Wi-Fi Programmable Temperature Controller User Guide

This is a digital, programmable, proportional-integral-derivative (PID), web-enabled temperature controller (Wi-Fi Programmable PID Thermocontroller). It provides an excellent and simple way to control temperature to closely match a target value. PID control accounts for error accumulating over time and allows the system to self-correct. Once the temperature exceeds or drops below the target value input in the program (temperature value), the PID controller starts accumulating error. This accumulated error informs the decisions that the controller makes to limit overshoot in the future, resulting in better control over the programmed temperature.

Our Thermocontroller has a Wi-Fi access point named 'ThermoController'. Once you connect to this you can access the controller management system via a web interface. You can connect using any device that has a web browser (e.g. PC, tablet, TV, smartphone, others with Wi-Fi) and with any operating system (Windows, Linux, iOS, etc.).

You can change existing temperature curves and create new ones with the curve editor. Simply drag the points on the graph to the desired position and then drop them. You can also use the text fields below to enter more specific values manually. The resulting slopes are automatically calculated for convenient datasheet comparison.

Features:

- Easy to create new kiln programs or modify existing ones.
- No limit on runtime – the kiln can fire for days.
- Micro-processor with Self-learning algorithms.
- Status can be viewed via Wi-Fi from multiple devices at once – computer, tablet etc.
- Firing cost estimate.
- NIST-linear conversion for accurate K-type thermocouple readings.
- Kiln's internal temperature can continue to be monitored after the program has ended.

Technical specifications:

- Voltage input: 110V - 240V AC
- SSR input current: $</= 16mA$
- SSR input voltage: $>/= 3V$
- Thermocouple sensor: K-type

How to use this Wi-Fi programmable t-controller:

To use this Thermocontroller, please ensure that your device can operate on a Wi-Fi connection and that it has a web browser. You can use a PC, laptop, tablet, or smartphone with any operating system (Windows, Linux, iOS, Android, etc.).

Once you have turned the kiln 'ON', open the Wi-Fi connection manager on your device, disconnect from any previously connected Wi-Fi networks, find the new 'ThermoController' network and connect to it. The password is 'ThermoController' as well.

Next, open your web browser and type '192.168.4.1:8888' in the address bar (or search field), then click 'Go' or 'Enter' on your device. You will see a web interface open, which will allow you to manage and program the Thermocontroller (see **Figure 1**).

Figure 1. Thermocontroller web interface: (1) Current temperature; **(2)** Current programmed temperature; **(3)** Remaining time until program ends; **(4)** Completion progress; **(5)** Pre-set program list; **(6)** Edit selected program; **(7)** Add/save new pre-set program; **(8)** Start/Stop button.


Choose the program you need from the dropdown menu (**Fig. 1, Label 5**), then click 'Start' or 'Stop' (if your program is already underway) (**Fig. 1, Label 8**). You will see a pop-up window appear showing the title of the program you have chosen to run, the estimated run time, and the approximate electricity consumption and cost needed to complete the program (**Fig. 2**). Please note that the electricity consumption and cost are very rough estimates and are only there to give you an approximate idea of the amounts required. These estimates do not guarantee that the electricity used and cost incurred will be exactly the same as the amounts stated.

Please also note that **Label 1** and **Label 2** may differ for the first 5-10 minutes due to temperature stabilisation processes inside the thermocouple, chamber and thermocontroller. During these first 5-10 minutes, the temperature may differ by 5-7⁰C for LOW temperatures (<500⁰C) and 1-3⁰C for HIGH temperatures (>500⁰C). In addition, please note that if your kiln has an additional temperature controller with a separate thermocouple, the difference between both controllers (temperatures) may be higher or lower as the two thermocouples are in different positions.

Next, you can confirm and start the chosen program by clicking 'Yes, start the Run'. Alternatively, if you want to change something then you can click 'No, take me back', which will take you back to the original web interface window.

Figure 2. Pop-up window showing program name, run time, and estimated electricity consumption:
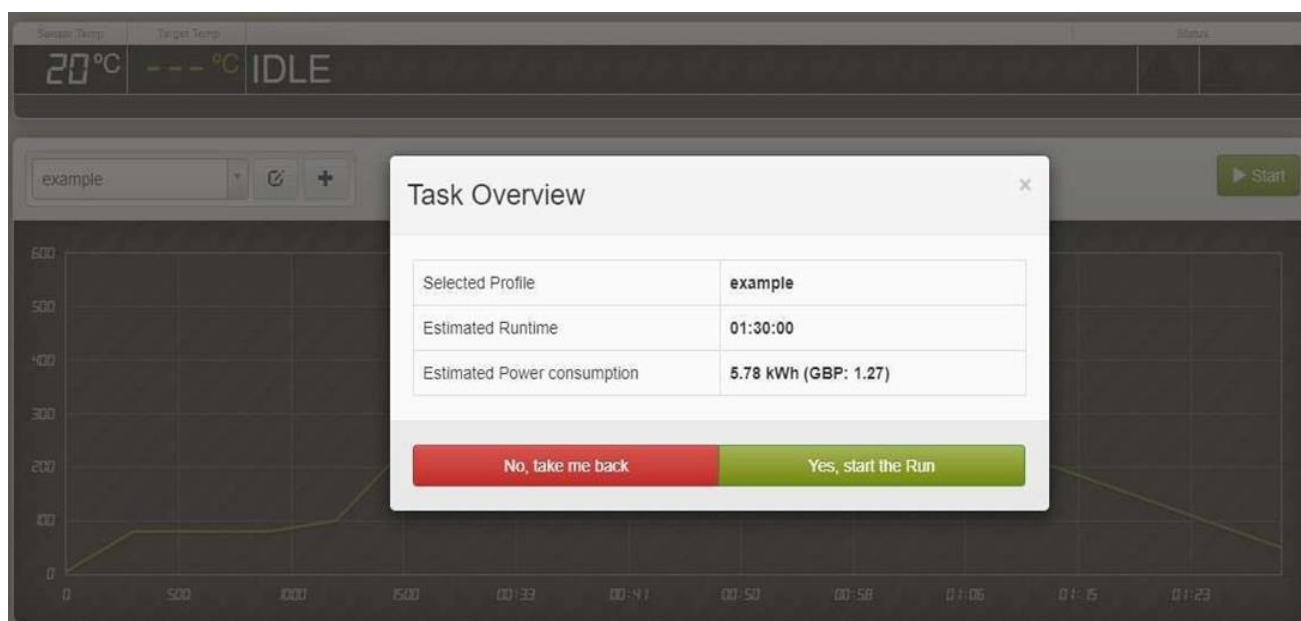

How to create a new program:

In the main interface window click on the '+' button (**Fig. 1, Label 7**) to start creating a new program. An empty editor window will open (**Fig. 3**). You can add or delete individual program steps by clicking '+' or '-'. If your program does not need to be highly accurate, you can drag the white dots corresponding to each program step you created onto the graph to your chosen location. You can do this by clicking and dragging with your mouse (PC, laptop) or tapping and dragging with your finger (smartphone, tablet). Later, you will also be able to edit the points in the text input mode.

Please note here that, for your convenience, this chart will show the TIME scale in a combination of seconds, minutes and hours, depending on your program.

If you need to input highly accurate temperature/time coordinates, then you can do this directly in the text input mode by clicking the button labelled **1** in **Figure 3:**

Figure 3. Editor Window. Y-axis – temperature, x-axis – time.
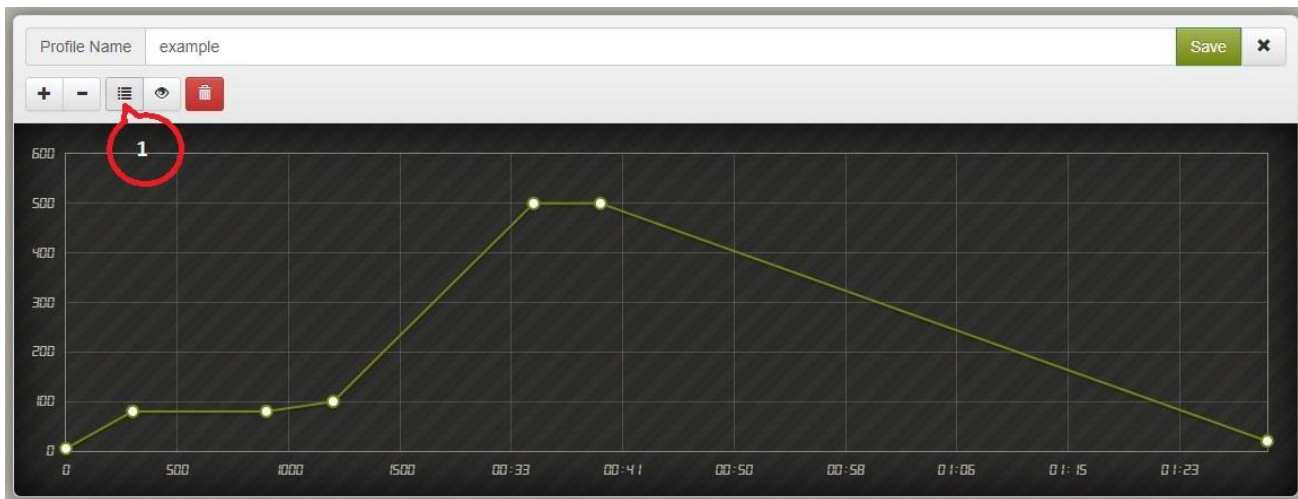
Once you have clicked this button, you will see a window open (see **Figure 4**).

PLEASE NOTE: the times you input in the 'Target Time in Minutes' fields correspond to the x-axis (**Fig. 3**), i.e. the time elapsed since the start of the program. They do **NOT** correspond to the duration of each step!

Here is a breakdown for the example program shown in **Figure 4**:

Step 1: Always start ANY program at 0 minutes and 5⁰C (the starting temperature should be lower than the temperature of the room in which the kiln is).

Step 2: Increase the temperature to 80⁰C within 5 minutes (type 80 and 5 into the second row).

Step 3: Maintain the temperature at 80⁰C for 10 minutes (type 80 in the temperature column and 15 in the time column – this is the 10 minutes in step 3 plus the 5 minutes in step 2).

Step 4: Increase the temperature to 100⁰C within 5 minutes (type 100 for the temperature and 20 for the time – this is the previously calculated 15 minutes plus the 5 minutes in this step). And so on.

Figure 4. Text editor window showing an example of program step input. Here you can input accurate time and temperature values for each step of the program.
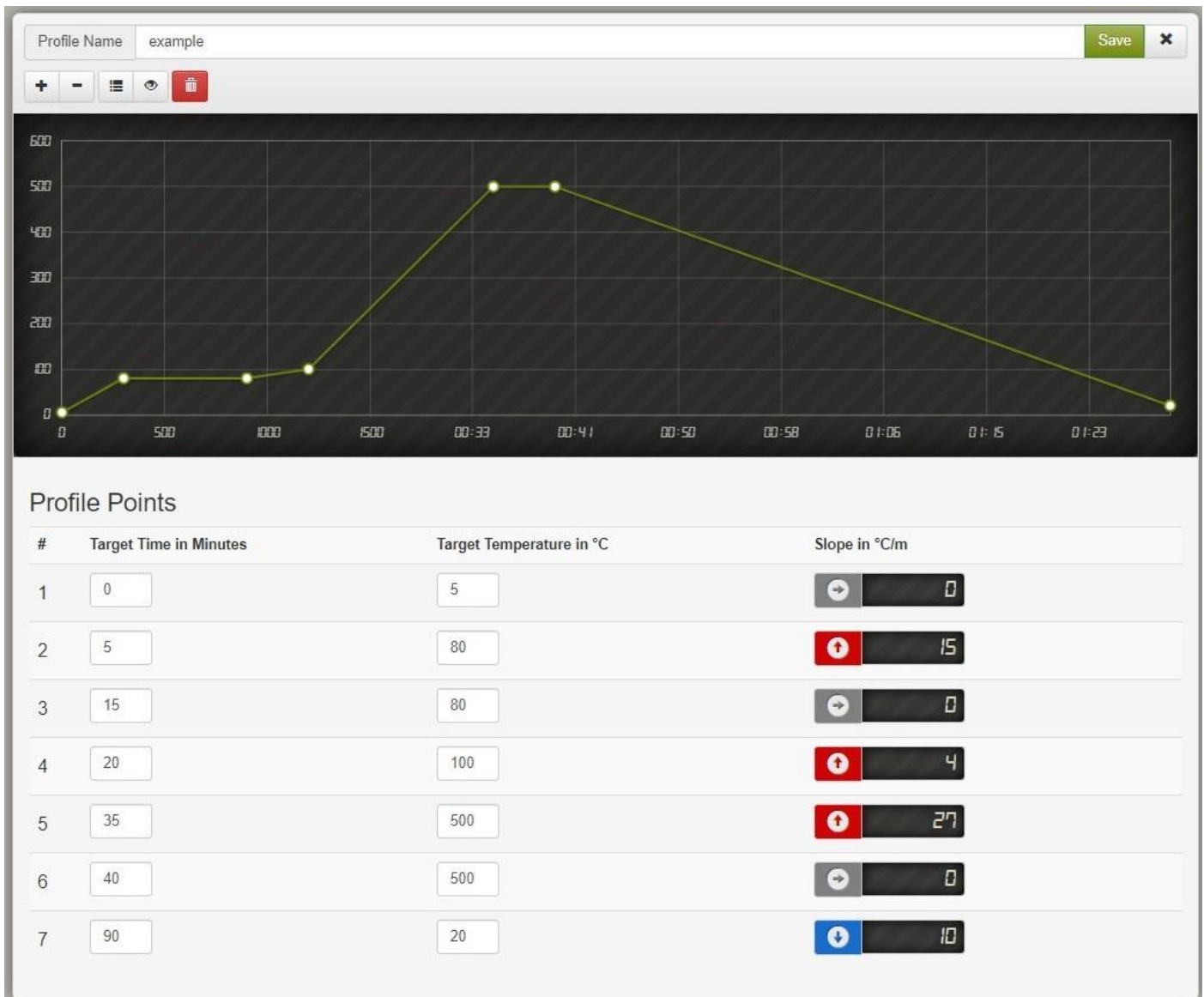
Once you have filled in all the values in your program you can save it by entering a program title of your choice in the 'Profile Name' field and then clicking/tapping on the 'Save' button. Next, press 'Start' to start your project(s).

PLEASE NOTE that in order for your new program to be saved into the program list for future use, your kiln should be turned 'ON' during the whole programming process.

Please also note that:

A: When your program starts you will see two different charts on screen:

- The **green chart** shows the set program.
- The **white chart** shows you where your program is NOW.

If an incorrect timescale was set then there may be a few degrees' difference between the two charts. For example, you cannot heat your kiln up to 1000ºC in 10 minutes if your kiln is not a gas-heating kiln and you cannot cool your kiln down from 300ºC to room temperature in 5 minutes as your kiln is not a freezer. The kiln is properly insulated, which means that heating or cooling takes time. By conducting a few tests, you will find the correct time parameters for each temperature you need. This will help you to minimise differences between the two charts.

B: You will also see some 'candlesticks' (white vertical bars) on the WHITE chart during any heating processes. You can ignore these; they represent an additional signal automatically sent to test the thermocouple connections and their sensitivity. The real temperature inside the chamber will remain as programmed.

C: Please do not put the thermocontroller in any place prone to temperatures over 50°C. If you place the thermocontroller in a box, you must ensure that the temperature within that box does not exceed 40-50°C. If the temperature in the box does get quite high, you should ensure that the box is adequately ventilated.

D: If it is not yet connected, please use a special extension K-type wire or a 0.5 mm^2 multicore copper wire to connect the thermocouple to the thermocontroller. A twisted pair cable is preferred.

E: If you are planning to use more than one of our controllers at home then you should let us know before or immediately after placing your order. We can then set up your controllers to have different IP addresses so that there is no IP conflict when you start using them.

F: When one program (chart) finishes and you start a new chart, the old chart will still be visible on the screen for comparison purposes. As soon as you start the new program, the old chart will be automatically deleted from the screen.

SAFETY

This Wi-Fi programmed controller is very easy to use and does not require any professional knowledge. Usually, it can be installed in a metal or plastic electrical box and then not require any maintenance or attention at all. However, if other people, including children, can access the controller or your programming device, then it is a good idea to always check your chart before starting a program, to ensure that it has NOT been accidently changed. This will help you avoid damaging the items you are firing inside the chamber.

HAVE MORE QUESTIONS? CONTACT US:

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