Instructions

thermo Sphere

Electric heating made easy

# T-MO Electric Heating Thermostat

## Installation Guide

T-MO1 White RAL 9003

T-MO1B Matt Black

**Make it easy and get one of our experts to set T-MO up for you!**

1. Install your T-MO and make sure it has power.
2. Download the T-MO app and connect it to your wifi.
3. Go to Settings > Support and tick "Grant support access".
4. Book a setup call online at t-mo.pro or call 01622 689 440.

**Scan to book a setup or support call**

### Contents



### Features

- WiFi (2.4 GHz) and BLE.
- Open API for integration.
- Profiles: Home, Away, Night, Work.
- Direct Link.
- Bluefusion.
- 14 segment LED display.
- Internal room sensor.
- External room sensor (wired).
- External floor sensor (wired).
- 3 modes: Heat, Cool, Eco.
- Relay function (no temperatures).
- Power regulator.
- Temperature limiter.
- Temperature calibration.
- Hysteresis and PWM.
- ZeroX™ detection.
- Open window detection.
- Adjustable active brightness.
- Adjustable standby brightness.
- Single pole switch.
- Child lock.
- Overload protection.
- Overheat protection.
- Google Home and Amazon Alexa compatibility (pending).
- Weekly schedule in app.
- Copy & paste scheduling.
- Active power metering.
- OTA firmware updates.

### Maintenance

The device is maintenance free. For indoor use only.

Working frequency 2.4GHz. Max output power **xx.xxxdBm**. The distance between user and products should be no less than 20cm. There is no restriction to use this product across the EU countries.

### Technical data

| | |
|---|---|
| Protocol | Wi-Fi (2.4GHz)/BLE |
| Rated voltage | 230VAC 50Hz |
| Max load | 3600W 16A (resistive load) |
| Max current | 16A |
| Power consumption | <2W |
| Power regulator Time cycle | 30 min. |
| Ambient temperature | 5°C to 40°C |
| Regulation temperature | 5°C to 40°C |
| Storage temperature | -30°C to 70°C |
| Hysteresis | 0.3°C to 3.0°C (default 0.5°C) |
| Humidity | 10% to 85% RH |
| Compatible NTC sensors | 6.8, 10, 12, 15, 22, 33, 47, 100kΩ @ 25°C |
| Length of NTC sensor | Max. 50 meters |
| Screw terminals | Max. 2.5mm2 2Nm |
| IP Code | IP21 |
| Size (L x W x H) | 84 x 84 x 45.5mm |
| Approvals | CE, UKCA, PSTI, Nemko |
| Warranty | 5 years |

**Download the T-MO app for your device here:**

Android
Google Play Store

Apple
iOS App Store

Thermogroup Ltd hereby declares that this device is in compliance with the essential requirements another relevant provisions of Directive 2014/53/EU.

## 1. Introduction

T-MO1 is an electronic thermostat designed for electric heating and water based heating control. The T-MO1 can also function as a relay, allowing for simple On/Off functionality without a temperature setting.

**Controls**

The thermostat can be controlled via Wi-Fi or Bluetooth (BLE) using the T-MO App or with the buttons on the front of the thermostat. The thermostat features a user-friendly interface, and an easy-to-read and clear 14-segment LED display. The display can be set to switch off completely when in standby mode to prevent light pollution at night time.

**Modes**

T-MO has 3 modes: Heat, Cool and Eco.

**Installation**

It has a sturdy metal frame for secure fastening in a 35mm deep junction box. The thermostat has a built-in room temperature sensor. Two additional external temperature sensors may also be connected.

**Get remote expert setup and commissioning, and ongoing support**

If Wi-Fi is available, we recommend our expert setup and commissioning service. Simply connect T-MO to WiFi, allow support access in the app and book a setup call to have one of our experts set up your thermostat for you.

ThermoSphere will then take responsibility for ongoing remote technical support for the T-MO and the associated ThermoSphere heating system.

You can also use this feature at any time to get help and support.

**WiFi and Bluetooth connectivity**

The installer can also configure the system via Wi-Fi. If Wi-Fi is not available, the system can be configured via Bluetooth. After the system is set up, the installer can transfer the property to the customer. The customer can then add the system to their local Wi-Fi network.

When used with Wi-Fi, the thermostat can communicate over a local API, allowing the user to integrate it with a local gateway, server, controller that offers such a service, without the need to connect it to the cloud. The device also supports Amazon Alexa and Google Home (support for Amazon Alexa and Google Home is pending).

All ThermoSphere products with Wi-Fi support and marked with the T-MO logo, can be controlled via our T-MO App. In the app, you can create profiles such as Home, Away, Night and Work to easily control, monitor, and organize your connected devices, or control them via a weekly schedule.

**DirectLink to other products**

The thermostat can connect wirelessly to other devices via DirectLink and BlueFusion. It can be controlled by other thermostats, and it can also control other thermostats and relays.

**Active power metering**

T-MO features active power metering, providing real-time information about your power consumption. It also allows you to manually set the power metering value when connected to a contactor.

**ZeroX™ Technology**

The device is equipped with ZeroX™ technology, which ensures the relay switches at 0V when turning on and off. This technology significantly extends the thermostat's lifespan.

**Electrical Load Compatibility**

The thermostat is designed specifically for resistive loads. When controlling large resistive, capacitive, or inductive loads, it is essential to use an appropriate contactor to protect the thermostat from excessive load to ensure safe operation.

The thermostat can withstand a resistive load of up to 16A/3600W at 230VAC. For loads above 13A, we recommend using a contactor.

## 2. Installation Disclaimer

Installation must be done by a qualified electrician in accordance with national building codes. Before installation, disconnect the power to the device from the mains. During installation of the device, power to the device must be disconnected and the circuit must be safely isolated AT ALL TIMES!

## 3. Quick Start Guide

Upon connecting the device to power, it will automatically enter add mode for a duration of 60 minutes.

1. Switch off the mains voltage (disable the fuse).
2. Open the junction box.
3. Connect the wires according to the description in chapter "Connections". Optional: Connect external wired sensors.
4. After verifying the connections, switch on the mains voltage.
5. In the T-MO App, choose "Add Device", enter your Wi-Fi details, search for and select your device.
6. The thermostat will display "INCL" when the thermostat is successfully added.

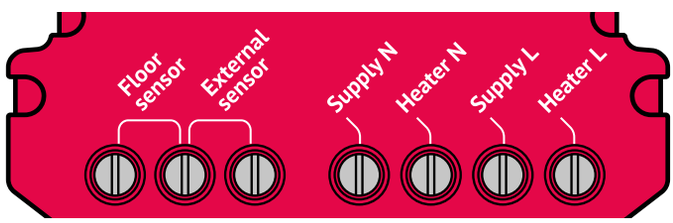
NB! If the connection fails, Err (error) will appear in the display.

## 4. Wiring connections

Max tightening torque for terminal screws: 2Nm.

If the cable used has multiple strands, using a end sleeve is advised. The product allows for wiring of cables with a cross section of up to 1x2.5mm2.

The screw terminals are accessible at the back of the device.




**Floor sensor**
NTC type 6.8, 10, 12, 15, 22, 33, 47 or 100kΩ. Default 10kΩ. No polarity.

**External sensor**
NTC type 6.8, 10, 12, 15, 22, 33, 47 or 100kΩ. Default 10kΩ. No polarity.

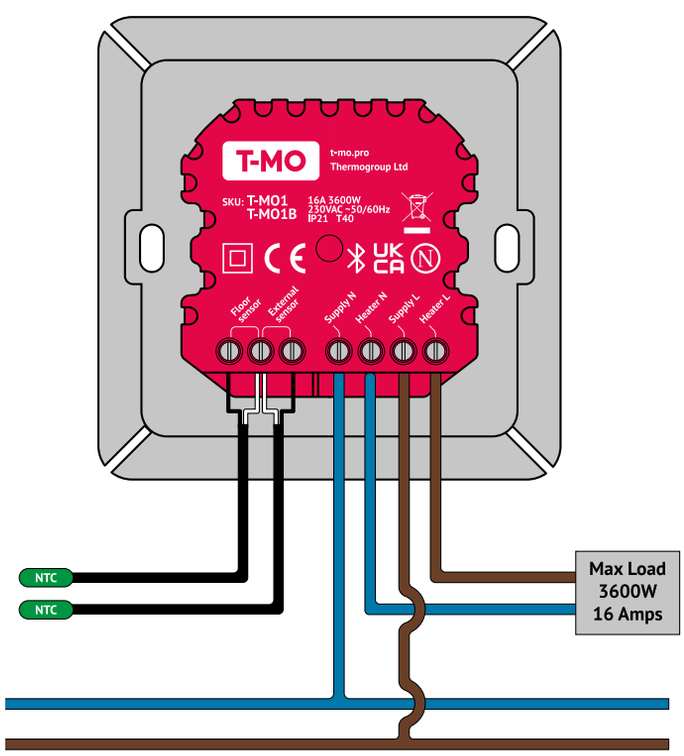
**Supply N**
Neutral connection to 230VAC supply circuit. Blue.

**Heater N**
Neutral connection to the heating circuit (load). Blue.

**Supply L**
Live connection to 230VAC supply circuit. Brown.

**Heater L**
Live230VAC connection to the heating circuit (load). Brown.

**NB:** The device is double insulated. The Earth/Ground connection must be made inside the back box in accordance with all relevant local wiring regulations.



## 5. Installation

Position the thermostat and mount it into the junction box using 2 screws.

Position the thermostat front over the part mounted in the junction box, then carefully press the front until it clicks into place.

In order to get power metering values, the load needs to be connected to both heating L + N.

**Never change the front from one thermostat to another. Doing so can affect the ZeroX function and damage the relay. This will void the warranty.**

## 5. Thermostat controls

| Icon | Name | Description |
|---|---|---|
| − | Left | Previous.<br>Decrease set temperature.<br>Decrease setting value. |
| ≡ | Middle | Menu confirm.<br>Menu enable. |
| + | Right | Previous.<br>Increase set temperature.<br>Increase setting value. |

## 7. Local settings menu

To enter the settings menu, hold the Center button for 5 seconds. The display will show "OFF". You are now in the settings menu. You can now scroll up and down using the Left and Right buttons. Some options have submenus. To navigate the submenus, press the Center button once to enter or exit the submenu. Press the Left and Right buttons to find your desired value and hold the Center button for 2 seconds to confirm your selection. "STOR" will appear to indicate settings are stored.

## 10. ADD/REMOVE

**Please read this before installation**

Upon connecting the device to power, it will automatically enter add mode for a duration of 60 minutes. During this time the device can be added to the app without starting add mode locally on the thermostat (skip to step 4 or 5 in chapter 10.1).

To remove a device, find the device in the T-MO App and choose "Delete this device". If the app is unavailable perform a "Factory reset".

### 10.1 Method 1: Wi-Fi and Bluetooth

Add mode is indicated on the device by rotating LED segments in the display. It indicates this for 90 seconds until a timeout occurs, or until the device has been added to the network.

Add mode may also be cancelled by performing the same procedure as for starting add mode.

When adding in Wi-Fi, skip step 5 below.

When adding to Bluetooth, skip step 4 below.

1. Hold the center button for 5 seconds. The display will show "OFF".

2. Press the "+" button once to see "CON" in the display.

3. Start the add mode on the thermostat by clicking the center button to see "APP" then holding the center button for approximately 2 seconds.

4. In the T-MO App choose "Add Device", enter your Wi-Fi details, search for your device and select it.

5. In the T-MO App choose "Add Device", choose "Add Bluetooth" device, search for your device and select it.

When a device is added to Bluetooth it is not accessible from the internet. You need to be within Bluetooth range of the device to control it.

The device is now ready for use with default settings.

**NB!** When the device is removed from the T-MO App, the parameters are reset to factory defaults.

If connection fails, please perform a "Factory reset" and try again.

### 10.2 Method 2: QR Code

The QR-Code can be used for inclusion, simplifying the adding procedure. The QR code can be located on the product.

1. Hold the center button for 5 seconds.

The display will show "OFF".

2. Press the "+" button once to see "CON" in the display.

3. Start the add mode on the thermostat by clicking the center button to see "APP" then holding the center button for approximately 2 seconds.

4. In the T-MO App "Add Wi-Fi device" or "Add Bluetooth device".

5. Press the QR Code button in the bottom right and scan the QR code on the device.

## 12. Factory reset

Enter the menu by holding the center button for about 5 seconds, navigate in the menu with the "+" button till you see "FACT". Press the center button until you see "----" blinking in the display, then hold for about 5 seconds to perform a reset.

You may also initiate a reset by holding the right and center buttons for 60 seconds.

When either of these procedures has been performed, the thermostat will perform a complete factory reset. The device will display "RES" for 5 seconds while performing a factory reset. When "RES" is no longer displayed, the thermostat has been reset.

## 13. Thermostat modes

The thermostat has 3 modes: HEAT (heating), COOL (cooling), and ECO (energy-saving mode with reduced heating setpoint). You select "HEAT", "COOL" or "ECO" via the MODE menu option, or by adjusting Parameter "Operating Mode (MODE)".

## 14. Functions

### 14.1 Thermostat mode (THER)

When the device is set to THER, it will operate as a normal thermostat and switch the heating on and off according to the measured temperature and temperature set point.

Some configuration parameters and menu options are limited to Thermostat mode.

### 14.2 Relay mode (RELA)

When the device is set to RELA, it will work as a relay without any temperature regulation. While it is in Relay mode, the display can be set to show a number of different items.

Some configuration parameters and menu options are limited to Relay mode.

## 15. Standby and main screen

When the thermostat remains untouched for a while, it will automatically go to the standby screen. The standby will by default show the setpoint temperature.

By pressing any button once, you will see the measured temperature. By pressing the Left or Right button multiple times, you will change the setpoint.

## 16. Temperature shown on display

During standby the display shows the setpoint temperature by default.

You can change what is shown by choosing either measured temperature "RELT", or the setpoint "SETT".

You select "SETT" or "RELT" by holding down the middle button for 2 seconds on the "MODE" menu item, or by changing the parameter "Temperature display" setting.

## 17. Sensor selection

The thermostat has multiple sensors and sensor modes. This lets you configure the thermostat to work correctly in most installations. The sensor mode/operating is selected from the menu option "OPER", or by setting Parameter "Sensor mode" ("OPER").

**Available sensor modes:**

F Floor sensor

A Internal room sensor

AF Internal room sensor + Floor sensor

A2 External room sensor

A2F External room sensor + Floor sensor

PWER Power regulator mode (no sensor used)

EXT External wireless sensor

RELA Relay functionality

**Floor Sensor Requirement and Temperature Limiting**

The temperature limits are by default - Minimum 5°C and maximum 40°C.

Some types of flooring require the use of a floor sensor to ensure that the floor temperature does not exceed 27°C. Refer to the floor manufacturer's manual for specific guidelines.

When the thermostat operates in AF or A2F mode, the floor temperature limiter is automatically set to 27°C (default).

In all other sensor modes (A, F or A2), the temperature limits are set to minimum 5°C and maximum 40°C.

## 18. External wireless sensors (EXT)

The thermostat allows you to choose EXT as a sensor mode.

When EXT is chosen, the device uses the temperature received from an external wireless sensor which is linked with the devices through a DirectLink.

If the device detects loss of communication with the DirectLinked device, the thermostat will revert to using a different sensor, or turning Off the thermostat. By default, it will revert to the internal sensor.

You may change what happens on loss of communication by changing the "External sensor fallback" setting.

## 19. Selecting sensor value

The thermostat allows the selection of multiple different resistance values for the NTC sensors. Both sensors must use the same NTC value.

The supported sensor values are as follows: 6.8, 10, 12, 15, 22, 33, 47 or 100KΩ. You select "SEN" via the menu option, or by setting "Sensor value (SEN)".

## 20. Min and max temperature settings

The thermostat allows you to set minimum and maximum temperatures for the connected sensors. You set the values via the "MIN" and "MAX" menu options.

| Menu Item | Description |
|---|---|
| ALO | Internal (ambient/air) sensor minimum temperature limit. |
| FLO | Floor sensor minimum temperature limit. |
| A2LO | External sensor minimum temperature limit. |
| AHI | Internal (ambient/air) sensor maximum temperature limit. |
| FHI | Floor sensor maximum temperature limit. |
| A2HI | External sensor maximum temperature limit. |

## 21. Calibration

If the temperature sensor readout is inaccurate, you can correct it by up to ±6°C. You calibrate using the CAL menu option and selecting the appropriate sensor or by adjusting "Internal sensor calibration (CAR)", "External sensor calibration (CAE)" or "Floor sensor calibration (CAF)" settings. The app and thermostat then shows the calibrated value.

## 22. Brightness

The display brightness for active and standby states are managed separately. You can set the values using the "BRIT" menu option or by setting Parameters "Active display brightness" and "Standby display brightness".

BR1 - Active display brightness,

BR2 - Standby display brightness.

## 22. Principles of regulation (Thermostat)

The thermostat uses temperature readings from the internal sensor and/or from external wired sensors, it regulates the temperature using either hysteresis (HYST) or PWM based on your choice.

You select "HYST" or "PWM" via the REG menu option, or by setting Parameter "Regulation mode".

**Hysteresis**

Hysteresis sets the offsets that are used with the setpoint to determine when the load is switched on and off relative to the measured temperature.

You can adjust the thermostat hysteresis, choosing values between 0.3°C and 3.0°C. The default setting is 0.5°C. When using water-based heating, we recommend a hysteresis of 1.0°C.

You may change the hysteresis by entering the local settings menu and holding the Center button for 2 seconds when "REG" is displayed. Here you can choose values between 0.3 and 3.0. It can also be changed by setting Parameter "Temperature control hysteresis".

**Pulse-width modulation PWM**

With PWM regulation enabled, the thermostat will regulate based on duty cycles. The thermostat is turned on and off in percentage intervals of the cycle. The amount of time the relay will be on is based on how far the measured temperature is from the setpoint.

## 24. Open window detection (OWD)

Open Window Detection (OWD) is a function which will reduce the thermostat setpoint on detection of an open window. This happens when the temperature sensor registers a rapid temperature drop.

When OWD is activated, the setpoint is reduced to 5°C in order not to waste energy. OWD will automatically be cancelled if it has been active for more than 1 hour, or if the temperature increases by 3°C. OWD can also be cancelled manually by increasing/decreasing the setpoint with the Left and Right buttons.

You enable or disable "OWD" via the OWD menu option, or by setting Parameter "Open window detection".

## 25. Size of heating load

The device has active power metering, but in some cases, you might want to adjust the measured value, for example if the load is switched by a contactor instead of directly by the thermostat.

By default, it is set to 0 and it uses the active power metering values. You can adjust it in increments of 100W up to 9900W, using the "LOAD" menu option or by setting Parameter "Size of Load".

## 26. KWH value in the menu

The device supports power metering to give insight into the power consumption of the connected heating system. The total consumption of the device can be seen from the "kWh" menu option. Enter the "KWH" submenu by pressing the middle button once to see the total consumption, hold the middle button for 2 seconds within the "KWH" submenu to reset it.

## 27. Display icons

| Icon | Description |
|---|---|
|  | The relay is on in Heating or Relay mode. |
|  | The relay is on in Cooling mode. |
|  | The current WI-FI signal strength. |
|  | There is an active Bluetooth connection. |

## 28. Child lock

Child lock prevents local button operations on the display. Hold the Left and Right buttons for 10 seconds. When enabled, "LOCK" appears on the display. When unlocked, "OPEN" is shown.

## 29. Direct Link

DirectLinks are direct connection between one or more supported devices. A DirectLink will send specific commands to Linked devices when events are triggered on the primary device.

### Setting and Removing DirectLinks

A DirectLink can be set directly from a device, from the app and from the API. When creating a DirectLink directly from the device, the Link set will depend on the Primary and Secondary device capabilities.

### Thermostat - Transmitting capabilities

| Link name | Description |
|---|---|
| Relay control | Control external relays based on the status of the thermostat's relay. |
| Primary thermostat | Send Thermostat mode and Setpoint. |

### Thermostat - Receiving capabilities

| Link name | Description |
|---|---|
| Secondary thermostat | Receive Thermostat mode and Setpoint and regulate based on them. |
| External wireless sensor | Receive temperature reports from an external temperature sensor, if the sensor mode is set to "EXT", the thermostat will use the temperature to regulate the connected heating system. |

### Relay - Transmitting capabilities

| Link name | Description |
|---|---|
| Relay control | Control external relays based on the status of the thermostat's relay. |

### Relay - Receiving capabilities

| Link name | Description |
|---|---|
| ON/OFF | Receives ON/OFF commands from another device to mirror the relay state. |

## 30. Bluefusion

BlueFusion is a function that allows Bluetooth-exclusive devices to also communicate on Wi-Fi, enabling them to be controlled via API commands.

BlueFusion requires that both a Bluetooth-only device and a Wi-Fi-compatible device are added to the same property in the T-MO app.

Once added, you can choose which Wi-Fi device the Bluetooth device should use as a communication bridge from an overview in the app.

## 31. Open API

The device features an Open API, enabling integration and remote control over the internet without requiring the use of our app. This means the device can be integrated into any system capable of sending and receiving data through an API, allowing developers to build custom solutions and automate interactions using standard HTTP requests.

## 32. Configuration parameters

T-MO products are designed to work out of the box. Some device configuration may be needed to alter the functionality to better serve user needs or unlock further enhanced features. The complete list of parameters can be found on thermosphere.com.

## 33. Display indicator

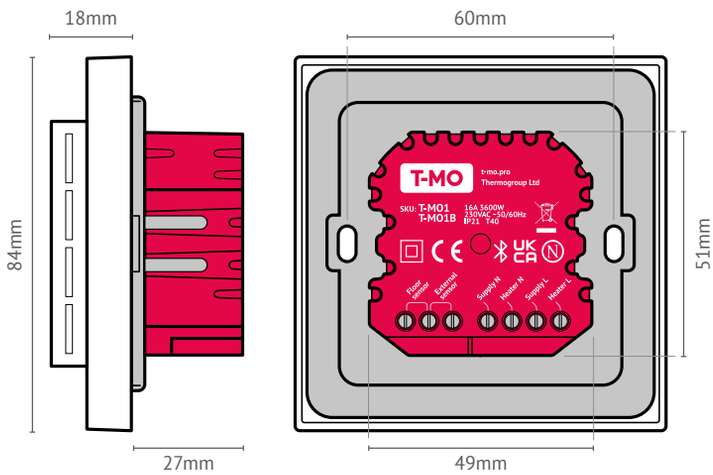
The device has an indicator that will flash on the display. This can be used while including to identify a device, and allow for it to be linked to the correct room within the T-MO App.

## 34. Firmware updates - OTA

It is possible to update a Wi-Fi T-MO product using the integrated "Over The Air" (OTA) update function. The product must be added to the T-MO App using Wi-Fi, and the product must have access to the Internet.

Go into the settings on the device you want to update and press "Update Firmware" button. This will check if a newer version is available, if there is one, it will be downloaded and installed.

## 35. Dimensions




## 36. Placement in junction boxes

T-MO must be installed in a 35mm deep backbox to allow adequate space for all of the required cables within the backbox.

When two or more thermostats are mounted too close to each other, the heat they emit can interfere with the internal temperature sensors and the temperature in the junction box can become too high. This can cause inaccurate temperature readings, especially under high load, leading to incorrect heating control.

To avoid such issues, thermostats should be installed as far apart as possible and always in separate junction boxes. This ensures more accurate temperature readings.

## 37. Safety features

T-MO has safety features to ensure safe operation and warn the user of any faults or unexpected behaviour. T-MO has an Overheat and an Overload function. If the thermostat registers an Overheat or Overload incident, the thermostat will switch off and an error will appear in the display.

### Overheating

The device features internal temperature sensors that detect overheating. It warns the user and turns off the relay to prevent any damage.

When overheating is detected, the device will:

- Turn off the relay.
- Display ERR6 in the display.
- Send a notification to the T-MO App.

### Overload

The device features a 16A overload protection. The overload triggered if there is a current draw of more than 16A.

When an overload is detected, the device will:

- Turn off the relay.
- Display ERR7 in the display.
- Send a notification to the T-MO App.

### Sensor failure

The device has the ability detect when there is no sensor connected or the sensor is broken or otherwise defective, causing an open circuit.

When a sensor error is detected, the device will:

- Turn off the relay.
- Display the relevant error in the display.

To clear a "Sensor not connected" error the device has to be disconnected from the mains, and the wiring and sensor(s) need to be checked. When the fault is resolved the mains can be reconnected and the device will function normally again.

### 38. Error codes

If you encounter an error code, try removing and reattaching the front of the thermostat to restart the device. If the issue persists, it is recommended to contact an electrician or support for further assistance.

| Error code | Description |
|---|---|
| **ERR** | **Connection failed.** Re-try adding to your network. |
| **ERR1** | **Internal error.** Usually a fault. Contact support. |
| **ERR2** | **Radio error.** Usually a fault. Contact support. |
| **ERR3** | **Internal error.** Usually a fault. Contact support. |
| **ERR4** | **Floor sensor error.** You may have selected F, AF or A2F sensor mode without a sensor connected to the correct terminals. The sensor may be damaged. |
| **ERR5** | **External sensor error.** You may have selected A2 or A2F sensor mode without a sensor connected to the correct terminals. The sensor may be damaged. |
| **ERR6** | **Overheating.** Contact an electrician. |
| **ERR7** | **Overload.** Contact an electrician. |

### 39. Other display messages

The following messages will sometimes be displayed on the screen:

| Display | Description |
|---|---|
| **LOCK** | **Child lock activated.** Buttons locked by child lock. |
| **OPEN** | **Child lock disabled.** Buttons active. |
| **STOR** | **Settings stored.** Changes have been saved. |

### Disclaimer

We develop and design our products in accordance with our strict quality requirements (ISO 9001) and environmental requirements (ISO 14001). All electrical installations must be carried out by a competent professional electrical installer. The product must be installed in accordance with our instruction manual and national building codes. Any wrongful installation, misuse or damage of the product is not covered under warranty.

Updated documentation is available at www.thermosphere.com. Thermogroup Ltd will not be held liable for any type of errors or omittances in our product information. Product specifications may change without further notice.

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

### App Connection

We

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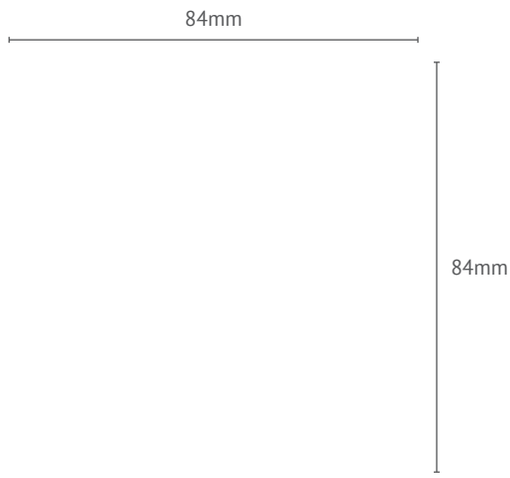
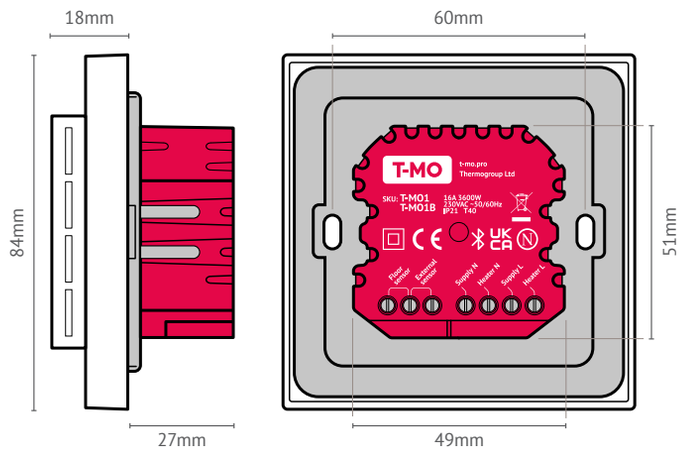
## Product dimensions

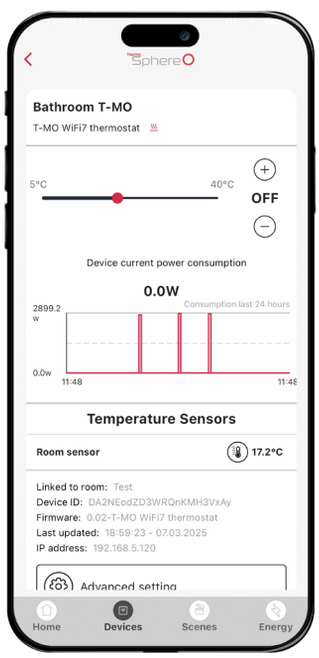


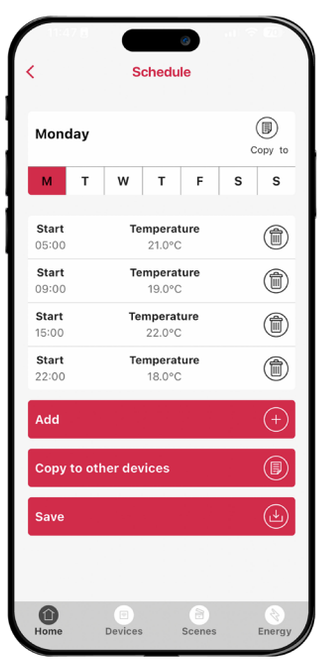




## The T-MO app

Use Bluetooth or direct WiFi to connect to your thermostat and access all the settings, scheduling and power metering data.

If you have more than one thermostat you can copy schedules and settings between them.




## Remote setup and support made easy

Give our technical team secure support access from inside the app.

Your thermostat will be professionally commissioned for you and set up with:

- An efficient heating schedule.
- Optimised settings for your system.
- Remote technical support if you need it.

Download on the App Store

GET IT ON Google Play

## Box contents

- 1 x T-MO thermostat.
- 2 x Fixing screws.
- 1 x NTC10K floor sensor probe (3m).
- 1 x Quick start guide.