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# Multiskan™ Ease Absorbance Microplate Reader

## TECHNICAL GUIDE

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**Revision** A

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

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|---|---|---|
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# Preface

This manual is for the following instruments:

- Multiskan™ Ease Absorbance Microplate Reader – Cat. No. **ME001000C**
- Multiskan™ Ease Absorbance Microplate Reader without touchscreen – Cat. No. **ME002000C**



Figure 1 (a). ME001000C

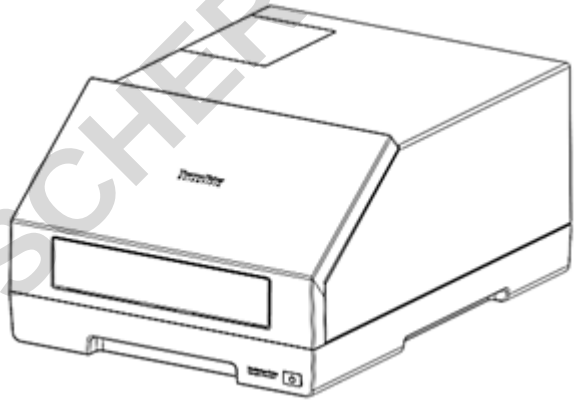


Figure 1 (b). ME002000C

**Figure 1 Multiskan™ Ease Absorbance Microplate Reader**

Use Multiskan™ Ease as standalone (**ME001000C**) or with Thermo Scientific™ SkanIt™ Software. Multiskan™ Ease is intended to be used in research laboratories by qualified personnel.

This document aims to give you the information you need to:

- Install and operate Multiskan™ Ease.
- Navigate in the Multiskan™ Ease User Interface.
- Install and use SkanIt™ Software.

Read the manual in its entirety before you start to operate the instrument.

Save this manual for future reference. This manual is an important part of the instrument and should be readily available.

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# 1 Product information

## Product description

The Thermo Scientific™ Multiskan™ Ease Absorbance Microplate Reader is a high-quality filter-based microplate photometer. It is used to measure absorbance from appropriate 96- or 384-well plate formats in the wavelength range of 400–760 nm. The instrument also has incubating and shaking capabilities and can be integrated into automation environments.

This instrument has two modes, and the differences between these two modes are as follows:

| Description | ME001000C | ME002000C |
|---|---|---|
| Plate support | 96 and 384 wells, w and w/o lid | 96 wells, w and w/o lid |
| Absorbance, turbidimetric measurement | √ | √ |
| Linear shaking | √ | √ |
| SkanIt Software supported | √ | √ |
| Incubator | √ | – |
| Touchscreen | √ | – |
| USB host | √ | – |
| Ethernet | √ | – |
| Microsoft™ One Drive™ | √ | – |

**Note:** The pictures in the manual are based on the **ME001000C** model. The content related to touchscreen UI and incubator is not applicable to the **ME002000C** model.

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# Description of parts

## Instrument overview

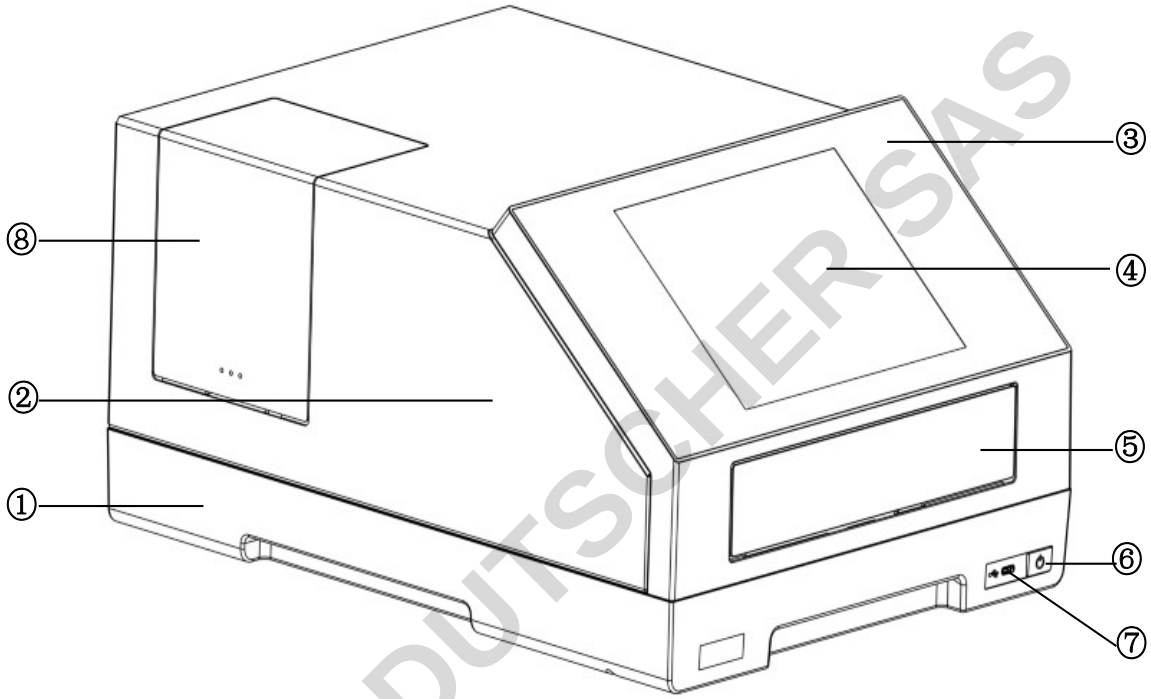



**Figure 2 Front view of the Multiskan™ Ease Absorbance Microplate Reader**

① Base
② Housing
③ Front panel
④ Touchscreen (**ME001000C** only)
⑤ Measurement chamber door
⑥ Power switch
⑦ USB-C connector (**ME001000C** only)
⑧ Filter wheel chamber door

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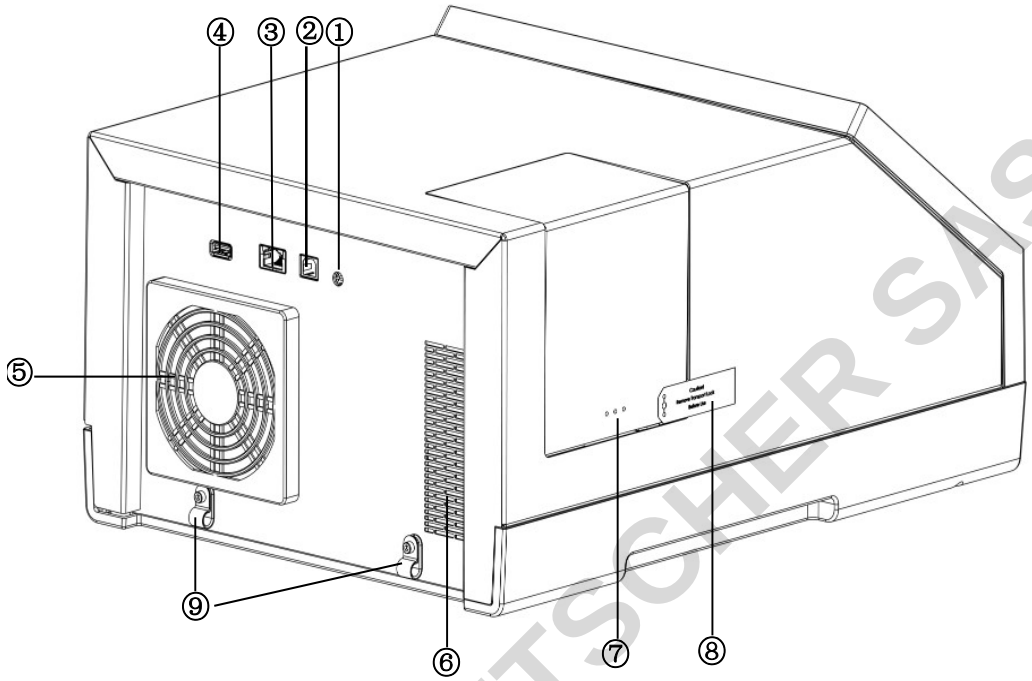



**Figure 3 Rear view of the Multiskan™ Ease Absorbance Microplate Reader**

① Power supply connector
② USB-B connector
③ Ethernet connector (**ME001000C** only)
④ USB-A connector (**ME001000C** only)
⑤ Cooling fan outlets
⑥ LED cooling fan outlet
⑦ Filter wheel chamber door
⑧ Label of the transport lock
⑨ Locking piece of the transport lock

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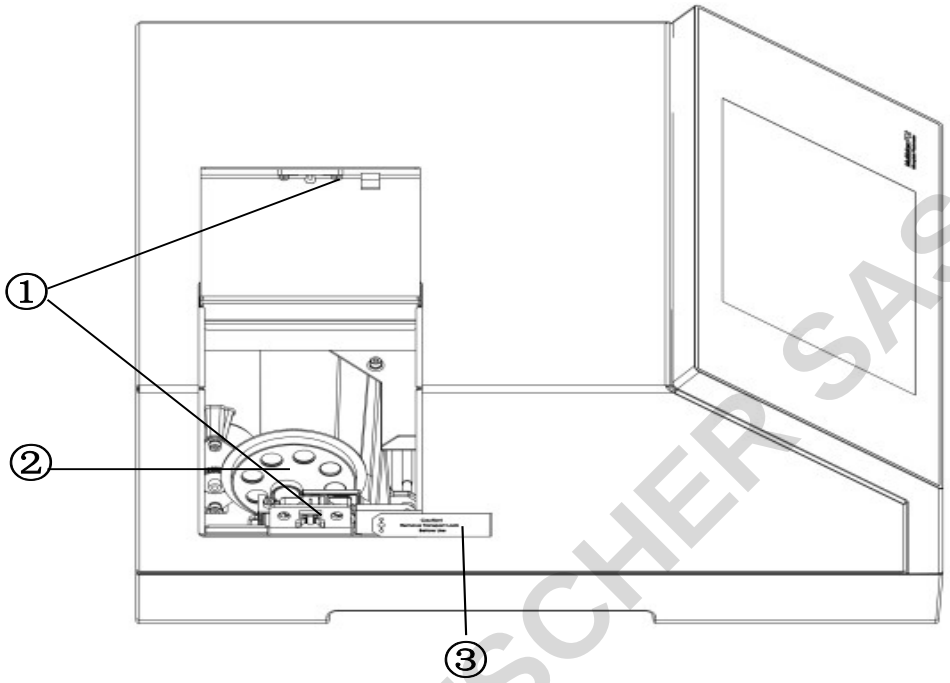



**Figure 4 Internal view of the Multiskan™ Ease Absorbance Microplate Reader**

① Filter wheel chamber door lock
② Filter wheel
③ Label of the transport lock

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## Microplates and plate carrier

Multiskan™ Ease Absorbance Microplate Reader supports all common clear bottom 96-well and 384-well microplates, with and without lids. The total height, including the microplate and lid, must be less than 18 mm. Flat and C-bottom plates are recommended. U-bottom microplates are suitable but not optimal, while V-bottom microplates are not recommended

The plate carrier acts as the sample holder.

**Note:** The maximum plate height of the microplate or a combination of the microplate and lid is 18 mm.

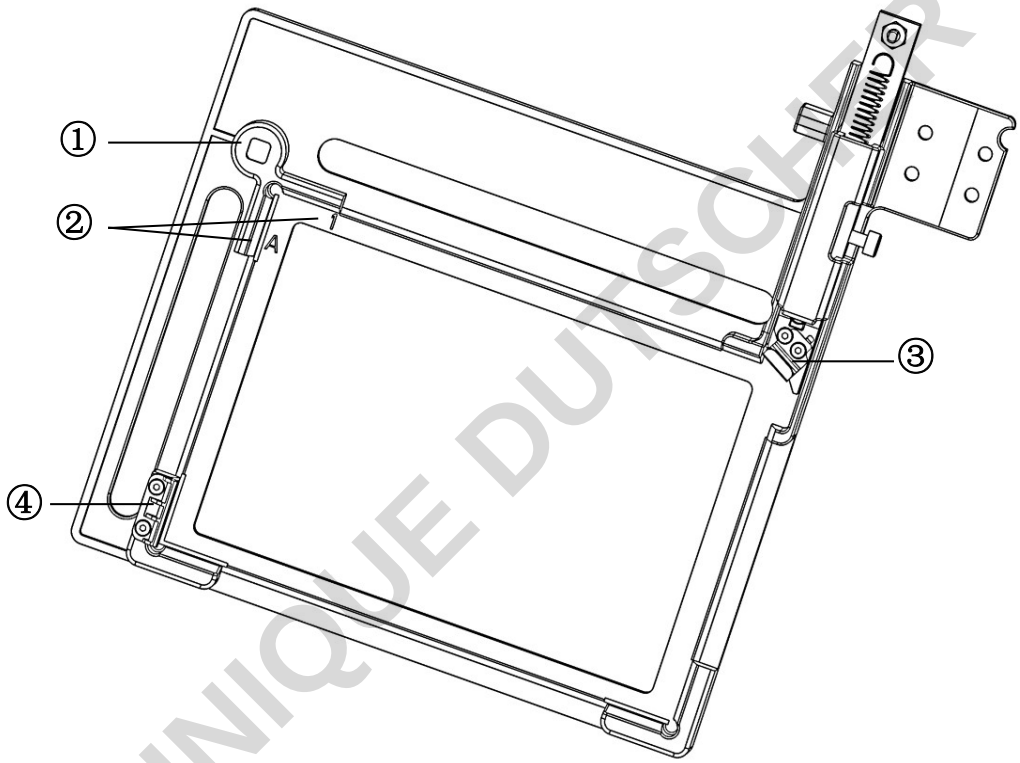



**Figure 5 Plate carrier of the Multiskan™ Ease Absorbance Microplate Reader**

① Positioning hole (used for position calibration)
② A1 plate position mark
③ Plate lock (used to fix the measurement plate)
④ Plate lid lock (used to fix the measurement plate lid)

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## Optical system

The principle of the Multiskan™ Ease Absorbance Microplate Reader optical measurement is shown in Figure 6. The instrument reads from bottom to top. The exact wavelength of the white LED used by the instrument is selected using interference filters in the rotating filter wheel. The light is guided to the microplate optics through an optical fiber. The measurements are conducted through the well.

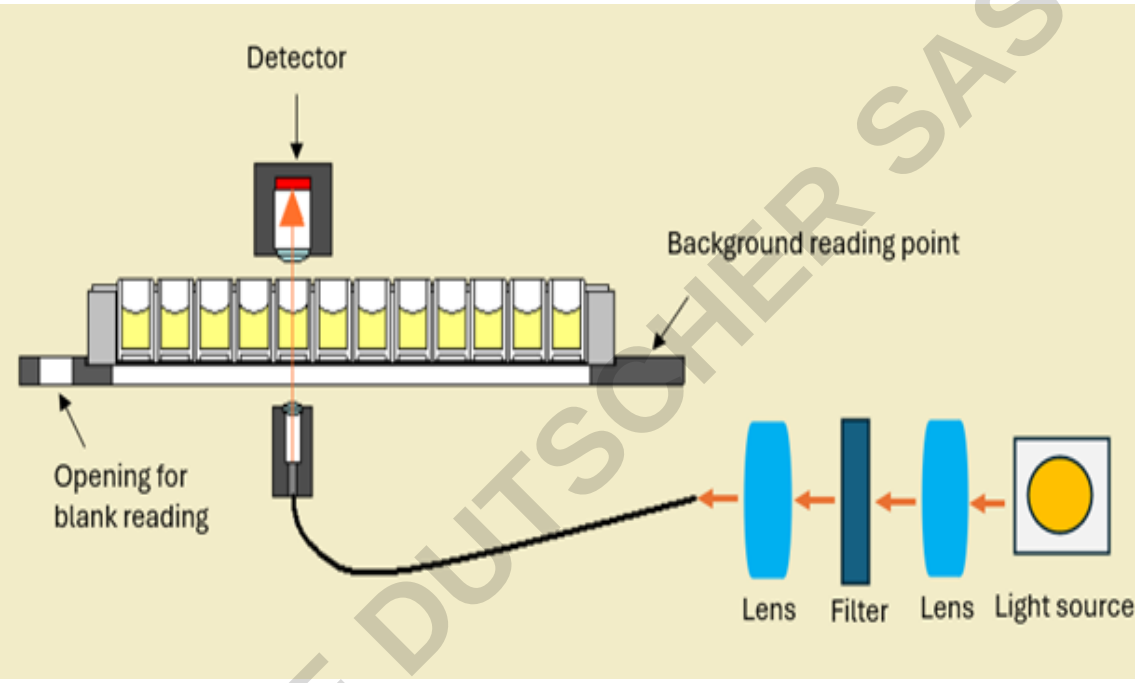
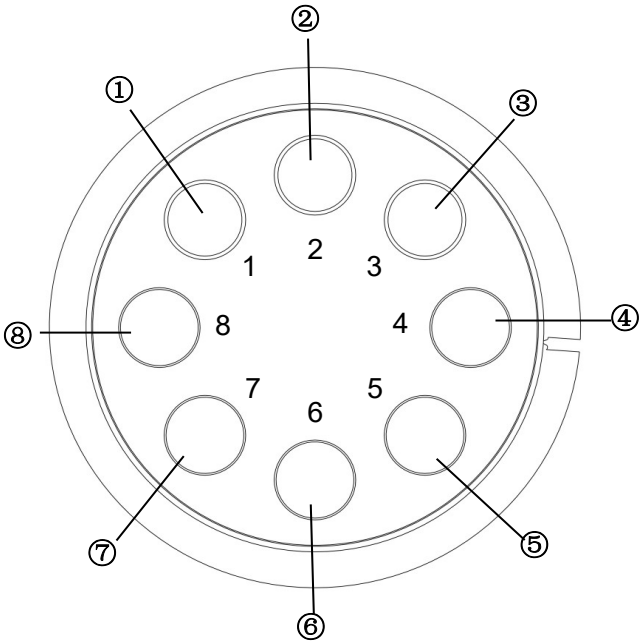



**Figure 6 Principle of operation**

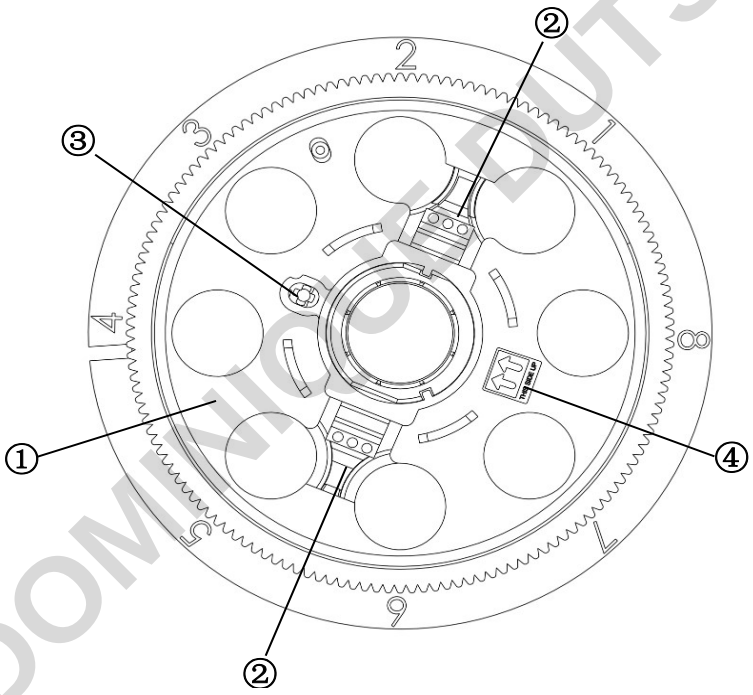
In microplate measurement, the track moves to select the well row, and the measurement head moves to select the well column. Blank (air) and dark level measurements are required to calculate absorbances. These measurements are performed once for each measured row. The instrument moves the microplate aside to measure the blank and dark automatically.

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① 405 nm default filter slot
② 450 nm default filter slot
③ 620 nm default filter slot
④ User defined filter slot
⑤ User defined filter slot
⑥ User defined filter slot
⑦ User defined filter slot
⑧ User defined filter slot

**Figure 7 Front of the filter wheel**




① Filter wheel cover used to fix filters
② Filter wheel cover lock
③ Filter wheel cover positioning hole
④ A mark used to indicate that this side is up

**Figure 8 Back of the filter wheel**

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## Incubator (ME001000C only)

The incubator in the measurement chamber consists of thermal sensor-controlled incubator zones, with two at the top and two at the bottom of the measurement chamber. The incubator design incorporates condensation control to prevent condensation from forming on the microplate lid by heating the lid to a slightly higher temperature than the microplate.

The incubation temperature range is ambient +4°C to 45°C.

**Note:** The liquid warms up considerably slower than the incubator.

## Shaker

Multiskan™ Ease Absorbance Microplate Reader supports linear shaking mode. The shaker operates at different adjustable speeds. Shaking parameters can be found in Appendix B, “Specifications”.

**Note:** The shaker is optimized for water-based liquids with low viscosity. If you use solutions other than water-based ones, test the shaking function before running the measurement to ensure proper mixing and that the liquid stays in the well.

**Note:** When shaker is used, the volume of the liquid in the well shall not exceed 60% of the maximum well volume to ensure that the liquid stays inside the well during the shaking.

**Note:** The shaker is not designed for continuous use. For shaking periods above 24 hours, it is recommended to use a dedicated shaker.

## Cooling fan

The cooling fan is intended to maintain the instrument temperature near ambient conditions. It is automatically activated when the power is on. Cooling fans operate in several different modes, each with a distinct fan speed.

## SkanIt™ Software

The instrument can be operated using the SkanIt™ Software version 8.0 or later, which controls all instrument functions and provides data processing and reporting functions.

For instructions on using the SkanIt™ Software, see the SkanIt™ Software for Microplate Readers Quick Reference and SkanIt™ Software for Microplate Readers User Guide.

The instrument also can be operated by an internal touchscreen UI. For instructions on using the internal touchscreen UI see Chapter 4, “Internal touchscreen UI”.

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# 2 Instrument Installation

## Receive and inspect the shipment

- Verify that the items shown on the shipping list are the same items that you ordered at the time of purchase.
- Carefully inspect the transport package, the instrument, and the accessories carefully for damage incurred during transit.

  **IMPORTANT!** If the box has been damaged in transit, it is to retain it for inspection by the carrier in case the instrument has also been damaged.

- Contact your local Thermo Fisher Scientific representative, if anything is missing or damaged.

## Unpack the instrument

To unpack the instrument:

1. Move the package to its site of operation.

   See “Environmental requirements and considerations” on page 17 before deciding where to place the instrument.

2. Unpack the instrument and accessories carefully after ensuring the arrows on the transport package are pointing upwards.

3. Open the top of the packages and lift the instrument out of the shipping carton.

4. To prevent condensation, leave the instrument in its protective plastic wrapping until it reaches ambient temperature.

The following items are included with the instrument and are immediately accessible upon opening the package.

- Packing list
- Quick Reference Guide to help with the installation
- USB disk box
- USB 2.0 A-B cable
- AC-to-DC power adapter
- Filter wheel box with the filter wheel
- Screwdriver
- Performance test report

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- CE documents
- COC certificate

**IMPORTANT!** Do not touch or loosen any screws or parts other than those specifically designated in the instructions. Doing so may cause misalignment and will invalidate the instrument warranty.

Retain the original packing materials and shipping carton for future transportation. The packaging is designed to ensure safe transport and minimize transit damage. Using alternative packaging materials may invalidate the warranty.

If you relocate your instrument or ship it for service, see “Ship the instrument for service” on page 80.

# Environmental requirements and considerations

**IMPORTANT!** Do not operate the instrument in an environment where potentially damaging liquids or gases are present.

1. Place the instrument on a sturdy laboratory bench that can support its weight.
2. Select a working area that is flat, horizontal, dry, clean, and vibration-proof. Ensure that there is additional room available for cables.
3. Ensure that the ambient air is clean and free of corrosive vapors, smoke, and dust.
4. Maintain an ambient temperature range between 10–40°C (50–104°F).
5. Keep humidity low enough to prevent condensation (relative humidity between 10% and 80%, non-condensing).
6. Ensure that there is at least 10 cm of free space around the instrument for ventilation. A laptop can be placed on top of the instrument.
7. Ensure that there is enough space in front of the instrument so that the plate carrier stays above the table when opened.
8. Avoid sites of operation with excess dust, vibrations, strong magnetic fields, direct sunlight, draft, excessive moisture, or large temperature fluctuations when installing the instrument.

The instrument operates at a safe noise level, so no sound level measurements are necessary after installation.

# Set up the instrument

The following installation steps must be performed before operating the instrument.

1. Remove the transport lock.
2. Connect the mains supply cable.
3. The instrument can be operated using the internal touchscreen UI.
4. To operate the instrument using SkanIt™ Software, connect the instrument to a computer and install the SkanIt™ Software Absorbance Microplate Readers to the connected computer.

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## Guidelines for setting up the instrument

- Only authorized technical service personnel are allowed to open the instrument. Before opening, disconnect the instrument from all voltage sources by unplugging the power supply cable.
- Do not touch switches or electrical outlets with wet hands. Power off the instrument before disconnecting it from the mains supply.
- The electromagnetic environment should be evaluated before operating the device. Avoid using the device near sources of strong electromagnetic radiation (for example, unshielded intentional RF sources), as these can interfere with the proper operation.
- Do not operate the instrument with the transport lock in place.
- Do not touch or loosen any screws or parts other than those specifically designated in the instructions. Doing so may cause misalignment and will void the instrument warranty.
- Allow the instrument to sit in room temperature for at least 3 hours before installing and switching it on to prevent condensation from causing a short circuit.

## Remove the transport lock

1. Remove the tape from the filter wheel chamber door on the left side of the instrument and from the plate carrier door on the front side of the instrument.
2. Open the filter wheel chamber door by clicking three dots ①.

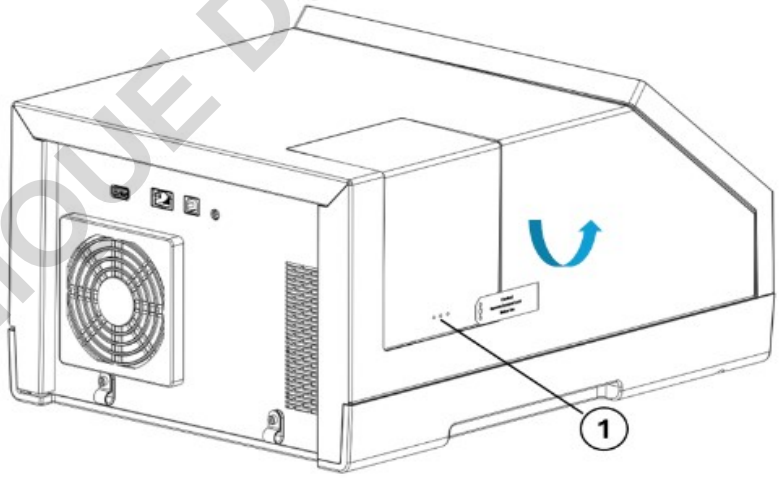



**Figure 9 Three dots**

The transport lock ② will be found on the right side of the filter wheel.

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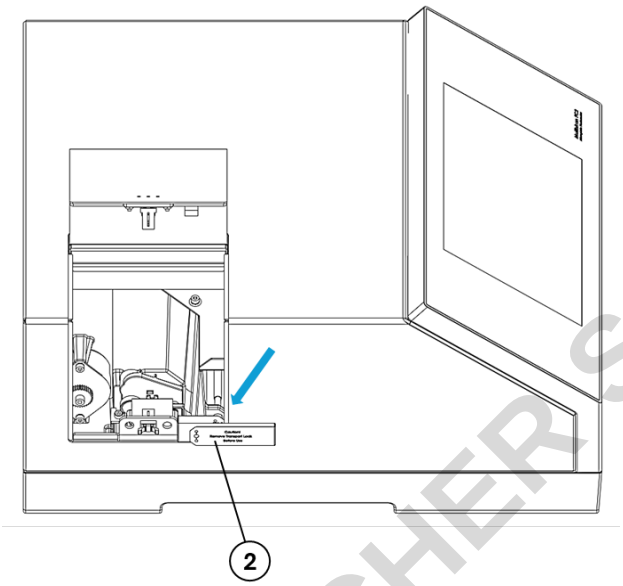



**Figure 10 Transport lock**

3. Loosen the fixing screws and remove the transport lock ③ from the filter wheel chamber, then insert the end of the transport lock into the hole at the end of the warning tag, securing the tag onto the transport lock.

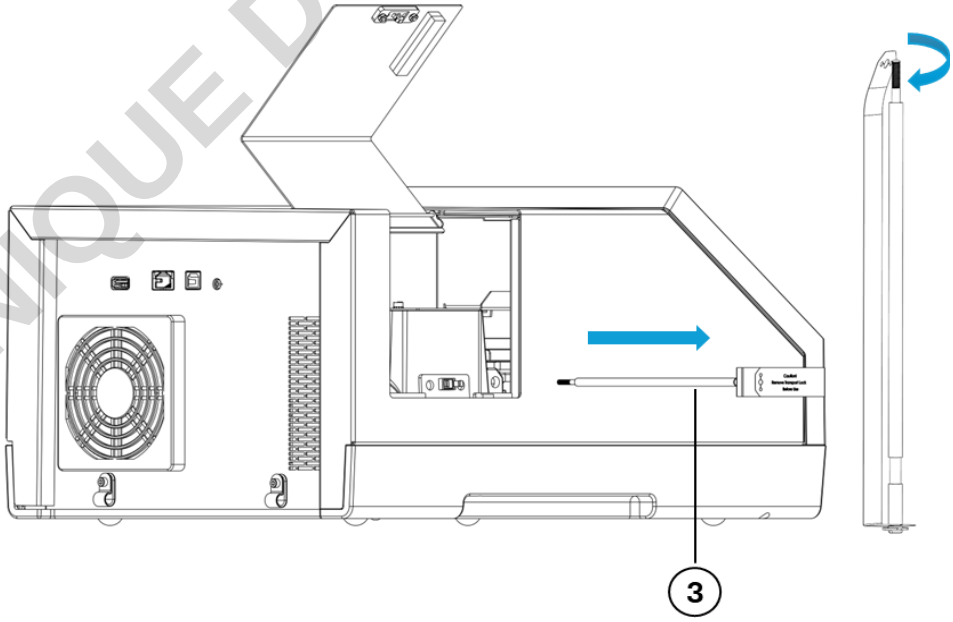



**Figure 11 Transport lock**

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4. Loosen the fixing screws of the right transport lock holder ring ④, then insert one end of the transport lock into the left holder ring and place the other end into the opened right holder ring.

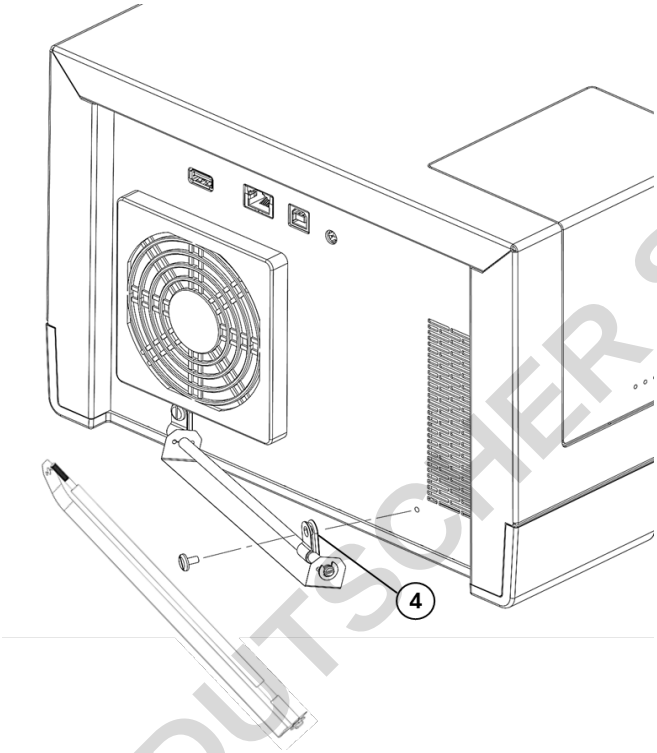



**Figure 12 Transport lock holder ring**

5. Tighten the screws of the transport lock holder ring and secure the transport lock on the back of the instrument for future use.

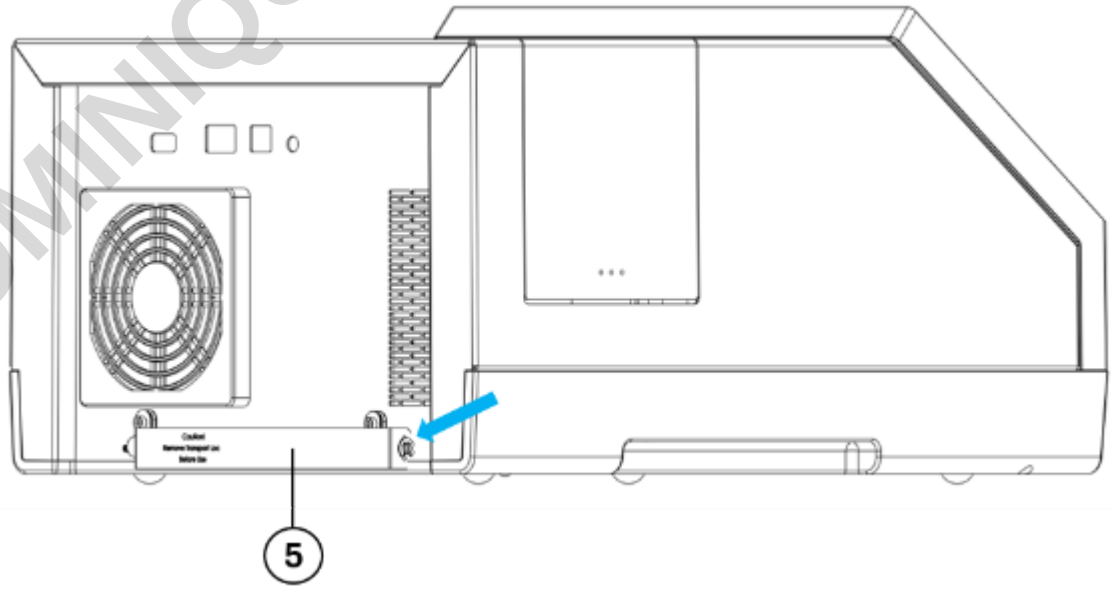



**Figure 13 Attach the transport lock**

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## Connect the mains supply cable

1. Connect the power supply cable to the AC-to-DC power adaptor, then plug the output of the AC-to-DC power adaptor into the power supply connector on the back panel. The input range is 100-240 Vac, 50/60 Hz, nominal.

**CAUTION!** Do not use other power supply cables than the one delivered with the instrument. Use the power supply cable designed for your region.

**CAUTION!** Do not connect the power supply to a power outlet line before plug the output of the AC-to-DC power adaptor in the power supply connector on the back panel.

2. Connect the power supply to a correctly installed line power outlet with a grounded conductor.

**CAUTION!** Do not operate the instrument from a power outlet that has no ground connection.

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# 3 Instrument operation

The instrument can be operated through the internal touchscreen UI and the Thermo Scientific™ SkanIt™ Software.

To operate the instrument using SkanIt™ Software, you should first install the software (see “Install the SkanIt™ Software” on page 24).

**IMPORTANT!** Do not operate the instrument when it is disassembled.

## Guidelines for operating the instrument

**CAUTION!** Do not operate the instrument from a power outlet that has no ground connection.

**CAUTION!**

- Do not smoke, eat, or drink while using the instrument.
- Wash your hands thoroughly after handling test fluids.
- Observe standard laboratory procedures when handling potentially hazardous samples.
- Wear proper protective clothing and disposable gloves.
- Ensure that the working area is well-ventilated.
- Do not spill fluids in or on the equipment.

**IMPORTANT!** Operate the instrument only with software and hardware specifically designed for it. Thermo Fisher Scientific assumes no liability for the use of third-party software applications.

**IMPORTANT!** When the instrument is connected to SkanIt™ Software, the software automatically updates the date and time of the instrument according to the computer clock.

**IMPORTANT!** It is recommended to include internal quality control samples in the assay to verify operation.

## Switch on the instrument

**IMPORTANT!** Before switching on the instrument, ensure that all the cables are properly connected and fitted according to the installation instructions.

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The power switch is located on the front cover of the instrument. Press the switch to power on the instrument.

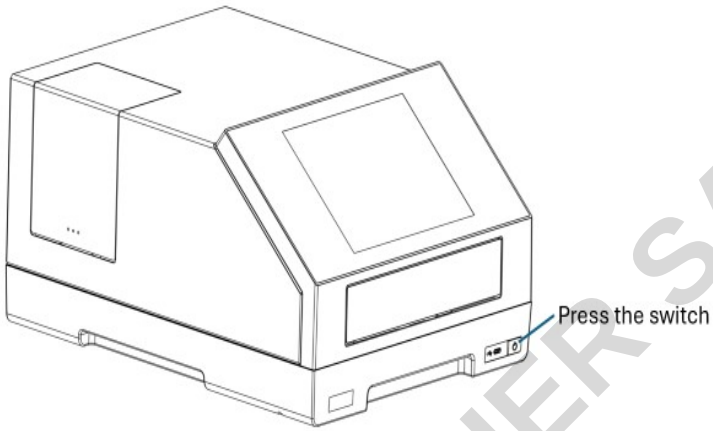



**Figure 14 Power switch**

## Start up the instrument

When you switch the instrument on, the instrument proceeds to perform self-diagnostics. It performs a set of initialization tests and adjustments.

The instrument also carries out mechanical, electrical, and optical checks, such as:

- File system check
- Plate startup check
- Head startup check
- Filter wheel startup check
- PD startup check
- Optical signal check
- LED intensity calibration for all filters and check
- Head offset calibration and check
- Track offset calibration and check
- Heating sensors check(**ME001000C** only)

When the instrument starts up successfully, the plate extends to indicate that the instrument is ready for use.

**Note:** It is further recommended to perform an empty plate run to verify proper instrument operation.

If anything fails in the initialization tests, error pop-ups will appear in the touchscreen UI or SkanIt™ Software. In this case, try switching the instrument off and on again. If the failure is repeated, contact authorized technical service.

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All error messages are stored in the internal memory log file. The error log file can be accessed with SkanIt™ Software by selecting **Settings** ▸ **Instrument** ▸ **Edit instrument parameters** ▸ **Reports** ▸ **Instrument** ▸ **Error Log** ▸ **Run Report**. See Appendix A, “Troubleshooting”.

**IMPORTANT!** Do not switch off the instrument during start up and self-diagnostics.

## Control switching

While power-on, the touchscreen UI automatically attempts to get control. After the touchscreen UI successfully gets control, you can switch control between the touchscreen UI and SkanIt™ Software.

If the instrument is idle and controlled by the touchscreen UI, opening the SkanIt™ Software automatically transfers control to the software.

If the instrument is idle and controlled by SkanIt™ Software, the touchscreen UI automatically displays a **Take Control** button. Pressing this button transfers control of the instrument to the touchscreen UI.

**Note:** Control can only be switched when the instrument is in an idle state. If the instrument is busy, control cannot be switched.

# Operation by touchscreen UI

The instrument (only Cat. No. **ME001000C**) can be operated independently using the internal touchscreen UI.

For more information to operate the instrument, see Chapter 4, “Internal touchscreen UI”.

# Operation by SkanIt™ Software

## Install the SkanIt™ Software

Install the SkanIt™ Software for Microplate Readers on the computer.

For installation instructions, see the SkanIt™ Software for Microplate Readers Quick Reference.

For more information about the software, see the SkanIt™ Software for Microplate Readers User Guide.

## Connect the instrument to a computer

1. To control the instrument using SkanIt™ Software, connect the instrument to the computer via a USB cable.
2. Once connected the instrument to SkanIt™ Software, software automatically updates the instrument date and time according to the PC clock.

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## Move the plate Carrier in/out

1. Move the plate carrier in or out of the measurement chamber using the SkanIt™ Software.
2. Click the **Run plate in** or **Run plate out** icon below the **Start** button.

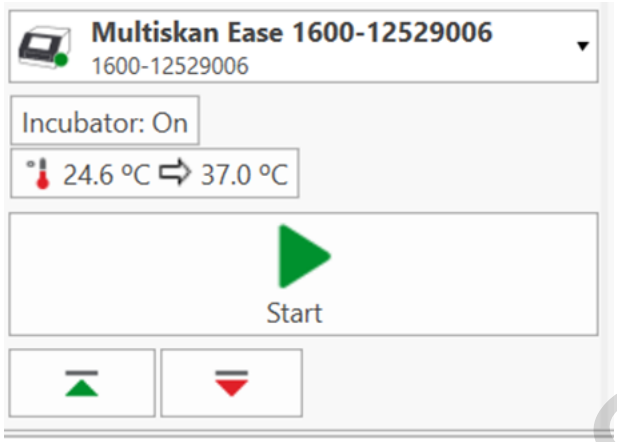



**Figure 15 Run plate in and Run plate out (from left to right under Start)**

## Load and measure a microplate

To measure a microplate:

1. Load the microplate.
   - If the plate carrier is inside the instrument, press the **Plate Out** button to move the plate carrier out of the measurement chamber.
   - Insert the microplate so that the A1 corner is positioned in the top left corner ① of the plate carrier.

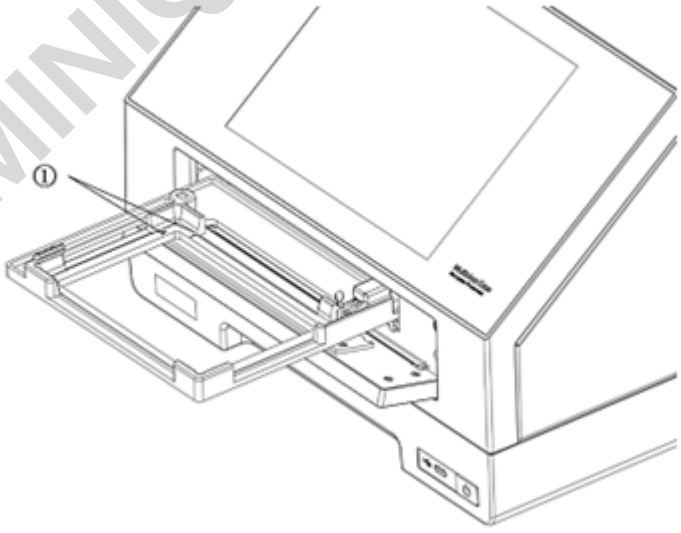



**Figure 16 Position the A1 corner in the top-left corner of the plate carrier**

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**IMPORTANT!** When placing a microplate onto the tray, always ensure that the correct plate type has been selected in SkanIt™ Software before you do anything else.

An unsuitable microplate can become jammed in the instrument.

2. Select the measurement parameters to define the measurement, then the measurement is executed with SkanIt™ Software.
   See the SkanIt™ Software User Guide.

**Note:** If the desired measurement is already saved in the SkanIt™ Software, you can open the measurement protocol.

3. Start the measurement protocol using the SkanIt™ software, then view the results of the measurement.
   See the SkanIt™ Software User Guide for more information.

# Measurements

**CAUTION!** Do not open the measurement chamber door during measurement because this causes stray light to enter and aborts the measurement.

## Principle of absorbance and turbidimetric measurement

In absorbance (Abs) and turbidimetric measurements, the following actions are carried out by the instrument:

1. The plate carrier is retracted.
2. The measurement wavelength is selected by rotating the filter wheel.
3. When scanning the whole plate, the measurement workflow is as below:
   - Move the measurement head to the left air position of the first row and measure the initial Air value.
   - Read the signal of each well from left to right of the first row.
   - Move the measurement head to the right Dark position of the first row and measure the Dark value.
   - Read the signal of each well from right to of the second row.
   - Move the measurement head to the left Air of the second row and measure the latest Air value.

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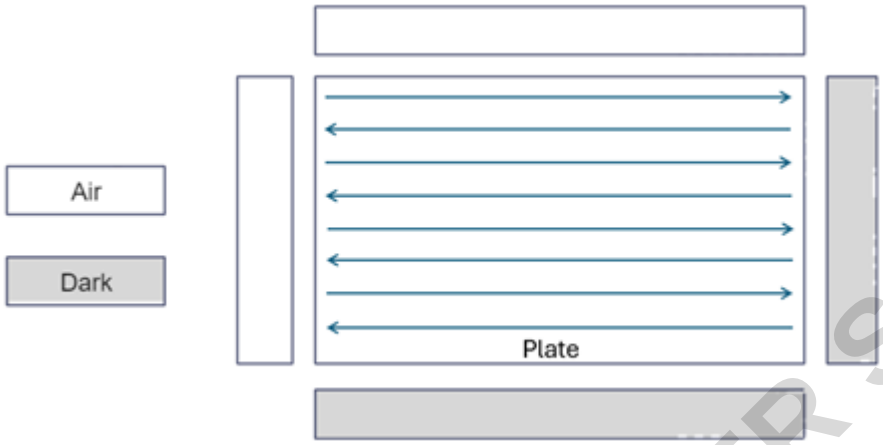



**Figure 17 Principle of Absorbance and Turbidimetric measurement**

4. Based on the latest air and initial air values, calculate the absorbance for each well in both rows. Then take measurements for the next two rows.
5. The wells can be measured either with fast mode or with precision mode.

**Note:** The measurement head does not stop at each well in fast mode, but it does in precision mode. The measurement time in fast mode is shorter than that in precision mode.

# Optical filter management

The Multiskan™ Ease Absorbance Microplate Reader has 3 factory-installed filters for photometric measurements, and 5 open filter positions are available in the filter wheels for accessory filters. Accessory filters should be installed according to your specific applications.

Several accessory filters are available for purchase; see **Ordering Information**.

**Table 1 Factory installed filter pair specifications**

| Filter name | Wavelength | Usage |
|---|---|---|
| Abs405 | 405 nm | • Alkaline phosphatase (AP) detection<br>• Enzyme activity detection<br>• Turbidimetric method for endotoxin detection |
| Abs450 | 450 nm | • Most ELISA kits detection (using Horse Radish Peroxidase (HRP) - Tetramethylbenzidine (TMB) reaction)<br>• XTT cell viability assay<br>• BCA protein quantification |
| Abs620 | 620 nm | • Bacterial growth curve measurement<br>• Background correction in dual-wavelength detection (ELISA and endotoxin detection) |

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## Add filters into filter wheel

1. Open the filter wheel chamber door, then remove the filter wheel.
   The filter wheel is fixed by magnetic suction and can be removed with a little force.

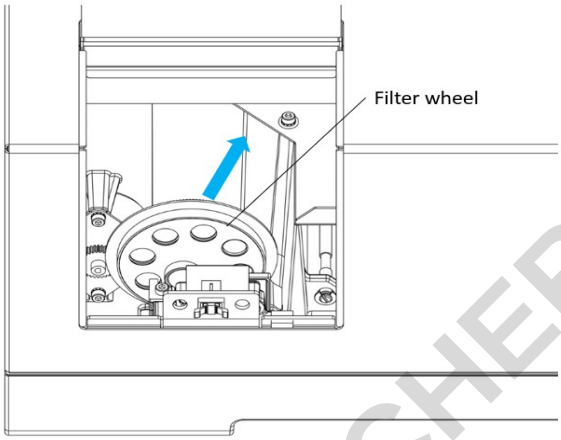



**Figure 18 Filter wheel**

2. Filter wheel cover is on the back of the filter wheel. Press the filter wheel cover lock inward to open the filter wheel cover.

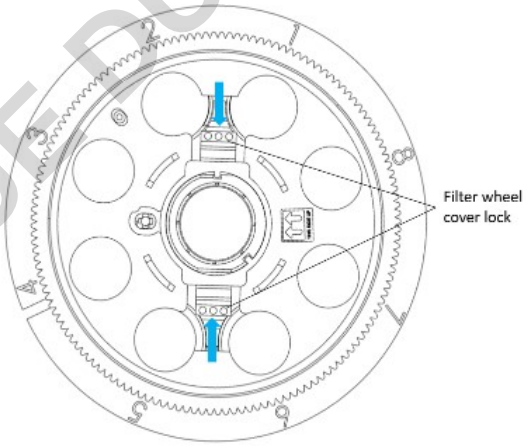



**Figure 19 Open the filter wheel cover**

3. Default filters are installed in slots 1,2,3, and accessory filters can be installed in slots 4–8.
   It is recommended to attach filters in the order of slot positions. For example, add accessory filter 1 into slot 4, and add accessory filter 2 into slot 5. The arrow on the filter ring is in the same direction as the arrow on the filter wheel.

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4. Once all the necessary filters are installed, close the cover of the filter wheel, then press the filter wheel cover lock outward to fix the filter wheel cover.

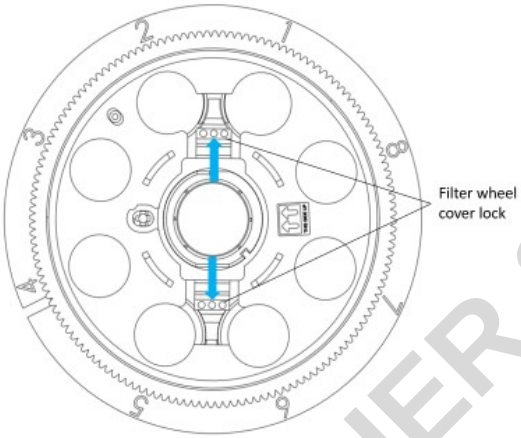



**Figure 20 Close the filter wheel cover lock**

**Note:** Do not touch the filter surfaces with your bare hands.

## Add filters via touchscreen UI

**Note:** Before adding filters via touchscreen UI, ensure that the filters are already installed in the filter wheel.

For adding filters by touchscreen UI, see “Change filter settings” on page 48.

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## Add filters via SkanIt™ Software

**Note:** Before adding filters via SkanIt™ Software, ensure that the filters are already installed in the filter wheel.

1. Open the SkanIt™ Software, then the software automatically identifies the connected instrument if it is idle.
2. Select **Menu** to open the **Application** menu, then select **Settings** to open the **Edit application settings** window.

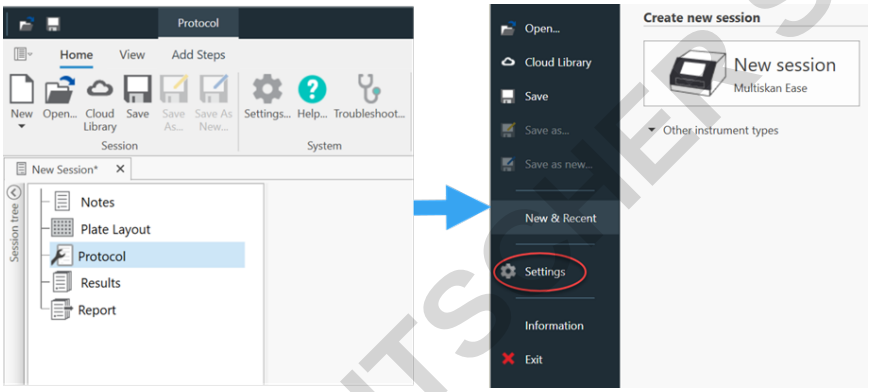



**Figure 21 Menu ▸ Application ▸ Settings**

3. Select **Instruments** to open the **Edit application setting** window.
   Currently connected instruments are shown in the **Instruments** list.

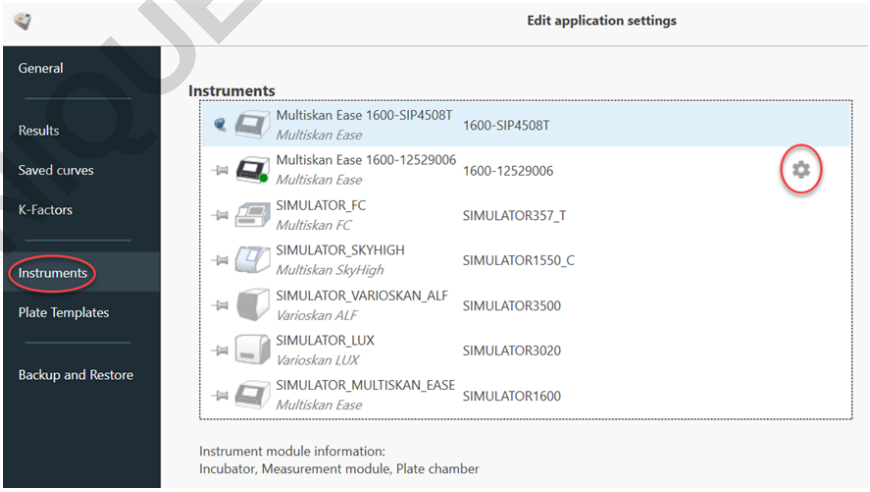



**Figure 22 Edit application setting**

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4. Select **Settings** to open the **Edit instrument parameters** window.

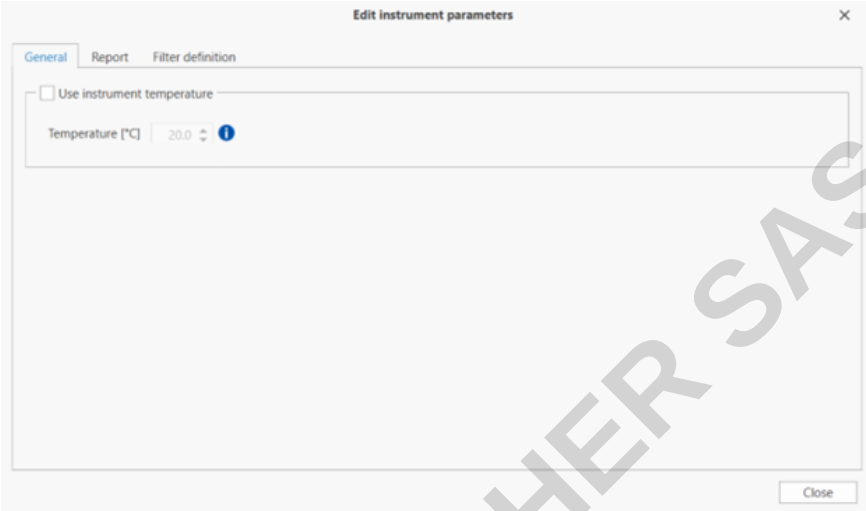



**Figure 23 Edit instrument parameters**

5. Select the **Filter definition** tab of **Edit instrument parameters** window to add accessory filters.

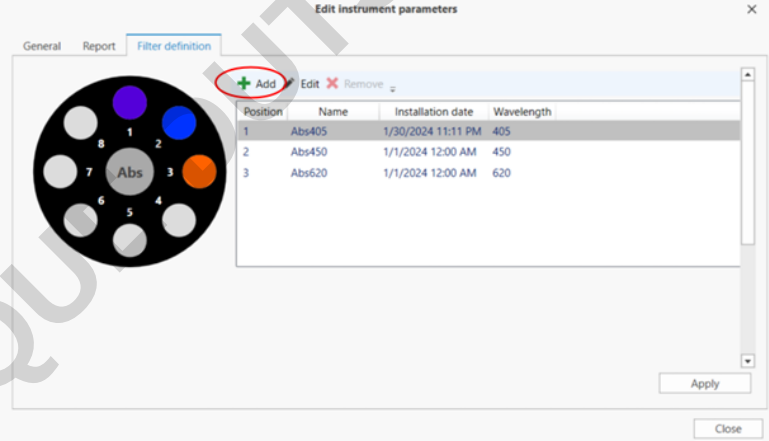



**Figure 24 Filter definition**

6. Click **Add** to add filters. **Add new filter** message box is displayed. Enter **Position**, **Name**, and **Wavelength** of the filter, then click **OK**.

   This new filter will be displayed in the filter list. Add the remaining filters one by one using this method until all required filters have been added.

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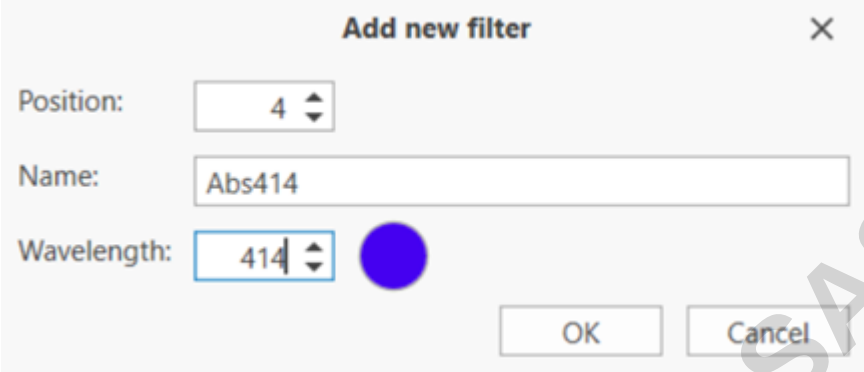



**Figure 25 Add new filter**

7. Click the **Apply** tab, then the instrument automatically completes the initial configuration for the newly added filters.

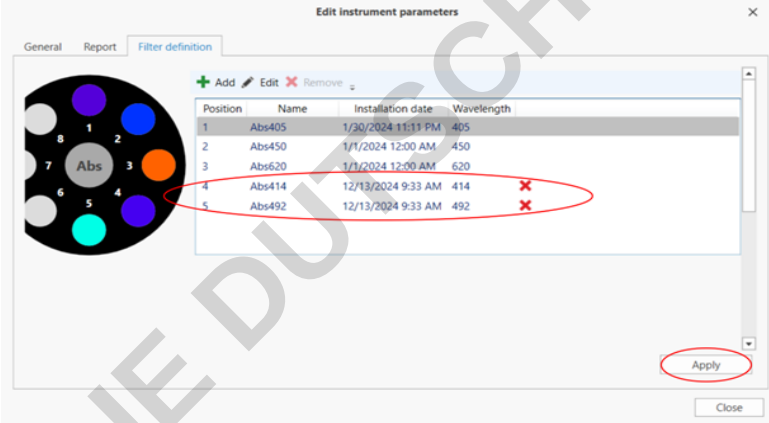



**Figure 26 Edit instrument parameters**

All these newly added filters are shown in the wavelength list, and now all new added filters are available for use.

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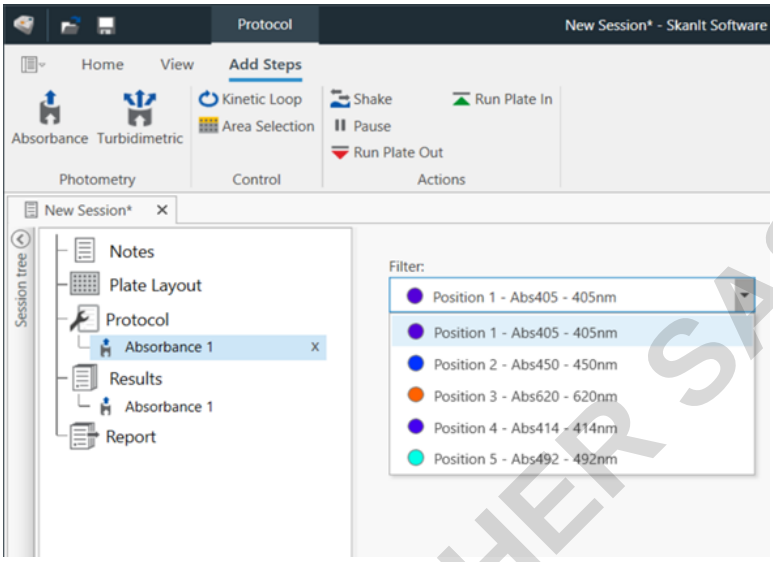



**Figure 27 Filter list**

# Instrument temperature

For setting the instrument temperature from touchscreen UI, see “Incubator control” on page 51.

You also can set the instrument temperature from the SkanIt™ Software.

1. When a measurement session is open, click the temperature icon above the **Start** button.
2. Check the **Temperature** box and set the required temperature.
3. Click **OK**.

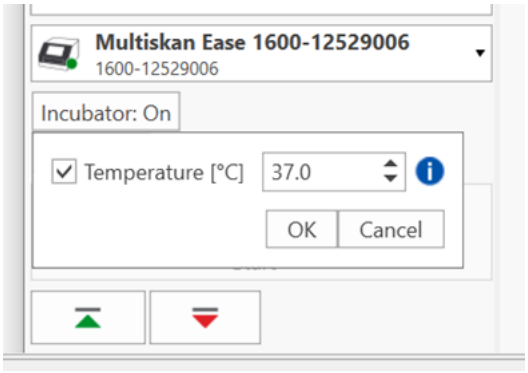



**Figure 28 Set temperature**

**Note:** The software shows both the current and target temperatures until the target temperature is reached.

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# Switch off the instrument

**IMPORTANT!** Power off the instrument after daily use.

1. Run the plate tray from SkanIt™ Software or from the touchscreen UI.
2. Press and hold the power switch on the front panel of the device for 5 seconds to power off the instrument.
3. To switch off **ME001000C**, tap **Main** menu ▸ **Power OFF** on the touchscreen UI.

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# 4 Internal touchscreen UI

## Initial setup steps

Upon initial power-on, the user interface guides the user through the following four setup steps:

1. **Language**: Select the system language from the list.

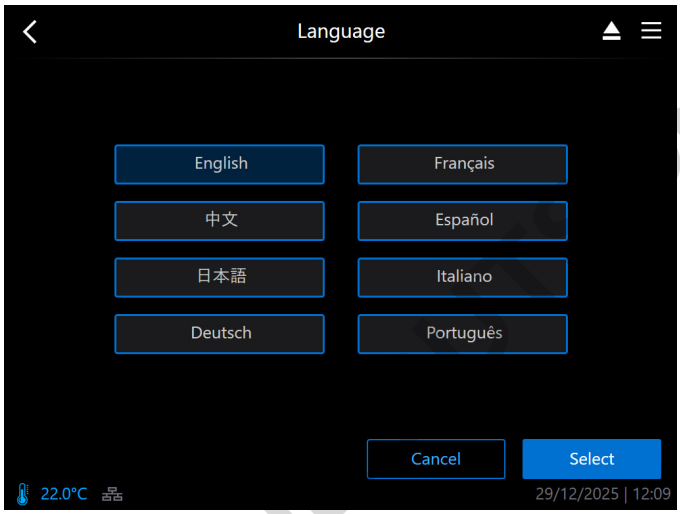



Figure 29 Language

2. **End User License Agreement**: Read and accept the End User License Agreement (EULA).

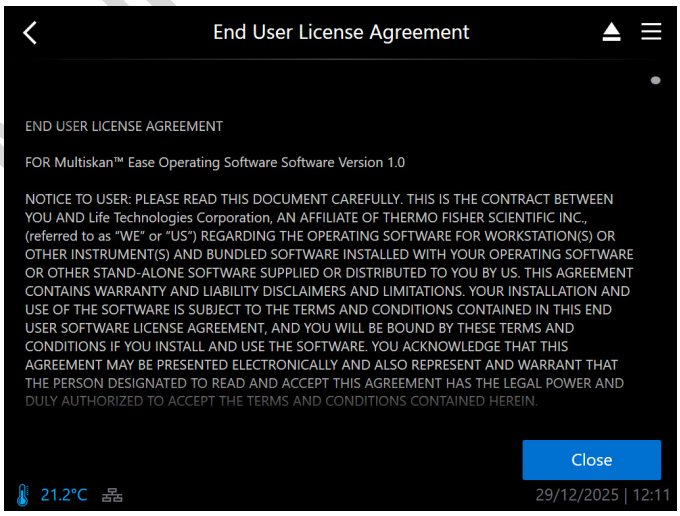



Figure 30 End User License Agreement

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3. **Network Configuration** *(optional)*: Connect the instrument to a local network or map a network drive through the server configuration.

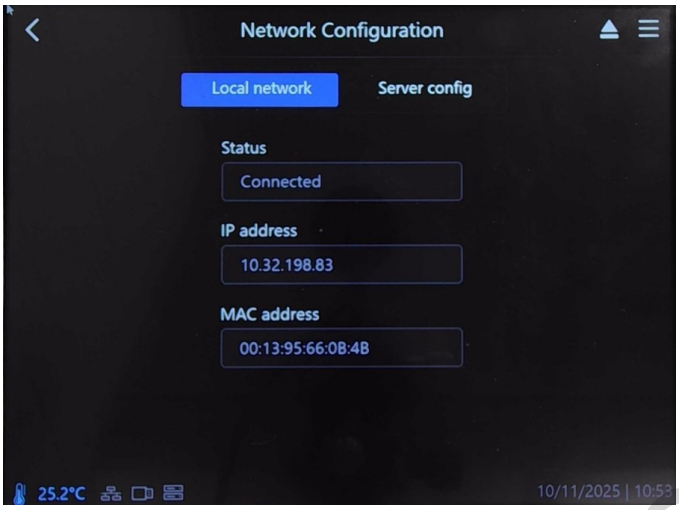



**Figure 31 Local network**

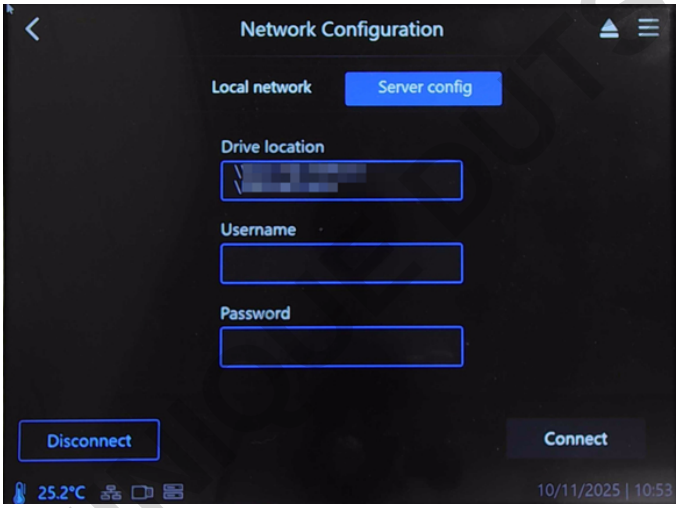



**Figure 32 Server configuration**

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4. **Time Zone, Date and Time**: Adjust and set the time zone, date and time as well as their display formats.

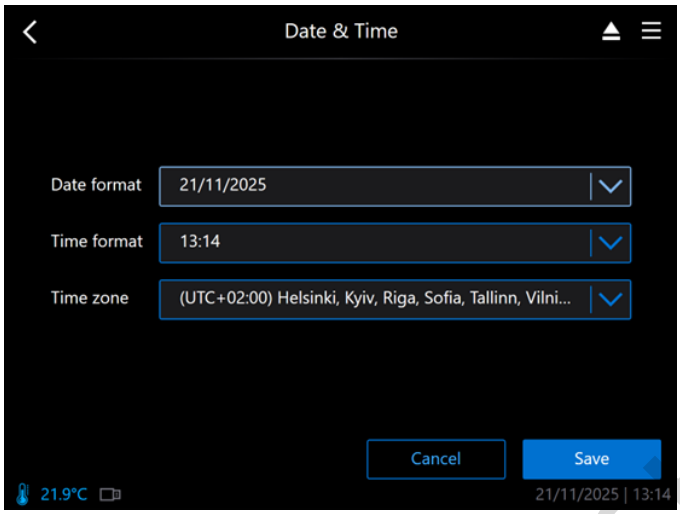



**Figure 33 Time Zone, Date and Time**

The user interface will indicate when the setup is complete, then the instrument will be ready for use.

---

**Note:** The operational system running the user interface does not allow the date and time setting to be set for a long period of time backwards. In such case, date and time setting will be restored at the next start-up.

---

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# Main view

The GUI of the system consists of the **Main view** with tray eject and main **Menu** in the top right corner, three quick controls in the middle, and several instrument status indicators in the bottom.

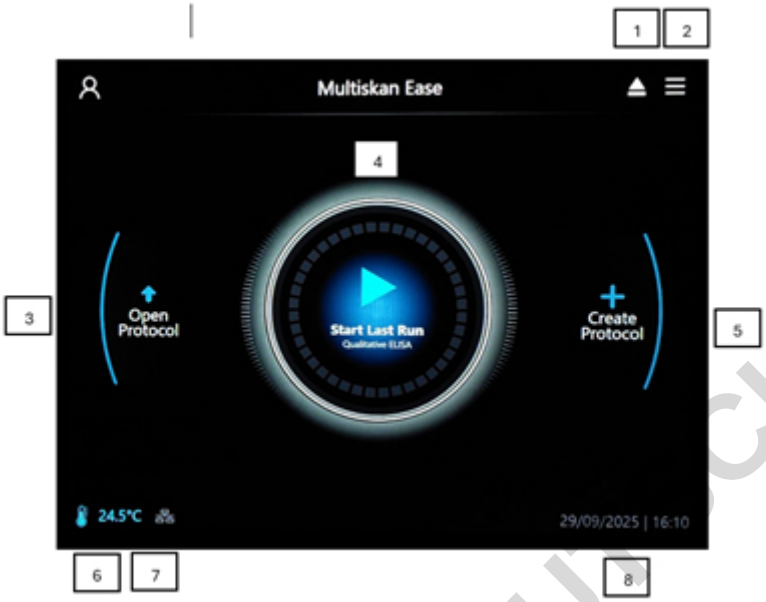



**Figure 34 Main view**

① Plate in/out
② Main menu
③ Quick access existing protocols
④ Quick run the last executed protocol
⑤ Quick create a new protocol
⑥ Instrument temperature
⑦ Network connection status
⑧ Date and time

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# General settings

To change internal software settings, open **Settings** in the main **Menu** at the top right corner of the main view:

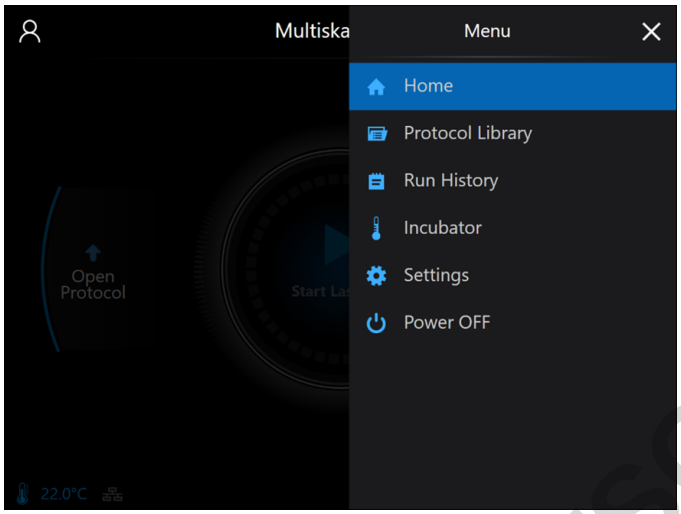



**Figure 35 Settings**

In the **Settings** menu, the user can modify the **Date & Time**, **Language**, **Network configuration**, **About instrument**, **Filter setup**, and **Troubleshooting**.

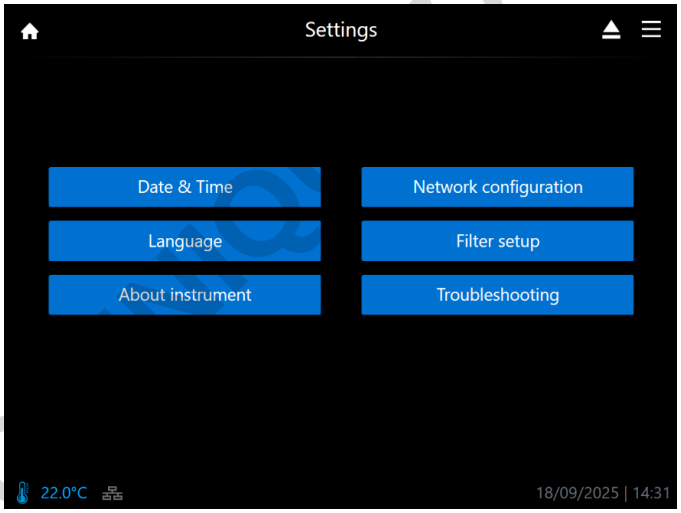



**Figure 36 Settings**

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## Set date and time

To set internal software date and time, follow these steps:

1. Tap **Menu** ▸ **Settings**, then click **Date & Time**.

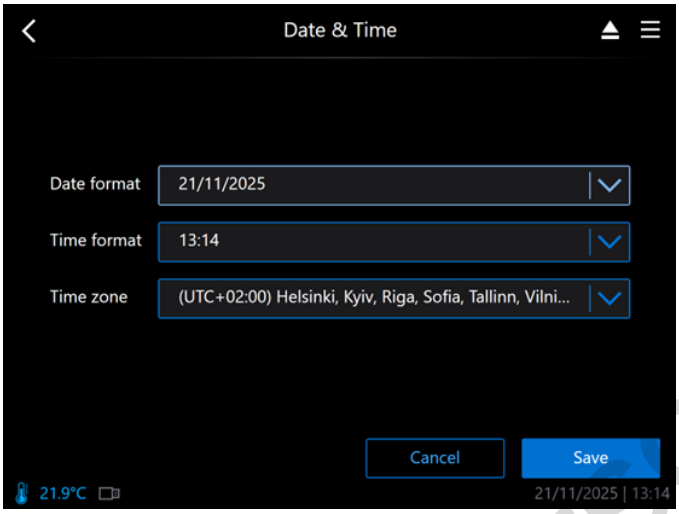



**Figure 37 Date & Time**

2. To choose a date format and to set the date, click **Date format**. Once set, tap **Done**.

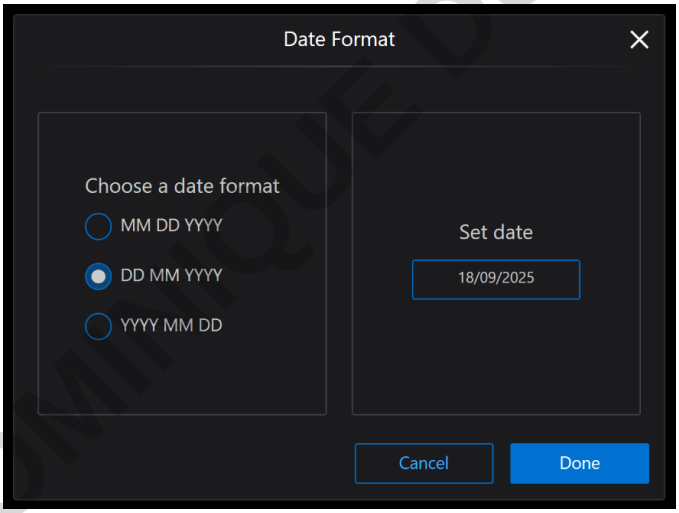



**Figure 38 Date format**

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3. To choose a time format and to set the time, click **Time format**. Once set, tap **Done**.

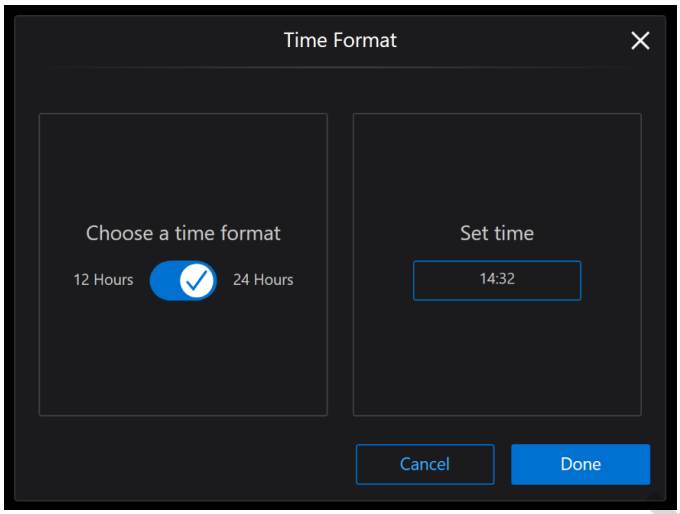



**Figure 39 Time format**

4. To save settings, click **Save** in the **Date & Time** screen.

## Language settings

To change the internal software language, follow these steps:

1. Tap **Menu** ▸ **Settings**, then click **Language**.
2. Select the internal software language from a list of languages available and click **Select**:




**Figure 40 Language settings**

## Network settings

To save data directly to shared folders on the network, the instrument can be connected to a local network using a network cable.

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## Connect to local network

1. Tap **Menu** ▸ **Settings** , then click **Network configuration**.
2. Tap **Local network** tab. The **Status** will show as **Connected** or **Disconnected**.
3. The required **IP** and **MAC** addresses auto-populate, and the instrument connects to local network.

## Map a network drive

1. Click **Server config** tab.
2. Enter the required **Drive location** (for example, //192.168.1.100/MyDocuments) with a Username and Password.
3. Tap **Connect**.
4. To disconnect network drive, click **Disconnect**.

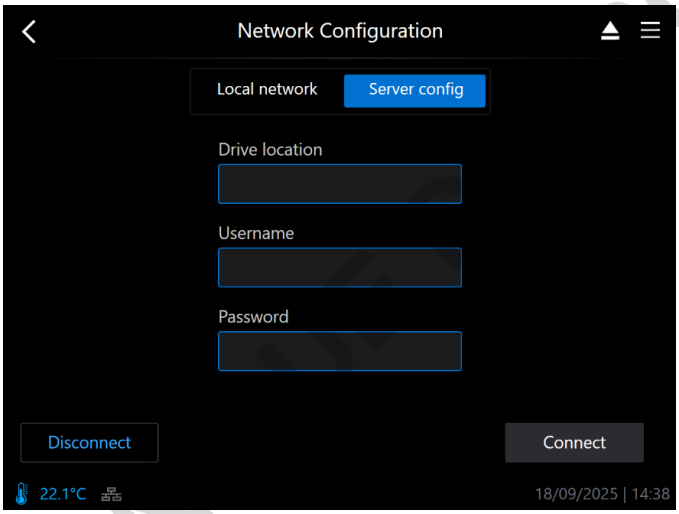



Figure 41

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## Connect Multiskan™ Ease to Microsoft™ OneDrive™

Multiskan™ Ease has connectivity to Microsoft™ OneDrive™ cloud storage. This makes it possible to load result reports from Multiskan™ Ease to OneDrive™ where data can be easily accessed anywhere. The limitation is that work or school accounts only can be used for data storage and connection is possible only via Ethernet port.

Application you need to sign in inside Microsoft™ OneDrive™ is named “Multiskan App”.

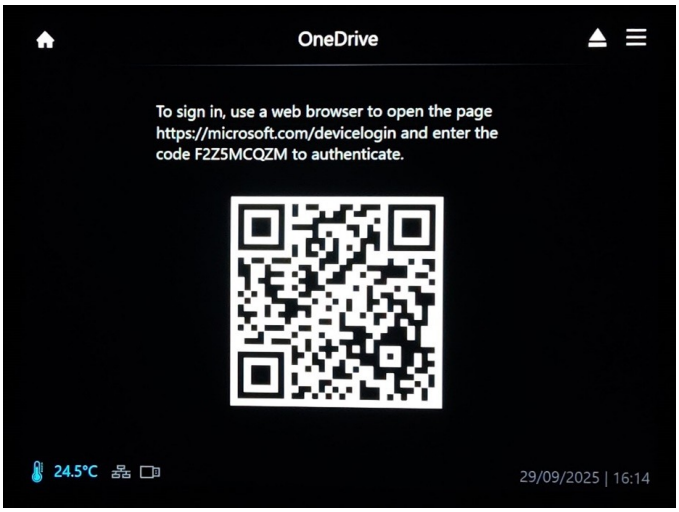
Switch on Multiskan™ Ease instrument and wait until it has fully started, and user interface home screen is visible.

1. Connect the ethernet cable to the back of the instrument.
2. When the ethernet connection has been established, an icon indicating active ethernet connection is shown in top left corner of the screen.

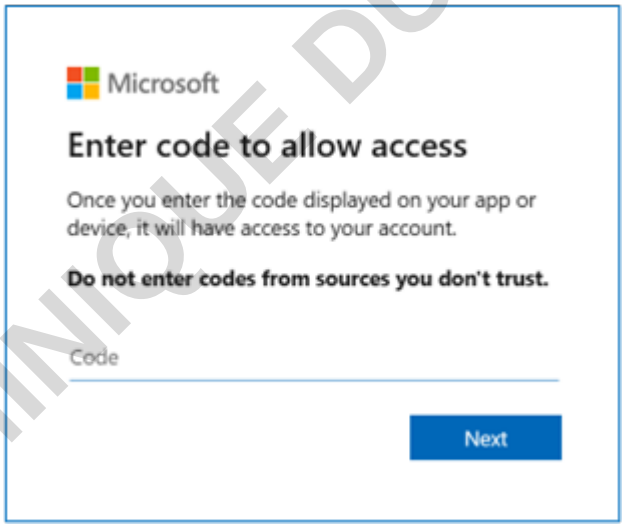



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3. Click the icon and OneDrive™ connection screen pops-up:



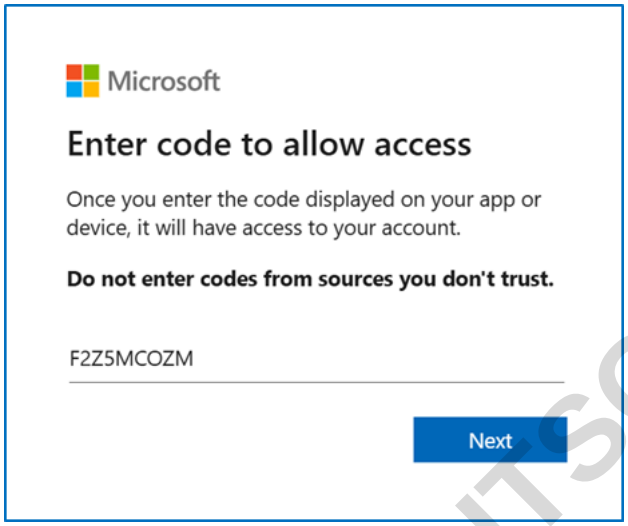

- This screen offers two possibilities for the connection.
- Option 1: Connecting via PC using instrument code
  - Using your PC, go to the web address **https://microsoft.com/devicelogin**
  - Device Login will show following page:



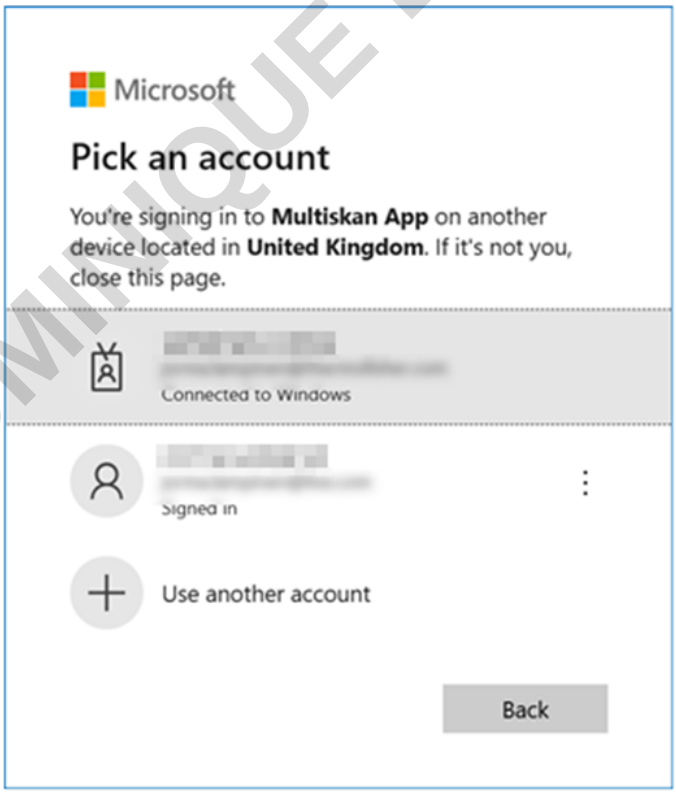

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## Connect Multiskan Ease via mobile phone using QR code (Alternative method)

- When OneDrive™ QR code page is open, read the code with your mobile phone and it will link you to the same Microsoft™ device login page as shown above on your mobile phone.
- Enter the code shown in Multiskan™ Ease screen. In this case “F2Z5MCOZM”:

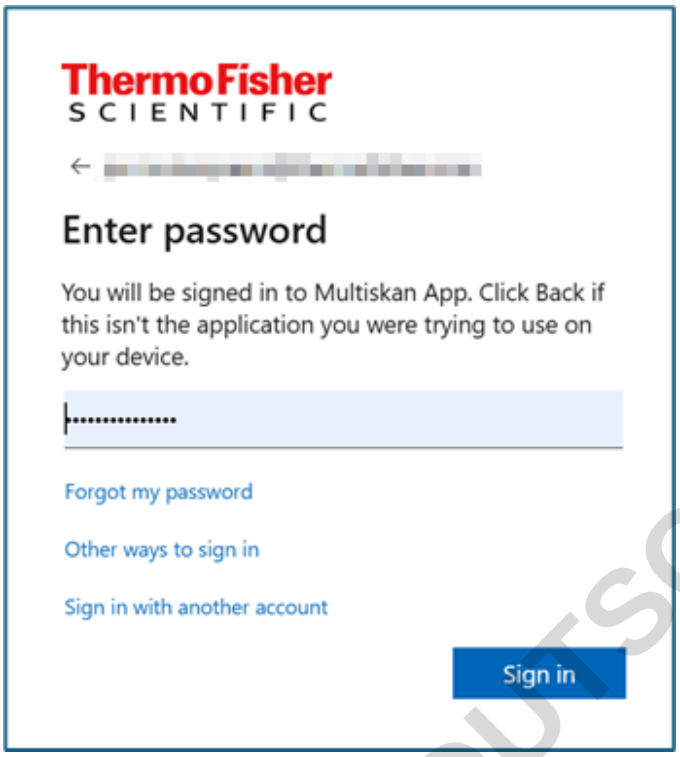



- Click **Next** and you will see:

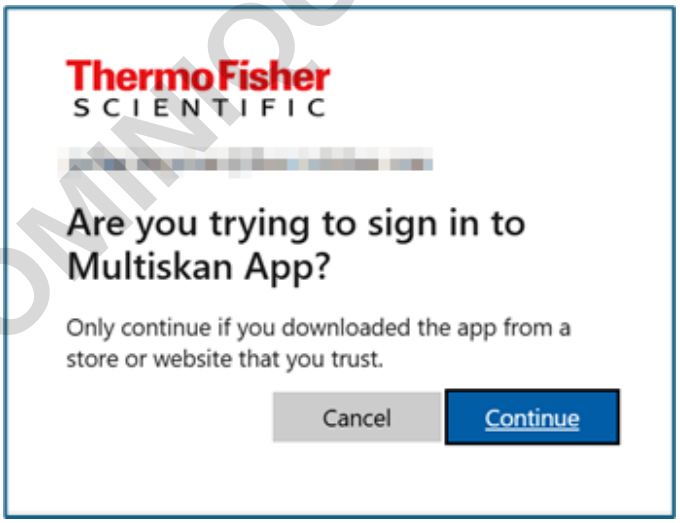



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- Select your corporate account and the sign in screen will pop up:

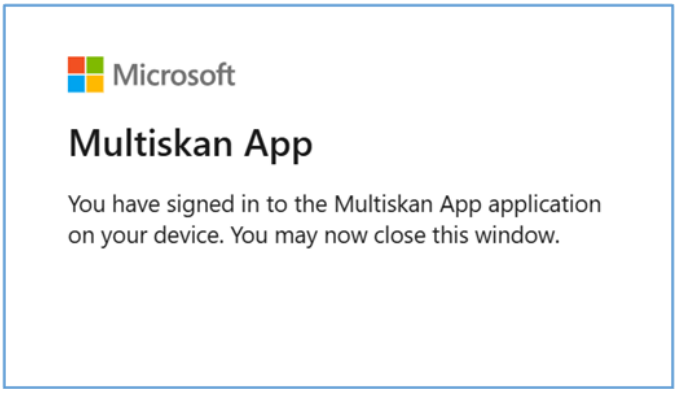



- Type your password, in case you have active SSO it will offer you the password. SSO is possible only with PC connection, when using mobile phone you must type in the password. Click **Sign in** and confirmation page will appear.




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- Confirm to sign in into Multiskan App and final login confirmation is shown on PC:




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- When signing is done, Multiskan™ Ease will show the confirmation of sign-in:




- When Multiskan™ Ease is connected to OneDrive™, the connection is indicated with account initials on the top left corner of the display. One can sign out from the OneDrive™ by tapping the initials and confirming the sign out in following verification screen.




## Change filter settings

The instrument is shipped with 3 factory-installed filters for photometric measurements, and 5 open filter positions are available in filter wheels for accessory filters. Accessory filters should be installed according to your specific applications. Several accessory filters are available for purchase (see **Ordering Information**). Default filters are installed in slots 1–3, and accessory filters can be installed in slots 4–8.

1. Tap **Menu** ▸ **Settings**, then click **Filter setup**.
2. Tap on any element on filter wheel to change filter **Name**.

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3. Tap **Wavelength (nm)** to save accessory filter wavelength.

**Note:** Factory installed filter wavelengths cannot be changed.

**Note:** Only one filter with the same wavelength can be installed in the instrument.

4. Select a filter, then click **Remove** to remove the filter.

**Note:** Factory installed filters cannot be removed.

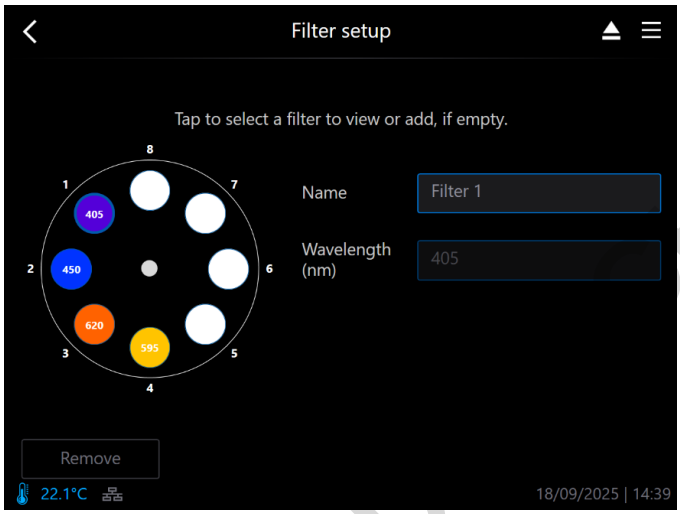



**Figure 42 Filter setup**

## Exporting instrument information

To export troubleshooting package and/or instrument report:

1. Tap **Menu** ▸ **Settings**, then click **Instrument Export**

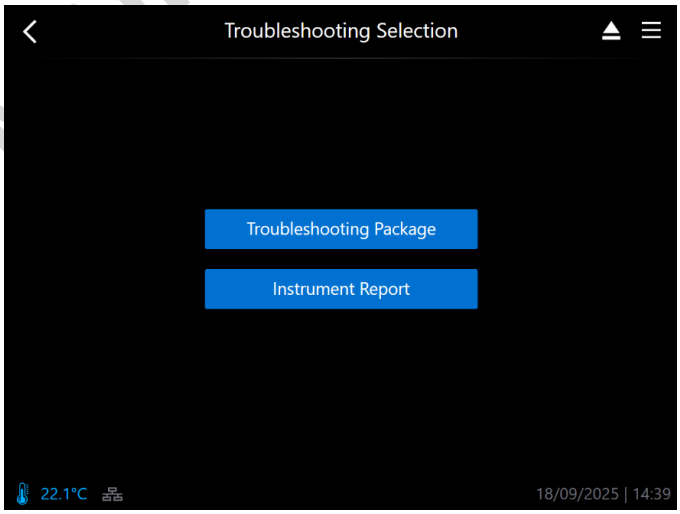



**Figure 43**

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2. Click **Troubleshooting Package** to export system log files or instrument report to export a detailed report of instrument hardware, software, and firmware.




Figure 44

3. Select the export destination (**USB drive**, **Network drive** or OneDrive™).

**Note:** When exporting a report from the instrument, ensure only one USB drive is connected—either to the USB-C or the USB-A port, not both.

## Instrument information, factory reset

To display information on the instrument hardware, software, firmware, and network settings, :

1. Navigate to **Menu** ▸ **Settings** ▸ **About instrument**.

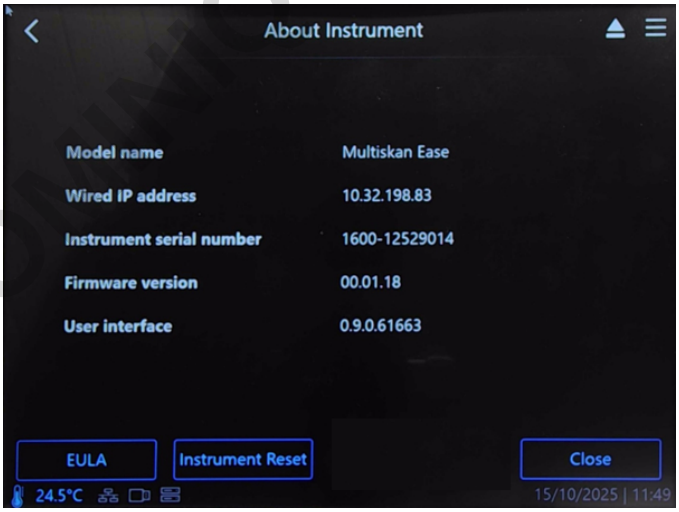



Figure 45 Instrument information

2. The user can also access the End User License Agreement (**EULA**) and reset the instrument to factory settings (**Instrument Reset**).

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# Incubator control

To access the incubator control, tap **Menu** ▸ **Incubator** or tap the temperature displayed in the lower left corner of the main view.

1. Click **Menu** ▸ **Incubator** to power on the incubator.

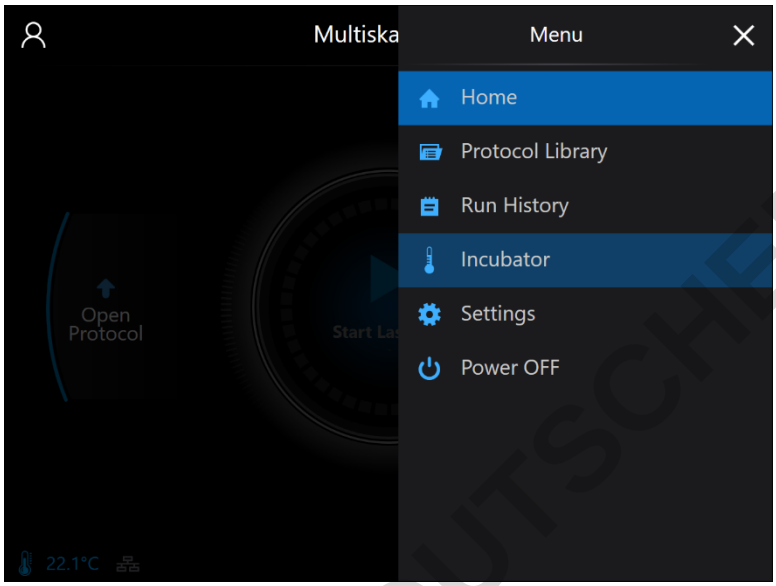



**Figure 46 Menu ▸ Incubator**

2. Alternatively, tap the temperature displayed in the lower left corner of the main view to access the incubator controls.




**Figure 47 Main view**

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3. Switch **On** from **Off** to enable the incubator, then set the **Target temperature** (°C).

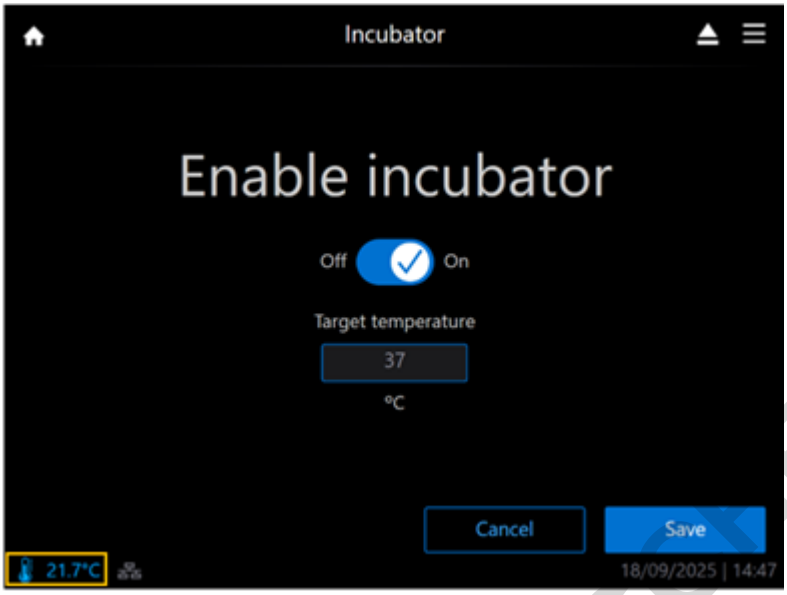



**Figure 48 Target temperature**

4. Tap **Save**.

## Create and save a protocol

1. Create new protocols using one of the following options:
   a. Select **Create Protocol** in the main view.




**Figure 49 Main view**

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b. Go to **Menu** ▸ **Protocol library**, then click **Create new**.

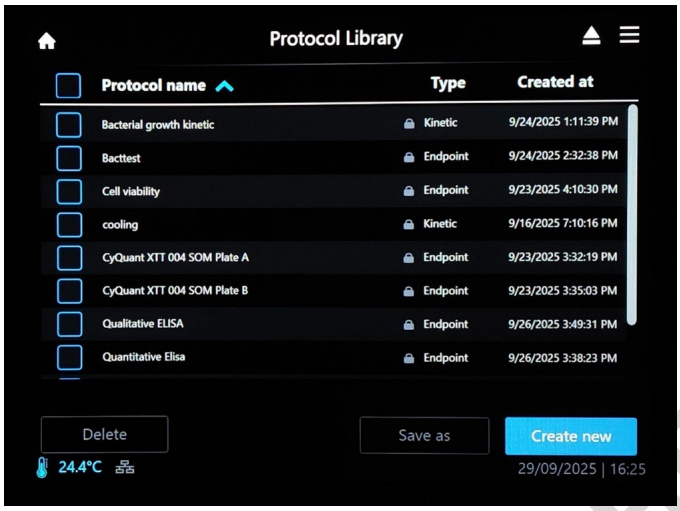



**Figure 50 Protocol library**

2. To create a protocol, first choose between **Endpoint** and **Kinetic** measurement.

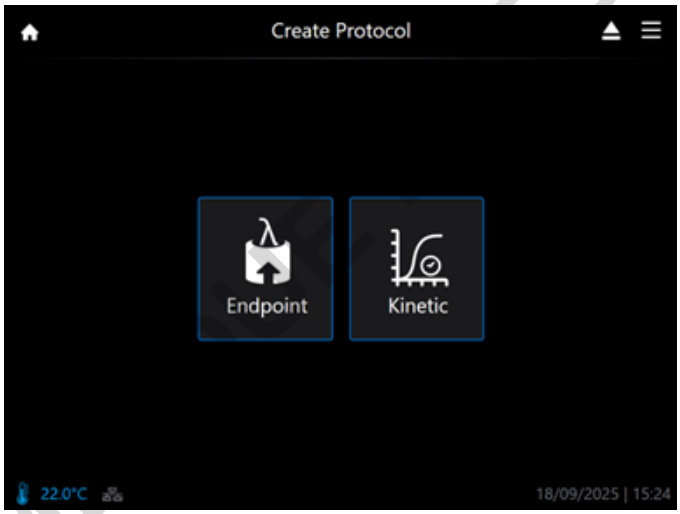



**Figure 51 Create Protocol**

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## Endpoint measurement protocol

To create an **Endpoint** measurement protocol, there are three tabs with different measurement related options: **Parameters**, **Plate layout**, and **Calculation**.

### Parameters

In the **Parameters** tab, user can configure the **Protocol name**, select the desired **Filter** (from the installed filters) and the **Reference** filter *(optional)*, enable or disable **Shaking**, and specify the **Shaking time**.

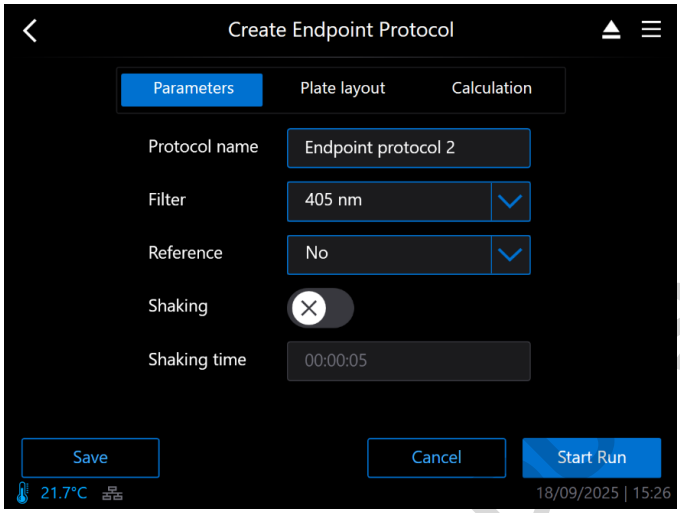



**Figure 52 Parameters**

**Note:** Shaking time minimum is 5 seconds and maximum is 4 hours, 59 minutes, 59 seconds.

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## Plate layout

In the **Plate layout** tab, user can configure the location of the following sample types: **Blank**, **Control**, **Standard**, and **Unknown**.

- **Blank**: Blank is the sample that represents the background absorbance level, typically contains assay buffer and reagents without the analyte. User can define unlimited number of replicates for the blank.

  Select sample type blank, then tap the first blank well, then hold and drag to add blank replicates. User can add blank wells also in various locations by tapping each blank well separately.

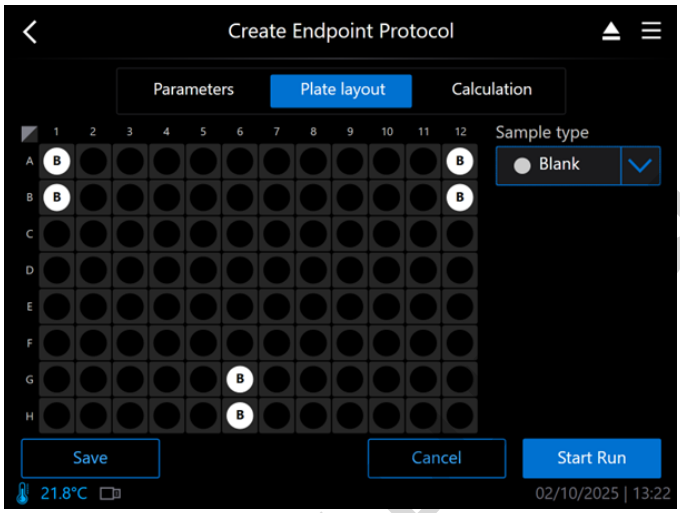



**Figure 53 Plate layout - Blank**

**Note:** GUI supports ANSI/SBS standard 96-well plate template. Other templates are supported in SkanIt™.

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- **Control**: Control is a known sample that is typically used for quality control or classification purpose. Each control sample can have 1–3 replicates aligned either horizontally or vertically.
  Select sample type control then tap the first control well. Replicates of the control is placed according to the selection. Either drag down or to the right, or tap on different well to add more control samples.

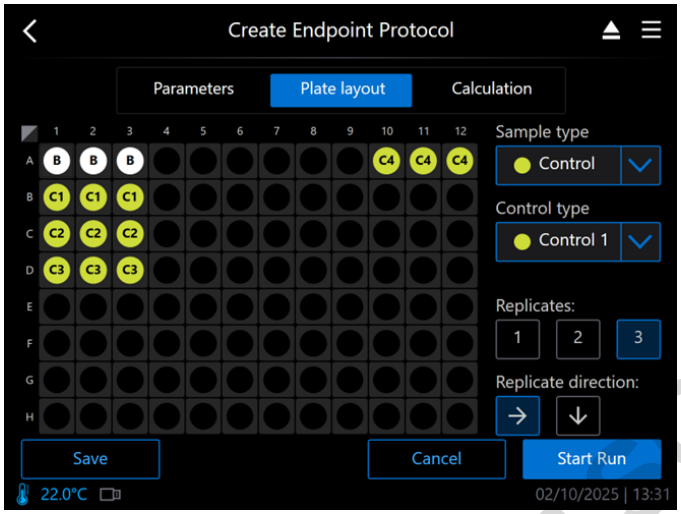



**Figure 54 Plate layout - Control**

- **Standard**: Standard is a sample with known analyte concentration and is used to create a calibration curve.
  User can define up to 8 different standard concentrations and their numeric value can be between 0.0001–99999.
  First, add or edit sample concentrations and the unit for the standard, then click **Save** to save the standard concentration.

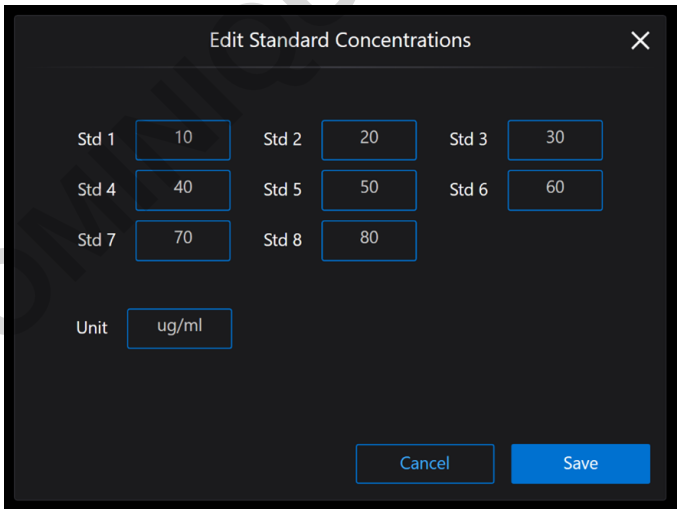



**Figure 55 Edit Standard Concentrations**

When concentrations are set, tap the correct well for the first replicate, then drag into requested direction to add the standards into the plate. Standards can be added also one by one by clicking the individual wells where the first replicate shall be.

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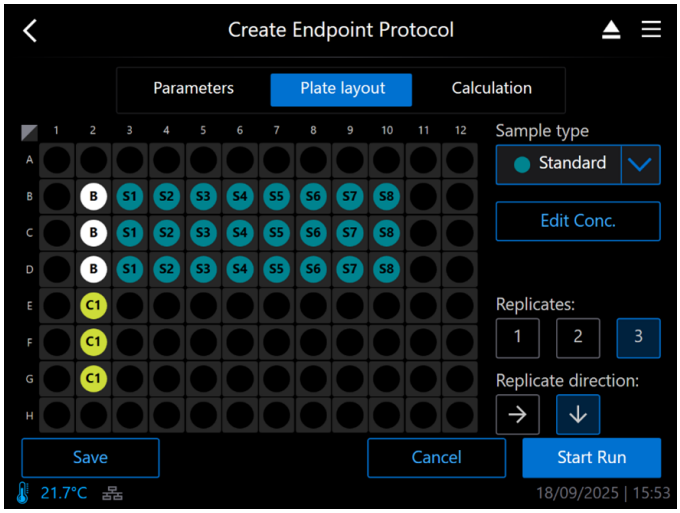



**Figure 56 Plate layout - Standard**

- **Unknown**: Unknowns are samples to be investigated. User can define the location, dilution factor, number of replicates (1–3), and the alignment of the unknowns. Dilution factor is automatically included in the Standard curve calculation of unknown sample concentrations.

**Note:** Only one dilution factor can be defined in the layout, and it is used for all unknown samples.

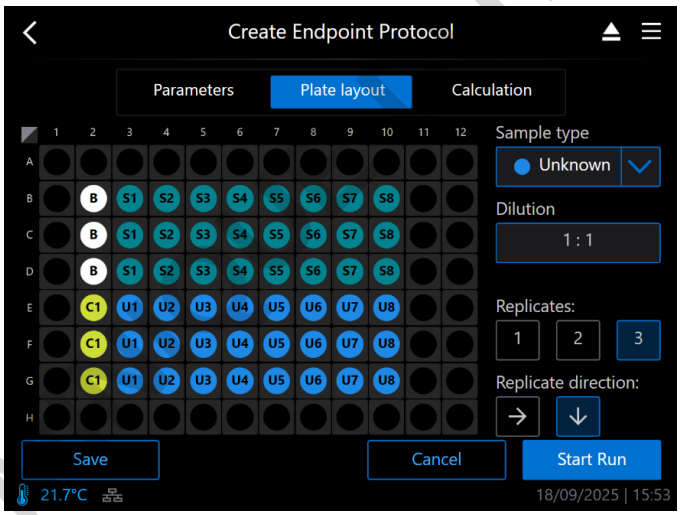



**Figure 57 Plate layout - Unknown**

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## Calculation

In the **Calculation** tab, the user can perform calculations based on **Raw** or **Blanked** (for example, blank subtracted) data type. Data type can be selected from the **Pre-calculation** dropdown list.

The user can enable calculations to generate standard curve based on the standard sample measurements, and/or perform threshold-based classification and rules-based quality control. All calculations are done using mean measurement values.

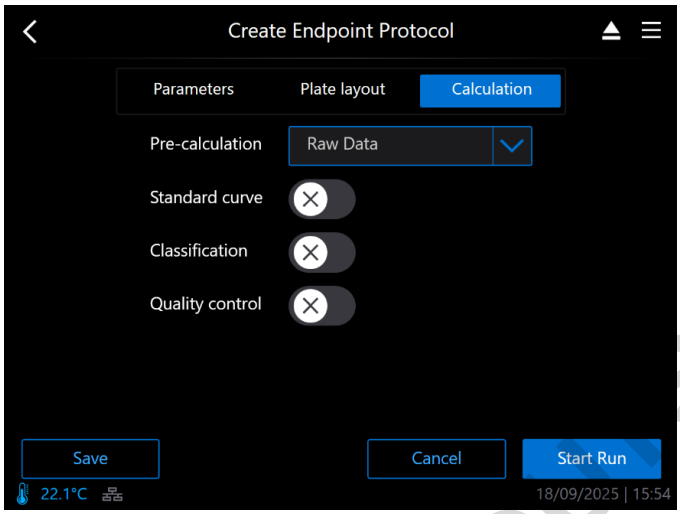



Figure 58 Calculation

## Standard curve

User can choose **Linear Regression** or **Four Parameter Logistics** (**4 PL**) from **Curve type** dropdown list. If Linear is selected, user can enable or disable curve **Extrapolation**. At least 3 standard concentrations is required to create the standard curve, independent from the curve type.

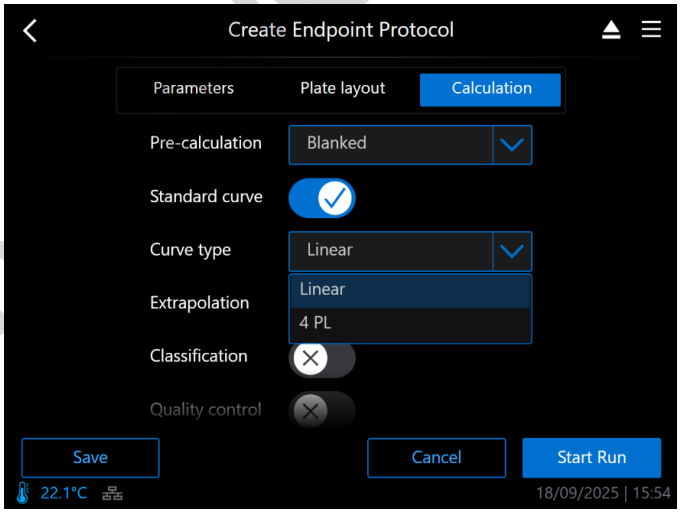



Figure 59 Standard curve

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## Classification

User can choose two or three categories to classify unknown samples based on the measurement values. Two category classification may consist of for example, Category 1: “Negative” and Category 2: “Positive”, whereas three category classification may contain an additional Category 3: “Unclear” between the Positive and Negative categories.

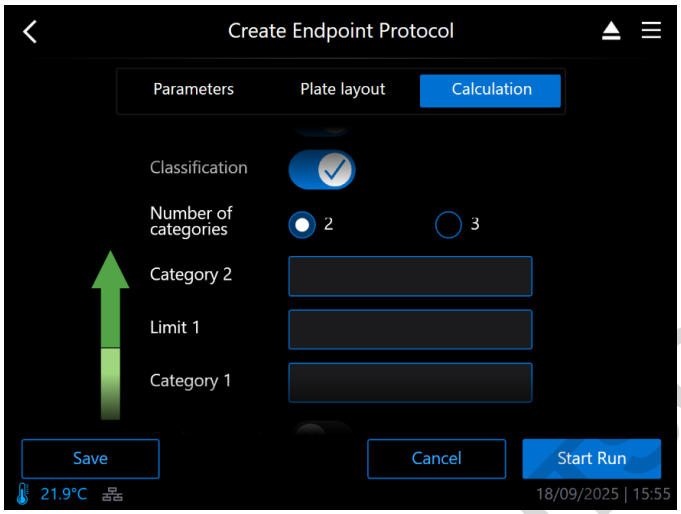
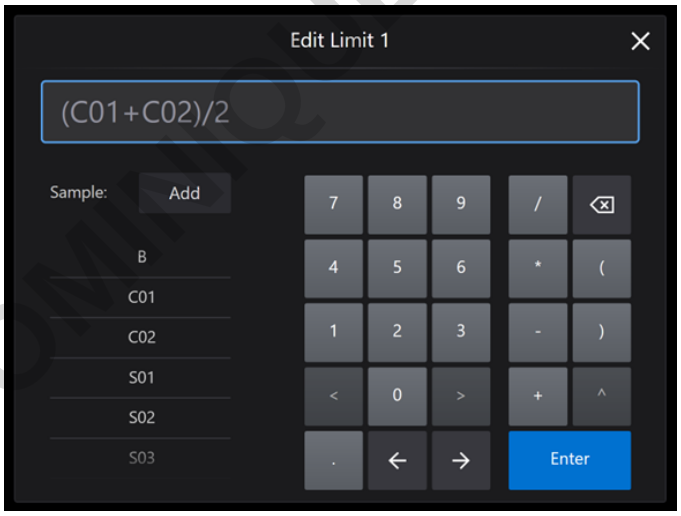



**Figure 60 Classification**

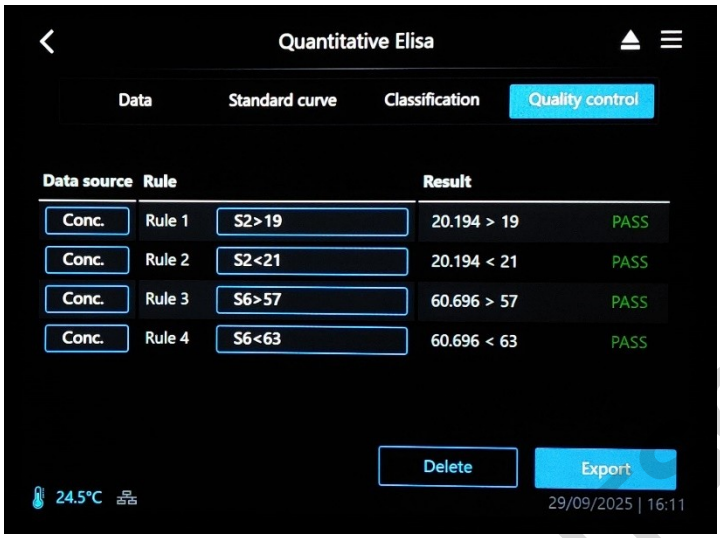
Classification limit values can be either entered as a number or calculated using mathematical formula based on blank, standard or control samples. Only basic calculations (+, -, *, /) can be used in limit formula.

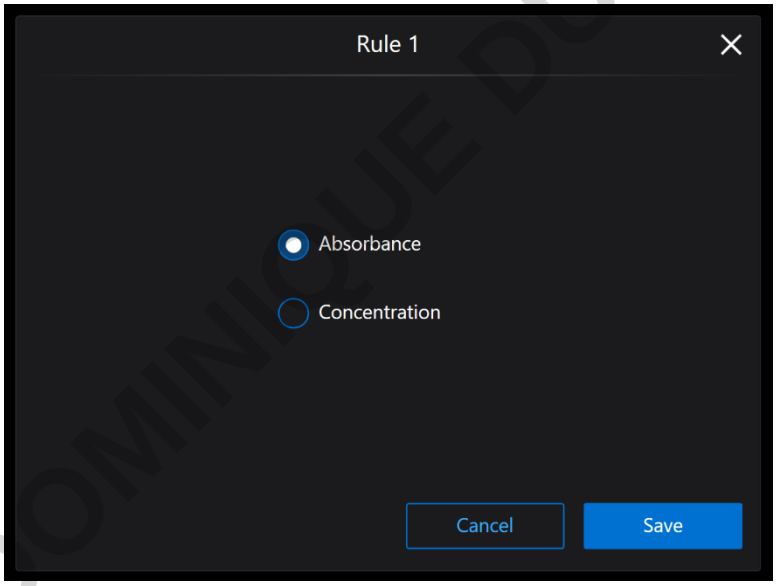



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## Quality control

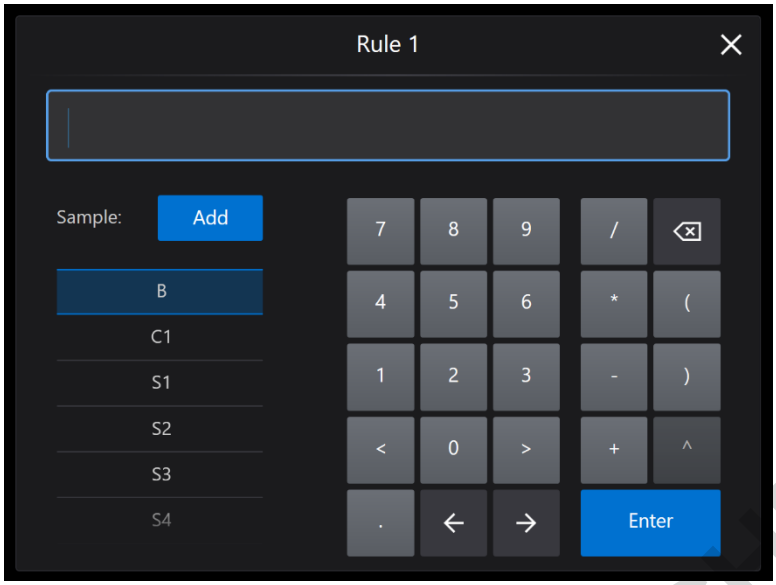
User can define up to 4 rules based on measured **Absorbance** or **Concentration** values (absorbance is selected by default and can be changed by clicking the **Abs** field). Concentration is possible to be chosen only when Standard curve has already been selected.




Rules are mathematical formulas that can be freely formulated using mean values of Blank, Control, or Standard samples. All rules must contain either less than (**<**) or greater than (**>**) criteria (for example, “(C1-B)>S3”).

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Once all protocol parameters have been set, user can **Save** the protocol for later use. The user can also start the protocol immediately by clicking **Start Run**.

## Kinetic measurement protocol

To create a new kinetic measurement protocol, there are two tabs with different measurement related options: **Parameters** and **Plate layout**.

### Parameters

In the **Parameters** tab, the user can define the **Protocol name**, set the **Number of cycles** and cycle **Intervals** for the kinetic run. User can also select the **Filter** (from installed default and accessory filters) and enable or disable **Shaking**.

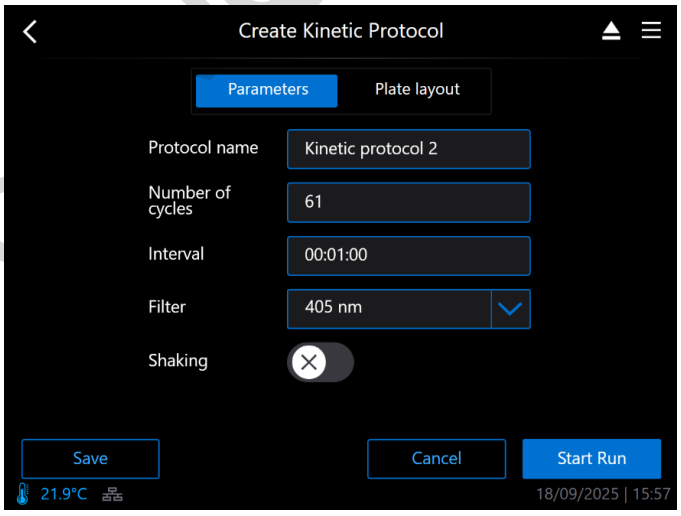



**Figure 61 Parameters**

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Users can define the number of cycles ranging from **2 to 500** and set the kinetic interval between **20 seconds** and **one hour**.

Shaking in kinetic protocol has only **ON** or **OFF** options. When shaking is on, it is always fixed to continuous linear shaking using 3 mm amplitude at 11 Hz frequency.

See “Plate layout” on page 55 in “Endpoint measurement protocol” on page 54 for details.

# Run protocol

Protocols created by user can be found in the **Protocol library** which is accessible from the **Main view** or from the main **Menu**. Protocols can be started either by clicking **Start run** in **Open Protocol/Create Protocol** or by starting the last active protocol (**Start Last Run** in the **Main view**).




**Figure 62 Run protocol**

When running a kinetic protocol, the user interface displays the progress with an estimated remaining run time.

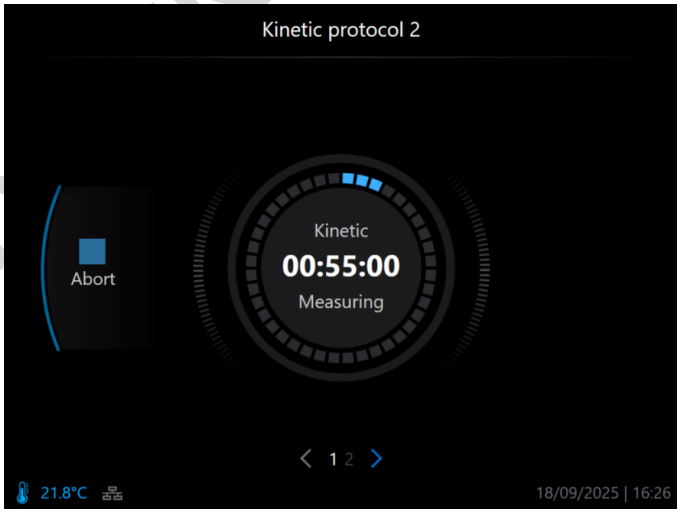



**Figure 63 Kinetic protocol 2**

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During a kinetic run, the user can view the real-time results as a plate map overview or monitor readings from an individual well can be opened by tapping any well position in overview window.

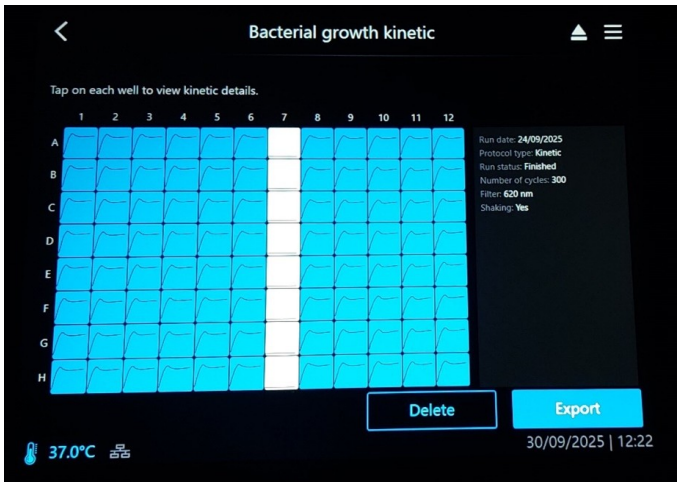



**Figure 64 Plate overview**




**Figure 65 Individual well**

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# Access, view, and export runs

All past runs can be accessed from **Menu** ▸ **Run History** :

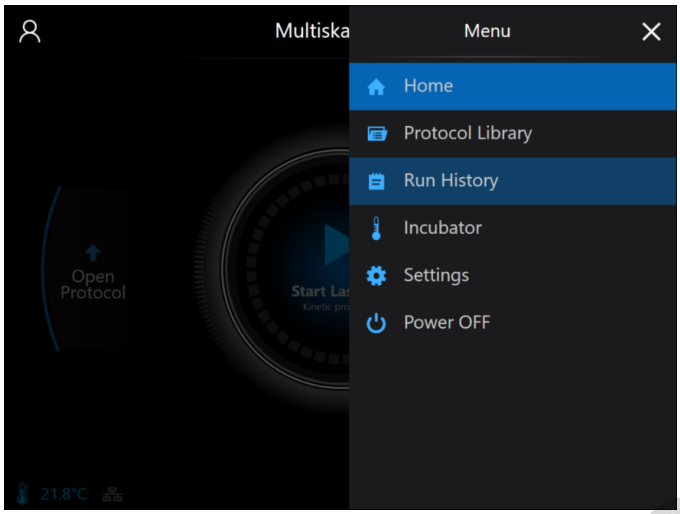



**Figure 66 Menu**

**Run History** lists all runs executed with the instrument. The list displays **Run name**, **Status**, **Type** (Endpoint or Kinetic), and execution date and time (**Ran at**) for each run. User can open runs by tapping the name bar.

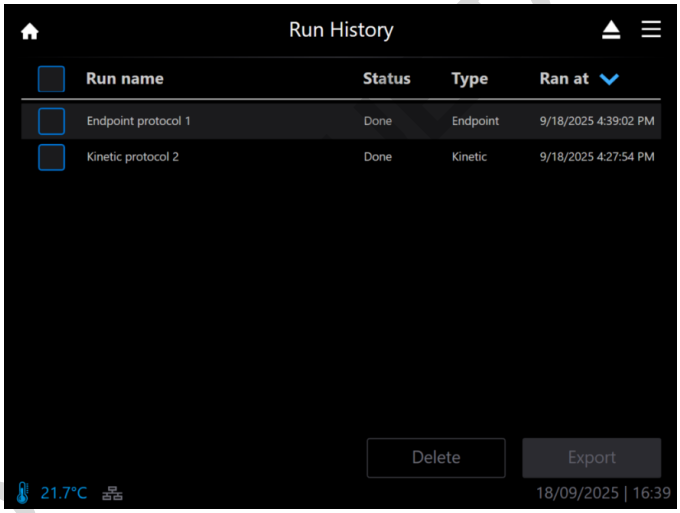



**Figure 67 Run History**

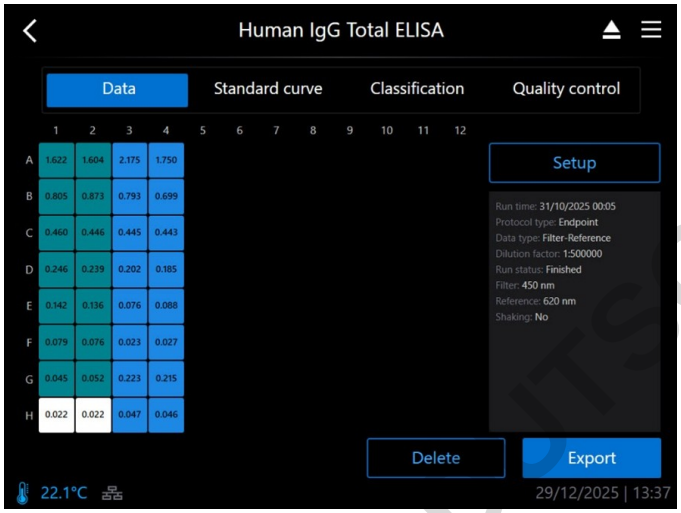
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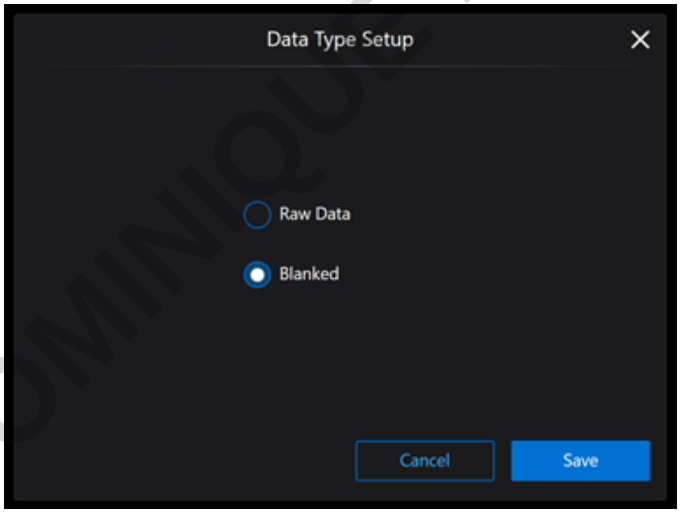
## Endpoint run results

When opening an **Endpoint** run, four tabs become available: **Data**, **Standard curve**, **Classification**, and **Quality control**. These tabs help the user to interpret the run results. All interpretation parameters can be modified without altering the raw data.

### Data

The tab displays a plate overview with either raw or blank-subtracted numerical values (can be changed using the **Setup** button). Protocol information and key parameters are shown on the right side.




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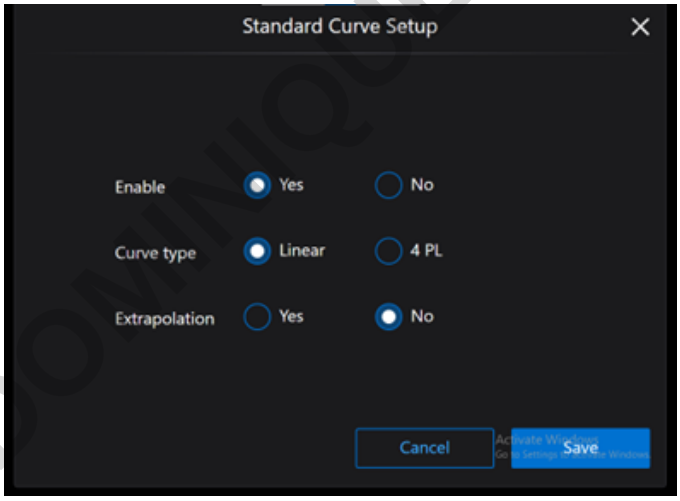
## Standard curve

This tab displays a standard curve drawn based on the data points defined by user. Standard curve parameters can be adjusted using the **Setup** button:



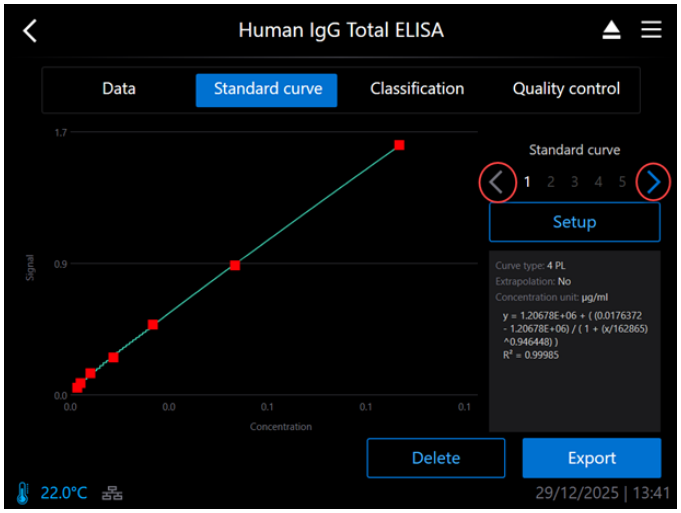

**Note:** Calculation of the standard curve requires minimum of three different standard concentrations.

**Note:** Standard curve is calculated only when there is sensible and realistic data set to perform the calculation. With invalid data, like if all data points are negative, the standard curve screen will show only empty curve screen with axis but not standard curve.




Standard curve display includes five screens, and the user can navigate between the screens by using left / right arrows on the right part of the screen.

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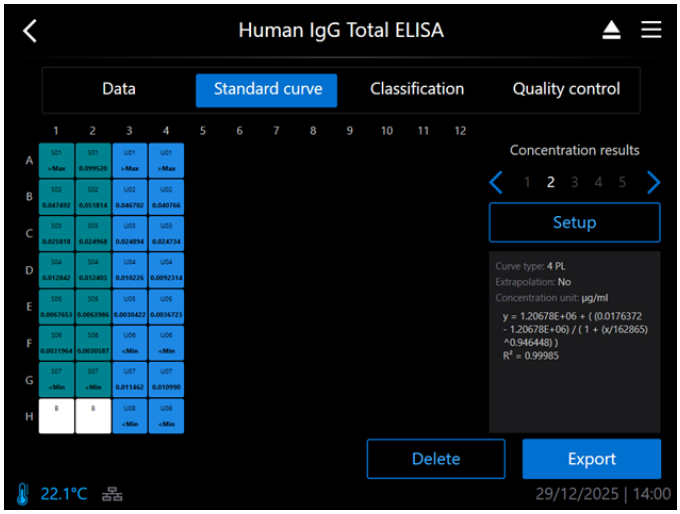



The first screen displays calculated standard curve and resulting fitting parameters.

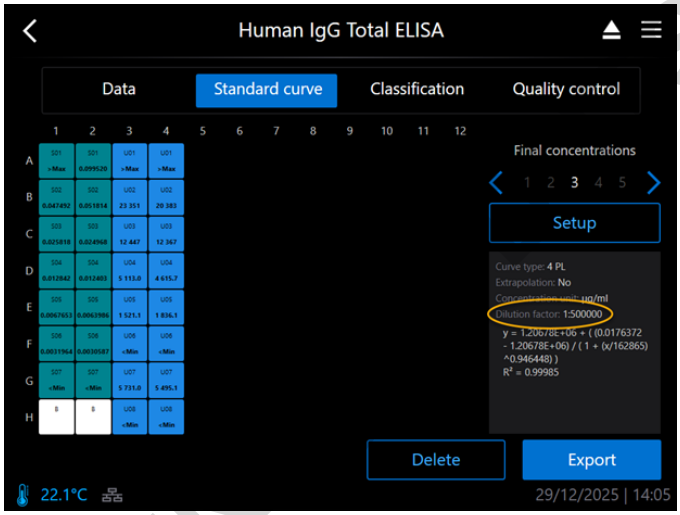



The second screen displays calculated average sample concentrations without dilution factor, Concentrations are calculated for Unknowns, Controls, and Standards. These back-calculated standard concentrations can be used for estimation of the curve fit quality. Samples that cannot be calculated (out of range) are displayed as **<Min** or **>Max**:

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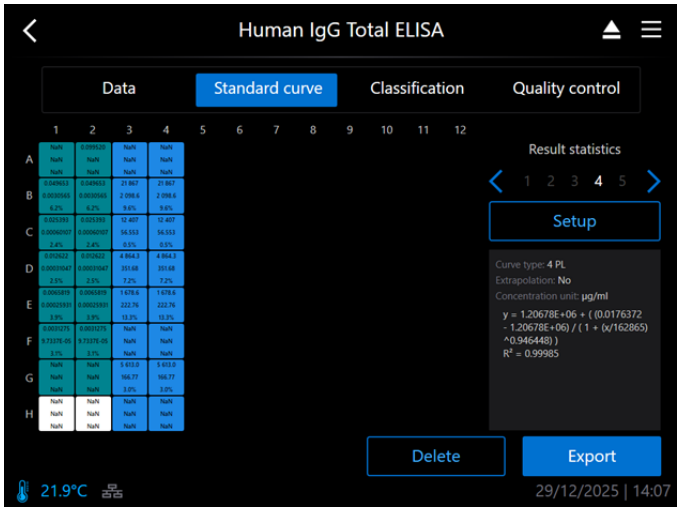



The third screen displays final concentrations where calculated average concentrations have been multiplied by the dilution factor.

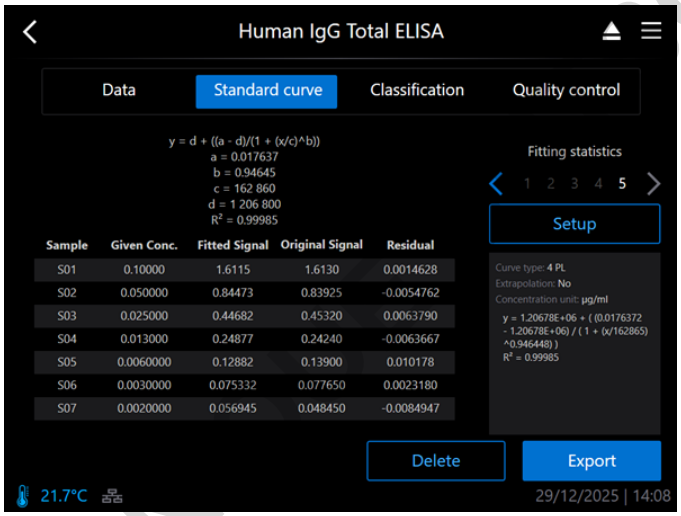



The fourth screen displays average concentration values (top), standard deviations (SD, middle), and coefficients of variation in percentages (CV%, bottom) for samples.

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The fifth and final screen displays curve fitting statistics and a summary data table of the standard series:

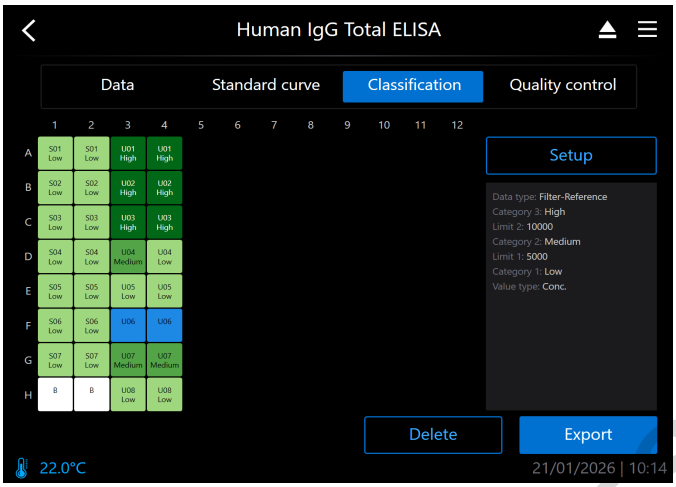


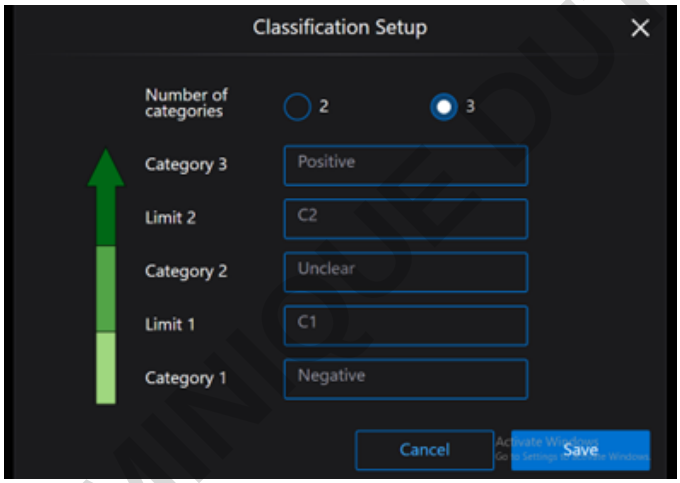

| Sample | Given Conc. | Fitted Signal | Original Signal | Residual |
|---|---|---|---|---|
| S01 | 0.10000 | 1.6115 | 1.6130 | 0.0014628 |
| S02 | 0.050000 | 0.84473 | 0.83925 | -0.0054762 |
| S03 | 0.025000 | 0.44682 | 0.45320 | 0.0063790 |
| S04 | 0.013000 | 0.24877 | 0.24240 | -0.0063667 |
| S05 | 0.0060000 | 0.12882 | 0.13900 | 0.010178 |
| S06 | 0.0030000 | 0.075332 | 0.077650 | 0.0023180 |
| S07 | 0.0020000 | 0.056945 | 0.048450 | -0.0084947 |

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## Classification

The classification tab displays a plate view with each well categorized according to the limits set by the user before the protocol was run. The classification limits can be accessed and modified using the **Setup** button.

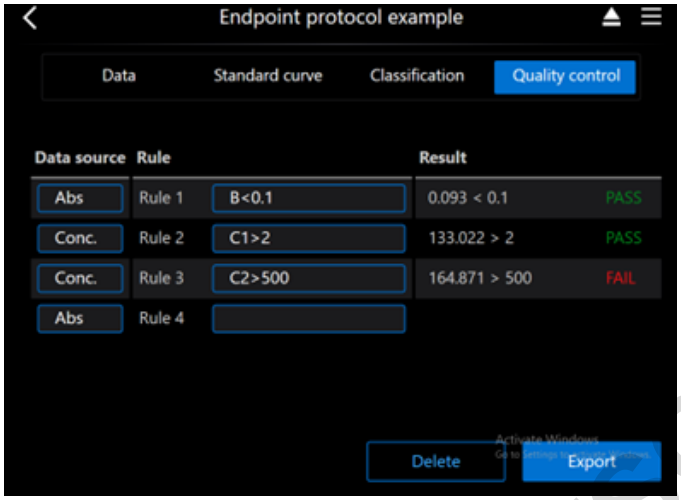



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## Quality control

**Quality control** tab displays all the rules and formulas defined by the user before the protocol was run and shows if the run passed or failed the QC.




## Data export

To export run data any time, select the **Export** button in the lower right corner of the screen. The user interface then prompts you to select data export destination and data format.




**Figure 68 Export**

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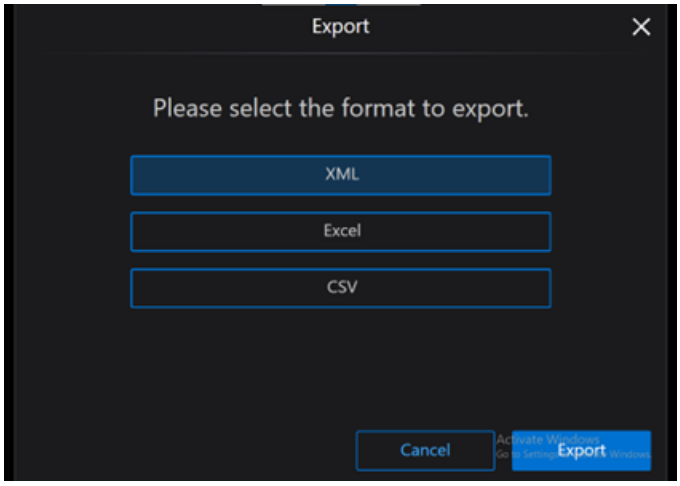
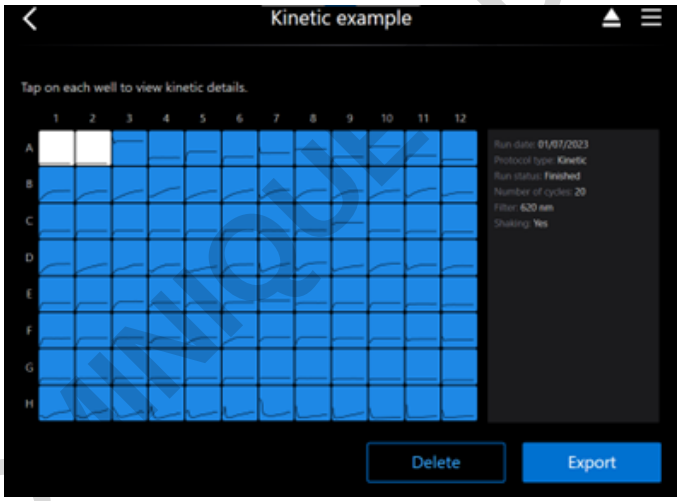



**Figure 69 Data format to export**

**Note:** When exporting data to USB drive, do not connect multiple USB drives to the instrument simultaneously. This will possibly cause illogical behavior of the export process.

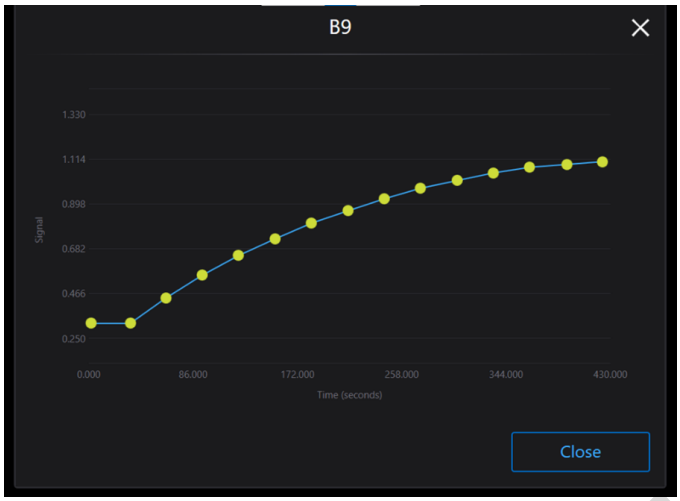
## Kinetic run results

- When opening the **Kinetic** run, you can see a plate overview displaying all kinetic measurements.




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- Tap any well position to open the results from an individual well.




- Click **Export** button in the plate overview screen to export results to a USB drive or any preconfigured network drive.

## Software updates

Multiskan Ease includes preinstalled internal software.

- For model **ME001000C**, software updates are provided on the Thermo Fisher website. Download the update package to a USB drive, insert the drive into the instrument, and the software upgrade will start automatically.
- For model **ME002000C**, use the firmware loader in Thermo Scientific™ SkanIt™ Software to update the firmware. See the Thermo Scientific™ SkanIt™ Software for Microplate Readers User Guide for detailed instructions.

**CAUTION!** Do not switch off the instrument during software installation. Installation time varies by update. The instrument may reboot several times; installation is complete when the home screen reappears.

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# Power control

Click main **Menu**, then **Power OFF** to switch off the instrument.

Alternatively, press physical power off button in front of the instrument.

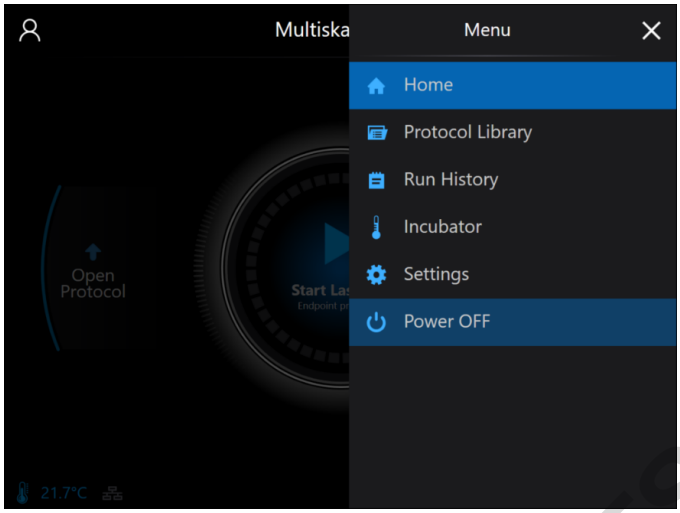



**Figure 70 Menu ▸ Power OFF**

In both ways, power off performs controlled shut down where the operational system, the touchscreen interface and the instrument firmware are shut down following controlled and timed shutdown process. This controlled shutdown takes about 15 seconds.

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# 5 Maintenance

This chapter describes how to maintain and service the instrument.

**Note:** Follow normal laboratory safety procedures about biohazardous, infectious, radiologic or toxic materials when maintaining the instrument.

## Regular and preventive maintenance

### Guidelines for maintaining the instrument

Contact local authorized technical service or your local Thermo Fisher Scientific representative for assistance, if necessary.

### Maintenance checklist

Users must perform routine and service procedures to avoid unnecessary wear and potential safety hazards.

The procedures and their recommended frequencies are described below.

**Table 2 Maintenance checklist**

| Maintenance | Daily | Weekly | Yearly | If required |
|---|---|---|---|---|
| Ensure proper shutdown. | | | | •[1] |
| Keep the instrument free of dust. | • | | | |
| Wipe away spilled saline solutions, solvents, acids or alkaline solutions from outer surfaces immediately to prevent damage, and wipe with deionized distilled water. | • | | | |
| If any surfaces have been contaminated with biohazardous material, disinfect with a mild sterilizing solution. | • | | | |
| Clean the case of the instrument periodically. | | • | | |
| Clean the plate carrier. | | • | | |
| Perform verification with Thermo Scientific™ Multiskan™ Verification Plate. | | | • | |

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**Table 2 Maintenance checklist** *(continued)*

| Maintenance | Daily | Weekly | Yearly | If required |
|---|---|---|---|---|
| Decontaminate the instrument when relocating the instrument or sending it for service.[2] | | | | • |
| Service the instrument regularly. | | | • | |

[1] To save energy, it is recommended to shut down the instrument for the weekends and other longer periods when the instrument is not in use.

[2] For detailed decontamination instructions, see “Cleaning and decontamination” on page 100.

## Instrument care

**WARNING!** If any surfaces have been contaminated with biohazardous material, use a mild sterilizing solution.

**WARNING!** Do not use acetone or any other strong solvents as they damage the covers.

**WARNING!** Do not autoclave any part of this instrument.

Ensure that the electricity supply in the laboratory conforms to that specified on the power adaptor type label.

To guarantee the continuous reliability and accuracy of Multiskan™ Ease, avoid disturbing any of the optical system components.

**IMPORTANT!** A misalignment of the light path affects measurements.

- Prevent any liquid from entering the instrument.
- Keep the instrument free of dust and other foreign matters.
- Clean the touchscreen display with a mild laboratory detergent.
- Clean the plastic covers and surfaces with a mild laboratory detergent or alcohol.
- Avoid using abrasive cleaning agents, as they can damage the paint finish.

It is recommended that you clean the case of the instrument periodically to maintain its good appearance.

For more information, see “Clean the instrument” on page 77.

If any damage occurs, contact your local Thermo Fisher Scientific representative for service.

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# Guidelines for cleaning the instrument

## Clean the instrument

Clean the instrument regularly as stated below.

1. Switch the instrument off.
2. Unplug the instrument.
3. Clean the outside of the instrument with a soft cloth dampened with water or mild detergent.
4. If you have spilt infectious agents on the instrument, decontaminate the instrument.

For more information, see “Cleaning and decontamination” on page 100.

**CAUTION!** Immediately wipe away spilled saline solutions, solvents, acids, or alkaline solutions from outer surfaces to prevent damage and wipe with deionized distilled water.

**CAUTION!** Painted surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer.

**CAUTION!** Do not use any solutions containing oxidative chemicals, such as hypochlorite and peroxides or strong bases, on any of the anodized aluminum surfaces (plate carrier). These substances can cause permanent damage to the surface finish.

**CAUTION!** Wear disposable gloves when cleaning the instrument.

## Clean the plate carrier

**WARNING!**

- Ensure that the bottom of each microplate is dry.
- Fluid on the bottom of a microplate may present a contamination hazard.
- Use good laboratory practices when handling any hazardous materials.

**CAUTION!**

- Keep the instrument plate carrier clean to avoid dust and dirt from entering the measurement chamber.
- Clean the plate carrier surface at least once a week using a soft cloth or tissue paper soaked in a mild detergent solution, soap solution or 70% ethanol.
- Wipe up spills immediately.
- Do not use formaldehyde or strong alkaline.

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1. Click the **Run plate out** icon in SkanIt™ software or press the **Plate Out** button in the touchscreen to run the plate out.
2. Clean the plate carrier with a soft cloth dampened with water or mild detergent.
3. If you have spilt infectious agents on the plate carrier, decontaminate the instrument.

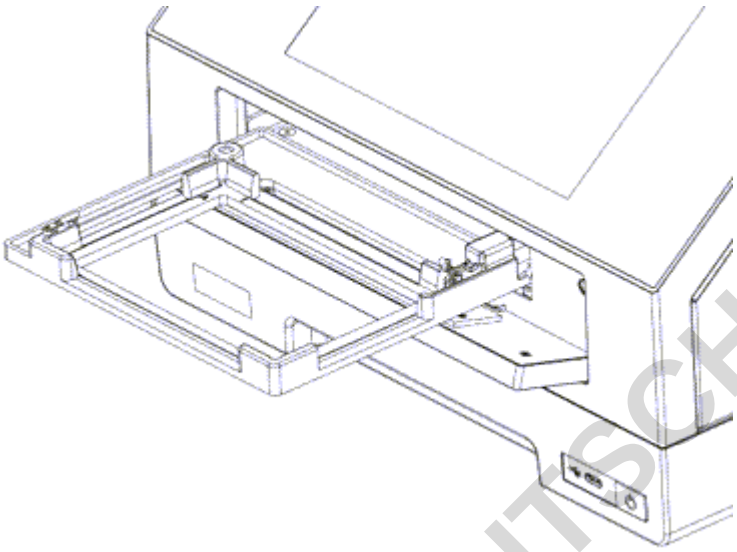


**Figure 71 Plate carrier**

For more information, see “Cleaning and decontamination” on page 100.

# Disposal information

## Disposal of instrument

If the instrument is exposed to potentially infectious chemical samples, toxic or corrosive chemicals or radioactive chemicals, waste management of the complete instrument must be carried out to ensure that there is no risk of contamination.

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.

To dispose of the instrument:

- Decontaminate the instrument.
- Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The proposals for the procedures vary by country.
  - Pollution degree: 2 (see Appendix D, “Safety”)
  - Method of disposal: Electronic waste, contaminated waste, (infectious waste)
- Recycle the original packaging and packing materials with operators known to you.

Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State (European Country), and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific’s compliance with these Directives, the recyclers in your

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country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at **EPM Weee Compliance | Thermo Fisher Scientific** .

For further information, contact your local Thermo Fisher Scientific representative.

## Disposal of materials

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal. See local regulations for the disposal of infectious material.

**WARNING!** The samples can be infectious. Dispose of all used disposable plastic microplates and disposable gloves, and so on as biohazardous waste. Be cautious and always use gloves.

## Decontamination procedure

**WARNING!** Only authorized and trained personnel can perform the decontamination procedure in a well-ventilated room wearing disposable gloves, protective glasses and clothing.

Decontamination should be performed in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

A decontamination procedure is only recommended when infectious substances have been in direct contact with any part(s) of the instrument.

If there is any risk of contamination with biohazardous material, the procedure recommended below or some other corresponding decontamination procedure must be performed.

The decontamination procedure is required prior to shipping the instrument to Thermo Fisher Scientific, for example, for repair.

If the instrument is shipped back to Thermo Fisher Scientific, it must be accompanied by 2 dated and signed Certificates of Decontamination.

Failure to confirm decontamination will incur additional labor charges or at worst the items will be returned for proper cleaning.

We strongly recommend that the complete decontamination procedure is performed before relocating the instrument from one laboratory to another.

Examples of disinfectants:

- Formaldehyde solution 10%
- Pure ethanol 70% (in distilled water)
- Virkon solution 1 – 3%
- Activated glutaraldehyde solution 4%
- Chloramine T

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**CAUTION!** If local or laboratory regulations prescribe regular decontamination, it is not advisable to use formaldehyde, as even small traces of formaldehyde negatively affect the enzyme being used in EIA tests resulting in bad test results.

**CAUTION!** Always use disposable gloves and protective clothing and operate in a well-ventilated area.

To decontaminate the instrument:

1. Prepare the decontaminant: 200 mL 10% formaldehyde solution or 200 mL 4% activated glutaraldehyde solution (or another agent recommended by your safety officer).
2. Empty the plate carrier and cuvette port.
3. Switch the instrument off and disconnect the mains power supply cable.
4. Disinfect the outside of the instrument using a cloth dampened with 70% pure ethanol in distilled water.
5. Place the instrument in a large plastic bag. Ensure the measurement chamber door is open and the plate carrier is out.
6. Place a cloth soaked in the prepared solution into the bag.
7. Ensure that the cloth does not touch the instrument.
8. Close the bag firmly and leave the instrument in the bag for at least 24 hours.
9. After at least 24 hours, remove the instrument from the bag.
10. Clean the instrument using a mild detergent.
11. Enclose a signed and dated Certificate of Decontamination both inside the transport package and attached to the outside of the package

# Ship the instrument for service

These instructions also apply if you need to relocate the instrument.

Before you can ship the instrument for service, you must refit the transport lock and pack the instrument appropriately.

## Pack the instrument for service

To pack the instrument for service:

1. Remove any microplates from the instrument.
2. Remove the mains supply power cable and disconnect the USB communication cable and any other connected devices.
3. Decontaminate the instrument.
4. Fit the transport lock. For instructions, see “Refit the transport lock” on page 81.
5. Pack the instrument, see “Repack the instrument” on page 84.

   Use the original packaging to ensure that no damage will occur to the instrument during shipping. Any damage incurs additional labor charges.

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If the original packaging is not available:

- If possible, place the instrument in a plastic bag to prevent loose packing material entering the instrument.
- Ensure that the instrument is completely suspended in packing material so that there is 100 mm between the box wall and the instrument.
- Wrap any loose parts and place them in the spare space around the instrument.

6. Inform the use of hazardous materials.
7. Enclose a dated and signed "Certificate of decontamination" on page 104 both inside and attached to the outside of the box in which you return your instrument or other items.

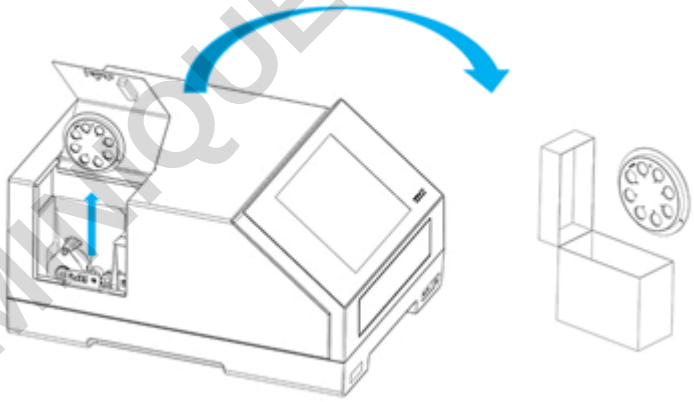
   If the decontamination form is missing or not completed, Thermo Fisher Scientific holds the process of treating your instrument until full information is provided.
8. Indicate the fault after you have been in touch with your local Thermo Fisher Scientific representative or the Thermo Fisher Scientific technical service department.
9. Enclose the returned goods authorization number (RGA) given by the Thermo Fisher Scientific representative.

   Keep a note of the RGA number and quote it in any correspondence to us.
10. Seal the box and ship it to the address on the label, and notify the depot of the shipping date, carrier and any tracking number so that Thermo Fisher Scientific can trace your instrument.

    For details on storage and transportation temperatures, see "General specifications" on page 92.

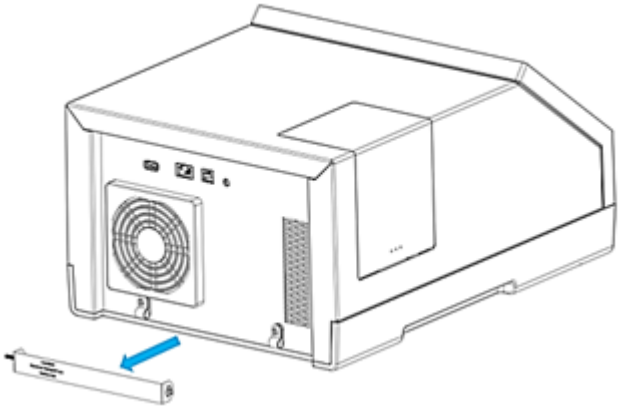
## Refit the transport lock

1. Take out the filter wheel from the filter wheel chamber, and put it into the filter wheel box.

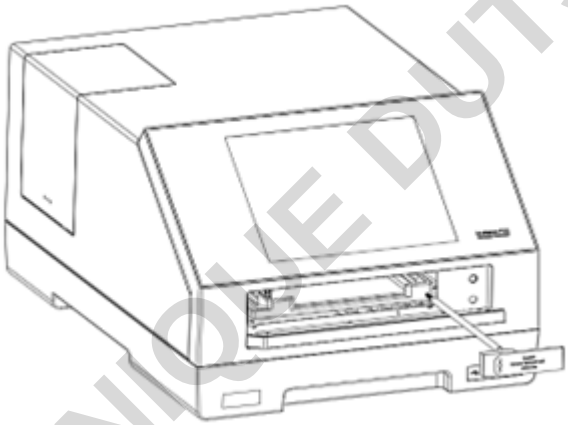


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2. Loosen the two screws of the transport lock holder on the back cover. Remove the transport lock from the instrument and retighten the screws on the holder.

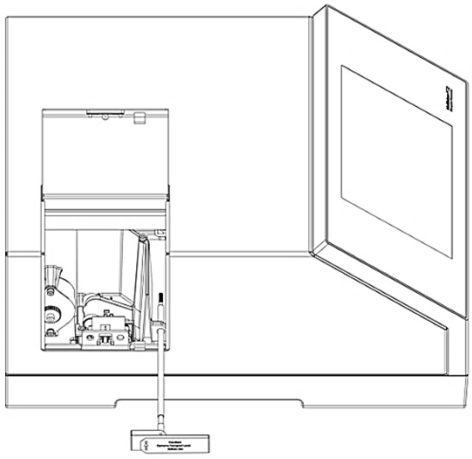


3. Open the measurement chamber door by hand. Using the transport lock as a tool, push the plate carrier into the chamber until it cannot be pushed further.

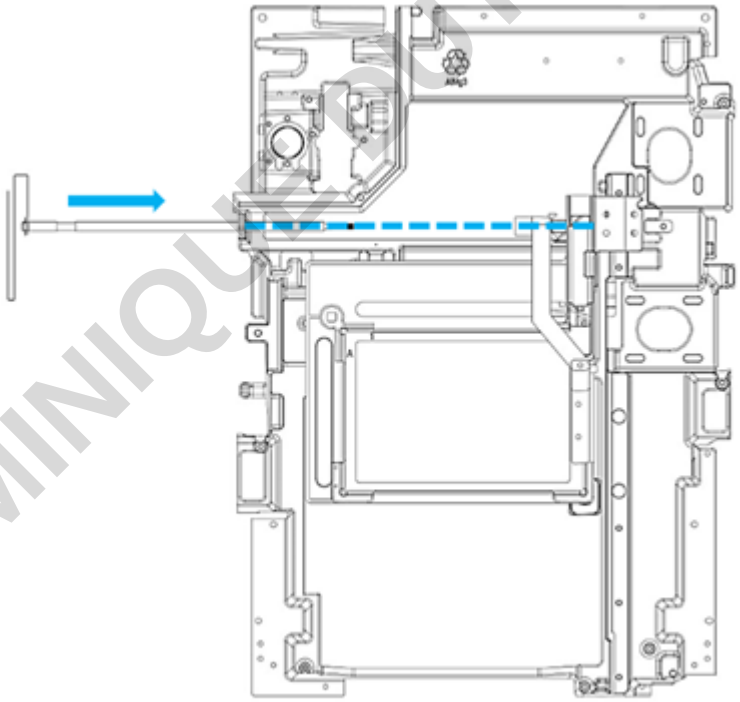


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4. Open the filter wheel chamber door. Using the transport lock as a tool, push the optical measurement head bracket until it cannot be pushed further through the space reserved in the filter wheel chamber.

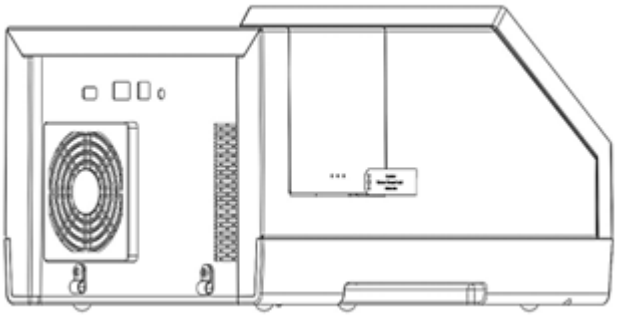


5. Guide the threaded end of the transport lock through the installation holes of both the optical measurement head bracket and the plate carrier. Tighten the transport lock clockwise.

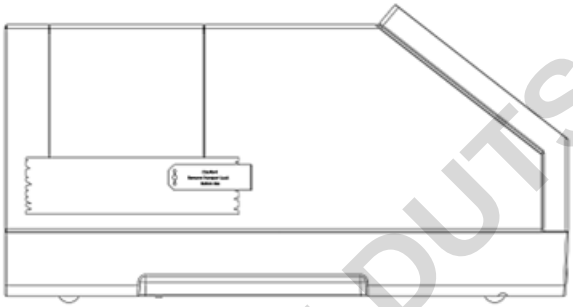


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6. Close the filter wheel door and ensure the warning tag is hanging outside the instrument.



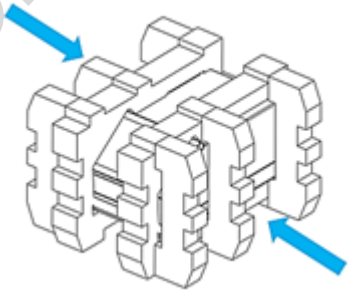
7. Seal the filter wheel door firmly with traceless adhesive tape as shown in the picture.



## Repack the instrument

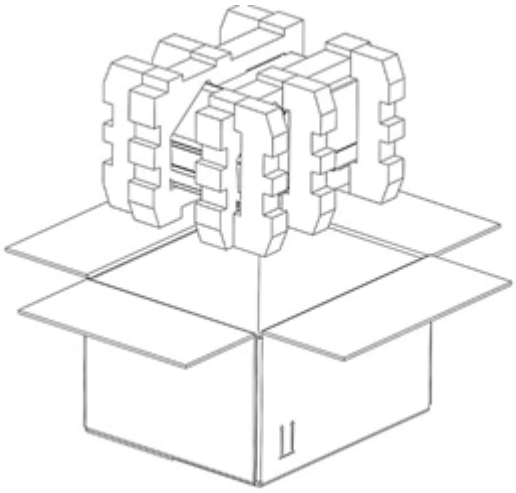
To repack the instrument by using the original packaging:

1. Place the instrument in a plastic bag to prevent loose packing material from entering the instrument. Seal the bag mouth with tape.
2. Install the foam on the left and right sides of the instrument.



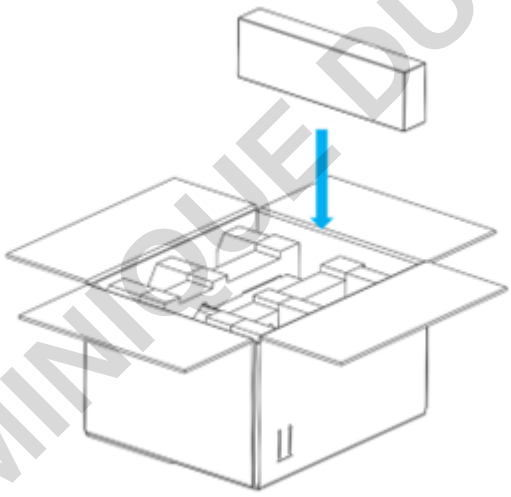
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3. Put the instrument into the carton, ensuring the "up" direction on the packaging box aligns with the "up" direction of the instrument.



4. Place the filter wheel box, adapter, and other accessories into the small box. Fill residual space with buffer material.

5. Put the small box into the reserved space in the carton.



6. Close the carton, then seal carton with adhesive tape.

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# A Troubleshooting

## Troubleshooting

**CAUTION!** Do not use the instrument if it appears to malfunction.

If there is an abnormal situation during operation, such as fluids spilling inside the instrument:

1. Power off the instrument by pushing the power button.
2. Unplug the instrument immediately from the power supply.
3. Carry out appropriate corrective measures.

   **Note:** Do not disassemble the instrument.

4. If the corrective measures taken do not help, contact authorized technical service or your local Thermo Fisher Scientific representative.

When an error is detected, the current operation is terminated. After an error, it is best to abort the current run and restart from the beginning after the problem is fixed. The error and warning codes that may appear in SkanIt™ Software or touchscreen UI.

All error messages are stored in the internal memory log file. The error log file can be accessed with SkanIt™ Software by selecting **Settings ▸ Instrument ▸ Edit instrument parameters ▸ Reports ▸ Instrument Error Log ▸ Run Report**.

Error and warning codes are reported in the response status. The internal touchscreen UI displays error messages with a short main text in a larger font and a subtext in a smaller font. These two elements are combined into a single message box in the SkanIt™ Software.

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**Table 3 Multiskan Ease firmware errors**

| Code | Explanation | Info message to the user in touchscreen UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 0 | The command was executed successfully. | — | — | — |
| 1 | Fatal software error. | Fatal internal firmware software error. | Restart the instrument. If error persists, contact service. | Fatal internal firmware software error. Restart the instrument. If error persists, contact service. |
| 2 | The instrument did not recognize the command it received. | Unknown instrument command received. | Restart the instrument. If error persists, contact service. | Unknown instrument command received. Restart the instrument. If error persists, contact service. |
| 3 | The arguments of the received command are not valid. | Unknown command parameters received. | Restart the instrument. If error persists, contact service. | Unknown command parameters received. Restart the instrument. If error persists, contact service. |
| 4 | Plate positioning error. | Plate carrier positioning error. | Check that there is nothing blocking the plate carrier. Restart the instrument. If error persists, contact service. | Plate carrier positioning error. Check that there is nothing blocking the plate carrier. Restart the instrument. If error persists, contact service. |
| 5 | Head positioning error. | Measurement head positioning error. | Check that there is nothing blocking the measuring head. Restart the instrument. If error persists, contact service. | Measurement head positioning error. Check that there is nothing blocking the measuring head. Restart the instrument. If error persists, contact service. |
| 6 | Filter wheel positioning error. | Filter wheel positioning error. | Check that filter wheel is in place and there is nothing blocking it from rotating. Restart the instrument. If error persists, contact service. | Filter wheel positioning error. Check that filter wheel is in place and there is nothing blocking it from rotating. Restart the instrument. If error persists, contact service. |
| 7 | AD converter offset voltage is too high. | AD converter voltage error. | Restart the instrument. If error persists, contact service. | AD converter voltage error. Restart the instrument. If error persists, contact service. |
| 8 | AD converter noise level is too high. | AD converter noise level error | Restart the instrument. If error persists, contact service. | AD converter noise level error. Restart the instrument. If error persists, contact service. |

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**Table 3 Multiskan Ease firmware errors** *(continued)*

| Code | Explanation | Info message to the user in touchscreen UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 11 | Attempt to set the instrument serial number when it already has been set. | Attempt to set the instrument serial number when it already has been set. | — | Attempt to set the instrument serial number when it already has been set. |
| 12 | File system error. | Fatal file system error. | Restart the instrument. If error persists, contact service. | Fatal file system error. Restart the instrument. If error persists, contact service. |
| 13 | Such an error during startup, that the execution of the MEA and SCA commands is precluded. | Fatal system startup error. | Restart the instrument. If error persists, contact service. | Fatal system startup error. Restart the instrument. If error persists, contact service. |
| 14 | The distance between plate wells is too short for scan measurement. | Illegal plate template settings. | Check that well to well distance in plate template is at least 4.5 mm, or use precision mode. Restart the instrument. | Illegal plate template settings. Check that well to well distance in plate template is at least 4.5 mm, or use precision mode. Restart the instrument. |
| 16 | Failed to adjust the lamp intensity for a filter. | Failure in filter setup. | Check that there are correct filter(s) in the defined filter position(s). Close the settings window, restart the instrument and redefine the filter or filters again. If error persists, contact service. | Failure in filter setup. Check that there are correct filter(s) in the defined filter position(s). Close the settings window, restart the instrument and redefine the filter(s) again. If error persists, contact service. |
| 17 | The dark level signal is too high. The dark level is checked once for each measured plate row/column. | The instrument has a dark signal level over the range. | Restart the instrument. If error persists, contact service. | The instrument has a dark signal level over the range. Restart the instrument. If error persists, contact service. |
| 18 | Measure signal saturation. | Measurement beam light intensity too high. | Check that there is a filter in the selected filter position. Restart the instrument. If error persists, contact service. | Measurement beam light intensity too high. Check that there is a filter in the selected filter position. Restart the instrument. If error persists, contact service. |

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**Table 3 Multiskan Ease firmware errors** *(continued)*

| Code | Explanation | Info message to the user in touchscreen UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 21 | The LED temperature is too high. | LED lamp failure. | Let the instrument to cool down for at least 30 minutes. Then restart the instrument. If error persists, contact service. | LED lamp failure. Let the instrument to cool down for at least 30 minutes. Then restart the instrument. If error persists, contact service. |
| 22 | XY table position calibration failed. This may be reported after startup. | Plate carrier calibration error. | Check that there is nothing preventing plate carrier from moving. Restart the instrument. If error persists, contact service. | Plate carrier calibration error. Check that there is nothing preventing plate carrier from moving. Restart the instrument. If error persists, contact service. |
| 23 | Command parser optimization failure. | Command parser optimization failure. | Restart the instrument. If error persists, contact service. | Command parser optimization failure. Restart the instrument. If error persists, contact service. |
| 24 | Filter wheel go home time out. | Filter wheel home position error. | Check that filter wheel is in place and rolling freely. Restart the instrument. If error persists, contact service. | Filter wheel home position error. Check that filter wheel is in place and rolling freely. Restart the instrument. If error persists, contact service. |
| 25 | Plate go home time out. | Plate carrier home position error. | Check that there is nothing preventing plate carrier from moving. Restart the instrument. If error persists, contact service. | Plate carrier home position error. Check that there is nothing preventing plate carrier from moving. Restart the instrument. If error persists, contact service. |
| 26 | Measurement head go home time out. | Measurement head position error. | Check that nothing is preventing the measurement head from moving. Restart the instrument. If error persists, contact service. | Measurement head position error. Check that nothing is preventing the measurement head from moving. Restart the instrument. If error persists, contact service. |
| 27 | Optics signal error. | Optics electronics error. | Restart the instrument. If error persists, contact service. | Optics electronics error. Restart the instrument. If error persists, contact service. |

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**Table 3 Multiskan Ease firmware errors** *(continued)*

| Code | Explanation | Info message to the user in touchscreen UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 28 | Incubator cannot reach the requested temperature. | The incubator cannot reach the requested temperature. | Ensure that incubator set temperature is at least 4 degrees above the ambient temperature. Then restart the instrument. If error persists, contact service. | The incubator cannot reach the requested temperature. Ensure that incubator set temperature is at minimum 4°C above the ambient temperature. Then restart the instrument. If error persists, contact service. |
| 29 | There is a big difference between the four temperature sensors. | There is too big difference between the four temperature sensors, or sensor(s) are reporting out-of-range values. | Restart the instrument. If error persists, contact service. | There is too big difference between the four temperature sensors, or sensor(s) are reporting out-of-range values. Restart the instrument. If error persists, contact service. |

**Table 4 Multiskan Ease firmware warnings**

| Code | Explanation | Info message to the user in SOM UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 100 | Unable to comply with the defined kinetic interval. | Failure to meet defined kinetic interval. | Increase the kinetic interval and retry. If error persists, contact service. | Failure to meet defined kinetic interval. Increase the kinetic interval and retry. If error persists, contact service. |
| 101 | The timer referenced in the WAI timer command is not (anymore) running. Your timing requirement is not met. | Failure to meet defined timing requirement(s). | Adjust protocol time settings and retry. If error persists, contact service. | Failure to meet defined timing requirement(s). Adjust protocol time settings and retry. If error persists, contact service. |
| 103 | Instrument is busy now. | Instrument is busy. | Control request was rejected because instrument is in use by another user interface. | Instrument is busy. Control request was rejected because instrument is in use by another user interface. Reconnect when instrument is available. |

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**Table 5 Multiskan Ease touchscreen UI errors**

| Code | Explanation | Info message to the user in SOM UI | | Info message to the user in SkanIt™ Software |
|---|---|---|---|---|
| | | Main text | Sub text | Text |
| 666 | Internal communication timeout | Software communication error. | Restart the instrument. If error remains, contact service. | Software communication error. Restart the instrument. If error remains, contact service. |
| 667 | Handshake response timeout | Handshake with the instrument failed. | Restart the instrument. If error remains, contact service. | Handshake with the instrument failed. Restart the instrument. If error remains, contact service. |
| 668 | Could not find HID device | Could not find the instrument. | Restart the instrument. If error remains, contact service. | Could not find the instrument. Restart the instrument. If error remains, contact service. |
| 669 | Internal communication error | Internal communication error. | Restart the instrument. If error remains, contact service. | Internal communication error. Restart the instrument. If error remains, contact service. |
| 670 | Stealth mode timeout | Firewall timeout error. | Restart the instrument. If error remains, contact service. | Firewall timeout error. Restart the instrument. If error remains, contact service. |
| 671 | Firmware update error | Firmware update failure. | Restart the instrument. If error remains, contact service. | Firmware update failure. Restart the instrument. If error remains, contact service. |
| 716 | Internal software error | Internal software error. | Restart the instrument. If error remains, contact service. | Internal software error. Restart the instrument. If error remains, contact service. |

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B

# Specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program.

## General specifications

| Specifications | ME001000C | ME002000C |
|---|---|---|
| Model | 1600-1 | 1600-3 |
| Overall dimensions | 295 mm (W) × 400 mm (D) × 215 mm (H) | 295 mm (W) × 400 mm (D) × 215 mm (H) |
| Weight | 10 kg | 8.5 kg |
| Operating conditions | • 10–40°C.<br>• Maximum relative humidity 80% for temperatures up to 31°C.<br>• Decreasing linearly to 50% relative humidity at 40 C.<br>**Note:** Indoor use only! | • 10–40°C.<br>• Maximum relative humidity 80% for temperatures up to 31°C.<br>• Decreasing linearly to 50% relative humidity at 40°C.<br>**Note:** Indoor use only! |
| Performance specification conditions | All performance specifications are fulfilled within an ambient temperature (20–25°C) in humidity range of 10–80%. | All performance specifications are fulfilled within an ambient temperature (20–25°C) in humidity range of 10–80%. |
| Transportation conditions | –40°C to +70°C, packed in transport packaging | –40°C to +70°C, packed in transport packaging |
| Storage conditions | –25°C to +50°C, packed in transport packaging | –25°C to +50°C, packed in transport packaging |
| Mains power supply | 100–240 Vac, 50/60 Hz, nominal | 100–240 Vac, 50/60 Hz, nominal |
| Power consumption | • Idle: 17 W<br>• Typical (without heating): 35 W<br>• Maximum (with heating): 90 W | • Idle: 9 W<br>• Typical: 27 W |
| Noise | <50 dB (at a distance of 500 mm) | <50 dB (at a distance of 500 mm) |
| User interface | Standalone use: 8-inch touchscreen display | — |

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*(continued)*

| Specifications | ME001000C | ME002000C |
|---|---|---|
| PC control | SkanIt™ Software<br>(Research Edition included) | SkanIt™ Software<br>(Research Edition included) |
| Connection | • 1 USB type A port, USB 2.0<br>• 1 USB type B port, USB 2.0<br>• 1 USB type C port, USB 2.0<br>• Ethernet port | 1 USB type B port, USB 2.0 |
| Incubator | Incubator included (heating only) | — |
| Shaker | Linear | Linear |
| Plate type | 96-well and 384-well microplates, with or without lid, maximum total height 18 mm. | 96-well microplates, with or without lid, maximum total height 18 mm. |

# Performance specifications

| Specifications | ME001000C | ME002000C |
|---|---|---|
| **Photometry** | | |
| Light source | White LED | White LED |
| Wavelength range | 400–760 nm | 400–760 nm |
| Wavelength selection | Filter wheels with 3 factory filters and 5 optional filter positions | Filter wheels with 3 factory filters and 5 optional filter positions |
| Factory filters[1] | 405 nm, 450 nm, and 620 nm | 405 nm, 450 nm, and 620 nm |
| Bandwidth (FWHM) | 3–8 nm | 3–8 nm |
| Wavelength accuracy | ±2 nm | ±2 nm |
| Linearity (Absorbance), at 450 nm | 0–3 Abs, 2.0% | 0–3 Abs, 2.0% |
| Accuracy (Absorbance), at 450 nm | ±(1.0% + 0.003 Abs) (0 – 3 Abs) | ±(1.0% + 0.003 Abs) (0 – 3 Abs) |
| Precision (Absorbance), at 450 nm | SD <0.005 Abs or CV <0.5%, whichever is greater | SD <0.005 Abs or CV <0.5%, whichever is greater |
| Turbidimetric sensitivity | <5 FTU (formazine turbidimetric units) | <5 FTU (formazine turbidimetric units) |
| Measurement speed[2] | 96-well microplates | 96-well microplates |

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*(continued)*

| Specifications | ME001000C | ME002000C |
|---|---|---|
| | • Fast mode: ≤10 seconds<br>• Precision mode: ≤20 seconds | • Fast mode: ≤10 seconds<br>• Precision mode: ≤20 seconds |
| **Incubator** | | |
| Temperature range | Ambient + 4°C to 45°C (room temperature 25°C) | — |
| Liquid warm-up time | <40 minutes from 25–37°C, 96-well microplate, 200 µL water/well | — |
| Mean temperature of wells at 37°C | ±0.5°C | — |
| Plate temperature uniformity at 37°C | <1.0°C | — |
| **Shaker** | | |
| Shaking modes | Linear | Linear |
| Shaking speeds | • Low (5 Hz, amplitude 15 mm)<br>• Medium (11 Hz, amplitude 3 mm)<br>• High (18 Hz, amplitude 1 mm) | • Low (5 Hz, amplitude 15 mm)<br>• Medium (11 Hz, amplitude 3 mm)<br>• High (18 Hz, amplitude 1 mm) |
| Shaking type | Continuous or pulsed | Continuous or pulsed |

[1] Hard coated filters with unlimited lifetime.
[2] Minimum kinetic interval time from A1 back to A1.

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C

# Ordering information

## Related products

| Product | Cat. No. |
|---|---|
| **Verification Plate** | |
| Multiskan™ Verification Plate | 24072805<br>24072800 |
| **Software** | |
| SkanIt™ Software for Microplate Readers, Drug Discovery Edition (offering compliance for FDA CFR 21 p11) | 5187149 |

## Accessory list

| Cat. No. | Accessories |
|---|---|
| MEOF0414 | 414 nm narrow bandwidth filter |
| MEOF0492 | 492 nm narrow bandwidth filter |
| MEOF0520 | 520 nm narrow bandwidth filter |
| MEOF0540 | 540 nm narrow bandwidth filter |
| MEOF0570 | 570 nm narrow bandwidth filter |
| MEOF0600 | 600 nm narrow bandwidth filter |
| MEOF0660 | 660 nm narrow bandwidth filter |
| MEOF0690 | 690 nm narrow bandwidth filter |
| MEOF0750 | 750 nm narrow bandwidth filter |
| MEAS0300 | Power adapter |
| MEAS0200 | Filter wheel with 3 default filters |

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# Safety

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

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

## Symbols on the 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.

| Symbol | English |
|---|---|
|  | See User Guide for details. |
|  | Environmental protection symbol of the China RoHS directive. The "e" in the symbol indicates the product does not have any hazardous substances in excess of the concentration limits. |

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*(continued)*

| Symbol | English |
|---|---|
| CE | The CE mark symbolizes that the product conforms to all applicable European Community provisions for which this marking is required. Operation of the instrument is subject to the conditions described in this manual. The protection provided by the device may be impaired if the instrument is used in a manner not specified by the manufacturer. |
| | Regulatory Compliance Mark indicates conformity with Australian standards for electromagnetic compatibility. |
| TÜVRheinland C US | This product conforms to UL 61010-1, CAN/CSA C22.2 No.61010-1 “Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part I: General Requirements.” Instruments bearing the TUV symbol are certified by TUV Product Services to be in conformance with the applicable safety standard for the US and Canada. |
| | Caution, risk of danger.<br>Consult the manual for further safety information. |
| | **WARNING!** Risk of electric shock. |
| | WARNING Biohazard risk. |
| | Protective conductor terminal (main ground) |
| | Do not dispose of this product in unsorted municipal waste.<br>**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. |

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# Instrument safety

## General instrument safety

- The instrument is for laboratory research use only.
- Observe proper laboratory safety precautions; wear protective clothing and follow approved laboratory safety procedures.
- Follow Good Laboratory Practice (GLP) to guarantee reliable analyses.
- Follow the preventive maintenance instructions to keep the instrument in the best condition, see “Maintenance checklist” on page 75.
- Observe all safety symbols and markings on the instrument.
- Do not open any covers except the filter wheel chamber door or measurement chamber door when the instrument is plugged in a power source.
- Do not open the measurement chamber door manually when the instrument is in operation.
- Do not push the plate carrier in manually unless the instrument is switched off.
- Do not force a microplate into the instrument.

**WARNING!** Only authorized technical service personnel are allowed to open the instrument. Disconnect the instrument from all voltage sources by disconnecting the power supply cable before opening it.

**WARNING!** Do not touch switches or electrical outlets with wet hands. Switch the instrument off before disconnecting it from the mains supply.

**WARNING!** The electromagnetic environment should be evaluated prior to operation of the device. Do not use this device in close proximity to sources of strong electromagnetic radiation (for example unshielded intentional RF sources), as these can interfere with the proper operation.

**WARNING!** Do not attempt to operate the instrument with the transport lock in place.

**WARNING!** Do not touch or loosen any screws or parts other than those specifically designated in the instructions. Doing so may cause misalignment and will void the instrument warranty.

**CAUTION!** Do not disturb the instrument and let it sit for at least three hours before installing and switching it on to prevent condensation causing a short circuit.

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# Operating conditions

The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:

| Parameter | Description |
|---|---|
| Altitude | Up to 2,000 m |
| Humidity | Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C |
| Temperature | 10–40°C |
| Mains supply fluctuations | ±10% from nominal |
| Installation category (Overvoltage category) | II (IEC 60664-1)[1] |
| Pollution degree | 2 (IEC 60664-1)[2] |

[1] The installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply, and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains, such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

[2] The pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only nonconductive pollution, such as dust, occurs with the exception of occasional conductivity caused by condensation.

# 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.

**WARNING! Power Supply Line Cords.** Use properly configured and approved line cords for the power supply in your facility. If the line cord is damaged, contact technical support.

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

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# 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.

# Safety and electromagnetic compatibility (EMC) standards

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

## Safety

| Reference | Description |
|---|---|
| CE-LVD (2014/35/EU) | European Union “Low Voltage Directive” |
| IEC 61010-1<br>GB 4793.1<br>EN 61010-1<br>UL 61010-1<br>CSA C22.2 No.61010-1-12 | *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements* |
| IEC 61010-2-010<br>GB 4793.6<br>EN 61010-2-010<br>UL 61010-2-010<br>CSA C22.2 No.61010-2-010 | *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials* |

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## EMC

| Reference | Description |
|---|---|
| CE-EMC (2014/30/EU) | European Union “EMC Directive” |
| EN IEC 61326-1<br>GB/T 18268.1 | *Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – 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 11364-2024 | “China RoHS” Standard—Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products<br>For instrument specific certificates, visit our customer resource page at **www.thermofisher.com/us/en/home/technical-resources/rohs-certificates.html**. |

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# 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.

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# Biological hazard safety



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



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

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

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# Certificate of decontamination

## Certificate of decontamination

| |
|---|
| Name: _____ |
| Address: _____ |
| Tel./Fax:_____ |
| Instrument: _____ Serial no.: _____<br>• I confirm that the returned items have not been contaminated by body fluids, toxic, carcinogenic or radioactive materials or any other hazardous materials.<br>• I confirm that the returned items have been decontaminated and can be handled without exposing the personnel to health hazards.<br>Materials used in the unit: Chemicals + Biological · Radioactive[1]) |
| Specific information about contaminants:<br>_____ |
| Decontamination procedure:<br>_____ |
| Date and place:<br>_____ |
| Signature:<br>_____ |
| Name (block capitals):_____ |
| This unit is certified by the undersigned to be free of radioactive contamination. |
| Date and plate:<br>_____ |
| Signature:_____ |
| Name (block capitals):_____ |

[1] The signature of a Radiation Safety Officer is also required when the unit has been used with radioactive materials.

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# Documentation and support

## Customer and technical support

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

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

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

## Limited product warranty

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

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