INSTALLATION GUIDE

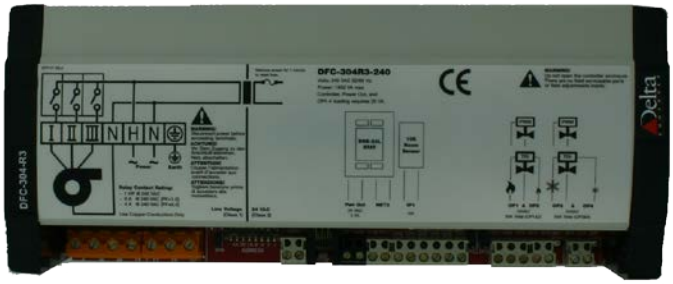
DFC-304R3-240 Rev 2.1 Installation Guide

Document Edition 1.1

Product Description

The DFC-304R3-240 Fan Coil Controller is a line powered, fully programmable (via GCL+) Native BACnet™ Application Controller that communicates using the BACnet MS/TP protocol. Direct 240 VAC line voltage terminal connections are provided for one, two, or three speed fans (up to 1 HP).

The binary model, with additional 4 triac outputs, covers a wide range of Fan Coil Unit applications, including two and four pipe fan coils. And room temperature can be a standard 10K sensor or a BACstat II connected via a secondary LINKnet network and 24 VAC power out connection.



Important Information

This controller has terminals for connecting 240VAC (Class 1, Line Voltage). The terminals are safety rated, however this controller may have to be mounted in an enclosure if it is not mounted inside the FCU. Check local electrical codes.

Package Contents

- Product: DFC-304R3-240 (Rev. 2.1)
- DFC-304R3-240 Installation Guide

Related Documents

- Delta Controls Wiring Guidelines
- DSC/DSC Release Notes for related Firmware
- Delta Controls General System Description (Delta Products System Architecture Description)

Cautions or Warnings

Personal injury/loss of life may occur if procedures are not performed as specified.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not open the controller. There are no field serviceable parts or field adjustments inside.

Equipment damage or loss of data may occur if the user does not follow a procedure as specified.

This controller is an Electro-statically sensitive device. Proper ESD protection (ground strap) should be used when installing this product so that damage to the product does not occur.

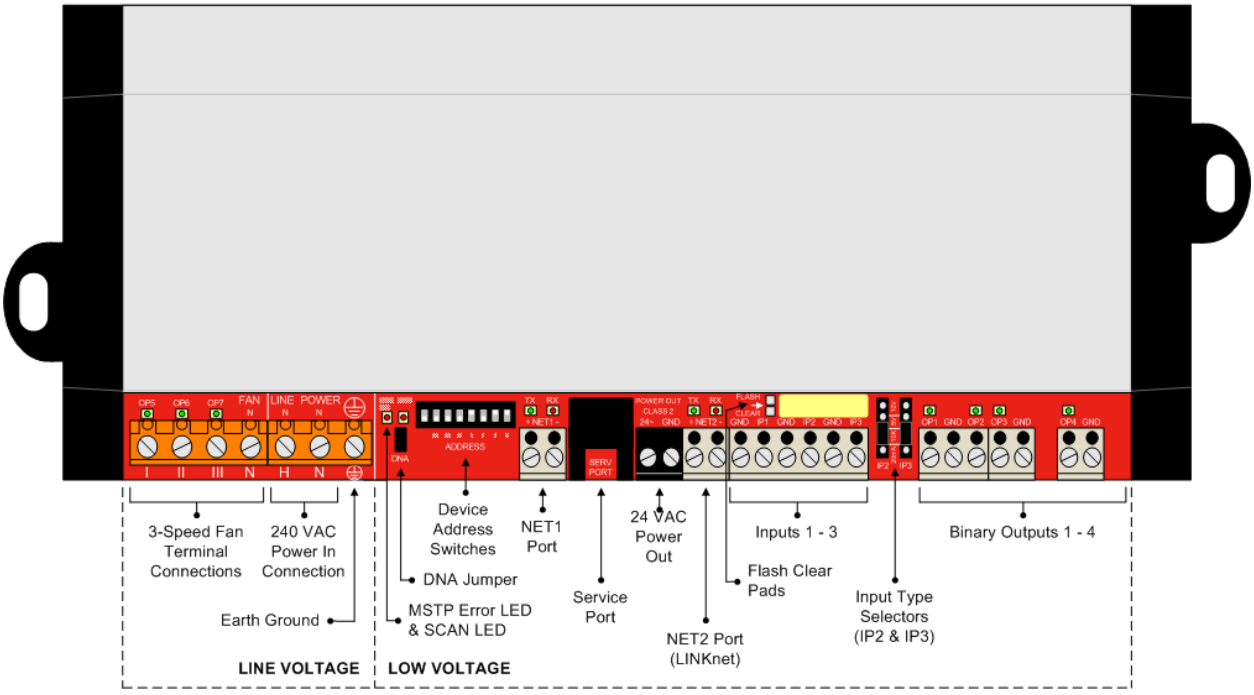
Mounting

The Fan Coil Controllers must be mounted inside the Fan Coil Unit box for safety reasons due to the presence of 240 VAC at terminal blocks.

The Fan Coil Controllers are mounted directly on a flat panel using the end mount tabs with two screws.

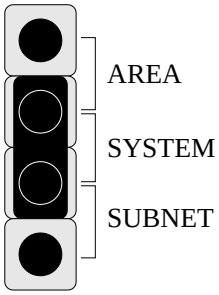
Board Layout

DFC-304R3 Fan Coil Controller (Binary)



Device Configuration

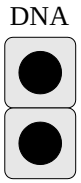
Device Type



Various products have the capability of being configured as one of several possible device types, which represents the network level that it will reside on in the network architecture (Area, System, Subnet). Other than the one device acting as a router, all other devices on the same network segment must be configured the same.

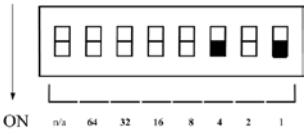
System/Subnet: The DFC-304R3-240 is a Subnet device only. It cannot be configured as a System device.

Derived Network Addressing



The **DNA jumper** comes ON by default. This allows the device to automatically configure a BACnet device address. This should NOT be removed unless you are assigning a BACnet device number through software. The BACnet device number should not be confused with the DIP switch setting, and each device must still have a unique dip switch address even when using software to define the device number.

Device Addressing



The Dip Switch is a binary switch. Each individual DIP switch represents a unique value, which forms the device address when added together.

To set the address, simply move the switches that add up to the devices desired address to the ON position.

Example: If the device is to be address 5 on the network, set the switch numbered 4 and the switch numbered 1 (equals 5) to the On position.

Note: Each device on the same MS/TP segment must have a unique DIP switch address.

Refer to the DNA section of the *ORCAview Technical Reference Manual*, and the *General System Description* for more information on DNA and System/Subnet devices.

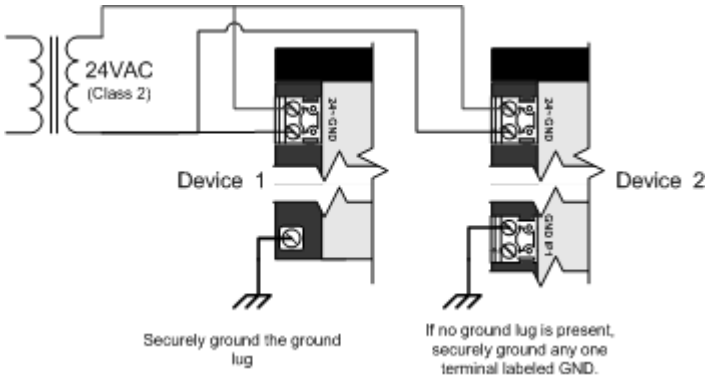
Wiring General

All wiring must conform to NEC and local codes and regulations.

- Use stranded or solid copper wire with 80ºC and 300 V rated insulation
- Connect protective earth ground
- A Disconnect Switch and/or Circuit Breaker shall be included in the building installation, (as required by local building code). The Circuit Breaker must be sized to accommodate the controller's power and the maximum load connected to the Fan Motor Relay outputs
- The Disconnect Switch shall be marked as the disconnect switch for the equipment, and mounted in close proximity of the equipment to allow for power disconnect for servicing
- Determine supply rating by summing total VA of product and Fan Motor load
- For the Line Voltage terminals, use 18 AWG to 12 AWG, (sized for Fan motor load) stranded or solid copper wire with Class I insulation
- Keep Class 2 wiring separate from Class 1 wiring

Power

The Fan Coil Controllers require 240 VAC 2000VA maximum, this includes fan motor load and low voltage circuitry. The on board transformer must only be used to provide power for the controller electronics, valve actuators powered through outputs, and 1 DNS-24L BACstat II connected to Class 2 Power. Class 2 inputs and outputs on the DFC's follow the same general wiring connection diagrams as other Delta Controls products.



If too much power is drawn from the on-board transformer, a re-settable fuse will be activated. After the fault has been fixed, power must be removed from the unit for 1 minute to allow the fuse to automatically reset.

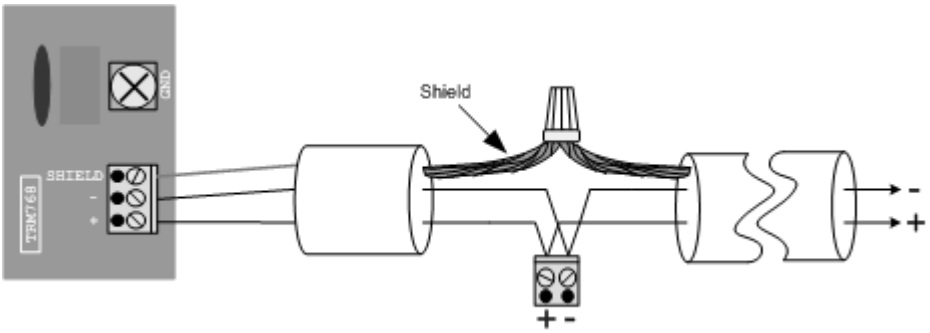
Network Communication

The controller communicates on Twisted Pair Ethernet 10-BaseT using BACnet IP and BACnet over Ethernet, or on an RS-485 LAN using the BACnet MS/TP protocol. Refer to *Delta Controls Wiring Guidelines* for further details.

MS/TP (RS485) Wiring

For detailed information on MS/TP and LINKnet wiring refer to *Delta Controls Wiring Guidelines*.

- The proper specified cabling must be used to ensure reliable communications. (22-24 AWG twisted pair, 100-120 ohms impedance, 17 pF/ft or lower capacitance, with a braided or aluminum foil shield.)
- Controllers should always be wired together in a daisy-chain fashion. Attempting to connect them using a starred or bus configuration will cause problems on the network.
- Networks with a total length greater than 4000 ft or with more than 50 devices require a repeater (RPT-768).
- LINKnet networks that have only 1-2 devices, and have less then 100 ft of cable length do not require network terminators.

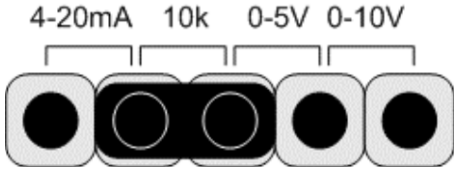


Input and Output Wiring

Inputs and outputs on the DFC-304R3-240 controller follow the same general wiring connection diagrams as other Delta Controls products. Refer to separate documentation for additional details.

Input Configuration

The input must be configured to accept the signal used by the input device. Place the jumper for each input in the correct location on the Input Type Selector Block. The diagram to the right shows the factory default selection of 10 KΩ.



4-20mA	▪	For sensors that use a 4 to 20 mA signal.
10K	▪	For 10 KΩ Thermistor temperature sensors, as well as Dry Contact binary inputs.
5V	▪	For sensors that use a 0 - 5 VDC signal.
10V	▪	For sensors that use a 0 -10 VDC signal.

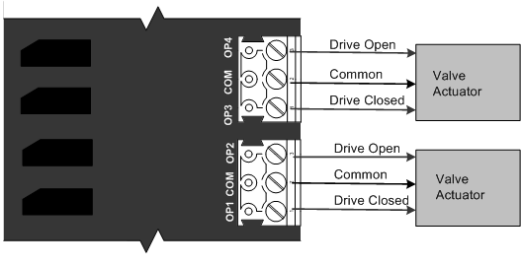
Output Configuration

Triac Outputs

DFC outputs switch INTERNALLY sourced 24VAC only. They cannot switch an external 24Vac power source.

The triac outputs are intended to drive a 24VAC tri-state or two-position valve actuator.

In the default FCU database, OP1 and OP2 are used to position a tri state heating valve actuator, and OP3 and OP4 are used for a tri state cooling valve actuator.



Fan Speed Relay Operation

The relay interlock circuitry only allows the highest speed select terminal to be energized. Speed I and II relays are disconnected by the hardware interlock circuitry when Speed III relay is active. The hardware interlock operates when two or more outputs are on, then the highest speed select terminal is energized.

The DFC controller hardware does not allow more than one fan relay to be energized at the same time. The default database will switch the fan speeds without any programmed time delay. Should this controller be used with FCU equipment that requires delays when switching the fan speeds, the database must be modified to suit.

It is recommended that the Speed III terminal be used for single speed fan applications; use Speed II and III terminals for two speed fan applications.

Database Backup

A Super capacitor is used for SRAM database backup. This device does not require maintenance or replacement during the lifetime of the product. While the product is powered up, the Super capacitor is automatically charged. After 48 hours of charging time, the Super capacitor has 100% backup time capacity.

There is a possibility of data loss if the Super capacitor charging time is too brief.

Network Communications Setup

The controller communicates on a BACnet MS/TP network at a default speed of 76,800 bps. Refer to the *ORCAview Technical Reference Manual* for further detail on configuring the BACnet MS/TP network or changing baud rates, etc.

Indicators

LED	Function	Description
Outputs (OP1 – OP7)	Output Status Indicators	This green LED is on or off to match the binary status of the associated output, or on with increasing intensity for analog outputs.
Scan	CPU Scan Indicator	This red LED flashes at a rate relative to the CPU scan rate.

Network (NET1)	MS/TP (RS485) Communication Status Indicators	The green LED flashes to indicate when the device is transmitting out the port, and the red LED flashes to indicate when the device is receiving data through the port.
Network (NET2)	MS/TP (RS485) Communication Status Indicators	The green LED flashes to indicate when the device is transmitting out the port, and the red LED flashes to indicate when the device is receiving data through the port. If communication is good, both LEDs will flash at a high rate.
MS/TP Error	MS/TP (RS485) Network Error Indicator	This red LED flashes to indicate a communication error or wiring mistake on the RS-485 network.

Product Specifications

To add additional specifications put the cursor on the outside right of the table and click enter to add a row.

Power Requirements		240 VAC 50/60Hz 2000 VA maximum Class 1 18 AWG to 12 AWG copper wire non-removable terminal blocks (90°C minimum rated wire or equivalent to be used)
Power Consumption		24 VAC, 50/60Hz 3.0 VA maximum for BACstat 5VA maximum per pair of triac outputs Class 2, SELV
Ambient Ratings		Temperature: 32º to 113º F (0º to 45º C) Humidity: 10 to 90% RH (non-condensing) Altitude: under 6500 ft. (2000 m.) Installation Category: II Pollution Degree: 2
Communication Ports		
	NET1 **Main LAN**	▪ BACnet MS/TP (RS-485) ▪ Communication: 9600, 19200, 38400, 76800 bps (default) ▪ Maximum of 99 devices (50 without a repeater)
	NET2 **SubLAN** **LINKnet**	▪ Communication: 76800 bps ▪ Maximum 4 devices on LINKnet, with no more than 2 DFM/DNT devices per controller. Note: Onboard transformer only provides enough power for 1 BACstat.
Inputs		1 10 KΩ Thermistor Dry Contact Input 2 Universal Inputs (10 bit), jumper configurable for the following input types: ▪ 0-5 VDC ▪ 0-10 VDC ▪ 10 KΩ Thermistor ▪ Dry Contact (using 10 KΩ Thermistor jumper setting ▪ 4-20 mA

Outputs 1-4, Class 2 (24VAC)	4 Binary Triac Outputs with LED status indication ▪ Switching 24 VAC @ 5VA maximum per pair of outputs (OP1, OP2, OP3 and OP4) ▪ Leakage Current per triac is 160 μA ▪ Internal 24 VAC power only
Outputs 5-7, Class 1 (Line Voltage)	3 Binary Relay Outputs for Fan Speed control with LED status indication ▪ Switching 240 VAC @ 1 HP ▪ Switching 250 VAC @ 8 A, Resistive Load, [PF=1.0] ▪ Switching 250 VAC @ 4 A, Inductive Load, [PF=0.4] ▪ Internal Line Voltage Power only ▪ 18 AWG to 12 AWG Copper wire non-removable terminal blocks
Technology	16 bit processor 1 MB (8 megabit) Flash Memory 256 KB SRAM memory (64 available for database) Database backup via non-volatile Flash memory Super-capacitor SRAM back-up Power and Status indication of the CPU with SCAN LED MS/TP Error indication with separate LED
Listings	**BACnet Testing Labs** – BTL Listed (with at least V3.22 Firmware) refer to www.bacnetassociation.org/bacnet_testing.htm
Compliance	**CE** – **EMC** Directive 89/336/EEC & IEC 61010-1 **FCC** – Class B **ICES** – Class B

Accessories

TRM-768	Delta Network Terminator for MS/TP
RPT-768	Delta Network Repeater for MS/TP

Model Number

DFC-304R3-240