

# Thermo Scientific Piko Thermal Cycler

## User Manual

Rev. 1.2





# **Thermo Scientific**

# **Piko Thermal Cyclers**

## **User Manual**

Rev. 1.2, Cat. no. N11469

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# About This User Manual

## Intended users

The Piko Thermal Cycler can be used in research and routine-test laboratories by professional personnel.

## How to use this user manual

This user manual is for the following instruments, Piko Thermal Cycler, 24-well (Cat. no. TCP0024) and Piko Thermal Cycler, 96-well (Cat. no. TCP0096). It has been designed to give you the information you need to:

- Review safety precautions
- Install the Piko Thermal Cycler
- Operate the instrument
- Adjust the settings and service the instrument
- Troubleshoot the instrument performance

This user manual also describes all the features and specifications of the Piko instrument.

Read the manual in its entirety before operating the instrument.

Bolded words refer to items or functions that may be selected from the programming menu or from the keypad of the instrument. The following is an example for initiating a protocol: “To run a protocol, first select **RUN** using the function key.”

The following is an example referring to the “Open” button on the keypad: “Press **OPEN** to disengage the heated lid, and release the block along the sliding rails of the Piko Thermal Cycler.”

Keep the user manual for future reference. The user manual is an important part of the instrument and should be readily available during use of the instrument. Keep the user manual together with the instrument in case you distribute it onwards.

## For more information

For the latest information on products and services, visit our websites at:

<http://www.thermoscientific.com/piko>

In our efforts to produce useful and appropriate documentation, we would appreciate any comments you may have on this user manual for your local Thermo Fisher Scientific representative.

## Safety instructions

**Read the User Manual** Operating the Piko Thermal Cycler without first reading the entire User Manual may constitute a risk to your health. Only a person capable of handling electrical equipment should use the Piko Thermal Cycler. NOT FOR CHILDREN. ▲

**Do Not Attempt to Repair** Do not remove the cover of the system. Do not try to repair or replace broken components – you put yourself at risk for electrical shock. Removing the cover or replacing/removing components will void the warranty. Contact customer service or your local distributor if your system is not functioning properly. ▲

**Do Not Touch the Sample Block** Certain components, including the sample block and heated lid, will become excessively hot. Touching these components may cause burns. ▲

**Do Not Tamper with Electronics** Coming in contact with the electronics, even when the system is off or unplugged, may cause an electrical shock or harm. ▲

**Do Not Use Flammable or Hazardous Liquids with the Piko Thermal Cycler** ▲

## Safety warnings

These symbols are intended to draw your attention to particularly important information and alert you to the presence of hazards as indicated.



**Caution** This symbol indicates risk of harm or personal injury. Always consult the User Manual before touching the area of the Piko Thermal Cycler that displays this symbol. ▲



**Caution** This symbol indicates a risk of personal injury or harm by electrical shock. Always consult the User Manual before touching the area of the Piko Thermal Cycler that displays this symbol. ▲



**Caution** This symbol indicates risk of personal injury or burn by contact with a very hot surface. Avoid touching such surfaces. ▲



**WEEE symbol** This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. ▲



**Note** Marks a hint, important information that is useful in the optimum operation of the system, or an item of interest. ▲

## Electromagnetic interference

This product conforms to the “Class B” standards for electromagnetic emissions intended for laboratory equipment applications. It is possible that emissions from this product may interfere with some sensitive appliances when placed nearby or in the same circuit as these appliances. The user should be aware of this potential risk and take appropriate measures to avoid interference.

## Environmental requirements

This section describes the environmental requirements of the Piko Thermal Cycler.



**Note** Important! It is highly recommended that all users of the Piko Thermal Cycler read the following section carefully. The performance and reliability of the Piko Thermal Cycler are closely linked to the working conditions in which the system is run. To ensure that your Piko Thermal Cycler will provide years of top-level performance and have the fewest problems, adhere to the environmental requirements described here. ▲

### Absolute environmental requirements

The Piko Thermal Cycler is rated to operate reliably in the following environmental conditions. Avoid extremes of these environmental ranges to best preserve the long-term performance and life span of the instrument.

- Ambient temperature: 5°C–30°C
- Ambient relative humidity: up to 80%
- Altitude: under 2000 m
- Indoor use only

### Recommended working conditions

The Piko Thermal Cycler will perform optimally and with greater reliability in the following operating conditions.

- Ambient temperature: 15°C–25°C
- Ambient relative humidity: under 50%
- Altitude: under 1000 m

### Airflow

Airflow is paramount to high-speed performance and reliability. It is important to maintain good heat sink cooling capability. It is best to have a cool source of incoming air and an unobstructed exhaust for outgoing air. Follow these three guidelines to best ensure optimum heat sink function:

- **Obstruction-free intake of air** – Do not place on a hot surface or on laboratory bench paper. Do not slide any paper or other material under the system as this may hamper the airflow or be sucked into the system.
- **Obstruction-free exhaust for outgoing air** – Always keep a distance of at least 10 cm between the exhaust vents and any large solid object such as walls, larger instruments, or other thermal cyclers. Do not have other instruments exhaust blowing directly at the Piko Thermal Cycler system.
- **Clean fins of heat sink** – Inspect the fins of the heat sink on a regular basis. Dirty heat sinks have a significantly lower capacity to dissipate heat. Clean the fins if they become dirty or covered in dust. You can use a cotton swab, a brush, or compressed air to remove dust.



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## Chapter 1

# Piko<sup>®</sup> Thermal Cycler Overview

The Piko Thermal Cycler (Figure 1-1) delivers high performance in a compact package. It incorporates novel technical solutions that allow significant reductions in PCR run times and the overall size of the instrument. The Piko Thermal Cycler is an ideal solution for both conventional and fast PCR applications. The Piko Thermal Cyclers are available in two different block configurations: 24-well and 96-well.



**Figure 1-1.** Piko Thermal Cycler



## Chapter 2

# Piko Thermal Cycler Main Parts

This chapter describes the main parts of the Piko Thermal Cycler.

**Front view** The front view of the Piko Thermal Cycler is shown in Figure 2–2.



**Figure 2–2.** Piko Thermal Cycler front view

**Rear view** The rear view of the Piko Thermal Cycler is shown in Figure 2–3.



**Figure 2–3.** Piko Thermal Cycler rear view

## Instrument user interface

The user interface of the Piko Thermal Cycler is shown in Figure 2–4.



**Figure 2–4.** Piko Thermal Cycler instrument user interface

## Main menu



The Piko Thermal Cycler user interface features four function keys which are used to select different menu options.

The function keys on the **Main** menu have the following actions:

- [F1] **RUN** Runs saved protocols. Allows editing of saved protocols.
  - [F2] **NEW** Begins programming of a new protocol.
  - [F3] **STAT** Shows Status screen (when running).
  - [F4] **TOOLS** Accesses global settings or diagnostic routines.
- [C] The **CANCEL** button. It will bring you back to the **Main** menu. If you are performing a run, and press the C button for more than a second, it will cancel the run. In certain cases, for example, when saving a file, the button takes you back one screen.

## LED function

To the left side of the power button on the keypad are two LEDs with the following indications:

<b>Constant blue</b>	System on and NOT in use.
<b>Blinking blue</b>	System on and in use.
<b>Constant red</b>	System has recently experienced an error. Refer to Chapter: " <i>Troubleshooting Guide</i> " for more information.

## Automatic lid

The heated lid is internally motor-controlled. It will automatically adjust to the optimal temperature and sealing pressure.

## External power supply

The Piko Thermal Cycler uses an external 200 watt power supply (an approach commonly used with lap-top computers). This is made possible by the instrument's unusually low power consumption.

## Vessels compatible with Piko Thermal Cycler

The Piko Thermal Cycler sample blocks (24-well and 96-well) will only accept microplates with a footprint in the dimension of a microscope slide. This Piko format gives the Piko Thermal Cycler its compactness as well as its ability to deliver excellent performance.

However, note that some other low profile thin-wall PCR tubes are also compatible with the 24-well Piko Thermal Cycler. For a complete listing of product numbers and additional product information, visit our website at [www.thermoscientific.com/piko](http://www.thermoscientific.com/piko).

UTW® Ultra-thin wall vessels provided by Thermo Fisher Scientific are recommended. These vessels were used in the optimization of the temperature algorithms of the instrument as well as in the validation of its performance. UTW vessels provide more consistent results in fast PCR protocols.



**Note** Conventional format microplates will not fit within the Piko Thermal Cycler. ▲

## Block formats

The Piko Thermal Cycler is available in two block formats (Figure 2–5 and Figure 2–6).



**Figure 2–5.** 24-well, max. volume 50  $\mu$ l



**Figure 2–6.** 96-well, max. volume 20  $\mu$ l



## Chapter 3

# Installation

This chapter describes the installation and setup of the Piko Thermal Cycler.

### Items included

Inside the Piko Thermal Cycler package you should find the following:

- Piko Thermal Cycler
- Power supply and power cord
- User Manual CD
- Quick Reference Guide

### Setting up the Piko Thermal Cycler

Setting up the Piko Thermal Cycler can be performed in 5 simple steps:

1. Remove all components from packaging.
2. Install the Piko Thermal Cycler in a protected location where no one can step on or trip over the line cord, and where the line cord remains accessible in case of a need to unplug the unit.
3. Plug the power supply into the back of the Piko Thermal Cycler.
4. Insert the power cord into the power supply.
5. Insert the power cord into the outlet.

The system will power up automatically.



**Caution** To prevent risk of shock or damage to the instrument, it is very important that the power supply be first connected to the Piko Thermal Cycler before plugging it into the wall. ▲



**Caution** Always use a grounded outlet and cord to provide power to a Piko Thermal Cycler. ▲

## **Installation**

Setting up the Piko Thermal Cycler

# Chapter 4

## Operation

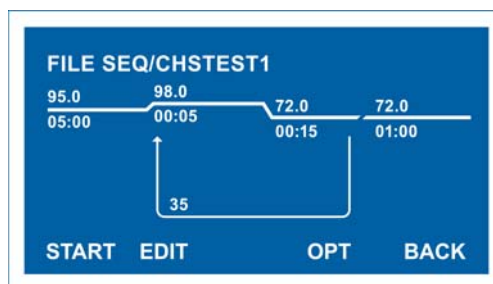
The operation of the Piko Thermal Cycler is described below.

### Operating modes

Programs can be edited either in a graphical mode or in a list mode.

You can change the mode by pressing the **TOGGLE** key at the lower left corner of the keypad. The mode remains until you change it again with the **TOGGLE** key. You can also change the mode when the instrument is running a protocol.

In the graphical mode the steps are displayed from left to right.



In the list mode the steps are in a numbered list.

Step	Temp (°C)	Time
1	95.0	05:00
2	LOOP	35 TIMES
3	98.0	00:05
4	72.0	00:15
5	72.0	01:00
6	4.0	∞

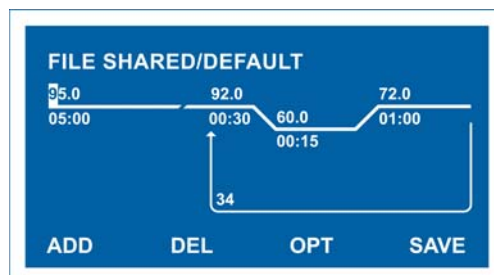


**Note** You cannot use the **TOGGLE** key when editing the time of a temperature step. It is used for changing the temperature step into an infinite hold. ▲

## Creating a new protocol

To create a new protocol, press **NEW** in the **Main** menu.

A **DEFAULT** protocol is displayed on the screen.



The **DEFAULT** protocol is a typical PCR temperature cycling routine: A temperature step is represented by a horizontal line with a temperature value (with a resolution of 0.1, in °C) above the line, and a time value (in mm:ss) below the line.

The **DEFAULT** protocol is permanently stored in the **SHARED** folder. If changes are made and saved to this file and folder, the latest saved version of the **DEFAULT** protocol will appear each time a new protocol is selected.



**Note** You can toggle between the graphical mode and list mode by pressing the **TOGGLE** key from the keypad. ▲

## Opening an existing protocol

To open an existing protocol:

1. From the **Main** menu press **RUN**.
2. Highlight the desired folder using the arrow keys.
3. Press **OPEN** to open the selected folder.
4. Highlight the desired protocol file using the arrow keys.
5. Press **OPEN** to open the selected protocol file.

This will display the protocol in graphical or list mode depending on which mode has most recently been used.

If you want to run the protocol, press **START**.

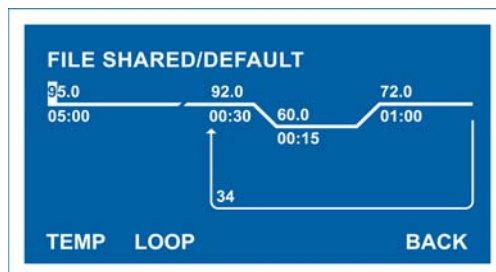
If you want to start editing the existing protocol, press **EDIT**.

## Editing a protocol

This section describes how to edit a protocol.

### Adding a temperature step

To add a temperature step:



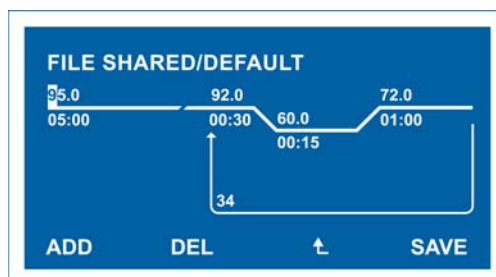
1. In the protocol editing screen, add a new temperature to the right of the highlighted step by pressing **ADD** and then **TEMP**. You can delete a highlighted temperature step by pressing **DEL**.
2. Modify the temperature and time values by moving to the value field with the arrow keys and entering a new value using the keypad.

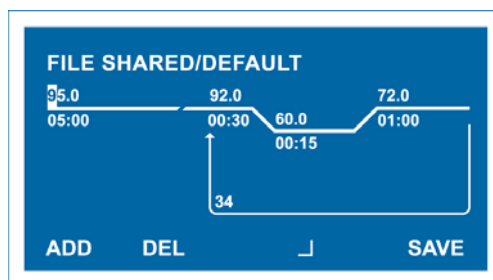
The decimal point will be added automatically. For a temperature of 60.5°C, enter the following: “6, 0, 5.” Similarly, for a time value, enter the numbers as you would write them: for a 1 minute and forty-five second hold, enter the following: “0, 1, 4, 5.”



### Adding a cycling loop

To add a cycling loop:

1. In the protocol editing screen, go to the last step of the desired loop and press **ADD**.
2. Press **LOOP**. The default loop has 3 steps and 35 cycles.
3. Move to the number of cycles value field in the left corner of the loop arrow, and change the number of cycles, if desired.





In the loop editing mode, the right and left arrow keys can be used to change the first or last step of the loop. The symbol above the **F3** key indicates whether the first step  of the loop or the last step  of the loop will be changed.

4. To toggle between these modes, press the **F3** key.

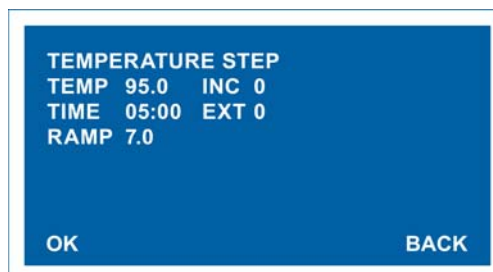
## Entering advanced programming options

Add temperature increments, time extensions, and adjust the ramp rate according to the following instructions.



**Note** You can also edit temperature and time values in this screen. ▲

1. In the FILE SHARED/DEFAULT screen, press **OPT**.



2. If you want to add (or subtract) an increment to the temperature step in a loop, move to the **INC** field with the arrow key, and edit the value. The amount of the increment will be added to (or subtracted from) each successive cycle. This is used for touchdown protocols. The input range is ( $\pm$ ) 0.1°C to 9.9°C/cycle.
3. If you want to add (or subtract) a defined time extension to a temperature step in a loop, move to the **EXT** field with the arrow key and edit the value. The amount of the extension is added to (or subtracted from) each successive cycle. The input range is ( $\pm$ ) 1 to 99 seconds/cycle.

4. If you want to slow the ramp rate to a value below the maximum go to the **RAMP** field and edit the value. The input range is 0.1 to 7.0°C/second.
5. Accept the changes by pressing **OK**.

You can go back to the protocol editing screen without saving the changes by pressing **BACK**.



**Note** If advanced options have been entered, the **OPT** menu label will be reverse displayed (have a white background) when the affected step is highlighted. This is to remind you that an option has been programmed into that step. ▲

### Deleting a cycling loop

1. In the protocol editing screen, go to any step in the loop.
2. Go to the number of cycles value in the loop arrow using the arrow keys, and press **DEL**.

The loop is deleted from the protocol.

### Adding an infinite hold

When editing the time field of any temperature step, press the **TOGGLE** key at the lower left corner of the keypad to add an infinite hold.

### Saving a protocol file

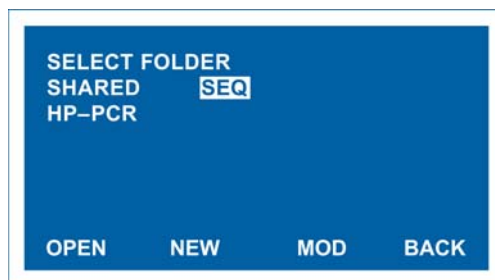
After editing a protocol file, save it according to the following instructions.

1. In the protocol editing screen, press **SAVE**.



**Note** If you do not want to save the changes, press the **C** button from the keypad. ▲

2. If you are saving a new protocol file, select the folder in which you wish to save the file and press **OPEN**.





**Note** If you are editing an existing protocol file, the file will be saved in the same folder as before, and you do not need to select the folder from the screen. If you wish to save the file to a new folder, press **BACK**, and select a folder or create a new one. ▲

If you want to create a new folder, in the **SELECT FOLDER** screen do as follows:

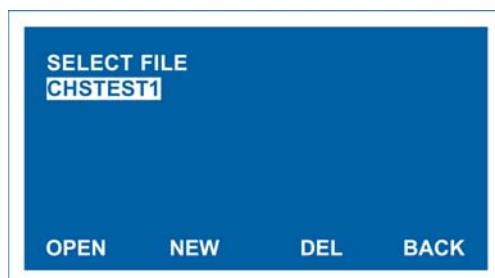
- a. Press **NEW**.
- b. Type the folder name (7 characters maximum).
- c. Type your password (4 characters maximum).

The password is optional. A password protected folder will prevent unauthorized users from editing protocols within the folder, or from saving new protocols to the folder. Password protection does not prevent unauthorized users from viewing or running the protocols within the folder. If the **PASSWORD** field is left blank, the folder will not be password-protected.



**Note** If a password is lost or forgotten, contact your Thermo Fisher Scientific representative for instructions on how to reset the folder. ▲

- d. Press **YES**.
- e. In the **SELECT FOLDER** screen, press **OPEN** to open the new folder.



3. To save the protocol file with a new name, press **NEW**, type the file name, and press **YES**.

If you want to overwrite an existing file, select the file in the list and press **OPEN**.

4. Confirm by pressing **YES**.

The protocol file is saved and you will return to the **Main** menu.



**Note** If you select **YES&RUN**, make sure that the samples are already loaded at this point. The instrument asks for the volume and then starts running the protocol. ▲



## Renaming or deleting an existing folder

You can rename or delete all other folders except the {RECENT} and the {SHARED} folder.

The {RECENT} folder stores the last six protocols that have been run on the Piko Thermal Cycler. The {SHARED} folder is a default folder that can be used and accessed by all users.

1. In the **Main** menu, press **RUN**.
2. Select a folder and press **MOD**.
3. If you want to rename the folder, select **RENAME** and type the new name. Password protected folders require a password to delete or rename a folder.



**Note** Text entry is similar to that of a cell phone. A number or character is automatically entered after a one second delay. Pressing the key will toggle through the assigned number and three characters (for example, press the key labeled [2, A,B,C] twice to select “A” and wait 1 second). A folder name can be a maximum of 7 characters long. ▲

4. If you want to delete an existing folder, press **DEL**.



**Note** Deleting a folder also deletes all the protocol files in it. ▲

5. Accept the changes by pressing **YES**.

## Running a protocol

To run a protocol:

1. From the **Main** menu, press **RUN**.
2. Highlight the folder in which the protocol file has been saved, press **OPEN**.
3. Highlight the protocol file and press **OPEN**.

The protocol will be displayed in graphical or list mode depending on which mode has most recently been used. You can toggle between the modes by pressing the **TOGGLE** key at the lower left corner of the keypad.

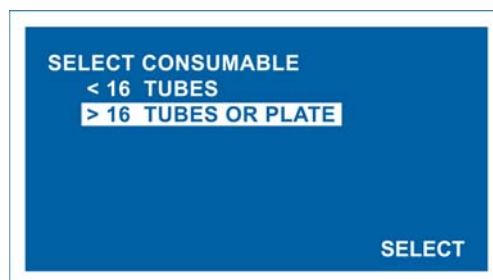
4. Press **START**.

5. Enter the sample volume (µl per well).
  - 24-well Piko Thermal Cycler: 10–50 µl
  - 96-well Piko Thermal Cycler: 5–20 µl



**Note** If you are using a 96-well Piko Thermal Cycler, the run will start immediately after accepting by pressing **YES**. ▲

6. If you are using a 24-well Piko Thermal Cycler, select lid pressure based on consumables. Highlight the appropriate alternative and press **SELECT**.



**Note** If less than 16 x 0.2 ml tubes have been loaded and PLATE is selected by mistake, the lid pressure may cause the tubes to become crushed or deformed. ▲



**Note** If only a few (1–3) 0.2 ml UTW tubes are used in a run, we recommend placing additional empty tubes in the corners of the block to avoid deformation. ▲

7. Accept the changes and start the run by pressing **YES**.



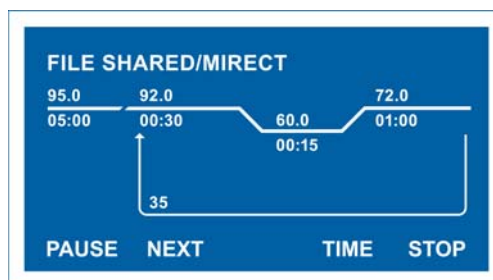
**Note** When the run begins, the lid will begin to move, a blue LED light will flash, and the running protocol will be displayed in graphical or list mode, depending on which has been selected. ▲

## Monitoring a run

You can monitor a run in two screens: Status screen and Time status screen.

### Status screen

Upon initiation of a run, the Piko Thermal Cycler will display the Status screen.



The current running temperature step in the protocol is represented by a flashing line, and the file name and host folder are displayed on the top of the screen.

To skip to the next temperature step in the protocol, press **NEXT**.



**Note** Pressing the **TOGGLE** key will switch the display between list mode and graphical mode. ▲

## Time status screen

You can toggle to the Time status screen by pressing **TIME**.



The Time status screen displays additional information about the run. As with the Status screen, the file name and host folder are displayed on the top of the screen. Additionally, the following status parameters are displayed:

- **STEP** – Displays the step number of the currently running temperature step, as well as the programmed temperature and time of the step.
- **CYCLE** – Displays the current cycle number.
- The large numbers in the middle of the screen display the hours, minutes and seconds remaining until the completion of the running protocol.

To return to the Status screen, press **STAT**.

## Functions in the screens

In both screens, you can pause the run on the present temperature step, or the next step if ramping, by pressing **PAUSE**. When paused, this option becomes **RESUME**.

You can stop a run by pressing **STOP**.

## Operation

### Monitoring a run

You can also return to the **Main** menu for writing or editing protocols while the instrument is running by pressing the **C** key on the keypad.



**Note** You can return to the Status screen from the **Main** menu screen by pressing **STAT** when a protocol is running. ▲

## Chapter 5

# Settings

This section describes the different settings of the Piko Thermal Cycler.

### Viewing general information on Piko Thermal Cycler

You can view the block type, serial number and the current version of the firmware in the System info menu.

1. In the **Main** menu, press **TOOLS**.
2. Highlight **SYSTEM INFO** and press **OPEN**.

You will see the instrument type and the serial number on the screen.



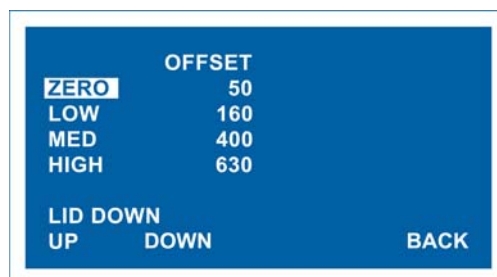
### Reading the lid offset values

To read the lid offset values:

1. In the **Main** menu, press **TOOLS**.
2. Highlight **DIAGNOSTICS** and press **OPEN**.
3. Highlight **LID** and press **OPEN**.
4. Read the **LID SETTINGS** values.

## Settings

Reading the sensor, drawer and lid states

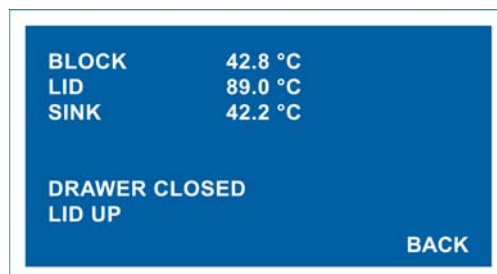


The LID screen displays the calibration settings for ZERO, LOW, MEDIUM and HIGH lid pressure. The **LID** menu will also periodically display the current location of the lid (UP or DOWN). These values may be requested by technical support when evaluating instrument operation.

## Reading the sensor, drawer and lid states

To read the sensor, drawer and lid states:

1. In the **Main** menu, press **TOOLS**.
2. Highlight **DIAGNOSTICS** and press **OPEN**.
3. Highlight **SENSORS** and press **OPEN**.



You can view the block, lid and sink temperatures, as well as the drawer and lid states. These values may be requested by technical support when evaluating instrument operation.

## Adjusting the contrast of the LCD screen

To adjust the contrast of the Piko Thermal Cycler's LCD screen:

1. In the **Main** menu, press **TOOLS**.
2. Highlight **DIAGNOSTICS** and press **OPEN**.
3. Highlight **DISPLAY** and press **OPEN**.



4. Adjust the contrast by pressing the up and down arrow keys from the keypad.
5. Accept the settings by pressing **YES**.

## Adjusting the date and time settings



To adjust the date and time:

**Note** If the Piko Thermal Cyclers is unplugged and without power for more than 72 hours, you may have to reset the clock. ▲

1. In the Main menu, press **TOOLS**.
2. Highlight **DIAGNOSTICS** and press **OPEN**.
3. Highlight **CLOCK** and press **OPEN**.



4. Press **MOD**.
5. Move to the date field and enter the new date (MM-DD-YYYY) using the keypad.
6. Move to the other fields with the arrow keys and edit the values.
7. Accept the changes by pressing **SAVE**.

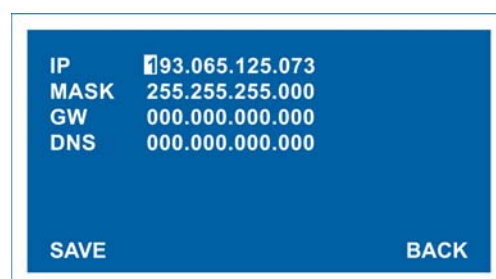
## Changing the network settings



In the Network menu you can change the IP address, the subnet mask (MASK), the gateway (GW), and the Domain Name Server (DNS).

**Caution** Improper settings can cause problems with the network, so caution should be used when changing the IP address from the default. ▲

1. In the **Main** menu, press **TOOLS**.
2. Highlight **NETWORK** and press **OPEN**.
3. Scroll to the desired row with arrow keys, and adjust the values.



4. Accept the changes by pressing **SAVE**.

Pressing **BACK** will take you to the **Main** menu without changing the settings.

## Service

This function is to be used by authorized Thermo Fisher Scientific service personnel only.

## Viewing protocol log files

The system creates a log file for each run protocol as well as for instrument errors. Refer to “Viewing instrument log files” on page 31.

1. In the **Main** menu, press **TOOLS**.
2. Highlight **LOGFILES** and press **OPEN**.
3. Select **PROTOCOL LOGS** and press **OPEN**.





4. Select the desired log file in the list and press **OPEN**.



The log file opens displaying the date and starting time of the run, as well as the runtime.



If there were no errors during the run, the screen shows “NO ENTRIES”.

If errors or warnings occurred during the run, the screen shows the number of entries.

- a. View the details of the error or warning by pressing **LIST**.
- b. See the entries in the protocol file by pressing **FILE**.
- c. In the event of an error, see the recommended action by pressing **ACTION**.

5. Quit the log file and PROTOCOL LOGS by pressing **BACK**.

## Viewing instrument log files

The instrument log records errors that occur when a program is not running (for example an anomalous sensor reading).

1. In the **Main** menu, press **TOOLS**.

## Settings

Parking the instrument for shipping or long-term storage

2. Highlight LOGFILES and press **OPEN**.
3. Select INSTRUMENT LOG and press **OPEN**.
4. Select the desired log file and press **OPEN**.

## Parking the instrument for shipping or long-term storage

If the instrument is shipped or stored for a longer period, park the instrument according to the following instructions.



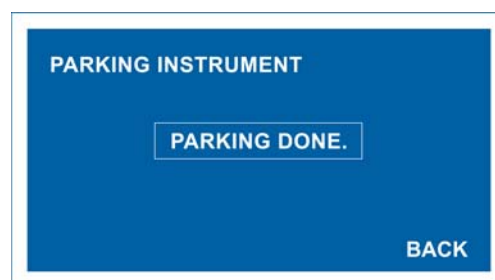
**Note** You will need an empty sample plate for parking the instrument. ▲

1. In the **Main** menu, press **TOOLS**.
2. Highlight PARK INSTRUMENT and press **OPEN**.



3. Insert an empty plate and close the drawer.
4. Press **OK**.

When parking is completed, the following message will be displayed:



5. Press **BACK** to return to the **TOOLS** menu.

## Chapter 6

# Maintenance

Contact local authorized technical service or your local Thermo Fisher Scientific representative for assistance, if necessary.

### Cleaning the Piko Thermal Cyclor

Clean the outside of the Piko Thermal Cyclor with a damp, soft cloth or tissue whenever something has been spilled on it or the cover is dusty. A mild soap solution may be used if needed.

Clean block wells with swabs moistened with water, 95% ethanol, or a 1:100 dilution of bleach in water.

### Disposal of the instrument

If the Piko Thermal Cyclor is exposed to potentially infectious biological samples, toxic or corrosive chemicals or radioactive chemicals, waste management of the complete instrument must be carried out to ensure that there is no risk of contamination.

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.



Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The proposals for the procedures vary by country.

<b>Pollution degree</b>	2 (see "Safety specifications" on page 36)
<b>Method of disposal</b>	Electronic waste Contaminated waste (Infectious waste)

Regarding the original packaging and packing materials, use the recycling operators known to you. For more information, contact your local Thermo Fisher Scientific representative.

## **Maintenance**

Disposal of the instrument

# Chapter 7

## Technical Specifications

### Instrument specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program (Table 7–1).

**Table 7–1.** Instrument specifications

Instrument specifications	
<b>Dimensions</b>	
Size	16 cm wide, 17 cm deep, 23 cm high
Weight	4 kg (includes power supply and cord)
<b>Electrical</b>	
Power supply	200 W, 24 V, 8.33 A
Line voltage	100–240 VAC
Input current	2.5 A and 4.0 A
Frequency	50–60 Hz
Power failure recovery	Yes
<b>Instrument configuration</b>	
Block formats	24-well, 96-well (not interchangeable)
Display	Backlit LCD
Memory	40 folders with 99 programs each
Communication ports	Ethernet, Serial
<b>Programming</b>	
Adjustable ramp rate	Yes
Touchdown	Yes
<b>Typical thermal performance</b>	
Max. ramp rate	> 5°C/s heating, > 4.5°C/s cooling
Thermal uniformity	± 0.3°C
Thermal accuracy	± 0.2°C
Thermal range	4°C to 99.9°C

## Safety specifications In conformity with the requirements

This section describes the safety specifications for the Piko Thermal Cycler instrument.

### Piko Thermal Cycler bears the following markings:

Type 5000

CE mark

cTÜVus monogram

100–240 Vac, 50/60 Hz

EUT: 24 VDC, 8.33 A

PSU: 100–240 Vac, 50–60 Hz, 2.5 A or 4 A

### The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:

Altitude Up to 2000 m

Temperature +5°C to +40°C

Humidity Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C

Mains supply fluctuations  $\pm 10\%$  from nominal

Installation category (overvoltage category) II according to IEC 60664-1 (see **Note 1**)

Pollution degree 2 according to IEC 60664-1 (see **Note 2**)



**Note 1)** The *installation category* (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains, such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

2) The *pollution degree* describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only nonconductive pollution, such as dust, occurs with the exception of occasional conductivity caused by condensation. ▲

## Chapter 8

# Troubleshooting Guide



**Note** Do not use the instrument if it appears that it does not function properly. ▲

### Error log

In case of an error there are two types of messages the Piko Thermal Cycler may display: warning messages and error messages.

A warning message may be displayed if the system is experiencing difficulty in running a protocol (for example, “Block temperature Too High” or “Lid Temperature Too Low”). In case of a temperature-related warning message, check to ensure that the air vents are not blocked and that the fan is working. A warning message is also displayed if a protocol is altered during a run (for example paused, or if steps are skipped).

If an error message appears in the display window, your Piko Thermal Cycler will abort the protocol and immediately shut down to prevent any damage to the system.

Should you receive an error message or a persistent warning message, contact your local distributor for support.

### Error messages

Errors inform you that a fatal event has occurred during the execution of the protocol (Table 8–2). For all errors except E1, the protocol will be stopped and all heating units will be turned off. For the case of a power interruption (E1) the instrument will resume operating as it was, but will display the error message until the user clears it.

**Table 8–2.** Error codes reported

Code	Error message	Description	Action
E1	POWER FAILURE	This error is set if the power was lost during protocol execution.	Check log files.
E3	BLOCK TEMP.	This error is set if the block temperature is far above normal use limits.	Contact support.
E4	LID TEMP.	This error is set if the lid temperature is far above normal use limits.	Contact support.
E5	SINK TEMP.	This error is set if the heat sink temperature is far above normal use limits.	Ensure that the airflow to the fan is not obstructed. If the problem persists, contact support.

Continued

## Troubleshooting Guide

### Error messages

Cont.

Code	Error message	Description	Action
E11	CALIB. TABLE	This error is set if any calibration temperature is out of the valid range.	Reboot the instrument. If the problem persists, contact support.
E12	SINK TEMP. LOW	This error is set if the sink temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E13	BLOCK TEMP. LOW	This error is set if the block temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E14	LID TEMP. LOW	This error is set if the lid temperature sets below -20°C. The reason for this can be a broken temperature gauge or a very low device temperature.	Wait for the instrument to reach the operating temp. If the problem persists, contact support.
E15	BLOCK TEMP. SHIFT	This error is set if consecutive reads of the block temperature differ more than is physically possible.	Reboot the instrument. If the problem persists, contact support.
E17	LID TEMP. SHIFT	This error is set if consecutive reads of the lid temperature differ more than is physically possible.	Reboot the instrument. If the problem persists, contact support.
E18	LID POS. FAILURE	This error is set if the lid hit pressure before it was supposed to. It can be caused by hitting an obstruction.	Retry. If the problem persists, see the manual.
E21	BLOCK TEMP. CHANGE	This error is set if power is applied to the block, but the temperature does not change.	Contact support.
E33	SELF TEST FAILURE	The Piko unit fails self test.	Reboot the instrument. If the problem persists, contact support.
E35	LID TEMP. CHANGE	This error is set if power is applied to the lid, but the temperature does not change.	Contact support.
E36	STRAIN GAUGE FAILURE	This error is set if the measured pressure value is not within valid limits or if the target pressure is not reached in a certain time.	Contact support.
E37	LID OPTO FAILURE	This error is set if the lid was driven up but fails to detect as being fully up within a specified time limit.	Retry. If the problem persists, see the manual.



## Warning messages

Warnings inform you that an unwanted event has possibly occurred during the execution of the protocol. The protocol is not stopped, but the event may have an effect on the results.

**Table 8–3.** Warning codes reported

Code	Warning message	Description	Action
W1	POWER FAILURE	This warning is set if there has been a power failure that has lasted less than 24h and the protocol was recovered.	Check the log files.
W8	BLOCK TEMP HIGH	This warning is set if the block temperature is above normal use limits.	
W9	LID TEMP HIGH	This warning is set if the lid temperature is above normal use limits.	
W10	SINK TEMP HIGH	This warning is set if the heat sink temperature is above use normal limits.	Check that the heat sink is clean.
W27	PROTOCOL STOPPED	This warning is set if the protocol is stopped before the end of protocol.	
W29	PROTOCOL PAUSED	This warning is set if the protocol is paused during the protocol run.	Check the log files.
W30	CYCLES ADDED	This warning is set if extra cycles are added to the protocol loop.	Check the log files.
W31	STEP SKIPPED	This warning is set if the protocol step is skipped (the NEXT key was used).	Check the log files.
W32	LID TEMP OVERRIDDEN	This warning is set if the lid temperature is overridden from the service menu.	Check the log files.

## Troubleshooting Guide

### Warning messages

## Chapter 9

# Ordering Information

Contact your local Thermo Fisher Scientific representative for ordering and service information (Table 9–4 and Table 9–5).

### Piko

**Table 9–4.** Instrument catalog number

Code	Item
TCP0024	Piko Thermal Cycler, 24-well
TCP0096	Piko Thermal Cycler, 96-well

### List of spare parts and accessories

**Table 9–5.** Codes for spare parts and accessories

Code	Item	Quantity
N11469	<i>Piko Thermal Cycler User Manual</i>	1
EA12101M-240-VAN	CMP power supply EA12101M-240-VAN	1
5180220	Power cable (UK)	1
1210550	Power cable (Euro)	1
1210520	Power cable (USA/Japan)	1
N08421	Power cable (China)	1



# Glossary

**PCR** Polymerase chain reaction.

**touchdown PCR** A protocol in which time and/or temperature are changed in small increments and are added or subtracted to each step in a loop. These changes continue to progress from cycle to cycle throughout the entire loop section of the protocol.

**UI** User interface.



## Notes

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## Notes

[illegible]





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