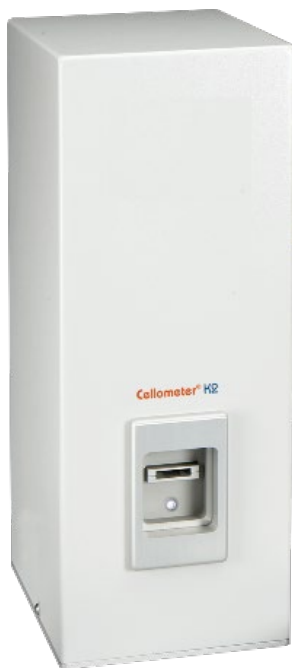


USER MANUAL

CELLOMETER[®] K2 (MATRIX)



8003393 Rev E

For Research Use Only. Not for use in
diagnostic procedures.



Cellometer® K2 Matrix User Manual

8003393 Rev E

Updated for Matrix v5.1.1 Software Release
February 2024

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Chapter 1. Introduction

This chapter presents introductory information to be reviewed *prior* to unpacking your Cellometer® K2 instrument. It includes a product overview, lists contents of shipping container, identifies symbols/abbreviations used on both the device label and instrument, and provides a summary of topics contained in this user manual.

CELLOMETER K2 MATRIX SYSTEM OVERVIEW

Cellometer® Automated Cell Counters incorporate the basic principles of Imaging Cytometry traditionally used in manual cell counting via hemocytometer into a suite of instruments designed to simplify the cell counting process. By capturing multiple images of cells to be counted, users can adjust parameters based on cell morphology and perform reanalysis as necessary. *Cellometer Counting Chambers* are equivalent to all four corner squares of a hemocytometer and are disposable, thus saving time and effort, and eliminating any risk of cross-contamination.

Using both *Brightfield* and *Dual-Fluorescent* imaging in combination with pattern-recognition software, the Cellometer K2 quickly identifies cells and accurately calculates *Cell Count*, *Mean Diameter (micron)* and *Cell Concentration (cells/mL)*. Customizable cell type parameters are designed to assist in the declustering of clumpy cell lines. For cultured cells stained with trypan blue or fluorescent reagents, the K2 simultaneously calculates *Live/Dead* and *Total* cell counts, *Viability (%)*, and *Live* and *Total* cell concentrations, including a helpful graphic overlay used to highlight live and dead cells with color-coded outlines in the image being viewed.

The minimal footprint of the Cellometer K2 is designed to fit into small lab spaces and the Matrix software can be loaded onto computers that meet specified requirements. With an Operating Computer connected to the instrument via USB cable, the system can be linked to a network for accessing external files, printers and storing count results. An optional Matrix 21 CFR Part 11 module ensures the integrity of your data by limiting access to authorized users, retaining an audit trail of user transactions, offering electronic signing/unsigned capabilities and providing multi-layer access control via user roles.

Intended Use

Intended use of the Cellometer K2 is to count cell lines and primary cells (e.g., total nucleated cells, PBMCs, splenocytes, hepatocytes, stem cells, tumor/tissue digests, etc.) with the ability to determine cell count, viability and additional analysis using trypan blue exclusion or fluorescent reagents.

Personnel operating this instrument are encouraged to familiarize themselves with device controls and operation. Ensure that users can identify all components associated with the instrument, perform adequate adjustments and understand performance criteria. If issues are encountered, see *Troubleshooting and Instrument Messages* on page 47 to restore performance if instrument does not meet or exceed defined performance criteria.



WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or by Revvity, Inc. may result in a hazardous process.

CONTENTS OF SHIPPING CONTAINER

Cellometer K2 Instrument

Instrument **Power Supply/Power Cord** (Figure 1)

USB 2.0 Connector Cable (Figure 2)

USB Drive (Figure 3)

Contains **Matrix** software and PDF files listed below
Store USB drive where it can easily be located if software needs to be installed on another computer.

Cellometer K2 Matrix User Manual (PDF file on USB/Laptop – *this document*)

Matrix Software User Manual (PDF file on USB/Laptop)

Cellometer K2 Matrix Quick Start Guide (PDF file on USB/Laptop and provided as printed copy with instrument)

Cellometer K2 Focus Guide

Graphic sheet to help users with adjusting instrument focus

Counting Chamber Slides (Figure 4)

One box of 75 disposable slides; each slide contains two separate counting chambers

AO/PI Viability Reagent (CS2-0106-S)

Starter Kit containing Fluorescent Beads and two SD100 slides

Revvity-provided Laptop (Figure 5) with **Power Supply/Power Cord**

Optional. If a Laptop (also referred to as Operating Computer) was purchased from Revvity with the instrument, it will be shipped in a separate box.

Figure 1. K2 Power Supply/Cord



Figure 2. Connector Cable



Figure 3. USB Drive



Figure 4. Counting Chamber Slides

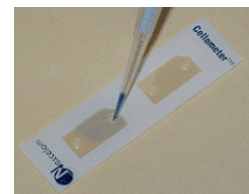


Figure 5. Laptop



MATRIX SOFTWARE OVERVIEW

The Matrix software used to run the Cellometer K2 is shared by multiple product families and includes default assays (identified with *MX_*, *PLX_* or *K2_* prefixes indicating the intended instrument) and report templates for *all* supported product types. However, only assays available for the Cellometer K2 will be displayed when entering setup details, and report templates will be adjusted dynamically for presentation based on scan results. Assays and report templates for *all* product types can be viewed in the **Manage** tab > *Assays* and *Report Templates* screens.

Key elements in Matrix software functionality are described below:

- *Acquiring Sample Data* – The **Acquire** tab > *Setup* and *Preview* options are sequential screens used to acquire sample data. After loading samples, entering setup details, selecting at least one well and then clicking the **Preview** button, you can preview live channel images and adjust instrument focus/fluorescent exposure for each channel. Clicking the **Count** button engages the camera to acquire sample images as specified by the selected assay, which are then processed by the Matrix imaging and pattern-recognition software to decluster, identify and count individual cells according to defined cell type parameters.

- *Analyzing Scan Results* – The **Data** tab > *Select, Results* and *Recount* options are sequential screens used to analyze scan results. Once a result is selected, you can vary the image displayed by clicking available channel buttons (e.g., **BR, FL1, FL2**, etc.) appearing across the top of the **Well View** tab or by choosing another well. Data associated with the well appears below the image or can be viewed as a consolidated report including data from *all* wells by clicking the **Summary** tab. To fine-tune the analysis of a scan, click the **Recount** button and either select a new assay or click the **View** button for the current assay to edit parameters as necessary. *Last Used Assay parameters are provided for your reference.*
- *Setting Up Auto Exports* – The Matrix auto export feature allows you to select the *Images* (e.g., *Raw Images* and *Colorized Images*), *Data* (e.g., *Well Level CSV, Object Level CSV* and *Object Level ACS*) and *Archive* (e.g., *Data Set*) output file types to be exported for an assay after completion of scan analysis. In addition, ACS templates can be imported into the Matrix software and assigned to an assay. On export, data will auto populate into the specified ACS template and can launch FCS Express if the *Auto Open* option is also selected.
- *Customizing Reports* – The Matrix custom reporting feature allows you to assign and/or modify report templates to be used by assays when generating scan results. You can change the report template used for displaying **Well View** tab data and manage the *Reports List* associated with an assay. You can also enable up to five additional tabs or specify output file types (e.g., *CSV, Excel, PDF* and *Word*) to be automatically exported, opened or printed after completion of scan analysis.
- *Managing Assays, Cell Types, ACS Templates and Report Templates* – The **Manage** tab > *Assays, Cell Types, ACS Templates* and *Report Templates* options display lists of these entities currently loaded in your instrument system. From these screens you can import/export, rename, delete or show/hide an entity in its applicable list. For most entities you can also view, create or use locked entities as templates to create new ones.

Matrix Screen Elements on page 22 and *Matrix Counting and Analysis Workflow* on page 33 are the only sections in this manual that reference using the Matrix software. See the **Matrix Software User Manual** for a full description of Matrix software functionality.

MINIMUM COMPUTER REQUIREMENTS

If a customer-supplied Operating Computer is set up to run the Cellometer K2 instrument powered by the Matrix software, it must meet the following *minimum* requirements:

- Windows 10 PC, 64-bit
- Intel® Core i7, 2.0 GHz processor
- 16 GB RAM
- USB 2.0 Port
- GPU NVIDIA P1000 (or equivalent)
- Full HD Display Resolution: 1920 x 1080 pixels

In addition, these requirements apply to any alternative computer (e.g., workstation or personal laptop) used to run the Matrix software in *Data Analysis* mode (i.e., while *not* connected to an instrument). *Scan results can easily be exported from the Operating Computer and imported onto an alternative computer for re-analysis.*

MATRIX 21 CFR PART 11 MODULE OVERVIEW

The Matrix software offers a *21 CFR Part 11* module that is compliant with the *Code of Federal Regulations (CFR) Title 21 Part 11 – Electronic Records: Electronic Signatures* published by the U. S. Food and Drug Administration (FDA). In summary, this module ensures that an organization’s use of electronic records and digital signatures in place of traditional paper-based documentation is in compliance with current FDA regulations.

Key elements in Matrix *21 CFR Part 11* module functionality are described below:


- *Electronic Signatures* are captured during the counting and analysis workflow using **e-Sign/e-Unsign** buttons and include the name of an authorized user, date/time when the signature was executed, reason for the action being performed and meaning of the signature (i.e., for the *Review, Approval or Rejection* of an action). If a user’s assigned role does not have permissions to approve count results, a supervisor can log in to e-Sign the record on behalf of the user.
- *Electronic Records* are created as the result of linking electronic signatures to user actions ensuring that records have not been copied or falsified in any manner.
- An *Audit Trail* provides assurance regarding the integrity of an electronic record and continually monitors all users performing actions, the type of actions performed, and the date/time associated with user actions.

This module may be enabled for your instrument at time of purchase or implemented as an upgrade in the field by Support. See the ***Matrix Software User Manual*** for a full description of Matrix *21 CFR Part 11* module functionality.

ABOUT THIS USER MANUAL

This *Cellometer K2 Matrix User Manual* provides information on the following topics:

- [Instrument System/Software Overviews](#)
- [Hazards, Safety Info and Environment](#)
- [Components, Device SN Label and Specs](#)
- [Unpacking and Site Preparation](#)
- [Installation, Operation and Screen Elements](#)
- [Comparison of Viability Methods](#)
- [Sample Preparation](#)
- [Matrix Counting and Analysis Workflow](#)
- [Cleaning, Maintenance and Storage](#)
- [Troubleshooting, Messages and FAQs](#)
- [Contacting Support and Reporting Issues](#)
- [Consumable Slides, Reagents and Beads](#)
- [Report Designer for WPF Reference](#)
- [Warranty and License Details](#)

The following *Precaution Signifiers* are used in conjunction with the  symbol in this user manual:



IMPORTANT: Note indicating that to skip or move past <content_of_note> may result in improper functionality of the instrument.



CAUTION: Note indicating that <content_of_note> may damage instrument to the point where it will no longer function as expected.



WARNING: Note indicating that <content_of_note> may permanently damage instrument and cause personal injury or harm.
















GLOSSARY OF ABBREVIATIONS

The following abbreviations may be displayed on the shipping container, on the Cellometer K2 device label or in this user manual.

A	Amperes	kW	Kilowatt
AC	Alternating Current	lb	Pound
ANSI	American National Standards Institute	PC	Personal Computer
AO	Acridine Orange	PI	Propidium Iodide
API	Application Program Interface	LED	Light-emitting Diode
@	at	MHz	Megahertz
BR	Brightfield	µg	Microgram
°C	Degrees Celsius	µL	Microliter
cm	Centimeter	µm	Micron (Micrometer)
EU	European Union	mL	Milliliter
°F	Degrees Fahrenheit	mm	Millimeter
FCC	Federal Communications Commission	ms	Millisecond
FDA	Food and Drug Administration	nm	Nanometer
FL	Fluorescence	OQ	Operational Qualification
GUI	Graphical User Interface	OSHA	Occupational Safety and Health Administration
Hz	Hertz	P/N	Part Number
IFU	Information for Use	SN	Serial Number
in	Inch	SW	Software
IPA	Isopropyl Alcohol	US	United States
IQ	Installation Qualification	USB	Universal Serial Bus
kg	Kilogram	V	Volts
kHz	Kilohertz	WEEE	Waste Electrical and Electronic Equipment

GLOSSARY OF SYMBOLS

The following international symbols may be displayed on the shipping container, on the Cellometer K2 device label or in this user manual.

	Keep Dry. Located on Shipping Container		This End Up. Located on Shipping Container		Fragile, Handle with Care. Located on Shipping Container
	FCC Part 15 Supplier Declaration of Conformity. Located in User Manual		European Conformity Mark. Located on Device SN Label		ISO 9001 Certified
	Polarity DC Power Connector. Located on Device SN Label		NRTL Safety Mark. Located on Device SN Label		On – Power Connection to Mains. Located on Instrument Power Switch
	Waste Electrical and Electronic Equipment Directive (WEEE). Located on Device SN Label		Korean Certification for EMC Directives and Registration Number. Located on Device SN Label		Off – Power Disconnection from Mains. Located on Instrument Power Switch
	Serial Number. Located on Device SN Label		UK Conformity Assessment Declaration of Conformity to UK Directives. Located on Device SN Label		Manufacturer. Located on Device SN Label

Chapter 2. Hazards, Safety and Environment

As with any equipment that involves moving parts, there are potential hazards involved in the operation and maintenance of this instrument. This chapter identifies potential hazards, lists equipment safety information and provides environmental requirements.

POTENTIAL HAZARDS

This section describes instrument safety features designed to minimize potential hazards. Before using the system, familiarize yourself with this information.



WARNING: No modification of this equipment is allowed. Modification of equipment can result in improper operation causing possible injury.

In the United States, the facility operating the instrument should follow all *OSHA Manual* lines and applicable ANSI standards for the safe use of this instrument.

Customer and operator agree that it is their sole responsibility to fully understand and comply with local, state, and federal laws, rules and regulations in the use of this system.

Cables and accessories not specified within the instructions for use with this instrument are not authorized. Using other cables and/or accessories may adversely impact safety and performance.

Note: The Cellometer K2 instrument should not be used adjacent to or stacked with other equipment unless specified by Revvity. If the system must be used adjacent to or stacked with other equipment, then observe the instrument in its configuration to verify instrument operation is normal and functions as expected.

Electrical Hazard

No part of the exterior housing should be removed. Do *not* open the instrument cover. For assistance, contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com



WARNING: To avoid the risk of electrical shock, this equipment must only be connected to a grounded electrical outlet.

In addition, ensure electrical supply plug is not obstructed and can be reached by users to disconnect the device if necessary.

Instrument System Hazard

Read the instructions, warnings and cautions provided with the instrument before using.



WARNING: Inspect instruments and cables for breaks, cracks, nicks and other damage before every use. This may be done visually under magnification or with a high voltage insulation testing device. If damaged, do *not* use. Damaged instruments or cables may result in injury to the user.



CAUTION: The instrument is designed to accept only one slide at a time. Do *not* attempt to load more than one slide into the sample slot. Doing so will cause an error and could damage the instrument.



CAUTION: Do *not* stack equipment on top of the Instrument or place Instrument on top of electrical equipment. This is an unstable configuration and does not allow for adequate cooling.

In addition, it is recommended that as much distance as possible be provided between the instrument and any equipment emitting a high vibration signature. High levels of vibration may affect clarity of the image being viewed.



WARNING: Do *not* remove the instrument cover. For assistance, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

Servicing Hazard

No one other than Revvity-authorized personnel may service inside the protective cover of the Cellometer K2 instrument.



CAUTION: Do not pull the system by the connectors. Toppling of the system or causing damage to the system may result in the instrument no longer functioning as expected.

SAFETY INFORMATION

Personnel operating and maintaining the Cellometer K2 instrument should be familiar with the safety information included in this section.

Safety Protocols

Revvity assumes no liability whatsoever for any damage, loss or injury resulting from an application of a product that is not in strict accordance with the instructions provided with the product. Revvity also assumes no liability for any damage or injury arising as a result of operator error or mistake, including, but not limited to, injury arising from operator's lack of qualification or as a result of errors or mistakes committed by such operator.

Read all installation and operation instructions contained in this user manual thoroughly before connecting the Cellometer K2 instrument to the main power connection *prior* to use. The Cellometer K2 must be set, regulated and used in accordance with instructions outlined in this user manual. Failure to observe safety warnings and precautions may present a risk.

Only individuals with appropriate safety training and knowledge should operate, assist in the operation of, or perform cleaning and routine maintenance of this instrument. Only the operator should be responsible for system controls during a procedure.

Safety Features

The Cellometer K2 instrument offers several safety features to prevent its misuse or unintentional activation. All personnel who operate the system should be familiar with these safety features.

For assistance, contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com



Federal Communications Commission

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

ENVIRONMENTAL REQUIREMENTS

Environmental requirements for intended operation of the Cellometer K2 instrument are presented below.

- For Indoor Use Only
- Elevation: 0 to 2,000 m
- Temperature Range: 10 °C to 30 °C
- Relative Humidity: 0% to 90% RH, non-condensing
- Pollution degree: Degree 2
- MAINS supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage

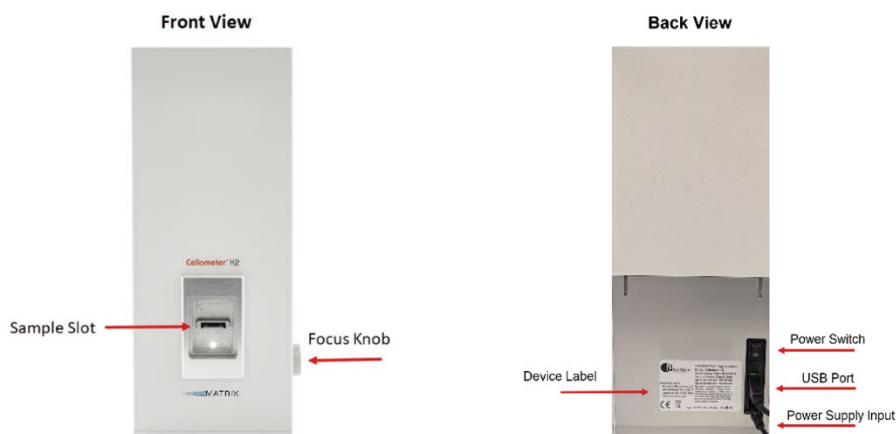


IMPORTANT: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Chapter 3. Instrument Description

This chapter describes the Cellometer K2 instrument components, device label and system specifications.

CELLOMETER K2 COMPONENTS



Sample Slot: Counting chamber slides are inserted into this slot for viewing (accepts only one slide at a time).

Focus Knob: Radial dial used to focus the camera.

Power Switch: Controls power going to the instrument.

USB 2.0 Port: Port used to connect Cellometer K2 to Operating Computer with Connector Cable provided.

Power Supply Input: Port used to connect the Power Supply/Power Cord to the instrument.

Device Label: Lists the instrument serial number (SN), model, manufacturer and input power requirement.

DEVICE SN LABEL



UK Conformity Assessment Declaration of Conformity to UK Directives



Korean Certification for EMC Directives and Registration Number




European Conformity Mark



NRTL Safety Mark









Waste Electrical and Electronic Equipment Directive (WEEE)



Cellometer® K2 Image Cytometer
Model: Cellometer K2
Serial Number: VisionLB-101-XXXX
Factory Installed Optics#: X040
Optics Module A #: VC-535-403
Optics Module B #: VC-660-503

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Input: 12 V DC 2.25A, 27W Max 



Polarity DC Power Connector

INSTRUMENT SPECIFICATIONS

The *Cellometer K2 Matrix System* is comprised of instrument connected via USB cable to an Operating Computer used to run the instrument software. The Operating Computer can be linked to a network for accessing external files, printers and for storing count results.

Cellometer K2			
Channels	Brightfield and Fluorescent (FL1 - <i>Green</i> and FL2 - <i>Red</i>)		
Fluorescent Optics	<table border="1"> <tr> <td>VC-535-403 Excitation / Emission: 470 nm / 535 nm <i>Example Fluorophores:</i> - Acridine Orange (+DNA) - CFDA - FITC</td> <td>VC-660-503 Excitation / Emission: 540 nm / 605 nm <i>Example Fluorophores:</i> - Propidium Iodide - Ethidium Bromide - 7-AAD</td> </tr> </table>	VC-535-403 Excitation / Emission: 470 nm / 535 nm <i>Example Fluorophores:</i> - Acridine Orange (+DNA) - CFDA - FITC	VC-660-503 Excitation / Emission: 540 nm / 605 nm <i>Example Fluorophores:</i> - Propidium Iodide - Ethidium Bromide - 7-AAD
VC-535-403 Excitation / Emission: 470 nm / 535 nm <i>Example Fluorophores:</i> - Acridine Orange (+DNA) - CFDA - FITC	VC-660-503 Excitation / Emission: 540 nm / 605 nm <i>Example Fluorophores:</i> - Propidium Iodide - Ethidium Bromide - 7-AAD		
Commonly Used Compatible Dyes	AO/PI, Trypan Blue		
Counting Speed (Per Sample)	<30 sec		
Volume (Per Chamber)	20 μ L		
Cell Size/Diameter Range	4 – 90 μ m		
Concentration Range	1x10 ⁵ – 1x10 ⁷ cells/mL		
Weight	23 lbs (10.4 kg)		
Width	6.0" (15.2 cm)		
Depth	8.5" (21.6 cm)		
Height	14.0" (35.6 cm)		
Input to Power Adapter	100-240 VAC, 50/60 Hz, 1.0 A		
Output to Instrument	12 VDC, 3.34 A		

The Cellometer K2 uses brightfield and fluorescent imaging with pattern-recognition software to quickly and accurately decluster, identify and count individual cells.

DECLARATION OF CONFORMITY

Cellometer K2 conforms to appropriate country standards and governing regulations as listed in the *Declaration of Conformity*. To request the K2 *Declaration of Conformity*, contact Support by visiting <https://www.revvy.com/contact-us> or send email to: CellC-support@revvy.com

Chapter 4. Unpacking and Site Preparation

This chapter presents site preparation facility requirements for setting up the Cellometer K2 and transporting instructions if the instrument must be moved to another location.

UNPACKING/SETTING UP THE INSTRUMENT

Congratulations on your purchase of one of the best declustering cell counters available! Please ensure you have secured the space required to set up your new Cellometer K2 (see *Facility Requirements* on page 15).

For assistance in setting up the instrument, visit the Cellometer K2 page on our website to for a training video on unboxing and getting started.

Our staff would be happy to help you set up your Cellometer K2. For assistance, contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com

1. Inspect the package to ensure no damage has occurred during shipping, if applicable. Contact Support if damage has visibly affected the instrument.
2. Ensure the box is facing up (i.e., *This End Up* symbol is facing in the right direction). If not, carefully turn the box right side up. *Box will weigh approximately 30 lbs (13.6 kg).*
3. Open the outer box and remove protective packaging.
4. Remove the Consumables box and carefully open to locate any temperature-controlled beads/reagents. Store the beads/reagents per the product insert provided.
5. Remove instrument accessories (e.g., Power Supply/Cord, USB 2.0 Connector Cable, USB Drive, *Cellometer K2 Focus Guide*, printed version of *Cellometer K2 Matrix Quick Start Guide* as well as any other documents) and set aside.



Note: USB Drive will be included only if instrument is *not* shipped with a Laptop (also referred to as Operating Computer). *If a Laptop was purchased from Revvity, it will be shipped in a separate box.*

6. Remove the Cellometer K2 instrument and place it in the prepared area (see *Facility Requirements* on page 15).
7. Remove the protective plastic from around the Cellometer K2.
8. Connect the instrument Power Supply to the instrument Power Cord.
9. Connect the instrument Power Supply to the Cellometer K2 and then plug the instrument Power Cord into a surge protector (*recommended*) or dedicated electrical outlet.
10. If an Operating Computer (Laptop) was purchased from Revvity with the instrument, open the laptop box (shipped separately) and set up laptop within reach of the Cellometer K2. The *USB 2.0 Connector Cable must reach the laptop while it is connected to the instrument.*
 - Connect the laptop Power Supply to the laptop Power Cord.
 - Connect the laptop Power Supply to the Operating Computer and then plug the laptop Power Cord into an electrical outlet.
 - Power on the Operating Computer and wait for it to initialize

11. Connect the Operating Computer to the Cellometer K2 using the USB 2.0 Connector Cable.
12. Turn the Cellometer K2 Power Switch to the *ON* position. *Power Switch is located on back of instrument.*
13. Confirm that light on front of instrument (under *Sample Slot*) is lit. The system is now ready for use.

Cellometer K2 IQ/OQ Validation

Revvity, Inc. has designed an *Installation Qualification/Operation Qualification (IQ/OQ)* validation specifically for the Cellometer K2 Matrix System. Our experienced Support team is available to assist your organization during set up of the instrument and while performing the IQ/OQ validation. Contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com

21 CFR Part 11 OQ Validation

If you have enabled Matrix *21 CFR Part 11* module functionality for your system, a separate *OQ* validation has been designed as a supplement to be run in conjunction with the *Cellometer K2 Matrix IQ/OQ Protocol*.

Note: Integrating the *Matrix 21 CFR Part 11 OQ Protocol Supplement* into the *Cellometer K2 Matrix IQ/OQ Protocol* requires that you have purchased a Matrix *21 CFR Part 11* module license and the *Cellometer K2-21MX-IQOQ Kit*.

Our experienced Support team is available to assist your organization during set up of the instrument and while performing the IQ/OQ validation. Contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com

SITE PREPARATION

Facility Requirements

Instrument must be plugged directly into a surge protector (recommended) or power outlet. Ensure all cables are free from kinks or tangles *prior* to starting the Cellometer K2.

Due to how the instrument is used with liquids, the instrument should be placed on a level surface.

Keep the area around the Cellometer K2 clean between, during and post operation.

Electrical requirements for the Cellometer K2 are as follows:

- 1.0 AMP service
- Wall receptacle voltage between 100 to 240 VAC
- 50/60 Hz

Note: Voltage requirements vary per region. For international customers, ensure that Power Cord meets local regulations or use a suitable replacement.

Note: The instrument can be disconnected from the mains by disconnecting the Power Cord from the mains plug or appliance coupler.



CAUTION: Do *not* position the device so that it is difficult to disconnect from power main.

Transporting the Instrument

Prior to transporting the instrument by vehicle, disconnect the main from the wall and package all accessories and consumables individually and safely, ensuring cables are also protectively wrapped. Refer to instrument dimensions to ensure vehicle to be used for transporting meets these requirements.

When the instrument is loaded into the vehicle, it should be secured in such a way to prevent the instrument or components from shifting during transport.



WARNING: Care should be taken while moving or transporting the instrument to prevent damage to the instrument and/or possible injury.

Disposal of Waste Electrical and Electronic Equipment



To comply with European Commission Directive on Waste Electrical and Electronic Equipment (WEEE) and other country and state regulations, do *not* dispose of this equipment in any location other than designated waste locations. For information regarding proper product disposal, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

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Chapter 5. Operation

This chapter describes installing the software and steps to be performed when using instrument for the first time.



WARNING: Never place a foreign object inside the Sample Slot (which is designed to accept only one slide at a time). Should anything get stuck or spill inside the sample slot, power OFF the instrument and contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

INSTALLING THE K2 MATRIX SYSTEM SOFTWARE

If you purchased a Revvity-provided Laptop with your Cellometer K2 instrument, the Matrix software is pre-installed and you can skip this section. Continue to *Using Instrument for the First Time* on page 21.


K2 Matrix System software installation consists of multiple steps including *Preparing for Installation*, *Installing the Matrix Software*, *Restoring the Matrix Database* and *Entering Instrument Details*. Once installation is complete, additional steps are required when using instrument for the first time such as *Connecting Instrument to Operating Computer*, *Launching the Matrix Software*, *Verifying Instrument and Camera Connections*, and *Calibrating Instrument via the Software*.

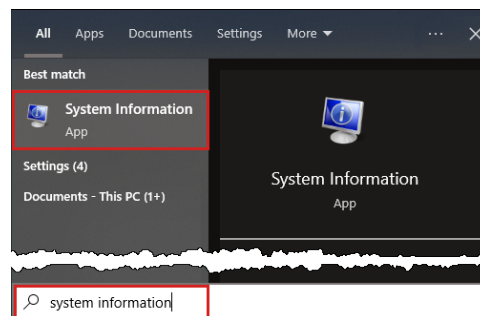
Note: Ensure that instrument is *not* connected to the Operating Computer during installation until specified below.

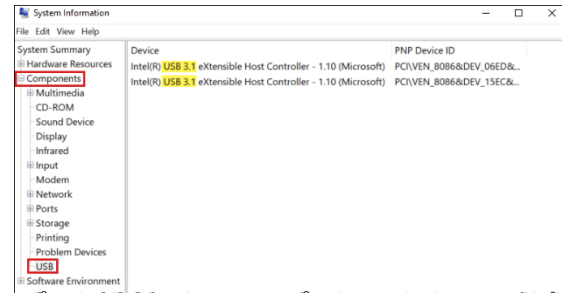
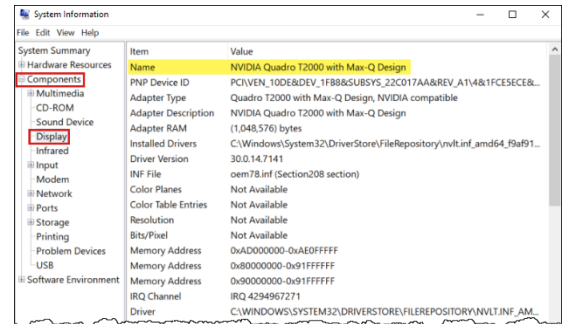
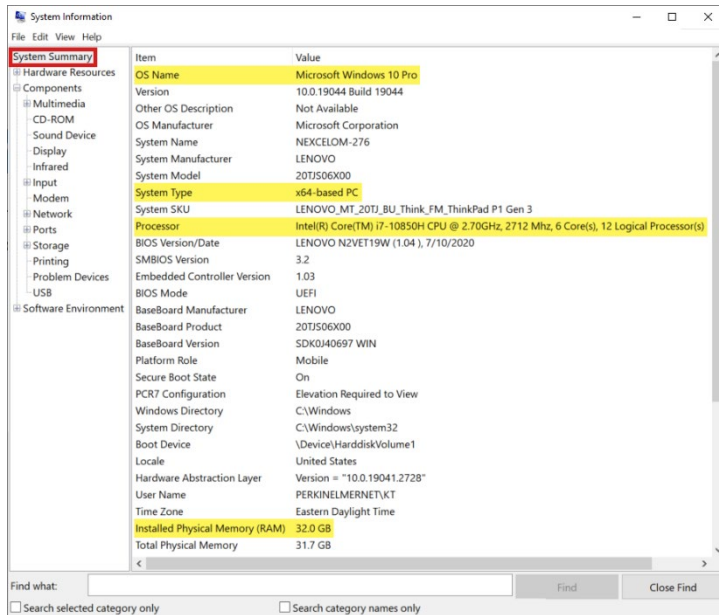
Preparing for Installation

Preparing for installation includes verifying that a customer-supplied Operating Computer meets Matrix software *minimum* requirements and confirming your user account has installation permissions.

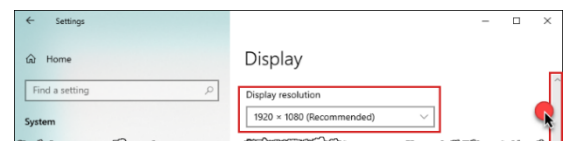
VERIFYING MINIMUM OPERATING COMPUTER REQUIREMENTS

1. Using the Windows Search functionality , enter **system information** and select the *System Information* app from the *Best Match* area. *The System Summary page is displayed by default (shown on next page).*
2. Confirm that Operating Computer meets or exceeds Matrix software *minimum* requirements by viewing information highlighted in the following sample screens – *OS Name*, *System Type*, *Processor* and *Installed Physical Memory (RAM)*.





3. To identify graphics cards available on the computer, expand the **Components** section and click **Display**.
4. If multiple graphics cards are available, scroll through the list to confirm that a card meets Matrix software *minimum* requirements (i.e., *GPU NVIDIA P1000 or equivalent*).
5. To identify USB ports available on the computer, click **USB** in the expanded *Components* section.
6. Close the window by clicking **X** in upper right corner.
7. Right-click on the desktop and select *Display Settings* from the menu displayed.
8. Using the scroll bar for the right pane, scroll down to view *Display Resolution*. Confirm that *1920 x 1080* is the selected resolution.
Note: If a different resolution is displayed, select *1920 x 1080* and click *Keep Changes*.
9. Close the window by clicking **X** in upper right corner.



VERIFYING SOFTWARE INSTALLATION PERMISSIONS

Verify that your user account on the Operating Computer has software installation permissions (typically requires the *Administrator* privilege).

Note this procedure will vary based on your installed Windows version. Check with your IT administrator for assistance in verifying software installation permissions.

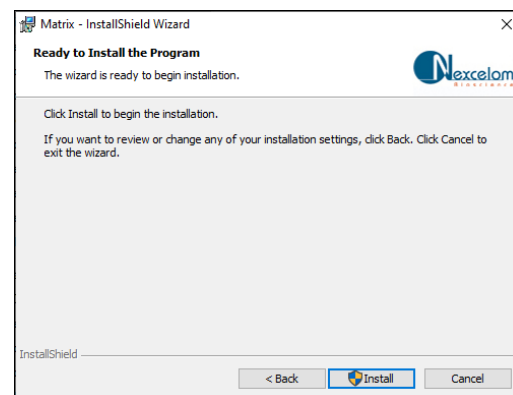
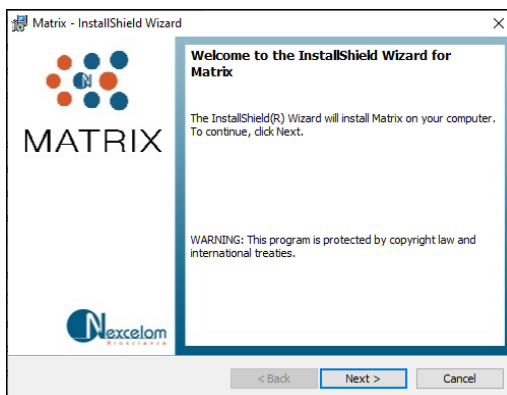
Installing the Matrix Software

If the Matrix 21 CFR Part 11 module is to be enabled (i.e., requires purchase of a license), you must contact Support after Matrix software installation is complete for assistance in enabling the module.

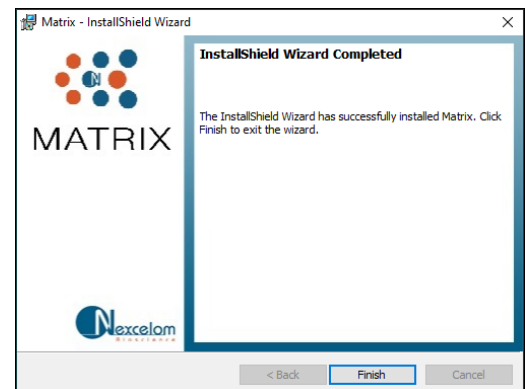
1. Insert USB Drive containing Matrix software into a USB port of the Operating Computer.
2. Navigate to USB drive and copy the following folders/files to indicated locations:
 - Copy **K2 Settings** folder and **Matrix vN.N_N.N.NNNNN.N** folder (where *N.N* represents version number and *NNNNN.N* is file build number) to the desktop.
 - Copy **Matrix_vN.N_N.N.N.NNNNN.N.bak** database file (where *N.N* represents version number and *NNNNN.N* is file build number) to root folder (e.g., **C:**).
3. Open the **Matrix_vN.N_N.N.N.NNNNN.N** folder on desktop and in the *DISK1* subfolder, double-click the **MatrixSetup.exe** installer file.

Note: Prior to installing the Matrix software, the installer checks for prerequisites such as C++ and MS SQL Server on your system. If the required prerequisites need to be installed, you'll need to restart your computer and then run the **MatrixSetup.exe** installer file again.

4. When the Welcome screen for the installer is displayed, click **Next**.

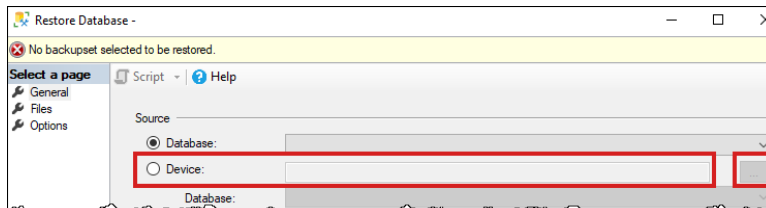


5. Click **Install**.
6. Click **Finish**.
7. Confirm that the **Matrix** icon appears on the desktop.
8. Open the **K2 Settings** folder on the desktop and then copy the **Configurations** folder contained within to the following path:
`<root_folder>/ProgramData/Nexcelom Bioscience/Matrix/vNNN`
 where *NNN* represents version number (e.g., *510* for version *5.1.0*).
9. When prompted with a confirmation message, click the **Replace files in destination** button and close the window.



Restoring the Matrix Database

- From the Windows Start Menu, expand the **Microsoft SQL Server Tools 18** folder to launch the **Microsoft SQL Server Management Studio 18** application.
- In the *Authentication* drop-down, select **SQL Server Authentication**.
- Log in using the following credentials – *Login: sa*
Password: Cellca01
- Click **Connect**.
- On the left side of the screen, right click on **Databases** and select **Restore Database** from the displayed menu.
- In the *Source* area, select the **Device** option and click the ... button.



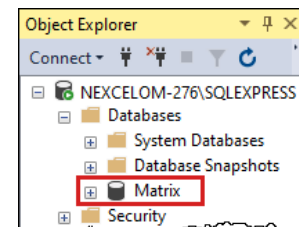
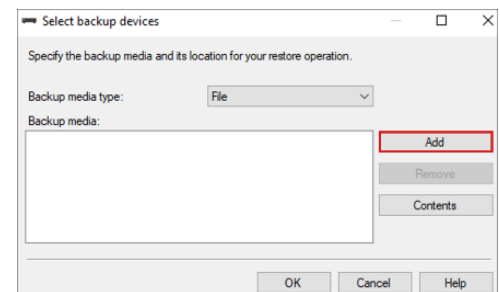
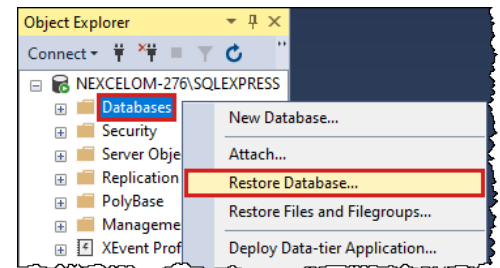
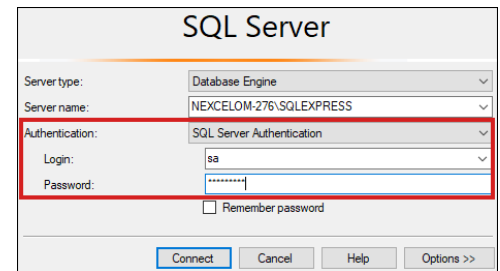
- Click the **Add** button.
- Navigate to location in the root folder (e.g., **C:**) where you copied the **Matrix_vN.N.N.N.NNNNN.N.bak** database file (where *N.N* represents version number and *NNNNN.N* is file build number). Select the file and click **OK**.
- When prompted with a confirmation message, click **OK** to confirm the file and then click **OK** again to restore the database.
- Expand the database tree and verify that the **Matrix** database appears in the list.
- Close the window by clicking **X** in the upper right corner of the screen.

The K2 Matrix System software installation is now complete.

Enabling the 21 CFR Part 11 Module

If the *Matrix 21 CFR Part 11* module is to be enabled for your system (i.e., requires purchase of a module license), you must contact Support *at this point* to request assistance in enabling the module.

For assistance, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com



USING INSTRUMENT FOR THE FIRST TIME

If you are accessing the Matrix software from a touchscreen device, you can interact directly with the software GUI by tapping gently on screen elements (e.g., tabs, drop-downs or buttons) using a finger or stylus. *If you choose to use touchscreen functionality, the term “click” as it appears in this guide may be replaced with “tap” interchangeably.* As an alternative, a USB mouse may also be connected.

Connecting Instrument to Operating Computer

1. Connect instrument Power Supply to Power Cord.
2. Connect instrument Power Supply/Power Cord to the Cellometer K2.
3. Plug instrument Power Cord into a surge protector (*recommended*) or electrical outlet.
4. Turn instrument Power Switch (located on back left) to the *ON* position. *Light on front of until will be lit.*
5. Connect USB Cable to the K2.
6. Set up Operating Computer within reach of the K2. *The USB Connector Cable must reach the computer while it is connected to instrument.* Power on computer and wait for the software to initialize.
7. Connect USB Cable to USB 2.0 port on Operating Computer. *Be sure that software installation is complete before connecting USB Cable. USB driver will be downloaded automatically by the Operating Computer.*

Launching the Matrix Software

From desktop of Operating Computer, launch the Matrix software by double-clicking the **Matrix** icon.



Note: Upon launch of the software the instrument will run through a startup sequence that includes connecting to the database and initializing the calibrations.

If using a customer-supplied Operating Computer, you will be prompted to enter instrument details.

ENTERING INSTRUMENT DETAILS

1. From desktop of Operating Computer, double-click the **Matrix** icon to launch the software.
2. Enter instrument *Serial Number* (located on back of unit).
3. Enter instrument *Optics Number* (located on back of unit).
4. Enter instrument *Filter 1* (i.e., *Optics Module A #* located on back of unit).
5. Enter instrument *Filter 2* (i.e., *Optics Module B #* located on back of unit).
6. Click **OK**.

Cellometer[®] K2

A new Cellometer K2 instrument was detected. Please supply the instrument information below to continue.

Serial #:

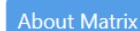
Optics:

Filter 1:


Filter 2:

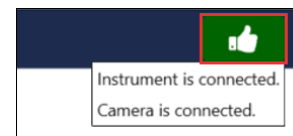
Verifying Matrix Software Version

1. Click the **Home** tab.
2. Click the **About Matrix** button to display the software version information.



Verifying Instrument and Camera Connections

1. Click the **Instrument Status**  icon (green “thumbs up”) located in the upper right corner of the screen.
2. Confirm that text in the message box displayed indicates the instrument and camera are connected to the Matrix software.
3. Click the icon again to close the message box.



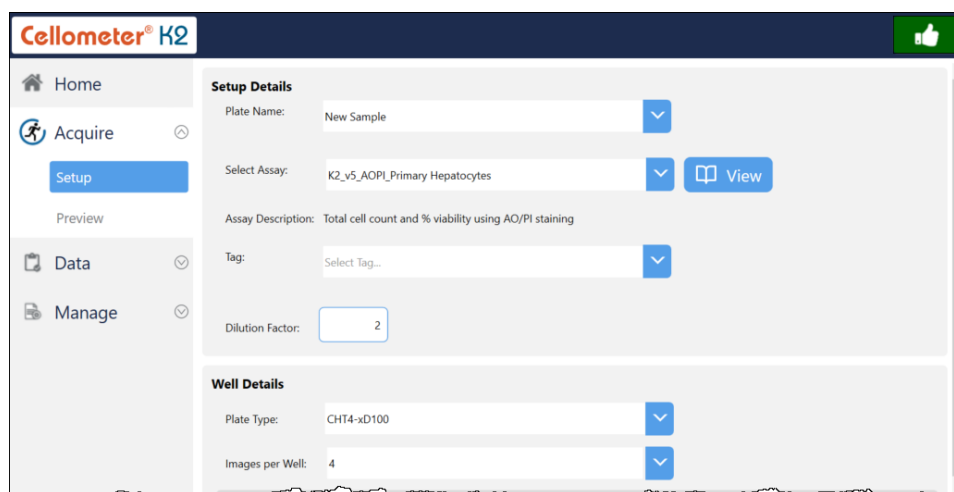
Calibrating Instrument Prior to First Use

After initial setup of an instrument, you must calibrate it using the Matrix software prior to first-time use. *You will be prompted with a message if you attempt to acquire data before calibration has been performed.*

The calibration process takes a background image that will be used to normalize the cell counter for each installed filter pair *without* a consumable counting chamber slide loaded in the instrument. For assistance, contact Support by visiting <https://www.revvy.com/contact-us> or send email to: CellC-support@revvity.com

MATRIX SCREEN ELEMENTS

Upon launching the Matrix software you are presented with the **Acquire** tab > **Setup** screen by default. Basic screen elements are described below.



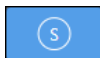
Note: If the Matrix 21 CFR Part 11 module has been enabled for your system, users must log in *before* they can use the software. See the **Matrix Software User Manual** for details on using 21 CFR Part 11 module functionality.

Header Bar

The *Header Bar* visible across the top of the screen is always displayed.



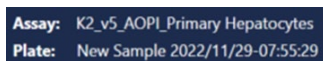
Functionality of Header Bar elements is described below.



Instrument Status Icons: Displayed in the right corner of the Header Bar, indicates current instrument status. Clicking this icon displays a message box containing details. Click icon again to close message box.

- The *Live Mode* icon (green “thumbs up”) indicates that the instrument and camera are connected to the Matrix software.
- The *Data Analysis Mode* icon (red “thumbs down”) indicates that the instrument and camera are *not* connected to the Matrix software.
- The *Simulated Mode* icon (blue with an “S”) indicates that the instrument and camera are running in simulation mode.

Note: *Simulated Mode* is only available to Revvity Sales/Field Application Scientists to demonstrate and test instrument functionality.



Assay/Plate Names: Assay name and plate name are added to the Header Bar when you proceed to the Preview screen in the count process.



User ID and Logout Button: If the *Matrix 21 CFR Part 11* module is enabled, displays the identity of the currently logged in user and **Logout** button. See the **Matrix Software User Manual** for details on using module functionality.

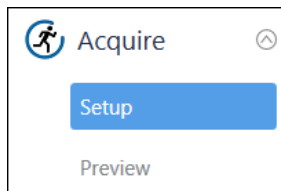
Navigation Bar

The *Navigation Bar* visible on the left side of the screen contains tabs/screen names and is always displayed. Functionality associated with each tab is described below. *Note that options displayed in the **Acquire** and **Data** tabs represent screens marking your progression through a sequential process, while options in the **Manage** tab may be individually selected to perform distinct tasks.*



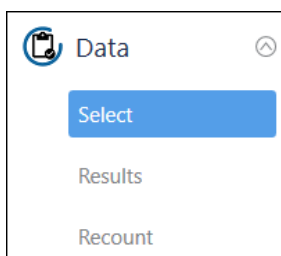
Home Tab: Displays the Powered By  **MATRIX** logo distinguishing the software from earlier versions used to run the instrument system.

Also contains the **About Matrix** button which displays software version details and global Support hotlines, as well as the **Generate Diagnostic Report/Clear All Logs** buttons used to assist Support with troubleshooting technical issues. See *Viewing Software Version* on page 25 and *Generating Diagnostic Reports* on page 49.



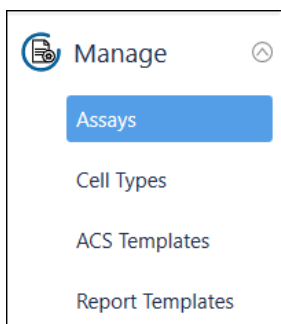
Acquire Tab: Contains the two sequential screens in the *Data Acquisition* workflow. For example, in the **Acquire** tab you must first enter *Setup* details before advancing on to *Preview* the sample and confirm focus/fluorescent exposure for each channel. As you move through screens in this workflow, the *Navigation Bar* status is updated to display the current screen.

The *Setup* screen can be selected as an option if you decide to review your setup *after* previewing the sample. Once you are satisfied and proceed to performing the count, the *Navigation Bar* status is updated to display the **Data** tab > *Results* screen. See *Performing a Cell Count* starting on page 33 for more information.



Data Tab: Contains the three sequential screens in the *Data Analysis* workflow. For example, in the **Data** tab you must first *Select* a scan result before you can view its count *Results*. You can then perform a *Recount* by fine-tuning assay parameter settings to be used in the analysis to create a new scan result. As you move through screens in this workflow, the *Navigation Bar* status is updated to display the current screen.

The *Select* screen can be selected as an option if you decide to review other count results *after* viewing the currently selected scan. See *Reviewing Count Results* starting on page 37 for more information.



Manage Tab: Contains the various system lists of assays, cell types, ACS templates and report templates used in the *Data Acquisition* and *Data Analysis* workflows.


- In the *Assays* screen you can view the library of assays available in your system, import/export assays, manage the list of assays as well as create new/modify existing assay details.
- In the *Cell Types* screen you can view the library of cell types available in your system, import/export cell types, manage the list of cell types as well as create new/modify existing cell type details.
- In the *ACS Templates* screen you can view the library of ACS templates available in your system, import/export ACS templates and manage the list of ACS templates. *ACS templates cannot be created or viewed in the Matrix software.*
ACS Templates can be used for populating data into specified formats when files are generated on export. If the *Auto Open* export option is also selected, the De Novo Software FCS Express application is launched for viewing the output file.
- In the *Report Templates* screen you can view the library of report templates available in your system, import/export report templates, and manage the list of report templates as well as create new/modify existing template details.

See the **Matrix Software User Manual** for details on using **Manage** tab options.

If the *Matrix 21 CFR Part 11* module has been enabled for your system, a user hierarchy must be established requiring the creation of roles that control varying levels of access to functionality available in each of these tabs. See the **Matrix Software User Manual** for details on using *Matrix 21 CFR Part 11* module functionality.

VIEWING SOFTWARE VERSION

The **Home** tab displays the logo for the instrument to which you are connected.

As the Cellometer K2 instrument can be run using either Cellometer Image Cytometer or Matrix software, the Powered By  MATRIX logo distinguishes the *K2 Matrix System* from earlier versions.



The **Home** tab also contains the **About Matrix** button which displays *Product Information* (e.g., software version, instrument serial number/firmware version, and camera serial number), and Revvity *Contact Information*.



For details on using the **Generate Diagnostic Report** and **Clear All Logs** buttons used to assist the Support team with troubleshooting technical issues, see *Generating Diagnostic Reports* on page 49.



WARNING: Logs may be required to maintain a historical archive. As using the **Clear All Logs** button will *permanently* remove accumulated logs for the installed Matrix software version, it is recommended that you contact IT *before* clearing logs from your system.

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Chapter 6. Viability Methods

This chapter describes how to choose a viability staining method based on the cell sample and selected assay type.

EVALUATING VIABILITY METHODS

When evaluating viability methods, it is critically important to use a single aliquot from the stock cell culture to perform *all* testing. The cell sample should be evaluated for concentration on the Cellometer K2 prior to staining.

Note: Cell concentrations of 1.0×10^5 – 1.0×10^7 cells/mL can be analyzed on the Cellometer K2, with a concentration of 1.0×10^6 cells/mL being optimal.

If comparing the *Trypan Blue* and *AO/PI* viability methods, a portion of the sample should be stained with trypan blue and another portion stained with AO/PI. *Using samples from the same aliquot containing identical cell concentrations will result in a more accurate comparison of staining methods.*

Dilution or concentration of a cell sample may be required based on the initial concentration. *It is recommended to use cell culture media for dilution.*

Using Trypan Blue Viability Method

Brightfield imaging and the *Trypan Blue Viability* can be used to determine the number, concentration and percentage of live cells for cell lines and cultured primary cells. Brightfield imaging with trypan blue staining is *not* recommended for samples containing debris, platelets or red blood cells. For accurately differentiating nucleated cells, fluorescence is required.

PREPARING A CELL SAMPLE FOR TRYPAN BLUE VIABILITY DETERMINATION

Invert the tube containing cells ten times (10x) and pipette up and down 10x to generate a homogeneous cell sample and reduce cell clumps. Do *not* shake or vortex the sample as this may damage cell membranes.

For viability measurement, stain cells by combining 20 μ L of cell sample with 20 μ L of a 0.2% trypan blue staining solution (for a final concentration of 0.1% trypan blue). Gently mix by pipetting up and down 10x.

TRYPAN BLUE STAINING SOLUTION GUIDELINES

Use the following trypan blue staining solution guidelines when preparing cell samples for analysis.

<i>Stain Type</i>	<i>Use with Cell Sample</i>	<i>Dilution Factor</i>
Trypan Blue (0.2%)	1:1	2

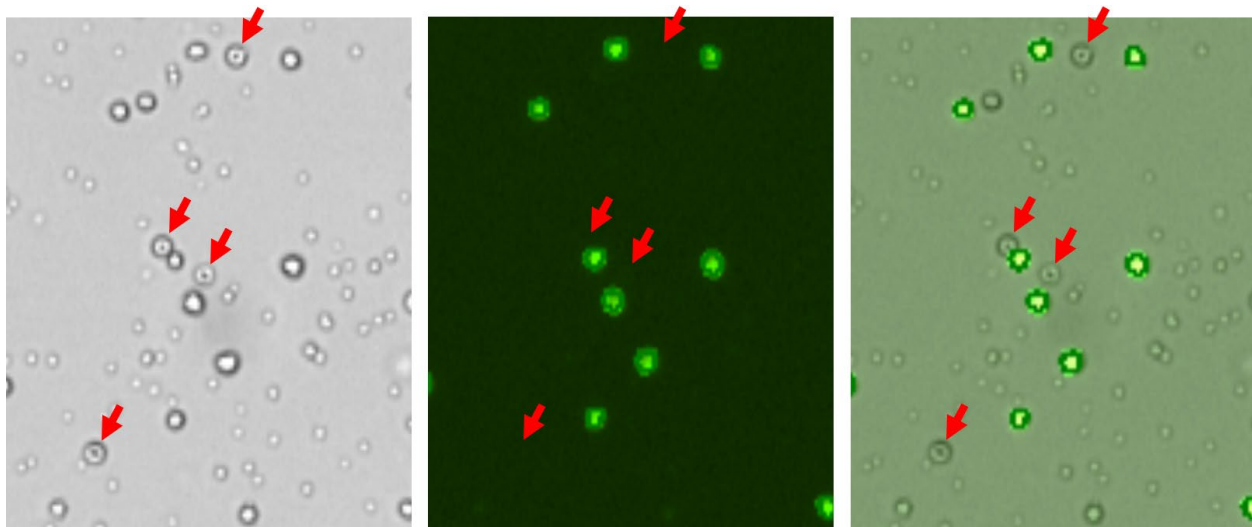
Using AO/PI Viability Method

Dual-fluorescence methods have been developed to accurately determine nucleated cell concentration and viability in primary cell samples containing debris and non-nucleated cells, including platelets and red blood cells.

In the *AO/PI Viability Method*, acridine orange (AO) enters all cells and stains their DNA causing nucleated cells to fluoresce *Green* (470/534 Channel), while propidium iodide (PI) only enters dead cells with compromised membranes and stains their DNA causing them to fluoresce *Red* (531/655 Channel).

- Cells stained with *both* AO and PI fluoresce *Red* due to quenching.
- Live nucleated cells are easily identified in the *Green* fluorescence channel.
- Dead nucleated cells are easily identified in the *Red* fluorescence channel.

As a result, debris and non-nucleated cells do not interfere with nucleated cell counts when using the AO/PI viability method.



In images captured by Cellometer K2 using the AO/PI viability method, red blood cells (RBCs, marked by red arrows) seen in the brightfield image (on left) are *not* seen in the fluorescent image (in middle), but are clearly identified in the overlay image (on right). Only nucleated cells are counted using the AO/PI staining method resulting in a more accurate total cell count and percent viability calculation.

PREPARING A CELL SAMPLE FOR AO/PI VIABILITY DETERMINATION

Invert the tube containing cells ten times (10x) and pipette up and down 10x to generate a homogeneous cell sample and reduce cell clumps. Do *not* shake or vortex the sample as this may damage cell membranes.

For viability measurement, stain cells by combining 20 μ L of cell sample with 20 μ L of AO/PI staining solution. For whole blood and other viscous samples, draw sample in and out of the pipette tip at least once prior to transferring for staining. Gently mix stained cell solution by pipetting up and down 10x before adding sample to counting chamber (CHT4).

The table below shows the recommended dilution when preparing cell samples for AO/PI viability analysis and the final *Dilution Factor* to enter into the Matrix software for a variety of sample types.

Sample Type	Preliminary Sample Dilution	Volume of Sample	Volume of AO/PI	Final Dilution Factor
Whole peripheral blood or cord blood	1:10	20 µL	20 µL	20
PBMCs following Ficoll separation	<i>Not Required</i>	20 µL	20 µL	2
Mononuclear cells from processed bone marrow	<i>Not Required</i>	20 µL	20 µL	2
Tumor digest/Tissue digest	<i>Not Required</i>	20 µL	20 µL	2
Stem cells from CD34+ separation	<i>Not Required</i>	20 µL	20 µL	2

AO/PI STAINING SOLUTION GUIDELINES

Use the following AO/PI staining solution guidelines when preparing cell samples for analysis.

Stain Type	Use with Cell Sample	Dilution Factor
AO (CS1-0108-5mL)	1:1	2
PI (CS1-0109-5mL)	1:1	2
AO/PI (CS2-0106-5mL)	1:1	2
AO/PI (CS2-0106-25mL)	1:1	2

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Chapter 7. Sample Preparation

This chapter describes preparing Cellometer counting chamber slides and loading counting beads/cell samples into counting chambers.

PREPARING COUNTING CHAMBER SLIDES

1. For SD100 slides, remove protective film from both sides of the slide. *PD100 slides are peeled and ready to use.*

Note: It may be difficult to peel protective film from slide. One method is to adhere tape to the top of film and then pull tape off (with film attached). Do *not* touch or write on the clear optical window areas of the slide.

Top of Slide



Bottom of Slide



2. Place the Cellometer disposable counting chamber slide on a fresh Kimwipe.
3. To prepare two samples at once, label individual counting chambers (e.g., *Chamber 1* and *Chamber 2*) in the white margin of each chamber. Take care to ensure the clear portion of the counting chamber is not touched.

Note: Both chambers of the slide do *not* need to be loaded with the same sample. Two different samples can be used on a single slide.

LOADING SAMPLES INTO COUNTING CHAMBERS

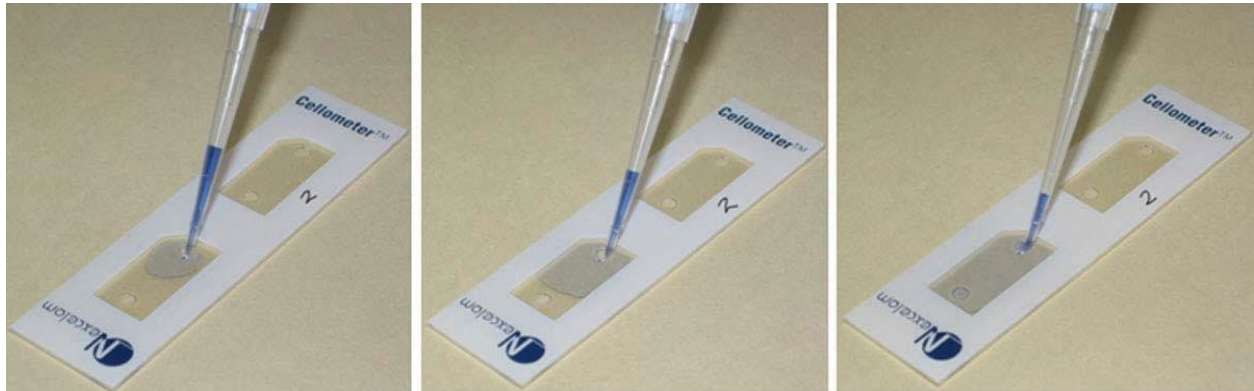
Cellometer counting chamber slides contain two independent chambers manufactured to a precisely controlled height. A cell suspension of 20 μL is pipetted into a chamber through its induction port.

1. To prepare the sample for counting, invert the tube containing your sample 10 times, then pipette up and down 10 times. This will help to evenly suspend cells. Do *not* shake sample as it may damage cell membranes.

Note: If testing for cell viability (*optional*), stain the sample using a 1:1 ratio with 0.2% trypan blue (or other chosen viability stain) and mix the stain by pipetting up and down 10 times *before* performing Step 1, above.

When preparing a sample to test for cell viability, ensure that the trypan blue stock concentration used is 0.2%. If stock concentration is 0.4%, it is recommended you dilute it with a balanced salt buffer (e.g., PBS) and filter diluted solution with a 0.2 μm filter before adding stain to your sample.

2. Immediately transfer 20 μL of sample into a counting chamber by pipetting directly onto its induction port. *There are two counting chambers per slide; each chamber may be loaded with a different sample.*
3. Hold the loaded slide in the white area and take care to stay away from the clear optical windows.



Load a counting chamber by touching pipette tip to the chamber's induction port and then slowly pipetting the entire 20 μL sample all at once. Capillary force automatically spreads the sample within the chamber. Each counting chamber can hold a separate sample as there is no mixing between the two individual chambers on a slide.

Chapter 8. Matrix Counting and Analysis Workflow

This chapter presents the basic workflow for counting beads/cells using the Cellometer K2 powered by Matrix software, including best practices and tips.

For a complete reference on using Matrix software functionality, see the **Matrix Software User Manual** for details.

PERFORMING A CELL COUNT

Performing a cell count consists of multiple steps (e.g., *Loading the Samples*, *Entering Setup Details*, *Setting Auto Export Location* and *Previewing the Samples*) before clicking the **Count** button.

Loading the Samples

If you have already prepared and loaded a slide with samples using instructions from Chapter 7. *Sample Preparation* starting on page 31, skip to *Entering Setup Details*, below.

1. Power on the Operating Computer and Cellometer K2 instrument.
2. Remove the protective film from both sides of the slide. *PD100 slides do not have this film. See Preparing Counting Chamber Slides on page 31 for details.*
3. Slowly pipette 20 μ L of cell/bead sample directly onto an induction port. Take care not to touch clear portion of counting chambers. See *Loading Samples into Counting Chambers* on page 32 for details.

Note: If testing for cell viability, you must stain the sample before loading it into the counting chamber. See *Trypan Blue Staining Solution Guidelines* on page 27 or *AO/PI Staining Solution Guidelines* on page 29.

4. Hold prepared slide by white area only and insert the counting chamber containing cell/bead sample into Sample Slot of Cellometer K2 until touching the internal stop. *The chamber inside the instrument will be counted.*




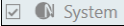
Entering Setup Details

1. From the desktop of Operating Computer, double-click the Matrix icon to launch the software. *The instrument will run through a startup sequence that includes connecting to the database and initializing the calibrations.*
2. In the **Acquire** tab > *Setup* screen displayed upon launch of the software, enter a plate name. *If a plate name is not entered, a date/time stamp will be appended to the "New Sample" default (e.g., New Sample 2023/08/25-10:58:09).*
3. Select an assay from the drop-down and confirm the assay description displayed.

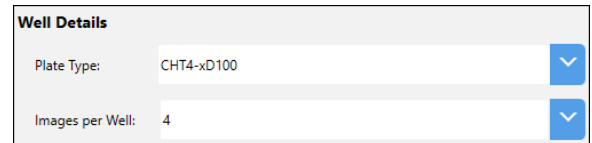


Setup Details	
Plate Name:	New Sample
Select Assay:	K2_v5_AOPI_Primary Hepatocytes
Assay Description:	Total cell count and % viability using AO/PI staining
Tag:	Select Tag...
Dilution Factor:	2

- To view and/or edit assay details, click the  **View** button. *Clicking the **View** button automatically updates your progression in the Navigation Bar to the **Manage** tab > Assays option.* Click the **Back** or **Save and Back** (if you have made any changes) button to return to the Setup screen.

Note: If an assay is locked for editing (i.e., the **Category** field displays  or *Locked* instead of *Unlocked*), users must first click **Save As** to save it as a new assay before they can edit parameters.

- If desired, add a **Tag** (e.g., to create a time course series for use in custom reporting). In addition, you can change the value in the **Dilution Factor** field to indicate the final dilution factor for the sample.
- In the *Well Details* area, select **Plate Type** (i.e., slide type) used for the sample and the number of **Images Per Well** (i.e., 1, 4 or 8) to be captured during the count.

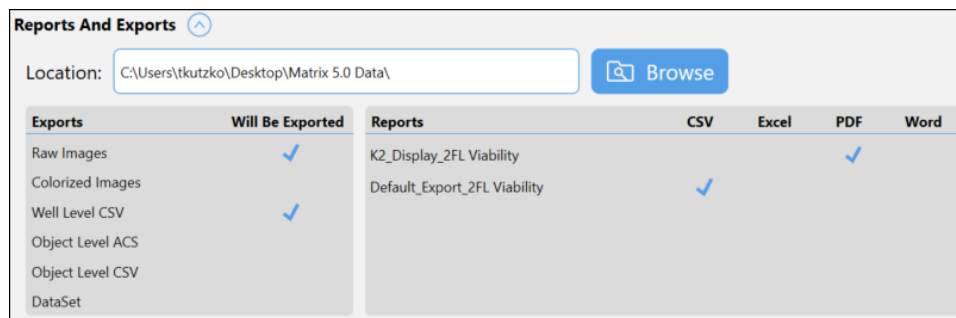


The screenshot shows a 'Well Details' form with two dropdown menus. The first dropdown is labeled 'Plate Type' and has 'CHT4-xD100' selected. The second dropdown is labeled 'Images per Well' and has '4' selected.

The visualization of *Images Per Well* for the slide depicts the selected number of images (i.e., cross-sections of the area in the counting chamber or “well”) to be captured during the scan.

Setting Auto Export Location

Expand the *Auto Export* area to identify a **Location** for automatically saving scan results. Click the **Browse** button and navigate to a folder on your Operating Computer or network to define the default export path. *This default path will remain the same within the software until it is manually changed.*



The screenshot shows the 'Reports And Exports' configuration window. At the top, there is a 'Location' field with the path 'C:\Users\tkutzko\Desktop\Matrix 5.0 Data\' and a 'Browse' button. Below this is a table with columns for 'Exports', 'Will Be Exported', 'Reports', 'CSV', 'Excel', 'PDF', and 'Word'.

Exports	Will Be Exported	Reports	CSV	Excel	PDF	Word
Raw Images	✓	K2_Display_2FL Viability			✓	
Colorized Images		Default_Export_2FL Viability	✓			
Well Level CSV	✓					
Object Level ACS						
Object Level CSV						
DataSet						

In addition, *Exports* (see descriptions provided below) and output files for *Reports* (e.g., *CSV*, *Excel*, *PDF* and *Word*) defined for the current assay are displayed.


Sample *Exports* include:

- Raw Images** Represents *Black and White* high-resolution PNG images for each channel in the assay.
- Colorized Images** Represents colorized, high-resolution PNG images of all acquired channels. *A single colorized image represents individual channel images superimposed one on top of another.*
- Well Level CSV** Represents well-level data including well name, calculation run, channel, count, mean size, etc. for each selected well in Comma Separated Values (CSV) format.
- Object Level ACS** Represents object-level data for each well including type, classification, size, circularity, area, perimeter, etc. in Image Cytometry Experiment (ICE) format.
Exported data may be associated with an ACS template and automatically opened for viewing in De Novo Software FCS Express (if specified in auto export options for the assay).

Object Level CSV	Represents object-level data for each well including type, classification, size, circularity, area, perimeter, etc. in Comma Separated Values (CSV) format.
Data Set	Represents a database file containing all images, results, assays, cell types and report templates associated with the scan result. <i>A data set is required to reload data for analysis or if you need help from Support to optimize assay and/or cell type parameters.</i>

To manage *Exports* and *Reports* defined for the selected assay, click the **View** button and expand the *Reports and Exports* option. Select *Exports* by clicking on file type buttons and manage *Reports* as necessary. Changes to the assay can either be saved to the current assay (i.e., any changes made will also be applied to other scan results that use the assay) or saved as a copy with a new name. Edited assays can be used for data acquisition. See the **Matrix Software User Manual** for details on editing an assay to manage exporting and reporting options.

Previewing the Samples

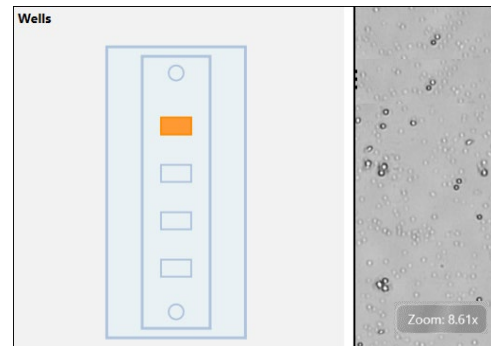
Once you have completed entering setup details for the samples, click the  **Preview** button located at the bottom of the Setup screen. The instrument engages its camera for viewing samples and displays the Preview screen. Users can view live images of samples in selected wells, preview available channels for *Imaging Mode* associated with the assay, adjust instrument focus and confirm fluorescent exposure for each channel.

Note: Although the **Acquire** tab > *Preview* option appears in the Navigation Bar, you cannot access the Preview screen directly as it requires well details entered in the Setup screen. Once you click the **Preview** button at the bottom of the Setup screen, the Navigation Bar is updated to show your progression to the Preview screen.

PREVIEWING LIVE IMAGES

In the *Wells* area, click on highlighted image sections in the slide visualization (i.e., representing cross-sections of the counting chamber or “well”). As you move from section to section, the live image changes per your selection.

To zoom in/out of an image, move the mouse to hover cursor over the viewing pane and turn the scroll wheel or, if using the touchscreen, apply universal gestures (e.g., touch center of image with two fingers and then spread them apart to zoom in and reverse this action to zoom out.) Current *Zoom* magnification is displayed in bottom right corner of the viewing pane.

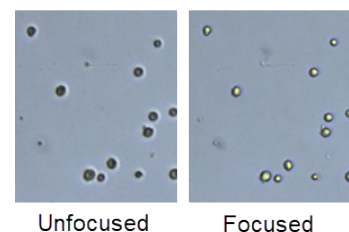


To move a zoomed image around, click and drag the image to a new location as needed.

ADJUSTING FOCUS

To adjust the focus of the live image being previewed, slowly turn the Focus Knob located on the right side of the instrument until cells/beads are in focus.

Obtaining good focus is key to ensuring accurate cell counts. Once good focus has been achieved, the instrument should perform most counting operations with only minor adjustments.



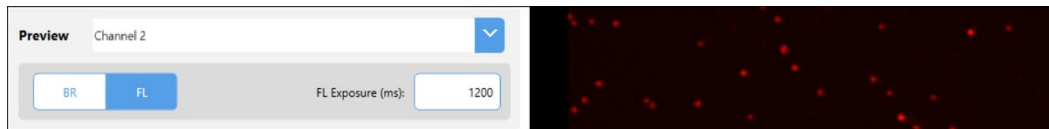
PREVIEWING CHANNEL IMAGES

In the *Preview* area, channels available for viewing (e.g., *Channel 1* and *Channel 2*) are based on the assay Imaging Mode. The *Channel 1/BR* image is displayed by default. Clicking the **FL** button displays the *Channel 1/FL* image.

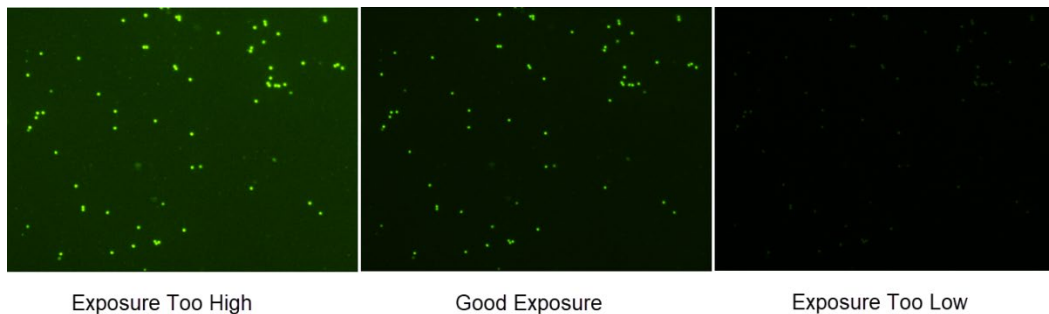


Note: If only one channel is available, the *Preview* field channel drop-down will be hidden. In addition, if the *BR Only* Imaging Mode is selected, the **FL** button will also be hidden.

To view images for another channel, select it from the **Preview** field drop-down. Click the **FL** button to view fluorescence in that channel. A sample *Channel 2/FL* image is shown below.




When previewing fluorescent images, confirm that FL signal is strong but has a low, dark background. Modify the **FL Exposure** to increase (prolong) or decrease (shorten) the exposure time accordingly.



Notes:

- For BR/FL imaging modes, each channel will be associated with two images – *Brightfield (BR)* and *Fluorescent (FL)*. These images are referred to in assay channel mappings as *BR1/FL1* and *BR2/FL2*.
- When working with assays that have two channels, use the *Channel 1/BR* image to adjust focus and then select the *FL* image to confirm exposure. For *Channel 2*, you only need to select the *FL* image to confirm exposure since focus of its paired *BR* image is adjusted automatically when you performed the task for *Channel 1*.
- If *FL* images are available for both *Channel 1* and *Channel 2*, a slight offset may exist between *BR1* and *BR2* images due to the distance the camera must travel.

Clicking the Count Button

Once you have completed previewing the live image for the sample, click the  button located at the bottom of the Preview screen. The instrument camera acquires sample images as specified by the selected assay which are then used by the Matrix Software to calculate count results according to defined cell type parameters.

Note: Depending on the number of selected wells/images per well and defined assay parameters, the counting process can take a few seconds to up to a few minutes.

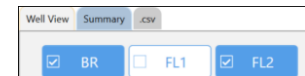
At the start of count processing, the Navigation Bar status is updated to display the **Data** tab > *Results* option.

As the system acquires sample images and calculates count results, the colors used to mark the *Wells* area selection (where the number of highlighted areas is based on the *Images Per Well* value) will change to indicate image status (i.e., from *Selected* to *Acquired* to *Counted*) as shown in the legend displayed below the slide visualization.



Area images are displayed in the **Well View** tab using the assigned *Display* report template to present count results. Additional tabs may be enabled for the scan result (e.g., **Summary** and **.csv**). *Count results will be displayed, printed and exported based on report templates defined for the assay.*

Well images displayed can be varied by toggling on/off available channel buttons (displayed across the top of the viewing area of the **Well View** tab) and enhancing the *Zoom* magnification.

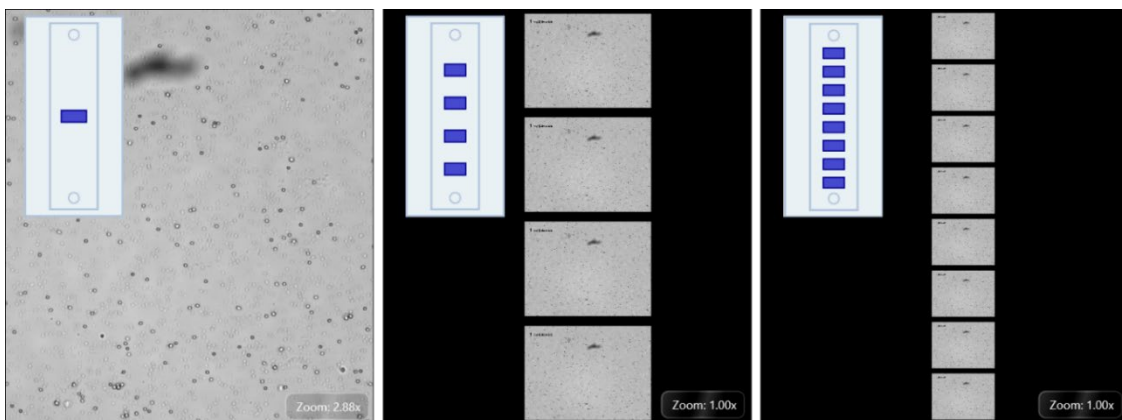


To zoom in and out of sample images, move the mouse to hover cursor over the viewing pane and turn the scroll wheel. Current *Zoom* magnification is displayed in bottom right corner of viewing pane.

When counting of all wells is complete the scan result will be added to the top of the Results List displayed on the Select screen. In addition, *Reports and Exports* output files defined for the current assay are automatically stored in the specified location.

ANALYZING SCAN RESULTS

When analyzing scan results, a single image is displayed in the viewing pane for the sample well. If an **Images Per Well** value of 4 or 8 was selected, click on the composite image (containing either 4 or 8 images for areas in the well stacked on top of each other) and drag to view all areas.



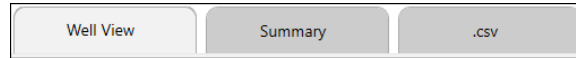
To zoom in/out of an image, move the mouse to hover cursor over the viewing pane and turn the scroll wheel or, if using the touchscreen, apply universal gestures (e.g., touch center of image with two fingers and then spread

them apart to zoom in and reverse this action to zoom out.) Current *Zoom* magnification is displayed in bottom right corner of the viewing pane.

To move a zoomed image around, click and drag the image to a new location as needed.

Understanding Default Report Tabs

Report tabs initially displayed across the top of the viewing pane are associated with report templates that have been assigned to the current assay and are enabled by default to format the presentation of scan result data.



Although the **Well View** tab will always be enabled, you can change the report template used for its display. In addition, you can disable default report tabs, change current report template assignments and add new tabs to meet your reporting needs. See the *Matrix Software User Manual* for custom reporting details.

Changing Well View Image Display

The **Well View** tab will always be displayed in the Results screen and includes both an image and the associated count results for the well. *If multiple images were taken (based on your Images Per Well selection), they will be stacked on top of each other and consolidated into a single image.* Click and drag the image to view other locations (or areas) in the well.

 A screenshot of the software interface. At the top, there are three tabs: 'Well View' (selected), 'Summary', and '.CSV'. Below the tabs are several checkboxes: 'BR' (checked), 'FL1' (unchecked), 'FL2' (unchecked), 'Zoom' (checked), and 'Counted' (unchecked). The main area is a large microscope image showing a field of cells. In the bottom right corner of the image, a red box highlights the text 'Zoom: 8.20x'. Below the image is a data table with the following content:



Well	Count	Concentration (cells/mL) at Dilution Factor: 2	Mean Size (um)	Viability: 58.0 %
A2	Live: 295	0.554 x10 ⁶	10.3	
	Dead: 215	0.403 x10 ⁶	10.4	
	Total: 510	0.957 x10 ⁶	10.2	

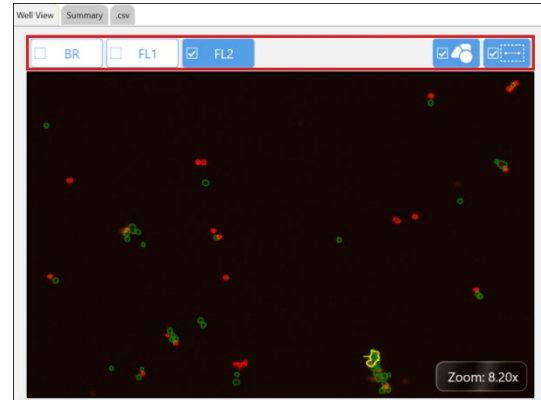
To zoom in/out of the image, move mouse to hover cursor over the viewing pane and turn the scroll wheel or, if using a touchscreen, by applying universal gestures (e.g., touching the center of the image with two fingers and then slowly spreading them apart to zoom in and reverse this action to zoom out). Zoom magnification is indicated in bottom right corner of the viewing pane and can be increased up to 10.00x.

At the bottom of the **Well View** tab is a report containing well-level details for the sample. *If an Images Per Well value of 4 or 8 was selected, the report represents consolidated data from all images.*

Varying Well View Channels/Counted Overlay Display

In the **Well View** report tab displayed by default, the following buttons may be available across the top of the viewing pane based on the Imaging Mode defined in the current assay.

- Click the **Brightfield (BR)** or **Fluorescence** (e.g., **FL1** or **FL2**) buttons to select/de-select channels used in the image display. *Channel views are overlaid on top of each other.*
- Click the  button to show/hide the graphic overlay that identifies *Counted* cells by surrounding them with color-coded outlines. *For 2-channel Viability assays, Green is used for counted/live cells, Red for dead cells and Yellow for cells not counted (e.g., if larger than the specified cell diameter).*
- Click the  button to enable/disable display of Zoom magnification in bottom right corner of viewing pane. *Zoom feature will still be functional even if not displayed.*

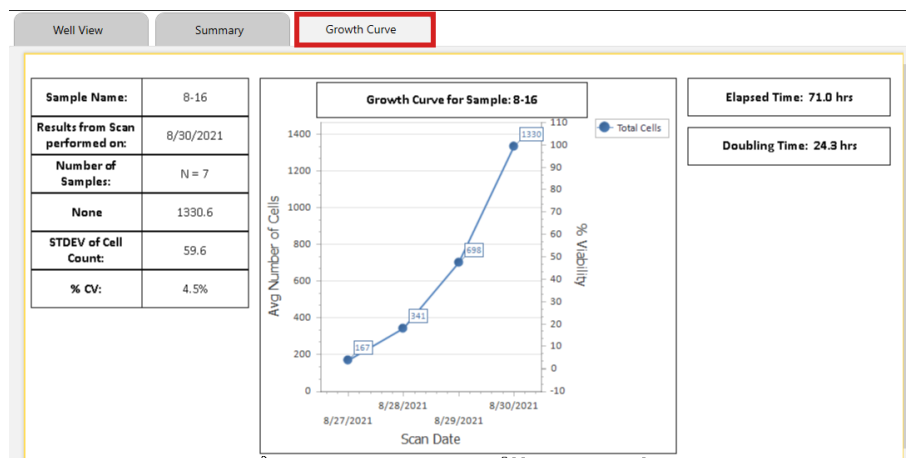


Understanding Custom Reporting

The Matrix custom reporting feature allows you to assign and/or modify report templates to be used by assays when generating scan results. You can change the report template used for display of the **Well View** report (which is always displayed) and add report templates to be enabled as tabs or output as specific file types (e.g., *CSV*, *Excel*, *PDF* and *Word*) that can be opened/printed upon report generation.

Note: Any changes made to *Reporting* options for an assay will be saved with the assay and applied to all other scan results using that assay the next time a recount is performed.

For example, a custom **Growth Curve** report tab has been enabled in the scan result shown below. Clicking this tab displays data in the format defined by the associated report template (i.e., illustrating calculation of a growth curve for a time course series of scan results).



See the **Matrix Software User Manual** for custom reporting details.

EXPORTING/PRINTING SCAN RESULT DATA

Verifying Auto Export

Expand the *Exports* area in the Results screen to verify that automatic exports were completed and click the location link to open folder where the exported scan result files are stored.

In addition, if you defined any output file types (e.g., *CSV*, *Excel*, *PDF* and *Word*) to be generated for assay report templates, you can verify that selected file type exports were also completed.

Exports	Status
Raw Images	✓
Colorized Images	
Well Level CSV	✓
Object Level ACS	
Object Level CSV	
DataSet	

Reports	CSV	Excel	PDF	Word
K2_Display_2FL Viability			✓	
Default_Export_2FL Viability	✓			

Exporting and Printing Scan Results (Manual Settings)

To manually select additional export options (images/data) for scan result files as well as generated output files for reports, click the **Export** button located at the bottom of the Results screen. The Export dialog is displayed.

Location: C:\Users\kutzko\Desktop\Matrix 5.0 Data\ Browse

Images Raw Images Colorized Images

Data Well Level CSV Object Level CSV Object Level ACS

Archive Data Set

Report	File Type	Auto Open		Print	
K2_Display_2FL Viability	<input type="checkbox"/> CSV	No	Yes	No	Yes
	<input type="checkbox"/> Excel	No	Yes	No	Yes
	<input type="checkbox"/> PDF	No	Yes	No	Yes
	<input type="checkbox"/> Word	No	Yes	No	Yes
Default_Export_2FL Viability	<input type="checkbox"/> CSV	No	Yes	No	Yes
	<input type="checkbox"/> Excel	No	Yes	No	Yes
	<input type="checkbox"/> PDF	No	Yes	No	Yes
	<input type="checkbox"/> Word	No	Yes	No	Yes

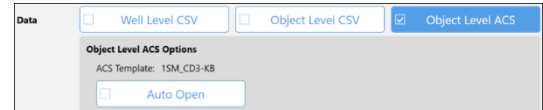
Export and Print Cancel

Confirm the export **Location** and if necessary update this path by clicking the **Browse** button, navigating to a folder on your Operating Computer or network, and clicking **OK**.

Select scan result **Images** (e.g., *Raw Images* or *Colorized Images*), **Data** (e.g., *Well Level CSV*, *Object Level CSV* and *Object Level ACS*) and **Archive** (e.g., *Data Set*) file options to be exported to the specified location. *Data Sets* are stored as *.SCANRESULT* files.

In addition, for reports associated with the scan result you can select generated output file types (e.g., *CSV*, *Excel*, *PDF* and *Word*) to be exported and indicate if files are to be opened automatically and/or printed upon export.

Note: If the *Object Level ACS* option is selected, the screen expands to display if an ACS template has been assigned to the assay and offers an *Auto Open* option after the report is generated. *If no ACS template is displayed, users can still export object level ACS data assuming they have the export privilege.* To change the ACS template assigned to an assay, users will need to edit the assay.



For report templates associated with the scan result you can select generated output file types (e.g., *CSV*, *Excel*, *PDF* and *Word*) to be exported and indicate if files are to be opened automatically and/or printed upon export.

Note: Any changes to export options are applied only when manually exporting scan results (i.e., by clicking the **Export and Print** button) and will *not* be saved with the assay or scan result.

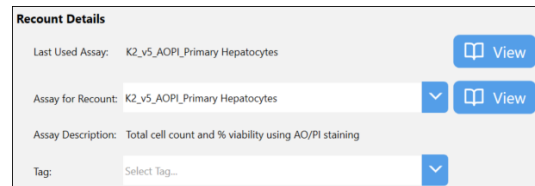
PERFORMING A RECOUNT

If you find it necessary to fine-tune assay parameters after reviewing your data results, click the **Recount** button located at the bottom of the Results screen. The Recount screen is displayed.

Once you have made any necessary changes (per the options described below), click the **Recount** button located at the bottom of the screen. After a recount is performed, the Navigation Bar returns to the Results screen.

Refining Assay Details/Selecting New Assay

In the *Recount Details* area you can view parameter settings for the *Last Used* assay, select a new assay from the drop-down or view the current assay to edit parameter settings to be used for the recount.

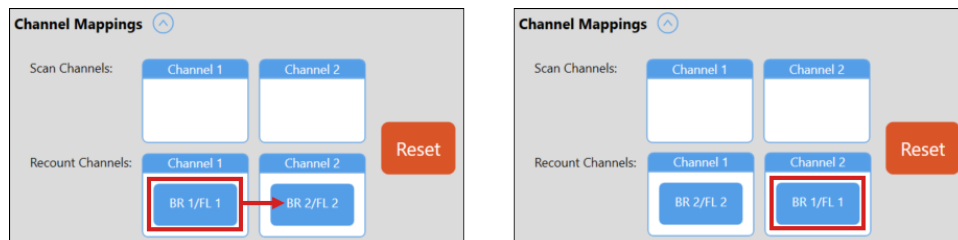


Managing Channel Mappings

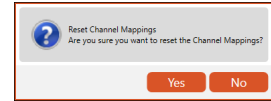
Expand the *Channel Mappings* area to identify *Scan Channels* and *Recount Channels* for the Imaging Mode associated with the current assay. Performing a recount uses channel mappings as defined by default (i.e., *Recount Channels* will remain in same positions used for the original *Scan Channels*).

Note: With the exception of *Brightfield Only* configurations (i.e., *BR1*, *BR2*, etc.), each channel will have separate brightfield and fluorescent images as depicted in the mapping indicators (i.e., *BR1/FL1* and *BR2/FL2*).

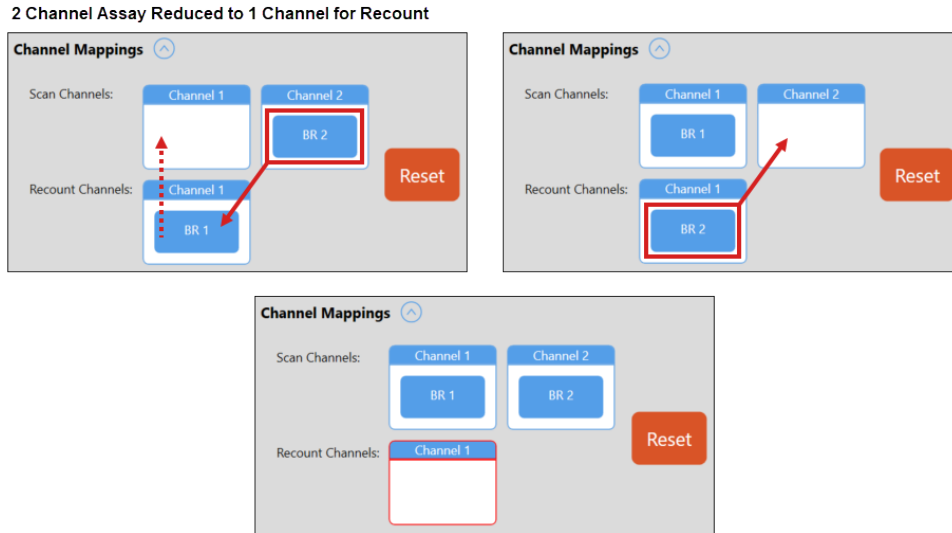
To manage channel mappings for use in a recount, click on a mapping indicator and drag it to a new channel. The mapping indicator in that channel will swap positions with the one you are dragging automatically.



To return channel mappings to the positions they were in when you first expanded the *Channel Mappings* area, click the **Reset** button followed by **Yes** to confirm the action.



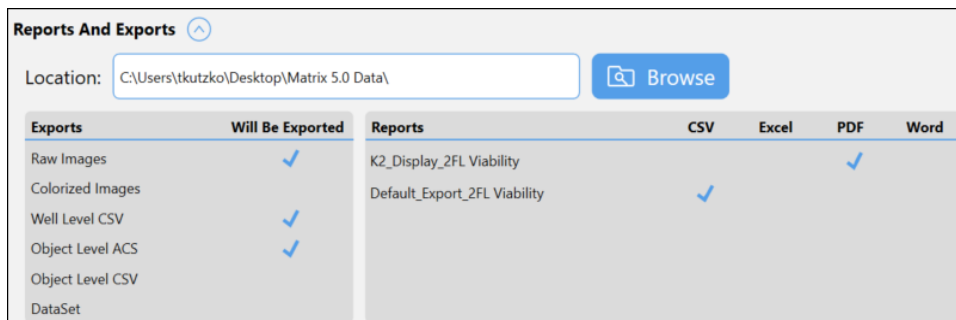
If a new assay selected for recount has fewer channels or you edit the assay previously used to reduce the number of channels, mappings displayed are updated to reflect available channels. To manage channel mappings for use in the recount, click on mapping indicators and drag them to an available position in the *Recount Channels* area.



If you drag indicators from *Recount Channels* to their home *Scan Channels* locations, a red outline is used to highlight empty *Recount Channels* locations. All *Recount Channels* must contain an indicator prior to recount.

Modifying Auto Export Options


Expand the *Reports and Exports* area to identify a **Location** for automatic exports of images/data and generated output files for reports. Click the **Browse** button and navigate to a folder on your Operating Computer or network to define the default export path. *This path will remain as the default in the software until it is manually changed.*



In addition, *Exports* (e.g., *Raw Images*, *Colorized Images*, *Well Level CSV*, *Object Level ACS*, *Object Level CSV* and *Dataset*) and output file types for *Reports* (e.g., *CSV*, *Excel*, *PDF* and *Word*) defined for the assay will be indicated with a blue checkmark.

Note: To modify *Report and Export* settings displayed, click the **View** button for the selected assay in *Setup Details* area and expand the *Reports and Exports* section to update *Exports* and *Reports* file types selected.

Clicking the Recount Button

Once you have completed entering recount details for the samples, click the  button located at the bottom of the Recount screen. The Matrix software performs a recount of the scan using the modified parameters and displays the new scan result.

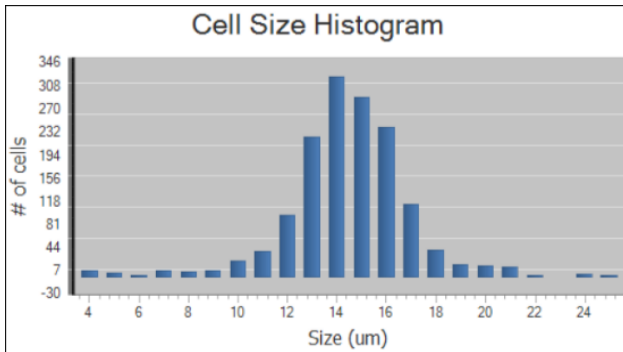
BEST PRACTICES AND WORKFLOW TIPS

- The *Images Per Well* field in the Setup screen allows you to specify the number of images to be taken of the counting chamber. Choosing 1 image provides a high-level overview of data and provides the fastest counting speed. Choosing 4 or 8 images increases the amount of data collected by partitioning the sample into sections and averaging the results from all images, thus improving the precision of calculations for statistical analysis but requiring more time to obtain count results. *Regardless of the number of Images Per Well selected, count results are for the entire counting chamber or “well” (i.e., representing an average of the results).*
- While using the **Acquire** tab, only the Setup screen can be selected as an option if you decide to review your setup *after* previewing the sample. Once you are satisfied and proceed to performing the count, *Navigation Bar* status is updated to display the **Data** tab > *Results* screen.
- While using the **Data** tab, only the Select screen can be selected as an option if you decide to review other count results *after* viewing the currently selected scan. *When a scan result is created for a sample as the result of a count, it will be displayed at the top of the Results List.* Double-click on any scan result in this list to view it. See the **Matrix Software User Manual** for details on managing scan results contained in the Results List.
- When viewing scan results, if you find it necessary to fine-tune assay and/or cell type parameter settings and re-analyze the data, click the **Recount** button at the bottom of the Results screen. You can either edit the *Last Used* assay parameters or select a new assay and edit its parameters as necessary to meet your requirements. See the **Matrix Software User Manual** for details on editing assay/cell type parameter settings.

Note: If you need help optimizing cell type parameter settings, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

- When viewing export results, multiple folders will be created in the export location defined for the scan result – a top-level *plate_name* folder (where *plate_name* represents the plate name you entered in the Setup screen) and a *<date_time>* subfolder (where *date_time* represents the date/time stamp of scan images). Within this second-level folder are additional folders (i.e., a *Plate-Name* folder containing scan images and a *<date_time>* folder containing the initial count results). *Contents of this <date_time> subfolder will vary based on selected export options.* Each time you perform a recount on the scan images a new *<date_time>* subfolder is created for the results.

- Data analysis features can be enhanced by creating tools such as a *Sample Adjustment Calculator* and *Cell Size Histogram* to be built into report templates.



See the **Matrix Software User Manual** for details on editing report templates and enabling them as tabs to customize scan results.

Count	Concentration (cells/mL) at Dilution Factor: 1	Mean Size (um)	
Live: 1028	0.893 x10 ⁶	16.7	Viability: 61.0 %
Dead: 666	0.579 x10 ⁶	14.9	
Total: 1696	1.470 x10 ⁶	16.0	

Sample Calculator		
Target Live Concentration (cells/mL)	Add (µmL) of diluent to 1mL of cell sample	Spin down sample, remove supernatant and resuspend pellet in (µmL) of diluent
100,000	7.93	
200,000	3.47	
250,000	2.57	
500,000	0.79	
750,000	0.19	
1,000,000		0.89
1,500,000		0.60

Target Number of Live Cells	(µ) mL of cell sample needed
100,000	0.112
500,000	0.560
1,000,000	1.120
1,500,000	1.680
2,000,000	2.240
2,500,000	2.800
5,000,000	5.599
10,000,000	11.198

Sample Name: K2_Dry Demo_AOPL Primary Hepatocytes
 Time Stamp: 3/15/2021 12:58:00 P
 Assay Name: K2_AOPL Primary Hepatocytes
 Assay Description: Total cell count and % viability using AO/PI staining

Chapter 9. Cleaning, Maintenance and Storage

Keeping the Cellometer K2 and its operative area clean between runs, during use and post runs is a best practice and prevents contamination. Caring for the instrument and its consumables is also a best practice.

Note: If using the Cellometer K2 within a biosafety cabinet, cleaning may not be required, or agents and materials may be adapted according to BSC system requirements. Please follow all instructions provided by the manufacturer.



CAUTION: Always power the instrument OFF before cleaning as damage to the machine could occur.



CAUTION: Allow for flammable agents used for cleaning or disinfecting to completely evaporate before powering the instrument ON.

CLEANING

The instrument and any cords/cables can be wiped down using a 70% Isopropyl (IPA) solution. Repeat until the soil is no longer visible. Finish with a fiber optic lint-free wipe (e.g., Kimwipes).

1. Dampen a fiber optic lint-free wipe with IPA.
2. Use the wipe to rub lightly on the outside of the instrument until it is visibly clean.
3. Wait for the cleaning agent to evaporate before powering the instrument ON.

Should something break or be spilled inside the device, power OFF the instrument and contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

Routine Maintenance

No one other than Revvity-authorized personnel may service inside the protective instrument cover of the Cellometer K2. Contact Support or an authorized service representative to address any changes in instrument output or performance.



WARNING: Do not remove the instrument cover due to an electric shock hazard. For assistance, contact Support.

Contacting Support

All technical questions regarding Cellometer K2 maintenance should be directed to Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

Preventive Inspection and Maintenance

Regular preventive inspections should be carried out to reduce safety concerns of the instrument due to aging, normal wear and tear, etc. The manufacturer assumes no responsibility for improper changes or repairs carried out on the instrument or its accessories by unauthorized persons. The warranty will immediately become void should an unauthorized personnel attempt to in any way repair or modify the instrument.

To schedule all preventive maintenance needs and address any functionality concerns, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

STORAGE

When preparing the instrument for storage:

- Always thoroughly clean the instrument, cables and any of the accessories or consumables before storage.
- Check for any damage and if possible, re-package the Instrument and Operating Computer in the original boxes.
- Ensure that storage temperature and spatial requirements are met (see *Site Preparation* on page 15).
- DO NOT put anything heavier than ≥ 25 lbs (11.3 kgs) on the instrument or the box in which it is stored.

Store the cables neatly, checking for signs of damage or wear frequently, and immediately before/after use. Do not allow the cables to become kinked or tangled. Do not set heavy objects on any of the accessories or consumables.

Note: Always store beads and reagents according to their information for use documentation.

Chapter 10. Troubleshooting and FAQs

This chapter lists troubleshooting steps for resolving potential issues, common instrument messages and *Frequently Asked Questions* (FAQs).

TROUBLESHOOTING AND INSTRUMENT MESSAGES

Instrument cannot be powered on

- Check to ensure Power Supply and Power Cord that were provided with the instrument are being used.
- Check to ensure Power Supply and Power Cord are *not* kinked or tangled.
- Check to ensure Power Supply and Power Cord are plugged in properly to both instrument and electrical outlet accordingly.
- If Power Cord is plugged into a surge protector (*recommended*), be sure that surge protector is powered on.
- Check to ensure Power Switch is in the *ON* position.

Once the instrument has been powered on, confirm that light on front of the instrument (under *Sample Slot*) is lit.

Operating Computer cannot connect to instrument

- Check to ensure USB 2.0 Connector Cable that was provided with the instrument is being used.
- Check to ensure USB 2.0 Connector Cable is plugged in properly to both Operating Computer and instrument.
- Reboot the Operating Computer to determine if connection issue/error message is resolved.
- If error message persists, connect a different Operating Computer to the instrument (contact Support for software).
- If error message persists, reach out to Support for a replacement USB 2.0 Connector Cable or for assistance with re-running the camera software drivers.

For assistance, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

Software displays “*Background was saved, but ... Dim XXX counts*” message

Contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

Software displays an error or hangs during image preview/acquisition

If the software displays an error or hangs during image preview/acquisition, exit the application by closing the window and then re-launch the software by double-clicking the **Matrix** icon. If the error persists, power cycle the instrument and restart accessory computer. Launch the software and proceed with image preview/acquisition.

In cases where this issue is *not* resolved by the procedure above or it continues to happen on a regular basis, contact Support by visiting <https://www.revivity.com/contact-us> or send email to: CellC-support@revivity.com

FREQUENTLY ASKED QUESTIONS

Can PD300 slides be used in the Cellometer K2 while using the Matrix software?

The Cellometer K2 powered by Matrix software is designed primarily for use with SD100 and/or PD100 slides. For Adipocytes or other cells larger than 90 μm that need PD300 slides, use the Cellometer Image Cytometer software for imaging and analysis.

How do I upgrade to the newest version of the software?

Contact Support with the serial number of the instrument to request an upgrade.

How do I order a replacement for an instrument Power Cord or USB 2.0 Connector Cable that has been lost?

Contact Support with the serial number of the instrument to request a replacement power cord/cable.

Why doesn't the cell type I need appear in the Cell Type drop-down?

Cell types can be imported from either the Revvity Cell Library or from custom libraries stored in external network locations. See the *Matrix Software User Manual* for instructions on how to import a cell library and populate the Cell Type drop-down menu with selected cell types. For a full list of available cell types and/or if you require a specific cell type, contact Support by visiting <https://www.revvity.com/contact-us> or send email to: CellC-support@revvity.com

When testing for cell viability, why are my count results lower than expected?

When preparing a sample to test for cell viability, ensure that the stock solution is being used as indicated in *Trypan Blue Staining Solution Guidelines* on page 27 or *AO/PI Staining Solution Guidelines* on page 29. Using stains in a concentration *higher* than recommended concentrations will make the cells more difficult to detect and may result in counting inaccuracies.

In addition, ensure that:

- The viability method is appropriate for the cell type. See *Evaluating Viability Methods* on page 27 for details.
- The current assay and/or cell type is appropriate for the sample. See the *Matrix Software User Manual* for more information about editing assays and cell type parameter settings.

Chapter 11. Contacting Support

This chapter presents the scope of Support services and contact methods. In addition, it contains instructions on how to report issues to Support and generate diagnostic reports to assist with troubleshooting.

SCOPE OF SUPPORT SERVICES

Revvity is dedicated to providing our customers with outstanding support including the following services:

- Online and in-lab customer training
- Creation of new cell types
- Optimization of counting parameters
- Creation of new report templates
- Troubleshooting via telephone
- Periodic safety checks and functional evaluations (offered as part of a separate maintenance contract)

To inquire about training, visit our website at <https://www.revvity.com/contact-us/customer-training> and choose the *Cell Counting and Image Cytometry* product. Enter your contact details and any training comments/questions.

CONTACT METHODS

If there is a technical issue with your instrument or software, contact Support using the following methods:

- Visit <https://www.revvity.com/contact-us/instrument-support-and-service> and choose the *Cell Counting and Image Cytometry* product for support. Enter instrument serial number, name and model, your contact details, and a detailed description to report the issue to Support.
- Visit <https://www.revvity.com/contact-us-by-phone> to find the global phone number for your area.
- Send email to CellC-support@revvity.com

REPORTING AN ISSUE TO SUPPORT

If a technical issue encountered cannot be resolved using troubleshooting steps presented in this guide (see *Troubleshooting and Instrument Messages* on page 47) or if the issue persists after rebooting the instrument, perform the following steps *before* contacting Support to report the issue:

1. Record the error message.
2. Record the sequence of events leading up to the error, if possible.
3. If necessary, close the error message window.
4. Record the Serial Number located on the Device Label for your instrument.
See *Device SN Label* on page 11.

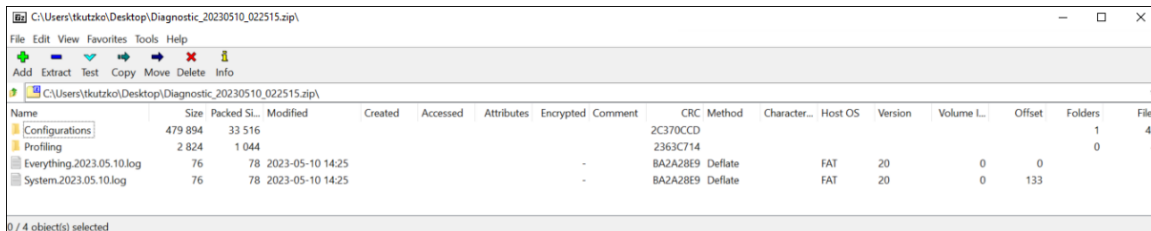
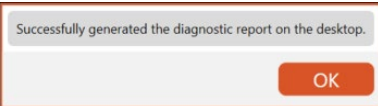
Gathering these details *prior* to contacting Support will be helpful as they troubleshoot the technical issue.

GENERATING DIAGNOSTIC REPORTS

To generate a diagnostic report that can be emailed to Support when experiencing a technical issue:

1. Click the **Home** tab and then the **About Matrix** button.
2. Click the **Generate Diagnostic Report** button followed by **OK** in response to the confirmation prompt.
3. From the desktop, click the generated **Diagnostic_YYYYMMDD.zip** folder (where YYYYMMDD represents the date on which file was generated) to display files in the folder.

Generate Diagnostic Report



Files in the zipped folder include logs (located in *C:\logs\Matrix\vNNN* where *NNN* represents installed version) and configuration files (located in *C:\ProgramData\Nexcelom Bioscience\Matrix\vNNN\Configurations*).

4. Attach the zipped folder to an email, include the *Support Ticket ID* (if assigned) in the Subject line and send to: CellC-support@revvity.com

It may be helpful to clear all logs before reproducing the sequence of steps leading up to an issue and/or to reduce the size of the diagnostic report to be sent to Support. *Logs are generated automatically by your system on a daily basis. Keep in mind that clearing all logs will remove files accumulated to date for the version.*



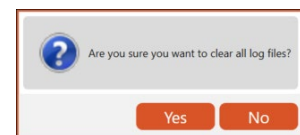
WARNING: Logs may be required to maintain a historical archive. As using the **Clear All Logs** button will *permanently* remove accumulated logs for the installed Matrix software version, it is recommended that you contact IT *before* clearing logs from your system.

To clear all logs:

1. Click the **Clear All Logs** button.

Note: It is *not* recommended to clear all logs unless you are confident that they are not being archived by your organization.
2. When prompted, click **Yes** to confirm you want to clear all logs.
3. Click **OK** to acknowledge that all logs have been cleared.

Clear All Logs



Successfully cleared all log files.

OK

Appendix A. Consumables

This appendix presents Revvity consumables designed specifically for the Cellometer K2 such as disposable counting chamber slides, assay reagents/reagent kits and counting beads.

COUNTING CHAMBER SLIDES

Cellometer *Counting Chamber Slides* are compatible with all Cellometer Systems. Each all plastic, disposable slide contains two sample counting chambers with precisely controlled height. The fixed 20 μ L sample size allows for simple, automated calculation of cell concentration following imaging and counting. Image-based counting with disposable counting chambers offers several key advantages:

- No potential clogging
- Ideal for fragile samples, such as hepatocytes
- No washing
- No potential cross-contamination

Visit the *Cellometer and Cellaca Slides* page on our website for a current listing or contact your Revvity Sales representative and to purchase Cellometer counting chamber slides directly from Revvity, Inc.

ASSAY REAGENTS AND KITS

Revvity provides a variety of assay reagents and reagent kits to accurately perform fluorescence-based cell counting and viability assays, including measuring percent viability and the number of live/dead cells.

Visit the *Reagents and Kits for Cell Counting and Cell-Based Assays* page on our website for a current listing or contact your Revvity Sales representative to purchase Cellometer K2 assay reagents and kits directly from Revvity.

COUNTING BEADS

Revvity offers a wide range of brightfield and fluorescent *Counting Beads* that may be used to verify instrument functionality and establish routine quality control SOPs for daily, weekly or monthly performance. *Beads are not intended to replace certification by Installation/Operation Qualification (IQ/OQ) procedures.*

Beads are supplied with the proper protocol, a *Certificate of Analysis*, and pass/fail criteria where users may choose to test concentration or viability read-outs on their instruments.

Visit the *Counting Beads* page on our website for a current listing or contact your Revvity Sales representative to purchase counting beads for use with Cellometer K2 instruments directly from Revvity.

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Appendix B. Report Designer for WPF Reference

Revvity uses *DevExpress* as a third-party plugin for Matrix software reporting capabilities.

Visit the following page on the DevExpress website for more information about creating Matrix software report templates using *Report Designer for WPF*.

<https://devexpress.github.io/dotnet-eud/interface-elements-for-desktop/articles/report-designer/report-designer-for-wpf.html>

Sample screens displaying the range of topics available for *Report Designer for WPF* functionality are shown below.

The screenshot displays the DevExpress Report Designer for WPF application. The interface is divided into several sections:

- Navigation Sidebar:** Contains a search bar and a list of categories with expandable sub-items. The 'Report Designer' category is currently selected.
- Main Content Area:** Displays the title 'Report Designer for WPF' and introductory text. Below the text is a preview of a report titled 'Suppliers'. The report includes a header section with the title 'Suppliers' and a table with the following columns: Company Name, Contact Name, Contact Title, Phone, Fax, Home Page, Address, Country, Region, City, and Postal Code.
- Report Explorer:** Located on the right side, it shows a tree view of the report's structure, including sections like topMarginBand1, Report-Header1, Detail, DetailReportBand, and BottomMargin.
- Properties Window:** Located at the bottom right, it shows the properties for the selected report, including the Data Source (dsMasterDet...), Designer Options, Display Name (Suppliers), and checkboxes for 'Draw the Grid' and 'Draw the Wat...'. The 'Export Options' section is also visible.
- Group And Sort:** A section at the bottom of the report preview area, used for defining groups and sorting criteria.

Dashboard for Desktop Dashboard for Web **Interface Elements for Desktop** Interface Elements for Web

Interface Elements for Desktop / Report Designer / Report Designer for WPF

Enter here to filter...

- + Charting
- + Docking
- + Editors
- + Expression Editor
- + Filter Editor
- + Grid
- + Layout Manager
- + Map
- + Navigation Bars
- + PDF Viewer
- + Pivot Table
- + Print Preview
- **Report Designer**
 - + Report Designer for WinForms
 - Report Designer for WPF

Different aspects of using the Report Designer are covered in the following documentation sections.

- [Creating Reports](#)

The tutorials in this section provide step-by-step instructions on both basic and advanced report customization.
- [Report Types](#)

The documents in this section describe how to create reports of different types with the Report Designer.
- [Report Elements](#)

The topics in this section provide information about report controls and bands used in the Report Designer.
- [Interface Elements](#)

The documents in this section are dedicated to the elements of the Report Designer user interface.
- [Report Wizard](#)

This documentation section describes the Report Wizard, which allows you to create reports based on built-in templates.
- [Document Preview](#)

The topics in this section describe the capabilities provided by the Print Preview.

Appendix C. Warranty and License Details

This appendix presents *Warranty Information* for Cellometer instruments, *Revvity's Limitation of Liability (Hardware and Software)* statement, and *Terms and Conditions* related to the use of Cellometer Image Cytometer software, Matrix software and all related documentation. In addition, it includes a definition of *Revvity's Proprietary Information*.

WARRANTY INFORMATION

Revvity warrants that Cellometer K2 instrumentation products shall, for a period of twelve (12) months from the date of purchase, be free of any defect in material and workmanship. The sole obligation of this warranty shall be to either repair or replace at our expense the product, at manufacturer's option. The original sales receipt must be supplied for warranty repair. Products which have been subjected to abuse, misuse, vandalism, accident, alteration, neglect, unauthorized repair or improper installation will not be covered by warranty.

Instruments must be handled and packaged correctly when shipping to other locations. Contact Revvity for additional information and to order packaging materials.

Any product being returned is to be properly disinfected and packaged (in original packing if possible). Damage sustained in shipping due to improper packing will not be covered by warranty.

TERMS AND CONDITIONS

The *Revvity, Inc. – Terms and Conditions of Sale* license agreement states the terms and conditions upon which Revvity offers to license to you the software together with all related documentation. The Software is licensed to you for use only in conjunction with Revvity's family of products.

In addition, the original Cellometer Image Cytometer software, Matrix software and any subsequent software upgrades installed on your Cellometer system by authorized representatives of Revvity, Inc. is protected. You may not tamper with this software (including unauthorized upgrades), disclose it to third parties or use it for any purpose other than running your Cellometer system. Revvity does not grant you any other rights to use or disclose the original Cellometer Image Cytometer software, Matrix software or subsequent upgrades, and any further uses will be prosecuted by Revvity, Inc. to the maximum extent possible by law. Any other use of Cellometer Image Cytometer software, Matrix software or upgrades is explicitly prohibited. In addition, you may not disclose Cellometer Image Cytometer software, Matrix software, upgrades, or any of its features and benefits to a third party.

Revvity Proprietary Information

Cellometer K2 products have been developed by Revvity and include certain intellectual property of Revvity, including without limitation, software, samples, schematics, specifications, manuals, designs, and other technical, business, trade secret, proprietary and confidential information provided to Buyer by Revvity ("Revvity Proprietary Information").

Buyer is granted a non-exclusive right and license to use the Revvity Proprietary Information solely: (a) as incorporated into, and in conjunction with, the products, (b) in conformance with the specifications, and (c) for Buyer's internal use.

Buyer may not: (i) assign, sublicense, transfer, lease, rent or distribute any of its rights in the Revvity Proprietary Information; (ii) port, translate, localize or create derivative works based upon the Revvity Proprietary Information in any manner; (iii) reverse assemble, decompile, reverse engineer, translate or otherwise attempt to derive or obtain the source code, the underlying ideas, algorithms, structure or organization of the Revvity Proprietary Information; (iv) use the Revvity Proprietary Information for the benefit of any third party including as part of any service bureau, time sharing or third party training arrangement; or (v) publish any benchmark testing results on any product or the Revvity Proprietary Information without Revvity's written consent.

Revvity retains all ownership rights in the Revvity Proprietary Information and, other than limited license set forth in this section, Buyer shall have no right in or to the Revvity Proprietary Information.

Buyer will not disclose the Revvity Proprietary Information to any third party or use it in any manner outside the scope of the license including: (1) developing, designing, manufacturing, engineering, reverse engineering, refurbishing, selling or offering for sale items, parts or components of items, derivatives of or equivalents, or (2) assisting any third party in any manner to perform such activity.

Buyer shall use reasonable care to protect the Revvity Proprietary Information, and in no event less than the care Buyer uses to protect its own like information.

LIMITATION OF LIABILITY (HARDWARE AND SOFTWARE)

Cellometer® automated cell counting instruments, software and consumables are intended for research use only.

In no event shall Revvity be liable for any damages whatsoever (including, without limitation, incidental, direct, indirect, special or consequential damages, damages for loss of business profits, business interruption, loss of business information) arising out of the use or inability to use this Software, Consumables or related Hardware.



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