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Rev. 2, 06/2011

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Introduction

The ORFLO Moxi Z Mini Automated Cell Counter performs cell count, size and viability measurements for particle sizes 2 – 34 microns. It combines the gold standard Coulter Principle with a patented thin-film sensor technology to deliver highly accurate and repeatable results in just 8 seconds.

The instrument is ultra-small and runs on a rechargeable battery, making it ideal for use in a hood. Cell concentration, average cell volume, average cell diameter, and the Moxi Viability Index (MVI) are displayed for each sample. Test results are also displayed in the form of a histogram. The Moxi Z unit can store approximately 500 histograms, and if desired, the data may be downloaded to a PC or Mac via a Bluetooth wireless connection.

The system is intended for research use only and has been tested with cell types that are representative of those commonly used.

The Moxi Z Mini Automated Cell Counting system is designed and manufactured by:

Orflo Technologies, a DBA of E.I. Spectra, LLC 18916 North Creek Parkway Building 2, Suite 105 Bothell, WA 98011 www.orflo.com

Symbols Used in This User Guide

The following symbols are used throughout this user guide and/or on product labels. The user is responsible for operating the product in accordance with the indicated requirements:

Symbol	Definition
\bigwedge	Warning alerts you to actions that may cause personal injury or pose a physical threat.
X	Do not discard with common solid waste at end of life. Segregate with other waste electrical and electronic equipment (WEEE) and send to an appropriate facility for recycling.
CE	Affixed in accordance with European Council Directives 2004/108/EC, (electromagnetic compatibility) and 2006/95/EC (safety requirements)
SUD C NRTL US	Safety tested and certified by TÜV SÜD [®] Product Service Division.

Safety Precautions

Please review and understand the safety instructions below before operating the Moxi Z Cell Counter.



- To avoid danger of electric shock, do not install the instrument in an area with a high humidity level, such as a greenhouse or an incubator. Refer to Operating Environmental Conditions in Specifications section.
- Do not touch the USB cable or USB charging adapter with wet hands.
- To avoid a potential shock hazard, choose the correct plug configuration and make sure that the USB cable and USB charging adapter are plugged securely into a properly grounded AC power outlet. Make sure that the connection between the USB cable and the instrument is secure.
- Always ensure that the power supply input voltage matches the voltage available in your location.
- Do not use with flammable or explosive liquids.
- Do not immerse instrument body in liquid, or allow liquid to enter any part of the instrument.

CAUTION:

- Do not expose instrument to vibrations. Vibrations may cause instrument malfunction or damage.
- Do not autoclave or expose to high temperature.
- Use only authorized accessories (universal power adapters, USB cable).
- If the instrument is dropped and broken, disconnect the USB cable and contact Orflo Technologies. Do not attempt to disassemble the instrument.

Consignes de sécurité

Veuillez lire et vous assurer de comprendre les consignes de sécurité ci-dessous avant d'utiliser le compteur Moxi Z Cell.



- Afin d'éviter tout danger de choc électrique, ne pas installer l'instrument dans un endroit où le taux d'humidité est élevé, comme dans une serre ou un incubateur. Se reporter à la section sur les spécifications en matière de conditions environnementales d'exploitation.
- Ne pas toucher au câble USB ou à l'adaptateur de charge USB les mains mouillées.
- Afin d'éviter tout risque de choc électrique, choisir la configuration de prise appropriée et s'assurer que le câble USB et l'adaptateur de charge USB sont bien branchés dans une prise de courant CA mise à la terre. S'assurer que la connexion entre le câble USB et l'instrument est bien établie.
- Toujours s'assurer que la tension d'entrée du bloc d'alimentation correspond à la tension disponible dans votre lieu.
- Ne pas utiliser avec des liquides inflammables ou explosifs.
- Ne pas immerger le corps de l'instrument dans du liquide ou permettre à du liquide de pénétrer dans l'instrument.

ATTENTION :

- Ne pas exposer l'instrument à des vibrations. Les vibrations peuvent causer le dysfonctionnement de l'instrument ou des dommages à celui-ci.
- Ne pas autoclaver ou exposer à des températures élevées.
- Utiliser uniquement les accessoires autorisés (adaptateurs de courant universels, câble USB). Si l'instrument est échappé et brisé, débrancher le câble USB et communiquer avec Orflo Technologies. Ne pas tenter de désassembler l'instrument.

Moxi Z Mini Automated Cell Counter Kit

The Moxi Z Mini Automated Cell Counter kit includes the Moxi Z instrument, USB Cable, Power Adapter (US and EU versions only), Cassette Dispenser, Calibration Check Beads, USB Flash Drive with software/user guide and 25 Cassettes (2 tests per cassette).



<u>Part</u>	Function
Touch Screen Display	Allows user to interface with instrument. Displays all information needed for operation. Displays test results and histograms with curve fitting, gating, cell volume, concentration, diameter, and Moxi Viability Index (MVI).
Power/Reset Button	Turns Moxi Z on and off. Resets the unit when pressed and held for >5 seconds.
Cassette Tray	Tray that needs to be pressed down for inserting cassette
USB Cable Port	Connects instrument to USB cable.
Cassette	Disposable used for loading samples. Each cassette contains two ports thereby allowing for two samples to be run per cassette.

Moxi Z Mini Automated Cell Counter Accessories







USB Cable & Power Adapter



Calibration Check Beads



USB Flash Drive with software



Electronic Calibration Cassette (sold separately)

Part Part

Function

Cassette Dispenser	Stores up to 25 cassettes for convenient dispensing
USB Cable	Connects instrument to PC/Mac or power adapter
Power Adapter (US and EU models only)	Connects USB cable to an AC outlet
USB Flash Drive	Stores Moxi Z software and user manual
Calibration Check Beads	Polystyrene beads for confirming proper system operation and calibration
Electronic Calibration Cassette (sold separately)	Electronic cassette for verifying proper system operation and calibration

Installation

The Moxi Z is shipped in a condition ready for initial use with the battery partially charged. If necessary, the battery can be charged by inserting the USB cable into the USB Cable Port and connecting the cable to a computer or power adapter. If using a power adapter, insert the plug into an AC outlet (110/220 V). The battery will be fully charged in approximately four hours.

Note: For optimal cell counting results, perform cell counts with the USB cable disconnected. Although the unit may be operated using AC power, this mode may cause undesirable electrical noise which could result in less accurate small particle counting results and may affect MVI. When not in use, the Moxi Z should be connected to a charging source so that the battery will maintain a continuous charge and be ready for immediate use. If a low battery warning appears on the display, stop using the instrument and charge the battery or operate the Moxi Z using an AC power source.

General Guidelines

The Moxi Z Mini Automated Cell Counter is used with the Moxi Z Cassette. Refer to the Specifications section for information on the operating ranges for the system.

The sample volume for a test should be 75 $\mu L.$

If necessary, prepare dilutions of the sample using ORFLO Diluent (Cat. No. MXA006) or a diluent compatible with the characteristics of the cells. The diluent used should not cause changes in the cell size and should have sufficient conductivity to enable operation of the instrument. Water, hypotonic, or hypertonic solutions are **not** acceptable diluents.

Note: Detergents and DMSO may interfere with cell counting. 10% DMSO is not an acceptable diluent but 1% DMSO may be used.

Serum-enriched media may also interfere with counting. Dilute samples with ORFLO Diluent or PBS rather than serum-enriched media.

Materials Required

Cell sample (diluted, if necessary); 75 µL minimum.

Pipette and appropriately sized pipette tips

Using the Moxi Z Automated Cell Counter

Settings

Set the date and time by pressing the **Settings** icon on the main menu of the Moxi Z. Then use the arrow keys and follow the instructions displayed on the screen.

Cell Counting

 If necessary, dilute a cell suspension with ORFLO Diluent or an appropriate diluent so that the cell concentration is within the operating range of the instrument (3,000 to 500,000 cells/mL). For optimal MVI performance, run samples at concentrations between 50,000 cells/mL and 350,000 cells/mL.

A dilution of 1:5 to 1:20 is recommended for most mammalian cell lines, but the appropriate dilution will depend on cell type and seeding density. The volume required for an accurate count is approximately 75 μ L.

2. Turn the Cell Counter on by pressing the power button and the **Home** screen will be displayed.





 Press the tray down and insert a Cassette into the Moxi Z. The Pipette 75µL Sample... screen will be displayed.



Moxi Z Mini Automated Cell Counter User Manual

- Pipette a 75 µL sample into the fill port of the cassette (either test 1 or test 2, depending on which end of the cassette was inserted into the instrument).
- 5. Touch the screen anywhere to start. The Moxi Z will begin the test and the histogram count results will be complete in approximately 8 seconds. The Curve Fitting and MVI calculations begin automatically and require only a few additional seconds. The results will then automatically be displayed on the screen.

Managing the Data

The results are initially displayed for a curve fit count on a diameter scale of 2-34 μm. If desired, touch the **ReScale** icon to display the results at a higher resolution. This is recommended when counting smaller cells or particles. Successively pressing the **ReScale** icon will reduce the diameter scale through the following ranges: 2-34, 2-26, 2-20, and 2-10 μm. This feature is only available immediately following a cell count. Touching the **ReCalc** icon at any time will reset the diameter scale to 2-34 μm. Touching the **Done** icon will save the current histogram.







 The histogram can also be gated manually by touching the Curve Fit Count results button. Gating markers can then be positioned as desired by sliding each blue gating marker independently. Only the cells between the markers are counted. Touching the Gated Count results button will return the display to curve fit mode.



- 3. Press the **Delete** icon at any time to permanently delete the results of the test.
- 4. Press the **Done** icon to save the results and return to the **Home** screen.

Retrieving and Deleting Data

1. To open a saved test, press the Histogram icon on the **Home** screen.



2. Icons for up to nine saved histograms will be displayed on the screen. Press the appropriate icon for the test of interest or press the **Page Up** or **Page Down** icon to view more test results.



- gated results screen, touch the Gated **Count** results button to return to the results for curve fit mode.
- 4. Press the **Zoom** and **Unzoom** icons to adjust the vertical scale of the histogram.

3. If desired, press the Curve Fit Count

results button. Gating markers can then be positioned as desired by sliding each blue gating marker independently. From the

5. Press the **Delete** icon to permanently delete the results of the test.

6. Press the **Done** icon to close the test results and return to the Home screen. (note: zoomed view will not be saved)



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Moxi Z Help

- 1. For help with operation of the Moxi Z, press the Help icon on the **Home** screen. Visual instructions for inserting a cassette will be presented.
- 2. Press the **Next** icon to view the next visual instruction that demonstrates how to pipette a sample into the cassette.
- 3. Press the **Next** icon to proceed to the next instruction screen or press the **Previous** icon to return to the previous screen.
- 4. Press the **Done** icon to exit the help screens and return to the **Home** screen.

For additional help, see the Troubleshooting table (page 15).

Installing MoxiChart Software on a PC

1. Insert Moxi Z flash drive into a USB port on your computer.



 If prompted to run MoxiChart Install, click YES and follow the on screen instructions. Otherwise, open ORFLO DISK folder and run MoxiChart Install. Complete the setup by following the instructions of the MoxiChart Setup Wizard.



Connecting to Moxi Z via Bluetooth with a PC

1. Press the **Bluetooth** icon to display the unit's Bluetooth I.D.

2. Run **MoxiChart** application and click on Bluetooth icon in upper right corner.



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 Choose the device which corresponds to the Moxi Z.

4. Select a folder to upload data files to.

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Installing MoxiChart Software on a Mac

1. Insert Moxi Z flash drive into a USB port on your computer.



- 2. Open the folder for the USB drive.
- 3. Double click on the on the file **MoxiChartInstaller.dmg**
- 4. Drag and drop **MoxiChart** into your applications folder.



5. From the applications folder, select **MoxiChart** to launch the application.

Connecting to Moxi Z via Bluetooth with a Mac

The procedure for connecting Moxi Z via Bluetooth with a Mac is the same as that for a PC. See the section entitled "Connecting to Moxi Z via Bluetooth with a PC" on page 12.

Moxi Z Automated Cell Counter Calibration Check

The Moxi Z Automated Cell Counter can be tested periodically with the included Calibration Check Beads. The beads can be used to test the system as well as for practice and troubleshooting. The bead size and concentration are specified on the vial containing the beads.

In addition, proper system operation and calibration can be verified using an Electronic Calibration Cassette (Cat No. MXA004) sold separately. Refer to the product instructions included with the Electronic Calibration Cassette for guidelines on its use.

Instrument Firmware and Software Upgrades

Moxi Z Automated Cell Counter firmware and software may be updated periodically. For information on the most up-to-date firmware and software, contact ORFLO Technologies at <u>www.orflo.com</u>. Register your instrument in order to receive notification about relevant firmware and software upgrades.

Updating Moxi Z Firmware

The Moxi Z firmware can be updated through a Bluetooth connection. The user first needs to put the Moxi Z into a firmware update mode. This can be done in either of the following two ways:

With the unit powered off, quickly press the power/reset button four times. When successful, the white Moxi Z screen will display with text under the Moxi Z logo that indicates the system is in firmware update mode. If unsuccessful, turn the power off and retry.





OR:

Alternatively, the firmware update mode can be entered from the Help menu screen. On the displayed image, touch the power button of the Moxi Z and the system will display a blue screen with a message that reads "System is loading...". If unsuccessful, the second page of the help menu is entered and the user must return to the previous page with the back arrow and retry.





From here, open MoxiChart and select **Update Firmware** from the **Tools** menu. Follow the instructions in the installation wizard to complete the firmware update.

Symptom	Cause	Corrective Action	
Questionable concentration	Concentration of cell sample is too high or too low	Make sure concentration of cell sample is within recommended guidelines. Refer to General Guidelines section.	
	Wrong diluent	Use a diluent that is compatible with cells being counted. ORFLO Diluent (Cat No. MXA006) or equivalent.	
	Cell clumping	Ensure the cells are in a single-cell suspension. Break clumps by pipetting up and down with a standard pipette. ORFLO recommends Accutase or equivalent.	
Questionable cell diameter	Wrong diluent	Use a diluent that is compatible with cells being counted. ORFLO Diluent (Cat No. MXA006) or equivalent.	
	Cell clumping	Ensure the cells are in a single-cell suspension. Break clumps by pipetting up and down with a standard pipette. ORFLO recommends Accutase or equivalent.	
Peak of interest indistinct	Cell concentration too low	Try running the cell sample at a higher concentration. Refer to Managing the Data section for instructions on adjusting the Y-axis.	
	Cells not viable		
Instrument stops responding	Internal firmware issue due to instrument malfunction or high level of external interference	Reset instrument by pressing and holding the power button for at least 5 seconds. If problem persists, return instrument for service.	
Battery will not fully charge	Battery is faulty or has surpassed its service life	Return instrument for battery replacement	

Troubleshooting

Error/Warning Messages	Cause	Corrective Action	
	Viscous sample (e.g. serum-enriched media)	Use ORFLO Diluent or PBS to dilute sample.	
Aperture block	Cell Counter sensor is blocked.	Sample concentration is too high; dilute cell sample more. Ensure that cells are in a single cell suspension. Break clumps by pipetting up and down with a standard pipette.	
	Wrong diluent	Use ORFLO Diluent or PBS.	
Lost start	Sample volume too small or air bubble in test cassette	Make sure sample volume is 75 µL.	
Lost sensor - detect	Sensor not properly inserted into cell counter	Do not remove cassette from Cell Counter before completion of counting cycle. Ensure cassette is properly inserted.	
Warning High Concentration	Concentration of cell sample is too high	Make sure concentration of cell sample is within recommended guidelines. Refer to General Guidelines section.	
Start open			
Stop open Start/stop short Electrode short	Issue detected upon test cassette insertion	Reinsert sensor. If problem persists, return instrument for service.	
Used cassette	Previously used sensor detected	Do not reuse sensors.	
Low battery	Battery needs to be recharged	Recharge instrument for a minimum of 4 hours or use instrument with AC power.	
Disk full	Instrument has exceeded maximum storage capacity of ~500 histograms	Delete histograms or download to computer.	
Disk now full	After histogram is recorded and saved, there is no more space on the disk drive	Delete files.	
Unhandled exception	Internal firmware issue due to instrument malfunction or high level of external interference	Clear error by turning instrument off and then on again Remove cell counter from sources of external interference. If problem persists, return instrument for service.	
SPI timeout	Instrument malfunction	If problem persists, return instrument for service.	
Corrupt filesys	Instrument malfunction	If problem persists, return instrument for service.	
Defaults loaded	Instrument has detected corruption or new version of firmware and reset all settings to factory defaults	If problem persists, return instrument for service.	
False start False stop	Sensor malfunction	Use new sensor.	

Maintenance and Storage

Storage

Store the Moxi Z Cell Counter and Moxi Z Test Cassettes at room temperature in a dry environment.

Avoid exposure to ultraviolet light as it may discolor and/or damage the instrument.

Charging the Battery

The Moxi Z Automated Cell Counter contains a 3.7 V lithium ion battery which can be charged for approximately 500 cycles. The battery may be charged at any time in the discharge cycle and can be charged continuously without damage, using a PC/Mac or the power adapter. Refer to the Installation section for information on how to charge the battery.

The battery life is about 2 to 5 years depending on use. Lithium ion batteries discharge even if they are not in use. To prevent battery damage from self-discharge, charge the battery at least once every two months.

Cleaning/Sanitizing

The Moxi Z Cell Counter is **NOT** autoclavable. Extreme heat will damage the battery, touch screen display, and other electronic components.

The external surfaces of the Moxi Z Cell Counter body and touch screen display can be sanitized by wiping with a soft, nonabrasive cloth moistened with 70% isopropyl alcohol (IPA) or 70% ethanol. Do not clean the instrument with any more aggressive solutions.

CAUTION: When sanitizing, make certain that no liquid enters any internal cavities of the instrument.

Maintenance

There is no routine maintenance required for the Moxi Z Automated Cell Counter. In addition, there are no user serviceable parts. Instrument repairs must be carried out by authorized personnel only.

CAUTION: To prevent battery damage, use ONLY the specified power adapter (Cat. No. MXA002 or MXA003) or the USB port of a computer.

Specifications for the Moxi Z Automated Cell Counter

Performance

Sample Volume Required Operating Range Cell Size Cell Concentration 75 µL

2-34 μm 3,000-500,000 cells/mL 50,000-350,000 cells/mL recommended for optimal MVI calculation 8 seconds

Test Time

Software

PC or Mac compatible; requires Windows XP, Windows Vista, Windows 7, or Mac OS X operating system

Dimensions

Length	7.6 in. (19.3 cm)
Width	4.3 in. (13.5 cm)
Height	2.8 in. (7.1 cm)
Weight	1.5 lbs (680 g)

Electrical Specifications

Internal BatteryRechargeable 3.7 V, 4400 mAh lithium ion
batteryAC Power AdaptersInput: 100-240 VAC (50/60 Hz), 0.2 A
Output: 5 V, 1 A
CE certified

Operating Environmental Conditions

Temperature15-30°CMaximum Relative Humidity20-80% (non-condensing)

Moxi Z Cassette Specifications (Type M)

Material Aspiration Volume Dimensions Polyester 75 µL Length: 3.3 in. (8.4 cm) Width: 1.2 in. (3.0 cm) Height: 0.035 in. (0.90 mm) 0.1 oz. (2.3 g)

Weight

Ordering Information

This section lists catalog numbers for the Moxi Z Automated Cell Counter and related products. You can purchase Orflo products through a regional distributor or on-line at <u>www.orflo.com</u>. See the Technical Assistance section for information about contacting Orflo.

Product Description	Cat. No.	Quantity/Pack
Moxi Z Mini Automated Cell Counter Kit, U.S. Version. (includes Cell Counter, Cassette Dispenser, USB Cable, USB Power Adapter, Calibration Beads, Cassettes (25/pk), and flash drive with software and manual.	MXZ001	1
Moxi Z Mini Automated Cell Counter Kit, E.U. Version. (includes Cell Counter, Cassette Dispenser, USB Cable, USB Power Adapter, Calibration Beads, Cassettes (25/pk), and flash drive with software and manual.	MXZ002	1
Moxi Z Mini Automated Cell Counter Kit, International Version. (includes Cell Counter, Cassette Dispenser, USB cable, Calibration Beads, Cassettes (25/pk), and flash drive with software and manual.	MXZ003	1
Cassettes, Type M	MXC001 MXC002	25/pk (50 tests) 10 x 25/pk (500 tests)
Cassette Dispenser	MXA001	1
USB Cable and Power Adapter (US version)	MXA002	1
USB Cable and Power Adapter (EU version)	MXA003	1
Electronic Calibration Cassette	MXA004	1
Calibration Check Bead Kit	MXA005	1
ORFLO Diluent (100 ml)	MXA006	1
USB Power Cable	MXA007	1

Technical Service

For technical service, contact ORFLO Technologies at (425) 806-0002 or email us at info@orflo.com.

Warranty

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