

**TEC22xx-2 Series LONWORKS®
Network Configurable Staged Thermostats**

**TEC22xx-2 Series LONWORKS Network Configurable
Staged Thermostats 2**

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TEC22xx-2 Series LONWORKS Network Configurable Staged Thermostats

Introduction

The TEC22xx-2 Series Thermostat provides exceptional accuracy due to its unique Proportional-Integral (PI) time proportioning control algorithm that eliminates temperature offset associated with traditional, differential-based on/off thermostats.

This technical bulletin describes how to set up your TEC22xx-2 Series LONWORKS® Network Configurable Staged Thermostat.

Wiring – Terminal Identification

The chart below shows the thermostat terminal identification.

Code Number	Multi-stage Economizer		Multi-stage		1H/1C		Code Number	Heat Pump	
	TEC 2264-2	TEC 2204-2	TEC 2263-2	TEC 2203-2	TEC 2261-2	TEC 2201-2		TEC 2262-2	TEC 2202-2
Programmable	Yes	No	Yes	No	Yes	No	Programmable	Yes	No
Top left terminal block							Top left terminal block		
Y2	X	X	X	X			Y2	X	X
Y1	X	X	X	X	X	X	Y1	X	X
G	X	X	X	X	X	X	G	X	X
RC	X	X	X	X	X	X	RC	X	X
C	X	X	X	X	X	X	C	X	X
Top right terminal block							Top right terminal block		
RH	X	X	X	X	X	X	RH	X	X
W1	X	X	X	X	X	X	W1	X	X
W2	X	X	X	X			O/B	X	X
Bottom terminal block							Bottom terminal block		
Econo	X	X							
Aux	X		X		X		Aux	X	
DI1	X	X	X	X	X	X	DI1	X	X
DI2	X	X	X	X	X	X	DI2	X	X
RS	X	X	X	X	X	X	RS	X	X
Scom	X	X	X	X	X	X	Scom	X	X
OS	X	X	X	X	X	X	OS	X	X
MS	X	X							

Screw Terminal Arrangement

Figure 1 shows the thermostat screw terminal arrangement.

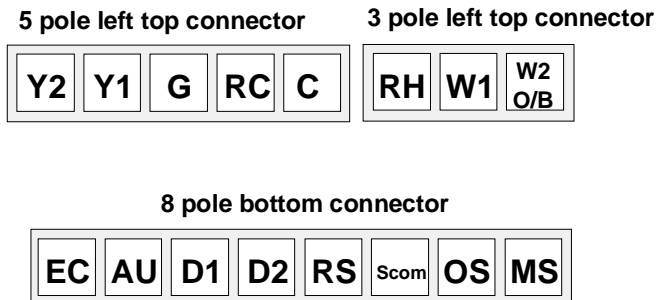


Figure 1: Screw Terminal Arrangement

User Menu Flow Chart

Figure 2 shows the user menu flow chart.

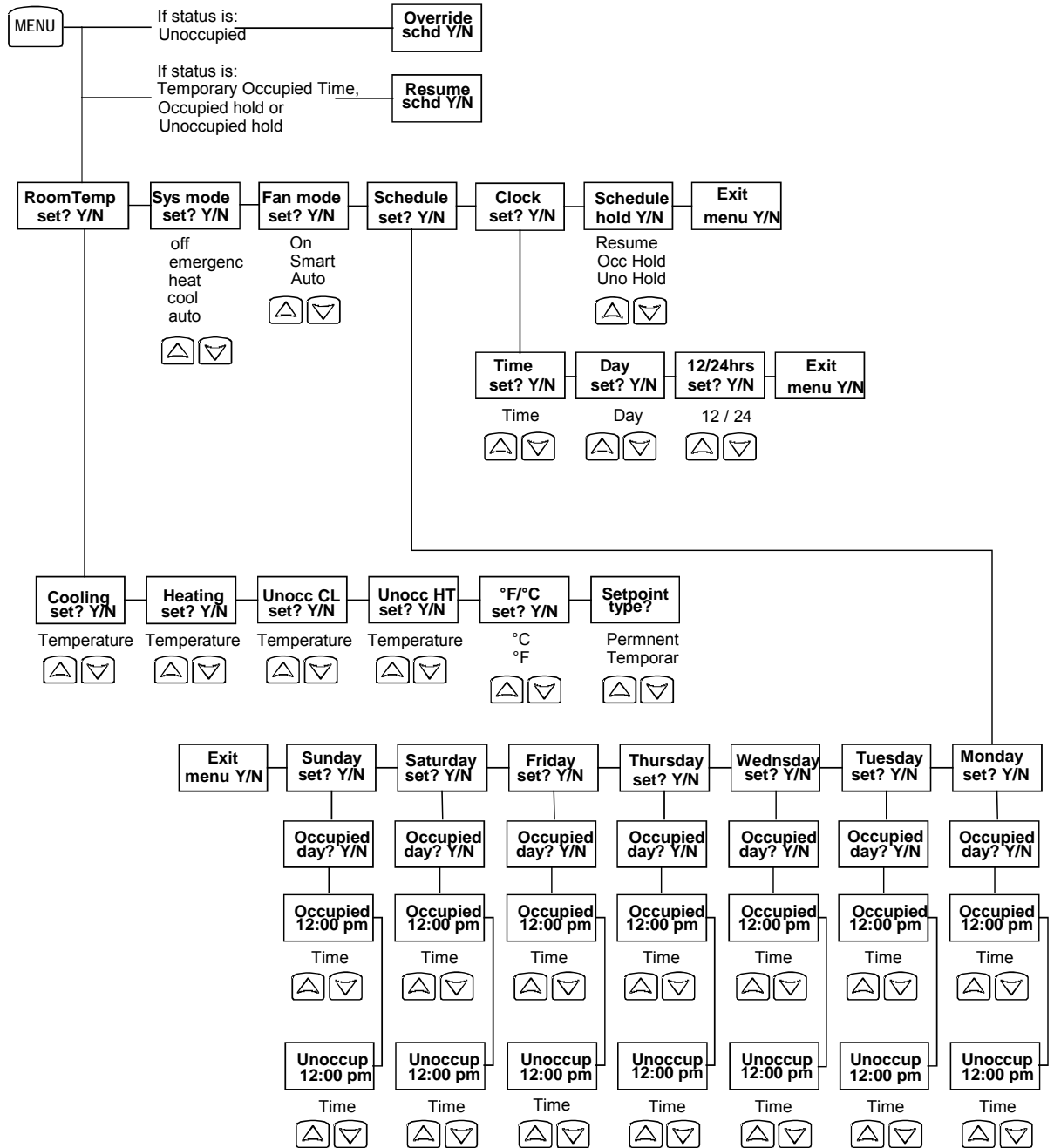


Figure 2: Flow Chart

Programming and Status Display Instructions

Status Display

The thermostat features a two-line, eight-character display. There is a low level backlight level that is always active and can only be seen at night. When left unattended, the thermostat has an auto scrolling display that shows the actual status of the system. Scroll each item one-by-one with the backlighting off. When you press any key, it causes the backlight to come on.

Sequence of auto-scroll status display:

Room temperature	Clock status	System mode	Schedule status	Outdoor temperature	Alarms
RoomTemp x.x °C or °F	Monday 12.00 AM	Sys mode auto	Occupied	Outdoor x.x °C or °F	Service
		Sys mode off	Occupied hold		Frost ON
		Sys mode heat	Unoccup		SetClock
		Sys mode cool	Unoccup hold		Filter
		Sys mode emergenc	Override		

Press the UP arrow (scroll) repetitively to access manual scroll of each menu item. The last item you view appears on the display for 30 seconds before it returns to automatic scrolling. Temperature updates automatically when scrolling is held.

Outdoor air temperature display only enables when you connect the outdoor air temperature sensor.

A maximum range status display of 50°C (122°F) indicates a shorted sensor. Associated functions, such as mode lockouts and economizer function disable automatically.

A minimum range status -40°C (-40°F) does not appear and indicates an opened sensor or a sensor not connected. Associated functions, such as mode lockouts and economizer disable automatically.

If alarms are detected, they automatically appear at the end of the status display scroll. During an alarm message display, the backlit screen lights up at the same time as the message and shuts off during the rest of the status display. A maximum of two alarms can appear at any given time. The priority for the alarms is as follows:

Frost ON	Indicates that the heating is energized by the low limit frost protection setpoint 5.6°C (42°F).
SetClock	Indicates that the clock needs to be reset. There has been a power failure which has lasted longer than 6 hours.
Service	Indicates that there is a service alarm as per one of the programmable digital inputs (DI1 or DI2).
Filter	Indicates that the filters are dirty as per one of the programmable digital inputs (DI1 or DI2).

The three status Light-Emitting Diodes (LEDs) on the thermostat cover indicate the status of the fan, a call for heat, or a call for cooling. When the thermostat is in one of the three modes, the LED illuminates. Figure 3 shows the thermostat models.

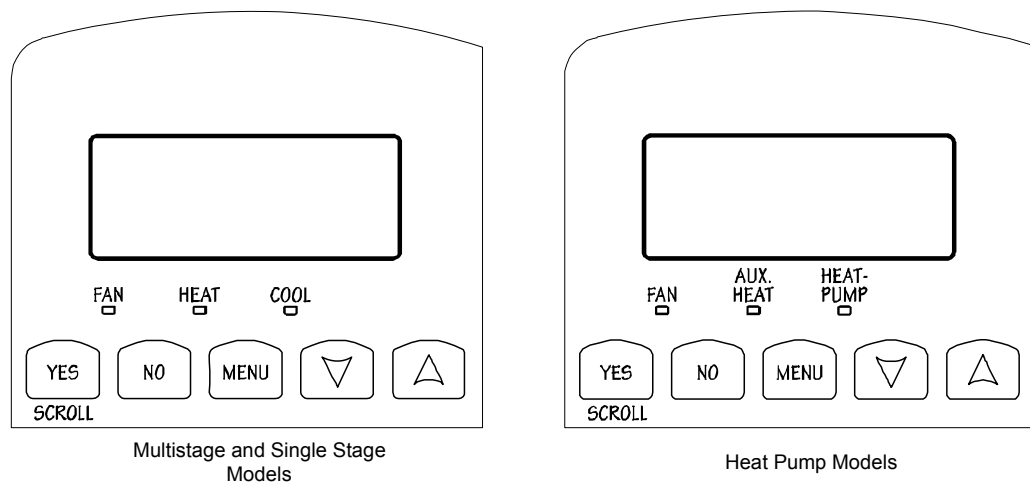


Figure 3: Thermostat Models

User Programming Instructions Menu







The TEC22xx-2 Series LONWORKS Network Configurable Thermostat features an intuitive, menu-driven, backlit Liquid Crystal Display (LCD) display that walks users through the programming steps. Access the menu to set the parameters such as temperature and time events, system mode, and fan mode.

Press the MENU key to bring up the user menu at any time. The status display automatically resumes after you exit the user-programming menu.

If you pause at any given time during programming, Auto Help text appears to help and guide you through the usage and programming of the thermostat.

Ex.: Press yes key to change cooling temperature setpoint
Use the up or down arrow to adjust cooling setpoint

Use the five keys on the thermostat cover to access and program each of the sections in the menu.

	Use to confirm a selection and move on to the next menu item.
	
	Use when you do not desire a parameter change, and to advance to the next menu item.
	Use to access the Main User Menu or exit the menu.
	Use to adjust the desired values when programming and configuring the thermostat. Also use to adjust the temporary setpoint for the specified TOccTime.
	Use to adjust the desired values when programming and configuring the thermostat. Also use to adjust the temporary setpoint for the specified TOccTime.

Note: When left unattended for 45 seconds, the display resumes automatic status display scrolling. To turn on the backlight, press any key on the front panel. The backlit display turns off when the thermostat is left unattended for 45 seconds.

Sequence of User Menus

The chart below shows the sequence of user menus.

Override Resume	Temperature setpoints	System mode setting	Fan mode setting	Schedules setting	Clock setting	Schedule hold
See the <i>Override an Unoccupied Mode</i> and <i>Resume Regular Scheduling</i> sections	See the <i>Temperature Setpoints</i> section	See the <i>System Mode Setting</i> section.	See the <i>Fan Mode Setting</i> section	See the <i>Schedule Set (2 events)</i> and <i>Schedule Set (4 events)</i> sections	See the <i>Clock/Day Settings</i> section	See the <i>Schedule Hold</i> section
Override schd Y/N	RoomTemp set Y/N	Sys mode set Y/N	Fan mode set Y/N	Schedule set Y/N	Clock set Y/N	Schedule hold Y/N
Appears only in unoccupied mode						
Resume schd Y/N						
Appears only in override mode or schedule hold						

The default profile set in the thermostat enables it to operate as a non-	Programmed default modes:
Occupied cooling setpoint = 24°C (75 °F)	System mode = Auto
Occupied heating setpoint = 22°C (72 °F)	Fan mode = Auto
Unoccupied cooling setpoint = 28°C (82 °F)	Programmed default schedules:
Unoccupied heating setpoint = 18°C (65 °F)	Monday through Sunday
Fahrenheit scale	Occupied time is: 12 00 AM
Setpoint type = permanent	Unoccupied time is: 11:59 PM

There is a 1-minute unoccupied period every night at 11:59 PM with this default configuration.

User Menus

Override an unoccupied period

The Override an unoccupied period menu only appears when the thermostat is in unoccupied mode. Enable the unoccupied mode by the internal timer scheduling or by a remote NSB contact via DI1 or DI2. This menu disables when you configure DI1 or DI2 to operate as a remote temporary override contact.

When you answer yes to this prompt, it causes the thermostat to go into occupied mode for an amount of time equal to the parameter “TOccTime” (1 to 12 hours).

Resume regular scheduling

This menu does not appear in regular operation. It only appears when the thermostat is in:

- Unoccupied override mode
- Permanent occupied
- Permanent unoccupied

When you answer Yes the thermostat resumes the regular programmed setpoints and scheduling. You can activate and cancel more than one derogation to regular programming at the same time.

For example, the thermostat can be in Permanent occupied mode while having an active temporary occupied cooling setpoint. The resume key cancels both derogations at the same time.

Temperature setpoints

The RoomTemp menu permits the adjustment of all temperature setpoints (occupied and unoccupied) and the desired temperature units (°F or °C).

Cooling setpoint Occupied mode		Heating setpoint Occupied mode		Cooling setpoint Unoccupied mode		Heating setpoint Unoccupied mode		°F or °C display setting		Setpoint type setting	
Cool set? Y/N	No next → Yes down ↓	Heat set? Y/N	No next → Yes down ↓	Unocc CL set? Y/N	No next → Yes down ↓	Unocc HT set? Y/N	No next → Yes down ↓	°F or °C set? Y/N	No next → Yes down ↓	Setpoint Type? Y/N	No = exit Yes down ↓
Use ▲ ▼ keys to set value, Use the Yes key to confirm											
Cool 70.0°F	Use ▲ ▼ To set value	Heat 68.00°F	Use ▲ ▼ To set value	Unocc CL 80.0°F	Use ▲ ▼ To set value	Unocc HT 60.0°F	Use ▲ ▼ To set value	Units °F	Use ▲ ▼ To set value	Setpoint permnent	Use ▲ ▼ To set value

The last item sets the type of setpoint programmed. Access the Setpoint type menu to set system mode operation.

Use ▲ ▼ to set value, Use the Yes key to confirm.

Setpoint permanent	Permanent setpoints (factory default) Choose permanent setpoints into the programmed schedule. If a setpoint is changed, it changes permanently in all events and schedules. If a permanent modification of the setpoints is required, this parameter needs to be set to permanent. Entering Permanent setpoint operation immediately cancels any temporary active setpoint.
Setpoint temporary	Temporary setpoints Enables the use of temporary setpoints. If a setpoint is changed, it changes momentarily as set per the TOccTime parameter (Ex. 3 hours). There is no indication that a temporary setpoint is enabled or active; when the override period is finished, the regular setpoint as set per the programmed schedule enables back. Cancel the temporary setpoint at any time by using the Permanent Setpoint option in this menu. If a permanent modification of the setpoints is required, this parameter needs to be set to permanent.

When you change the Heat max or Cool min parameters through configuration, it cancels temporary setpoint automatically.

System Mode Setting

Access the System mode menu to set system mode operation.

Use ▲ ▼ to set value; use the Yes key to confirm.

Sys mode auto	Automatic mode Automatic changeover mode between heating and cooling operation
Sys mode cooling	Cooling mode Cooling operation mode only
Sys mode heating	Heating mode Heating operation mode only
Sys mode emergency	Emergency heat mode (heat pump models only) Forced auxiliary heat operation mode only
Sys mode off	Off mode Normal cooling or heating operation disabled If enabled in installer parameters, only the automatic heating frost protection at 50°F (10°C) is enabled

Fan mode setting

This section of the menu permits the setting of the fan mode operation.

Use ▲ ▼ to set value; use the Yes key to confirm

Fan mode On	On fan mode Fan is on continuously, even when system mode is OFF.
Fan mode Auto	Automatic fan mode Fan cycles on a call for heating or cooling for both occupied and unoccupied periods.
Fan mode Smart	Smart fan mode During occupied periods, fan is on continuously. In unoccupied mode, fan cycles on a call for heating or cooling.

Schedule set (2 events)

You can schedule 2 or 4 events per day. Set the events in the configuration menu as per parameter (2/4event)

This section of the menu permits you to set whether 2 or 4 events are needed. You can tailor each day to specific schedules.

- Two events can be programmed per day.
- Occupied and unoccupied periods can be set for each day.

Monday timer Schedule set		Tuesday timer Schedule set		Wednesday timer Schedule set		Other days are identical
Monday set? Y/N	No next → Yes down ↓	Tuesday set? Y/N	No next → Yes down ↓	Wednesd set? Y/N	No next → Yes down ↓	Selects the day to be programmed or modified

Use the Yes key to access day scheduling; use the No key to jump to next day.

Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Yes = Daily schedules will be accessed No = Unoccupied mode all day
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Use the Yes key to access day scheduling; use the No key to jump to next day.

Copy Y/N Previous	No next → Yes down ↓	Copy Y/N Previous	Yes next → No down ↓	Yes = Copies previous day schedule No = Accesses daily schedules
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Use the Yes key to copy previous day; use the No key to set new time value for each day.

Occupied 00:00 AM	Use ▲ ▼ To set value	Occupied 00:00 AM	Use ▲ ▼ To set value	Occupied 00:00 AM	Use ▲ ▼ To set value	Sets Event # 1 Occupied time Activates occupied setpoints
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Use ▲ ▼ to set value; use the Yes key to confirm.

Unoccup 00:00 AM	Use ▲ ▼ To set value	Unoccup 00:00 AM	Use ▲ ▼ To set value	Unoccup 00:00 AM	Use ▲ ▼ To set value	Sets Event # 2 Unoccupied time Activates unoccupied setpoints
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Use ▲ ▼ to set value, Yes key to confirm.

Below are two examples of two event office schedules.

Example 1- Office building closed all weekend

Event	Period #1 - Event #1		Period #1 - Event #2		Daily Occupancy
	Occupied		Unoccupied		
Setpoint	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F	
Monday	7.00 AM		6.00 PM		Daytime only
Tuesday	7.00 AM		6.00 PM		Daytime only
Wednesday	7.00 AM		6.00 PM		Daytime only
Thursday	7.00 AM		6.00 PM		Daytime only
Friday	7.00 AM		6.00 PM		Daytime only
Saturday	12.00 PM *		12.00 PM *		Unoccupied
Sunday	12.00 PM *		12.00 PM *		Unoccupied

* Programming consecutive events to the same time causes the thermostat to choose the last event as the time at which it sets its schedule. In the above example, the thermostat controls the unoccupied set point until 7:00 AM Monday.

Example 2 - Commercial building which is occupied all weekend

Event	Period #1 - Event #1		Period #1 - Event #2		Daily Occupancy
	Occupied		Unoccupied		
Setpoint	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F	
Monday	8.00 AM		5.00 PM		Daytime only
Tuesday	8.00 AM		5.00 PM		Daytime only
Wednesday	8.00 AM		5.00 PM		Daytime only
Thursday	8.00 AM		5.00 PM		Daytime only
Friday	8.00 AM		5.00 PM		Daytime only
Saturday	12.00 AM **		11.59 PM **		Occupied
Sunday	12.00 AM **		11.59 PM **		Occupied

** To program a day as occupied for 24 hours, set that day Occupied time to 12:00 AM and Unoccupied time to 11:59 PM. There is a 1-minute unoccupied period every night at 11:59 PM with this schedule configuration.

Schedule set (4 events)

The Schedule set (4 events) menu allows you to set either 2 or 4 events. You can modify each day to specific schedules.

- 4 events can be programmed per day.
- Occupied and Unoccupied periods can be set for each day.
- Programming the third and fourth events to the same time cancels the last period.

Monday timer Schedule set		Tuesday timer Schedule set		Wednesday timer Schedule set		Other days are identical
Monday set? Y/N	No next → Yes down ↓	Tuesday set? Y/N	No next → Yes down ↓	Wednesd set? Y/N	No next → Yes down ↓	Selects the day to be programmed or modified

Use the Yes key to access day scheduling; use the No key to jump to next day.

Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Yes = Accesses daily schedules No = Unoccupied mode all day
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Use the Yes key to access day scheduling; use the No key to jump to next day.

Copy Y/N Previous	Yes next → No down ↓	Copy Y/N Previous	Yes next → No down ↓	Yes = Copies previous day schedule No = Access daily schedules
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Use the Yes key to copy previous day; use the No key to set new time value for each day.

Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Sets Event # 1 Occupied time Activates occupied setpoints
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Use ▲▼ to set value; use the Yes key to confirm.

Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Sets Event # 2 Unoccupied time Activates unoccupied setpoints
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Use ▲▼ to set value; use the Yes key to confirm.

Occupie2 00:00 AM	Use ▲▼ To set value	Occupie2 00:00 AM	Use ▲▼ To set value	Occupie2 00:00 AM	Use ▲▼ To set value	Sets Event # 3 Occupied time Activates occupied setpoints
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Use ▲▼ to set value; use the Yes key to confirm.

Unoccup 2 00:00 AM	Use ▲▼ To set value	Unoccup2 00:00 AM	Use ▲▼ To set value	Unoccup2 00:00 AM	Use ▲▼ To set value	Sets Event # 4 Unoccupied time Activates unoccupied setpoints
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Use ▲▼ to set value; use the Yes key to confirm.

Example 1- Four event retail establishment schedules

Event	Period 1 - Event 1		Period 1 - Event 2		Period 2 - Event 3		Period 2 - Event 4		
Setpoint	Occupied		Unoccupied		Occupied		Unoccupied		
	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F	Daily Occupancy
Monday	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Daytime only
Tuesday	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Daytime only
Wednesd ay	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Daytime only
Thursday	7.00 AM		5.00 PM		7.00 PM		10.30 PM		Day/evening time only
Friday	7.00 AM		5.00 PM		7.00 PM		10.30 PM		Day/evening time only
Saturday	12.00 PM *		12.00 PM *		12.00 PM *		12.00 PM *		Unoccupied
Sunday	12.00 PM *		12.00 PM *		12.00 PM *		12.00 PM *		Unoccupied

* Programming events to the same time cancels the last period and leaves the thermostat in unoccupied mode.

Example 2- Residential

Event	Period 1 - Event 1		Period 1 - Event 2		Period 2 - Event 3		Period 2 - Event 4		Daily Occupancy
Setpoint	Occupied		Unoccupied		Occupied		Unoccupied		
	Cool 72°F	Heat 70°F	Cool 80°F	Heat 62°F	Cool 72°F	Heat 70°F	Cool 80°F	Heat 62°F	
Monday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Tuesday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Wednesday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Thursday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Friday	6:00 AM		8:00 AM		4:00 PM		11:30 PM		Day/evening time only
Saturday	8:00 AM *		8:00 AM *		8:00 AM *		11:59 PM *		Daytime only
Sunday	12:00 AM *		12:00 AM *		12:00 AM *		11:59 PM *		Occupied all day

* Programming consecutive events to the same time causes the thermostat to choose the last event as the time at which it sets its schedule. In the above example for Saturday, the thermostat controls the occupied set point from 8:00 AM until 11:59 PM. Since it is desired to be in occupied mode throughout the night, then it is necessary to program the first event on Sunday at 12:00 AM. The thermostat forces a one minute unoccupied period for a one minute period (between 11:59 PM and 12:00 AM on Saturday).

Clock/Day Settings

The Clock/Day Settings menu allows you to set the time and day.

Time setting		Day setting		Time format setting	
Time set? Y/N	No next → Yes down ↓	Day set? Y/N	No next → Yes down ↓	12/24hrs set? Y/N	No = exit Yes down ↓
Time 0:00	Use ▲▼ To set value	Day Monday	Use ▲▼ To set value	12/24hrs 12 hrs	Use ▲▼ To set value

Schedule Hold

The Schedule hold menu allows you to set a permanent schedule hold that bypasses the internal thermostat scheduling.

Use the permanent schedule hold function for non-scheduled events that extend for various periods of time. When you enable a permanent occupied or permanent unoccupied schedule hold, it cancels any active override.

You can use temporary setpoints during permanent hold. The duration of the temporary setpoint is as set per the OVERRIDE parameter (for example 3 hours).

Use ▲ ▼ to set value; use the Yes key to confirm.

Schedule resume	Resume regular scheduling cancels the permanent hold and re-enables the regular programming as set per internal scheduling or as per remote NSB via one of the DI's configured as remote NSB. You can also accomplish this action by using the Resume menu. Any temporary setpoints that are active are left active for the duration of the period as set per the TOccTime parameter.
Schedule occ hold	Hold permanent occupied forces the thermostat into a permanent occupied mode using the occupied setpoints. All timed scheduling functions are by-passed. The PERMANENT OCCUPIED status will appear in the automatic status scroll. The permanent occupied override can be cancelled using the Resume menu. If the menu key is pressed, the Resume schedule menu appears. Answering Yes to this question re-enables the regular programmed scheduling as dictated by the current time.
Schedule uno hold	Hold permanent unoccupied forces the thermostat into a permanent unoccupied mode using the unoccupied setpoints. All timed scheduling functions are by-passed. The PERMANENT UNOCCUPIED status appears in the automatic status scroll. The permanent unoccupied override can be cancelled using the Resume menu. If the menu key is pressed, the Resume schedule menu will appear. Answering Yes to this question re-enables the regular programmed scheduling as dictated by the current time.

Installer Configuration Parameter Menu

All Thermostat Models

The Installer configuration parameter menu allows you to set the proper parameters for optimum system operation. Access the Installer configuration parameter menu with the hidden configuration key.

Note: Not all parameters are used on every model. There is no online help associated with the installer configuration parameter menu.

Table 1: All Thermostat Models Configuration Parameters

Configuration parameters	Significance Default value	Adjustments					
DI 1	Digital input no.1 configuration Open contact input = function not energized Closed contact input = function energized Default value = None	Open contact = occupied setpoints Closed contacts = unoccupied setpoints None, No function is associated with the input. Rem NSB, remote NSB timer clock input. Disables the internal scheduling of the thermostat. The scheduling sets per the digital input. The time still displays as information, but the menu part related to scheduling disables and is no longer accessible. RemOVR Temporary override remote contact. Disables all override menu functions of the thermostat. The manual remote momentarily closed contact now controls the override function. When configured in this mode, the input operates in a toggle mode. Enable this function to toggle between unoccupied and occupied setpoints for the amount of time set by parameter (TOccTime) temporary occupancy time. When Override is enabled, an Override status message displays. Filter, a backlit flashing Filter alarm displays on the thermostat LCD screen when the input is energized. Service, a backlit flashing Service alarm displays on the thermostat LCD screen when the input is energized.					
DI 2	Digital input no. 2 configuration Default value = None	Same as above. It is possible to configure both inputs to have the same function.					
lockout	Keypad lockout levels Default value = 0 No lock	0 = No lock 1 = Low level 2 = High level					
Level	Resume to scheduling	Temperature setpoints	System mode setting	Fan mode setting	Schedules setting	Clock setting	Permanent hold
	Resume sched Y/N	RoomTemp set Y/N	Sys mode set Y/N	Fan mode set Y/N	Schedule set Y/N	Clock set Y/N	Schedule hold Y/N
0	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access
1	Yes access	No access	Yes access	Yes access	No access	Yes access	Yes access
2	No access	No access	No access	No access	No access	Yes access	No access
pwr del	Power-up delay Default value = 10 seconds	On initial power up of the thermostat (each time 24 VAC power supply is removed and re-applied) there is a delay before any operation is authorized (fan, cooling or heating). Use to sequence start up multiple units/thermostat in one location. 10 to 120 seconds.					

Table Continued on next page . . .

Configuration Parameters (Cont.)	Significance Default value	Adjustments
Frost pr	Frost protection enabled Default value = Off On heat pump models the system mode forces to EMERGENCY mode if frost protection is activated	Off: no frost protection On: frost protection enables in all system modes 42°F (5.6°C) Frost protection enables even in system Off mode Off or On
heat max	Maximum heating setpoint limit Default value = 90°F (32°C)	Maximum occupied and unoccupied heating setpoint adjustment. Heating setpoint range is: 40 to 90°F (4.5 to 32.0°C)
cool min	Minimum cooling setpoint limit Default value = 54°F (12°C)	Minimum occupied and unoccupied cooling setpoint adjustment. Cooling setpoint range is: 54 to 100°F (12.0 to 37.5°C)
anticycle	Minimum on/off operation time for stages Default value = 2 minutes Note: You can set anti-short cycling to 0 minutes for equipment that possesses its own anti-cycling timer. Do not use this value unless the equipment is equipped with such internal timer. Failure to do so can damage the equipment.	Minimum On/Off operation time of cooling and heating stages. 0, 1, 2, 3, 4 and 5 minutes
Heat cph	Heating stages cycles per hour Default value = 4 C.P.H. For multi-stage models, heat cph applies to W1 and W2 For heat pump models, heat cph applies to W1 only (Emergency heat)	Sets the maximum number of heating stage cycles per hour under normal control operation. It represents the maximum number of cycles that the equipment turns ON and OFF in one hour. Note: A higher C.P.H represents a higher accuracy of control at the expense of wearing mechanical components faster. 3, 4, 5, 6,7 and 8 C.P.H.
cool cph	Cooling stages cycles per hour Default value = 4 C.P.H. For multi-stage models, cool cph applies to Y1 and Y2 For heat pump models, cool cph applies to Y1 and Y2 in cooling and heating independently of the reversing valve position	Sets the maximum number of cooling stage cycles per hour under normal control operation. It represents the maximum number of cycles that the equipment turns on and off in one hour. Note: A higher C.P.H represents a higher accuracy of control at the expense of wearing mechanical components faster. 3 or 4 C.P.H.
deadband	Minimum deadband Default value = 2.0°F (1.1°C)	Minimum deadband value between the heating and cooling setpoints. If modified, it applies only when any of the setpoints are modified. 2, 3 or 4 °F (1.0 to 2.0 °C)
fan cont	Fan control Default value = On For multi-stage models, fan control applies to W1 and W2 For heat pump models, fan control applies to W1 only (Emergency heat)	Fan control in heating mode. When you select On, the thermostat in all cases always controls the fan (terminal G). Valid for On or Auto fan mode. When you select Off, the fan (terminal G) is not energized when heating stages (terminals W1 and W2) are solicited. The fan is controlled by the equipment fan limit control in this case. Valid only for Auto fan mode. On fan mode leaves the fan always on. On or Off

Table Continued on next page . . .		
Configuration Parameters (Cont.)	Significance Default value	Adjustments
fan del	Fan delay Default value = Off	Fan delay extends fan operation by 60 seconds after the call for heating or cooling ends. Valid only for Auto fan mode. On fan mode leaves the fan always on. Off or On
TOccTime	Temporary occupancy time Default value = 3 hours	Temporary occupancy time with occupied mode setpoints when override function is enabled. When the thermostat is in unoccupied mode, function is enabled with either the menu or DI1 or DI2 configured as remote override input. 0,1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 hours
cal RS	Room air temperature sensor calibration Default value = 0.0 °F or °C	Offset that can be added/subtracted to actual displayed room temperature. ± 5.0 °F (± 2.5 °C)
cal OS	Outside air temperature sensor calibration Default value = 0.0 °F or °C	Offset that can be added/subtracted to actual displayed outside air temperature. ± 5.0 °F (± 2.5 °C)
H stage	Number of heating stages. Applicable to 2-stage models only. Default value = 2 stages For heat pump models, H stage is limited to 1 stage only (W1 – Aux. Heat)	Reverts the operation of 2-stage thermostat to single stage operation only when the second heating step is not needed. 1 or 2 stages
C stage Or HP stage	Number of cooling stages 2-stages model only Default value = 2 stages For heat pump models, HP stage selects the number of compressor stages	Reverts the operation of 2-stage thermostat to single stage operation only when the second cooling step is not needed. 1 or 2 stages
H lock	Outside air temperature heating lockout Default value = 120°F (49°C)	Disables heating stage operation based on outdoor air temperature. Function only enables if OS (outside air temperature sensor) is connected. From -15°F up to 120°F (-26°C up to 49°C)
C lock	Outside air temperature mechanical cooling lockout. Default value = -40°F (-40°C)	Disables cooling stage operation based on outdoor air temperature. On economizer model, free cooling is not disabled by this function. Function only enables if OS (outside air temperature sensor) is connected. From -40°F up to 95°F (-40°C up to 35°C)
2/4 event	Number of events configuration Default value = 2 event	2 events sets up programming for the following: <ul style="list-style-type: none"> • Event 1-Occupied setpoints • Event 2-Unoccupied setpoints 4 events, sets up programming for the following: <ul style="list-style-type: none"> • Event 1-Occupied setpoints • Event 2-Unoccupied setpoints • Event 3-Occupied setpoints • Event 4-Unoccupied setpoints

Table continued on next page . . .

Configuration Parameters (Cont.)	Significance Default value	Adjustments		
aux cont	Auxiliary contact configuration Default value = N.O. normally open	This contact can be used to energize peripheral devices such as: lighting equipment, exhaust fans, economizers, etc. This contact operates in parallel with the internal occupied/unoccupied schedule of the thermostat or the remote NSB contact if DI1 or DI2 is used. When the system is in OFF mode , the contact remains in its unoccupied status independently of the occupied/unoccupied schedule.		
		Configured	Contact occupied status	Contact unoccupied status
		N.O.	Closed	Opened
		N.C.	Opened	Closed
Prog rec	Progressive recovery enabled Default value = Off Progressive recovery is automatically disabled if DI 1 and/or DI 2 are configured remote NSB	Off , = no progressive recovery The programmed occupied schedule time is the time at which the system restarts. On , = progressive recovery active. The programmed occupied schedule time is the time at which the desired occupied temperature is attained. The thermostat automatically optimizes the equipment start time. In any case, the latest a system restarts is 10 minutes prior to the occupied period time.		

Heat Pump Models

Table 2 describes the configuration parameters for the heat pump models.

Table 2: Heat Pump Models Configuration Parameters

Configuration parameters	Significance Default value	Adjustments
high bp	High balance point Default value = 90°F (32.0°C) Function will only be enabled if OS (outside air temperature sensor) is connected.	In <i>Heating or Auto mode</i> , it is the outside air temperature value at which the auxiliary heat will be cut off. Above that value, only the heat pump will be used to maintain the heating setpoint. 34 to 90°F (1.0 to 32.0°C)
low bp	Low balance point Default value = -12°F (-24°C) Function will only be enabled if OS (outside air temperature sensor) is connected.	In <i>Heating, Cooling or Auto mode</i> , it is the outside air temperature value at which the heat pump operation will be cut off. Below that value, only the auxiliary heat will be used to maintain the heating setpoint. -40 to 30°F (-40 to -1.0°C)
comf/eco	Comfort or economy mode Default value = Comfort	Sets the operation and interaction mode of the heat pump with the auxiliary heat. <i>Comfort mode. In Heating mode.</i> If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat energizes to satisfy the same heating setpoint. <i>Economy mode. In Heating mode.</i> If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat energizes to satisfy only when the temperature has dropped 2.0°F (1.1°C) below the heating setpoint. Selecting economy mode adds a deadband between the heat pump and auxiliary heat in heating mode. The actual temperature maintained is lower than the true heating setpoint to maximize the heat pump operation. When the outdoor air temperature drops below the <i>low balance point</i> , the deadband eliminates and the auxiliary heat maintains the true heating setpoint alone. <i>Economy mode. In Emergency mode.</i> If <i>Emergency heat mode</i> is selected, the setpoint maintained, is the heating setpoint.
re valve	Reversing valve operation O/B Default value = O	Heat pump reversing valve operation. O energizes the valve in cooling operation. B energizes the valve in heating operation. O or B
comp/aux	Compressor/auxiliary interlock Default value = Off	Sets the operation and interaction mode of the heat pump with the auxiliary heat. <i>Interlock Off. In Heating mode.</i> If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat energizes at the same time as the heat pump stage. This applies when the air handler heat pump coil is installed before the auxiliary heat. (all electric systems) <i>Interlock On. In Heating mode.</i> If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat energizes and the heat pump cuts off. This applies when the air handler heat pump coil is installed after the auxiliary heat (add on systems). There is a 2-minute delay to restart the heat pump, when the auxiliary heat is shut down. Off or On

Note: When the outside air sensor is not connected or when the outside air sensor is shorted, the thermostat bypasses the:

- heating lockout
- cooling lockout
- low balance input
- high balance input

Emergency mode bypasses the heating lockout and permits auxiliary heating whenever a heating demand occurs.

Economizer Models

Table 3 shows the configuration parameters for the economizer models.

Table 3: Economizer Models Configuration Parameters

Economizer Models only		
chngstpt	Changeover setpoint Default value = 55°F (13.0°C)	In <i>Cooling</i> mode. The outside air temperature value at which the cooling will be switched over from mechanical (compressor) to free cooling (economizer) 14 to 70°F (-10.0 to 21.0°C)
min pos	Minimum position Default value = 0% See Table 4 for Outside Air Percentage information.	Outside air damper minimum position. Will be active only when fan is on (G terminal) and the internal or remote scheduling is in occupied mode. When internal or remote scheduling is in unoccupied mode and/or fan is off, minimum position will be set to 0% 0 to 100 % = 0 to 10 Vdc output range
C mech	Mechanical cooling allowed Default value = Off	In <i>Cooling</i> mode. Allows the operation of the mechanical cooling if the free cooling (economizer) cannot maintain the cooling setpoint. Off Typically applies when the MS (mixed air temperature sensor) is installed after the mechanical cooling refrigeration coils. In this case, mechanical cooling will never operate at the same time as free cooling. On Typically applies when the MS (mixed air temperature sensor) is installed before the mechanical cooling refrigeration coils in the mixing plenum. In this case, mechanical cooling is allowed when the free cooling (economizer operation) cannot maintain the cooling setpoint. Off or On
mix stpt	Mixed air setpoint Default value = 55°F (13.0°C)	Free cooling mixed air setpoint when economizer mode is enabled. 50 to 90°F (10.0 to 32.0°C)
MS dis	Display mixed air temperature Economizer model only, only if sensor is installed	Used as diagnostic/service help to troubleshoot and diagnose economizer operation.

Table 4: Outside Air Percentage for min pos

Outside air percentage	0%	5%	10%	15%	20%	25%	30%
Setting for 0-10 Vdc Actuator	0%	5%	10%	15%	20%	25%	30%
Setting for 2-10 Vdc Actuator	0 to 20%	24%	28%	32%	36%	40%	44%

Troubleshooting Guide

Table 5: Troubleshooting All Models

Symptom	Possible Cause	Corrective Action
No display on the thermostat	Absent or incorrect supply voltage	Check power supply voltage between C and RC to be from 19-30 VAC. Check for tripped fuse or circuit breaker.
	Overloaded power transformer	Verify that the transformer used is powerful enough (enough VA's) to supply all controlled devices including the thermostat.
Keyboard menu does not access all functions	Keyboard locked	Change configuration parameter LOCKOUT to value "0" to access all levels of the menu.
Temperature setpoints revert to original value after a certain time period	Temporary setpoint option selected	The thermostat needs to be in Permanent setpoint mode for the new setpoint to be kept in memory and used all the time. Go to the Set temperature menu. The last prompt is setpoint type. Set it to Permanent setpoint.
Thermostat will not call for heating	Wrong mode selected	Select heating mode.
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint.
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	Heating lockout attained	Mode is locked out based on outside air temperature. Change configuration parameter H Lock to value 120°F (49°C) to by-pass lockout.
	Wiring error	Start the Fan by forcing the Fan ON mode. Put a jumper across terminals RH and W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC and RH.
Thermostat will not call for cooling	Wrong mode selected	Select cooling mode.
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied cooling setpoint.
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start.
	Cooling setpoint is satisfied	Lower the cooling setpoint.
	Cooling lockout attained	Mode is locked out based on outside air temperature. Change configuration parameter C Lock to value -40°F (-40°C) to by-pass lockout.
	Wiring error	Start the Fan by forcing the Fan ON mode. Put a jumper across terminals RC and Y1. The cooling should come ON. If it does not, verify wiring.
The thermostat will not turn on the fan	Wrong mode selected	Start the Fan by forcing the Fan ON mode.
	Wiring error	Put a jumper across terminals RC and G. The fan should come ON. If it does not, verify wiring.
Digital display shows missing digits or erratic segments	Defective display	Replace thermostat.

Table 6: Troubleshooting Heat Pump Models

Symptom	Possible Cause	Corrective Action
Auxiliary heat does not operate	Wrong mode selected	Select emergency heat mode.
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint.
	Anticycle delay active	Wait, the anticycling period ends and the equipment starts.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	High Balance point attained	Mode is locked out based on outside air temperature. Change configuration parameter High BP to value 90°F (32°C) to by-pass lockout.
	Heating lockout attained	Mode is locked out based on outside air temperature. Change configuration parameter H Lock to value 120°F (49°C) to by-pass lockout.
	Wiring error	Start the Fan by forcing the Fan ON mode. Put a jumper across terminals RH and W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC and RH
Heat pump does not operate in heating mode	Wrong mode selected	Select heating mode.
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint.
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	Low Balance point attained	Mode is locked out based on outside air temperature. Change configuration parameter Low BP to value -12°F (-24°C) to by-pass lockout.
	Heating lockout attained	Mode is locked out based on outside air temperature. Change configuration parameter H Lock to value 120°F (49°C) to by-pass lockout.
	Wiring error	Start the Fan by forcing the Fan ON mode. Put a jumper across terminals RH and W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC and RH.
	Wrong reversing valve configuration	Wrong selection of parameter Re Valve. Select O energizes the valve in cooling operation. Valve is normally heat. Select B energizes the valve in heating operation. Valve is normally cool.

Important: All TEC22xx-2 Series **thermostat** controls are for use as operating controls only and are not safety devices. These instruments have undergone rigorous tests and verifications prior to shipment to ensure proper and reliable operation in the field. Whenever a control failure could lead to personal injury and/or loss of property, it becomes the responsibility of the user/installer/electrical system designer to incorporate safety devices (such as relays, flow switch, thermal protections) and/or alarm system to protect the entire system against such catastrophic failures. Tampering of the devices or misapplication of the device voids the warranty.



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