# cooling and heating thermoshaker with pid fuzzy control

Cooling and heating thermoshaker combines PID intelligent temperature control technology and DC brushless motor drive system, which can efficiently complete a variety of operations such as heating, cooling and oscillation of samples.

## Cooling and Heating Thermoshaker

## Main Features

1. Multi-use design: Independently control heating, oscillation, timing functions for flexible configuration and improved equipment utilization.
2. Metal module design: Excellent thermal conductivity and temperature uniformity; easy module replacement enhances practicality and longevity.
3. Fast heating & accurate temperature control: Rapid heating and precise control ensure reliability of experimental results.
4. Microprocessor control system: Guarantees temperature stability and uniformity, adapting to varied experimental conditions.
5. Low noise DC brushless motor: Ensures stable, quiet operation and long life with minimal maintenance.

6. LCD display: Real-time monitoring of temperature, oscillation speed, and other data for convenient operation and setup.
7. Short oscillation function: Supports rapid, transient mixing/shaking operations for agile sample handling.
8. Temperature calibration: Built-in calibration ensures precise temperature measurement for high-accuracy experiments.
9. Stable oscillation speed: Accurate, low-fluctuation mixing for consistent results with various sample types.
10. Alarm function: Audible signal upon program completion for timely experimental response.
11. Power failure recovery & auto power-on: Automatically resumes operation after outages, preventing data loss.
12. Cooling function (TH10R model): Semiconductor refrigeration enables sample cooling during experiments.

## Core Advantages

1. Efficient multi-functional integration: Combines heating, cooling, and oscillation for flexible, efficient experiments without frequent equipment swaps.
2. Accurate temperature control & homogeneous mixing: PID system and oscillation ensure uniform sample temperature and consistent mixing.
3. Fast response & high stability: Rapid heating, precise control, timely cooling, and short oscillation enable high-efficiency experiments.

4. Intelligent control: Automated operation via microprocessor and smart programming, reducing manual input and boosting accuracy/safety.
5. Low maintenance, long life: Brushless motor and modular design reduce upkeep and extend service life.
6. Flexible application: Power recovery, auto power-on, and refrigeration module support complex experimental needs.

## Working Principle

1. Heating: Built-in heating module uses PID control for uniform, accurate temperature elevation, preventing sample damage.
2. Cooling (TH10R): Semiconductor refrigeration rapidly cools samples for temperature-sensitive experiments.
3. Oscillation: Brushless motor drives adjustable-frequency mixing (up to 3000rpm) for homogeneous sample preparation.
4. Intelligent control: PID and microprocessor system monitor/adjust temperature and mixing, with power recovery and timer reminders for convenience and safety.

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| **Model** | **TH10** | **TH10R** |
|---|---|---|
| Temperature range | ambient+5°C to 100°C | ambient-20°C to 100°C |
| Temperature resolution | 0.1°C | |
| Temperature accuracy | ≤0.3°C | |
| Temperature uniformity | ≤0.3°C | |
| Speed | 200 rpm to 1800 rpm | 200 rpm to 1500 rpm |
| Orbit diameter | 3 mm | |
| Temperature rise time | ≤12 minutes, 25°C to 100°C | |
| Refrigeration method | no | peltier |
| Temperature reduction time 1 | fan cooling | ≤10 minutes, 100°C to 25°C |
| Temperature reduction | fan cooling | ≤15 minutes, ambient to ambient-20°C |

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| **Model** | **TH10** | **TH10R** |
|---|---|---|
| time 2 | | |
| Multi-point operation | 5 points | |
| Multi-point cycle operation | 99 cycles | |
| Timer | 1 second to 99 hours 59 minutes or continuous | |
| External dimensions | 260x196x150mm | |
| Power supply | 230Vac, 50-60Hz | 110Vac to 220Vac, 50-60Hz |
| Weight | 7.0kg | 7.5kg |