Thermostat/Humidifier Control

Digital 7 Day Programmable

EMERSON
Climate Technologies

Comfort-Set®

90 Series™
PREMIUM

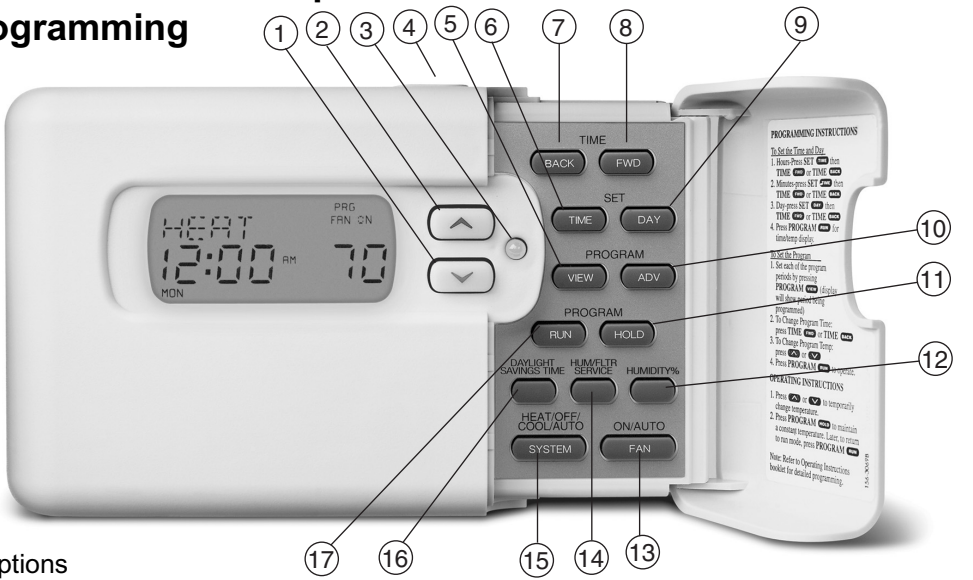
1F97-391

Installation and Operating Instructions

Retain for Future Use

WHITE-RODGERS

Easy, Menu-Driven Set-Up and Programming



Premium options
to customize the thermostat
to fit your application.

INTRODUCTION

Thank you for purchasing your new Comfort-Set 90 thermostat and humidifier control. White-Rodgers has been producing energy saving controls for over 60 years. We have been designing and producing the Comfort-Set family of electronic programmable thermostats since 1982. Comfort-Set 90 is the third generation of the electronic programmable family. We believe you will find that the Comfort-Set 90 is the most user friendly and technologically advanced thermostat and humidifier control available today.

You will find information about thermostat buttons and display beginning on page 2.

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INTRODUCTION

THE THERMOSTAT BUTTONS

See inside front cover for illustration showing button locations.

1 (Blue arrow) Lowers temperature setting (45°F or 7°C minimum)

2 (Red arrow) Raises temperature setting (99°F or 37°C maximum)

3 The yellow indicator glows when the system is operating.

4 This button (on top of the cover) lights the display.

5 Used to initiate or review thermostat programming.

6 Used with **TIME** FWD **/TIME** BACK to set the clock.

7 Used to adjust the time backward, or to select the previous menu item.

8 Used to adjust the time forward, or to select the next menu item.

9 Used with **TIME** FWD **/TIME** BACK to set the current day and with HOLD to enter VACATION mode.

10 Used to advance operation to the next program period.

11 Used to manually override programming to hold at a selected temperature.

12 Used to display humidity.

13 Selects fan operation (see The Display, figure 1 21). This button is also used to program the fan to run continuously during a program period.

14 Used to set/reset the filter and humidity maintenance timer.

15 Sets the system mode (**HEAT**ing, **OFF**, **COOL**ing, or **AUTO**matic changeover).

16 Used to adjust the clock one hour forward or back.

17 Used to start or return to program operation.

LARGE LIGHTED (LCD) DISPLAY

The thermostat display alternately shows the current time and the current temperature on the left side. The display also shows the temperature you have programmed or set on the right side of your screen.

18 Displays system mode (**HEAT**, **OFF**, **COOL**, **AUTO**, **HOLD**, **VACA** or **HUMD**). During programming displays the time period (**MOR, DAY, EVE, NHT**) being programmed. In the configuration menu, the menu item name is shown, one word at a time (**PRGM MODE**, **EMR**, **COOL FAN DELA OFF**, etc.).

19 **CHECK BATTERY** appears when the "AA" alkaline batteries are weak and should be replaced. **BATTERY** appears when the thermostat is running on battery power only. **CHECK STAT** appears when the thermostat detects certain problems within itself. **CHECK SYSTEM** appears when the thermostat detects certain problems in the heating or humidity system.

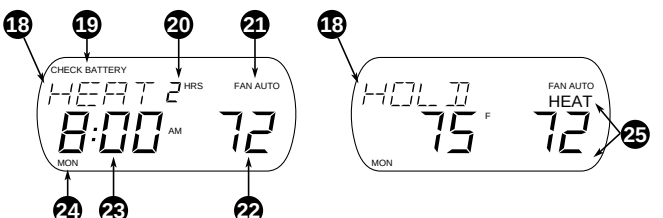


Figure 1. The Display

20 Indicates the length of time remaining in a temporary hold condition. Also indicates the length of time remaining in VACATION mode.

21 Displays **FAN ON** when the fan is operating continuously. Displays **FAN AUTO** when the fan cycles with the heating or cooling system.

22 Displays the setpoint temperature. In HUMD mode, shows humidity setpoint.

23 Alternately displays room temperature and time of day. In HUMD mode, shows actual humidity.

24 Shows the current day of the week. When programming, shows the day(s) being programmed.

25 The word **HEAT** or **COOL** will appear above or below the setpoint if area **18** is needed to display other information.

INSTALLATION AND CONFIGURATION

This White-Rodgers Automatic Setback Digital Thermostat uses microcomputer technology to provide precise time, temperature and humidity control. This thermostat offers the flexibility to design heating and cooling programs that fit personal needs. This thermostat is adaptable to most 24 Volt residential forced air, hydronic (hot water or steam), electric heat systems.

SPECIFICATIONS

Model 1F97-391 7 Day Programming

ELECTRICAL DATA

Electrical Rating:
17 to 30 VAC, 50/60 Hz
0.05 to 1.5 Amps
1.5 Amps Maximum Total Load
(All terminals combined)

Standard Systems:
Fuel: Gas, Oil, Electric
Type: Heating/Cooling, Heat Only, Hot Water or Steam Systems, Cool Only

THERMAL DATA

Setpoint Temperature Range:
45° to 99°F (7° to 37°C)

Setpoint Humidity Range:
10% to 45%

Operating Ambient Temperature:
32° to 110°F (0° to 43°C)

Operating Humidity Range:
90% non-condensing max.

Shipping Temperature Range:
-4° to 131°F (-20° to 55°C)

⚠ WARNING

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.

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

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

⚠ WARNING

Do not wire HM1 or HM2 from thermostat (24 volts) to HUM on ignition control (120 volts).

⚠ 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.

NOTE

Read all instructions thoroughly before beginning installation.

This thermostat is intended for use with a low voltage system. Do not use directly on a line voltage system unless an isolation relay/transformer is installed.

Do not exceed the ratings shown in the Specifications section, preceding page. If in doubt about the electrical ratings of your heating/cooling system, have it inspected by a qualified heating and air conditioning contractor or licensed electrician.

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.

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 non-absorbent gloves, take up the spilled mercury with sand or other absorbent material 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 2895 Harrison Street, Batesville, AR 72501 for proper disposal.

REMOVE OLD THERMOSTAT

Shut off electricity at main fuse or circuit breaker box until installation is complete AND the jumper leads (fig. 10, page 17) on the back of the thermostat are configured properly.

Remove the front cover of the old thermostat. With wires still attached, remove wall plate from the wall.

Identify each wire attached to the thermostat using one of the labels enclosed with the new thermostat.

Disconnect the wires from the old thermostat one at a time. **DO NOT** let the wires fall back into the wall.

Install the new thermostat using the following procedures.

ATTACH BASE TO WALL

Remove packing material from the thermostat. Place fingers of one hand on the center top and bottom portion of the thermostat. Grasp the base in the other hand on top and bottom center and gently pull straight out. Forcing or prying on the thermostat will cause damage to the unit.

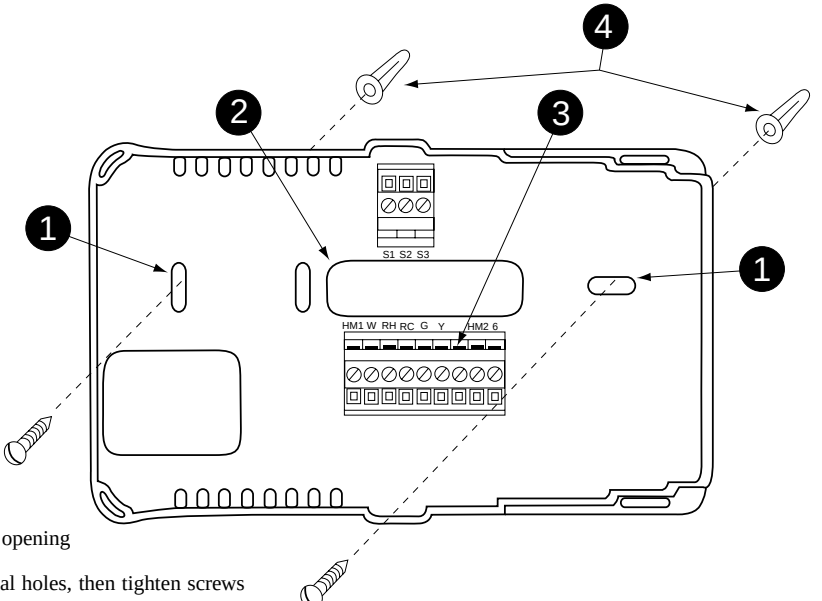
Place the base over the hole in the wall where the wires come out and mark mounting hole locations base as a template. Drill $^{3}/_{16}$" pilot holes, and install screw anchors in the wall.

Run wires through hole in base and attach base to wall (see fig. 2, page 7).

Insert the wires into the terminals on the base using the appropriate wiring diagram and tighten the terminal screws.

CONFIGURING AND PROGRAMMING

Before the power is turned on, the thermostat must be configured to operate properly with the system. See CONFIGURATION on page 16 in this manual.

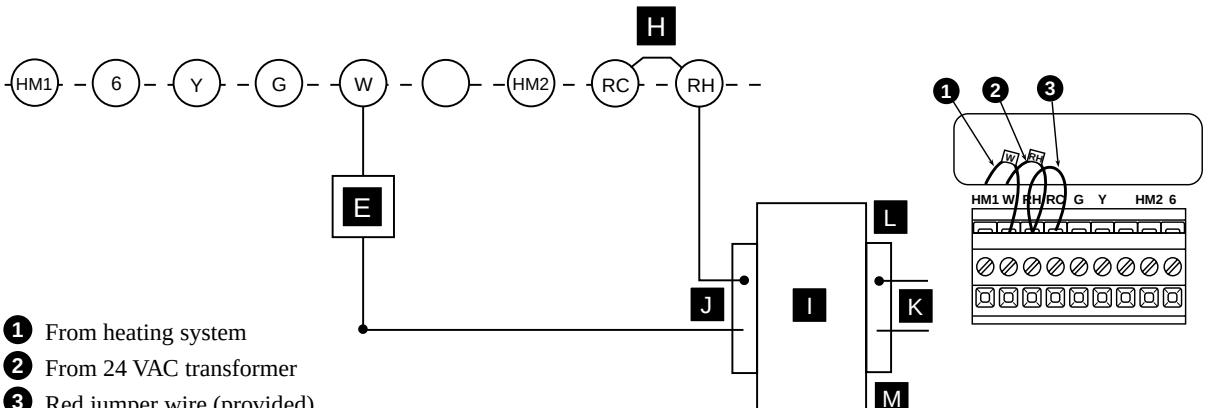


1. Mounting screws
2. Pull wires through this opening
3. Insert wires into terminal holes, then tighten screws
4. Screw anchors

Figure 2 – Thermostat base

WIRING DIAGRAMS

All wiring diagrams are for typical systems only. Refer to equipment manufacturers' instructions for specific system wiring information.



1. From heating system
2. From 24 VAC transformer
3. Red jumper wire (provided)

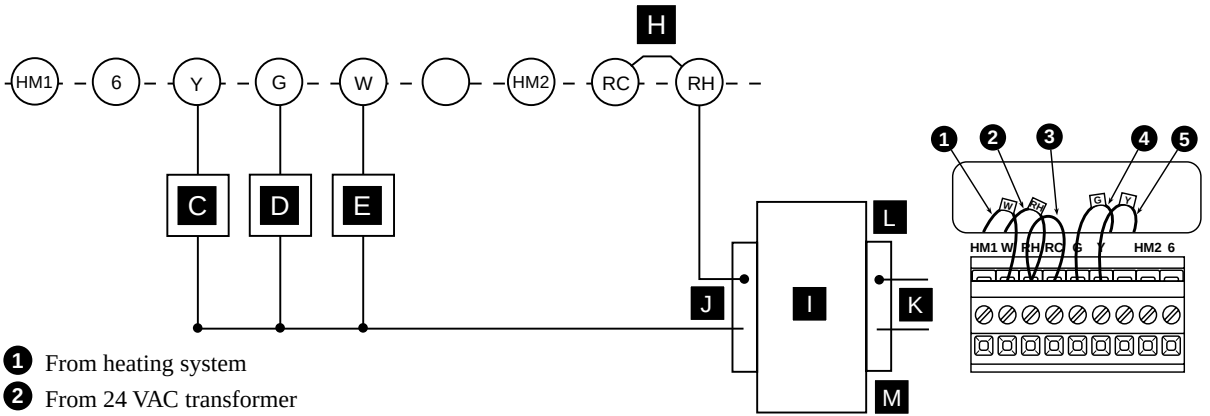
For humidifier wiring see pages 14-15.
See page 9 for letter identification.

NOTE: Ensure that RED RH/RC jumper wire (provided with thermostat) is connected between thermostat's RH and RC terminals for proper operation with this system.

Figure 3 – Typical wiring diagram for heating only, single transformer system

LETTER IDENTIFICATION FOR WIRING DIAGRAMS

- **A** Humidifier System
- **B** Zone Valve
- **C** Cooling System
- **D** Fan Relay
- **E** Heating System
- **H** Jumper Wire
- **I** TRANSFORMER
- **J** 24 VAC Side
- **K** 120 VAC Side
- **L** Hot Side
- **M** Neutral Side
- **N** HEATING TRANSFORMER
- **O** COOLING TRANSFORMER
- **P** Jumper Wire (field-installed)



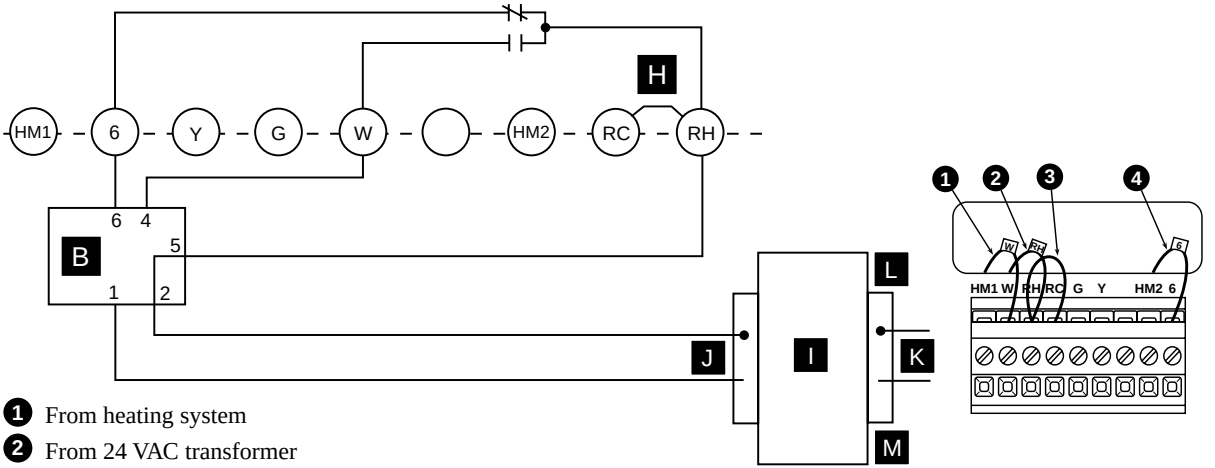
1. From heating system
2. From 24 VAC transformer
3. Red jumper wire (provided)
4. From fan relay
5. From cool system

For humidifier wiring see pages 14-15.
See page 9 for letter identification.

NOTE: Ensure that RED RH/RC jumper wire (provided with thermostat) is connected between thermostat's RH and RC terminals for proper operation with this system.

NOTE: For three-wire heat only system, connect terminals **G, W** and **RH**. For cool only system, connect terminals **Y, G** and **RH**.

Figure 4 – Typical wiring diagram for heat only, cool only, & heat/cool single transformer system

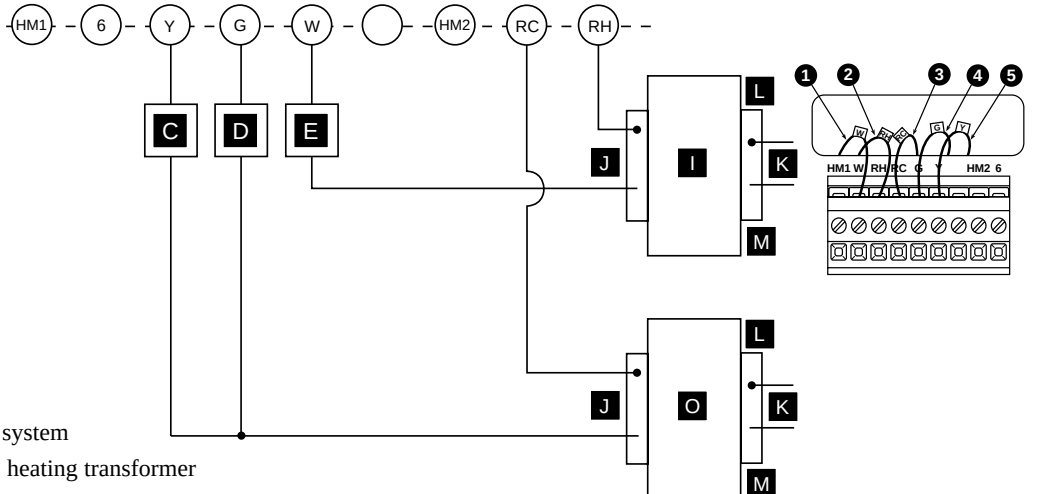


1. From heating system
2. From 24 VAC transformer (through zone valve)
3. Red jumper wire (provided)
4. From zone valve system

For humidifier wiring see pages 14-15.
See page 9 for letter identification.

NOTE: Thermostat must have batteries installed.
NOTE: Ensure that RED RH/RC jumper wire (provided with thermostat) is connected between thermostat's RH and RC terminals for proper operation with this system.

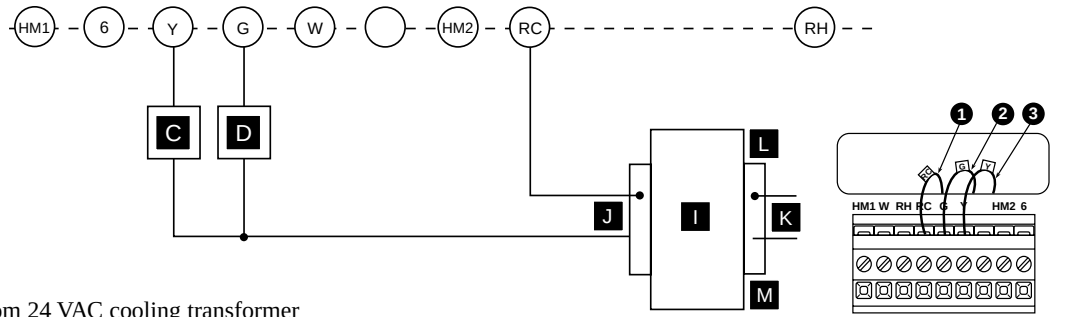
Figure 5 – Typical wiring diagram for heat only, three-wire, zone valve system



1. From heating system
2. From 24 VAC heating transformer
3. From 24 VAC cooling transformer
4. From fan relay
5. From cooling system

Figure 6 – Typical wiring diagram for heat/cool, two-transformer system

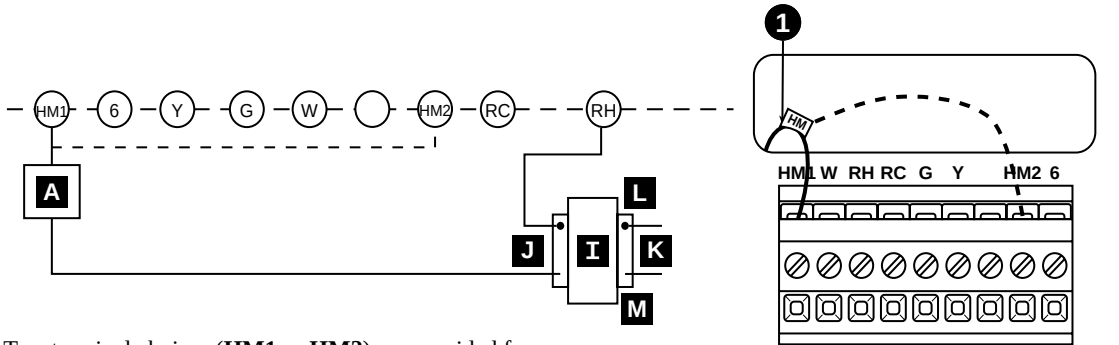
For humidifier wiring see pages 14-15.
See page 9 for letter identification.



1. From 24 VAC cooling transformer
2. From fan relay
3. From cooling system

For humidifier wiring see pages 14-15.
See page 9 for letter identification.

Figure 7 – Typical wiring diagram for three-wire cooling system



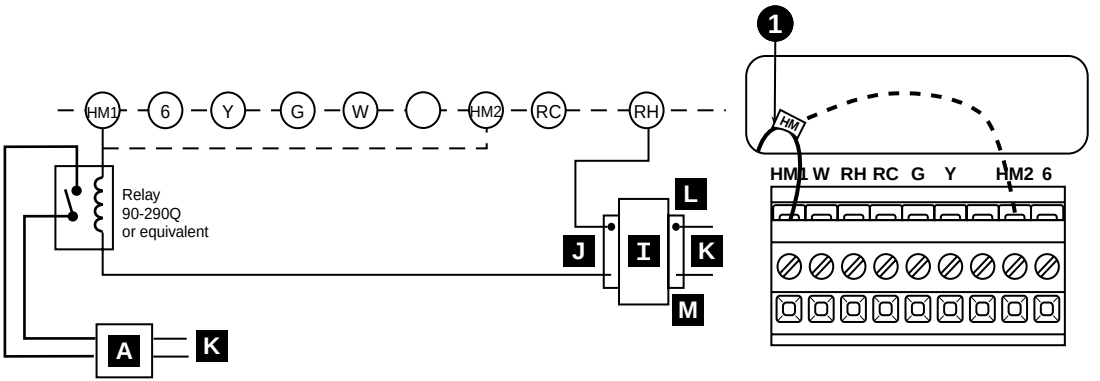
NOTE: Two terminal choices (**HM1** or **HM2**) are provided for humidifier control. When the humidity setting is higher than the room humidity:
HM1 turns off the humidifier when the call for heat ends.
HM2 powers the humidifier an additional 30 seconds after the call for heat ends to provide slightly more humidity output.

Most installers will use **HM1** unless they feel more humidity is desirable.

1 From humidity system

See page 9 for letter identification.

Figure 8 – Typical wiring diagram for 24V humidifier system



1 From humidity system

See page 9 for letter identification.

Figure 9 – Typical wiring diagram for 120V humidifier system

CONFIGURATION

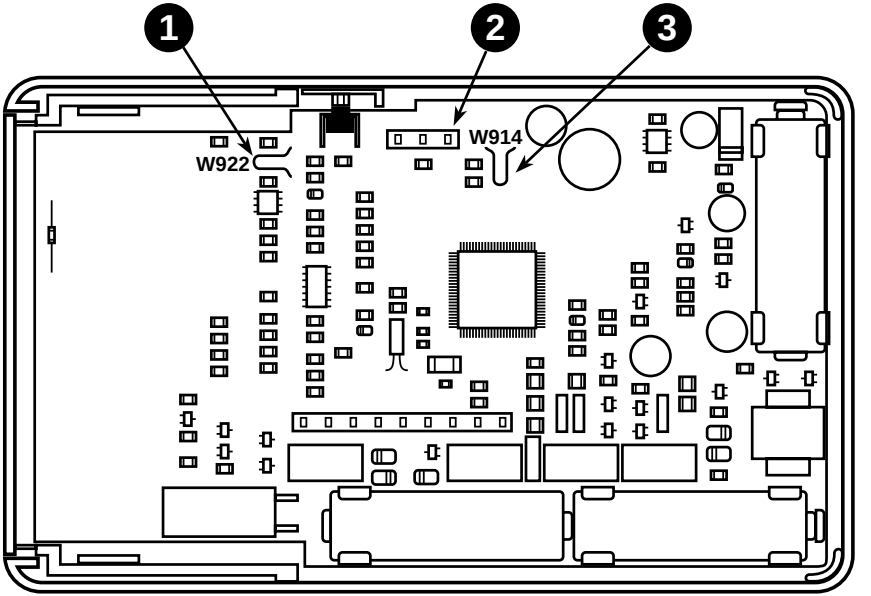
JUMPERS

Before turning power on to the system, the jumpers on the back of the thermostat must be configured to operate correctly with the system equipment.

This thermostat is configured from the factory to operate a standard fossil fuel (gas, oil, etc.), forced hot air system with a single stage air conditioning compressor and fan. This is the correct configuration for any system that DOES NOT require the thermostat to energize the fan on a call for heat.

If you have an electric heat or other system that REQUIRES the thermostat to control the fan, find and cut the jumper lead labelled W914 (see fig. 10). This will allow the thermostat to energize the fan instantly on a call for heat. If you are unsure if the system requires the thermostat to control the fan, contact a qualified heating and air conditioning service person.

A remote sensor can be used with this thermostat. To use a remote sensor, jumper W922 must be clipped (see fig. 10) and the REMT SEN option in the configuration menu must be set to ON.



1. Clip for remote sense
2. 3-pin connector
3. Clip for electric heat

Figure 10 – Jumper locations

CONFIGURATION MENU

The configuration menu allows you to set thermostat operating characteristics to your system or personal requirements. To enter the menu, press **TIME** FWD and **TIME** BACK once at the same time. Press **TIME** FWD to advance through the menu options. Press ^ v arrow keys to change options. Either the installer or the operator may change shaded options. We recommend that other options be set by the installer.

Step	Press Button(s)	Displayed (Factory Default)	Press ^ or v to select:	COMMENTS
1	**TIME** FWD **TIME** BACK	EMR (ON)	OFF	Selects EMR option ON or OFF See page 32
2	**TIME** FWD	SET CYCL HEAT (05)	02 - 40	Adjusts heat anticipation value (2 through 40) See page 20
3	**TIME** FWD	SET CYCL COOL (12)	09 - 40	Adjusts cool anticipation value (9 through 40) See page 20
4	**TIME** FWD	COOL FAN DELA OFF (01)	01 - 127	Adjusts cool fan-off delay (1 through 127 sec.) See page 20
5	**TIME** FWD	COOL FAN DELA ON (04)	01 - 05	Adjusts cool fan-on delay (1 through 5 sec.) See page 20
6	**TIME** FWD	COMP LOCK (OFF)	ON	Selects compressor lockout ON or OFF (see NOTE) See page 21
7	**TIME** FWD	SYSTEM (HEAT-OFF-COOL-AUTO)	HEAT-OFF, COOL-OFF, HEAT-OFF-COOL	Selects system switch choices for heat only, cool only, heat/cool or automatic changeover See page 21

8	**TIME** FWD	0˚F (0)	5 LO to 5 HI	Adjusts temperature display higher or lower See page 32
9	**TIME** FWD	(˚F)	˚C	Adjusts temperature display to ˚F or ˚C.
10	**TIME** FWD	BEEP (ON)	OFF	Turns beeper ON or OFF
11	**TIME** FWD	REMT SEN (OFF)	ON	Selects remote sensor OFF or ON See page 21
12	**TIME** FWD	PART LOCK (OFF)	ON	Selects partial keypad lockout OFF or ON See page 34
13	**TIME** FWD	LOCK (OFF)	ON	Selects total keypad lockout OFF or ON See page 34
14	**TIME** FWD	RH	20 LO to 20 HI	Adjusts humidity display higher or lower See page 36
15	**TIME** FWD	DRY (0)	HI - LO	Selects programmable automatic humidity reduction See page 37
16	**PROGRAM** RUN			Returns to normal operation

NOTE: COMP LOCK OFF permanently defeats the compressor lockout. Turn this feature off only if the system already provides for compressor short-cycle protection.

ADJUSTABLE ANTICIPATION

This option allows the cycle times in heating and cooling to be increased or decreased. The factory set values can be adjusted higher for longer cycles or lower for shorter cycles.

The adjustment range for HEATING is from 2 to 40. The factory preset is 5. The adjustment range for COOLING is from 9 to 40. The factory preset is 12. **The recommended initial setting for hydronic (hot water or steam) systems is 35.**

The cooling will not go below 9 because compressors require a longer cycle.

The chart below shows how this adjustment range affects thermostat performance.

COOL FAN-ON AND FAN-OFF DELAY

This option allows a selection of a fan-on delay of 1 to 5 seconds on a call for cool and 1 to 127 seconds of fan-off delay after the thermostat has satisfied the call for cool.

A short delay to allow the A-coil to cool off before the fan turns on may be preferred. This also allows the

	HEATING		COOLING	
Anticipation Value	**Cycle Length**	**Differential Temperature**	**Cycle Length**	**Differential Temperature**
2–8	Shorter	0.4–0.6˚F (0.2–0.3˚C)	N/A	N/A
9–20	Longer	0.6–1.0˚F (0.3–0.6˚C)	Shorter	0.6–1.0˚F (0.3–0.6˚C)
21–40	Hydronic	1.0–1.6˚F (0.6–0.9˚C)	Longer	1.0–1.6˚F (0.6–0.9˚C)

These numbers are approximate and represent operation with a typical system. Actual temperature differentials and run times may vary widely based on your building and equipment, as well as outdoor temperature conditions.

compressor and the fan to come on at slightly different times, which allows full power to the compressor on start up.

The fan off delay allows the fan to continue running after the compressor has shut off. This distributes the cooling that would otherwise stay trapped in the air conditioning coils through the ducts. Ideally the timing would be set so the fan shuts off just as the cool air is exhausted. If this timing is set *too* long the fan may begin blowing warm air before it shuts off. Shortening the fan-off delay will prevent this.

COMPRESSOR LOCKOUT

This thermostat is designed with an optional compressor lockout feature. It is designed to protect the system against premature compressor failure by "locking out" the compressor for at least five minutes after each cycle. When the thermostat is in compressor lockout, the word COOL will flash on the display. During this period, the compressor will not be energized.

Selecting COMP LOCK ON in the configuration menu (page 18, step 6) will enable this feature.

DISABLING HEAT, COOL, OR AUTO MODES

The automatic changeover feature of this thermostat can be disabled (automatic changeover allows the thermostat to switch between heating and cooling to maintain temperature). If this thermostat is controlling a heating-only or cooling-only system, the heat, cool, or auto modes can be disabled.

Lockout Bypass Option

FOR QUALIFIED SERVICE TECHNICIANS' USE ONLY. HOMEOWNERS SHOULD NOT USE THIS FEATURE DUE TO POSSIBILITY OF EQUIPMENT OR PROPERTY DAMAGE, OR PERSONAL INJURY.

To override this feature for one cycle while testing thermostat operation, press **SET** TIME and **SET** DAY buttons at the same time.

OPTIONAL REMOTE TEMPERATURE SENSE

An optional remote sensor (part # F145-1328) can be attached to this thermostat and may be wired as far

away as 300 feet. The thermostat will use the temperature in the remote location as its room temperature display.

This is an excellent feature if the thermostat is in a poor location for sensing temperature or the thermostat is in a separate room to prevent tampering.

NOTE

The remote sense feature will not work if the system does not provide 24V to the thermostat (example: heating-only system or 3-wire zone valves).

To use a remote sensor, jumper W922 must be clipped (see figure 10) **and** the REMT SEN option in the configuration menu (on page 19) must be set to ON.

After the thermostat is installed and configured, do the following to ensure proper operation.

FAN OPERATION

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

1. Turn power on to the system.
2. Press FAN until **FAN ON** is displayed. The fan should begin to operate.
3. Press FAN until **FAN AUTO** is displayed. The fan should stop operating.

HEATING SYSTEM

1. Press SYSTEM until **HEAT** is displayed. If the heating system has a standing pilot, ensure that it is lit.
2. Press ^ to adjust thermostat setting above room temperature. The heating system should begin to operate.
3. Press v to adjust temperature below room temperature. The heating system should stop operating.

HUMIDIFIER OPERATION CHECK

NOTE: Humidifier will only operate when the furnace is running.

1. Press SYSTEM switch until **HEAT** is displayed.
2. Press ^ until the setpoint is above the room temperature by a few degrees and the furnace starts running.
3. Press HUMIDITY %. The display will show the current humidity level in the room and the current humidity setpoint for approximately 10 seconds.
4. To check humidifier, press ^ to

HUMIDIFIER OPERATION CHECK (cont'd.)

raise the humidity setpoint (45% maximum) above the room humidity level. The humidifier should operate. If the humidity in the room is above 45%, press ^ to adjust the setting to 45% (the maximum setting) and hold the up arrow in for 5 seconds. The display will read ON and the humidifier will operate. This test will last for one heat cycle. The humidifier will then operate when the heat is running to maintain your humidity setting.

COOLING SYSTEM

⚠ WARNING

To prevent compressor and/or property damage, if the outdoor temperature is below 50°F (10°C), DO NOT operate the cooling system.

1. Press SYSTEM until **COOL** is displayed.
2. Press v to adjust thermostat setting below room temperature. The fan should come on (after the fan-on delay time, if any), followed by cold air circulation. There may be a 5 minute delay on compressor operation.
3. Press ^ to adjust temperature setting above room temperature. The cooling system should stop operating, and the fan should stop running (after the fan-off delay time, if any).

RESETTING THERMOSTAT

The thermostat can be reset back to factory default programs and configuration options. Removing power from the thermostat **will not** reset it to the default settings. Before resetting the thermostat, you may want to make note of the previously selected configuration options and programming.

To reset the thermostat, press and release **PROGRAM** RUN, then press the FAN, **TIME** BACK and v buttons at the same time. This will reset the thermostat to factory default programs and configuration. The display will momentarily go blank, then all segments on the display will momentarily be shown. The thermostat will then go into the **HOLD** mode and will maintain factory preset temperatures.

PROGRAMMING

MANUAL OPERATION (Bypassing the Program)

Your Comfort-Set 90 thermostat can be used to control temperature manually (without programming). For manual operation, press SYSTEM to select **HEAT** or **COOL**, then press **PROGRAM** HOLD. Use ^ or v to set the temperature as desired.

PROGRAMMED OPERATION

Planning Your Program

The sample schedule (pages 26 & 27) shows the factory installed programs for heating and cooling. The heating and cooling programs are separate, and must be programmed individually. To use the factory program, set the clock and press **PROGRAM** RUN with the thermostat SYSTEM set to **Heat**, **Cool**, or **Auto**.

Fill out the blank schedules (pages 28 & 29) with the time and temperatures you want in **your** program. Fill in every space for your program.

The same temperature can be repeated more than once if you do not want the temperature to change over several time periods. This is useful for homes or businesses that are occupied all day and only want a setback temperature at night.

Entering Your Program

To Set the Clock:

1. Press **PROGRAM** RUN.
2. Press **SET** TIME. The display will show the hour. Use **TIME** FWD or **TIME** BACK to set to the current hour and AM/PM designation.
3. Press **SET** TIME again. The display will show minutes. Use **TIME** FWD or **TIME** BACK to set to the current minutes.
4. Press **PROGRAM** RUN.

To Set the Day:

5. Press **SET** DAY. The display will indicate a day of the week. Use **TIME** FWD or **TIME** BACK to set to the current day of the week.
6. Press **PROGRAM** RUN.

To Set the Program:

7. Press SYSTEM to select **HEAT** (for heating program) or **COOL** (for cooling program).
8. Press **PROGRAM** VIEW one time. The display will show **MOR** and the settings for time and temperature.

9. If you program Monday the first time you press **PROGRAM** VIEW it will be copied to the rest of the week. To program the other days of the week press ADV./**DAY** until you reach the day you wish to change and follow Steps 10, 11 & 12. You can also copy the program from one day to another. To copy, press HOLD/**COPY**. The display will show **COPY**, and all the other days of week will be flashing. Press HOLD/**COPY** again to copy the day in to the rest of the week or press **TIME** FWD or **TIME** BACK until you reach the day you want to copy to and press HOLD/**COPY**.

10. Press **TIME** FWD or **TIME** BACK to set the time on the display as selected in your **HEATING** or **COOLING Schedule.** Be sure to check the AM or PM on the display.

11. Press the red ^ or blue v button to adjust the temperature to match your schedule. If you want the fan ON continuously during this period, press FAN.

12. Press **PROGRAM** VIEW one time. **MOR** on the display will change to **DAY**. Repeat steps 10 and 11 to enter time and temperature for this period.

13. Press **PROGRAM** VIEW to continue through the entire schedule, entering time and temperature for each period. When you are satisfied that your program matches your schedule, press **PROGRAM** RUN. Programming is now complete for this mode and your program is running.

14. To program the other mode, repeat the procedure from step 6.

7 Day Sample HEAT Program Schedule
(Shows factory programming)

	❶		❷		❸		❹	
	❺	❻	❺	❻	❺	❻	❺	❻
MON	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
TUE	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
WED	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
THU	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
FRI	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
SAT	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)
SUN	6:00 AM	70°F (21°C)	8:00 AM	62°F (16°C)	5:00 PM	70°F (21°C)	10:00 PM	62°F (16°C)

❶ Morning (MOR)
❷ Day (DAY)
❸ Evening (EVE)
❹ Night (NHT)
❺ Start Time
❻ Temperature

7 Day Sample COOL Program Schedule
(Shows factory programming)

	❶		❷		❸		❹	
	❺	❻	❺	❻	❺	❻	❺	❻
MON	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
TUE	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
WED	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
THU	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
FRI	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
SAT	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)
SUN	6:00 AM	78°F (25°C)	8:00 AM	85°F (29°C)	5:00 PM	78°F (25°C)	10:00 PM	82°F (27°C)

❶ Morning (MOR)
❷ Day (DAY)
❸ Evening (EVE)
❹ Night (NHT)
❺ Start Time
❻ Temperature

7 Day Personal HEAT
Program Schedule

	❶		❷		❸		❹	
	❺	❻	❺	❻	❺	❻	❺	❻
MON								
TUE								
WED								
THU								
FRI								
SAT								
SUN								

❶ Morning (MOR)
❷ Day (DAY)
❸ Evening (EVE)
❹ Night (NHT)
❺ Start Time
❻ Temperature

7 Day Personal COOL
Program Schedule

	❶		❷		❸		❹	
	❺	❻	❺	❻	❺	❻	❺	❻
MON								
TUE								
WED								
THU								
FRI								
SAT								
SUN								

❶ Morning (MOR)
❷ Day (DAY)
❸ Evening (EVE)
❹ Night (NHT)
❺ Start Time
❻ Temperature

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Pushbutton Backlight

The large numbers and letters on your LCD screen make it easy to see. In low light conditions, press the button on top of the thermostat and the display will light up for three seconds. For ten minutes after pressing the light button, pressing any other button will light the display for ten seconds. The display light uses power from the 3 “AA” alkaline batteries installed. Excessive use of the display light will reduce battery life.

Factory Preprogramming

This thermostat has been programmed at the factory. The chart in the programming examples section lists these factory settings. If the times and temperatures are the same as your schedule, you may simply run the factory installed program by pressing **PROGRAM** RUN.

Arm Chair Programming.

The thermostat uses 24 VAC power supplied by the system for normal operation. However, if the installed “AA” batteries are providing sufficient power, you can program the thermostat away from the wall. If the thermostat indicates low battery power (**CHECK BATTERY**), refer to the Battery Back-up feature (page 33).

Temporary Program Override.

Any time your program is running and you would like to override it for a specific amount of time, press ^ or v until the temperature you want is displayed. The display will indicate **HOLD**, and the number of hours remaining in the hold period will be indicated with the word **HRS**. To adjust the length of time for the override, press **TIME** FWD or **TIME** BACK. **HOLD TILL** will be displayed as well as the HOLD period expiration time. Press **TIME** FWD or **TIME** BACK buttons until you reach the time you would like it to resume the program. The TIME FWD or **TIME** BACK buttons adjust the time in 15 minute increments. This programmed hold time has a 19 hour maximum and 15 minute minimum. Beyond 19 hours you may wish to use the vacation hold feature (page 33). If you need to, you can adjust the temperature up or down.

Indefinite Program Hold.

If you want to operate the thermostat to keep a set temperature without a program running, press **PROGRAM** HOLD. The ^ or v buttons can be used to raise or lower the temperature. The thermostat will hold the set temperature until you return to the program by pressing **PROGRAM** RUN.

Selectable Energy Management Recovery (EMR)

EMR causes the thermostat to start operating the system early in order to make the building temperature reach your program setpoint at the time you specify. In heating, the thermostat will start 5 minutes early for every 1°F difference between the room temperature and the next programmed temperature. In cooling, the thermostat uses 15 minutes per °F.

EXAMPLE: If the temperature in the room is 65°F and the thermostat is programmed for 70°F at 7 AM, the thermostat will start approximately 25 minutes early. The difference between the room temperature (65°F) and the setpoint (70°F) is 5°. 5° X 5 minutes per °F = 25 minutes. The setpoint on the display will actually change to display 70° about 25 minutes early.

The maximum time the thermostat can start early in heating is 75 minutes. The maximum time the thermostat can start early in cooling is 3 hours and 45 minutes. Cooling can start earlier because it takes longer for cooling systems to reach the desired temperature.

To select or deselect this feature, refer to the CONFIGURATION section (page 18, step 1).

Automatic Heat/Cool Changeover

If you have a heating/cooling system, the thermostat can be set to automatically switch the system from heating to cooling as needed. To set your thermostat to this operating mode, press SYSTEM button until **AUTO** is displayed on the screen.

Pressing the ^ and v buttons at the same time will change the setpoint temperature displayed to the setpoint of the other mode. This will allow you to modify both the HEAT and COOL setpoints to accommodate a HOLD condition while in Automatic Changeover mode. To adjust, refer to the Configuration section (page18, step 7).

Adjustable Temperature Display

The room temperature display can be adjusted to read higher or lower by following the configuration menu and adjusting the temperature to a higher or lower value. The thermostat is calibrated at the factory to display a very accurate room temperature, but due to various conditions and/or personal preference, you may wish to adjust the thermostat display higher or lower (up to 5°F). For example, if the thermostat displays a room temperature of 70° but you want it to display **73°**, you can adjust it. To adjust, refer to the CONFIGURATION section (page 19, step 8).

Programmable Fan Control

This feature allows you to have your fan operate continuously through one or more programmed time periods. This is useful if you want constant air circulation in your location during a specific time period. If you do not use this feature, the fan will cycle normally with the heating and cooling system.

Programmable Vacation Time/ Temperature Operation.

The **VACATION** mode allows you to program the thermostat to hold a constant temperature for 1 to 29 days. At the end of the day and time you select, the thermostat will return to normal program operation.

To program the number of days, press **HOLD** then press **SET** DAY . **VACA HOLD TILL** will be displayed. The display will also show **DAYS** (flashing) and the number **5**. To change the number of vacation days, press **TIME** FWD or **TIME** BACK. Press ^ or v to set the temperature you wish to maintain while away. While still in the vacation mode, set the time you want the program to resume by pressing **SET** TIME once. The current time will display. Press **TIME** FWD to adjust the time in 15 minute increments. You may wish to select a few hours in advance of your expected return to allow time to reach the desired temperature. Your thermostat is now programmed to hold the temperature you selected through your vacation for HEAT, COOL, or AUTO.

After 20 seconds the display will return to time/temperature alternation, and will display **VACA**. Pressing **SET** DAY again will activate the vacation mode settings. Pressing **PROGRAM** RUN cancels this feature and begins running your normal program.

Daylight Savings Time Button.

One button adjustment allows you to change your thermostat clock between Standard Time and Daylight Savings time. Simply push the **DAYLIGHT SAVINGS TIME** button to advance the time forward one hour in the Spring. In the Fall, press the **DAYLIGHT SAVINGS TIME** button twice to fall back an hour. If you push it three times in a row (in less than 30 seconds) it will return to the original time setting. After clock adjustment, press **PROGRAM** RUN to resume your normal program.

Battery Back-Up.

Three “AA” alkaline batteries allow the thermostat to maintain its program in the event of a power loss. They also operate the back light for viewing the

display in low light conditions, and allow for armchair programming.

CHECK BATTERY will be displayed when the batteries are low. To assure optimum performance, change batteries once a year or when **CHECK BATTERY** is displayed. When changing batteries, always replace all three batteries with new "AA" alkaline batteries (for optimum performance, we recommend Energizer® batteries). If the batteries must be changed frequently, it may indicate a problem with the system. Contact the heating/cooling system manufacturer or a service person. Remember that excessive use of the display light will reduce battery life.

Keypad Lockout.

This security feature allows you to lock out the keypad to prevent unauthorized tampering with the program. Two levels of security are available, Total Keypad Lockout or Partial Keypad Lockout. Total Keypad Lockout renders all buttons inoperative. Partial Keypad Lockout allows only the ^ or v to operate for temporary temperature overrides. It also limits the temperature to the maximum heating and minimum cooling temperatures used in your program. This is especially useful in buildings where unscheduled events are common. Anyone can change the temperature, but only between the temperatures you set and only for two hours or the number of hours you specify if you set up your Hold Till timing (see Temporary Program Override, page 31). To select or deselect this feature, refer to the CONFIGURATION section (page 19, steps 12 and 13).

Thermostat Startup After Total Power Loss.

On installation, or when power is restored after a total power loss to the thermostat, your thermostat will automatically maintain a heating temperature of 62°F (16°C) and a cooling temperature of 85°F (29°C). A total loss of power will occur when you lose 24 VAC power to the thermostat, and you have no battery backup. If this happens, the thermostat display will go blank in about one minute after power loss.

When power is restored, the thermostat will automatically return to the temperatures listed above. If this happens, set the clock and day of the week (use steps 1 through 6 from "**Entering Your Program",** page 24), then select **HEAT, COOL** or **AUTO** using the SYSTEM. button, and press **PROGRAM** RUN to resume operation with your previously set program.

Compressor Short-Cycle Protection.

Your thermostat can be configured to protect your system against premature compressor failure by “locking out” the compressor. This ensures that the compressor will stay off for at least five minutes on each cycle. When the thermostat is in compressor lock-out, the word **COOL** will flash. During this period, the compressor will not be energized. See installation and configuration, page 18, step 6.

Air Filter Change-Out Indicator.

This feature allows the thermostat to display the words **CHNG FLTR** (change filter) after a set time of fan operation. This is a reminder to change or clean your air filter. The factory set interval for **CHNG FLTR** to be displayed is 200 hours of fan operation. This can be set anywhere from 0 to 1950 hours in 25 hour increments. **A selection of 00 will cancel this feature.**

When **CHNG FLTR** is displayed, you can clear it by pressing the **HUM/ FLTR SERVICE** button. This resets the timer and starts counting the hours until the next filter change.

The following steps will allow you to change the number of hours for filter change-out.

1. If you see **CHNG FLTR** on the display, press the **HUM/FLTR SERVICE** button once to reset the timer. If you do not see **CHNG FLTR** proceed to step 2.

On a 7–Day thermostat, when the **HUM/FLTR SERVICE** button is pressed twice, the display will show the number of hours remaining before **CHNG FLTR** indicator will display.

2. Press the **HUM/FLTR SERVICE** button. The display will show **SET FILTER TIME** and will show the number of hours to filter change.

3. Press **TIME** FWD or **TIME** BACK to change the time to your requirements.

4. Press **PROGRAM** RUN to return to the normal operating mode.

NOTE: If unsure what interval to use between filter changes or cleaning, contact the manufacturer of your heating/cooling equipment.

System and Thermostat Diagnostics.

The display will indicate **CHECK SYSTEM** if the room temperature does not rise within two hours of the call for heat. After two hours the thermostat will quit calling for heat for one minute (this allows some furnaces to reset) and call for heat again. It will

repeat this sequence three times. If the temperature still does not rise, it will continue to call for heat. This normally indicates the heating system is not working correctly. You may wish to consult your furnace manufacturer or service person.

The display will indicate **CHECK STAT** if one of the following occurs.

• One of the buttons is stuck down or in. Check buttons, make sure nothing is pushing them in.

• The thermostat sensor is not functioning. If using a remote sensor, check connections, wiring and power.

• The humidity sensor is not functioning.

After checking the above, press **PROGRAM** RUN to reset the display. If this does not clear the display, disconnect power and remove the batteries for five minutes.

If these checks fail to solve the problem, the thermostat should be replaced.

Adjustable Humidity Display.

The room humidity display can be adjusted to read higher or lower by following the configuration menu and adjusting the humidity to a higher or lower value (up to 20% RH). The sensed humidity is calibrated at the factory. If you want to adjust it, refer to the CONFIGURATION section (page 19, step 14).

Humidifier Maintenance Indicator.

This feature allows the thermostat to display the words **CHCK HUMD** (check humidifier) after a set time of humidifier operation. This is a reminder to maintain or clean your humidifier. The factory set interval for **CHCK HUMD** to be displayed is 100 hours of humidifier operation. This can be set anywhere from 0 to 1975 hours in 25 hour increments. A selection of 00 will cancel this feature.

When **CHCK HUMD** is displayed, you can clear it by pressing **HUM/ FLTR SERVICE** button. This resets the timer and starts counting the hours until the next humidifier maintenance.

The following steps will allow you to change the number of hours for humidifier maintenance.

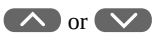
1. If you see **CHCK HUMD** on the display, press the **HUM/FLTR SERVICE** button once to reset the timer. Also display will show **SET HUMD TIME** and will show the number of hours to humidifier maintenance.

2. Press **TIME** FWD or **TIME** BACK to change the time to your requirements.

3. Press **PROGRAM** RUN to return to the normal operating mode.

Humidifier Control and Monitoring

When humidity key is pressed in the run mode the actual humidity will be displayed on the left side of the display. **HUMD** is displayed above the actual humidity. The humidity set point is displayed on the right side of the display.

 or key may be pressed to modify the humidity set point. Maximum displayed humidity is 80% RH and minimum displayed humidity is 10% RH. If the heating system is operating and there is a demand for humidity, then the humidifier will operate.

If the demand for humidity is not satisfied for ten consecutive heat cycle operations, the display will show the word HUMD for one second and the word MX for one second signaling maximum possible humidity is reached with respect to the humidifier's capability.

Programmable Automatic Humidity Reduction.

This feature automatically lowers humidity when the outside temperature drops. This is to prevent the interior windows/walls from reaching the dew point where water condenses on surfaces. To achieve automatic humidity reduction, the thermostat lowers the humidity when furnace cycles are long. When the furnace runs shorter cycles, it increases humidity. For suggested settings see table below.

If your window insulation is poor, you need high humidity reduction. If your window insulation is good, you need low humidity reduction (factory setting).

To adjust this feature, refer to the CONFIGURATION section (page 19, step 15). Selection of 0 will cancel this feature.

HI	Poorly insulated homes or homes with a lot of condensation on windows/walls
0	Factory default – no humidity reduction
LO	Well insulated homes requiring little humidity reduction

FAQs	1F97-391
1. My thermostat is reading in Celsius. How do I change it to Fahrenheit?	Press PROGRAM **RUN** to make certain the thermostat is in the run program mode, then press TIME **FWD** and TIME **BACK** at the same time to enter the configuration menu. Press TIME **FWD** until you get to °C then press the **UP** or **DOWN** arrow to select °F, press PROGRAM **RUN** to return to normal operation.
2. The display shows the word **CHECK BATTERY**. What does it mean?	**CHECK BATTERY** on the digital display indicates low batteries. The **BATTERY** symbol (not blinking) indicates a loss of power (24 volts) from the heating and cooling equipment to the thermostat, or that the thermostat is operating on battery power only.
3. How do I bypass (not use) the program?	To bypass the program and operate the thermostat manually press the MODE **SYSTEM** button to select Heat or Cool (whichever you prefer) and press **HOLD**. Use the Temp **Up** or Temp **Down** buttons to set the thermostat on the temperature you want. The temperature setting you choose will be held until you manually change it using the Temp **Up** or Temp **Down** buttons. The thermostat will remain in the **HOLD** mode when you change temperature and maintain whatever temperature you set. If you decide to return to the program, press PROGRAM **RUN** to cancel the hold feature.
4. What functions do the connecting terminals have on the subbase?	Typical terminals and functions: **HM1**=Humidifier System **6**=Zone Valve **Y**=Cooling System **G**=Fan Relay **W**=Heating System **HM2**=Humidifier System **RC**= Power (Cooling) **RH**=Power (Heating)

FAQs	1F97-391
5. My furnace (air conditioning) cycles too fast (slow). Is there an adjustment?	The **1F97-391** has a feature called Adjustable Heating and Cooling Cycle times (also called Anticipation) that allows you to increase or decrease the cycle times in heating and cooling. This is useful if you think your cycle times are too long or too short. The higher the number you select, the longer the cycle. The lower the number you select, the shorter the cycle. The **1F97-391** is adjusted in the configuration menu (see your installation instructions). The range of adjustment for HEATING is from 2 to 40. The factory Preset is 5. The range of adjustment for COOLING is from 9 to 40. The factory Preset is 12. The cooling will not go below 9 because compressors require a longer cycle. See page 20.
6. Why does the blower fan keep running after the system has shut off?	Normally the blower will turn off within a few minutes after the call for heat or cool. The blower running after the system shuts off may indicate (1) the thermostat is set to **FAN ON**, (2) the fan has been programmed to run at that time period or (3) something has damaged the thermostat or equipment. If the thermostat display indicates **FAN ON**, press the fan button once to set it to **FAN AUTO**, meaning the fan will cycle only with the equipment. If the display indicates **PRG FAN** (Program Fan), sometime during programming, the **FAN** button was pushed. To remove **PRG FAN** (Program Fan), check all of the programmed times and temperatures. When you encounter **PRG FAN**, press the **FAN** button to remove it from that time period in the program. As a final test, set the thermostat to **OFF**. Verify that **FAN ON** or **FAN AUTO** is not displayed. If the fan continues to run, you may want to contact your heating and cooling service person for assistance.

FAQs	1F97-391
7. Do I have to program a stop time for each program period?	There is no need to select a time to stop a programming period. Starting a new programming period will stop the previous program period.
8. My display light does not work. Can it be fixed or replaced?	The display light in the **1F97-391** is not a replaceable item. The display light uses power from the batteries. If batteries are good, a replacement thermostat would be indicated.
9. Between Heating and Cooling seasons, I want to turn my system off. Will this change the program?	Any time you wish to turn your system off, simply press **SYSTEM** button until the display shows **OFF**. This will not affect your thermostat's programming in any way. To turn the system back on, press **SYSTEM** button until **HEAT**, **OFF**, **COOL**, or **AUTO** is displayed and press RUN. The system will begin operating according to the current thermostat program.
10. Do I have to reprogram my thermostat after I change the batteries?	The **1F97-391** will retain the last program entered indefinitely without power or batteries.

FAQs	1F97-391
11. How can I get an extra copy of the Operating Manual for my thermostat?	Visit our website at www.white-rodgers.com for operating manuals.
12. What do I do if my system is not working properly and I need service?	Contact a Local Heating & Cooling service person or visit our website at www.white-rodgers.com to consult our “Where to Buy” Service/Dealer locator.
13. What does **CHCK HUMD** on the display mean and how do I reset it?	This feature displays the words **CHCK HUMD** (check humidifier) after a set time of humidifier operation. This is a reminder to maintain or clean your humidifier. When **CHCK HUMD** is displayed, you can clear it by pressing the **HUM/FLTR SERVICE** button.
14. When I push the **Humidity** button, it displays **HUMD MX**. What does this mean?	**HUMD MX** indicates the humidifier has not reached the current humidity setting in the last 10 heating cycles. If the condition persists, a service person may recommend additional humidifier capacity.

TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
No Heat/No Cool/No Fan (common problems)	1. Blown fuse or tripped circuit breaker. 2. Furnace power switch to OFF. 3. Furnace blower compartment door or panel loose or not properly installed.	Replace fuse or reset breaker. Turn switch to ON. Replace door panel in proper position to engage safety interlock or door switch.
No Heat	1. Pilot light not lit. 2. Thermostat not set to Heat. 3. Loose connection to thermostat or system. 4. Furnace Lock-Out Condition. Heat may also be intermittent.	Re-light pilot. Press the **SYSTEM** button until Heat is displayed and raise temperature above room temperature. Verify thermostat and system wires are securely attached. Many furnaces have safety devices that shut down when a lock-out condition occurs. If the heat works intermittently, contact the furnace manufacturer or local service person for assistance.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
No Heat (cont.)	5. Heating system requires service or thermostat requires replacement.	Diagnostic: Press the **SYSTEM** button until Heat is displayed and raise the setpoint above room temperature. Within a few seconds the thermostat should make a soft click sound. This sound usually indicates the thermostat is operating properly. If the thermostat does not click, try the reset operation by pressing the **FAN**, TIME **BACK**, and the temperature **DOWN** arrow at the same time. If the thermostat does not click after being reset, contact your heating and cooling service person or place of purchase for a replacement. If the thermostat clicks, contact the furnace manufacturer or a service person to verify the heating is operating correctly.
No Cool	1. Thermostat not set to Cool. 2. Loose connection to thermostat or system. 3. Cooling system requires service or thermostat requires replacement	Press the **SYSTEM** button to Cool and lower temperature below room temperature. Verify thermostat and system wires are securely attached. Same procedure as Diagnostic for No Heat condition except set the thermostat to Cool and lower the setpoint below the room temperature. There may be up to a 5 minute delay before the thermostat clicks in Cooling.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Heat, Cool or Fan Runs Constantly	1. Possible short in wiring. 2. Possible short in thermostat. 3. Possible short in heat/cool/fan system. 4. Fan Switch is set to Fan On.	Check each wire connection to verify they are not shorted or touching together. No bare wire should stick out from under terminal screws. Try resetting the thermostat as described in previous Corrective Actions. Also, if the FAN switch is set to the ON position, the blower fan will cycle continuously whether the heating or cooling system is running, move FAN switch to the AUTO position. If the condition persists, the manufacturer of your system or service person can instruct you on how to test the Heat/Cool system for correct operation. If the system operates correctly, replace the thermostat.
Thermostat Setting and Thermostat Thermometer Disagree	1. Thermostat thermometer setting requires adjustment.	The thermometer can be adjusted +/- 5 degrees. See Temperature Display Adjustment in the Configuration Menu Section.
Thermostat Does Not Follow Program	1. AM or PM set incorrectly in program. 2. AM or PM set incorrectly on the clock. 3. Voltage spike or static discharge.	Check current clock and program settings including the AM or PM designations for each time period. If a voltage spike or a static discharge occurs, use the Reset Operation by pressing **FAN**, **TIME BACK**, and the temperature **DOWN** arrow at the same time.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Blank Display and/or Keypad Not Responding	1. Voltage spike or static discharge. 2. Battery change required.	Replace batteries and check heat/cool system for proper operation. If a voltage spike occurs, use the Reset Operation by pressing **FAN**, **TIME BACK**, and the temperature **DOWN** arrow at the same time.
How do I change the room Humidity display?		The room Humidity display can be adjusted to read higher or lower by following the configuration menu and adjusting the humidity to a higher or lower value (up to **20% RH**). To adjust the humidity display refer to the **CONFIGURATION** section (page 19, step 14).

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NOTES

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