User Guide | CG001673 | Rev A

Atera Instrument

For use with:

Atera Instrument, PN-1001128



Notices

Document Number

CG001673 | Rev A

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Instrument & Licensed Software Updates Warranties

Updates to existing Instruments and Licensed Software may be required to enable customers to use new or existing products.

Support

Email: support@10xgenomics.com
10x Genomics, Inc.
6230 Stoneridge Mall Road
Pleasanton, CA, 94588

Document Revision Summary

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Introduction

The Atera platform is an end-to-end solution from 10x Genomics that provides high-throughput, highly scalable, sensitive, and targeted gene expression information at subcellular resolution. The platform includes the Atera Instrument, an instrument for high-throughput single cell spatial imaging that seamlessly integrates upstream assay workflows, high-resolution imaging, decoding, and onboard data analysis.

- Intuitive instrument design and interface.
- Automated in situ platform that performs successive rounds of fluorescent probe hybridization, imaging, and probe removal to generate an optical signature for each gene transcript.
- Image processing, decoding, and secondary analysis are performed in real-time on-instrument.
- Data visualization and reanalysis with 10x Genomics-provided data analysis software.

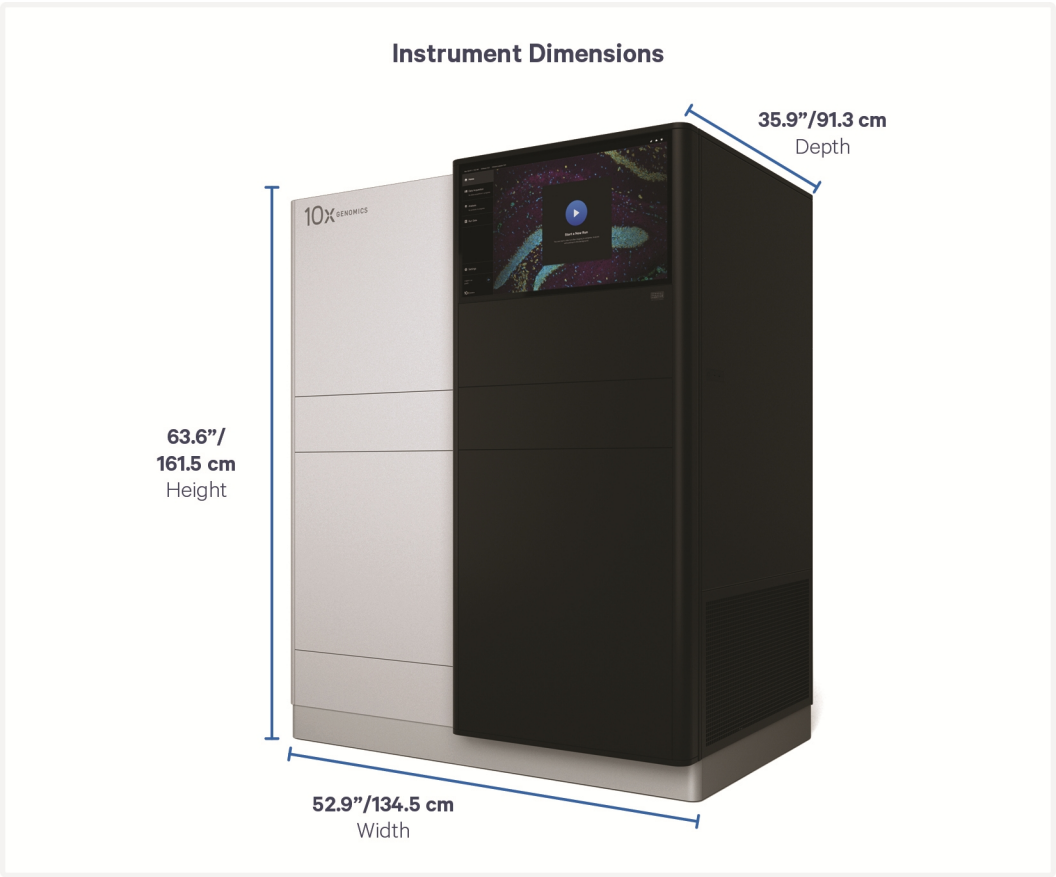
Product Identification

The product labels are located on the back panel of the instrument above the electrical outlet.



Instrument Specifications

Parameter	Atera Instrument Specifications		
Weight			
Instrument	1,350 lb/614 kg		
Instrument Live Load	500 kg/m^2		
Dimensions	**Width**	**Depth**	**Height**
Instrument	52.9"/134.5 cm	35.9"/91.3cm*	63.6"/161.5 cm
UPS *(APC SMX2000LV for low voltage or SMX2200HV for high voltage configurations)*	7"/17.8 cm	19"/48.3 cm	17"/43.2 cm
Storage Requirements			
Humidity	<60% for long-term storage (> 1 week) <80% for transportation and short-term storage (< 1 week)		
Temperature	13–25°C (55–77°F) for long-term storage (> 1 week) 10–40°C (50–104°F) for transportation and short-term storage (< 1 week)		
Operating Specifications			
Electrical Specifications	100–240 VAC, 50–60 Hz, 16 A maximum		
Pollution Degree	2 (Indoor Use Only)		
Operating Temperature	19–25°C (66–77°F) *Use in a typical indoor laboratory environment. Extreme temperature conditions will result in run failure or possible damage to the instrument*		
Humidity	30–80% Relative Humidity, noncondensing		
Altitude	Altitude up to 2,000 m (1.2 miles) above sea level		
Environmental Vibration Guidelines	ISO Office (or better) during idle ISO Operating Theater (or better) during run *No bumps or shocks adjacent to the instrument during a run*		
Heat Output	~1,600 W (5,460 BTU/h)		
Power Cable Length	6 ft/183 cm		
Sound Output	<63 dB at 1 meter from instrument		
Output Data Storage Capacity	15 TB NVMe		
Ethernet Link Speed	Up to 10 Gbps		
Operating System	Ubuntu 24.04 LTS		
*Instrument can temporarily be configured to pass through a door with 35"/89 cm clear opening			


Instrument Dimensions
35.9”/91.3 cm
Depth
63.6”/
161.5 cm
Height
52.9”/134.5 cm
Width

Safety & Compliance Information

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Safety

Before operation, ensure that all potential users have received:

- Instruction in general safety practices for laboratories.
- Instruction in specific safety practices for the Atera Instrument.
- All related Safety Data Sheet (SDS) documents.

Precautions are illustrated in the following way:

Symbols	Description
	The general Warning symbol indicates the possibility of damaging the instrument or compromising the results of a method.
	The Electrical Hazard symbol indicates the presence of electrical components that can be harmful to the operator if handled incorrectly.
	The Mechanical Hazard symbol indicates the presence of moving mechanical parts that can be harmful to the operator if handled incorrectly.
	The Hazardous Materials symbol indicates the presence of materials that are toxic or otherwise harmful to the operator if handled incorrectly.
	The Biohazard symbol indicates the presence of biological samples that can be harmful to the operator if handled incorrectly.
	The Caution Hot Surface symbol indicates the possibility of touchable surface that may exceed 105°C.



Ensure ground is reliably connected before plugging the Atera power cord into the power source (receptacle). Grounding is required to prevent electric shock. If the power source is not grounded, qualified personnel must first install a reliable safety ground.



Caution Possibility of electric shock.



Warning: The door is capable of moving an object that is in its opening path. If an object is in the path, the object could fall and create a hazard.



Pinch risk: Ensure no obstructions or fingers present near closing trays. Once the system is floating, keep fingers away from the area between the support plate and the top of the isolators. Any object between these points may be caught if the load or air supply changes.



Warning: Avoid using the Atera Instrument in a manner not specified by 10x Genomics. The Atera Instrument has been designed to protect the user. If used improperly, the intended user protections can be impaired.



Heavy Load: 1,350 lb (614 kg). Contact 10x Genomics Service Personnel for Lifting and Installation.



Warning: Hot Surface near the heaters.



Warning: Only trained personnel can access this enclosure.

tory

The Atera Instrument has been designed, tested, and certified to be in compliance. Consult Certifications & Compliance Documents for complete details.

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Instrument Installation

10x Genomics will provide complete installation services necessary for the Atera Instrument.

Important Notice: Professional Service and Maintenance Policy

All installation, service, calibration, and maintenance procedures for this laboratory equipment must be performed exclusively by a 10x Genomics personnel or an authorized, certified third-party vendor. This equipment has been designed and evaluated to meet the strict electrical and mechanical safety requirements of IEC 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use). Attempting to self-install or service this equipment independently voids the warranty and may cause severe operational hazards.

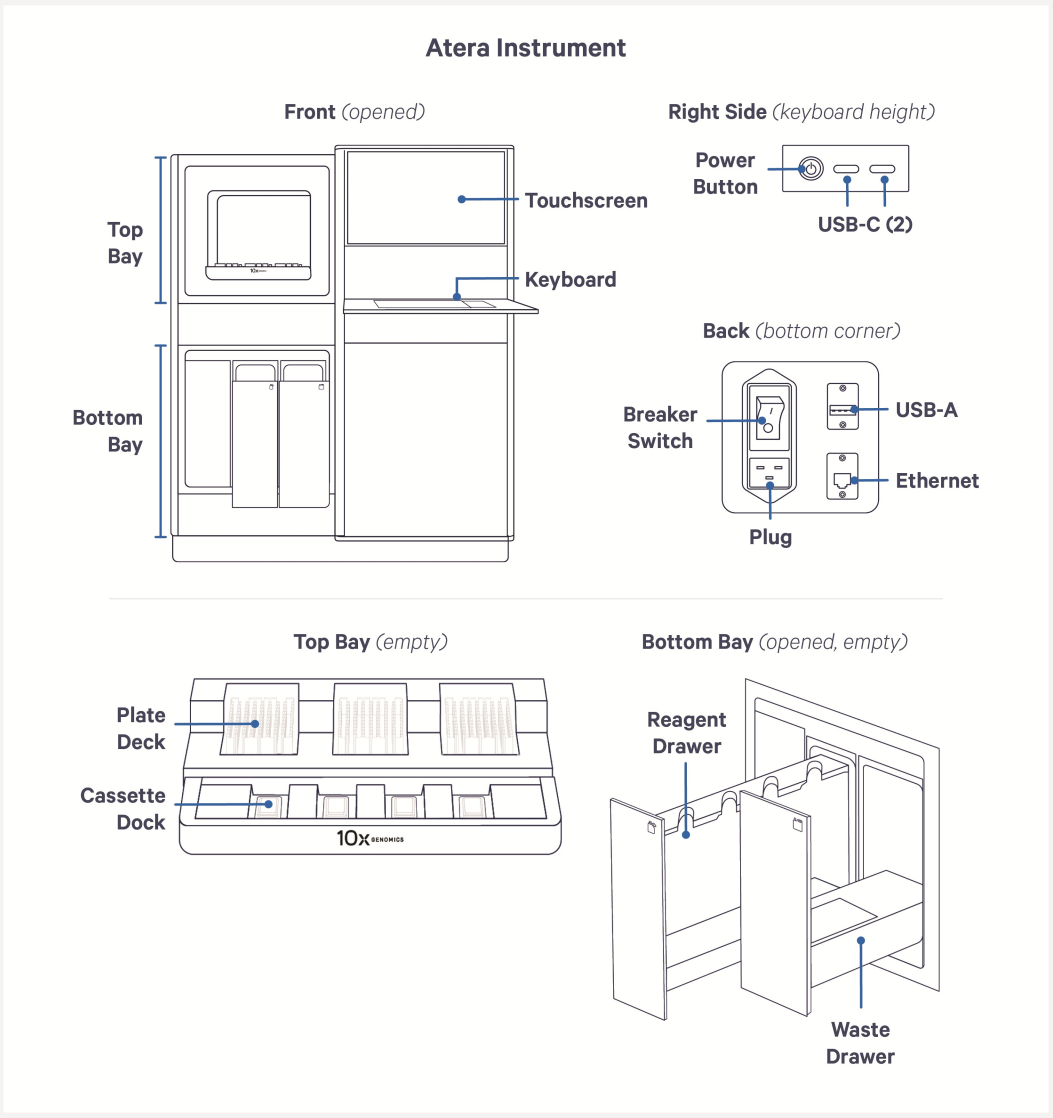
Installation: All on-site equipment assembly, placement, and initial configuration are strictly restricted to certified 10x Genomics personnel or manufacturer-approved service partners.

Maintenance: Routine upkeep, calibrations, and repairs must be handled by qualified 10x Genomics personnel or contracted third-party provider to ensure safety and regulatory compliance.

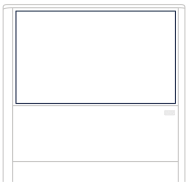
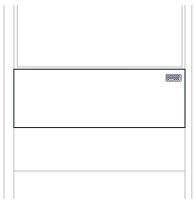
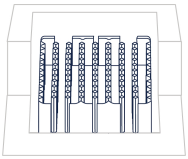
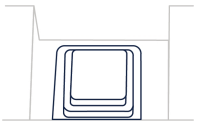
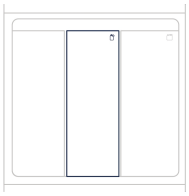
Liability: Any damage, failure, or malfunction resulting from unauthorized installation, modifications, or attempted in-house servicing is entirely the responsibility of the operator and is not covered under the warranty.

System Components

The Atera Instrument contains hardware features designed for instrument function. Description and specific location of each feature is detailed below.

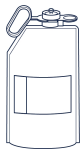
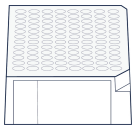
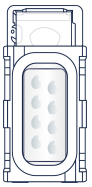
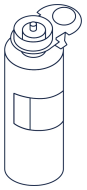
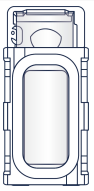


Hardware Components

Description	
Power button and USB-C Located on the right side of the instrument around keyboard height.	
Other ports and switches Located in the back of the instrument is one USB-A port, one Ethernet port, and a breaker switch. Do not touch the breaker switch unless prompted by 10x Genomics personnel.	
Touchscreen Located on the right side of the instrument. Interaction with the software user interface is performed here.	
Keyboard Located directly under the touchscreen marked by a keyboard icon. Gently push the top right corner of the panel to open. The retractable keyboard and trackpad are used during instrument operation. Avoid using the keyboard during instrument runs.	
Plate deck The plate deck is in the center of the top bay. Plate racks hold reagent plates required for an instrument run.	
Cassette dock The cassette dock sits below the plate deck in the top bay. Up to four prepared slide cassettes can be loaded here prior to instrument run.	
Reagent drawer The reagent drawer is the middle door of the bottom bay and houses four reagent pouches used for an instrument run.	
Waste drawer The waste drawer is the right most door of the bottom bay and houses an empty waste bottle used to collect liquid waste generated during a run.	

LED indicator lights located next to the reagent plates, reagent pouches, and slide cassettes describe loading status. See Troubleshooting on page 52 for details on each loading status.

Consumables

Description	
Reagent pouches Four reagent pouches containing specific buffers are used during the instrument run. Load the pouches into the corresponding slot in the reagent drawer when prompted by the instrument UI. Single use only. Discard after each run.	
Reagent plates Reagent plates containing specific reagents are used during the instrument run. Load the plates into the corresponding location in the plate deck when prompted by the instrument UI. Specific handling and preparation are required prior to loading. Single use only. Discard after each run.	
Waste bottle (reusable) The reusable liquid waste bottle sits in the waste drawer and collects liquid waste generated during an instrument run. Empty bottle after each run and return it back to the waste drawer before starting the next run. **Do not discard.**	
Slide cassette Slide cassette holds the tissue slide in place during the upstream tissue preparation and Atera assay workflow. Up to four cassettes are loaded onto the cassette dock prior to instrument run. Single use only.	
Maintenance wash bottles (reusable) Four maintenance wash bottles come pre-loaded on the instrument. Maintenance wash bottles are used during maintenance washes, which must be run after the instrument has been idle for a period of time. Wash bottles are reusable and must be air dried prior to storing for future use. **Do not discard.**	
Cleanup cassettes (reusable) Three cleanup cassettes are required to collect liquid during postrun cleanup. Cleanup cassettes contain a slide, and must always be used with slide in place. Cassettes are reusable and must be cleaned and stored properly for future use. **Do not discard.**	

Instrument Bundle & Accessory Kits

Atera Instrument Bundle, PN-1001128

Includes:

- Atera Instrument (PN-1000842)*
- Instrument Accessory Kit (PN-1001179)

**Maintenance wash bottles (4), plates (2), and waste bottle are preloaded onto the instrument and used during instrument operation and maintenance. Do not discard.*

Atera Instrument Accessory Kit, PN-1001179

shipped with instrument

Item	#	Part Number
Atera Thermocycler Adaptor (1 ea)	2	1001175
Atera Tissue Alignment Tool (1 ea)	2	1001176
Power cord C19 - C20, 12 AWG, BLK, 6FT	1	3004784
Power cord 5-20P-C19, 12 AWG, BLK, 6FT	1	3004785
Ethernet Cable, 20 ft.	1	3001611
Atera Wash/Cleanup Cassette Set (1 assembly)*	1	1001177
Probe with Fluidic Fitting*	1	3002998
Vibration Pad 4" diameter*	1	3003422
Spacer, feet, welded frame*	4	3004726
**Used only by 10x Genomics personnel during installation*		

Additional Materials

The listed items have been tested by 10x Genomics and perform optimally with the assay. Substituting materials may adversely affect system performance. For items with multiple options listed, choose option based on availability and preference. Consult the manufacturer's website for regional part numbers.

Item	Description	Vendor	Part Number
☐ Centrifuge with plate rotor	Allegra X-14 Series Benchtop centrifuge 120 V Or equivalent; fits deep-well 96 well plates (~2 ml vol.)	Beckman Coulter	-
☐ Large water bath (optional)	Branson M5800H Mechanical Heated Ultrasonic Cleaner *or equivalent (minimum 5L volume)*	Marshall Scientific	CPX-952-517R
☐ Waste disposal system	Liquid waste disposal system in compliance with your institutional guidelines (~approx. 3 L waste expected)	-	-
☐ Laboratory balance			
☐ Compressed Canned Air for cleaning	-	-	-
☐ Lens-cleaning Paper or Lint-free Laboratory Wipes *High-Tech Conversions ULTIMATE 9 Quilted 2-Ply Polyester Wipes from Fisher Scientific or equivalent*			
☐ 70% Isopropanol	-	-	-
☐ 70% Ethanol	-	-	-
☐ 100% Ethanol	-	-	-
☐ Reagent-grade bleach (0.5% NaOCl)	Use standard, additive-free sodium hypochlorite bleach only. Do not use formulas with added fragrances, colorants, thickeners, or splash reducers.	-	-
☐ Nuclease-free Water OR Access to a Ultrapure/MilliQ water system	Nuclease-free Water (not DEPC-treated)	Thermo Fisher Scientific	AM9932/ AM9937

This list may not include some standard laboratory equipment.

Instrument Run Phases

An Atera Instrument run consists of two phases: data acquisition and analysis. Once data acquisition finishes, the run automatically moves into analysis. During this phase, a new run can be started as long as no more than one run is already queued for analysis. Data egress runs in the background without

interfering with acquisition and analysis. If automatic data egress is set up, it will be added to the queue immediately after analysis completes.

Software Overview

On-Instrument Pipeline Overview

The Atera Instrument includes an on-instrument analysis pipeline. The instrument captures vertical stacks of images at every cycle (of fluorescent probe hybridization, imaging, and probe removal) and in every channel for multiple fields of view, which need to be processed, corrected, and stitched to build a single image representing the tissue section. The pipeline detects puncta in every cycle and every image to observe all potential mRNA. These puncta are decoded into gene IDs, and each decoded transcript is assigned a quality score.

The Atera Instrument protocol performs nuclei and interior cell staining and imaging. If the optional Atera Cell Segmentation Staining Reagents (PN-1001146) are used in assay preparation, boundary and interior protein stain images are also acquired on-instrument and used for cell segmentation outputs. Finally, the pipeline outputs a bundle of data files (see Data Output on page 44 section) that can be exported for further downstream analysis.

Tips & Best Practices

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Cleaning Slides & Cassette Dock 22

Icons



Tips & Best Practices section includes additional guidance



Signifies critical step requiring accurate execution



Troubleshooting section includes additional guidance



Indicates a video is available for the specified technique

Reagent Plate & Pouch Preparation

Reagent plate and pouch thawing and preparation must occur prior to instrument loading. General thawing guidelines are listed below. See Atera Gene Expression User Guide (CG001672) for complete detailed instructions on how to thaw and prepare reagent plates and reagent pouches.

Reagent Plates

Thaw plates in their original packaging at **4ºC** for **16–72 h** or at **37ºC** for **2.5 h**. Unopened plates in their original mylar packaging may be kept at **4ºC** for up to **3 days**. Total time (thawing and time at 4ºC) should not exceed **72 h**. See Atera Gene Expression User Guide (CG001672) instructions on preparing the plates after thawing.

Reagent Pouch

Reagent Pouch 4 must be thawed **overnight (16–24 h)** at **room temperature** prior to the instrument run. See Atera Gene Expression User Guide (CG001672) instructions on preparing Pouch 4 after thawing.

Reagent Pouches 1-3 do not require preparation.

Cleaning Slides & Cassette Dock

Cleaning the bottom of the tissue slide and the cassette dock prior to loading the assembled cassette is critical for a successful run. Any fingerprints, lint, or liquid may interfere with image acquisition that may result in an incomplete run or incomplete/unreliable data generation.

Following a completed run, clean the dock after unloading the slide, especially if liquid has accumulated during the run to prevent liquid from drying onto the surface of the cassette dock.

a. Spray 70% isopropanol onto a lint-free laboratory wipe and clean the surface of the cassette dock, paying attention to the raised areas that come into contact with the slide. Let evaporate.

i. Optional: Spray 70% isopropanol on a cotton swab and use to clean off crevices if necessary.

b. Use compressed air to remove any remaining lint paying close attention to raised areas. Confirm surface is dry.



Follow local lab safety or EHS requirements for using compressed air.

c. Check assembled cassette to ensure the seals are not leaking liquid by blotting bottom with lint-free laboratory wipe.

d. Clean the bottom surface of the slide with 70% isopropanol using a lint-free laboratory wipe without spilling the storage buffer. Confirm the bottom of the slide bottom is clean and dry.



A dry, clean, lint-free surface on both the slide bottom and cassette dock is critical for a proper instrument run. Debris or lint can interfere with image acquisition.

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Instrument Setup

Warning: Avoid using the Atera Instrument in a manner not specified by 10x Genomics. The instrument has been designed to protect the user. If used improperly, the intended user protections can be impaired.

General Power Safety

Grounding is required to prevent electric shock. If the power source is not grounded, qualified personnel must first install a reliable safety ground.

- DO NOT plug the instrument power cable into an electrical outlet if the power cable is damaged.
- To prevent electric shock, plug the instrument power cable into properly grounded outlets.
- When using an extension cable or power strip, ensure that the total ampere rating of the instrument does not exceed the ampere rating of the extension cable. The extension cable must be designed for grounded plugs and plugged into a grounded wall outlet.
- Be sure to grasp the plug, not the cable, when disconnecting the instrument from an electric socket.

Powering On Instrument

a. *If not already done*, toggle the breaker switch located in the back of the instrument to the ON position.

Breaker switch should always be in the ON position. Do not turn it OFF unless instructed to do so.

b. Wait **6 min** to allow instrument to fully turn on.

c. Press and hold the side power button down for **3 sec**. The touchscreen will turn on.

Set up and Register Instrument (First-time Use Only)

a. Press and hold the power button for **3 sec**.

b. Click *Start Setup* on the touchscreen to begin

c. Follow onscreen instructions to set up the following

i. Admin account: Required - See User Accounts on the next page for more information about account types.

ii. Network connection: Networking your instrument is required. The Atera Instrument requires outbound connectivity to 10x Genomics Cloud for software updates and support purposes.

iii. Local time zone: All times displayed on the instrument will be local time, including estimated run completion.

iv. Instrument registration to 10x Genomics Cloud: If necessary, multiple users can be registered to a single instrument.

v. Diagnostic bundle settings: Select Automatic or Manual upload of diagnostic bundles. Deleting output bundles will permanently delete the local copy of associated diagnostic bundles. Automatic upload to 10x Genomics Cloud is highly recommended to decrease risk of losing diagnostic bundles required for support resolutions.

vi. Password policies (Optional): Manage authentication settings

vii. Set up data transfer destination (Optional): Used for transferring data from the instrument to local storage.

d. Upon completion, the home screen will appear.

User Accounts

The Atera Instrument supports two user roles: Administrator and Operator, each with different capabilities. More than one Administrator account can be created, which is useful when managing data across multiple users. Note: an Administrator account must be created during instrument setup.

Administrator and Operator roles are able to load consumables, initiate new runs, handle errors, and view run progress. See the table below for a full breakdown of functional differences in Settings options between roles.

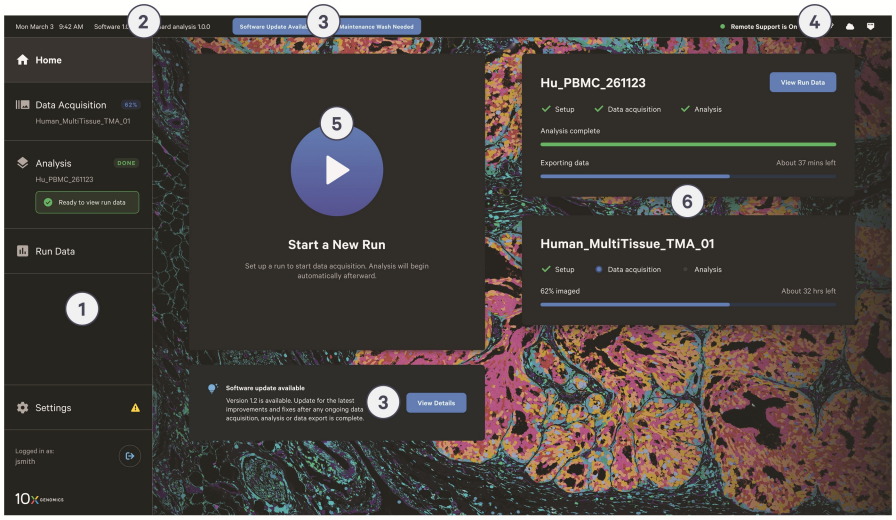
Function	Administrator	Operator
Custom Panel		
Manage custom panels (upload, delete, view)	✅	✅
Network Shared Folders		
Add new destination	✅	✅
Manage own destination (view, edit, mark public/private, delete)	✅	✅
Manage any destination (view, edit, mark public/private, delete)	✅	❌
Audit Logs		
Export or delete audit logs	✅	❌

Function	Administrator	Operator
Users		
Add or edit a user	✅	❌
Reset password	✅	❌
View user list	✅	✅
View disabled users	✅	❌
Start registration (10x Genomics Cloud)	✅	✅
Authentication Policies		
View policies	✅	✅
Edit policies	✅	❌
Readiness Tests		
Start readiness test	✅	✅
Readiness Test Logs		
View all readiness tests logs	✅	✅
About		
View all fields	✅	✅
Diagnostic Bundle Management		
Enable/disable automatic diagnostic bundle upload	✅	❌
Block manual diagnostic bundle upload	✅	❌
Software		
View all details	✅	✅
Download and install software update	✅	❌
Change automated update download status	✅	❌
Remote Access		
Enable remote access	✅	✅
View remote access details	✅	✅
Edit remote access timeout	✅	❌
Network		
View network settings	✅	✅
Edit network settings	✅	❌
Run network diagnostics	✅	✅

Function	Administrator	Operator
Time		
Set time zone	✅	✅
Edit time zone	✅	❌
Set NTP server	✅	❌
Run History		
View all runs (Excludes run details)	✅	✅
Manage own runs (view, egress, delete, upload diagnostic bundle)	✅	✅
Manage all runs (view, egress, delete, upload diagnostic bundle)	✅	❌

Atera User Interface

Atera Instrument User Interface



1. **Menu Options**
2. **Software Versions**
3. **Notifications** *(if any)*
4. **Status Icons**
5. **Initiate Run**
6. **Run Progress** *(if any)*

Menu Options

The menu, on the left side of the screen, contains the following tabs::

Menu Selection	Description
Home	Returns to home screen
Data Acquisition	View estimated run time and run status during an instrument run
Analysis	View status during data analysis

Menu Selection	Description
Run Data	View, manage, and export all run data collected on the instrument
Settings	View and manage system and instrument run related settings. See next section for all available settings

Settings

Settings Page	Description
About	Information about the system (including instrument serial number), software version, and available disk space
Software	View and update instrument software version (Most recent release notes are accessible here)
Network	Configure network settings for instrument
Time	Configure time zone for instrument to display local time
Audit Logs	Audit trail of instrument modifications and operations through the UI
Support & Remote Access	Enable/disable remote access by 10x Genomics and select upload method of diagnostic bundles. Diagnostic bundles are unique to every run and are used in case of support needs
Maintenance Wash	Initiate maintenance wash and view maintenance wash history
System Tests	Initiate instrument tests and view results (The only user-run test is the Readiness Test while others on the instrument are for 10x Field Engineers only)
Hardware Controls	Manually control relevant instrument hardware
Network Shared Folder	Configure and manage network shared folders for output data transfer
Third-Party Cloud Storage	Configure and manage third-party cloud storage accounts for output data transfer
Panel Configurations	View, manage, and upload custom or add-on panels here (Only panels uploaded to the instrument are displayed)
Account	Username and password information
Users	View, add, and manage on-instrument accounts
Authentication Policies	Manage password and timeout related options

Status Icons

Type	Icon	Connection Status
USB		USB connected
	no icon	USB not connected
Ethernet		Ethernet connected
		Ethernet connection error (Action required)
		Ethernet not connected

Type	Icon	Connection Status
10x Genomics Cloud		10x Genomics Cloud connected
		10x Genomics Cloud connection error (Action required)

Network Connectivity

Atera has a highly interactive user interface paired with network connectivity, intended to provide a seamless user experience along with efficient remote monitoring to optimize instrument performance. This also gives 10x Genomics the ability to respond quickly and troubleshoot any issues that may occur.

Consult the Atera Network Connectivity Guidelines Technical Note (CG001695) for comprehensive information regarding remote performance monitoring, support and more.

Software Updates

Keep the Atera Instrument software up to date to utilize the latest assay products, features, and bug fixes. Updates may improve or alter the on-instrument analysis pipeline.



Using the latest version of the software is recommended, however changes to the pipeline may introduce batch effects if upgrades are completed between runs involved in a multirun experiment. Consult the Atera Instrument Software Release Notes for changes to the Atera Onboard Analysis pipeline before updating.

The instrument requires an internet connection to receive notifications and perform installation.

View Current Software Versions

The Atera Instrument is run by two software applications: the Atera Instrument software and the Atera Onboard Analysis software.

The system's current software versions can be found in the *Settings* › *Software*. Automatic software updates can also be enabled or disabled on this screen. Enable this feature to have updates downloaded in the background. Using this feature will not impact instrument runs and is highly recommended.

Downloading and Installing Software Update

a. When a new software version is available, the instrument will display notifications in numerous places (pop up notification, home screen, top

status bar, side bar).

b. Click any notification method and follow on screen instructions to download and/or install the software update. Installation is disabled during an instrument run.

c. During update, a pop up window will appear showing progress bar with completion percentage. Do not turn off the instrument while software update is in progress.

d. Following installation, the instrument will automatically restart. Follow on screen instructions to log in when prompted.

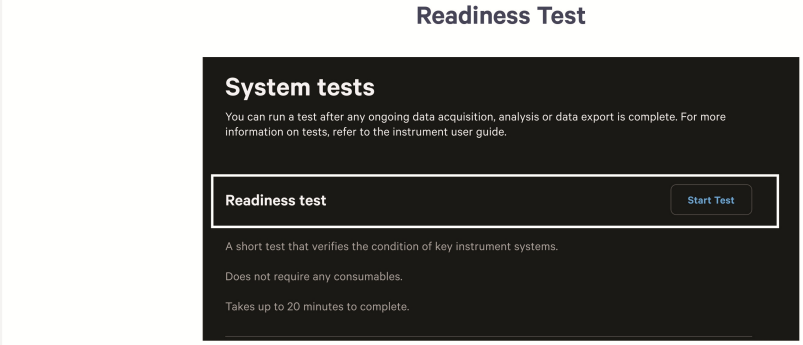
Readiness Test

The Readiness Test verifies all systems are working optimally and the instrument is ready for use. It is included as a prerun verification for all runs, but can be initiated as a standalone operation at the discretion of the end user from the Tests Menu option. No reagents required.

a. On the left panel, press Settings > System Tests.

b. Two types of System tests exist. Users run “Readiness Test”. To start the test, click “Start Test” under Readiness Test.

The Instrument Performance Test is for 10x Field Engineers only.



Under **Readiness Test** > press *Start Test* to begin

c. A successful Readiness Test verifies the instrument is ready for use. Follow on screen instructions if a failed or incomplete test occurs.

10x GENOMICS

System Operation

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Prerun Checks

Ensure the following have been completed or are ready before initializing an instrument run.

Prerun Check	Relevant Documentation/Instructions
☐ Atera Pouch 4 is equilibrated to room temperature and inverted 30 x to mix	CG001672 Atera Gene Expression User Guide
☐ Atera Plate 1 and Plate 2 are equilibrated for 30 minutes at room temp and inverted 20x to mix, then spun down	CG001672 Atera Gene Expression User Guide
☐ Bottom of slides are cleaned before loading	Cleaning Slides & Cassette Dock on page 22
☐ Panels are pre-loaded on the instrument or ready on a USB for upload	For custom panels, customers receive an email with .json file. If not found, contact support@10xgenomics.com
☐ Plugs are removed from reagent pouches before loading	
☐ Sufficient disk space on the instrument is available (~5 TB are required to start a new run)	To view available disk space, go to *Settings* > *About*.

Initialize & Load Instrument

During operation, always follow onscreen instructions and prompts.

a. If not already on, press and hold the power button for **3 sec** to power on.

b. Enter user name and password to log onto the instrument.

c. Press *Start a New Run* to begin.

A new run cannot start if data acquisition from a prior run is already initiated and has not yet completed or if one analysis run is in progress and a second analysis run is ready to begin

d. Press *Begin Run Setup*. Readiness test takes **~20 min**. Press *Continue* when complete.

e. **(For FFPE samples only, if instrument loading occurs on the day after assay workflow)** Skip step e if loading instrument on the same day as assay, or if using FF tissue.

During system checks, retrieve cassettes and perform a final ethanol dry as described below.

i. Remove all PBS-T from each well



ii. **Immediately** add **750 µl** 70% Ethanol to each well. Incubate for **1 min** at **room temperature**. Remove all 70% Ethanol.

iii. **Wash 1**: Add **750 µl** 100% Ethanol to each well. Incubate for **1 min** at **room temperature**. Remove all 100% Ethanol.

iv. **Wash 2**: Add **750 µl** 100% Ethanol to each well. Incubate for 1 min at **room temperature**. Remove all 100% Ethanol.

v. Air dry for **10 min**.

vi. Add **1.5 ml** PBS-T to rehydrate. Cassettes are now ready to be loaded onto instrument when prompted.

f. When system checks are complete, press *Continue*. Enter run information. Press *Continue* when complete.

i. Run name: Maximum 32 characters consisting of uppercase or lowercase letters (A-Z) and numbers (0-9), underscores, hyphens, and spaces.

ii. Assay type (Atera WTA or Atera Select)

iii. Number of slides in kit (2 slides or 4 slides)

iv. Custom gene panels used? (Yes/No)

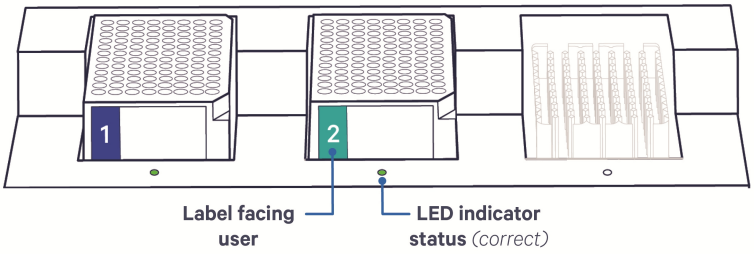
v. *If Atera Select and Custom was chosen:* Number of panels used to prepare slides (1 or 2)

vi. Atera Multi-Tissue Stain used? (Yes/No)

vii. Data export destination (optional)

g. Load reagent plates in the top bay plate deck with the label facing the user. Ensure the plates are firmly loaded in place. Detection status will be noted on the touchscreen and the LED indicator light in front of each plate.

Atera Plate Loading



The foil seal on the plates should be intact when loading instrument. DO NOT use plates if foil seal is punctured.

If the indicator light is not solid green, an issue has occurred. See Troubleshooting on page 52 for a list of LED indicator light colors and their meanings.

h. Clean the cassette dock. See Cleaning Slides & Cassette Dock on page 22 for instructions.

i. Load sample(s). For each cassette:

i. Confirm no liquid is leaking from the assembly.

If cassette is leaking, see Troubleshooting on page 52 for instructions on how to reset the cassette.

ii. Remove the cassette lid.

iii. Load the slide cassette on the cassette dock with the label at the top. Detection status will be noted on the touchscreen. Press *Continue* when all cassettes are loaded.

If the indicator light is not solid green, an issue has occurred. See Troubleshooting on page 52 for a list of LED indicator light colors and their meanings.

j. Enter slide information and select/upload gene panel(s). Press *Continue* when complete.

All slides must use the same panel configuration type per run. The panel configuration refers to the complete set of panels used in your experiment. Consult Atera Gene Expression Panels for more details on acceptable panel configurations.

Confirm the gene panel(s) .json file(s) selected match the panels used upstream during the assay workflow, including unique design IDs associated with custom gene panels.

k. *If not already loaded*, open the waste drawer in the bottom bay (right) and load an empty waste bottle into the drawer. Close the drawer.

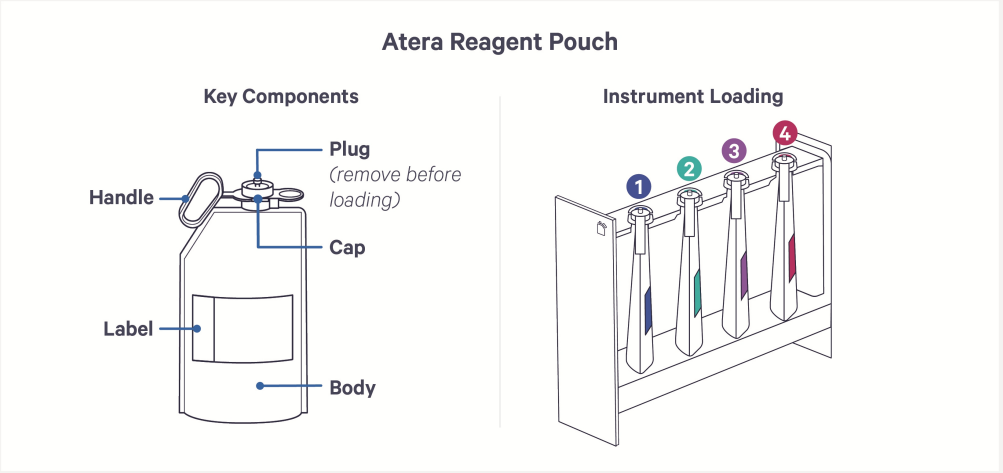
l. Load reagent pouches

i. Retrieve thawed Pouch 4 from **room temperature** and invert **30x**.

*If Pouch 4 was not thawed overnight, Pouch 4 may be thawed for **3 h** in a **37°C** water bath. Water bath must be at least 7 L. Pouch should be upright with water covering most of the pouch except for the cap. DO NOT submerge the cap.*

ii. Remove the plug from each pouch (see image below)

iii. Open the reagent drawer and load the four reagent pouches in the correct position. Detection status will be noted on the touchscreen and the LED indicator light next to each pouch holder. When all pouches are successfully loaded, close the drawer completely. Press *Continue* when complete.



If the indicator light is not solid green, an issue has occurred. See Troubleshooting on page 52 for a list of LED indicator light colors and their meanings.

Overview Scan

a. Press *Start Overview Scans*. The scanned image will be used for region selection. Bay doors should close automatically prior to beginning overview scan. The overview scan takes **~90 min** to complete.

TIPS

In the overview scan image, the bottom is the label end of the slide. Ensure region of interest (ROI) selection at next step matches sample placement on the slide.

b. When overview scan is complete, press *Continue* to proceed.

Region Selection

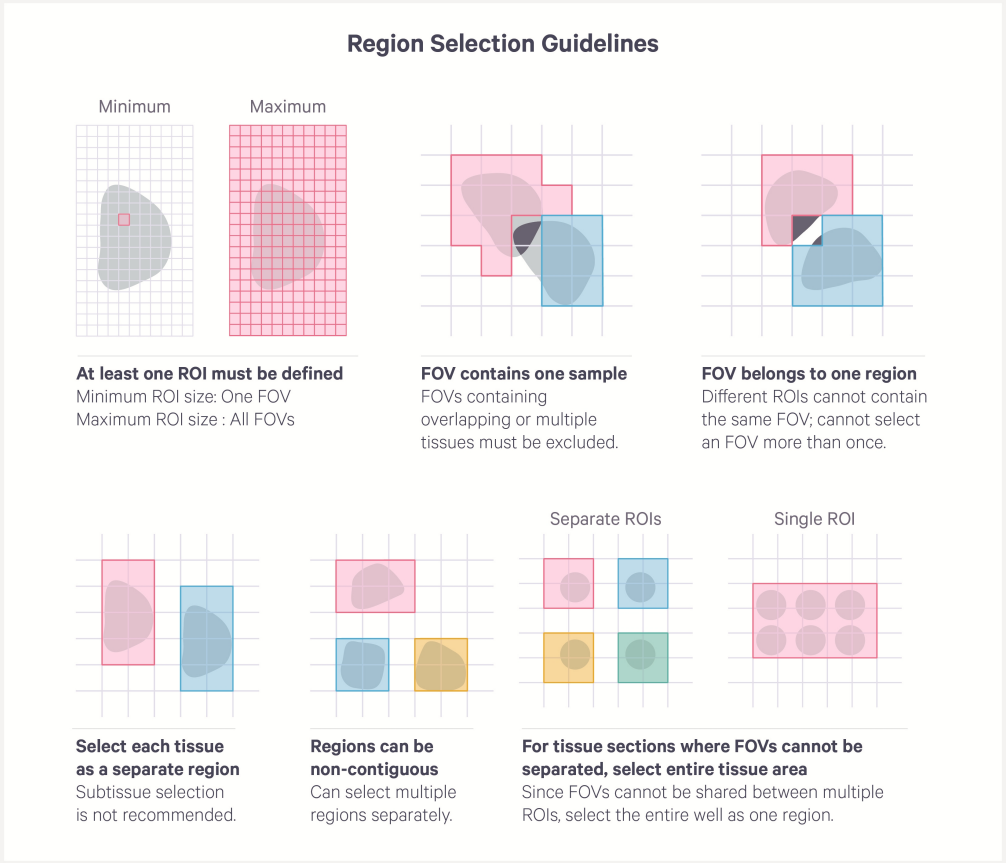
a. Starting with slide 1, press *Add ROIs*.

b. Follow onscreen instructions and guidelines to select regions of interest. Each region will be exported as its own output bundle.

TIPS *Each grid box is one field of view (FOV). Each FOV can only belong to one ROI and cannot be split or selected multiple times.*

*When selecting a region, **deselect all the blank FOVs**. Including blank FOVs will yield stitching errors.*

c. Follow the guidelines for region selection below.



d. When complete, press *Save and Close*. Selected ROIs will be appear over the scan on overview page when added.

e. If running additional slides, repeat steps to add ROIs to remaining slides.

TIPS *Region names must be unique within each slide and contain only alphanumeric characters. Region names are used to name the output directory, some Output Bundle files, and in the experiment.spatial manifest file.*

Initiate Run

a. Confirm run settings, slide cassette details, and gene panels. When ready, press *Start Run*.

b. Touchscreen will display run progress. The estimated run time will appear after the first cycle completes. To cancel run at any time, press the *Cancel Data Acquisition* button at the bottom-left corner of the screen.



See Troubleshooting on page 52 for the types of errors that may be encountered when operating the Atera Instrument. The touchscreen will guide the user through recoverable errors. If the error continues or if the instrument has seen critical errors, contact support@10xgenomics.com with the error code displayed on the screen.



All reagents and consumables are **not recoverable** if a run is canceled.

Monitoring Run Status

Registered users of a 10x Genomics Cloud-connected Atera Instrument can monitor instrument status and run progress on the cloud, and will receive email notifications. Consult the Monitor Run Time Progress page for details.

Postrun Cleanup & Unloading

Postrun cleanup involves disposal of solid and liquid waste. Follow local and institutional guidelines for proper handling and disposal of volatile and hazardous chemicals and solid waste.

a. Once data acquisition is complete, press *Start Cleanup*.

Initiate cleanup within 64 hours after a run is completed. Cleanup will stop slide hydration.

b. When slide cassette retrieval is ready, press *Continue*. The top bay door will open. Unload and discard the used reagent plates following institutional or local guidelines for proper waste disposal.

c. Unload all slide cassettes and store promptly to maintain sample integrity.

d. *If storing slides for future use:*

i. Remove all the liquid from the cassette.

ii. Add **1.5 ml** fresh PBS-T to the cassette.

iii. Apply the Atera Cassette Lid (ensure lid is completely clipped in). Incomplete application will lead to evaporation.

iv. Place at **4°C in the dark** for up to **one week**.

e. Load three empty cleanup cassettes into the first three locations of the cassette dock. Press *Continue* when complete. The top bay door will close and fluidics cleanup will begin. Cleanup takes **up to 2 hours**.

f. When fluidics cleanup is complete, press *Continue*. The top and bottom bay doors will open.

g. Carefully unload the cleanup cassettes from the cassette dock. Ensure no liquid spills onto the instrument. Place aside.

h. Open the waste drawer and unload the waste bottle. Discard the liquid waste following institution or local guidelines. Place the empty waste bottle back into the waste drawer and close.

i. Open the reagent drawer and unload the reagent pouches. Place all pouches aside. Close the reagent drawer. Press *Complete* to finish cleanup.

Cleanup Cassette Maintenance

Cleanup cassettes are reusable and must be cleaned and maintained properly for continued use. Do not use wipes or bleach.

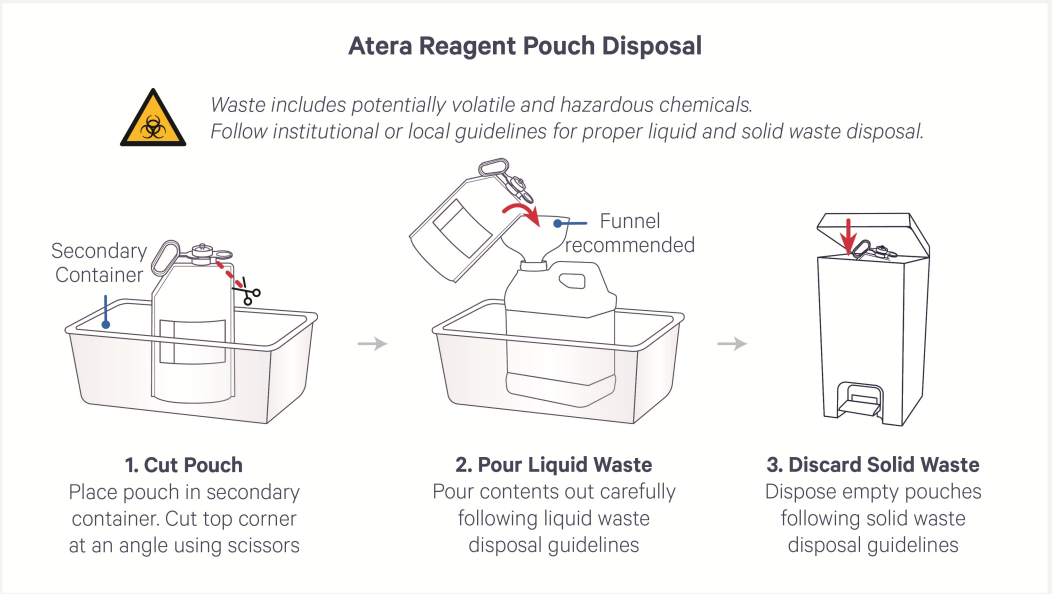
a. Invert each cassette to discard liquid on the cassette into a liquid waste container.

b. Add **2 ml** Ultrapure or Nuclease-free water to each well. Invert each cassette into a liquid waste container to remove. Repeat this two additional times for a total of **three washes**.

c. Air dry the cleanup cassettes with the wells facing up.

d. Once completely dried, store the cassettes covered in a box at room temperature until next use. Keep the cleanup cassette assembled at all times. Do not disassemble.

Reagent Pouch Disposal



Steps described are for one pouch. Dispose of each pouch individually.

a. Place the pouch inside a secondary container. Cut the top corner of the pouch (opposite of pouch handle).

b. Carefully empty the liquid into waste container following institution and local guidelines. A funnel may be used to prevent spilling and splatter.

i. Reagent Pouches 3 and 4 contain known hazardous chemicals and must be disposed of in a liquid waste container according to institutional guidelines.

ii. Reagent Pouches 1 and 2 may or may not require the same handling, depending on institutional and regional regulations. Consult the SDS to determine whether their contents can be disposed of outside a liquid waste container according to institutional guidelines.

c. Once emptied, discard the pouch following guidelines for disposing solid waste.

Reagent Plate Disposal



Follow local and institutional guidelines for proper handling and disposal of volatile and hazardous chemicals and solid waste.

Steps described are for one plate. Dispose of each plate individually.

a. Using a multichannel pipette fitted with P1000 tips, carefully puncture all the wells of the reagent plate.

b. Carefully invert the reagent plate over a liquid waste container. Ensure the waste container opening is wider than the plate so that all the liquid is deposited into the waste container.

c. Once emptied, discard the plate following guidelines for disposing solid waste.

Data Output

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Data Output

During each run, data acquisition and analysis are performed in real-time on-instrument. The analysis-only phase begins automatically following completion of data acquisition, generating a run-specific data output folder. Run data is available after analysis is complete.

Data Output Location

Run data is exported to the destination defined during set up. If destination location needs to be added or edited, press the *Analysis* tab on the left side and choose *Select Destination* or *Edit* at the bottom right corner of the screen.

After the run is complete, data generated across all the runs can be accessed under the *Run Data* tab on the left side of the screen.

Run History and Data Export

Press *Run Data* on the left-hand menu to view run history and export run data.

Data can be exported using one of these options:

- Third-party cloud storage **(highly recommended)**
- Network shared folder
- Portable USB drive (not recommended due to data size)
    - USB drive storage must be able to accommodate run data size, version 3.0 or higher, and be pre-formatted to the exFAT file system, which is compatible with the operating systems indicated below.
    - *Label cannot contain spaces or the following characters !@#$%&*)+=*
File System	Windows	macOS *(10.6.5 & later)*	Ubuntu Linux
exFAT	Yes	Yes	Yes

To export data, select the run(s) to export and then press *Export Run Data* at the top right of the screen. Select the desired export destination. Follow onscreen instructions to add a new export location. New export destinations can also be configured in the *Settings* menu under the *Data Management* section. Data egress will run in parallel to other activities and does not prevent a new run from taking place.

TIPS Exporting data after each instrument run is highly recommended to reduce the system load and avoid possibility of losing run data or blocking run initiation.

Data Storage Capacity

The Atera Instrument has a storage capacity of 15 TB. To view available disk space, go to *Settings* > *About*. Sufficient disk space (~5 TB) is required to start a new run. To manage disk space, press *Run Data* to download and delete past runs from the instrument.

The number of runs stored on the instrument depends on many factors including tissue size, transcript density, assay type, and other factors. Most Atera WTA runs will generate ~500 GB of data/slide. A fully covered slide of transcript-dense tissue will generate ~ 1 TB of Atera WTA data.

	2 slides per run	4 slides per run
Likely	1 TB	2 TB
Fully loaded	2 TB	4 TB

Deleting Runs and Diagnostic Bundles

After data export, runs can be deleted from the instrument. The customer is responsible for managing and deleting output bundles from the runs. Deleting runs may depend on user account type. See User Accounts on page 26 for more information.

Deleting output data will also delete diagnostic bundles associated with each run. Diagnostic bundles not uploaded to 10x Genomics Cloud will be permanently lost and cannot be retrieved. Check upload status on each run's detail page, and press *Upload Diagnostic Bundle* to upload manually if needed. To manage diagnostic bundle handling including enabling automatic upload, go to *Settings* > *Support & Remote Access*.

Maintenance

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Maintenance

Postrun Cleanup

The Atera Instrument undergoes a cleanup process following each instrument run. See Postrun Cleanup & Unloading on page 40 for complete details.

Exterior and Interior Surface Cleaning

It is good practice to keep the instrument clean and free of dust and debris that may affect its function and/or cooling efficiency. The surfaces of the Atera Instrument are compatible with 70% ethanol, 70% isopropanol, and 0.525% NaOCl.

For routine cleaning or to clean any liquid that has leaked during a run, wipe the exposed surfaces with 70% ethanol or 70% isopropanol using a lint free laboratory wipe. Use compressed air to dry and remove debris as needed.



Follow local lab safety or EHS requirements for using compressed air.

DO NOT use 0.525% NaOCl for routine cleaning. Frequency of such cleaning should not exceed 3 times during the life of the instrument. If using bleach, minimize the necessary contact time with the instrument.

Always wipe off any bleach residue in-between and after cleaning with distilled water. Residual bleach can cause corrosion and damage to the instrument.



DO NOT mix bleach with alcohols. Mixing bleach with alcohols poses a safety hazard. Apply all standard safety practices when using cleaners, and dispose of any generated waste in a responsible manner.

Powering OFF Instrument

Instrument shutdown is not required, but users may power off the instrument if it is expected to be idle for extended periods.

To power off, press and hold the power button for **3 sec**. Wait **6 min** to allow for system to fully power down.



Do NOT power off the Breaker Switch. This must remain in the ON position for proper instrument function.

Maintenance Wash

A maintenance wash is required after the instrument has been idle for **2 weeks**. Perform a maintenance wash when prompted by the instrument, following the onscreen instructions.

Failure to perform maintenance washes when prompted may result in compromised instrument function.

Gather Materials and Prepare Solutions

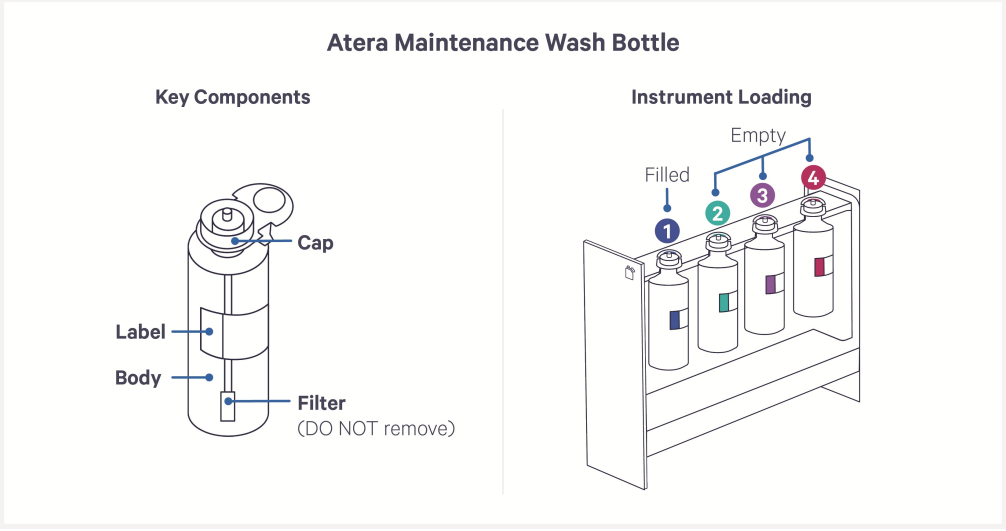
- Gather materials and reagents
  - Four maintenance wash bottles (shipped with instrument)
  - Reagent-grade bleach. Use standard, additive-free sodium hypochlorite bleach only. Do not use formulas with added fragrances, colorants, thickeners, or splash reducers.
  - Deionized (DI) water or other lab-grade water. Sterile DI water is recommended if available, and never use tap water.
- Prepare **400 ml** bleach cleaning solution (0.5% NaOCl in DI water). Bleach cleaning solution must be prepared **fresh** on same-day of use to maintain effectiveness.
- Obtain **400 ml** DI water plus extra for rinsing between wash phases

Perform Maintenance Wash

a. On the touchscreen, press *Settings* > *Maintenance Wash* and press *Start Maintenance Wash*.

b. Uncap Wash Bottle 1, fill with **400 ml** of bleach cleaning solution and cap. A funnel may be used to prevent spilling. Leave Wash Bottles 2, 3, and 4 empty. Do **not** fill with liquid.

DO NOT remove or discard the filter.



c. Open the reagent drawer and load the wash bottles in the correct location. Detection status will be noted on the touchscreen and the LED indicator light next to each holder. Close the reagent drawer when complete and press *Start Wash*. The bottom bay door will close and Phase 1 of the maintenance wash will begin. Phase 1 will take **~1 hour 45 minutes**.

d. When Phase 1 is complete, press *Continue* to proceed to next step.

e. Open the reagent drawer and remove Wash Bottle 1. Uncap and empty any residual liquid. Rinse briefly with DI water.

f. Fill Wash Bottle 1 with **400 ml** DI water place cap back on. Load Wash Bottle 1 back into the reagent drawer. Confirm detection on screen. Once confirmed, close the drawer and press *Continue*. The bottom bay door will close and Phase 2 of the maintenance wash will begin. Phase 2 will take **~2 hours**.

g. When Phase 2 is complete, press *Continue* to proceed to next step.

h. Open the reagent drawer and remove all wash bottles. Uncap and discard any remaining rinse water from Wash Bottle 1. It is safe to pour down a sink drain. Allow Wash Bottle 1 to air-dry before recapping and storing.



DO NOT remove or discard the filter.



i. Discard the waste contents of Wash Bottles 2–4 in a liquid waste container. Follow local and institutional guidelines for proper handling and disposal of liquid waste. Allow Wash Bottles 2-4 to dry. Once dry, recap Wash Bottles 2–4 with their respective caps.



DO NOT remove or discard the filter.

j. Store all bottles in a cool, dry place. Do not discard. Close reagent drawer.



k. Open the waste drawer and remove the waste bottle. Empty and dispose of the liquid waste. Rinse the waste bottle with DI water and dry. Place the bottle back in the instrument drawer and close.

l. Ensure all drawers are closed and press *Continue*. The bottom bay door will close and the maintenance wash is complete.

Service

10x Genomics will contact the user at regular intervals to schedule and perform routine service and maintenance.



Electrical shock hazard. DO NOT open the Atera Instrument in a manner not specified during standard operation. There are no user-serviceable parts inside. Refer all servicing to qualified 10x Genomics service personnel.



Servicing is required when the Atera Instrument has been damaged in any way (e.g., a power entry module or plug is damaged, liquid was spilled into, or

objects fell into the instrument, the instrument does not operate properly, or has been dropped). For more information, contact support@10xgenomics.com. **Disconnect all power prior to conducting repairs to electrical components.**

Only the power cords supplied with the Atera Instrument will be used during installation. DO NOT replace cords with a non-approved power cord as it may be inadequately rated to handle the electrical loads.

Important Notice: Professional Service and Maintenance Policy

All installation, service, calibration, and maintenance procedures for this laboratory equipment must be performed exclusively by a 10x Genomics personnel or an authorized, certified third-party vendor. This equipment has been designed and evaluated to meet the strict electrical and mechanical safety requirements of IEC 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use). Attempting to self-install or service this equipment independently voids the warranty and may cause severe operational hazards.

Installation: All on-site equipment assembly, placement, and initial configuration are strictly restricted to certified 10x Genomics personnel or manufacturer-approved service partners.

Maintenance: Routine upkeep, calibrations, and repairs must be handled by qualified 10x Genomics personnel or contracted third-party provider to ensure safety and regulatory compliance.

Liability: Any damage, failure, or malfunction resulting from unauthorized installation, modifications, or attempted in-house servicing is entirely the responsibility of the operator and is not covered under the warranty.

Environmental Requirements

It is the design intent of the Atera Instrument that it is used in a typical indoor laboratory environment. The instrument's operating temperature is 19–25°C (66–77°F), humidity 80% max (noncondensing). See Instrument Specifications on page 8.

Troubleshooting



Troubleshooting 52

Errors 55

Troubleshooting

Check Assembled Cassette for Leaks

Improperly assembled cassettes may leak liquid. A leaking cassette can cause the instrument run to fail and may damage the instrument. Always inspect each cassette for proper assembly before loading it onto the cassette dock.



If cassette assembly is leaking prior to instrument run, disassemble and reassemble the cassette as described in the Atera Cassette Assembly, Disassembly, and Use, Quick Reference Card (Document CG001674).

Add **1.5 ml** PBS-T to cover the slide before loading onto the instrument. **Confirm cassette is no longer leaking before loading**.

If leak persists, slide may be cracked. DO NOT proceed with instrument run. Cracked or broken slides will result in instrument failure and replacement reagents will not be provided.

Ensure the slide sections do not dry out during the process.

Storing Slides After Instrument Failure

The ability to re-run slides is contingent on the specific assay configuration and extent to which the original run completed, contact support@10xgenomics.com for more information. For FFPE samples, if an instrument error is resolved on the same day, proceed with run as usual. If an instrument error cannot be resolved on the same day and the instrument run is rescheduled, perform ethanol drying step again on day of run.

LED Indicator Light Status

LED lights associated with reagent plates and pouches indicate loading status.

Loading Status	LED Status	Solution
For Reagent Plates		
Plate deck is ready to be loaded	Solid white	Load reagent plate in corresponding location on the plate deck
Wrong plate loaded	Solid red	Remove plate and load correct plate
Expired plate loaded	Solid yellow	Remove plate and load an unexpired plate
Plate is loaded correctly	Solid green	Move to next step
For Reagent Pouches/Maintenance Wash Bottle		
Reagent pouches/maintenance wash bottles are ready to be loaded	Solid white	Load reagent pouches/maintenence wash bottles in corresponding location in the reagent drawer
Wrong pouch/bottle loaded	Solid red	Remove pouch/bottle and load correct pouch
Expired pouch loaded	Solid yellow	Remove pouch and load an unexpired pouch
Pouch/bottle is loaded correctly	Solid green	Move to next step
For Slide Cassettes		
Slide cassettes are ready to be loaded	Solid white	Load slides cassettes on the cassette dock. The number of LED lights illuminated correspond to the number of samples defined during run settings.
No slide cassette loaded/detected	Solid red	Load slide cassette in the corresponding position on the cassette dock.
Slide cassettes are loaded correctly	Solid green	Move to next step

Full Instrument Shutdown

In some instances, it may be necessary to perform a full power-cycle of the instrument when instructed by 10x Genomics personnel. Contact support@10xgenomics.com prior to attempting the following steps.

a. Press and hold the side power button down for **3 sec**. The touchscreen should turn black.

b. Wait **6 min** to allow instrument to fully shut down.

c. Toggle the breaker switch to the OFF position.

Troubleshooting Instrument Errors

Error	Solution
During initialization and run setup	
Cannot start a new run	A new run cannot start if data acquisition from a prior run is already initiated and has not yet completed or if one analysis run is in progress and a second analysis run is ready to begin. Wait for completion until starting a new run.
LED indicator light is not green	See the LED indicator light status table above for detailed information
Need to open bay doors	Go to *Settings* > *Hardware Controls* > *Open Doors*. Only perform when the instrument is experiencing an issue or as advised by 10x Genomics personnel. Bay doors are disabled during an instrument run.
Insufficient storage to start run	Go to *Run Data* to delete previous run data. Ensure all run data has been exported and backed up safely before deleting. Confirm diagnostic bundles are uploaded to the 10x Genomics Cloud if desired. They are not exported with run data and will be lost when run is deleted. Approximately 5 TB are required to start a new run.
Readiness test error	Run cannot be initiated. Contact support@10xgenomics.com for assistance. For FFPE samples, if the run is resolved in the same day, proceed as usual. If the run happens at a later date, ethanol drying step must be performed again.
Reagent plate loading error	Ensure the correct reagent plate is placed firmly into the correct place on the plate deck. Plates muct be fresh, unused, and not expired. If the error persists despite correct placement, press *Override Warning*.
Slide cassette loading error	Confirm the number of slides loaded match the number of slides indicated in run details. Follow onscreen instructions on specific loading error and solution.
Reagent pouch loading error	Ensure the correct reagent pouch is placed in the correct place within the reagent drawer. Pouches much be fresh, unused, and not expired. If the error persists despite correct placement, press *Override Warning*.
Cabinet drawer open	Confirm both the reagent drawer and waste drawer are properly closed completely. If error persists after closing doors, press *Override Warning*.
Missing custom panels to upload	Custom panel files are emailed to the customer. Check email for .json file. If not found, contact support@10xgenomics.com for the concatenated panel_ config.json file.
During data analysis	
Failures during data analysis phase	If failure causes run termination, samples will be kept hydrated until run cleanup. See the Postrun Cleanup & Unloading on page 40 section for guidance regarding keeping samples stable after unloading. Contact support@10xgenomics.com for assistance.
Postrun cleanup and maintenance	
Slide/sample(s) are not hydrated	Contact support@10xgenomics.com for assistance.
Cleanup cassettes loaded incorrectly	Ensure three cleanup cassettes are loaded in the first three positions of the cassette dock. Do not put a cleanup cassette in the right most position. If error message persists, press *Override Warning*.
Maintenance wash bottles incorrectly	Ensure the correct maintenance wash bottle is placed in the correct place within the reagent drawer. If the error persists despite correct placement, press *Override Warning*.

Error	Solution
Other	
Screen/instrument frozen	Contact support@10xgenomics.com for assistance before proceeding.

Errors

Errors can appear in different ways on the instrument. Onscreen instructions will guide the user through recoverable errors. If the error continues, contact support@10xgenomics.com with the error code.

Contextual Error Messages

While completing information fields, invalid input is noted by a red bounding box. Follow guidance described to resolve the error.



Error Alerts

When an error occurs, the user is notified in various ways including pop-up notifications, error icons, error chips. Follow onscreen instructions for next steps.

Critical Errors

Contact support@10xgenomics.com with the error code. Do not proceed with any further runs.

Enable Remote Support for Troubleshooting Guidance

When contacting 10x Genomics for technical support, 10x Genomics personnel may remotely access the instrument for providing troubleshooting guidance.

Enable remote support by pressing *Settings* › *Support & Remote Access* and switching the toggle to ON position. Choose a session length of either 2 or 7 days; remote access will end automatically once that period passes. Remote status can be seen in the top bar of the instrument screen.

Authorized 10x Genomics personnel will remotely access the Atera Instrument when given explicit permission from the user to do so. Only data necessary to provide troubleshooting support will be recovered and handled.