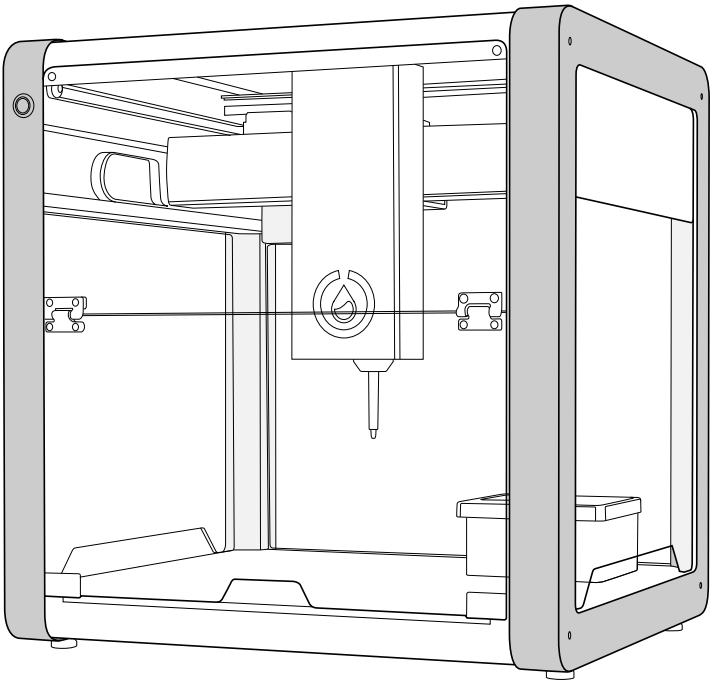
opentrons

OT-2 Liquid Handling Robot

Safety and Regulatory Compliance Information



Opentrons Labworks Inc.

Edition

Revision OT-2R, May 2021

Please read this operating manual thoroughly before using the OT-2

Failure to follow the following warnings, precautions, and instructions for proper operation will void the warranty of the product. It may also result in injury to the operator,and cause safety, reliability, and performance hazards within the OT-2 system. The company does not assume responsibility.

PRECAUTIONS:

1. This product must be powered by the power adapter that comes with the power supply or the power supply of the same specification. It is strictly forbidden to use the power supply with inconsistent specifications and models.
2. Without permission, the electronics shall not be changed or changed at will; if it is necessary to expand or change the function, please communicate with the company's professional and technical personnel.
3. When doing an experiment, all labware and hardware on the deck must be placed within the effective working range of the work surface.
4. After the program is set, do not place hands inside the OT-2 during the normal operation of the machine, so as to prevent the machine from injuring people or other objects from damaging the machine.
5. Do not spray liquid on the product or otherwise allow it to get wet.
6. When cleaning and maintaining the machine, be sure to turn off the machine and disconnect the power before proceeding.

Post sales service & contacting Opentrons

If you have any questions about the use of the system, abnormal phenomena, special needs, please contact support@opentrons.com. Also visit www.opentrons.com.

Equipment Ratings

INTENDED USE

The Opentrons OT-2 is an affordable, easy to use robotic liquid handler intended for use in a research lab. The OT-2 automates common wet lab protocols to relieve lab scientists of the need to perform tedious manual labor. This guide will help you learn how to get the best use of it, or visit www.opentrons.com for more information.

SAFE USE SPECIFICATIONS

Please refer to these specifications and compliance guidelines to ensure safe usage of the OT-2 which include safe use specifications for all input and output connections for the product and its power supply, electrical input and PC connection, and the warning labels bearing this information on the module:

- Do **NOT** replace IEC cord unless at the direction of Opentrons customer support.
- AC IEC power connection to power supply with earth grounding. Make sure that outlet or circuit has earth/protective grounding.
- USB: User can connect Opentrons Modules to the USB port in the back of the machine
- Ethernet Network Connection. User connects to a computer over Ethernet
- Do not lift or move the OT-2 without the help of another person

Table 1. Technical Specifications

SPECIFICATION	DETAIL
Dimensions	63cm x 57cm x 66cm / 25in x 22.5in x 26in (W,D,H)
Weight	42kg (93lbs)
Ethernet Port	1 x LAN RJ45

Table 1. Technical Specifications

SPECIFICATION	DETAIL
USB Ports	4 x USB 2.0
Connectivity	WiFi 2.4 GHz IEEE 802.11b/g/n
Audio	Integrated Speaker
Pipette Configurations	Single and 8-channel pipetting. 2-pipette mounts, for a configuration of 1 or 2 single or 8-channel pipettes. Pipettes are easily interchangeable
Deck	11 deck slots enable countless configurations. Deck slots are compatible with standard SBS dimensions. Deck also includes a removable trash bin
Interface	Works with any computer using Windows 10, macOS 10.10 or later, Ubuntu 12.04 or later

Table 2. Input Ratings (DC)

a. Max Power (W) 220 Watts
b. Max Power (VA) 36 VDC
c. Max Current 6.1A

STERILITY

Full polycarbonate enclosure designed to limit exposure. The OT-2 is not a sterile environment.

Safety and Regulatory Compliance

SAFETY WARNING LABELS

Warning labels posted on the OT-2 and in this manual warn you about sources of potential injury or harm. A key for each safety warning label is referenced in the Table.

Table 3. 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 which can pose risk of personal injury when moving.

Table 4. Instrument Safety Warnings

Warning labels posted on the Opentrons OT-2 refer directly to the safe use of the instrument.

ICON	MEANING
	**Warning about risk of harm to body or equipment.** Operating the OT-2 before reading this manual poses a risk of personal injury or instrument damage. Only qualified laboratory personnel should operate this instrument.
	**Warning about risk of harm to body or equipment from electrical shock.** Operating the OT-2 before reading this manual poses a risk of personal injury or instrument damage. Only qualified laboratory personnel should operate this instrument.
	**CAUTION:** Hot surface! When using any Opentrons modules that can reach high temperatures do not touch hot surfaces.
	**Warning about risk pinch.** Avoid reaching into the OT-2 enclosure while it is running a protocol or there is a risk of pinch.

Table 5. Environmental Conditions

SPECIFICATION	DETAIL
Environment	Indoor use only
Altitude	Up to 2,000 meters above sea level
Temperature	20-24°C
Relative Humidity	Recommended 40-60% RH. Up to 80%
Mains Supply Voltage Fluctuation	The power supply is rated from 85-264 VAC. DC Output 36V +/- 2% EN61000-4-11:2004 >95% dip 0.5 periods 30% dip 25 periods >95% interruptions 250 periods.
Overvoltage Category	Category II
Wet Location	OT-2 and its accessories are intended to be used in a laboratory in non-wet locations
Pollution Degree	Pollution degree 2. OT-2 and it's accessories are meant for use in laboratories

COMPLIANCE STANDARDS

This OT-2 and it's accessories have been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards:

- IEC/UL/CSA/EN 61010-1 :2001 Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 1: General requirements
- IEC/UL/CSA/EN 61010-2-010:2015 Ed.3 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/UL/CSA/EN 61010-2-051:2015Ed.3 Safety Requirements For Electrical Equipment For Measurement, Control And Laboratory Use Part 2-051: Particular Requirements For Laboratory Equipment For Mixing And Stirring

ELECTROMAGNETIC COMPATIBILITY (EMC)

- IEC61326-1 :2013 Electrical Equipment for measurement, control, and laboratory use -EMC Requirements, Class A
- EN 61000-3-2:2014 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions
- EN 61000-3-3:2013
- KN 61000-6-3:2012
- EN 61000-3-2:2014
- IEC 61000-3-3:2013 Ed.3+A1
- IEC 61000-6-1*AEI
- EN 61000-3-3:2008
- FCC Part 15, Subpart B, Sections 15.107 and 15.109 as a Class A digital device
- IC ICES-003:2016Ed.6 Information Technology Equipment (Including Digital Apparatus) –Limits and Methods of Measurement

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.

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 and Manufacturer Description

PRODUCT DESCRIPTION

The OT-2 is a liquid handling lab robot. It is open-source, highly customizable, kit and reagent agnostic, and takes up half a lab bench. Its software, app, and hardware modules are built by scientists for scientists and don't require coding knowledge to use.

MANUFACTURER DESCRIPTION

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