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invitrogen

SureLock™ Tandem Midi Gel Tank

USER GUIDE

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Publication Number MAN0018507

Revision B.0

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ThermoFisher SCIENTIFIC

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Revision history: Pub. No. MAN0018507

Revision	Date	Description
B.0	13 May 2021	Updating based on multiple instrument changes.
A.0	02 July 2020	New manual.

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Contents

- SureLock Tandem Midi Gel Tank 5
  - Product description 5
  - Product specifications 7
  - Overview of tank assembly 9
  - Gel electrophoresis protocol 10
    - Insert cassette 11
    - Fill tank with running buffer and load samples 12
    - Start electrophoresis 12
  - Open midi gel cassette 13
  - Maintenance 16
  - Storage 17
  - Run conditions 17
  - Troubleshooting 18
  - Related products 19
  - Customer and technical support 22

Tank safety 23

Safety 25

- Symbols on this instrument 25
  - Standard safety symbols 26
  - Additional safety symbols 26
  - Control and connection symbols 27
  - Conformity symbols 27
- Safety information for instruments not manufactured by Thermo Fisher Scientific 28
- Instrument safety 28
  - General 28
  - Electrical safety 29
  - Cleaning and decontamination 30
- Safety and electromagnetic compatibility (EMC) standards 30
  - Safety standards 31
  - Environmental design standards 31
- Chemical safety 32

Limited product warranty 34

SureLock Tandem Midi Gel Tank

WARNING! Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves. Safety Data Sheets (SDSs) are available from **thermofisher.com/support**.

Product description

The Invitrogen™ SureLock™ Tandem Midi Gel Tank provides a rapid protocol for midi gel electrophoresis requiring minimal buffer in a leak-free system. With a set-up time of ~30 seconds, the tank efficiently runs midi gels while providing consistent performance.



Table 1 Contents and part descriptions

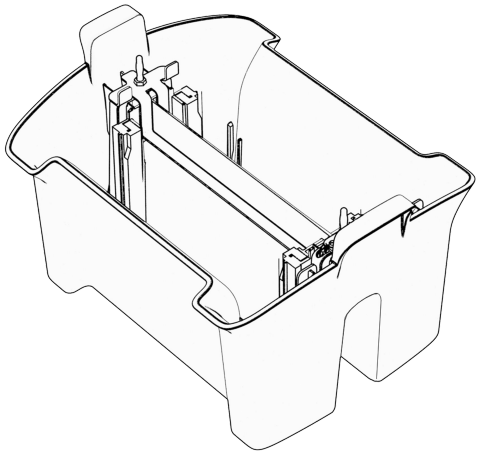
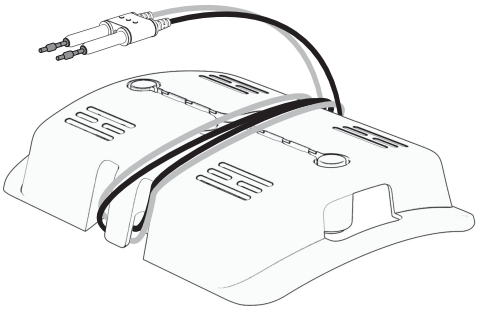
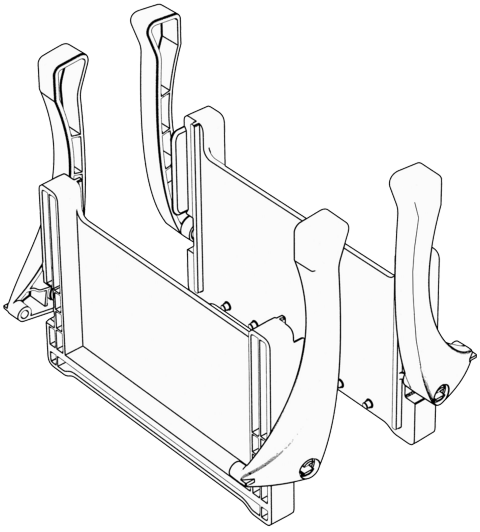
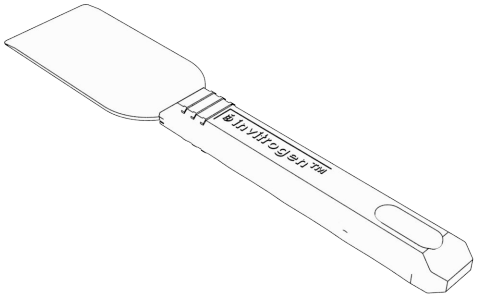
Component	Description	
Midi Gel Electrophoresis Tank	• Front and back design with 2 independent chambers each with a capacity of ~550 mL. • The cathode and anode connectors are designed into the electrophoresis tank.	
Midi Gel Tank Lid	• Contains sockets for the anode and cathode connectors. • Connects to the power supply through 2 electrode cables. • Cable wrap feature to securely wrap cables for easy storage. • Lid and tank are keyed to ensure proper installation.	
Cassette Clamps (2)	Each clamp consists of a cam plate and 2 independently movable cam handles.	

Table 1 Contents and part descriptions *(continued)*

Component	Description	
Gel Knife	For easy opening of Invitrogen™ pre-cast midi gels.	

Product specifications

Specification	Parameter
Dimensions (L × W × H)	25 × 18 × 17 cm (height with lid)
Capacity	Up to 2 midi gels
Compatible Gels	All Invitrogen™ precast midi gels and Invitrogen™ empty midi gel cassettes
Gel Dimensions	Gel size: 8 × 13 cm Gel cassette: 10.3 × 15 cm Thickness: 1.0 mm
Buffer Chamber Requirement	Inner chamber: 170 mL (per gel) Outer chamber: 350 mL (per gel)
Tank Material	Polycarbonate
Electrode Wire	Platinum (0.010" diameter)
Electrode Limits	300 VDC or 250 Watts
Operating Temperature	20-50°C
Temperature Limit	60°C
Chemical Resistance	Not compatible with chlorinated hydrocarbons (e.g., chloroform), aromatic hydrocarbons (e.g., toluene, benzene), acetone, ethyl alcohol, or isopropyl alcohol.

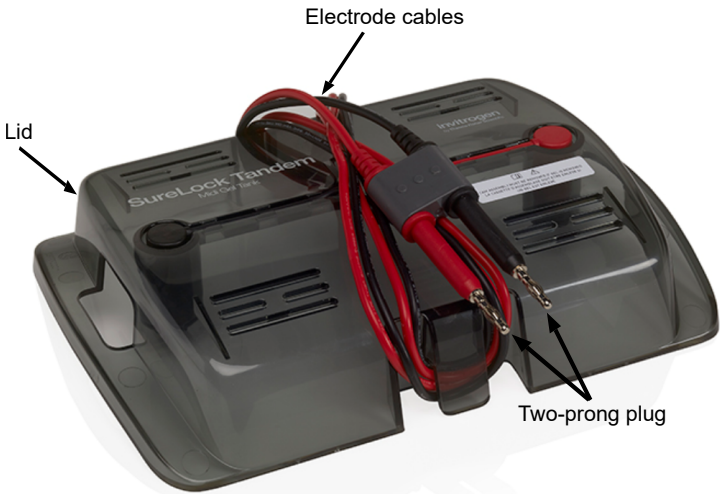


Figure 1 Lid with electrode cables

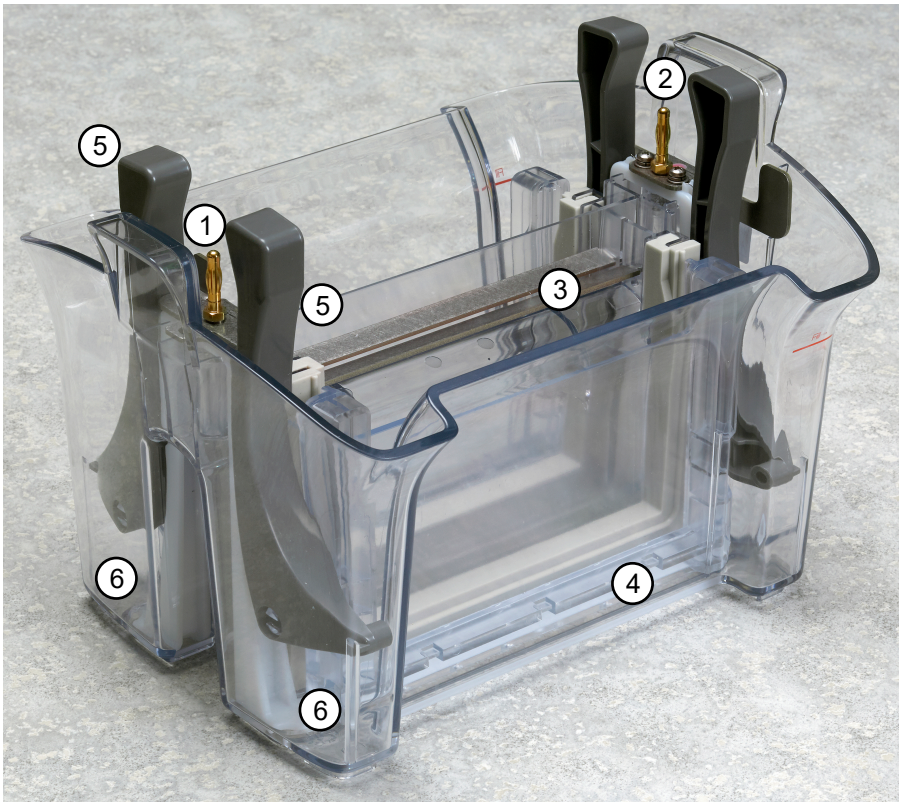


Figure 2 Tank with cassette clamps

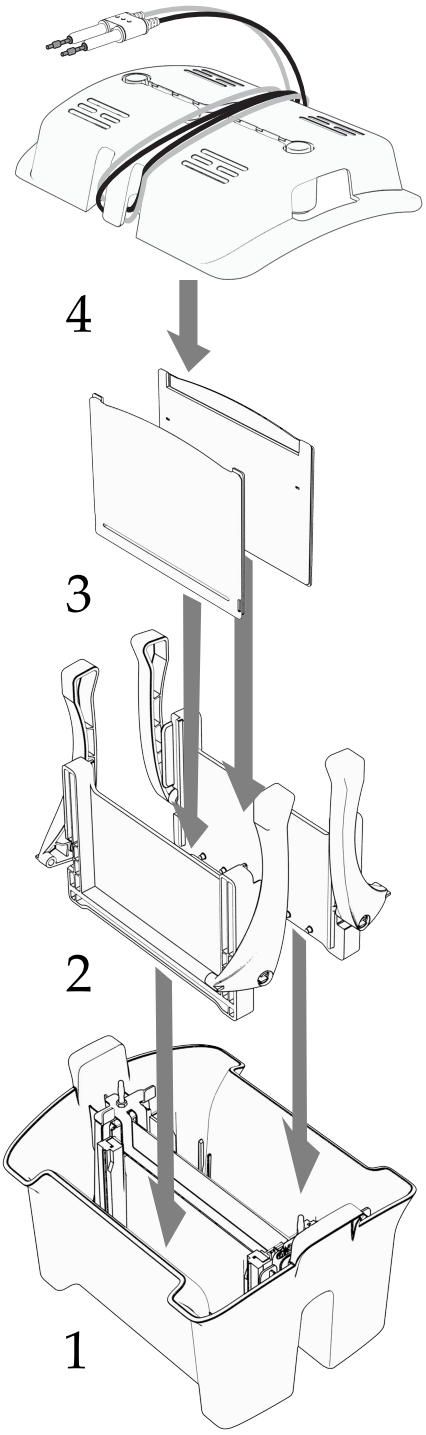
① Cathode Connector (–)
② Anode Connector (+)
③ Cathode Electrode
④ Anode Electrode
⑤ Cassette Clamps
⑥ Independent Gel Running Chambers

Overview of tank assembly

1. Place the tank on a flat surface.
2. Place the cassette clamps in the chambers of the tank.

   Note: The cassette clamps are directional, so ensure they are placed in the correct orientation, as shown.

3. Place the midi gel cassette between the cassette clamp and the gray sealing gasket with the cassette wells facing the center of the tank.
4. Place the lid on top of the tank.



Gel electrophoresis protocol

Prepare buffers

- Prepare 1X running buffer appropriate for the type of midi gel being used. Approximately 520 mL of 1X running buffer is needed for each gel run.
- Use the same buffer type for both chambers of the electrophoresis tank (e.g., do not perform electrophoresis with MES in one chamber and MOPS in the other).

Prepare samples

- Refer to the instructions for your midi gel for sample preparation guidelines including:
  - Appropriate sample buffers
  - Recommended protein concentration and load volumes

Running conditions

- Prior to performing electrophoresis, ensure the power supply output is adequate for the number of gels being run.
- Run times may vary depending upon the power supply.
- Refer to “Run conditions” on page 17 or the instructions for your midi gel for recommended power settings.

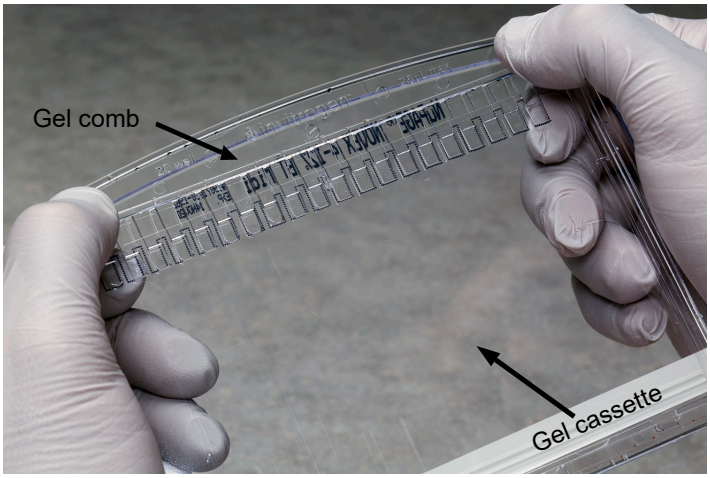
Prepare gel cassette

Note: When handling a gel cassette, always hold by the edges.

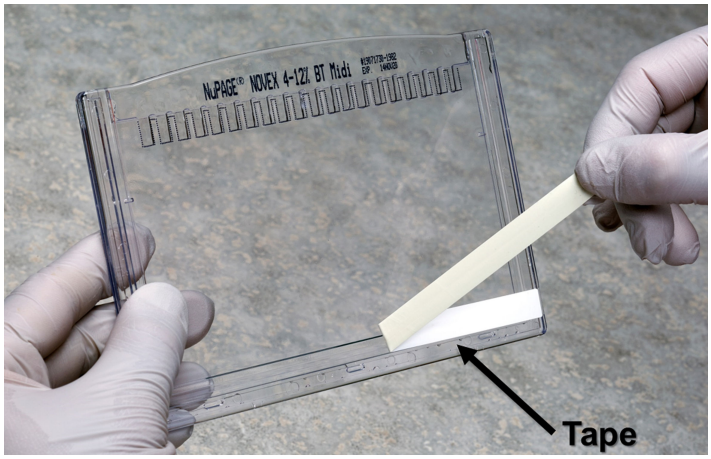
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1. Cut open the gel cassette pouch, discard packaging buffer in sink, and gently remove the cassette.
2. Rinse the cassette with deionized water.
3. Remove the gel comb by sliding the comb up one side at a time, as shown below.

Note: Be careful not to damage the wells when removing the comb, or samples may leak from one well to the other.



4. Remove the tape covering the slot at the lower portion of the cassette.



5. Using a pipette, rinse the wells 3 times with 1X running buffer to remove any packaging buffer from the wells. Invert the gel and shake gently between rinses to remove buffer.

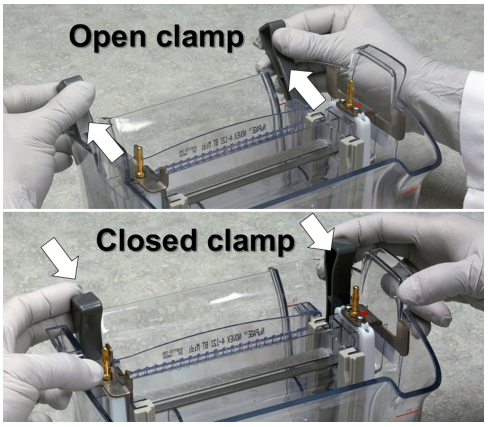
CAUTION! Always wear protective clothing when performing laboratory experiments. To avoid contamination from possible residual acrylamide, wear protective gloves when loading and unloading the SureLock™ Tandem Midi Gel Tank, staining/destaining, and drying gels.

Insert cassette

1. Open the cassette clamps.

2. Place the gel cassette(s) between the cassette clamp and the gray sealing gasket with the cassette wells facing the center of the tank. Lower the cassette so it rests on the bottom of the tank.

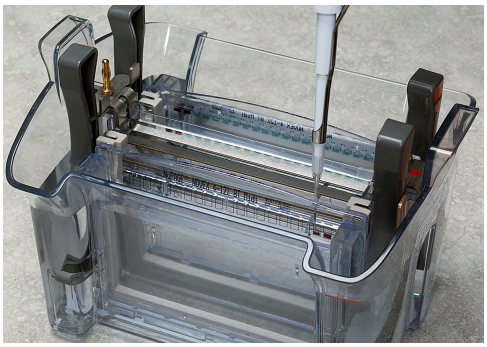
3. Close the cassette clamps.



Fill tank with running buffer and load samples

For each gel being run:

1. Add 1X running buffer to the cathode (inner) chamber (–) such that the gel wells are completely submerged with buffer (~170 mL).
2. Add 1X running buffer to the anode (outer) chamber (+) to the level of the red Fill Line printed on the outside of the tank (~350 mL)
3. Load the samples and protein standards.



Note: Use caution to not damage the wells or gel with the pipette tip during loading.

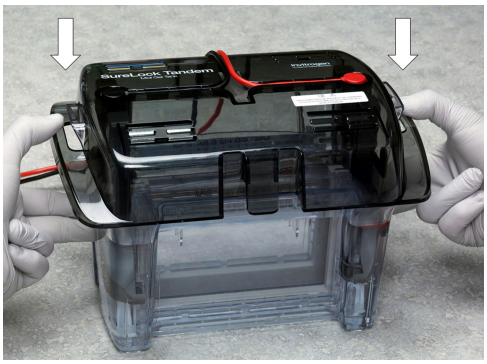
WARNING! If only running one gel, NEVER fill the unused chamber with buffer. Operating the tank with a chamber filled with buffer, but without a clamped gel, can result in a short circuit, excessively hot buffer, and damage to the tank. See "Tank safety" on page 23 for more information.

WARNING! NEVER fill the tank above the Fill Line with running buffer. Overfilling the tank can result in a short circuit, excessively hot buffer, and damage to the tank. See "Tank safety" on page 23 for more information.

Start electrophoresis

CAUTION! Make sure the power supply is off before connecting or disconnecting the Midi Gel Tank to the power supply.

1. Place the lid on the electrophoresis tank. The lid can only be firmly seated in one orientation. Match the red and black circles on the electrodes within the tank to the red and black electrodes on the lid.



Note: If the lid is not correctly seated, power will not be properly supplied to the system.

2. With the **power off**, connect the electrode cables to the power supply. Red to the (+) jack, Black to the (–) jack.

WARNING! Ensure the electrode cable leads are inserted all the way into the sockets of the power supply. Failure to do so can pose a shock hazard to the user. See "Tank safety" on page 23 for more information.

Note: If using a Bio-Rad™ Power Supply, Novex™ Power Supply Adapters (Cat. No. ZA10001) are NOT needed for the SureLock™ Tandem Midi Gel Tank and should be removed prior to use.

3. Turn on the power supply.

4. Set the power supply according to the type of buffer and gel being used (refer to "Run conditions" on page 17 or the instructions provided with your midi gel). Press the **Start** button on the power supply to begin electrophoresis.

WARNING! During electrophoresis of two gels, if one gel is removed from the tank in order to run the second gel longer, the cassette clamp in the unused chamber MUST also be removed before resuming electrophoresis (as per the warning label on the lid). Failure to do so can result in a short circuit, excessively hot buffer, and damage the tank. See "Tank safety" on page 23 for more information.

Open midi gel cassette

1. End electrophoresis by pressing **STOP** on the power supply, or waiting until a run is completed.

2. Turn off the power supply and disconnect the cables.

WARNING! NEVER remove the tank lid or the electrode cables from the tank while the power supply is active. See "Tank safety" on page 23 for more information.

3. Remove the lid and release the cassette clamps to the open position.

4. Remove the gel cassette(s) from the tank. Handle gel cassette(s) by the edges.

5. Lay the gel cassette (well-side up) on a flat surface.

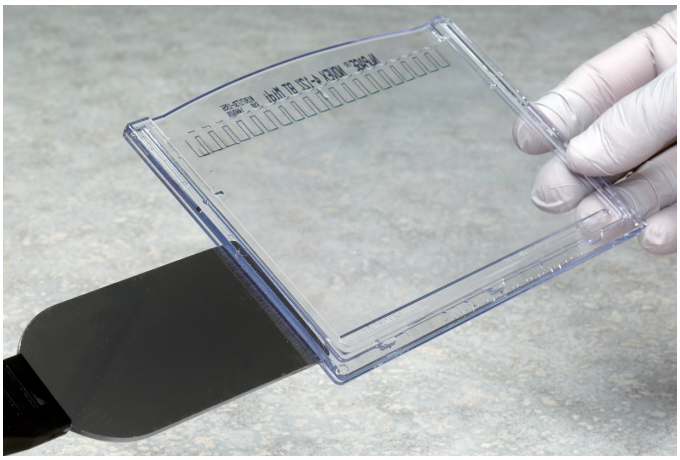
6. Carefully insert the beveled edge of the Gel Knife into the narrow gap between the 2 cassette plates, as shown below.



Note: Do not push the Gel Knife forcefully between the cassette plates or you may cut into the gel.

7. Lever the Gel Knife handle up and down gently to separate the plates. A cracking sound indicates that you have successfully broken the bond holding the cassette plates together.

8. Rotate the cassette and repeat steps 6–7 on the other sides until the 2 plates are completely separated.

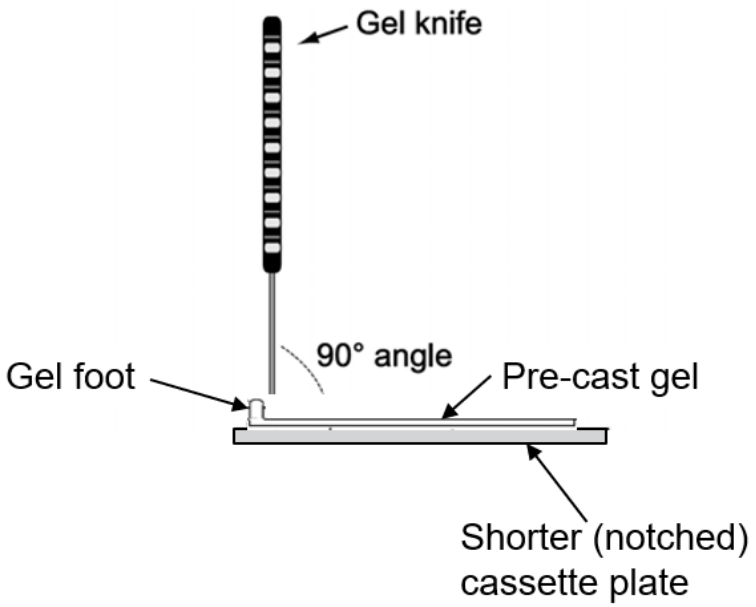


9. Upon separating the 2 plates, the gel may adhere to either side. Remove and discard the plate without the gel. Allow the gel to remain on the other plate.

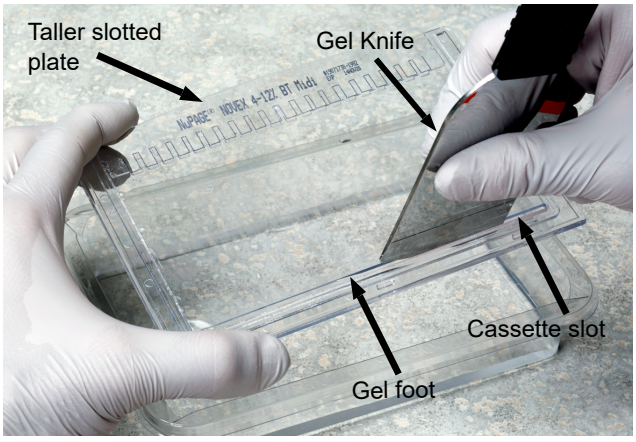
Note: Gels can easily tear if they are not handled carefully. Step 10 provides two methods for removing the gel from the plate without tearing it.

10. Remove the gel from the plate using one of the 2 methods:

- **Method 1**: If the gel is adhered to the shorter (notched) plate, proceed with the following steps:
  a. Hold the Gel Knife at a 90° angle to the gel and push down to cut the gel (refer to diagram below). Repeat the action laterally to cut off the entire foot.



  b. Hold the plate with the gel facing downwards over a container filled with water. Use the knife to carefully loosen one lower corner of the gel and allow the gel to peel away from the plate and into the container.
- **Method 2**: If the gel is adhered to the taller (slotted) plate, proceed with the following steps:
  a. Hold the plate with the gel facing downwards over a container filled with water.
  b. Use the gel knife to push the gel foot through the slot in the cassette until the gel peels away from the plate and gently falls into the container.
  c. Cut the gel foot off the gel before transfer or after fixing and staining, but before drying.



11. Immediately fix, stain, or transfer the gel as desired.

Maintenance

WARNING! Disconnect the power cables before any cleaning or maintenance is performed on the unit.

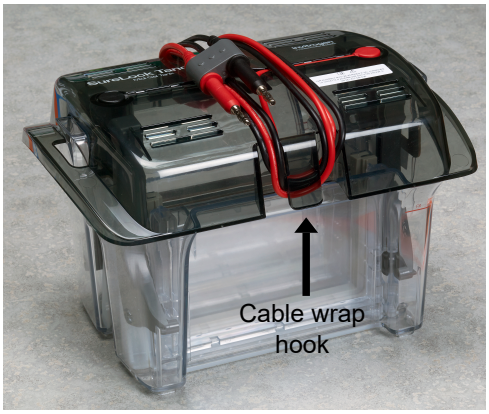
- When electrophoresis is complete, dispose of the buffer appropriately. Rinse the tank with water to remove residual running buffer.
- Clean the surface of the Midi Gel Tank with a soft, non-abrasive, lint-free cloth dampened with water.
- **The gel tank material is not compatible with chlorinated hydrocarbons (e.g., chloroform), aromatic hydrocarbons (e.g., toluene, benzene, etc.), acetone, ethyl alcohol, or isopropyl alcohol.**

WARNING! Cleaning the Midi Gel Tank with non-compatible chemicals can lead to tank fracturing and leaks.

For any issues, contact Technical Support (see “Customer and technical support” on page 22).

Storage

- Allow tank to dry completely before storing.
- Do not store with buffer or gels inside the tank.
- Cassette clamps may be stored inside the tank.
- For ease of storage, use the cable wrap hook on the lid. The cable wraps around the lid and the end of the cable features a clip that keeps it in place.



Run conditions

Expected run conditions during electrophoresis are provided for various types of midi gels. The current values in the table below are for one gel. If running two gels, the current would be doubled. Note that current and run-time values are approximate and will vary depending on gel percentage and the power supply used for electrophoresis.

Gel Type	Constant Voltage (V)	Starting Current (mA)	Maximum Current (mA)	Run Time (minutes)
4-12% Bis-Tris (MES buffer)	200	200	300	30
4-12% Bis-Tris (MOPS buffer)	200	190	210	40
3-8% Tris-Acetate (Denatured)	150	60	80	60
3-8% Tris-Acetate (Native)	150	40	60	135
4-20% Tris-Glycine Plus (Denatured)	200	90	100	60
4-20% Tris-Glycine Plus (Native)	125	40	50	120

Troubleshooting

Observation	Possible cause	Recommended action
Run takes longer than normal.	Buffers were too dilute.	Check buffer recipes. Do not reuse buffers. Remake buffer if necessary.
	Buffer chamber was leaking.	Make sure the cassette clamp is firmly seated, the gaskets are in place, and the cassette clamps are locked.
	Voltage and/or current was set too low.	Set the correct voltage and/or current. See "Running conditions" in “Gel electrophoresis protocol” on page 10 for more details.
Run is faster than normal with poor resolution.	Incorrect running buffer was used or buffer was too concentrated.	Check buffer recipe. Dilute or remake buffer if necessary.
	Voltage and/or current was set too high.	Decrease voltage and/or current to recommended running conditions. See "Running conditions" in “Gel electrophoresis protocol” on page 10 for more details.
Current reading on power supply is zero or very low.	Tape was left on the bottom of the cassette.	Remove the tape from the cassette.
	Connection to power supply was not complete.	Check conductance on all connections using a voltmeter. **Note:** Do not check connections if not trained in this procedure. Contact Technical Support for further help.
	Insufficient buffer level.	Make sure there is sufficient buffer in the tank. The cathode (inside) chamber needs to be filled above the wells (~170 mL), and the anode (outside) chamber needs to be filled to the red fill line (~350 mL). See “Fill tank with running buffer and load samples” on page 12 for more details.
Cannot see the sample wells to load the sample.	Difficult to see contrast between the sample well and the rest of the gel.	Mark cassette at the bottom of the wells with a marker pen prior to placing the cassette in the electrophoresis tank.
Current reading on power supply is much higher than expected or maxed out.	Too many gels were being run at once using one power supply.	Check the power limits of the power supply being used and use additional power supplies if needed.
	Cassette was not properly clamped.	Ensure that the cassette clamp is firmly seated, the gaskets are in place, and the cassette clamps are in the locked position. See “Insert cassette” on page 11 for more details.

Observation	Possible cause	Recommended action
Current reading on power supply is much higher than expected or maxed out. *(continued)*	Tank was overfilled with running buffer.	If buffer level is above the height of the gel, the cathode and anode chambers are in direct contact resulting in an electrical short circuit. Ensure correct buffer volumes. Cathode buffer level should be covering the wells but not above the height of the gel (~170 mL). Anode buffer level should be filled to the red fill line printed on the outside of the tank (~350 mL). See "Fill tank with running buffer and load samples" on page 12 for more details.
Proteins are not migrating into the gel.	The cassette is installed backwards in the tank.	Install the cassette in the correct orientation, with the well opening facing towards the cathode electrode (center of the tank).
	The power cable is installed backwards into the power supply.	Install the power cable in the correct orientation (red to red, black to black).

Related products

Replacement parts, related products and consumables can be found in the tables below.

Table 2 Replacement parts

Product	Quantity	Product No.
SureLock™ Tandem Midi Gel Tank	1	STM1003
SureLock™ Tandem Midi Gel Tank Replacement Lid	1	STM1002
SureLock™ Tandem Midi Gel Tank Replacement Cassette Clamp	1	STM1004
Gel Knife	1	EI9010

Table 3 Power Supplies

Product	Quantity	Product No.
PowerEase™ Touch 350 W Power Supply (115 VAC)	1	PS0350
PowerEase™ Touch 350 W Power Supply (230 VAC)	1	PS0351

Table 4 Pipette tips for gel loading

Product	Quantity	Product No.
Gel Loading Tips (Standard Round)	200/pk	LC1001
Flat Gel Loading Tips	200/pk	LC1002

Table 5 Pre-mixed buffers

Product	Quantity	Product No.
NuPAGE™ Midi Gels (Bis-Tris and Tris-Acetate)		
NuPAGE™ MOPS SDS Running Buffer (20X)	500 mL	NP0001
NuPAGE™ MES SDS Running Buffer (20X)	500 mL	NP0002
NuPAGE™ Tris-Acetate SDS Running Buffer (20X)	500 mL	LA0041
NuPAGE™ Sample Reducing Agent (10X)	10 mL	NP0009
NuPAGE™ Antioxidant	15 mL	NP0005
NuPAGE™ LDS Sample Buffer (4X)	250 mL	NP0008
Novex™ Tris-Glycine Midi Gels		
Novex™ Tris-Glycine SDS Running Buffer (10X)	500 mL	LC2675
Novex™ Tris-Glycine SDS Sample Buffer (2X)	20 mL	LC2676
Novex™ Tris-Glycine Native Running Buffer (10X)	500 mL	LC2672
Novex™ Tris-Glycine Native Sample Buffer (2X)	20 mL	LC2673

Table 6 Pre-cast gels

Product	Quantity	Catalog No.
Novex™ Tris-Glycine Plus Midi Gels		
Novex™ 10%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WXP01012BOX
Novex™ 10%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WXP01020BOX
Novex™ 10%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WXP01026BOX
Novex™ 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WXP01212BOX
Novex™ 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WXP01220BOX
Novex™ 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WXP01226BOX
Novex™ 4 to 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WXP41212BOX
Novex™ 4 to 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WXP41220BOX
Novex™ 4 to 12%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WXP41226BOX
Novex™ 4 to 20%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WXP42012BOX
Novex™ 4 to 20%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WXP42020BOX
Novex™ 4 to 20%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WXP42026BOX
Novex™ 8 to 16%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WXP81612BOX

Table 6 Pre-cast gels *(continued)*

Product	Quantity	Catalog No.
Novex™ 8 to 16%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WXP81620BOX
Novex™ 8 to 16%, Tris-Glycine Plus, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WXP81626BOX
NuPAGE™ Midi Gels (Bis-Tris and Tris-Acetate)		
NuPAGE™ 8%, Bis-Tris, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WG1001BOX
NuPAGE™ 8%, Bis-Tris, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WG1002BOX
NuPAGE™ 8%, Bis-Tris, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WG1003BOX
NuPAGE™ 10%, Bis-Tris, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WG1201BOX
NuPAGE™ 10%, Bis-Tris, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WG1202BOX
NuPAGE™ 10%, Bis-Tris, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WG1203BOX
NuPAGE™ 4 to 12%, Bis-Tris, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WG1401BOX
NuPAGE™ 4 to 12%, Bis-Tris, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WG1402BOX
NuPAGE™ 4 to 12%, Bis-Tris, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WG1403BOX
NuPAGE™ 3 to 8%, Tris-Acetate, 1.0 mm, Midi Protein Gel, 12+2-well	10 gels	WG1601BOX
NuPAGE™ 3 to 8%, Tris-Acetate, 1.0 mm, Midi Protein Gel, 20-well	10 gels	WG1602BOX
NuPAGE™ 3 to 8%, Tris-Acetate, 1.0 mm, Midi Protein Gel, 26-well	10 gels	WG1603BOX

Table 7 Transfer equipment and consumables

Product	Quantity	Catalog No.
SureLock™ Tandem Midi Welcome Pack, PVDF	1	STM4014
SureLock™ Tandem Midi Welcome Pack, Nitrocellulose	1	STM4015
SureLock™ Tandem Midi Blot Module	1	STM2001
SureLock™ Tandem Transfer Tray	1	STM3001
SureLock™ Tandem Midi Sponge Kit	8 sponges	STM2002
SureLock™ Tandem Midi Blot Module Replacement Gasket Kit	1	STM2003
SureLock™ Tandem Midi Pre-cut Membranes and Filters, 0.45 µm, PVDF	20 stacks	STM2006
SureLock™ Tandem Midi Pre-cut Membranes and Filters, 0.2 µm, Nitrocellulose	20 stacks	STM2007
SureLock™ Tandem Midi Pre-cut Membranes and Filters, 0.45 µm, Nitrocellulose	20 stacks	STM2008

Customer and technical support

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

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

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

Tank safety

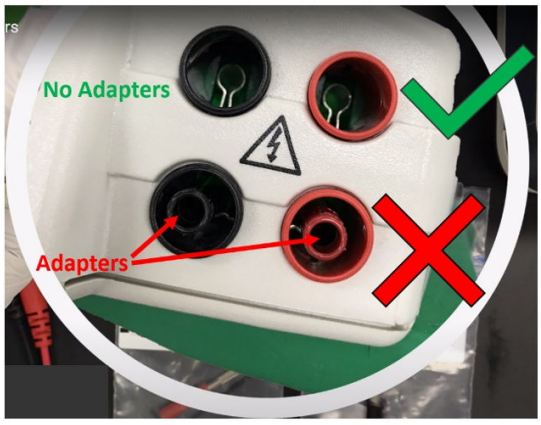
CAUTION! Follow all instructions to avoid any safety issues.

Electrical safety

- During operation, the Midi Gel Tank and Blot Module must be used with an external DC power supply designed specifically for electrophoresis and transfer applications. This power supply must be isolated from ground so that the DC output is floating. See Table 3, "Power Supplies" in “Related products” on page 19 for recommended power supplies.
- Once the Midi Gel Tank lid is removed from the tank, the electrical connection to the tank is broken, but can still be electrifed. Always stop the electrophoresis run by turning off the power supply first, then remove the lid from the tank.
- ALWAYS disconnect tank lids from the power supply when not in use. Operating a power supply in which lids are connected but not seated onto a tank may present an electrical shock hazard. If the power supply is turned on in this scenario, the electrical connections on the inside of the tank lid could potentially be live and exposed.
- ALWAYS insert the electrode cable leads all the way into the sockets of the power supply. Failure to do so can leave part of the electrode exposed which can pose an electrical shock risk to the user if touched.

Note: If using a Bio-Rad™ Power Supply, Novex™ Power Supply Adapters (Cat. No. #ZA10001) should NOT be used with the SureLock™ Tandem Tank and should be removed prior to use. See images below. For removal instructions, refer to the User Guide for product #ZA10001.





- NEVER connect or disconnect wire leads from the power jacks while the power supply is running. Instead, turn the power supply off first, then remove wire leads.
- Do not attempt to use the Gel Runner Tank without the tank lid. Do not use lids from other gel tanks.

Tank safety

- If running one gel, NEVER fill the unused chamber with buffer. Operating the tank with a chamber filled with buffer, but without a clamped gel, can cause a short circuit because the cathode and anode electrodes are in contact with the same body of buffer. This can result in excessively hot buffer, damage to the tank, and a burn hazard to the user.
- NEVER fill the tank with running buffer above the Fill Line, which is printed on the outside of the tank. Overfilling the tank can cause a short circuit if the cathode and anode electrodes are in contact with the same body of buffer. This can result in excessively hot buffer, damage to the tank, and a burn hazard to the user.
- During electrophoresis of two gels, if one gel is removed from the tank in order to run the second gel longer, the cassette clamp in the unused chamber MUST also be removed before resuming electrophoresis (as stated on the warning label on the lid). Because buffer is already in the chamber of the removed gel, a short circuit can occur if the cassette clamp remains in the chamber. A short circuit can occur if the cathode and anode electrodes are in contact with the same body of buffer. This can result in excessively hot buffer, damage to the tank, and a burn hazard to the user.

Table 8 Maximum electrical operating parameters

Maximum voltage limit	300 VDC
Maximum power limit	250 Watts
Maximum operating temperature	60°C

The SureLock™ Tandem Midi Gel Tank is designed to meet EN61010-1 Safety Standards. This product is safe to use when operated in accordance with this instruction manual. If this unit is used or modified in a manner not specified in this instruction manual then protection afforded by the unit will be impaired. Alteration of this unit will:

- Void the warranty.
- Void the EN61010-1 safety standard certification.
- Create a potential safety hazard.

Thermo Fisher Scientific is not responsible for any injury or damage caused by use of this unit when operated for purposes other than intended. All repairs and service should be performed by a service professional.

The SureLock™ Tandem Midi Gel Tank is classified as Class II of IEC 536 for protection against electrical shock.

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, see the "Documentation and Support" section in this document.

Symbols on this instrument

Symbols may be found on the instrument to warn against potential hazards or convey important safety information. In this document, the hazard symbol is used along with one of the following user attention words.

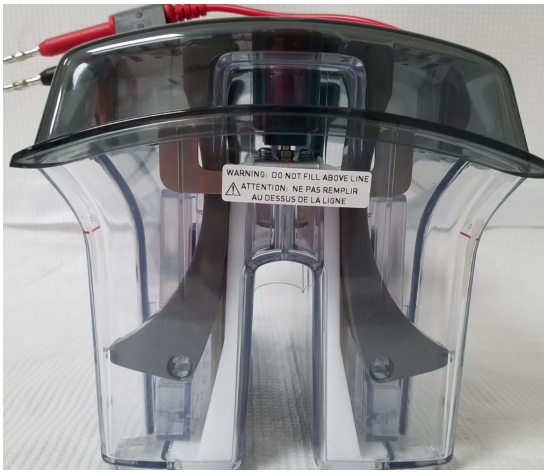
- **CAUTION!**—Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
- **WARNING!**—Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
- **DANGER!**—Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Standard safety symbols

Symbol and description
CAUTION! Risk of danger. Consult the manual for further safety information.
CAUTION! Risk of electrical shock.

Symbole et description
MISE EN GARDE ! Risque de danger. Consulter le manuel pour d'autres renseignements de sécurité.
MISE EN GARDE ! Risque de choc électrique.

Additional safety symbols

Symbol	Location
WARNING: DO NOT FILL ABOVE LINE ATTENTION: NE PAS REMPLIR AU DESSUS DE LA LIGNE	
CAM ASSEMBLY MUST BE REMOVED IF GEL IS REMOVED LA CASSETTE D'ASSEMBLAGE DOIT ETRE ENLEVE SI UN GEL EST ENLEVE	

(continued)

Symbol	Location
	

Control and connection symbols

Symbols and descriptions	
	On (Power)
	Off (Power)
	Earth (ground) terminal
	Protective conductor terminal (main ground)
	Direct current
	Alternating current
	Both direct and alternating current

Conformity symbols

Conformity mark	Description
	Indicates conformity with safety requirements for Canada and U.S.A.
	Indicates conformity with China RoHS requirements.
	Indicates conformity with European Union requirements.
	Indicates conformity with Australian standards for electromagnetic compatibility.

(continued)

Conformity mark	Description
	Indicates conformity with the WEEE Directive 2012/19/EU. **CAUTION!** To minimize negative environmental impact from disposal of electronic waste, do not dispose of electronic waste in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provision and contact customer service for information about responsible disposal options.

Safety information for instruments not manufactured by Thermo Fisher Scientific

Some of the accessories provided as part of the instrument system are not designed or built by Thermo Fisher Scientific. Consult the manufacturer's documentation for the information needed for the safe use of these products.

Instrument safety

General

CAUTION! Do not remove instrument protective covers. If you remove the protective instrument panels or disable interlock devices, you may be exposed to serious hazards including, but not limited to, severe electrical shock, laser exposure, crushing, or chemical exposure.

Electrical safety



WARNING! Ensure appropriate electrical supply. For safe operation of the instrument:

- Plug the system into a properly grounded receptacle with adequate current capacity.
- Ensure the electrical supply is of suitable voltage.
- Never operate the instrument with the ground disconnected. Grounding continuity is required for safe operation of the instrument.



AVERTISSEMENT ! Veiller à utiliser une alimentation électrique appropriée. Pour garantir le fonctionnement de l'instrument en toute sécurité :

- Brancher le système sur une prise électrique correctement mise à la terre et de puissance adéquate.
- S'assurer que la tension électrique est convenable.
- Ne jamais utiliser l'instrument alors que le dispositif de mise à la terre est déconnecté. La continuité de la mise à la terre est impérative pour le fonctionnement de l'instrument en toute sécurité.



WARNING! Power Supply Line Cords. Use properly configured and approved line cords for the power supply in your facility.



AVERTISSEMENT ! Cordons d'alimentation électrique. Utiliser des cordons d'alimentation adaptés et approuvés pour raccorder l'instrument au circuit électrique du site.



WARNING! Disconnecting Power. To fully disconnect power either detach or unplug the power cord, positioning the instrument such that the power cord is accessible.



AVERTISSEMENT ! Déconnecter l'alimentation. Pour déconnecter entièrement l'alimentation, détacher ou débrancher le cordon d'alimentation. Placer l'instrument de manière à ce que le cordon d'alimentation soit accessible.

Cleaning and decontamination

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

- No decontamination or cleaning agents are used that can react with parts of the equipment or with material that is contained in the equipment. Use of such agents could cause a HAZARD condition.
- The instrument is properly decontaminated a) if hazardous material is spilled onto or into the equipment, and/or b) before the instrument is serviced at your facility or is sent for repair, maintenance, trade-in, disposal, or termination of a loan. Request decontamination forms from customer service.
- Before using any cleaning or decontamination methods (except methods that are recommended by the manufacturer), confirm with the manufacturer that the proposed method will not damage the equipment.

MISE EN GARDE ! Nettoyage et décontamination. Utiliser uniquement les méthodes de nettoyage et de décontamination indiquées dans la documentation du fabricant destinée aux utilisateurs. L'opérateur (ou toute autre personne responsable) est tenu d'assurer le respect des exigences suivantes:

- Ne pas utiliser d'agents de nettoyage ou de décontamination susceptibles de réagir avec certaines parties de l'appareil ou avec les matières qu'il contient et de constituer, de ce fait, un DANGER.
- L'instrument doit être correctement décontaminé a) si des substances dangereuses sont renversées sur ou à l'intérieur de l'équipement, et/ou b) avant de le faire réviser sur site ou de l'envoyer à des fins de réparation, de maintenance, de revente, d'élimination ou à l'expiration d'une période de prêt (des informations sur les formes de décontamination peuvent être demandées auprès du Service clientèle).
- Avant d'utiliser une méthode de nettoyage ou de décontamination (autre que celles recommandées par le fabricant), les utilisateurs doivent vérifier auprès de celui-ci qu'elle ne risque pas d'endommager l'appareil.

Safety and electromagnetic compatibility (EMC) standards

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

Safety standards

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*

Environmental design standards

Reference	Description
Directive 2012/19/EU	European Union “WEEE Directive”—Waste electrical and electronic equipment
Directive 2011/65/EU	European Union “RoHS Directive”—Restriction of hazardous substances in electrical and electronic equipment
SJ/T 11364-2014	“China RoHS” Standard—Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products For instrument specific certificates, visit our customer resource page at **www.thermofisher.com/us/en/home/technical-resources/rohs-certificates.html**.

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.

AVERTISSEMENT ! **PRÉCAUTIONS GÉNÉRALES EN CAS DE MANIPULATION DE PRODUITS CHIMIQUES.** Pour minimiser les risques, veiller à ce que le personnel du laboratoire lise attentivement et mette en œuvre les consignes de sécurité générales relatives à l'utilisation et au stockage des produits chimiques et à la gestion des déchets qui en découlent, décrites ci-dessous. Consulter également la FDS appropriée pour connaître les précautions et instructions particulières à respecter :

- Lire et comprendre les fiches de données de sécurité (FDS) fournies par le fabricant avant de stocker, de manipuler ou d'utiliser les matériaux dangereux ou les produits chimiques. Pour obtenir les FDS, se reporter à la section « Documentation et support » du présent document.
- Limiter les contacts avec les produits chimiques. Porter des équipements de protection appropriés lors de la manipulation des produits chimiques (par exemple : lunettes de sûreté, gants ou vêtements de protection).
- Limiter l'inhalation des produits chimiques. Ne pas laisser les récipients de produits chimiques ouverts. Ils ne doivent être utilisés qu'avec une ventilation adéquate (par exemple, sorbonne).
- Vérifier régulièrement l'absence de fuite ou d'écoulement des produits chimiques. En cas de fuite ou d'écoulement d'un produit, respecter les directives de nettoyage du fabricant recommandées dans la FDS.
- Manipuler les déchets chimiques dans une sorbonne.

- Veiller à utiliser des récipients à déchets primaire et secondaire. (Le récipient primaire contient les déchets immédiats, le récipient secondaire contient les fuites et les écoulements du récipient primaire. Les deux récipients doivent être compatibles avec les matériaux mis au rebut et conformes aux exigences locales, nationales et communautaires en matière de confinement des récipients.)
- Une fois le récipient à déchets vidé, il doit être refermé hermétiquement avec le couvercle fourni.
- Caractériser (par une analyse si nécessaire) les déchets générés par les applications, les réactifs et les substrats particuliers utilisés dans le laboratoire.
- Vérifier que les déchets sont convenablement stockés, transférés, transportés et éliminés en respectant toutes les réglementations locales, nationales et/ou communautaires en vigueur.
- **IMPORTANT !** Les matériaux représentant un danger biologique ou radioactif exigent parfois une manipulation spéciale, et des limitations peuvent s'appliquer à leur élimination.



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



WARNING! **4L Reagent and Waste Bottle Safety.** Four-liter reagent and waste bottles can crack and leak. Each 4-liter bottle should be secured in a low-density polyethylene safety container with the cover fastened and the handles locked in the upright position.

Limited product warranty

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

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