IKA

designed for scientists

T 18 mini digital

ENGLISH

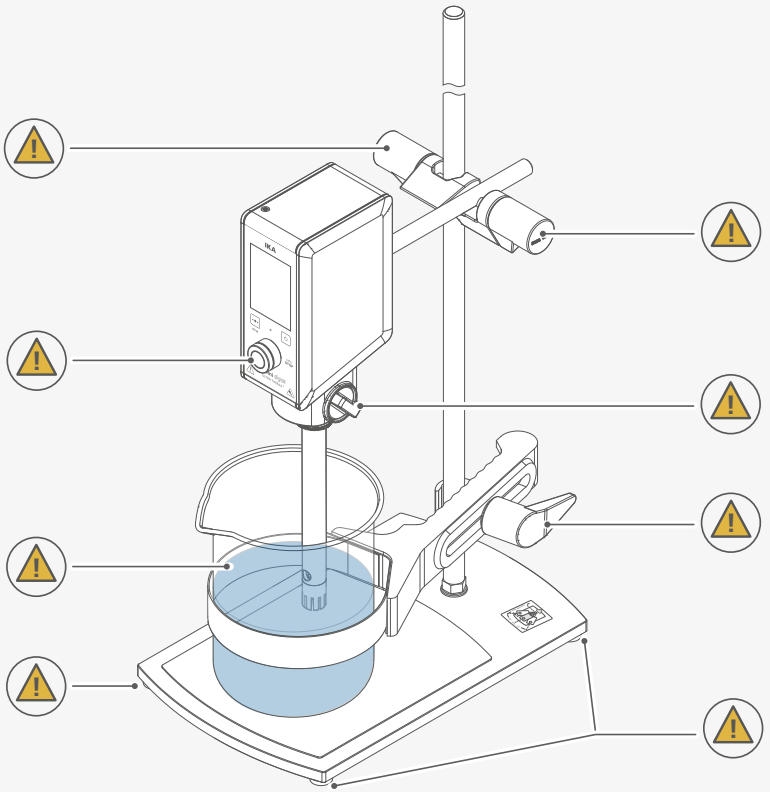


Fig. 1

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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 6010-2-051, 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 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.

Caution! Indicates crushing risk to fingers/hand.

Caution! Indicates a hazardous situation that can cause from 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.

Warning!
› Beware of the risk of:
- flammable materials
- glass breakage
- sharp edges on the dispersing tool.

Caution!
› Wear your personal protective equipment in accordance with the hazard category of the media to be processed. There is a risk from:
- splashing and evaporation of liquids
- body parts, hair, clothing and jewellery getting caught.

Notice!
› Pay attention to the marked sites in Fig. 1.
› The device must only be used in a technically perfect condition.
› Do not cover the ventilation slots on the device in order to ensure adequate cooling.
› Abrasion from the device or the rotating accessories can get into the medium you are working on.

/// Device setup

Warning!
› The standby button and control knob of the device must be accessed immediately, directly and without risk at any time. If access to standby button and control knob cannot be ensured, an additional emergency stop switch that can be easily accessed must be installed in the work area.

Caution!
› Make sure that the device is stably mounted. The vessel used for dispersing must be secured.

Notice!
› Set up the stand in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
› Place the power supply outside the working area of the device.
› Ensure that the dispersing tool is securely properly into the device.
› All screw connections must be properly tightened.
› Check that the turning knobs are secure and tighten if necessary.
› Glass vessels must always be secured with a clamp to prevent them spinning.
› Before switching on the device make sure that the dispersing tool shaft is immersed in the medium. Observe the operating instructions of the dispersing tools.
› The distance between the dispersing tool and the vessel bottom should not be less than 10 mm.
› Use the dispersing tool always inside the dispersing vessel.
› Do not use the device without a dispersing tool.

/// 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.
› 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!
› The device is not suitable for hand-held operation.
› Pull out the power plug when changing or handling the dispersing tool.

Caution!
› Do not touch rotating parts during operation.

Caution!
› The dispersing tool and the coupling flange can become hot during the operation.
› If a dispersing tool is not inserted into the drive flange as far as the mark it can become extremely hot in operation and thus suffer damage.

Caution!
› Be aware that the device starts with the set speed, which is shown on the display. If uncertain start with the lowest speed and increase it gradually.
› Reduce the speed if the medium splashes out of the vessel because the speed is too high.
› If the interaction between the medium and dispersing tool or working with dispersing tools with a stator diameter ≥18 mm and a speed of more than 20000 rpm, makes a loud noise, be sure to wear your personal protective equipment.

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, liquids and other contaminants.
› Never run dispersing tools dry, as the gasket and bearings will be destroyed if the tools are not cooled by the medium.
› In the event of unbalance or unusual noises, switch off the device immediately. Replace the dispersing tool. If there is no difference after the change of the dispersing tool, return it to the dealer or the manufacturer along with a description of the fault.
› Ensure that the stand does not start to move.
› There may be electrostatic discharges between the medium and the dispersing device shaft which could pose a direct danger.

/// Power supply / switching off the device

› The device can only be disconnected from the power supply by pulling out the power plug or the connector plug.
› Always disconnect the plug before fitting accessories or cleaning.
› The socket for the power cord must be easily accessible.
› The device does not start up again automatically following a cut in the power supply.

/// Accessories

› Protect the device and accessories from bumps and impacts.
› Check the device and accessories beforehand for damage each time you use them. Do not use damaged components.
› Only dispersing tool approved by IKA may be used.
› Safe operation is only guaranteed with the accessories described in the “Accessories” chapter.

/// Maintenance

› The device must only be opened by trained specialists, even during repair. 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

When used in combination with one of our recommended dispersing tools, the device is a high-speed dispersing and emulsifying device capable of handling free-flowing and liquid media in batches.

Production of:
Emulsions
Dispersions
Wet crushing

Intended use: on stand (dispersing tool points down)

/// Range of use

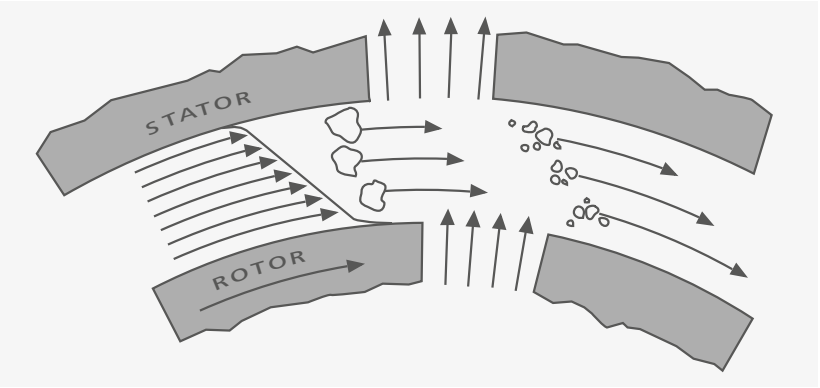
Indoor environments similar to that a laboratory of research, teaching, trade or industry.

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

Dispersion is the dissolution and diffusion of a solid, liquid or gaseous phase in a liquid that is not consolute with that phase.

The rotor/stator principle:
Due to the high rotation speed of the rotor, the medium to be processed is automatically drawn axially into the dispersion head and then forced radially through the slots in the rotor/stator arrangement. The high accelerations acting on the material produce extremely strong shear and thrust forces. In addition, high turbulence occurs in the shear gap between rotor and stator, which provides optimum mixing of the suspension.



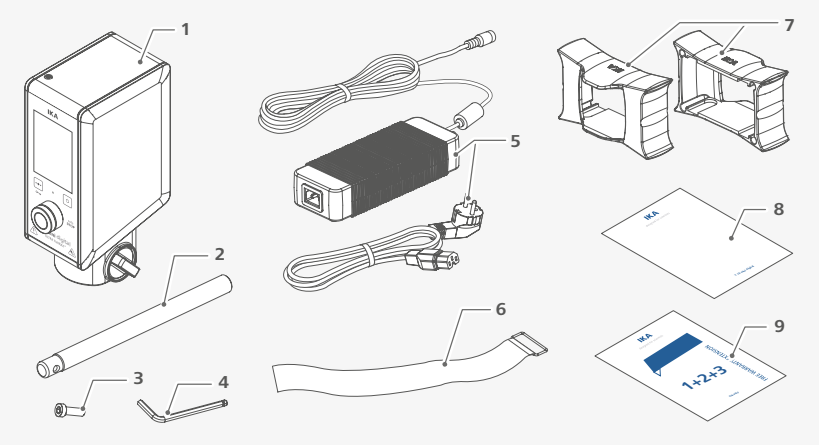
The dispersion effectiveness is heavily dependent on the product of the shear gradient and the time the particles spend in the shear zone. The optimum range for the circumferential velocity of the rotor / stator arrangement is 6–24 m/s.
A processing time of a few minutes is usually sufficient to produce the desired fineness. Long processing times bring only insignificant improvements in the obtainable fineness; the energy expended serves merely to increase the temperature of the medium.

Drive

The device opens up a wide range of possibilities for dispersion technology in the conventional laboratory with a respective performance output of approximately 160 watts at 25000 rpm.
The speed is set by using the control knob. The motor speed can be read from the LED display. For example, a value of 13.6 corresponds to 13600 rpm.

Unpacking

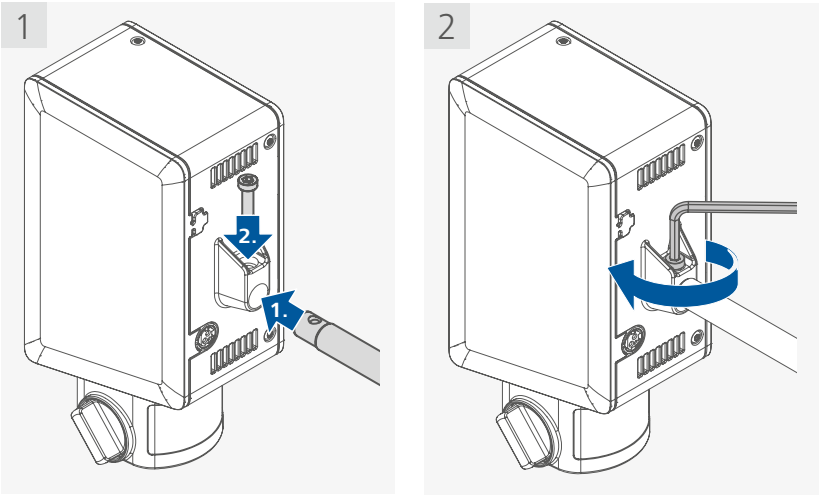
› Please unpack the device carefully.
› Any damage should be notified immediately to the shipping agent (post office, railway network or logistics company).



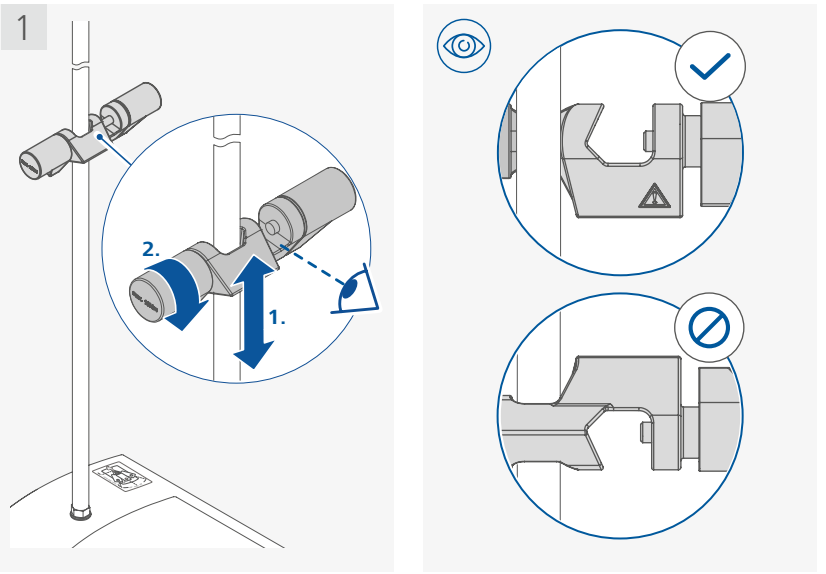
1	**T 18 mini digital**	6	Power cord set
2	Extension arm	7	Holding band
3	Hexagonal socket screw	8	Brackets for the desktop power supply
4	Hexagon socket offset screw key	9	User guide
5	Desktop power supply	10	Warranty card

Installation

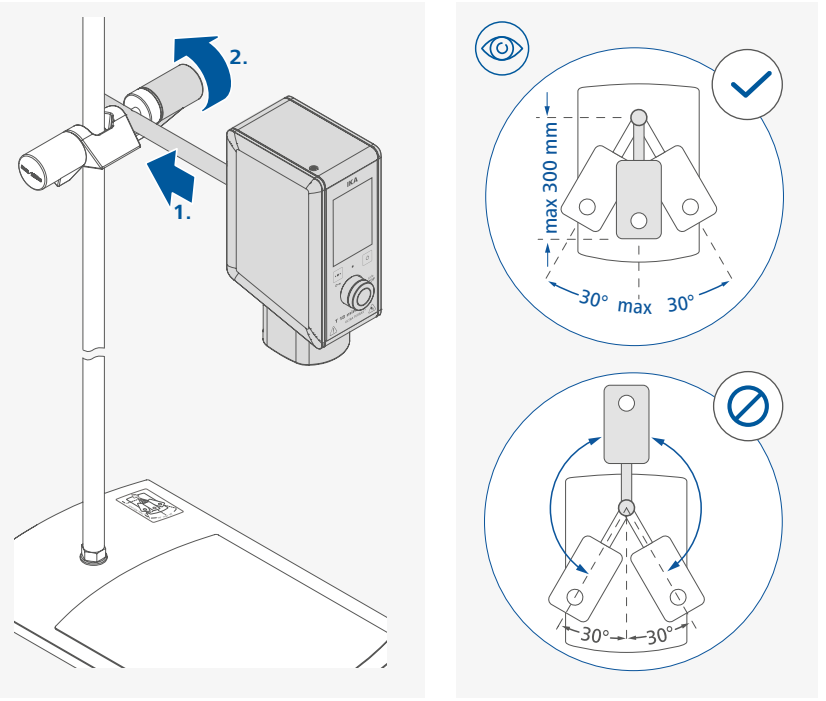
/// Securing the extension arm to the device



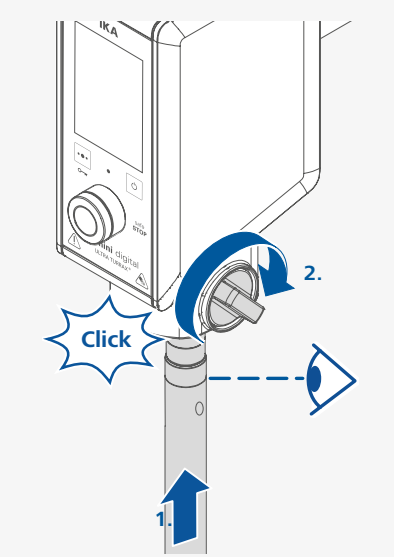
/// Securing the cross sleeve to the stand

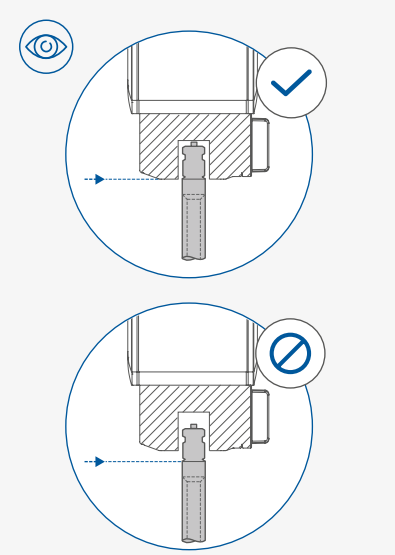


/// Securing the device to the cross sleeve



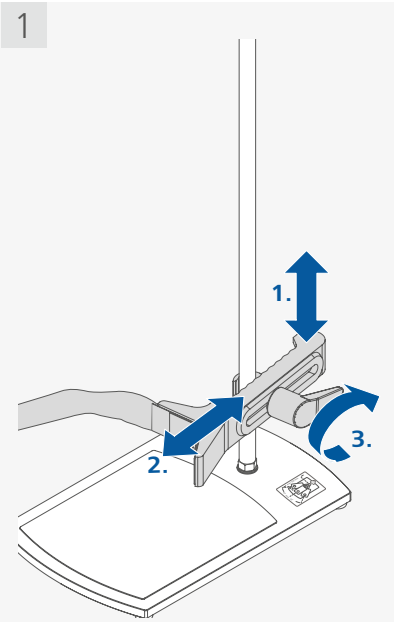
/// Securing the dispersing tool



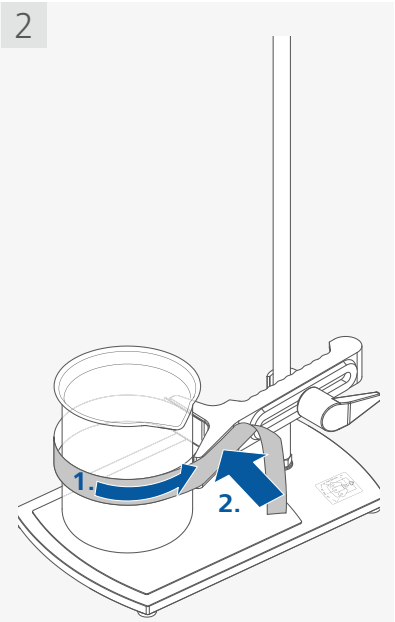


/// Securing the vessel to the stand

1

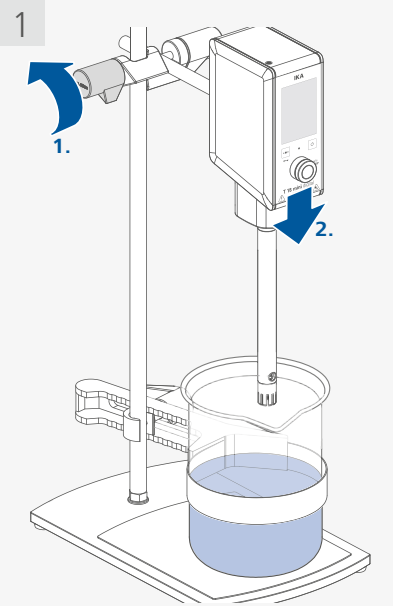


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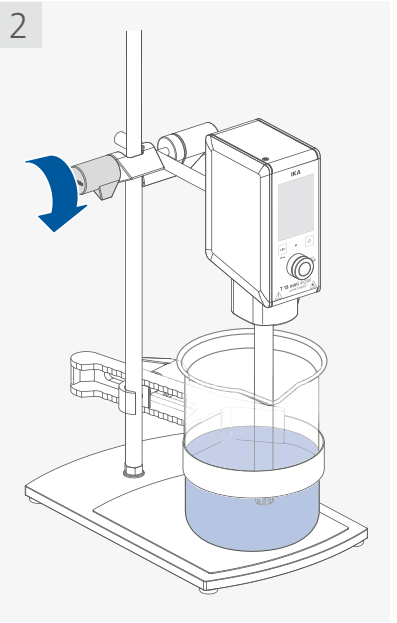


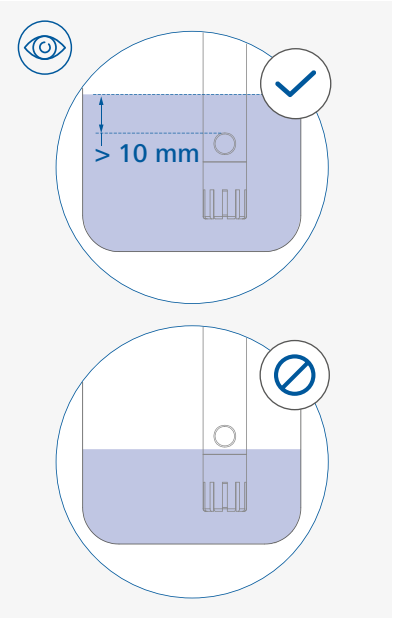
/// Positioning the device

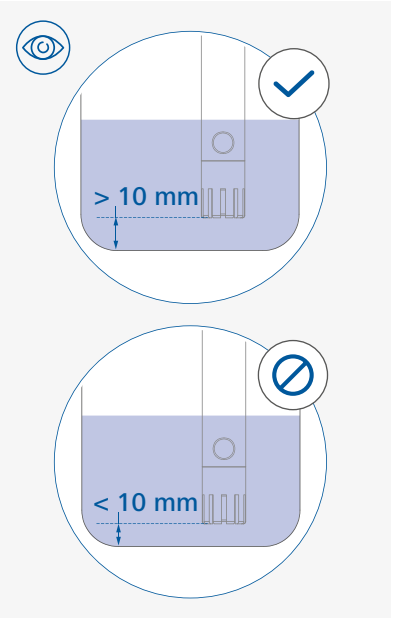
1



2



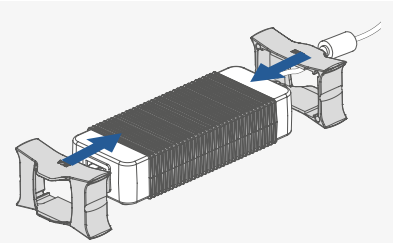


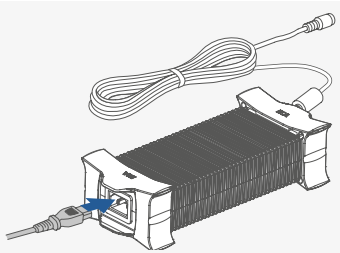


Notice!
The filling level of the medium must be at least 10 mm above the lower overflow hole of the shaft.

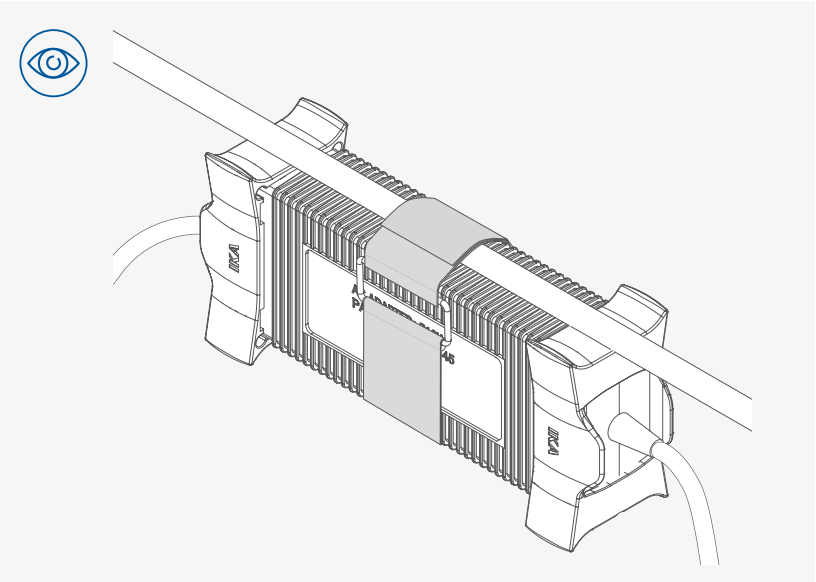
Notice!
The distance between the dispersing tool and the vessel bottom should not be less than 10 mm.

/// Attaching the brackets to the desktop power supply



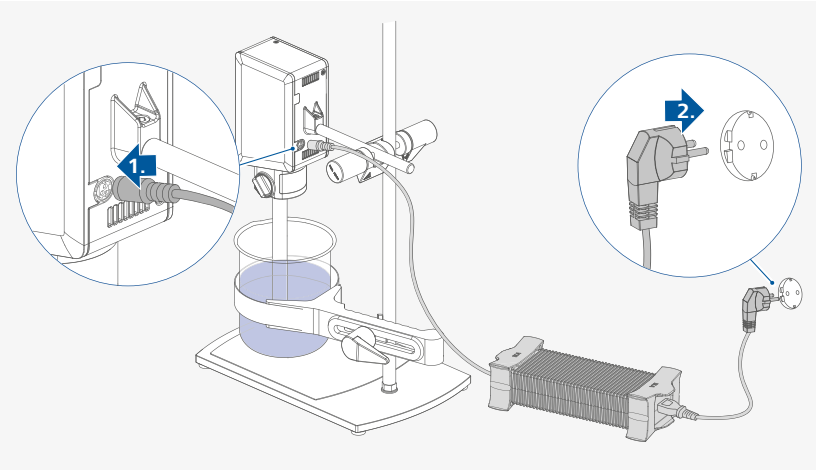


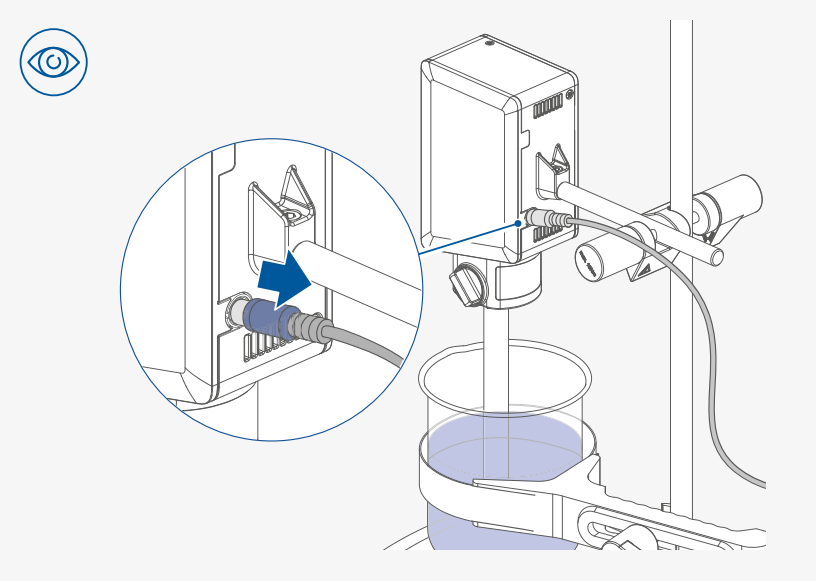
The brackets can prevent the desktop power supply from liquids on the table.



If required, the desktop power supply can be attached to a horizontally aligned pole using the brackets and the holding band supplied.

/// Connecting to the power

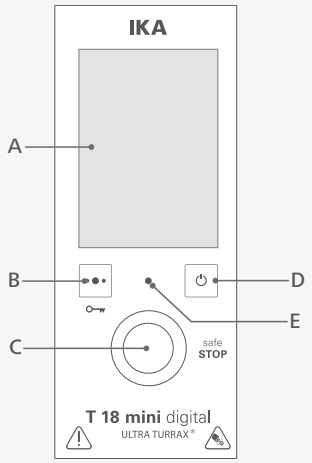




Notice!
To disconnect the device plug from the device, first release the plug lock by pulling back the plug housing. Don't pull the connection cord.

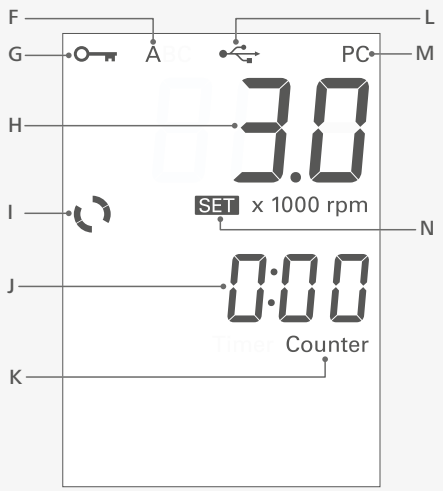
Operator panel and display

/// Explanation of the control elements



A	Display	Display of the set parameters of the device.
B	Multifunction button	Switch between different device functions: - Timer/Counter - Operating mode - Device information
		Lock/unlock the settings. Press and hold for 3 seconds to activate/ deactivate the lock function.
C	Control knob (rotating / pressing)	Set the speed. Select and chang the settings in the menu. Start/stop function of the device.
		Stop the device safely in lock status and with external control.
D	Standby button	Switches the device to standby mode (no disconnection from the power supply).
E	Status LED	LED lights up green: Device is ready for use. LED pulses green: Device function is activated. LED lights up white: Device is in standby mode. LED blinks red: Device is in error status.

/// Explanation of symbols on the working screen



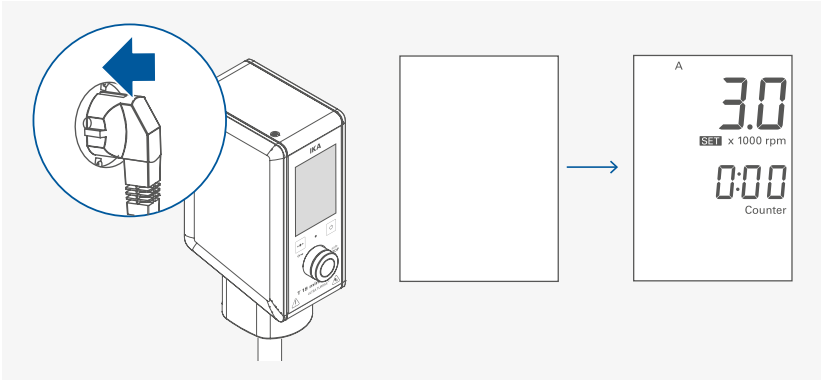
F	Operating mode symbol	Indicate the device is in operating mode (A, B or C).
G	Lock button symbol	Indicate the settings of the device is locked.
H	Speed display	Display the speed value (x 1000 rpm).
I	Working symbol	Indicates that the device function is activate.
J	"Timer/Counter" display	Indicate the "Timer/Counter" value.
K	"Timer/Counter" symbol	Indicate the "Timer" or "Counter" is activated.
L	USB connection symbol	Indicates a USB cable is connected.
M	PC control symbol	Indicate the device is controlled by a PC.
N	"SET" symbol	Indicate that the set value is displayed.

i The symbols displayed change depending on the status and settings of the device.

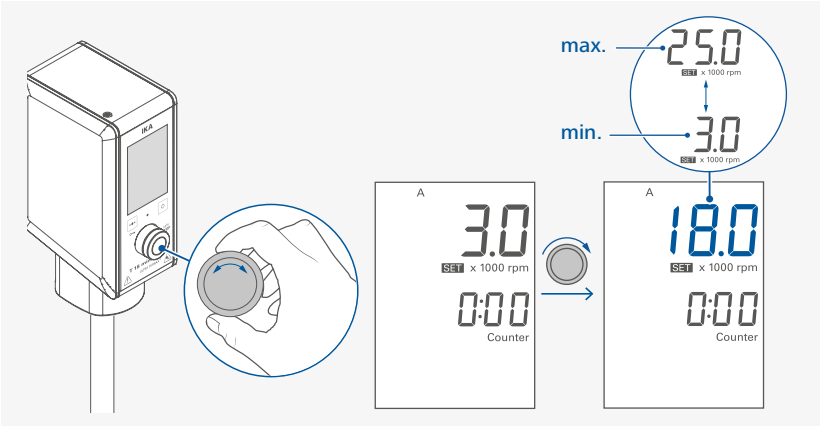
Operation

Notice!
Observe the ambient conditions (temperature, humidity etc.) listed under “Technical Data”.

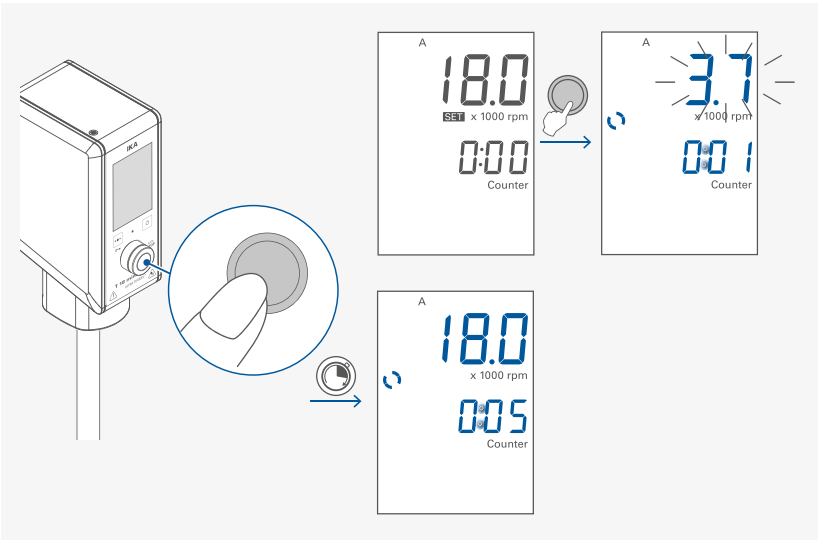
/// Switching on



/// Setting the speed

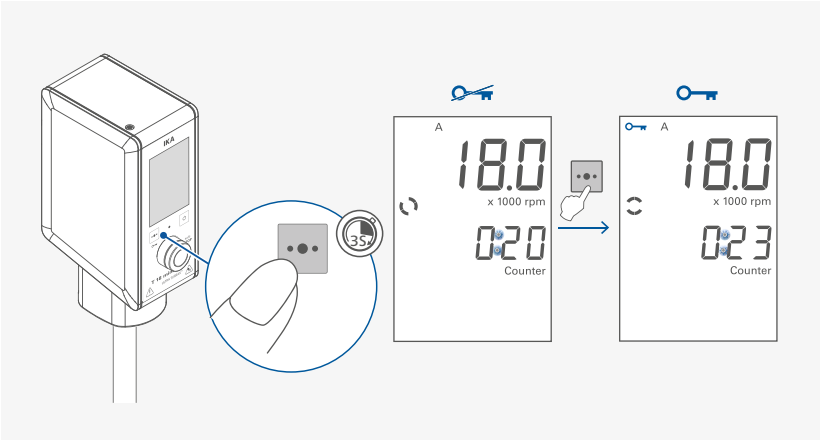


/// Starting device function

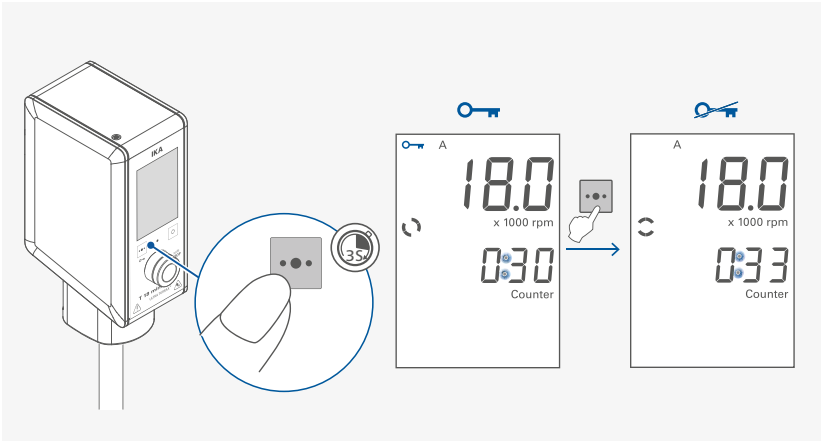


/// Locking/unlocking the settings

› Locking the settings

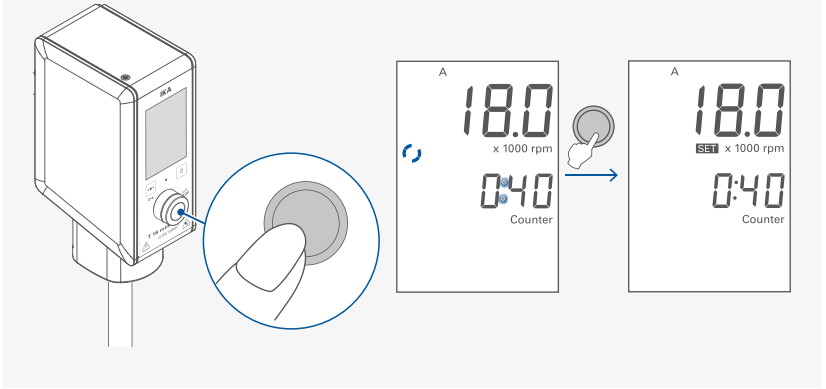


› Unlocking the settings



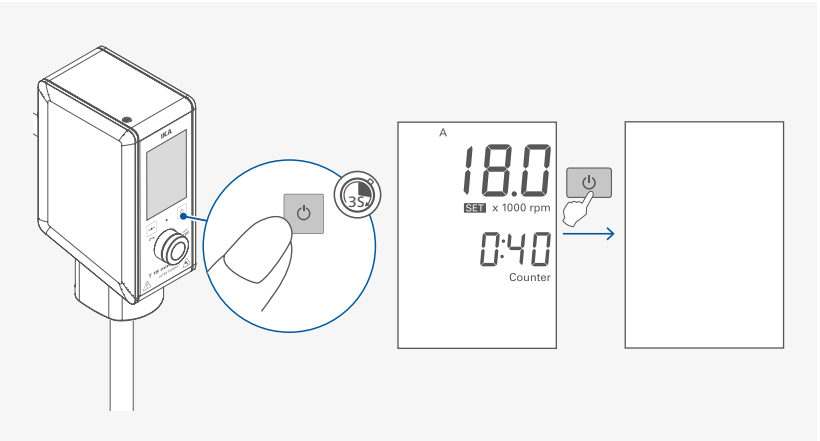
i Even in locking status, the device can be stopped or switched off by pressing the control knob (C) or standby button (D).

/// Stopping the device



i
› After stopping the device function, the last speed setting is shown on the display.
› After stopping the device function, the last set timer value or the elapsed running time (counter value) is displayed.

/// Activate standby mode



Menu navigation and structure

/// Menu navigation

› Activate the editing of menu option by touching multifunction button (B) shortly.
› Activate the editing of next menu option by touching multifunction button (B) shortly again.
› Current selected menu option blinks.
› Edit the desired menu option by turning and pressing the control knob.

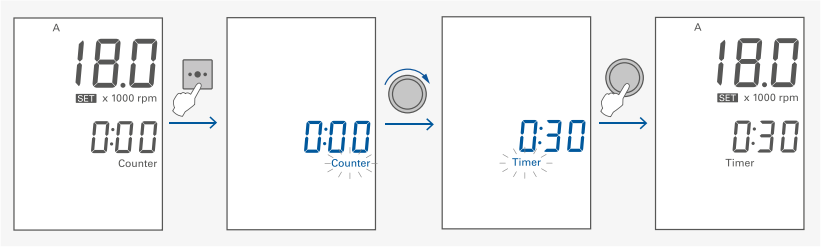
/// Menu structure

			Default settings
Menu	Counter		Activated
	Timer		-
	Operating mode	Mode A	Activated
		Mode B	-
		Mode C	-
	Device information		-

/// Menu details

Counter/timer:

Setting and confirming the timer value or counter in stopped or operating status:
› Activating the "Timer/Counter" setting.
› Set the desired timer value.
› Confirming the setting.

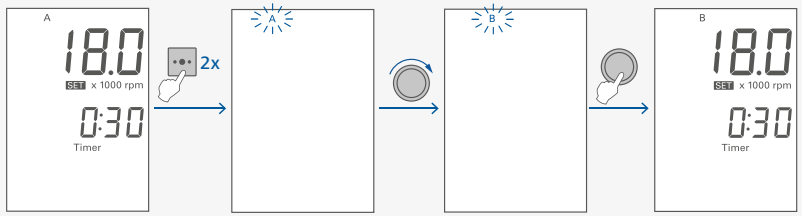


› If the value of the timer/counter setting is set to 0:00, the counter function is activated and the corresponding symbol (K) lights up.
When the device function is started, this value automatically starts to run from 0:00 to maximum value 99:59:59.
› If the value of the timer/counter setting is set to a value larger than 0:00, the timer function is activated and the corresponding symbol (K) lights up.
Once the set timer value has elapsed, the device function stops automatically and the last set timer value is displayed.
The maximum timer value is 99:59:59.
› While the device function is active, the timer setting can be checked by pressing the multifunction button (B) and reset if necessary.
› The device function can be stopped by pressing the control button (C). This stops the timer and resets it to the last set value.

Operating mode:

Setting the operating mode in stopped status:

› Select the operating mode menu.
› Select the desired operating mode.
› Confirm the setting.



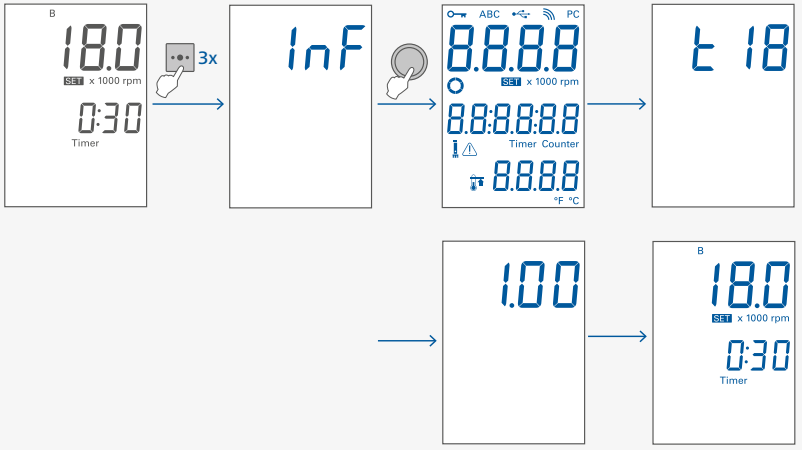
i

› **Operating mode A:**
After a power failure the set values are not saved. The devie doesn't restart by itself.
› **Operating mode B:**
After a power failure the set values are saved. The devie doesn't restart by itself.
› **Operating mode C:**
After a power failure the set values are saved and cannot be changed. The devie doesn't restart by itself.

Device information:

Overview of the device information in the stopped state:

› Select the device information menu.
› Confirm the setting.



i

When the device Information setting is active, a self-check screen, the device name, and the software version will appear.

Interfaces and outputs

The device can be operated in “Remote” mode via the USB port connected to a PC and with the laboratory software Labworldsoft®.
The device software can also be updated with a PC via USB port.

Note: Please comply with the system requirements together with the operating instructions and help section included with the software.
Also note the requirements for the ability to put the device into a safe status in an emergency if it is controlled externally.

/// 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.

/// USB device drivers

First, download the latest driver for IKA devices with USB interface from:
www.ika.com/ika/lws/download/usb-driver.zip.
Install the driver by running the setup file. Connect the IKA device through the USB data cable to the PC. The data communication is via a virtual COM port.

Note: The USB driver is unnecessary for Windows 10 system. Don't install it for Windows 10 system.

/// Command syntax and format

The following applies to the command set:

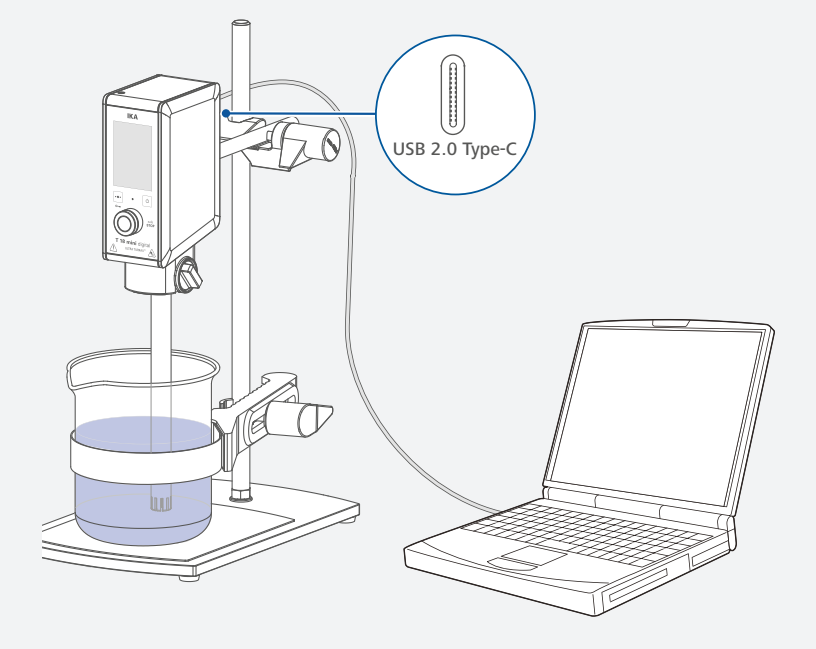
› Commands are generally sent from the computer to the lab device.
› The lab device only sends at the computer’s request. Even fault indications cannot be sent spontaneously from the lab device to the computer (automation system).
› Commands are transmitted in capital letters.
› Commands and parameters 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 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 Labworldsoft®, provides a convenient tool for controlling the device and collecting data under MS Windows.

Commands	Function
IN_NAME	Read device name.
RESET	Switch to normal operation mode
IN_PV_4	Read current speed value
IN_SP_4	Read rated value
OUT_SP_4 X (X = 3000 ... 25000)	Set the rated speed value to X rpm.
START_4	Start the motor
STOP_4	Stop the motor
IN_SOFTWARE	Read software ID and version

/// Connections between device and external devices

› Connecting device to a PC:



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



/// Device software update

Keep your device up-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 **www.ika.com**.

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 the devices:
Water containing surfactant / 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.

/// Ordering spare parts

When ordering spare parts, please indicate:
› Device type.
› Serial number, see type plate.
› Item and designation of the spare part, see: **www.ika.com**, spare parts diagram and spare parts list.

/// Repairs

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 "Decontamination Certificate" from **IKA**, or download printout of it from the **IKA** website **www.ika.com**.
If you require servicing, return the device in its original packaging. Storage packaging is not sufficient. Please also use suitable transport packaging.

Error codes

Any malfunctions during operation will be identified by an error message on the display.
Proceed as follows in such cases:
› Switch off the device with the power switch or disconnect the device from the power supply.
› Carry out corrective measures.
› Restart the device.

Note: In case of a failure, press the control knob or start/stop button for 1 seconds to show the full error code.

Error code | Causes | Effect | Solutions

E24: Motor

04243610 - Motor speed blocked

Causes	› Motor can't run normal (can't start or not reach the target speed)
Effect	› Motor off
Solutions	› Switch off the device. › Check the structure for possible blockage

04240702 - Motor current upper limit exceeded

Causes	› Overload
Effect	› Motor off
Solutions	› Switch off the device. › Decrease the speed setting or the load.

E41: Temperature internal

04411702 - Internal temperature upper limit exceeded

Causes	› Inside temperature is too high
Effect	› Motor off
Solutions	› Switch off the device and let it cool down. › Restart the device.

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.

Accessories

R 1825	Plate stand	**RH 3**	Strap clamp
R 1826	Plate stand	**BC 1000**	Beaker cap
R 1827	Plate stand	**Silentstream**	
R 182	Cross sleeve		

See more accessories on **www.ika.com**.

Permitted dispersing tools

Dispersing tools series S 18 ...
Abbreviations:
S 18: suitable for device **T 18**...
N: PTFE bearing
D: Without seal
KS: Synthetic material

Dispersing tools for T 18...
10 G, 14 G, 19 G: Stator / shaft tube diameter
G: Coarse
Speed range: upto 25000 rpm

Designation	**Shaft material**
S 18 N - 10 G	Stainless steel
S 18 N - 19 G	Stainless steel
S 18 D - 10 G - KS	Synthetic material
S 18 D - 14 G - KS	Synthetic material

For applications and further information, please see the operating instructions of the dispersing tools.
Only use the dispersing tools listed and observe the operating instructions of the dispersing tool.

Technical data

Motor rating input	W	210
Motor rating output	W	160
Volume range (H_2O)	l	0.001 ... 1.5
Maximum viscosity	mPa•s	2000
Speed range	rpm	3000 ... 25000
Speed deviation		± 3 % of current speed
Speed display		LED
Speed adjustment		stepless
Noise without dispersing tool	dB (A)	≤ 75
Extension arm (Ø x L)	mm	13 x 160
Timer/counter function		Yes
Max. timer/counter		100 hours (99:59:59 [hour:minute:second])
Time display		LED
Permitted on time	%	100
Dimension (W x D x H)	mm	66 x 100 x186
Weight	kg	1.8
Permissible ambient temperature	°C	+ 5 ... + 40
Permissible relative humidity	%	80
Drive		Brushless motor
IP code according to EN 60529		IP 30
Interface		USB
Operation at a terrestrial altitude	m	max. 2000
Power supply		
Input		100 ... 240 VAC / 5.0 ... 2.5 A 50 ... 60 Hz
Output		48 VDC 310 W
Protection class		I

Subject to technical changes!

Warranty

In accordance with IKA Terms and Condition of sale, 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.

IKA

designed for scientists

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Technical specifications may be changed without prior notice.

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