Stratys™ Site Preparation Guide

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bionano

Table of Contents

Revision History

REVISION	NOTES
1	Initial release.
2	Changed power consumption in Stratys Instrument Controller Table Made changes to Table 2: External Firewall Requirements: services Adjusted formatting of document
A	Revised for Stratys Launch
B	Revised Planning section to add RHEL v9.0 under Stratys Compute and Bionano Access Server (BAS).
C	Added ports needed for RHEL licensing, corrected hardware specs on the BAS, added information about a UPS
D	Corrected the DLS protocol version, removed user-supplied materials, and updating wording for clarity

Introduction

This document provides guidelines and specifications to prepare the user site for installation and operation of the Bionano Stratys™ System. Please review the information in this guide before preparing the user site. Authorized Bionano personnel will assist users through the installation and sample preparation process.

The site preparation process has four stages:

Preparation Stage	Description
Planning	• Hardware and software requirements • Network, file storage, and electrical requirements • Coordination of requirements between the research team, IT Operations, security groups, and any other governance parties. • User-supplied materials and equipment
Preparing for Instrument Arrival	• Installation guidelines • Laboratory guidelines • Environmental considerations
Preparing for Installation and Training	• Site preparation checklists • Crate contents • Accessory and Qualification kits • Installation and training schedule
Post Installation Follow-Up	• Preparing for follow-up review

The following roles and responsibilities must be followed to ensure a successful installation:

Role	Responsibility
Bionano Field Service Engineer (FSE)	• Coordinate installation date with the customer • Perform full installation and qualification of Stratys System (Instrument and Access Server).
Bionano Field Application Scientist (FAS)	• Act as customer point of contact. • Coordinate training date with the customer. • Ensure that all materials required for training are present on site. • Train the customer in sample preparation, running the instrument, and reviewing data output.
Customer	• Ensure that all requirements for installation listed in this document are met. • Provide all user-supplied materials needed for training.
IT at Customer Site	• Provide static IP addresses as described in this document. • Configure network firewall ahead of installation time • Provide an SSL certificate for the Bionano Access® Server • Install VIA Client on identified user's workstations

Planning

The planning stage provides guidelines for configuration, network security, and file storage. These guidelines explain the required infrastructure for a successful implementation of the Stratys system within the user organization.

Successful planning requires a comprehensive coordination between all relevant parties at the site, such as the research team, IT Operations, security groups, and any other governance parties. It is essential to involve compliance teams in the process as early as possible to ensure efficient installation.

Hardware Requirements and Specifications

STRATYS INSTRUMENT

Type	Requirements/Specifications
Physical	• Height: 74 cm (29 in) • Width: 58 cm (23 in) • Depth: 74 cm (29 in) • Weight: 73kg (160lb)
Power	• 100-240 VAC at 50-60 Hertz • Power Consumption ≤ 300 Watts • 2m long, IEC 60320-C13 power cord

STRATYS INSTRUMENT CONTROLLER (INCLUDED WITH INSTRUMENT)

The Stratys Instrument Controller is designed to be located adjacent to the Stratys Instrument. The two systems are directly tethered for controlling the instrument and direct data transfer of image files.

Type	Requirements/Specifications	
Accessories	• Mouse and keyboard	• Monitor (see below)
Operating System	• Windows 10 IoT Enterprise LTSC 2021 2009 x64	
Software	• Stratys Instrument Controller Software (ICS) • TeamViewer (remote assistance, optional)	• Microsoft Edge (not user accessible, service only)
Memory	• 64GB RAM	
Compute	• NVIDIA RTX 6000 48GB Ada	• AMD Epyc CPU
Data Storage	• 1TB SSD OS	• 4TB SSD Data
Space	• Height: 46 cm (18 in) • Width: 18 cm (7 in)	• Depth: 56.4 cm (20.2 in) • Weight: 40lbs
Power	• 100-240 VAC at 50-60 Hertz • Power Consumption 650 Watts	• 2m long, IEC 60320-C19 power cord
Network	• 2x – 10 gigabit ethernets ports Port 1 (required): connected to the Bionano Access Server Port 2 (recommended): connected to customer network at ≥ 1 GB, to provide support capabilities to the Stratys System	
Monitor	• 25”, width: 57 cm (22.4 in) • 100-240V at 50-60 Hertz	• Power Consumption: 22W • 2m long, IEC 60320-C13 power cord

BIONANO ACCESS SERVER (INCLUDED WITH INSTRUMENT)

The Bionano Access Server (BAS) is designed to be located adjacent to the Stratys Instrument Controller. The two systems are directly tethered for direct data transfer.

Type	Requirements/Specifications
Accessories	• None
Software	• RHEL v9.0 • Bionano Access • Bionano Solve • PostgresSQL • Nodejs • Perl • Python • R • Docker • VIA
Memory	• 128GB RAM
Data Storage	• 4x 16TB with RAID Controller
Space	• Height: 42 cm (17 in) • Width: 18 cm (7 in) • Depth: 52 cm (20.4 in) • Weight: 34 lb (15.4 kg)
Power	• 100-240 VAC at 50-60 Hertz • Power Consumption ≤ 300 Watts • 2m long, IEC 60320-C13 power cord
Network	• 3x – 10 gigabit ethernets ports Port 1 (required): directly tethered to the Instrument Controller at 10 GB Port 2 (required): directly tethered to the Stratys Compute at 10 GB Port 3 (required): connected to customer network at ≥ 1 GB

STRATYS COMPUTE (INCLUDED WITH INSTRUMENT BUNDLE)

The Stratys Compute requires a direct connection to the Bionano Access Server (BAS). Stratys Compute is not accessible on the customer network.

Bionano Support personnel will configure the network for all Bionano systems during installation.

The Bionano Access Server and Stratys Compute are designed to be located adjacent to the Stratys Instrument Controller. The systems are tethered for direct data transfer.

Type	Requirements/Specifications
Accessories	• None
Software	• RHEL v9.0 • Bionano Solve • Singularity • Slurm
Memory	• 256 GB
Processing	• AMD Epyc CPU • 3x NVIDIA RTX 6000 Ada GPU
Data Storage	• 1TB SSD – Operating system • 4TB SSD - Application work drive
Space	• Height: 46 cm (18 in) • Width: 18 cm (7 in) • Depth: 47 cm (18.5 in) • Weight: Approx 40lbs
Power	• 100-240 VAC at 50-60hz • Power consumption 1200 watts • 2m long, IEC 60320-C19 power cord
Network	• 1x – 10 gigabit ethernets ports Port 1 (required): directly tethered to the Bionano Access Server at 10 GB

Network Overview

Figure 1 depicts the Stratys system connectivity path. The Stratys Instrument captures images of labeled DNA molecules from the Stratys Chip. The Instrument Controller (which controls the function of the Stratys Instrument) converts the images into Molecules data files (.bnx) and computes real-time throughput, molecule N50, label density values, and other molecule quality metrics. The Molecules data files are transferred to the Bionano Access Server, and mapping metrics are displayed in real-time both in the Instrument Control Software (ICS) and on the Bionano Access dashboard. Once the chip run is complete, the completed Molecules data files are automatically imported into the Bionano Access web application (hosted at the Bionano Access Server). The Molecules data files can then be used to launch a variety of downstream data analysis operations. Stratys Compute then processes the data analysis operation jobs submitted from the Bionano Access web application. Bionano also offers optional cloud-based computing (Bionano Compute On Demand), which can be used in place of the Stratys Compute, or to augment the Stratys Compute resources during periods of heavy computational demand. The Bionano Access web application monitors the progress of each computation job, captures the output, notifies the user of completion, and allows them to inspect the results in a web browser on their Customer Workstation.

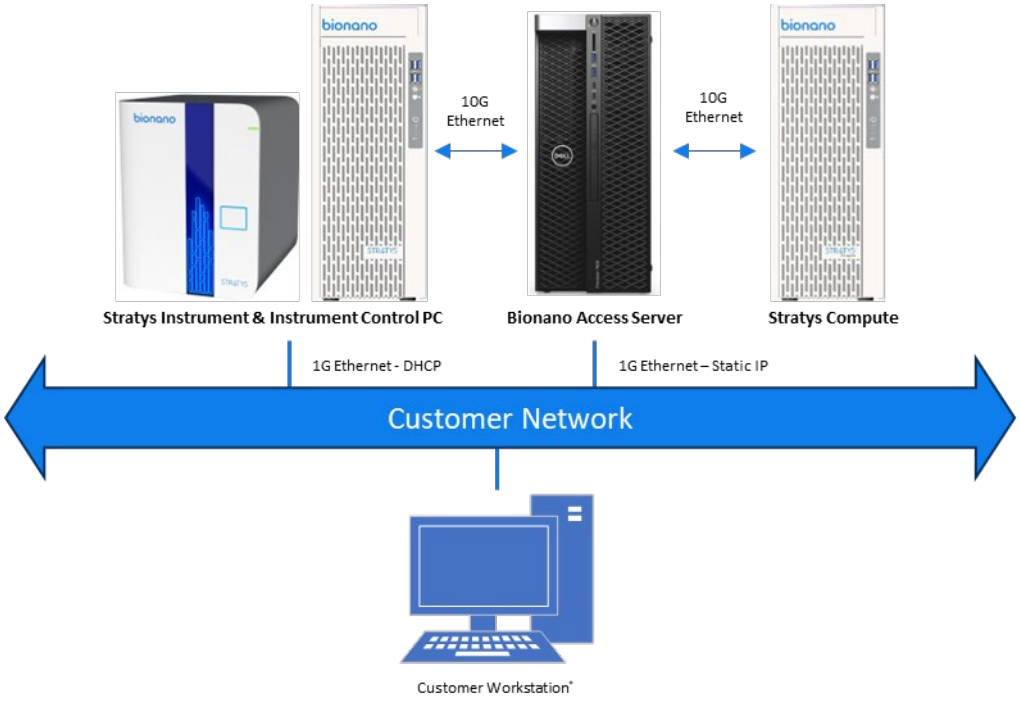

Figure 1. Stratys System Connectivity Diagram
* User-Provided

Network Requirements

The components in the Stratys system require network connectivity to communicate with each other. Poor network reliability or throughput can affect the performance of your Stratys system.

Bionano Access is installed on the Bionano Access Server and is accessible via standard web browsers from workstations connected to the same network. Users can perform various activities, such as setting up chip runs, monitoring instrument run status, reviewing data output, and launching, visualizing, and sharing data analyses (when properly configured with Bionano computation servers), by logging into Bionano Access via a web browser. Our recommended web browser is Chrome.

NOTE: VIA Client should be installed on a user's workstation prior to analysis training. Refer to the VIA Client Installation section of the *Bionano VIA Installation Guide* (CG-00044).

The Bionano Access Server has a tethered connection to the Stratys Instrument Controller.

Firewall Requirements

The Stratys system requires access to the ports and URLs seen in **Table 1, Table 2** and **Table 3,** which enable Bionano Assure, TeamViewer, Windows Update Services, and Compute On Demand, if applicable.

Table 1. Internal Firewall Requirements

From System	To Service	Ports *(outbound)*	URL *(outbound)*
User Workstations	Bionano Access Server	TCP: 3005 SSH: 22	http://<ipaddress BAS> [1]
			https://<ipaddress BAS> [1]
	VIA *(Client to be installed)*	TCP: 8443 (default)	https://<ipaddress BAS> [1]

[1] Bionano Access Server Static IP address to be provided by local IT administrators

EXTERNAL FIREWALL REQUIREMENTS: SERVICES

Table 2: External Firewall Requirements: services

From System	To Service	Ports *(outbound)*	URL *(outbound)*
Instrument Controller	Bionano Assure	TCP: 80, 443 (SSL)	https://api-assure.bionano.com
			https://sabionanoassure.blob.core.windows.net
	Windows Update[2]	TCP: 80, 443	http://windowsupdate.microsoft.com
			http://*.windowsupdate.microsoft.com
			https://*.windowsupdate.microsoft.com
			http://*.update.microsoft.com
			https://msedge.api.cdp.microsoft.com
			http://*.windowsupdate.com
			http://download.windowsupdate.com
			https://download.microsoft.com
			http://*.download.windowsupdate.com
			http://wustat.windows.com
			http://ntservicepack.microsoft.com
			http://go.microsoft.com
			http://*.dl.delivery.mp.microsoft.com
			https://*.dl.delivery.mp.microsoft.com
			http://dl.delivery.mp.microsoft.com
			https://dl.delivery.mp.microsoft.com
	TeamViewer	TCP/UDP: 5938 TCP: 443, 80	http://*.teamviewer.com
			https://*.teamviewer.com
Bionano Access Server	Users emailing[3]	SMTP: 587	email-smtp.us-west-2.amazonaws.com
	Bionano Assure	TCP: 3000	https://*.bionanostratus.com
	Compute On Demand	TCP: 3000, 3001	https://*.bionanostratus.com
			http://*.bionanostratus.com
		TCP: 443	https://platform.rescale.com
			https://*.amazonaws.com
	TeamViewer	TCP/UDP: 5938 TCP: 443, 80	http://*.teamviewer.com
			https://*.teamviewer.com
	RHEL Licensing	TCP: 443	https://repo-us.bionano.com https://repo-eu@bionano.com
Compute Server (nodes)	RHEL Licensing	TCP: 443	https://repo-us.bionano.com https://repo-eu@bionano.com

[2] *Windows Server Update Services (Configure WSUS)*
[3] *Users notification emailing service.*

EXTERNAL FIREWALL REQUIREMENTS: SERVER UPDATE

Table 3: External Firewall Requirements: Server Update

From System	To Service	Ports *(outbound)*	URL *(outbound)*
Bionano Access Server	internet	temporary opening allowing planned update to be rolled out	

BACKUP REQUIREMENTS

The Stratys solution does not come with backup capabilities. Typically, customers already have enterprise level backup solutions so it would be redundant. Customers should determine their backup needs and arrange to back up the Bionano Access Server on a regular basis. The Bionano Access Server is the only system that has long term storage for data generated from the Stratys system. The Bionano Access Server has approximately 40TB of storage total and could see daily file growth up to 60-240GB per day depending on chip runs and analysis performed.

FILE STORAGE RECOMMENDATIONS

The Bionano Access Server will store output files from all chip runs and analysis jobs, including Molecules data files (.bnx), Guided Assembly results, etc. This data will continue to grow over time. The Bionano Access Server has been configured to have sufficient file storage for several years. We highly recommend that all content in the Access Installation folder is backed up on a regular basis. Depending on system utilization you may need to transition to an enterprise storage solution if you exceed the capacity of the Bionano Access Server. Alternatively, users can export and archive unused projects periodically. See the *Bionano Access User Guide (CG-30142)* for details.

UN-INTERRUPTABLE POWER SUPPLY (UPS)

Bionano recommends the Stratys instrument and Instrument Controller be plugged into a UPS. A UPS rated to 2000 VA / 1200 W will be sufficient for the instrument and Instrument Controller. This will not be sufficient for the Stratys Compute. The Stratys Compute is not recommended to be plugged into a UPS.

User-Supplied Materials

Training on the sample preparation workflow requires the lab to be stocked with some user-supplied materials. We have user-supplied material checklists depending on the specific workflow to be followed during training. The lab contact personnel must go through the checklist appropriate to their workflow and ensure their lab is stocked with the listed items. Any items that are missing must be procured prior to the start of training. When all materials are present in the lab, the checklist must be filled out and signed by the lab contact and returned to the FAS. Training can only be scheduled once the FAS has received this signed checklist. Success of the onsite training on the Bionano workflow depends on the possession of all required user-supplied materials.

User-Supplied Material Checklist	Description
Site Preparation: User Supplied Material Checklist for SP-G2 DNA Isolation and DLS-G2 DNA labeling (CG-00050)	To complete for all cell culture, blood, and bone marrow aspirate workflows
Site Preparation: User Supplied Material Checklist for SP Tissue and Tumor (CG-00051)	To complete for tissue workflows (Note: You will also need to complete the “DLS-G2 Labeling” section of CG-00050

Preparing for Arrival

Installation Guidelines

An authorized service provider delivers the system. Make sure that the crate is stored securely near the installation lab bench. The instrument has two tip-tilt indicators mounted to the outside of the crate as well as one impact-shock indicator. Please inspect the exterior of the crate for damage and inform your FSE if either one of the two tip-tilt sensors, or the shock-impact sensors have been triggered (**Figure 2**).

Figure 2. (from left to right) shock-impact sensors (un-triggered and triggered) and tip-tilt sensors (un-triggered and triggered)

CAUTION: Only a Bionano FSE (or personnel approved by Bionano) can uncrate and install the instrument.

- Ensure that the lab space and bench are ready for installation.
- Ensure that you have a pallet jack to support the crate and instrument.
- Ensure there are at least three people to assist the FSE with lifting the Stratys instrument.

Dimensions

Measurement	Instrument Crate (including instrument)	Accessory Crate (including accessories)
Height	110 cm (43 in)	81 cm (32 in)
Width	81 cm (31 in)	109 cm (43 in)
Depth	96 cm (37 in)	74 cm (29 in)
Weight	128kg (282lb)	152kg (335lb)

Laboratory Guidelines

- Prepare a clean, level surface such as a sturdy lab bench for the instrument.
- Keep the instrument away from direct sunlight or heat source.
- Do not place the instrument on a lab bench that has liquids or chemicals.
- Do not place any other equipment on the bench that could produce vibrations, including centrifuges, compressors, and shakers.
- Do not place the instrument on or near objects that can produce vibrations, such as heavy doors.
- Do not place objects on top of the instrument.

LAB BENCH LAYOUT

Position the instrument to allow proper ventilation and access to the power switch and power outlet.

Access	Minimum Clearance
Lab Bench Space	Allow at least 150 cm (59 in) wide by 77 cm (30 in) depth.
Top	Allow at least 93 cm (37 in) above the instrument.
Back	Allow at least 5 cm (2 in) behind the instrument.
Sides	Allow at least 15 cm (6 in) on each side of the instrument.
Connections	5x standard electrical outlets (100~240 VAC) and 2x 1 GB Ethernet ports

CAUTION: Moving the instrument can compromise data integrity.

- Insufficient overhead clearance can damage the stage access door and affect run performance.
- The Stratys Instrument Controller must be placed within 1 m (3 ft) of the instrument.
- The Bionano Access Server must be placed within 1m (3 ft) of the Stratys Instrument Controller.
- The Stratys Compute must be placed within 1m (3 ft) of the Bionano Access Server.

Environmental Considerations

This instrument is designed for indoor use only.

Element	Specification
Temperature	Maintain a stable lab temperature of 19°C (66°F) to 25°C (77°F).
Humidity	Maintain a noncondensing relative humidity between 20–80%.
Elevation	Place the instrument at an altitude below 2,000 m (6,500 ft) above sea level.
Ventilation	At least 5 cm (2 in) of clearance behind the instrument to allow proper ventilation and access to power outlet. Overhead clearance required for installation and service is 93 cm (37 inch).
Air Quality	Operate the instrument in a Pollution Degree II environment or better as defined by the International Electrotechnical Commission (IEC).

Preparing for Installation and Training

Site Preparation Checklist

- Ensure that your facility is ready for the delivery of the crate.
- Ensure that you have the appropriate equipment to support the crate and instrument (e.g., pallet jack).
- Ensure that all required personnel are present on the scheduled installation day (at least three people to assist the FSE with lifting Stratys instrument).
- Ensure that you have received and properly stored the contents in the Accessory Kit, Qualification Kit, and User Training Kit (contents listed below).
- Verify that your site has proper computing, network, file storage, and electrical requirements.

Crate Contents

Item	Crate	Storage Temperature
Instrument	Instrument Crate	15–25 °C (59–77 °F)
Monitor	Accessory Crate	15–25 °C (59–77 °F)
Keyboard	Accessory Crate	15–25 °C (59–77 °F)
Mouse	Accessory Crate	15–25 °C (59–77 °F)
Instrument Controller	Individual Box	15–25 °C (59–77 °F)
Bionano Access Server	Accessory Crate	15–25 °C (59–77 °F)
Accessory Kit	Accessory Crate	15–25 °C (59–77 °F)

The FSE will unpack the crates during the installation visit.
Compute Servers will ship in additional crate (Storage Temperature: 15–25 °C (59–77 °F)).

Accessory kit (Part #80095)

Item	Content	Storage Temperature
US-Specific Power Cord	4 each	15–25 °C (59–77 °F)
Display Port Cable	2 each	15–25 °C (59–77 °F)
Network Cable (Cat7)	4 each	15–25 °C (59–77 °F)
USB 2.0 A to B Connector	1 each	15–25 °C (59–77 °F)
Air Filter	3 each	15–25 °C (59–77 °F)
Lens Cleaning Paper	2 each	15–25 °C (59–77 °F)
Mousepad	1 each	15–25 °C (59–77 °F)

NOTE: The Accessory Kit is included in the crate.

Stratys Instrument Qualification kit (Part # 90178)

The Stratys System Qualification Kit will be shipped around the same time as the Stratys system unless its shipment is otherwise specified and coordinated by your FSE.

Item	Part #	Content	Storage
Stratys Core Chip	20474	9 each	2-8°C
DLS Biological Control A, 100 µl	20400	2 each	2-8°C
SP Large Genome Labeling Control, 5000 ng	20399	1 each	2-8°C

User Training kits (Parts # 90149, 90150, 90127)

A User Training Kit will be added to your instrument order by your Regional Business Manager and will be included with the shipment of your instrument. This User Training Kit will contain the following items: 1) a DNA Isolation Kit, 2) a DNA Labeling Kit, and 3) Bionano Prep SP Magnetic Retriever (2-pack). Depending on the sample type to be used for the training, the User Training Kit you receive will be one of the following:

For Blood and Cell preps, Part # 90149, containing the following: PN 80060 SP-G2 Blood and Cell DNA Isolation Kit + PN 80046 DLS-G2 Labeling Kit + PN 80031 Bionano Prep SP Magnetic Retriever (2-pack)

For Bone Marrow Aspirate preps, Part # 90150, containing the following: PN 80060 SP-G2 Blood and Cell DNA Isolation Kit + PN 80062 BMA Add-On + PN 80046 DLS-G2 Labeling Kit + PN 80031 Bionano Prep SP Magnetic Retriever (2-pack)

For Tumor and Tissue preps, Part # 90127, containing the following: PN 80038 SP Tumor and Tissue DNA Isolation + PN 80046 DLS-G2 Labeling Kit + PN 80031 Bionano Prep SP Magnetic Retriever (2-pack)

Please check the individual components of the User Training Kit when you receive the shipment, and store each box at its appropriate storage temperature listed on the box. The table indicates the contents to be expected within each kit.

DNA Labeling Kit	Part #	# of Reactions	# of Boxes	Storage Temperature(s)
Bionano Prep DLS-G2 Labeling Kit	80046	12 rxn	3	-25 to -15°C, 2-8°C, 15-30°C

DNA Isolation Kits	Part #	# of Reactions	# of Boxes	Storage Temperatures(s)
Bionano Prep SP-G2 Blood and Cell Culture DNA Isolation Kit	80060	12 rxn	3	-25 to -15°C, 2-8°C, 15-30°C
Bionano Prep SP-G2 Bone Marrow Aspirate Add-On	80062	12 rxn	1	15-30°C
Bionano Prep SP Tissue and Tumor DNA Isolation Kit	80038	10 rxn	1	15-30°C

Post-Installation Follow Up and Resources

Follow-up calls and training sessions will be scheduled by your FAS or other Bionano personnel. These will discuss topics such as data review, data analysis training, and other topics. Ongoing support will be provided by your FAS and other Bionano personnel.

Additional Resources

The following resources will be useful for ongoing training and support. They are available for download from the Bionano Support page.

Resource	Description
Stratys System Safety Guide (CG-00023)	Provides important safety information about the Stratys System
Stratys System User Guide (CG-00041)	Includes details on instrument control software use, loading and running a Stratys chip, and support and maintenance
Bionano Access Software Guide (CG-30142)	Detailed user guide for the Bionano Access software
Data Security Guidelines (CG-30292)	Provides security guidelines for Compute On Demand and Bionano Assure
Bionano VIA Installation Guide (CG-00044)	Guide detailing the installation of Bionano VIA Software

Glossary

Term	Definition
CIFS	Common Internet File System
FAS	Field Application Scientist
FSE	Field Service Engineer
GB	Gigabyte
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
OS	Operating system
SGE jobs	Son of Grid Engine jobs
SSD	Solid-state drive
SFTP	Secure File Transfer Protocol
SMTP	Simple Mail Transfer Protocol
SSH	Secure Shell
TB	Terabyte
IEC	International Electrotechnical Commission

Technical Assistance

For technical assistance, contact Bionano Technical Support.

You can retrieve documentation on Bionano products, SDS files, certificates of analysis, frequently asked questions, and other related documents from the Support website or by request through e-mail and telephone.

TYPE	CONTACT
Email	support@bionano.com
Phone	Hours of Operation: Monday through Friday, 9:00 a.m. to 5:00 p.m., PT US: +1 (858) 888-7663 Monday through Friday, 9:00 a.m. to 5:00 p.m., CET UK: +44 115 654 8660 France: +33 5 37 10 00 77 Belgium: +32 10 39 71 00
Website	www.bionano.com/support
Address	Bionano, Inc. 9540 Towne Centre Drive, Suite 100 San Diego, CA 92121

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