

Varioskan™ ALF Multimode Microplate Reader

USER GUIDE

Catalog Numbers VA000010C

Publication Number MAN0030013

Revision C



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



Thermo Fisher Scientific (Guangzhou) Biotechnology Company, Ltd. | Block B3 1-5F, Block B4 1-4F | No. 77 Kang Zhao 2nd Road | Huangpu District, Guangzhou, China

Revision history: MAN0030013 C (English)

Revision	Date	Description
C	7 August 2024	Change of usage statement from LUN to RUO.
B00	19 April 2024	Update of usage statement to LUN.
A.0	5 February 2024	New manual for the Varioskan™ ALF Multimode Microplate Reader.

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

DISCLAIMER: TO THE EXTENT ALLOWED BY LAW, THERMO FISHER SCIENTIFIC INC. AND/OR ITS AFFILIATE(S) WILL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, INDIRECT, PUNITIVE, MULTIPLE, OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING FROM THIS DOCUMENT, INCLUDING YOUR USE OF IT.

Important Licensing Information: This product may be covered by one or more Limited Use Label Licenses. By use of this product, you accept the terms and conditions of all applicable Limited Use Label Licenses.

TRADEMARKS: All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified.

©2024 Thermo Fisher Scientific Inc. All rights reserved.

Contents

■	CHAPTER 1	Product information	5
		Product description	5
		Instrument overview	6
		Principle of operation	8
■	CHAPTER 2	Set up the instrument	10
		Remove the transport lock	10
		Connect the mains supply cable	12
		Connect the instrument to a computer	12
		Install the SkanIt™ software	12
		Perform an operational check	13
■	CHAPTER 3	Methods	14
		Instrument operation	14
		Guidelines for instrument operation	14
		Switch on the instrument	14
		Switch off the instrument	15
		Open or close the measurement chamber	15
		Instrument temperature	16
		Optical filter management	16
		Using the SkanIt™ software	26
■	CHAPTER 4	Maintenance	27
		Instrument maintenance	27
		Clean the instrument	27
		Guidelines for maintaining the instrument	27
		Maintenance checklist	28
■	APPENDIX A	Specifications	29
		Instrument specifications	29

- **APPENDIX B Safety 30**
 - Symbols on the instrument 30
 - Instrument safety 32
 - General instrument safety 32
 - Electrical safety 33
 - Cleaning and decontamination 33
 - Safety and electromagnetic compatibility (EMC) standards 33
 - Safety 34
 - EMC 34
 - Environmental design standards 34
 - Chemical safety 35
 - Biological hazard safety 36
- **APPENDIX C Documentation and support 37**
 - Customer and technical support 37
 - Limited product warranty 37



Product information

Product description

The Thermo Scientific™ Varioskan™ ALF Multimode Microplate Reader is a multi-technology microplate reader. The instrument is used to measure fluorescence intensity (FI), luminescence, absorbance and turbidity from samples in appropriate microplates. The instrument also has incubating and shaking capabilities, and can be integrated into automation environments.

The instrument is used with an external computer installed with the Thermo Scientific™ SkanIt™ Software for Microplate Readers.

The instrument has detection technology capable of making the following measurements when using the appropriate microplates:

- Absorbance
- Turbidity
- Fluorescence intensity (FI)
- Luminescence

The instrument selects the measurement wavelength either by using filters or monochromator depending on the measurement technology.

- The monochromator is used in absorbance and turbidity measurements.
- Filters are used in fluorescence intensity measurements.
- Most luminescence measurements do not require wavelength selection. But if required, filters can be used.

The instrument supports all common 6-well, 12-well, 24-well, 48-well, 96-well, and 384-well microplates with or without lids or seals, as well as low-volume microplates. Additionally Thermo Scientific™ μ Drop™ Plate and μ Drop™ Duo Plate products can be used for absorbance measurement.

The instrument has an incubator for temperature control up to 45°C and a plate shaking capability with linear, orbital, dual orbital shaking modes.

End point and kinetic modes are supported for all detection techniques. Spectral measurements can be carried out in UV/Vis/NIR range for absorbance measurement.

Instrument overview

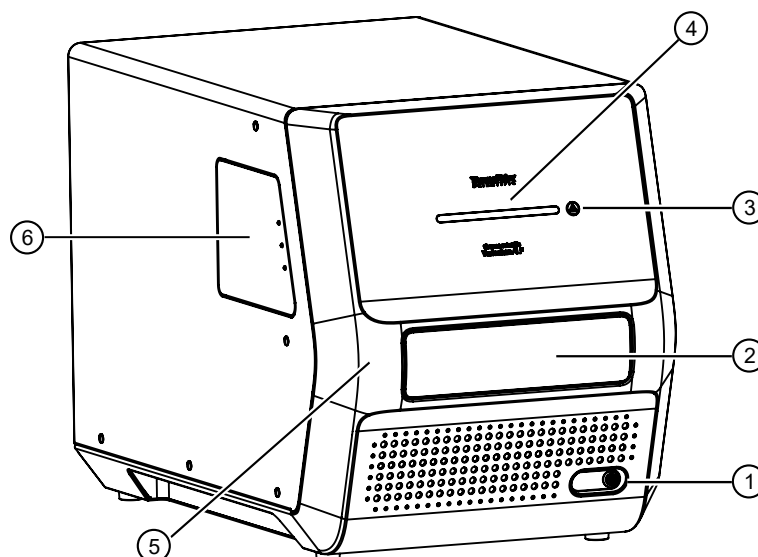


Figure 1 Front view of the Varioskan™ ALF Multimode Microplate Reader

- | | |
|----------------------------|--|
| ① Power switch | ④ LED bar indicator (see table for explanations) |
| ② Measurement chamber door | ⑤ Front cover |
| ③ Plate In/Out button | ⑥ Filter wheel chamber door |

LED bar indicator	Instrument state
Blue light changing brightness slowly	Power on
Blue light steady	Standby
Blue light moving towards middle of light bar	Plate moving out
Blue light moving towards sides of light bar	Plate moving in
Blue light converges at a point in the middle	Plate out
Blue light flashing slowly ^[1]	Incubator on
Blue light blinking	Busy ^[2]
Violet light moving back and forth	Measuring absorbance or turbidity
Bright green light moving back and forth	Measuring fluorescence intensity
Dark yellow light moving back and forth	Measuring luminescence
Amber blinking	Error

^[1] This indicator can be interrupted by other LED bar indicator states, but it does not mean the incubator has been turned off.

^[2] Indicates non-measuring working state, such as kinetic interval and shaking.

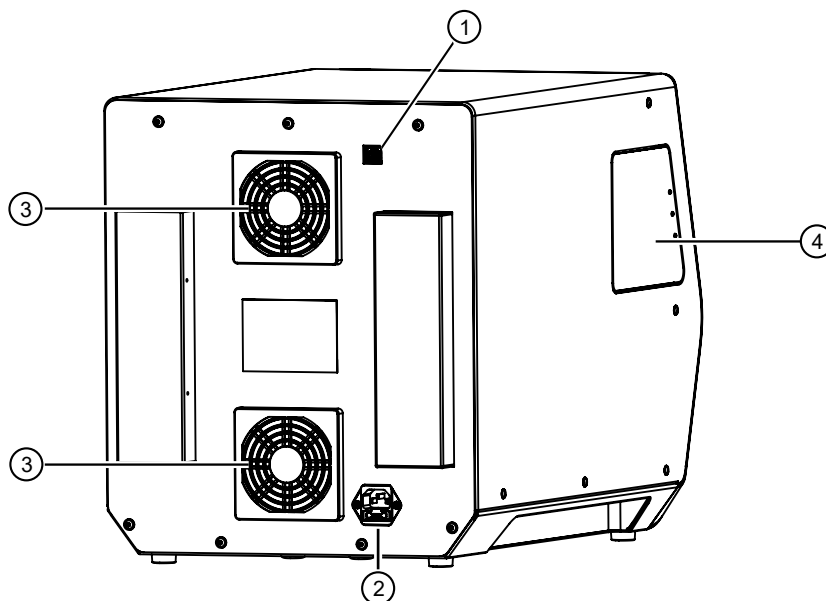


Figure 2 Rear view of the Varioskan™ ALF Multimode Microplate Reader

- | | |
|--------------------------------|-----------------------------|
| ① USB-B connector | ③ Cooling fan outlets |
| ② Mains power supply connector | ④ Filter wheel chamber door |

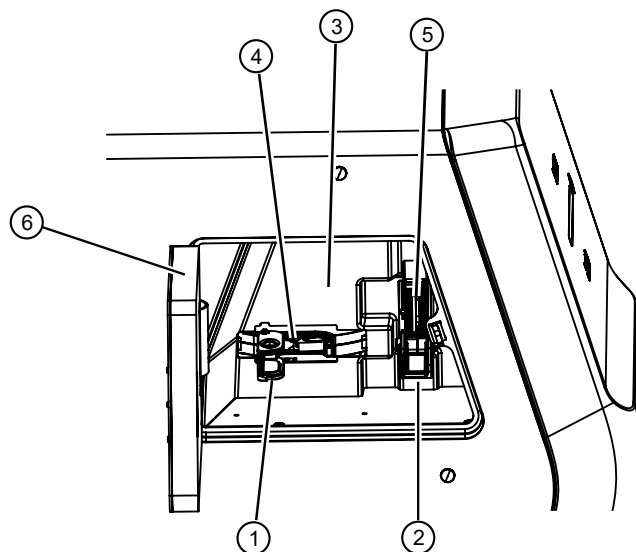


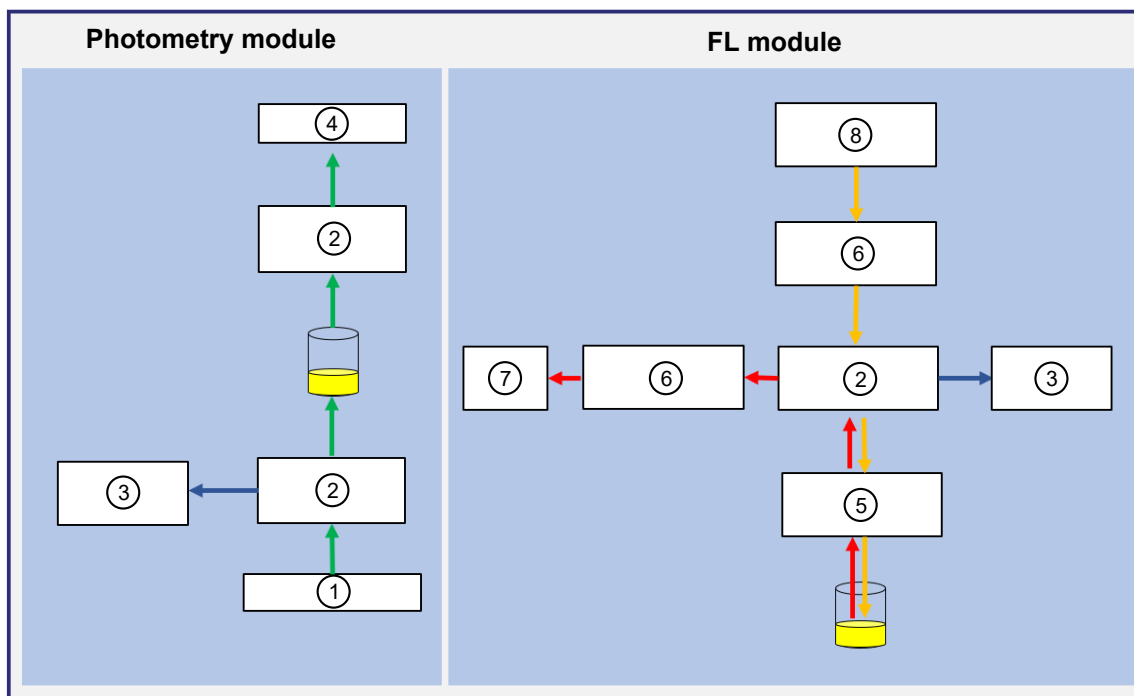
Figure 3 Internal view of the Varioskan™ ALF Multimode Microplate Reader

- | | |
|--------------------------------|-----------------------------|
| ① Excitation filter wheel door | ④ Excitation filter wheel |
| ② Emission filter wheel door | ⑤ Emission filter wheel |
| ③ Light shield | ⑥ Filter wheel chamber door |

Principle of operation

The instrument is equipped with the following two detection modules:

- Photometry module used for absorbance and turbidity detection
- Fluorometry & Luminometry (FL) module, used for fluorescence intensity (FI) and luminescence detection



- ① Monochromator
- ② Measurement optics
- ③ Reference optics
- ④ Photodiode

- ⑤ Automatic crosstalk shield
- ⑥ Shutter and filter selector
- ⑦ Photomultiplier tube (PMT)
- ⑧ Excitation optics

Absorbance and turbidity measurements are conducted through the well; fluorescence intensity and luminescence measurements are conducted from the top of the well.

For photometric measurements, the exact wavelength of the spectrum of the xenon flash lamp is selected by using a monochromator. The light is guided to the microplate optics through an optical fiber, where part of the light is being guided through the sample and the others are guided to the reference detector. The light is sensed simultaneously by the reference detector and the measurement detector positioned after the sample to compensate any intensity fluctuations of the xenon flash lamp.

For fluorometric measurements, the xenon flash lamp is used as the source of the excitation light. The excitation light will pass the excitation optical system and a filter wheel to generate a narrow-band beam. Part of the beam is measured by an excitation reference detector, and the other will pass through the optical system and excite the sample. The emission light is collected by optical system and filtered by emission filter wheel so that the light intensity at a specific wavelength will be measured by the PMT detector.

Luminometric measurements shared the emission path of fluorometry. To minimize the crosstalk interference, an automatic shield is used. However, the automatic crosstalk shield will not be used if the height of the plate is above 15.5 mm in luminometric measurements.

2

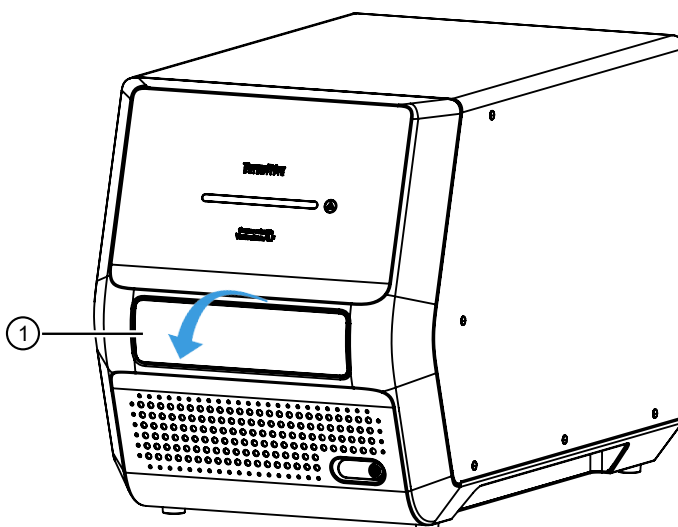
Set up the instrument

The following installation steps must be performed before the instrument can be operated.

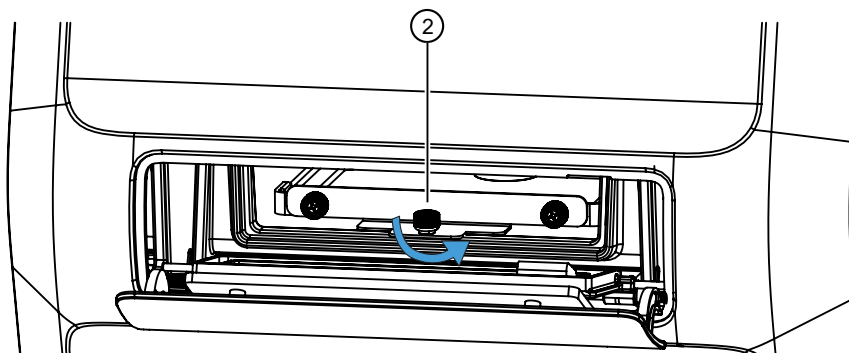
1. Remove the transport lock.
2. Connect the mains supply cable.
3. Connect the instrument to a computer.
4. Install the SkanIt™ Software for Microplate Readers to the computer connected to the instrument.

Remove the transport lock

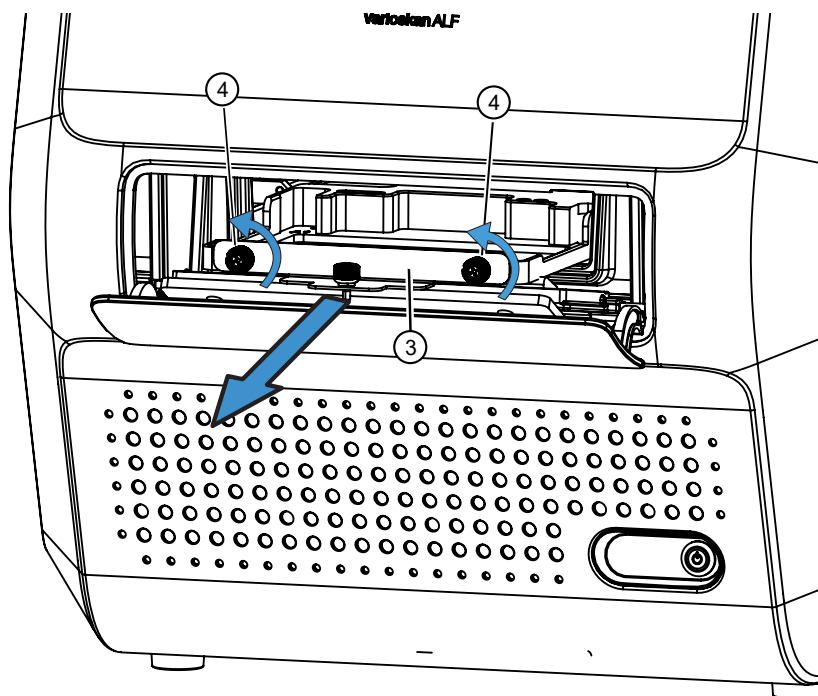
1. Open the measurement chamber door ① by pulling the upper edge.



2. Unscrew the transport lock bar ② by turning it counterclockwise.

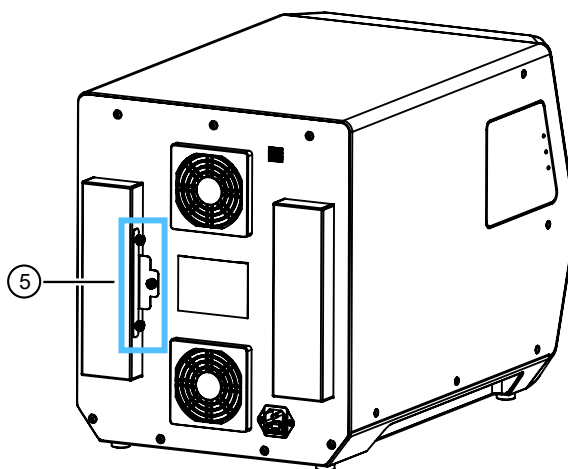


3. Pull the transport lock ③ until the plate carrier is fully out of the measurement chamber.
4. Unfasten two fixing screws ④ and remove the transport lock from the plate carrier.



5. Push the plate carrier back into the measurement chamber and make sure that the measurement chamber door closes properly.

6. Attach the transport lock ⑤ on the back of the instrument with the fixing screw and the locking piece that is on the back of the instrument.



Connect the mains supply cable

1. Connect the power supply cable to power supply connector on the back panel.



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



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

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

Connect the instrument to a computer

Connect the instrument to a PC using a USB cable.

Connecting the instrument to the SkanIt™ software automatically updates the instrument date and time according to the PC clock.

Install the SkanIt™ software

Install the SkanIt™ Software for Microplate Readers on the PC. 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*.

Perform an operational check

When the instrument is switched on, the instrument performs self-diagnostic tests and the LED bar indicator displays a blue light changing brightness slowly. When the plate carrier is extended out from the measurement chamber, and the LED bar indicator displays a steady blue light, the instrument is ready for use.

Note: Fluorometric filter pairs need to be defined in the SkanIt™ software, see the *SkanIt™ Software for Microplate Readers User Guide*.

Instrument operation

This chapter describes the instrument preparation steps you can take before you start a measurement.

After you have installed the instrument, switch it on and start the SkanIt™ software. The software finds the instrument automatically. If you have not installed the software, see “Install the SkanIt™ software” on page 12. Do not operate the instrument when it is disassembled.

Guidelines for instrument operation

- Do not operate the instrument when it is disassembled or exposed.
- Do not use cell or tissue cultures in the device that are not in accordance with the regulations of safety levels L1, L2 and L3.
- Do not open the measurement chamber door during operation.
- Do not open the filter wheel chamber door during operation.
- Do not autoclave any part of the instrument.
- Do not loosen or remove screws or parts other than those allowed in the instructions.
- Do not touch filter or optical lens surfaces with bare hands.
- Do not damage the optical system components.
- Keep the bottom of the microplates dry to avoid contamination.

Switch on the instrument

IMPORTANT! Before you switch the instrument on, make sure that all the cables are properly fitted according to the installation instructions.

Switch the instrument on by pushing the power button on the front cover of the instrument.

Instrument startup

When the instrument is switched on, the instrument performs a series of self-diagnostics. It performs a set of initialization tests and adjustments. It also performs mechanical, electrical, and optical checks.

The LED bar indicator displays blue light changing brightness slowly during this check.

When the instrument self-diagnostics is completed, the peaking buzzer will prompt the results with beep sound.

- No error—Double short beep, the LED bar display blue light steady, the instrument is ready for use.
- Error—Triple long beep, the LED bar display amber blinking.

If anything fails in the initialization tests or adjustments, the LED bar turns to a blinking amber . Turn the power switch off, then on. If this does not help, contact Technical Support.



CAUTION! Do not switch the power off during startup or self-diagnostics.

Switch off the instrument

Switch the instrument off after daily operation.

1. Move the plate carrier into the measurement chamber using the SkanIt™ software, or the **Plate in/out** button on the instrument.
2. Use the **on/off** switch on the front panel of the instrument to switch the instrument off.

Open or close the measurement chamber

Move the plate carrier in or out of the measurement chamber using the SkanIt™ software or directly from the instrument.

Move the plate carrier using the SkanIt™ software

Click the **Run plate in** or **Run plate out** icon below the **Start** button.



- ① Start
- ② Run plate in
- ③ Run plate out

Move the plate carrier using the instrument controls

Press the **Plate in/out** button on the right side of the instrument to move the plate carrier in or out of the measurement chamber.



Instrument temperature

Instrument temperature is set using the SkanIt™ software (up to a maximum of 45°C).

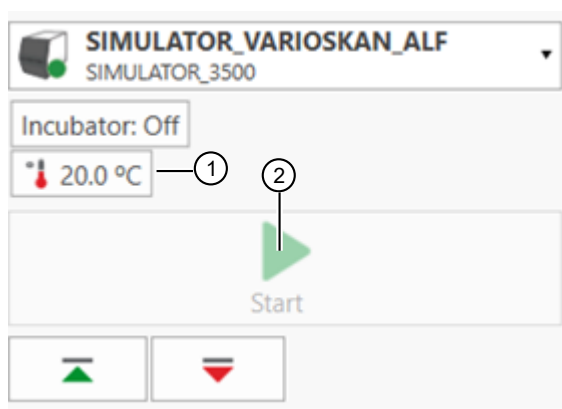
The software shows both the current and target temperatures until the target temperature is reached.

When the incubator is on, the LED bar display flash very slowly. This state can be interrupted by other LED bar indicator states. But that doesn't mean the incubator has been turned off.

Note: The instrument has no cooling system.

Set instrument temperature

1. When a measurement session is open, click the **Temperature** button above the **Start** button.



- ① **Temperature** button/box
- ② **Start**

2. Check the **Temperature** box and set the temperature.
3. Click **OK**.

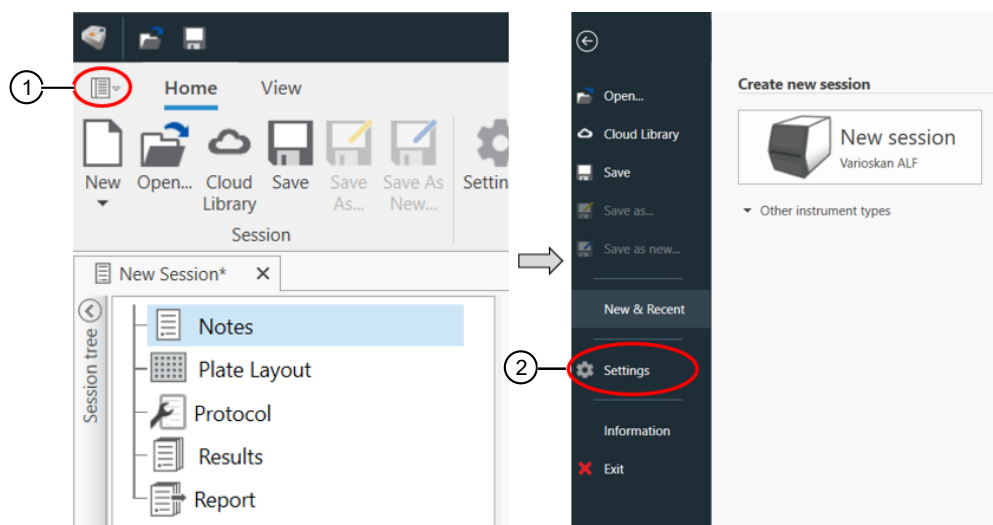
Optical filter management

The Varioskan™ ALF Multimode Microplate Reader has three factory installed filter pairs for fluorometric measurements. Five open filter positions are available in both excitation and emission filter wheels for accessory filters. The filters in the emission filter wheel can also be used for luminometric measurements. Accessory filters should be installed according to your specific applications.

For more information about filters, see the *Varioskan™ ALF Multimode Microplate Reader Technical Guide* ([MAN0030139](#)).

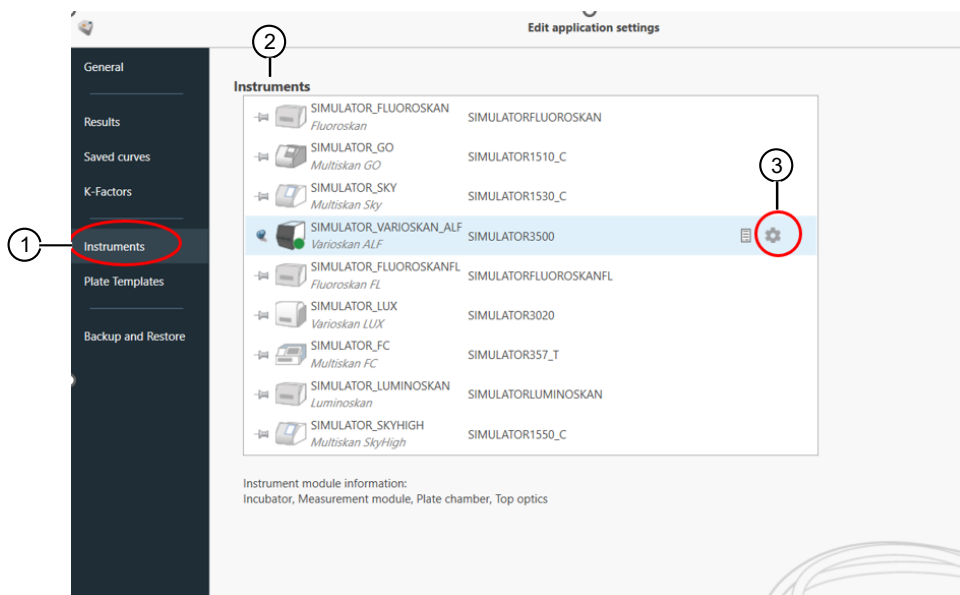
Identify instrument in SkanIt™ software

1. Turn on the instrument and open the SkanIt™ software.
The software automatically identifies any connected instruments.
2. Select **Menu** to open the **Application** menu, then select **Settings** to open the **Edit application settings** window.



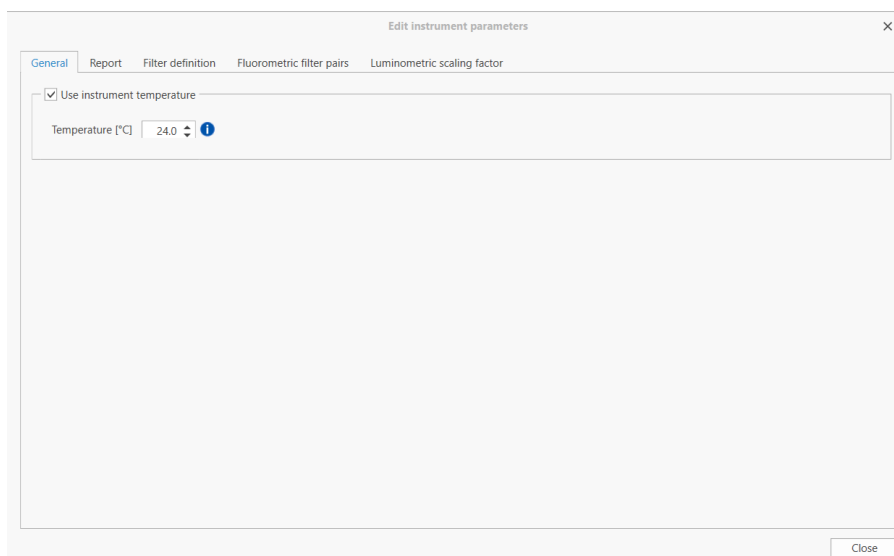
- ① **Menu**
- ② **Settings**

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



- ① **Instruments**
② **Instruments** list
③ **Settings**

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



5. Select the **Filter definition** tab of **Edit instrument parameters** window to add accessory excitation (see page 19 and emission (see page 22) filters.

Excitation filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF34525	Excitation filter, 345 nm	345	25	332-358	5/30/2023 12:00 AM	Yes
VF48515	Excitation filter, 485 nm	485	15	477-493	5/30/2023 12:00 AM	Yes
VF55515	Excitation filter, 555 nm	555	15	547-563	5/30/2023 12:00 AM	Yes

Emission filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF45040	Emission filter, 450 nm	450	40	430-470	5/30/2023 12:00 AM	Yes
VF52515	Emission filter, 525 nm	525	15	517-533	5/30/2023 12:00 AM	Yes
VF61545	Emission filter, 615 nm	615	45	592-638	5/30/2023 12:00 AM	Yes

Add excitation filter

1. Select **Add** in the **Filter definition** tab to add an excitation filter.

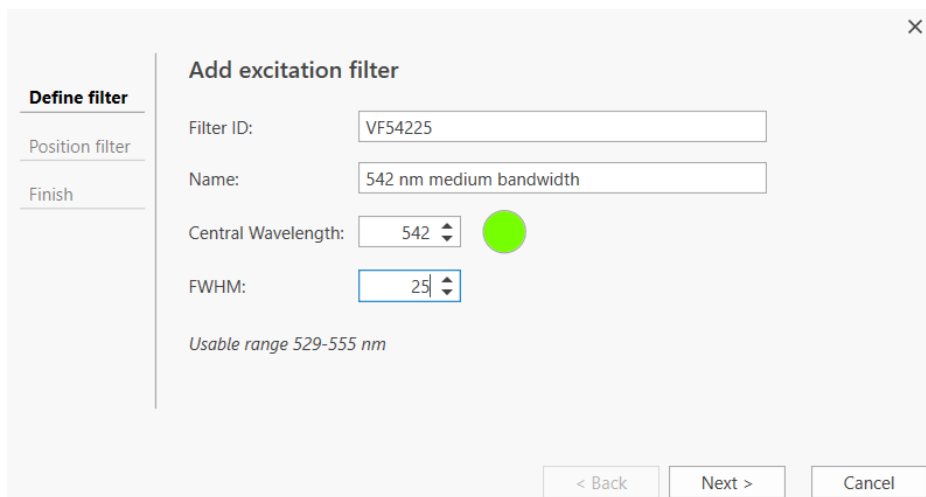
Excitation filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF34525	Excitation filter, 345 nm	345	25	332-358	5/30/2023 12:00 AM	Yes
VF48515	Excitation filter, 485 nm	485	15	477-493	5/30/2023 12:00 AM	Yes
VF55515	Excitation filter, 555 nm	555	15	547-563	5/30/2023 12:00 AM	Yes

Emission filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF45040	Emission filter, 450 nm	450	40	430-470	5/30/2023 12:00 AM	Yes
VF52515	Emission filter, 525 nm	525	15	517-533	5/30/2023 12:00 AM	Yes
VF61545	Emission filter, 615 nm	615	45	592-638	5/30/2023 12:00 AM	Yes

2. Input **Filter ID** (Cat. No. of filter), **Name**, **Central wavelength**, and **FWHM** (full width at half maximum) in the **Define filter** dialog box.

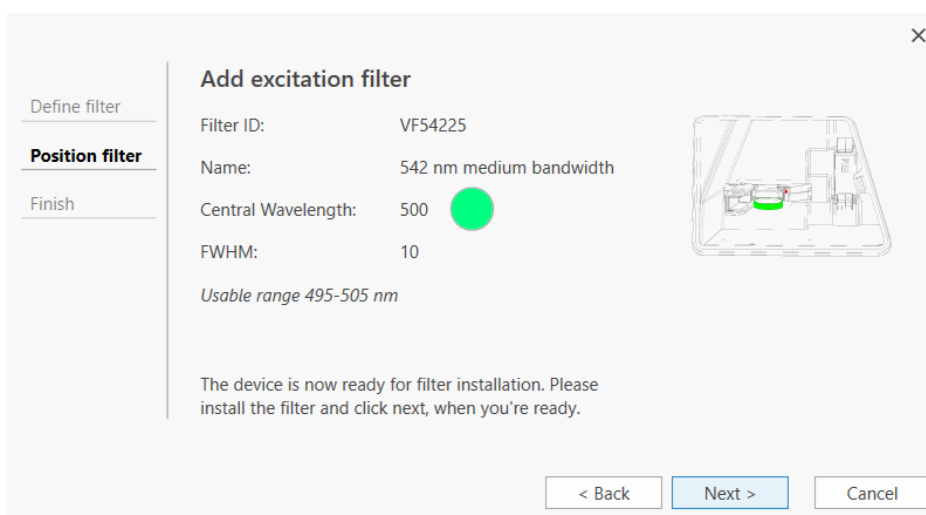


The screenshot shows the 'Add excitation filter' dialog box with the 'Define filter' tab selected. The fields are filled with the following information:

Field	Value
Filter ID:	VF54225
Name:	542 nm medium bandwidth
Central Wavelength:	542
FWHM:	25

Below the fields, it states 'Usable range 529-555 nm'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

3. Select **Next** to view the **Position filter** dialog box.
The instrument will rotate the filter wheel so it is ready for filter installation.



The screenshot shows the 'Add excitation filter' dialog box with the 'Position filter' tab selected. The fields are filled with the following information:

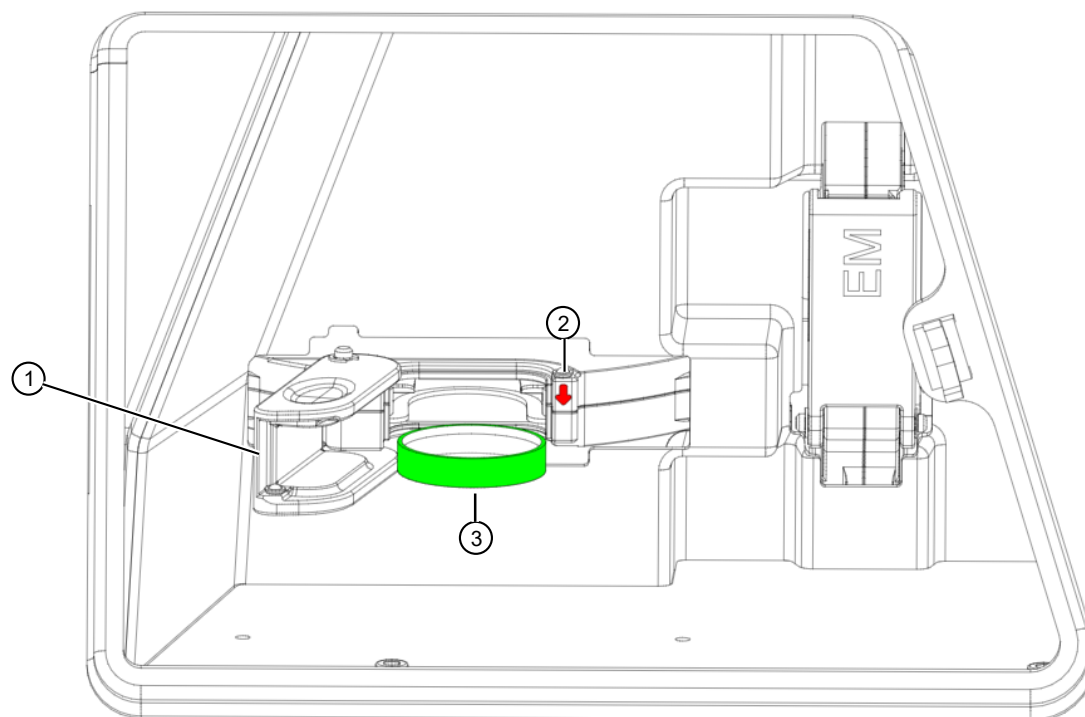
Field	Value
Filter ID:	VF54225
Name:	542 nm medium bandwidth
Central Wavelength:	500
FWHM:	10

Below the fields, it states 'Usable range 495-505 nm'. To the right of the fields is a diagram of the filter wheel assembly. At the bottom, there is a message: 'The device is now ready for filter installation. Please install the filter and click next, when you're ready.' Below this message are three buttons: '< Back', 'Next >', and 'Cancel'.

4. Open the filter wheel chamber door on the left side of the instrument to access the excitation filter wheel, which is oriented in a horizontal position. Open the excitation filter wheel door (marked "EM") and insert the user defined filter.

The direction of the arrow on the filter needs to match the arrow indicating the direction of light propagation on the filter wheel.

IMPORTANT! Do not touch the surfaces of the filter with bare hands.



- ① Excitation filter wheel door
- ② Arrow indicating direction of light propagation
- ③ Accessory filter

5. Close the excitation wheel door, then close the filter wheel chamber door. Select **Next** to view the **Finish** dialog box and confirm the filter parameters.

×

Define filter

Position filter

Finish

Add excitation filter

You have now installed the following filter. Please check that the information is correct and finish the installation by clicking Finish.

Filter ID:	VF54225
Name:	542 nm medium bandwidth
Central Wavelength:	542 ●
FWHM:	25

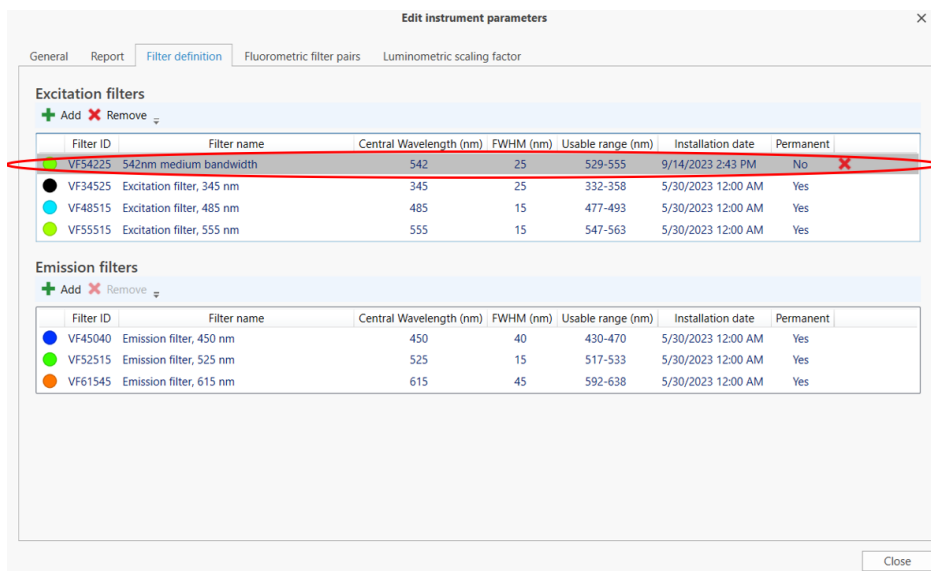
Usable range 529-555 nm

< Back
Finish
Cancel

6. Select **Finish**.

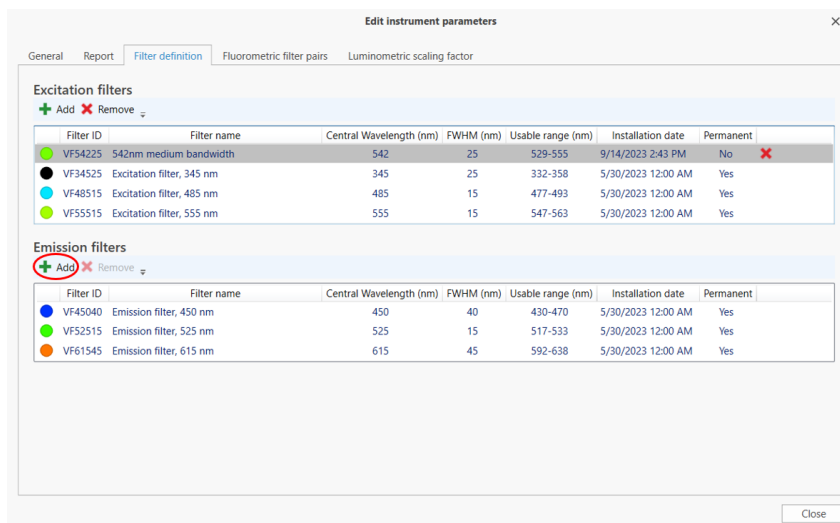
IMPORTANT! Do not forget to close the excitation filter wheel door and the filter wheel chamber door after inserting accessory filters.

The new filter is displayed in the **Excitation filters** list.

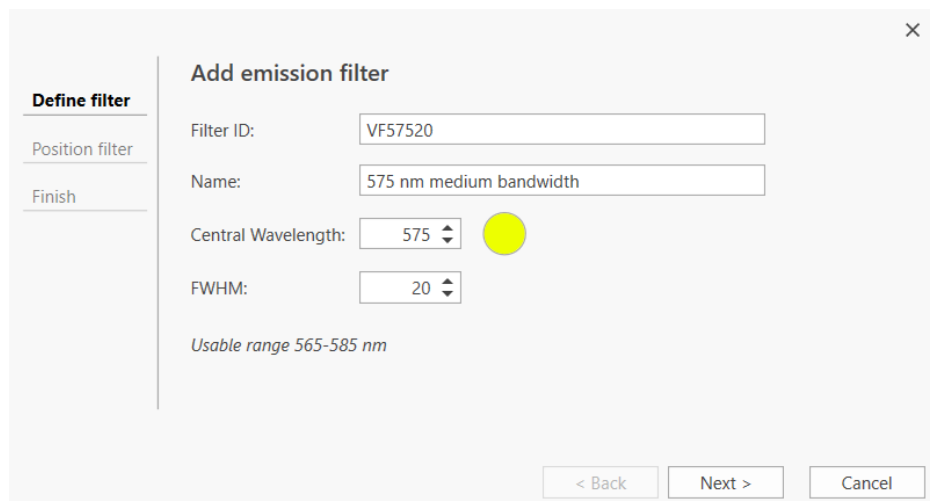


Add emission filter

1. Select **Add** in the **Filter definition** tab to add an emission filter.



2. Input **Filter ID** (Cat. No. of filter), **Name**, **Central wavelength**, and **FWHM** (full width at half maximum) in the **Define filter** dialog box.

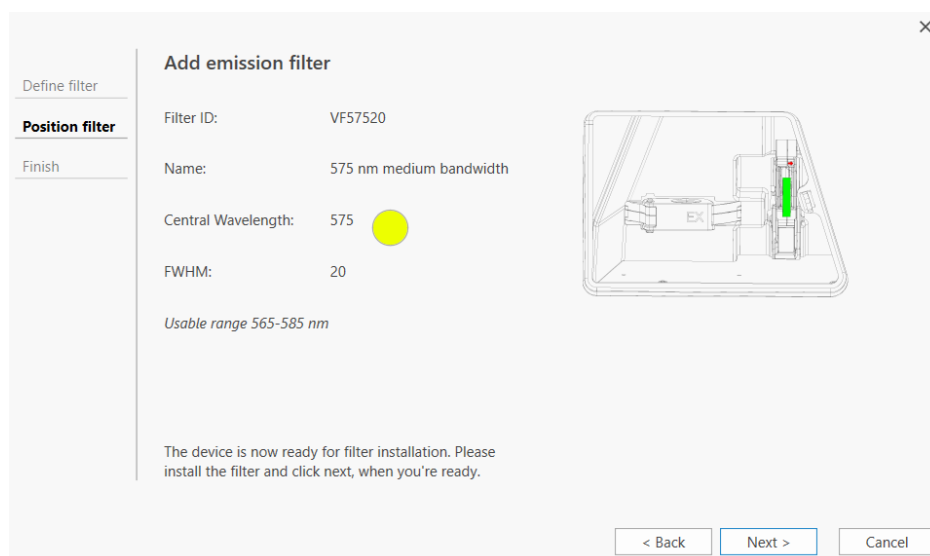


The screenshot shows a dialog box titled "Add emission filter" with a close button (X) in the top right corner. On the left, there is a sidebar with three tabs: "Define filter" (selected), "Position filter", and "Finish". The main area contains the following fields:

- Filter ID: VF57520
- Name: 575 nm medium bandwidth
- Central Wavelength: 575 (with a yellow circular color indicator)
- FWHM: 20

Below these fields, it says "Usable range 565-585 nm". At the bottom, there are three buttons: "< Back", "Next >", and "Cancel".

3. Select **Next** to view the **Position filter** dialog box.
The instrument will rotate the filter wheel so it is ready for filter installation.

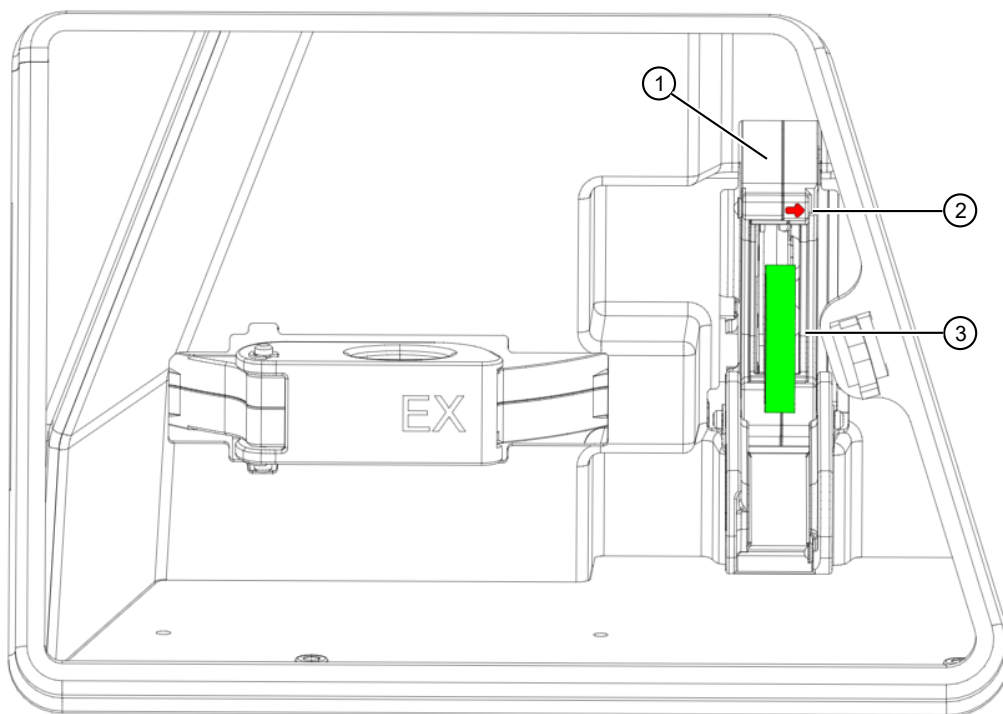


The screenshot shows the same "Add emission filter" dialog box, but now the "Position filter" tab is selected in the sidebar. The fields for Filter ID, Name, Central Wavelength, and FWHM remain the same. A diagram on the right shows a 3D perspective view of the filter wheel assembly with a green arrow pointing to the filter slot. Below the diagram, it says "Usable range 565-585 nm". At the bottom, there is a message: "The device is now ready for filter installation. Please install the filter and click next, when you're ready." The "Next >" button is highlighted in blue.

4. Open the filter wheel chamber door on the left side of the instrument to access the emission filter wheel, which is oriented in a vertical position. Open the emission filter wheel door (marked "EX") and insert the user defined filter.

IMPORTANT! Do not expose the interior of the emission filter wheel to bright light when the filter wheel door is open.

IMPORTANT! Do not touch the surfaces of the filters with bare hands.



- ① Emission filter wheel door
- ② Arrow indicating direction of light propagation
- ③ Accessory filter

5. Close the emission wheel door, then close the filter wheel chamber door. Select **Next** to view the **Finish** dialog box and confirm the filter parameters.

Define filter

Position filter

Finish

Add emission filter

You have now installed the following filter. Please check that the information is correct and finish the installation by clicking Finish.

Filter ID: VF57520

Name: 575 nm medium bandwidth

Central Wavelength: 575 

FWHM: 20

Usable range 565-585 nm

< Back

Finish

Cancel

6. Select **Finish**.

IMPORTANT! Do not forget to close the emission filter wheel door and the filter wheel chamber door after inserting accessory filters.

The new filter is displayed in the **Emission filters** list.

Edit instrument parameters

General Report **Filter definition** Fluorometric filter pairs Luminometric scaling factor

Excitation filters

+ Add - Remove

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF54225	542 nm medium bandwidth	500	10	495-505	9/14/2023 4:09 PM	No
VF34525	Excitation filter, 345 nm	345	25	332-358	5/30/2023 12:00 AM	Yes
VF48515	Excitation filter, 485 nm	485	15	477-493	5/30/2023 12:00 AM	Yes
VF55515	Excitation filter, 555 nm	555	15	547-563	5/30/2023 12:00 AM	Yes

Emission filters

+ Add - Remove

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)	Installation date	Permanent
VF57520	575 nm medium bandwidth	575	20	565-585	9/14/2023 4:19 PM	No
VF45040	Emission filter, 450 nm	450	40	430-470	5/30/2023 12:00 AM	Yes
VF52515	Emission filter, 525 nm	525	15	517-533	5/30/2023 12:00 AM	Yes
VF61545	Emission filter, 615 nm	615	45	592-638	5/30/2023 12:00 AM	Yes

Close

Add fluorometric filter pairs

1. Select **Add** in the **Fluorometric filter pairs** tab to add fluorometric filter pairs.

Edit instrument parameters

General Report Filter definition **Fluorometric filter pairs** Luminometric scaling factor

Fluorometric filter pairs

+ Add Edit Scaling Factor - Remove

Pair name	Scaling factor	Filter ID	Excitation filter name	Filter ID	Emission filter name
Blue fluorescence	1	VF34525	Excitation filter, 345 nm	VF45040	Emission filter, 450 nm
Green fluorescence	1	VF48515	Excitation filter, 485 nm	VF52515	Emission filter, 525 nm
Orange fluorescence	1	VF55515	Excitation filter, 555 nm	VF61545	Emission filter, 615 nm

Close

- Input a name for the new filter pair. Select an excitation filter and an emission filter to form a fluorometric filter pair, then select **OK**.

Create new filter pair

Name: Alexa Fluor assay

Excitation filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)
VF54225	542 nm medium bandwidth	500	10	495-505
VF34525	Excitation filter, 345 nm	345	25	332-358
VF48515	Excitation filter, 485 nm	485	15	477-493
VF55515	Excitation filter, 555 nm	555	15	547-563

Emission filters

Filter ID	Filter name	Central Wavelength (nm)	FWHM (nm)	Usable range (nm)
VF57520	575 nm medium bandwidth	575	20	565-585
VF45040	Emission filter, 450 nm	450	40	430-470
VF52515	Emission filter, 525 nm	525	15	517-533
VF61545	Emission filter, 615 nm	615	45	592-638

OK Cancel

The new fluorometric filter pair is displayed in the **Fluorometric filter pairs** list.

Edit instrument parameters

General Report Filter definition **Fluorometric filter pairs** Luminometric scaling factor

Fluorometric filter pairs

+ Add Edit Scaling Factor Remove

Pair name	Scaling factor	Filter ID	Excitation filter name	Filter ID	Emission filter name
Alexa Fluor assay	1	VF54225	542 nm medium bandwidth	VF57520	575 nm medium bandwidth
Blue fluorescence	1	VF34525	Excitation filter, 345 nm	VF45040	Emission filter, 450 nm
Green fluorescence	1	VF48515	Excitation filter, 485 nm	VF52515	Emission filter, 525 nm
Orange fluorescence	1	VF55515	Excitation filter, 555 nm	VF61545	Emission filter, 615 nm

Close

Using the SkanIt™ software

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



Maintenance

Instrument maintenance

Clean the instrument

Clean the instrument after each use.

1. Switch the instrument off with the plate carrier extended out of the measurement chamber.
2. Unplug the instrument.
3. Wipe the surface of the plate carrier with a soft cloth or tissue paper moistened with distilled water, mild detergent (SDS, sodium dodecyl sulfate) or a soap solution.
4. Disinfect any spilled infectious agents with 70% ethanol or another disinfectant.
5. Push the plate carrier back into the instrument.

Guidelines for maintaining the instrument

- Decontaminate the instrument before removing from the laboratory and before servicing.
- Follow the preventative maintenance instructions to keep the instrument in the best condition, see “Maintenance checklist” on page 28.
- Do not use the instrument if it does not function properly.
- Do not spill fluids in or on the equipment.
- Take the chemical resistance of the microplates into account.
- Make sure the microplate is not too full.
- Keep the underside of the microplates dry to avoid contamination.

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. ^[2]	✓	—	—	—
Clean the case of the instrument.	—	✓	—	—
Clean the plate carrier.	—	✓	—	—
Perform verification with Thermo Scientific Multifunctional Verification plate or Thermo Scientific Lumiwell plate.	—	—	✓	—
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.

^[2] For detailed decontamination instructions, see *Varioskan™ ALF Multimode Microplate Reader Technical Guide*.



Specifications

Instrument specifications

Parameter	Description
Operating conditions	+10°C to +40°C; Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C Indoor use only
Mains power supply	100–240 Vac, 50/60 Hz, nominal
Power consumption	Maximum: 305 W; Typical operation <85 W
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	+5°C to +40°C
Mains supply fluctuations	±10% from nominal
Installation category (Overvoltage category)	II
Pollution degree	2



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](https://www.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
	Refer to 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.
	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.

(continued)

Symbol	English
	The UKCA mark symbolizes that the product conforms to all applicable provisions in Great Britain (England, Wales, and Scotland) 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.
	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 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  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.

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 preventative maintenance instructions to keep the instrument in the best condition, see “Maintenance checklist” on page 28.
- 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 (e.g. 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! Leave the instrument to sit for at least three hours before installing and switching it on to prevent condensation causing a short circuit.

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.

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 GB 4793.1 EN 61010-1	<i>Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements</i>
IEC 61010-2-010 GB 4793.6 EN 61010-2-010	<i>Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials</i>
IEC 61010-2-081 GB 4793.9 EN 61010-2-081	<i>Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes</i>

EMC

Reference	Description
CE-EMC (2014/30/EU)	European Union “EMC Directive”
EN 61326-1 GB 18268.1	<i>Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements</i>

Environmental design standards

Reference	Description
Directive 2012/19/EU	European Union “WEEE Directive” — Waste electrical and electronic equipment
Directive 2011/65/EU and (EU) 2015/863	European Union “RoHS Directive” — Restriction of hazardous substances in electrical and electronic equipment
SJ/T 11364-2014	“China RoHS” Standard — Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products

Chemical safety



WARNING! GENERAL CHEMICAL HANDLING. To minimize hazards, ensure laboratory personnel read and practice the general safety guidelines for chemical usage, storage, and waste provided below. Consult the relevant SDS for specific precautions and instructions:

- Read and understand the Safety Data Sheets (SDSs) provided by the chemical manufacturer before you store, handle, or work with any chemicals or hazardous materials. To obtain SDSs, see the "Documentation and Support" section in this document.
- Minimize contact with chemicals. Wear appropriate personal protective equipment when handling chemicals (for example, safety glasses, gloves, or protective clothing).
- Minimize the inhalation of chemicals. Do not leave chemical containers open. Use only with sufficient ventilation (for example, fume hood).
- Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the manufacturer cleanup procedures as recommended in the SDS.
- Handle chemical wastes in a fume hood.
- Ensure use of primary and secondary waste containers. (A primary waste container holds the immediate waste. A secondary container contains spills or leaks from the primary container. Both containers must be compatible with the waste material and meet federal, state, and local requirements for container storage.)
- After emptying a waste container, seal it with the cap provided.
- Characterize (by analysis if needed) the waste generated by the particular applications, reagents, and substrates used in your laboratory.
- Ensure that the waste is stored, transferred, transported, and disposed of according to all local, state/provincial, and/or national regulations.
- **IMPORTANT!** Radioactive or biohazardous materials may require special handling, and disposal limitations may apply.

Biological hazard safety



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



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

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



Documentation and support

Customer and technical support

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

