Saphyr® Site Preparation Guide (for Saphyr P/N 60325)

Document Number: 30248

Revision: A

Table of Contents

Legal Notice

For Research Use Only. Not for use in diagnostic procedures.

This material is protected by United States Copyright Law and International Treaties. Unauthorized use of this material is prohibited. No part of the publication may be copied, reproduced, distributed, translated, reverse-engineered or transmitted in any form or by any media, or by any means, whether now known or unknown, without the express prior permission in writing from Bionano Genomics. Copying, under the law, includes translating into another language or format. The technical data contained herein is intended for ultimate destinations permitted by U.S. law. Diversion contrary to U. S. law prohibited. This publication represents the latest information available at the time of release. Due to continuous efforts to improve the product, technical changes may occur that are not reflected in this document. Bionano Genomics reserves the right to make changes in specifications and other information contained in this publication at any time and without prior notice. Please contact Bionano Genomics Customer Support for the latest information.

BIONANO GENOMICS DISCLAIMS ALL WARRANTIES WITH RESPECT TO THIS DOCUMENT, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE FULLEST EXTENT ALLOWED BY LAW, IN NO EVENT SHALL BIONANO GENOMICS BE LIABLE, WHETHER IN CONTRACT, TORT, WARRANTY, OR UNDER ANY STATUTE OR ON ANY OTHER BASIS FOR SPECIAL, INCIDENTAL, INDIRECT, PUNITIVE, MULTIPLE OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING FROM THIS DOCUMENT, INCLUDING BUT NOT LIMITED TO THE USE THEREOF, WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT BIONANO GENOMICS IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Patents

Products of Bionano Genomics® may be covered by one or more U.S. or foreign patents.

Trademarks

The Bionano Genomics logo and names of Bionano Genomics products or services are registered trademarks or trademarks owned by Bionano Genomics in the United States and certain other countries.

Bionano Genomics®, Irys®, IrysView®, IrysChip®, IrysPrep®, IrysSolve®, Saphyr®, Saphyr Chip®, and Bionano Access® are trademarks of Bionano Genomics, Inc. All other trademarks are the sole property of their respective owners.

No license to use any trademarks of Bionano Genomics is given or implied. Users are not permitted to use these trademarks without the prior written consent of Bionano Genomics. The use of these trademarks or any other materials, except as permitted herein, is expressly prohibited and may be in violation of federal or other applicable laws.

Chapter 1: Introduction

This document provides guidelines and specifications to prepare your site for installation and operation of the Bionano Genomics Saphyr® System, P/N 60325. (P/N 60325 is the Saphyr system with the dual cartridge capability. If you have purchased Saphyr P/N 60239 with single cartridge capability, please see the Site Preparation Guide P/N 30145). Please review the information in this guide before preparing your site. Authorized Bionano personnel will assist you 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 Arrival	• **Installation guidelines** • **Laboratory guidelines** • **Environmental considerations**
Preparing for Implementation	• **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:

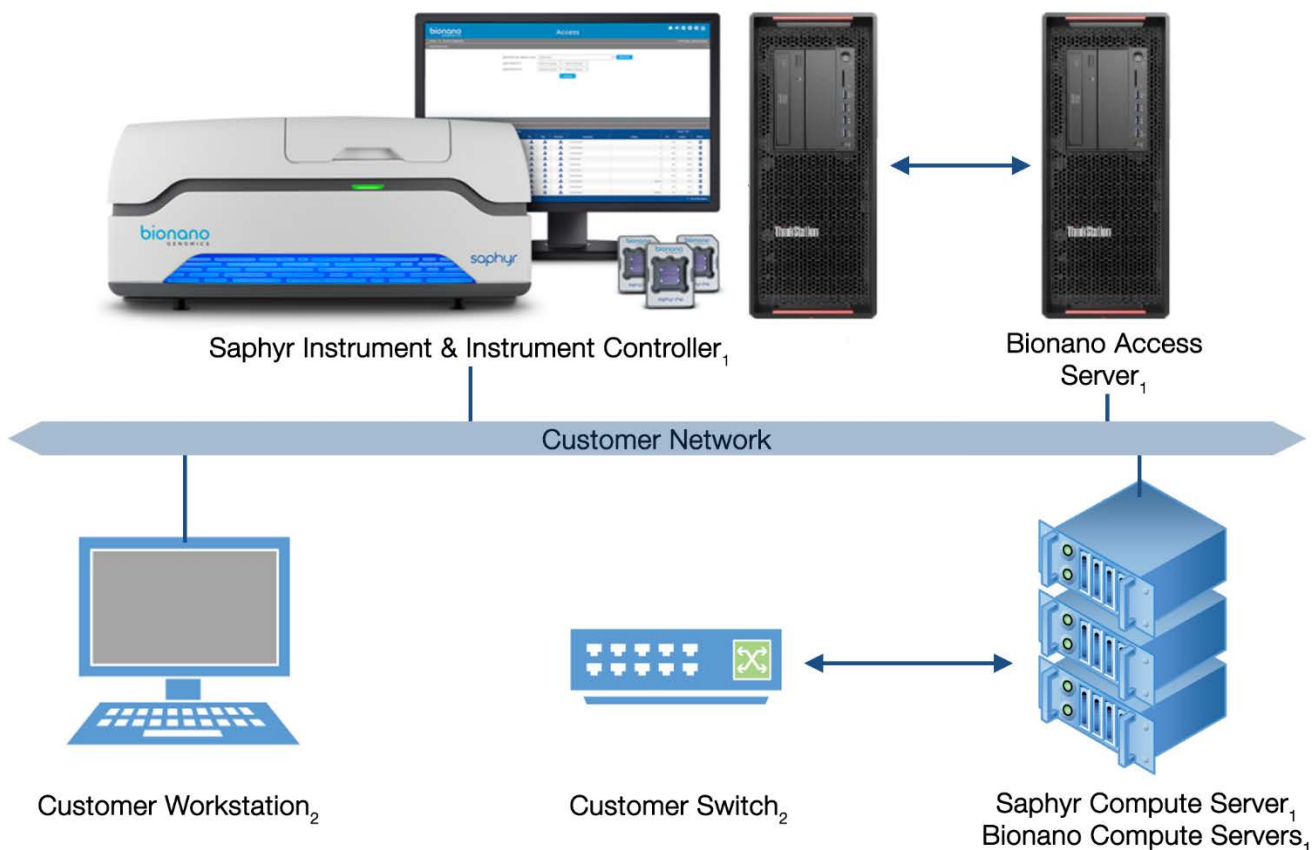| Role	Responsibility
Bionano Genomics Field Service Engineer	• **Coordinate installation date with the customer** • **Perform full installation and qualification of Saphyr System.**
Bionano Genomics Field Application Scientist	• **Coordinate training date with the customer.** • **Train the customer in sample preparation, running the instrument, and reviewing data output.**
Customer	• **Ensure that all requirements listed in this document are met.** • **Provide all user-supplied materials listed in this document.**
IT at Customer Site	• **Rack and connect Saphyr Compute and Bionano Compute Servers** • **Provide IP addresses as described in this document.** • **Provide a switch as described in this document.** • **Provide an SSL certificate if HTTPS communication is desired.**

Chapter 2: 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 Saphyr system within your 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.

Saphyr System Overview

The Saphyr Instrument captures images of labeled DNA molecules from the Saphyr Chip. The instrument controller converts the images into molecule data files (.bnx) and computes real-time throughput, molecule N50, and label density values. The .bnx files are transferred to the Bionano Access Server, where mapping metrics are calculated and displayed in the Instrument Control Software (ICS) and Bionano Access dashboards. Once the chip run is complete, the completed molecule data files are automatically imported into the Bionano Access web application. The molecule data files can then be used to perform various bioinformatics operations such as generating *de novo* assemblies. The Customer Switch isolates traffic for the Compute Servers which are designed to work together as a cluster to process bioinformatics jobs submitted from the Bionano Access web application. This application monitors the progress of each computation job, captures the ouput, notifies the user of completion, and allows them to inspect the results in their browser on the Customer Workstation.

Figure 1: Saphyr System Connectivity Diagram

Saphyr Instrument & Instrument Controller$_1$

Bionano Access Server$_1$

Customer Network

Customer Workstation$_2$

Customer Switch$_2$

Saphyr Compute Server$_1$
Bionano Compute Servers$_1$

^{1}Bionano Purchase ^{2}User Provided

Computing Requirements

The Saphyr System is a collection of components, each of which fulfills an essential function.

Component	Function	Provided By
Saphyr Instrument	Performs the scanning of samples	Bionano
Saphyr Instrument Controller	Controls the function of the Saphyr Instrument	Bionano
Bionano Access Web Server	Web Server for Bionano Access Software	Bionano
Saphyr Compute Server	Serves as computing head node	Bionano
Bionano Compute Server	Performs bioinformatics analysis	Bionano
Customer Workstation	Used to interact with Bionano Access	Customer
Switch	Isolates traffic for the compute servers	Customer

It is possible in some cases for Bionano Genomics to use of existing clusters for compute resources, however there are multiple system requirements. A detailed discussion is necessary to determine viability and additional support costs.

Hardware Requirements and Specifications

We recommend that all Saphyr components (Instrument, Saphyr Instrument Controller, Bionano Access and Compute Servers) be connected to a user-supplied uninterruptible power supply (UPS). This recommendation is for line conditioning and ensuring sufficient power supply.

Saphyr Instrument

Type	Requirements/Specifications
Provided By	Bionano
Space	- Height: 38 cm (15 in) - Width: 86 cm (34 in) - Depth: 71 cm (28 in)
Power	100-240 VAC at 50-60 Hertz - Power Consumption ≤ 300 Watts - The instrument is shipped with a United States power cord. Users outside of the United States are required to supply a 2m long, country specific IEC 60320-C13 power cord.

Saphyr Instrument Controller (included with instrument purchase)

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

Type	Requirements/Specifications
Provided By	**Bionano**
Accessories	• **Monitor** • **Keyboard** • **Mouse**
Software	• **SaphyrICS** • **Chrome** • **GoToAssist Client** • **Putty** • **Filezilla**
Hardware	**32 GB Ram**
Data Storage	• **Two - 8 TB (D drive),** • **256 GB (C drive)**
Space	• **Height: 46 cm (18 in)** • **Width: 18 cm (7 in)** • **Depth: 47 cm (18.5 in)**
Power	• **100-240 VAC at 50-60 Hertz** • **Power Consumption ≤ 300 Watts** • **The Instrument Controller is shipped with a United States power cord. Users outside of the United States are required to supply a 2m long, country specific IEC 60320-C13 power cord.**
Network	**10 GB 4 port**

Bionano Access Web Server (included with instrument purchase)

The webserver is designed to be located adjacent to the Saphyr Instrument Controller. The two systems are directly teathered for direct data transfer.

Type	Requirements/Specifications
Provided By	**Bionano**
Software	• **CentOS 7.3** • **Bionano Access** • **Bionano Tools** • **PostgresSQL 9.6** • **Nodejs 8.9.4** • **Perl 5.24** • **Python 2.7.5** • **R 3.3.1**
Hardware	**128 GB Ram**
Data Storage	**40 Terabytes with RAID Controller**
Space	• **Height: 46 cm (18 in)** • **Width: 18 cm (7 in)** • **Depth: 47 cm (18.5 in)**
Power	• **100-240 VAC at 50-60 Hertz** • **Power Consumption ≤ 300 Watts** • **The server is shipped with a United States power cord. Users outside of the United States are required to supply a 2m long, country specific IEC 60320-C13 power cord.**
Network	**10 GB 4 port**

Saphyr Compute Server (additional purchase)

The Saphyr Compute Server is recommended to perform *de novo* assembly, variant annotation, hybrid scaffolding, and other bioinformatics pipeline functions. It acts as a head node and therefore must be implemented before adding additional Bionano Compute Servers.

Type	Requirements/Specifications
Provided By	**Bionano (additional purchase)**
Software	• **CentOS 7.3** • **Python 2.7.5** • **Perl 5.24** • **R 3.3.1** • **Son of Grid Engine (SGE) 8.1.9**
Hardware	**4 Node 6028TP-HC1R Server**
Space	• **2U rackmount server (to be provided by customer)** • **Rails and cords supplied with server**
Power	• **Dual 2000 W power supplies (Recommended: APC Smart-UPS 3000VA LCD RM 2U UPS - rack mounted)** • **2 6' NEMA 5-15P to IEC320-C13 power cables. Users outside of the United States are required to supply two 2m long, country specific IEC 60320-C13 power cord.**
Network	**4 X 1 GB Ethernet connection**

Bionano Compute Servers (additional purchase)

Our recommended configuration includes one Bionano Compute Server. You must have at least one Saphyr Compute Server before adding any Bionano Compute systems.

Type	Requirements/Specifications
Provided By	**Bionano (additional purchase)**
Software	• **CentOS 7.3** • **Python 2.7.5** • **Perl 5.24** • **R 3.3.1** • **Son of Grid Engine (SGE) 8.1.9**
Hardware	**4 Node 6028TP-HC1R Server**
Space	• **2U rackmount server (to be provided by customer)** • **Rails and cords supplied with server**
Power	• **Dual 2000 W power supplies (Recommended: APC Smart-UPS 3000VA LCD RM 2U UPS - rack mounted)** • **2 6' NEMA 5-15P to IEC320-C13 power cables. Users outside of the United States are required to supply two 2m long, country specific IEC 60320-C13 power cord.**
Network	**4 X 1 GB Ethernet connection**

⚠️ **CAUTION:** Do not attach the power cord to an extension cord, power strip or surge protector.

Switch (customer provided)

Type	Requirements/Specifications
Provided By	**Customer**
Hardware	• **24-port GB, Layer 2+ Switch** • **Rack-mountable** • **NETGEAR switch is recommended (p/n, GSM7228S-100NES) or equivalent**

Network Requirements

The components in the Saphyr system require network connectivity to communicate with each other. Poor network reliability or throughput can affect the performance of your Saphyr system. Please consider the following network requirements:

The Bionano Access Server has a tethered connection to the Saphyr Instrument Controller. They need to be close enough to run a 6 foot network cable between them.

Originating From	Target	Protocol
Saphyr Instrument Controller	**Bionano Access Server**	**SSH (port 22)**
Saphyr Instrument Controller	**Saphyr Compute server**	**CIFS**
Bionano Access Web Server	**Compute servers**	**SSH (port 22)** **SCP (port 22)**
Bionano Access Web Server	**Email server**	**SMTP (port 25)**
Instrument Controller, workstations, and compute servers	**Bionano Access Server**	**HTTP (default port 3005)**

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 generating experiments, monitoring instrument and run status, performing and sharing analyses (when properly configured with Bionano computation servers), by logging into Bionano Access via a web browser. Our recommended web browser is Chrome. The Saphyr Instrument Controller should be accessible externally to Bionano if remote support is desired.

The default configuration requires two static IP addresses. One is for the Bionano Access Server in the lab and one is for the Saphyr Compute Server in the data center. Sometimes the lab and the data center are on different subnets. The two IP addresses provided need to be accessible to each other. The remaining compute nodes will be on a separate custom subnet. The Saphyr1a node will be dual homed. It will have one static IP accessible to the Bionano Access server and one IP address on the subnet with the other compute nodes. IP routing will be used on Saphyr1a to direct responses from the compute nodes back to the Bionano Access Server. Each compute node also has an separate IMPI port. If you want to have your IPMI traffic on a separate network plan for an additional connection for each compute node. Each compute server has four nodes.

For a more secure installation it is possible to switch from HTTP to HTTPS communication. The customer must provide and install the SSL certificate so that is obtained by the appropriate parties for that specific installation and organization. During installation we always confirm initial installation using HTTP and then add the SSL certificate once initial operation has been confirmed. The use of self signed certificates is not supported.

File Storage Recommendations

By default, the Instrument Controller does not save image data. Users may choose to save the raw images prior to their run. If this option is chosen, a maximum of two chips can be run before the image data needs to be deleted or transferred manually. See User Guide (P/N 30247) for details.If you want to archive or retain raw images for a period of time, we recommend that you archive images to a file server after each run. The customer is responsible for archiving and backing up raw images from the Saphyr Instrument Controller if desired (but this is not required).

The Bionano Access Server will store result files such as molecule data files (BNX) and *de novo* assemblies. 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 the data files and PostgreSQL database on the Bionano Access Server are backed up on a regular basis. Depending on system utilization you man 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 Bionano Access User Guide (P/N 30142) for details.

User-Supplied Materials

The following user-supplied materials are required for sample preparation training. Confirm with your FAS when you have all the consumables and equipment available before scheduling your training. Additional, sample-specific, consumables are listed on subsequent pages.

User-Supplied Equipment

Equipment	Supplier
Bath Sonicator	Branson, catalog # CPX 952-119R (or similar)
Orbital shaker, 12 in x 12 in Platform	Cole-Parmer, catalog # EW-51820-30
ThermoMixer C (heated and intermittent mixing)	Eppendorf, catalog # 5382000023
SmartBlock, 50 ml, conical tubes	Eppendorf, catalog # 5365000028
Qubit Fluorometer	ThermoFisher, catalog # Q33216 (or similar)
Positive-Displacement Pipette MR-10 (recommended)	Rainin, catalog # 17008575
Microcentrifuge, refrigerated	General lab supplier
2 Heat Blocks for 1.5 ml tubes, or 2 Water Baths	General lab supplier
Pipettes (2, 10, 20, 200, and 1000 µl)	General lab supplier
Forceps for Membrane Placement	TDI International # TDI-2A-SA or Similar
Ice bucket and ice	General lab supplier
Vortexer	General lab supplier
Thermal Cycler with Heated Lid (10 °C above block temp)	General lab supplier
4 °C refrigerator and -20 °C freezer	General lab supplier
-20 °C Enzyme Block*	General Lab Supplier
4 °C Aluminum Cooling Tube Block*	Sigma Aldrich Catalog # Z740270 or similar
HulaMixer Sample Mixer *	Thermo Fisher, Catalog # 15920D

*Required for DLS Labeling Process

User-Supplied Consumables

Consumable	Supplier
2% CleanCut Agarose (12 ml)	Bio-Rad, Catalog # 1703594
Plug Molds, Disposable (5 x 50 plugs)	Bio-Rad, Catalog # 1703713
Screened caps, green, for 50 ml conicals (get 4)	Bio-Rad, catalog # 1703711
MF-Millipore membrane filter, 0.1 µm	Millipore, catalog # VCWP04700
Proteinase K enzyme, Puregene, 5 ml	Qiagen, catalog # 158920
RNase A solution, 5 ml	Qiagen, catalog # 158924
Agarase enzyme, 100 Units, 0.5 U/µl	ThermoFisher, catalog # EO0461
Conical centrifuge tubes, 15 ml and 50 ml	ThermoFisher, catalog # 14-959-53A and 14-432-22
PCR tubes, thin-walled, DNase-free, 0.2 ml	ThermoFisher, catalog # AM12225 or equivalent
Petri dishes, sterile, 60 x 15 mm	ThermoFisher # 1431160N or VWR # 28384-092
Qubit Broad Range (BR) dsDNA Assay Kit	ThermoFisher, catalog # Q32853
Qubit High Sensitivity (HS) dsDNA Kit (recommended)	ThermoFisher, catalog # Q32851
Qubit Assay Tubes	ThermoFisher # Q32856 or Axygen # 10011-830
TE pH 8.0 solution, 500 ml	ThermoFisher, catalog # AM9849
UltraPure nuclease-free water	ThermoFisher, catalog # 10977015
Microcentrifuge tubes, 0.5 ml, amber, nuclease-free	USA Scientific, catalog # 1605-0007
Pipette tips, 200 µl, nonfiltered	USA Scientific, # 1111-1810 or Rainin Equivalent
Pipette tips, wide-bore, filter, aerosol, 200 µl	VWR, catalog # 46620-642 or Rainin Equivalent
Round/tapered spatula, metal	VWR, catalog # 82027-530
Microcentrifuge tubes, 1.5 ml	VWR, catalog # 87003-294
Pipette tips, aerosol-resistant 2, 10, 20 and 200 µl	General lab supplier
Nickase, Nb.BssSI (20 U/µl) (recommended for NLRS)	NEB, catalog # R0681S
Pipette tips, 10 µl, C-10 for positive displacement (recommended)	Rainin, catalog # 17008604

Additional User-Supplied Materials for DNA Isolation

The following materials are required for extracting DNA from varying sources. Ensure that you have the appropriate materials available on training day.

Human Cell Culture

The following user-supplied material is required for the human cell culture DNA extraction.

Material	Supplier
Bionano Prep Blood and Cell Culture DNA Isolation Kit **	Bionano, part # 80004

** The isolation kit will come with the User Training Kit that you request in Chapter 4.

Human Blood

The following user-supplied materials are required for the human blood DNA extraction.

Material	Supplier
Bionano Prep Blood and Cell Culture DNA Isolation Kit **	Bionano, part # 80004
Hemocue and cuvettes *	Hemocue, catalog # W1214 and 113003
QIAamp DNA Blood Mini Kit *	Qiagen, catalog # 51104
RBC lysis solution, 450 ml	Qiagen, catalog # 158902
Vari-Mix test tube rocker, or equivalent	ThermoFisher, catalog # M48725
Ethanol, 96-100% *	Sigma Aldrich, catalog # E7023
Centrifuge, Swing-bucket Refrigerated, 15 ml Tube Adapters	Eppendorf 5804R or equivalent

*You can use either Hemocue or QIAmp for the human blood DNA extraction, although we recommend using Hemocue. If you use QIAmp, you also need to purchase ethanol (96–100%).
** The isolation kit will come with the User Training Kit that you request in Chapter 4.

Animal Soft Tissue

The following user-supplied materials are used for the animal soft tissue DNA extraction. If your workflow requires dissecting and archiving tissues, all optional items are strongly recommended.

Material	Supplier
Bionano Prep Animal Tissue DNA Isolation Kit **	Bionano, part # 80002
Tissue Grinder - Dounce (7 ml) or Tenbroek (1 ml)	VWR, catalog # 62400-620 or 14231-358
Ethanol, 96-100%	Sigma Aldrich, catalog # E7023
-80 °C freezer	General lab supplier
Dissecting forceps	VWR, catalog # 89259-946
Razor blade or scalpel	General lab supplier
Weigh boats	General lab supplier
Milligram Scale	General lab supplier
Liquid Nitrogen or Dry Ice	General lab supplier
Conical bottom cryogenic vial (optional)	General lab supplier
Chillable dissecting surface (optional)	General lab supplier

** The isolation kit will come with the User Training Kit that you request in Chapter 4.

Animal Fibrous Tissue

The following user-supplied materials are used for the animal fibrous tissue DNA extraction. If your workflow necessitates dissecting and archiving tissues, we strongly recommend all optional items listed.

Material	Supplier
Bionano Prep Animal Tissue DNA Isolation Kit **	Bionano, part # 80002
Formaldehyde 36.5%– 38% in H$_2$O	Sigma Aldrich, catalog # F8775
Rotor-stator homogenizer	Qiagen, catalog # 9001271
Disposable rotor-stator probes	Qiagen, catalog # 990890
-80 °C freezer	General lab supplier
Dissecting forceps	VWR, catalog # 89259-946
Razor blade or scalpel	General lab supplier
Weigh boats	General lab supplier
Milligram Scale	General lab supplier
Liquid Nitrogen or Dry Ice	General lab supplier
Conical bottom cryogenic vial (optional)	General lab supplier
Chillable dissecting surface (optional)	General lab supplier

** The isolation kit will come with the User Training Kit that you request in Chapter 4.

Plant Tissue

The following user-supplied materials are required for the plant tissue DNA extraction.

Material	Supplier
Bionano Prep Plant DNA Isolation Kit	Bionano, part # 80003
Cell strainers, 40 µm and 100 µm	Corning, catalog # 352340 and 352360
Refrigerated centrifuge and swinging bucket (4,500 x g) for 50 ml conical tubes	Eppendorf, catalog # 5804R with A-4-44 Rotor
Rotor-stator homogenizer <u>and</u> disposable probes	Qiagen, catalog # 9001271 <u>and</u> 990890
Formaldehyde 36.5% – 38% in H$_2$O	Sigma Aldrich, catalog # F8775
β-MercaptoEthanol (BME)	Sigma Aldrich, catalog # M6250
Spermidine trihydrochloride	Sigma Aldrich, catalog # S2501
Spermine tetrahydrochloride	Sigma Aldrich, catalog # S1141
Petri dish, square, 12 cm x 12 cm	Sigma Aldrich, catalog # Z617679
Glass centrifuge tubes, 15-16 ml	VWR, catalog # 46100-832
Rubber adapters	VWR, catalog # 46100-830
Plastic spatula	VWR, catalog # 82027-534
Dissecting forceps	VWR, catalog # 89259-946
Razor blade, scalpel, or scissors	General lab supplier
Weigh boats (recommended)	General lab supplier
Milligram Scale	General lab supplier
Small paint brush, all plastic	General supplier

** The isolation kit will come with the User Training Kit that you request in Chapter 4.

Bacterial

The following user-supplied material is required for the bacterial DNA extraction.

Material	Supplier
Bacterial DNA Module Kit (Lysozyme and Buffer)	Bio-Rad, catalog # 1703597

Chapter 3: 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.

⚠️ **CAUTION:** Only a Bionano Field Service Engineer can uncrate and install the instrument.

- At least three weeks before installation, confirm with your Field Application Scientist (FAS) that you have the required consumables and equipment.
- 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 Saphyr instrument.
- Install the Saphyr Compute Server and Bionano Compute Server(s) in the data center. Ensure that IP addresses and all network requirements have been met as described in the Network Requirements section above.

Dimensions

Measurement	Instrument	Crate
Height	**38 cm (15 in)**	**152 cm (60 in)**
Width	**86 cm (34 in)**	**109 cm (43 in)**
Depth	**71 cm (28 in)**	**74 cm (29 in)**
Weight	**103 kg (227 lb)**	**68 kg (150 lb) [crate]** **272 kg (600 lb) [crate + instrument, controller, monitor, server, and accessory kit**

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	**4 standard electrical outlets (100~240 VAC) and two 1 GB Ethernet port**

- ⚠️ **CAUTION**: Moving the instrument can compromise data integrity.

- Insufficient overhead clearance can damage the stage access door and affect run performance.

- The Saphyr Instrument Controller must be placed within 3 feet of the instrument.

- The network cable between the Bionano Access Server and the Saphyr Instrument Controller must be no longer than 20 feet.

Environmental Considerations

This instrument is designed for indoor use only.

Element	Specification
Temperature	**Maintain a 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 sealevel.**
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 Commision (IEC).**

Chapter 4: Preparing for Implementation

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.
- Ensure that you have received and properly stored the contents in the Qualification Kit and Accessory Kit.
- Verify that your site has proper computing, network, file storage and electrical requirements.

Crate Contents

Item	Content	Storage Temperature
Instrument	1 each	15–25 °C (59–77 °F)
Monitor	1 each	15–25 °C (59–77 °F)
Keyboard	1 each	15–25 °C (59–77 °F)
Mouse	1 each	15–25 °C (59–77 °F)
Instrument Controller	1 each	15–25 °C (59–77 °F)
Bionano Access Server	1 each	15–25 °C (59–77 °F)
Accessory Kit	1 each	15–25 °C (59–77 °F)

The FSE will unpack the crate during the installation visit.
Compute Servers will ship in separate crating.

Accessory Kit

The Accessory Kit is included in the crate.

Item	Content	Storage Temperature
US-Specific Power Cord	3 each	15–25 °C (59–77 °F)
Saphyr Chip Clip	2 clips	15–25 °C (59–77 °F)
Display Port Cable	1 each	15–25 °C (59–77 °F)
Network Cable (Cat 3)	3 each	15–25 °C (59–77 °F)
Serial Cable (M/F)	1 each	15–25 °C (59–77 °F)
USB 2.0 A to B Connector	1 each	15–25 °C (59–77 °F)
USB 3.0 A to B Connector	1 each	15–25 °C (59–77 °F)
Air Filter	3 each	15–25 °C (59–77 °F)
Sparkle, Optical Cleaner	1 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)

Qualification Kit (Part #90034)

The Saphyr System Qualification Kit will be coordinated by your FSE to arrive approximately one to three weeks before installation.

Item	Part #	Content	Storage
Saphyr Chip® 3x1000	20366	2 each	4 °C
Saphyr Biological Control A, 100 µl	20337	1 each	4 °C

User Training Kits (Part # 90012 – 90017)

The Saphyr System User Training Kit will be coordinated by your FAS to arrive approximately one to three weeks before training begins. It will contain a combination of: 1) Saphyr Chips & Control, 2) a DNA Labeling Kit and 3) a DNA Isolation Kit.

Coordinate with your FAS to send the proper Labeling Kit and Isolation Kit combination as listed by referencing <u>one</u> of the part numbers below (90012 – 90017) for delivery :

Part # 90015 - DLS Labeling + Blood and Cell Culture DNA Isolation
Part # 90016 - DLS Labeling + Animal Tissue DNA Isolation
Part # 90017 - DLS Labeling + Plant Tissue DNA Isolation

Part # 90012 - NLRS Labeling + Blood and Cell Culture DNA Isolation
Part # 90013 - NLRS Labeling + Animal Tissue DNA Isolation
Part # 90014 - NLRS Labeling + Plant Tissue DNA Isolation

1) Saphyr Chips and Controls
The contents in this table will be included in <u>every</u> User Training Kit combination above.

Item	Part #	Content	Storage
Saphyr Chip® 3 x 1000	**20366**	**2 each**	**4 °C**
Large Genome Labeling Control (3.5 µg)	**20276**	**1 each**	**4 °C**

2) Labeling Kit Training Contents: NLRS Kit <u>or</u> DLS Kit
The table indicates the contents to be expected depending on which <u>one</u> of the labeling kits that is requested for training.

DLS Training Kit Items	Part #	Content	Storage
Bionano Prep DLS Labeling Kit	**80005**	**1 each (10 rxn)**	**-20°C, 4°C, RT**
NLRS Training Kit Items	**Part #**	**Content**	**Storage**
Bionano Prep NLRS Labeling Kit	**80001**	**1 each (10 rxn)**	**4°C, -20°C**
Taq DNA Polymerase, incl. Thermopol Buffer	**10065**	**400 Units**	**-20 °C**
Nickase, Nt.BspQI	**10066**	**1,000 Units**	**-20 °C**
Taq DNA Ligase	**10064**	**2,000 Units**	**-20 °C**
NAD+	**10063**	**0.2 ml**	**-20 °C**

3) DNA Isolation Training Kit: Blood & Cell Culture, Animal Tissue <u>or</u> Plant Tissue
Choose <u>one</u> of the DNA isolation kits below to be used during training.

DNA Isolation Training Kits	Part #	Content	Storage
Blood & Cell Culture DNA Isolation Kit	**80004**	**1 each (10 rxn)**	**RT**
Animal Tissue DNA Isolation Kit	**80002**	**1 each (10 rxn)**	**RT**
Plant Tissue DNA Isolation Kit	**80003**	**1 each (5 rxn)**	**4°C, RT**

Installation and Training Schedule

Below are example schedules for installation of the Saphyr System (by the FSE) and training on the Saphyr System (by the FAS). Depending on the customers proximity to the FAS, travel time and customer workflow, your training time may differ.

Installation

An example of a 3-day installation schedule:

Day 1	Day 2	Day 3
• **Uncrate and move the instrument to installation area** • **Instrument installation**	• **Function verification** • **Optical alignment verification** • **System operation qualification**	• **Network connections**

Training

An example of a 5-day training schedule:

Day 1	Day 2	Day 3	Day 4	Day 5 (optional)
• **Sample DNA extraction** • **Saphyr technology presentation**	• **Sample DNA extraction continues**	• **DNA labeling** • **Bionano Access overview**	• **Set up run** • **Load chip** • **Bionano Access— monitor data and view metrics**	• **Data analysis with Bionano Access** • **Q & A** • **Best practices**

Chapter 5: Post-Installation Follow Up

After you have completed the training, you will have a follow-up review meeting with your FAS. The review meeting is usually in the format of a conference call or WebEx.

For the review, prepare to provide the following:

- Data produced from your first run without the FAS on site.
- List of customization requests for the instrument and software.
- List of questions, concerns, and issues, such as your level of comfort, comprehension, and confidence on using the Saphyr system.

Additional Resources

The following documentation is available for download from the Bionano Support page.

Resource	Description
Saphyr System Safety Guide (for Saphyr P/N 60325) (document #30249)	**Provides information about the instrument safety considerations.**
Saphyr System User Guide (for Saphyr P/N 60325) (document #30247)	**Provides an overview of instrument components and software, proper maintenance, and troubleshooting.**
Bionano Access Software User Guide (document # 30142)	**Provides an overview of data analysis.**

Glossary

Term	Definition
CIFS	**Common Internet File System**
Chip run	**A chip run generates approximately two terabytes of image data.**
FAS	**Field Application Scientist**
FSE	**Field Service Engineer**
GB	**Gigabyte**
HTTP	**Hypertext Transfer Protocol**
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 Commision**

Technical Assistance

For technical assistance, contact Bionano Genomics Technical Support.

You can retrieve documentation on Bionano products, SDS's, 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@bionanogenomics.com
Phone	**Hours of Operation:** **Monday through Friday, 9:00 a.m. to 5:00 p.m., PST** **US: +1 (858) 888-7600**
Website	**www.bionanongenomics.com/support**

Bionano Genomics, Inc.
9540 Towne Centre Drive, Suite 100
San Diego, CA 92121