

# **BD Rhapsody™ Single-Cell Analysis System Installation and Maintenance Guide**

**For the BD Rhapsody™ Express Instrument  
and BD Rhapsody™ Scanner**

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## **Regulatory information**

**For Research Use Only. Not for use in diagnostic or therapeutic procedures.**

## **FCC information**

**WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTICE:** 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. BD is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment. This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## **Patents**

The BD Rhapsody™ Targeted mRNA and AbSeq Reagent Kit is covered by one or more of the following U.S. patents: 8835358, 9315857, 9290808, 9290809, 9567646, and 9598736.

## Revision history

Revision	Date	Change made
Doc ID: 43084 Rev. 1.0	09/2017	Initial release.
Doc ID: 43084 Rev. 2.0	01/2018	—Changed “software on/off button” to “front power button.” —Added pipette maintenance and service. —Corrected from 10 mm to 8 mm hex key. —Rebranded the document.
Doc ID: 43084 Rev. 3.0	04/2018	—Changed <i>Single Cell Targeted Library Preparation with the BD Rhapsody™ Single-Cell Analysis System User Guide</i> to the <i>BD Rhapsody™ Single-Cell Analysis System User Guide</i> . —Added link to obtain SDSs. —Replaced “BD Rhapsody™ Sample Loading Station” with “BD Rhapsody™ Express instrument.” The instrument remains the same.
Doc ID: 43084 Rev. 4.0	08/2018	—Replaced “ <i>BD Rhapsody™ Single-Cell Analysis System User Guide</i> (Doc ID: 47395)” with “ <i>BD Rhapsody™ Single-Cell Analysis System Instrument User Guide</i> (Doc ID: 214062).”

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# 1

## Introduction

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## About this guide

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**Introduction** This guide provides instructions on installing and maintaining the BD™ Express instrument and BD Rhapsody™ Scanner.

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**Intended use** This guide is intended for users of the BD Rhapsody Express instrument and BD Rhapsody Scanner. Read this guide prior to installing and maintaining the instruments.

For intended use of the BD Rhapsody™ Single-Cell Analysis system, see the *BD Rhapsody™ Single-Cell Analysis System Instrument User Guide* (Doc ID: 214062).

For detailed site requirements and technical specifications, see the *BD Rhapsody™ Express Instrument and BD Rhapsody™ Scanner Site Preparation Guide* (Doc ID: 47391).

Genomics technical publications are available for download from the BD Genomics Resource Library at [bd.com/genomics-resources](http://bd.com/genomics-resources).

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## Safety symbols

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**Introduction** This topic describes the safety symbols used in this guide.

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**Safety symbols** The following table lists the safety symbols used in this guide to alert you to potential hazards.

Symbol	Meaning
	Caution. Indicates the need for the user to consult the instructions for use for important cautionary information, such as warnings and precautions that cannot, for a variety of reasons, be presented on the device itself.
	Biological hazard. All surfaces that come in contact with biological specimens can transmit potentially fatal disease. Use universal precautions when cleaning surfaces. Wear suitable protective clothing, eyewear, and gloves.
	Lifting hazard
	Electrical hazard

## Safety data sheets

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**Introduction** This topic describes how to obtain safety data sheets (SDSs).

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**Obtaining SDSs** Before handling chemicals, read and understand the SDSs. To obtain SDSs for chemicals ordered from BD Biosciences, go to [regdocs.bd.com](http://regdocs.bd.com) or contact BD Biosciences technical support at [researchapplications@bd.com](mailto:researchapplications@bd.com).

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## Instrument technical support

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**Introduction** This topic describes how to get technical support for the BD Rhapsody Express instrument and BD Rhapsody Scanner.

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**Contacting technical support** If technical assistance is required, contact [researchapplications@bd.com](mailto:researchapplications@bd.com) or 1.877.232.8995, prompt 2, 2 or, +353.61.307734. You can contact technical support in Europe at [help.biosciences@europe.bd.com](mailto:help.biosciences@europe.bd.com) or at these telephone numbers:

Location	Telephone number	Location	Telephone number
Worldwide	+32 2 40 09 895		
Austria	01 92 80 465	Netherlands	010 71 14 800
Belgium	02 40 17 093	Norway	800 18 530
Denmark	80 88 21 93	Portugal	800 86 01 76
Finland	800 11 63 17	South Africa	0800 98 10 08
France	01 70 70 81 93	Spain	91 41 46 250

<b>Location (continued)</b>	<b>Telephone number</b>	<b>Location</b>	<b>Telephone number</b>
Germany	069 22 22 25 60	Sweden	08 50 69 21 54
Greece	00800 12 75 06	Switzerland	044 58 04 373
Italy	02 36 00 36 85	United Kingdom	0207 07 53 226

Before contacting BD Biosciences, have the following information available:

- Product name, model number, and serial number on the rear of the instrument
  - Any error messages
  - Details of recent system performance
  - For the scanner, the version of the software that you are using
  - For the scanner, run history on the History screen
-

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# 2

## Installation

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## BD Rhapsody™ Express instrument installation

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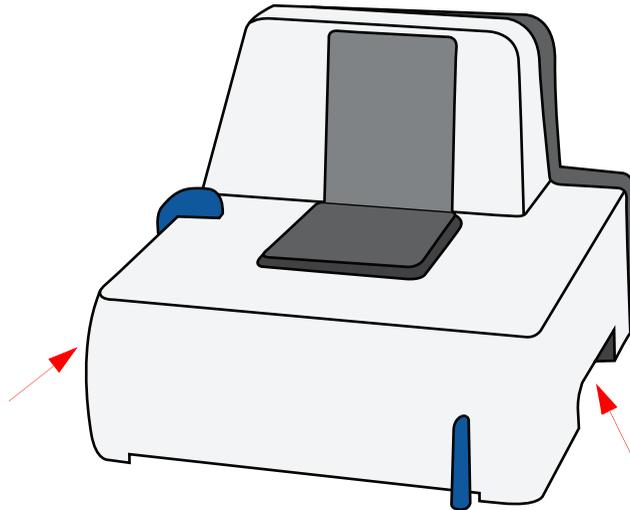
**Preparing the site** Prepare the site for the Express instrument. See the *BD Rhapsody™ Express Instrument and BD Rhapsody™ Scanner Site Preparation Guide* (Doc ID: 47391).

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**Installation** Contact BD Biosciences technical support at [researchapplications@bd.com](mailto:researchapplications@bd.com).

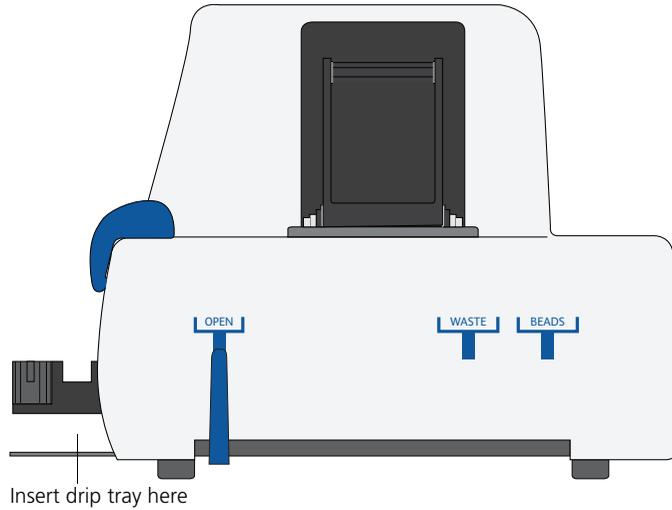
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**Lifting the BD Rhapsody Express instrument** Lift the Express instrument by firmly grasping the cutout on each side of the instrument:

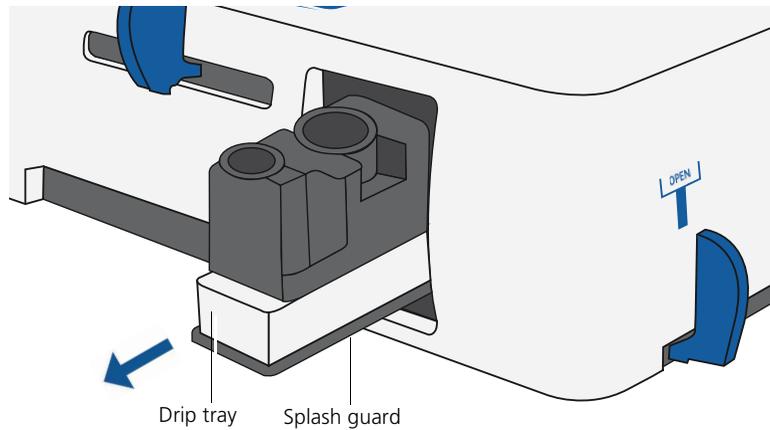


## Installing the drip tray and splash shield

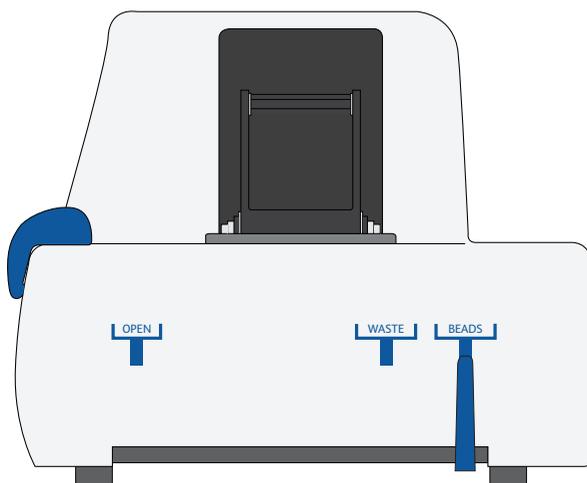
1. Move the front slider to **OPEN**:



2. Review the location of parts:



3. Orient the white drip tray so that its larger compartment faces upwards and is positioned toward the interior of the instrument. The compartments of the drip tray correspond to the tube sizes above it.
4. Insert the drip tray fully until it stops.
5. Move front slider to **BEADS**:



6. Slide the splash shield fully, underneath the drip tray, until it stops.
-

## BD Rhapsody™ Scanner installation

**Preparing the site** Prepare the site for the scanner. See the *BD Rhapsody™ Express Instrument and BD Rhapsody™ Scanner Site Preparation Guide*.

### Before you begin

- Contact BD Biosciences technical support at [researchapplications@bd.com](mailto:researchapplications@bd.com).

During installation, the BD Biosciences field applications specialist will remove and store the shipping brackets on the instrument chassis in case of future shipping of the BD Rhapsody Scanner. (Optional) Store the shipping crate on site.

BD Biosciences strongly recommends installing the scanner on a laboratory bench that has no known sources of vibration, such as vortexers and centrifuges.

- Obtain an 8 mm hex key.

### Lifting the BD Rhapsody Scanner

1. Receive appropriate training for lifting and maneuvering the scanner.
2. Ensure sufficient bench space (with clearance) is available prior to lifting (W x D x H: 51 x 61 x 69 cm).
3. Take a suitably wide path to move the scanner by dolly or crate bed close to the final position.



**Lifting hazard.** The scanner weighs 58.0 kg (128 lb). Lifting it requires two people each able to lift 29.0 kg (64.0 lb). Each person should be of similar height for lifting stability.

4. Ensure that the area for lifting the scanner is sufficient.
5. Position the scanner beside the laboratory bench.
6. Twist the four latches of the crate to release the top cover, and then rotate the latches to the closed position to ensure that the latches do not catch on the latch retainer.

7. Lift off the top crate cover, and store it.
  8. Lift off the foil bag, unclamp the crate supporting frame, and remove the frame.
  9. Release the shipping clamps from the pallet base with an 8 mm hex key.
  10. Temporarily store the instrument shipping clamps for reassembly.
  11. Unpack the accessory pack.
  12. Choose a lead lifter to provide clear instructions on readying and steadying the lift.
  13. After each lifter grips the lift handles securely, raise the scanner waist high, and immediately place it in the designated bench space.  
  
**Note:** If necessary, ask the field application specialist to install the seismic restraints.
  14. Clean the work space, and appropriately wipe it down.
  15. Reinstall the shipping clamps on the pallet base.
  16. Reseat the crate frame, and repack the empty accessory box.
  17. Replace the foil cover over the crate frame and accessory box.
  18. Place the shipping top cover over the pallet base.
  19. Twist the four latches to lock the top cover to the pallet retainer.
-

# 3

## Maintenance

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# Maintaining the BD Rhapsody™ Express instrument

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## Introduction

This section describes how to maintain and decontaminate the BD Rhapsody Express instrument.

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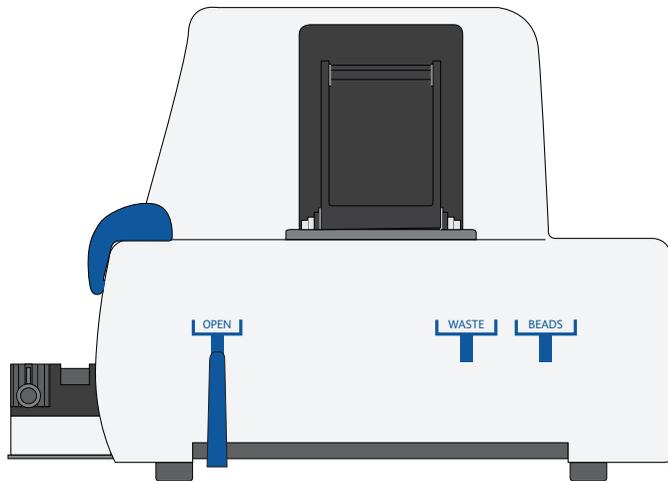
## General maintenance guidelines

Use 10% (v/v) bleach or 70% (v/v) ethyl alcohol or 70% (v/v) isopropyl alcohol to clean the Express instrument.

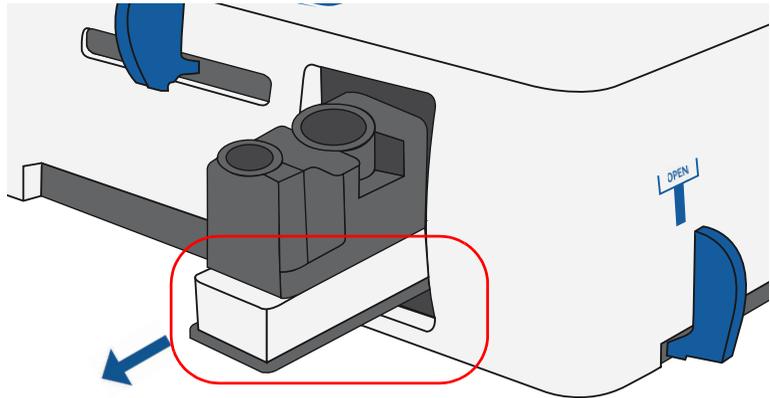
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## Cleaning the drip tray and tube receptacles

1. During cleaning, wear suitable protective clothing, eyewear, and gloves.
2. After each use, move the front slider to **OPEN**:



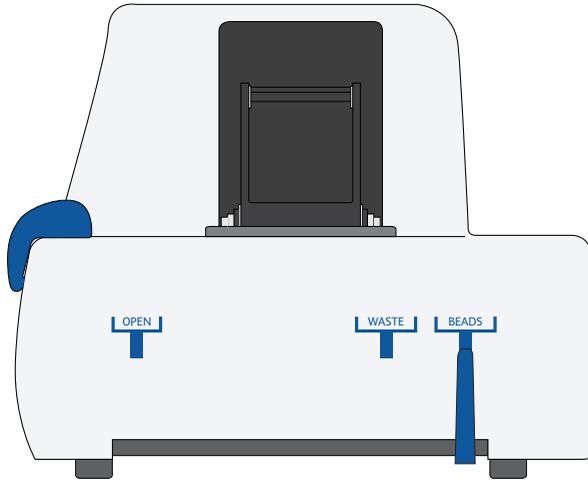
3. Remove the white drip tray (red oval) by lifting it slightly and pulling it out:



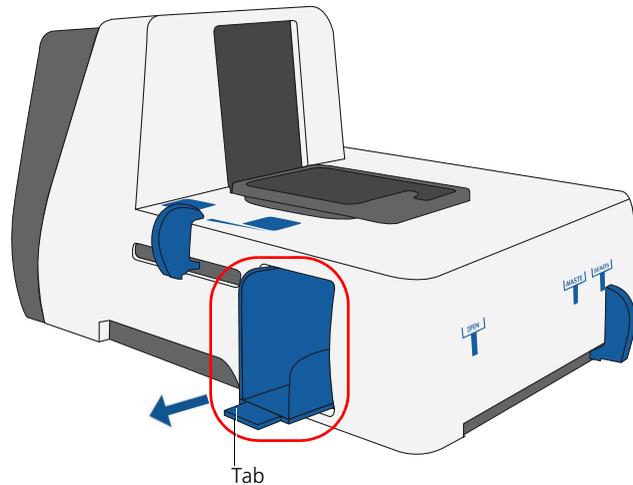
4. If necessary, appropriately dispose of the liquids in the drip tray.
5. Use pre-moistened cleaning wipes with 10% bleach or 70% ethyl alcohol to wipe the sides, top, and bottom of the drip tray and the tube receptacles for the Waste Collection Container (PN 650000090) and Bead Retrieval Tube (5 mL LoBind Tube).
6. Use a dry lint-free wiper to dry the components.
7. Orient the white drip tray so that its larger compartment faces upwards and is positioned toward the interior of the instrument, and then reinsert the drip tray fully until it stops. The compartments of the drip tray correspond to the tube sizes above it.
8. Move the front slider with the correct collection tubes to the appropriate position to **BEADS** or **WASTE**.
9. Dispose of the used cleaning materials in the biohazard containers.

**Cleaning the splash shield**

1. Move the front slider to **BEADS** for access to the splash shield tab:



2. On the left side of the Express instrument, grasp the bottom tab, and pull out the splash shield (red oval). To avoid spills, do not tilt the tray:



3. Appropriately dispose of liquid in the splash shield.
4. Wash the splash shield with 10% bleach or 70% ethyl alcohol.
5. Use a dry lint-free wiper to dry the splash shield.
6. Slide the splash shield fully into the left opening of the instrument until it stops.
7. Dispose of the used cleaning materials in biohazard containers.

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### **Cleaning the cartridge tray**

1. Remove the BD Rhapsody™ Cartridge, if present.
  2. Use a dry lint-free wiper to dry the cartridge tray.
  3. Use a lint-free wiper moistened with 10% bleach or 70% ethyl alcohol to clean the tray.
  4. Dispose of the used cleaning materials in biohazard containers.
-

## Returning the BD Rhapsody Express instrument for service

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1. Before returning the Express instrument to BD Biosciences, follow the cleaning protocol. See [Maintaining the BD Rhapsody™ Express instrument \(page 20\)](#).
  2. Complete the decontamination label provided by BD Biosciences.
  3. Contact BD Biosciences at [researchapplications@bd.com](mailto:researchapplications@bd.com) for return authorization.
  4. Complete the return shipping label.
  5. Ship the Express instrument to BD Biosciences according to shipping instructions on the label.
-

# Maintaining the BD Rhapsody™ Scanner

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**Introduction** This section describes how to maintain and decontaminate the BD Rhapsody Scanner.

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**Maintenance policy** The scanner may be opened for the following reasons:

- Remove and retain shipping brackets from the scanner during installation
- Clean optics cover during maintenance
- Investigate instrument on site by BD personnel only

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**General maintenance guidelines**

- Clean the optics cover of the scanner if there are visible stains.
- Wipe the touchscreen with pre-moistened cleaning wipes containing 70% (v/v) ethyl alcohol or 70% (v/v) isopropyl alcohol.

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### Performing a soft shutdown of the BD Rhapsody Scanner

Perform a soft shutdown of the scanner once a month to clear the memory buffer in the instrument computer.

1. Press the scanner front power button once to shut down the instrument computer (red circle):



If necessary, save data and tap the exit icon.

2. After ten seconds, press the front power button once again to restart the scanner computer.
3. Log in to launch the scanner software. The scanner is ready for use.

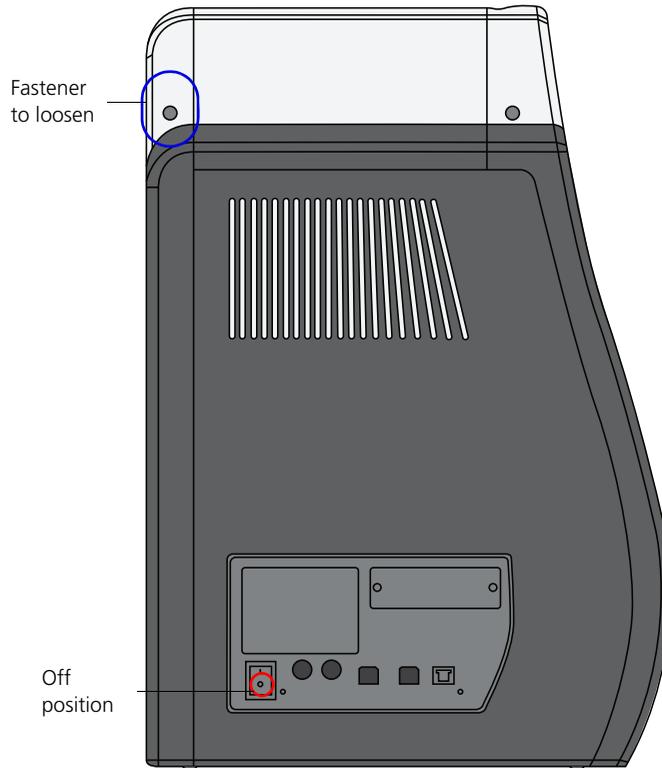
**Cleaning the optics cover**

1. Press the scanner front power button once to shut down the instrument computer (red circle):



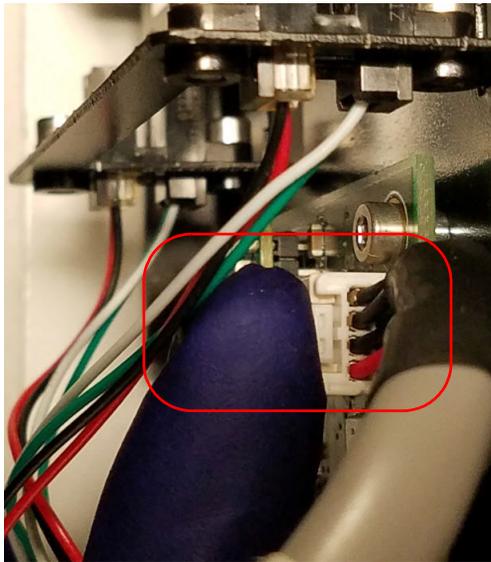
If necessary, save data and tap the exit icon.

2. Toggle the master power switch to off (O) on the rear of the instrument (red circle):



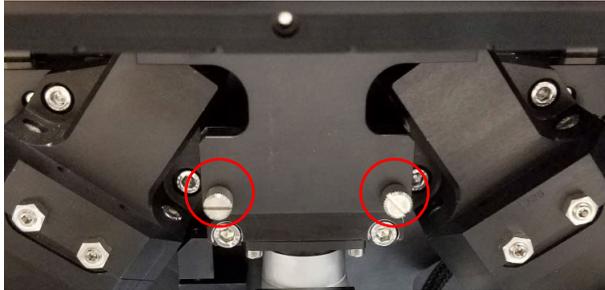
3. Remove side panel to access the optics cover:
  - a. Use a 3 mm ball end hex key to unscrew the fastener from the instrument. Stop unscrewing the fastener after it is loose. See the drawing in step 2.
  - b. Slide the panel back ~15 mm, and tilt it ~30° toward you.

- c. Push the tab to unplug the door control cable, which is located on the left toward the front of the instrument near the base:



- d. Lift the panel away from the instrument, and carefully set it aside to avoid damaging the tray door mechanism.
4. Use compressed dry gas to blow away visible dust. Look for visible dust on the optics cover.
  5. If no more dust is seen on the optics cover, proceed to step 12 to reinstall the panel. If the glass of the optics cover requires further cleaning, proceed to step 6.

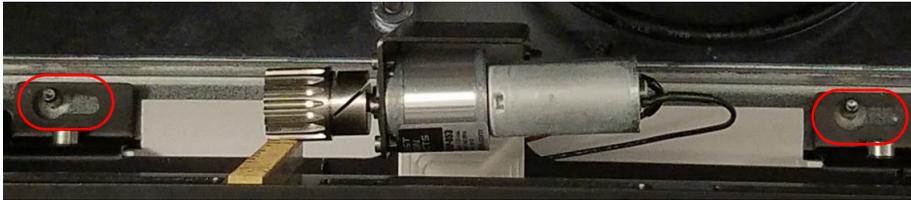
6. Loosen the locking screws (red circles) on the optics cover:



7. Slide the optics cover toward you, and remove it from the instrument.
8. Use compressed dry gas to blow away visible dust from the glass of the optics cover.
9. Use a dry lint-free wiper to remove dust from the cover.
10. Examine the glass carefully. If the glass is clean, proceed to step 11. If the glass remains dirty, wipe the glass with a lint-free cloth moistened with 100% isopropyl alcohol or 100% ethanol. Air dry the glass.
11. Push in the optics cover, and tighten the locking screws to secure it.

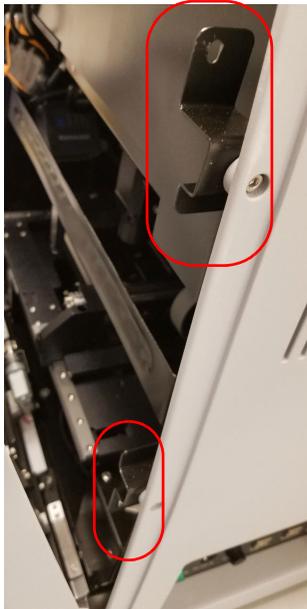
## 12. Reinstall the panel:

- a. At a  $\sim 30^\circ$  angle with the panel tilted toward you, carefully insert the base of the panel into the two alignment pinholes in the base (red circles):



- b. Plug in the door control cable.

- c. Push the panel until it is flush with the instrument. Ensure that alignment tabs on the right and left sides of the instrument insert into the panel (red circles):



- d. Slide the panel forward ~15 mm toward the front of the instrument so that the bottom pins engage and the fastener can be inserted into the instrument.
  - e. Use the 3 mm ball end hex key (included with the scanner) to screw the fastener to the instrument until the fastener is just tightened.
13. Toggle the master power switch to on (I) on the rear of the scanner.
  14. Press the scanner front power button once to turn on the instrument computer.
  15. Log in to launch the scanner software. The scanner is ready for use.
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## Returning the BD Rhapsody Scanner for service

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1. Before returning the scanner to BD Biosciences, follow the cleaning protocol. See [Maintaining the BD Rhapsody™ Scanner \(page 25\)](#).
  2. Complete the decontamination label provided by BD Biosciences.
  3. Contact BD Biosciences at [researchapplications@bd.com](mailto:researchapplications@bd.com) for return authorization and additional information for securing the instrument before shipment.
  4. Complete the return shipping label.
  5. Ship the scanner to BD Biosciences according to the shipping instructions on the label.
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## Maintaining the BD Rhapsody™ P1200M and P5000M pipettes

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**Introduction** This section describes how to maintain and decontaminate the BD Rhapsody P1200M and P5000M pipettes.

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**General maintenance guidelines**

- Wipe the pipettes with pre-moistened cleaning wipes containing 70% (v/v) ethyl alcohol or 70% (v/v) isopropyl alcohol.
  - Charge pipettes between experiments.
- 

## Returning the BD Rhapsody P1200M and P5000M pipettes for service

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**Introduction** This section describes how to calibrate and service the BD Rhapsody P1200M and P5000M pipettes. Calibrate the pipettes every 12 months to ensure accurate sample volume transfer at each step.

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**Procedure**

1. Before shipping the pipettes for calibration, follow the cleaning protocol. See [Maintaining the BD Rhapsody™ P1200M and P5000M pipettes \(page 34\)](#).
2. Complete the decontamination label provided by BD Biosciences.
3. Obtain the purchase order number required to pay for calibration by the Gilson Service Center. In the purchase order for either pipette, include one of these part numbers:
  - LVL3SBD: Non-ISO 17025 calibration
  - LVL3SISOBD: ISO 17025 calibration

**Note:** Each purchase order number is automatically recognized by the service center as a service part number that is unique to Becton Dickinson-customized pipettes.

4. Ship the pipettes to the appropriate Gilson Service Center:

Location	Shipping address
USA	Gilson Service Center 3101 Laura Lane, STE 100 Middleton, WI 53562 USA
Europe	Gilson International - France SAS Attention: OEM Department 19 Avenue des Entrepreneurs CS 55501 95400 VILLIERS-LE-BEL FRANCE

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# 4

## Troubleshooting

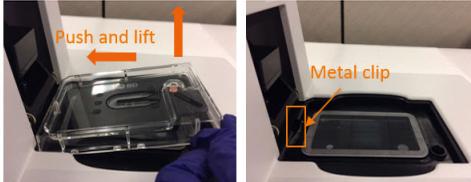
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# BD Rhapsody™ Express instrument troubleshooting

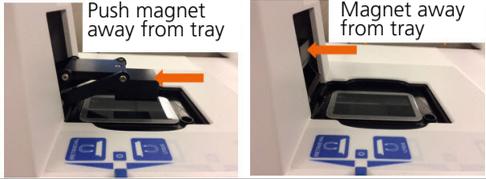
## Introduction

This topic describes possible problems and recommended solutions for installing and maintaining the and the Express instrument.

## Difficulty removing cartridge from the BD Rhapsody Express instrument

Possible causes	Recommended solutions
<p>Cartridge remains clipped at the rear of the tray</p>	<p>Push the cartridge on the tray toward the back of the Express instrument to compress the metal clip, and then lift the cartridge to remove it:</p>  <p>If the cartridge does not detach from the instrument, contact BD Biosciences technical support at <a href="mailto:researchapplications@bd.com">researchapplications@bd.com</a>.</p>

### Left slider is not engaging the retrieval magnet

Possible causes	Recommended solutions
Various	<p>Move the left slider to the middle (0) position. If the Retrieval (top) magnet is not away from the cartridge tray, lift and push the Retrieval magnet away from the cartridge tray:</p> 

### Front slider is stuck or not moving smoothly

Possible causes	Recommended solutions
Various	<p>Clean the splash shield. See <a href="#">Cleaning the splash shield (page 22)</a>, and reinstall it. See <a href="#">Installing the drip tray and splash shield (page 15)</a>. Ensure to install the splash shield fully, underneath the drip tray, until it stops.</p>

# BD Rhapsody™ Scanner troubleshooting

**Introduction** This topic describes possible problems and recommended solutions for installing and maintaining the BD Rhapsody Scanner.

## Failure mode

Possible causes	Recommended solutions
Instrument not powering on	<ul style="list-style-type: none"> <li>• Ensure that there is power from the facility to the scanner.</li> <li>• Toggle the master power switch to on (I) on the rear of the scanner.</li> <li>• Ensure that the mains plug does not have a blown fuse.</li> </ul>  <p>If the fuse is blown, contact BD Biosciences technical support at <a href="mailto:researchapplications@bd.com">researchapplications@bd.com</a>.</p> <ul style="list-style-type: none"> <li>• Ensure that the scanner front power button is lit green, and the scanner display is on.</li> <li>• Ensure that the DC Power brick-to-brick power cord is inserted into the rear of the scanner.</li> <li>• Unplug power to the scanner, and then check for a blown fuse on the rear of the scanner. Unscrew the fuse holder and inspect the fuse. If the fuse is blown, contact BD Biosciences technical support at <a href="mailto:researchapplications@bd.com">researchapplications@bd.com</a>.</li> <li>• Ensure that the green light on the DC Power Brick is on:</li> </ul>  <ul style="list-style-type: none"> <li>• Ensure that the scanner software displays and is active.</li> <li>• Report any failures to BD Biosciences technical support at <a href="mailto:researchapplications@bd.com">researchapplications@bd.com</a>. If possible, capture error messages, and report any other unusual changes with the scanner, including above average noise levels.</li> </ul>

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**Touchscreen  
unresponsive**

Possible causes	Recommended solutions
Electrical issue	<ul style="list-style-type: none"><li data-bbox="696 386 1170 526">● Use an external keyboard and mouse. For suggested peripherals, see the <i>BD Rhapsody™ Single-Cell Analysis System Instrument User Guide</i> (Doc ID: 214062).</li><li data-bbox="696 542 1170 597">● Contact BD Biosciences technical support at <a href="mailto:researchapplications@bd.com">researchapplications@bd.com</a>.</li></ul>

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# A

## Safety

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## General safety and limitations

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For complete safety information, see the *BD Rhapsody™ Express Instrument and BD Rhapsody™ Scanner Safety and Limitations Guide* (Doc ID: 42061) and the *BD Rhapsody™ Single-Cell Analysis System Instrument User Guide* (Doc ID: 214062).

Genomics technical publications are available for download from the BD Genomics Resource Library at [bd.com/genomics-resources](https://bd.com/genomics-resources).

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## Chemical safety

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**Waste disposal**      Dispose of waste using proper precautions and in accordance with local regulations.

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## Waste disposal

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**Disposal of the instrument**      Contact BD Biosciences technical support at [researchapplications@bd.com](mailto:researchapplications@bd.com) before moving the BD Rhapsody™ Scanner or disposing of the BD Rhapsody™ Express instrument or the BD Rhapsody Scanner. For more information, see [Instrument technical support \(page 10\)](#).

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# Glossary

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## B

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**BD Rhapsody™ Express instrument** Mechanical instrument used for loading Cell Capture Beads and cells into the BD Rhapsody™ Cartridge.

**BD Rhapsody™ Scanner** Instrument used for counting cells on a hemocytometer and for providing quality metrics on cartridge workflow.

**BD Rhapsody™ Single-Cell Analysis system** The system includes:

- BD Rhapsody™ Express instrument
  - BD Rhapsody™ P1200M pipette
  - BD Rhapsody™ P5000M pipette
  - BD Rhapsody Scanner
  - Hemocytometer Adapter
  - Bioinformatics software and sequencing analysis
-