IKA

designed for scientists

IKA MATRIX Orbital Delta F0.5
IKA MATRIX Orbital Delta F1.5
IKA MATRIX Orbital Delta F2.0
IKA MATRIX Orbital Delta FP

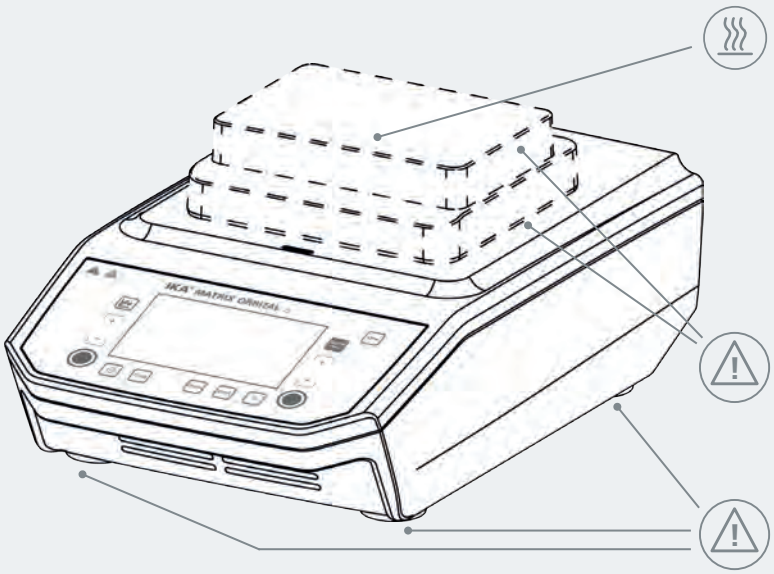


Fig. 1

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 declaration of conformity or further declarations of conformity can be requested.

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.

Danger! Indicates the exposure to a hot surface.

/// General Symbols

A— Position number

Correct/Result!
Shows the correct execution or the result of an action step.

Wrong!
Shows the incorrect execution of an action step.

Note!
Displays action steps that require particular attention to detail.

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.
› The device must only be used in a technically perfect condition.

/// Device setup

Danger!
› Please pay attention to the dangerous parts of the equipment in Fig. 1.

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.

Caution!
› 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.
› Overfilling with liquid may cause the medium to splash out. For this reason, only closed test tubes should be used.
› Check the device and accessories for damage before each use. Do not use damaged components.
› All screw connections must be properly tightened.
› The power cord and wires of external sensors must not touch the heated areas.

/// Work with the device

› The device must only be used in a technically perfect condition.

Danger - Risk of burns!
› Exercise caution when touching parts of the housing and the heating plate.
› The heating plate can reach dangerous temperatures. Pay attention to the residual heat on the heating plate after switching off the stirrer.
› The device may only be transported when the heating plate has cooled down

Danger!
› You must not touch any moving parts (danger of crushing, impacts and cuts, Fig. 1 points of danger shown)
› 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,
  - release of toxic or combustible gases,
  - body parts, hair, clothing and jewelry getting caught.
› Reduce the speed if:
  - the device is not running smoothly.

/// Permissible media/Contamination/Side reactions

Danger!
› 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.

Warning!
› Beware of the risk of:
  - glass breakage as a result of mechanical shaking power.
› **Caution:** Only media whose flashpoint lies above 170 °C may be processed or heated with this device. (acc. to EN 61010-2-010)

› Beware of hazards due to:
  - flammable materials
  - combustible media with a low boiling temperature
  - glass breakage
  - incorrect container size
  - overfilling of media (in a beaker)
  - unsafe condition of container.

Notice!

› Covers or parts that can be removed from the device without tools must later be refitted to ensure safe operation. This will prevent the infiltration of foreign objects and liquids.
› Process pathogenic materials only in closed vessels under a suitable fume hood.

/// Accessories

› Safe operation is guaranteed only with the use of original IKA accessories.
› Always disconnect the plug before attaching accessories.
› Accessories must be securely attached to the device and cannot come off by themselves. The centre of gravity of the assembly must lie within the surface on which it is set up.
› Observe the operating instructions of the accessories.
› Protect the device and accessories from bumping and impacting.
› Check the device and accessories beforehand for damage each time when you use them. Do not use damaged components.
› Place the vessels securely on the shaking table or the selected insert.
› The securing of the sample vessels and the securing of the inserts must be checked at regular intervals, particularly before each recommissioning.

/// Power supply / switching off the device

Notice!

› The specified settings on the rating plate must coincide with the actual mains supply.
› The device can only be disconnected from the mains supply by pulling out the mains plug or the connector plug.
› The device must only be operated with the original power supply unit.
› The outlet for the mains plug must be easily accessible.
› Socket must be earthed
› After an interruption to the power supply, the device does not start up again automatically (factory settings).
› The device is maintenance-free and must not be opened.

/// Maintenance

› Follow the cleaning instructions.
› Even in case of repairs, the device may only be opened by trained staff. Before opening, you should disconnect from the mains. Energised parts inside may also continue to be live for some time after the mains plug is removed.
› Only use original IKA spare parts!

/// Disposal instructions

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

Intended use

/// Use

The MATRIX ORBITAL DELTA shaker is used to mix liquids. These can be shaken in sample vessels or sample plates, perhaps also using different inserts.

/// Range of use

Indoor environments similar to that of a laboratory in research, education, commerce or industry.

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.

Useful information

The device can be used with a wide range of applications in combination with different vessels.

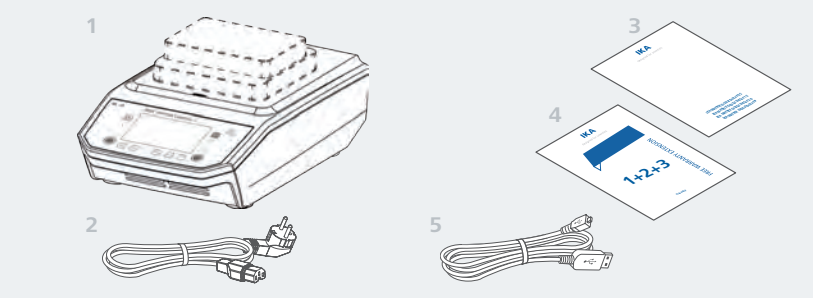
Notice!

› As the motor gives off heat, the mounting plate may heat up.
› Vibrations caused by the device can cause laboratory structures and equipment to vibrate. For this reason you should pay special care to ensure a stable mounting plate and make sure vessels cannot slip, to make sure that unwanted vibrations are not caused in the surroundings and the walls of the device. The feet of the device and the mounting plate should be cleaned before each start-up.

Unpacking

/// Scope of delivery

› Please unpack the device carefully;
› Any damage should be notified immediately to the shipping agent (post office, railway network or logistics company).



1	IKA Matrix Orbital DELTA	4	Warranty card
2	Mains cable	5	USB cable
3	User guide		

/// Device Setup

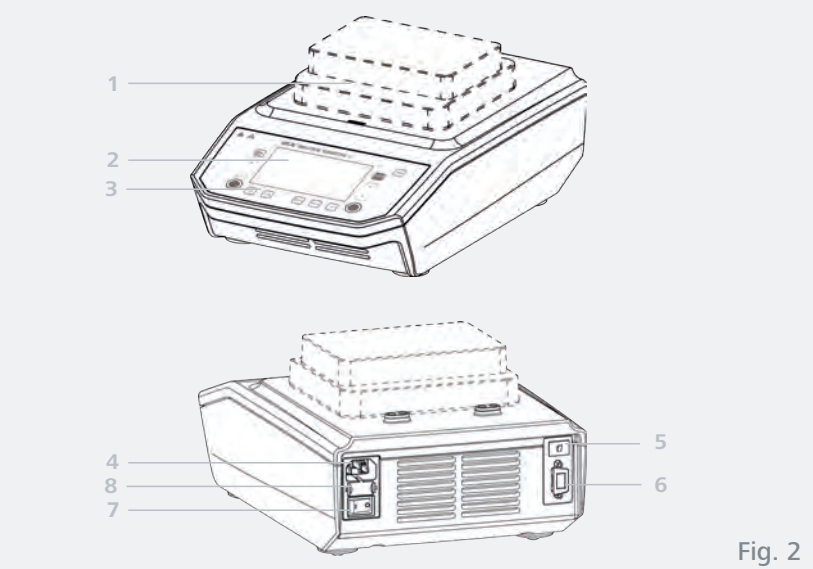
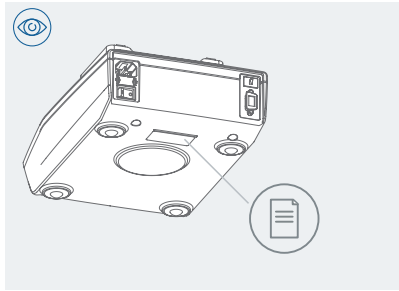


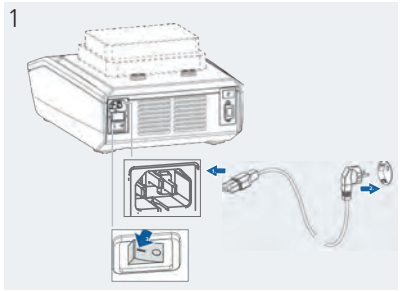
Fig. 2

1	Shaking table	5	USB interface
2	Display	6	RS 232 interface
3	Operator panel	7	Power switch (ON/OFF)
4	Mains connection	8	Fuse holder

Assembly

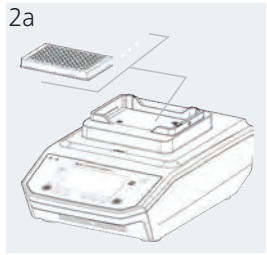
/// Connection to the power supply

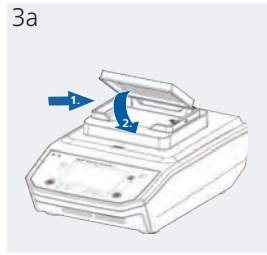


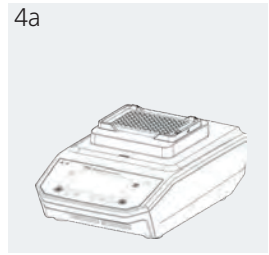


/// Mount the inserts/sample plates

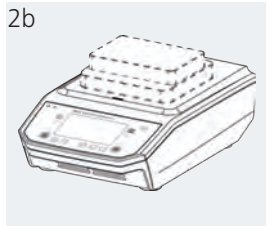
› Deepwell plates (DWP)
› Microtiter plates (MTP)

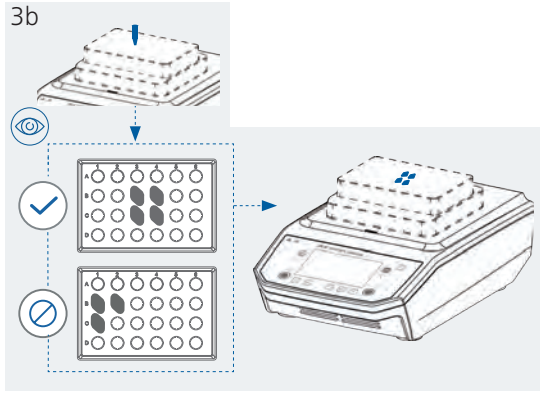






/// Mount the sample vessels





Operator panel and display

/// Explanation of the control elements

Pos.	Designation	Function
A	Graph key	Speed/Temperature/Time diagram
B	Timer key	Editing/activating the timer
C	Program key	Program management
D	Menu key	› press 1x: Back to main menu › press 2x: Back to working display
E	Back key	Returns to previous menu level
F	Pause key	› Stops the mix and timer function › Restart work procedure: Press the pause button again. Caution: With an active program function, the pause button cannot be selected.
G	Start/Stop/Enter key	› Start/stop mixing at set speed › Input button in the menu
H	(-) key	› Reduces the motor speed in the main screen › Menu navigation in the submenu
I	(+) key	› Increases the motor speed in the main screen › Menu navigation in the submenu
J	Quick Mix key	As long as the button is pressed, the mixing process is active with the set speed.
K	Lock key	Lock / Unlock the keys
L	(+) - key	Increases the temperature in the main screen
M	(-) - key	Reduces the temperature in the main screen
N	Start/Stop key	Heating in start/stop with set temperature

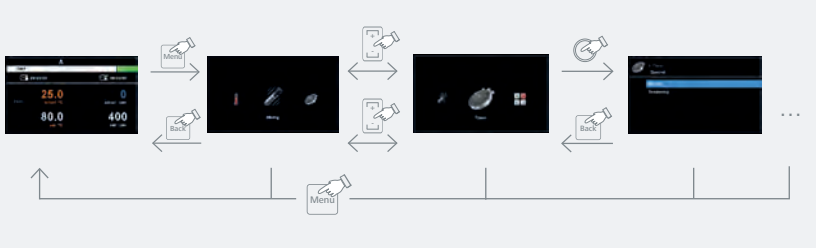
/// Explanation of symbols on the working screen

Symbol	Designation	Function
	Shaking	The shaking function is activated
00:10 + INT	Shaking in Intermittent Mode	The shaking function in intermittent mode
PC	PC control	The shaker is connected to a computer and is controlled by it
PR	Programm control	The shaker is controlled by a programm (“Programs” chapter)
INT	Intermittent Mode	The shaker is in intermittent mode
	USB	The shaker communicates via a USB cable
	Key lock	Key lock is activated
A B C	Operating mode	The operating mode is displayed: A, B or C
	Timer (mixing)	Timer mode maximum value that can be selected “99hh:59mm:59ss”
	Counter (mixing)	Counter mode. The counter can only count up to the maximum value “99hh:59mm:59ss”. When this value is reached, the device runs again and the counter stops
	Timer/Counter (tempering)	Timer operation/counter mode for tempering maximum value that can be selected “99hh:59mm:59ss” Counter mode. The counter can only count up to the maximum value “99hh:59mm:59ss”. When this value is reached, the device runs again and the counter stops
	Timer (tempering)	Timer for tempering starts as soon as the target temperature is reached
	Counter (tempering)	Counter for tempering starts as soon as the target temperature is reached
	Heating	Heating is activated
	ThermoCover detecting	ThermoCover is connected to the device
Fast Moderate Slow	Temperatur control rate	The set temperature control rate is displayed on the main screen
	Power failure	Showed a previous power supply interruption
IKA MATRIX 1.5 ml	Device variant	Used inserts/sample plates/sample vessels

Menu navigation and structure

/// Menu navigation

- Press “Menu” button (D).
- Select a menu item by pressing the “(+)” button (I) or the “(-)” button (H).
- Confirm the menu item by pressing the “Start/Stop/Enter” button (G).
- In the menu item press the “(+)” button (I) or the “(-)” button (H) to select the desired menu options and to edit/activate/deactivate the values or settings.
- Confirm the settings by pressing the “Start/Stop/Enter” button (G).
- Press the “Back“ button (E), to leave/cancel the setting or to return to the previous menu.
- Press the “Menu” button (D) to go straight back to the work screen.



/// Menu structure

				Factory settings
Tempering	Control rate	Fast		Activated
		Moderate		-
		Slow		-
Mixing	Intermittent Mode	Activate		-
		CW time		00:10 (mm:ss)
		Stop time		00:10 (mm:ss)
		CCW time		00:00 (mm:ss)
Timer	Mixing	Timer/Counter	Hours/Minutes/Seconds	00 (hh/mm/ss)
	Tempering	Timer/Counter	Hours/Minutes/Seconds	00 (hh/mm/ss)
		Start condition	Immediately	Activated
			Set temperature reached	-
Mode	A			Activated
	B			-
	C			-
Graph	Axis Scaling	Automatic	Y-Axis: Maximum value	Activated
			X-Axis: 5 minutes	Activated
		Manual	Y-Axis 1—Speed — Maximum	3000 rpm
			Y-Axis 1—Speed — Minimum	0 rpm
			Y-Axis 2—Temperature — Maximum	100 °C
			Y-Axis 2—Temperature — Minimum	1 °C
			X-Axis — Time range — x minutes	5 minutes
	Axis Assignment	Mixing		Activated
		Temperature		Activated
Programs	Start			-
	Edit	Edit	Speed	-
			Temperature	-
			Control mode — Time/± 0.0K/RAMP	-
			Time (hh:mm:ss)	-
			Mixing direction (CW/CCW/CW & CCW)	-
		Delete		-
		Insert		-
		Save		-
	Delete			-
	Rename			-
Safety	Password			No Password (000)
Settings	Language	English		Activated
		German		-
		...		-
	Units	Temperature	°C	Activated
			°F	-
	Display	Background	Black	Activated
			White	-
		Firmware update information		Activated
	Sound	Key tone		Activated
	Factorys settings			-
	Information	Software	Version xxx	-
		Firmware update information		-

Tempering

Control rate:

In the "Control rate" menu option, you can select the desired control rate between "Fast", "Moderate" and "Slow". A check mark (√) indicates the control rate is activated.

Fast: Fast tempering with a certain level overshooting.

Moderate: Moderate tempering with minimal overshooting.

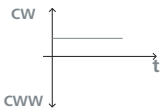
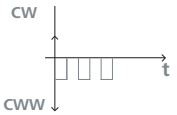
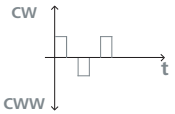
Slow: Precise tempering without overshooting.

Mixing

Intermittent mode:

In the menu you can select/carry out various settings for the direction of rotation and the mixing process:

1. Tick (✓): Intermittent mode option activated
2. CW time: set
3. Stop time: set
4. CCW time: set

Symbolic combination	Graph representation	Description
CW		**Factory setting: CW continuos mode mode**
CW		**CW & Stop activated:** **CW run time & stop time can be set separately**
CCW		**CCW & Stop activated:** **CCW run time & stop time can be set separately**
CW/CCW		**CW- STOP - CCW activated** **CW/CCW/STOP time can be set separately.**

Timer/Counter

Setting hours, minutes and seconds.

Mixing	
Timer	Max. adjustable value (max. 99hh:59mm:59ss)
Counter	Counter starts at 00hh:00mm:00ss (max. 99hh:59mm:59ss) When the maximum value is reached, the device runs again and the counter stops.
Temperature: Start condition *immediately* is selected	
Timer	Max. adjustable value (max. 99hh:59mm:59ss)
Counter	Counter starts at 00hh:00mm:00ss (max. 99hh:59mm:59ss) When the maximum value is reached, the device runs again and the counter stops.
Temperature: Start condition *When the target temperature is reached* is selected	
Timer	Max. adjustable value (max. 99hh:59mm:59ss)
Counter	Counter starts at 00hh:00mm:00ss (max. 99hh:59mm:59ss) When the maximum value is reached, the device runs again and the counter stops.

Modes

A	After switching on/mains power interruption, the functions do not restart automatically.
B	After switching on/mains power interruption, the functions restart automatically, depending on previous settings.
C	Setpoints (set in A or B) cannot be changed. After switching on/mains power interruption, the functions restart automatically, depending on previous settings.

Graph

Axis scaling

Automatic	X-Axis It is scaled to 5 minutes. A tick (✓) activates the function. Y-Axis: Maximum value
Manual	Y-Axis 1: Input of the speed limits (min./max. in rpm)
	Y-Axis 2: Input of the temperature limits (min./max.in °C/°F)
	X-axis: 5; 10; 20; 30; 60; 90; 120 selectable in minutes

Axis Assignment

Mixing	rpm
Temperature	°C, °F

Programs

5 user-defined speed/temperature (rpm/°C) time profiles can be created in the "Programs" menu. After a program has been selected, the following menu options are available.

Start:

Starts the program when loop mode is requested:

- *Infinite loop:* Upon completion of the last segment, the program continues with the first segment until the user ends the program by stopping a device function.
- *Loop Count:* Indicates the total number of loop cycles until program end.

⚠ **Notice!** At the end of the program all device functions are switched off.

Edit:

Change the program parameters of the selected program (edit, insert, delete or save). When you have edited the program time for at least one segment, an edit symbol appears for the relevant program.

SegNo.	Segment Number
Temp.	Target temperature

Ctrl.Mode	Time / ± x.x K / RAMP
	Time (time-controlled): Also, the target temperature that has been reached is maintained for the time specified in the column “Time hh:mm:ss”. Then the next program segment is automatically carried out. *± x.x K (gradient-controlled):* The segment is ended when the target temperature specified in the “Temp” column is reached within the control hysteresis (tolerance) specified in the column “Control Mode (± x.x K)”. *RAMP (gradient-controlled):* This enables even heating up with a defined gradient The segment is closed after the target temperature has been reached. The gradient in K/min comes from the quotient of the temperature difference and the time “Time hh:mm” specified in the current segment. The temperature difference is calculated from the target value temperatures of the current and preceding segment. ⚠ **Notice!** The ramp function can only be selected from the 2nd segment.
Time	hh:mm:ss
Mixing direction	CW/CCW/CW & CCW

Edit: To edit/change the program parameters.
Insert: Inserts a new program segment after the selected segment.
Delete: To delete the program segment
Save: Save the changes

Delete:
Delete all program parameters of the selected program using the navigation button + (I)/ button - (H) and the “Start/Stop/Enter “ button (G), “Delete” menu option. The edit symbol ( ) disappears. Abort the procedure with the Back -key.

Rename:
Rename the selected program with the navigation button + (I)/button - (H) and “Start/Stop/ Enter “-button (G).

Safety

Password:
In the “Password” menu, the menu settings can be locked by a 3-digit password.

Settings

Languages:
Select the desired language.

Unit:
Selection of “°C” or “°F” as the measurement unit for the temperature value shown in the display.

Display:
Change the background colour of the working screen.

Sound:
Activate/deactivate the button sound.

Factory settings:
Select the “Factory settings” option by turning and pressing the rotary/push knob. The system requests confirmation to restore the factory settings. Pressing the “OK” button resets all the system settings to the original standard values set at dispatch from the factory (see “Menu structure”).

Information:
Overview of the most important system settings of the device.

Operation

/// Switching on

After switching on via the main switch (Fig. 2, (8)), the device type, device designation and the firmware version are shown in the display.

Firmware Update Tool

After the home screen, you will see the information screen for the firmware update tool. You can use the tool to update the software of your IKA device to the latest version. Firmware updates contain new functions or optimisations of previous functions. You can download the Firmware Update Tool at www.ika.de/fut.

1

/// Set speed

2

/// Set temperature

3

/// Setting Timer/Counter

Interfaces and outputs

The device can be operated by computer via an RS 232 or USB port using labworldsoft® laboratory software. 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 Universal Serial Bus (USB) is a serial bus for connecting the device to the PC. Equipped with USB devices can be connected to a PC during operation (hot plugging). Connected devices and their properties are automatically recognized. The USB port can also be used to update firmware.

/// USB device drivers

First, download the latest driver for IKA devices with USB port.

Install the driver by running the setup file. Then connect the IKA device through the USB data cable to the PC.
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.

/// Command syntax and format

The following applies to the command set:

› Commands are generally sent from the computer (Master) to the device (Slave).
› The device sends only at the computer's request. Even fault indications cannot be sent spontaneously from the device to the computer (automation system).
› Commands are transmitted in capital letters.
› Commands and parameters including successive parameters are separated by at least one space (Code: hex 0x20).
› Each individual command (incl. parameters and data) and each response are terminated with Blank CR LF (Code: hex 0x0d hex 0x0A) and have a maximum length of 80 characters.
› The decimal separator in a number is a dot (Code: hex 0x2E).

The above details correspond as far as possible to the recommendations of the NAMUR working party (NAMUR recommendations for the design of electrical plug connections for analogue and digital signal transmission on individual items of laboratory control equipment, rev. 1.1).
The NAMUR commands and the additional specific IKA commands 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 labworld*soft*®, provides a convenient tool for controlling the device and collecting data under MS Windows, and includes graphical entry features, for motor speed ramps for example.

Commands	Function
IN_PV 2	Read the actual temperature
IN_PV_4	Read the actual speed.
IN_SP_2	Read the set temperature
IN_SP_4	Read set mixing speed
OUT_SP_2 xxx	Set the temperature value to xxx
OUT_SP_4 xxx	Set the speed value to xxx
OUT_SP_12@n	Set the WD-safety temperature with echo of the set (defined) value
OUT_SP_42@n	Set the WD-safety speed with echo of the set (defined) value
OUT_WD1@n	Start the watchdog mode 1 and set the time for the watchdog to n (20...1500) seconds. Echo of the Watchdog time. During a WD1-event, the tempering and mixing functions are switched off. This command needs to be send within the watchdog time.
OUT_WD2@n	Start the watchdog mode 2 and set the watchdog time to n (20...1500) seconds. Echo of the watchdog time. During a WD2-event, the set temperature is changed to the WD safety temperature and the motor set speed is set to the WD safety speed. This command needs to be send within the watchdog time.
RESET	Switch to normal operation mode
START_2	Start heating function
STOP_2	Stop heating function
START_4	Start the motor
STOP_4	Stop the motor
IN_VERSION	Read software version
IN_SOFTWARE_ID	Read software ID and version

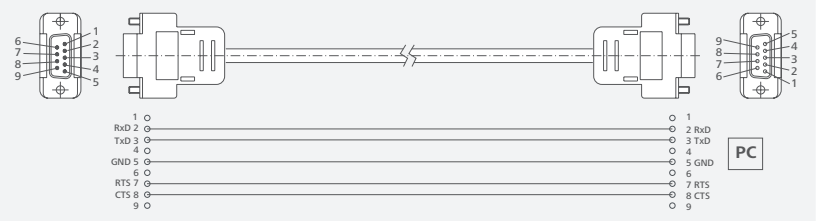
"Watchdog" functions, monitoring of the serial data flow:
If, once this function has been activated (see NAMUR commands), there is no retransmission of the command from the computer within the set time ("watchdog time"), the tempering and mixing functions are switched off in accordance with the set "watchdog" function or are changed to the set target values.
The data transmission may be interrupted by, for example, a crash in the operating system, a power failure in the PC or an issue with the connection table between the computer and the device.

"Watchdog" – mode 1:
If there is an interruption in data communications (longer than the set watchdog time), the tempering and mixing functions are switched off and Error 2 is displayed.

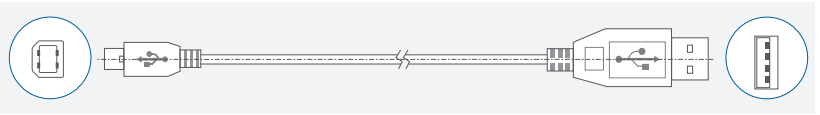
"Watchdog" – mode 2:
If there is an interruption in data communications (longer than the set watchdog time), the speed target value is changed to the WD safety speed limit and the temperature target value is changed to the WD safety temperature limit value. The error message Error 2 is displayed.

/// Connections between device and external devices

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



USB 2.0 Cable (A - B):
This cable is required to connect USB port to a PC.



/// Device firmware update

Keep your device up-to-to-date with the IKA Firmware update tool.
The firmware update can be done with a computer connected through USB-Interface.
For this, you need register on our website MyIKA first.
After registering your device IKA will inform you about available updates for your devices. Please download the software "FWUToolSetup.zip" from our IKA service website.

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!
Only use IKA-approved cleaning agents when cleaning your IKA devices.
They are: water (containing detergent) und isopropanol

› Wear protective gloves during cleaning the device.
› Electrical device 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:
› machine type,
› serial number, see type plate,
› item and designation of the spare part,
› software version.

/// Repair

Please send in device for repair only after it has been cleaned and is free from any materials which may constitute a health hazard.
For repair, please request the "**Safety declaration (Decontamination Certificate)**" from IKA or use the download printout of it from IKA website.
If you require servicing, return the device in its original packaging. Storage packaging is not sufficient. Please also use suitable transport packaging.

Error codes

The fault is shown by an error message on the display if the error occurs. Proceed as follows in such case:
› Switch the device off.
› Carry out corrective measures.
› Restart the device.

Error 02
Watchdog Error 02

Causes	› PC does not send any data within the set watchdog time. › Connection to PC interrupted
Effect	› Motor switched off
Solutions	› Change watchdog time › Transmit data from PC within set watchdog time (OUT_WDx@m) › Check cable and plug

Error 03
Device internal temperature

Causes	› Device internal temperature too high
Effect	› Motor off
Solutions	Turn off the device and let it cool down

Error 48
Motor Overload

Causes	› Overload / overload protection triggered
Effect	› Motor off
Solutions	› Reduce the speed setting or the load.

If the action 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.

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 machine 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.

Accessories

For further accessiores see www.imlab.eu.

Technical data

	Unit	F0.5	F1.5	F2.0	FP
General data					
Nominal voltage	VAC	100 … 240 ±10%			
Input	Hz	50 / 60			
Fuse		T4A 250V (2x)			
Power input max.	W	240			
Dimensions (W × D × H)	mm	216 x 351 x 149	216 x 351 x 158	216 x 351 x 158	216 x 351 x 147
Weight	kg	9.2			
Protection class according to DIN EN 60529		IP 21			
Permissible ambient temperature	°C	+5 … +40			
Permissible relative humidity	%	80			
Operation at a terrestrial altitude	m	2000			
Operating mode		timer and continuous operation			
Max. load	kg	0,3			
Permissible ON time	%	100			
Working with sample plates		-			microtitre, deep well & PCR plates
Number of sample plates	Stck	-			1
Working with sample vessels		0.5 ml vessels	1.5 ml vessels	2.0 ml vessels	-
Number of sample vessels	Stck	24			-
Heat function					
Heating temperature min.	°C	room temp. +4°			
Heating temperature max.	°C	100			
Heat output	W	100			
Set temperature resolution	±K	1			
Fixed safety circuit Safety temperature limit	°C	145			
Mix function					
Type of movement		orbital			
Direction of movement		Standard: CW Programmable: CW/CCW			
Shaker diameter	mm	3			
Speed min.	rpm	0			
Speed min. (adjustable)	rpm	300			
Speed max.	rpm	2000	1500		2000
Speed deviation	rpm	±30			
User interface					
Display		TFT-Display 4,3" (10,9 cm)			
Operation		Capacitative buttons			
Timer		1 s … 99 h 59 m 59 s			
Counter		1 s … 99 h 59 m 59 s (∞)			
Programming		Interval and program mode			
Remote		Labworld Soft			
Software Update		IKA Firmware Update Tool			
Interfaces					
RS 232		9-pol Sub-D (back side)			
USB		Type B (front side)			

Subject to technical changes!