Honeywell

XE99 SERIES

FAN-COIL THERMOSTATS
2-PIPE & 4-PIPE FAN-COIL CONTROL

FEATURES

- **Attractive modern styling makes this thermostat ideal for offices or hotels**

- **Digital display of room ambient temperature, with display of user selected setpoint on demand**

- **Push button adjustment of setpoint**

- **Switches allow manual control of system operation and fan speed**

- **Special energy savings mode activated by external input from Energy Management System (EMS) – a window contact or hotel card-key - overrides the temperature setting to installer defined heating and cooling temperatures**

- **Energy savings input (EMS) can be configured to be normally open circuit or normally closed circuit**

- **All models have a proportional plus integral (P+I) control algorithm which allows the ON/OFF control to regulate the temperature to within ±0.75°C**

- **Thermostat mounts directly onto a wall, a standard 65x65mm junction box (hole pitch 60mm) or a US 2x4inch horizontal junction box**

- **Installer setup mode allowing operating parameters to be changed**

- **°C or °F display selectable**

- **Adjustable deadband (some models) for heat & cool sequence control**

- **Fixed 1°C stage separation (some models) for 2-stage heating or 2-stage cooling operation**

- **Possibility to configure heating or cooling mode (some models) for energy savings feature**

- **Selectable energy savings (setup) cooling setpoint and (setback) heating setpoint**

- **Adjustable maximum heating and minimum cooling setpoint limits**

- **Adjustable minimum relay off-times (heating or cooling) for applications requiring compressor short-cycle protection**

- **EEPROM permanently retains user settings in the event of power loss**

- **Digital display shows unique icons when cooling or heating relays have operated, or when energy savings mode is active**

- **Suitable for use with Honeywell valves and actuators: VU448A + VU53/VU54, VC4000 series, V4043/V4044 and thermal actuators M100, Z100, M4450 with associated valves**

- **Plug-in remote sensor available on some models**

APPLICATION

The XE99 range of digital thermostats is designed for ON/OFF control of the fan, valves, compressor or auxiliary electric heater in fan-coil and small air-conditioner applications.

Models are available for control of :
- 2-pipe fan-coil units
- 2-pipe fan-coil units with manual heat/cool changeover
- 2-pipe fan-coil units with auxiliary electric heater
- 4-pipe fan-coil units with manual heat/cool changeover
- 4-pipe fan-coil units with sequence (deadband) control
- single stage or 2-stage air-conditioners

Many XE99 models are suitable for multiple applications – they can be configured for each application by changes in the output wiring and the connection of different external links between the wiring terminals.

The fan can also be controlled from the thermostat. In some cases it is wired to run continuously, and can be switched off with the system ON/OFF switch, while with other models there is a choice of running the fan continuously, or cycling it with the thermostat.

Heat/cool changeover operation is also possible. This function can be accomplished either by a manually operated heat/ cool switch on the front of the thermostat or in some versions automatically by the use of a pipe thermostat on the supply water pipe of the fan-coil.

Where a compressor or an auxiliary electric heater is used, this should be normally switched using a relay or contactor, whose operation is controlled by the thermostat.
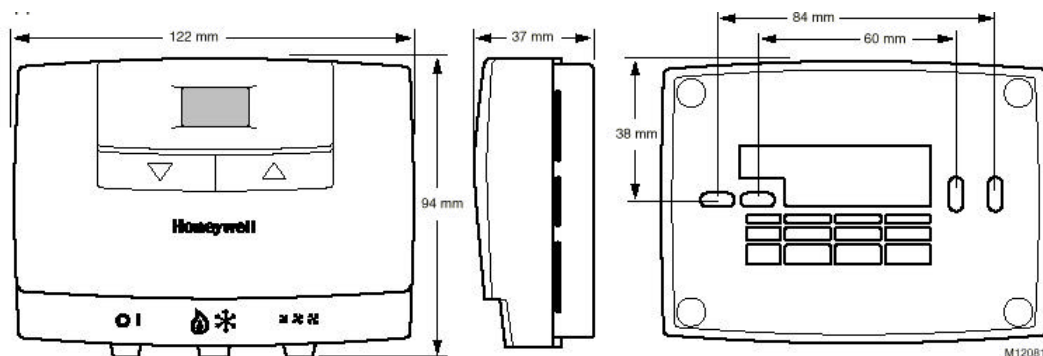
SPECIFICATIONS

Model	Switches				Features				Applications		
	On / Off (SPST)	3-Speed Fan (SP3T)	Fan On / Auto (SPDT)	Heat / Cool low volt (SPDT)	Number of Relays	Energy Savings Input	Remote Sensor	Deadband	2-Pipe Fancoil	4-Pipe Fancoil	2-Stage Air-con Unit
T6570A2008					1	✔			✔		
T6570A2016					1	✔	✔		✔		
T6570B2006	✔				1	✔			✔		
T6570B2014	✔				1	✔	✔		✔		
T6574A2004	✔	✔			1	✔			✔		
T6574A2012	✔	✔			1	✔	✔		✔		
T6574B2002	✔	✔	✔		1	✔			✔		
T6574B2010	✔	✔	✔		1	✔	✔		✔		
T6575A2003	✔	✔		✔	2	✔		✔	✔		
T6575A2011	✔	✔		✔	2	✔	✔	✔	✔		
T6575B2001	✔	✔		✔	2	✔		✔	✔	✔	
T6575B2019	✔	✔		✔	2	✔	✔	✔	✔	✔	
T6575C2006	✔	✔			2	✔		✔		✔	
T6575C2014	✔	✔			2	✔	✔	✔		✔	
T6576A2002	✔	✔			2	✔		✔ *			✔
T6576A2010	✔	✔			2	✔	✔	✔ *			✔

* Stage separation = 1°C

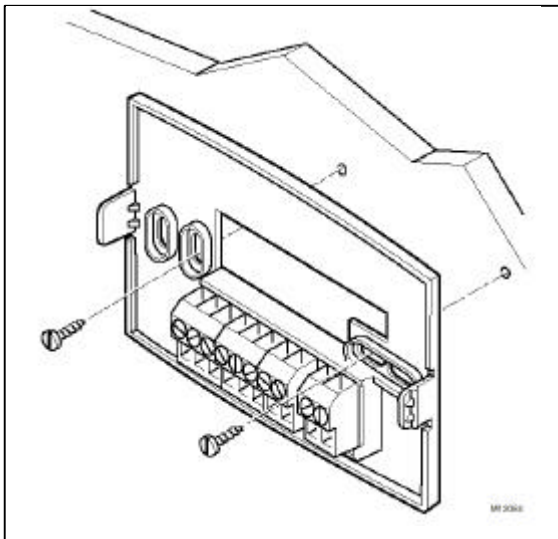|				
Setpoint range	:	10...30°C	Wiring	: 11 screw-in terminals per unit, capable of accepting 2 wires up to 1.5 mm², 2 x 18AWG or 1 x 14AWG
Supply voltage	:	230 V~ (±10%), 50 Hz		
Thermostat switch	:	1 or 2 S.P.D.T. relays (depending on model)	Energy Savings Input	: Dry contact rating 24Vdc, maximum contact resistance of 1000ohms
Control Performance	:	P+I algorithm applied to ON/OFF control gives typical control to ±0.75°C at 22°C at 50% duty cycle	Enclosure	: Plastic 3-piece housing
			Dimensions	: 94 x 122 x 37 mm (w x h x d).
Electrical ratings	:	4(2) A, 230 V~ , 12A inrush Typical loads are fans, zone valves and relays	Protection class	: IP30
			Environmental requirements	: Operating temperature range 5 to 45°C Shipping and storage temperature range -20 to 55°C Humidity range 5 to 95% rh, non-condensing at 26°C
Operational life	:	Greater than 100,000 cycles (all loads) for thermostat contacts at 230 V~ Greater than 10,000 operations for all manually operated switches		
Mounting	:	Mounts directly onto wall or wall-box - a standard 65x65mm junction box (hole pitch 60mm) or a US 2x4inch horizontal junction box. Mounting screws supplied	Remote Sensor	: Plug-in connection, with 1.5m cable
			Approvals	: CE mark, complying with standards EN60730-1 (1995), EN55014-1 (1997), EN55014-2 (1996). Product must be wired as shown for CE compliance.

DIMENSIONS

APPLICATIONS

OS Numbers	Application	Details	Notes
T6570A2008	general	cooling only	
T6570A2016		heating only	
T6570B2006	general	cooling only	With output for 1-speed continuous fan operation
T6570B2014		heating only	
T6574A2004	2-Pipe fan-coil	cooling only, fan continuous	
T6574A2012		cooling only, fan cycled	
		heating only, fan continuous	
		heating only, fan cycled	
		heat/cool changeover, fan continuous	Use external aquastat
		heat/cool changeover, fan cycled	Energy savings feature not possible
T6574B2002	2-Pipe fan-coil	cooling only, fan continuous or cycled	Fan On / Auto switch is used to switch between fan continuous or fan cycled
T6574B2010		heating only, fan continuous or cycled	
T6575A2003	2-Pipe fan-coil + electric heater	heat/cool changeover, fan continuous	Output is suitable for controlling a relay or contactor for electric heat switching
T6575A2011			
T6575B2001	2-Pipe fan-coil	heat/cool changeover, fan continuous	
T6575B2019		heat/cool changeover, fan cycled	
	4-Pipe fan-coil	heat/cool changeover, fan continuous	
T6575C2006	4-Pipe fan-coil	heat + cool in sequence, fan continuous	Deadband is adjustable
T6575C2014			
T6576A2002	air conditioner	2-stage cooling	Stage separation is 1°C, non-adjustable
T6576A2010		2-stage heating	Energy savings feature is not available

INSTALLATION

Location

The XE99 Series thermostat is the temperature control element in the fan-coil or air-conditioning system, and must be located about 1.5m above the floor in a position with good air circulation at room temperature. Do not mount it where it could be affected by :-

- draughts or dead spots behind doors or in corners
- hot or cold air from ducts
- radiant heat from the sun or appliances
- unheated (uncooled) areas such as an outside wall behind the thermostat
- concealed pipes or chimneys

Mounting the thermostat

Any XE99 Series thermostat can be directly mounted on the wall or horizontally on either a 65x65mm standard junction box or a 2x4inch US junction box (see diagram). Mounting screws are supplied for both alternatives.

IMPORTANT

The installer must be a trained service engineer
Disconnect the power supply before beginning installation

1. Locate the wall-plate in the mounting position, insert the mounting screws through the appropriate holes, and screw into position.
2. Complete the wiring (see later).
3. Attach the thermostat to the wall-plate as follows :
4. Locate the 2 centre side holes on the back of the thermostat
5. Align the holes with the 2 side tabs on the wall-plate
6. Press down firmly and snap the thermostat into place
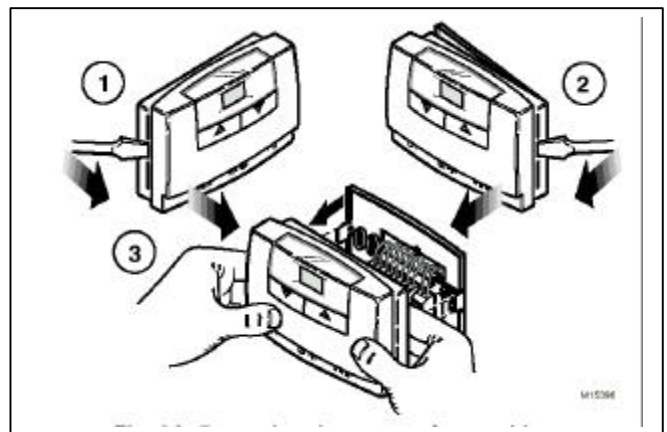
Wiring the thermostat

The standard wiring access is via a hole in the centre of the thermostat wall-plate. There is also a single breakout on top of the thermostat for surface wiring from above.

Removing the thermostat

If it becomes necessary to remove the thermostat from the wall-plate :

1. Pry the left side of the thermostat away from the wall-plate (see diagram below).
2. Pry the right side of the thermostat away from the wall-plate.
3. Use both hands to pull the thermostat straight away from the wall-plate.
4. NOTE - Improper removal of the thermostat from the wall-plate may damage the device.

Operation

Control

Proportional + Integral Control

Like a mechanical thermostat, XE99 has an ON/OFF control output. However, this output is regulated by a *proportional + integral* algorithm, which enables XE99 to control closer to setpoint than a conventional thermostat and ensures the space temperature is maintained within 0.75°C of the setpoint.

Proportional + integral action eliminates the difference between the temperature setpoint and the effective control point by adjusting the on-time of the output until the control point matches the setpoint. The on-time is based on a fixed cycle rate of 4 cycles/hour, and the proportional band is 1.6°C.

Single Stage Control (Cooling or Heating)

In cooling mode the user setpoint will be positioned at the bottom of the Proportional Band, so the setpoint will effectively be the temperature where the cooling switches off. In heating mode the user setpoint will be positioned at the top of the Proportional Band, and this will be the temperature where the heating switches off. This also applies to XE99 models with manual heat/cool changeover.

SINGLE STAGE COOLING

User setpoint changed from 20.0ºC to 21.5ºC

SINGLE STAGE HEATING

User setpoint changed from 23.0ºC to 21.5ºC
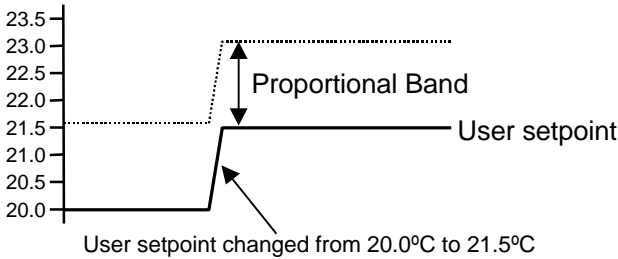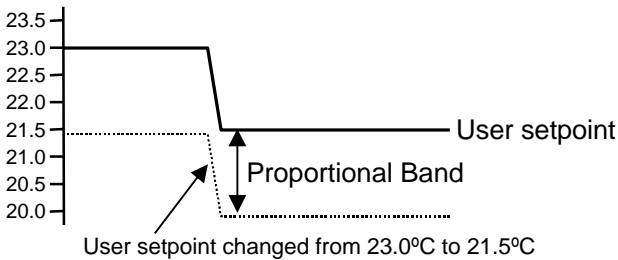
Heating+Cooling Sequence Control with Deadband

This type of control is only available on some XE99 models. The deadband is selected in the *Installer Setup Mode*. For control purposes it is centred on the user setpoint, with the deadband value then defining the effective heating and cooling setpoints. The cooling switch-off-point will be positioned at the bottom end of the cooling proportional band. Likewise, the heating switch-off point will be positioned at the top end of the heating proportional band. For example, with a deadband of 2°C and a user setpoint of 22°C, the effective heating setpoint will be 21°C and the effective cooling setpoint will be 23°C. Any change to the user setpoint will cause both heating and cooling setpoints

change in parallel, unless they are limited by the minimum cooling setpoint or maximum heating setpoint limits set within the *Installer Setup Mode*.

HEATING + COOLING SEQUENCE CONTROL

User setpoint changed from 22.0ºC to 23.5ºC
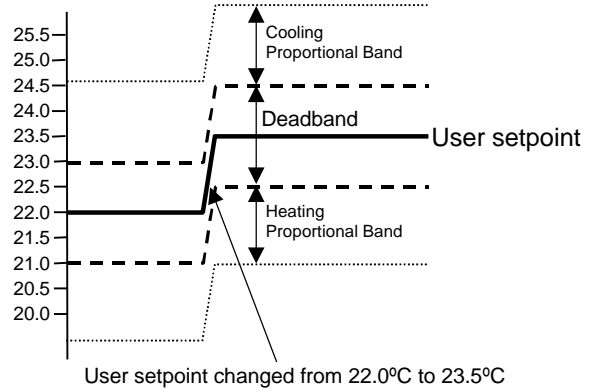
2-Stage Control (2-stage cooling or 2-stage heating)
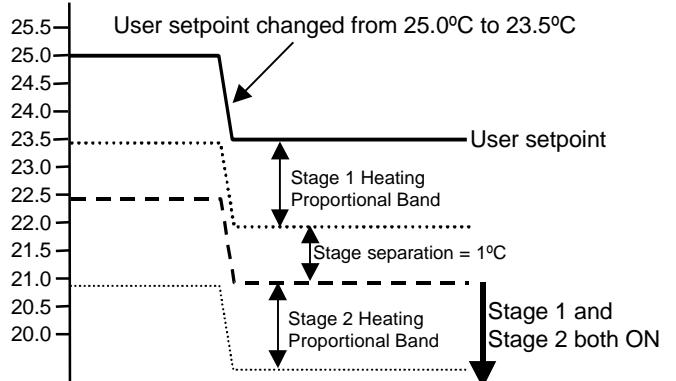
This type of control is only available on some XE99 models. The stages are separated by a fixed amount, 1°C, so that, once the first stage is 100% on, the temperature has to change by a further 1°C before the second stage will start to cycle. Examples are shown below.

2-STAGE COOLING CONTROL

User setpoint changed from 20.0ºC to 23.5ºC
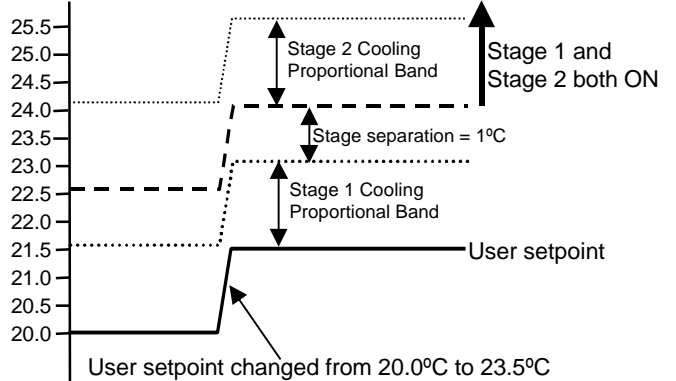
2-STAGE HEATING CONTROL

Operating Modes

XE99 has 2 main operating modes, *Comfort Mode* and *Energy Savings Mode*, and also has an *OFF Mode* selected by the on/off switch.

Comfort Mode

This is the normal operating mode where the XE99 controls to the setpoint selected by the user.
On initial switch on, or after the On / Off switch has been activated the user setpoint will return to the default value. The control action will be determined by either the default settings or the installer set parameters if the defaults have been altered.

Energy Savings Mode

Energy savings mode is activated by a special Energy Management System (EMS) input from a card-key, occupancy switch or window contact switch. If the signal via input terminals 10 and 11 is calling for energy savings mode, then the XE99 will control to user/installer defined setback setpoints for increased energy savings. The display will show a **$** symbol to indicate when this mode is active.

For example, if the user setpoint is 21°C and the Energy Savings Mode setpoint for cooling (*unoccupied cooling setpoint*) has been set to 28°C, then XE99 will control to 28°C when the input signal activates the economy mode. The energy savings mode input can be configured within the *installer setup mode* to be activated either a short circuit (default) or open circuit signal.
The default *Energy Savings Mode* setpoints are shown in the table below.

Energy Savings Mode - Setpoints				
	Heating Setpoint		Cooling Setpoint	
Description	Default	Range	Default	Range
°C Scale	18°C	10-18°C	25°C	25-30°C
°F Scale	65°F	50-65°F	77°F	77-90°F

The wiring connections are shown below for the EMS input.
Please note – the EMS input should be wired as for a
~~*230V installation to ensure compliance with the*~~
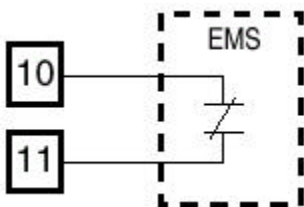
Off Mode

If the system switch is set to the Off position, power will be removed from the XE99 electronics and output terminals, and the display will go blank. The thermostat will reboot when power is restored with the On/off switch.
Please note – this ON/OFF switch is a functional switch and should not be used as an isolating switch.

Startup

On first powering up, or after the ON/OFF switch has been set to *ON*, the XE99 undergoes a startup and self-checking sequence. Firstly all the segments on the LCD display are illuminated to check the display. Next a number appears to indicate the software version. The final check is a check of the sensor. The symbol rS will appear to indicate the remote sensor is connected. On completion of the startup sequence, after approximately 2 seconds, XE99 will resume normal control in either *Comfort* or *Economy* Mode.

On initial power on, the temperature setpoint defaults are as shown in the following table. The current setpoint is stored in EEPROM, and if the XE99 is switched off, then on again, it will resume control at the last known setpoint.

Power Up Default Setpoints				
	1-relay or heat/cool changeover models		2-relay heat + cool sequence models	
	°C Scale	°F Scale	°C Scale	°F Scale
Setpoint default	22	73	22	73
Cooling OFF point	-	-	23	75
Heating OFF point	-	-	21	71

Additional Switches

Fan Speed Switch (SP3T line voltage)
Where supplied, the fan switch allows the selection of 3 different settings - low, medium, or high.

System Heat/Cool Switch (SPST low voltage)
Where supplied, this switch signals the microprocessor to operate the relays in either heating or cooling mode. In heating mode the cooling relay is disabled, and in cooling mode the heating relay is disabled.

User Programming Modes

Temperature (Comfort) Setpoint

The temperature setpoint can be adjusted between 10°C and 30°C in steps of 0.5°C by using the ▼ and ▲ keys. If °F operation is set within the *installer setup mode* (see later) the range will be 50°F to 90°F, adjustable in 1°F steps.

Display

The measured room temperature is normally displayed (unless configured otherwise in the *installer setup mode*) and the first press of the ▲ or ▼ keys will switch to displaying the user setpoint. If no key is pressed for 5 seconds, the display will return to showing the room temperature.

When the cooling relay is closed this will be indicated by a ✳ symbol, whereas closure of the heating relay will be indicated by a ◊ symbol.

INSTALLER SETUP MODE

The XE99 Series thermostat allows many of its operating parameters to be adjusted via an *Installer Setup Mode*. For ease of programming, each operating parameter has a 2 letter identifier code, which is shown on the display during the *Installer Setup Mode* programming sequence. A description of these is shown in the table below.

Settable Parameters

Parameter	ID	Description
Temperature Scale	**tS**	Allows selection of either °C or °F scale.
Dead Band	**db**	Allows deadband to be set.
Heat or Cool Operating Mode	**OP**	Allows setting of operating mode on single relay, non-changeover models, to either Heat or Cool.
Energy Savings Cooling Setpoint	**uC**	Allows energy savings cooling setpoint to be programmed, for energy savings.
Energy Savings Heating Setpoint	**uH**	Allows energy savings heating setpoint to be programmed, for energy savings
Minimum Cooling Off Time	**CO**	Allows the cooling off-time to be set for short cycle prevention.
Minimum Heating Off Time	**HO**	Allows the heating off-time to be set for short cycle prevention.
Minimum Cooling Setpoint	**CL**	Sets the minimum allowable cooling setpoint.
Maximum Heating Setpoint	**HL**	Sets the maximum allowable heating setpoint.
Configuration of Energy Savings Input	**ES**	Allows the energy savings mode to be activated by a choice of either contact closure or contact opening
Display of Room Temperature	**rt**	Allows the installer to restrict the displayed temperature to setpoint only. If this parameter is selected the unit will always display the setpoint temperature.

Programming the Parameters

The installer setup mode is accessed by reducing the setpoint to 10°C (50°F), waiting until the room temperature is displayed, and then pressing the ▼ and ▲ keys simultaneously for 3 seconds. *If the installer set-up has previously been entered and the Minimum Cooling Setpoint increased above 10°C, the installer set-up mode can be accessed by reducing the setpoint to the new value before pressing the two buttons.*
The first parameter identifier will be displayed at this point and the parameter value can be changed by pressing the ▲ key. The first press displays the default value and any subsequent press alters the value. The values will wrap around. To select the parameter value and move to the next parameter the ▼ is pressed. After the final parameter is selected a further press of the ▼ key exits from programming mode.
The programming mode can be re-entered by pressing the ▲ and▼ keys together. If no key is pressed for 15 minutes installer set-up mode will be exited.

Parameter Values

Each parameter has a *default* value that is used when the XE99 is first powered up. This value can be changed from within the Installer Setup Mode, and once changed it will be stored in EEPROM so it is not lost in the event of power failure.
If the user wishes to restore the parameters to the default values, this can be done by changing the temperature scale **tS** from °C to °F and back again.

Choice of Parameters

Description	Default		Range	
Temperature Scale	°C		°C / °F	
	°C Scale		**°F Scale**	
Description	**Default**	**Range**	**Default**	**Range**
Dead Band	2	2, 3, 4	4	3, 4, 5
Heat or Cool Operating Mode	cool (0)	cool/heat (0 / 1)	cool (0)	cool/heat (0 / 1)
Energy Savings Cooling Setpoint	25	25...30	77	77...90
Energy Savings Heating Setpoint	18	10...18	65	50...65
Minimum Cooling Off Time	0	0,3,4,5	0	0,3,4,5
Minimum Heating Off Time	0	0,3,4,5	0	0,3,4,5
Minimum Cooling Setpoint	10	10 - 30	50	50 - 90
Maximum Heating Setpoint	30	10 - 30	90	50 - 90
Configuration of Energy Savings Input	s/c (1) contact	s/c(1) or o/c (0) contact	s/c (1) contact	s/c (1) or o/c (0) contact
Display of Room Temperature	Display room temp.(1)	Display room temp. (1) or display setpoint only (0)	Display room temp.(1)	Display room temp. (1) or display setpoint only (0)

Programming Example

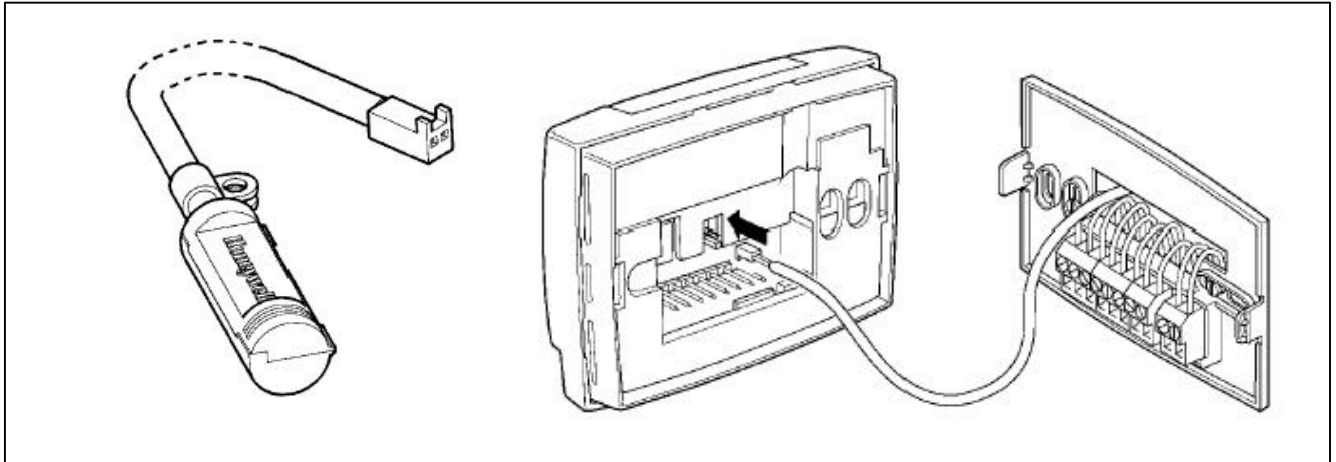To enter the installer setup mode:

1. Press ▼ to change the temperature setpoint to 10°C (50°F)

2. Wait until the room temperature is displayed.

3. Press and hold ▼ ▲ together until **tS** is displayed.

4. The temperature scale can now be changed, if required, by pressing ▲

5. Now press ▼ to move to the next parameter.

6. When the parameter code is displayed, press ▲once to show the factory set value

7. Continue to press ▲ to show all possible values of this parameter in sequence (the values will scroll around).

8. When the desired value is displayed, it is selected by pressing ▼ once. This will also move to the next parameter, whose identifier will now be displayed.

9. Continue to use ▼ to move from one parameter to the next, and ▲ to alter the parameter value.

10. When the last parameter **rt** has been selected, a final press of ▼ will return the display to the normal operating

REMOTE SENSOR

The XE99 remote sensor, supplied with some models, is used for sensing the temperature at a distance form the mounting position of the thermostat. A typical application is to sense the return air temperature to the fan-coil unit. The sensor has a special plug for quick connection, and is supplied with 1.5m length of cable.

Connecting the remote sensor

The sensor plug is connected to a pronged socket on the back of the XE99 body. The sensor cable can be run through the wiring access hole on the wall-plate, or alternatively through the break-out on top of the thermostat. If the 1.5m cable supplied is not long enough, it can be extended up to a maximum of 30m, by inserting an additional length of wire. The sensor wiring is polarity free, but care must be taken to ensure good electrical connections are maintained.

WIRING

T6570A
Connect Load to 3 for Heating, to 4 for Cooling

T6570B
Connect Load to 3 for Heating, to 4 for Cooling, Fan optional

T6574A
‡ Connect 5&6 for Fan Continuous, 4&6 for Fan Cycled

T6574A
‡ Connect 5&6 for Fan Continuous, 3&6 for Fan Cycled

EN0R8519 R2 2000

T6574A

‡ Connect 5&6 for Fan Continuous, 6&C for Fan Cycled

T6574B

‡ For Heating control connect Load to 3, then connect 3&6

T6575B

‡ Connect 3&4 for Control of 2-pipe Fan-coil Units
Connect 5&6 for Fan Continuous, 4&6 for Fan Cycled

T6575B

‡ Connect 5&6 for Control of 4-pipe Fan-coil Units,
Fan Continuous operation

T6575A

Connect output from 4 to electric heat relay coil

T6575C

T6576A

T6576A

Honeywell

Honeywell Control Systems Limited