

# Callisto System

## SITE REQUIREMENTS GUIDE



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# About This Guide



**CAUTION** ABBREVIATED SAFETY ALERTS. Hazard symbols and hazard types specified in procedures may be abbreviated in this document. For complete safety information, see the safety appendix on [page 27](#).

For more information on instrument operation and safety, see the Callisto System User Guide (PN 100-7598). For related documentation, go to [fluidigm.com/documents](http://fluidigm.com/documents).

## Safety Alert Conventions

This guide uses specific conventions for presenting information that may require your attention. Refer to the following safety alert conventions.

### Safety Alerts for Chemicals

Fluidigm follows the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) for communicating chemical hazard information. GHS provides a common means of classifying chemical hazards and a standardized approach to chemical label elements and safety data sheets (SDSs). Key elements include:

- Pictograms that consist of a symbol on a white background within a red diamond-shaped frame. Refer to the individual SDS for the applicable pictograms and warnings pertaining to the chemicals being used.



- Signal words that alert the user to a potential hazard and indicate the severity level. The signal words used for chemical hazards under GHS:

**DANGER** Indicates more severe hazards.

**WARNING** Indicates less severe hazards.

## Safety Alerts for Instruments

For hazards associated with instruments, this guide uses the following indicators:

- Pictograms that consist of a symbol on a white background within a black triangle-shaped frame.



- Signal words that alert the user to a potential hazard and indicate the severity level. The signal words used for instrument hazards:

**DANGER** Indicates an imminent hazard that will result in severe injury or death if not avoided.

**WARNING** Indicates a potentially hazardous situation that could result in serious injury or death.

**CAUTION** Indicates a potentially hazardous situation that could result in minor or moderate personal injury.

**IMPORTANT** Indicates information necessary for proper use of products or successful outcome of experiments.

## Safety Data Sheets

Read and understand the SDSs before handling chemicals. To obtain SDSs for chemicals ordered from Fluidigm Corporation, either alone or as part of this system, go to [fluidigm.com/sds](http://fluidigm.com/sds) and search for the SDS using either the product name or the part number.

Some chemicals referred to in this user guide may not have been provided with your system. Obtain the SDSs for chemicals provided by other manufacturers from those manufacturers.

## Revision History

Revision	Date	Description of Change
B1	30 June 2016	<ul style="list-style-type: none"><li>• Updated specification to Callisto™ system software from v3.4 to v3.8 or later. (See <a href="#">Step 2: Review the Equipment List on page 8.</a>)</li><li>• Replaced “USB” with “USB drive” where appropriate.</li><li>• Removed reagent and consumables lists, which are not related to site installation, and kept only materials required for site installation of Callisto. (See <a href="#">Step 2: Review the Equipment List on page 8.</a>)</li></ul>
A3	31 July 2015	Initial release

# Site Requirements

## Introduction

The Fluidigm service and support team will schedule a time to install Callisto at your site and train your staff to use the system. Before a Fluidigm service representative arrives to install the system, you need to choose and prepare your site according to the instructions in this document.

Notify your Fluidigm representative if special shipping arrangements are necessary at your site, or if you need assistance in placing Callisto.



**WARNING** Do not modify this device. Unauthorized modifications may create a safety hazard.

## Site Preparation Workflow

Perform the following six steps to choose and prepare your site:

Site Prep Workflow	
1	Review this guide.
2	Review required reagents and ancillary equipment lists.
3	Select a site for the Callisto system that meets Fluidigm requirements.
4	Stock the site with the required safety equipment.
5	Receive the Callisto system and perform a visual check of the crate and containers. If damage is apparent, contact Fluidigm technical support.
6	Place the crated and boxed components at their final destination.

## Step 1: Review This Guide

Use this guide for information on all Callisto system site requirements, including safety, environmental, electrical, and space requirements.

## Step 2: Review the Equipment List

**NOTE** For complete lists of reagents and consumables, see the Callisto System Getting Started Guide (PN 100-7599).

### Required Equipment

Product Name	Company	Part Number
Callisto system, with system software v3.8 or later, and 10–20 m 1/4 inch tubing, and two 8 A, 250 V, time-lag fuses	Fluidigm	100-9911
Gas regulator*	Local vendor	—
Adapter for gas regulator†	Local vendor	—
Input fitting for two-stage gas regulator*	MLS	—
Pre-mixed gas containing 5% CO <sub>2</sub> and 5%–22% O <sub>2</sub> , balanced by N <sub>2</sub>	MLS	—
Vortexer	MLS	—
Pipettes (P2, P20, P200, P1000) and appropriate low-retention tips	MLS	—
Microcentrifuge	MLS	—
Tabletop centrifuge for 15 and 50 mL conical tubes	MLS	—
Cell culture hood	MLS	—
Inverted tissue culture microscope	MLS	—
Computer: <ul style="list-style-type: none"> <li>• Microsoft® Windows® 7 (32- or 64-bit) or higher</li> <li>• Intel® or AMD 2 GHz dual-core processor or higher</li> <li>• 4 GB RAM</li> <li>• 200 GB hard disk space</li> <li>• Microsoft .NET 4.0 (installed by the Callisto™ Experiment Planner installer)</li> </ul>	MLS	—
Surge protector	MLS	—
USB drive	MLS	—

\* Recommended: Airgas® Two Stage 0–100 psi Analytical Cylinder Regulator CGA-500 with Needle Valve (PN Y12-215D500) or equivalent regulator

† Recommended: Airgas 1/4 inch Female NPT X 1/4 inch Compression Nickel-Plated Brass Adapter (output fitting; PN Y99-26120) or equivalent adapter

‡ Consult the gas supplier.

## Suggested Equipment



Product Name	Company	Part Number
For gene expression analysis: <ul style="list-style-type: none"><li>• Biomark™ HD system or</li><li>• 7900HT Fast Real-Time PCR System</li></ul>	Fluidigm  Thermo Fisher Scientific	Inquire  4351405
Bracket for gas tank*	MLS	—
Automated stage for imaging/microscopy†	MLS	—
Cell culture incubator at 37 °C	MLS	—

\* Recommended: Radnor® Model WB100C Steel Single Cylinder Wall Bracket with Chain (Airgas, PN RAD64003560).

† For instructions and coordinates to image cell culture chambers, see [Appendix A: Program a Microscope to Image Cell Culture Chambers on page 22](#).

## Step 3: Meet Site Requirements

To operate Callisto, your site should meet the following requirements:

- Harmonized standards
- Environmental conditions
- Laboratory bench requirements
- Electrical requirements
- Pre-mixed gas requirements

### Harmonized Standards

**IMPORTANT** The installation location cannot be designated Biosafety Level 3 (BSL-3) or Biosafety Level 4 (BSL-4). Fluidigm does not install, service, or repair the Callisto system in areas designated BSL-3 or BSL-4.

The Callisto system conforms to the provisions of the following harmonized standards:

- IEC 61010-1:2001 (second edition)
- IEC 61010-2-010:2003
- IEC 61010-2-081:2001 +A1:2003
- IEC 61326-1:2012
- CAN/CSA-C22.2 No. 61010-1-04
- CAN/CSA-C22.2 No. 61010-2-010-04
- CAN/CSA-C22.2 No. 61010-2-081-04

### Environmental Conditions

#### Altitude

Callisto is for use in altitudes not exceeding 8,202 ft (2,500 m) above sea level. If your facility is located above this elevation, call technical support.

#### Humidity and Temperature

##### **IMPORTANT**

- Do not locate the system next to heat sources or cooling ducts, or in direct sunlight or extreme ambient lighting. Temperature extremes can cause system instability.
- Callisto is for indoor use only.

Callisto should be used in an environment that meets these requirements:

Conditions	Requirements
Temperature	Ambient: 15–28 °C (59–82 °F)
Humidity	30%–80%, noncondensing
Pollution	Degree 2
Electrical installation	Category II
Altitude	Up to 2,500 m (8,202 ft)

## Pollution

Callisto conforms to standard laboratory environments. Do not install the system where conductive pollutants are present.

## Ventilation Requirements

Callisto produces only hot air exhaust (no fumes or vapors). Callisto has an exhaust grill exit. Four inches (10.2 cm) of clearance must be maintained at the exhaust grill exit.

The air intake is on the bottom of the instrument.

**IMPORTANT** Do not place paper or any other object underneath the instrument.

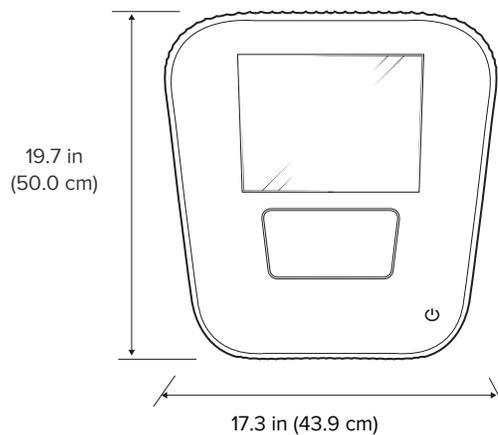
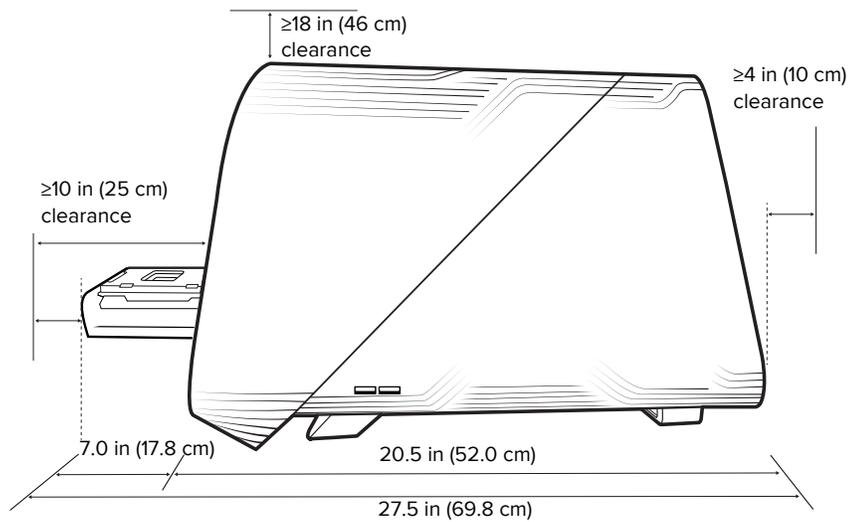
Ensure your lab space is ventilated using non-recirculating air exchanges.

## Laboratory Bench Requirements

**IMPORTANT** Your laboratory bench must support at least 200 lb (91 kg).

Provide a work surface that can accommodate Callisto. The table and figure below show the dimensions and weight of the instrument:

Length	Width	Height	Weight
27.5 in (69.8 cm)	17.3 in (43.9 cm)	19.7 in (50.0 cm)	137 lb (62 kg)



Callisto is a desktop instrument. To accommodate one instrument, we recommend a bench top with minimum depth of 30 inches (76 cm) and width of 19 inches (48 cm). To allow adequate air circulation and maintenance, keep at least 4 inches (10 cm) clearance behind, 10 inches (25 cm) in front, and 18 inches (46 cm) above the instrument. The bench must be able to support 200 lb.

**IMPORTANT** Do not place the system on a heated surface or directly above a source of heat.



**CAUTION** Position the system so the power cord can be easily disconnected.

## Electrical Requirements

This section applies to Callisto. For the electrical requirements of other Fluidigm equipment, see respective equipment documentation.

### Electrical Installation

Category II

### Callisto Electrical Requirements

Callisto requires one electrical power outlet. The system operates through 100–240 V AC power at 50–60 Hz, (8.0 A):

Customer Location	Voltage (VAC)	Frequency (Hz)	Maximum Current (A)	Typical Average Power Consumption (W)
Japan	100 ±10%	50–60 ±1%	8.0	Idle: 40 Operating: 175
United States, Canada	115 ±10%	50–60 ±1%	8.0	Idle: 40 Operating: 175
Europe, Australia	230 ±10%	50–60 ±1%	3.7	Idle: 40 Operating: 175

## Instrument Labeling



**IMPORTANT** Supply voltage fluctuation must not exceed 10% of the normal value. If the voltage fluctuation exceeds normal value, see [Strong Recommendation for Uninterruptible Power Supply on page 15](#).

## Power Cord Requirements

Fluidigm provides a country-specific power cord.

Customer Location	Minimum Wire Gauge (AWG)	Maximum Length (m)	Instrument End Plug	Receptacle End Plug
Japan, United States, Canada	14	2	IEC C13	Country-specific
Europe, Australia	16	2	IEC C13	Country-specific

## Receptacle Requirements

When connecting this instrument to a receptacle, check with your facilities manager to make sure the circuit will not be overloaded. If you are connecting multiple instruments to the same electrical receptacle or circuit, be sure the sum of all the instruments' maximum current draw is within the circuit's current limit. Receptacles must be grounded. Callisto requires only one grounded electrical connection.

**IMPORTANT** Do not use extension cords.

## Surge Protector Requirement

Connect Callisto to a surge protector and then connect the surge protector, if possible, to an uninterruptible power supply.

## Strong Recommendation for Uninterruptible Power Supply

Fluidigm strongly recommends that you protect your Callisto system with an uninterruptible power supply (UPS). Fluctuating voltage can compromise your system's performance and the outcome of your experiment. We encourage a UPS for all installed instruments, but it is particularly critical for geographic regions that have electrical voltage fluctuations exceeding  $\pm 10\%$  of normal range. The minimum requirements for the UPS to maintain power for one system are:

Conditions	Requirements
Output Power Capacity	300 W (400 VA)
Backup Time (Run Time)	2 hr
Power Draw (Load)	175 W

A recommended vendor is Franek Technologies ([frank.com](http://frank.com)).

## Disconnecting Power

In case of emergency, you must be able to immediately disconnect the main power supply to the instrument.

## (Optional) In-House Air Supply

Callisto has an internal compressor to generate compressed air and draws in ambient air by default. The instrument can draw in-house air, and it must be clean dry air (CDA). To use in-house CDA, attach 1/4 inch tubing to the air inlet on the back of the system. The allowable pressure input is listed on the back of the instrument.

## Pre-mixed Gas Requirements

Callisto works with clean, dry, pre-mixed gas (standard grade) containing 5% CO<sub>2</sub> and 5%–22% O<sub>2</sub>, balanced by N<sub>2</sub>. The gas is regulated to 22–25 psi (152–172 kPa).

**NOTE** Pre-mixed gas is already enabled in the software and the instrument by default.

- 1 Attach the gas bottle ≤12 ft from the instrument.
- 2 Attach the appropriate input fitting between the pre-mixed gas tank and the regulator.
- 3 Attach the appropriate output fitting between the regulator and the 1/4 inch outside diameter gas tubing. (See [Required Equipment on page 8.](#))
- 4 Connect the gas tubing to the pre-mixed gas inlet of the instrument. [See the Callisto System User Guide (PN 100-7598).]

**NOTE** One 50 lb tank of pre-mixed gas can maintain instrument operation for ~1 month under normal operating conditions. Replace the tank before it reaches 100 psi.

## Step 4: Stock the Site

**IMPORTANT** Safety personnel at your company must ensure that:

- Safety policies to protect laboratory personnel from potential harm are established and are followed by personnel.
- All necessary safety devices and equipment are in the laboratory or in close proximity.

## Required Safety Equipment

Fluidigm expects your laboratory to have safety policies in place to protect laboratory personnel from potential harm. We expect that appropriate safety practices are followed at all times.

Safety equipment that must be at the installation location includes:

- Adequate ventilation, including vent line/fume hood, if applicable
- Safety shower
- Eyewash station
- Biohazard waste container, if applicable
- Applicable SDSs
- Protection from potentially infectious biological material, hazardous chemicals, and radiation that may be present in the area where the Fluidigm Service Representative will be working
- Spill cleanup equipment
- First-aid equipment
- Eye and hand protection
- Fire extinguisher
  - You are responsible for providing an appropriate fire extinguisher for use on or near Callisto.
  - The fire extinguishers must be appropriate for use on chemical and electrical fires and be approved by your local fire marshal or other authority having jurisdiction in your area.

## Step 5: Receive the System

Because Callisto weighs ~137 lb/62 kg (180 lb/82 kg crated), consider where it is going to be delivered and how to get it to and into your laboratory.

**IMPORTANT** Do not tip Callisto on end. Tipping damages the instrument hardware and electronics.

### Delivery and System Inspection

For new Callisto system installations, you can anticipate receiving:

- Callisto system, crated
- Instrument accessories, boxed

Use this checklist to perform a check of all delivered components:

- Check the packing list against the original order.
- Check all boxes and crates for damage.
- Note any damage and report it to the Fluidigm Service Representative.
- Locate the reagent kit (if ordered) and unpack immediately.
- Store each component at the appropriate temperature. (See [Step 2: Review the Equipment List on page 8.](#))

## System Size and Weight Specifications



**WARNING** PHYSICAL INJURY HAZARD. Do not attempt to lift or move this instrument and/or crates without the use of appropriate moving/lifting equipment.



Specifications	Callisto System
<b>Packaged</b>	
Weight	180 lb (82 kg)
Dimensions	38.6 in L x 26.2 in W x 32.5 in H (98.0 cm L x 66.5 cm W x 82.6 cm H)
<b>Unpackaged</b>	
Weight	137 lb (62 kg)
Dimensions	27.5 in L x 17.3 in W x 19.7 in H (69.8 cm L x 43.9 cm W x 50.0 cm H)

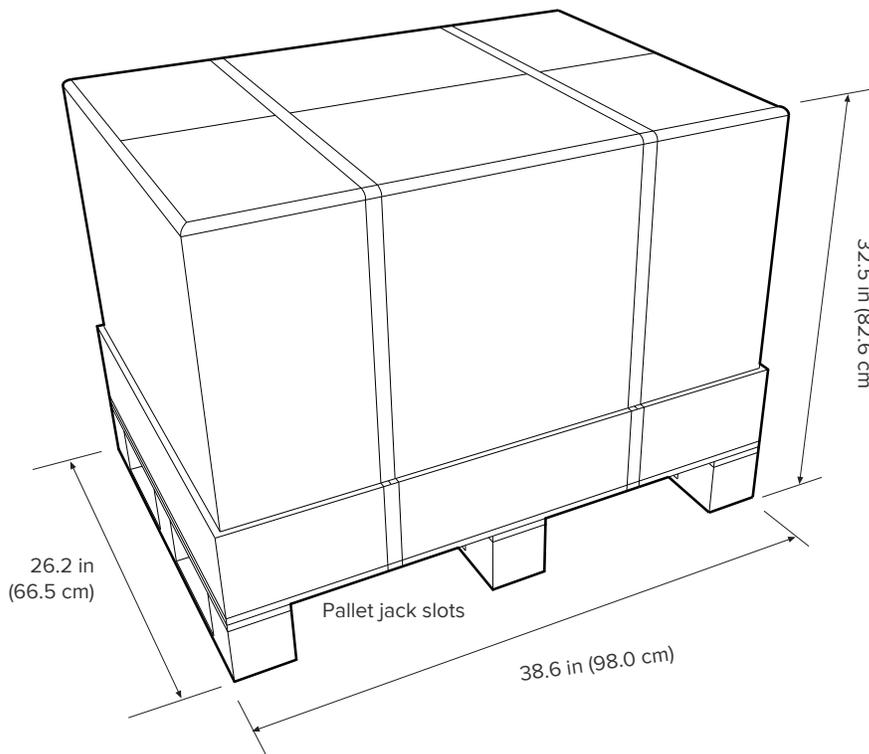


Figure 1. Callisto system (crated)

## Path Clearances

**IMPORTANT** A clear path from the loading dock to the laboratory bench must be established. The path must accommodate the dimensions of the crate.

Make sure the path to the installation site has the following minimum clearances:

Height	36 in (91 cm)
Width	40 in (102 cm)

## Step 6: Place the System at the Site

Remove all unnecessary materials from the proposed installation site prior to the arrival of the Fluidigm field service engineer.

Have the crated Callisto system at its permanent location prior to the arrival of a field service engineer. Wait for the engineer to arrive before unpacking the crate.

### System Weight



**WARNING** PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed or crated items unless you use proper lifting techniques. The crated Callisto system weighs ~180 lb (~82 kg).



After Callisto is installed, do not attempt to lift it without help from others. Use appropriate equipment and lifting techniques.

## Installation

Before the installation date, make sure you have done the following:

### Actions

- Removed all unnecessary materials from the proposed final installation site

---

- Received the Callisto system and performed a visual check of the crate and containers

---

- Moved the crated and boxed equipment from the receiving location to the installation area

---

Contact the Fluidigm service and support team if you require assistance with any of these steps.

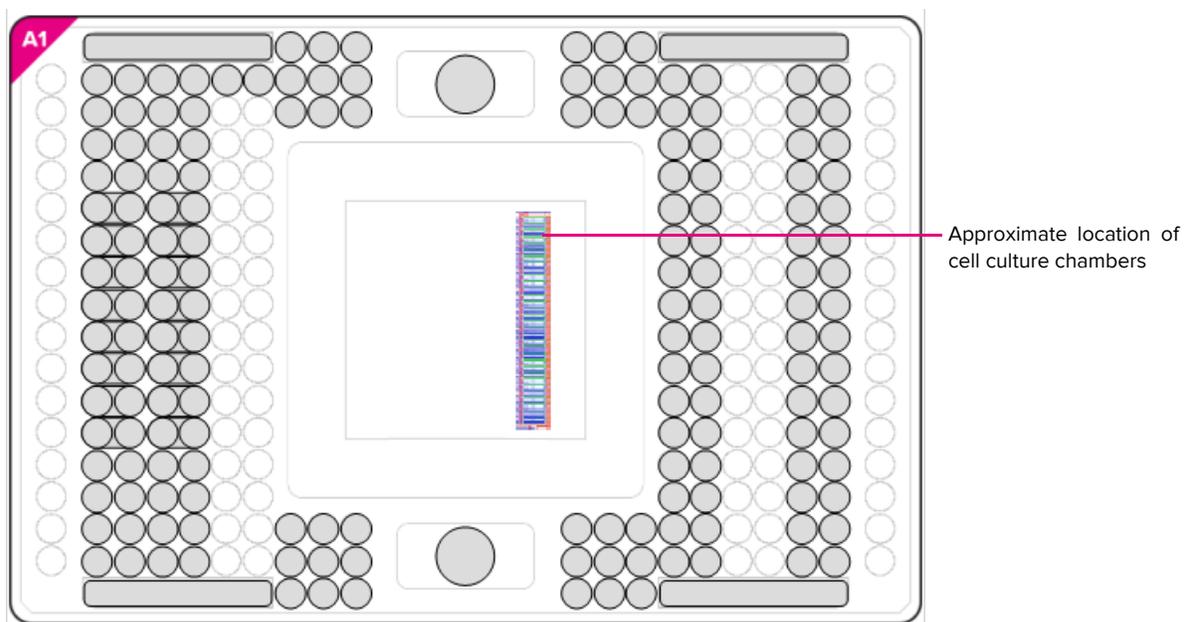
### Installation Time Estimate

Installation of Callisto is estimated to take one day. Site issues and other factors may delay or extend the installation time.

# Appendix A: Program a Microscope to Image Cell Culture Chambers

It is good laboratory practice to monitor cell health and viability during cell culture experiments. For this reason, Fluidigm designed the Callisto Cell Culture IFC (integrated fluidic circuit) to be transparent, so cells can be imaged using a standard inverted microscope. A moderate- or high-powered microscope, manual or with an automated stage, will aid in viewing cell cultures in the chambers of the Cell Culture IFC. For more information on recommended microscope options, see the Minimum Specifications for Imaging Cells in Fluidigm Integrated Fluidic Circuits (PN 100-5004).

On the right-half side of the Cell Culture IFC, there are 32 cell culture chambers that can be imaged:



## Image Cell Culture Chambers Using a Manual Microscope

- 1 Move the microscope stage to Cell Culture Chamber 1:

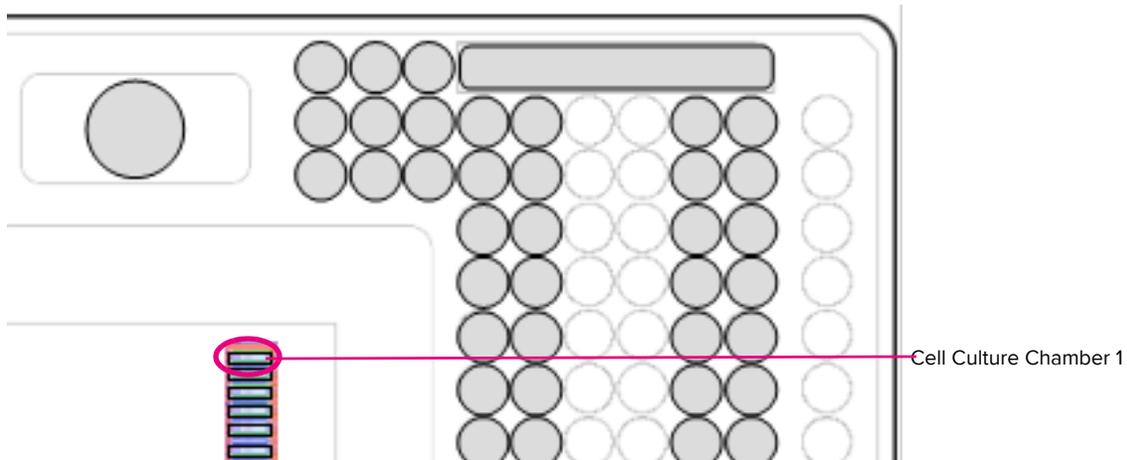


Figure 2. Approximate location of Cell Culture Chamber 1 in the Callisto Adherent Cell Culture IFC

- 2 Capture one image at each desired wavelength for the chamber.
- 3 Repeat steps 1–2 for other chambers.

## Image Cell Culture Chambers Using a Microscope with an Automated Stage

A microscope with an automated stage can be programmed to capture multiple images per chamber for a complete image of the chamber. The microscope can be programmed manually or by using the coordinates provided by Fluidigm. To minimize the time cells are out of the instrument, set up the imaging program before running an experiment on Callisto.

**NOTE** Each chamber in the Cell Culture IFC is 2,970  $\mu\text{m}$  long (end to end) and 490  $\mu\text{m}$  wide. The chambers are 990  $\mu\text{m}$  apart (center to center).

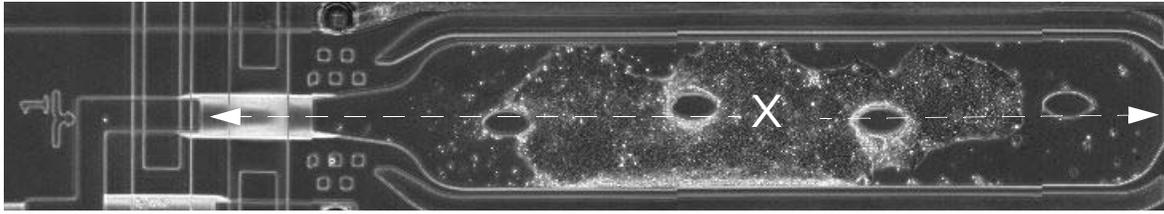


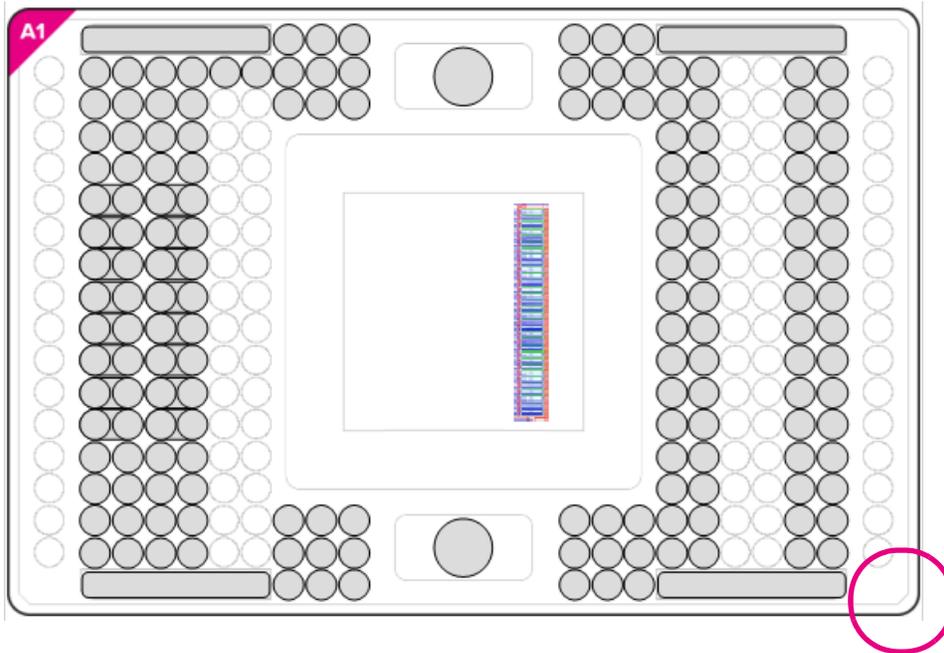
Figure 3. A cell culture chamber in the Callisto Adherent Cell Culture IFC. The “X” is the center point of the chamber.

## Program the Microscope to Image by Automated Steps

- 1 Move the microscope stage to chamber 1. (See [Figure 2](#) on [page 23](#)).
- 2 Program the microscope to take a sufficient number of images to cover the entire cell culture chamber. Include the chamber number in the image series to track it.
- 3 Program the microscope to step 990  $\mu\text{m}$  down to image the next chamber.
- 4 Repeat the previous step 31 times to image all 32 cell culture chambers.
- 5 Save the imaging pattern according to your imaging software. This pattern can be reused with other Callisto Adherent Cell Culture IFCs.

## Program the Microscope to Image by Coordinates

- 1 Enter the coordinates to image all chambers. (See [Table 1 on page 26](#).) Enter coordinates starting at one of two places:
  - The corner opposite the A1 notch (see Datum-Carrier Corner Opposite A1 Notch in [See Table 1 on page 26](#)):



- The center point of the IFC (see Datum-Carrier Center of Mass in the table). The “X” in [Figure 3 on page 24](#) represents the coordinates for the middle of the chamber.
- 2 Use the entered coordinates to take full-chamber images of all 32 cell culture chambers in the Callisto IFC.

Table 1. Cell culture chamber coordinates

Datum-Carrier Corner Opposite A1 Notch		
Chamber Number	x-Location	y-Location
1	-53947.8	58095.5
2	-53947.8	57105.5
3	-53947.8	56115.5
4	-53947.8	55125.5
5	-53947.8	54135.5
6	-53947.8	53145.5
7	-53947.8	52155.5
8	-53947.8	51165.5
9	-53947.8	50175.5
10	-53947.8	49185.5
11	-53947.8	48195.5
12	-53947.8	47205.5
13	-53947.8	46215.5
14	-53947.8	45225.5
15	-53947.8	44235.5
16	-53947.8	43245.5
17	-53947.8	42255.5
18	-53947.8	41265.5
19	-53947.8	40275.5
20	-53947.8	39285.5
21	-53947.8	38295.5
22	-53947.8	37305.5
23	-53947.8	36315.5
24	-53947.8	35325.5
25	-53947.8	34335.5
26	-53947.8	33345.5
27	-53947.8	32355.5
28	-53947.8	31365.5
29	-53947.8	30375.5
30	-53947.8	29385.5
31	-53947.8	28395.5
32	-53947.8	27405.5

Datum-Carrier Center of Mass		
Site Number	x-Location	y-Location
1	9820.8	15355.5
2	9820.8	14365.5
3	9820.8	13375.5
4	9820.8	12385.5
5	9820.8	11395.5
6	9820.8	10405.5
7	9820.8	9415.5
8	9820.8	8425.5
9	9820.8	7435.5
10	9820.8	6445.5
11	9820.8	5455.5
12	9820.8	4465.5
13	9820.8	3475.5
14	9820.8	2485.5
15	9820.8	1495.5
16	9820.8	505.5
17	9820.8	-484.5
18	9820.8	-1474.5
19	9820.8	-2464.5
20	9820.8	-3454.5
21	9820.8	-4444.5
22	9820.8	-5434.5
23	9820.8	-6424.5
24	9820.8	-7414.5
25	9820.8	-8404.5
26	9820.8	-9394.5
27	9820.8	-10384.5
28	9820.8	-11374.5
29	9820.8	-12364.5
30	9820.8	-13354.5
31	9820.8	-14344.5
32	9820.8	-15334.5

Chamber Pitch	
Chamber-to-Chamber Distance (μm)	Chamber Length (μm)
990	2,970

# Appendix B: Safety

## General Safety

In addition to your site-specific safety requirements, Fluidigm recommends the following general safety guidelines in all laboratory and manufacturing areas:

- Use personal protective equipment (PPE): safety glasses, fully enclosed shoes, lab coats, and gloves.
- Know the locations of all safety equipment (fire extinguishers, spill kits, eyewashes/showers, first-aid kits, safety data sheets, etc.), emergency exit locations, and emergency/injury reporting procedures.
- Do not eat, drink, or smoke in lab areas.
- Maintain clean work areas.
- Wash hands before leaving the lab.

## Instrument Safety



**WARNING** Do not modify this device. Unauthorized modifications may create a safety hazard.



**CAUTION** HOT SURFACE The Callisto thermal cycler chuck gets hot and can burn your skin. Use caution when working near the chuck.



**CAUTION** PINCH HAZARD. The Callisto door and tray can pinch your hand. Make sure your fingers, hand, and shirtsleeves are clear of the door and tray when loading or ejecting an integrated fluidic circuit (IFC).



**WARNING** BIOHAZARD. If you are putting biohazardous material on the instrument, use appropriate personal protective equipment and adhere to *Biosafety in Microbiological and Biomedical Laboratories* (BMBL) from the Centers for Disease Control and Prevention and to your lab's safety protocol to limit biohazard risks. If biohazardous materials are used, properly label the equipment as a biohazard. For more information, see the BMBL guidelines at: [cdc.gov/biosafety/publications/index.htm](https://www.cdc.gov/biosafety/publications/index.htm).

## Electrical Safety



**WARNING** ELECTRICAL HAZARD. Electrical shock can result if the Callisto instrument is operated without its protective covers.



**WARNING** ELECTRICAL HAZARD. Plug the system into a properly grounded receptacle with adequate current capacity.

## Chemical Safety

Read and comprehend all safety data sheets (SDSs) by chemical manufacturers before you use, store, or handle any chemicals or hazardous materials.

Wear personal protective equipment (gloves, safety glasses, fully enclosed shoes, lab coats) when handling chemicals.

Do not inhale fumes from chemicals. Use adequate ventilation, and return caps to bottles immediately after use.

Check regularly for chemical spills or leaks. Follow SDS recommendations for cleaning up spills or leaks.



**For technical support visit [fluidigm.com/support](https://fluidigm.com/support).**