



## Installation & Operation Guide



### **Direct Digital VAV Controllers**

*KMD-7001/7051 - VAV Terminal Units*

*KMD-7002/7052 - Dual Duct VAV Units*

*KMD-7003/7053 - Fan Induction Units*

# Introduction

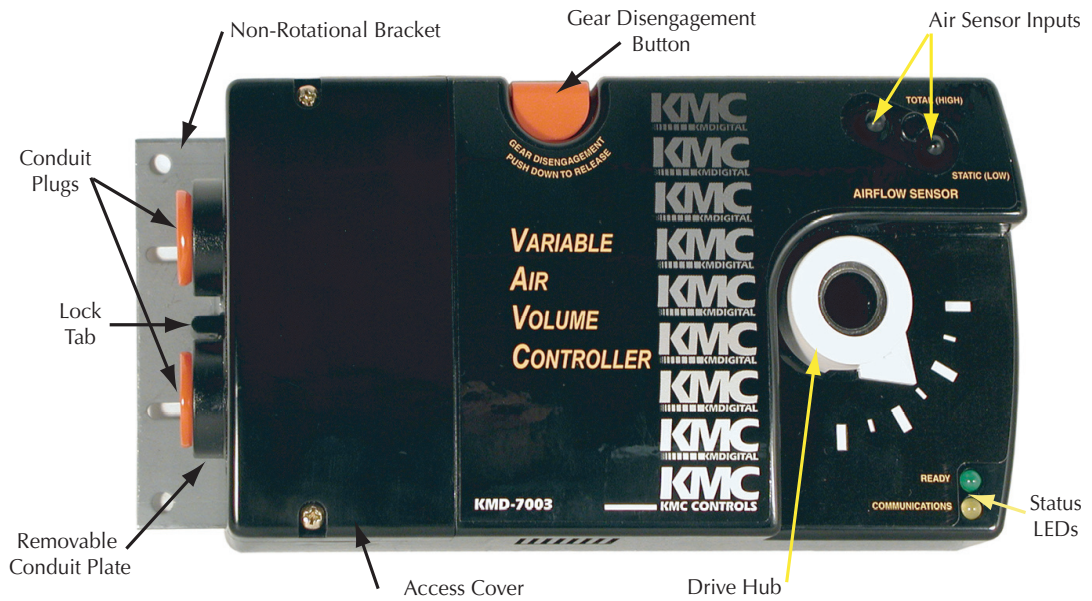
This section provides a brief overview of the KMD-7001, 7002 and 7003 Direct Digital Controllers. These units are intended for use with standard 1/2" round or 3/8" square damper shafts.



**Note:**

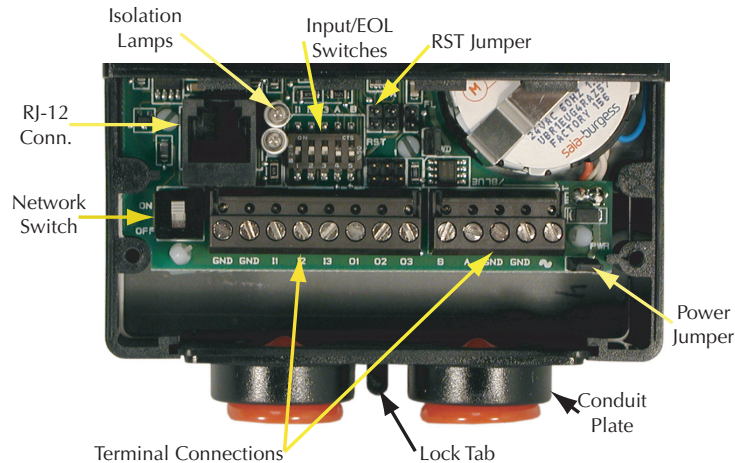
For installations using a 3/8" round shaft, you will need the HFO-0011 shaft adaptor.

Review this material before you attempt to install the controller.

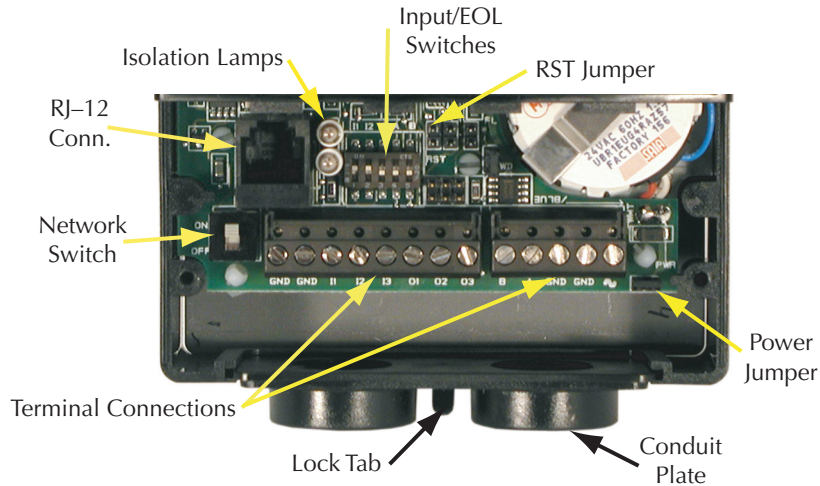


*Illustration 1. Controller Components*

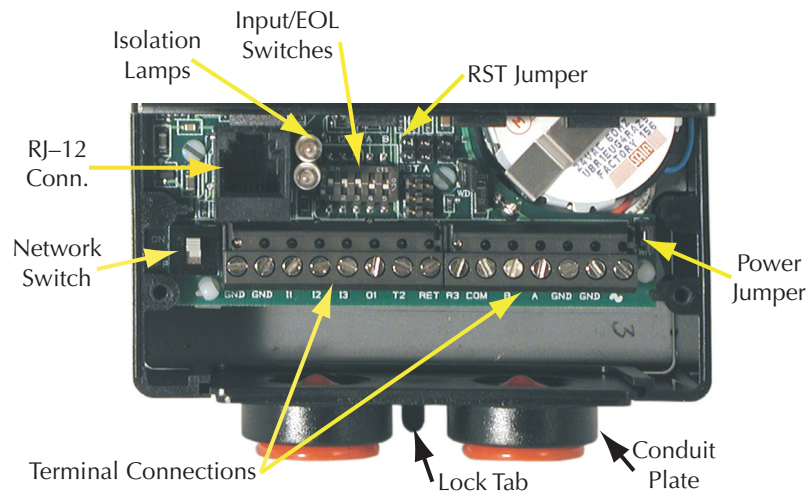
The following illustrations show the different model connection details.



*Illustration 2. KMD-7001 Controller Connector Detail*



*Illustration 3. KMD-7002 Controller Connector Detail*



*Illustration 4. KMD-7003 Controller Connector Detail*

## Installation

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This section provides important instructions and guidelines for installing the KMD-7001, 7002 and 7003 series controllers. Carefully review this information prior to attempting installation.

### Preparation

Prior to mounting the controller, the rotational limits must be set using stop pins. These settings limit the shaft rotation in the clockwise (CW) and counterclockwise (CCW) directions. (Refer to Illustration 5.)

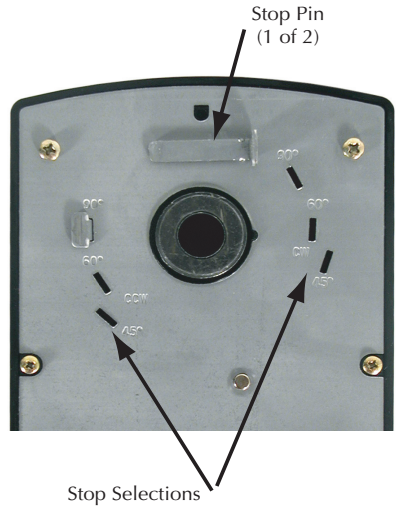


Illustration 5. Controller Stop Selections

To set the rotational limits:

1. Turn the controller over so you have access to the back.
2. Locate the two stop pins installed in the back of the unit. (You will find one pin in a CCW setting and one in a CW setting.)
3. Identify the limits you wish to use.

The maximum amount of shaft rotation is 90°. Placing a stop pin in both 90° slots allows the actuator the full 90° of travel. Placing a stop pin in any other slot restricts actuator motion in the indicated direction (CW or CCW). Refer to Illustration 6 for pin placement and travel. The first number represents the CCW pin and the second the CW pin (CCW/CW).

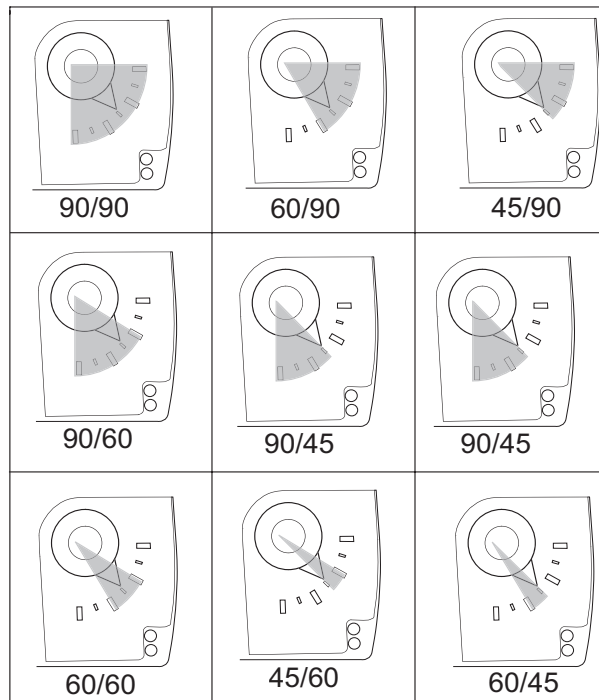


Illustration 6. Controller Travel and Stop Selections

### ! Caution

Both stop pins must be installed to prevent actuator damage.

4. If the stop pins are positioned as required, you may leave them in place. If not, remove the appropriate pin(s) and place it in the correct slot.

## Mounting

The controller will be mounted directly over the damper shaft. A minimum shaft length of 1-3/4" (45 mm) is required. The base of the controller must contact the mounting surface to allow installation of a bracket to prevent the controller from rotating.



### Note:

The controller should be mounted close enough to the Pitot tubes to allow a maximum 24" length of tubing to reach the controller inputs.

Proceed as follows:

1. Back out the set screws in the shaft collar so the shaft can fit through the collar.
2. Place the controller on the damper shaft in the approximate final position.
3. Position the non-rotation bracket and secure it using #8 or #10 self-tapping screws. Make certain the notch in the bracket securely engages the Lock tab on the controller. (Refer to Illustration 1.)
4. Manually position the damper in the full open position.
5. Adjust the drive hub as follows:
  - A. If the damper rotates counter clockwise to close, depress the gear disengagement button and rotate the drive hub to the full clockwise position then release the button.
  - B. If the damper rotates clockwise to close, depress the gear disengagement button and rotate the drive hub to the full counter clockwise position then release the button.
6. Tighten the two set screws in the drive hub to approximately 50-inch pounds (5.65 N-m) to lock the hub to the shaft.

## Wiring

The controller comes with a removable conduit plate. The plate provides two 1/2" female threaded conduit couplings. If conduit is to be used, note the following:

- ◆ The conduit plate may be removed by removing the two screws that secure the access cover and removing the cover. Connect the required conduit and replace the plate in the controller housing.
- ◆ The plugs may also be sliced to allow wiring to enter the controller with a minimum of outside contaminates.

## Input Connections

All input and output connections are made using the connectors beneath the access cover. Remove the two screws that secure this cover to remove the cover and complete input and output connections as discussed below.

### Universal Inputs

Inputs are configured per the model.

#### 7001/7051 and 7003/7053

Inputs are connected to the wire terminal strip using connections I1–I3. Observe the following guidelines. (Refer to Illustration 2 and 4.)

- ◆ Connect device inputs to the input terminal connections for inputs I1–I3.
- ◆ Connect all grounds to the common GND reference terminals.
- ◆ If input pull-ups are required, refer to “Board Configuration” later in this section.



#### Note:

Input #1 (I1) is typically assigned to the space temperature sensor input, otherwise it is available for use. Inputs 2 and 3 are available for optional inputs.

#### 7002/7052

These inputs are the same as on the 7001/7003 series except for Input #3 (I3). The I3 input on these models is dedicated to the TSP Slave Flow Sensor input. (Refer to Illustration 3.)

### RS-485 Inputs

To make connections to a KMC Tier 2 (RS-485) network use the RS-485 connections on the terminal strip. If the Controller is at the End-of-Line, refer to “Configuration” after connections are completed.



#### Detail

The End-of-Line connection will have only one wire attached to the A and B terminals.

- ◆ For reliable operation, use Belden cable model #82760 or equivalent (18 gauge, twisted, shielded, 50 picofarads or less) for all network terminal block connections.
- ◆ Connect the nodes of the network in a daisy-chain arrangement. This means:
  - Connect the *A* terminal in parallel with all other *A* terminals.
  - Connect the *B* terminal in parallel with all other *B* terminals.
- ◆ Connect the shields of the cable together at each controller.
- ◆ Connect the shield drain wire to an earth ground only at one end of the segment; tape back the shield ground at the other end.

## Airflow Sensor

An Airflow Sensor is incorporated as one of the inputs to the controller. Remove the plugs and connect the tubing from the Pitot assembly to the airflow sensor inputs above the drive hub. (Refer to Illustration 1.)

## Connecting Outputs

The Controller provides three output connection options configured according to the model. Locate your model from the units discussed below:

### **7001/7051 and 7002/7052**

These models provide three universal outputs O1, O2 and O3. They will provide 0/12 VDC at a maximum of 50 mA in Digital mode or 0-10 VDC at a maximum of 30 mA in Analog mode. Returns are connected to the GND connections on the left end of the strip. (Refer to Illustration 2 and 3.)

### **7003/7053**

These models are unique as described below: (Refer to Illustration 4.)

**Out 1** – This is a universal output that may be used as an output option. Output ratings are the same as on the other models.

**T2** – This Triac output will switch a maximum voltage of 30 VAC. It is rated for a minimum current of 20 mA and a maximum of 1A. Use the RET terminal for the triac return.

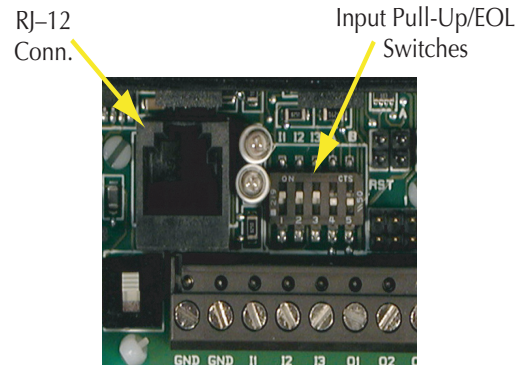
**R3** – This output is assigned as the Normally Open Relay Output. The output will switch up to 30 VAC/DC at up to 2A maximum. The return connects to the COM terminal.

## RJ-12

An RJ-12 connector is provided for connection to the KMD-1001 NetView or the KMD-11xx Series NetSensor or a PC. Simply place the appropriate cable connector in the provided RJ-12 connector and connect the other end to the device.

## Board Configuration

Configuration settings may be required for the inputs or the RS-485 connection. If you must activate or deactivate pull-ups on the inputs or set the end-of-line termination for the RS-485 connection, refer to Illustration 7 to locate the switches for these settings.



*Illustration 7. Typical Input Pull-up and EOL Switch Placement*

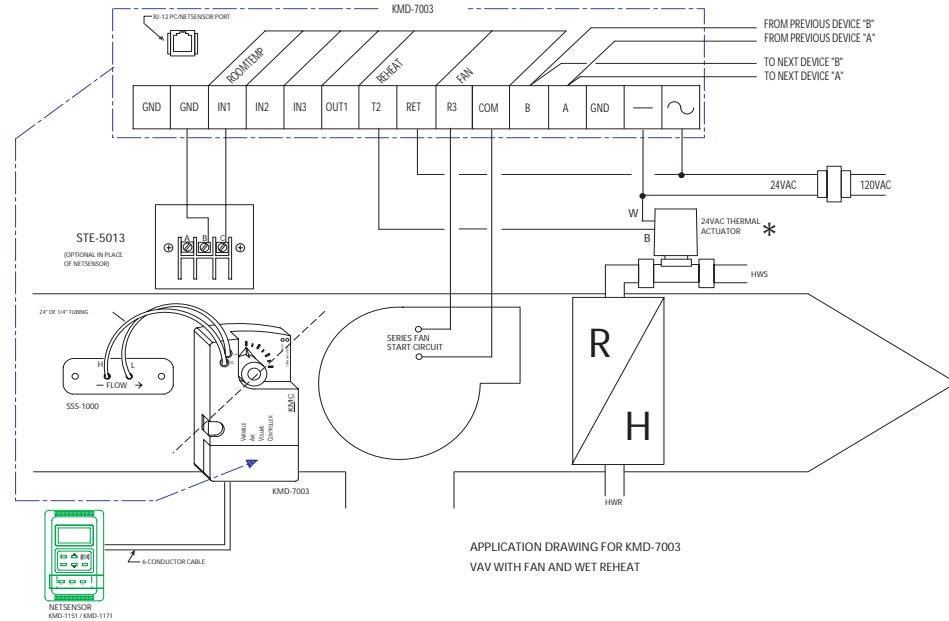
Proceed as follows:

1. If the access cover is still on the controller, remove the two screws that secure the cover, then remove the cover.
2. Locate the switch next to the isolation lamps behind the terminal strip. (See Illustrations 4.)
3. Set the switches as follows:
  - A. If the RS-485 connection is the End-of-Line controller, verify that both switches 4 & 5 (A & B) are in the ON position. Otherwise, the switches remain in the default "OFF" position.
  - B. If one or more inputs require a pull-up, verify that the appropriate switches (I1–I3) is set to the default "ON" position. For devices supplying their own voltage/current for passive devices, move the switch to the "OFF" position.
4. After you set the switches, replace the controller cover and secure it with the screws you removed earlier.

## Power Connection

Connect the 24 VAC supply voltage to the power terminal block on the lower right side of the controller near the PWR jumper. Connect the GND side of the transformer to the GND terminal and the AC Phase side to the AC terminal. Power is applied to the controller when the power supply (or transformer) is plugged in and the PWR jumper is in place. Illustration 7 shows a typical connection diagram for the controller.





\*For electric reheat applications, use a separate 24 VAC transformer to isolate the relay through the Triac.

*Illustration 8. Typical KMD-7003 Application*



**Note:**

Typical Application Diagrams may be obtained by contacting KMC Controls Technical Support at 574-831-5250 or e-mail us at [techs@kmccontrols.com](mailto:techs@kmccontrols.com).

## Network Configuration

Prior to operating the controller, it must be configured using the Hardware Configuration Manager (HCM) application supplied with WinControl. Refer to the WinControl XL User's Manual and the KMC Digital Applications Manual for additional information.



**Note:**

All controllers on the same network must be configured for the same baud rate and each controller assigned a unique address.

## Programming

Refer to the KMC Digital Applications Manual for information on how to program the controller.

# Operation

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Once configured, programmed and powered up, the controller requires very little user intervention.

## Controls and Indicators

The following sections describe the controls and indicators found on the controller.

### Network ON/OFF

The network ON/OFF switch is located near the RJ-12 connector. Use this switch to enable or disable the RS-485 network connection. When the switch is ON the controller can communicate on the network; when it is OFF, the controller is isolated from the network.

Alternately, you may remove the Isolation Lamps to isolate the controller from the network.

### Status LEDs

Two Status LEDs are located on the left side of the controller above the power connector terminal. They are used to indicate the following:

**Ready** – This LED flashes rapidly whenever the controller is operating normally. You can consider this the same as a power LED.

**Communications** – This LED indicates when the controller is transmitting over the RS-485 network connection.

### Isolation Lamps

Two Isolation Lamps are located near the RJ-11 connector. These lamps serve three functions:

- ◆ Removing the lamps will open the RS-485 circuit and isolate the controller from the network.
- ◆ If one, or both, lamps are lit, it indicates the network is improperly phased. This means that the ground potential of the controller is not the same as other controllers on the network
- ◆ If the voltage or current on the network exceeds safe levels, the lamps operate as fuses and may protect the controller from damage.

## Resetting the Controller

If the controller appears to be operating incorrectly, or is not responding to commands, you may need to reset the controller.



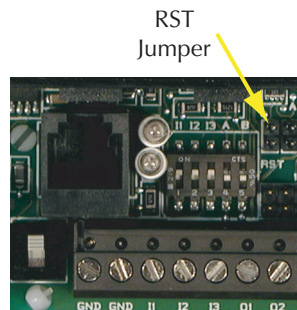
### Note

Resetting the controller will restore the factory default configuration.

It may be necessary to re-configure the controller with HCM to establish normal communications and operation. Re-programming may also be required.

To reset the controller, proceed as follows.

1. Remove the two screws that secure the Access Cover, then remove the cover.
2. Locate the jumper block next to the input pull-up switches (see Illustration 8).



*Illustration 8. Reset (RST) Jumper Location*

3. Power off the controller. (Remove the PWR jumper.)
4. Locate the RST pins and place a jumper across them.
5. Power up the controller. Wait until the Ready LED flashes normally.
6. Power off the controller.
7. Remove the jumper from the RST pins.
8. Replace the PWR jumper.
8. Replace the controller cover.
9. Re-configure the controller if necessary.

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