



**Model TLVT1**  
**Digital Touchscreen Programmable**  
**Thermostat with Heat Pump** 120515

**CAUTION:**

1. Turn off any electrical devices (e.g. heater, cooler) that are connected to the unit before installation and maintenance.
2. The installer must be a trained service engineer.
3. Disconnect the supply before battery replacement.
4. Do not dispose the used up battery with the household waste. Please refer to your local area for proper disposal.
5. It must be mounted on a dry clean indoor place.

**Feature List**

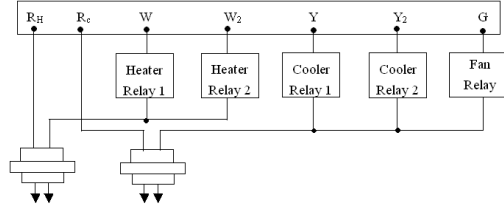
- Thermostat / Heat-pump Selection (software selectable)
- Fan On / Auto
- Battery Powered (2 “AA” alkaline batteries)
- 7-day (Monday to Sunday), 4-timezone section and temperature program settings
- Temperature display in °F or °C
- Temperature Measurable Range : 32 ~ 99°F / 0 ~ 40°C
- Program Copy for fast programming
- EEPROM stores heat and cool program settings
- Program Override Mode (Temporary / Permanent)
- Real clock in 12 hr / 24 hr
- Filter, energy and UV lamp usage record
- Adjustable interval time for filter, energy and UV usage
- Energy Saving Index
- Defrost function
- Cleaning Screen mode
- Calendar
- Holiday Mode
- Security Mode

**Wiring**

- When two-transformer system is used, connect the wires to R<sub>H</sub> and R<sub>C</sub> accordingly to the diagram shown. When single-transformer system is used, connect R<sub>H</sub> and R<sub>C</sub> together.
- There are two wiring configurations: thermostat or heat-pump. Please select the configuration to be used and then connect the appliances accordingly.

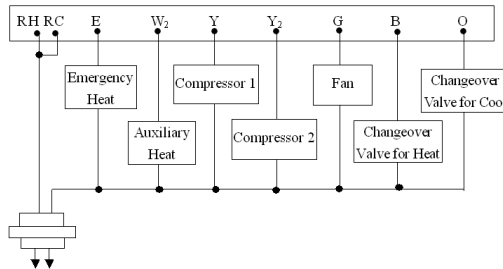
**Thermostat**

Terminals	Device
R <sub>H</sub>	24Vac supply for heater
R <sub>C</sub>	24Vac supply for cooler
W	1 <sup>st</sup> stage heating
W <sub>2</sub>	2 <sup>nd</sup> stage heating
Y	1 <sup>st</sup> stage cooling
Y <sub>2</sub>	2 <sup>nd</sup> stage cooling
G	Fan



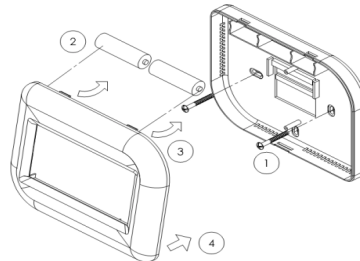
**Heat-pump**

Terminals	Device
R <sub>H</sub>	24Vac supply
R <sub>C</sub>	
E	Emergency Heat
W <sub>2</sub>	Auxiliary Heat
Y	1 <sup>st</sup> stage compressor
Y <sub>2</sub>	2 <sup>nd</sup> stage compressor
G	Fan
B	Changeover valve for heat
O	Changeover valve for cool



Pull all cables back into wall prior to avoid trapping wires. Do not use metal conduit or of cable provided with a metal sheath. Recommend adding fuse or protective device in the live circuit.

**Mounting**



1. Base housing
  - I. Adjust the base on the wall or junction box and ensure the base is at surface level and cover the junction box comfortably.
  - II. If necessary, pull the cables out at the middle hole of the base.

- III. If necessary, place the 2 pcs of wall anchors at the wall.
  - IV. Fasten the base with the 2 pcs of long screws.
  - V. Place the cables at the hole near the terminal block.
2. Insert 2 AA batteries into the battery case on the thermostat (Please observe polarity).
  3. Hold the thermostat on the base. Align the screw blocks with the pins on the back of the thermostat.
  4. Push the thermostat straight onto the base until snaps into place.

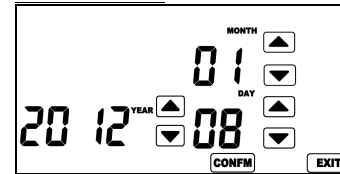
**Setup Mode**

There are 10 settings in the setup mode:

1. Calendar
2. 12 / 24 hour selection
3. °C / °F display selection
4. HE / HG selection
5. Thermostat / Heat-pump selection
6. Control system selection
7. Span and Differential selection
8. Delay / Long Delay selection
9. DST (Daylight Saving Time) Selection
10. Screen lock selection

To enter setup mode, press and hold **SYSTEM** for 5 seconds. In setup mode, press **EXIT** to discard changes made to current setting and exit setup mode. Press **CONFIRM** to apply changes and proceed to next setting.

**Set Calendar**



Press **▼** / **▲** to change year, month and day accordingly. Press **CONFIRM** to apply changes and proceed to next setting.

**12/24 hour**

Press **▼** / **▲** to toggle between 12 and 24 hour mode. Press **CONFIRM** to apply changes and proceed to next setting.

**°C / °F Selection**

Press **▼** / **▲** to toggle between °C or °F temperature unit. Press **CONFIRM** to apply changes and proceed to next setting.

**HE / HG Selection**

Press **▼** / **▲** toggle between HE / HG selection. Press **CONFIRM** to apply changes and proceed to next setting. When fan is in auto mode and HE is selected, fan will be turned on as long as heater / cooler is turned on. When fan is in auto mode and HG is selected, fan will only be turned on during cool mode.

	HE	HG
Heat On	Fan On	Fan Off
Cool On	Fan On	Fan On

\* Heat-pump discard HE/HG selection except for emergency heat

**Thermostat / Heat-pump**

Press **▼** / **▲** to toggle between thermostat and heat-pump selection.

“th” represents thermostat.  
 “HP” represents heat-pump.

Press **CONFIRM** to apply changes and proceed to next setting.

**Control System Selection**

Press **▼** / **▲** to toggle between control system selection. Press **CONFIRM** to apply changes and proceed to next setting.

Selectable configurations are shown as follow :

**Thermostat**

Configuration	Display	Terminal Connection
1 heat 1 cool	1H1C	R <sub>H</sub> , R <sub>C</sub> , W, Y
1 heat 2 cool	1H2C	R <sub>H</sub> , R <sub>C</sub> , W, Y, Y <sub>2</sub>
2 heat 1 cool	2H1C	R <sub>H</sub> , R <sub>C</sub> , W, W <sub>2</sub> , Y
2 heat 2 cool	2H2C	R <sub>H</sub> , R <sub>C</sub> , W, W <sub>2</sub> , Y, Y <sub>2</sub>

\* Connect fan ( terminal : G ) if necessary.

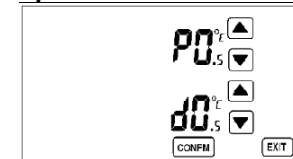
**Heat-pump**

Configuration	Display	Terminal Connection
1 heat 1 cool	1H1C	R <sub>H</sub> , R <sub>C</sub> , Y, B, O
2 heat 2 cool	2H2C	R <sub>H</sub> , R <sub>C</sub> , Y, Y <sub>2</sub> , B, O
2 heat 2 cool Auxiliary heat	3H2C	R <sub>H</sub> , R <sub>C</sub> , W <sub>2</sub> , Y, Y <sub>2</sub>

\* Connect fan ( terminal : G ) if necessary.

\* Emergency Heat ( terminal : E ) is used for defrost control. Connect it if necessary.

**Span and differential Selection**



“P” represents span setting.  
 “d” represents differential setting.  
 Span and differential setting units will be changed according to the temperature unit selected by user.  
 The selectable values are 0.5°C(1°F) / 1.0°C(2°F) / 1.5°C(3°F).  
 The default span and differential settings are 0.5°C / 1°F.  
 Press **▼** / **▲** to change the values. Press **CONFIRM** to apply changes and proceed to next setting.

**Delay / Long Delay Selection**

Press **▼** / **▲** to toggle between delay and long delay selection. Press **CONFIRM** to apply changes and proceed to next setting. Delay for heat / cool on to prevent short cycling of system that may damage the appliance.  
 “dE” represents delay. “L dE” represents long delay.

	Delay	Long delay
Heat mode	5~10 sec	4~5 min
Cool mode	4~5 min	4~5 min

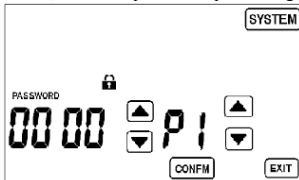
For Heat-pump configuration, it will always be a long delay irrespecting to this selection setting.

**DST (Daylight Saving Time)**

Press **▼** / **▲** to toggle on/off of the DST function.  
 \* The DST used is based on USA time-zone.

## Secure Lock Selection

Press or to enable(ON) or disable(OFF) the security lock. If it is enabled, user is required to input a 4-digits password.



Press or on the left to change the password. P1 indicates that the 1<sup>st</sup> digit password (read from left) is selected. Press or on the right to select the digit.

After setting all 4 digits, press **CONFIRM** to activate the security mode.

When security mode is activated, is shown on the LCD and all keys are disabled expect **SYSTEM**.

\* If the password is 8888, all settings will restore to default upon pressing **CONFIRM**.

## Disable the security lock

1. Press **SYSTEM** and user is required to enter the correct password.
2. If the password is correct, the security lock will be disabled. Otherwise, it remains locked.

\* Security Lock cannot be maintained once power is lost.

## View Calendar

1. Press the current weekday to view current date.
2. Press **EXIT** to exit the viewing.

## Clock Setting

1. Press **CLOCK** to enter the clock setting mode.
2. Firstly, the hour is shown. Press or to change the hour. Press **CONFIRM** to save the setting.
3. Then, the minute is shown. Press or to change the minute. Press **CONFIRM** to save the setting and exit clock setting.

## Clean Screen Mode

1. Press **CLEAR** to enter the cleaning screen mode.
2. The screen will show a 20-second countdown immediately after the key press.
3. During countdown, all keys are disabled.
4. When countdown reaches zero, press **EXIT** to exit clean screen mode, or press **CLEAR** to repeat the countdown.

## Usage

TLVT1 can record the Filter, UV and energy usage. These counters count hourly. Each count is 4 digits long (0~9999). Filter usage counts when the fan is turned on; UV usage counts as long as TLVT1 is powered on. Energy usage counts when heater / cooler is turned on. When the counts reach the set limit, the corresponding usage icon will be shown on the screen.

### View Usage

1. Press **USAGE** to enter the usage mode.
2. Filter, UV and Energy counter are shown alternatively by pressing **USAGE**.
3. Press **CLEAR** to clear the current counter records.
4. Press **EXIT** to exit the usage mode.

### Adjusting Usage limit

1. Press and hold **USAGE** for 3 seconds during the usage mode.
2. Press or to change the internal time (0~9999).
3. Press **CONFIRM** to save the setting.

4. Press **EXIT** to exit the limit setting.

## Defrost

When the room temperature is below 5 °C / 41 °F, HEATER will always be turned ON and COOLER will be turned OFF irrespective of the current control temperature set. 2<sup>nd</sup> stage heater, emergency and auxiliary heater may be turned on depending on the control system configuration. Defrost indicator will be shown on screen.

## Program mode

Default programs are as the below:

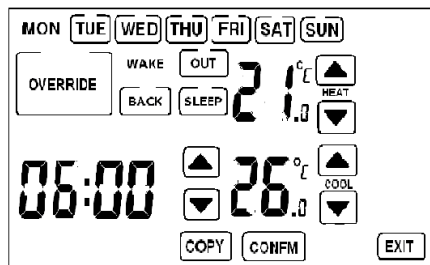
Heat settings :

	Wake	Out	Back	Sleep
Mon	6:00 (21 °C / 70 °F)	8:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	22:00 (16 °C / 61 °F)
Tue	6:00 (21 °C / 70 °F)	8:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	22:00 (16 °C / 61 °F)
Wed	6:00 (21 °C / 70 °F)	8:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	22:00 (16 °C / 61 °F)
Thu	6:00 (21 °C / 70 °F)	8:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	22:00 (16 °C / 61 °F)
Fri	6:00 (21 °C / 70 °F)	8:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	22:00 (16 °C / 61 °F)
Sat	6:00 (21 °C / 70 °F)	10:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	23:00 (16 °C / 61 °F)
Sun	6:00 (21 °C / 70 °F)	10:00 (16 °C / 61 °F)	18:00 (21 °C / 70 °F)	23:00 (16 °C / 61 °F)

Cool setting:

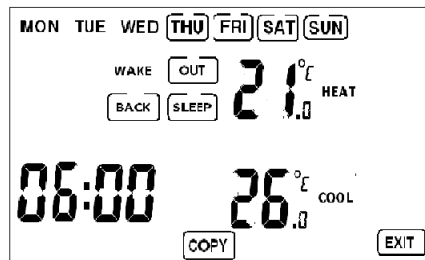
	Wake	Out	Back	Sleep
Mon	6:00 (26 °C / 79 °F)	8:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	22:00 (28 °C / 82 °F)
Tue	6:00 (26 °C / 79 °F)	8:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	22:00 (28 °C / 82 °F)
Wed	6:00 (26 °C / 79 °F)	8:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	22:00 (28 °C / 82 °F)
Thu	6:00 (26 °C / 79 °F)	8:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	22:00 (28 °C / 82 °F)
Fri	6:00 (26 °C / 79 °F)	8:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	22:00 (28 °C / 82 °F)
Sat	6:00 (26 °C / 79 °F)	10:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	23:00 (28 °C / 82 °F)
Sun	6:00 (26 °C / 79 °F)	10:00 (29.5 °C / 85 °F)	18:00 (26 °C / 79 °F)	23:00 (28 °C / 82 °F)

1. Press **PROG** to enter the program mode.
2. Default start from "MON" and "WAKE".
3. Current program of setting is without .



4. Press / to change the time, heat and cool setting temperature.

5. Press **EXIT** to go back to normal mode.
6. Press **CONFIRM** to save setting and go back to normal mode.
7. Press **COPY** to copy the program.
8. During copying, the heat and cool setting temperatures are not set but still can be checked by pressing **WAKE**, **OUT**, **BACK** and **SLEEP**.
9. Press the other days to copy the program. The days that are copied will also be without .



10. Press "COPY" again to finish the copy mode and return to program setting mode.

## Override mode

1. Press **PERMANENT OVERRIDE PROGRAM** to select permanent override, temporary override and program.
2. Default heat and cool setting temperature for override and permanent override mode is 26 °C / 79 °F.
3. Press / to change the override setting temperature in heat and cool mode respectively.

Temporary override mode returns to normal mode when new program starts if override time does not set.

## Holiday Mode

1. Select system to temporary override.
2. Press and hold **OVERRIDE** for about 3 seconds to enter holiday mode setting.
3. User may set the time interval for the holiday mode duration. Value on the left refers to number of hours and that on the right refers to number of days.
4. Press / to adjust the values.
5. Press **CONFIRM** to apply changes, or **EXIT** to discard changes.
6. When holiday mode is activated, **OVERRIDE** flashes.
7. The thermostat will keep using the current setting temperature until the holiday time duration reaches zero. It then returns to program mode.
8. To disable holiday mode, any one of the three methods can be done.
  - i. Change system to permanent override mode.
  - ii. Change system to normal mode.
  - iii. Set the holiday time interval to zero.

## System setting

In Normal mode, press and release **SYSTEM** to enter system mode.

User may set the system used by pressing **SYSTEM**.

It follows the sequence below:

(HEAT EM) → HEAT → COOL → AUTO → OFF → HEAT	
HEAT	It is the same as HEAT mode, except that it would turn on emergency heat instead of compressor ( Heat-pump
EM	

MODE	only).
HEAT MODE	Heating appliances will be activated when the room temperature is lower than the setting temperature.
COOL MODE	Cooling appliances will be activated when the room temperature is higher than the setting temperature.
AUTO MODE	The unit will use the current heat and cool setting temperature to turn on heating or cooling appliances.
OFF MODE	No heating and Cooling will be activated at any temperature.

"LO" will be shown on the screen when room temperature is below 0 °C / 32 °F.

"HI" will be shown on the screen when room temperature is above 40 °C / 99 °F.

When one appliance is turned on, will be shown on the screen as indication.

Similarly, will be shown on the screen when second appliance is turned on.

### Emergency Heat

When it is activated, "EM." will be shown on the screen.

### Auxiliary Heat

When it is activated, "AUX" will be shown on the screen.

## FAN mode

Press **FAN** to enter fan mode. In the fan mode, press **FAN** to toggle the Fan controls (FAN ON or FAN AUTO).

FAN ON: Fan stays on all the time.

FAN AUTO: Fan turns ON whenever heating or Cooling is on (Depends on HE/HG setting).

## Energy saving index

The energy saving index is calculated based on the setting of your program. It is used as a reference for the user to know how likely the program is to conserve energy or consume more.

If the user sets a comfort program setting, the appliances are likely to be turned on a lot and "LOSE" may be shown on the screen. If the appliances are less likely to be turned on, "SAVE" may be shown on the screen.

The likelihood of saving energy or losing energy is converted to a percentage value for reference.

If the value is higher than 99%, "HI" will be shown instead.

## Low battery

If the voltage batteries drop below 2.7V, icon will be on.

## Electrical Interface

Temperature measurement:	0~40 °C / 32~99 °F
Control temperature range:	5~35 °C / 41~95 °F
Temperature resolution:	0.5 °C / 1 °F
Temperature accuracy:	±0.5 °C / ±1 °F
Battery:	2 AA alkaline battery
Relay contact Voltage:	24Vac 50/60Hz
Relay contact Current:	1A Max