

RCS

MODEL ZC2S

2 ZONE HVAC CONTROL UNIT

INSTALLATION AND OPERATION MANUAL

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Introduction

The ZC2S two zone HVAC Control Unit allows 2 standard electronic thermostats to connect to a single heating and cooling HVAC mechanical system. It provides two independent “zones” of temperature control by controlling the mechanical system and motorized dampers in each zone.

The ZC2S is for use with any residential style standard gas or electric heating HVAC system up to 5 ton capacity. The control unit supports one stage heating and one stage cooling systems.

The two zones are truly independent and can be in either heating or cooling modes. The control unit features auto changeover from heating to cooling modes and gives heating calls priority.

The ZC2S operation is fully automatic and transparent to the user. Each zone thermostat provides the complete and independent control for that zone. You can think of each zone as having a separate heating/cooling system with its own thermostat.

Each zone **Thermostat** determines the operation of the heating and cooling system so you should refer to your **Thermostat Manual** for information on how to “operate” the system.

Thermostats for use with the ZC2S

The ZC2S works with most ELECTRONIC thermostats (Honeywell, White Rogers, Lux). Use only thermostats that are either **battery operated** or that use **both sides of the 24VAC power** (*they have R and C terminals*) from the HVAC system

DO NOT USE POWER STEALING THERMOSTATS!

Typically these thermostats “steal” power from the “W” or Heat connection on the HVAC system. **THESE WILL NOT WORK WITH THE ZC2S ZONE CONTROL UNIT.**

It is also recommended that you do not use older style mechanical thermostats that use “anticipator” circuits as these will not function properly.

Thermostats connect to the zone control unit terminals the same as they would connect to the HVAC system.

Zone Dampers for use with the ZC2S

The ZC2S provides independent control of temperature by regulating the flow of conditioned air to the zones by motorized dampers. The system uses two position, on/off control.

The controllers are designed to work with **normally open**, two position, spring return, 24VAC, 2 wire motorized dampers, such as the *RCS RD Series* of round motorized dampers. These dampers draw .5A each.

Normally open dampers are used to provide fail-safe operation, assuring condition air will be available even if a damper motor fails. When zone 1 calls for heating or cooling, the zone 2 damper closes.

Maximum rated current for all dampers is 1 Amp. (typically 2 dampers).

HVAC Systems Compatibility

The ZC2S is designed to work with most standard gas/electric residential style heating and cooling systems and provide the following outputs to the HVAC system.

One stage of heating: W output

One stage of cooling: Y output
Fan: G output

The Fan output is selectable for normal gas heating system operation with no fan output with heat calls or for electric heating systems which require fan output with heat calls.

The controllers connect to the HVAC systems at their standard thermostat connections and function just like a thermostat to the system. Consult your HVAC thermostat wiring diagram for verification of compatibility with the zone control units.

Thermal Equalizer Feature

The ZC2S version of the controllers includes the exclusive patented *THERMAL EQUALIZER* feature. This is used in two story, forced air applications to reduce the effects of heat stratification. Heat rises naturally and during heating cycles the upstairs zone tends to overheat. This loss of heat to the upstairs keeps the downstairs zone cooler and calling for more heat. This process continues until the upstairs is uncomfortably hot and the downstairs is still calling for more heat.

To balance this natural phenomena, the *THERMAL EQUALIZER* feature will monitor the length of time the heat has been calling downstairs and after a selectable time period, will stop the heat call and recycle the overheated upstairs air back down to the downstairs zone. This "equalizer cycle" will reduce the heat buildup upstairs and put the heat back downstairs where it is still needed. The net effect is a more comfortable temperature in the upstairs zone and an energy saving reuse of the excess heat in the downstairs zone.

The Thermal Equalizer feature monitors Zone 1 for heat run times and this zone must be the "downstairs zone". When the Thermal Equalizer cycle is on, the Zone 2 damper will be closed and the high speed fan turned on. Zone 2 must be the "upstairs zone" when using the Thermal Equalizer feature.

Short Cycle Protection Delay

The ZC2S control unit provide a 5 minute delay between successive compressor operations for short cycle protection. This delays one zone from calling for compressor operation shortly after another has stopped and prevents potential damage to the compressor due to rapid off-on cycling. Most thermostats also have built-in short cycle protection delays, so remember these compressor cycle delays are normal when trouble shooting the system. For testing purposes, you can reset the controller's 5 min delay by removing power from the controller.

Status Led

The status LED will flash one time every second for normal operation. During certain other modes of operation the LED will flash differently to indication these modes. See table below.

LED Flash Modes

One Flash	Normal Operation
Two Flashes	Equalizer Cycle On
Three Flashes	Short Cycle Protection Delay On. (Compressor output inhibited)

Installation

Install the controller near the HVAC mechanical system or in a convenient indoor service location, such as the garage, basement, closet or utility room.

Mount the controller to the wall or structural bracing. Mounting the controller onto the HVAC unit is possible but generally not desirable due to the potential for excessive vibration and heat.

Wiring

Thermostats. Use standard 18GA thermostat wiring to connect the thermostats to the controller and the controller to the mechanical system.

Dampers. Zone damper outputs provide 24VAC at 1 Amp maximum to the dampers. Use 18 gauge thermostat wire for the dampers.

Power

ZC2S Control Units are powered from the HVAC system's 24VAC R and C (common) terminals. No external transformer is required. Total damper draw must be limited to 1 Amp per zone.

Fuse

The controller is supplied with a 2AG style 2 Amp fuse.

Thermostat Wiring

Connect the zone thermostats to their respective zone input terminals, J1 & J2. Both the 24VAC Common (C) and 24VAC (R) power is available at these terminals. Only the 24VAC (R) terminal is required for proper input from the thermostats. The 24VAC Common (C) is provided for thermostats that require power from the system.

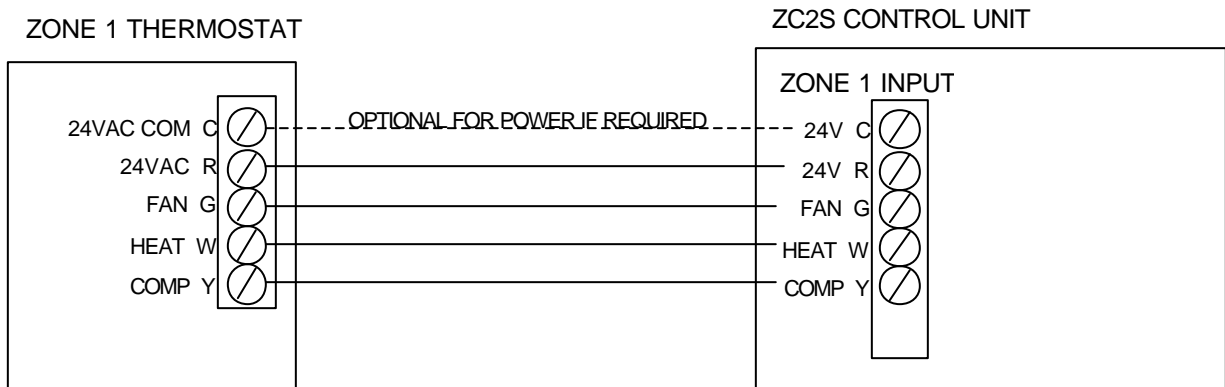


FIG 1. WIRING THERMOSTATS TO THE CONTROLLER

HVAC System Wiring

The ZC2S control units connect to the HVAC mechanical systems at the normal thermostat connections on the HVAC indoor units.

WIRING FOR STANDARD HVAC SYSTEMS

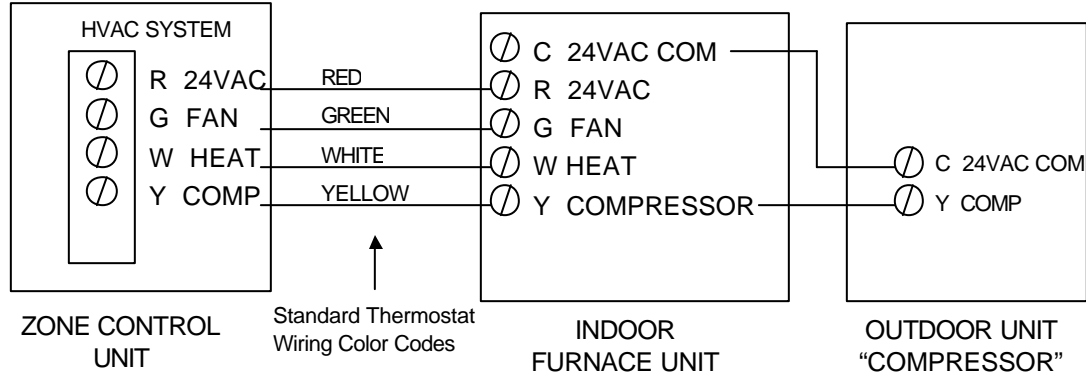


FIG 2. WIRING ZONE CONTROL UNIT TO STANDARD HVAC SYSTEM

Control Unit Setup: Dipswitch Settings

The control unit has a configuration dipswitch, SW1. Set the dipswitch as follows.

SW1 Position 1: Test Mode (For service technician use only, do not run in test mode)

Select OFF for Normal operation. All delays normal.

Select ON for Test mode to reduce delays to 10 seconds and shorten run times to one minute to facilitate system checkout and troubleshooting.

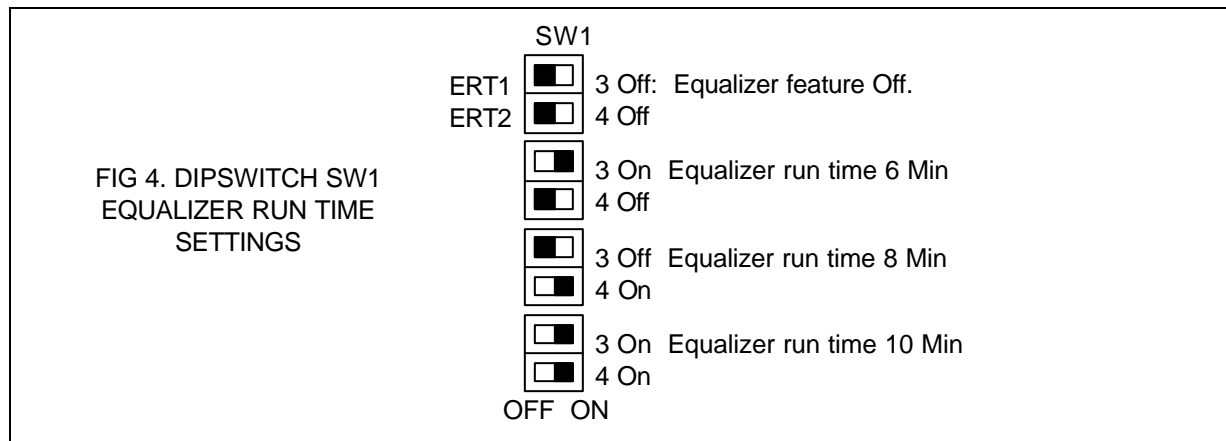
SW1 Position 2: Fan Mode Select

Select OFF for Standard Gas systems (no fan with heat calls)

Select ON for Electric Heating systems (fan with heat calls)

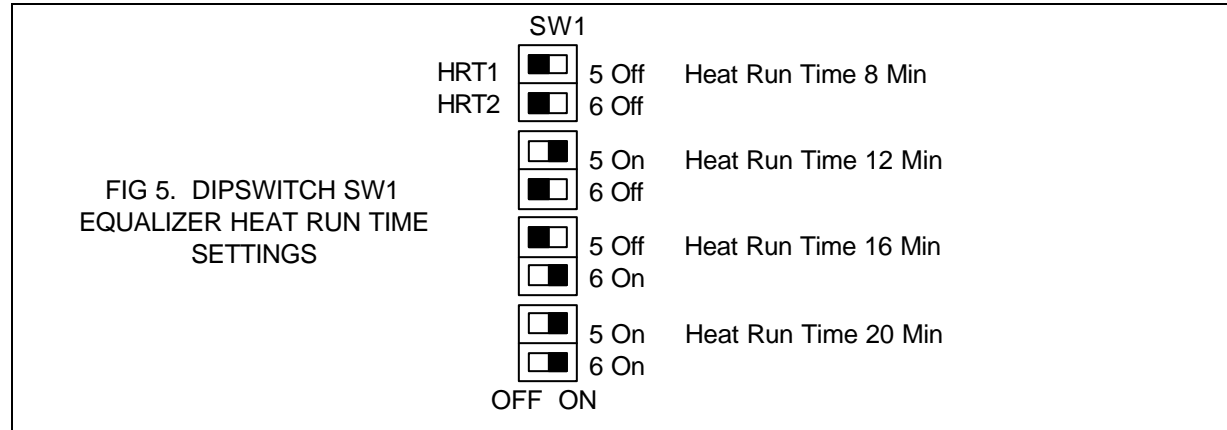
SW1 Position 3& 4: Thermal Equalizer Mode Select

These two dipswitch positions determine the length of time the equalizer cycle will run after it has been tripped on by the Heat Run Time timeout.



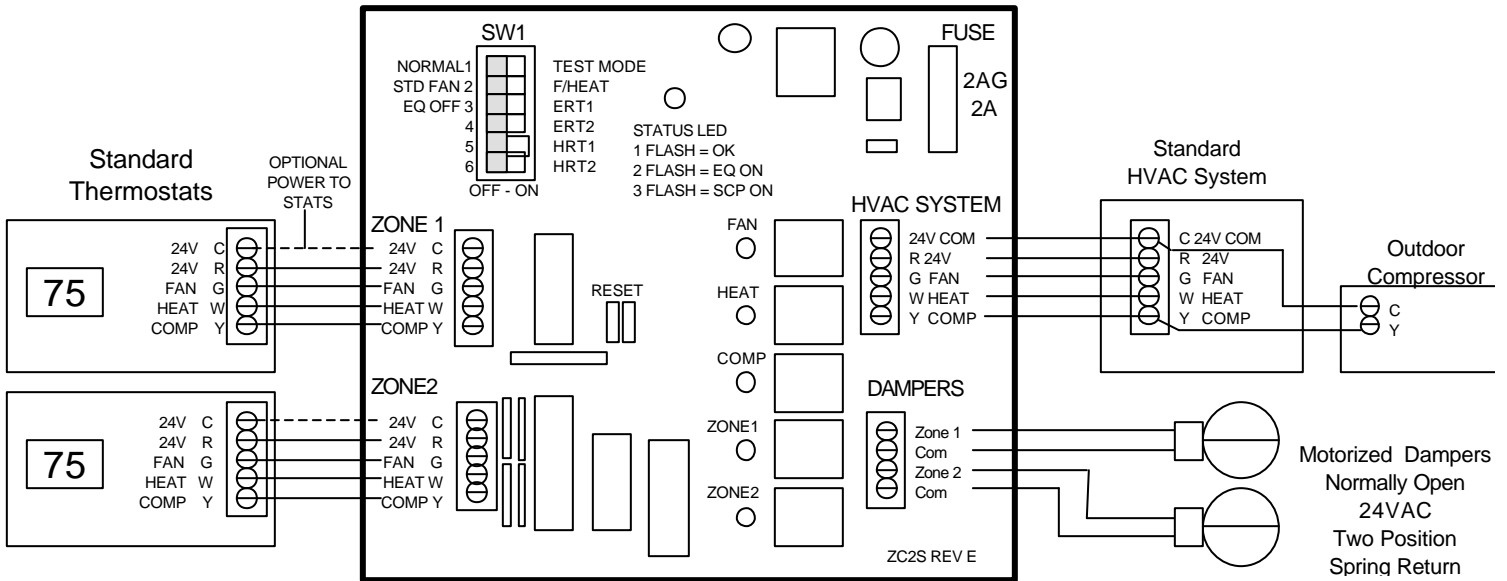
SW1 Positions 5 & 6: Thermal Equalizer Heat Run Time Mode Select

These two dipswitch positions determine the length of time that a Zone 1 Heat Call can be on before it times out and is interrupted by an equalizer cycle.



WIRING DIAGRAM

- For Standard Thermostats
- For Standard HVAC Systems
- One Stage Heat, One Stage Cool
- Thermal Equalizer Feature



STATUS LED: The status LED shows normal operation by flashing slowly. If the Status LED is not flashing, check power/fuse. Two flashes indicate that the Equalizer run cycle is on. Three flashes indicate that the Short cycle protection is on.

SHORT CYCLE PROTECTION (SCP) DELAY. The control unit protects the compressor from short cycling by a 5 minute delay at the end of every compressor "run" cycle. The Status LED will flash rapidly three times to indicate SCP delay is active.

Dipswitch Settings:

<p>SW1-1 TEST MODE</p> <p>1 <input type="checkbox"/> OFF = NORMAL OPERATION</p> <p>1 <input checked="" type="checkbox"/> ON = TEST MODE- ALL DELAYS CANCELED</p>	<p>SW1-2 FAN MODE SELECT</p> <p>2 <input type="checkbox"/> OFF = Gas Systems. NO fan w/heat</p> <p>2 <input checked="" type="checkbox"/> ON = Electric Systems. Fan w/heat</p>
<p>SW1- 3 & 4 EQUALIZER MODE SELECTION</p> <p>3 <input type="checkbox"/> Equalizer OFF</p> <p>4 <input type="checkbox"/> Equalizer Run Time = 6 Min</p> <p>3 <input checked="" type="checkbox"/> Equalizer Run Time = 8 Min</p> <p>4 <input type="checkbox"/> Equalizer Run Time = 10 Min</p>	<p>SW1-5 & 6 HEAT RUN TIME SELECTION</p> <p>5 <input type="checkbox"/> Heat Run Time = 8 Min</p> <p>6 <input type="checkbox"/> Heat Run Time = 12 Min</p> <p>5 <input checked="" type="checkbox"/> Heat Run Time = 16 Min</p> <p>6 <input type="checkbox"/> Heat Run Time = 20 Min</p> <p>Note: There is a 2 Min Minimum Heat Run Time (MHRT). If the Heat Call is terminated during this period, no Equalizer cycle will be started at the end of the call. If the Heat Call last longer than the MHRT, but less than 8 Min, then an Equalizer cycle will be started at the end of the call.</p>