

IKA® MTS 2/4 digital



BETRIEBSANLEITUNG D 3

OPERATING INSTRUCTIONS GB 8

MODE D'EMPLOI F 13



Contents

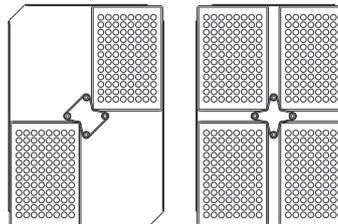
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Safety instructions

When adjusting the speed, pay careful attention to the containers fastened onto the agitation table to prevent the medium to be shaken from possibly splashing out. **Select the speed based on how full the container will be so as to prevent the medium from splashing out. Observe applicable safety instructions and guidelines as well as work protection and accident prevention requirements for use in the laboratory. Avoid bumping and striking the agitation table. Even minor damage that cannot be detected may result in damage to the motor bearing. Careful handling will ensure safe working and a long service life for the device.**

If you notice that the device is not running smoothly, the speed must always be reduced until no more unevenness occurs in the operation.

Make certain that the device is equipped with at least two diagonally offset or four micro-titer plates, whether or not these are completely filled. Never operate the device without micro-titer plates. Otherwise, resonance may arise when it runs at high speeds.



The micro-titer plates used for the agitation process must be securely fastened on the agitation table. Make certain in this regard to lock the round band for clamping the micro-titer plates. It must be replaced when necessary before it is too worn.

Only a specialist may open the device.



ATTENTION! Covers or parts that can be removed from the device must be put in place on the device in order to ensure safe operation.

The IKA MTS 2/4 digital was not constructed for operation in dangerous atmospheres, for mixing dangerous substances or for operation under water.

The instrument may not be operated in rooms with explosion hazards. **The device must be placed on a level and skid-free holding surface.**

Use only original IKA accessories.



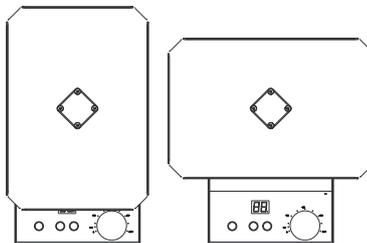
Proper use

The IKA MTS 2/4 digital is designed for agitating from two to four micro-titer plates.

It is designed for use in laboratories. The motion of the agitation table is a horizontal circular-shaped motion at every point, thanks to a newly designed vibration element. The circular movement is produced by an exciter with a 3-mm stroke (peak-to-peak).

To ensure usage in conformity with intended purpose, the device must rest upon a stable, even and slip-free holding surface. Otherwise it must be ensured that objects in the vicinity of the device are kept at an appropriate distance and that they cannot move around during the agitation process. Please make certain that the device is by itself and not touching any other objects. The arrangement of the agitation table was designed so that the device requires a little setup place as possible. In spite of this, you have the option of mounting the agitation table rotated by 90 degrees.

First remove the power cord. Remove the round band on the four clamping bolts on the agitation table. Then completely loosen the four fastening screws with the aid of the socket wrench included with delivery and remove the fastening screws. Rotate the agitation table by 90 degrees. Do not remove the spacing ring (No. 54) on the inside; otherwise the bearing will be exposed. Assemble the clamping bolts and screws in the reverse order. Make certain the screws are seated properly in their threadings.



Unpacking

Please unpack the equipment carefully and check for any damages. It is important that any damages which may have arisen during transport are ascertained when unpacking. If applicable a fact report must be set immediately (post, rail or forwarder).

The delivery scope covers:

A IKA MTS 2/4 digital, an Torx-offset screwdriver, an connecting cable, 5 O-rings and operating instructions.

General information

With the purchase of this device, you have acquired a high-quality product. The design of the unit and its special shape ensure ease of handling and problem-free work.

The speed-controlled external rotor asynchronous motor allows for infinite adjustment of the speed in the range from 0 to 1100 rpms. The electronic motor control system keeps the speed constant. The heat generated by the motor may cause the holding surface of the micro-titer plates to heat up.

The movement of the agitation table with the weight placed on it to be agitated produces a reaction force on the drive. This force is comparable with an imbalance. There is therefore an imbalance weight on the motor that compensates for part of the imbalance forces. Because of the differing weight of every material to be agitated, a residual imbalance remains. This imbalance tends to move the device back and forth and to move it on the holding surface. To prevent the entire system from resonating, always fit the device evenly with at least two micro-titer plates. Never operate the device

at a "critical speed" Either reduce the speed and agitate at a lesser intensity or pass through the critical point as quickly as possible if you would like to work at a higher speed or greater agitation intensity.

Commissioning

Check whether the voltage specified on the type plate matches the mains voltage available.

Set the micro-titer plate at an angle by pressing diagonally against the extendable round band around a corner. Place the micro-titer plate evenly on the holding surface and push it outward under the edges of the sheet that are bent inward.

Before you switch on the device, rotate the turn dial for speed control as far as it will go to the left.

If these conditions are met, the device is ready to operate after plugging in the mains plug. If these procedures are not followed, safe operation cannot be guaranteed and/or the equipment may be damaged. Please note the ambient conditions indicated in the Technical details (temperature, and relative humidity).

You can turn the device on with the power switch (1), which

is located on the right side of the device. After you have turned on the device, all the segments of the LED display (2) briefly light up and an audio signal is heard. After this self-test of the device, the speed display shows the value "0"; the drive is turned off. Now select the desired speed in revolutions per minute on the turn dial for speed adjustment (3).

The following options are available for operating the device. You can adjust them with the buttons on the front foil pad. When you press a button, an audio signal confirms your action.

A: Continuous operation

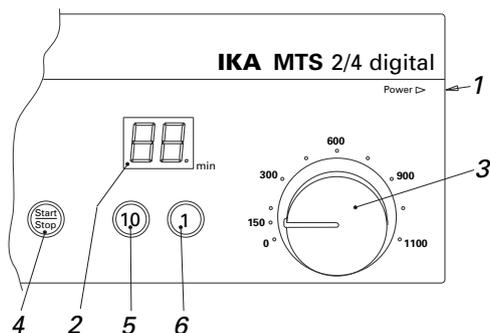
The device is in continuous operation mode when the LED display (2) indicates a value of "0". To start the drive in continuous operation, press the "Start/Stop" button (4) again one more time. The drive starts to run at the adjusted speed. The LED display (2) shows two small zeros ("oo"). To stop operation, press the "Start/Stop" button (4) again. The drive stops and the LED display shows the value "0" again.

The "1" button (6) and the "10" button (5) have no function in continuous operation.

B: Time switch

In this mode (Timer), you can select an operating time in the range of 1 to 99 minutes. You can adjust the desired time setting with the "1" key (6) and the "10" key (5). Every time you press the "1" key (6), the time setting is incremented by 1 minute. Correspondingly, every time you press the "10" key (5), the time setting is incremented by 10 minutes. The set time is shown on the LED display (5). If the ones or tens place shows a "9", it will be replaced the next time the button is pressed by a "0".

Timer mode is indicated by the dot on the lower right-hand corner of the LED display (2). To start the drive, press the "Start/Stop" button once (4). The drive starts to run at the adjusted speed and the decimal point flashes.



The LED display **(2)** indicates the remaining time in minutes and counts down backwards until it reaches a value of 0. When the set time has expired, the drive stops and an audio signal is heard three times. The LED display **(2)** shows a value of "0" and the dot that identifies Timer mode stops flashing.

You can stop the drive while the timer is running at any time by pressing the "Start/Stop" button (4). The LED display **(2)** will show a value of "0" afterward in this case as well, and the dot that identifies Timer mode will stop flashing. While Timer mode is in operation, you can increase or decrease the time setting as required by pressing the "1" key **(6)** and/or the "10" key **(5)** as described above. After you have changed the time setting, the time begins to elapse again and the LED display **(2)** shows the remaining time in minutes as it did before.

Motor protection

Blocking or overloading the motor beyond the permissible motor temperature causes the device to switch off automatically due to the safety circuit. The LED display (2) displays the corresponding error message. To eliminate the error, please check the operating conditions. Also allow the device to cool off.

The device must be turned off and back on again.

Error codes

Error message MTS 2/4:

Please note! If an error occurs, an audio warning signal is generated and the Timer display switches to E + error

number. First try to turn off the device and then turn it back on to continue operation. If an error is not eliminated even after waiting for a considerable amount of time, please contact our service department. You should always let us know what error code was displayed. This facilitates troubleshooting and helps us draw some initial conclusions.

Error message	Error	Cause of error
E 1	The potentiometer for the speed setting does not specify any target value	-Too rapida change in the speed target value -Internal device error
E 2	Motor blocked	-Agitation table is inhibited in its stroke motion by an external effect
	Read fork signal not present	-Internal device error
E 3	Maximum adjustable speed of the device exceeded	-Resonance behavior of the test setup
E 4	Motor standstill for device switch-on routine (safety query) not provided	-To switching on the device, the motor does not en rotation motion
E 5	Safety relay cannot be activated	-Internal device error
E 7	Problem with power supply	-The device is being operated with over-voltage or under-voltage. (For permissible voltage range, see the Technical Data)
E 8	Triac cannot be activated	-Internal device error

Maintenance and cleaning

The IKA MTS 2/4 digital is maintenance-free. It is subject only to the natural wear and tear of components and their statistical failure rate.

When ordering spare parts, please give the manufacturing number shown on the type plate, the machine type and the name of the spare part.

Please send in equipment for repair only after it has been cleaned and is free from any materials which may constitute a health hazard. Use only cleansing agents which have been approved by IKA to clean IKA devices. To remove use:

Dyes	isopropyl alcohol
Construction materials	water containing tenside / isopropyl alcohol
Cosmetics	water containing tenside / isopropyl alcohol
Foodstuffs	water containing tenside
Fuels	water containing tenside

For materials which are not listed, please request information from IKA. Wear the proper protective gloves during cleaning of the devices. Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.

Before using another than the recommended method for cleaning or decontamination, the user must ascertain with the manufacturer that this method does not destroy the instrument.

Associated standards and regulations

Construction in accordance with the following safety standards

IEC 61 010-1

UL 3101-1

CAN/CSA C22.2 (1010-1)

Construction in accordance with the following EMC standards

IEC 61 326-1

Associated EU guidelines

EMC-guidelines: 89/336/EWG 93/31/EWG

Machine guidelines: 73/023/EWG

Technical data

design voltage:	or	VAC	230±10%
		VAC	115±10%
design frequency:		Hz	50/60
input power:		W	19
output power:		W	5
Speed range:		rpm	0 - 1100 (infinitely adjustable)
Speed setting:			Turn dial on front side)
Speed display:			Scale 0 - 1100
Drive:			Speed controlled asynchronous motor
Agitation stroke		mm	4 Ø
Shaking motion:			horizontal, circular
Perm. duration of operation:		%	100
Perm. ambient temperature:		°C	+5 to +40
Perm. relative humidity:		%	80
protection class acc. DIN 40 050:			IP 21
protection class:			II
overvoltage category:			II
contamination level:			2
operation at a terrestrial altitude:	m		max. 2000 above sea level
max. load:		kg	2 (including attachment)
dimensions: (W x D x H)		mm	157x247x130 (without attachment)
weight:		kg	5,7