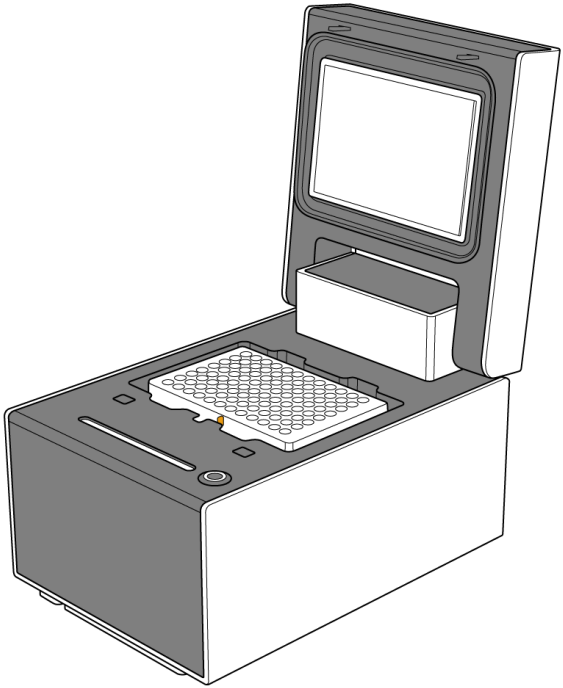
opentrons

Opentrons GEN1 Thermocycler



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Product and Manufacturer Description

PRODUCT DESCRIPTION

The Opentrons GEN1 Thermocycler module is an easy-to-use on-deck module that enables automation of upstream and downstream workflow steps. It is a fully automated thermocycler. This guide will help you learn how to get the best use of it.

MANUFACTURER DESCRIPTION

Opentrons Labworks Inc
20 Jay Street, #528
Brooklyn, New York
NY 11201

Safety Information and Regulatory Compliance

The Opentrons GEN1 Thermocycler heats and cools very quickly during operation. We strongly recommend that you follow the safety specifications listed in this section and throughout this manual.

SAFE USE SPECIFICATIONS

Please refer to these specifications and compliance guidelines to ensure safe usage of The Opentrons Thermocycler. Figure 1 illustrates safe use specifications for all input and output connections for the module and its power supply, including electrical input and PC connection, including the sticker bearing this information on the module:

- Do NOT replace cord unless at the direction of Opentrons customer support
- AC IEC power connection to power supply
- DC power connection to thermocycler: 36 Volts DC
- USB (with USB Symbol)
- The following copy is shown on the instrument sticker:
  - Name: Thermocyler
  - Model: GEN1
  - DC Input: 36V
  - Max: Power: 36 VDC 17.50
- Rated conditions for all input/output connections (e.g. voltage, current)

POWER SUPPLY (AC)	THERMOCYCLER (DC)
a. Max Power (W) 630 Watts b. Max Power (VA) 100-240VAC C. 8.5	a. Max Power (W) 630 Watts b. Max Power (VA) 36 VDC c. Max Current 17.5A

SAFETY WARNING LABELS

Warning labels posted on the Opentrons Thermocycler and in this manual warn you about sources of potential injury or harm. A key for each safety warning label is referenced in Table 1.

NOTE: French safety warnings are listed in the back of the manual. (**REMARQUE:** Les avertissements de sécurité en français se trouvent à la fin du manuel.)

Table 1. Instrument safety warning labels

ICON	MEANING
	**CAUTION:** Risk of danger! This symbol identifies instrument components that pose a risk of personal injury or instrument damage if improperly handled. Wherever this symbol appears, please consult the manual for further information on safe handling before proceeding.
	**CAUTION**: Risk of electrical shock! This symbol identifies instrument components that pose a risk of electrical shock if handled improperly.
	**CAUTION:** Hot surface! This symbol identifies instrument components that pose a risk of personal injury due to excessively high heat temperature if handled improperly.
	**CAUTION:** Pinch Point! This symbol identifies instrument components (namely, the automated lid) which can pose risk of personal injury due to its closing mechanism. Please do not reach near the lid when it is in operation.

Warning labels posted on the Opentrons Thermocycler refer directly to the safe use of the instrument, as explained in Table 2.

NOTE: French safety warnings are listed in the back of the manual. (**REMARQUE:** Les avertissements de sécurité en français se trouvent à la fin du manuel.)

Table 2. Instrument safety warning labels

ICON	MEANING
	**Warning about risk of harm to body or equipment.** Operating the Opentrons Thermocycler before reading this manual poses a risk of personal injury or instrument damage. Only qualified laboratory personnel should operate this instrument.

Table 2 Continued: Instrument safety warning labels

ICON	MEANING
	**Warning about risk of harm to body or equipment from electrical shock.** Do not attempt to repair or remove the outer case of the Opentrons Thermocycler or its power supply unless directed by Opentrons' support team. Failure to do so puts you at risk of electrical shock.
	**Warning about risk of harm to body or equipment.** The Opentrons Thermocycler generates enough heat to cause serious burns. Wear safety goggles or other eye protection at all times during operation. Always ensure the sample block returns to idle temperature before opening the lid and removing samples. Always allow maximum clearance to avoid accidental burns. Unplug the unit after use, if possible.
	**Warning about risk of explosion.** The Opentrons Thermocycler sample blocks can become hot enough during the course of normal operation to cause liquids to boil and explode.

SAFETY AND REGULATORY COMPLIANCE

This instrument has been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards (explained in Table 3).

Table 3. Safe use specifications

USAGE ASPECT	CONDITIONS FOR SAFE USER
Rated input power	(VA) 100-240VAC 8.5-5A 36 VDC 17.5A
Over-voltage category	Category II
Environment	Indoor use only
Ambient Temperature	20-24°C
Relative humidity	Up to 80%
Altitude	Up to 2,000 meters above sea level

SAFETY COMPLIANCE

This instrument has been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards:

- IEC 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 1: General requirements
- IEC 61010-2-010:2003 Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 2-010: Particular requirements for laboratory equipment for the heating of material
- CAN/CSA-C22.2 NO. 61010-1-04 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements
- CAN/CSA-C22.2 NO. 61010-2-010-04 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 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 1: General requirements
- EN 61010-2-010:2003 Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 2-010: Particular requirements for laboratory equipment for the heating of material
- UL 61010-1:2004(R2008) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use -Part 1: General Requirements

- UL 61010A-2-010:2002 Standard for Electrical Equipment for Laboratory Use; Part 2: Particular Requirements for Laboratory Equipment for the Heating of Material

ELECTROMAGNETIC COMPATIBILITY (EMC)

- IEC61326-1:2005 Electrical Equipment for measurement, control, and laboratory use -EMC Requirements, Class A
- EN61326-1:2006 Electrical Equipment for measurement, control, and laboratory use -EMC Requirements, Class A
- FCC Part 15, Subpart B, Sections 15.107 and 15.109 as a Class A digital device.

FCC WARNINGS AND NOTES

WARNING! Changes or modifications to this unit not expressly approved by Opentrons Labworks Inc, 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 his 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 Canadian EMC compliance:** Le present appareil numerique n'emet pas de bruits radioelectrique depassant les limites applicables aux appareils numeriques de class A prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministere des Communications du Canada.

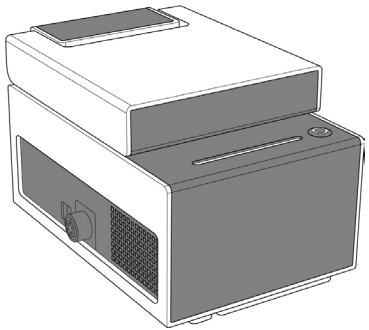
CISPR 11 CLASS A

- **WARNING:** Class A equipment is intended for use in an industrial environment. In the documentation for the user, a statement shall be included drawing to the fact that there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

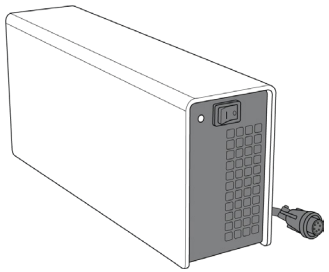
Product Description

Model Number: GEN1

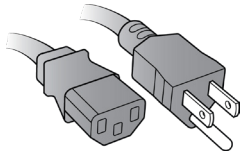
Diagram of included parts:



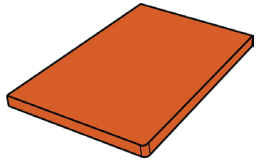
1x Thermocycler



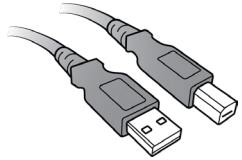
1x Power supply and power supply connector
(Connects the Thermocycler to the power supply bar)



1x Power cable
(Connects the power supply bar to a wall socket)



5x Automation seals
(Please sterilize before use)

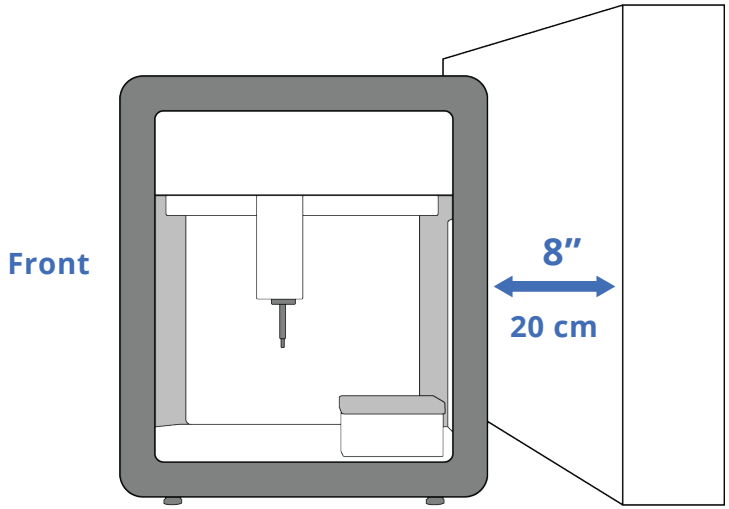


1x USB 2.0 cable
(Connects the Thermocyler to the OT-2)

Setup and Maintenance

VENTILATION REQUIREMENTS (E.G. FREE SPACE FOR FAN OUTPUT)

- 20 cm / 8 inches between the unit and a wall



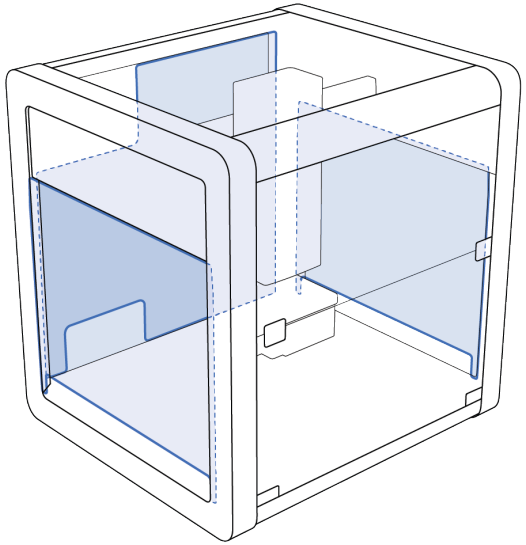
SETUP STEPS

1. **Setup Thermocycler Compatible Panels**
2. **Powering Up and Deck Placement**
3. **Silicone Automation Seals**
4. **Sterilizing Seals**
5. **Latching Plates**

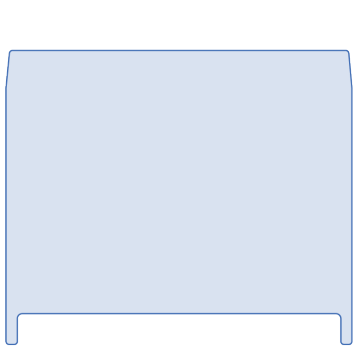
1 Thermocycler Compatible Panels

To help enable adequate ventilation for the Opentrons Thermocycler, and to provide enough space for the power/USB cords to connect to the module - we advise that your OT-2 robot includes the ventilation panels shown below.

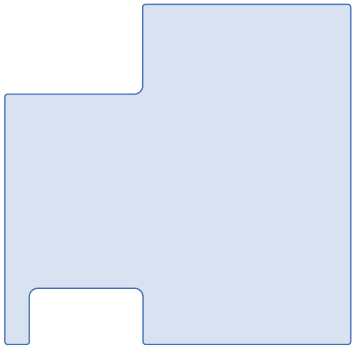
NOTE: this step is only required for older models of the OT-2.
If your robot already has the cutout in the bottom left of the back panel, skip ahead to Step 2.



OT-2 Panel Diagram



2x Side Panels



1x Rear Panel

To add new panels to your OT-2:

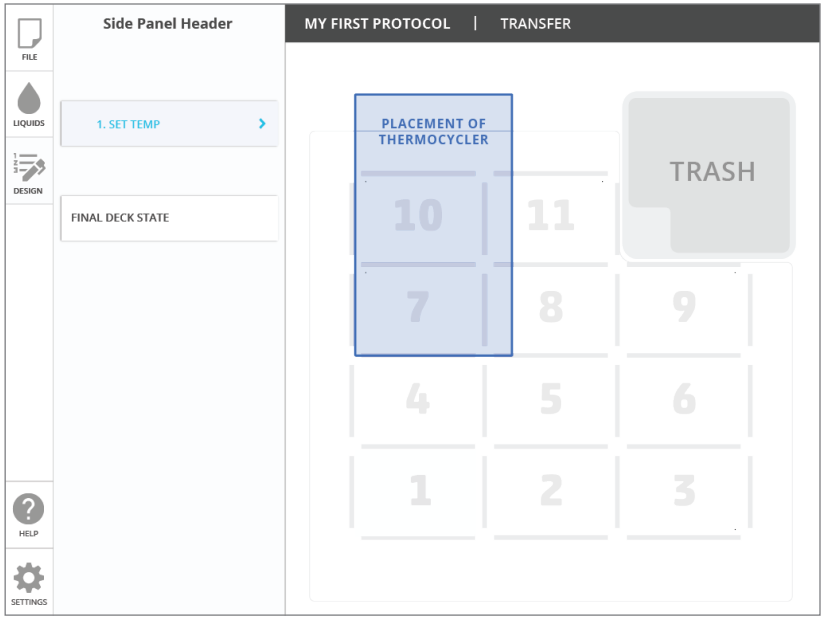
- Take off the existing left, rear and right acrylic panels with a 2.5mm hex screwdriver
  - One was included with your OT-2, but any 2.5mm hex screwdriver will do
- Screw in the new polycarbonate panels

We will check if your model needs the new panels when you order a thermocycler.

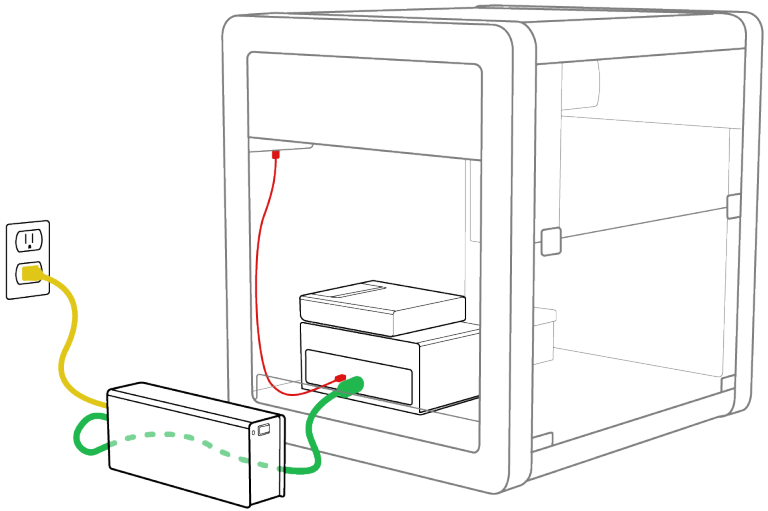
To clean the new panels, use 70% ethanol.

2 Powering Up and Deck Placement

1. Carefully place the Opentrons Thermocycler in deck slots 7, 8, 10 and 11. Please lift carefully, using two hands (the unit is 7.6 kg, which is quite heavy for its size).

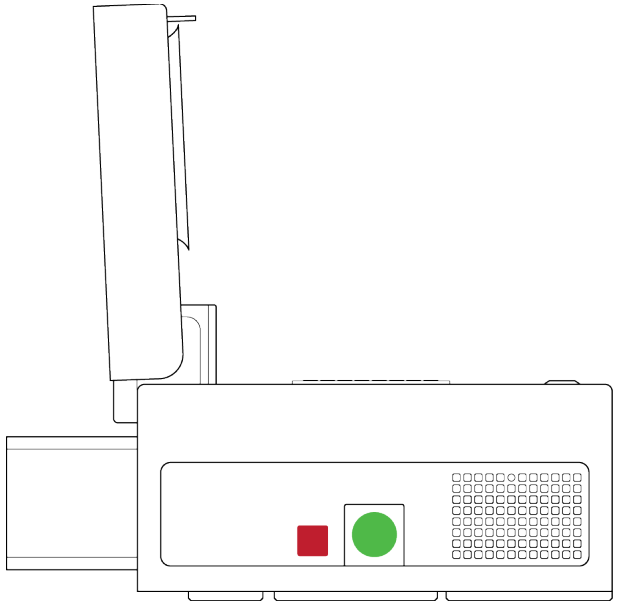


2. Connect the Opentrons Thermocycler to the power supply and OT-2 by plugging in the USB cord and screwing the power cord into the unit as shown in the diagram. Be sure to weave the cords through the opening in the polycarbonate panel.



- Connect **USB 2.0 Cable** to Raspberry Pi (like other modules)
- **Power Supply Connector** plugs into Thermocycler then then needs to be screwed on for safety
- **Power Cable** plugs into back of Power Supply and to the wall outlet

Rear Side of Power Supply



Left side of thermocycler

3. Once everything is connected, turn on the OT-2 and the Opentrons Thermocycler power supply. If you see a white light on the Opentrons Thermocycler, it is powered on. You may open and close the lid of the Opentrons Thermocycler by pressing the round button on the front.

Operational Requirements

The Opentrons Thermocycler requires the latest version of the Opentrons App and OT-2 operating system which can be found here:

› opentrons.com/ot-app

Connectivity and Usage instructions

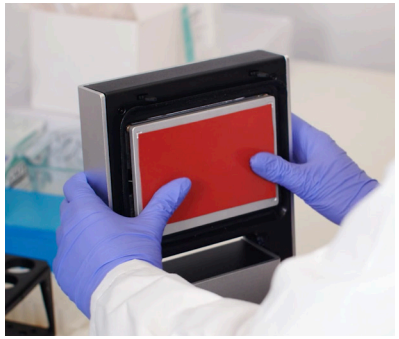
Full connectivity, usage, and labware compatibility instructions for using the Opentrons Thermocycler with the OT-2 can be found here:

› opentrons.com/support/thermocycler

3 Silicone Automation Seals

Your Opentrons Thermocycler arrives with 5 silicone automation seals. Similar to a traditional seal, these silicone seals help reduce evaporation. Apply a seal to the lid of the instrument, NOT directly to the plate, to enable pipetting access. Each seal can be used for approximately 20 thermocycler runs.

NOTE: You MUST sterilize seals before use in order to ensure sterility.



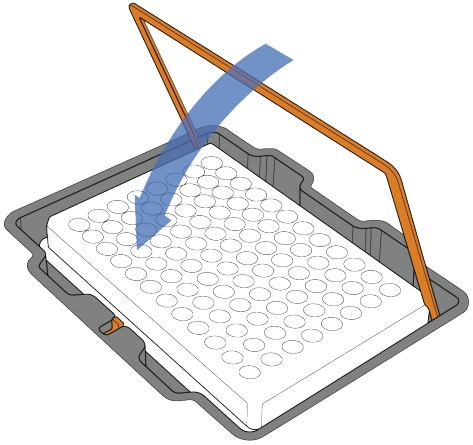
4 Sterilizing Seals

NOTE: Seals must be sterilized before your first thermocycler run.
Apply the seal to the lid. Wipe it with a 1:10 dilution of bleach. Let it dry. Wipe it down with molecular biology grade water. Let it dry.

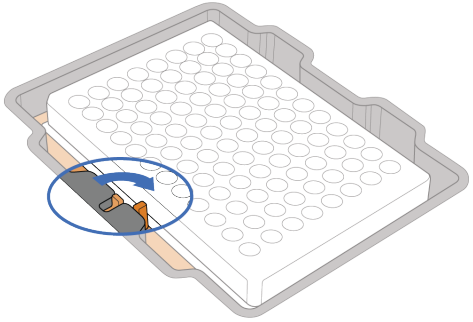
5 Latching Plates

To accommodate a tight seal when opening and closing the instrument lid, you must latch it. Please follow this diagram.

Step 1



Step 2



LABWARE COMPATIBILITY

The Opentrons Thermocycler is compatible with full-skirted 96 well PCR plates. We recommend you use the NEST 0.1 mL 96-Well PCR Plate, Full Skirt, which you can purchase at shop.opentrons.com.

Cleaning & decontamination

For instructions on cleaning and care, go to:

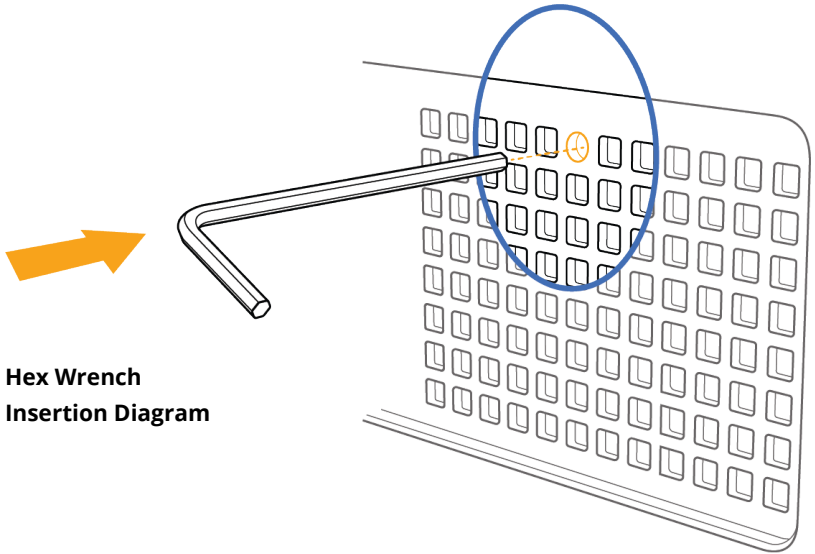
› opentrons.com/support/cleaning

WARRANTY

While we try our best to ensure you get a quality product, we understand that things can go wrong from time to time. If that happens, we will make it right. For more information visit opentrons.com/support.

Emergency Open Lid

In case of a power outage, connectivity issue, or other electrical failure, the thermocycler lid may not open. If you need to manually open it to retrieve your samples, please: turn the unit off, unplug it, insert the hex wrench into the circular slot next to the cable as shown in the diagram below, push the wrench in an inch / 25 mm, and lift the lid.



Hex Wrench Insertion Diagram

ÉTIQUETTES D'AVERTISSEMENT DE SÉCURITÉ

Les étiquettes d'avertissement affichées sur le Thermocycler Opentrons et dans ce manuel vous avertissent des sources potentielles de blessures ou de dommages. Une clé pour chaque étiquette d'avertissement de sécurité est référencée dans le Tableau 1.

Tableau 1. Étiquettes d'avertissement de sécurité des instruments.

ICÔNE	SENS
	**ATTENTION:** Risque de danger! Ce symbole identifie les composants de l'instrument qui présentent un risque de blessure ou de dommage pour l'instrument s'ils ne sont pas manipulés correctement. Où que ce symbole apparaisse, veuillez consulter le manuel pour plus d'informations sur la sécurité du traitement avant de continuer.
	**ATTENTION:** Risque d'électrocution! Ce symbole identifie les composants de l'instrument présentant un risque de choc électrique en cas de manipulation incorrecte.
	**ATTENTION:** Surface chaude! Ce symbole identifie les composants de l'instrument présentant un risque de blessure corporelle en raison d'une température de chauffage excessivement élevée s'ils sont manipulés de manière incorrecte.
	**ATTENTION:** Pincer! Ce symbole identifie les composants de l'instrument (à savoir le couvercle automatisé) qui peuvent présenter un risque de blessure en raison de son mécanisme de fermeture. S'il vous plaît ne pas atteindre près du couvercle lorsqu'il est en cours d'utilisation.

AVERTISSEMENTS DE SÉCURITÉ DES INSTRUMENTS

Les étiquettes d'avertissement apposées sur le Thermocycler Opentrons font directement référence à l'utilisation en toute sécurité de l'instrument, comme expliqué dans le Tableau 2.

Tableau 2. Étiquettes d'avertissement de sécurité des instruments.

ICÔNE	SENS
	**Avertissement sur les risques de lésions corporelles ou corporelles.** Utiliser le thermocycleur Opentrons avant de lire ce manuel présente un risque de blessure ou de dommage aux instruments. Seul un personnel de laboratoire qualifié doit utiliser cet instrument.

Tableau 2 a continué. Étiquettes d'avertissement de sécurité des instruments.

ICÔNE	SENS
	**Avertissement concernant le risque de blessure corporelle ou physique par électrocution.** Ne tentez pas de réparer ou de retirer le boîtier extérieur du thermocycleur Opentrons ni son alimentation, sauf indication contraire de l'équipe de support technique d'Opentrons. Ne pas le faire vous expose à un risque de choc électrique.
	**Avertissement sur le risque de brûlure.** Le thermocycleur Opentrons génère suffisamment de chaleur pour causer de graves brûlures. Porter des lunettes de protection ou une autre protection oculaire en tout temps pendant le fonctionnement. Assurez-vous toujours que le bloc d'échantillons retourne à la température d'inactivité avant d'ouvrir le couvercle et de retirer les échantillons. Toujours autoriser un dégagement maximal pour éviter les brûlures accidentelles. Débranchez l'appareil après utilisation, si possible.
	**Avertissement sur le risque d'explosion.** Les blocs d'échantillons Opentrons Thermocycler peuvent devenir suffisamment chauds au cours de leur fonctionnement normal pour provoquer l'ébullition et l'explosion de liquides.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