

# Operating Manual

## Digital Touchscreen Thermostat





## 1. Overview

The Ice Air model ELA-13086 is a digital thermostat with a TFT touch screen user interface (thin film transistor liquid crystal display; TFT-LCD). It provides the user with control of heating or cooling mode, temperature adjustment, 7-day programmable schedule, and various working mode options. A time clock and calendar are integral functions to this device.

## 2. Main Features

- Adjustable fan speed: High, medium, low, and auto. (2-speed or 3-speed can be set by the dip switch; 2-speed is the default)
- Optional mode: cooling, heating, auto and fan only. (heating function can be set by the dip switch; the default assumes a heating function present)
- Clock can be set to 12-hour (AM/PM) or 24-hour mode
- Calendar ranges: from 2020 to 2099
- 7-day programmable schedule (optional, set by the dip switch, the default is "function available." If the user wants to disable the "7-day programmable schedule" they can do so via the dip switch, which would cause the thermostat to operate like a simple thermostat)
- Time delay function: 3 minute delay for compressor at first power-on; (this can be using the dip switch; the default is delay post start-up)
- System failure warning
- Heating mode: Set the heating mode type (hydronic coil heater, electric resistance, heat pump, etc.) using the dip switch
- Space temperature sensor is integral to the thermostat; the temperature sensing range is: 32°F to 99°F

- Optional unit mounted temperature sensor: User can select the integrated temperature sensor within the thermostat (default) or the unit mounted temperature sensor. (range of temperature detecting: 32°F to 99°F)
- Anti-freeze protection for hydronic heating applications (protection triggered when return air temperature is less than or equal to 40°F; thermostat returns to the previously set mode when the ambient temperature is higher than 60°F)
- Cold air prevention function, available only for hydronic heating applications in heating mode

## 3. Electrical Specifications

Power supply: AC24V/1A/50-60HZ

Warning input: AC24V±20%, keeping 10s (warning is triggered if abnormal condition occurs for more than 10 seconds)

Rest output: AC24V

Control signal output: AC24V/0.5A

## 4. Outside Temperature Sensor

5K/3950K±1% (cable type)

## 5. Specification of TFT Screen

Size: 3.5"

Resolution: 320×RGB×480dot

Display area: 48.96(H) × 73.44(V) mm

Screen type: Capacitive TFT touch screen

## 6. Dip switch options

TABLE 1

Dial code	Description	ON	OFF	Default
J1	Heating function	Valid	Invalid	Valid
J2	7-day programing function	Valid	Invalid	Valid
J3	Heating mode	Hydronic heating coil	Others	Hydronic heating coil
J4	Fan speed	2-speed	3-speed	2-speed
J5	Product type	PTAC/FCU/Hybrid	WSHP/PTHP	PTAC/FCU/Hybrid
J6	Compressor delay at first power-on	Valid	Invalid	Valid
J7	Space temperature sensor	Inside (thermostat built-in)	Outside	Inside

\* To set various dip switch status to get suitable functions as below Table 2.

### Notes:

J1: If the unit has any heating function, then J1=ON; J1=OFF in cooling only applications.

J2: If the user does not want "7-day programing function," then J2=OFF. With J2=OFF, the thermostat functions like a simple thermostat.

J3: The thermostat needs to know what type of heating is present. If the unit is using hydronic heating coil for the heating function (such as PTAC with hydronic heating coil or Hydronic WSHP), then J3=ON.

J4: For 2-speed fan operation J4=ON; for 3-speed fan applications J4=OFF.

J5: Refer to Table 5 for details.

J6: J6=ON is the default. J6=OFF is a test/service function option.

J7: There are two ambient temperature sensors in total, one is inside the thermostat A, the other is inside the unit. This switch is to set which sensor the customer is going to use.

**7. Input or output for the terminal block** **TABLE 2**

Terminal #	Description	Terminal	Input/Output	Voltage
1	Transformer L	R	Input	24VAC
2	Transformer N	C	Input	0VAC
3	Cooling	COOL	Output	0/off; 24VAC/on
4	High fan speed	F1	Output	0/off; 24VAC/on
5	Medium fan speed	F2	Output	0/off; 24VAC/on
6	Low fan speed	F3	Output	0/off; 24VAC/on
7	Heating	H1	Output	0/off; 24VAC/on
8	Hydronic heating coil detecting	P	Input	ON/OFF signal
9	Common terminal	G	Input	--
10	Outside ambient temperature sensor	RT	Input	--
11	Resume	RST	Output	0/off; 24VAC/on
12	Alarm	ALARM	Input	0/off; 24VAC/on

**8. 7-day Programmable Default Schedule** **TABLE 3**

The default day, time, and temperature are noted in Table 3 below. These values can be changed by the user at any time.

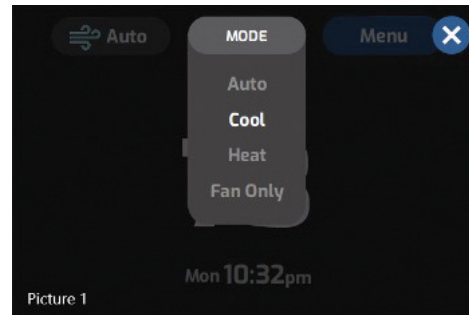
	Event	Time	Heat	Cool
Monday to Friday	Wake	6:00 AM	70 °F	78 °F
	Away	8:00 AM	62 °F	85 °F
	Home	6:00 PM	70 °F	78 °F
	Sleep	10:00 PM	62 °F	82 °F
Saturday and Sunday	Wake	6:00 AM	70 °F	78 °F
	Away	10:00 AM	62 °F	85 °F
	Home	6:00 PM	70 °F	78 °F
	Sleep	11:00 PM	62 °F	82 °F

**9. Mode Functional Description**

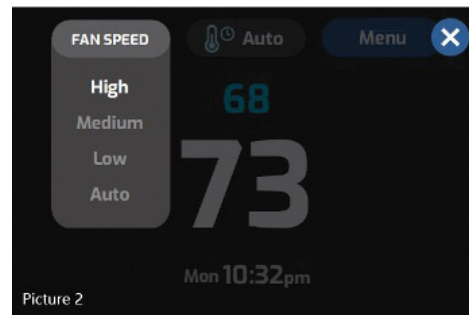
- **Cool Mode**
  - Select the Cool function from the menu by touching the **MODE** icon on the main screen (see Figure 1)
  - Select **FAN SPEED** from the menu by touching the **FAN SPEED** icon on the main screen then selecting High, Medium, Low, or Auto (see Figure 2)
  - The unit will run according to the default settings in Table 3 if the user has not altered any settings
  - **Temporary Override:** The user can change the temperature setting temporarily by touching the “+” or “-” icon on the main screen to get the expected temperature settings. The “+” and “-” icons appear after the user touches the screen. The temporary override setting will be effective once the user has not touched the screen for more than 3-seconds; (Figure 3)
  - The temporary override setting will only apply to the time period between the input and the next temperature pre-loaded in the programmed weekly schedule.

- The **Temporary Override** will be shown on the screen, to indicate the new setting is different with the setting that set in the weekly schedule; and will not disappear until the applicable time period has passed
- The color of the temperature value and temporary override text will be white when the setting is equal to the ambient temperature, it will be blue when the setting is lower than the ambient temperature, and it will be orange when the new setting is higher than the ambient temperature
- Temperature Range: 51°F to 91°F

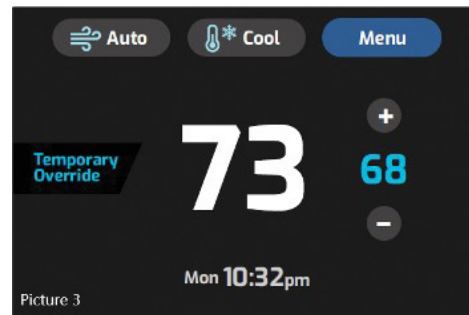
**FIGURE 1**



**FIGURE 2**



**FIGURE 3**



- **Heat Mode**
  - Same operation as **Cool** mode; See specific operation for Cool mode page 11
  - This function only applies to the unit with heating function
- **Auto Mode**
  - The same operation as **Cool** mode; See specific operation for **Cool** mode page 11
  - This function only applies to the unit with both cooling and heating functions. The **AUTO** option will be invalid if the unit

is configured for cooling only

- The unit will run automatically to maintain the space temperature, selecting either heating or cooling mode as required by the space conditions
- When **AUTO** mode is selected, the unit will operate the fan at low speed for 20-seconds, then enter into cooling, heating, or fan mode depending on the deviation between the space temperature and the set point temperature. The default temperature is 77°F in this mode, and the unit will run as noted in Table 4. The unit only runs in one functional mode once it enters into cooling or heating mode

**TABLE 4**

Space temperature (Tr)	Tr <70°F (critical)	70°F ≤ Tr ≤ 79°F (critical)	79°F ≤ Tr (critical)
Function Mode	Heating	Fan	Cooling

- User can set new expected temperature from 51°F to 91°F by touch “+” or “-” icon on the main screen, the unit will run similarly as Table 4 but with different critical temperature.

**Fan Only Mode**

- To select **Fan Only** function and fan speed; see referenced MODE and FAN SPEED instructions
- In Fan Only mode, the unit will only operate the indoor evaporator fan
- Temperature cannot be set at this mode, “+” and “-” icon on the main screen will be invalid

**10. Fan Speed Display Related to Signal Output to Fan Motor for Various Product Types**

- When dip switch J4 = ON, i.e. 2 fan speed [Alternate: “fan speed 2” or “dual fan speed operation”]; High, Low, and Auto fan speed can be selected
- When dip switch J4 = OFF, i.e. 3 fan speeds [Alternate: “fan speed 3” or “tri fan speed operation”]; High, Medium, Low and Auto fan speed can be selected (option for future use)
- See Table 5 and Table 6 for fan speed set points and the corresponding Signal Output to the fan motor for various products

**PTAC / FCU / Hybrid (J5 = ON)**

**TABLE 5**

Function Mode	Cooling		Heating		Fan only	
Set Point Display	LOW	HIGH	LOW	HIGH	LOW	HIGH
Signal output (J3 = On)	Medium	High	Low	Medium	Medium	High
Signal output(J3 = Off)	Medium	High	Medium	High	Medium	High

**WSHP / PTHP (J5 = OFF)**

**TABLE 6**

Function Mode	Cooling		Heating		Fan only	
Set Point Display	LOW	HIGH	LOW	HIGH	LOW	HIGH
Signal output (J3 = On)	Medium	High	Medium	High	Medium	High
Signal output(J3 = Off)	Medium	High	Medium	High	Medium	High

**11. AUTO Fan Speed in Different Modes**

**Cooling – Auto**

- High speed: when space temperature ≥ Cool set point +2°C (4°F)
- Low speed: when Cool Set point -1°C (2°F) ≥ space temperature ≥ Cool Set point +1°C (2°F)
- Fan stop: when compressor stop

**Electrical heater heating and others – Auto**

- High speed: when space temperature ≤ Cool Set point +2°C (4°F)
- Low speed: when Cool Set point -1°C (2°F) ≤ space temperature ≤ Cool Set point +1°C (2°F)
- Fan stop: 10 seconds delay after the heater relay closed

**Hydronic coil heating including Hybrid/FCU – Auto**

- High speed: when the P1 was detected to be closed, and, space temperature ≤ Cool Set point +2°C (4°F)
- Low speed: when space temperature ≤ Cool Set point -1°C (2°F)
- Fan stop: 10 seconds delay after the heater relay closed

**MODE – Auto**

- Once the MODE is selected to AUTO, the fan will run in the same manner as noted in Cooling mode page 11

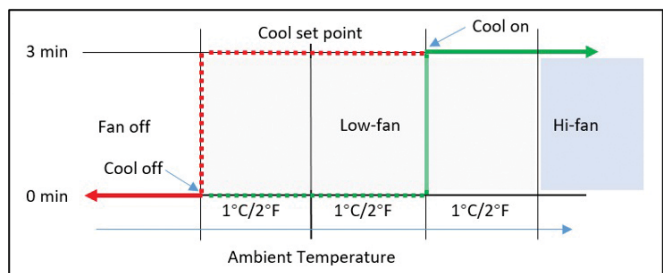
**Remark:** Other fan speeds like High, Medium and Low will cause no change once it is selected.

**12. Compressor Control for Cooling Mode**

- Critical for compressor ON or OFF
- Compressor ON: space temperature ≥ Cool Set point +1°C (2°F)
- Compressor OFF: space temperature ≤ Cool set point - 1°C (2°F)

**Remark:** The fan status noted in the figure below only refers to the fan speed in “Auto” fan mode.

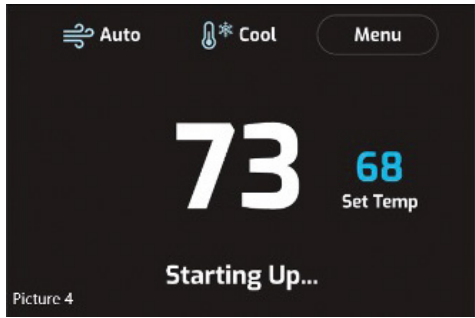
**FIGURE 4**



**Compressor protection**

- If the power is cycled ON, the compressor will start after 3 minutes delay, and will indicate “Starting Up...” on the main screen and flash the Cool icon (see Figure 5); This function can be set to valid or invalid by the dip switch J6
- The compressor always starts with a 3 minutes delay each time it is enabled; the “Starting Up...” message is not shown in between compressor cycles, only when being powered up from an power OFF position

FIGURE 5

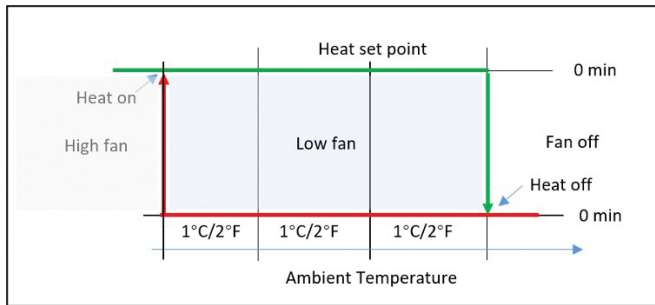


**13. Heating Relay Control for Heat MODE**

- **Criteria for heating relay ON or OFF**
- Relay ON: space temperature  $\leq$  Cool set point - 1°C (2°F)
- Relay OFF: space temperature  $\geq$  Cool set point +1°C (2°F)

**Remark:** The fan status in Figure 6 only refers to the fan speed at AUTO fan mode

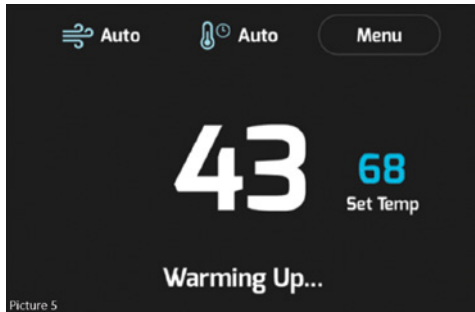
FIGURE 6



**14. Anti-freeze Protection for Hydronic Heating Coil Applications**

- This function is valid only when the unit is using a hydronic coil for heating and dip switch J3 = ON
- Trigger criterial: when the unit is ON or standing by, and, when the ambient temperature is  $\leq$  40°F (5°C), the protection is triggered. The unit will enter heat mode (heating reply is ON) and run medium fan speed, and Figure 7 will be shown on the main screen
- Resume criterial: when the space temperature = 60°F, the unit go back to pervious working status

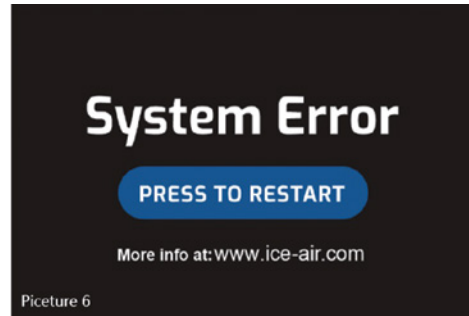
FIGURE 7



**15. Alarm System**

- When the unit has a fault occurred (for example, high pressure protection triggered), if terminal “ALA” receives a signal for 10 seconds, then the unit will stop all output to the components, and Figure 8 will be shown on the screen
- The user can try to restart the unit by touching the “PRESS TO RESTART” icon on the screen
- If the system does not restart and operate normally, technical support is available at [www.ice-air.com](http://www.ice-air.com)

FIGURE 8



**16. 7-Day Programmable Schedule**

- **Home, Away, and Sleep Temperature Settings**
  - Touch the **Menu** icon on the main screen, then enter the sub-menu, and touch **Cool Setting** to enter another sub-screen for the cooling temperature setting (for example) (see Figures 9, 10, 11)
  - To set the expect temperature for various time periods, touch the “+” or “-“ icons next to the temperature settings (see Figures 12, 13)
  - Users can switch from °F or °C by touching said icons located at the bottom of the Settings page (see Figures 11, 12, 13)
  - To exit and go back to the main screen, touch the X icon in the upper right hand of the screen, or touch ← to go back to the previous screen (see Figures 11, 12, 13)
- The new setting are effective immediately for the week and will display in the weekly schedule screen; User can see the new settings when entering the weekly schedule screen
- Heat Settings function that same as the Cool Settings
- The default settings for the weekly temperature schedules is noted in Table 3. New settings will overwrite previous settings

FIGURE 9

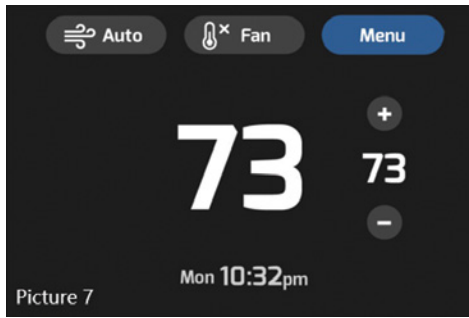


FIGURE 10

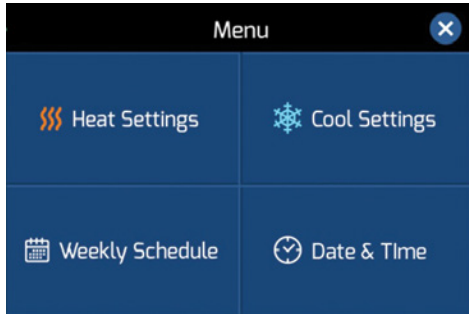


FIGURE 11

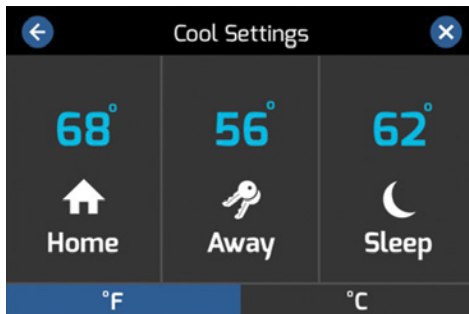


FIGURE 12

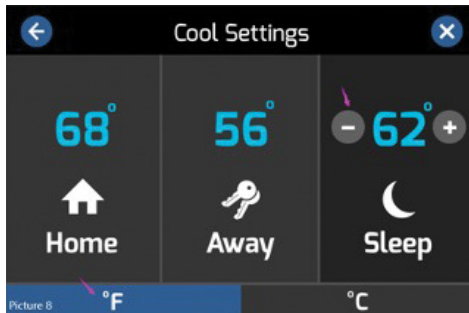
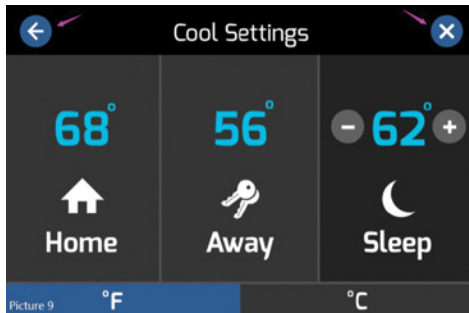


FIGURE 13



• **Weekly Schedule Settings**

- Touch the MENU icon on the main screen, enter the sub-menu, and select **Weekly Schedule** to enter the selection screen (see Figures 14, 15, 16, 17)
- To set the **Wake Time** for one day or several days (example: Monday, Wednesday and Friday), touch “M”, “W” and “F” one by one, then touch time icon under the Wake icon to enter the time setting for **Wake Time**; see Figure 18
- Touch ↑ or ↓ icons to set expected hour and minutes; (the time advances in 5-minute intervals)
- Touch the **Save** icon to record the settings, and touch Remove to reset the setting
- Touch the **X** icon to finish the settings and return to the main screen, or touch ← to page backwards
- The new setting will be shown on the **Weekly Schedule** screen; User can see the new settings when entering into the Weekly Schedule screen
- Use the same procedure to set the expected time for **Away, Home and Sleep**
- If the user does not select specific days and set specific times directly, then the new settings will apply to all of the days of the week
- The default settings for the weekly temperature schedules is noted in Table 3. New settings overview the previous settings
- Prior to the Day and Time being set by the user, the display will show “No Set” in the time display section of the screen. Once the Day and Time are set, it will display under the temperature indicator (see Figure 14)
- If the settings for each day are different, then “Multiple” will be indicated; if the settings for several days is the same, the set time will be shown (see Figure 17)

FIGURE 14

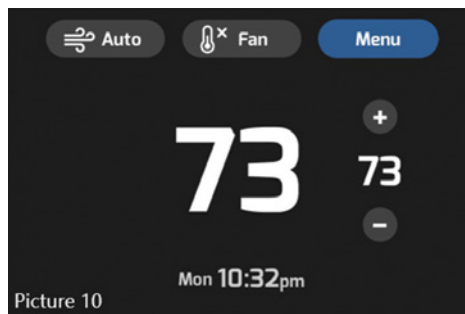


FIGURE 15

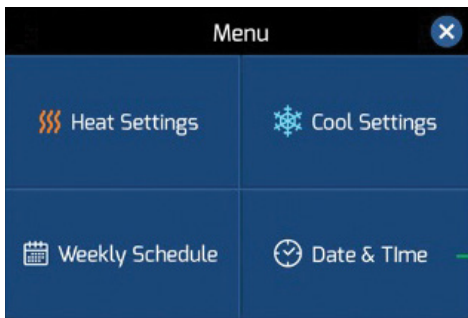


FIGURE 16

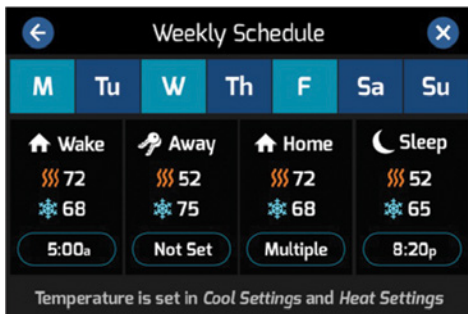


FIGURE 17

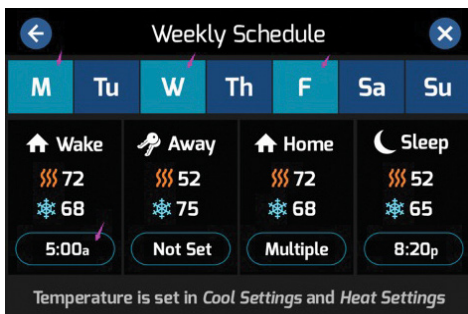
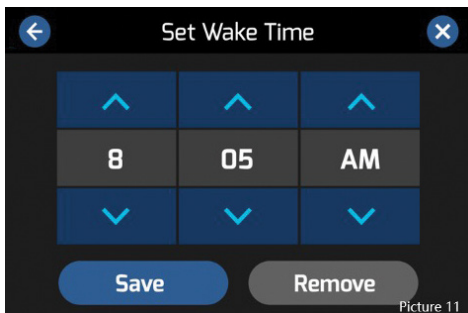


FIGURE 18



### 17. System Time and Date Setting

- Touch the **MENU** icon on the main screen to enter the sub-menu, then touch **Date & Time** to enter the Day & Time sub-screen (see Figure 19, 20, 21, 22)
- Touch **Edit Date** or **Edit Time** to enter the screen to edit these settings (see Figures 23, 24)
- User can select 12-hour or 24-hour format by touching the 12h or 24h icon respectively
- To set Date: Touch ↑ or ↓ icon to set expected year, month and date; touch Save & Exit to save the settings and go back to the upper menu

- To set Time: Touch ↑ or ↓ icon to set expected hour and minutes (5 minutes as a step when pressing on the time adjustment icon); touch Save & Exit to save the settings and go back to the upper menu
- If the user does not touch the Save & Exit icon after the new setting, and touches **X** or ← instead, the system will reminder the user to save or not save (see Figure 25)

FIGURE 19

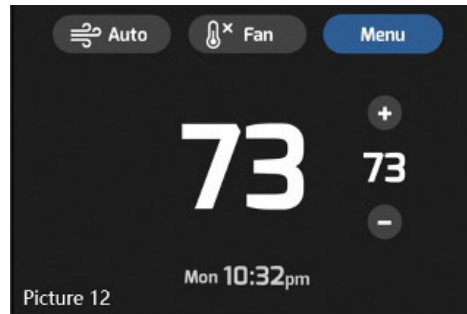


FIGURE 20

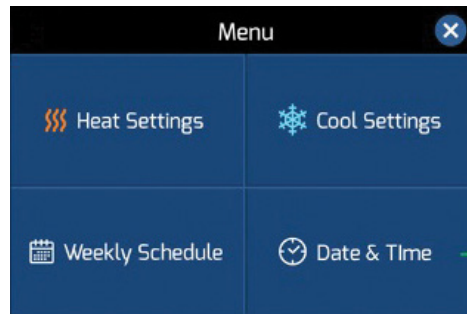


FIGURE 21

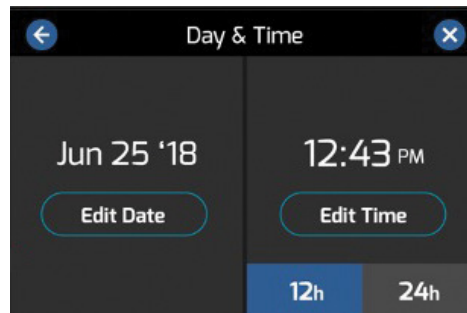


FIGURE 22

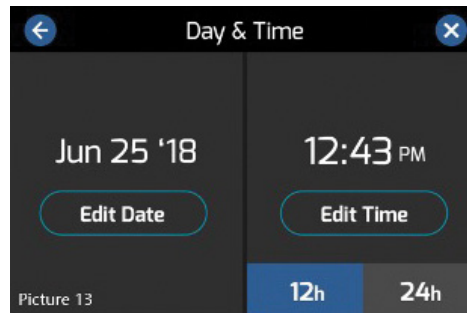


FIGURE 23

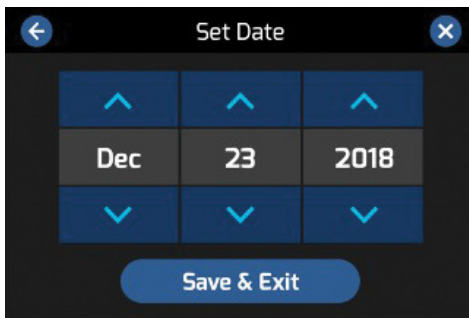
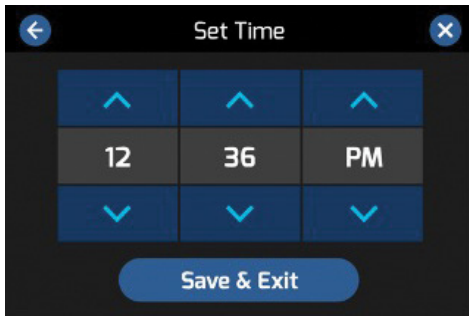


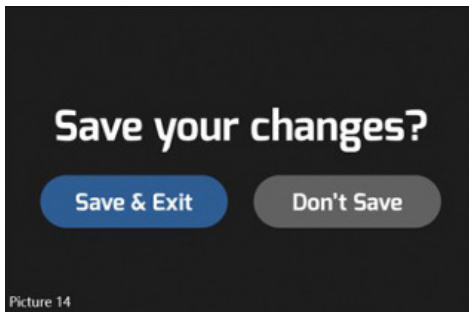
FIGURE 24



### 18. Power ON and Power OFF the Thermostat

- The thermostat requires 24-VAC power
- The thermostat will start up by showing the Ice Air logo and main “standing by” screen; Push main button on the plastic casing for the thermostat to enter working status; see Figures 26, 27
- To power the thermostat OFF, press the main button on the plastic casing for 3-seconds
- The screen will go into sleep mode 30-seconds after the last touch to the screen has been made. The user needs to touch the screen to wake up the display

FIGURE 25



Picture 14

FIGURE 26



Picture 15

FIGURE 27

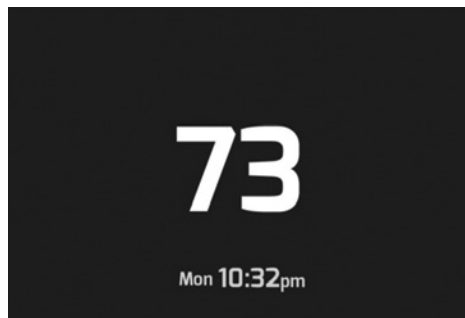
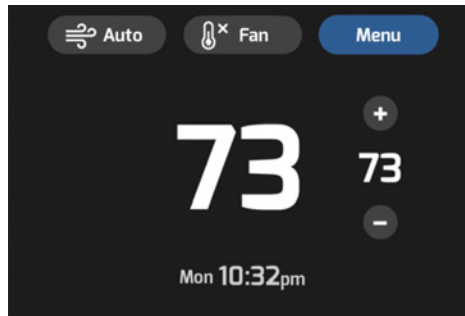


FIGURE 28



**PLEASE NOTE:** Other thermostats are available including:

Habitat Wireless  
Thermostat



Digital LCD Thermostat



System compatible with other 3<sup>rd</sup> party thermostats not shown here.

For more information go to: [www.ice-air.com/thermostats](http://www.ice-air.com/thermostats)



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