
PTC Tempo Thermal Cycler

Instrument Guide

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BIO-RAD

PTC Tempo Thermal Cycler

Instrument Guide

For Research Use Only



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To view the OPEN LICENSES

1. On the Home screen, tap Tools and then tap About.
2. On the About screen, select Legal Notices in the System section.

Revision History Table

| Document | Date | Description of Change |
|--|---------------|--|
| PTC Tempo Thermal Cyclers Instrument Guide (Doc ID #10000145169) | December 2022 | Initial Release |
| PTC Tempo Thermal Cyclers Instrument Guide (Doc ID #10000145169) | July 2023 | Includes <ul style="list-style-type: none">■ PTC Tempo 384 and PTC Tempo 48/48 thermal cyclers■ Incubating sample on PTC Tempo 48/48 thermal cyclers■ Starting and stopping PTC Tempo Automation API■ Establishing a static IP connection■ Updated plate loading instructions without a tube frame |

Revision History Table

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Safety and Regulatory Compliance

Bio-Rad's PTC Tempo Thermal Cyclers (known in this guide as the PTC Tempo thermal cycler) heat and cool very quickly during operation. Bio-Rad strongly recommends that you follow the safety specifications listed throughout this guide.

Note: Use only Bio-Rad-supplied Ethernet cables and power cords when using the PTC Tempo thermal cycler.

Safety Warning Labels

Warning labels posted on the PTC Tempo thermal cycler and in this manual inform you of sources of injury or harm. [Table 1](#) defines each safety warning label.

Table 1. General safety warnings








| Icon | Meaning |
|--|--|
|  | Operating the PTC Tempo thermal cycler before reading this manual can constitute a personal injury hazard. The use of this instrument in a manner not specified in this manual or by Bio-Rad may result in the protection features of the instrument becoming impaired or disabled. |
|   | There are no biohazards or radioactive hazards associated with the PTC Tempo thermal cycler itself. These hazards only become a concern when they are introduced into the system via the samples being tested. When handling biohazardous or radioactive samples, adhere to the recommended precautions and guidelines specific to your laboratory and location. These guidelines should include cleaning, monitoring, and disposal methods for the hazardous materials you are using. |
|  | In addition, as identified above, there is a small risk of explosion, or of expulsion of liquids or vapors from the sample containers. When working with hazardous materials the risk of injury from expelled material is compounded with the risk that the hazardous material themselves could be dispersed in and around the instrument. Users should take appropriate precautions for such a situation. |

Table 1. General safety warnings, continued

| Icon | Meaning |
|---|--|
|  | <p>The PTC Tempo thermal cyclers operate at temperatures high enough to cause serious burns. Always allow the sample block to return to room temperature before opening the lid and removing samples. Even after the sample block has cooled, the surrounding areas as well as the heater plate can remain hot for quite some time. In situations where there is not sufficient time to allow the instrument to cool, the use of protective equipment such as thermal gloves or “oven mitts” is recommended.</p> |
|  | <p>The safety and performance of any system incorporating a PTC Tempo thermal cyclers is solely the responsibility of the assembler of the system.</p> |
|  | <p>The PTC Tempo thermal cyclers can become hot enough during the course of normal operation to cause liquids in the samples to boil or vaporize, pressurizing the sample containers. There is the possibility that the sample containers could fail, leading to leaks, fluid spray, or explosive rupture and expelling vapors or liquids in and around the instrument.</p> <p>Users should always operate the instrument with the lid closed or wear safety goggles, thermal gloves, and other personal protection equipment during operation to avoid injury. Opening the instrument while samples are still hot, such as after aborting a run, can allow pressurized containers to leak, spray, or spurt liquid. Always allow the samples to cool before opening the lid.</p> <p>Users should never run a reaction with a lid or seal that is open, loose, punctured, or otherwise damaged because it will increase the likelihood of a dangerous rupture or explosion.</p> <p>Users should never run a reaction with volatile reagents that could increase the likelihood of a dangerous rupture or explosion.</p> |

Safety and Regulatory Compliance

Safety Compliance

The PTC Tempo thermal cyclers have been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards:

- IEC 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements
- IEC 61010-2-010:2019 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-010: Particular requirements for laboratory equipment for the heating of materials
- IEC 61010-2-081:2019 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

- CAN/CSA-C22.2 NO. 61010-1-12:2018 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements
- CAN/CSA-C22.2 NO. 61010-2-010:19 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 2-010: Particular requirements for laboratory equipment for the heating of materials
- CAN/CSA-C22.2 NO. 61010-2-081:19 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

- EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements
- EN 61010-2-010:2014 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-010: Particular requirements for laboratory equipment for the heating of materials
- EN 61010-2-081:2015 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

- UL 61010-1:2012 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 1: General Requirements
- UL 61010-2-010:2019 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-010: Particular requirements for laboratory equipment for the heating of materials
- UL 61010-2-081:2019 Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

Electromagnetic Compatibility (EMC)

The PTC Tempo thermal cycler has been tested and found to be in compliance with all applicable requirements of the following electromagnetic compatibility standards:

- IEC 61326-1:2020 Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements. Tested as a Class A device
- EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements. Tested as a Class A device
- FCC Part 15, Subpart B, Sections 15.107 and 15.109. Tested as a Class A digital device
- CAN ICES-003v6:2019 Interference-causing equipment standard, information technology equipment (including digital apparatus) — Limits and methods of measurement. Tested to Class A limits

EMC Warnings and Notes

- **Warning:** Changes or modifications to this unit, not expressly approved by Bio-Rad, could void the user's authority to operate the equipment.
- **Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.
- **Note regarding FCC compliance:** Although this instrument has been tested and found to comply with Part 15, Subpart B of the FCC Rules for a Class A digital device, please note that this compliance is voluntary, for the instrument qualifies as an "exempted device" under 47 CFR 15.103 (c), in regard to the cited FCC regulations in effect at the time of manufacture.

- **Note regarding cables:** This instrument was tested for EMC compliance with the USB cables supplied with the instrument. These cables, or Bio-Rad authorized replacements, must be used with this instrument to ensure continued compliance with the EMC emissions limits.

Environment Requirements

The PTC Tempo thermal cycler has been designed to be safely operated under the environmental conditions listed in the following table.

Table 2. PTC Tempo Thermal Cyclers environment requirements

| Parameter | Specification |
|-----------------------------------|--|
| Environment | Indoor use only |
| Operating altitude | Up to 2,000 meters above sea level |
| Ambient room temperature | 15–31°C* 59–88°F |
| Transport and storage temperature | –20° to 60°C** –4 to 140°F |
| Relative humidity | 20% to 80% (noncondensing)*** |
| Operating power | 100 to 240 VAC, 50/60 Hz, 850 W Max |
| Mains supply voltage fluctuation | ±10% |
| Maximum power usage | <850 watts |
| Fuses | 10 A, 250 V, 5 x 20 mm, fast blow (qty. 2) |
| Overvoltage category | II |
| Pollution degree | 2 |

* Operating the instrument outside of this temperature range may not meet performance specifications. A room temperature between 5–40°C (41–104°F) is considered safe.

** Store and transport the instrument in its shipping container to meet these temperature conditions.

*** Operating the instrument at 4°C should be limited to 18 hours at these conditions. Holds at 4°C can be performed for up to 72 hours if humidity is 20% to 60% (noncondensing).

Hazards

The PTC Tempo thermal cycler is designed to operate safely when used in the manner prescribed by the manufacturer. If the thermal cycler or any of its associated components is used in a manner not specified by the manufacturer, the inherent protection provided by the instrument may be impaired. Bio-Rad is not liable for any injury or damage caused by the use of this equipment in any unspecified manner, or by modifications to the instrument not performed by Bio-Rad or an authorized agent. Service of the PTC Tempo thermal cycler should be performed only by trained Bio-Rad personnel.

Biohazards

The PTC Tempo thermal cycler is a laboratory product. However, if biohazardous samples are present, adhere to the following guidelines and comply with any local guidelines specific to your laboratory and location.

Note: No biohazardous substances are exhausted during normal operations of this instrument.

General Precautions

- Always wear a laboratory coat, laboratory gloves, and safety glasses with side shields or goggles.
- Keep your hands away from your mouth, nose, and eyes.
- Completely protect any cut or abrasion before working with potentially infectious materials.
- Wash your hands thoroughly with soap and water after working with any potentially infectious material before leaving the laboratory.
- Remove wristwatches and jewelry before working at the bench.
- Store all infectious or potentially infectious material in unbreakable leak-proof containers.
- Before leaving the laboratory, remove protective clothing.
- Do not use a gloved hand to write, answer the telephone, turn on a light switch, or touch anything that other people may touch without gloves.
- Change gloves frequently. Remove gloves immediately when they are visibly contaminated.
- Do not expose materials that cannot be properly decontaminated to potentially infectious material.
- Upon completion of an operation involving biohazardous material, decontaminate the work area with an appropriate disinfectant (for example, a 1:10 dilution of household bleach).

Surface Decontamination



WARNING! To prevent electrical shock, always turn off and unplug the instrument prior to performing decontamination procedures.

The following areas can be cleaned with any hospital-grade bactericide, virucide, or fungicide disinfectant:

- Outer lid and chassis
- Inner sample block surface and sample block wells
- Control panel and display

To prepare and apply the disinfectant, refer to the instructions provided by the product manufacturer. Always rinse the sample block and sample block wells several times with water after applying a disinfectant. Thoroughly dry the sample block and sample block wells after rinsing with water.

Important: Do not use abrasive or corrosive detergents or strong alkaline solutions. These agents can scratch surfaces and damage the sample block, resulting in loss of precise thermal control.

Disposal of Biohazardous Material

Dispose of the following potentially contaminated materials in accordance with laboratory local, regional, and national regulations:

- Clinical samples
- Reagents
- Used reaction vessels or other consumables that may be contaminated

Chemical Hazards

The PTC Tempo thermal cycler contains no potentially hazardous chemical materials.

Explosive or Flammability Hazards

The PTC Tempo thermal cycler poses no uncommon hazard related to flammability or explosion when used in a proper manner as specified by Bio-Rad Laboratories.

Electrical Hazards

The PTC Tempo thermal cycler poses no uncommon electrical hazard to operators if installed and operated properly without physical modification and connected to a power source of proper specification.

Transport

Before moving or shipping the PTC Tempo thermal cycler, decontamination procedures must be performed. Always move or ship the thermal cycler in a separate container in the Bio-Rad-supplied packaging material, which protects the system from damage.

For information about transporting the thermal cycler and to request the appropriate packaging material, contact your local Bio-Rad office.

Battery

The PTC Tempo thermal cycler uses one 3 V lithium-metal coin cell battery to maintain time settings in the event of AC power loss. If the time does not remain set after the unit is turned off, it may be an indication that the batteries are getting weak.



WARNING! Do not attempt to change the batteries. They are not user serviceable. Instead, contact Bio-Rad Technical Support for assistance.

Disposal

The PTC Tempo thermal cyclers contain electrical materials; they should not be disposed of as unsorted waste and must be collected separately, according to European Union Directive 2012/19/EU on waste electrical and electronic equipment — WEEE Directive. Before disposal, contact your local Bio-Rad representative for country-specific instructions.

Chapter 1 Introduction

The PTC Tempo Thermal Cyclers (known in this guide as the PTC Tempo thermal cycler) are thermal cyclers with an integrated 96-well, 384-well, 48/48-well or 96-well large volume sample block, depending on the thermal cycler.

Thermal cyclers are essential laboratory equipment for laboratories that run polymerase chain reaction (PCR) for sequencing, cloning, mutagenesis, and many other applications. The fully adjustable heated lid supports a wide range of vessels and sealers, including low-profile and standard-height PCR plates.

This guide explains how to set up and use the PTC Tempo thermal cycler to perform PCR experiments, manage users, and connect to external data storage on the network and to BR.io, the cloud application from Bio-Rad.

Important: Cybersecurity is the protection of assets in cyberspace from cyberattacks. Cybersecurity is Bio-Rad's ability to secure its people, information, systems, and reputation in cyberspace. Cyberspace is the always-on, technologically interconnected world; it consists of people, organizations, information, and technology.

Fast reaction is important with cybersecurity issues! If you suspect that there may be a cybersecurity issue concerning your instrument or that cybersecurity has been breached at your site, contact your Bio-Rad representative for technical support immediately.

Main Features

The main features of the PTC Tempo thermal cycler include:

- Connectivity to Bio-Rad's BR.io app to manage PCR protocol files and view run status

Using the BR.io app, you can create PCR protocols in the app, download and run them on your linked PTC Tempo thermal cycler, view the run status remotely, and then upload the run report to the BR.io app.

For more information about BR.io, go to [BR.io](#). From the BR.io Home page, you can

- Create a BR.io account
- Explore the BR.io app via video
- Access helpful BR.io guides

Linking your PTC Tempo thermal cycler to your BR.io account requires an Internet connection. See your IT administrator to connect your PTC Tempo thermal cycler to the Internet.

- Ability to integrate with laboratory automation systems using the PTC Tempo Automation API

For more information see the PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell API Reference Guide.

- Wireless and WLAN Ethernet network compatibility enables connectivity to your internal network for unlimited data access and storage on shared network drives as well connectivity to your BR.io cloud account
- USB drive compatibility provides an optional medium for protocol transfer and storage
- Programmable temperature gradient to quickly and easily identify optimal annealing temperatures

Performance Specifications

PTC Tempo thermal cycler components provide precise temperature control, fast ramp rates, gradient capabilities for method optimization and multiple block options to fit your labs particular needs. [Table 3](#) lists the sample block performance specifications for the PTC Tempo thermal cycler.

Reaction Module Performance Specifications

Table 3. PTC Tempo Thermal Cycler reaction module specifications

| Item | Specification | | | |
|--|--|---|----------------------------------|-----------------------------------|
| | PTC Tempo 96 | PTC Tempo Deepwell | PTC Tempo 384 | PTC Tempo 48/48 |
| Volume | 1–50 µl (10–50 µl Recommended) | 1–125 µl Optimal (10–125 µl Recommended) | 1–30 µl (3–20 µl Recommended) | 1–50 µl (10–50 µl Recommended) |
| Maximum ramp rate | 5°C/sec | 2.5°C/sec | 2.5°C/sec | 4.0°C/sec |
| Average ramp rate | 3.3°C/sec | 2.0°C/sec | 2.0°C/sec | 3.0°C/sec |
| The following specifications apply to all instruments | | | | |
| Lid temperature | 30–110°C | | | |
| Heating and cooling method | Peltier | | | |
| Temperature range | 4–100°C | | | |
| Increment | -10°C to 10°C/cycle | | | |
| Gradient | | | | |
| Operational range | 30–100°C | | | |
| Programmable span | 1–24°C | | | |
| Temperature accuracy | ±0.2°C of programmed target at 90°C | | | |
| Temperature uniformity | ±0.4°C well-to-well within 10 sec of arrival at 90°C | | | |

Finding Out More

The PTC Tempo Thermal Cycler web site (bio-rad.com/PTCTempo) provides access to technical notes, manuals, product information, and technical support. This site also provides many technical resources on a wide variety of methods and applications related to conventional PCR.

Chapter 2 Setting Up the PTC Tempo Thermal Cyclers

This chapter explains how to set up the PTC Tempo thermal cycler at your site.

Site Requirements

The tables in this section list the bench space and power requirements necessary to successfully install and use the PTC Tempo thermal cycler. For weight and dimensions of the packaged PTC Tempo thermal cyclers, see [Shipping Container Specifications for PTC Tempo Thermal Cyclers on page 34](#).

Important: Install your PTC Tempo thermal cycler on a flat, dry surface with sufficient cool airflow for it to run properly.

PTC Tempo Thermal Cycler Dimensions

Note: Ensure that there is enough clear space on the lab bench for your instrument plus additional space to maneuver it while installing cables and accessories.

The lab bench on which you plan to install the PTC Tempo thermal cycler must support its width, depth, height, and weight. [Table 4](#) lists the specifications of the PTC Tempo thermal cycler that your lab bench must support to ensure proper installation.

Table 4. PTC Tempo Thermal Cycler dimensions

| Item | Specification |
|------------|--|
| Dimensions | W: 10.9 in; 27.6 cm D: 19.8 in; 50.2 cm H (lid fully open): 17.0 in; 43.1 cm H (lid closed): 10.1 in; 25.5 cm |
| Weight | ■ Automated lid thermal cyclers: 32.63 lb; 14.8 kg ■ Manual lid thermal cyclers: 30.64 lb; 13.9 kg |

Power Requirements

Power to the PTC Tempo thermal cycler must be stable and within specifications to ensure proper operation. The power cord connected to the power inlet port must be rated for 10 amps or more.

Table 5. PTC Tempo Thermal Cycler power requirements

| Item | Specification |
|-------------------------|---|
| Number of power sockets | ■ One socket for the PTC Tempo thermal cycler |

Network Requirements

The PTC Tempo thermal cycler supports connectivity through Ethernet, wireless networking, and USB.

Table 6. PTC Tempo Thermal Cycler networking requirements

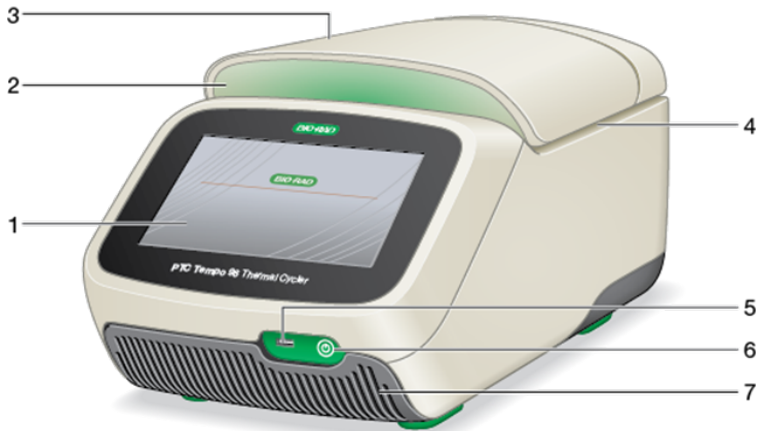
| Item | Specification |
|--------------------------------|---|
| Ethernet port | 10/100 BASE-T (RJ45)* |
| USB ports | USB 2.0 Type A (three on rear panel, one on front panel) |
| Wireless connectivity | Requires the PTC Tempo thermal cycler Wi-Fi adaptor appropriate for your locale (See your Bio-Rad Sales representative for more information.) Supports IEEE 802.11b/g/n 2.4 GHz, and IEEE 802.11 a/n/ac 5 GHz standards.* |
| USB barcode scanner (optional) | Scanner must be attached via USB cable |

* Default network support is DHCP. For information about configuring an Internet connection, see [Setting Up a Network Connection on the PTC Tempo Thermal Cycler on page 64](#).

System Overview

The illustrations in this section display the main components of the PTC Tempo thermal cycler.

Front View (96-Well, 384-Well, and Deepwell)



LEGEND

| | |
|-------------------------|----------------------|
| 1. Touch screen display | 2. LED system status |
| 3. Sample block lid | 4. Sample block |
| 5. USB A port | 6. Soft power switch |
| 7. Air intake vents | |

Details

- **Touch screen display** — provides access to all functions necessary to create and run protocols.
- **LED system status** — indicates system status:
 - Green (constant) — run is in progress.
 - Green (flashing) — run is paused.
 - Blue (flashing) — run has completed (flashes until lid is opened).
 - Red (flashing) — system error.
 - OFF — thermal cycler is idle (not executing a run, lid not moving) or is shut down.

- **Automated lid** — provides access to the sample block.

Note: The PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell systems do not have a manual open/close button on the lid. To open or close the lid, use the button on the Home screen, Run Setup screen, or Run Status screen.

- **Sample block** — holds the 96-well, 384-well, or Deepwell plate, depending on the instrument.
- **USB A port** — connects the PTC Tempo thermal cycler to a USB drive, mouse, keyboard, barcode scanner, or PTC Tempo thermal cycler Wi-Fi adaptor.
- **Soft power switch** — turns on the PTC Tempo thermal cycler software.

Light on the soft power switch illuminates a different color depending on software state:

- White — instrument and software are powered on.
 - Blue — software is powered off; instrument is in stand-by mode.
 - Red (flashing) — system error.
 - OFF — thermal cycler is shut down.
- **Air intake vents** — allow the thermal cycler to heat and cool quickly.



Important: Keep all air vents clean and clear of obstruction. Do not insert any object in the air vents at any time. Fans or other internal moving parts may collide with the object and cause personal injury or damage the thermal cycler. Conductive objects could contact internal circuitry and cause damage to the thermal cycler.

Front View (48/48-Well)



LEGEND

- | | |
|---------------------------|----------------------------|
| ■ 1. Touch screen display | ■ 2. LED system status bar |
| ■ 3. Block A lid | ■ 4. Block B lid (raised) |
| ■ 5. Sample block | ■ 6. USB A port |
| ■ 7. Soft power button | ■ 8. Air intake vents |

Details

- **Touch screen display** — provides access to all functions necessary to create and run protocols.
- **LED system status** — indicates system status for the specific block:
 - Green (constant) — run is in progress.
 - Green (flashing) — run is paused.
 - Blue (flashing) — run has completed (flashes until lid is opened).
 - Red (flashing) — system error.
 - OFF — thermal cycler is idle (not executing a run, lid not moving) or system is shut down.

- **Manual dual-block lids** — provide access to the sample blocks.
- **Sample block** — each block holds a single 48-well plate.
- **USB A port** — connects the PTC Tempo thermal cycler to a USB drive, mouse, keyboard, PTC Tempo thermal cycler Wi-Fi adaptor, or barcode scanner.
- **Soft power switch** — turns on the PTC Tempo thermal cycler software.

Light on the soft power switch illuminates a different color depending on software state:

- White — instrument and software are powered on.
- Blue — software is powered off, instrument is in stand-by mode.
- Red (flashing) — system error.
- OFF — thermal cycler is shut down.

- **Air intake vents** — allow the system to heat and cool quickly.



Important: Keep all air vents clean and clear of obstruction. Do not insert any object in the air vents at any time. Fans or other internal moving parts may collide with the object and cause personal injury or damage the system. Conductive objects could contact internal circuitry and cause damage to the system.

Special Considerations Regarding the PTC Tempo Thermal Cycler Touch Screen

The following are special considerations regarding the PTC Tempo thermal cycler's touch screen. If you have any questions regarding the touch screen, contact Bio-Rad Technical Support.



WARNING! If any liquid leaks out of a damaged glass cell and comes in contact with your skin, wash thoroughly with soap and water.

Notes:

- A strong incident light shining on the touch screen for extended periods of time may degrade the quality and performance of the display.
- Do not expose the touch screen to strong ultraviolet rays or direct sunlight for long periods of time.
- Do not touch or scratch the surface of the touch screen with any hard object.

Back View



LEGEND

| | |
|------------------|---------------------|
| 1. Power input | 2. Power switch |
| 3. Fuses | 4. Cooling vents |
| 5. Ethernet port | 6. USB Type A ports |

Details

- **Power input** — connects to AC power.
- **Power switch** — powers the PTC Tempo thermal cycler up to full power and down to a 1 Watt power consumption.
- **Fuses** — provide access to the fuses.
- **Cooling vents** — cool the PTC Tempo thermal cycler.
Important: Do not block the cooling vents. For optimal operation, ensure that air can circulate behind the PTC Tempo thermal cycler.
- **USB type A ports** — transfer data to and from a USB flash drive or connect a USB mouse, keyboard, barcode scanner, or PTC Tempo thermal cycler Wi-Fi adaptor.
- **Ethernet port** — connects the PTC Tempo thermal cycler to your network.

Unpacking the Thermal Cycler

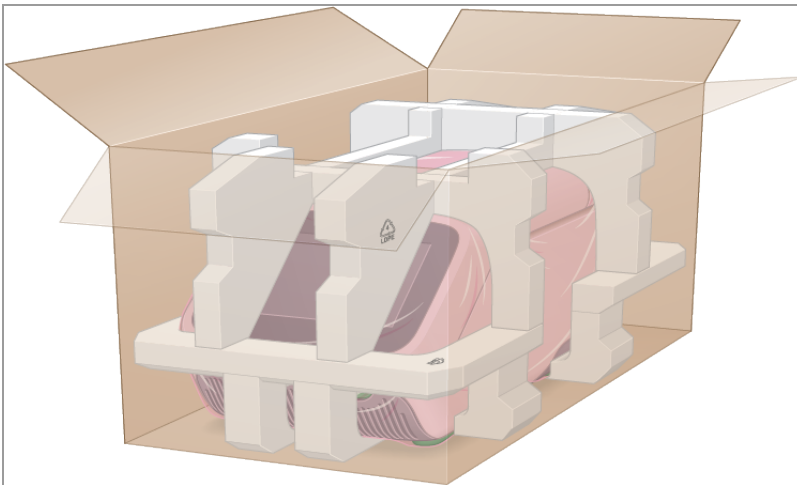
This section explains how to properly unpack the PTC Tempo thermal cycler. Read this section before you begin.

Caution: The packaged PTC Tempo thermal cycler weighs approximately 39 lb (17.7 kg). Bio-Rad strongly recommends that you use a pallet jack to move the instrument from the shipping dock to the laboratory.



Important: Use proper lifting techniques when moving and lifting the instrument to prevent damage to the instrument and personal injury. Bio-Rad recommends that two or more people lift the instrument.

The image below depicts the PTC Tempo thermal cycler inside its packaging.



Shipping Container Specifications for PTC Tempo Thermal Cyclers

Table 7 lists the specifications of the PTC Tempo thermal cycler in its shipping container.

For information about bench space specifications, see [Site Requirements on page 25](#).

Table 7. Shipping container specifications for PTC Tempo Thermal Cyclers

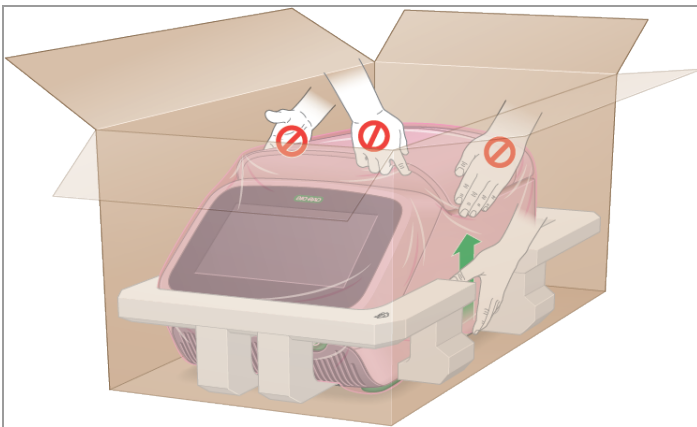
| Parameter | Specification |
|------------|--|
| Weight | 39 lb; 17.7 kg |
| Dimensions | Depth: 25.5 in; 64.8 cm Width: 17 in; 43.2 cm Height: 16.8 in; 42.7 cm |

Unpacking the Thermal Cycler

Install the PTC Tempo thermal cycler on a flat, dry surface with sufficient cool airflow to run properly. The AC power cord is approximately 5' in length. Ensure you have sufficient access to the power outlet before you begin.

Note: Ensure that there is enough clear space on the lab bench for your instrument plus additional space to maneuver it while installing cables and accessories.

Caution: When handling the instrument, do not grip the LCD screen or lid. To lift the instrument, position your hands underneath the right and left sides of the instrument.

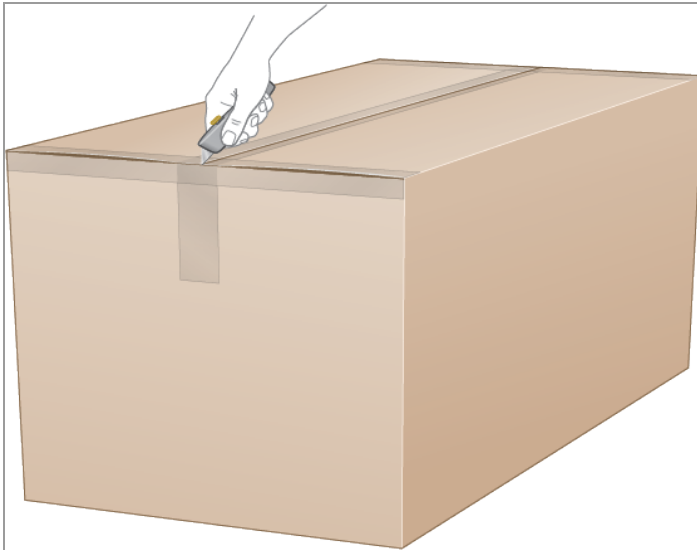


To unpack the thermal cycler

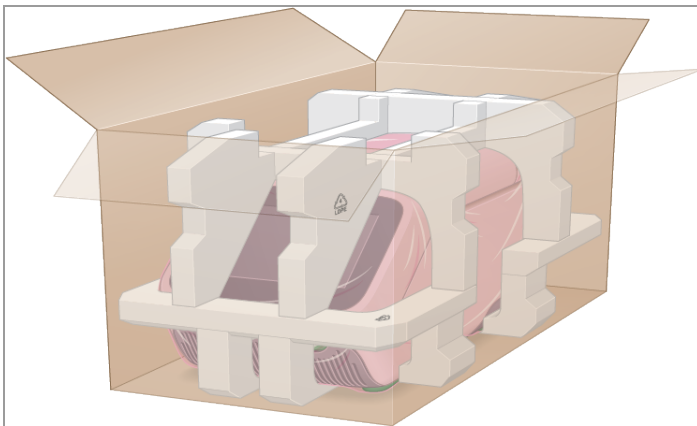
1. Ensure that the path from the shipping dock to the laboratory is clear of obstacles and can accommodate the packaged PTC Tempo thermal cycler and a pallet jack.
2. Using a pallet jack, move the instrument container from the shipping dock to the laboratory.

Important: Bio-Rad strongly recommends that you do NOT use a hand truck to move the packaged instrument.

3. Release the instrument container next to the lab bench.
4. With a box cutter, carefully slice the adhesive tape that secures the top major flaps together.

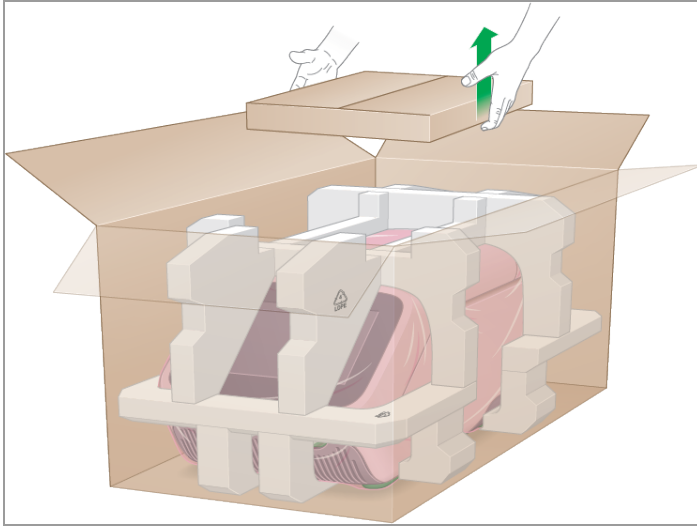


5. Spread the top major and minor flaps on the box to fully open the box.

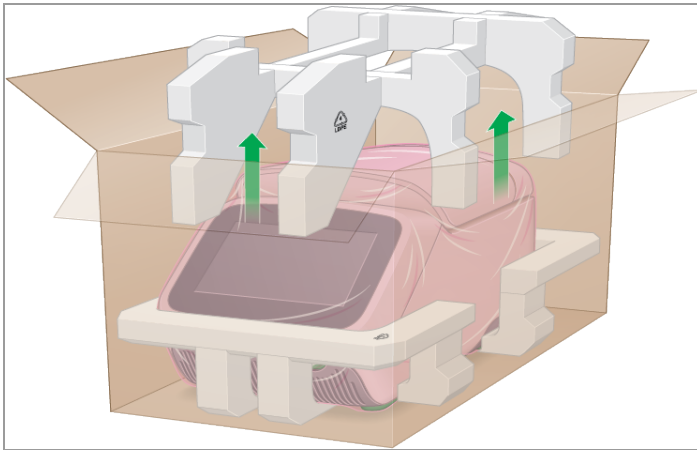


You see the accessories box and the PTC Tempo thermal cycler wrapped in plastic sheeting and inserted into the foam packing structure.

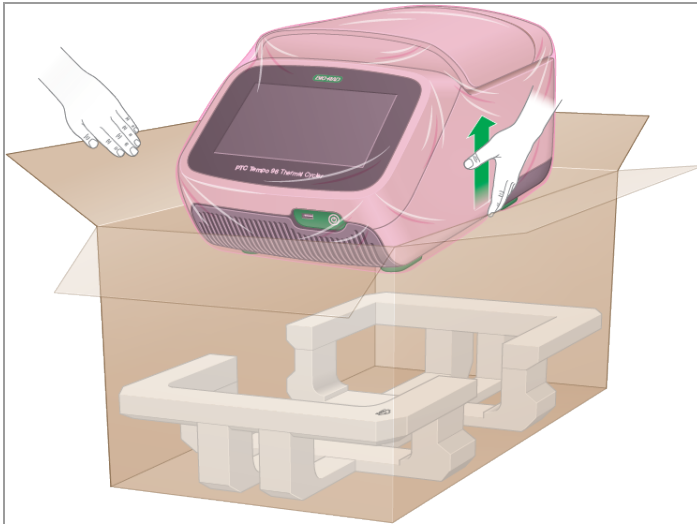
6. Remove the accessories box and place it to the side.



7. Remove the top foam insert and place it to the side.



8. While one person holds open the major flaps, using the lift points gently lift the instrument up out of the box and place it on the bench.



9. Slide the plastic cover toward the back of the instrument to remove.
10. Inspect the instrument for any damage.
11. Open the accessories box and examine the contents. You should receive:

- 1 Tube frame
- 1 7' Bio-Rad–provided Ethernet cable
- 1 5' Bio-Rad–provided AC power cord
- 1 PTC Tempo Thermal Cycler Quick Start Guide
- 1 PTC Tempo Thermal Cycler Safety and Regulatory Guide



Important: If you observe any damage to the thermal cycler or to the cord or cable, do not continue. Instead, contact Bio-Rad Customer Support.

Connecting the Power and Communication Cables

After you unpack the PTC Tempo thermal cycler and install it on the lab bench, you will need to connect the power cord and (optionally) the communication cables. This section explains how to connect the cord and cables.

Tip: Before connecting the cables, familiarize yourself with the PTC Tempo thermal cycler, its accessory kit, and power switches.

Important: Ensure you have enough room on the lab bench to reach the power switch on the back of the thermal cycler after connecting the power cord and Ethernet cable. Use only the Bio-Rad-supplied power cord and Ethernet cable.

To connect the PTC Tempo thermal cycler power and communication cables

1. Locate the accessory kit that shipped with the PTC Tempo thermal cycler.
2. Remove the AC power cord and Ethernet cable from the accessory kit.

Tip: Store the packing material for future use. If any item is missing or damaged, contact your local Bio-Rad office.

3. Insert one end of the AC power cord into the power inlet port on back of the thermal cycler.
4. Insert the other end of the AC power cord into an available grounded, surge-protected AC outlet.

Logging In to the PTC Tempo Thermal Cycler

The PTC Tempo thermal cycler ships with two default users: Admin and Guest. Users also have the option to create their own account when first logging in to the thermal cycler.

Tip: Creating user accounts on the PTC Tempo thermal cycler is optional though recommended.

Any user can log in as Guest and access all protocols in the Public folder and the Bio-Rad-supplied protocols in the Templates folder.

Any user, including the Guest account, can create, edit, and run protocols. When logged in as Guest, users can save their protocols into the Public folder or to an attached USB drive.

Tip: All files saved into the Public folder are available to all users of the PTC Tempo thermal cycler.

The PTC Tempo thermal cycler automatically creates a personal folder for each user who creates their own user account, as well as for the Admin user. When logged in, users can create and save protocols into their personal folder. The Admin user can create and save protocols to the Admin folder as well as to any individual user's personal folder.

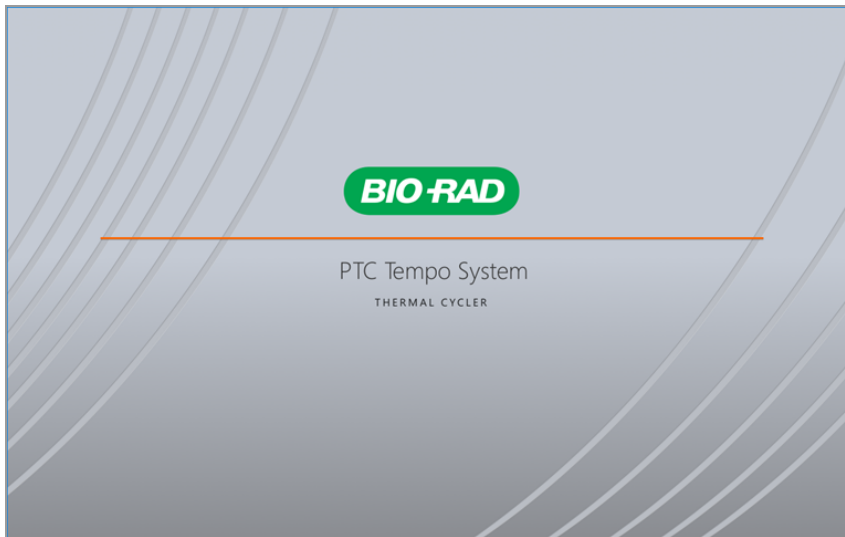
Note: Files saved to a personal folder are accessible only to the logged-in user or to the Admin user.

Starting the PTC Tempo Thermal Cycler

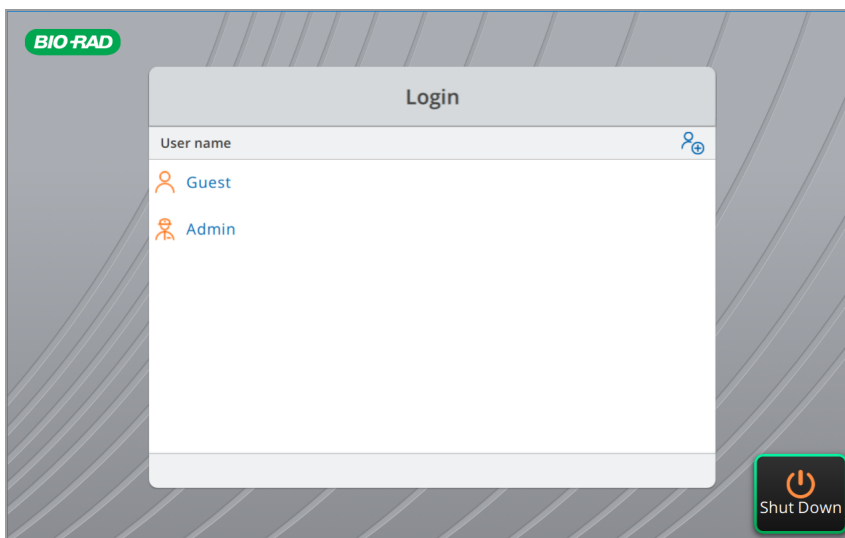
To start the PTC Tempo Thermal Cycler

- ▶ If you have not already done so, press the power switch on the back of the instrument and then press the soft power button on the front of the instrument to start the PTC Tempo thermal cycler.

You see the PTC Tempo Thermal Cycler startup screen.



The thermal cycler displays the Login screen.



Creating PTC Tempo Thermal Cyclers User Accounts

Tip: Creating user accounts on the PTC Tempo thermal cyclers is optional but highly recommended.

When logged in to the PTC Tempo thermal cyclers, you can

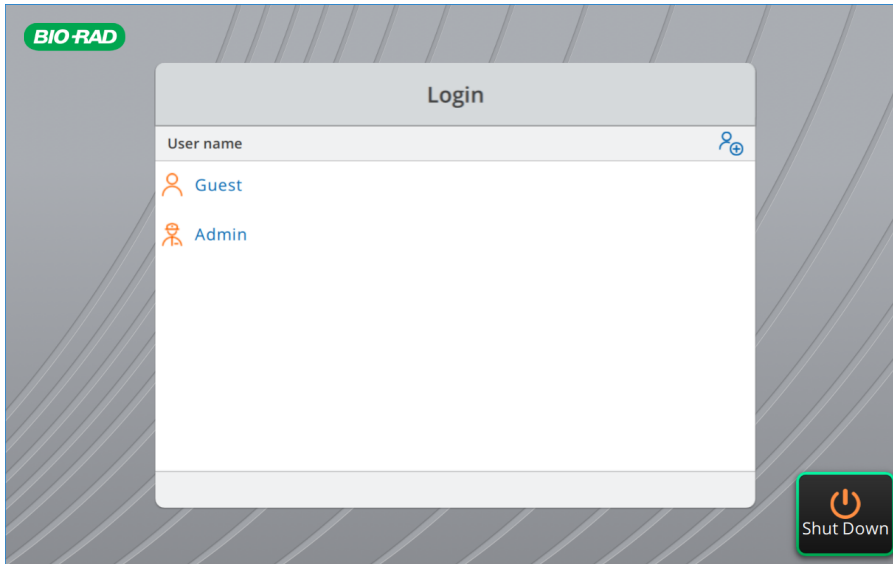
- Create and edit protocols and then save them to your personal folder.
- Rename a protocol in your personal or a public folder.
- Delete protocols in your personal folder.
- Copy a protocol to a public folder or USB drive.
- Connect to a shared folder on the network to store or access protocol files.
- Connect to your BR.io account.
- Run protocols; the run reports for which are automatically generated and saved on the instrument and to your BR.io account.
- Create and change your password.


This section explains how to create user accounts on the PTC Tempo thermal cyclers.

To create a new user

1. Do one of the following:
 - Turn on the PTC Tempo thermal cyclers.
 - On the Home screen, tap Logout to log out a currently logged-in user.

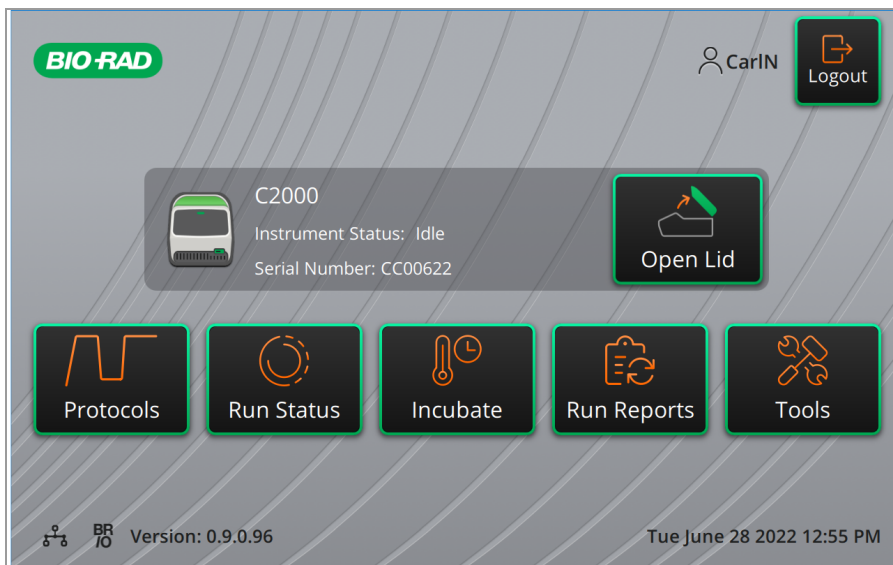
The Login list appears.



2. Tap the Create User icon ().
3. Using the alphanumeric keypad that appears, type a user name and then tap OK.

Tip: You can create a password by accessing Tools > User Profile. See [Setting User Passwords on page 71](#) for more information.

The Home screen appears and displays your user name next to the Logout button.



Logging In to the PTC Tempo Thermal Cycler

When the PTC Tempo thermal cycler starts, the Login list appears and displays the existing users.

Important: By default, the Admin user account does not have a password. When accessed for the first time, Bio-Rad strongly recommends that you create a password for the Admin user account and record the password in a password safe.

To log in to the Admin account when the PTC Tempo thermal cycler starts

1. In the Login list, tap Admin.
2. When prompted, enter the Admin password using the alphanumeric keypad that appears and then tap OK.

To log in to a User account when the PTC Tempo thermal cycler starts

1. In the Login list, locate and tap your user name.
2. If prompted, enter your password using the alphanumeric keypad that appears and then tap OK.

Tip: After you create your user account, the keypad does not appear if you did not create a password.

To log in to the Guest account when the PTC Tempo thermal cycler starts

- ▶ In the Login list, tap Guest.

Tip: The keypad does not appear because the Guest account does not have a password.

To change users

1. On the Home screen, tap Logout to log out the currently logged-in user.
The Login list appears.
2. In the Login list, tap your user name.
3. If prompted, enter your password using the alphanumeric keypad that appears and then tap OK.

Tip: The keypad does not appear if the user account does not have a password.

To log out

- ▶ On the Home screen, tap Logout.

Loading the Sample Block

For a list of plates and tubes compatible with the PTC Tempo thermal cycler, visit us at bio-rad.com/PTCTempo or contact your local Bio-Rad Sales representative.

To ensure uniform heating and cooling of samples, reaction vessels must be in complete contact with the sample block. To ensure adequate contact, do the following:

- Confirm that the sample block is clean before loading samples.
- Firmly press the individual tubes, tube strips, or microplates into the block wells.
- When using one or a few tubes, use the tube frame or load at least four empty tubes (for 96-well and Deepwell plates) or three empty tubes (for 48/48-well plates) in each corner of the block to ensure the lid exerts even pressure on individual tubes.



Caution: When loading fewer than four tubes onto a PTC Tempo 96-well or Deepwell plate without a tube frame, load the tubes horizontally, vertically, or in a square pattern in each corner of the sample block. For 48/48-well plates, load three tubes in each corner or in a vertical or horizontal configuration of the sample block. This arrangement safeguards the tubes from being crushed when the thermal cycler lid is closed. For examples on loading tubes in each corner, see [Loading Plates, Tubes, and Tube Strips into the Reaction Module on page 45](#).

Loading Plates, Tubes, and Tube Strips into the Reaction Module

The inner lid of the reaction module applies heat and force to the reaction vessel lids (caps or seal) to produce consistent and successful reactions. Heating the inner lid prevents condensation while applying force seals the reaction to prevent evaporation.



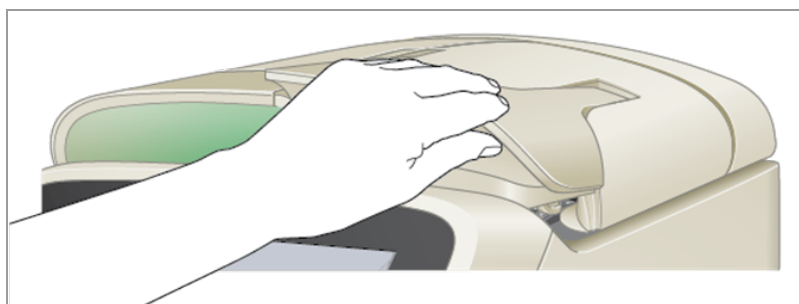
Caution: Never run a sample with a lid or seal that is open, loose, punctured, or otherwise damaged. Doing so will increase the likelihood of a rupture, which could cause injury or contaminate the thermal cycler.



Warning: After a run, the heated inner lid can remain hot. Use caution when opening and closing the lid.

To load plates into the sample block

1. Open the lid of the thermal cycler:
 - To open the lid on the PTC Tempo 96, PTC Tempo 384, or PTC Tempo Deepwell thermal cyclers, do one of the following:
 - On the Home screen, tap Open Lid.
 - On the Run Setup screen, tap Open Lid.
 - To open the lid on the PTC Tempo 48/48 thermal cycler, lift the lid lever completely until the lid of the reaction module stays open without assistance.



2. Place the microplate, individual tubes, or tube strips with sealed lids in the block.

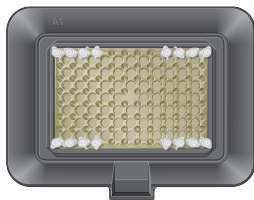
Important: Verify that the tubes are completely sealed to prevent leakage.

Tip: For optimal results, load sample volumes of 10–50 μl for the PTC Tempo 96, and PTC Tempo 48/48 thermal cyclers, 3–30 μl for the PTC Tempo 384 thermal cycler, and 10–125 μl for the PTC Tempo Deepwell thermal cycler.



Caution: When loading fewer than four tubes onto a 96-well or Deepwell plate without a tube frame, ensure that four tubes are arranged in a horizontal, vertical, or a square configuration in each corner of the sample block as shown below. For 48/48-well plates, load three tubes in a horizontal, vertical or "corner" configuration in each corner of the sample block as shown below. This prevents the tubes from being crushed when the thermal cycler lid is closed.

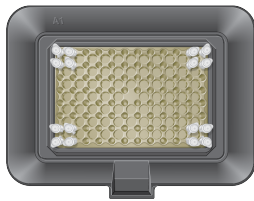
- Horizontal configuration (96-well or Deepwell)



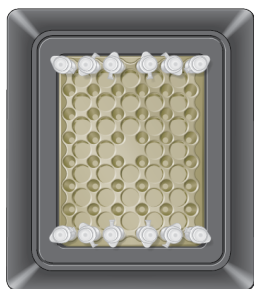
- Vertical configuration (96-well or Deepwell)



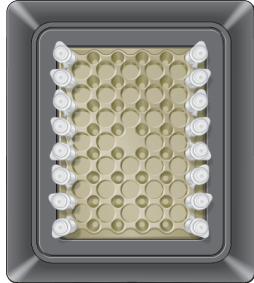
- Square configuration (96-well or Deepwell)



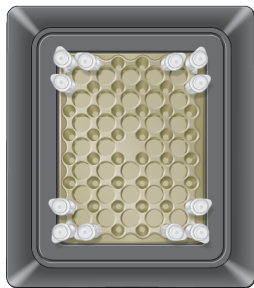
- Horizontal configuration (48/48-well)



- Vertical configuration (48/48-well)



- "Corner" configuration (48/48-well)



3. Close the lid of the thermal cycler:

- To close the motorized lid, do one of the following:

- On the Home screen, tap Close Lid.
- On the Run Setup screen, tap Close Lid.

Important: Ensure that nothing obstructs the lid when it closes. Although there is a safety mechanism to prevent the lid from closing if it senses an obstruction, do not place anything in the way of the lid before closing.


- To close the manual lid, gently press down on the lid making sure that it is securely in place.

Tip: The lid of the PTC Tempo 48/48 thermal cycler does not require tightening.

Shutting Down the PTC Tempo Thermal Cycler

Important: Follow these instructions to safely and completely shut down the PTC Tempo thermal cycler.

To shut down the PTC Tempo thermal cycler

1. Ensure that no protocol is running and the thermal cycler is no longer in use.
2. If you have not already done so, remove the samples from the block:
 - a. On the Home screen, tap Open Lid to access the samples.
 - b. Do one of the following:
 - For PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell thermal cyclers, tap Open Lid on the Home screen to access the samples.
 - For PTC Tempo 48/48 thermal cyclers, manually open the lid for the appropriate block to access the samples.
 - c. Remove the samples from the block and then close the lid.
3. On the Home screen, tap Logout to log out of the thermal cycler.
4. On the Login screen, tap Shut Down () and then tap Yes to power off the software.

Tip: The soft power button on the front of the instrument will illuminate blue. While the switch is illuminated blue, the instrument is in a stand-by state. Pressing the software power button while it is blue will start the PTC Tempo thermal cycler.
5. To completely shut down the thermal cycler, press the power switch on the back of the instrument to consume only 1W of power per the 1Watt initiative.

Chapter 3 Configuring the PTC Tempo Thermal Cyclers

After successfully installing the PTC Tempo thermal cyclers, you can configure the thermal cyclers according to the requirements at your site. Using the thermal cyclers' touch screen, users with the Admin role can perform the following tasks.

- Set the PTC Tempo thermal cyclers' time zone and local time
- Rename the thermal cyclers
- Set up network and wireless communication
- Manage user accounts

As a PTC Tempo thermal cycler user, you can

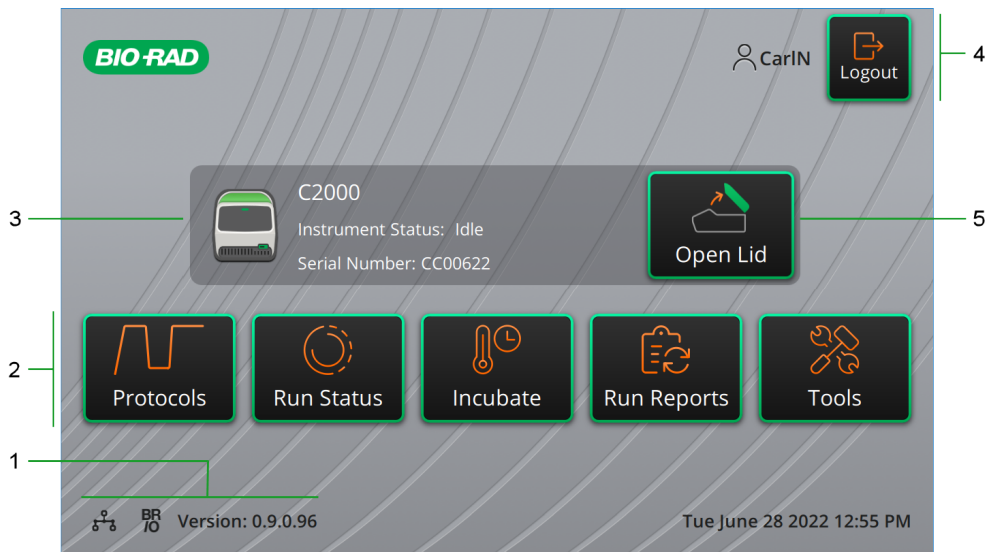
- Create your own PTC Tempo thermal cycler log-in account
- Set or change your password
- Connect to your BR.io account
- Set or change connection to a shared network folder

This chapter explains how to configure the PTC Tempo thermal cyclers.

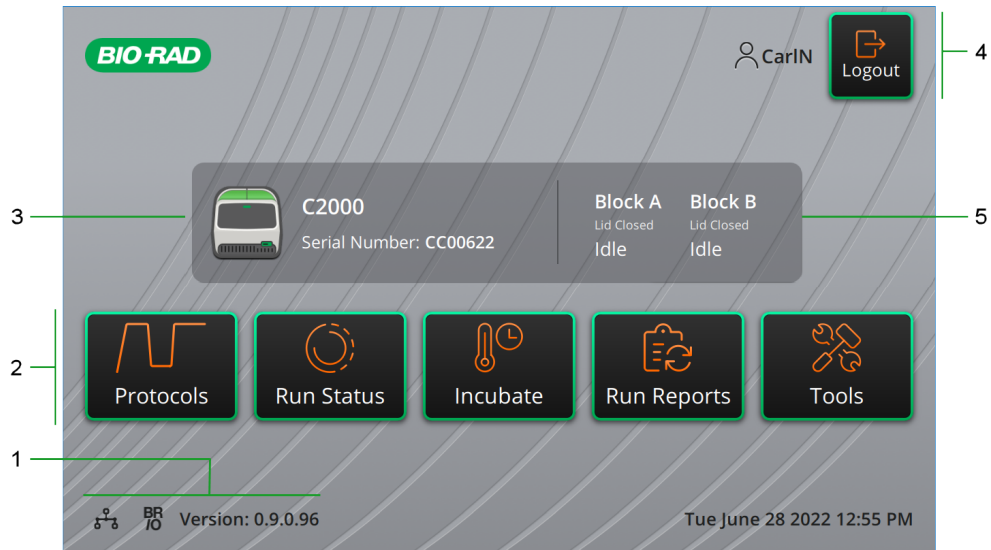
Touch Screen Overview

This section provides an overview of the touch screen features of both the manual lid dual 48/48 and the automated lid single block PTC Tempo thermal cyclers.

PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell Thermal Cyclers



PTC Tempo 48/48 Thermal Cyclers



LEGEND

- | | |
|--|---------------------------|
| 1. Connectivity and software version | 2. Primary activity menu |
| 3. Instrument details | 4. Current logged-in user |
| 5. (Manual lid) Block and lid status (Automated lid) Open/close lid | |

Details

- **Connectivity and software version** — displays the current software version and the type of operational connection:

- **Network connection** — indicates operational connection to an Ethernet or Wi-Fi network:



– Ethernet connection



- – Wi-Fi connection

Note: When the instrument has both a Wi-Fi dongle inserted and an Ethernet cable connected to the network, the default network connection is Ethernet. You will see only the Ethernet icon on the Home screen.

- **BR.io connection** — indicates operational connection to BR.io:



- — logged-in user is linked to their BR.io account.



- — logged-in user is not linked to their BR.io account.

Tip: Only logged in users with a password can link to BR.io. The Guest user cannot link to BR.io.

To manage the connection, see [Connecting to Your Bio-Rad BR.io Account on page 76](#).

- **Software version** — displays the touch screen software version. To manually install updates, see [Updating Software and Firmware on PTC Tempo Thermal Cyclers on page 160](#).
- **Primary activity menu** — provides quick access to the primary activities required to create and run protocols and manage the operation of the PTC Tempo thermal cyclers.
 - **Protocols** — opens the Protocol Browser where you can create and manage protocols and execute runs. For details on creating protocols, see [Creating Protocols on page 87](#). For details on managing your protocols, see [Managing Files on page 125](#).
 - **Run Status** — opens the Run Status screen to view the status of the current run.
 - **Incubate** — opens the Incubate settings screen on which you can enter Incubate settings and execute an incubation run.
 - **Run Reports** — opens the Run Reports screen to view and export your run reports.
 - **Tools** — accesses menus from which users and administrators can perform system management operations.
- **Instrument status** — identifies the thermal cyclers and their serial numbers. For thermal cyclers with automated lids, also identifies the current instrument status.
- **Logout action/status** — identifies the currently logged-in user and enables the user to log out of the thermal cyclers.
 - **Logout** — tap this button to log out. The thermal cyclers then display the Login list.

Tip: To create a new user account, see [Creating PTC Tempo Thermal Cyclers User Accounts on page 41](#).
 - **Logged in user** — identifies the user currently logged in to the thermal cyclers.



- **Open/Close Lid** — (Automated lid thermal cyclers) opens or closes the instrument lid.
Tip: If the lid is closed, the label is Open Lid. If the lid is open, the label is Close Lid.
- **Block Status** — (Manual lid thermal cyclers) identifies the block and lid status of both Block A and Block B.

For details on loading plates, see [Loading the Sample Block on page 44](#).

Software Files

Table 8 lists the PTC Tempo thermal cycler file types.

Table 8. PTC Tempo thermal cycler file types

| File Type | Icon | Extension | Details |
|-----------|---|-----------|---|
| Protocol |  | .prcl | Contains protocol setup details to perform a PCR run. |
| PDF |  | .pdf | Contains setup details of a protocol that was created on the PTC Tempo thermal cycler. It is exported and saved in a zip folder to an attached USB drive. |

Tools Screen

From the Tools screen, users and administrators can access a variety of options. These options control the thermal cyclers. All options available to users are also available to administrators. Only those who log in with an administrator account have access to the Admin options.

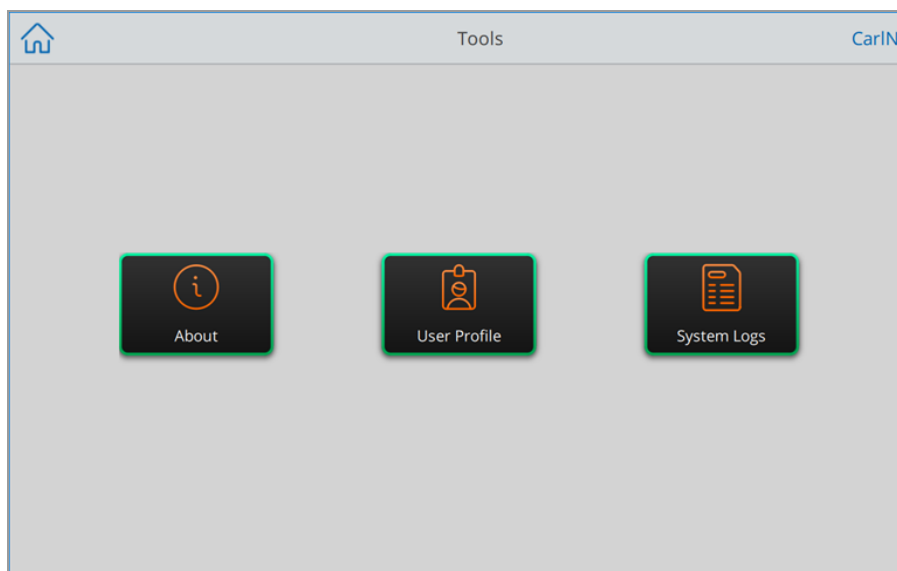
User Tools Screen Options

Tip: You do not need to log in with a user account to access the User options. The Guest account can also access options on the Tools screen.

To access the User Tools screen

1. On the Home screen, tap Logout, and then log in with your user credentials.
2. On the Home screen, tap Tools.

The User Tools screen appears.



- **About** — view the current software version, serial number, a list of all open source licenses used in PTC Tempo thermal cycler software, disk space capacity and availability, as well as total number of run hours and cycles the thermal cycler has accumulated since the last log on.

Tip: To view the list of all open source license code, tap Legal Notices. To view the agreements and terms for each item, tap its link.

- **User Profile** — view user profile options for password, shared network drive, and (when registered) the BR.io account information.
- **System Logs** — view a log of all messages and events that occur during each run.

Note: From this screen, logged-in users can export all log files to an attached USB drive. Admin users can export all logs as well as delete all logs from the thermal cycler.

Admin Tools Screen Options

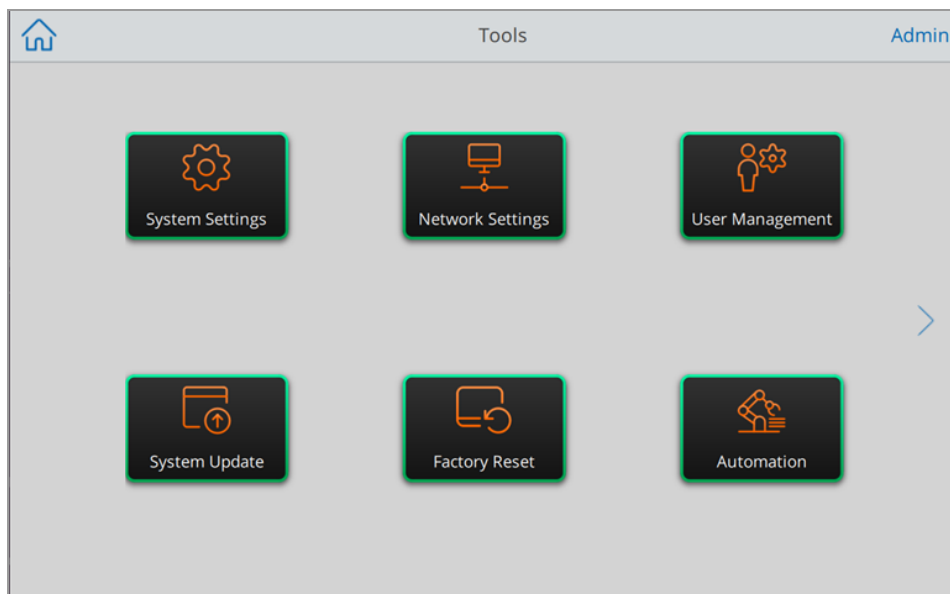
All options available to users are also available to administrators. Only those who log in with the Admin role have access to the Admin options.

Tip: The Admin Tools screen is the initial Tools screen to appear. To view the standard User options, tap the arrow button on the right side of the screen.

To access the Admin Tools screen

1. Log in as an Admin user.
2. On the Home screen, tap Tools.

The Tools screen appears and displays the Admin options.



- **System Settings** — from this screen, Admin users can
 - Set the time zone, date, and time on the thermal cyclers
 - Rename the thermal cyclers
 - Enable or disable the diagnostic port. For more information about the diagnostic port, see [Enabling the Diagnostic Port on the PTC Tempo Thermal Cycler on page 62](#).
- **Network Settings** — view details about the current network connection; use this screen to connect the thermal cyclers to the internal network via wireless connection.

- **User Management** — enable secure user mode, change a user's role, reset passwords, and add and remove users.
- **System Update** — update the system software and firmware from an attached USB drive.

Note: The PTC Tempo thermal cycler installer can include both software and firmware updates. PTC Tempo thermal cycler firmware updates are not distributed in a separate package.

- **Factory Reset** — reset the PTC Tempo thermal cycler to its original state.

Caution: Performing a factory reset deletes all user accounts and user data from the thermal cycler. This process cannot be undone. Take care when performing a factory reset.

- **Automation** — start the PTC Tempo Application Programming Interface (API) to remotely control PTC Tempo thermal cyclers.

Notes:

- Starting the PTC Tempo API locks the thermal cycler. While locked, the thermal cycler is not available for manual control.
- This feature is not available on PTC Tempo 48/48 thermal cyclers.

For information about launching Automation, see [Introduction to the PTC Tempo Application Programming Interface on page 133](#).

Tip: For more information about the PTC Tempo API, see the document PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell API Reference Guide.

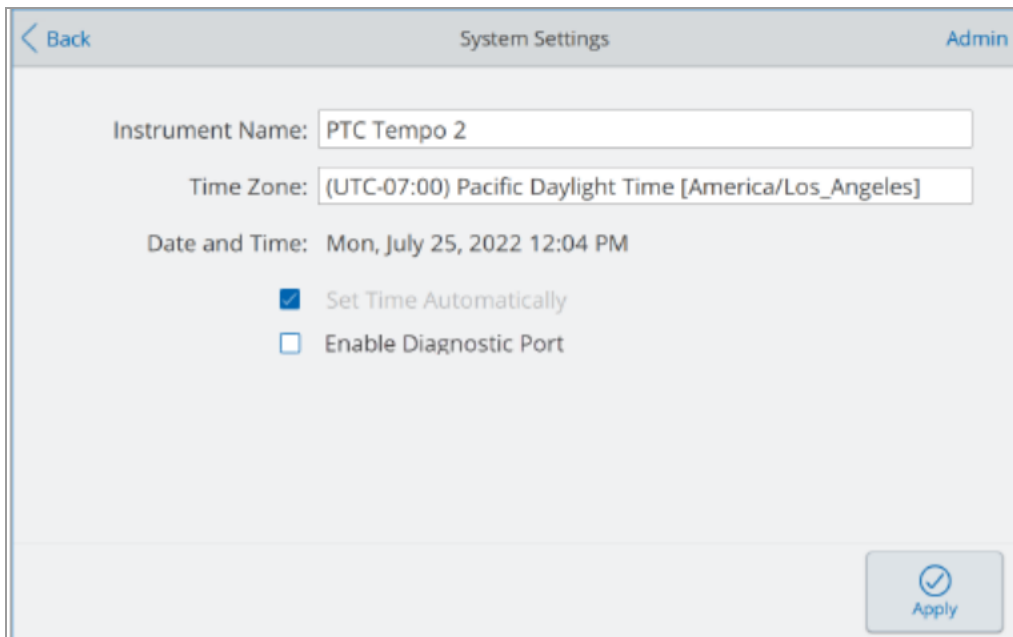
Renaming the PTC Tempo Thermal Cycler

Initially, the name of each PTC Tempo thermal cycler is its serial number. You can rename the thermal cycler for easy identification.

Tip: If you rename the PTC Tempo thermal cycler after users have linked the instrument to their BR.io account, instruct them to refresh their BR.io screen to see the new instrument name appear in the application.

To rename a PTC Tempo thermal cycler

1. Log in as an Admin user.
2. On the Home screen, tap Tools to open the Tools screen.
3. On the Admin tools screen, tap System Settings to open the System Settings screen.



The screenshot shows the 'System Settings' screen for an Admin user. At the top, there is a 'Back' button on the left and 'Admin' on the right. The main content area contains the following settings:

- Instrument Name:** A text input field containing 'PTC Tempo 2'.
- Time Zone:** A dropdown menu showing '(UTC-07:00) Pacific Daylight Time [America/Los_Angeles]'.
- Date and Time:** Displays 'Mon, July 25, 2022 12:04 PM'.
- Set Time Automatically**
- Enable Diagnostic Port**

At the bottom right, there is a blue 'Apply' button with a checkmark icon.

4. Tap the Instrument Name field and type a new name using the alphanumeric keypad that appears.
5. Tap Apply to confirm the change in settings.
6. Tap Back to return to the Tools screen.

Setting the Time Zone on the PTC Tempo Thermal Cycler

The date and time on the PTC Tempo thermal cycler is synchronized to the time zone configured in your thermal cycler's operating system. If your thermal cycler is connected to the Internet, you can automatically set the date and time to the time zone in which it is located.

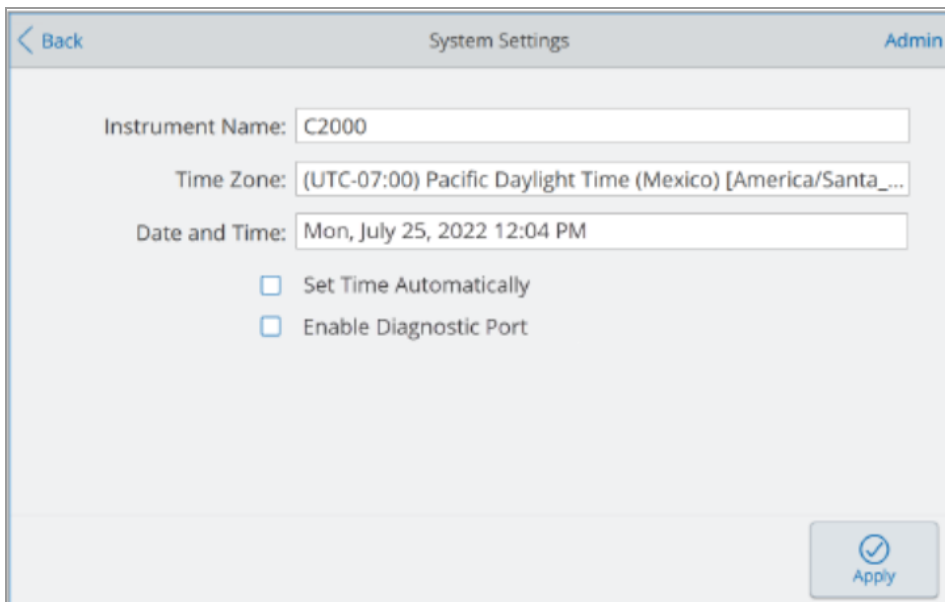
Alternatively, you can set the time zone according to your lab's practices. You can manually set the date and time on the thermal cycler. In this manner, actual local time might differ from the detected time zone. However, run reports generated from protocols retrieved from computers running BR.io that are not in the same time zone as the PTC Tempo thermal cycler will display the intended time.

The time zone changes are applied immediately to the System Settings Date and Time fields and saved when you tap Apply. Any changes you made to the date and time prior to setting the time zone are lost.

Tip: Time changes due to switching between daylight saving and standard time are applied when you set the instrument to automatically set the Time zone.

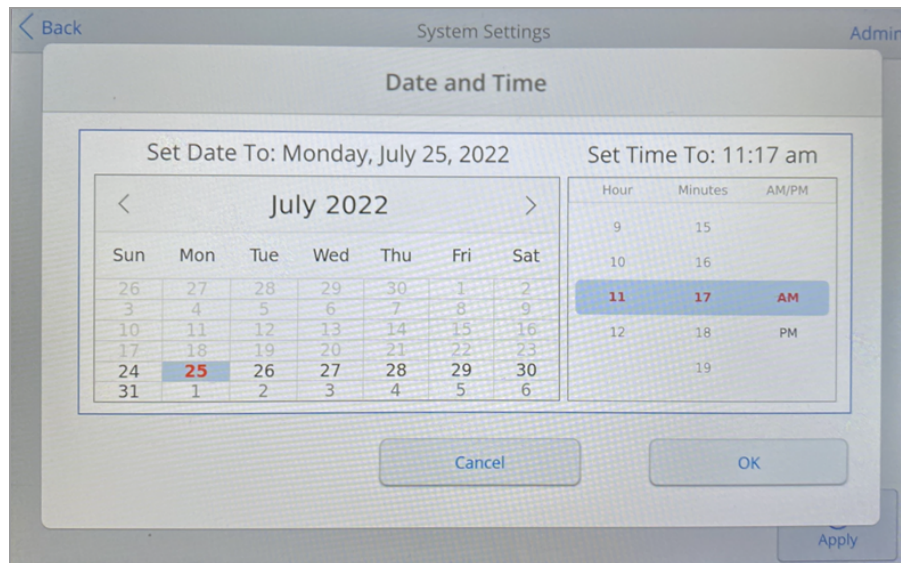
To set the time zone on the PTC Tempo thermal cycler

1. Log in as an Admin user.
2. On the Home screen, tap Tools to open the Tools screen.
3. On the Admin Tools screen, tap System Settings to open the System Settings screen.



4. Tap the Time Zone field, select the target time zone from the Time Zone screen that appears, and tap OK.

5. To set the date and time, do one of the following:
 - To set the date and time *automatically*, select the target Time Zone and then tap Set Time Zone Automatically.
 - To set the date and time *manually*, tap the Date and Time field, set date, time, and AM or PM in the Date and Time screen that appears, and tap OK.



6. Tap Apply to confirm the change in settings.
7. Tap Back to return to the Tools screen.

Enabling the Diagnostic Port on the PTC Tempo Thermal Cyclers

Important: Cybersecurity is the protection of assets in cyberspace from cyberattacks. Cybersecurity is Bio-Rad's ability to secure its people, information, systems, and reputation in cyberspace. Cyberspace is the always-on, technologically interconnected world; it consists of people, organizations, information, and technology.

Fast reaction is important with cybersecurity issues! If you suspect that there may be a cybersecurity issue concerning your instrument or that cybersecurity has been breached at your site, contact your Bio-Rad representative for technical support immediately.

To reduce cybersecurity threats, all TCP/IP ports on the PTC Tempo thermal cyclers are closed by default. To enable Bio-Rad Technical Support team to connect remotely for diagnosing and troubleshooting issues, the PTC Tempo thermal cyclers Admin user can temporarily open a diagnostic port on the instrument.

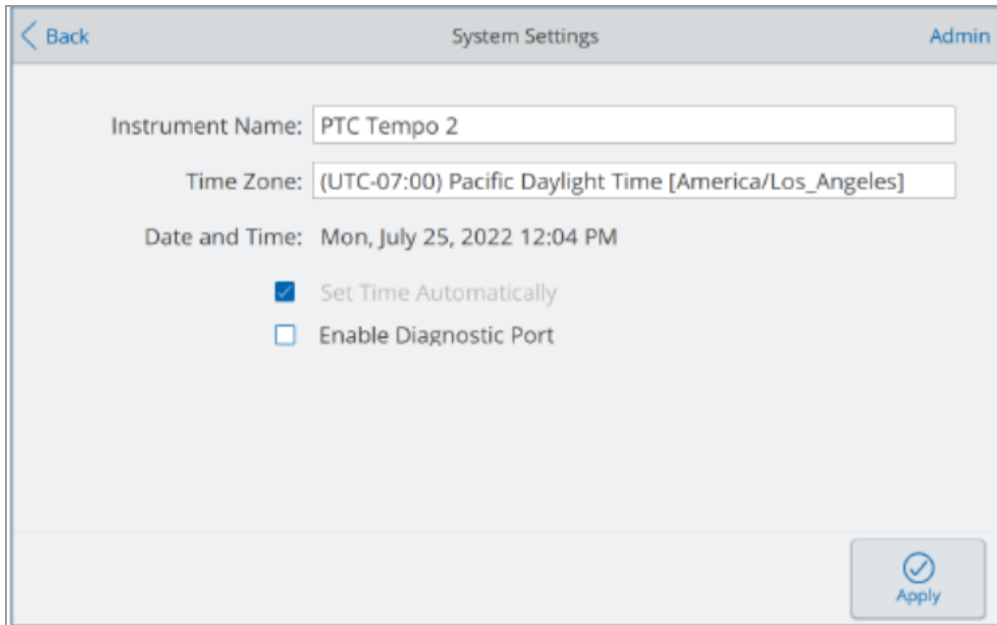
Note: Rebooting the instrument does not change the state of the port. Performing a Factory Reset automatically closes the open port.

Important: Bio-Rad strongly recommends that you close the open diagnostic port after Bio-Rad Technical Support completes troubleshooting the instrument to reduce any threat of cybersecurity attacks.

To enable access to the diagnostic port

1. Log in as an Admin user.
2. On the Home screen, tap Tools.

3. On the Admin tools screen, tap System Settings to open the System Settings screen.



4. Tap Enable Diagnostic Port and then tap Apply to confirm the change.
5. Tap Back to return to the Tools screen.

To disable the diagnostic port

1. Log in as an Admin user.
2. On the Home screen, tap Tools to open the Tools screen and then tap System Settings.
3. On the System Settings screen, clear the Enable Diagnostic Port checkbox and then tap Apply.
4. Tap Back to return to the Tools screen.

Setting Up a Network Connection on the PTC Tempo Thermal Cycler

When establishing a connection between the PTC Tempo thermal cycler and your internal network, a DHCP server is required so that the system receives an IP address. The DHCP server should be configured to always assign the same IP address to the system. See your network administrator for more information.

By default, the PTC Tempo thermal cycler's IP address is dynamic. That is, the IP address can change each time the system restarts. In these cases, the system must reestablish a connection to your internal network each time it starts. A static IP address never changes; thus the system always reconnects to the network each time it restarts.

The PTC Tempo thermal cycler connects to your internal network using the DHCP server. This section explains how to view the dynamic IP or static IP network settings for your PTC Tempo thermal cycler.

Viewing the Dynamic IP Network Settings

Note: Before starting this procedure, ensure your PTC Tempo thermal cycler is turned off.

To view the dynamic IP network settings

1. If you have not already done so, insert one end of the provided Ethernet cable into the Ethernet port on the back of the PTC Tempo thermal cycler.
2. Insert the loose end of the Ethernet cable into the network connection router or hub.
3. Turn on the thermal cycler.

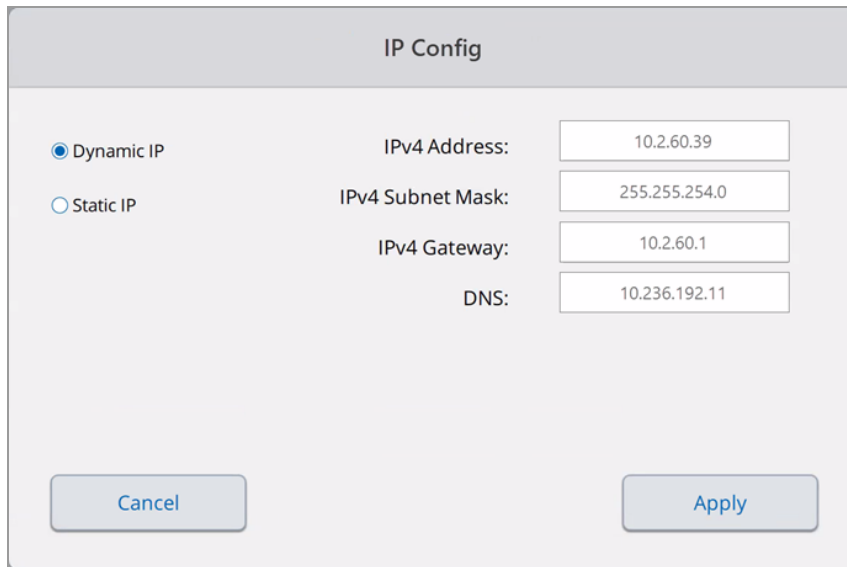
The PTC Tempo thermal cycler automatically detects an available IP address and connects to your network. The thermal cycler displays the Ethernet icon in the lower left corner of the Home screen to indicate successful Ethernet network communication.



4. To test the dynamic IP configuration, log into the PTC Tempo thermal cycler as Admin and tap Tools on the Home screen.
5. In the Admin Tools list, tap Network Settings.

6. On the Network Settings screen, tap IP Config.

The IP Config dialog box appears and displays the current dynamic configuration details, for example:



The screenshot shows a dialog box titled "IP Config". On the left, there are two radio buttons: "Dynamic IP" (which is selected) and "Static IP". To the right of these are four input fields with their respective labels: "IPv4 Address:" (10.2.60.39), "IPv4 Subnet Mask:" (255.255.254.0), "IPv4 Gateway:" (10.2.60.1), and "DNS:" (10.236.192.11). At the bottom of the dialog, there are two buttons: "Cancel" on the left and "Apply" on the right.

7. Tap Cancel to close the IP Config dialog box and return to the Network Settings screen.
8. On the Network Settings screen, tap Back to return to the Tools screen.
9. If necessary, implement network security measures per your organization's security and privacy policies.

Setting Up a Static IP Network Connection

Note: Before starting this procedure, ensure your PTC Tempo thermal cyclers are turned off.

When setting up a static IP network connection, you must provide the IPv4 address, subnet mask, gateway, and DNS server details for your system. See your system administrator for the appropriate settings.

Note: PTC Tempo thermal cyclers support only IPv4 connectivity. Ensure the settings are appropriate for your site.

To set up a static IP network connection

1. If you have not already done so, insert the provided Ethernet cable into the Ethernet port on the back of the PTC Tempo thermal cyclers.
2. Insert the loose end of the Ethernet cable into the network connection router or hub.
3. Turn on the system.

The PTC Tempo thermal cyclers automatically detect an available IP address and connect to your network.

4. To set up a static IP configuration, log into the PTC Tempo thermal cyclers as Admin and tap Tools on the Home screen.
5. In the Admin Tools list, tap Network Settings.
6. On the Network Settings screen, tap IP Config.

The IP Config dialog box appears.

7. Tap Static IP and then tap each field to enter their values in the numeric keypads that appear.

Tip: To clear the optional fields, tap the field and then tap the back key on the keypad to clear the default value.

- IPv4 address — the specific numeric address for the PTC Tempo thermal cyclers
- IPv4 subnet mask — the numeric filter used to define the subnet to which the IP address belongs
- IPv4 gateway* — the IP address of the node that allows communication between subnets
- DNS* — the IP address of the node that translates a server name to its IP address

* The IPv4 gateway and DNS settings are *optional* if you plan to use the PTC Tempo thermal cyclers in an automated environment and access it via the API. In this case the thermal cyclers connect to a Peer-to-Peer (P2P) local area network.

IPv4 gateway and DNS settings are *required* if you plan to connect the PTC Tempo thermal cycler to the network to access a network drive or connect to BR.io.

For more information about

- PTC Tempo thermal cycler API, see PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell API Reference Guide
- Accessing a network drive, see [Setting Up a Connection to a Shared Network Drive on page 72](#)
- Connecting to BR.io, see [Connecting to Your Bio-Rad BR.io Account on page 76](#)

IP Config

Dynamic IP

Static IP

IPv4 Address: 10.2.61.89

IPv4 Subnet Mask: 255.255.254.0

IPv4 Gateway: 10.2.60.1

DNS: 10.236.18.140

Cancel Apply

8. Tap Apply to apply the changes, close the IP Config dialog box, and return to the Network Settings screen.
9. On the Network Settings screen, tap Back to return to the Tools screen.
10. The system displays the Ethernet icon in the lower left corner of the Home screen to indicate successful Ethernet network communication.
11. If necessary, implement network security measures per your organization's security and privacy policies.

Setting Up a Wireless Connection

Note: The PTC Tempo thermal cycler Wi-Fi adaptor is specific to the country in which it is to be used. Contact your Bio-Rad Sales representative for the correct adaptor to purchase or visit bio-rad.com/PTCTempo.

You can connect the PTC Tempo thermal cycler to internal wireless access points within your organization. When successfully connected, you can access your shared network folder and connect to your BR.io account. The PTC Tempo thermal cycler recognizes all wireless access points within your company and displays the strength and security level of each connection. The thermal cycler maintains the most recent connection until you change it.

This section explains how to connect the PTC Tempo thermal cycler to a wireless access point within your organization and how to change wireless connections.

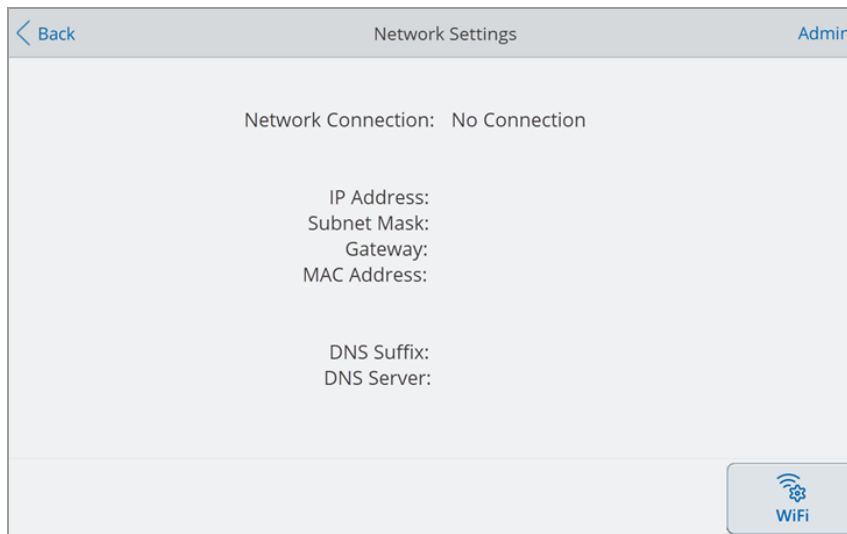
Tip: To set up a shared network folder, see [Setting Up a Connection to a Shared Network Drive on page 72](#). To set up a connection to BR.io, see [Connecting to Your Bio-Rad BR.io Account](#).

Important: Consult your system administrator for site-specific wireless IP connections and their secure passwords before continuing. Wireless networks that require additional authentication are not supported.

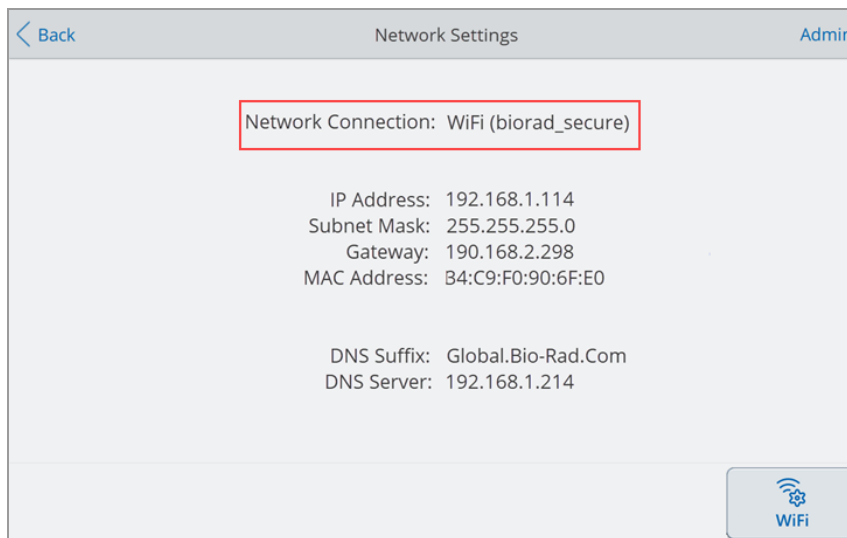
To connect the PTC Tempo thermal cycler to a wireless access point

1. Locate your locale-specific PTC Tempo thermal cycler Wi-Fi adaptor and insert it into a USB A port on the thermal cycler.
2. Log in as an Admin user.
3. On the Home screen, tap Tools to open the Tools screen and then tap Network Settings to display the Network Settings screen.

The Networks Settings screen appears. The following image appears if you have not established an Ethernet connection and this is the first time you are setting up a wireless connection.



If your PTC Tempo thermal cycler is currently connected to a wireless access point, its network connection information appears on the screen:



4. Tap WiFi to display a list of available wireless connections.

The thermal cycler displays the name of each wireless access point, its security setting (Secured or Open), and its signal strength.

Tip: The list of available networks automatically refreshes when networks are located. If your preferred access point does not appear in the list, or if the list appears empty, tap Cancel to return to the Network Settings screen and then tap WiFi to return to the WiFi Settings dialog box.

5. Tap the preferred access point and then tap Connect.
6. If the preferred access point is secured, you must provide the WiFi password in order to connect.

Note: If you do not know the password, contact your system administrator.

Type the WiFi password in the alphanumeric keyboard that appears and then tap OK.

A message appears indicating that the Wi-Fi connection is successful.

7. Tap OK to close the message and return to the Network Settings dialog box.
8. On the Network Settings screen, tap Back to return to the Tools screen.
9. The thermal cycler displays the Wi-Fi icon in the lower left corner of the Home screen to indicate successful wireless access point connection.



Managing Personal User Accounts

As a logged in PTC Tempo thermal cycler user, you can

- Set or change your password
- Set or change your shared network drive
- Connect to your BR.io account from PTC Tempo thermal cycler

This section explains how to manage your personal account.

Setting User Passwords

Bio-Rad recommends that you create a password at the time you create your user profile. You can change your password at any time.

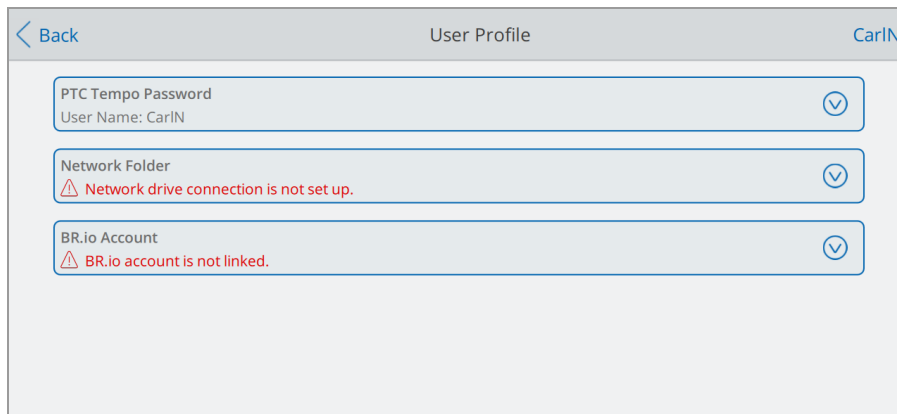
Note: If you plan to connect to a shared network drive you must have a password.


Tip: PTC Tempo thermal cycler passwords can be any combination of alphanumeric characters. Passwords must be between 4–50 characters and are case-sensitive.

To create a user password

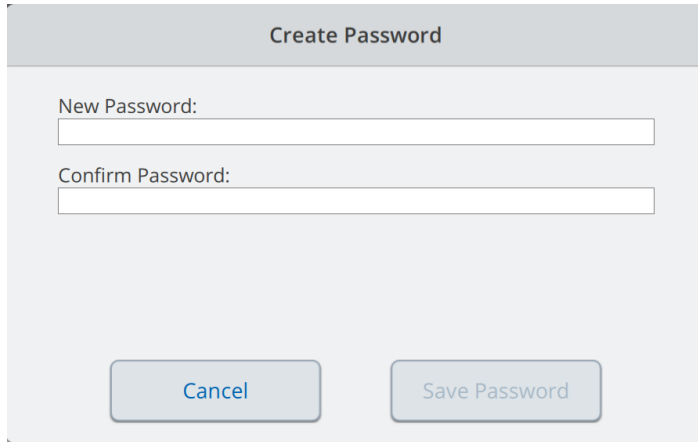
1. From the Home screen, tap Tools.
2. On The Tools screen, tap User Profile.

The User Profile screen appears.



3. In the PTC Tempo thermal cycler Password section, tap  to expand the dialog box and then tap Change Password.

The Create Password dialog box appears.



The image shows a 'Create Password' dialog box with a light gray background. At the top, there is a title bar with the text 'Create Password'. Below the title bar, there are two text input fields. The first field is labeled 'New Password:' and the second is labeled 'Confirm Password:'. At the bottom of the dialog, there are two buttons: 'Cancel' on the left and 'Save Password' on the right. Both buttons have a light blue background and rounded corners.

4. Type and confirm your password using the alphanumeric keyboard and then tap Save Password.
5. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

To change your password

1. On the User Profile screen, expand the Password section and then tap Change Password.
2. Type your current password using the alphanumeric keyboard that appears, and then tap OK.

The Change Password dialog box appears.

3. In the Change Password dialog box, type and confirm your password using the alphanumeric keyboard that appears and then tap Save Password.
4. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

Setting Up a Connection to a Shared Network Drive

Note: You must have a password on the PTC Tempo thermal cyclers to connect to a shared network drive. See [Setting User Passwords on page 71](#) for more information.

You can connect your PTC Tempo thermal cyclers user account to a shared drive on your internal network. When connected, you can create protocols on your PTC Tempo thermal cyclers and save protocols to your network drive. You can also copy protocol files from your network drive to a folder on the PTC Tempo thermal cyclers.

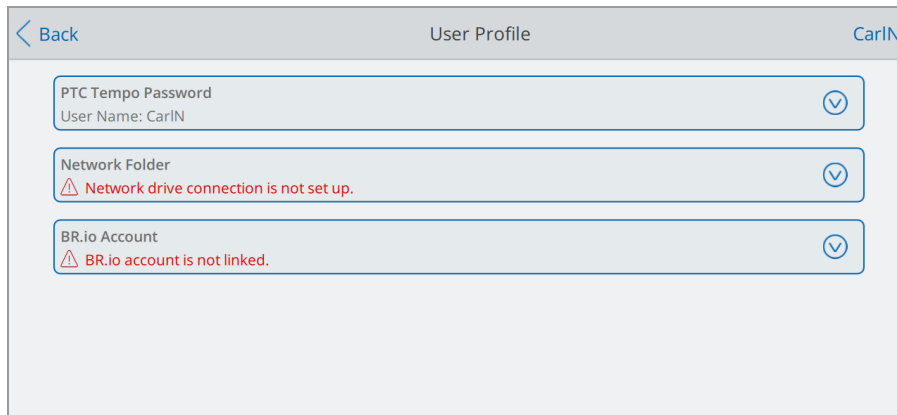
Important: Before you can connect the PTC Tempo thermal cyclers to your network drive, your PTC Tempo thermal cyclers Admin must establish a connection to the network through either Ethernet or a wireless network connection. For more information, see [Setting Up a Network Connection on the PTC Tempo Thermal Cyclers on page 64](#) or [Setting Up a Wireless Connection on page 68](#).


Tip: The thermal cycler automatically saves your network connection details when you successfully connect to your shared network folder. Thereafter, the thermal cycler will automatically connect to your shared network folder upon login until you disconnect from that folder.

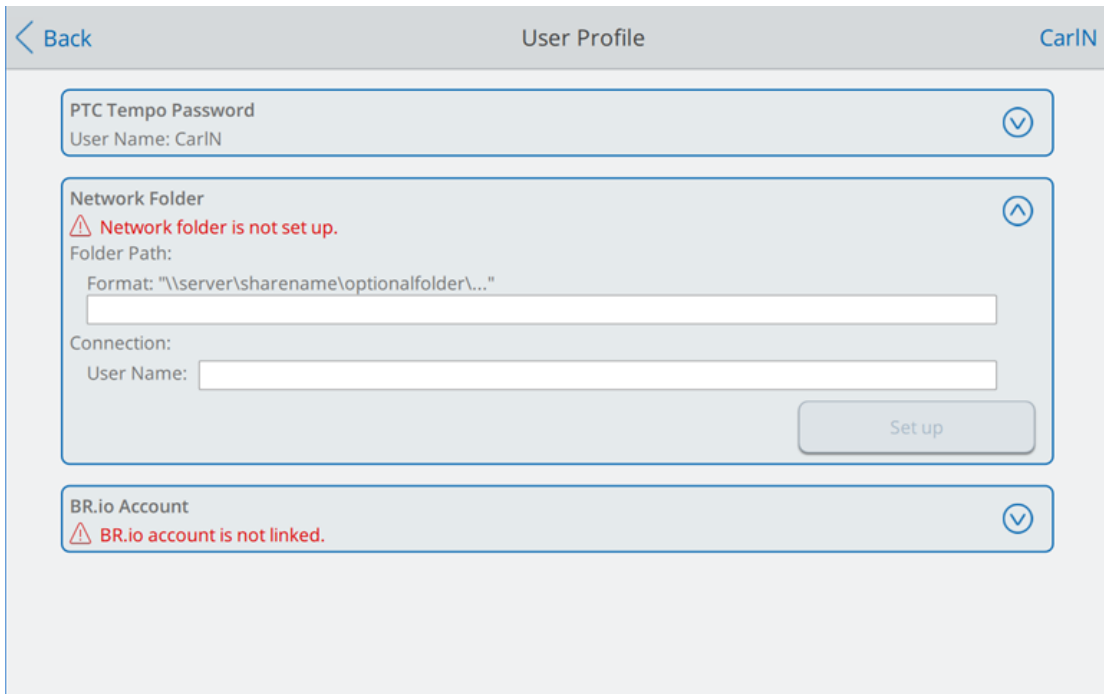
To connect to a shared network drive

1. On the Tools screen, tap User Profile.

The User Profile screen appears.



2. In the Network Folder section, tap  to expand the dialog box.



3. In the Folder Path section, type the path to the shared network folder using the following format:

`\\server_name\share_name\optional_folder\target_folder`

Note: You must type two slashes (\\) at the beginning of the path, and separate each folder with a single slash. The entire path must contain no more than 80 characters, including the target folder. For example

`\\global\DBGGroup\Protocols\CarlN`

Tip: The PTC Tempo thermal cycler accepts either forward or back slashes, but you must be consistent when typing the path. That is, use either forward or backslashes, not a combination.

4. In the Connection section, type the **global domain name** and user name you use to connect to that server in this format:

`global_domain_name\user_name`

You must include the slash in the path, for example:

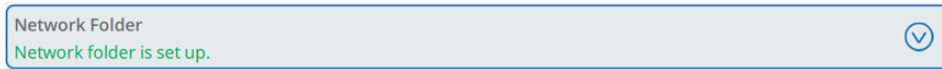
`Global\CarlN`

Tip: This user name might be different than your PTC Tempo thermal cycler user name.

5. Tap Connect.

6. Type the password you use to connect to that server using the alphanumeric keyboard that appears and then tap OK.

When the connection is successful, the Network Folder status changes to Network folder is set up:




7. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

Tip: The thermal cyclers inform you when the folder to which you are connected is read-only.

To disconnect the PTC Tempo thermal cyclers from your network drive

1. From the Home screen, tap Tools, then in the User screen tap User Profile.

The User Profile screen appears.

2. In the Network Folder section, tap the  icon to expand the dialog box.
3. Tap Disconnect.
4. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

Connecting to Your Bio-Rad BR.io Account

Note: You must have a password on the PTC Tempo thermal cycler in order to connect to your BR.io account. See [Setting User Passwords on page 71](#) for more information. You must also set up a BR.io account. For information about registering a BR.io account, see the help information in the BR.io app.

You can connect multiple PTC Tempo thermal cyclers to your Bio-Rad BR.io account. When connected, you can create PCR protocols in the BR.io app, download them to and run them on one or more PTC Tempo thermal cyclers. Upon completion, the run reports are automatically uploaded to the BR.io app. You can also run different PCR protocols from BR.io on each PTC Tempo thermal cycler.

Important: Before you can connect the PTC Tempo thermal cycler to your BR.io account, your PTC Tempo thermal cycler Admin must establish a connection to the Internet either through Ethernet or a wireless network communication. For more information, see [Setting Up a Network Connection on the PTC Tempo Thermal Cycler on page 64](#) or [Setting Up a Wireless Connection on page 68](#).

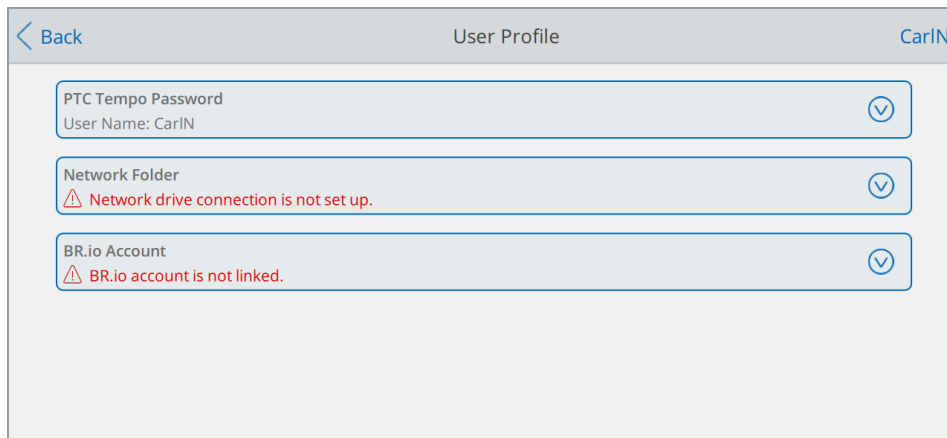
Tip: For more information about Bio-Rad's BR.io app, or to register your instrument, go to [BR.io](#).


Connecting the PTC Tempo Thermal Cycler to Your BR.io Account

To connect the PTC Tempo thermal cycler to your BR.io account

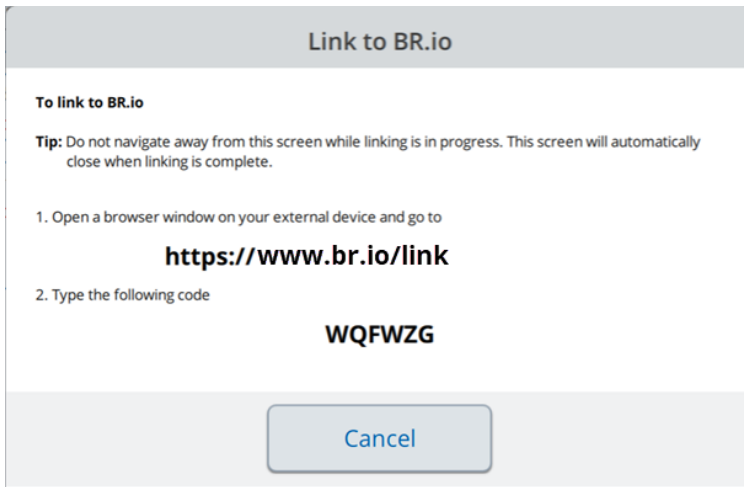
1. From the Home screen, tap Tools, then in the User screen tap User Profile.

The User Profile screen appears.



2. In the BR.io Account section, tap  to expand the dialog box.
3. In the expanded dialog box click Link.

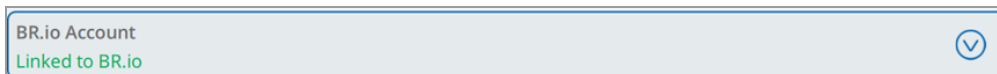
The thermal cycler displays a message while it retrieves an authentication code. When retrieved, the Link to BR.io dialog box appears.



Note: The authentication code is valid for one hour after it is retrieved. If you have not linked your instrument within that timeframe, you will need to start again.

4. Follow the on-screen procedure:
 - a. Open a web browser and navigate to
br.io/link
 - b. At the prompt, type the code that appears on the Link to BR.io screen and click Submit.
 - c. Follow the prompts on the upcoming screens to complete the linking process to BR.io.

When the thermal cyclers has linked to your BR.io account, this screen automatically closes and the BR.io Account status changes to Linked:



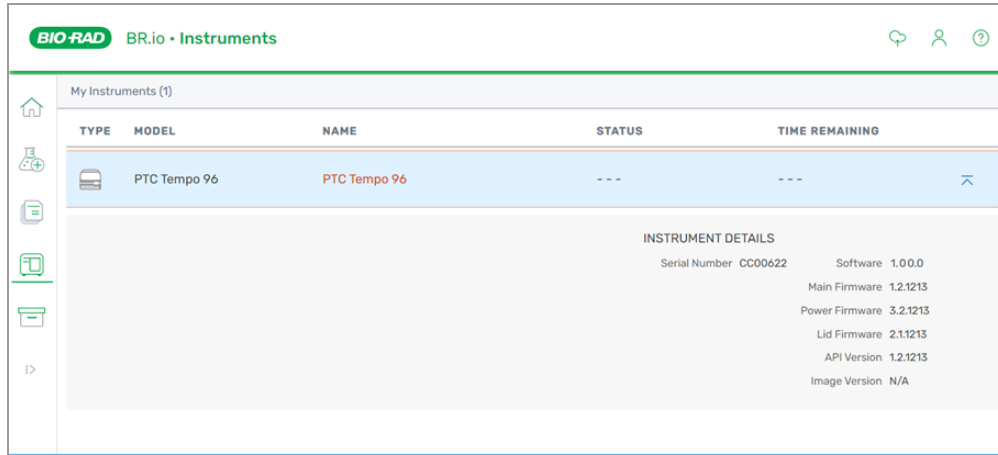
5. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

When the PTC Tempo thermal cyclers successfully links to the BR.io

- The BR.io icon appears in the bottom left corner of the Home screen:



In the BR.io app, the Instrument Manager displays the connected instrument:



Note: When you log into the PTC Tempo thermal cycler after establishing the BR.io account connection, you are automatically connected to your BR.io account. When you log in to your BR.io account, your thermal cycler appears in the instrument list. When you log out of the PTC Tempo thermal cycler, your thermal cycler is removed.


Disconnecting the PTC Tempo Thermal Cycler from Your BR.io Account

If you need to remove a PTC Tempo thermal cycler from your BR.io account, you must unlink your PTC Tempo thermal cycler's user account from the BR.io app.

To disconnect the PTC Tempo thermal cycler from your BR.io account

1. From the Home screen, tap Tools, then in the User screen tap User Profile.

The User Profile screen appears.

2. In the BR.io Account section, tap  to expand the dialog box.
3. Tap Unlink.

A status dialog appears to confirm your PTC Tempo thermal cycler user account is unlinked from BR.io.

4. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

Managing User Accounts

The PTC Tempo thermal cycler Admin user can perform limited user management tasks. From the User Profile screen, the Admin user can create his own password. From the User Management screen, the Admin user can

- Enable secure user mode for all users
- Change a user's role
- Reset a user's password
- Create and delete user accounts

This section explains how to set the Admin password and manage user accounts.


Setting the Admin Password

Important: The default Admin user does not have a password. Bio-Rad strongly recommends that the user who assumes the Admin role immediately set a password and store that password in a password safe. Bio-Rad strongly recommends that you assign the Admin role to another user. Resetting the Admin password requires a call to Bio-Rad Technical Support.

PTC Tempo thermal cycler passwords can be any combination of alphanumeric characters. Passwords must be between 4–50 characters and are case-sensitive.

Note: If you plan to connect to Bio-Rad's BR.io app or a shared network drive, you must have a password.

To add the Admin password

1. Log in as an Admin user.
2. On the Home screen, tap Tools to open the Admin Tools screen.
3. Tap the arrow on the right side of the screen to display the User Tools screen then tap User Profile.
The User Profile screen appears.
4. In the PTC Tempo thermal cycler Password section, tap the  icon and then tap Change Password.
5. In the Create Password dialog box, type and confirm your password using the alphanumeric keyboard that appears, tap Save Password, and then tap OK.
6. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

To change the Admin password

1. In the PTC Tempo thermal cycler Password section on the User Profile screen, tap Change Password.
2. Type your current password using the alphanumeric keyboard that appears, and then tap OK.
The Change Password dialog box appears.
3. Type and confirm your new password, tap Save Password, and then tap OK.
4. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

Changing User Settings

To limit and control access to the PTC Tempo thermal cyclers, the admin user can enable Secure User mode. When enabled

- The Guest user is not available for use
- All logged-in users must have a password
- Only users with the Admin role can create user accounts

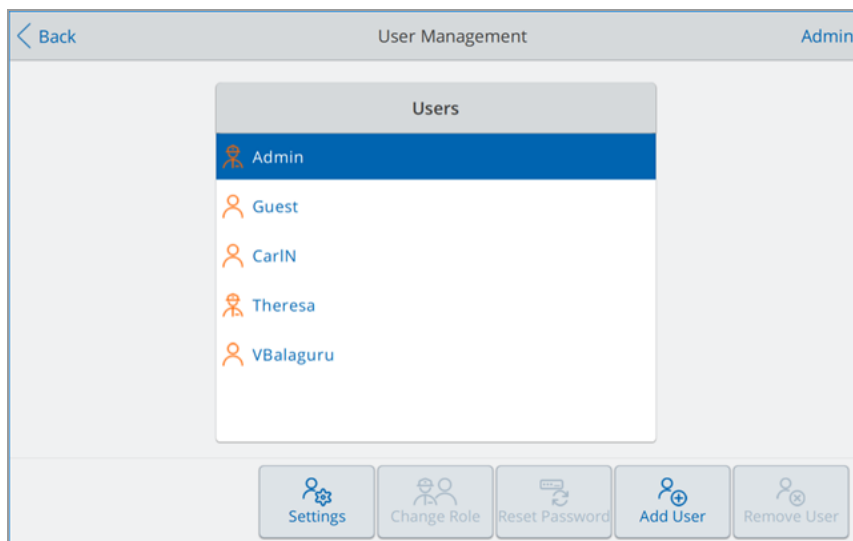
Secure User mode can be enabled or disabled at any time. If Secure User mode is enabled after users have created a personal login account, the thermal cycler confirms the user has already created a password.

Note: If a user does not have a password, the user is prompted at the next login to create a password before logging in. This applies to the Admin user as well.

To enable Secure User mode

1. Log in as an Admin user.
2. On the Home screen, tap Tools and then tap User Management.

The User Management screen appears.



3. Tap Settings.
4. On the Settings screen, select Enable Secure User mode and then tap OK.

Tip: The Guest user no longer appears in the Users list.

5. Tap Back to return to the Tools screen and then tap Home to return to the Home screen.

To disable Secure User mode

1. Log in as an Admin user.
2. On the Home screen, navigate to the Settings screen.
3. On the Settings screen, clear Enable Secure User mode and then click OK.

Tip: The Guest user reappears in the Users list.

Changing a User's Role

The PTC Tempo thermal cycler ships with two default users: Admin and Guest. To reduce the usage of the default user Admin, PTC Tempo thermal cycler enables you to assign the Admin role to a logged-in user. The logged-in user assigned the Admin role has the same privileges as the Admin. You can assign the role to one or more logged-in users.

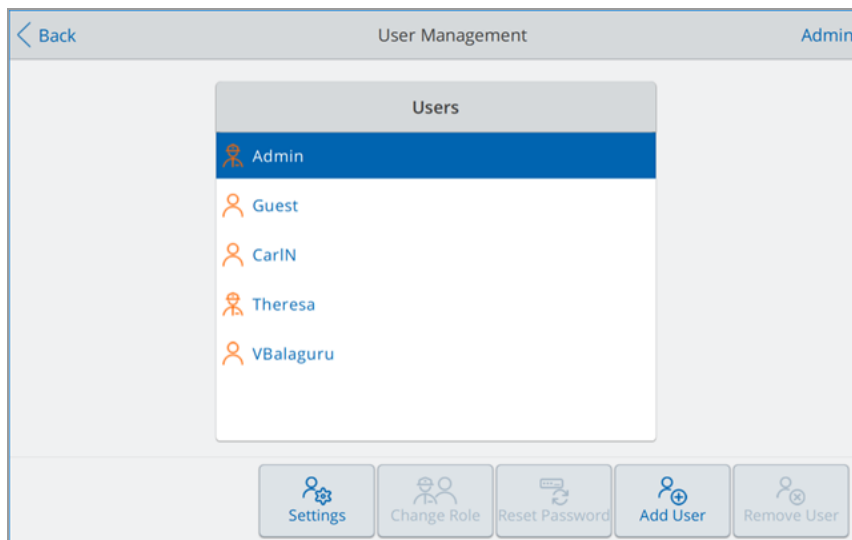
You can assign this role at any time. You can also revert this role at any time. When reverted, the user's privileges revert to those of the logged-in user.

Note: The Guest user cannot be assigned this role.

To change a user's role

1. Log in as an Admin user.
2. On the Home screen, tap Tools and then tap User Management.

The User Management screen appears.



3. Select the user's name and then tap Change Role.
4. On the Change Role screen, select the appropriate role and then tap OK.
5. Tap Back to return to the Tools screen and then tap Home to return to the Home screen.

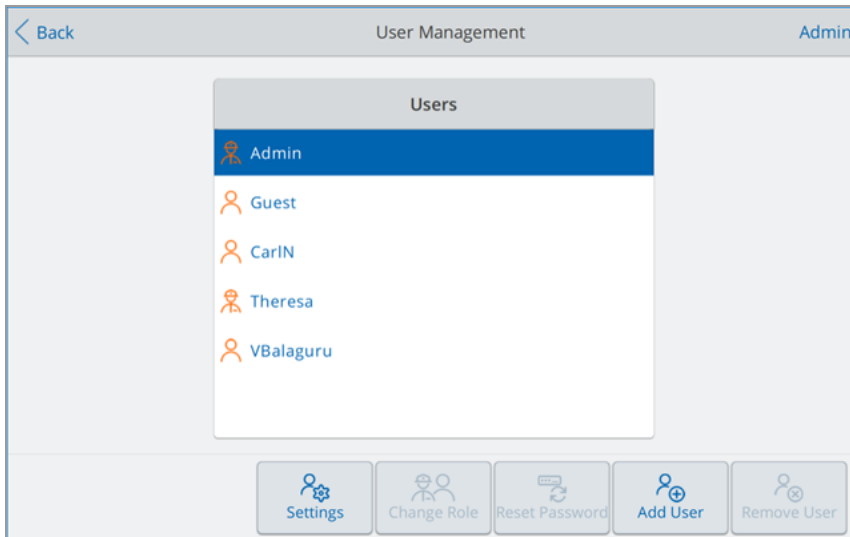
Resetting User Passwords

In the event that a user forgets his password, the Admin user can create a temporary password. When the user next logs in, the software prompts the user to reset their password. Users can change their password at any time and as often as they choose.

To change or add a password for another user

1. Log in as an Admin user.
2. On the Home screen, tap Tools then in the Admin Tools screen tap User Management.

The User Management screen appears.



3. Tap the targeted user name on the Users list.
4. Tap Reset Password on the bottom toolbar.
The Reset Password dialog box appears.
5. Type and confirm the temporary password using the alphanumeric keyboard that appears, and then tap Save Password.
6. Tap Back to return to the Tools screen, and then tap Home to return to the Home screen.

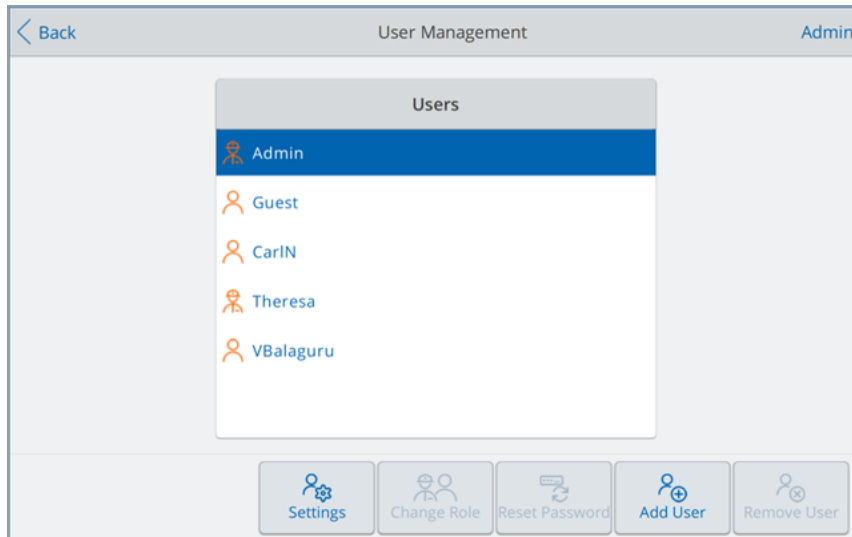
Creating User Accounts

Users with the Admin role can create user accounts on the PTC Tempo Thermal Cycler instruments at any time. When Secure User mode is enabled, only the Admin role can create user accounts. For more information about Secure User mode, [Changing User Settings on page 81](#).

To create a user account

1. Log in as an Admin user.
2. On the Home screen, tap Tools then tap User Management.

The User Management screen appears.



3. Tap Add User.
4. Using the alphanumeric keypad that appears, type a user name and then tap OK.

The name of the new user appears in the Users list.

Tip: New users do not have a password. They can create a password when they log in by following the procedure in [Setting User Passwords on page 71](#).

5. Tap Back to return to the Tools screen and then tap Home to return to the Home screen.

Deleting User Accounts



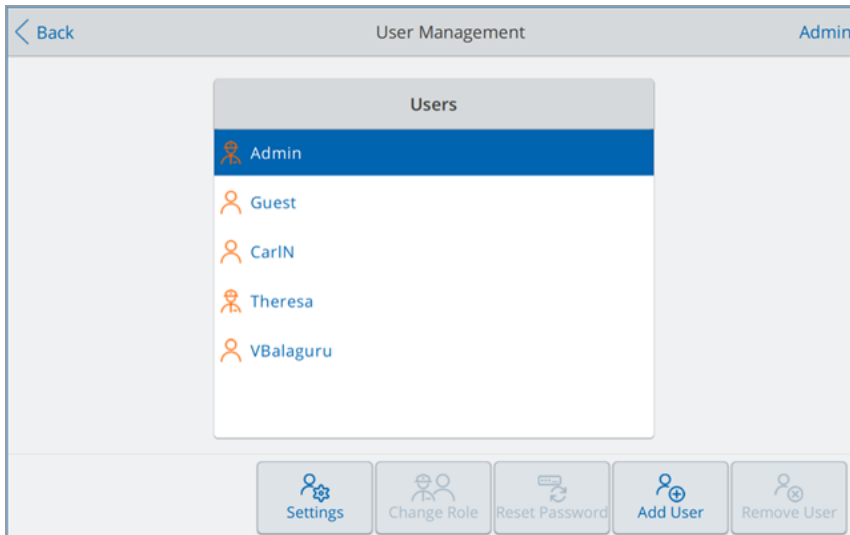
WARNING! Deleting users accounts from the PTC Tempo thermal cyclers also permanently deletes their protocols, run reports, and user data. Deleting user accounts from the PTC Tempo thermal cyclers also automatically unlinks that user from their BR.io account. Take care when deleting users from the thermal cyclers.

Note: You cannot delete the Admin or Guest user accounts.

To delete a user account

1. Log in as an Admin user.
2. On the Home screen, tap Tools then in the Admin Tools screen tap User Management.

The User Management screen appears.



3. Tap the targeted user name on the Users list.
4. Tap Remove User on the bottom toolbar.
A warning appears informing you that removing a user permanently deletes their user data.
5. Tap No to cancel the screen or Yes to remove the user account and permanently delete their data.
6. Tap Back to return to the Tools screen and then tap Home to return to the Home screen.

Chapter 4 Creating Protocols

Using the touch screen on the PTC Tempo thermal cycler, you can create and edit protocols, change step parameters, and set the sample volume and lid temperature.

For each protocol, you can add, edit, or remove any of the following parameters:

- Temperature gradients
- Temperature increments
- Ramp rate
- Extend time
- Alert beeps
- GOTO steps

A protocol can contain the following types of steps:

- Temperature — ramps to a target temperature at specified ramp rate and holds that temperature.
- Gradient — applies a temperature differential across the rows of the block.
- GOTO — creates a cycle of a specific number of repetitions between certain steps in the protocol.

The section [Parameters and Ranges for Protocol Steps on page 88](#) lists the options and ranges for protocol steps. Review the information in this section before creating your protocol.

Parameters and Ranges for Protocol Steps

Use the information in [Table 9](#) to modify the default settings for the steps in your protocol.

Temperature Steps

The target temperature is a value between 4.0 and 100.0°C, set in tenths of a degree. The thermal cycler ramps to this temperature and holds that value for a specified amount of time (the hold time).

Gradient Steps

The gradient range is the difference between the lower and upper temperatures in a gradient step. The maximum allowed range is 24°C. The lower temperature is a value between 30.0 and 99.0°C, set in tenths of a degree. The upper temperature range can be set from 31.0 to 100.0°C. The thermal cycler ramps to the target temperature gradient across the block and holds that temperature for a specified hold time.

Important: The instrument calculates the gradient value. When you enter a value in the gradient calculator's top and bottom fields, the software automatically calculates and assigns the temperatures for the remaining fields. When you enter a temperature in any field between the top and bottom field, the instrument automatically calculates the remaining fields. You cannot manually enter a temperature value in every field.

Table 9. Parameters and ranges for protocol steps

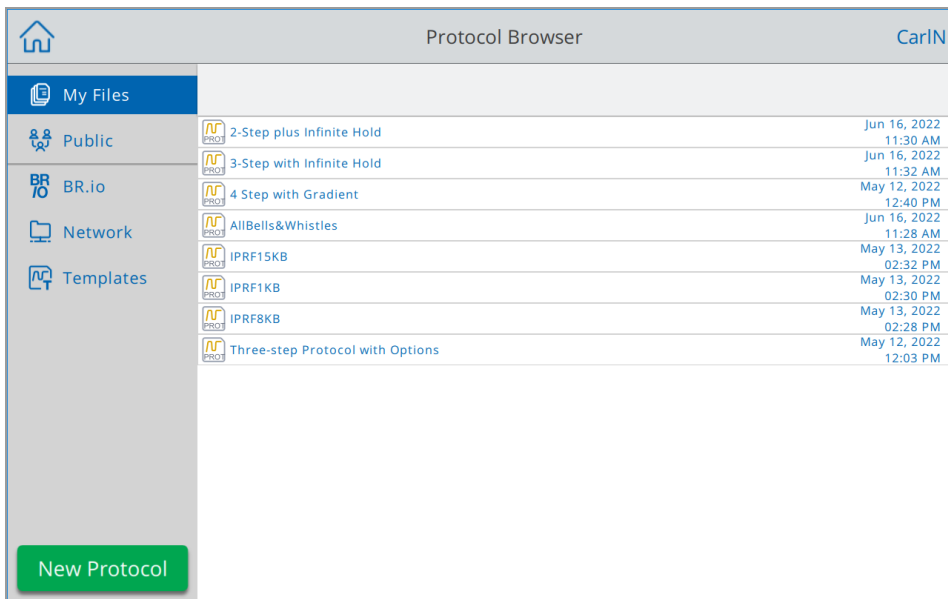
| Parameter | Range | Description |
|-----------|--|--|
| Ramp rate | <ul style="list-style-type: none"> ■ For PTC Tempo 96 systems: 0.1–5°C per sec ■ For PTC Tempo Deepwell systems: 0.1–2.5°C per sec ■ For PTC Tempo 384 systems: 0.1–2.5°C per sec ■ For PTC Tempo 48/48 systems: 0.1–4°C per sec | <p>Instructs the thermal cycler to ramp to the target temperature at the specified rate in that step.</p> <p>Available only to temperature steps.</p> |
| Increment | A number from –10.0 to 10.0°C per cycle in tenths of a degree | <p>Instructs the thermal cycler to change the target temperature of a step with each cycle, where a positive number increases the temperature and a negative number decreases the temperature.</p> <p>Available only to temperature steps in a GOTO cycle.</p> |
| Extend | A time from –60 to 60 sec per cycle | <p>Instructs the thermal cycler to extend the hold time with each cycle. A positive number increases the hold time and a negative number decreases the hold time.</p> <p>Available to both temperature and gradient steps.</p> |
| Beep | (No parameters) | <p>Instructs the thermal cycler to beep to signal that the thermal cycler has reached the target temperature for that step.</p> <p>Available to both temperature and gradient steps.</p> |

Creating a Protocol

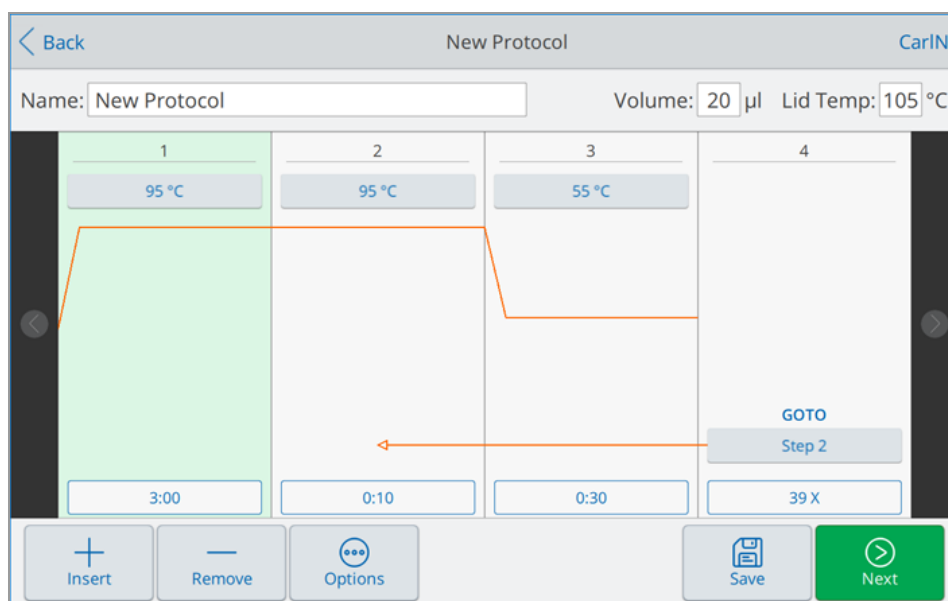
Important: While creating your protocol, take care when setting the sample volume and lid temperature. If the lid temperature is too high, the sample temperature might rise above the target temperature. For more information about these settings, see [Setting Sample Volume and Lid Temperature on page 103](#).

To create a protocol

1. On the Home screen, tap Protocols to open the Protocol Browser screen.



2. On the Protocol Browser screen, tap New Protocol to display the Protocol screen.



3. To set or change any of the following, tap its respective button or field and enter a value using the alphanumeric keypad that appears:

- **Name** — the name of the protocol. The name can consist of up to 32 alphanumeric characters.

- **Volume** — the sample/reaction volume in μl .

Note: The volume setting affects the control mode used to determine when the sample reaches the target temperature. For details, see [Sample Volume and Temperature Control Modes on page 103](#).

- **Temperature** — the target temperature of the step. For example:

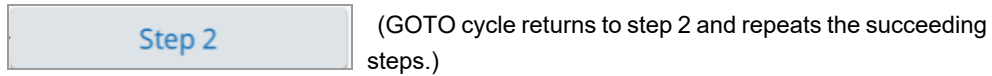
(target temperature set to 95°C)

- **Time** — the hold time of the step (between 1 sec and 17:59:59) in the format of HH:MM:SS. For example:

(hold time set to 10 sec)

Tip: To set an infinite hold on a step, tap the key.

- **GOTO step number** — (for GOTO steps only) the step number to which the GOTO cycle returns. For example:

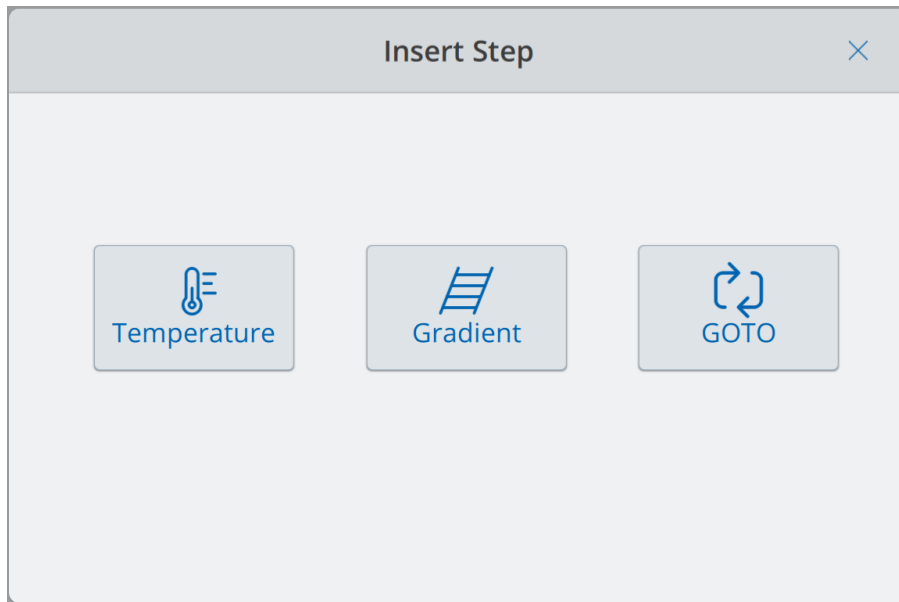


- **GOTO cycles** — (for GOTO steps only) the number of times to repeat the cycle. The default is 39 times. For example:



4. (Optional) If your protocol requires a new temperature, gradient, or GOTO step:
 - a. Select the step in the protocol that will precede the new step and tap Insert at the bottom of the screen.

The Insert Step dialog appears.



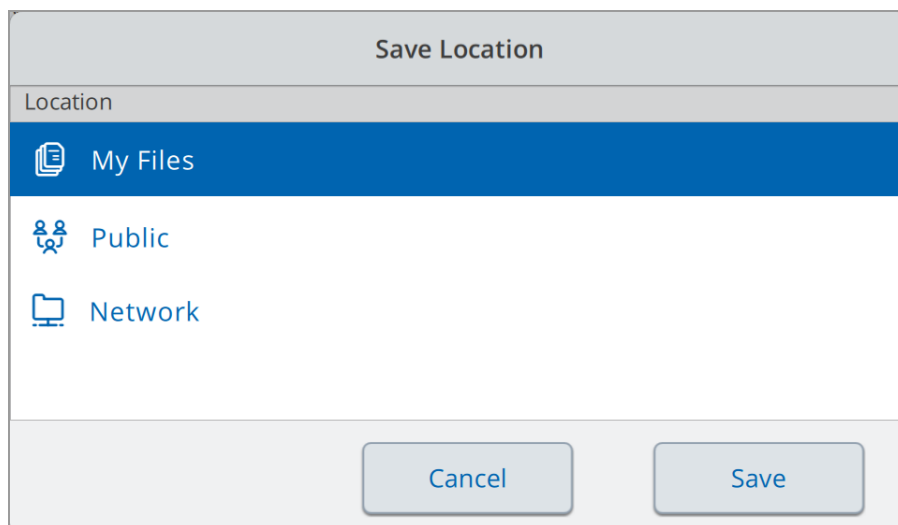
- b. Tap the type of step to insert.

The new step appears in the protocol, highlighted and to right of the selected step. The default temperature of the new step is 50°C and the default time is 30 sec (0:30). Tap time or temperature to edit the parameters in the new step.

5. (Optional) To delete a step, select the step and tap Remove at the bottom of the screen.

6. Tap Save to save the protocol.

The Save Location dialog box appears:



If you have a local user account, the default save location is your personal folder, which appears as My Files in the Save Location dialog box. Protocols that are saved in that folder are visible only to you. Files within your My Files folder are not available to or shareable with other users.

Alternatively, you can choose to save protocols to an attached USB drive or to a shared network folder if you have enabled this setting.

Finally, you can save protocols to the Public folder. Files that are saved in that folder are visible to and shareable with every PTC Tempo thermal cyclers user who uses the instrument.

Important: Files saved to an alternate location are not concurrently saved on the PTC Tempo thermal cyclers. Consider this before selecting the location.

For Guest users, the default save location is the Public folder. Guest users can save protocols only in the Public folder or to an attached USB drive.

Tip: For more information about managing files and folders, see [Chapter 6, Managing Files](#).

7. In the Save Location dialog box, select a location in which to save your protocol and tap Save.

Note: USB drives with Properties > Attributes manually set to Read-only can still be written to on PTC Tempo instruments.

8. On the New Protocol screen, tap Next to display the Run Setup screen.

- On the PTC Tempo 96, PTC Tempo 384, or PTC Tempo Deepwell or thermal cyclers you see

Run Setup CarlN

Name: 2-Step plus Infinite Hold Volume: 20 µl Lid Temp: 60 °C

Run Name:

Plate ID:

Notification:

- On PTC Tempo 48/48 thermal cyclers you see

Run Setup CarlN

Name: 2-Step plus Infinite Hold

| | |
|--|--|
| <input type="checkbox"/> Block A Volume: 20 µl Lid Temp: 60 °C Run Name: Plate ID: Notification: | <input type="checkbox"/> Block B Volume: 20 µl Lid Temp: 60 °C Run Name: Plate ID: Notification: |
|--|--|

9. (On the PTC Tempo 48/48 thermal cycler only) Select either Block A or Block B to adjust the settings.

Tip: To run this protocol on both blocks concurrently, select both Block A and Block B.

10. Adjust the run settings as needed for your protocol:

- Sample volume
- Lid temperature
- (Optional) Run name

Tip: This is the name for the run file, separate from the protocol name.

- (Optional) Plate ID
- Notification after the run is complete

The instrument can produce a beep sound to alert you when the run completes.

11. Tap Run to start the run.

Tip: The PTC Tempo thermal cycler detects whether reaction tubes are inserted on the sample block and displays a message if no tubes are detected.

For more information, see [Chapter 5, Running Protocols](#).

Modifying the Settings in a Protocol Step

While you create your protocol, you can modify the default settings for each step. You can add or remove any of the following:

- Target temperature
- Hold time
- Temperature gradients
- Temperature increments
- Ramp rate
- Extend time
- Alert beeps

You can also modify the default settings of a GOTO step. These tasks are explained in the sections that follow.

Changing Target Temperature and Hold Time

To change the target temperature and hold time

1. Select the target step and then tap Options on the bottom toolbar to open the Step Options dialog box:

The image shows a dialog box titled "Step Options". It contains the following fields and controls:

- Temperature: 95 °C
- Gradient (°C):
- Hold Time: 3:00 HH:MM:SS
- Ramp Rate: [input] °C/s
- Increment: [input] °C/cycle
- Extend: [input] s/cycle
- Beep:
- Buttons: Cancel, OK

2. Tap the appropriate option and enter a new value in the keypad that appears.

3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Tip: Alternatively, tap the appropriate field in the target step and enter a new value in the keypad that appears. Tap OK to close the keypad and return to the protocol.

Adding or Removing a Temperature Gradient

To add a temperature gradient

1. On the protocol, select the target step and tap Options.

The Step Options dialog box appears.

Step Options

Temperature: °C Gradient (°C):

Hold Time: HH:MM:SS

Ramp Rate: °C/s ↕

Increment: °C/cycle ⬆️

Extend: s/cycle ⌚

Beep: 🔊

2. In the Step Options dialog box, tap the Gradient checkbox. The gradient range appears to the right in the Step Options dialog box.

Step Options ✕

Temperature: Gradient (°C): A

Time: HH:MM:SS B

Ramp Rate: °C/s ↕ C

Increment: °C/cycle ⬆️ D

Extend: s/cycle ⌚ E

Beep: 🔊 F

Plate Read: 📷 G

H

3. To change the gradient range tap either the higher or lower value and enter a new value in the keypad that appears.

Important: The upper value of the gradient range must be within 24°C of the lower value.

4. Tap OK to confirm and close the keypad.
5. Tap OK to close the Step Options dialog box.
6. Tap Save to save the changes.

To remove the temperature gradient

1. On the protocol, select the gradient step and then tap Options.

The Step Options dialog box appears.

2. Clear the Gradient checkbox.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Adding or Removing the Ramp Rate

The ramp rate option instructs the thermal cycler to ramp to the target temperature at a specified rate in that step.

To emulate a thermal cycler that runs at a slower ramp rate than the PTC Tempo thermal cycler, change the ramp rate of the appropriate protocol step.

To add a ramp rate

1. On the protocol, select the target step and tap Options.
The Step Options dialog box appears.
2. Tap Ramp Rate and enter a value using the keypad that appears.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

To remove a ramp rate

1. On the protocol, select the ramp rate step and tap Options.
2. In the Step Options dialog box, tap Ramp Rate and then tap Off to clear the entry.

3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Adding or Removing a Temperature Increment

A temperature increment raises or lowers the target temperature of a step within each cycle.

To add a temperature increment

1. On the protocol, select the target step and tap Options.

The Step Options dialog box appears.

2. Tap Increment.
3. Enter an increment value using the keypad that appears.

Tip: A positive number increases the temperature, a negative number decreases the temperature.

4. Tap OK to confirm and close the keypad.
5. Tap OK to close the Step Options dialog box.
6. Tap Save to save the changes.

To remove a temperature increment

1. On the protocol, select the temperature increment step and tap Options.
2. In the Step Options dialog box, tap Increment and then clear the entry.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Adding or Removing an Extend Time Option

The Extend option instructs the thermal cycler to extend the hold time with each cycle.

To add or modify an Extend option

1. On the protocol, select the target step and tap Options.
The Step Options dialog box appears.
2. Tap Extend and type a value using the keypad that appears.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

To remove an Extend option

1. On the protocol, select the extend step and tap Options.
2. In the Step Options dialog box, tap Extend and then tap 0 (zero) to clear the entry.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Adding or Removing a Beep Alert

The PTC Tempo thermal cycler can emit a beep sound when it reaches the target temperature of a protocol step.

To add a beep alert

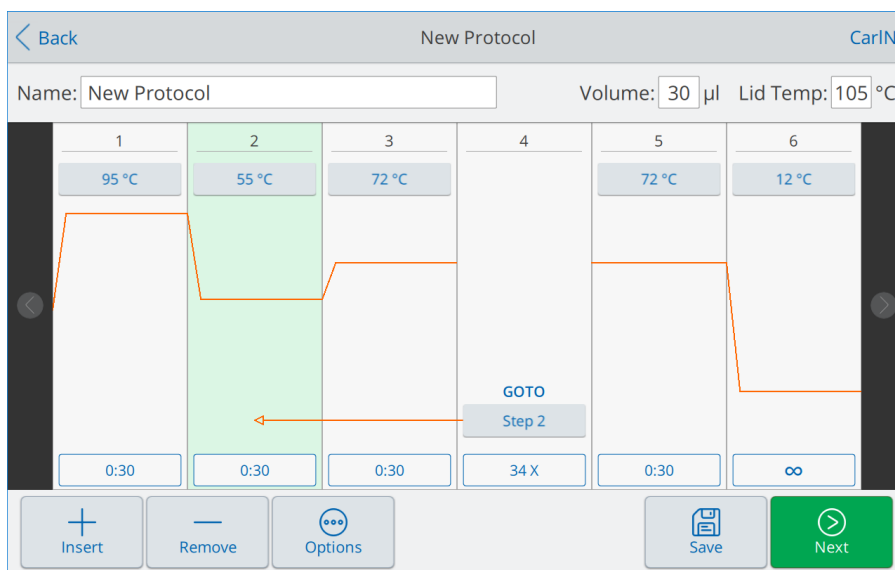
1. On the protocol, select the target step and tap Options.
The Step Options dialog box appears.
2. Tap the Beep checkbox to select it.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

To remove a beep alert

1. On the protocol, select the beep step and tap Options.
2. In the Step Options dialog box, tap Beep to clear the checkbox.
3. Tap OK to confirm and close the keypad.
4. Tap OK to close the Step Options dialog box.
5. Tap Save to save the changes.

Changing Parameters in a GOTO Step

The GOTO step instructs the thermal cycler to return to a specific step in the protocol and repeat the series of steps a specified number of times. This creates a cycle in the PCR experiment. The GOTO step in Step 4 in the following image instructs the thermal cycler to return to Step 2 and perform 34 additional repeats, for a total of 35 cycles.



To change parameters in a GOTO step

1. To change the return-to step, tap **Step** in the GOTO step and type the new step number using the keypad that appears.
2. Tap OK to confirm and close the keypad.
3. To change the number of repeats, tap the repeat **X** on the GOTO step and type a new value.
4. Tap OK to confirm and close the keypad.
5. Tap Save to save the changes.

Setting Sample Volume and Lid Temperature

Important: If the lid temperature is too high, the sample temperature might rise above the target temperature.

Sample Volume and Temperature Control Modes

The PTC Tempo thermal cycler uses one of two control modes to determine when the sample reaches the target temperature:

- **Calculated mode** — when a sample volume setting is greater than zero, the PTC Tempo thermal cycler calculates the sample temperature based on the sample volume. Bio-Rad recommends using the calculated mode because it most accurately represents the actual sample temperature.
- **Block mode** — when a sample volume setting is zero (0) μl , the PTC Tempo thermal cycler assumes that the sample temperature is the same as the measured block temperature.

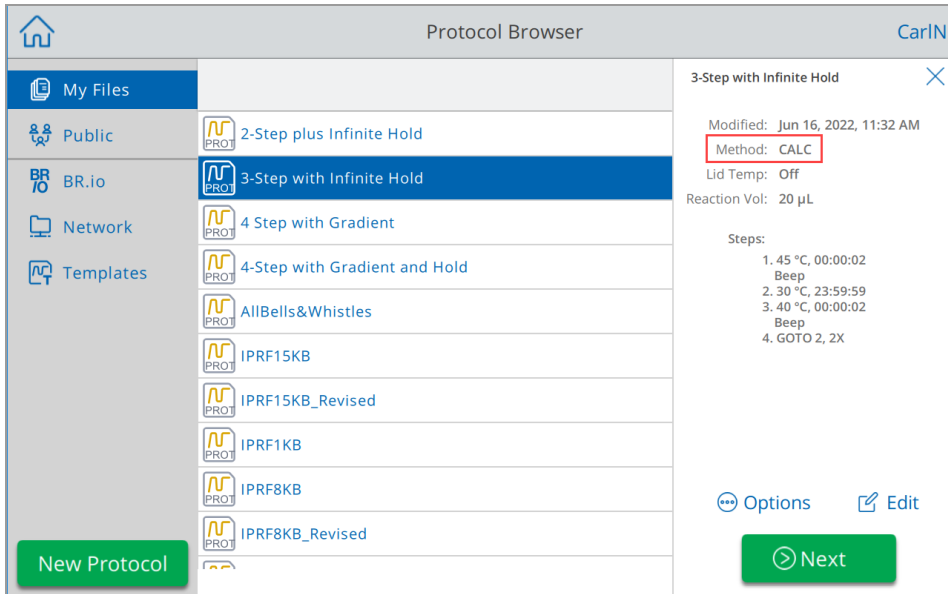
To change the sample volume

1. On the New Protocol or Edit Protocol screen, tap Volume at the top of the screen and type a new value using keypad that appears.
2. Tap OK to confirm and close the keypad.

To view the control mode setting for a saved protocol

1. From the Home screen, tap Protocols to open the Protocol Browser screen.
2. Tap the folder in which the protocol or run file resides, and then tap the file's name to view its details.

For example, the image that follows shows that the 3-Step with Infinite Hold protocol uses the CALC (calculated) control mode:



Lid Temperature

Note: For the PTC Tempo 48/48, PTC Tempo 96, and PTC Tempo Deepwell thermal cyclers, Bio-Rad recommends a lid temperature of 105°C. For the PTC Tempo 384 thermal cyclers, Bio-Rad recommends a lid temperature of 95°C.

The PTC Tempo thermal cycler's adjustable heated lid allows you to control the lid temperature. Heating the lid prevents condensation from forming inside the sample wells. When the PTC Tempo thermal cycler is running, the heated lid maintains the temperature specified for the protocol being run. Without a heated lid, water from the reagents can be lost to condensation, concentrating the reactants in the tube or plate.

The default lid temperature is 105°C for the PTC Tempo 48/48, PTC Tempo 96, and PTC Tempo Deepwell, and 95°C for the PTC Tempo 384 sample blocks.

Note: When the block is running an infinite hold at a temperature below 30.0°C for the last step in the protocol, the lid heater maintains 31.0°C.

To change the lid temperature

1. On the New Protocol or Edit Protocol screen, tap Lid Temp at the top of the screen and type a new value using keypad that appears.
2. Tap OK to confirm and close the keypad.

Editing a Protocol

You can edit any parameter within an existing protocol. You can then save it with the same name into the same or a different folder, or you can rename the protocol and save it into any folder. A renamed protocol does not overwrite the original protocol.

Tip: You edit a protocol located in your shared network folder. As well, you can edit an existing protocol located in your network folder and then save it with a new name to create a new protocol.

Caution: Saving a protocol with the same name in the same folder overwrites the original protocol. You can have multiple protocols with the same name as long as they are saved in different folders.

The PTC Tempo thermal cycler provides two options with which to edit a protocol:

- Direct interaction with buttons that appear on the protocol:
 - On temperature and gradient steps, tap the temperature and step time buttons to set these parameters. More options are available in the Options dialog.
 - On GOTO steps, tap the step number button to change the step at which the GOTO cycle begins. Tap the cycles button to change the number of cycles to repeat.
- Tap Options on the bottom toolbar to open the Step Options dialog box, which provides access to all options available for the selected step.

Chapter 5 Running Protocols

From the PTC Tempo thermal cycler you can

- Run a new protocol
- Run a saved protocol
- Run a protocol created on BR.io
- Rerun a protocol from its run report
- View the status of a run
- Pause and resume a run
- Skip steps in a run
- Stop a run

This chapter explains how to perform these tasks using the PTC Tempo thermal cycler's touch screen.

Note: Always check the sample block for condensation and clean before beginning the next run.

Running a Protocol

PTC Tempo thermal cycler offers several options for running a protocol:

- Run a new protocol.
- Run a saved protocol.
- Run a protocol from its run report.
- Run a protocol from your BR.io account.

This section explains these options in detail.

Running a New Protocol

To create and run a new protocol, see [Creating a Protocol on page 90](#).

Running a Saved Protocol

Using the PTC Tempo thermal cycler's Protocol Browser feature, logged-in users can select and run protocols that are saved locally in their My Files folder, an attached USB drive, or a shared network folder.

Guest users can run protocols saved in the Public folder or an attached USB drive.

Admin users can run saved protocols from any local folder, an attached USB drive, or a shared network folder.

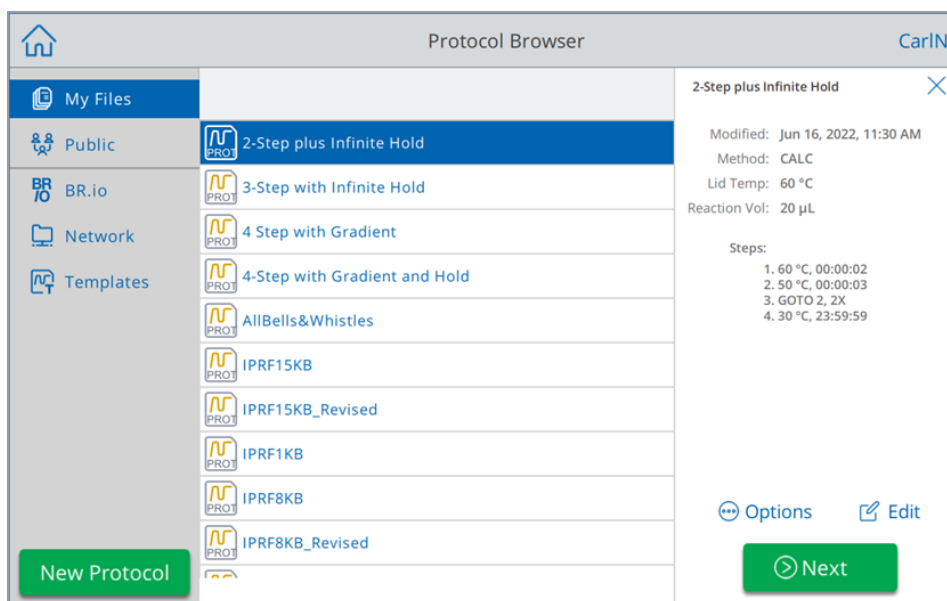
Important: The PTC Tempo thermal cycler considers single quote marks (') as invalid characters. As well, the PTC Tempo thermal cycler does not support protocols names greater than 32 characters in length. If you are running a protocol from an attached USB drive or a shared network drive that contains a single quote mark and/or more than 32 characters in its name, you must return to the location of the original protocol and rename it before starting the run.

Note: In the case of running from a USB drive:

1. Remove the USB drive from the PTC Tempo thermal cycler.
2. Insert the USB drive into the computer from which you copied the original protocol.
3. Copy the renamed protocol onto the USB drive.
4. Reinsert the USB drive into the PTC Tempo thermal cycler and start your run again.

To run a saved protocol

1. On the Home screen, tap Protocols to open the Protocol Browser screen.
2. Tap the location in which the protocol is saved and then tap the file name to select it.



3. Tap Next.

The Run Setup dialog box appears.

- On PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell thermal cyclers you see:

The screenshot shows a mobile application interface for the 'Run Setup' dialog. At the top, there is a header bar with a back arrow, the text 'Run Setup', and the 'CarIN' logo. Below the header, the 'Name' is set to '2-Step plus Infinite Hold'. To the right, 'Volume' is set to '20 μl' and 'Lid Temp' is set to '60 °C'. The main area contains three input fields: 'Run Name', 'Plate ID', and 'Notification'. The 'Notification' field has a speaker icon. At the bottom right, there are two buttons: 'Open Lid' (with a lid icon) and 'Run' (with a right arrow icon).

- On PTC Tempo 48/48 thermal cyclers you see:

The screenshot shows a mobile application interface for the 'Run Setup' dialog. At the top, there is a header bar with a back arrow, the text 'Run Setup', and the 'CarIN' logo. Below the header, the 'Name' is set to '2-Step plus Infinite Hold'. The main area is divided into two columns, 'Block A' and 'Block B', each with its own 'Run Name', 'Plate ID', and 'Notification' input fields. The 'Volume' is set to '20 μl' and 'Lid Temp' is set to '60 °C' for both blocks. At the bottom right, there is a single 'Run' button with a right arrow icon.

4. Adjust the run settings as needed for your experiment:

Note: On PTC Tempo 48/48 thermal cyclers only, select one or both blocks to adjust the settings.

- Sample volume
- Lid temperature
- (Optional) Run name

Note: The run name is limited to 50 characters.

- (Optional) Plate ID

To add a plate ID, do one of the following:

- Tap the Plate ID field and manually enter the plate ID in the alphanumeric keyboard that appears and then tap OK to accept the plate ID and close the keyboard.
- Use a USB barcode scanner to scan the plate's barcode into this field:
 - a. Connect a barcode scanner to one of the thermal cycler's USB ports.

Note: The PTC Tempo thermal cycler only supports barcode scanners that are ready to use when connected.
 - b. Tap the Plate ID field to view the Plate ID alphanumeric keyboard.
 - c. Tap the text field in the keyboard and then scan the barcode to insert the barcode into the text field.
 - d. Tap OK to accept the barcode and close the keyboard.

- Beep notification after the run is complete:



5. As needed, tap Open Lid (and Close Lid) to insert the plate in the sample block.

Note: On PTC Tempo 48/48 thermal cyclers you manually open and close the lid.

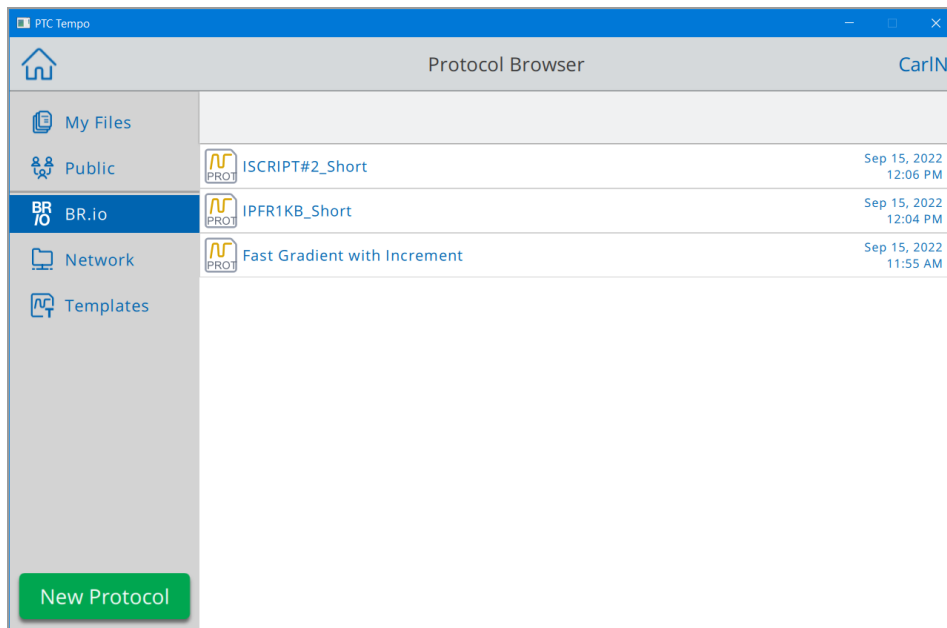
6. Tap Run to start the run.
7. When the run completes, the Status screen displays Protocol Complete.

Running a Protocol from Your BR.io Cloud Account

Important: The PTC Tempo thermal cycler considers single quote marks (') as invalid characters. If your protocol name contains a single quote mark, it will be substituted with an underscore (_). The PTC Tempo thermal cycler does not support protocols names greater than 32 characters in length. If your protocol name contains more than 32 characters, the PTC Tempo thermal cycler truncates all characters after the 32nd.

To run a protocol from your BR.io account

1. Make sure you have connected your PTC Tempo thermal cycler's user account to your BR.io account. For details, see [Connecting to Your Bio-Rad BR.io Account on page 76](#).
2. On the Home screen, tap Protocols to open the Protocol Browser screen.
3. In the Protocol Browser's left navigation pane, tap the BR.io icon to display the protocols, and then tap the protocol you want to run.



4. Tap Next.
The Run Setup dialog box appears.
5. Adjust the run settings as needed for your experiment.
See [Running a Saved Protocol on page 108](#) for more information.
6. If necessary, insert the plate in the sample block.

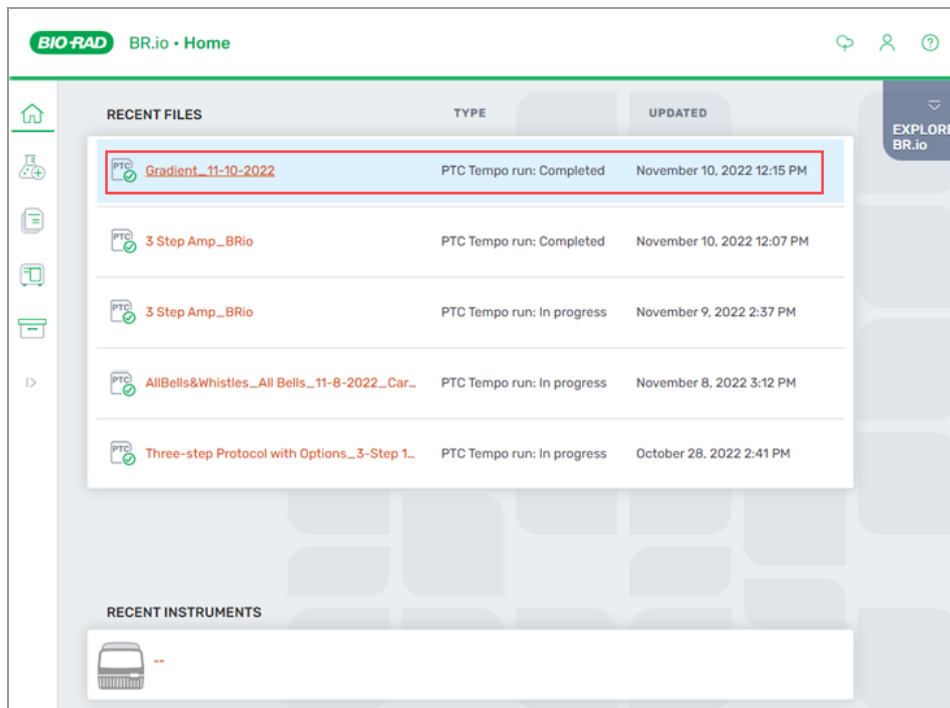
7. Tap Run to start the run.

While the run is in progress, the instrument status in your BR.io app is Running.

8. When the run completes, the run report is saved to your BR.io account as well as on the PTC Tempo thermal cycler.

Note: In the event of an interruption to the PTC Tempo thermal cycler/BR.io connection while your protocol is running and the connection is not restored before the end of the run, the run report is automatically saved to the instrument. When connection is reestablished, the run report is then automatically uploaded to your BR.io account.

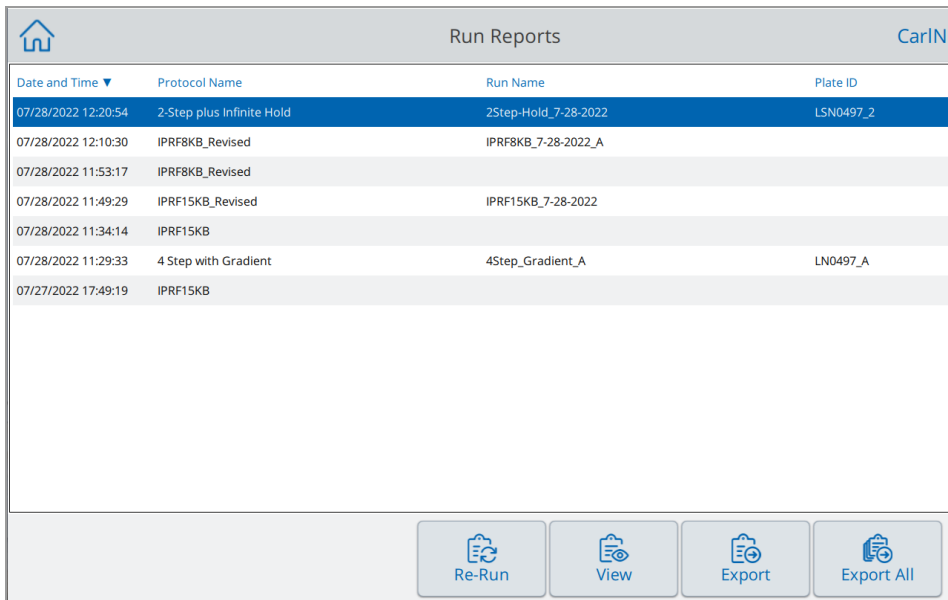
The run report is available in your BR.io Files list.



Running a Completed PTC Tempo Thermal Cycler Protocol from its Run Report

To run a completed PTC Tempo thermal cycler protocol

1. On the Home screen, tap Run Reports to open the Run Reports screen.



The screenshot shows the 'Run Reports' screen with a table of protocol runs. The table has four columns: Date and Time, Protocol Name, Run Name, and Plate ID. The first row is highlighted in blue. Below the table are four action buttons: Re-Run, View, Export, and Export All.

| Date and Time | Protocol Name | Run Name | Plate ID |
|---------------------|---------------------------|----------------------|-----------|
| 07/28/2022 12:20:54 | 2-Step plus Infinite Hold | 2Step-Hold_7-28-2022 | LSN0497_2 |
| 07/28/2022 12:10:30 | IPRF8KB_Revised | IPRF8KB_7-28-2022_A | |
| 07/28/2022 11:53:17 | IPRF8KB_Revised | | |
| 07/28/2022 11:49:29 | IPRF15KB_Revised | IPRF15KB_7-28-2022 | |
| 07/28/2022 11:34:14 | IPRF15KB | | |
| 07/28/2022 11:29:33 | 4 Step with Gradient | 4Step_Gradient_A | LN0497_A |
| 07/27/2022 17:49:19 | IPRF15KB | | |

2. Select the protocol you want to rerun and tap Re-Run.

The Run Setup dialog box appears.

Running a Completed PTC Tempo Thermal Cycler Protocol from its Run Report

The Run Setup screen displays the following information and controls:

- Navigation: Back (left), Run Setup (center), CarIN (right)
- Protocol Name: 2-Step plus Infinite Hold
- Volume: 20 μ l
- Lid Temp: Off $^{\circ}$ C
- Run Name: 2Step-Hold_7-28-2022
- Plate ID: (empty field)
- Notification: (checkbox and speaker icon)
- Buttons: Open Lid, Run

- Adjust the volume and lid temp settings as needed for your experiment and tap Run.

Tip: To differentiate the second run report on the Run Reports screen from the original if you did not change the name, view the time stamp on the protocol name, for example:

The Run Reports screen displays a table of run reports with the following data:

| Date and Time | Protocol Name | Run Name | Plate ID |
|---------------------|---------------------------|----------------------|-----------|
| 07/28/2022 12:46:26 | 2-Step plus Infinite Hold | 2Step-Hold_7-28-2022 | LSN0497_2 |
| 07/28/2022 12:20:54 | 2-Step plus Infinite Hold | 2Step-Hold_7-28-2022 | LSN0497_2 |
| 07/28/2022 12:10:30 | IPRF8KB_Revised | IPRF8KB_7-28-2022_A | |
| 07/28/2022 11:53:17 | IPRF8KB_Revised | | |
| 07/28/2022 11:49:29 | IPRF15KB_Revised | IPRF15KB_7-28-2022 | |
| 07/28/2022 11:34:14 | IPRF15KB | | |
| 07/28/2022 11:29:33 | 4 Step with Gradient | 4Step_Gradient_A | LN0497_A |
| 07/27/2022 17:49:19 | IPRF15KB | | |

Navigation and Action Buttons: Re-Run, View, Export, Export All

Monitoring a Run

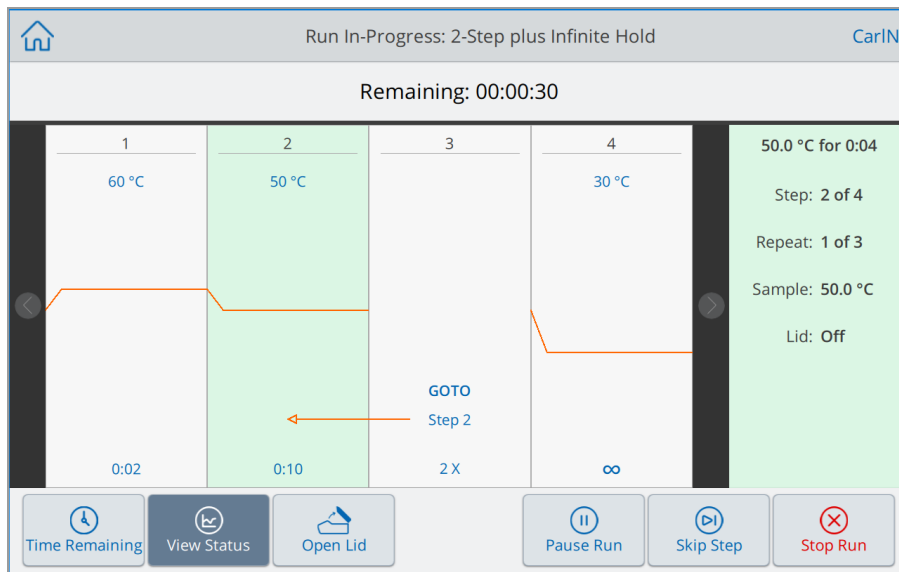
During a run, you can use the status buttons on the Home screen to monitor the run.

To monitor a running protocol

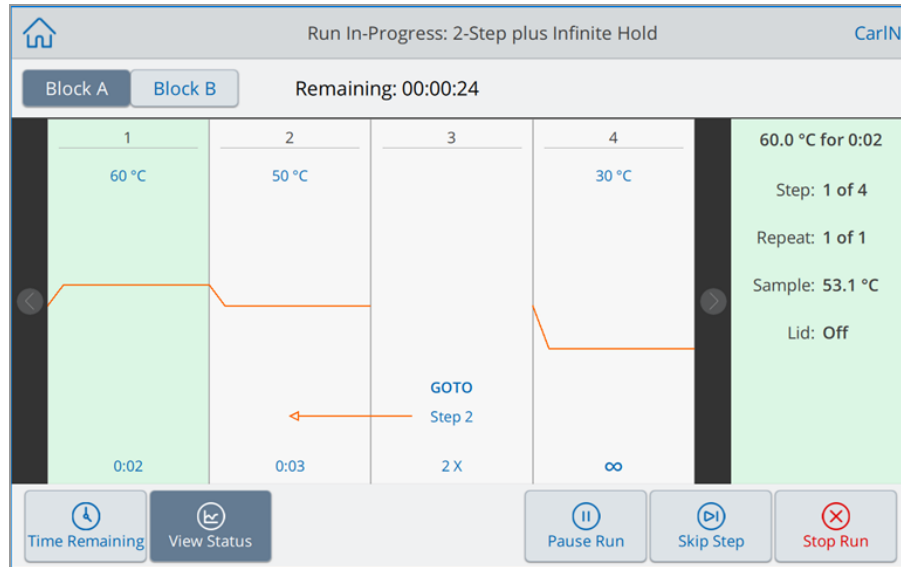
1. To see the detailed status of a run in progress, tap Run Status on the Home screen.

The Run In-Progress screen appears.

- On PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell thermal cyclers you see



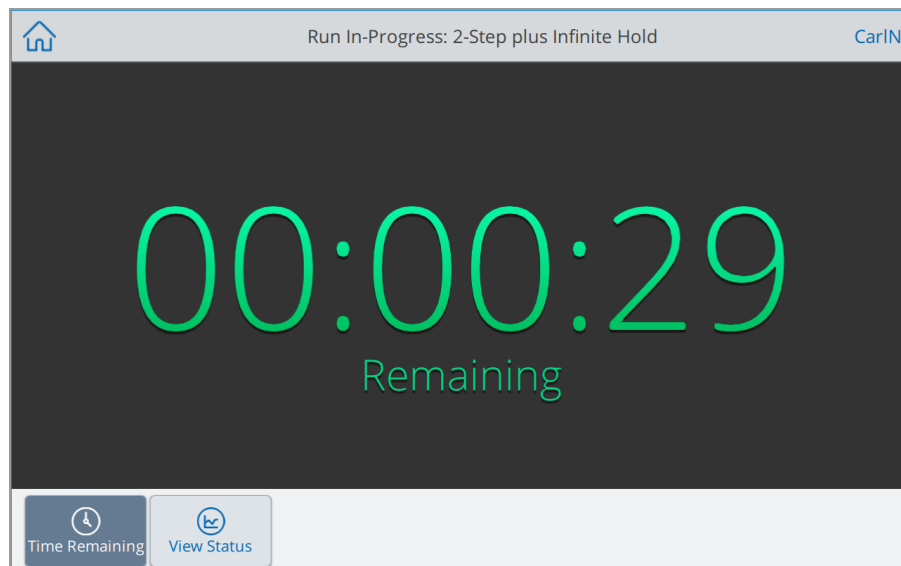
- On PTC Tempo 48/48 thermal cyclers you see



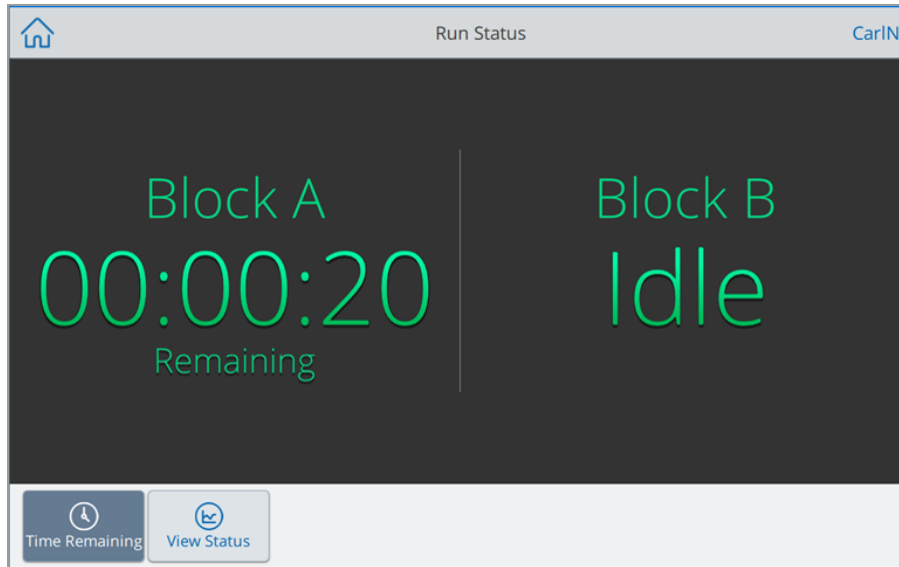
Tip: Block A is the default Run In-Progress screen on PTC Tempo 48/48 thermal cyclers. To view the run in progress details for runs on Block B, tap Block B in the status bar.

- To view the remaining time for the run, tap Time Remaining.

- On PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell thermal cyclers you see



- On PTC Tempo 48/48 thermal cyclers you see



Pausing a Run

From its status screen, you can temporarily pause a run in progress. While the run is paused, the PTC Tempo thermal cycler continues to heat or cool to the target temperature if it has not been reached, and also maintains the lid temperature.

Tip: After a power failure, the PTC Tempo thermal cycler displays a warning message. When the power resumes, the thermal cycler automatically resumes the run from the point in the protocol that was in progress at the time of the power failure.

Important: Pausing a step can adversely change the outcome of the PCR reaction. If the protocol is paused during a temperature step, the PCR reaction stays at the target temperature for a longer hold time than the protocol step requires.

To pause or resume a running protocol

1. On the Home screen, tap Run Status.
The Run In-Progress screen appears.
2. On the Run In-Progress screen, do one of the following:
 - Tap Pause to pause the running protocol.
 - Tap Resume to resume the protocol.

Skipping Steps in a Protocol

From the status screen, you can skip steps in a protocol while it is running if it is necessary to shorten the protocol.

Notes:

- If the PTC Tempo thermal cycler is currently in an infinite hold, tap Skip Step to exit the hold.
- If you tap Skip Step while in a GOTO step, the software exits the GOTO loop and continues to the next step in the protocol.

To skip a step in a running protocol

1. If necessary, on the Home screen, tap Run Status to display the Run In-Progress screen.
2. Tap Skip Step to skip to the next step. If in a GOTO cycle, skip out of the cycle and to the next step in the protocol.

Tip: To skip more than one step, tap Skip Step multiple times.

Stopping a Run

You can stop a protocol while it is running. When the protocol is stopped, the block immediately stops changing temperature.



WARNING! Do not open the lid immediately after stopping a run. Opening the lid while samples are still hot can allow pressurized containers to leak, spray, or spurt liquid. Always allow the samples to cool before opening the lid.

To stop a run in progress

1. Tap Run Status on the Home screen.

The Run In-Progress screen appears.

2. Tap Stop Run.

Incubating Samples

PTC Tempo thermal cycler provides a default Incubate protocol that you can use to incubate samples at a constant temperature for any amount of time. The default incubation temperature is 50°C and the default length of time is infinite. You can change these default settings or modify the settings to meet your specific needs.

Changes made by the logged in user are persisted for that user. Changes made by the Guest user are not persisted. The next person logging in as Guest will always see the default settings.

Note: Incubating samples for extended periods of time at 4–10°C, particularly in areas of high humidity, can cause excessive moisture condensation around the block. Clean any condensation that might have formed before running another protocol.

To incubate samples at a single temperature

1. On the Home screen, tap Incubate.
 - On the PTC Tempo 96, PTC Tempo 384, or PTC Tempo Deepwell thermal cyclers you see

The screenshot shows the 'Incubate' configuration screen. At the top left is a home icon, and at the top right is the user name 'CarlN'. The main area contains the following settings:

- Temperature: 50 °C
- Hold Time: ∞ HH:MM:SS
- Lid Temperature: 100 °C
- Hold at 4 °C after incubate

At the bottom right, there are two buttons: 'Open Lid' (with a lid icon) and 'Run' (with a play icon).

- On PTC Tempo 48/48 thermal cyclers you see

The screenshot shows the 'Incubate' screen of the PTC Tempo 48/48 thermal cycler. The interface is split into two columns for 'Block A' and 'Block B'. Each column contains a checkbox to enable the block, followed by input fields for Temperature (50 °C), Hold Time (∞ HH:MM:SS), Lid Temperature (100 °C), and a checkbox for 'Hold at 5 °C after incubate' for Block A and 'Hold at 4 °C after incubate' for Block B. A green 'Run' button is located at the bottom right.

2. (On the PTC Tempo 48/48 thermal cycler only) Select either Block A or Block B to enable and adjust the settings.

Tip: To incubate both blocks concurrently, select both Block A and Block B.

3. Adjust the run settings as needed to incubate your sample.

Note: When incubation occurs at temperatures below 30°C, the lid maintains a temperature of 31°C to prevent excessive condensation.

4. If you modified the Hold time for a selected temperature and want to set an Infinite hold for another temperature to start after the time ends:

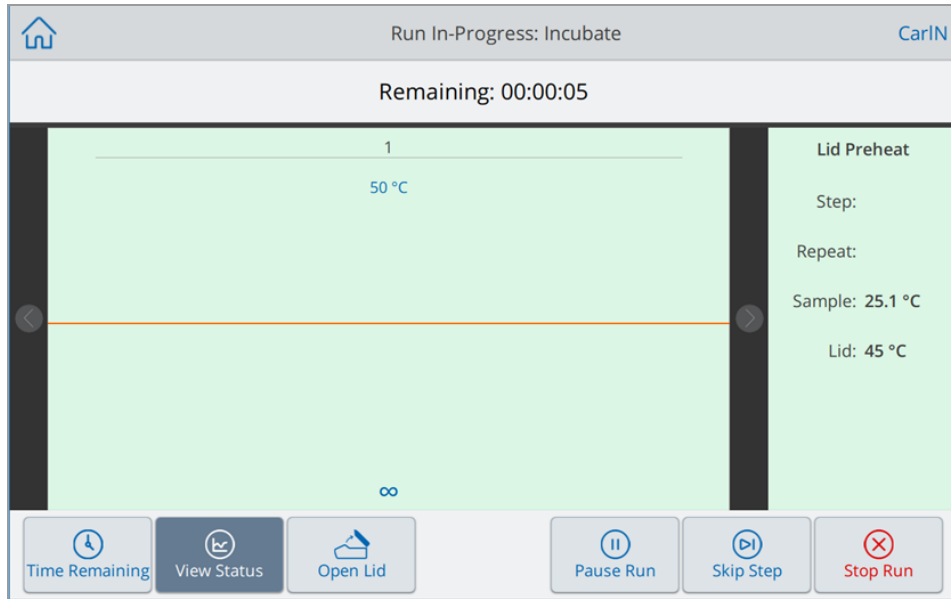
- a. Select the Hold at 4°C after incubate checkbox.
- b. (Optional) Change the hold temperature.

This creates a two-step Incubate protocol; the first step incubates the sample for the specified temperature and time, the second step sets an infinite hold at the specified temperature.

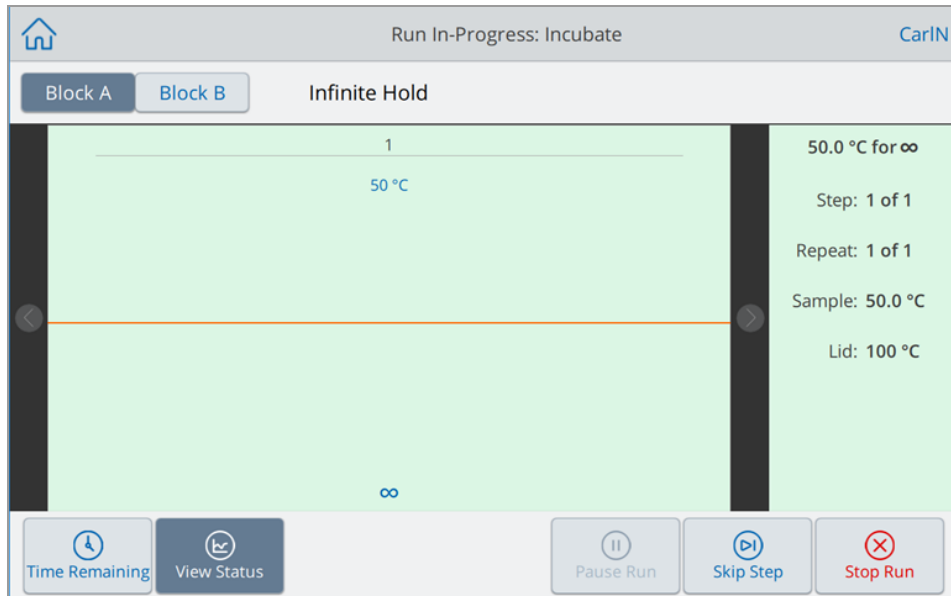
5. Tap Run to start the incubation.

The Run In-Progress: Incubate screen appears.

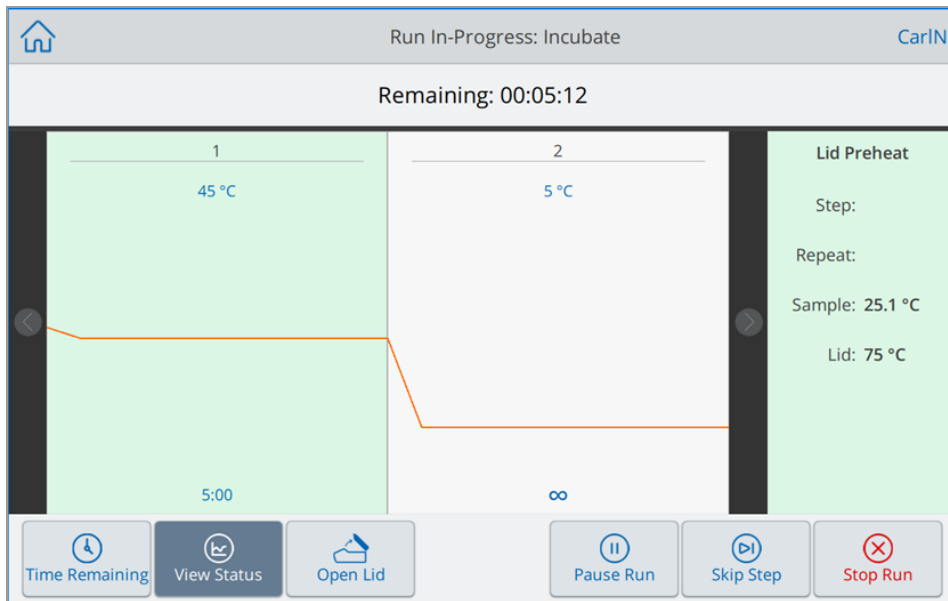
- If you *did not* select the Hold at checkbox on the Incubate screen:
 - On the PTC Tempo 96, PTC Tempo 384, or PTC Tempo Deepwell thermal cyclers you see



- On PTC Tempo 48/48 thermal cyclers you see



- If you *did* select the Hold at checkbox on the Incubate screen:
 - On the PTC Tempo 96, PTC Tempo 384, or PTC Tempo Deepwell thermal cyclers you see



- On the PTC Tempo 48/48 thermal cyclers you see



6. Tap Stop Run to stop incubation.

When you stop the run, the system logs the Incubate run in the System log and creates a run report.

Note: If the final step is set to Infinite, you must manually stop the Incubate run.

Chapter 6 Managing Files

Using the PTC Tempo thermal cycler's protocol browser feature, you can

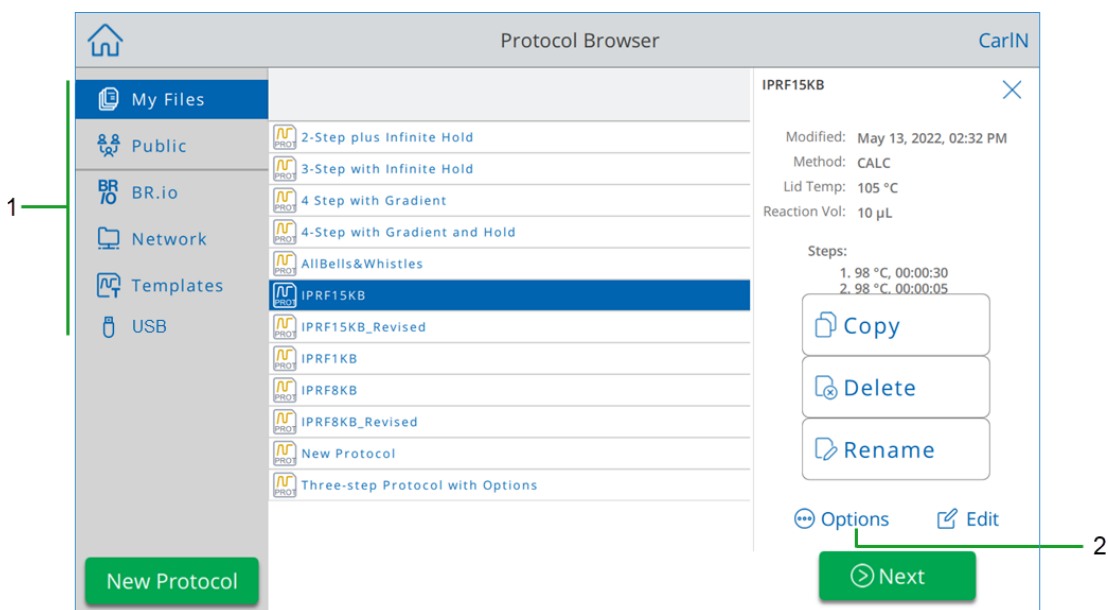
- Save protocols directly on the PTC Tempo thermal cycler or to a connected USB drive or shared network drive
- Copy protocols from a shared network drive
- Copy protocols to and from a connected USB drive
- Rename protocols on the thermal cycler
- Delete unnecessary protocols from the thermal cycler

This chapter explains how to manage protocols on the PTC Tempo thermal cycler.

The Protocol Browser Screen

On the PTC Tempo thermal cycler, you manage protocols using the Protocol Browser screen.

To view the Protocol Browser, tap Protocols on the Home screen.



The Legend table on page 126 describes the Protocol Browser screen in detail.

LEGEND

- 1 **Directories** — Potential directories:
- **My Files** — file storage available only to the person logged in to the PTC Tempo thermal cycler.
Tip: This option is not available to users who do not have a local account (that is, users logged in as Guest).
 - **Public** — file storage available to all users. Use this directory to share files across users.
Tip: This option is available to users who do not have a local account (that is, users logged in as Guest).
 - **BR.io** — contains protocols available in the BR.io account for the logged in user only; requires a BR.io account and a connection to the account (for details, see [Connecting to Your Bio-Rad BR.io Account on page 76](#)).
 - **Network** — file storage on a network drive connected to the PTC Tempo thermal cycler via Ethernet or wireless communication (for details, see [Setting Up a Connection to a Shared Network Drive on page 72](#)).
 - **Templates** — contains conventional PCR protocols that Bio-Rad supplies. This option is available to all users. The folder and the protocols within are read-only. You cannot add to or remove protocols in this folder. You cannot edit the protocols within the folder.
 - **USB** — file storage on a portable USB storage device connected to the PTC Tempo thermal cycler.
-
- 2 **File management options** — after selecting a file, the file details pane appears. Management options include:
- **Copy** — copies the existing file to a specified location
 - **Delete** — deletes the file from its current location
 - **Rename** — renames the file at its current location

Managing Files

To manage files, tap Protocols on the Home screen to open the Protocol Browser screen. [Table 10](#) lists all the file management functions available on the Protocol Browser screen.

Notes:

- The file management functionality is not available for files viewed in your BR.io folder.
- File names have a 32-character limit on the PTC Tempo thermal cycler.

Table 10. List of file and folder functions in the File Browser screen

| Options | Function |
|---------------------|---|
| File options | (all file actions occur locally on the instrument) |
| Copy | Copies the selected file to a specified location on the thermal cycler or to an attached USB drive. Note: USB drives with Properties > Attributes manually set to Read-only can still be written to on PTC Tempo instruments. |
| Delete | Deletes the file from its current location. |
| Rename | Renames the file at its current location. |

Managing Files on the PTC Tempo Thermal Cyclers

Using the PTC Tempo thermal cyclers' Protocol Browser, you can copy, rename, and delete protocol files located

- Locally on the thermal cyclers
- On an attached USB

Note: You cannot copy files to or from your BR.io account. When your PTC Tempo thermal cyclers connects to your BR.io account, it automatically syncs with your account and displays a list of all current protocols that are compatible with your thermal cyclers.

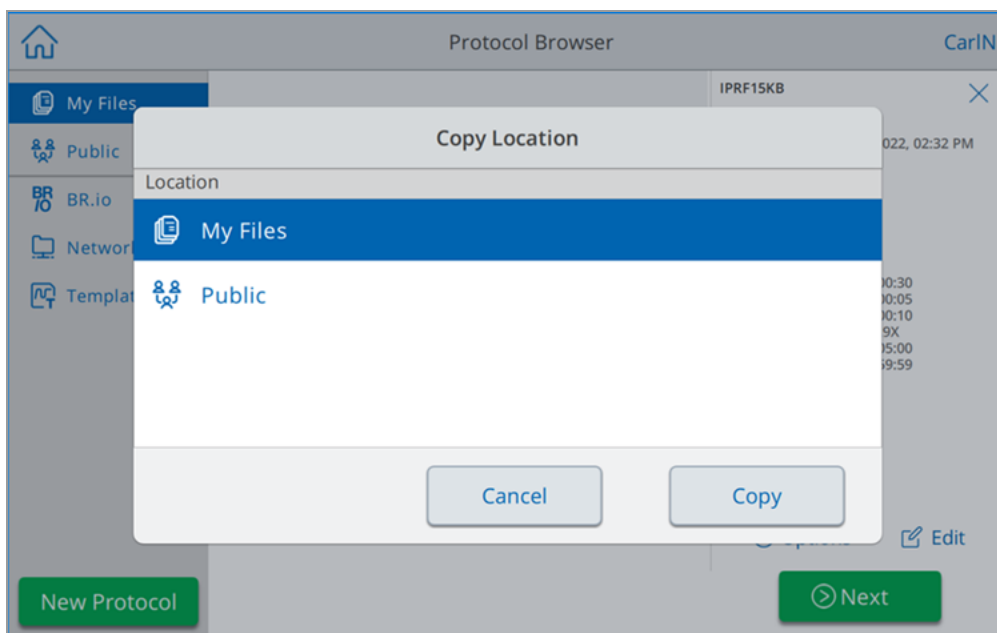
This section explains how to manage files on the PTC Tempo thermal cyclers.

Copying Files

Note: You cannot copy protocols to a shared network folder or to your BR.io account. You can copy protocols from your network folder to a location on the thermal cyclers.

Tip: Protocols copied to an attached USB saved as .pctl files.

1. On the PTC Tempo thermal cyclers' Home screen, tap Protocols to view the Protocol Browser screen.
2. On the Protocol Browser screen, navigate to the file you want to copy, then tap the file to view the file details pane.
3. In the file details pane, tap Options and then tap Copy.



The Copy Location dialog box appears.

4. In the Copy Location dialog box, select a location in which to copy the protocol.
5. Tap Copy to copy the file to the selected location or Cancel to return to the Protocol Browser screen.

Note: If a file with the same name exists at the selected location, a message box appears. Tap Yes to overwrite the existing file or No to return to the Protocol Browser screen.

The PTC Tempo thermal cycler displays a confirmation message when the file is successfully copied.

Deleting a File

Note: You cannot delete protocols that are located in your shared network folder.

To delete a file

1. On the Home screen, tap Protocols to view the Protocol Browser screen.
2. On the Protocol Browser screen, navigate to the file you want to delete, then tap the file to view the file details pane.
3. In the file details pane, tap Options and then tap Delete.

The Delete confirmation message appears.

4. Tap Delete to confirm or Cancel to return to the File Browser screen.

The PTC Tempo thermal cycler displays a confirmation message when the file is successfully deleted.

Renaming a File

- You cannot rename protocols that are located in your shared network folder.
- The protocol files located in the Templates folder are read-only and cannot be renamed. However, you can copy a Template protocol file to another location, open the file and edit the parameters. You can then save the edited protocol with a new name.

To rename a file

1. On the Home screen, tap Protocols to view the Protocol Browser screen.
2. On the Protocol Browser screen, navigate to the file you want to rename, then tap the file to view the file details pane.
3. In the file details pane, tap Options, then tap Rename and type a new name for the file using the keypad that appears.
4. Tap OK to confirm.

Backing Up and Restoring Files

Using the PTC Tempo thermal cycler's protocol browser you can quickly back up and restore your protocol files to an attached USB drive or to a shared network folder. You can also export your run reports to an attached USB drive.

Tip: Bio-Rad recommends that you back up your files often, and to a location other than the PTC Tempo thermal cycler. Follow the recommended SOPs in place at your site.

To restore files that are lost during a power failure or system disconnection, see [Recovering Files on page 164](#).

Notes: You can back up and restore only one protocol file at a time.

To back up or restore files

1. With the target file open in the Protocol Browser screen, tap Options > Copy.
2. In the Copy Location dialog box, tap the target destination and then tap Copy.

File Storage

The PTC Tempo thermal cyclers store approximately 100,000 files including protocols and run reports on the thermal cyclers. Protocols are saved locally in either your My Files folder or to the Public folder in the Protocol Browser. Up to 100 run reports per user are saved in the Run Reports viewer. For more information on how to recover protocol and run report files, see [Recovering Files on page 164](#).

Exporting Run Reports

When the run completes, the PTC Tempo thermal cycler creates and stores a run report of the protocol.

In the event of a system disconnection or interruption, the PTC Tempo thermal cycler memory can also recover up to 100 of the most recent protocol runs. These runs are logged into the run reports menu.

To export run reports

1. Insert a USB drive into a USB port on the PTC Tempo thermal cycler.
2. Log in to the PTC Tempo thermal cycler.
3. On the Home screen, tap Run Reports to open the Run Reports screen.
4. On the Run Reports screen, do one of the following:
 - To export a single run report, select the report in the Run Reports list and tap Export.
 - To export all run reports, tap Export All.

The run reports are saved as separate .pdf files to the folder PTC Tempo Run Reports on the attached USB drive.

Recovering Files

The PTC Tempo thermal cycler allows the Admin user to copy all protocol files and export all run reports to an attached USB drive. This section explains how to perform these tasks.

Note: Only an Admin user can export protocol files and run reports for all users.

Copying Protocol Files

To copy protocol files

1. Insert a USB drive into a USB port on the PTC Tempo thermal cycler.
2. Log in as an Admin user.
3. On the Home screen, tap Protocols to open the Protocol Browser screen.
4. In the left navigation pane, select the name of a user.

The protocols for that user appear in the middle pane.

5. For each protocol that you want to export:
 - a. Select the protocol in the middle pane.
 - b. In the right pane, select Options and then select Copy.
 - c. In the Copy Location dialog box, select the USB drive and click Copy.

The protocol file is saved to the attached USB drive as a .pcri file.

Note: You can only export one protocol file at a time. You must perform this procedure for each user on the thermal cycler, and for any protocol files saved to the Public folder.

After you copy the files, you can insert the USB drive into another Bio-Rad thermal cycler, open the USB drive and copy the files onto that thermal cycler.

Exporting Run Reports

To export run reports

1. Insert a USB drive into a USB port on the PTC Tempo thermal cycler.
2. Log in to the PTC Tempo thermal cycler.
3. On the Home screen, tap Run Reports to open the Run Reports screen.
4. On the Run Reports screen, do one of the following:
 - To export a single run report, select the report in the Run Reports list and tap Export.
 - To export all run reports, tap Export All.

The run reports are saved as separate .pdf files to the folder PTC Tempo Run Reports on the attached USB drive.

Appendix A Introduction to the PTC Tempo Application Programming Interface

The PTC Tempo Application Programming Interface (API) is a JSON-formatted secure HTTPS web service that enables local or remote client applications to control the PTC Tempo thermal cycler and monitor its status.

To use the PTC Tempo thermal cycler Automation API, you must

- Activate the PTC Tempo thermal cycler Automation API license key
- Create the Automation user
- Start automation

These tasks are explained in detail in the sections that follow.

Activating PTC Tempo API and Automation

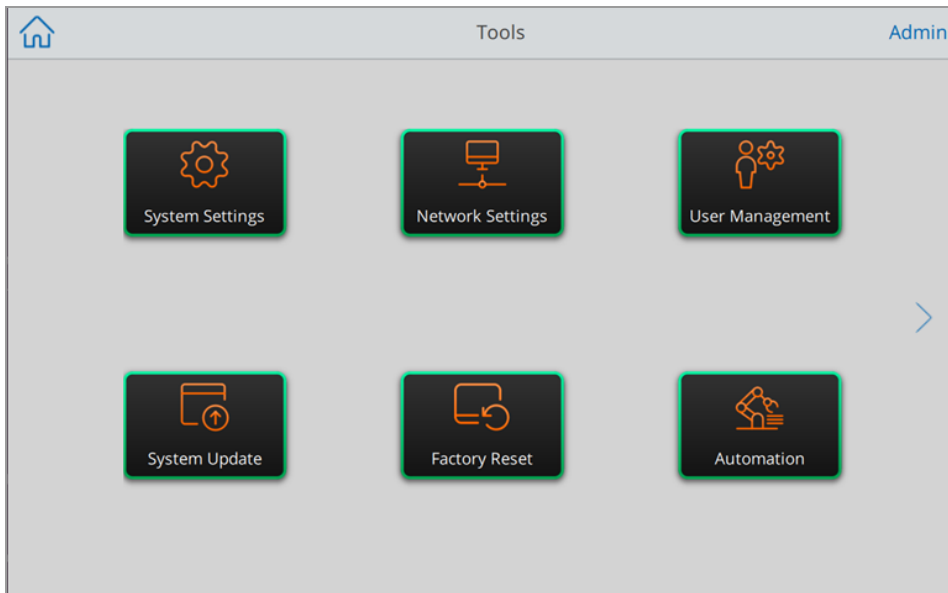
To activate the PTC Tempo API and to initially enable automation an Admin user must enter a license key using the PTC Tempo thermal cycler alphanumeric keypad. When the system validates the license key, you can send URL requests to the server and enable automation.

Note: The license key appears on a sticker that ships with this API Reference Guide. If you do not have the license key, obtain it from your Bio-Rad customer service representative before attempting to start automation.

To activate the PTC Tempo thermal cycler API license key

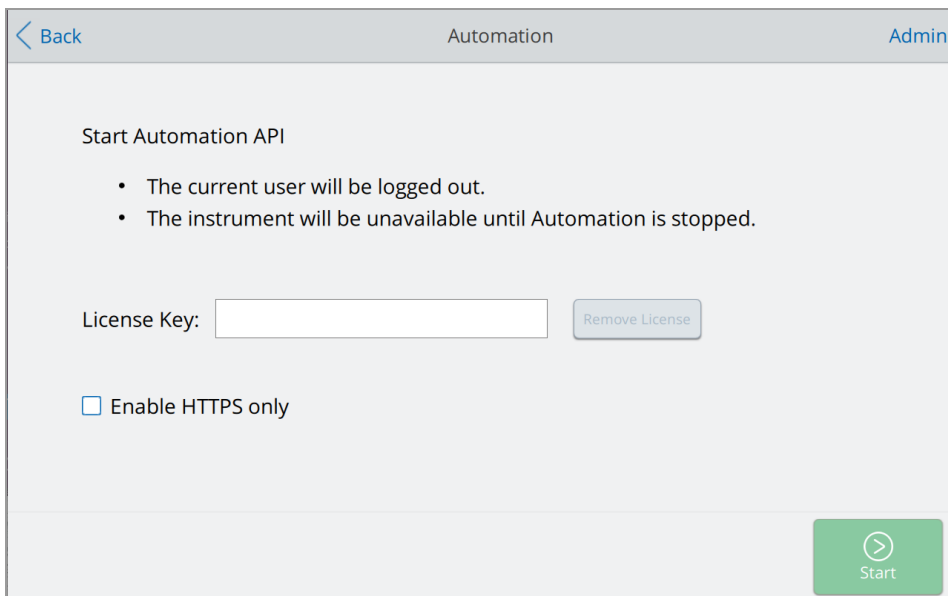
1. Log in as an Admin user or as a user with admin privileges.
2. On the Home screen, tap Tools to open the Admin Tools screen.

The Tools screen appears.



3. Tap Automation.

The Automation screen appears.



4. Tap the License Key field. In the alphanumeric keypad, enter the license key that appears on the sticker.

Note: The license key cannot exceed 20 characters.

5. Tap OK to confirm.
6. Tap Start to start Automation and (if required) create the Automation use.

The PTC Tempo thermal cyclers are ready for automation.

Creating the Automation User

A unique Automation user controls the PTC Tempo thermal cyclers automation by sending requests to the automation server via the PTC Tempo thermal cyclers API. An Admin user must start automation on the PTC Tempo thermal cyclers before the Automation user can use the Automation API and prepare the HTTP server to receive API requests. The system creates an Automation user when an Admin user initially starts automation. This user requires a password.

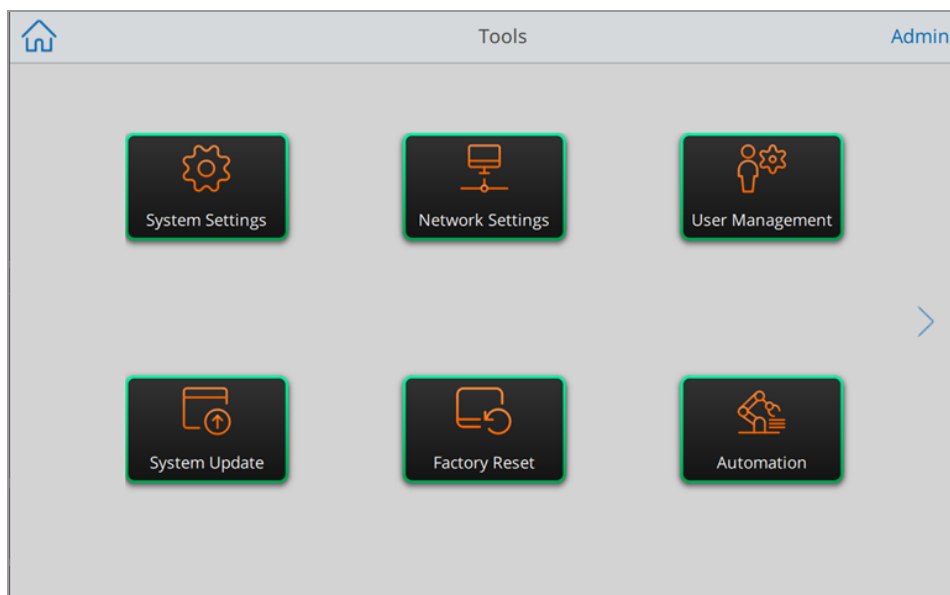
Note: The PTC Tempo thermal cyclers allow for only one Automation user.

Important: The Automation user profile name is reserved for the user who will run the PTC Tempo thermal cyclers automation API. If this user name already exists, protocols created by this user will be available for the automation API.

To create an Automation user

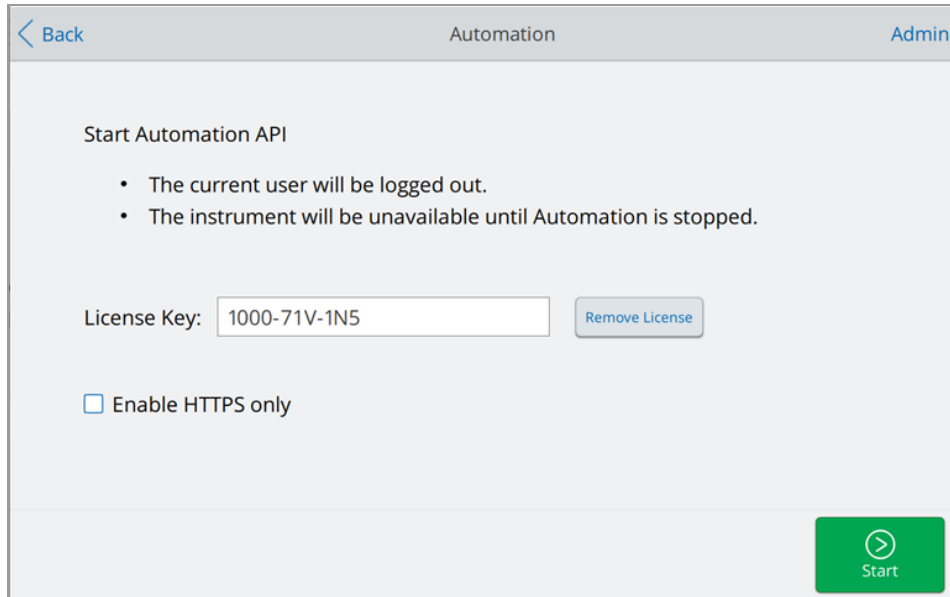
1. Log in as an Admin user or as a user with admin privileges.
2. On the Home screen, tap Tools to open the Admin Tools screen.

The Tools screen appears.



3. Tap Automation.

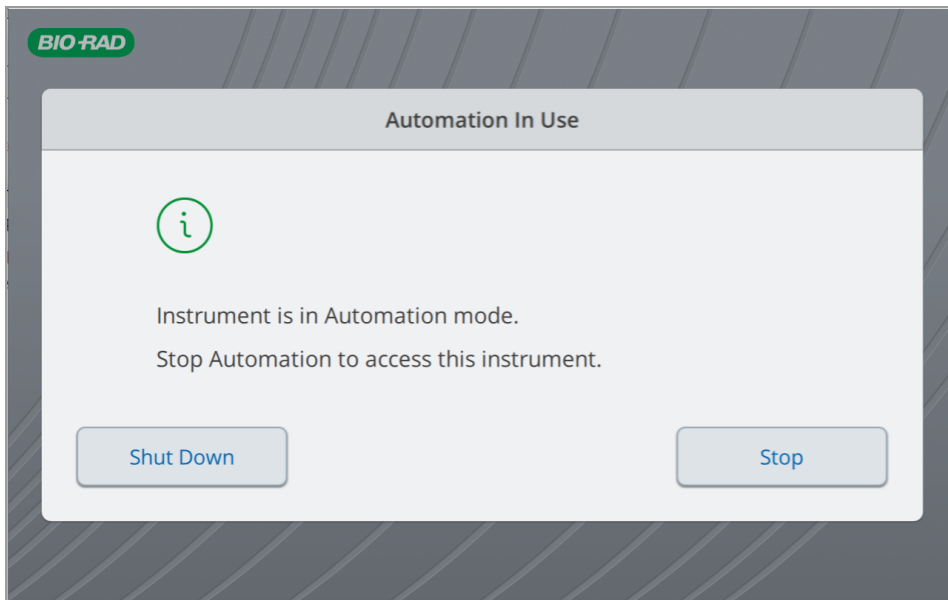
The Automation screen appears.



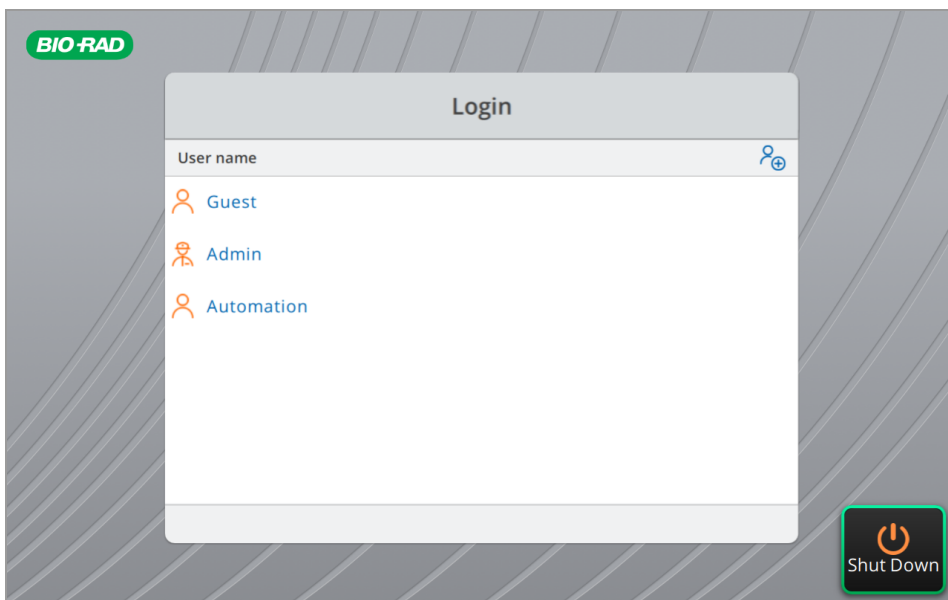
4. (Optional) The Automation API works with both HTTP and HTTPS. Select the Enable HTTPS only checkbox if your site requires only encrypted requests with HTTPS. The setting persists until the Admin user clears the checkbox.

Tap Start.

5. The Create Password dialog box appears. Enter and confirm a password for the new user in the alphanumeric keyboard that appears, and then tap Save Password.
6. The system creates the new Automation user and starts automation. After the system creates the Automation user, the Admin user is logged out, and the Automation in Use screen appears.



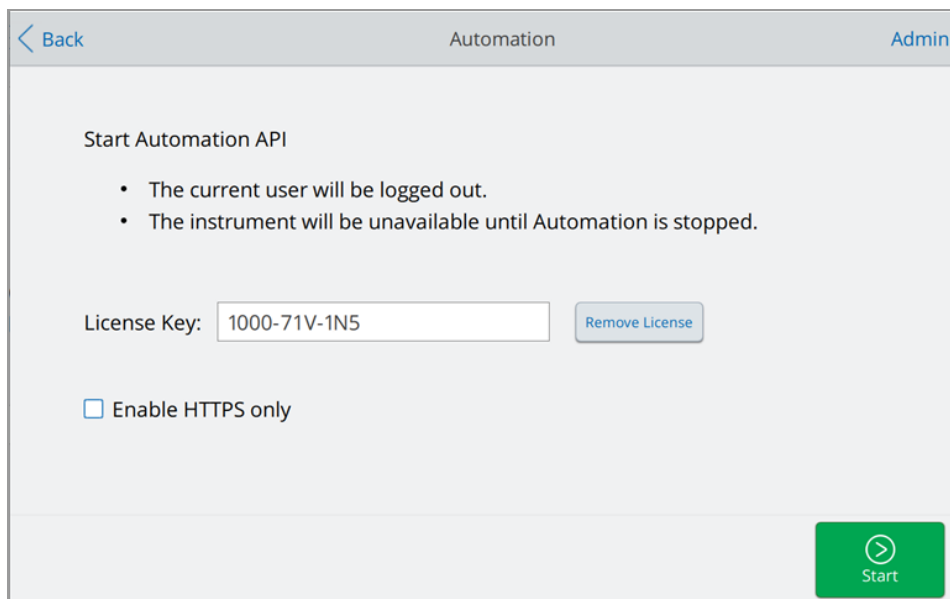
Note: After the system creates the Automation user, that user appears in the list of users on the Login screen. You can log in to the PTC Tempo thermal cycler as the Automation user to create and save protocols to the Automation folder. However, only the Admin user can initialize automation.



Starting Automation

To start PTC Tempo automation

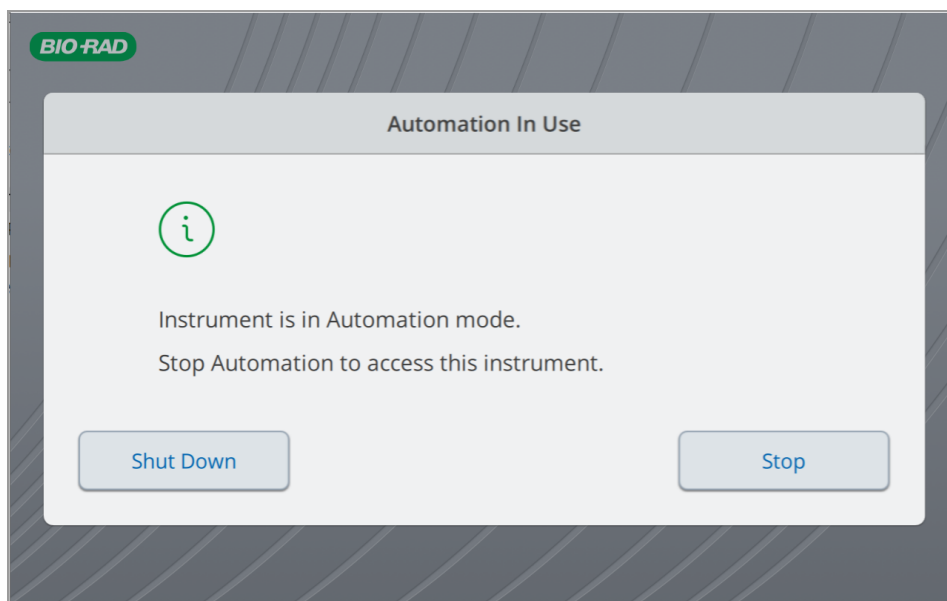
1. Log in as an Admin user or a user with admin privileges.
2. On the Home screen, tap Tools to open the Admin Tools screen.
3. On the Tools screen, tap Automation.
4. On the Automation screen, tap Start.



Tip: If the Automation user does not already exist, the system creates the Automation user and prompts the Admin to assign a password to the Automation user account.

If Enable HTTPS only was previously selected, it will remain selected until the Admin user clears the checkbox.

5. The system logs out the Admin user and launches automation. The Automation in Use screen appears, which remains visible until a user stops automation or shuts down the instrument.



Note: If a protocol is running, you cannot shut down the thermal cycler. In this case, the Shut Down button is disabled. Stop the protocol before shutting down the thermal cycler.

Important: You must enable automation in order to ping the PTC Tempo thermal cycler. Pinging the thermal cycler can help troubleshoot any API connection issues that might occur during automation.

Stopping Automation

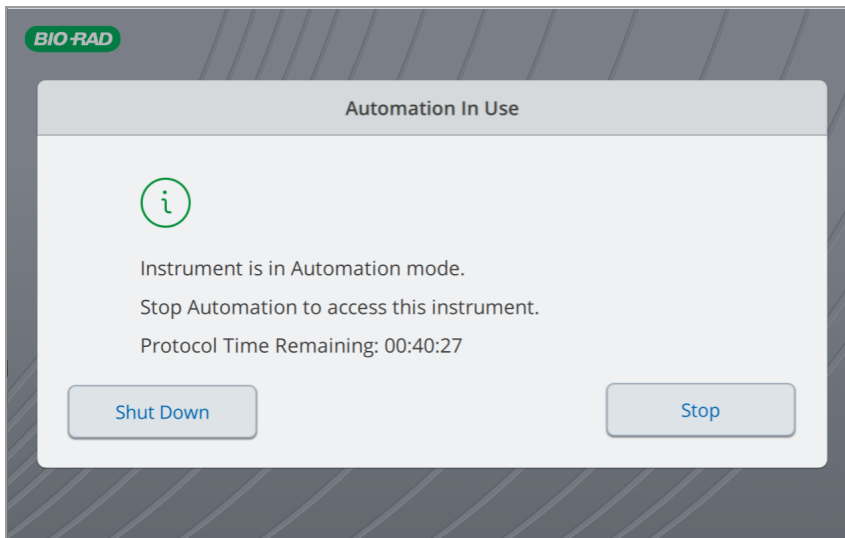
Any user can stop the automation by tapping Stop on the Automation In Use screen. When the user stops the automation, any protocol run in progress will also stop.

Note: Stopping automation also stops any active automation protocol runs.

The user also has the option to shut down the instrument during automation. A user cannot shut down the thermal cycler while a protocol run is in progress.

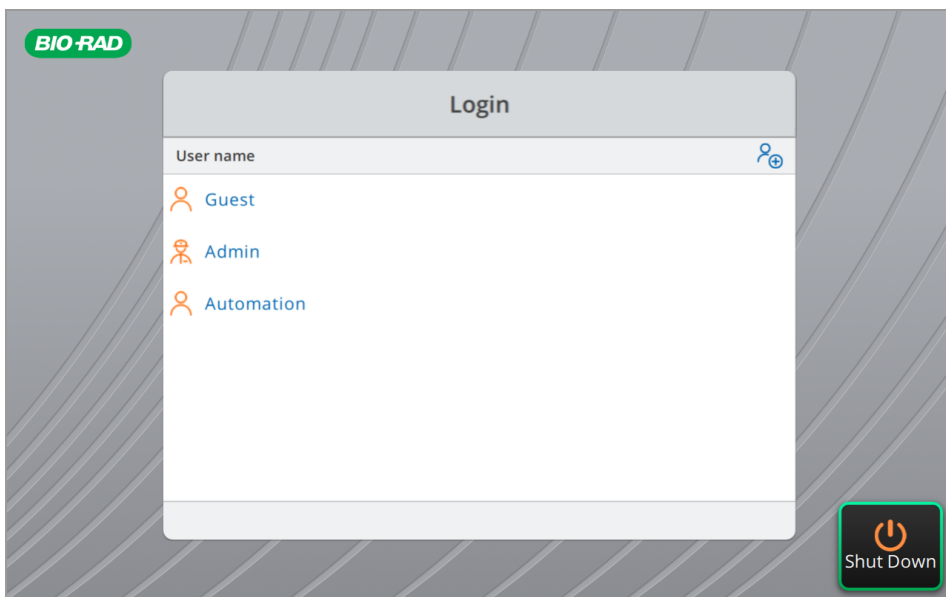
To stop PTC Tempo automation

1. In the Automation in Use message box, tap Stop.



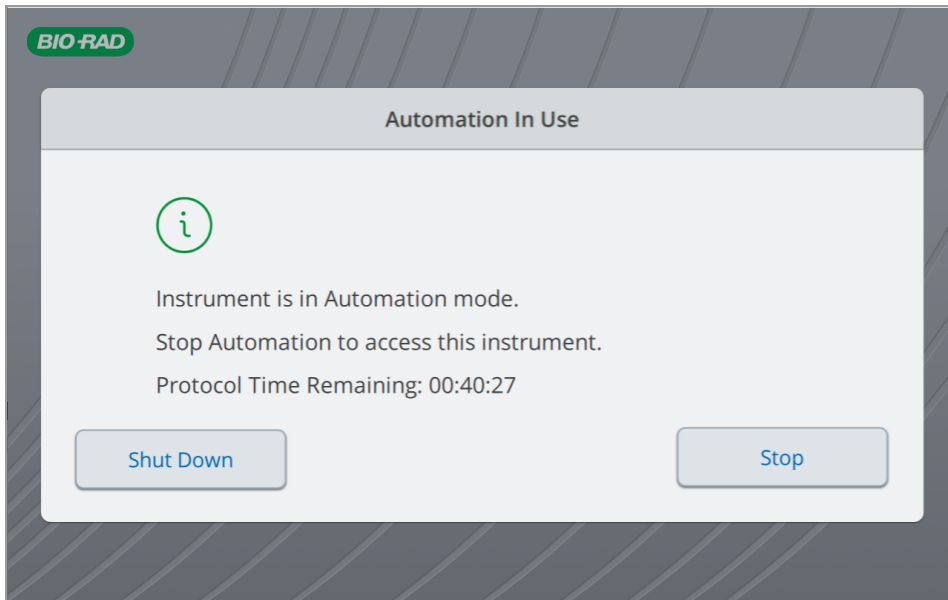
Note: Stopping automation will not remove the Automation user.

2. In the Stop Automation confirmation dialog, tap Yes to confirm that you want to stop automation.
3. The Login screen appears. To start automation, log in as an Admin user and follow the steps in [Starting Automation on page 138](#).



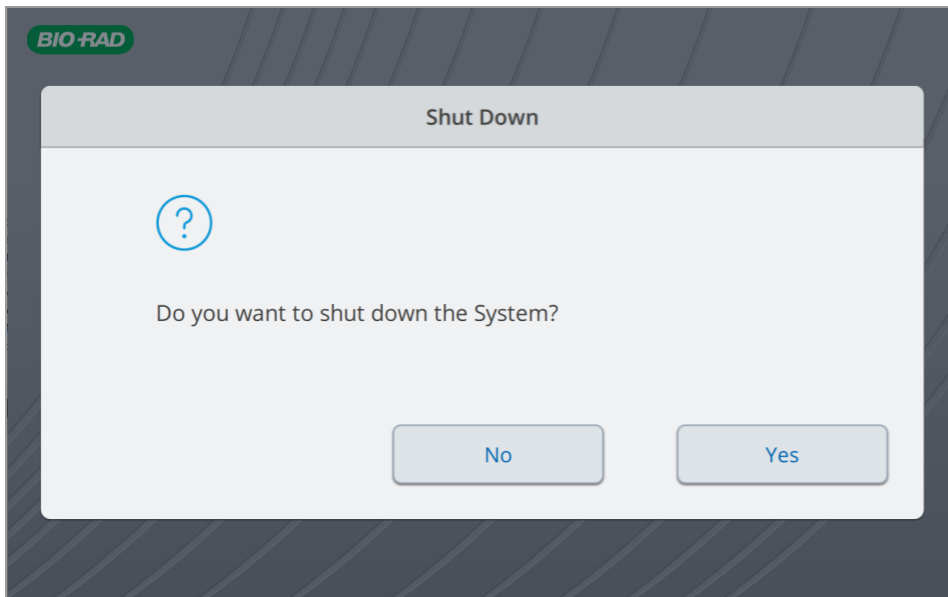
To shut down the PTC Tempo thermal cycler during automation

1. In the Automation in Use message box, tap Shut Down.



Note: If a protocol is running, you cannot shut down the thermal cycler. In this case, the Shut Down button is disabled. Stop the protocol before shutting down the thermal cycler.

2. In the Shut Down dialog, tap Yes to shut down the instrument.



For more information about running the PTC Tempo thermal cycler in automation mode, see PTC Tempo Thermal Cycler API Reference Guide.

Deactivating the Automation API

An Admin user can deactivate PTC Tempo thermal cycler automation and remove the automation API license key.



WARNING! Deactivating the automation API removes the license key and disables the PTC Tempo thermal cycler's ability to interact with the automated systems in your laboratory. Take care when deactivating the automation API.

To deactivate PTC Tempo Automation

1. Log in as an Admin user or a user with admin privileges.
2. On the Home screen, tap Tools to open the Admin Tools screen.
3. On the Tools screen, tap Automation.
4. On the Automation screen, tap Remove License.

< Back Automation Admin

Start Automation API

- The current user will be logged out.
- The instrument will be unavailable until Automation is stopped.

License Key:

Enable HTTPS only

5. Click OK to confirm.
6. Automation is deactivated and the license key is removed.

Note: Deactivating automation does not remove the Automation user.

Appendix B Catalog Numbers for PTC Tempo Thermal Cyclers and Accessories

This appendix lists the catalog numbers for the PTC Tempo thermal cyclers and accessories.

Instruments and Accessories

Table 11. Catalog numbers for PTC Tempo Thermal Cyclers and accessories

| Catalog Number | Description |
|---|---|
| Instruments | |
| 12015382 | PTC Tempo 96 Thermal Cycler |
| 12015392 | PTC Tempo Deepwell Thermal Cycler |
| 12015394 | PTC Tempo 384 Thermal Cycler |
| 12015309 | PTC Tempo 48/48 Thermal Cycler |
| 12019776 | License, 1 seat, API, PTC Tempo |
| 12014924 | Plate lifter, 384 block |
| 12019862 | Tube frame, 0.5 ml tubes, PTC Tempo Deepwell Thermal Cycler |
| 16007743 | 7' CAT6 Ethernet cable* |
| 9007622 | 5' Power cord |
| 184-9000 | Tube Frame for the 96 and 48/48 Reaction Modules |
| 184-9001 | Tube Frame for the 96-Deep Well Reaction Module |
| | Wi-Fi Adaptor for use with PTC Tempo thermal cyclers Contact your Bio-Rad Sales representative for information about the adaptor specific to your locale or visit bio-rad.com/PTCTempo . |
| * For continued compliance with EMC standards only use Bio-Rad-approved Ethernet cables with this instrument. | |

Appendix B Catalog Numbers for PTC Tempo Thermal Cyclers and Accessories

Appendix C Recommended Plastic Consumables

Recommended Plastic Consumables for PTC Tempo Thermal Cyclers

The PTC Tempo 48/48, PTC Tempo 96, and PTC Tempo Deepwell thermal cyclers accept low-profile 0.2 ml plates and tubes. For optimal results, Bio-Rad recommends the following consumables.

- HSP9655 — Hard-Shell™ 96-Well PCR Plates, low profile, thin wall, skirted, white shell/white well
- HSP9601 — Hard-Shell 96-Well PCR Plates, low profile, thin wall, skirted, white shell/clear well
- TLS0801 — 0.2 ml 8-tube PCR Strips without Caps, low profile, clear
- TCS0803 — 0.2 ml Flat PCR Tube 8-Cap Strips, optical, ultraclear

Plastic Consumables for PTC Tempo 96 Thermal Cyclers

These consumables are compatible with PTC Tempo 96 thermal cyclers. For optimal results Bio-Rad recommends the consumables listed in [Recommended Plastic Consumables](#).

- TFI0201 — 0.2 ml PCR Tubes with Flat Caps, high profile, clear
- TWI0201 — 0.2 ml PCR Tubes with Domed Caps, high profile, clear
- TBS0201 — 0.2 ml 8-Tube PCR Strips without Caps, high profile, clear
- HSP96xx — Hard-Shell 96-Well PCR Plates, low profile, thin wall, skirted
- HSL96xx — Hard-Shell 96-Well PCR Plates, low profile, thin wall, semi-skirted
- HSL9605 — Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white
- HSL9905 — Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white, barcoded
- HSS96xx — Hard-Shell 96-Well PCR Plates, high profile, semi-skirted
- HSS9901 — Hard-Shell 96-Well PCR Plates, high profile, semi-skirted, clear shell/clear well, barcoded
- MLP96xx — Multiplate™ 96-Well, PCR Plates, high profile, unskirted
- MLL96xx — Multiplate 96-Well PCR Plates, low profile, unskirted

Plastic Consumables for PTC Tempo 384 Thermal Cyclers

For optimal results, Bio-Rad recommends the following consumables for PTC Tempo 384 thermal cyclers:

- HSP3805 — Hard-Shell 384-Well PCR Plates, thin wall, skirted, clear shell/white well
- HSP38XX — Hard-Shell 384-Well PCR Plates, thin wall, skirted
- HSP3801 — Hard-Shell 384-Well PCR Plates, thin wall, skirted, clear shell and clear well
- HSR4805 — Hard-Shell 384-Well PCR Plates, clear shell/white well, barcoded

Plastic Consumables for PTC Tempo 48/48 Thermal Cyclers

For optimal results, Bio-Rad recommends the following consumables for PTC Tempo 48/48 thermal cyclers:

- MLL4801 — Multiplate 48-Well PCR Plates, low profile, unskirted, clear
- MLL4851 — Multiplate 48-Well PCR Plates, low profile, unskirted, white
- MLP4801 — Multiplate 48-Well PCR Plates, high profile, unskirted, clear
- TFI0201 — 0.2 ml PCR Tubes with Flat Caps, high profile, clear
- TWI0201 — 0.2 ml PCR Tubes with Domed Caps, high profile, clear
- TBS0201 — 0.2 ml 8-Tube PCR Strips without Caps, high profile, clear
- TBC0802 — 0.2 ml 8-Tube PCR Strips and Domed Cap Strips, high profile, clear
- TLS0801 — 0.2 ml 8-tube PCR Strips without Caps, low profile, clear
- TCS0803 — 0.2 ml Flat PCR Tube 8-Cap Strips, optical, ultraclear

Plastic Consumables for PTC Tempo Deepwell Thermal Cyclers

These consumables are compatible with PTC Tempo Deepwell thermal cyclers. For optimal results, Bio-Rad recommends the consumables listed in [Recommended Plastic Consumables on page 147](#).

- TBI0502 — 0.5 ml PCR Tubes with Flat Caps, high profile, clear
- TBS0201 — 0.2 ml 8-Tube PCR Strips without Caps, high profile, clear
- TBC0802 — 0.2 ml 8-Tube PCR Strips and Domed Cap Strips, high profile, clear
- TFI0201 — 0.2 ml PCR Tubes with Flat Caps, high profile, clear
- TWI0201 — 0.2 ml PCR Tubes with Domed Caps, high profile, clear
- HSP96xx — Hard-Shell 96-Well PCR Plates, low profile, thin wall, skirted

- HSL96xx — Hard-Shell 96-Well PCR Plates, low profile, thin wall, semi-skirted
- HSL9605 — Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white
- HSL9905 — Hard-Shell 96-Well PCR Plates, low profile, semi-skirted, clear/white barcoded
- HSS96xx — Hard-Shell 96-Well PCR Plates, high profile, semi-skirted
- HSS9901 — Hard-Shell 96-Well PCR Plates, high profile, semi-skirted, clear shell/clear well, barcoded
- MLP96xx — Multiplate 96-Well, PCR Plates, high profile, unskirted
- MLL96xxx — Multiplate 96-Well PCR Plates, low profile, unskirted
- 12001925 — ddPCR 96-Well Plates (for QX600/QX200 Droplet Digital PCR System)

Plate Seals

For optimal results, Bio-Rad recommends the following plate seals:

- MSA 5001 — Microseal™ 'A' PCR Plate and PCR Tube Sealing Film (non-adhesive, silicone-based)
- MSB1001 — Microseal 'B' PCR Plate Sealing Film, adhesive, optical
- MSC1001 — Microseal 'C' PCR Plate Sealing Film, adhesive, optical (pressure-sensitive)
- MSF1001 — Microseal 'F' PCR Plate Seal, foil, pierceable
- 1814030 — PCR Plate Heat Seal, clear, optical
- 1814040 — PCR Plate Heat Seal, foil, pierceable
- 1814045 — PCR Plate Heat Seal, foil, peelable

Appendix C Recommended Plastic Consumables

Appendix D Maintenance and Troubleshooting

This appendix explains how to clean and maintain the PTC Tempo Thermal Cycler and how to troubleshoot problems that you might have. If you need to return the thermal cycler to Bio-Rad, see [Returning the PTC Tempo Thermal Cycler to Bio-Rad on page 156](#).

Important: Cybersecurity is the protection of assets in cyberspace from cyberattacks. Cybersecurity is Bio-Rad's ability to secure its people, information, systems, and reputation in cyberspace. Cyberspace is the always-on, technologically interconnected world; it consists of people, organizations, information, and technology.

Fast reaction is important with cybersecurity issues! If you suspect that there may be a cybersecurity issue concerning your instrument or that cybersecurity has been breached at your site, contact your Bio-Rad representative for technical support immediately.

Cleaning and Maintaining the PTC Tempo Thermal Cycler

The PTC Tempo thermal cycler requires little maintenance for proper operation and precise thermal control. However, with long and constant use, the thermal cycler will require some cleaning and other maintenance.

The PTC Tempo thermal cycler includes a sample block that must heat and cool quickly. Contamination of the sample block can interfere with thermal cycling.

Avoid contaminating your PTC Tempo thermal cycler by following these guidelines:

- Always clean the outside of any containers before placing them in the block.
- Never run a reaction with a seal that is open, loose, punctured, or otherwise damaged.
- Clean the sample block and inner lid periodically to prevent the buildup of dirt, biohazardous material, or fluorescent solutions (see [Table 13 on page 154](#)).



Fig. 1: PTC Tempo 96 and Deepwell sample block and lid






- Clean the outer surface of the PTC Tempo thermal cycler on a regular schedule to remove any debris or dirt that might interfere with proper function (see [Table 13](#)). Clean the thermal cycler to prevent damage to the air intake or sample bay.

Important: For instructions on handling and cleaning radioactive or biohazardous materials, consult the guidelines for radiation safety and biosafety provided by your institution. These guidelines also include hazardous materials disposal methods.

PTC Tempo Thermal Cycler Cleaning and Maintenance Safety Warnings

When cleaning and maintaining the PTC Tempo thermal cycler, always consider and follow the warnings listed in [Table 12](#) that follows.

Table 12. Cleaning and maintenance safety warnings

| Warning | |
|---|--|
|  | To prevent electrical shock, always turn off and unplug the instrument from the electrical outlet before cleaning it. |
|  | A thermal cycler operates at temperatures high enough to cause serious burns. Always allow the entire instrument to return to room temperature before cleaning. |
|  | When handling biohazardous or radioactive samples, adhere to the recommended precautions and guidelines specific to your laboratory and location. These guidelines should include cleaning, monitoring, and disposal methods for the hazardous material (s) you are using. |
|  | In addition, as identified above, there is a small risk of explosion, or of expulsion of liquids or vapors from the sample container(s). When working with hazardous materials the risk of injury from expelled material is compounded with the risk that the hazardous material themselves could be dispersed in and around the instrument. Users should take appropriate precautions for such a situation. |
|  | |

PTC Tempo Thermal Cycler Maintenance

Table 13 lists the components of the PTC Tempo thermal cycler that require maintenance.

Table 13. PTC Tempo thermal cycler maintenance

| Component | Action |
|------------------------------------|---|
| Air vents | <p>Use a soft brush, damp cloth, or vacuum cleaner to remove light dust from the air vents. Remove any heavy dust that is deep in the vents with a vacuum cleaner.</p> <p>Tip: Cleaning the vents allows sufficient airflow for precise thermal control during a run.</p> |
| Outside case of the thermal cycler | <p>Use a damp cloth or tissue to clean spills off the outside case. If needed, use a mild soap solution and remove the residue completely.</p> <p>Tip: Cleaning the outside case prevents corrosion.</p> |
| Sample block | <p>Important: Clean spills immediately to prevent them from drying inside wells.</p> <p>Note: Always check the sample block for condensation and clean before beginning the next run.</p> <p>Use disposable plastic pipettes with water (recommended), 95% ethanol, or a 1:100 dilution of bleach in water. Always rinse the wells with water several times to remove all traces of ethanol, bleach, or soap.</p> <p>Note: Consider the following when cleaning the sample block:</p> <ul style="list-style-type: none"> ■ If left in the block wells, bleach, ethanol, or soap could corrode the block and/or destroy tubes and microplates during a run. Always rinse the block thoroughly after cleaning it with any solution other than water. ■ Never clean the sample block with strong alkaline solutions (strong soap, ammonia, or highly concentrated bleach). Never use corrosive or abrasive cleaning solutions. These cleaning agents can damage the block, preventing precise thermal control. ■ Never heat the block with cleaning solution on or in it. Heating the block with cleaning solution damages the block and lid. <p>If oil is used, the wells must be cleaned thoroughly and often. Use of oil in the wells is not recommended. Use a solution of 95% ethanol to clean oil on the sample block. Do not allow oil to build up in the block.</p> |

Manually Opening the Automated Lid

In the event of a power outage while a run is in progress, you can manually open the automated lid on the PTC Tempo 384-well, 96-well, and Deepwell thermal cyclers in order to retrieve the sample plate. After you manually open the lid, an active protocol run (including runs with an infinite hold or in a paused state) will stop when the power resumes.

Tip: You can stop the run manually from the Run In Progress screen, or power off the instrument using the power button on the back of the thermal cycler.

Note: Bio-Rad strongly recommends that whenever possible, you use the Open Lid and Close Lid buttons on the Home, Run Setup, and Run Status screens. Manually opening the lid can impact the usage of the instrument.



WARNING! Touching the lid heater can cause harm if not fully protected. Ensure that you wear protective gloves and refrain from contacting the lid heater.

To manually open the automated lid

1. Verify the thermal cycler is powered off.
If necessary, power off the instrument by pressing the power switch on the back of the instrument.
2. Locate a 3 mm hex screw driver.
3. Carefully insert the screw driver into the small hole on the right side of the automated lid, below the LED light.
4. While pressing down on the lid with medium force, turn the driver toward you until the lid unlatches.
Tip: You will feel the lid unlatch. Pressing down on the lid holds the lid from quickly opening.
5. Manually lift the lid to its fully open position.
6. Carefully remove the plate from the sample block.
7. (Optional) Power off the thermal cycler.

Returning the PTC Tempo Thermal Cycler to Bio-Rad

Important: Should you need to return your thermal cycler to Bio-Rad, your Bio-Rad Technical Support specialist will provide instructions and packaging material to prepare it for safe return. Before you return the thermal cycler, you must reinstall the shipping plate.

Important: Before you begin, ensure that you have completely exported all protocols and run reports to a USB drive.

To reinstall the shipping plate

1. Locate the shipping plate that you saved when you installed the thermal cycler.
2. Place the shipping plate onto the sample block and ensure that it is secure.

Note: If you are returning the PTC Tempo 48/48 thermal cycler, you will need to reinstall the shipping plates on both Block A and Block B.

3. Close the lid and ensure that it is completely latched.
4. Log out of the thermal cycler and then shut down the PTC Tempo thermal cycler.
5. Follow the instructions provided by Technical Support to complete the packaging.

Maintaining Sufficient Air Flow

The PTC Tempo thermal cycler requires sufficient air flow to heat and cool precisely to the correct target temperature. If the flow of air is blocked, the thermal cycler cannot ramp to the correct temperature in the specified time. This section explains how to test the air flow and how to fix low or warm air flow.

Testing for Sufficient Air Flow

The air flow is sufficient when the thermal cycler heats and cools to the correct target temperatures promptly. Bio-Rad suggests that you test the air flow when you set up the PTC Tempo thermal cycler in a new location. You can also measure the air temperature at any time to ensure sufficient air flow.

To determine the presence of sufficient air flow

1. Set up and start the thermal cycler.
2. Adjust the local environment for typical conditions:
 - Turn on any nearby equipment, such as fans or other thermal cyclers.
 - Open any window blinds to reproduce typical conditions during a run.
3. Run a typical PCR protocol for 30 min.

If more than one is in the area, run a protocol on all at the same time.

Note: Samples are not required for the test runs. However, you must include an empty microplate or tubes. The lid does not heat correctly if it touches the sample block.

4. Measure the air temperature at the air intake vents.

If the air intake temperature increases above 31°C, see [Fixing Insufficient Air Flow](#) that follows.

Fixing Insufficient Air Flow

If the air temperature near the thermal cycler is above 31°C, make one or more of the following changes to increase the flow of cooler air:

- Adjust air conditioning to lower the ambient air temperature.
- Move the thermal cycler to another location.
- Provide more space around the thermal cycler and between adjacent thermal cyclers. Arrange the thermal cyclers so that the warm exhaust air from one does not enter the air intake vents of another.
- Shield the thermal cycler from heat sources such as radiators, heat-producing instruments, and bright sunlight.

Replacing Fuses

Fuses on the PTC Tempo thermal cycler are designed to blow in case of severe power surges or other causes of electrical short. This protects both the user and the thermal cycler from excessive, potentially damaging electric currents. Fuses on the PTC Tempo thermal cycler rarely need to be replaced. However, some institutions prefer to replace fuses on a regular basis to maintain uninterrupted operation.

If the thermal cycler does not power up, first verify that the power cord is plugged in to a functioning power source. Also, verify that the power cord and power source are within the specifications for this thermal cycler.

Important: Do not attempt to replace the power cord on the PTC Tempo thermal cycler. Instead, contact Bio-Rad Technical Support.

Finally, verify that the fuses are intact. If the fuses are broken or burned, replace the fuses. This section explains how to view and replace fuses on the PTC Tempo thermal cycler.

Tip: The thermal cycler utilizes two 10 A, 250 V, 5 x 20 mm, fast blow fuses.



WARNING! To prevent electrical shock, always turn off and unplug the thermal cycler from the electrical outlet before checking the fuses.

To view and replace the fuses

1. Verify that you have powered off the instrument and unplugged the power cord from the back of the instrument.

Important: You must unplug the power cord from the instrument to open the fuse door. Trying to open the fuse door while the cord is plugged in could damage the door.

2. Using your fingertip, gently pull the black fuse door on the back of the thermal cycler out toward you.
3. Using a small flathead screw driver, gently pry out the red fuse holder until you can grasp it with your fingers.
4. When you can firmly grasp the fuse holder, pull it straight out of the instrument.
5. Using a fingertip, gently pry the fuse out of the fuse holder.
6. The fuse holder contains two fuses, one on each side. You must inspect both fuses.

A bad fuse displays a break or burned spot in the internal metal filament, or measures open with an Ohm meter. A good fuse has an internal metal filament or measures short (< 1 Ohm). If a fuse is bad or damaged, replace it with a new fuse of the same type and rating.

Note: Some fuses used in the PTC Tempo thermal cycler are made from ceramic and cannot be visually inspected. In this case, you must use an Ohm meter to determine whether the fuse is good. Alternatively, you can replace the fuse with a known good one without checking.

7. Assuming the prongs indicate the front of the fuse holder, insert the back end of a 10 A, 250 V, 5 x 20 mm, fast blow fuse into the middle bracket. Ensure the front end of the fuse faces the prongs.
8. With the flat red square on the fuse holder facing upward, insert the fuse holder into the instrument and firmly press it into position.
9. Close the fuse door, insert the power cord, and turn on the instrument.



Caution: If the PTC Tempo thermal cycler repeatedly blows one or more fuses, there could be an internal problem with the instrument. Contact Bio-Rad Technical Support for assistance in determining whether it is safe to replace the fuses again or if the instrument should be repaired.

Updating Software and Firmware on PTC Tempo Thermal Cyclers

Important: Only the Admin user can upgrade software and firmware on PTC Tempo thermal cyclers.

Bio-Rad alerts you to software and firmware updates that are available for the PTC Tempo thermal cycler through email. You access the updates from Bio-Rad's Firmware & Software Updates web site. The update file for PTC Tempo thermal cyclers can include operating system and software and firmware updates. All updates for the PTC Tempo thermal cycler are distributed in a single file.

Before updating, Bio-Rad recommends that you verify the current version installed on the PTC Tempo thermal cyclers. This section explains how to verify the installed version and how to upgrade the thermal cycler.

Note: Depending on the type of upgrade, this process can take several minutes to complete.

Verifying the Currently Installed Version

To verify the current version of the PTC Tempo thermal cycler software

1. On Home screen, log in as an Admin user and tap Tools to view the Tools screen.
2. Tap About and note the currently installed software version on the About screen.
3. Ensure the version you are upgrading to is newer than the version currently installed.
4. Tap Back and then tap Home to return to the Home screen.

Updating the PTC Tempo Thermal Cycler Software and Firmware

Note: Depending on the type of update, this process can take several minutes to complete.

Important: While the update is in progress, do not shut down the thermal cycler and do not remove the USB drive.

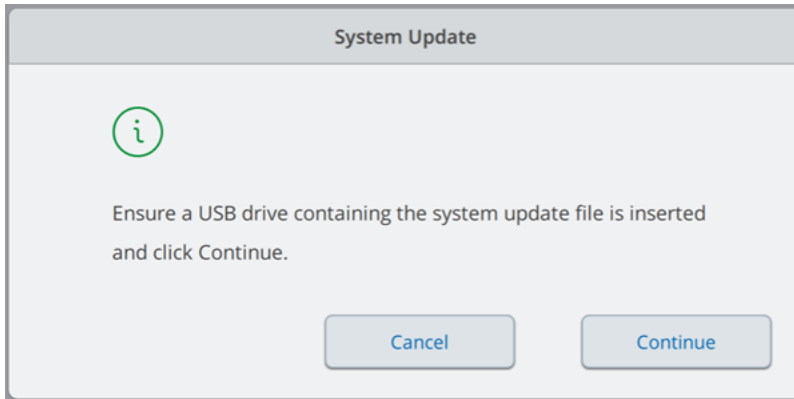
To update PTC Tempo thermal cycler software and firmware

1. From a computer that has access to the Internet, log into the Firmware & Software Updates page at bio-rad.com/pcrupdates and download the update file onto an attached USB drive.

Note: Copy the update file into the root directory of the empty USB drive. Supported file system formats include exFAT, FAT32, and NTFS.

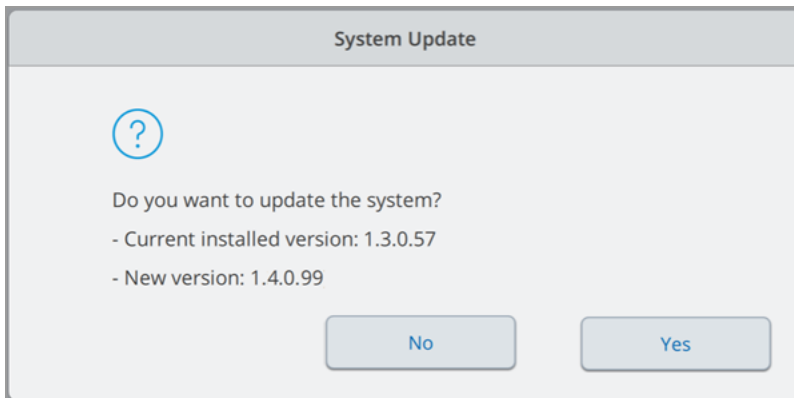
2. Insert the USB drive into a USB port on the PTC Tempo thermal cycler.
3. On the Home screen, log in as an Admin user and tap Tools to open the Admin tools screen.
4. On the Admin tools screen, tap System Update.

The System Update screen appears prompting you to confirm that a USB drive containing the update file is inserted.



5. Tap Continue.

The thermal cycler verifies that the update file is newer than the software version currently installed. When the update file is verified, you are prompted to confirm the update.



6. Do one of the following:

- To cancel the update, tap No.
- To update the system, tap Yes and follow the prompts.

Important: While the update is in progress, do not shut down the thermal cycler and do not remove the USB drive.

Notes:


- Determining the operating system version can take time.

- When the update completes, the system automatically restarts. If a Firmware update is required, the system restarts twice.

Shutting Down the PTC Tempo Thermal Cycler

Important: Follow these instructions to safely and completely shut down the PTC Tempo thermal cycler.

To shut down the PTC Tempo thermal cycler

1. Ensure that no protocol is running and the thermal cycler is no longer in use.
2. If you have not already done so, remove the samples from the block:
 - a. On the Home screen, tap Open Lid to access the samples.
 - b. Do one of the following:
 - For PTC Tempo 96, PTC Tempo 384, and PTC Tempo Deepwell thermal cyclers, tap Open Lid on the Home screen to access the samples.
 - For PTC Tempo 48/48 thermal cyclers, manually open the lid for the appropriate block to access the samples.
 - c. Remove the samples from the block and then close the lid.
3. On the Home screen, tap Logout to log out of the thermal cycler.
4. On the Login screen, tap Shut Down () and then tap Yes to power off the software.

Tip: The soft power button on the front of the instrument will illuminate blue. While the switch is illuminated blue, the instrument is in a stand-by state. Pressing the software power button while it is blue will start the PTC Tempo thermal cycler.
5. To completely shut down the thermal cycler, press the power switch on the back of the instrument to consume only 1W of power per the 1Watt initiative.

Troubleshooting PTC Tempo Thermal Cyclers

This section provides information about exporting system log information that can be used for troubleshooting purposes. It also lists potential problems and suggested solutions for the PTC Tempo thermal cycler.

Recovering Files

The PTC Tempo thermal cycler allows the Admin user to copy all protocol files and export all run reports to an attached USB drive. This section explains how to perform these tasks.

Note: Only an Admin user can export protocol files and run reports for all users.

Copying Protocol Files

To copy protocol files

1. Insert a USB drive into a USB port on the PTC Tempo thermal cycler.
2. Log in as an Admin user.
3. On the Home screen, tap Protocols to open the Protocol Browser screen.
4. In the left navigation pane, select the name of a user.
The protocols for that user appear in the middle pane.
5. For each protocol that you want to export:
 - a. Select the protocol in the middle pane.
 - b. In the right pane, select Options and then select Copy.
 - c. In the Copy Location dialog box, select the USB drive and click Copy.

The protocol file is saved to the attached USB drive as a .pcri file.

Note: You can only export one protocol file at a time. You must perform this procedure for each user on the thermal cycler, and for any protocol files saved to the Public folder.

After you copy the files, you can insert the USB drive into another Bio-Rad thermal cycler, open the USB drive and copy the files onto that thermal cycler.

Exporting Run Reports

To export run reports

1. Insert a USB drive into a USB port on the PTC Tempo thermal cycler.
2. Log in to the PTC Tempo thermal cycler.

3. On the Home screen, tap Run Reports to open the Run Reports screen.
4. On the Run Reports screen, do one of the following:
 - To export a single run report, select the report in the Run Reports list and tap Export.
 - To export all run reports, tap Export All.

The run reports are saved as separate .pdf files to the folder PTC Tempo Run Reports on the attached USB drive.

Viewing and Exporting Log Files

PTC Tempo thermal cyclers log files contain information that is helpful in troubleshooting problems with the thermal cycler. Bio-Rad Technical Support might ask you to provide these files so that they can better assist you in resolving problems. You can export the log files to an attached USB drive.

The PTC Tempo thermal cycler retains all log data until it is cleared. Only an Admin user can clear the log file.

To view and export log files

1. If you have not yet done so, insert a USB drive into a USB port on the instrument.
2. On the Home screen, tap Tools to open the Tools screen.
3. On the Tools screen, tap System Logs.

The System Logs screen appears.

| Date and Time ▼ | Log Type | Description |
|---------------------|----------|---|
| 2022-06-07 16:39:22 | Info | Logged in user: Theresa |
| 2022-06-07 16:39:16 | Info | Logged out user: CarlN |
| 2022-06-07 16:39:04 | Info | Logged in user: CarlN |
| 2022-06-07 16:39:00 | Info | Logged out user: Theresa |
| 2022-06-07 10:23:36 | Info | Logged in user: Theresa |
| 2022-06-07 10:23:24 | Info | System has started. The Software Version: 0.9.0.942 DEV GC-e78cf589 |
| 2022-06-07 09:09:50 | Info | System has started. The Software Version: 0.9.0.942 DEV GC-e78cf589 |
| 2022-06-06 17:14:37 | Info | Role was changed for user Theresa from User to Administrator. |
| 2022-06-06 17:14:29 | Info | Logged in user: Admin |
| 2022-06-06 17:14:27 | Info | Logged out user: Theresa |
| 2022-06-06 17:02:11 | Info | Logged in user: Theresa |
| 2022-06-06 17:02:05 | Info | Logged out user: Admin |
| 2022-06-06 17:01:59 | Info | Role was changed for user Theresa from Administrator to User. |
| 2022-06-06 17:01:49 | Info | Logged in user: Admin |

4. Tap Export Logs to export the system logs. The PTC Tempo thermal cycler creates a .zip file labeled <instrument- name>_<date-and-time-of-export.zip> on the attached USB drive and exports the following files as .txt files:

- CyclersFirmwareLog
- DebugLog(s)
- JournalCtlLog
- LidFirmwareLog
- SystemInformationLog
- SystemLog

5. Click Back and then the Home button to return to the Home screen.

To view the log information, remove the USB drive from the PTC Tempo thermal cycler, insert it into a USB port on an available computer, and open the log files in a text editing or word processing program.

Troubleshooting Issues

| Error | Possible causes | Troubleshooting steps |
|---|--------------------|---|
| Unable to use USB drives | Power loss | Turn the PTC Tempo thermal cycler off and then on. |
| Unable to connect to BR.io after a run completes, before the run report is uploaded to your BR.io account | Communication loss | Copy the run report to an attached USB drive or to a shared network folder and import into BR.io. |
| Unable to reconnect to a shared network folder after Wi-Fi connection disruption | Communication loss | Restart PTC Tempo thermal cycler and then reconnect to the shared network folder. |

Appendix E Free and Open-Source Notices for PTC Tempo Thermal Cycler Products

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To view the OPEN LICENSE text

- ▶ On the PTC Tempo Thermal Cycler, navigate to Tools > About and tap Legal Notices on the System tile.

Downloading the Open Sources Software

To download the open source software

- ▶ In a web browser, navigate to bio-rad.com/PTCTempo-opensource

Appendix F References

1. Breslauer KJ et al. (1986). Predicting DNA duplex stability from the base sequence. *Proc Natl Acad Sci USA* 83, 3,746–3,750.
2. Sugimoto N et al. (1996). Improved thermodynamic parameters and helix initiation factor to predict stability of DNA duplexes. *Nucleic Acids Res* 24, 4,501–4,505.

Appendix F References



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