M2-D PRO MAGNETIC AND HEATING STIRRER

USER MANUAL



ARGO LAB

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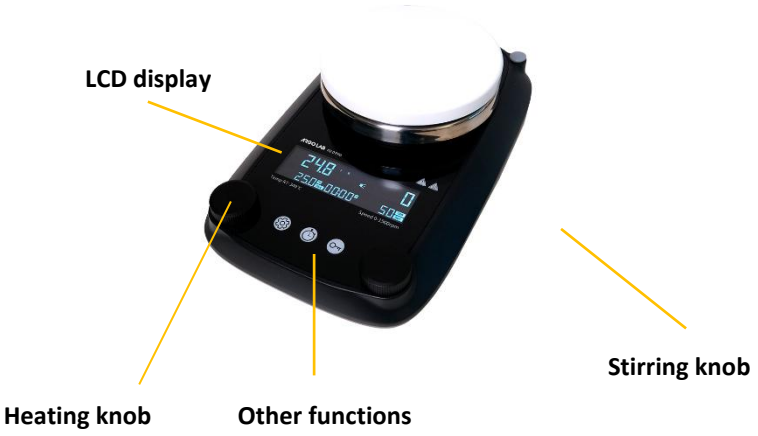
1. SAFETY INSTRUCTIONS

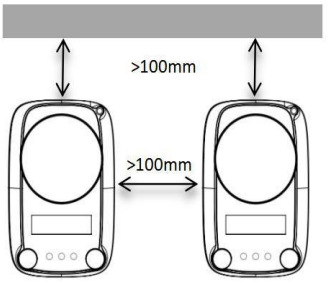
	• Read the instructions carefully before using. • Ensure that only qualified personnel use this tool. • Do not heat highly flammable or highly volatile substances.
	• Be very careful when touching the heating plate. It can reach temperatures of up to 340 °C. • Be careful when touching the aluminium parts of the case and the heating plate. Both can reach dangerous temperatures. • Be aware of residual heat on the heating plate and case after switching off the stirrer. • The device may only be transported/moved once the heating plate has cooled down and the instrument has been disconnected from the power supply.
	• Before use, ensure that the instrument is connected to a grounded socket.

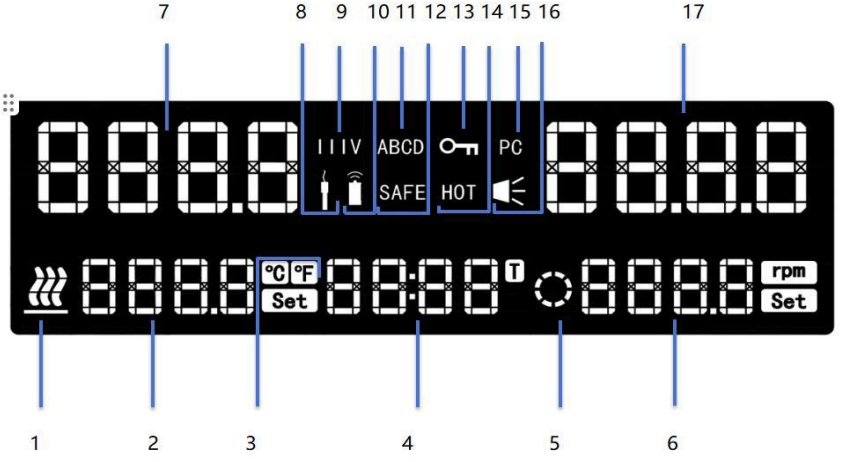
During operation, the user must:

- Avoid the splashing and/or evaporation of liquids.
- Avoid the emission of toxic or combustible gases.
- Place the instrument in a suitable area, on a stable, clean, non-slip, dry and fireproof surface.
- Not use the instrument in explosive atmospheres, containing dangerous substances or under water.
- Gradually increase the stirring speed.
- Ensure the set heating temperature is always at least 25°C lower than the combustion temperature of the heated substance used.
- Pay close attention to the risks of flammable materials or samples with low boiling temperatures, overfilling of samples and unsafe and/or unsuitable containers for heating.
- Use any pathogenic samples only in closed containers.
- Check that the instrument and accessories are in optimal condition before use. Never use damaged components. Optimal safety and operation are guaranteed only if the instrument and accessories described are in good working order.
- Ensure that the accessories are firmly connected to the device.
- Ensure that the instrument can be disconnected by disconnecting it from the power supply or by disconnecting the cable.
- Ensure that the operating voltage indicated on the instrument label corresponds to that of the mains to which is it connected.
- Make sure that the power cable does not touch the heating plate.
- Ensure that the instrument can only be opened by specialised technicians.
- Keep the instrument away from electromagnetic fields.
- Respect the minimum distance between the device and the wall (minimum 10cm).

2. DISPLAY, POSITIONING AND CONTROL







1	Heating function ON	**10**	Connecting the remote control
2	Setting temperature value	**11**	Temperature control mode
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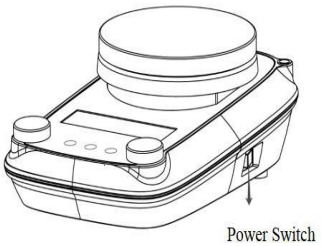
4	Timing	**13**	Safety lock
5	Stirring function ON	**14**	“Hot” warning
6	Setting speed value	**15**	PC connection
7	Current temperature value	**16**	Buzzer
8	PT 1000 probe connected	**17**	Current speed value
9	Operation mode		

3. POWER ON, POWER OFF, HIBERNATE



1) To turn on the instrument, turn on the power switch and then enter the main interface.
2) To enter hibernation mode, press and hold the temperature knob and speed knob simultaneously for 3s.
   To come out of hibernation mode, press and hold the temperature knob and speed knob simultaneously for 3s and enter the main interface.
3) To turn off the instrument, turn off the power switch.

4. OPERATION

- Check that the operating voltage specified on the nameplate matches the grid voltage.
- Ensure that the power outlets have good grounding.
- Turn on the instrument and perform a power-on self-test.
- Place the appropriate stirrer into the container and fill it with the sample to be stirred.
- Place the container on the instrument tray.
- Set the mixing speed and start mixing, ensuring that the stirrer is functioning correctly.
- Set the heating temperature and start the heating, observing the actual temperature displayed on the LCD screen
- Setting the mixing time.
- Once finished, switch off the heating and stirring function.

If the above operation works correctly, the instrument is ready for official use. If it does not work correctly, the instrument may have been damaged during transport, and so please contact your distributor.

5. HEATING FUNCTION

1) Rotate the temperature knob to adjust the temperature to the desired parameter:
   a. On the temperature knob, the  animation is displayed on the interface. This indicates that the heating function is switched on. The set and actual temperatures are always shown on the display.
   b. For single-function models, the desired temperature can be adjusted with the temperature adjustment knob.
   When the heating function is switched on, the left side of the LCD screen displays the real-time temperature value, and the right side displays the set temperature value.

2) If no external temperature sensor is connected, the display will show the disc temperature. This machine uses an external temperature sensor PT1000. After the external temperature sensor has been connected, the screen will display the symbol  indicating that the external temperature sensor works. The LCD screen will display the real-time temperature of the external temperature sensor.

3) Display temperature unit: Press and hold the temperature knob and the setting  button at the same time. The instrument setup temperature and actual temperature units will switch from degrees Celsius (°C) to degrees Fahrenheit (°F).

4) An external temperature sensor allows for more precise and faster control of the temperature of the sample than the built-in temperature control. The external temperature sensor must be placed in the ambient liquid, not in the heated sample. If an abnormality is detected, the heating module will automatically shut down, in which case do the following:

   a. Turn off the instrument.
   b. Ensure that the external thermometer sensor is immersed in the heated sample.
   c. Turn on the instrument, set the target temperature and turn on the heating function.
   d. If the instrument does not return to normal operation, contact the manufacturer/supplier.

5) The temperature in the setup area when the instrument is turned on is the setup temperature when the instrument was last turned off. In common use, there may be a difference between the setup heating temperature display value and the following current temperature.
   - Heating plate center and outer edge
   - Containers and samples in container

These differences exist due to thermal conduction properties. To ensure accurate temperatures in the vessel, use an external temperature sensor PT1000.

5.1 Residual temperature warning (HOT)

To prevent burns, the instrument has a residual heat warning function (Hot):

- If the temperature of the heating disc remains above 50°C after the heating function has been switched off, the LCD display will show "Hot" to warn that the temperature of the heating disc is too high and that there is a risk of scalding.

- After switching off the main switch of the instrument, if the temperature of the disc is higher than 50 °C, the display will show "Hot" and the actual temperature value, and when the temperature of the heated disc drops below 50 °C, the instrument will automatically power off. If the user needs to switch off the LCD screen immediately, unplug the power supply. The residual heat warning function cannot be operated in the event of a mains failure or with the mains unplugged.

5.2 Safety temperature

To set the safety temperature limit:

- Click the setup button to enter the safety temperature setting interface, rotate the temperature knob to adjust the safety temperature and after the setting is completed, click the setup button again to return to the main interface which indicates that the safety temperature setting is completed. Once the temperature limit is reached, the instrument will turn off the heating function.

6. STIRRING FUNCTION

Insert the appropriate stirrer into the container, rotate the speed knob, adjust the speed to the desired parameters. After clicking the speed knob, the interface will show the symbol

and an animation, indicating that the RPM function is switched on. The set RPM and the actual RPM are always shown on the display.

For the single-function model: The stirring speed can be adjusted using the stirring knob. When the stirring function is activated, the actual speed is displayed on the left side of the LCD screen, while the set speed is displayed on the right side.

7. TIMING FUNCTION

Press the  button for about 3 seconds after which the screen will show 

When this symbol appears:

- The hour digit on the left-hand side will flash. Rotate the RPM knob to adjust to the desired time and then press the RPM knob briefly to confirm.
- The minute digit on the right-hand side will flash. Rotate the RPM knob to adjust to the desired time and then press the RPM knob briefly to confirm.
- To start timing, click the time button (":"). When it flashes, timing will start. The instrument will emit three beeps when the timer ends.

When the time has ended, the heating function stops but the stirring function does not stop preventing heat damage to the samples.
For the single-function model: Press the setting button to switch to the time adjustment interface, rotate the time knob to set the desired time, and press the knob to confirm. The actual running time will then be displayed on the left-hand side of the screen, while the set time appears on the right-hand side.

8. SAFETY LOCK FUNCTION

To put the instrument into safety lock, press and hold the operator's key button  to display the symbol  . In this state, buttons and knobs cannot be operated.

To exit the safety lock press and hold the operator's key button  . The symbol  will disappear, allowing buttons and knobs to be operated.

9. SETTINGS MENU

After turning on the instrument, press and hold the setup  button to enter the following settings:

9.1 Operation Mode Setting

Rotate the temperature knob to enter operating mode. Press the setting  button to confirm.

Ⅰ Mode: All settings are stored when the instrument is switched off or the power is disconnected. The heating and stirring functions are switched off after switching on.
The safety circuit can be set or changed. After switching it on, the display shows *Operation Mode Ⅰ*.

Ⅱ Mode: All settings are stored when the instrument is switched off or the power is disconnected. The heating and stirring functions are the same after switching on as they were before the last switch-off and may be off or on. The safety circuit can be set or changed. After switching on, the display shows *Operation mode Ⅱ*.

Attention: If the heating is on when the instrument is in Ⅱ mode, when the instrument is switched from menu setting to calibration setting, the heating function must be turned off first. Click the setting button to enter the main interface.

Ⅲ Mode: The operation of the instrument is the same as in Ⅰ mode (except that the safety temperature needs to be confirmed). When the value of the safety temperature is flashing, the safety temperature value can be adjusted by the temperature knob. If no adjustment is needed, after the safety temperature has been flashing for 5s, it will automatically enter the main interface.

9.2 Heating model setting

To enter Heating Mode, press the setting button. The screen will switch to the heating mode adjustment interface. Rotate the temperature knob to select the heating mode and press the setting button to confirm. There are 3 modes:

- **MODE A** - Rapid heat-up mode. The heating rate is fast with some overshoot.
- **MODE B** - Standard heat-up mode. The heating rate is faster with less overshoot.
- **MODE C** - Stable heating mode. The heating rate is slower with little or no overshoot.

9.3 Buzzer setting

To enter buzzer, press the button. The screen will switch to the buzzer setting interface. Turn the temperature knob to adjust the buzzer on or off and press the setting button to confirm.

9.4 Calibration settings

The instrument calibration mode is for external temperature only, and an external temperature sensor must be connected if calibration is required.

1) Calibration operation: Click the 'Set' button to enter the calibration interface:

    a. The display will show both the actual temperature and the set temperature. At the same time, "CAL" will appear at the actual speed. Rotate the temperature knob to select the desired temperature. Press the temperature knob to confirm. The heating indicator will turn on, and the instrument will begin heating. Once the temperature stabilises, press the speed knob to calibrate the temperature. After completing the temperature setting, press the speed knob again.

b. The actual rotational speed will display “DONE,” indicating that the calibration is complete. Turn off the instrument. After restarting, the instrument will return to the main interface.

2) If a calibration is not needed, click the setup button to skip the calibration interface and enter the main interface of instrument operation.

10. DATA INTERFACE

The instrument can be connected to a computer via an RS232 interface and controlled by software. The software of the instrument can also be updated by connecting to a computer via RS232. Configure:

- Transmission process: Asynchronous start-stop mode.
- Transmission type: full-duplex communication system.
- Characteristics: 8 data bits, 1 start bit, 1 stop bit, no parity bit.
- Transmission rate: 9600 bit/s.
- Data flow control: none.
- Access procedure: The instrument transfers data to the computer only when the computer issues a demand command.

11. RESTORE FACTORY SETTING

Turn on the instrument and when the screen flashes, press and hold the speed knob. When the screen displays "rE", turn off and restart the machine to restore the factory settings. (In Ⅲ mode, the safety temperature confirmation appears first, and then the "rE" character is displayed).

12. FAULT DIAGNOSIS

1) If the instrument does not start, check the power supply and:
   a. Check whether the power cord is connected securely.
   b. Check if the power fuse is damaged or loose.

2) If the instrument power-on self-test is not normal:
   a. Switch off the instrument and restart it.

3) If the rotation speed cannot reach the set value:
   a. It may be because the viscosity of the medium fluid is too high, causing abnormal deceleration.

4) If the instrument does not power up when the instrument is switched off:

a. The heating disc temperature may be higher than 50°C resulting in the residual heat warning function being displayed.

5) Fault Reporting

If any of the problems mentioned occur, please contact technical support.

Error code	Problem description	Troubleshooting
ER3	PT1000 probe removed during heating from the liquid.	Once the probe function has been checked, reinsert it into the container.
ER4	PT1000 probe exceeds temperature target by 40°C.	Reboot, cool down and re-start the instrument.
ER5	Built-in temperature sensor exceeds the overheating protection.	Switch off the instrument, cool down and re-start the instrument.
ER6	Heating switched off, temperature rises automatically by 20°C-	Press any button.
ER8	No rpm detected when mixing/stirring is switched on-	Switch off the power and re-start the instrument.
ER9	PT1000 probe not correctly placed or put into the liquid and the temperature rise is less than 5°C after 7 min of heating.	Check PT1000 probe integrity and function.

13. MAINTENANCE

This instrument requires no special maintenance. The instrument will only experience natural wear and tear of spare parts that may cause occasional failure. Proper use and keeping it in good working condition will extend the life of the instrument.

14. CLEANING

1) Disconnect the power supply when cleaning the instrument.
2) Wear protective gloves when cleaning the instrument.
3) Keep the instrument dry and clean during routine work, quickly remove spilt liquids, use a non-abrasive cleaner to clean the external surfaces and do not connect the power supply until all surfaces are dry. If liquid or wet solids get inside the instrument, quickly disconnect it from the power supply and do not use it again, contact the manufacturer/supplier for further advice.
4) Keep the instrument tidy and do not allow cleaning solutions to get into the instrument.
5) The power must be disconnected before maintenance and cleaning, please use our recommended method to clean the instrument. Removal method:

Material	Cleaning solution
Dye	Isopropanol
Building material	Aqueous solution containing active agent/isopropyl alcohol
Cosmetic products	Aqueous solution containing active agent/isopropyl alcohol
Foods	Aqueous solutions containing active agents
Fuel oil	Aqueous solutions containing active agents

Consult the manufacturer for materials not listed in the above table. Before using any other cleaning method, the user must confirm with the manufacturer that the method will not damage the instrument. Wear suitable protective gloves when cleaning the instrument.

15. RELATED REGULATIONS

The instrument has been manufactured in compliance with the following safety standards:

- EN 61010-1
- UL 3101-1
- CAN/CSA C22.2(1010-1) EN 61010-2-10

The instrument has been manufactured in compliance with the following EMC standards:

- EN 61326-1

European guidelines:

- EMC guidelines: 89/336/EWG
- Machine guidelines: 73/023/EWG

16. TECHNICAL PARAMETERS

Specs	M2-D Pro
Work plate dimensions	Ø 135 mm
Work plate material	Al + ceramic coating
Motor type	Brushless DC motor
Stirring positions	1

Max stirring q. ty [H_2O]	20 L
Max magnetic bar [length]	80 mm
Speed range	50 - 1500 rpm, resolution. ±1 rpm
Speed & Temp display	LCD
Heating temp. range	RT – 340°C, increment 1°C
Temperature accuracy	±1°C (<100°C) - ±1% (>100°C) PT1000: ±0,2°C (entire range)
Overheating temp. protec.	420°C
Hot warning	50°C
Connection	RS 232
IP grade	IP42
Timer function	1 min – 99h59min
Motor rating output	10 W
Power	650 W
Heating output	600 W
Voltage	200 – 240 V - 50/60 Hz
Dimensions [WxDxH]	270x175x198 mm
Weight	2,2 Kg
Working conditions	5 – 40°C – Max 80%RH

17. DISPOSAL OF ELECTRONIC EQUIPMENT



Electrical and electronic equipment bearing this symbol cannot be disposed of in public landfills.
In accordance with the WEEE Directive 2012/19/EU, European users of electrical and electronic equipment have the option of returning used equipment to the Distributor or Manufacturer when purchasing new equipment. The illegal disposal of electrical and electronic equipment is punishable by a financial penalty.

18. WARRANTY

- The distributor applies a 24-month warranty, in the case of correct use.
- During the warranty period, the distributor will substitute or repair defective components.
- This warranty covers only electronic parts of the instrument and doesn't apply to damages due to improper use (such as liquid spillage inside of the instrument).