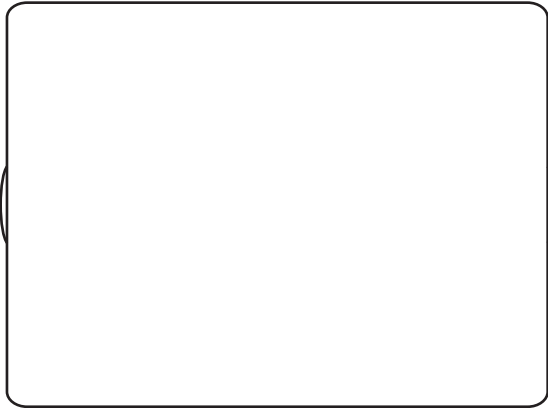


SYST0101ZP Ion™ Damper Control Installation and Start-Up Instructions




A970401

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 Ion™ System Zoning Design Guide for more information on specifying and designing zoning systems.

This instruction covers the physical installation and start up of the Ion™ 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).

• **NOTE:** The Ion™ Zoning System IS NOT compatible with all ICP communicating indoor equipment. For example, (F,G)9MV and (F,G)8MV two-stage, communicating gas furnaces are NOT compatible with the Ion™ Zoning System. See the Ion™ System Control product data for more information.

• **NOTE:** Only use modulating dampers provided by ICP for use with the Ion™ Zoning System. Dampers provided by other companies are NOT compatible with the Ion™ Zoning System.

• **NOTE:** Observer® System accessories, except for certain dampers (see damper list), are NOT compatible with the Ion Zoning System.

Use the Observer® Zoning System, or equivalent, for non-compatible indoor units, such as non-communicating indoor units, or the (F,G)9MV and (F,G)8MV gas furnaces. The Observer® Zoning System may also be used in retrofit applications where it is impractical to change existing zone dampers.

• Install the Ion™ System Control and Remote Room Sensors in non-condensing areas with ambient temperatures between 32°F and 120°F. Install dampers and the Ion™ 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. See the Ion Zoning System Design Guide for more information.

• **DO NOT USE** a bypass damper with the Ion™ Zoning System. Addition of a bypass will cause improper operation. Airflow management will be performed by the Ion™ System Control algorithms. The Ion™ System Control will monitor the system and will maintain proper airflow through the heating / cooling equipment.

INTRODUCTION

The Ion™ 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 Ion™ 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 Ion™ 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, modulating zone damper to control the air supplied to it and a zone sensor to sense temperature in each zone. There are two types of zone sensors available and may be used in combination:

• Ion™ System Control (p/n SYST0101CW) — 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 may be used to sense the Zone 1 temperature. This can give the installer some flexibility in locating the Master Ion™ System Control wall control to another area.

- Remote Room Sensor (p/n SYSTXIIRRS01) — 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).

Be sure to select the desired sensor type for each zone. Zone sensors other than the Ion™ System Control must be purchased separately. Installation Instructions for these sensors are included with the sensor.

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 ION™ DAMPER CONTROL

All system wiring is run back to the Ion™ Damper Control. Select a location near the ICP communicating furnace or fan coil where wiring from the Ion™ System Control, each Remote Room Sensor, each damper actuator, and the equipment itself can come together easily.

The Ion™ Damper Control is approved for indoor use only and should never be installed with any of its components exposed to the elements. The Ion™ 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 Ion™ Damper Control, do not mount on plenum, ductwork, or flush against surface.

LOCATING ION™ SYSTEM CONTROL WALL CONTROL

The Ion™ System Control is the command center for the Ion™ 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 Ion™ Damper Control, the system automatically switches to using this sensor for Zone 1 and ignores the sensor within the Ion™ System Control. This arrangement allows the Ion™ System 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 Ion™ System Control also controls humidity functions. If the System 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 Ion™ 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 (when available) to replace the Remote Room Sensor with no wiring changes at a later date. The Ion™ System 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 Ion™ Damper Control, so its location is important.

NOTE: Wiring of the communications 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 communications bus connection:

DX+ — Green = Data A

DX- — Yellow = Data B

C — White = 24 VAC (Com)

R — 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 ION™ DAMPER CONTROL

The Ion™ 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 ION™ SYSTEM CONTROL

See the Ion™ System Control Installation Instructions for details.

NOTE: Improper wiring of the communications connector will cause the Ion™ 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.

Step 4 — Install Zone Dampers

NOTE: Only use modulating dampers provided by ICP for use with the Ion Zoning System. Dampers provided by other companies are NOT compatible with the Ion Zoning System.

Proper selection and sizing of dampers is very important for proper system operation. Be sure to consult the Ion™ System Control Product Data Sheet and Ion™ 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, except, avoid placing the actuator directly below the ductwork if condensation on or within the duct is expected. 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).

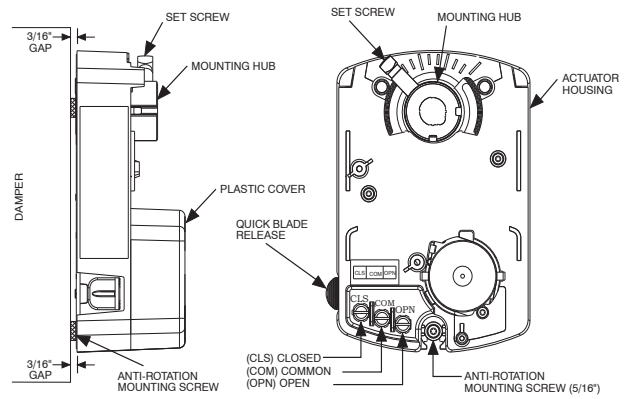


Fig. 1 - Damper 24VAC Connections

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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. **DO NOT** use dampers 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.

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).

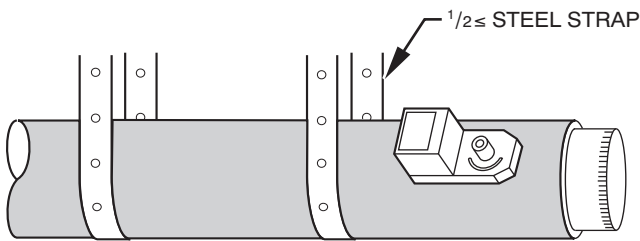


Fig. 2 - Insulated Round Metal Duct Work

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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). Again, be sure to position the damper actuator to avoid condensate from the ductwork dripping onto the actuator.

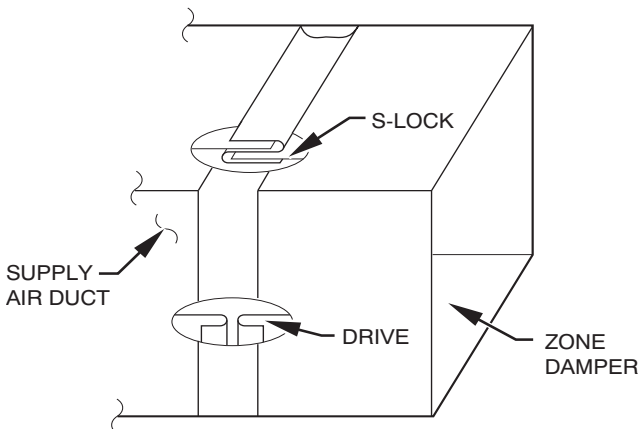


Fig. 3 - Rectangular Metal Ductwork

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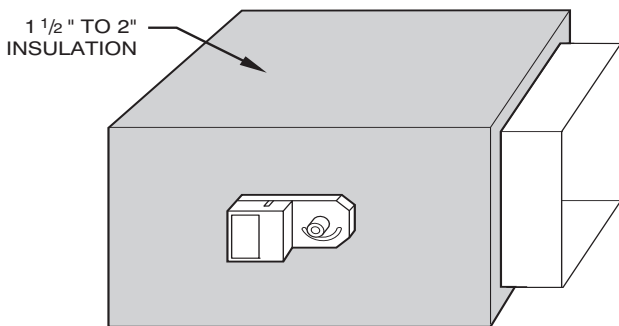


Fig. 4 - Insulated Rectangular Metal Ductwork

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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).

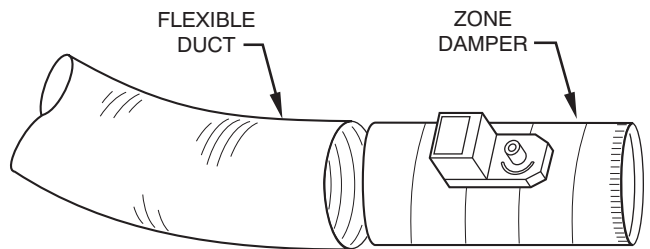


Fig. 5 - Round Flexible Ductwork

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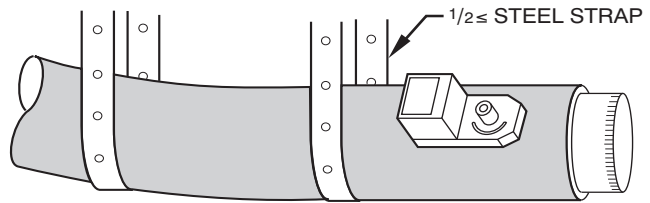


Fig. 6 - Insulated Round Flexible Ductwork

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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).

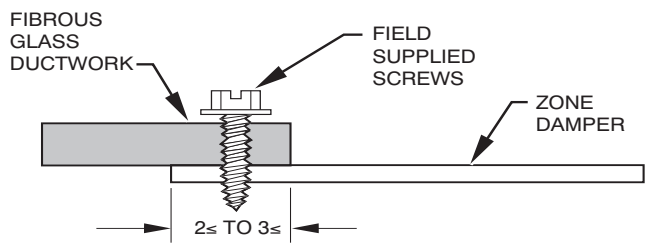


Fig. 7 - Rectangular Fibrous Glass Ductwork

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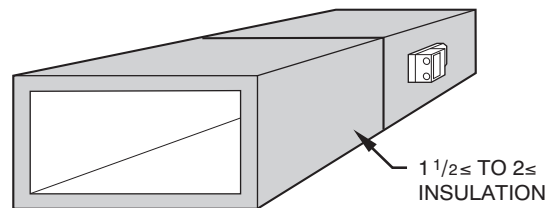
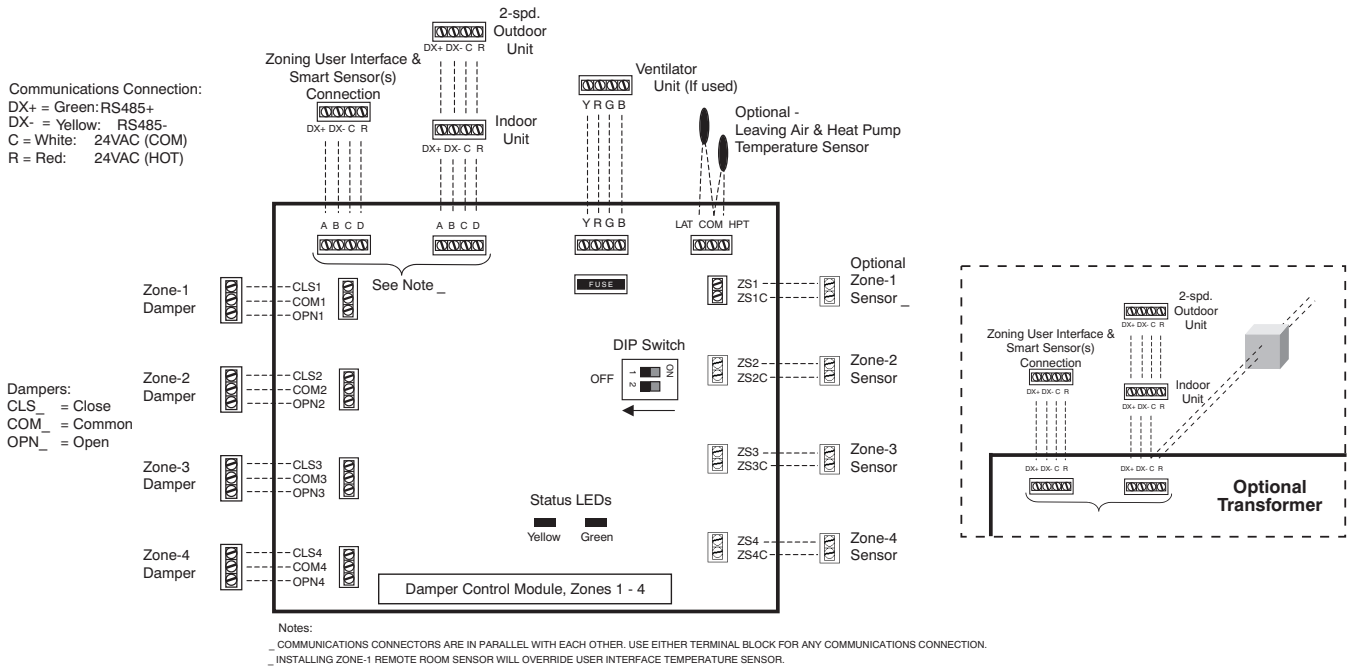


Fig. 8 - Insulated Rectangular Fibrous Glass Ductwork

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Step 5 — Final Wiring

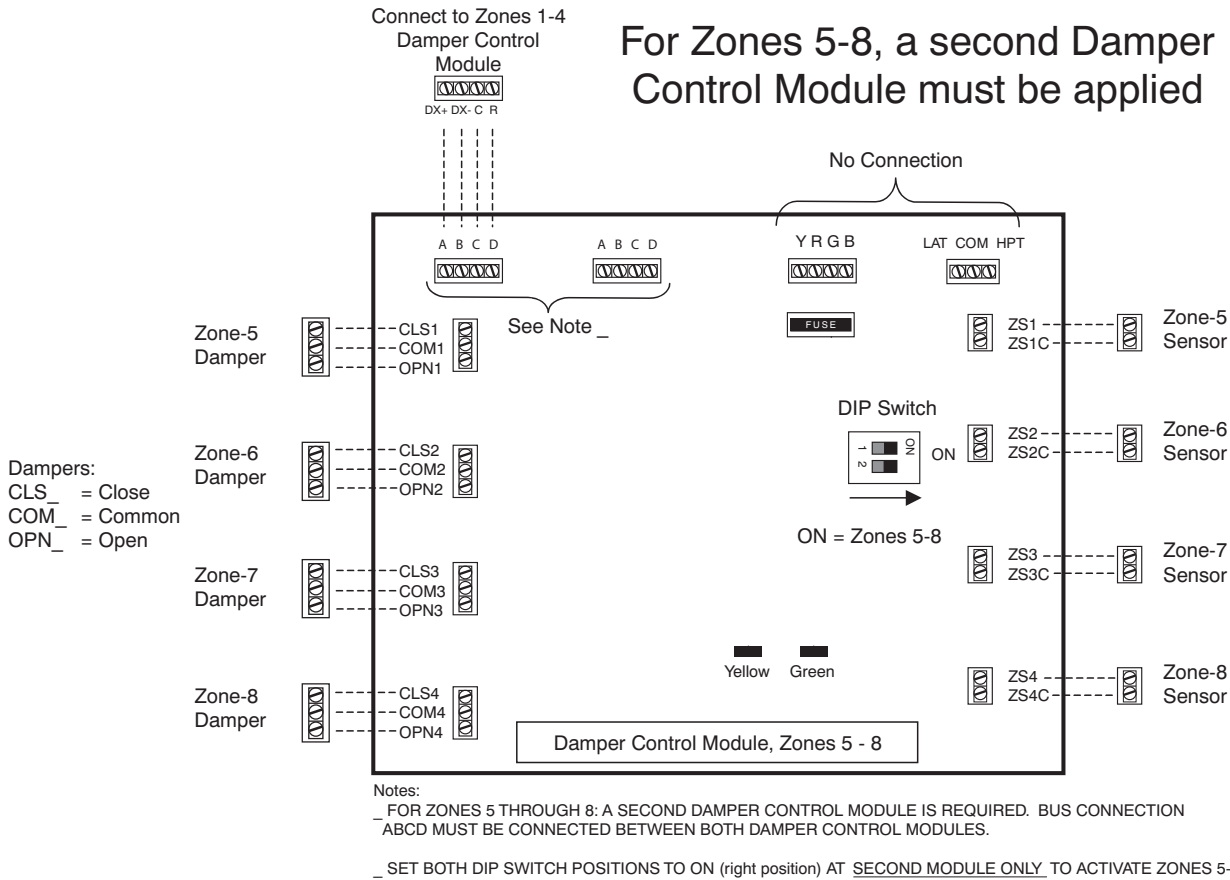
Bring all damper and sensor wires together at the Ion™ Damper Control. Make all system wiring connections as shown in Fig. 9. The two communications bus connections on the Ion™ Damper Control are in parallel with each other. Use either terminal block to connect the Ion™ System Control, Smart Sensor(s) (when available), 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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LEAVING AIR TEMPERATURE / HEAT PUMP TEMPERATURE (LAT / HPT) SENSORS

These inputs on the Ion™ 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 Ion™ Zoning System does not require these because the Ion™ System 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 Ion™ System Control. If applied, connect sensors to the LAT / HPT terminals (See Fig. 9, System Wiring, for connection to the Ion™ 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 Ion™ Damper Control does not receive communications with the Ion™ System 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 Ion™ 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 1A automotive type.

Step 6 — Additional Damper Control Board Setup

If you have more than four zones, a second Ion™ 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 communications bus connector must be wired between both Ion™ Damper Controls.

Step 7 — Transformer Requirements

The Ion™ Zoning System 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 (when available), 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.

For those who still want more transformer capacity, a 60 VA system transformer may be used in place of the supplied 40 VA part. Note that if more power for the communicating system is desired, use a field-installed, Class 2, 24VAC transformer. Remove the "C" and "R" power connections from the indoor unit communication bus connector. Connect the communication bus C and R connections at the Ion™ Damper Control to the field-installed transformer to power the communication system.

Step 8 — System Start-up

Follow the system start-up process outlined in the Ion™ System Control Installation Instructions for details.

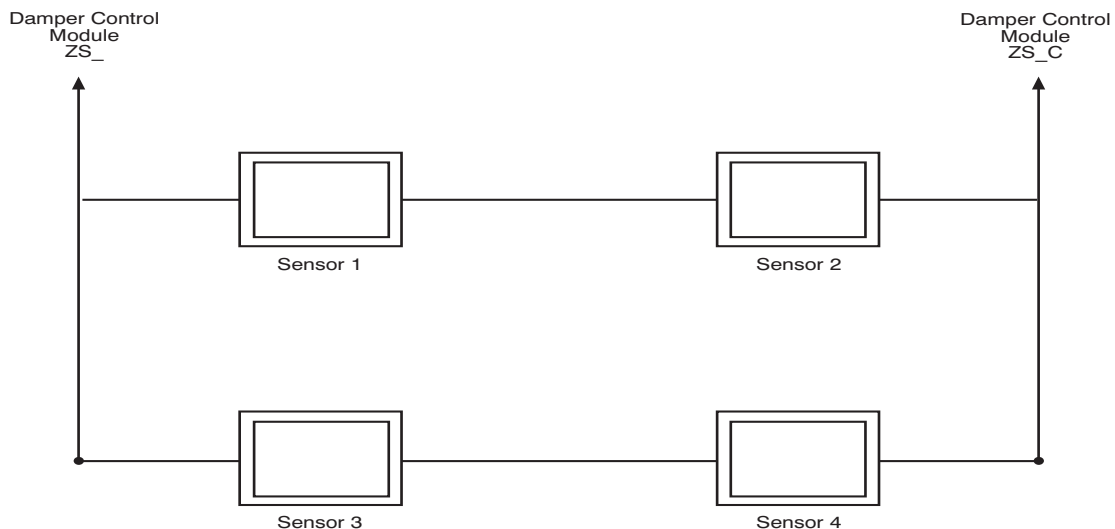


Fig. 11 - Remote Room Sensor Averaging 4-Sensor Application (series - parallel)

TROUBLESHOOTING

Ion™ System Control does not power up:

1. Recheck the wiring to the communications 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 Ion™ Damper Control.
3. Check for 24 VAC between the C and R terminals at the Ion™ System Control terminal block. See the Transformer Requirements section if load issues on the indoor unit transformer is suspected.
4. Check the fuse at the indoor unit circuit board, and the Ion™ Damper Control.

Ion™ System Control display says “Indoor Unit Not Found:”

1. Recheck the wiring to communications on all devices. Make sure all colors match for every terminal.
2. Press the side button at the Ion™ System Control to try again.
3. Check for power to the indoor unit. If a field-supplied transformer is used to power the communication, make sure that power source is connected and powered.
4. Disconnect all communications connections from every device and only reconnect the Ion™ System Control to the indoor unit (and field-supplied transformer, if applicable). If the indoor unit is identified by the system control, then another device on the communications connection may be at fault. Reconnect each device's communications 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 communications connection only contains an indoor unit and an Ion™ System Control, then the wiring, indoor unit control board, or Ion™ System Control may be at fault.

Ion™ System 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 communications connections.

Ion™ System 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 communications connections.

Zone dampers do not move:

1. Check the fuse located on the Ion™ 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 1A 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.

