



# Nest Learning Thermostat 3rd Generation Stuck On

Nest Learning Thermostat with Caleffi Z-One Relay ZSR-106 Multi-Zone Pump Control requires a common (C) wire

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## INTRODUCTION

I have a hot water radiator system for heating in my house. The house is divided into multiple zones. Each zone has a thermostat that controls a valve to turn on hot water to the radiator in that zone.

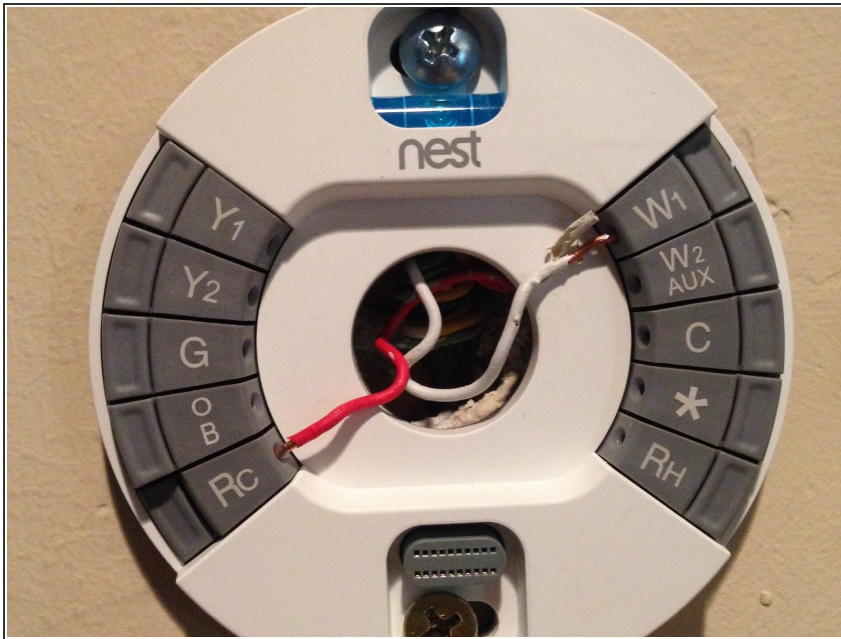
These valves are controlled by a Caleffi Z-One Relay ZSR-106 Multi-Zone Pump Control. Other models in this family include ZSR-103, ZSR-104, which I expect will operate in the same way.



### TOOLS:

- [Wire Stripper](#) (1)
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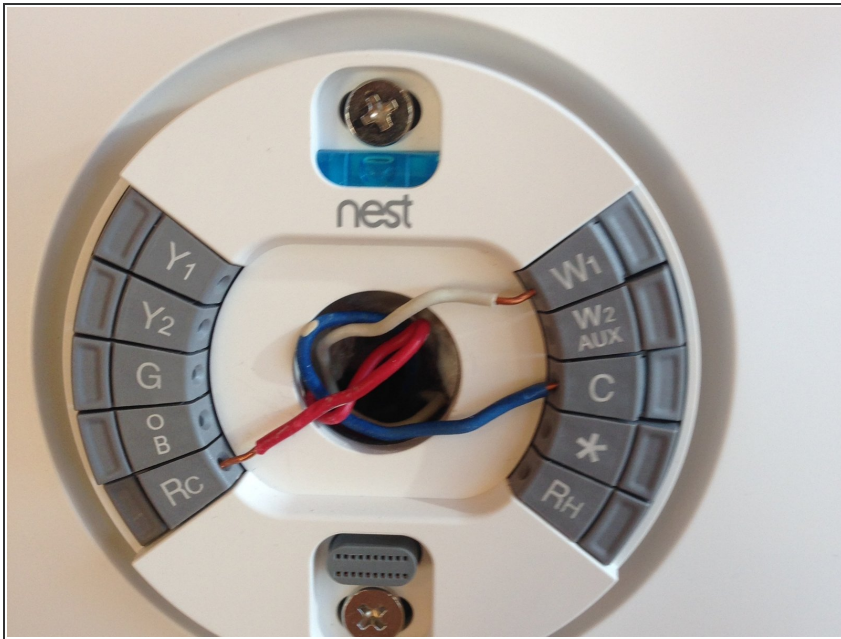
## Step 1 — The Problem



- The existing thermostat was a two-wire installation using only R and W wires. To turn heat on, it connected R (24VAC power) to W (heating).
- The Nest Thermostat has an internal battery that needs to be charged. If only two wires are connected it steals power from these lines. For some installations, it doesn't draw enough current to turn the heater on. Unfortunately, in my installation it draws too much current.
- The Nest Base also uses power and steals it from two-wire installations. In my case, simply plugging in the base ***WITHOUT THE THERMOSTAT*** was enough to activate the heater.
- I had thought the Nest Base was passive and simply connected wires together. But this is **NOT** the case. It has a power supply, and integrated circuits, so it requires power too.
- This meant the heater was always running even when the Nest Thermostat said it was not.



## Step 2 — The Solution



- The solution is to add a C wire, also called a common or ground wire.
- The Nest Thermostat and Nest Base can use power between R and C and not affect the W (heating) wire.
- Fortunately, in my installation, the wire used actually had three conductors. So I just had to strip and connect the third wire.
- Also fortunately, the Caleffi ZSR-106 has a terminal for C, it just wasn't wired up. So it was a simple matter to strip and connect the third wire on this side too.

## Step 3 — Other Problems



- In searching for a solution to my problem, I came across a few other issues:
- In a two-wire installation, if the heater never turns on (eg. during the summer), the battery in the Nest Thermostat can go flat. So the Nest Thermostat will **TURN ON THE HEAT**, just to charge the battery.
- This problem is also solved with a three-wire installation (adding a C wire).
- Another problem might occur if you try to put too many Nest Thermostats on the same power transformer. The Nest Thermostat uses a lot of power when it is charging its battery, so this adds up. I didn't have this problem, so I can't speak to it.
- I only tried this with a 3rd generation Nest Thermostat. I expect other versions are similar, but I haven't tried them.

To reassemble your device, follow these instructions in reverse order.