HTW-51-1000 Series Large LCD Digital Thermostat
110VAC/220 VAC
2-pipe/4-pipe fan coil control

Data sheet

Application

This digital thermostats are designed for application of 3-speed fan and valves in fan coil system.
Including:

2-pipe cool only/heat only/manual changeover and 4-pipe manual or automatic changeover
- Ventilation mode
- Manual or automatic 3-speed fan control
- Water valve control

Fan speed can be selected to automatic or manual 3-speed control mode.
In ventilation mode, fan only support manual speed control.

Features

- Super modern appearance design, suitable for office, hotel and residential building
- Horizontal and vertical model available for variant application
- Slim design, direct installation on 86 size box
- Stylish and elegant blue/green backlight with blue/green colour ring
- 2-pipe/4-pipe integrated into one unit with easy configuration
- Big LCD display with English and icons
- Easy to install and set-up
- Time on/off function
- Selectable room temperature or setpoint display
- Manual or automatic fan speed selection
- Remote temperature sensor
- Energy saving mode activation by button press or dry contact (key card)
- Cycle per Hour (CPH) function
- Adjustment of display room temperature
- Temperature unit either ^{o}C or ^{o}F
- User setting can be kept when power off
- Freezing protection function available
- Lock or unlock keys or part of keys in Installer Set-up
- Heat and cool setpoint limitation for energy saving

Model summary

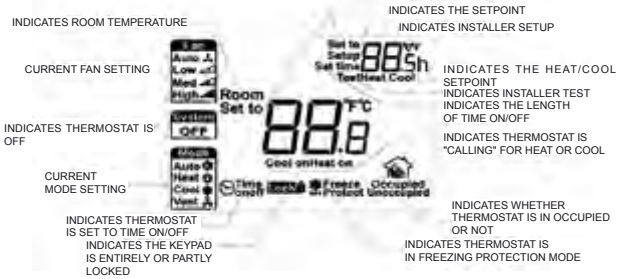
Model HTW-51-1000	Horizontal/ Vertical	Backlight/ Color Ring	Time on/off	2-pipe/ 4-pipe	Power supply（V）	Energy Saving	Ventilation	Manual/ Automatic Fan	Remote Sensor
-H2BB	Horizontal	Blue	Y	2/4	220	Y	Y	Y	Y
-V2BB	Vertical	Blue	Y	2/4	220	Y	Y	Y	Y
-H2GG	Horizontal	Green	Y	2/4	220	Y	Y	Y	Y
-V2GG	Vertical	Green	Y	2/4	220	Y	Y	Y	Y
-H1BB	Horizontal	Blue	Y	2/4	110	Y	Y	Y	Y
-V1BB	Vertical	Blue	Y	2/4	110	Y	Y	Y	Y
-H1GG	Horizontal	Green	Y	2/4	110	Y	Y	Y	Y
-V1GG	Vertical	Green	Y	2/4	110	Y	Y	Y	Y

Note: Horizontal models are taken as samples for display, operation and installation pictures shown in below parts.

Mechanical design

Thermostat appearnce

LCD display



Function

Valve control

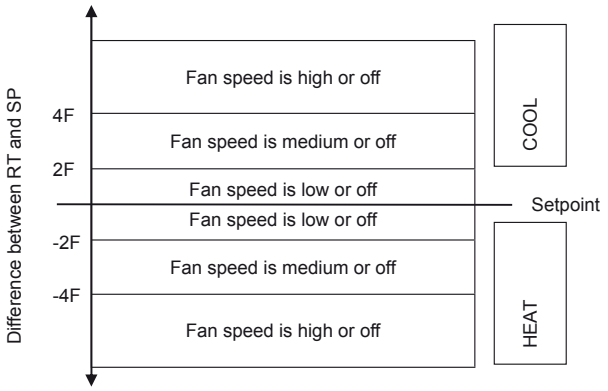
Thermostat acquires the room temperature via its integrated sensor or external temperature sensor and maintains the setpoint by delivering on/off valve control commands output.

PRESS THE MODE BUTTON TO SELECT HEAT, COOL, AUTO OR VENT

Fan Operation

PRESS THE FAN BUTTON TO SELECT LOW, MED, HIGH OR AUTO

Fan can be selected as manual or automatic 3-speed operation. In Manual mode, the fan is switched to the selected speed via control output Gh, Gm, Gl. While in automatic mode, fan speed depends on the difference between room temperature and setpoint. When room temperature reaches setpoint, valve will be closed and meanwhile, fan will be closed either.

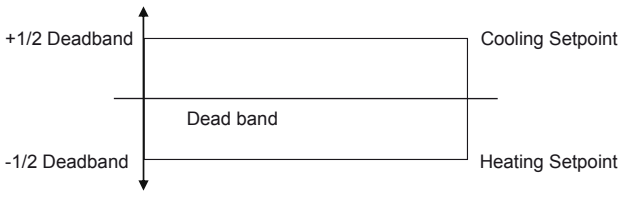


Fan speed ramping control algorithm

Four-pipe application

System will have a fixed deadband set in ISU between heating and cooling setpoints for Automatic Change Over (ACO) configured thermostats.While the heating and cooling set points determine the dead band.

If the difference between heating and cooling set points is less than the dead band set in ISU, then the dead band set in ISU is enforced. When adjusting the cooling set point, conflicts will be resolved by moving the heating set point out of the way of the cooling set point (heating set point=cooling set point –dead band set in ISU). When adjusting the heating setpoint, conflicts will be resolved by moving the cooling set point out of the way of the heating set point (cooling set point=heating set point +dead band set in ISU). Heating and Cooling range stops will determine the maximum heating setpoint setting and minimum cooling setpoint setting.



4 pipes auto change over setpoint algorithm

The last system control mode used will determine the mode in ACO when in the deadband.

Temperature display
The displayed temperature can be set to acquired room temperature or setpoint. The setting can be made during Installer Set-Up process.
Room temperature and scetornt can be displayed simultaneously.

Cycle per hour (CPH)
In order to get a more accurate temperature control, CPH function may enable the thermostat to open the valve for several times per hour even the temperature is close to setpoint (difference less than ½ P-band). The default value is 4 for heating and 3 for cooling and can be changed in Installer Set-Up process.

Time on/off
If the thermostat is off, hold power button for 3 seconds, system will be time on mode. If the thermostat is on, hold power button for 3 seconds, system will be time off mode.
The setting range is from 0 to 12 hours. The step is 0.5 hour with the default time is 0.

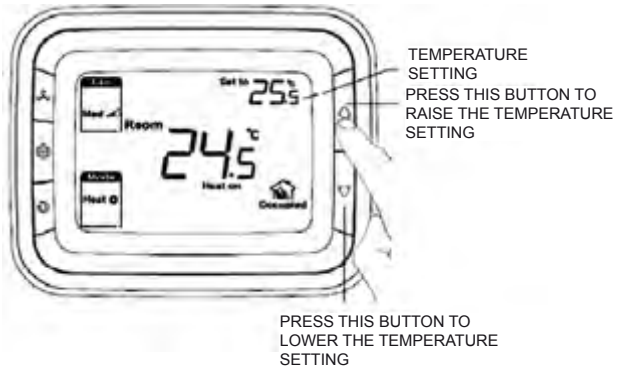
Backlight
Any key press will activate the backlight. Backlights will timeout 8 seconds after last key press. When in Installer Set-up and Installer test mode, the backlight will timeout 60 seconds after last key press.

Remote temperature sensor
It provides control either depending on the acquired room temperature or depends on the return air temperature. The model of remote temperature sensor is (NTC20K).

Keypad lock
Keypad lock can be set in ISU with default status is all keys available. You may change into mode button locked out, Fan and mode buttons locked out and All buttons locked out by changing the ISU.

Operating modes
The following operating modes are available:

Comfort mode
In comfort mode, the setpoint can be changed by pressing up and down button. Different applications include cool only, heat only and manual heat/cool changeover.



Ventilation mode
Press mode button to enter ventilation mode. In ventilation mode, no output for valve while the fan will operate according to selected fan speed.

Energy saving mode
A potential-free dry contact (such as hotel key card) or button press (pressing mode button for continuous 3 seconds) can activate the energy saving mode with icon appearing on screen. The dry contact can be selected as normal open or normal close type in ISU.

If activated by dry contact, all buttons will be locked except the multi-key for ISU. If energy saving is activated by button press, then any following button press will stop energy saving mode.

For heating mode, if the energy saving function is enabled, the setpoint will change to remote setback heating setpoint. The range of remote setback heating setpoint is from 10°C to 21°C and default value is 18°C. The value may change in ISU with step of 0.5°C.

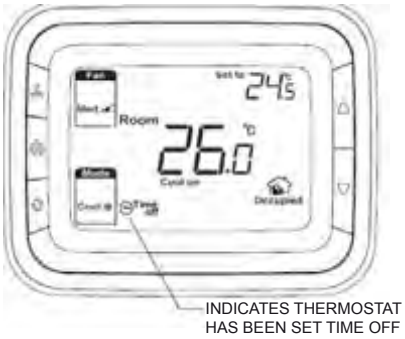
For cooling mode, if the energy saving function is enabled, the setpoint will change to remote setback cooling setpoint. The range of remote setback cooling setpoint is from 22°C to 32°C and default value is 26°C. The value may change in ISU with step of 0.5°C.

Freezing protection mode

Freezing protection can be selected as disabled (default) or enabled. In freezing protection mode (no such mode in cool only application), when thermostat is in OFF mode while the acquired temperature is below 6°C, the thermostat will start heat mode until the temperature rises to 8°C or the thermostat is turned on.

On/off mode

Pressing power button can switch between on and off mode.



Technical specification

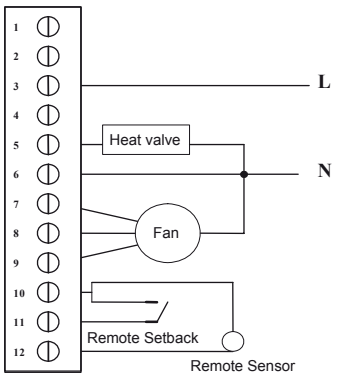
Power supply	110 (+/-10%) VAC, 220(+10%, -15%)VAC
Frequency	50/60Hz
Control algorithm	PI, On/off output
Accuracy	+/-1°C at 21°C
Rating capacity	For 220V power supply: 4(2)A for fan load, 2(1)A for zone valve
Cycle times	100,000
Setpoint range	10~32°C
Display range	0~37°C
Installation	Installed on 86×86mm junction box or US2×4 inch.
Protection Class	IP20
Environmental Conditions	Operation temperature -18~49°C Shipping temperature -35~65°C Relative humidity 5~90%

Terminal Designations

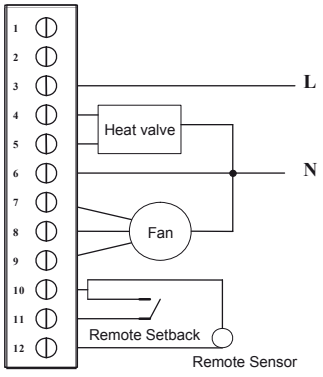
Item	Terminal	Description
1	Cc	Cooling close
2	Y	Cooling open
3	L	AC Power
4	Ch/Cc	Heating close/Cooling close
5	W/Y	Heating open/Cooling open
6	N	AC Ground
7	Gh	High speed fan relay
8	Gm	Medium speed fan relay
9	Gl	Low speed fan relay
10	Sc	Ground for remote sensor and remote setback
11	RSB	Remote set back
12	Rs	Remote sensor

Wiring diagrams

Application 1: 2 pipes heat only wiring diagram

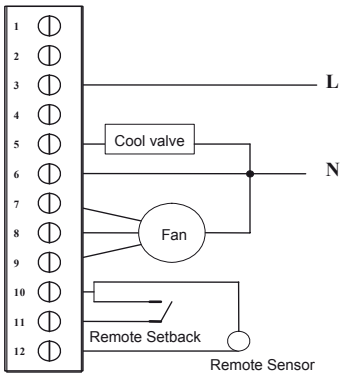


Typical wiring for ON/OFF control in 2 pipe heating only

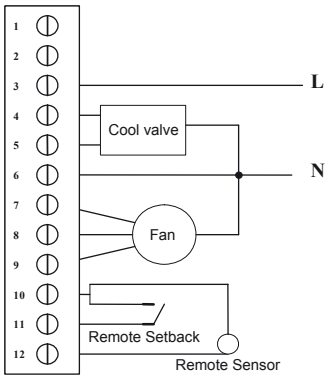


Typical wiring for ON/OFF control in 2 pipe heating only

Application 2: 2 pipes Cool only wiring diagram

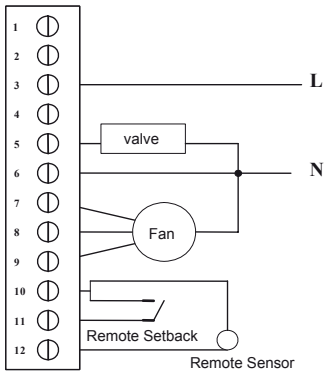


Typical wiring for ON/OFF control in 2 pipe cooling only

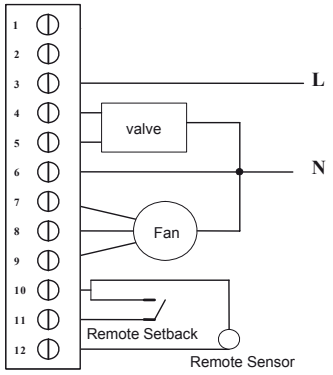


Typical wiring for ON/OFF control in 2 pipe cooling only

Application 3: 2 pipes 1 stage Heat or 1 stage Cool MCO wiring diagram



Typical wiring for ON/OFF control in 2 pipe 1H1C



Typical wiring for ON/OFF control in 2 pipe 1H1C

Application 4: 4 pipes 1stage Heat and 1 stage Cool MCO/ACO wiring diagram

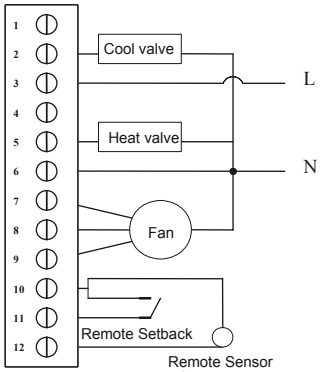
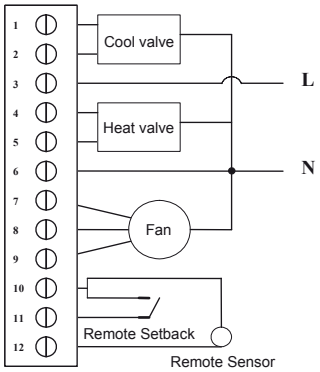


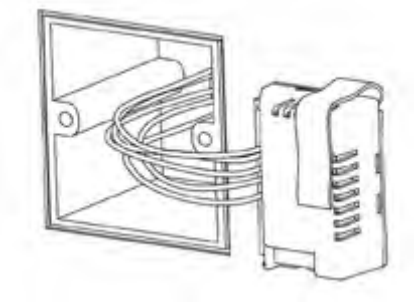
Fig.2.7 Typical wiring for ON/OFF control in 4 pipe 1H/1C Auto/ Manual Change over



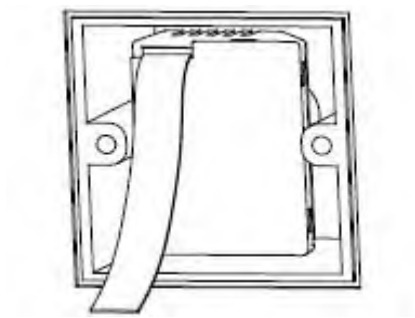
Typical wiring for 3-wire control in 4 pipe 1H/1C Auto/ Manual Change over

Installation & Commissioning

1 Pull wires through wire hole.
Loosen screw terminals, insert wires into terminal block, then retighten screws.

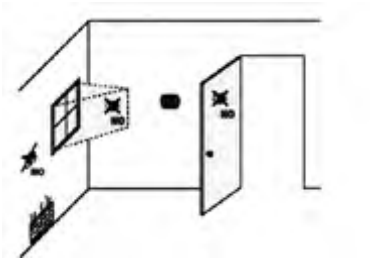


2 Push the Power box into the junction box.



Back cover installation

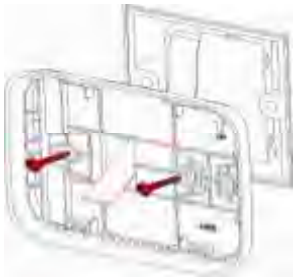
Install the thermostat about 5 feet (1.5m) above the floor in an area with good air circulation at average temperature.



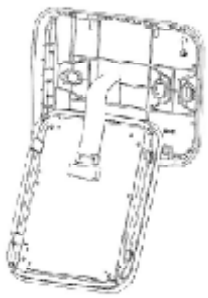
Do not install in locations where the thermostat can be affected by:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Sunlight or radiant heat from appliances
- Concealed pipes or chimneys
- Unheated/uncooled areas such as an outside wall behind the thermostat

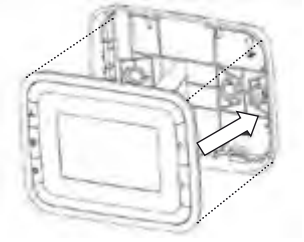
1 Place Back cover over junction box, insert and tighten mounting screws.



2 Insert the cable into connector on circuit board of thermostat.

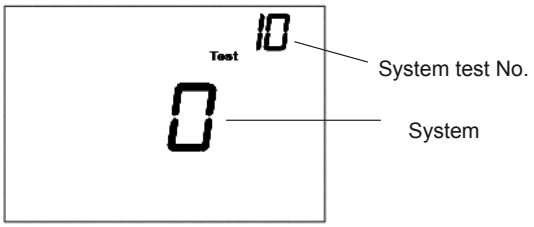


3 Align 4 tabs on the Back cover with corresponding slots on the back of the thermostat, and then push it until the thermostat snaps in place.



Installer system test

After completing the installer setup above, press the button again to begin a system test
Follow the procedure below to test the heating and cooling and fan system.

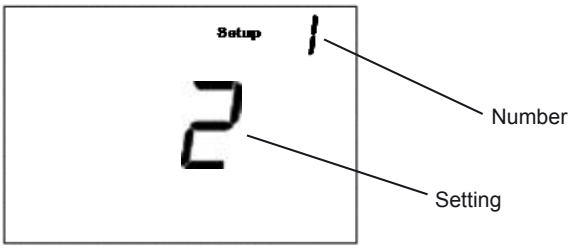


Press and hold ▲ and ▼ buttons 3 seconds to enter test mode.
Press ▲ or ▼ button to change system status.
Press ↻ button to advance to next test number.
Press ▲ and ▼ button hold to terminate system test at any time.

System Test System Status
10 Heat 0 Heat turn off.
1 Heat turns on.
30 Cool 0 Cool off.
1 Cool on.
40 Fan 0 Fan off
1 Low speed Fan on
2 Medium speed Fan on
3 High speed Fan on
70 Thermostat information(for reference only)
71 Software revision number (major)
72 Software revision number (minor)
73 Configuration identification code (major)
74 Configuration identification code (minor)
75 Production configuration date code (week)
76 Production configuration date code (year)

Installer Set-Up (ISU) setting

Press ▲ and ↻ simultaneously for 3 seconds to enter ISU as below:



Press ▲ or ▼ to change settings
Press ↻ to advance to next function
Press ▲ and hold ↻ and buttons 3 seconds to exit and save settings

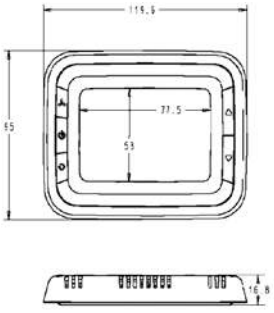
Setup Function Settings & Options

Number	Description	Possible Options
1	System type	0 Heat only
		1 Cool only
		2 two pipes 1H1C manual (Default)
		4 four pipes manual
		5 four pipes auto
5	Remote sensor	**0 Onboard Sensor (Default)**
		1 Remote (NTC20K)
9	Temperature scale	0 ºF
		1 ºC(Default)
10	Fan control type	0 Cycle only
		1 Constant only (3 speed: Low->Med->High-> Low)
		2 User can choose Cycle or Constant (3 speed: Low->Med->High->Auto-> Low) (Default)
12	Sequence Dead band for four pipes	1 ºC (2 ºF)
		1.5 ºC (3 ºF)(Default)
		2 ºC (4 ºF)
		3 ºC (5 ºF)
		3.5 ºC (6 ºF)
		4 ºC (7 ºF)
		4.5 ºC (8 ºF)
		5 ºC (9 ºF)
13	CPH value For Heat	1
		2
		3
		4 (default)
		5
		6
		7
		8
		9
		10
		11
		12
14	CPH value For Cool	1
		2
		3(default)
		4
		5
		6
18	Display Temperature adjustment	-2 ºC(-4 ºF)
		-1.5 ºC(-3 ºF)
		-1 ºC(-2 ºF)
		-0.5 ºC(-1 ºF)
		0 ºC(0 ºF) (default)
		0.5 ºC(1 ºF)
		1 ºC(2 ºF)
		1.5 ºC(3 ºF)
		2 ºC(4 ºF)
19	Temperature Display mode	0 display Room Temperature
		1 display Setpoint
		2 display both (default)
20	Heating Range Stops	10-32 ºC default **32 ºC** (50-90 ºF default **90 ºF**)
21	Cooling Range Stops	10-32 ºC default **10 ºC** (50-90 ºF default **50 ºF**)
22	Keypad Lockout	**0 All keys available(default)**
		1 System button Locked out
		2 Fan and System button Locked out
		3 All buttons locked out
23	Remote setback enable method	0 Hotel card NO
		1 Hotel Card NC
		2 Button (Default)
24	Remote setback heating setpoint	Range 10-21ºC Default : **18 ºC** (Range 50-70ºF Default : 64)
25	Remote setback cooling setpoint	Range 22-32ºC Default : **26 ºC** (Range 72-90 ºF Default : 79 ºF)
27	Freeze Protection	**0 Disabled (default)**
		1 Enabled

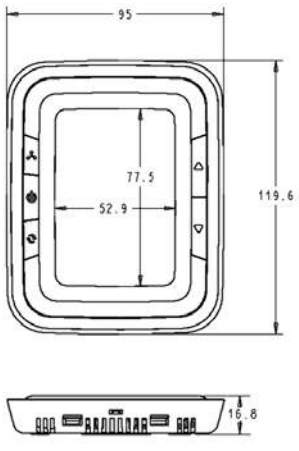
Troubleshooting Tips

If…	Then…
Heating system does not turn on.	♦ Set the mode to Heat by pressing the Mode button. ♦ Check that the heat temperature setting is set above the room temperature and “Heat On” shows solidly in the display. ♦ Wait five minutes for the heating system to respond.
Cooling system does not turn on.	♦ Set the mode to Cool by pressing the Mode button. ♦ Check that the cool temperature setting is set below the room temperature and “Cool On” shows solidly in the display. ♦ Wait five minutes for the cooling system to respond.
The fan doesn’t work.	♦ Check whether the Fan mode is set to Auto ♦ Check whether the heating or cooling system works.
The Mode button doesn’t work.	♦ Check whether the keypad is locked or not. ♦ Check whether the system is working in Energy saving mode. ♦ Check whether the thermostat is off.
The Fan button doesn’t work.	♦ Check whether the keypad is locked or not. ♦ Check whether the system is working in Energy saving mode. ♦ Check whether the thermostat is off.
The Up or Down button doesn’t work.	♦ Check whether the keypad is locked or not. ♦ Check whether the system is working in Energy saving mode. ♦ Check whether the thermostat is off.

Dimension



Horizontal model



Vertical model