

# *Opti Mag-ST* Digital Hot Plate Stirrer

*User Manual*



**EH-1990-100** *Digital Magnetic  
Hot Plate Stirrer*



*Please read carefully and follow all operating and  
safety instructions!*

## Contents

Contents.....	2	8	7.3 C Mode of Operation .....	10
Preface .....	3		Function: Heating .....	10
Service.....	3		8.1 Working with external temperature sensor .....	11
Warranty.....	3		8.2 Residual heat warning ( HOT ) .....	11
1 Safety Instructions .....	4		8.3 Setting the safety temperature.....	12
2 Proper use.....	5	9	Function: Stirring .....	12
3 Inspection .....	5		9.1 Basic Stirring .....	12
3.1 Receiving Inspection .....	5		9.2 Stirring bar breakaway monitoring.....	12
3.2 List of Items.....	6	10	Faults.....	13
4 Trial run .....	6	11	Maintenance and Cleaning .....	14
5 Control and Display.....	7	12	Associated standards and regulations .....	14
5.1 Control elements .....	7	13	Technical data .....	15
5.2 Display.....	8	14	Accessories list.....	16
6 Initialization .....	9	15	Main spare parts list .....	16
6.1 Initializing sequence.....	9			
6.2 Default settings .....	9			
6.3 Resetting parameters to factory settings.....	9			
7 Operating modes .....	9			
7.1 A Mode of Operation .....	9			
7.2 B Mode of Operation .....	10			

## Preface

Congratulations on purchasing the OPTI-MAG Hot Plate Stirrer. Users should read this manual carefully, know all of the cautions and follow all instructions and procedures when using this instrument.

## Service

Should assistance be required, you may contact Chemglass Life Sciences for technical support via phone, email, fax, website, or mail:

***Chemglass LIFE SCIENCES***

***3800 North Mill Road***

***Vineland, NJ 08360***

***Tel: 800-843-1794***

***Fax: 800-922-4361***

***Email: [techsupport@cglifesciences.com](mailto:techsupport@cglifesciences.com)***

***Web Site: <http://www.cglifesciences.com>***

Please provide a customer service or technical service representative with the following information:

- Serial Number ( located on the rear panel )

- Description of problem
- Methods and/or procedures tried to resolve the problem
- Your Contact Information

## Warranty

This unit is warranted to be free from defects in materials and workmanship under normal use and service, for a period of 24 months from the date of invoice. It shall not apply to any product or parts which have been damaged because of improper installation, improper connections, misuse, accident or abnormal conditions of operation.

For claims under the Warranty please contact a customer service representative at 1-800-843-1794 to obtain a "Return Merchandise Authorization" number (RMA#). Once the unit is returned it will be evaluated for repair/replacement according to the warranty. If the repair/replacement is covered under warranty the user would be only be liable for freight costs. If it is deemed not covered by warranty, then a repair/replacement quote will be sent to the user.

# 1 Safety Instructions

	<p>Warning!</p> <ul style="list-style-type: none"> <li>• Read the operating instructions carefully before using the instrument.</li> <li>• Ensure that only trained staff work with the instrument.</li> </ul>
	<p>Risk of burn!</p> <ul style="list-style-type: none"> <li>• Caution when touching the housing parts and the heating plate. The heating plate can reach temperatures of 340 °C.</li> <li>• Observe the “Hot” character even after switching the unit off.</li> </ul>
	<p>Protective ground contact !</p> <ul style="list-style-type: none"> <li>• Make sure that the outlet has a ground contact before use.</li> </ul>

- Wear the personal guard in accordance with the hazard category of the media to be processed. Otherwise there is a risk from:
  - Splashing and evaporation of liquids

- Release of toxic or combustible gases.-
- Set up the instrument in an open area on an even, stable, clean, non-slip, dry and fireproof surface; do not operate the instrument in explosive atmospheres, with hazardous substances or under water.
- Gradually increase the speed. Reduce the speed if :
  - The medium splashes out of the vessel because of the speed being set to high.
  - The instrument is not running smoothly, or container moves on the base plate.
- Temperature must always be set to at least 25 °C lower than the fire point of the media used.
- Beware of hazards due to:
  - Flammable materials or media with a low boiling temperature
  - Overfilling of media
  - Unsafe container
- Process pathogenic materials only in closed vessels.
- Check the instrument and accessories for damage each time you use them. Do not use damaged components. Safe operation is only guaranteed with the accessories described in the “Accessories”

chapter. Accessories must be securely attached to the device. Always disconnect the plug before fitting accessories.

- The instrument can only be disconnected from the main power supply by pulling out the power cord.
- The voltage stated on the label must correspond to the main power supply.
- Ensure that the mains power supply cable does not touch the heating base plate. Do not cover the device.
- The instrument may only be opened by authorized personnel.
- Keep away from high magnetic field.
- Observe the minimum distances between the devices; between the device and the wall; and above the assembly (min. 100 mm).

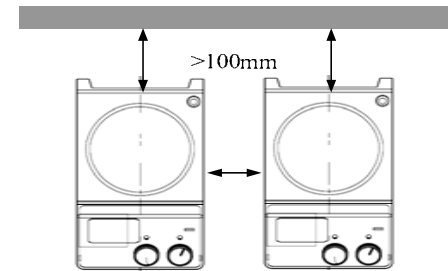


Figure 1

## 2 Proper use

The instrument is designed for mixing and/or heating liquids in academic institutions, laboratories or factories. This device is not suitable for use in residential areas or other areas that may cause danger to the user or instrument as mentioned in Chapter 1.

## 3 Inspection

### 3.1 Receiving Inspection

Unpack the equipment carefully and check for any

damages which may have arisen during transport. If necessary please contact Chemglass Life Sciences for technical support.



**Note:**

If there is any apparent damage to the system, please do not plug it into the power outlet.

- Power ON the device and begin initializing.
- Add the medium into the vessel along with a magnetic stir bar.
- Place the vessel on the heating plate.
- Set the rated stirring speed and start stirring.
- Observe the stirring bar and LCD display.
- Set the rated temperature and start heating.
- Observe the real temperature on LCD display.
- Stop heating and stirring.

### 3.2 List of Items

The EH-1990-100 includes the following items:

Items	Qty
<b>Opti-MAG HPS</b>	<b>1</b>
<b>Power Cord</b>	<b>1</b>
<b>User Manual</b>	<b>1</b>

Table 1

If these operations above appear normal, the device is ready to operate. If these operations do not appear normal, the device may be damaged during transportation, please contact Chemglass Life Sciences for technical support.

## 4 Trial run

- Make sure that the required operating voltage and power supply voltage match.
- Ensure that power outlet has a ground connection.

## 5 Control and Display

### 5.1 Control Elements

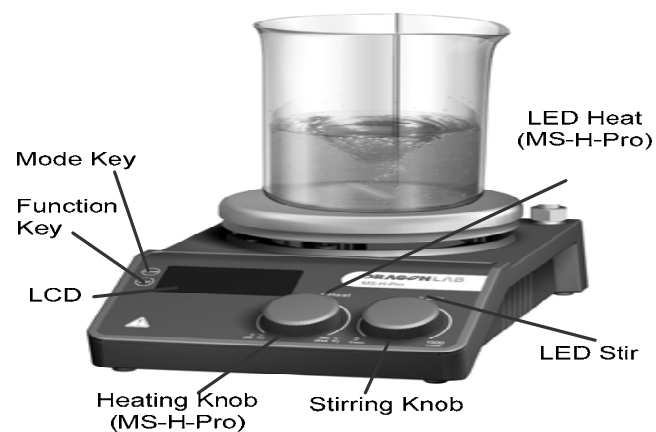
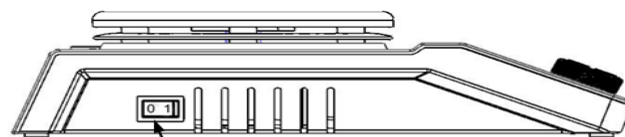


Figure 2



Power Switch

Figure 3

Items	Descriptions
Stirring Knob	Sets the rated speed. The function “Stirring” is switched ON or OFF by pushing the knob down.
Heating Knob	Sets the rated temperature. The function “heating” is switched ON or OFF by pushing the knob down.
Mode Key	Switch among the three operating modes: A, B, and C mode.
Set Key	Setting all parameters of the unit
LCD	LCD displays the actual working state and all settings of the unit.
LED Heat	When the heating function is switched ON, the Heat LED is illuminated.
LED Stir	When the stirring function is switched ON, the “Stir” LED is illuminated.
Power Switch	Switches the unit ON or OFF (Mains).

Table 2

## 5.2 Display

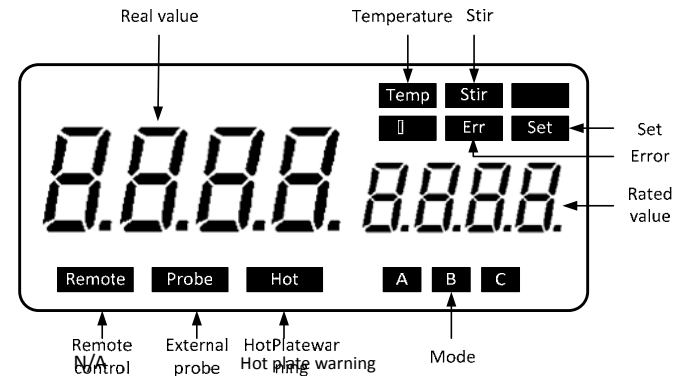


Figure 4

Characters	Descriptions
Temp and °C	Displays temperature when the heating function is switched ON.
Stir	Displays stirring state when the stirring function is switched ON.
Mode	Displays the setting mode in order of A, B and C after pressing "mode" key.
Set	Press "set" key to set function, and

	display Set characters.
Hot	Displays hot warning if the heating plate temperature is above 50°C.
Probe	Displays when using external probe.
Remote	N/A.
Err	Displays in case of error.
Rated value	Users set value for Heating or Stirring.
Real value	Actual value as measured by either internal or external sensors for Heating or Stirring.

Table 3



### Note:

If both heating and stirring functions have been started at the same time, the display of function "heating" always has higher priority. If the speed is changed via the stirring knob, the stirring speed is displayed and reverses to the temperature after 5 seconds.

## 6 Initialization

### 6.1 Initializing sequence

- Turn on instrument by the main power switch.
- The “Heat” and “Stir” LEDs and the LCD display flash about 3 times.
- LCD displays the heating plate’s safe temperature setting as “SAFE xxx°C”.
- LCD displays residual heat warning “rES On/OFF”.
- LCD displays stirring bar breakaway monitoring “br On/OFF”.
- LCD displays operating modes (A, B, C).

### 6.2 Default settings

EH-1990-100 is supplied with the following default settings:

Items	Default settings
Operating mode	A
Set temperature (°C )	25
SAFE (°C )	350
Set rotary speed (rpm)	0

residual heat warning	On
Stirring bar breakaway monitoring	OFF

Table 4

### 6.3 Resetting parameters to factory default settings

Reset the parameters to the default settings, as follows:

- Turn off by the power switch.
- Press and hold the “Set” and “Mode” keys at the same time and switch on the main ON/OFF switch. Release buttons after 5 seconds.
- The unit is now reset to the factory default settings.

## 7 Operating modes

Opti-Mag ST can be operated in the following three operating modes:

### 7.1 “A” Mode of Operation

In the A mode, heating and stirring functions are used without supporting external temperature sensors. The residual temperature warning, safe temperature limit and stirring bar breakaway monitoring can be set in this mode.

## 7.2 “B” Mode of Operation

In the B mode, this unit has heating and stirring functions using the internal or external temperature sensors. If an external temperature sensor is not plugged in, “PROBE” will flash. If plugged in, “PROBE” will be shown on the digital display to indicate that the sensor is operating. The external temperature sensors’ value and actual temperature are displayed.

Residual temperature warning, safe temperature limit and stirring bar breakaway monitoring can be set in this mode.

## 7.3 “C” Mode of Operation

In the C mode, this unit maintains the set parameters of the heating and stirring functions before it was last switched off. The residual temperature warning, safe temperature limit and stirring bar breakaway monitoring cannot be set in this mode.



**Note: WARNING**

Mode changing and parameter setting should only be done when the heating or stirring is NOT on

## 8 Function: Heating

The device has a built-in 400W heating element. The heating plate is maintained at a constant temperature by a digital control circuit. The heating plate temperature is also monitored from a separate, adjustable safety circuit. The two temperature sensors are built into the heating plate. This unit can also be controlled from a single external Pt1000 temperature sensor (p/n: EH-1995-110).

- If an external temperature sensor is used, it must be plugged in before the device is switched ON.
- Set the desired temperature value using the rotary “Heat” knob.
- When the heating function is switched on, the LED for the “Heat” function will illuminate and the LCD will display the real temperature.
- The rated temperature will be displayed on the upper right-hand side of the digital display as well as **Temp** and **°C** characters.
- The heating function is switched on or off via the “Heat” knob.

## 8.1 Working with an external temperature sensor (p/n: EH-1995-110)

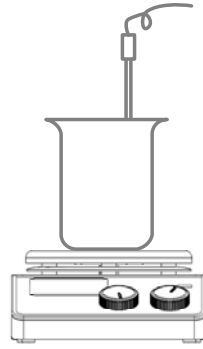


Figure 5

Only in mode “B” can an external temperature sensor be used. If connected, “PROBE” will be shown on the digital display to indicate the sensor is operating. “PROBE” will flash if no external sensor is connected. The unit continues to operate using the internal sensors.

- Ensure that the external temperature sensor is inserted in the media to a depth of at least 20 mm.
- When using metal vessels, do not place the

temperature sensors on the bottom of the vessel. Placing sensors on the vessel bottom can cause excessively high temperatures to be measured especially in media which have poor conductivity. The tip of the measuring sensor must be at least 5 mm from the vessel bottom; a distance of 10 mm is ideal.

- Compared with the temperature control of the heating plate internal sensors, the external temperature sensor can control the medium’s temperature more precisely.

## 8.2 Heat warning ( HOT )

In the A or B mode, users can set the residual heat warning function as follows:

- Continue to press the function “Set” key until the LCD displays “rES”.
- Push the rotary Heat Knob to turn on or off the residual heat warning function. The LCD will display “On” or “OFF”.
- Continue to press the function “Set” key until the “Set” character is removed.

- The residual heat warning function is now set to On or Off, whichever was selected.

In order to prevent the risk of burns from a hot heating plate, this unit has a heat warning function. When heating plate temperature is above 50°C, “Hot” will flash to warn that there is a hazard of burns from the heating plate. If the unit is switched off (mains switch) and the heating plate temperature is above 50°C, then “Hot” and “OFF” will flash in the LCD display. The unit will turn off completely when the heating plate temperature drops below 50°C. NOTE: The Stirring function remains on until it is turned off, or when the unit completely turns off.

### 8.3 Setting the safety temperature

In the A or B mode, the safety temperature can be set, as follows:

- Continue to press the function “Set” key until the LCD displays “SAFE”.
- Adjust the rotary Heat Knob to the desired Safety Temperature value (100-350°C).
- Continue to press the function “Set” key until the “Set” character is removed.

- The value of the safety temperature has been stored and setting is completed.

## 9 Function: Stirring

### 9.1 Basic Stirring

The function “stirring” is turned on or off via the rotary stirring knob. The motor speed is set from the knob (100 to 1500 rpm in steps of 10 rpm).

When both the function heating and stirring are on and the motor speed is changed, the LCD will shift to the speed value and come back to the temperature value in about 5 seconds.

### 9.2 Stirring bar breakaway monitoring

In the A or B mode, the stirring bar breakaway monitoring can be set, as follows:

- Continue to press the function “Set” key until the LCD displays “br”.
- Push the rotary Heat Knob to turn on or off the stirring bar breakaway monitoring function. The LCD will display “On” or “OFF”.

- Continue to press the function “Set” key until the “Set” character is removed.
- The stirring bar breakaway monitoring function has been set.

Breakaway can occur when stirring at high speeds or when large stirring bars are being driven at speeds close to the maximum magnetic torque.

The stirring bar breakaway monitoring function can be set at the rotary speed range between 300 and 1500 rpm. When stirring bar breakaway is detected, stirring is stopped immediately to enable the stirring bar to be picked up. After this, stirring starts again and rotary speed increases up to the set speed. If a further stirring bar breakaway occurs within the next 3 minutes of stirring at a constant set speed, the stirring bar will be picked up again and stirring will restart but this time at the set speed reduced by 100 rpm. The speed will be reduced each time in 100 rpm steps until the minimum of 200 rpm is reached. In this case you should select new test conditions.

**IMPORTANT:**

***The stirring bar breakaway monitoring function should***

***be tested for your particular configuration taking into account the stirring bars, speed, vessel and medium you are using.***

## 10 Faults

- Instrument will not power ON
  - Ensure the power cord is plugged into a live circuit
  - Verify that the inlet fuse (5A) is not blown
- Fault in power on self test
  - Switch OFF the unit, then switch ON and reset the instruments to factory default setting.
- Temperature cannot reach set point
  - Check whether the safety temperature value is set too low
- Motor speed cannot reach set point
  - Check whether the Stirring bar breakaway monitoring is ON
  - Excessive medium viscosity may cause abnormal speed reduction of the motor

- Heating cannot be started when the heating knob is pressed, or stirring cannot be started when the stirring knob is pressed
  - Check whether the unit is in the mode setting program, exit from the mode setting and restart the heating/stirring functions
- Unit cannot be powered off when switched off
  - Check if the residual heat warning function is on and the heating plate temperature is above 50°C
  - Turn off residual heat warning function before powering OFF the unit

## 11 Maintenance and Cleaning

- Proper maintenance can keep instruments working in good condition and lengthen its lifetime.
- Use caution when spraying any cleanser so as not to get cleaner inside unit.
- Unplug the power cord when cleaning.
- Only use a cleanser as advised below:

Dyes	isopropyl alcohol
------	-------------------

Construction materials	water tenside / alcohol	containing isopropyl alcohol
Cosmetics	water tenside / alcohol	containing isopropyl alcohol
Foodstuffs	water tenside	containing
Fuels	water tenside	containing

- Wear the proper protective gloves while cleaning the instrument.

Before using any other method of cleaning or decontamination, the user must ascertain with CG Life Sciences that the method will not damage the instrument.

## 12 Associated standards and regulations

Construction in accordance with the following safety standards:

EN 61010-1

UL 3101-1

CAN/CSA C22.2(1010-1)

EN 61010-2-10

Construction in accordance with the following EMC standards:

EN 61326-1

Associated EU guidelines:

EMC-guidelines: 89/336/EWG

Instrument guidelines: 73/023/EWG

### 13 Technical data

Voltage [VAC]	85 ~ 265
Frequency [Hz]	50/60
Power [W]	450
Stirring point position quantity	1
Max. stirring quantity (H <sub>2</sub> O) [l]	20
Max. magnetic bar [mm]	80
Motor type	Disk type-motor with exterior rotor brushless

	motor
Max. power output of motor [W]	10
Speed range[rpm]	100 ~ 1500
Rotary speed display	LCD
Speed display accuracy [rpm]	1
Heating plate material	Stainless steel
Ø of the heating plate [mm]	Ø 135
Heating power[W]	400
Heating rate (1L water) [K/min]	6
Temperature range [°C]	RT ~ 340
Temperature display[°C]	LCD
Temperature display accuracy [°C]	0.1
Control accuracy of heating temperature [°C]	1
Adjustable safety circuit (heating plate) [°C]	100 ~ 350
Temperature sensor	PT1000

Control accuracy of heating temperature with temperature sensor [°C]	0.2
Dimensions (mm)	280×160×85
Weight [kg]	2.8
Permitted ambient temperature[°C]	5 ~ 40
Permitted relative humidity	80%

Table 5

## 14 Accessories

Part No.	Description
EH-1995-110	Pt1000 Temperature sensor stainless steel (red cable)
EH-1995-150	Pt1000 Temperature sensor stainless steel and support kit
EH-1995-160	Support kit – Boss head, Vertical support rod, Horizontal holding rod
CG-1995-05	Boss head (permits mounting any

Part No.	Description
	option to vertical support rod)
CG-1995-06	Vertical support rod (Stainless Steel, 10mm OD x 450mm length – threads into back corner of hot plate stirrer
CG-1995-22	Horizontal holding rod

Table 6

## 15 Main spare parts

Part No.	Description
EH-1995-170	Rotary knob (Heating or Stirring)
EH-1995-171	Rubber feet
EH-1995-172	Replacement power cord

Table 7

**Chemglass LIFE SCIENCES**

**3800 North Mill Road**

**Vineland, NJ 08360**

**Tel: 800-843-1794**

**Fax: 800-922-4361**

**Email: [techsupport@cglifesciences.com](mailto:techsupport@cglifesciences.com)**

**Web Site: <http://www.cglifesciences.com>**

