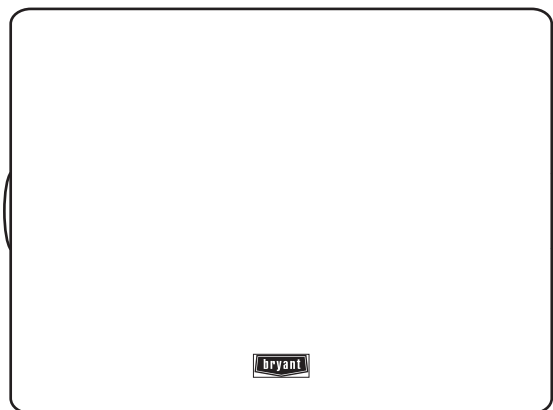




# Installation and Start-Up Instructions



A97038

**NOTE:** Read the entire instruction manual before starting the installation.

## SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings and cautions included in literature and attached to the unit. Consult local building codes and the current edition of the National Electrical Code (NEC) NFPA 70. In Canada, refer to the current editions of the Canadian Electrical Code CSA C22.1.

Recognize safety information. When you see this symbol ⚠ on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand the signal words **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards, which **will** result in severe personal injury or death. **WARNING** signifies hazards, which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

## INSTALLATION CONSIDERATIONS

Before the actual installation of a zoning system can begin, decisions need to be made to determine the number and location of zones and sensors. This affects duct and damper selections.

**See the Evolution® System Zoning Design Guide for more information on specifying and designing zoning systems.**

This instruction covers the physical installation and start up of the Evolution® Damper Control. Use this instruction to guide the actual installation process after all the air side decisions have been made. One Damper Control is capable of handling up to four zones of operation. When greater than four zones are required, a second Damper Control Module is needed for zones 5 through 8 (8 zones maximum).

- Install the Evolution® Zone Control (Evolution® Connex™ Wall Control) and Remote Room Sensors in non-condensing areas with ambient temperatures between 32° F and 120° F. Install dampers and the Evolution® Damper Control in non-condensing areas with ambient temperatures between -4° F to 158° F (-20° to 70° C).
- A TXV is required on the indoor coil when used with all residential split system equipment.
- Proper equipment selection and duct sizing are important in a zoned system.
- **DO NOT USE** a bypass damper with the Evolution® Zoning System. Addition of a bypass will cause improper operation. Airflow management will be performed by the Evolution® Connex™ Wall Control algorithms. The Evolution® Connex™ Wall Control will monitor the system and will maintain proper airflow through the heating / cooling equipment.

## INTRODUCTION

The Evolution® Zoning System allows air conditioning and heating equipment to control temperatures and humidity in up to 8 distinct spaces, or zones, within a building. Each zone has independent temperature settings. The comfort temperature settings can change automatically through the use of schedules. This allows the Evolution® System to change temperature settings in zones to reflect occupancy or usage. For example, the end user can condition bedrooms in a home from 5:00 PM through 7:00 AM or the kitchen from 3:00 PM through 6:00 PM. The Evolution® System uses motorized air volume control dampers (also called zone dampers) to regulate flow of conditioned air into zones. In this manner, the system can selectively heat or cool certain portions of a building depending upon space temperature requirements.

Each zone requires a motorized zone damper to control the air supplied to it and a zone sensor to sense temperature in each zone. There are three types of zone sensors available and may be used in combination:

- Evolution® Connex™ Wall Control (p/n SYSTXCBBECC01, SYSTXBECW01, or SYSTXBECN01) — Each installation has only one Master wall/zoning control. This is the command center for the entire system. It will typically be located in Zone 1 to sense and control the temperature in this zone. If desired, a Remote Room Sensor or a Smart Sensor may be used to sense the Zone 1 temperature. This can give the installer some flexibility in locating the Master Evolution® Connex™ wall control to another area.
- Remote Room Sensor (p/n SYSTXBBRRS01) — Any zone may use a Remote Room Sensor (including Zone 1). This is a temperature sensor only, having no additional user inputs. In applications where zone temperature averaging may be desired, this may be done using 4 Remote Room Sensors in a series / parallel wiring configuration (See Fig. 11 for Remote Room Sensor Averaging).
- Smart Sensor (p/n SYSTXBBSMS01) — Any zone may use a Smart Sensor (including Zone 1). It provides a temperature display and buttons to adjust the desired temperature in that zone only. It also displays the outdoor temperature and indoor humidity.

Be sure to select the desired sensor type for each zone. Zone sensors other than the Evolution® Connex™ wall control must be purchased separately. Installation Instructions for these sensors are included with them.

## INSTALLATION

### Step 1 — Check Equipment and Job Site

**INSPECT EQUIPMENT**—File claim with shipping company, prior to installation, if shipment is damaged or incomplete.

### Step 2 — Component Location and Wiring Considerations

## ⚠ WARNING

### ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing sensor, turn off all power to unit. There may be more than one power disconnect.

**NOTE:** All wiring must comply with national, local, and state codes.

### LOCATING Evolution® DAMPER CONTROL

All system wiring is run back to the Evolution® Damper Control. Select a location near the Evolution® furnace or fan coil where wiring from the Evolution® Connex™ wall control, each Remote Room Sensor or Smart Sensor, each damper actuator, and the equipment itself can come together easily.

The Evolution® Damper Control is approved for indoor use only and should never be installed with any of its components exposed to the elements. The Evolution® Damper Control (and the zone dampers) may be installed in any area where the temperature remains between -4° F to 158° F (-20° C to 70° C), and where there is no condensation. The cover must be installed to prevent damage from other sources. Do not locate where it will be accessible to children. It may be mounted in either vertical or horizontal position. Remember that wiring access is likely the most important consideration.

## ⚠ CAUTION

### ELECTRICAL OPERATION HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

To prevent possible damage to the Evolution® Damper Control, do not mount on plenum, ductwork, or flush against surface.

### LOCATING MASTER ZONING WALL CONTROL

The Evolution® Connex™ wall control is the command center for the Evolution® Zone System. It should be located where it is easily accessible and visible to home or business owner. It is also normally the Zone 1 sensor and as such needs to be located to properly measure the temperature in Zone 1. If these two requirements conflict, a separate Remote Room Sensor can be added for Zone 1.

When a Remote Room Sensor is connected to Zone 1 terminals (ZS1 and ZS1C) of the Evolution® Damper Control, the system automatically switches to using this sensor for Zone 1 and ignores the sensor within the Evolution® Connex™ wall control. This arrangement allows the Evolution® Connex™ wall control to be located at any convenient place within the home or business. In this arrangement, only the Zone 1 Remote Room Sensor must be located in Zone 1.

**NOTE:** The Evolution® Connex™ wall control also controls humidity functions. If the wall control is not used to control Zone 1 temperature, it must still be located in a suitable area where humidity control will not be affected.

### LOCATING SENSORS

For proper operation, each sensor must accurately measure the temperature within its zone. For accurate temperature measurement, the following guidelines should be followed:

#### Sensor should be mounted:

- Approximately 5 ft. (1.5m) from floor.
- Close to the center of its zone, preferably on an inside wall.
- On a section of wall without pipes or duct work.

#### Sensor should NOT be mounted:

- Close to a window, on an outside wall, or next to a door leading to the outside.
- Where it will be exposed to direct light and heat from a lamp, sun, fireplace, or other temperature radiating object which may cause a false reading.
- Close to or in direct airflow from supply registers.
- In areas with poor air circulation, such as behind a door or in an alcove.

### WIRING CONSIDERATIONS

Ordinary thermostat wire is ideal when wiring the Evolution® Zoning System (shielded cable is not necessary). Use 20 AWG or larger for typical installations. Lengths over 100 ft. should use 18 AWG or larger wire. Remote Room Sensors require only two conductors, but it is recommended that at least four conductors be run. This will allow a Smart Sensor to replace the Remote Room Sensor with no wiring changes at a later date. The Evolution® Connex™ wall control requires four conductors, each damper actuator requires three conductors. Cut off or fold back and tape any unneeded wires. Plan the routing of wiring early to avoid possible problems later. Remember, all wires converge at the Evolution® Damper Control, so its location is important.

**NOTE:** Wiring of the ABCD bus only requires a four-wire connection; however, it is good practice to run thermostat cable having more than four wires in the event of a damaged or broken wire during installation.

The following color code is recommended for each ABCD bus connection:

- A** — Green = Data A
- B** — Yellow = Data B
- C** — White = 24 VAC (Com)
- D** — Red = 24VAC (Hot)

It is not mandatory that the above color code be used, but each bus connection in the system **MUST** be wired consistently.

### Step 3 — Install Components

#### INSTALL Evolution® DAMPER CONTROL

The Evolution® Damper Control is designed so that wires can enter it from behind, above, or below. Plan wire routing before mounting Damper Control.

1. Remove cover to access mounting holes.
2. Mount back plate to wall using screws and wall anchors provided.
3. Level back plate and tighten screws.

#### INSTALL MASTER ZONING WALL CONTROL

See the Evolution® Connex™ wall control Installation Instructions for details.

**NOTE:** Improper wiring of the ABCD connector will cause the Evolution® Zoning System to operate improperly. Check to make sure all wiring is correct before proceeding with installation or turning on power.

#### INSTALL REMOTE ROOM SENSORS

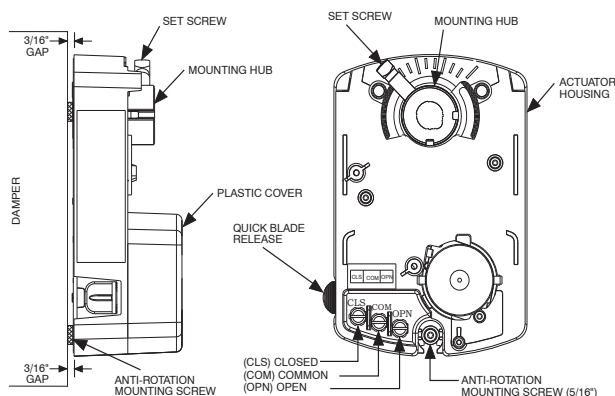
1. Separate the sensor cover and mounting back plate by squeezing the top and bottom of the cover together firmly by grasping the raised top and bottom ridges. This will release the cover. Mount to the wall using the screws and anchors provided.
2. Pull a 2-conductor wire through hole on right-hand side.
3. Recommended connection is **BLACK** to either terminal, **WHITE** to remaining terminal (sensor terminals are not marked for polarity because polarity is not important). Stranded or common bell wire may be used. Lengths up to 1000 ft. will contribute no noticeable error.
4. Push any extra wire into the wall and seal the hole to prevent air leaks. Align the sensor cover with the base plate, then press firmly until the cover snaps into place.

#### INSTALL ZONING SMART SENSOR

See the Evolution® Zoning Smart Sensor Installation Instructions for details.

### Step 4 — Install Zone Dampers

Proper selection and sizing of dampers is very important for proper system operation. Be sure to consult the Damper Product Data Sheet and Evolution® Zoning Design Guide for assistance in making these selections. Selection and sizing information is not provided in this installation instruction. Zone dampers are available in round, rectangular, and slip-in design, and may be installed in any position. Install the damper so that the actuator is visible for inspection and accessible in the event it would need to be serviced. The black mark on the end of the damper shaft represents the position of the damper blade. To wire the damper, locate the terminals labeled: OPN (open); COM (common); CLS (closed); and wire appropriately (see Fig. 1 for Damper 24 VAC connection).



**Fig. 1 - Damper 24VAC Connections**

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If the duct system requires multiple dampers for a single zone, up to five dampers (maximum) may be wired in parallel. For all applications, including retrofit, it is recommended to use only current dampers with direct-drive style actuators. **DO NOT** use older damper with crank-arm style actuators.

If an actuator is removed from a damper for any reason, it must be properly aligned when it is reinstalled. This can be done by rotating the actuator and the blade to their closed positions and then tightening the actuator (set screw) to the shaft. This assures alignment at the closed position. (Pressing the quick blade release button allows the actuator to be manually turned.)

## ⚠ CAUTION

#### ELECTRICAL OPERATION HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Condensation can damage the actuator. When dampers are located in an unconditioned space, condensation is likely to occur in cooling. To prevent condensation and losses, all dampers and ductwork in unconditioned space must be insulated or otherwise protected.

Whenever condensation might occur, it is recommended that a plastic actuator cover (p/n, DAMPACTXXCOV) be used over the actuator. This cover can help prevent condensation on the actuator by helping to keep out ambient humidity. Insulation may be applied over the cover to minimize heat transfer.

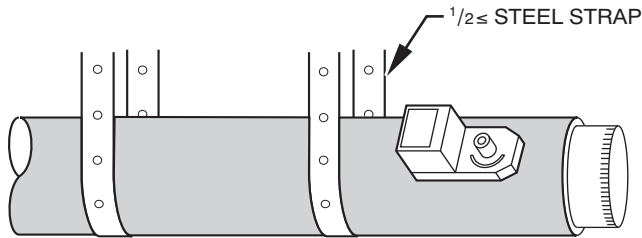
To install, place the cover over the actuator and seal it in place over the surrounding insulation with duct tape on all four sides. Sealing need not be perfect because there will be positive pressure inside the cover. Do not mount the dampers with their actuators hanging directly beneath the ductwork. It is best to mount the actuator facing in either the three or nine o'clock position.

For specific duct types, follow the instructions below:

**NOTE:** All zone dampers and ductwork must be properly supported according to local codes or SMACNA standards.

## ROUND METAL DUCTWORK

1. Crimp the end of the branch duct.
2. Slip the end of the zone damper over the ductwork end. Use a self-tapping sheet metal screw to secure.
3. Properly seal the joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with the actuator.
4. If dampers are applied in an unconditioned space, insulate them using 1-1/2 inch to 2 inch insulation (See Fig. 2).

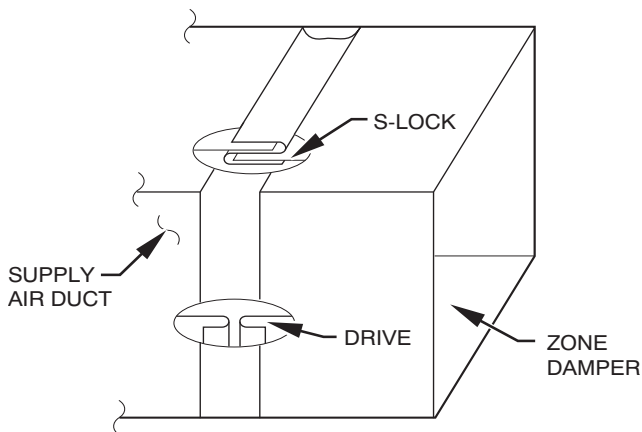


**Fig. 2 - Insulated Round Metal Duct Work**

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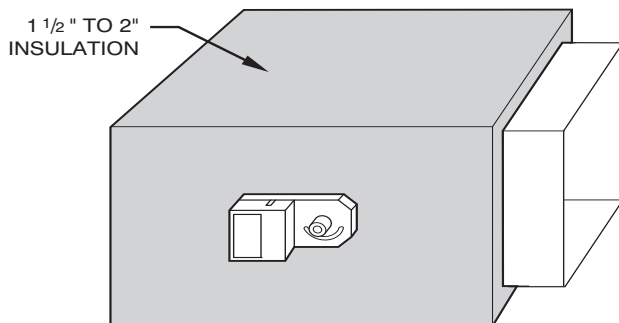
## RECTANGULAR DUCTWORK

1. Make connections using S-lock and drives (See Fig. 3).
2. Properly seal the joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with the actuator.
3. If dampers are applied in an unconditioned space, insulate them using 1-1/2 inch to 2 inch insulation (See Fig. 4).



**Fig. 3 - Rectangular Metal Ductwork**

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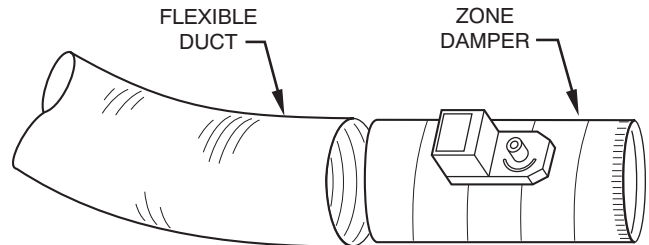


**Fig. 4 - Insulated Rectangular Metal Ductwork**

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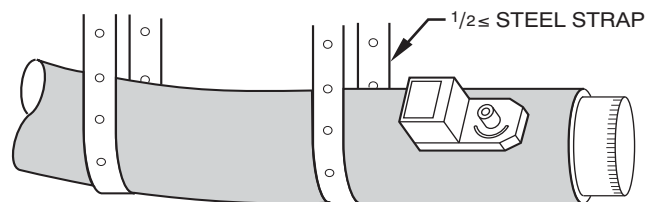
## ROUND FLEXIBLE DUCTWORK

1. Slip one end of the flexible ductwork over the zone damper end (See Fig. 5).
2. Secure flexible duct to the zone damper using SMACNA or other approved method.
3. Properly seal the joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with the actuator.
4. If dampers are applied in an unconditioned space, insulate them using 1-1/2 inch to 2 inch insulation (See Fig. 6).



**Fig. 5 - Round Flexible Ductwork**

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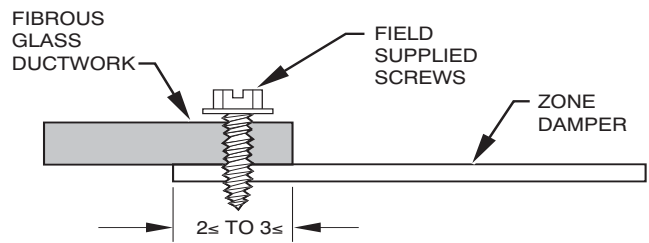


**Fig. 6 - Insulated Round Flexible Ductwork**

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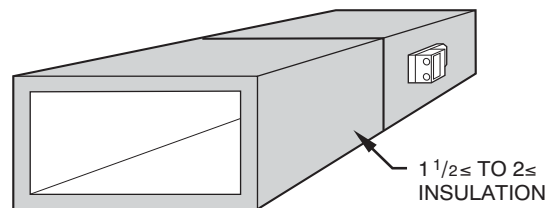
## RECTANGULAR FIBROUS GLASS DUCTWORK

1. Insert one end of the zone damper into the fibrous glass ductwork end approximately 2 to 3 inches (See Fig. 7).
2. Use the field supplied screws to secure the duct board to the zone damper.
3. Properly seal the joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with the actuator.
4. If dampers are applied in an unconditioned space, insulate them using 1-1/2 inch to 2 inch insulation (See Fig. 8).



**Fig. 7 - Rectangular Fibrous Glass Ductwork**

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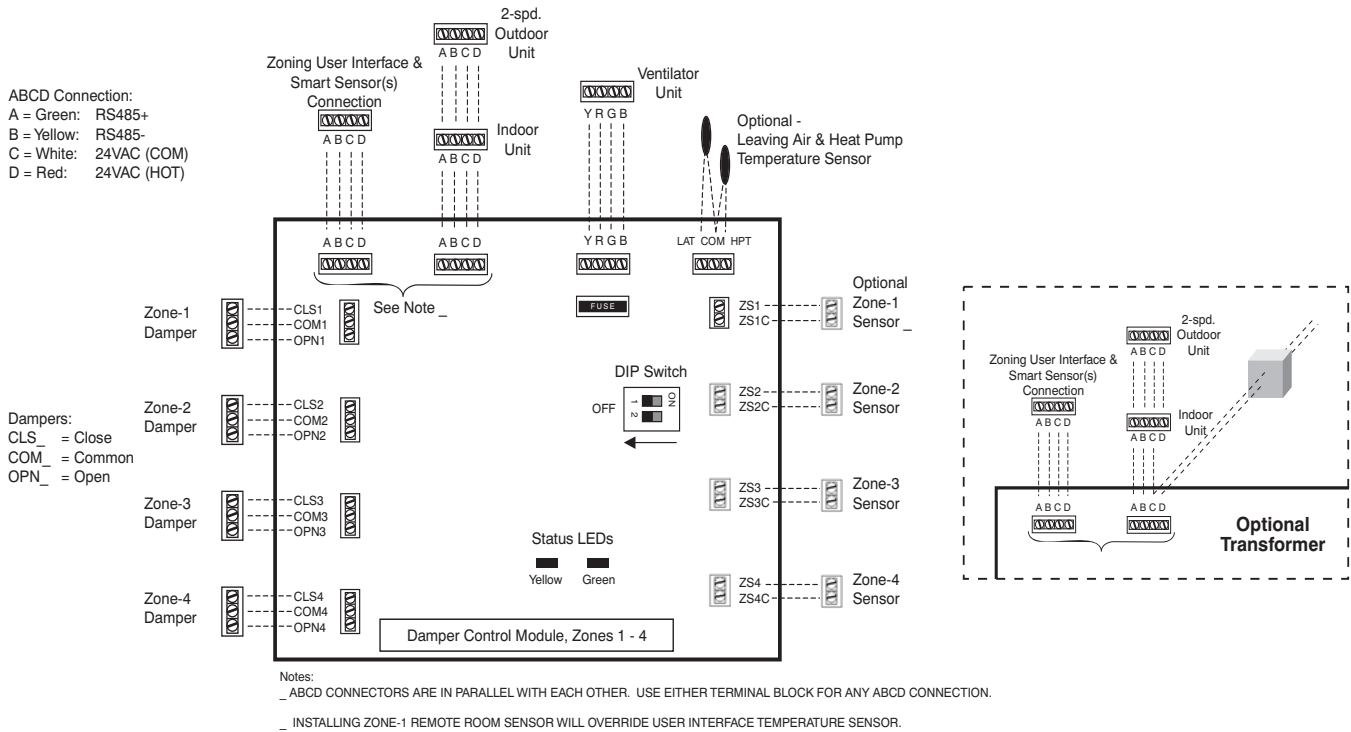
**Fig. 8 - Insulated Rectangular Fibrous Glass Ductwork**

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## Step 5 — Final Wiring

Bring all damper and sensor wires together at the Evolution® Damper Control. Make all system wiring connections as shown in Fig. 9. The two ABCD bus connections on the Evolution® Damper Control are in parallel with each other. Use either terminal block to

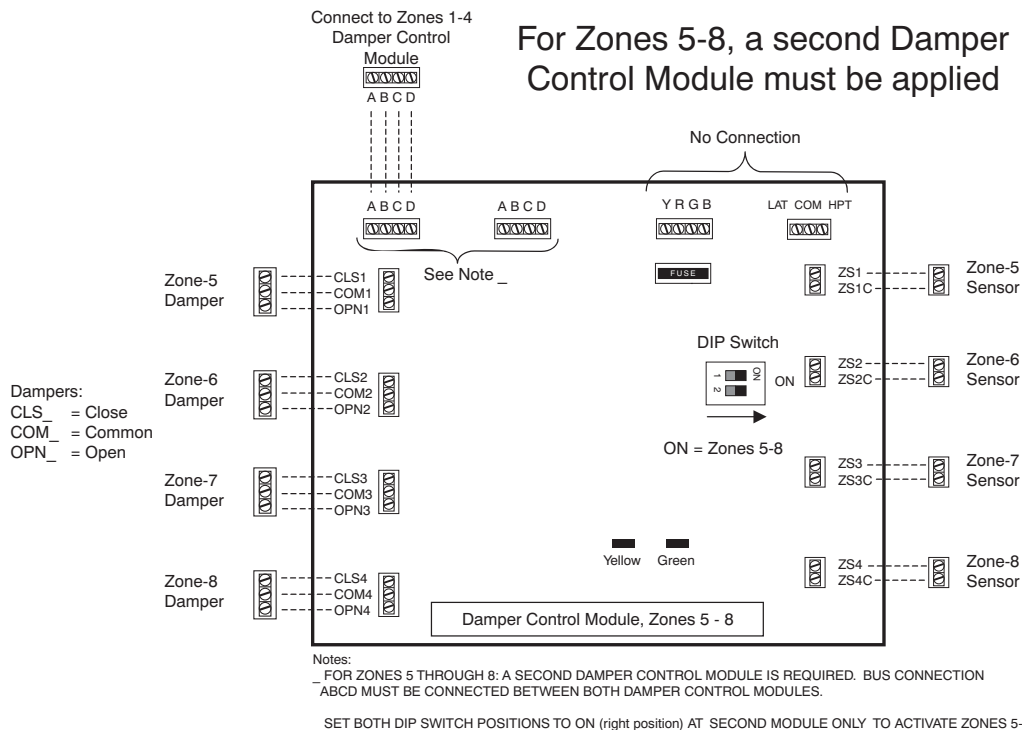
connect the Master Zoning Wall Control, Smart Sensor(s), variable-speed indoor unit and 2-speed communicating outdoor unit (if applied). If more than four zones are required (up to 8 zones maximum), see Step 6 and Fig. 10 for additional Damper Control Board Setup for Zones 5-8.



### Zoning System Wiring Diagram Zones 1 - 4

Fig. 9 - System Wiring

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### Zoning System Wiring Diagram Zones 5 - 8

Fig. 10 - Additional Damper Control Board Setup for Zones 5 - 8

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## VENTILATOR WIRING

The Evolution® Damper Control can control a Carrier Heat Recovery Ventilator or Energy Recovery Ventilator (HRV / ERV). Connect the four wires from the ventilator control board (see ventilator installation instructions for details) to the connector labeled YRGB. This label identifies the color of the wire to match the ventilator wire colors (Y=yellow, R=red, G=green, B=blue or black). If you have two Evolution® Damper Controls, connect the ventilator to the control for zones 1 through 4.

## LEAVING AIR TEMPERATURE / HEAT PUMP TEMPERATURE (LAT / HPT) SENSORS

These inputs on the Evolution® Damper Control are used only for diagnostic purposes and NOT required for regular use. Traditionally, the LAT/HPT sensors were required for temperature and equipment monitoring. The Evolution® Zoning System does not require these because the Evolution® Connex™ wall control algorithms will perform temperature and airflow management without the use of these sensors. If desired, one or both sensors may be used to monitor leaving air temperature and/or indoor coil air temperature. Consideration and/or flexibility will now permit using one of these sensors in the return air duct giving the dealer an option to view both entering and leaving air temperature at the Evolution® Connex™ wall control. If applied, connect sensors to the LAT / HPT terminals (See Fig. 9, System Wiring, for connection to the Evolution® Damper Control). LAT is monitored by both AC and HP systems. LAT and HPT are both monitored **only** in HP systems.

To install - Locate the LAT sensor in the main supply trunk after the heating and cooling coil and before the first branch. The LAT sensor is radiant shielded to prevent heat from affecting correct air temperature.

1. Drill a 1/4 inch hole at the location in the supply trunk where the sensor will be installed.
2. Insert the sensor in the hole and use it as a template to mark the two mounting holes.
3. Drill two 1/16 inch holes to accept #6 screws through pre-drilled holes in the duct temperature sensor backplate.
4. Use two #6 sheet metal screws to mount the duct temperature sensor to the unit.
5. Connect the sensor to 2-conductor wire using the provided wire nuts.

The HPT sensor (in heat pump applications) measures the temperature of the air leaving the indoor coil. The sensor is installed downstream of the indoor coil, but before the electric heaters. It can be installed through the wall of the fan coil or may be located entirely inside the fan coil near the blower inlet. Anchor firmly in place with cable ties so that it cannot interfere with the blower wheel (See Fig. 9).

## LED INDICATORS

Under normal operation, the Yellow and Green LEDs will be on continuously (solid). If the Evolution® Damper Control does not receive communications with the Evolution® Connex™ Wall Control, the Green LED will **not** be on. If there are faults present, the Yellow LED indicator will blink a two-digit status code. The first digit will blink at a fast rate, and the second at a slow rate.

| STATUS CODE | DESCRIPTION           |
|-------------|-----------------------|
| 16 =        | Communication Failure |
| 24 =        | Damper Fuse Failed    |
| 45 =        | Board Failure         |
| 46 =        | Low Input Voltage     |

## FUSE

A 1A automotive type fuse is used to protect the Evolution® Damper Control from over current on the damper drive outputs. If this fuse fails, the damper wiring should be inspected for shorts. Also, no more than five damper motors should be connected to a single damper output. The fuse should always be replaced with an identical 3A automotive type.

## Step 6 — Additional Damper Control Board Setup

If you have more than four zones, a second Evolution® Damper Control must be used and both dip switch settings on the second board supporting zones 5 through 8 must be moved to the right. The ABCD bus connector must be wired between both Evolution® Damper Controls.

## Step 7 — Transformer Requirements

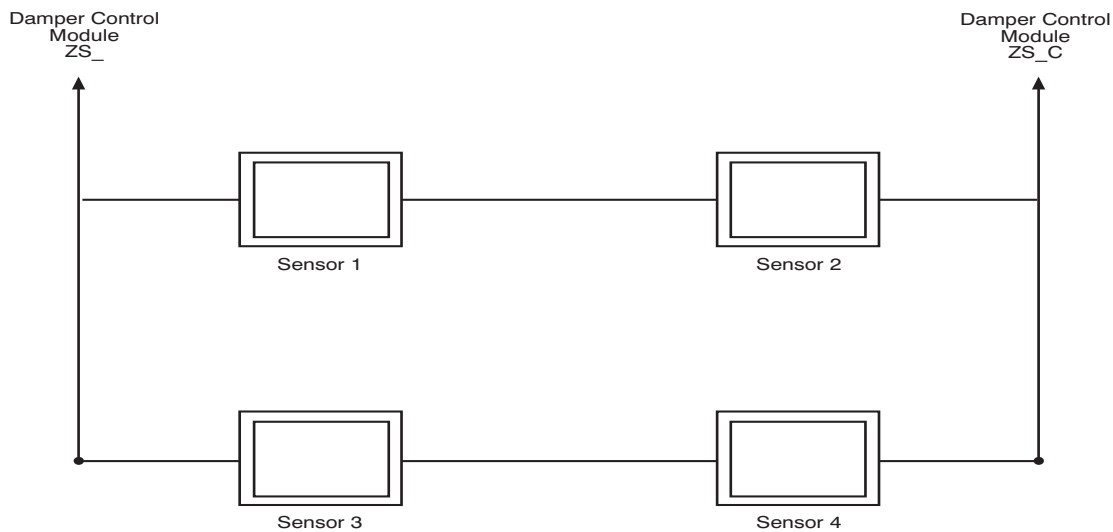
The Evolution® Zoning System has a lower power draw than the system transformer from previous controls. It also drives only two zone damper outputs at a time. As a result, up to eight zones each with up to five dampers, plus a smart sensor, can be handled without increasing the size of the system transformer or adding a second zoning transformer.

Use of the transformer provided in the furnace or fan coil is recommended without change in all zoning applications except those having a System Access Module (SAM). The SAM requires a separate transformer.

For those who still want more transformer capacity, a 60 VA system transformer may be used in place of the supplied 40 VA part.

## Step 8 — System Start-up

Follow the system start-up process outlined in the Evolution® Connex™ wall control Installation Instructions for details.



**Fig. 11 - Remote Room Sensor Averaging 4-Sensor Application (series - parallel)**

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## TROUBLESHOOTING

### **Evolution® Connex™ Wall Control does not power up:**

1. Recheck the wiring to the ABCD connector on all devices. Make sure all colors match for every terminal.
2. Make sure power is applied to the indoor unit, and the Yellow and Green LEDs are lit on the Evolution® Damper Control.
3. Check for 24 VAC between the C and D terminals at the Evolution® Connex™ wall control terminal block.
4. Check the fuse at the indoor unit circuit board, and the Evolution® Damper Control.

### **Evolution® Connex™ Wall Control display says “Indoor Unit Not Found:”**

1. Recheck the wiring to ABCD on all devices. Make sure all colors match for every terminal.
2. Press the side button at the Evolution® Connex™ wall control to try again.
3. Check for power to the indoor unit.
4. Disconnect all ABCD connections from every device and only reconnect the Evolution® Connex™ wall control to the indoor unit. If the indoor unit is identified by the wall control, then another device on the ABCD connection may be at fault. Reconnect each device’s ABCD connection one at a time and perform a Re-Install from the Service Menu after each connection is made. If one or more devices are not found after reconnecting the last device, the last device may be suspect.
5. If the ABCD connection only contains an indoor unit and an Evolution® Connex™ Wall Control, then the wiring, indoor unit control board, or Evolution® Connex™ Wall Control may be at fault.

### **Evolution® Connex™ Wall Control display says “Outdoor Unit Not Found” when applied with a two-speed communicating outdoor unit:**

- Recheck the wiring to the ABCD connector on the outdoor unit. Make sure all colors match for every terminal.

### **Evolution® Connex™ Wall Control cannot find Zones 5 - 8:**

1. Make sure zone module 5 - 8 has the dip switches set to the far right.
2. Recheck the wiring to the ABCD connections.

### **Evolution® Connex™ wall control can find zones 5 - 8, but not 1 - 4:**

1. Make sure zone module 1 - 4 has the dip switches set to the far left.
2. Recheck the wiring to the ABCD connections.

### **Some zones do not provide enough comfort (a noticeable difference exists between the actual room temperature and operating set point, or equipment does not turn on):**

- The zone airflow limit may be set too low. Perform the zone airflow limit checkout procedure. See the Evolution® Connex™ wall control Installation Instructions for details.

### **Some zones provide too much airflow and are noisy:**

- The zone airflow limit may be set too high. Perform the zone airflow limit checkout procedure. See the Evolution® Connex™ wall control Installation Instructions for details.

### **Zone dampers do not move:**

1. Check the fuse located on the Evolution® Damper Control. If the fuse is failed, check the damper wiring and inspect for shorts. No more than five damper motors should be connected to a single damper output. The fuse should be replaced with an identical 3A automotive type.
2. Use the System Checkout procedure (refer to the Installation Instructions) to test the zoning dampers and to verify that the correct set of dampers is opening for each zone.
3. Dampers may be powered directly—for testing purposes only—by connecting 24VAC directly across Com and Open, or Com and Close. The damper should open or close, based on which input is being powered. This will rule out the damper.

