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About this document

These operating instructions describe all the functions and the operation of the magnetic stirrers type Hei-PLATE Mix'n'Heat Expert and Hei-PLATE Mix'n'Heat Ultimate.

The operating instructions are an integral part of the described device!

Typographic conventions

Standardized symbols, signal words and highlighting elements are used in this document to warn of hazards and to identify important information or rather special text contents.

Symbol	Signal word / explanation
⚠	Warning symbols in combination with a signal word indicate dangers: **DANGER** Indicates an immediate dangerous situation. Failure to respect the indications will result in death or serious injury. **WARNING** Indicates a potential danger. Failure to respect the indications will result in serious injuries. **CAUTION** Indicates a potential hazard which, If not avoided, damage to property and minor to moderate injuries can occur.
①	Mandatory signs are used to indicate important and useful information on handling a product. This information is used to ensure operational safety and to maintain the value of the product.
[GUI]	**Parameter** designations, **display texts**, and **device labels** are typographically highlighted in the text and in tables to facilitate their assignment on the device.
➡	The arrow indicates specific instructions to be followed to ensure operational safety when handling the product.

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Safety instructions in the official languages of the European Union

A summary of all safety instructions in the official languages of the European Union can be found in our Safety Guide for the product group magnetic stirrers (Ref. 01-005-006-68). This document is available for download on our homepage in the most up-to-date version.

Directives applied, product certification

CE	**CE marking** The device meets all requirements of the following directives: • European Machinery Directive, 2006/42/EC • EMC Directive, 2004/108/EC
TÜV SÜD c US	**NRTL Certification** The device has been tested in accordance with the following standards: • CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11 • CSA-C22.2 No. 61010-2-010:2019 • CSA-C22.2 No. 61010-2-051:2019 • UL 61010-1:2012/R:2019-07 • UL 61010-2-010:2019 • UL 61010-2-051:2019

California Residents

Important information for California residents regarding Prop 65. Please visit www.
P65Warnings.ca.gov for more information.

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com.

Violations of copyright (e.g. unauthorized use or modification of the software) may result in civil
claims (e.g. omission, compensation for damages) and/or entail criminal penalties within the
meaning of the legislation of the destination country.

Residual risk

The device has been designed and manufactured in accordance with the state-of-the-art stan-
dards at the time of development and the recognized safety regulations. During mounting and
use, as well as during maintenance, repair and cleaning work, there are nevertheless certain
residual risks associated with the described device.

These are identified and described at the appropriate points in this document.

Intended use

The device has been developed and designed by the manufacturer for the following laboratory
activities:

– Heating
– Mixing
– Stirring
– Titrating

Any other use of this device is not considered as intended!

Due to its design, the device in its delivery condition may only be used in analytical processes
or in laboratory-like conditions in the food, cosmetics, and pharmaceutical industries as well as
other comparable industries that manufacture products intended for consumption by humans
or animals, or for use on humans or animals.

Compliant use

The user is generally responsible for evaluating the conformity of his application and, if necessary, for taking additional measures.

Reasonably foreseeable misuse

Additional measures may be necessary for use under conditions or for purposes deviating from the intended use, and/or specific guidelines and safety regulations must be observed. Corresponding requirements must be evaluated and implemented by the operator in each individual case.

Compliance with and implementation of all relevant directives and safety measures for the respective field of application is generally the responsibility of the operator.

All risks resulting from improper use are borne generally by the operator.

The device may generally be operated by authorized and instructed personnel. Training and qualification of the operating personnel as well as ensuring that the device is handled responsibly are the general responsibility of the operator!

Transportation

During transportation, avoid severe shocks and mechanical stresses that can cause damage to the device. Keep the original packaging in a dry and protected place for later use.

Storage

Always store the device in its original packaging. To protect against damage and excessive material aging, store the device in an environment that is as dry, temperature-stable and dust-free as possible.

Acclimatization

After each transportation and after storage under critical climatic conditions (e.g. high temperature difference between inside and outside), allow the device to acclimatize at room temperature for at least two hours to prevent possible damage due to condensation before commissioning it in the place of use. If necessary, extend the acclimatization phase if the temperature differences are very high.

Make all supply connections (power supply, tubing) only after the device has been acclimatized!

Permissible ambient conditions

The device is designed for indoor use only. The device is **NOT** suitable for outdoor use! The device is **NOT** suitable for use in potentially explosive areas!

When used in corrosive atmospheres, the service life of the device may be reduced depending on the concentration, duration and frequency of exposure.

Processing liquids at extreme cold temperatures

The device is suitable for the processing of liquids at extreme cold temperatures within the stated permissible ambient conditions and observing the regulations for proper use.

Always use a suitable insulating vessel (e.g., a Deware flask) to process liquids above a temperature of < -15 °C to avoid damages to the device due to condensation and frost.

General safety instructions

➜ Before commissioning and using the device, familiarize yourself with all the safety regula-tions and occupational safety guidelines applicable at the place of use and observe them at all times.

➜ Only operate the device if it is in faultless technical condition. In particular, ensure that there is no visible damage on the device itself, the power supply cord and, where appli-cable, on connected devices or the supply connections.

➜ If there is missing or misleading information on the device or regarding occupational safety, contact the responsible safety specialist or our technical service.

➜ Only use the device in accordance with the regulations on intended use („Intended use" on page 69).

Electrical safety

➜ Before connecting the device to the power supply, ensure that the voltage indicated on the rating plate matches the specifications of the local power utility company.

➜ Ensure that the power supply circuit provided is protected by means of a residual-current device (RCD).

➜ Only use the three-pole power supply cord supplied with the device.

➜ The device must only be supplied with power from a properly grounded mains socket-outlet.

➜ Have repairs and/or maintenance work on the device carried out exclusively by an autho-rized electrician or by the technical service department of Heidolph Instruments.

➜ Always disconnect the device from the power supply system before carrying out any maintenance, cleaning or repair work.

Data security

➜ The user is responsible for ensuring data security when transferring data between the described device and other devices.

➜ Only use secure networks for the data transfer and avoid use of critical infrastructure.

➜ Only use high-quality shielded data cables for the data transfer.

➜ For data transfer via a USB B connection, an industrial standard USB hub should be preferably used to ensure the most stable connection possible.

Operational safety

→ Operate the device under a closed ventilated fume hood when working with potentially hazardous substances (see EN 14175 and DIN 12924).

→ Do not cover the heating plate during operation: this has a negative effect on the housing cooling function (air gap), the thermal conductivity of the heating plate and possibly the life of the device.

→ All incoming and outgoing lines (power connection cable, data cable, measuring cable, hose connections, etc.) must be laid and secure to prevent any contact with hot surfaces (heating plate) and potential kinking, rubbing and shearing points (e.g. on lab jacks).

→ Do not make any unauthorized changes or modifications to the device!

→ Only use genuine spare parts and accessories, or those expressly approved by the manufacturer!

→ Rectify malfunctions or faults on the device immediately.

→ Switch off and disconnect the device from the power supply, preventing reconnection, if it is not possible to eliminate the malfunction or rectify the fault immediately.

→ Observe all other applicable regulations such as laboratory and workplace guidelines, recognized safety technology rules and special local regulations.

Occupational safety

→ Always use the prescribed personal protective equipment (PPE) such as protective clothing, safety goggles, protective gloves, safety shoes, etc.

→ Persons with pacemakers or other susceptible implants must maintain a minimum distance of 10 cm from the device to prevent possible malfunctions.

→ Do not operate any other devices in the immediate vicinity of the device
   – which generate emission or radiation sources in the frequency range 3×10^{11} Hz to 3×10^{15} Hz (in the optical spectral range wavelengths from 1,000 μm to 0,1 μm),
   – which generate ultrasonic or ionizing waves.

→ Do not process any substances that could release energy in an uncontrolled manner (e.g. self-ignition).

→ Do not process substances in which the energy input through mixing poses a danger.

→ Do not work with an open flame in the immediate vicinity of the device (risk of explosion).

→ Only use heat transfer agents and media that are explicitly approved and suitable for laboratory operation and for the respective working environment.

→ Wipe off any liquid that may have spilled on the device immediately.

Personal protective equipment (PPE)

The operating company must determine and provide the necessary PPE, depending on the respective application and the media and chemicals used.

The corresponding instruction of the personnel is solely within the operating company's responsibility.

Environmental protection

When processing environmentally hazardous substances, take appropriate measures to avoid hazards to the environment.

The evaluation of corresponding measures such as the marking of a hazardous area, their implementation, and the training of the relevant personnel is the sole responsibility of the operator!

Biohazard

When processing biohazardous substances, take appropriate measures to prevent hazards to persons and the environment, including:

➜   Instruction of the personnel regarding the necessary safety measures.

➜   Provision of personal protective equipment (PPE) and instruction of the personnel in its use.

➜   Marking the device with a biohazard warning symbol.

The evaluation of corresponding measures such as the marking of a hazardous area, their implementation, and the training of the relevant personnel is the sole responsibility of the operator!

Other regulations

In addition to the notes and instructions in this document, observe all other applicable regulations such as laboratory and workplace guidelines, hazardous substances ordinances, recognized rules of safety engineering and occupational medicine as well as particular local regulations!

ⓘ	Noncompliance will invalidate any warranty claims against Heidolph Instruments. The operator is solely liable for all damage resulting from unauthorized changes or modifications to the device, from the use of unauthorized or non-genuine spare parts and accessories, or from disregarding the safety instructions and hazard warnings or the manufacturer's instructions!

Mechanical design

Hei-PLATE Mix'n'Heat Expert

- Heating plate
- Rotation speed indicator
- Standby button
- Push-and-rotary controls [Rotation]
- Back button
- Timer button
- Menu button
- Temperature display
- Push-and-rotary controls [Temperature]

Hei-PLATE Mix'n'Heat Expert

- Heating plate
- Rotation speed indicator
- Standby button
- Push-and-rotary controls [Rotation]
- Back button
- Timer button
- Menu button
- Control buttons Lab jack
- Temperature display
- Push-and-rotary controls [Temperature]

Device connections, interfaces

Hei-PLATE Mix'n'Heat Expert

Legend

1	Protective cover, closed
2	Appliance inlet
3	USB B interface for activating the device in remote operation. See section „Remote mode" on page 100 for detailed information.
4	Connection socket for temperature sensor type Pt1000 (bayonet mount). See section „Operation with external temperature sensor" on page 96 for detailed information on operation with an optional temperature sensor.

Hei-PLATE Mix'n'Heat Expert

Legend

1	Protective cover, closed
2	Appliance inlet
3	RS-232 interface (Sub-D, 9-pin) for activating the device in remote mode. See section „Remote mode" on page 100 for detailed information.
4	RJ-45 interface for activating the device in remote operation. See section „Device activation via server-based software" on page 100 for detailed information.
5	USB C interface for connection of an optional lab jack. For detailed information on operation with an optional lab jack see section „Operation with lab jack" on page 101.
6	USB B interface for activating the device in remote operation. See section „Remote mode" on page 100 for detailed information.
7	Connection socket for temperature sensor type Pt1000 (bayonet mount). See section „Operation with external temperature sensor" on page 96 for detailed information on operation with an optional temperature sensor.
8	USB A interface for recording the device's process data on a USB stick. For detailed information on the data recording function, see section „Data logging" on page 99.

Displays and symbols

The temperature values (set/actual) and diverse symbols for indicating the operating states are shown on the left side of the device display. The speed values (set/actual) and diverse symbols for indicating the operating states and the set system time are shown on the right side of the device display.

In both displays, the timer display (remaining time display) for the respective function appears at the bottom edge of the screen:
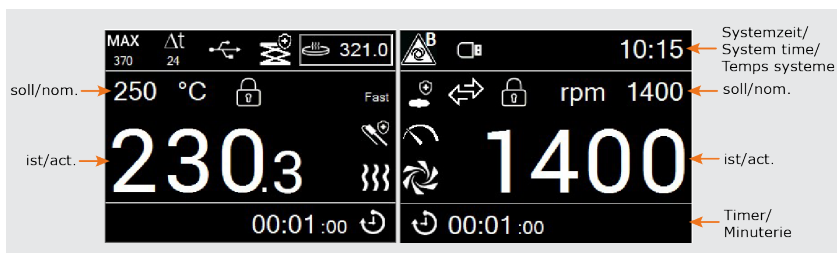
General symbols

MAX 370	Maximum heating plate temperature: The symbol and set value are only shown if the factory setting (375 °C) is changed.
Δt 24	Safety temperature Delta T: The symbol and set value are only shown if the factory setting (25 °C) is changed.
(lab jack symbol)	[Lab jack] symbol: appears as soon as a lab jack is connected (Hei-PLATE Mix'n'Heat Ultimate only).
(lock symbol)	Lock symbol, push-and-rotary wheel: shown in the push-and-rotary wheel state [locked].
B (automatic restart symbol)	[Automatic restart] Mode B/C is active. The symbol remains hidden if the function is in mode A (deactivated, factory setting).
(USB symbol)	Symbol [USB stick detected in front USB A port]: Operating data are recorded (data logging function).
(stir bar detector symbol)	[Stir bar detector] symbol: The symbol remains hidden if the function is switched off.
(interval operation symbol)	[Interval operation active] symbol: The symbol remains hidden if the function is switched off.
(soft start symbol)	[Soft start in slow/medium/fast mode] symbol (adjusted pointer position 10.00/12.00/14.00 h)
(rotation symbol)	[Rotation] symbol: is continuously visible, if the rotation function is switched on it turns clockwise or counterclockwise depending on the user clockwise/counterclockwise setting.

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Dependent symbols

	Interfaces
	Interfaces
	USB B interface assigned: [Safe] interface mode only.
	LAN interface assigned: [Safe] interface mode only.
	RS-232 interface assigned: [Safe] interface mode only.
	[Expert] interface mode active: this symbol replaces all the above-named interface symbols as soon as the [Expert] interface mode is activated via the **Settings** menu.
	[Profile active] symbol: this symbol replaces all the above-named interface symbols as soon as a profile has been loaded and is worked through.
	Heating modes
Fast	[FAST] heating mode is active
Precise	[PRECISE] heating mode is active (can only be selected in operation with external temperature sensor Pt1000)
Precise+	[PRECISE+] heating mode active (can only be selected in operation with external temperature sensor Pt1000)
	Heating plate/temperature sensor
	[Heating plate] symbol: appears if the set setpoint temperature is adjusted to the heating plate of the device.
	[External temperature sensor Pt1000] symbol: replaces the [heating plate] symbol as soon as an external temperature sensor Pt1000 is connected and the set setpoint temperature is adjusted to this.
	[Double sensor] symbol: in operation with double sensor, this symbol replaces the [Heating plate] and/or [external temperature sensor Pt1000] symbols.
321.0	Temperature display field, top right side in the left device display: Display of the heating plate temperature.
321.0	Temperature display field, top right side in the left device display: Sensor temperature display/replaces heating plate display when double sensor is used.
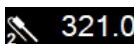
Temperature control

[Temperature control active] symbol: if heating function is switched on (LED ring of the [Heating] push-and-rotary control is lit), this symbol is always shown if the device readjusts the temperature.

> The symbol is shown for the duration of a control pulse for reaching the set setpoint temperature and goes out until the following control pulse.
>
> The control pulse has no influence on the actual heating function!

[Temperature control inactive] symbol: is shown at a printed board temperature of 90 °C or higher (temperature monitoring by software).

> The symbol indicates that, due to an excessively high printed board temperature, the heating output is reduced temporarily until after a cooling phase when the temperature value is back within the allowable range below 90 °C (see warning message W59, section „Warning codes" on page 110).

Sensor monitoring active display

If sensor monitoring is switched on, the [External temperature sensor Pt1000] and [Double sensor] symbols are marked by the safety symbol.

Lab jack monitoring active display

If lab jack monitoring is switched on, the [Lab jack connected] symbol is marked by the safety symbol (Hei-PLATE Mix'n'Heat Ultimate only).

> As soon as the Main menu is opened, all data and symbols are grouped together on the left device display. During the parameterization/configuration, all menu settings are shown on the right of the device display. Example:

MAX	Δt	⊷	🥤		321.0		Menu
⌇⌇⌇		Fast			↺ ↻		**Heating mode**
250	🔒	°C	rpm	🔒	1400		Lift
230.3			**1400**				Setting
00:01:00			00:01:00				Safety features

Menu structure

The following sections provide an overview of the menu structure of the described device variants.

Hei-PLATE Mix'n'Heat Expert

Heating mode	Fast Precise Precise+	
Settings	Temperature	°C °F Sensor cal.
	Rotation	Soft start Stir bar detector Direction Interval
	Language	English Deutsch
	Sound	
	Interface mode	Safe Expert
	Auto Standby	
	Factory settings	
Safety features	Safety ΔT	
	Sensor monitoring	
	Operating mode	A: Heating+Rotation off B: Rotation on C: Heating+Rotation on
	T limit	
Info	Device Info Operating hours Error list	

Hei-PLATE Mix'n'Heat Expert

Heating mode
- Fast
- Precise
- Precise+

Lift
- descend by XXX mm
- Heating expired
- Error

Settings
- Temperature
  - °C
  - °F
  - Sensor cal.
- Rotation
  - Soft start
  - Stir bar detector
  - Direction
  - Interval
- Language
  - English
  - Deutsch
- Date/Time
- Sound
- Interface mode
  - Safe
  - Expert
- Auto standby
- Factory settings

Safety features
- Safety ΔT
- Sensor monitoring
- Operating mode
  - A: Heating+Rotation off
  - B: Rotation on
  - C: Heating+Rotation on
- T limit

Profiles
- New/Active
- Favorites

Graph

Info
- Device Info
- Network Info
- Operating time
- Error list

Menu navigation

The various operating and device settings are accessed via the Main menu (see section „Menu structure" on page 80 for whole menu structure.

➜ Press the menu button to open the main menu.

➜ Turn one of the two push-and-rotary controls to select and mark a menu option.

  – The marked option has a white background.

  – Press one of the two push-and-rotary controls to open the marked submenu.

  – Use one of the two push-and-rotary controls to select an option on the next menu level or a set value.

  – Press one of the two push-and-rotary controls to open the marked submenu or to adjust the set value.

➜ Press one of the two push-and-rotary controls to confirm a changed setting or to adopt a changed value.

➜ Press the Back button to return to the respective higher level menu.

➜ Press the Menu button to return to the main display.

Push-and-rotary controls

The device is equipped with two push-and-rotary controls for setting the [temperature] and the [rotation], for adjusting various device parameters, and for switching the heating and the mixing function on and off (see section „Mechanical design" on page 74).

➜ Turn the push-and-rotary controls gradually or continuously, clockwise or counterclockwise, to increase or decrease the respective displayed value (temperature, speed, set value).

➜ Press a push-and-rotary control to confirm a value or a selection within the menu navigation.

➜ Press the [Temperature] control to turn the heating function on and off.

➜ Press the [Rotation] control to turn the mixing function on and off.

Lock function

➜ Press and keep the [Temperature] or [rpm] push-and-rotary control pressed for at least two seconds until the white lock symbol appears on the display. In this way, the two push-and-rotary controls [Temperature] and [rpm] can also be locked simultaneously.

!	As soon as a push-and-rotary control is locked, the corresponding setpoint (rpm or heating temperature) can no longer be adjusted. The device is thus protected against accidental adjustment of the setpoint values. However, the push function of a locked controller is always retained, so that the respective function (heating, rotation) can be switched off reliably and without delay at any time.

➜ Press and keep pressed the [Temperature] or [rpm] push-and-rotary control again for two seconds until the white lock symbol disappears. In this state, the push-and-rotary control is unlocked.

Set up the device

When choosing a suitable location and installing device, note the following safety instructions:

CAUTION
- To use the device, place it on a clean, stable, level, horizontal, and heat-resistant surface.
- Make sure that the power plug can be reached directly at any time, in order to disconnect the device from the power supply at any time without delay.
- Before switching on, make sure that the device is sufficiently stable.
- Before switching on, always make sure that all setups are centered as far as possible and are fixed on the base unit with sufficient stability.
- Keep all support and contact surfaces clean and dry.
- During operation, make sure that the required minimum distance of 15 cm between the magnetic stirrer and other devices and structures is maintained.

Optional protection from splashing and dripping water

Heidolph Instruments provides suitable silicone covers (option, not included in scope of delivery) as additional protection against heavy soiling or damage caused by very aggressive media:

These can be easily fixed on the device, and removed for cleaning and maintenance purposes without tools.

For further information on the available accessories see www.heidolph-instruments.com, Product page → Accessories.

Power supply

The appliance inlet is located under the protective cover on the back of the device: Lift the protective cover for connecting the power supply cable by hand. No tools are required to open the protective cover.

As soon as the device is supplied with voltage via the power supply cable, the Standby button LED lights up white.

DANGER

If the interface inlets and outlets are assigned too high voltages and are insufficiently insulated, metallic parts such as the housing can become live in the event of a fault.

- Safely isolate extra low voltage inputs and outputs via 25 V AC or 60 V DC according to EN 61140, or by double or reinforced insulation according to EN 60730-1 or DIN 60950-1.
- Use only shielded connection cables. Connect the shield to the connector housing.

Liquid can penetrate open interfaces and come into contact with live parts. This causes a risk of malfunctions through to short-circuit.

- Make sure that unused interfaces are always covers (covers on the front and back of the device).

Basic and safety settings

Before processing the sample, check basic settings such as time, date, temperature unit, etc. as well as diverse safety settings, and if necessary, adapt them to the specific user, see sections „General settings" on page 86 and „Safety functions" on page 88.

General notes

CAUTION

At high speeds in combination with a large load and/or a tall setup on the heating plate, there is a risk of the device swinging up and falling.

- Only increase the speed to the required level gradually under the named conditions, and pay attention to the stability of the setup.
- Lower the speed or reduce the total load on the heating plate if the device starts to move independently during operation.

If the distribution of the load on the heating plate is uneven, there is a risk of the device swinging up and falling.

- Always pay attention to even distribution of the containers and in particular to uniform distribution of the weight if vessels of different sizes and/or differently filled vessels are placed on the heating plate at the same time.

At high speeds there is a risk of improperly fastened vessels falling off the heating plate.

- Before switching on the device, make sure that all vessels are properly fixed on the heating plate.

High pressures can result when processing samples in closed containers.

- Always use adequately dimensioned, pressure-resistant vessels: Note the expansion volume of the sample!
- Use available protective devices such as laboratory fume hoods, etc.

- Always wear the specified personal protective equipment (PPE).

Always place individual vessels in the center of the heating plate.

Use suitable attachments for processing multiple samples/vessels simultaneously.

Secure the vessels on the heating plate with a suitable clamping fixture or suitable attachment for high speeds and depending on the physical properties of the sample.

Do not switch on the appliance until all the vessels are securely positioned on the heating plate.

Do not heat the empty heating plate above 300 °C. Above this temperature limit there is a risk of the unloaded heating plate deforming over time and therefore being unable to provide a stable standing area!

Switching the device on/off

Press the Standby button to switch on the device. When the device is switched on, the LED of the Standby button is lit green.

After switching on the device, the temperature values (setpoint/actual) and diverse symbols indicating the operating states are shown on the left device display. The speed values (set/actual) and diverse symbols for indicating the operating states and the set system time (Ultimate variant) are shown on the right side of the device display, see also section „Displays and symbols" on page 77.

Press the Standby button again to switch off the device. When the device is switched off, the LED of the Standby button is lit white.

> Note that the Standby button merely switches the device to Standby mode and does not disconnect it from the power supply.

General settings

> Observe the instructions in section „Push-and-rotary controls" on page 82 and „General settings" on page 86!

Temperature unit

Define the required display unit for all temperature values as follows:
→ Open the [Settings] → [Temperature] menu.
→ Choose one of the following options: Degrees Celsius [°C] or Degrees Fahrenheit [°F].
→ Confirm the new setting and close the menu.

Menu language

Determine the required user language as follows:
→ Open the [Settings] → [Language] menu.
→ Choose one of the following options: [German] or [English].
→ Confirm the new setting and close the menu.

Date/Time

The device's internal time and date information can be adjusted for specific users of Hei-PLATE Mix'n'Heat Ultimate devices.
→ Open the [Settings] → [Date/Time] menu.
→ Select the time display format under [Format]. Options: 12 or 24-hour display.
→ Use a push-and-rotary control to set the values for year, month and day, one after the other, in the top row.
→ Confirm each value by pressing a push-and-rotary control.
   –   The respective next value is highlighted in white automatically and can be adjusted.
→ Confirm the new setting and close the menu.

Button sounds

Define whether pressing buttons is acknowledged with button sounds:

➜ Open the [Settings] → [Sound] menu.

➜ Choose one of the following options: [on] or [off].

➜ Confirm the new setting and close the menu.

> ! This parameter explicitly only relates to the device's button sounds.
> For safety reasons, the signal and warning sounds cannot be switched off.

Interface mode

Hei-PLATE Mix'n'Heat Ultimate devices provide two interface modes, which define access to the controllable device functions:

In [Safe] mode the device can only ever be controlled via one interface.

– The heating function and rotation can be switched off at any time using the push-and-rotary control on the device; setpoint setting using the push-and-rotary control is not possible in interface mode.

In [Expert] mode the device can be controlled/operated in parallel via all interfaces and the push-and-rotary controls on the device. The following prioritization applies to the command processing:

– 1. Start/Stop heating and rotation using a push-and-rotary control on the device (exception: setpoint setting using the push-and-rotary controls is not possible)

– 2. Programmed commands and settings while working through a profile

– 3. Incoming commands via the USB B interface

– 4. Incoming commands via the RS-232 interface

– 5. Incoming commands via the LAN interface

Determine the required interface mode as follows:

➜ Open the [Settings] → [Interface mode] menu.

➜ Choose one of the following options: [Safe] or [Expert].

➜ Confirm the new setting and close the menu.

Auto-standby

When the auto standby function is activated, the device is automatically switched off from idle status (no heating function, no agitation function) if no operation is performed for a period of three minutes.

The device can be switched on again at any time using the Standby button.

Activate or deactivate the Auto Standby function as follows:

➜ Open the [Settings] → [Auto standby] menu.

➜ Choose one of the following options: [on] or [off].

➜ Confirm the new setting and close the menu.

Factory settings

The device can be reset to the factory settings if necessary. To do this, proceed as follows:

➜ Open the [Settings] → [Factory settings] menu.

➜ Select the [Yes] option.

➜ Confirm the selection.

– The device is reset without any confirmation prompt!

> (!) On resetting the device to the factory settings, the recorded logs (operating hours, error messages) as well as the set time and date are retained. All other user settings are irretrievably deleted. This operation cannot be undone.
>
> A list of all factory settings can be found in the appendix to this document.

Safety functions

> (!) Observe the instructions in section „Push-and-rotary controls" on page 82 and „General settings" on page 86!

Safety temperature ΔT

The [Safety ΔT] monitoring function is used to monitor the actual temperature deviation of the heating plate or the heating medium (when using an external temperature sensor) from the set setpoint: If the actual temperature exceeds the set setpoint by the set value ΔT, the heating process is canceled.

In this case, error E23 is shown on the device display; at the same time, the rotational speed is reduced to 100 rpm.

The monitoring function ensures that the heating function is switched off in the event of a faulty setup or in case of an unwanted exothermic reaction.

The value for limiting the maximum settable setpoint temperature of the heating plate can be defined within a range from 10 °C - 25 °C in the [Safety] → [Safety ΔT] menu.

Sensor monitoring

When operated with an external temperature sensor Pt1000, the heating function of the device is switched off automatically by the sensor monitoring in the following cases:

– sudden temperature drop at the sensor, e.g. in the event of a lack of media contact or in the event of a steep temperature drop caused by adding more cold medium (error E21)

– too slow temperature rise at the sensor despite high heating output, e.g. when processing large volumes (error E22)

If required, the sensor monitoring can be deactivated/activated in the [Safety] → [Sensor monitoring] menu.

Practical tip

If sensor monitoring is switched on (factory setting), the [External temperature sensor Pt1000] and [Double sensor] symbols are marked by the safety symbol, see Table „Sensor monitoring active display" on page 79.

Regardless of the sensor monitoring status – note the following points:

➜ Do not switch on the heating function until the temperature sensor is immersed in the sample.

➜ Secure the temperature sensor against accidentally falling out of the sample.

➜ Be very careful when adding more cool medium and avoid abrupt temperature fluctuations.

Automatic restart

The behavior of the device after a power outage can be defined via the [Safety] → [Restart] menu. The following options are available:

– Mode A: The heating function and rotation remain switched off when the power supply is restored:
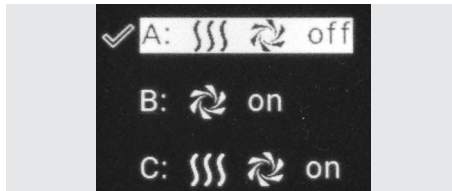
– Mode B: Rotation is automatically switched back on when the power supply is restored, the heating function remains off:

– Mode C: The heating function and rotation are automatically switched back on again when the power supply is restored:
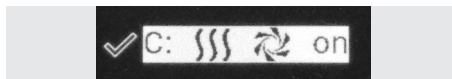
In the as-delivered condition, the heating and rotation function remain switched off (mode A) when the power supply is restored and the device remains in the Standby state.

On selecting mode B or C, a warning symbol and the **Autostart** notice appear on restarting, in addition, an acoustic warning signal is emitted and the LED rings of the two push-and-rotary controls flash. The symbol of the selected mode flashes on the display until the notice is acknowledged by operating one of the push-and-rotary controls.

Limiting the heating plate temperature

The limiting of the device's heating plate temperature is set to the maximum value of 375 °C by default (max. setpoint temperature 350 °C plus maximum safety temperature ΔT 25 °C). This value can be set to a value between 50 °C – 374 °C in the [Safety] → [T limit] menu.

> **Application example**
>
> If the heating plate temperature is limited, e.g. to 200 °C with a safety setting ΔT of 20 °C (see section „Safety temperature ΔT" on page 88), the setpoint temperature can be preset to 180 °C maximum.
>
> The symbol and the value for the heating plate temperature (see „Displays and symbols" on page 77) is only shown on the display if the setting has been adjusted by the user and does not equal the factory setting.

Monitoring the internal housing temperature

In case of an excessive temperature rise (printed board temperature above 90 °C) inside the housing, the heating output is reduced temporarily until, after a cooling phase, the temperature value is back within the permissible range below 90 °C, see warning message W59, section „Warning codes" on page 110 and section „Displays and symbols" on page 77.

If this value is reached in a stable way, the warning can be confirmed by pressing any button and the device can continue to operate without a restart.

If, after the cooling phase, a printed board temperature above 90 °C continues to be measured, the device switches to error mode E15 and must be cooled in the switched off state for at least one hour. In this case, check the setup and restart the device!

Residual heat indicator

After switching off the heating function and after switching off the device via the Standby button, the actual temperature of the heating plate is shown on the display until it has cooled to a level of 50 °C with falling trend. At the same time, during this cooling phase the LED ring of the [temperature] push-and-rotary control flashes.

The visual displays (display and LED ring) go out as soon as the measured surface temperature of the heating plate is below 50 °C.

WARNING

As long as the device is not disconnected from the power supply, the display shows the actual temperature of the heating plate or temperature measured at the external temperature sensor.

- Note that the temperature at the external sensor can differ substantially from the surface temperature of the heating plate.
- Avoid direct skin contact with the heating plate!
- Do not place heat-sensitive objects on the heating plate.

Heating mode

WARNING

Contact with surfaces above 50 °C can lead to serious injury.

- Always pay attention to the heating temperature indicator of the device.
- Avoid direct skin contact with the heating plate during operation and also observe the residual heat indicator after switching off!
- Do not place heat-sensitive objects on the heating plate.
- Always use the necessary personal protective equipment (heat-resistant gloves, eye protection, safety clothing) to process samples from a temperature of 50 °C.

Set the heating temperature

When the device is switched on, the values for setpoint and actual temperature are shown on the temperature display, see section „Displays and symbols" on page 77.

➜ Turn the [Temperature] push-and-rotary control clockwise or counter-clockwise to set the desired temperature (setting range: 20 – 350 °C).

➜ Press the [Temperature] push-and-rotary control to activate the heating function.

  – When the heating function is activated, the LED ring of the [Temperature] push-and-rotary control lights up orange.

  – In normal operation without timer, the on-period is displayed to the nearest second as a stopwatch at the bottom edge of the screen.

> The stopped on-period of the last heating process is also displayed after switching off the heating function, until a new heating cycle is started or the device is switched off.

  – During the heating process, the [Heating] symbol is always shown when the device readjusts the heating.

➜ The setpoint can be adjusted at any time:

  – Use the [Temperature] push-and-rotary control to adjust the setpoint during operation as required.

  – The temperature is tracked until the new setpoint is reached.

➜ Press the [Temperature] push-and-rotary control again to turn off the heating function.

Rotational mode

WARNING

When using open vessels, there is a risk that fluid will spray out.

- Whenever possible, use closed vessels for processing corrosive, toxic or biohazardous substances and seal them safely.
- Especially using open vessels, increase the rotation speed only gradually and observe the fluid movements.
- Always use the necessary personal protective equipment (heat-resistant gloves, eye protection, safety clothing) to process samples from a temperature of 50 °C.

Setting the rotational speed

When the device is switched on, the values for set and actual speed are shown on the speed display, see section „Displays and symbols" on page 77.

→ Turn the [Rotation] push-and-rotary control clockwise or counter-clockwise to set the desired nominal speed (setting range: 100 – 1,400 rpm).

Starting rotation

→ Press the [Rotation] push-and-rotary control to activate the mixing function.

- When the mixing function is activated, the LED ring of the [Rotation] push-and-rotary control lights up white.
- In normal operation without timer, the on-period is displayed to the nearest second as a stopwatch at the bottom edge of the screen.

The stopped on-period of the last stirring process is also displayed after switching off the stirring function, until a new stirring cycle is started or the device is switched off.

- If the stirring function is switched on, the [Stirring active] symbol rotates. As soon as the set stirring function is switched off, the displayed symbol is static.

→ The setpoint can be adjusted at any time:

- Use the [Rotation] push-and-rotary control to adjust the setpoint during operation as required.
- The rotation speed is adjusted without any delay (observe the display!).

→ Press the [Rotation] push-and-rotary control to turn off the mixing function.

Magnetic stir bar detector

The magnetic field stir bar detector function can detect loss of the magnetic coupling between the motor and magnetic stirring bar and initiate switching off of the rotational movement. In the event of a magnetic field interruption, despite the magnetic field setup, the magnetic stirring bar in the container does not move, no longer moves or moves in an uncontrolled way.

The function can be activated/deactivated in the [Settings] → [Rotation] → [Stir bar detector] menu.

CAUTION

In the event of a magnetic field break, there is a risk of the magnetic stirring bar thrashing about in the container in an uncontrolled way and damaging the glass.

Only deactivate the magnetic field stir bar detector if this is useful for the process or is required.

Functional principle

If a magnetic field interruption has been detected and the rotational movement switched off, the motor is then switched on again automatically and the speed is run at a value of 50 rpm below the value recorded at the moment at which the interruption was detected (example: if the interruption was recorded at a speed of 1000 rpm, the speed is now run at 950 rpm with the following motor start attempt).

In case of a multiple magnetic field break, the target speed is reduced by 50 rpm with each new startup attempt, until the minimum speed of 100 rpm is reached.

Notes and practical tips

- The function reliably detects a magnetic field break in the horizontal detection. A magnetic field break in the vertical direction (e.g. on lifting the vessel while the device is running) may under certain circumstances not be detected until after a time delay.
- The vessel and the magnetic stirring bar should not be moved during rotation to ensure faultless function of the stir bar detector at all times.
- If magnetic field interruption detection is active, the [soft start function] should be set to [slow] or [medium] to enable reliable detection of an interruption (see section „Soft start" on page 94).

The suitability and effectiveness of the magnetic field stir bar detector depends on the respective process setup made up of the magnetic stirring bar, vessel, medium and speed.

The ideal combination of these factors can only be determined by the user within the scope of individual test series under the specific ambient conditions.

Basically: the higher the torque to be transferred, the more safely the magnetic field stir bar detector functions.

An overview of all currently available magnetic stirring bars and the respective areas of use can be found on our website www.heidolph-instruments.de → Products → Magnetic stirrers → Accessories.

Soft start

This function can be used to define the start speed of the rotational movement.

Depending on the setting, after switching on the rotation, the speed is gradually increased to the set setpoint speed according to the selected mode [slow], [average] or [fast]: based on [average] mode, starting in [slow] mode is approx. twice as slow and approx. three times faster in [fast] mode.

Activate the required mode in the [Rotation] → [Soft start] menu. The set mode is visualized on the display via the soft start symbol:

[slow]   [medium]   [fast]

Direction of rotation

The rotational direction of the magnetic field and thus the rotational direction of the magnetic stirring bar in the positioned container can be preselected in the [Settings] → [Rotation] → [Direction] menu. Press a push-and-rotary control to select one of the following options: [Counterclockwise] direction, [Clockwise] direction.

Interval operation

In interval operation, the direction of rotation of the magnetic field, and thus the direction of the magnetic stirring bar, is reversed at defined time intervals. In this way, homogeneous results can be achieved, especially when processing samples containing solids.

Activate interval operation and define the interval for the direction of rotation reversal in the [Settings] → [Rotation] → [Interval operation] menu.

Operation with timer

The device provides a timer function for precise presetting of a specific stirring time and heating period by the operator. The timers for stirring time and heating duration work independently of each other!

➜ Press the [Timer] button at the switched on device to switch to the setting mode for the timer function:

– While the button LED is lit, the [Temperature] push-and-rotary control can be used to preset a heating period within the range from 1 minute up to 99 hours and 59 minutes.

– While the button LED is lit, the [Rotation] push-and-rotary control can be used to preset a stirring period within the range from 1 minute up to 99 hours and 59 minutes.

– If no setting is made within approx. three seconds, the button LED goes out and the device returns to normal mode.

– Set values are adopted without further confirmation after approx. three seconds of inactivity (button LED goes out).

– As soon as a stirring time and/or a heating period has/have been preset, the timer symbol appears on the temperature and/or the speed display, next to the displayed time:

Timer ein/on

➜ The timer is started as soon as the heating and/or the stirring function is activated.

– The remaining time is displayed to the nearest second (countdown display) on the temperature and/or speed display.

Signaling timer end

➜ After the timer has expired (individual stirring or heating period), the device generates an acoustic signal in the form of five bleeps.

➜ However, if both timers are activated in parallel with different expiry times, the device signals as follows:

– After the first timer has expired (timer with shorter period, stirring time or heating duration, depending on the setting): two (2) beeps.

– After expiry of the second timer (timer with longer duration): five (5) beeps.

➜ To deactivate the timer function, the set values for stirring time and/or heating duration must be reset manually. The set times remain active even in the event of an interruption in the power supply.

Operation with external temperature sensor

The described devices can be operated with an external temperature sensor (control sensor): a temperature sensor Pt1000 with two sensor elements in one sensor tube (optional accessory) is required for faultless and safe operation.

For safety reasons, we recommend using the temperature sensors of Heidolph Instruments, since thanks to their specific material properties, they have the required quality for daily laboratory use, for further information see www.heidolph-instruments.com, Product page → Accessories.


WARNING

Note that if a temperature sensor is connected, the temperature is adjusted to it automatically. As long as the temperature sensor is not immersed in the sample, the reference temperature of the ambient air is displayed. The heating plate can therefore heat up to 350 °C unnoticed!

- Always immerse the temperature sensor in the sample before switching on the device or before calibrating!
- Do not place heat-sensitive objects on the heating plate.
- Always use the necessary personal protective equipment (heat-resistant gloves, eye protection, safety clothing) to process samples from a temperature of 50 °C.

During operation with an external temperature sensor the temperature is adjusted to it automatically. The temperature display changes as follows:

➜ Instead of the heating plate temperature, the actual temperature measured at the sensor is shown next to the set setpoint temperature on the display.

➜ The measured heating plate temperature appears in the temperature display field, see also section „Displays and symbols" on page 77.

The external temperature sensor is connected to the connection socket (bayonet mount) provided at the back, see section „Device connections, interfaces" on page 75. As soon as the external temperature sensor is detected, a corresponding symbol appears in the area of the temperature display:
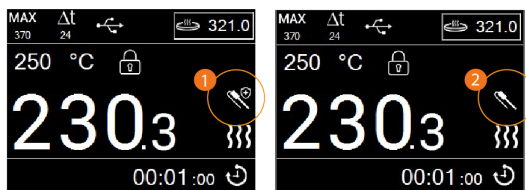
➜ [1]: External temperature sensor detected, sensor monitoring safety function is active.

OR

➜ [2]: External temperature sensor detected, sensor monitoring safety function deactivated (see also section „Sensor monitoring" on page 88).

Heating modes

As soon as a compatible external temperature sensor is connected to the device, in addition to the standard [FAST] heating mode, the additional [PRECISE] and [PRECISE+] heating modes are also available to adjust the process behavior:

➜ Before commissioning the device with an external temperature sensor, make sure that it has been detected correctly (note the display symbol, see section „Dependent symbols" on page 78).

➜ From the [Main menu], open the [Heating mode] menu and define the required mode:

  – [FAST] mode: In this mode, the heating plate is heated up quickly to the preset temperature (factory setting).

  – [PRECISE] mode: In this mode, the heating plate is heated slowly and without overshooting to the preset temperature.

  – [PRECISE+] mode: In this mode, the heating plate is heated even slower and without overshooting to the preset temperature.

Sensor calibration

If using an external temperature sensor, the displayed temperature value can be calibrated to the specific external conditions in the laboratory with an offset.

To do this, proceed as follows:

➜ Make sure that the external sensor is properly connected to the device.

➜ Immerse the sensor in the reference sample and switch on the device.

➜ Open the [Settings] → [Temperature] → [Sensor cal.] menu

➜ Adjust the temperature display value as required

The value is retained – even if the temperature sensor is replaced – until renewed calibration is undertaken.

Operation with double sensor

When operating the magnetic stirrer with an oil bath attachment, a so-called double sensor (option, not included in the scope of delivery) can be used to additionally monitor the temperature of the heating medium.

Double sensor setup

A double sensor consists of an external temperature sensor of the type Pt1000 with two sensor elements, which are installed in a sensor tube. This works as a control sensor (Pt1000 Control).

In addition, a further, conventional Pt1000 sensor with only one sensor element is wired onto the connector. This is used as a monitoring sensor (Pt1000 Monitoring) and can be used, e.g. for documentation purposes.

Control mode

During operation with a double sensor, the temperature is adjusted to the control sensor automatically. The temperature display changes as follows:

➜ Instead of the heating plate temperature, the actual temperature measured at the Pt1000 temperature sensor is shown next to the set setpoint temperature on the display.

➜ The measured value of the monitoring sensor appears in the header in the top right of the temperature display field, see also section „Displays and symbols" on page 77.

The external temperature sensor is connected to the connection socket (bayonet mount) provided at the back, see section „Device connections, interfaces" on page 75. As soon as the double sensor is detected, a corresponding symbol appears in the area of the temperature display:
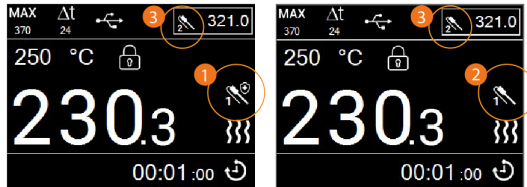
→   [1]: Double sensor detected, safety function [sensor monitoring] is active.
→   [3]: [Sensor temperature] symbol replaces [Heating plate] symbol in the temperature display.

   OR

→   [2]: External temperature sensor detected, sensor monitoring safety function deactivated (see also section „Sensor monitoring" on page 88).
→   [3]: [Sensor temperature] symbol replaces [Heating plate] symbol in the temperature display.

   Control and monitoring sensor positioning

Control and monitoring sensor of a double sensor unit are clearly marked.
→   Connect the connection plug of the double sensor unit in a first step with the-pin connection socket on the back of the magnetic stirrer.
→   Immerse the control sensor in the liquid.
→   Position and fix the monitoring sensor in that way that a stable reference measurement can be performed: Heidolph Instruments' heating bath attachments have e.g. two holes in which the sensor can be put an is fixed securely when used.

Data logging

The Hei-PLATE Mix'n'Heat Ultimate type devices are equipped with a USB A interface at the front. This interface can be used to record the following process data:

- Time and date
- Recording period
- All recorded temperatures (set/actual)
- Rotation speed (set/actual)
- Further setting parameter such as safety temperature, heating mode, etc.

All data are stored in an editable *csv file on the USB stick and can be read using a standard spreadsheet program.

!	The data recording starts as soon as a compatible USB stick (FAT32 file system) is inserted in the interface. The recording volume varies depending on the storage capacity of the connected USB stick: the named data are transferred by the device every 10 seconds, this corresponds to a data volume of approx. 1 Mbyte/minute. The data recording stops at the end of the process or when the connected USB stick is removed or its storage capacity is exceeded.

File handling

The file handling follows the usual conventions of the spreadsheet program used by you.

Note, e.g., the following procedure for use of Microsoft Excel:

➜ Open the MS Excel application and select the [Empty document] option.

➜ Switch to the [Data] tab.

➜ Click the Menu option [from Text/CSV].

➜ Localize and mark the Export file in the following selection window and start the import process with [Import].

➜ In the following dialog window, set the [Tab] option as the separator.

Remote mode

WARNING

Secure the device in remote mode with a clearly visible warning sign and, if necessary, take further ambient-specific protective measures that protect against damage to property and injuries in the event of unexpected/unmonitored starting of the device.

Device activation at the PC

Devices of the type Hei-PLATE Mix'n'Heat Expert can be addressed via an external control via the integrated USB B interface.

Devices of the type Hei-PLATE Mix'n'Heat Ultimate can be addressed via an external control via the integrated RS-232 and/or USB B interface.

The data interfaces enable activation of the device and recording of the process data in remote mode. This requires suitable software (e.g. Hei-CONTROL), which supports the set of commands stored in the device. See also section „RS-232/USB B interface commands" on page 116 for further information.

The freely available Hei-CONTROL software for activating your device via a PC can be downloaded from our homepage:

➜ www.heidolph-instruments.com / Service / Downloads / Software

A detailed description of the software and driver installation and all information on the system requirements can be found in the Hei-CONTROL operating instructions, Ref. 01-005-005-69; download:

➜ www.heidolph-instruments.com / Service / Downloads / Operation manuals.

Further information on internal device interface handling can be found in section „Interface mode" on page 87.

If required, contact an authorized dealer or our technical service, see „Contact information" on page 123.

Device activation via server-based software

Devices of the type Hei-PLATE Mix'n'Heat Ultimate can be activated via the integrated RJ-45 interface (ethernet) via a server-based software.

If required, contact an authorized dealer or our technical service, see „Contact information" on page 123.

Operation with lab jack

Hei-PLATE Mix'n'Heat Ultimate type devices can be operated with an optional lab jack. The lab jack is connected to the USB C connection socket at the back of the device using the USB C cable supplied.

CAUTION

The USB C interface of the magnetic stirrer may only be used for operation with a Heidolph Instruments' lab jack. The general USB C standard is not supported. Direct or indirect damage caused by connecting devices not authorized by the manufacturer to the device's USB C interface is the responsibility of the user.

WARNING

The lab jack is designed for a load of maximum 10 kg. Direct or indirect damages caused by an overload of the lab jack, are generally the sole responsibility of the user.

Always be sure to position all setups and accessory parts centrally above the magnetic stirrer on the lab jack.

Move the lab jack downward and/or pull the setups centrally upward as much as possible to remove glass flasks or attachments from the magnetic stirrer!

Never pivot setups to the outside (see example: setup with magnetic stirrer, heating attachment and Findenser®).
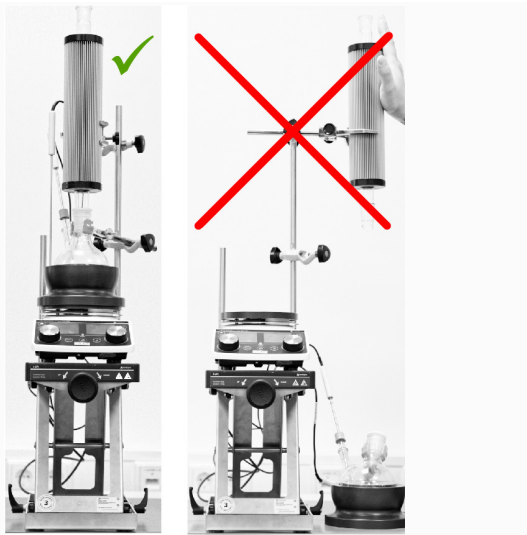
Setup, Positioning

Thanks to its robust design and the self-locking scissor mechanism, the lab jack supplied by Heidolph Instruments offers the best stability and work safety.

Follow the safety instructions below:

→ To use the lab jack, place it on a clean, dry, stable, even and horizontal surface.

→ Always make sure that all setup components and accessory parts of the magnetic stirrer are securely fixed (see also the corresponding delivery documentation or operating and/or mounting instructions):

→ Fix the setups preferably on a wall grid (if available). When mounted on a wall grid, ensure that the wall grid and all mounting elements have sufficient self-protection and load capacity!

→ Use all recommended retaining and fixing elements for setup components and accessory parts.

→ The lab jack, the magnetic stirrer and any other setups do not form a physical unit and must always be transported separately.

→ Before each transport, disconnect the cable connection between the lab jack and the magnetic stirrer.

Magnetic stirrer – lab jack cable connection

The lab jack [2] scope of delivery includes a suitable USB cable for connection to the magnetic stirrer [1]:
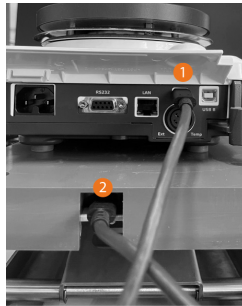
As soon as the lab jack has been detected by the software, the corresponding symbol appears on the display of the magnetic stirrer:
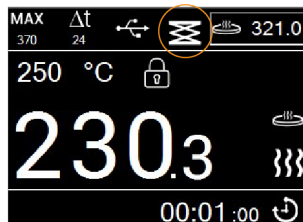

In case of interruption of the data connection between the lab jack and magnetic stirrer, the following warning appears on the display of the magnetic stirrer [73: Lab jack has no connection] and the [Lab jack connected] symbol goes out.

This warning message can be acknowledged at any time, and this has no negative effects on the ongoing processes of the magnetic stirrer.

Limiting the travel distance

The travel distance of the lab jack can be limited mechanically with the help of suitable and adjustable clamping levers (optional accessory, see section „Accessories" on page 121):
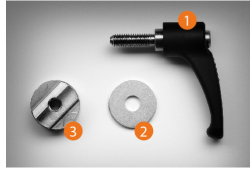
Each adjustable clamping lever [1] is mounted with a suitable shim [2] and a guide piece [3]:

➜ Place the guide piece [3] in the guide of the lab jack [4a] from the inside.

➜ Place the shim [2] on the thread of the clamping lever [1].

➜ Screw the clamping lever [1] onto the guide piece [3]:
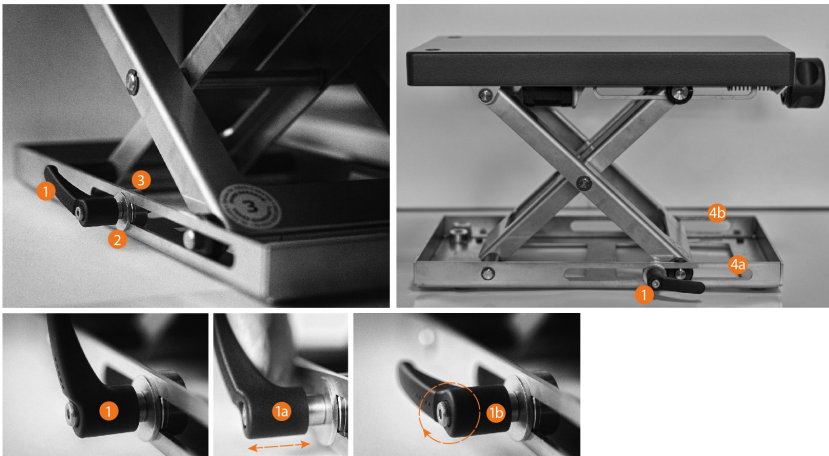
– Fix the second clamping lever in the same way in the opposite guide of the lab jack [4b].

➜ The position of the clamping lever can be adjusted, if necessary:

– Pull the clamping lever outwards to unlock it [1a].

– Turn the clamping lever clockwise or counterclockwise in a suitable position [1b].

➜ Move the lab jack upward to the highest working point [5], push the two clamping levers onto the two guide pins [6] until they stop and tighten the two clamping levers.
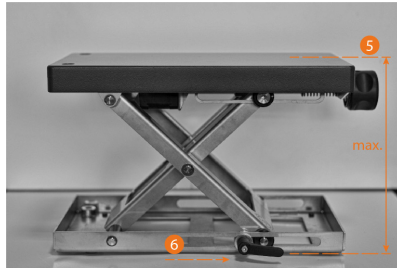
!	The lab jack can now not be moved beyond this vertical stop point.
	Check both thumbscrews for tight fit before commissioning and regularly during operation.

Lab jack operation

CAUTION

- Never reach into the lab jack mechanism after it is connected to the magnetic stirrer.
- Do not place any objects in the lab jack mechanism.
- Always make sure that there is sufficient distance between the lab jack and other devices or structures: the required minimum distance is 15 cm on all sides.
- Make sure that no incoming or outgoing lines (power connection cable, data cable, hose connections) protrude into the lab jack's mechanism.
- Clean the lab jack's mechanism at regular intervals or immediately if it is highly soiled.
- Always make sure that the travel path of the lab jack is not blocked.
- In the event of high setups, pay particular attention to moving the center of gravity of the whole setup to the middle of the lab jack table as far as possible to ensure adequate stability.
- Attach a suitable warning of unexpected traversing movements of the lab jack to the overall setup in remote and in unsupervised operation.

The lab jack is moved up and down using the two control buttons [up]/[down] or the hand-wheel, see „Mechanical design" on page 74.

Use the handwheel especially for fine adjustment:

➜ Turn the handwheel clockwise to move the lab jack downward.
➜ Turn the handwheel counterclockwise to move the lab jack upward.

General notes

If no lab jack is detected, the information **No lab jack connected** appears on opening the menu. In this case, check the cable connection between the magnetic stirrer and lab jack.

If the lab jack has been detected, the [Lab jack connected] symbol appears in the header of the display. As soon as the [Lower lab jack automatically] function is activated (**Timer expired** option and/or **Error** option activated) the [Lab jack connected] symbol is marked with the safety symbol:
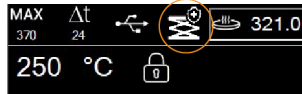
In automatic mode, the lab jack can only move downward. The upward traversing movement is only controlled via the [Lift] button and the handwheel at the front!

When lowering the lab jack, the movement speed is significantly reduced 150 mm before reaching the physically possible end position due to safety reasons.

- In case of a sensor error (warning code W68), the lab jack can be moved down and up until the end position using the control buttons on the magnetic stirrer.
- As long as the sensor error exists, the downward movement speed is automatically and significantly reduced.
- If the lab jack is moved upward, the upper end position will eventually not be detected. In this case, the motor keeps turning and the click sound will still be heard until you release the button. In this case, the system cannot be damaged!
- If the sensor error occurs in automatic mode, the lab jack is moved until the lower end position with a significantly reduced speed and regardless of the set travel distance.

Lowering the lab jack automatically

From the Main menu, open the [Lab jack] menu and make the required settings for automatic lowering of the lab jack:
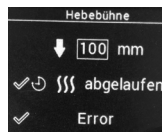
→ Define the required travel distance in the first line first.

→ Mark the (heating) **timer expired / abgelaufen** option if the lab jack is to move downward automatically after the timer has expired. If the option is deselected, the lab jack does not move after the timer has expired. An eventual sensor error has no influence on the timer function.

→ Mark the **Error** option if the lab jack is to move downward immediately in case of an error (error message or warning message!). The magnetic stirrer then switches to the safe operating state (speed 100 rpm, heating off). If the option is deselected, the lab jack does not move in case of error.

When lowering in automatic mode, the lab jack is positioned with an accuracy of ±5.

Signaling

When moving the lab jack, the following visual and/or acoustic messages are generated:

→ When moving the lab jack in automatic mode, a warning symbol [Risk of crushing] is shown on the display of the magnetic stirrer for the whole moving duration.

→ When moving the lab jack upward and downward, the magnetic stirrer generates a clack sound in every operating state and for the whole moving duration.

→ Button sounds ON (see section „Button sounds" on page 87), lab jack moves automatically downward after a timer has expired: Magnetic stirrer generates two or five signal sounds (according to timer setting, see section „Operation with timer" on page 95).

→ Button sounds OFF: lab jack moves automatically downward after a timer has expired: Magnetic stirrer generates a signal sound.

→ Button sounds ON: lab jack moves automatically downward in case of an error: Magnetic stirrer generates a signal sound.

→ Button sounds OFF: lab jack moves automatically downward in case of an error: Magnetic stirrer generates a signal sound.

→ When the lower end position has been reached, the warning message [W71/W72] is also generated in normal operation (see also section „Warning codes" on page 110).

Profiles

The Hei-PLATE Mix'n'Heat Ultimate type devices provide the option of storing multiple consecutive process steps as a profile in the system memory. From the [Main menu], open the [Profiles] menu to create or edit user-defined profiles.

Create a new profile

➜ To create a new profile, choose the [New/Active] option:
   – The Editor screen is opened, press a push-and-rotary control to mark the first value **hh:mm** (white background)

➜ Use a push-and-rotary control to set the required process time and confirm it by pressing a push-and-rotary control.
   – The following value **°C** is marked automatically.

➜ Use a push-and-rotary control to set the required setpoint temperature and confirm it by pressing a push-and-rotary control.
   – The following symbol [**|**] is marked automatically.

➜ Use a push-and-rotary control to switch between the Ramp jump [**|**] (temperature is adjusted as quickly as possible) and increase/lower gradually [**/**] (temperature is moved to the value within the set time) options. Example: Process time 05:00, temperature 50°C, temperature is heated to 50°C within five hours).

➜ Confirm each selection by pressing a push-and-rotary control.
   – The following value **rpm** is marked automatically.

➜ Use a push-and-rotary control to set the required set speed and confirm it by pressing a push-and-rotary control.
   – The following symbol [**|**] is marked automatically.

➜ Use a push-and-rotary control to switch between the ramp jump [**|**] (speed is adjusted with a jump) and increase/lower gradually [**/**] (speed is adjusted gradually) options, and confirm the selection by pressing a push-and-rotary control.

➜ If all values of a row have been defined in the way described, a further row is created. A profile can consist of up to ten (10) individual steps. Three individual steps have been defined in the following example:

New profile				
00:00	50	|	200	|
00:10	100	/	1000	/
01:00	0	/	0	|
hh:mm	°C	|	rpm	|

🗑 💾 ↪ ▶ ⇄

> ❗ Note that, especially for working through a profile in loop mode, the setpoints for temperature and speed must be set to 0 in the last step (see example above)!

Available buttons

🗑	Delete button: Delete profile or favorite
💾	Save profile
⬈	Load favorites
▶	Start profile (changes to stop profile during operation)
⇄	Activate/deactivate continuous loop operation

On saving a profile, the following input screen appears by default:


```
          Save active profile

_____

A B C D E F G H I  J K L M

N O P Q R S T  U V W X Y Z

_  0 1 2 3 4 5 6 7 8 0    <-

Save            Cancel
```
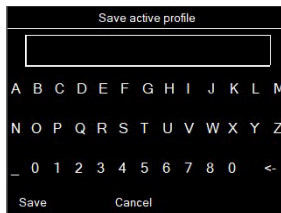
➜ Assign a unique name to each profile (it can be be adjusted at any time).
  – Use a push-and-rotary wheel to select an available character and confirm by pressing a push-and-rotary wheel.
  – Confirm the changes with **Save** to adopt them. If applicable, select **Cancel** to retain an existing profile in the memory under its previous name.

⚠ **CAUTION**

On switching off the device, the last loaded profile remains active.

Eventual modifications on an existing profile will not be reset automatically, even on switching off the device. This means that the most recently used profile will be switched to active, if necessary with modified values, when starting the device again.

▪ If necessary, load an existing profile again to undone modifications on the stored parameters.
▪ After a restart or after switching on the device again and before working through the latest active profile again, check the set values if necessary!

Load favorite

➜ Select the [Favorites] option to open the list of stored profiles.

  – Use one of the two push-and-rotary controls to mark the required entry.
  – Press one of the two push-and-rotary controls to activate the marked profile.
  – If applicable, press the Continuous loop button to work through an active/loaded profile in continuous operation.
  – Press the Start button to work through the activated profile in single or continuous mode.

Graph function

On starting the heating and/or stirring function, the devices of the type
Hei-PLATE Mix'n'Heat Ultimate automatically record the temperature (red-orange) and rotation curve (green-yellow) based on the process time.

This diagram can be opened via the [Settings] → [Graph] menu. The following figure shows the graphic representation of an arbitrary process by way of example:
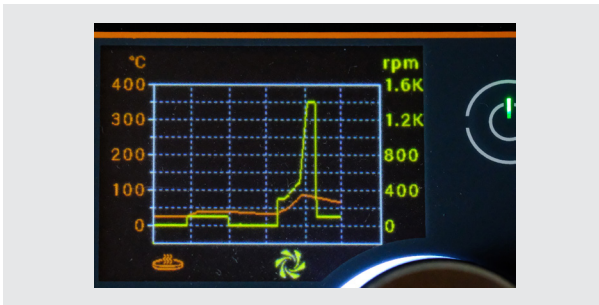
Device information

The following information can be called up in the [Settings] → [Info] menu:

➜ Device info (serial number, firmware version)
➜ Network info
➜ Operating time broken down by device, heating and motor
➜ Error list (list of the logged error messages)

Troubleshooting

The following table includes possible failures and corresponding corrective measures:

Malfunction	Possible cause/ remedy
LED Standby button is not lit	➜ Mains voltage not present: Check the power supply cable for damage, check the connection plug for correct seating, check the fuse of the house installation. ➜ LED defective, contact technical service.
No mixing function	➜ No magnetic stirring bar in the vessel, insert magnetic stirring bars. ➜ Device is defective, contact technical service.
No heating function	➜ Heating plate defective, contact technical service!
Temperature display with connected temperature sensor is implausible	➜ Temperature sensor connected wrongly, check the connection. ➜ The immersion depth is too low, note the minimum immersion depth of 20 mm.
Deviation setpoint/ current value of sample	➜ Setpoint too low, take into account heat losses. ➜ Heating plate defective, contact technical service!

If a fault cannot be rectified with the described suggestions, please contact an authorized sales representative or our technical service (see section „Contact information" on page 123).

Warning codes

> ! Remove the cause of the fault and press one of the device buttons to confirm a warning code. The device can continue to operate without a restart.

Code	Description, remedy
W59	Printed board temperature > 90 °C (reduction). Temperature control switched off due to too high temperature in the housing: Temperature control has been/will be switched on again automatically after cooling phase.
W60	Power interruption, no display. Restart the device after the power is restored.
W61	Plausibility check sensor/motor (lab jack): Disconnect the lab jack, contact Heidolph's technical service/sales partner.
W62	Lab jack motor short-circuit phase-phase: Disconnect the lab jack, contact Heidolph's technical service/sales partner.

Code	Description, remedy
W63	Lab jack motor short-circuit phase-GND: Disconnect the lab jack, contact Heidolph's technical service/sales partner
W64	Lab jack motor overheated: Disconnect the lab jack, leave it to cool
W65	Lab jack undervoltage: Disconnect the lab jack, contact Heidolph's technical service/sales partner
W66	Lab jack overvoltage: Disconnect the lab jack, contact Heidolph's technical service/sales partner
W67	Lab jack power supply error, USB C interface error: Disconnect the lab jack, contact Heidolph's technical service/sales partner
W68	Lab jack position sensor error: Disconnect the lab jack, contact Heidolph's technical service/sales partner
W69	Lab jack communication error: Timeout during the signal transmission, disconnect the lab jack, contact Heidolph's technical service/sales partner.
W70	Lab jack position error: Timeout during the positioning, disconnect the lab jack, contact Heidolph's technical service/sales partner.
W71	Motor blockage during the automatic downward move of the lab jack: Check lab jack mechanism for blockages and/or check setting of the travel distance
W72	Lab jack overload: End position reached or overload: Check lab jack position and, if necessary, correct the end position, check lab jack for overload
W73	No lab jack connection: Check the cable connection between the magnetic stirrer and lab jack, check the cable for damage, contact Heidolph's technical service/sales partner if necessary
W101	USB A, ULPI cannot be accessed: contact Heidolph's technical service/sales partner
W102	USB C error: contact Heidolph's technical service/sales partner
W103	Ethernet Phy error: contact Heidolph's technical service/sales partner
W104	RTC quartz error: contact Heidolph's technical service/sales partner
W105	RTC battery empty: contact Heidolph's technical service/sales partner
W106	USB stick memory capacity: Change the USB stick

Error codes

> In case of error, the device must be restarted after removing the cause of the error.

Code	Description, remedy
E11	Internal sensor break: contact Heidolph's technical service/sales partner
E12	Internal sensor break or short-circuit (hardware), temperature limit value / heating plate temperature limitation / printed board temperature exceeded: Allow the device to cool, restart, adjust the temperature limit value
E13	Internal sensor difference > 15 °C, impermissible internal sensor measured value difference: contact Heidolph's technical service/sales partner
E14	Internal safety temperature ($T_{hotplate}$ > T_{set} + ΔT [adjustable range: 10 – 25 °C]), heating point setpoint temperature exceedance above safety ΔT: Correct the test set-up, restart the device
E15	Max printed board temperature has been exceeded, device shutdown as a result of component overheating: Allow the device to cool for at least one hour and check the setup
E16	Actual and set values of the temperature limit do not match, difference between actual and setpoint values of temperature limit: contact Heidolph's technical service/sales partner
E21	External temperature sensor media contact lost during the ongoing process, cool medium added to the process: Reposition the sensor, restart the device
E22	External temperature sensor without media contact on switching on: Reposition the sensor, restart the device
E23	Safety temperature at the external temperature sensor exceeded ($T_{Heating\ plate}$ > $T_{setpoint}$ + ΔT [settable range: 10 – 25 °C]), medium setpoint temperature exceedance above safety ΔT: Correct the test set-up, restart the device
E33	Heating push-and-rotary control pressed within ten seconds, push-and-rotary control is defective: contact Heidolph's technical service/sales partner
E34	Rotation push-and-rotary control pressed within ten seconds, push-and-rotary control is defective: contact Heidolph's technical service/sales partner
E36	Failure of communication between basic printed board/HMI: contact Heidolph's technical service/sales partner
E37	Failure of communication between HMI/interface IOs: contact Heidolph's technical service/sales partner

Code	Description, remedy
E41	Motor is defective: contact Heidolph's technical service/sales partner
E51	External sensor break: Replace the temperature sensor
E52	External sensor difference > 15 °C, impermissible external sensor measured value difference: contact Heidolph's technical service/sales partner
E53	External temperature sensor plugged in or disconnected with switched on heating: Restart device

Technical specifications

General device data		
Hei-PLATE Mix'n'Heat	**Expert**	**Ultimate**
Dimensions (W × H × D)	168 × 101 × 299 mm	
Usable surface heating plate	∅ 135 / 145 mm	∅ 145 mm
Weight	approx. 3 kg	
Maximum permissible load	25 kg	
Drive	EC motor, counterclockwise/clockwise rotating	
Speed range	100 – 1,400 rpm, setting accuracy 1 rpm	
Heating power	800 W at 230 V (EU) 600 W at 115 V (US)	
Heating temperature range	20 – 350 °C, setting accuracy 1 K	
Heating control	PID	
Temperature measurement accuracy	Operation with external temperature measuring sensor Pt1000: ±0.2 K, plus tolerance Pt1000	
Temperature measurement resolution	0.1 K	
Display	2× TFT display	
Protection class (EN 60529)	IP42	
Acoustic pressure	< 50 db(A)	
Electrical data		
Rated voltage	230 V, 50/60 Hz (EU) 115 V, 50/60 Hz (US)	
Connection	L+N+PE	
Protection class	I	
Overvoltage category	II	
Degree of pollution	2	
Power input	Normal operation 230 V: 825 W (EU) / 115 V: 625 W (US) Standby mode: 1.7 W	
EMC class	B, Group 1	
Permissible ambient conditions		
Operating temperature	5 °C–31 °C at up to 80 % rel. humidity, 32 °C–40 °C at up to 50 % rel. humidity (linearly reducing)	
Installation altitude	up to 2,000 m asl	

Lab jack	e-Lift
Load capacity	max. 10 kg
Protection class (EN 60529)	Mechanic IP02, electronics IP42
Power supply	Via magnetic stirrer/USB-C cable
Footprint (w × d)	185 × 390 mm, incl. handwheel
Usable area (w × d)	185 × 350 mm
Height	min. 95 mm, max. 275 mm
Weight	6 kg

List of the factory settings

Parameters	Factory setting	Adjustment range
Heating mode	FAST	• FAST • PRECISE • PRECISE+
Temperature [unit]	°C	• °C • °F
Soft start	Medium	• Slow • Medium • Fast
[Magnetic field] stir bar detector	Off	• On • Off
[Rotating field] direction	Counterclockwise	• Counterclockwise • Clockwise
Interval operation	Off	• On • Off
Language [menu navigation]	English	• English • German
Sound [button sounds]	On	• On • Off
Interface mode	Safe	• Safe • Expert
Auto standby	Off	• On • Off
[Safety temperature] safety delta T	25 °C	• 10 °C –25 °C
Sensor monitoring	On	• On • Off
Restart [after interruption of the power supply]	A: Heating Rotation off	• A: Heating Rotation off • B: Rotation on • C: Heating Rotation on
T limit [maximum heating plate temperature]	375 °C	• 50 °C –375 °C

RS-232/USB B interface commands

Query actual value

Command	Response	Description
IN_PV_1\r\n	IN_PV_1 X\r\n	X = actual value, sample temperature sensor (°C)
IN_PV_2\r\n	IN_PV_2 X\r\n	X = actual value, sample safety temperature (°C)
IN_PV_3\r\n	IN_PV_3 X\r\n	X = actual heating plate temperature value (°C)
IN_PV_4\r\n	IN_PV_4 X\r\n	X = actual heating plate safety temperature value (°C)
IN_PV_5\r\n	IN_PV_5 X\r\n	X = actual motor speed value (rpm)
IN_PV_6\r\n	IN_PV_6 X\r\n	X = actual sample temperature sensor value (°F)
IN_PV_7\r\n	IN_PV_7 X\r\n	X = actual sample safety temperature value (°F)
IN_PV_8\r\n	IN_PV_8 X\r\n	X = actual heating plate temperature value (°F)
IN_PV_9\r\n	IN_PV_9 X\r\n	X = actual heating plate safety temperature value (°F)
IN_PV_10\r\n	IN_PV_10 X\r\n	X = actual carrier temperature (°C)
IN_PV_11\r\n	IN_PV_12 X\r\n	X = actual carrier temperature (°F)

Query setpoint value

Command	Response	Description
IN_SP_1\r\n	IN_SP_1 X\r\n	X = setpoint temperature, sample/heating plate (°C)
IN_SP_2\r\n	IN_SP_2 X\r\n	X = setpoint safety temperature delta (°C)
IN_SP_3\r\n	IN_SP_3 X\r\n	X = set motor speed value (rpm)
IN_SP_4\r\n	IN_SP_4 X\r\n	X = setpoint temperature, sample/heating plate (°F)
IN_SP_5\r\n	IN_SP_5 X\r\n	X = setpoint value, safety temperature delta (°F)
IN_SP_6\r\n	IN_SP_6 X\r\n	X = setpoint value, max. heating plate temperature (°C)
IN_SP_7\r\n	IN_SP_7 X\r\n	X = setpoint value, max. heating plate temperature (°F)

Query mode

Command	Response	Description
IN_MODE_1\r\n	IN_MODE_1 Y\r\n	Query ext. sensor • Y = 0: No ext. sensor (heating plate temperature control) • Y = 1: external medium temperature sensor (2 Pt1000) • Y = 2: ext. medium sensor (2 Pt100) • Y = 3: ext. medium sensor and carrier (3 Pt1000) • Y = 4: ext. medium sensor and carrier (3 Pt100)
IN_MODE_2\r\n	IN_MODE_2 Y\r\n	Behavior after power failure • Y = 0: All OFF after power restored, • Y = 1: Heating/motor ON after power restored • Y = 2: Motor ON after power restored
IN_MODE_4\r\n	IN_MODE_4 Y\r\n	Query heating control • 0: Heating control in PRECISE mode • 1: Heating control in FAST mode, • 2: Heating control in PRECISE mode with HeatOn

IN_MODE_5\r\n	IN_MODE_5 Y\r\n	Query motor direction of rotation ▪ 0: CCW ▪ 1: CW
IN_MODE_6\r\n	IN_MODE_6 Y\r\n	Query motor acceleration level ▪ 0: slow ▪ 1: medium ▪ 2: fast
IN_MODE_7\r\n	IN_MODE_7 Y\r\n	Query ext. sensor monitoring ▪ 1: on ▪ 0: off
IN_MODE_8\r\n	IN_MODE_8 Y\r\n	Query stir bar detector ▪ 1: on ▪ 0: off

Query status, type, version

Command	Response	Description
STATUS\r\n	STATUS Y\r\n	Status query ▪ Y = 0: Manual operation at the device ▪ Y = 1: Remote operation START_1/START_2 ▪ Y = 2: Remote operation STOP_1/STOP_2 ▪ Y < 0: Error code ▪ Y =-1: Remote blocked (device stopped manually)
S_CTRL\r\n	S_CTRL Y\r\n	Query current control source ▪ Y = 0: Manual, ext control allowed ▪ Y = 1: Profiles ▪ Y = 2: USB B ▪ Y = 3: RS-232 ▪ Y = 4: LAN ▪ Y = 7: Manual, ext. control blocked
S_OP\r\n	S_OP Y\r\n	Query current control status ▪ Y = 0: All off; ▪ Y = 1: Heating on; ▪ Y = 2: Motor on; ▪ Y = 3: Heating and motor on
SW_VERS\r\n	SW_VERS V Y. Y. Y \r\n	Y.Y.Y = HMI-Version (e.g: 1.2.345)
M\r\n	M\r\n	Identify device: Display of the tripped device begins to flash
T\r\n	T MR_ULTIMATE\r\n T MR_ EXPERT\r\n	Query device type
QR_INFO\r\n	S#S#S\r\n	Barcode string, format: ▪ Material number: max. 18 digits alphanum. ▪ Serial number: max. 12 digits alphanum. ▪ Production order: max. 8 digits numerical ▪ Separator: #

Query compact device info

Command	Response	Description
IN_SP_ALL\r\n	IN_SP_ALL Z\r\n	All set points: Z = All X values from IN_SP_1 to IN_SP_7, separated by semicolon
IN_PV_ALL\r\n	IN_PV_ALL Z\r\n	All actual values: Z = All X values from IN_PV_1 to IN_PV_11, separated by semicolon
IN_MODE_ALL\r\n	IN_ MODE _ALL Z\r\n	All modes: Z = All Y-values from IN_MODE_1 to 8, separated by semicolon. The nonexistent value IN_MODE_3 is replaced by "999".

Setting set values

Command	Response	Description
OUT_SP_1 Y\r\n	OUT_SP_1 X\r\n	Set setpoint temperature, sample/heating plate (°C)
OUT_SP_2 Y\r\n	OUT_SP_2 X\r\n	Set setpoint value, safety deltaT (°C)
OUT_SP_3 Y\r\n	OUT_SP_3 X\r\n	Set setpoint speed (rpm)
OUT_SP_4 Y\r\n	OUT_SP_4 X\r\n	Set setpoint temperature, sample/heating plate (°F)
OUT_SP_5 Y\r\n	OUT_SP_5 X\r\n	Set setpoint value, safety deltaT (°F)
OUT_SP_6 Y\r\n	OUT_SP_6 X\r\n	Set setpoint value, heating plate max. temperature (°C)
OUT_SP_7 Y\r\n	OUT_SP_7 X\r\n	Set setpoint value, heating plate max. temperature (°F)
OUT_SP_8 Y\r\n	OUT_SP_8 X\r\n	Lower lab jack to Y mm (Ultimate only)

Setting modes

Command	Response	Description
OUT_MODE_2 Y\r\n	OUT_MODE_2 Y\r\n	Set behavior after power failure • Y = 0: All OFF after power restored • Y = 1: Heating/motor ON after power restored • Y = 2: Motor ON after power restored
OUT_MODE_4 Y\r\n	OUT_MODE_4 Y\r\n	Set heating control • 0 = heating control in PRECISE mode (without heating source), • 1 = heating control in FAST mode, • 2 = heating control in PRECISE mode (heating source - HeatOn)
OUT_MODE_5 Y\r\n	OUT_MODE_5 Y\r\n	Set motor direction of rotation • 0 = CCW • 1 = CW
OUT_MODE_6 Y\r\n	OUT_MODE_6 Y\r\n	Set motor acceleration level • 0 = slow • 1 = medium • 2 = fast
OUT_MODE_7 Y\r\n	OUT_MODE_7 Y\r\n	Set ext. sensor monitoring • 1 = on • 0 = off
OUT_MODE_8 Y\r\n	OUT_MODE_8 Y\r\n	Set stir bar detector • 1 = on • 0 = off

Device control

Command	Response	Description
START_1\r\n	START_1\r\n	Start heating
START_2\r\n	START_2\r\n	Start rotation
STOP_1\r\n	STOP_1\r\n	Switch off heating
STOP_2\r\n	STOP_2\r\n	Switch off rotation
RESET\r\n	RESET\r\n	Reset all
PA_NEW\r\n	PA_NEW\r\n	Switch over to enhanced interface protocol
PA_OLD\r\n	PA_OLD\r\n	Switch over to old interface protocol
CC_ON\r\n	CC_ON\r\n	Connection test on
CC_OFF\r\n	CC_OFF\r\n	Connection test off

RS-232 interface parameters
➜ 9600 Baud
➜ Parity: even
➜ Data: 7 Bit
➜ Stop: 1 Bit

IN commands
➜ X = numerical value with one place after the decimal
➜ Y = Decimal number
➜ Z = multiple numerical values, separated by semicolon
➜ S = ASCII string
➜ If no external temperature sensor is connected, all relevant actual values are sent in **999.9** format.

Command termination
➜ ...\r\n

Temperature sensor connection socket pin assignment

Position of the connection socket on the housing, see section „Device connections, interfaces" on page 75 if necessary.

Connector type for connection to the magnetic stirrer: 4 pin round connector, e.g. Binder series 678, article number: 99-0609-00-04.

Sensor type 1 pin assignment: two sensor elements of the type Pt100 or Pt1000

Sensor element A   Sensor element B
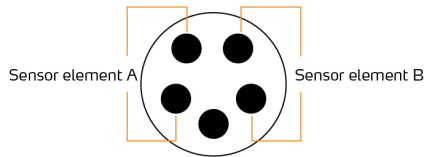
➜   Sensor elements of A and sensor elements of B in one sensor housing

Pin assignment for sensor type 2: three sensor elements of the type Pt100 or Pt1000:

Sensor element A
Sensor element B
Sensor element C
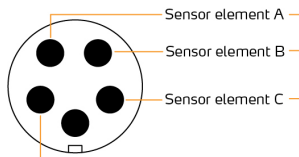
–   Sensor elements of B and sensor elements of C in one sensor housing, sensor elements of A in a second sensor housing.

EITHER sensor elements of of the type Pt1000 **OR** of the type Pt100 may only ever be used in a system.

Scope of delivery

Item	Quantity	Product no.
Hei-PLATE Mix'n'Heat Expert	1	506-32101-00
Hei-PLATE Mix'n'Heat Ultimate	1	506-41101-00
Safety Guide	1	01-005-006-68
Operating instructions	1	01-005-006-69
Warranty registration	1	01-006-002-78

Accessories

> Detailed information on the available accessories for your device variant can be found on our website at
> www.heidolph-instruments.com.
>
> In case of need, contact an authorized dealer or our technical service, see „Contact information" on page 123.

Device service

WARNING

Live components are installed inside the device. When opening the device, there is a risk of touching live components.

- Disconnect the device from the power supply before carrying out any cleaning, maintenance or repair work.
- Penetrating liquid poses the risk of an electric shock! When cleaning, avoid the penetration of liquids.

General cleaning instructions

Wipe all surfaces of the device with a damp cloth if necessary. Persistent contamination can be removed with mild soapy water.

CAUTION

In the event of contact with aggressive media, make sure that all surfaces are cleaned immediately with suitable aids to prevent damage to the device surface.

Improper cleaning can damage the surfaces of the device. Furthermore, penetrating liquid can damage the electronic components inside the device.

- Clean the device's surfaces with a soft, lint-free and only slightly moistened cloth.
- Never use any aggressive or abrasive cleaning agents or aids.

Software/firmware update

The device software/firmware can only be updated by our technical service.

If required, contact an authorized dealer or our technical service, see „Contact information" on page 123.

Repairs

Repairs to the device may only be carried out by authorized experts! Unauthorized repairs during the warranty period will result in the loss of the warranty claim. The owner is solely liable for damage caused by unauthorized repairs.

If repairs are required, contact an authorized dealer or our technical service, see „Contact information" on page 123. Include the completed certificate of decontamination with every device return, see „Certificate of decontamination" on page 124.

Maintenance

There are no user-serviceable components in the unit housing. If necessary (in the event of abnormal operating behavior such as excessive noise or heat generation, for example), contact our technical service, see „Contact information" on page 123.

Disposal

- When disposing of the device, observe the provisions of the WEEE Directive 2012/19/EU and its transposition into national law in the country of use.
- When disposing of portable batteries, observe the provisions of the European Battery Directive 2013/56/EU and their implementation in national law in the country of use.
- Check the device and all components for residues of substances that are hazardous to health, the environment and biohazardous before disposal.
- Properly remove and dispose of residues of substances that are hazardous to health, the environment and are biohazardous!

Warranty statement

Heidolph Instruments GmbH & Co. KG provides a three-year warranty against material and manufacturing defects.

Glass and wear parts, transportation damage, and damage resulting from improper handling or non-intended use of the product are excluded from the warranty.

The warranty period for registered products begins on the date of purchase. Register the product with the enclosed warranty card or on our homepage www.heidolph.com.

For non-registered products, the warranty period begins with the date of the serial production (to be determined by the serial number).

In the event of material or manufacturing defects, the product will either be repaired or replaced free of charge within the warranty period.

Contact information

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Local distributors

To find your local distributor please visit www.heidolph.com