neptronic®

Fan Coil Thermostat

Specification & Installation Instructions

Features:

TFC54F3-BA2

- Selectable digital output
- Selectable control mode
- Selectable Fahrenheit or Celsius scale
- Manual Night Set Back override (programmable)
- Multi level lockable access menu
- Lockable set point
- Selectable internal or external temperature sensor
- Selectable proportional control band and dead band

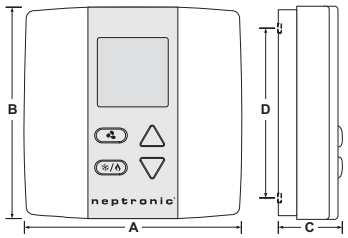
Technical Data	TFC54F3-BA2
Outputs	3 programmable dry contact outputs (fan and/or heating/cooling)
	2 on/off programmable triac outputs (heating and/or cooling)
Contact rating	Resistive load: rated load: 1.0 Amp / 24 Vac / Vdc Inductive load: rated load: 0.3 Amp / 24 Vac / Vdc maximum switching capacity: 30 VA / 24 W
Triac rating	0.3 Amp @ 24 Vac (8 VA) (Ind./Res.)
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 @ 22ºC [±0.9ºF @ 71.6ºF] typical calibrated
Proportional band	0.5ºC to 5ºC [1ºF to 10ºF] adjustable
External sensor thermistor	Type G, 0ºC [32ºF] = 29.49KΩ, 25ºC [77ºF] = 10.00kΩ, 50ºC [122ºF] = 3.893kΩ,
Electrical connection	0.8 mm^2 [18 AWG] minimum
Operating temperature	0ºC to 50ºC [32ºF to 122ºF]
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]

Interface

Symbols on display

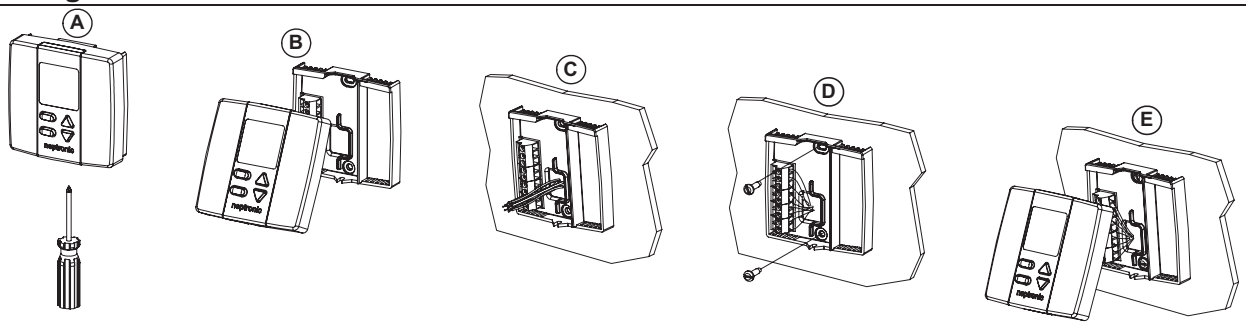
A	***Cooling ON 100% output A: Automatic***		***Menu set-up Lock ON***
A	***Heating ON 100% output A: Automatic***		***Programming mode (Technician setting)***
A	***Fan ON A: Automatic***	MIN MAX	***Minimum/Maximum set points***
°C or °F	***ºC: Celsius scale ºF: Fahrenheit scale***		***Energy saving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

Dimensions



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

Mounting Instructions



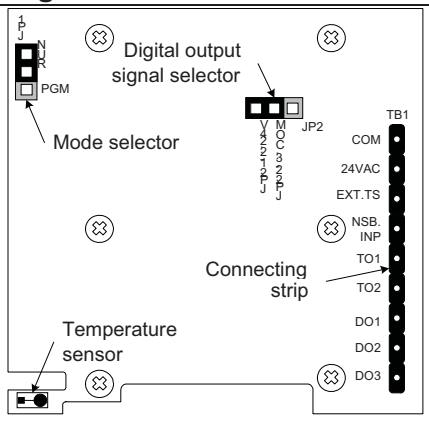
CAUTION: Risk of malfunction. Remove power prior to separate thermostat cover from its base.

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	TFC54F3-BA2
1	Common
2	24 Vac
3	Exterior temperature sensor
4	Night set back input
5	Contact output 4 (CT4)
6	Contact output 3 (CT3)
7	Contact output 2 (CT2) / Fan output high (DO1)
8	Contact output 1 (CT1) / Fan output medium (DO2)
9	Fan output low (DO3)

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

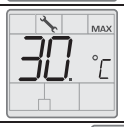
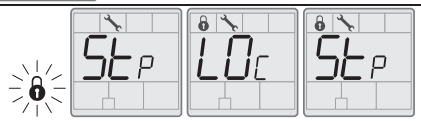
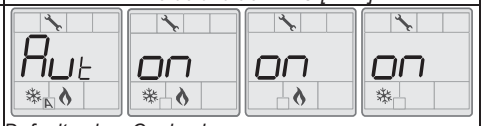
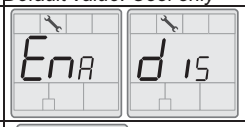
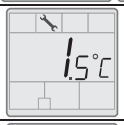
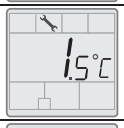
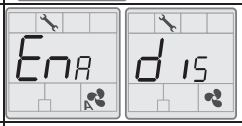
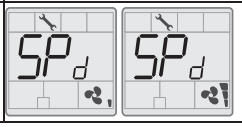
Digital output signal selection (JP2)

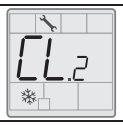
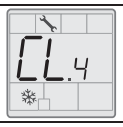
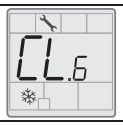
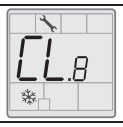
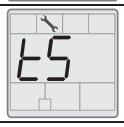
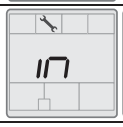
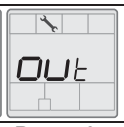
Jumper (JP2) on 24 Vac:
All digital output signal is linked to 24 Vac.

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

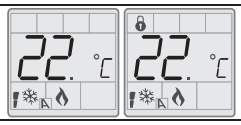
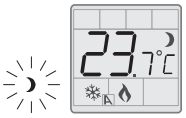
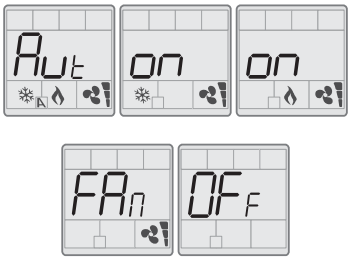
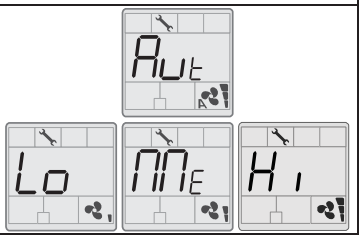
Programming mode

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] (max. offset ± 5 ºC) 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. The minimum value is restricted by the maximum value (step #3).	 Minimum range: 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1.0ºF] *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. The maximum value is restricted by the minimum value (step #2).	 Maximum range: 10 to 35ºC [50 to 95ºF] Increment: 0.5ºC [1.0ºF] *Default value: 30ºC [86ºF]*
4		**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.	 *Default value: Unlocked*
5		**Adjust set point:** Display scrolls between "**StP**" and the temperature set point. Select the desired set point. It should be within the temperature range.	 Setpoint range : 10 to 35ºC [50 to 95ºF] Increment: 1ºC [1.8ºF] *Default value: 22ºC [72ºF]*
6		**Adjust the control mode:** Display switches between "**CtL**" and "**Aut**". Select which control mode you want to authorize: Automatic, heating only or cooling only. If you want to authorize this entire mode, choose Automatic mode.	 *Default value: Cool only*
7		**Set On/Off function enable or disable:** Display switches between "**OFF**" and "**ena**". You can enable or disable the ON/OFF mode adjustment by end user.	 *Default value: Enable (Ena)*
8		**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]*
9		**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]*
10		**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]*
11		**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]*
12		**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 #14.**	 *Default value: Enable (Ena)*
13		**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.*
14		**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 or speed 3. If you want to use 3 fan contact, select speed 3 and **go directly to step #19**.	 *Default value: 1 speed*

Step	Display	Description	Values
15		**Contact 1 (Ct1) Close (CL) position:** (If you have selected the 1 fan speed at step #14) Display switches between "**Ct1**" and the value of the first contact close "**CL**". Heating or cooling symbol is also displayed. Please select which ramp and percentage you want contact 1 to close: Heating ramp or Cooling ramp at 20% to 90% of the demand.	 Range: CL.2, .3, .4, .5, .6, .7, .8 or .9 Increment: 0.1 (10%) *Default value: CL.2 + cool symbol (Contact **close** at 20% of the **Cooling** demand)*
16		**Contact 1 (Ct1) Open (OP) position:** (If you have selected the 1 fan speed at step #14) Display switches between "**Ct1**" and the value of the first contact open "**OP**". Heating or cooling symbol is also displayed. Please select which percentage you want contact 1 to open: 0% to 70% of the demand. *Note: The ramp will be the same as you choose for close position at step #15.*	 Range: OP.0, .1, .2, .3, .4, .5, .6 or .7 Increment: 0.1 (10%) *Default value: OP.0 + cool symbol (Contact **open** at 0% of the **Cooling** demand)*
17		**Contact 2 (Ct2) Close (CL) position:** (If you have selected the 1 fan speed at step #14) Display switches between "**Ct2**" and the value of the second contact close "**CL**". Heating or cooling symbol is also displayed. Please select which ramp and percentage you want contact 2 to close: Heating ramp or Cooling ramp at 20% to 90% of the demand.	 Range: CL.2, .3, .4, .5, .6, .7, .8 or .9 Increment: 0.1 (10%) *Default value: CL.4 + cool symbol (Contact **close** at 40% of the **Cooling** demand)*
18		**Contact 2 (Ct2) Open (OP) position:** (If you have selected the 1 fan speed at step #14) Display switches between "**Ct2**" and the value of the second contact open "**OP**". Heating or cooling symbol is also displayed. Please select which percentage you want contact 2 to open: 0% to 70% of the demand. *Note: The ramp will be the same as you choose for close position at step #17.*	 Range: OP.0, .1, .2, .3, .4, .5, .6 or .7 Increment: 0.1 (10%) *Default value: OP.3 + cool symbol (Contact **open** at 30% of the **Cooling** demand)*
19		**Contact 3 (Ct3) close (CL) position:** Display switches between "**Ct3**" and the value of the third contact close "**CL**". Heating or cooling symbol is also displayed. Please select which ramp and percentage you want contact 3 to close: Heating ramp or Cooling ramp at 20% to 90% of the demand.	 Range: CL.2, .3, .4, .5, .6, .7, .8 or .9 Increment: 0.1 (10%) *Default value: CL.6 + cool symbol (Contact **close** at 60% of the **Cooling** demand)*
20		**Contact 3 (Ct3) open (OP) position:** Display switches between "**Ct3**" and the value of the third contact open "**OP**". Heating or cooling symbol is also displayed. Please select which percentage you want contact 3 to open: 0% to 70% of the demand. *Note: The ramp will be the same as you choose for close position at step #19.*	 Range: OP.0, .1, .2, .3, .4, .5, .6 or .7 Increment: 0.1 (10%) *Default value: OP.5 + cool symbol (Contact **open** at 50% of the **Cooling** demand)*
21		**Contact 4 (Ct4) close (CL) position:** Display switches between "**Ct4**" and the value of the fourth contact close "**CL**". Heating or cooling symbol is also displayed. Please select which ramp and percentage you want contact 4 to close: Heating ramp or Cooling ramp at 20% to 90% of the demand.	 Range: CL.2, .3, .4, .5, .6, .7, .8 or .9 Increment: 0.1 (10%) *Default value: CL.8 cool symbol (Contact **close** at 80% of the **Cooling** demand)*
22		**Contact 4 (Ct4) open (OP) position:** Display switches between "**Ct4**" and the value of the fourth contact open "**OP**". Heating or cooling symbol is also displayed. Please select which percentage you want contact 4 to open: 0% to 70% of the demand. *Note: The ramp will be the same as you choose for close position at step #21.*	 Range: OP.0, .1, .2, .3, .4, .5, .6 or .7 Increment: 0.1 (10%) *Default value: OP.7 + cool symbol (Contact **open** at 70% of the **Cooling** demand)*
23		**Delay cooling contact (protection for compressor):** Display switches between "**noc**" and the value (in minutes) of the delay to activate / reactivate cooling contact. **MIN** and cooling symbols are also displayed. Please select the desired value of the delay cooling contact.	 Range: 0 to 10 min. Increment: 1 min. *Default value: 0 min.*
24		**Internal/external temperature sensor selection:** Display switches between "**tS**" and "**in**" or "**out**". Please select internal or external sensor. **If you selected "in", go directly to step #25.**	  *Default value: Internal temperature sensor (in)*
25		**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 122ºF] (max. offset ± 5ºC) Increment: 0.1ºC [0.2ºF] Display: 0.0ºC [32.0ºF], resistance will be infinite. 50.0ºC [99.9ºF], resistance will be short circuited.
26		**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 (go to step #1).	 Range: OFF or 0 to 180 min. Increment: 15min. *Default value: 120 min.*
27		**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]*
28		**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 and Heating ✓ Cooling ✓ Heating ✓ Fan only ✓ OFF To turn off thermostat, press on ❄/🔥 and select ***OFF***. All the functions will stop. Note: These selections can vary according to the choice made on step #6 & #7.	
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 ✓ Low speed ✓ Medium speed ✓ High speed Note: These selections can vary according to the choice made on step #12 & #14.	

Auto Fan / Auto Speed Sequence 3 speeds contact (programming mode step #14)

Auto Fan (programming mode step #12)	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

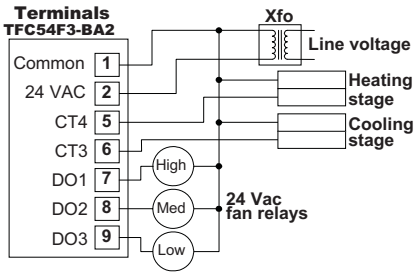
Auto Fan / Auto Speed Sequence with fan 1 speed contact (programming mode step #14)

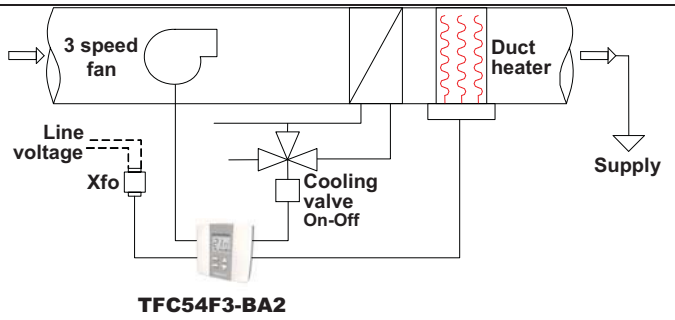
Auto Fan (programming mode step #12)	Mode button	Fan button	If control demand > 0	If control demand = 0
Enable	Heat	Auto Speed*	Fan speed = On on heat demand	Fan = Off
		On	Fan = On	Fan = On
	Cool	Auto Speed*	Fan speed = On on cool demand	Fan = Off
		On	Fan = On	Fan = On
	Auto (H/C)	Auto Speed*	Fan speed = On on heat/cool demand	Fan = Off
		On	Fan = On	Fan = On
	Fan	On	Fan = On	Fan = On
	Off	Off	Off	Off
Disable	Heat	Auto Speed*	Fan speed = On on heat demand	Fan = On
		On	Fan = On	Fan = On
	Cool	Auto Speed*	Fan speed = On on cool demand	Fan = On
		On	Fan = On	Fan = On
	Auto (H/C)	Auto Speed*	Fan speed = On on heat/cool demand	Fan = On
		On	Fan = On	Fan = On
	Fan	On	Fan = On	Fan = On
	Off	Off	Off	Off

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

Typical Applications

Ex. 1 — 1 stage cooling, 1 stage electric heater with 3 speed fan

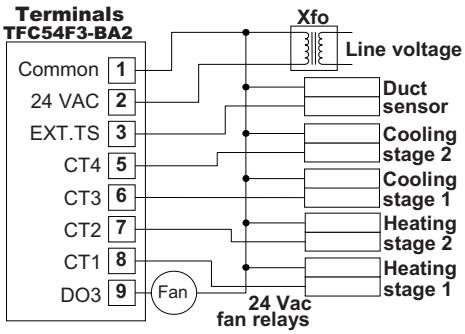


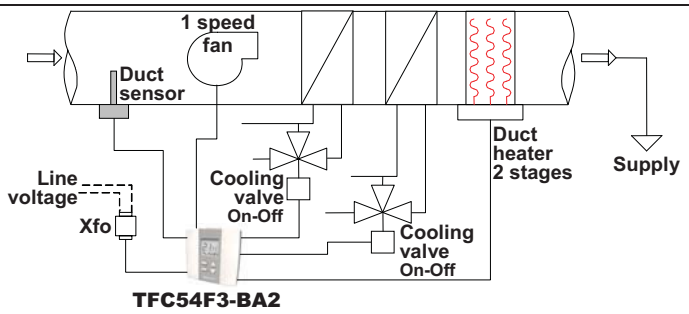


Programming setup

Step	Setup
14	Set "**SPd**" 3 speed **(three digit near de fan)**
19-20	Set **"Ct3"** close and open in **cooling**
21-22	Set **"Ct4"** close and open in **heating**
24	Set **"tS"** internal **(in)**

Ex. 2 — 2 stages cooling, 2 stages electric heater with 1 speed fan and duct sensor

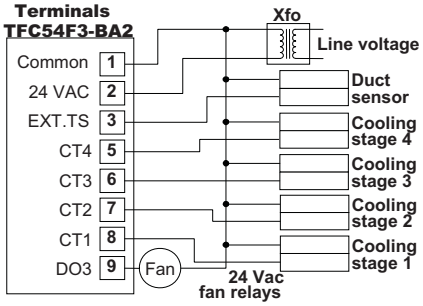


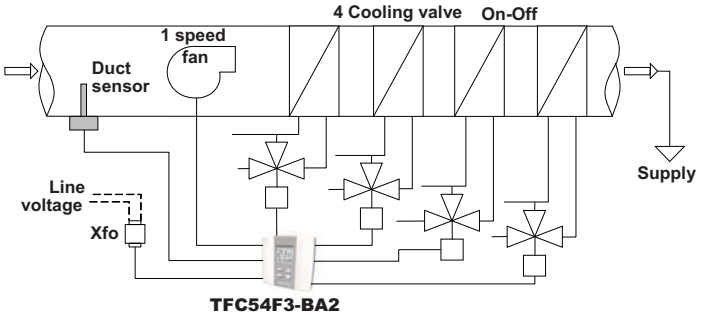


Programming setup

Step	Setup
14	Set "**SPd**" 1 speed **(one digit near de fan)**
15-16	Set **"Ct1"** close and open in **heating**
17-18	Set **"Ct2"** close and open in **heating**
19-20	Set **"Ct3"** close and open in **cooling**
21-22	Set **"Ct4"** close and open in **cooling**
24	Set **"tS"** external **(out)**

Ex. 3 — 4 stages cooling with 1 speed fan and duct sensor



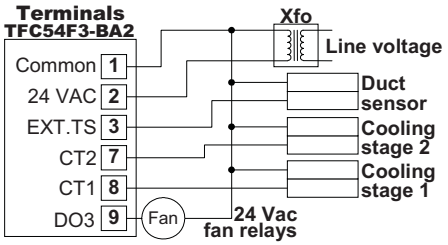


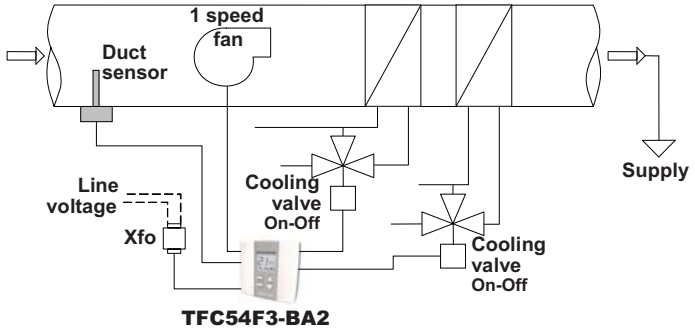
Programming setup

Step	Setup
14	Set "**SPd**" 1 speed **(one digit near de fan)**
15-16	Set **"Ct1"** close and open in **cooling**
17-18	Set **"Ct2"** close and open in **cooling**
19-20	Set **"Ct3"** close and open in **cooling**
21-22	Set **"Ct4"** close and open in **cooling**
24	Set **"tS"** external **(out)**

Typical Applications

Ex.	Wiring	Schematic
4	**2 stages cooling with 1 speed fan and duct sensor**	

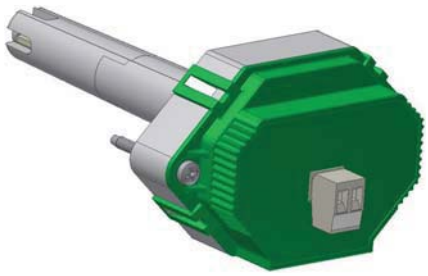




Programming setup

Step	Setup
14	Set "**SPd**" 1 speed **(one digit near de fan)**
15-16	Set **"Ct1"** close and open in **cooling**
17-18	Set **"Ct2"** close and open in **cooling**
24	Set **"tS"** external **(out)**

Remote duct sensor STC8-11

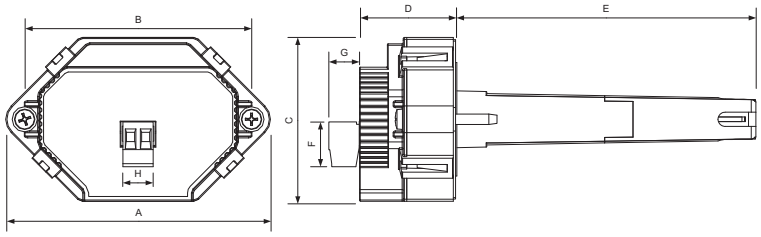


Technical Data	STC8-11
Description	Duct sensor for remote temperature reading. Can be used with a temperature controller TRO, TFC, TFH, TFP, EFC or EVC from Neptronic®
Sensor	NTC (negative temperature coefficient)
Resistor @ 25ºC	10 KΩ (β 0-50 = 3575)
Dissipation constant	1 mW/°C
Maximum power rating	30 mW at 25°C [77ºF] derated to 1 mW at 125°C [257ºF]
Tolerance	±0.2ºC from 0ºC to 70ºC [±0.36ºF from 32ºF to 158ºF]

Sensor table

STC8-11 (10 KΩ)			
Temperature	**Resistor KΩ**	**Temperature**	**Resistor KΩ**
-40 ºC [-40ºF]	239.700	25ºC [77ºF]	10.0
-35 ºC [-31ºF]	179.200	30ºC [86ºF]	8.194
-30 ºC [-22ºF]	135.200	35ºC [95ºF]	6.752
-25 ºC [-13ºF]	102.900	40ºC [104ºF]	5.592
-20 ºC [-4ºF]	78.910	45ºC [113ºF]	4.655
-15 ºC [5ºF]	61.020	50ºC [122ºF]	3.893
-10 ºC [14ºF]	47.540	55ºC [131ºF]	3.271
-5 ºC [23ºF]	37.310	60ºC [140ºF]	2.760
0 ºC [32ºF]	29.490	65ºC [149ºF]	2.339
5 ºC [41ºF]	23.460	70ºC [158ºF]	1.990
10ºC [50ºF]	18.780	75ºC [167ºF]	1.700
15ºC [59ºF]	15.130	80ºC [176ºF]	1.458
20ºC [68ºF]	12.260		

Dimensions



Dimension	Imperial (in)	Metric (mm)
A	3.5	89
B	3	76
C	2.16	55
D	1.3	33
E	3.95	100
F	0.6	15
G	0.37	9.5
H	0.4	10

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**.