – Di, Do, Ai, Ao
  - a. On/Off based monitoring and control of equipment
  - b. Manual or scheduled operation of equipment
  - c. Operation based upon interlock with management points (group(s))
  - d. Monitor equipment error/alarm status
- 21. Digital Input/Output (DEC102A51-US2) unit or Digital Input (DEC101A51-US2) unit
  - a. On/Off based monitoring and control of equipment
  - b. Manual or scheduled operation of equipment
  - c. Operation based upon interlock with management points (group(s))
  - d. Monitor equipment error/alarm status
- 22. Controller shall support force shutdown of associated indoor unit groups.
- 23. Web/Email Function
  - a. Each intelligent Touch Manager shall be capable of monitoring, operating, and scheduling a maximum of 64 indoor unit groups (up to 512 indoor unit groups with the addition of the iTM Plus Adapter) from a networked PC's web browser. It shall also be capable of creating general user access and sending detailed error emails to a customized distribution list (up to 10 email addresses).
  - b. All PCs shall be field supplied
- 24. Optional Software
  - a. DCM002A71: Power Proportional Distribution (PPD)
    - 1) Licensed per option, per intelligent Touch Manager shall be required.
    - 2) The tenant billing option shall be capable of calculating VRV Controls Network equipment energy usage in kWh based on the energy consumption of the outdoor unit(s) divided among the associated indoor units. This software is used in conjunction with the intelligent Touch Manager and a Watt Hour Meter (WHM). A maximum of 3 Watt Hour Meters can be connected to the intelligent Touch Manager. Up to 4 additional Watt Hour Meters can be connected to each iTM Plus Adapter, and up to 7 iTM Plus Adapters can be connected to the intelligent Touch Manager.
    - 3) The Power Proportional Distribution results data can be saved to a USB flash drive, or on a PC with the use of the web access. Data is saved in the CSV format. Results can be stored up to 13 months in the intelligent Touch Manager
- B. DCM601A72: iTM Plus Adapter (expander for ITM)
  - 1. Provide Adapter in sufficient quantity to control all fan coils and outdoor units on project.
  - 2. The iTM Plus Adapter shall provide control for all VRV, SkyAir indoor units, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter.
    - a. It shall be capable of handling a maximum of 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units.
    - b. The iTM Plus Adapter is to be used in conjunction with intelligent Touch Manager.
    - c. Up to 7 iTM Plus Adapters can be connected to a single intelligent Touch Manager. This combination will provide intelligent Touch Manager monitoring and control of up to 512 indoor unit groups, 1024 indoor units, and 80 outdoor units.
    - d. The iTM Plus Adapter shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
  - 3. Wiring

- a. The controller wiring shall consist of a non-polar two-wire connection to the outdoor unit at terminals F1F2 (out-out).
    - b. The iTM Plus Adapter is wall mounted and is used in conjunction with the intelligent Touch Manager to maintain the optimal operation of the connected indoor unit(s).
    - c. The iTM Plus Adapter is connected to the intelligent Touch Manager via a polarity sensitive 18-2 AWG stranded non-shielded wire (field supplied).
  4. The iTM Plus Adapter can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface and Modbus Adapter to control the same indoor unit groups.
    - a. No more than 2 remote controllers can be placed in the same group.
    - b. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together.
    - c. Manual addressing is required of each indoor unit group associated with the iTM Plus Adapter.
  5. Mounting:
    - a. The iTM Plus Adapter can be mounted on the wall or in a standard enclosure (field supplied).
  6. Features:
    - a. The iTM Plus Adapter shall be approximately 6.30" x 5.87" x 2.41" in size.
  7. Basic Operation:
    - a. Control of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.
  8. Programmability:
    - a. Programming of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.
- C. DCM009A51: BACnet Client Option
1. The iTM BACnet Client Option shall be capable of making the intelligent Touch Manager work as a BACnet client using the BACnet/IP protocol. A BACnet client machine is able to send service requests to a BACnet server machine that then performs the services and reports the results to the client. By registering equipment and sensors connected to a BACnet server as management points, equipment and sensors can be monitored and controlled by the intelligent Touch Manager. The BACnet Client option must be enabled/activated in each intelligent Touch Manager to be used.
  2. System Capacity
    - a. A maximum of 50 BACnet servers can be monitored and/or controlled by one intelligent Touch Manager.
    - b. A maximum of 1536 objects can be monitored and/or controlled by one intelligent Touch Manager.
    - c. A maximum of 512 management points, including BACnet management points, external management points, internal Ai management points, AHU management points, and Chiller management points, can be registered in one intelligent Touch Manager.
  3. Objects that can be used in BACnet management points are:
    - a. Analog Input (Object Type Number 0)
    - b. Analog Output (Object Type Number 1)
    - c. Analog Value (Object Type Number 2)
    - d. Binary Input (Object Type Number 3)
    - e. Binary Output (Object Type Number 4)
    - f. Binary Value (Object Type Number 5)
    - g. Multi-Sate Input (Object Type Number 13)
    - h. Multi-Sate Output (Object Type Number 14)
    - i. Multi-Sate Value (Object Type Number 19)

D. DCM014A51: BACnet Server Gateway Option

1. The iTM BACnet Server Gateway Option shall be capable of making the intelligent Touch Manager work as a BACnet gateway using the BACnet/IP protocol. The iTM BACnet Server Gateway Option shall be capable of exposing indoor unit management points as BACnet objects to the (BMS). The iTM BACnet Server/Gateway Option shall be capable of allowing the BMS to monitor and control indoor units BACnet objects.
2. The iTM BACnet Server Gateway Option shall be compatible with VRV, SkyAir, Outdoor Air Processing Unit, Mini-Split system with use of KRP928, and FFQ indoor unit for Multi-split system.
3. Functions:
  - a. The iTM BACnet Server Gateway Option shall be capable of supporting Change of Value (COV) notification.
  - b. The iTM BACnet Server Gateway Option shall communicate to BMS using port number 47808 (configurable).
  - c. The iTM BACnet Server Gateway Option shall function as BACnet router to provide unique virtual BACnet device identification number (ID) for every indoor unit group address.
  - d. The iTM BACnet Server Gateway Option shall provide configurable BACnet Network number.
  - e. The iTM BACnet Server Gateway Option shall be capable of being configured as a foreign device. It shall be capable of communicating across BACnet Broadcast Management Devices (BBMD) in different subnet networks
  - f. The iTM BACnet Server Gateway Option shall be run in environments with BACnet communication traffic up to 100 packets/second.
  - g. The iTM BACnet Server Gateway Option functions shall be configurable through CSV file which shall be downloaded from iTM and configured by trained personnel.
4. System Capacity
  - a. Max of 128 indoor units groups (Up to 256 indoor units) can be controlled from (BMS)
  - b. Max of 8 DIII-Net ports shall be connected to iTM.
5. The Building Management System shall monitor and control the following BACnet objects for indoor units
  - a. Indoor unit ON/OFF status.
  - b. Alarm status with error description
  - c. Room temperature.
  - d. Indoor Unit ON details
    - 1) Off
    - 2) Normal [ON]
    - 3) Override
    - 4) Setback
  - e. Filter sign status.
  - f. Fan status.
  - g. Communication status.
  - h. Thermo-on status.
  - i. Compressor status
    - 1) On
    - 2) Off
    - 3) Defrost
  - j. Aux heater status.
  - k. Occupancy Mode
    - 1) Unoccupied,
    - 2) Occupied
    - 3) Standby
  - l. Operation Mode (Cool, Heat, Fan, and Dry)
  - m. Cooling and Heating setpoints during occupied mode.
  - n. Cooling and Heating setpoints during unoccupied mode.
  - o. Maximum and minimum cooling setpoint.
  - p. Maximum and Minimum heating setpoint

- q. Minimum cooling and heating setpoint differential.
  - r. Fan Speed
    - 1) Up to 3 speeds (dependent upon indoor unit type)
  - s. Vane direction (dependent upon indoor unit type)
    - 1) 5 fixed positions or swing position
  - t. Remote controller permit/prohibit
    - 1) On/Off
    - 2) Mode,
    - 3) Setpoint
  - u. Filter sign reset for indoor units
  - f. Forced indoor units off.
6. The Building Management System may choose to monitor and control the following BACnet objects linked to iTM control logic:
- a. Enable/Disable iTM Schedule operation.
  - b. Enable/Disable iTM Auto Changeover Operation.
  - c. Set Timed Override Minutes.
    - 1) Monitor and configure timer extension on iTM (30, 60, 90, 120, 150, 180 minutes)
  - d. System forced off
    - 1) Enable/Disable all emergency stop programs that are registered on the iTM.
7. Schedule
- a. The BMS shall utilize iTM schedule function or support weekly schedule settings through its programming.
  - b. BMS schedule shall support the indoor unit:
    - 1) Each scheduled event shall specify time and target group address.
    - 2) Each scheduled event shall include Occupancy Mode, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, and Unoccupied cooling setpoint, Unoccupied heating setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable.
    - 3) An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BMS programming.
8. Auto Changeover
- a. The BMS shall utilize iTM Auto changeover function or support auto-changeover through its programming.
  - b. Auto-change shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
  - c. Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or the same branch selector box in the Heat Recovery system.
  - d. Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint
    - 1) Differential to be determined by BACnet building management system programming
  - e. Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
    - 1) Differential to be determined by BACnet building management system programming
  - f. Guard timer
    - 1) Upon changeover, guard timer will prevent another changeover during this period.
    - 2) Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule.

- 3) Guard timer to be configured by BMS programming (30 minute minimum recommended)
  9. Setpoint limitation
    - a. The BMS shall utilize maximum and minimum cooling and heating setpoint to configure upper and lower setpoints range.
  10. System shutdown:
    - a. BMS should utilize System forced off point to execute emergency stop program registered on the iTM.
  11. Restricted functions:
    - a. The following iTM functions shall be prohibited when the BACnet Server Gateway option enabled:
      - 1) Interlocking Control.
      - 2) Emergency Stop (Emergency stop manual release).
      - 3) Power Proportional Distribution (PPD) option.
      - 4) BACnet Client option.
      - 5) D-Net Service.
      - 6) External Management Point Registration
- E. DMS502B71: Interface for use in BACnet
1. The Interface for use in BACnet shall provide the ability for a Building Management System (BMS) to control all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter.
  2. It shall be capable of controlling a maximum of 2 DIII-Net systems or 64 indoor unit groups (128 indoor units) connected to a maximum of 10 outdoor units on each DIII-Net system.
  3. Each DIII-Net system is independent of each other and each DIII-Net system will terminate on its own DIII-Net port (2 DIII-Net ports standard). The Optional DIII Board (DAM411B51) can be added to the interface.
  4. This option provides 2 additional DIII-Net ports to the interface; a total of 4 DIII-Net ports (maximum of 64 indoor unit groups per DIII-Net port) which can handle a maximum of 256 indoor unit groups (512 indoor units) and 40 outdoor units.
  5. The Interface for use in BACnet shall support operations superseding that of the Daikin centralized controller, local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
  6. The Interface for use in BACnet uses a standard open protocol based on ANSI/ASHREA Standard 135. The BACnet Interface has been certified by the BACnet Testing Laboratories (BTL). The BACnet Interface is compatible with BACnet IP (ISO16484-5).
  7. The interface wiring shall consist of a non-polar two-wire connection to the terminals F1F2 (out-out) of the outdoor unit. The Interface for use in BACnet is wall mounted and is used as a translator between the BACnet Building Management System (BMS) and the VRV DIII-Net communication bus to maintain the optimal operation of the connected indoor unit(s).
  8. The Interface for use in BACnet can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), and DCS601C71 (Intelligent Touch Controller (ITC)) with or without the DCS601A72 (ITC DIII Plus Adapter) to control the same indoor unit groups. No more than 2 remote controllers can be placed in the same group. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each indoor unit group associated with the Intelligent Touch Controller and the Interfaces for use in BACnet.
  9. The Interface for use in BACnet shall be equipped with one RJ-45 Ethernet port to support interconnection with a network PC via the Internet or Local Area Network (LAN). The Ethernet connection shall be capable of transmission on 10Base-T and/or 100Base-TX connection at 100 Mbps.
  10. The Interface for use in BACnet shall be capable of being configured as a foreign device. It shall be capable of communicating across BACnet Broadcast Management Devices (BBMD) in different subnet networks.

11. The Interface for use in BACnet shall be capable of supporting Change of Value (COV) notification for all available objects.
12. The Daikin BACnet Setup Tool shall be available so that certified commissioning personnel/facility staff can securely log into each Interface for use in BACnet via a PC to support the configuration and testing of the Interface for use in BACnet.
13. Mounting:
  - a. The Interface for use in BACnet shall be mounted indoor on the wall or in an enclosure (Field Supplied). For exterior mounting the Interface must be mounted in an enclosure, and proper NEMA and/or IP rating enclosure should be used.
  - b. The Interface for use in BACnet shall be approximately 10.81" x 10.34" x 2.69" in size.
14. Display Features:
  - a. LED display provides the interface's operational status and alarm.
  - b. The Interface for use in BACnet shall be capable of displaying indoor unit objects on the BACnet building management system.
15. The Interface for use in BACnet shall provide the BACnet building management system the capability to command the setpoint temperature in 1 °F increments with a range of 60 °F to 90 °F or in 0.1 °C increments with a range of 16 °C to 32 °C.
16. Display of temperature setpoint information shall be selectable for Fahrenheit or Celsius at the commissioning.
17. The Interface for use in BACnet shall provide the BACnet building management system the capability to display the room temperature in 0.1 °F (0.1 °C accuracy) increments with a range of -120 °F to 180 °F or in 0.1 °C increments with a range of (-84 °C to 82 °C).
  - a. Display of room temperature information shall be selectable for Fahrenheit or Celsius at the commissioning.
18. Error codes generated by the indoor units, outdoor units, branch selector boxes, and remote controllers shall be displayed on the BACnet building management system in the event of system abnormality/error with a two digit error code as specified by Daikin.
  - a. Communication errors between the Interface for use in BACnet and the BACnet building management system shall be displayed with a red flashing LED on the Interface for use in BACnet
19. Basic Operation:
  - a. The Interface for use in BACnet will provide up to 32 objects that can be monitored/controlled via the BACnet building management system (see the Interface for use in BACnet Design Guide –EDUS72-749C)
  - b. Capable of controlling up to 64 indoor unit groups (128 indoor units) per DIII-Net port (2 DIII-Net ports standard).
  - c. Optional DIII Board (DAM411B51) can be added to increase DIII-Net ports to a total of 4 DIII-Net ports.
  - d. This provides a total of 256 indoor unit groups (512 indoor units) that can be monitored and controlled via the BACnet building management system
  - e. The Building Management System shall use following objects for operations:
    - 1) On/Off
    - 2) On/Off Status
    - 3) Alarm Normal/Malfunction
    - 4) Malfunction Code
    - 5) Operation Mode (Cool, Heat, Fan, Dry)
    - 6) Operation Mode Status
    - 7) Fan Speed
      - a) Up to 3 speeds (dependent upon indoor unit type)
    - 8) Fan Speed Status
    - 9) Measured Room Temperature
    - 10) Setpoint
    - 11) Filter sign signal
    - 12) Filter sign reset for indoor units
    - 13) Remote controller permit/prohibit of On/Off
    - 14) Remote controller permit/prohibit of Mode

- 15) Remote controller permit/prohibit of Setpoint
- 16) Centralized controller (lower central controller disable)
- 17) Communication Status
- 18) Forced system off (Indoor units per DIII-net)
- 19) Airflow Direction (dependent upon indoor unit type)
- 20) 5 fixed positions or oscillating
- 21) Airflow Direction Status
- 22) Forced Thermo-off of indoor units
- 23) Forced Thermo-off Status
- 24) Energy saving offset of indoor unit setpoint
- 25) Energy saving Status
- 26) Thermo-on status
- 27) Compressor status
- 28) Indoor Fan status
- 29) Heater status
- 30) Ventilation Mode (Bypass, ERV, Auto)
- 31) Ventilation Mode Status
- 32) Ventilation Amount
  - a) Up to 3 speeds (Low, High, Auto)
  - b) Fresh-up
- 33) Ventilation Amount Status
- 34) Capable of providing battery backup power for up to 3 years in total time for the clock
- 35) Settings stored in non-volatile memory
20. Programmability:
  - a. The BACnet building management system shall support weekly schedule settings through its programming.
    - 1) The schedule shall support the indoor unit:
    - 2) On/Off
    - 3) Each scheduled event shall specify time and target group
    - 4) Each scheduled event shall include On/Off, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, Setup (Cooling) setback setpoint, Setback (Heating) setback setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable
    - 5) Setup (Cooling) and Setback (Heating) setpoints when unit is Off (unoccupied) by Group
    - 6) An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BACnet building management system programming.
  - b. The BACnet building management system shall support auto-changeover through its programming.
    - 1) Auto-change shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
    - 2) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or the same branch selector box in the Heat Recovery system.
    - 3) Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint
      - a) Differential to be determined by BACnet building management system programming

- 4) Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
    - a) Differential to be determined by BACnet building management system programming
  - 5) Guard timer
    - a) Upon changeover, guard timer will prevent another changeover during this period.
    - b) Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule.
    - c) Guard timer to be configured by BACnet building management system programming (30 minute minimum recommended)
  - c. The Interface for use in BACnet shall support force shutdown of associated indoor unit groups.
- F. DMS504C71: Interface for use in Lonworks
- 1. The Interface for use in Lonworks shall provide control for all VRV, SkyAir indoor units, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter.
  - 2. It shall be capable of handling a maximum of 64 indoor unit groups (128 indoor units) connected to a maximum of 10 outdoor units.
  - 3. The Interface for use in Lonworks shall support operations superseding that of the Daikin centralized controller, local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
  - 4. The Interface for use in Lonworks wiring shall consist of a stranded non-polar two-wire connection to the terminals F1F2 (out-out) of the outdoor unit.
  - 5. The Interface for use in Lonworks is wall mounted and can be used in conjunction with the Intelligent Touch Controller to maintain the optimal operation of the connected indoor unit(s).
  - 6. The Interface for use in Lonworks is connected to the Lonworks building management system by twisted two wire pair specified by Echelon.
  - 7. The Interface for use in Lonworks can be used in conjunction with the BRC1E71 (Navigation Remote Controller), BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), and DCS601C71 (Intelligent Touch Controller (ITC)) with or without the DCS601A72 (ITC DIII Plus Adapter) to control the same indoor unit groups. No more than 2 remote controllers can be placed in the same group. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each indoor unit group associated with the Interface for use in Lonworks.
  - 8. Mounting:
    - a. The Interface for use in Lonworks can be mounted indoor on the wall or in an enclosure (field supplied). For exterior mounting the Interface must be mounted in an enclosure, and proper NEMA and/or IP rating enclosure should be used.
    - b. The Interface for use in Lonworks shall be approximately 10.23" x 6.61" x 1.94" in size.
  - 9. Display Features:
    - a. LED display provides the interface's operational status and alarm.
    - b. The Interface for use in Lonworks shall be capable of displaying the indoor unit network variable points on the Lonworks building management system.
    - c. The Interface for use in Lonworks shall provide the Lonworks building management system the capability to command the setpoint temperature in 0.1<sup>0</sup>C increments with a range of 16<sup>0</sup>C - 32<sup>0</sup>C.
      - 1) Display of temperature setpoint information shall be displayed in Celsius
      - 2) Fahrenheit display will require the Lonworks building management system to convert the temperature setpoint from Celsius to Fahrenheit
    - d. The Interface for use in Lonworks shall provide the Lonworks building management system the capability to display the room temperature in 0.1<sup>0</sup>C increments with a range of -10<sup>0</sup>C - 50<sup>0</sup>C.
      - 1) Display of room temperature information shall be shown in Celsius



- 2) Fahrenheit display will require the Lonworks building management system to convert the room temperature from Celsius to Fahrenheit
  - e. Error codes generated by the indoor units, outdoor units, branch selector boxes, and remote controllers shall be displayed on the Lonworks building management system in the event of system abnormality/error with a decimal value error code that can be cross referenced as specified by Daikin.
    - 1) Communication errors between the Interface for use in Lonworks and the Lonworks building management system shall be displayed with a red flashing LED on the Interface for use in Lonworks
10. Basic Operation:
- a. The Interface for use in Lonworks will provide 2 Node Network Variables, 4 Common Network Variables for the DIII-Net communication bus, and 23 indoor unit Network Variables for each indoor unit that can be monitored/controlled via the Lonworks building management system (see the Interface for use in Lonworks Design Guide – ED72-333)
  - b. Capable of controlling up to 64 indoor unit groups (128 indoor units)
  - c. The Building management System shall control the following group operations:
    - 1) On/Off
    - 2) Operation Mode (Auto, Heat, Cool, Fan)
    - 3) Single setpoint setting for Cooling and Heating in the occupied mode
    - 4) Fan Speed
      - a) 2 fan speeds selectable (High/Low)
      - b) Indoor units with 3 or more fan speeds will display as either high or low based upon fan speed value.
      - c) Fan speeds with a value less than 4 will display as “Low”. Values 5 or greater will display as “High”.
    - 5) Remote controller permit/prohibit of On/Off, Mode, and Setpoint
    - 6) Filter sign reset for indoor units
    - 7) Disable the Intelligent Touch Controller
    - 8) Forced off of indoor units
    - 9) Forced Thermo-off of indoor units
  - d. Capable of providing battery backup power for up to 3 years in total time
    - 1) Capable of providing battery backup power for up to 1 month in total time with a minimum charging time of 24 hours.
    - 2) Settings stored in non-volatile memory
    - 3) Binding between the Interface for use in Lonworks and the Lonworks building management system will be saved if power is lost.
11. Programmability:
- a. The Lonworks building management system shall support weekly schedule settings through its programming.
    - 1) The schedule shall support the indoor unit :
    - 2) On/Off
    - 3) Each scheduled event shall specify time and target group
    - 4) Each scheduled event shall include On/Off, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, Setup (Cooling) setback setpoint, Setback (Heating) setback setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Operation Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable
    - 5) Setup (Cooling) and Setback (Heating) setback setpoints when unit is Off (unoccupied) by Group
    - 6) An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BACnet building management system programming.
  - b. The Lonworks building management system shall support auto-changeover through its programming.

- 1) Auto-changeover shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
- 2) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or to the same branch selector box in the Heat Recovery system.
- 3) Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint
- 4) Differential to be determined by BACnet building management system programming
- 5) Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
- 6) Differential to be determined by BACnet building management system programming
- 7) Guard timer
  - a) Upon changeover, guard timer will prevent frequent changeover during a short period
  - b) Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule
  - c) Guard timer to be configured by the Lonworks building management system programming (30 minute minimum recommended)
- c. The Interface for use in Lonworks shall support force shutdown of associated indoor unit groups.

#### 4.03 LOCAL REMOTE CONTROLS

- A. Daikin VRV local remote controllers are compatible with all VRV indoor units. The remote controller wiring consist of a non-polar two-wire connection to the indoor unit. The local remote controllers may be wall-mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s). Temperature setpoint can be adjusted in increments of 1°F/°C. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address. The local remote controllers do not need to be addressed.
- B. BRC1E73: Navigation (NAV) Remote Controller
  1. The NAV Remote Controller can provide control for all VRV indoor units.
  2. The remote controller wiring consist of a non-polar two-wire connection to the indoor unit at terminals P1/P2.
  3. The NAV Remote Controller is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).
  4. The NAV Remote Controller does not need to be addressed.
  5. The NAV Remote Controller can be used in conjunction with the BRC2A71 (Simplified Remote Controller) or another NAV Remote Controller to control the same indoor unit group. No more than 2 remote controllers can be placed in the same group.
  6. Mounting:
    - a) The NAV Remote Controller shall be mounted into a standard 2" x 4" junction box.
  7. Display Features:
    - a. The NAV Remote Controller shall be approximately 4.75" x 4.75" in size with a 2.75" x 1.75" LCD display.
    - b. Backlit LCD display with contrast adjustment and auto off after 30 seconds.
    - c. Display language shall be selectable from English, French or Spanish.
    - d. Selectable display – Detailed, Standard and Simple

- 1) Detailed display
  - a) Shall display Operation Mode, Cool, Heat and Setback setpoints, Fan Speed, Louver position, Room Temperature, Time and Day of the Week
- 2) Standard display
  - b) Shall display Operation Mode, Cool, Heat and Setback setpoints and Fan Speed
- 3) Simple display
  - a) Shall display Operation Mode, Cool, Heat and Setback setpoints, Fan Speed and Room Temperature
  - b) The room temperature shall be displayed with a large 11/16" font
- e. All displayed items configurable
- f. Configure "Off" to be displayed when unit is turned off (field setting required) Prevents mode adjustment
- g. Setpoint can be removed from display when unit is turned Off (field setting required) Prevents setpoint adjustment
- h. Fan speed display removable (field setting required) Prevents fan speed adjustment
- i. System Status icons.
- j. The controller shall display temperature setpoint in one degree increments with a range of 60-90°F (16-32°C)
- k. Detailed and Simple display will reflect room temperature (0-176°F/-18-80°C range in one degree increments).
- l. Display of temperature information shall be configurable for Fahrenheit or Celsius
- m. On/Off status shall be displayed with an LED.
- n. Error codes will be displayed with a two digit code in the event of system abnormality/error. (A blinking LED will also signal system abnormality/error)
- o. The following system temperatures can be displayed to assist service personnel in troubleshooting:
  - 1) Return Air Temperature
  - 2) Liquid Line Temperature
  - 3) Gas Line Temperature
  - 4) Discharge Air Temperature (depending on unit),
  - 5) Remote Controller Sensor Temperature
  - 6) Temperature used for Indoor Unit Control
8. Basic Operation:
  - a. Capable of controlling a group of up to 16 indoor units.
  - b. Controller shall control the following group operations:
    - 1) On/Off, Operation Mode (Cool, Heat, Fan, Dry and Auto\* (\*with VRV Heat Recovery & Heat Pump Systems))
      - a) Configure only the essential modes to be selectable – remove unnecessary mode selection(s) from display
    - 2) Independent Cooling and Heating setpoints in the occupied mode
      - a) Dual setpoints (individual Cool and Heat setpoints with minimum setpoint differential 0 – 7°F (0 – 4°C) default 2°F (1°C)) or Single setpoint
    - 3) Independent Cooling Setup and Heating Setback setpoints in the unoccupied mode
    - 4) Fan Speed
      - a) Up to 5 speeds (dependent on indoor unit type)
    - 5) Vane direction and oscillation (dependent on indoor unit type)
      - a) Airflow direction
      - b) Up to 5 louver positions and auto swing
      - c) Individual airflow
      - d) Provides individual control of up to four (4) louvers on an indoor unit
      - e) Dual airflow
      - f) Provides control of both internal and external louver positions
      - g) Automatic draft protection
        - i. Automatically prevents air flow from blowing directly on occupants

- c. The controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating in the occupied period
- d. Function button lockout (On/Off, Mode, Fan Speed, Up/Down, Left, Right Arrows)
- e. Optional Controller Face Decal to hide unnecessary (locked out) buttons
- f. Indoor Unit group assignment
- g. Filter indicator
  - 1) Filter service indicator shall be displayed after 100, 1250 or 2500 (default) hours of run time configurable via field setting
- h. Clock (12/24 hour) and Day display
- i. Automatic adjustment for Daylight Savings Time (DST)
  - 1) Set changeover period (second Sunday in March / first Sunday in November)
- 9. Programmability:
  - a. Controller shall support schedule settings with selectable weekly pattern options.
    - 1) 7-day
    - 2) Weekday + Weekend
    - 3) Weekday + Saturday + Sunday
    - 4) Everyday
    - 5) The schedule shall support unit On/Off
    - 6) Independent settings for Cooling and/or Heating setpoints when unit is on (occupied)
    - 7) Independent Setup (Cooling) and Setback (Heating) setpoints when unit is off (unoccupied)
    - 8) A maximum of 5 operations can be schedulable per day
    - 9) Time setting in 1-minute increments
  - b. The Controller shall support Auto-changeover mode for both Heat Pump and Heat Recovery systems, therefore, allowing the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat according to the room temperature and temperature setpoint.
  - c. Changeover to cooling mode shall occur at cooling setpoint + 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration. Configurable from 1 – 4°F (0.5 – 2°C)
  - d. Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1°F (0.5°C) as the secondary changeover deadband. Configurable from 1 – 4°F (0.5 – 2°C)
  - e. Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration. Configurable from 1 – 4°F (0.5 – 2°C)
  - f. Changeover to heating mode shall occur at the primary changeover deadband to heating - 1°F (0.5°C) as the secondary changeover deadband. Configurable from 1 – 4°F (0.5 – 2°C)
  - g. 1 hour guard timer
    - 1) Upon changeover, guard timer will prevent another changeover during this period.
    - 2) Guard timer is ignored by a change of setpoint manually from either the Multi-zone Controller, Remote Controller, or by schedule.
    - 3) The Guard timer is also ignored if the space temperature reaches the secondary changeover deadband (configurable from 1 - 4°F (0.5 – 2°C)) from the primary changeover deadband, and the guard timer has been activated
    - 4) 60 minutes as default, configurable to 15, 30, or 90 minutes
  - h. The controller shall support the Auto-setback by sensor function (dependent on indoor unit type)
    - 1) The cooling and heating setpoints shall gradually relax (configurable) internally when the room is determined to be unoccupied
    - 2) The internal setpoint shall return to the original setpoint when room occupancy is detected
  - i. The controller shall support the Auto-off by sensor function (dependent on indoor unit type)

- 1) The indoor unit shall turn off when it is determined that the room is unoccupied after a specified time has elapsed
  - 2) The indoor unit shall be turned on manually when occupancy is detected
  - j. The controller shall support the Filter Auto Clean function to be performed once a day (dependent on indoor unit type)
    - 1) Eight (8) time periods (00:00-03:00, 03:00-06:00, 06:00-09:00, 09:00-12:00, 12:00-15:00, 15:00-18:00, 18:00-21:00, 21:00-00:00) shall be available to select from to enable the automatic filter cleaning function
    - 2) Default time period (00:00 to 3:00) shall be used if the period for filter auto cleaning is not specified
    - 3) The indoor unit shall be stopped during auto filter cleaning function operation
  - k. The Controller shall support an Auto Off Timer for temporarily enabling indoor unit operation during the unoccupied period.
    - 1) When the Off Timer is enabled and when the unit is manually turned on at the remote controller
    - 2) The controller shall shut off the unit after a set time period
    - 3) The time period shall be configurable in the controller menu with a range of 30-180 minutes in 10 minute increments
  - l. The room temperature shall be capable of being sensed at either the NAV Remote Controller, the Indoor Unit return air temperature sensor (default), or Remote Temperature Sensor (KRCS01-1B) configured through the field settings.
- C. KRCS01-1B: Remote Temperature Sensor
1. The Remote Temperature Sensor can provide temperature sensing for all VRV indoor units.
  2. The remote controller wiring consists of a non-polar two-wire connection to the indoor unit at terminals X13A.
  3. The Remote Temperature Sensor is wall mounted and is used to maintain the optimal operation of the connected indoor unit.
  4. The Remote Temperature Sensor can be used in conjunction with the Navigation Remote Controller, Simplified Remote Controller, and the Wireless Remote Controller to sense space temperature outside of the indoor unit. No more than 2 remote controllers can be placed in the same group.
  5. Mounting:
    - a. Sensor Box shall be 2.38" x 1.97" x 0.75" (H x W x D) in size.
    - b. Can be mounted on the wall in the provided sensor box
    - c. Can be mounted in the Simplified Remote Controller (BRC2A71).
    - d. Can be mounted a button temperature sensor holder (field supplied).
  6. Application:
    - a. The location of the temperature sensor should provide a realistic sample of the space temperature in order to provide the optimum comfort level to the occupants.
      - 1) Things that need to be considered are:
        - a) Indoor unit location
        - b) Will outside area be brought into the space and/or indoor unit
        - c) Ceiling heights
        - d) Control Scheme
        - e) Design and limitations due to architecture
        - f) Plenum air return
  7. Basic Operation:
    - a. Replaces indoor unit return air temperature sensor.
    - b. Senses room temperature for only one indoor unit.

#### END OF SECTION