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# OPERATION MANUAL

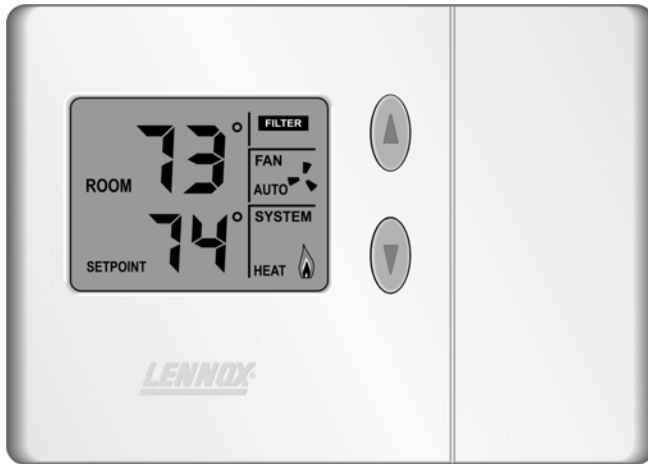
## Merit® Series Thermostat

CONTROLS (51M32)

504,865M  
09/04

TP Technical  
Publications

Litho U.S.A.



### Merit® Series Thermostat

The Lennox Merit® Series Thermostat 51M32 is a nonprogrammable electronic thermostat that is easy-to-use and has a large, easy-to-read display and excellent temperature control. The thermostat also includes a programmable filter change reminder and a system check indicator. The system check indicator will notify the user of the need for equipment service.

Thermostat 51M32 is suitable for non-heat pump, single-stage heat/single cool applications that are matched with a gas or electric furnace.

### General

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

### Introduction

This document describes the operation of Lennox thermostat 51M32. Refer to the installation manual for instructions regarding installation and wiring of the thermostat.

### Initial Thermostat Power-up

When power is initially applied to the thermostat, the display will appear as shown in figure 1.

### RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

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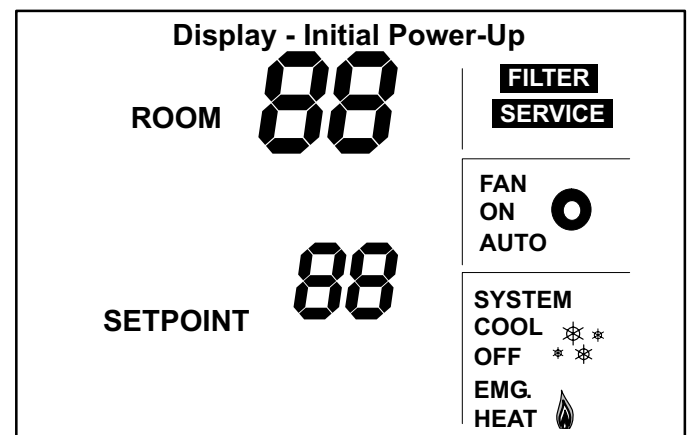


Figure 1

All display segments are momentarily activated. This occurs as a normal part of thermostat initialization. Within a few seconds, the display will appear as shown in figure 2 (figure shows temperature in Fahrenheit units).

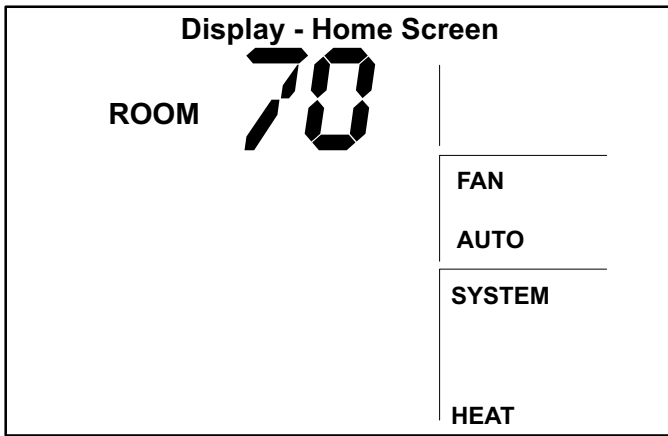


Figure 2

Figure 2 illustrates the HOME screen. Note that an indoor room temperature of 70°F is initially displayed. After about 1 minute of warm-up time, the actual room temperature will be displayed. HEAT mode is the system default (as indicated in the SYSTEM box at lower right).

A pale blue display backlight will turn on each time a key is pressed. The backlight will turn off 8 seconds after the last key is pressed.

### Heating Control

The HEAT button is located behind the small door on the right-hand side of the thermostat. See figure 3.

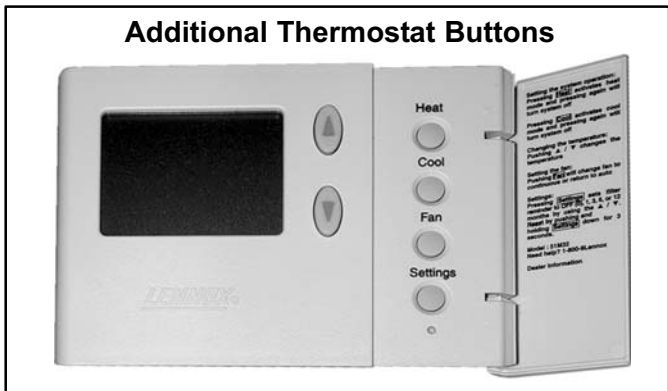


Figure 3

### Enabling and Disabling Heat Mode

Use the HEAT button to enable or disable heat mode as desired. If the thermostat is in off mode, heat mode is enabled when the HEAT button is pressed. This is indicated by HEAT in the SYSTEM box as shown in figure 4.

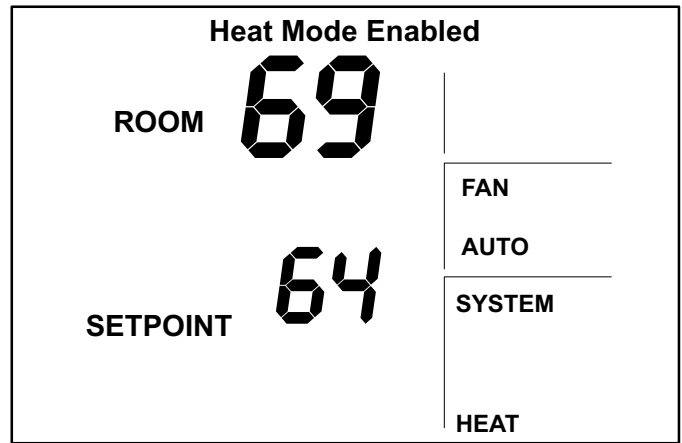


Figure 4

If the thermostat is in heat mode, heat mode is disabled when the HEAT button is pressed. This is indicated by OFF in the SYSTEM box as shown in figure 5.

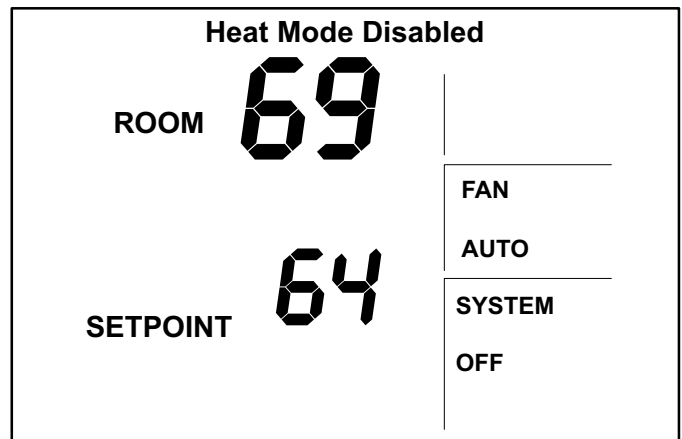


Figure 5

### Heating Demand

The thermostat must be in heat mode in order to properly control the heating equipment. When in heat mode, if the actual temperature is lower than the temperature setpoint, a heating demand is detected by the thermostat. The thermostat will then activate the heating equipment to satisfy the demand. Heating operation is indicated by a flame icon in the SYSTEM box as shown in figure 6.

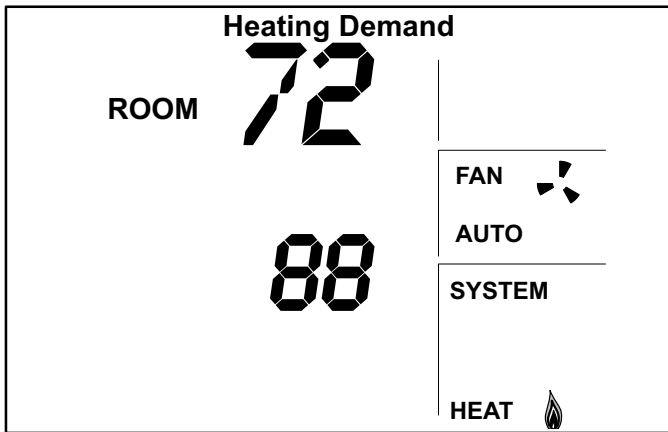


Figure 6

When the actual temperature rises above the temperature setpoint, the flame icon will disappear. This indicates that the heating demand has been satisfied and that the heating equipment has been turned off.

*NOTE - The heating equipment is activated for at least 3 minutes if no buttons are pressed during the demand interval.*

### Cooling Control

The COOL button is located behind the small door on the right-hand side of the thermostat. See figure 3.

### Enabling and Disabling Cool Mode

Use the COOL button to enable or disable cool mode as necessary. If the thermostat is in off mode, cool mode is enabled when the COOL button is pressed. This is indicated by COOL in the SYSTEM box.

If the thermostat is in cool mode, cool mode is disabled when the COOL button is pressed. This is indicated by OFF in the SYSTEM box.

### Cooling Demand

The thermostat must be in cool mode in order to properly control the cooling equipment. When in cool mode, if the room temperature is higher than the temperature setpoint, a cooling demand is detected by the thermostat.

The thermostat will then activate the cooling equipment to satisfy the demand. Cooling operation is indicated by a snowflake icon in the SYSTEM box as shown in figure 7. When the actual temperature drops below the temperature setpoint, the snowflake icon will disappear. This indicates that the cooling demand has been satisfied and that the cooling equipment has been turned off.

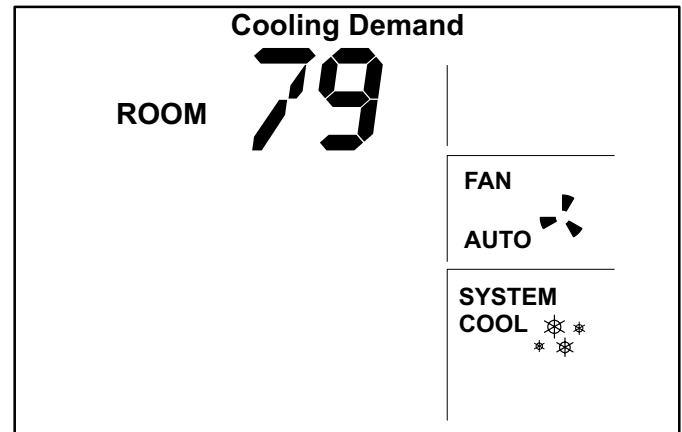


Figure 7

*NOTE - The cooling equipment is activated for at least 4 minutes if no buttons are pressed during the demand interval. Cooling equipment operation is locked out for 5 minutes after a demand has been satisfied. If another cooling demand occurs during this 5-minute interval, the snowflake icon will flash; however, the cooling equipment will not run until the 5-minute delay has elapsed.*

### Adjusting Temperature Setpoint

The temperature setpoint represents the desired temperature of the space around the thermostat. The default temperature setpoint is 70°F. To adjust the setpoint, press the UP or DOWN arrow keys to the right of the display screen.

The existing setpoint will be displayed just below the actual room temperature as shown in figure 8. Use the UP or DOWN arrow keys to adjust the setpoint up or down. The setpoint will increase by 1°F each time the UP key is pressed. The setpoint will decrease by 1°F each time the DOWN key is pressed.

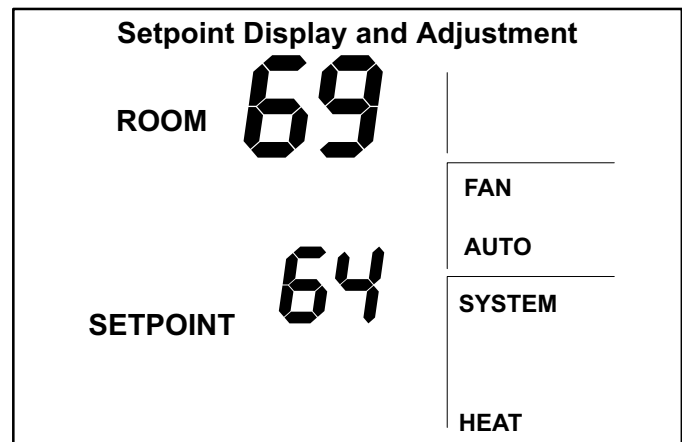


Figure 8

After the desired setpoint is reached, the HOME screen will reappear after about 8 seconds.

## Fan Control

The FAN button is located behind the small door on the right-hand side of the thermostat. See figure 3. The FAN button can be used to select either continuous fan mode or auto fan mode.

If continuous fan mode is enabled, the fan will run continuously regardless of whether the heating or cooling equipment is running. Also, ON will be displayed in the FAN box as shown in figure 9.

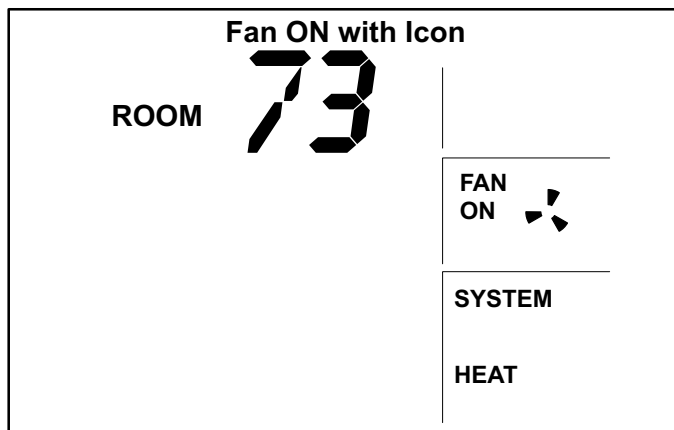


Figure 9

If auto fan mode is selected, the fan will only run when the heating or cooling equipment is running. In this case, AUTO will be displayed in the FAN box as shown in figure 10.

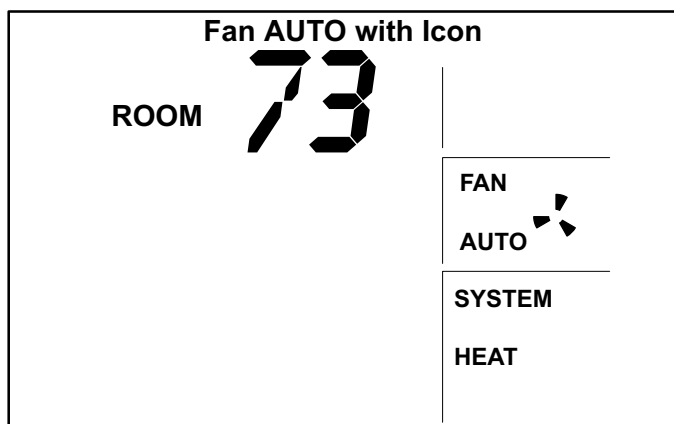


Figure 10

To change from continuous to auto fan mode and vice versa, press the FAN button. Also note the presence of a fan icon in the FAN box. This icon indicates that the fan is running.

## Filter Reminder

The 51M32 thermostat includes a filter reminder feature. The filter reminder can be set for 1, 3, 6, or 12-month intervals. The SETTINGS button, located behind the door on the right-hand side of the thermostat is used to set the filter reminder interval. See figure 3. Press the SETTINGS button from the HOME screen to display the Filter Reminder Settings screen as shown in figure 11.

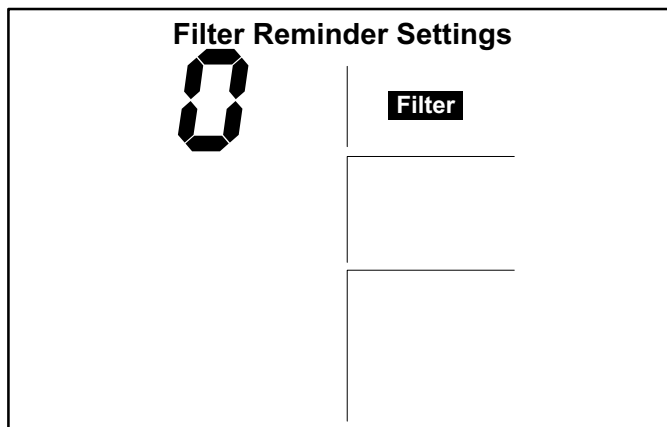


Figure 11

The default setting for the filter reminder is 0, which disables the function. Use the UP arrow while in the Filter Reminder Settings screen to select the desired interval between reminders. It may be necessary to press the UP arrow several times to access the desired setting. The HOME screen will reappear about 10 seconds after the arrow key has been pressed for the final time.

After the programmed interval has elapsed, the FILTER reminder will be displayed as shown in figure 12. After the filter has been changed, reset the filter reminder by pressing the SETTINGS button for 4 seconds. The screen will blink for a few moments to indicate that the timer has been reset.

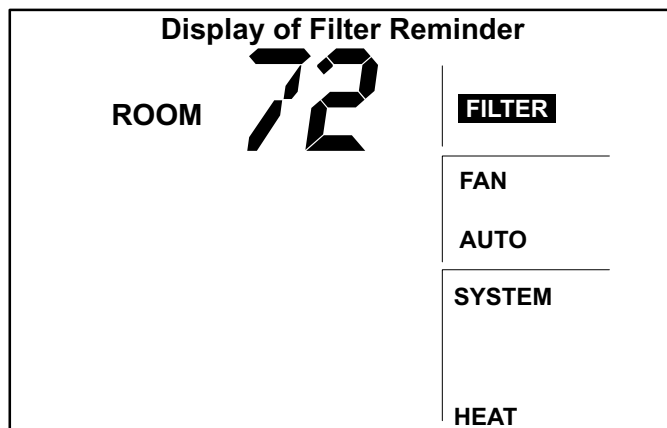


Figure 12

## Service Indicator

When abnormal equipment operation is detected, the SERVICE indicator will flash on the upper-right corner of the screen. This indicates that the equipment requires service from a qualified service technician. The SERVICE indicator is shown in figure 13.

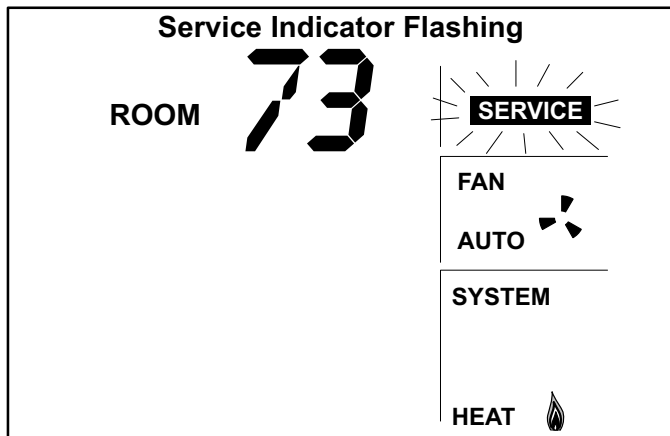


Figure 13

## Thermostat RESET

Under some abnormal conditions, it may be desirable to “reset” the thermostat to its default condition. This can be useful on rare occasions when the thermostat is behaving abnormally (e.g. after an electrical storm or power outage). The RESET button can be used to recover from this situation.

The RESET button is an unlabeled, recessed button located behind the door on the right-hand side of the thermostat, just below the SETTINGS button. The RESET button is visible in figure 3. Use a paper clip or small pencil to press the RESET button. After the RESET button is pressed, the thermostat settings will return to the defaults listed in the Default Settings section.

## Default Thermostat Settings

Default thermostat settings are in table 1.

Table 1

Default Thermostat Settings	
Mode	Heat
Setpoint	70°F (or 21°C)
Fan	Auto
Filter Reminder	OFF (reminder setting = 0)
Equipment Protection Timers	reset back to zero

## Technical Specifications

### Thermostat Type

Electronic nonprogrammable thermostat for 1H/1C, gas or electric heat, non-heat pump, non-power robbing applications.

### Power Supply Range

18VAC - 30VAC (24VAC nominal), 60Hz

### Temperature Display

Display Scale: Fahrenheit or Celsius user selectable (via DIP switches)

Display range: 35°F (2°C) to 99°F (37°C)

Display resolution: 1°F (1°C)

Display Accuracy: +/-1°F

### Temperature Measurement Range

Measurement Scale: Fahrenheit

Measurement Range: 35°F to 99°F

Measurement Resolution: 0.5°F

Measurement Accuracy: +/-1°F

Field Offset: via DIP switches to +/-3°F

Sampling Method: temperature measurements sampled every 15 seconds. Displayed temperature is the average of the last four measurements.

### Temperature Setpoint Range

Setting range: 50°F (10°C) to 90°F (32°C)

Setting resolution: 1°F (1°C)

### Fan Control

AUTO or ON modes, gas or electric heat compatible via DIP switches (also see Thermostat Output section).

### I/O Relays

All thermostat relays are latching type to minimize power consumption.

1. HEAT/COOL relay output
2. FAN relay output
3. SERVICE relay input

### Equipment Protection Timers

Minimum Compressor OFF time: 5 minutes

Minimum Compressor ON time: 4 minutes

Minimum Furnace ON time: 3 minutes

Minimum furnace cycle time (elapsed time between any furnace activation and the next furnace activation): 6 minutes.

Minimum elapsed time between any compressor activation and the next compressor activation: 6 minutes.

*NOTE - All protection timers (except the compressor OFF timer) can be over-ridden if a heating or cooling demand is initiated or terminated using the UP, DOWN, HEAT, or COOL buttons.*

## Equipment Protection Override

Both the minimum compressor OFF timer and the minimum equipment cycle timer can be over-riden by pressing and holding either the HEAT or COOL button down for 4 seconds.

## Over-Temperature Protection

Thermal mechanical switch opens W1 at 93°F+/-6°F.

## Filter Reminder

Settings of 0 (Off), 1, 3, 6 or 12 months are available. When programmed time has elapsed, a FILTER indicator is displayed.

## Service Reminder

The SERVICE indicator is displayed only under the following conditions:

- if the thermostat Y1 terminal has been activated with 24VAC for at least 5 minutes, AND the L terminal is shorted to the R terminal;
- OR
- if the thermostat Y1 terminal has been activated with 24VAC for at least 5 minutes, AND the L terminal is shorted to the C terminal.

## Power Loss/Recovery

Thermostat memory is retained for a minimum of 24 hours during a power loss (includes retention of programmed temperature setpoint, heat/cool and fan mode settings, filter reminder status, and equipment protection timers). After 24 hours of power loss, programmed settings will be lost and replaced with default settings.

## ⚠ IMPORTANT

**Power must be applied for at least six consecutive hours prior to a power loss in order for memory to be retained for the specified time.**

## LCD Backlight

Activated for 8 seconds when any key is pressed.

*NOTE - During an electrical storm or similar disturbance, the backlight may activate for a few seconds. This is normal and will no longer occur after the electrical disturbance has passed.*

## Thermostat Operating Conditions

35°F to 105°F, 5% to 90% RH

## Thermostat Storage Conditions

-40°F to 185°F, 5% to 95% RH

## Thermostat Output Table

The following table depicts the 51M32 thermostat output states for various input conditions. See table 2.

**Table 2**

Thermostat Outputs			
Condition	W1	Y1	G
<b>Gas Heat, Auto Fan</b>			
heat demand	X		
cool demand		X	X
no demand			
<b>Gas Heat, Continuous Fan</b>			
heat demand	X		X
cool demand		X	X
no demand			X
<b>Electric Heat, Auto Fan</b>			
heat demand	X		X
cool demand		X	X
no demand			
<b>Electric Heat, Continuous Fan</b>			
heat demand	X		X
cool demand		X	X
no demand			X
<i>NOTE -</i> X = output is activated with 24VAC.			



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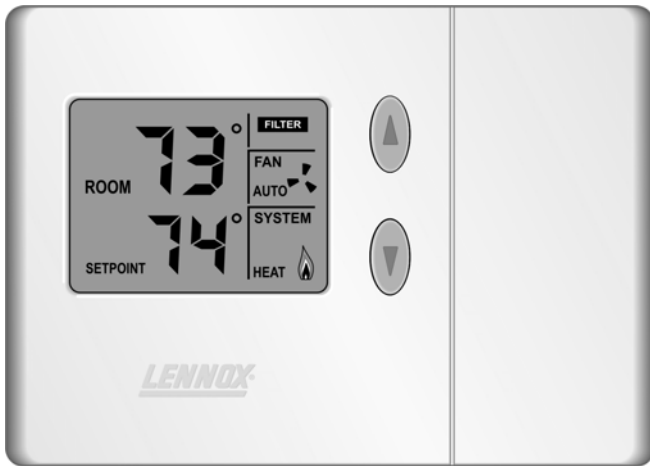
## Merit® Series Thermostat

CONTROLS (51M33)

504,931M  
09/04



Litho U.S.A.



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### Merit® Series Thermostat

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Thermostat 51M33 is suitable for heat pump, single-stage heat/single cool applications that are matched with a gas or electric furnace.

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### Initial Thermostat Power-up

When power is initially applied to the thermostat, the display will appear as shown in figure 1.

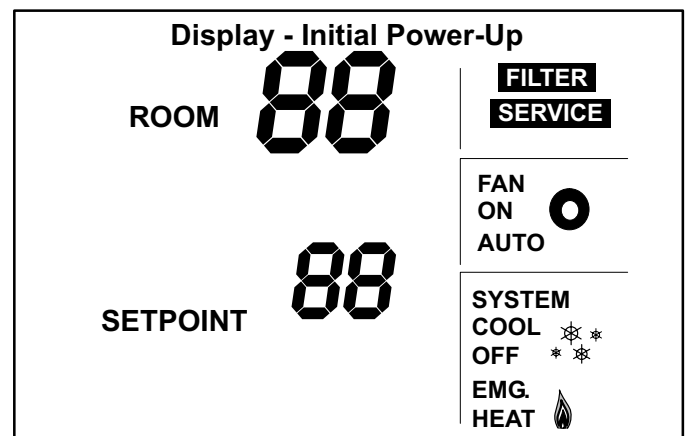
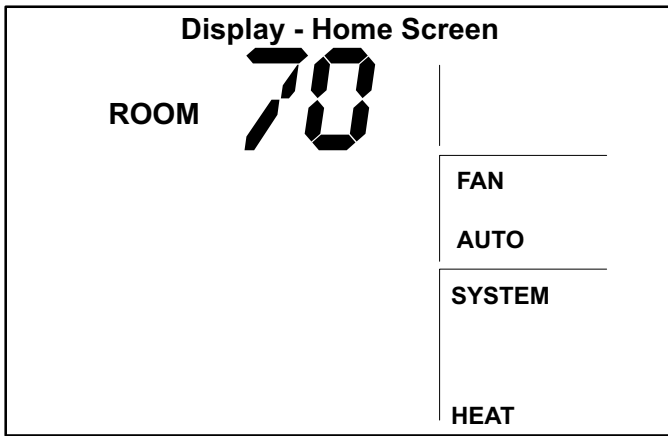


Figure 1

All display segments are momentarily activated. This occurs as a normal part of thermostat initialization. Within a few seconds, the display will appear as shown in figure 2 (figure shows temperature in Fahrenheit units).



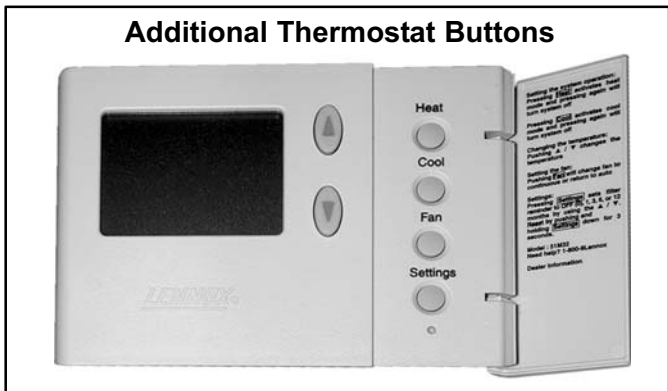
**Figure 2**

Figure 2 illustrates the HOME screen. Note that an indoor room temperature of 70°F is initially displayed. After about 1 minute of warm-up time, the actual room temperature will be displayed. HEAT mode is the system default (as indicated in the SYSTEM box at lower right).

A pale blue display backlight will turn on each time a key is pressed. The backlight will turn off 8 seconds after the last key is pressed.

### Heating Control

The HEAT button is located behind the small door on the right-hand side of the thermostat. See figure 3.



**Figure 3**

#### Normal Heat Mode

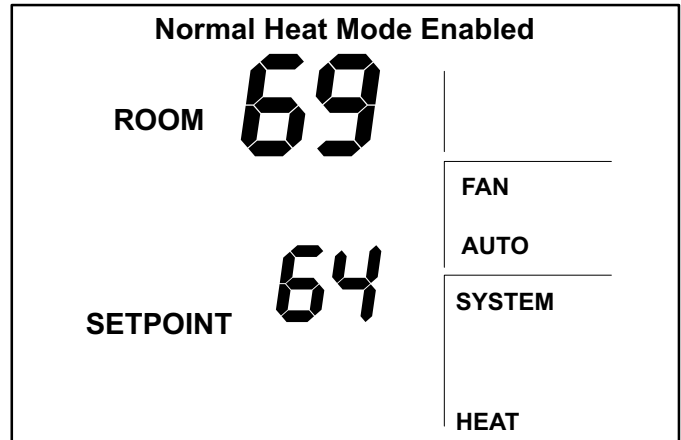
In normal heat mode, both the heat pump and the backup heat source are used to provide heat. If the thermostat detects that the heat pump is not able to provide enough heat (as may be the case in very cold weather), then the backup heat source is activated.

#### Emergency Heat Mode

In emergency heat mode, only the backup heat source is used to provide heat. The heat pump is disabled. The backup heat source will be activated only when there is a heat demand.

#### Enabling and Disabling Heat Mode

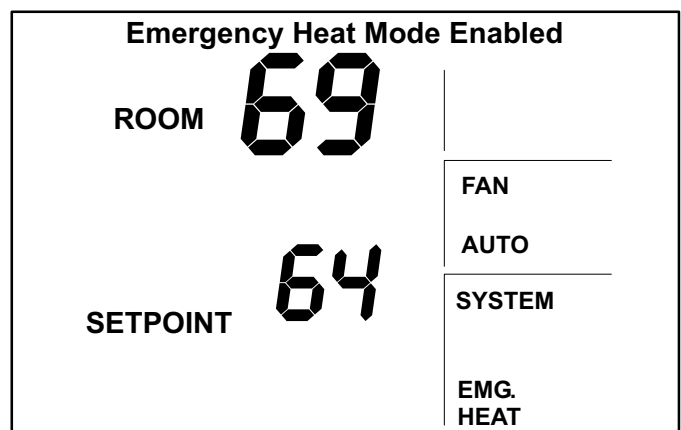
Use the HEAT button to select normal heat mode, emergency heat mode, or to disable heat modes as desired. If the thermostat is in off mode, normal heat mode is enabled when the HEAT button is pressed. This is indicated by HEAT in the SYSTEM box as shown in figure 4.



**Figure 4**

If the thermostat is in normal heat mode when the HEAT button is pressed, then emergency heat mode is enabled. This is indicated by EMG. HEAT in the SYSTEM box as shown in figure 5.

If the thermostat is in emergency heat mode when the HEAT button is pressed, then heat modes are disabled. This is indicated by OFF in the SYSTEM box as shown in figure 6.



**Figure 5**



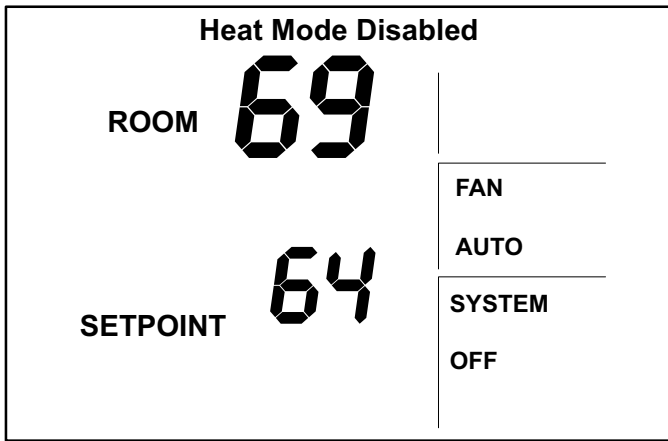


Figure 6

### Heating Demand

The thermostat must be in either normal or emergency heat mode in order to properly control the heating equipment. When in either heat mode, if the actual temperature is lower than the temperature setpoint, a heating demand is detected by the thermostat. The thermostat will then activate the heating equipment to satisfy the demand. Heating operation is indicated by a flame icon in the SYSTEM box as shown in figure 7.

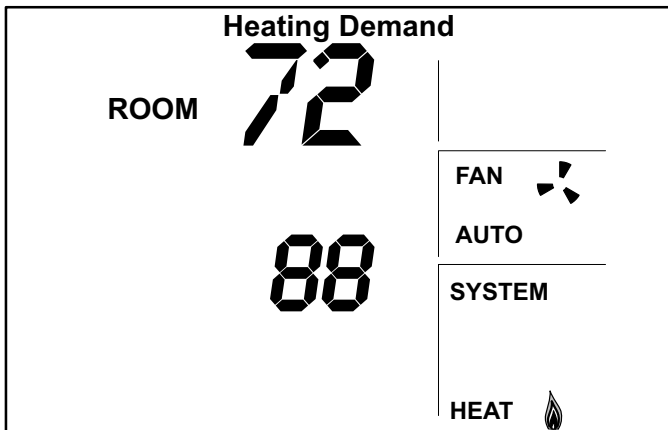


Figure 7

When the actual temperature rises above the temperature setpoint, the flame icon will disappear. This indicates that the heating demand has been satisfied and that the heating equipment has been turned off.

*NOTE - The heat pump is activated for at least 4 minutes if no buttons are pressed during the demand interval. The backup heat source is activated for at least 3 minutes if no buttons are pressed during the demand interval.*

Heat pump operation is locked out for 5 minutes after a demand has been satisfied. If another heat pump demand occurs during this 5-minute interval, the flame icon will flash; however, the heat pump will not run until the 5-minute delay has elapsed.

### Cooling Control

The COOL button is located behind the small door on the right-hand side of the thermostat. See figure 3.

### Enabling and Disabling Cool Mode

Use the COOL button to enable or disable cool mode as necessary. If the thermostat is in off mode, cool mode is enabled when the COOL button is pressed. This is indicated by COOL in the SYSTEM box.

If the thermostat is in cool mode, cool mode is disabled when the COOL button is pressed. This is indicated by OFF in the SYSTEM box.

### Cooling Demand

The thermostat must be in cool mode in order to properly control the cooling equipment. When in cool mode, if the room temperature is higher than the temperature setpoint, a cooling demand is detected by the thermostat.

The thermostat will then activate the cooling equipment to satisfy the demand. Cooling operation is indicated by a snowflake icon in the SYSTEM box as shown in figure 8. When the actual temperature drops below the temperature setpoint, the snowflake icon will disappear. This indicates that the cooling demand has been satisfied and that the cooling equipment has been turned off.

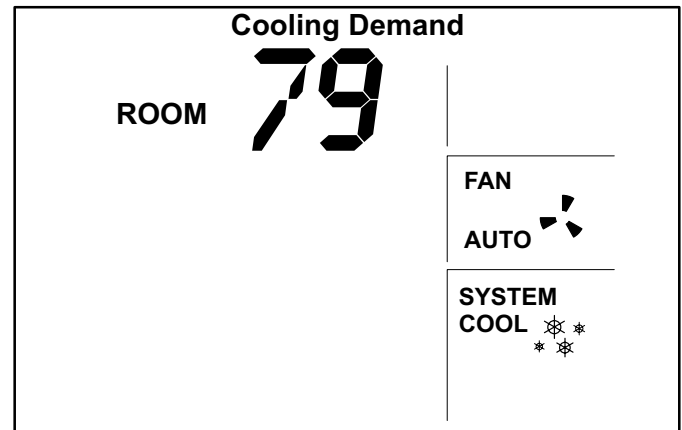


Figure 8

*NOTE - The cooling equipment is activated for at least 4 minutes if no buttons are pressed during the demand interval. Cooling equipment operation is locked out for 5 minutes after a demand has been satisfied. If another cooling demand occurs during this 5-minute interval, the snowflake icon will flash; however, the cooling equipment will not run until the 5-minute delay has elapsed.*

### Adjusting Temperature Setpoint

The temperature setpoint represents the desired temperature of the space around the thermostat. The default temperature setpoint is 70°F. To adjust the setpoint, press the UP or DOWN arrow keys to the right of the display screen.

The existing setpoint will be displayed just below the actual room temperature as shown in figure 9. Use the UP or DOWN arrow keys to adjust the setpoint up or down. The setpoint will increase by 1°F each time the UP key is pressed. The setpoint will decrease by 1°F each time the DOWN key is pressed.

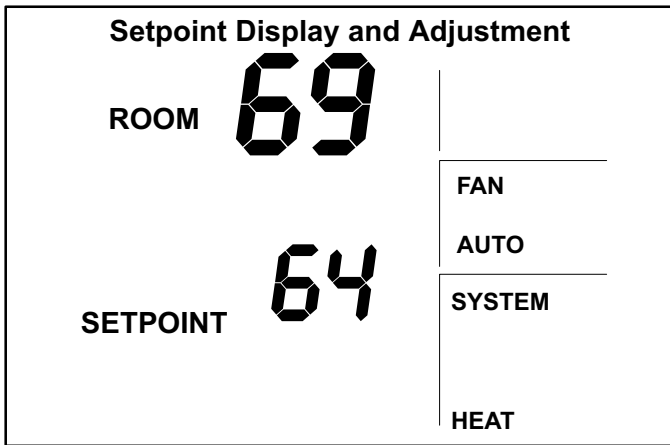


Figure 9

After the desired setpoint is reached, the HOME screen will reappear after about 8 seconds.

### Fan Control

The FAN button is located behind the small door on the right-hand side of the thermostat. See figure 3. The FAN button can be used to select either continuous fan mode or auto fan mode.

If continuous fan mode is enabled, the fan will run continuously regardless of whether the heating or cooling equipment is running. Also, ON will be displayed in the FAN box as shown in figure 10.

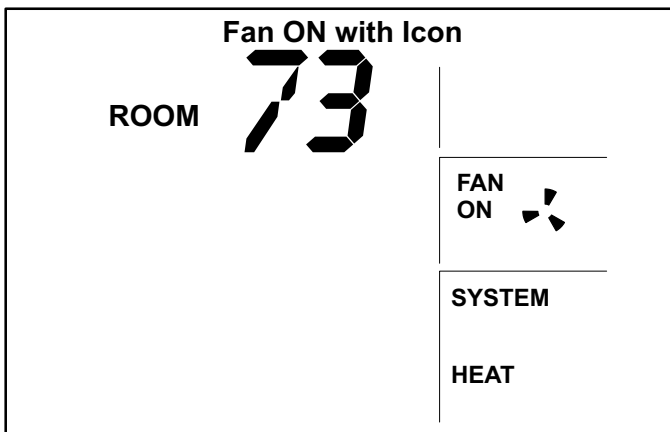


Figure 10

If auto fan mode is selected, the fan will only run when the heating or cooling equipment is running. In this case, AUTO will be displayed in the FAN box as shown in figure 11.

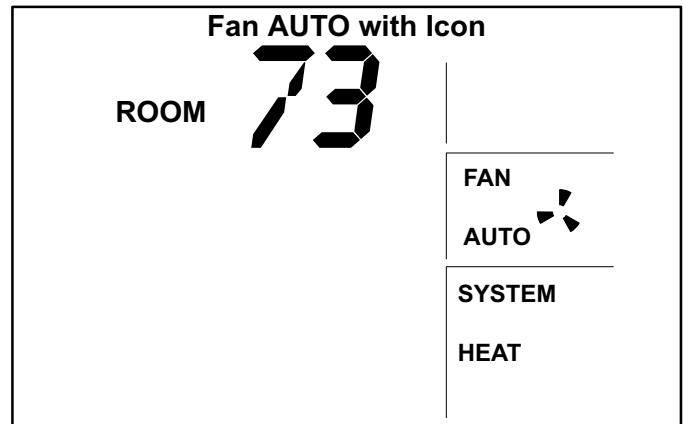


Figure 11

To change from continuous to auto fan mode and vice versa, press the FAN button. Also note the presence of a fan icon in the FAN box. This icon indicates that the fan is running.

### Filter Reminder

The 51M33 thermostat includes a filter reminder feature. The filter reminder can be set for 1, 3, 6, or 12-month intervals. The SETTINGS button, located behind the door on the right-hand side of the thermostat is used to set the filter reminder interval. See figure 3. Press the SETTINGS button from the HOME screen to display the Filter Reminder Settings screen as shown in figure 12.

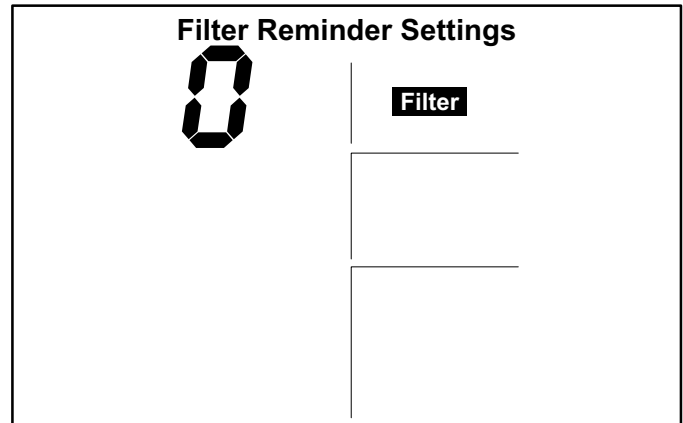


Figure 12

The default setting for the filter reminder is 0, which disables the function. Use the UP arrow while in the Filter Reminder Settings screen to select the desired interval between reminders. It may be necessary to press the UP arrow several times to access the desired setting. The HOME screen will reappear about 10 seconds after the arrow key has been pressed for the final time.

After the programmed interval has elapsed, the FILTER reminder will be displayed as shown in figure 13. After the filter has been changed, reset the filter reminder by pressing the SETTINGS button for 4 seconds. The screen will blink for a few moments to indicate that the timer has been reset.

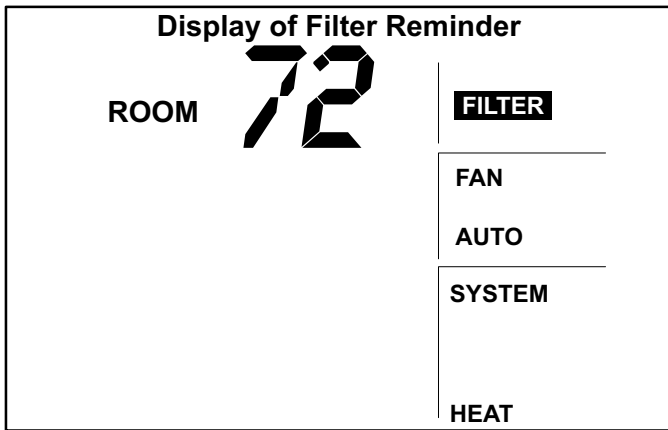


Figure 13

### Balance Point

*NOTE - The balance point is only available with the outdoor sensor.*

If the optional outdoor sensor (X2658) is connected to the thermostat, balance point adjustment is available. The balance point feature allows the measured outdoor temperature to govern operation of the heat pump and backup heat source.

Use the SETTINGS button to access the balance point setting. If the outdoor sensor is attached to the thermostat, press the SETTINGS button twice to access the Balance Point Settings screen (see figure 14).

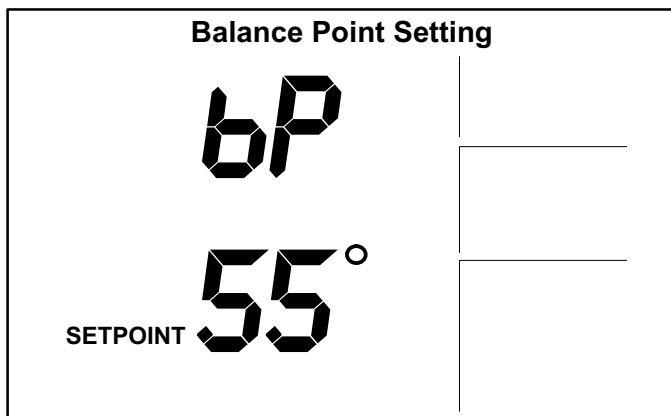


Figure 14

The balance point can be set at any temperature between 1°F and 55°F (-17°C to 13°C). A balance point setting of zero disables the balance point function (in this case, the thermostat behaves as if no outdoor sensor is attached). The default balance point setting is 55°F.

To adjust the balance point up or down, press the UP or

DOWN arrow keys to the right of the display screen. The balance point setting will increase by 1°F each time the UP key is pressed. The balance point setting will decrease by 1°F each time the DOWN key is pressed.

After the desired balance point is reached, the HOME screen will reappear after about eight seconds.

*NOTE - The balance point feature allows the temperature to rise or fall 3°F above or below the setpoint. This prevents excessive cycling of the equipment when the outdoor temperature is near the balance point. For example, if the balance point is 40°F and the actual outdoor temperature is 35°F, the outdoor temperature must rise to 43°F before equipment adjustment occurs. Conversely, if the balance point is 40°F and the actual outdoor temperature is 45°F, the outdoor temperature must drop to 37°F before equipment adjustment occurs.*

### Service Indicator

When abnormal equipment operation is detected, the SERVICE indicator will flash on the upper-right corner of the screen. This indicates that the equipment requires service from a qualified service technician. The SERVICE indicator is shown in figure 15.

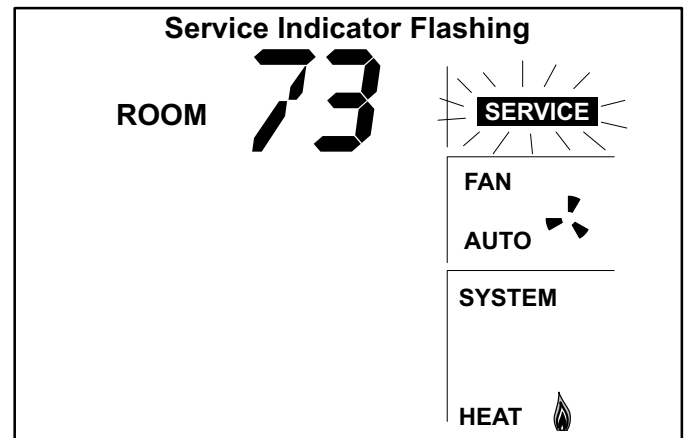


Figure 15

### Thermostat RESET

Under some abnormal conditions, it may be desirable to reset the thermostat to its default condition. The RESET button can be used to return the unit to normal operation after an occurrence such as an electrical storm or power outage.

The RESET button is an unlabeled, recessed button located behind the door on the right-hand side of the thermostat, just below the SETTINGS button. The RESET button is visible in figure 3. Use a paper clip or small pencil to press the RESET button. After the RESET button is pressed, the thermostat settings will return to the defaults listed in the Default Settings section.

## Default Thermostat Settings

Default Thermostat settings are in table 1.

**Table 1**

Default Thermostat Settings	
Mode	Heat
Setpoint	70°F (or 21°C)
Fan	Auto
Filter Reminder	OFF (reminder setting = 0)
Equipment Protection Timers	reset back to zero

## Technical Specifications

### Thermostat Type

Electronic nonprogrammable thermostat for 1H/1C, heat pump with electric or gas backup heat source, non-power robbing applications.

### Power Supply Range

18VAC - 30VAC (24VAC nominal), 60Hz

### Temperature Display

Display Scale: Fahrenheit or Celsius user selectable (via DIP switches)

Display range: 35°F (2°C) to 99°F (37°C)

Display resolution: 1°F (1°C)

Display Accuracy: +/-1°F

### Temperature Measurement Range

Measurement Scale: Fahrenheit

Measurement Range: 35°F to 99°F

Measurement Resolution: 0.5°F

Measurement Accuracy: +/-1°F

Field Offset: via DIP switches to +/-3°F

Sampling Method: temperature measurements sampled every 15 seconds. Displayed temperature is the average of the last four measurements.

### Temperature Setpoint Range

Setting range: 50°F (10°C) to 90°F (32°C)

Setting resolution: 1°F (1°C)

### Fan Control

AUTO or ON modes.

### Backup Heat Source Selection

Electric or gas furnace, selectable via DIP switch #5 (Aux or Dual, respectively). See also Thermostat Output section.

### I/O Relays

All thermostat relays are latching type to minimize power consumption. See table 2.

**Table 2**

51M33 Terminal Designations	
Connections	Description
O	Reversing valve, cool active
B	Reversing valve, heat active
R	24VAC
G	Fan control
Y1	First stage cooling/heating, compressor generated
W1	Auxiliary heating, furnace generated
L	Service Indicator
C	24VAC common
E	Emergency heat
T	Outdoor temperature sensor connection 1
T	Outdoor temperature sensor connection 2

### Equipment Protection Timers

Minimum Compressor OFF time: 5 minutes

Minimum Compressor ON time: 4 minutes

Minimum Furnace ON time: 3 minutes

Minimum backup furnace cycle time (elapsed time between any furnace activation and the next furnace activation): 6 minutes.

Minimum elapsed time between any compressor activation and the next compressor activation: 6 minutes.

*NOTE - All protection timers (except the compressor OFF timer) can be over-ridden if a heating or cooling demand is initiated or terminated using the UP, DOWN, HEAT, or COOL buttons.*

### Equipment Protection Override

Both the minimum compressor OFF timer and the minimum equipment cycle timer can be over-ridden by pressing and holding either the HEAT or COOL button down for 4 seconds.

### Over-Temperature Protection

Thermal mechanical switch opens W1 at 93°F +/-6°F.

### Filter Reminder

Settings of 0 (Off), 1, 3, 6 or 12 months are available. When programmed time has elapsed, a FILTER indicator is displayed.

### Balance Point

0°F (OFF) to 55°F, user selectable.

## Service Reminder

The SERVICE indicator is displayed only under the following conditions:

- if the thermostat Y1 terminal has been activated with 24VAC for at least 5 minutes, AND the L terminal is shorted to the R terminal;

OR

- if the thermostat Y1 terminal has been activated with 24VAC for at least 5 minutes, AND the L terminal is shorted to the C terminal.

## Power Loss/Recovery

Thermostat memory is retained for a minimum of 24 hours during a power loss (includes retention of programmed temperature setpoint, heat/cool and fan mode settings, filter reminder status, and equipment protection timers). After 24 hours of power loss, programmed settings will be lost and replaced with default settings.

## IMPORTANT

**Power must be applied for at least six consecutive hours prior to a power loss in order for memory to be retained for the specified time.**

### LCD Backlight

Activated for 8 seconds when any key is pressed.

*NOTE - During an electrical storm or similar disturbance, the backlight may activate for a few seconds. This is normal and will no longer occur after the electrical disturbance has passed.*

### Thermostat Operating Conditions

35°F to 105°F, 5% to 90% RH

### Thermostat Storage Conditions

-40°F to 185°F, 5% to 95% RH

### Thermostat Output Table

Table 3 (see page 8) provides details of the 51M33 thermostat output states for various input conditions.

**Table 3**

<b>Thermostat Output States</b>					
<b>Condition</b>	<b>W1</b>	<b>Y1</b>	<b>G</b>	<b>O</b>	<b>E</b>
<b>Electric Heat Backup - No Outdoor Sensor</b>					
small heat demand		X	X		
large heat demand	X	X	X		
emergency heat demand			X		X
cool demand		X	X	X	
no demand				dc	
<b>Gas Heat Backup (Dual Fuel) - No Outdoor Sensor</b>					
small heat demand		X	X		
large heat demand	X				
emergency heat demand					X
cool demand		X	X	X	
no demand				dc	
<b>Electric Heat Backup - Outdoor Sensor Attached</b>					
small heat demand (BBP)		X	X		
large heat demand (BBP)	X	X	X		
small heat demand (ABP)		X	X		
large heat demand (ABP)		X	X		
emergency heat demand			X		X
cool demand		X	X	X	
no demand				dc	
<b>Gas Heat Backup (Dual Fuel) - Outdoor Sensor Attached</b>					
small heat demand (BBP)	X				
large heat demand (BBP)	X				
small heat demand (ABP)		X	X		
large heat demand (ABP)	X				
emergency heat demand					X
cool demand		X	X	X	
no demand				dc	
<b>NOTE -</b>					
<ul style="list-style-type: none"> <li>• X = output is activated with 24VAC</li> <li>• dc: does not care (output can be in either state, i.e., either active or inactive)</li> <li>• <i>BBP: outdoor temperature is below balance point</i></li> <li>• <i>ABP: outdoor temperature is above balance point</i></li> <li>• <i>small heat demand: temperature is between (setpoint - 1.5°F) and (setpoint - 0.5°F), and 30-minute upstage timer has not expired (see Normal Heat Mode graph)</i></li> <li>• <i>large heat demand: temperature is below (setpoint - 1.5°F), or 30-minute upstage timer has expired (see Normal Heat Mode graph)</i></li> <li>• <i>the state of the B terminal is opposite the state of the O terminal.</i></li> <li>• <i>data above are tabulated for AUTO fan setting. If fan setting is ON, the fan is activated in all cases.</i></li> </ul>					

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