IKA

designed for scientists

IKA KS 3000 i control
IKA KS 3000 ic control

Contents

EN

EU Declaration of conformity

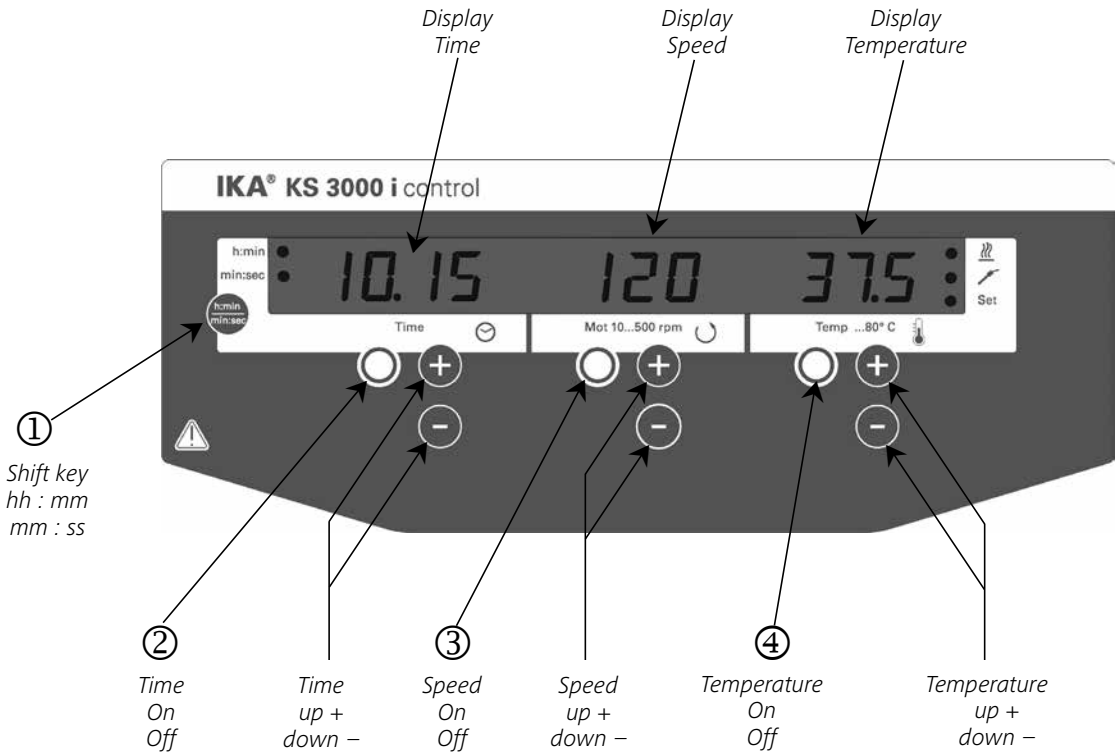
We declare under our sole responsibility that this product corresponds to the directives 2014/35/EU, 2006/42/EC, 2014/30/EU and 2011/65/EU and conforms with the standards or normative documents: EN 61010-1, EN 61010-2-051, EN 61326-1, EN 60529 and EN ISO 12100.

A copy of the complete EU Declaration of Conformity can be requested via: sales@ika.com.

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.

Operator panel and display



Explication of warning symbols

General hazard.

This symbol identifies informaton **that is of absolute importance to ensure health and safety**. Failure to observe this information may be detrimental to health or may result in injuries.

This symbol indicates information **witch is important for ensuring that the appliance functions without any technical problems**.
Failure to observe this information could damage the appliance.

This symbol indicates information **which is important for proper use of the appliance and / or ensuring that the appliance functions correctly.** Failure to observe this information can lead to inaccurate results.

ATTENTION - Risk of damage due to magnetism.

Safety instructions

General instructions

- **Read the operating instructions in full before starting up and follow the safety instructions.**
- Keep the operating instructions in a place where they can be accessed by everyone.
- Ensure that only trained staff work with the appliance.
- Follow the safety instructions, guidlines, occupational health and safety and and accident prevention regulations.
- Socket must be earthed (protective ground contact).

- **Risk of burns!**
  Exercise caution when touching the housing parts and the attachments. They may become hot.. Pay attention to the residual heat after switching off.
- Beware of the high dead weight of the appliance when transporting. Ensure that your fingers do not get crushed when setting down the appliance.

Arrangement of equipment

- **Do not** operate the appliance in explosive atmospheres, with hazardous substances.
- Set up the appliance in a spacious area on an even, stable, clean, non-slip, dry and fireproof surface.
- The feet of the appliance must be clean and undamaged.
- The voltage stated on the type plate must correspond to the mains voltage.
- The socket for the mains cord must be easily accessible.
- Check the appliance and accessories beforehand for damage each time you use them. Do not use damaged components.

Permissible media / Contamination / Side reactions

- **Caution!** Only process and heat up any media that has a flash point higher than the adjusted safe temperature limit that has been set. The safe temperature limit must always be set to at least 25 °C lower than the fire point of the media used

Beware of hazards due to:

- flammable materials
- combustibles media with a low boiling temperature
- glass breakage
- incorrect container size
- overfilling of media
- unsafe condition of container
- biological and microbiological materials.

- Process pathogenic materials only in closed vessels under a suitable extractor hood. Please contact **IKA** if you have any questions.

- 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 irridiation.

- The media used in the appliance may result in danger specific to the media and the process. This applies, for example, to shaking cultures with living cells and to aggressive or flammable media.

Particulars as small estimated endangerments can become, if they arise with one another in combination, a larger endangerment. This manual cannot describe the dangers and resulting safety measures in more detail.

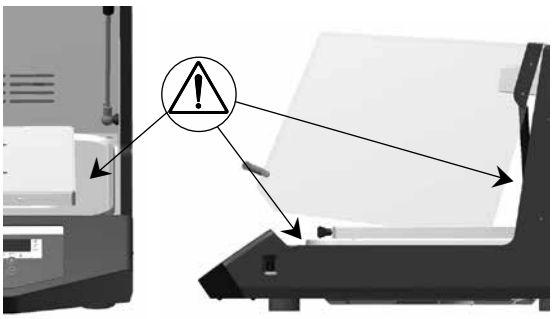
Performing trials

Wear your personal protective equipment in accordance with the hazard category of the media to be processed.
Otherwise there is a risk from:

- splashing and evaporation of liquids
- ejection of parts
- body parts, hair, clothing and jewellery getting caught.

- Gradually increase the shaking rate..
- Reduce the shaking rate if
  - the medium splashes out of the vessel because the speed is too high
  - the appliance is not running smoothly
- If you notice that the device is not running smoothly, the shaking rate must always be reduced until no more uneveness occurs in the operation.
- Because of improper loading and the position of the center of gravity, dynamic forces may arise during the agitation process that cause the shaker to move about on the table.
  For restrictions of load capacity and material weight during high shaking frequencies, please see the description in the „Attachments" section.
- Pay attention to the vessels on the shaking table when setting the shaking rate. This will prevent any of the medium to be shaken from spurting out of the sample vessels.
- Should vessels break during operation or the media be spilt, interrupt the shaking process immediately, remove any vessel residue and clean the appliance.
- Never touch moving parts.

⚠ DANGER Caution! The shaker still runs after the cover has been opened.
Wait for it to stop running.
(Risk of being crushed, shocked or cut, see figure illustrating danger points).



Accessories

- NOTE ! Covering or parts that are capable of being removed from the unit without accessory equipment have to be re-tached to the unit for safe operation in order to prevent, for example, the ingress of fluids, foreign matter, etc..
- All accessories and vessels in place for the shaking process must be firmly secured.
- Accessories may only be assembled once the plug has been dis connected. The safety of the user cannot be guaranteed if the appliance is operated with accessories that are not supplied or recommended by the manufacturer or if the appliance is operated improperly, contrary to the manufacturer's specifications.
- Shaking vessels which are not properly secured could get damaged or be projected out, thus causing injury. It is essential to regularly check that the vessels to be shaken and the attachments are firmly secured, especially before using the appliance again.
- When using an external temperature sensor, it must always be in the medium. Immerse the external temperature sensor at least 20mm into the medium.

To the protection of the equipment

- When servicing, the wiring selected by IKA must be set up again!
- Avoid allowing objects to push or strike the agitation table.
- Keep a minimum distance of 100mm from the appliance on all sides.

Correct use

- **Use**
  - for mixing and / or heating liquids

- **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.

Unpacking

- **Contents of package**

KS 3000 i control
- Shaking device
- Mains cable
- Operating instructions
- 4 clamping screws short
- Temperature sensor PT 1000.80
- USB-Cable
- RS232-Cable
- safety declaration

KS 3000 ic control
- Shaking device
- Operating instructions
- 4 clamping screws shor
- Temperature sensor PT 1000.80
- 2 hose connecting pieces
- 2 hose connecting clamp
- 2 unlocking handle
- RS232-Cable
- safety declaration
- Mains cable
- USB-Cable

- **Unpacking**
  - Please unpack the device carefully
  - In the case of any damage a detailed report must be set immediately (post, rail or forwarder)

Commissioning

Make sure before start-up of the equipment that the drain hose leads into a drain!
For protection in transport, a strip of foamed material is inserted between the shaker table and the inner face or the rear wall. This must be removed before initial commissioning.
Check whether the voltage specified on the type plate matches the mains voltage available. The power socket used must be earthed (protective earth conductor contact). 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.
Observe the ambient conditions (temperature, humidity, etc.) listed under Technical Data.

Switching on

⚠WARNING Note the load guideline values for the attachments prior to switching appliance on (see „Attachments“).

The appliance is switched on using the switch on the side of the appliance. Once it has been switched on, all of the LEDs light up briefly during the self test.

❶ 8.8.8.8 8.8.8 8.8.8
Display fields

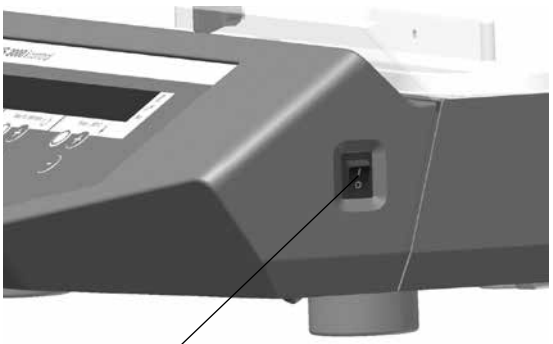
❷ 3.000 A 1.02
Device type *Operating mode* *Software version*

❸ SAFE 500 900
Safety limit values *max. adjustable speed* *max. adjustable temperature*

Tapping the Start/Stop keys or On/Off key starts the particular functions.

The desired default values can be changed using the + or - keys.

Use the shift key ① to switch from hour / minute mode to minute / second mode.



Main switch I/O

If the elapsed time exceeds the value of 100 hours, the display switches from hour / minute mode 99.59

to hour mode h 100

Only whole hours are displayed in hour mode.

The following sections contain detailed information about the individual functions.

Setting the safety limit values

If the Time ON/OFF key ② is held down while „SAFE“ is displayed, the safety limit values can be changed using the respective up/down keys.

Function Shaking

Press ③ key to start or stop the shake function. The speed can be adjusted during operation. The displayed value flashes until the pre-set speed has been reached.

When the shaking function is started using button ③ , the timer automatically starts measuring the time until the next switch-off.

Note:
The shaking function can only be started when the cover is closed. When the cover is opened, the shaker automatically switches off the shaking and heating functions.

Timer

The desired shaking duration is set on the operator panel of the timer using the Time +/- keys. The shift key can be used to switch from hour mode to minute mode.

The Time On/Off key activates the timer and shaking functions.

When the time is up, the shaking function stops and an acoustic signal is given off. If the cover is opened before the time is up, the timer goes to „pause“ and the display flashes. If the cover remains open for more than 15 minutes, the timer switches off and an error code appears on the display. The shaker no longer starts when the cover is closed.

If the timer is not activated, the Time display automatically shows the operating time following the start of the shaking function.

Function Heating

Once the appliance starts, the display indicates the actual value for the set temperature.

Press the ④ key to start or stop the heating function. The temperature is entered using the Temp +/- keys. In operation, the temperature is displayed in 0.1 °C steps.

The target value appears approx. every 5 seconds and remains on the display for 2 seconds.

Note:
The heating function can only be started when the cover is closed. When the cover is opened, the shaker automatically switches off the shaking and heating functions

Operating modes

You can choose between operating modes A, b and C.

A	Appliance does not start up again following power outage Safety limit value for speed and temperature adjustable
b	Appliance starts up again following power outage Safety limit value for speed and temperature adjustable
C	Appliance starts up again following power outage Safety limit values cannot be changed

Setting the operating mode

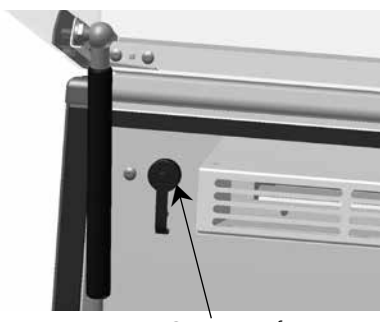
Switch on appliance and simultaneously hold down the Time Start/Stop key ② and the shift key ① .

The display indicates either A, b or C depending on the operating mode set (factory default setting A).
Switching the appliance off and on switches to the next operating mode.

Following the selection of the operating mode, the corresponding letter appears on the display for 5 seconds, the appliance is ready for operation..

External temperature sensor

If external temperature sensor PT1000.80 is connected to the internal slide-on receptacle, the temperature can be measured at any place in the medium.



Connector for PT1000.80

The temperature control of the heating works automatically with this display or measuring value. This is indicated by the lighting up of the LED next to the temperature sensor symbol.

⚠ WARNING Locate the external temperature sensor and the connecting cable so that the shaking motion is unimpeded and no vessels are damaged or tipped over.

Calibration - Temperature

The appliance is calibrated at the factory.

This function allows the temperature to be calibrated to a desired value. This may be necessary, for example, if special sample containers, their arrangement or external influences (e.g. sunshine) cause the measuring value for the temperature to be incorrect.

Calibration with or without inserted sensor

- Fill Erlenmeyer flask (250ml) with water to the 100ml mark
- Place the Erlenmeyer flask in the centre
- Immerse the sensor of the external measuring device in the water
- Set the target temperature
- Close the cover and start the Temp function
- Wait until the temperature in the incubation cover has stabilised
- While holding down the shift key ①, briefly press the Temp On/Off key ④ , the CAL display appears; keep holding down the shift key ①.
- Set the temperature value read off the external measuring device using the Temp up + / down - keys
- Calibration is complete when you release the shift key

Reset

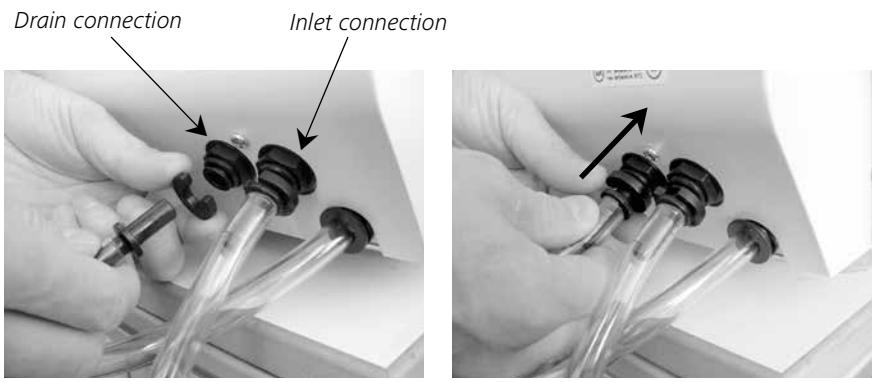
To restore the factory settings, hold down the Mot „-“ key and the Temp „-“ key and press the main switch I/O.

Factory setting:- Operating mode A
Upper speed limit 500 rpm
Safety temperature limit 95 °C
Temperature calibration

Appliance variant KS 3000 ic control

There is a cooler built into this appliance variant.
By using an external cooling unit, the working temperature can be lowered in relation to the room temperature (depending on the supply temperature). Set the desired temperature on the KS 3000 and switch the heating function on.

The cooler is connected to an external cooling unit (e.g. IKA KV 600) via the plug connection at the back of the appliance. The inlet and outlet connections are labelled accordingly at the back of the appliance. To connect the cooling pipes there are two hose connection pieces included. They can be connected to a hose with a 10mm interior diameter. The connectors are unlocked by coaxially positioning the unlocking lever and pressing slightly in the direction of the arrow. By positioning and light pressure in the direction of the plug, the connectors are locked/connected to the inlet/outlet plug connections on the housing.



Water is the only coolant that may be used (with antifreeze, e.g. ethylene glycol).
Permissible cooling agents - inlet temperature 3 to 20 °C
Temperature limit 80°C

Observe the maximum permissible pressure of 1 bar! As a safeguard, we recommend using a pressure limiter (e.g. IKA C25). This is not necessary when using an IKA KV600.

Accumulated condensate is drained out of the cooler through the drain hose.

Error codes

An error is indicated by an acoustic signal and an error code is displayed.

E. g.:

If faults cannot be eliminated directly, you must perform a RESET (see „Resetting parameters to the factory settings")!

If the faults still cannot be eliminated, the appliance must be inspected by a technical service.

Error code	Description	Cause	Effect	Solution
Er 3	Temperature inside unit too high	• Permitted ambient temperature has been exeeded • Ventilation slots or fan housing blocked	Heating off	• Switch off the unit. Allow it to cool down and switch on again. • Clean ventilation slots or fan housing • Observe maximum permissible ambient-temperature
Er 4	Differance between setpoint and actual speeds is too large	• Motor seized or overload	Motor off	• Reduce the torque load (load) • Reduce setpoint speed
Er 8	The calibration value of the temperature sensor is outside the limit value	• Fault in calibration procedure • Value was incorrectly stored to memory • EPROM switching error	Heating off	• Repeat the calibration procedure
Er 14	External temperature sensor, short-circuit	• Short-circuit at temperature sensor plug • Short-circuit in connecting cable or on Temperature sensor	Heating off	• Check the plug • Substitude the temperature sensor
Er 16	External temperature sensor has exceeded the SAFE Temp	• SAFE Temp is set at a temperature lower than the actual temperature on the external temperature sensor	Heating off	• Allow the unit to cool down • Set the SAFE Temp at a higher temperature
Er 17	Temperature sensor - Incubation-room has exceeded the SAFE Temp	• SAFE Temp is set at a temperature lower than the actual temperature on the external temperature sensor	Heating off	• Allow the unit to cool down • Set the SAFE Temp at a higher temperature
Er 26	Difference between the internal control and safety temperature sensors too large	• Ventilation slots in incubation room blocked • Radial-flow fan does not rotate • Fault in the control or safety temperature sensors	Heating off	• Switch off the unit. Allow it to cool down and then switch on again. • Check fan or ventilation slots and clean if necessary
Er 60	Power outage	• Power outage during operation	Interruption of heating or shaking function	• Delete the display by pressing the shift key
PC 1	In remote operation (PC) with watchdog function 1 (WD) enabled: No communication between PC and unit	• PC does not send data during the watchdog time • The connection/cable to the PC is broken	Heating off Motor off	• Change the watchdog time • Send data from the PC within the watchdog time • Check the connector cable and plug
PC 2	In remote operation (PC) with watchdog function 2 (WD) enabled: No communication between PC and unit	• PC does not send data during the watchdog time • The connection/cable to the PC is broken	The setpoint temperature is set to the WD safety temperature The setpoint speed is set to the WD safety speed	• Change the watchdog time • Send data from the PC within the watchdog time • Check the connector cable and plug

Attachments

The following attachments are offered as accessories

AS 260.1
Universal attachment

AS 260.2
Bracket attachment

AS 260.3
Bowl attachment

AS 260.5
Separating funnel attachment

The attachments are affixed to the shaking table using the four clamping screws provided.

Load (standard values)

Load / kg	1	3	5	7,5
Max. speed / rpm	500	400	300	120

Interfaces and outputs

USB interface

The Universal Serial Bus (USB) is a serial bus system for connecting the KS 3000 to the PC. Devices with USB capabilities can be connected and disconnected whilst in operation (hot-plugging); connected devices and their properties are also detected automatically.
The USB interface is used in conjunction with labworldsoft® for operation in "Remote" mode

Installation
Connect the KS 3000 to the PC using the USB data cable. The KS 3000 will then transmit information to the Windows operating system to tell it which device drivers are required. Windows will then either:
- Load the driver
- Install the driver automatically, if it is not already installed
- Prompt the user to perform a manual installation
- In this case, select the appropriate download from the IKA Internet product page.

Configuration

The unit can be controlled from an external PC (using the dedicated software labworldsoft) via the RS 232 C serial interface / USB fitted to the unit.

To increase safety when controlling the shaking unit from a PC, enable the watchdog function for monitoring the continuous serial data flow (see section watchdog function)

- The functions of the inteface lines between laboratory instrument and automation system are selected from the specfied signals of the EIA-standard RS 232 C, corresponding with DIN 66020 Part 1. The allotment of the bushing can be taken from illustration.
- For the electrical properties of the interface lines and for the allotment of the signal status, standard RS 232 C, corresponding with DIN 66259 Part 1 applies.

- Transmission method: Asynchronous signal transmission in start-stop-operation.
- Mode of transmission: Fully Duplex
- Character format: Character imaging acc. to data format DIN 66022 for start – stop operation. 1 start bit; 7 character bits; 1 parity bit-[straight (even)]; 1 stop bit..
- Transmission speed: 9600 Bit/s
- Access method: Data communication from shaker to computer is only possible on demand of the computer.

Instruction syntax

Here applies thje following:
- The instructionsare generally sent from the processor (master) to the laboratory instrument (slave).
- The laboratory instrument exclusively sends on demand of the processor. Even error codes cannot be spontaneously communicated from the laboratory instrument to the processor (automatic system)
- Instructions and parameters as well as subsequent parameters are separated by at least o n e blank. (Code: hex 0x20)
- Each individual instruction including parameters and data as well as each reply are terminated with CR LF (Code: hex 0x0D and 0x0A) and have a maximum lenght of 80 characters.
- The decimal separator in a floating point number is the point. (Code: hex 0x2E)

The above statements largely correspond with the recommendations of the NAMUR-Assocation (NAMUR-recommendations for the design of electric plug connections for the analog and digital signal transmission to labortory - MSR individual units. Rev. 1.1).

Overview of the NAMUR-instructions

Abbreviations:
X,y = numbering parameter (integer number)
m = variable value, integer
n = value of variable, floating point number
X = 1 Pt1000 medium temperature (external temperature sensor)
X = 2 temperature (incubations room)
X = 3 safety temperature
X = 4 speed
X = 6 safety speed
X = 50 Pt1000.80 medium temperature sensor offset in K (-5.0 <= n <=+5.0)
X = 52 incubations room temperature sensor offset in K (-5.0 <= n <=+5.0)

NAMUR Instructions	Function
IN_NAME	Input description name
IN_PV_X X=1;2;3;4;	Reading the real value
IN_SOFTWARE	Input software ID number date, version
IN_SP_X X=1;2;3;4;6;12; 42;50;52;53;	Reading the set rated value
IN_TYPE	Input laboratory unit ID
OUT_NAME name	Output description name. (Max. 10 characters, default: KS3000 ic)
OUT_SP_12@n	Setting the WD safety temperature with the echo of the set value
OUT_SP_42@n	Setzen der WD safety speed with the echo of the set value
OUT_SP_X n X=1;2;4;50;52	Setting the rated value to n
OUT_WD1@m	Watchdog mode 1: When a WD1 event occurs, the heating and shaking functions are shutdown and message PC 1 is displayed. Set the watchdog time to m (20...1500) seconds, with echo of the watchdog time. This instruction starts the watchdog function and must be sent within the set watchdog time
OUT_WD2@m	Watchdog mode 2: When a WD2 event occurs, the speed setpoint will be set to the WD safety setpoint speed and the temperature setpoint will be set to the WD safety setpoint temperature. The PC 2 warning is displayed. The WD2 event can be reset with OUT_ WD2@0-resetting also blocks the watch dog function. Set the watchdog time to m (20...1500) secondes, with echo of the watchdog time. This command starts the watchdog function and must be sent within the set watchdog time.
RESET	Switching off the instrument function.
START_X; X=1;2;4	Starting the instrument's (remote) function; *(display additionally: PC)*
STATUS	Display of status 1S: mode of operation A 2S: mode of operation B 3S: mode of operation C S0: manual operation without fault S1: Automatic operation Start (without fault) S2: Automatic operation Stop (without fault)
	<0: error code: (-1) - 1: error 1 - ... (see table) -31: error 31 -83: wrong parity -84: unknown instruction -85: wrong instruction sequence -86: invalid rated value -87: not sufficient storage space
STOP_X X=1;2;4	Switching off the instrument - (remote) funktion. Variables set with OUT_SP_X are maintained. Contains the instruction RMP_STOP. *(display additionally: PC)*

"Watchdog" function, monitoring the serial data flow

The following applies to situations where the watchdog function is enabled (see Namur instructions). If no new transmissions of these commands from the PC take place within the preset watchdog time, the heating and shaking functions will be shutdown according to the watchdog mode selected or will be controlled using the preset setpoints. An operating system crash, a PC power failure or a fault in the connecting cable to the instrument can cause an interruption in data transmission.

"Watchdog"– Mode 1

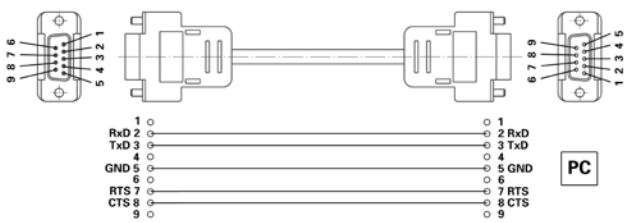
If an interruption in data transmission occurs which is longer than the preset watchdog time, the heating and shaking functions will be shutdown and the error message PC 1 will be displayed.

"Watchdog"– Mode 2

If an interruption in data transmission occurs which is longer than the preset watchdog time, the speed setpoint value will be set to the WD safety speed setpoint and the temperature setpoint will be set to the WD safety temperature setpoint.
The PC 2 warning message will be displayed.

Connections between shaking instrument and external devices

PC 1.1 Cable
Cable PC 1.1 for connection to the 9-pin socket on the computer



Maintenance and cleaning

The shaker KS 3000 i control and KS 3000 ic control is mainten ace free. It is subject only to the natural wear and tear of components and their statistical failure rate.
Examine in regular intervals the functionality and the correct attachment of the two gas-filled supports!
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: water containing tenside / isopropyl alcohol.

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.

Collecting tray with drain hose (for picture see below)
(applies to KS 3000 i control and KS 3000 ic control)
In the event of glass breakage, leaking liquid is collected by the collecting tray below the shaking table and guided to the drain hose via a drain at the rear.

Cleaning of the collecting tray:
- loosen four countersunk head screw at the top side of the shaking table
- remove shaking table upward

Cleaning the Plexiglas cover:
- Do not dry wipe!
- Do not use abrasive materials!
- Do not use solvents!

Clean dusty surfaces with warm water, detergent and a soft cloth. We recommend the anti-static plastic cleaner "AKU" by Burnus GmbH, Darmstadt.

For disinfecting, only use products prescribed by the manufacturer specially for use on Plexiglas

Ordering spare parts

When ordering spare parts, please give:
- Device type
- Manufacturing number, see type plate
- Software version
- Item number and designation of the spare part, see **www.ika.com.**

1. Remove drain hose from bracket

2 Place drain hose in laboratory drain

Repair

The device must be clean and free from any materials which may constitude a health hazard when sent for repair.
Use the „safety declaration" included or download the form from the IKA website **www.ika.com.**

Please return the appliance in its original packaging. Storage packaging is not sufficient for returns. Please also use suitable packaging for transportation.

Accessories

- **AS 260.1** Universal attachment
- **AS 260.2** Bracket attachment
- **STICKMAX**
- **AS 260.3** Bowl attachment
- **AS 260.5** Separating funnel attachment
- **PC1.1** Adapter

Technical data

Design voltage	**VAC**	230 ± 10%
or	**VAC**	115 ± 10%
Design frequency	**Hz**	50/60
Heating power	**W**	1000
Input power	**W**	1120
Speed range	**rpm**	10 - 500
Heating temperature range	**°C**	RT +5 80
Temperature constancy (200 ml water at set point T = 37 °C, RT 25 °C)	**K**	0.1
Temperature sensor PT1000.80 - variation DIN EN 60751 Kl.A	**K**	≤ ± [0.15 + 0.002 x (T)]
Permitted duration of operation	**%**	100
Permitted ambient temperature	**°C**	+15 at +32
Permitted relative humidity	**%**	80
Protection class acc. DIN EN 60529		IP 30
Protection class		I
Overvoltage category		II
Contamination level		2
Operation at a terrestrial altitude	**m**	max. 2000 above sea level
Drive		Speedcontrol asynchronous motor
Protection at overload		Temperature sensor in motorwinding
Fuses on apparatus plug	**A**	T16A (Id.Nr. 39 357 01)
Radius orbit	**mm**	20
Shaking motion		orbital
Max. Load	**kg**	7.5
Dimensions (W x H x D)	**mm**	465 x 430 x 695
Weight (i control)	**kg**	35
Weight (ic control)	**kg**	37
Speed setting (Button on front side)		Digital
Dissolution of adjusting	**rpm**	1
Speed display		LED - Display
Max. speed deviation from idle	**%**	±1
Temperature seting (Button on front side)		Digital
Dissolution of adjusting	**K**	0.1
Temperature display		LED - Display
Time setting (Button on front side)		Digital altern. Min/Std)
Time display		LED - Display (1 - 999 hh:min/min:sec)
Interface		USB and RS 232 C
<u>KS 3000 ic control</u>		
Temperature range (inlet T>3°C)	**°C**	12 - 90

Subject to technical changes!