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Daikin DKN Plus with 3rd Party Thermostat

Application Note

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Daikin DKN Plus with 3rd Party Thermostat

1. Description

Some applications require additional control options such as a smartphone app, wall-mounted thermostat, or integration with a BMS system. The DKN Plus is a Daikin product that can be added to a Daikin VRV or mini-split unit to offer a variety of additional control options as needed. The DKN Plus is Wifi enabled and offers cloud-based control and can integrate via BACnet or Modbus. The features covered here are the 3rd-party 24v thermostat connection and API integration.

2. Application and Design

With nearly limitless selections of 24v thermostats available, the DKN Plus will allow for nearly any 24v thermostat to be used via the 24v fallback terminals. It may also be desired to use a smart thermostat with Wifi and web-based cloud or app control. In this case, a cloud-to-cloud API connection can be established which allows for seamless control of the equipment while also reserving the 24v fallback control for periods when the API connection cannot be maintained (Wifi signal loss, cloud service disruption, etc.).

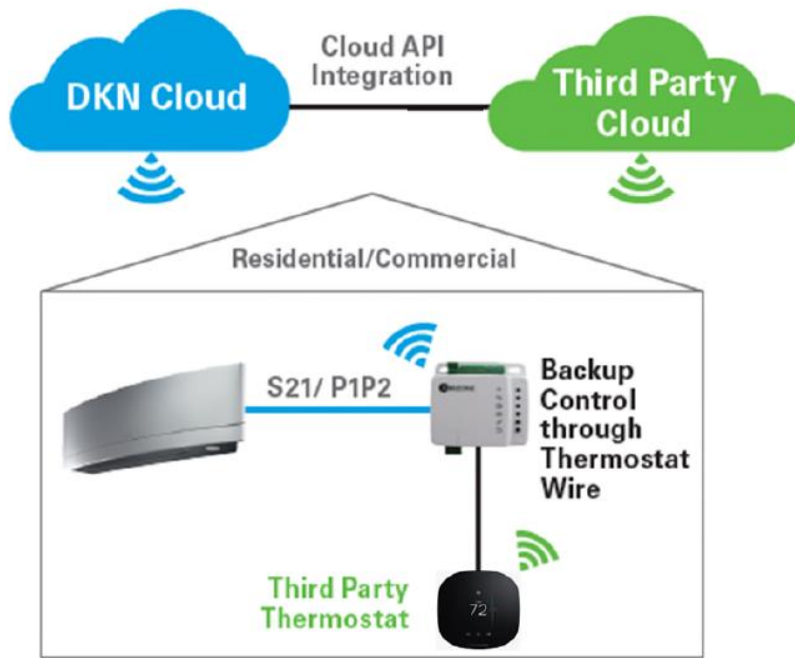


Fig 1. Cloud API Overview

2.1 Cloud-to-Cloud API Connection

The Cloud-to-Cloud API connection is external to the device and outside of the local network. This is a "handshake" between the DKN cloud service and the 3rd party cloud service. Once the link has been established, control values can be relayed from the 3rd party thermostat directly to the Daikin equipment. For example, setting the thermostat to Cool with a setpoint of 72°F will then send these values to the Daikin equipment for the internal control logic to maintain 72°F in Cool mode. The current 3rd party thermostats that are supported are the Ecobee, Nest, Honeywell Home Cloud: T6, T9, T10 and Round Smart. More options may become available with future releases.

The Cloud API link must be configured in the DKN app. Start by creating an account on the website for the 3rd party device selected. Then configure the DKN device using the app. In the Menu, select the Third-Party Device submenu and click Add Thermostat. It will then give prompts for each step to select the device and enter required information to create the link between the two Cloud accounts. Once complete, the 3rd party device will appear in the list of 3rd party devices. It is recommended to also wire the GWY connections for fallback control, see the fallback section 2.3 for more info.



Fig 2. Cloud-to-Cloud API Connection

2.2 Local API Connection (for Daikin Thermostats)

Local API is functionally the same as Cloud API except the "handshake" is taking place in the local network (same Wi-Fi network) directly between the two devices. This will eliminate the need to maintain cloud connection or internet connection. The two devices will only need to be on the same Wi-Fi network. Just like the Cloud API, setpoint and temperature values will be synced between the two devices and the internal logic of the system will maintain the setpoint. Local API is only available for Daikin ColorTouch and Mini smart thermostats. These thermostats also offer a cloud service for use with the Daikin thermostat phone app or website. More options may become available with future releases.

Setup of the Local API is in the Configuration menu in the Integration submenu. Select the appropriate thermostat model and select the check mark at the top to save. Each of the two devices, DKN Plus and Daikin thermostat must be named the same (ie. Master Bedroom or Living Room). Once configured, as long as they are on the same network, the DKN Plus will detect the thermostat and sync the control points. It is recommended to also wire the GWY connections for fallback control, see section 2.3 for more info.

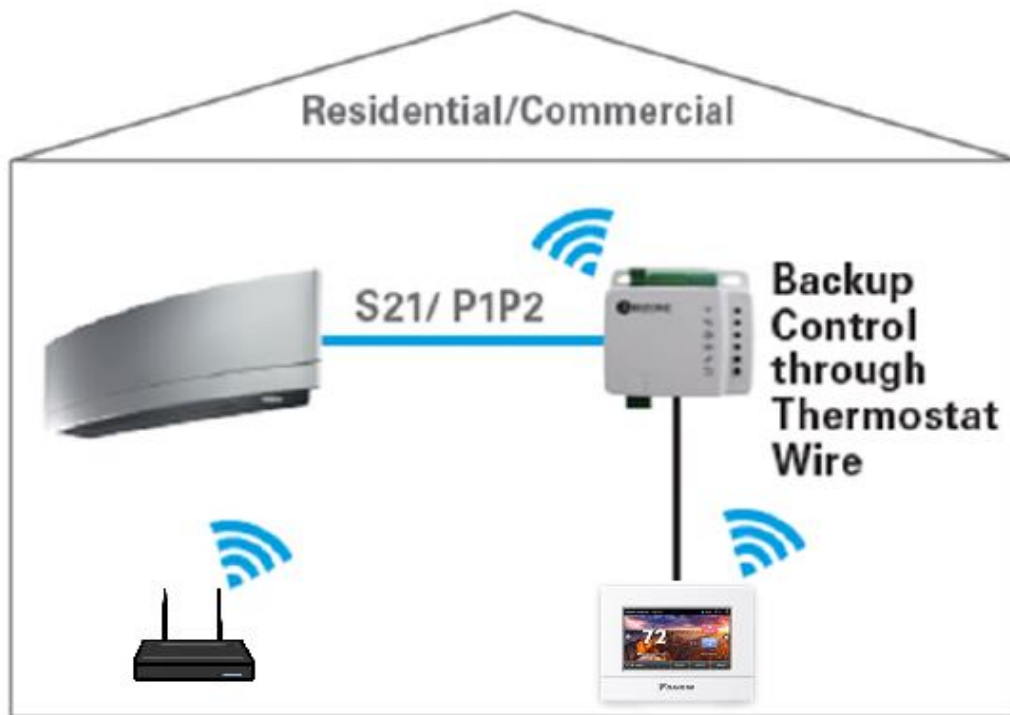


Fig 3. Local API Connection

2.3 Fallback Connection (GWY Terminals)

The 24v fallback connection (GWY) is an additional control option to maintain control of the equipment in case the API connection cannot be maintained (Wifi signal, cloud service disruption, etc). However, it can also be used as the primary control interface. The control of the system is reduced to a simple logic due to the lack of communication and reduction to a 24v on-off signal. When the API connection is lost, the DKN Plus will look for a signal on the GWY terminals to control Fan, Heat, or Cool modes. If a call for thermal operation is detected (W or Y), The DKN Plus will read the current space temperature and calculate a current setpoint using the Alpha or Beta constants as configured in the app. If the unit runs for some time without satisfying the call, the DKN will gradually adjust the indoor unit internal setpoint value to further extend the capacity of the unit until the thermal call has been released. While this is not taking full advantage of the internal logic of the equipment, it will still provide a certain level of control to maintain comfort in the space.

If the thermostat selected does not support an API connection, it must be wired to the GWY terminals like a traditional system and the fallback algorithm will be used at all times. For this, the DKN device cannot be connected to Wifi.

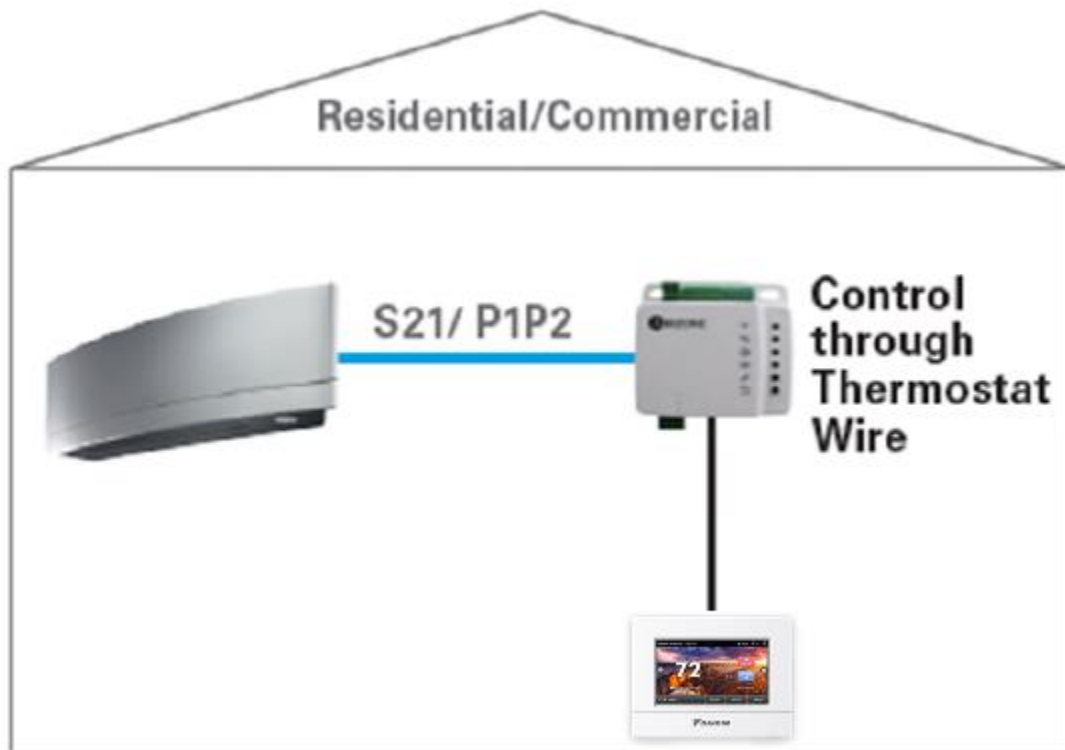


Fig 4. Fallback Connection (no Wifi)

3. Setup and Commissioning

To start, a DKN Plus will need to be installed at the indoor unit via the S21 port or P1P2 terminals depending on the indoor unit model. Select the correct cable of the two provided with the DKN adapter. Remove power from system and connect the S21 cable for mini-split applications and the P1P2 with power connector for VRV applications. The power for P1P2 units is connected to plug labeled X18A, X35A or X9A (depending on the model) located on the main pcb in the unit.

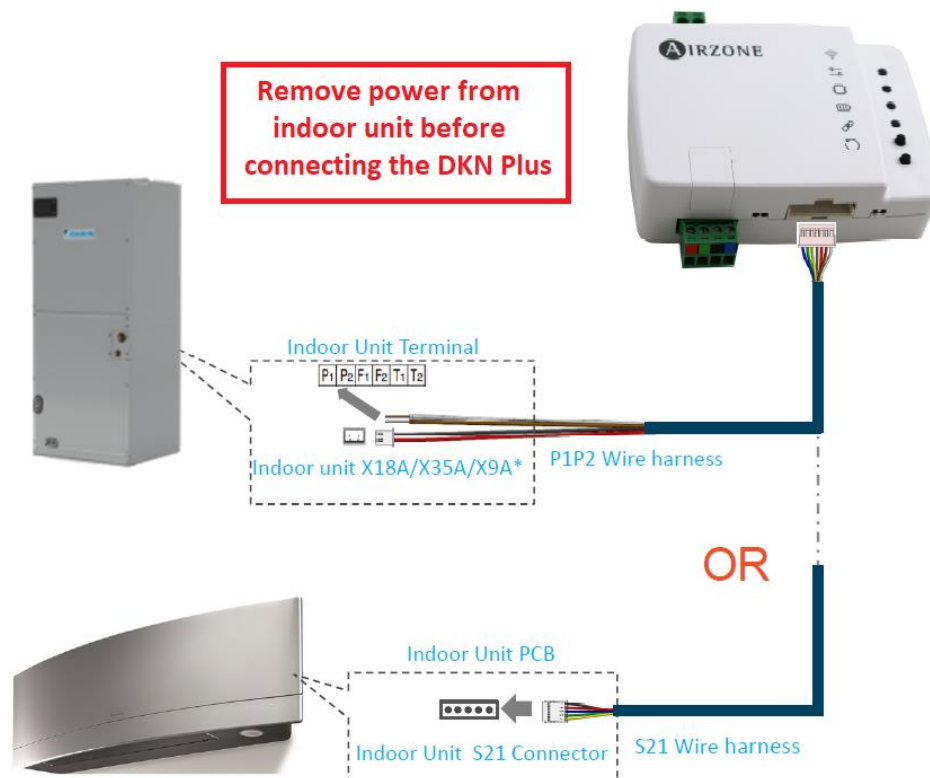


Fig. 5 Connection to indoor unit

For P1P2 units, a NAV controller will be needed for initial field settings:

1. Set the field setting to enable fan operation in thermo-Off condition to the user set value for Cooling and Heating. 12(22):3-02 and 12(22):6-02.
2. Set the field setting to allow the indoor unit to operate with a deadband of 0.9°F or 0.5°C., 12(22):2-02.
3. Set the field setting to use the return or remote sensor. 10(20):2-02.
4. Set group address and AirNet address.
5. If the NAV Controller will be left installed, it must be set as the SUB controller after the field settings have been set. Reset power to system after change has been made.

For S21 units, no additional setting will be needed for the unit, only configuration of the DKN Plus as needed.

Configuration of the GWY control is enabled by default in the DKN adapter and will be selected for use if no cloud connection can be established. The default fallback settings will work for most applications, and it is recommended to run the system for a trial period before adjusting the Alpha (cooling) and Beta (heating) values, if needed. Greater Alpha/Beta gets a more rapid response to temperature variants, lower value gets a more gentle response to a thermal-on state. Wiring will include separate 24vac to the power terminals of the DKN Plus and RCGWY terminals to the thermostat for power and control. Be sure the thermostat is configured for a non-heat pump system as we are not using the O/B terminal.

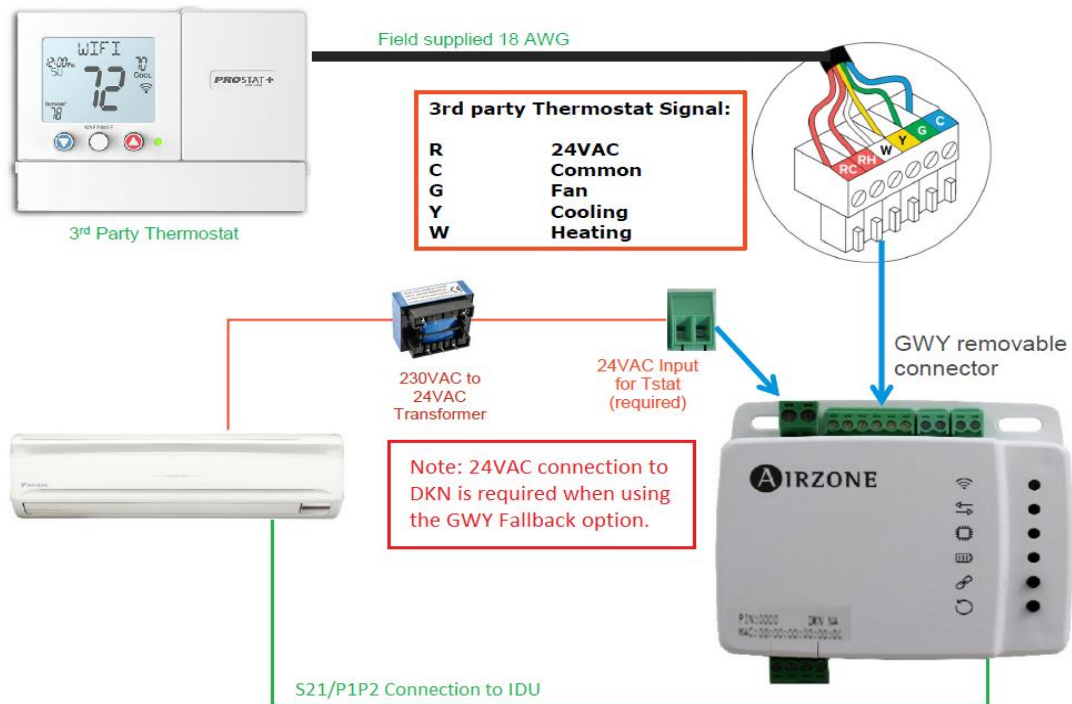


Fig 4. Connection Diagram for 24v 3rd Party Thermostat

4. Functions Available for Control

For API connected thermostats, the user will be able to set the On/Off, Mode and Setpoint. The thermostat will provide the current space temperature reading to the indoor unit as read at the thermostat.

For thermostats operating with the fallback logic, the user can set the On/Off, Mode and Setpoint at the thermostat. With a thermal call to the DKN Plus, a current space temperature setpoint will be calculated and used to control the operation of the system. The thermostat will display the space temperature as read by its own sensor, but the unit will operate based on its own sensor reading. Some indoor units come with a return air temperature sensor located inside the unit, an optional remote sensor can be installed and positioned as needed if the factory sensor location will not work for application. The unit will be commanded off when the thermal call is removed from the input on the DKN Plus.

5. Exclusions

1. For all 3rd party thermostats, louver position control is not available for any units that have this feature. Louver position can still be set using the wireless handheld remote or secondary Daikin controller if needed.
2. Fan speed control is not available with 3rd party thermostats. However, fan speed can be set in the fallback configuration menu in the app.
3. If a central controller or BMS interface is used, the central controller or BMS system should be used for monitoring only.
4. Fallback or API control functions are not available for FTX__AXVJU or FTXB__AXVJU units.
5. Remote or return air temperature sensor should be added to FXTQ and CXTQ for use with the fallback logic.

6. Summary

The DKN Plus adds additional control options for Daikin VRV or Minisplit units including 3rd party thermostats, Wifi, app control, home automation, etc. We have covered the 3rd party thermostats with API integration, Wifi and fallback control logic. When selecting the Daikin thermostat or 3rd party thermostat for use with the DKN Plus, it is important to understand how this will affect the control of the system and how to maximize the features available. It is recommended to use the API connection whenever possible along with the 24v fallback connection for continued operation when the API connection is lost.

WARNING

- Only qualified personnel must complete installation.
- Consult your Daikin dealer regarding relocation and reinstallation of the remote controller. Improper installation may result in electric shock or fire.
- Electrical work must be performed in accordance with relevant local and national regulations, and with the instructions in this installation manual. Improper installation may cause electric shock or fire.
- Only use specified accessories and parts for installation. Failure to use specified parts may result in electric shock, fire, or controller damage.
- Do not disassemble, reconstruct, or repair. Electric shock or fire may occur.
- Only use specified wiring and verify all wiring is secured. Assure no external forces act on the terminal connections or wires. Improper connections or installation may result in electric shock or fire.
- Confirm power to the unit is OFF before touching electrical components.

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