



Zonesmart 5-Port Zone Controller System

Installation, Operation and Maintenance Manual



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All technical information subject to change without notice.

SAFETY INFORMATION

It is the responsibility of the installer to ensure the installation complies with all national and local building codes and standards, in addition to the instructions outlined in this manual. All applicable codes take precedence over any instructions made in this document.



This symbol indicates safety alerts. When you see this symbol on labels or in this manual, be alert to the potential for personal injury. Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which if not avoided, **will result in death or serious injury.**

WARNING indicates a **potentially** hazardous situation, which if not avoided, **could result in death or serious injury.**

CAUTION indicates a **potentially** hazardous situation, which if not avoided, **may result in minor or moderate injury.** It is also used to alert against unsafe practices and hazards involving only property damage.



WARNING - Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Only a qualified contractor, installer or service agency should install this product. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance.



CAUTION - This product must be installed in strict compliance with the installation instructions and any applicable local, provincial, state, and national codes including, but not limited to; building, electrical, and mechanical codes.



WARNING - FIRE OR ELECTRICAL HAZARD. Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. A fire or electrical hazard may result causing property damage, personal injury or loss of life.



WARNING – Boilers and water heaters being used in conjunction with the Zonesmart may contain hot water at 180°F. Parts containing water this hot can scald very quickly. Use extreme caution when servicing or performing maintenance on any parts containing hot water. To avoid severe burns, allow equipment to cool before performing maintenance.

INTRODUCTION

The Zonesmart add-on accessory provides intelligent air distribution to Ecosmart air handlers and supports up to 5 zones. Each zone is intended to service a floor/zone of the building with an associated local thermostat. For example: usually the 'master' thermostat would be located in the most commonly used space with 'slaves' located on/in other floors/zones.

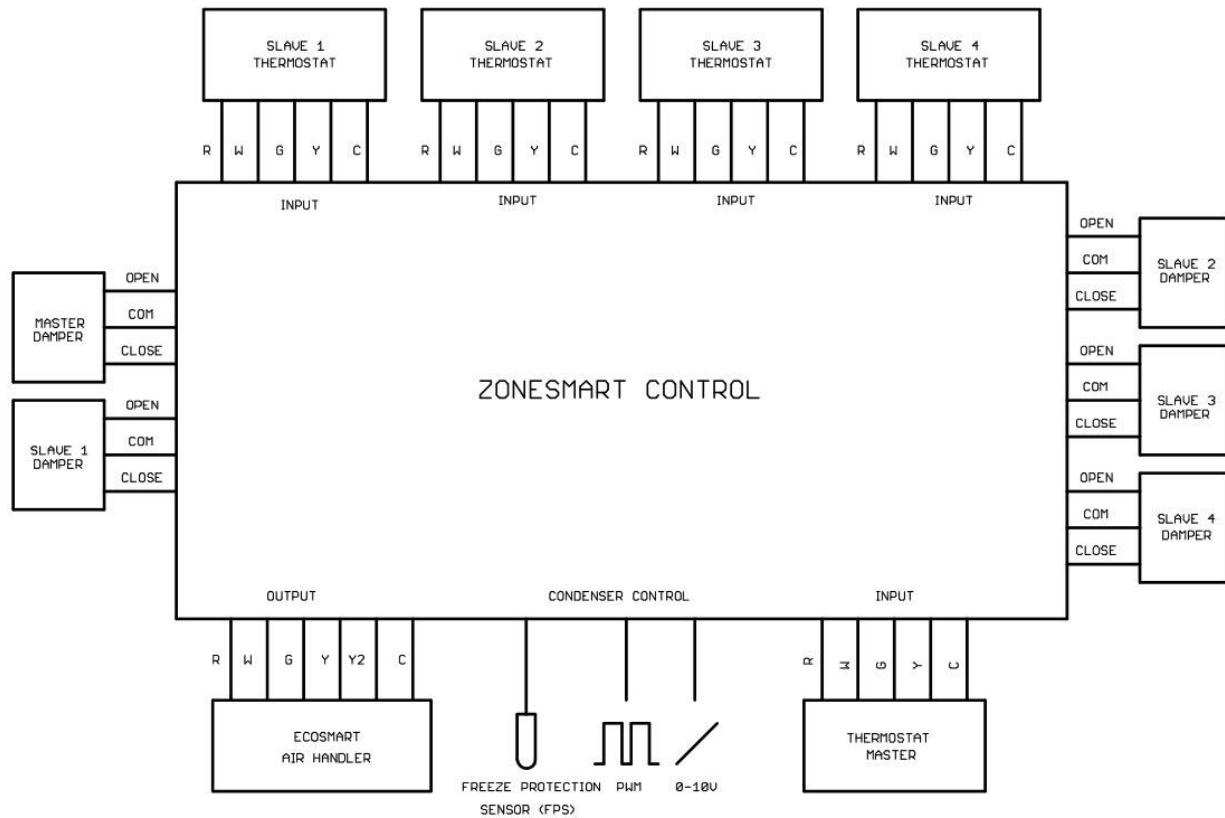
When mounting the zone dampers directly on top of the ecosmart, the standard single hole supplied top cover is replaced by a multi-port 2 or 3-hole cover (see Figure 2 – Zonesmart available multi-port top cover variations).

Alternatively, an open top remote variation (REM model) can be used with a standard rectangular plenum to which round duct is installed. The 6in or 8in dampers installed along the round duct can be located up to 50ft away from the Zonesmart controller.

FEATURES

- The Zonesmart consists of one 'master' and up to four 'slave' thermostats. The 'master' thermostat determines whether the system is in heat or cool mode and the 'slave' thermostats operate according to whichever mode the 'master' is in.
 - Any thermostat can initiate heating, cooling (based on 'master' selection) or fan via a 'first come first served' scheme. A zone call for heating or cooling will have priority over the fan function from any zone.
 - Thermostats for 'master' and 'slave' can be any normal variety without heat/cool anticipators. Zonesmart wiring supports R, W, G, Y, and C (for 'smart wi-fi-type' thermostats).
 - Supports standard, two stage and variable types of condensers using intelligent algorithms to prevent coil freeze up.
 - Dampers can be mounted to special top covers of Ecosmart air handlers or be remotely installed on take-off piping from the main plenum. Refer to Figure 2.
 - Simple and quick installation - dampers are connected to the Zonesmart controller using standard RJ11 telephone cables and can be located up to 50ft away.
- Each Zone can be 'doubled up' to drive two dampers using a common telephone line splitter plugged directly into the Zonesmart controller – (for example: one damper for supply air and another for return air).

BLOCK DIAGRAM



ZONESMART PART NUMBERS FOR ORDERING

Zonesmart can be ordered as a kit. Refer to Figure 1 – Zonesmart Nomenclature for ordering.

Each kit includes:

- Zonesmart controller
- top cover (refer to Figure 2 – Zonesmart multi-port top cover variations)
- dampers
- damper connecting cables
- ecosmart control cable
- freeze protection sensor

Zonesmart can be customized using the Line Items chart. Refer to Figure 3 – Zonesmart Line Items.



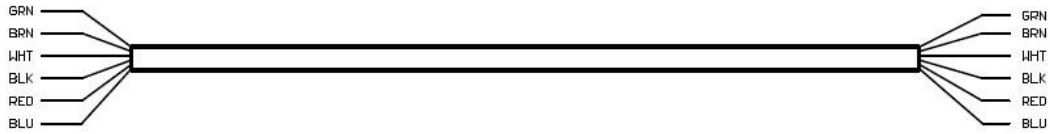
Zonesmart controller 5-port 22019 – Qty.1



Air duct damper 6in 22017 or Air duct damper 8in 22018 – up to Qty. 5



Cable assy. Zonesmart damper 7ft 20011, 25ft 20013 – up to Qty. 5



Cable assy. Zonesmart control 20010 – Qty.1



**Cable assy. Zonesmart freeze sensor 20012 – Qty.1
(includes Cable Tie 7.5" 19027 - Qty.2)**

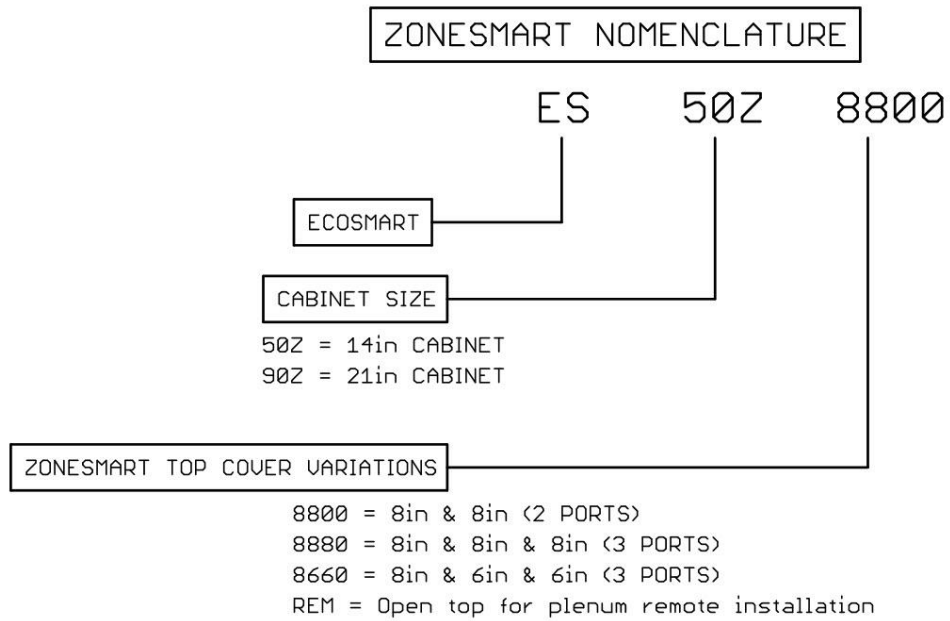


Figure 1 – Zonesmart Nomenclature

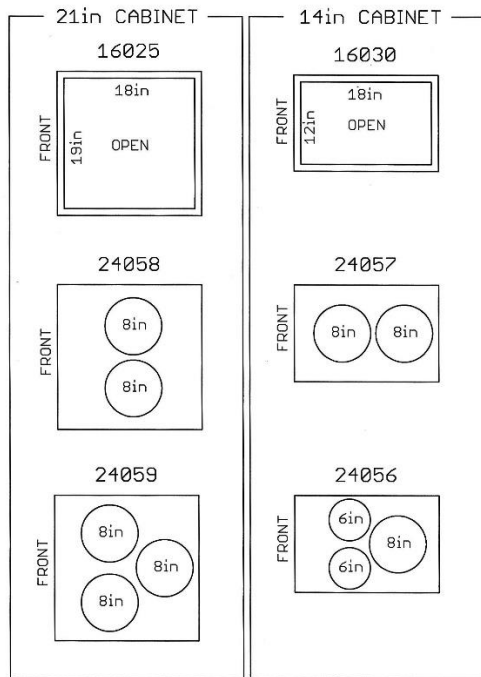


Figure 2 – Zonesmart multi-port top cover variations

P/N	Description
16066	Spin-on collar 6in
16067	Spin-on collar 8in
16068	Spin-on collar 10in
22017	Air duct damper set 6in
22018	Air duct damper set 8in
20011	Cable assy. Zonesmart damper RJ11 4-cond 7ft
20013	Cable assy. Zonesmart damper RJ11 4-cond 25ft
20014	Adapter RJ11 male to dual female
16030	Top cover square opening 14in
16044	Top cover HVP 14in 2x8in ports
16042	Top cover HVP 14in 2x6in, 1x8in ports
16025	Top cover square opening 21in
16046	Top cover HVP 21in 2x8in ports
16048	Top cover HVP 21in 3x8in ports
20010	Cable assy. Zonesmart control 10ft
20009	Cable assy. supply temp sensor 10ft
18017	Adapter double male-female 0.250"

Figure 3 – Zonesmart line items

ADDITIONAL EQUIPMENT REQUIRED

- Thermostats
- Low voltage thermostat wire (5 conductor) to connect thermostats to Zonesmart control

INSTALLATION

- Remove top panel from the HVP Ecosmart air handler if a multi-port top panel is required.
- Insert collars into multi-port top cover.
- Insert damper assemblies into collars.
- If dampers are to be remotely mounted, install rectangular plenum on REM type cover (dampers are installed on round ducting attached to rectangular plenum)
- Mount Zonesmart controller box.
- Connect Zonesmart to Ecosmart with cable assembly 20010 – refer to Zonesmart wiring at end of this manual.
- Dampers are connected with supplied 7ft telephone cables (optional 25ft cables are available). Cables up to 50ft may be used if installation requires.
- Thermostat: normal type with AUTO/FAN and COOL/OFF/HEAT functions.
- Connect 'master' thermostat to terminal block labelled 'Master Thermostat'. Master thermostat is usually located on the main floor of the building. Connect up to 4 'slave' thermostat(s) to terminal block(s) labelled 'Slave Thermostat(s)'. Slave thermostats are usually located on the other floors.
- Connect freeze protection temperature sensor 20011 to suction line of cooling coil with hose clamp provided. Insulate around sensor.

Installing two dampers per zone

A telephone cable splitter may be used to connect two dampers to the same port on the control board. This feature allows supply and return airflow to be controlled simultaneously resulting in better air control within a zone.

OPERATION

On powerup, the Zonesmart goes through an initialization process as follows:

- All 5 dampers open fully – takes about 1 minute.
- If no thermostats are calling, dampers will close according to the value specified in Table 1.
- When initially energized after installation, the Zonesmart starts up in heating mode.

- **The ‘master’ needs to be run in heat or cool mode momentarily for the Zonesmart to recognize and store the current mode of operation. The information is permanently stored. In the event of a power failure the control will start up in the last mode of operation prior to the power failure.**

- All of the thermostats operate equally on a ‘first come first served’ basis.
- The ‘master’ determines whether the system is in heating or cooling mode.
- Master and slave thermostats independently control their own dampers.
- The Zonesmart utilizes a dynamic control strategy and the power does not have to be cycled on and off for the changes to take effect. Changes take effect in about 10 seconds.
- Heating and cooling take priority over fan operation.

HRV INTEGRATION

Heat Recovery Ventilator (HRV) can be integrated into the system by connecting the HRV dry contacts to the G and R thermostat connection for one of the zones. It is recommended to connect the HRV to the thermostat controlling the largest zone.

HRV connection can be made in parallel to an existing zone thermostat or to a zone that is unused. For example, if 3 zones are used, the HRV can be connected to the zone 4 or 5 thermostat connection using just G and R.

When the HRV turns on during its ‘timed on’ period, the fan function of the ecosmart air handler will turn on to distribute fresh air within the ducting. If the ecosmart is already heating or cooling, the fan will already be on.

CLOSE SWITCH

There may be up to 10 dampers (2 per zone) installed in a system. Each zone may be independently set by selecting one of four 'close' settings (3 partially open amounts to fully closed) using a dedicated DIP switch per zone. See Table 1 below.

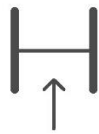
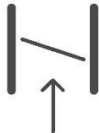
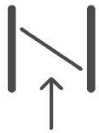

AIR FLOW	DAMPER	SWITCH 1	SWITCH 2
	Fully Closed	ON	ON
	62% Closed	OFF	ON
	33% Closed	ON	OFF
	18% Closed	OFF	OFF

Table 1 – Amount dampers 'close'

System Off

Master/slave thermostats are 'off' or not calling. Zone dampers are set to the desired closed position. Ecosmart is off.

Fan

Master/slave thermostats set to 'fan'.

- Any thermostat with fan 'on' starts the fan on the Ecosmart. Any thermostat that has fan 'on' has its damper open; other thermostats with fan on 'auto' have their dampers closed as per their set closed positions Table 1.

Freeze Protection

Zonesmart supports standard, two stage and variable speed 'inverting' condensers. A freeze protection sensor is attached to the suction line of the cooling coil and monitors temperature to prevent freeze up.

OPTION SWITCH

Option switches 1 and 2 determine the type of condenser being used.

Switch 3 forces all dampers to the open position when calibrating HVP ecosmart. (Thermostats are non-functional in this mode). After calibration set, switch 3 to the OFF position.

OPTIONS	SWITCH 1	SWITCH 2	SWITCH 3	Notes
Standard condenser	OFF	OFF	X	Condenser runs when Y is energized
Two Stage Condenser	ON	OFF	X	Condenser runs on high when Y is energized and low when Y2 is energized
Variable 'inverter' condenser	OFF	ON	X	Condenser is variably controlled by PWM duty or 0-10V command
Force all dampers to open position	X	X	ON	Used when calibrating HVP ecosmart Thermostats inoperable

Table 2 – Condenser Options (X = Does not matter)

CONDENSER FREEZE PROTECTION

Standard Condenser Freeze Operation

Condenser is controlled locally using a standard freeze stat wired between 'Y' and condenser contactor.

Operation as follows:

- Freeze stat attached to cooling coil suction line and insulated.
- Below 35°F, condenser turns off.
- Above 50°F, condenser turns on.

- When thermostats are satisfied, dampers close after 30 seconds, allowing time for the Ecosmart to extract all the stored energy prior to shut down.

Two Stage Condenser Freeze Operation

Condenser is controlled using Zonesmart freeze protection sensor mounted to cooling coil suction line and insulated.

Operation as follows:

- Above 50°F, Zonesmart switches to 'Y' for cooling (high rate of cooling).
- Below 40°F, Zonesmart switches to 'Y2' for cooling (low rate of cooling).
- When thermostats are satisfied, dampers close after 30 seconds, allowing time for the Ecosmart to extract all the stored energy prior to shut down.

Variable 'Inverting' Condenser Freeze Operation

Condenser is controlled using Zonesmart freeze protection sensor mounted to cooling coil suction line and insulated.

Depending on the type of interface required by the variable condenser, the Zonesmart provides two control output interfaces which operate simultaneously.

1. A PWM (Pulse Width Modulation) digital output varying from 0 to 100% duty
2. A 0-10V analog output varying from 0V to 10V

Operation as follows:

- Under normal operation, Zonesmart outputs 100% duty PWM and 10V to the condenser which runs at its full rate.
- Once the cooling coil suction temperature goes below 40°F, Zonesmart begins to reduce the PWM and output voltage while monitoring the temperature. The PWM reduces to 10% duty and the voltage reduces to 1 volt.
Once the temperature rises above 40°F, the Zonesmart will start to increase the PWM and output voltage, allowing the condenser to operate between 10-100%. This prevents potential freeze-up if airflow is reduced due to outlets being closed.
- If the cooling coil suction line temperature goes below 32°F, while the condenser is operating at its lowest rate, the Zonesmart reduces the PWM to 0% duty and output voltage to 0V. This shuts off the condenser as the cooling coil will begin to freeze.
- When thermostats are satisfied, dampers close after 30 seconds, allowing time for the Ecosmart to extract remaining heat prior to shut down.

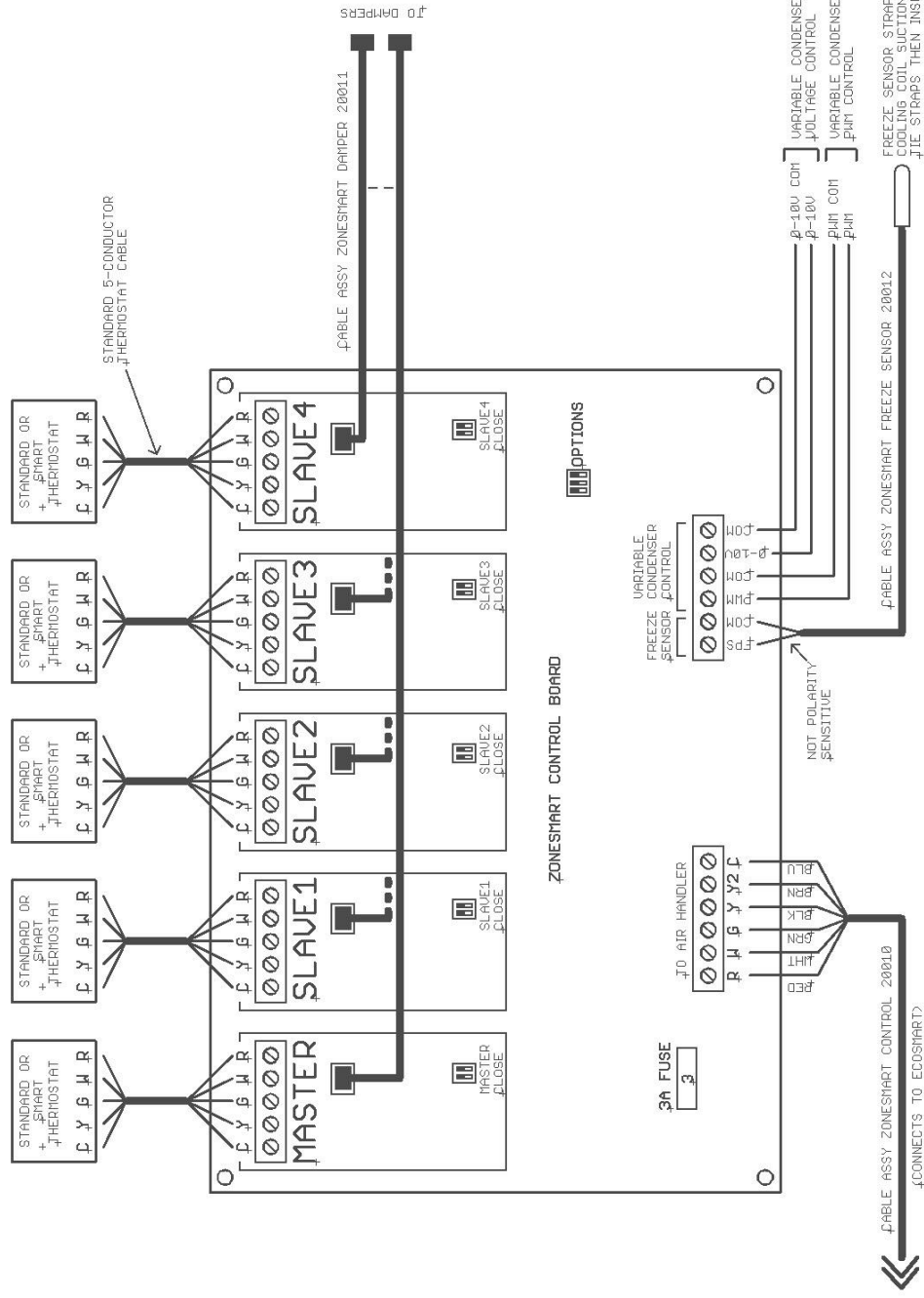
TROUBLESHOOTING

- Dampers include a pointer which moves from left to right. Each damper is marked with 'closed' and 'open' to show the status of the damper. Allow sufficient time for the dampers to complete their moves.
- Upon initial system start up, all dampers will open sequentially and then will be set as required by thermostats – operating mode defaults to heat. Wait until complete - this may take a while.
- Heat or cool mode is permanently stored in memory within the Zonesmart. In the event the power is interrupted after the master has been 'trained' (operated momentarily in heat or cool mode) after start up - see Operation section. The Zonesmart control will re-start in its last stored mode.

WARRANTY

Warranty is 1 years' parts.

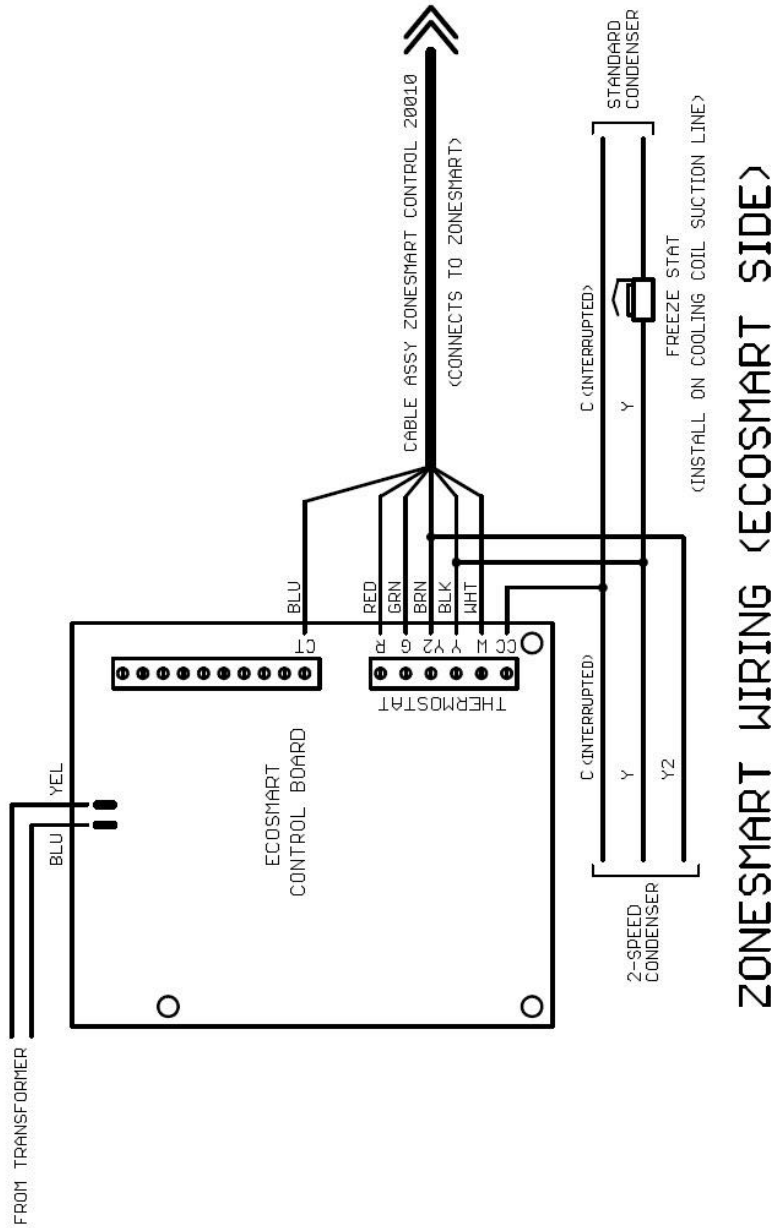
ZONESMART WIRING



FREEZE SENSOR MUST BE INSTALLED FOR CORRECT OPERATION EVEN IF COOLING IS NOT INSTALLED

ZONESMART WIRING (ZONESMART SIDE)

Note: The Zonesmart controller requires constant 24VAC power from the Ecosmart to operate correctly. A constant 'C' connection is achieved by connecting the blue wire of control cable 20010 to the terminal marked 'CT' as shown below.



ZONESMART WIRING (ECOSMART SIDE)