![Emerson logo]

1F85U-42PR (Programmable)
Installation and Operating Instructions
80 Series™ Universal Thermostat
Battery Powered or Hardwired with Common
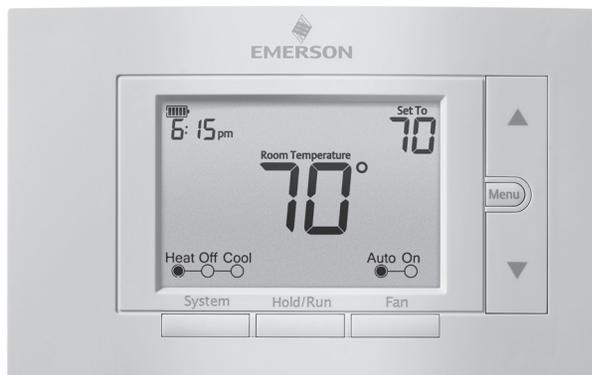
Optional Accessory: Wall Cover-Up Plate F61-2663, 6-3/4" W x 4-1/2" H

INDEX

Thermostat Applications	Maximum Stages Heat/ Cool
Conventional Gas, Oil, Electric (mV and 24V), Heat only, Cool only or Heat/Cool Systems	2/2
Heat Pump (Air Source or Geothermal) with Aux. Heat	4/2

MERCURY NOTICE: This product does not contain mercury. However, this product may replace a product that contains mercury. Mercury and products containing mercury must not be discarded in household trash. Refer to **www.thermostat-recycle.org** for information on disposing of products containing mercury.

SPECIFICATIONS

Electrical Rating:
    Battery Power .... mV to 30 VAC, NEC Class II, 50/60 Hz
    Input-Hardwire .... 20 to 30 VAC, NEC Class II, 50/60 Hz
Terminal Load... 1.5 A per terminal, 2.5A maximum all terminals combined
Setpoint Range .... 45° to 99° F (7° to 37° C)
Rated Differentials (@ 6°F/ Hr):   Fast   Med   Slow
    Heat (Conventional Gas / Oil / Elect)..... 0.5°F   0.75°F   1.9°F
    Cool (Central Air) .... 0.9°F   1.2°F   1.7°F
    Heat Pump (Heat and Cool) .... 0.9°F   1.2°F   1.7°F
    Heat Pump Aux. .... 0.5°F   0.75°F   1.9°F
Operating Ambient .... 32°F to +105°F (0° to +41°C)
Display Temperature Range .... 32°F to +99°F (0 to 37°C)
Operating Humidity .... 90% non-condensing maximum
Shipping Temperature Range................... -20°F to + 150°F (-29° to +65°C)
Thermostat Dimensions........................... 3-3/4" H x 6" W x 1-1/8" D

WIRING

Refer to equipment manufacturer's instructions for specific system wiring information. After wiring, see INSTALLER MENU for proper thermostat configuration. Wiring table shown are for typical systems and describe the thermostat terminal functions. Wiring will change when dedicated emergency heat is on (See Installer menu #15).

Terminal Designations	Terminal Function
RC	Power (24V) - Cooling
RH	Power (24V) - Heating
O/B 6 (not shown) - 3 wire zone valve	Reversing Valve or output for 3 wire zone valves Configurable as "O" or "B" Reversing Valve or 3 wire zone heat (power close)
Y	1st Stage Compressor
G	Fan Relay
W/E	1st Stage Heat (conventional); 1st Stage Auxiliary Heat (heat pump) Can operate as Emergency Heat only (See Installer Menu #15)
C	Common wire for 24V (optional with batteries)
L	Heat Pump Malfunction / Diagnostic terminal (input signal requires common)
Y2	2nd Stage compressor
W2	2nd Stage Heat (Conventional) 2nd Stage Auxiliary Heat (Heat Pump) Can operate as 1st Stage Auxiliary Heat (See Installer Menu #15)
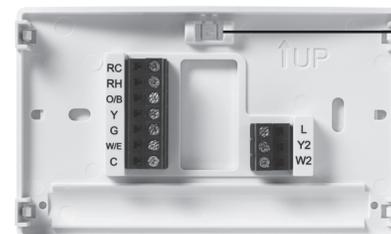
Leveling Thermostat
Leveling is for appearance only and will not affect thermostat operation.

Precautions

- 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 handing 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 burn out thermostat and could cause personal injury and/or property damage.

⚠ **CAUTION**

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

⚠ **CAUTION**

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

Do not allow the compressor to run unless the compressor oil heaters have been operational for 6 hours and the system has not been operational for at least 5 minutes.
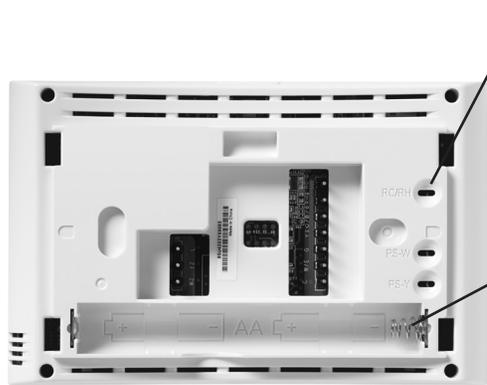
RC/RH Jumper Wire

This thermostat electrically connects the RC and RH terminals so a jumper wire is not required. If the application provides a separate wire for RC and RH, clip the RC/RH jumper. This will isolate both terminals so they can be independently used.

Battery Location

Premium AA alkaline batteries are required when C-wire is not available. When C-wire is available, the batteries provide a back-up source of power (this will maintain the clock in the event of a power outage).

INSTALLER MENU

To prevent changes that may affect system performance, this thermostat has an INSTALLER MENU and a USER MENU. The INSTALLER MENU provides access to every option, while the USER MENU provides access to items that will not affect system performance. To access the INSTALLER MENU press the **Menu** button for 8 seconds. The display will show item **05** in the table below. Use **Next** and **Back** to navigate through menu items. Press ▲ or ▼ to change a menu setting.

Installer Menu # (Hold Menu 8 Seconds)	Description	Default Setting (flashing icons)	Settings (Press ▲ or ▼)
05	**Outdoor Equipment:** selects air conditioner (AC) or heat pump (HP) equipment as well as the number of stage	AC2	AC0 AC1 AC2 HP1 HP2
10	**Indoor Equipment:** selects whether the equipment is a gas furnace, electric furnace or fan only	EL2	FAN GA1 GA2 EL1 EL2
15 dE	**Dedicated Emergency:** W/E only operates in Emergency Aux mode. W2 becomes 1st stage Aux. Heat	OFF	On OFF
20 R	O,B or 3 Wire Zone Valve Selection	O	O B 3
30 CR	**Heat Cycle Rate:** how often the heat will turn on	MEd	SLO – slow MEd – medium FAS – fast
32 CR	**Aux Cycle Rate:** how often the auxiliary heat will turn on	MEd	SLO – slow MEd – medium FAS – fast
35 CR	**Cool Cycle Rate:** how often the cooling will turn on	MEd	SLO – slow MEd – medium FAS – fast
50 CL	**Compressor Lockout:** protects the compressor from short cycling	OFF	On – 5 minute delay OFF – no delay
65	**Max Heat Limit:** maximum set point for heat mode	99	47 to 99
66	**Minimum Cool Limit:** minimum set point for cool mode	45	45 to 97

(Installer Menu continued on next page)

INSTALLER MENU (Continued)

Installer's Menu # (Hold Menu 8 Seconds)	Description	Default Setting (flashing icons)	Settings (Press ▲ or ▼)
74	**Schedule Type:** set as either 7-Day, 5-1-1 Day or Non-Programmable	5	7 – 7 Day 5 – 5-1-1 Day 0 – Non Programmable
75	Defines periods per day	4	2 -leave, return 4 -wake, leave, return, sleep
76 E	**Early Start:** starts heating or cooling early so your programmed temperature is reached by the programmed time	OFF	On – start early OFF – start at program period time
79	**Fahrenheit or Celsius**	°F	°F – Fahrenheit °C – Celsius
81	**Temperature Display Adjustment:** adjust the displayed "Room Temperature"	0	-5 to +5
83 dL	**Continuous Display Light:** keep the backlight always on – "C" wire required	OFF	On – always on OFF – momentarily
86	**Change Air Filter:** set up a monthly reminder	OFF	1 to 12 – reminder time (months) OFF – no filter reminder
88	**Auto Changeover:** thermostat automatically switches between heat and cool.	OFF	On – enable auto OFF – disable auto
99 🔒	**Keypad Lock:** prevent unwanted changes to the thermostat	OFF	On – disable buttons OFF – all buttons are active

TEST EQUIPMENT *Turn on power to the system.*

Fan Operation
If your system does not have a G terminal connection, skip to **Heating System**.
1.) Press the fan button to select the On position. The blower should begin to operate.
2.) Press the fan button to select the Auto position. The blower should stop immediately.

Heating System
1.) Press the **System** button to select the **Heat** position. Heat Pumps only - if the auxiliary heating system has a standing pilot, be sure to light it.
2.) Press ▲ to adjust thermostat setting to 1° above room temperature. The heating system should begin to operate and the thermostat will indicate **Heat On**.
3.) For heat pump with auxiliary- Press ▲ to adjust thermostat setting to 3° above room temperature. The auxiliary heat should begin to operate and the thermostat will indicate **Heat On Aux**.
4.) Press ▼ to adjust thermostat setting 1° below room temperature. The heating system should stop operating and the **Heat On** icon will disappear.

Auxiliary System (only for heat pumps with auxiliary)
1.) Press the system button to select the **Aux** position.
2.) Press ▲ to adjust thermostat setting to 1° above room temperature. The auxiliary heating system should begin to operate and the thermostat will indicate **Heat On Aux**.
3.) Press ▼ to adjust thermostat setting 1° below room temperature. The auxiliary heating system should stop operating and the **Heat On Aux** icon will disappear.

Cooling System
1.) Press the system button to select the **Cool** position.
2.) Press ▼ to adjust thermostat setting 1° below room temperature. The blower should come on immediately on high speed, followed by cold air circulation. The thermostat will indicate **Cool On.** There can be up to a 5 minute delay. (see INSTALLER MENU, item 50)
3.) Press ▲ to adjust thermostat setting 1° above room temperature. The cooling system should stop operating and the **Cool On** icon will disappear.

*Note: If **Starting Soon** is shown on the display, the compressor lockout feature is operating. There will be up to a 5 minute delay before the compressor turns on (see INSTALLER MENU, item 50).*

USING THE THERMOSTAT

THERMOSTAT OVERVIEW

Before you begin using your thermostat, you should be familiar with its features, display and the location/operation of the thermostat buttons and switches.

THERMOSTAT BUTTONS AND SWITCHES	THE DISPLAY
1.) Fan Button	8.) **Next (Menu button)** is used to navigate within a menu
2.) Hold a permanent temperature or press again to cancel hold (return to programmed schedule)	9.) Set the correct time, access the schedule and customize thermostat settings.
3.) System Button	10.) **Back (Fan button)** is used to navigate within a menu
4.) Backlight Button (located on the top of the thermostat)	11.) **Exit (Hold/Run button)** returns to the home screen
5.) Raises Temperature Setting	12.) Thermostat is protecting the equipment from short cycling (5-minute delay)
6.) Access Menu Options	13.) Indicates that the system is running in Cool, Heat or Auxiliary mode. (Heat Pump Only -The auxiliary will run in Heat mode when the heat pump cannot maintain the set temperature.)
7.) Lowers Temperature Setting	14.) **SEE TROUBLESHOOTING**
	15.) Battery status indicator
	16.) Replace battery indicator
	17.) Day of the week used when programming a schedule
	18.) Permanent hold (bypassing the schedule)
	19.) Temperature setpoint
	20.) Appears when the keypad is locked (to prevent unwanted changes)
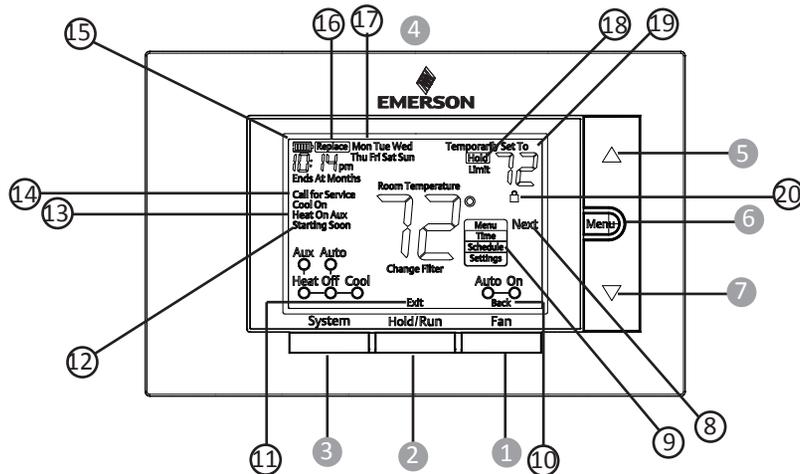
Whenever "▭ Replace" appears in the display, new premium brand AA alkaline batteries should be installed. If the house will be unoccupied for an extended period and either "▭" or "▭ Replace" is displayed, install new batteries before leaving.

USER MENU

To customize thermostat settings, press the **Menu** button from the home screen. Use the ▲ or ▼ buttons to highlight **Settings** and press **Next**. Use **Next** and **Back** to navigate through menu items. Press ▲ or ▼ to change the setting.

User's Menu # (Press Menu button and release)	Description	Default Setting (flashing icons)	Settings (Press ▲ or ▼)
01	**Schedule Type:** set as either 7-Day, 5-1-1 Day or Non Programmable	5	**7** – 7 Day **5** – 5-1-1 Day **0** – Non-Programmable
02	Defines periods per day	4	2 - leave, return 4 - wake, leave, return, sleep
03 E	**Early Start:** starts heating or cooling early so your programmed temperature is reached by the programmed time	OFF	**On** – start early **OFF** – start at program period time
04	**Fahrenheit or Celsius**	°F	**°F** – Fahrenheit **°C** – Celsius
05	**Temperature Display Adjustment:** adjust the Room Temperature)	0	**-5 to +5**
06 dL	**Continuous Display Light:** keep the backlight always on – "C" wire required	OFF	**On** – always on **OFF** – momentarily
07	**Change Air Filter:** set up a monthly reminder	OFF	**1 to 12** – reminder time (months) **OFF** – no filter reminder
08	**Auto-Changeover:** thermostat automatically switches between heat and cool	OFF	**On** - enable auto **OFF** - disable auto
09 🔒	**Keypad Lock:** prevent unwanted changes to the thermostat	OFF	**On** – disable buttons **OFF** – all buttons are active

THERMOSTAT OPERATION

Set Current Time and Day
Note: Time icons will flash at initial power up or after a reset.

1.) Press **Menu**
2.) The time icon will be flashing, Press **Next** to advance and set the time
3.) Use ▲ or ▼ to set the correct time
4.) Press **Next** and use ▲ or ▼ to set the correct day
5.) Press **Exit** when finished.

The default program is **5-1-1 Day**, but can be setup as a **7-Day** or **Non-Programmable** thermostat (refer to the **User Menu** above)

- **Hold Temperature (bypassing the schedule)** – With the **System** set to **Heat** or **Cool**, momentarily press the **Hold/Run** button. **Hold** will be displayed. Use ▲ or ▼ to adjust the temperature. The thermostat will hold the room temperature at the selected setting until you press **Hold/Run** again to start program operation (cancels permanent Hold).

- **Program Override (Temporary Hold)** – Press ▲ or ▼ until the desired temperature is displayed. The thermostat will override the schedule until the next programmed time period with a minimum override of 2 hours. Then the thermostat will automatically revert to the program.

- **Keypad Lockout** – To prevent unwanted changes, the buttons can be disabled. To turn this feature On, press and hold ▲ and the **Menu** button until the 🔒 icon appears (this can also be turned on in the menu). To turn Off, press and hold ▲ and the **Menu** button for 3 seconds.

THERMOSTAT SCHEDULE

Energy Saving Factory Schedule

This thermostat is programmed with the energy saving settings shown in the table below for all days of the week.

	Wake	Leave	Return	Sleep
Heating Schedule	6:00 AM - 70°F	8:00 AM - 62°F	5:00 PM - 70°F	10:00 PM - 62°F
Cooling Schedule	6:00 AM - 75°F	8:00 AM - 83°F	5:00 PM - 75°F	10:00 PM - 78°F

Note: Thermostat can be programmed on or off the subbase

Modify the Heating Schedule

1.) Use the **System** button to select **Heat**
2.) Press **Menu**
3.) Use the ▼ button to select **Schedule** and press **Next** to enter the schedule
4.) The time icons will flash – use ▲ or ▼ to set the time for the start of a period
5.) Press **Next** – the set point icons will flash – use ▲ or ▼ to set the temperature for the current period
6.) Continue to press **Next** to advance through all periods (Wake, Leave, Return, Sleep) for all days of the week.

*Note: Press **Back** to return to the previous setting. Once all days of the week have been programmed the thermostat will display **End**. Press **Exit** at any time to save changes and return to home screen.*

Modify the Cooling Schedule

1.) Use the **System** button to select **Cool**
2.) Repeat steps 2-6 from the heating schedule

TROUBLESHOOTING

Symptom	Possible Cause	Corrective Action
No Heat/ No Cool/ No Fan (common problem)	1.) Blown fuse or tripped circuit breaker 2.) Furnace power switch to OFF 3.) Furnace blower compartment door panel loose or not properly installed 4.) Loose connection to thermostat or system	1.) Replace fuse or reset breaker 2.) Turn switch to ON 3.) Replace door panel in proper position to engage safety interlock or door switch 4.) Tighten Connections
No Heat	1.) System not set to Heat 2.) Loose connection to thermostat or system 3.) Heating System requires service or thermostat requires replacement	1.) Set thermostat to Heat. 2.) Verify thermostat and system wires are securely attached. 3.) Diagnostic: Set System to Heat and raise the setpoint above room temperature. Within five minutes the thermostat should make a soft click sound and "Heat On" should appear on display. This sound indicates the thermostat is operating properly. If the thermostat does not click, try the reset operation listed below. 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 system is operating correctly.

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TROUBLESHOOTING (Continued)

Symptom	Possible Cause	Corrective Action
No Cool	1.) System not set to Cool 2.) Loose connection to thermostat or system 3.) Cooling System requires service or thermostat requires replacement	1.) Set thermostat to Cool. 2.) Verify thermostat and system wires are securely attached. 3.) Diagnostic: Set System to Cool and lower setpoint below room temperature. Same procedures 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 five minute delay before the thermostat clicks in Cooling if the compressor lock-out option is selected in the installer menu. (see INSTALLER MENU, item 50)
Heat, Cool or Fan Runs Constantly	Possible short in wiring, thermostat, heat, cool or fan system	Check each wire connection to verify they are not shorted or touching other wires. Try resetting the thermostat. If the condition persists contact your HVAC service person.
Thermostat Display & Thermometer Disagree	Thermostat display requires adjustment	Display can be adjusted +/-5°. See User Menu item 05
Furnace (Air Conditioner) Cycles Too Fast or Slow (narrow or wide temperature swing)	The location of the thermostat and/or the size of the Heating System may be influencing the cycle rate	Digital thermostats provide precise control and cycle faster than older mechanical models. The system turns on and off more frequently, but runs for a shorter time. If you would like to increase cycle time, choose SLO for slow cycle in the Installer menu. (Reference menu items 30, 32 & 35) If an acceptable cycle rate is not achieved, contact your HVAC service person.
"Call for Service" icon appears on displayed	1.) Heating system is not able to heat the space to within 10 degrees of the setpoint within 2 hours 2.) Cooling system is not able to cool the space to within 10 degrees of the setpoint within 2 hours 3.) If "--" is displayed for the Room Temperature, a replacement thermostat is needed 4.) None of the buttons operate on the thermostat 5.) If "Call for Service" is flashing, compressor self diagnostic is detecting an issue with the outdoor unit	1.) See corrective action for "No Heat" 2.) See corrective action for "No Cool" 3.) Replace thermostat 4.) Make sure keypad lockout is not turned on (🔒), If it's OFF, try reset shown below. 5.) Contact a service person to verify the outdoor equipment is operating correctly

Resetting the Thermostat or Thermostat Settings

If the thermostat has good batteries, but has a blank display or does not respond to key presses, the thermostat should be reset by removing the batteries for 2 minutes. This reset will not change the menu settings or program. If the condition persists after reinstalling the batteries, replace the thermostat.

To conveniently reset only the schedule and user settings back to factory defaults, press **Menu** and **Backlight** buttons at the same time and hold until the display goes blank and resets.

HOMEOWNER HELP LINE: 1-800-284-2925

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