Smart Temp

SMT-700 Installer Manual

Ver 3.0

Great effort has been taken to making the SMT-700 thermostat system intuitive, reliable and easy to install. Using a common sense approach to the installation will ensure the product is installed easily and to the customer's satisfaction. Please read and understand this instruction manual so that installation, testing and commissioning process is undertaken in an efficient and effective manner. This manual is to be used in conjunction with the user manual.

Installation

As with any air conditioning project undertaken, careful installation is the key to a successful outcome. Time taken during this installation process will be rewarded by a happy customer and fewer call-backs.

The steps required to install the SMT-700 thermostat are

1. Read and understand this manual.
2. Install the SMT-700 hardware.
3. Set the DIP switches on the main PCB to match the need of the project / user.
4. Wire the wall controller and optional remote temperature sensor(s) to the main PCB.
5. Wire the zone / outside air dampers to the main PCB.
6. Power up the air conditioning system.
7. Set the installer software options (if required).
8. Program and set up the wall thermostat. (The User Manual will assist with this).
9. Test the heating, cooling and other functions – Commissioning.

For convenience the layout of this manual is in the same order as the steps listed above

Setting the hardware switches

The first 5 switches are used to control the heating & cooling and air conditioning system. The following three are not essential for correct equipment operation and relate to user functions.

(The drawing on page 3 shows the location of the Function Selection DIP switches on the main PCB.)

A/C Equipment Control Settings	**SW1- Fan Speed Select**
	Switch On = 3 speed Fan Relay G1 = Low, G2 = Med, G3 = High
	Switch Off = Single Speed Fan. Relay G1 only (Relays G2 & G3 are not used)
	
	SW2- SMT-700 Equipment Control Method.
	Switch On = Heat Pump (Compressors with reversing valve)
	Switch Off = Heat with add on Cool (Y used exclusively for cooling & W used exclusively for heating)
	
	SW3- Equipment Stages
	Switch On = Multistage equipment control
	Switch Off = Single Stage equipment control (Y2 & W2 outputs disabled)
	
	SW4- Various
	<u>If SW 2= ON - Heat Pump Mode</u>
	      Switch On = Reversing Valve energises in HEAT mode (B)
	      Switch Off = Reversing Valve energises in COOL mode (O)
	<u>If SW 2= OFF – Heat Cool Mode</u>
	      Switch On = Fan in Heat called by thermostat (HE)
	      Switch Off = Fan in Heat **NOT** called by thermostat (HG)
	
	SW5 Compressor Anti Cycle Delay Timer
	Switch On = 4 Min Delay on break timer (anti-cycle).
	Switch Off = Time Delay Off

User Comfort / Control Options

SW6 Thermostat Type
Switch On = Programmable Thermostat mode (See User Manual - Programmable Mode)
Switch Off = Manual Thermostat Mode (See User Manual - Manual Mode)

SW7 - Climate Zoning Mode (See User Manual - Zoning)
Switch On = Zoning enabled
Switch Off = Zoning disabled

SW8 – Daily Events
If Switch 6 =ON (Programmable thermostat mode)
       Switch 8 On = Residential Programming. 4 events per day (Wake / Leave / Return / Sleep)
       Switch 8 Off = Commercial Programming. 2 events per day (Start / Stop)
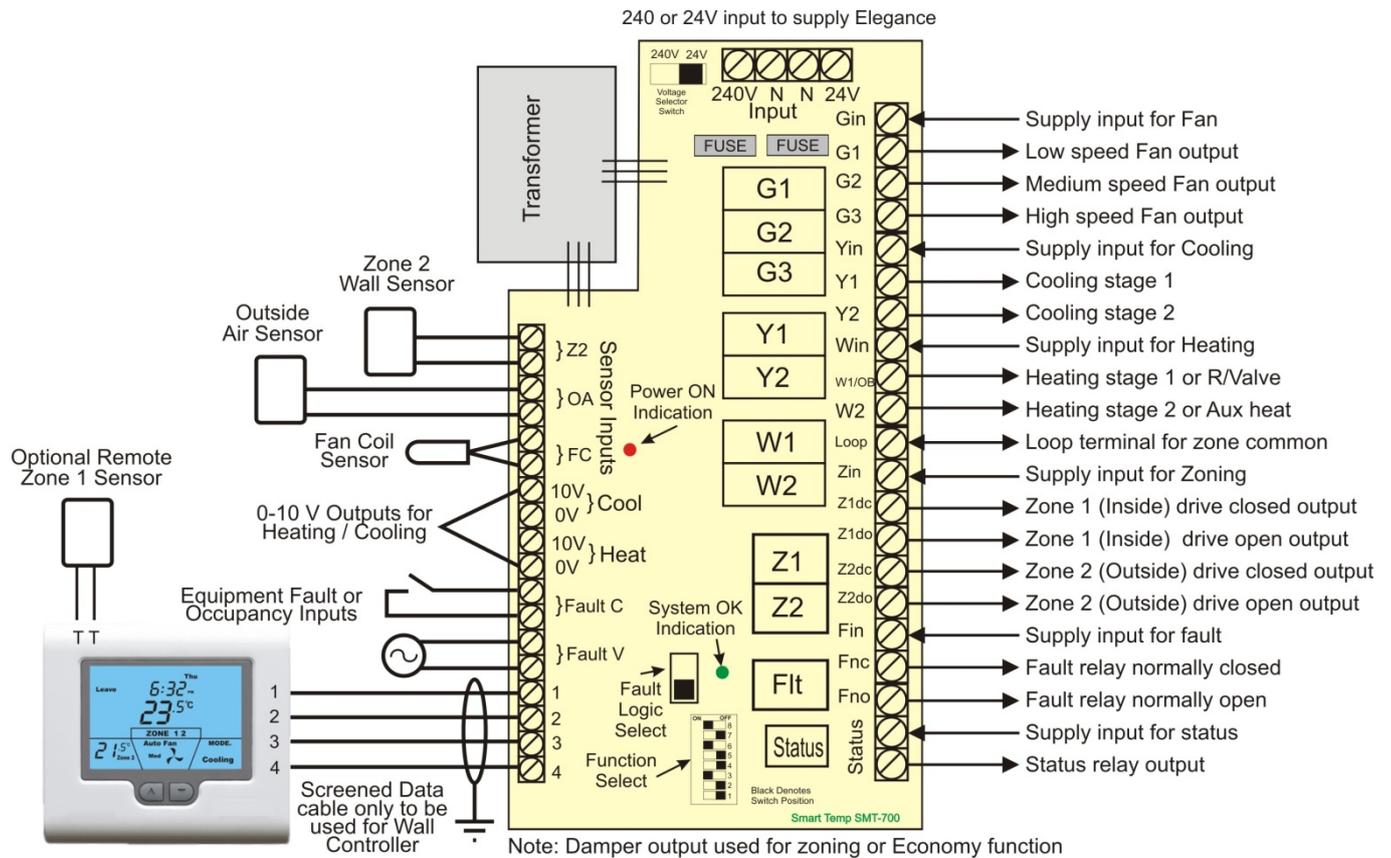
If Switch 6 =OFF (Manual thermostat mode)
       Switch 8 On = 2 Individual set point groups (Day & Night Manual Mode)
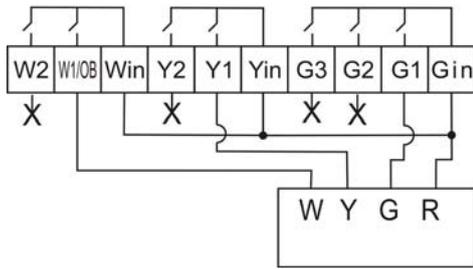   Switch 8 Off = 1 event Manual Mode

Wiring

Wiring Overview

An overall view of the SMT-700 input and output wiring has been provided below. More detailed wiring examples have been provided on the following page.

240 or 24V input to supply Elegance

Note: Damper output used for zoning or Economy function

1 stage gas / oil heating & with add on cooling systems. 1 fan speed

Recommended Switch Setting

1	Fan Speed	OFF	1 Fan Speed
2	AC Type	OFF	Heat Cool Mode
3	# Stages	OFF	1 Stage
4	R-Valve / Fan	OFF	Gas / Oil Heating
5	Comp Delay	Check Equipment Needs	
6	Mode	As per customer requirements	
7	Zoning	As per customer requirements	
8	Events	As per customer requirements	

If three fan speeds are required and supported by the heating and or cooling system, turn sw1 on (fan speed select) and connect equipments medium and high fan speeds to G2 & G3 terminals on the SMT -700 main PCB respectively.

For 2 heat or cool, turn Sw 3 on (Stage number select) and use Y2 & W2 for second stage cooling and heating.

1 stage gas / oil heating & with separate cooling systems. 1 fan speed

Recommended Switch Setting
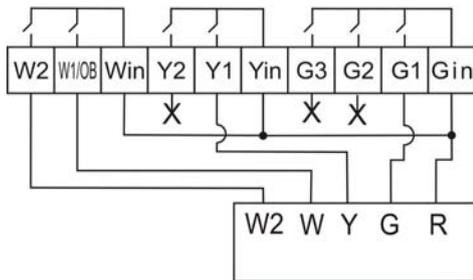
1	Fan Speed	OFF	1 Fan Speed
2	AC Type	OFF	Heat Cool Mode
3	# Stages	OFF	1 Stage
4	R-Valve / Fan	OFF	Gas / Oil Heating
5	Comp Delay	Check Equipment Needs	
6	Mode	As per customer requirements	
7	Zoning	As per customer requirements	
8	Events	As per customer requirements	

If three fan speeds are required and supported by the heating and or cooling system, turn sw1 on (fan speed select) and connect equipments medium and high fan speeds to G2 & G3 terminals on the SMT -700 main PCB respectively.

For 2 heat or cool, turn Sw 3 on (Stage number select) and use Y2 & W2 for second stage cooling and heating.

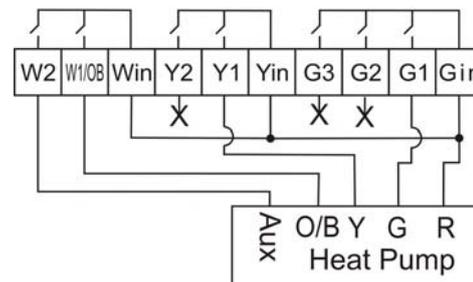## 2 stage gas / oil heating & with add on cooling systems. 1 fan speed

Recommended Switch Setting

1	Fan Speed	OFF	1 Fan Speed
2	AC Type	OFF	Heat Cool Mode
3	# Stages	OFF	1 Stage
4	R-Valve / Fan	OFF	Gas / Oil Heating
5	Comp Delay	Check Equipment Needs	
6	Mode	As per customer requirements	
7	Zoning	As per customer requirements	
8	Events	As per customer requirements	

If three fan speeds are required and supported by the heating and or cooling system, turn sw1 on (fan speed select) and connect equipments medium and high fan speeds to G2 & G3 terminals on the SMT -700 main PCB respectively.

If 2 stage cooling is required, connect the second cooling stage to Y2

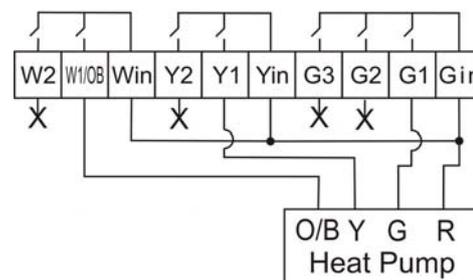## 1 stage heat pump with Aux Heat 1 fan speed

Recommended Switch Setting

1	Fan Speed	OFF	1 Fan Speed
2	AC Type	ON	Heat Pump Mode
3	# Stages	OFF	1 Stage
4	R-Valve / Fan	On= Heat (B) Off= Cool(O)	
5	Comp Delay	Check Equipment Needs	
6	Mode	As per customer requirements	
7	Zoning	As per customer requirements	
8	Events	As per customer requirements	

If three fan speeds are required and supported by the A/C system, turn sw1 on (fan speed select) and connect equipments medium and high fan speeds to G2 & G3 terminals on the SMT -700 main PCB respectively.

For 2 Stage Heat pump operation, turn Sw 3 on (Stage number select) and use Y2 for second stage compressor.

1 stage heat pump 1 fan speed

Recommended Switch Setting

1	Fan Speed	OFF	1 Fan Speed
2	AC Type	ON	Heat Pump Mode
3	# Stages	OFF	1 Stage
4	R-Valve / Fan	On= Heat (B) Off= Cool(O)	
5	Comp Delay	Check Equipment Needs	
6	Mode	As per customer requirements	
7	Zoning	As per customer requirements	
8	Events	As per customer requirements	

If three fan speeds are required and supported by the heating and or cooling system, turn sw1 on (fan speed select) and connect equipments medium and high fan speeds to G2 & G3 terminals on the SMT-700 main PCB respectively.

Wiring 0-10V outputs
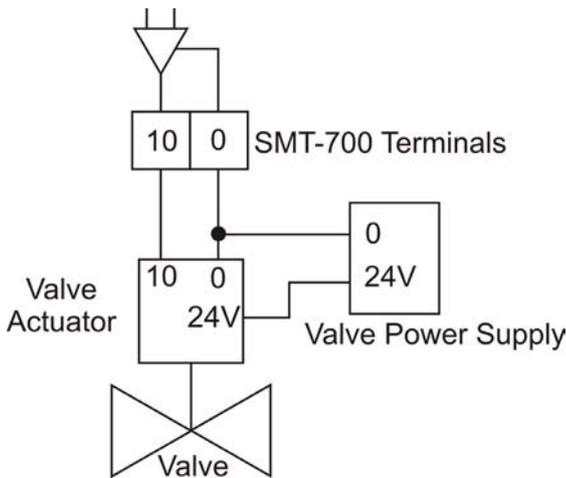
The SMT-700 has a separate floating 0-10 volt output for both heating and cooling that operate in parallel with the relay heating and cooling outputs. Whenever the SMT-700 makes a heating or cooling call, the corresponding 0-10V output is also on.

This permits you to mix and match your control logic to suit the application, such as a modulated chilled water valve for cooling and On/Off electric heating elements for heating.

The advanced installer option on page 9 details how you are able to "span" the range of the 0-10 output of the SMT-700 to suit your particular needs.
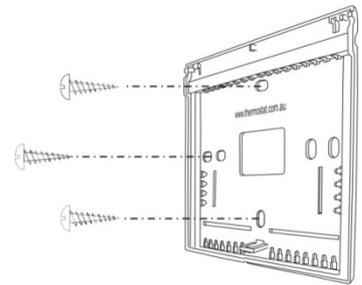
Wall Controller

Mounting the wall controller

The SMT-700 can only be as accurate as the temperature sensor fitted to the wall controller, or its optional remote temperature sensor(s) permit. It is therefore essential that the wall controller be installed in a location that is typical of the ambient room temperature. Do not install the wall controller in a draft, near a floor, behind doors or on a non-insulated external wall. Also avoid placing the wall controller in areas where the air movement is limited, affected by direct sunlight or other areas not "typical" of the temperature of the room.

Further, when mounting the SMT-700 be aware that drafts may travel down the inside of cavity walls, (especially if mounted on external walls) and enter the back of the wall controller or sensor enclosure through the cable entry holes in the wall. It is important to fully seal these holes to prevent any drafts affecting the internally mounted temperature sensor. It is recommended to mount the SMT-700 or remote sensors between 1.5 & 1.7 metres from the floor where possible.

Move the control wires through the large opening in the thermostat base plate then place the thermostat base on the wall and using appropriate screws, firmly attach the thermostat base to the wall. Seal any holes where cables enter the back of the thermostat.

The SMT-700 wall controller must be wired to the main PCB fitted in the air conditioner using 4 core screened cable **ONLY**. Smart Temp cable P/N GA-MC74S100 is available in 100m rolls and is recommended for this wiring. The screen on the cable must be grounded at one end only to eliminate spurious noise corrupting the data stream.

Wall controller wiring schedule	
Wall Controller Terminal Number	Main PCB Terminal Number
1	1
2	2
3	3
4	4

Maximum cable run is realistically limited to a cable loop resistance of 20 ohms. Using Smart Temp P/N GA-MC74S100 cable this is aproximately150 meters. Absolute maximum cable run under ideal conditions is 1,000 meters.

One the wiring is complete in the wall controller back plate; the wall controller can be assembled. Ensure the fold down button cover is attached to the front of the SMT-700 (so you have the two remaining pieces attached together, the plastic lid and the wall controller containing the LCD and electronics). Align the top the thermostat (with the lid attached) so that the mounting lugs on the top of the thermostat mate with the holes in the top of the base plate. Swing the lower section of the wall controller onto the base that is mounted to the wall until it clips securely closed.

Take careful note that the internally mounted room sensor will not jam between the two case halves when snapping the case together - this may damage the temperature sensor.

Backup battery.
A backup battery is provided inside the wall controller. This batteries ONLY function is to keep the clock running during power outage. The battery life is typically 5-10 years in normal service. Replacement batteries can be obtained from your authorised Smart Temp service centre or other reputable battery supplier. Part Number CR-1220.

Using a remote temperature sensor
If using a remote temperature sensor rather than the fitted wall controller temperature sensor attach the cables to this sensor and to the terminals marked "TT" in the wall controller base plate. The SMT-700 will auto detect this sensor and disable the on board temperature sensor. Common figure "8" cable is suitable for this provided the sensor runs are not extraordinarily long (> 30m) or unavoidably run past high voltage cable or electrically noisy environments.
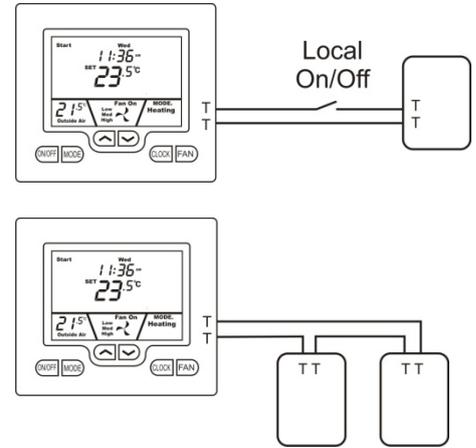
As the wall controller "Auto detects this remote sensor and uses it when available, placing an On/Off switch in line with the remote sensor permits it to be turned On or Off from a remote location. For example, the SMT-700 wall controller may be mounted in an office reception with a remote temperature sensor mounted in a board room. Switching the temperature sensing locations between the board room and reception can then be achieved with an inline switch.

Multiple remote sensors can be used where the temperature averaging of a larger area is required.

More examples of sensors configurations are given on page 13

Zoning

Note: - Zone control function cannot be used when the Outside air function is used.

Dip switch #7 MUST be <u>ON</u> for zone control to operate.

The SMT-700 is capable of actively controlling two separate temperature controlled zones. The optional Zone 2 temperature sensor is required if the second zone is to be temperature controlled. The optional zone 2 sensor is Smart Temp P/N H-RS-01. The zone two temperature sensor is a two wire sensor and is fitted to the Z2 terminals on the main PCB. If this sensor is fitted correctly and the zoning function has been turned on (SW7=On) the zone two temperature will be displayed on the LCD.

The LCD will show which zone is active and the zone 2 temperature if the optional zone 2 sensor has been fitted.

To change the active zone tap the On/Off button to cycle through Zone 1 only, Zone 2 only then both Zones. You are not able to close both zones simultaneously.

Status LED's are provided on the main PCB to show which zones are open.

The zone damper relay contact rating is 5A @ 240VAC maximum. You are permitted to wire multiple zone dampers in parallel if required provided the contact rating is not exceeded. Note. Some brands of zone dampers cannot be wired in parallel due to "damper feedback". Damper feedback will cause the dampers to continually move open and closed regardless of the SMT-700 relay status. Check with your damper provider to ensure suitability for parallel connection before using this type of damper.

The SMT-700 active zoning function will open and close zone dampers and turn heating and cooling on or off as required to ensure that <u>all zone that are on</u>, are kept at their desired temperature. The SMT-700 does NOT simply average zone temperatures resulting in area's that are too hot or cool.

As a consequence of this advanced zone management method there may seem to be unusual delays before heating or cooling starts. The SMT-700 has time delays in place that provide adequate time for zone dampers to move to their correct position prior to starting the heating or cooling. When commissioning the zoning system patience may be required as some delays are up to 4 minutes in length to give zone dampers time to move and fun run on delays time to expire.
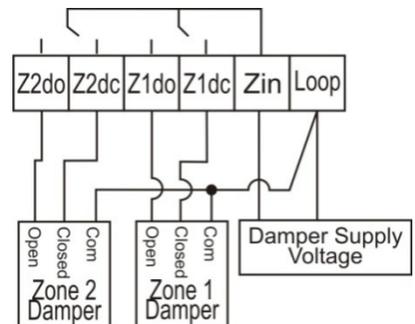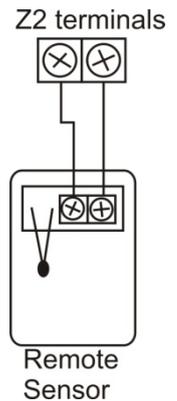
Outside Air Economy

Note:- Outside air function cannot be used when the zone control function is used.

Dip switch #7 MUST be <u>OFF</u> for the Economy function to operate.

The SMT-700 has an integrated outside air economy function that when used, will take advantage of cooler outside air to cool the building. The optional outside air temperature sensor will be required. P/N H-RS-01

The Zone 1 & Zone 2 dampers are used to control the outside air economy dampers.

To activate the outside air economy function
1. Turn Dip switch #7 to OFF (Zoning disabled)
2. Fit the required outside air temperature senor to the "OA" terminals on the main PCB.
3. Enter the Installer menu and set the OA function to on. See the installer menu on page 7 for more information on setting this function.
    (Note: You will not be able to complete step 3 if steps 1 & 2 are not yet complete).
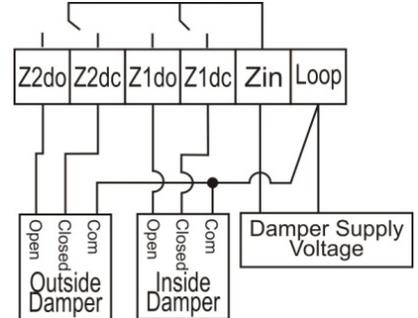
If economy mode is used, the following 4 states of cooling can exist.

<u>Cooling NOT required</u>
> Inside Damper is Open.
> Outside Damper is Closed.
> Compressors Off.
> Fan as set by user. (On or Off).

<u>Normal Cooling</u> - Outside air is less than 2 deg C cooler than the inside air temperature.
> Inside Damper is Open.
> Outside Damper is Closed.
> Compressors run.
> Fan running.
> "Cooling" is shown in the LCD.

<u>Stage 1 Economy -</u> Outside air is least 2deg c cooler than the inside air temperature.
> Inside damper closed.
> Outside damper open.
> Compressors run.
> Fan running.
> "Cooling" & "Economy" is shown in the LCD

<u>Stage 2 Economy -</u> Outside air is least 6 deg c cooler than the inside air temperature.
> Inside damper closed.
> Outside damper open.
> Compressors OFF.
> Fan running.
> "Cooling" & "Economy" is shown in the LCD

The zone damper relay contact rating is 5A @ 240VAC maximum. You are permitted to wire multiple zone dampers in parallel if required, such as a indoor relief damper provided this contact rating is not exceeded. Note. Some brands of zone dampers cannot be wired in parallel due to "damper feedback". Damper feedback will cause the dampers to continually move open and closed regardless of the SMT-700 relay status. Check with your damper provider to ensure suitability for parallel connection before using this type of damper.

Advanced Installer Software Functions.

Note:- in almost all but a few cases will the functions in this menu need to be altered from their default state.

The SMT-700 has a PIN protected menu that permits the installer to "fine tune" the SMT-700 for the specific requirements of the installation or to enable / disable various functions as specifically required for the project.

Entering Installer Mode

If not already, turn the SMT-700 on with the On/Off Button.

Next, <u>press and hold</u> the Mode button for 30 seconds. After 30 seconds the SMT-700 LCD will show "*88:15*". Using the (▲) or down (▼) buttons adjust this number to show "*88:21*" (factory default) or to the PIN value that you have previously set.

Tap the Mode button. If the 2 digit PIN has been entered correctly the LCD will show the first menu item in the installer menu. If the PIN is incorrect you will be exited from this menu.

When in the advanced installer menu you will be automatically exited if no buttons are pressed for 60 seconds.

The menu items are shown in their order of appearance below. Tapping the mode button will advance you through the menu options. Tapping or holding the up (▲) or down (▼) buttons permit the values to be adjusted. The default values for this menu are shown in the examples below.

PN= 21 Set Pin

This is the PIN to enter installer mode in future attempts. This menu item permits the user to set their own PIN if they do not wish to use the factory default PIN of 21.

Caution -   **If this PIN value is changed and forgotten you will not be able to re-enter the Installer menu and the wall controller must be returned to Smart Temp or approved service centre to be unlocked. There may be a fee for this service.**

LC= 00 Keyboard Lock

The SMT-700 is fitted with a keyboard lock to prevent unauthorised tampering. When the keyboard lock is active the padlock symbol will be displayed on the LCD. When a locked button has been pressed the padlock will flash to inform the user the desired function has been locked.
LC= 00 Key board Lock OFF
LC= 01 Key board Lock ON Level 1
LC= 02 Key board Lock ON Level 2

<u>Level 1 Lock</u>
      In Programmable mode - All SMT-700 buttons are locked.
      In Manual mode - all SMT-700 buttons EXCEPT the on / off button are locked.
<u>Level 2 Lock</u>
      In Programmable mode - All SMT-700 buttons EXCEPT the ON/OFF button are locked.
      In Manual mode - all SMT-700 buttons EXCEPT the ON / OFF and temperature up (▲) or Temperature down (▼) button are locked.

TD= 00 Temperature Display Mode

The SMT-700 can hide the current room temperature if required and only display the set temperature for the current operational mode. If the SMT-700 is heating, or the last mode was heating the SMT-700 will only display the heating set temperature (Not current room temperature). If the SMT-700 is cooling, or the last mode was cooling the SMT-700 will only display the cooling set temperature (Not current room temperature).

If TD= 00 then the SMT-700 will display both the Room Temperature & Set Temperature
If TD= 01 the SMT-700 will display set temperature only.

C1= 00 Zone 1 Calibration Function

The SMT-700 main zone temperature sensor is extremely accurate and as such it should never need to be calibrated. You should exhaust all other explanations for perceived temperature inaccuracies before making any adjustments to the SMT-700 temperature sensor. The range of adjustment is +/- 3c

C2= 00 Zone 2 Calibration Function

The SMT-700 zone two temperature sensor is extremely accurate and as such it should never need to be calibrated. You should exhaust all other explanations for perceived temperature inaccuracies before making any adjustments to the SMT-700 temperature sensor. The range of adjustment is +/- 3c

AO= 01 Analogue Output Span

The SMT-700 permits you to "Span" the range of the 0-10v heating and cooling outputs. The AO=XX value is the temperature away from set point where the output will be at 10V. The output is liner from 0v (heating and cooling off) to AO=XX value where the output is 10V. The range of adjustment is 1 to 9c.

CF= C Display Units

This sets the SMT-700 display units as Celsius "C" or Fahrenheit "F" for all user menu's and most installer menus.

CT= 00 Manual Count Down Time Value

Note: This function only operates in manual mode (SW6=Off)
The SMT-700 can be set to automatically switch the air conditioning off in CT=XX hours, adjustable from 0 to 8.
This feature is useful in installations where the air conditioning should only run for a limited time, or where an area is used infrequently – such as training rooms for example. The installer can set an Auto Off time, so that "XX" hours after the SMT-700 is turned on it will automatically switch itself off again.
Range of adjustment 0 & 8 hours (00= Countdown timer function is off)

HL= 30 Heating Limit Set point

The SMT-700 can limit the maximum permitted heating set temperature if required. This may reduce energy costs by the installer setting realistic values. When the user sets the Heating temperature that equals the HL=XX value the padlock symbol on the LCD will flash indicating the maximum permitted heating set temperature has been reached. The range is 00(off) ~30c

CL= 15 Cooling Limit Set point

The SMT-700 can limit the minimum permitted Cooling set temperature if required. This may reduce energy costs by the installer setting realistic values. When the user sets the Cooling temperature that equals the CL=XX value the padlock symbol on the LCD will flash indicating the minimum permitted cooling set temperature has been reached. The range is 15~37c (off)

SD= 02 Stage Delays

This value sets the temperature difference in deg C (F) between 1st & 2nd stages of heating and cooling, and 2nd & 3rd stages of heating. This value is adjustable between 1 & 3 deg.

OS= 00 Adaptive Recovery. (Optimised Start)

Adaptive Recovery or optimised start compares the differences between the current set point, the room temperature and the outside air temperature (if OA sensor is fitted) to determine the most energy efficient time to start the heating, cooling or Air conditioning system to ensure the room is at the set point by the event start time.
OS=00 Optimised start is off. (The heating or cooling will start (or stop) at the event time)
OS=01 Optimised start is on. (The heating or cooling system will start (or stop) before the event time to achieve the desired temperature by the event time) (If Outside Air Sensor Fitted)

$FO= O2$ Indoor Fan Options.

This function is enabled only when the fan mode is Fan On ."FAN ON" will be displayed in the LCD
The SMT-700 has the capability to control the indoor fan in a number of intelligent ways. These abilities are described below.

Option 0	The fan will run continuously - 100% of the time, 24 hours a day 7 days a week. (Note: If you wish the fan to cycle on & off with the heating and cooling calls all the time set the fan mode to Auto fan "Auto fan will be displayed in the LCD)
Option 1.	The fan will run continuously while in cooling mode to ensure the maximum fresh air ventilation and to aid in cooling (i.e the fan will continue to run when cooling stops) but automatically change modes to cycle the fan on and off when the last mode is heating. (This is done to prevent cold drafts that may occur on cold days when A/C system is heating).
Option 2. (Default).	Available only if the SMT-700 is in a Programmable Mode. The Fan will Run continuously from the Wake (or Start) Program to the sleep (or Stop) program and then run in AUTO mode overnight to maintain the night time set points. This ensures sufficient ventilation during the daytime occupied hours and quiet energy efficient comfort overnight.
Option 3.	Available if the SMT-700 is in Programmable Mode Only. This mode is the combination of option 1 and option 2 given above.

$PZ= OO$ Zone Programming

Should it be desired, the SMT-700 will permit the user to program zone(s) to automatically change at the same times as the various daily events. This will permit the user to program the sleep zone to turn on when the sleep program begins for example. When this function is enabled the SMT-700 adds an extra step to the programming sequence
PZ=00 Program zone function is off.
PZ=01 Program zone function is on.

$FS= OO$ Fan Speed Limit

Note: This function only operates when zoning is enabled (SW7=On) and only when fan speed is set to 3 speed mode (SW1=On). To protect the ducting, fan motors and other pressure sensitive components, if required the installer can disable the use of high-speed indoor fan when only one zone is on (either zone 1 or zone 2). The fan can run in high speed only when both zones are on.
FS=00 High-speed fan anytime
FS=01 High-speed fan only when both zones are on. (Led Z1 & Z2 on main PCB lit)

$FN= OA$ Equipment Mode

The SMT-700 can control both heating and cooling systems. However, there may be situations where the SMT-700 is to control a Heating only system, or a Cooling only system. In these circumstances the SMT-700 can be set to heat only or to cool only modes to eliminate user confusion. In the heat or cool only mode all reference to the non-used mode is removed from the mode selection button and all programming and temperature selecting functions etc.
In heating only mode, the mode button toggles between heat and fan only. In cooling only mode, the mode button toggles between cool and fan only.
Fn=A Auto mode (Both Heating & Cooling control).
Fn=C Cool only mode (Heating function and options disabled).
Fn=H Heat only mode (Cooling function and options disabled).

$TC= 12$ Clock Mode

The SMT-700 has both a 12 hour, am/pm style clock or a 24hour military style clock.
TC = 12 AM/PM clock type
TC = 24 Military style 24 hour clock type.

FF= 1 **Fault Fan** (Occupancy Mode Fan control method)
The function of the Fault Inputs (Flt C & Flt B) can be changed to become an "occupancy input"
FF is the function you wish the fan to implement when the Flt C or Flt V inputs are active.
FF=0 Fan is OFF when the fault / occupancy input is active.
FF=1 Fan is locked to low speed when the fault / occupancy input is active. (Default)
FF=2 Fan is locked to Med speed when the fault / occupancy input is active.
FF=3 Fan is locked to High speed when the fault / occupancy input is active.
FF=A Fan is locked to Auto speed when the fault / occupancy input is active.

FH= -- Fault Heat (Occupancy Mode Heating Temperature)
The function of the Fault Inputs (Flt C & Flt B) can be changed to become an "occupancy input"
FH is the heating temperature you wish to maintain when the Flt C or Flt V inputs are active.
Range is "—" (off) to 37c

FC= -- Fault Cool (Occupancy Mode Cooling Temperature)
The function of the Fault Inputs (Flt C & Flt B) can be changed to become an "occupancy input"
FC is the cooling temperature you wish to maintain when the Flt C or Flt V inputs are active.
Range is 35c to "—" (off)

DI= -- De-Ice
The SMT-700 will monitor the fan coil temperature and stop the indoor fan when the fan coil temperature falls below 27c. However, if required this value can be adjusted from the default value by setting the DI-XX value to your preferred temperature.

EC= OF Economy Function
Economy function permits the introduction of outside air into a building if the outside air temperature is cool enough to assist with the cooling of the building.
EC= OF Economy function OFF
EC=On Economy function ON
(Note: Only If outside air sensor fitted (OA Sensor) **AND** Sw7=0ff (Zoning disabled)

Additional Capabilities

Fault / Occupancy inputs
NOTE: The fault logic of the SMT-700 is Fail Safe.
A green LED is fitted on the main PCB and labelled "System OK". If this LED is not lit, then a fault condition exists from either of the fault inputs or an internally detected SMT-700 fault. When a fault is detected the fault relay will DE-ENERGISE and the Green "System OK" LED will turn off.

The SMT-700 Main PCB is fitted with two equipment fault inputs. These inputs are marked "FltV" and "FltC".
If either or both of these fault inputs are tripped, the following default[1] events will occur
- All heating & cooling outputs will be set to OFF
- The indoor fan is set to low speed. (To maintain ventilation)
- The onboard FAULT relay will turn OFF.
- The green "SYSTEM OK" LED on the main PCB will turn OFF.
- The word "Fault" on the wall controller LCD will be visible.

The fault inputs can be used to automatically shut the air conditioning system down in the following circumstances.
- The Air Conditioning HP/LP limit has been reached (By monitoring the HP/LP switch status).
- The water flow for a water sourced heat pump has failed (By monitoring a flow / pressure switch).
- The condensate tray is full (if fitted with a liquid level switch).
- A phase for the compressor has failed (if a phase fail relay is fitted).
- A fire input has been tripped or other emergency shutdown event has occurred. (Note – for fire shut down you may need to program the fan speed to off also by setting FF to 0).
- Other examples for the use of the fault inputs include - Duct pressure switches, remote time clock override shutdowns, DDC shutdown signals etc.

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[1] These values can be installer set to operate differently as described in the "Occupancy Mode" section of this manual.

The inputs logic is described below.

Fault Input V (Voltage) 24VAC.	Used when the fault output of the equipment under the SMT-700 control supplies (or looses) a 24VAC fault signal when it is in a in fault condition.
Fault Input C (Contact)	Fault input "C" is used when the equipment under the SMT-700 control closes (or opens) a voltage free, dry contact when in the fault condition.
SW1, "Fault Logic Select " on the main PCB selects the logic of the fault input, either as a normal or fail safe fault input. See the wiring example on page 3 for this switch location	
Position "A"	If the switch is in position "A" the SMT-700 will be in fault when fault input "V" has 24VAC **applied** to it, or if fault input "C" contacts are **shorted**.
Position "B"	If the switch is in position "B" the SMT-700 will be in fault when 24VAC has been **removed** from fault input "V" or when an **open circuit** is detected at fault input "C".

Occupancy inputs & Outputs

As discussed briefly above, the SMT-700 fault input function can be redefined by changing three separate values in the advanced installer menu. This menu is described on page 11 of the manual.

When the fault input(s) are active, the FF (Fault fan speed is selected), FH (fault heating set point is used) and FC (fault cooling set point is used).

The Occupancy / fault inputs than can then be connected to a door key switch, movement sensor, DDC building management system, alarm system (for automatic un-occupied mode when alarm is armed) or to a remote override switch that when tripped, will substitute the room occupants temperature settings for the FF, FH & FC Advanced installer menu values. When this input is returned to the normal state, so will the user set temperature values as set at the wall controller.

Status Output.

A normally open 1A @240V relay has been provided as a Status output. This relay will energise when ever the SMT-700 is calling a function from the air conditioning system.

This relay's primary function is to provide feedback to other equipment that the heating or cooling system is in use. This can be used as a "heart beat" indicator that will trip a remote alarm if the heating or cooling system has not been used for a pre-set period of time. Alternatively, this can be connected to an energy consumption data logger for billing purposes.

LCD Mode indicators / Diagnostics.

Compressor protection delay.
> If the word "Heat" or "Cool" flashes in the LCD, a 4 minute anti cycle delay is in progress. Heating or cooling calls will not be initiated during this safety lockout period.

Heating or Cooling running.
> The word "Heat" or "Cool" will change to "Heating" or "Cooling" when the air conditioning system is heating or cooling.

Stage Indication.
> A small "full stop" will appear on the end of the word "MODE" when stage 2 heating or cooling is being called. This full stop will flash when Auxiliary heating is called / required.

Spanner Icon
> The appearance of the spanner ICON in the LCD indicates an internal SMT-700 fault has occurred. Typically loss of communication between the wall controller and the main PCB.

FAULT
> If the word "Fault" is shown in the LCD, an external device connected to the fault input on the main PCB has been activated.
> **Note:** The word "FAULT" is NOT shown if the FF, FH or FC values have been set from the factory default values.

Padlock ICON
> The padlock symbol will be shown when ever the keyboard is locked. If a locked button has been pressed or a user control limit has been reached the padlock symbol will flash to remind the user the attempted operation is prohibited.

Main PCB Indicators & Functions.

Reversing valve logic

To minimise reversing valve operations the SMT-700 will keep the reversing valve in its last mode when the compressors stop. For example, when the heating set point is reached the reversing valve will stay energised when the compressor stops ready for the next heating call. The reversing valve will only change mode in this example until just before cooling is required where it will stay de-energised when the compressor stops.
Turning the SMT-700 OFF at the wall controller will de-energise the reversing valve after a 3 minute delay.

LED indicators

All relays on the SMT-700 are identified by printing on the PCB. The relay coil has a LED in parallel so that when a relay coil is energised, the associated LED will be on. This simplifies diagnostics greatly.

System OK indication

The green system OK indicator will be lit when ever the SMT-700 is operating normally.

Power ON indicator

The RED power on indictor proves the presence of power and fuse condition of the SMT-700 main PCB.

Zone safety relay

With SW7 set to off (Zone select) the SMT-700 will keep one zone relay on at all times to protect against an installer forgetting to turn SW7 to on after wiring zone dampers to the A/C system.

Sensor Configurations Examples

The "TT" "OA" or "Z2" inputs are able to accept multiple temperature sensor inputs rather than just a single sensor if it is necessary to average the temperature over a larger area than one temperature sensor can accommodate. Typical sensor configuration as are detailed below.

Note: Single element (Smart Temp P/n H-RS-01) and twin element (Smart Temp P/n H-RS-02) sensors may be required. 3 sensor option not recommended as the twin element sensor has the same "Voting Right" for averaging as the two single element sensors in the same circuit.
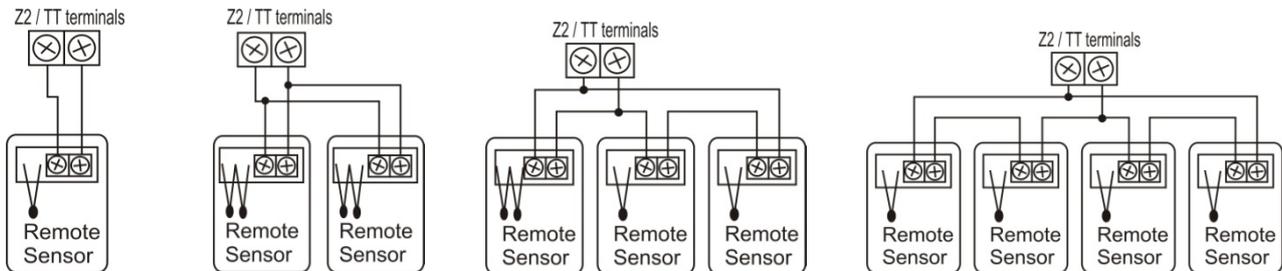
1 x P/n H-RS-01   2 x P/n H-RS-02   1 x P/n H-RS-02 &   4 x P/n H-RS-01
                                                   2 x P/n H-RS-01

Testing & Setup

The SMT-700 should be regarded as a standard thermostat for setup and testing. A simple common sense attitude should be applied to the testing of the system

To test the Heating simply raise the heating set point temperature above the room (or zone temperature) and ensuring the Air conditioning starts in heat mode and runs satisfactorily, verify that warm air is being produced and directed to the appropriate zone as shown on the SMT-700 wall display. Verify the correct LEDS (as determined by the mode setup) are illuminated on in the main PCB. This may or may not include testing the three indoor fan speeds in heating mode (if applicable). Testing the cooling is equally simple, lower the cooling set point temperature to below the current room temperature and insure the Air conditioning starts in cool mode and runs satisfactorily and chilled air is produced. This may or may not include testing the three indoor fan speeds in cooling mode.

Tip:- The SMT-700 LCD will change the word Heat (or Cool) to Heating (or Cooling) when heating or cooling is taking place. The full stop ". " on the end of the word "MODE" will become visible when the SMT-700 is demanding 2nd stage heating or cooling , and flash when the 3rd stage of heating is being used.

Please note the Economy function overrides the normal zoning function. If Economy mode has been set this testing procedure may not work as the SMT-700 may determine outside air is better suited for cooling purpose than running the cooling system. If Economy mode is active, the word "Economy" will be visible on the LCD if outside air is being used to cool.

Once the correct operation of the Heating & cooling system has been verified testing of the zoning (if installed) must be completed. The simplest way to accomplish this is to turn the SMT-700 to Fan only mode and tap the on/off button to select zone 1 only. Air should only be coming from the zone 1 registers (vents) and the Z1 LED on the main PCB should be on (Z2 LED should be OFF). Select Zone 2 only by tapping the On/Off button and verify that air is only coming from the zone 2 registers (vents) and the Z2 LED on the main PCB should be on (Z1 LED should be OFF).

Test other functions that may be active on this installation of the SMT-700 such as outdoor air temperature sensors, timer functions and keyboard locks etc to ensure the system as installed performs to the expected level. If the SMT-700 is NOT performing to the desired expectation please study that function again in this manual. If, you have questions or concerns, please contact Smart Temp or an authorised agent for technical support.

Fan Coil sensor & Functions
The SMT-700 fan coil sensor is responsible for warm start; residual heat / cool fan run functions etc.

If Heating,
> The indoor fan will delay starting until after the indoor coil temperature exceeds 33c.
> The indoor fan will stop if the indoor coil temperature falls below 27c.

In Cooling.
> The Indoor fan & compressors will stop for 10 mins if the indoor coil temperature drops below – 2c.
> The indoor fan will run on momentarily when cooling stops to purge.

SMT-700 sensor resistance table – all sensors

TZT0-701 Sensor resistance table. 10K NTC type II																														
Deg C	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
KΩ	32.96	31.31	29.76	28.29	26.9	25.58	24.34	23.16	22.05	20.99	20	19.05	18.16	17.32	16.286	15.34	14.395	14.36	13.76	13.09	12.51	11.96	11.43	10.93	10.45	10.0	9.57	9.16	8.75	8.4	8.05

Commissioning hint.
If commissioning a large apartment project, by keeping a wall controller with you and swapping it for the room wall controller fitted to the apartment you can easily activate heating / cooling and zone functions etc while you are at the main PCB to verify correct equipment operation. Simply swap the wiring back to the apartment controller at the completion of the commissioning process. This eliminates the need for two people when commissioning or endless trips up and down ladders to change functions or fan speeds with the apartment fitted controller.

Troubleshooting

Fault Table		
Symptom	**Suspected Fault**	**Suggested remedy**
Power LED on main PCB is OFF	Loss of power to main PCB	Check supply voltage
	PCB Fuse failed.	Check PCB fuses
	240V / 24V switch in wrong position	Check voltage selection switch
	Faulty Power LED	Check to see if any other PCB LEDS are on.
"System OK" LED OFF & "Fault" is displayed on LCD when no fault exists.	Device connected to fault input has initiated a shut down.	Correct fault from external device.
	Fault logic jumper (A/B switch) in the wrong position.	Change fault logic switch position
	Short on Flt "A" fault input cabling.	Check fault input wiring
Spanner icon on in LCD No equipment function	Internal SMT-700 Fault detected. Communication loss between main PCB and wall controller should be strongly suspected.	Make sure you use screened cable. Check wiring between wall controller and main PCB for shorts or open circuits. Ensure correct wiring. Cycle power to reset.
Fan, Cool or Heat does not work when PCB LED's show these relays on	Separate supplies are required for the fan, cooling and heating relays.	Ensure supply voltage has been applied to Gin, Yin and Win terminals.
Cannot select either heat or cool modes	SMT-700 set for Heating or cooling only modes	See Advanced user menu on page 8 for information on this function
PIN 21 does not let me into installer mode	PIN has been set to another value other than the default 21.	Contact installer for the current PIN. Return wall controller to Smart Temp or approved service agent for resetting. (Service Fee may apply)
Fan sometimes stops and starts intermittently while heating or cooling is running	This may not be a fault.	Check fan coil sensor temperature as fan coil may not be at correct temperature for fan operation.
	Check Function switch 1, 2 & 4 for correct position	SMT-700 may not be in correct operational mode.
Main PCB power LED is on but wall controller has no display	Faulty control wiring.	Check wiring between wall controller and main PCB. Should measure 12V DC between terminals 1 & 2 (approximately)
No Heating or cooling or fan etc outputs from the relays	Function not called by SMT-700.	Check the LED on main PCB for the relay to ensure the SMT-700 is calling the function in question.
	No power to relay common	Ensure Gin, Yin & Win has power applied to them. See page 3 for wiring information.
Air Conditioning System seems to runs continuously.	Heating and or cooling temperatures set at unrealistic values.	Set a lower heat temperature and/or a higher cooling temperature.
	Check sw2 for correct settings.	Heat Cool system set to Heat Pump mode.
	Fan set to Fan ON mode	Change fan mode to Auto
Erratic Damper operation – constantly moving despite no change in SMT-700 damper output.	Some brands of dampers "feedback" voltage on the non-used terminals. i.e. while driving open voltage can be found from the damper on the drive closed terminal. This function prevents dampers being wired in parallel.	Replace the damper with a brand that does not have this feedback problem, such as Belimo LM24T available from Smart Temp or authorised Smart Temp Distributor.
Some buttons do not appear to operate	Key board lock is on	Enter installer mode and unlock buttons. Requires correct pin. See page 8
Cooling called by wall controller but Y1 & Y2 relays Off	Indoor coil iced up	Compressors & Fan stoped for 10 minutes to de-ice indoor coil.
	LCD shows "Economy" – This is Not a fault.	Outside air economy function cooling being used rather than compressors. See page 7.
Temperature reading seems inaccurate	Check sensor location	Move sensors away from drafts or external heat sources
	Check wall penetrations. Warm or cool outside air may travel down wall cavity and through cable penetration and effect sensor.	Block all holes behind the sensors or wall controller.
	Incorrect calibration factor applied to sensor.	See page 8 for details on setting sensor offsets.

Specifications

Input Voltage 24VAC / 240VAC (fused) selectable
Operating Temperature 0-50C (32 to 122F)
RH 0-95% (non condensing)
Size
Wall Controller 113 x 103 x 23mm
Control PCB 190 x 140 x 61mm
Temp Sensors - 10K NTC type II
Accuracy +/- 0.3deg C @ 25 C
Resolution 0.1 deg C
Control Range Off to 38c
Outside Air temp display range -8 ~ 60c
Back light - Blue EL
Optimised Start method - Time to Start Vs Temp Differential method
Display Size 74 x 55mm
Communications Protocol - Native RS485 - 150M max run 4 core cable.
Warm Start - fan Coil >33c.
Heat run on – Fan coil<27c.
Economy function >2.5c dampers only >6 suspend comp call
Relays (Maximum ratings - all supplied Voltage Free)
Fan Low - Max 10A 240V Inductive
Fan Med - Max 10A 240V Inductive
Fan High - Max 10A 240V Inductive
Heat 1 - Max 10A 240V Inductive
Heat 2 - Max 10A 240V Inductive
Cool 1 - Max 10A 240V Inductive
Cool 2 - Max 10A 240V Inductive
Damper 1 - Max 5A 240V Inductive Changeover
Damper 2 - Max 5A 240V Inductive Changeover
Fault - Max 1A 240V Inductive Changeover
Status - Max 1A 240V Inductive
Approvals CE, Ctick

<u>Warranty Information</u>

This product is warranted to be free from manufacturing defects for 24months from the date of sale. Should a warranty claim be required contact Smart Temp or place of purchase for a return authorisation number prior to returning and suspected faulty components.

Exclusions

This warranty does not include incidental or consequential damage that may result from using this equipment. Nor does this warranty cover abuse, rain, moisture damage or using this equipment outside of the quoted specifications.

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Due to continual product improvement specifications subject to change without notice.