

# DIY Zoning: Total Control

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## 1. Making the system completely operational

### 1.1. LAST WARNING

**Warning:**

Abandon hope, all ye who enter here.

If you made it this far, you definitely know what you are doing. There's just this pesky issue of dealing with real world and its issues. Mostly, these issues boil down to the following quotation:

*What we do not understand, we fear. What we fear, we destroy.*

Like it says in the [prerequisites](#), if you decide to install the hardware that controls your HVAC unit, and, God forbid, connect it to your HVAC unit, you're looking for trouble. Your HVAC servicemen will look funny at you. They, in turn, may make your home warranty company look funny at you. As well as manufacturer warranty supervisor. As a result, you may lose the warranty on your equipment, and, what's even worse, have an insurance fraud lawsuit against you filed by your home warranty company. So let me repeat again, in bold letters:

**Warning:**

Connecting a device other than "approved" thermostat to your HVAC equipment will get you in trouble with your HVAC contractors and/or servicemen. Consequently, this may cause problems with your home warranty company, if you have one, as well as problems proving that you did not violate the factory specifications and thus didn't void your HVAC unit manufacturer's and/or installers warranty.

**Warning:**

YOU MUST UNDERSTAND THE CONSEQUENCES AND TAKE RESPONSIBILITY. IF YOU DO IT, YOU'RE ON YOUR OWN. IF IT BREAKS, YOU KEEP BOTH PIECES.

Now that we're done with formalities, let's get down to business.

### 1.2. Choosing the right hardware

Depending on the kind of HVAC unit that you have, you may choose to select different hardware to control it. The (known) options are: 1-Wire® serial and USB.

#### 1.2.1. 1-Wire®

This option uses 1-Wire® switches (DS2406 or DS2408) combined with optoisolators and triacs, or a plain relay.

An advantage is low cost, a disadvantage is that they can't really be represented as an integral device, but as a collection of switches.

### 1.2.2. Serial Devices

Custom devices (such as a DTR controller made by Tim Small) as well as existing devices such as X10 fall into this category.

An advantage is that the devices are integral (from the business logic point of view), a disadvantage is that they can't be autoprobed.

### 1.2.3. USB Devices

There are some nifty USB devices that allow to control high power currents, but none of them seem to be available at the moment.

An advantage is that the devices are integral, a disadvantage is that the USB specs don't allow a cable to be longer than a few meters, so you will either have to place the computer running DZ next to your HVAC unit (which is not entirely unreasonable), or have longer 24VAC wire runs from the HVAC unit to your computer.

#### FIXME (VT):

Need to add the schematics... Some are available at [Sensor Network](#) page.

## 1.3. Connecting DZ to your HVAC unit

#### Warning:

It is highly recommended to make sure that the original thermostat can be plugged back in in a matter of seconds. Best way to achieve this is to connect a male 10 pin connector to the thermostat and to DZ control unit, and female connector to the cable that goes to the HVAC unit (has to be female because of 24VAC in it, whereas thermostat doesn't provide any voltage).

First of all, you have to understand how the HVAC unit is controlled.

#### Warning:

Information provided here is a guideline. Not all the unit and thermostat manufacturers follow the same standards, and there are proprietary connectors as well. Check your connector and talk to a HVAC professional before attempting to do anything. In particular, Lennox and Rheem/Ruud systems are known to do that. Stop and investigate if you see a terminal marked W1 or W2 - these are usually not standard at all.

A typical thermostat connector looks like this:

Symbol	Wire Color	Function
C	Black?	Common. <b>Not a ground!</b>
R	Red	Return. 24V AC.
Mode Switches		
B	Blue	Engage heat mode.
O	Orange	Engage cool mode.
Function Switches		
G	Green	Call for fan.
Y	Yellow	Call for cool.
W	White	Call for heat.

**Table 1: Typical thermostat connector**

For multistage units, there will be Y2, W2. Sometimes, there's a HUM input to connect the humidifier. And again, this chart may be completely off if the connector is proprietary, such as Carrier Infinity (just 4 wires, function unknown).

**Note:**

The unit is controlled by closing dry contacts between the control wires and return. The predominant nature of the load is inductive, so the contacts must be protected, whether they are relays or solid state switches.

**FIXME (VT):**

Have to write the rest of this section.

## 2. Next Step

Lo and behold, you've finished the installation. Now, let's try to think outside of the box.

Proceed to [Beyond Installation](#).

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