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Part No:- 502-0174-00
Model :- TEK7DT

CUSTOMER INFORMATION

1 Introduction

1.1 Definitions

Term	Meaning
Pre-wet	Run the pump only prior to starting the fan to ensure pads are wet
Auto Cooling	Thermostatic controlled cooling
Comfort level	Thermostat setting that equates to a set temperature

1.2 General Description

The TEK7DT is an Analogue Interface Wall Control intended to be used in combination with but not limited to:

TEK 7EC, 7 series general evaporative control.
TEK 600 series control boxes (not including TEK632)
TEK 400 series control boxes

The TEK7DT features are outlined below. Please note some of the features outlined in this SPEC sheet may not be available in use with the older series control boxes.

- Full graphic display
- Room temperature measurement, and optional display, on LCD
- Set level adjustment by use of "Up" and "Down" buttons
- Timer function providing delayed on/off operation
- Auto Cooling, Manual Cooling, and Fan operation
- Pre-wet control built-in
- Analogue outputs to set cooler operating mode.

2 Functional Requirements

2.1 Inputs / Outputs

2.1.1 Analogue Control Connections

The TEK7DT provides a 5-way header for connection of the Cooler control loom. The header is TE CONNECTIVITY #171825-5 2.5mm pitch or similar. The connections are as shown in the table below.

Pin	Function
1	0V
2	Pump/Dump*
3	Fan
4	5.6V
5	Not connected

*Dump not supported in this version of the product.
The input impedance of the Pump and Fan control lines on the cooler control must be greater than 100kΩ.

2.1.2 Power Supply

The TEK700 requires a nominal 5.6V supply at 45mA.

2.1.3 Temperature

An on-board sensor is used for temperature measurement. The absolute accuracy is ± 1°C, with an internal calculated resolution 0.5°C and a displayed resolution of 1°C.

2.1.4 User Interface

The User Interface is made up of an LCD, 5 buttons, and an indicator LED.

2.1.4.1 LED

There shall be a single blue LED to indicate when the control is in the On state.

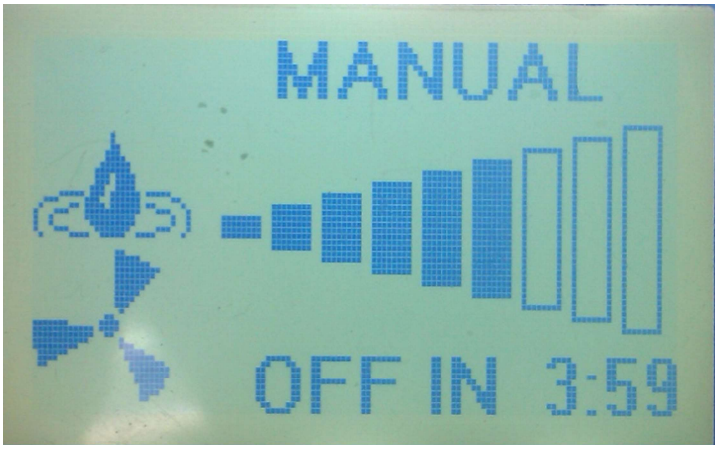
2.1.4.2 Buttons

There shall be 5 buttons for control of the mode and operating conditions.

- "Up" – for increasing Set Level or desired Fan Speed
- "Down" - for decreasing Set Level or desired Fan Speed
- "On/Off" – for switching on and off the cooler functions
- "Mode" – for cycling through the cooler functions
- "Timer" – for enabling and disabling the timer function

2.1.4.3 LCD

The display is a full graphics LCD as shown below. The segments are blue with a white backlight.



The backlight intensity shall increase while the user is interacting with the control but will then drop to a lower level 30 seconds after the last interaction.

2.2 Default Settings

On initial power up, the TEK7DT shall adopt the following settings.

Item	Setting
Mode	Off
Previous Mode	Manual Cool
Previous Auto Cooling Level	5
Previous Manual Cooling Level	5
Previous Fan Level	5
Timer	Inactive

If power is removed from the TEK7DT, it shall return to the settings described above. All parameter settings are stored in non-volatile memory and will be retained in the event of a power failure.

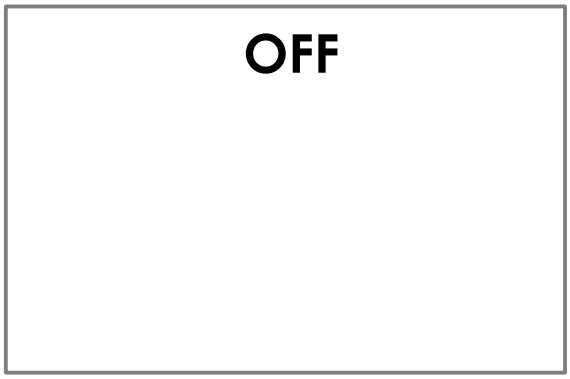
2.3 Room Temperature Display

The room temperature by default is disabled. If enabled by setting the *Room Temperature Enable* parameter to a value of 1, the room temperature will be displayed in the top left corner of the display.

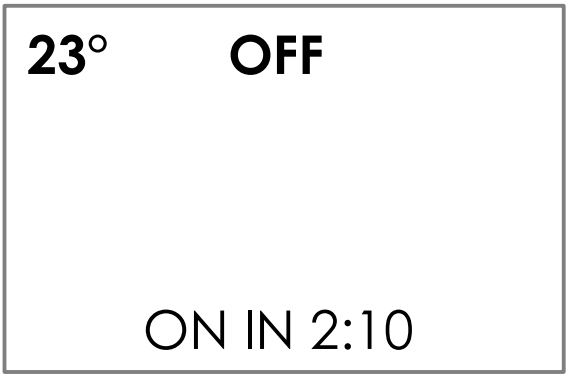
2.4 Operating Modes

2.4.1 Off State

In the Off state, the TEK7DT display is as shown below dependant on the timer setting. The LED is off as well as the Fan and Pump outputs. If the timer is active, the display shows the hours and minutes remaining before the control turns on. When the timer has elapsed, it shall return to the last operating mode.



No timer set, temperature display disabled



Timer active and temperature display enabled.

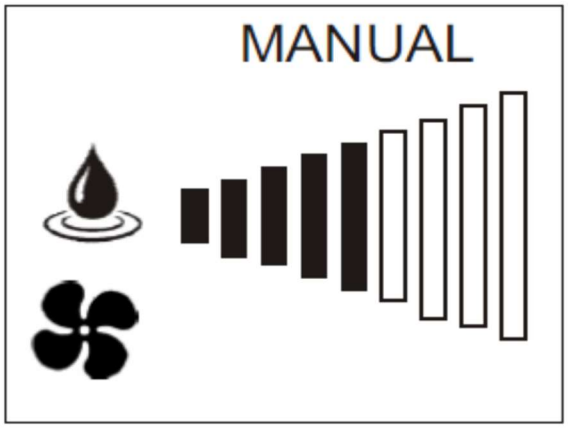
In the Off state, the following key presses are available.

Key Press	Action
On/Off	Returns to the last operating mode
Timer	Enter Timer setup
Press & Hold Up & Down	Enter Code Entry for Installer parameters
Press & Hold Timer & Mode	Enter Code Entry for Service parameters
Press & Hold On/Off, Mode & Up	Enter Code Entry for Factory parameters

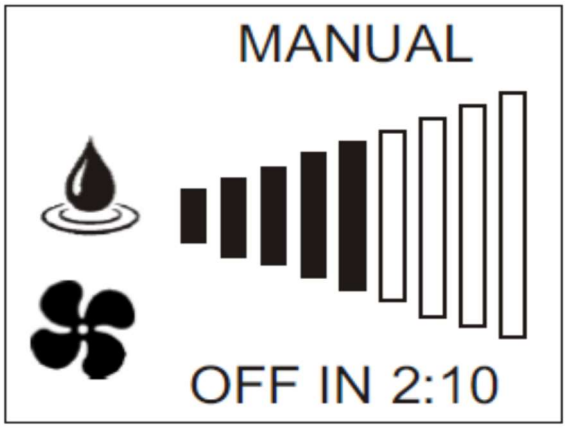
All other key presses are ignored.

2.4.2 Manual Cooling

When operating in Manual mode, the LED is illuminated and the display is as shown below. If the timer is active, the display shows the hours and minutes until the control will return to the Off state.



No timer set



Timer active

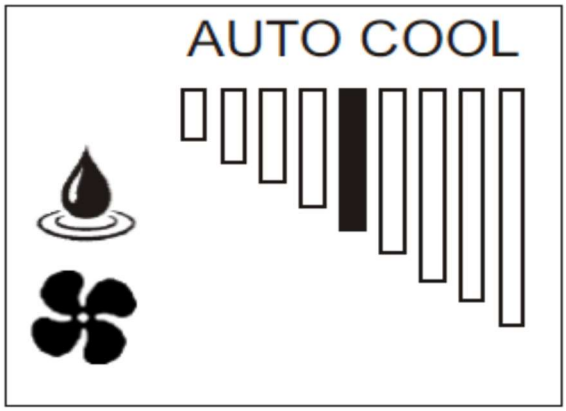
The manual cooling level can be adjusted between the limits of 1 and 9.

In the Manual Cooling Mode, the following key presses are available.

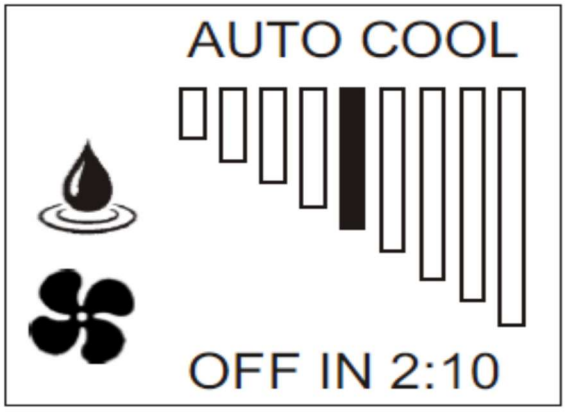
Key Press	Action
On/Off	Returns to the Off state
Timer	Enter Timer setup
Mode	Transition to Auto mode
Up	Increase manual cooling level setting
Down	Decrease manual cooling level setting

2.4.3 Auto (Thermostatic) Cooling

When operating in Auto mode, the LED is illuminated and the display is as shown below. If the timer is active, the display shows the hours and minutes until the control will return to the Off state.



No timer set



Timer active

The comfort level can be adjusted between the limits of 1 and 9. The comfort level translates to set temperature as shown in the table below.

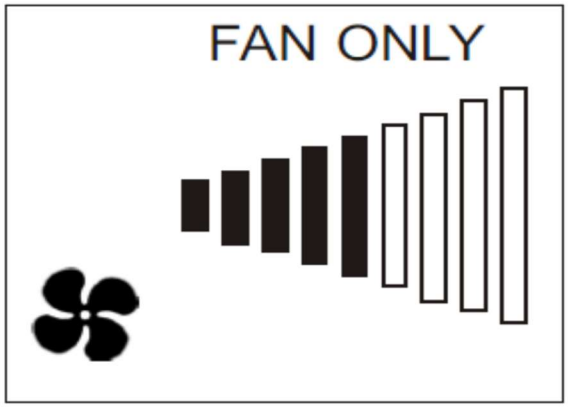
Comfort Level	Temperature
1	32
2	30
3	28
4	26
5	24
6	22
7	20
8	18
9	16

In the Auto state, the following key presses are available.

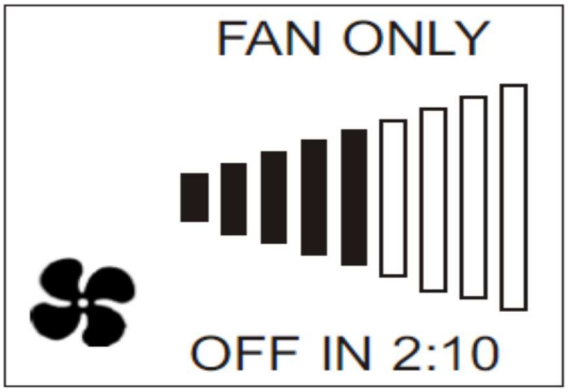
Key Press	Action
On/Off	Returns to the Off state
Timer	Enter Timer setup
Mode	Transition to Fan Only mode
Up	Increase comfort level setting
Down	Decrease comfort level setting

2.4.4 Fan Only

When operating in Fan Only mode, the LED is illuminated and the display is as shown below. If the timer is active, the display shows the hours and minutes until the control will return to the Off state.



No timer set



Timer active

The fan speed can be adjusted between the limits of 1 and 9.
In the Fan Only Mode, the following key presses are available.

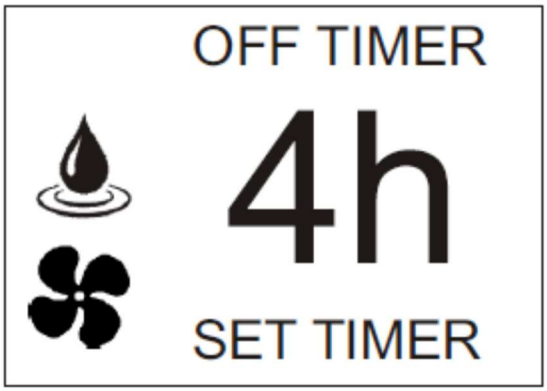
Key Press	Action
On/Off	Returns to the Off state
Timer	Enter Timer setup
Mode	Transition to Manual Cooling mode
Up	Increase fan speed
Down	Decrease fan speed

2.5 Timer Control

The TEK7DT allows either delayed turn off or delayed turn on. If the Timer Setting state is entered from the Off state, a time to On will be set. If the Timer Setting state was entered from one of the other Operating states then a time to Off will be set. The display indicates which is being set in the top part of the screen. The central part of the screen indicates the length of timer delay. The time may be set between 0 and 17 hours. Note that setting 0 hours will result in the timer being cancelled. When the timer expires, the TEK7DT will return to the previous operating Mode for an On timer and return to the Off state for an Off timer.

Note that pressing the On/Off button in one of the Operating states will cancel the timer.

On Time setting



Off Time setting

In the Timer Set state, the following key presses are available.

Key Press	Action
On/Off	Cancel timer setup and return to previous operating state
Timer	Enable timer with current setting
Mode	Cancel timer setup and return to previous operating state
Up	Increase time delay
Down	Decrease time delay

2.6 Appliance Status Indication

The Drip and Fan icons shall reflect the operating status of the pump and fan respectively. The icons shall be off whenever the fan and pump are off. When executing a pre-wet, the icons shall flash. When cooling, the fan icon shall rotate and the drip icon shall fall. In Fan Only mode, the drip icon shall be off and the fan icon shall be rotating.

2.7 Appliance Control

2.7.1 Control Levels

The voltages applied to the Fan and Pump outputs are shown in the table below.

State	Output	Level (V)
Off	Pump	> 3.5
On	Pump	< 3.0
Off	Fan	> 3.5
Minimum Speed	Fan	3.0
Maximum Speed	Fan	1.0

Note that the Maximum and Minimum Fan speed voltages can be adjusted with parameters.

2.7.2 Pre-wet

If there is a call for cooling in either Auto or Manual Cooling mode and the pump has been off for more than 30 minutes then a pre-wet will occur. The pump will run for 2 minutes before the fan is allowed to start. The pre-wet can be manually bypassed by changing to Fan Only mode and then back to Auto or Manual cooling.

The time before a pre-wet is initiated can be adjusted by varying the *Dry Time* parameter.
The pre-wet length can be adjusted by varying the *Prewet Time* parameter.

2.7.3 Manual Cooling and Fan Only Modes

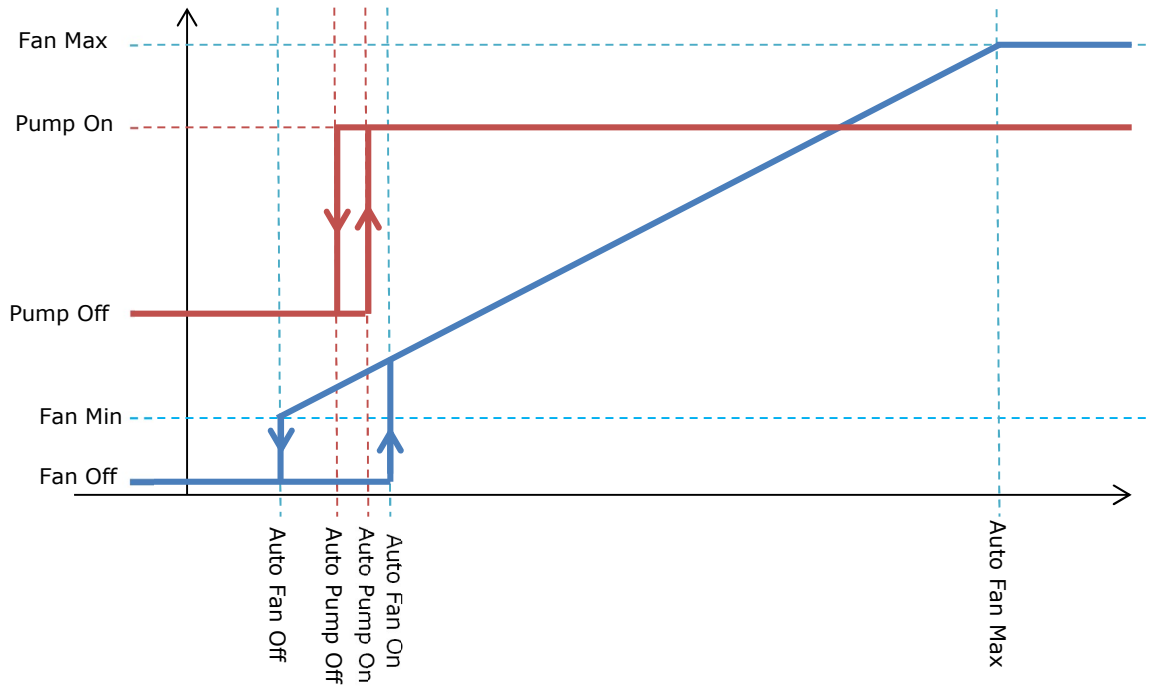
In Manual Cooling and Fan only mode, the fan speed is set as per the formula below.

$$Speed = (Level - 1) \cdot \frac{(MaxSpeed - MinSpeed)}{8} + MinSpeed$$

Note that the values of *MaxSpeed* and *MinSpeed* above are parameters.

2.7.4 Auto Cooling Mode

In Auto Cooling mode, the fan and pump operation is shown in the diagram below.



Five parameters control the performance of the fan and pump in Auto Cooling mode. In the sections below the term temperature difference refers to the difference between the Room temperature and the set temperature as determined by the auto level setting.

2.7.4.1 Fan Control

- Temperature differential less than *Auto Fan Off* – fan is off.
- Temperature differential is less than *Auto Fan On* and the fan is currently off – fan is off.
- Temperature differential is more than *Auto Fan Max* – fan speed is maximum.

For all other temperature differentials, fan speed ramps up as the difference between the temperature differential and *Auto Fan Off* as per the formula below.

$$Level = \left(T_{Diff} - AutoFanOff\right) \cdot \frac{\left(MaxSpeed - MinSpeed\right)}{\left(AutoFanMax - AutoFanOff\right)} + MinSpeed$$

2.7.4.2 Pump Control

- Temperature differential is less than *Auto Pump Off* – pump is off.
- Temperature differential is more than *Auto Pump* On – pump is on.
- For all other differentials, the pump state remains unchanged.

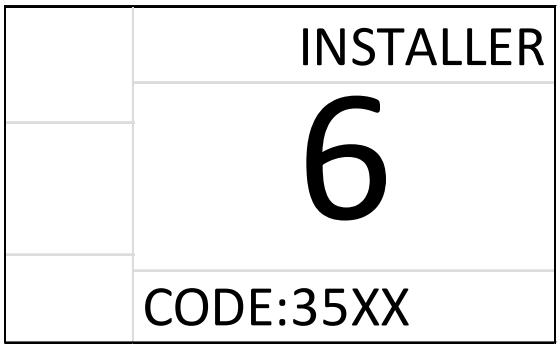
2.8 Special Access Modes

There are three levels of Special Access mode – Installer, Service and Factory. The method of initiating entry is different for each level but once initiated, the subsequent processes are the same. Entry into the Special Access modes is a two step process. From the Off state, pressing and holding the special key combinations will cause a transition to the Code Entry state. Once the correct code is entered, the TEK7DT will enter requested special access mode.

Access Mode	Key Press
Installer	Press & Hold Up & Down
Service	Press & Hold Timer & Mode
Factory	Press & Hold On/Off, Mode & Up

2.8.1 Code Entry State

In the Code entry state, the LED is off and the display is as shown below.



The text at the top of the display will show the access level as "INSTALLER", "SERVICE" or "FACTORY". The central section shows the value of the current digit and the bottom section shows the digits entered and those remaining.

In the Code Entry state, the following key presses are available.

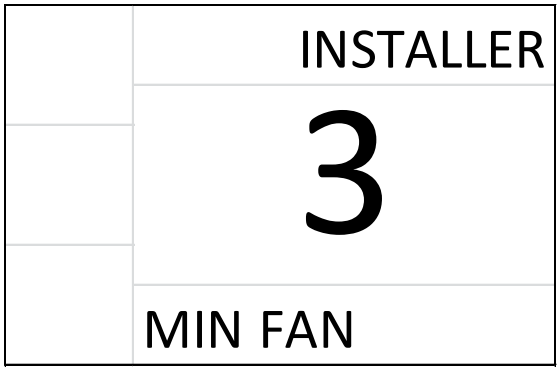
Key Press	Action
On/Off	Cancel and return to the Off state
Timer	Cancel and return to the Off state
Mode	Save the current digit value and step to the next digit or enter Installer mode
Up	Increase digit value
Down	Decrease digit value
Long time out	Cancel and return to the Off state

The key value to enter each special access mode is different. If the Mode key is pressed with the correct key code entered, the TEK7DT will transition to selected special access mode. If the key value is not valid, pressing the Mode button will just cycle through the digits. The key codes for each level are shown below.

Access Mode	Key Code
Installer	7452
Service	2791
Factory	0912

2.8.2 Special Access State

In the Special Access state, the LED is off and the display is as shown below.



The text at the top of the display will show the access level as "INSTALLER", "SERVICE" or "FACTORY". The central section shows the current parameter value and the bottom section shows the parameter that is being set.

In the Installer state, the following key presses are available.

Key Press	Action
On/Off	Return to the Off state
Timer	Return to the Off state
Mode	Save the current parameter value and step to the next parameter
Up	Increase parameter value
Down	Decrease parameter value
Long time out	Return to the Off state

The parameter values will automatically be limited to the maximum and minimum values allowed. Adjusting parameters pertaining to the fan speed will cause the fan to run at the parameter speed setting.

2.9 Parameters

The TEK7DT has the parameters shown in the table below. All parameters are stored in non-volatile memory.

Parameter	Level	Default	Minimum	Maximum	Units
Min Fan Speed	Service	3.0	2.0	3.3	V
Max Fan Speed	Service	1.0	0.8	2.0	V
Pre-wet Time	Service	120	30	240	Secs
Dry Time	Service	30	5	120	Mins
Show Temperature	Installer	0	0	1	
Auto Fan Off	Factory	0.5	0	4	Degrees
Auto Fan On	Factory	0.5	0	2	Degrees
Auto Fan Max	Factory	4.0	2	9.5	Degrees
Auto Pump Off	Factory	0.5	0	2	Degrees
Auto Pump On	Factory	0	0	2	Degrees

Notes on parameters

- The values for Min and Max fan speed represent the voltage applied to the fan control output.
- Auto parameters are differentials with respect to other parameters to ensure consistency of operation. The interpretation is shown in the table below.

Parameter	Meaning	Effective Default Value
Auto Fan Off	Actual temperature differential when the fan will switch off.	0.5C
Auto Fan On	Relative to Auto Fan Off. Fan will switch on at Auto Fan Off + Auto Fan On	0.5 + 0.5 = 1.0C
Auto Fan Max	Relative to Auto Fan Off. Fan will reach maximum speed at Auto Fan Off + Auto Fan Max	0.5 + 4.0 = 4.5C
Auto Pump Off	Relative to Auto Fan Off. Pump will switch off at Auto Fan Off + Auto Pump Off	0.5 + 0.5 = 1.0C
Auto Pump On	Relative to Auto Fan On (which is relative to Auto Fan Off). Pump will switch on at Auto Fan Off + Auto Fan On - Auto Pump On. This relativity ensures that the pump switches on before the fan.	0.5 + 0.5 – 0.0 = 1.0C

3 Environmental Requirements

3.1 Temperature

Nominal operational ambient -10-60°C.
Storage Ambient -20-80°C.

3.2 Humidity

10-95% RH, non condensing

4 Mechanical Requirements

4.1 Physical Size restrictions

The physical size of the enclosure has been designed to be compatible with a standard wall plate.

4.2 Enclosure Details
The enclosure shall be a 3 part moulding, the Wall Plate, Inner housing and Cover.
The PCB shall be mounted between the Wall plate and Inner housing.
There shall be openings at the top and bottom of the enclosure to allow natural draft airflow around the PCB and temperature sensor.

4.3 Mounting method
The TEK7DT shall be mounted vertically to the internal wall of a home.
Mounting screws pass though the Wall plate for affixing to the wall.
The remainder of the assembly clips to the Wall plate.
Cable entry shall be from the internal wall cavity through the rear of the wall plate.

4.4 Packaging
The packing shall be in one carton with a set of corresponding wall-plugs and screws in a plastic bag.

5 Authority Approvals

5.1 Standards to be met
Not applicable

5.2 Other
Not applicable