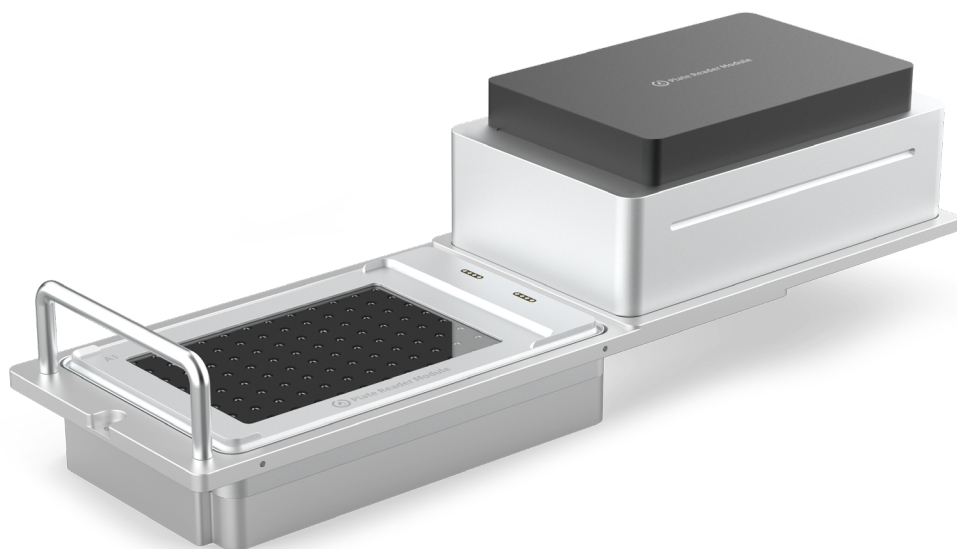




Absorbance Plate Reader Module

Instruction Manual



Opentrons Labworks Inc.

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Product and Manufacturer Description

PRODUCT DESCRIPTION

The Opentrons Absorbance Plate Reader Module is an on-deck microplate spectrophotometer that works with the Flex liquid handling robot. It uses light absorbance to determine sample concentrations. The module accepts ANSI/SBS-standard 96-well plates and has 96 separate detection units, which allows for rapid endpoint or kinetic sample analysis. The Absorbance Plate Reader is designed for laboratory research and other non-in-vitro diagnostic analyses.

MANUFACTURER DESCRIPTION

Opentrons Labworks Inc
45-18 Ct Square W
Long Island City, NY 11101

The Opentrons Flex Absorbance Plate Reader may currently not be offered, used or put on the market in any European Patent Convention States due to a third party patent application.

Safety Information

Opentrons recommends that you follow the safe use specifications listed in this section and throughout this manual.

SAFE USE SPECIFICATIONS

The Absorbance Plate Reader is designed for use with the Flex liquid handling robot. It cannot be used with an OT-2 robot or as standalone equipment. Follow the [installation instructions](#) to ensure proper and safe operation.



Warning: Always use the Opentrons Flex Gripper to move the illumination unit onto or off of the detection unit. Do not move the illumination unit by hand.

The Absorbance Plate Reader should only be used indoors in an environment with stable ambient conditions. The following table lists and defines the environmental operating conditions for recommended use, transportation, and storage of your plate reader.




Note: The module should not be powered on or used in conditions outside of the recommended operating conditions.

Environmental Conditions	Recommended	Transportation	Storage
Ambient Temperatures	+5 to +40 °C	-10 to 50 °C	+5 to +40 °C
Relative Humidity	Up to 70%	Up to 70%	Up to 70%

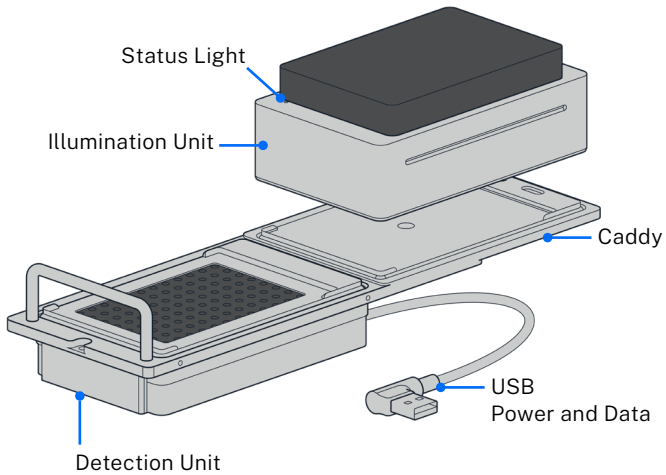
The following table lists and defines standards for recommended use, transportation, and storage.

Operating Conditions	Description
Recommended	Opentrons has validated the performance of the Absorbance Plate Reader in the conditions recommended for system operation. Operating the module in these conditions provides optimal results.
Transportation and storage	Storage and transportation conditions only apply when the device is completely disconnected from power and other equipment.

INSTRUMENT SAFETY WARNINGS

Symbol	Description
	<p>CAUTIONS:</p> <ul style="list-style-type: none">■ Protect the module from moisture, heat, and dust during long-term storage.■ Avoid operating or letting the module sit in direct sunlight.■ Don't store well plates filled with reagents in the module. Evaporating gases could damage it.■ Check for and remove well plates from the module before transport or storage. This helps avoid spillage and contamination.

Product Specifications



INCLUDED PARTS

- (1) Absorbance Plate Reader Module
- (1) Caddy for deck mounting
- (1) USB cable
- (2) Spare deck slot screws (M4x10 mm socket head)
- (1) Cleaning cloth
- (1) Test certificate

Physical Specifications

Specification	Description
Module dimensions	155.3 mm L x 95.5 mm W x 57 mm H
Module weight	~790 g
Composition	Aluminum
Pollution degree	2
Service life	10 years with average use of 4 hours per day

Measurement Specifications

Measurement method	Absorbance
Measurement techniques	Endpoint and kinetic
Detection	96 photodiodes
Measurement range	0–4.0 optical density (OD)
Resolution	0.001 OD
Accuracy	<p>The maximum deviation between the determined value and the true value.</p> <p>At 405 nm:</p> <ul style="list-style-type: none">■ $\leq 1.5\% + 0.010$ OD from 0.0–2.0 OD■ $\leq 3\% + 0.010$ OD from 2.0–3.0 OD <p>At or above 450 nm:</p> <ul style="list-style-type: none">■ $\leq 1\% + 0.010$ OD from 0.0–2.0 OD■ $\leq 1.5\% + 0.010$ OD from 2.0–3.0 OD
Reproducibility	<p>The maximum deviation between the determined values when the measurement is repeated directly.</p> <ul style="list-style-type: none">■ $\leq 0.5\% + 0.005$ OD from 0.0–2.0 OD■ $\leq 1\% + 0.010$ OD from 2.0–3.0 OD
Linearity	<p>The maximum deviation between the true and the determined increase of the value.</p> <p>At 405 nm:</p> <ul style="list-style-type: none">■ $\leq 1.5\%$ from 0.0–2.0 OD■ $\leq 3\%$ from 2.0–3.0 OD <p>At or above 450 nm:</p> <ul style="list-style-type: none">■ $\leq 1\%$ from 0.0–2.0 OD■ $\leq 1.5\%$ from 2.0–3.0 OD

Input and Output Connections

The Absorbance Plate Reader has the following power input requirements, which are met by its USB connection to a Flex robot.

POWER SUPPLY (DC)

- **Input:** Power from a USB port with 5 VDC and a maximum of 3 A.
- **Power consumption:** 2.5 W
- **Fuse:** 1 A (very fast acting)

Detection Wavelengths

The Absorbance Plate Reader emits light in the visible spectrum at 450 nm (blue), 562 nm (green), 600 nm (orange), and 650 nm (red).

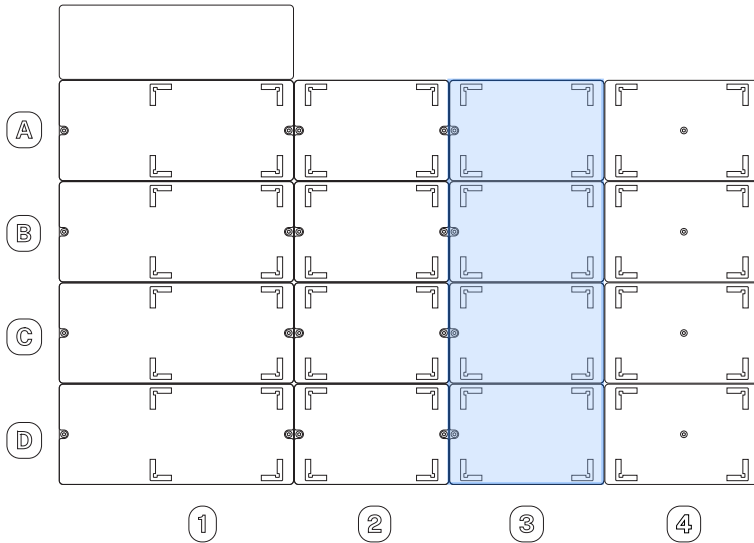
Status Light

The Absorbance Plate Reader has a single status light on the lid. It illuminates in different colors and patterns to indicate various operating conditions.

Color	Pattern	Status
○ White	Solid	The module is on and ready.
	Pulsing	Self-test after connecting to power.
🌈 Various	Solid	Initialization/measurement in progress. The status light color corresponds to the selected light wavelength used for analysis.
● Yellow	Pulsing	A well plate is inside the reader.
● Red	Blinking	An error has occurred.

Deck Placement

You can put the plate reader in deck slots A3–D3 only. The module comes pre-installed in its own caddy, which attaches the unit to the deck.



Note: Other deck components may need one of these slots. For example, the default location for the internal trash bin is slot A3, but this component can go in any one of multiple deck locations. The external waste chute requires slot D3 so you'll have to remove it (if installed) to put the plate reader in this location.

Installation Steps

To attach the Absorbance Plate Reader to your Flex:

- 1 Use a 2.5 mm hex screwdriver to remove the deck slot you want to use for the module. Retain the screws.
- 2 Insert the module into the open deck slot and secure it with the screws you removed in Step 1.
- 3 Route the USB cable under the deck and attach it to a USB port on the right side of the robot.

When connected, the Absorbance Plate Reader appears in the Instruments and Modules section on your robot's device details page in the Opentrons App. It does not require positional calibration after installation. You can use the Absorbance Plate Reader as soon as the robot detects it.

Using Plate Reader Data

Plate reader data is available on the Recent Protocol Runs screen in the Opentrons App. To download your data from the app, click **Devices** and select your Flex from the list. Next, find the protocol that used the plate reader. Expand that protocol and click the **Download** link to retrieve your data. The robot formats plate reader data as a comma-separated value (.csv) file.

Run	Protocol	Files	Status	Run duration
10/9/2024 08:23:45	Plate Reader Protocol...	3	Complete	01:15:02

Protocol files		
Name	Date	Download
Plate Reader Output.csv	10/9/2024 09:38:47	Download

You can also use plate reader data immediately in a Python protocol. See the [Python Protocol API documentation](#) for more information.

Maintenance

There are no user-repairable parts on the Absorbance Plate Reader. Contact Opentrons Support if the unit is damaged.

Cleaning

Use a soft cloth dampened with water to wipe off all exterior surfaces. You can also use a mild soap and water solution to clean heavily soiled areas or to remove tenacious residue.

Use the included cleaning cloth or compressed air to remove dust or dirt from the interior surfaces of the illumination and detection units. You can also use a cloth dampened with 80% ethanol if a light dusting does not clean these parts of the plate reader sufficiently.



Warning:

- Do not spray cleaning liquids directly onto the plate reader.
- Never clean the device with stiff, coarse brushes, abrasives, detergents, or harsh solvents.
- Wear protective gloves if cleaning involves potential contact with hazardous materials or liquids.

Additional Product Information

WARRANTY

All hardware purchased from Opentrons is covered under a 1-year standard warranty. Opentrons warrants to the end-user of the products that they will be free of manufacturing defects due to part quality issues or poor workmanship and also warrants that the products will materially conform to Opentrons' published specifications.

SUPPORT

Opentrons Support can help you with questions about our products and services. If you discover a defect, or believe your product is not functioning to published specifications, contact us at support@opentrons.com.

Please have the module's serial number available when contacting support. You can find the serial number on the side of the detection unit or in the Opentrons App. On the plate reader card in the Instruments and Modules section of your robot's device detail page, click the three-dot menu (⋮) and then **About**.

APP DOWNLOAD

Control your liquid handling robot and module using the Opentrons App. Download the app for Windows, macOS, or Ubuntu at <https://opentrons.com/ot-app/>.



Post-sales service & contacting Opentrons

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