

User Manual

Ultra-Stable Temperature
Chamber (Air Bath)

TK-105 US

SAMPLE



Kambič

WARRANTY

Kambic d.o.o. guaranties that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty is valid only if the product has been installed and used in accordance to the instructions supplied by Kambic d.o.o.

Kambic d.o.o. shall in no event be liable for incidental or consequential damages, including without limitations, lost profits, loss of income, loss of business opportunities, loss of use, and other related exposures, caused by incorrect use of product.

Warranty is valid for **13 months** from date of shipping and includes spare parts and labor.

Type:	TK-105 US
Serial number:	
Date of shipping:	
Signature/stamp:	

Manufacturer:

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Thank you for your trust and for buying this device. We hope it will successfully serve the purpose for many years.

**CAREFULLY READ THESE INSTRUCTIONS
BEFORE USING THE DEVICE**

SAMPLE



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EN

1. WARNINGS AND SAFETY PRECAUTIONS

Always keep this manual in close reach for reference. This product should only be used and operated by skilled and trained personnel familiar with technical capabilities and potential safety hazards.

Always follow and obey the national regulations related to technology and labor laws.

To avoid injuries and equipment damage study and follow the safety instructions and warnings.

Legal:

The content of the manual is subject to change without notice.

Understanding and following this operating manual is first step to hazard-free and safe use of the equipment.

This user manual can not reach out to all application that might even develop in the future. If you find information unclear or you are not sure about safe use of the product in your specific case, do not hesitate to contact your dealer or us via info@kambic.com for further information or opinions.

In no event shall Kambic d.o.o. be held liable for any damages, direct or incidental related to the use of this product and manual.

Product can be equipped with variety of accessories and options. This warning list might include elements that are applicable only with certain models and accessories.



READ ALL INSTRUCTIONS BEFORE USE!

Reduce the possibility of injury and failure.



WARNING

Before you perform any kind of maintenance, disconnect all electrical power to the unit! DO NOT operate this unite without a properly grounded, properly polarized power cord. DO NOT connect this unite to a non-grounded, non-polarized outlet.



DANGER

Appliance must not be installed in a room where the possibility of explosive atmosphere is present!



DANGER OF BREAKDOWN

Service only allowed to authorized personnel!



DANGER OF FIRE

Heating of flammable materials is not allowed!



WARNING

Close the doors tightly before start! Do not open doors during the cycle!



DANGER OF BURNS

Use safety gloves when operating with high/low temperatures!



EXPLOSION HAZARD

Do not process any materials that could generate explosive hazardous Atmosphere!



EXPLOSION HAZARD

Do not operate the equipment in explosive hazardous atmosphere!



ELECTRIC HAZARD

Do not operate the equipment in wet and condensing environment!



STABILITY HAZARD

Do not load or affect product stability with heavy loads or climbing the product!



TRANSPORT HAZARD

Transport the chamber only in original packing!
Always secure the chamber stability during reposition!
Never use doors or handles or accessories for holding point during reposition!



OVERHEATING HAZARD

Do not install the equipment in non ventilated environments!
Ensure appropriate space and volume around the chamber!
Ensure sufficient heat dissipation for product cooling!

DE

WARNUNGEN UND SICHERHEITSVORKEHRUNGEN

Halten Sie dieses Handbuch zum Nachschlagen stets griffbereit. Dieses Produkt darf nur durch befähigtes und trainiertes Personal verwendet werden, dass mit den technischen Eigenschaften und potentiellen Sicherheitsrisiken vertraut ist.

Befolgen Sie stets die nationalen technischen und Arbeitsrechtsvorschriften.

Um Verletzungen sowie Schäden am Gerät zu vermeiden, lesen und befolgen Sie die Sicherheitsanweisungen und Warnungen.

Rechtliche Hinweise:

Der Inhalt dieses Handbuchs kann ohne vorherige Benachrichtigung geändert werden.

Das Benutzerhandbuch zu verstehen und zu befolgen, ist der erste Schritt zur gefahrenfreien und sicheren Verwendung dieses Geräts.

Dieses Benutzerhandbuch kann nicht alle Geräte, einschließlich zukünftiger Entwicklungen abdecken. Wenn Sie Informationen als unklar empfinden oder sich über die sichere Verwendung des Gerätes in Ihrem spezifischen Fall unsicher sind, zögern Sie nicht, Ihren Händler oder uns über info@kambic.com zu weiteren Informationen oder Stellungnahmen zu kontaktieren.

Keinesfalls kann Kambic d.o.o. für Schäden jeglicher Art durch Verwendung dieses Produktes oder Handbuchs, direkt oder indirekt, verantwortlich gemacht werden.

Das Produkt kann mit verschiedenen Zubehörteilen und Optionen ausgestattet sein. Die Warnungsliste kann Punkte enthalten, die nur auf bestimmte Modelle und Zubehörteile zutreffend sind.



LESEN SIE VOR DER VERWENDUNG ALLE ANWEISUNGEN!

Reduzieren Sie die Verletzungs- und Schadensmöglichkeiten.



WARNUNG

Vor jeglichen Wartungsarbeiten alle Netzversorgungsanschlüsse zum Gerät trennen! Das Gerät NICHT ohne ordnungsgemäß geerdetes und gepoltes Netzanschlusskabel verwenden. Das Gerät NICHT an eine Steckdose ohne Erdung oder mit falscher Polung anschließen.



GEFAHR

Das Gerät darf nicht in Räumen mit möglicherweise auftretender explosionsfähiger Atmosphäre betrieben werden!



GEFAHR DES GERÄTEAUSFALLS

Wartung nur durch autorisiertes Personal zulässig!



BRANDGEFAHR

Beheizung von entzündlichen Materialien ist nicht zulässig!



WARNUNG

Türen vor dem Start dicht schließen und im Betrieb nicht öffnen!



GEFAHR VON VERBRENNUNGEN

Verwenden Sie bei hohen/niedrigen Temperaturen Sicherheitshandschuhe!



EXPLOSIONSGEFAHR

Verwenden Sie keine Materialien, die eine explosionsfähige Atmosphäre erzeugen könnten!



EXPLOSIONSGEFAHR

Das Gerät nicht in explosionsfähiger Atmosphäre betreiben!



GEFAHR ELEKTRISCHER SCHLÄGE

Das Gerät nicht in feuchter oder kondensierender Umgebung betreiben!



GEFAHR DER SCHWERPUNKTVERLAGERUNG

Keine schweren Lasten laden oder Stabilität durch Zuladung oder Besteigen des Produktes beeinflussen!



GEFAHR DURCH TRANSPORT

Transportieren Sie die Kammer nur in der Originalverpackung!
Bei Positionsveränderung stets die Kammerstabilität absichern!
Niemals Türen, Griffe oder Zubehörteile zum Tragen des Gerätes nutzen!



GEFAHR DER ÜBERHITZUNG

Das Gerät nicht in unbelüfteter Umgebung installieren!
Stellen Sie genug Abstand und Raumvolumen um die Kammer sicher!
Stellen Sie ausreichend Wärmeabfuhr zur Kühlung des Produktes sicher!

FR

MISES EN GARDE ET MESURES DE SÉCURITÉ

Veillez toujours garder ce manuel à proximité en cas de besoin. Ce produit ne doit être utilisé et manié que par du personnel formé et compétent étant au fait des capacités techniques et des risques potentiels d'accident.

Veillez toujours suivre et respecter les réglementations nationales en matière de technologie et de code du travail.

Afin d'éviter tout dommage corporel et matériel, veuillez étudier et suivre ces consignes de sécurité et mises en garde.

Clause légale:

Le contenu de ce manuel est sujet à modifications sans préavis.

La compréhension et le respect de ce manuel d'utilisation est le premier pas vers une utilisation sûre et sans danger de l'équipement.

Ce manuel d'utilisation ne peut s'étendre à l'ensemble des applications susceptibles de se développer à l'avenir. Si vous trouvez certaines informations peu claires ou si vous avez des doutes concernant une utilisation sûre dans votre cas précis, n'hésitez pas à contacter votre vendeur ou nous-mêmes via info@kambic.com pour plus d'informations ou de conseils.

En aucun cas Kambic d.o.o. ne pourra être tenu responsable pour quelques dommages directs ou accidentels que ce soient liés à l'utilisation de ce produit ou de ce manuel.

Le produit peut être équipé de nombreux accessoires et options. Cette liste de mises en garde est susceptible de contenir des éléments n'étant applicables qu'à certains modèles et accessoires.



LISEZ TOUTES LES CONSIGNES AVANT UTILISATION!

Limitez le risque d'accidents et de pannes.



ATTENTION

Déconnectez toute alimentation électrique de l'appareil avant de réaliser quelque type de maintenance que ce soit!

N'utilisez PAS cet appareil sans câble électrique correctement relié à la terre et correctement polarisé. Ne connectez PAS cet appareil à une prise non reliée à la terre ou non polarisée.



DANGER

L'appareil ne doit pas être installé dans une pièce présentant un risque d'atmosphère explosive!



RISQUE DE PANNE

Utilisation uniquement autorisée au personnel habilité!



RISQUE D'INCENDIE

Interdiction de chauffer des matériaux inflammables!



ATTENTION

Fermez les portes fermement avant de démarrer ! N'ouvrez pas les portes pendant le cycle!



RISQUE DE BRÛLURES

Portez des gants de sécurité lors d'une utilisation à hautes/basses températures!



RISQUE D'EXPLOSION

N'utilisez aucuns matériaux pouvant générer une atmosphère présentant des risques d'explosion!



RISQUE D'EXPLOSION

N'utilisez pas l'équipement dans une atmosphère présentant des risques d'explosion!



RISQUE D'ÉLECTROCUTION

N'utilisez pas l'équipement dans un environnement humide et présentant de la condensation!



RISQUE D'INSTABILITÉ

N'affectez pas la stabilité du produit avec de lourdes charges ou en montant sur celui-ci!



RISQUES LIÉS AU TRANSPORT

Ne transportez la chambre que dans son emballage d'origine!
Assurez toujours la stabilité de la chambre pendant son déplacement!
N'utilisez jamais de portes, de poignées ou d'accessoires comme point d'appui pendant un déplacement!



RISQUE DE SURCHAUFFE

N'installez pas l'équipement dans un environnement non ventilé!
Assurez suffisamment d'espace et de volume autour de la chambre!
Assurez suffisamment de dissipation thermique pour le refroidissement du produit!

ES

ADVERTENCIAS Y PRECAUCIONES DE SEGURIDAD

Mantenga siempre este manual al alcance de la mano para su posterior consulta. Sólo el personal cualificado y capacitado que conoce capacidades técnicas y posibles riesgos de seguridad debe usar y manipular este producto.

Observe y cumpla siempre con las reglamentaciones nacionales relativas a la tecnología, igual que con la legislación laboral.

Para evitar heridas y daños en el equipo, revise y siga las instrucciones y advertencias de seguridad.

Aviso legal:

El contenido de este manual está sujeto a cambio sin previo aviso.

Entender y seguir las instrucciones de este manual de funcionamiento es el primer paso para el uso del equipo sin riesgos y de una manera segura.

Este manual de usuario no puede cubrir todas las aplicaciones que puedan desarrollarse en el futuro. Si considera que alguna información no está clara o tiene dudas en cuanto al uso seguro del producto en su caso particular, contacte con su distribuidor o escríbanos a info@kambic.com para obtener información adicional u opinión.

Sociedad limitada Kambic d.o.o. en ningún caso será responsable de ningún tipo de daños directos o incidentales resultantes de la utilización de este producto y manual.

El producto puede ser provisto de una variedad de accesorios y opciones. Esta lista de advertencias puede incluir elementos aplicables sólo a algunos modelos y accesorios.



¡LEA TODAS LAS INSTRUCCIONES ANTES DE USAR EL PRODUCTO!

Reduzca la posibilidad de heridas y averías.



ADVERTENCIA

Antes de cualquier mantenimiento, idesconecta todo el suministro eléctrico de la unidad! NO manipule esta unidad sin un cable de alimentación debidamente polarizado y puesto a tierra. NO conecte esta unidad con un enchufe no polarizado y sin puesta a tierra!



PELIGRO!

¡El Aparato no se debe instalar en el lugar en el que existe la posibilidad de presencia de atmósfera explosiva!



PELIGRO DE FALLO

Uso permitido sólo para el personal autorizado!



PELIGRO DE INCENDIO

Mantener alejado de fuentes de calor, chispas, llama abierta o superficies calientes!
No fumar!



ADVERTENCIA

¡Cierre la puerta ajustadamente antes de comenzar! ¡Durante el ciclo no abra la puerta!



PELIGRO DE QUEMADURAS

¡Al manipular el producto en temperaturas altas o bajas, utilice los guantes protectores!



RIESGO DE EXPLOSIÓN

¡No procese ningún material que pueda generar una atmósfera explosiva peligrosa!



RIESGO DE EXPLOSIÓN

¡No manipule el equipo en una atmósfera explosiva peligrosa!



RIESGOS ELÉCTRICOS

¡No manipule el equipo en un ambiente húmedo y de condensación!



RIESGO DE INESTABILIDAD

¡No aplique carga ni desestabilice el producto con cargas pesadas!
¡No subir al producto!



RIESGOS AL TRANSPORTAR

¡Transporte la cámara sólo en su empaque original!
¡Proporcione siempre estabilidad a la cámara al reposicionarla!
¡Nunca la agarre por las puertas, asideros o accesorios durante el reposicionamiento!
eliminar y secar el agua por completo de los elementos del sistema!



RIESGO DE SOBRECALENTAMIENTO

¡No instale al equipo en los ambientes sin ventilación!
¡Proporcione suficiente espacio y volumen alrededor de la cámara!
¡Proporcione la disipación del calor suficiente para enfriar el producto!

ПРЕДУПРЕЖДЕНИЯ И МЕРЫ ПРЕДОСТОРОЖНОСТИ

Всегда держите данное руководство в непосредственной близости для справки. Данное изделие должно использоваться и эксплуатироваться только квалифицированным и подготовленным персоналом, ознакомленным с техническими возможностями и потенциальными угрозами безопасности.

Всегда последовательно соблюдайте национальные правила, касающиеся технологий и трудового законодательства. Во избежание травм и повреждений оборудования изучите и следуйте инструкциям по технике безопасности и предупреждениям.

Правовая информация:

Содержание данного руководства может быть изменено без предварительного уведомления.

Понимание и следование данной инструкции по эксплуатации является первым шагом на пути к безопасности и безопасному использованию оборудования.

Данная инструкция по эксплуатации не может охватить все приложения, которые могут развиваться в будущем.

Если информация для вас является неясной или вы не уверены в безопасном использовании изделия в вашем конкретном случае, рекомендуем обращаться к вашему дилеру или к нам через info@kambic.com за дополнительной информацией или мнением. Ни при каких обстоятельствах Kambic d.o.o. не несет ответственности за любые повреждения, прямо или косвенно связанные с использованием данного изделия и руководства.

Изделие может быть оснащено разнообразными аксессуарами и опциями. Этот список предупреждений может включать элементы, которые применимы только к определенным моделям и аксессуарам.



ПРОЧИТАЙТЕ ВСЕ ИНСТРУКЦИИ ПЕРЕД ИСПОЛЬЗОВАНИЕМ!

Уменьшите вероятность травм и сбоев.



ПРЕДУПРЕЖДЕНИЕ!

Прежде чем выполнять какое-либо обслуживание, отключите все электропитание к устройству! НЕ используйте это устройство это устройство без правильно заземленного, правильно поляризованного шнура питания. НЕ подключайте это устройство к незаземленной, неполяризованной розетке.



ОПАСНОСТЬ

Прибор не должен устанавливаться в помещении, где присутствует взрывоопасная атмосфера!



ОПАСНОСТЬ ПОВРЕЖДЕНИЯ

Обслуживание разрешается только уполномоченному персоналу!



ОПАСНОСТЬ ВОСПЛАМЕНЕНИЯ

Нагревание воспламеняющихся материалов запрещено!



ПРЕДУПРЕЖДЕНИЕ

Плотно закройте двери перед запуском! Не открывайте двери во время цикла!



ОПАСНОСТЬ ОЖОГОВ

При работе с высокими / низкими температурами используйте защитные перчатки!



ОПАСНОСТЬ ВЗРЫВА!

Не обрабатывайте любые материалы, которые могут создавать взрывоопасную атмосферу!



ОПАСНОСТЬ ВЗРЫВА!

Не используйте оборудование во взрывоопасной среде!



ЭЛЕКТРИЧЕСКАЯ ОПАСНОСТЬ

Не используйте оборудование во влажной и конденсационной среде!



ОПАСНОСТЬ НЕСТАБИЛЬНОСТИ

Не перегружайте и не влияйте на стабильность изделия тяжелыми нагрузками или подъемом на изделие!



ТРАНСПОРТНАЯ БЕЗОПАСНОСТЬ

Транспортируйте камеру только в оригинальной упаковке!
Всегда сохраняйте стабильность камеры во время перемещения!
Никогда не используйте двери или ручки или аксессуары для Удерживания во время перемещения!



ОПАСНОСТЬ ПЕРЕГРЕВА

Не устанавливайте оборудование в невентилируемых помещениях!
Обеспечьте необходимое расстояние и пространство вокруг камеры!
Обеспечьте достаточную теплоотдачу для охлаждения изделия!

2. INTRODUCTIONS

Ultra-stable temperature chamber (air bath) is design to maintain the uniform constant temperature over a wide operating range.

Air Baths are a superb choice for precision controlled operating environments without the mess and expense of fluid bath operation.

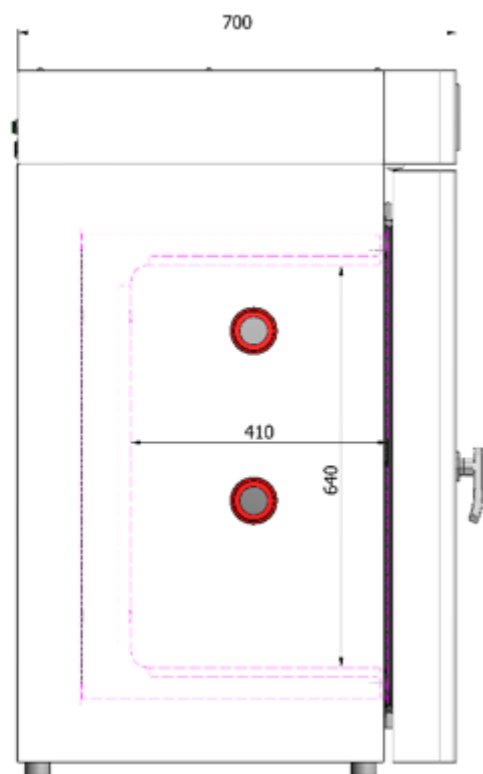
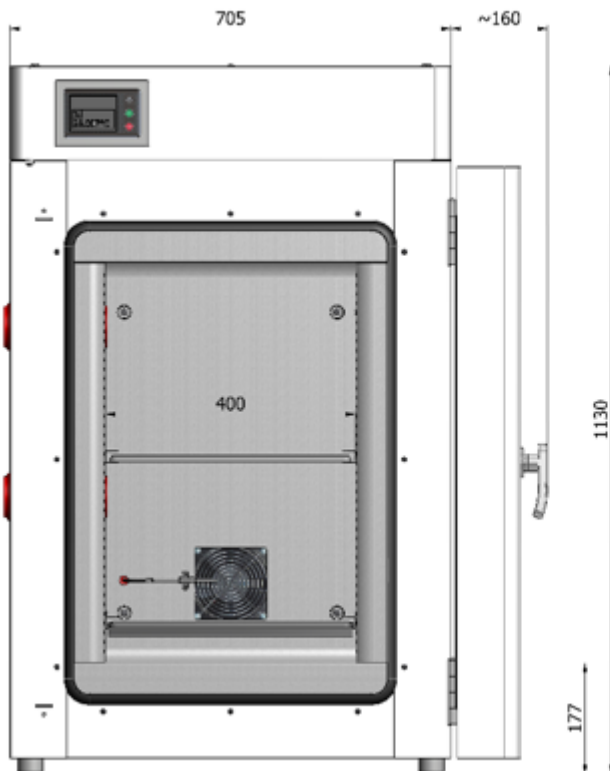
The device housing is made of powder coated aluminized sheet metal. Internal chamber is made of stainless steel AISI 304. Inside are two shelves witch allowing easy access to the inserted objects. Easy access to the inside of the chamber is achieved through the conveniently mounted front door. Wires or cables are brought into the chamber through a small, insulated opening on the side of the unit.

The integrated control unit adds convenience as it eliminates a separate controller. The internal temperature is shown on an external display located on the front of the chamber. A touch display can be used to set the individual temperatures between 15 °C and 50 °C.

Cooling and heating for the chamber is provided by a Peltier Cooling System. Internal fan is used to circulate the air inside the chamber to provide temperature stability and uniformity.

3. TECHNICAL DATA

TK-105 US	
External dimensions	705 x 1130 x 700mm (W x H x D)
Internal dimensions	400 x 640 x 410mm (W x H x D)
Volume	105 L
Temperature range	+15°C ...+50°C
Temperature display resolution	0.001°C
Temperature set resolution	0.001°C
Temperature stability	+/- 0.005°C @ 23°C
Control	MPC-PID
Power supply	230V±10%; 50Hz, 60Hz
Wattage	200W
Interface	RS-232
Shelve	2 included
Access port	2 x 55x20mm included
Weight	112kg



4. INSTRUCTIONS FOR USE

Step 1: Connect the power cord into the power supply 230V±10%; 50Hz, 60Hz

Step 2: Close the chamber door.

Step 3: Put the main switch in position 1 (on the back of the device)

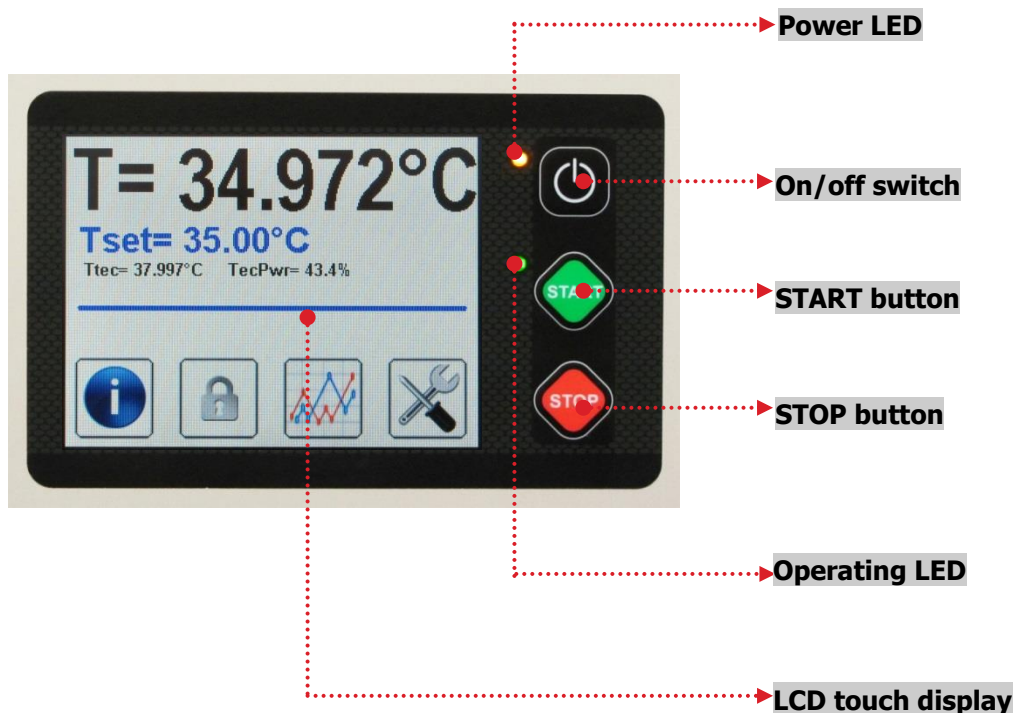
Step 3: Press On/off switch

Step 4: Select the desired temperature and press "**START button**"

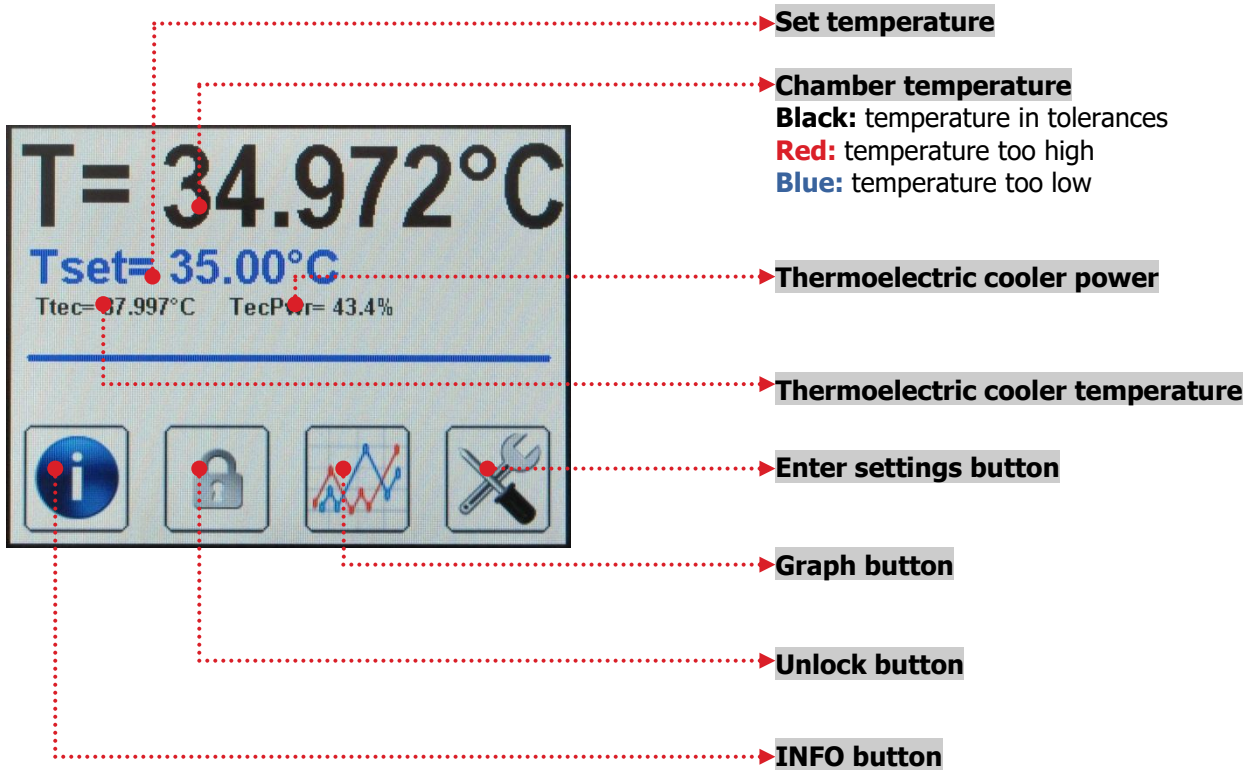
Step 5: From this moment on the device runs completely automatically

Step 6: Press "**STOP**" to stop the device

4.2 Control panel with touch display

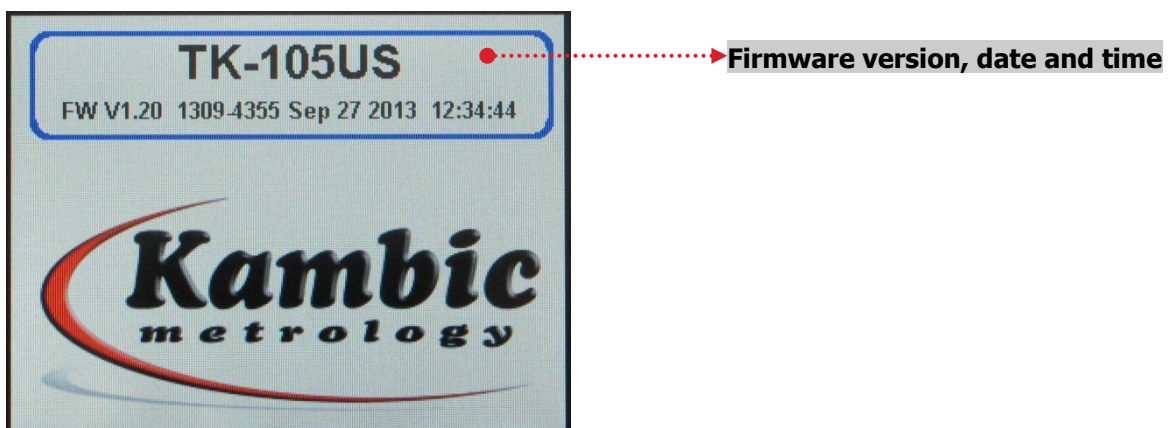


4.2.1 Main screen



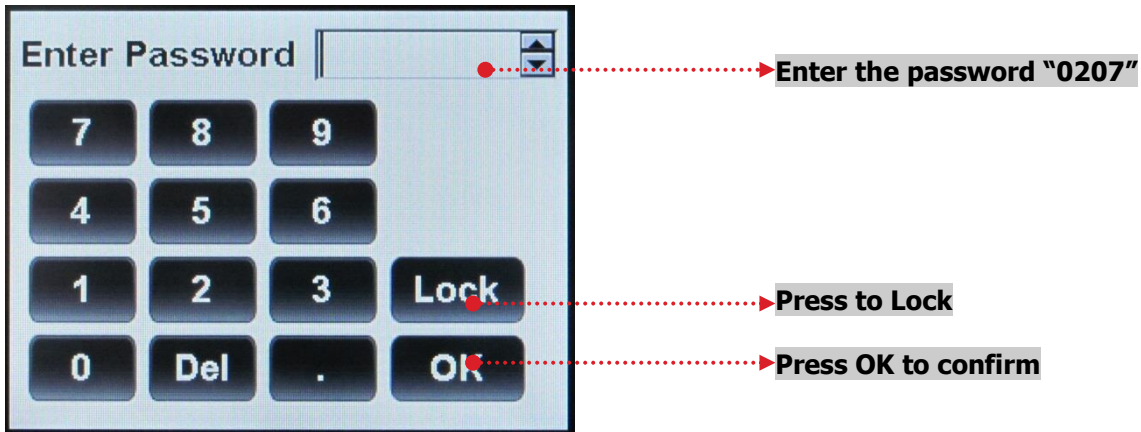
4.2.2 INFO screen

Press INFO button to see this screen:



4.2.3 Unlock screen

Press Unlock button to see this screen:



Enter the password 0207 and confirm with OK button. That will enable editing PID settings and temperature corrections.

To disable the possibility of editing PID setting and temperature corrections press the "Lock" button. The controller will lock itself automatically after 2 minutes of no action.

4.2.4 Graph screen

Press Graph button to see this screen:



4.2.5 Main settings

The screenshot shows the 'MAIN SETTINGS' screen with the following items:

- Temperature:** 35.00°C (with a red hand icon pointing to the value)
- Vent.SpeedCtrl:** ON
- LCD Backlight:** 5
- Four directional arrow buttons (Left, Down, Up, Right) at the bottom.

Callouts from the right side of the image point to the following elements:

- Touch value to select:** Points to the temperature value.
- Set temperature:** Points to the temperature value.
- Fan speed control:** Points to the 'ON' status. Below it, text reads: 'OFF: fan operates on full RPM', 'ON: fan RPMs are controlled'.
- Set LCD brightness:** Points to the '5' value.
- Next screen:** Points to the Right arrow button.
- Increase value:** Points to the Up arrow button.
- Decrease value:** Points to the Down arrow button.
- Previous (main) screen:** Points to the Left arrow button.

4.2.6 Chamber-PID settings

The screenshot shows the 'Chamber-PID SETTINGS' screen with the following items:

- Kp-Heating Gain:** 2.0 (with a red hand icon pointing to the value)
- Kp1-Cooling Gain:** 2.0
- Ti-Integral time:** 150.0
- Td-Derivat.const.:** 0.0
- (Fact.Defaults: Kp= 2.0,Kp1= 2.0,Ti=150,Td= 0)
- Four directional arrow buttons (Left, Down, Up, Right) at the bottom.

Callouts from the right side of the image point to the following elements:

- Touch value to select:** Points to the Kp-Heating Gain value.
- Next screen:** Points to the Right arrow button.
- Increase value:** Points to the Up arrow button.
- Decrease value:** Points to the Down arrow button.
- Previous screen:** Points to the Left arrow button.

Default values	
Kp-Heating Gain	2.0
Kp1-Cooling Gain	2.0
Ti-Integral time	150.0
Td-Derivat.const.	0.0

4.2.7 Thermoelectric cooler - PID settings

TEC - PID SETTINGS

Kp-Heating Gain: 30.0
 Kp1-Cooling Gain: 60.0
 Ti-Integral time: 50.0
 Td-Derivat.const.: 0.0
 (Fact.Defaults: Kp= 30.0,Kp1= 60.0,Ti= 50,Td= 0)

Navigation buttons: Left, Down, Up, Right

Labels: Touch value to select, Next screen, Increase value, Decrease value, Previous screen

Default values	
Kp-Heating Gain	30.0
Kp1-Cooling Gain	60.0
Ti-Integral time	50.0
Td-Derivat.const.	0.0

4.2.8 Temperature corrections

Temp.Corr. T= 34.973°C

Corr. at 0.0°C = 0.000
 Corr. at 15.0°C = 15.000
 Corr. at 25.0°C = 25.000
 Corr. at 40.0°C = 40.000

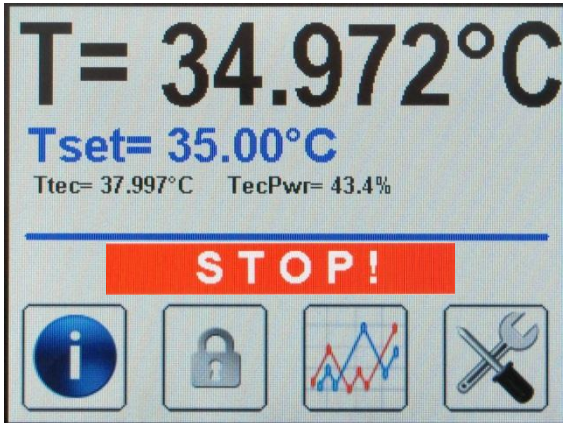
Navigation buttons: Left, Down, Up, Right

Labels: Touch value to select, Next screen, Increase value, Decrease value, Previous (main) screen

Default values	
Corr. At 0.0°C	0.000
Corr. At 15.0°C	14.980
Corr. At 25.0°C	24.870
Corr. At 40.0°C	39.980

4.2.9 STOP screen

If you press stop button (1 second or more) to stop the cycle you will see this screen:



4.2.10 Door alarm screen

If you open the door while cycle is in progress there will be an audio alarm and you will see this screen:



5. SERVICE AND MAINTENANCE



WARNING

In case of maintenance interventions, disconnect power supply!

Maintenance and service within the warranty period may only be performed by the authorized service person.

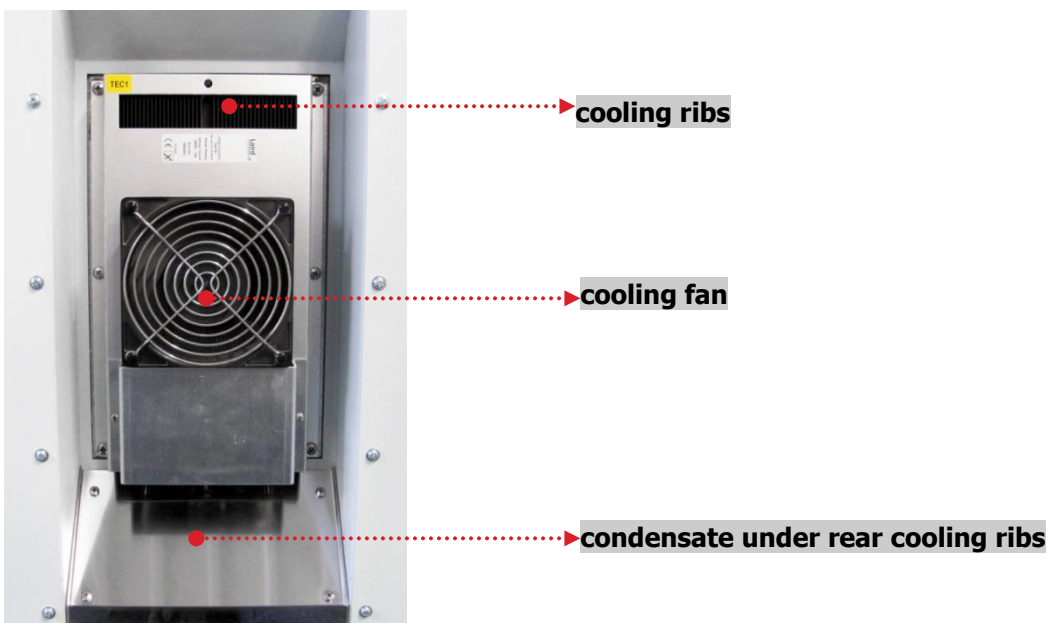
Please advise Kambic in before alternation & modification.

All spare parts are in stock in the producer's magazine. It is only allowed to use the original spare parts.

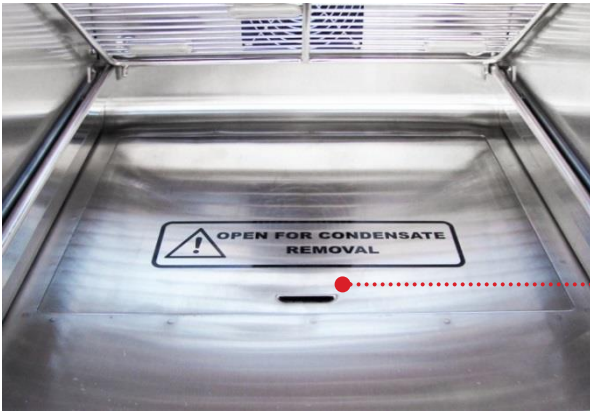
Keep the inside and outside surfaces of the chamber clean. For cleaning use some soft cleaning detergents and soft cloth.

Clean the rear cooling fan and cooling ribs.

Check and remove condensate under rear cooling ribs.



Check and remove condensate from internal chamber.



internal chamber opening

In the event of failure, call the service!

Maintenance plan

OPERATION	FREQUENCY
Clean the rear cooling fan and cooling ribs	monthly
Check and remove condensate from internal chamber	weekly
Check and remove condensate under rear cooling ribs	weekly
General cleaning of the apparatus housing	weekly

6. REQUIRES SPACE AND CONNECTIONS

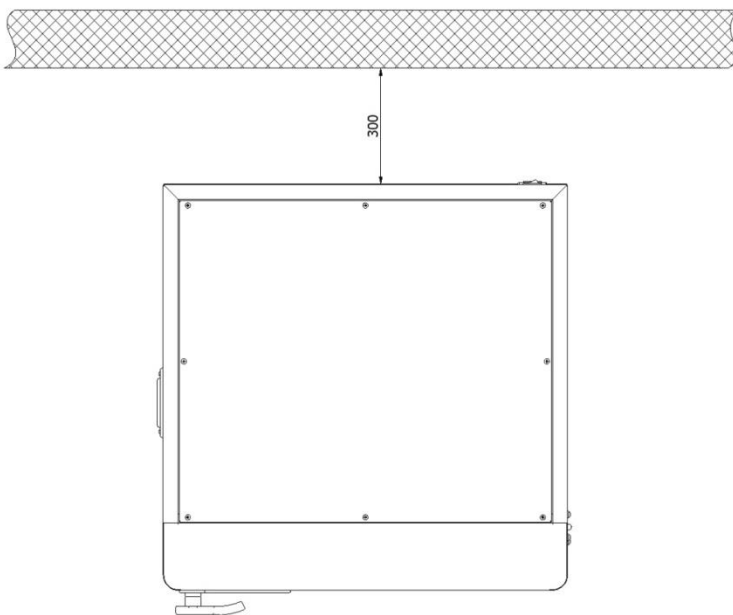
The appliance must be positioned at least 300 mm away from a wall to allow the cooling of Peltier cooling system via its rear fan.

Additional space or relocation of the apparatus may be necessary when carrying out any maintenance or servicing.

The user must provide electrical connection: 200W / 230V \pm 10% / 50Hz, 60Hz.

Environmental and operational conditions

Temperature	+23°C \pm 5°C
Relative humidity	from 15 % to 75 %



7. DISMANTLING AND DISPOSAL



This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment. For more information please contact your household waste disposal service.

8. ABBRIVATIONS

T	chamber temperature
Tset	set temperature
Ttec	thermoelectric cooler temperature
TecPwr	thermoelectric cooler power
PID	proportional–integral–derivative (control loop)
LCD	Liquid Cristal Display
LED	light-emitting diode
RS-232	standard communication interface

9. TROUBLESHOOTING

Alarm door opened

- ➔ check the end switch
- ➔ check the locking mechanism

Water drip from chamber

- ➔ remove condensate
- ➔ check the chamber seal
- ➔ check the access port seal

Low temperature stability & uniformity

- ➔ check the door seal
- ➔ check the operation of the rear fan
- ➔ check the operation of the inner fan
- ➔ check the cooling ribs inside & outside
- ➔ check the temperature sensor

Increased noise

- ➔ check the rear fan
- ➔ check the inner fan

Damaged seal

- ➔ replace it with the original

Damaged foam on access port

- ➔ replace with a closed cell type foam

Controller malfunction

- ➔ call service

10. RS-232 COMMUNICATION PROTOCOL

COM port settings:

- 9600 Baud
- No parity
- 8 Data bit
- 1 Stop bit

Connector pins info:

- 3 = TXD RS232 output from controller
- 7 = GND
- 11 = RXD RS232 input to controller

All commands must be written in capital letters and identical as written in this description!

After the receipt of the command (START, STOP, SETTEMP) the data is immediately written in the eeprom. This way the controller will always return to the last settings in case of a power failure.

No.	Command:	Action:
1.	STOP <LF>	Operation of the bath stopped. Equal to STOP on the controller.
2.	START<LF>	Operation of the bath activated. Equal to the START on the controller.
3.	SETTEMP= 37.0<LF>	Set temperature with single decimal
4.	SETTEMP?<LF>	Request of set temperature. Will return current set temperature. SETTEMP=37.000<CF><LF>
5.	TXD<LF>	Request of set and current temperature. Will return current set temperature and current measured temperature. Tm=37.001 Ts=37.0<CR><LF>
6.	KP=120<LF>	Set P component in PID controller
7.	KP?<LF>	Request of current P component. Will return KP=120<CR><LF>
8.	TI=600<LF>	Set I component in PID controller
9.	TI?<LF>	Request of current I component. Will return TI=600<CR><LF>
10.	TD=0<LF>	Set D component in PID controller
11.	TD?<LF>	Request of current D component. Will return TD=0<CF><LF>
12.	TRIG=10<LF>	Automatic RS232 output period 10 seconds. 0 seconds automatic output disabled. Will output: 10.06.3 Tm=37.001 Ts=37.0 P=75WD=0<CR><LF> Usable with combination to dot printer EPSON LX-300
13.	TRIG?<LF>	Request of current output period. Will return TRIG=10<CR><LF>