

# **GHK12X2 GREENHOUSE CONTROLLER**

## **Installation Manual**

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## Installation Overview

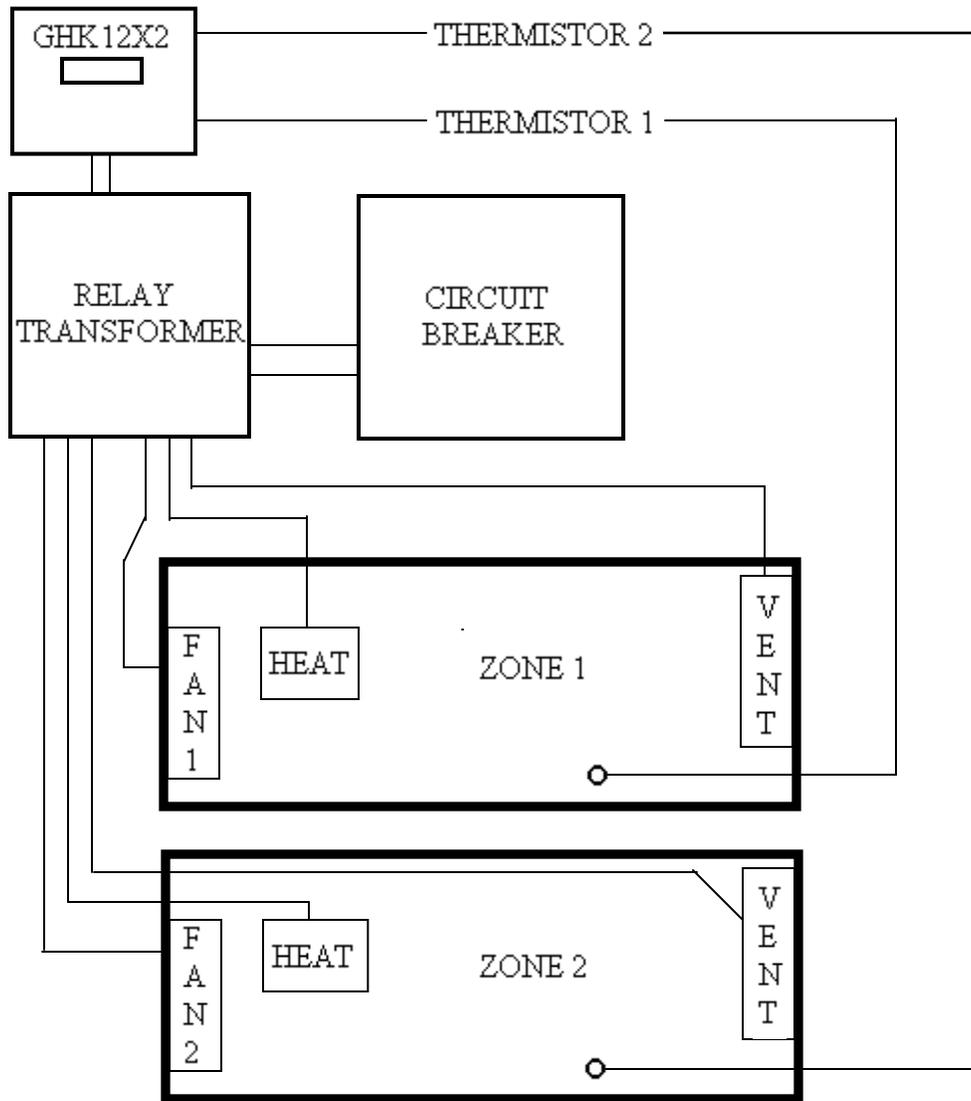


Figure 1

A typical installation consists of a circuit breaker box, relay/transformer box and a GHK12x2. The circuit breaker box provides overload protection. The relay/transformer box switches line power to the appliances. And, the GHK12x2 senses temperature and provides control signals.



**BE SURE ALL POWER IS OFF BEFORE INSTALLATION!**

INSTALLATION SHOULD BE DONE BY A LICENSED ELECTRICIAN.

BE SURE ALL WIRING AND EQUIPMENT IS INSTALLED ACCORDING TO LOCAL ELECTRICAL CODES.

THE GHK12X2 IS A LOW VOLTAGE DEVICE. LIMITED TO 24V AC CONTROL VOLTAGES.

**CAUTION:** The GHK12X2 is designed to be reliable but as with all equipment, failures do occur. Therefore, in situations where loss could result from the failure of the GHK12X2, separate backup thermostat or alarm systems should be installed.

The reliability and performance of the GHK12X2 can be compromised by locating the controller in direct sunlight or in direct water spray.

## PLACEMENT AND MOUNTING

Mount the GHK12X2 in an easy-access location. Usually close to the breaker box and relay box. Protect it from direct sunlight for better reliability and readability. Moisture can cause corrosion and premature failure, so avoid direct water and have all wires enter and leave through liquid-tight connectors, waterproof conduit, or seal the wires with silicone sealant.

### WARNING:

Some sealants release acetic acid while curing. Be sure sealant is completely cured (up to 3 days) before closing control box to avoid corrosion damage. All openings for wiring should be in the bottom of the box when mounted.

To mount the GHK12X2, remove the front cover and unplug ribbon cable from the relay board. Insert the 4 self-drilling screws provided with the GHK12X2 through the 4 screw-hole knockouts and fasten the box to the wall. Cover the screw heads with plastic cups provided. After all wiring is complete and any sealant cured, reattach the ribbon cable and screw on the front cover.

As an alternative, you can mount the GHK12X2 with drywall screws placed through the corner holes of the box.

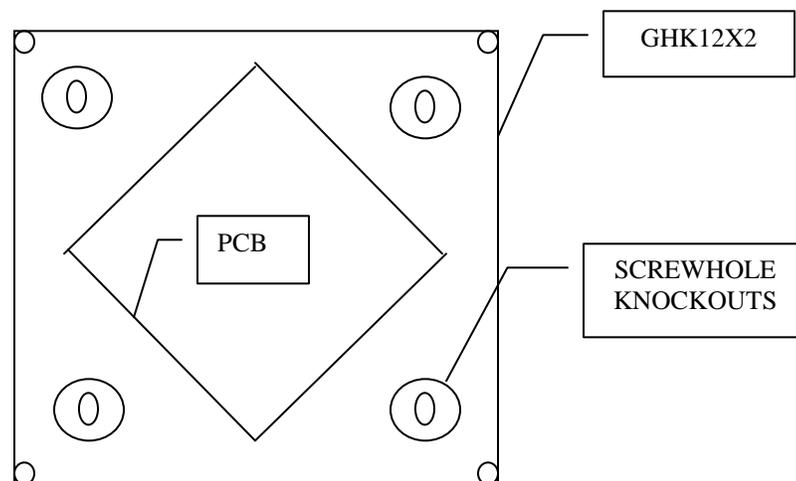


Figure 2

## GHK12X2 OUTPUTS

### OUTPUT SPECIFICATIONS

OUTPUT	CONTACT TYPE	VOLTAGE RATING	CURRENT RATING
HEAT	OPEN/CLOSED OR SOURCE 24V AC	24V AC	2A RESISTIVE LOAD
COOL HAF TIMER	SOURCE 24V AC	24V AC	2A RESISTIVE LOAD
ALARM	OPEN/CLOSED	24V AC	2A RESISTIVE LOAD

All cool, horizontal airflow (HAF), and timer outputs, source 24V AC to drive a relay or contactor. The GHK12X2's drive relays are rated at 2A when driving a resistance load. For reliability, snubber circuits are on each output. For even greater reliability, load currents on the GHK12X2's relays should be less than 1A (24 VA load or less).

### OUTPUT CONFIGURATION

Each 24 VAC output has a contact that is common to 24VAC input line 2 (24L2) and a contact that is 24VAC line 1 switched through a relay.

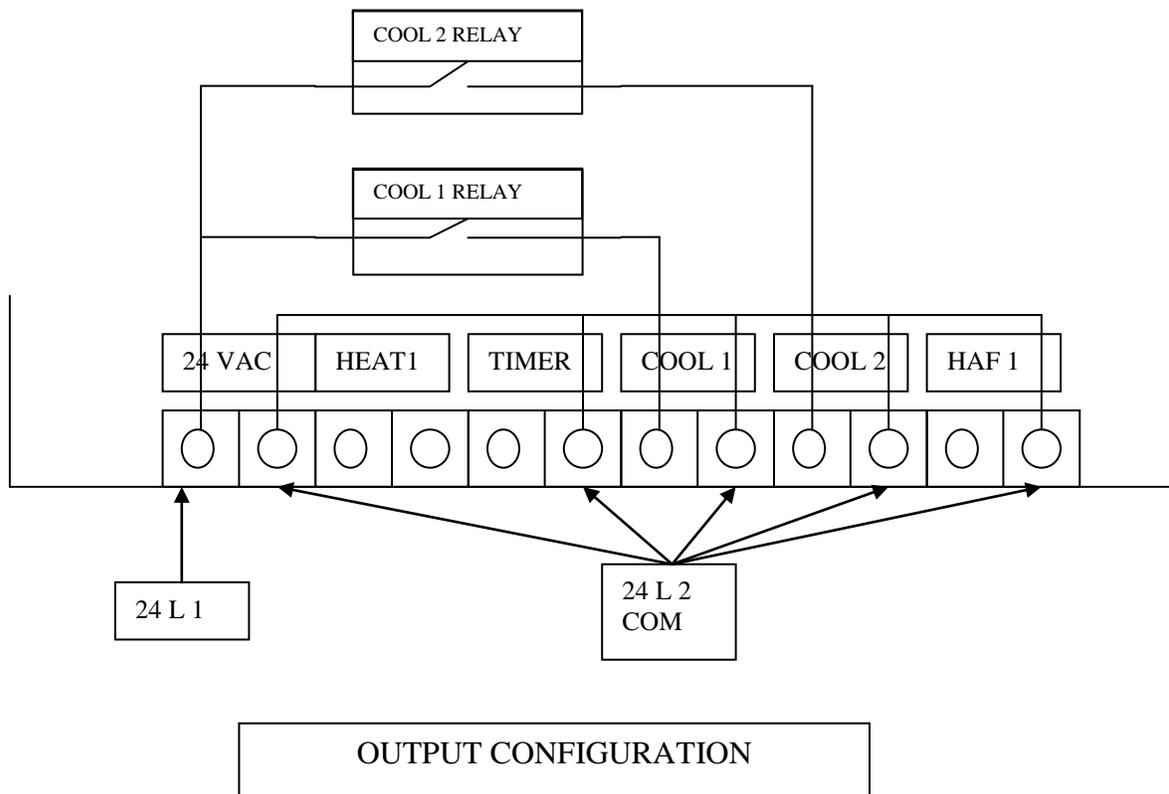
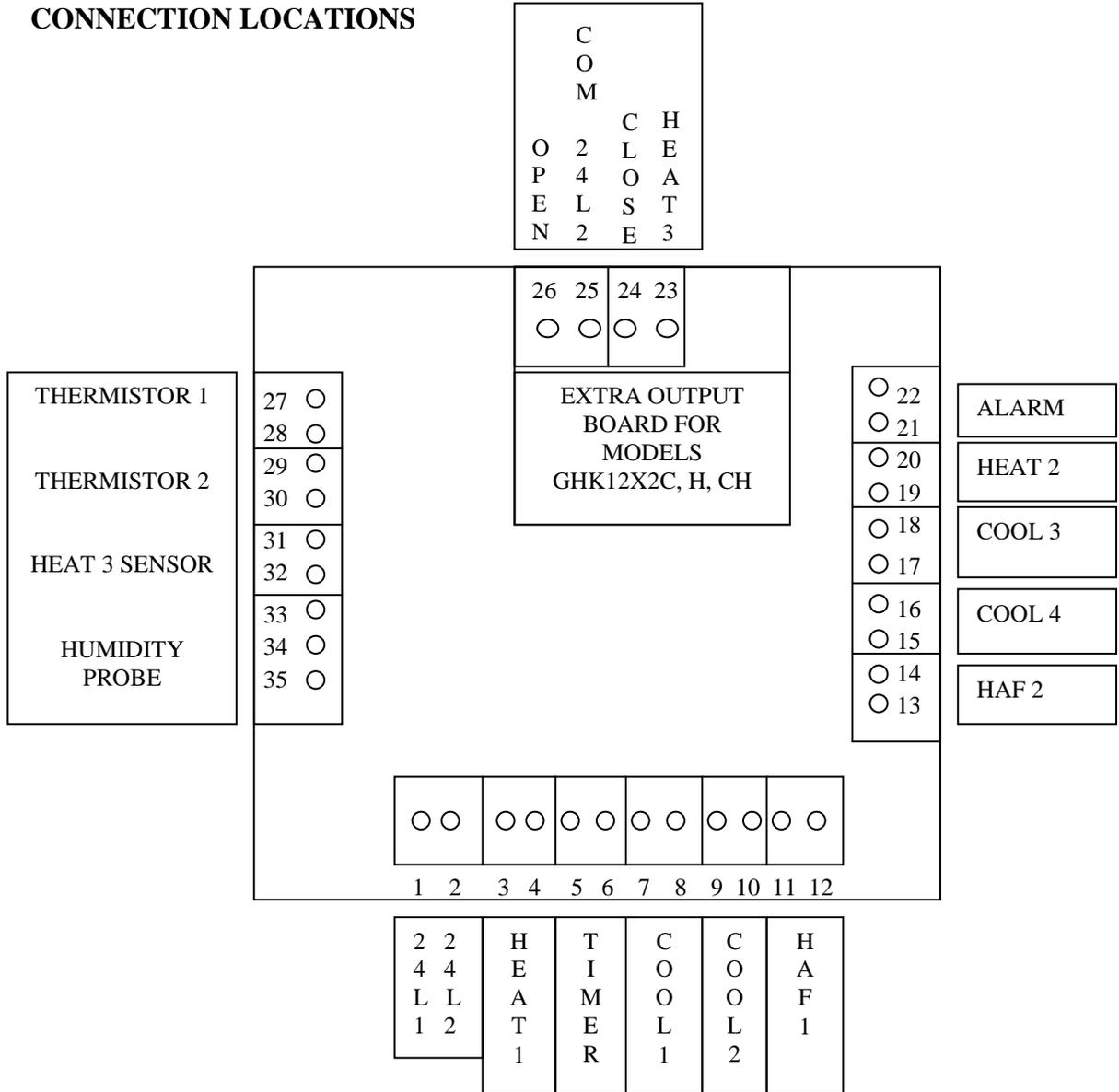


Figure 3

**CONNECTION LOCATIONS**



TERMINAL	DESCRIPTION
1	24VAC L1
2	24VAC L2 COM
3	HEAT 1 OUT
4	HEAT 1 COM
5	TIMER OUT
6	TIMER COM
7	COOL 1 OUT
8	COOL 1 COM
9	COOL 2 OUT
10	COOL 2 COM
11	HAF 1 OUT
12	HAF 1 COM

TERMINAL	DESCRIPTION
13	HAF 2 OUT
14	HAF 2 COM
15	COOL 4 OUT
16	COOL 4 COM
17	COOL 3 OUT
18	COOL 3 COM
19	HEAT 2 OUT
20	HEAT 2 COM
21	ALARM
22	ALARM
23	HEAT 3 OUT
24	CLOSE OUT

TERMINAL	DESCRIPTION
25	COM
26	OPEN
27	THERMISTOR 1
28	THERMISTOR 1
29	THERMISTOR 2
30	THERMISTOR 2
31	THERM. HEAT 3
32	THERM. HEAT 3
33	HUM. IN
34	HUM. POWER 5V
35	HUM. GROUND

**Figure 4**

## COOL OUTPUTS

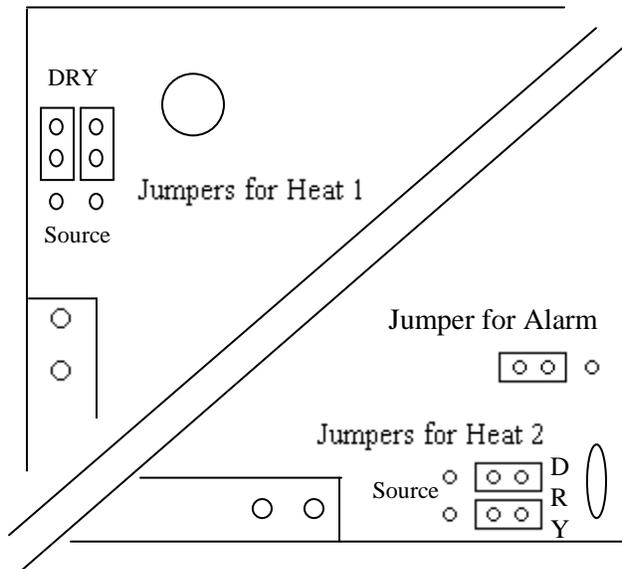
In 2-zone mode, outputs Cool 1 and Cool 3 are designed to open the vents. Outputs Cool 2 and Cool 4 control the fans. The controller has a 30 second delay between Cool 1 (Cool 3) activating and Cool 2 (Cool 4) coming on to ensure the vents are open before the fans start. In 1-zone mode, Cool 1 is used to open vents, Cool 2 and Cool 3 for fans and Cool 4 for additional fans or pad cooler.

## HAF OUTPUTS

The HAF 1 output is the normally closed side of the Cool 2 relay and HAF 2 is the normally closed side of the Cool 4 relay. Therefore HAF 1 (HAF 2) is off when the Cool 2 (Cool 4) fan is on and HAF 1 (HAF 2) is on when Cool 2 (Cool 4) is off.

## HEAT OUTPUTS

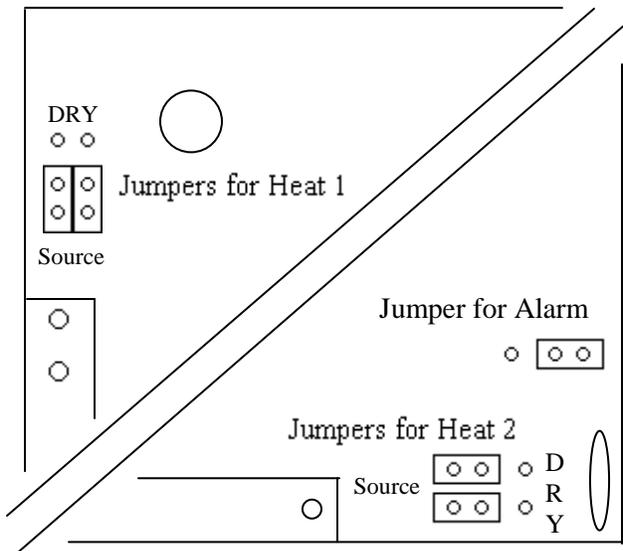
The heat outputs can be configured as an open/closed contact like a thermostat (dry contact) or to source 24V AC to drive a relay. Open/closed contact is the factory setting.



Jumpers shown for Heat 1 and Heat 2 are configured as OPEN/CLOSED contacts.

Jumper for Alarm is showing a normally open configuration.

Figure 5



Jumpers shown for Heat 1 and Heat 2 are configured to SOURCE 24VAC.

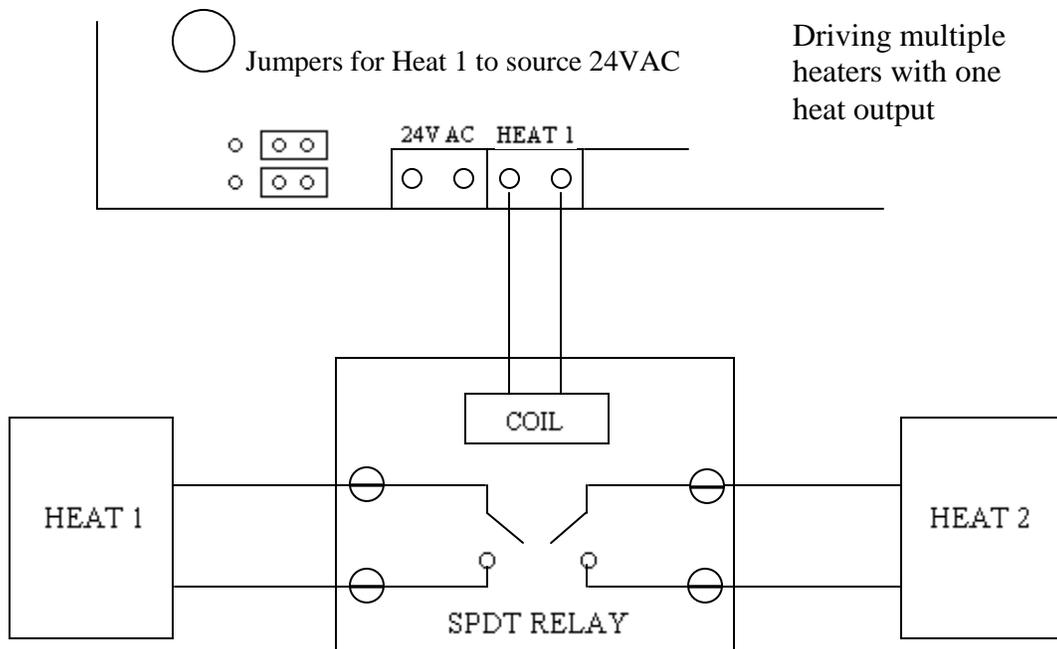
Jumper for Alarm is showing a normally closed configuration.

Figure 6

HEAT OUTPUTS cont.

When controlling more than one heater from one heat output, configure the output to source 24V AC to drive a relay(s) to keep the control loops separate.

Also, when controlling a line voltage heater, configure the heat output to source 24V AC to drive a relay of sufficient capacity to run the heater.



Driving multiple heaters with one heat output

Figure 7

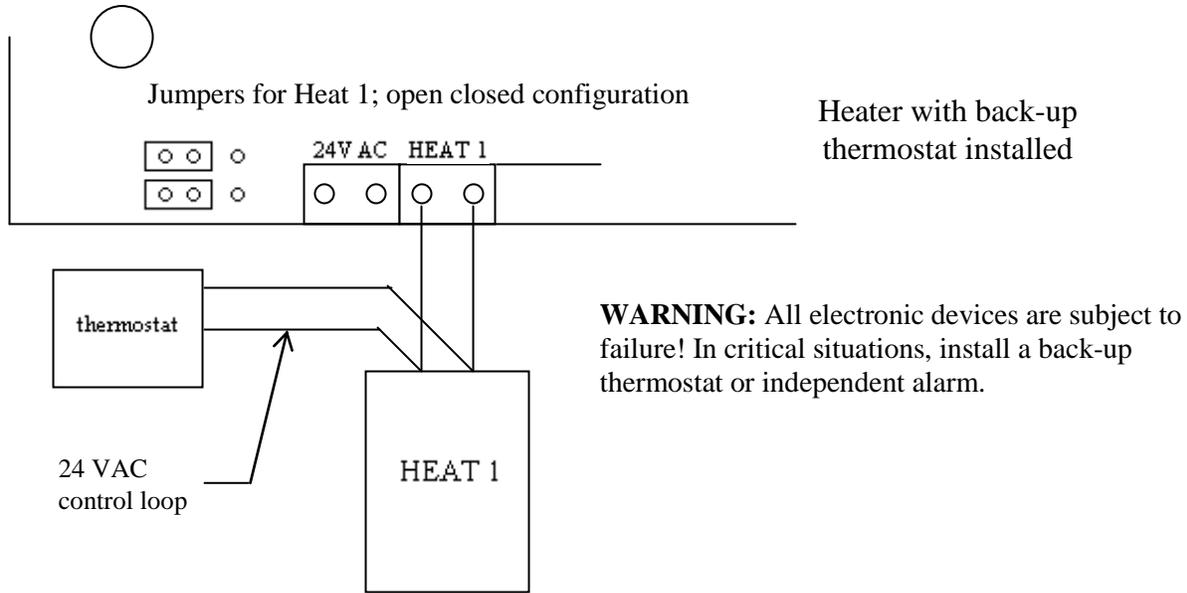


Figure 8

## TIMER OUTPUT

The timer output sources 24V AC to drive a solenoid or relay(s). The solenoid should have a coil with less than a 24VA load.

## ALARM OUTPUT

The alarm is an open/closed contact. When the GHK12X2 is powered and operating properly the contacts are CLOSED. The contacts OPEN when power is lost or when the high or low alarm is triggered. The alarm output can be configured for either normally open or normally closed by changing the jumper for the alarm output. See **Figure 5** and **Figure 6** for jumper placement.

## THERMISTOR

The thermistor is the temperature sensor. The GHK12X2 has two thermistor inputs labeled TH1 and TH2. In 1-zone mode, the readings are averaged and displayed. In the 2-zone mode, Heat 1, Cool 1, and Cool 2 work to keep TH1 at the correct temperature. Also, Heat 2, Cool 3, and Cool 4 work together to keep TH2 at the desired temperature.

The thermistors should be slightly above the plant height. To ensure proper readings, it should not be in direct sunlight or where it will be sprayed with water. It is generally placed closer to the cool air inlet and further from the heat. In 1 zone mode separate the thermistors across the width of the greenhouse to give the best average temperature. See **Figure 9**.

The thermistors come with 24' leads and can be connected directly to the two terminals for TH1 and to the two terminals for TH2. There is no special orientation to the thermistor leads. Should you need to extend the leads of the thermistor, use the 3M Scotchlock™ sealed connectors provided. Use only wire size of 22-14 AWG to ensure proper connection. A faulty connection will cause erroneous temperature readings. Up to 300' of wire can be added without affecting the temperature reading.

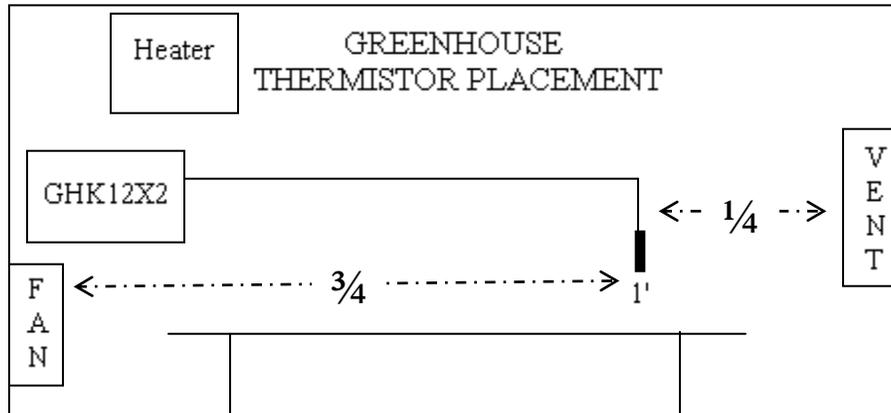


Figure 9

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