DD15 Interface Module

Daikin North America LLC and Honeywell have jointly developed an organically integrated system which allows Honeywell's INNCOM Integrated Room Automation system to provide direct digital control of the Daikin Variable Refrigerant Volume (VRV) heat recovery system. This is an industry first solution that provides the hotelier an intelligent integrated room automation system capable of connecting all of the guestroom devices to control room temperature, lighting drapes and amenities, in-room 3rd party integration of door locks, as well as connect to the INNcontrol 3 software on a central server over the Deep Mesh Network, with the efficiency of Daikins VRV system.

Table 1 DD15 Interface Module

Features

- A seamless energy management solution, with integrated VRV capability tailored specifically for hospitality
- Provides a more energy efficient solution with lower operating costs than traditional FCU systems
- Maximizes dehumidification capability, and significantly reduces mechanical noise over traditional FCU systems
- In-room 2.4Ghz RF wireless network communications
- Software control of the field settings for the Daikin VRV in door unit (IDU)
- Error reporting from the Daikin system to the INNcontrol 3 application on the central server
- Over-the-air loadable for easy installation, commissioning, and maintenance
- Ideal for new installation and retrofit
- Compact interface module
- Best-in-class offerings from Honeywell and Daikin

Specifications

Parameter	Specification
Input Voltage (P4)	16VDC
DC Output (P3)	12V, 30mA (50mA Peak)
Current Consumption	Typical 100mA. See the DD15 Digital Output section for application specific current consumption.
Bind Switch	Recessed switch used for commissioning and binding (S1)
Indicator LED's	Diagnostic LED (green), Transmit activity (Yellow), Receive activity (Red)
Communications	S5bus for wired bus communication, 2.4Ghz wireless RF Transceiver for Deep Mesh RF communication
Dimensions	84.5mm (L) x 47mm (W) x 29mm (H)
Maximum Operating Temperature	(0°C to 40°C)
Maximum Storage Temperature	-40°C – 70°C
Relative Humidity	5 – 90%RH Non-Condensing
Approvals	FCC 47CFR PT 15.247 Issued:2004/10/01 Operation within the bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz RSS-247 Issue: 2015/05/22 Issue 1 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices FCC 47CFR PT 15 SPT B Issued:2013/01/28 Title 47 CFR Part 15 Subpart B: Unintentional Radiators ICES 003 Issued: 2012/08/01 Spectrum Management and Telecommunications Interference-Causing Equipment Standard

Parameter	Specification
	EN 300 328:2015 V1.9.1 EMC & Radio Spectrum Matters (ERM); Wideband Transmission Systems Data Transmission Equipment Operating in the 2.4GHz ISM Band & Using Wide Band Modulation Techniques Harmonized EN for Article 3.2-R&TTE Directive EN 300 489-1 V1.9.2 Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements EN 301 489-17 Electromagnetic compatibility and radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific Conditions for broadband data transmission systems –V2.1.1 N 55022 Issue:2010/12/01 Information Technology Equipment-Radio Disturbance Characteristics – Limits and Methods of Measurement, Includes COR 2011/10/01 EN 55024 Issue: 2010/11/01 Information Technology Equipment – Immunity Characteristics Limits and Methods of Measurement.

Table 2 DD15 Interface Module Specifications

DD15 System Overview
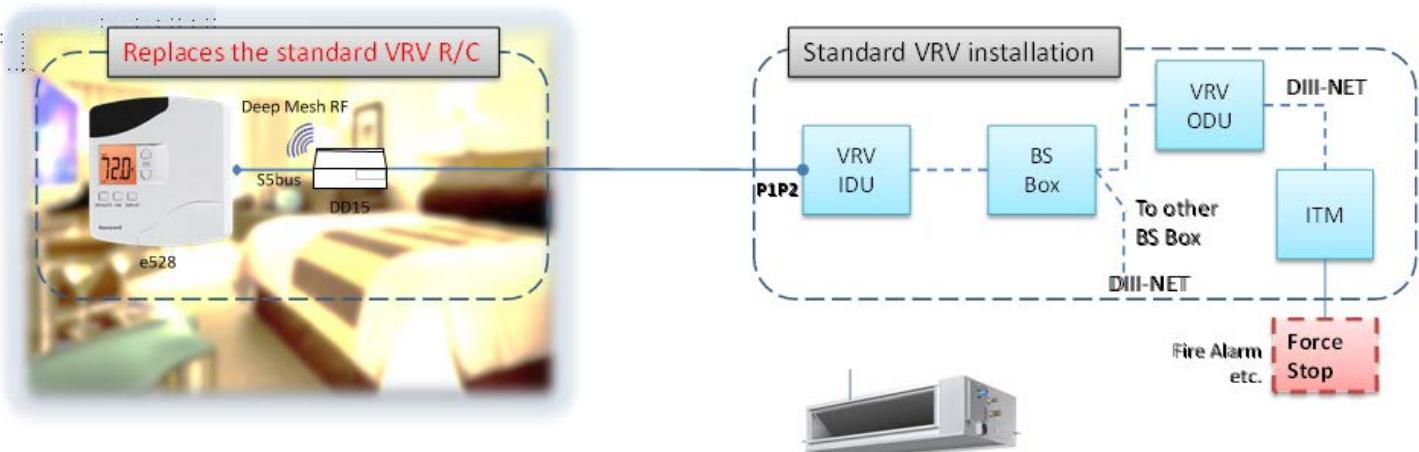
Figure 1 Standard VRV Integration Overview

Honeywell's INNCOM e528 or e527 thermostat replaces the standard Daikin VRV room controller for the heat recovery system. Daikin's heat recovery solution provides an alternative to a chiller plant and is becoming more widely accepted in the hospitality market. The e528 or e527 thermostat is the "intelligent" device capable of linking ancillary sensors and serving as an information gateway. For example, coupled with a magnetic door switch (wired or wireless), motion detectors and other devices, the e528 or e527 thermostat becomes the center of a highly effective Energy Management System application, communicating EMS information requirements from the guestroom to the central server. When connected to the INNcontrol server over a wired or wireless backhaul network, a centrally controlled EMS package is created. Through interfaces with other devices and sensors, the solution provides the following functions:

- Guestroom HVAC diagnostics
- Remote room occupancy indication
- Central Electronic Lock
- Humidity Management
- Outside temperature display
- Peak demand load shedding

- Property/Building Management System (PMS/BMS) interface

Table 3 Typical Wired Application
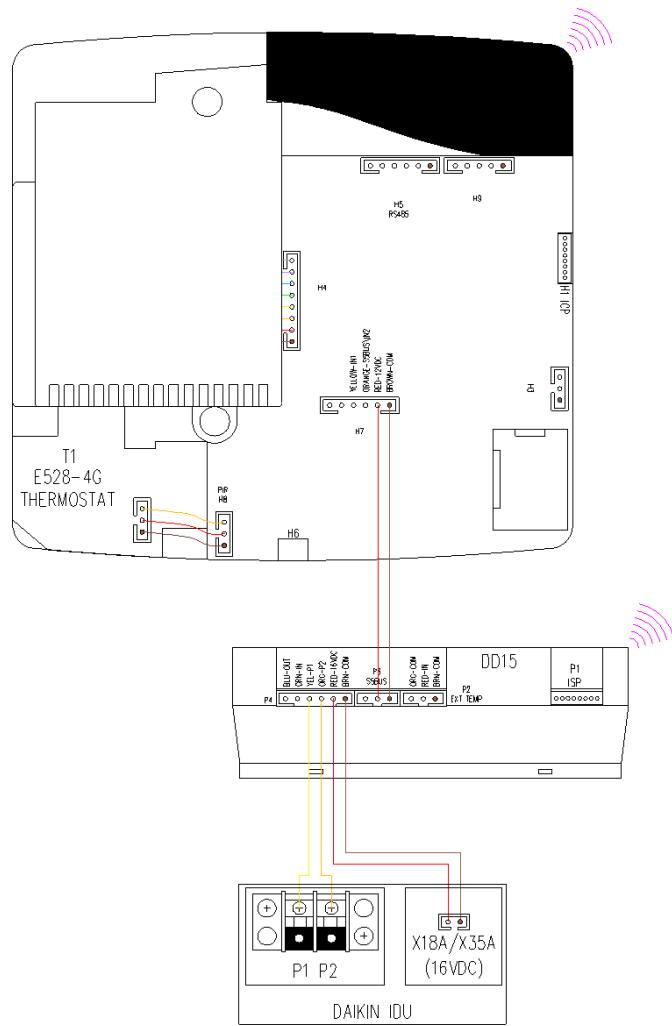
Table 4 Typical Wireless Application

Deep Mesh Wireless Communication

The DD15 interface module is equipped with a 2.4 GHz wireless RF transceiver for Deep Mesh RF communications. This provides the capability to wirelessly communicate to Honeywell's INNCOM e528 or e527 thermostat. This additionally provides the capability to wirelessly over-the-air load the device for software updates and configuration changes.

NOTE: The DD15 is not intended to be used as a general purpose RF media gateway or protocol converter.

Parameter	Specification
RF Data Rate	250kbps
Antenna Type	SMT
Indoor Range	100ft
Outdoor/ RF line-of-sight range	1000ft+
Transmit Power	10mW (+18dBm)
Receive Sensitivity	-94.6dBm
Frequency Band	2.4Ghz
Encryption	AES-128
Protocol	802.15.4
Frequency Channels	11-26

Table 5 Deep Mesh RF Radio Attributes

DD15 P1 P2 Daikin Communication Bus

The DD15 provides a native system bus link called P1/P2 to the Daikin VRV IDU. This gives Honeywell's INNCOM e527 and e528 the unique capability to provide high resolution control of the VRV system, and receive critical information from the VRV system such as fault cases, error codes, and run-time status information.

Running Long Cable Lengths

The DD15 is typically installed in our around the Daikin IDU using the provided harnesses. When wiring the Daikin P1P2 bus or DIII –net line communication cable should be non-shielded, 18AWG, standard non-polar cabling. For further detailed wired requirements of the Daikin IDU, please contact Daikin directly.

Parameter	Specification
24AWG Bare Solid Copper	
Insulation	**FRPE (PVC), 100% FEP (Plenum)**
Ripcord	**Under Jacket**
Jacket	**Flame Retardant PVC**
Impedance	**100 +/- 15 Ohms**
Mutual Capacitance, Max. nf/1000ft	**17.1**
DC Resistance, Max. Ohms/100ft	**28.6**

Table 6 DD15 Cable and Conductor Attributes

DD15 RF Bind Procedure

The following address teaches instruction assumes the product installer has a working knowledge of the INNCOM system, or is an INNCOM by Honeywell installer. For more help commissioning the DD15, please go to our website at https://www.inncom.com/en-us/resources/Pages/default.aspx

Function
S1 is used for teaching the DD15 a specific device address or function map. Use a paper clip to access S1 for teaching the address. 1. The DD15 uses a "reverse binding" procedure to acquire network information from the thermostat, meaning that the device will signal the thermostat that it wants the information. Besides the information set in the thermostat in the steps above, the DD15 requires a map of network components, complete with unique address. This information is typically carried in the I/O Map.

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2. Place the thermostat in Service Parameter mode as above. Go to the Io (I/O Map Teach) parameter and press the DISPLAY button (for e528.4G) or OFF/AUTO to view the value. Set the Io value to the desired I/O Map number. Do NOT press the thermostat's DISPLAY or OFF/AUTO button.

3. For the e528.4G, press OFF/AUTO and the LCD will display bnd.

4. Using a small point (e.g., the end of a straightened paper clip), press the recessed Reset/Bind switch (S1) on the DD15 once.

5. The thermostat sends a bind offer to the DD15. If accepted, the thermostat will buzz loudly. The DD15 will reset.

6. Test the DD15 functionality.

DD15 Diagnostic LED's

The DD15 is equipped with 3 LED's to provide diagnostics and sign-of-life indication, as well as data transmit and data receive activity indication.

LED	Function
Green	**Slow Blink Pattern** (once per second): Indicates the DD15 is in standard operation mode, is powered, and running. **Medium Speed Blink Pattern:** The DD15 has accepted the teach-mode command, and will reset. **Solid On Pattern:** DD15 is in failure mode. **Sold Off Pattern:** The DD15 is not powered on, or if powered on, the DD15 is in failure mode.
Red	**Fast Blink Pattern:** Indicates P1/P2 received data activity
Yellow	**Fast Blink Pattern:** Indicates P1/P2 transmitted data activity

Table 7 DD15 LED Function

DD15 Start Up

The DD15 device will power up without user interaction, and operate in default mode until communication with the thermostat is established. The diagnostic LED will fast blink on start up. The system will return to the last configured temperature setting, and update upon first interaction. The DD15 will send all necessary field settings to the Daikin IDU, such as fan always, and remote measured room temperature (temperature measured from the INNCOM e528 or e527 thermostat).

DD15 Power Outage and Restoration

All INNCOM devices have an onboard non-volatile memory, which is used to store the operating state of the DD15 in case of a power outage. With restoration of communications or power, the unit will initiate a brief power-up sequence. After power-up is complete, the unit will return to the last know configuration state.

DD15 Headers

P1 In-Circuit Programming Header – Main Micro

Pin	Signal	Function
1-8	Various	Programming header for programming the main micro. Use 03-0501

Table 8 DD15 In-Circuit Programming Header

P2 External Temperature Sensor

Pin	Signal	Function	Color
1	GND	Ground	Brown
2	NTC	10K NTC (NU)	Red
3	GND	Ground	Orange
	Honeywell recommends to use the following: PN: 04-1094.MOD external thermistor		

	PN: 04-1096.MOD ruggedized external thermistor

Table 9 DD15 External Temperature Sensor Header

P3 **S5bus In / S5bus Out**

Pin	Signal	Function	Color
1	GND	Ground	Brown
2	VEE	12VDC	Red
3	S5bus	Communication Bus (NU)	Orange

Table 10 DD15 S5bus and Input Voltage Header

P4 **P1/P2 Interface**

Pin	Signal	Function	Color
1	GND	Common	Brown
2	VIN	Power(+16VDC)	Red
3	P2	Daikin Communication Bus	Orange
4	P1	Daikin Communication Bus	Yellow
5	IN-1	Dry Contact Input (NU)	Green
6	OUT-1	Open Collector Output (NU)	Blue

Table 11 Daikin IDU Interface Header

DD15 Exploded Diagram (add better cad drawing of unit showing headers)
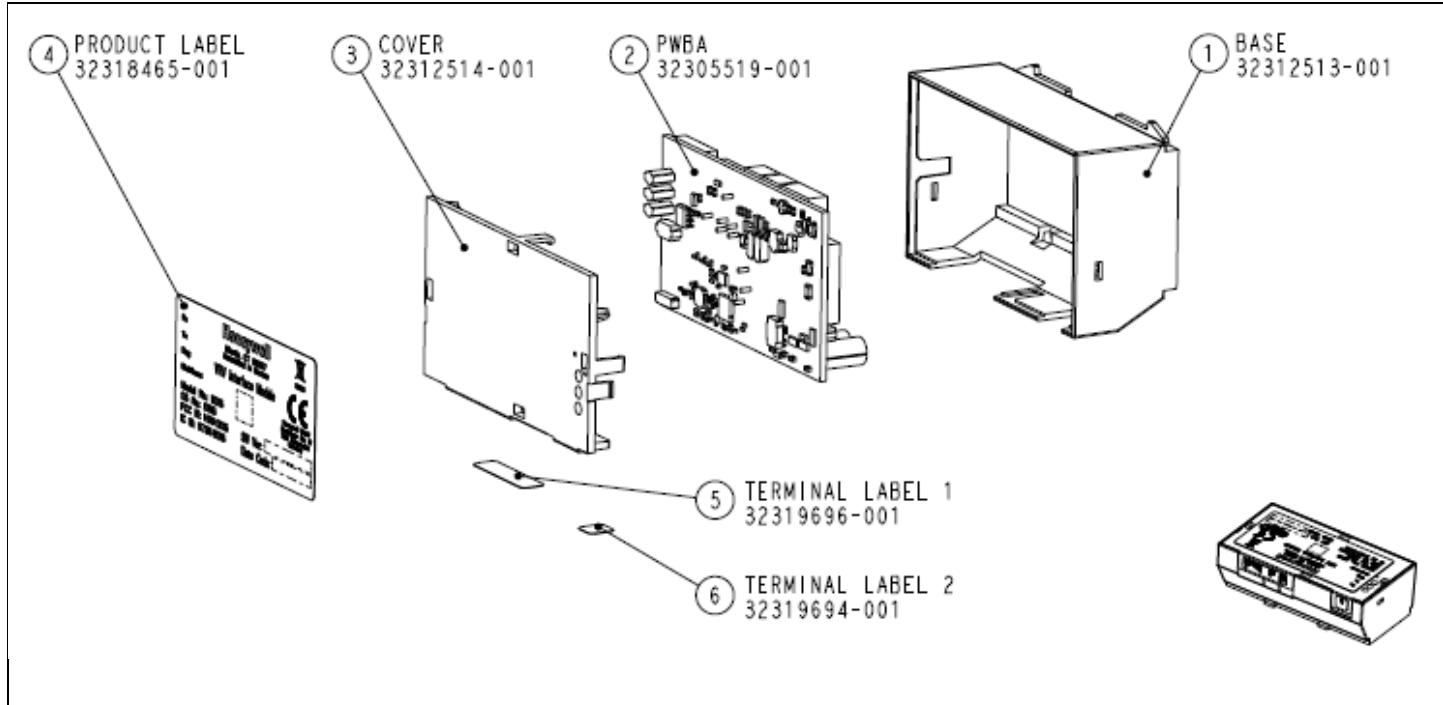
DD15 Installation

The DD15 is intended to be mounted in-side or around the Daikin IDU, in an orientation that is suitably flat using the provided double sided tape. It is critical to avoid mounting the DD15 inside a metal box as this will negatively impact the RF performance.

The DD15 Daikin Interface Device will be mounted within the Daikin wall mounted indoor unit, or in a ceiling near the Daikin ducted type indoor unit. In the wall mounted indoor unit, the DD15 housing is designed to snap into the metal frame. In the ducted indoor unit type, the DD15 will be equipped with double sided sticky tape to be mounted on or near the unit (the DD15 has to be mounted outside the ducted type indoor unit in a wireless application due to the RF limiting factors of the metal frame).

Wall mounted indoor unit:

Figure-5: Wall mounted Daikin unit

Ducted type indoor unit:
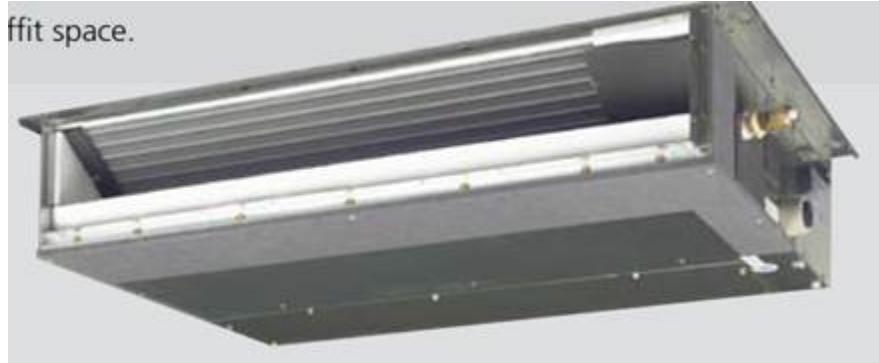
WARNING! Electrical Shock Hazard! Can cause severe injury, death or property damage. Disconnect power supply and load power sources before beginning wiring or making wiring connections to prevent electrical shock or equipment damage.

DD15 Harnesses

Part Number	Drawing
32315379 (x1)	
62-1465	
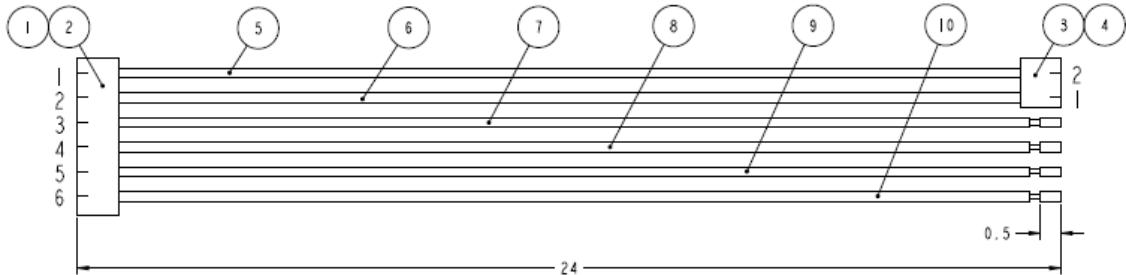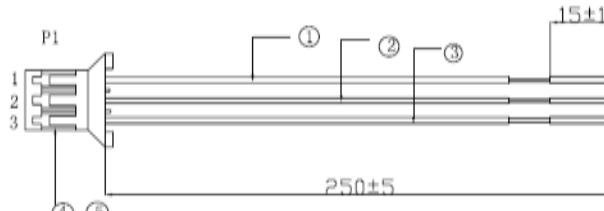
DD15 Ordering Information

Part Number	Description
DD15	Daikin VRV Interface Module

Interfacing Thermostat

	Part Number	Description
	01-9911-A0L7- (and following suffixes)	Honeywell's INNCOM e528 Thermostat
	201-527 (and following suffixes	Honeywell's INNCOM e527 Thermostat

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Regulatory Compliance

This device has been tested and found to be in compliance with the requirements stated below.

Federal Communications Commission (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

> **NOTE!**
>
> This equipment has been tested and found to comply with the limits for Class B digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
>
> Re-orient or relocate the receiving antenna
>
> Increase the separation between the equipment and receiver
>
> Connect the equipment to an outlet on a different circuit from the receiver
>
> Consult the dealer or an experienced radio/TV contractor for help.

> **CAUTION!**
>
> Any changes or modifications not expressly approved by Honeywell could void your authority to operate this equipment.

Canadian Dept. of Comm.(DOC)

> **NOTE!**
>
> This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
>
> C'et appareil est conforme la norme d'Industrie Canada exempts de licence RSS. Son fonctionnement est soumis aux deux conditions suivantes: (1) c'et appareil ne peut pas provoquer d'interférences, et (2) c'et appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de la dispositifWaste Electrical & Electronic Equipment

Customers are advised to dispose of this product at the end of its useful life according to applicable local laws, regulations, and procedures.