

## SmartZonePLUS Equipment Staging

### COOLING – Air Conditioning and Heat Pump

- First stage occurs any time there is a call for cooling or a changeover from heating to cooling. Y1 and G are energized. In heat pump cooling mode OB may also be initiated.
- After 8 minutes of initial run time in first stage, the ELC (Electronic Limit Control) will initiate Y2 if the supply air temp has not dropped below 10 degrees above the Low Temp Cut-Out temperature.
- Once second stage is initiated and after a 3 minute minimum run time, if the supply air temp goes below 4 degrees above the Low Temp Cut-Out, Y2 is de-energized and only Y1 and G are energized.
- This scenario is repeated as dictated by the supply air temp.

#### Special Case: DIP switch #5 in the '2nd STAGE' position and EC1 thermostat with Y2 Connected:

- The EC1 thermostat with a 2<sup>ND</sup> stage call will force 2<sup>nd</sup> stage operation by energizing Y2 on the equipment terminal, ignoring the time and temperature strategy described above.
- During an EC1 thermostat 2<sup>nd</sup> stage call, the ELC's second stage cut-in and cut-out are ignored.

#### Special Case: DIP switch #5 in the '20%+Zone1' position and EC1 thermostat with Y2 Connected:

- Unless a minimum of 20% of all zones in the system are calling, the ELC's second stage cut-in and cut-out will be ignored.
- An EC1 thermostat with a 2<sup>ND</sup> stage call will force the equipment to go to 2<sup>nd</sup> stage operation, ignoring the timing described above.
- During an EC1 thermostat 2<sup>nd</sup> stage call, the ELC's second stage cut-in and cut-out are ignored.

### HEATING – Gas, Electric and Fuel Oil

- First stage occurs anytime there is a call for heating or a changeover from cooling to heating. W1/EH is energized. 45 seconds later, G will be energized to insure fan operation.
- After 8 minutes of initial run time in first stage, the ELC will initiate W2/OB if the supply air temp has not risen above 25 degrees below the High Temp Cut-Out temperature. 110 Deg F (Default)
- Once second stage is initiated, if the supply air temp rises above 10 degrees below the High Temp Cut-Out, W2/OB is de-energized and only W1 and G are energized. 125 Deg F (Default)
- This scenario is repeated as dictated by the supply air temp.

#### Special Case: DIP switch #5 in the '2nd STAGE' position and EC1 thermostat with W2 Connected:

- An EC1 thermostat with a 2<sup>ND</sup> stage call will force the equipment to go to 2<sup>nd</sup> stage operation, ignoring the timing described above.
- During an EC1 thermostat 2<sup>nd</sup> stage call, the ELC's second stage cut-in and cut-out are ignored.

#### Special Case: DIP switch #5 in the '20%+Zone1' position and EC1 thermostat with W2 Connected:

- Unless a minimum of 20% of all zones in the system are calling, the ELC's second stage cut-in and cut-out will be ignored.
- An EC1 thermostat with a 2<sup>ND</sup> stage call will force the equipment to go to 2<sup>nd</sup> stage operation, ignoring the timing described above.
- During an EC1 thermostat 2<sup>nd</sup> stage call, the ELC's second stage cut-in and cut-out are ignored.

### HEATING - Heat Pump

- First stage occurs anytime there is a call for heating or a changeover from cooling to heating. Y1 and G are energized. If the DIP switch set to B, then B will also be energized.
- After 4 minutes of initial run time in first stage, the ELC will initiate Y2 if supply air temp has not risen above 15 degrees below the High Temp Cut-Out temperature. 105 Deg F (Default)
- Once second stage is initiated, if the supply air temp rises above 5 degrees below the High Temp Cut-Out, Y2 is de-energized and only Y1 and G are energized. 115 Deg F (Default)
- This scenario is repeated as dictated by the supply air temp.

### ELECTRIC AUXILLARY/EMERGENCY HEAT

- Auxiliary Heat - After 6 minutes of initial run time, if the supply air temp drops below 90 degrees, W1/EH will be energized.
- If the supply air temp rises above 100 degrees W1/EH will be de-energized and only Y1, Y2 and G will be energized. (See Note 1, Note 2 and Note 3 below)
- This scenario is repeated as dictated by the supply air temp.

### FOSSIL FUEL (DUAL FUEL) AUX./EMERGENCY HEAT

- Auxiliary Heat - After 6 minutes of initial run time, if the supply air temp drops below 90 degrees, W1/EH will be energized. This will remove Y1 and Y2 and energize W1/EH only. G will be initiated 45 seconds later to insure starting an indoor blower. W1/EH will initiate start up of the fossil fuel furnace. (See Note 1, Note 2 and Note 3 below).
- Only the W1/EH and G will remain energized for the remainder of the heating cycle.
- This scenario is repeated as dictated by the supply air temp.

### EMERGENCY HEAT

- Emergency Heat can only be initiated through a heat pump thermostat in the EC1 – ZONE 1 thermostat position.
- If this thermostat is placed in Em. Heat, the **SmartZonePLUS™** system is latched into emergency heat. No compressor will run and only heating calls will be recognized.
- Only the W1/EH and G will remain energized for the remainder of the heating cycle.
- Remove the Em. Heat call at EC1 stat and make a call for something other than Em. Heat from EC1 stat in order to unlatch the board and take system out of emergency heat.

**Note 1:** When the Outdoor Air Temperature Sensor is installed, the Heat Pump Compressor will not energize in the heating mode if the Outdoor Air temperature is below the OA TEMP LO TEMP Balance Point Cutout. (See Configuration Section, Pushbuttons, 11th Press for adjustment instructions)

**Note 2:** When the Outdoor Air Temperature Sensor is installed, the Auxiliary Heat will not energize if the Outdoor Air temperature is above the OA HI TEMP Balance Point Cutout. (See Configuration Section, Pushbuttons, 12th Press for adjustment instructions)

**Note 3:** Failure to install an outdoor temperature sensor will cause the Fresh Air temperature cutout settings and the Heat Pump Balance Point cutout settings to be not settable and ignored.



TECH SUPPORT: 866-XCI-CTRL  
GENERAL INFO: 866-XCI-HVAC  
WEBSITE: xcicontrols.com



## NETWORKED HVAC ZONE CONTROL SYSTEM

### Residential & Light Commercial Applications

- **EXPANDABLE TO 33 ZONES**
- **ELECTRONIC LIMIT CONTROL™ (ELC)**
- **BUILT-IN FRESH AIR CONTROLLER**
- **ECONOMY MODE**
- **GAS/ELECTRIC & HEAT PUMP**
- **5-YEAR LIMITED WARRANTY**

### EC1 Equipment Controller RZ1 & RZ4 Zone Expansion Boards

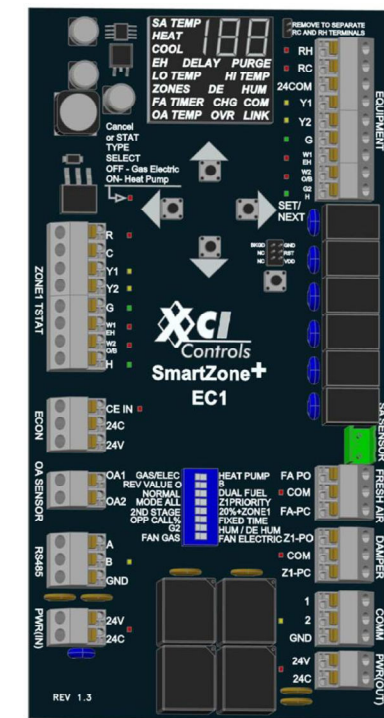
**SmartZonePLUS** introduces a residential and light commercial HVAC zoning control system with the flexibility to incrementally expand from two (2) zones up to 33 zones from a single forced-air system. Each SmartZone+ system utilizes a single Electronic Control Module (EC1) to manage communications of the individual one-zone (RZ1) and four-zone (RZ4) expansion modules, and perform control functions of the HVAC equipment.

### Easy Operation

- Mix & Match Standard Gas/Electric and Heat Pump Thermostats
- Built-In Adjustable Fresh Air Damper Control from 0 to 60 Minutes per Hour
- Multiple Intelligent Staging Options, based on Supply Air Temperature, Time or Zone-1 Staging
- Automatic Changeover for Maximum Comfort
- Optional Outdoor Temperature Sensor allows Control of Heat Pump via Balance Points and Temperature Thresholds for Fresh Air Control

### Flexible Installation

- EC-1 Controller Handles Heat Pump (including Dual Fuel) & Conventional Gas-Electric Systems
- Supports up to 2-Stage Cooling Equipment, and 3-Stage Heating, including Emergency Heat
- Simple Pushbutton and Dipswitch Configuration
- Quick-Connect Screwless Terminals
- Innovative Enclosure Design with Multiple Wiring & Mounting options, both Local and Remote
- New SmartPanel™ Wiring Enclosure System allows for Fast Module Installation



### SmartZonePLUS-EC1

INCLUDES: Clear Cover Plastic Enclosure

### Simple Service

- Monitor Complete System from the EC1 Control Panel or from ANYWHERE in the WORLD
- Color-Coded Diagnostic LEDs for Each Thermostat Call
- Two-Color LEDs for Each Damper Position
- Electronic Limit Control™ (ELC) Protects Compressor and Heat Exchanger
- Pushbutton ELC™ for Adjustable Temperature Cut-Outs
- Full Text Display Allows Viewing of Complete System Status at the EC1 Panel
- System Communications Diagnostics for Easy Troubleshooting

### Convenient Customer Features

- Customer Never Needs to Use the Control Panel
- Selectable Zone-1 Priority for More Customer Control
- Enable Emergency Heat from Zone-1 Heat Pump Thermostat
- Constant Supply Air Monitoring from ELC ensures Customer Safety
- Zone-Specific Ventilation Mode; Energize Fan from any Thermostat
- Integrates with all Home Automation Systems
- Superior 5-Year Limited Factory Warranty

**PUSH BUTTONS & DISPLAY**

# SmartZonePLUS EC1 Quick-Reference

NORMAL OPERATION	SETUP MENU
Below the display indicators an installer or user might see during normal operation are listed and described. For further detail, refer to the SmartZonePLUS System Manual	<b>Right Button Press</b>
<b>SA TEMP</b> Temperature displayed by EC1 is the Supply Air Temp	1 <b>ZONES + COOL</b> Number of Zones calling for Cool mode displayed by EC1
<b>OA TEMP</b> Temperature displayed by EC1 is the Outdoor Air Temp (if "-" displayed then NO outdoor sensor installed)	2 <b>ZONES + HEAT</b> Number of Zones calling for Heat mode displayed by EC1
<b>COMM LINK</b> Communications Link established with at least one RZ1 or RZ4	3 <b>ZONES</b> Total Number of Zones connected and communicating to EC1
<b>HEAT</b> System is running in Heat mode	4 <b>CHG OVR</b> Time in minutes before system will begin PURGE to switch modes ("-" will be displayed if no calls present)
<b>COOL</b> System is running in Cool mode	5 <b>LO TEMP (FLASHING)</b> Low Temperature Limit displayed by EC1
<b>E.H</b> System is running in Emergency Heat mode (only for Heat Pump and only if Zone 1 Thermostat is calling for Emer Heat)	6 <b>HI TEMP (FLASHING)</b> High Temperature Limit displayed by EC1
<b>DELAY</b> System is on 3 minute time delay because all calls have been satisfied	7 <b>DE HUM or HUM</b> Humidification or DeHumidification Mode can be selected by pressing the up or down pushbuttons
<b>PURGE + HEAT</b> The system is purging from Heat mode and will start-up in Cool mode after 3 minutes	8 <b>FA TIMER (FLASHING)</b> Time (Minutes per Hour) the Fresh Air Damper will be opened (Must be set to zero "0" if no Fresh Air Damper installed)
<b>PURGE + COOL</b> The system is purging from Cool mode and will start-up in Heat mode after 3 minutes	9 <b>FA TIMER + OA TEMP + LO TEMP</b> Low Outdoor Temperature Limit to prevent FA Damper from opening when Outdoor Temp is below this setting (will be ignored when no OA Sensor installed)
<b>DE HUM or HUM</b> The system is running in DeHumidification or Humidification mode (only if Zone 1 Thermostat is calling)	10 <b>FA TIMER + OA TEMP + HI TEMP</b> High Outdoor Temperature Limit to prevent FA Damper from opening when Outdoor Temp is above this setting (will be ignored when no OA Sensor installed)
<b>HI TEMP</b> The system has cut-out on a High Temp Limit at the Supply Air Sensor (Equipment fan should still be running and system will start back up after 3 minute minimum off time when Supply Temp has dropped within range)	11 <b>OA TEMP + LO TEMP</b> Low Balance Point Setting - On Heat Pump equipment this setting prevents the compressor from running below this set temperature
<b>LO TEMP</b> The system has cut-out on a Low Temp Limit at the Supply Air Sensor (Equipment fan should still be running and system will start back up after 3 minute minimum off time when Supply Temp has dropped within range)	12 <b>OA TEMP + HI TEMP</b> High Balance Point Setting - On Heat Pump equipment this setting prevents the auxiliary heat from running above this set temperature
<b>FA TIMER</b> Fresh Air Damper is open	13 <b>SA TEMP</b> THE SET/NEXT BUTTON MUST BE PRESSED TO MAKE ANY CHANGES PERMINATE

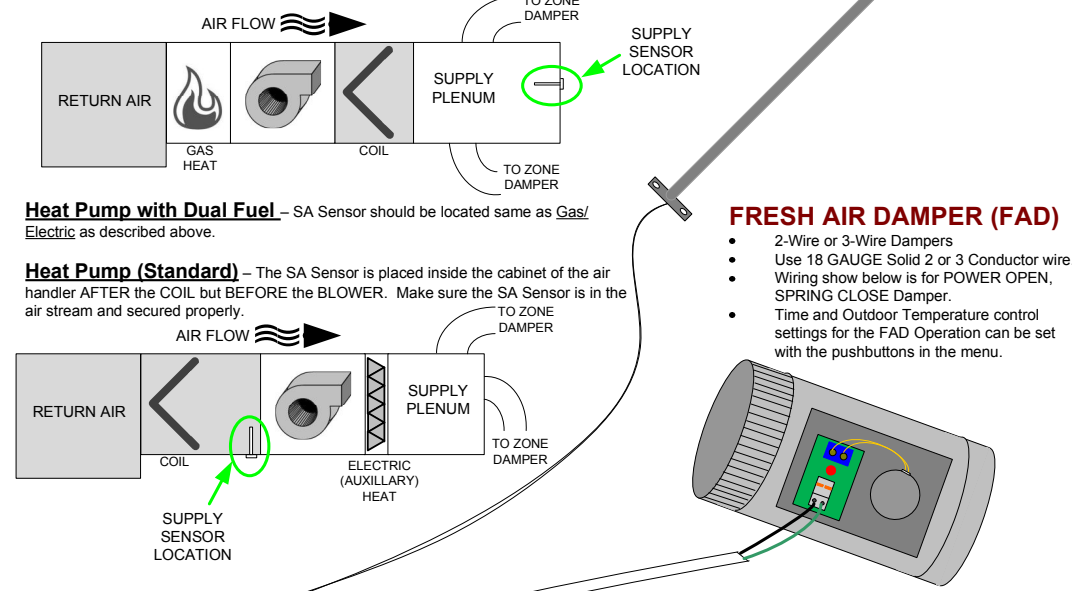
**EQUIPMENT WIRING**  
USE 18 GAUGE Solid Conductor Wire  
NOT ALL TERMINALS ARE NECESSARY FOR ALL EQUIPMENT, PLEASE CHECK WITH EQUIPMENT MANUFACTURER FOR CORRECT WIRING.  
**NOTE:** The EC-1 EQUIPMENT Terminal should be wired to the HVAC Equipment just like single thermostat normally would be.

**EC-1 EQUIPMENT WIRING TABLE**

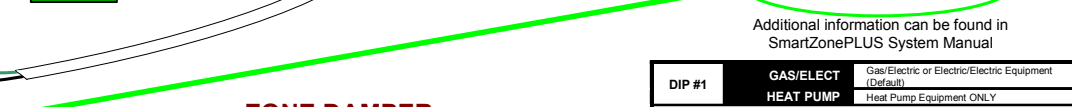
EQUIPMENT	COLOR (TYPICAL)	EC-1
24VAC (HOT) FROM COOL TRANSFORMER	RED	RC
24VAC (HOT) FROM HEAT TRANSFORMER	RED	RH
24VAC (COMMON)	-- no standard	C
COMPRESSOR (STAGE 1)	YELLOW	Y1
COMPRESSOR (STAGE 2)	-- no standard	Y2 (OPTIONAL)
FAN	GREEN	G
HEAT (STAGE 1) or EMERGENCY HEAT	WHITE	W1-EH
HEAT (STAGE 2) or REVERSING VALVE	ORANGE	W2-O/B (OPTIONAL)
HIGH SPEED FAN, HUMIDIFY or DEHUMIDIFY	-- no standard	G2-H (OPTIONAL)

**SUPPLY AIR SENSOR (SAS)**

**Sensor Wiring**  
Using the provided GREEN connector (Factory Connected to Sensor Wire) plug the SA Sensor wire into the SmartZonePLUS Controller Board.  
**NOTE:** WITHOUT THIS SENSOR, THE SmartZonePLUS CONTROLLER BOARD WILL NOT OPERATE. All dampers will OPEN, only Zone 1 will be able to make calls and only first stage equipment will be energized.  
**Sensor Placement (Location)**  
**Gas/Electric** - SA Sensor should be located in Supply Air Plenum where it will sense AVERAGE air temperature within the plenum. The most ideal placement for the SA Sensor will be 2 to 4 feet beyond the evaporator. Make sure the SA Sensor is in the air stream and secured properly.



**Heat Pump with Dual Fuel** - SA Sensor should be located same as Gas/Electric as described above.  
**Heat Pump (Standard)** - The SA Sensor is placed inside the cabinet of the air handler AFTER the COIL but BEFORE the BLOWER. Make sure the SA Sensor is in the air stream and secured properly.



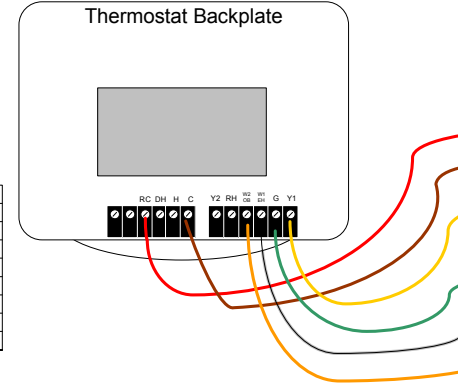
- FRESH AIR DAMPER (FAD)**
- 2-Wire or 3-Wire Dampers
  - Use 18 GAUGE Solid 2 or 3 Conductor wire.
  - Wiring show below is for POWER OPEN, SPRING CLOSE Damper.
  - Time and Outdoor Temperature control settings for the FAD Operation can be set with the pushbuttons in the menu.

**THERMOSTAT WIRING**  
USE 18 GAUGE Solid Conductor Wire

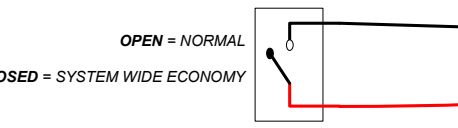
ZONE 1 Thermostat Input on the EC-1 can be used to control staging of the equipment in both Heating and Cooling with the use of a multi-stage thermostat. In the case of a HEAT PUMP System with Emergency Heat, ZONE 1 Thermostat is the only thermostat with the ability to control Emergency Heat.

**ZONE 1 THERMOSTAT WIRING TABLE**

EQUIPMENT	COLOR (TYPICAL)	EC-1
24VAC (HOT)	RED	R
24VAC (COMMON)	-- no standard	C
COMPRESSOR (STAGE 1)	YELLOW	Y1
COMPRESSOR (STAGE 2)	-- no standard	Y2 (OPTIONAL)
FAN	GREEN	G
HEAT (STAGE 1) or EMERGENCY HEAT	WHITE	W1-EH
HEAT (STAGE 2) or REVERSING VALVE	ORANGE	W2-O/B (OPTIONAL)
HUMIDIFY or DEHUMIDIFY	-- no standard	H (OPTIONAL)



**ECONOMY MODE SWITCH (SYSTEM WIDE)**  
**(OPTIONAL)** A CONNECTION CAN BE MADE BETWEEN 24V OUT and CE INPUT to put the entire SmartZonePLUS System (ALL RZ1s and RZ4s connected to this EC1) in ECONOMY MODE. This means the EC-1 board will not make calls to the equipment unless the ZONE 1 Thermostat makes a call. All other zones besides ZONE 1 will be ignored, however the RZ1 and RZ4 dampers will still open and close as needed.  
**APPLICATION:** A simple timer could be used to put the entire system into economy mode after hours.



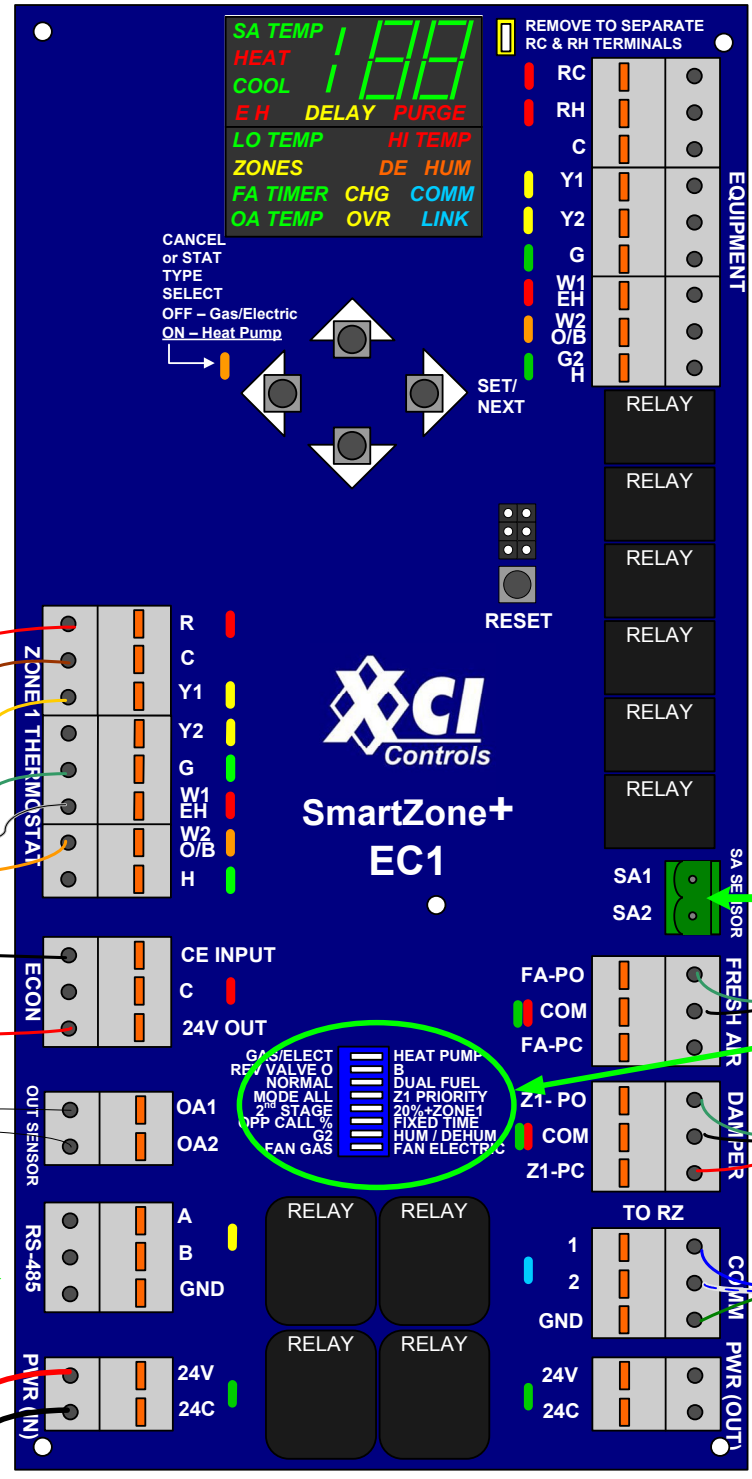
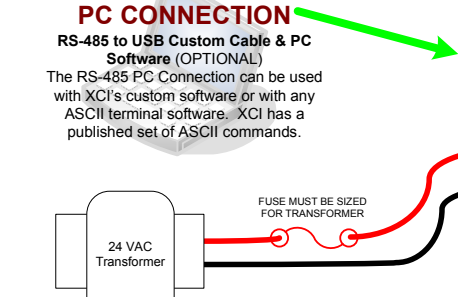
**OUTDOOR SENSOR (OAS)**  
**(OPTIONAL)** This optional accessory (SOLD SEPARATELY) is for informational purposes only unless the system is set to HEAT PUMP and DUAL FUEL (DIP SWITCHES 1 and 3 to the right). In the case of DUAL FUEL & HEAT PUMP, the OUTDOOR SENSOR will allow for HIGH and LOW Compressor cutout temperatures to be set in the menu. (HIGH and LOW Balance Points)  
The OUTDOOR SENSOR can also be used to control temperature limits for FRESH AIR Damper operation.



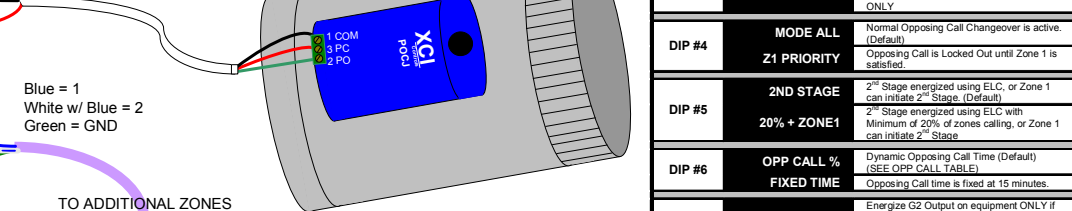
**POWER (24 VAC)**  
SmartZonePLUS System MUST BE POWERED WITH AN INDEPENDENT, FUSED TRANSFORMER. The size of this transformer(s) will be determined with the TABLE below.  
**NOTE:** Multiple transformers can be used to power the SmartZonePLUS system.

**TRANSFORMER SIZING TABLE**

SmartZonePLUS Device	Power Requirement
EC-1 Equipment Controller	14 VA
RZ-1 1-Zone Expander	10 VA
RZ-4 4-Zone Expander	14 VA
TSZ-2 TrueTouch Thermostat	3 VA
SZD Spring Return Damper	10 VA
POC Round POC Damper	3 VA



**ZONE DAMPER**  
2-Wire or 3-Wire Dampers  
Use 18 GAUGE Solid 2 or 3 Conductor wire.



**COMMUNICATIONS (COMM)**  
FOR CONNECTION TO ADDITIONAL ZONES  
**COMM LINK WIRE REQUIREMENTS:** UP TO 1000 Feet per System  
Cat5 (Category 5) Wire: 8 Conductor (4 Twisted Pairs) Solid (Only 2 Pairs used for COMM)

**DIP SWITCHES**  
Additional information can be found in SmartZonePLUS System Manual

DIP #1	GAS/ELECT HEAT PUMP	Gas/Electric or Electric/Electric Equipment (Default) Heat Pump Equipment ONLY
DIP #2	REV VALVE O B	Reversing valve is energized in COOLING (Default) Reversing valve is energized in HEATING
DIP #3	NORMAL DUAL FUEL	Operates electric auxiliary heat with compressor (Default) Operates gas auxiliary heat with NO compressor. USE IN HEAT PUMP MODE ONLY
DIP #4	MODE ALL Z1 PRIORITY	Normal Opposing Call Changeover is active. (Default) Opposing Call is Locked out until Zone 1 is satisfied
DIP #5	2ND STAGE 20% + ZONE1	2nd Stage energized using ELC, or Zone 1 can initiate 2nd Stage. (Default) 2nd Stage energized using ELC with Minimum of 20% of zones calling, or Zone 1 can initiate 2nd Stage
DIP #6	OPP CALL % FIXED TIME	Dynamic Opposing Call Time (Default) (SEE OPP CALL TABLE) Opposing Call time is fixed at 15 minutes.
DIP #7	G2 HUM / DE HUM	Energize G2 Output on equipment ONLY if 20% or more of the total zones calling for the mode currently running Choose HUM or DE HUM in the button setup menu (Zone 1 Thermostat controls Humidity)
DIP #8	FAN GAS FAN ELECTRIC	Fan energized 45 seconds after any heat call (Factory Default) Fan energized immediately with any heat call