IKA

designed for scientists

I-MAG

ENGLISH

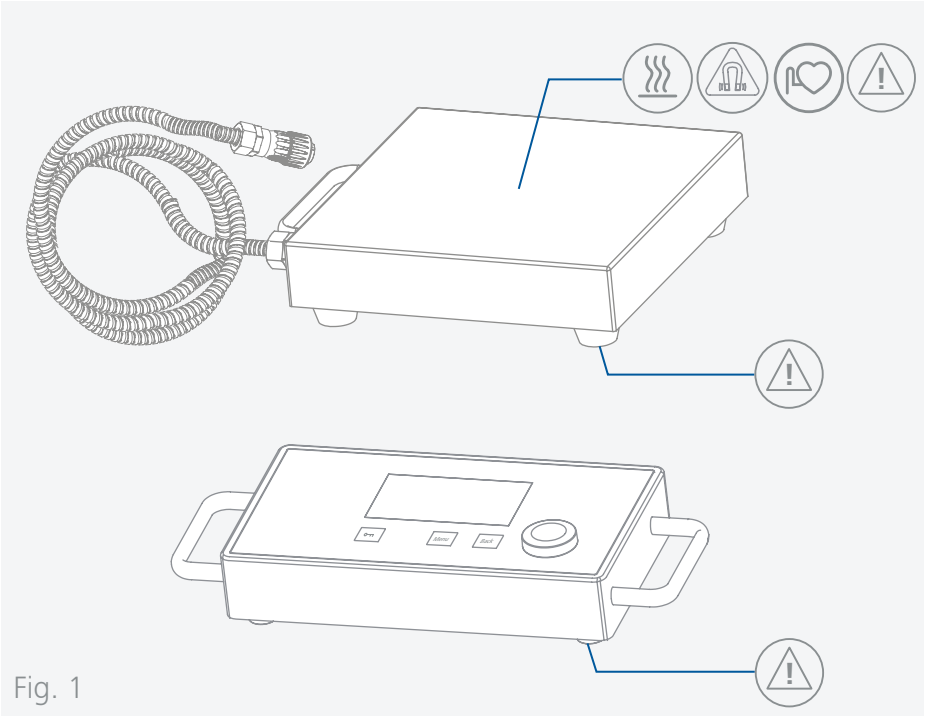


Fig. 1

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Source language: German

EU Declaration of conformity

We declare under our sole responsibility that this product corresponds to the directives 2014/35/EU, 2006/42/EC, 2014/30/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 61010-2-051, EN 61326-1, EN 60529 and EN ISO 12100.
A copy of the complete EU Declaration of Conformity can be requested at **sales@ika.com**.

Explication of warning symbols

/// Warning symbols

Danger! Indicates an (extremely) hazardous situation, which, if not avoided, will result in death, serious injury.

Warning! Indicates a hazardous situation, which, if not avoided, can result in death, serious injury.

Caution! Indicates a potentially hazardous situation, which, if not avoided, can result in injury.

Notice! Indicates practices which, if not avoided, can result in equipment damage.

Attention! Indicates the risks due to magnetism.
Effects of the strong magnetic field have to be taken into account, which can result in risks of injury (cardiac pacemakers, data storage media, crushing...).

Danger! Indicates the exposure to a hot surface.

/// General Symbols

A— Position number
Indicates device components relevant to actions.

Correct / result
Indicates the correct execution or the result of an action step.

Wrong
Indicates the incorrect execution of an action step.

Note
Indicates steps of actions that require particular attention.

Safety instructions

/// General information

› **Read the operating instructions completely before starting up and follow the safety instructions.**
› Keep the operating instructions in a place where it can be accessed by everyone.
› Ensure that only trained staff work with the device.
› Follow the safety instructions, guidelines, occupational health and safety and accident prevention regulations.
› Electrical outlet must be grounded (protective ground contact).

Attention – Magnetism!
› Effects of the magnetic field have to be taken into account (e.g. data storage media, cardiac pacemakers ...).

Caution!
› Pay attention to the marked sites in **Fig. 1**.

/// Device design

Caution!
› Device surface is partially made of glass:
- Glass surface can be damaged by impact.
- If glass surface is damaged it could cause injury, don`t use the device anymore.

Notice!
› Set up the device in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
› The feet of the device must be clean and undamaged.
› Keep the setup plate clean.
› Ensure that the vessel stands safely on the device.
› Protect the device and accessories from bumps and impacts.
› Check the device and accessories for damage before each use. Do not use damaged components.
› Please note that the housings of the I-MAG stirring system, consisting of I-MAG CP and I-MAG 300, have different protection classes (see "Technical data - Protection class").

/// Working with the device

Danger!
› Do not use the device in explosive atmospheres, it is not EX-protected.
› With substances capable of forming an explosive mixture, appropriate safety measures must be applied, e.g. working under a fume hood.
› To avoid body injury and property damage, observe the relevant safety and accident prevention measures when processing hazardous materials.

Warning!
› Only process media that will not react dangerously to the extra energy produced through processing. This also applies to any extra energy produced in other ways, e.g. through light irradiation.
› Beware of hazards due to:
- flammable materials,
- glass breakage,
- incorrect container size,
- overfilling of media,
- unsafe condition of container.
› Process pathogenic materials only in closed vessels under a suitable fume hood.

Caution!

› Wear your personal protective equipment in accordance with the hazard category of the media to be processed. There may be a risk from:
  - splashing and evaporation of liquids,
  - ejection of parts,
  - release of toxic or combustible gases.
› Reduce speed if:
  - medium splashes out of vessel because the speed is too high,
  - device is not running smoothly,
  - container moves on the setup plate,
  - an error message is displayed.

Notice!

› Working in dry operation is not permitted with the IKAFLON 90 slide magnetic rod included in the scope of delivery and the IKAFLON 118 float magnetic stirring system listed as an accessory.
› Secure the small vessels (especially those made of metal) with an anti-twist device.

Danger!

› The setup plate can heat up due to the action of the magnets at high motor speeds.

› Please consider any possible contaminations and unwanted chemical reactions.
› It may be possible for wear debris from rotating accessory parts to reach the material being processed.
› When using PTFE-coated magnetic bars, the following has to be noted: Chemical reactions of PTFE occur in contact with molten or solute alkali metals and alkaline earth metals, as well as with fine powders of metals in groups 2 and 3 of the periodic system at temperatures above 300 °C – 400 °C. Only elementary fluorine, chlorotrifluoride and alkali metals attack it; halogenated hydrocarbons have a reversible swelling effect.
(Source: Römpps Chemie-Lexikon and "Ulmann", Volume 19)

/// Accessories

› Safe operation is guaranteed only with the use of original IKA accessories.
› Always disconnect the plug before attaching accessories.
› Observe the operating instructions of the accessories.

/// Power supply / Switching off the device

Warning!

› The device will automatically restart in mode B following any interruption to the power supply.

› The voltage stated on the type plate must correspond to the mains voltage.
› The outlet for the mains plug must be easily accessible.
› The device can only be disconnected from the mains supply by pulling out the mains plug or the connector plug.

/// Maintenance

› The device may only be opened by qualified and IKA approved experts. The device must be unplugged from the power supply before opening. Live parts inside the device may still be live for some time after unplugging from the power supply.

/// Disposal instructions

› The device, accessories and packaging must be disposed of in accordance with local and national regulations.

Intended use

/// Use

› The magnetic stirrer is suitable for mixing substances.

/// Area of use

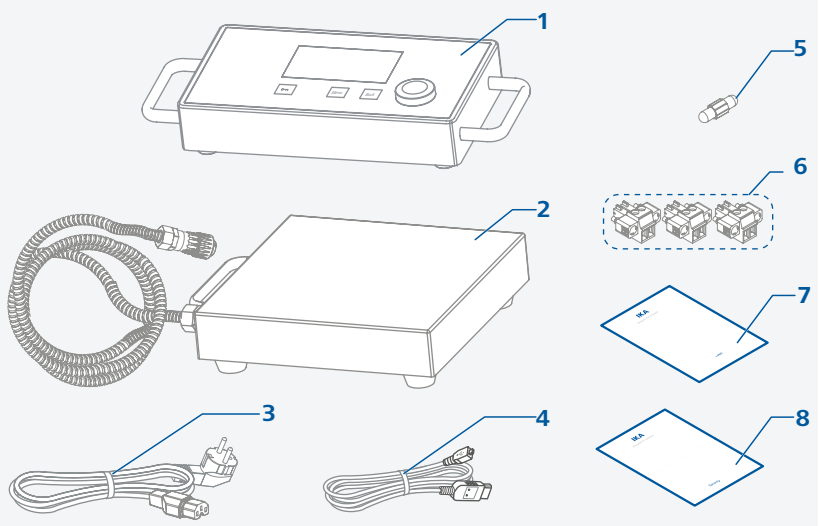
› Indoor environments similar to that a laboratory of research, teaching, trade or industry area.
› The safety of the user cannot be guaranteed:
  - if the device is operated with accessories that are not supplied or recommended by the manufacturer,
  - if the device is operated improperly or contrary to the manufacture's specifications,
  - if the device or the printed circuit board are modified by third parties.

Unpacking

/// Unpacking

› Unpack the device carefully. Any damage should immediately be reported to the carrier (mail, rail or freight forwarding company).

/// Scope of delivery



1	I-MAG CP	5	IKAFLON 90 slide
2	I-MAG 300	6	Adapter for analog interface, 3x
3	Power cord set	7	User guide
4	USB cable	8	Warranty card

Useful information

The magnetic stirrer is suitable for continuous operation. The motor current is limited electronically. The device has an anti-stall and anti-overload system. If a fault occurs, a safety circuit immediately switches off the motor permanently.

/// Speed – normal operation

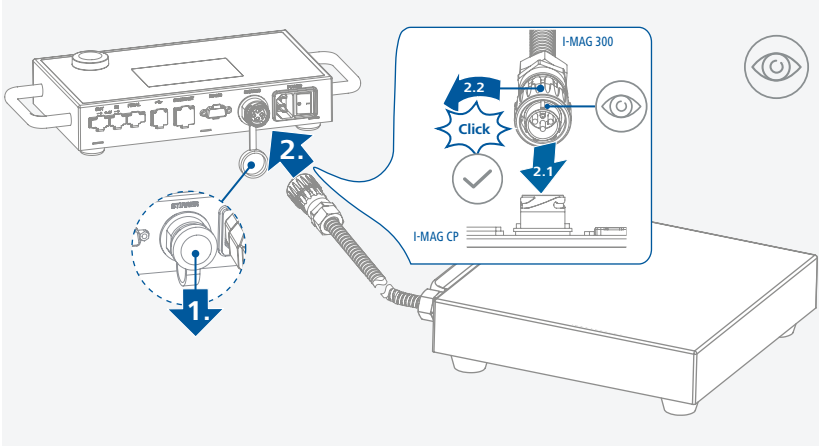
Speed - regulated (no variation in speed):
The speed is monitored and regulated by processor controlled. The target speed is constantly compared with the actual speed value. This guarantees a constant speed even if the viscosity of the substance being stirred changes.
Fluctuations in mains voltage within the permitted tolerance range have no effect on the quality of regulation and constancy of speed. The speed is set using the rotating / pressing knob. During normal operations the speed value on the display corresponds to the speed of the stirring bar in revolutions per minute (rpm).

/// Speed – overload operation

When adding solid or semi-viscous substances, the magnetic stirrer can be operated at 130 % of its rated power for a short time.
In overload operation, e.g. due to the increasing viscosity of the medium to be stirred, the speed is reduced to such an extent that the rated current of the unit is not exceeded.
Overload status:
The device is already running in overload mode if the actual speed does not match the setpoint speed.
If the motor current or the device's internal temperature exceeds the permissible limit, you will be informed by a warning message in the display.

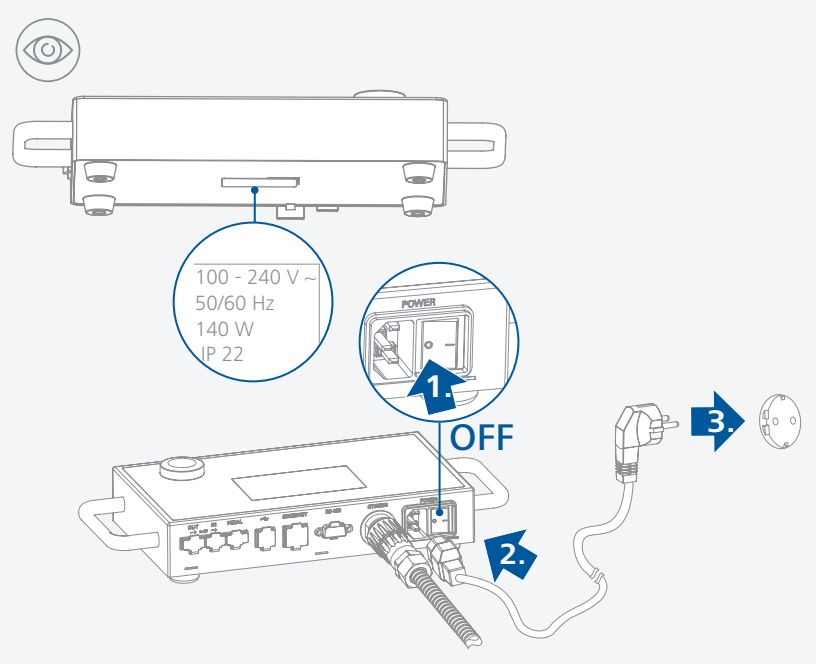
Installation

/// Connect the I-MAG 300 to the I-MAG CP



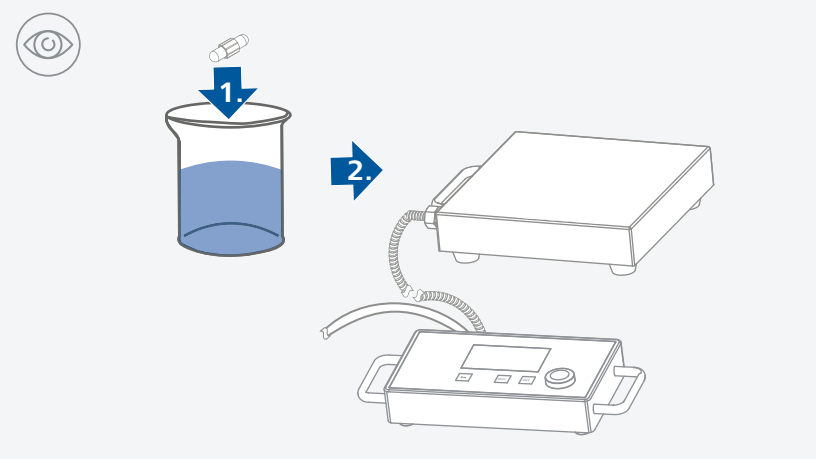
/// Connect the I-MAG CP to the power supply

Notice!
› The socket used must be earthed (fitted with earth contact).
› Observe the ambient conditions (temperature, humidity, etc.) listed under “Technical data”.



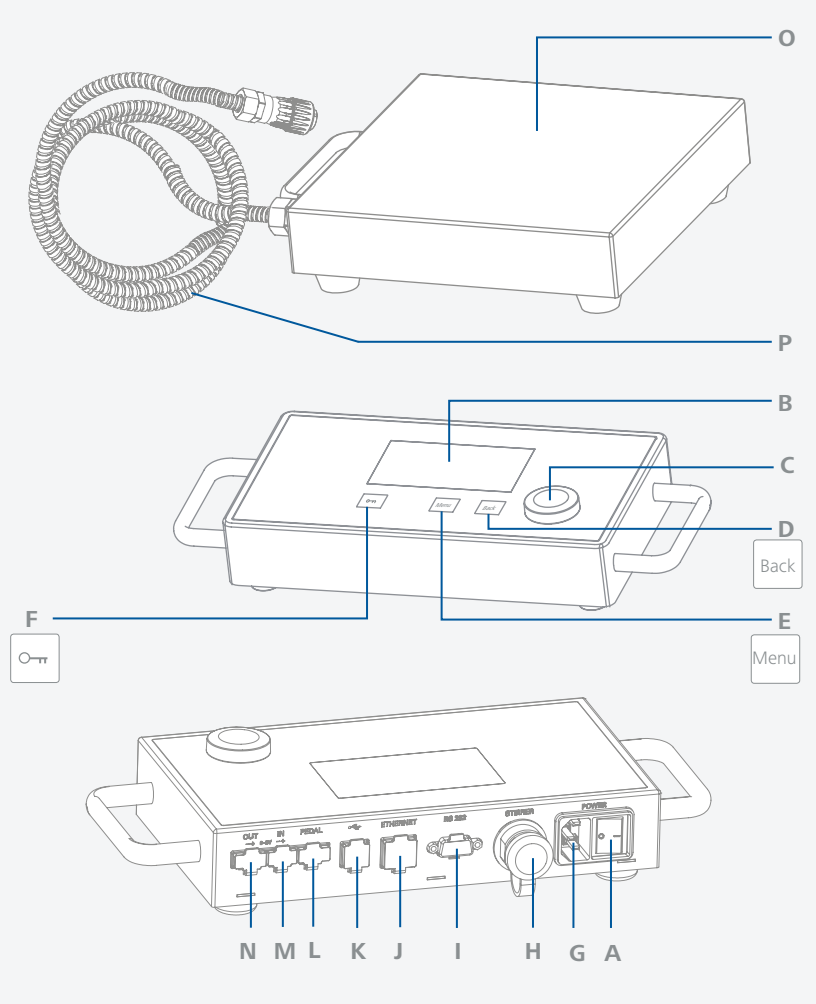
/// Place the vessel with a magnetic rod

Notice!
› Small vessels, especially those made of metal, must be secured against twisting!



Operator panel and display

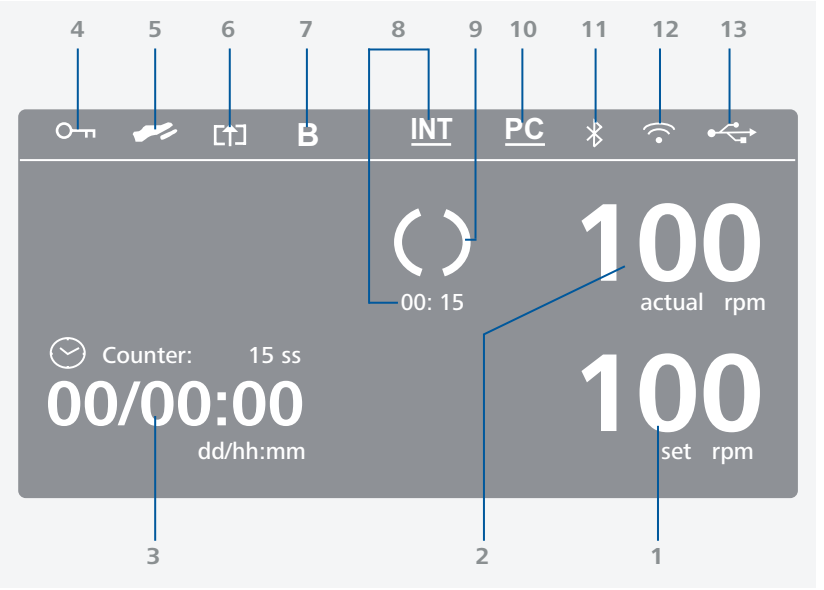
/// Operator panel



A	Mains switch
B	Display
C	Rotating / pressing knob
D	“Back“ button
E	“Menu“ button
F	Button lock
G	Power socket
H	I-MAG 300 interface

I	RS 232 interface
J	Ethernet interface
K	USB interface
L	Interface (Pedal switch)
M	Interface analog signal (input)
N	Interface analog signal (output)
O	Setup plate
P	Connection cable I-MAG CP

/// Display

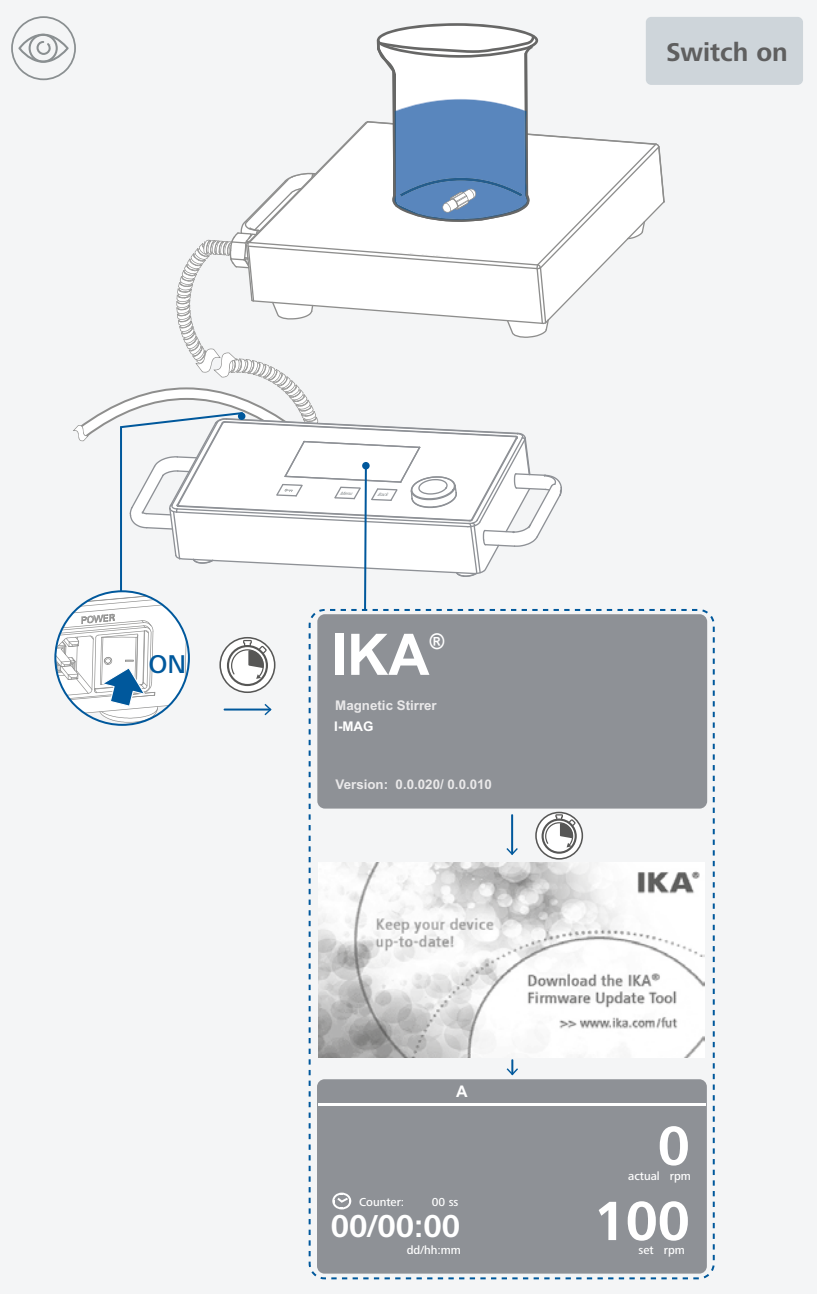


1	Set speed value
2	Actual speed value
3	Counter / Timer
4	Button lock
5	Pedal switch
6	Analog input control
7	Operating mode

8	Intermittent mode
9	Motor running / rotation direction
10	Connection with PC established
11	Bluetooth activated
12	WIFI activated
13	USB connection with PC

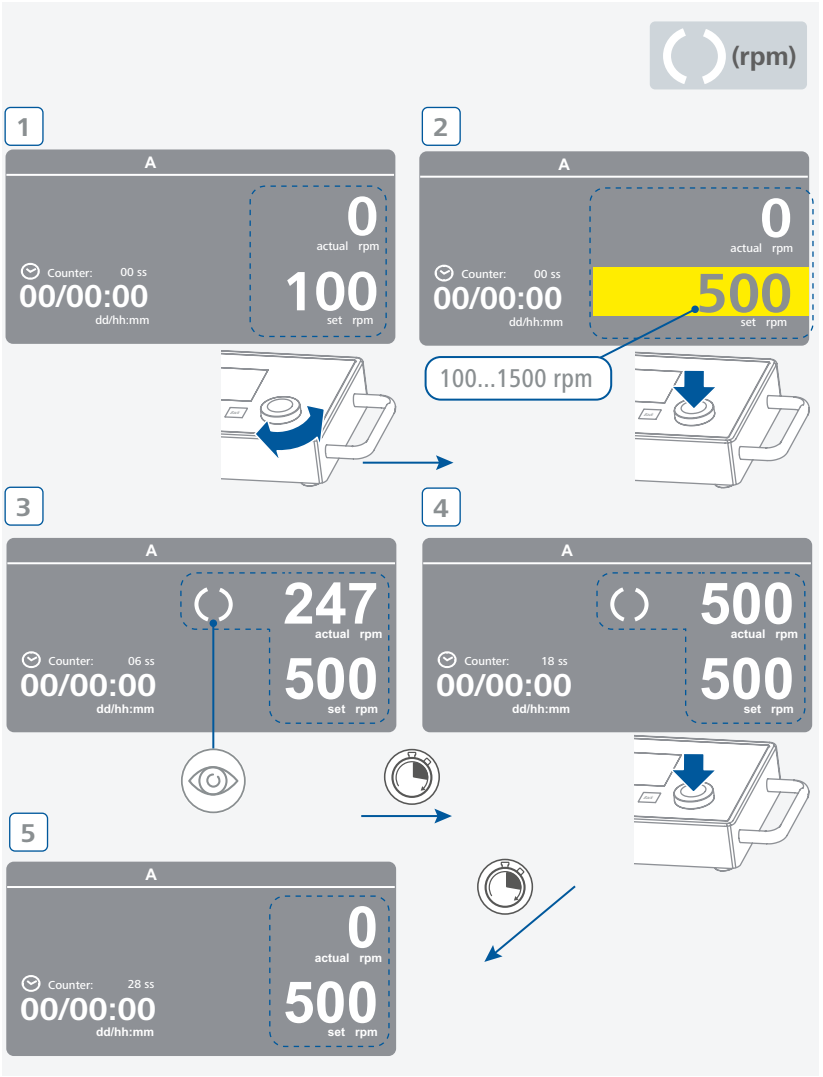
Operation

/// Switch on

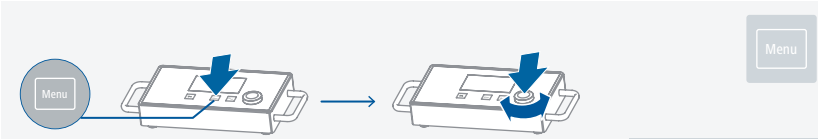


/// Stirring

› Set the speed using the rotating / pressing knob.
The set speed value is shown on the right of the display.
› Press the rotating / pressing knob to start the stirring function.



/// Menu structure



			Factory settings
Stirring	Speed limit	Minimum	100 rpm
		Maximum	1500 rpm
	Direction of rotation		CCW
	Stirring bar decoupling		ON
	Intermittent mode	Intermittent mode	Disabled
		Reverse rotation	OFF
		Interval run time	00:30 mm:ss
		Interval pause time	00:30 mm:ss
	Analog signal	Input control	OFF
		Output control	OFF
		Input calibration	-
		Output calibration	-
	Pedal switch		OFF
	Acceleration time	Time	30 Seconds (20...99)
Timer	Counter		00:00:00 dd/hh:mm
	Beep after timeout		✓
Operating Mode	A		✓
	B		-
	D		-
Programs	Program 1	Start	Infinite loop	OFF
			Loop count	1
		Edit	Edit	-
			Insert	-
			Delete	-
		Delete		-
		Rename		-
	Program 2			
	...			
Safety	Password		0 0 0
Network	Device name		-
	Ethernet	DHCP	ON
		Static IP	IP Address	255.255.255.255
			Subnet Mask	255.255.255.255
			Default Gateway	255.255.255.255
	WIFI		-
	Bluetooth		-
Settings	Languages	English	✓
		Deutsch	-
		...	-
	Display	Brightness	100% (10%...100%)
		Background	Black
		Firmware Update Information	✓
	Sound	Volume	100% (10%...100%)
		Key tone	ON
	Factory Settings	Menu settings	-
		Programs	-
		Network	-
		All	-
	Information	Display firmware version	0.0.028
		Logic firmware version	0.0.010
		Display build time	-
		Logic build time	-
		Device name	-
		Speed Min.	100
		Speed Max.	1500
		Intermittent mode	Disabled
		Interval run time	00:30
		Interval pause time	00:30
		Wireless MAC	-
		Ethernet MAC	-

Stirring

Speed limit

In the menu "Speed limit", the user can set the desired minimum and maximum speed limits for the magnetic stirrer. The default setting is the maximum allowable speed of the magnetic stirrer. If the “Speed limit” has been changed, the speed can only be set within this range.

Direction of rotation

In the menu "Direction of Rotation", the user can switch the direction between clockwise (CW) and counterclockwise (CCW). When the device is running, the direction of rotation cannot be changed.

Stirring bar decoupling

If the device detects that a stirring bar has broken away, the stirring function is interrupted temporarily in order to pick up the bar. The system then returns to the previously set speed. When the system detects a bar decoupling, this is indicated with a special symbol "". If another stirring bar decoupling occurs within the next 3 minutes (as long as the target speed has not been modified), once the bar is recovered the system only goes up to a speed of 100 rpm. In the case of 4 consecutive stirring bar decouplings -with less than 3 minutes’ normal speed between them - the error message Error 41 is displayed. The speed is reduced to 200 rpm.
In such cases, the testing conditions will need to be reconsidered.
Note: The user is responsible for ensuring the suitability/function of the stirring bar decoupling monitoring for the current conditions: stirring bar, speed, vessel, medium, etc.
Stirring bar decoupling monitoring does not work if the stirring bar already breaks away before the system has reached the set target speed!

Intermittent mode

The "Intermittent mode" is a cyclic interruption of the stirring function. The respective run time and pause time can be set. When the "Intermittent mode" is activated, the corresponding time is displayed on the main screen.

Analog signal
Analog signals can be processed between the I-MAG and an external device that can work with the voltage ranging from 0 to 5 V.
Note: Before the calibration, please set both "Input control" and "Output control" to "OFF".
Input control: If the analog input is activated, the set speed will be changed by the input signal that transmitted from the external device.
Output control: If the analog output is activated, the external device can query the actual speed through the output signal. In addition, the signal is linear with the actual speed.
Input calibration:
1. Enter the menu option "Input calibration".
2. Connect a stable 0.33V signal to the analog input. Press the OK button for confirmation and go to the next step.
3. Connect a stable 5 V signal to the analog input. Press the OK button to confirm that the calibration is done.

Output calibration:
1. Enter the menu option "Output calibration".
2. Adjust the parameter to generate 0.33 V on the analog output. Press the OK button for confirmation and go to the next step.
3. Adjust the parameter to generate 5 V on the analog output. Press the OK button to confirm that the calibration is done.

Pedal switch
By activating this function, an external pedal switch can be used to start or stop the stirring function.
To activate this function, the user must correctly connect the pedal switch via the interface (pedal switch) , and set the option "Pedal switch" ON in the device menu ("Menu" > "Stirring" > "Pedal switch").
After activating this function, the user can still start or stop the device using the rotating / pressing knob.

Acceleration time
The "Acceleration time" option allows the user to set the time (20 ... 99 seconds) that the device takes to accelerate from the minimum speed to the maximum speed.



Timer

Counter
In this submenu, the user can set the duration of the stirring function. If a value of "00:00:00" is set, the timer function is deactivated and the counter is activated. The device stops automatically after the set target time has elapsed.
Note: The user can manually stop the stirring function while the timer function is activated. In this case, the countdown of the timer is interrupted. If the stirring function is stopped manually while the counter function was activated, the total duration of the test is displayed.

Beep after timeout
This menu item allows the user to turn on / off the sound that occurs when the timer reaches 00:00:00. A tick shows that the option is activated.



Operating Mode

A
After power-on / power failure no automatic restart of functions.

B
After power- on / power failure automatic restart of functions, depending on previous settings.

D
Confirmation request for set value changes, if functions are active. After power-on / power failure no automatic restart of functions.
During operation, in mode D the device behaves the same as in operating mode A with the exception that:
- During operation, the setpoint speed must be confirmed by pressing the rotating / pressing knob. To change the setpoint speed, turn the rotating / pressing knob until the desired value appears.
- The new value will be highlighted in yellow color on the display for 4 seconds. During operation, confirm the new setpoint speed by pressing the rotating / pressing knob, otherwise the setpoint speed jumps back to its previous value.



Programs

Under menu “Programs”, 10 user-defined profiles can be created. In addition, the user can define whether the intermittent mode is activated or not in the programs.
If the intermittent mode is activated, the Interval run time / Interval pause time value from “Intermittent mode” setting will be taken.

1. Start: Starts the program upon request of loop mode.
- *Infinite loop:* Upon completion of the last segment, the program continues with the first segment until the user ends the program by stopping the device function.
- *Loop count:* Indicates the total number of the loop cycles until the program ends.
  Note: At the end of the program all device functions are switched off.

2. Edit: To edit the selected program, select the "Edit" button with the rotating / pressing knob. Using the "Edit", "Insert" or "Delete" buttons, you can make the corresponding changes.
In a program, user can define up to 10 program segments. The selected program segment is highlighted in blue.
When editing a parameter (Speed / Time), press the rotating / pressing knob on the selected parameter. The highlighted cursor turns yellow to indicate that the parameter can be edited by turning the rotating / pressing knob.

3. Delete: Delete the selected program by pressing on the button “Delete“ with rotating / pressing knob.
If a selected program is deleted by pressing on menu option “Delete” with rotating / pressing knob, all the program parameters will be emptied.

4. Rename: Rename the selected program by rotating / pressing on the button “Rename“ with rotating / pressing knob.



Safety

Password
In the menu option “Password”, you can lock the menu settings by a 3-digit password (factory setting: 0 0 0).
If you have forgotten the password, contact our service department.



Network

Device name
The “Device name” option allows the user to enter the device name.

Ethernet
DHCP (Dynamic Host Configuration Protocol):
If the DHCP protocol is enabled, the IP address of the device will be assigned automatically.
Static IP:
The device loads the fixed IP address configured by the user. This setting must be set correctly, otherwise the device will not have access to the Ethernet.



Settings

Languages
The “Languages“ option allows the user to select the desired language by turning and pressing the rotating / pressing knob. A tick indicates the language that is set for the system.

Display
In the "Display" menu, the user can adjust the brightness, change the background color of the work screen between black and white, and activate or deactivate the firmware update information when starting the device.

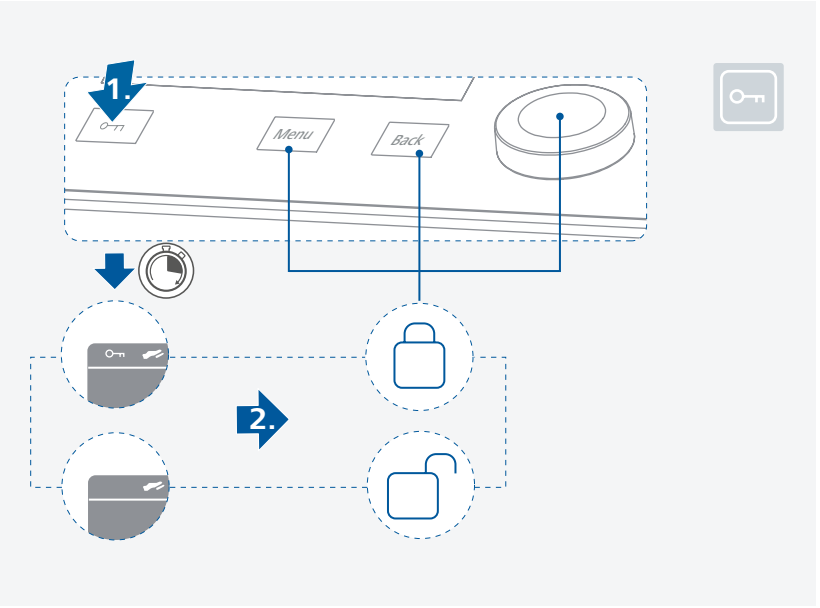
Sound
In the menu "Sound", the user can set the volume or activate / deactivate the key tone.

Factory Settings
In the "Factory settings" menu, the user can reset the device to the factory settings.
The following parameters can be selected: "Menu settings", "Programs", "Network" and "All".
Select the corresponding parameter you want to reset with the rotating / pressing knob. The system will prompt you to confirm the restoration of the selected factory setting. Press “OK” button to reset all the system settings to the original standard values set at dispatch from the factory (see “Menu structure”).

Information
In the "Information" option, the user gets an overview of the most important system settings of the device.

/// Lock button

› An active locking is indicated by the symbol (🔑).



Interfaces and outputs

The device can be operated by computer via an RS 232, USB or Ethernet interface using the laboratory software labworldsoft®.
The device software can also be updated with a PC via the RS 232 or USB port.

Notice!
Please comply with the system requirements together with the operating instructions and help section included with the software.

/// USB interface

The connected devices and their properties are detected automatically. The USB interface is used in conjunction with software control for "remote" operation and can also be used for software update of the device.

/// USB device drivers

First, download the latest driver for IKA devices with USB interface from:
https://www.ika.com/ika/lws/download/CP210x_Universal_Windows_Driver.zip
Install the driver by running the setup file. Then connect the IKA device to the PC via the USB data cable and follow the instructions.
The data communication is via a virtual COM port.

/// RS 232 interface

Configuration:
- The functions of the interface connections between the device and the automation system are chosen from the signals specified in EIA standard RS 232 in accordance with DIN 66 020 Part 1.
- For the electrical characteristics of the interface and the allocation of signal status, standard RS 232 applies in accordance with DIN 66 259 Part 1.
- Transmission procedure: asynchronous character transmission in start-stop mode.
- Type of transmission: full duplex.
- Character format: character representation in accordance with data format in DIN 66 022 for start-stop mode. 1 start bit; 7 character bits; 1 parity bit (even); 1 stop bit.
- Transmission speed: 9600 bit/s
- Data flow control: none.
- Access procedure: data transfer from the device to the computer takes place only at the computer's request.

/// Ethernet

- After connecting the device to the router or PC via the Ethernet cable, the correct IP address should be entered.
- If the DHCP protocol is enabled, the IP address is assigned automatically. If not, the user should enter it manually. The IP port number is fixed at 40812.

/// Interface (Pedal switch)

- Press the pedal switch: The stirring function starts or stops immediately.

/// Analog signal port (input & output)

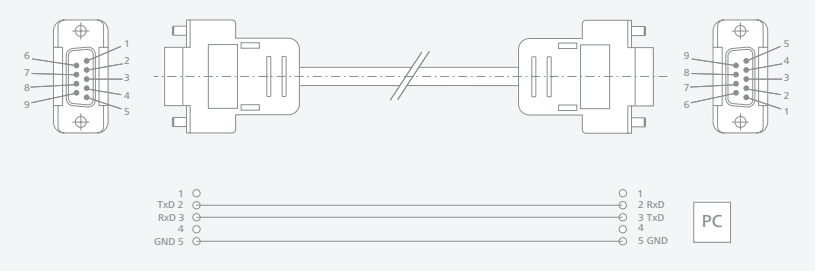
- Connect the analog input of the magnetic stirrer to the output port of the external control device. When this function is activated, the set speed will be controlled by the external voltage signal.
- Connect the analog output of the magnetic stirrer to the input port of the external control device. When this function is activated, a voltage signal will be generated that corresponds to the actual speed value.

/// Command syntax and format

The NAMUR commands and the additional specific IKA commands commissioning serve only as low level commands for communication between the device and the PC. With a suitable terminal or communications program these commands can be transmitted directly to the device. The IKA software package, Labworldsoft®, provides a convenient tool for controlling device and collecting data under MS Windows, and includes graphical entry features, for motor speed ramps for example.
For more information on how to control your device with NAMUR or other commands please visit **www.ika.com**.

/// Connections between I-MAG and external devices

PC 1.1 cable:
This cable is required to connect the RS 232 port to a PC.



USB cable A – B:
This cable is required to connect the USB port to a PC.



Maintenance and cleaning

› The device is maintenance-free. It is only subject to the natural wear and tear of components and their statistical failure rate.

/// Cleaning

› For cleaning disconnect the mains plug!
› Use only cleaning agents which have been approved by IKA to clean IKA devices. These are: water (containing surfactant) and isopropyl alcohol
› Wear protective gloves during cleaning the devices.
› Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.
› Do not allow moisture to get into the device when cleaning.
› Before using another than the recommended method for cleaning or decontamination, the user must ascertain with IKA that this method does not destroy the device.

/// Spare parts order

› When ordering spare parts, please give:
- device type.
- serial number, see type plate.
- position number and description of spare part, see **www.ika.com**.
- software version.

/// Repair

› Please only send devices in for repair that have been cleaned and are free of materials which might present health hazards.
› For repair, please request the "**Safety Declaration (Decontamination Certificate)**" from IKA or use the download printout of it from IKA website at **www.ika.com**.
› If your appliance requires repair, return it in its original packaging. Storage packaging is not sufficient when sending the device - also use appropriate transport packaging.

Accessories

› IKAFLON 118 float
› I-MAG SP 150
› I-MAG SP 300
› I-MAG cart
› RSE XL

› For accessories see **www.ika.com**.

Error codes

› The fault is shown by an error code on the display as following if the error occurs. Proceed as follows in such cases:
- Turn off the device by using the mains switch.
- Carry out corrective measures.
- Restart the device.

Error code | Causes | Effect | Solutions

Error 03 - Device internal temperature is too high

Causes	› Temperature inside of the device is too high.
Effect	› Motor switched off
Solutions	› Switch off the device and let it cool down.

Error 04 - Motor control is unavailable

Causes	› Motor blockage or overload.
Effect	› Motor switched off
Solutions	› Disconnect the device from the power supply. › Decrease the load on the motor and restart device again.

Error 08 - Motor over current (Max current)

Causes	› Speed sensor fault or overload.
Effect	› Motor switched off
Solutions	› Disconnect the device from the power supply.

Error 41 - Stirring Bar break away

Causes	› The bar has broken away four times in a row without an explicit change in the target value.
Effect	› Target speed reduced by at least 300 rpm.
Solutions	› Select a lower target speed. › Select a smaller stirring bar.

Error 99 - Internal Communication Error

Causes	› I-MAG CP is unable to communicate with I-MAG 300.
Effect	› Motor switched off
Solutions	› Check the connection cable I-MAG CP, see "Installation".

› If the actions described fails to resolve the fault or another error code is displayed then take one of the following steps:
- Contact the service department.
- Send the device for repair, including a short description of the fault.

Technical data

General data	I-MAG 300	I-MAG CP
Voltage	-	100 ... 240 V
Frequency	-	50 / 60 Hz
Power input	140 W	
Power input standby	-	5 W
DC voltage	48 V	-
Motor rating output	90 W	-
USB interface	-	yes
RS 232 interface	-	yes
Bluetooth interface	-	no
Interface analog signal	-	yes
Interface (Pedal switch)	-	yes
Ethernet interface	-	yes
Programs	-	yes
Firmware update	-	yes
Wireless control	-	no
Automatic reverse rotation	yes	-
Intermittent mode	yes	-
Break detection stirring bar	yes	
Permissible ambient temperature	+ 5 ... + 40 °C	
Permissible relative humidity	80 %	
Protection class according to DIN EN 60529	IP 64	IP 22
Material of installation surface	stainless steel 1.4301	-
Dimensions of installation area	260 x 260 mm	-
Dimensions (W x D x H)	260 x 300 x 70 mm	335 x 165 x 65 mm
Weight	6 kg	2 kg
Protection class	I	
Contamination level	2	
Overvoltage category	II	
Operation at a terrestrial altitude	max. 2000 m	
Stirring function		
Number of stirring positions	1	-
Stirring quantity max. per stirring position (H_2O) with I-MAG SP 150 with I-MAG SP 300	 150 l 300 l	-
Max. bearing load, I-MAG 300	75 kg	-
Direction of rotation	right / left	-
Speed display set-value	-	TFT
Speed display actual-value	-	TFT
Speed control	-	rotating / pressing knob
Speed range	100 ... 1500 rpm	-
Setting accuracy speed	10 rpm	-
Speed deviation (no overload)	± 10 rpm	-
Stirring bar length	30 ... 140 mm	-
Self-heating of the setup plate by max. stirring (RT: 22 °C / duration: 1 h)	+ 26 K	-
Timer function		
Timer	-	yes
Timer display	-	TFT
Timer control	-	buttons + rotating / pressing knob
Time setting range	-	0 / 1 minutes ... 99 days + 23 hours + 59 minutes
Analog signal		
Analog input: Measuring voltage range Input resistance		 0 ... +5 V > 100 kΩ
Analog output: Operating voltage range Output loadability		 0 ... +5 V > 2 kΩ

Subject to technical changes!

Warranty

› In accordance with IKA warranty conditions, the warranty period is 24 months. For claims under the warranty please contact your local dealer. You may also send the device direct to our factory, enclosing the delivery invoice and giving reasons for the claim. You will be liable for freight costs.

› The warranty does not cover worn out parts, nor does it apply to faults resulting from improper use, insufficient care or maintenance not carried out in accordance with the instructions in this operating manual.

IKA

designed for scientists

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Technical specifications may be changed without prior notice.