

## MODELS

**500 1 HEAT/1 COOL**

**505 HEAT ONLY**

**507 COOL ONLY**

### Builder Series

*Mercury-Free Mechanical Thermostats  
with the Exclusive Megaswitch™  
Magnetic Switch Technology*

# USER MANUAL

*Compatible with low voltage, single stage gas, oil or electric heating or cooling systems. Model 500 can be used with single stage heat pumps. Models 500 & 505 can also be used on 250mv to 750mv millivolt heat only systems. Do not use on applications with voltages above 30 Volts AC.*

**READ ALL INSTRUCTIONS BEFORE PROCEEDING**

# WARNING!

## Important Safety Information

- Always turn off power to air conditioning or heating system prior to installing, removing cleaning or servicing thermostat.
- Read this manual thoroughly prior to installing or operating this thermostat.
- This thermostat is designed for use with 24 Volt-AC low voltage single stage gas, oil or electric heating or cooling systems, including single stage heat pumps (Model 500 only). This thermostat can also be used on 250mv to 750mv millivolt heating only systems (Models 500 and 505).
- Do not use this thermostat on applications with voltage above 30 Volts AC.
- The system must have 24 Volt AC present for proper system operation and control.
- Wiring must conform to all building codes and ordinances as required by local and national code authorities having jurisdiction.
- Do not short (or jumper) across terminals on the gas valve or at the heating or cooling system control board to test the thermostat installation. This could damage the thermostat and void the warranty.
- Do not select **COOL** mode of operation if the outside temperature is below 50° F (10° C). This could possibly damage the controlled cooling system and may cause personal injury.
- This thermostat should only be used as described in this manual. Any other use is not recommended and will void warranty.

# 1 SPECIFICATIONS

- Electrical Rating: 24 Volt AC (18-30 Volt AC), 250 – 750 millivolts
- Heat Anticipation: 0.15 to 1.2 amps.
- Temperature Range: 50° - 90° F (10° - 32° C)

## 2.1 Replacing Existing Thermostat

1. Always turn off power to the air conditioning or heating system prior to removing existing thermostat.
2. Remove the cover of old thermostat and locate wire terminals. Do not remove wires from terminals yet.
3. Label wires prior to removal from terminals. Use chart below to determine new terminal designations for new thermostat.

Old Terminal	New Terminal	Terminal Description
V or Rc	Rc	Cooling Transformer
M, 4, Rh or R	Rh	Heating Transformer
O	O	Reversing Valve (Cooling)
B	B	Reversing Valve (Heating)
Y	Y	Cooling or Compressor for HP system
H, W or 4	W	Heating Control
G or F	G	Fan Control

4. After labeling and removing all wires from terminals, unscrew the existing thermostat mounting base from wall. Be sure to secure wires to prevent them from slipping back into the hole in the wall.

**NOTE:** This thermostat is designed for use with a 24 Volt AC low voltage single stage gas, oil or electric heating or cooling systems, including single stage heat pumps (Model 500 only). This thermostat can also be used on 250mv to 750mv millivolt heating only systems (Models 500 and 505). Do not use this thermostat on applications with voltages above 30 Volts AC.

## 2.2 Installing Your New Thermostat

**NOTE:** If installing this thermostat in a new installation, be sure to locate the thermostat 4 to 5 feet above the floor in accordance with applicable building codes. Be sure to install thermostat in a location that provides good airflow characteristics and avoid areas behind doors, near corners, air vents, direct sunlight or near any heat generating device. Installation in any of these areas could impact thermostat performance.

1. Always turn off power to the air conditioning or heating system prior to installing new thermostat.
2. Place system lever to **OFF** position, and fan control lever to **AUTO** position.
3. Remove the front cover of the thermostat by firmly pulling it away from the base.
4. Place thermostat base against wall in the desired thermostat location and guide thermostat wires through vertical slot in base.
5. Mark placement of mounting holes as appropriate and drill using a 3/16" drill bit.
6. Gently tap supplied plastic anchors into the holes in the wall.
7. Place the thermostat base against the wall in the desired location making sure the mounting holes are aligned as appropriate and the thermostat wires are properly inserted through the slotted opening in the base.
8. Fasten the base to wall using supplied screws.
9. Connect wires to proper terminal screws using new terminal designations (see *Wiring Diagrams* section of manual).
10. Make sure all of the wire connections are secure and are not touching any other terminal to prevent electrical shorts and potential damage to the thermostat.
11. Locate the internal fan option jumper, **HG** (Gas) or **HE** (Elec) on the base (Model 500 only). This jumper controls the heating system fan delay. Insert the jumper over the pins labeled **HG** for gas or oil fired systems. This will allow the furnace to run for a few seconds before initiating the fan. Insert the jumper over the pins labeled **HE** for electric systems with electric furnace elements that require the fan to come on immediately and for heat pump systems.
12. Attach front cover of thermostat to base of the thermostat by pressing it onto the four corner posts of base.
13. Restore system power so you can test installation.

## 2 INSTALLATION *cont.*

### 2.3 Setting the Heat Anticipator

**NOTE:** Some heating systems require a longer or shorter "ON/OFF" period to maintain comfort.

Set the heat anticipator as specified in one of the following conditions:

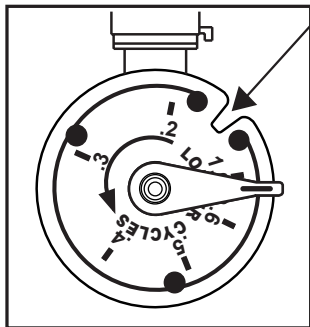
- For replacement installations match the anticipator setting with that of the thermostat being replaced.
- For new installations match the current draw (amperage) of the heating control or relay. To do this check the rating label on the control within the heating system. If the label cannot be found, determine circuit amperage by:

1. Slide the system lever to **OFF**, or set temperature to lowest setting so that the contacts are open. Make sure system power is turned back on.
2. Set an AC ammeter to the 0 to 1 amp. range. Place the meter probes on W and Rh terminals. The heating valve or relay will turn "ON" and a reading will appear on the meter. Note this reading. Remove the probes from the terminals.
3. Set the heat anticipator arrow to this meter reading. This is the normal setting.
4. The anticipator adjustment must be made so that the thermostat is in "balance" with the rest of the system. It will determine how often the heating system turns on and off.

**NOTE:** If installing on a millivolt heat only system, set the anticipator to the maximum setting of 1.2.

**NOTE:** Allow the heating system to operate for a full day or more. Too frequent cycling of the heating system can result in lower life expectancy for the heating system. If adjustments are necessary, make them in 0.1 amp increments at a time. Move the anticipator lever in direction of arrow to cycle less often.

**WARNING:** Thermostat will not function if anticipator handle covers PC board cutout.



### **WARNING!**

The adjustable heat anticipator will burn out if 25 Volts are applied directly to the thermostat by shorting out the gas valve or primary control during testing or by improper wiring.

## 3 TESTING YOUR NEW THERMOSTAT

### **WARNING!** Read *BEFORE* Testing

- Do not short (or jumper) across terminals on the gas valve or at the heating or cooling system control board to test the thermostat installation. This could damage the thermostat and void the warranty.
- Do not select **COOL** mode of operation if the outside temperature is below 50° F (10° C). This could possibly damage the controlled cooling system and may cause personal injury.

1. Place system lever in the **HEAT** position.
2. Adjust temperature lever until indicator is at least 3 degrees above the room temperature. The heating system should start within several seconds. Fan may not turn on immediately due to the heating system built-in fan delay.
3. Place system lever in the **OFF** position. The heating system should stop within several seconds.

## 3 TESTING YOUR NEW THERMOSTAT *cont.*

### **WARNING!**

For heat pumps, **DO NOT** place system lever back in the **HEAT** position. Quick repetitive cycles of the system compressor can lead to damage and shorten its life expectancy.

4. Place system lever in the **COOL** position.
5. Adjust temperature lever until indicator is at least 3 degrees lower than room temperature. The cooling system should start within several seconds.
6. Place system lever in the **OFF** position. The cooling system should stop within several seconds.

### **WARNING!**

**DO NOT** place the system lever back in the **COOL** position. Quick repetitive cycles of the cooling system compressor can lead to damage and shorten its life expectancy.

7. Place fan lever in the **ON** position. The system blower should start.
8. Place fan lever in the **AUTO** position. The system blower should stop.

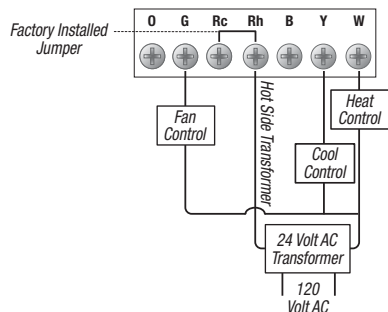
## 4 USING YOUR NEW THERMOSTAT

1. Set the system lever to either **HEAT** or **COOL**.
2. Adjust the temperature lever to the desired setpoint temperature.

## 5 TROUBLESHOOTING

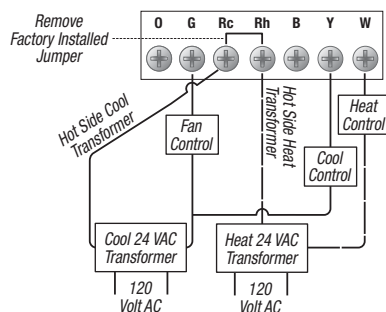
SYMPTOM	POTENTIAL SOLUTION
Thermostat does not turn on heating or cooling system.	Check to see if system lever is in the <b>OFF</b> position. This indicates that the system is turned <b>OFF</b> at the thermostat. Move the system lever to either the <b>HEAT</b> or <b>COOL</b> position. Heating or cooling system may be malfunctioning. Call a professional service technician immediately to verify system operation.
Thermostat turns on heating instead of cooling, or cooling instead of heating.	Check thermostat wiring to be sure that the heating and cooling stages are connected to the correct terminals. See <i>Installation</i> and <i>Wiring Diagrams</i> sections of this manual.
Thermostat turns heating system on too often or not often enough.	Increase or decrease anticipator setting as appropriate to provide the desired performance level. See <i>Setting Heat Anticipator</i> section of this manual.
Fan continues to run all the time whether the system is on or off.	Check that the fan control lever is in the <b>AUTO</b> position. This will allow the fan to run only when the heating or cooling system is turned on and running. Check thermostat wiring to make sure that the fan control wiring is connected to the correct terminal. See <i>Installation</i> and <i>Wiring Diagrams</i> sections of this manual.

Typical 4-Wire Single Transformer Heating and Cooling System

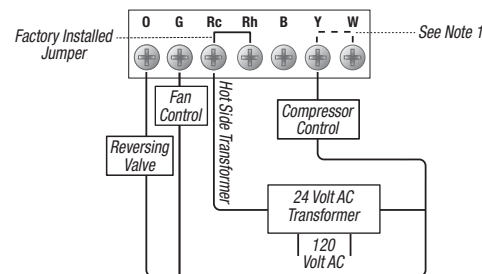


- NOTES:**
1. For Model 505 with Electric Heat, if fan wire is present connect to "W" terminal.
  2. For 2-Wire 24 Volt AC or 250mV – 750mV Millivolt Heating Only Systems, remove factory installed jumper.

Typical 5-Wire Two Transformer Heating and Cooling System



Typical Single Stage Heat Pump Reversing Valve Active in Cooling



- NOTES:**
1. Installer must place jumper wire between "W" and "Y" terminals.
  2. For Typical Single Stage Heat Pump Reversing Valve Active in Heating, reversing valve must be connected to "B" terminal instead of "O" terminal.

## ONE YEAR LIMITED WARRANTY

Braeburn Systems LLC warrants each new Braeburn thermostat against any defects that are due to faulty material or workmanship for a period of one year after the original date of purchase by a professional service technician. This warranty and our liability does not include damage to merchandise or the thermostat resulting from accident, alteration, neglect, misuse, improper installation or any other failure to follow Braeburn installation and operating instructions.

Braeburn Systems LLC agrees to repair or replace at its option any Braeburn thermostat under warranty provided it is returned postage prepaid to our warranty facility in a padded carton within the warranty period, with proof of the original date of purchase and a brief description of the malfunction. This limited warranty does not include the cost of removal or re-installation. This warranty gives you specific legal rights and you may also have other rights that vary from state to state or province to province. Answers to any questions regarding our limited warranty may be obtained by writing our corporate offices.

**WARRANTY FACILITY:** Braeburn Systems LLC  
Attn: Warranty Department  
2215 Cornell Avenue  
Montgomery, IL 60538

# Braeburn®

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# 1 YEAR LIMITED WARRANTY