neptronic®

Fan Coil Thermostat
Specification & Installation instructions

Feature:

TFC54F3X1-OE1

- Selectable analog & digital output
- Selectable fan speed contact
- Selectable Fahrenheit or Celsius scale
- Manual Night Set Back override (programmable)
- Multi level lockable access menu
- Lockable Set point / Control mode
- Selectable internal or external temperature sensor
- Selectable proportional control band & dead band
- Change over by contact or external temperature sensor available

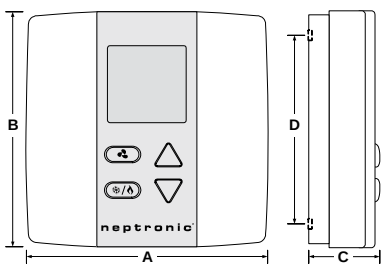
Technical Data	TFC54F3X1-OE1
Outputs	2 Analog outputs (cooling and/or heating and/or change over 0-10VDC)
	3 Digital outputs (fan)
Contact rating	Resistive load: rated load: 1.0 Amp / 24 VAC / VDC Inductive load: rated load: 0.3 Amp / 24 VAC / VDC maximum switching capacity: 30 VA / 24 W
Power supply	22 to 26 VAC 50/60Hz
Power consumption	1 VA
Set point range	10ºC to +35ºC [50ºF to 95ºF]
Display resolution	+/-0.1ºC [0.2ºF]
Control accuracy	Temperature: +/-0.5ºC [0.9ºF] @ 22ºC [71.6ºF] typical calibrated
Proportional band	0.5 ºC to 5ºC [1ºF to 10ºF] adjustable
Electrical connection	0.8 mm^2 [18 AWG] minimum
Operating temperature	0ºC to50ºC [32ºF to122ºF]
Storage temperature	-30ºC to +50ºC [-22ºF to +122ºF]
Relative Humidity	5 to 95 % non condensing
Degree of protection of housing	IP 30 to EN 60529
Weight	80 g. [0.18 lb]

Presentation

Symbols on display

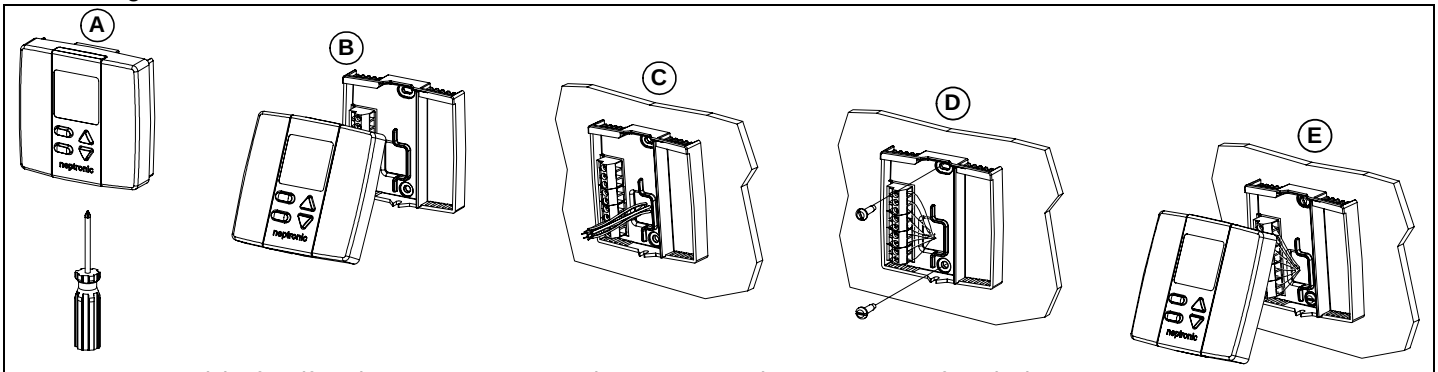
A	***Cooling ON 100% output A: Automatic***		***Menu set-up Lock ON***
A	***Heating ON 100% output A: Automatic***		***Programming mode (Technician setting)***
A	***Fan ON 3rd speed activated A: Automatic***	MIN MAX	***Minimum/Maximum set points***
°C or °F	***ºC: Celsius scale ºF: Fahrenheit scale***		***Energy saving mode ON***

Dimensions



Dimension	Inches	Metric (mm)
A	3.00	78
B	3.00	78
C	1.00	24
D	2.36	60

Mounting Instructions



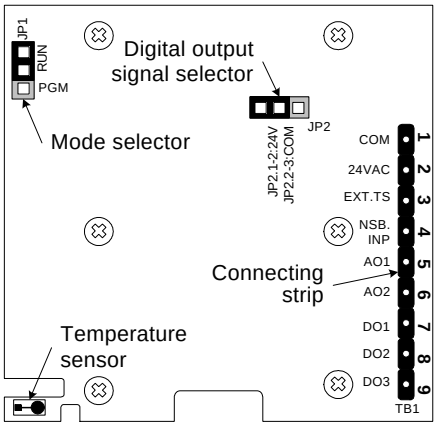
CAUTION: Risk of malfunction. Remove power prior to separate thermostat cover from its base.

A. Remove the screw (captive) holding the base and the front cover of the thermostat.
B. Lift the front cover of the thermostat to separate it from the base.
C. Pull wire through the base hole.
D. Secure the base to the wall using wall anchors and screws (supplied). Make the appropriate connections.
E. Mount the control module on the base and secure using the screw.

Terminal description

Terminals	2 Pipe	4 Pipe
1	Common	
2	24 VAC	
3	Change over temp. sensor or contact	Exterior temperature sensor
4	Night set back input	
5	Analog output 1 (AO1) Cool/Heat	Analog output 1 (AO1) Heat
6	Analog output 2 (AO2) Reheat	Analog output 2 (AO2) Cool
7	Digital output 1 (DO1) fan high	
8	Digital output 2 (DO2) fan medium	
9	Digital output 3 (DO3) fan low	

Settings on PC Board



Mode Selection (JP1)

Jumper (JP1) on RUN:
Thermostat is in **operation mode**.
Thermostat must be set in this mode to operate properly.
If not locked, set point, control mode and speed fan (Heating & Cooling ON, Cooling only ON or Heating only ON) may be modified by end user.

Jumper (JP1) on PGM:
Thermostat is set in **Programming mode**.
Refer to following section about all settings description

Digital output signal selection (JP2)

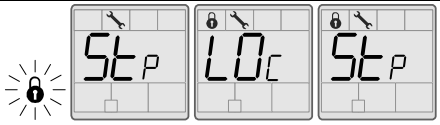
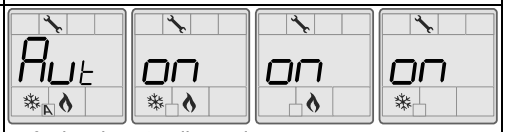
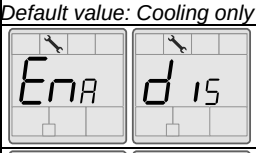
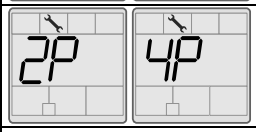
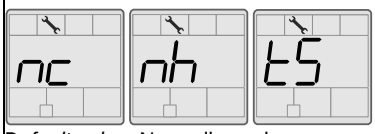
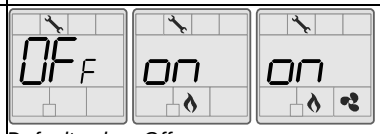
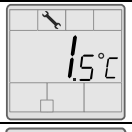
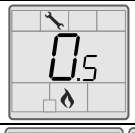
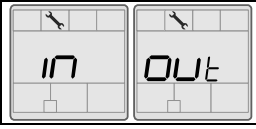
Jumper (JP2) on 24VAC:
All digital output signal is linked to 24 vac.

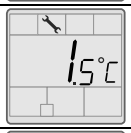
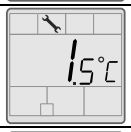
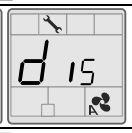
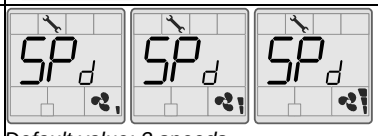
Jumper (JP2) on COM:
All digital output signal is linked to common.

Programming mode (you can refer to flowchart on page 6)

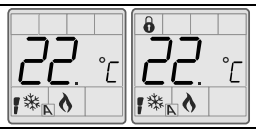
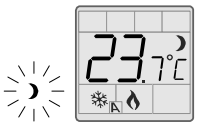
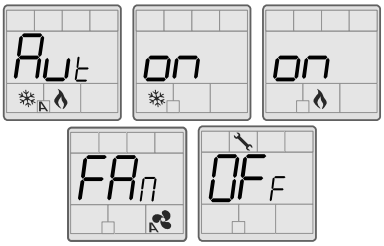
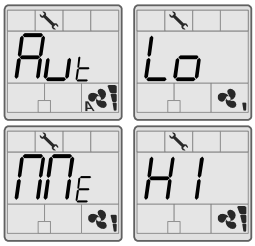
When in this mode this symbol is displayed. Please press on button to advance to the next program function, press on button to return to preceding stage and press on button △ or ▽ to change value. You can leave the programming mode at any time, changed values will be recorded.

Step	Display	Description	Values
1		**Internal temperature sensor Calibration:** Display switches between "**tS1**" and temperature read by internal temperature sensor. You can adjust the calibration of the sensor by comparison with a known thermometer. For example if thermostat has been installed in an area where temperature is slightly different than the room typical temperature (thermostat place right under the air diffuser).	 Range : 5 to 45ºC [41 to 99ºF] Increment: 0.1ºC [0.2ºF]
2		**Minimum set point:** Display switches between "**Stp**" and the minimum set point temperature. **MIN** symbol is also displayed. Please select the desired minimum set point temperature.	 Minimum range 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 15ºC [59ºF]*
3		**Maximum set point** Display switches between "**Stp**" and the maximum set point temperature. **MAX** symbol is also displayed. Please select the desired maximum set point temperature.	 Maximum range 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 30ºC [86ºF]*

Step	Display	Description	Values
4A		**Locking the set point :** Display switches between "**LOc**" and "**Stp**". You can lock or unlock the set point adjustment by end user. If locked the lock symbol will appear. If you do not want to lock set point adjustment by end user, **go directly to step #5.**	 *Default value: Unlocked*
4B		**Locking the set point (cont'd):** Select the desired locked set point temperature; this one should be within the temperature range.	Set point range : 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 22ºC [72ºF]*
5		**Adjust the control mode:** Display switches between "**CtL**" and "**Aut**". Select which control mode you want to authorize: Automatic, cooling or heating, heating only or cooling only. If you want to authorize this entire mode, choose Automatic mode.	 *Default value: Cooling only*
6		**Set On/Off function enable or disable:** Display switches between "**OFF**" and "**ena**". You can enable or disable the Automatic mode adjustment by end user.	 *Default value: Enable*
7		**Set 2 pipes or 4 pipes:** Display switches between "**Pno**" and "**2P**". Select which number of pipes you want to use: 2 pipes or 4 pipes. If you have selected the 4 pipes, **go directly to step #12.**	 *Default value: 2 pipe*
8A		**Change over mode selection:** Display switches between "**COc**" and "**nc**". Please select mode of change over between contact normally cool or contact normally heat or external sensor. Note: This selection will affect "**AO1**" and/or "**Ct1**" if they are set in change over mode. If normally cool "**nc**" is selected, heating mode will be activated upon closing of contact. If normally heat "**nh**" is selected, cooling mode will be activated upon closing of contact. If external sensor "**tS**" is selected, heating mode will be activated when temperature read by external sensor is above the Change Over Set Point temperature "**tCo**", and cooling mode will be activated when temperature read by external sensor is under "**tCo**", see step #8A. **If "tS" is not selected, go directly to step #9.**	 *Default value:* Normally cool
8B		**Change over set point temperature:** (If "**tS**" has been selected at step #8A) Display switches between "**tCo**" and the change over set point temperature selected. Please select the change over set point temperature. Note: heating mode will be activated when temperature read by external sensor is above the change over set point temperature "**tCo**", and cooling mode will be activated when temperature read by external sensor is under "**tCo**".	 Range: 5 to 35ºC [41 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 24ºC [82ºF]*
8C		**Change over temperature sensor Calibration:** Display switches between "**COS**" and the temperature read by the change over temperature sensor (if connected). You can adjust the calibration of the change over sensor by comparison with a known thermometer.	 Range: 0 to 50ºC [32 to 99.9ºF] Increment: 0.1ºC [0.2ºF] Display: 0.0ºC [32.0ºF], resistance will be infinite. 50.0ºC [99.9ºF], resistance will be short circuited.
9		**Set local reheat On/Off or TPM:** (If you have selected 2pipe control mode at step #7) Display switches between "**LHt**" and "**OFF**". Select which signal output you want for TO2. You can choose OFF (no signal selected), ON analog heating only, ON analog heating & fan output. If you select OFF (no local reheat), **go directly to step #14.**	 *Default value: Off*
10		**Proportional band for local reheat (TO2):** Display switches between "**Pb.L**" and the value of the local reheat proportional band, heating symbol is also displayed. Please select the desired value of local reheat proportional band.	 Proportional band range : 0.5 to 5.0ºC [1.0 to 10.0ºF] Increment: 0.5ºC [1.0ºF] *Default value: 1.5ºC [3.0ºF]*
11		**Dead band for local reheat (TO2):** Display switches between "**db. L**" and the value of the local reheat dead band, heating symbols are also displayed. Please select the desired value of local reheat dead band. **Go to step #14.**	 Proportional band range : 0.3 to 5.0ºC [0.6 to 10.0ºF] Increment: 0.1ºC [0.2ºF] *Default value: 0.5ºC [1.0ºF]*
12		**Internal/external temperature sensor selection:** Display switches between "**tS**" and "**in**" or "**out**". Please select internal or external sensor.	 *Default value: Internal temperature sensor*

Step	Display	Description	Values
13		**External temperature sensor Calibration:** Display switches between "**tS2**" and the temperature read by the external temperature sensor (if connected). You can adjust the calibration of the external sensor by comparison with a known thermometer.	 Range: 0 to 50ºC [32 to 99.9ºF] Increment: 0.1ºC [0.2ºF] Display: 0.0ºC [32.0ºF], resistance will be infinite. 50.0ºC [99.9ºF], resistance will be short circuited.
14		**Proportional band 1 in heating:** Display switches between "**Pb.1**" and the value of the 1st heating proportional band, heating symbol is also displayed. Please select the desired value of 1st heating proportional band.	 Proportional band range : 0.5 to 5.0ºC [1.0 to 10.0ºF] Increment: 0.5ºC [1.0ºF] *Default value: 1.5ºC [3.0ºF]*
15		**Proportional band 1 in cooling:** Display switches between "**Pb.1**" and the value of the 1st cooling proportional band, cooling symbol is also displayed. Please select the desired value of 1st cooling proportional band.	 Proportional band range : 0.5 to 5.0ºC [1.0 to 10.0ºF] Increment: 0.5ºC [1.0ºF] *Default value: 1.5ºC [3.0ºF]*
16		**Dead band in heating:** Display switches between "**db.1**" and the value of the dead band in heating, heating symbols are also displayed. Please select the desired value of dead band in heating.	 Proportional band range : 0.3 to 5.0ºC [0.6 to 10.0ºF] Increment: 0.1ºC [0.2ºF] *Default value: 0.3ºC [0.6ºF]*
17		**Dead band in cooling:** Display switches between "**db.1**" and the value of the dead band in cooling, cooling symbols are also displayed. Please select the desired value of dead band in cooling.	 Proportional band range : 0.3 to 5.0ºC [0.6 to 10.0ºF] Increment: 0.1ºC [0.2ºF] *Default value: 0.3ºC [0.6ºF]*
18		**Minimum position of Ao1 ramp:** Display switches between "**Ao.1**" and the value of the minimum position of the Ao1 ramp. **MIN** symbol is also displayed. Please select the desired value of the minimum position of the Ao1 ramp. (This is the "zero" value)	 Range: 0.0 to 10.0 Volt. Increment: 0.2 Volt. *Default value: 0.0 Volt*
19		**Maximum position of Ao1 ramp:** Display switches between "**Ao.1**" and the value of the maximum position of the Ao1 ramp. **MAX** symbol is also displayed. Please select the desired value of the minimum position of the Ao1 ramp. (This is the "span" value)	 Range: 0.0 to 10.0 Volt. Increment: 0.1 Volt. *Default value: 10.0 Volt*
20		**Minimum position of Ao2 ramp:** Display switches between "**Ao.2**" and the value of the minimum position of the Ao2 ramp. **MIN** symbol is also displayed. Please select the desired value of the minimum position of the Ao2 ramp. (This is the "zero" value)	 Range: 0.0 to 10.0 Volt. Increment: 0.2 Volt. *Default value: 0.0 Volt*
21		**Maximum position of Ao2 ramp:** Display switches between "**Ao.2**" and the value of the maximum position of the Ao2 ramp. **MAX** symbol is also displayed. Please select the desired value of the minimum position of the Ao2 ramp. (This is the "span" value)	 Range: 0.0 to 10.0 Volt. Increment: 0.1 Volt. *Default value: 10.0 Volt*
22		**Set fan speed automatic mode enable or disable:** Display switches between "**FAn**" and "**ena**". Fan symbol is also displayed. You can enable or disable the Automatic mode adjustment by end user. If you selected to disable the automatic mode, **go directly to step #24**	  *Default value: Enable*
23		**Time out fan contact:** Display switches between "**Fto**" and the automatic shutoff delay value (in minutes) when there is no demand. **MIN** and fan symbols are also displayed. Please select the desired value of the automatic shutoff delay.	 Range: 0 to 15 min. Increment: 1 min. *Default value: 0 min.*
24		**Fan speed contact:** Display switches between "**FAn**" and "**SPd**" and the speed of the fan. Fan symbol is also displayed. Select which speed contact you want: speed 1, speed 2 or speed 3.	 *Default value: 3 speeds*
25		**Night set back derogation time:** Display switches between "**nSb**" and the derogation time in minute. **MIN** and NSB symbol is also displayed. Please select the desired derogation time. If you select "**OFF**", the thermostat is off when NSB is activated.	 Range: OFF or 00 to 180 min. Increment: 15min. *Default value: 120 min.*
26		**Heating Set point during Night set back:** Display switches between "**Stp**" and the value of the heating set point temperature during night set back. NSB and heating symbols are also displayed. Please select the heating set point temperature during night set back.	 Range: 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 16ºC [61ºF]*
27		**Cooling Set point during Night set back:** Display switches between "**Stp**" and the value of the cooling set point temperature during night set back. NSB and cooling symbols are also displayed. Please select the cooling set point temperature during night set back.	 Range: 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1ºF] *Default value: 28ºC [82ºF]*

Operation mode

Step	Description	Display
A	At powering up, thermostat will light display and activate all LCD segments during 2 seconds. **Illuminating the LCD.** To illuminate the LCD, you just have to push onto △ or ▽ buttons. LCD will light for 8 seconds. **Temperature display** In operation mode, thermostat will automatically display temperature read. To change the scale between ºC and ºF, press on both △ and ▽ for 3 seconds.	
B	**Set point display and adjustment:** To display the set point, press two times on △ or ▽ Set point will be displayed during 5 seconds. To adjust set point, press on △ or ▽ while the temperature set point is displayed. *Note: If set point adjustment has been locked, 🔒 symbol will be displayed.*	
C	**Night set back (NSB):** When thermostat is in night set back mode, NSB ☽ symbol is displayed, so set point for cooling and/or heating are increased as per the setting made in programming mode. If not locked, night set back can be derogated for a predetermined period by pressing onto any of the 4 buttons. During period of NSB derogation the ☽ symbol will flash. If NSB does not flash, the derogation period is finished or the Night set back derogation has been locked in programming mode.	
D	**Control mode selection:** To change the control mode, press on (✻/🔥). Control mode will be displayed during 5 seconds. You can choose one of the following: ✓ Automatic Cooling or Heating ✓ Cooling only ✓ Heating only ✓ Fan only ✓ OFF (if not disable in programming mode) Note: These selections can vary according to the choice made on step #5 & 6.	
E	**Fan speed mode selection:** To change the fan speed mode, press on (🌀). Fan speed mode will be displayed during 5 seconds. You can choose one of the following: ✓ Automatic speed (if not disable in programming mode) ✓ Low speed ✓ Medium speed ✓ High speed Note: These selections can vary according to the choice made on step #22 & 24 & step #D.	

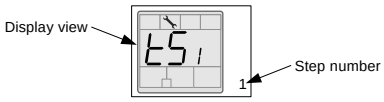
Auto Fan / Auto Speed Sequence

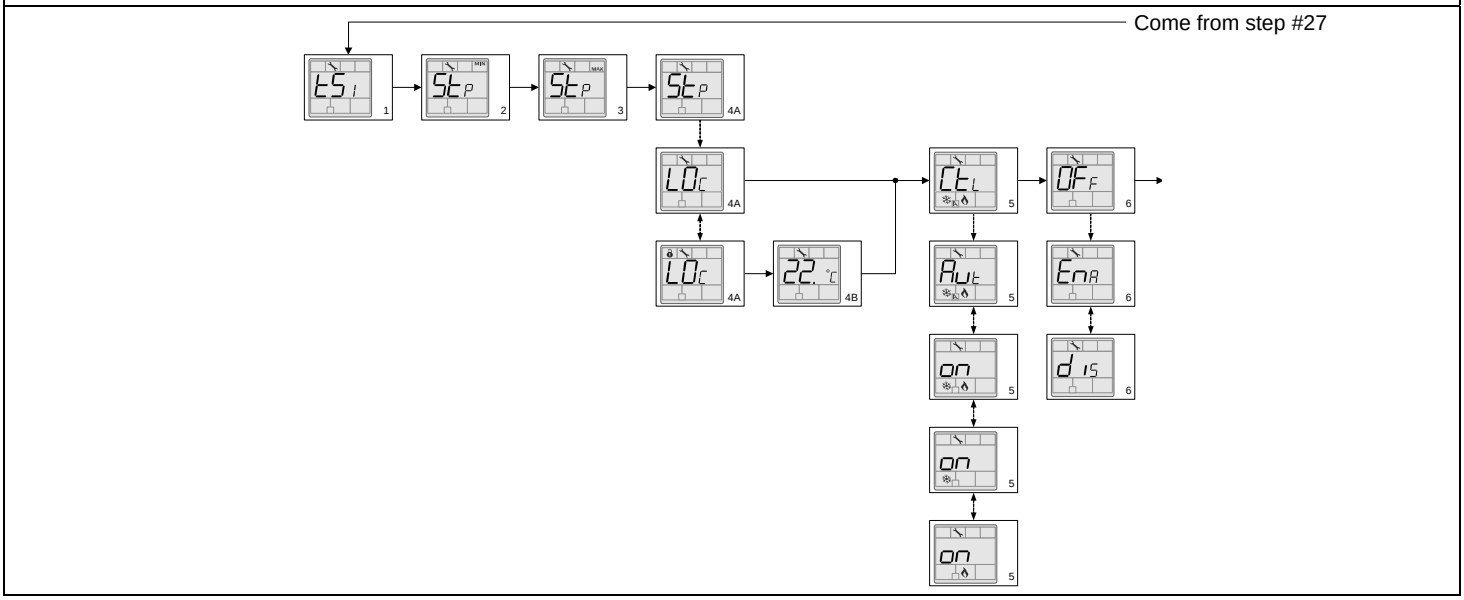
Auto Fan (programming mode step #22)	**Mode button**	**Fan button**	**If control demand > 0**	**If control demand = 0**
Enable	Heat	Auto Speed*	Fan speed = heat demand	Fan = Off
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Cool	Auto Speed*	Fan speed = cool demand	Fan = Off
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Auto (H/C)	Auto Speed*	Fan speed = heat/cool demand	Fan = Off
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Fan	Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Off	Off	Off	Off
Disable	Heat	Auto Speed*	Fan speed = heat demand	Fan speed = Low
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Cool	Auto Speed*	Fan speed = cool demand	Fan speed = Low
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Auto (H/C)	Auto Speed*	Fan speed = heat/cool demand	Fan speed = Low
		Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Fan	Low	Fan speed = Low	Fan speed = Low
		Medium	Fan speed = Medium	Fan speed = Medium
		High	Fan speed = High	Fan speed = High
	Off	Off	Off	Off

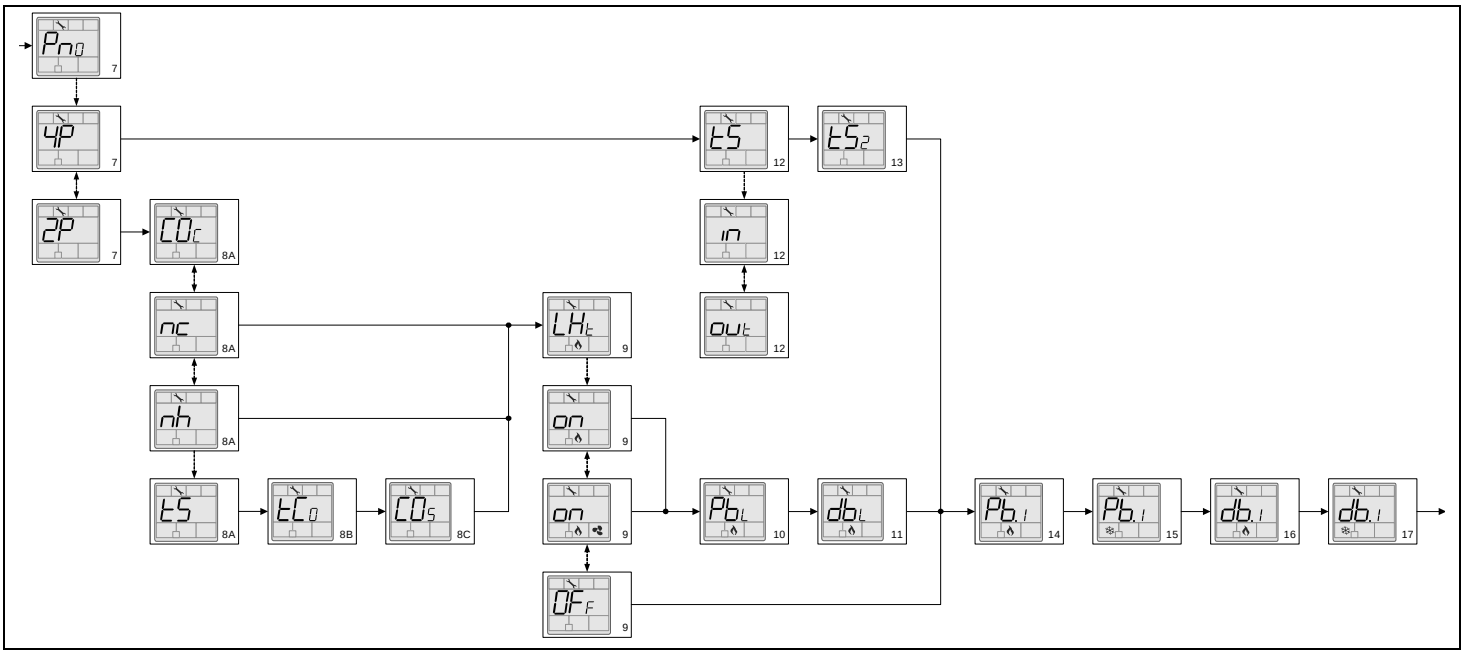
*When fan button is set in **Auto Speed**, the symbol A will be apparent.

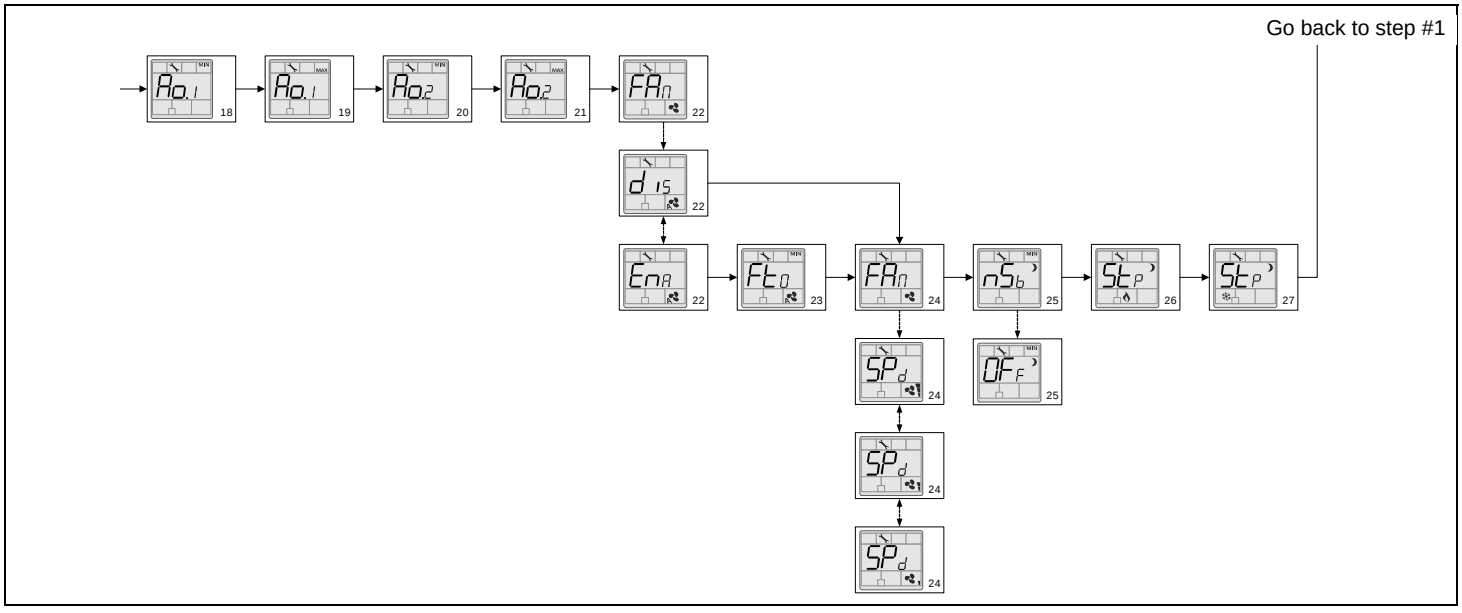
Flowchart

Use the flowchart to visualize the next step in programming mode.





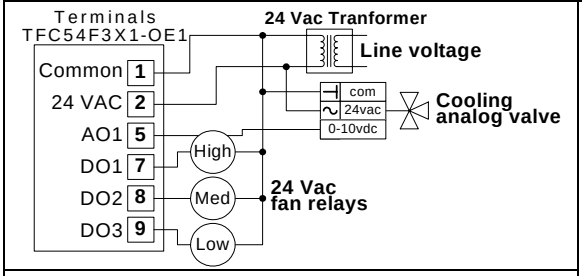




Typical Applications

Ex. 1 — Cooling only, 3 speed fan and Analog actuator

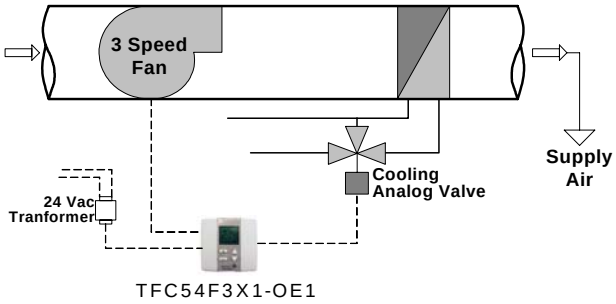
Wiring



Programming setup

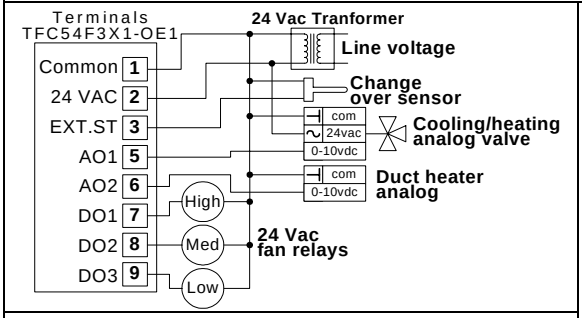
Step	Setup
5	Set **"Ctl"** in cooling only **(on, cool)**
7	Set **"Pno"** in 2 pipe **(2P)**
8	Set **"COc"** in normaly cool **(nc)**
9	Set **"LHt"** off **(OFf)**
24	Set "**SPd**" 3 speed **(three dot near de fan)**

Schematic



Ex. 2 — 2Pipe system cooling or heating with electric heater, 3 speed fan and Analog actuator

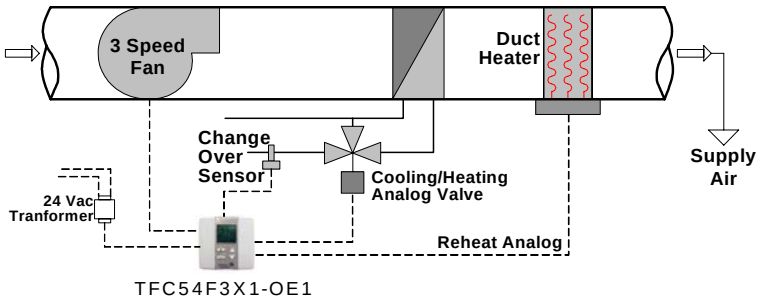
Wiring



Programming setup

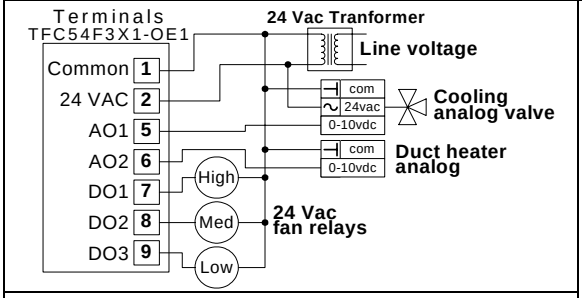
Step	Setup
5	Set **"Ctl"** in automatic **(Aut)**
7	Set **"Pno"** in 2 pipe **(2P)**
8	Set **"COc"** in temperature sensor **(tS)**
9	Set **"LHt"** in heat + fan **(on, heat + fan)**
24	Set "**SPd**" 3 speed **(three dot near de fan)**

Schematic



Ex. 3 — 4Pipe system cooling and heater with 3 speed fan and Analog actuator

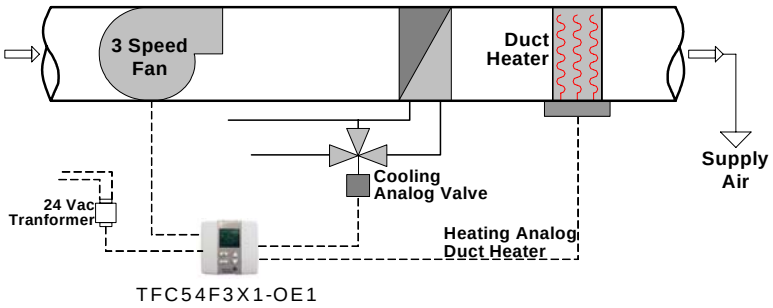
Wiring



Programming setup

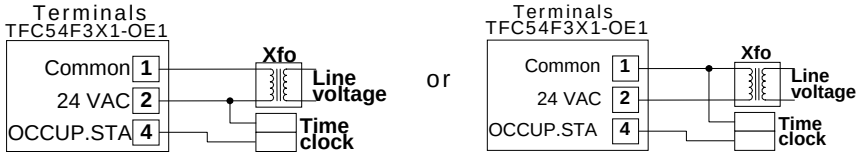
Step	Setup
5	Set **"Ctl"** in automatic **(Aut)**
7	Set **"Pno"** in 4 pipe **(4P)**
12	Set **"tS"** internal **(in)**
24	Set "**SPd**" 3 speed **(three dot near de fan)**

Schematic

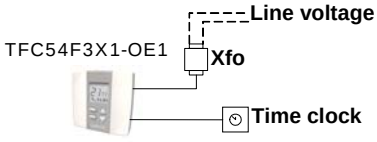


Night set back

Wiring



Schematic



Recycling at end of life

At end of life, please return the thermostat to your Neptronic® local distributor for recycling. If you need to find the nearest Neptronic® authorized distributor, please consult **www.neptronic.com**.