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Daikin Mini-split Integration with VRV Control Systems

Application Note

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Daikin Mini-split Integration with VRV Control Systems

1. Description

The proprietary DIII-Net protocol provides communication between VRV-type Daikin indoor and outdoor units and is capable of connecting multiple systems with a central controller or a central BMS interface.

The intent of the DIII-Net adapter PCB is to allow for mini/multi-split units that lack the capability of DIII communication but have a S21 port to connect to a DIII network for control and monitoring from a central controller or BMS interface.

2. Application and Design

It may be necessary to monitor and control a mini-split or multiport system via a centralized controller or building management system. For example, mini-splits are often a good choice for server rooms as the heat load will differ enough from the rest of the building to require a separate system for proper climate control and these systems will offer a simple solution for design and installation purposes. But then the question will be asked: “How can we monitor and control this unit using the existing building management system?” In this case, the KRP928BB2S adapter PCB will add the DIII-Net communication to a compatible indoor unit using the S21 port and tie in with the Daikin VRV system which will allow for connection to a centralized controller or BMS system via a BMS gateway product.

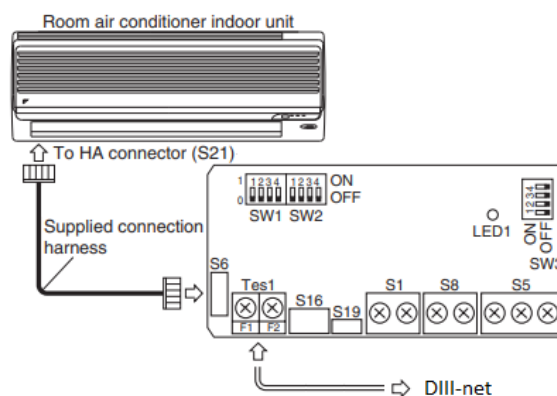


Fig 1. KRP928BB2S Connection Diagram

Various combinations of equipment and control options that would require different adapters or accessory options will be used to meet the requirements of the site. The next few sections will cover details of the different scenarios.

2.1 Minisplit IDU integrated with VRV system

When a Daikin mini/multi-split unit is integrated with a central controller along with a Daikin VRV system DIII network, the KRP928BB2S can be installed near the indoor unit and daisy-chained on F1F2 with the VRV indoor DIII-Net wiring. In this configuration, the mini-split will connect to the DIII-Net on an indoor unit network while the central controller or BMS interface will connect to the VRV outdoor units. The F1F2 wiring is terminated using 18 AWG, 2 conductor, stranded, non-shielded wire and daisy-chained between each indoor unit. The F1F2 terminals are not polarity sensitive. A unique group address will need to be assigned to each KRP928BB2S for each DIII network.

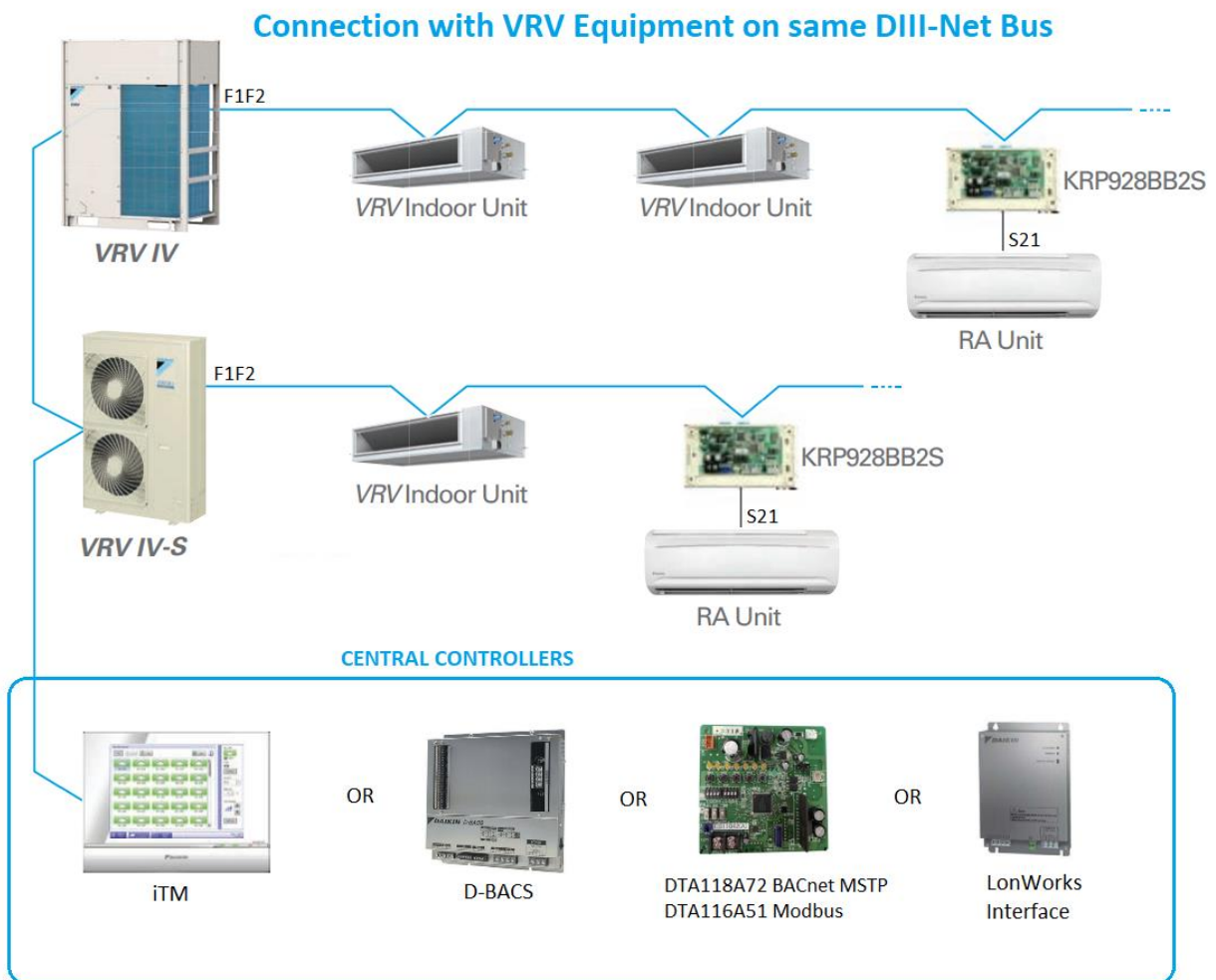


Fig 2. RA connection diagram for installation including the VRV system.

2.2 Mini-split IDU integrated without a VRV system.

If a Daikin VRV system is not installed onsite or the mini-split unit needs to connect independently from the VRV system with a central controller, the KRP928BB2S can be installed on the indoor unit and daisy-chained with any other mini-splits/KRP units using the same F1F2 wiring rules as VRV DIII-Net wiring. In this configuration, the DIII network will consist of only RA/QA units with a KRP928BB2S for each indoor unit. The F1F2 wiring follows the same rules as VRV DIII-Net: 18/2 stranded non-shielded; and is not polarity sensitive. A unique group address will need to be assigned to each KRP928BB2S for each DIII network.

Since there is no VRV ODU in this scenario, the DTA118A72 DIII-Net BACnet MSTP Adapter or DTA116A51 DIII-Net Modbus Adapter will not work as a standalone BMS interface. Another “Master” device is needed on the same network or a separate power source for the DIII-Net communication to function. If the network includes a FFQ or FDMQ unit, these units will act as a master and allow for the DIII network to function. See the following section for more details.

Connection with Only RA/QA Equipment on a DIII-Net Bus

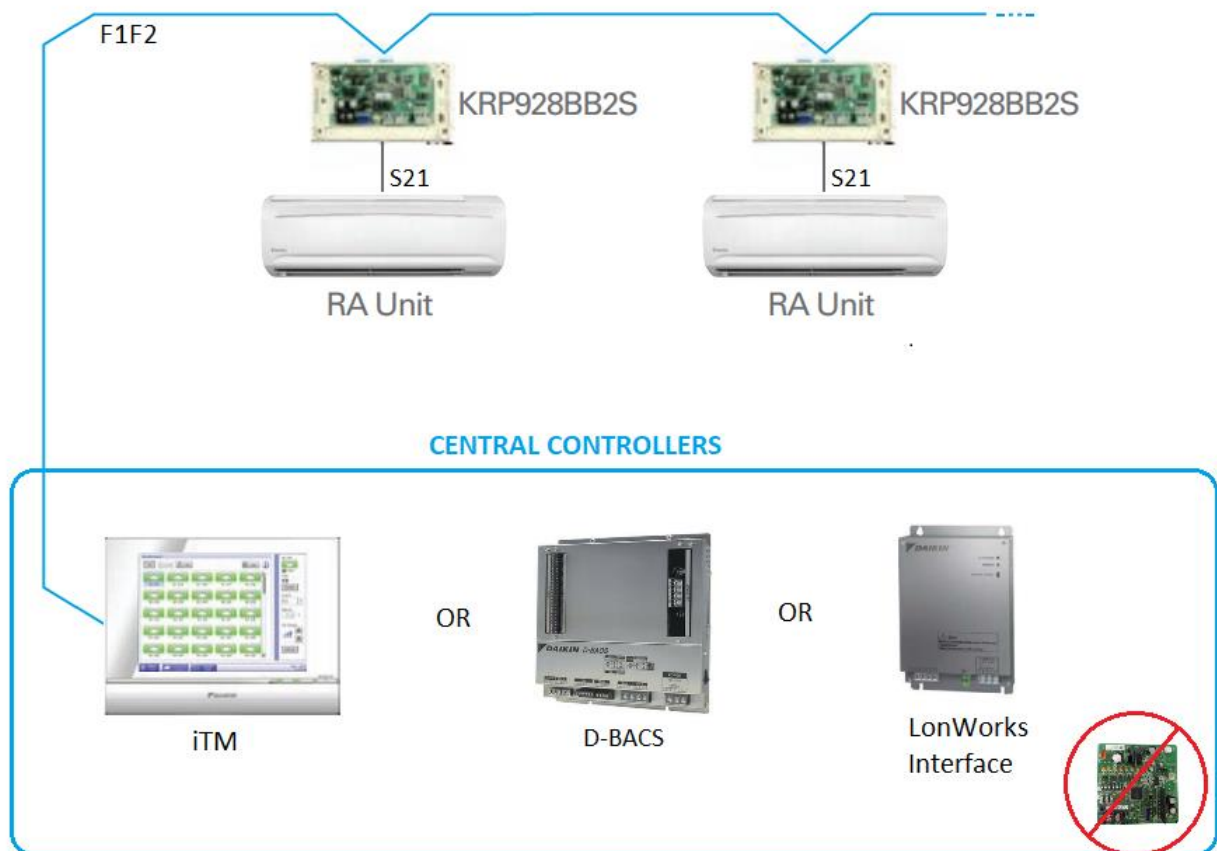


Fig 3. Connection Diagram for installations without a VRV system.

2.3 Mini-split IDU integrated without a VRV system but includes an FFQ/FDMQ IDU

A similar configuration to the previous but adding an FFQ Vista Cassette or FDMQ ducted unit changes the rules slightly. The FFQ and FDMQ units have F1F2 terminals included in the unit and can act as a Master device on the network therefore allowing for the use of the DTA118A72 DIII-Net BACnet MSTP Adapter or DTA116A51 DIII-Net Modbus Adapter without another Master device or separate power source on the network. See the following revised connection diagram.

Connection with Only RA/QA Equipment on a DIII-Net Bus Including FFQ/FDMQ Unit

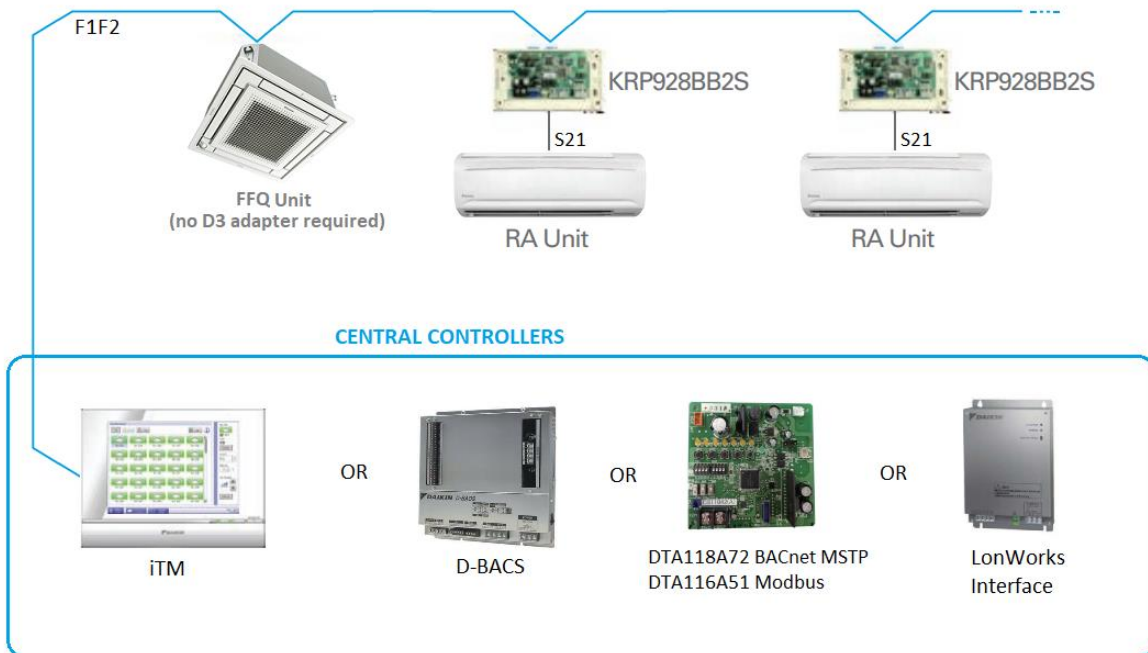


Fig 4. Connection Diagram for installs without a VRV system but includes FFQ/FDMQ

3. Setup and Commissioning

The setup process for the KRP928BB2S adapter PCB for DIII-Net operation only requires a Group Address set using DIP switches on the PCB. This will need to be set for each adapter PCB used and be unique for each unit on the same DIII network. A Group Address consists of two segments (A-BB), where “A” can range from 1 to 4 and “BB” can range from 00 to 15. SW2:1-3 will set the first segment “A” (Group). SW1:1-4 will set the second segment “BB” (Address). See table below for switch settings.

SW2 setting	Upper group No.	SW1 setting	Lower group No.	SW1 setting	Lower group No.
	1—		0 0		0 8
	2—		0 1		0 9
	3—		0 2		1 0
	4—		0 3		1 1
	5—		0 4		1 2
	6—		0 5		1 3
	7—		0 6		1 4
	8—		0 7		1 5

Fig. 5 Group Address Switch Table

For example, to set a Group Address of **1-14**: SW2 switches 1-3 will be off and SW1: 1 off; 2-4 on . Or for Group Address of **4-03**: SW2:1-2 on; 3 off and SW1: 1-2 on; 3-4 off

4. Functions Available for Control

Connecting an S21 unit to the DIII-Net with a Central Controller or BMS Gateway will enable monitoring and control of the unit without the need to be in front of the unit. The control points will vary depending on the model of the S21 unit. For basic control that applies to all units: on/off, mode, setpoint and fan speed will be available. Some units will also have more features like louver position. See the tables below that outline the control points available for each unit when connected to various BMS interfaces.

Function	<i>iTM w/BACnet Server</i>	<i>BACnet Interface</i>	<i>LonWorks Interface</i>	<i>ModBus Interface</i>
On/Off operation and monitoring	■	■	■	■
Malfunction notification	■	■	■	■
Room temperature monitoring	■	■	■	■
Setpoint setting and monitoring	■	■	■	■
Operation mode setting and monitoring	■	■	■	■
Filter sign monitoring and reset	N/A	N/A	N/A	N/A
Thermo-on status	N/A	N/A	N/A	N/A
Compressor Status	N/A	N/A	N/A	N/A
Indoor unit fan status	N/A	N/A	N/A	N/A
Vane setting monitoring Adjustment	N/A	N/A	N/A	N/A
Fan speed setting and monitoring	N/A	N/A	N/A	N/A
Force thermo-Off setting	N/A	N/A	N/A	N/A
Energy Savings Settings	N/A	N/A	N/A	N/A

Fig. 6 Points available for S21 unit and KRP928BB2S

Function	iTM w/BACnet™ Server	BACnet™ Interface	LonWorks™ Interface	ModBus™ Interface
On/Off operation and monitoring	■	■	■	■
Malfunction notification	■	■	■	■
Room temperature monitoring	■	■	■	■
Setpoint setting and monitoring	■	■	■	■
Operation mode setting and monitoring	■	■	■	■
Filter sign monitoring and reset	■	■	■	■
Thermo-on status	■	■	■	N/A
Compressor Status	■	■	N/A	N/A
Indoor unit fan status	■	■	N/A	■
Vane setting monitoring Adjustment	■	■	N/A	■
Fan speed setting and monitoring	■	■	■	■
Force thermo-Off setting	■	■	■	Monitor only
Energy Savings Settings	■	■	N/A	N/A

Fig. 7 Points available for FFQ/FDMQ units

5. Exclusions

1. For models ending in AXVJU, the room temperature value will not be available for display.
2. Additional control logic, i.e.. Schedule, setback, range limits, prohibit, etc., will be dependent on the central controller or BMS interface selected. If a 3rd party BMS is being used, Logic will need to be created for any additional control logic needed.

6. Summary

The mini-split/multiport systems are often chosen for the small size or simplicity and often are used in a facility that requires remote monitoring or control. The KRP928 adapter PCB provides a DIII-Net interface to allow for expanding the control options to include Daikin centralized controllers or BMS interface. With the wiring design options to include other Daikin VRV, SkyAir, or DIII-Net equipped units, integration with a centralized controller can be greatly simplified, saving time and resources.

7. Appendix A – Adapter Compatibility List

Below is a table listing the different minisplit series and the required adapters.

Model Number	Building Automation Network Control (A BMS Interface is required in all cases below)
FTXS, FVXS, FDXS, FTXG, CTXG	KRP928BB2S
FTXM, FTXR	KRP928BB2S
FTX/FTK 09/12	KRP928BB2S (Note 1)
FTX/FTK 18/24	KRP928BB2S (Note 2)
FFQ, FDMQ	Connect F1F2 Terminals to Interface
FTX(B)/FTK(B)__AXVJU	No Compatibility
FTX(B)/FTK(B)__BXVJU	KRP928BB2S

Fig. 8 Adapter Compatibility by series

Note 1: KRP067A41E Adapter is required.

Note 2: KRP980B2E Adapter is required.

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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