invitrogen

E-Gel™ Power Snap Lite Electrophoresis System

USER GUIDE

E-Gel™ Power Snap Lite Electrophoresis Device and E-Gel™ Power Snap Lite Camera for use with E-Gel™, E-Gel™ EX, CloneWell™, and SizeSelect™ agarose gels

Catalog Numbers G8502, G8600, G8700

Publication Number MAN1002008

Revision A

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

ThermoFisher SCIENTIFIC

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

Revision history: MAN1002008 A (English)

Revision	Date	Description
A	12 May 2026	New document for the E-Gel™ Power Snap Lite Electrophoresis System.

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

Contents

1 Product information

Product description

The E-Gel™ Power Snap Lite Electrophoresis System is designed to produce a fast and convenient DNA agarose gel electrophoresis and documentation workflow.

The E-Gel™ Power Snap Lite Electrophoresis System is composed of two units:

The **E-Gel™ Power Snap Lite Electrophoresis Device** consists of the E-Gel™ Power Snap Lite Electrophoresis Base with a blue light transilluminator and amber filter, and a power supply to enable gel separation and real-time sample tracking of samples in E-Gel™ agarose gels pre-stained with SYBR™ Safe or SYBR™ Gold II DNA stains. The device is pre-programmed with protocols for each type of available E-Gel™ agarose gel.

The **E-Gel™ Power Snap Lite Camera** is a seamlessly integrated part of the E-Gel™ Power Snap Lite Electrophoresis System. The cable-free, high-resolution digital camera is designed for rapid imaging and documentation of E-Gel™ agarose gels. Camera functions include real-time view, automatic capture, and image adjustment features.

The system is optimized for use with E-Gel™ EX, E-Gel™ SYBR™ Safe, E-Gel™ CloneWell™ II, and E-Gel™ SizeSelect™ II gels.

Features

- **Fast DNA separation** in as little as 10 minutes with E-Gel™ EX Agarose Gels
- **Real-time sample view** for instant analysis and run control
- **Quick gel image documentation** with the E-Gel™ Power Snap Lite Camera

Throughput

The E-Gel™ Power Snap Lite Electrophoresis System is used with medium throughput E-Gel™ Double Comb (1–22 DNA samples per gel), or routine throughput E-Gel™ agarose gels (1–11 DNA samples per gel).

System components

The E-Gel™ Power Snap Lite Electrophoresis System consists of:

- E-Gel™ Power Snap Lite Electrophoresis Device
- E-Gel™ Power Snap Lite Camera (requires E-Gel™ Power Snap Lite Electrophoresis Device)

Contents

Depending on the ordered catalog number the product will arrive with following components:

Component	G8502	G8600	G8700
E-Gel™ Power Snap Lite Electrophoresis Base	1 each	–	1 each
E-Gel™ Power Snap Lite Camera [1]	–	1 each	1 each
Power cord with adaptor	1 each	–	1 each
Safe Imager™ Viewing Glasses (Cat. No. S37103)	1 each	–	1 each

[1] Requires E-Gel™ Power Snap Lite Electrophoresis Base

Upon receiving the instrument

The E-Gel™ Power Snap Lite Electrophoresis Device and E-Gel™ Power Snap Lite Camera are shipped at room temperature.

Examine the unit carefully for any damage incurred during transit. File any damage claims with the carrier. The warranty does not cover in-transit damage.

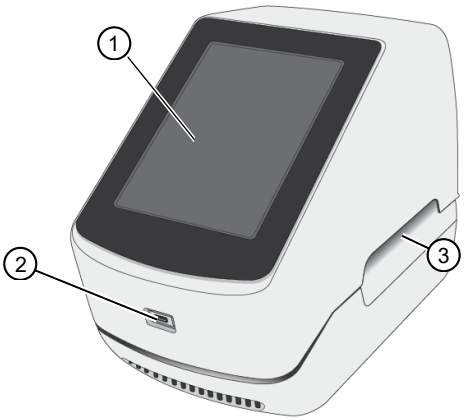
Storage

E-Gel™ Power Snap Lite Electrophoresis Device

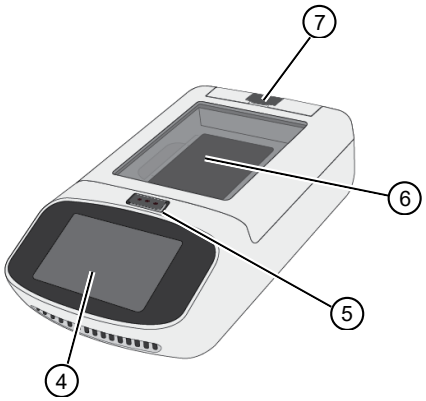
- Store the devices at room temperature.
- Do not store or use the electrophoresis device at 4°C.

Description of parts

Front view



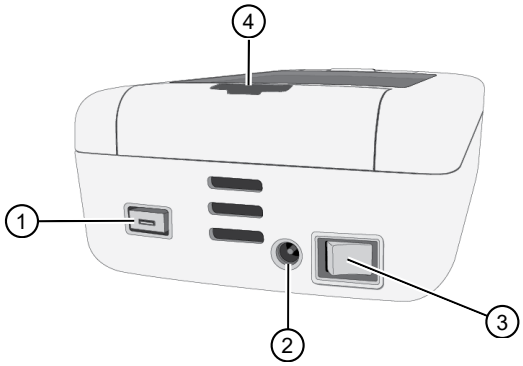
E-Gel™ Power Snap Lite System
(Base docked with Camera)

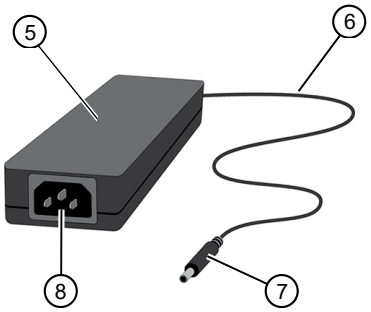


E-Gel™ Power Snap Lite Base

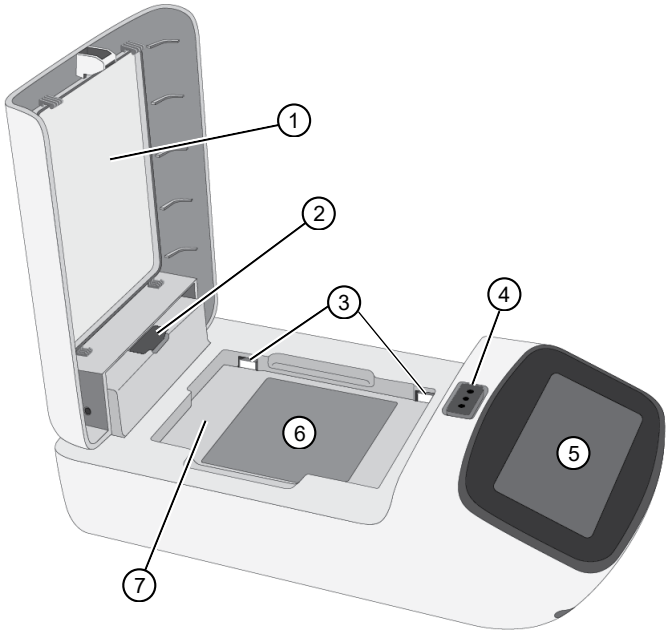
① Camera touchscreen
② USB port for image export/firmware upgrade
③ Handhold for lifting camera (on both sides)
④ Base unit touchscreen
⑤ Open button for filter lid
⑥ Lid with amber filter
⑦ Docking connector (covered)

Parts of the E-Gel™ Power Snap Lite Electrophoresis Device



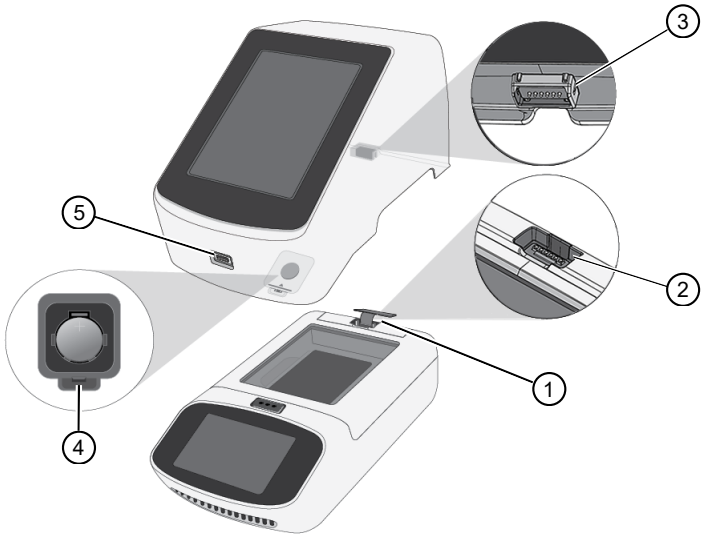


① USB port for firmware upgrade
② DC input
③ Power switch
④ Docking connector (covered)
⑤ Adaptor
⑥ DC output cable
⑦ Connector to DC input of electrophoresis unit
⑧ AC power cord inlet



1. Lid with amber filter (open)
2. Docking connector (covered)
3. Electrodes
4. Open button for filter lid
5. Electrophoresis base touchscreen
6. Blue-light transilluminator
7. E-Gel™ cassette compartment

Parts of the E-Gel™ Power Snap Lite Camera



1. Docking connector (uncovered)
2. Docking connector
3. Camera connector
4. Battery compartment
5. USB port for image export/firmware upgrade

Base unit graphic user interface

Table 1 Touchscreen controls

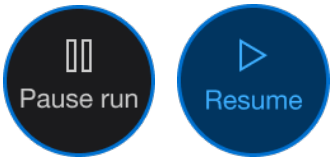
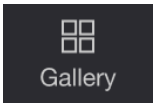
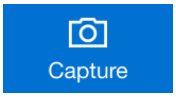
Button	Function
	Initiate gel run workflow
	Switch on/off blue light transilluminator
	Settings screen to access: • **About instrument** • **Screen brightness** • **Software update** • **Service mode** • **Instrument settings**
	Pause/Resume gel run
	Select category • Single row gel (11-well) • Double row gel (22-well) • CloneWell, NGS, SizeSelect, Reverse (Others) • Run last protocol
	Gallery screen to access: • **Actions** screen to **Edit**, **Delete**, or **Export** images • **Sort** images
	Capture gel image
	Returns to the previous screen

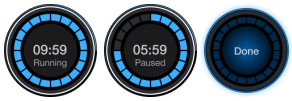
Table 1 Touchscreen controls *(continued)*

Button	Function
	Go to Home screen
	Go to Sign in screen
	Go to Settings screen
	Close the current modal window.

Touchscreen status indicators

See page 12 for an overview of the base unit GUI, and page 22 for an overview of the camera module GUI.

Table 2 Status indicators

Button	Function
	Instrument status 1. Time remaining 2. Protocol status (step, paused, etc.)
	Indicates whether a USB device is inserted into the instrument.

2 Using the E-Gel™ Power Snap Lite Electrophoresis Device

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

For specific protocols describing the use of E-Gel™ CloneWell™ II Agarose Gels, see page 29.

For specific protocols describing the use of E-Gel™ SizeSelect™ II Agarose Gels, see page 35.

Required materials

For electrophoresis:

- E-Gel™ Power Snap Lite Electrophoresis Device (see “Contents” on page 9)
- Safe Imager™ Viewing Glasses (see “Contents” on page 9)
- Nucleic acid sample
- E-Gel™ agarose gel cassette (see “Choosing the right gel” on page 53).
- E-Gel™ ladder (see “Choosing the right DNA or RNA ladder” on page 58) 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 Lite Camera (see “Contents” on page 9), iGlow™ Gel Documentation System (Cat. No. IGLOW), 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.

- **Keep all loading volumes uniform.** Samples, ladder, and empty wells should be filled with identical volumes of the appropriate material. If samples are less than the required volume, add E-Gel™ 1X Sample Loading Buffer or deionized water to the required volume.
- **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		1X E-Gel™ Sample Loading Buffer	Deionized water
		Sample with single band	Sample with multiple bands		
E-Gel™ EX	1%, 2%, 4%	0.5–50 ng	50 ng	2 µL	Fill to 20 µL
E-Gel™ EX Double Comb	1%, 2%				
E-Gel™ with SYBR™ Safe	1%, 2%, 4%	5–300 ng	500 ng	—	Fill to 20 µL
E-Gel™ Double Comb with SYBR™ Safe	1%, 2%				
E-Gel™ CloneWell™ II	0.8%	5-500 ng [1]	500 ng	2.5 µL [2]	Fill to 25 µL
E-Gel™ SizeSelect™ II	2%	1-300 ng	300 ng		
E-Gel™ NGS	0.8%	5-500 ng	500 ng	2.5 µL	Fill to 20 µL

[1] For best results, use 200–500 ng of sample.
[2] Use 10X Sample Loading Buffer (included with E-Gel™ CloneWell™ II or SizeSelect™ II Agarose Gels.

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

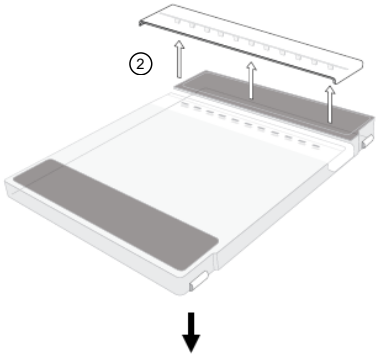
- Dilute the ladder accordingly with deionized water or 1X E-Gel™ Sample Loading Buffer.
- **Use the indicated amount of ladder per well.** Overloading the ladder will result in distorted or incomplete band separation.

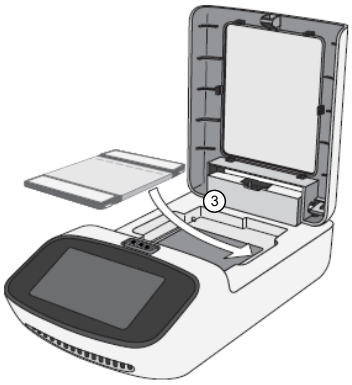
E-Gel™ DNA Ladder	E-Gel™ EX	E-Gel™ with SYBR™ Safe	E-Gel™ CloneWell™ II	E-Gel™ SizeSelect™ II
E-Gel™ Ultra Low Range DNA Ladder	4 µL (100 ng)	20 µL (500 ng)	–	–
E-Gel™ 50 bp DNA Ladder	2 µL (50 ng)	20 µL (500 ng)	–	2 µL (50 ng)
E-Gel™ 1 Kb PLUS™ DNA Ladder	2 µL (50 ng)	20 µL (500 ng)	25 µL (625 ng)	–
E-Gel™ 1 Kb PLUS™ Express	2 µL (80 ng)	20 µL (800 ng)	25 µL (1,000 ng)	–
E-Gel™ Sizing DNA Ladder	20 µL (40 ng)	–	–	25 µL (50 ng)
E-Gel™ Low Range Quantitative DNA Ladder	5 µL (87.5 ng)	10 µL (175 ng)	–	–

Prepare gel

Prepare samples as described in “Prepare samples” on page 15.

1. Remove E-Gel™ agarose gel from package.
2. Gently remove comb from the cassette.
3. Load the gel into the cassette compartment, starting from the right edge.
4. Press down on the left side of the cassette to secure it in place.
5. Load gels within 15 minutes after opening the package to prevent dehydration.

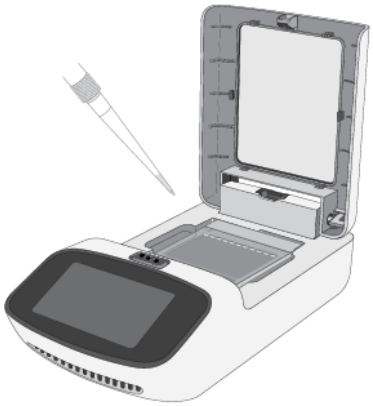




Load samples

- Use the recommended total loading volume for each gel type. Do not load more than recommended amount of DNA sample or ladder per well.
- Avoid introducing bubbles while loading. Bubbles can cause band distortion.

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. Start the run within 1 minute after loading samples.

   To obtain sharper bands, wait no more than 1 minute to allow nucleic acid samples to sink to the bottom of the wells.

Run the gel

1. Select **Set up run** on the main dial of the touchscreen to start E-Gel™ protocol selection.

2. Select the **E-Gel™ Category** corresponding to your gel type.

Gel Type	Category	Default run time	Maximum run time
E-Gel™ EX Agarose Gel, 1% and 2%	 **11 wells**	10 min	15 min
E-Gel™ EX Agarose Gel, 4%		15 min	20 min
E-Gel™ Agarose Gel with SYBR™ Safe, 1% and 2%		26 min	35 min
E-Gel™ Agarose Gel with SYBR™ Safe, 4%		30 min	35 min
E-Gel™ EX Double Comb Agarose Gel, 1% and 2%	 **22 wells**	13 min	15 min
E-Gel™ Double Comb Agarose Gel with SYBR™ Safe, 1% and 2%		5 min	8 min
E-Gel™ NGS Agarose Gel, 0.8%	 **Others**	26 min	35 min
E-Gel™ SizeSelect™ II Agarose Gel, 2%		8 min	20 min
E-Gel™ CloneWell™ II Agarose Gel, 0.8%		12 min	35 min
Reverse		2 min	3 min

3. (*Optional*) To repeat the last protocol used, select the **Run last** category.

4. (*Optional*) Adjust the **Duration** of the gel run using the +/– buttons or select the **Duration** field to open a keyboard to enter a value.

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

6. (*Optional*) Select **Pause run** to access the **Actions** screen for other options or **Back light** to view the run in real time (see page 19).

7. The run stops automatically after the programmed time has elapsed and beeps.
   a. Select **More time**, enter a **Duration**, then **Start run** to run the gel longer.

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

8. Proceed to image capture (see Chapter 3, “Using the E-Gel™ Power Snap Lite Camera”) or other downstream application.

Additional actions

During electrophoresis, the status of DNA separation can be checked in real time by selecting **Back light**, or **View gel** if viewing from the camera module.

In addition, the protocol can be temporarily stopped by selecting **Pause run**.

Select the main dial while the protocol is paused to access the **Actions** screen to:

- Edit the duration of the protocol.
- Cancel 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.

View gel

For optimal viewing, dim the ambient lighting in the room, or use the E-Gel™ Power Snap Lite Camera (for details, see Chapter 3, “Using the E-Gel™ Power Snap Lite Camera”).

Note: Allow E-Gel™ agarose gels with SYBR™ Safe to cool down for 15 minutes at room temperature or 5 minutes at +4°C before imaging to increase sensitivity.

1. Select **Back light** to activate the blue light transilluminator.

   Note: The transilluminator turns off automatically after 1 minute.

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

3. Select **Back light** 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 **Back light** to re-activate the blue light transilluminator.

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**

3 Using the E-Gel™ Power Snap Lite Camera

General guidelines

- The E-Gel™ Power Snap Lite Camera is an integral part of the E-Gel™ Power Snap Lite Electrophoresis System, and only works when docked to the E-Gel™ Power Snap Lite Electrophoresis Device.
- The E-Gel™ Power Snap Lite Camera, is designed for initiating electrophoresis, and performing imaging of E-Gel™ agarose gels. It is not suitable for use with any third party products or pour-your-own agarose gels.
- The E-Gel™ Power Snap Lite Camera does not require connection to a desktop computer. Data is transferred from the camera using a USB storage device.

Set up the camera

The first time the camera is started requires the date and time to be set.

1. Select **Settings** / ⚙.
2. Select **Instrument settings.**
3. Select **Date/Time.**
4. Choose the date and time format, then select **Done.**
5. Set the current date and time, then select **Done.**

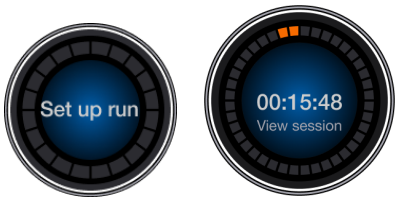
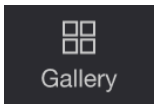
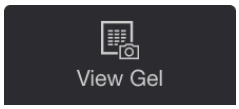
Modify camera settings

Select **Settings** / ⚙ to access additional features.

- Select **Instrument setting** to adjust screen brightness, default image type, and sleep mode features (see “Instrument settings” on page 52).
- Select **Update software** to install the latest firmware update (see page 46).

Camera module graphic user interface

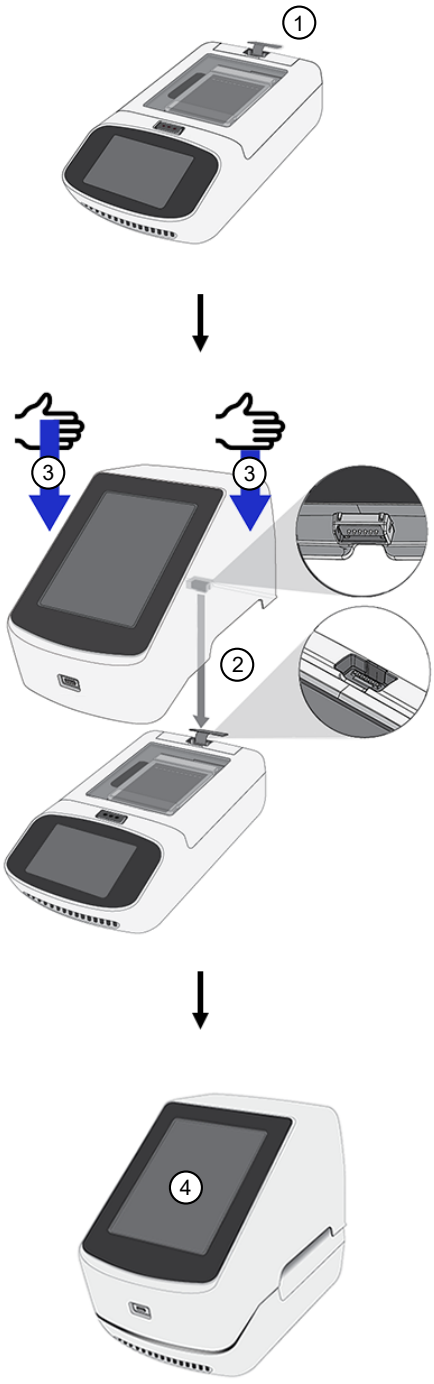
The home screen displays a main dial that shows a countdown timer when the gel is running. Three additional buttons are displayed across the bottom of the screen.

Control	Function
	• Initiate gel run workflow • **Capture** gel image • **Edit**/adjust capture settings • **Export** image
	Access image gallery
	• Visualize gel during run • Capture gel image
	Pause/resume gel run

Attach the camera

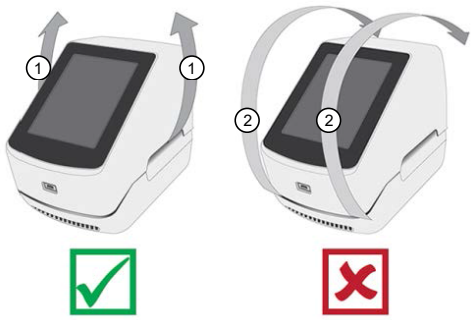
The E-Gel™ Power Snap Lite Camera can be attached to the E-Gel™ Power Snap Lite Electrophoresis Device either during a run, or after the run is completed.

1. Remove the rubber connector cover.
2. Align the docking connector on the base with the connector on the camera.
3. Using both hands, gently place the E-Gel™ Power Snap Lite Camera on top of the electrophoresis base.
4. When connected, the E-Gel™ Power Snap Lite 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 in both hands, and insert your fingers toward the rear of the handhold.
2. Lift the camera up off of the base module.



Run the gel

The process to run a protocol from the E-Gel™ Power Snap Lite Camera interface is the same as the process described for the E-Gel™ Power Snap Lite Electrophoresis Device.

1. Prepare samples (see “Prepare samples” on page 15)
2. Prepare gel (see page 17)
3. Load samples (see page 17)
4. Run the gel (see page 18)

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.

Note: Allow E-Gel™ agarose gels with SYBR™ Safe to cool down for 15 minutes at room temperature or 5 minutes at +4°C before imaging to increase sensitivity.

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

Settings for the E-Gel™ Power Snap Lite Camera other than exposure can be adjusted during the capture session.

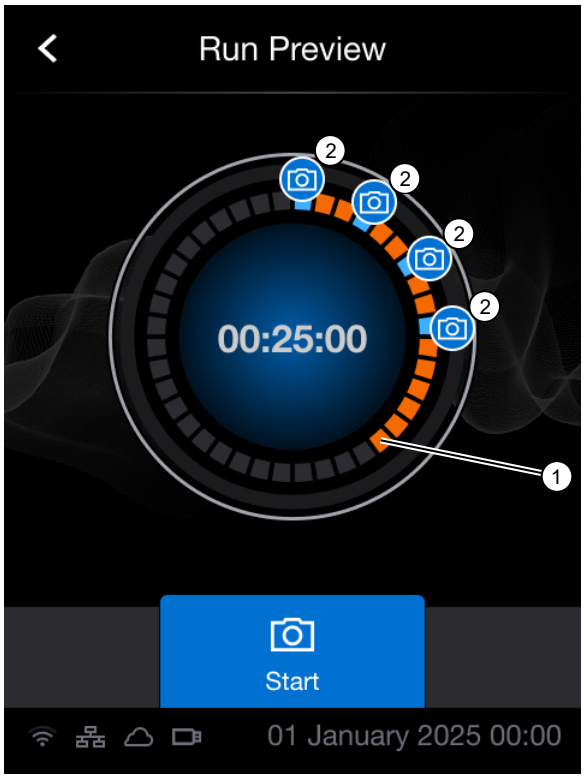
1. Select **Edit** from the capture screen.
2. Select the desired image setting from the dropdown list.

Setting	Detail
Brightness	Use ⊕/⊖ or move the slider to adjust image brightness settings.
Contrast	Use ⊕/⊖ or move the slider to adjust image contrast settings.
Invert	Convert image into grayscale and inverts color palette.
Grayscale	Convert image into a grayscale.

3. (*Optional*) Select **Undo** to reverse the adjustment, or **Cancel** ▸ **Continue** to discard all edits.
4. Select **Done** to confirm the edits.
5. Select **Capture** to capture the image with the new settings.

Automatic image capture

The E-Gel™ Power Snap Lite Camera can automatically capture images as the gel runs. The camera can capture and save 2–5 images of the gel at evenly spaced intervals.



① Time indicator
② Automatic image capture points

Set automatic image capture

1. Select **Auto capture**
2. Select one of following capture methods:
   a. **Smart exposure**: captures each image at the optimal exposure level.
   b. **Exposure bracketing**: captures each image at three different exposure settings.
3. Select the number of images to be captured.
4. Select the time at which image capture starts (5, 10, 15, 20, 25, 30, or 36 minutes before the end of the protocol).
   The start of capture is indicated by orange tick marks on the dial.

   Note: If a time setting is incompatible with the gel protocol run time, it will be disabled.
5. Select **Start** to begin the automatic capture session.

Cancel auto capture

Select ⌂ **(Home)** ▸ **Yes**.

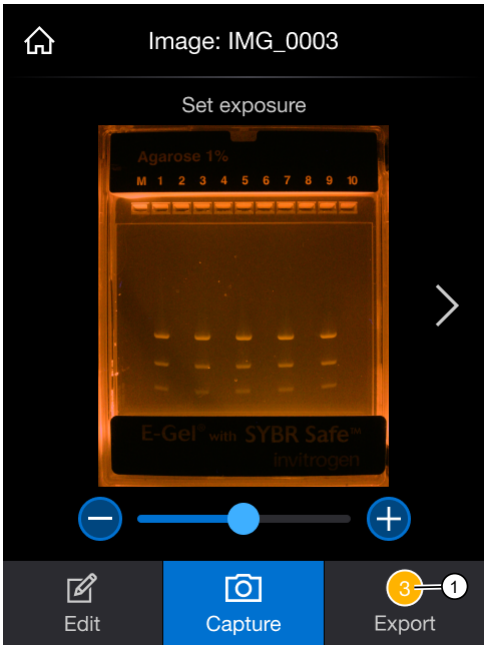
Export image

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

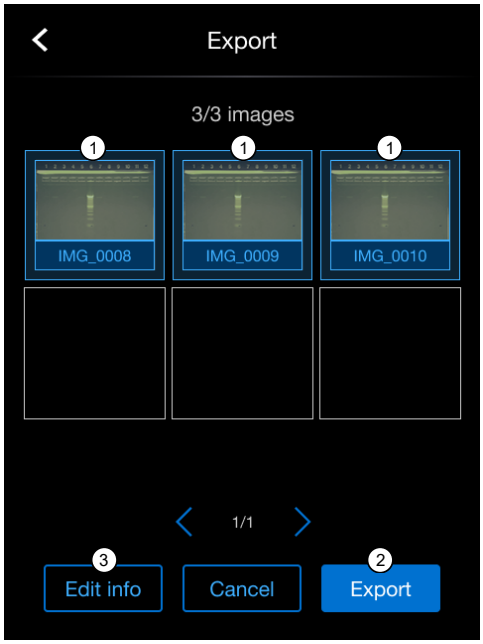
1. Insert a USB storage device into the USB port at the front of the E-Gel™ Power Snap Lite Camera.

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



① Icon showing the number of images stored in the active session gallery.

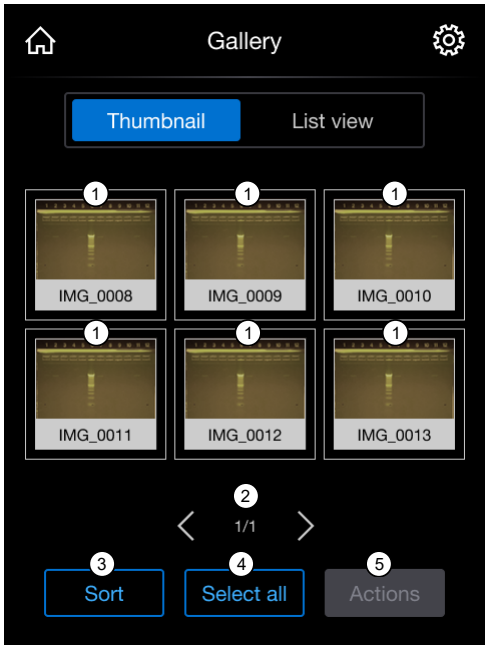
3. Review the images in the active session gallery, and select files for export.
4. (*Optional*) Select **Edit info** to change the file name, file type (JPEG, or TIFF format), or add comments.
5. Select **Export** to export active session images to the USB storage device.



① Captured image
② **Export** button
③ **Edit info** button

Export from image gallery

1. Insert a USB storage device into the USB port at the front of the E-Gel™ Power Snap Lite Camera.
2. Select **Gallery** from the **Home** screen.
3. Select **Thumbnails** or **List view** for navigation.
4. (*Optional*) Select **Sort** to organize files by date.
5. Select an image(s) to select the file, or tap again to de-select the file.
6. Select **Actions** from the gallery screen.
7. (*Optional*) Select **Delete** to delete selected image(s) from the camera.
8. (*Optional*) Select **Edit info** to change the file name, or add comments.
9. Select **Export** to export selected image(s) to the USB storage device.



① Captured image
② **Switch page** button
③ **Sort** button
④ **Select all** button
⑤ **Actions** button

4 E-Gel™ CloneWell™ II gels

E-Gel™ CloneWell™ II pre-cast agarose gels are designed for use with the E-Gel™ Power Snap Lite Electrophoresis Device, and provide a fast, safe, and effective DNA fragment isolation method for DNA cloning workflows.

Advantages

- Target fragments are collected directly from a recovery well. No gel-purification is required.
- Contains SYBR™ Safe DNA stain, eliminating the risk of DNA damage, and improving cloning efficiency by avoiding UV transillumination.

General guidelines

- Load gel within 15 minutes of opening the pouch to prevent dehydration; run the gel within 1 minute 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 63).

Prepare samples

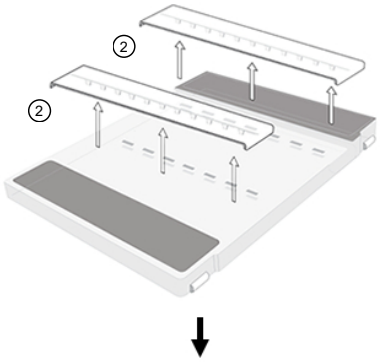
- Prepare up to 25 µL of sample in 1X Sample Loading Buffer (e.g., use 2.5 µL of 10X Sample Loading Buffer with 22.5 µL total sample).

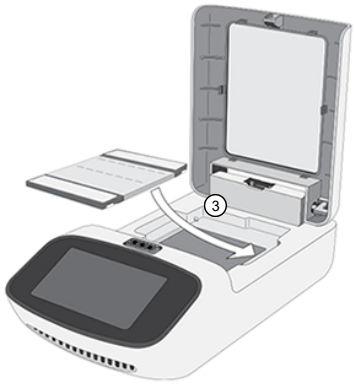
  10X Sample Loading Buffer is provided with E-Gel™ CloneWell™ II Agarose Gels.
- **Use the indicated amount of DNA per well** for single or multiple bands.
- Divide samples with higher amounts of DNA across multiple wells.
- Use up to 25 µL total sample volume per well.
- Dilute high salt samples (certain 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	5-500 ng	500 ng	25 µL

Prepare gel

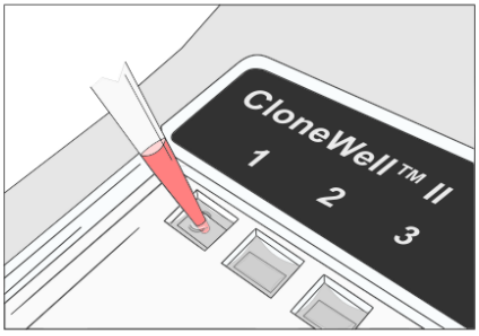
1. **Remove** the gel from the package.
2. Gently **remove** the combs. Do not allow the combs to bend or create suction in the wells during removal.
3. **Insert** gel cassette into the E-Gel™ Power Snap Lite Electrophoresis Device, starting from the right edge.
4. Press down on the left side of the 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.



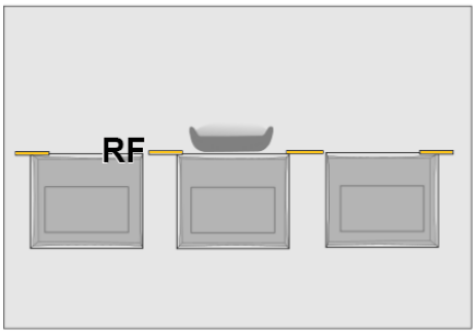
Run the gel

1. Press **Set up run,** then select the **CloneWell™ 0.8%** protocol on E-Gel™ Power Snap Lite 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 32).
3. **Adjust** protocol time according to the expected migration time of the target fragment to the reference line.
4. **Run the gel** protocol by selecting **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.



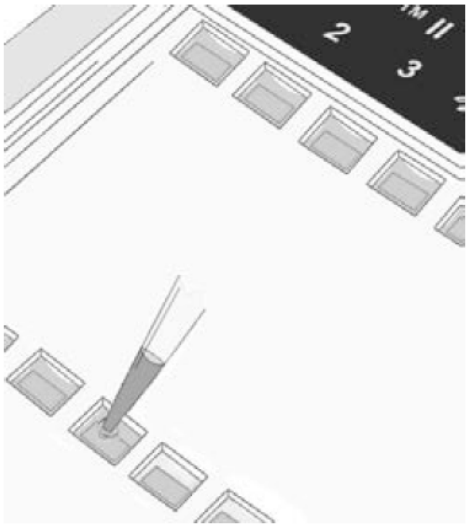
IMPORTANT! Put on orange Safe Imager™ viewing glasses prior to proceeding to further steps. Reduce ambient light or work in dark room for better visibility.

Prepare wells

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

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

   Ensure the recovery well contains water throughout the run. Refilling the wells every 10 minutes is recommended.



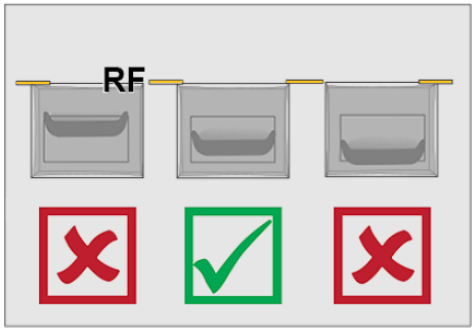
Collect DNA fragment

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.



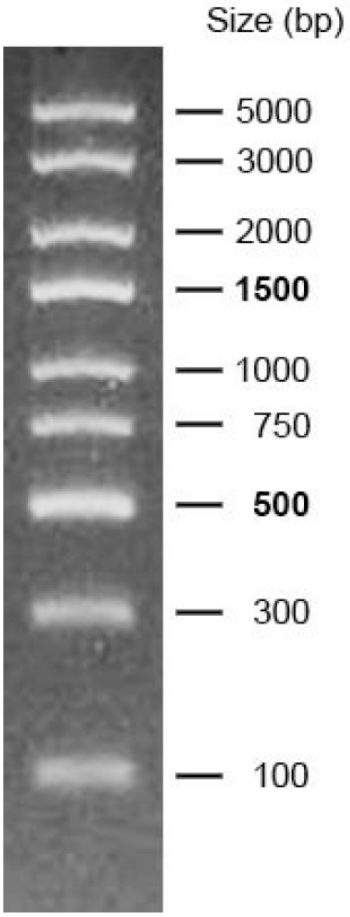
4. (*Optional*) Collect additional DNA bands in the same sample from the recovery well by adding more water to the recovery well (see “Prepare wells” on page 31).

5. (*Optional*) Use the **Reverse E-Gel™** protocol if the band of interest passes the recovery well (see “Change to another protocol” on page 20).

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

Troubleshooting

For common E-Gel™ troubleshooting guidelines refer to troubleshooting guide (see “Troubleshooting” on page 43).

Observation	Cause	Recommended action
Poor resolution or smearing of bands	Sample is overloaded	Do not load more than 500 ng of DNA in a single lane
	High salt concentration	Dilute your samples 2- to 5-fold
	Total sample volume is too low or too high	Load recommended sample volume of 25 µL per lane.
	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.
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.
	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 well	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 35 minutes. Use fresh gel. Follow sample loading recommendations.

5 E-Gel™ SizeSelect™ II gels

E-Gel™ SizeSelect™ II 2% Agarose Gels are designed for use with the E-Gel™ Power Snap Lite Electrophoresis Device, and provide a fast and convenient method for DNA fragment library size selection as part of NGS library preparation workflows.

Advantages

- Target fragments are collected directly from a recovery well.
- Contains highly-sensitive SYBR™ Gold II nucleic acid stain that allows detection down to 1 ng/band of DNA.

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” on page 64).

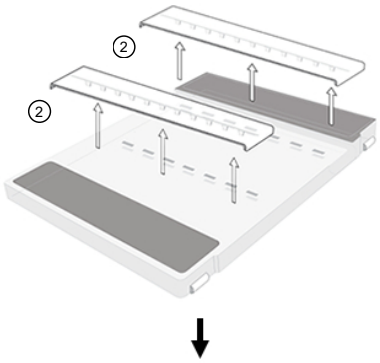
Prepare samples

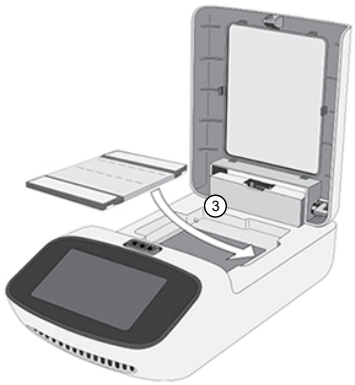
- Prepare up to 25 µL of sample in 1X Sample Loading Buffer (e.g., use 2.5 µL of 10X Sample Loading Buffer with 22.5 µL total sample).
  10X Sample Loading Buffer is provided with E-Gel™ SizeSelect™ II Agarose Gels.
- **Use the indicated amount of DNA per well** for single or multiple bands.
- Do not 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	300 ng	25 µL

Prepare gel

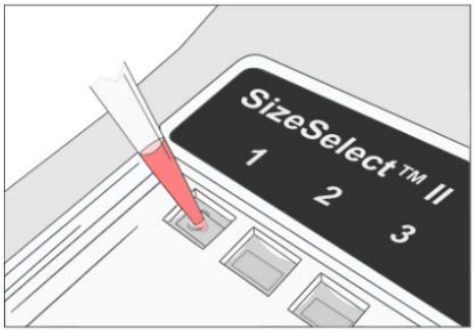
1. **Remove** the gel from the package.
2. Gently **remove** the combs. Do not allow the combs to bend or create suction in the wells during removal.
3. **Insert** gel cassette into the E-Gel™ Power Snap Lite Electrophoresis Device, starting from the right edge.
4. Press down on the left side of the 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.



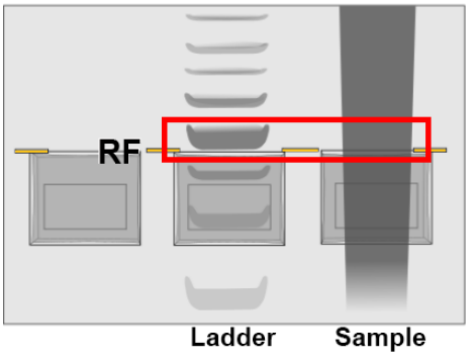
Run the gel

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 38).
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.

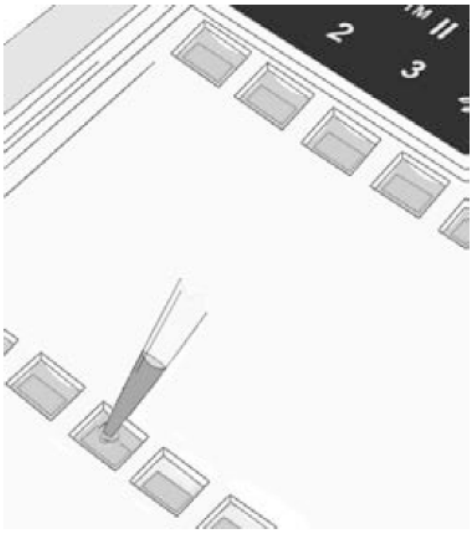


IMPORTANT! Put on orange Safe Imager™ viewing glasses prior to proceeding to further steps. Reduce ambient light or work in dark room for better visibility.

Prepare wells

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

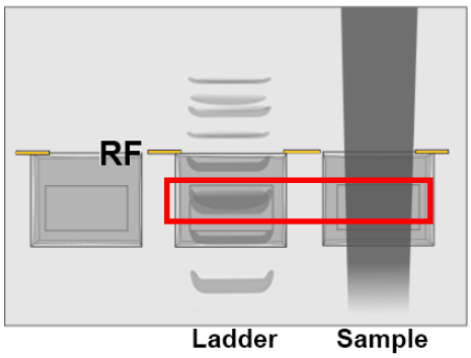
   The transilluminator turns off automatically when the filter lid is opened. Press **Back light** to re-activate the blue light transilluminator.
2. Carefully remove all liquid from the recovery wells.
3. Load 50 µL of nuclease-free water to all recovery wells. Do not allow water to spill over the edge 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 20).

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

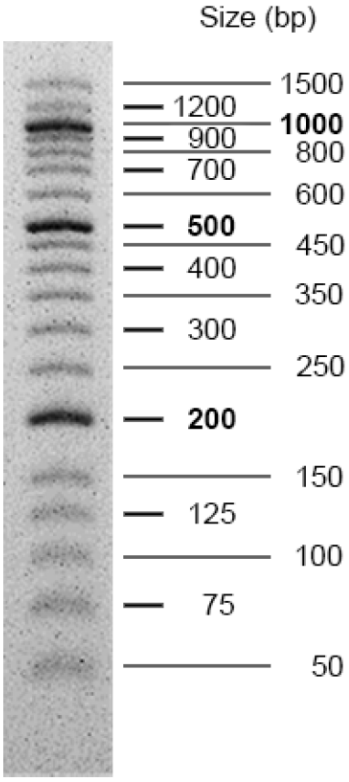
Ladder	Fragment size	DNA amount (per 25 µL)	Migration time to reference line
	1,500 bp	1.5 ng	~19.5 min
	1,200 bp	1.5 ng	~18.5 min
	1,000 bp	6.0 ng	~17.5 min
	900 bp	2.0 ng	~17 min
	800 bp	2.0 ng	~16.5 min
	700 bp	2.0 ng	~16 min
	600 bp	2.0 ng	~15.5 min
	500 bp	6.0 ng	~14.5 min
	450 bp	2.0 ng	~14 min
	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**	

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
400-base-read	480 bp	14–20 min	**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					
200-base-read	270 bp	12–14 min	**500 ng**	300 bp band is at the **top** of the **exposed agarose area**	

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	**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.

Troubleshooting

For common E-Gel™ troubleshooting guidelines refer to troubleshooting guide (see “Troubleshooting” on page 43).

Observation	Cause	Recommended action
Poor resolution or smearing of bands	Sample is overloaded	Do not exceed 500 ng of total DNA per one sample lane or 500 ng DNA per one band. Do not exceed 1 ug for sheared DNA
	High salt concentration	Dilute your samples 2- to 5-fold
	Total sample volume is too low or too high	Use recommended sample volume of 25 µL per lane
	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.
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.
	Target DNA passed the recovery gel	Carefully observe the DNA migration into the recovery well. Minimize ambient light or perform the workflow in dark room.
	DNA 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
DNA band passed the recovery well	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 30 minutes. Use fresh gel. Follow sample loading recommendations.

Troubleshooting

Troubleshooting

Observation	Cause	Recommended action
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 adaptor used	Use only UL Listed Class 2 Direct Plug-in Adaptor included with the E-Gel™ Power Snap Lite Electrophoresis Device.
Poor resolution or smearing of bands	Sample is overloaded	Use correct amount of sample as described in Sample Preparation.
	High salt concentration	Dilute high-salt samples as described in Sample Preparation.
	Total sample volume is too low	Load recommended sample volume based gel type. Keep all sample volumes uniform. Load deionized water in all empty wells
	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 was not electrophoresed 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

(continued)

Observation	Cause	Recommended action
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 • Adjust the exposure time or modify the brightness and contrast of the image.
RNA sample cannot be seen	Inhibition of visualization by heat and denaturing agent	• Wait 10–15 minutes for gel to cool before visualization • Adjust the exposure time or modify the brightness and contrast of the image.
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 Lite Camera)	Incorrect camera adjustments	Refer to "Adjust capture settings" on page 25.
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 iGlow™ Gel Documentation System (Cat. No. IGLOW).

B

Maintenance

System maintenance

Repeated instrument use can result in formation of spots and smudges on the glass over the transilluminator and on the amber filter, which can then decrease image quality. Clean the glass over the transilluminator and amber filter as needed.

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.

Cleaning

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.

Upgrade system firmware

1. Download the latest firmware file from thermofisher.com to your PC.

2. Unzip and transfer the firmware upgrade files to a USB storage device.

3. Insert the USB storage device into a USB port on the instrument.
   a. Use the port located at the back of the E-Gel™ Power Snap Lite Electrophoresis Device (A) to upgrade the electrophoresis unit.

   b. Use the port located at the front of the E-Gel™ Power Snap Lite Camera (B) to upgrade the camera.

4. Press **Settings** / ⚙, then select **Software update.** The instrument will search for the update files in the USB storage device.

5. Select **Update.** The instrument will automatically install the new software. Installation takes 1–2 minutes. The instrument reboots after software installation is complete.

IMPORTANT! do not power off the instrument during software installation.

6. After installation is comple, remove the the USB storage device.

7. Switch the instrument **off,** then after a few seconds, switch the instrument **on** again.

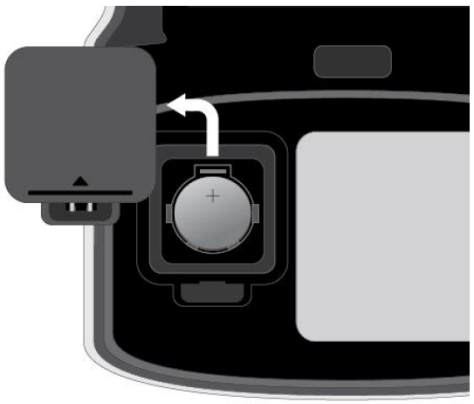
8. Verify that the updated software is installed by pressing **Settings** / ⚙, then select **About instrument.**

Battery replacement

The E-Gel™ Power Snap Lite 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 indicate the need to replace it.

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



C

Specifications

Instrument specifications

Instrument dimensions and specifications

Specification	E-Gel™ Power Snap Lite Electrophoresis Device
Dimensions	242 mm × 130 mm × 70 mm [1]
Weight	1.4 kg
Touchscreen LCD display	77.4 mm × 43.86 mm
Viewing surface dimensions	90 mm × 110 mm
Amber filter dimensions	86 mm × 105 mm
LED light	Blue LED (CWL: 465 nm, FWHM: 20 nm)
LED life	50,000 hours
LED specification	Array of 12 high power LEDs emitting at 465 +/- 10 nm

[1] Dimensions for Base Module only, excludes external power supply and accessories.

Specification	E-Gel™ Power Snap Lite Camera
Dimensions	259 mm × 130 mm × 152 mm
Weight	1.4 kg
Internal memory	32 GB
Touchscreen LCD display	115.2 mm × 86.4 mm
Camera type	color CMOS
Gel image resolution	2208 × 1776 (3.9MP), 8 bits
Dynamic range	68dB
Image output	.tif (Grayscale) and .jpg (Color)
Lens f/number	2.8

Electrical requirements

WARNING! For safety, the power outlet used for powering the instrument must be accessible at all times. In case of emergency, you must be able to immediately disconnect the main power supply to the instrument. Allow adequate space between the wall and the equipment so the power cord can be disconnected in case of emergency.

- Electric receptacle with grounding capability
- Maximum power dissipation: ~90 W
- Mains AC line voltage tolerances must be up to ±10 percent of nominal voltage

	Rated Voltage (Input)	Rated Current (Input)	Rated Frequency (Input)	Rated Power (Output)
AC/DC Power Supply	100–240 VAC ±10%	1.3 A	50/60 Hz	90 W
E-Gel™ Power Snap Lite Electrophoresis Device	48 VDC ±2.5%	1.87 A	N/A	N/A
E-Gel™ Power Snap Lite Camera	Does not function as a standalone device. Powered from E-Gel™ Power Snap Lite Electrophoresis Device.			

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.
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.
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.

(continued)

Condition	Acceptable Range
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 ≤52 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.

D

Settings

Settings

The **Settings** screen is used to access instrument settings, protocol, maintenance, and instrument log features.

Table 6 Base unit settings

Setting	Function
About instrument	Display information about the base unit such as software version and serial number.
Screen brightness	Adjust the brightness of the base unit touchscreen. See “Adjust screen brightness” on page 51 for details.
Software update	Update the instrument firmware. See “Upgrade system firmware” on page 46 for details.
Service mode	For Thermo Fisher Scientific service representative use only.

Table 7 Camera module unit settings

Setting	Function
instrument settings	Go to camera module settings. See “Instrument settings” on page 52 for details.
About instrument	Display information about the camera module such as software version and serial number.
Software update	Update the instrument firmware. See “Upgrade system firmware” on page 46 for details.
Service mode	For Thermo Fisher Scientific service representative use only.

Adjust screen brightness

1. Access the screen brightness control.
   a. Select **Settings/** ⚙ ▸ **Screen brightness** from the **Home** screen of the base unit.
   b. Select **Settings** ⚙ ▸ **Brightness** from the **Home** screen of the camera module.
2. Use ⊕/⊖ or move the slider to adjust screen brightness settings.

3. (*Optional*) Select **Cancel** to undo changes.
4. Select **Done** to confirm the edits.

Instrument settings

The **Settings** screen is used to access instrument settings, protocol, maintenance, and instrument log features.

Setting	Function
Sleep mode	Set time interval for sleep mode to begin when camera is inactive. See "Set sleep mode" on page 52 for details.
Brightness	Adjust the brightness of the camera module touchscreen. See "Adjust screen brightness" on page 51 for details.
Date/Time	Set the date and time. See "Set date and time" on page 52 for details.
Default file type	Set the file type for the captured image. • JPEG (compressed, smaller size) • TiFF (uncompressed, larger size)
Reset image gallery	Delete all images stored in the camera module.

Set sleep mode

Set sleep mode to conserve energy when the camera is not in use.

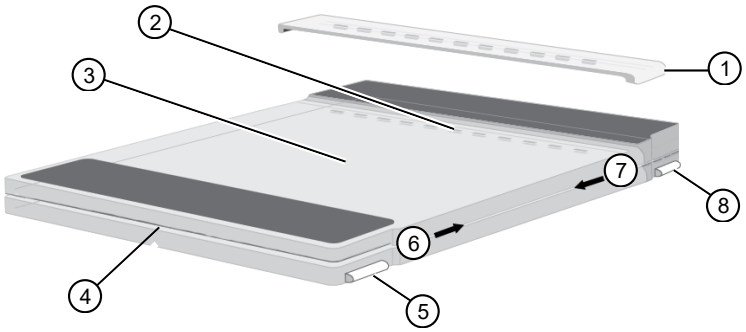
1. Select ⚙ **(Settings)** ▸ **Sleep mode** from the **Home** screen of the camera module.
2. Set the toggle to **On** or **Off** to enable or disable sleep mode.
3. Select the field for the timer, then select the appropriate time fields to set the time interval that needs to elapse before the camera module enters sleep mode.
4. Select **Done**.

Set date and time

1. Select ⚙ **(Settings)** ▸ **Date / Time** from the **Home** screen of the camera module.
2. Select a **Date** field, then select the appropriate fields to set the day (**DD**), month (**MM**), or year (**YYYY**).
3. Select a **Time** field, then select the appropriate fields to set the time.
4. Select **Done**.

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
② Sample wells
③ Agarose gel
④ Groove
⑤ Anode (+)
⑥ $Tris^+$ migration path
⑦ AC^- migration path
⑧ Cathode (–)

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/egelselection** for additional information, or use the specifications of various single-use gels in the followng tables to determine the optimal gel type for your application.

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
Application	**Fast separation and high sensitivity sample analysis**		**Routine gel separation**	
No. rows	1 row	2 rows	1 row	2 rows
Loading wells	11 wells	22 wells	11 wells	22 wells
Loading volume	20 µL	20 µL	20 µL	20 µL
Stain	SYBR™ Gold II		SYBR™ Safe	
Detection sensitivity	0.5 ng/band		3 ng/band	
% Agarose	1%, 2%, 4%	1%, 2%	1%, 2%, 4%	1%, 2%
Separation range	1%: 100 bp - 5 kb 2%: 50 bp - 2 kb 4%: 10 bp – 500 bp	1%: 400 bp - 5 kb 2%: 50 bp - 2 kb	1%: 100 bp - 5 kb 2%: 50 bp - 2 kb 4%: 10 bp – 500 bp	1%: 400 bp - 5 kb 2%: 50 bp - 2 kb
Run time	1%, 2%: 10-15 min 4%: 15-20 min	5-8 min	26-35 min	13-15 min
Access to sample	Yes (openable)	Yes (openable)	Yes (openable)	Yes (openable)

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	1 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

(continued)

	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**
Run time	12-28 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.

Other applications for routine electrophoresis

E-Gel™ EX Agarose Gels can be used to run RNA samples. RNA can be run under denaturing or non-denaturing conditions. Use non-denaturing conditions only when checking for RNA quality, where accurately determining size is not critical. See Appendix G, “Running RNA samples on E-Gel™ EX agarose gels” for instructions on performing electrophoresis of RNA samples.

Opening E-Gel™ cassettes

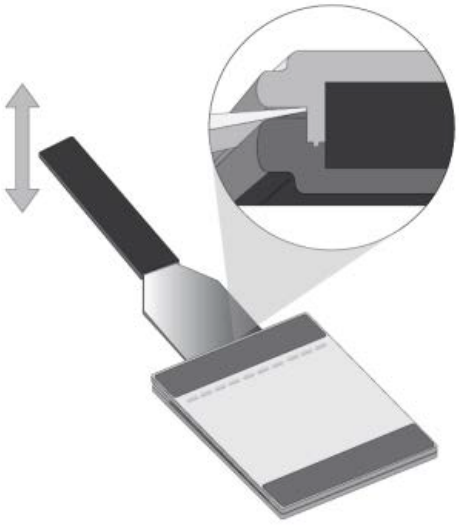
- Electrophoresis must be complete before opening the E-Gel™ cassette.
- Photograph the gel before opening the cassette.
- If you plan to isolate DNA from the E-Gel™ agarose gel, open the cassette and excise the gel fragment immediately after electrophoresis as bands will diffuse within 20 minutes.
- 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

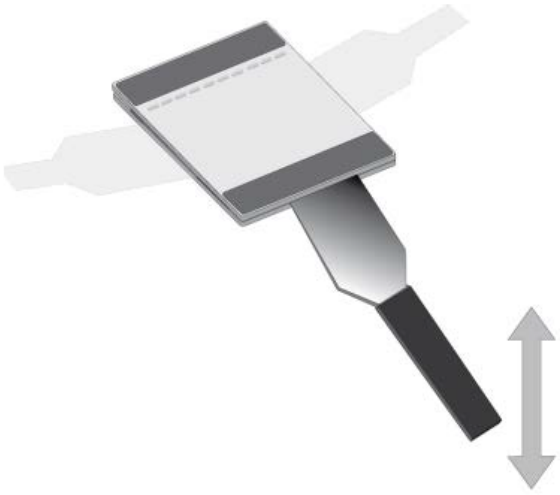
The Gel Knife (Cat. no. EI9010) is used to open the cassette for E-Gel™ EX and E-Gel™ NGS agarose gels.

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 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” on page 63).

Choosing the right ladder

Choosing the right DNA or RNA ladder

Go to **thermofisher.com/egelselection** 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.

		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
Gel Type	% Agarose	(Cat. No. 10488090)	(Cat. No. 10488091)	(Cat. No. 10488099)	(Cat. No. 12352019)	(Cat. No. 12373031)	(Cat. No. 10488096)	(Cat. No. AM7150)	(Cat. No. AM7145)	(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™ CloneWell™ II	0.8%	–	✔	–	✔	–	–	–	–	–
E-Gel™ SizeSelect™ II	2%	–	–	–	–	–	–	–	–	✔
E-Gel™ NGS	0.8%	✔	✔	–	–	–	–	–	–	–

Running RNA samples on E-Gel™ EX agarose gels

E-Gel™ EX Agarose Gels can be used to run RNA samples. RNA can be run under denaturing or non-denaturing conditions. Use non-denaturing conditions only when checking for RNA quality, where accurately determining size is not critical.

Non-denaturing conditions

- Mix RNA sample with RNase-free water such that the final volume is 20 µL.
- Do not heat. Load the entire sample onto the E-Gel™ EX gel.
- Run RNA using the E-Gel™ EX 1–2% program for 10 minutes.

Denaturing agents

The only denaturing agent that is compatible with the E-Gel™ EX system is Formamide, 50–95%. Lower concentrations are also acceptable.

IMPORTANT! Using other denaturing agents like Glyoxal, Formaldehyde, or Urea results in very poor separation and band morphology on E-Gel™ EX gels.

Prepare RNA ladder

Mix 500 ng of RNA ladder with formamide (50% final concentration) in a final volume of 20 µL.

- For 1% E-Gel™ EX Agarose Gels use the Millennium™ RNA Marker (Cat. No. AM7150).
- For 2% E-Gel™ EX Agarose Gels use the Century™-Plus RNA Ladder (Cat. No. AM7145)

Perform RNA electrophoresis under denaturing conditions

1. Mix RNA (250 ng–2 µg) sample with formamide (to 50–95%) such that the final volume is 20 µL.
2. Heat samples at 65°C for 5 minutes to denature RNA.
3. Place samples on ice immediately after heating.
4. Load entire sample onto E-Gel™ EX gel.

5. Load the RNA ladder.

6. Fill any remaining empty wells with 20 µL of water or E-Gel™ Sample Loading Buffer (Cat. No. 10482055).

   Note: Running samples in Sample Loading Buffer alongside samples in water on the same gel is not recommended.

7. Run RNA using the E-Gel™ EX 1–2% program for 10 minutes.

H Visualization of DNA gel stains

About the blue-light transilluminator

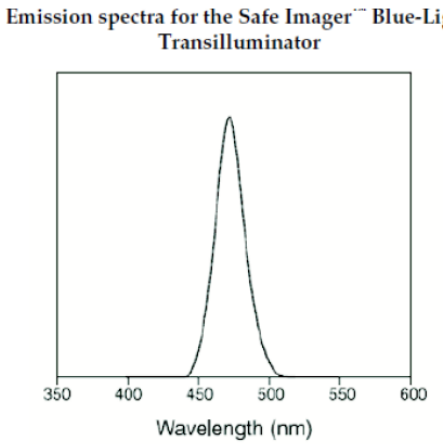
To monitor sample separation right at laboratory bench, the E-Gel™ Power Snap Lite Electrophoresis Device has an integrated blue-light LED source with emission maximum at 465 nm. This enables real-time monitoring of samples running on E-Gel™ agarose gels that are pre-stained with SYBR™ Safe or SYBR™ Gold II DNA stains.

The light from a LED source within the transilluminator passes through a blue filter producing a single intensity signal at approximately 465 nm, effective for the excitation of SYBR™ DNA-binding dyes such as SYBR™ Safe DNA gel stain and SYBR™ Gold. Sensitivity obtained using this instrument is comparable to that obtained with a standard UV transilluminator.

The E-Gel™ Power Snap Lite Electrophoresis Device transilluminator is designed for viewing E-Gel™ with SYBR™ Safe and E-Gel™ Double Comb with SYBR™ Safe gels, E-Gel™ EX and E-Gel™ EX Double Comb gels, E-Gel™ CloneWell™ II gels, E-Gel™ NGS gels, and E-Gel™ SizeSelect™ II gels.

The use of blue-light transillumination is advantageous over the UV, as it does not require UV protective equipment during use. In preparative gel electrophoresis blue-light transillumination results in dramatically increased cloning efficiencies compared to UV transillumination.

IMPORTANT! Do not look directly at blue-light transilluminator surface. Make sure the filter lid is closed when the blue light is on. When working with opened filter cover, always use E-Gel™ Safe Imager™ viewing glasses.



Imaging E-Gel™s on third party gel imagers

For E-Gel™ agarose gel imaging on other commercially available imaging devices follow user guides provided by the supplier. Instruments with an excitation source in the UV range or between 470–530 nm may also be used with the proper filter. Contact your instrument manufacturer for advice.

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.

Safety features

SYBR™ Safe DNA gel stain is not classified as hazardous waste under US Federal regulations.

- Meets the requirements of the Clean Water Act and the National Pollutant Discharge Elimination System regulations.
- Does not induce transformations in primary cultures of Syrian hamster embryo (SHE) cells.
- Does not cause mutations in mouse lymphoma cells at the TK locus, nor does it induce chromosomal aberrations in cultured human peripheral blood lymphocytes, with or without S9 metabolic activation.
- Causes fewer mutations in the standard Ames test compared to ethidium bromide. Weakly positive results occurred in only four out of seven Salmonella strains, and only with activation by a mammalian S9 fraction.
- Produces no signs of mortality or toxicity at a limit dose of 5000 mg/kg from a single oral administration.

View studies documenting the safety of SYBR™ Safe in the SYBR™ Safe White Paper document, available from **thermofisher.com/content/dam/LifeTech/global/life-sciences/pdfs/494.pdf**

Cloning benefits

By using the blue light transillumination for visualization, DNA damage is dramatically reduced, thus improving cloning efficiency. For more information, go to: **thermofisher.com/sybrsafe**

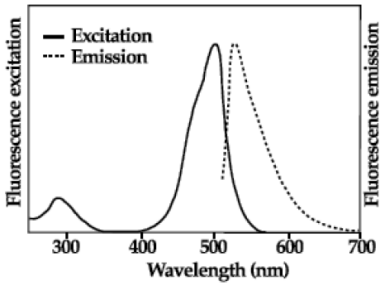
Disposal

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.

Spectrum

Bound to nucleic acids, SYBR™ Safe stain has fluorescence excitation maxima at 280 and 502 nm, and an emission maximum at 530 nm (see following figure).

Normalized fluorescence excitation and emission spectra of SYBR™ Safe DNA gel stain, determined in the presence of DNA.



Visualization

For quick visualization and documentation of SYBR™ Safe stained E-Gel™ agarose gels use the E-Gel™ Power Snap Lite Camera.

Alternatively, use a blue light transilluminator or a standard UV transilluminator. The UV excitation range is not optimal for SYBR™ Safe stain, therefore gels visualized on UV transilluminator will provide lower sensitivity.

SYBR™ Gold II gel stain

SYBR™ Gold II gel stain has been specifically developed for E-Gel™ EX and E-Gel™ SizeSelect™ II 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.

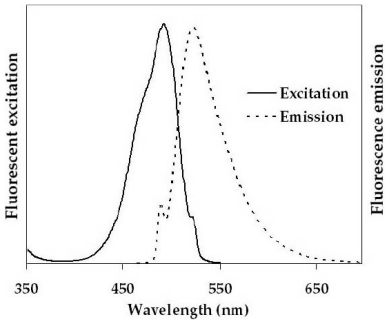
Disposal

Dispose E-Gel™ EX and E-Gel™ SizeSelect™ 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.

Spectrum

When bound to nucleic acids, the proprietary nucleic acid stain in E-Gel™ EX and E-Gel™ SizeSelect™ agarose gels has fluorescence excitation maxima at 490 nm, and an emission maximum at 522 nm (see figure below).

Normalized fluorescence excitation and emission spectra of proprietary DNA gel stain in E-Gel™ EX and E-Gel™ SizeSelect™ agarose gels, determined in the presence of DNA.



Visualization

For quick visualization and documentation of SYBR™ Gold II stained E-Gel™ agarose gels use the E-Gel™ Power Snap Lite Camera.

Alternatively, use a blue light transilluminator or a standard UV transilluminator.

Accessory products

E-Gel™ agarose gels

Refer to **Choosing the right gel** (“Choosing the right gel” on page 53) to select the most suitable gel for your application. For additional information, go to **thermofisher.com/egelselection**.

Application	Products	% Agarose	Stain type	No. of sample wells	Quantity	Catalog No.
Fast and ultra-sensitive DNA sample analysis	E-Gel™ EX Agarose Gels	1%	SYBR™ Gold II	11	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%		22	10 gels	A42345
					20 gels	A44887
					50 gels	A44888
		2%			10 gels	A42346
					20 gels	A44889
					50 gels	A44890
Routine agarose workflow	E-Gel™ Agarose Gels with SYBR™ Safe	1%	SYBR™ Safe	11	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%		22	10 gels	A42347
					20 gels	A44885

(continued)

Application	Products	% Agarose	Stain type	No. of sample wells	Quantity	Catalog No.
Routine agarose workflow	E-Gel™ Double Comb Agarose Gels with SYBR™ Safe	1%	SYBR™ Safe	22	50 gels	A44886
		2%			10 gels	A42348
					20 gels	A42390
					50 gels	A44884
Cloning workflow	E-Gel™ CloneWell™ II Agarose Gels	0.8%		7	10 gels	G661818
NGS size selection workflow	E-Gel™ NGS Agarose Gels	0.8%	SYBR™ Gold II	11	10 gels	A25798
	E-Gel™ SizeSelect™ II Agarose Gels	2%		7	10 gels	G661012

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

J

Safety

WARNING! GENERAL SAFETY. Using this product in a manner not specified in the user documentation may result in personal injury or damage to the instrument or device. Ensure that anyone using this product has received instructions in general safety practices for laboratories and the safety information provided in this document.

- Before using an instrument or device, read and understand the safety information provided in the user documentation provided by the manufacturer of the instrument or device.
- Before handling chemicals, read and understand all applicable Safety Data Sheets (SDSs) and use appropriate personal protective equipment (gloves, gowns, eye protection, and so on). To obtain SDSs, visit **thermofisher.com/support**.

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 Lite Electrophoresis System is subject to the following conditions:

- Indoor use.
- Altitude below 2000 meters.
- Temperature range: 5 to 30°C.
- Maximum relative humidity: 80% (maxiumum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C).
- 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 Lite Electrophoresis System. To honor the warranty, the E-Gel™ Power Snap Lite 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.	
	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)
CE	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 Lite 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.
c UL us	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.
UK CA	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 Lite 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.

(continued)

Symbol and description	
	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.
	**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 Lite 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.

(continued)

Symbol and description	
UK CA	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 Lite 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
25	Chine RoHS EFUP 25

Safety compliance

The instrument design and manufacture complies with the following standards and requirements for safety.

Reference	Description
EU Directive 2014/35/EU	European Union "Low Voltage Directive"
IEC 61010-1 EN 61010-1 UL 61010-1 CAN/CSA C22.2 No. 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
IEC 61010-2-081 EN 61010-2-081 UL 61010-2-081 CAN/CSA C22.2 No. 61010-2-081	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

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.

EMC compliance

Reference	Description
Directive 2014/30/EU	European Union “EMC Directive”
IEC 61326-1 EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements
FCC Part 15 Subpart B (47 CFR)	U.S. Standard Radio Frequency Devices 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
ICES-001	Canadian regulatory standard for Industrial, Scientific and Medical (ISM) Equipment

Environmental design standards

Reference	Description
EU Directive 2012/19/EU	European Union “WEEE Directive”—Waste electrical and electronic equipment
EU Directive 2011/65/EU	European Union “RoHS Directive”—Restriction of hazardous substances in electrical and electronic equipment
SJ/T 11364-2014 GB/T 26572-2011	“China RoHS” Standard—Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products
EC 1907/2006	European Union “REACH Directive”—Registration, Evaluation, Authorisation and Restriction of Chemicals

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 79).

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

- 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.
- 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. See “System maintenance” on page 45 for details.

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.

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
  cdc.gov/labs/bmbl
- Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 (Laboratory biosafety manual, fourth edition and associated monographs)
  who.int/publications/i/item/9789240011311

Documentation and support

Customer and technical support

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  - 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 its affiliates 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 questions, contact Life Technologies at **www.thermofisher.com/support**.