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ArrayScan® VTI HCS Reader: Live Module User's Guide

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WARNING



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Introduction

The ArrayScan® V^{TI} HCS Reader now offers complete live-cell, quantitative kinetic imaging through the addition of the Live Module. You can now image live cells and keep cells alive for both short- and long-term experiments in a controlled environment similar to that of a tissue culture incubator.

Highlights include:

- Complete environmental control with full reporting of CO_2 percentage and temperature over the defined time course
- Works with all Cellomics® BioApplications
- Makes motility and kinetic calculations
- Validated performance

The Live Module includes the Live Cell Chamber and the Chamber Controller.

About this Guide

The chapters that follow this introduction are described below.

Chapter 1 provides an overview of the Live Cell Chamber and Chamber Controller.

Chapter 2 provides instructions for Live Cell Chamber setup and operation.

Chapter 3 provides instructions for Live Cell Chamber maintenance.

Terminology, Conventions, and Symbols

This guide assumes that you have a basic knowledge of computers using the Microsoft® Windows® operating system and that you have experience working with windows, menus, commands, buttons, tabs, dialog boxes, and other Microsoft Windows elements. If you are unfamiliar with these terms, please refer to Microsoft Windows documentation.

Throughout this guide certain terminology, conventions, and symbols are used consistently. These conventions are described in the following sections.

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Symbol	Description
	Biohazard
	Risk of Eye Injury – Wear safety glasses designed to filter dangerous ultraviolet wavelengths.
NOTE 	A tip, suggestion, or additional information

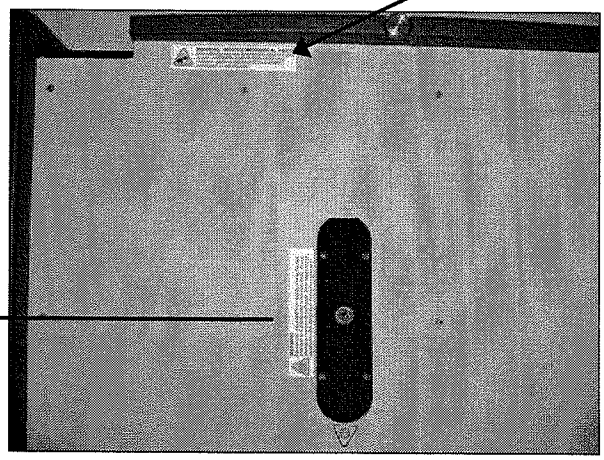
WARNING



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WARNING - MOVING MECHANICAL PARTS
Before opening stage door or removing an instrument panel or cover, verify that the stage is totally inactive. After verification, wait for a minimum of 30 seconds before opening door or removing cover.

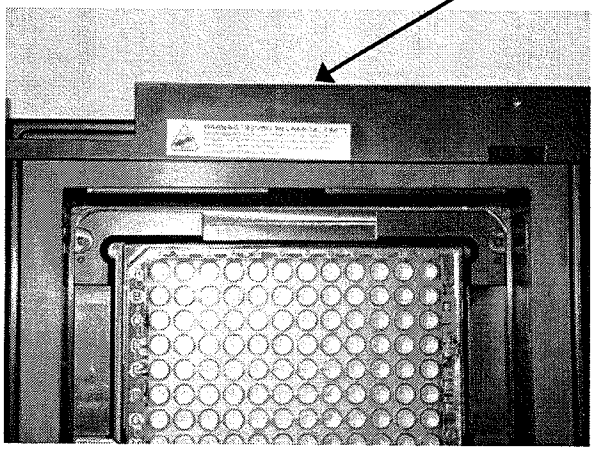


Top view of the Chamber and the ArrayScan V^{TI} Lid

WARNING

Eye damage may result from directly viewing the light produced by the lamp used in this instrument. Do not attempt to remove the light guide. Wear safety glasses designed to filter dangerous ultraviolet wavelengths.

WARNING - MOVING MECHANICAL PARTS
Before opening stage door or removing an instrument panel or cover, verify that the stage is totally inactive. After verification, wait for a minimum of 30 seconds before opening door or removing cover.



Sample compartment stage

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Contacting Technical Support

If you have a technical question that you are unable to answer after consulting the documentation, please contact Technical Support. However, before contacting Technical Support for service or support, it is helpful if you are prepared to answer the following questions:

- What were you doing when the problem occurred?
- Can you reproduce the problem?
- Did you try to solve the problem? If so, what steps did you take and what did you observe?
- Which error messages, if any, appeared?

Having these answers will help us provide you with a solution as quickly as possible.

Technical Support Contact Information:

Thermo Fisher Scientific
100 Technology Drive
Pittsburgh, PA 15219
telephone: (412) 770-2525 or toll-free (in U.S. only): (800) 432-4091
fax: (412) 770-2450
email: techsupport@cellomics.com

For European assistance, please contact:
telephone: +44 118 9880 262
fax: +44 118 9880 362

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- Suggestions: Please provide suggestions, if possible, on how to correct or improve the documentation or online help.

Email feedback to: **documentation@cellomics.com**

Please use this email address for documentation feedback only. If you have a technical question or comments on the product software or hardware, please contact Technical Support.

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Chapter

1

Overview of the Live Module

WARNING

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This chapter provides an overview of the Live Cell Chamber and Chamber Controller. Operating instructions and specifications can be found in subsequent chapters.

Overview of the Live Cell Chamber and Chamber Controller

When purchasing the optional Live Module for use with the ArrayScan V^{TI} HCS Reader, you have the ability to not only image live cells, but to keep those cells alive for both short- and long-term experiments in a controlled environment similar to that of a tissue culture incubator.

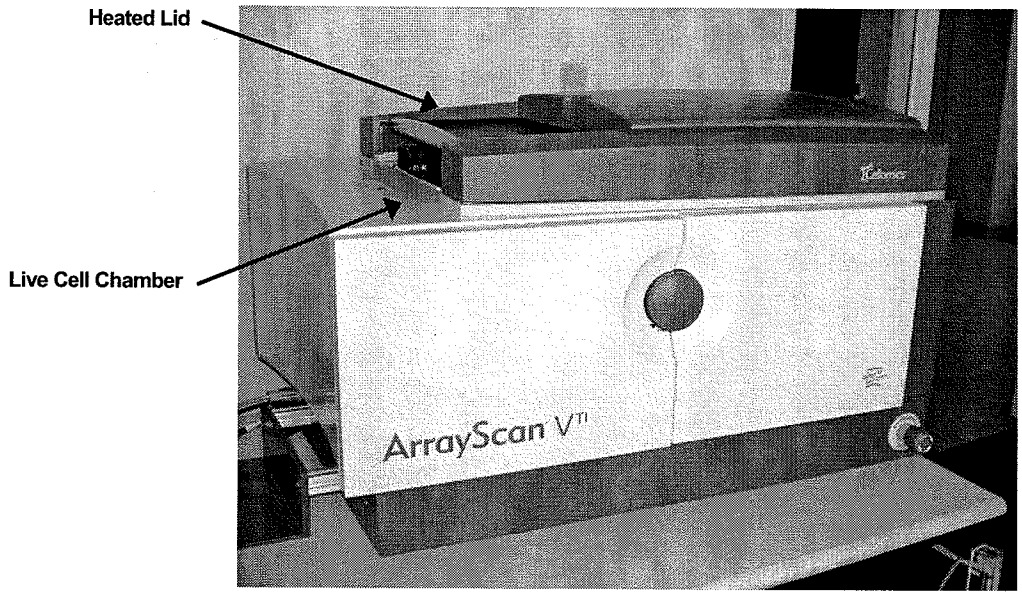


Figure 1.1 *ArrayScan V^{TI} HCS Reader with Live Module (500 Series)*

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Chamber Controller Components

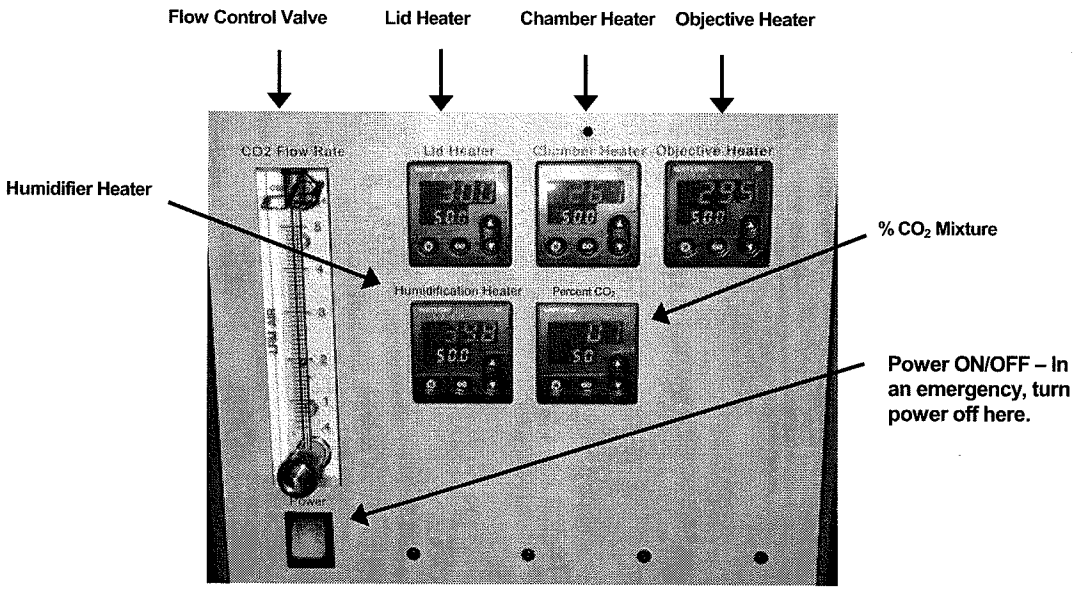


Figure 1.3 Front View of the Chamber Controller with open front door

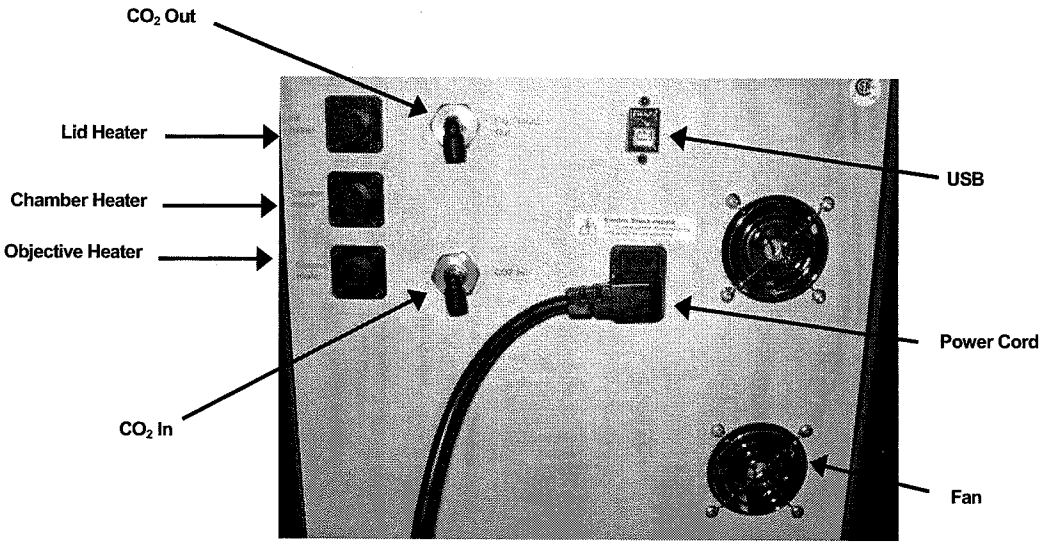


Figure 1.4 Back view of the Chamber Controller

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Chapter

2

Operating the Live Module

WARNING



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WARNING



RISK OF ELECTRIC SHOCK!

- **ONLY QUALIFIED SERVICE PERSONNEL** may install, disassemble or perform testing or repairs. The instrument may only be opened by trained, qualified service personnel and only after it has been disconnected from the mains.
- The ArrayScan V^{TI} HCS Reader contains voltages that are potentially hazardous. The ArrayScan instrument may only be connected to power outlets that are properly grounded and free from electrical or mechanical defects. The grounding effect must not be nullified by an extension cable which does not have a protective ground wire.
- Check whether the local line voltage and the operating voltage of the ArrayScan V^{TI} instrument and all the other electrical components are identical. Incorrect voltage settings which do not meet the specifications may damage the instrument or impair its functions.
- If it is established that the protection measures are no longer being met, the instrument must be switched OFF and safeguarded against inadvertent operation.
- Periodically inspect power cords and plugs for proper condition and replace as necessary.

WARNING



FIRE HAZARD!

Only use fuses of the same type and rating. Disconnect the mains power cord before changing the ArrayScan V^{TI} Instrument or Chamber Controller fuses. To reduce the risk of fire or shock, replace fuses only with fuses of the same type and rating.

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System Startup and Shutdown Procedures

System Startup

WARNING







CHAMBER CONTROLLER WARNINGS

- No user repairable parts in unit.
- Connecting unit to main power supply must be done by qualified personnel.
- Do NOT turn the Chamber Controller ON immediately after it has been taken from a cold environment to a warm environment or warm to cold environment. The resulting condensation could destroy the Controller. Allow the Chamber Controller to reach room temperature before switching ON.
- The Chamber Controller generates heat during operation. Make sure it is adequately ventilated. Choose a well ventilated area to position the system and provide at least 12 inches clearance in rear for proper fan exhaust, 4 inches side clearance for cabling, and 16 inches front clearance for door access. Do not cover the ventilation openings of the device.
- If you suspect that the Chamber Controller unit is not capable of safe operation, immediately switch OFF the device, disconnect the device from mains power, and prevent others from using the device. Be sure to do this if the device shows signs of visible damage, the device no longer functions, the device has been stored for long periods under unfavorable conditions, or the device has been subjected to considerable stress in transit.
- Do not set the lid heater, chamber heater, objective heater, or bubbler heater to a set-point temperature greater than 80 degrees C. If temperature limits of any heater are set higher than factory set points, overall safety can be impaired.
- If any water is spilled on the controller, turn OFF the Chamber Controller, disconnect the AC power cords from the unit, and then clean spill immediately.
- Follow all local and national regulations for the handling and dispensing of CO_2 into and out of the unit.
- You should also refer to additional safety precautions throughout this manual and all operation and maintenance manuals relating to the entire Reader system.
- **FIRE HAZARD!** Only use fuses of the same type and rating: T 10.0 A H.

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temperature and CO_2 settings will remain from the previous session. If you want to change these settings, please refer to the section titled, **Live Cell Chamber Setup Procedures**.

5) Turn on the ArrayScan V^{TI} HCS Reader power switch.

NOTE

- After powering the system, the system automatically starts a self calibration test. This may take a few minutes. Wait for the test to complete before continuing.
- The lamp requires a 90-second warm up period for stable lamp output.
- To ensure maximum lamp life, the lamp should remain on for a minimum of 5 minutes.
- If the instrument is turned off and an attempt is made to turn it back on before the lamp has fully cooled, a flashing bulb with the "no" symbol may appear on the lamp display. The lamp will automatically re-strike when the lamp has cooled.

Starting the ArrayScan Software

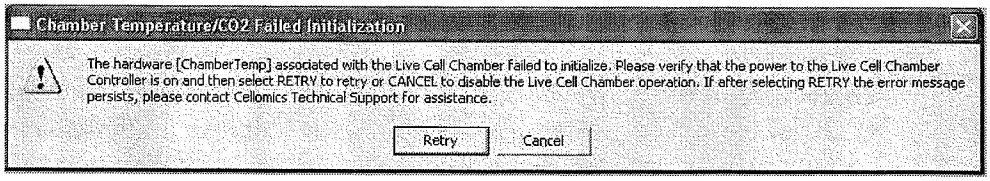
Please refer to your *ArrayScan V^{TI} HCS Reader User's Guide* for instructions on starting the ArrayScan software.

Starting the ArrayScan without the Live Cell Chamber

If necessary, you can use the ArrayScan V^{TI} HCS Reader without the Live Cell Chamber turned on.

To use the Reader without the Live Cell Chamber (Chamber is powered OFF),

1) Follow ArrayScan Hardware Startup procedures with the exception of powering the Chamber Controller. Do not turn on the Chamber Controller power switch. During startup, the following dialog box will appear.



2) Choose the **Cancel** option.

Note that the Chamber functionality will not be available. Also note that the Chamber functionality will not be available for all future system startups until you re-enable it. Therefore, the next time you wish to use the ArrayScan with the Live Cell Chamber, you must re-enable the Chamber. Detailed instructions for re-enabling the Chamber are provided below.

To re-enable the Live Cell Chamber,

1) Verify that the ArrayScan software application is closed.

2) From the ArrayScan installation folder (default location: C:\Program Files\Cellomics\ArrayScan60), select the **Tools** folder and then select the **Customer** folder. Double-click the **ArrayScanConfig.exe** file.

3) The ArrayScan Configuration Tool appears as shown in the following figure.

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Live Cell Chamber Setup Procedures

CAUTION

Do not change the settings directly on the Chamber Controller unit.

CAUTION

The output pressure of the CO_2 supply should be 1 bar (15 psi).

Connecting a CO_2 Gas Tank

To connect a CO_2 gas tank,

1) Connect a gas tank or CO_2 line with 100 % CO_2 to connector **CO_2 input**.

2) Adjust the pressure regulator at the gas tank to 1 bar (15 psi) (tolerance: +5 psi).

3) Allow the Chamber Controller unit to warm for approximately 30 minutes, assuming that you are transferring warm plates from an incubator. You do not need to turn on the CO_2 until approximately 15 minutes before the start of a scan.

Adjusting the Live Cell Chamber Settings

To make adjustments to the chamber settings,

1) Verify that you have performed the hardware and software startup procedures, including turning on the CO_2 supply and adding fresh water to the bubbler.

2) From the Scan Plate View of the ArrayScan software application, select **Configure Live Cell Chamber** from the **Tools** menu. The Live Cell Chamber dialog box appears as shown in the following figure.

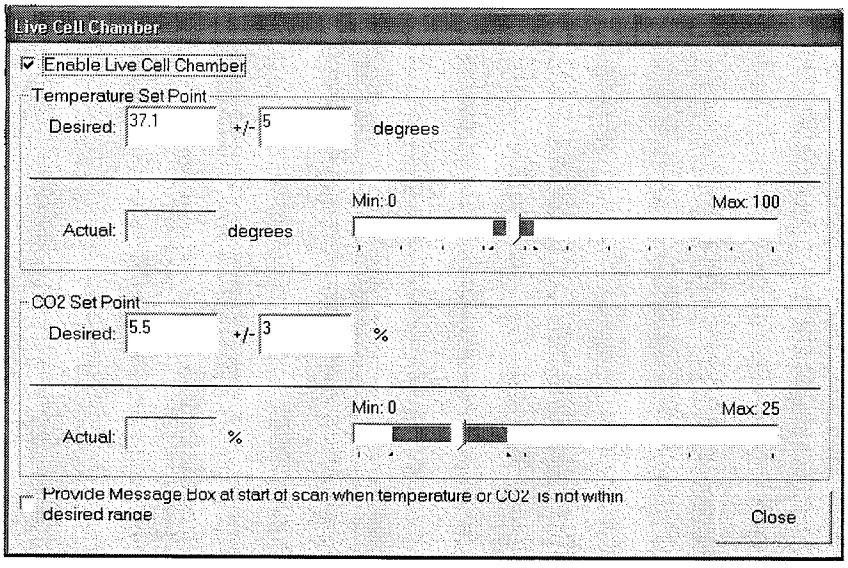


Figure 2.1 Live Cell Chamber dialog box

3) If you wish to use the Live Cell Chamber software features, verify that the **Enable Live Cell Chamber** checkbox is checked. To disable the chamber software features, clear the

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Inserting a Plate in the Sample Compartment

The light-tight, temperature and humidity controlled sample compartment accepts microplates for measurement from either the robotic plate handler or from manually placing a plate in the compartment. Please refer to your *ArrayScan V^{TI} HCS Reader User's Guide* for information regarding supported microplate types.

Inserting a Plate Using a Robotic Plate Handler

If you are using a robotic plate handler with the ArrayScan V^{TI} HCS Reader, please refer to the *ArrayScan V^{TI} HCS Reader: Robotic Plate Handler User's Guide* for instructions on setup procedures including instructions for inserting plates.

Inserting a Single Plate in the Sample Compartment

This section describes how to manually insert a single microplate in the Live Cell Chamber sample compartment without the use of a robotic plate handler. If you are using the barcode reader, follow the labeling procedures described in the *ArrayScan V^{TI} HCS Reader User's Guide.*

WARNING





BIOHAZARD!

- Use proper laboratory practices when handling any hazardous materials.
- Make sure that biohazards do not contaminate ArrayScan V^{TI} HCS Reader components.
- In the event that system contamination occurs, contact Technical Support for applicable cleanup procedures.

CAUTION





MOVING MECHANICAL PARTS!

The ArrayScan V^{TI} instrument and Live Cell Chamber incorporates moving parts. The chamber cover may open unexpectedly and the sample compartment may move without warning. Please note the crush hazard signs applied to potentially dangerous parts. Before opening doors or removing an instrument panel or cover, verify that the system is totally inactive. After verification, wait for a minimum of 30 seconds before opening door or removing panel or cover.

To insert the microplate,

WARNING





Risk of Eye Injury!

Wear safety glasses designed to filter dangerous ultraviolet wavelengths. Wear protective gloves and clothing to filter infrared light.

Eye damage may result from directly viewing the light produced by the lamp. Never look directly into an illuminated objective or microplate well.

Do not attempt to manually open the Chamber lid.

1) On the menu bar across the top, select **Load Plate**. This places the microplate stage in a position that provides easy access to the microplate holder.

2) To insert the microplate into the microplate holder, rotate the microplate so that well A1 is located in the lower left corner as viewed from the top, front of the instrument. Place the plate into the holder and ensure that it is lying flat in the holder.

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Running an Assay Protocol with the Live Cell Chamber

If you are performing a kinetic assay, you must configure the kinetic settings. These settings are accessible within the Protocol Create Window by clicking the Kinetics checkbox and then Configure Kinetics button. The Assay Protocol stores the kinetic information as well as which features are to be stored. Please refer to the *ArrayScan V^{TI} User's Guide Addendum, version x.5 to x.6* for detailed information on these settings.

If you are scanning a single plate, and the Live Cell Chamber is turned on but is not in the desired target range, a message box will appear informing you that the targeted environmental conditions are not currently being met. You will have the opportunity to continue or stop the scan. Note that this message will only appear if you chose the option, **Provide message box at start of scan when temperature or CO_2 is not within desired range,** when configuring the Live Cell Chamber.

Please refer to the *ArrayScan V^{TI} HCS Reader User's Guide* for instructions on scanning a microplate.

Monitoring Fluid Level in Humidification Bubbler

During system use, monitor the fluid level in the Bubbler bottle and refill if necessary. Fluid level should be between 100 and 450 mL. Be sure to use de-ionized water. Sterile water is not necessary. If fluid level drops below 100 mL, discard fluid and fill bottle to 450 mL.

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Chapter

3

Maintaining the Live Module

WARNING



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WARNING



RISK OF ELECTRIC SHOCK!

- **ONLY QUALIFIED SERVICE PERSONNEL** may install, disassemble or perform testing or repairs. The instrument may only be opened by trained, qualified service personnel and only after it has been disconnected from the mains.
- The ArrayScan V^{TI} HCS Reader contains voltages that are potentially hazardous. The ArrayScan instrument may only be connected to power outlets that are properly grounded and free from electrical or mechanical defects. The grounding effect must not be nullified by an extension cable which does not have a protective ground wire.
- Check whether the local line voltage and the operating voltage of the ArrayScan V^{TI} instrument and all the other electrical components are identical. Incorrect voltage settings which do not meet the specifications may damage the instrument or impair its functions.
- If it is established that the protection measures are no longer being met, the instrument must be switched OFF and safeguarded against inadvertent operation.
- Periodically inspect power cords and plugs for proper condition and replace as necessary.
- Disconnect the mains power cord before changing fuses.

DANGER



If smoke, abnormal noise, or strange odor is present, immediately shut down the system and notify Technical Support. It is dangerous to continue using the system.

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DANGER



RISK OF EYE AND SKIN INJURY!
Wear safety glasses designed to filter dangerous ultraviolet wavelengths. Wear protective gloves and clothing to filter infrared light.

Eye damage may result from directly viewing the light produced by the lamp. The level of UV energy supplied by the lamp used in this product is sufficient to ignite flammable surfaces.

- Do not attempt to disconnect the light guide. Turning power on to the lamp unit without the light guide properly installed can increase your risk of exposure to UV light.
- Shut off lamp power if light leakage is observed.
- Never look into the light emitting end of the light guide. The light could severely damage the cornea and retina of the eye if the light is observed directly.
- Never allow light from the light guide to radiate onto flammable material.
- Never look directly into an illuminated objective or microplate well.
- Turn the lamp off and disconnect the AC power cord from the unit before removing cover.

Skin damage may result from exposure to infrared light emanating from the lamp unit. The irradiation will cause heat generation and may cause sunburn-grade inflammation. Always wear safety glasses, gloves, and other appropriate protective gear when operating the equipment.

All excitation filter wheel positions must be filled with either filters or stops.

WARNING



The sample stage is equipped with a laser barcode scanner. This scanner incorporates a laser device of laser safety class 2. The wavelength of the laser is 650 nm, the output power is 1 mW (continuous wave). During common operation, laser radiation outside the instrument is unlikely. Intentional deflection of the beam by means of tools or mirrors may be possible but constitutes an improper use of the instrument.

This chapter describes maintenance procedures for the Live Module on the ArrayScan V^{TI} HCS Reader. The following topics are described in detail in this chapter:

- Routine Care and Maintenance of the Live Module
- Chamber Controller Fuse Replacement
- Chamber Controller Cleaning
- Chamber Controller Replacement Parts

Routine Care and Maintenance of the Live Module

To ensure proper operation of the Live Module:

- Periodically check all power cords and cables for secure connection and proper condition.
- Keep the Chamber Controller dust free. Please refer to cleaning instructions found later in this chapter.
- Avoid exposure to extreme climatic influences such as temperature shocks or high humidity, as well as mechanical shocks.

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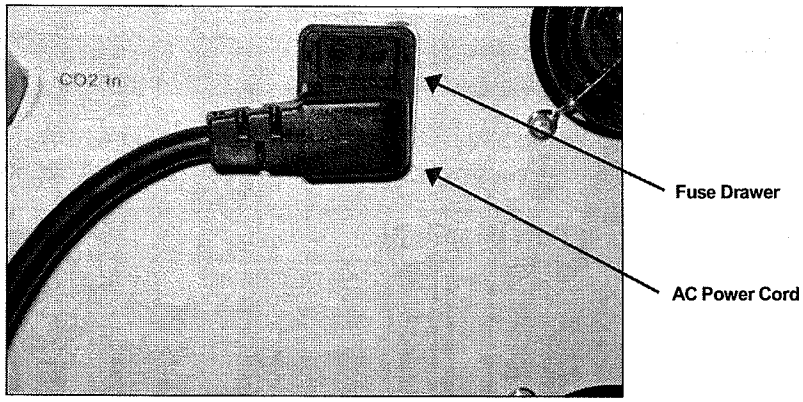


Figure 3.1 Back view of the Chamber Controller

4) Remove the fuse drawer on the power input module (located above the AC power connection on the back of the Chamber Controller). You may need a small screwdriver to gently pry it open.

5) Remove the existing fuse. Visually inspect and check for continuity. If replacement is necessary, replace the fuse with a fuse of the same type and rating: T 10.0A H.

6) Replace the fuse drawer.

7) Plug the Chamber Controller power cord into the power input module.

8) Follow System Startup procedures.

9) If the Chamber Controller does not power up, or if the fuse fails again, please contact Technical Support for further assistance.

Chamber Controller Cleaning

To ensure proper operation of the Chamber Controller, be sure to perform the following procedures:

- Clean the outer surfaces of the Chamber Controller with a clean, damp cloth. Use another lint-free cloth to wipe the Controller dry. Do not use any solvent.
- Clean up any spills immediately.
- Always protect the Chamber Controller from dust and moisture. Remove dust particles with a clean brush or rubber blower.

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Appendix

A

Controller Specifications

NOTE

Technical specifications are subject to change without notice. Please refer to your *ArrayScan V*^{TI} *HCS Reader User's Guide* for system specifications.

Electrical

Input Voltage/Frequency	100/250 V~, 50 Hz to 60 Hz
Input Current (Max)	6 A (120 V) 3 A (230 V)
Dimensions (WxHxD)	13 in. x 13 in. x 19 in.
Weight (kg)	45 lbs.

Environment

Intended Site	Closed Room
Permissible ambient temperature range during operation *	+ 18°C to + 25°C *
Permissible ambient temperature range during transport	+ 5°C to + 50°C
Permissible relative humidity during operation (non-condensing)	< 75% at 30° C
Power Line Fuses	10 A / 250 V AC

NOTE

* Note that the Live Cell Chamber temperature will vary with room temperature. For critical live cell experiments, it is recommended that you keep room temperature constant.

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