

Daikin HVAC Controls Guide Specification

VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEM Advanced Multi-zone Controller

Part 1 - General

1.01. Physical characteristics

A. General:

The advanced multi-zone controller shall be made from plastic materials with a neutral color. Each control shall have a LCD (Liquid Crystal Display) that shows On/Off, setpoint, room temperature, mode of operation (Cool/Heat/Dry/Fan/Auto), louver position, and fan speed.

1.02. Electrical characteristics

A. General:

The advanced multi-zone controller will require 24 VAC to power the controller. The advanced multi-zone controller shall supply 16 volts DC 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.

B. 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.

C. Wiring size:

Wiring shall be non-shielded, 2-conductor sheathed vinyl cord or cable, and 18 AWG stranded copper wire.

1.03. VRV Controls Network

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[®] or Lonworks[®] interfaces; all of

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which blend to provide the optimal control strategy for the best HVAC comfort solution.

Part 2 - Products

2.01. Advanced Multi-zone Controllers

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.

A. DCS601C71: Intelligent Touch Controller (ITC) V. 6.02

The Intelligent Touch Controller (version 6.02) 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 Controller shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.

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 Controller is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).

The Intelligent Touch Controller can be used in conjunction with the BRC1E71 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet, and Lonworks interfaces 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.

The Intelligent Touch Controller shall be equipped with one RJ-45 Ethernet port to support interconnection with a network PC via the internet or Local Area Network (LAN).

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Optional software functions shall be available so that facility staff can securely log into each Intelligent Touch Controller via the PC's web browser to support monitoring, scheduling, error email, and general user functions. Additional optional software functions of Tenant Billing, and HTTP Interface shall also be available. The optional software shall require advanced purchase and can only be activated upon receipt of a license key from Daikin AC.

1. Mounting:
 - The Intelligent Touch Controller shall be mounted on the wall or into a recessed fixing box (KJB411A).

2. Display Features:
 - a. The Intelligent Touch Controller shall be approximately 9.07" x 5.79" in size with a backlit 5.7" LCD display.
 - b. Display information shall be selectable from English, French, Italian, German, or Spanish.
 - c. Featured backlit LCD with contrast adjustment and auto off after 30 minutes (default) is adjustable between 1 to 60 minutes.
 - d. The Controller shall display On/Off, Operation Mode, Setpoint, Space Temperature, Louver Position, Fan Speed for Group/Zone.
 - e. The Controller shall display Date (mm/dd/yyyy or dd/mm/yyyy format selectable) and day of the week along with the time of day (12hr or 24hr display selectable).
 - f. The Controller shall adjust for daylight savings time (DST) automatically.
 - g. Display information shall be updated every 3 seconds to show the latest status of the indoor unit groups.
 - h. System status icons shall display On/Off (color coded), Malfunction/Error (color coded), Forced Stop, Set Schedule/Setback/Auto-changeover, Filter, and Screen Lock.
 - i. The controller shall display the temperature setpoint in one degree increments with a range of 60°F - 90°F (16°C - 32°C).
 - 1) Display of temperature setpoint information shall be configurable for Fahrenheit or Celsius
 - j. Display shall reflect room temperature 0°F - 176°F (-18°C - 80°C) range in one degree increment.
 - 1) Display of room temperature information shall be configurable for Fahrenheit or Celsius
 - k. The System Setting Mode shall be used to configure options and display information for each Zone or Group.
 - l. Zone configuration shall display Setpoint Range Limitation, Setback Temperature setting, and Auto-changeover for each Zone.
 - m. Indoor units shall be capable of being displayed by Zone or Group.

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- 1) Zones configuration via the Intelligent Touch Controller shall consist of a single indoor unit group or a collection of indoor unit groups blocked together for control and monitoring purposes
 - 2) Groups shall consist of 1 to 16 indoor units daisy chained together via the remote control wiring on P1P2 of the indoor unit terminal block for control and monitoring purposes
 - 3) Groups and Zones may be assigned names (ex. Office 101, Lobby, North Hallway, etc...)
 - n. Error status shall be displayed in the event of system abnormality/error with one of two color coded icons placed over the indoor unit icon.
 - 1) Communication errors between the Intelligent Touch Controller and the indoor units shall be displayed with a blue triangle placed over the indoor unit Icon
 - 2) System errors between the Intelligent Touch Controller and the indoor units shall be displayed with a yellow triangle placed over the indoor unit icon
 - 3) Error history shall be available for viewing the 10 most recent errors/abnormalities
3. Basic Operation:
- a. Capable of controlling Zone(s) or Group(s) of up to 64 indoor unit groups (128 indoor units).
 - b. Controller shall control the following group operations:
 - 1) On/Off
 - 2) Operation Mode (Cool, Heat, Fan, Dry, and Auto)
 - 3) Independent Cooling and Heating setpoints in the occupied mode
 - i) Cooling setpoint shall be maintained higher than or equal to the heating setpoint
 - ii) Adjustable minimum setpoint differential 0 - 7⁰F (0 - 4⁰C) between cooling and heating setpoints
 - iii) Selectable single setpoint mode
 - 4) Independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode adjustable to 40 - 95⁰F (5 - 35⁰C)
 - i) Setup and Setback setpoints shall be set outside of the occupied setpoint range
 - ii) The recovery differential shall be 4⁰F (default) and adjustable between 2 – 10⁰F
 - iii) Settings shall be applied based upon the Zone configurations
 - 5) Fan Speed
 - i) Up to 3 speeds (dependent upon indoor unit type)
 - 6) Airflow direction (dependent upon indoor unit type)
 - i) 5 fixed positions or swing position
 - 7) The controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Zone configurations

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- 8) Remote controller permit/prohibit of On/Off, Mode, and Setpoint
 - 9) Lock out setting for Intelligent Touch Controller display
 - 10) Indoor unit Group/Zone assignment
 - c. Capable of providing battery backup power for up to 2 years in total time for the clock.
 - 1) Settings stored in non-volatile memory
4. Programmability:
- a. Controller shall support weekly schedule settings.
 - 1) Selectable weekly patterns
 - i) 7-day
 - ii) Weekday + Weekend
 - iii) Weekday + Saturday + Sunday
 - 2) The schedule shall support unit On/Off
 - 3) 8 independent schedules configurable with up to 8 events settable for each schedule
 - i) Each scheduled event shall specify time and target Zone or Group
 - ii) Each scheduled event shall include On/Off, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, Setup (Cooling) Setpoint, Setback (Heating) Setpoint, Remote Controller On/Off Prohibit, Remote Controller Mode Prohibit, Remote Controller Setpoint Prohibit, and Timed Override Enable
 - iii) Independently settable Cooling and Heating setpoints when unit is On (occupied)
 - iv) Setup (Cooling) and Setback (Heating) setpoints when unit is Off (unoccupied) by Zone
 - v) Time setting in 1-minute increments
 - vi) A 2 hour override shall be provided for use enabling indoor unit operation during the unoccupied period
 - 4) A maximum of 40 exception days can be schedule on the yearly schedule
 - i) Exception days shall be used to override specified days on the weekly schedule based upon irregular occupied/unoccupied conditions
 - ii) Exception days can be configured on a set date (Jan 1) or floating date (1st Monday in September)
 - b. The Controller shall support auto-changeover.
 - 1) Auto-change shall provide Individual, Fixed, and Averaging changeover methods for both Heat Pump and Heat Recovery systems based upon the Zone 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) Individual method (recommended for Heat Recovery Systems)

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- i) Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the Zone
- ii) Changeover affects individual indoor unit group in the Zone
- 3) Fixed method
 - i) Changeover evaluated by room temperature and setpoints of the representative unit (first registered unit) in the Zone
 - ii) Changeover affects all indoor unit groups in the Zone
- 4) Average method
 - i) Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints in the Zone
 - ii) Changeover affects all indoor unit groups in the Zone
- 5) 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.
- 6) Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint, and the room temperature is greater than or equal to the average of the cooling and heating setpoints + 2.7⁰F
- 7) Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint, and the room temperature is less than or equal to the average of the cooling and heating setpoints - 2.7⁰F
- 8) 1 hour guard timer
 - i) Upon changeover, guard timer will prevent another changeover during this period.
 - ii) Guard timer is ignored by a change of setpoint manually from either Intelligent Touch Controller or Remote Controller or by schedule.
 - iii) 60 minutes as default, configurable to 15, 30, or 90 minutes
- c. Controller shall support Interlock
 - 1) Interlock feature for use with 3rd party equipment (DOAS, dampers, occupancy sensing, etc...) to automatically control groups or zones corresponding to the change of the operation states or the On/Off states of any group.
 - 2) Requires Digital Input/Output (DEC102A51-US2) unit or Digital Input (DEC101A51-US2) unit
 - i) On/Off based monitoring and control of equipment
 - ii) Manual or scheduled operation of equipment
 - iii) Operation based upon interlock with VRV indoor unit group(s)
 - iv) Monitor equipment error/alarm status
- d. Controller shall support force shutdown of associated indoor unit groups.

5. Software Options

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Licensed per option, per Intelligent Touch Controller shall be required. All PCs shall be field supplied.

- a. DCS004A71: Web/Email software
Each Intelligent Touch Controller shall be capable of monitoring, operating, and scheduling a maximum of 64 indoor unit groups (128 indoor unit groups with the addition of the DIII-Net 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 3 email addresses).
- b. DCS002A71: Power Proportional Distribution (PPD)
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 Controller and a Watt Hour Meter (WHM). A maximum of 3 Watt Hour Meters can be connected to the Intelligent Touch Controller. The use of the DIII-Net Plus Adapter will add an additional 3 Watt Hour Meters.
The Power Proportional Distribution results data can be saved to a PCMCIA card, or on a PC with the use of the web option software. Data is saved in the CSV format. Results can be stored up to 12 months.
- c. DCS007A51: HTTP Interface
This option shall be capable of creating a software interface between the VRV Controls Network and Home Automation control systems.

B. DCS601A72: DIII-Net Plus Adapter

The DIII-Net 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. 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. The DIII-Net Plus Adapter is to be used in conjunction with Intelligent Touch Controller. This combination will provide Intelligent Touch Controller monitoring and control of up to 128 indoor unit groups, 256 indoor units, and 20 outdoor units. The DIII-Net Plus Adapter shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.

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 DIII-Net Plus Adapter is wall mounted and is used in conjunction with the Intelligent Touch Controller to maintain the optimal operation of the connected indoor unit(s). The DIII-Net Plus Adapter is connected to the Intelligent Touch Controller via a RS-232-C/RJ-45 cable (supplied with adapter).

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The DIII-Net Plus Adapter can be used in conjunction with the BRC1E71 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet, and Lonworks interfaces 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 DIII-Net Plus Adapter.

1. Mounting:
 - The DIII-Net Plus Adapter can be mounted on the wall or in a standard enclosure (field supplied).
2. Features:
 - a. The DIII-Net Plus Adapter shall be approximately 7.47” x 6.19” in size.
3. Basic Operation:
 - a. Control of all associated indoor unit groups shall be done via the connected Intelligent Touch Controller.
4. Programmability:
 - a. Programming of all associated indoor unit groups shall be done via the connected Intelligent Touch Controller.