E-Gel™ Power Snap Plus Electrophoresis System

USER GUIDE

For use with E-Gel™, E-Gel™EX, E-Gel™ 48, and E-Gel™ 96 Agarose Gels, and E-PAGE™ Gels

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

Life Technologies Holdings Pte Ltd | Block 33 | Marsiling Industrial Estate Road 3 | #07-06, Singapore 739256

Revision history: C.0 MAN0002591 (English)

Revision	Date	Description
C.0	12 May 2023	Revision of instrument and gel specifications.
B.0	24 August 2022	Addition of catalog numbers for orderable combination SKUs.
A.0	5 April 2022	New user guide for the E-Gel™ Power Snap Plus Electrophoresis System.

The information in this guide is subject to change without notice.

Contents

Product information

Product description

The Invitrogen™ E-Gel™ Power Snap Plus Electrophoresis System is an easy-to-use system designed for performing electrophoresis and documentation of nucleic acids with pre-cast E-Gel™ agarose gels and E-PAGE™ gels.

The system consists of a base module containing a power supply, blue light transilluminator, and amber filter in one unit, and a camera module capable of high-resolution image capture and documentation without the need for focusing or adjustment.

The system is compatible with precast E-Gel™, E-Gel™EX, E-Gel™ 48, and E-Gel™ 96 agarose gels, as well as E-PAGE™ gels.

Product contents

Base module kit contents

The E-Gel™ Power Snap Plus Electrophoresis System is available in several different configurations based upon the components included in the kit.

Cat. No.	Base module	Camera module	Wi-fi dongle	E-Gel™*48* agarose gel	E-Gel™*96* agarose gel
G9311/G9301	1	1	1	—	—
G9331/G9341	1	1	1	8 gels	—
G9332/G9342	1	1	1	8 gels	—
G9381/G9391	1	1	1	—	8 gels
G9382/G9392	1	1	1	—	8 gels
G9110/G9101	1	—	—	—	—
G9200/G9201	—	1	—	—	—

Base module kit contents

The contents of the E-Gel™ Power Snap Plus Electrophoresis Device kit are listed in the following table. The device is shipped at room temperature.

See "System components" on page 9 for specifications and description of the E-Gel™ Power Snap Plus Electrophoresis Device, and "First time instrument setup" on page 13 to set up the instrument.

Product	Quantity
E-Gel™ Power Snap Plus Electrophoresis Device	1
E-Gel™ Adapter for E-Gel™ Power Snap Plus Electrophoresis Device	1
Power cord with AC/DC power adapter (for US/Canada/Taiwan/Japan, Europe, or UK)	1
Safe Imager™ Viewing Glasses	1

Camera module kit contents

The contents of the E-Gel™ Power Snap Plus Camera kit are listed in the following table. The camera is shipped at room temperature.

See "System components" on page 9 for specifications and description of the E-Gel™ Power Snap Plus Camera, and "First time instrument setup" on page 13 to set up the instrument.

Product	Quantity
E-Gel™ Power Snap Plus Camera	1

System components

Parts of the E-Gel™ Power Snap Plus Base Module and AC/DC power adapter
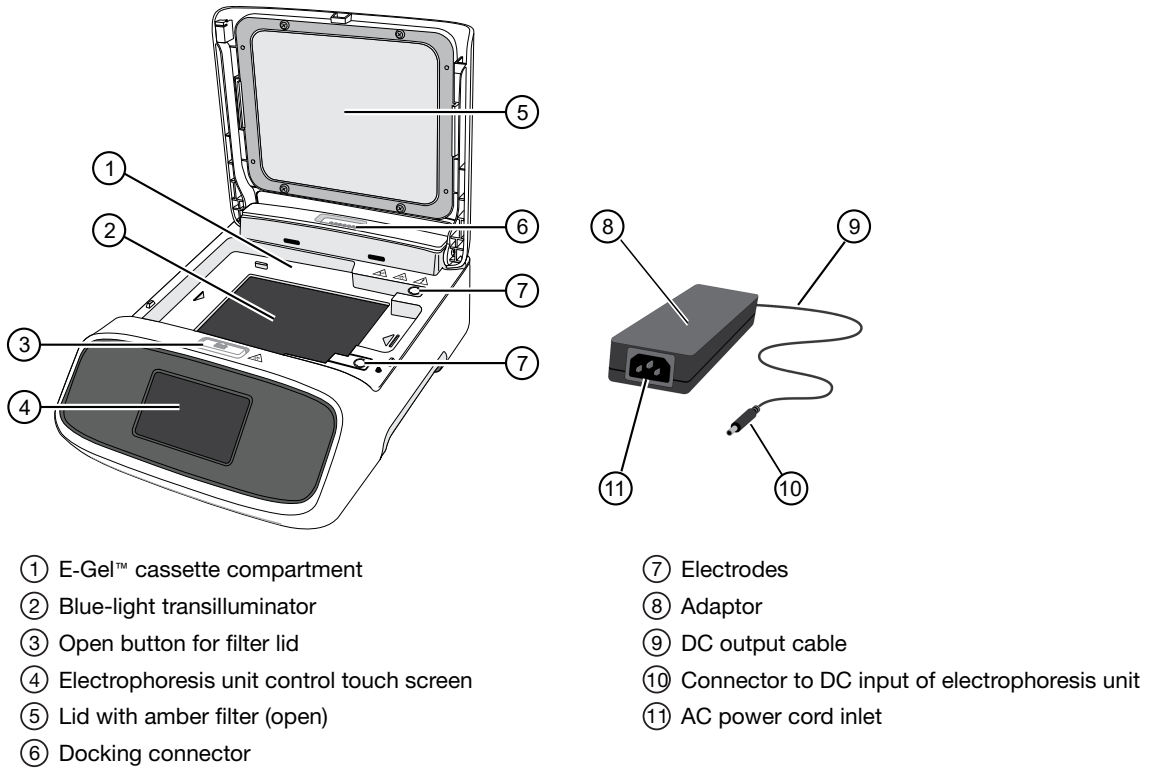
1. E-Gel™ cassette compartment
2. Blue-light transilluminator
3. Open button for filter lid
4. Electrophoresis unit control touch screen
5. Lid with amber filter (open)
6. Docking connector
7. Electrodes
8. Adaptor
9. DC output cable
10. Connector to DC input of electrophoresis unit
11. AC power cord inlet

Parts of the E-Gel™ Power Snap Plus camera module

1. Touch screen
2. USB port for image export/camera module firmware upgrade
3. Handhold for lifting (on both sides)
4. Battery compartment
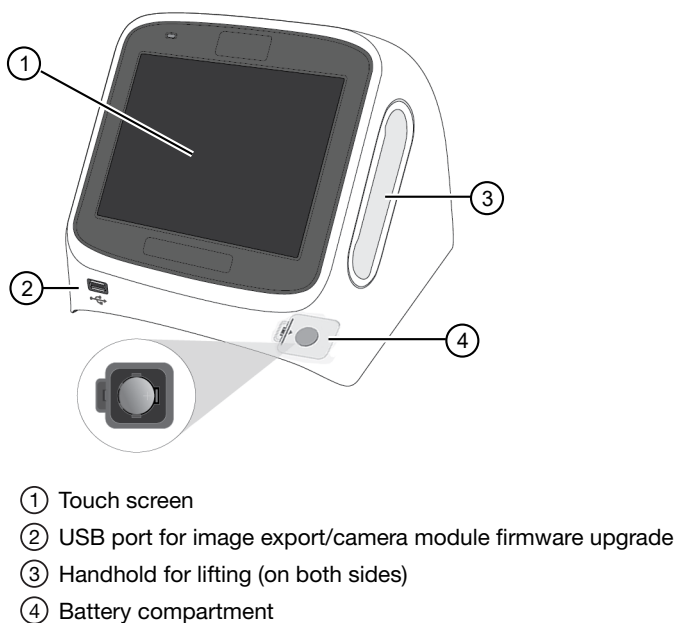
Rear view of the E-Gel™ Power Snap Plus camera module and base module
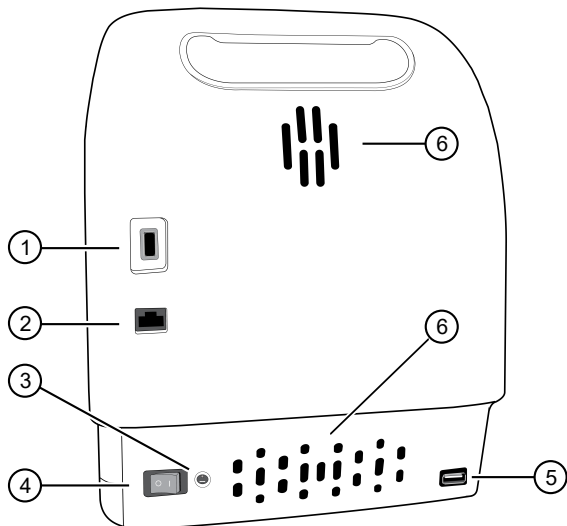
① USB port for wireless module
② Ethernet port
③ DC input port
④ Power switch
⑤ USB port for image export/base module firmware upgrade
⑥ Ventilation ports

Touchscreen controls

Table 1   General touchscreen controls

Button	Function
←	Returns to the previous screen
⌂	Go to Home screen
👤	Go to Sign in screen
⚙	Go to Settings screen
✕	Close the current modal window.

Touchscreen status indicators

See for an overview of the base module, and for an overview of the camera module.

Table 2   Status indicators

Button	Function
	View instrument status 1. Time remaining 2. Protocol status (step, paused, etc.)
	Indicates whether a USB device is inserted into the instrument.
	Indicates whether the Wi-Fi is on or off.
	Indicates whether the instrument is connected to wired network.
	Indicates whether the instrument is connected to the Thermo Fisher™ Connect Platform.

Enter text

When you press a field that requires the input of text, the text editor, as seen in the following figure, opens.
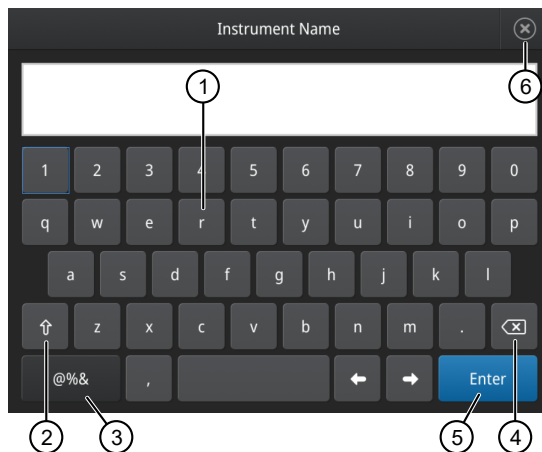
① Enter a letter   ④ Delete
② Change letter case   ⑤ Close and save
③ Enter punctuation or other symbols   ⑥ Close without saving

Enter numbers

When you press a field that requires a numerical input, the numeric editor, as seen in the following figure, opens.
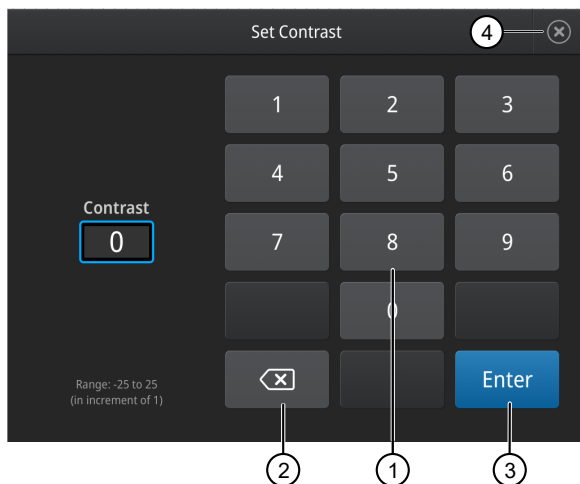
① Enter a number   ③ Close and save

② Delete/backspace   ④ Close without saving

Required materials not provided

- *(Optional)* Electrical protective devices.
  The use of one or more of the following electrical protective devices is recommended.
  - Power line regulator (100–240 V)
  - Surge protector/line conditioner (10-kVA)
  - Uninterruptible power supply (1.5-kVA)
- USB-enabled Wi-Fi Module (for wireless connection)

First time instrument setup

The E-Gel™ Power Snap Plus Electrophoresis System consists of a base module, the E-Gel™ Power Snap Plus Electrophoresis Device, and a camera module, the E-Gel™ Power Snap Plus Camera.

The E-Gel™ Power Snap Plus Electrophoresis Device can be used independently of the camera module, and is ready to use once the power cord and adapter are attached.

The E-Gel™ Power Snap Plus Camera is used in conjunction with the E-Gel™ Power Snap Plus Electrophoresis Device, and requires the user to set instrument parameters before use, and to access cloud-based resources.

Set up the base module

1. Remove the protective film covering the amber filter.

2. Connect the power cable to the power adapter, then plug the adaptor plug to the E-Gel™ Power Snap Plus Electrophoresis Device.

3. Plug the power cord into an electrical outlet.
   The instrument operates at voltages of 100–240 VAC and the frequency range of 50/60 Hz. Ensure that the local supply voltage in the laboratory conforms to that specified on the type label on the back of the instrument

4. Turn on the master switch located at the back of the device.

Set up the camera module

1. Remove the protective film covering the touch screen.

2. Place the E-Gel™ Power Snap Plus Camera on top of the base module.

3. Set the date and time on the camera.

4. Set the cloud region on the camera.

5. *(Optional)* Connect the instrument to the Internet.

Connect the instrument to the Internet

The instrument can connect to the Internet by either wired or wireless methods.

To connect by wired method through the instrument Ethernet port using a cable, see "Set up a wired connection" on page 15.

To connect by wireless method through the instrument USB wireless adapter port with a USB-enabled Wi-Fi card, see "Set up a wireless connection" on page 14.

Set up a wireless connection

Connect the High-Power USB Wi-Fi Module (Cat. No. A26774 to the USB wireless adapter port (see "Rear view of the E-Gel™ Power Snap Plus camera module and base module" on page 10 for port location).

1. See "Set up a wired connection" on page 15 Steps 1 through 3 to find the **Network configuration** screen.

2. In the **Network configuration** screen, select a field in the **Wireless** panel.
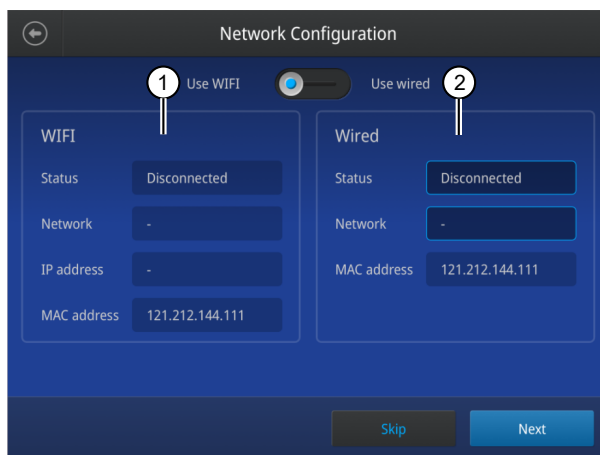
| ① Wireless panel | ② Wired panel |

> **Note:** During initial setup, if you selected the Wired option in the **Network Connection** screen, you will be required to enter the IP address if you selected the Static IP wired option. If you selected the Dynamic IP wired option, the IP address is automatically populated.

3. Once a wireless connection has been detected, a list of the available networks is displayed. Select the network name of your choice or select **Join others**.

> **Note:** If you choose **Join others**, the **Configure and Join Network** screen opens.

4. In the **Configure and Join Network** screen, select the **Network Name** field, then enter the name and security type of the network.

5. Select the security type from the **Security type** dropdown menu.

Note: Contact your IT Systems Administrator for information on security type.

Select from the following options:

- Open
- WEP
- WPA Personal

- WPA2 Personal
- WPA Enterprise
- WPA2 Enterprise

Note: The above options are available only if **Join Other Network** was selected in Step 3. You cannot change the security type if you selected an existing network.

---

6. Select **Join** to continue or **Cancel** to exit from the **Find and Join a Network** screen.

7. Depending on the security type you have selected, enter the appropriate passwords and select **Join**.

8. If all the entered information is correct, the **Network Connection Complete** screen will appear. Select **OK** to continue.

Note: If incorrect information was entered the **Network Connection Failed** screen will open. Select **OK** to continue to the **Security type** screen.

Set up a wired connection

Connect one end of a Ethernet cable to the instrument Ethernet port, and the other end to an Ethernet port wall plug (see "Rear view of the E-Gel™ Power Snap Plus camera module and base module" on page 10 for port location).

1. On the **Home** screen, select ⊛ **(Settings)**.
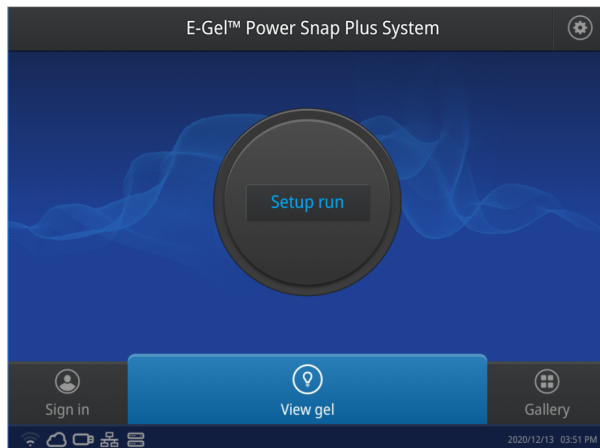
2. In the **Settings** screen, select **Instrument Settings**.

Settings

About instrument

Instrument settings

Maintenance & services
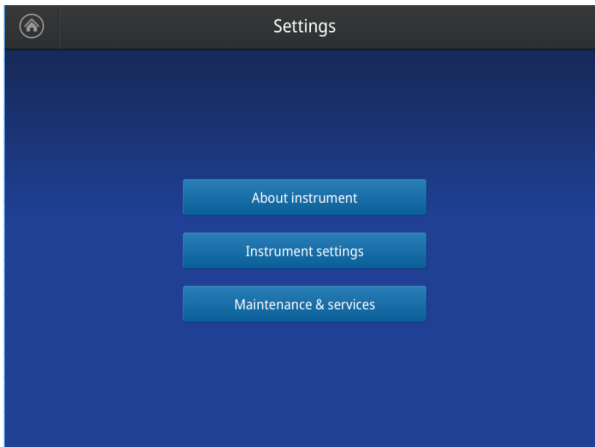
3. In the **Instrument Settings** screen, select **Network configuration**.

Instrument Settings

Instrument name	Network configuration
Date & time	File name convention
Sleep mode	Cloud region
Brightness	PIN expiration
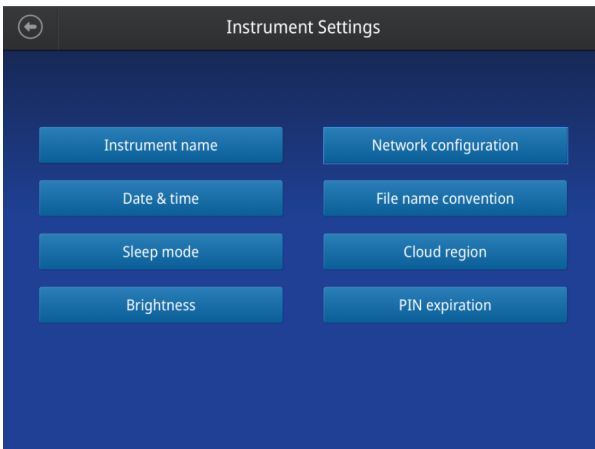
4. In the **Network Connection** screen, select a field in the **Wired** panel.

Network Configuration

① Use WIFI   Use wired ②

WIFI

Status	Disconnected
Network	-
IP address	-
MAC address	121.212.144.111

Wired

Status	Disconnected
Network	-
MAC address	121.212.144.111

Skip   Next
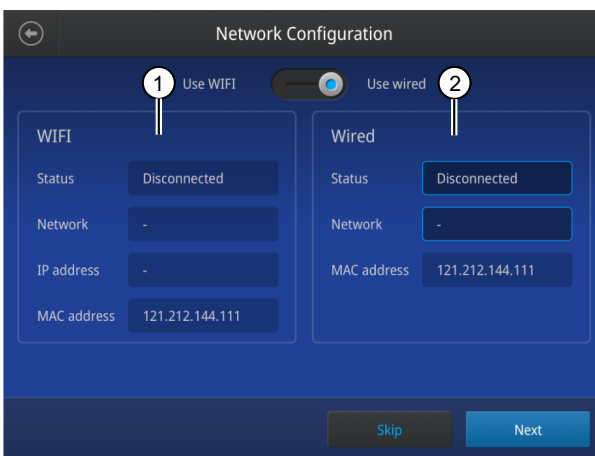
① Wireless panel   ② Wired panel

5. Select a method to enter an IP address.

   a. Select **DHCP** to obtain an IP address automatically. A check mark appears when DHCP is selected.

   b. Select **Static IP** to enter an IP address manually, then enter the appropriate IP addresses for the instrument, the Subnet Mask, and, optionally, the Default Gateway, the Primary DNS Server, and the Secondary DNS Server using the numeric editor. Addresses are in the form of X.X.X.X, where each X is a 3- digit number, from 001 to 255.
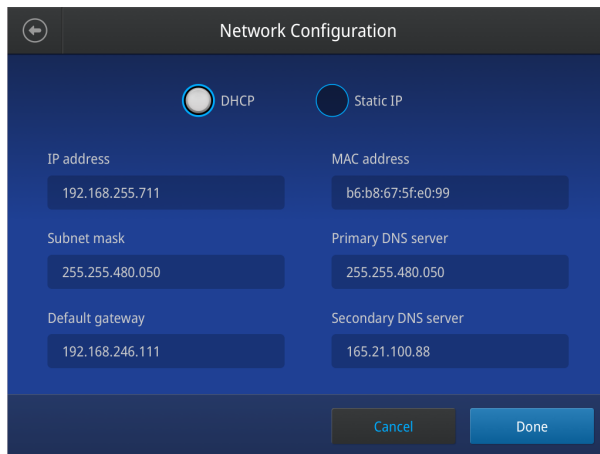
Note: If your instrument is not on a network, you do not need to set the IP address. Ask your system administrator if the IP address is assigned statically or dynamically. For static addresses, you need to know the IP address for the instrument, the subnet mask, and the default gateway.

6. Select **Done** to save the changes and go back to the **Instrument Settings** screen or select **Cancel** to exit the screen without saving the changes.

Create a user profile on the instrument

1. Select 👤 **(Sign In)** > **Get started** > **Create profile**.

2. Fill in the required text fields and enter a four digit PIN to create your user profile.

   Note: The first profile created is automatically given an Administrator profile (indicated by an asterisk after the **Username**).

3. Select **Create**.

Manage user profiles

All users can manage their profiles to edit personal folder names, change PINs, and link to the cloud by selecting their 👤 **(Profile)** to enter their **My Profile** page.

Users with Administrator profiles (as indicated by an asterisk after their user name) also have the ability to manage all user accounts by selecting **All accounts** after entering their **My Profile** page.

The following actions are available from the user profile screen:

- Change a password
- Create a new user profile
- Grant administrator rights to selected user profile (Administrator only)
- Delete a user profile (Administrator only)
- Delete a PIN (Administrator only)

Change a user password

1. Select **Edit**.

2. Enter the old password.

3. Enter a new four digit password.

4. Re-enter the new password, then select **Done**

Delete a user password

If a password is forgotten, an administrator can delete the existing password to allow a new one to be created. This function resets a PIN, so the user with a deleted PIN is prompted to create a new PIN the next time they log in)

1. Select **All accounts**.

2. Select the account with the forgotten password.

3. Select **Delete PIN**

Delete a user profile

1. Select **All accounts**.

2. Select the account to be deleted.

3. Select **Delete account**

Assign or remove administrator privileges

1. Select **All accounts**.

2. Select the account to be modified.

3. Switch the toggle to **Yes** to grant privileges, or **No** to remove privileges

An asterisk appears next to user profiles with administrator privileges.

About the Thermo Fisher™ Connect Platform

The Thermo Fisher™ Connect Platform enables access to the E-Gel™ Power Snap Plus Electrophoresis Device through InstrumentConnect by way of a web browser or mobile device. This cloud-based tool allows the user to perform the following functions when the instrument has Internet connectivity.

- Upload captured images to your Connect account.
- Share captured images within a research team or with colleagues in another laboratory, location, or country.
- Upgrade instrument software automatically, without hardware or manual updates (Administrator profile only).

IMPORTANT! The date and time for the instrument must be properly configured for all features of Thermo Fisher™ Connect Platform to work properly. See "Instrument settings" for details on setting the date and time.

Create a Connect account

1. Go to **thermofisher.com/connect** from your web browser.

2. Click **Sign up now** and follow the prompts to create an account.
   Your e-mail address is used as your username.

3. When signed in, click **Update PIN number**.

4. Enter a PIN number in the **new** and **confirm** fields.
   The PIN number is necessary to sign in to Connect from the instrument.

Link the instrument to Connect (Administrator only)

1. Select ▲ **(Sign In)** ▸ **Link cloud**, then select the cloud region of the instrument.

2. Select the method for linking the instrument to Connect .
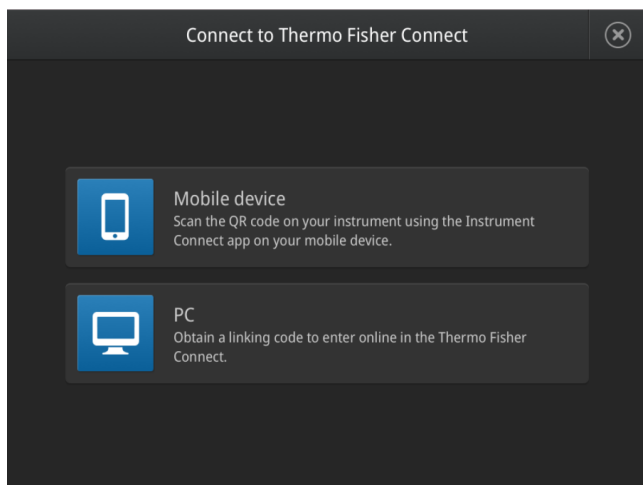
Connect by mobile device

Select ▲ **(Sign In)** ▸ **Get started** ▸ **Connect** ▸ **Mobile device** from the instrument to generate a QR code.

1. Download the "Instrument Connect Mobile Application" on your mobile device.
   a. For iPad™ or iPhone™ devices, download the application from the Apple™ App Store by searching for Instrument Connect by Thermo Fisher Scientific.

   b. For Android devices, download the application from Google™ Play by searching for Instrument Connect by Thermo Fisher Scientific.

2. Launch the Instrument Connect Mobile Application and log in using your Connect login and password.

3. Capture the QR code on the instrument screen.

Connect by PC

Select 👤 **(Sign In) ▸ Get started ▸ Connect ▸ PC** from the instrument to generate a linking code.

1. Log in to your Connect account using a web browser from a computer.

2. Select ▣ **(InstrumentConnect)** from the left navigation strip.

3. Select ▣ **(Add an Instrument)** from the top navigation strip.

4. Select **Power Snap Plus** from the drop down menu, then click **Next**.

5. Enter the linking code generated by the instrument in the text box, then click **Send**.
   Upon successful authentication, the instrument is linked to Connect.

Connect by instrument

1. Enter your Connect **Username** and **Password** from the instrument.

2. Click **Link account**.

   Note: If you do not have a PIN, you will be prompted to create one.

   Upon successful authentication, the instrument is linked to Connect.

Connect the instrument to the Internet

1. Connect your instrument to the Internet.

   - Connect through the instrument Ethernet port using a cable.
   - Connect via wireless connection with a USB-enabled Wi-Fi dongle.

2. Swipe down on the touchscreen to confirm that the instrument has an active network connection.

Create a PIN number

1. Log in to your Connect account using a web browser.

2. Navigate to 📱 (**InstrumentConnect**).

3. Select **Update PIN number**.

4. Confirm the PIN number.

Generate a link code from the instrument

1. Open the **Notifications** screen on the instrument.

2. Select **Connect** to generate a link code and QR code.

3. Copy down the link code generated by the instrument, or take a picture of the QR code with your mobile device if you have a QR code scanner app installed.

Set up a new Administrator

1. Log the current Administrator into their Connect account.

2. Select **Instruments**

3. Select the Power Snap Plus device that the user is linked to.

4. Select **Manage users**.
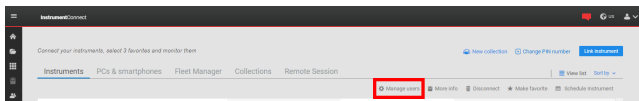
5. Set Administrator privileges to another user linked to the same instrument.

Add an instrument to your Connect account

Connect supports access to the Power Snap Plus device with the InstrumentConnect application on your mobile device or from a web browser. When the instrument is connected, real-time instrument status can be viewed from the InstrumentConnect application.

IMPORTANT! The first Connect account that links to the instrument becomes Administrator by default. If the first user needs to be unlinked from the instrument, a new user must be assigned the Administrator role beforehand. Failure to do so will result in the loss of instrument connectivity for all other linked users. For instructions on how to setup a new Administrator see "Set up a new Administrator" on page 22.

Add an instrument to your Connect account (PC)

1. Log in to your Connect account using a web browser.

2. Select ▯ (**InstrumentConnect**) from the left navigation strip.

3. Select ▦ (**Add an Instrument**) from the top navigation strip.

4. Select **Power Snap Plus** from the **Instrument type** drop down menu, then click **Next**.

5. Enter the linking code generated by the instrument in the text box, then click **Send**. Upon successful authentication, the instrument is linked to Connect.

Add an instrument to your Connect account with linking code (mobile device)

1. Open the InstrumentConnect application on a mobile device.

2. Select **+**.

3. Select **Linking code**.

4. Enter the linking code obtained from the instrument.

5. Select **Send**.

Add an instrument to your Connect account with QR code (mobile device)

Install a QR code scanner app on your mobile device to connect to the instrument using the QR code.

1. Open the InstrumentConnect application on a mobile device.

2. Select **QR code**.

3. Take a picture of the QR code on the **Notifications** screen of the instrument with your mobile device.

Access your Connect account from an instrument

1. Swipe down to open the **Notifications** screen.

2. Select **Sign in**.

   Note: If another user account is displayed, select the **username** to sign out and connect a different user account.

3. Select your username from the list of linked accounts.

4. Enter your Connect PIN number.
   If you do not have a PIN number, set the PIN number in the dialog box.

5. Select **OK**.

2

Using the E-Gel™ Power Snap Plus Electrophoresis Device

This section provides instructions for performing electrophoresis using the E-Gel™ Power Snap Plus Electrophoresis Device.

For specific protocols describing the use of E-Gel™ CloneWell™ II Agarose Gels, see page 59.

For specific protocols describing the use of E-Gel™ SizeSelect™ II Agarose Gels, see page 64.

User interface overview

Symbol	Function
Main dial	
Set up run	**Load protocol** Initiate gel run workflow Displays the instrument status when a protocol is run (see "Touchscreen status indicators" on page 11).
25:59 Running 03:14 Paused Done	Status dial
View gel	Switch on/off blue light transilluminator
Settings	Settings screen to access: • **About instrument** • **Software update** • **Screen brightness** • **Service mode** See Appendix B, "Recommended instrument settings" for details.
Pause run Resume	Pause/Resume gel run

Required materials

For electrophoresis:

- E-Gel™ Power Snap Plus Electrophoresis Device (Cat No. G9101)
- Safe Imager™ Viewing Glasses (included)
- Nucleic acid or protein sample
- E-Gel™ agarose gel or E-PAGE™ gel cassette (see "Choosing the right gel" on page 74).
- E-Gel™ ladder (see "Choosing the right DNA or RNA ladder" on page 78) or other appropriate molecular weight ladder
- Optional: 1X E-Gel™ Sample Loading Buffer (Cat No. 10482055)

For E-Gel™ gel documentation:

- E-Gel™ Power Snap Plus Camera (Cat. No G9201), or other third-party imager.
- USB storage device (not included)

Prepare samples

Sample preparation is critical for separation quality. Follow these guidelines for best result.

- Prepare DNA sample in deionized water or 1X E-Gel™ Sample Loading Buffer.
- For **E-Gel™ EX agarose gels**, prepare DNA sample in 0.1X E-Gel™ Sample Loading Buffer.
- **Use the indicated amount of DNA per well** for single or multiple bands. If you are unsure how much to use, test a range of concentrations to determine the optimal concentration for your particular sample. Overloading DNA will cause poor resolution.

Gel type	% Agarose	Amount of DNA per well		Total loading volume
		Sample with single band	Sample with multiple bands	
E-Gel™ EX	1%, 2%, 4%	0.5–50 ng	50 ng	20 µL
E-Gel™ EX Double Comb	1%, 2%			
E-Gel™ with SYBR™ Safe	1%, 2%, 4%	5–300 ng	500 ng	20 µL
E-Gel™ Double Comb with SYBR™ Safe	1%, 2%			
E-Gel™ 48 with SYBR™ Safe	1%	5-200 ng	500 ng	15 µL
	2%, 4%			15 µL
E-Gel™ 96 with SYBR™ Safe	1%			20 µL
	2%			20 µL
E-Gel™ CloneWell™ II	0.8%	5-500 ng [1]	800 ng	25 µL

(continued)

Gel type	% Agarose	Amount of DNA per well		Total loading volume
		Sample with single band	Sample with multiple bands	
E-Gel™ SizeSelect II	2%	1-300 ng	300 ng	25 µL
E-Gel™ NGS	0.8%	5-500 ng	500 ng	20 µL

[1] For best results, use 200–500 ng of sample.

Dilute samples containing high salt

E-Gel™ EX gels are sensitive to high salt and EDTA content. Samples containing ≥50 mM NaCl, 100 mM KCl, 10 mM acetate ions, or 10 mM EDTA (i.e., certain restriction enzyme and PCR buffers) cause loss of resolution on E-Gel™ agarose gels.

Dilute samples containing high salt concentration 2- to 20-fold to obtain the best results.

DNA ladder preparation guidelines

- Dilute the ladder accordingly with deionized water or 1X E-Gel™ Sample Loading Buffer.

   Note: For **E-Gel™ EX agarose gels**, use 0.1X E-Gel™ Sample Loading Buffer.

- **Use the indicated amount of ladder per well.** Overloading the ladder will result in distorted or incomplete band separation.

E-Gel™ DNA Ladder	E-Gel™ EX	E-Gel™ EX Double Comb	E-Gel™ with SYBR™ Safe	E-Gel™ Double Comb with SYBR™ Safe	E-Gel™ 48 with SYBR™ Safe	E-Gel™ 96 with SYBR™ Safe	E-Gel™ CloneWell™ II	E-Gel™ SizeSelect II	E-Gel™ NGS
E-Gel™ Ultra Low Range DNA Ladder	4 µL (100 ng)	–	20 µL (500 ng)	–	15 µL (375 ng)	–	–	–	–
E-Gel™ 50 bp DNA Ladder	2 µL (50 ng)	2 µL (50 ng)	–	–	–	–	–	2 µL (50 ng)	–
E-Gel™ 1 Kb PLUS™ DNA Ladder	2 µL (50 ng)	–	20 µL (500 ng)	–	15 µL (375 ng)	–	25 µL (625 ng)	–	–
E-Gel™ 1 Kb PLUS™ Express	2 µL (80 ng)	2 µL (80 ng)	12.5 µL (500 ng)	12.5 µL (500 ng)	–	–	25 µL (1,000 ng)	–	–

(continued)

E-Gel™ DNA Ladder	E-Gel™ EX	E-Gel™ EX Double Comb	E-Gel™ with SYBR™ Safe	E-Gel™ Double Comb with SYBR™ Safe	E-Gel™ 48 with SYBR™ Safe	E-Gel™ 96 with SYBR™ Safe	E-Gel™ CloneWell™ II	E-Gel™ SizeSelect II	E-Gel™ NGS
E-Gel™ Sizing DNA Ladder	–	–	–	–	–	–	–	25 µL (50 ng)	20 µL (40 ng)
E-Gel™ Low Range Quantitative DNA Ladder	–	3 µL (52.5 ng)	–	20 µL (350 ng)	15 µL (626.5 ng)	20 µL (350 ng)	–	–	–
E-Gel™ 96 High Range DNA Marker	–	–	20 µL (100 ng)	20 µL (100 ng)	15 µL (75 ng)	20 µL (100 ng)	–	–	–

Prepare the gel

1. Remove the gel from the package.

2. Gently remove the combs. Do not allow the combs to bend or create suction in the wells during removal.

3. Place the cassette into a E-Gel™ Adapter.

4. Insert the gel cassette and adapter into the E-Gel™ Power Snap Plus Electrophoresis Device, starting from the right edge.

5. Press down on the left side of the cassette to secure it into the device.

6. Load gels within 15 minutes after opening the package.

Sample loading guidelines

- **Use the recommended total loading volume for each gel type.** Do not load more than recommended amount of DNA sample or ladder per well.

- **Load deionized water into all empty wells.**

- **Keep all sample volumes uniform.** If there are not enough samples to load all the wells of the gel, load an identical volume of deionized water into any empty wells. Prepare samples by adding E-Gel™ 1X Sample Loading Buffer [1] or deionized water to the required amount of DNA to bring the total required sample volume.

- Avoid introducing bubbles while loading. Bubbles can cause band distortion.

Gel type	Total loading volume
E-Gel™ EX	20 µL
E-Gel™ EX Double Comb	
E-Gel™ with SYBR™ Safe	
E-Gel™ Double Comb with SYBR™ Safe	
E-Gel™ 48 Agarose Gel with SYBR™ Safe	15 µL
E-Gel™ 96 Agarose Gel with SYBR™ Safe	20 µL
E-Gel™ CloneWell™ II	25 µL
E-Gel™ SizeSelect™ II	25 µL
E-Gel™ NGS	20 µL
E-PAGE™ 48	15 µL
E-PAGE™ 96	20 µL

Load samples

1. Load prepared samples. Keep all sample volumes uniform.

2. Load prepared DNA ladder.

3. Load 1X E-Gel™ Sample Loading Buffer or deionized water in all empty wells.

   Note: For **E-Gel™ EX agarose gels**, use 0.1X E-Gel™ Sample Loading Buffer.

4. Run gels within 1 minute after loading samples.

[1] For E-Gel™ EX gels, use 0.1X loading buffer for best results.

Run the gel

Note: The graphic interface of the base module is shown in this section, and will appear slightly different if performing the run using the camera module.

1. Select **Set up run** to start E-Gel™ protocol selection.

2. Select the **Category** corresponding to the E-Gel™ cassette in the device.
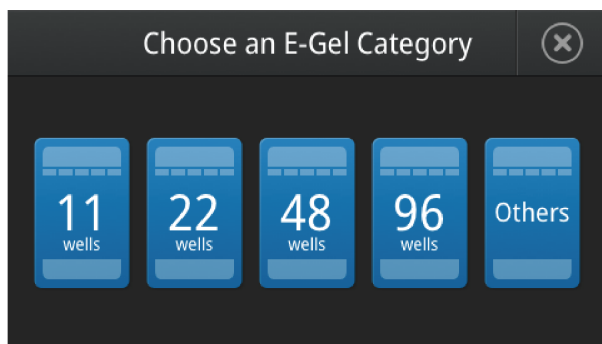
3. Select the **Type** corresponding to the E-Gel™ cassette in the device.
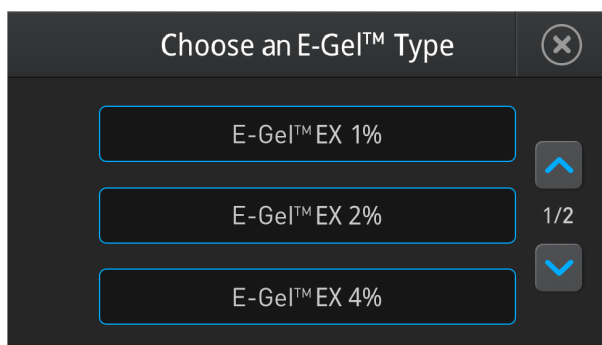
4. Adjust run time **Duration** if necessary. Use the +/– buttons or press in the duration field to open a keyboard to enter a number

   Note: Do not exceed the maximum run time indicated for the specific gel type, as this will impact separation quality.

5. Select **Start run** to begin running the gel.

   (*Optional*) For recurring experiments, select the last used protocol.

6. The run stops automatically after the programmed time has elapsed and beeps.

   a. Select **More time** to run the gel longer.

   b. Select **Done** to end the protocol.

7. Proceed to image capture (see "Using the E-Gel™ Power Snap Plus Camera") or other downstream application.

Check status

The status and the remaining run time of the protocol are indicated on the status dial.

DNA separation can be viewed in real time by turning on the transilluminator. This feature is only compatible with gels containing dyes visible by blue light transillumination (i.e., E-Gel™ EX, E-Gel™ SYBR™ Safe, E-Gel™ CloneWell™ II, E-Gel™ SizeSelect™ II, E-Gel™ 96 with SYBR™ Safe, and E-Gel™ 96 with SYBR™ Safe agarose gels).

For optimal viewing, dim the ambient lighting in the room, or use the E-Gel™ Power Snap Plus Camera for visualization (see "View gel" on page 34).

View the gel

1. Select **View gel** to activate the blue light transilluminator.

   Note: The transilluminator turns off automatically after 2 minutes.

2. Monitor the sample in real-time during the run.

3. Select **View gel** again to switch off the blue light transilluminator.

View gel with filter lid open

IMPORTANT! Always wear Safe Imager™ Viewing Glasses when viewing the gel with the filter lid opened.

The transilluminator turns off automatically when the filter lid is opened.

Select **View gel ▸ Proceed** to activate the blue light transilluminator when the lid is open.

Modify a run

The E-Gel™ protocol can be cancelled or modified during the run. however the device does not allow the duration to exceed the maximum allowable run time for the specific E-Gel™ protocol.

Pause the run

1. Select **Pause run** to temporarily stop the run.

2. Select **Resume** to restart the run.

Cancel the run

1. Select **Pause run** to temporarily stop the run.

2. Tap the status dial, then select **Cancel run** to stop the run.

Edit gel duration

1. Select **Pause run** to temporarily stop the run.

2. Tap the status dial, then select **Edit gel duration**.

3. Adjust the protocol duration using the **+/–** buttons or tap the duration field to open a keyboard to enter a number.

4. Select **Resume** to restart the run.

   Note: Do not run the same gel multiple times or extend the gel protocol beyond the maximum allowed duration. Running the gel past the allowed duration will damage the gel and result in poor sample separation.

Change to another protocol

1. Select **Pause run** to temporarily stop the run.

2. Tap the status dial, then select **Cancel run** to stop the run.

3. Select **Set up run.**

4. Select another E-Gel™ protocol (e.g., **Reverse E-Gel™).** Use the up/down arrows to navigate through the menu.

5. Select **Start run**

Using the E-Gel™ Power Snap Plus Camera

This section provides instructions for performing image capture using the E-Gel™ Power Snap Plus Camera.

User interface overview

Symbol	Function
Main dial	
00:25:59 View Gel	Status dial to view gel and access: • **Capture** gel image • **Edit**/adjust capture settings • **Export** image
	Gallery screen to access: • **Actions** screen to **Edit, Delete**, or **Export** images • **Sort** images
	Capture gel image
	Edit gel image
	Export gel image
	Return to Home screen (countdown timer/view gel)
	Settings screen to access: • **About instrument** • **Instrument settings** • **Maintenance & services**

Attach the camera

The E-Gel™ Power Snap Plus Camera can be attached to the E-Gel™ Power Snap Plus Electrophoresis Device either during a run, or after the run is completed.

1. **Unfasten** the docking connector cover.

2. **Align** the docking connector with the camera connector.

3. **Lower** the E-Gel™ Power Snap Plus Camera on top of the electrophoresis device and gently snap the camera in place.

4. When connected, the E-Gel™ Power Snap Plus Camera displays a brief welcome splash screen, which changes to the home screen when it is ready to use.

Remove the camera

1. Carefully hold the sides of the camera hood and insert your fingers toward the rear of the handhold.

2. Lift the camera up off of the base module.

View gel

1. Select **View Gel** to access the view gel screen and visualize the bands on the gel.

2. **Adjust exposure setting** if necessary.

   Note: The gel image in the capture screen is a still picture which is refreshed periodically, or when adjustment sliders are used. When viewing an ongoing gel run, you will not see smooth band migration in real time.

Capture image

1. Select **Capture** to access the capture screen and save image(s) to the camera.

2. Adjust capture settings if necessary.

Adjust capture settings

1. Select **Auto Exposure** or use the **+/–** to set the exposure time manually.

2. Select **Capture** to capture the image with the new settings.

View image gallery

Select **Gallery** to view all captured images.

Images are displayed in **Thumbnail view** (default) or **List view**, depending upon which setting is selected.

To select images, tap the thumbnail(s), the desired line(s) from the image list, or **Select All**. Tap a selection to deselect the file.

From the **Gallery**, images can be sorted using the **Filter** function, exported, or deleted.

The following additional operations can be performed by selecting an image and selecting **Actions**.

- View image information
- Rename files/Perform batch rename of files
- Adjust image settings
- Deconvolute image file (96-well format only)

Note: If multiple files were selected from the gallery, choose the image to be viewed or upon which to perform an action from the thumbnail strip beneath the main image display.
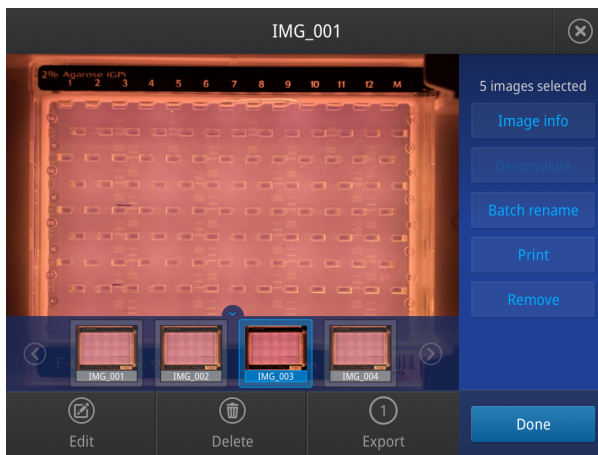
View image information

1. Select an image by tapping the graphic in the **Thumbnail view** or the file from the **List view**.

2. Select **Actions ▸ Image Info** to see the image information.

Rename image file

File names are automatically created using a number of predefined attributes.

Select **Attributes** to set the attributes that will be used in the file name. There are two **Custom** fields that can be used to add custom text to the file name.

Note: To perform a batch rename, select multiple files or use **Select All** from the **Gallery** view.

Change the order of attributes used to name the image file by selecting an attribute bar and dragging it to the new position.
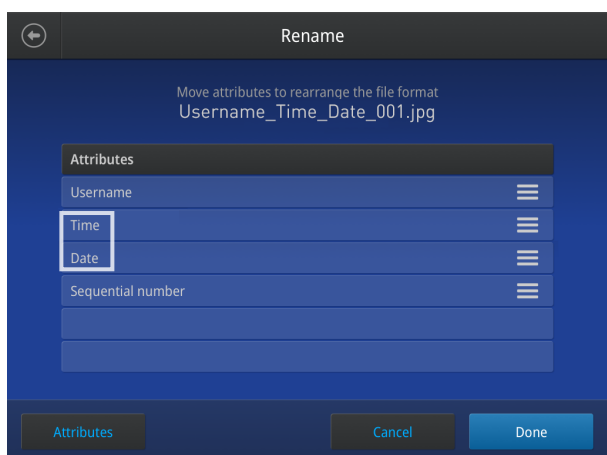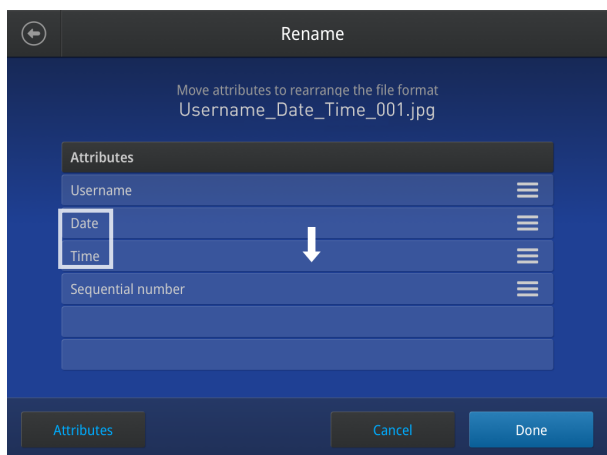
Adjust image settings

1. Select **Edit** from the image view screen.

2. Select the desired image setting from the drop down menu.

3. Use +/− or move the slider to adjust the selected setting.

4. Select **Done** to confirm the change to the image.

Setting	Detail
Brightness	Adjusts image brightness settings.
Contrast	Adjusts image contrast settings.
Invert	Converts image into grayscale and inverts color palette.
Grayscale	Converts image into a grayscale.

Deconvolute image

Deconvolution is a process that reconfigures the staggered well format from digital images of 96-well gels into a more conventional side-by-side layout for analysis and documentation. A deconvolution grid is placed over the image, and reorganizes the gel lanes into any of three different layouts (2×52, 4×26, 8×13).
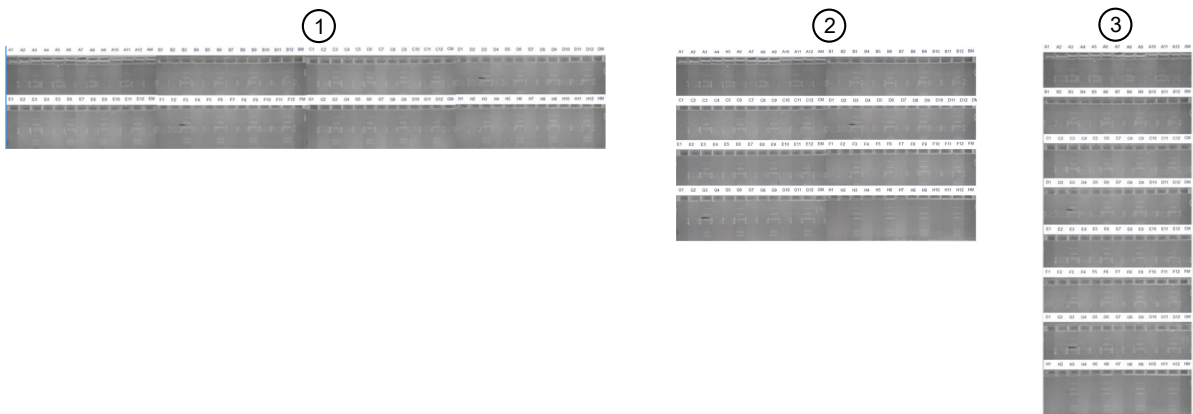
① 2 × 52 layout
② 4 × 26 layout
③ 8 × 13 layout

Deconvolute gel image

1. Select the image of a 96-well gel by tapping the graphic in the **Thumbnail view** or the file from the **List view**.

2. Select **Actions ▸ Deconvolute** to apply the deconvolution grid.

3. Adjust the placement and scale of the deconvolution grid using the directional pad and height/width controls.

   Ensure that each of the 96 lanes of the cassette are fully contained within the lane boxes and do not overlap with adjacent lanes.
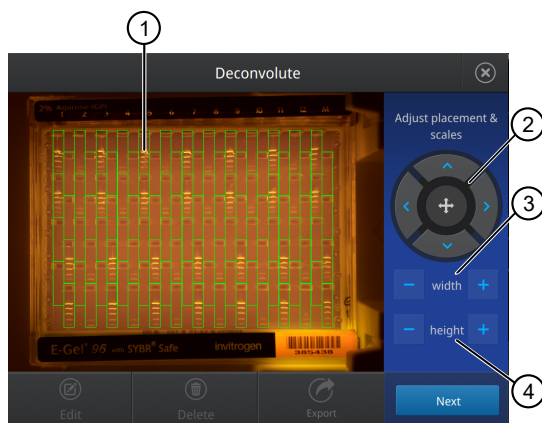
① Deconvolution grid	③ Width control
② Directional pad	④ Height control

4. Select **Next** after adjustments are complete.

5. Select the layout of the deconvoluted lanes (2×52, 4×26, 8×13).

6. Select **Deconvolute**.

Export image

Images can be exported from the capture screen or the image gallery. The number of images captured in an active capture session will appear on the Export button on the capture screen. Images previously stored on internal memory are accessed from the image gallery.

Export from capture screen

1. Insert a USB storage device into the USB port at the front of the camera.

2. Select **Export** from the capture screen.

   Note: The number of captured images is indicated in the **Export** icon.

---

3. Review the images in the session gallery, and select files for export.

4. Tap the **File type** field to set the image format and file size.

   Note: Select the checkbox to crop images upon export if desired (11 or 22-well format only).

5. Tap the **Destination** field to set the destination where the file will be saved.

6. (*Optional*) Tap the **Name** field to create a name for the file to be exported.

   Note: This name change is only used for the exported file, and does not alter the original name of the file on the instrument.

7. (*Optional*) Select the **Add comments** to add comments to the image file.

8. Select **Export** to export active session images to the USB storage device.

Export from image gallery

1. Insert a USB storage device into the USB port at the front of the camera.

2. Select **Gallery** from the home screen.

3. Select **Thumbnails** or **List view** for navigation.

   Note: Use the checkbox to select all images, or apply the filter to set parameters for the images to display in the gallery.

4. Review the images in the session gallery, and select files for export.

5. Tap the **File type** field to set the image format and file size.

   Note: Select the checkbox to crop images upon export if desired.

6. Tap the **Destination** field to set the destination where the file will be saved.

   Note: Guest profiles can only export to USB.

7. (*Optional*) Tap the **Name** field to edit the name of the file to be exported.

8. (*Optional*) Select the **Add comments** to add comments to the image file.

9. (*Optional*) Select **Delete** to delete selected image(s) from the camera.

10. Select **Export** to export active session images to the USB storage device.

Connect to network drive

Ensure the instrument is connected to the same network as the network drive where the images are to be exported (the instrument must have a valid IP address).

The instrument IP address can be found at **Settings ▸ About Instrument**, or at **Settings ▸ Instrument Settings ▸ Network Configuration**.
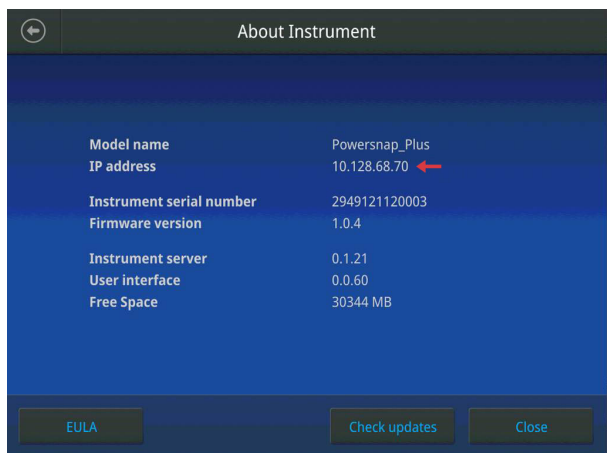
To connect to a particular network, select **Settings ▸ Instrument Settings ▸ Network Configuration**. There you will be able to select the wired or wireless network and configure the settings.

Make sure the network you connect to is the same network as the network drive. From the host end (network drive end) you can check if the instrument is on the same network by issuing the following command inside a command prompt.

```
ping <ip address of instrument>
```

Export from image gallery to network drive

1. Select **Gallery** from the home screen, then pick the image or images you want to export.

2. Select **Network Drive** in the **Destination** field.

3. Select **Export**.

4. Configure the destination by completing the fields in the **Network Drive** screen.
   a. In the **Drive location** field, enter the network path to the folder you want to export the images to.

      The network path or location can be found by viewing the folder properties.

b. In the **Domain name** field, enter the **Connection-specific DNS Suffix**.

The DNS suffix can be found on the host end (network drive host side) by issuing the following command inside a command prompt.

```
ipconfig /all
```

The connection-specific DNS suffix is located in the network adaptor for your main connection.
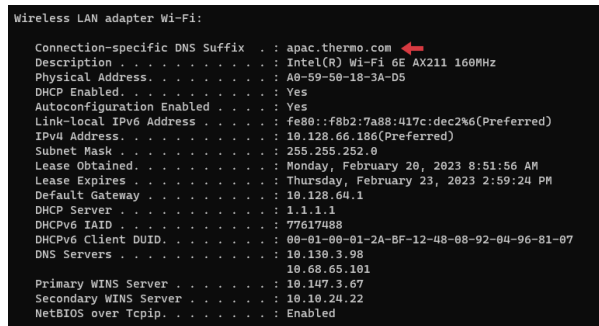
c. In the **Username** field, enter of the user account name for your computer (or any user within the active directory if your network is a local corporate network that has access to the network folder which you want to export the images to).

d. In the **Password** field, enter the password associated with the user account entered in the **Username** field.
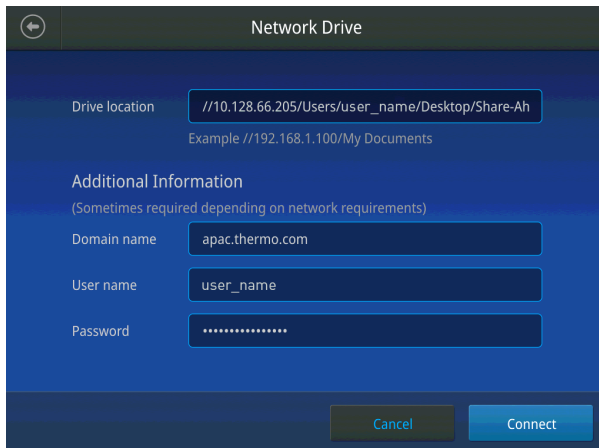
5. Select **Connect**.

Maintenance

Cleaning and maintenance

⚠️ **CAUTION!** Cleaning and decontamination. Use only the cleaning and decontamination methods specified in the user documentation. It is the responsibility of the operator (or other responsible person) to ensure the following requirements are met:

- No decontamination or cleaning agents are used that can cause a HAZARD as a result of a reaction with parts of the equipment or with material contained in the equipment.
- The instrument is properly decontaminated a) if hazardous material is spilled onto or into the equipment, and/or b) prior to having the instrument serviced at your facility or sending the instrument for repair, maintenance, trade-in, disposal, or termination of a loan (decontamination forms may be required from customer service).
- Before using any cleaning or decontamination methods (except those recommended by the manufacturer), users should confirm with the manufacturer that the proposed method will not damage the equipment.

Clean the surface of the E-Gel™ Power Snap Plus Electrophoresis Device with a damp cloth. **Do not** use harsh detergents or organic solvents to clean the unit.

In case liquids (e.g., buffer, water, coffee) are accidentally spilled inside the instrument, wipe the spill using dry laboratory paper.

For any other repairs and service, contact Technical Support. **Do not** perform any repairs or service by yourself to avoid damage to the instrument or voiding the warranty.

Materials required

- Safety glasses
- Powder-free gloves
- Tissue, lint-free
- Deionized water
- Ethanol, 70% solution

Note: Avoid the use of detergents. Ensure the instrument is switched off and unplugged before cleaning.

Clean the E-Gel™ Power Snap Plus Electrophoresis Device

1. Open the filter lid to expose the cassette compartment.

2. Lightly spray the glass surface with deionized water or a 70% ethanol solution.

3. Wipe the surface with a lint-free tissue until sufficiently clean.

4. Close the filter lid and operate the instrument as normal.

Replace the camera battery

The E-Gel™ Power Snap Plus Camera contains a 3 V CR2450 battery which is required to record the file date and time for the captured images.

When battery runs out, the system will no longer be able to track date and time when undocked from the E-Gel™ Power Snap Plus Electrophoresis Device. Discrepancies in date and time may indicate the need to replace the battery.

1. Open the battery compartment on the underside of the E-Gel™ Power Snap Plus Camera.

2. Place the battery compartment cover to one side.

3. Remove and replace the old battery.

4. Replace the battery compartment cover and close the battery compartment.
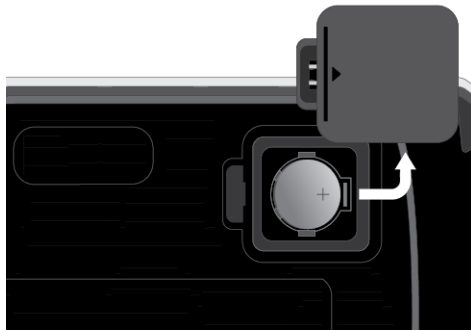
Upgrade the system firmware

Update software directly through Connect or using an USB drive with updated software downloaded from **thermofisher.com/connect**.
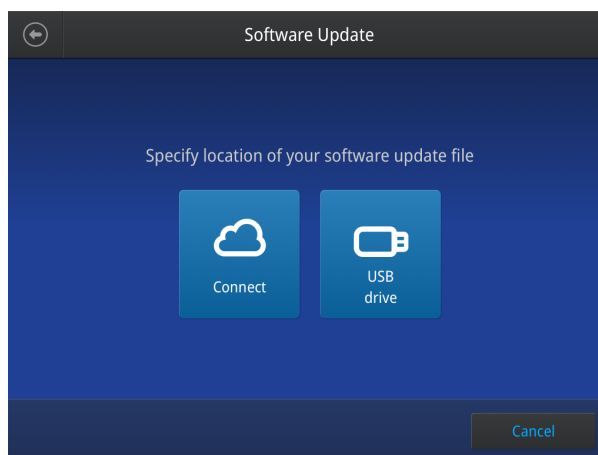
Determine firmware version on instrument

When a new firmware version is released, you may be required to load the new firmware on the instrument.

You will need a USB memory device and, if your instrument requires login, the login details to upgrade the firmware.

1. Select ⚙ **(Settings)** > **About Instrument**.

2. View current firmware version.

Upgrade the instrument firmware (Cloud)

IMPORTANT! You cannot upgrade the firmware while a run is in progress.

1. Select ⚙ **(Settings)** ▸ **Maintenance & Services** ▸ **Software Update** ▸ **ThermoFisher Connect**.

2. Select **Yes** to start the upgrade.

   IMPORTANT! To prevent instrument malfunction and required service, do not power off the instrument during the upgrade.

   When the upgrade process is complete, the instrument will automatically restart.

Download new firmware

1. Go to **thermofisher.com** from your web browser.

2. Click **Product Support** ▸ **Technical Resources** ▸ **Product Support** ▸ **Software, Patches & Updates**.

3. Select E-Gel™ Power Snap Plus Electrophoresis Device in the list, then click **Updates & Patches**.

4. Find the appropriate file. If the version number is:

   • The same as the current version on the instrument, you do not need to upgrade the firmware.

   • Different from the current version on the instrument, download the new firmware.

5. Insert a USB memory device into the USB port on the computer.

6. Click the link in the Software column, then select the USB memory device as the location for the saved file.

   Note: The file must be downloaded to the root directory of the USB memory device and not into a folder.

7. Remove the USB memory device from the computer when the download is complete.

Upgrade the instrument firmware (USB drive)

IMPORTANT! You cannot upgrade the firmware while a run is in progress.

1. Insert the USB memory device (FAT32 format file system) with the new firmware in the USB port of your instrument.

   Note: For instruments with the USB shortcuts feature enabled, you will be directed to the **USB shortcuts** screen. Select **Update Software** to proceed to the **Software Update** screen.

2. Select ⚙ **(Settings)** ▸ **Maintenance & Services** ▸ **Software Update** ▸ **USB drive**.
   The Software Update screen opens:
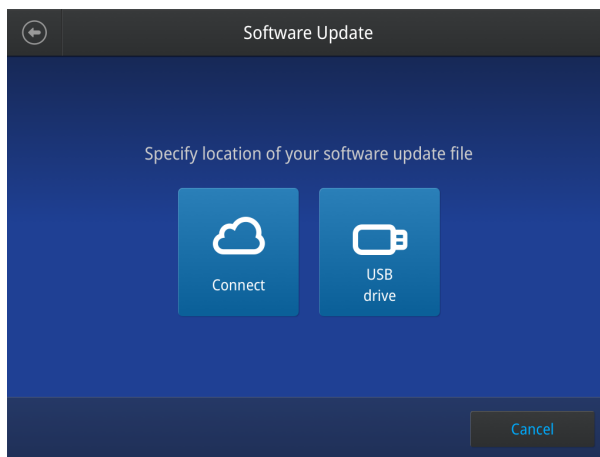
3. Choose the row with the new firmware file from the USB memory device, then **Select**.

4. Select **Yes** to start the upgrade.

   IMPORTANT! To prevent instrument malfunction and required service, do not power off the instrument during the upgrade.

   When the upgrade process is complete, the instrument will automatically restart.

Self Verification test

Use the **Self Verification Test** feature to check the instrument hardware. The check includes testing the cooling block, pumps, and other components.

Select **Last Test** to view the results of the last **Self Verification Test**.

Carry out the **Self Verification Test** periodically or whenever there is an intermittent instrument error. Contact your service representative in case of block failure.
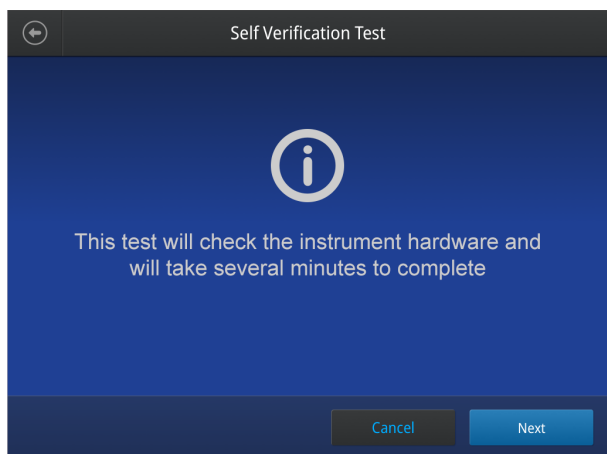
Restore factory settings (*Administrator profile only*)

Select **Restore factory settings** to remove all the data and customized settings and revert to factory settings. All data and settings will be erased once factory settings are restored. At the end of the restoration process, the message, "Your instrument has been restored." is displayed and the instrument automatically reboots after 30 seconds.
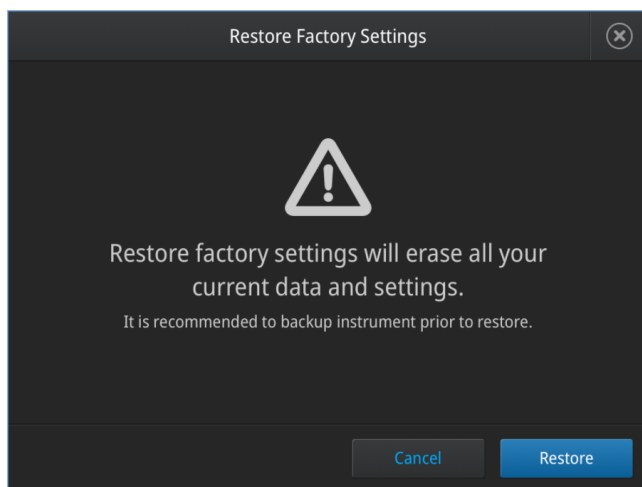
Troubleshooting

Observation	Possible cause	Recommended action
Poor resolution or smearing of bands	Sample is overloaded.	Use correct amount of sample as described in Sample Preparation. Do not exceed 500 ng of total DNA per one sample lane or 500 ng DNA per one band. Do not exceed 1 µg for sheared DNA.
	High salt concentration.	Dilute high-salt samples as described in Sample Preparation. Dilute samples 2- to 30-fold depending on the E-Gel™ type.
	Total sample volume is too low or too high.	Load recommended sample volume of 25 µL per lane. Keep all sample volumes uniform. Load deionized water in all empty wells.
	Loading wells were not pre-filled with deionized water prior to loading the sample.	Fill all gel wells with 50 µL of deionized water prior to loading any sample or a ladder.
	Samples were not prepared properly.	Prepare up to 25 µL of sample in 1X concentration of 10X Sample Loading Buffer.
	Physical gel damage.	Avoid touching the gel well with the pipette when loading the sample.
	Band distortion caused by air bubbles.	Avoid introducing bubbles while loading the samples.
	Gel electrophoresis was not starated immediately after sample loading.	Run the gel within 1 minute of sample loading.
	Gel was not loaded with the sample for an extended time.	Load the opened gel within 15 minutes after opening.
	Expired gel used.	Use properly stored gels before the expiration date.
	Gel was frozen.	Always store gels at room temperature. Gels exposed to temperatures below 4°C exhibit smears.
	Extended electrophoresis run time.	Extended run times resulting in poor band migration or a melted gel.
Low yield	Incorrect loading volume chosen.	Load up to 25 µL of prepared sample per well.
	Recovery wells were not filled with water prior to elution.	Once target fragment reaches reference line, pause the run and fill all recover wells with deionized water.

Observation	Possible cause	Recommended action
Low yield *(continued)*	DNA band passed the recovery gel.	Carefully observe the band migration into the recovery well. Minimize ambient light or perform the workflow in dark room.
	DNA band amount is too high.	Collect DNA from the well in two or more fractions. Be sure to load the recommended DNA amount.
Target DNA band cannot be seen	High ambient light or low sample amount.	Perform the workflow in dark room environment to minimize ambient lights; confirm sample concentration prior to loading.
DNA band passed the recovery gel	Selected protocol time was too long.	Choose the **Reverse E-Gel™** program to run the band backwards into the collection well.
DNA migration exhibits smiley effect	Extended gel run time or aged gels used or incorrect loading conditions.	Do not run gels longer than 40 minutes. Use fresh gel. Follow sample loading recommendations.
No current	Cassette improperly Inserted, defective or expired.	Remove and re-insert cassette or try using new cassette. Use properly stored gels before the specified expiration date.
	Incorrect power adapter used.	Use only UL Listed Class 1 Adapter included with the E-Gel™ Power Snap Plus Electrophoresis Device.
Sample leaking from the wells	Sample is overloaded.	Load the recommended sample volume per well.
	Wells damaged during comb removal.	Remove the gel comb gently without damaging the wells.
DNA sample cannot be seen	Inhibition of visualization by heat.	Wait 10–15 minutes for gel to cool before visualization.
RNA sample cannot be seen	Inhibition of visualization by heat and denaturing agent.	Wait 10–15 minutes for gel to cool before visualization.
Speckles visible	Dust fluorescing in same wavelength as SYBR™ Safe / SYBR™ Gold II.	Make sure gel is clean before imaging.
High background, suboptimal, or no image (when used with E-Gel™ Power Snap Plus Camera)	Incorrect camera adjustments.	See section camera settings in user guide.
	Incompatible E-Gel™ agarose gel used.	E-Gel™ agarose gels with ethidium bromide are not optimal for visualization on blue light transilluminator. Use E-Gel™ Imager with UV base or a third party UV transilluminator.
High background, suboptimal, or no image (when used with E-Gel™ Imager)	No filters or wrong filter set.	Refer to E-Gel™ Imager Technical Guide or instrument manufacturer for optimal filter set.
	Photographic settings not optimal.	Determine optimal settings empirically by adjusting exposure time, gain, etc.
Low cloning efficiency	Used a UV light source to visualize DNA.	For cloning applications Use E-Gel™ CloneWell™ II Agarose Gels with SYBR™ Safe; or for gel excision use a blue light transilluminator, such as the Safe Imager™ 2.0 Blue-Light Transilluminator (Cat. No. G6600).

B Recommended instrument settings

About Instrument

Select **Settings** ▸ **About Instrument** to find out more information about the instrument (e.g., firmware version and instrument statistics).

- Select **EULA** to view the End User License Agreement, or download it to a USB drive.
- Select **Check updates** to find out if updates are available for the instrument (camera module only).
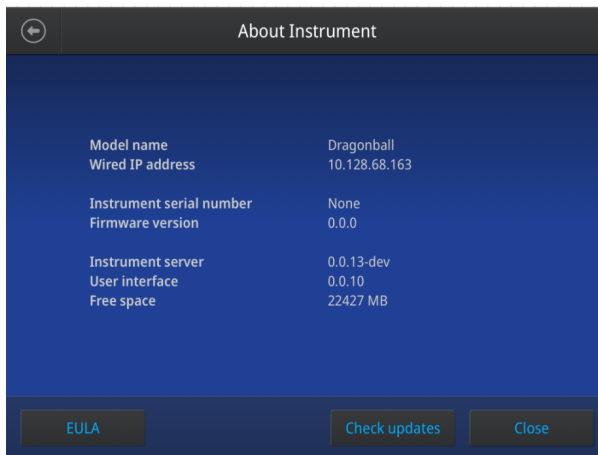
Recommended instrument settings

Select ⚙ **(Settings)** and access the **Settings** screen to configure the instrument.
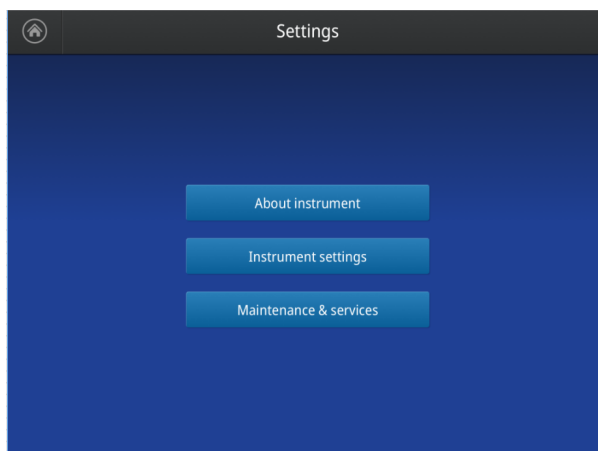
Instrument settings

Base module settings

Select **Instrument Settings** to set the following instrument parameters.
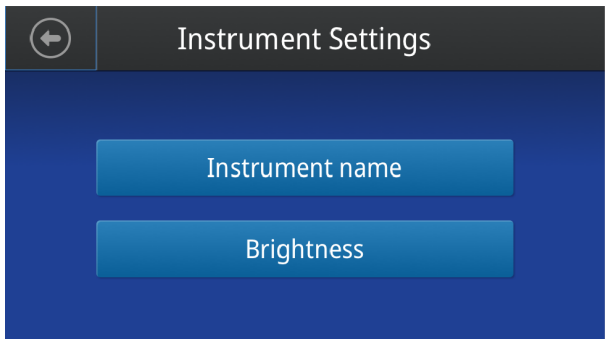
- **Instrument name**

  Select the **Instrument name** field to activate the text editor. Enter up to 25 alphanumeric characters to identify the instrument.

  Note: The instrument name cannot have spaces. Separate consecutive characters with a hyphen or underscore; for example, *My_Instrument*.
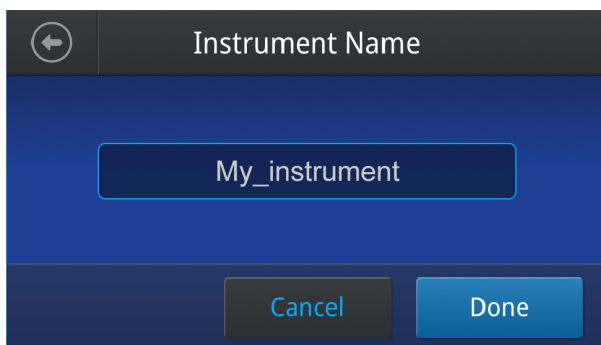
- **Brightness**

  Use the slider to adjust the brightness of the touch screen.
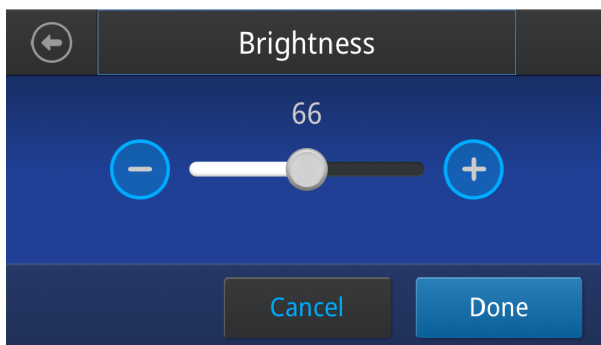
Camera module settings

Select **Instrument Settings** to set the following instrument parameters.
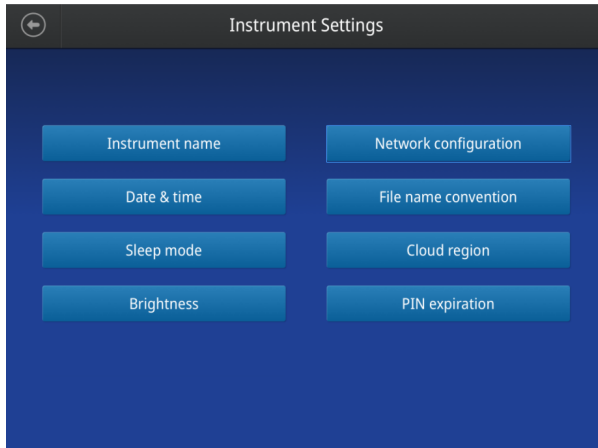
- **Instrument name** (*Administrator profile only*)

  Select the **Instrument name** field to activate the text editor. Enter up to 25 alphanumeric characters to identify the instrument.

  Note: The instrument name cannot have spaces. Separate consecutive characters with a hyphen or underscore; for example, *My_Instrument*.
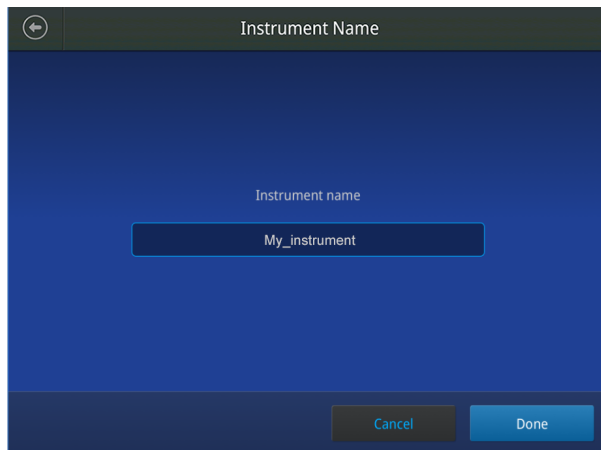
- **Date and time**
  - Select the **Time Zone** field to set the time zone.
  - Select the **Date/Format** field to choose the date format and set the date.
  - Select the **Time/Format** field to activate the numeric editor to set the time.
  - Select **Done** to save the settings.
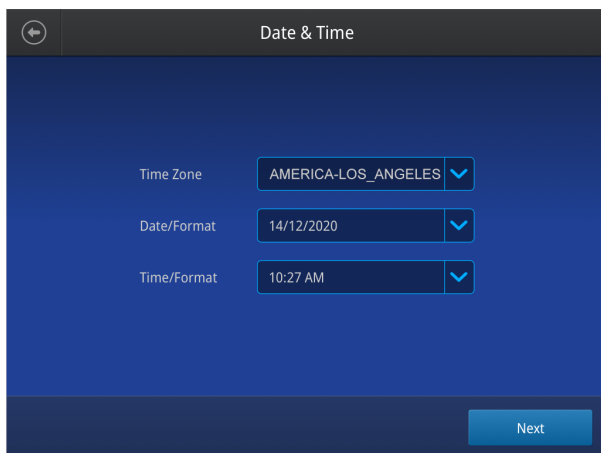
- **Sleep mode**

  Use the **Off** and **On** toggle to disable or enable sleep mode in order for the instrument to conserve energy when not in use. In the 'On' mode, select the **Edit Time** field to activate the numeric editor and set the length of time that the instrument can remain idle before it goes to sleep mode.
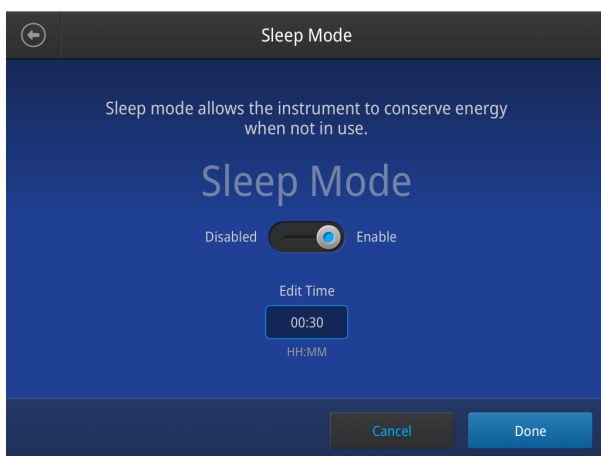
- **Brightness**

  Use the slider to adjust the brightness of the touch screen.
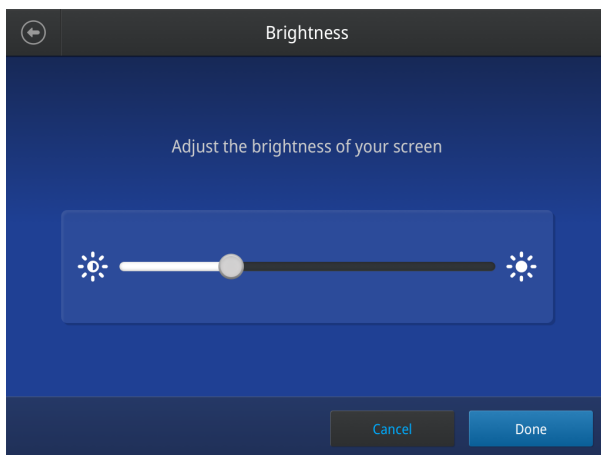
- **Network configuration**

Select the type of network connection that will be used to connect the instrument to the Internet. For details on using the Wireless and Ethernet options, see "Connect the instrument to the Internet" on page 14.
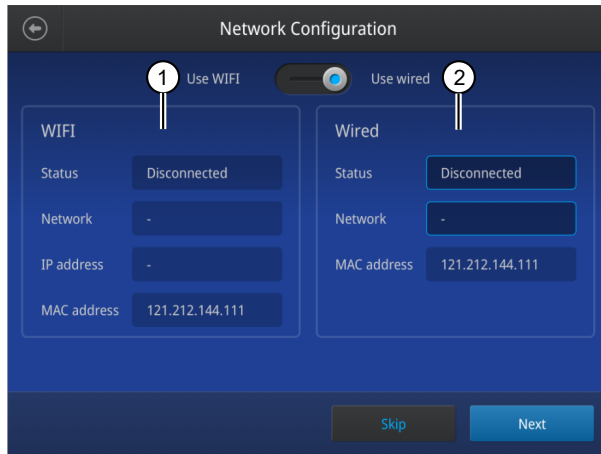
① Wireless panel   ② Wired panel

- **File naming convention**

  Select parameters (user name, date, time, sequential numbering) and order of text to be automatically included in the name of saved files.

- **Cloud region** (*Administrator profile only*)

  Select the appropriate field to set the cloud region for the instrument.

- **Pin expiry** (*Administrator profile only*)

  Enable to set expiration of user PIN after a selected period of time. Users will need to create a new PIN upon expiration.

Maintenance & services

Select **Maintenance & Services** to set the following instrument parameters.
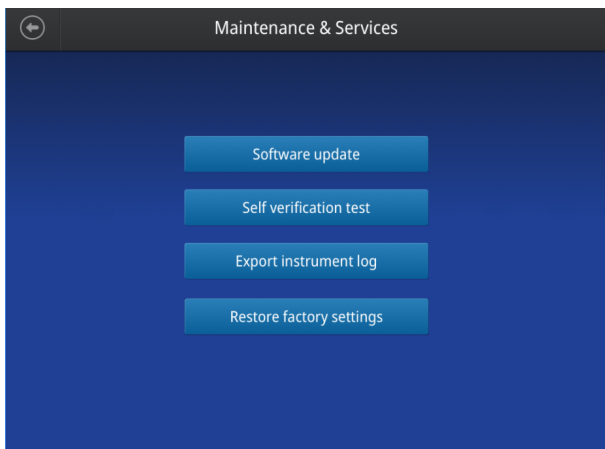
- (Administrator only) Select **Software Update** to update the System firmware. See "Upgrade the system firmware" on page 43 for instructions on updating the firmware.

- (Administrator only) Select **Self Verification Test** to conduct a check on the instrument hardware. The check includes testing the pumps, motors, and other components. See "Maintenance" on page 42 for instructions on conducting the self-verification test.

- (Administrator only) Select **Export Instrument Log** to export the instrument logs to a USB memory device. Insert the USB memory device into the USB port before using this feature.

- (Administrator only) Select **Restore factory settings** is used to reset the instrument to the original factory settings See "Restore factory settings (Administrator profile only)" on page 46.

E-Gel™ agarose gels

E-Gel™ agarose gels are precast bufferless gels with electrodes embedded in the agarose matrix. Each gel contains an ion generating system, a pH balancing system, and DNA stain packaged inside a transparent plastic cassette. Each gel cassette contains two ion exchange matrices (IEMs) that are in contact with the gel and electrodes. The IEMs supply a continuous flow of ions throughout the gel resulting in a sustained electric field required for running the gel.

①	Comb	⑤	Anode (+)
②	Sample wells	⑥	Tris$^+$ migration path
③	Agarose gel	⑦	AC$^-$ migration path
④	Groove	⑧	Cathode (–)
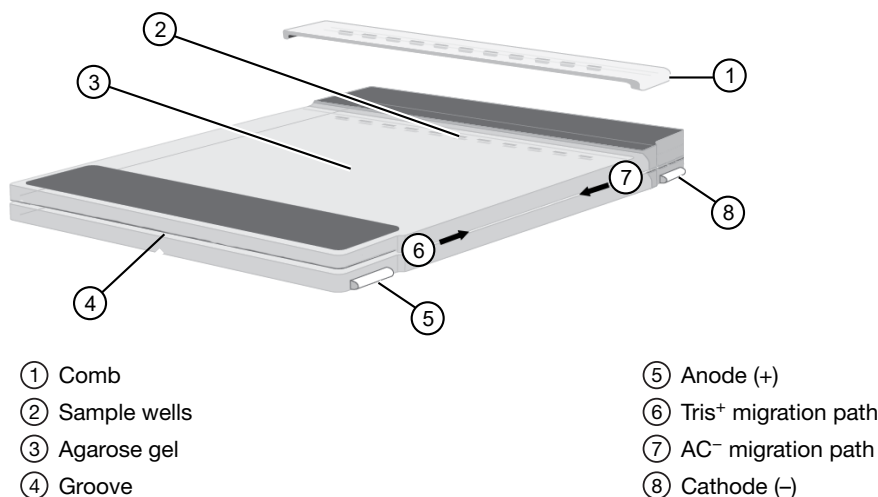
Nucleic acid stains used in E-Gel™ agarose gels

SYBR™ Safe DNA gel stain

SYBR™ Safe DNA gel stain has been specifically developed for reduced mutagenicity, making it safer than ethidium bromide for staining DNA in agarose gels. The detection sensitivity of E-Gel™ with SYBR™ Safe stain is similar to that of E-Gel™ containing ethidium bromide. DNA bands stained with SYBR™ Safe DNA gel stain can be detected by standard UV transillumination, visible-light transillumination, or laser-scanning.

Disposal

SYBR™ Safe DNA gel stain is not classified as hazardous waste, but because disposal regulations vary, please contact your safety office or local municipality for appropriate SYBR™ Safe disposal in your community.

SYBR™ gold II gel stain

SYBR™ Gold II gel stain has been specifically developed for E-Gel™ EX, E-Gel™ SizeSelect™ II and E-Gel™ Go! agarose gels. This gel stain has high sensitivity, with detection down to 0.5 ng/band of DNA. This fluorescent nucleic acid stain can be viewed by blue light transilluminator, significantly reducing DNA damage that can reduce cloning efficiency.

Disposal

Dispose E-Gel™ EX, E-Gel™ SizeSelect™ and E-Gel™ Go! agarose gels as hazardous waste in the same manner as ethidium bromide containing gels. Contact your safety office or local municipality for appropriate disposal in your community.

Opening E-Gel™ cassettes

- Electrophoresis must be complete before opening the E-Gel™ cassette.
- Photograph the gel before opening the cassette.
- If you plan to isolate DNA from the E-Gel™ agarose gel, open the cassette and excise the gel fragment immediately after electrophoresis as bands will diffuse within 20 minutes.
- If you plan to blot the gel, prepare your blotting apparatus before opening the cassette.
- IMPORTANT! Before opening the E-Gel™ cassette, put on safety goggles and gloves.

Gel knife

The Gel Knife (Cat. no. EI9010) is used to open the cassette for E-Gel™ EX and E-Gel™ NGS agarose gels.

Sharp edge

Open E-Gel™ EX and NGS cassettes with a gel knife

1. Place the cassette on a flat surface, with the wells facing upward.

2. **Insert** the sharp edge of the gel knife into the groove around the edge of the cassette edge, then lever the knife up and down to crack the seal.
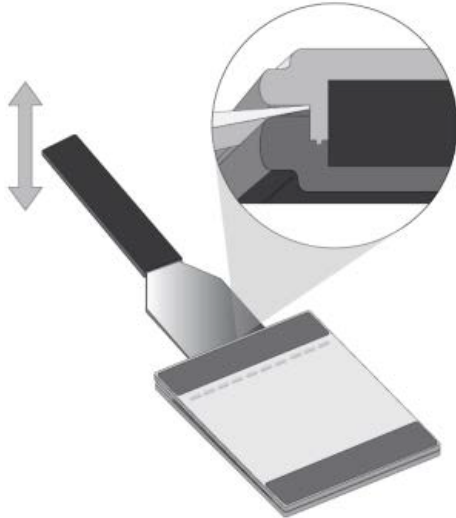
3. **Unseal** the plate by working around the perimeter of the entire cassette and cracking the seal for every edge.
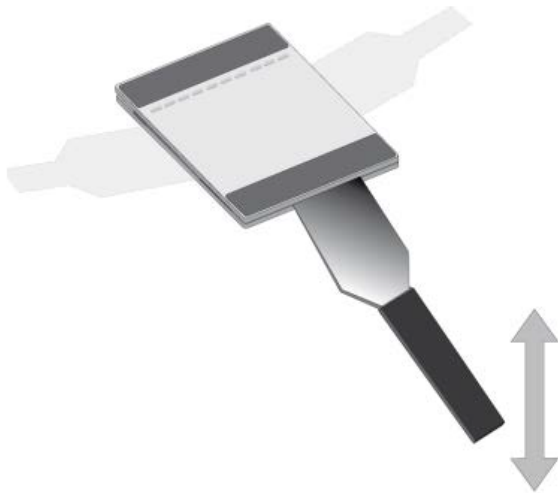
4. Remove the top of the gel cassette after all four sides of the cassette are unsealed.

5. Proceed to downstream application.

   If you plan to transfer DNA from the gel by blotting, only the main running gel is required. Remove the upper and lower ion exchange matrix layers and the well areas with the Gel Knife.

   If you plan to purify DNA from the gel, excise the gel fragment. Transfer the gel slice to a microcentrifuge tube.

Cleaning and storage

Clean the Gel Knife with mild detergent and water after use, and store at room temperature.

E-Gel™ agarose gel disposal guidelines

- Discard E-Gel™ EX Agarose Gels and E-Gel™ SizeSelect™ Agarose Gels as hazardous waste.
- SYBR™ Safe stain is not classified as hazardous waste under US Federal regulations, but contact your safety office for appropriate disposal methods (see "SYBR™ Safe DNA gel stain").

D E-Gel™ CloneWell™ II Agarose Gels

E-Gel™ CloneWell™ II pre-cast agarose gels can be used with the E-Gel™ Power Snap Plus Electrophoresis Device to provide a fast, safe, and effective DNA fragment isolation method for DNA cloning workflows.

General guidelines

- Load gel within 15 minutes of opening the pouch; run the gel immediately after loading.
- Monitor the band of interest carefully as it migrates near the recovery wells. It may be difficult to see low amounts of DNA in the well.
- **IMPORTANT!** Always wear Safe Imager™ Viewing Glasses when viewing the gel with the filter lid opened.
- For guidance on disposal of used gels, see SYBR™ Safe DNA Gel Stain ("SYBR™ Safe DNA gel stain" on page 55).

Prepare samples

- Prepare up to 25 µL of sample in 1X Sample Loading Buffer (e.g., use 2.5 µL of 10X Sample Loading Buffer with 22.5 µL total sample).
  10X Sample Loading Buffer is provided with E-Gel™ CloneWell™ II Agarose Gels.
- **Use the indicated amount of DNA per well** for single or multiple bands.
- Divide samples with higher amounts of DNA across multiple wells.
- Use up to 25 µL total sample volume per well.
- Dilute high salt samples (certain restriction enzyme and PCR buffers) 2- to 5-fold.

Gel type	Amount of DNA per well		Total loading volume
	Sample with single band	Sample with multiple bands	
E-Gel™ CloneWell™ II	200-800 ng	800 ng	25 µL

Prepare the gel

1. Remove the gel from the package.

2. Gently remove the combs. Do not allow the combs to bend or create suction in the wells during removal.

3. Place the cassette into a E-Gel™ Adapter, starting from the right edge.

4. Insert the gel cassette and adapter into the E-Gel™ Power Snap Plus Electrophoresis Device, starting from the right edge.

5. Press down on the left side of the cassette to secure it into the device.

Load samples

1. Fill all wells of both rows with 50 µL of deionized water.

2. Load 25 µL of sample with 1X Sample Loading Buffer into wells from the bottom up. Do not damage the gel or introduce bubbles into the wells.

3. Load 25 µL of ready-to-use E-Gel™ 1 Kb PLUS™ Express DNA Ladder into a well.
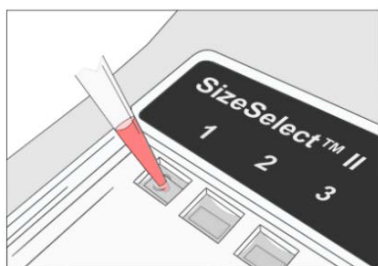
Run the gel

1. Press **Set up run,** then select the **CloneWell™ 0.8%** protocol on E-Gel™ Power Snap Electrophoresis Device.

2. Determine the estimated run time. See the E-Gel™ 1 Kb PLUS™ Express DNA Ladder migration pattern for approximate sample migration time ("Guidelines for estimating run time" on page 63).

3. **Adjust** protocol time according to the expected migration time of the target fragment to the reference line.

4. **Run the gel** protocol by pressing **Start run.** The run stops automatically after the programmed time has elapsed.

Check status

1. Check the gel status by activating the Back light.

   Monitor the gel during the run to avoid the target fragment missing the recovery well

2. Pause the gel when the band of interest reaches the reference line (RF) near the row of recovery wells.

   IMPORTANT! Put on orange Safe Imager™ viewing glasses prior to proceeding to further steps. Reduce ambient light or work in dark room for better visibility.
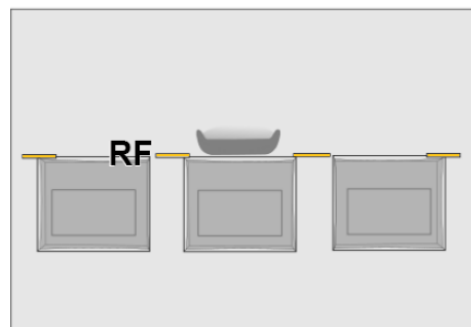
Prepare wells

1. Open the filter lid of the E-Gel™ Power Snap Plus Electrophoresis Device and activate the Back light.

   The transilluminator turns off automatically when the filter lid is opened. Press **Back light** to re-activate the blue light transilluminator.

2. Load 40 µL of deionized water to all recovery wells. Do not allow water to spill over the edge of the wells.

Collect DNA fragment
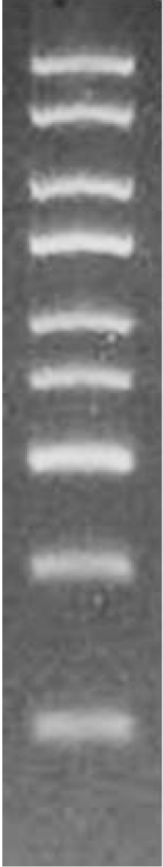
1. **Resume the run** and carefully observe as the band of interest fully enters the recovery well.

2. Stop the gel and recover the sample with a pipette. Avoid piercing the agarose.

   Some residual DNA will remain visible in the well due to migration into the agarose at the bottom of the well.

3. Proceed with downstream cloning workflow. No additional gel-purification is required.

4. (*Optional*) Collect additional DNA bands in the same sample from the recovery well by adding more water to the recovery well (see "Prepare wells" on page 62).

5. (*Optional*) Use the **Reverse E-Gel™** protocol if the band of interest passes the recovery well (see "Change to another protocol" on page 32).
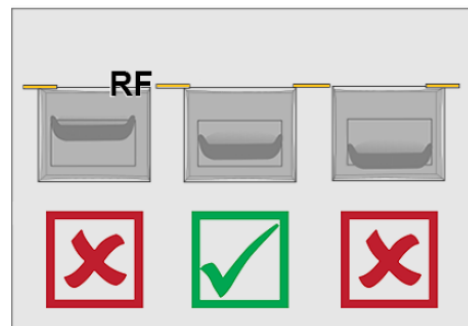
Guidelines for estimating run time

- Refer to the E-Gel™ 1 Kb PLUS™ Express DNA Ladder migration pattern table to estimate target DNA run time to the reference line.

- The run times indicated in the table are estimates. Monitor your gel in real time during the run to ensure the sample does not pass the recovery well.

- Identically sized bands in different wells may migrate differently.

- DNA fragment size, amount, and salt content can affect migration rates.

Table 3   E-Gel™ 1 Kb PLUS™ express DNA ladder migration pattern

Ladder	Fragment size	DNA amount (per 25 µL)	Migration time to reference line
	5000 bp	100 ng	~27.5 min
	3000 bp	100 ng	~23 min
	2000 bp	100 ng	~20.5 min
	1500 bp	160 ng	~19 min
	1000 bp	90 ng	~17 min
	750 bp	90 ng	~16 min
	500 bp	180 ng	~15 min
	300 bp	90 ng	~14 min
	100 bp	90 ng	~13 min

E E-Gel™ SizeSelect™ II Agarose Gels

E-Gel™ SizeSelect™ II 2% Agarose Gels can be used with the E-Gel™ Power Snap Plus Electrophoresis Device to provide a fast and convenient method for DNA fragment library size selection as part of NGS library preparation workflows.

General guidelines

- Load gel within 15 minutes of opening the pouch; run the gel immediately after loading.
- **IMPORTANT!** Always wear Safe Imager™ Viewing Glasses when viewing the gel with the filter lid opened.
- For guidance on disposal of used gels, see SYBR™ Gold II DNA Stain ("SYBR™ gold II gel stain").

Prepare samples

- Prepare up to 25 μL of sample in 1X Sample Loading Buffer (e.g., use 2.5 μL of 10X Sample Loading Buffer with 22.5 μL total sample).
  10X Sample Loading Buffer is provided with E-Gel™ SizeSelect™ II Agarose Gels.
- **Use the indicated amount of DNA per well** for single or multiple bands.
- Do not exceed 1 μg for sheared DNA.
- Divide samples with higher amounts of DNA across multiple wells.
- Use up to 25 μL total sample volume per well.
- Dilute high salt samples (certain restriction enzyme and PCR buffers) 2- to 5-fold.

Gel type	Amount of DNA per well		Total loading volume
	Sample with single band	Sample with multiple bands	
E-Gel™ SizeSelect™ II	1-300 ng	500 ng	25 μL

Prepare the gel

1. Remove the gel from the package.

2. Gently remove the combs. Do not allow the combs to bend or create suction in the wells during removal.

3. Place the cassette into a E-Gel™ Adapter, starting from the right edge.

4. Insert the gel cassette and adapter into the E-Gel™ Power Snap Plus Electrophoresis Device, starting from the right edge.

5. Press down on the left side of the cassette to secure it into the device.

Load samples

1. Fill all wells of both rows with 50 µL of deionized water.

2. Load 25 µL of sample with 1X Sample Loading Buffer into wells from the bottom up. Do not damage the gel or introduce bubbles into the wells.

3. Load 25 µL of ready-to-use E-Gel™ Sizing DNA Ladder into a well.
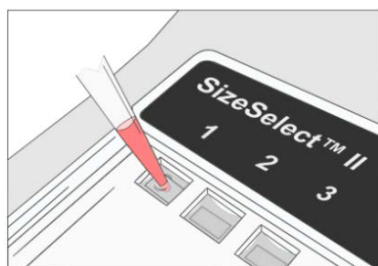
Run the gel

1. Press **Set up run,** then select the **SizeSelect™ 2%** protocol on E-Gel™ Power Snap Plus Electrophoresis Device.

2. Determine the estimated run time. See the E-Gel™ Sizing DNA Ladder migration pattern for approximate sample migration time ("Guidelines for estimating run time" on page 69).

3. **Adjust** protocol time according to the expected migration time of the target fragment to the reference line.

4. **Run the gel** protocol by pressing **Start run.** The run stops automatically after the programmed time has elapsed.

Check status

1. Check the gel status by activating the Back light.

   Monitor the gel during the run to avoid the target fragment missing the recovery well

2. Pause the gel when the reference band of the DNA ladder reaches the reference line (RF) near the row of recovery wells.

   IMPORTANT! Put on orange Safe Imager™ viewing glasses prior to proceeding to further steps. Reduce ambient light or work in dark room for better visibility.
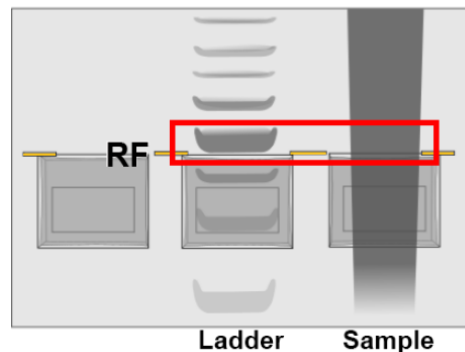
Prepare wells

1. Open the filter lid of the E-Gel™ Power Snap Plus Electrophoresis Device and activate the Back light.

   The transilluminator turns off automatically when the filter lid is opened. Press **Back light** to re-activate the blue light transilluminator.

2. Carefully remove all liquid from the recovery wells.

3. Load 50 μL of nuclease-free water to all recovery wells. Do not allow water to spill over the edge of the wells.

Collect DNA fragment

1. **Resume the run** and carefully observe as the reference band enters the recovery well.

   IMPORTANT! See NGS library size selection reference to determine when to collect samples of specific target library length.

2. Stop the gel and recover the sample with a pipette. Avoid piercing the agarose.

   Some residual DNA will remain visible in the well due to migration into the agarose at the bottom of the well.

3. Proceed with downstream NGS workflow.

4. (*Optional*) Use the **Reverse E-Gel™** protocol if the band
   of interest passes the recovery well (see "Change to
   another protocol" on page 32).
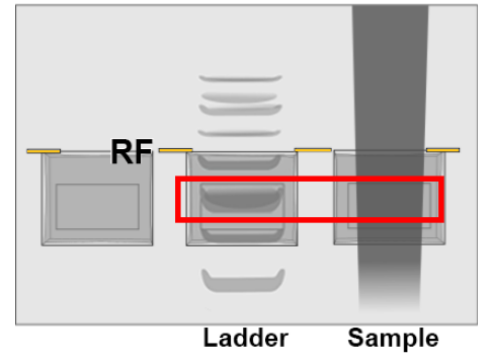
Guidelines for estimating run time

- Refer to the E-Gel™ Sizing DNA Ladder migration pattern table to estimate target DNA run time to the reference line.

- The E-Gel™ DNA Sizing Ladder is also used as a size reference marker. Refer to the NGS library size selection reference to estimate run time from the reference line to the collection well.

- The run times indicated in the table are estimates. Monitor your gel in real time during the run to ensure the sample does not pass the recovery well.

- Identically sized bands in different wells may migrate differently.

- DNA fragment size, amount, and salt content can affect migration rates.

Table 4   E-Gel™ sizing DNA ladder migration pattern

Ladder	Fragment size	DNA amount (per 25 µL)	Migration time to reference line
	1,500 bp	1.5 ng	~19.5 min
	1,200 bp	1.5 ng	~18.5 min
	1,000 bp	6.0 ng	~17.5 min
	900 bp	2.0 ng	~17 min
	800 bp	2.0 ng	~16.5 min
	700 bp	2.0 ng	~16 min
	600 bp	2.0 ng	~15.5 min
	500 bp	6.0 ng	~14.5 min
	450 bp	2.0 ng	~14 min
	400 bp	2.0 ng	~13.5 min
	350 bp	2.0 ng	~13 min
	300 bp	2.0 ng	~12.5 min
	250 bp	2.0 ng	~11.5 min
	200 bp	6.0 ng	~11 min
	150 bp	2.0 ng	~10 min
	125 bp	2.0 ng	~9.5 min
	100 bp	2.0 ng	~9 min
	75 bp	2.5 ng	~8.5 min
	50 bp	2.5 ng	~8 min

Table 5 NGS library size selection reference
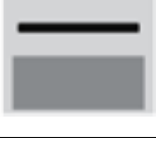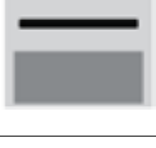
Library Size	Target library peak	Run time to reference line	Input sample amount	Stop the run and collect your sample when…	Schematic view
Ion PGM™ System					
400-base-read	480 bp	14–20 min	**500 ng**	500 bp band is at the **top** of the **exposed agarose area**	
			50–100 ng	500 bp band has **just entered the top edge** of the **collection well**	
300-base-read	390 bp	13–16 min	**500 ng**	400 bp band is at the **middle** of the **exposed agarose area**	
			50–100 ng	500 bp band is at the **top** of the **exposed agarose area**	
200-base-read	330 bp	12–14 min	**500 ng**	350 bp band is at the **top** of the **exposed agarose area**	
			50–100 ng	350 bp band has **just completely entered the top edge** of the **collection well**	
100-base-read	200 bp	11–12.5 min	**500 ng**	200 bp band is in the **middle** of the **collection well**	
			50–100 ng	200 bp band is in the **middle** of the **collection well**	
Ion Proton™ System					

Table 5   NGS library size selection reference *(continued)*

Library Size	Target library peak	Run time to reference line	Input sample amount	Stop the run and collect your sample when…	Schematic view
200-base-read	270 bp	12–14 min	**500 ng**	300 bp band is at the **top** of the **exposed agarose area**	
			50–100 ng	300 bp band is at the **middle** of the **exposed agarose area**	
150-base-read	220 bp	11–14.5 min	**500 ng**	250 bp band is at the **middle** of the **exposed agarose area**	
			50–100 ng	250 bp band is at the **middle** of the **exposed agarose area**	

Quantitation of isolated DNA

- Recovered DNA can be assessed using the Qubit™ fluorometer (Cat. no. Q32868), or by gel electrophoresis.

- qPCR is recommended for accurate quantitation of next generation sequencing libraries recovered from E-Gel™ SizeSelect™ II gels.

- Recovered samples are not compatible with 280 nm measurements without first performing buffer exchange.

Specifications

System specifications

Specification	E-Gel™ Power Snap Plus Electrophoresis Device
Dimensions	291 mm × 220 mm × 101 mm
Weight	2.15 kg
Rated Voltage (Input)	48 VDC
Rated Power (Input)	90 W
Rated Voltage (Output)	Maximum 380 VDC (output between electrodes)
Touchscreen LCD display	3.5 inch TFT module with capacitive touch
Viewing surface dimensions	154 mm × 112 mm
Amber filter dimensions	130 mm × 160 mm
LED light	Blue LED (center wavelength: 465 nm, full width, half max: 20 nm)
LED life	50,000 hours
LED specification	Array of 39 high power LEDs emitting at 465 +/- 10 nm

Specification	AC/DC power adapter [1]
Rated Voltage (Input)	100–240 VAC
Rated Current (Input)	1.3 A
Rated Frequency (Input)	50/60 Hz
Rated Voltage (Output)	48 VDC
Rated Power (Output)	Maximum 90 W

[1] Provided with the system for use with the E-Gel™ Power Snap Plus Electrophoresis Device only.

Specification	E-Gel™ Power Snap Plus Camera
Dimensions	233 mm × 210 mm × 228 mm
Weight	2 kg
Power	Does not function as a standalone device. Powered from the E-Gel™ Power Snap Plus Electrophoresis Device.

(continued)

Specification	E-Gel™ Power Snap Plus Camera
Internal memory	64 GB SD card
Touchscreen LCD display	8 inch TFT module with capacitive touch
Camera type	Color, complementary metal-oxide semiconductor (CMOS)
Gel image resolution	4,208 × 3,120 (13 MP), 8 bits
Dynamic range	68 dB
Image output	TIF, JPG, PNG, G2i
Lens f/number	2.8

Related products

Accessory products

Choosing the right gel

To obtain the best results for your application, it is important to choose the correct agarose percentage and well format. Go to **thermofisher.com/Egel-ladderselectiontool** for additional information, or use the specifications of various single-use only gels in the followng tables to determine the optimal gel type for your purpose.

Gels for preparative gel electrophoresis in cloning and NGS applications

	E-Gel™ CloneWell™ II	E-Gel™ Size Select II	E-Gel™ NGS
Application	Target fragment isolation in cloning workflow	Low range fragment library size selection in NGS workflow	High range fragment library size selection
No rows	2 rows: 1 loading row and 1 recovery row	2 rows: 1 loading row and 1 recovery row	1 row with sample loading wells
Loading wells	7	7	10 + 1 marker lane
Loading volume	25 µL	25 µL	20 µL
Stain	SYBR™ Safe	SYBR™ Gold II	SYBR™ Safe
Detection sensitivity	5 ng/band	0.5 ng/band	5 ng/band
% Agarose	0.8%	2%	0.8%
Separation range	100 bp – 6 kb	50 bp – 2 kb	800 bp – 10 kb
Run time	13-28 min	8-20 min	26-32 min
Access to sample	Sample recovered via elution wells	Sample recovered via elution wells	Openable cassette. Manual gel excision.

Analytical gels

	E-Gel™ EX Agarose Gels	E-Gel™ EX Double Comb Agarose Gels	E-Gel™ SYBR™ Safe Agarose Gels	E-Gel™ Double Comb SYBR™ Safe Agarose Gels	E-Gel™ 48 Agarose Gels with SYBR™ Safe	E-Gel™ 96 Agarose Gels with SYBR™ Safe
Application	Fast separation and high sensitivity sample analysis		Routine gel separation		High-throughput analysis and genotyping	
No. rows	1 row	2 rows	1 row	2 rows	2 row	8 rows
Loading wells	11 wells	22 wells	11 wells	22 wells	48 wells and 4 marker lanes	96 wells and 8 marker lanes
Loading volume	20 µL	20 µL	20 µL	20 µL	15 µL	20 µL
Stain	SYBR™ Gold II		SYBR™ Safe		SYBR™ Safe	
Detection sensitivity	0.5 ng/band		3 ng/band		3 ng/band	
% Agarose	1%, 2%, 4%	1%, 2%	1%, 2%, 4%	1%, 2%	1%, 2%, 4%	1%, 2%
Separation range	1%: 100 bp - 5 kb 2%: 100 bp - 2 kb 4%: 10 bp – 500 bp	1%: 400 bp - 5 kb 2%: 50 bp - 2 kb	1%: 100 bp - 5 kb 2%: 100 bp - 2 kb 4%: 10 bp – 500 bp	1%: 400 bp - 5 kb 2%: 50 bp - 2 kb	1%: 400 bp - 10 kb 2%: 50 bp - 3 kb 4%: 10 bp – 500 bp	1%: 400 bp - 10 kb 2%: 100 bp - 2 kb
Run time	1%, 2%: 10-17 min 4%: 15-20 min	5-8 min	26-40 min	13-15 min	17-25 min	12-17 min
Access to sample	Yes (openable)	Yes (openable)	Yes (openable)	Yes (openable)	Yes (openable)	Yes (openable)

E-Gel™ Agarose Gels

See "Choosing the right gel" on page 74 to select the most suitable gel for your application.

Products	% Agarose	Quantity	Catalog No.
E-Gel™ EX Agarose Gels	1%	10 gels	G401001
		20 gels	G402021
	2%	10 gels	G401002
		20 gels	G402022
	4%	10 gels	G401004
E-Gel™ EX Double Comb Agarose Gels	1%	10 gels	A42345
		20 gels	A44887
		50 gels	A44888
	2%	10 gels	A42346
		20 gels	A44889
		50 gels	A44890
E-Gel™ Agarose Gels with SYBR™ Safe	1%	10 gels	A42100
		20 gels	A45202
		50 gels	A45203
	2%	10 gels	A42135
		20 gels	A45204
		50 gels	A45205
	4%	10 gels	A42136
		20 gels	A45206
E-Gel™ Double Comb Agarose Gels with SYBR™ Safe	1%	10 gels	A42347
		20 gels	A44885
		50 gels	A44886
	2%	10 gels	A42348
		20 gels	A42390
		50 gels	A44884
E-Gel™ 48 Agarose Gels with SYBR™ Safe	1%	8 gels	G820801
		32 gels	G820841

(continued)

Products	% Agarose	Quantity	Catalog No.
E-Gel™ 48 Agarose Gels with SYBR™ Safe	2%	8 gels	G820802
		32 gels	G820842
	4%	8 gels	G820804
		32 gels	G820844
E-Gel™ 96 Agarose Gels with SYBR™ Safe	1%	8 gels	G720801
		32 gels	G720841
	2%	8 gels	G720802
		32 gels	G720842
E-Gel™ NGS Agarose Gels	0.8%	10 gels	A25798
E-Gel™ CloneWell™ II Agarose Gels	0.8%	10 gels	G661818
E-Gel™ SizeSelect™ II Agarose Gels	2%	10 gels	G661012
E-PAGE™ Protein Gels			
E-PAGE™ 3.7 mm, Midi Protein Gels	8%	8 gels	EP04808
E-PAGE™ 3.7 mm, Midi Protein Gels	6%	8 gels	EP09606

Choosing the right DNA or RNA ladder

Go to **thermofisher.com/Egel-ladderselectiontool** for additional information, or use the following table to select the E-Gel™ DNA or RNA ladder that yields the best resolution for your E-Gel™ agarose gel.

Gel Type	% Agarose	E-Gel™ 1 Kb PLUS™ DNA Ladder (Cat. No. 10488090)	E-Gel™ 1 Kb PLUS™ Express (Cat. No. 10488091)	E-Gel™ 50 bp DNA Ladder (Cat. No. 10488099)	E-Gel™ 96 High Range DNA Marker (Cat. No. 12352019)	E-Gel™ Low Range Quantitative DNA Ladder (Cat. No. 12373031)	E-Gel™ Ultra Low Range DNA Ladder (Cat. No. 10488096)	Millennium™ RNA Ladder (Cat. No. AM7150)	Century™-Plus RNA Ladder (Cat. No. AM7145)	E-Gel™ Sizing DNA Ladder (Cat. No. 10488100)
E-Gel™ EX	1%	—	✔	—	—	—	—	✔	—	—
	2%	✔	✔	—	—	—	✔	—	✔	—
	4%	—	—	✔	—	—	✔	—	✔	—
E-Gel™ EX Double Comb	1%	—	✔	—	✔	—	—	—	—	—
	2%	—	—	✔	—	✔	—	—	—	—
E-Gel™ with SYBR™ Safe	1%	✔	—	—	—	—	—	—	—	—
	2%	—	✔	—	—	—	—	—	—	—
	4%	—	—	✔	—	—	✔	—	—	—
E-Gel™ Double Comb with SYBR™ Safe	1%	—	✔	—	✔	—	—	—	—	—
	2%	—	✔	—	—	✔	—	—	—	—
E-Gel™ 48 with SYBR™ Safe	1%, 2%	✔	—	—	—	—	—	—	—	—
	4%	—	—	—	—	✔	—	—	—	—
E-Gel™ 96 with SYBR™ Safe	1%	—	—	—	✔	—	—	—	—	—
	2%	—	—	—	—	✔	—	—	—	—

(continued)

		E-Gel™ 1 Kb PLUS™ DNA Ladder	E-Gel™ 1 Kb PLUS™ Express	E-Gel™ 50 bp DNA Ladder	E-Gel™ 96 High Range DNA Marker	E-Gel™ Low Range Quantitative DNA Ladder	E-Gel™ Ultra Low Range DNA Ladder	Millennium™ RNA Ladder	Century™-Plus RNA Ladder	E-Gel™ Sizing DNA Ladder
E-Gel™ CloneWell™ II	0.8%	–	✔	–	–	–	–	–	–	–
E-Gel™ SizeSelect™ II	2%	–	–	–	–	–	–	–	–	✔
E-Gel™ NGS	0.8%	✔	✔	–	–	–	–	–	–	–

Ladders and buffers

E-Gel™ DNA Ladders	Quantity	Applications	Catalog No.
E-Gel™ 1 Kb PLUS™ DNA Ladder (25 ng/µL)	2 × 1 mL	100 apps	10488090
E-Gel™ 1 Kb PLUS™ Express Ladder (40 ng/µL)	2 × 1.25 mL	100 apps	10488091
E-Gel™ 50 bp DNA Ladder (25 ng/µL)	2 × 1 mL	100 apps	10488099
E-Gel™ Sizing DNA Ladder (2 ng/µL)	2 × 1.25 mL	100 apps	10488100
E-Gel™ Low Range Quantitative DNA Ladder (17.5 ng/µL)	1 mL	100 apps	12373031
E-Gel™ Ultra Low Range DNA Ladder (25 ng/µL)	2 × 1 mL	100 apps	10488096
E-Gel™ 96 High Range DNA Marker (5 ng/µL)	2 × 1 mL	100 apps	12352019
E-Gel™ Sample Loading Buffer, 1X	4 × 1.25 mL	–	10482055

Accessory items

Product	Quantity	Catalog No.
Safe Imager™ Viewing Glasses	1 each	S37103
Gel Knife	1 each	EI9010

Before starting

Before you begin using this product, or any installation or service operation, please read the following safety information. Attention to these warnings will help prevent personal injuries and damage to the products.

It is your responsibility to use the product in an appropriate manner. This product is designed for use solely in laboratory environments, and must not be used in any way that may cause personal injury or property damage.

You are responsible if the product is used for any intention other than its designated purpose or in disregard of Thermo Fisher Scientific instructions. Thermo Fisher Scientific shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits.

Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product.

Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

Operation of the E-Gel™ Power Snap Electrophoresis System is subject to the following conditions:

- Indoor use.
- Altitude below 2000 meters.
- Temperature range: 5 to 30℃.
- Maximum relative humidity: 80% (maxiumum relative humidity 80% for temperatures up to 31℃, decreasing linearly to 50% relative humidity at 40℃).
- Installation categories (over voltage categories) II; Pollution degree 2
- Mains supply voltage fluctuations not to exceed 10% of the nominal voltage (100–240 V, 50/60 Hz, 1.3 A).
- Mains plug is a disconnect device and must be easily accessible.
- Do not attempt to open the E-Gel™ Power Snap Electrophoresis System. To honor the warranty, the E-Gel™ Power Snap Electrophoresis System can only be opened and serviced by Thermo Fisher Scientific.
- The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by Thermo Fisher Scientific.

- The device must be connected to a mains socket outlet with protective earthing connections.
- Ventilation requirements: room ventilation.

Installing the instrument

The product may be installed only under the conditions and in the positions specified by Thermo Fisher Scientific.

Following are the required operating position and conditions:

- Do not place the product in an area where it will be subject to vibration.
- Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose.
- Do not place the product on heat-generating surface or near heat emitting devices such equipment racks or heaters. Verify that there is sufficient clearance between the product and any other system that may exhaust warm air.
- Do not place the product in an area where its ventilation system is obstructed. Lack of proper ventilation may result in electric shock, fire and/or serious personal injury or death.
- The product is for indoor use only
- Use only with suitably rated mains supply cord (having 3 conductors min. 16 AWG or 1.5 mm^2, min. 300V, Harmonized Type for Europe and UL Listed/CSA Certified for North America, with molded plug rated min. 10A).
- A tolerance of ±10 % shall apply to the nominal input voltage and ±3 Hz to the nominal frequency, overvoltage category 2.
- Maximum operating altitude 2000 m asl, Maximum transport altitude 4500 m asl.

Explanation of symbols and warnings

Symbol and description
⚠️ **CAUTION!** Risk of danger. Consult the manual for further safety information.
⚡ **CAUTION!** Risk of electrical shock.
☀️ **CAUTION!** Do not stare into beam Use eye protection during servicing
☣️ **CAUTION!** Potential biohazard.

(continued)

Symbol and description
WEEE (Waste Electrical and Electronic Equipment) symbol indicates that this product should not be disposed of in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE. This instrument meets European requirement WEEE Directive 2012/19/EU.
OFF (power)
ON (power)
Protective earth (ground)
The CE mark symbolizes that the product conforms to all applicable European Community provisions for which this marking is required. Operation of the E-Gel™ Power Snap Plus Electrophoresis System is subject to the conditions described in this manual. The protection provided by the device may be impaired if the instrument is used in a manner not specified by the manufacturer.
This product conforms to UL 61010-1, CAN/CSA C22.2 No.61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part I: General Requirements." Instruments bearing the UL symbol are certified by Underwriters Laboratories to be in conformance with the applicable safety standard for the US and Canada.
The UKCA mark symbolizes that the product conforms to all applicable provisions in Great Briitain (England, Wales, and Scotland) for which this marking is required. Operation of the E-Gel™ Power Snap Plus Electrophoresis System is subject to the conditions described in this manual. The protection provided by the device may be impaired if the instrument is used in a manner not specified by the manufacturer.
Regulatory Compliance Mark indicates conformity with Australian standards for electromagnetic compatibility.
China RoHS EFUP 25

Symboles d'information

Symbol and description
⚠ **MISE EN GARDE !** Risque de danger. Consulter le manuel pour d'autres renseignements de sécurité.
⚠ **MISE EN GARDE !** Risque de choc électrique.

(continued)

Symbol and description
⚠ **MISE EN GARDE !** Ne regardez pas directement dans le faisceau Utilisez une protection oculaire pendant la maintenance
⚠ **MISE EN GARDE !** Danger biologique potentiel.
Le symbole **DEEE** (Déchets d'équipements électriques et électroniques) indique que ce produit ne doit pas être mis au rebut avec des déchets ménagers non triés. Suivez la réglementation locale relative à l'élimination des déchets usuels pour réduire l'impact environnemental des DEEE. Rendez-vous sur **www.invitrogen.com/weee** pour prendre connaissance des options de collecte et de recyclage..
OFF (ARRÊT) (alimentation)
ON (MARCHE) (alimentation)
Protection par la mise à la terre (masse)
La marque CE est un symbole indiquant que le produit est conforme à toutes les dispositions applicables de la Communauté européenne pour lesquelles ce marquage est obligatoire. L'utilisation du E-Gel™ Power Snap Plus Electrophoresis System est soumise aux conditions décrites dans ce manuel. Si vous utilisez l'instrument d'une manière non spécifiée par le fabricant, la protection offerte par l'appareil pourrait s'en trouver détériorée.
Ce produit est conforme à UL 61010-1, CAN/CSA C22.2 No.61010-1 «Exigences de sécurité pour l'équipement électrique pour la mesure, le contrôle et l'utilisation en laboratoire, Partie I : Généralité Les exigences.» Les instruments portant le symbole UL sont certifiés par Underwriters Laboratories conforme à la norme de sécurité applicable aux États-Unis et au Canada.
La marque UKCA est un symbole indiquant que le produit est conforme à toutes les dispositions applicables en Grande-Bretagne (Angleterre, Pays de Galles et Écosse) pour lesquelles ce marquage est obligatoire. L'utilisation du E-Gel™ Power Snap Plus Electrophoresis System est soumise aux conditions décrites dans ce manuel. Si vous utilisez l'instrument d'une manière non spécifiée par le fabricant, la protection offerte par l'appareil pourrait s'en trouver détériorée.
La marque de conformité réglementaire indique qu'elle est conforme aux normes australiennes compatibilité électromagnétique
Chine RoHS EFUP 25

Environmental requirements

Condition	Acceptable Range
Installation site	Indoor use only
Electromagnetic interference	Do not use this device in close proximity to sources of strong electromagnetic radiation (for example, unshielded intentional RF sources). Strong electromagnetic radiation may interfere with the proper operation of the device.
Altitude	Maximum of 2000 m (6500 ft.) above sea level
Operating conditions	• Humidity: 15–80% relative humidity (noncondensing) • Temperature: 15 to 30°C (59 to 86°F) **Note:** For optimal performance, avoid rapid or extreme fluctuations in room temperature.
Storage and transport conditions	• Humidity: 20–80% relative humidity (noncondensing) • Temperature: –30 to 60°C (–22 to 140°F)
Thermal output	During operation, the net thermal output, based on the actual current draw of the instrument, is expected to be approximately 72 W (245.67 Btu/h).
Vibration	Ensure that the instrument is not adjacent to strong vibration sources, such as a centrifuge, pump, or compressor. Excessive vibration will affect instrument performance.
Pollution degree	The instrument has a Pollution Degree rating of II. The instrument may only be installed in an environment that has nonconductive pollutants such as dust particles or wood chips. Typical environments with a Pollution Degree II rating are laboratories and sales and commercial areas. The noise output of the instrument is ≤45 dB(A) when running.
Other conditions	Ensure the instrument is located away from any vents that could expel particulate material onto the instrument components. Avoid placing the instrument adjacent to heaters, cooling ducts, or in direct sunlight.

Electromagnetic compatibility (EMC) standards

Class A notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Electrical safety

The following information on electrical safety must be observed, failing to follow these instruction may result in electric shock, fire and/or serious personal injury or death.

Service operation requirements

In the event of an equipment malfunction, it is the responsibility of the customer to report the need for service to Thermo Fisher Scientific or to one of the authorized agents. For service information, contact Technical Support ("Customer and technical support" on page 90).

Servicing of this device is to be performed by trained service pe rsonnel only.

- Prior to switching on the product, ensure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network.

- This product should be connected to the power mains using a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.

- If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

- The appliance coupler of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 m).

- Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

- Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.

- Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

- Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1, IEC61010-1/EN 61010-1, or IEC 62368-1/EN 62368-1 standards that apply in each case.

- Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.

- Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.

- The overvoltage protection should limit the magnitude of the overvoltage surge to 1kV between the any of the power line and ground.

- Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.

- Prior to cleaning the product, disconnect it completely from the power supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

LED (Light-Emitting diode)

⚠️ **CAUTION!** LED (light-emitting diode) HAZARD. Removing the protective covers and (when applicable) defeating the interlock(s) may result in exposure to the internal LED. LEDs can burn the retina, causing permanent blind spots. To ensure safe LED operation:

- Never look directly into the light beam.

- Wear proper eye protection and post a warning sign at the entrance to the laboratory if the LED protection is defeated for servicing

- Remove jewelry and other items that can reflect a light beam into your eyes or those of others

Do not remove safety labels, instrument protective panels, or defeat safety interlocks.

Chemical safety

> ⚠ **WARNING! GENERAL CHEMICAL HANDLING.** To minimize hazards, ensure laboratory personnel read and practice the general safety guidelines for chemical usage, storage, and waste provided below. Consult the relevant SDS for specific precautions and instructions:
>
> - Read and understand the Safety Data Sheets (SDSs) provided by the chemical manufacturer before you store, handle, or work with any chemicals or hazardous materials. To obtain SDSs, see the "Documentation and Support" section in this document.
> - Minimize contact with chemicals. Wear appropriate personal protective equipment when handling chemicals (for example, safety glasses, gloves, or protective clothing).
> - Minimize the inhalation of chemicals. Do not leave chemical containers open. Use only with sufficient ventilation (for example, fume hood).
> - Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the manufacturer cleanup procedures as recommended in the SDS.
> - Handle chemical wastes in a fume hood.
> - Ensure use of primary and secondary waste containers. (A primary waste container holds the immediate waste. A secondary container contains spills or leaks from the primary container. Both containers must be compatible with the waste material and meet federal, state, and local requirements for container storage.)
> - After emptying a waste container, seal it with the cap provided.
> - Characterize (by analysis if needed) the waste generated by the particular applications, reagents, and substrates used in your laboratory.
> - Ensure that the waste is stored, transferred, transported, and disposed of according to all local, state/provincial, and/or national regulations.
> - **IMPORTANT!** Radioactive or biohazardous materials may require special handling, and disposal limitations may apply.

> ⚠ **WARNING! HAZARDOUS WASTE (from instruments).** Waste produced by the instrument is potentially hazardous. Follow the guidelines noted in the preceding General Chemical Handling warning.

Biological hazard safety

⚠ **WARNING! Potential Biohazard.** Depending on the samples used on this instrument, the surface may be considered a biohazard. Use appropriate decontamination methods when working with biohazards.

⚠ **WARNING! BIOHAZARD.** Biological samples such as tissues, body fluids, infectious agents, and blood of humans and other animals have the potential to transmit infectious diseases. Conduct all work in properly equipped facilities with the appropriate safety equipment (for example, physical containment devices). Safety equipment can also include items for personal protection, such as gloves, coats, gowns, shoe covers, boots, respirators, face shields, safety glasses, or goggles. Individuals should be trained according to applicable regulatory and company/ institution requirements before working with potentially biohazardous materials. Follow all applicable local, state/provincial, and/or national regulations. The following references provide general guidelines when handling biological samples in laboratory environment.

- U.S. Department of Health and Human Services, *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 6th Edition, HHS Publication No. (CDC) 300859, Revised June 2020
  https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2020-P.pdf
- Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 (Laboratory biosafety manual, fourth edition and associated monographs)
  www.who.int/publications/i/item/9789240011311

Documentation and support

Customer and technical support

Visit **thermofisher.com/support** for the latest service and support information.

- Worldwide contact telephone numbers
- Product support information
  - Product FAQs
  - Software, patches, and updates
  - Training for many applications and instruments
- Order and web support
- Product documentation
  - User guides, manuals, and protocols
  - Certificates of Analysis
  - Safety Data Sheets (SDSs; also known as MSDSs)

  Note: For SDSs for reagents and chemicals from other manufacturers, contact the manufacturer.

Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale at **www.thermofisher.com/us/en/home/global/terms-and-conditions.html**. If you have any questions, please contact Life Technologies at **www.thermofisher.com/support**.