

Zonex Systems  
**Intelligent Fresh Air Ventilator**  
Installation Instructions



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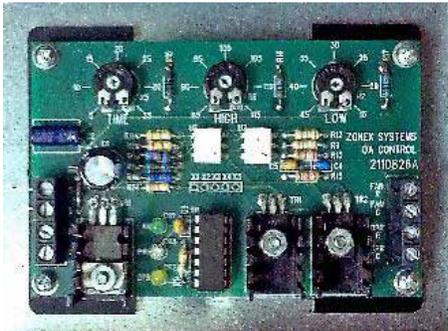
Part # IFAV  
Rev. 10/16/2014

## INTRODUCTION

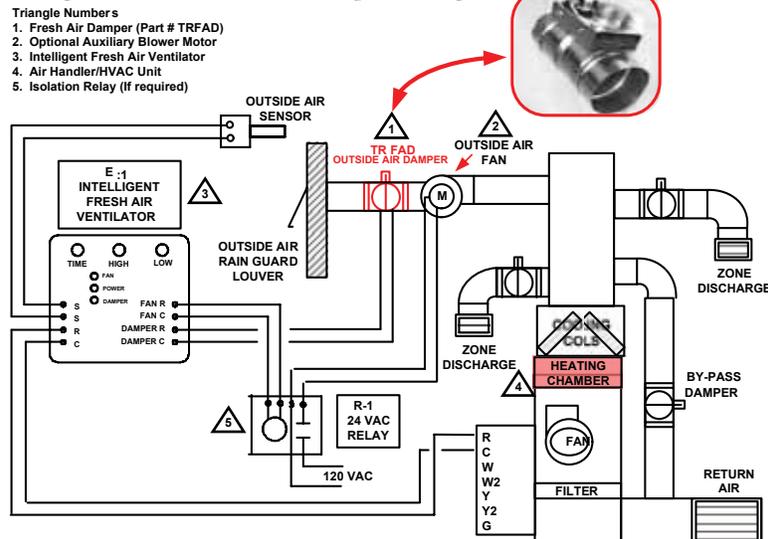
The Zonex Systems Intelligent Fresh Air Ventilator (PART # IFAV) is a fresh air ventilation controller designed to meet both ASHRAE 62.2 ventilation requirement and provide needed strategy to meet Energy Star fresh air demand within a 24-hour operations. This is accomplished through the Intelligent Fresh Air Ventilator's sophisticated software that monitors run time and uses outside air temperature to determine when fresh air operation occurs. Insuring proper indoor air quality standards per ASHRAE 62.2 and Energy Star.

It is recommended that the intake air hood be an open metal type with a 1/4" screen. The fresh air intake should be located away from dryer or furnace vents, driveways, trash area, and pool equipment. If the application is in a cold climate, locate the fresh air intake above snow line. Verify local code requirements for your location to insure you are in compliance. In most applications, a 6" to 8" air intake duct will be used with a Zonex Systems Fresh Air damper (Part# TRFAD06, TRFAD07, or TRFAD08). This damper is power open spring closed and can keep unwanted outside air from entering the system. In some applications, a secondary fan will be used to bring in outside air, in these applications; fan and air intake duct should be sized together.

(Part # IFAV)



Intelligent Fresh Air Ventilator Concept Drawing



## INTELLIGENT FRESH AIR VENTILATOR OVERVIEW

Zonex Systems Intelligent Fresh Air Ventilator (PART # IFAV) has three adjustable functions built into the controller. Time, High and Low potentiometers are on the controller and allow the controller to be field configured for each application. An outside air sensor is provided with the Intelligent Fresh Air Ventilator in order to provide outside air lockout when outside air is above or below High and Low settings. Outside Air Sensor provides Intelligent Fresh Air Ventilator with the ability to lockout fresh air operation until the outside air temperature has returned to desired temperature. In order to meet requirements for Energy Star, lockout time is tracked and once temperature has returned to desired range, the Intelligent Fresh Air Ventilator will run using stored time and current demand until all fresh air time requirements have been met. If lockout time exceeds point between lockout and demanded fresh air in a 24-hour period, the Intelligent Fresh Air Ventilator will run the balance of 24-hour period in order to meet fresh air demand.

**Time:** Time refers to the number of minutes each hour controller will call for fan and damper operation (If set for 20, then fan and damper will be energized 20 minutes out of each hour). Time is adjustable from 10 to 40 minutes each hour, and will be set based on fresh air requirements as set by ASHRAE 62.2. Control is factory set for 25 minutes.

**High:** The High potentiometer is used to lock out fresh air when the outside air temperature is too high. This feature provides the builder and homeowner the ability to lock out hot air from entering the house when outside air temperature is too high. High limit is adjustable from 85 to 115°. Control is factory set for 100°

**Low:** The Low potentiometer is used to lock out fresh air activity based on outside air temperature being too low. This feature provides the builder and homeowner with the ability to lock out cool air from entering the house when outside air temperature is too low. Low limit is adjustable from 15 to 45°. Control is factory set for 30°

**Outside Air Sensor (OAS):** Outside Air Sensor

# TYPICAL INSTALLATION METHODS

## INSTALLATION METHOD #1

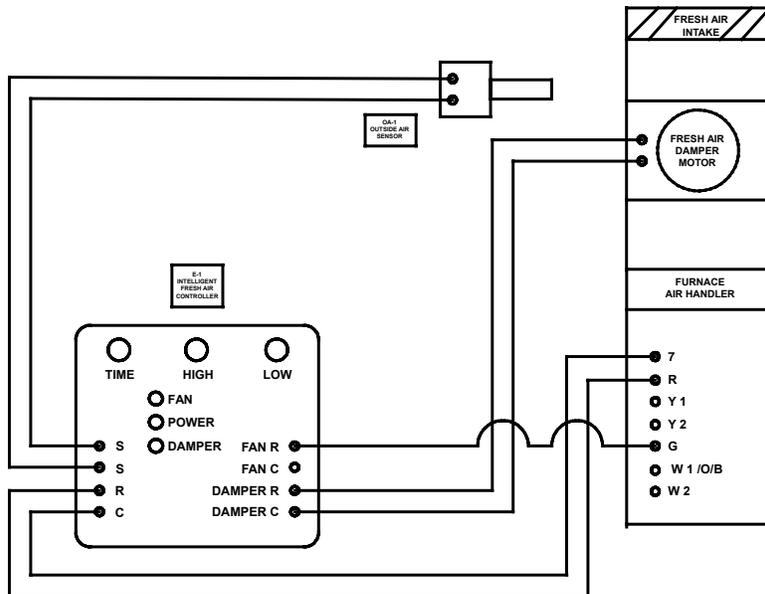
### Air Handler/Furnace Blower with electronic fresh air damper (Part # TRFAD)

This application uses the air handler/furnace blower and a fresh air damper to provide fresh air into the return of the air handler/furnace system. The unit transformer can be used to power this installation method and will power the Intelligent Fresh Air Ventilator (PART # IFAV), blower motor and fresh air damper. For this application, an outside air duct is installed from the return air plenum to an outside air intake. A fresh air damper (part # TRFAD) is installed in the outside air duct.

#### Wiring

1. Wire R and C of Intelligent Fresh Air Ventilator to R and C of air handler/furnace
2. Wire OAS Sensor to S S terminals
3. Wire Damper R and C to fresh air Damper.
4. Wire Fan R to G terminal of air handler/furnace. When R terminal of Intelligent Fresh Air Ventilator is energized, it will provide fan call at air handler/furnace.

Refer to Drawing 2



Drawing #2

## INSTALLATION METHOD #2

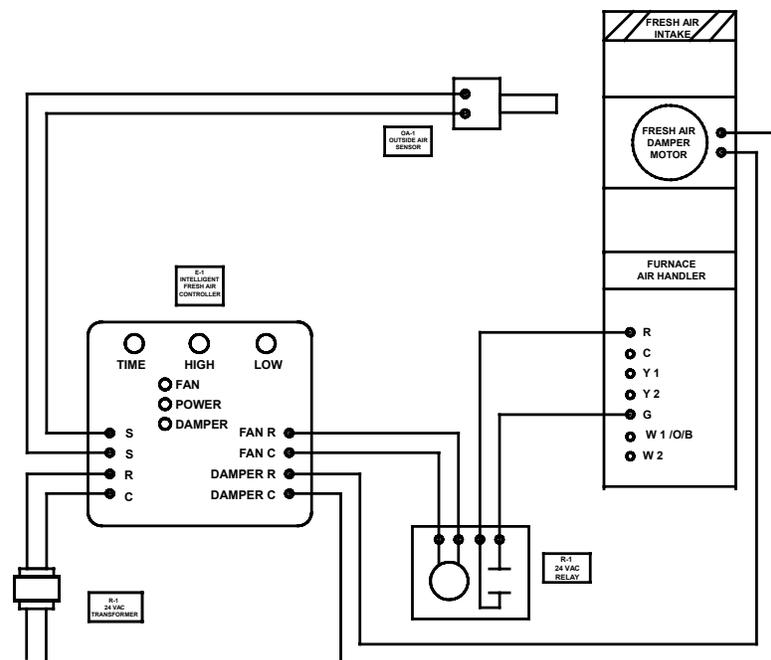
### Installation using an Independent 24-volt 40 va. Transformer to control Air Handler/Furnace Blower with Fresh Air Damper

This Application is used when the Air Handler/Furnace Transformer is too small to power Intelligent Fresh Air Ventilator (PART # IFAV) and FAD damper. For this application, an outside air duct is installed from the return air plenum to an outside fresh air intake. A fresh air damper (part # TRFAD) is installed in the outside air duct and wired to the Damper outputs R and C of the Intelligent Fresh Air Ventilator. A 24 volt single pole relay is required for this application. Isolating the Intelligent Fresh Air Ventilator from the 24-volt control voltage of the Air Handler/Furnace.

#### Wiring

1. In this application, an independent transformer is wired to R and C of the Intelligent Fresh Air Ventilator.
2. Wire OAS Sensor to S S terminals
3. Wire damper outputs R and C are wired to the fresh air damper
4. Wire fan R and C to the coil of relay (24-volt single pole relay).
5. Wire R from air handler/furnace to one side of relay contact points
6. Wire G from air handler/furnace to other side of contact points of relay.

Refer to Drawing #3



Drawing #3

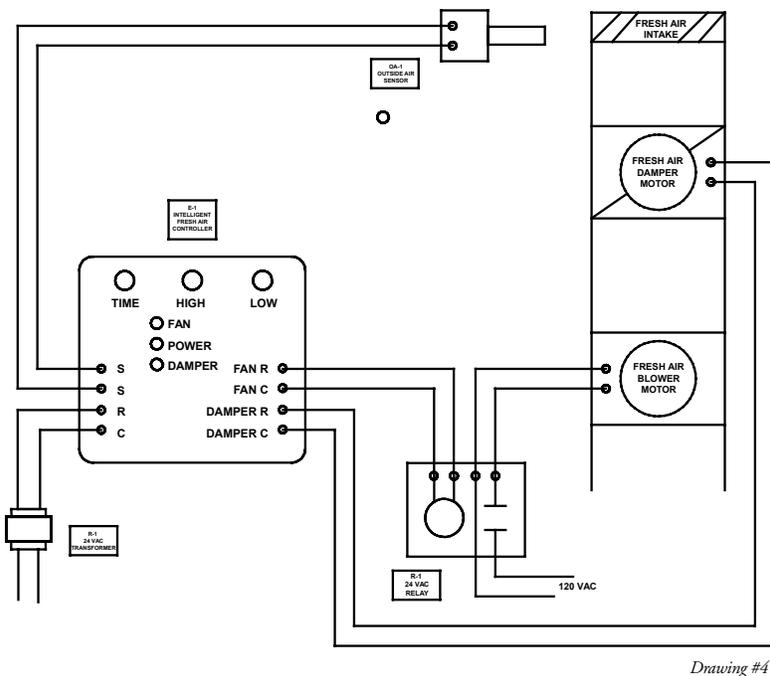
### INSTALLATION METHOD #3

#### Independent Fan, Fresh Air Damper and Independent Transformer

For this application an outside air damper and secondary blower motor is used to introduce outside air into the supply plenum. Install outside air duct from supply plenum to outside air intake. Install fresh air damper in outside air duct and install secondary blower motor in fresh air duct. A 24-volt single pole relay is needed to switch power for fan motor, as motor voltage will be greater than 24 volts.

#### Wiring

1. Wire independent transformer to R and C of the Intelligent Fresh Air Ventilator.
2. Wire OAS Sensor to S S terminals
3. Wire fresh air damper from Damper R and C outputs to fresh air damper (part #TRFAD)
4. Wire Fan R to one side relay coil
5. Wire Fan C to second side relay coil
6. Wire input side of one leg of blower fan to relay contact
7. Wire output side of relay to blower fan
8. Wire Second leg of blower power to blower motor



### SEQUENCE OF OPERATIONS

When the Intelligent Fresh Air Ventilator is energized, the controller will memorize the TIME setting, number of minutes to run each hour and subtract this time from sixty minutes. The balance of the hour will remain off.

Each minute the OAS sensor is checked and compared to the HIGH and LOW setting. If OAS temperature is within the desired range as set by HIGH and LOW setting, the Intelligent Fresh Air Ventilator will energize fan and damper outputs for TIME setting set on control

### SEQUENCE OF OPERATIONS

If the OAS temperature exceeds HIGH or LOW settings, the Intelligent Fresh Air Ventilator will lockout fresh air operations and track run minutes not used due to lockout. These minutes will be stored and used once the OAS temperature returns to HIGH and LOW limit ranges. Make up time will run with the next run cycle and will run continuously until all demanded time, stored and normal operation, have been used.

If based on HIGH and LOW limit ranges the OAS temperature does not return to desired range, the Intelligent Fresh Air Ventilator will use the TIME setting to calculate how much time is needed to run in order to meet the 24 hour fresh air demand for your application.

*Example* If time is set for 20 minutes and high limit is set for 100 with low set for 40, then the Intelligent Fresh Air Ventilator will run for 20 minutes of each hour.

If time is set for 20 minutes and OAS temperature is above 100 degrees, the controller will lockout operation and store 20 minutes for each hour OAS temperature is above 100 degrees. If the OAS temperature drops to less than 100 degrees, the Intelligent Fresh Air Ventilator will energize outputs to run off stored minutes while also running scheduled run time until all makeup and normal operation minutes have been used.

If OAS temperature does not return to set range temperature, the Intelligent Fresh Air Ventilator will calculate run time needed, based on TIME setting range, to meet Ashrae 62.2 and Energy Star 3 requirement and once balance point is reached, energize outputs to insure fresh air requirement is met. If Time set point is 20 minutes, and the controller has been locked out on HIGH or LOW limit for 16 hours, then the controller will energize for the next 8 hours to make up stored time and run normal demand time to meet 24-hour requirements.

Set TIME POT for 20 minutes for 50 CFM house.

When OAS temperature exceeds HIGH or LOW pot set point (ex. 100 degrees) outputs will be off, damper is closed and fan is off. Off operation, internal timer will start storing off hours. When off hours equal 16, fan will energize and damper will open. The Intelligent Fresh Air Controller will operate continuously for the next 8 hours to make up both stored hours and current demand hours.

Set TIME POT for 30 Minutes for 75CFM house.

When OAS temperature exceeds HIGH or LOW pot set point (ex. 100 degrees) outputs will be off, damper is closed and fan is off. Off operation, internal timer will start storing off hours. When off hours equal 12, fan will energize and damper will open. The Intelligent Fresh Air Controller will operate continuously for the next 12 hours to make up both stored hours and current demand hours.

Set Time Pot for 40 minutes for 100 CFM house.

When OAS temperature exceeds HIGH or LOW pot set point (ex. 100 degrees) outputs will be off, damper is closed and fan is off. Off operation, internal timer will start storing off hours. When off hours equal 8, fan will energize and damper will open. The Intelligent Fresh Air Controller will operate continuously for the next 16 hours to make up both stored hours and current demand hours.

Note: The above time settings and airflows are based on 150 cfm of air being provided for the system.

## VENTILATION NEEDED

Required ventilation per hour is established by ASHRAE 62.2. To calculate air requirement, the following formula can be used.

ASHRAE FORMULA to find Fresh Air Ventilation  
 House Size (Sq.Ft.) x .01 + ((#Bedrooms + 1) x 7.5) = CFM

*Example*            2000 (Sq.Ft) house with 3 bedrooms  
                           2000 x .01 + ((3 + 1) x 7.5)  
                           20 + (4x7.5)  
                           20 + 30 = 50 CFM

### Work Sheet

House Size \_\_\_\_\_ sq. ft.    Number of Bedrooms \_\_\_\_\_

\_\_\_\_\_ x .01 + ((\_\_\_\_\_ + 1) x 7.5) = \_\_\_\_\_ CFM required.

Sq. Ft.of House                      Bedrooms

### DETERMINING CFM OF A FRESH AIR DUCT

The following table provides airflow delivery information to introduce 150 cfm of outside air for a 6", 7", or 8" pipe. (Note: Each elbow adds 8' to the total duct length). Inlet screen and hood losses are included. .3" of negative static pressure was used for these estimates.

| Length of Outside Air Duct | Size of Duct | CFM |
|----------------------------|--------------|-----|
| 30 Feet                    | 6"           | 150 |
| 60 Feet                    | 7"           | 150 |
| 90 Feet                    | 8"           | 150 |

You can use the chart above for an estimate of fresh air provided from fresh air duct. However, more precise measurement can be found by using an airflow measuring tool, device by Nailor, etc.

### DETERMINING NEEDED RUN TIME

CFM required \_\_\_\_\_ (Transfer value from calculation above)  
 CFM Measured \_\_\_\_\_ (Transfer value from measurement above)

To determine run time needed, use the following formula.

Required CFM/CFM Measured x 60 minute

Example: Based on 150 CFM of air delivered thru the Fresh Air Duct

Required CFM 50                      Measured 150 CFM

50/150 x 60 = Runtime per hour                      .3 x 60 = 20 minutes  
 of runtime per hour

A time setting of 20 minutes will provide 50 CFM per hour at normal temperature range.

When the outside temperature exceeds HIGH or LOW pot settings, 20 minutes is in the 10 to 25 minute range. If the temperature stays out of range for 16 hours, the damper will open and fan will operate for next 8 hours. This will provide 8 x 150 CFM or 1200 CFM to match the 50 CFM x 24 hour (50 cfm x 24 hours = 1200) daily requirement.

## INTELLIGENT FRESH AIR RECOVERY

The Zonex Systems Intelligent Fresh Air Ventilator is designed to insure minimum fresh air requirements per ASHRAE 62.2 and Energy Star Ventilation. In order to meet minimum demands while using High and LOW temperature lockout, the Intelligent Fresh Air Ventilator is programmed to use three time range settings to control intelligent recovery. When TIME potentiometer is set and powered "ON" the controller will lock in TIME in minutes for intelligent recovery.

| Time  | Lockout Time | Intelligent Recovery |
|-------|--------------|----------------------|
| 10-25 | 16 Hours     | 8 Hours              |
| 26-32 | 12 Hours     | 12 Hours             |
| 33-40 | 8 Hours      | 16 Hours             |

### TIME SETTING

#### 10-25 Minutes

If Intelligent Fresh Air Ventilator is locked out due to HIGH or LOW Settings for 16 hours, Intelligent Recovery will occur and run fan and damper for the next 8 hours to insure minimum outside air requirement.

#### 26-32 Minutes

If Intelligent Fresh Air Ventilator is locked out due to HIGH or LOW Settings for 12 hours, Intelligent Recovery will occur and run fan and damper for the next 12 hours to insure minimum outside air requirement.

#### 33-40 Minutes

If Intelligent Fresh Air Ventilator is locked out due to High or LOW Settings for 8 hours, Intelligent Recovery will occur and run fan and damper for the next 16 hours to insure minimum outside air requirement.