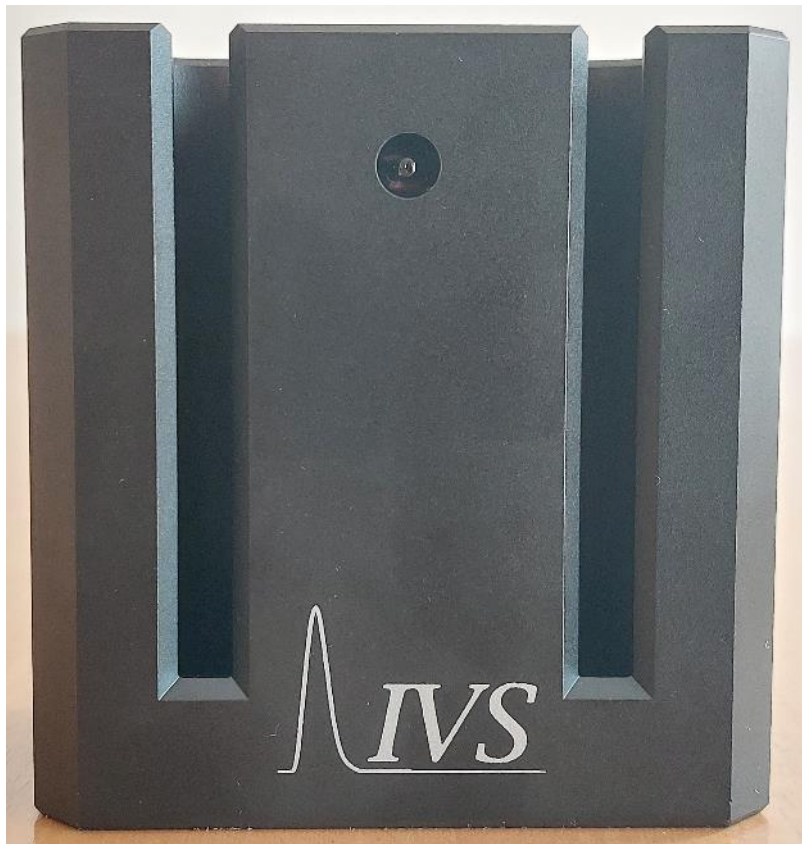


Essential Medium Heater



Instructions for Use

This guide serves as an operating manual for the Laboratory Dry Block Heater “Essential Medium Heater”, in the following also referred to as “device”.

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Copyright © 2025-2026 InVitroSys GmbH
Igelgarten 10
82166 Gräfelfing
Germany

info@invitrosys.com

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2 General Safety Instructions

2.1 Intended use

The Essential Medium Heater is designed to quickly heat aqueous culture medium in a 50 ml laboratory tube to 38°C in a laboratory environment.

The device is exclusively intended for indoor use or for use at room temperature on heat-resistant surfaces.

The specific country and institutional safety requirements for operation of electric devices in laboratory environments and for handling of biomaterial must be adhered to.

The Device is **not** intended for use in private households.

2.2 User requirements

The device as well as all device accessories shall be operated only by trained personnel with the knowledge required for handling electric devices in laboratory environments.

Users must observe the specific country, institutional and laboratory safety instructions for handling of biomaterial and must wear adequate personal protection equipment (gloves, lab coat, safety goggles, and face mask, if applicable). Please carefully read this operating manual and the instructions for use of accessories before use and make yourself familiar with the operation of the device.

2.3 Limits of use



Do not operate the device in environments in which explosives are used.

Do not use this device with explosives or highly reactive substances.

Do not use this device with substances or material that may produce an explosive atmosphere.

Do not use this device to heat up flammable liquids.

Due to its design, the Essential Medium Heater is not suitable for use in a potentially explosive atmosphere because parts can get hotter than 38 °C and may therefore ignite explosive materials.

The device shall only be used in a safe environment, for example in the open-plan environment of a vented laboratory or inside a laminar flow bench with a metal surface. Always place the device on heat-resistant, non-flammable materials. The user shall be responsible for any risk arising from the use of such substances.



The device shall only be connected to power supplies delivering 12V DC and at least 3.5 A.

The Essential Medium Heater must only be operated with 12V DC. Power supplies exceeding 12V DC may lead to device damage and possibly to dangerous electric shock, i.e. personal injury.

2.4 Hazards that may arise from intended use



Hot Surfaces on the device can cause pain and burns. Before touching the device make sure its temperature is within a tolerable range.

Do not fill water or any other fluid directly into the device. This can cause device damage with subsequent personal injury.

Do not heat up or insert any inflammable fluids when the device is running.

Do not use a defective power supply! Defective power supplies can lead to safety risks such as electric shocks, fires, or damage to the device

Do not use with broken tubes. Spilled medium may damage the device and is difficult to clean.

3 Description of the Product

3.1 Scope of Delivery

1x Medium Heater Block
1x Universal Power Adapter (EU, UK, US und AU)

3.2 Technical Data

3.2.1 Medium Heater Block

Dimensions	85 mm x 55 mm x 89 mm (W x D x H)
Weight	ca. 540 g
Power Input (while heating up)	ca. 40 W
Power Input (temperature maintenance)	ca. 5-6 W
Fix Temperature target value	38 °C
Environment	For indoor use only
Ambient temperature	0 °C to 35 °C
Ambient relative air humidity	10% to 80%

3.2.2 Power Unit



Input	100...240V AC (50-60Hz), 1.2A
Output	12 V DC, 3.5 A
Maximum Output Power	42 W
Barrel connector	5.5 x 2.1 x 10 mm, positive centre 
EMC interference	EN 61326-1/EN 55011 – Category B
EMC immunity	EN 61326-1

3.3 Working principle

The device operates using a robust temperature-control concept that combines

- (1) continuous electronic temperature regulation and
- (2) a hardware-level over-temperature safety switch.

The system is designed to reliably maintain a block temperature of 38 °C while preventing unsafe temperature elevations even in the event of a software or electronic malfunction.

3.3.1 Temperature Measurement

A high-precision temperature sensor is embedded inside a bore in the center of the aluminum heating block. This arrangement ensures that the core temperature of the block is measured, providing an accurate thermal reference unaffected by surface fluctuations.

Because the block has a large thermal mass, its temperature changes slowly and predictably. This allows stable regulation without overshoot and ensures uniform heating of the inserted 50 mL laboratory tubes.

3.3.2 Temperature Regulation

The device uses a single-point control strategy:

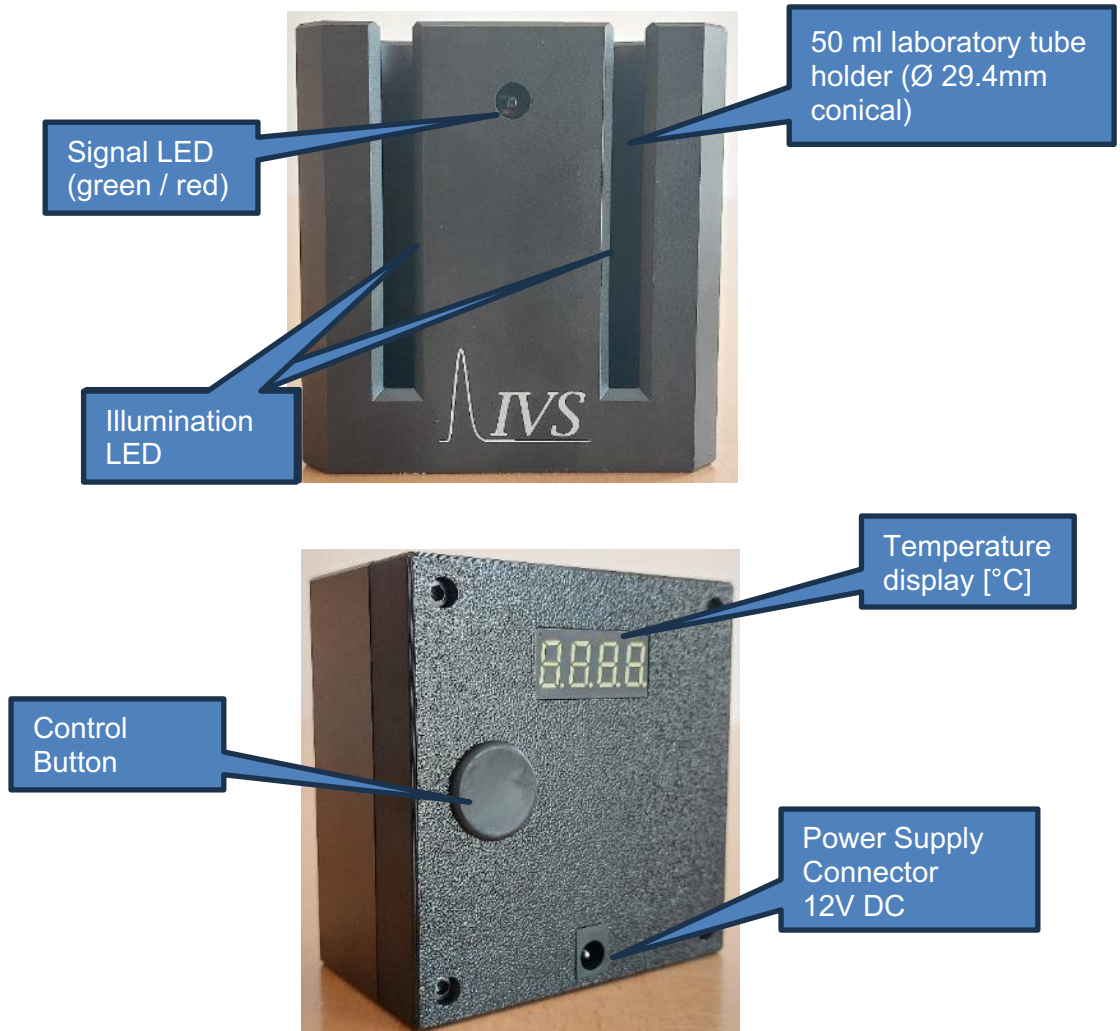
- If the measured temperature is below the setpoint (38 °C), the heater is switched on.
- If the measured temperature is at or above the setpoint, the heater is switched off.

3.3.3 Hardware Over-Temperature Safety

In addition to firmware-controlled regulation, the device features a dedicated hardware over-temperature protection. A thermal switch permanently cuts the power to the heater when the aluminum block temperature exceeds approximately 50–52 °C. This mechanism is independent of the microcontroller and the software.

4 Operating Instructions

4.1 Product overview and components



4.2 Operation

Operation is carried out exclusively via the button on the rear of the medium heater.

4.2.1 Turning the illumination light on and off

A short press on the button (press and release the button briefly, i.e. for less than 1 second) switches the LED lighting on or off.

This status is stored in a fail-safe manner and restored the next time the device is started up.

4.2.2 Heating process

The medium heater has a fixed target temperature of 38 °C. When turned on it will heat up to that temperature and then keep it until it is turned off. For heating curves, see the appendix of this manual.

- Pressing and holding the button (press and release the button for >1s and <4s) starts or stops the heating process.
- This status is stored in a fail-safe manner and restored the next time the device is started up.
- The current temperature is shown on the display (on the back of the device). The status LED (green/red) indicates the current status of the heating process.
- LED off: Heating is switched off
- Static red: Heating is switched on, setpoint (38 °C) has not yet been reached.
- Static green: Heating is switched on and the setpoint temperature has been reached (38°C ±0.5°C)
- Flashing red: Cyclical flashing (1Hz) of the red LED indicates that the setpoint temperature has been exceeded by more than 0.5°C (> 38.5 °C)

4.2.3 Temperature display

The current temperature of the block [°C] is shown on the display.

Note that the shown temperature is not necessarily equal to the temperature of the medium inside the tube.

The dot (in the 4th position) flashes when the display is updated and thus indicates that the heater is functioning.



4.2.4 Heating up cold medium

When warming up cold medium, it depends on the amount of medium (up to 50 mL) and the starting temperature of the medium how long it takes until the medium has reached a temperature of 36 - 38 °C.

Roughly, it will take 20 min if the starting temperature is 20 °C and 30 min if the starting temperature is 4 °C. As a reference, see the heating curves in the appendix of this manual.

If the temperature of the medium is critical, we recommend heating for at least 35 min. This will ensure a medium temperature of 36 - 38 °C.

4.2.5 Keeping the temperature of pre-warmed medium

If the medium has already the target temperature, e.g. after heating it up in a water bath, the device can be used to keep the medium warm on the laminar flow bench:

- Turn on the device
- Observe the temperature display or the signal LED: Once the block has reached 38 °C, the LED will turn green.
- Place the tube inside one of the slots.

4.2.6 Error output

Errors are indicated by the red status LED:

LED flashing frequency	Error Source
1x 0.1s on, 1s off	Error reading the temperature sensor
2x 0,1s on, 1s off	Operation outside the permissible temperature range (permissible range: 0°C – 35°C)
3x 0,1s on, 1s off	Runtime error: Heating takes too long

4.3 Test tubes

The Essential Medium Heater can be used to heat up and/or keep warm one or two standard 50 ml laboratory test / centrifuge tubes with outer diameters of approx. 28-29.5 mm.

4.4 Cleaning and maintenance

When cleaning the device, make sure it is turned off.

Use a clean, damp cloth to clean the surfaces after each use.

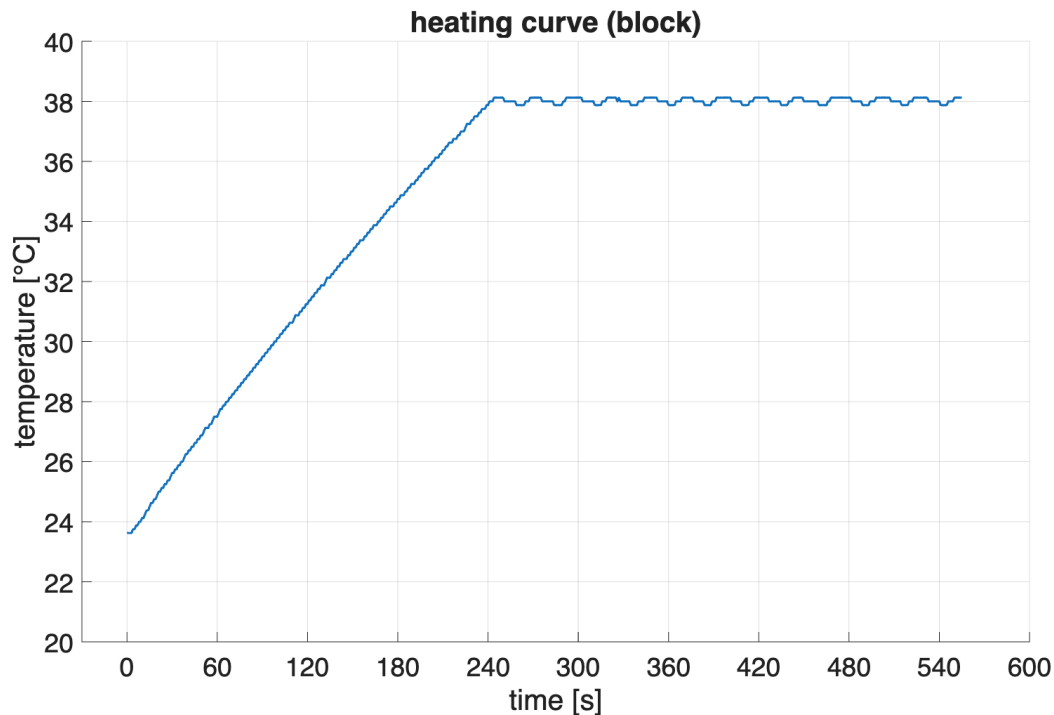
If medium has been spilled into the tube holder slots, use a clean absorbent cloth or tissue to remove the medium. Then use a fresh cloth or tissue damped with de-ionized water to wipe the inside of the slots. Then let dry.

When using the heater under a laminar flow bench, spray the device from the outside with 70% ethanol before turning it on. Then place it on the bench while turned off and let dry for 5-10 min. Then turn the device on.

5 Appendix

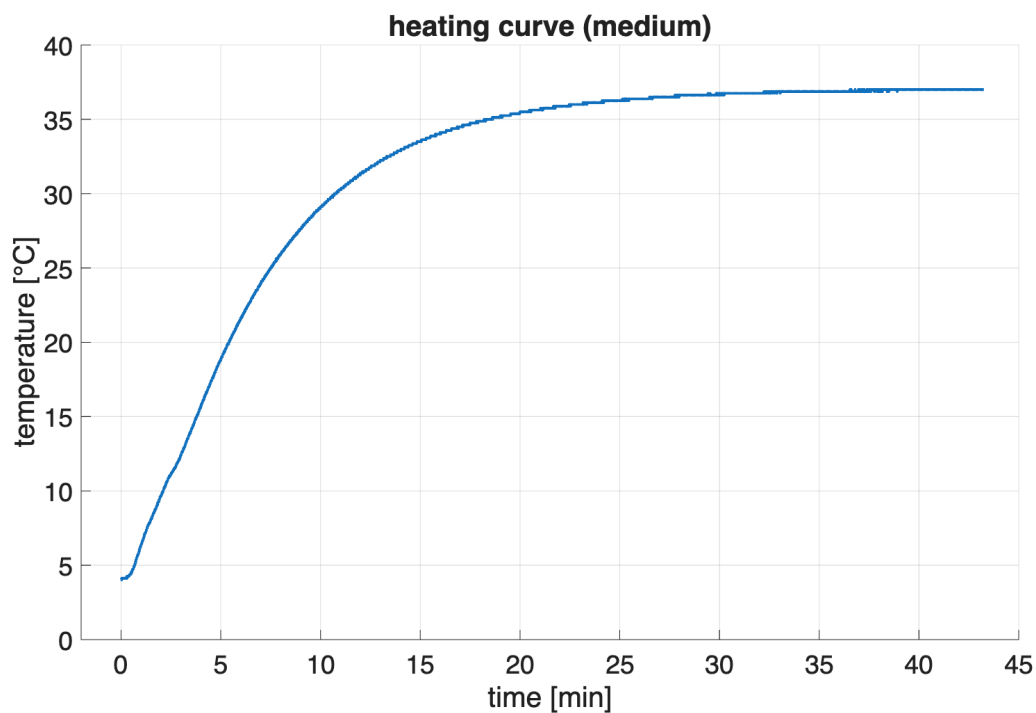
5.1 Heating curves

5.1.1 Heating curve without medium



No medium, Ambient temperature: 23.5 °C, x axis: time in minutes, y axis: temperature in °C

5.1.2 Heating curve with medium



Shown is the medium temperature (50 mL). Ambient temperature: 23.5 °C.

5.2 Name plate

The name plate with the unique serial number, among other information, is located on the bottom of the device.



6 Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Unauthorized modifications or changes in the product or unintended use of the product will render this declaration null and void.

Manufacturer:

InVitroSys GmbH
Henkestr. 91
91052 Erlangen, Germany

Product: Essential Medium Heater
Model: 1.0
Product type: Laboratory Dry Block Heater

The product is in conformity with the following EU Directives:

2014/35/EU: Low Voltage Directive (LVD)
2014/30/EU: Electromagnetic Compatibility Directive (EMC)
2011/65/EU: Restriction of Hazardous Substances (RoHS)

Applied standards:

EN 61010-1
EN 61326-1
EN IEC 63000:2018

Erlangen, December 10, 2025



Dr. Thomas Seidel
Managing Director

7 FCC Compliance Statement (USA only)

This device complies with Part 15 of the FCC Rules for Class A digital devices.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.