

2mag STIRRING DRYBATH 2mag STIRRING HOTPLATE

Stirring heating blocks and stirring heating plates



STIRRING HOTPLATE 6
with control unit heatMIXcontrol

Order no.: 66306

STIRRING HOTPLATE 15
with control unit heatMIXcontrol

Order no.: 66315

STIRRING DRYBATH 15-100
with control unit heatMIXcontrol

Order no.: 63100

STIRRING DRYBATH 15-250
with control unit heatMIXcontrol

Order no.: 63250

STIRRING DRYBATH 8-250 ERL
with control unit heatMIXcontrol
with 8 contact adapters

Order no.: 63825

Control unit heatMIXcontrol

Order no.: 68300

Thank you for your confidence shown in us!

Congratulations to the purchase of your new product.

For any enquiries, questions or suggestions please do not hesitate to contact us at info@2mag.de.

2mag

Main competence of **2mag AG** is based upon mixing, tempering and measuring/controlling. In these fields we are offering support with our products to the modern laboratory within the standardized daily business as well as for the implementation of highly complex processes in the state-of-the-art research. Due to the fact that **2mag** is developing according to customer's needs, is manufacturing self-contained and under permanent quality control and is also selling on-site together with competent contact persons, we can guaranty our customer an outstanding quality and product performance.

Includes

Quick start

Operation Manual

Technical Documentation

Specifications

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A Quickstart

1. Overview of your product

STIRRING HOTPLATE 6 and STIRRING HOTPLATE 15



*Image 1: Heated Inductive Stirring Systems **STIRRING HOTPLATE 6** and **STIRRING HOTPLATE 15** (image without control unit)*

Your product contains at despatch

- 🌀 A modern inductive magnetic stirring system consisting of:
 - a PTFE-coated heating plate with selectively 6 or 15 stirring points with firmly connected
 - heating cable (3-pin plug) and
 - stirrer control cable (15-pin plug)
- 🌀 An external control unit heatMIXcontrol incl. power cable

STIRRING DRYBATH 15-100 / 15-250 and 8-250 ERL



Image 2: **STIRRING DRYBATH 15-100 / 15-250** (incl. control unit heatMIXcontrol)

Your product contains at despatch

- 🌀 A modern inductive magnetic stirring system consisting of:
 - a PTFE-coated aluminium heating block with 15 block boreholes for 100 ml laboratory glass flasks respectively 250 ml laboratory glass flasks with firmly connected
 - heating cable (3-pin plug) and
 - stirrer control cable (15-pin plug)
- 🌀 An external control unit heatMIXcontrol incl. power cable

STIRRING DRYBATH 15-100 / 15-250 and 8-250 ERL



Image 3: **STIRRING DRYBATH 8-250 ERL** (incl. control unit heatMIXcontrol)

Your product contains at despatch

- 🌀 A modern inductive magnetic stirring system consisting of:
a PTFE-coated aluminium heating block with 8 block boreholes for
250 ml laboratory glass flasks with firmly connected heating
cable (3-pin plug) and stirrer control cable (15-pin plug)
- 🌀 An external control unit heatMIXcontrol incl. power cable
- 🌀 8 contact sleeves made of aluminium

2. Application fields

2.1 Operator

The **STIRRING HOTPLATE** and **STIRRING DRYBATH** are used in the fields of chemistry, medicine, pharmacy, microbiology and biotechnology. The operators are generally working in research and development, production and quality assurance

2.2 Basic functions

Basic functions are stirring and/or tempering of liquids in suitable temperature-proof and chemically resistible vessels.

2.3 Product combinations

In addition to the use at the conventional laboratory desk our products have also been tested for the application in

-  Laminar flow devices
-  Safety cabinets
-  Safety cabins

2.4 Application not for the intended use

The **STIRRING HOTPLATE** and **STIRRING DRYBATH** are **explicitly not intended** for the application:



-  In water baths or humid rooms
-  Stirring and warming of flammable liquids
-  Warming of pressure-tight closed vessels (e.g. Erlenmeyer flasks, lab flasks)
-  General danger of explosion

The **2mag** is offering special products for the just mentioned application combinations. More information for this can be found at <http://www.2mag.de> or at info@2mag.de

2.5 Combinations of vessels

Please use round, heat resistant vessels made of glass or non-magnetic metal. You can use vessels up to the maximum size stated in the spread sheet 1. The vessels should have a thin, even wall thickness.

Flat glass bottoms (without any curve to the inside) and smooth surfaces will improve the operating characteristic of the magnetic stirring bar. At the same time they will improve the heat transfer from the STIRRING HOTPLATE resp. the STIRRING DRYBATH to the liquid.

Uneven surfaces would reduce the stirring power and would cause reaming up of the stirring bar's gliding surface.

In case you intend to stir large amount of liquids, please chose such stirring flasks that have a comparatively small diameter and thin bottom. The magnetic stirring bar can then be centred better.

Heated Stirring System	Stirring vessels	Nominal content	Max. amount
STIRRING HOTPLATE 6	Erlenmeyer flasks und lab flasks	25 ml	6
		50/100 ml	6
		250/500 ml	6
		1000 ml	6
	beaker glass (high design)	25 ml	6
		50 ml	6
		100/250 ml	6
		600/1000 ml	6
		2000 ml	6
STIRRING HOTPLATE 15	Erlenmeyer flasks und lab flasks	25 ml	15
		50/100 ml	15
		250/500 ml	8/6
		1000 ml	6
	beaker glass (high design)	25 ml	15
		50 ml	15
		100/250 ml	15
		600/1000 ml	8
		2000 ml	6
STIRRING DRYBATH 15-100	lab flask	100 ml	15
	beaker glass (high design)	150 ml	15
STIRRING DRYBATH 15-250	lab flask	250 ml	15
	beaker glass (high design)	400 ml	15
STIRRING DRYBATH 8-250 ERL	Erlenmeyer flasks	250 ml	8

Spread sheet 1: **Combination examples for vessels**



Please always place the flasks in the magnetic centre of the magnetic stirrer. This will ensure the optimum stirring effect!



Do never use any pressure-tight closed flasks.

RISK OF BURSTING!



**Use only temperature-resistant vessels.
Be careful with plastic flasks!**

2.6 Stirring bars

In general, all stirring bars matching the length and diameter can be used. But we recommend using the commercial stirring bars with Samarium Cobalt magnetic core (SmCo). By using this highly energetic magnetic material the maximum stirring power of the magnetic stirrer can be achieved, especially when mixing viscose media.

2.7 Tips and hints to the topic stirring

The mixing flasks should be filled max. up to the middle (high speed range) resp. up to $\frac{3}{4}$ (low speed range).

Place one magnetic stirring bar in each stirring flask.

Place the stirring flasks right in the centre of the stirring point on the STIRRING HOTPLATE resp. in one borehole of the STIRRING DRYBATH.

In case the magnetic stirring bar turns in an unsteady or jerky way or bounces:

The interaction between the alternating magnetic field and the magnetic stirring bar is too high.

-  Increase the speed or
-  Use a smaller magnetic stirring bar or
-  Decrease the stirring power.

In case the magnetic stirring bar will not be centred or leaves the centre permanently:

The interaction between the alternating magnetic field and the magnetic stirring bar is too low.

Or the stirring bar has a bottom that is uneven or too thick-walled.

Move the flask slightly back and forth and centre it again onto the stirring point of the STIRRING HOTPLATE resp. in the borehole of the STIRRING DRYBATH.

- 🌀 Reduce the speed or use a longer magnetic stirring bar or one with a larger diameter or
- 🌀 Use a smaller flask with a thin-walled, even bottom or
- 🌀 Reduce the filling amount in the flasks or
- 🌀 Increase the stirring speed.

In case the stirring activity is too weak:

- 🌀 Use commercial magnetic stirring bars with SamariumCobalt-core.
- 🌀 Use a longer stirring bar or a stirring flask with smaller diameter.



We recommend using 2mag – ASTEROID stirring bars to increase the stirring performance.

3. Installation

3.1 Safety advice

Please ensure the following basic conditions prior to installation:



The wear-free inductive drive works with magnetism. **Cardiac pacemakers, data storage mediums, magnetic cards and other devices**, which can be affected by magnetic fields, have to be kept away from the fields of the stirring unit as well as from the stirring bars.



The device must not be used in explosive rooms.
The device must not be dipped and submersed in water or any cleaning solutions.



Your supply voltage has to comply with the label of the control unit. The **control unit** has to be **switched off** before any power connection as well as before any other power supply.



To increase the operation safety, the control unit should be placed apart from chemical materials and reactions as well as away from thermal influences.
For special requirements please contact info@2mag.de.



ATTENTION!
The control unit has to be switched off, **BEFORE** you connect or disconnect the plugs.



Always turn off the power switch (1) first BEFORE handling the connection cables.

3.2 Installation, connection to control unit heatMIXcontrol

Step by step instruction (please also see image 4)



Image 4: control unit heatMIXcontrol

- 🌀 **Switch off the control unit with the power switch (1) at the rear side and disconnect the main power cable (3) BEFORE handling the connection cables!**
- 🌀 The heating cable (5) has to be connected to the 3-pin connection socket (4) of the control unit.
- 🌀 The stirrer control- and sensor-cable (7) has now to be connected to the 15-pin connection socket (6) of the control unit.
Please secure this plug connection by turning the screws situated at the plug. Only by this a trouble-free operation can be guaranteed.
- 🌀 Connect the main power cable (3) to the main power input at the side (2) and afterwards to the power plug.
- 🌀 The control unit is now connected to the end unit and ready for operation.
- 🌀 Please switch on the control unit with the power switch (1) at the rear side. The control unit will now run through a short self-test and will then be ready for operation immediately.
- 🌀 **Please note the following operation instruction to avoid any operating errors, malfunctions or accidents.**



Image 4: Installation, rear side of the control unit heatMIXcontrol 230 V

Description functional elements heatMIXcontrol 230 V - rear side

- 1 Main power switch
- 2 Main power socket (incl. fuse 6.3 AmT)
- 3 Main power cable
- 4 Socket for heater cable
- 5 Connector of heater cable end unit
- 6 Socket for stirrer- /sensor cable
- 7 Connector of stirrer-/ sensor cable end unit
- 8 Socket – RS232 interface
- 9 Socket – Pt100 external probe temperature sensor
- 10 Control unit heatMIXcontrol

Pt Temperature Sensor Pt100 (Accessory)

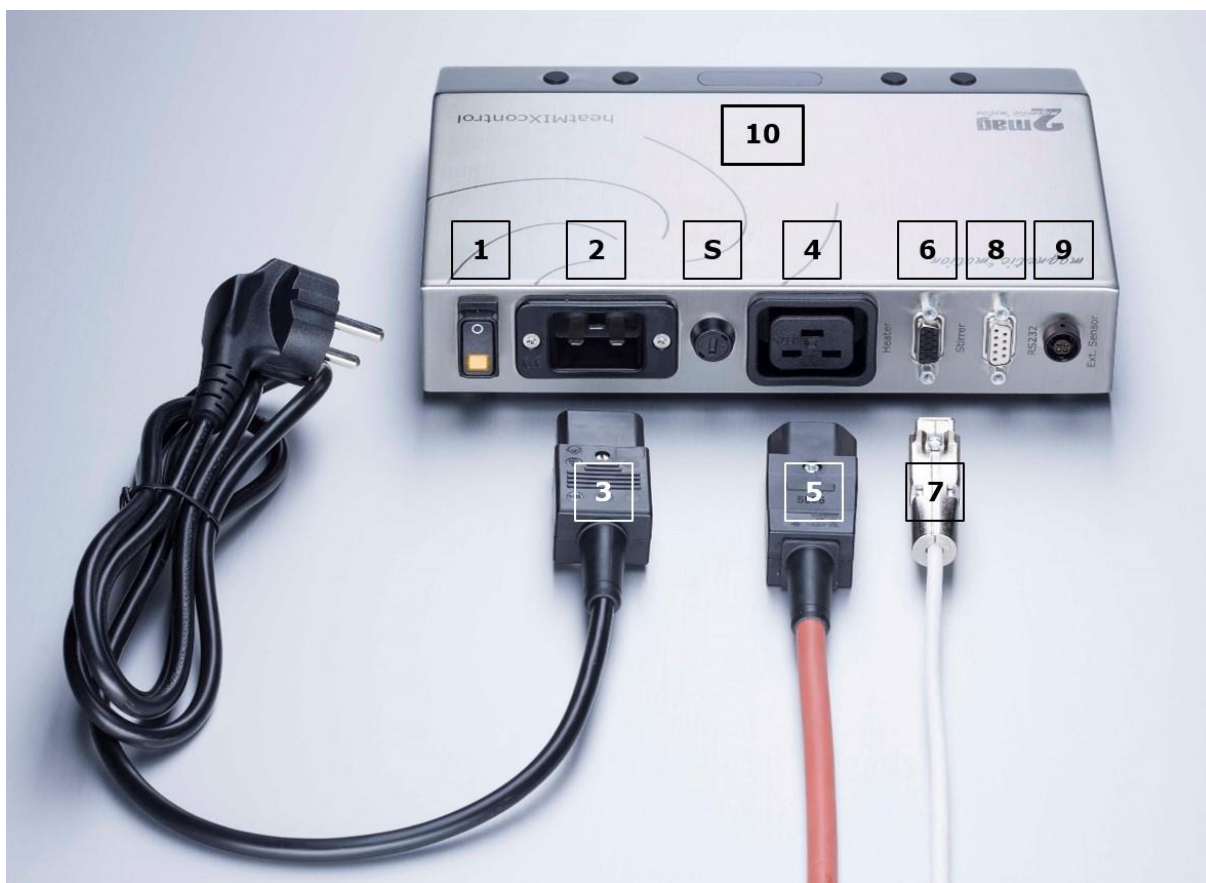


Image 6: Installation, rear side of the control unit heatMIXcontrol 115 V

Description functional elements heatMIXcontrol 115 V - rear side

- 1 Main power switch
- 2 Main power socket (incl. fuse 6.3 AmT)
- 3 Main power cable
- 4 Socket for heater cable
- 5 Connector of heater cable end unit
- 6 Socket for stirrer- /sensor cable
- 7 Connector of stirrer-/ sensor cable end unit
- 8 Socket – RS232 interface
- 9 Socket – Pt100 external probe temperature sensor
- 10 Control unit heatMIXcontrol
- S Fuse 12.5 A T

Pt Temperature Sensor Pt100 (Accessory)

4. Operating of the control unit heatMIXcontrol

4.1. Operating of the control unit

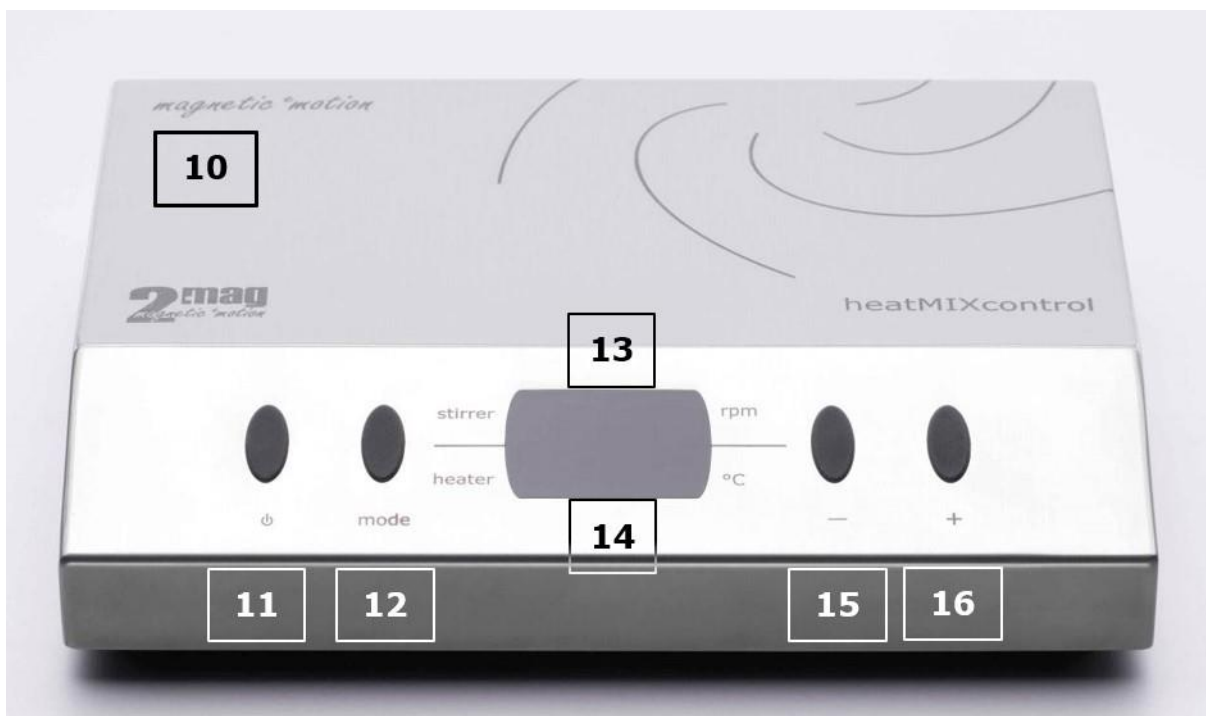


Image 7: Operating elements of control unit heatMIXcontrol

4.1.1 Description operating elements

10 Control unit heatMIXcontrol

Stirrer control

- 11 ON/OFF key
- 12 MODE-key for selection of the configuration layers
- 13 Display for stirrer (upper line)
- 14 Display for heater (lower line)
- 15 MINUS-key (-) for reduction of parameter
- 16 PLUS-key (+) for increase of parameters

Operation of the control unit

After the cables and connection have been installed correctly according to **"Installation, Connection to the control unit heatMIXcontrol"**, the STIRRING HOTPLATE respectively the STIRRING DRYBATH will be ready for operation.

4.1.2 Overview – function of the keys

ON/OFF-key (11)

By pressing of the ON/OFF key (11) the functions stirring and heating can be switch ON and OFF at one time.

MODE-key (12)

By repeated pressing of the MODE-key (12) the following shown configuration- and adjustment layers can be selected and adjusted by pressing of the MINUS-key (15) resp. PLUS-key (16).
All described actions (following numbers of MODE-key pressing) are always based on the "standard display layer" (basic operation display).

1x pressing MODE-key (12)

Selection of adjustment SET-temperature of heater

2x pressing MODE- key (12)

Selection of adjustment MAXIMUM-temperature of temperature limiter

3x pressing MODE- key (12)

Selection of internal temperature sensor or external probe temperature sensor (accessory) for controlling of the probe temperature

4x pressing MODE- key (12)

Selection of ON- resp. OFF heater function

5x pressing MODE- key (12)

Selection of adjustment of stirrer power

6x pressing MODE- key (12)

Selection of ON- resp. OFF stirrer function

7x pressing MODE- key (12)

Return to standard display layer (basic operation display)

MINUS- (15) and PLUS- key (16)

By pressing the MINUS- (15) resp. PLUS-key (16) the function and parameter shown above can be adjusted.

4.2 Heating operation and heating control



**Do not heat up liquids whose flashpoint is lower than the set temperature.
Explosion hazard! Fire hazard!**



**HOT Hotplate resp. HOT Drybath!
Temperatures up to +200 °C possible!
Burning hazard!**



With temperatures of above > +150 °C the PTFE coating of the Hotplate resp. of the Drybath will soften. In this actual condition, never place any hard or edged devices on the surface.

Operation note:

Interrelation of temperature controller and integrated adjustable over-temperature limiter

The control unit 2mag heatMIXcontrol is equipped with an additional independent and adjustable over-temperature limiter.

The over-temperature limiter is always of higher ranking, which means that in case of the actual value of the measured temperature being higher than the set limiting maximum value of the over-temperature limiter, the heating controller will be limited and as a result of this the heating is cut off.

In case of the actual value being lower than the set limiting value of the over-temperature limiter, the heating controller will be activated again and the control process will be started again.

The over-temperature limiter is an additional safety protection measure in case of potential heating controllers' defects or other malfunctions. In addition, the maximum temperature of the heating block can be limited to protect temperature-sensitive samples against accidentally over-heating.

The over-temperature limiter works with a second own temperature sensor and is, therefore, technically absolutely independent of the heating controller.

Heater control

The control unit heatMIXcontrol is equipped with a precise and modern heating controller.

All necessary parameters were set factory-made, optimized to the corresponding heating system and locked against accidentally shift. Therefore, only the setting of the SET-temperature can be made.

As a result, a fast and precise heating will be guaranteed without high overshooting when the target temperature is reached.

4.2.1 Adjustment – Heater SET-Temperature

Please press **1x MODE-key (12)** for selection of the configuration layer "SET temperature heater".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the SET temperature can be adjusted between +30°C up to +200°C in steps by 1°C.

The adjusted SET temperature is shown in the display (14, lower line), e.g. "**S.200**". The display is showing the value in °C.

The actual hotplate-/ block-temperature is shown in the standard display layer. The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The temperature adjustment is finished then. The SET temperature adjustment can also be finished immediately by pressing 6x the MODE-key (12) again → return to standard display layer.

The heating process is immediately starting after setting the SET-temperature.

Operation hint:

The available adjustment range of the SET-temperature is limited by the adjustment of the over-temperature limiter.

Example:

The set maximum temperature of the over-temperature limiter is +150°C. In this case it is not possible to adjust higher SET-temperatures than +150°C at the heater controller.

4.2.2 Adjustment – Over-Temperature Limiter

Please press **2x MODE-key (12)** for selection of the configuration layer "MAXIMUM-temperature limiter".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the MAXIMUM temperature can be adjusted between +30°C up to +200°C in steps by 1°C.

The adjusted MAXIMUM temperature is shown in the display (14, lower line), e.g. "**L.200**". The display is showing the value in °C.

The actual hotplate-/ block-temperature is shown in the standard display layer. The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The temperature adjustment is finished then. The SET temperature adjustment can also be finished immediately by pressing 5x the MODE-key (12) again → return to standard display layer.

Operation hint:

The adjusted MAXIMUM temperature is the maximum SET temperature of the heater controller, too.

4.2.3 Switching – Internal/External Temperature Sensor

Please press **3x MODE-key (12)** for selection of the configuration layer "Switching – Internal/External Temperature Sensor".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the internal or alternatively the external sensor for controlling the probe temperature can be activated.

The adjusted status is shown in the display (14, lower line) with. "**_. I**" for INTERNAL or "**_. E**" for EXTERNAL.

The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The adjustment is finished then.

The sensor adjustment can also be finished immediately by pressing 4x the MODE-key (12) again → return to standard display layer.

The temperature control process after switching to the external temperature sensor is working only with the external sensor. The internal temperature sensor is switched off then.

The adjustment of the SET-temperature is working as explained in "4.2.1 Adjustment - Heater SET-Temperature".

The over-temperature limiter is active during using the external temperature sensor, too.

Attention:

Please be always sure, that the external temperature sensor is dipped into the probe with enough filling height. Only in this case it is a reliable and safety operation of the heater end unit possible.

The external temperature sensor has to be connected to the socket (9) for PT100 external probe temperature sensor of the control unit heatMIXcontrol.

4.2.4 Switching – Heater ON and OFF

Please press **4x MODE-key (12)** for selection of the configuration layer "Switching Heater ON and OFF".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the heating function can be switched ON and OFF.

The adjusted status is shown in the display (14, lower line) with. **"H. ON"** for heater ON or **"H.OFF"** for heater OFF.

The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The adjustment is finished then.

The sensor adjustment can also be finished immediately by pressing 3x the MODE-key (12) again → return to standard display layer.

The standard display layer (14, lower line) is showing the status heater "ON" by the blinking dot down to the right of the display (14, lower line).

4.3 Stirrer Operation and Control

4.3.1 Stirrer – ON and OFF

Please press the ON/OFF-key (11) once. The magnetic stirrer (heater as well) will be switched on by that. The current stirring speed will be shown in the display (13, upper line).

By pressing the ON/OFF-key (11) once more, the magnetic stirrer (heater as well) will be switched off again. The display (13/14) expires.

4.3.2 SoftStart

After the magnetic stirrer was switched on, the stirring bars in the flasks will first be caught, afterwards centred in the flask and then – to increase the operating safety – be smoothly accelerated to the set speed accurately.

The accelerating phase will be shown by the illumination dot at the right segment of the LED-display (13, upper line).

4.3.3 Stirrer speed adjustment

The speed of the magnetic stirrer can be adjusted by pressing the MINUS- (15) resp. the PLUS-key (16).

The adjusted speed will be shown in the display (13, upper line) when the magnetic stirrer is switched on. The speed range can be adjusted between 100 and 2000 rpm in steps by 10.

By constantly pressing the MINUS- resp. the PLUS-keys, an accelerated adjustment of the speed can be achieved.

Hint:

The speed is only adjustable in the configuration layer “standard display layer” (basic operation display).

4.3.4 QuickSet

To enter the start- respectively maximum speed directly and quickly there is the Quickset-function available.

The use of the following described keys will be made with the stirrer turned on.

Setting the Start Speed

Press the MINUS-key (15) permanently and press shortly the ON/OFF-key (11) afterwards. The start speed “100” will be set.

Setting the Maximum Speed

Press the PLUS-key (16) permanently and press shortly the ON/OFF-key (11) afterwards. The maximum speed “2000” will be set.

4.3.5 Stirrer – Power adjustment

A newly developed and extremely efficient magnetic stirrer will come into operation.

The inductive drive concept causes an operational heat output by the magnetic stirrer. To reduce the heat output the power of the magnetic stirrer can be adjusted.

A **high power** setting is necessary to mix viscose media and large amounts to be stirred in a strong and efficient way.

A **low power** setting guaranties a warming-free long-term use for example of aqueous probes at room temperature.

Please press **5x MODE-key (12)** for selection of the configuration layer "Stirrer Power".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the stirring power can be the power can be adjusted between 10/20/30/40/50/60/70/80/90/100%.

The adjusted stirring power is shown in % in the display (13, upper line), e.g. "**P.100**" for 100% stirring power.

The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The adjustment is finished then.

The stirring power adjustment can also be finished immediately by pressing 2x the MODE-key (12) again → return to standard display layer.

4.3.6 Switching – Stirrer ON and OFF

Please press **6x MODE-key (12)** for selection of the configuration layer "Switching Stirrer ON and OFF".

By pressing the MINUS-key (15) respectively the PLUS-key (16) just after pressing the MODE-key, the stirrer function can be switched ON and OFF.

The adjusted status is shown in the display (14, lower line) with. "**ON**" for stirrer ON or "**OFF**" for heater OFF.

The display (13/14) will turn back to the standard display layer after approx. 5 seconds. The adjustment is finished then.

The sensor adjustment can also be finished immediately by pressing 1x the MODE-key (12) again → return to standard display layer.



The wear-free inductive drive works with magnetism. **Cardiac pacemakers, data storage mediums, magnetic cards and other devices**, which can be affected by magnetic fields, have to be kept away from the fields of the stirring unit as well as from the stirring bars.

4.4 Standard Display Layer

The "standard display layer" is the basic operation display with display of stirrer speed in rpm (13, upper line) and actual hotplate-/ block temperature in °C (14, lower line).

Heater

In the case of deactivated heater as shown at "4.2.4 Switching - Heater ON and OFF" the heater-display (13, upper line) is showing instead of the temperature only "OFF".

Stirrer

In the case of deactivated stirrer as shown at "4.3.6 Switching – Stirrer ON and OFF" the stirrer-display (14, lower line) is showing instead the speed only "OFF".

After pressing **7x MODE-key (12)** all configuration layers are circulated and the standard display layer will be reached again.

Alternatively the display (13/14) is turning automatically back to the standard display layer after approx. 5 seconds without any key pressing.

5. Interface – RS232

The control unit heatMIXcontrol (order no. 68300) includes an interface RS232 for external control by e.g. PC.

5.1 Pin-assignment RS232 interface, SUB-D connector

The assignment of the RS232 interface is shown below.

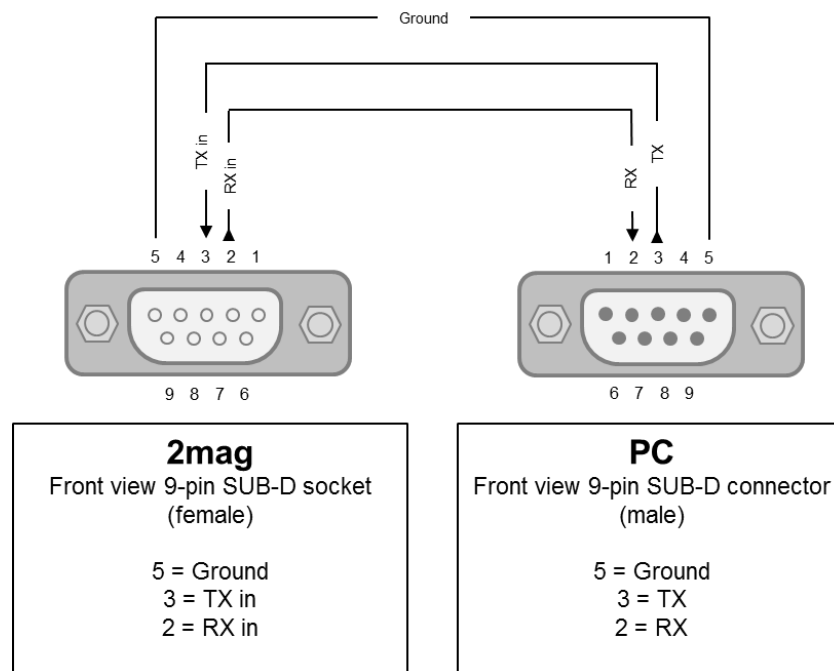


Image 8: Pin-assignment RS232 interface

5.2 RS232 Commands

The RS232-commands are ASCII coded and can be sent to the **heatMIXcontrol** with e.g. the program PuTTY.

Listing of commands and feedbacks (with comments):

No.	Command	Feedback	Comment
1	startstirrer/(_A)	OK_START_A	Command Start is not working!
2	stopstirrer/(_A)	OK_STOP_A	Command Stop is not working!
3	setrpm_*RPM*/(_A)	OK_*RPM*RPM_A	*RPM*: 3 or 4 digits, e.g. 100 or 2000, 3 digits optional with leading zero e.g. 0100
4	sendrpm/(_A)	OK_*RPM*RPM_A	*RPM*: 4 digits, values with only 3 digits with leading zero, e.g. 0500 or 1000
5	setpower_*POW*/(_A)	OK_POWER*POW*_A	*POW*: 3 digits, values with only 2 digits with leading zero, e.g. 050 or 100
6	sendpower/(_A)	OK_POWER*POW*_A	*POW*: 3 digits, values with only 2 digits with leading zero, e.g. 050 or 100
7	setadd_X_A	OK_SETADD_A_X	Change of unit address A to X
8	setdefault/(_A)	OK_SETDEFAULT_A	Reset to 350 rpm, 50% power, TMAX 200°C, TSET 50°C, internal sensor
9	startheater/(_A)	OK_STARTHEATER_A	Command Start is not working!
10	stopheater/(_A)	OK_STOPHEATER_A	Command Stop is not working!
11	settemp_*TSET*/(_A)	OK_TSET*TSET*`C_A	*TSET*: 3 digits, values with only 2 digits with leading zero, e.g. 060 or 100
12	settmax_*MAX*/(_A)	OK_TMAX*MAX*`C_A	*MAX*: 3 digits, values with only 2 digits with leading zero, e.g. 060 or 100
13	setsensor_*SEN*/(_A)	OK_SENSOR_*SEN*_A	*SEN*: 1 digit, I (internal) or E (external)
14	sendtset/(_A)	OK_TSET*TSET*`C_A	*TSET*: 3 digits, values with only 2 digits with leading zero, e.g. 060 or 100
15	sendtemp/(_A)	OK_TEMP*TEMP*`C_A	*TEMP*: 3 digits, values with only 2 digits with leading zero, e.g. 060 or 100
16	sendtmax/(_A).	OK_TMAX*MAX*`C_A	*MAX*: 3 digits, values with only 2 digits with leading zero, e.g. 060 or 100
17	sendstatus/(_A)	OK_VXXXX_ON_RE_A	1. ER or OK 2. SW version no. 3. On or OF (heater) 4. RE/MA (remote/manual) 5. Address
18	sendtstatus/(_A)	OK_RE_ON_OK_I_A	1. ER or OK 2. RE/MA (remote/manual) 3. ON or OF (heater) 4. ER or OK (heating function) 5. I or E (internal or external sensor) 6. Address

Spread sheet 2: Commands – interface RS232

Each entering of the complete command has to be finished with the ASCII code "Carriage Return (CR)". There is no determination of small and capital letters.

5.3 Format – Command – Feedback

Control commands are defined with the command, parameters (when indicated) and the unit address attached with underscore (optional).

There are 4 kinds of addressing:

1. Without any address, addressing one unit, feedback- see spreadsheet 2
2. Basic address with letter A to Y: `_C`, only one unit, feedback- see spread sheet 2
3. Range address with letter A to Y: `_AK`, only one unit, feedback- see spread sheet 2
4. Command to ALL connected units: `_Z`, feedback = command

Feedback of commands

The feedback of the addressed units is as follows:

1. OK or ER [code of error] – in the case of error
2. Command and parameter (when indicated)
3. Unit address (A-Y, Z = all units, default address is: A)

If a command is addressed with `_Z` or no unit is addressed, then the feedback will be identical to the command.

Error codes

Error 1: Unknown Command

Error 2: Manual Mode (Start, Stop not possible)

Error 3: Parameter out of range (set value not allowed)

5.4 Hints to Parameter Operation

The control unit heatMIXcontrol is saving two different sets of parameters independently – in each case for manual and remote operation.

By starting the control unit manually (by using the keys) or remotely (by using the RS232 interface) the control unit will be started in the manual or remote mode. It is NOT possible to switch from the manual to the remote mode or backwards. Furthermore it can be changed only the parameters of the actual running mode.

The mode can be changed by switching off the control unit by pressing the ON/OFF-key (11).

The **Set-commands** can only set the parameters of the remote mode.

The **Send-commands** are giving always back the parameters of the actual running mode.

It can be changed the manual parameters only by the keys during running in the manual mode and the remote parameter only by the RS232 interface during running in the remote mode!

Via PC and RS232 interface remotely adjusted parameters cannot be changed manually by the keys.

Via the unit keys manually adjusted parameters cannot be changed via PC and RS232 interface. But the parameters of the actual running mode can be checked via the PC and RS232 interface.

The manually switched on control unit cannot be switched off or on via the RS232 interface.

During using the manual mode all parameters can be set via the RS232 interface. These remote parameters cannot be read out in the manual mode. In this case the answer is giving back the parameters of the manual mode.

The via RS232 interface adjusted remote parameters will be saved automatically and will be valid after starting the control unit in the remote mode.

The read out of the parameters are giving always back the parameters of the actual running mode.

Only by switching off the control unit by pressing the ON/OFF-key (11) the running mode can be stopped. That means the remotely started control unit can switched off in this case manually (safety switching).

5.5 Control of more than one units

Several control units can be connected to a PC interface via commercially available interface adapters.

All controllers are addressed with the address _A in the factory. To control the control units individually, each control unit has to be addressed with an own address with help of the command "SetAdd".

5.6 Control with PuTTY

The commands which are shown in table 2 and 3 can be sent from the PC to the controller with the program PuTTY.

The following settings must be made with the PC-SW "PuTTY":

Category: "Session" →

Serial line: COM?

Speed: 9600

Connection type: Serial

Category: "Terminal" →

Implicit CR in every LF

Implicit LF in every CR

Local echo: Force on

Local line editing: Force on

Category: "Connection" → "Serial" →

Serial line to connect to: COM?

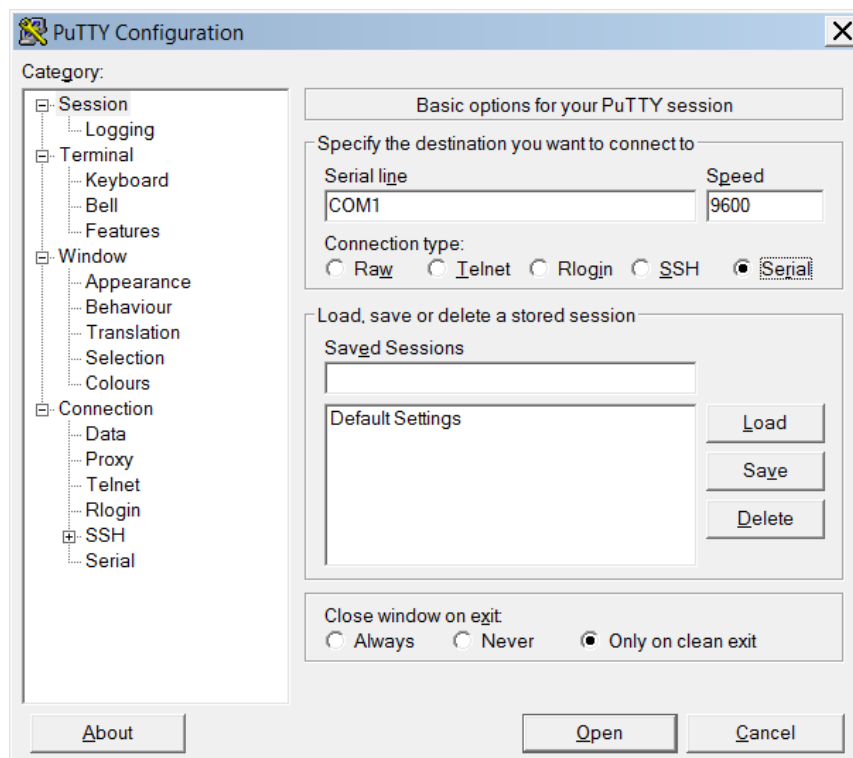
Speed (baud): 9600

Data bits: 8

Stop bits: 1

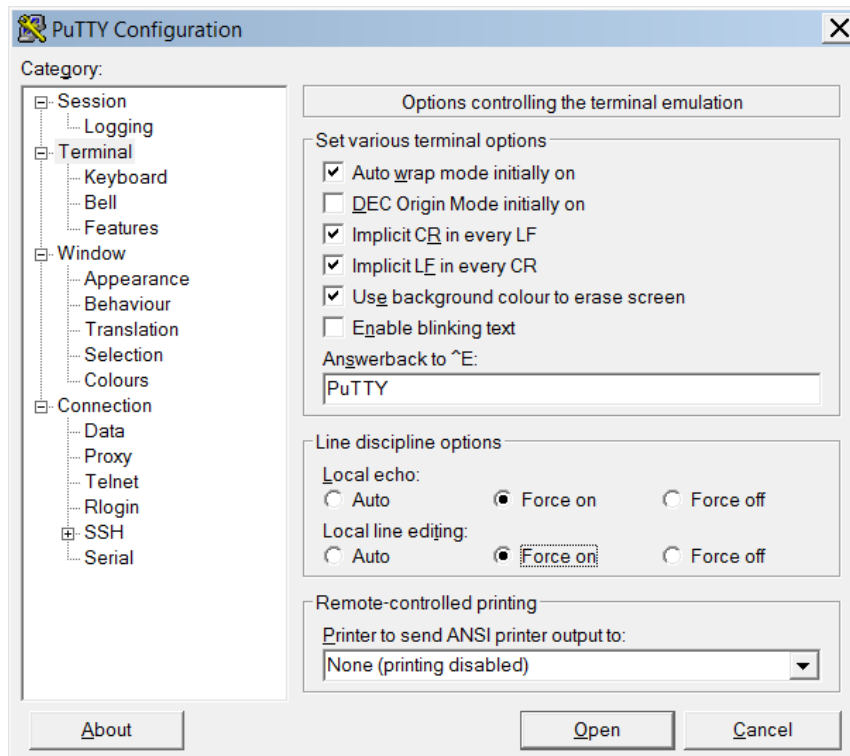
Parity: None

Flow control: None



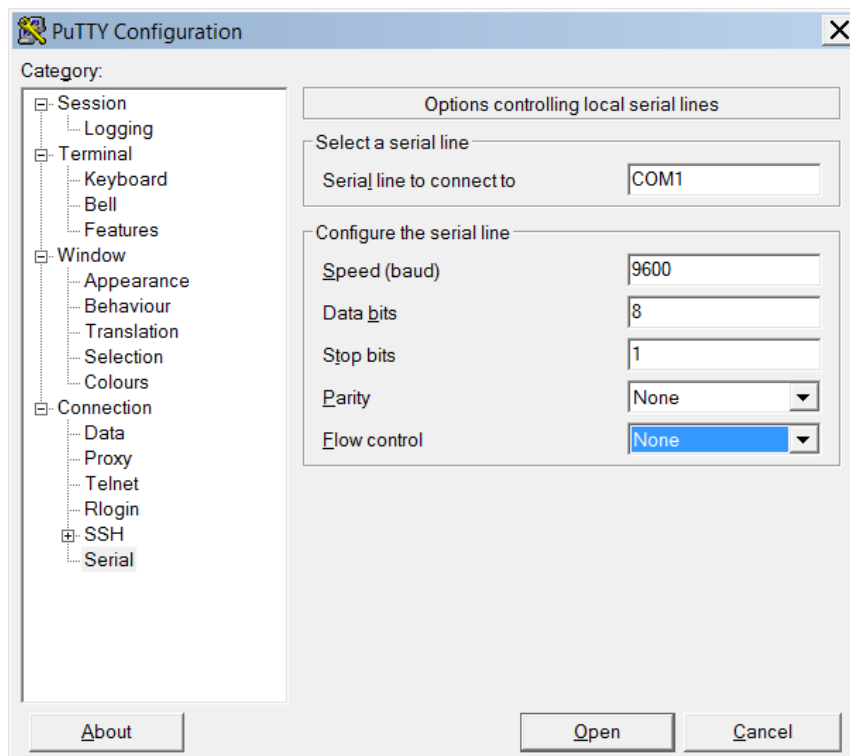
Screenshot 1:

Category: "Session" | Serial line: COM? | Speed: 9600 | Connection type: Serial



Screenshot 2:

Category: "Terminal" | Implicit CR in every LF | Implicit LF in every CR |
Local echo: Force on | Local line editing: Force on



Screenshot 3:

Category: "Connection" → "Serial" | Serial line to connect to: COM? |
Speed (baud): 9600 | Data bits: 8 | Stop bits: 1 | Parity: None | Flow control: None

6. Safety arrangement heating

To have an additional safety arrangement, an irreversible thermal heating fuse has been integrated in the STRIRRING HOTPLATE and the STIRRING DRYBATH.

Should due to a technical defect at the controller of the control unit temperature exceed approx. +240°C, the thermal fuse will be released irreversibly. The device will switch off the heating permanently and has to be sent to the factory service department for general control.

In this case the measuring value of electrical heating element will be unlimited (interrupted).

Please contact: info@2mag.de

7. Accessories

7.1 Stand for heatMIXcontrol

Stable stainless steel stand (order no. 69500) for space-saving positioning of control unit heatMIXcontrol, organized cable route on rear side, easy installation, incl. assembling material.



Image 9: Stand with control unit heatMIXcontrol

7.2 External Temperature Sensor Pt100

Temperature sensor (order no. 69100) for direct controlling of the probe temperature.



Image 10: External Temperature Sensor Pt100

7.3 Reducing adapters

Inserts consisting of aluminum alloy for STIRRING DRYBATH 15-100 and STIRRING DRYBATH 15-250. For reduction of the bore hole diameter. Guarantees an excellent heat transfer in the case of using smaller glasses.



Bild 11: Reducing adapter STIRRING DRYBATH 15-100 und 15-250

Individual inner diameter on request.

7.4 Stirring bars ASTEROID

To increase the stirring performance, we recommend the use of 2mag **ASTEROID** magnetic stirring bars.



Image 12: ASTEROID family

We recommend:

ASTEROID 25 (order no. 44025) for STIRRING HOTPLATE 15, STIRRING DRYBATH 15-100 / 15-250 / 8-250 ERL.

ASTEROID 40 (order no. 44040) for STIRRING HOTPLATE 6.

B Maintenance, Cleaning and Care



Do not use any cleaning agent or cleaning rag that is based on chlorine with metallic components or ammoniac.

These agents may harm the surface.

Do not quench the hot STIRRING HOTPLATE resp. the STIRRING DRYBATH with cold water.



The devices must not be dipped in water or any cleaning solutions.

2mag devices are generally maintenance-free.

Due to their construction the **2mag** devices are very robust and designed for the professional daily use.

We recommend cleaning the devices' surfaces with e.g. cleaning agents containing tensides or isopropyl alcohol regularly.

BEFORE cleaning the surfaces, switch off the device with the power switch (1) and pull out the main power cable (3) afterwards.



Please keep in mind that the Hotplate or Drybath may still be hot even if the heating had been turned off some hours ago and that there is still an acute danger of burning!

C Protection against released gases and substances

The occupational exposure limit value (OEL) is the limit value for the time-weighted average concentration of a substance in the air at the workplace in relation to a given reference period.

It indicates the concentration of a substance up to which acute or chronic harmful effects on health are generally not to be expected.

Information on exposure limits and handling and storage regulations for substances can be found in OSHA publications. Local, national or regional regulations may also apply.

D Service case and customer service



During service, the device may only be opened by an authorized customer service.

In case of any defect on the device, please make sure to contact us first. We will be ready to offer help quickly and straightforward.

2mag AG

Schragenhofstr. 35 J
DE-80992 Muenchen
GERMANY

Fon: +49 89 38153110

E-Mail: info@2mag.de

Web: www.2mag.de

Warranty:

Due to their construction, the **2mag** devices are very robust and designed for the professional daily use.

The magnetic drive works without any mechanically moved parts as e.g. belts, bearings or motors. Therefore a maximum of reliability within daily use is achieved.

Should in any case, despite our strict quality control, a system part not work without any fault, it can be repaired or exchanged by our customer service without any problems.

We guarantee 3 years warranty on all material and manufacturing defects.

E Errors

The magnetic stirring bar is turning in an unbalanced way:

There is no denying that magnetic stirring bars are aging in the course of time. This may happen by e.g. sterilizing, usage at high temperatures or causing stress (dropping down)

The magnetism can be decreased by this.

Separate out this stirring bar and exchange it by a new one.

The control unit is not ready for operation despite the power connection has been made and the power switch had been turned on:

Please get into contact with us.

The temperature control shows "ERR" in the display:

Please check whether the 15-pin plug connection has been installed correctly.

The heating of the Hotplate or Drybath will not start working:

Please check whether the 3-pin plug connection has been installed correctly.

Please check whether the heating control is active (right down LED-dot lower line of display (14) has to blink).

Please check whether the heater is switched ON and the maximum limiting temperature of the over-temperature limiter was exceeded.

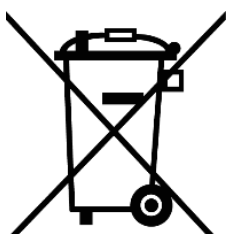
Please **ALWAYS** pay attention to the present ambient conditions before changing the set limiting temperature, e.g. which substance is going to be tempered, flash point of the substance, ambient temperature etc. to avoid potential accidents.

In general, we are ready to help you in case of problems.

For any enquiries, questions or suggestions please do not hesitate to contact us at: info@2mag.de

F Disposal

The WEEE Directive 2012/19/EU regulates the sale, take-back and proper disposal of waste electrical and electronic equipment within the European Union.



The symbol for the separate collection of electrical and electronic equipment is a crossed-out wheeled garbage can.

Disposal with household waste / municipal waste is not permitted!



Packaging materials must be disposed of in accordance with current local regulations.

G Technical details

STIRRING HOTPLATE 6 und STIRRING HOTPLATE 15

	STIRRING HOTPLATE 6 (incl. heatMIXcontrol)	STIRRING HOTPLATE 15 (incl. heatMIXcontrol)
Order no.	66306	66315
Stirring points	6	15
Stirring points distance	130 mm	65 mm
Stirring amount/point	1 -1,500 ml	1- 1,000 ml
Stirring power (max.)	40 watts	
Hotplate material	aluminium alloy / PTFE-coated	
Frame material	stainless steel	
Temperature range	+40°C up to +200 °C	
Overheat protection	irreversibly	
Measurements (WxDxH)	250 x 430 x 75 mm	
Weight (gross)	approx. 13 kg	
Operating conditions	-10 °C up to +50 °C	
Storage conditions	-40°C up to +70°C, 10 - 95 %, 500 - 1060 hPa	
Protection category	IP31	
Electrical data	230 VAC / 5 A	
Heating power (max.) at 230 V mains voltage	1,200 watts	

STIRRING DRYBATH 15-100 und STIRRING DRYBATH 15-250

	DRYBATH 15-100 (incl. heatMIXcontrol)	DRYBATH 15-250 (incl. heatMIXcontrol)
Order no.	63100	63250
Stirring points	15	15
Stirring points distance	65 mm	84 mm
Stirring amount/point	100ml lab flask 150 ml beaker glass	250 ml lab flask 400 ml beaker glass
Stirring power (max.)	40 watts	
Block bore holes (Ø/T)	57.5 / 48 mm	71 / 78 mm
Block material	aluminium alloy / PTFE-coated	
Frame material	stainless steel	
Temperature range	+40°C up to +200 °C	
Overheat protection	irreversible	
Measurements (WxDxH)	280 x 430 x 120 mm	335 x 515 x 150 mm
Weight (gross)	approx. 20 kg	approx. 35 kg
Operating conditions	-10 °C up to +50 °C	
Protection category	IP31	
Storage conditions	-40°C up to +70°C, 10 - 95 %, 500 - 1060 hPa	
Electrical data	230 VAC / 5 A	
Heating power (max.) at 230 V mains voltage	1,000 watts	1,150 watts

STIRRING DRYBATH 8-250 ERL

	STIRRING DRYBATH 8-250 ERL (incl. heatMIXcontrol and 8 contact adapters)
Order no.	63825
Stirring points	8
Stirring points distance	100 mm
Stirring amount/point	250 ml Erlenmeyer flasks
Stirring power	40 watts
Block bore holes (Ø/T)	87.2 / 78 mm
Block material	aluminium alloy / PTFE-coated
Frame material	stainless steel
Temperature range	+40°C up to +200 °C
Overheat protection	irreversible
Measurements (WxDxH)	335 x 515 x 150 mm
Weight (gross)	approx. 40 kg
Operating conditions	-10 °C up to +50 °C
Protection category	-40°C up to +70°C, 10 - 95 %, 500 - 1060 hPa
Storage conditions	IP31
Electrical data	230 VAC / 5 A
Heating power (max.) at 230 V mains voltage	1,150 watts



All STIRRING HOTPLATE and STIRRING DRYBATH will be delivered with heatMIXcontrol (inclusive).

Control unit heatMIXcontrol

	heatMIXcontrol
Order no.	68300 (only spare part)
Stirring speed	100 – 2000 rpm
Stirring power (max.)	40 watts
Power setting	10-100% (10-step)
Housing material	stainless steel
Measurements (WxDxH)	225 x 171 x 48 mm
Weight (gross)	approx. 2.2 kg
Permitted operation conditions	0 up to +40 °C (at 80% humidity)
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa
Protection category	IP20
Electrical data	100-240 V / 50-60 Hz / 5 A

Accessory – Stand for vertical positioning of the control unit

	Stand
Order no.	69910
Material	Stainless steel
Measurements (WxDxH)	225 x 132 x 150 mm
Weight (gross)	approx. 1,0 kg

Accessory – External Temperature Sensor Pt100

	External Temperature Sensor Pt100
Order no.	69100
Sensor type	Pt100
Material	Stainless steel
Measurements (DxL)	Ø 3 x 150 mm
Cable length	1 m
Weight (gross)	approx. 0,1 kg

Accessory – Reducing adapters

	for STIRRING DRYBATH 15-100	for STIRRING DRYBATH 15-250
Order no.	on request	
Outer diameter (ØxL)	Ø 57.5 x 47 mm	Ø 71.5 x 78 mm
Inner diameter	on request	

Accessory Magnetic Stirring Bar ASTEROID 25/40

	ASTEROID 25	ASTEROID 40
Order no.	44025	44040
Shape	triangle, convex	triangle, convex
Material	PTFE	PTFE
Measurement (HxL, D)	14 x 25 mm, Ø 16 mm	28 x 40 mm, Ø 33 mm
Weight (gross)	approx. 0.07 kg	approx. 0.12 kg

H EU-Declaration of conformity for technical devices

(acc. to EU-guideline of the electromagnetic compatibility 2014/30/EU and the low voltage directive 2014/35/EU)

2mag AG
Schragenhofstraße 35 J
DE-80992 Muenchen
GERMANY

Hereby declares that the product

STIRRING-DRYBATH 15-100
STIRRING-DRYBATH 15-250
STIRRING DRYBATH 8-250 ERL
STIRRING HOTPLATE 6
STIRRING HOTPLATE 15

incl. control unit
heatMIXcontrol

is conform to the appropriate regulations of the EU-guideline of the electromagnetic compatibility (EU-guideline 2014/30/EU) as well as the low voltage directive (2014/35/EU) incl. their changes and the laws for the realization of the guideline into national law.

The declaration is valid under the following conditions:
The ambient conditions being stated in the operation manuals have to be adhered to.
This mainly applies to the supply with electric energy.

The following norms/standards were chosen to evaluate the finished products with regard to electromagnetic compatibility:

- DIN EN 61000-3-2
- DIN EN 61000-3-3
- DIN EN 61326-1
- DIN EN 60529

The following norms/standards were chosen to evaluate the finished products with regard to low voltage directive:

- DIN EN 61010-1
- DIN EN 61010-2-010
- DIN EN 61010-2-51