# Semi-Automated Sheet Heat Sealer User Manual


AZENTA
LIFE SCIENCES

347782 Revision D

# Azenta US, Inc.

Information provided within this document is subject to change without notice, and although believed to be accurate, Azenta US, Inc. assumes no responsibility for any errors, omissions, or inaccuracies.

BioStore™, BioWarehouse™, SampleStore™, Strata™, Tube Auditor™, Azenta™, Azenta Life Sciences™, and the Azenta logo are trademarks of Azenta US, Inc.

CryoExchange®, CryoPod®, FrameStar®, FreezerPro®, and IntelliXcap® are registered U.S. trademarks of Azenta US, Inc.

All other trademarks are properties of their respective owners.



This technology is subject to United States export Administration Regulations and authorized to the destination only; diversion contrary to U.S. law is prohibited.

Original manual printed in English.

These are the original instructions for the Semi-Automated Sheet Heat Sealer.

**Corporate Headquarters**
2910 Fortune Circle West
Indianapolis, IN 46241 U.S.A.

**European Union Representative**
Im Leuschnerpark 1B
64347 Griesheim, Germany

## For Technical Support:

| Location | Contact Number | Website |
|---|---|---|
| North America | +1.888.2.AZENTA<br>(+1.888.229.3682) | www.azenta.com |
| Europe | +44.0.161.777.2000 | |
| Japan | +81.45.4477.5570 (ext. 24) | |

# Revision History

## Part Number: 347782

## Semi-Automated Sheet Heat Sealer User Manual

| Revision | Date |
|---|---|
| **Revision A** | 25 JUN 2020 |
| **Revision B** | 14 JUL 2021 |
| **Revision C** | 13 AUG 2021 |
| **Revision D** | 28 SEP 2022 |

# Table of Contents

# 1. Safety

**DANGER**

**Read the Safety Chapter**

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

**NOTICE**

It is the responsibility of each person working on this product to know the applicable regulatory safety codes as well as the facility safety procedures, safety equipment, and contact information.

## Safety Information

This user manual contains important operating and maintenance instructions which must be read, understood, and followed by the product user. Failure to use this product according to this user manual may degrade or defeat the protection normally provided by this product.

Read this user manual including the safety notes prior to product use and keep it for future reference.

This product must only be used in accordance with proper safety standards and procedures, together with the instructions included in this manual.

The sealer has been designed and manufactured to conform to international safety specifications.

It is essential that the users know the potential hazards associated with the equipment.

All operators should know and observe the safety precautions and warnings given in this section before starting to use the instrument.

If the unit is used in a way not specified by the manufacturer, the protection provided by the equipment may be ineffective.

**WARNING**

**Appropriate Use**

The machine is designed for indoor laboratory use only, at an altitude of less than 2000 m above sea level, within an operative temperature range of 18 °C to 35 °C and a storage temperature range of -20 °C to 40 °C. The relative humidity range is 20% to 80% non-condensing.

- If the instrument is stored outside these ranges, it should be left to stand until it equilibrates to within the above limits.
- Ensure that the voltage selection switch is set to the correct voltage and that the correct fuse for the required voltage setting is fitted.
- Do not work outside the rated power supply range.
- Use the cleaning method recommended by the manufacturer. Ensure the unit is only connected to an earthed supply.
- There are no user accessible or serviceable parts inside the unit. Do not remove the unit's cabinet.

**WARNING**

**Risk of Electric Shock (High Voltage)**

This equipment should only be dismantled by properly trained personnel, removing the top case exposes potentially lethal mains voltages.

**WARNING**

**High Temperature**

The hot plate can reach temperature up to 200 °C.

- Care must be taken not to touch it or serious burns may occur.
- The equipment will maintain a high temperature for a considerable time after switching off and it is essential to wait before starting cleaning operations.
- Sealed sample plates may remain hot for some seconds after sealing and should be handled with care.

**WARNING**

**Pinch Point**

Moving parts of the product may cause squeezing or compression of fingers or hands resulting in personal injury.

- Do not operate the product without the protective covers in place.

**CAUTION**

**Personal Protective Equipment**

Always wear safety glasses and other appropriate protective equipment when operating this product.

## Warnings

### Personal Injury

- Do not use this product in a manner other than as stated in the "General Operation Safety" section of this manual as the protection provided by the equipment may be impaired.
- This product is designed for use in laboratory environments by persons knowledgeable in safe laboratory practices.

### Electric Shock

- This product must be connected to a grounded power outlet for safe functioning.
- Use only the power cord supplied with the product.
- The power cord is the device available for full disconnect from mains input.
- Position the product for use so that the power cord can be easily disconnected without having to move the product.
- Disconnect the power cord before moving or cleaning the unit.

### Product Damage

- Keep the product dry and clean.
- Do not immerse the product in liquid for cleaning.
- This unit is not explosion or spark proof.
- Do not operate this product near volatile or flammable materials.

## General Operation Safety

- When using infectious, radioactive, toxic and other solutions which may pose health risks, please observe the appropriate safety precautions.
- Do not use this machine in a potentially explosive environment or with potentially explosive chemicals.
- Install the machine in a location free of excessive dust.
- Avoid placing the machine in direct sunlight.
- Choose a flat, stable surface capable of withstanding the weight of the machine.
- Install the machine in the room temperature 18˚C to 35˚C, relative humidity 20 – 80%.
- Do not block the air vents.
- Make sure the power source conforms to the required power supply specifications.
- To avoid electric shock, make sure the machine is plugged into a grounded electric outlet.
- Do not allow water or any foreign objects to enter the various openings of the machine.
- Switch off the power switch before cleaning or performing any service on the machine, such as replacing the fuses.
- To guarantee sufficient ventilation, ensure that the sealer has at least 30 cm of free space on all sides, including the rear.
- Repair should be carried out by authorized service personnel only.
- Use original spare parts and accessories only.

# Regulatory Compliance and Declaration of Conformity

The Semi-Automated Sheet Heat Sealer meets the requirements of the European Union's Machinery Directive 2006/42/EC, Electromagnetic Compatibility Directive 2014/30/EU, and 2011/65/EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment. In accordance with the directives, Azenta Life Sciences has issued a Declaration of Conformity and the Semi-Automated Sheet Heat Sealer has a CE mark affixed.

| DOCUMENT NUMBER: | TITLE: | |
|---|---|---|
| 347509 | **Declaration of Conformity, Machinery Directive** | AZENTA LIFE SCIENCES |
| REVISION: B | DOCUMENT CLASSIFICATION: | |
| ECO# EC132455 | 04-Form, Template or Other | |

**DECLARATION OF CONFORMITY**

Description: Semi-Automated Sheet Heat Sealer

Function: The Sheet Heat Sealer is designed to heat-seal plates

Product code: 59-2000, 59-200x

Business name and full address of the manufacturer of the machinery:
Azenta Life Sciences, Northbank, Irlam, Manchester M44 5AY, United Kingdom

Name and address of the person, established in the Community, authorized to compile the relevant technical documentation:
Azenta Life Sciences (Germany) GmbH, Im Leuschnerpark 1B, 64347 Griesheim, Germany

The manufacturer declares:

- That this machinery fulfills all the relevant provisions of Directive 2006/42/EC (Machinery Directive)
  - EN 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction
  - ISO/TR 14121-2:2012 ED2 Safety of machinery. Risk assessment. Practical guidance and examples of methods
  - EN 61010-1:2010+A1:2019. Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
  - EN 61010-2-010:2020 Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for laboratory equipment for the heating of materials
  - EN 61010-2-081:2015 Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes
- That this machinery fulfils all the relevant provisions of Directive 2014/30/EU (EMC Directive)
  - EN 61326-1:2021 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
- That this machinery is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and amendment 2015/863/EU.
  - BS EN IEC 63000:2018. Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Year CE Marking Affixed to Product: 2020

Signed for and on the behalf of Azenta Life Sciences:

Rob Woodward

Rob Woodward (Oct 25, 2021 05:58 GMT+1)

Print name: Rob Woodward
Position: Senior Vice President, Global Quality Executive Management
Place: Irlam, Manchester





| Date Printed: Saturday, October 23, 2021 | **This is uncontrolled when printed** | PAGE 1 OF 1 |
|---|---|---|

# 2. Introduction

The Semi-Automated Sheet Heat Sealer is a compact semi-automatic sheet heat sealer which is compatible with a wide range of seals and plates of differing designs and heights. With variable temperature and time settings, sealing conditions are easily optimized to produce a 100% tight seal, eliminating sample loss.

When you place the plate and seal on the holder and press the **Operate** button, the drawer automatically closes. The sealing process is controlled by an electric mechanism providing consistent plate sealing, eliminating variation, and giving reliable sealing every time.

When using the Semi-Automated Sheet Heat Sealer for the first time, please read this entire user manual carefully. To guarantee problem free and safe operation, it is essential to observe the following information.

## Unpacking (Packing/Contents Listing)

The device is delivered in an external carton and an internal carton with protective PE foam cushions. Remove the Semi-Automated Sheet Heat Sealer from each carton. All packaging should be retained until it has been established that the unit is working properly.

Open the Semi-Automated Sheet Heat Sealer package (59-2000) and confirm that all items are included:

- Semi-Automated Sheet Heat Sealer Device
- Power cable
- Operation Manual and Quick User Guide
- Semi-Automated Sheet Heat Sealer Plate Support Adapter, Standard, 59-2001
- Separate fuse for 115V AC supply

If there are any items missing, damaged, or not according to your order, please contact your distributor or sales representative immediately.

## Shipping Screw

**CAUTION**

**Remove and Save Shipping Screw**

It is essential that the shipping screw is removed before the unit is powered up for the first time. After removing it, keep the shipping screw in a safe place, as it is important to re-insert screw into the central position on the back of the instrument for any subsequent transport of the unit.

An additional screw has been added to the back of the Semi-Automated Sheet Heat Sealer to prevent the drawer located on the front of the instrument from opening during transport. It is essential that this bracket is removed before the unit is powered up for the first time.

On delivery of your instrument, remove the screw located in the center of the back of the instrument with a screwdriver, as in Figure 2-1. This screw can be identified by the red washer, seen in Figure 2-2.

**Figure 2-1: Location of Shipping Screw**

**Figure 2-2: Shipping Screw with Red Washer**

If the back screw has not yet been removed successfully, the error message "Er1" displays.

Make sure you keep the shipping screw in a safe place. For subsequent transport of the instrument, you must re-insert screw into the central position on the back of the instrument. This is important to prevent any damage to the instrument during transport. For details, refer to Appendix D: "Shipping Instructions" on page 44.

**CAUTION**

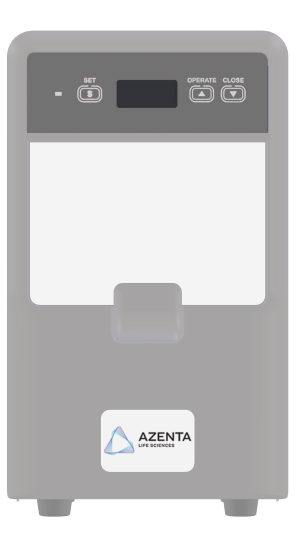
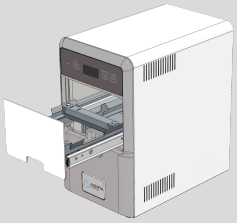
**Change Fuse**

This instrument is fitted with a 230V fuse.

- If your geographical location requires the use of a 110V fuse, follow instructions in "Voltage Check" on page 19 for changing the voltage settings.

# Instrument Overview

## Sealer Parts

| Sealer Part | Image |
|---|---|
| Casing and Control Panel |  |
| Rear Power Interface |  |
| Heating Platen |  |
| Plate Carrier |  |

## Control Panel

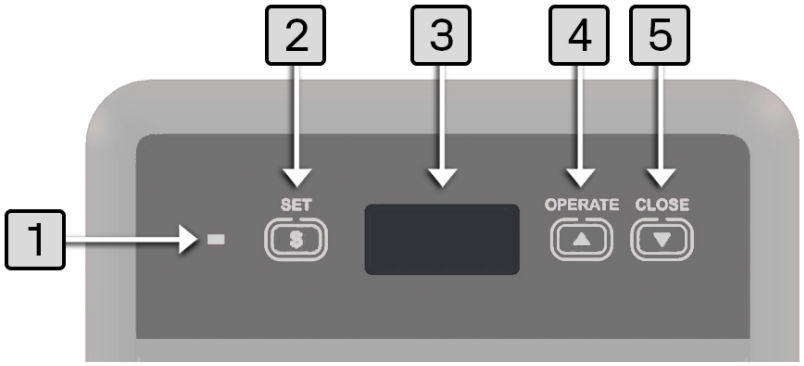



Figure 2-3: Control Panel

Table 2-1: Description of Control Panel Features

| Number | Part |
|---|---|
| 1 | Amber LED status indicator |
| 2 | *Set-up* or *Run* mode key |
| 3 | Three digit LED display |
| 4 | Operate, open drawer, and incremental (up) key |
| 5 | Close drawer and decremental (down) key |

## Rear Power Features


Figure 2-4: Rear Power Features

Table 2-2: Description of Rear Power Features

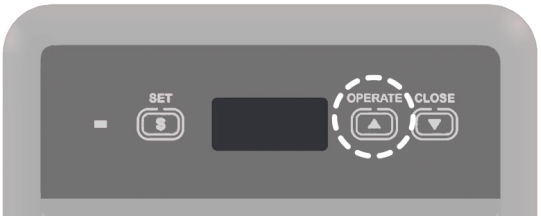
| Number | Part |
|---|---|
| 1 | Power setting 115/230 VAC and fuse holder |
| 2 | I/O power switch |
| 3 | Mains power plug |

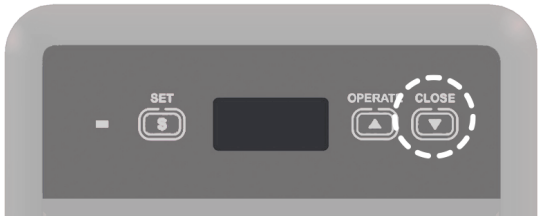
# 3. Installation

## Unpacking and Start-Up

After unpacking, retain all packing material and fixtures, as you must always transport the unit in its original packaging to avoid damage. The manufacturer accepts no responsibility for damage incurred unless the unit is correctly packed and transported in this way.

To start up your unit, complete the following steps:

| Step | Action |
|---|---|
| 1. | Remove the Semi-Automated Sheet Heat Sealer unit from its packaging. |
| 2. | Place the unit on a level surface, away from direct sunlight. |
| 3. | Ensure that there is access to the power switch at the back of the unit and that the vents on the casing are not obstructed. |
| 4. | Remove the shipping screw as described in "Unpacking (Packing/Contents Listing)" on page 12. |
| 5. | Insert the power cable and power up the instrument. |
| 6. | Once the unit is powered up, press the **Operate** button, highlighted in the image below.<br>  <br>The drawer opens. |

| Step | Action |
|---|---|
| 7. | Remove the protective elastic bands and press the **Close** button, highlighted in the image below.<br>  <br>The drawer closes. |

After this initial startup, you should check the mains voltage selector switch to ensure that the voltage has been set to the correct value. Connect the unit to the mains power supply and switch on the I/O switch on the rear power interface. If the heater within the unit is receiving power, the amber LED on the control panel illuminates.

After you set the desired temperature using the **Operate** (increase) and **Close** (decrease) buttons, the temperature display value increases and the LED light flashes. Wait until the amber LED light stops flashing and you hear a beep. This signals to the operator that the set temperature has been reached and the unit is ready to seal.

## Voltage Check

**CAUTION**

**Electrical Installation**

| | |
|---|---|
| Be sure that the equipment is not connected to the mains power. |  |

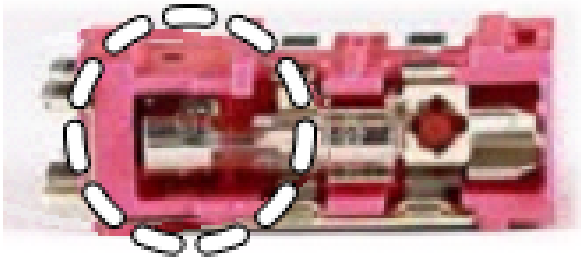
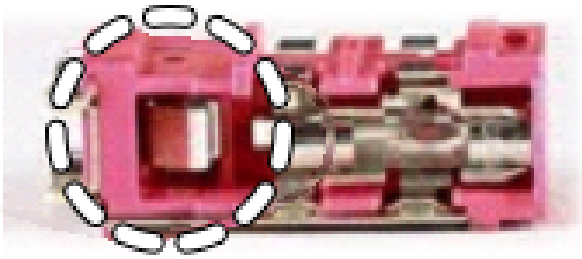
The connection panel at the rear of the Semi-Automated Sheet Heat Sealer contains the following features:

- Power setting 115/230 VAC and fuse holder
- I/O power switch
- Mains power plug

The set voltage is displayed in white on a red background on the power setting and fuse holder.

### Changing the Voltage Setting

To change the voltage setting, complete the following steps:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1.</td><td>Open fuse holder compartment with a screwdriver.</td></tr>
<tr><td>2.</td><td>With the screwdriver, lever out the fuse holder, as demonstrated in the images below:<br>  </td></tr>
<tr><td>3.</td><td>Replace the two fuses according to the table below:<br><table><tr><th>Power Voltage</th><th>(EN 60127)</th></tr><tr><td>115V</td><td>3.15 A (T)</td></tr><tr><td>230V</td><td>2 A (T)</td></tr></table></td></tr>
<tr><td>4.</td><td>Insert the fuse holder keeping the set voltage label at the top.</td></tr>
<tr><td>5.</td><td>Close the fuse compartment by pressing gently.<br>If the fuse holder is inserted correctly, as in image below, you can read the voltage selected.<br>  <br>The image below is an example of a fuse holder inserted incorrectly:<br>  </td></tr>
</table>

# 4. Settings and Operation

## Setting Up Operating Mode

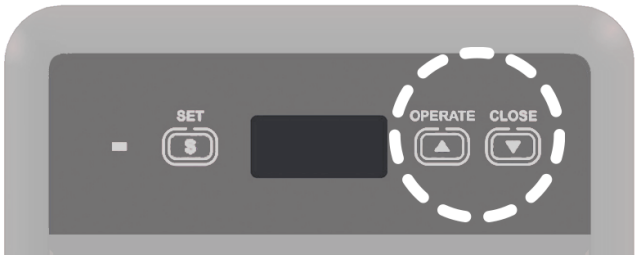
Turn on the Semi-Automated Sheet Heat Sealer using the switch located at back of the unit. The display shows the software version for a few seconds, then shows the temperature to which the Semi-Automated Sheet Heat Sealer is currently set. The unit is delivered with the heater platen turned off.

The first time you switch the unit on, the keypad displays "OFF". Otherwise, when you switch the unit on, the LED light flashes and the unit starts to heat up to the last set temperature.

The following sections detail how to control the "Temperature and Time Settings" and the "Standby, Power Down, and Audible Warning Control Settings", as well as the procedures for "Run Mode", "Standby Mode", "Power Down Mode", and "Closing the Drawer".

# Temperature and Time Settings

To set the temperature and time settings, complete the following steps:

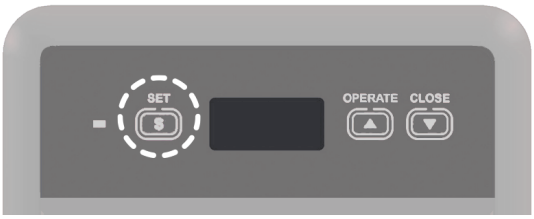
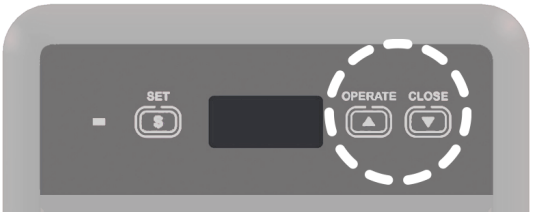
| Step | Action |
|---|---|
| 1. | Briefly press and release **S** on the control panel, highlighted in the image below.<br>  <br>The display shows the last set sealing temperature (flashing). |
| 2. | Increase or decrease the temperature by using the **Operate** (increase) or **Close** (decrease) buttons, highlighted in the image below.<br>  <br>Temperature can be set between 120°C and 200°C with steps of 1°C or to “OFF”.<br>To increase or decrease the temperate in 1°C steps, press the keys once.<br>To increase or decrease the temperature rapidly, press and hold your finger on the keys, releasing the button once you have reached the desired temperature. |
| 3. | Press **S** again to store the new temperature.<br>The display flashes "t" and the current sealing time. |
| 4. | Increase or decrease the sealing time by using the **Operate** (increase) or **Close** (decrease) buttons.<br>Time can be set between 0.0 seconds and 1.0 seconds in steps of 0.1 second increments, or from 1 second to 10 seconds in steps of 0.5 second increments.<br>To increase or decrease the time rapidly, press and hold your finger on the keys, releasing the button once you have reached the desired time. |
| 5. | Press **S** again to store the new sealing time value.<br>***NOTE:*** *In doing so, you also exit from the program menu.*<br>The unit returns to *Run* mode and the actual temperature of the heating platen is shown in the display. |

# Standby, Power Down, and Audible Warning Control Settings

Standby time is the time after which the heater temperature is automatically reduced to 60°C when the unit is left idle.

Power down time is the time after which the heater automatically switches off when the unit is left idle.

To set the standby time, power down time, and audible warning control settings, complete the following steps:

| Step | Action |
|---|---|
| 1. | Press the **S** on the control panel (highlighted below) for 10 seconds, then release.<br>  <br>The display flashes the letter "L" and the last set standby time in minutes. |
| 2. | Increase or decrease the standby time using the **Operate** (increase) or **Close** (decrease) buttons, highlighted below.<br>  <br>Standby time can be set between 1 minute and 99 minutes with steps of 1 minute, or as “no” standby. |
| 3. | Press **S** again to store the new standby time.<br>The display flashes the letter "P" and the current power down time (in hours). |
| 4. | Increase or decrease the power down time using the **Operate** (increase) or **Close** (decrease) buttons.<br>Power down time can be set between 1 hour and 24 hours with steps of 1 hour. |
| 5. | Press **S** again to store the new power down time.<br>The display flashes the letter "S" and the current audible warning setting. |
| 6. | Enable the audible warning function by pressing the **Operate** button ("on"), or disable the function by pressing the **Close** button ("no"). |
| 7. | Press **S** again to store the audible warning function.<br>The display flashes the letter “r”.<br>***NOTE:*** *This MUST BE set to “on”, or the drawer does not function correctly.* |
| 8. | Press **S** again to save and exit.<br>The unit returns to *Run* mode and the actual temperature of the heating platen is shown in the display. |

# Run Mode

**CAUTION**

**High Temperature Hazard**

| | |
|---|---|
| Foil backed film may remain hot for a number of seconds after sealing. Care should be taken in handling these plates. |  |

## Heat Sealing Film Recommendations

When using heat sealing films that have a tendency to curl, such as 4titude® Peel Heat Seal (4ti-0521), DMSO Resistant Peel Heat Seal (4ti-0587), or Clear Weld Heat Seal Mark II (4ti-0575), use the Semi-Automated Sheet Heat Sealer Sealing Frame (59-2009) to hold down the seal.

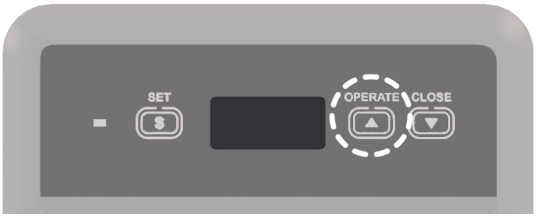
The Sealing Frame is supplied with the Semi-Automated Sheet Heat Sealer Plate Support Adapter, PCR 96 (59-2003, optional extra) and is also available as separate item (59-2009).

For deep well plates, place the Semi-Automated Sheet Heat Sealer Weighted Sealing Platen (59-2008, optional extra) on top of the sealing film.

For most other plates, we recommend the use of the Semi-Automated Sheet Heat Sealer Sealing Frame (59-2009).

See the "Run Mode Procedure" on page 25.

## Run Mode Procedure

| Step | Action |
|---|---|
| 1. | Switch on the unit.<br>The unit automatically begins to warm up the heating platen to the last set temperature. The display shows the temperature increase in real time with the amber LED flashing.<br>When the heating platen reaches the set temperature, the unit emits an audible beep and the amber LED remains permanently illuminated. The system is now ready for sealing. |
| 2. | Press the **Operate** button, highlighted in the image below, to open the drawer.<br>  |
| 3. | Load the sample plate onto the appropriate plate support adapter. |
| 4. | Place the sealing film over the plate, ensuring that the sealing surface is face down. |
| 5. | Press the **Operate** button with the drawer open, and the plate and adapter loaded.<br>The drawer automatically closes and the sealing process begins.<br>Once the plate makes contact with the heating platen, the display shows the letter “t” and the countdown of the programmed sealing time starts.<br>When the countdown timer reaches zero, the drawer automatically opens. |
| 6. | Remove the sealed plate.<br>The unit emits an audible beep once the heating platen has reached the programmed temperature again and a new cycle can be started. |

# Standby Mode

If left idle for a prolonged time, the Semi-Automated Sheet Heat Sealer automatically switches into *Standby* mode (automatically set at 60 minutes, unless otherwise specified) and the temperature of the heating plate is reduced to 60 °C.

When entering into *Standby* mode, the display shows the decrease of the temperature in real time and the amber LED switches off.

The temperature of the heating platen is maintained at 60 °C during standby.

The display shows the actual temperature of the heating platen, rather than the set sealing temperature.

If you press any key, the unit automatically begins to warm up the heating plate to the pre-selected sealing temperature.

See "Sealing Parameters" on page 32 to change the time after which the unit switches into *Standby* mode or to switch off the *Standby* function.

# Power Down Mode

If the unit remains idle in *Standby* mode for a prolonged time, the system goes into *Power down* mode and the heating platen switches off (automatically set at 10 hours, unless otherwise specified). The amber LED also switches off.

The display shows the temperature decrease until it reaches 45 °C. Once it reaches 45 °C, the unit displays the letters "LO".

If you press any key, the unit automatically begins to warm up the heating platen to the pre-selected sealing temperature.

See "Standby, Power Down, and Audible Warning Control Settings" on page 23 to change the time after which the unit switches into *Power down* mode.

# Closing the Drawer

When the unit is not in use, prevent damage or dust contamination in the unit by closing the drawer of the unit.

***NOTE:*** Do not manually close the drawer.

To close the drawer safely, complete the following step:

| Step | Action |
|---|---|
| 1. | Press the **Close** button, highlighted in the image below.<br>  <br>The drawer closes. |

# 5. Optimizing Seal Quality

## Plate Requirements

The Semi-Automated Sheet Heat Sealer accommodates plates made from a variety of materials and plate designs. For a complete list of the acceptable sealing materials, refer to "Heat Seal Materials" on page 30.

The Semi-Automated Sheet Heat Sealer is designed to accommodate plates which meet the standard established by the Society of Biomolecular Sciences (SBS). These include, but are not limited to, deep-well plates, PCR, and standard microplates in the 96, 384, and 1536 well formats.

In accessing the suitability of a plate for heat sealing, it is important to look at its design and the quality of manufacturing. In general terms, it is important for the plate design to have raised rims around each well, giving a defined sealing ring around each well. When assessing the seal quality, it is important to study a recently removed seal looking for a regular pattern of sealing rings from one end of the plate to the other.

Incomplete sealing indicates that the plate is not perfectly flat, not flattened during the sealing process, or not supported adequately in the plate support adapter.

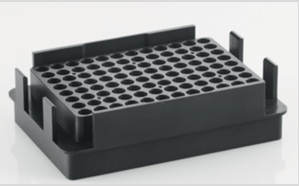
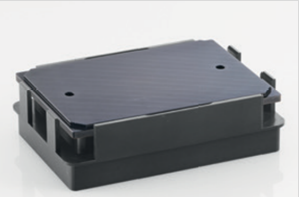
The Semi-Automated Sheet Heat Sealer is designed to be used with any of the following plate types made from polypropylene, polyethylene, polystyrene, polycarbonate, and COC:

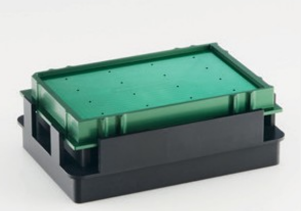
- PCR plates
- SBS format shallow well plates (384-well)
- Roche 1536 well plates
- Deep-well plates
- Tube blocks (various)
- Vision Plates™

# Plate Support Adapters

The Semi-Automated Sheet Heat Sealer is designed to seal microplates from 4 mm to 60 mm in height. You must first place all plates in an appropriate adapter to bring the sealing surface into the correct height range for the sealer. In addition to this, 96 and 384 well PCR plates require an adapter to support the plate precisely enough to produce an even seal. With a 96 and 384 well PCR plate, it is necessary to support each well completely, whereas with standard microplates, it is only necessary to support the underside of the well but not the skirt.

Our Random Access plates supply a novel 96 well plate design with individually removable tubes. These plates can be sealed in one step using Random Access heat seals (96 individual foil seal spots on a removable backing), resulting in individually sealed tubes. Please refer to the table below to select the correct adapter for the plate you wish to seal.

| Plate Type | Adapter to Use | Adapter Image |
|---|---|---|
| Fully skirted PCR plates (e.g. 384 well and low profile 96 well PCR Plates, fully skirted FrameStar® PCR plates) | Plate Support Adapter, Standard (59-2001, included) |  |
| 96 well PCR plates | Plate Support Adapter, PCR 96 (59-2003, optional extra; includes Semi-Automated Sheet Heat Sealer Sealing Frame, 59-2009)<br>***NOTE:*** *When using the PCR 96 adapter, the standard plate adapter (59-2001, included) should be removed from the drawer* |  |
| Fully skirted 1-component 384 well PCR plates (FrameStar® 384 well plates also compatible) | Plate Support Adapter, PCR 384 (59-2004, optional extra) |  |
| Shallow well plates (e.g. FrameStar® 384 well PCR plates) | Plate Support Adapter, Standard (59-2001, included)<br>*placed inside*<br>Plate Support Adapter, PCR 96 (59-2003, optional extra)<br>***NOTE:*** *This set-up allows the use of the Semi-Automated Sheet Heat Sealer Sealing Frame (59-2009) to keep the seal perfectly aligned.* |  |

| Plate Type | Adapter to Use | Adapter Image |
|---|---|---|
| Roche 1536 well plates | Place Support Adapter, Roche 1536 (59-2002, optional extra)<br>*placed inside*<br>Plate Support Adapter, PCR 96 (59-2003, optional extra) |  |
| Deep well plates, fully skirted SBS standard plates (except 96 well PCR plates) | Plate Support Adapter, Storage 96 and 384 (59-2006, optional extra) |  |
| Use of Random Access Heat Seals with standard and low profile plates | Plate Support Adapter, Random Access (59-2005, optional extra) |  |

## Heat Seal Materials

The Semi-Automated Sheet Heat Sealer is compatible with the widest range of heat sealing materials available on the market. Details of available materials can be found in the following table, Azenta Life Sciences literature, or by visiting www.azenta.com.

***NOTE:*** Azenta Life Sciences also offers sample sheets for evaluation purposes. Please contact us at www.azenta.com.

| Code | Description | Dimensions | Sheets/Cases |
|---|---|---|---|
| 4ti-0541 | Clear Heat Seal, sheets | 125 mm x 78 mm | 100 |
| 4ti-0575 | Clear Weld Heat Seal Mark 2, sheets | 125 mm x 78 mm | 100 |
| 4ti-0581 | Clear Heat Seal 3730, sheets on perforated roll | 125 mm x 78 mm | 1,000 |
| 4ti-05481 | Clear Heat Seal Plus, sheets | 125 mm x 78 mm | 100 |
| 4ti-0521<br>4ti-0521/RA-TAB<br>4ti-052/RA-8 | Peel Heat Seals, sheets<br>Random Access Peel Heat Seal, With Tabs, sheets<br>Random Access Peel Heat Seal 96/8, sheets | 125 mm x 78 mm<br>127 mm x 100 mm<br>127 mm x 100 mm | 100<br>100<br>100 |
| 4ti-05231 | Universal Peel Heat Seal, sheets | 125 mm x 78 mm | 100 |
| 4ti-0587 | DMSO Resistant Peel Heat Seal, sheets | 125 mm x 78 mm | 100 |

| Code | Description | Dimensions | Sheets/Cases |
|---|---|---|---|
| 4ti-0531<br>4ti-0531/GR<br>4ti-0531/RA | Pierce Heat Seal, sheets<br>Pierce Heat Seal, sheets, with printed grid reference<br>Random Access Pierce Heat Seal, sheets | 125 mm x 78 mm<br>125 mm x 78 mm<br>127 mm x 100 mm | 100<br>100<br>100 |
| 4ti-05381<br>4ti-05381/RA | Pierce Heat Seal Strong, sheets<br>Random Access Pierce Heat Seal Strong, sheets | 125 mm x 78 mm<br>127 mm x 100 mm | 100<br>100 |
| 4ti-0536 | Foil Heat Seal, sheets | 125 mm x 78 mm | 100 |
| 4ti-0547 | Polystyrene Foil Heat Seal, sheets | 127 mm x 100 mm | 100 |
| 4ti-0591 | Thermal Bond Heat Seal, sheets | 125 mm x 78 mm | 100 |
| 4ti-0597<br>4ti-0597/ST | Gas Permeable Heat Seal Mark 2, sheets<br>Gas Permeable Heat Seal Mark 2, sheets, sterile | 125 mm x 78 mm<br>125 mm x 78 mm | 100<br>10 x 10 |
| 4ti-0541/SLIT | Gas Permeable Clear Heat Seal, sheets | 125 mm x 78 mm | 100 |
| 66-1001 | FluidX AirFilm 96, with tab | 125 mm x 78 mm | 50 |
| 66-1021 | FluidX AirFilm 96, without tab | 125 mm x 78 mm | 50 |

# Sealing Parameters

Once you have established that your plate quality is sufficient, you are using the correct plate support adapter, and you have chosen your sealing material, it is necessary to optimize the sealing parameters of time and temperature. This can be achieved using empty plates.

In general terms, it is sensible to keep one of the parameters constant and vary the other when optimizing. For example, set the sealing time to two seconds and gradually increase the temperature. Monitor the results until you are satisfied with the quality of the resulting seal. You can then further fine-tune the quality by maintaining your desired temperature and adjusting the time in 0.1 second increments.

The following sealing temperatures and times are for guidance only. Sealing efficiency varies depending on the plate type used. All sealing parameters were estimated using software version 1.07.

## Sealing Parameters Chart

> ***NOTE:*** These values are for guidance only. It is advisable to conduct trials depending on the plate type being sealed. Add one second to the sealing time when the Semi-Automated Sheet Heat Sealer Weighted Sealing Platen is used (59-2008).

The following chart details the code, description, and sealing temperature (°C) / seal time (sec) for the three different plates mentioned, as well as the 96 Rack of Tubes.

| Code | Description | 96 well PCR plates * | 384 well PCR plates * | Vision Plates™ ** | 96 Rack of Tubes |
|---|---|---|---|---|---|
| 4ti-0541 | Clear Heat Seal | 175-185 / 2-3 | 165-180 / 3 | 185-200 / 3 | |
| 4ti-0575 | Clear Weld Heat Seal Mark 2 | 175-180 / 2-3 | 170-175 / 2-3 | | |
| 4ti-0581 | Clear Heat Seal 3730 | 165-175 / 3 | 165-175 / 2 | 175-185 / 2-3 | |
| 4ti-05481 | Clear Heat Seal Plus | 175-185 / 2-3 | 165-180 / 3 | 185-200 / 3 | |
| 4ti-0521 | Peel Heat Seal | 175-185 / 2-3 | 170-175 / 2-3 | | |
| 4ti-05231 | Universal Peel Heat Seal | 175 / 2 | 175 / 2 | 180 / 2 | |
| 4ti-0587 | DMSO Resistant Peel Heat Seal | 175-185 / 3 | 170-175 / 2-3 | | |
| 4ti-0531 | Pierce Heat Seal | 160-175 / 2 | 160-175 / 2 | 185-200 / 3 | |
| 4ti-0581 | Pierce Heat Seal Strong | 170-180 / 2 | 170-180 / 2 | 180-200 / 3 | |

| Code | Description | 96 well PCR plates * | 384 well PCR plates * | Vision Plates™ ** | 96 Rack of Tubes |
|---|---|---|---|---|---|
| 4ti-0536 | Foil Heat Seal | 165-180 / 2 | 160-175 / 2-3 | 185-200 / 3 | |
| 4ti-0547 | Polystyrene Foil Heat Seal | | | 185-200 / 3 | |
| 4ti-0591 | Thermal Bond Heat Seal | 170-180 / 2-3 | 160-170 / 2 | | |
| 4ti-0595 | Gas Permeable Heat Seal Mark 2 | 165-175 / 3 | 165-175 / 3 | 175-185 / 3 | |
| 4ti-0541/SLIT | Gas Permeable Clear Heat Seal | 175-185 / 2-3 | 165-180 / 3 | 185-200 / 3 | |
| 66-1001 | FluidX AirFilm 96, with tab | | | | 185 / 6 |
| 66-1021 | FluidX AirFilm 96, without tabs | | | | 185 / 6 |

* These values are for two-component PCR plates. For one-piece polypropylene plates, increase dwell time by one second.

** These values can be used for all polystyrene plates.

## Sealing Parameters Random Access Seals Chart

The Plate Support Adapter, Random Access, 59-2005, is required for low/standard profile plates for use with Random Access Heat Seals listed below.

The following chart details the code, description, and sealing temperature (°C) / seal time (sec) for the three different plates mentioned.

| Code | Description | Random Access Plates | FrameStar® Break-A-Way Plates * | FrameStar® Break-2-Ways Plates ** |
|---|---|---|---|---|
| 4ti-0521/RA-TAB | Random Access Peel Heat Seal, with tabs | 180 / 3 | 185 / 4 | 185 / 4 * |
| 4ti-0521/RA-8 | Random Access Peel Heat Seal, 96/8 | N/A | 185 / 4 | 185 / 4 * |
| 4ti-0531/RA | Random Access Pierce Heat Seal | 170 / 2 | 175 / 2 | 175 / 2 |
| 4ti-05381/RA | Random Access Pierce Heat Seal Strong | 185 / 5 | 185 / 5 | 185 / 5 * |

* Applies to FrameStar® Break-A-Way Plates, Low Profile with a lot no. >504035. Plates with a lot no. <504035 are compatible with adapter 59-2005. For details, contact us at Service.Products@azenta.com.

** For FrameStar® Break-2-Ways Plates, Low Profile, increase seal time by one second.

# 6. Troubleshooting

A list of possible error messages generated by the Semi-Automated Sheet Heat Sealer are summarized within this chapter.

If the solutions given below do not solve the problem, please contact Azenta Life Sciences at Service.Products@azenta.com or their authorized local distributor.

## Error Messages

| Display Message | Error |
|---|---|
| Er1 | The system cannot reach the home position within a defined time<br>OR<br>The shipping screw must be removed on start-up of instrument after shipping. |
| Er2 | The system cannot control the heating element correctly. |
| Er3 | The sealer cannot complete the sealing compression within a defined time. |
| Er4 | The system cannot lower the elevator within a defined time, following sealing. |
| Er5 | Elevator motor is overloaded. |
| Er6 | Temperature sensor is not functional. |
| Er7 | Drawer error |
| Er8 | Low handler sensor error during compression |
| ErA | Drawer motor is overloaded. |
| ErB | Drawer cannot reach the open or closed position. |
| ErC | Drawer does not move or the system does not detect the movement. |
| ErD | Both the "close drawer" sensor and "open drawer" sensor are active at the same time. |

The errors remain displayed until the problem is solved. To clear the error, press the **Close** button. If any of the above errors persist, switch off the unit, then switch it on again.

If within 10 seconds the problem is not solved, the heated platen automatically turns off to avoid sample damage.

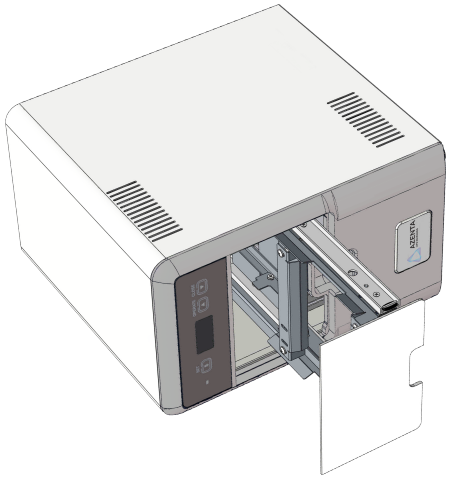
If the problem is solved within 10 seconds, the unit automatically returns to *Run* Mode.

## Cleaning the Heating Platen

If the sealing film is placed upside down on the plate, the sealing film becomes stuck to the heating platen. To clean it, proceed as follows:

| **CAUTION**<br>**Heat Hazard** | |
|---|---|
| Do not attempt to clean the unit until it has cooled down to near room temperature. |  |

| Step | Action |
|---|---|
| **1.** | Set the temperature to “OFF” (see "Temperature and Time Settings" on page 22). |
| **2.** | Allow the unit to cool until heating platen is close to ambient. |
| **3.** | If the drawer is not open, press the **Operate** button to open. |
| **4.** | Switch the unit off at the back using the I/O switch. |
| **5.** | Disconnect the mains power supply. |

| Step | Action |
|---|---|
| 6. | Lay the unit gently onto the side to allow better access to heating platen.<br>  |
| 7. | Clean heating platen using a blunt plastic tool, such as a spatula. Gently scrape away the hardened plastic and clean any residue left on the heating platen with a damp cloth. |
| 8. | Ensure nothing is obstructing the drawer. |
| 9. | Reconnect the mains power supply and reboot the instrument.<br>The drawer automatically closes and the system automatically heats back up to the last set temperature. |

# 7. Maintenance

**CAUTION**

**Risk of Electric Shock**

Cleaning the unit without taking the appropriate safety measures could end in electric shock.
Before cleaning, ensure the following safety measures:

- The unit is switched off.
- The power cable is disconnected.
- The heated parts are at ambient temperature.

The unit does not require regular maintenance but it should be kept clean.

The external casing of the heat sealer can be cleaned with a cloth dipped in water or ethanol (methanol, formaldehyde can also be used).

The unit should not be immersed in solvents. Do not use acetone or abrasive cleaners.

No parts are to be autoclaved (except adapters).

In case of radioactive spillages, it is recommended to use an appropriate cleaning agent. For any other maintenance operation not indicated in this manual, please contact Azenta Life Sciences.

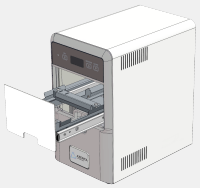
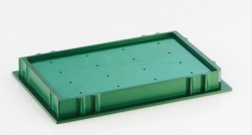
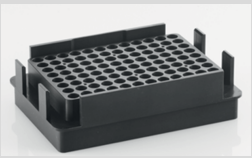
# 8. Appendices

This chapter contains the appendices for the manual.

# Appendix A: Technical Specifications

| Parameter | Specification Category | Specification |
|---|---|---|
| Mechanical | Dimensions (H x D x W)<br>Weight | 313 mm x 277 mm x 181 mm<br>10 kg |
| Electrical | Voltage<br>Frequency<br>Power at 100-115V<br>Power at 230V | 100-115/230 ±10% Vac<br>50/60 Hz<br>240-300 VA<br>300 VA |
| Environmental | Temperature range<br>Relative humidity<br>Maximum altitude | Operative 18°C - 35°, Storage -20°C – 40°C<br>20% - 80% not condensing<br>2000 m |
| Sound Pressure Level | Maximum measured level | 60 dbA (below the limits of 85 dbA defined by regulation in force) |
| Safety Information | Pollution<br>Overvoltage<br>Devices for use indoors | Degree 2<br>Category II |
| Setup Parameters | Sealing temperature | OFF or from 60°C to 200°C<br>Step: 1°C<br>Default: OFF |
| | Sealing time | from 0.0 to 10 seconds<br>Step: 0.5 seconds<br>Default: 3 seconds |
| | Standby cycle | "no" standby or from 1 to 99 minutes<br>Step: 1 minute<br>Default: 60 minutes |
| | Standby temperature | 60°C, not programmable |
| | Power down temperature | ambient |
| | Warning acoustic (Buzzer) | ON/OFF<br>Default: ON |

# Appendix B: Ordering Information

| Code | Name/Description | Image | Quantity |
|---|---|---|---|
| 59-2000 | Semi-Automated Sheet Heat Sealer<br>*including power cord, manual, standard plate support adapter (59-2001), 3.15A (T) fuse, 12 month warranty* |  | 1 |
| 59-2001 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, Standard<br>*for skirted 96 and 384 well plates* |  | 1 |
| 59-2002 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, Roche 1536<br>*for Roche 1536 well PCR plates* |  | 1 |
| 59-2003 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, PCR 96<br>*for 96 well PCR plates, including Semi-Automated Sheet Heat Sealer Sealing Frame (59-2009)* |  | 1 |
| 59-2004 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, PCR 384<br>*for 384 well PCR plates* |  | 1 |
| 59-2005 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, Random Access<br>*for use of Random Access Seals* |  | 1 |
| 59-2006 | Semi-Automated Sheet Heat Sealer Plate Support Adapter, Storage 96 and 384<br>*for 96 well and 384 well storage plates* |  | 1 |
| 59-2008 | Semi-Automated Sheet Heat Sealer Weighted Sealing Platen |  | 1 |

| Code | Name/Description | Image | Quantity |
|---|---|---|---|
| 59-2009 | Semi-Automated Sheet Heat Sealer Sealing Frame<br>*for use with the Semi-Automated Sheet Heat Sealer Plate Support Adapter, PCR 96 (59-2003)* |  | 1 |

# Appendix C: Warranty

Azenta Life Sciences warrants that the Semi-Automated Sheet Heat Sealer should be free from defects in materials and workmanship for a period of 12 months from the date of purchase. The purchase date is determined by the invoice date from Azenta Life Sciences to the customer. If the instrument is being incorporated into an automated system by a third party, the warranty period may be extended by a maximum of 6 months or the date the system is commissioned, whichever is the shorter. For this automation extension to be valid, Azenta Life Sciences must be notified of this requirement along with the details of the integrator at the point of purchase.

Each Semi-Automated Sheet Heat Sealer is tested and documented by the manufacturer before shipping. Azenta Life Sciences Ltd‘s Quality Control System guarantees that the performance of the Semi-Automated Sheet Heat Sealer you have purchased is within its specifications.

The warranty covers all parts and labour costs associated with a repair of the unit within the first 12 months. The need for returning a unit for service must first be agreed with Azenta Life Sciences via telephone support. Once it is established a return is necessary, Azenta Life Sciences will issue a returns number, details of which must be returned with the unit.

The warranty does not cover defects caused by excessive wear and tear or damage due to shipping, accident, abuse, misuse, problems with electrical power, or usage not in accordance with product instructions, if other than original spare parts supplied by the manufacturer have been used, or if other than original Azenta Life Sciences seal sheets have been used.

The warranty does not automatically cover shipping charges. Shipping costs (both ways) will be covered by Azenta Life Sciences where a returns number is issued within 8 weeks of the original delivery date (as confirmed by the invoice date). Shipping costs after this period will need to be covered by the customer.

Once returned to a Azenta Life Sciences designated service center, the unit will be inspected and repaired accordingly and a report provided to the customer. Azenta Life Sciences would expect to carry out this work and return the unit within 10 working days of receiving the unit.

Onsite service or a swap out service (where a loaner instrument is shipped to the customer whilst theirs is repaired) can be arranged at extra cost. Please contact Azenta Life Sciences if you are interested in this service.

This standard warranty can be extended to 24 or 36 months respectively.

Extended warranty must be purchased within 4 weeks of the original invoice address.

# Appendix D: Shipping Instructions

When shipping the unit, you must use the original packaging to prevent damage to the instrument. It is also important to re-insert the shipping screw into the central position on the back of the instrument to prevent any damage to the instrument during transport.

The manufacturer accepts no responsibility for damage incurred unless the unit is correctly packed as described below and transported using the original packaging.

**CAUTION**

**Remove Plate Carriers**

If the plate carrier(s) are left inside the unit during shipping, they may cause severe damage to the sealer.

**CAUTION**

**Insert Shipping Screw**

If the unit is shipped without the shipping screw, the drawer can be damaged during shipping.

| Step | Action |
|---|---|
| 1. | Remove the plate carrier(s) from the unit. |
| 2. | Push the **Close** button to close the drawer.<br>***NOTE:*** *Do not manually push the drawer closed.* |
| 3. | Switch off the unit. |
| 4. | Unplug the external power supply from the main power and remove the power cord from the sealer. |
| 5. | Re-insert the shipping screw into the central position on the back of the instrument.<br>• Ensure that the front drawer is fully shut.<br>• Insert and tighten the screw securely into place on the back of the instrument with a screwdriver.<br>• Confirm the front door cannot be opened once the screw is firmly in place. |
| 6. | Place the sealer between the two foam inserts inside the original shipping box. |

| Step | Action |
|---|---|
| 7. | Place the accessories in the smaller cardboard box and place on top of the foam inserts. |
| 8. | Close the box using a suitable adhesive tape. |

# Appendix E: Recycling and Disposal

**CAUTION**

**Decontamination**

For sealer recycling and disposal, the following operations have to be carried out:

- Switch off the sealer
- Remove the plate, eliminating any contamination on the instrument in accordance with national and international safety regulations

The operator is responsible for the substances used for decontamination: these substances must not create dangerous reactions with the poured substances.
If you have any doubt about which substances to use for decontamination, contact your sale representative.

## Uninstalling the Sealer

To uninstall the sealer, perform the following operations in sequence:

| Step | Action |
|---|---|
| 1. | Open the drawer. |
| 2. | Remove the plates and adapter inserted in the sealer. |
| 3. | Press the **Close** button to close the drawer.<br>***NOTE:*** *Do not manually close the drawer.* |
| 4. | Switch off the unit. |
| 5. | Unplug the external power supply from the main power and then remove the power cord from the sealer. |
| 6. | If present, unplug the RS232 cable. |

## WEEE Statement (European Union)

The symbol above indicates that Waste Electrical and Electronic Equipment (WEEE) is not to be disposed of as unsorted municipal waste. Equipment marked with this symbol is to be collected separately.

The objectives of this program are to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally. Specific treatment of WEEE is indispensable in order to avoid the dispersion of pollutants into the recycled material or waste stream. Such treatment is the most effective means of protecting the customer's environment.

The waste collection, reuse, recycling, and recovery programs available to Azenta Life Sciences-customers, vary by customer location. Please contact the responsible body (e.g., your laboratory manager) for information about local requirements.