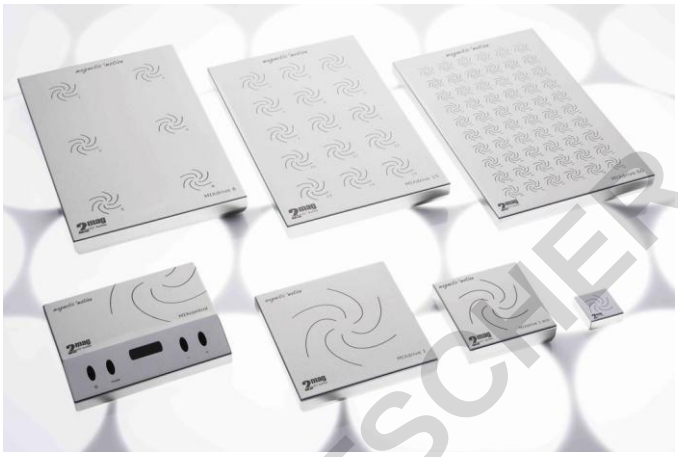
OPERATION MANUAL

2mag MIXdrive with MIXcontrol

Submersible stirring drives with external control



cuvetteMIXdrive 1	Order no.: 40400
MIXdrive 1 XS	Order no.: 40300
MIXdrive 1 eco	Order no.: 40101
MIXdrive 1	Order no.: 40001
MIXdrive 6	Order no.: 40006
MIXdrive 15	Order no.: 40015
MIXdrive 60	Order no.: 40060
MIXdrive OEM	Order no.: 4xxxx
MIXdrive 1 XS HT	Order no.: 40303
MIXdrive 1 eco HT	Order no.: 40301
MIXdrive 1 HT	Order no.: 40201
MIXdrive 6 HT	Order no.: 40206
MIXdrive 15 HT	Order no.: 40215
MIXdrive 60 HT	Order no.: 40260
MIXdrive OEM HT	Order no.: 4xxxx
with	
MIXcontrol eco	Order no.: 90100
MIXcontrol eco DINrail (Poti)	Order no.: 90140
MIXcontrol eco DINrail (0-10V)	Order no.: 90150
MIXcontrol eco DINrail (RS232)	Order no.: 90160
MIXcontrol 20	Order no.: 90200
MIXcontrol 20 RS232	Order no.: 90210
MIXcontrol 20 DINrail (0-10V)	Order no.: 90220
MIXcontrol 20 DINrail (RS232)	Order no.: 90221
MIXcontrol 40	Order no.: 90400
MIXcontrol 40 RS232	Order no.: 90410
MIXcontrol 40 DINrail (0-10V)	Order no.: 90420
MIXcontrol 40 DINrail (RS232)	Order no.: 90421

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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** 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.

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Includes:

Quick start
Operation Manual
Technical Documentation
Specifications

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A Quick start

1. Overview of your product

Magnetic stirrer MIXdrive with control unit MIXcontrol



Image 1: 15-position magnetic stirrer MIXdrive 15 with control unit MIXcontrol 40

Your product contains at despatch:

- A modern inductive magnetic stirring system (**MIXdrive**) consisting of a stainless-steel stirring plate with 1, 6, 15 or 60 stirring points with fixed stirrer control cable (4-pin plug, with screw nut)
- An external control unit with one connector socket (**MIXcontrol eco** / **MIXcontrol 20**) respectively two connector sockets (**MIXcontrol 40**) for connection of the stirrer control cables as well as a pluggable power cable (country-specific) and with RS232 PC-interface (option).

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2. Applications

2.1 Operator

The 100% maintenance- and wear-free magnetic stirrers **MIXdrive** 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 function is stirring of liquids in suitable and chemically resistible vessels. The stirrer housing is hermetically close and therefore immersible.
The maximum ambient temperature is +50°C in air and +50°C in water immersed.
The maximum ambient temperature of the high temperature versions (**MIXdrive HT-series**) is +200°C in air and +95°C in water immersed.

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
- Water baths
- Incubators

Please note: For using the stirrer in incubators please set the adjustable stirring power to the minimum usable power to reduce the additional heating effect caused by the magnetic stirring drive. Please see chapter "5 External heating operations in incubators and water baths" at page 36.

2.4 Application not for the intended use

The magnetic stirrers **MIXdrive** are **explicitly not intended** for the application:



- Stirring and warming of flammable liquids
- Warming of pressure-tight closed and NOT pressure resistant vessels or glasses
  (e.g. Erlenmeyer flasks, lab flasks)
- At general atmosphere or danger of explosion

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

2.5 Combinations of vessels

Please use round, chemical resistant and where required heat-resistant vessels made of glass or non-magnetic metal. You can use vessels up to the maximum size stated in the table 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. 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.

Magnetic Stirrer	**Stirring vessels**	**Nominal content**	**Max. amount**
cuvetteMIXdrive 1	cuvettes	up to 25 ml	1
MIXdrive 1 XS MIXdrive 1 XS HT	lab flasks beaker glasses	1,000 ml	1
MIXdrive 1 eco MIXdrive 1 eco HT	Erlenmeyer flasks lab flasks beaker glasses	3,000 ml	1
MIXdrive 1 MIXdrive 1HT	Erlenmeyer flasks lab flasks beaker glasses	10,000 ml	1
MIXdrive 6 MIXdrive 6 HT	Erlenmeyer flasks and lab flasks beaker glasses (high design)	25 ml 50/100 ml 250/500 ml 1,000 ml 2,000 ml 3,000 ml 25 ml 50 ml 100/250 ml 600/1000 ml 3,000 ml	6 6 6 6 3 2 6 6 6 6 2
MIXdrive 15 MIXdrive 15 HT	Erlenmeyer flasks and lab flasks beaker glasses (high design)	25 ml 50/100 ml 250/500 ml 1,000 ml 2,000 ml 3,000 ml 25 ml 50 ml 100/250 ml 600/1000 ml 3,000 ml	15 15 8/6 6 3 2 15 15 15 8 2
MIXdrive 60 MIXdrive 60 HT	Reaction vessels small volume glasses	50 ml	2

Table 1: Combination examples for vessels

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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!



Do only use temperature-resistant vessels.
Be careful with plastic flasks!



Danger when handling glass vessels
DANGER OF BREAKING!

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.

ASTEROID Stirring Bars
We recommend using 2mag –ASTEROID stirring bars to increase the stirring performance at enhanced requirements.

ASTEROID stirring bars a high-effective and ideal for:

- large mixing volumes
- viscous media
- stirring over wide distances
- at disadvantageous vessel bottoms.

2mag ASTEROID stirring bars transmit more than 4x higher torque. Therefore, the bars creating an unbeatable increased mixing effect in comparison to conventional stirring bars. The high energetic and long-term stable magnetic field does not have any demagnetization effect. The concave design is made for a minimum of bearing surface and reliable rotation. Significantly higher rotation speed reachable! 300% less PTFE abrasion than comparable round shape stirring bars. The triangular shape raises the powerful shear force and increases the mixing effect at lower rotation speed.

The high-quality PTFE cover is even and sealing the magnet, FDA-conform and steam sterilizable at 121°C.

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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 ¾ (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 for and centre it again onto the stirring point of the stirrer surface.

- 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.



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

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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 control unit MIXcontrol must not be dipped 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 or power disconnection.



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 first before handling the connection cables.

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3.2 Installation, connection to the control unit MIXcontrol eco

Step by step instruction (please also see image 2 and 3)

- **Switch off the control unit MIXcontrol eco BEFORE you handle the connection cables by disconnection of the power supply unit (1) and the low-voltage power cable (2)!**
- The stirrer control cable (8) of the magnetic stirrer MIXdrive (9)has now to be connected to the 4-pin socket of the control unit (7). **Please secure this plug connection by turning the screw nut situated at the plug.** Only by this a trouble-free operation can be guaranteed.
- Take the low-voltage power cable (2) of the power supply unit (1) and connect the plug (3) to the power input socket (4) of the control unit (5).
- Connect the power supply unit (1) with power socket
- The control unit is now connected to the magnetic stirrer and ready for operation.

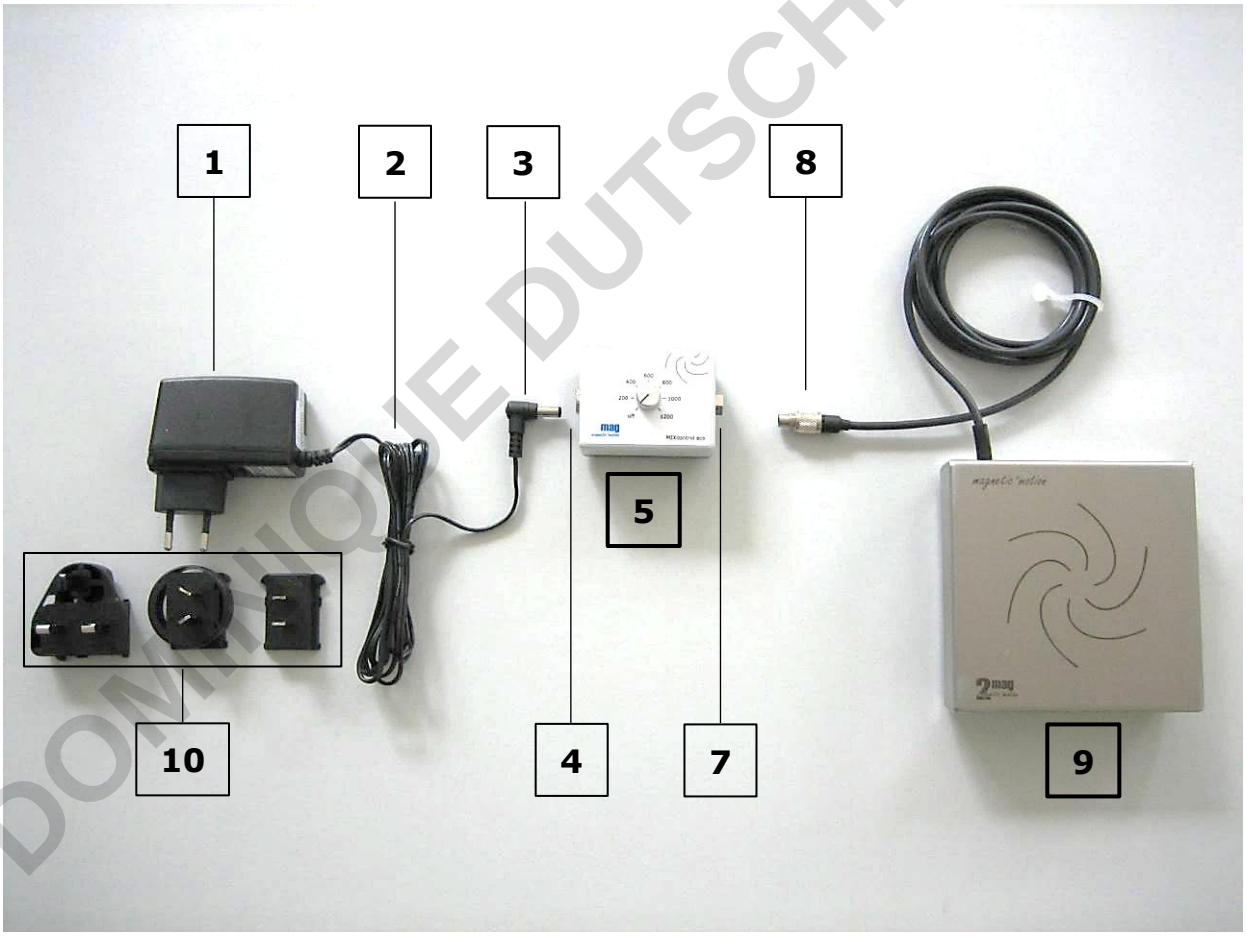


Image 2: Installation, magnetic stirrer MIXdrive with control unit MIXcontrol eco

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Description functional elements of control unit MIXcontrol eco

1 Power supply unit (Input 100-240 V / 50-60 Hz / 0.75 A; Output: 24 V /15 W)
2 Low-voltage cable between power supply unit and control unit
3 Low-voltage connector of the stirrer control cable
4 Low-voltage socket for the stirrer control cable

5 Control unit MIXcontrol eco
6 Speed control (rpm)

7 Socket for control cable for the magnetic stirrer
8 Control cable of the magnetic stirrer
9 Magnetic stirrer

10 Changeable country-specific power adapter (content of delivery)

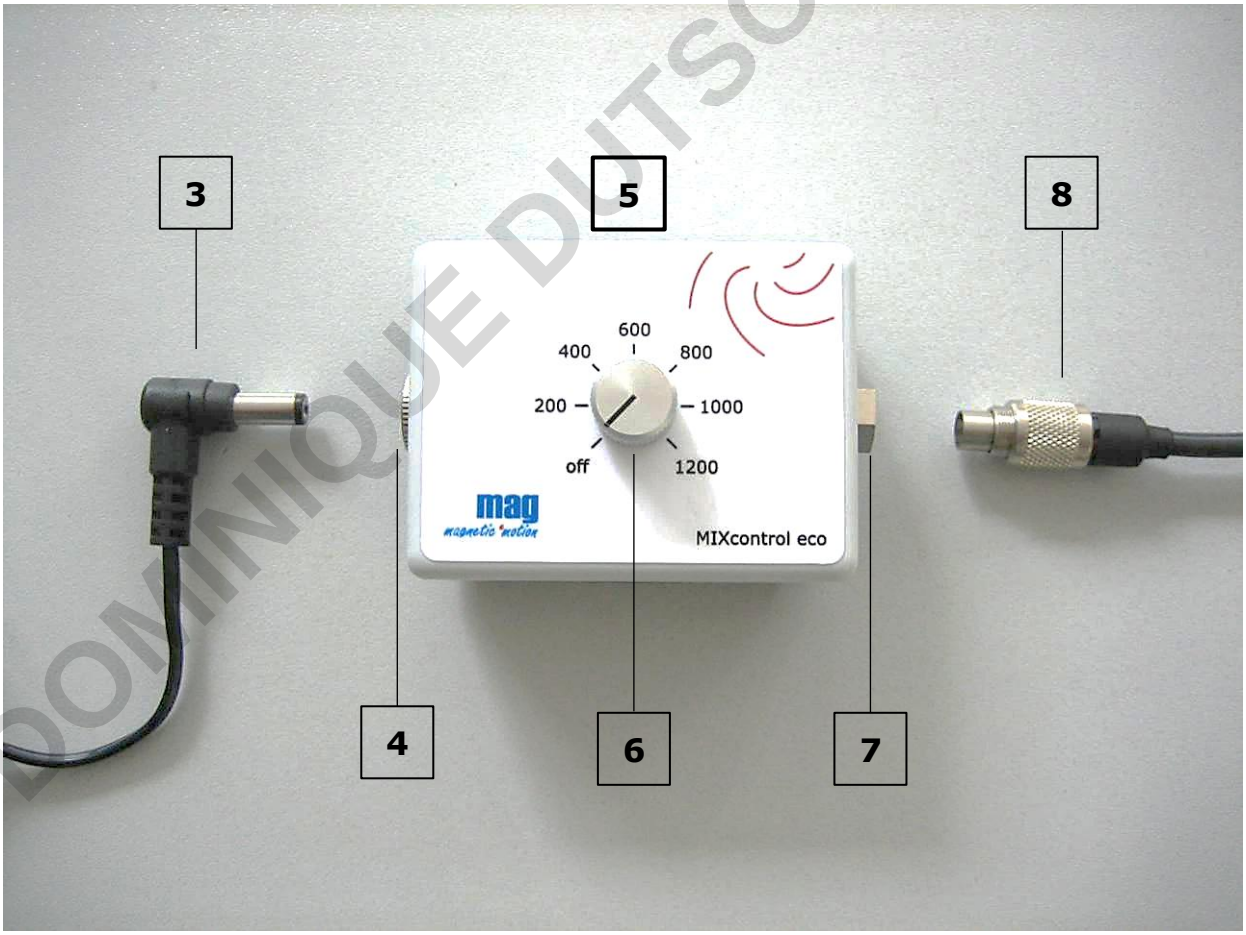


Image 3: Installation, close-up of control unit MIXcontrol eco

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3.3 Installation, connection to the control unit MIXcontrol 20

Step by step instruction (please also see image 4a)

- **Switch off the control unit MIXcontrol BEFORE you handle the connection cables with the power switch (5) and disconnect the power cable (4)!**
- The stirrer control cable (1) of the magnetic stirrer MIXdrive (7) has now to be connected to the 4-pin socket of the control unit (2). **Please secure this plug connection by turning the screw nut situated at the plug.** Only by this a trouble-free operation can be guaranteed.
- Connect the power cable (4) to the power input (3) rear-side and afterwards to the power socket.
- The control unit is now connected to the magnetic stirrer and ready for operation.



Image 4a: Installation, rear side of the control unit MIXcontrol 20

Description functional elements of control unit - backside

1 Connector of the stirrer control cable
2 Socket for the stirrer control cable
3 Power socket
4 Power cable
5 Power switch
6 Control unit 2mag – MIXcontrol 20
7 Stirring drive unit 2mag - MIXdrive

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3.4 Installation, connection to the control unit MIXcontrol 40

Step by step instruction (please also see image 4b)

- **Switch off the control unit MIXcontrol BEFORE you handle the connection cables with the power switch (5) and disconnect the power cable (4)!**
- The stirrer control cable (1) of the magnetic stirrer MIXdrive (7) has now to be connected to the 4-pin socket of the control unit (2). **Please secure this plug connection by turning the screw nut situated at the plug.** Only by this a trouble-free operation can be guaranteed.
- It can be connected directly **up to two stirring drives MIXdrive of the identical type**.
- Connect the power cable (4) to the power input (3) rear-side and afterwards to the power plug.
- The control unit is now connected to the magnetic stirrer and ready for operation.

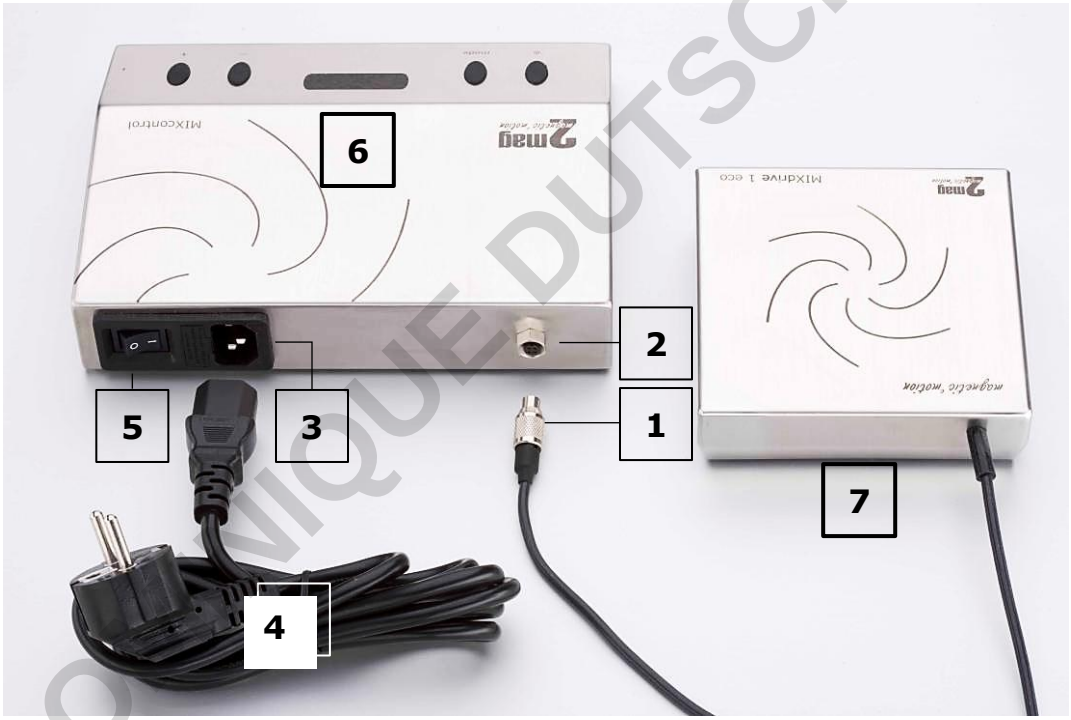


Image 4b: Installation, rear side of the control unit MIXcontrol 40

Description functional elements of control unit - backside

1 Connector of the stirrer control cable
2 Socket for the stirrer control cable
3 Power socket
4 Power cable
5 Power switch
6 Control unit 2mag - MIXcontrol 40
7 Stirring drive unit 2mag - MIXdrive

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4. Operating of the control units

4.1. Operating of the control unit MIXcontrol eco



Image 5: Functional elements, control unit MIXcontrol eco

4.1.1 Description functional elements MIXcontrol eco

5 Control unit 2mag - MIXcontrol eco
6 ON/OFF and SPEED-button

Operating of the magnetic stirrer

After the cables have been installed correctly according to **Installation, connection to the magnetic stirrer**, the magnetic stirring system **MIXdrive** will be ready for operation.

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4.1.2 Stirring operation and stirrer control MIXcontrol eco

Turning On
Turn the SPEED-button (6) clockwise. The magnetic stirrer will be turned on.

Turning Off
Turn the SPEED-button (6) counter-clockwise to the "OFF" sign until the left stop of the button. The magnetic stirrer will be turned off.

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.

Stirrer speed adjustment
The speed of the magnetic stirrer can be adjusted by turning of the speed button.
Choose a speed which allows the stirring bar to work reliable and safe.



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.

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4.2. Operating of the control unit MIXcontrol 20/40

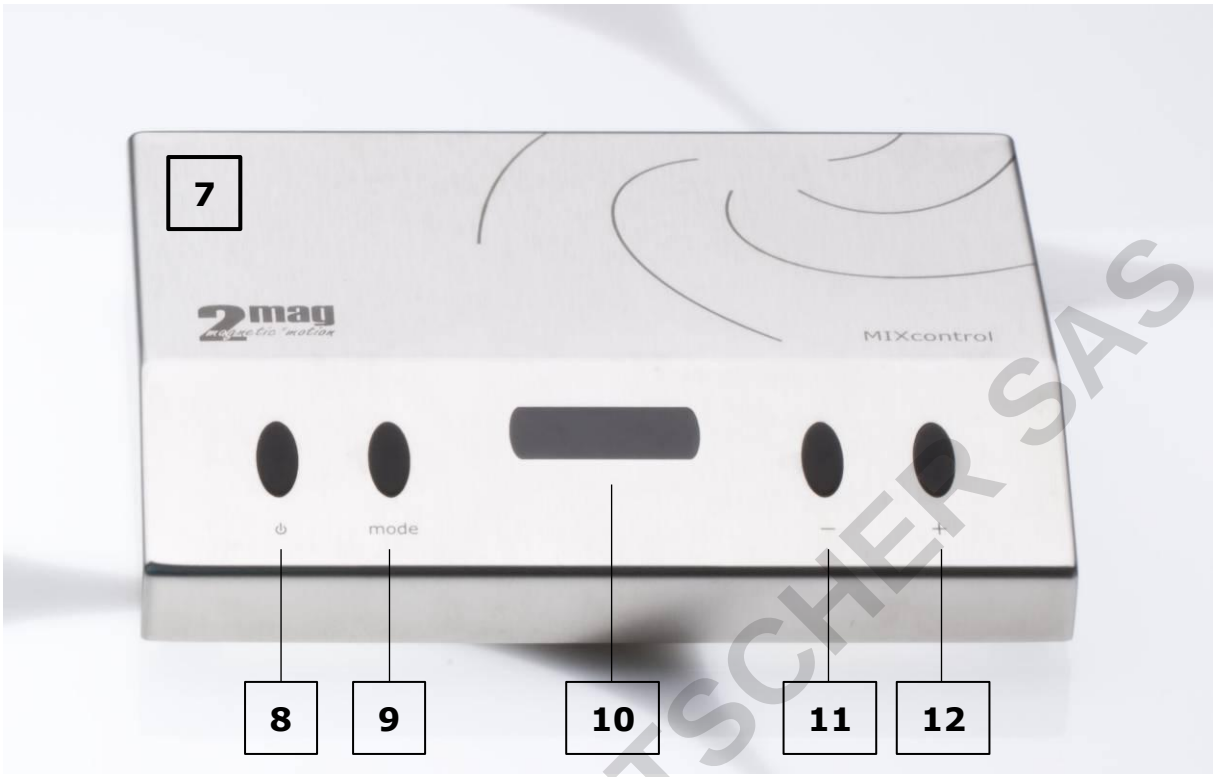


Image 6: Operating elements of control unit MIXcontrol 20 / 40

4.2.1 Description operating elements MIXcontrol 20/40

7 Control unit 2mag - MIXcontrol 20 / 40

Stirrer control

8 ON/OFF key for magnetic stirrer
9 MODE-key (M) for power adjustment of the magnetic stirrer
10 Display for speed indicator and power indicator
11 MINUS-key (-) for reduction of stirrer speed
12 PLUS-key (+) for increase of the stirrer speed

Operating of the control unit

After the cables have been installed correctly according to "**Installation, Connection to the control unit"**, the magnetic stirrer system MIXdrive will be ready for operation.

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4.2.2 Stirring operation and stirrer control MIXcontrol 20/40

Turning On and Off
Please turn on the power switch (5) at the rear side of the control unit MIXcontrol.
Please press the ON/OFF-key (8) once. The magnetic stirrer will be switched on by that. The current stirring speed will be shown in the display (10).
By pressing the ON/OFF-key (8) once more, the magnetic stirrer will be switched off again. The display indicator (10) expires.

AutoSave
Automatic saving of the last functional status after disconnection from the mains power supply or after a power failure. All parameters for speed and power are restored.

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 of a dot at the right segment of the LED-display (10).

Stirrer speed adjustment
The speed of the magnetic stirrer can be adjusted by pressing the MINUS- (11) resp. the PLUS-key (12).
The adjusted speed will be shown in the display (10) when the magnetic stirrer is switched on. The speed range can be adjusted between 100 and 1,600 rpm (MIXcontrol 20) or 100 and 2000 rpm (MIXcontrol 40) in steps by 10.
By constantly pressing the MINUS- resp. the PLUS-keys, an accelerated adjustment of the speed can be achieved.

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 (11) permanently and press shortly the ON/OFF-key (8) afterwards. The start speed "100" will be set.
Setting the Maximum Speed
Press the PLUS-key (12) permanently and press shortly the ON/OFF-key (8) afterwards. The maximum speed "2000" (MIXcontrol 20: "1600") will be set.

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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.

The stirring power can be adjusted in four steps by using the MODE-key (9). By pressing the MINUS-key (11) respectively the PLUS-key (12) just after pressing the MODE-key, the power can be adjusted in 4 steps (25/50/75/100%; MIXcontrol 20) or in 10 steps (10-100%; MIXcontrol 40). The current value is now shown on the display (10). The display (10) will turn back to the current speed indicator after approx. 5 seconds.
The power adjustment is finished again at the time the speed range is shown. The power adjustment can also be finished immediately by pressing the MODE-key (9) again.

Display, Magnetic Stirrer
The display (10) provides as described above a description of:

- Current stirring speed (always with switched on magnetic stirrer)
- Set power (after pressing the MODE-key (9))
- To check, whether the magnetic stirrer is switched on. The display will not be illuminated in case the stirrer is switched off.



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.

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4.3 Interface (analog) – 0-10 volts

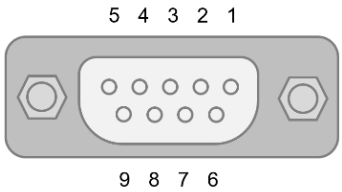
The control units MIXcontrol eco (as well as OEM-circuit versions) are available with an analog 0-10V interface.
The speed and the ON-OFF function can be controlled via this interface.
A special housing for a fast and easy installation on cap rails e.g. in control boxes is available, too.

4.3.1 Pin-assignment 0-10 V interface, SUB-D socket

The circuit version of the control unit with 0-10 volts interface is in the most cases a custom-made version. Therefore, please ask ALWAYS before installation and using for the valid pin assignment.

Support: info@2mag.de

SUB-D socket on the control unit:



Pin 5: Ground
Pin 9: 0-10 V Signal

or
free wired cables (depending on version)

or
socket on request

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4.3.2 Connections MIXcontrol eco DINrail 0-10 V

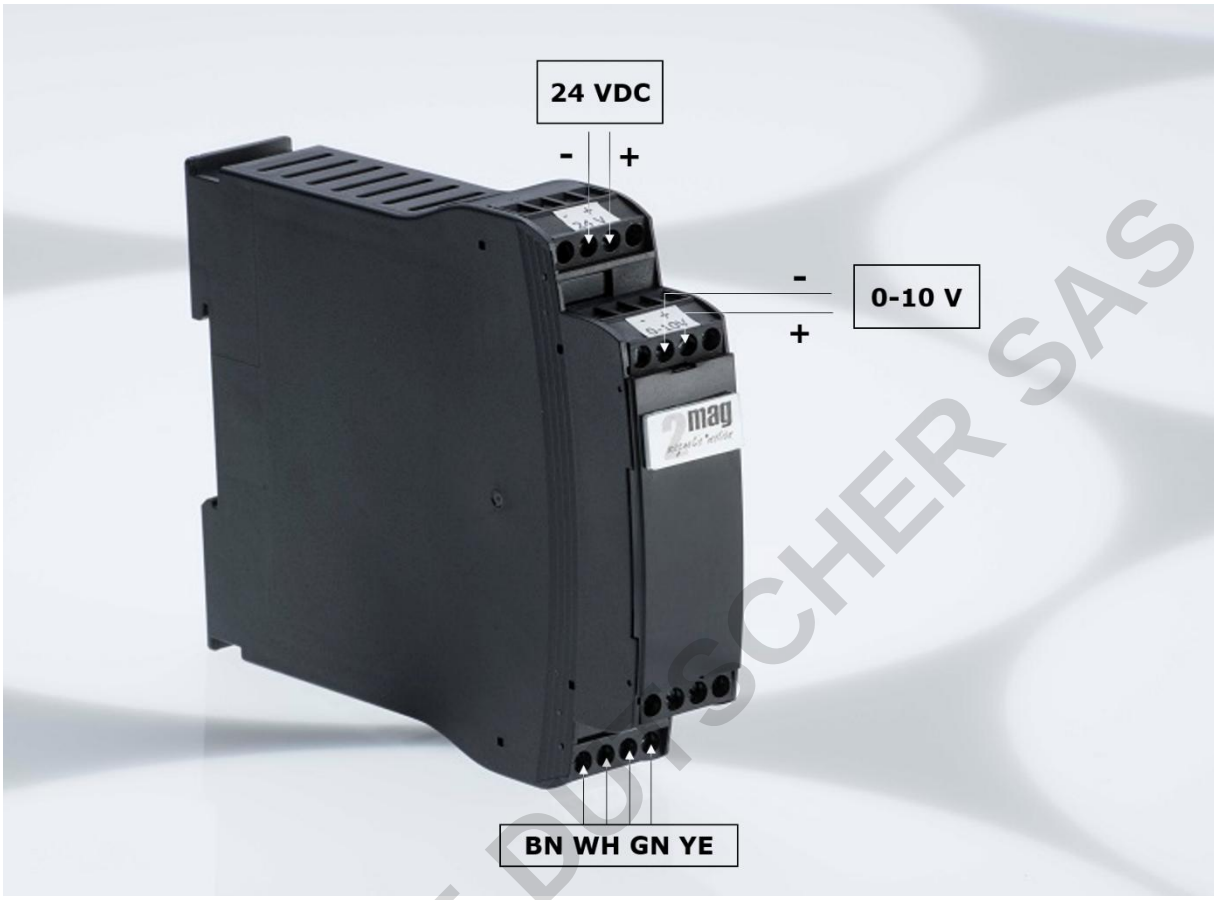


Image 7: Connections of MIXcontrol eco DINrail 0-10 volts

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4.3.3 Connections MIXcontrol 20/40 DINrail 0-10 volts

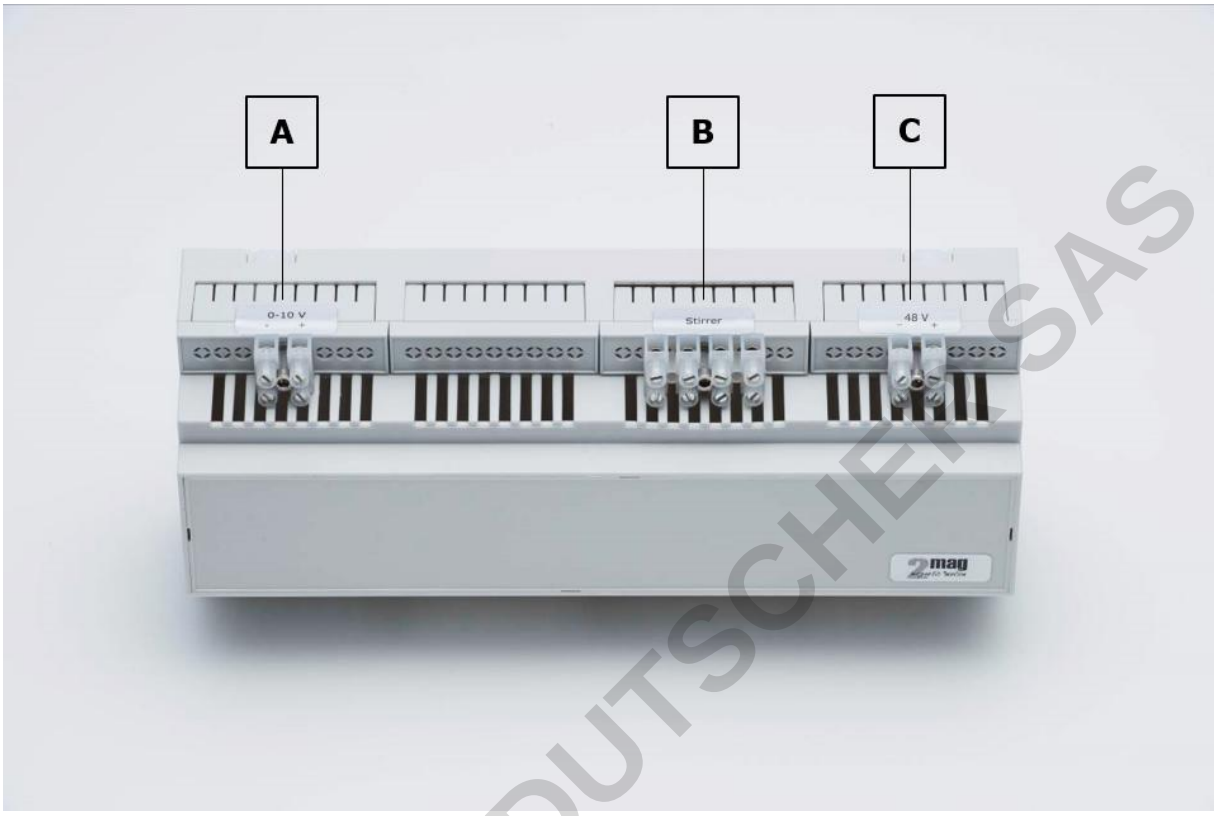


Image 8: Connections of MIXcontrol 20/40 DINrail 0-10 V

Description functional elements of MIXcontrol 20/40 DINrail

A 0-10 V interface (screw terminal)
B Connection of the stirrer control cable (1x for MIXcontrol 20, 2x for MIXcontrol 40) (screw terminal)
C Power input 48 VDC (screw terminal)

All connections (A-C) can be made as a screw terminal or socket.

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4.3.4 Technical data 0-10 volts interface

MIXcontrol eco

Supply voltage:	24V
Stirring power:	10 watts, not adjustable
Speed range:	120–1200 rpm

Control voltage / rpm correlation: linear

OFF	< 0,25V (ca. 0,03V hysteresis)
120 rpm	0,25V – 0,28V
1200 rpm	> 9,4V

MIXcontrol 20

Supply voltage:	48V
Stirring power:	20 watts, not adjustable
Speed range:	100–1600 rpm

Control voltage / rpm correlation: linear

OFF	< 0,25V (ca. 0,03V hysteresis)
100 rpm	0,25V – 0,28V
1600 rpm	> 9,4V

MIXcontrol 40

Supply voltage:	48V
Stirring power:	20 watts, not adjustable
Speed range:	100–2000 rpm

Control voltage / rpm correlation: linear

OFF	< 0,25V (ca. 0,03V hysteresis)
100 rpm	0,25V – 0,28V
2000 rpm	> 9,4V

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4.4 Interface (analog) – 4-20 mA

The control units MIXcontrol eco (as well as OEM-circuit versions) are available with an analog 4-20 mA interface.
The speed and the ON-OFF function can be controlled via this interface.
A special housing for a fast and easy installation on cap rails e.g. in control boxes is available, too.

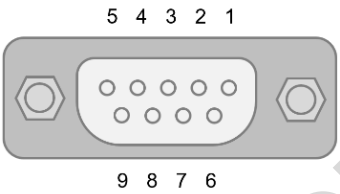
Please note: It is not possible to operate the control units using buttons!

4.4.1 Pin-assignment 4-20 mA interface, SUB-D socket

The circuit version of the control unit with 4-20 mA interface is in the most cases a custom-made version. Therefore, please ask ALWAYS before installation and using for the valid pin assignment.

Support: info@2mag.de

SUB-D socket on the control unit:



PIN-assignment INPUT:
Pin 5: Ground | Pin 9: 4-20 mA signal

PIN-assignment OUTPUT:
Pin 5: Ground | Pin 9: 4-20 mA signal

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4.4.2 Connections MIXcontrol eco DINrail 4-20 mA

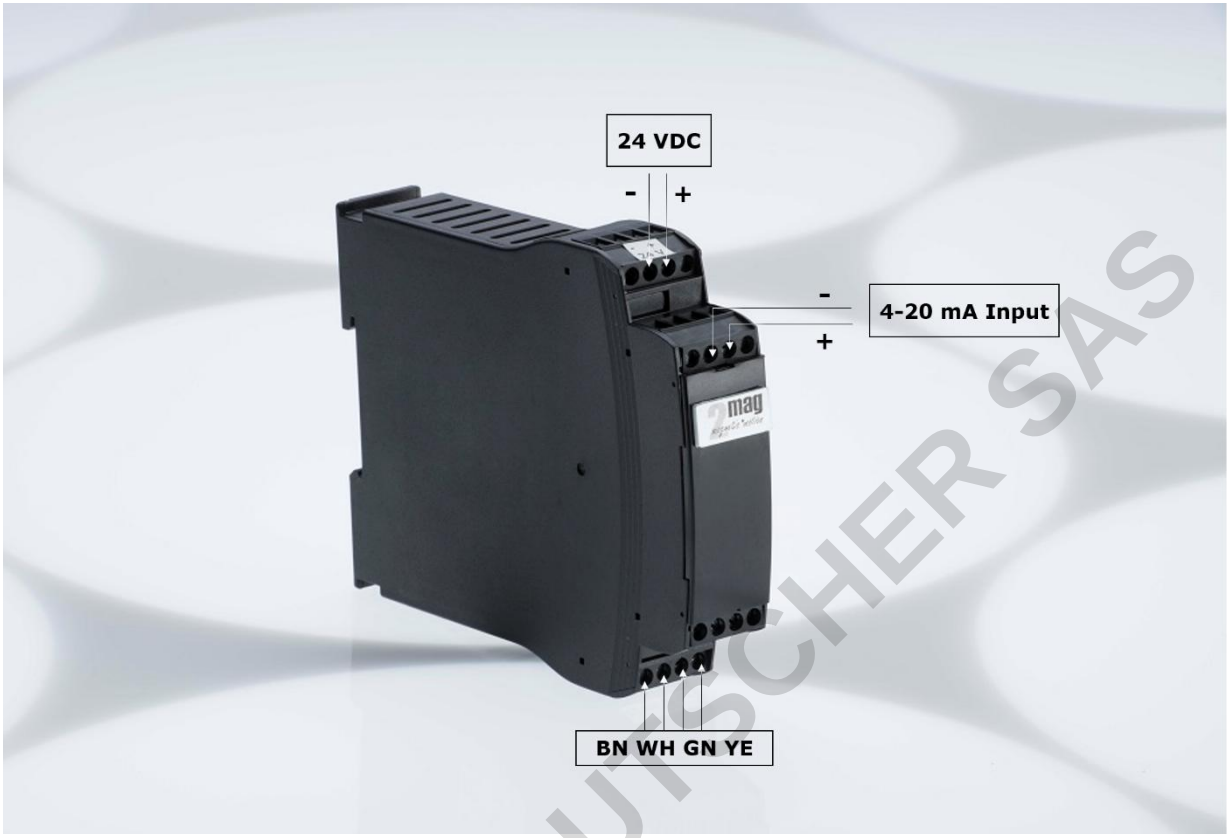


Image 9: Connections of MIXcontrol eco DINrail 4-20 mA

Please note: The MIXcontrol eco DINrail is only available with 4-20 mA input. A 4-20 mA output interface is unfortunately not possible due to the small size.

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4.4.3 Connections MIXcontrol 20/40 DINrail 4-20 mA

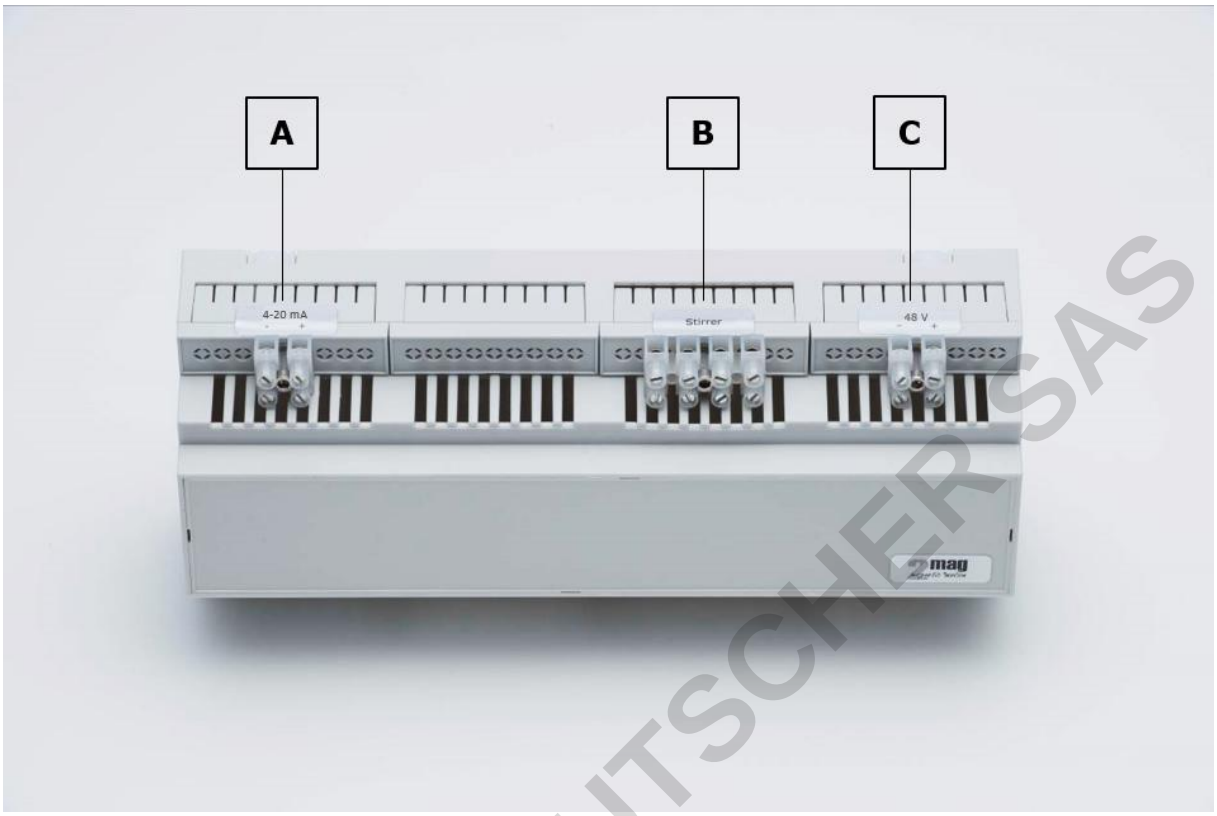


Image 10: Connections of MIXcontrol 20/40 DINrail 4-20 mA

Description functional elements of MIXcontrol 20/40 DINrail

A 4-20 mA interface (screw terminal)
B Connection of the stirrer control cable (1x for MIXcontrol 20, 2x for MIXcontrol 40) (screw terminal)
C Power input 48 VDC (screw terminal)

Please note: All connections (A-C) can be made as a luster terminal or socket.

Please note: The control values can be customized.

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4.5 PC-Interface – RS232

The control units MIXcontrol 20 RS232 (order no. 90210), MIXcontrol 20 DINrail RS232 (order no. 90221), MIXcontrol 40 RS232 (order no. 90410) and MIXcontrol 40 DINrail RS232 (order no. 90421) include an interface RS232 for external control by e.g. PC.

4.5.1 Pin-assignment RS232 interface, SUB-D connector

Pin assignment of the RS232 interface:

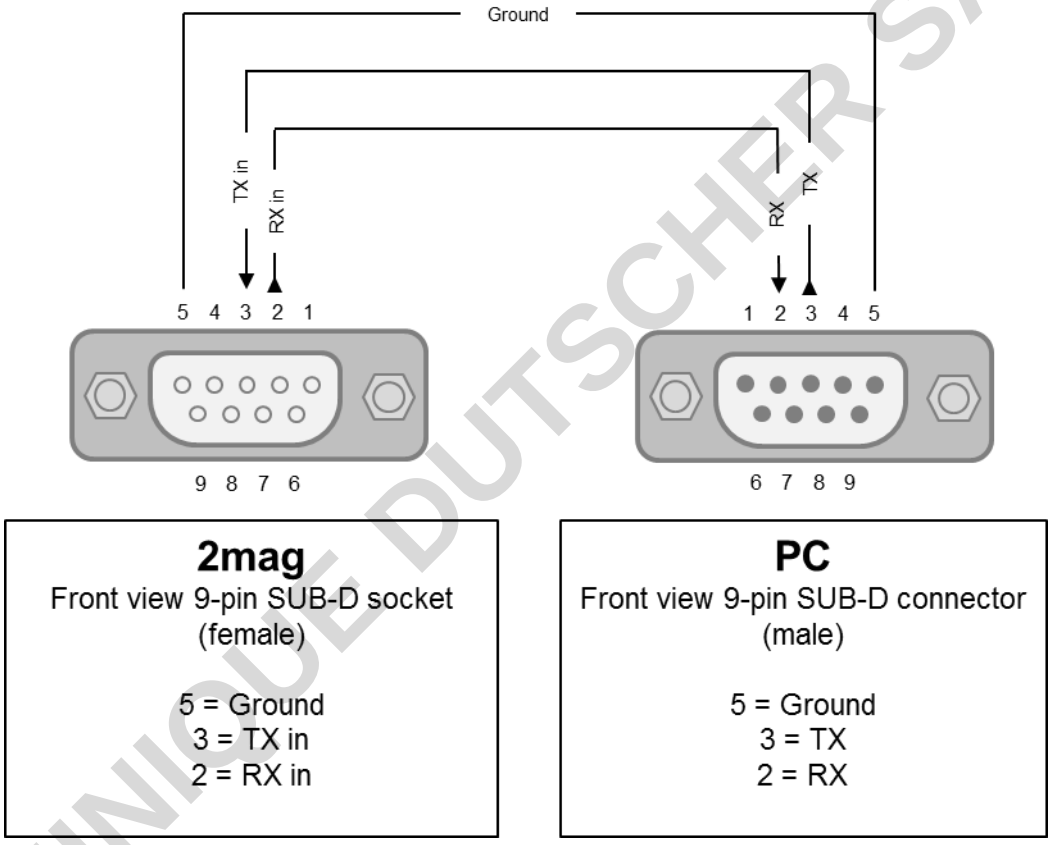


Image 11: Pin-assignment RS232 interface

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4.5.2 Connections MIXcontrol eco DINrail RS232

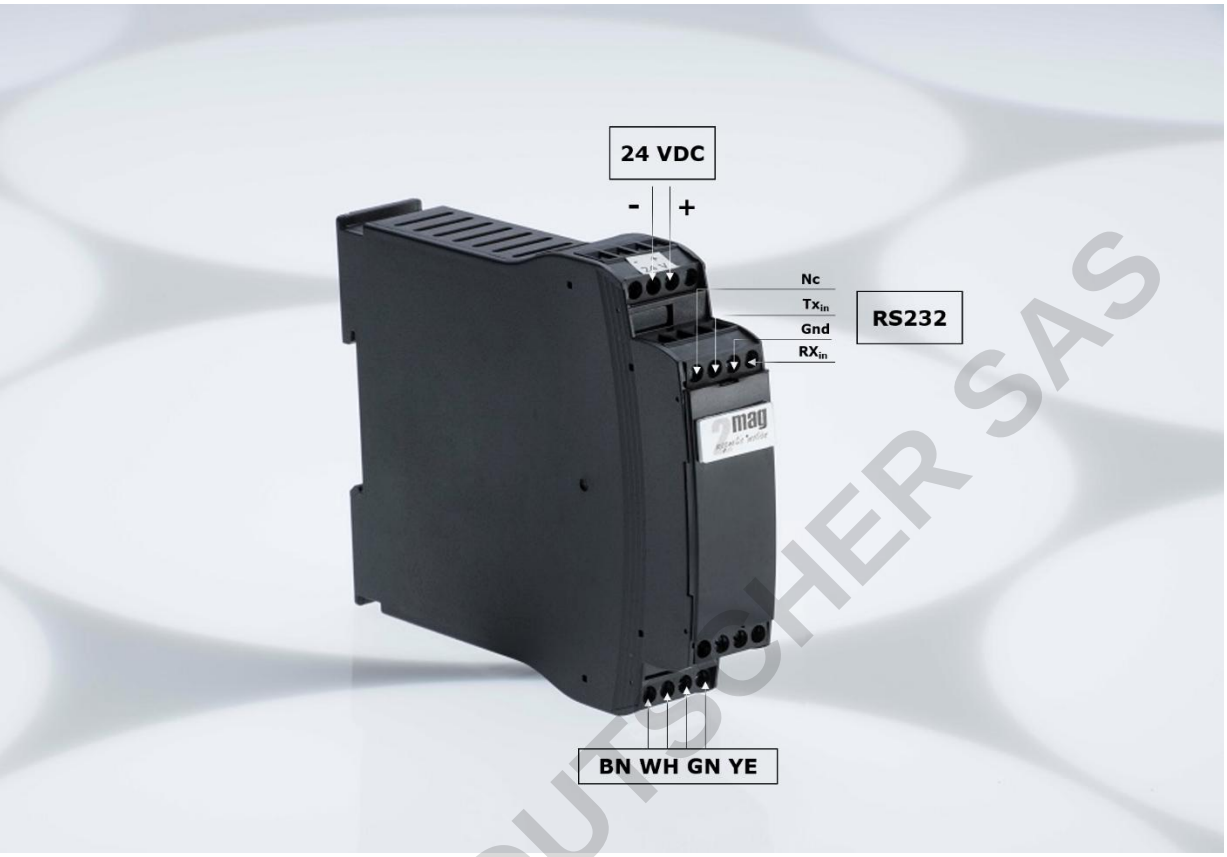


Image 12: Connections of MIXcontrol eco DINrail RS232

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4.5.3 RS232 Commands – MIXcontrol eco DINrail

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

Listing of commands and feedbacks (with comments):

No.	Command	Feedback	Comment
1	start/(_A)	OK_START_A	
2	stop/(_A)	OK_STOP_A	
3	setrpm_*RPM*/(_A)	OK_*RPM*RPM_A	*RPM*: 3 or 4 digits, e.g. 120 or 1200, (3 digits optional with leading zero e.g. 0120)
4	sendrpm/(_A)	OK_*RPM*RPM_A	*RPM*: 4 digits, values with only 3 digits with leading zero e.g. 0120 or 1200

Table 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.

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4.5.4 Connections MIXcontrol 20/40 DINrail RS232

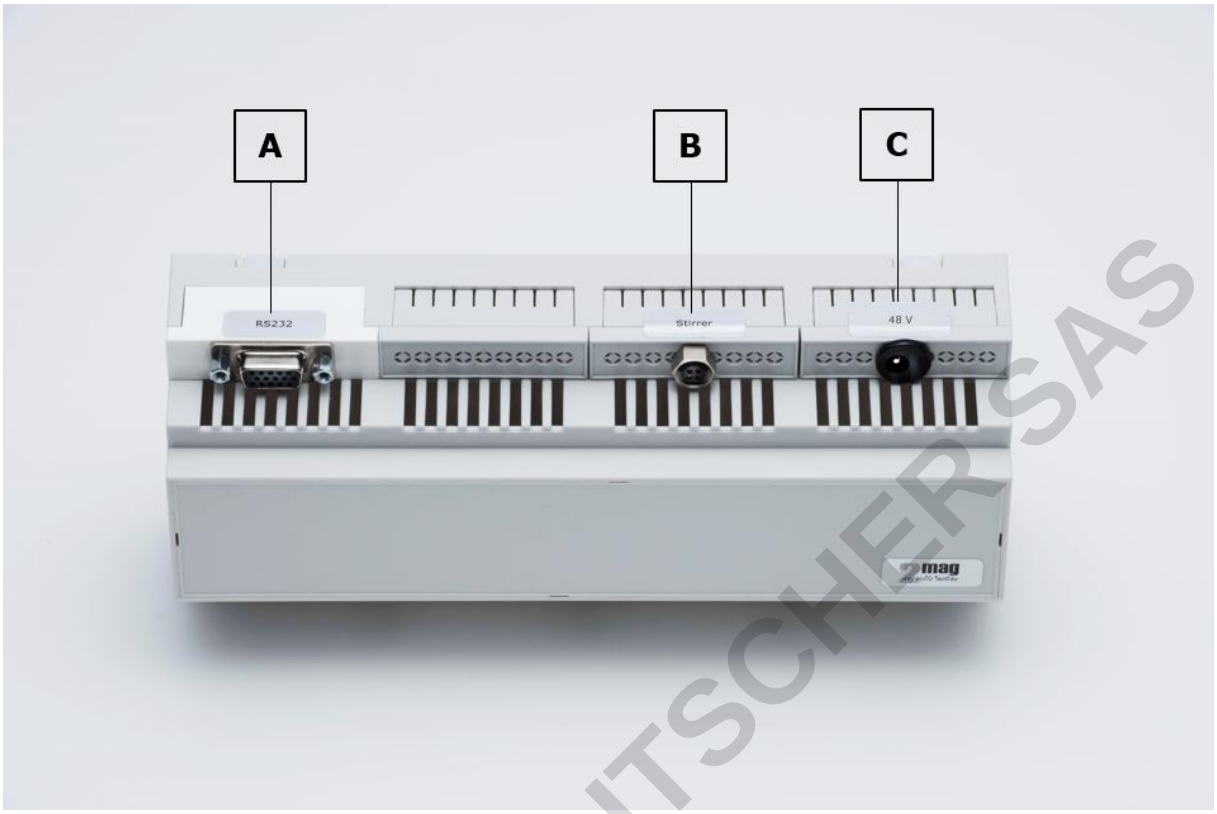


Image 13: Connections of MIXcontrol 20/40 DINrail RS232

Description functional elements of MIXcontrol 20/40 DINrail

A RS232 interface
B Socket for the stirrer control cable (1x for MIXcontrol 20, 2x for MIXcontrol 40)
C Power socket 48 VDC

All connections (A-C) can be made as a luster terminal or socket.

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4.5.5 RS232 Commands - MIXcontrol 20/40

The RS232-commands are ASCII coded and can be sent to the **MIXcontrol 20/40** with e.g. the program HyperTerminal which is coming with the Windows operation system.

Listing of commands and feedbacks (with comments):

No.	Command	Feedback	Comment
1	start/(_A)	OK_START_A	
2	stop/(_A)	OK_STOP_A	
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*: 3 or 4 digits, e.g. 100 or 2000, (3 digits (optional with leading zero e.g. 0100, depends on the set value)
5	setpower_*POW*/(_A)	OK_POWER*POW*_A	*POW*: 2 or 3 digits, e.g. 50 or 100, without leading zero
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 and 50% power
9	sendstatus/(_A)	OK_VXXXX_REM_A	1. ER or OK 2. SW versions no. 3. REM/MAN/OFF (remote/manual/offline) 4. Address

Table 3: 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.

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4.5.6 Format – Command – Feedback

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

There are 4 kinds of addressing:
1. Without any address, addressing one unit, feedback- see table 2
2. Basic address with letter A to Y: _C, only one unit, feedback - see table 2
3. Range address with letter A to Y: _AK, only one unit, feedback- see table 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)

4.5.7 Hints to Parameter Operation

The control unit 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.

The manual parameters can be changed 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!

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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).

4.5.8 Control of more than one unit

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”.

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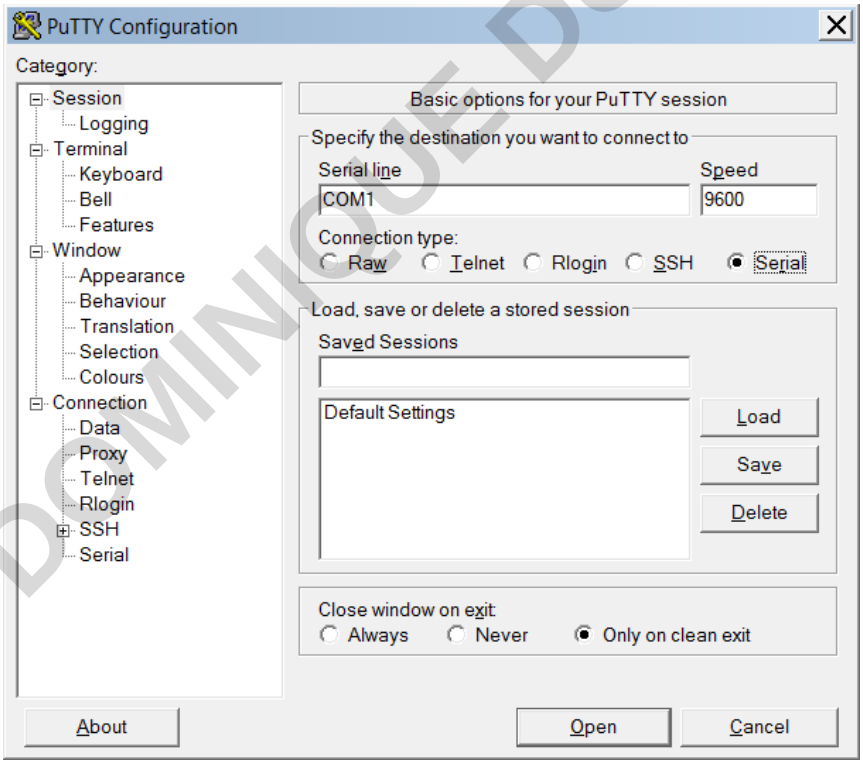
4.5.9 Control with PuTTY

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

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

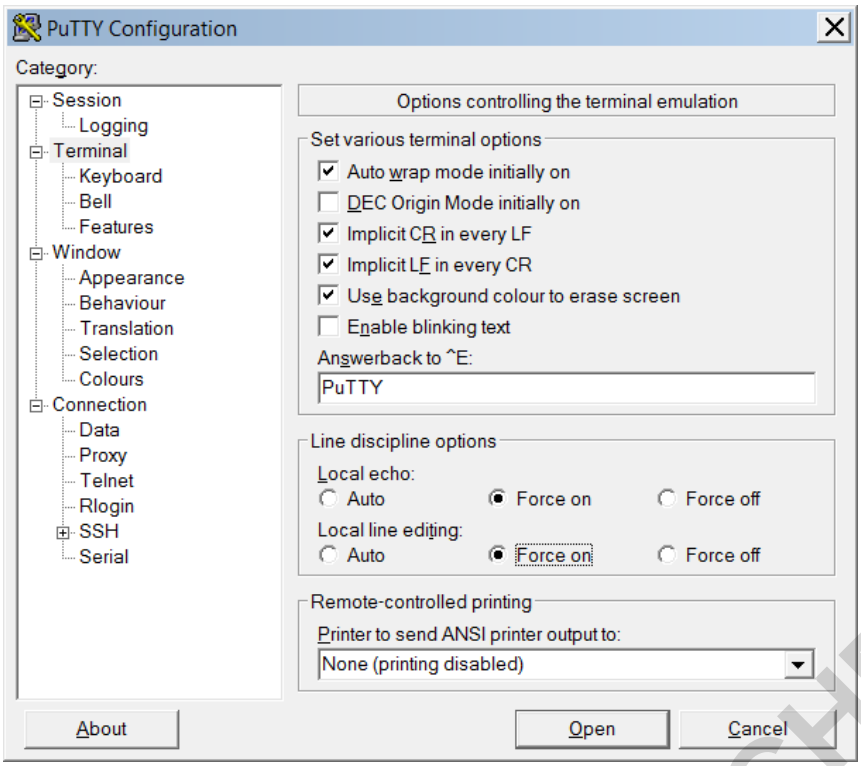
Category: "Terminal" →
Implicit CR in every LF
Implicit LF in every CR
Local echo: Force on
Local line editing: Force on

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

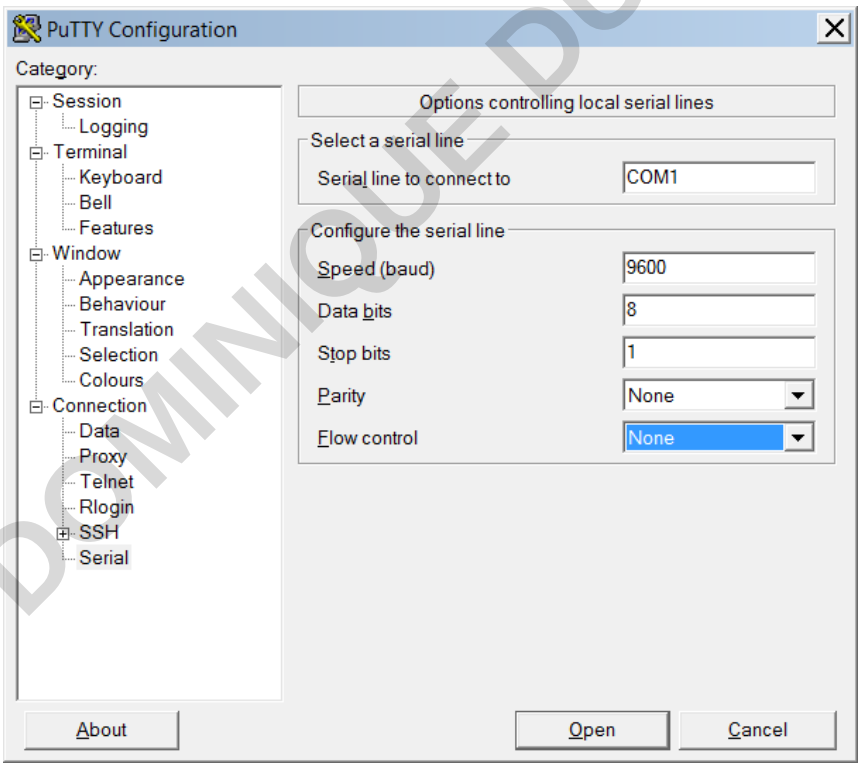


Screenshot 1:
Category: "Session" | Serial line: COM? | Speed: 9600 | Connection type: Serial

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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

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4.6 Combinations Stirring Drives – Control Units

All stirring drives **MIXdrive** are, with regard to the inner life, technically identical. The control units **MIXcontrol** define thereby the performance of the stirrers and the operation comfort.

Please note following restrictions regarding the combination possibilities, which are depending on the size of the stirring drive:

	Stirring Drive	**Control Unit**
MIXdrive (basic) up to +50 °C (in air and submersed)	MIXdrive 60 MIXdrive 15 MIXdrive 6	MIXcontrol 40 MIXcontrol 20 MIXcontrol eco
	MIXdrive 1	MIXcontrol 20 MIXcontrol eco
	MIXdrive 1 eco MIXdrive 1 XS cuvetteMIXdrive	MIXcontrol eco
MIXdrive (HT) (HT = High Temperature) up to +200 °C (in air) up to +95 °C (submersed)	MIXdrive 60 HT MIXdrive 15 HT MIXdrive 6 HT	MIXcontrol 40 MIXcontrol 20 MIXcontrol eco
	MIXdrive 1 HT	MIXcontrol 20 MIXcontrol eco
	MIXdrive 1 eco HT MIXdrive 1 XS HT	MIXcontrol eco

Table 4: Combinations of stirring drives **MIXdrive** with control units **MIXcontrol**



Forbidden stirring drive-control unit combinations (please see table 4) can cause thermal overload and permanent damage of the stirring drives!



Depending on the installation situation, the MIXdrive 1 XS (HT) drives can become hotter than 60°C. DANGER OF BURNING!

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5. External heating operation in incubators and water baths

5.1 External heating

The magnetic stirring drives of the MIXdrive series have been developed for operation in incubators and water baths.

Please always observe the following warnings for safe operation!



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



Do never use any pressure-tight closed vessels
RISK OF BURSTING!



Please use only temperature-resistant vessels
Beware of plastic vessels!



Danger when handling glass vessels
DANGER OF BREAKING!

5.2 Bath fluids

If you use water as the bath fluid, we recommended a water mixture of 70 % soft/decalcified water and 30 % tap water.

Please note the information given on the water quality:

- Hard water is not suitable for temperature control tasks due to its high lime content and will produce lime deposits.
- Ferrous water can cause corrosion, even on stainless steel.
- Chloric water can cause pitting corrosion.
- Distilled and deionized water is not suitable. Its specific properties cause corrosion on the stainless-steel housing of the stirring drive.

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The following must be observed when using other bath fluids: The basic version of the MIXdrive stirring drives is sealed with polyurethane, the high-temperature version with silicone.
Tempering agents used must not attack these sealing materials. Please always check the material resistance before immersing in a bath fluid.



Never immerse the HT version of the stirring drives in silicone oils!



Always check the resistance of the sealing materials with regard to the temperature control agents / bath fluids used.

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5.3 Stainless Steel Bath mixBATH

The articles **mixBATH** (order no.: 40950) and **mixBATH PC** (order no.: 40850) are available as accessories.
Both baths are suitable for the **MIXdrive 6/15/60** stirring drives, very durable, stable and suitable for immersion circulators (heating/cooling).
The mixBATH PC can be used up to +50°C and is ideal in combination with the basic versions of the MIXdrive 6/15/60 stirring drives.
The mixBATH stainless steel bath is the right choice for higher temperatures.
The high-temperature versions of the MIXdrive 6 HT/15 HT/60 HT stirrer drives can be operated submerged up to 95°C.



Image 17: stainless steel bath mixBATH



Image 18: polycarbonate bath mixBATH PC

For operation temperatures higher than the allowed operation temperatures (up to +95°C submersed - HT-Version) the stirring drive has to be placed below the mixBATH. The construction allows a perfect positioning of the stirrer below the bath and stirring centre marks inside the bath help to find the right stirring positions.



Attention: The maximum allowed operation temperatures must be noted during using the stirrer below the bath too!

The integrated left-/right body stop is optimized for exact thermostat positioning (pump flow) with using MIXdrive 6 resp. MIXdrive 15.

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6. Maximum operation temperatures



Incubator operation
Please note the **maximum operation temperature +50 °C** in air for the standard versions

and

+200°C for the high temperature versions (HT).
Operation in higher ambient temperatures can damage the stirring drive.



Water bath operation:
Please note the **maximum operation temperature +50 °C** in water immersed for the standard versions

and

+95°C for the high temperature versions (HT) in water immersed.
Operation in higher ambient temperatures can damage the stirring drive.

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7. Accessories

7.1 Distributor distriBOX 4 / distriBOX 8

With help of the accessory item **distriBOX 4/8** can be connected several stirring drives with only one control unit.
Therefore e.g. 4x MIXdrive 1 XS can be operated synchronous with the control unit MIXcontrol 40.

Please note that the stirring power will be divided by the connected number of stirring drives.

The stirring drives MIXdrive have to be connected in pairs only!
In the not allowed cases that only 1/3/5/7 stirring drives are connected the control unit will be destroyed immediately.



Image 14: Distributor distriBOX 4/8

The accessory item distriBOX is available as 4-fold (**distriBOX 4**, order no. 49004) and 8-fold distributor (**distriBOX 8**, order no. 49008).

The stirring drives MIXdrive have to be connected with the distriBOX in pairs only!

In the not allowed cases that only 1/3/5/7 stirring drives are connected the control unit will be destroyed immediately.

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7.2 Extension Cord for MIXdrive

With the accessory **Extension Cord for MIXdrive series** (order no. 46100) the control wire of the stirrer can be extended by 3m.



Image 15: Extension cord for MIXdrive, length 3m

Other lengths on request!

7.3 Stirring bars ASTEROID

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



Image 16: ASTEROID family

Depending on the vessel size, we recommend:

ASTEROID 25 (Order no. 44025)
for MIXdrive 1 XS (HT), MIXdrive 1 eco (HT), MIXdrive 15 (HT).

ASTEROID 40 (Order no. 44040)
for MIXdrive 1 (HT), MIXdrive 6 (HT).

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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.



The control unit 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 and pull out the power cable afterwards.

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.

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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 grant 3 years warranty on all material and manufacturing defects.

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E Errors

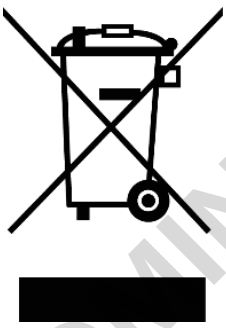
The magnetic stirring bar is turning in an unbalanced way:
There is no denying that magnetic stirring bars are aging in the course of time. This may happen by e.g. sterilizing, usage at high temperatures or causing stress (dropping down). The magnetism can be decreased by this.
Separate out this stirring 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.

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.

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G Technical details
Stirring drives – Basic-version

Stirring drive cuvetteMIXdrive 1 / MIXdrive 1 XS

	cuvetteMIXdrive 1	**MIXdrive 1 XS**
Order no.	40400	40300
Stirring points	1	1
Stirring volume/point	up to 25 ml	1,000 ml
Stirring power (max.)	MIXcontrol only (< 10 W)	
Material housing	stainless-steel	
Material sealing	PUR	
Permitted operation conditions (air)	-10 up to +50 °C (at 100% humidity)	
Permitted operation conditions (water)	+50 °C in water immersed	
Measurement (WxDxH)	12.5 x 12.5 x 6 mm	48 x 48 x 18 mm
Weight (gross)	approx. 0.14 kg	approx. 0.36 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa	
Protection category	IP68	

Stirring drive MIXdrive 1 eco / 1

	MIXdrive 1 eco	**MIXdrive 1**
Order no.	40101	40001
Stirring points	1	1
Stirring volume/point	3,000 ml	10,000 ml
Stirring power (max.)	MIXcontrol only (< 10 W)	MIXcontrol only (< 20 W)
Material housing	stainless-steel	
Material sealing	PUR	
Permitted operation conditions (air)	-10 up to +50 °C (at 100% humidity)	
Permitted operation conditions (water)	+50 °C in water immersed	
Measurement (WxDxH)	120 x 120 x 35 mm	180 x 180 x 38 mm
Weight (gross)	approx. 1.6 kg	approx. 3.5 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa	
Protection category	IP68	

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Stirring drives MIXdrive 6 / 15 / 60

	MIXdrive 6	MIXdrive 15	MIXdrive 60
Order no.	40006	40015	40060
Stirring points	6	15	60
Stirring point distance	130 mm	65 mm	32,5 mm
Stirring volume/point	3,000 ml	3,000 ml	500 ml
Stirring power (max.)	MIXcontrol only (< 40 W)		
Material housing	stainless-steel		
Material sealing	PUR		
Permitted operation conditions (air)	-10 up to +50 °C (at 100% humidity)		
Permitted operation conditions (water)	+50 °C in water immersed		
Measurement (WxDxH)	245 x 375 x 38 mm		
Weight (gross)	approx. 9.4 kg	approx. 9.5 kg	approx. 8.9 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa		
Protection category	IP68		

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Stirring drives – High temperature (HT)-version

Stirring drive MIXdrive 1 XS

	MIXdrive 1 XS HT
Order no.	40303
Stirring points	1
Stirring volume/point	1.000 ml
Stirring power (max.)	MIXcontrol only (< 10 W)
Material housing	stainless-steel
Material sealing	silicone
Permitted operation conditions (air)	-30 up to +200 °C (at 100% humidity)
Permitted operation conditions (water)	+95 °C in water immersed
Measurement (WxDxH)	48 x 48 x 18 mm
Weight (gross)	approx. 0.35 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500- 1060 hPa
Protection category	IP68

Stirring drive MIXdrive 1 eco HT / 1 HT

	MIXdrive 1 eco HT	**MIXdrive 1 HT**
Order no.	40301	40201
Stirring points	1	1
Stirring volume/point	3,000 ml	10,000 ml
Stirring power (max.)	MIXcontrol only (< 10 W)	MIXcontrol only (< 20 W)
Material housing	stainless-steel	
Material sealing	silicone	
Permitted operation conditions (air)	-30 up to +200 °C (at 100% humidity)	
Permitted operation conditions (water)	+95 °C in water immersed	
Measurement (WxDxH)	120 x 120 x 35 mm	180 x 180 x 38 mm
Weight (gross)	approx. 1.5 kg	approx. 3.3 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa	
Protection category	IP68	

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Stirring drive MIXdrive 6 HT / 15 HT / 60 HT

	MIXdrive 6 HT	MIXdrive 15 HT	MIXdrive 60 HT
Order no.	40206	40215	40260
Stirring points	6	15	60
Stirring point distance	130 mm	65 mm	32,5 mm
Stirring volume/point	3,000 ml	3,000 ml	500 ml
Stirring power (max.)	MIXcontrol only (< 40 W)		
Material housing	stainless-steel		
Material sealing	PUR		
Permitted operation conditions (air)	-10 up to +200 °C (at 100% humidity)		
Permitted operation conditions (water)	+95 °C in water immersed		
Measurement (WxDxH)	245 x 375 x 38 mm		
Weight (gross)	approx. 9.0 kg	approx. 9.1 kg	approx. 8.4 kg
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa		
Protection category	IP68		

Stirring drives MIXdrive OEM / OEM HT

The technical data of OEM version are depending on the individual specs.

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Control units

Control unit MIXcontrol eco

	MIXcontrol eco
Order no.	90100
Speed range	120 – 1,200 rpm
Stirring power	10 watts
Stirring power steps	-
Housing material	Platics molding
Measurements (WxDxH)	65 x 50 x 45 mm
Weight (gross)	approx. 0.5 kg
Permitted operation conditions	0 up to +40 °C (at 80% humidity)
Electrical data	24 VDC / 0.4 A
Permitted storage conditions	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa
Protection category	IP20
Pollution degree rating	PD2

Control unit MIXcontrol eco DINrail with potentiometer, 0-10 V or RS232

	MIXcontrol eco DINrail mit Poti	MIXcontrol eco DINrail 0-10V	MIXcontrol eco DINrail RS232
Order no.	90140	90150	90160
Speed range	120 – 1,200 rpm		
Stirring power	10 watts		
Stirring power steps	-		
Housing material	Platics molding		
Measurements (WxDxH)	24 x 100 x 120 mm		
Weight (gross)	approx. 0.25 kg		
Permitted operation conditions	0 up to +40 °C (at 80% humidity)		
Electrical data	24 VDC / 0.4 A		
Permitted storage conditions.	-40 °C up to +70 °C, 10-95 %, 500-1060 hPa		
Protection category	IP20		
Pollution degree rating	PD2		

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Control unit MIXcontrol 20 / 40

	MIXcontrol 20	MIXcontrol 40
Order no.	90200	90400
Order no. with RS232 interface	90210	90410
Speed range	100 – 1,600 rpm	100 – 2,000 rpm
Stirring power	20 watts	40 watts
Stirring power steps	4-steps (25/50/75/100%)	10-steps (10-100%)
Housing material	stainless-steel	
Measurements (WxDxH)	200 x 155 x 380 mm	
Weight (gross)	approx. 1.9 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	IP 20	
Electrical data	100-240 V / 50-60 Hz / 1.5 A	
Pollution degree rating	PD2	

Control unit MIXcontrol 20 / 40 DINrail

	MIXcontrol 20	MIXcontrol 40
Order no.	on request	on request
Order no. with RS232 interface	on request	on request
Speed range	100 – 1,600 rpm	100 – 2,000 rpm
Stirring power	20 watts	40 watts
Stirring power steps	-	
Electrical data	48 VDC / 1.5 A	
Housing material	plastic	
Measurements (WxDxH)	210 x 90 x 58 mm	
Weight (gross)	approx. 0.75 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	48 VDC / 1.5 A	
Pollution degree rating	PD2	

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Accessories

Accessory distriBOX 4 / 8

	distriBOX 4	distriBOX 8
Order no.	49004	49008
Connection sockets	4	8
Material housing	stainless-steel	
Material sealing	PUR	
Measurements (BxTxH)	48 x 48 x 25 mm	48 x 92 x 25 mm
Weight (gross)	ca. 0.18 kg	ca. 0.27
Permitted operation	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	

Accessory mixBATH / mixBATH PC

	mixBATH	mixBATH PC
Order no.	40950	40850
Material housing	Stainless steel	Polycarbonate
Measurement (BxTxH)	277 x 537 x 175 mm	280 x 540 x 178 mm
Measurement (BxTxH)	318 x 600 x 190 mm	300 x 560 x 198 mm
Weight (gross)	approx. 8.0 kg	approx. 8.3 kg

Accessory Extension Cord for MIXdrive

	Extension Cord MIXdrive
Order no.	46100
Material	silicone cover, wires PTFE-covered
Length	3 m
Weight (gross)	approx. 0.15 kg

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

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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

cuvetteMIXdrive 1 / MIXdrive 1 XS / 1 eco / 1 / 6 / 15 / 60 / OEM
MIXdrive 1 XS HT / 1 eco HT / 1 HT / 6 HT / 15 HT / 60 HT / OEM HT

incl.
MIXcontrol eco / 20 / 40 / OEM

Optional accessories
distriBOX 4 / 8 / extension cords

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 61010-2-51

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