



CONTROLS APPLICATION GUIDE



VRV CONTROLLERS  
COMBINATION



## A GLOBAL LEADER IN HVAC INVESTED IN NORTH AMERICA

### **About Daikin:**

Daikin Industries, Ltd. (DIL) is a global Fortune 1000 company which celebrated its 90th anniversary in May 2014. The company is recognized as one of the largest HVAC (Heating, Ventilation, Air Conditioning) manufacturers in the world. DIL is primarily engaged in developing indoor comfort products and refrigeration systems for residential, commercial and industrial applications. Its consistent success is derived, in part, from a focus on innovative, energy-efficient and premium quality indoor climate and comfort management solutions.









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# 1. Introduction

In most applications, combining different types of controllers are required as per project specs. This document will go over how to implement control logic when different controller types exist on the same DIII-Net line.

Daikin controls products that will be discussed in this document are:

<b>Open Protocol Interfaces</b>	 <b>BACnet® Interface DMS502B71</b>	 <b>LON® Interface DMS504C71</b>	 <b>iTM BACnet® Server DCM014A51</b>
<b>Multi-Zone Controller</b>	 <b>Intelligent Touch Controller™ (iTC) DCS601C71</b>	 <b>Intelligent Touch Manager™ (iTM) DCM601A71</b>	
<b>Local Controller</b>	 <b>Navigation™ Remote Controller (NAV)</b>		

## List of common controls logic are:

- » **Setpoint**
- » **Auto Changeover**
- » **Setback**
- » **Schedule**
- » **Remote Controller prohibition**
- » **Setpoint Range Limitation/Restriction**

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## 2. Indoor Unit Logic

## 2. Indoor Unit Logic

1. The indoor unit contains control logic to maintain room temperature by adjusting the refrigerant flow and has the following data points:
  - a. Unit ON/OFF
  - b. Operation Mode: Cool, Heat, Fan, Dry, Auto (Auto mode is not recommended as it can create large temperature differentials between mode changes).
  - c. Setpoint: 60° F to 90° F, 1° F basis (16° C to 32° C, basis).
  - d. Room Temperature (read only).
  - e. Fan Speed: L, ML, M, MH, H, Auto (depends on indoor unit type).
  - f. Airflow Direction (if the indoor unit has louvers).
  - g. Alarm Status (read only).
  - h. Malfunction Code (read only).
2. Indoor Unit Sequence of Operation
  - a. During the cooling thermo-on (call for cooling) period, the indoor unit fan will operate based the fan setting from the local controller, *iTC*<sup>™</sup>, *iTM*<sup>™</sup>, or BMS.
  - b. During the cooling thermo-off (cooling satisfied) period, the fan will continue to operate based on the setting from the local controller, *iTC*, *iTM*, or BMS fan speed setting. However, the fan can be turned OFF during the thermo-off period with a field setting (depends on the indoor unit type). However, the fan should not be OFF when an indoor unit receives outside air.
  - c. During the heating thermo-on (call for heating) period, the indoor unit fan will operate based on the fan setting from the local controller, *iTC*, *iTM*, or BMS.
  - d. During the heating thermo-off (heating satisfied) period, the fan will continue to operate in LL (Low Low) speed (default). The fan can be set to ON (H, MH, M, ML, L), LL or completely OFF with a field setting (depends on the indoor unit type). However, the fan should not be OFF when an indoor unit receives outside air.
3. Dry Mode
  - a. When selected, the setpoint is set based on the current room temperature as not to over cool.
  - b. Setpoint = Return Air Temperature (when the Return Air Temperature ≤ 75° F).
  - c. Setpoint = Return Air Temperature – 1° F (when the Return Air Temperature > 76° F).  
(when FXTQ is used, the current setpoint can be selected by a field setting)
  - d. The current setpoint is not displayed on the local controller, *iTC*, *iTM*, or the BMS setpoint during Dry mode.
  - e. In Dry mode (or Fan mode), the BMS can write the cooling and heating setpoints to the *iTM*, which are set to the IDU management point in the *iTM*. However, the cooling and heating setpoints are not sent to the indoor unit.
4. Room Temperature Sensing
  - a. The room temperature can be measured by the following:
    - I. Indoor unit return air sensor (depending on indoor unit model).
    - II. Remote temperature sensor (KRCS01-1B/4/2UA).
    - III. Sensor in the BRC1E73 (local remote controller).
  - b. The sensing method depends on the indoor unit configuration (field setting).
  - c. The BMS cannot send the room temperature to the indoor unit due to the fact that the room temperature is a read only point for the BMS.



Round Flow Sensing  
Cassette with Sensor

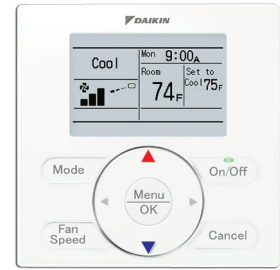
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### 3. Navigation™ Remote Controller (NAV)–BRC1E73

# 3. Navigation™ Remote Controller (NAV)–BRC1E73

## 3.1 Setpoints

1. By default the NAV controller is configured with dual setpoints with a minimum setpoint differential of 2° F, which can be configured for "None", "Single SP" (single setpoint) or 0 - 8° F (0 - 4° C).
2. When a multi-zone controller is connected to the DIII-Net line, the minimum setpoint differential is set to "Single SP" automatically.
3. When the minimum setpoint differential is set to "Single SP", there is one setpoint for both cool and heat modes.
4. By default the heat setpoint cannot be set higher than the cooling setpoint and the cooling setpoint cannot be set lower than the heating setpoint.
5. If the Min. Setpoint Differential of "NONE" is set, the heating setpoint will be allowed to go higher than the cooling setpoint and cooling setpoint will be allowed to go lower than the heating setpoint if a centralized controller is not connected to the DIII-Net.



NAVIGATION Remote Controller (NAV)

## 3.2 Setpoint Range Limitation

1. The setpoint range limitation logic resides on the NAV controller to limit the adjustable setpoint ranges individually for cooling and heating.
  - a. Cooling setpoint range limitations is configurable between 60° F and 90° F.
  - b. Heating setpoint range limitation is configurable between 60° F and 90° F.
2. The setpoint range limitation is related to the setback setpoints. The setback setpoints can only be set outside of the occupied setpoint range and has a fixed 2° F differential between the highest/lowest possible occupied setpoint (based upon configured range limit) and the setback setpoint. The setback (unoccupied) setpoint will reduce the occupied setpoint range automatically to maintain a 2° F fixed differential from the highest (cooling) and lowest (heating) possible occupied setpoints.
3. The setpoint range limitation is located in the Service Settings menu / Energy Saving Options menu.

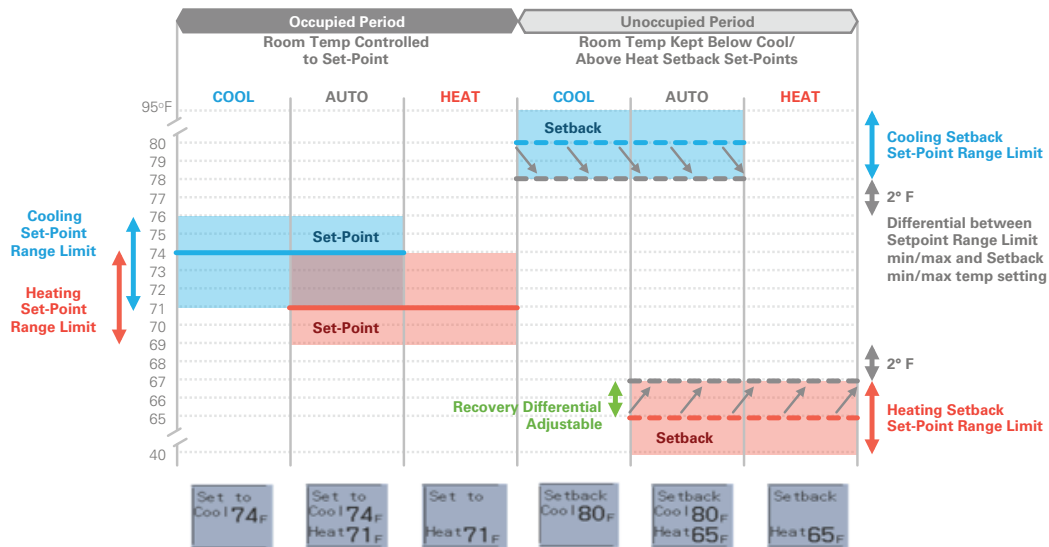


Fig 1. Setpoints and Setpoints Range Limitation on the NAV controller



### 3. Navigation™ Remote Controller (NAV)–BRC1E73

#### 3.3 Auto Changeover

1. Auto changeover logic is available for Heat Pump system and Heat Recovery systems.
2. The changeover logic changes 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 refrigerant port in the Heat Recovery system.
3. Commanding a mode change for Heat Recovery and Heat Pump Systems requires a Changeover Master. What is a Changeover Master?
  - 3.1. When the VRV contractor has commissioned a Heat Pump system, an indoor unit can be nominated as the changeover master. This allows the nominated unit to change the mode of operation for all units connected to the same outdoor unit. (See Figure 2)
  - 3.2. A Heat Recovery system can utilize BS Boxes to provide simultaneous heating and cooling for each zone. A Heat Recovery system can utilize BS Boxes to provide simultaneous heating and cooling for each zone.
  - 3.3. Every unit or group of units connected to a BS Box port can either be in cooling or heating mode, i.e., units connected to the same BS Box port operate as a mini Heat Pump system. (See Figure 3)

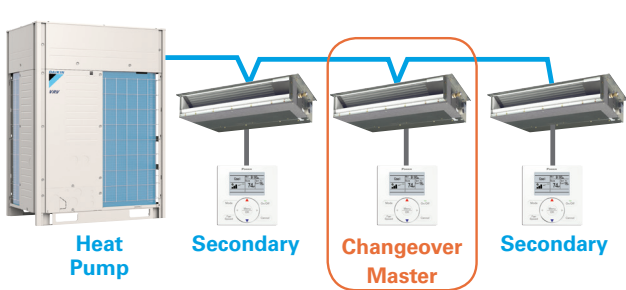


Fig 2. Heat Pump System

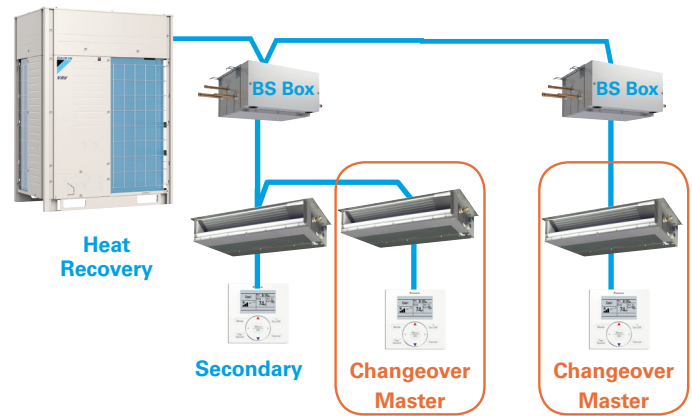


Fig 3. Heat Recovery System

#### 4. Changeover Master and Secondary (Non-Master) Indoor Units

- 4.1. Cool and heat modes are only available for selection on the cool/heat changeover master indoor unit. The following table indicates the available operating modes for secondary indoor units in the system based on the selected mode of the master indoor unit.

When the master indoor unit is set to	Secondary indoor units in the system can be set to			
	Cool	Dry	Heat	Fan
Cool mode	●	●		●
Dry mode	●	●		●
Heat mode			●	●
Fan mode				●

#### 3.3 Auto Changeover (cont.)

5. The setpoint for cooling and heating are configurable with a minimum differential of 0 to 8° F or single setpoint. The changeover is automatically controlled to happen in either of the following two cases:
  - 5.1. **Case 1:** Changeover at the primary changeover temperature after the guard timer expires.  
 In default, the primary changeover setpoint is 1° F above cooling setpoint or 1° F below heating setpoint, which is configurable between 1° F – 4° F using field settings. In default, the guard timer is 60 minutes, which is configurable to 15, 30 or 90 minutes using field settings. The initiation of guard timer is built in to help prevent frequent changeover which may cause energy waste.
  - 5.2. **Case 2:** Changeover at the secondary changeover temperature.  
 In default, the secondary changeover temperature is 1° F above the primary changeover temperature for cooling or 1° F below the primary changeover temperature for heating, which is configurable between 1° F – 4° F using field settings. Case 2 will happen while the guard time is active in case 1.

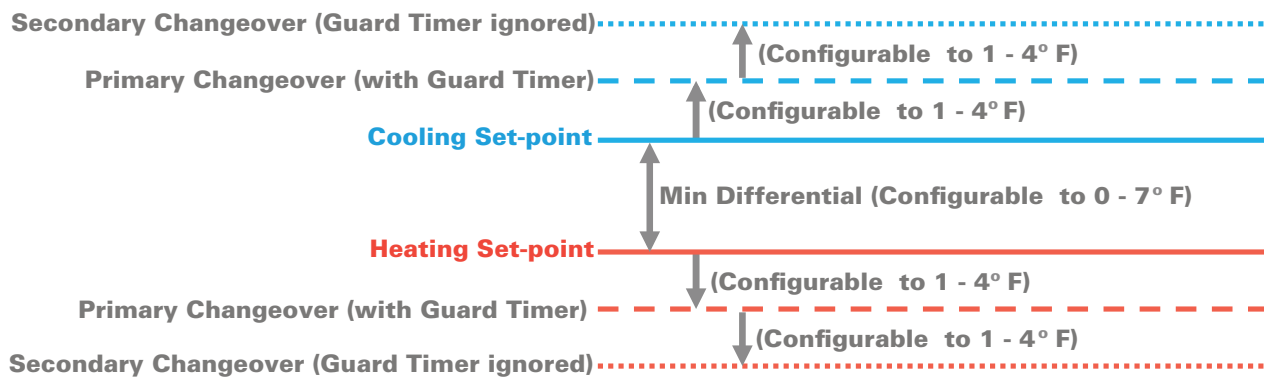


Fig 4. The NAV controller Auto Changeover logic

6. The Guard timer is ignored by a change of setpoint manually from either the Multi-zone Controller, Remote Controller, or by schedule.
7. 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.
8. Auto changeover logic is activated when the field setting 1e-4-02 is set at the NAV controller.
9. If the operation mode is prohibited and the NAV controller is set for auto changeover, the auto changeover logic will also be prohibited from happening.
10. If any of the multi-zone controllers or the open protocol interfaces are connected to the DIII-Net line after the 1e-4-02 field setting is made, the NAV controller auto changeover logic will be disabled but it can be re-enabled using field settings 1e-4-02.
11. If the BACnet® Interface, LON® Interface or *iTC* sends the “Auto” mode command to the indoor unit, “AUTO” mode will show up on the NAV controller display which uses the auto changeover logic of the indoor unit and as a result the NAV controller auto changeover being disabled. Therefore, the auto mode should not be selected from the *BACnet/LON* interface or *iTC*. The NAV Auto changeover can be re-enabled using field setting 1e-4-02.

### 3. Navigation™ Remote Controller (NAV)–BRC1E73

#### 3.4 Setback

1. The setback function resides on the NAV controller which provides independent setback setpoints for cooling and heating (adjustable between 40° F – 95° F).
2. By default the setback function is disabled and can be enabled when the 1e-2-04 field setting is set.
3. A guard timer keeps the indoor unit ON for at least 30 minutes after the setback function turns the indoor unit ON.
4. If the indoor unit is set to Fan or Dry mode, the setback function will not work.
5. Setback Control Logic
  - a. The setback function keeps the room temperature at a moderate level with the setback setpoints when the indoor unit is turned off (when the room is unoccupied). The indoor unit only turns on if the room temperature rises to meet the Cool Setback Setpoint in cooling mode, or if the room temperature falls to meet the Heat Setback Setpoint in heating mode. Once the room temperature has recovered and the guard timer has expired, the indoor unit is turned off.
  - b. If the indoor unit is turned ON by the NAV controller manually (or by the Schedule function), the normal operation is maintained, i.e., the indoor unit maintains the room temperature from the occupied setpoint.
  - c. When the Setback function turns ON the indoor unit (unless it is turned off by the NAV controller manually or by the Schedule function), the Setback function maintains the room temperature below (or above) the setback setpoints.
  - d. The setback setpoints can only be set outside of the occupied setpoint range with a minimum 2° F differential from the occupied setpoint.

#### 3.5 Schedule

1. The NAV controller has 4 selectable weekly schedules: 5 + 2 (Weekday + Weekend), 5 + 1 + 1 (Weekday + Saturday + Sunday), 1 (Everyday).
2. The NAV controller schedule allows programming of up to 5 events per day with cool /heat setpoints and/or setback setpoints.

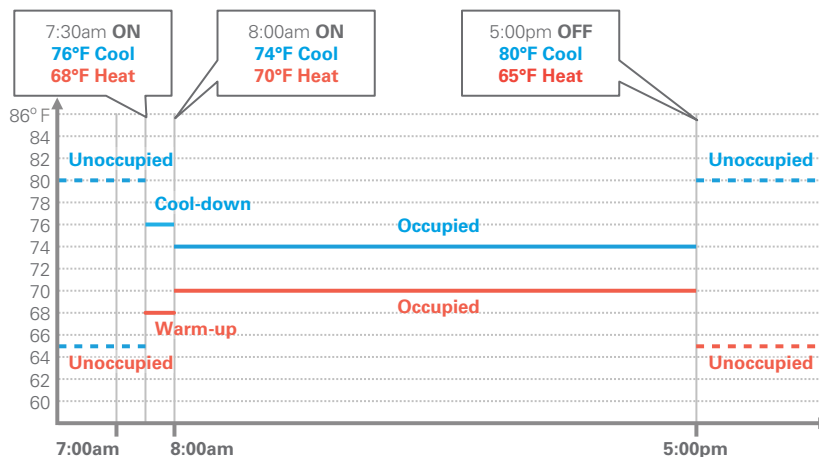


Fig 5. NAV Controller Scheduling

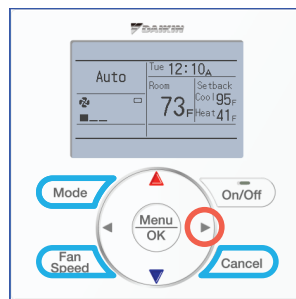
Schedule				
	Time	Act	Cool	Heat
WKDY	7:15 <sub>A</sub>	ON	76 <sub>F</sub>	68 <sub>F</sub>
	8:00 <sub>A</sub>	ON	74 <sub>F</sub>	70 <sub>F</sub>
	5:00 <sub>P</sub>	OFF	80 <sub>F</sub>	65 <sub>F</sub>
	--:--	--	--	--
	--:--	--	--	--
Setting				

## 3.6 Remote Controller Prohibition

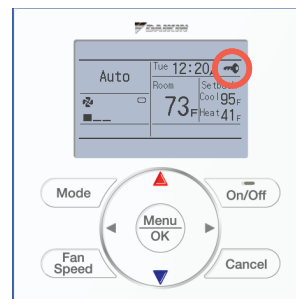
### 3.6.1 Prohibit Buttons

- The NAV controller has the ability to prohibit (lockout) its button usage.
- To configure which buttons to prohibit, access Service Setting → Prohibit Functions → Prohibit Buttons.
  - Enable = permit
  - Disable = prohibit
  - Disable in Off = prohibit only while the unit is off
- To activate the configured button prohibits, press right arrow, Mode, Fan Speed and Cancel buttons at the same time momentarily while the main screen is displayed. The same steps can be followed to release it (see Fig 6 below).
- Once locked, if the prohibited button is pushed, a key icon will blink for three times, which indicates that the button(s) has been locked out.
  - The key icon is available in Detailed and Standard display modes only.

Prohibit Buttons	
Up/Dwn	: Disable
Left	: Enable
Right	: Disable in Off
On/Off	: Enable
Mode	: <b>Enable</b>
Fan Speed	: Disable
Setting <span>◀▶</span>	



Push the Four buttons at the same time to lock



(In simple display mode Key icon is not displayed)

Fig 6. Activate Prohibit Buttons on the NAV Controller

### 3.6.2 Prohibit Mode

- The NAV controller has the ability to prohibit the indoor unit operation mode usage.
- To configure and activate which operation mode to prohibit, access Service Setting → Prohibit Functions → Prohibit Mode.
  - Enable = permit
  - Disable = prohibit
- Prohibit Mode does not display the key icon, and the keys lock pattern is not used to activate mode prohibit function.
- At least one mode must be active / enabled as all modes cannot be disabling at the same time.

Prohibit Mode	
Fan	: Enable
Cool	: Enable
Heat	: Enable
Auto	: Enable
Dry	: <b>Disable</b>
VentClean	: Enable
Setting <span>◀▶</span>	

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## 4. Intelligent Touch Controller™ (iTC) – DCS601C71

## 4. Intelligent Touch Controller™ (iTC) – DCS601C71

### 4.1 Setpoint

- The *iTC* has independent Cooling and Heating setpoints in the occupied mode adjustable between 60 - 90° F.
  - Cooling setpoint shall be maintained higher than or equal to the heating setpoint.
  - The minimum cooling and heating setpoint differential is adjustable between 0 - 7° F (0 - 4° C).
- The *iTC* has independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode which are adjustable between 40 - 95° F (5 - 35° C).
  - Setup and Setback setpoints is to set outside of the occupied setpoint range
  - Settings shall be applied based upon the Zone configurations.



Intelligent Touch Controller  
(iTC) DCS601C71

### 4.2 Setpoint Range Limitation

- The setpoints range limitation logic on the *iTC* is to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Zone configurations (default 60 - 90° F).
- The Setpoint Range is disabled by default and it could be enabled to set the setpoint range values.
- The setpoint range limitation is related to the setback setpoints. The setback setpoints can only be set outside of the occupied setpoint range with a 2° F differential. The setback (unoccupied) setpoint will automatically be adjusted to maintain a 2° F fixed differential from the highest (cooling) and lowest (heating) possible occupied setpoints. The setpoint range limit has to be adjusted from its default setting in order has to be adjusted setback below 92 F in cooling mode or 58° F heating mode.

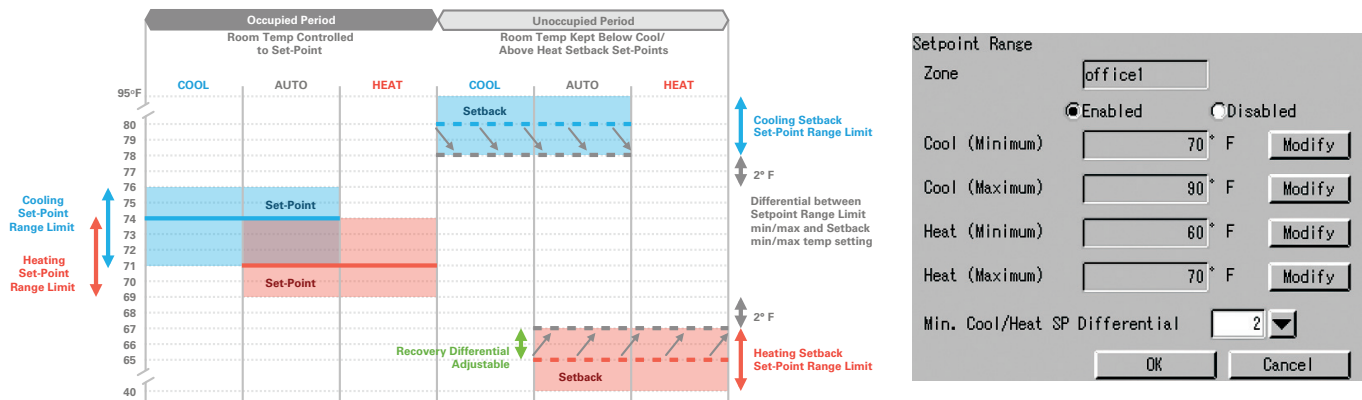


Fig 7. Setpoint Range Limitation on the *iTC*

### 4.3 Auto Changeover

1. The auto changeover logic changes 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 the branch selector box refrigerant port in the Heat Recovery system. Refer back to the changeover master discussion in section 3.3. (See Figure 2 & 3)
2. 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 + 2.7° F.
3. 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 - 2.7° F.
4. 1 hour guard timer
  - a. Upon changeover, a guard timer will be activated to prevent another changeover during this period.
  - b. The guard timer is ignored by a change of setpoint manually from either Intelligent Touch Controller or Remote Controller or by schedule.
  - c. The guard timer is set to minutes as default, configurable to 15, 30, or 90 minutes.

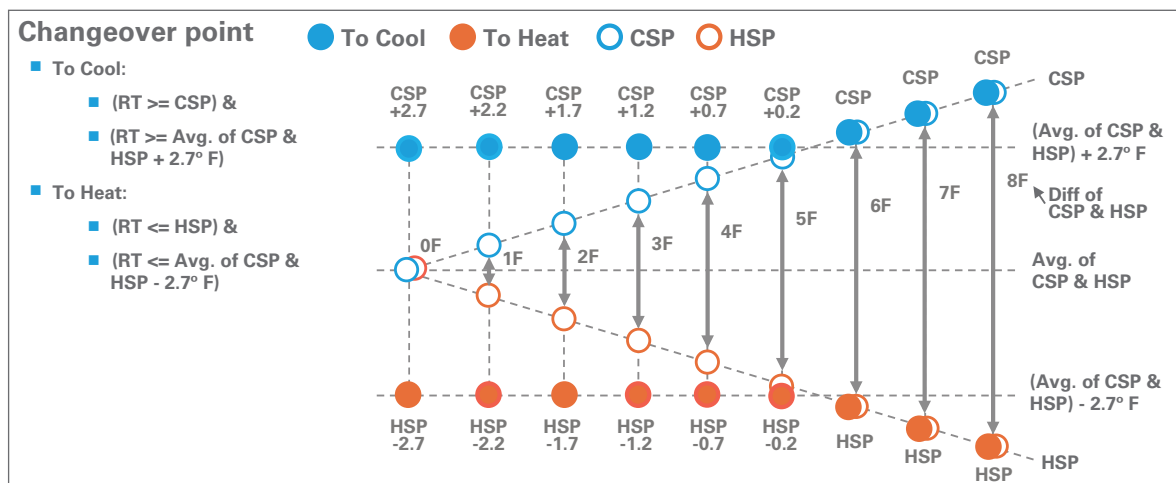


Fig 8. Auto Changeover logic on the iTC

5. The iTC provides 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.
  - 5.1. Individual method (recommended for Heat Recovery Systems)
    - a. Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the Zone.
    - b. Changeover affects individual indoor unit group in the Zone.
  - 5.2. Fixed method
    - a. Changeover evaluated by room temperature and setpoints of the representative unit (first registered unit) in the Zone
    - b. Changeover affects all indoor unit groups in the Zone.
  - 5.3. Average method
    - a. Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints in the Zone.
    - b. Changeover affects all indoor unit groups in the Zone.

## 4. Intelligent Touch Controller™ (iTC) – DCS601C71

### 4.4 Setback

1. The iTC's setback logic and cooling/heating setback setpoints reside on the iTC.
2. The setback logic is not activated by default and it could be activated for all indoor units, per zone level.
3. When setback logic is activated during unoccupied hours, the iTC maintains the room temperature between the cooling and heating setback setpoints turning the indoor unit on/off when necessary.
4. The Independent Setback Recovery Temp differential for cooling is -4° F by default and heating is +4° F by default. It is configurable between 2 – 10° F.

### 4.5 Schedule

1. The iTC weekly schedule patterns are 7 days, 5 + 2 (Weekday + Weekend) or 5 + 1 + 1 (Weekday + Saturday + Sunday)
2. The iTC has 8 independent schedules available with 40 exception days per schedule.
3. The schedule supports up to 8 events per day. Functions able to be scheduled per event 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.

### 4.6 Remote Controller Prohibition

1. R/C Enable/Disable for On/Off, Operation mode and Setpoint are available as iTC advanced settings on the Zone level and individual indoor unit level.
2. Also this function could be used on iTC's schedule and interlock program.

Setpoint	Value	Action
Cool	82° F	No change / Modify
Heat	88° F	No change / Modify
Setback Setpoint - Cool	-	No change / Modify / Deactivate
Setback Setpoint - Heat	-	No change / Modify / Deactivate

Fig 9. The setback setpoints configuration on the iTC

No.	Time	Type	Target	On/Off
01	08:00 AM	Z	All	On
02	08:00 PM	Z	All	Off

Fig 10. The Event list on the iTC schedule

Setting	Value	Action
R/C Enable/Disable On/Off	Permitted	No change / [Dropdown]
Operation Mode	Permitted	No change / [Dropdown]
Setpoint	Permitted	No change / [Dropdown]
Fan Speed	Middle	No change / [Dropdown]
Air Direction	3	No change / [Dropdown]
Filter Sign	OFF	[Dropdown]

Fig 11. Remote controller prohibition configuration on the iTC



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## 5. Intelligent Touch Manager (*iTM*) – DCM601A71

## 5. Intelligent Touch Manager (iTM) – DCM601A71

### 5.1 Setpoint

1. Independent cool and heat dual setpoints are available in the occupied period. Single setpoint mode is available with 0° F min setpoint differential and setpoint tracking enabled.
2. Minimum Cool/Heat Setpoint Differential refers to the difference between the cooling and heating setpoint values. The differential can be set between 0° F – 7° F.
3. Setpoint tracking is used to lock in the Min. Setpoint Differential for cooling and heating to a fixed value.
4. The setback setpoints (cooling and heating) in the unoccupied period are adjustable between 50° F – 95° F.
5. The setback setpoints can only be set outside of the occupied setpoint range with a 2° F differential. The setback (unoccupied) setpoint will reduce the occupied setpoint range automatically to maintain a 2° F fixed differential from the highest (cooling) and lowest (heating) possible occupied setpoints.



Intelligent Touch Manager (iTM) DCM601A71

### 5.2 Setpoint Range Limitation

1. Occupied setpoint range for cooling and heating are configurable by Setpoint Range Limitation within 60° F – 90° F as a default. The cooling setpoint cannot be set lower than the heating setpoint and the heating setpoint cannot be set higher than the cooling setpoint.
2. The Setpoint Range is disabled by default and it could be enabled to set the setpoint range values.
3. The setpoint range limitation is related to the setback setpoints. The setback (unoccupied) setpoints can only be set outside of the occupied setpoint range with a 2° F differential. The setback setpoint will reduce the occupied setpoint range automatically to maintain a 2° F fixed differential from the highest (cooling) and lowest (heating) possible occupied setpoints.

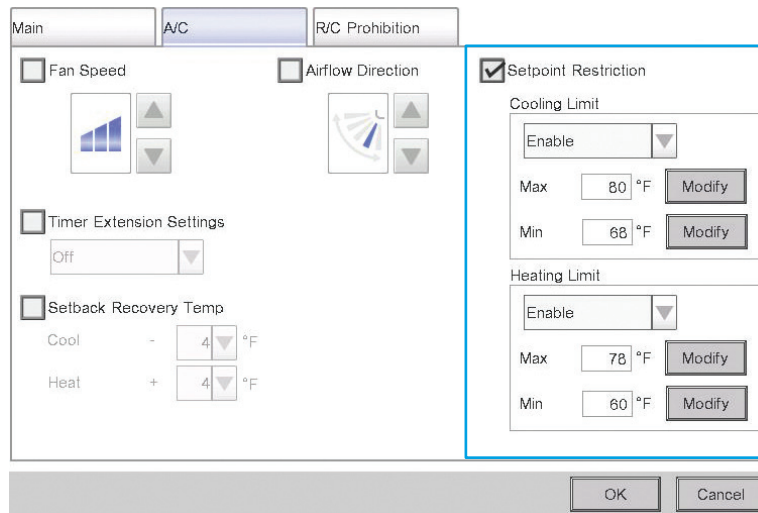
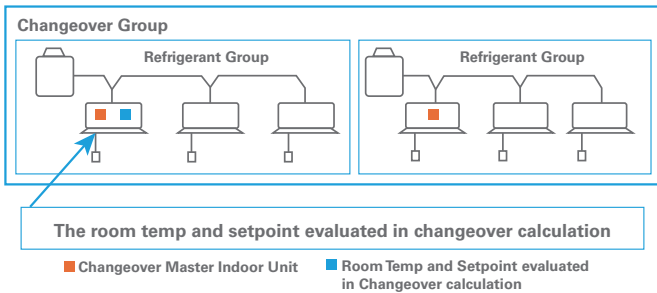


Fig 12. Setpoint Range Limitation configuration on the iTM

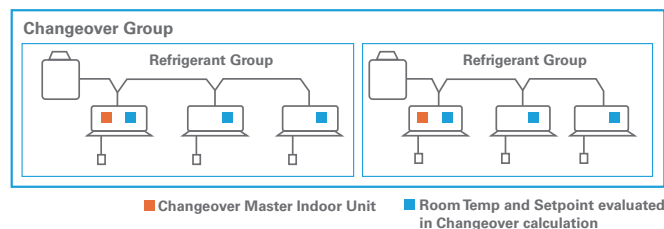
## 5.3 Auto Changeover

1. The Auto Changeover logic changes 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 refrigerant port in the Heat Recovery system. Refer back to changeover master discussion in section 3.3.
2. The *iTM* provides four changeover methods to meet a variety of expectations in a project. Fixed, Individual, Average, or Vote methods can be specified in the changeover group with targeted indoor units, as well as Primary/Secondary Changeover deadbands. A guard timer will be applied to prevent frequent mode change, which is configurable for 15, 30, or 60 (default) minute.
  - 2.1. Fixed Method:
    - a. Changeover is evaluated with the representative indoor unit.
    - b. Changeover affects all indoor units.
    - c. Good method for prioritizing the representative indoor unit for the Heat Pump system (or multiple units on the same port of the BS Box in Heat Recovery system). (See Figure 13)
  - 2.2. Individual Method:
    - a. Changeover is evaluated by, and affects, each indoor unit individually.
    - b. Used in application with the Heat Recovery system. (See Figure 14)

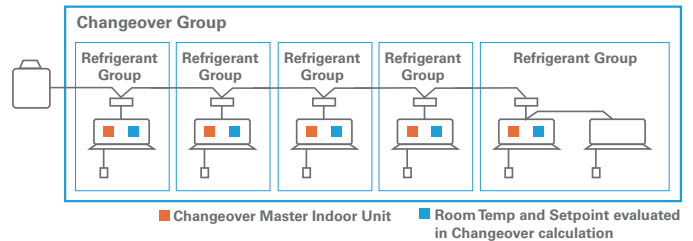


**Fig 13. Auto changeover Fixed method on the *iTM***

- 2.3. Average Method:
  - a. Changeover is evaluated based on the average of the room temperature and average setpoints in the change-over group.
  - b. A weight (0-3) can be added to each indoor unit demand in the changeover group. The default is 1.
  - c. Changeover affects all indoor units in the changeover group.
  - d. Used in applications with Heat Pump systems (or multiple units on the same port of the BS Box in the Heat Recovery system).



**Fig 15. Auto changeover Average method on the *iTM***



**Fig 14. Auto changeover Individual method on the *iTM***

### 5.3 Auto Changeover (cont.)

#### 2.4. Vote Method:

- Changeover is evaluated based on the total cooling demand and total heating demand. If the total cooling demand is greater than the heating demand, the *iTM* changes the indoor units in the changeover group to cool mode.
- When the changeover group is in cooling mode, the total cooling demand will decrease; at that point, the total heating demand may become greater than the cooling demand and change the mode to heating (a guard timer applies).
- The setpoints can be different in each indoor unit within the changeover group. The demand is calculated based on the setpoints in comparison to room temperature for each indoor unit. The demand within the Primary Changeover deadband (PCd) is considered as no demand.
- A good method for Heat Pump systems (or multiple units on the same port of the BS Box in Heat Recovery system) as a pseudo-simultaneous cooling and heating operation.
- A weight (0-3) can be added to each indoor unit demand in the changeover group. The default is 1.
- An option for heating override can be applied if there is an indoor unit which the heating demand exceeds  $[H\_SP - (PCd + SCd)]$ .

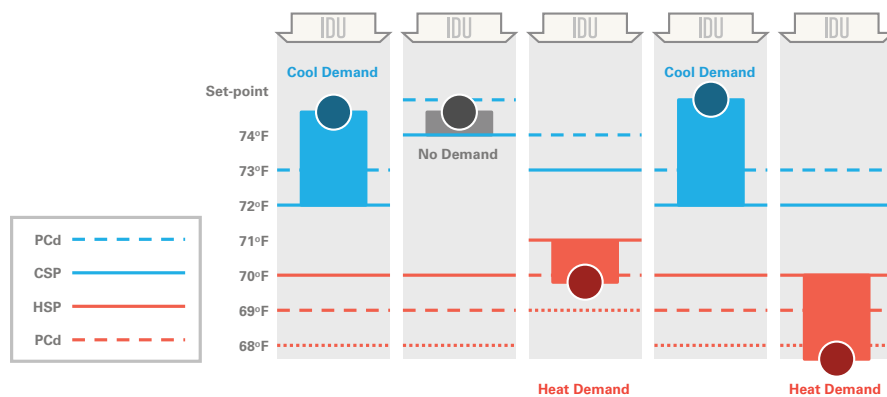


Fig 16. Auto changeover Vote method on the *iTM*

### 5.4 Setback

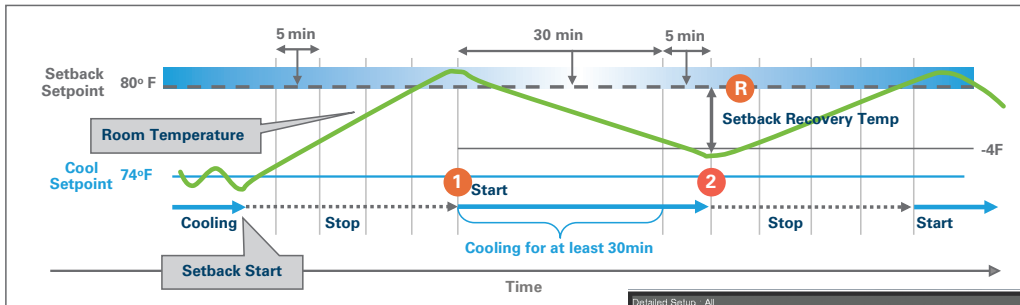
- The Setback function keeps the room temperature at a moderate level with the setback setpoints when the indoor unit is off (when the room is unoccupied). The indoor unit only turns on if the room temperature rises to meet the Cool Setback Setpoint in cooling mode, or if the room temperature falls to meet the Heat Setback Setpoint in heating mode. Once the room temperature has recovered and the guard timer has expired, the indoor unit is turned off.
- A guard timer keeps the indoor unit on for at least 30 minutes after the setback function turns on the indoor unit.
- If the indoor unit is set to Fan or Dry mode, the setback function will not work.
- The *iTM* setback provides independent setback setpoints for cooling and heating which reside on the *iTM* itself along with the *iTM* setback control logic.
- By default the setback setpoints are disabled and can be enabled by the schedule, interlock, and setting features.
  - The default setback setpoint for cooling is 80° F (configurable).
  - The default setback setpoint for heating is 64° F (configurable).
  - Independent Setback Recovery Temp (hysteresis) for cooling (-4° F default) and heating (+4° F default). Configurable from 2° F to 10° F.

# 5. Intelligent Touch Manager (iTM) – DCM601A71

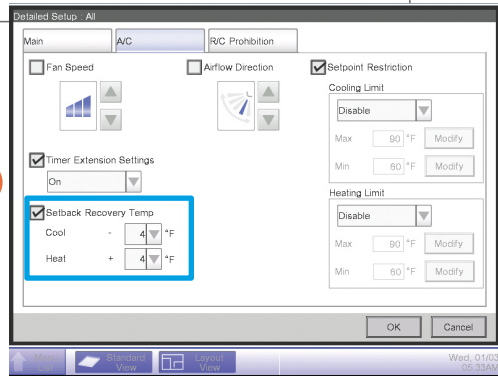
## 6. Setback Control Logic

- a. Room temperature and setback setpoint are evaluated every five minutes for each indoor unit.
- b. If the indoor unit is turned on by the *iTM* manually (or by the Schedule function), the normal operation is maintained, i.e., the indoor unit maintains the room temperature from the setpoint.
- c. When the Setback function turns on the indoor unit (unless it is turned off by the *iTM* manually, by the Schedule function, or by a remote controller), the Setback function maintains the room temperature below (or above) the setback setpoint.

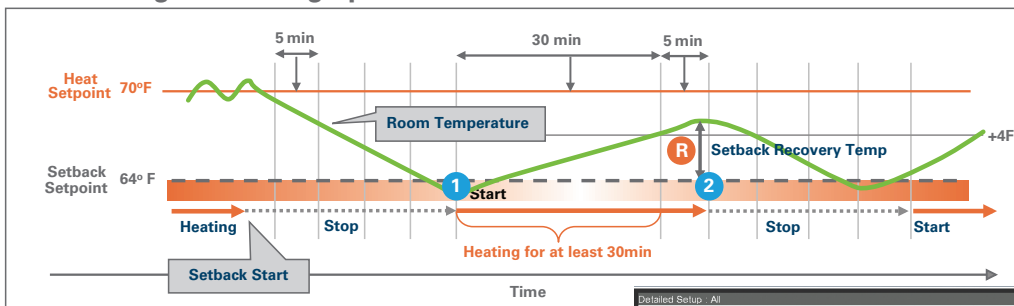
### Setback Logic – Cooling operation



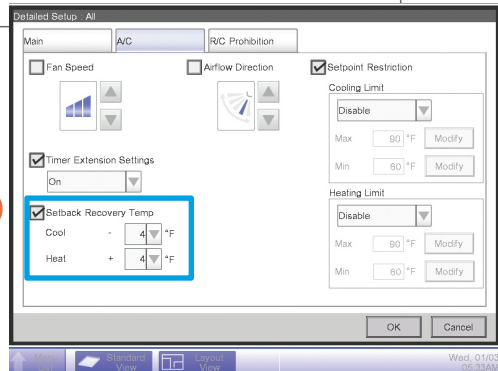
- 1 Decision to start indoor unit cooling operation**
  - » Decision time: every 5 min after stop
  - » Condition: Room temperature  $\geq$  Setback Setpoint
- 2 Decision to stop indoor unit operation**
  - » Decision time: every 5 min after 30 min from the time cooling starts.
  - » Condition: Room temperature  $\leq$  Setback Setpoint – Setback Recovery Temp



### Setback Logic – Heating operation



- 1 Decision to start indoor unit heating operation**
  - » Decision time: every 5 min after stop
  - » Condition: Room temperature  $\leq$  Setback Setpoint
- 2 Decision to stop indoor unit operation**
  - » Decision time: every 5 min after 30 min from the time heating starts.
  - » Condition: Room temperature  $\geq$  Setback Setpoint + Setback Recovery Temp



## 5.5 Schedule

1. Up to 100 schedule programs can be created.
2. 7 day , 5 + 2 (Weekday + Weekend), 5 + 1 + 1 (Weekday + Saturday + Sunday), 1 (Everyday)
3. Up to 20 Events can be registered each day, which could include Start/Stop Start/Stop, Setpoint, Operation Mode, Optimum Start, Setback, Timer Extension, Setpoint offset, R/C Prohibition or Fan Speed
4. Independent Cool and Heat setpoints and Independent Setback setpoints allow for one schedule to be set to run year round.

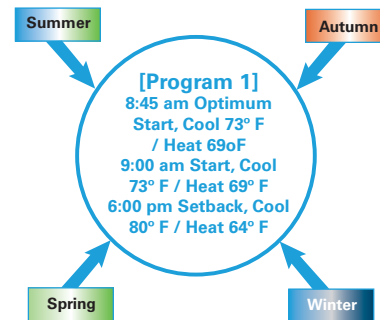
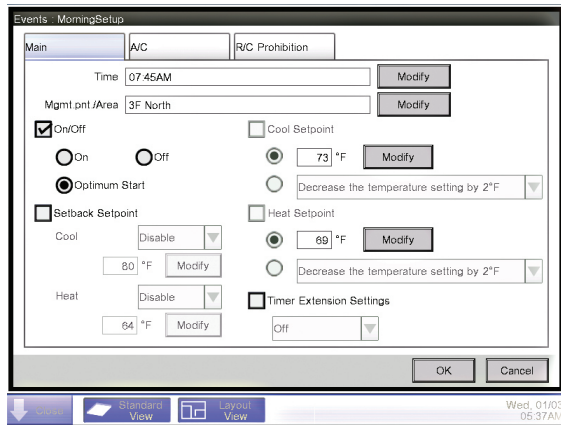


Fig 17. Event configuration on iTM Schedule

## 5.6 Remote Controller Prohibition

1. R/C prohibition consists of On/Off, Mode and Setpoint.
2. R/C prohibition can be set for an individual indoor unit, a Zone/Area (group of indoor units), through a schedule or interlock program.
3. The Remote Controller On/Off and Mode adjustment can be prohibited during the occupied hours. However, On/Off may need to be permitted during the unoccupied period for the Timed Override operation.

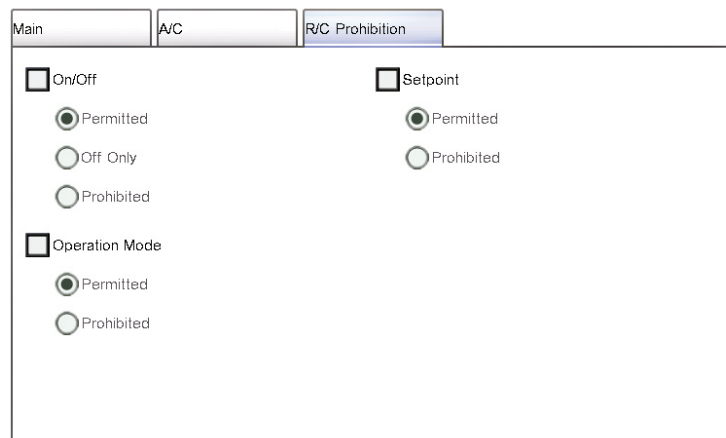


Fig 18. Remote controller prohibition configuration on the iTM

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## 6. iTM BACnet® Server Gateway (DCM014A51)

## 6. iTM BACnet® Server Gateway (DCM014A51)

1. The (*iTM*) is capable of serving as a *BACnet* interface for Building Management System (BMS) integration. The *iTM BACnet* Server Gateway option (DCM014A51) will provide BMS integrators with the ability to monitor and control VRV indoor units via the *BACnet*/IP protocol. The *iTM BACnet* Server Gateway option eliminates the need for an additional hardware interface for the BMS to monitor and control a VRV system. The *iTM BACnet* Server Gateway option provides seamless control-logic integration between the *iTM* and BMS.
2. The *iTM BACnet* Server Gateway option is a software license that can be added to an *iTM* with v2.04 or higher. Dual setpoints, Auto changeover, Setback, Schedule, Remote Controller Prohibition and Setpoint Range Limitation can be configured on the *iTM* and the BMS can utilize it remotely.
3. The *iTM BACnet* Server Gateway will provide the following data points to the BMS:

### 3.1. System configuration points linked to the *iTM* control logic

Point Name	Point Description
<b>Enable <i>iTM</i> Schedule Operation</b>	Enable or Disable <i>iTM</i> Schedule operation
<b>Enable <i>iTM</i> Auto Changeover Operation</b>	Enable or disable <i>iTM</i> Auto changeover logic
<b>Timed Override Minutes</b>	Set override time in minutes
<b>System Forced Off</b>	The Forced System Stop command will force the indoor unit to stop running. Remote controller will be locked out from restarting indoor units during the forced system stop event.

### 3.2. Indoor unit Points

	Point Name	Point Description
<b>Monitoring Points</b>	<b>Unit On_Off Status</b>	Monitors if the indoor unit fan is On or Off
	<b>Alarm Status</b>	Monitors whether or not the indoor unit is operating normally, and issues an alarm if the indoor unit as a malfunction. Error Code is shown in the description.
	<b>Room Temperature</b>	Monitors and displays the room temperature.
	<b>Unit On Details</b>	Indoor unit details operation Off - Normal (On) - Override - Setback
	<b>Filter Sign Status</b>	Monitors filter run time and provides service alert.
	<b>Indoor Fan Status</b>	Monitors if the indoor unit fan is On or Off
	<b>Communication Status</b>	Monitor if the communication is Normal or in Alarm
	<b>Thermo-on Status</b>	Monitors whether or not the indoor unit is actively cooling or heating.
	<b>Compressor Status</b>	Monitors if the compressor of the outdoor unit is On/Off/Defrost
	<b>Aux Heater Status</b>	Monitors if the external heater controlled by the indoor unit is operating.
	<b>Changeover Option</b>	Monitor if <i>iTM</i> changeover logic is Active



*iTM BACnet* Server Gateway  
DCM014A51



## 6. iTM BACnet® Server Gateway (DCM014A51)

Operation, Configuration and Monitoring points	Point Name	Point Description
	<b>Occupancy Mode</b>	Set the occupancy of the indoor unit Occupied, Unoccupied or Standby
	<b>Operation mode</b>	Set Cool - Heat - Fan - Dry operation mode. For the indoor unit and monitors the latest mode
	<b>Occ Cooling Setpoint</b>	Sets the occupied cooling setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Occ Heating Setpoint</b>	Sets the occupied heating setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Unocc Cooling Setpoint</b>	Sets the unoccupied cooling setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Unocc Heating Setpoint</b>	Sets the occupied heating setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Max Cooling Setpoint</b>	Sets the maximum cooling setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Min Cooling Setpoint</b>	Sets the minimum cooling setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Max Heating Setpoint</b>	Sets the maximum Heating setpoint of the indoor unit and monitors the latest setpoint value
	<b>Min Heating Setpoint</b>	Sets the minimum heating setpoint of the indoor unit and monitors the latest setpoint value.
	<b>Min Setpoint Differential (Cooling &amp; Heating)</b>	Sets the minimum differential value between cooling and heating setpoint monitor the latest differential value.
	<b>Cooling &amp; Heating Setpoint Tracking Mode</b>	Enable or Disable <i>iTM</i> setpoint tracking mode.
	<b>Fan speed</b>	Sets the indoor unit fan speed and monitors the latest setting
	<b>Timed Override Operation</b>	Enable or Disable <i>iTM</i> override timer
	<b>Remote Controller Prohibit (On_Off)</b>	Permits or prohibits the remote controller to control the indoor unit's On/Off.
	<b>Remote Controller Prohibit (Operation Mode)</b>	Permits or prohibits the remote controller to control the indoor unit's Operation mode.
<b>Remote Controller Prohibit (Setpoint)</b>	Permits or prohibits the remote controller to control the indoor unit's Setpoint.	
<b>Filter Sign Reset</b>	Clears the Filter sign status.	
<b>Forced Thermo-off</b>	Force the indoor unit to stop actively cooling or heating.	

- The *iTM* should be commissioned prior to the integration with the BMS. All the control specifications should be set (such as room names, auto changeover, setback, setpoint range limit, dual or single setpoints, and schedule). System configurations made in the *iTM* will be available to the BMS once the indoor units are discovered by the front end.

## 7. BACnet<sup>®</sup> Interface (DMS502B71)

## 7. BACnet® Interface (DMS502B71)

1. The *BACnet* Interface (DMS502B71) will provide BMS integrators with the ability to monitor and control VRV indoor units via the *BACnet*/IP protocol.
2. The *BACnet* Interface will provide the following *BACnet* data points to the BMS:



BACnet Interface DMS502B71

	Point Name	Point Description
Operation, Configuration and Monitoring points	<b>On / Off (Note 2)</b>	Starts / stops the indoor unit and monitors the latest status.
	<b>Operation Mode (Note 2)</b>	Sets the Cool / Heat / Fan / Dry mode for the indoor unit and monitors the latest mode.
	<b>Fan Speed (Note 2)</b>	Sets the indoor unit fan speed and monitors the latest setting.
	<b>Setpoint (Note 2)</b>	Sets the setpoint of the indoor unit and monitors the latest setpoint.
	<b>Filter Sign Reset</b>	Clear the Filter sign status.
	<b>Remote Controller Permit / Prohibit (On / Off)</b>	Permits or prohibits the remote controller to control the indoor unit's On/Off.
	<b>Remote Controller Permit / Prohibit (Operation mode)</b>	Permits or prohibits the remote controller to control the indoor unit's Operation mode.
	<b>Remote Controller Permit / Prohibit (Setpoint)</b>	Permits or prohibits the remote controller to control the indoor unit's Setpoint.
	<b>Lower Centralized Controller Operation Enable / Disable</b>	Enables or disables operation of a Centralized Controller connected to the DIII network.
	<b>Forced System Stop</b>	The Forced System Stop command will force the indoor unit to stop running. Remote controllers will be locked out from restarting indoor units during the forced system stop event.
	<b>Airflow Direction (Note 2)</b>	Sets the Airflow Direction and monitors the latest setting.
	<b>Forced Thermo-Off</b>	In response to the Forced Thermo-off command, the indoor unit stops actively cooling or heating.
	<b>Energy Saving</b>	Offsets the internal setpoint +3.6° F (2° C) in cooling, and -3.6° F (-2° C) in heating in an indoor units. The actual setpoints is not changed.
	<b>Ventilation Mode (Note 2)</b>	Sets the VAM unit in ERV, Bypass or Auto mode and monitors the latest mode
<b>Ventilation Amount (Note 2)</b>	Sets the ventilation amount is in Low, High, Auto, Fresh-up Low, Fresh-up High or Fresh-up Auto and monitors the latest setting.	
Monitoring points	<b>Alarm</b>	Monitors whether or not the indoor unit is operating normally, and issues an alarm if the indoor unit has a malfunction
	<b>Malfunction code</b>	Displays a malfunction code specified by Daikin if an indoor unit in the system has a malfunction.
	<b>Measured Room temperature (Note 1)</b>	Monitors and displays the room temperature.
	<b>Filter sign</b>	Monitors filter run time and provides service alert.
	<b>Communication status</b>	Monitors the indoor unit's DIII-net communications status.
	<b>Thermo-on</b>	Monitors whether or not the indoor unit is actively cooling or heating.
	<b>Compressor status</b>	Monitors the compressor of the outdoor unit connected to the indoor unit is operating.
	<b>Indoor fan status</b>	Monitors if the indoor unit fan is On or Off
<b>Heater status</b>	Monitors if the heater controlled by the indoor unit is operating.	

1. Room temperature data (*BACnet* object name RoomTemp\_XXX) by default is reported from the Daikin indoor unit's return air thermistor. This applies to all VRV indoor units styles and capacities. During periods when the indoor unit is turned off or during certain operating modes that cycle the fan off including defrost operation, hot-start and system pressure equalization, the reported temperature may not accurately reflect the actual space temperature. For applications where this temperature value will be primary to system control including mode and temperature setpoint management, it is recommended that the Daikin remote temperature sensor (Part No. KRCS01-1B or 4B depending on model) is specified for each indoor unit and installed within the occupied space or unit be configured to be controlled from temperature sensor in BRC1E71/72 NAVIGATION Controller if the unit is capable.
2. The indoor unit saves the settings for the Setpoint, On/Off, Operation mode, Airflow direction, and Fan Speed in the nonvolatile memory of the indoor unit each time they are changed, so that the settings will not be lost when a power loss occurs. This nonvolatile memory has a write count limit and may cause a failure if the "write to" count limit is exceeded. Therefore when the Setpoint, On/Off, Operation mode, Airflow direction, and Fan Speed of each indoor unit are automatically controlled from the building management system via the Interface for use in *BACnet*, be sure that the number of changes for each setting should not exceed 7, 000 times per year. If the same value is repeatedly sent, it will not be added to the total "write to" count.
3. *BACnet* is a registered trademark of ASHRAE

### 7.1 Setpoint

1. The *BACnet* Interface provides a single setpoint for both cooling and heating modes.
2. If dual setpoints are required by the project specifications, the integrator will need to manage the cooling and heating setpoints from his programming on the BMS front end.
3. When sending a new operation mode command from the BMS, the integrator must send the new setpoint with the new operation mode change.

### 7.2 Setpoint Range Limitation

1. Setpoint Range Limitation should be programmed by the BMS front end by using the provided data points. (Operation Mode Status – Temp Setpoint – On/Off Status).
2. If the setpoint range limitation has been configured on one of the VRV controller (*NAV* controller or *iTC/iTM*), when the indoor unit receives a setpoint outside of the range, the setpoint will change to the closest acceptable value.

### 7.3 Auto Changeover

1. Auto changeover control logic should be programmed on the BMS front end using the provided data points (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status).
  - a. When using independent cooling and heating setpoints, the new setpoint value must be communicated with every mode change sent to the indoor unit. Heating and cooling setpoints memory locations in the indoor unit are simultaneously overwritten when sending the setpoint.
  - b. A guard timer of at least 15 minutes is recommended with this sequence to prevent frequent mode changes.
  - c. The BMS should not send “Auto” operation mode to indoor unit as this will enable the indoor unit auto changeover logic which has a wide changeover deadband.

### 7.4 Setback

1. Setback logic should be programmed on the BMS front end using the provided data points (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status – On/Off Command)
2. If the setback function has been configured on any of VRV controller (*NAV* controller or *iTC/iTM*), the BMS will not be notified.

### 7.5 Schedule

1. The BMS should set the Occupied and Unoccupied modes from the BMS Master Schedule.
2. If the BMS Master schedule is used, the Optimum Start should be configured from the Master Schedule.
3. The schedule can be configured on the BMS front end using the provided data points (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Command).
4. During unoccupied hours, BMS integrator should program afterhours override to allow the occupant to operate the indoor unit for a predefined time.

### 7.6 Remote Controller Prohibition

1. The prohibits can be set by the BMS front end by enabling the provided data points. (Remote Controller Permit/ Prohibit On/Off - Remote Controller Permit/Prohibit Operation Mode – Remote Controller Permit/Prohibit Setpoint).

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## 8. LON<sup>®</sup> Interface (DMS504C71)

## 8. LON<sup>®</sup> Interface (DMS504C71)

1. The LON Interface (DMS504C71) will provide BMS integrators with the ability to monitor and control VRV indoor units via the LonWorks<sup>®</sup> protocol.
2. The LON interface will provide the following LON network variables to the BMS:



LON Interface DMS504C71

	Function	Description
Monitoring points	<b>ON / OFF Status</b>	Monitors the On / Off status of the indoor unit.
	<b>Operation Mode Status</b>	Monitors whether the indoor unit is in the Cool, Heat or Fan mode.
	<b>Temperature Setpoint</b>	Monitors the current temperature setpoint of the indoor unit.
	<b>Room Temperature (Note 1)</b>	Monitors the current return air or room temperature of the indoor unit. (Note 1)
	<b>Fan Speed</b>	Monitors the current fan speed setting of the indoor unit.
	<b>Filter Indication Status</b>	Monitors the filter run time and provides service alert.
	<b>Forced Thermo-off Status</b>	Monitors whether the indoor unit is forced to a stop actively cooling or heating.
	<b>Remote Controller ON / OFF Permit/Prohibit Status</b>	Monitors the permit/prohibit status of the indoor units remote controller ON / OFF button.
	<b>Remote Controller Operating Mode Permit/Prohibit Status</b>	Monitors the permit/prohibit status of the indoor units remote controller operation mode button.
	<b>Remote Controller Temperature Setpoint Permit/Prohibit Status</b>	Monitors the permit/prohibit status of the indoor units remote controller temperature Setpoint buttons.
	<b>System Forced OFF Setting Status*</b>	Monitors the system forced off status for all indoor units connected to the LON gateway.
	<b>Centralized Controller Operation Enable/Disable Setting Status*</b>	Monitors the network variable input status for enable/disable of the Centralized Controller on the DIII-Net bus.
	<b>Indoor Unit Communication Status</b>	Monitors the communication status of the indoor unit to the DIII-Net.
Operation, configuration, and control points	<b>ON / OFF Command</b>	Starts and stops the indoor unit. (Note 2)
	<b>Operating Mode</b>	Sets the Cool / Heat / Fan / Auto mode for the indoor unit. (Note 2)
	<b>Temperature Setpoint</b>	Commands the temperature setpoint for the indoor unit. (Note 2)
	<b>Airflow Rate (Fan Speed)</b>	Sets the fan speed (high, low) for the indoor unit. (Note 2)
	<b>Filter Indicator Reset</b>	Resets the filter maintenance indicator on the indoor unit.
	<b>Forced Thermo OFF Setting</b>	Forcibly stops all cooling or heating capacity for the indoor unit.
	<b>Remote Controller ON / OFF Restriction Setting</b>	Permits/Prohibits operation of the indoor unit remote controller ON / OFF button.
	<b>Remote Controller Operating Mode Restriction Setting</b>	Permits/Prohibits operation of the indoor unit remote controller MODE button.
	<b>Remote Controller Temperature Setpoint Restriction Setting</b>	Permits/Prohibits operation of indoor unit remote controller temperature setpoint buttons
	<b>System Forced OFF Setting*</b>	Forced system stop forces indoor units to stop running base on receive alarm input. Remote controllers then locked out from restarting indoor unit during forced stop event.
<b>Centralized Controller Enable/Disable.*</b>	Network variable input to enable/disable the operation of Daikin centralized controller on the DIII-Net bus.	

\* Control Items pertaining to the entire system.

1. Room temperature data (SNVT\_temp\_p nvoSpaceTemp\_nn) by default is reported from the Daikin indoor units embedded return air thermistor. Depending upon the remote controller model and the manufacturing date of the indoor unit, this may be reconfigured to retrieve the room temperature value from the remote controller thermistor. During periods when the indoor unit is turned off or during certain operating modes that cycle off the fan including defrost operation, hot-start and system pressure equalization, the reported temperature may not accurately reflect the actual space temperature. For applications where this temperature value will be primary to system control including mode and temperature setpoint management, it is recommended that the Daikin remote temperature sensor (Part No. KRCS01-1B) is specified for each indoor unit or the remote controller is programmed to report room temperature through the gateway. Please consult Daikin AC for guidance with specific applications.
2. The Daikin indoor unit maintains the settings for temperature start / stop status, operating mode, air direction and fan speed in non-volatile memory each time they are changed. These settings will not be lost upon a power loss event. LonWorks<sup>®</sup> and LonTalk<sup>®</sup> are registered trademarks of the Echelon Corporation.

## 8. LON® Interface (DMS504C71)

### 8.1 Setpoint

1. The *LON* Interface provides a single setpoint for both cooling and heating modes.
2. If dual setpoints are required by the project specifications, the integrator will need to manage the cooling and heating setpoints from his programming on the BMS frontend
3. When sending a new operation mode command from the BMS, the integrator must send the new setpoint with the new operation mode change.

### 8.2 Setpoint Range limitation

1. It could be programmed on the BMS front end by using the provided data points. (Operation Mode Status – Temp Setpoint – On/Off Status)
2. If the setpoint range limitation has been configured on one of the VRV controller (*NAV* controller or *iTC/iTM*), when the indoor unit receives a setpoint outside of the range, the set point will change to the closest acceptable value.

### 8.3 Auto Changeover

1. Auto changeover control logic could be programmed on the BMS front end using the provided data points (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status).
  - a. When using independent cooling and heating setpoints, the new setpoint must be communicated with every mode change sent to the indoor unit. Heating and cooling setpoints memory locations in the indoor unit are simultaneously overwritten when sending the setpoint.
  - b. A guard timer of at least 15 minutes is recommended with this sequence to prevent frequent mode changes.
  - c. The BMS should not send “Auto” operation mode to indoor unit as this will use indoor unit Auto logic that has wide changeover deadband.

### 8.4 Setback

1. Setback logic should be programmed by the BMS front end using the provided data points (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status – On/Off Command)
2. If the setback function has been configured on any of VRV controller (*NAV* controller or *iTC/iTM*), the BMS will not be notified.

### 8.5 Schedule

1. The BMS should set the Occupied, and Unoccupied modes from the BMS Master Schedule
2. If the BMS Master schedule is used, the Optimum Start should be configured from the Master Schedule.
3. The schedule could be configured on the BMS front end using the provided data points (Operation Mode Command – Temperature Setpoint – Room Temp– On/Off Command)
4. During unoccupied hours, BMS integrator should program afterhours override to allow the occupant to operate the indoor unit for a predefined time.

### 8.6 Remote Controller Prohibition

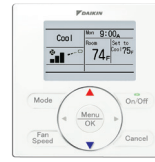
1. The prohibits can be set by the BMS front end by enabling the provided data points. (Remote Controller On/Off Restriction Setting - Remote Controller Operation Mode Restriction Setting– Remote Controller Temperature Setpoint Restriction Setting )

## 9. NAV Controller + *iTC*



## 9.1 Setpoints

1. When the *iTC* communicates to the indoor unit, the *NAV* controller will automatically be set to single setpoint (Single SP). This setting cannot be changed unless the central controller is removed from DIII-Net.
2. Independent cooling and heating setpoint with minimum differential from 0 - 7° F are available on the *iTC*. Single setpoint is also available when the min setpoint differential configured as "0\*" on the *iTC*.



NAVIGATION Remote Controller (NAV)



Intelligent Touch Controller™ (iTC) DCS601C71

## 9.2 Setpoint Range Limitation

1. Setpoint range limitation should be configured on the *iTC*.
2. If the setpoint range limitation is enabled on the *NAV* controller, the same setpoint range must be configured for cooling and heating setpoints because the *NAV* controller will be restricted to single setpoint mode.
3. If setpoint range limitation is enabled on the *iTC* and *NAV* controller, the indoor unit will follow the tighter setpoint range.
  - a. In the example below, the setpoint range limitation is tighter on the *NAV* controller. If the heat setpoint is set to 75° F from the *iTC*, the setpoint will revert back to 74° F.

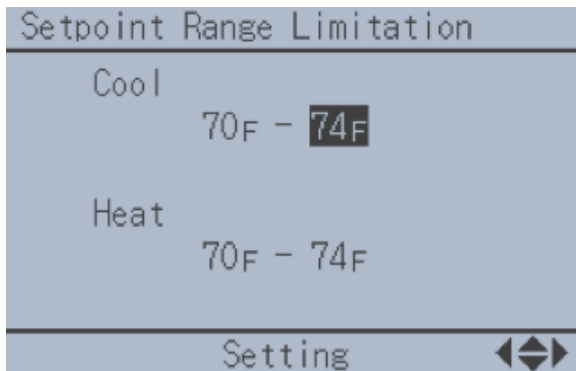


Fig 19. Setpoint Range Limitation on NAV controller

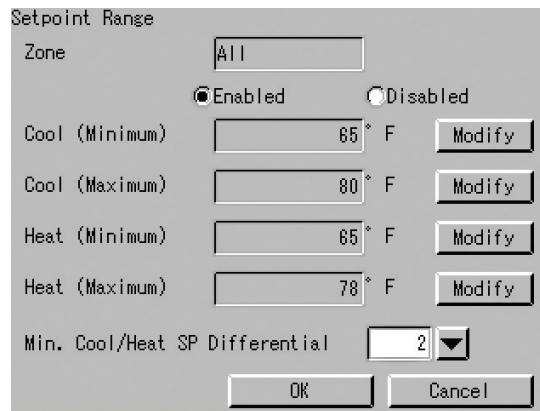


Fig 20. Setpoint Range Limitation on iTC

### 9.3 Auto Changeover

1. The auto changeover should be configured on the *iTC*, Auto mode should not be utilized.
2. When the *iTC* communicates to the indoor unit, NAV controller auto changeover logic will be disabled (if previously enabled). The NAV controller's auto changeover logic and schedule will also be disabled every time the Auto mode is selected at the *iTC*.
3. If the NAV controller's Auto changeover and schedule need to be utilized, field settings 1e-4-02 should be set.
4. If the Auto changeover of the NAV controller and the *iTC* has been enabled, both changeover logic will be active and the indoor unit will follow tighter changeover deadband.



### 9.4 Setback

1. The setback control logic should be configured on the *iTC*.
2. When *iTC* setback logic is enabled, the setback setpoints will not be sent to the indoor unit and it will not be visible from the NAV controller. The same applies when setback is set at the NAV controller.
3. If the setback logic of the NAV controller and the *iTC* has been enabled, both logics will run independently and the closer setback setpoint will turn on the indoor unit.

### 9.5 Schedule

1. The schedule events should be configured on the *iTC*.
2. If the *iTC* is added to the DIII-Net after the NAV schedule is enabled, NAV controller "Schedule" menu selection will be removed from the NAV controller main menu.
3. Assuming Auto changeover and schedule of the NAV controller need to be utilized, the NAV controller field settings 1e-4-02 should be set and then the "Schedule" menu will be visible on the NAV controller main menu.
4. If a schedule event has been enabled on the NAV controller and another event has been enabled on the *iTC*, the indoor unit will follow both schedules which may cause operation conflict as the VRV control logic is based upon the last command received.

### 9.6 Remote Controller Prohibition

1. Remote controller prohibition can be configured on the *iTC* or the NAV controller, However it is recommended that the prohibits be set at the *iTC*.
2. If the remote controller prohibition functions are enabled from the *iTC*, the NAV controller will display "Central Control"  at the top of the NAV display screen.
3. When the *iTC* is used to prohibit the remote controller setpoint adjustment, it prevents the up/down arrow buttons from adjusting the occupied setpoint when the indoor unit is ON. When the indoor unit is turned off and setback has been enabled at the NAV controller, the up/down button can be used to adjust the setback setpoints and cannot be locked out, even though the same physical up/down buttons are used.
4. If the occupant turns on the indoor unit during the unoccupied hours and the setpoint prohibit is still set, the occupant will not be able to adjust the occupied setpoint. The prohibit must be changed to permit setpoint to provide the occupant with the ability to adjust the occupied setpoint during the unoccupied period.
5. If the remote controller button prohibition function is enabled from the NAV controller, a flashing key icon  will display next to the clock on the NAV display screen and the *iTC* will not be notified.

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## 10. NAV Controller + iTM

## 10.1 Setpoints

1. When the *iTM* communicates with the indoor unit, the *NAV* controller will automatically be set to single setpoint (Single SP). This setting cannot be changed unless the central controller is removed from DIII-Net.
2. Independent cooling and heating setpoint are available on the *iTM*. Single setpoint mode is also available if the minimum setpoint differential set to 0° F and setpoint tracking is enabled.



NAVIGATION Remote Controller (NAV)



Intelligent Touch Manager (*iTM*) DCM601A71

## 10.2 Setpoint Range limitation

1. Setpoint range limitation should be configured on the *iTM*.
2. When setpoint range limitation is enabled on the *NAV*, the *NAV* will set to Single SP, so that the setpoint range limit cannot be configured to different ranges for the cool and heat modes.
3. If setpoint range limitation is enabled on the *iTM* and *NAV* controller, the indoor unit will follow the tighter setpoint range.
  - a. In the example below, the setpoint range limitation is tighter on the *NAV* controller. If the heat setpoint is set to 75° F from the *iTM*, it will revert back to 74° F.

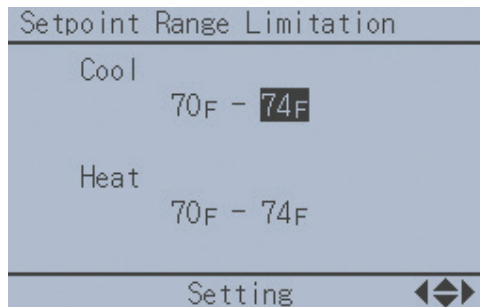


Fig 21. Setpoint Range Limitation on *NAV* controller

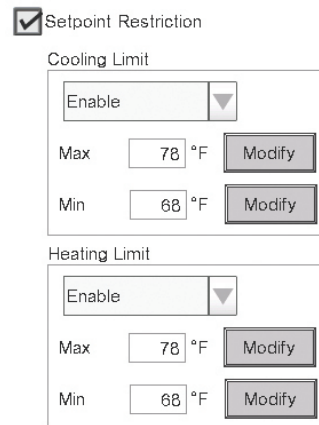


Fig 22. Setpoint Range Limitation on *iTM*

## 10.3 Auto Changeover

1. Auto changeover should be configured on the *iTM*.
2. When the *iTM* communicates to the indoor unit, the *NAV* controller auto changeover logic will be disabled (if previously enabled).
3. If the *NAV* controller's Auto changeover or the schedule needed to be utilized, field settings 1e-4-02 should be set. If Auto mode is selected at the *NAV* controller, the *iTM* will overwrite the mode with the actual operation mode. (ie: AUTO Cool => Cool) on the *NAV* controller.
4. If the *NAV*'s auto changeover and *iTM*'s auto changeover are enabled at the same time, the indoor unit will follow the tighter changeover deadband.
  - a. If the *NAV* auto changeover's deadband is tighter than *iTM* auto changeover's deadband, the indoor unit will follow *NAV* auto changeover logic.
  - b. If the *NAV* is set for auto changeover and the *iTM* auto changeover's deadband is tighter than *NAV* auto changeover's deadband, the indoor unit will follow the *iTM* auto changeover logic and the operation mode will change to whatever assigned by the *iTM*.



### 10.4 Setback

1. The setback control logic should be configured on the *iTM*.
2. The *iTM*'s setback setpoints are not sent to the indoor unit from the *iTM* and it will not be visible from the NAV controller.
3. The NAV controller's setback setpoints are not sent to the indoor unit from the NAV controller and it will not be visible from the *iTM*.
4. If the setback is enabled on the NAV controller and the indoor unit is turned ON because of NAV controller's setback logic, the *iTM* will only recognize the indoor unit ON status.
5. If the setback is enabled on the *iTM* and the indoor unit turned ON because of the *iTM*'s setback logic, the NAV controller will only recognize the indoor unit ON status.
6. If the setback logic of the NAV controller and the *iTM* has been enabled, both logics will run independently and the closer setback setpoint to room temp will turn on the indoor unit.

### 10.5 Schedule

1. The operation schedule should be configured on the *iTM*.
2. If the *iTM* is connected to the DIII-Net after the NAV schedule is enabled using the field setting 1e-4-02, NAV controller schedule will be disabled (if previously enabled).
3. Assuming the Auto changeover and schedule of the NAV controller need to be utilized, the NAV controller field settings 1e-4-02 should be set and then "Schedule" menu will be visible on the NAV controller main menu.
4. If the schedule function is enabled on the NAV controller and another schedule enabled on *iTM*, the indoor unit will follow both schedules and that may cause operation conflict. (indoor unit follows the last command)

### 10.6 Remote Controller Prohibition

1. Remote controller prohibition should be configured on the *iTM*.
2. If the remote controller prohibition function is enabled from the *iTM*, the NAV controller will display "Central Control"  on top of the NAV display screen.
3. If the remote controller button prohibition function is enabled from the NAV controller, a flashing key icon  will display next to the clock on the NAV display screen. The *iTM* will not be notified.
4. When the *iTM* is used to prohibit the remote controller setpoint adjustment, it prevents the NAV up/down arrow buttons from adjusting the occupied setpoint when the indoor unit is ON. When the indoor unit is turned off and the setback has been enabled at the NAV controller, the up/down button can be used to adjust the setback setpoints and cannot be locked out, even though the same physical up/down buttons are used.
5. If the occupant turns on the indoor unit during the unoccupied hours and the setpoint prohibit is still set, the occupant will not be able to adjust the occupied setpoint. The prohibit must be changed to permit setpoint to provide the occupant with the ability to adjust the occupied setpoint during the unoccupied period.

## 11. NAV Controller + BACnet®/LON® (open protocol) Interfaces

## 11. NAV Controller + BACnet®/LON® (open protocol) Interfaces

### 11.1 Setpoints

1. When any of the open protocol interfaces are connected on the DIII-Net line, the NAV controller will automatically be set to single setpoint mode (Single SP).
2. The BACnet and LON interfaces can only provide a single setpoint point, however the dual setpoints could be programmed by the BMS.

### 11.2 Setpoint range limitation

1. Setpoint Range Limitation could be configured on the NAV controller or the BMS front end using the provided data points. (Operation Mode Status – Temp Setpoint – On/Off Status)
2. When the setpoint range limitation is set on the NAV controller and the NAV is set to Single SP, the setpoint range limit cannot be configured to different ranges for the cool and heat modes.
3. The BMS will not be able to view or change the setpoint range limit set at the NAV.

### 11.3 Auto Changeover

1. When any of the open protocol interfaces are connected on the DIII-Net line, Auto-changeover function of the NAV controller will be disabled (if previously enabled).
2. If the NAV controller's Auto changeover logic and schedule need to be utilized, NAV controller field settings 1e-4-02 should be set and then auto changeover will be available from the NAV controller.
3. If Auto mode is selected as the operation mode by the BMS the NAV controller's auto changeover function will be disabled (but can be re-enabled with field setting 1e-4-02).
4. The BMS should not send "Auto" operation mode to indoor unit as this will use indoor unit AUTO logic that has a wide un-configurable (depending upon the indoor unit type) changeover deadband.
5. The auto changeover control logic should be programmed on the BMS front end using the provided data points. (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status).
  - a. When using independent cooling and heating setpoints, the new setpoint must be communicated with every mode change sent to the indoor unit. Heating and cooling setpoints memory locations in the indoor unit are simultaneously overwritten when sending the setpoint.
  - b. A guard timer of at least 15 minutes is recommended with this sequence to prevent frequent mode changes.



NAVIGATION Remote Controller (NAV)



BACnet Interface DMS502B71

OR



LON Interface DMS504C71

## 11. NAV Controller + BACnet®/LON® (open protocol) Interfaces



### 11.4 Setback

1. Setback logic should be programmed on the BMS front end using the provided data points from the open protocol interfaces. (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status – On/Off Command)
2. If the Setback is enabled on the NAV controller and the indoor unit turned on because of NAV controller setback logic, the open protocol interface will only recognize the indoor unit ON status, and will not recognize the NAV controller setback logic is active.

### 11.5 Schedule

1. When any of the open protocol interfaces connected on the DIII-Net line, the NAV controller schedule will be disabled (if previously enabled).
2. The schedule should be configured on the BMS front end using On/OFF command, Operation mode and room temp setpoints.
3. In cases where the NAV controller auto changeover and the schedule need to be utilized, NAV controller field settings 1e-4-02 should be used and then the “Schedule” menu will be visible on the NAV main menu and the NAV auto changeover will be also available.
4. If a schedule is enabled on the NAV controller and another schedule enabled on the BMS front end, the indoor unit will follow both schedules and that may cause operation conflict. (indoor unit follows the last command)

### 11.6 Remote Controller Prohibition

1. It should be configured on the BMS front end by using the provided data points for prohibiting functions. (On/Off - Mode – Setpoint )
2. When the prohibition functions are enabled by the BMS front end, the NAV controller will display “Central Control”  on top of the NAV display screen.
3. If this function enabled from the NAV controller, a flashing key icon  will display next to the clock on the NAV display screen and the BMS front end will not receive any notification.
4. When the BMS is used to prohibit the remote controller setpoint adjustment, it prevents the NAV up/down arrow buttons from adjusting the occupied setpoint when the indoor unit is ON. When the indoor unit is turned off and setback has been enabled at the NAV controller, the up/down button can be used to adjust the NAV setback setpoints and cannot be locked out, even though the same physical up/down buttons are used
5. If the occupant turns on the indoor unit during the unoccupied hours and the setpoint prohibit is still set, the occupant will not be able to adjust the occupied setpoint. The prohibit must be changed to permit setpoint to provide the occupant with the ability to adjust the occupied setpoint during the unoccupied period.



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## 12. NAV Controller + *iTM/ITC* + BACnet<sup>®</sup>/LON<sup>®</sup> (open protocol) Interface

## 12. NAV Controller + *iTM/iTC* + BACnet®/LON® (open protocol) Interface

### 12.1 Setpoints

- Dual setpoints should be running on the highest level controller which is the BMS front end *iTC* or *iTM* should be configured for single setpoint.
- Dual setpoints are not provided through the open protocol interfaces, but it should be programmed by BMS using the provided data points if necessary.
- When any of the open protocol interfaces and the *iTC* or the *iTM* are connected on the same DIII-Net line, NAV controller will automatically be set to single setpoint mode.
- If the *iTC* or the *iTM* is set for dual setpoints, the *iTC* or the *iTM* will send the configured setpoint to the indoor unit on every mode change. If the BMS send a new setpoint that is different than what configured on the *iTC* or the *iTM*, the BMS will override the *iTC* or the *iTM* setpoint and the indoor unit will accept the new setpoint.
- If the *iTC* or the *iTM* acts as a backup controller, the BMS integrator should enable the Central Controller enable/disable point from the *BACnet* or *LON* interface system, an M5 error code will be displayed on the *iTC* or *iTM* and 5 minutes later central controller will begin to monitor and control the VRV system. Once the BMS establishes communication the Central Controller can again be disabled.
  - The *iTC* should be configured for single setpoint mode as following:
    - Set Min. Cool/Heat SP differential to 0\*(for single setpoint mode)
    - Otherwise, when BMS changes the mode, the *iTC* would change the setpoint because the *iTC* manages individual C/H setpoints.

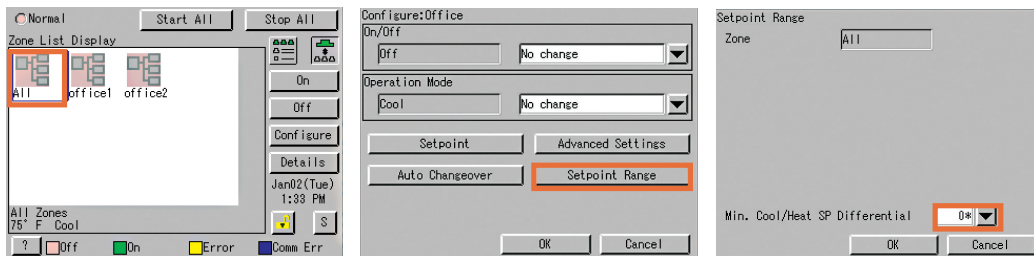
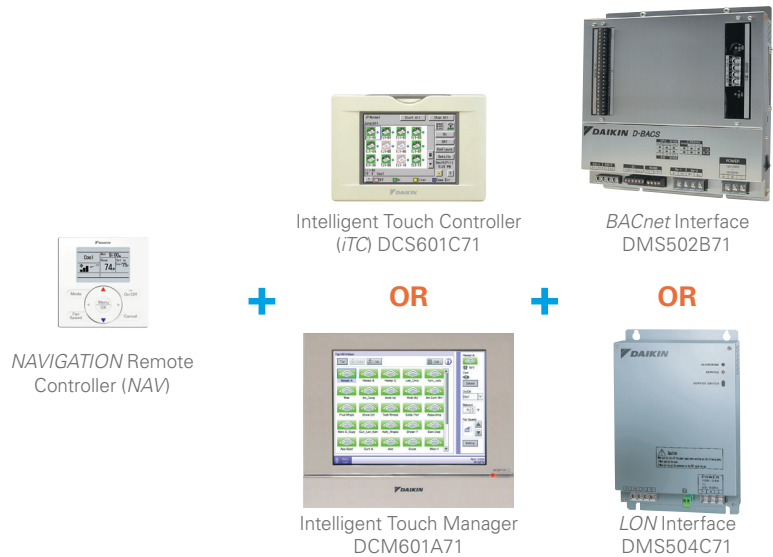


Fig 23. Single setpoint configuration on the *iTC*

- The *iTM* should be configured for single setpoint mode as following:
  - Set Min Cool/Heat setpoint differential to 0° F and enable setpoint tracking (single setpoint mode for *iTM*)
  - Otherwise, when BMS changes the mode, *iTM* would change the setpoint because *iTM* manages individual Cool/Heat setpoints.

## 12. NAV Controller + *iTM*/*iTC* + BACnet®/LON® (open protocol) Interface

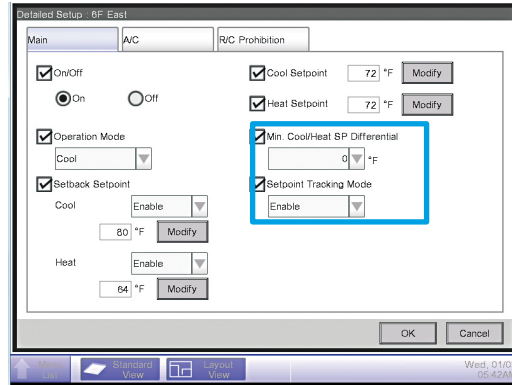


Fig 24. Single setpoint configuration on the *iTM*

### 12.2 Setpoint Range Limitation

1. Setpoint range limitation should be programmed on the BMS front end by using the provided data points. (Operation Mode Status – Temp Setpoint – On/Off Status).
2. When the setpoint range limitation is enabled on the *NAV* controller and the *NAV* is set to Single SP, the setpoint range limit cannot be configured to different ranges for the cool and heat modes.
3. Setpoint range limits set in the *iTC*, *iTM* or *NAV* controller cannot be adjusted from the BMS.
4. The Setpoint range limitation on the *iTC* or the *iTM* will be disabled by default when the *BACnet* or *LON* gateway connected to the *DIII-Net* line. However, the setpoint range limitation can be utilized on the *iTM* or *iTC* by changing the setting from "Automatic" to "Enabled" for the Setpoint Range Limitation under the "DIII-Net Engineering" menu.

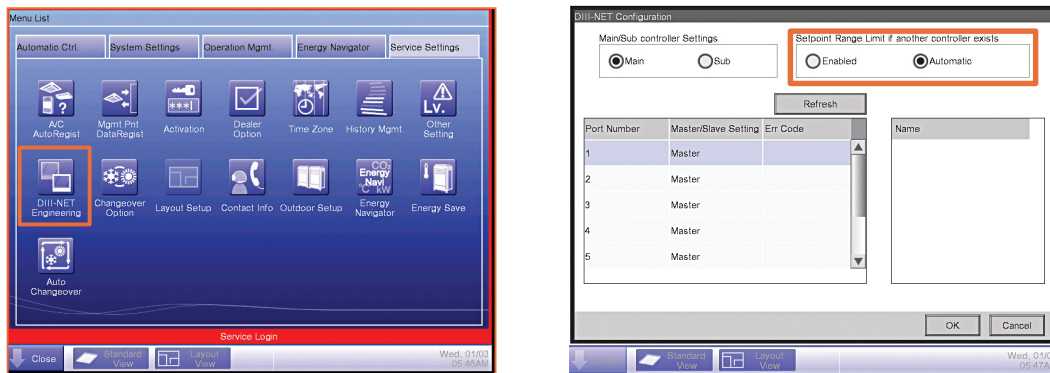


Fig 25. DIII-Net engineering configuration on the *iTM*

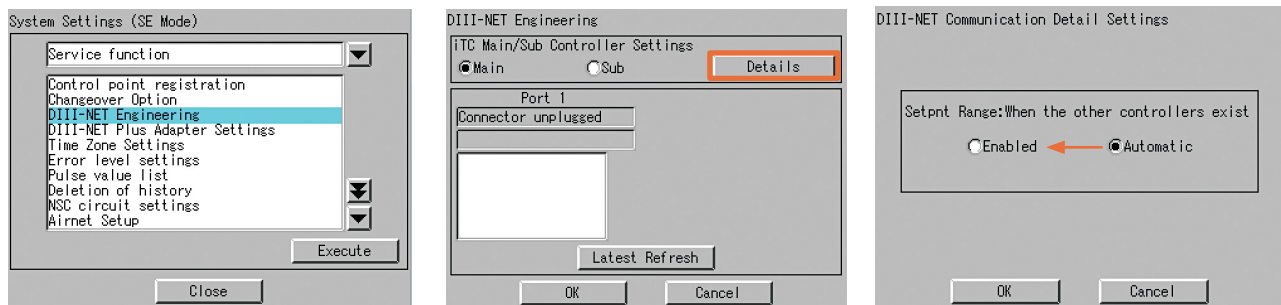


Fig 26. DIII-Net engineering configuration on the *iTC*

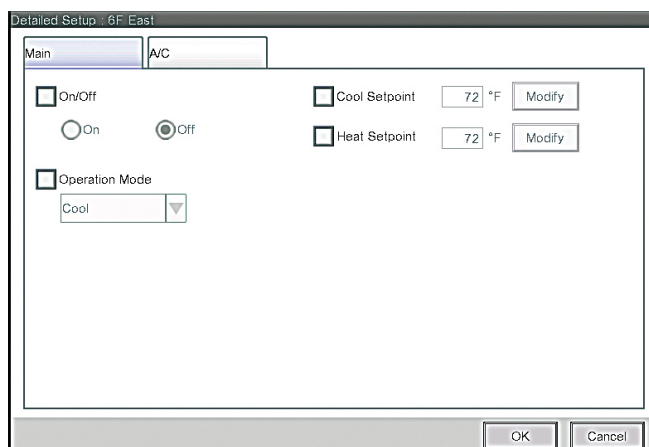
## 12. NAV Controller + *iTM/iTC* + BACnet®/LON® (open protocol) Interface

### 12.3 Auto Changeover

1. Auto changeover should be programmed by the BMS front end using the provided data points. (Operation Mode command – Temp Setpoint – Room Temp – On/Off Status)
  - a. BMS should not send the “Auto” operation mode to the indoor unit as this will use indoor unit AUTO logic which has wide un-configurable (depending upon indoor unit type) changeover deadband.
  - b. When the BMS programs the changeover logic using independent cooling and heating setpoints, the new setpoint must be communicated with every mode change as both heating and cooling setpoint memory locations are simultaneously overwritten when sending the setpoint.
  - c. A guard timer of at least 15 minutes is recommended with this sequence to prevent frequent operation mode changes.
2. Auto changeover can be used by *NAV*, *iTM* or *iTC* using single setpoint.
3. If the *NAV* controller auto changeover and schedule need to be utilized, *NAV* controller field settings 1e-4-02 should be set.
4. If the *iTC* or BMS send auto mode to the indoor unit, the *NAV* auto changeover function will be disabled

### 12.4 Setback

1. Setback logic should be programmed on the BMS front end using the provided data points from the open protocol interfaces. (Operation Mode Command – Temp Setpoint – Room Temp – On/Off Status – On/Off Command)
2. If any of the open protocol interfaces are connected to the DIII-Net line and the *iTM* is also connected, the setback logic (as well as set point range limitation, setpoint tracking, min cool/heat setpoint differential and remote controller prohibition) will be removed from the *iTM*s display by default. The following indoor unit configuration screenshot of the *iTM* shows that setback, setpoint range limitation, setpoint and RC prohibition function are removed from the *iTM* display with the connection of open protocol interface connected to DIII-Net line.



**Fig 27. *iTM* functions are disabled with the connection of open protocol interface**



3. To use the setback logic of the *iTM*, change the setting from "Automatic" to "Enabled" for the Setpoint Range Limitation (Automatic default setting) under the DIII-Net Engineering menu. (See Section 12.2.4) Set Cool/Heat setpoint differential to 0 and enable setpoint Once set to Enabled the Setback Setpoints, Setpoint Range Limit, Min Cool/Heat SP Differential and Setpoint Tracking Mode will be visible on the *iTM* display.
  - a. The BMS can see the unit on/off status. It cannot recognize if the *NAV*, *iTC*, *iTM* setback functions or user turns on the unit.

## 12. NAV Controller + *iTM/iTC* + BACnet®/LON® (open protocol) Interface

### 12.5 Schedule

1. The schedule should be configured on the BMS front end, if the BMS front end is the main user interface.
2. When any of the open protocol interfaces or the *iTM/iTC* is connected on the DIII-Net line, the *NAV* controller schedule will be disabled; *NAV* controller field settings 1e-4-02 may be set to re-enable the schedule.
3. If a schedule is enabled on the *NAV*, *iTM/iTC* and another schedule setup on the BMS front end, the indoor unit will follow all schedules and that may cause operation conflict (indoor unit follows the last command).

### 12.6 Remote Controller Prohibition

1. It should be configured on the BMS front end by using the provided data points for prohibiting functions. (On/Off – Mode - Setpoint)
2. When any of the open protocol interfaces connected with the *iTC* or the *iTM* on the same DIII-Net line, the remote controller prohibition function will be disabled on the *iTC* or the *iTM*.
3. When the prohibition function is enabled by the BMS front end, the *NAV* controller will display “Central Control”  on top of the *NAV* display screen.
4. When the BMS is used to prohibit the remote controller setpoint adjustment, it prevents the *NAV* up/down arrow buttons from adjusting the occupied setpoint when the indoor unit is ON. When the indoor unit is turned off and setback has been enabled at the *NAV* controller, the up/down button can be used to adjust the *NAV* setback setpoints and cannot be locked out, even though the same physical up/down buttons are used
5. If the occupant turns on the indoor unit during the unoccupied hours and the setpoint prohibit is still set, the occupant will not be able to adjust the occupied setpoint. The prohibit must be changed to permit setpoint to provide the occupant with the ability to adjust the occupied setpoint during the unoccupied period.
6. When the prohibition function is enabled from the *NAV* controller, a flashing key icon  will display next to the clock on the *NAV* controller and BMS front end will not receive any notification.

## 13. NAV Controller + iTM BACnet® Server

## 13. NAV Controller + iTM BACnet® Server

### 13.1 Dual Setpoints

1. Dual setpoints (occupied cooling – occupied heating) are available on *iTM BACnet* Server and should be utilized by the BMS.
2. When the *iTM* connects on the DIII-Net line, *NAV* controller will automatically set to single setpoint (Single SP). This setting cannot be changed unless the central controller is removed from DIII-Net



NAVIGATION Remote Controller (NAV)



*iTM BACnet* Server DCM014A51

### 13.2 Setpoint Range Limitation

1. Setpoint Range Limitation should be configured on the *iTM* or BMS front end by using the provided data points. (Max cooling Setpoint – Min cooling Setpoint – Max Heating setpoint – Min Heating setpoint).
  - a. When BMS front end changes the present value of any of these data points, the changes will be reflected on the *iTM* and vice versa.
2. When the setpoint range is configured on the *NAV* controller and the *NAV* is set to Single SP, the setpoint range limit cannot be configured to different ranges for the cool and heat modes.

### 13.3 Auto Changeover

1. Auto changeover can be configured on the *iTM* and enabled or disabled by on the BMS using “Enable *iTM* Auto changeover Operation”.
2. When the *iTM* communicates to the indoor unit, *NAV* controller auto changeover logic will be disabled. (if previously enabled)
3. In cases where the *NAV* controller’s auto changeover and schedule needs to utilized, field settings 1e-4-02 should be used.



### 13.4 Setback

1. The *iTM BACnet* Server provides unoccupied cooling and heating setpoint which are visible to the BMS and can be adjusted from the BMS.
2. If the setback is enabled on the *NAV* controller and the indoor unit turned on because of *NAV* controller setback logic, the *iTM* and the BMS will only recognize the indoor unit ON status.

### 13.5 Schedule

1. The schedule should be configured on the BMS front end, if the BMS front end is the main user interface.
2. If the *iTM* schedule has been configured, the BMS can utilize “Enable *iTM* Schedule Operation” data point to enable or disable the *iTM* schedule.
3. If the *iTM* is connected to the DIII-Net after the schedule is enabled on the *NAV*, *NAV* controller schedule will be disabled.
4. If the *NAV* controller auto changeover and schedule need to utilized, *NAV* controller field settings 1e-4-02 should be set and then the “Schedule” will be visible on the *NAV* main menu.
5. To avoid schedule conflicts, the schedule should only be configured on one controller.

### 13.6 Remote Controller Prohibition

1. Remote controller prohibition could be configured on the *iTM* or the BMS front end by using the provided data points. (Remote controller prohibit (On/off) – Remote controller prohibit (operation mode) and Remote controller prohibit (setpoint)).
  - a. When the BMS front end changes the present value of any of these data points, changes will be reflected on the *iTM* and vice versa.
2. When the prohibit function is enabled by the BMS front end or *iTM*, the *NAV* controller will display “Central Control”  on top of the *NAV* display screen.
3. If this function is enabled from the remote controller, a flashing key icon  will be displayed next to the clock on the *NAV* display screen and the BMS front end will not receive any notification.







**Daikin** provides innovative, premium quality indoor climate management solutions to meet the changing needs of residential, commercial and industrial customers.



#### ADDITIONAL INFORMATION

Before purchasing this appliance, read important information about its estimated annual energy consumption, yearly operating cost, or energy efficiency rating that is available from your retailer.

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