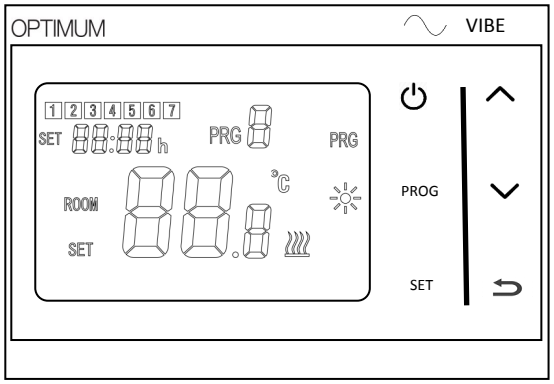
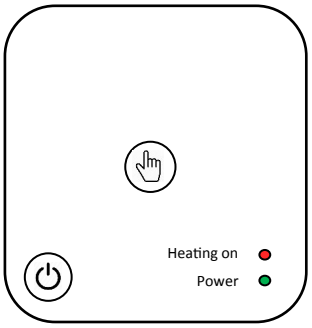
OPTIMUM VIBE PROGRAMMABLE THERMOSTAT - HOW IT WORKS



Transmitter



Receiver

Introduction to the OPTIMUM VIBE programmable thermostat

The OPTIMUM VIBE is a 868MHz Radio Frequency programmable thermostat. The receiver is battery-powered (2 x AAA alkaline), with a large backlit liquid crystal display and capacitive touch-style controls. It is supplied with a wall-bracket if required for wall mounting, and an alternative convenient desktop stand. The transmitter can be programmed with up to six different timed temperature periods. In addition, by touching the SET button, the thermostat can be put into a fixed-temperature manual mode, so you can use this programmable device as a simple manually controlled thermostat. The mains-powered receiver is designed to be permanently wired and wall-mounted adjacent to the boiler or heat source. There is an ON/OFF button and override / commissioning button, with Power and Heating on LED's. The receiver controls a volt-free changeover relay rated at 10A, so it is suitable for use with all types of combination boilers and electrical heaters up to 2kW.

The VIBE transmitter controls are capacitive switches represented by icons. They have no moving parts and operate like the touch-screen of a mobile phone.

Touching any icon will bring on the backlit display for 5 seconds. As soon as the backlight is on, touch any icon to carry out the desired action: ON/OFF to turn the transmitter ON or OFF; touch the PROG icon to put the transmitter into program run mode. Whilst in run mode, touch the PROG icon for 5 seconds to enter the programming mode; or touch the SET icon briefly to change from program mode, to manual mode, and again to go back to program mode. Touch the SET icon for 5 seconds to enter time & day setting mode; touch the UP or DOWN icons to change the temperature manually, or in program or settings mode, to change a value when it's flashing. Program entry and Settings actions will eventually time-out back to the run mode, or you can quit from those screens back to run mode by pressing the BACK icon.

Pre-commissioned - The transmitter and receiver are pre-commissioned so that they will communicate securely.

Temperature regulation techniques

The **default** temperature regulation technique is **ON/OFF**; the heating will operate until the set temperature has been achieved. The heating is then turned off until the room temperature falls back below the set temperature, and this cycle will repeat until the next programmed temperature change. The temperature differential is + / - 0.5^0C. The default ON/OFF settings mean the control set operates just like a traditional dial-type thermostat. ON/OFF temperature control is a Class I regulation technique, contributing 1% to system energy efficiency. The control set includes functions which are explained below, that are designed to save energy. These features are set to OFF to allow the user / installer to choose their preferred functions.

The user can select **Optimisation mode**: the control set operates to achieve the target temperature by the start of the next programmed temperature period. The Time interval is set according to the speed of reaction of the heating system, at 10, 15, or 20 minutes, which is the time allowed for the heating to increase the temperature by 1^0C. As the nights become colder in the autumn, the controller will bring the heating on a little earlier. As the nights become less cold in the springtime, the controller will bring the heating on a little later. These adjustments are made to achieve the desired temperature at the programmed time. If there is a sudden change in average overnight temperature, the controller may take a day or two to adjust. Optimisation is recognised within the UK Government BEIS (Department for Business, Energy and Industrial Strategy) 'smart control' criteria.

The user can also select **TPI mode**: TPI mode makes the thermostat act as a load compensator, by switching the heat source on and off at varying intervals, thereby reducing the average temperature of the water returning to the boiler. By operating in this way the thermostat will regulate the temperature more accurately, without the swings above and below the set temperature of an ON/OFF regulation device. TPI mode provides greater comfort, and can save between 6 to 10%* on energy costs, compared to a simple ON/OFF temperature regulation device. TPI mode is recognised within the BEIS 'smart control' criteria, being a Class IV regulation technique, contributing 2% to system energy efficiency.

** source: BRE Report September 2017 "Compensation and TPI Heating Controls"*

There is more detailed information about ON/OFF, Optimisation and T.P.I. modes on pages 3 & 4 of this guide.

You can set Frost Protection to OFF (- - in the display), or you can set a level between 5 & 15^{0}C. Even when the transmitter is switched off - and therefore not running the programmed heating temperature profile - the transmitter will monitor the room temperature and bring the heating on if the temperature falls below the set frost protection level.

Explanation recommended by the Energy Saving Trust:

What is a Programmable Room Thermostat?

A programmable room thermostat is both a programmer and a room thermostat. A programmer allows you to set 'On' and 'Off' time periods to suit your own lifestyle. A room thermostat works by sensing the air temperature, switching on the heating when the air temperature falls below the thermostat setting, and switching it off once this set temperature has been reached.

So, a programmable room thermostat lets you choose what times you want the heating to be on, and what temperature it should reach while it is on. It will allow you to select different temperatures in your home at different times of the day (and days of the week) to meet your particular needs.

Turning a programmable room thermostat to a higher setting will not make the room heat up any faster. How quickly the room heats up depends on the design of the heating system, for example, the size of boiler and radiators.

Neither does the setting affect how quickly the room cools down. Turning a programmable room thermostat to a lower setting will result in the room being controlled at a lower temperature, and saves energy.

The way to set and use your programmable room thermostat is to find the lowest temperature settings that you are comfortable with at the different times you have chosen, and then leave it alone to do its job. The best way to do this is to set low temperatures first, say 18^{o}C, and then turn them up by one degree each day until you are comfortable with the temperatures. You won't have to adjust the thermostat further. Any adjustments above these settings will waste energy and cost you more money.

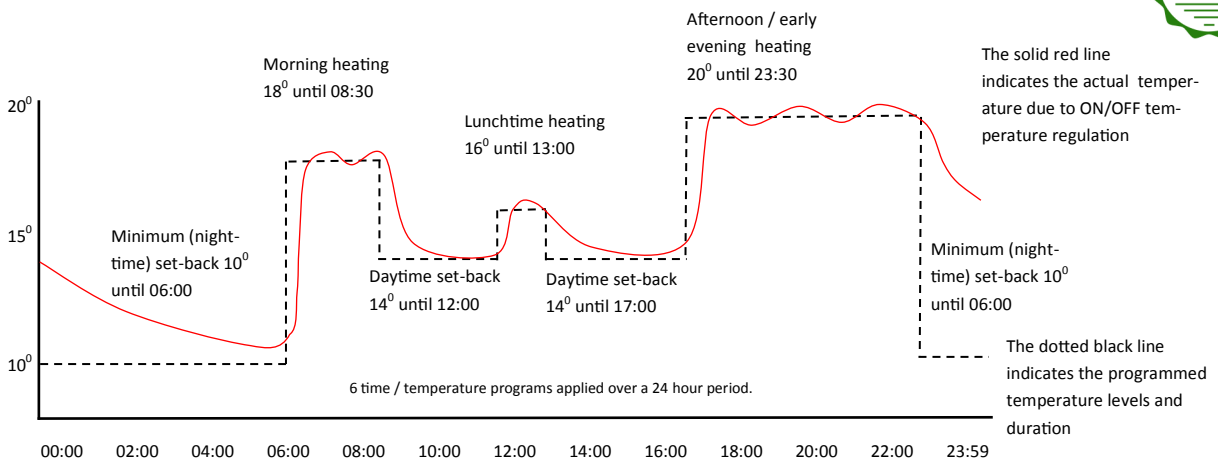
If your heating system is a boiler with radiators, there will usually be only one programmable room thermostat to control the whole house. But you can have different temperatures in individual rooms by installing thermostatic radiator valves (TRVs) on individual radiators. If you don't have TRVs, you should choose a temperature that is reasonable for the whole house. If you do have TRVs, you can choose a slightly higher setting to make sure that even the coldest room is comfortable, then prevent any overheating in other rooms by adjusting the TRVs.

The time on the programmer must be correct. Some types have to be adjusted in spring and autumn at the changes between Greenwich Mean Time and British Summer Time.

You may be able to temporarily adjust the heating programme, for example, 'Override', 'Advance' or 'Boost'. These are explained in the manufacturer's instructions.

Programmable room thermostats need a free flow of air to sense the temperature, so they must not be covered by curtains or blocked by furniture. Nearby electric or gas fires, televisions, wall or table lamps are likely to prevent the thermostat from working properly.

Temperature track for ON / OFF control: Central Heating time / temperature profile for 24 hour period



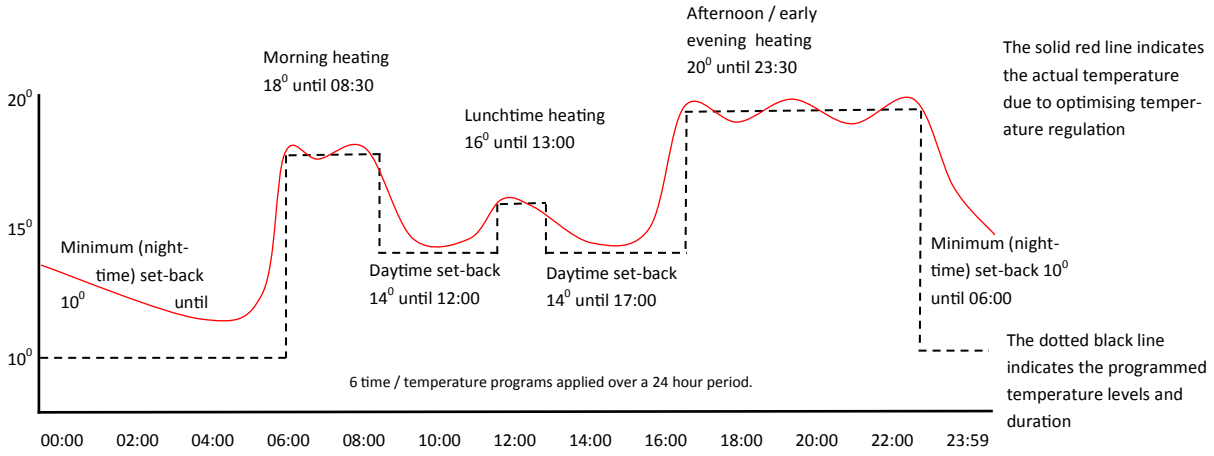
ON / OFF temperature regulation example:

5 temperature levels / 6 timed temperature changes

Summary: In the default ON/OFF regulation setting (NOr in the configuration screen), the heating will be controlled by switching On and Off around the set point, just like a traditional dial-type mechanical thermostat. The temperature will rise above, and fall below the set point, as the heating is alternately switched on and off.

If the thermostat is left in the default ON/OFF temperature regulation configuration, if the first program is 18⁰C at 06:00, the thermostat will switch the heating on at 06:00. If the ambient temperature in the property had fallen to 12⁰C, the temperature achieved by the heating will be governed by the rate of rise of temperature, which is the result of the heat output of the heating system, and the heat loss characteristic of the property. In this example, assuming that the temperature in the property increases by 1⁰C every 10 minutes, the temperature would only reach 18⁰C after one hour - i.e. at 07:00. The thermostat will switch the heating off 0.5⁰C above the set temperature, and switch back on again once the temperature has fallen 0.5⁰C below the set temperature, according to the differential or hysteresis set in the configuration menu (default hysteresis 0.5⁰C)

Temperature track for Optimising control: Central Heating time / temperature profile for 24 hour period



Optimising temperature regulation example:

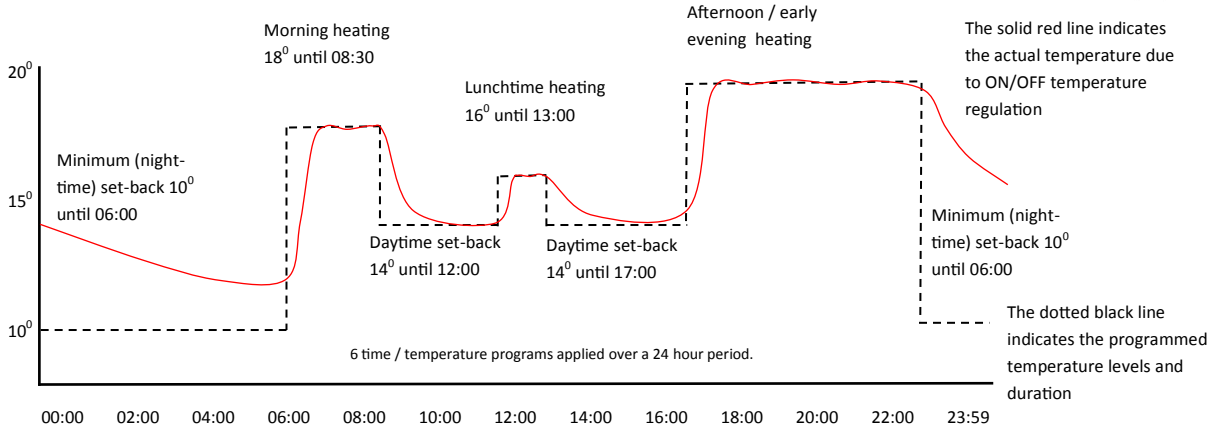
5 temperature levels / 6 timed temperature changes

Summary: If Optimisation regulation has been selected (OPs in the configuration screen) , the heating will be switched on early to achieve best results. This is not a fault, it's the way the device has been configured. Please read on to learn more about this temperature regulation technique.

If optimising temperature regulation is selected in the installation menu, this makes the thermostat 'optimise' the heating start-up times in order to achieve the set temperature at the set time. This means that the thermostat will monitor the actual temperature, and switch on early, in order to raise the temperature to the required level. For best results, the Time Interval (Ti in the configuration screen) should be set to match the speed of response of the heating system (see Installation Instructions). The actual temperature in-between heating periods is governed by the heat loss characteristic of the property, and the outdoor temperature: when it's colder outside the property loses more heat.

The thermostat learns or remembers the time taken to increase the temperature of the property, and adapts the optimisation period using multiples of the set Time interval to get the best result. If the outdoor temperature changes significantly, the thermostat must re-learn the rate of rise of temperature in the property, and adapt to a new start-up time.

Central Heating time / temperature profile for 24 hour period - temperature track for T.P.I. control



T.P.I. temperature regulation example:

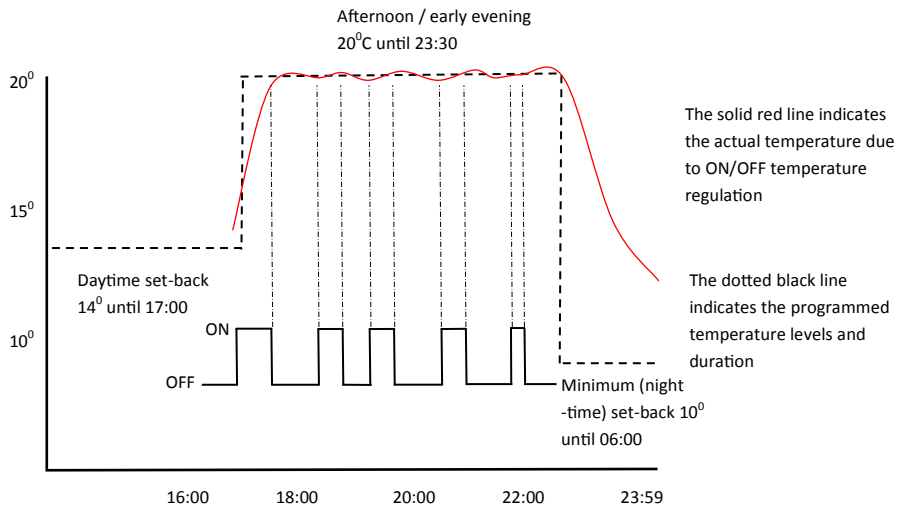
5 temperature levels / 6 timed temperature changes

Summary: If T.P.I. regulation has been selected, the heating will be switched On and Off according to an algorithm, which works out the best way to regulate the temperature as closely as possible to the set point. You must set Options 54 (heating cycles per hour) and Pb (proportional bandwidth) in the configuration menu to match the heating system response time and achieve the best control (see Installation Instructions)

When a building is heated, the temperature starts to increase. If the heating is switched off, the temperature will continue to increase for a short time, due to the remnant heat in the system, which has to pass from the radiators into the rooms. T.P.I. (Time proportional / Integral) temperature regulation technique is designed to work with this characteristic, to avoid over– and under-shooting the set temperature.

In practise, this means that the thermostat will switch the heating On, and monitor the rate of rise of temperature, until the temperature starts to approach the set point. **Before** the temperature reaches the set point, the thermostat will switch the heating Off, thus allowing the remnant heat to make-up the difference. The thermostat will continue to switch the heating On and Off in an anticipatory fashion, in order to keep the actual temperature as close as possible to the set point. The result is that the actual temperature will avoid the over- / under-shooting which results from the ON/OFF regulation technique. The benefit to the occupants is that energy is not wasted, and the temperature is more comfortable. According to the Building Research Establishment*, energy cost savings can be between 6 and 10% compared to a thermostat using a simple ON/OFF temperature.

T.P.I. control—heating ON / OFF characteristic in detail



The T.P.I. control technique will vary the ON duration within the cycle time, to achieve the most accurate temperature level. Minimising energy consumption, but maximising comfort.

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