



WHITE-RODGERS

1F86-241

Non-Programmable Electronic Digital Thermostat

**INSTALLATION AND
OPERATION INSTRUCTIONS**

Operator: Save these instructions for future use!

**FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY
BEFORE INSTALLING OR OPERATING THIS CONTROL COULD CAUSE
PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

DESCRIPTION

Your new White-Rodgers Digital Thermostat uses the technology of a solid-state microcomputer to provide precise time/temperature control. This thermostat offers you the flexibility to design heating and cooling programs that fit your needs.

Features:

- 24 Volt System powered
- Simultaneous heat and cool set point storage
- Pre-set temperature control

- Backlit display
- LCD continuously displays set point and room temperature
- °F/°C convertibility
- Temperature range 45° to 90°F
- RC, RH, C, W, Y, G, O and B terminals
- B and O terminals for single stage heat pumps (no auxiliary heat) or damper operation
- Set point storage in case of power loss

PRECAUTIONS

This thermostat is intended for use with a low voltage system; do not use this thermostat with a line voltage system. If in doubt about whether your wiring is millivolt, line, or low voltage, have it inspected by a qualified heating and air conditioning contractor or electrician.

Do not exceed the specification ratings.

All wiring must conform to local and national electrical codes and ordinances.

This control is a precision instrument, and should be handled carefully. Rough handling or distorting components could cause the control to malfunction.

WARNING

Do not use on circuits exceeding specified voltage. Higher voltage will damage control and could cause shock or fire hazard.

Do not short out terminals on gas valve or primary control to test. Short or incorrect wiring will damage thermostat and could cause personal injury and/or property damage.

Thermostat installation and all components of the system shall conform to Class II circuits per the NEC code.

CAUTION

To prevent electrical shock and/or equipment damage, disconnect electric power to system at main fuse or circuit breaker box until installation is complete.

SPECIFICATIONS

ELECTRICAL DATA

Electrical Rating:

- 18 to 30 VAC 50/60 Hz. or D.C.
- 0.05 to 1.0 Amps (Load per terminal)
- 1.5 Amps Maximum Total Load** (All terminals combined)

THERMAL DATA

Setpoint Temperature Range:

45°F to 90°F (7°C to 32°C)

Operating Ambient Temperature Range:

32°F to 105°F

Operating Humidity Range:

0 to 90% RH (non-condensing)

Shipping Temperature Range:

-4°F to 150°F

APPLICATIONS

For use with:

- Standard heat/cool or heat only systems
- Electric heat systems
- Gas or oil fired systems
- Gas systems with intermittent ignition devices (I.I.D.) and/or vent dampers
- Hydronic (hot water or steam) systems
- Single-stage heat pump systems (no auxiliary heat)

DO NOT USE WITH:

- Millivolt systems
- Multi-stage systems
- Systems exceeding 30 VAC and 1.5 amps
- 3-wire zoned hydronic heating systems



WHITE-RODGERS DIVISION
EMERSON ELECTRIC CO.
9797 REAVIS ROAD
ST. LOUIS, MISSOURI 63123-5398

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INSTALLATION

REMOVE OLD THERMOSTAT

1. Shut off electricity at the main fuse box until installation is complete. Ensure that electrical power is disconnected.
2. Remove the front cover of the old thermostat. **With wires still attached**, remove wall plate from the wall. If the old thermostat has a wall mounting plate, remove the thermostat and the wall mounting plate as an assembly.
3. **Identify each wire attached to the old thermostat using the labels enclosed with the new thermostat.**
4. Disconnect the wires from old thermostat one at a time. **DO NOT LET WIRES FALL BACK INTO THE WALL.**
5. Install new thermostat using the following procedures.

ATTENTION!

This product does not contain mercury. However, this product may replace a unit which contains mercury.

Do not open mercury cells. If a cell becomes damaged, do not touch any spilled mercury. Wearing nonabsorbent gloves, take up the spilled mercury and place into a container which can be sealed. If a cell becomes damaged, the unit should be discarded.

Mercury must not be discarded in household trash. When the unit this product is replacing is to be discarded, place in a suitable container and return to White-Rodgers at 9797 Reavis Road, St. Louis, MO, 63123-5398 for proper disposal.

ELECTRIC HEAT OR SINGLE-STAGE HEAT PUMP SYSTEMS

Read entire paragraph before setting electric heat switch. If you are unsure of your application, contact a qualified service person.

If you have a single-stage heat pump system, OR your system uses central electric heat, where the blower is energized by a **separate circuit** through the fan relay (meaning that the fan turns on immediately on call for heat), then the switch on the thermostat base must be moved to the "ELECTRIC" position (see fig 1). If the thermostat is energizing electric heat sequencers, the switch **MUST** remain in the "GAS" position.

If you must move the switch to the "ELECTRIC" position (to the left), use a small screwdriver or pencil.

ATTACH THERMOSTAT BASE TO WALL

1. Remove the packing material from the thermostat. Gently pull the cover straight off the base. Forcing or prying on the thermostat will cause damage to the unit. If necessary, move the electric heat switch (see **ELECTRIC HEAT SYSTEMS**, above).
2. Connect wires beneath terminal screws on base using appropriate wiring schematic (see figs. 2 through 7).
3. Place base over hole in wall and mark mounting hole locations on wall using base as a template.
4. Move base out of the way. Drill mounting holes.
5. Fasten base loosely to wall, as shown in fig. 1, using two mounting screws. Place a level against bottom of base, adjust until level, and then tighten screws. (Leveling is for appearance only and will not affect thermostat operation.) If you are using existing mounting holes, or if holes drilled are too large and do not allow you to tighten base snugly, use plastic screw anchors to secure subbase.

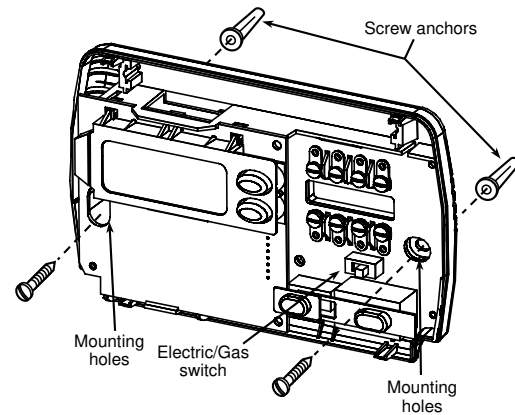


Figure 1. Thermostat Base

6. Push excess wire into wall and plug hole with a fire-resistant material (such as fiberglass insulation) to prevent drafts from affecting thermostat operation.

HYDRONIC (HOT WATER OR STEAM) HEATING SYSTEMS

This thermostat is set to operate properly with a forced-air heating system. If you have a hydronic heating system (a system that heats with hot water or steam), you must set the thermostat to operate properly with your system. Change the second option in the configuration menu to SL (see CONFIGURATION MENU, page 4).

CHECK THERMOSTAT OPERATION

If at any time during testing your system does not operate properly, contact a qualified service person.



Turn on power to the system.

Fan Operation

If your system **does not** have a **G** terminal connection, skip to **Heating System**.

1. Move fan switch to **ON** position. The blower should begin to operate.
2. Move fan switch to **AUTO** position. The blower should stop immediately.

Heating System

1. Move SYSTEM switch to **HEAT** position. If the heating system has a standing pilot, be sure to light it.
2. Press  to adjust thermostat setting above room temperature. The heating system should begin to operate.
3. Press  to adjust temperature setting below room temperature. The heating system should stop operating.

Cooling System

CAUTION

To prevent compressor and/or property damage, if the outdoor temperature is below 50°F, DO NOT operate the cooling system.

1. Move SYSTEM switch to **COOL** position.

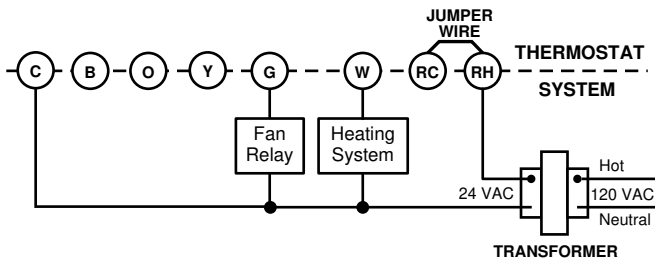


Figure 2. Typical wiring diagram for heat only, 3-wire, single transformer systems with common connection (required)

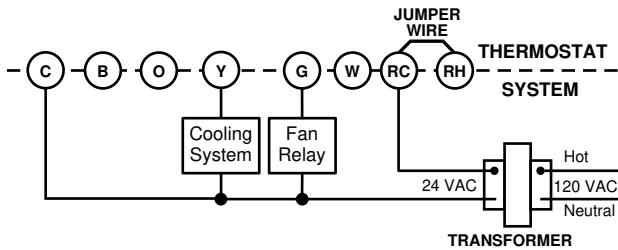


Figure 3. Typical wiring diagram for cool only, 3-wire, single transformer systems with common connection (required)

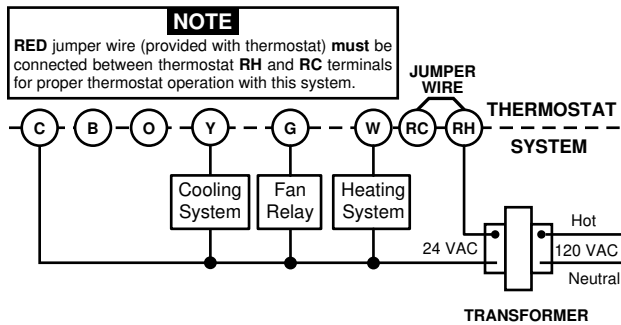


Figure 4. Typical wiring diagram for heat/cool, 4-wire, single transformer systems with common connection (required)

NOTE
RED jumper wire (provided with thermostat) must be connected between thermostat RH and RC terminals for proper thermostat operation with this system.

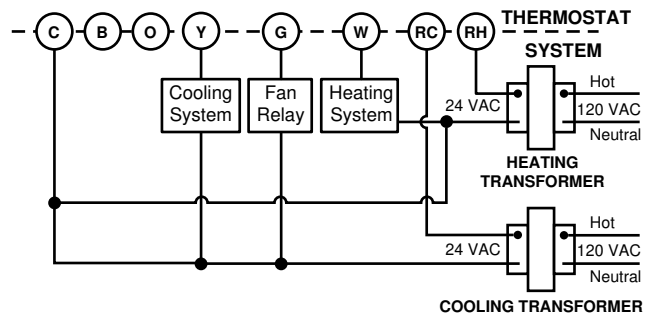
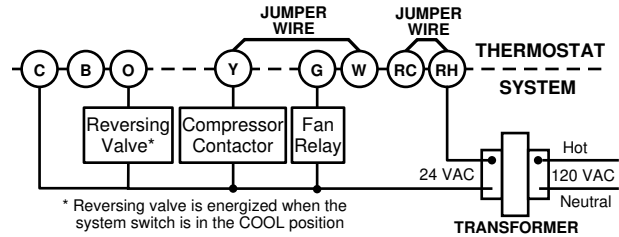
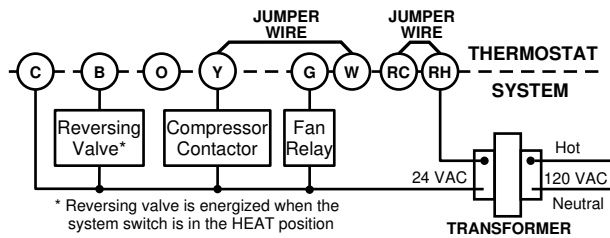


Figure 5. Typical wiring diagram for heat/cool, 5-wire, two-transformer systems with common connection (required)



* Reversing valve is energized when the system switch is in the COOL position

Figure 6. Typical wiring diagram for heat pump with reversing valve energized in COOL with common connection (required)



* Reversing valve is energized when the system switch is in the HEAT position

Figure 7. Typical wiring diagram for heat pump with reversing valve energized in HEAT with common connection (required)

- Press to adjust thermostat setting below room temperature. The blower should come on immediately on high speed, followed by cold air circulation
- Press to adjust temperature setting above room temperature. The cooling system should stop operating.

OPERATION

Before you begin using your thermostat, you should be familiar with its features and with the display and the location and operation of the thermostat buttons. Your thermostat consists of two parts: the **thermostat cover** and the **base**. To remove the cover, pull it straight out from the base. To replace the cover, line up the cover with the base and press until the cover snaps onto the base.

The Thermostat Buttons and Switches

- Raises temperature setting.
- Lowers temperature setting.
- FAN switch (ON, AUTO).
- SYSTEM switch (COOL, OFF, HEAT).

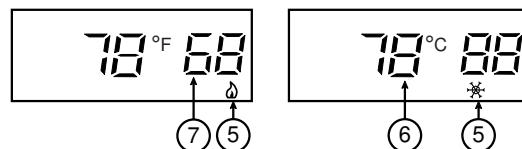
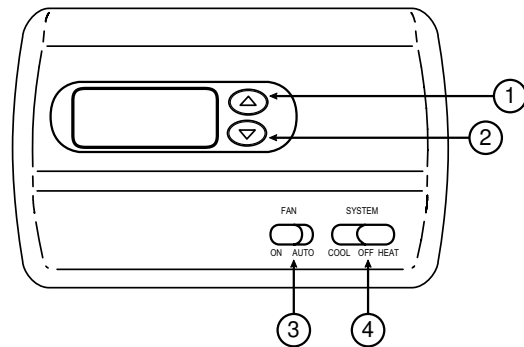


Figure 8. Thermostat display, buttons, and switches

The Display

- ⑤ **Flame icon** (δ) is displayed when the SYSTEM switch is in the HEAT position. **Snowflake icon** (*) is displayed (non-flashing) when the SYSTEM switch is in the COOL position. **Snowflake** is displayed (flashing) if the thermostat is in lockout mode to prevent the compressor from cycling too quickly.
- ⑥ Displays current time and temperature.
- ⑦ Displays set point temperature (this is blank when SYSTEM switch is in the OFF position).

CONFIGURATION MENU

The configuration menu allows you to set certain thermostat operating characteristics to your system or personal requirements.

Move SYSTEM switch to the OFF position, then press \odot and \ominus at the same time to enter the configuration menu. The display will show the first item in the configuration menu.

The configuration menu chart below summarizes the configuration options. An explanation of each option follows.

Press \odot and \ominus to change to the next menu item. To exit the menu and return to the program operation, move the SYSTEM switch to HEAT or COOL. If no keys are pressed within fifteen minutes, the thermostat will revert to normal operation.

- 2) **Select FA or SL (Fast or Slow) Heating Cycle Rate** - The FA setting is frequently used for gas, oil or electric heat. The SL setting produces a longer heating cycle which is normally for hot water or steam (hydronic) systems. Both settings produce very accurate temperature control and can be set to your personal preference. FA cycles the system just under 1°F and the SL setting cycles at approximately 1.5°F.
- 3) **Select Display Backlight (d-L OFF or ON)** - The display backlight improves display contrast in low lighting conditions. Selecting backlight ON will keep the light on continuously. Selecting OFF will keep the light off.

- 4) **Select Compressor Lockout (LOC OFF or ON)** - Selecting LOC ON will cause the thermostat to wait 5 minutes before turning on the compressor if the heating and cooling system loses power. It will also wait 5 minutes minimum between cooling cycles. This is intended to help protect the compressor from short cycling. Some newer compressors already have a time delay built in and do not require this feature. Your compressor manufacturer can tell you if the feature is already present in their system. When the compressor time delay occurs it will flash the (snowflake icon) for about five minutes then turn on the compressor.
- 5) **Select Temperature Display Adjustment (4 LO to 4 HI)** - Allows you to adjust the room temperature display 4° higher or lower. Your thermostat was accurately calibrated at the factory but you have the option to change the display temperature to match your previous thermostat.
- 6) **Select Temperature Display (°F or °C)** - Changes the display readout to Centigrade or Fahrenheit as required.

OPERATING FEATURES

Now that you are familiar with the thermostat buttons and display, read the following information to learn about the many features of the thermostat.

- **SIMULTANEOUS HEATING/COOLING PROGRAM STORAGE** — You can enter both your heating and cooling set points at the same time. There is no need to change the thermostat at the beginning of each season.
- **CONFIGURATION MENU** — Allows you to customize certain thermostat options.

SETTING THE THERMOSTAT

This thermostat is very easy to operate. Set the SYSTEM switch to either HEAT or COOL then press \odot or \ominus until the temperature you want to maintain is shown on the right side of the display. If you want to turn the system off, just move the SYSTEM switch to OFF.

The FAN switch controls the fan operation. When the FAN switch is set to AUTO, the fan will cycle with the furnace or air conditioner. When the FAN switch is set to ON, the fan will run continuously, regardless of SYSTEM switch position.

Configuration Menu

Step	Press Button(s)	Displayed (Factory Default)	Press \odot or \ominus to select:	COMMENTS
1	Set SYSTEM switch to OFF			SYSTEM switch must be OFF to configure thermostat options
2	\odot and \ominus	ϕ (FA)	SL	Select FA or SL (Fast or Slow) heating cycle rate
3	\odot and \ominus	d-L (ON)	OFF	Select display backlight OFF or ON
4	\odot and \ominus	LOC (OFF)	ON	Select Compressor lockout OFF or ON
5	\odot and \ominus	0 HI (0)	4 LO to 4 HI	Select temperature display adjustment higher or lower
6	\odot and \ominus	(°F)	°C	Select temperature display to °F or °C
7	Set SYSTEM switch to HEAT or COOL			Returns to normal operation

* Press \odot and \ominus to advance to next item

TROUBLESHOOTING

No Heating

With the SYSTEM switch set to **HEAT**, when the setpoint temperature is raised or lowered past the room temperature, the thermostat will make a soft click sound. Usually, the sound indicates the thermostat is operating correctly. If the system does not come on, check the system or contact your heating/cooling service person. If the thermostat does not click try the Reset Operation listed below.

No Cooling



Same procedure as heating except set SYSTEM switch to **COOL**. There can be up to a 5 minute compressor lock-out time delay before the thermostat clicks in **COOL**.

Blank Display

A blank digital display usually indicates loss of power to the thermostat from the heating and cooling system or indicates the thermostat has received a voltage spike or static discharge (see Reset Operation).

The thermostat must have 24 volts constantly supplied to terminals RC/RH and C. A blown fuse or tripped breaker could cause a power loss. Also, many furnaces contain safety or limit devices that can disconnect the power to the thermostat intermittently.

Reset Operation

If a voltage spike or static discharge blanks out the display or causes erratic thermostat operation you can reset the thermostat by pressing ,  and move the SYSTEM switch from OFF to HEAT at the same time. This also resets the factory defaults to the configuration menu. If the thermostat has power, has been reset and still does not function correctly contact your heating/cooling service person or place of purchase.

