

Safe

Heating and Mixing



Leading Safety Standards

Superior Ease of Use

Reduced Cost of Ownership

Operating Manual

2

Magnetic Stirrer MR Hei-Standard, MR Hei-Tec, MR Hei-Connect
Operating manual must be read before initial start-up.
Please follow the safety instructions provided.
Please keep for future reference.

Original-Betriebsanleitung

36

Magnetrührer MR Hei-Standard, MR Hei-Tec, MR Hei-Connect
Betriebsanleitung vor Erstinbetriebnahme unbedingt lesen.
Sicherheitshinweise beachten.
Für künftige Verwendung aufbewahren.

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Version and variants

Version

This manual describes the function, operation and maintenance of the magnetic stirrers MR Hei-Standard and MR Hei-Tec, MR Hei-Connect

Version	Alteration date
1.3	08.2016

Variants

The units are available in different configurations. Certain features and functions apply to specific configurations only. The varieties are documented in this manual.

About this manual

This operating manual is a component of the device described here.



- Please read this manual carefully and obey all safety and warning notices.
- Ensure that every operator reads this manual.
- Ensure that this manual is accessible for every operator.
- Pass on the operating manual to the subsequent owner.



For the current version of this operating manual in pdf format, please go to:

[http://www.heidolph-instruments.com/Support/Operation Manuals/ Magnetic Stirrers/All MR Hei- models/MR Hei-Standard, MR Hei-Tec, MR Hei-Connect](http://www.heidolph-instruments.com/Support/Operation%20Manuals/Magnetic%20Stirrers/All%20MR%20Hei-%20models/MR%20Hei-Standard,%20MR%20Hei-Tec,%20MR%20Hei-Connect)

In addition please observe the regional regulations.



Terms and signs used

In this manual you will find standardized terms and signs to warn you of possible dangers or give important hints. Please take special notice to these signs to avoid personal injury or damage to the unit.

The following terms and type of signs (basic drawing elements) are used:

Symbol	Additional term / Description
Warning signs 	The yellow triangle indicates hazardous situations. It is used in combination with the following terms: DANGER: Indicates a hazardous situation which, if not avoided, will result in irreversible injury or death. WARNING: Indicates a hazardous situation which, if not avoided, could result in serious injury or material damage. CAUTION: Indicates a hazardous situation which, if not avoided, may result in a minor injury or material damage.
Prohibitory signs 	Not to do: The red circle indicates a situation that should be avoided under all circumstances to avoid injury or damage.
Mandatory signs 	To do: The blue circle indicates important information. Please obey to avoid property damage.

Other signs used

Symbol	Description
→	Handling instruction, action required
✓	Result of action
▪ ▪ ▪	List of information
a. b. c.	List of variants



General safety instructions

EU Declaration of Conformity



This device complies with the following EC-Directives*:

- 2006/42/EC Machinery Directive
- 2014/30/EU Electromagnetic Compatibility Directive

*Also see attachment „EU Declaration of Conformity“.

The device has been constructed according to state-of-the-art technology and recognized safety regulations. However, risks may still arise during installation, operation and maintenance.

→ Please ensure the operating manual is available at all times.

The device may only be used under the following circumstances:

- Only operate the device, if it is in full working order.
- Ensure all operators of the device possess the necessary safety and risk awareness.
- Operate the device according to the instructions stipulated in this manual only.
- If there is something you do not understand, or certain information is missing, ask your manager or contact the manufacturer.
- Do not do anything on the device without authorization.
- Only use the device according to its intended use.

Intended use

The device is intended for use by trained and authorized personnel only.

The device is suitable for the following use:	<ul style="list-style-type: none"> • heating • mixing
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The operation for the device is suitable in one of the following locations:	in any research application
---	-----------------------------

Improper use

Any use which deviates from the device's intended use is considered to be improper. The manufacturer does not accept liability for any damages resulting from non-permitted uses. The risk is carried by the operator alone.



Installation / Electrical safety

- The device may only be connected when the mains voltage corresponds to the information on the type plate of the unit.
- The mains connection must be accessible at all times.
- Repairs may only be performed by a qualified electrician.
- Never operate the unit with a damaged power cord.
- Always turn the unit OFF and disconnect mains power before performing any maintenance or service.

Personnel qualification

- The device may only be operated by qualified persons.
- The device may only be operated by individuals who have been instructed in its proper use by qualified persons.
- The device may only be operated and maintained by persons who are of legal age.
- Other personnel may only work with the unit under continuous supervision of an experienced qualified operator.
- This manual must be read and understood by all persons working with the device.
- The personnel must have received special safety instructions in order to guarantee responsible and safe work procedures.

Operating company's obligations

Installation site

- The device must be positioned in a suitable location.
- The device must be installed sufficiently stable on a dry, even and temperature resistant surface.
- Do not operate the device in proximity of highly inflammable and explosive substances.
- Installation and operation of the device is only permitted in facilities which are fitted with the appropriate laboratory equipment (e.g. with air extraction units).
- We recommend operation in fume hood enclosures depending on the agents used.
- The device may only be operated in enclosed spaces and under the following environmental conditions:

Ambient temperature	5 - 31 °C at 80 % relative humidity
	32 - 40 °C decrease linearly till max. 50 % relative humidity
Installation altitude	0 - 2,000 m (6,500 feet) height above sea level
Degree of pollution	2
Overvoltage category	II



Changes to the unit

- No unauthorized changes may be made to the unit.
- No parts may be used which have not been approved by the manufacturer.
- Unauthorized changes result in the EC Declaration of Conformity losing its validity, and the unit may no longer be operated.
- The manufacturer is not liable for any damage, danger or injuries that result from unauthorized changes or from operating the unit other than described in this manual.

Safety for the personnel

- Ensure that only qualified personnel operates the device.
- Observe the following regulations:
 - Laboratory guidelines
 - Accident prevention regulation
 - Ordinance on Hazardous Substances
 - Other generally accepted rules of safety engineering and occupational health
 - Local regulations

ⓘ Safety during use

- Beware of the effect of magnetic fields on cardiac pacemakers and data media. Observe the according warning in chapter "Start-up", "Setting up device".
- Wear the appropriate protective clothing when working on the device (clothing, protective glasses and, if necessary, safety gloves).
- Do not use the device in potentially explosive areas. The device is not protected against explosion. There is no explosion or ATEX protection available.
- Do not operate or assemble devices in the vicinity which are emission or radiation sources (electromagnetic waves) for the frequency range ($3 \cdot 10^{11}$ Hz to $3 \cdot 10^{15}$ Hz).
- Avoid putting pressure on the display when you do not operate the device.
- Eliminate errors immediately.
- Do not use abrasive material to clean the surfaces. Only wipe with damp cloths.
- Always switch the device off after use.

ⓘ Disposal

- Check the device components for hazardous substances and solvents.
- Clean all components before disposal.
- Dispose of the device according to the valid national legal regulations.
- Dispose of the packaging material in accordance with the valid national legal regulations.



ⓘ Device overview

MR Hei-Standard overall view



MR Hei-Standard control panel





Device Description

MR Hei-Tec, MR Hei-Connect overall view



MR Hei-Tec, MR Hei-Connect control panel



Start-Up

Setting up device



Warning: Magnetic field!

The magnetic field beneath the hotplate could cause irritations with cardiac pacemaker if you get too close.

Personnel with a cardiac pacemaker, implanted defibrillator or dosing pump should keep a minimum distance of 10 cm (4 inches) to the device.



Warning: Risk of slipping device!

As a result of vibrations generated during operation the device might slide off the table top.

The surface must be smooth, clean and temperature resistant and should be properly leveled.

- Locate the shaker on a stable, horizontal surface.
- Clean surface and feet with a damp cloth and ethanol regularly.

Connect/disconnect power cord

Connect power cord

The power cord comes with a three-wire plug and recess on the bottom side.

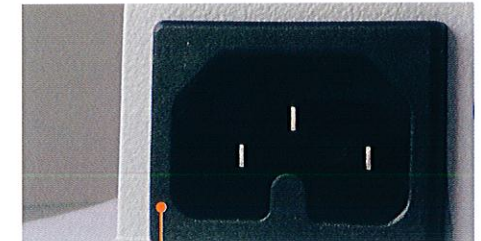


Unit plug

Power cord

The socket is located on the back side of the unit.

- Connect plug to the socket with the recess facing down.
- Push plug up against socket until securely attached.
- Connect plug to power socket.



Unit socket

Disconnect power cord

- Disconnect plug from power socket first.
- Then disconnect plug from socket on unit.



➤ Switch unit on and off

The ON/OFF switch is situated at the right side of the device beneath the control panel.

Switch unit on

→ Press ON/OFF switch at the right side.

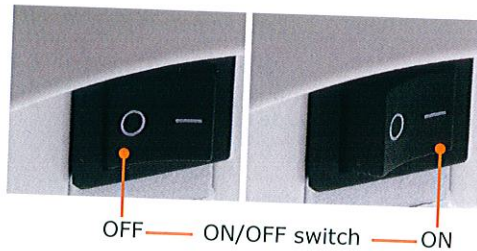
✓ The unit is switched on.

MR Hei-Standard

✓ The green operating indicator lights up.

MR Hei-Tec, MR Hei-Connect

✓ The display switches on and shows the actual parameters.



Switch unit off

→ Press ON/OFF switch at the left side.

✓ The unit powers off.

MR Hei-Standard

✓ The green operating indicator switches off.

MR Hei-Tec, MR Hei-Connect

✓ The display switches off.



➤ Place vessels



Caution:

Risk of breakage and spillage

If the stirring bars start rotation suddenly at high speed or the vessels are not placed securely vessels might break or they may slip off and spill the sample.

Prior to start heating and mixing ensure that all vessels are placed with sample and stirring bars and that they are securely placed.

Heating bath accessories for round flasks and beakers as well as attachments for water, gas and evaporating distributors are available.

→ To place a number of vessels securely on plate use optional adaptors (see general catalogue).

→ Single vessels with flat bottoms like beakers may be placed directly on hotplate.



A single flask should be arranged in the middle of the hotplate.

Several flasks should be distributed equally on the plate.

› Mixing



When using device inside heating cabinets, make reference to ambient conditions as stipulated in chapter "Technical data".

Set speed and start rotation



Warning: Risk of poisoning!

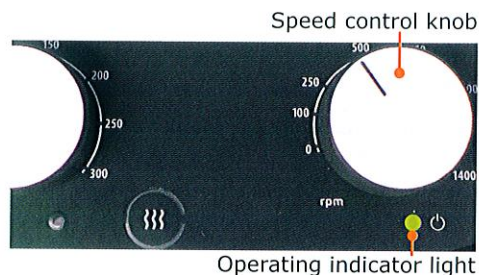
Open vessels and too high speed may result in samples splashing.
Use vessels with narrow neck especially if sample is dangerous or toxic.
Adjust speed step by step until you have reached the required rpm settings.
Wear safety glasses and especially with dangerous and toxic samples appropriate protective clothing.

Speed can be set between 100 rpm - 1,400 rpm.

- Place vessel with sample and stirring bar on hotplate.
- Turn item on with ON/OFF switch.

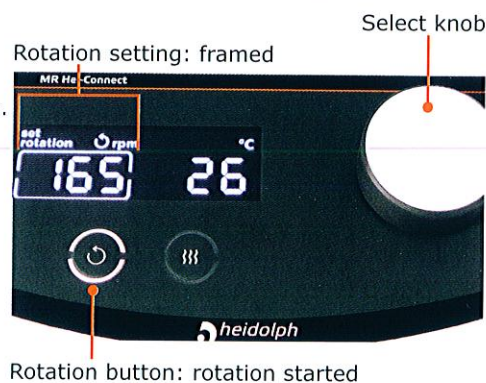
MR Hei-Standard

- ✓ Operating indicator light is on.
- Set speed with speed control knob.
- ✓ Rotation starts immediately.



MR Hei-Tec, MR Hei-Connect

- Choose rotation setting with select knob.
- ✓ Rotation setting is marked with a frame.
- Press select knob within 3 seconds.
- Set required speed by turning knob.
- Press rotation button.
- Rotation button illuminates.
- ✓ Rotation starts immediately.
- ✓ The actual speed is shown in the display.



› Heating

Set temperature



Warning: Risk of burning!

The hotplate can reach temperatures up to 300 °C.
If you work with temperatures above 50 °C wear safety gloves and appropriate protective clothing.



Warning: Risk of ignition!

Inflammable samples may ignite with high temperatures.
If you work with inflammable samples set temperature at least 25 °C lower than ignition point of sample.

There are two options to control heating:

- Without external temperature sensor: temperature will be measured and controlled via hotplate.
- With external temperature sensor: temperature will be measured and controlled via sensor directly in sample (see chapter "Assembly, Temperature sensor").

You can set the following temperature range:

- Hotplate / temperature sensor: between 20 °C and 300 °C (lower degrees depending on ambient temperature).



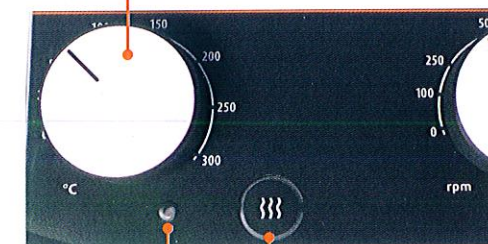
Working without external temperature sensor:

Due to differences in heat conductivity of various materials of vessels and sample the temperature of hotplate should be set 1½ to 4 times higher than the desired sample temperature.

MR Hei-Standard

- ✓ Heating button is switched off.
- Set required temperature with temperature control knob.

Temperature control knob: set temperature



Control light

Operation

MR Hei-Tec, MR Hei-Connect

- ✓ Actual temperature is shown in the display.
- Choose temperature setting with select knob.
- ✓ Temperature setting is marked with a frame.
- Press select knob within 3 seconds.
- Set required temperature by turning select knob.
- Press select knob or wait 3 seconds.
- ✓ Set temperature is saved.
- ✓ The actual temperature appears in the display.

Temperature setting: framed



If no entries are made within 3 seconds the last entry will be saved and the display switches to show actual parameters.



Working with external temperature sensor Pt 1000:
The display shows "ext" in addition. Setting temperature is exactly the same procedure.

Show set parameters: MR Hei-Tec, MR Hei-Connect

- ✓ Device is switched on.
- ✓ Display shows actual parameters for speed and temperature.
- Press select knob and hold pressed.
- ✓ Display switches to show set parameters.

Start heating

- ✓ Vessel with sample and stirring bar is placed on hotplate.
- ✓ Device is switched on.
- Press heating button.
- ✓ Heating button illuminates.
- ✓ Heating starts immediately.
- ✓ The actual temperature is shown in the display.

Heating button



Heating off

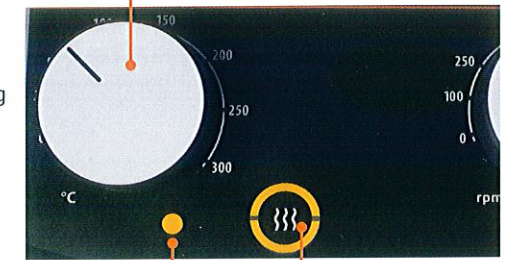
Heating on

Operation

MR Hei-Standard

- ✓ In addition to heating button, the control light for heating up will illuminate.
- ✓ Control light will be illuminated as long as set temperature is not reached.
- ✓ When set temperature is reached the control light for heating up will go out.

Temperature control knob



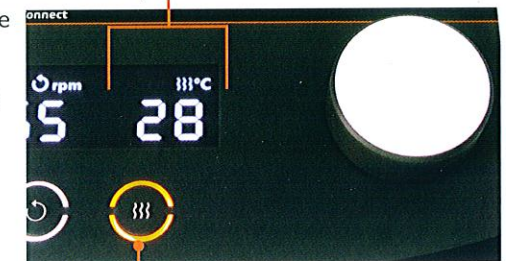
Control light: heating up

Heating button: Heating on

MR Hei-Tec, MR Hei-Connect

- ✓ The actual temperature is shown in the display.
- ✓ An additional heating symbol will be shown in the display as long as set temperature is not reached.
- ✓ When set temperature is reached the heating symbol will disappear.

Actual temperature



Heating button: Heating on



Temperature can be adjusted any time when heating is on.



The unit is equipped with a residual heat indicator.

- ✓ If heating is switched off and temperature is above 50 °C, the heating button will blink orange.
- ✓ The illumination of the heating button will switch off automatically, when temperature decreases below 50 °C.

The residual heat indicator does not function when device is switched OFF via main switch! When switched ON again, residual heat will function again.

Stop heating

- Press heating button.
- ✓ Illumination of heating button will go out.
- ✓ Heating is switched off.



A power failure will stop heating and mixing and put device on stand by. Set temperature and speed will be saved.

External temperature sensor Pt 1000

(optional accessory, see chapter "Accessories and spare parts")

As soon as the external temperature sensor Pt 1000 is connected, temperature will not be measured and controlled at hotplate but directly at sensor. (Connection see chapter "Assembly, Connect temperature sensor Pt 1000").



For reliable measurement the temperature sensor has to be inserted at least 20 mm into sample.



Warning: Risk of burning! Possible damage of device

If temperature sensor is not inserted in sample the sensor measures and controls ambient temperature. The hotplate keeps up raising temperature till max. temperature of 300 °C but set temperature can never be reached.

If temperature sensor Pt 1000 is connected always insert sensor in sample before heating is started.

Heating with external temperature sensor: MR Hei-Tec, MR Hei-Connect

When external temperature sensor is connected, 2 additional functions are available:

- Heating up "Fast" or "Precise":
Fast mode: speeds up heating to set temperature (factory setting) when shortest heating up time is important.
Precise mode: enables heating up without overshooting for temperature-sensitive samples.
- Calibrate:
This function allows to change the temperature measured by sensor in a range of -5 °C to +5 °C.

Selecting heating mode

- ✓ Sample is positioned on hotplate.
- ✓ Temperature sensor is connected and inserted in sample.
- ✓ Required temperature is set.
- Press heating button.
- ✓ Heating button starts blinking.

- ✓ "FA St" for fast mode appears in display.
- Press heating button within 3 sec.
- ✓ Display changes from "FA St" to "PrE CIS" for precise mode.
- ✓ As long as the heating button keeps blinking, you can switch back and forth from fast mode to precise mode.
- ✓ As soon as heating button is lit continuously, device will be heating in last mode selected.
- ✓ Last mode selected will be saved after switch off.



Heating button: blinking

Select knob



Heating button: blinking

Select knob

Calibrate

- ✓ Temperature sensor is connected and inserted in sample.
- ✓ Device is switched on.
- ✓ Rotation and heating are switched off.
- Press select knob and hold pressed.
- Press rotation button in addition once.
- ✓ "CAL" appears in display.
- While still pressing select knob press rotation button repeatedly until required temperature difference is displayed.
- Release select knob.
- ✓ The device is calibrated.
- ✓ Your settings will be saved after switch off.



Rotation button

Select knob

Deactivate and activate safety functions

If temperature is measured via external temperature sensor Pt 1000, the error control switches off heating:

- at sudden temperature decrease at sensor (error E21)
- if temperature increase at sensor is too slow in correspondence to heating power (error E22)

These safety functions are factory preset. If necessary you can deactivate these 2 safety functions.



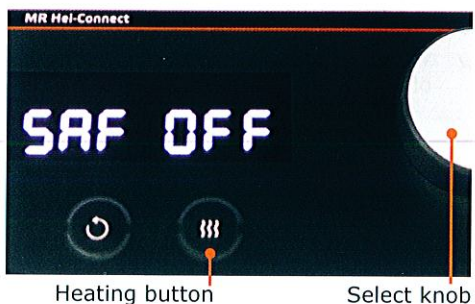
Warning:
Risk of burning! Possible damage of device

Described safety functions switch off heating including when temperature sensor is not positioned in sample. When temperature sensor is not positioned in sample, the sensor measures ambient temperature. The hotplate keeps up raising temperature till max. temperature of 300 °C but set temperature can never be reached.

When deactivating these 2 safety functions:

- Ensure that temperature sensor is always inserted in sample prior to switch on heating.
- Never fill in sample to already heated up sample during running operation, if temperature differs to already heated up sample.

- ✓ Temperature sensor is connected and inserted in sample.
- ✓ Device is switched on.
- ✓ Rotation and heating are switched off.
- Press select knob and hold pressed.
- Press heating button in addition once.
- ✓ "SAF On" appears in display.
- While still pressing select knob press heating button once again.
- ✓ Display changes from "SAF On" to "SAF OFF"
- Release select knob.
- ✓ The 2 safety functions are deactivated.
- ✓ Your setting will be saved after switch off.
- To re-activate safety functions repeat procedure till display shows "SAF On".



Interface MR Hei-Connect

You can connect the unit to a PC via interface. The serial interface RS 232 is located on the back of the unit.



Connect and interlink interfaces

RS 232 interface

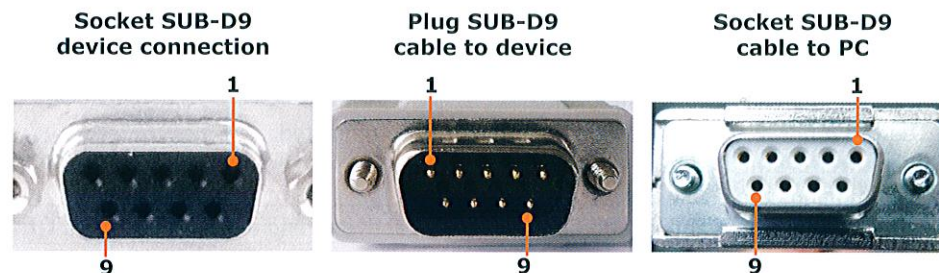
If you are utilizing an interface cable not supplied by Heidolph please ensure correct allocation. The RS 232 cable may only be connected as shown below:

Plug SUB-D9

Socket SUB-D9



Pin assignment



Connect interfaces

A fitting interface cable is optionally available.



The interface cable should not exceed a length of 2.80 m. A longer cable might lead to transmission errors.

- ✓ The device is switched off.
- Insert the plug of interface cable into the interface of the stirrer.
- Insert the other end into the interface on your PC.



Warning: Remote-controlled start! Risk of injury!

Sudden rotation of stirring bars at high speed can lead to breakage of beakers.



Always ensure sample with stirring bars is placed on device before starting any process.

Risk of scalding!

The heating plate reaches up to 300 °C! You might get seriously burned.

Avoid direct body contact with heating plate or samples placed on top of it when hot. Wear appropriate safety clothes in the vicinity of device.

Every user must be aware of the potential risk of injury.

Link interfaces

- ✓ The PC is switched on.
- Switch ON the overhead stirrer.
- Start rotation via PC.
- ✓ The communication link between PC and stirrer is completed.
- ✓ The stirrer is switched to remote-operation.
- ✓ All commands are solely executed via PC.
- ✓ Only heating button and rotation button are still active to end a running process.
- ✓ You can always switch OFF the unit via the ON/OFF button on the stirrer.

Interface commands



Prior to sending the first command via PC please switch to the extended interface protocol. Command is: PA_NEW (see below). As soon as device is switched OFF and ON again the old interface protocol is activated.

The old interface protocol is compatible with the magnetic stirrer MR Hei-End. You will find the corresponding commands in the operation manual MR Hei-End.

Each command has to be confirmed by Carriage Return (equivalent to "\r") and Line Feed (equivalent to "\n"). Feedback from device depends on interface protocol in use:

- Extended interface protocol (PA_NEW): Feedback ... \r\n
- Old interface protocol (PA_OLD): Feedback ... \n\r (factory setting)

*Command	Feedback from MR	Description
PA_NEW\r\n	PA_NEW\r\n	Switch to extended interface protocol
PA_OLD\r\n	PA_OLD\r\n	Switch to old interface protocol compatible to magnetic stirrer MR Hei-End
OUT_SP_1 Y\r\n	OUT_SP_1 X\r\n	Set temperature sample/hotplate (°C)
OUT_SP_3 Y\r\n	OUT_SP_3 X\r\n	Set speed (rpm)
OUT_MODE_2 Y\r\n	OUT_MODE_2 Y\r\n	Y = 0: All OFF after power return, Y = 1: Heating/motor ON after power return
OUT_MODE_4 Y\r\n	IN_MODE_4 Y\r\n	Temperature control: 0 = Precise-Mode 1 = Fast-Mode
START_1\r\n	START_1\r\n	Start heating: Remote active; „PC“ blinking in display MR
START_2\r\n	START_2\r\n	Start rotation: Remote active; „PC“ blinking in display MR
STOP_1\r\n	STOP_1\r\n	Stop heating
STOP_2\r\n	STOP_2\r\n	Stop rotation
RESET\r\n	RESET\r\n	Reset all: activate old interface protocol, heating off, motor off, deactivate remote
SW_VERS\r\n	Version string\r\n	Show software version
CC_ON\r\n**	CC_ON\r\n	Connection check on: stop motor and heating after 10 sec. of inactivity
CC_OFF\r\n	CC_OFF\r\n	Connection check off

*Query	Feedback from MR	Description
IN_PV_1\r\n	IN_PV_1 X\r\n	X = Actual value temperature sensor sample (°C)
IN_PV_2\r\n	IN_PV_2 X\r\n	X = Actual value safety temperature sample (°C)
IN_PV_3\r\n	IN_PV_3 X\r\n	X = Actual value temperature hotplate (°C)
IN_PV_4\r\n	IN_PV_4 X\r\n	X = Actual value safety temperature hotplate (°C)
IN_PV_5\r\n	IN_PV_5 X\r\n	X = Actual value speed motor (rpm)
IN_SP_1\r\n	IN_SP_1 X\r\n	X = Set value temperature sample/hotplate (°C)
IN_SP_2\r\n	IN_SP_2 X\r\n	X = Set value safety temperature delta (°C)
IN_SP_3\r\n	IN_SP_3 X\r\n	X = Set value speed motor (rpm)
IN_MODE_1\r\n	IN_MODE_1 Y\r\n	Query temperature control Y = 0: hotplate Y = 1: external temperature sensor
IN_MODE_2\r\n	IN_MODE_2 Y\r\n	Query power cut conduct Y = 0: All OFF after power return Y = 1: Heating/motor ON after power return
IN_MODE_4\r\n	IN_MODE_4 Y\r\n	Query temperature control 0 = Precise-Mode 1 = Fast-Mode
STATUS\r\n	STATUS Y\r\n	Y = 0: Manual operation at 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)

* **Interface parameter RS 232:** 9600 Baud, No Parity, 8 Bit, 1 Stop bit

** If rotation and/or heating are active and communication stops for more than 10 sec. "PC Err" will be displayed:

- Send any command from PC:
Communication restored, remote operation still active, connection check keeps running
- Send command „CC_OFF“:
Communication restored, remote operation still active, connection check switched off
- Send command „RESET“:
Remote operation switched off
- Switch device ON/OFF via main switch:
Remote operation switched off

(also see chapter „Possible errors and how to resolve“, MR-Hei Tec, MR-Hei Connect“).



- Do not send commands as package, minimum pause 0.1 seconds
- X substitutes decimal digits; Y substitutes a 1 digit figure

Cleaning

All surfaces of the unit allow for cleaning with a damp cloth and if required a mild soap lotion.



Attention: Damage to the surfaces

All surfaces can be damaged by improper cleaning.

In any case do not use:

- Chlorine bleach or any cleaning agent including chlorine
- Ammonia
- Abrasive cleaning agents such as cleaning rags, scrubbing agents or any other agents which include metal components



As a result of vibrations generated during operation the device might slide off the table top.

To ensure a stable position clean surface and feet with a damp cloth and ethanol regularly.

Maintenance

The unit is maintenance-free. Any necessary repair must be performed by an authorized Heidolph distributor.

Please contact Heidolph Instruments or your local Heidolph Instruments distributor.

➤ Possible errors and how to resolve

General

Malfunctions	Possible reason	Troubleshooting
Power LED does not enlighten	No power	<ul style="list-style-type: none"> Check size and shape of plug and compatibility to your electrical socket Check circuit breakers
	Light diode defective	Contact your local Heidolph Instruments distributor
No rotation function	No stirring bars in vessel	Insert stirring bars
No heating up function	Set temperature exceeded	Let device cool down
Sample temperature lower than desired	Temperature controlled via hotplate	Raise temperature of hotplate

MR Hei-Standard

Error message	Possible reason	Troubleshooting
Operating indicator light blinking 1 time No heating function	<ul style="list-style-type: none"> Hotplate temperature >25 °C to set temperature Hotplate sensor defective 	Contact your local Heidolph Instruments distributor
Operating indicator light blinking 2 times No heating function	Set temperature external Pt 1000 exceeded for more than 25°C: <ul style="list-style-type: none"> Exothermic reaction Test setup problematic 	Adjust test setup
	<ul style="list-style-type: none"> Temperature control Pt 1000 defective 	Contact your local Heidolph Instruments distributor
Operating indicator light blinking 3 times No heating function	<ul style="list-style-type: none"> Rotation knob defective Temperature knob defective Heating button defective 	Contact your local Heidolph Instruments distributor
Operating indicator light blinking 4 times <ul style="list-style-type: none"> No heating function No rotating function 	Motor defective	Contact your local Heidolph Instruments distributor

MR Hei-Tec / MR Hei-Connect

Error messages	Possible reason	Troubleshooting
E11, E12 E13, E14 No heating function	<ul style="list-style-type: none"> Hotplate temperature >25 °C to set temperature Hotplate sensor defective 	Contact your local Heidolph Instruments distributor
E21 No heating function (safety function*)	External temperature sensor Pt 1000 not inserted in sample any more	<ul style="list-style-type: none"> Position temperature sensor correctly Switch off device and on again after 10 sec.
	External temperature sensor connected and cool sample refilled during operation	Switch off device and on again after 10 sec.
E22 No heating function (safety function*)	External temperature sensor Pt 1000 not inserted in sample when heating was switched on	<ul style="list-style-type: none"> Position temperature sensor correctly Switch off device and on again after 10 sec.
	<ul style="list-style-type: none"> Temperature at Pt 1000 too low during first 10 minutes Temperature increase for physical reasons not possible 	<ul style="list-style-type: none"> Optimize heat conduction Reduce sample volume if applicable
E23 (only precise mode) <ul style="list-style-type: none"> No heating function No selection possible 	Set temperature external Pt 1000 exceeded for more than 25°C: <ul style="list-style-type: none"> Exothermic reaction Test setup problematic Temperature control Pt 1000 defective 	Adjust test setup
E33	Heating button defective	Contact your local Heidolph Instruments distributor
<ul style="list-style-type: none"> No heating function No selection possible No reaction of rotating button 		
E34	Rotation button defective	Contact your local Heidolph Instruments distributor
<ul style="list-style-type: none"> No heating function No rotating function No selection possible 		
E35	Select knob defective	Contact your local Heidolph Instruments distributor
<ul style="list-style-type: none"> No heating function No selection possible 		
E41	Motor defective	Contact your local Heidolph Instruments distributor
<ul style="list-style-type: none"> No heating function No rotating function 		
E51, E52, E53	External temperature sensor breakage	Replace temperature sensor
	External temperature sensor connected / disconnected during operation	<ul style="list-style-type: none"> Switch off device Connect / disconnect temperature sensor Switch on device
PC Err (only MR-Hei Connect**)	No communication in remote operation since more than 10 sec.	Send any type of command from PC

* These two safety functions can be deactivated (see chapter "Operation, Heating with temperature sensor: MR Hei-Tec, MR Hei-Connect", section "Deactivate and activate safety functions").

**Also see chapter „Interface MR-Hei Connect, Interface commands“

If you experience a malfunction which can not be resolved, please contact your authorized Heidolph Instruments distributor immediately.



Electrical connections

Repairs of any kind are allowed by **qualified professional electricians only**. Any improper repair can result in a dangerous situation. Contact your local Heidolph Instruments distributor for any repair you may have.



Warning: Electric shock!

This unit must only be connected to a grounded electrical socket.

The unit and voltage must match. The rating plate on the back side of the unit provides all voltage specifics (see picture below).

When shipped the unit is grounded. In case the original plug is changed, the new plug must have a protective conductor!



Color code for electrical connections:

Europe		North America	
GREEN/YELLOW	PE: Protective conductor (Earth)	GREEN	PE: Protective conductor (Earth)
BLUE	N: Neutral conductor	WHITE	N: Neutral conductor
BROWN	P: Phase	BLACK	P: Phase

The unit is connected with the power cord supplied to the electrical socket. It plugs into the housing on the rear side of the unit.

For countries utilizing a plug other than the standard one supplied:

- The plug supplied may only be changed by a professional electrician.
- If utilizing an adaptor ensure that it is grounded and approved by the local regulations.



Mounting periphery devices

Connect external temperature sensor Pt 1000

(optional accessory, see chapter "Accessories and spare parts")

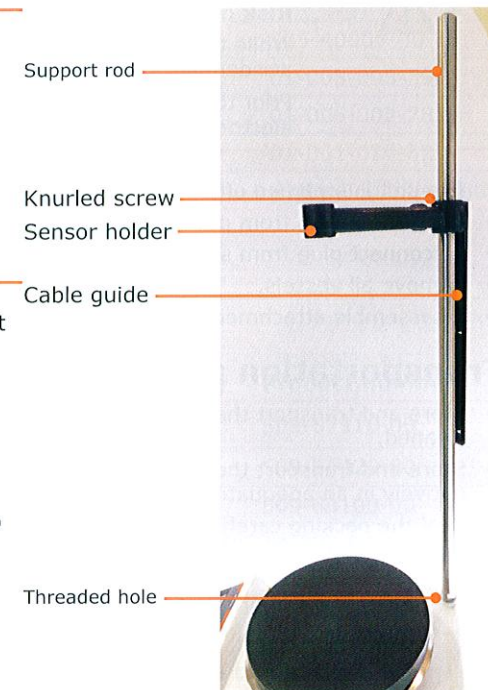


Caution: Risk of cable damage

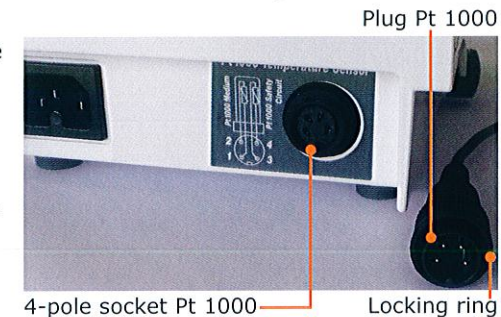
The cable of temperature sensor might get damaged by too high temperatures.

Ensure the cable does not get in contact with very hot materials. Please use cable guide tube delivered with holding system.

- Screw support rod into threaded hole at left rear corner of device.
- Pass sensor holder over support rod.
- Adjust height of sensor holder and fix with knurled screw.
- Pass temperature sensor from top into sensor holder.
- Clamp cable of temperature sensor into three clamps of cable guide.



- ✓ Device is switched off.
- Connect plug to 4-pole socket with the tongue facing down on back side of device.
- Push locking ring towards device and turn clockwise approx. 1/4, till it audibly engages.
- Insert temperature sensor from above into sensor holder.



Only connect and disconnect temperature sensor when device is switched off. If temperature sensor is connected or disconnected during heating operation, the device is unable to measure and control temperature.



➤ Dismantling, transportation and storage

Dismantling



**Warning:
Risk of injury!**

While the unit is plugged in you might be at harm if the device is accidentally switched to ON mode.

Prior to dismantling switch the unit off and pull the plug from the electric socket. Ensure that the unit is not switched on again.

- ✓ The unit is switched off.
- Disconnect plug from power socket.
- Disconnect plug from socket on the unit.
- Remove all vessels.
- Disassemble attachments.

Transportation and storage

- Store and transport the unit and its components only if they were emptied and cleaned,
- Store and transport the unit and parts of unit in the original packing material or alternatively in an adequate container to prevent damages.
- Seal the packing carefully against unauthorized or mistaken opening.
- Store the unit in a dry and frost-free place.



Improper transportation may result in damages to the system and the mechanical components.

Avoid any kind of shocks during transportation.



➤ Scope of delivery

Component	Variant	Quantity	Product number
Magnetic stirrer	MR Hei-Standard (230 V)	1	505-20000-00
	MR Hei-Tec (230V)	1	505-30000-00
	MR Hei-Connect (230 V)	1	505-40000-00
Operating manual English / German		1	01-005-005-39
Warranty registration / Confirmation of condition		1	01-006-002-78
EU Declaration of Conformity		1	01-001-025-02
Power cord		1	depending on country

➤ Accessories

Component	Quantity	Product number
Temperature sensor Pt 1000, stainless steel V4A	1	509-67910-00
Temperature sensor Pt 1000, glass-coated	1	509-67920-00
Pt 1000 clamping system	1	509-63100-00
MR Hei-Connect: RS 232-interface cable	1	14-007-040-72
Accessories for heating bath (water and oil) 1 l, 2 l, 4 l		See general catalog

Additional accessories are shown in the general catalog or on our website at www.heidolph.com



Technical data

MR Hei-Standard, MR Hei-Tec, MR Hei-Connect

Supply power	230 V (50/60 Hz) or 115 V (50/60 Hz)	
Power consumption (W)	820	or 620
Protection class (DIN EN 60529)	IP 32	
Drive	EC-motor	
Overheat protection	no	
Operating mode	continuous	
Speed range (rpm)	100 - 1,400	
Speed accuracy (%)	±2	
Stirring capacity, max (H ₂ O) (l)	20	
Temperature control	Micro controller	
Heating power (W)	800	or 600
Hotplate temperature (° C)	20 - 300	
Accuracy hotplate (° C)	±5	
Safety circuit hotplate (° C)	>25 set temperature hotplate	
External sensor	Pt 1000	
Pt 1000 temperature max. (° C)	300	
Temperature accuracy with external temperature sensor (° C)	±1	
Safety circuit hotplate via temperature sensor Pt 1000 (° C)	>25 set temperature Pt 1000	
Load capacity, max. (kg)	25	
Plate diameter (Ø) (mm)	145	
Dimensions (l x w x h) (mm)	277 x 173 x 94	
Weight (kg)	2.9	
Permissible ambient conditions	<ul style="list-style-type: none"> • 5 - 40 °C • 80 % relative humidity, no condensation at 5 - 31 °C, linear decreasing to 50 % at 40 °C 	

Model	MR Hei-Standard	MR Hei-Tec	MR Hei-Connect
Interface			RS 232
Speed setting	analog	digital	digital
Accuracy temperature setting (° C)	±5	±1	±1

* Accuracy determined with following parameters: 800 ml water in 1 l beaker, form H according to DIN 12 331; temperature 50 °C; magnetic stirring bars 40 mm; speed 600 rpm; sensor depth 60 mm.



Contact / Technical Service

Questions / Repair work

If any aspect of installation, operation or maintenance remains unanswered in the present manual, please get in touch with the following address.

For repairs please call Heidolph Instruments or your local authorized Heidolph Instruments distributor.



Warning: Danger of poisoning!

Contaminated units can lead to severe injury or death of our employees!

When shipping items for repair that may have been contaminated by hazardous substances, please:

- advise exact substance
- take adequate protective action towards our parts receiving and service personnel
- mark the pack in accordance with Ordinance on Hazardous Substances

Included at the end of this manual you will find a „Confirmation of condition of unit“.

→ Kindly copy and fill in this form and submit it prior to shipping the unit for repair.

Contact details:



Heidolph Instruments Germany

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Heidolph Instruments North America

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Heidolph Instruments United Kingdom

Phone: 01799 - 5133-20
E-mail: service@radleys.co.uk
www.heidolph-instruments.co.uk

All other countries

You will find contact details of your local Heidolph distributor at www.heidolph.com