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Illumina DRAGEN Server v4

Site Prep and Installation Guide

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

Table of Contents

Overview

This resource provides instructions for setting up the Illumina® DRAGEN Server™, including preparing your site for installation and operation.

> ⚠️ The CentOS Project will discontinue support of CentOS 7 on June 30, 2024. As a result, support for CentOS 7 on the DRAGEN Servers will end. Upgrade the operating system to Oracle 8 to continue to use future versions of the DRAGEN Server software. Refer to the Upgrade to Oracle 8 instructions on support.illumina.com/bulletins.html. Contact Illumina Technical Support for additional help.

Use the following specifications and guidelines included to prepare your facility:

- Space requirements
- Electrical requirements
- Environmental considerations
- Computing requirements
- Network considerations

Server Specifications

Component	Specifications
CPU	Dual Intel LGA3647-P0 Xeon Scalable Processor (up to 140W TDP)
System Memory	512 GB DDR4

Site Preparation

This section provides specifications and guidelines for preparing your site for installation and operation of the DRAGEN Server.

- Laboratory space requirements
- Electrical requirements
- Environmental considerations

Delivery and Setup

The DRAGEN Server is unpacked and installed by the customer. The space must be ready before delivery.

Box Dimensions

Use the following dimensions to determine transport, setup, and storage plans.

Measurement	Dimension
Height	29.5 cm (11.6 in)
Width	62 cm (24.4 in)
Depth	96 cm (37.8 in)
Weight	34.8 kg (77 lb)

Shipping Box Components

The DRAGEN Server and components are shipped in one box. The following components are included:

- Power cord, country-specific
- DRAGEN Server License USB key
- Rack mount rails - 80.0 cm (31.5 in) length
- Rack mount screws
- Two SFP+ transceivers

Facility Requirements

Use the specifications and requirements provided in this section to set up your lab space.

Equipment Dimensions

Measurement	Dimension
Height	8.8 cm (3.46 in)
Width	43.8 cm (17.24 in)
Depth	76.0 cm (29.924 in)

Rack Requirements

Minimum Depth	60.95cm (25 in)
Maximum Depth	89.7cm (35.4 in)

⚠️ Consider the length of the rails for the server installation and placement. If the depth of the rack is shorter than the rails, 31.5 in, then the rails could interfere with the existing power and network management lines.

Placement Requirements

Position the DRAGEN Server to allow proper ventilation, access to one power outlet, and access for servicing.

- Allow a rack height of at least 2U.

- Make sure that there is one standard pocket outlet within 10 ft (3 m) of the server.

- Position the instrument so personnel can quickly disconnect the power cords from the outlets.

Electrical Requirements

Power Specifications

Type	Specification
Line voltage	100–240 VAC at 47/63 Hz
Peak power consumption	750 Watts
Power supply rating	2000 Watts at 100%

For 100–240 Volts AC, your facility must be wired with a minimum 15 Amp grounded line with proper voltage. An electrical ground is required. If the voltage fluctuates more than 10%, a power line regulator is required.

The server must be connected to a dedicated circuit that must not be shared with any other equipment.

Receptacles

Your facility must be wired with the following receptacles:

- For 100–110 Volts AC—Two 10 amp grounded, dedicated lines with proper voltage and electrical ground.

- For 220–240 Volts AC—Two 6 amp grounded lines with proper voltage and electrical ground.

- North America and Japan—NEMA 5–15.

- If the voltage fluctuates more than 10%, power line regulators are required.

Protective Earth

The has a connection to protective earth through the enclosure. The safety ground on the power cord returns protective earth to a safe reference. The protective earth connection on the power cord must be in good working condition when using this device.

Power Cords

The instrument comes with an international standard IEC 60320 C20 receptacle, and is shipped with a region-specific power cord. To obtain equivalent receptacles or power cords that comply with local standards, consult a third-party supplier such as Interpower Corporation (`www.interpower.com`). All power cords are 2.5 m (8 ft) in length.

Hazardous voltages are removed from the instrument only when the power cord is disconnected from the AC power source. Position the server so that you can quickly disconnect the power cord from the outlet.

⚠ To avoid power surges, use an extension cord to connect the instrument to a power supply.

Fuses

The server contains no user-replaceable fuses.

Environmental Considerations

The following table specifies temperature, humidity, and other environmental considerations for safely housing the instrument.

Element	Specification
Temperature	Maintain a server room temperature of 0°C to 35°C. This temperature is the operating temperature of the DRAGEN Server. Do not allow the ambient temperature to vary by more than ±2°C.
Humidity	Maintain a noncondensing relative humidity between 10–85%.
Altitude	Locate the DRAGEN Server at an altitude below 2,000 meters (6,500 ft).
Air Quality	Operate the server in a data center environment with air filtration per ISO 14644-1 Class 8 with a 95% upper confidence limit.
Ventilation	Consult your facilities department for ventilation requirements sufficient for the level of heat output expected from the DRAGEN Server.
Location	Operate the server in an indoor environment only. The server is not suitable for use in locations where children are likely to be present. The server is intended for use in a server room.

Heat Output

Measured Power	Thermal Output
800 Watts	2800 BTU/hr

Noise Output

Acoustical Performance	Noise Output (dB)	Distance from Server
Idle @ 25°C ambient	70	1 meter (3.3 feet)
Maximum load @ 25°C ambient	76	1 meter (3.3 feet)

Uninterruptible Power Supply

Illumina recommends using a user-supplied uninterruptible power supply (UPS).

Illumina is not responsible for data loss caused by interrupted power, regardless of whether the DRAGEN Server is connected to a UPS. Standard generator-backed power is often not uninterruptible, so a brief power outage occurs before power resumes. This power outage interrupts analysis and data transfer.

The following table shows three example recommended UPS models for the DRAGEN Server.

Specification	Japan APC Model # SMX1500RMJ2U	North America APC Model # SMX1500RM2UNC	International APC Model # SMX1500RMI2UNC
Maximum Output Capacity	1200 W 1500 VA	1200 W 1440 VA	1200 W 1500 VA
Input Voltage (Nominal)	100 VAC	120 VAC	230 VAC
Input Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Input Connection	NEMA 5–15P	NEMA 5–15P	IEC-320 C14 Schuko CEE7/EU1-16P British BS1363A
Built-In UPS Output Receptacles	Six NEMA 5—15 R (battery backup)	Eight NEMA 5–15R (battery backup)	Eight IEC 320 C13 (battery backup)
Dimensions	8.9 cm × 43.2 cm × 46.8 cm	8.9 cm × 43.1 cm × 49.0 cm (3.5 in × 17.0 in × 19.3 in)	8.9 cm × 43.2 cm × 49.0 cm
Rack Height	2U	2U	2U
Weight	27.8 kg	24.8 kg (54.6 lb)	24.8 kg
Typical Run Time (at 500 Watt Average Draw)	19.5 minutes	22.9 minutes	22.9 minutes

Safety & Compliance

This guide provides important safety information pertaining to the installation and operation of the DRAGEN Server. This guide includes product compliance and regulatory statements. Read this document before performing any procedures on the server.

The country of origin and date of manufacture of the server are printed on the server label.

Safety Considerations and Markings

This section identifies potential hazards associated with installing, servicing, and operating the . Do not operate or interact with the in a manner that exposes you to any of these dangers.

General Safety Warnings

Make sure that all personnel are trained in the correct operation of the and any potential safety considerations.

> Follow all operating instructions when working in areas marked with this label to minimize risk to personnel or the .

Electrical Safety Warnings

Do not remove the outer panels from the . There are no user-serviceable components inside. Operating the with any of the panels removed creates potential exposure to line voltage and DC voltages.

Compliance and Regulatory Markings

The is labeled with the following compliance and regulatory markings.

Waste Electrical & Electronic Equipment (WEEE)

This label indicates that the instrument meets the WEEE Directive for waste.

Visit support.illumina.com/certificates.html for guidance on recycling your equipment.

Set Up the DRAGEN Server

This section provides information on installing the DRAGEN Server. Before beginning, make sure that you have all the components and your facility meets the requirements.

The following components are not included with the DRAGEN Server and required to set up the server:

- Monitor with a VGA input
- VGA cable
- Keyboard with a USB input
- Mouse with a USB input
- Two USB cables

Install the Server Racks

Use the following instructions to mount the DRAGEN Server to your server rack.

Attach Mounting Bracket to Server

1. Pull the mounting bracket rail out from the rail assembly until you reach the safety lock.
2. Press the yellow rail lock lever up, and then remove the mounting bracket rail from the rail assembly.
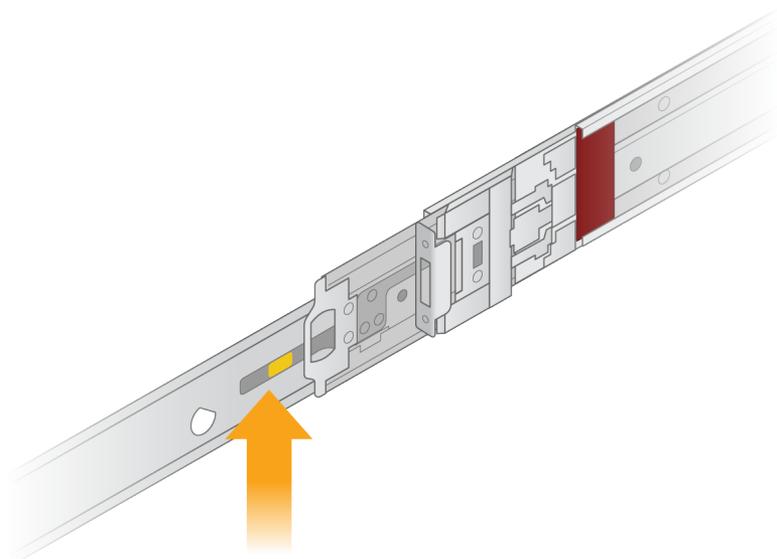
Figure 1   Expanded Rail Assembly

3. Align the key slots to the T studs on the sides of the server and slide the mounting bracket back to lock into place.

4. Repeat to attach the mounting bracket on the other side.

Mount the Rail Assemblies in Rack

1. Press down on the rail assembly mechanism to unlock the rear rail assembly lock.

2. Align the rail assembly into the desired server rack brackets and push forward to lock into place. An audible click indicates that the rail assembly is in place.

3. Release the yellow locking latch and push the slider forward to the rear of the rail assembly.

4. Align the rail assembly into the desired front server rack brackets and flip the lock mechanism forward to lock the rail assembly into place.

5. Repeat for the other rail.

Figure 2   Rail Assembly Aligned With Server Brackets

Install the Server in the Rack

Two people are recommended for moving the server.

1. Facing the front of the rack, align the mounting brackets on the server with the slide rails inside the rack.
2. Slide the mounting brackets into the slide rails until you reach the safety locks.
3. Press both safety lock triggers down simultaneously and slide the server forward until it rests against the server rack.
4. Insert the required cables.
5. Insert screws into the rectangular window on the front of each lock mechanism.
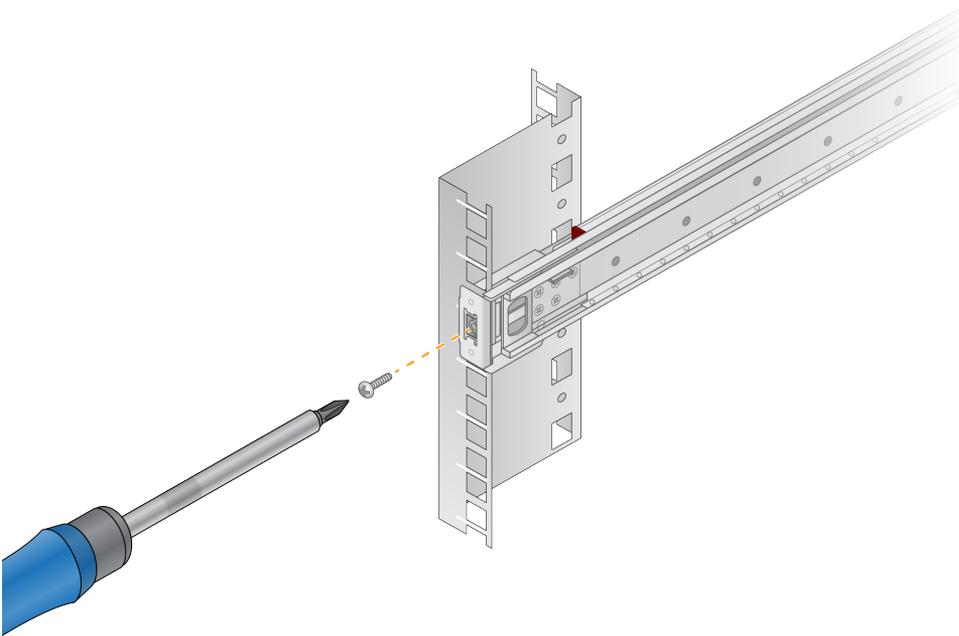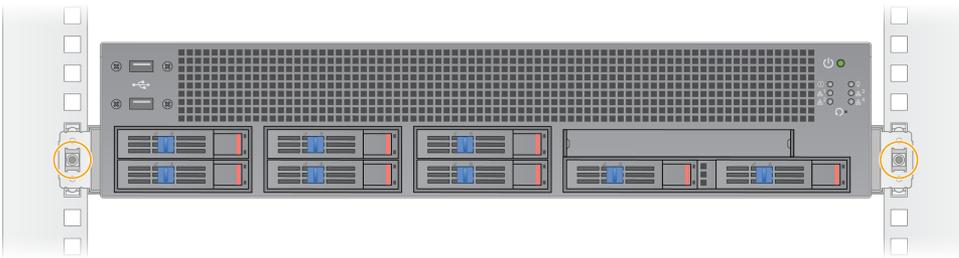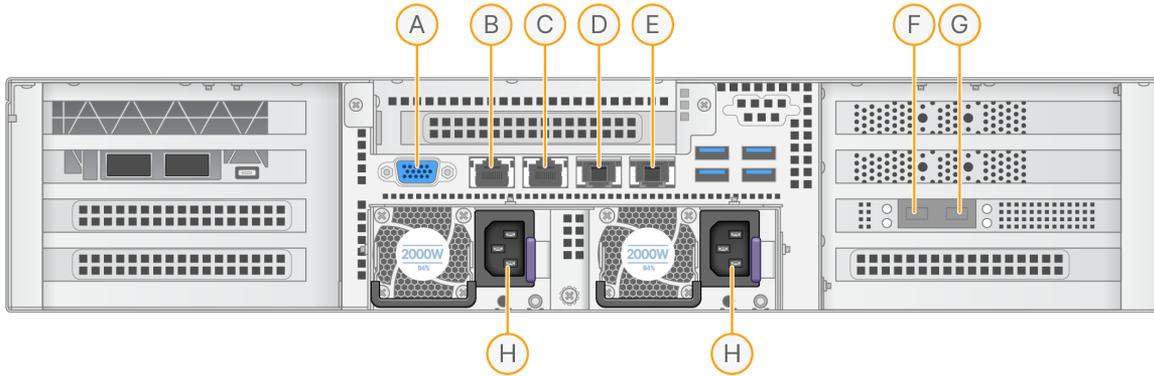
Figure 3   Secured Server

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Server Ports

The following figure indicates the port location for each cable required when installing the Illumina DRAGEN Server.

Figure 4   Rear of DRAGEN Server

A. VGA port (monitor)

B. 1 GB Ethernet port with interface name enp5s0 (BMC)

C. 1 GB Ethernet port with interface name enp4s0

D. 10 GB Ethernet port with interface name enp26s0f1

E. 10 GB Ethernet port with interface name enp26s0f0

F. 10 GB SFP+ port with interface name enp135s0f0

G. 10 GB SFP+ port with interface name enp135s0f1

H. Power supply inlets

Insert Cables

1. Using the VGA cable, attach the VGA monitor to the server VGA port.

2. Attach the USB keyboard to any open USB port.

3. Attach network cable RJ45 to network port C.

Install the Illumina DRAGEN Server License

You can activate the DRAGEN Server by installing the USB license key as follows. You must activate the server before proceeding.

1. Connect the power supply to the AC inlet, and then to a wall outlet.

2. Locate the USB license key in the delivery box.

3. Plug the USB license key into any USB port on the back of the server.

4. Connect the power cord to the power supply inlet, and then to the wall outlet.

5. The server turns on automatically.

6. Connect your monitor to the DRAGEN Server using the VGA port.

7. Connect your keyboard to the DRAGEN Server using any unoccupied USB port.

Shut Down the Server

You can shut down the DRAGEN Server directly from the command line.

1. Log in as root.

2. To initiate system shutdown, enter:

```
poweroff
```

Wait a few minutes until the server comes to a complete shutdown.

Configure Settings

You can configure the following settings for the DRAGEN Server:

- Security

- Networking

- Baseboard management controller

Security and Safety

The DRAGEN Server is designed to resist attacks. Supplement this design with the following security recommendations:

- A secure internal LAN to prevent the distribution of data to all web browsers.

- Limited access to the DRAGEN Server to prevent the removal of the RAID controller, disk drives, and access to data. Booting in single-user mode allows access to the whole system.

- The DRAGEN Server is designed to analyze sequencing data. Do not consider it a general-purpose computer. For quality and security reasons, do not use the computer for web browsing, checking email, reviewing documents, or other unnecessary activity. These activities can result in degraded performance or loss of data.

Antivirus Software

Illumina does not recommend running any virus scanners on the DRAGEN Server. Virus scanners often impact the performance of High-Performance Computing (HPC) systems.

Restricted Ports and Authentication

Outbound Connections	lus.edicogenome.com port 80
Inbound Connections	SSH: TCP port 22

Stack Overflow Protection

Modern processors disable coded execution in data sections of the program to address stack overflow attacks. By default, this feature is enabled.

User Behavior

The DRAGEN Server is designed for analyzing sequencing data. For quality and security reasons, it should not be used for general-purpose computing such as web browsing, checking email, or running third-party software. These activities can result in degraded performance or data loss. Users should

also avoid storing files on the scratch drive as it can impede the proper operation of the server.

Network Considerations

Before running tests, make sure that your network contains the required components and meets the network connection recommendations.

DRAGEN Server setup requires the following network components:

- Default gateway address
- DNS Server IP address
- IP addresses (2)
- Subnet mask for the IP addresses

The following operations require an external internet connection using TCP on ports 80 and 443:

- Updating the software
- Remote assistance from Illumina Technical Support
- Access to license server

Network Connections

Use the following recommendations to install and configure a network connection:

- Recommended bandwidth for a connection is 10 GB per second.
- Switches and other network equipment must have a minimum of 10 GB per second.
  - Calculate the total capacity of the workload on each network switch. The number of connected instruments and ancillary equipment, such as a printer, can impact capacity.
- For 10 GB connections, SFP+ and RJ45 connections are supported. If using SFP+ ports, twinax cables or SFP+ transceivers are required. Validated transceivers include Intel and Finisar.
- Ask your IT professional to review network maintenance activities for potential compatibility risks with the system.

Configure the Server Network

Using the Network Manger Text User Interface (NMTUI), you can configure the IP address, gateway, DNS server, and additional options for your connection.

1. Enter the user name and password. Refer to your Welcome email from the Illumina Support to get your user name and password.
2. Enter:

```
nmtui
```

3. Use your keyboard to navigate the NMTUI.

4. Select Activate a connection to view your active Ethernet connection.
   The active Ethernet connection shows an asterisk in front of the connection name.

5. Select Back.

6. Select Edit a connection.

7. Navigate to your active connection, and then select Edit.

8. Select Show next to IPv4 Configuration or IPv6 Configuration.

9. Select Automatic to choose one of the following IP configurations:

   - [To remove the IP configuration], select Disabled.

   - [To automatically obtain your IP address from DHCP], select Automatic.

   - [To manually set your IP address], select Manual.

10. Set the following network settings:

    - IP address and subnet mask

    - Gateway

    - DNS server

    - [Optional] Search domain

    - [Optional] Select additional routing settings depending on your routing configuration.

11. Select how users can access the connection.

    - Automatically connection—The connection acts as the default connection for all users.

    - Available to all users—All users can access this connection. Disabling this option removes the connection from the list of available connections for users.

12. Select OK.

Set Server Time

Set Server Time to Local Time Zone

1. Log in as root.

2. Check if the current server time reflects the local time zone using the date command. Enter:

```
date
```

3. Check for a nearby city with the correct time zone using the `timedatectl list-timezones` command.
   For example, use the following command to find time zones in Asia:

```
timedatectl list-timezones | grep Asia
```

4. Change the server time to local time using the `timedatectl set-timezone` command.

Example:

```
timedatectl set-timezone Asia/Singapore
```

5. To make sure that the server time has changed, enter:
```
date
```

```
ls -l /etc/localtime
```

Synchronize Server Time to NTP Server

1. Log in as root.

2. Check if chrony daemon is running. Enter:

```
systemctl status chronyd
```

3. If the result from the previous command shows inactive or dead, enable the chrony daemon. Enter:

```
systemctl enable chronyd
```

4. To start the daemon, enter:

```
systemctl start chronyd
```

5. Edit /etc/chrony.conf using vi. Enter:

```
vi /etc/chrony.conf
```

1. Replace the default NTP server settings to the local NTP server.

2. Example:

Original default settings:

```
server 0.centos.pool.ntp.org iburst
server 1.centos.pool.ntp.org iburst
server 2.centos.pool.ntp.org iburst
server 3.centos.pool.ntp.org iburst
```

Settings to use local NTP server(s):

```
server 192.168.1.1 iburst
server 192.168.1.2 iburst
```

3. To save the file, enter:

```
:wq!
```

4. To restart the chrony daemon, enter:

```
systemctl restart chronyd
```

5. Check the health of the local time server. Enter:

```
timedatectl
```

6. Make sure that DRAGEN Server can synchronize with the local NTP server using one of the following commends:

- chronyc tracking (Manual)
- ntpdate (Automatic)
  The following is an example command:

```
ntpdate -q 192.168.1.1
```

Set Server Time to Local Time Zone

1. Log in as root.
2. Check if the current server time reflects the local time zone using the date command. Enter:

```
date
```

3. Check for a nearby city with the correct time zone using the `timedatectl list-timezones` command.
   For example, use the following command to find time zones in Asia:

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timedatectl list-timezones | grep Asia
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   - chronyc tracking (Manual)

   - ntpdate (Automatic)
     The following is an example command:

```
    ntpdate -q 192.168.1.1
```

Configure BMC

You can connect to the Baseboard Management Controller (BMC) to provide remote monitoring and control for Illumina Technical Support. Refer to *Server Ports* on page 13 for the proper port to use.

1. Log in as root using the root password provided in the DRAGEN Server welcome email. If you have not received your sign in credentials, contact Illumina Customer Service.

2. If signing in for the first time, reset your password.
   Passwords must contain at least 10 alphanumeric characters and two special characters.

3. To use a static IP address, do as follows.

   a. Enter the following command:

   ```
   ipmitool lan set 1 ipsrc static
   ```

   b. To set the IP address, enter:

   ```
   ipmitool lan set 1 ipaddr <IP address>
   ```

   c. To set the netmask, enter:

   ```
   ipmitool lan set 1 netmask <netmask ID>
   ```

   d. To set the default gateway, enter:

   ```
   ipmitool lan set 1 defgw ipaddr <gateway ID>
   ```

4. Enter the IP address into the web browser. You can sign in as an admin using the password printed on the back of the DRAGEN Server.

Access the Server Remotely

To access your DRAGEN Server from a remote location, you must set your firewall zone to public and allow root login from SSH connections.

Set Firewall Zone

By default, the firewall is enabled and blocks all incoming connections. To allow remote SSH connections, run the following script:

```
/usr/local/bin/mfg_enable_network.sh
```

This script accomplishes these steps:

- Sets firewall zone to public
- Sets network interfaces to automatically start when the server is turned on
- Allows users to log in via SSH
- Reloads the SSHD configuration

- Restarts the network manager service

Allow Root Log in by SSH

To access the Illumina DRAGEN Server remotely, you must enable root log in by SSH connections. By default, root log in from SSH connections are blocked.

1. Log in as root.

2. Open `/etc/ssh/sshd_config`.

3. Set `PermitRootLogin` to `yes`.

4. Restart sshd. Enter:

```
systemctl restart sshd
```

Set Firewall Zone

By default, the firewall is enabled and blocks all incoming connections. To allow remote SSH connections, the firewall zone must be set to public.

1. Log in as root.

2. Set the default firewall zone to public. Enter:

```
firewall-cmd --set-default-zone=public
```

Allow Root Log in by SSH

To access the Illumina DRAGEN Server remotely, you must enable root log in by SSH connections. By default, root log in from SSH connections are blocked.

1. Log in as root.

2. Open `/etc/ssh/sshd_config`.

3. Set `PermitRootLogin` to `yes`.

4. Restart sshd. Enter:

```
systemctl restart sshd
```

Technical Assistance

For technical assistance, contact Illumina Technical Support.

Website:	www.illumina.com
Email:	techsupport@illumina.com

Illumina Technical Support Telephone Numbers

Region	Toll Free	International
Australia	+61 1800 775 688	
Austria	+43 800 006249	+43 19286540
Belgium	+32 800 77 160	+32 3 400 29 73
Canada	+1 800 809 4566	
China		+86 400 066 5835
Denmark	+45 80 82 01 83	+45 89 87 11 56
Finland	+358 800 918 363	+358 9 7479 0110
France	+33 8 05 10 21 93	+33 1 70 77 04 46
Germany	+49 800 101 4940	+49 89 3803 5677
Hong Kong, China	+852 800 960 230	
India	+91 8006500375	
Indonesia		0078036510048
Ireland	+353 1800 936608	+353 1 695 0506
Italy	+39 800 985513	+39 236003759
Japan	+81 0800 111 5011	
Malaysia	+60 1800 80 6789	
Netherlands	+31 800 022 2493	+31 20 713 2960
New Zealand	+64 800 451650	
Norway	+47 800 16 836	+47 21 93 96 93
Philippines	+63 180016510798	
Singapore	1 800 5792 745	
South Korea	+82 80 234 5300	
Spain	+34 800 300 143	+34 911 899 417

Region	Toll Free	International
Sweden	+46 2 00883979	+46 8 50619671
Switzerland	+41 800 200 442	+41 56 580 00 00
Taiwan, China	+886 8 06651752	
Thailand	+66 1800 011 304	
United Kingdom	+44 800 012 6019	+44 20 7305 7197
United States	+1 800 809 4566	+1 858 202 4566
Vietnam	+84 1206 5263	

Safety data sheets (SDSs)—Available on the Illumina website at support.illumina.com/sds.html.

Product documentation—Available for download from support.illumina.com.

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