Mechanical design

1 Heating plate
2 On/off switch
3 Rotary control [temperature]
4 Display
5 Rotary control [rotation]

6 Appliance inlet
7 Six-pole connection socket for external temperature controller EKT Hei-Con

The connections at the rear of the device are fitted with a protective cover. No tools are needed to open the protective cover.

Positioning the device

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.

Power supply

DANGER

Observe the notes and instructions given in section “Electrical safety” on page 31.

Switching the device on/off

To turn on the device, press the on/off button. When the device is switched on, the on/off button lights up green.

To turn off the device, press the on/off button again. When the device is turned off, the on/off button lights up white.

Settings

The following adjustments can be made in the device settings:

- Enable/disable auto standby
- Activating/deactivating the [automatic restart] function
- Activating/deactivating the [soft start] function
- Calibration of external temperature sensor (PT1000)
- Activating/deactivating the safety function

Open the settings menu

→ Turn off the device (on/off button lights up white).
→ Press simultaneously and hold both the push-and-rotary controls [temperature] and [rotation].
→ Press the on/off button until AR off (first setting option) appears on the display.
→ Release the push-and-rotary controls and the on/off button.
→ Use the [temperature] control to select one after another the following options:

- [AR]: Activate or deactivate automatic restart
- [SoS]: Activate or deactivate soft start
- [ASd]: Activate or deactivate auto standby
- [SAF]: Activate or deactivate the security function
- [CAL]: Calibrate the connected temperature sensor

➜ Use the [rotation] control to select the desired mode:
  – [on] or [off] for automatic restart, soft start, auto standby and safety function
  – Temperature deviation in [°C] for sensor calibration

If no selection is made within about five seconds, the menu is automatically closed and the device is in the on state!

Automatic restart

If the [automatic restart] function is activated, the device switches on again automatically with the set parameters after a power interruption when the power is restored.

By default, the [automatic restart] function is deactivated. The function can be activated or deactivated at any time via the device settings:

➜ Open device settings (see section “Open the settings menu” on page 34)

➜ Set [AR] to [on] to activate the function

Operation behavior when the mains is restored after a power interruption

- On/off button flashes white/green.
- Heating plate reheats to the set temperature value.
- Speed is ramped up to the set value.
- Once the set operating values have been reached, the on/off button will light up green again.

➜ Set [AR] to [off] to disable the function

Soft start

When the [soft start] function is activated, the speed is gradually increased to the set value after the rotation is switched on.

By default, the [soft start] function is activated. The function can be activated or deactivated at any time via the device settings:

➜ Open device settings (see section “Open the settings menu” on page 34)

➜ Set [SoS] to [off] to disable the function

➜ Set [SoS] to [on] to enable the function

Auto standby function

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 must then be switched on again using the on/off button.

By default, the [auto standby] function is deactivated. The function can be activated or deactivated at any time via the device settings:

➜ Open device settings (see section “Open the settings menu” on page 34)

➜ Set [ASd] to [on] to enable the function

➜ Set [ASd] to [off] to disable the function

Safety function

(Only relevant and available operating the device with an external temperature sensor, see also section “Operation with external temperature sensor” on page 39.)

If the safety function is activated, the heating function is automatically switched off when the sensor detects a sudden drop in temperature or when the measured temperature rises too slow.

By default, the safety function is activated. The function can be activated or deactivated via the device settings:

➜ Open device settings (see section “Open the settings menu” on page 34)

➜ Set [SAF] to [off] to disable the function

➜ Set [SAF] to [on] to activate the function

Sensor calibration

(Only relevant and available operating the device with an external temperature sensor, see also section “Operation with external temperature sensor” on page 39.)

The calibration function can be used to set the connected temperature sensor according to the specific ambient conditions in your laboratory.

The sensor calibration function is only available when a compatible temperature sensor is connected. To calibrate the connected temperature sensor, follow these steps:

➜ Immerse the sensor in the reference sample

➜ Open device settings (see section “Open the settings menu” on page 34)

➜ Select parameter [CAL]

➜ Adjust the displayed temperature value as desired

The value is retained until a new calibration is performed.

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 ensure that the vessels are evenly distributed on the heating plate.
- Pay particular attention to even distribution of the weight load when vessels of different size and/or differently filled vessels are placed on the heating plate at the same time!

High speeds carry the risk of improperly fastened vessels falling off the heating plate and contaminating the environment by leaking chemicals.

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

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

Use suitable attachments for processing multiple samples/vessels simultaneously.

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

Always wear the specified personal protective equipment (PPE).

Push-and-rotary control

The device is equipped with two push-and-rotary controls for setting [temperature] and [rotation], for adjusting various device parameters, and for switching the heating and mix functions on and off (see section “Mechanical design” on page 33).

The operation of the push-and-rotary controls is described in detail in the following sections:

Adjust values

Quickly turn the two knobs clockwise or counter-clockwise to increase or decrease the displayed value (temperature, speed, setting value).

Switch heating/mix function on/off

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

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

Display set values

During normal operation, move the two controls one detent position clockwise or counter-clockwise to display the set point (temperature, speed).

Lock function

Press and hold the [temperature] or the [rotation] push-and-rotary control for at least two seconds until the displayed value (temperature or speed) is highlighted with a white frame.

In this state, the push-and-rotary control is locked to prevent unintended operation.

Press and hold the [temperature] or the [rotation] push-and-rotary control again for at least two seconds until the white marker frame disappears. In this state, the push-and-rotary control is unlocked.

The two push-and-rotary controls [temperature] and [rotation] can be locked at the same time as described.

Set the heating temperature

WARNING

The heating plate is designed for a maximum operating temperature of 300°C. 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.

→ Turn on the device as described in section “Switching the device on/off” on page 34
  – The display shows the current temperature of the heating plate.
→ Turn the [Temperature] push-and-rotary control clockwise or counter-clockwise to set the desired temperature (setting range: 20 – 300 °C).
  – The setpoint can be adjusted at any time during operation.
→ Press the [Temperature] push-and-rotary control to activate the heating function.
  – When the heating function is activated, the LED ring of the [Temperature] control lights up orange.
→ Press the [Temperature] push-and-rotary control again to turn off the heating function.

Residual heat indicator

When the device is switched off, the display shows the current temperature of the heating plate. At the same time, the LED ring of the [Temperature] control flashes.

The optical indicators (display and LED ring) will turn off as soon as the surface temperature of the heating plate reaches a level of 50 °C with a falling tendency.

WARNING

As long as the device is not switched off, the display shows the current temperature of the heating plate or the measured value from the external temperature sensor.

Note that the sensor reading may differ significantly from the current surface temperature of the heating plate!

Avoid direct skin contact with the heating plate!

Do not place heat-sensitive objects on the heating plate.

Setting the rotation speed

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.

→ Turn on the device as described in section “Switching the device on/off” on page 34
  – The display shows 0 rpm.
→ Turn the [Rotation] push-and-rotary control clockwise or counter-clockwise to set the desired nominal speed (setting range: 100 – 1,400 rpm).
→ Press the [Rotation] control to activate the mixing function.
  – When the mixing function is activated, the LED ring of the [Rotation] control lights up white.
  – The displayed rotation speed value continuously updates until the setpoint is reached.
→ The setpoint can be adjusted at any time:
  – Use the [Rotation] control to adjust the setpoint as required.
  – The rotation speed is adjusted without any delay (observe the display!).
→ Press the [Rotation] control again to turn off the mixing function.

Operation with external temperature sensor

Devices of the type Hei-PLATE Mix'n'Heat Core⁺ can be operated with an external temperature controller (PT1000, optional accessory).

For detailed instructions on how to set up and connect a temperature controller, refer to the associated operating instructions.

When using an external temperature sensor, the current temperature is not measured on the heating plate, but on the connected sensor. The temperature indicator on the display is marked with the [ext] symbol.

Calibrate the external sensor as described in section “Sensor calibration” on page 36 to obtain correct readings and work results.

Two heating modes are available when using an external temperature sensor:

- FASt mode: In this mode, the heating plate is heated up quickly to the preset temperature (factory setting).
- PrECIS mode: In this mode, the heating plate is heated slowly and without overshooting to the preset temperature.

WARNING

As long as the temperature sensor is not immersed in the sample, the temperature of the ambient air is displayed. The heating plate can therefore heat up to 300 °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.

Procedure

➜ Ensure that the external temperature sensor is correctly connected.

➜ Switch on the device and set the heating temperature, see section “Set the heating temperature” on page 38.

- The device operates in the last active heating mode (FASt or PrECIS).

➜ Press the [Temperature] control to change the heating mode if necessary (LED ring flashes rapidly).

- Activate FASt mode: Press the control once and wait until the LED ring lights up continuously.
- Activate PrECIS mode: Press the control twice and wait until the LED ring lights up continuously.

➜ Immerse the external temperature sensor at least 20 mm deep in the sample to obtain a stable reading.

- The display shows the measured temperature of the sensor: Symbol [ext].

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

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

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

Troubleshooting

Malfunction	Possible cause/ remedy
On/off button illumination remains off	▪ 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 stirring bars. ▪ Rotation speed set to zero, increase rotation speed.
No heating function	▪ Heating temperature setpoint below current temperature, adjust setpoint. ▪ Heating plate defective, contact technical service!
Temperature display not plausible with temperature sensor connected	▪ Check temperature sensor 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 details" on page 45).

Error codes

E11	Sensor break, internal sensor
E12	Sensor break or short circuit, internal hardware
E13	Internal sensor difference < 15 °C
E14	Internal safety temperature (T heating plate > Tset + 25 °C)
E21	External temperature sensor: media contact lost in the current process
E22	External temperature sensor without media contact when switching on
E23	External safety temperature exceeded
E36	IO expander: Loss of communication
E41	Drive failure
E51	External sensor break
E52	External sensor difference > 15 °C
E53	External temperature sensor disconnected or plugged in when the heating is switched on

Technical specifications

General device data	
Model	**Hei-PLATE Mix'n'Heat Core+**
Dimensions (W × H × D)	168 × 101 × 299 mm
Usable surface heating plate	∅ 135 mm bzw. ∅ 145 mm (depending on model, see ordering data)
Weight	approx. 3 kg
Maximum permissible load	25 kg
Drive	EC motor, left-turning
Speed range	100 – 1,400 rpm
Adjustment accuracy	5 rpm
Heating power	800 W at 230 V (EU) 600 W at 115 V (US)
Heating temperature range	20 – 300 °C
Indication/measurement range	15 – 325°C (with temperature sensor Pt1000)
Heating control	PID
Adjustment accuracy	1 K
Measurement accuracy (DIN IEC 751 Class a)	±0.2 K, plus tolerance PT1000
Measurement resolution	1 K
Display	LCD 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) Normal operation 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 (decreasing linearly)
Installation altitude	up to 2,000 mamsl