

'TEMPIO' THERMOSTATIC RADIATOR VALVE WITH REMOTE SENSOR

WHAT IS MY ROOM TEMPERATURE?

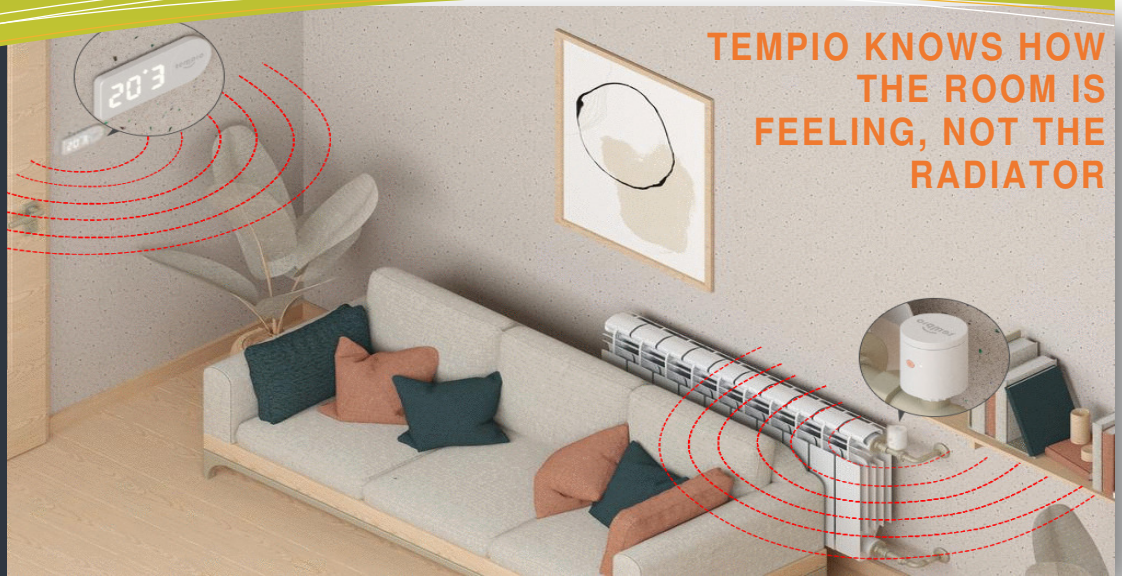
CHANGE THE MYTHS

What is my room temperature? This is a vital question everyone would like to know whenever to talk about the room's heating.

Virtually all manufacturers call the Temperature as showing on the TRV is your room temperature, but in reality, do we believe in this explanation?

Some manufacturers suggested to get to know your tentative room temperature; you need a few degree adjustments while using the TRV Apps depending on different application / areas by hit and trial methods. But still, there is no firm guidance as to what this will be.

All the TRV built-in temperature sensor needs different offset ranges when the radiator is cold/off. It will change when the radiator starts to warm up again, and the heat is generated. Therefore, simple one static offset value is not an ideal way to determine the actual room temperature.



ROOM TEMPERATURE - TIME TO LEARN THE TRUTH

Typically, a thermostatic radiator valve (TRV) is mounted close to the radiator, just within centimetres of the radiator body itself. We set the TRV temperature and expect the radiator to follow and maintain this temperature throughout the room, but unfortunately, this is not the case. The water temperature runs through the radiator varying between 65°C, and 75°C, where the TRV built in sensor eventually picking up the air temperature around its closed proximity, means next to a significant source of radiant heat from the radiator body thus call for the false temperature signal to the valve to operate. In disparity, the actual room temperature will be far less than the measured temperature of the TRV, and no set of rules will be able to tell us the correct room temperature at that time. Therefore, we believe that the TRV will maintain our room temperature according to the setpoint as incorrect but to some extent, misleading.

The difference between the room's actual temperature and the measured temperature on TRV is called the **temperature offset**.

The set temperature range will depend upon the Type of TRV's and the sensor's performance. However, it varies between 4°C to 8°C.

THE BIG INVENTION

This is where the Tempio Remote sensor concept comes in with the perfect solution for all type of radiators heating application i.e Panel radiator, Cast Iron radiator LST radiator with Cover or those areas where curtains or sofas have caused the obstruction around the radiator.



The inventive LED remote wireless smart sensor detects the ACTUAL room temperature and communicates with the TRV valve and synchronised wirelessly between the TRV and the remote wireless sensor, bringing revolutionary new creativity to achieved seamless room temperature desire and depose the hidden overheating problem once and for all.

You can place and install your remote sensor anywhere in the room then set the room temperature through your phone apps or voice command. The remote sensor continuously monitors the room air temperature and controls the TRV accordingly and keeps your entire room temperature as close as possible with your set point. one single remote sensor can control up to 4 Radiators valve instantaneously.



OVERHEATING, THE HIDDEN FACT

In the Image above, the desired room setpoint temperature is 18.5°C. In contrast, the TRV temperature shows 27.4°C is a lot higher then the intended setpoint, However, if we consider this as room temperature then this means the room overheated by 8.9°C (27.4°C - setpoint 18.5°C), Massive wastage of energy, but if we presume this as a TRV proximity temperature, not the actual room temperature, then the question is what is my room temperature and where can I find this?

We are all aware that whatever we have measured at the TRV end is not a room temperature, so the mystery still unresolved. The question still needs to be answered about how we can be sure the room temperature is maintained correctly.

EVERY DEGREE COUNT AND COST US

Every single degree temperature variant cost us around £85 to £90 a year based on the typical three-bedroom semi-detached house ^[4].

Low Surface temperature Radiator is another example where uncontrolled room/space air temperature is the primary concern. On all occasion where LST radiators are installed, the built-in TRV sensor must have an air movement restrictions and abstractions issue around the vicinity of the radiator thus prone to have more probabilities for incorrect temperature reading even with the optional external 2-meter capillary sensor installed. This will also not keep the room's desire temperature as that capillary also routed near the heated radiator anyhow.

ENERGY SAVING CONCEPT

Saving energy notion start from our electricity or heating consumption; half of your energy bills or two-thirds of the energy used is for space heating in our home.

There is a common perception that our heating bills constitute as fuel costs, but the reality is different, on the contrary, whatever fuel we are using to keep our heating system in operation is being used to cover the heat loss. The fewer the heat loss, the lower the energy bill, but unfortunately, we have minimal options to deal with this. The heat loss is directly related to our house's construction, better insulation, better construction U values will reduce the heat loss. However, an added contributed overheating or offset heating factor causes the energy cost to upsurge.

Another smart and productive energy-saving means to have better control of your room temperature, but this theory doesn't look workable if we have a vast offset temperature loss as stipulated i-e around 8.9°C as an above example using other Smart WIFI radiators Valve; however, we can get a substantial saving if we are able to reduce this offset overheating condition.



ASSESSING THE ENERGY SAVINGS

We have carried out a test for the Room temperature variances between standard WIFI TRV V/S Tempio TRV+ Remote Room sensor to assess energy saving. The test has been done on single panel Radiator with Radiator cover to find out which TRV's will save an overheating and maintain the room temperature closest to the set point

The Summary of the test results are the following:

Description	Standard WIFI TRV	Tempio WIFI TRV TP368 +RS
Setpoint temperature °C	20.0°C ^[1]	20.0°C ^[2]
Minimum temperature of the room recorded ^[3]	20.5°C	19.7°C
Maximum temperature of the room recorded ^[3]	22.9°C	20.4°C
Room Temperature variation	2.4°C	0.7°C
Average room temperature maintained	21.4°C	20.0°
Test Recorded Hours	24 Hours	24 Hours

Based on the table above and the following DATA test sheet, the highest room temperature was recorded with Tempio TRV and the remote sensor as 20.4°C, which is very close to the setpoint temperature. On the other hand, the highest room temperature recorded with other TRV was 22.9°C.

The test proved that with the Tempio TRV and remote sensor, the room had maintained the air temperature closest to its setpoint.

As per the following temperature comparison graph, it is also envisaged that the Tempio TRV has not only maintained the room temperature more preciously but saved extra overheating, which otherwise be the case with the standard TRV and may have caused additional energy burn at the boiler end



ITS ALL ABOUT SAVING BUT IN REAL TERM

As per the report published by the ^[4] ['The Department of Energy & Climate Change'](#) The simple temperature down by 2.0°C can save 3,900 kWh/y Energy.

If we imply these into our temperature offset variant temperature of 1.7°C saving due to Tempio TRV and a remote sensor, we could save around 3,315kWh/y energy equal to [610 kg carbon dioxide a year](#) ^[6]

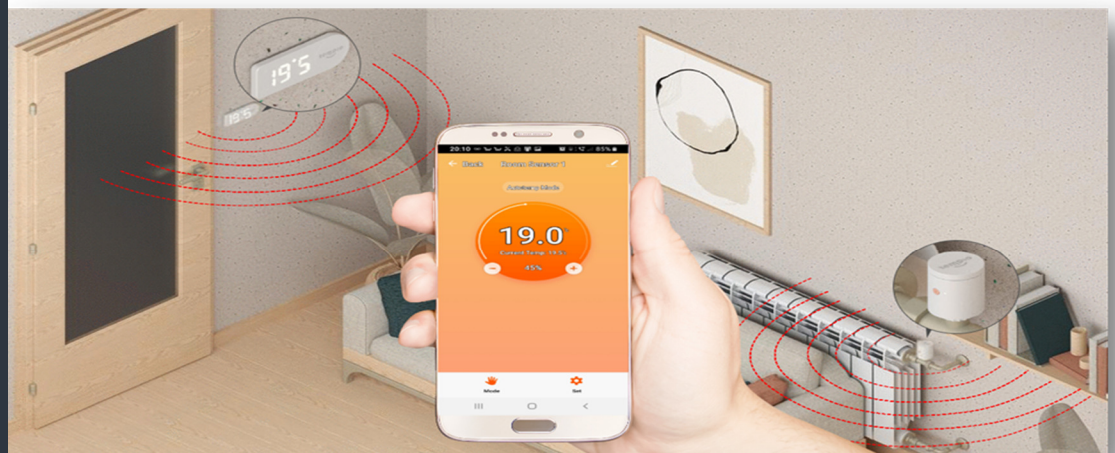
An alternate way to calculate the energy from 1.7°C is to consider average achieved temperatures drop and then multiply this with [the degree days](#) ^[4].

According to [another study](#) ^[5] Reducing the 1.7°C could save around £145 to £150 a year based on the typical three-bedroom semi-detached house with central gas heating.



References :

- ^[1] Setpoint temperature at TRV
- ^[2] Setpoint temperature at Remote Sensor
- ^[3] The calibrated temperature data loggers were used to have accurate room temperature readings instead of having TRV readings. We have also recorded the Standard TRV proximate temperature to ascertain the ΔT temperature variance (offset temperature) between the TRV and the actual room temperature.
The minimum temperature recorded around the Standard TRV: 19.6°C
The maximum temperature recorded around the Standard TRV: 25.9°C
- ^[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/128720/6923-how-much-energy-could-be-saved-by-making-small-cha.pdf
- ^[5] <https://www.energylivenews.com/2020/10/28/uk-homes-could-save-1-4bn-by-turning-thermostats-down-by-just-1c/#:~:text=An%20estimated%2017%20million%20households,by%20just%201%C2%B0C.>
- ^[6] save £75 and 320kg of carbon dioxide



ROOM TEMPERATURE LOGGERS FOR STANDARD WIFI TRV



File created on: 23-12-2020 19:29:51

Data Report

Device Information

Device Model: RC-5

Total Space: 32000

Storage Mode: --

Button Tone: --

Logging Interval: 0:0:50

Press Button : Enable

Alarm Tone: --

Logging interval shortened
in alarm: --

Start Time: 03-12-2020 19:35:00

Temperature Unit: °C

Trip Description

Serial Number: EFE203G04362

Trip Description: RC-5 Data Logger Room Temperature

Alarm Settings

H1: 24.0°C

Ideal Zone:

L1: 15.0°C

Alarm Status

Normal

Normal

Summary

Data Points: 3375

Maximum(Temperature): 22.9°C

First Alarm(Temperature): N/A

Maximum(Humidity): --

First Alarm(Humidity): --

First Reading: 03-12-2020 19:35:00

Minimum(Temperature): 20.3°C

Mean Kinetic Temperature (MKT): 21.4°C

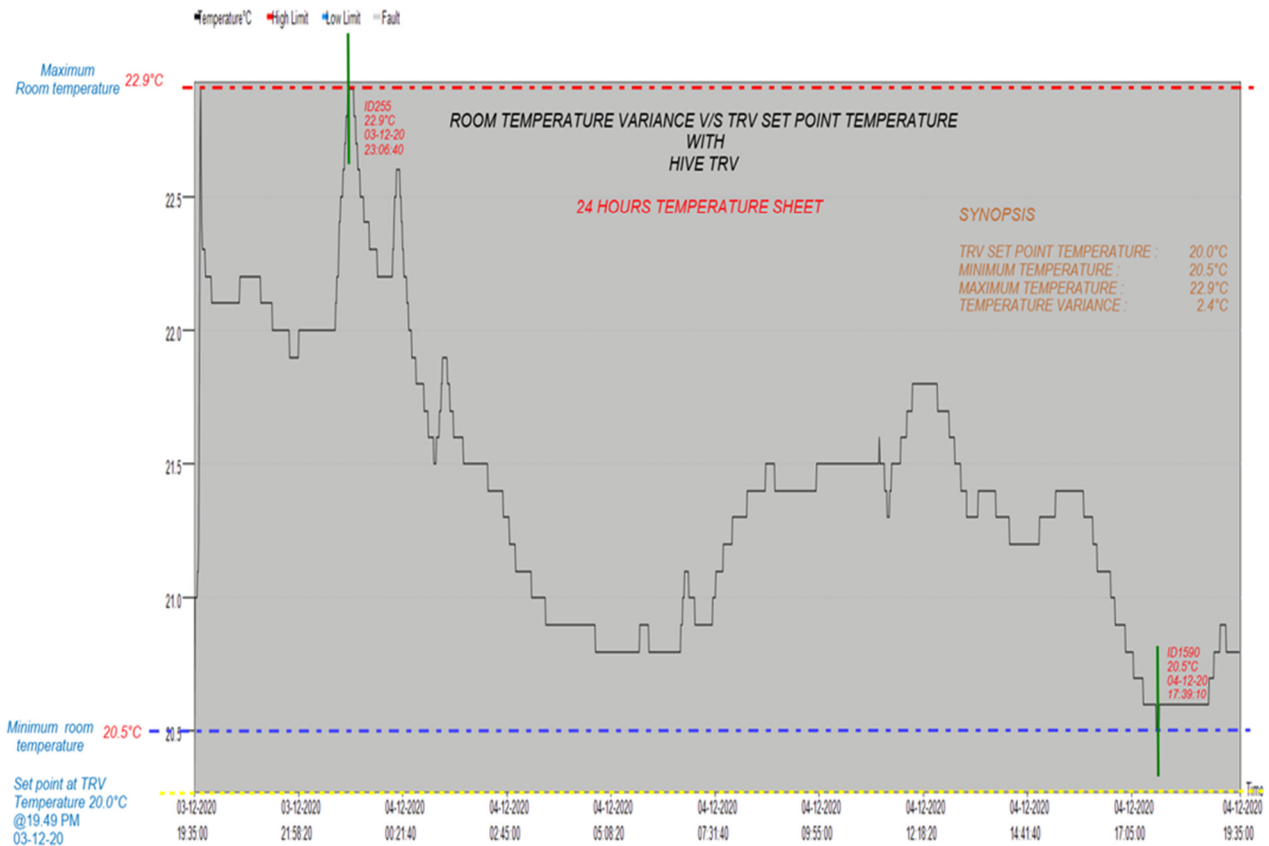
Minimum(Humidity): --

Last Reading: 04-12-2020 19:35:00

Average(Temperature): 21.4°C

Recorded Period: 1D 0H 0M 0S

Average(Humidity): --



ROOM TEMPERATURE LOGGERS FOR TEMPIO TRV WITH REMOTE SENSOR



File created on: 14-12-2020 15:48:50

Data Report

Device Information

Device Model: RC-5

Total Space: 32000

Storage Mode: --

Button Tone: --

Logging Interval: 0:30:0

Press Button : Enable

Alarm Tone: --

Logging interval shortened
in alarm: --

Start Time: 12-12-2020 20:27:07

Temperature Unit: °C

Trip Description

Serial Number: EFE203G04363

Trip Description: RC-5 Data Logger 4

Alarm Settings

H1: 24.0°C

Ideal Zone:

L1: 15.0°C

Alarm Status

Normal

Normal

Summary

Data Points: 87

Maximum(Temperature): 20.4°C

First Alarm(Temperature): N/A

Maximum(Humidity): --

First Alarm(Humidity): --

First Reading: 12-12-2020 20:57:07

Minimum(Temperature): 19.7°C

Mean Kinetic Temperature (MKT): 20.0°C

Minimum(Humidity): --

Last Reading: 13-12-2020 20:27:07

Average(Temperature): 20.0°C

Recorded Period: 1D 0H 0M 0S

Average(Humidity): --

