

User and installation manual



Shaker with clamping

Thermoshake AC | Thermoshake AC 180
Part No.: 7100160 | 7100161

Teleshake AC | Teleshake 95 AC
Part No.: 7100151 | 7100150

INHECO Industrial Heating and Cooling GmbH reserves the right to modify their products for quality improvement. Please note that such modifications may not be documented in this manual.

This manual and the information herein have been assembled with due diligence.

INHECO GmbH does not assume liability for any misprints or cases of damage resulting from misprints in this manual. If there are any uncertainties, please feel free to contact sales@inheco.com. → How to contact INHECO, page 6.

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1 IMPORTANT NOTES

1.1. General Information

Read the user instructions completely. The manual explains how to operate and handle all shaking devices with automated clamping mechanism (Shaking devices).

Currently INHECO offers 3 types of Shaking devices: Thermoshake AC: 71000160, Thermoshake AC 180: 7100161; Teleshake AC: 71000151 and Teleshake 95 AC: 71000150. Please follow these manual instructions, as otherwise injury or product damage cannot be excluded.

Missing or insufficient knowledge of the manual leads to loss of liability against INHECO GmbH.

This manual is part of the Thermoshake AC, Teleshake AC and Teleshake 95 Shaking device and must be retained until the device is disposed of and must be passed on with the devices when the device is taken over by a new user.

The devices with automated clamping meet the acknowledged rules of technology and comply with today's standards.

Manual instructions must be followed in order to ensure safe handling of the device.

Security-related warnings in this manual are classified into three hazard levels:

- The signal word WARNING indicates hazards which – without precautionary measures – can result in serious injury or even death.
- The signal word CAUTION indicates hazards which – without precautionary measures – can result in minor to moderate injuries
- The signal word NOTE stands for the general precautionary measures that have to be taken to avoid damaging the device when using it.
- The signal word NOTICE stands for the general measures that help using the device.

Contact INHECO in case there are any uncertainties of how to operate or how to handle the devices with auto clamping.

Your opinion about this manual provides us with valuable insights on how we can improve this document. Please do not hesitate to direct your comments to sales@inheco.com, → How to contact INHECO, page 6.

1.2. Explanation of Symbols

Symbol	Explanation
	Potential danger of serious injury or death → signal word WARNING or CAUTION indicate the severity.
	Caution: Potential danger of hot surface.
·	Bullet points indicate steps of instructions.
-	Hyphens refer to enumerations.
→	Arrows indicate: "refer to" and are mostly an active link

1.3. Abbreviations and Glossary

The following acronyms and items are used in this document	
AC	Auto Clamping
°C	Degree Celsius
°F	Degree Fahrenheit
mm	Millimeter
in	Inch
Hz	Hertz [1/s]
K	Kelvin
kg	Kilogram
lbs	Pounds
dB(A)	Decibel
RH	relative humidity
TEC	Thermo- Electric- Cooler (Thermoelectric Module)
Vdc	Voltage direct current
Adc	Ampere direct current
W	Watt
rpm	revolutions per minute
IVD	In Vitro Diagnostic
FDA	Food and Drug Administration
MTC	Multi TEC Control controls up to 6 INHECO devices individually
STC	Single TEC Control controls 1 INHECO device
Offset	The difference between the set temperature and actual value once the temperature is stable
PT100	PT100 is a Resistive-Temperature-Detector (RTD). This sensor increases its resistance with increasing temperature.
Calibration	Calibration is the validation of specific measurement techniques and equipment. At the simplest level, calibration is a comparison between measurements - one of known magnitude or correctness - made or set with one device and another measurement made in as similar a way as possible with a second device.

1.4. Warranty

The warranty period starts on the date of shipment. Any damage caused by operating the Shaking devices outside the specifications and guidelines leads to the loss of warranty. Broken seals on INHECO devices lead to the loss of warranty as well.

INHECO will only accept parts / devices for return that do not pose a threat to the health of our staff. In particular, the devices may not have been used in Biosafety Level 3 and 4 environments or have been exposed to radioactive or radiation materials. → Cleaning and Decontamination, page 30.

Devices exposed to Biosafety Level 3 and 4 Environments are not accepted by INHECO for return.

1.5. How to contact INHECO

INHECO GmbH	
Address	Fraunhoferstr. 11 82152 Martinsried Germany
Telephone - Sales	+49 89 899593 120
Telephone - Techhotline	+49 89 899593 121
Fax	+49 89 899593 149
E-Mail - Sales	sales@inheco.com
E-Mail - Technical -Hotline	techhotline@inheco.com
Website	www.inheco.com

Technical Support & Trouble Shooting Instructions:

<http://www.inheco.com/service/technical-support.html>

2 PRODUCT DESCRIPTION

2.1. Intended Use

While the Thermoshake AC is one of the most compact **heated and cooled** shaking positions for a wide range of standard ANSI/SLAS (formerly SBS) plates and tubes. The Teleshake AC is offering the **shaking without temperature control** and the Teleshake 95 AC heating and shaking control up to 125°C **without cooling**. All AC devcies have a compact size.

The Shaking devices can be placed on the deck of liquid handling systems with the lowest possible usage of space. The Shaking devices offer excellent control of temperature and fluid mixing according to their temperature needs. Shaking curve is orbital. Due to the new clamp mechanism the device allows higher shaking rpm than with the standard Thermoshake.

The cooling function of the Thermoshake AC offers the unique possibility to stop reactions quickly by reducing the temperature of the liquid samples.

The Shaking devices can be operated with two types of precise temperature/rpm controllers with integrated power supply (MTC or STC). The units are heating/cooling devices with CE and UL certification. They are mainly used on robotic platforms and systems in LabAutomation.

The Shaking devices are designed specifically for use in Life Science. The Shaking device is prepared for easy integration into IVD applications, but the final IVD validation has to be performed by the first marketer (IVD application).

When using the Shaking devices in a Biosafety Laboratory Environment, the user is responsible for labeling the devices according to the WHO Laboratory Biosafety Manual (ISBN 92 4154650 6) and for operating the devices according to this Biosafety Manual.

The Shaking devices must be used exclusively by laboratory professionals trained in laboratory techniques with LabAutomation systems and having studied the instructions for use of this instrument as well as the instructions of the workstation the device is used in.

2.2. Scope of Supply

Before initial operation, make sure that the shipment of your unit and its scope of supply is complete, and no parts are damaged.

In case of parcel or product damages, make photos of the damaged boxes and products and email them to techhotline@inheco.com immediately. Transportation damages must be reported to INHECO within 7 days of delivery. The following components should be included in each shipment:

2.2.1. For Thermoshake AC and Thermoshake AC 180

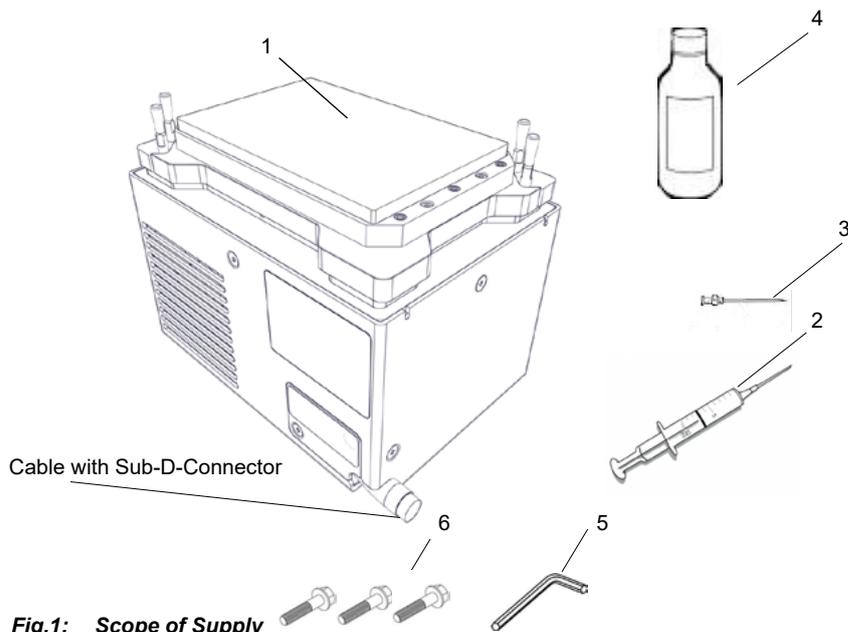


Fig.1: Scope of Supply

- (1) Thermoshake AC incl. Sub-D-Connector Cable *
- (2) Syringe to refill the cooling liquid
- (3) Syringe needle to refill the cooling fluid
- (4) Cooling fluid
- (5) Socket wrench for filling nozzle of the cooling liquid reservoir
- (6) 3 allen screws to fix thermal adapters

* image may vary depending on what Thermoshake AC is ordered.

The Sub-D-Connector Cable is already connected with the Thermoshake AC and it also needs to be connected to the Yellow Slot Module installed inside the TEC Control Unit (MTC or STC). → Initial Operation, page 16.

2.2.2. For Teleshake AC and Teleshake 95 AC

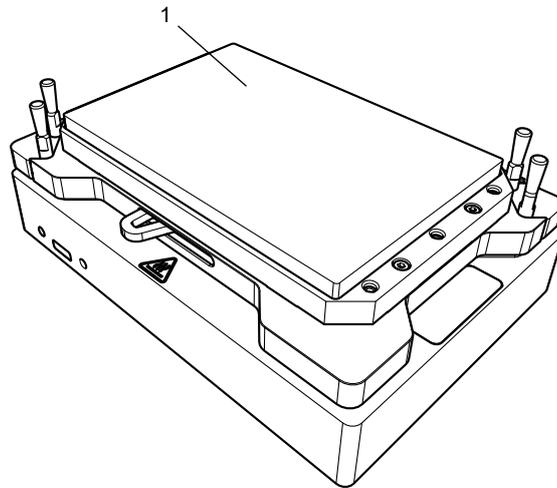


Fig.2: Scope of Supply

(1) Teleshake (95) AC incl. Sub-D-Connector Cable

The Sub-D-Connector Cable is already connected with the Teleshake (95) AC and it also needs to be connected to the Yellow Slot Module installed inside the TEC Control Unit (MTC or STC). → Initial Operation, page 16.

2.3. Functional Elements:

In the following images the Thermoshake AC (180) is shown, but the clamping mechanism of the Teleshake (95) AC is identical to this. If there are differences in other functional elements they are clearly pointed out.

2.3.1. Clamping Mechanism

The automated clamping mechanism is suited for ANSI/SLAS standard plates and it will make sure that the plates will keep in position during shaking. After shaking is stopped the clamp mechanism will automatically open and the shaker table will go back into in 0.



WARNING

In case the plate is not complying with standard ANSI/SLAS plates and / or the shaking speed is not set according to the specifications, the clamping mechanism might not sufficiently fix the plate on the shaker table during shaking.

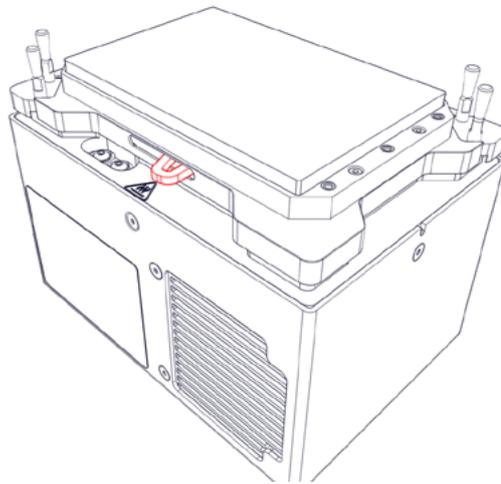


Fig.3: Clamp Mechanism "Open"

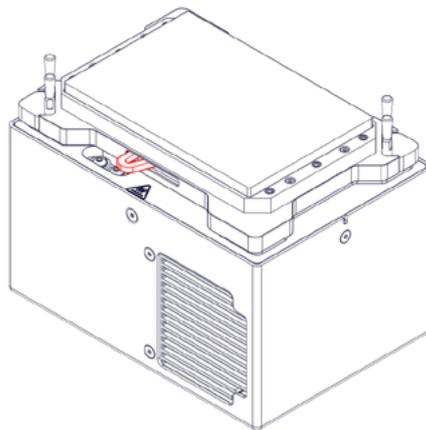


Fig.4: Clamp Mechanism "Closed"



CAUTION

Pinching of finger: While the clamp mechanism is closing you might pinch your finger or your glove. Closing or opening takes about 5 sec.

2.3.2. Fixation Pins

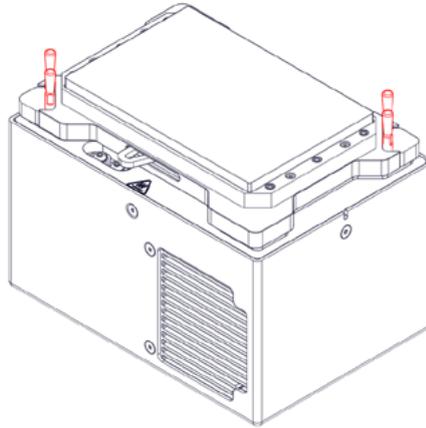


Fig.5: Fixation Pins of Clamp Mechanism



CAUTION

Pinching of finger: While the clamp mechanism is closing you might pinch your finger or your glove. Closing or opening takes about 5 sec.

2.3.3. Cold plate (temperature area) (only for Thermoshake AC and Teleshake 95 AC)

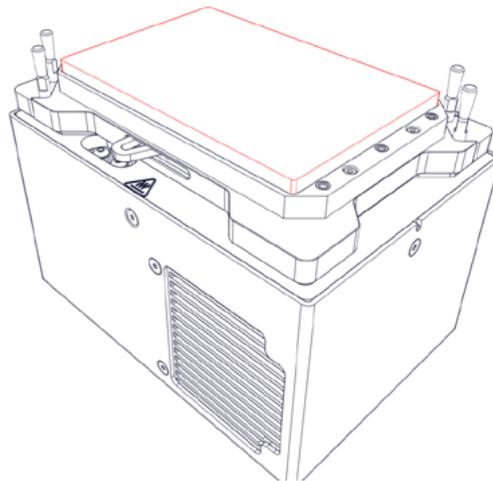


Fig.6: Heated area of Thermoshake AC (Teleshake 95 AC is similar)



WARNING

Devices can burn your skin. Even after switching off the TEC Control Unit, the connected devices can still be hot and could seriously burn your skin as the material's temperature can reach up to +125°C [+257°F]! It takes a while to cool down after the device has been switched off.

2.3.4. Ventilation of Thermoshake AC and Thermoshake AC 180

The ventilation is the big difference between Thermoshake AC and Thermoshake AC 180. With the standard device the fans airflow direction is from the outside to the inside sucking ambient room temperature into the device. The Thermoshake AC 180 has a turned fan which means the hot air is blown out.

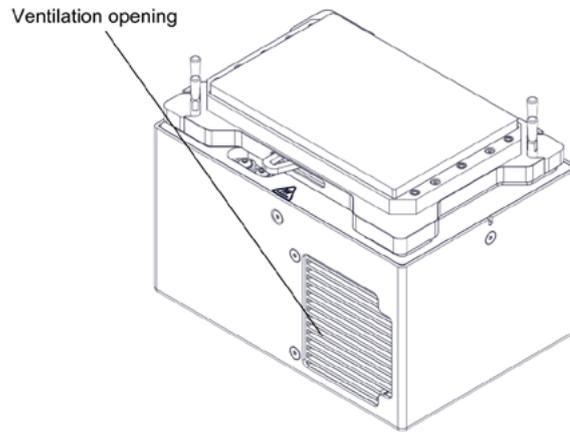


Fig.7: Ventilation

The Teleshake AC and Teleshake 95 AC do not have any ventilation.

2.4. Status LED and Firmware update

(only for Teleshake AC and Teleshake 95 AC)

The Teleshake provide a functionality to check the status at the device itself. Furthermore, there is a microUSB connector and a button for firmware update. How to perform a firmware update will be explained in an additional manual.

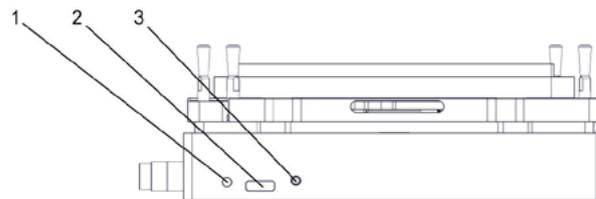


Fig.8: Functional Elements Teleshake AC and Teleshake 95 AC

(1) Status LED

Color of LED	State	Description
red	steady for 30 sec. shortly off, and again 30 sec steady	device is booting
green	blinking	device is ready for communication

(2) microUSB connector

(3) Button for use during firmware update

2.5. Labels

The identification label with part number and serial number also contains important technical indications. The electrical specification on the label must meet your local situation. The label is placed on the side of the device. The identification label must not be removed. If it has become illegible or falls off, it has to be replaced by a new identification label. New labels can be ordered at INHECO. In case the label is missing and you do not know the part number and serial number, they can also be read out with the software (MTC/STC Demo Tool) which can be downloaded from INHECO's login section on www.inheco.com. → Trouble Shooting & Support, page 18f.

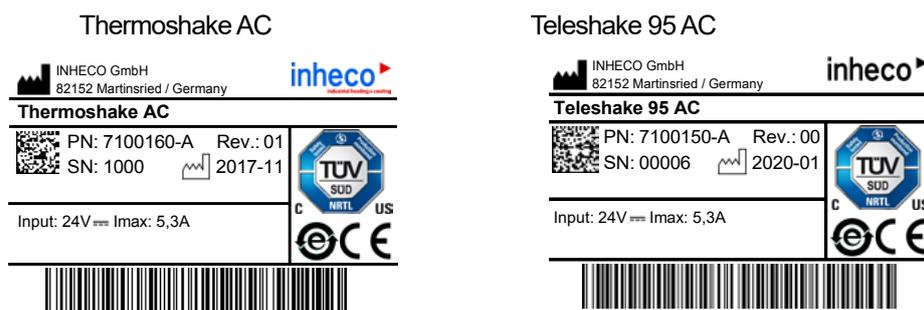


Fig.9: Product labels on the device (example, not all types are shown)



Fig.10: Product labels on the device



Fig.11: Example shipment labels on the package



Caution Hot

Fig.12: Other labels on the product (for Thermoshake AC (180) and Teleshake 95 AC)

2.6. Technical Data

Technical Data incl. Dimensions			
Shaker type	Teleshake AC	Teleshake 95 AC	Thermoshake AC and 180
Part number	p/n 7100151	p/n 7100150	p/n 7100160 p/n 7100161
height (bottom to contact surface)	47.3 mm [1.862 in]	47.3mm [1.862 in]	109.9mm [4.327 in]
height with standard fixation pins	53.7 mm [2.144 in]	53.7 mm [2.144 in]	115.9 mm [4.563 in]
Length x width	144 x 101 mm [5.669 x 3976 in]	144 x 101 mm [5.669 x 3976 in]	147 mm x 104 mm [5.787 in x 4.095 in]
Temperature range	---*1	up to +125°C [up to +257°F]	+4°C to +70°C [+39.2°F to +158°F]
Maximum temperature difference in cooling mode $\Delta T (=T_{\text{ambient}} - T_{\text{target}})$	---	---	25K
Noise	Max. 42dB(A)		
Protection Category	IP 20		
Weight including cables	2.2 kg [4.85 lbs]	2.2 kg [4.65 lbs]	3.5 kg [7.7 lbs]

*1) ambient +5K

Technical information regarding shaking for all devices		
	Teleshake (95) AC 7100150+7100151	Thermoshake AC
Maximum load	1.0 kg	
Shaker frequency weight reduce the max. speed	200 to 3000 rpm	300 to 3000 rpm*2)
Shaking amplitude	2 mm [0.07874 in]	
Shaking pattern	Orbital	

*2) Depending on the load, as otherwise liquid might get spilled or adapter might not be hold tight to the clamp mechanism. We recommend to test the speed you want to use with a microtiter plate and water to test the behavior first.

The use of RPM smaller 300 with the Thermoshake AC is possible. However, the shaking performance cannot be guaranteed. In case the shaking is not steady you will receive a warning "error 35 slot x (x = slot ID)". This error can be ignored if no other error or warning are set in the same time. It is not INHECO's responsibility if there is any method failure due to this low RPM.

Environmental Conditions		
Tolerable relative humidity	Operation	10-80% RH (non condensing*3) at +20°C up to +30°C [+68°F to +86°F]
	Transportation and storage	10-80% RH (non condensing*3) at +20°C up to +30°C [+68°F to +86°F]
Temperature	Operation	+15°C to +32°C [+59°F to 90°F]
	Transportation and storage	-10°C to +60°C [+14°F to 140°F], non condensing*3)

*3) Condensate can prevent the Shaking devices from operating properly and can damage the Thermoshake AC. Condensate should be eliminated on a daily basis or more often, for example by heating cycles in between cooling cycles.

3 SAFETY INSTRUCTIONS

3.1. Product-specific Risks



WARNING

Follow the safety instructions given below in order to avoid danger for user and device.

General

- The Shaking device ("the device") needs maintenance on a regular basis regarding cooling liquid, → Thermoshake AC Maintenance (Refilling of Cooling Liquid Reservoir), page 24ff.
- The device has to be placed in an upright position. On non-observance, it will eventually overheat, causing the temperature fuse to blow.
- The main power switch of the TEC Control Unit must always be accessible.
- Free air supply must be ensured to prevent damage to the device. Do not cover the ventilation openings at the front and rear panel at any time. Ensure a minimum of at least 30 mm (1.2 inch) of free space between the ventilation openings at the front and at the back and adjacent devices or walls.
- Ensure that there is no other device installed next to the device increasing the inlet air temperature for the device above the specified temperatures. In case of doubt, please contact INHECO for further analysis.
- Do not insert any parts into the ventilation inlet or outlet.
- Do not exceed minimum or maximum ambient temperature and humidity conditions during operation or storage of the device → Technical Data, page 13.
- The device must not be used in environments with risk of explosion.
- The device is for indoor use only.



Burning Hazard:

- Devices can burn your skin. Even after switching off the TEC Control Unit, the connected devices can still be hot and could seriously burn your skin as the material's temperature can reach up to 125°C [+257°F]! It takes a while to cool down after the device has been used.



Pinching of finger:

- While the clamp mechanism is closing you might pinch your finger or your glove.



Electrical Shock:

- The device must not be used if the device itself or the power cable shows visible signs of damage.
- You can suffer an electric shock and injuries, if the device is not connected properly or if you do not disconnect the device from the TEC Control Unit outlet before opening the housing.
- Never connect or remove the power plug of the TEC Control Unit with wet hands.
- Original power cable for the TEC Control Unit provided by INHECO has to be used to guarantee safe and proper operation.
- The wall power outlet must have a ground earth connection (Safety Class 1).
- Where an ungrounded receptacle is encountered, a qualified electrician must replace it with a properly (PE) grounded receptacle in accordance with the local electrical code.

- Make sure that the electrical specification on the identification label at the side panel meets your local situation. → Labels, page 12.

Biosafety Laboratory Environment

- When using the devices in a Biosafety Laboratory Environment, the user is responsible for labeling the devices according to the WHO Laboratory Biosafety Manual (ISBN 92 4154650 6) and for operating the devices in accordance to this WHO Laboratory Biosafety Manual.

3.2. Technical Alterations

- Do not alter the product. Any modification or change which is not approved by INHECO leads to the loss of warranty. Broken seals on INHECO devices lead to the loss of warranty as well.
- Use only original parts provided by INHECO. Parts provided by other suppliers can impair the functionality of the unit.
- Damages due to the use of non-original parts are excluded from INHECO's liability.

3.3. Malfunctions

- In case of a malfunction, switch off and disconnect the device immediately. Make sure to inform the authorized person in charge.
- Make sure that the malfunctioning unit is not accidentally re-installed and used before the malfunction is effectively eliminated. → Trouble Shooting and Support, page 24.

4 HARDWARE INSTALLATION

4.1. Scope of Supply

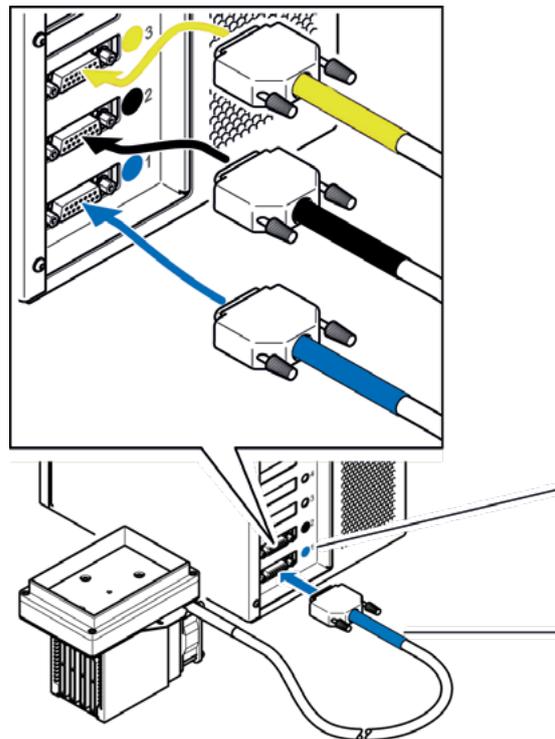
Before initial operation, make sure that the shipment of your unit is complete and neither packaging nor parts are damaged → Scope of Supply, chapter 2.2.

4.2. Initial Operation

4.2.1. How to connect devices to the MTC / STC

In order to connect an INHECO heating/cooling/shaking device, the TEC Control Unit has to be equipped with the corresponding Slot Module. There are blue, black, and red Slot Modules available. The following table shows the appropriate Slot Module for each heating/cooling/shaking device.

Product	Color	Article No.	Heating/cooling/shaking Device
Black Slot Module	black	2400125	CPAC HT 2-TEC, HeatPAC, Heated Lid, Teleshake 95, Thermoshake AC,
Blue Slot Module	blue	2400128	CPAC (only 7000190 & 7000179)
Yellow Slot Module	yellow	2400211	Thermoshake AC, Thermoshake AC 180 Teleshake 95 AC, Teleshake AC



For clear identification, all Slot Modules and connectors are marked in blue, black or yellow.

When connecting a new device, the color code has to be strictly respected.

In case of wrong connection, interaction will not be possible, and an error message will be issued.

The color coding of the Slot Modules is visible from the outside through small round windows.

At the connectors, the sleeve must be marked in the same color as the Slot Module.

Fig.13: Example of connected heating/cooling/shaking device (image shows CPAC)

NOTE

Never plug in our plug out a device while the Controller is running. Always turn off the Controller before disconnecting or connecting the device.

- Disconnect the power cord of the TEC Control Unit.
- Connect the Shaking device to the appropriate Slot Module and lock the connector. The Shaking device must be connected to a Yellow Slot Module.
- Connect the power cord of the TEC Control Unit.
- Switch the TEC Control Unit on.
The touch-screen display of the TEC Control Unit shows the name (or abbreviation) of the currently connected device. When multiple devices are installed, you can switch between the devices by touching the arrow left or arrow right button of the touch screen.

4.3. Programming the Movement Pattern

In difference to the standard Thermoshake and Teleshake 95 without clamp mechanism the only movement pattern of the Shaking device in this manual is orbital and anticlockwise.

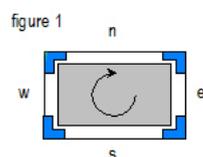


Fig.14: Shaking pattern

4.4. Fixation of Disposables (Tubes, Reservoirs, Plates)

A proper positioning of the disposable is essential to avoid uncontrolled motions of the plate, and to achieve the desired shaker frequency.

NOTICE

Please test your requested shaking frequency with a disposable first, then with the disposable filled with water to make sure that the frequency is not set too high for your set up.

NOTICE

The Labware needs to be SBS size, if labware is too small or too big the clamping mechanism will not close correctly and might get damaged.

Tubes, reservoirs, and plates without flat bottom require a thermal adapter (insert, nest), -> Installation of Adapters, page 19. A flat bottom plate can be placed directly onto the contact surface and is positioned by the holder at two corners of the thermoshake.

A custom-fit thermal adapter plate (insert, nest) for the temperature transfer into the tube or plate also ensures a proper positioning of the plate. The holder at the four corners can be taken off in case the standard holder is not suitable for your set up. → chapter 4.5. Visit www.inheco.com to find the custom-fit adapter for your disposable and contact sales@inheco.com in case you need a custom-fit holder.

NOTICE

Optimized temperature settings require a temperature off-set value adjusted to the thermal characteristics of the disposable. → Manual MTC/STC for further details.

4.5. Removal of Fixation Pins

Use an open-end wrench to unscrew the pins and replace them with the custom-fit pins provided by INHECO.

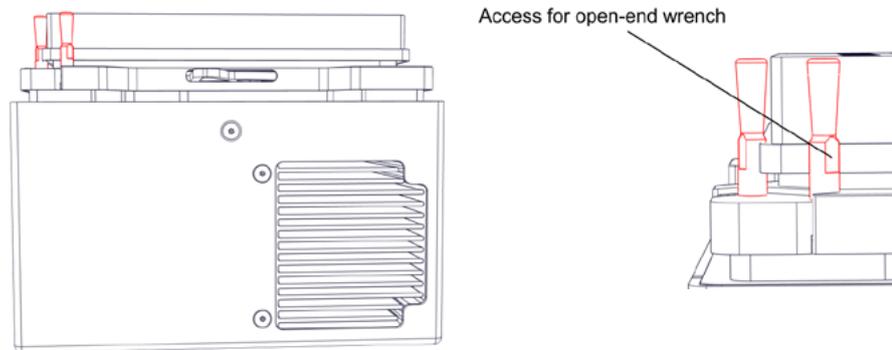


Fig.15: Removal of Fixation Pins

- use the open-end wrench to screw the new pins back in position.

NOTICE

In case the standard fixation pins don't work with your plate please contact INHECO (sales@inheco.com) for customized fixation pins.

4.6. Installation of Adapter Plates (Inserts, Nests)

A thermal adapter is not needed for microplates with flat bottoms. Such plates can be placed directly onto the temperature contact surface of the Shaking device.

Custom-fit adapters are required for all tubes, reservoirs and plates without flat bottoms, to ensure temperature transfer into the disposable/assay. The adapter may facilitate accurate positioning for easy robotic handling plate.

Visit www.inheco.com to find the adapter which fits your tube, reservoir or plate. In case you do not find your disposable on the list of adapters, ask sales@inheco.com for a custom design.

There are two orientations possible for the installation of the adapter plates.

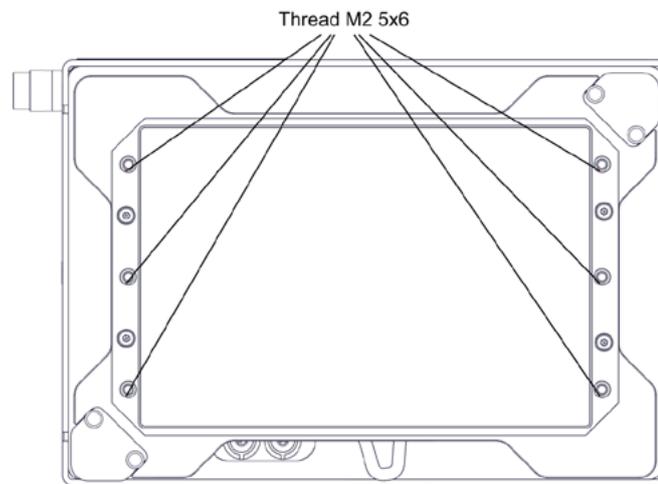


Fig.16: Threaded holes to fix or unfix the adapter plates

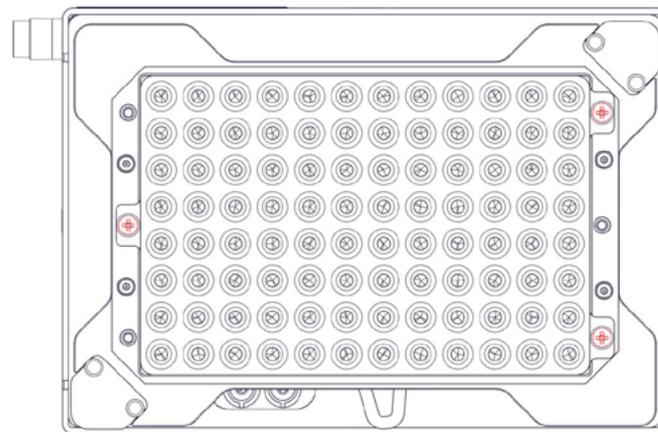


Fig.17: Device with installed PCR adapter plate (3 screw holes used)

4.7. Mechanical Integration

The Shaking devices are usually integrated into liquid handling workstations. The way of fixation depends on the hardware provided by the automation platform manufacturer. When the Thermoshake Shaking devices are placed on a bench top, they must be fixed to the ground with two M4 screws via the thread holes of the units. The ground must be firm and even.

Drilling schematic for secure mounting of the Thermoshake AC (180):

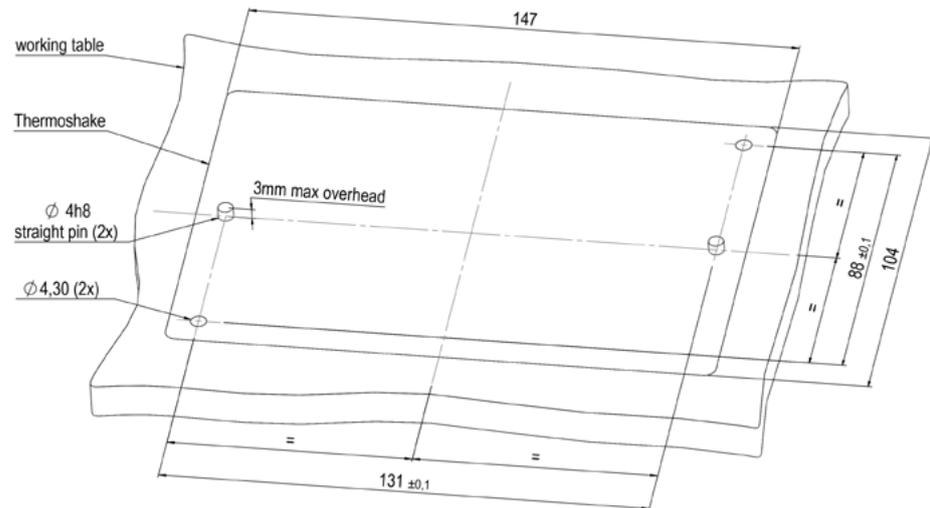


Fig.18: Drilling Scheme

NOTE

The Shaker always needs to be fixed to the ground for proper shaking performance. But shaking influence is less than with the standard Thermoshake.

Drilling schematic for secure mounting of the Teleshake (95) AC unit (It is nearly identical but the total length of the device is difference).

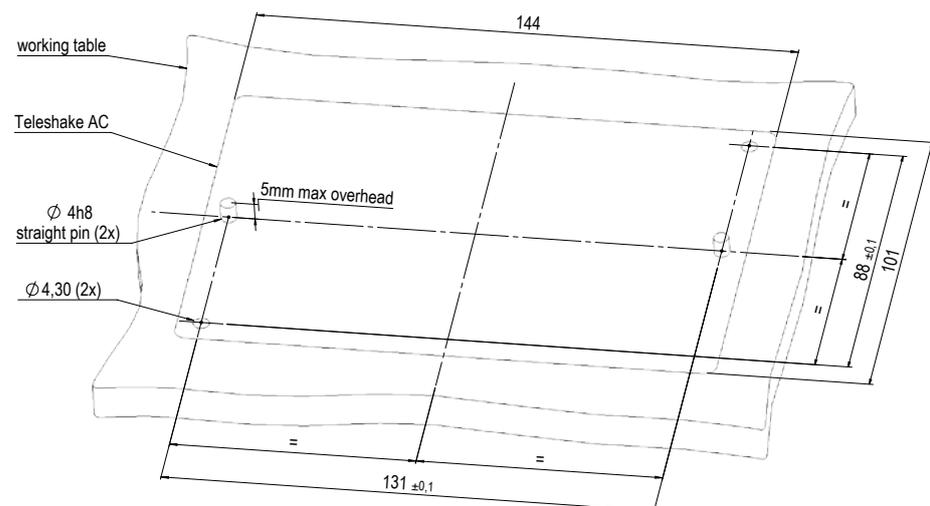


Fig.19: Drilling Scheme

Information for teaching your robotic system:

After shaking is stopped the clamp mechanism will automatically open and the shaker is back in Zero-position.

5 SOFTWARE INSTALLATION

INHECO offers a software called Demo Tool to provide limited functional control (also possible via touchscreen of the MTC/STC) and the opportunity to send manually entered firmware commands to the devices.

We recommend contacting your workstation provider for integration (including software integration) of the MTC/STC with devices into your workstation.

6 DAILY USAGE

The devices can be operated by touchscreen at the front panel of the MTC/STC, by the Demo Tool software delivered by INHECO or by the software of your liquid handling workstation. The INHECO Demo Tool software and the touchscreen allow programming basic temperature and shaking sequences. More complex control sequences can be performed with the software of your robotic platform provider or if you write your own software based on our Firmware Command Set and DLL.

For more information consult the following documents:

- for touch-screen operation: MTC/STC Manual
- for software operation: Demo Tool Manual
- for firmware commands: MTC/STC Firmware Command Set

These documents can be downloaded from INHECO' login section on www.inheco.com.

6.1. Safety Instructions for Operation

Free air supply of the ventilation inlet and outlet must be ensured to avoid damage to the unit (only for Thermoshake AC).

NOTE

Do not operate the Shaking devices in an ambient temperature of more than 32°C (90°F). Otherwise the devices may not work properly or may even get damaged.

Ensure that there is a minimum of at least 30 mm / 1.2 inches free of space between the ventilation openings and adjacent devices or walls.

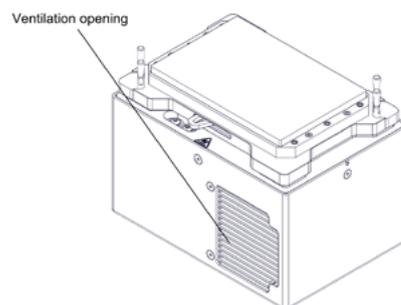


Fig.20: ventilation opening



WARNING

Devices can burn your skin. Even after switching off the TEC Control Unit, the connected devices can still be hot and could seriously burn your skin as the material's temperature can reach up to +125°C [+257°F]! It takes a while to cool down after the device has been used.



CAUTION

Pinching of finger: While the clamp mechanism is closing you might pinch your finger or your glove. Closing or opening takes about 5 sec.



WARNING

In case the plate is smaller or bigger than ANSI/SLAS standard plate or the rpm speed was set to high for the load, the clamp mechanism might fail and the plate can pop out of the mechanism. Also, when the speed is set to high the hot liquid (up to 70°C) might spill and might harm your skin.

It is strongly recommended to test the speed you want to use with a microtiter plate and water to test the behavior first.

6.2. How to get the Shaking devices in closed position

For transportation of the Shaking device the shaker needs to be in closed position. There are several ways to do so.

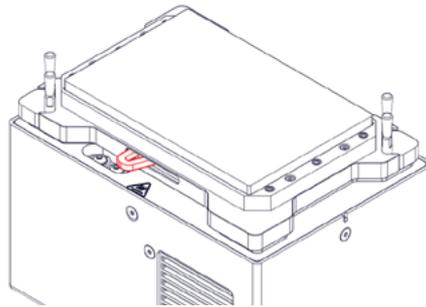


Fig.21: Clamp Mechanism "Closed"

6.2.1. With commands

Use the commands xSSR0 and xASE1. As the clamp mechanism closes as soon as the shaking starts.

6.2.2. Using the MTC/STC controller

Restart the controller and power the controller of as soon as the lever is in closed position → Fig. 21: lever in closed position

6.2.3. Mechanically

NOTE

If the device cannot be closed via commands or controller. There is no way to secure the shaking mechanism. In this case contact INHECO to receive the permission to ship the device as it is. If a device is received opened without the permission of INHECO any damages will be invoiced to the customer (even when in warranty).

6.3. How to get the Shaking device in opened position

In case the clamp mechanism has a problem to open there are several ways to open it:

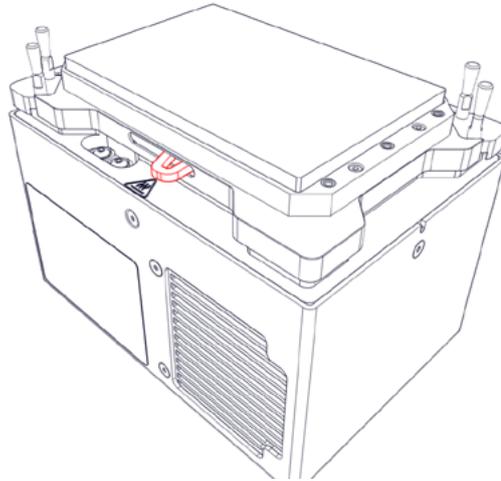


Fig.22: Clamp Mechanism "Open" with lever (in red)

6.3.1. With commands via Demotool

Use the commands xSSR0 and xASE0 (x= slot ID). As soon as the shaking is stopped

6.3.2. By restarting the controller

After restarting the computer, the clamp mechanism is opened and in zero-position.

6.3.3. Using the lever

If sending the commands or the restart is not successful you can use the lever to open the clamp mechanism.

7 MAINTENANCE

7.1. Software Updates

For updates of the Demo Tool Software, contact: sales@inheco.com → How to contact INHECO, page 6.

7.2. Trouble-Shooting & Support

In case of an operation failure follow the trouble-shooting instructions of this chapter. INHECO needs the below mentioned information to help you troubleshooting the operation failure.

Provide the following when contacting INHECO for support:

- INHECO product number of the device (shown on device label)
- INHECO product name of the device (shown on device label)
- INHECO serial number of the device (shown on device label or via software)
- Detailed error description
- Error code report (generated with software “MTC/STC Demo Tool”)
- Information about setup of devices:
 - o integrated in workstation
 - o controlled by MTC or STC (incl. part number and serial number)
 - o controlled by workstation software or INHECO software

Serial numbers are shown on the device labels of the TEC Control Unit and connected devices, but you can also read them out by using INHECO’s software “MTC/STC Demo Tool” (Demo Tool). The Demo Tool must also be used to generate the above-mentioned report of error codes for the TEC Control Unit and all connected devices → Demo Tool Manual.

Based on the above information, INHECO’s TechHotline decides about the requirement of a return. → Return for Repair only with RMA Number, page 26.

7.2.1. Installation of the Software “MTC/STC Demo Tool”

The Demo Tool can be downloaded from INHECO’ login section on www.inheco.com. In this section you will also find the Demo Tool Manual with detailed instructions of the software.re.

Download the MTC/STC Demo Tool and the DLL file into the same folder. Both files must be saved **into the same folder, otherwise it is impossible to run the Demo Tool.**

7.2.2. Serial Numbers via Demo Tool

Start the Demo Tool and click on the button “find MTC” (or “find STC”). The software scans all Com-Ports and subsequently displays the connected MTC/STC as well as connected devices.

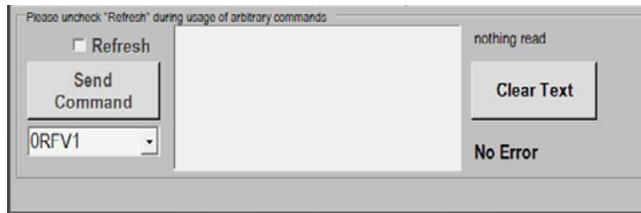


Fig.23: Command section of the User Interface

- Make sure the Refresh Box is unchecked (as in Fig. 14).
- Enter your command into the command field. (overwrite the last command shown in this field e.g. last command was 0RFV1).
- Select button “Send Command”.
- Enter following Commands:
 - for MTC/STC Mainboard serial number: 0RFV2
 - for Slot Module serial number: xRFV2 (x=slotID: 1-6)
 - for external connected device: RSNx (x=slotID: 1-6)

7.2.3. Error Code Report generated with “MTC/STC Demo Tool”

- Start the Demo Tool.
- Click on the button “find MTC” (or “find STC”).
The software scans all Com-Ports and subsequently displays the connected MTC/STC as well as connected devices.
- Click on the button “report error codes”.
An additional window appears in which all error codes are displayed. Email a screenshot of this window along with all other required information to techhotline@inheco.com

7.3. Maintenance - Refilling of Cooling Liquid Reservoir

(only for Thermoshake AC)

The Thermoshake AC needs a well-defined minimum level of cooling liquid to work properly and to avoid damages to the system. To ensure that the Thermoshake AC does not run dry INHECO implemented a sensor to check the liquid level of the cooling liquid. The sensor can be addressed with a command to report the cooling liquid level. This command can be integrated into your daily routine with different ways:

- integrated in workstation software (→ contact your workstation provider)
- integrated in start up routine of MTC/STC (error displayed on screen → chapter 7.3.3)
- integrated in the error code report of INHECOs Demo Tool software (→ chapter 7.3.4)
- manually send via INHECOs Demo Tool software (→ RRS Command, chapter 7.3.4)

NOTE

In any case we recommend refilling the Thermoshake at least every 3 months.

7.3.1. Refill Tools delivered with Thermoshake AC

- 100ml cooling liquid (23% ethanol, 77% distilled water)
- syringe to fill the reservoir
- socket wrench (2mm) to open filling nozzle

7.3.2. Refill Procedure

- Switch off the power of the MTC/STC.
- Unplug the Thermoshake AC from the MTC/STC.
- Loose the screw plugs of the cooling fluid reservoir (→ fig. 24).
- Fill the reservoir with the injection syringe delivered with the Thermoshake AC until the liquid is visible in the filling nozzle.

NOTE

Use the original INHECO cooling fluid or a mixture of 23% ethanol and 77% distilled water to avoid damage to the unit.

- Insert the needle of the empty syringe as deeply as possible into the filling nozzle and extract as much of the fluid as possible.

NOTE

This method ensures that the reservoir contains cooling fluid at the maximum filling level.

- Close the reservoir with the screw plugs incl. seal ring of the cooling fluid reservoir.

NOTE

Never leave the reservoir open.

- Connect the Thermoshake AC with the MTC/STC.
- The Thermoshake AC is now ready again for use.

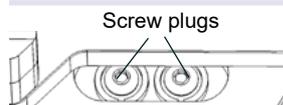


Fig.24: Screw plugs of the cooling fluid reservoir

7.3.3. Refill Check with MTC/STC Touch Screen Display

Error 7 displayed on the MTC/STC touch screen indicates the refill requirement. The touch screen of the MTC/STC controller box displays Error 7 only under the following conditions:

- The power of the control unit MTC/STC was switched on less than 10 minutes ago (Error 7 is only displayed for 10 minutes).
- No other errors occurred during the first 10 minutes of power supply (error messages overwrite previous error messages).
- MTC: Thermoshake AC and slot number are selected via the select buttons.
Example: **Thermo 6** is displayed in the upper left corner if Thermoshake AC of slot 6 is selected.
- Activate heating/cooling by touching the button **Temp** which then appears black.



NOTICE

Upper left corner indicates **Thermo 6** when the Thermoshake of slot 6 is selected. Use or to control select devices.

Fig.25: Activate heating/cooling by touching the button **Temp** which then appears black

Procedure to check cooling liquid with display of MTC

- Switch MTC power off.
- Switch MTC power on.
- Select Thermoshake AC and Slot via **Select** button. (Fig. 25 display: eg. **Thermo 6**)
- Touch button **Temp**. (Temp. button must appear black)

Procedure to check cooling liquid with display of STC

- Switch STC power off.
- Switch STC power on.
- Touch button **Temp**. (Temp. button must appear black)

In case the touch screen displays Error 7, the liquid reservoir of the selected Thermoshake AC is below minimum filling level and requires a refill of cooling fluid. In case the touch screen does not display Error 7 after selection of the Thermoshake AC and Slot, the filling level may not be at maximum level, but the level is sufficient.

7.3.4. Refill Check with MTC/STC Demo Tool

The **MTC/STC Demo Tool** and the **Demo Tool Manual** can be downloaded from INHECO' website www.inheco.com. Login/password can be requested from sales@inheco.com.

The Demo Tool offers two options to check the refill requirement:

- check via Error Code Report (→ below)
- check with RRS command (→ page 23)

Check refill requirement via Error Code Report:

- Select button [Report Error Codes](#).
- Search in the displayed report for Details of Error: 07: **occurrences: 00X** → Fig. 26
- Make a note of the number of occurrences in case Error: 07 is listed in report.
- Filling level is fine in case Error: 07 is not shown (scroll down report).
- Restart MTC/STC in case Error: 07 is shown.
- Enter value of target temperature between 40 and 700 (+4°C and +70°C).
- Activate temperature by a mouse click on the [Set](#) button of the target temperature.
- Select button [Report Error Codes](#) again.
- Search again for the number of occurrences in the Details of Error: 07: **occurrences: 00X**.
- Compare number of occurrences of 2nd report with number of occurrences of 1st report.

In case number of occurrences has increased from one report to the next, a refill is required.

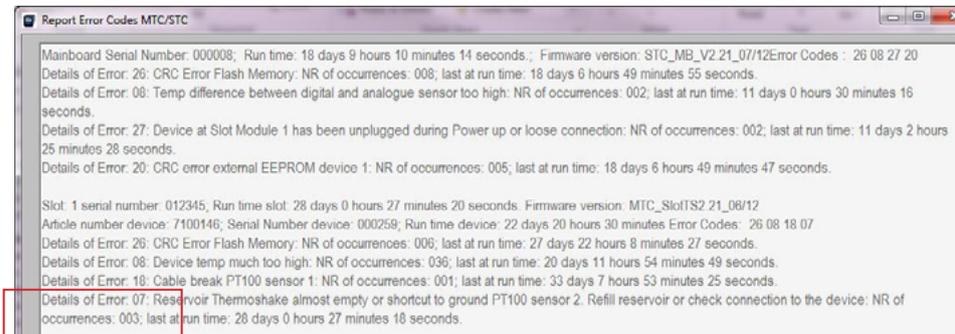


Fig.26: Example: Details of Error 07: no. of occurrences: 003, in case of an increase in 2nd report to 004 → refill is required

NOTICE

Maximum number of occurrences is 255. If this number is reached the error memory of the slot module has to be erased.

- Make a screenshot of error code report.
- Send screenshot to techhotline@inheco.com along with request for command to set back the error codes.

Check refill requirement via RRS command:

- Enter value of target temperature between 40 and 700 (+4°C and +70°C).
- Activate temperature by a mouse click on the [Set](#) button of the target temperature.
- Uncheck the [REFRESH](#) checkbox.
- Enter in the command field the command xRRS (x = SlotID → table below).

Command for STC	Description
1RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to a Single TEC Control unit.

Commands for MTC	Description
1RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 1
2RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 2
3RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 3
4RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 4
5RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 5
6RRS	send this command to check the filling level of cooling liquid of a Thermoshake AC connected to slot module 6

NOTICE

The command field shows either the default command 0RFV1 or the last command you have entered. Overwrite this last command.

- Select button [Send command](#).

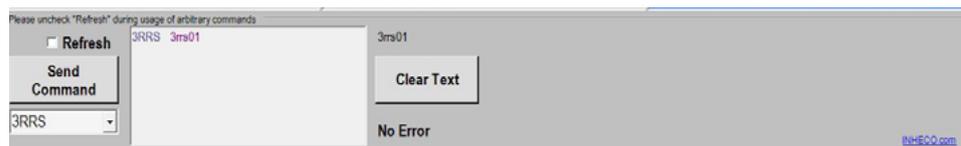


Fig.27: Command section after command was sent. Command and reply displayed in [reply message field](#).

- The command and answer are displayed in the [reply message field](#) (→ possible replies in table on page 30).

NOTE

The last number of the answer is relevant: 0 means empty and 1 means full.

Possible Answer (x = slotID)	Description of Reply Messages
xrrsY0 or xrrsY1	the fifth digit (here Y) is the reply message byte from the error code table and the sixth digit is 0 (zero) when the reservoir is empty or 1 (one) when the reservoir is full.
xrrs00	empty system
xrrs01	full system
xrrs60	empty system (6 indicates reset detected)
xrrs61	full system (6 indicates reset detected)
xrrsR0	empty system (R indicates cable break or shortcut PT100 detected)
xrrsR1	full system (R indicates cable break or shortcut PT100 detected)
xrrsA..._..._...	This is a reply without information on level status thus command has to be repeated: <ul style="list-style-type: none"> • Select button Refresh (in the upper left corner of user interface) • Uncheck refresh check box • Resend command.

7.4. Cleaning



CAUTION

Before **cleaning** the Thermoshake devices, disconnect the power and make sure that the temperature at the heating plate is below +50°C.

The contact surface should be cleaned regularly to ensure optimum heat transfer into the disposable and assay. Always clean the contact surface after a spillage. Use a cloth with a 50:50 water / isopropanol solution and make sure that no deposits are left on the surface. Liquids must not enter into the unit.

Do not use aggressive cleaning fluids such as acetone, or abrasive cleaners.

Contact INHECO in case you prefer other cleaning liquids or methods as they might be harmful for the material of the devices.

7.5. Decontamination

Decontamination is required before return of a device to INHECO in case it has been exposed to human or animal blood/fluid/tissue or has been exposed to biological, chemical, or radioactive materials.

The surface decontamination should include a wipe-down of the housing surface with a decontaminating solution. A solution of 70% alcohol, bleach (5%-12%) or Microside SQ can be used where effective for the respective target material (organism). Otherwise the appropriate decontamination method and solution to eliminate any risk must be applied. Fumigation (e.g. with toxic formaldehyde or ethylene oxide gas) might be required if decontamination of inaccessible areas is needed but ensure to take precautions when using toxic gases or fluids for decontamination.

NOTICE

Contact INHECO if you are not sure whether the used decontamination method or solution could damage the device or its surface material.

NOTE

In case of **decontamination with gas**, make sure that no liquid enters inside the device. Usually the device is in operation and connected to the power outlet, as ventilation is needed for an effective decontamination with gas.

7.6. Calibration / Verification

For proper performance of the Shaking devices, it is recommended to verify the thermal and shaking performance at least once a year. Depending on the application, shorter verification intervals may be required. INHECO recommends to use the INHECO Measurement Plate (IMP) to perform the verification.

Contact techhotline@inheco.com in case of performance deviations from set values.

NOTICE

Please note that the set Heater Offset has an impact on the temperature verification of the device. Make sure that the Heater Offset is considered when performing the temperature verification.

7.7. Return for Repair only with RMA Number

INHECO devices must be repaired by INHECO only. Parts must not be exchanged by the user. Exchange of parts or broken seals can lead to the loss of warranty. Spare Parts must be ordered from INHECO.

INHECO only accepts decontaminated devices for repair, firmware update, maintenance etc., in case the devices were exposed to blood, to other body fluids or tissues, to biological, chemical or radioactive materials.

→ Decontamination and Cleaning, page 31.

Devices which were exposed to biosafety level 3 and 4 environments are not accepted by INHECO for return.

Ask techhotline@inheco.com or visit www.inheco.com/service/returns-rma.html for the return procedure before you return a device to INHECO. Do not return any devices without INHECO's RMA number. INHECO's RMA number must be shown on the outside of the return package. Returns without RMA number are not being processed by INHECO.

Devices should ideally be returned in the original packaging. If not possible, make sure that devices are sufficiently protected and cannot move within the package to avoid transportation damage.

NOTE

Do NOT return the device in open position as otherwise the shaker motor will get damaged. How to get the device in closed position → Chapter 6.2.

7.8. Transportation and Storage

It is recommended to keep the original packaging. INHECO devices should be shipped and stored in their original packaging. Adhere to required environmental conditions for transportation and storage → Technical Data, page 13.

7.9. Shut Down and Disposal

The device has to be disposed of in accordance with environmental and biosafety directives. You have to arrange for correct electric waste disposal following current safety regulations of your country.

All INHECO devices are RoHS and WEEE compliant.

8 ACCESSORIES

8.1. Multi TEC Control (MTC) / Single TEC Control (STC)

Product Name	Description	Part Number
Multi TEC Control	controls up to 6 INHECO devices individually	8900030
Single TEC Control	controls 1 INHECO device	8900031

8.2. Yellow Slot Module

Product Name	Description	Part Number
Yellow Slot Module	Teleshake (95) AC, Thermoshake AC (180)	2400211

8.3. Thermal Adapter for Temperature Transfer

A list of adapters (inserts, nests) can be downloaded from INHECO's webpage www.inheco.com or requested from sales@inheco.com.

8.4. Miscellaneous

Product Name	Description	Part Number
INHECO Measurement Plate (IMP)	verification of temperature and shaking performance	7901000
Heated Lid	heating up to +135°C	8900033
Cooling Liquid Thermoshake AC	100 ml for 3 refills (23% ethanol + 77% distilled water)	3800053

EC - Declaration of Conformity

in accordance with Directive 93/68/EEC (CE), 2014/30/EU (EMC), 2014/35/EU (LVD) and 2011/65/EU (RoHS II)

Product: Single TEC Control (STC), Single TEC Control Compact (STCC),
Multi TEC Control (MTC), Multi TEC Control Compact (MTCC)
(with Slots 2400125+2400128+2400211+2400205)
connected with corresponding devices:
CPAC Microplate, CPAC Ultraflat, Thermoshake or Teleshake, HeatPAC, Heated Lid

Part No: 8900029, 8900030, 8900031, 8900036, 8900033
7000163, 7000168, 7000179, 7000190, 7000166, 7100136, 7100146, 7100144, 7100160,
7100161, 7900046, 7100150, 7100151

Standards (Safety): EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
EN 61010-2-010:2014
EN 61010-2-101:2017

Standards (EMC): EN 55011:2016
EN 61326-1:2013
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 61000-4-2:2009
EN 61000-4-3:2006 A1:2009 A2: 2010
EN 61000-4-4:2004 A1:2010
EN 61000-4-5: 2006
EN 61000-4-6:2009
EN 61000-4-8:2010
EN 61000-4-11:2004

This product complies with the essential requirements of the Low Voltage Directive (LVD) and Electromagnetic Compatibility (EMC) directive, when used for its intended use.

International Standards For international standards please see UL certificate U8 046515 0033 Rev.00,
U8 046515 0034 Rev.00 and U8 046515 0037 Rev. 01
Download UL certificat: <http://www.inheco.com/service/certificates.html>

Manufacturer address: INHECO Industrial Heating and Cooling GmbH
Fraunhoferstr. 11
82152 Martinsried
Germany

Martinsried, May 2020