USER MANUAL

Biomeme

FRANKLIN™ REAL-TIME PCR THERMOCYCLER

Last Updated: 8/8/2025

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2. INTRODUCTION

The Biomeme Franklin™ transforms your smartphone into a thermocycler for real-time PCR or isothermal analysis with sample-to-result in 30-60 minutes, depending on the test protocol. The Franklin thermocycler enables multiplex real-time detection of up to 27 targets from 1 sample or test 9 samples for up to 3 targets each.

Just under 3 pounds, hand-held, and battery-operated for maximum portability enabling a full day's work out in the field on a single charge.

3. TECHNICAL SPECIFICATIONS

SPECIFICATION	VALUE
Sample Capacity	9 Wells
Reaction Volume per Well	20µL
Total Channels	3
Franklin™ one9 Fluorophore*	FAM / SYBR (Green)
Franklin™ three9 Fluorophores	FAM / SYBR (Green), TexasRedX (Amber), ATTO647N (Red)
System Control & Data Transfer	Wireless (BLE)/Wired (Micro USB)
Integrated Barcode Scanner	Yes (via App)
Max Samples per Run	9
Max PCR Targets per Run	27
Weight	1.20 kg / 2.65 lb.
Operating Ambient Temperature	4 - 40°C / 39 - 104°F
Operating Humidity Limit	0 - 99%
Operating Altitude Limit	3,048 m / 10,000 ft
Wall Power (VAC)	100 - 240V
Voltage	19V
Full Load Current	3.3A
Internal Battery	Approximately 5 hours
Quantitative	Yes
IP Rating	IP30
Pollution Degree	2
Degree of Ingress Protection	Keep 5 cm clearance around the thermocycler for proper performance

***NOTE:** The Franklin™ one9 is available in a limited capacity and can only be purchased upon special request.

4. THERMOCYCLER BUTTON LAYOUT

There are 4 buttons located on the top of the Franklin™ thermocycler:

5. LED STATUS INDICATORS

The Franklin™ has 5 LEDs on the front of the unit. The LEDs are used to convey various states of the thermocycler, as outlined in the table below.

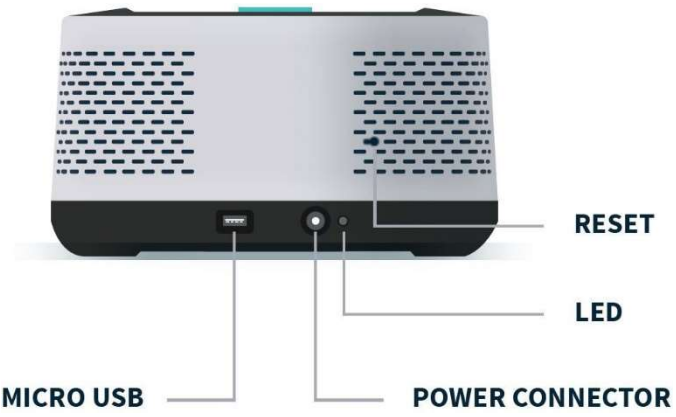
Color	Interpretation
WHITE	5 solid indicates the thermocycler is on 5 blinking indicates Bluetooth (BLE) is pairing
GREEN	2 solid indicates remaining battery is between 21 and 40% 3 solid indicates remaining battery is between 41 and 60% 4 solid indicates remaining battery is between 61 and 80% 5 solid indicates remaining battery is between 81 and 100% 1 blinking indicates charging
YELLOW	1 solid indicates run start to 9% complete 2 solid indicates run is between 10 and 31% complete 3 solid indicates run is between 32 and 53% complete 4 solid indicates run is between 54 and 75% complete 5 solid indicates run is between 76 and 99% complete
RED	1 solid indicates remaining battery is between 0 and 20% 5 blinking indicates the thermocycler lid is open or an error
BLUE	5 blinking indicates the test is complete, and data is ready to be transferred to a smartphone

6. TURNING THE THERMOCYCLER ON AND OFF

To power on the thermocycler, press and hold the power button (located on the top of the unit) for roughly half a second. The status LED on the front of the thermocycler will illuminate white to indicate it has successfully turned on.

To turn the unit off, press and hold the power button for 1.5 seconds and the status LED will turn off upon release of the button. The unit will turn off after 15 minutes of inactivity.

7. CHARGING & CHECKING BATTERY STATUS



Note: *To preserve the smartphone's battery life, disconnect from the thermocycler when it's not in use.*

If the battery is running low, plug the AC power adapter into an outlet and insert the power connector into the back of the thermocycler. The LED on the back of the thermocycler will illuminate blue.

If unable to turn your thermocycler off using the power button on top, you may press the reset button to force it off (all test data on the unit will be lost).

Lastly, when the battery button is held, the LED on the front of the thermocycler indicates the battery charge status as follows:

	LED Status	Battery Percentage
5 solid	GREEN	81 - 100%
4 solid	GREEN	61 - 80%
3 solid	GREEN	41 - 60%
2 solid	GREEN	21 - 40%
1 solid	RED	0 - 20%

A single green LED will blink while charging.

If the battery charge is between 0 and 20%, the bottom-most LED will blink green while charging. If the battery charge is greater than 20%, the topmost LED will blink green while charging.

A test cannot be initiated until the battery is charged at least to 30%.

For proper battery maintenance and performance, please fully charge the thermocycler at least once every three months. The thermocycler should not be left without charging for extended periods of time. If the device has not been charged in more than three months and the thermocycler will not turn on, please contact support@biomeme.com.

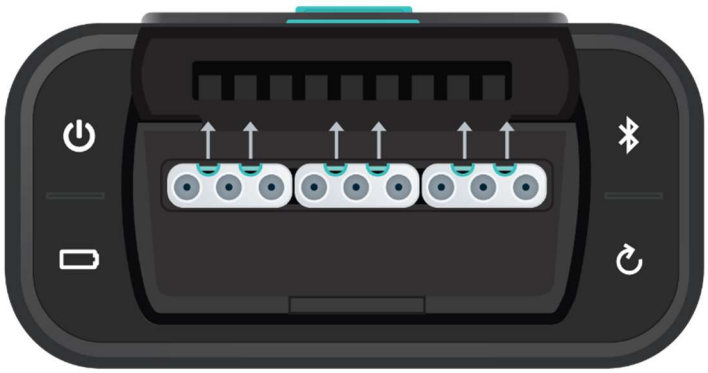
8. ENABLING & DISABLING BLUETOOTH (BLE)

Bluetooth can be turned on or off at any time by pressing and holding the Bluetooth button on the top of the thermocycler for roughly half a second. By default, Bluetooth is disabled. A blue LED will light up next to the BLE button indicating it is enabled.

Once enabled, tap Connect via BLE when prompted in the smartphone app. If working with multiple Franklin™ thermocyclers, select the appropriate unit and tap Confirm. The LED on the front of the thermocycler will flash white indicating it is connected.

9. PLACING GO-STRIPS INTO THERMOCYCLER

1. Open the lid of the thermocycler by sliding the latch on top of the unit.
2. Place the Go-Strip, with the void-filling cap inserted, into a 3-well slot, starting from the left and continuing toward the right. The void-filling cap will feel slightly loose. When the lid of the thermocycler is closed, it will secure the caps into place, sealing the PCR reaction.
3. It is important to make sure the Go-Strip is oriented correctly when placing it into the thermocycler. Make sure the strip connections that are visible through the void filling cap cutouts are facing the back of the thermocycler as shown in the illustration below, then close the lid.



4. Navigate to the Biomeme Go mobile application on your smartphone to begin the testing protocol.
5. For further instructional information, please contact support@biomeme.com.

NOTE: Transport your Franklin™ thermocycler in its carrying case. Additionally, moving your thermocycler while thermocycling could result in errors. We highly recommend not moving or opening the device while thermocycling to avoid losing your PCR run. After your run has completed, be careful when removing your Go-Strips and void filling caps to avoid liquid splatter.

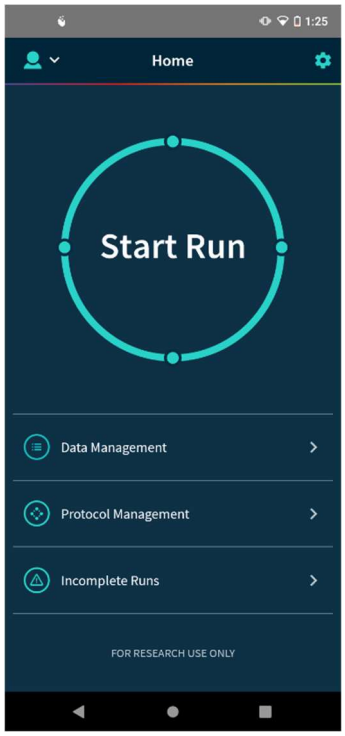
10. DATA RECOVERY

This function allows for the most recently completed test data to be recovered. This function is used when the Franklin connection to the Biomeme Go App was lost during the test. After starting the test, the Franklin will run the test to completion, regardless of connection to the Biomeme Go App. The Biomeme Go App has a step-by-step workflow for recovery of data.

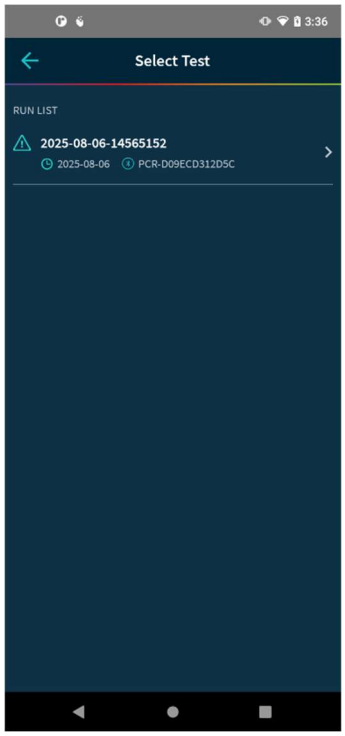
NOTE: Incomplete runs must be recovered before starting a new run, or the data will be lost.

1. Open or launch the Biomeme Go App on the smartphone.

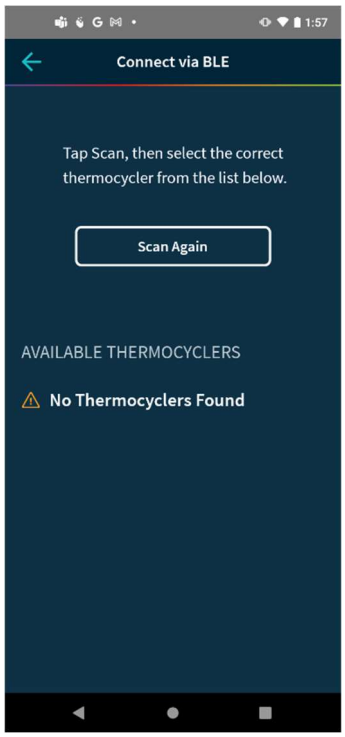
2. Click the “Incomplete Runs” bar on the Biomeme Go App home screen.



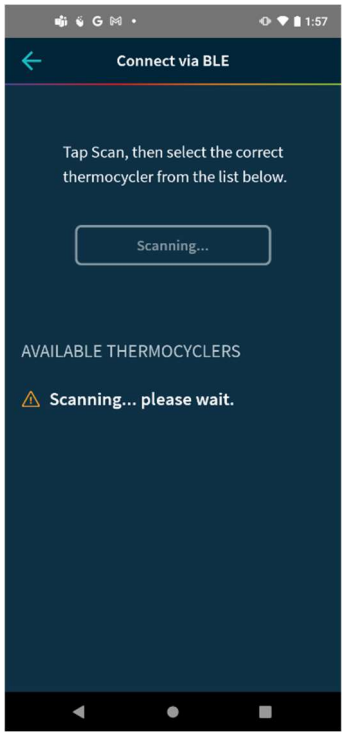
3. Click on the run that needs to be recovered. Please note that if another run was performed before the run was recovered, the run will now be unrecoverable.



4. The Biomeme Go App will prompt the user to connect to the Franklin Turn on the Franklin and follow the steps for BLE connection, or for USB/serial connection. If connecting via USB/serial, the app may prompt user to allow Biomeme Go to access the device.



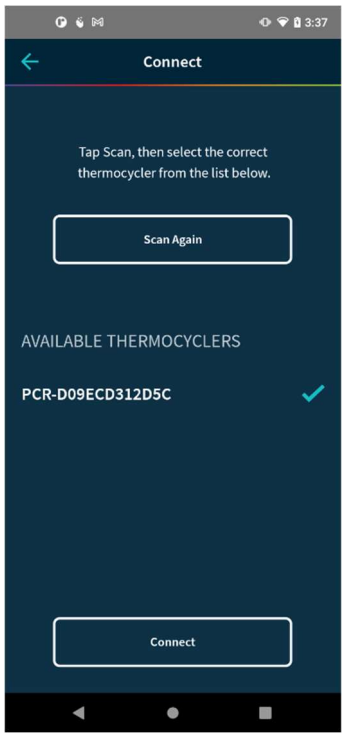
5. If the Franklin does not show up in the Available Thermocyclers list, press “Scan Again”.



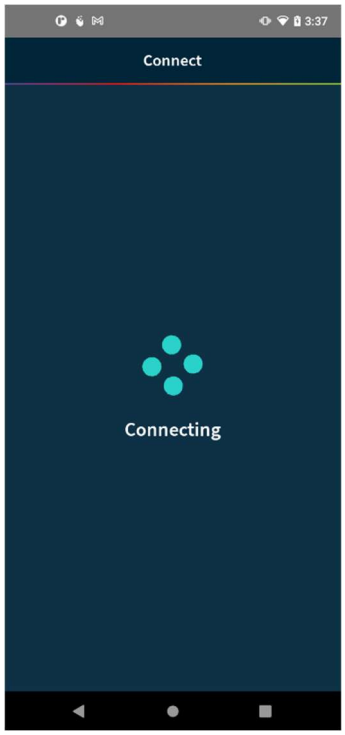
6. Once the Thermocycler appears in the list, click on it such that there is a blue “checkmark” next to it.

   On the Franklin device, press the “Recovery” button.

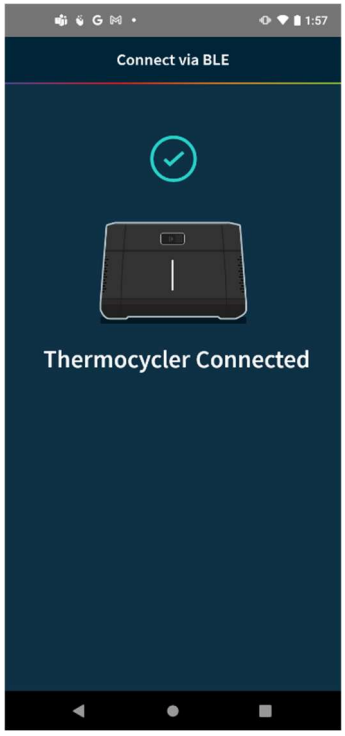
   Select “Connect”.



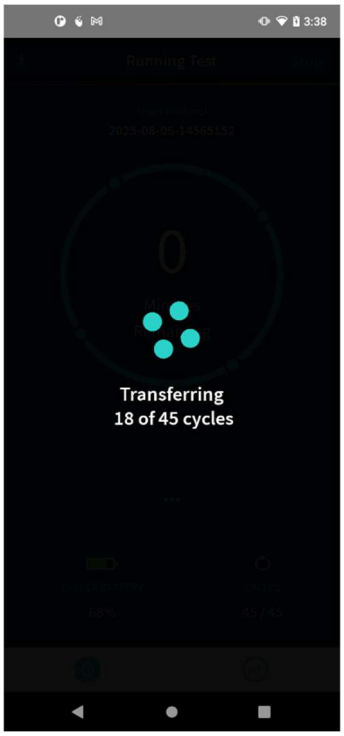
7. The flash screen to the right will display as the Franklin and smartphone are pairing.



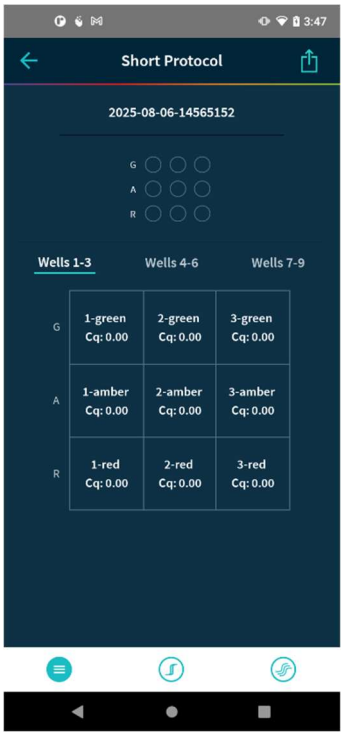
8. The smartphone will show the Thermocycler Connected screen after pairing. The Biomeme Go App will automatically continue to run recovery.



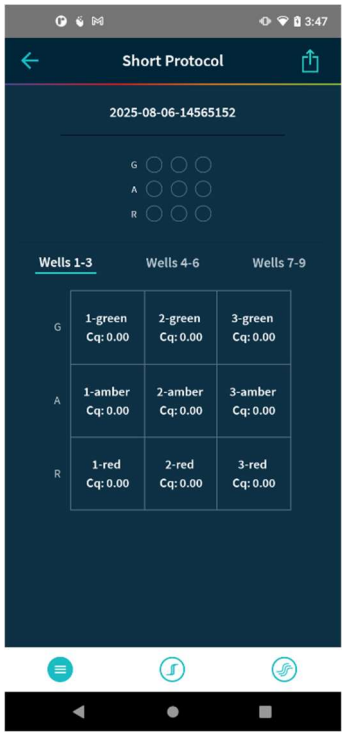
9. A flash screen showing the data upload will appear. Do not turn off the Franklin or phone until all cycles have transferred.



10. Once run recovery is complete, the results screen will appear. Analyze results as applicable.



11. The recovered run will now be in the “View Results” section of the Biomeme Go app.



11. CALIBRATION

The Franklin thermocycler does not require calibration or servicing in the defined operational life of the instrument. The Franklin thermocycler does not have user serviceable parts. Do not attempt to open or service the thermocycler under any circumstance. If the thermocycler ceases to operate, contact Biomeme Customer Success.

12. OPERATIONAL PRECAUTIONS

12.1. GENERAL SAFETY PRECAUTIONS

- The Franklin thermocycler and its equipment should only be operated, maintained, and stored as directed in this document. Do not add or place anything into the wells or ports where the Go-Strips are placed.
- Do not modify the Franklin thermocycler hardware. The Franklin thermocycler has no user-serviceable parts.
- Do not place the Franklin thermocycler near liquid filled containers or areas where the Franklin thermocycler and its equipment may be subjected to dripping or splashing liquids.
- Avoid touching internal parts. This could lead to damage of the instrument or harm to the user.

- Do not use if any part of the Franklin thermocycler is visibly damaged.
- Transport the Franklin thermocycler in the provided pelican carrying case.
- When plugging the Franklin thermocycler in for serial use with the Biomeme Go App, ensure the USB adapter is in the proper orientation when plugged into the Franklin thermocycler to prevent damage to the micro-USB port.
- Do not drop the Franklin thermocycler, as it could damage the unit.

12.2. BIOSAFETY PRECAUTIONS

- Use specimen appropriate personal protective equipment when using the Franklin thermocycler.
- Follow local and site-specific laboratory safety protocols when operating this Franklin thermocycler.
- Dispose of all potentially contaminated materials in the appropriate biohazard receptacle (Sharps, Biohazard Bin, etc.). Do not reuse disposable supplies such as, Biomeme Go-Strips, or anything used in the collection or preparation of the specimen.

13. LIMITATIONS

- Ensure the Franklin thermocycler is on a stable, flat, level surface, ±15°, prior to operation.
- Do not tilt, open, or move the Franklin thermocycler during operation; doing so may alter the results of the assay.
- Use only non-powdered disposable gloves when operating or handling the Franklin thermocycler.
- All assays provided by Biomeme are fixed-parameter assays and cannot be modified by the user.
- Do not use any decontamination or cleaning agents that are not recommended by Biomeme. Use of such agents may result in damage to the Franklin thermocycler.
- Prior to use, verify that all reagents and consumables are within expiry and are not damaged.
- Do not store the Franklin thermocycler ISP in the pelican case while running a test.
- Only use the cord and adapter provided with the ISP and plug the Franklin thermocycler directly into the outlet. Do not plug the Franklin thermocycler into an extension cord or power strip.
- Do not unplug external power source while a test is being conducted.

14. HAZARDS

To reduce the risk of electrical shock:

- Unplug the Franklin thermocycler before cleaning
- Only plug the Franklin thermocycler into an approved receptacle
- Do not immerse in water or cleaning solutions
- Do not attempt to open the enclosure
- Avoid touching internal parts of the Franklin thermocycler as some surfaces may be hot and could lead to burn injuries.

- Ensure all appendages are clear from pinch area while closing lid to prevent minor trauma.
- Do not handle the instrument or cords with wet hands, this may lead to electrical shock.

15. INSTRUMENT SERVICE AND MAINTENANCE

The Franklin thermocycler has no user serviceable parts. If servicing or replacement is required, please contact Biomeme Customer Success.

For proper battery maintenance and performance, please fully charge the thermocycler battery at least once every three months. The thermocycler should not be left without charging for extended periods of time. If the thermocycler has not been charged in more than three months and will not power on, please contact Biomeme Customer Success.

The exterior of Franklin thermocycler can be cleaned using 70% isopropyl alcohol (IPA). Disconnect the Franklin thermocycler from any cables before cleaning. Wearing PPE, apply the IPA to a towelette. Wipe the exterior using the towelette, taking care to keep the lid closed.

CAUTION: Do not spray or pour solution directly onto the Franklin thermocycler. Do not allow the cleaning solution to contact any internal surface. Do not use bleach.

When cleaning the interior of the thermocycler, use a dust-free swab. Do not attempt to clean the wells within the heater block.

- Do not disassemble the thermocycler for cleaning.
- Do not immerse in water or cleaning solutions.
- Do not clean with soap or other solutions.
- Avoid cleaning the heating wells (silver colored area inside the Franklin thermocycler).

16. SOFTWARE UPDATES

In the event there is a software update available, a Biomeme Customer Success representative will contact customer directly with instructions on updating the app. Software updates will require internet access to download the update.

17. SYMBOLS GLOSSARY

SYMBOL	DESCRIPTION
	Caution. User should consult the products associated labeling for warnings and precautions that cannot be presented on the device itself.
	Keep Dry
	Electrical and Electronic Equipment waste. Discard products at separate collection facilities for recovery and recycling.
	User may need to consult the instructions for use.
	Corrosive or irritant effect on skin or severe eye irritation.
	Health Hazard
	Highly flammable liquid and vapor.
	Acute Toxicity

18. CONTACT

Customer Success

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19. LEGAL

The customer is responsible for compliance with regulatory requirements that pertain to their procedures and uses of the instrument. The information in this guide is subject to change without notice.

For Research Use Only. Not for human or veterinary diagnostics.

20. REVISION HISTORY

Version	Revision Date	Description of Revision(s)
01	August 8th, 2025	Transfer to eQMS. Updated formatting to reflect Biomeme branding. Updated battery charging interval from every 6 months to every 3 months. Updated Data Recovery (Section 10) steps to include screenshots and clarified instructions.