invitrogen

Bandmate™ Automated Western Blot Processor

USER GUIDE

For automation of western blot processing

Catalog Numbers BW1000

Publication Number MAN0018722

Revision C.0

ThermoFisher SCIENTIFIC

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For descriptions of symbols on product labels or product documents, go to thermofisher.com/symbols-definition.

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Revision	Date	Description
C.0	14 Sep 2021	Added to products for separate purchase and troubleshooting topics. Minor corrections.
B.0	06 Oct 2020	Corrected safety and regulatory topics per guidance from Compliance. Added Canadian French translations to Electrical Safety topic.
A.0	28 Feb 2020	New Manual.

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1 Bandmate™ Automated Western Processor

Product description

The Invitrogen™ Bandmate™ Automated Western Blot Processor is a self-contained western blot processing system that can process up to 4 mini blots or 2 midi blots at a time. Each blot can be probed with different antibodies, if desired. The instrument has built-in traditional programs, but permits custom programs for incubation and wash times. Antibodies and reagents are directly streamed into incubation trays, which eliminates cross-contamination between reagents. The curved mini and midi trays allow for even processing of blots with minimal antibody volumes; minimally 3.5 mL primary antibody for mini blots and 7.5 mL for midi blots.

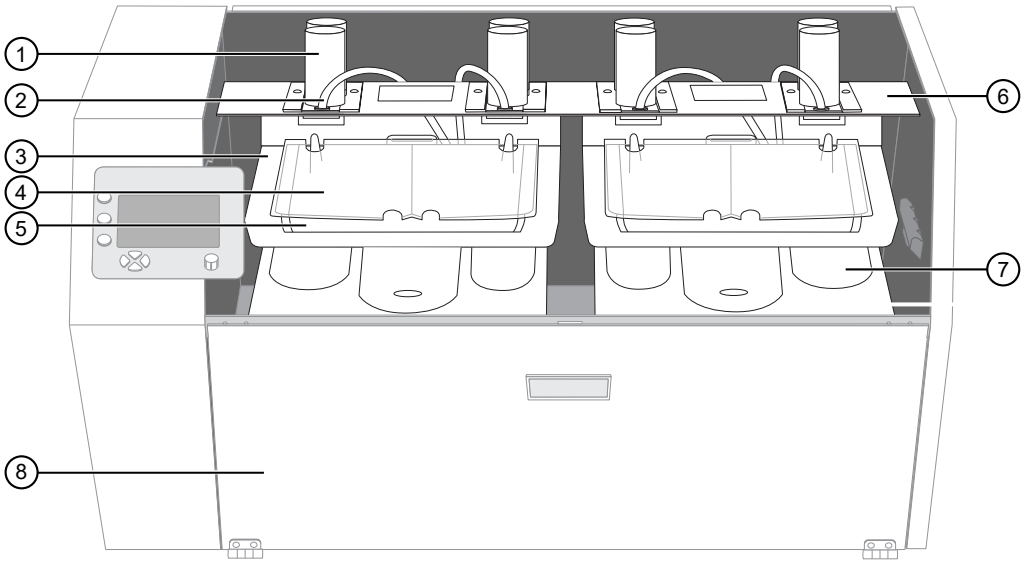


Figure 1 Instrument overview

1. Reagent tubes (antibody reservoirs)
2. Wash buffer tubing
3. Rocker cradle
4. Tray cover
5. Sample tray
6. Reagent slider
7. Waste and recovery funnel tray
8. Waste tank compartment (behind door panel)

Table 1 Program icons

Icon	Function	Icon	Function
	Accept		Fill
	Back		Home
	Cancel (Stop)		Pause
	Continue		Run
	Drain		Save
	Edit		

Contents

Table 2 Bandmate™ Automated Western Blot Processor (Cat. No. BW1000)

Contents	Amount
Buffer Hose w/ Quick-connect Coupling	1
Interior Siphon Hose for Buffer Bottle	1
Reagent Tubes	40
50 mL Recovery Tubes	8
Mini Trays	2
Midi Trays	2
Tray Covers	2
Funnel Trays	2
Waste Trays	2
Quick Reference Guide	1

Table 3 Available for separate purchase

Product	Cat. No.
Reagent Tubes (100 tubes)	BW020X5
Reagent Tubes (500 tubes)	BW020X25
Mini Trays (2 trays)	BW0060
Midi Trays (2 trays)	BW0070

Table 3 Available for separate purchase *(continued)*

Product	Cat. No.
Waste Tray	BW0030
Funnel Tray	BW0040
Tray Cover	BW0050
4 L Buffer Bottle	BW0010

Table 4 Accessory products

Product	Cat. No.
Pierce™ Clear Milk Blocking Buffer (10X)	37587
Blocker FL Fluorescent Blocking Buffer (10X)	37565
Blocker BSA (10X) in PBS	37525
Blocker BSA (10X) in TBS	37520
SuperSignal™ West Pico PLUS Chemiluminescent Substrate	34579
SuperSignal™ West Atto Ultimate Sensitivity Substrate	A38555
Pierce™ Reversible Protein Stain Kit for Nitrocellulose Membranes	24580
Pierce™ Reversible Protein Stain Kit for PVDF Membranes	24585

Operate the Bandmate™ Automated Western Blot Processor

Set up the system

1. Set up the processor on a stable, level lab bench.
2. Open the door and remove the funnel tray.
3. Replace the funnel tray so that it hooks onto the catch at the back of the unit. Close the door.
4. Attach the wash buffer hose to the connector located in the back of the instrument and attach the other end to the buffer bottle using the quick-connect fitting.
5. Plug the power supply into the power jack on the back of the instrument and connect the plug into a wall outlet.

Program the processor

- Store up to 8 programs.
- All incubation steps can be set from 1 second to 96 hours.
- Volume range for washes is between 10 mL to 75 mL for mini gels and 10 mL to 150 mL for midi gels.
- We recommend using 20-30 mL per wash for mini gels and 30-50 mL for midi gels.
- Recommended antibody volumes are ≥3.5 mL for mini blots and ≥7.5 mL for midi blots.
- Maximum number of given steps in a protocol is 9.
- Recommended rocks per minute for incubation steps is 15 rpm. Recommended rocks per minute for wash steps is 20 rpm.

1. From the home screen, select **Programs**. A list of programs, with default times will appear. The Standard Western Blotting Protocol may be used for guidance and as a template. Select the desired program using the dial. Press **Edit**.

2. Enter a name for the custom protocol. Select letters and numbers by turning the dial. Use the cluster of 4 buttons at the lower left of the screen to navigate between characters and delete characters or add spaces. When finished, press **Save** to save the program name, and then press **Continue** →.

3. Select whether the protocol will be used with a mini tray (two chambers with a central divider) or a midi tray (one large chamber). Press **Save**, then press **Continue** →.

4. Choose whether a quick rinse step is required in the protocol. A rinse will dispense 10 mL of wash buffer at the end of each step. If a rinse is desired, highlight **Enable** on the screen. Press **Continue** →.

5. On the last screen, input the times and reagent for each step in your protocol. Buffer wash steps can be repeated up to ten times, but reagent steps cannot be repeated. When selecting the step, the following may be chosen: **Buffer**; **Reagent 1**; **Reagent 2**; and **End**. Use the toggle button to highlight what needs to be modified and use the knob to move through the selections. Selecting **End** indicates that there are no more steps. **End** must be selected as the last step in the protocol.

   Below are the Preprogrammed Standard Western Blot Protocols, whereby Step 1 already has the blocking solution pre-filled in the tray and contains two reagent (antibody addition) steps. Step 2 is the dispensing step for primary antibody, which is designated as Reagent 1, while Step 4 is the dispensing step for secondary antibody and is designated as Reagent 2. Steps 3 and 5 are wash steps with buffer.

Table 5 Standard Mini

Step	Reagent	Repeat	Fill volume	Rock time	Rocks per min.	Drain to[1]
1	Pre Fill	1X	—	1 hr	15	Waste
2	1	1X	—	1 hr	15	Waste
3	Buffer	3X	20 mL	10 mins	20	Waste
4	2	1X	—	30 mins	15	Waste
5	Buffer	6X	20 mL	5 mins	20	—

[1] Change from **Waste** to **Recover** if antibodies need to be saved.

Table 6 Standard Midi

Step	Reagent	Repeat	Fill volume	Rock time	Rocks per min.	Drain to[1]
1	Pre Fill	1X	—	1 hr	15	Waste
2	1	1X	—	1 hr	15	Waste
3	Buffer	3X	40 mL	10 mins	20	Waste
4	2	1X	—	30 mins	15	Waste
5	Buffer	6X	40 mL	5 mins	20	—

[1] Change from **Waste** to **Recover** if antibodies need to be saved.

6. Choose the antibody recovery option if antibodies need to be recovered for future use. Recovered reagents will be diverted to 50-mL conical tubes that can be placed in the brackets on either side of the waste tray in the numbered holes (position 1 for first antibody addition and position 2 for second antibody addition). If antibodies do not need to be recovered, all reagent steps may be set to **Waste**. Press **Save** .

Note: If you choose to recover the antibody, place uncapped 50-mL recovery tubes, or comparable 50-mL conical tubes, in the appropriate location(s) in the waste tray. Skirted conical tubes are recommended because these tubes maintain proper positioning under the funnel tray opening. If non-skirted tubes are used, align tubes vertically and do not allow the tubes to lean. This will reduce the risk of solution loss during the recovery steps.

Note: When modifying an existing program, it is important to save before starting the program. Only saved in-process programs will automatically resume after a power shutdown or outage.

Run the processor

1. Turn the power switch located at the back of the unit to the "On" position. The display will illuminate and the moving parts will return to their home positions. After a few seconds, the home screen will display.

2. Program or select your preferred western blot protocol (see “Program the processor” on page 7).

3. Fill the buffer bottle in the back of the processor. Ensure that the hose hanging from the cap reaches the bottom of the bottle. Leave the cap loose to allow air into the bottle as liquid is pumped out.

   For each wash, 10–75 mL of wash buffer can be dispensed for mini gels and 10–150 mL for midi gels. We recommend using 20–30 mL per wash for mini gels and 30–50 mL for midi gels. Ensure there is enough wash buffer to complete the protocol.

4. Flush the buffer lines by selecting **Flush** from the home screen menu, then press **Accept** . Press **Fill** until wash buffer is dispensed from all nozzles. This may take several seconds. The wash buffer dispenses into the blot tray. **Drain** all wash buffer from blot tray before use.

5. If using primary and secondary antibodies, two reagent tubes will be required for each blot being processed. Check to ensure the foil on the bottom of the reagent tubes is not damaged. Screw one reagent tube firmly and completely into the primary antibody position, noted with the number 1 toward the back of the slider. Next, screw the other reagent tube into the secondary antibody position, noted with the number 2, just behind the buffer dispensing nozzle.

6. Pipet the appropriate antibody solution into each reagent tube.

   A standard-sized mini blot processed in a mini tray requires a minimum of 3.5 mL of each primary antibody and secondary antibody solutions. A standard-sized midi blot processed in a midi tray requires a minimum of 7.5 mL of each primary antibody and secondary antibody solutions.

7. Place blot(s) into the sample tray protein side up with protein lanes perpendicular to the tray gates. If using a mini tray, which has a central divider, make sure the blot is on the same side of the divider as the appropriate antibody reagent tubes.

8. Pour blocking buffer of choice in to the tray. Use no more than 45 mL of blocking buffer per mini tray and no more than 90 mL of blocking buffer for midi trays. Replace the tray cover and make sure it is fully seated.

Tray Size	Minimum Volume	Maximum Volume
Mini	3.5 mL	45 mL
Midi	7.5 mL	90 mL

9. To recover the antibody solutions, place empty 50 mL uncapped conical tubes in the appropriate spaces on each side of the waste tray (space #1 for the primary antibody and #2 for the secondary antibodies).

   Note: For antibody recovery from midi trays, conical tubes must be added on both sides of the waste tank as recovered solutions will be distributed in both tubes.

10. Check the waste tank to make sure that it is empty. Ensure that the funnel tray and waste trays are pushed all the way to the back and are in place. Close the waste compartment and the work area window.

11. Select the desired protocol from the menu and press **Run** ▶.

12. Select the trays to be used for the protocol. Follow the instructions on the screen to indicate which section(s) are in use.

13. Press **Continue** →.

14. Press **Run** ▶.

15. Once the run is complete, press **Home** to stop the rocker and return to the home screen. Open the window and remove the blot. The blot is now ready for downstream processing (chemiluminescent or colorimetric detection) and/or immediate imaging (fluorescence).

    Note: The rocker will continue to rock with the final dispensed wash buffer volume in the tray after all of the steps of the protocol are completed to ensure that the blots do not dry out. The **Home** button should be selected before removing the blot from the blot tray.

Clean the processor

1. Wash the sample trays, funnel trays, and tray covers using a gentle laboratory detergent. Rinse with distilled water and dry face down.

2. Remove the Reagent Tubes from the instrument.

3. If the processor is not going to be used again for some time, flush the buffer line with distilled water to prevent salt build-up. To flush, place the wash buffer hose into a container of distilled water, then select **Flush** to run water through the lines and into the trays. Once water has been flushed through the tubing, remove the tubing from the water container, then select **Flush** until the liquid is completely flushed from the system and tubing.

General maintenance

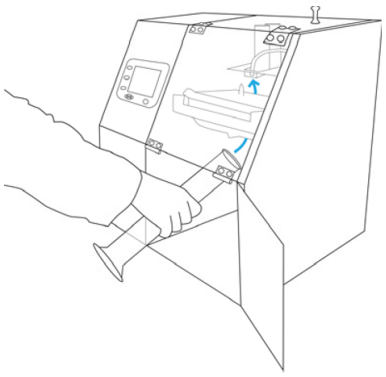
Replacing buffers

When replacing or adding additional wash buffer to the wash bottle, it is recommended to flush the lines to ensure no bubbles were introduced when the buffer was replenished.

Calibration

The pumps that deliver wash buffer to the tray have been calibrated at the factory. To check or re-calibrate the pumps, use the **Calibration** function. Pumps should be re-calibrated every 6 months or when moving the instrument from room temperature to a cold room or vice versa. The temperature of the environment can impact the dispensed volume.

1. Prior to calibration of the pumps, confirm that the wash buffer line is completely full of liquid. If there are bubbles in the line, use the **Flush** function to remove them.



2. Open the waste compartment and remove the funnel trays and sample trays. If using a larger graduated cylinder and extra room is needed, remove the waste tank. Alternatively, detach the hose from the hose nozzle and place it in the graduated cylinder.

   Note: Be careful not to stretch or distort the hose.

3. Place the graduated cylinder under the buffer, position as indicated on the graphical display, and press **Fill** to dispense liquid into the cylinder. The pump will dispense approximately 40 mL.

4. Once the pump has stopped running, measure the actual amount of liquid dispensed and enter the value using the encoder knob. Measure the volume from the other positions in the same way and record the value. Press **Save**. The pumps are now calibrated.

5. Replace the waste tank and trays, then close the waste compartment.
   The amount of liquid dispensed by the pumps is temperature-dependent. This is accounted for in the factory calibration.

The Bandmate™processor calibrates based on temperature. "Warm" calibration is indicated by the red numbers, while "cold" calibration is indicated by the blue numbers. These numbers represent the pump coefficients, ranging from 100 to 300 with 200 being the intrinsic value of the pump. The cutoff temperature between "warm" and "cold" is 12°C. To check the calibration and use the processor at different temperatures, perform a "warm" and a "cold" calibration at the warmest and coldest temperatures at which the processor is planned to be used. **If the processor is only used at one temperature, it is unnecessary to calibrate it at any other temperature.**

General system cleaning

- Rinse the waste tank and funnel tray. The trays are resistant to chemicals typically used in a western blot, but some of the components of blocking buffers (nonfat dry milk, BSA, etc.) can form deposits on the surface.
- If needed, use water and a lab tissue to clean the display screen protector, work area window, and any interior surfaces of the instrument. Using alcohol is not recommended as it may fog plastic surfaces over time.

Instrument dimensions and specifications

Dimensions	60 cm × 39 cm × 42 cm
Weight	15 kg (32 lbs)
Capacity	4 mini blots, 2 midi blots
Rocks per minute	5-40 rpm
Maximum washes per step	10
Minimum reagent per blot	3.5 mL (mini), 7.5 mL (midi)
Maximum number of protocol steps	9
Maximum number of protocols	7
Buffer dispensing volume	10-150 mL
Incubation step time range	0.1 sec to 96 hrs
Power requirements	12 VDC, 5 A
Relative humidity	5-90%
Operating temperature	4-40°C
Altitude	2,000 m
Storage temperature	-40 to 50°C

Troubleshooting

Observation	Possible cause	Recommended action
Processor won't start.	Power cord plug is inserted in an inactive wall outlet and/or not fully inserted in the socket on the back of the processor.	Ensure the power cord plug is inserted in a live wall outlet and/or fully inserted in the socket on the back of the processor.

Observation	Possible cause	Recommended action
Processor stopped working.	Processor electronics errored.	Turn the system off for one minute to allow the electronics to reset. If the processor does not turn on after resetting, contact technical support.
Processor loses power.	Processor was unplugged or a power outage occurred.	Restore power to the unit when possible. If a run was in progress, it will automatically re-start at the point it had reached when power was lost (only if the program was saved). No other special measures are needed. If you wish to terminate the recovered run, press the "home" button when the program recovery screen is displayed.
Processor stops during a run and displays an error message.	An error was detected. The most common error is that the work area window is not fully closed.	The run will resume once the error is corrected.
Antibodies are not dispensed.	The pokers on the sample tray are not facing toward the back of the instrument.	Ensure that the pokers on the sample tray are facing toward the back of the instrument.
	The pokers on the sample tray have been damaged.	Ensure that the pokers on the sample tray remain at a 90° angle to the horizontal, are not bent over, and that they are still sharp. If the pokers are bent, it may be possible to bend the pokers back to their original vertical position. Test the tube-puncturing capability of the pokers with water or buffer in the reagent tubes after repositioning.
		Repeat the run with a new sample tray that is provided with the processor. Alternatively, replacement trays are available for puchase if the pokers become damaged.
Buffer is not dispensed during the run.	The end of the buffer hose may not have been resting at the bottom of the filled buffer bottle, or the cap may be tight and not allowing air flow into the bottle.	Ensure that the end of the buffer hose is resting in the bottom of a filled bottle of buffer. The buffer bottle cap should be slightly loose to allow air to flow into the bottle.
The device is noisy.	The tray's magnet covers were omitted, or the trays were not correctly seated on the rocker cradle. The omission of the magnet cover may lead to the tray bouncing out of the rocker cradle.	Before starting the program, ensure that both magnetic cover trays are securely in place and correctly aligned on the blot trays.

Observation	Possible cause	Recommended action
There is no detection for targets that were successfully detected using traditional processing.	The primary antibody might have been placed on position number 2 instead of position number 1.	Perform a short program with only the secondary antibody to see if the band will appear.
	The reagent tubes were not pierced. Possible issues can include: a faulty tube, bent piercing points on the incubation tray, or faulty alignment of the reagent slider.	Verify that all tubes have foil covers on the bottoms and that the incubation tray piercing points are not bent, broken, or dull.
		If the alignment of the reagent slider appears to be an issue, contact technical support.

A 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.

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.
	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.

CAUTION! Solvents and Pressurized fluids. Wear eye protection when working with any pressurized fluids. Use caution when working with any polymeric tubing that is under pressure:

- Extinguish any nearby flames if you use flammable solvents.
- Do not use polymeric tubing that has been severely stressed or kinked.
- Do not use polymeric tubing with tetrahydrofuran or nitric and sulfuric acids.
- Be aware that methylene chloride and dimethyl sulfoxide cause polymeric tubing to swell and greatly reduce the rupture pressure of the tubing.
- Be aware that high solvent flow rates (~40mL/min) may cause a static charge to build up on the surface of the tubing and electrical sparks may result.

Physical injury

CAUTION! Moving and Lifting Injury. The instrument is to be moved and positioned only by the personnel or vendor specified in the applicable site preparation guide. Improper lifting can cause painful and permanent back injury.

Things to consider before lifting or moving the instrument or accessories:

- Depending on the weight, moving or lifting may require two or more persons.
- If you decide to lift or move the instrument after it has been installed, do not attempt to do so without the assistance of others, the use of appropriate moving equipment, and proper lifting techniques.
- Ensure you have a secure, comfortable grip on the instrument or accessory.
- Make sure that the path from where the object is to where it is being moved is clear of obstructions.
- Do not lift an object and twist your torso at the same time. Keep your spine in a good neutral position while lifting with your legs.
- Participants should coordinate lift and move intentions with each other before lifting and carrying.
- For smaller packages, rather than lifting the object from the packing box, carefully tilt the box on its side and hold it stationary while someone else slides the contents out of the box.

Electrical safety

WARNING! Do not overfill trays with liquid. Excess liquid can overflow into the control unit and possibly cause electrical shock. Follow the appropriate instructions for reagent amounts and empty any remaining liquid in the waste containers upon run completion.

WARNING! Use outside of the workflows described in this manual may put the operator at risk of dangerous exposure to electrical shock. Do not use this instrument for any purposes or in any configurations not described in this manual.

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.

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

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

Instrument component and accessory disposal

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 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*

EMC standards

Reference	Description
EU Directive 2014/30/EU	European Union “EMC Directive”
EN 61326-1 IEC 61326-1	*Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements*
AS/NZS CISPR 11	*Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical (ISM) Radiofrequency Equipment*
ICES-001, Issue 4	*Industrial, Scientific and Medical (ISM) Radio Frequency Generators*
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. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna. • Increase the separation between the equipment and receiver. • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. • Consult the dealer or an experienced radio/TV technician for help. This equipment has been designed and tested to CISPR 11 Class A. In a domestic environment it may cause radio interference, in which case, you may need to take measures to mitigate the interference. Do not use this device in close proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), as these can interfere with the proper operation.

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.

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.

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)*, 5th Edition, HHS Publication No. (CDC) 21-1112, Revised December 2009; found at:
  https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2020-P.pdf
- World Health Organization, *Laboratory Biosafety Manual*, 3rd Edition, WHO/CDS/CSR/LYO/2004.11; found at:
  www.who.int/publications/i/item/9789240011311

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