

ecojay



SmartZone-2X & 4X

Installation, Specification & Operation Guide

p. 3

FULL STATUS
DIGITAL
DISPLAY

SPARE FUSE
INCLUDED

QUICK
SCREWLESS
TERMINALS

p. 4

HEAT PUMP
OR
GAS/ELECTRIC
THERMOSTAT

p. 4

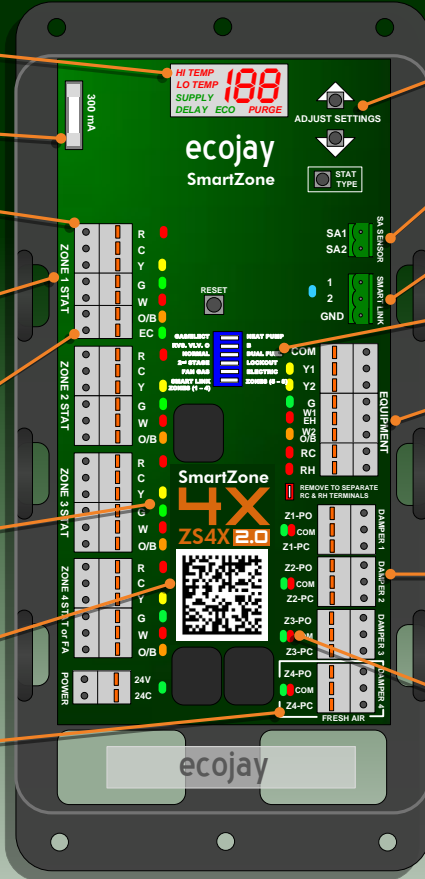
EXCLUSIVE "ECO"
FOR ENHANCED
CONTROL

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)



SIMPLE SETUP
AND
CONFIGURATION

p. 4,7

SUPPLY AIR
TEMP SENSOR
INCLUDED

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EXPANDABLE
TO 8 ZONES

p. 8

DUAL FUEL
CAPABILITY

p. 7

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

p. 5,6,7

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

p. 5

STATUS LEDs SHOW
DAMPER POSITION
RED = CLOSED
GREEN = OPEN

p. 5

ECOJAY SmartZone-4X (4 ZONE)
2-ZONE also available (ZS2X-2.0)

ecojay.com

888-523-ECOJ
(3265)

PLEASE REVIEW ENTIRE DOCUMENT BEFORE BEGINNING INSTALLATION

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.

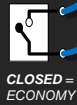
► Only W1/EH and G will be allowed to energize while SmartZone is LOCKED into emergency heat. (ie. Compressor & cooling calls will be LOCKED OUT)

► 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. (ie. 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. 7) 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

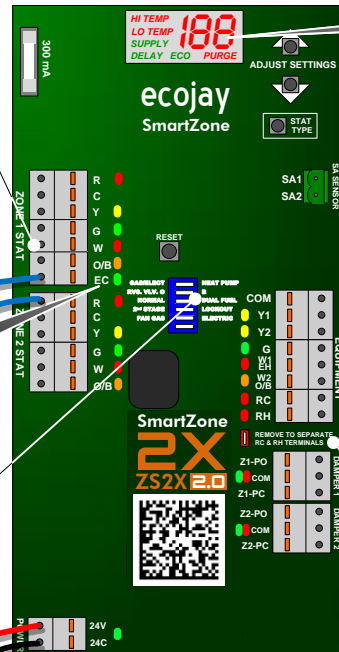
- Select location that provides easiest path to run wires.
 - Do not mount where exposed directly to air stream from supply air grills.
 - Do not mount where exposed to radiant heat from windows or skylights.
 - Do not use power stealing or triac models.
 - Gas/electric and/or heat pump stats can be 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 the ECOJAY DAMPER SYSTEM GUIDE for more information.

HVAC EQUIPMENT

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



DISPLAY OPERATION & FUNCTION

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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

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.**

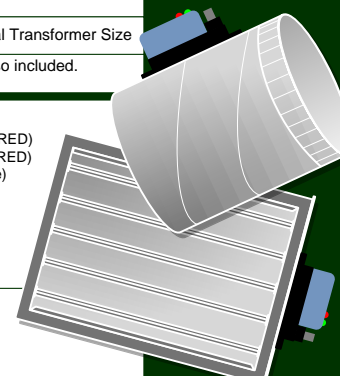
RC/RH JUMPER

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.

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. (Field supplied transformer should also be fused)
OUTPUTS	EQUIPMENT	10 AMP @ 24VAC Contact Rating 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 st Stage Compressor (YELLOW) Y2 – 2 nd Stage Compressor (YELLOW) G – Fan (GREEN) W1/EH – 1 st Stage Heat OR Emergency Heat (RED) W2/OB – 2 nd Stage Heat OR Reversing Valve (ORANGE)
	DAMPERS	10 AMP @ 24VAC Contact Rating (40VA) 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]
INPUTS	THERMOSTAT	<u>LABEL – DESCRIPTION (LED COLOR)</u> 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
	TEMPERATURE	10K Type III Thermistor SA Sensor – 4" Supply Air Temperature Sensor Stainless Steel Probe (Provided with each SmartZone)

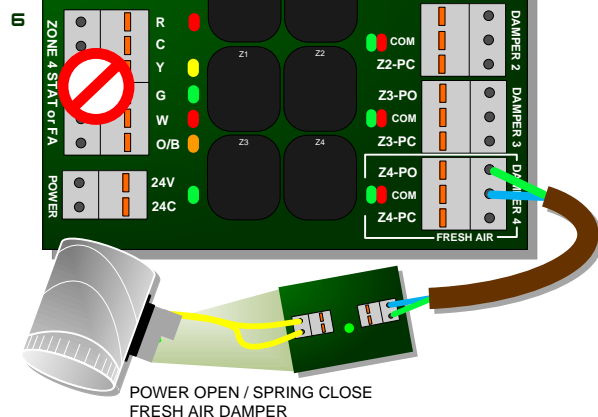


ROUND AND RECTANGULAR DAMPERS

Available in over 60 different sizes and configurations!



MORE INFORMATION AVAILABLE ONLINE - ecojoy.com



POWER OPEN / SPRING CLOSE
FRESH AIR DAMPER

NOTE: In the case of an 8X system, the fresh air only needs to be set on the PRIMARY SmartZone controller.

FRESH AIR CONTROL SmartZone-4X ONLY

FOLLOW THE STEPS TO USE **ZONE 4 AS A FRESH AIR DAMPER CONTROL & AUTOMATIC FAN CYCLER**

- 1 Press STAT TYPE Button until (zone) "4" is flashing on the display.
- 2 Press the up arrow until FA is flashing on the display.
- 3 Press STAT TYPE button again one time and the # of minutes per hour Fresh Air will run is displayed.
- 4 Use the ▲ UP and ▼ DOWN arrows to adjust the # of minutes per hour in 5 minute increments.
- 5 Press STAT TYPE button again one time to save the settings and return to normal operation.

REFER TO ASHRAE Guidelines to determine the necessary minutes per hour based on occupancy, total volume and CFM of fresh air duct to meet 62.2 standards.

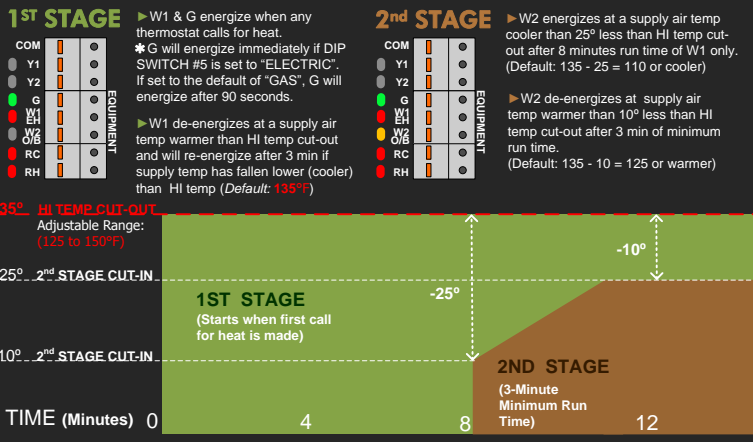
SmartZone EQUIPMENT STAGING

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 2nd stage or operate any dampers.

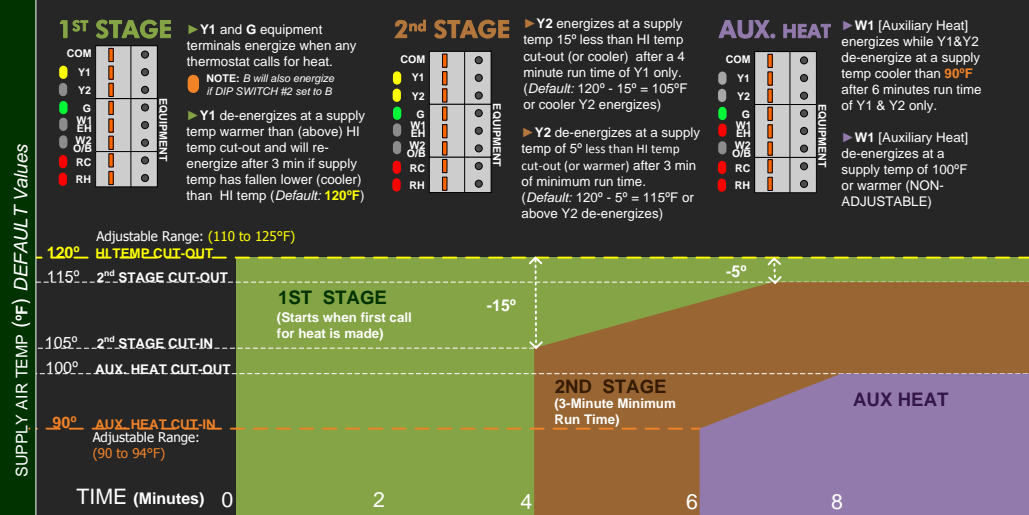
The charts in this section along illustrate this correlation between TIME, TEMPERATURE, & STAGING (FACTORY DEFAULTS SHOWN IN CHARTS)

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)

GAS/ELECTRIC HEATING

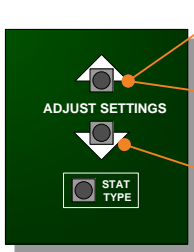


HEAT PUMP (NORMAL) – HEATING TELELECTRIC AUX1



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.

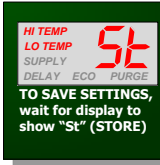
AUX. HEAT CUT-IN

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.



TO SAVE SETTINGS, wait for display to show "St" (STORE)

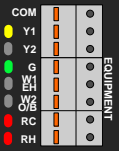
AUTO CHANGEOVER

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 (Continued)

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

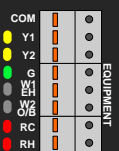
1ST STAGE



► 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)

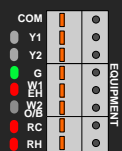
2nd STAGE



► 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

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

TIME (Minutes) 0 2 4 6 8

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

2ND STAGE
 (3-Minute Minimum Run Time)

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

- **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
 - RVS. VLV. G
 - NORMAL
 - 3rd STAGE
 - FAN BAS
 - SMART LINK ZONES (1-4)
 - HEAT PUMP
 - DUAL FUEL
 - LOCKOUT
 - INTRUSIVE ZONES (8-9)

COOLING ALL

SUPPLY AIR TEMP (°F) DEFAULT Values

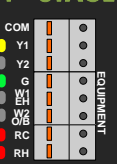
TIME (Minutes) 0 4 8 12

58° 2nd STAGE CUT-IN

52° 2nd STAGE CUT-OUT

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

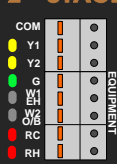
1ST STAGE



► 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)

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SmartLINK MAKES 8-ZONES EASY

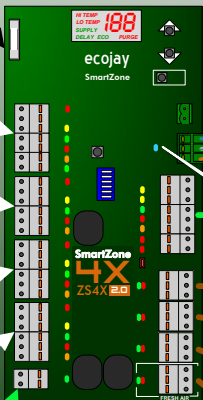
For systems with
5 to 8-Zones:

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

**PRIMARY
(ZONE 1 to 4)
SmartZone-4X**



**ZONE
1 to 4
THERMO-
STATS**

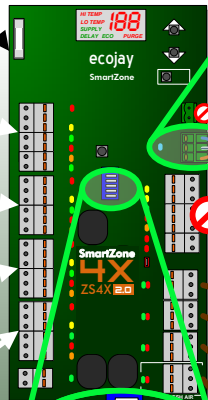


If two separate transformers are
used for a SmartLINK application
(using two 4X Boards to create 8
zones), the primary and secondary
polarity **MUST** be the **SAME** on both.

**SECONDARY
(ZONE 5 to 8)
SmartZone-4X**

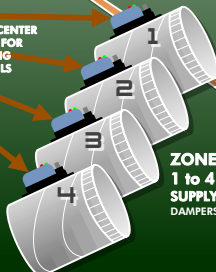


**ZONE
5 to 8
THERMO-
STATS**



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

***SEE CENTER
PAGE FOR
WIRING
DETAILS**



**ZONE
1 to 4
SUPPLY
DAMPERS**

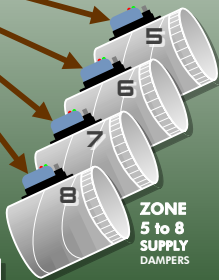
V.L.V. 0
NORMAL
2nd STAGE
FAN ON
SMART LINK
ZONES (1-4)

8
DUAL PULS.
LOCKOUT
IN ACTIVE
ZONES (5-8)

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.

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



**ZONE
5 to 8
SUPPLY
DAMPERS**



**ONLY
AVAILABLE
with
SmartZone
4X**