spartan PERIPHERAL DEVICES

Front view

Back view

#	Item	Description
1	LCD	Display temperature and working status.
2	MODE button	Access to user and engineer menu and for setting confirmation or change ℃/℉ unit if press for over 3 sec.
3	FAN button	Toggle to change Fan mode: Auto or Continuous
4	UP & DOWN buttons	Increase & decrease setting or previous/next item
5	SET button	Setting for clock and programmable Schedules
6	On/Off button	Turn on/off thermostat
7	Set-point icons	Display set-point temperature while it is flashing
8	Fan icons	Indicate Fan status
9	Flake icon	Indicate working on Cooling mode
10	Hot spring icon	Indicate working on Heating mode
11	Flow icon	Indicate working on ventilating mode
12	Working icon	Indicate cooling/heating valve open
13	Clock	Not used
14	Sleep	Sleep mode is enable while it is shown
15	Moon Sign	Indicate room unoccupied
16	Outdoor icon	Indicate door/ window open
17	Cover screw	Screw to tighten back cover with front cover
18	Back plate	Plate for mounting on electric box
19	Wiring terminal blocks	Terminals for wiring
20	Mounting holes	Holes for mounting on electric box
21	small 8888	Display time
22	Schedule number	Programmable Schedule running or setting
23	Day	Current day of Sunday ~ Saturday or setting

Installation
Mounting on electric box

1. Separate back plate from the controller by loosing the cover screw;
2. Align the mounting holes on the screw holes of the electric box(applicable to 65x65 or US standard box);
3. Fix the back plate on the electric box by tightening the back plate screws. Suggest to use Philips wider "truss head" or "washer head" #6-32x 3/4"(20mm).

---

4. DO NOT let the bolt head rise above the wall of mounting holes of back plate. It might cause the short circuit of the controller.

Mounting front cover

1. Lock front cover on the back plate by tightening the cover screw underneath with screw driver of Philip electronic instrument type or similar.

Wiring Example

1. All wires come from electric box must be inserted above the retainers of respective terminal block before tightening the captive screws;
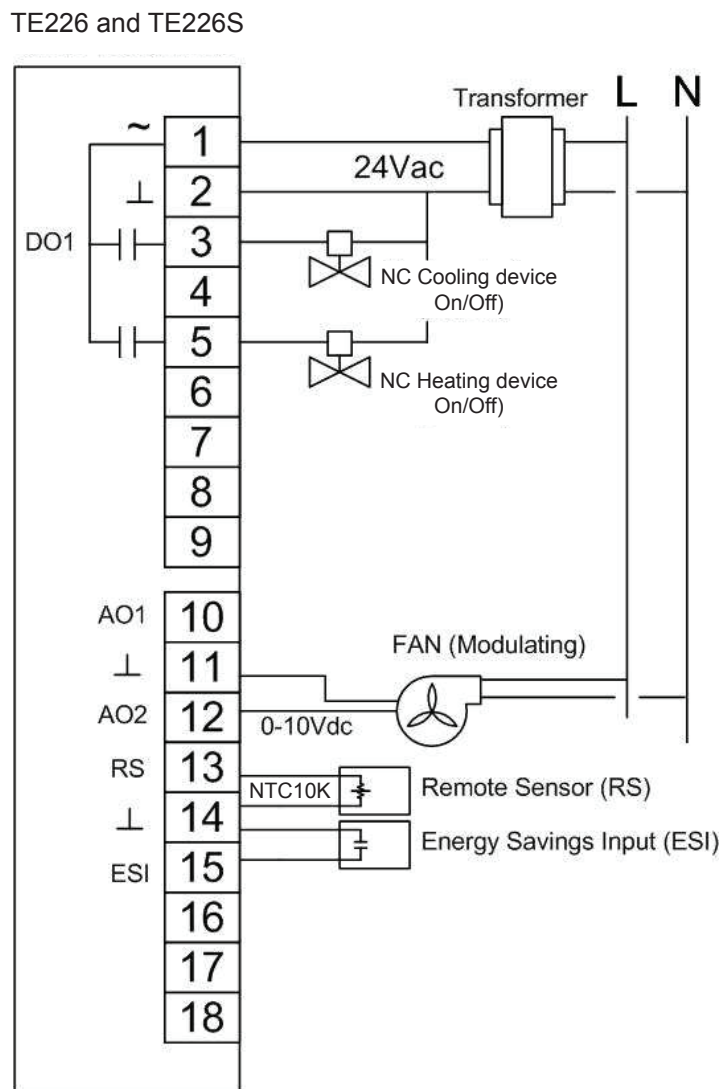
TE226 and TE226S

Wiring Diagram for
TE226 and TE226S
Series Thermostats

Operation

User Mode Operation

The first tier of operation includes the following settings as Figure 2. To operate:

1. Power switch ⏻ "ON" or "OFF" to start/ stop the System;

2. After switching "ON", press any button to start the User Mode operation.

   i. Press "MODE" button to switch over different working modes. When MODE is pressed for more than 3 seconds, the unit of temperature will toggle to change to ˚F or ˚C.

   ii. Press UP/ DOWN button to increase/ decrease or rotate the values of setting.

   iii. Press "FAN" button to toggle over different fan modes.

   iv. Press "SET" button to set current date/time. When SET is pressed for more than 3 seconds, users can set the temperature for programmable schedules.

3. It will return to normal display with the latest setting if there's no button pressed for 10 seconds.

#	Item	Description	Remarks
1	Normal Display	Display Current Room or Set-Point Temperature and Current Time-Day.	Setting "-SP- "Parameter in Engineer Table to Choose Current Room or Set-Point Temperature.
2	Temperature Setting ▲ ▼	Set The Required Temperature	
3	Mode Select MODE	1. Select The Working Mode: (1) Run/ Halt/ Stop for Schedule 2. When MODE Is Pressed For More Than 3 Seconds, The Unit Of Temperature Will Toggle To Change To ˚F or ˚C.	**RUN:** Run Schedules. **HALT:** Pause "Current" Schedule and Use Manual SP. **STOP:** Stop Using All Schedules and Use Manual SP.
4a	Fan Auto/ Continuous for TE226S	1. Change Fan Mode for Auto or Continuous Mode 2. Auto Mode Will Stop Fan Output During Dead Band 3. Continuous Mode Will Output Low Speed During Dead Band	Minimum Speed Can Be Set Via FanL(E17) parameter in Engineer Table
4b	Fan Continuous for TE226	1. Continuous Mode Will Output Low Speed During Dead Band	Minimum Speed Can Be Set Via FanL(E17) parameter in Engineer Table
5	Time/ Date/ Schedule Setting SET	1. Set Current Time in 12- Or 24- Hour Format; 2. Set Calendar and Day of Week; 3. When SET Is Pressed for More Than 3 Seconds, Users Can Set Temperature Set Points for programmable Schedules	Press SET to Continue Settings. Press MODE, FAN, Or POWER Button to Escape Any Time During Setting.
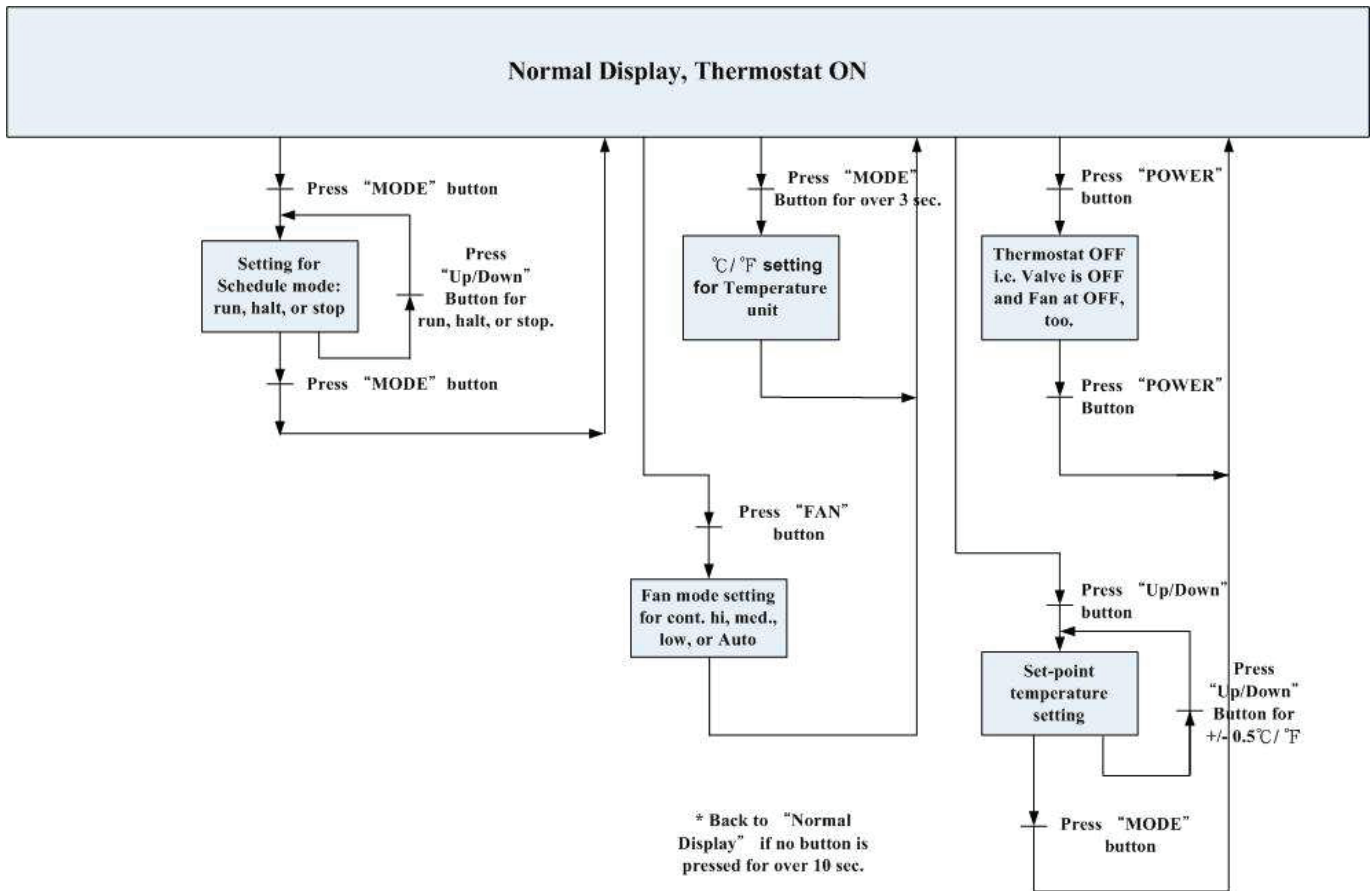
Fig. 2   User Mode operation sequence

Overview for the settings of Clock and Programmable Schedules

Normal Display, Thermostat ON

Press "SET" button → Clock Setting* → Press "SET" button

Press "SET" button For 3 sec. → Schedule Setting* → Press "SET" button
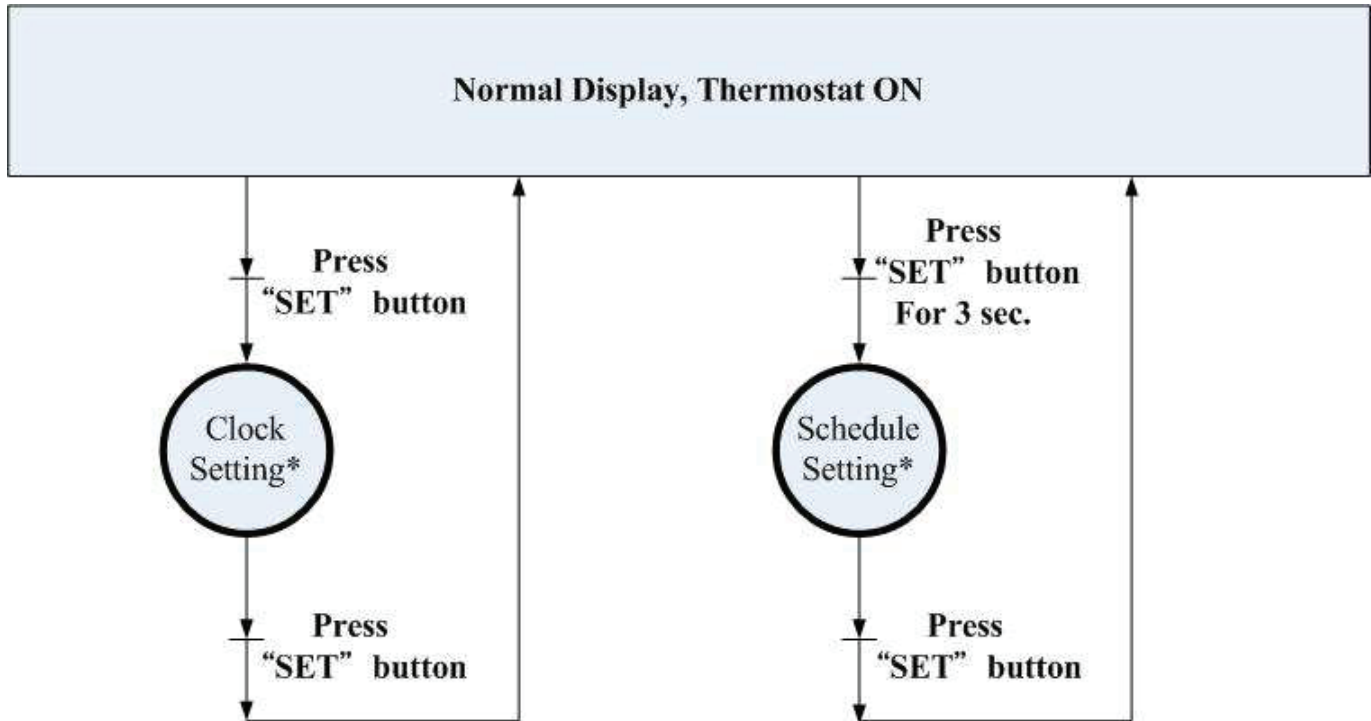
* Please refer to its related detailed state diagram respectively for details.

📖 Press MODE, FAN, or POWER button to escape any time during setting.

1. Detailed State Diagram for Clock Setting
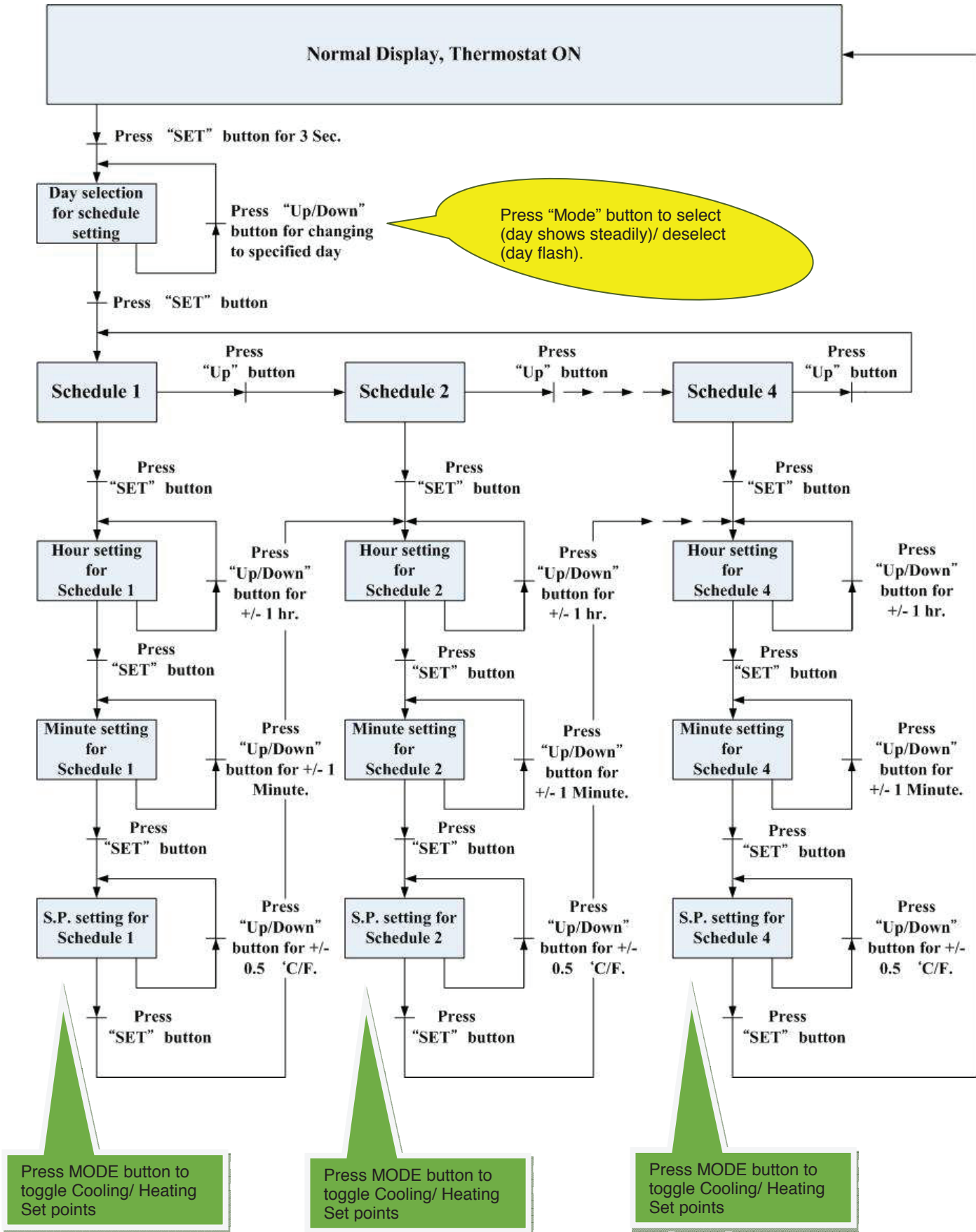
```
┌─────────────────────────────────────────────────────────────────────┐
│                  Normal Display, Thermostat ON                        │
└─────────────────────────────────────────────────────────────────────┘
        │                                                          ▲
        │ Press "SET" button                                       │
        ▼                                                          │
┌──────────────────┐                                              │
│ 12-hr. or 24-hr. │   Press "Up/Down" button for changing         │
│  selection for   │   to 12-hr. or 24-hr. clock.                  │
│      Clock       │                                              │
└──────────────────┘                                              │
        │                                                          │
        │ Press "SET" button          Press "SET" button           │
        ▼                                                          │
┌──────────────────┐                    ┌──────────────────┐       │
│   Hour setting   │   Press "Up/Down"  │ Year setting for │   Press "Up/Down"
│       for        │   button for       │      Clock       │   button for changing to
│      Clock       │   +/- 1 hr.        └──────────────────┘   specified year.
└──────────────────┘                            │
        │                                        │ Press "SET" button
        │ Press "SET" button                     ▼
        ▼                              ┌──────────────────┐
┌──────────────────┐                   │  Month setting   │   Press "Up/Down"
│  Minute setting  │   Press "Up/Down" │       for        │   button for changing to
│       for        │   button for      │      Clock       │   specified month.
│      Clock       │   +/- 1 minute.   └──────────────────┘
└──────────────────┘                            │
        │                                        │ Press "SET" button
        │ Press "SET" button                     ▼
        ▼                              ┌──────────────────┐
┌──────────────────┐                   │ Day setting for  │   Press "Up/Down"
│  Today setting   │   Press "Up/Down" │      Clock       │   button for changing to
│       for        │   button for      └──────────────────┘   specified day.
│      Clock       │   changing to             │
└──────────────────┘   Sun.~Sat..             │ Press "SET" button
        │
        │ Press "SET" button
```

2. Detailed State Diagram for Schedule Setting

Normal Display, Thermostat ON

Press "SET" button for 3 Sec.

Day selection for schedule setting

Press "Up/Down" button for changing to specified day

Press "Mode" button to select (day shows steadily)/ deselect (day flash).

Press "SET" button

Schedule 1	**Schedule 2**	**Schedule 4**

Press "Up" button — Press "Up" button — Press "Up" button

Press "SET" button

Hour setting for Schedule 1 — Press "Up/Down" button for +/- 1 hr.

Hour setting for Schedule 2 — Press "Up/Down" button for +/- 1 hr.

Hour setting for Schedule 4 — Press "Up/Down" button for +/- 1 hr.

Press "SET" button

Minute setting for Schedule 1 — Press "Up/Down" button for +/- 1 Minute.

Minute setting for Schedule 2 — Press "Up/Down" button for +/- 1 Minute.

Minute setting for Schedule 4 — Press "Up/Down" button for +/- 1 Minute.

Press "SET" button

S.P. setting for Schedule 1 — Press "Up/Down" button for +/- 0.5 ˚C/F.

S.P. setting for Schedule 2 — Press "Up/Down" button for +/- 0.5 ˚C/F.

S.P. setting for Schedule 4 — Press "Up/Down" button for +/- 0.5 ˚C/F.

Press "SET" button

Press MODE button to toggle Cooling/ Heating Set points

Press MODE button to toggle Cooling/ Heating Set points

Press MODE button to toggle Cooling/ Heating Set points

Default Set Point for Programmable Schedules

COOL	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Sch. 1 ①	6:00 26.0℃	6:00 26.0℃	6:00 26.0℃	6:00 26.0℃	6:00 26.0℃	6:00 26.0℃	6:00 26.0℃
Sch. 2 ②	8:00 29.5℃	8:00 29.5℃	8:00 29.5℃	8:00 29.5℃	8:00 29.5℃	8:00 29.5℃	8:00 29.5℃
Sch. 3 ③	18:00 26.0℃	18:00 26.0℃	18:00 26.0℃	18:00 26.0℃	18:00 26.0℃	18:00 26.0℃	18:00 26.0℃
Sch. 4 ④	22:00 26.0℃	22:00 26.0℃	22:00 26.0℃	22:00 26.0℃	22:00 26.0℃	22:00 26.0℃	22:00 26.0℃

HEAT	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Sch. 1 ①	6:00 21.0℃	6:00 21.0℃	6:00 21.0℃	6:00 21.0℃	6:00 21.0℃	6:00 21.0℃	6:00 21.0℃
Sch. 2 ②	8:00 16.0℃	8:00 16.0℃	8:00 16.0℃	8:00 16.0℃	8:00 16.0℃	8:00 16.0℃	8:00 16.0℃
Sch. 3 ③	18:00 21.0℃	18:00 21.0℃	18:00 21.0℃	18:00 21.0℃	18:00 21.0℃	18:00 21.0℃	18:00 21.0℃
Sch. 4 ④	22:00 18.0℃	22:00 18.0℃	22:00 18.0℃	22:00 18.0℃	22:00 18.0℃	22:00 18.0℃	22:00 18.0℃

- Unoccupied Set Points: activated by occupancy contact; Cooling: 28.0℃/ Heating: 15.0℃ for factory defaults. And These two can be re-set by ESIC(E2) and ESIH(E3) parameters in Engineer Mode table.

- When schedules are activated, refer to cooling/ heating set points according to current schedule.

- When pause or stop schedules, refer to manual set point or latest set point as cooling set point and dead band for heating set point deviation.

- Programmable Cooling Set Point range: 10.0℃~37.0℃; Programmable Heating Set Point range: 4.5℃~32.0℃; make sure to set heating lower than cooling set point to have proper controls.
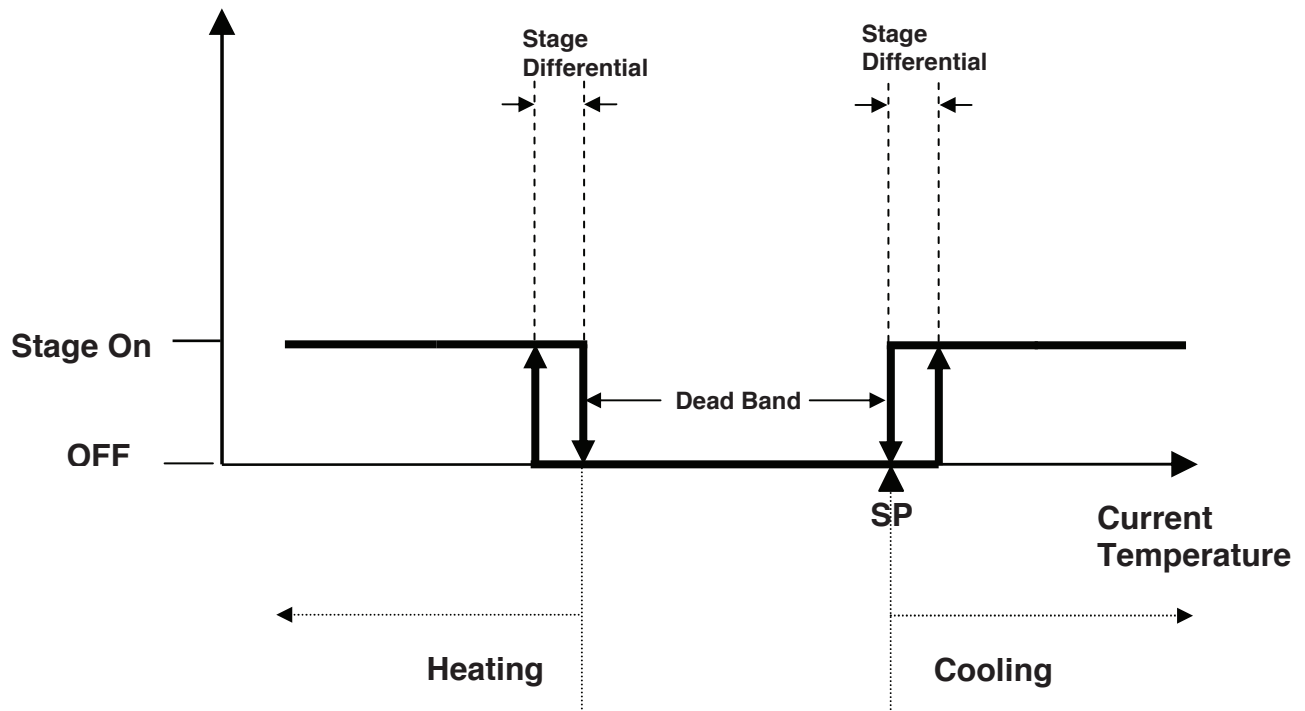
1. On-off Valve Controls:

- When Cooling or Heating is on, a "Running (Gear) (on will be shown on the LCD.

- **Cooling/ Heating On Delay**: In addition to Dead Band, whenever cooling/ heating was ON, switching to heating/ cooling ON will consider the minimum delay time as set in Item E19 of Engineer Mode.

Cooling and Heating Control, Auto Changeover, for Example

Spartan Peripheral Devices telephone: (450) 424-6067 • fax: (450) 424-6071 • email: info@spartan-pd.com • website: www.spartan-pd.com

2. Fan Controls:

(1) **Fan Output Adjustment**: Fan output requires minimum adjustment (AO2 Low(E7)) from 0-5 Vdc and maximum adjustment (AO2 High(E8)) from 5 to 10 Vdc

These two values are adjusted by balancing contractor that will measure minimum and maximum CFM the fan will supply and set this two values.

(2) **Fan Control**: The TE226 model will run the fan continuously at low speed (Fan Low(E17)) (say 25-30% of max design airflow) during occupied and dead band for delivery outside air from suite HRV or OA vent duct

If there is a call for heating or cooling the fan would ramp up to maximum design airflow for the FCU on the project.

 (3) **Fan Mode**: The TE226S model, by pressing FAN button to toggle AUTO icon on and off to represent Auto Mode ("AUTO" show on screen) and Continuous Mode. Continuous Mode will keep fan running at low speed in the least while Auto Mode will run from 0%. During dead band, Auto Mode will stop fan speed while Continuous Mode will run fan at low speed(Fan Low(E17)).

By pressing POWER button to switch on/ off fan and heating/ cooling outputs.
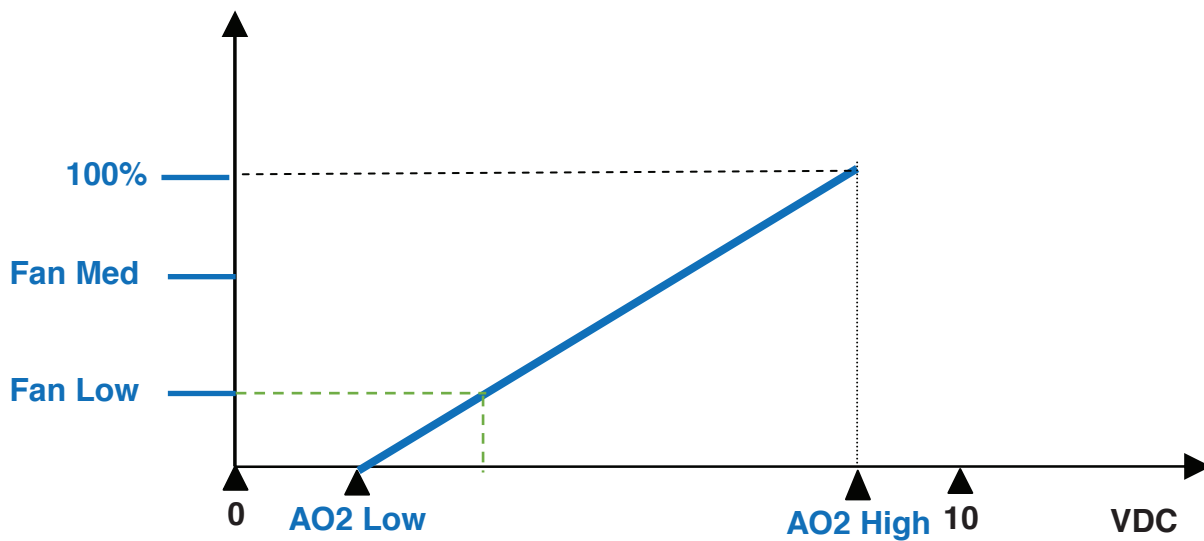
3. Special note:

1. Fan bar will be shown according to the fan output reaches low speed, medium speed or 100% of max output.

2. ESI (Energy Saving Input) Contact status -- When the contact is activated (Vacation or Room unoccupied), a "Moon (☾)" icon will be shown on the LCD and the thermostat will change the set-point temperatures of Cooling & Heating to be ESIC & ESIH (refer to Engineer table for details.). When the contact is deactivated (Room back to be occupied), it will set the set-point values back as normal.

3. If disable local ESI contact detection, the room will become always occupied status as default.

4. The icon ①, ②, ③, or ④ will be shown on LCD while the programmable Schedule 1,2,3, or 4 is running.

5. If press "MODE" button, there are three Schedule modes "RUN, HALT, and STOP" for selection:

    a.) RUN mode means Running on Schedules. And at the same time an icon (🔔) will be steadily shown on the LCD.

    b.) HALT mode means temporarily using manual S.P instead of "current" Schedule. And the icon (🔔) will be flashing on the LCD.

    c.) STOP mode means using manual S.P instead of "all" Schedules. i.e. Temporarily disable all programmable Schedules. And the icon (🔔) will be NOT shown on the LCD.

6. There is an adjustable time delay between heating and cooling from 0 to 5 minutes. This delay time can be adjusted by the dLAy parameter in the Engineer table. The default is 0 minute.

Engineer Mode Operation

This mode is highly suggested to be operated by trained engineers because it is related to system parameters that will affect the control results. To operate:

1. Press "Up" and "Down" buttons for over 5 seconds to enter into engineer mode;
2. Press UP or DOWN button to rotate the menu item and press MODE button to enter into the item;
3. Press UP or DOWN button to change the setting and press MODE button to confirm the setting and return to menu item selection. For no button pressed for 10 seconds, it will go back to menu item selection. The setting won't be changed then.
4. To leave Engineer Mode, rotate till "End" and press MODE button or leave the button intact for 10 seconds.
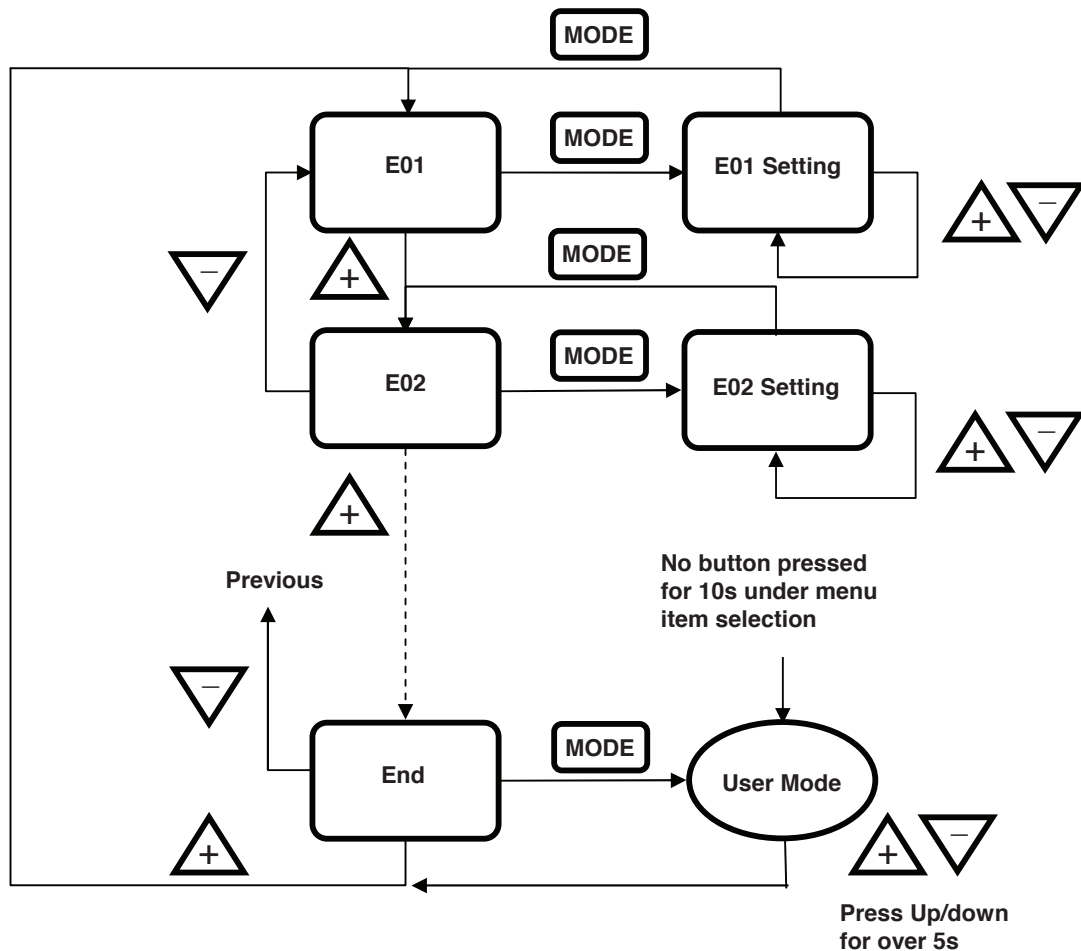Engineer mode operation flow chart:

Fig. 3 Engineer Mode operation sequence

6. Engineer mode menu item descriptions:

Item	Mnemonic	Description	°C Type		°F Type		Step
			Default	Range	Default	Range	
E1	db	Deadband	4.0	0~10.0	7.0	0~18.0	0.5 (°C/°F)
E2	ESIC	Unoccupied(ESI) Cooling Set Point	28.0	25.0~35.0	82.0	77.0~95.0	1.0 (°C/°F)
E3	ESIH	Unoccupied(ESI) Heating Set Point	15.0	10.0~22.0	59.0	50.0~72.0	1.0 (°C/°F)
E4	I-t	Integral Time and Output Cycle Time	90	10~500	90	10-500	10 (Sec.)
E5	AO1L	Not used					
E6	AO1H	Not used					
E7	AO2L	Analog Output 2 Low Adjustment (for FAN control)	0	0~125	0	0~125	1(~0.044V)
E8	AO2H	Analog Output 2 High Adjustment (for FAN control)	-25	-150~0	-25	-150~0	1(~0.044V)
E9	SP-L	Low Limit for Temperature Set Point	10.0	0~50.0	50.0	32.0~122.0	1.0 (°C/°F)
E10	SP-H	High Limit for Temperature Set Point	35.0	0~50.0	95.0	32.0~122.0	1.0 (°C/°F)
E11	OFSt	Current Temperature Offset	0.0	-10.0~10.0	0.0	-18.0~18.0	0.1 (°C/°F)
E12	Pb	Proportional Band or Stage Width	2.0	0~10.0	3.6	0~18.0	0.1 (°C/°F)
E13	LOC	Bit Definition --- Bit 0: Mode Button 1: Down Buttons 2: Up Button 3: Fan Button 4: Power Button 5: Set Button 6: ESI Contact Detection 7: Reserved *Bit Value 0: Unlock / enable 1: Lock / disable Examples: 0- Unlock/enable all 1- Lock MODE Button 2- Lock Down Button … 8-Lock Fan Button … 15-Lock MODE & Down & Up & Fan SPEED Buttons 16-Lock Power Button … 64-Disable ESI contact detection … … 255- Lock/disable all	0	0-255	0	0-255	1

E14	ESI	ESI Contact Definition	0	0~1	0	0~1	0: N.O. 1: N.C.
E15	rS	Present Temperature Is Getting from Built-In Temperature Sensor, or Remote Temperature Sensor.	0	0~1	0	0~1	0: built-in 1: remote
E16	-SP-	Display Present Value of Temperature or Set-Point for Normal Displaying	0	0-1	0	0-1	0: display PV 1: display SP
E17	FAnL	Lowest Fan Speed in Continuous Fan Mode	25	0~100	25	0~100	1(%)
E18	Fan2	Medium Fan Speed	60	20~100	60	20~100	1(%)
E19	dLAy	Minimum delay time between cooling and heating	0	0~5	0	0~5	1 (minute)
E20	tESt	Self-Diagnostic					
E21	rSt	Reset All Parameters to Factory Defaults					
E22	End	Exit Engineer Mode					