

# ecojay

## ZONING GUIDE



Installation,  
Specification &  
Operation

p. 3

FULL STATUS  
DIGITAL  
DISPLAY

SPARE FUSE  
INCLUDED

QUICK  
SCREWLESS  
TERMINALS

p. 6

HEAT PUMP  
OR  
GAS/ELECTRIC  
THERMOSTAT

p.6

EXCLUSIVE "ECO"  
FOR ENHANCED  
CONTROL

STATUS LEDs  
SHOW HEAT  
OR COOL CALLS  
(No Voltmeter  
Required)

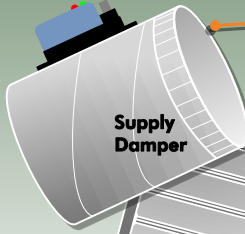
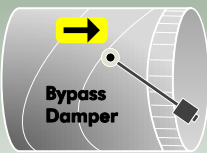
SCAN WITH  
SMARTPHONE FOR  
MORE INFO

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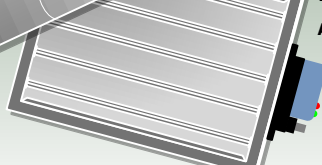
FRESH AIR  
CONTROL  
(4X ONLY)

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BYPASS  
(PRESSURE  
RELIEF)



Supply  
Damper

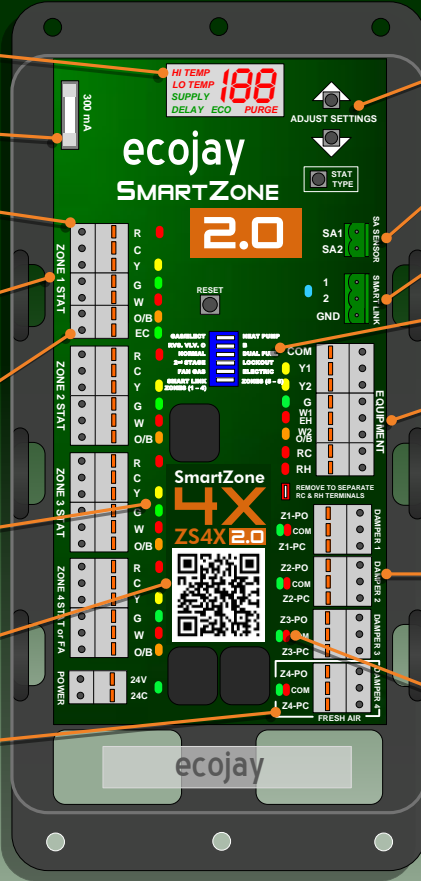


DAMPER SIZING  
& DUCT DESIGN

p. 8,9

ROUND AND  
RECTANGULAR  
DAMPERS

Available in over 60  
different sizes and  
configurations!



SIMPLE SETUP  
AND  
CONFIGURATION

p. 4,7

SUPPLY AIR  
TEMP SENSOR  
INCLUDED

p. 7

EXPANDABLE  
TO 8 ZONES

p. 12

DUAL FUEL  
CAPABILITY

p. 5

COMPATIBLE EQUIPMENT:  
GAS/FOSSIL FUEL/ELECTRIC  
or  
HEAT PUMP (Inc. DUAL FUEL)  
up to  
2-STAGE Cooling  
3-STAGE Heating

p. 4,5,7

USE ANY DAMPER  
2-WIRE or 3-WIRE  
(Power Open/Close,  
Spring Open,  
or Spring Close)

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STATUS LEDs SHOW  
DAMPER POSITION  
RED = CLOSED  
GREEN = OPEN

p. 7

SmartZone-4X (ZS4X-2.0) 4 ZONE  
SmartZone-2X (ZS2X-2.0) 2 ZONE

PLEASE REVIEW ENTIRE DOCUMENT BEFORE BEGINNING INSTALLATION

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(3265)

# SmartZone MODES & OPERATION

## EMERGENCY HEAT

► Emergency Heat can ONLY be operated by a heat pump thermostat connected to the ZONE 1 "W" thermostat terminal. SmartZone allows Gas/Electric or Heat Pump thermostats to be used on all zones with heat pump equipment.

► If ZONE 1 thermostat calls for Emer. Heat, the SmartZone system will be LOCKED into emergency heat. The compressor will NOT energize and only heating calls will be recognized from any zone other than ZONE 1.

► Only W1/EH and G will be allowed to energize while SmartZone is LOCKED into emergency heat. (ie. Compressor & cooling calls will be LOCKED OUT)

► All cooling calls from ZONES 2 thru 4 will be ignored and any heating call from these zones will be treated by the SmartZone system as Emer. Heat.

► To UNLOCK and take the system out of Emer. Heat, remove the Emer. Heat call at the ZONE 1 thermostat **AND** make a call for compressor heat or cooling from this thermostat.

## ECONOMY MODE

ECONOMY MODE (ECO) input on SmartZone allows the use of a switch, occupancy sensor, or dry-contact to keep Zones 2 thru 4 from making equipment calls. (i.e. Heat or Cool will not energize if only zones 2 thru 4 are calling while EC Input is energized) **Connect 24V and EC INPUT to set the SmartZone System into ECONOMY MODE. Only ZONE 1 will be able to make equipment calls. All other zone calls will open and close dampers as needed to take advantage of the active mode energized by the ZONE 1 thermostat. NO ADDITIONAL SETTINGS REQUIRED.**



## DUAL FUEL FOSSIL FUEL AUX. HEAT

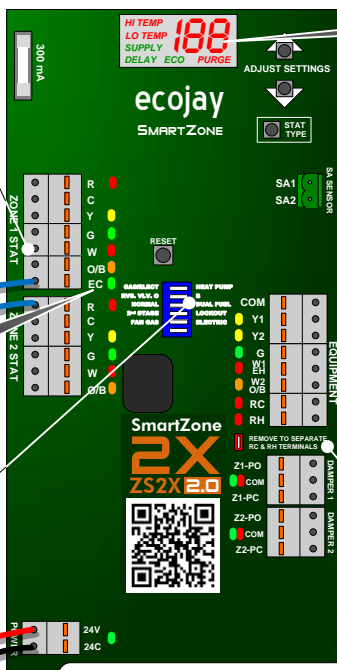
In DUAL FUEL Mode, the compressor(s) will not run when AUXILIARY HEAT is energized. SmartZone controls dual fuel so a "dual fuel kit" and HEAT PUMP THERMOSTATS are NOT required. GAS/ELECTRIC thermostats may be used with a heat pump system, however, use a Heat Pump stat for the ZONE 1 Thermostat to control EMERGENCY HEAT (Described above). Always install the heat pump evaporator downstream of the furnace, this prevents condensation in the heat exchanger during the cooling mode. SEE SmartZone Equipment Staging (p. 5) for more details about DUAL FUEL.

## TRANSFORMER SIZING

24VAC TRANSFORMER (NOT INCLUDED) MUST BE SIZED AND FUSED BASED ON THE SMARTZONE CONTROLLER, TOTAL DAMPERS AND THERMOSTATS

ECOJAY Device	POWER
SmartZone-4X	14 VA
SmartZone-2X	12VA
Power Open/Close Damper	3 VA
Spring Return Damper	10 VA
Typical Thermostat	2 VA

24 VAC  
TRANSFORMER



**EXAMPLE** Transformer Calculation:

**1 SMARTZONE-4X (14 VA)**  
**+ 4 POC DAMPERS (3 VA X 4)**  
**+ 4 THERMOSTATS (2 VA X 4)**  
**= 37 VA**

So, for this example of a basic 4-Zone system, a 40VA transformer with a 2 AMP Fuse can be used. SEE page 5 for more info about FUSE size.

# PRE-INSTALLATION CHECKLIST

## SMARTZONE PANEL

- Calculate minimum 24V transformer VA capacity (add VA requirement for SmartZone controller + # of thermostats + # & type of dampers) – see Transformer Sizing section this page.
- Check primary and secondary voltage for zoning transformer. Make sure separate transformer and circuit is use from equipment transformer.
- Select mounting location that provides space and easy path to run wires.

## THERMOSTATS

- Select location that provides easiest path to run wires.
  - Do not mount where exposed directly to air stream from supply air grills.
  - Do not mount where exposed to radiant heat from windows or skylights.
  - Do not use power stealing or triac models.
  - Gas/electric and/or heat pump stats can be used on heat pump equipment (heat pump stat is required on zone 1 only if emergency heat control is needed).
- NOTE: Use only gas/electric stats with gas/electric equipment.

## DUCT & DAMPERS

- Design all zones to balance the CFM evenly (each zone should be similar in size).
- Avoid creating small zones (< 20% of total capacity).
- Use proper excess (surplus) air-flow management including these techniques – bypass duct/damper, dump zone(s) or adjust dampers max close settings to allow leakage.
- Ecojay recommends the use of a bypass duct/damper that is large enough to accommodate the total system CFM capacity minus the CFM capacity of the smallest zone.
- REFER TO pages 8,9,10,11 for more information.

## HVAC EQUIPMENT

- Perform basic equipment check including compressor, refrigerant charge, blower, furnace, filter before installing or starting up SmartZone system.



**MORE INFORMATION AVAILABLE ONLINE - [ecojay.com](http://ecojay.com)**

## PURGE

A 3 minute PURGE of the supply air plenum is initiated during Opposing-Call Changeover. (Switching from Heat to Cool or Cool to Heat) During the PURGE, the fan will remain energized to purge existing supply air temperature and to allow equalization of hvac system pressures before energizing the opposing mode call. During the PURGE Mode, zone(s) calling for the opposite mode will have damper(s) closed. All other dampers (non-calling zone(s) and zone(s) calling for mode last energized) will remain open during PURGE Mode. During PURGE the digital display will count down the number of seconds left during purge time.

## TIME DELAY

Time DELAY is designed for equipment protection. After calls from all zones have been satisfied and the equipment is de-energized, a 3-minute Time DELAY will be completed before new thermostat calls will be processed. During the DELAY all dampers open and the equipment will NOT run. During DELAY the digital display will count down the number of seconds left during purge time if a new call is energized. **NOTE:** Although SmartZone will not energize the fan (or equipment) during DELAY the equipment being used may have a built in control that causes the fan to continue running.

## RC/RH JUMPER

The RC/RH Jumper is Factory Installed on the SmartZone Controller. If the equipment requires separate transformers for heat and cool, REMOVE the RC/RH jumper [JP2] below the EQUIPMENT connector on the right side.

**NOTE:** In the case of a Heat-Pump System, the RC/RH jumper should NOT be removed.

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Multi-function digits show supply temperature, cut-out temperatures (high and low), zone thermostat types, fresh-air time.

SUPPLY

Supply Air Temperature displayed. "--" on temp display = SAS disconnected.

PURGE

System is in PURGE mode for equipment changeover (Fan [G] and dampers continue to operate, Countdown timer on digits 180 sec.)

HI TEMP (ON)

HIGH TEMP LIMIT sensed, SmartZone Controller de-energizes equipment HEAT output for a minimum of 3 minutes (Fan [G] and damper outputs continues to operate)

HI TEMP (FLASHING)

Setting HIGH TEMP LIMIT – Press UP or DOWN Arrow Buttons to adjust the HIGH TEMP LIMIT (factory default: heat pump – 120° F, electric heat – 135° F, gas heat – 135° F)

LO TEMP (ON)

LOW TEMP LIMIT sensed, SmartZone Controller de-energizes equipment COOL output for a minimum of 3 minutes (Fan [G] and damper outputs continue to operate)

LO TEMP (FLASHING)

Setting LOW TEMP LIMIT – Press the UP or DOWN Arrow Buttons to adjust the LOW TEMP LIMIT (factory default 48° F)

DELAY

SmartZone Controller has satisfied all calls and will DELAY 3 min before initiating any additional calls. (Countdown timer on digits 180 sec. if call made)

ECO (ON)

EC input on Zone 1 is energized and system is in ECONOMY MODE. Only Zone 1 can initiate equipment calls; other zones will only open and close dampers as needed.

ECO (FLASHING)

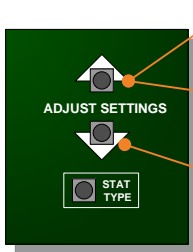
If ZONE 4 has been configured for FRESH AIR and FRESH AIR is being currently satisfied. FAN should be running and ZONE 4 (FA Damper) energized in the OPEN position

## SPECIFICATIONS

POWER	SmartZone-2X SmartZone-4X	14VA MAX (375 mA @ 24VAC) [2X = 12VA, 8X = 28VA] If multiple transformers are used in 8X system, the primary and secondary polarities must be the same for both transformers and on both ZS4X boards.
	SYSTEM	14VA + Stats (2VA ea.) + Dampers (3- 10 VA ea.)= Total Transformer Size
	PROTECTION	Integrated 5X20mm 300mA Fuse- One replacement also included. <b>(Field supplied transformer should also be fused)</b>
OUTPUTS	EQUIPMENT	<b>10 AMP @ 24VAC Contact Rating</b> RH – 24VAC HOT from Heating Transformer on Equipment (RED) RC – 24VAC HOT from Cooling Transformer on Equipment (RED) C – 24VAC COMMON from Transformer on Equipment (none) Y1 – 1 <sup>st</sup> Stage Compressor (YELLOW) Y2 – 2 <sup>nd</sup> Stage Compressor (YELLOW) G – Fan (GREEN) W1/EH – 1 <sup>st</sup> Stage Heat OR Emergency Heat (RED) W2/OB – 2 <sup>nd</sup> Stage Heat OR Reversing Valve (ORANGE)
	DAMPERS	<b>10 AMP @ 24VAC Contact Rating (40VA)</b> Power-Close / Spring-Open Dampers (10VA) Power-Open / Spring-Close Dampers (10VA) Power-Open / Power-Close Dampers (3VA)
	SmartLINK (COMM)	COMM – 3 Wire Communications to SmartLINK (BLUE) [Use Cat5 Cable ONLY]
	THERMOSTAT	<b>LABEL – DESCRIPTION (LED COLOR)</b> R – 24VAC HOT (RED) C – Common (NONE) Y – Compressor (YELLOW) G – Fan (GREEN) W – Heat OR Emergency Heat (RED) O/B – Reversing Valve (ORANGE) EC – Economy Input (GREEN) ← Zone ONE only
INPUTS	TEMPERATURE	<b>10K Type III Thermistor</b> SA Sensor – 4" Supply Air Temperature Sensor Stainless Steel Probe (Provided with each SmartZone)

# HIGH AND LOW LIMIT ADJUST

See EQUIPMENT STAGING below for more details. For protection, SmartZone will not allow the EQUIPMENT to run above or below these settable limits.



## SET HIGH TEMP LIMIT (CUT-OUT)

PRESS & release the ▲ "UP" arrow button when the display is showing SUPPLY temperature. The "HI TEMP" indicator will flash and the digits will show the currently set temperature. This high limit cut-out can be adjusted up or down using the ▲ ▼ buttons. See EQUIPMENT STAGING below for more details.

## AUX. HEAT CUT-IN

PRESS & HOLD the ▲ "UP" arrow button for 5 seconds when the display is showing SUPPLY temperature. When released the "HI LIMIT" and "DELAY" indicators will flash and the digits will show the currently set temperature (DEFAULT = 90, adjustable from 90 to 94 using ▲ ▼ buttons).

## SET LOW TEMP LIMIT (CUT-OUT)

PRESS & release the ▼ "DOWN" arrow button when the display is showing SUPPLY temperature. The "LO TEMP" indicator will flash and the digits will show the currently set temperature. This low limit cut-out can be adjusted up or down using the ▲ ▼ buttons. See EQUIPMENT STAGING below for more details.

**IMPORTANT NOTE:** Changing either the LOW or HIGH temp limit will also affect the staging cut-in and cut-out temperatures settings. Adjusting these can cause staging to occur sooner or later as needed. See EQUIPMENT STAGING below for more details about each scenario.



# AUTO CHANGEOVER

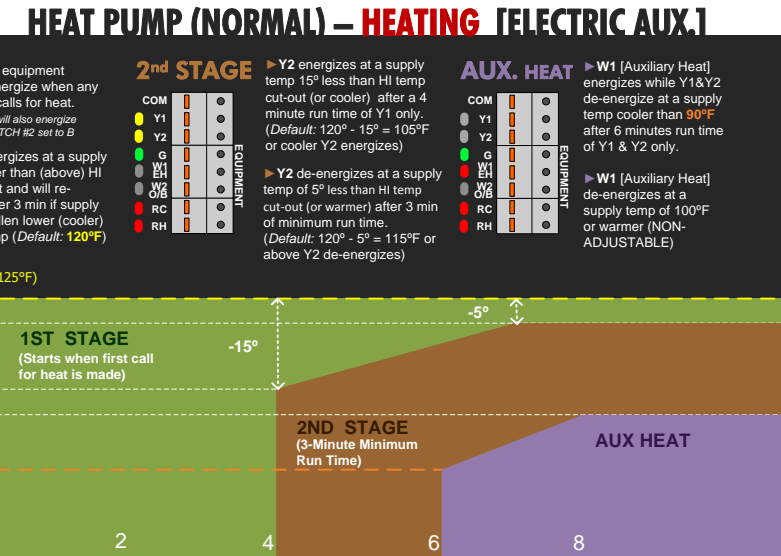
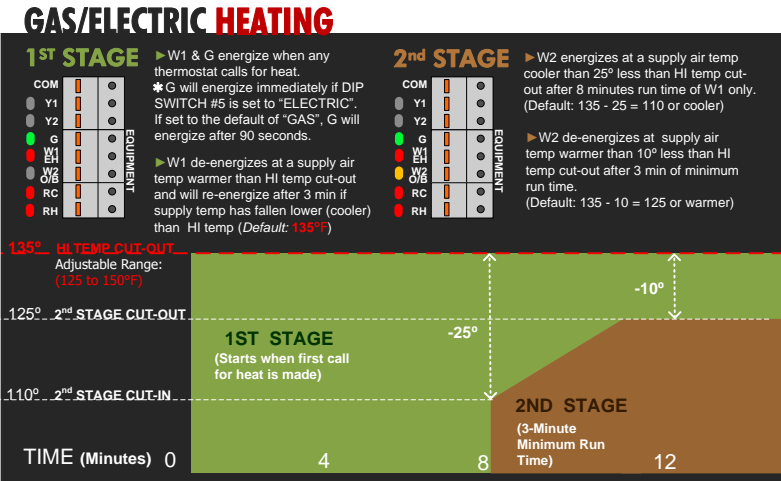
With the SmartZone system, it is possible to have a zone(s) calling for cool and another zone(s) calling for heat. These are called opposing calls. When the equipment has an active call running and SmartZone receives an opposing call from another zone(s), the existing active mode running on the equipment will be limited to a maximum run time of 15 minutes from the time the first opposing mode call was received. If the active mode does not satisfy the calling zone(s) in this 15 minute interval SmartZone will initiate a CHANGEOVER process de-energizing the active mode and initiating a 3 minute PURGE (see page 3 for more about PURGE). During PURGE, all dampers open during the previously active mode remain open and the fan remains energized to neutralize the supply air temperature before energizing the opposing call mode on the equipment CHANGEOVER process.

# SmartZone EQUIPMENT STAGING

The SmartZone controls equipment staging automatically based on time and supply air temperature. (This temperature is read by the SUPPLY AIR TEMP SENSOR – SEE previous page for proper installation) **NOTE:** Without this sensor installed, the SmartZone will NOT run 2<sup>nd</sup> stage or operate any dampers.

The charts in this section illustrate this correlation between TIME, TEMPERATURE, & STAGING (FACTORY DEFAULTS SHOWN IN CHARTS)

Time and temperature settings will vary according to the type of equipment SmartZone is configured for and the HI/LO temp limit settings used. Staging will occur ONLY when the minimum run-time and temperature range conditions are met. The factory default settings for temperature cut-in and cut-out are adjustable. (SEE HIGH and LOW LIMIT ADJUST section above)



## SYMPTOM

## POSSIBLE CAUSE

DISPLAY IS BLANK

- ▶ VERIFY OUTPUT OF TRANSFORMER INCLUDING CONNECTIONS TO PRIMARY, SECONDARY AND ZONE PANEL POWER CONNECTOR
- ▶ CHECK TRANSFORMER FUSE
- ▶ CHECK SMARTZONE FUSE (SPARE INCLUDED)
- ▶ CHECK FOR SHORT IN WIRING CONNECTED TO SMARTZONE (REMOVE THERMOSTAT, DAMPER, & EQUIPMENT WIRES)

DISPLAY READS "--"

- ▶ SUPPLY AIR TEMP SENSOR IS NOT CONNECTED TO SMARTZONE
- ▶ SUPPLY AIR TEMP SENSOR HAS A LOOSE CONNECTION
- ▶ DIP SWITCH # 6 IS SET TO "ZONE 5-8" → THIS IS ONLY FOR 8 ZONE APPLICATIONS
- ▶ SUPPLY AIR TEMP SENSOR IS DEFECTIVE

THERMOSTAT INDICATES CALL BUT EQUIPMENT TERMINALS NOT RESPONDING

- ▶ SMARTZONE IS IN "DELAY" OR "PURGE" - DISPLAY SHOULD BE COUNTING DOWN IN SECONDS TIME REMAINING (3 MIN)
- ▶ AN INCOMPATIBLE THERMOSTAT IS CONNECTED TO SMARTZONE (THERMOSTATS WITH A COMMON SHOULD BE USED)
- ▶ WIRING BETWEEN SMARTZONE AND EQUIPMENT COULD BE DAMAGED OR NOT SECURELY CONNECTED
- ▶ TRANSFORMER TO POWER SMARTZONE & COMPONENTS COULD HAVE INSUFFICIENT VA RATING
- ▶ PRIMARY POWERING SMARTZONE TRANSFORMER COULD BE BEYOND CAPACITY (USE DEDICATED CIRCUIT FROM BREAKER)

SMARTZONE EQUIPMENT INDICATES HEAT/COOL CALL BUT EQUIPMENT NOT ENERGIZING

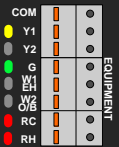
- ▶ RC/RH JUMPER MISSING OR INSTALLED ON ONLY ONE PIN
- ▶ EQUIPMENT TRANSFORMER NOT CONNECTED, SHORTED OR LOOSE CONNECTION (ALSO CHECK FUSE)
- ▶ SMARTZONE TRANSFORMER INSUFFICIENT VA (SEE PAGE 2)
- ▶ ECO MODE ENERGIZED: "ECO" WILL BE ILLUMINATED ON DISPLAY (SEE PAGE 2)
- ▶ SMARTZONE HAS DEFECTIVE EQUIPMENT RELAY (CALL FOR RMA VERIFICATION)

HEAT PUMP ONLY: SMARTZONE ENERGIZES COOLING WHEN ZONES CALL FOR HEAT (O/B DOESN'T ENERGIZE)

- ▶ "STAT TYPE" SETTING DOES NOT MATCH THERMOSTAT BEING USED (PRESS STAT TYPE BUTTON – PAGE 6)
- ▶ AN INCOMPATIBLE THERMOSTAT IS CONNECTED TO SMARTZONE (THERMOSTATS WITH A COMMON SHOULD BE USED)
- ▶ DIP SWITCH # 2 (REVERSING VALVE) SET TO OPPOSITE MODE "O" OR "B"
- ▶ WIRING BETWEEN SMARTZONE O/B TERMINAL AND EQUIPMENT COULD BE DAMAGED OR NOT SECURELY CONNECTED (CHECK VOLTAGE)

## HEAT PUMP (DUAL FUEL) – HEATING [GAS AUX.]

### 1ST STAGE

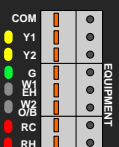


▶ Y1 and G equipment terminals energize when any thermostat calls for heat.

NOTE: B will also energize if DIP SWITCH #2 set to B

▶ Y1 de-energizes at a supply temp warmer than (above) HI temp cut-out and will re-energize after 3 min if supply temp has fallen lower (cooler) than HI temp (Default: 120°F)

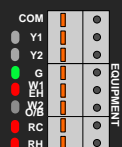
### 2nd STAGE



▶ Y2 energizes at a supply temp 15° less than HI temp cut-out (or cooler) after a 4 minute run time of Y1 only. (Default: 120° - 15° = 105°F or cooler Y2 energizes)

▶ Y2 de-energizes at a supply temp of 5° less than HI temp cut-out (or warmer) after 3 min of minimum run time. (Default: 120° - 5° = 115°F or above Y2 de-energizes)

### AUX. HEAT



▶ W1 [Auxiliary Heat] energizes AND Y1 & Y2 will de-energize at a supply temp cooler than 90°F after 6 minutes run time of Y1 & Y2.

▶ W1 [Auxiliary Heat] remains energized until all heat calls are satisfied or the supply temp gets warmer than "GAS/ELECTRIC" HI limit (Default: 135°F)

SUPPLY AIR TEMP (°F) DEFAULT Values

135° GAS AUX. HEAT HI TEMP CUT-OUT  
 \*\* Adjustable Range: (125 to 150°F)

Adjustable Range: (110 to 125°F)  
 120° HI TEMP CUT-OUT

115° 2nd STAGE CUT-OUT

105° 2nd STAGE CUT-IN

Adjustable Range: (90 to 94°F)  
 90° AUX. HEAT CUT-IN

TIME (Minutes) 0 2 4 6 8

1ST STAGE  
 (Starts when first call for heat is made)

2ND STAGE  
 (3-Minute Minimum Run Time)

\*\*NOTE: SET DIP SWITCH #3 to GAS/ELECT temporarily to adjust this HI LIMIT CUT-OUT. Make sure to set it back to HEAT PUMP when adjustment is complete.

GAS/ELECT	HEAT PUMP
RVB. VLV. 0	B
NORMAL	DUAL FUEL
LOCKOUT	LOCKOUT
3rd STAGE	3rd STAGE
PAIR BASH	PAIR BASH
SMART LINK	SMART LINK
ZONES (1-4)	ZONES (8-8)

AUX. HEAT  
 (Once AUX Heat has started in Dual Fuel mode, it will continue to run until all heat calls are satisfied.)

## COOLING ALL

SUPPLY AIR TEMP (°F) DEFAULT Values

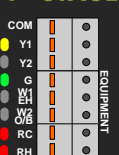
TIME (Minutes) 0 4 8 12

58° 2nd STAGE CUT-IN

52° 2nd STAGE CUT-OUT

Adjustable Range: (41 to 55°F)  
 48° LOW TEMP CUT-OUT

### 1ST STAGE

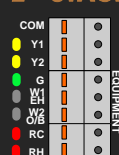


▶ Y1 and G energize when any thermostat calls for cool.

NOTE: O will also energize if DIP SWITCH #1 set to HEAT PUMP and #2 set to O

▶ Y1 de-energizes at a supply air temp lower (cooler) than the LO temp cut-out and will re-energize after 3 min if supply temp has risen above (warmer) than LO temp. (Default: 48°F or cooler)

### 2nd STAGE



▶ Y2 energizes at a supply air temp higher (warmer) than 10° more than LO temp cut-out after 8 minutes run time of Y1 only. (Default: 48° + 10° = 58°F or warmer)

▶ Y2 de-energizes at a supply air temp cooler than 4° more than LO temp cut-out after 3 min of minimum run time. (Default: 48° + 4° = 52°F or cooler Y2 de-energizes)

# 5 THERMOSTAT TYPE SETUP 8

On Heat Pump equipment ONLY, either Gas/Electric or Heat Pump thermostats can be used. The SmartZone controller **MUST** be set for the thermostat type being used or the equipment will not operate properly with potential risk of damage. Set the thermostat type as shown below using the "STAT TYPE" and "Arrow" buttons. **NOTE:** When GAS/ELECTRIC Equipment, this option is NOT available, all thermostats will be GAS/ELECTRIC.

**NOTE 2:** When using SmartLink for 8X system, secondary controller stat type must also be set using the same method.

## 1 SELECT ZONE

Press the STAT TYPE Button...

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**1**

ONE TIME...

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**2**

TWO TIMES...

4 Zone ONLY

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**3**

THREE TIMES...

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**4**

FOUR TIMES

## 2 ADJUST STAT TYPE

Press the UP and DOWN Arrows

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**GE**

Y = Cool  
W = Heat

**GAS / ELECTRIC**  
[Standard Heat/Cool Thermostat]

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**HP**

DIP #2: Rvs. Vlv. O  
(Default)

Y = Heat  
Y + O = Cool

**HEAT PUMP**  
Thermostat

DIP #2: Rvs. Vlv. B  
Y = Cool  
Y + B = Heat

W = Em. Heat (Zone 1 must initialize)

HI TEMP  
LO TEMP  
SUPPLY  
DELAY ECO PURGE

**FA**

If FA is selected, Zone 4 Damper will operate as a Fresh Air Damper. SEE NEXT PAGE FOR DETAILS

**FRESH AIR**  
(Available on Zone 4 ONLY)

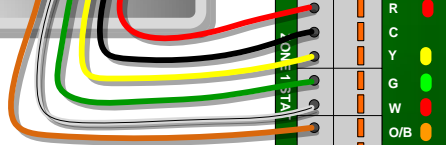
# INSTALLATION

- 1 Mount SmartZone
- 2 Install SUPPLY TE...
- 3 Wire DAMPERS to...
- 4 Set DIP SWITCHES
- 5 Wire THERMOS...
- 6 Wire SMARTLINK...
- 7 Wire SmartZone 2...
- 8 Set THERMOS...
- 9 Wire EQUIPMENT

REPLACE FUSE WITH 300mA Fuse (5X20mm) Spare Included

**Heat Pump THERMOSTAT w/ EH**

W2 W1  
O8 EH G Y C R



# THERMOSTAT WIRING 5

SmartZone will use time and temperature to automatically manage staging. This accurate method of staging eliminates the need for multi-stage thermostats. SmartZone is compatible with most all thermostats that have a common connection or are battery powered / mechanical.

THERMOSTAT	COLOR (TYPICAL)	SmartZone
24VAC (HOT)	RED	R
24VAC (COMMON)	-- no standard	C
COMPRESSOR	YELLOW	Y
FAN	GREEN	G
HEAT or EMERGENCY HEAT	WHITE	W
REVERSING VALVE	ORANGE	O/B

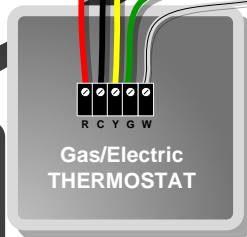
USE 18 GAUGE Solid Conductor Wire  
**NOTE:** For a HEAT PUMP System with Emergency Heat: ONLY ZONE 1 Thermostat will have the ability to energize Emergency Heat.

# DIP SWITCHES 4

BOLD = DEFAULT

<b>1</b>	<b>GAS/ELECT</b>	Standard GE or All Electric Equipment
	HEAT PUMP	Heat Pump Equipment
<b>2</b>	<b>RVS. VLV O</b>	Reversing valve energized in COOLING
	B	Reversing valve energized in HEATING
<b>3</b>	<b>NORMAL</b>	Operates Aux. Heat WITH compressor (HP Only)
	DUAL FUEL	Operates Aux. Heat WITHOUT compressor
<b>4</b>	<b>2<sup>nd</sup> STAGE</b>	2nd Stage Active (Normal Operation)
	LOCKOUT	2nd Stage will not energize if only ONE zone open
<b>5</b>	<b>FAN GAS</b>	Energizes fan after 90 second delay in heating
	ELECTRIC	Energizes fan immediately with heating
<b>6</b>	<b>SmartLink ZONES (1-4)</b>	Primary equipment controller (NORMAL)
	ZONES (5 - 8)	Zone Expansion Mode - Add 4-Zones to SmartZone

4 ZONE (254X) ONLY



FUSE

24 VAC TRANSFORMER

# POWER WIRING

USE 18 GAUGE Solid Conductor Wire and always install a field supplied fuse as shown.

**NOTE: ALWAYS Disconnect power to SmartZone while making any wiring changes.** See previous page 2 for transformer sizing requirements.

# INSTALLATION STEPS

Enclosure (not pictured)

TEMP SENSOR

SmartZone

Sensors on SmartZone

Wires to SmartZone

if applicable (ONLY 5 Zones or more)

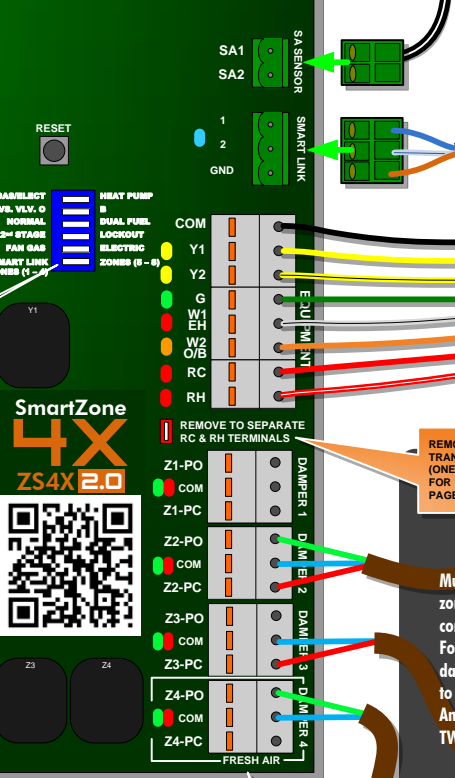
24VAC TRANSFORMER

TYPE if using Heat Pump

Wires to SmartZone



PUSH BUTTONS FOR ADJUSTING HIGH AND LOW TEMP LIMITS, CONFIGURING THERMOSTAT TYPE AND FRESH AIR OPERATION. SEE NEXT PAGE FOR DETAILS.

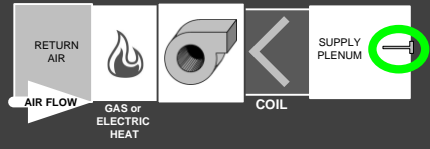


## 2 SUPPLY TEMP SENSOR

TEMPERATURE SENSOR (SAS) INCLUDED must be securely installed and properly located for SmartZone to operate properly. "--" will be flashing on the display if SAS not plugged into the SmartZone board.

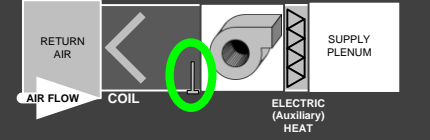
### GAS/ELECTRIC or HEAT PUMP w/ Dual Fuel!

INSTALL SAS 2" to 4" down-flow of the coil



### HEAT PUMP (Standard - Electric Aux.)

INSTALL SAS AFTER the COIL but BEFORE the BLOWER



## 6 SMARTLINK

EASY WAY TO ADD MORE ZONES - SmartZone-4X ONLY - SEE BACK PAGE FOR DETAILS

## 9 EQUIPMENT WIRING

USE 18 GAUGE Solid Conductor Wire

NOTE: Disconnect power to equipment transformer while wiring SmartZone

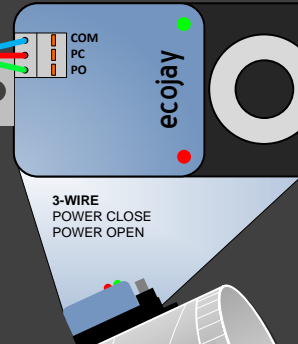
EQUIPMENT	COLOR (TYPICAL)	ECOJAY SmartZone
24VAC (COMMON)	-- no standard	COM
COMPRESSOR (STAGE 1)	YELLOW	Y1
COMPRESSOR (STAGE 2)	-- no standard	Y2 (OPT.)
FAN (BLOWER)	GREEN	G
HEAT (STAGE 1) or EMER. HEAT	WHITE	W1-EH
HEAT (STAGE 2) or RVS. VALVE	ORANGE	W2-O/B (OPT.)
24VAC - COOLING	RED	RC
24VAC - HEATING	RED	RH

## 3 DAMPER WIRING

USE 18 Gauge Solid Conductor Wire

REMOVE IF TWO EQUIPMENT TRANSFORMERS ARE USED (ONE FOR HEATING AND ONE FOR COOLING) SEE PREVIOUS PAGE FOR MORE DETAILS.

Multiple dampers can be wired to each zone as necessary based on duct configuration. 40 VA PER ZONE MAX. (ie. Four 10 VA Dampers or thirteen, 3 VA dampers OR any combination adding up to a total of less than 40VA) Any 24VAC Damper can be used including TWO-WIRE or THREE-WIRE Dampers.



## 7

### FUSE SIZE RULE OF THUMB

TRANSFORMER VA	FUSE SIZE
40	2A
75	3A
100	4A

ZONE 4 DAMPER TERMINAL CAN BE CONFIGURED AND USED AS A FRESH AIR DAMPER CONTROL. SEE NEXT PAGE FOR DETAILS.



# Duct System, Dampers & Bypass

**SMARTZONE DUCT SYSTEM** Typically, a zoning system can use the same duct sizing as a traditional single-thermostat system if the pressure relief (See page 10-11 on BYPASS) is installed correctly AND the system is 4 or less zones. As systems get larger than 4 zones, it may become necessary to increase the duct & damper sizes of the smaller zones (or all the zones) in order to minimize the amount of pressure relief needed when only the smallest zone is open.

**NOTE:** To reduce air noise, install time, cost and total number of dampers: Connect dampers directly to the plenum with a starting collar and branch off smaller ducts going to different areas within the zones.

**ZONE BALANCING** In a typical zoning application it is preferable to design a system that has roughly equal size zones (in terms of CFM). This does not mean that every zone must have EXACTLY the same CFM requirements but the system will work most efficiently if they are approximately the same size. Following this guideline will minimize the amount of pressure relief (bypass) necessary. A good rule to follow is that no single zone should be smaller than about 20% of the total system capacity.

**AIR NOISE** should be always be minimized and in a zoning system with opening & closing dampers it can be more challenging. To minimize noise and maintain adequate throw, zone duct should be designed to provide 600 to 700 FPM velocity airflow. This can be achieved by providing large enough ducts/dampers to supply the volume (CFM) of air needed for the zone. Use the "Normal CFM" chart to check round duct size(s) that will achieve this velocity.

- For zones with multiple dampers, the total zone CFM is the sum of all the dampers "Normal CFM"
- For rectangular duct systems use the RECTANGULAR CFM Equation provided for "Normal CFM"

## ROUND DAMPER CFM CHART

Normal CFM – Air velocity range is 600 to 700 FPM

Max CFM – Air velocity of 900 FPM

Damper Size	Normal CFM	Max CFM
6"	100	200
7"	150	250
8"	200	300
9"	300	450
10"	400	600
12"	600	900
14"	900	1400
16"	1400	2000

## RECTANGULAR DAMPER CFM FORMULA

Normal CFM =

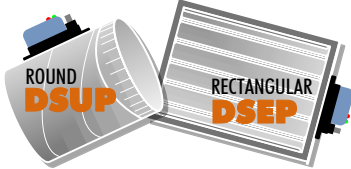
(Surface Area in Sq. Ft.) X 600 FPM

Max CFM =

(Surface Area in Sq. Ft.) X 900 FPM

\* Surface Area in Sq. Ft. = ("Height" X "Width") / 144  
Surface area of a rectangular damper can be calculated by multiplying Height by Width (H X W) in inches and dividing by 144 square inches per square foot.

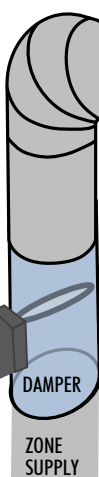
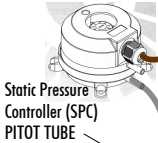
**BYPASS Setup & Sizing on PAGES 10-11**



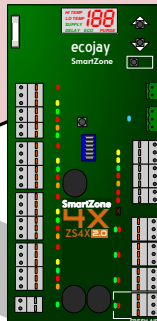
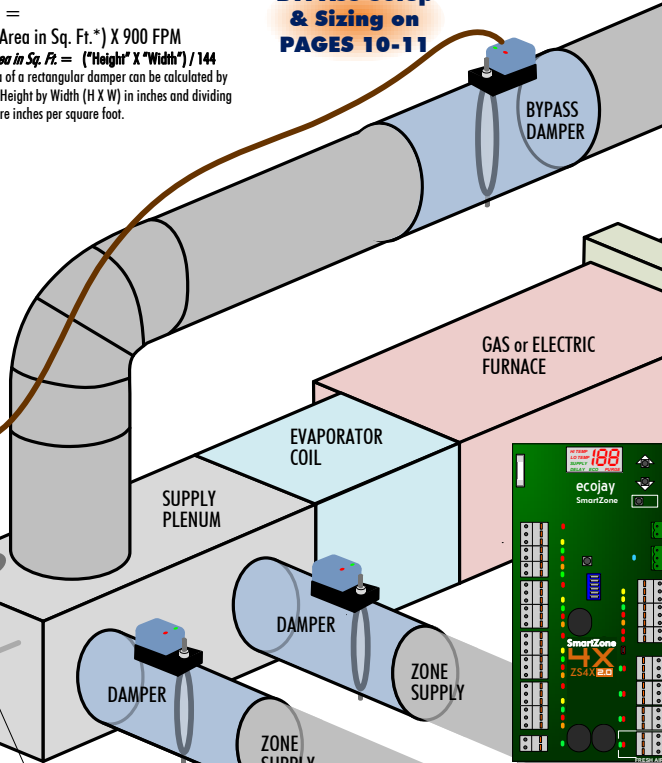
## SPRING DAMPERS

use a motor to power the damper blade in ONE direction and a spring to move the blade in the opposite direction. When power is applied to the damper, the motor moves the blade. When power is removed, the spring moves the blade in the opposite direction.

**WARNING:** Spring Dampers consume more electricity than power-open/power-close dampers. (10 to 12 VA when powered)



**POWER DAMPERS** Power Open /Power Close dampers use three wires to power the damper open OR power it closed. The zone panel is responsible for supplying a 24VAC signal to either the PO (Power Open) or PC (Power Closed) terminal of these dampers. Primary advantages of Power Open/Power Close Dampers include lower power consumption, quiet operation and greater reliability. (2.5 to 3VA)



**Use the ECO SmartZone CONTROLLER to operate damper equipment and thermostat calls**



# FRESH AIR Setup & Configuration

## FRESH AIR CONTROL

BUILT IN TO SMARTZONE-4X WILL AUTOMATICALLY ENERGIZE FAN AND OPEN FRESH AIR DAMPER (ZONE 4) DURING 'FRESH AIR RUN TIME'

- ▶ FRESH AIR CAN BE CONFIGURED USING THE PUSHBUTTONS
- ▶ UTILIZES THE EQUIPMENT 'FAN' TERMINAL
- ▶ CONTROLS A FRESH AIR DAMPER WITH THE 'ZONE 4' TERMINAL

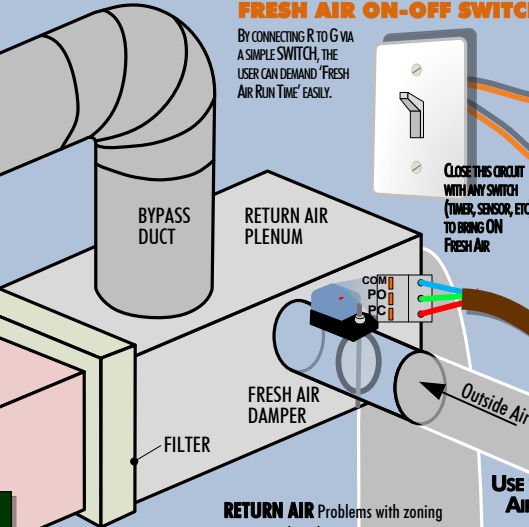
## ADVANCED Fresh Air

WHEN ZONE 4 IS CONFIGURED AS FRESH AIR, THE ZONE 4 THERMOSTAT INPUTS CAN BE USED FOR MORE GRANULAR CONTROL OF THE FRESH AIR RUN TIME(S). BY MAKING A CONNECTION BETWEEN 'R' AND 'Y, G, W, OR O/B' THE FRESH AIR RUN TIME CAN BE AFFECTED AS FOLLOWS:

- ▶ Y = ECONOMIZER (SEE SMARTZONE ADVANCED FRESH AIR GUIDE)
- ▶ G = FRESH AIR ON (DEMAND)
- ▶ W = FRESH AIR ONLY DURING EQUIPMENT CALLS (HEATING OR COOLING)
- ▶ O/B = FRESH AIR OFF (DISABLE)

### FRESH AIR ON-OFF SWITCH

BY CONNECTING R TO G VIA A SIMPLE SWITCH, THE USER CAN DEMAND 'FRESH AIR RUN TIME' EASILY.



CLOSE THIS CIRCUIT WITH ANY SWITCH (TIMER, SENSOR, ETC) TO BRING ON FRESH AIR

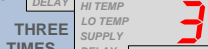
### 1 PRESS 'STAT TYPE' (4 times)

TO GET TO ZONE 4



### 2 PRESS ▲

TO SELECT 'FA'



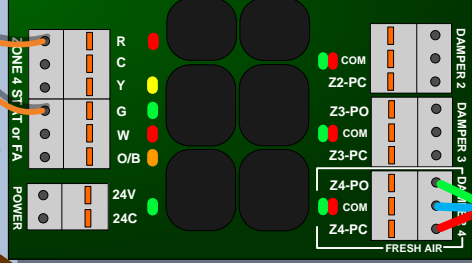
### 3 PRESS 'STAT TYPE'

TO SET # MINUTES PER HOUR "FRESH AIR RUN TIME"

USE ▲ ▼ TO SET IN 5 MIN INCREMENTS (SET FROM 0 TO 60 MINUTES)



## SmartZone-4X - 2.0



## ASHRAE 62.2 Fresh Air

USE THE CALCULATION BELOW TO SET THE # OF MINUTES 'FRESH AIR RUN TIME' TO SATISFY THE ASHRAE 62.2 REQUIREMENTS.

Floor Area	BEDROOMS				
	0-1	2-3	4-5	6-7	>7
< 1500	30	45	60	75	90
1500-3000	45	60	75	90	105
3000-4500	60	75	90	105	120
4500-6000	75	90	105	120	135
6000-7500	90	105	120	135	150
> 7500	105	120	135	150	165

SELECT THE CFM-NEEDED FROM THE CHART ON THE RIGHT AND USE IN THE FORMULA BELOW

CFM-Needed

$$\text{'Fresh Air Run Time'} = 60 \text{ min} \times \left( \frac{\text{CFM-Needed}}{\text{Measured-CFM}} \right)$$

**MEASURE** the actual CFM provided by the Fresh Air Damper using an anemometer to make the 'Fresh Air Run Time' calculation. Set this time on the SmartZone-4X using the steps above.

Round Size

CFM

For the purpose of Fresh Air Damper size selection, this chart shows approximate CFM capability

6"	30-50
7"	50-80
8"	80-120
9"	120-170
10"	170-230



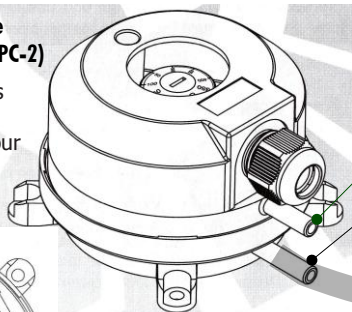
# BYPASS Setup & Sizing

## Static Pressure Controlled Bypass

### Mounting

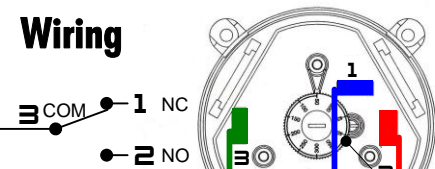
Mount with the sample line connections in the "down" position. Use screws & standoffs through at least two of the four mounting feet holes. (As shown below)

Static Pressure Controller (ASPC-2)

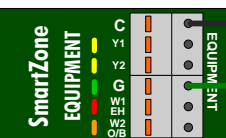


- REMOVE CAP from LOW-PRESSURE INLET
- Connect the flexible tubing to the HIGH-PRESSURE INLET as shown
- TUBING INCLUDED

### Wiring



Pressure inlets pointing down



USE 18 Gauge Solid Core wire & Matching spade connectors (included)

**WORKS WITH**  
3-WIRE  
POWER CLOSE  
POWER OPEN  
ROUND OR  
RECTANGULAR



### Modulating Bypass Configuration

The goal is to calibrate the bypass damper so that it is barely staying closed when all zones are open. This will cause the bypass damper to open if supply dampers close and the plenum pressure increases.

**1**

Make a call from ALL zones for cooling so all zone dampers are fully open AND the equipment fan (blower) is running at the HIGHEST speed.

**2**

Turn knob clockwise SLOWLY until the bypass damper motor starts closing (ECOJAY damper RED light will flash) If damper starts opening again before fully closing, turn the knob clockwise SLOWLY until it starts closing again. Repeat this process until the damper is fully closed. (ECOJAY damper RED light will be solid)

**3**

VERY Slowly turn the knob counter-clockwise until the bypass damper motor starts to run open. (ECOJAY damper GREEN light will flash)

## Barometric Bypass

### Mounting & Setup

It is critical that the Bypass Damper is adjusted properly for the Zoning system to work properly.

- Remove the Weight arm from the damper at the shaft collar and move the weight to the end of head of the weight arm bolt.
- Follow drawings to the right to install the damper and choose the proper initial weight arm position based on the direction of airflow.
- Make a call for cooling from ALL zones & verify that all zone dampers are open.
- Make sure the bypass damper remains closed. If it is opening already, add more weight (ABDW).
- Once the bypass damper is remaining closed, slowly move the weight toward the shaft (1/2 inch at a time) until the bypass damper starts to open slightly.
- Move the weight back about 1/2 inch so the bypass damper remains closed with all Zones open.
- Close one or more zones by removing the cooling calls and ensure that the barometric bypass damper opens.

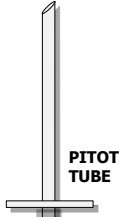
# (MODULATING)

## Air Probe (Pitot Tube)

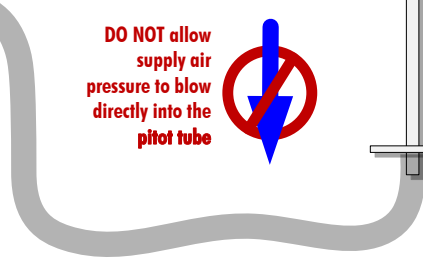
Locate the air probe (pitot tube) at least



downstream from the air source, preferably as close to the center of the airstream as possible



**DO NOT** allow supply air pressure to blow directly into the pitot tube



Just as soon as the motor starts to run open, turn the knob back clockwise just enough that the damper motor stays closed. (ECOJAY damper RED light will be solid)

To test if bypass is sized and configured properly, make a call ONLY from the smallest zone for cooling with the fan at the HIGHEST speed and the BYPASS Damper should fully or almost fully open within 1 to 2 minutes

# Bypass SIZE

**BYPASS DAMPER (Pressure Relief)** A bypass system consists of a short duct connecting the supply plenum to the return air plenum. A "bypass" damper is installed in this duct that opens/closes automatically to maintain constant pressure inside the duct when zones open and close. When the correct size bypass damper is installed and adjusted correctly, it will be fully CLOSED when all zones are calling (no air bypassing) and will OPEN proportionately as more zone dampers close.

### BYPASS DAMPER SIZING:

Select a round damper size with a **Max CFM** greater than the **CFM-Needed** to bypass. Use the formula below to calculate CFM needed to bypass and the **ROUND DAMPER CFM CHART** to check Max CFM.

TYPICALLY 400  
CFM PER TON  
800 = 2  
1200 = 3  
1600 = 4  
2000 = 5

EQUIPMENT AIRFLOW CAPACITY IN CFM (HIGH SPEED)

CFM OF SMALLEST ZONE USE "NORMAL CFM" FROM THE CFM CHART (PAGE: 8)

**CFM-NEEDED TO BYPASS** USE A BYPASS DAMPER THAT HAS LARGER "MAX CFM"

**EXAMPLE:** 4-Ton equipment with 10" smallest zone:  
1600 CFM (EQUIPMENT)  
- 400 CFM (SMALLEST ZONE - NORMAL CFM ON PAGE: 8)  
= 1200 CFM NEEDED

SO, FROM THE ROUND DAMPER MAX CFM ON PAGE: 8, A 14" ROUND DAMPER SHOULD BE USED FOR BYPASS.

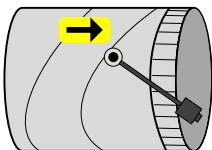
Below chart assumes 400 CFM per Ton  
\*\*USE next size UP round bypass damper for any system with a single zone less than 200 CFM.

### BYPASS DAMPER "RULE OF THUMB"

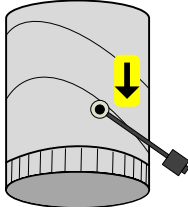
Unit Size (Tons)	Round Damper Size (Inches)**
2 - 2.5	10"
3 - 3.5	12"
4 - 4.5	14"
5	14 - 16"

**Initial Weight-Arm Positions** depend on **AIRFLOW** and **ORIENTATION** of the bypass damper. Below are the four (4) initial weight arm positions. Select **AIRFLOW & ORIENTATION** for specific application.

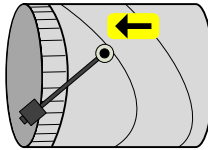
**Left to Right**  
4 o'clock Position



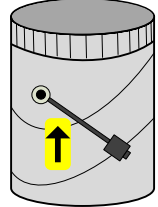
**Down-Flow**  
4 o'clock Position



**Right to Left**  
8 o'clock Position



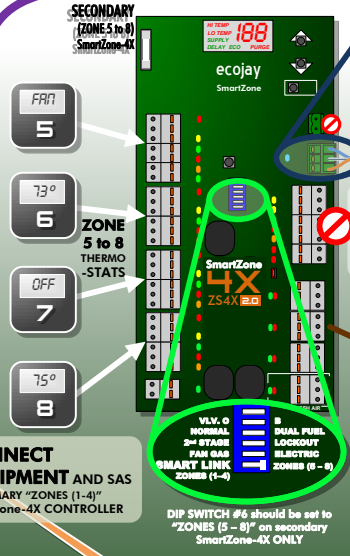
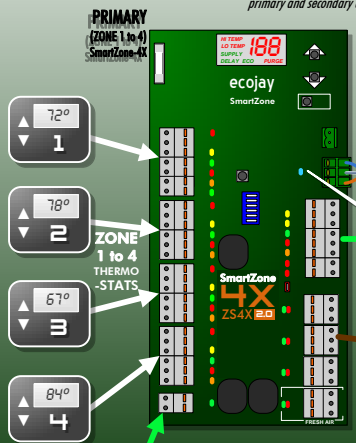
**Up-Flow**  
4 o'clock Position



**NOTE:** Extra weight may be required for upflow applications. (Order ABDW)

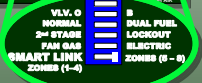
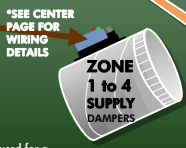
# ecojoy SmartLINK MAKES 8-ZONES EASY

**For systems with 5 to 8-Zones:**  
Connect two SmartZone-4X Controllers together using only a CAT 5 cable.  
(Wiring detail shown to right - same for primary and secondary controller)



**DO NOT CONNECT EQUIPMENT OR SAS TO SECONDARY "ZONES (5-8)" SmartZone-4X CONTROLLER**

**CONNECT EQUIPMENT AND SAS TO PRIMARY "ZONES (1-4)" SmartZone-4X CONTROLLER**



DIP SWITCH #6 should be set to "ZONES (5 - 8)" on secondary SmartZone-4X ONLY

**BLUE SmartLINK LED "Flashing" indicates communication established and working. If LED is OFF or SOLID BLUE, check SmartLINK cable wiring or transformer polarity.**

If two separate transformers are used for a SmartLINK application (using two 4X Boards to create 8 zones), the primary and secondary polarity **MUST** be the SAME on both.

**ONLY AVAILABLE with SmartZone 4X**

ecojoy llc.   
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Grapevine, TX 76051  
888-523-3265  
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