

Thermo Scientific Multiskan GO User Manual

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Remarks on screenshots

Screenshots may be slightly different on your system depending on the firmware version.

No liability for consequential damages

Thermo Fisher Scientific shall not be liable for any damages whatsoever arising out of the use or inability to use this product.

Power failure

The system requires uninterrupted power supply in order to operate correctly. Thermo Fisher Scientific has no responsibility whatsoever for system malfunctions arising from power failures.

About This User Manual

Intended users

The Multiskan GO, as standalone or with Thermo Scientific SkanIt Software, can be used in research laboratories by professional personnel.

How to use this user manual

This user manual is for the following instruments, Multiskan GO w/o cuvette: Cat. no. 51119200 and 51119250 (Japan), and Multiskan GO with cuvette: 51119300 and 51119350 (Japan). It aims to give you the information you need for:

- Reviewing safety precautions
- Installing the Multiskan GO
- Navigating in the Multiskan GO user interface
- Operating the instrument
- Programming measurement sessions
- Performing basic cleaning and maintenance procedures
- Troubleshooting the instrument

This user manual also describes all the features and specifications of the Multiskan GO instrument as well as ordering information.

Note that simulated data appears in the screen captures.

Read the manual in its entirety before operating the instrument.

Keep the user manual for future reference. The user manual is an important part of the instrument and should be readily available.

Thermo Scientific SkanIt Software

For SkanIt Software related issues, refer to the *SkanIt Software for Microplate Readers User Manual* (Cat. No. N16243) or *SkanIt Software for Microplate Readers Technical Manual* (Cat. No. N16046). The SkanIt Software for Microplate Readers, Research Edition CD (Cat. no. 5187139) includes the following manuals:

- *SkanIt Software for Microplate Readers User Manual* and its respective language versions
- *SkanIt Software for Microplate Readers Technical Manual*

For more information

For the latest information on products and services, visit our website:

<http://www.thermoscientific.com>
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In our efforts to provide useful and appropriate documentation, we would appreciate any comments you may have on this user manual to your local Thermo Fisher Scientific representative.

Manufacturer

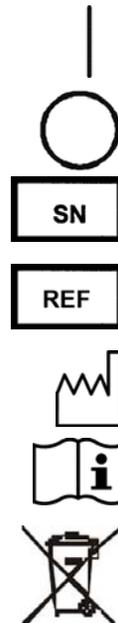
Thermo Fisher Scientific Oy
Ratastie 2, P.O. Box 100
FI-01621
FINLAND

Safety symbols and markings

These symbols are intended to draw your attention to particularly important information and alert you to the presence of hazards.

Safety symbols and markings used on the Multiskan GO

The following symbols and markings appear on the type label and the instrument itself.



Power on ▲

Power off ▲

Serial number ▲

Catalog number ▲

Date of manufacture ▲

Consult instructions for use ▲

WEEE symbol This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. ▲

A black label with the following text (Figure 2–3):

CAUTION: WARNING: DISCONNECT SUPPLY BEFORE
SERVICING and AVERTISSEMENT: COUPER
L'ALIMENTATION AVANT L'ENTRETIEN ET LE
DEPANNAGE. ▲

Warning and other markings used in the documentation

The following symbols and markings appear in this user manual.



Warning Risk of electric shock. ▲



Warning Biohazard risk. ▲



Warning Risk of injury to the user(s). ▲



Caution Risk of damage to the instrument, other equipment or loss of performance or function in a specific application. ▲



Note Marks a hint, important information that is useful in the optimum operation of the system, or an item of interest. ▲

About This User Manual
Safety symbols and markings

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Chapter 1

Introduction to the Multiskan[®] GO

The Multiskan GO (Figure 1-1) is a high-quality monochromator-based UV/VIS spectrophotometer. It is used in spectral scanning, end-point and kinetic measurements to measure absorbance in the 200–1000 nm wavelength range from appropriate 96- or 384-well plates with and without lids and various types of cuvettes. The instrument allows incubation up to 45°C and shaking of the microplate.

The instrument can be controlled as standalone with straight forward internal software for quick and simple plate and cuvette measurements or by PC using SkanIt Software. It can be operated in several languages (English, German, French, Spanish, Portuguese, Russian, Chinese and Japanese). In addition, the Multiskan GO is robotic compatible and can be connected to plate handling devices such as stackers. The unique Power Save function lowers its energy consumption.

The Multiskan GO can be used in a variety of research applications, including nucleic acid and protein analysis, ELISA assays, enzyme assays, cytotoxicity and cell proliferation assays as well as apoptosis assays.

The Multiskan GO is available in the following configurations:

- Multiskan GO w/o cuvette 100–240 V – Cat. no. 51119200 and 51119250 (Japan)
96- and 384-well plate reading, shaking and incubation.
- Multiskan GO with cuvette 100–240 V – Cat. no. 51119300 and 51119350 (Japan)
96- and 384-well plate reading, shaking and incubation.
Cuvette reading capability with incubation.



Note This manual covers the operation of the Multiskan GO with the cuvette instrument version. If you have the Multiskan GO without the cuvette, you can skip over the parts of the manual referring to cuvette use. ▲



Figure 1-1. Multiskan GO with cuvette port (A) and without cuvette port (B)

Intended use

The Multiskan GO is a spectrophotometer that is used to measure photometric assays with defined 96- and 384-well microplates. The Multiskan GO with the cuvette version can also measure photometric assays with cuvettes.

The Multiskan GO is intended to be used in research laboratories by professional personnel. The Multiskan GO is designed to be part of an analyzing system for the end user, who is responsible for validating the system to ensure reliable and safe results. We recommend using Good Laboratory Practices (GLP) during the analyzing process



Caution Operate the instrument only with software and hardware that is specifically designed or selected for it. Thermo Fisher Scientific assumes no liability for the use of third-party software applications. ▲

Chapter 2

General Description

This chapter describes the main parts of the Multiskan GO instrument.

Instrument views

The front view of the Multiskan GO with cuvette instrument is shown in Figure 2–2.

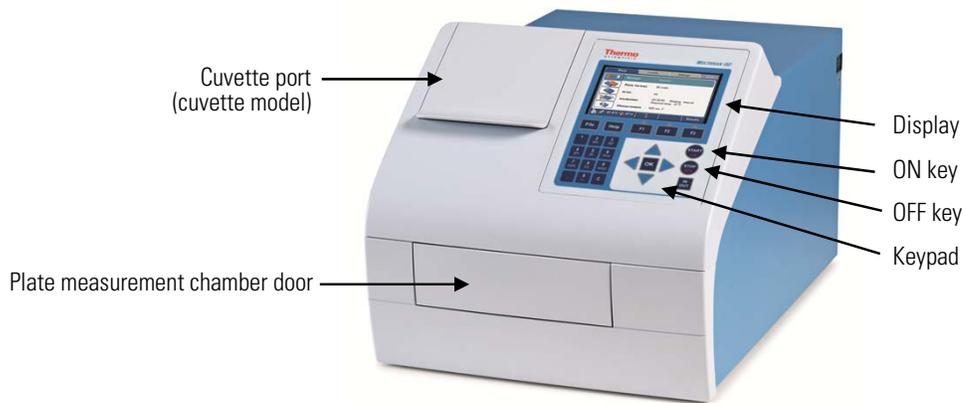


Figure 2–2. Multiskan GO with cuvette front view

The rear view of the Multiskan GO instrument is shown in Figure 2–3.

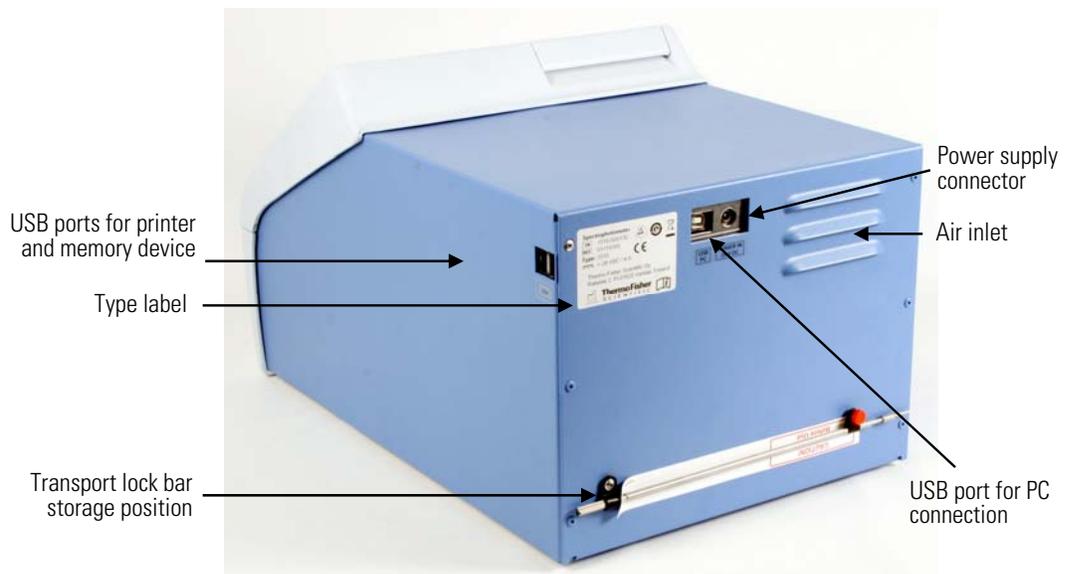


Figure 2–3. Multiskan GO rear view

The side view of the Multiskan GO with cuvette instrument is shown in Figure 2–4.



Figure 2–4. Multiskan GO with cuvette side view

Plate carrier

The Multiskan GO supports all common clear bottom 96- and 384-well plates with and without lids as well as low-volume plates (preferably a high base type). Flat and C-bottom shaped well bottoms are recommended, U-bottom plates are suitable but not optimal and V-bottom plates are not recommended.

The plate carrier (Figure 2–4) acts as the sample holder. The maximum plate height of a combined plate and lid is 18.5 mm.

Cuvette port

The Multiskan GO with cuvette (Figure 2–4) has an incorporated cuvette port that can measure the absorbance of solutions in suitable cuvettes. Cuvette port dimensions for selecting suitable cuvettes are presented in Table 2–1.

Table 2–1. Cuvette port properties

Cuvette width x depth	Cuvette height	Measurement beam position *)	Beam diameter
12.5 x 12.5 mm	40–58 mm	8.5 mm	< 1.8 mm

*) Beam center height from the bottom of the cuvette port.

Cuvettes corresponding to the dimensions in the table above can be used with the Multiskan GO cuvette port. Refer to Appendix C: “Example of Available Cuvettes”.

To maximize the linear range, the following cuvette window sizes must be used with the Multiskan GO:

- When plastic cuvettes are used in the UV area, the window can be 2 mm or more.
- When plastic cuvettes are used in the VIS area, the window must be at least 3 mm.
- When masked wall cuvettes are used, the window can be 2 mm or more.
- When clear quartz or glass cuvettes are used, the window must be at least 3 mm.

Black masked wall cuvettes are always recommended with the Multiskan GO over clear quartz or glass cuvettes because they offer better performance.

Ensure that the selected cuvette type has a clear window within the measurement window and that the measurement windows of the fully inserted cuvette are aligned with the measurement direction arrow on the cuvette port (Figure 2–5).

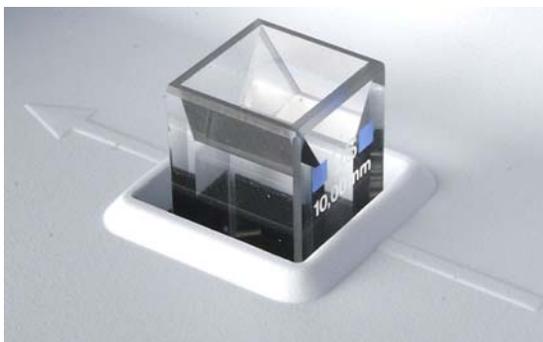


Figure 2–5. Aligning the measurement windows of the inserted cuvette

Optical system

The optical system of the Multiskan GO instrument is shown in Figure 2–6.

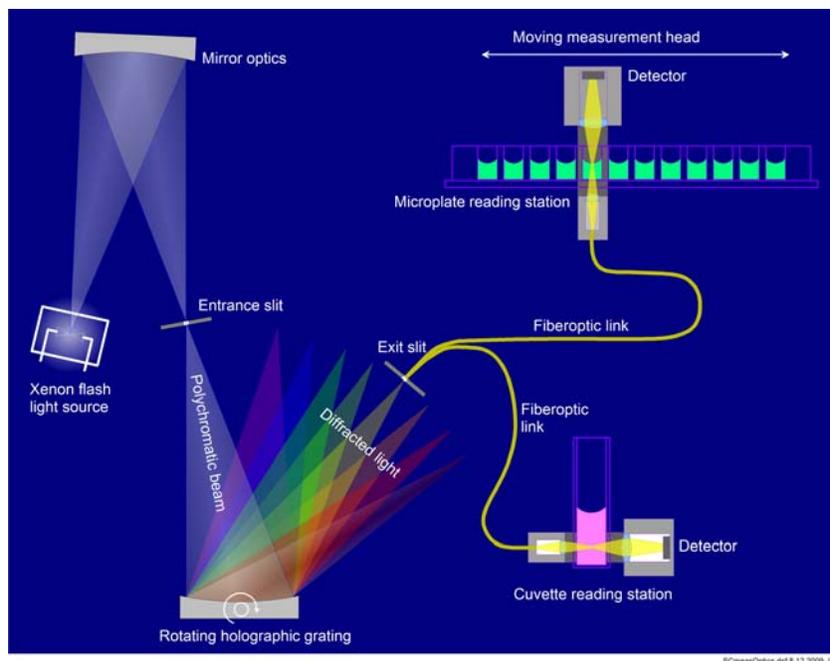


Figure 2–6. Multiskan GO with cuvette optical system

Incubator

Both the plate carrier and the cuvette port have their own incubator. The incubation temperature setting is the same for both the plate carrier and the cuvette port.

The plate measurement chamber incubator consists of thermal sensor controlled incubator zones, with two at the top and two on the bottom of the incubator chamber. The incubator design prevents condensation forming on the microplate lid.

The cuvette port incubator is equipped with a separate heating element controlled by a thermal sensor.

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

Note that the liquid warm-up is considerably slower than the incubator warm-up.

Cooling fan

The cooling fan is used to maintain the instrument temperature near ambient conditions. It is automatically activated when the instrument measurement is ongoing.

The fan can also be activated for faster instrument cooling, by setting the target temperature lower than the current plate incubator temperature. The lowest possible temperature is slightly above ambient.

Shaker

The linear shaker of the plate carrier operates at different adjustable speeds (Table 2–2). If the sample physical properties differ considerably from water or if U-bottom plates are used, ensure that the proper microplate shaking parameters are used.

The cuvette port does not support shaking.

Table 2–2. Shaking speeds

Speed name	Speed
Low	5 Hz, amplitude 15 mm
Medium	11 Hz, amplitude 3 mm
High	20 Hz, amplitude 1 mm

USB ports for memory device and printer

The USB port can accept an external memory device or printer (Figure 2–3 on page 11).

You can transfer any measurement data to the PC with a USB memory device.

It is recommended to use FAT16 or FAT32 formatted USB memory devices.

It is not recommended to use multiple drive USB memory devices that contain virtual CD drives. For more information, refer to Chapter 8: “*Troubleshooting Guide*”.

The external printer must support HP PCL 5, PCL5e or PCL5c emulation types (Figure 2–3 on page 11). Typically printers with emulation type PCL6 also support PCL5. You can print measurement data with or without printout header texts.

Skant Software

The instrument can be controlled with SkanIt Software for Microplate Readers, which controls all the instrument functions and provides data processing as well as reporting functions. For more information, refer to the *Skant Software for Microplate Readers User Manual* (Cat. no. N16243) or *Skant Software for Microplate Readers Technical Manual* (Cat. No. N16046).

General Description
SkanIt Software

Chapter 3

Installation

This chapter describes the installation of the Multiskan GO instrument.

What to do upon delivery

This section covers the relevant procedures to be carried out on receipt of the instrument.

Unpacking the instrument

Move the packed instrument to its site of operation. To prevent condensation, the instrument should be left in its protective plastic wrapping until the ambient temperature has been reached. Unpack the Multiskan GO instrument and its accessories carefully so that the arrows on the transport packaging point upwards. Place the instrument onto a laboratory bench.



Caution 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. ▲

Retain the original packaging for future transportation. The packaging is designed to ensure safe transport and minimize transit damage. Use of insufficient packaging materials may invalidate the warranty. Retain all instrument-related documentation provided by the manufacturer for future use.

If you relocate your instrument or ship it for service, refer to “Packing for service” on page 63.

Checking delivery for completeness and damage

Check the enclosed packing list against the order. Visually inspect the transport package, the instrument and the accessories for any possible damage. If any parts are missing or damaged, contact your local Thermo Fisher Scientific representative or Thermo Fisher Scientific Oy.

Environmental requirements

When setting up your Multiskan GO, avoid locations with excessive dust, vibrations, strong magnetic fields, direct sunlight, draft, excessive moisture or large temperature fluctuations.

It is recommended to place the instrument with the whole plate carrier above the table when the plate carrier is in the out position.

Make sure that:

- The working area is flat, dry, clean and vibration-proof, and leaves additional room for cables, covers, etc.
- There is sufficiently room behind the instrument to enable disconnecting the device.
- The ambient air is clean and free of corrosive vapors, smoke and dust.
- The ambient temperature range is between +10°C and +40°C.
- The humidity is low so that condensation does not occur (relative humidity is between 10% and 80%).



Caution Do not operate the instrument in an environment where potentially damaging liquids or gases are present. ▲

Installation steps

This section describes the installation steps that have to be carried out before operating the instrument.



Caution Leave the instrument to sit for at least three hours before installing and switching it on, to prevent condensation causing a short circuit. ▲

Removing the transport lock



To remove the transport lock:

Caution Do not attempt to operate the instrument with the transport lock in place (Figure 3–7). ▲



Figure 3–7. Multiskan GO with the transport lock in place

1. Open the measurement chamber door by pushing the bottom edge and pulling the upper edge (Figure 3–8).



Figure 3–8. Transport lock bar with warning tag

2. Unscrew the transport lock bar by turning it counterclockwise. Use a suitable flat head screwdriver if necessary.
3. Pull the plate carrier until it is fully out of the instrument (Figure 3–9).



Figure 3–9. Plate carrier pulled fully out

4. Unfasten the **red** fixing screw and remove the lock bar from the carrier.
5. Push the plate carrier back into the instrument and make sure that the measurement chamber door closes properly (Figure 3–10).



Figure 3–10. Transport lock removed

Store the transport lock bar on the back of the instrument (Figure 3–11) for use in future instrument relocation or transportation.

Connecting the power supply cable

To connect the power supply cable:



Warning Never operate your instrument from a power outlet that has no ground connection. Never use a power supply cable other than the Thermo Scientific power supply cable designed for your region. ▲

1. Connect the power supply cable to the power supply connector and plug in the instrument (Figure 3–11).
2. Connect the power supply to a correctly installed line power outlet with a grounded conductor.

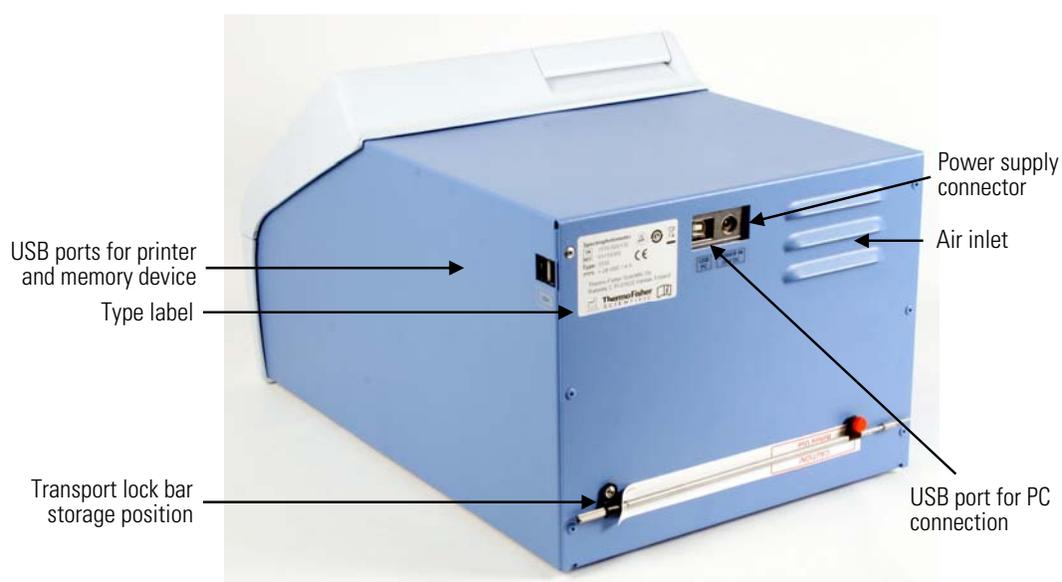


Figure 3–11. Connecting the power supply cable

Connecting to a computer

If you are using a computer with the Multiskan GO, connect the communication cable to the USB port marked USB/PC (Figure 3–11).

Connecting to a printer

If you are using a printer, connect it to the USB port marked USB/PRINTER (Figure 3–11).

Warnings and cautions

This instrument is designed to be safe for use. When correctly installed, operated and maintained, it will present no hazard to the user.

The following recommendations are given for added user safety.

Electrical

Ensure that the power supply cable supplied with the unit is always used. If a correct type of mains cable is not provided, use only cables certified by the local authorities.

The power plug should only be inserted into a socket outlet with a protective ground contact. Never use an extension cable without a protective ground wire.



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. ▲

Operational check

Before you put the instrument into use, perform the following operational check:



1. Switch the instrument on by pressing the START/ON key. The instrument proceeds to perform the self diagnostics.
2. Check that the plate carrier comes out of the instrument and the “*Self diagnostics passed*” text appears briefly on the display.



3. Press the START/ON key.
4. Check that the plate carrier moves in and the measurement chamber door closes properly.

The instrument starts the measurement. After the measurement, the plate carrier comes out and the measurement results are displayed. No error messages should appear on the display.

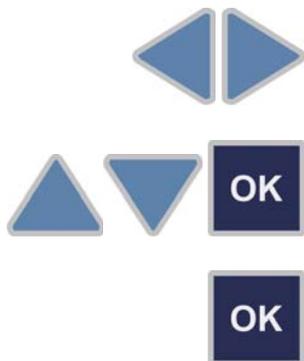


5. Press the F3 (Close) key to close the result table.

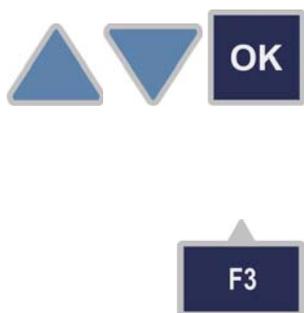
Changing the language

You can select the preferred language for the user interface. The user interface, errors and warnings, printouts and exported data are available in the selected language.

To change the user interface language:



1. Select the **Settings** menu tab using the arrow keys.
2. Select **Configuration** with the arrow keys and press the OK key.
3. Press the OK key to select **Language**.



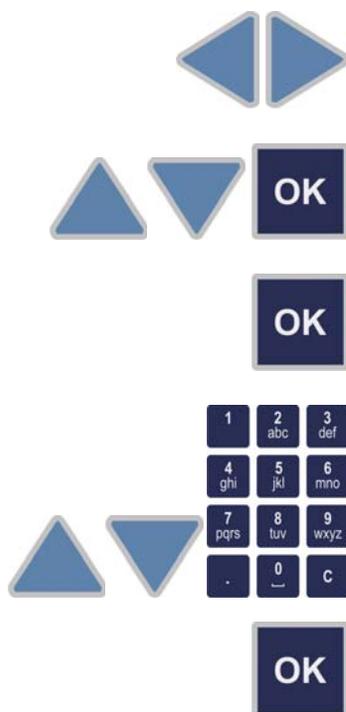
4. Choose the user interface language from the list using the arrow keys, and press the OK key to confirm the selection. The available languages are: English (default), German, French, Spanish, Portuguese, Russian, Chinese and Japanese.
5. Press the F3 (Close) key to return to the Settings menu.

For more information on the Settings menu, refer to “Settings menu” on page 51.

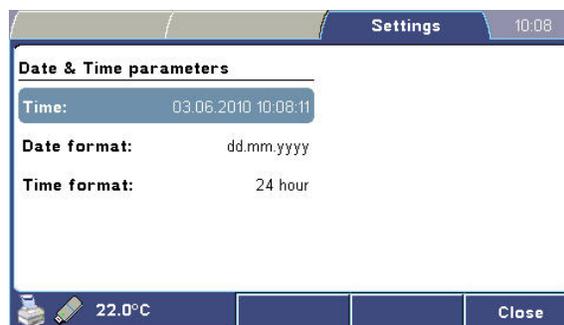
Setting the instrument clock

The instrument date and time settings may be incorrect on delivery and should be checked and set before using the instrument.

To set the instrument date and time:



1. Select the **Settings** menu tab using the arrow keys.
2. Select **Date & Time** with the arrow keys and press the OK key.
3. Press the OK key to select **Time**.
4. Enter the correct date and time with the arrow keys and the alphanumeric keys, and press the OK key to confirm the selection.



5. Press the F3 (Close) key to return to the Settings menu.

In the Date & Time submenu, you can also select the display formats for the date and the time.



Note Connecting the instrument to SkanIt Software automatically updates the instrument date and time according to the PC clock. ▲

Power Save feature

The Multiskan GO has a Power Save feature which lowers power consumption when the instrument is idle. You can control the feature in the Settings menu where you can set the idle period before activation or turn the feature off.

In the power saving mode, the stepper motors and incubators are shut down, the flash lamp is off and the display is dimmed. The state of the user interface is stored.

To reactivate the instrument, press any instrument key. The SkanIt Software reactivates the instrument automatically. The user interface returns to the previous state.

To change the Power Save parameter:

1. Select the **Settings** menu tab using the arrow keys.
2. Select **Configuration** with the arrow keys.
3. Select **Power Save** and press the OK key to change the parameter. Select *No* to inactivate the Power Save feature.

Installing SkanIt Software for Multiskan GO

For information on installing SkanIt Software for Microplate Readers, refer to the *SkanIt Software for Microplate Readers User Manual* (Cat. no. N16243).

When the instrument is connected to SkanIt Software, the “*Remote mode active*” text is shown on the display.



The STOP/OFF key on the keypad can be used to disconnect the computer remote control.

Chapter 4

Routine Operation

Switching on

Before switching the instrument on, check that all the cables are properly fitted according to the installation instructions.



Switch the instrument on by pressing the START/ON key. The instrument proceeds to perform the self diagnostics and displays “*Self diagnostics passed*” after it has been passed. The instrument is now ready for use.



Note The cuvette port cover must be closed during the startup self diagnostics tests. ▲



Note Do not switch the power off during startup, self diagnostics or when data is transferred to the memory device. ▲

Measuring a plate

To measure a microplate:

1. Load the microplate. If the plate carrier is in, first drive the plate carrier out by pressing the IN/OUT key. Always insert the microplate so that the A1 corner is positioned in the top left-hand corner of the plate carrier (Figure 4–12).



Figure 4–12. Multiskan GO with plate carrier out



Caution Ensure that you select the correct plate type. An unsuitable plate may become jammed in the instrument. When you work in the UV range, use quartz or other UV-compatible microplates. ▲

2. Define the measurement parameters in the **Plate** menu.
3. Press the **START/ON** key to start the measurement.
4. View the results of the measurement.
5. Save, export or print the results if desired.

Measuring a cuvette

To measure a cuvette:

1. Open the cuvette port cover.
2. Ensure that the cuvette port is empty or insert a cuvette with buffer to perform instrument zeroing.
3. Close the cuvette port cover.
4. Select the measurement session and define its parameters in the **Cuvette** menu.
5. Zero the instrument by pressing the **F2 (Zero)** key. For more information, see “Zeroing for cuvettes” on page 43.
6. Insert the sample cuvette into the cuvette port with its measurement windows aligned with the measurement direction arrow on the cuvette station (Figure 4–13). Ensure that the cuvette is fully inserted.



Figure 4-13. Multiskan GO cuvette port

7. Press the START/ON key to start the measurement.
8. View the results of the measurement.
9. Export or print the measurement data if desired.



Note Always keep the same cuvette orientation. ▲

Caution Ensure that you use a correct cuvette type with a measurement position height of 8.5 mm. When you work in the UV range, use quartz or other UV-compatible cuvettes. ▲

When not using the cuvette port, keep the cuvette port cover closed to protect it from dirt and dust.

Shutting down

To shut down the Multiskan GO instrument:

1. Remove any plates or cuvettes from the instrument.



2. Switch off the instrument after use by pressing and holding the STOP/OFF key for a few seconds.

Routine Operation
Shutting down

Chapter 5

Instrument User Interface

This chapter describes the display and the keypad (Figure 5–14) for navigating the menus and editing the parameters of the Multiskan GO instrument.

Display and keys

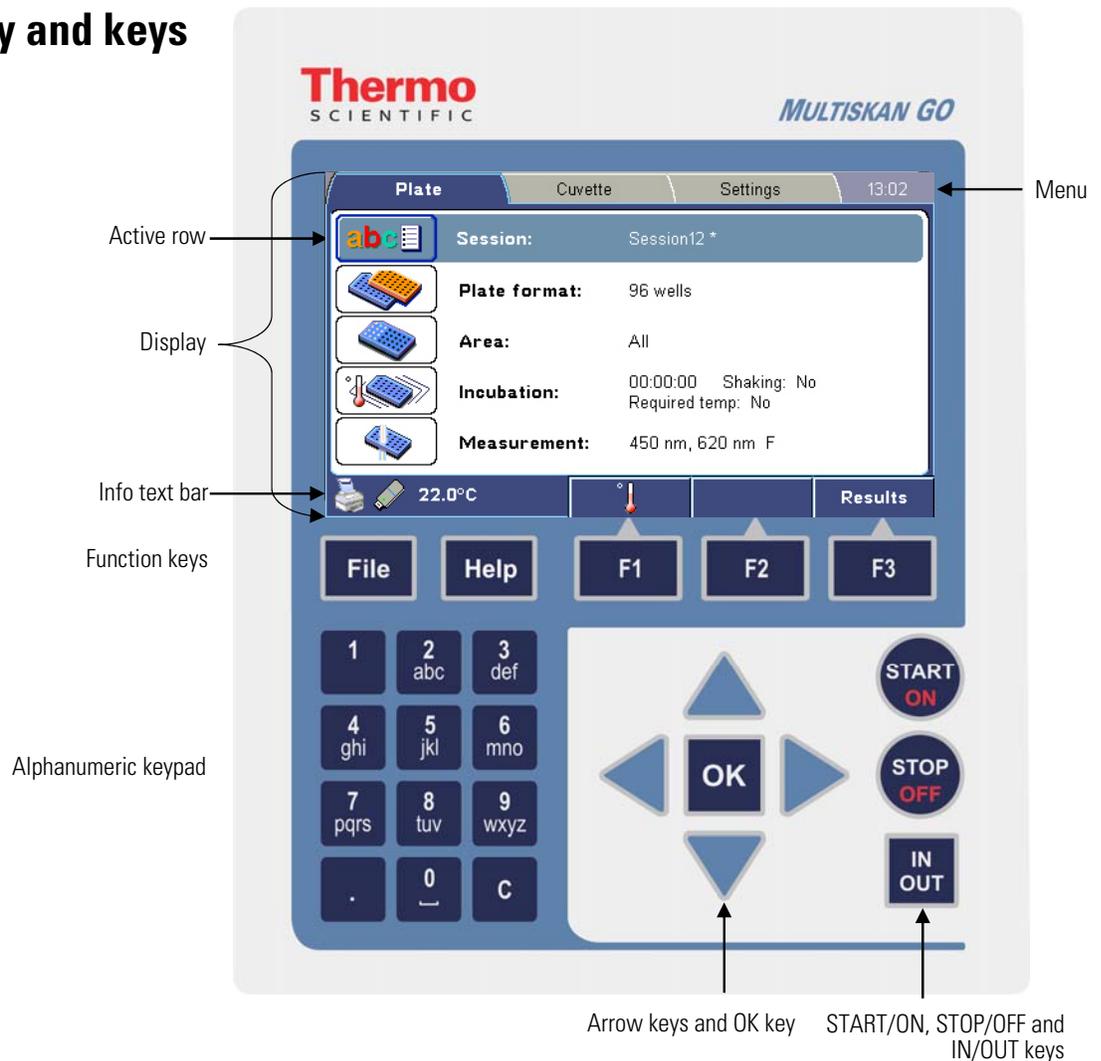


Figure 5–14. Keypad and display of the Multiskan GO

Instrument User Interface

Display and keys

The user interface keys are detailed below.



The LEFT, RIGHT, UP and DOWN arrow keys navigate the menu structure, move inside windows, and change numeric values.

Repeat a selection by holding down the arrow key.



The OK key selects and edits the highlighted item.



The alphanumeric keys enter numerical data and text.

- Press a key several times to cycle through the characters.
- Pressing the 0 key enters a character space in text fields.
- Period/Dot (.): decimal point



The CLEAR (C) key deletes text and numbers.



The F1–F3 keys select the action shown on the info text bar above the corresponding key.

The info text bar is updated according to the active menu.



The FILE key opens the File menu for containing data management functions.



The HELP key offers information on the current view.



The IN/OUT key moves the plate carrier into or out of the instrument.



The START/ON key:

- Switches the instrument on.
- Starts a microplate or cuvette measurement.
- Accepts settings in submenus.



The STOP/OFF key:

- Terminates the measurement process.
- Terminates the computer remote control.
- Cancels the current setting in submenus.
- Switches the instrument off (press and hold).

Menu structure

The user interface is divided into the **Plate**, **Cuvette** and **Settings** menus. These main menus are displayed as tabs at the top of the display.



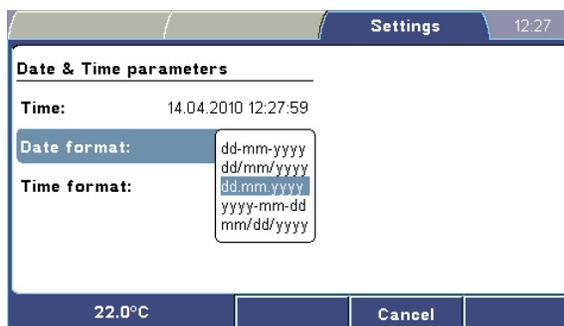
You can switch between the **Plate**, **Cuvette** and **Settings** menus with the LEFT and RIGHT arrow keys when you are on the main menu level.

The **Plate** and **Cuvette** menus are used to define the measurement parameters for microplate and cuvette measurements. The **Settings** menu contains universal instrument configuration settings.

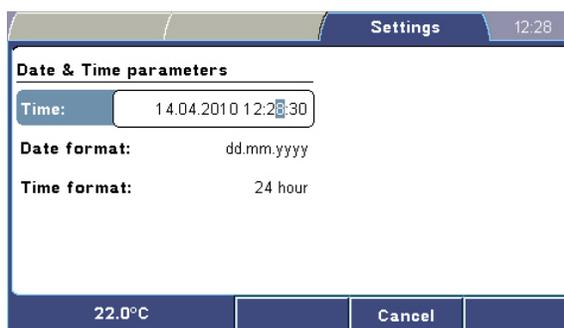


Highlight a menu item using the UP and DOWN arrow keys and select the item by pressing the OK key.

Selecting an item opens a selection box or enters a submenu in which you can make selections using the arrow keys and the OK key.



In number or text fields, you can enter characters with the UP and DOWN arrow keys or the alphanumeric keys.





In each view of the user interface, the *info text bar* shows the actions available for the F1–F3 keys.



The info text bar also displays the current instrument temperature, as well as the target temperature when the incubator is activated.

If a printer or USB memory device is connected to the instrument, a corresponding icon is displayed on the info text bar.



Note The Multiskan GO maintains the used settings and parameters until these are changed. ▲

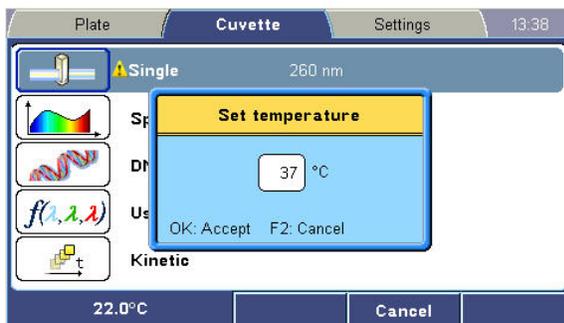
Instrument incubator

The incubator temperature can be controlled from the Plate and Cuvette menus using the F1 key.

The info text bar shows the current temperature in degrees Celsius (C°). Depending on the selected menu, either the plate measurement chamber or the cuvette station temperature is displayed.



Press the F1 key to set the instrument incubator temperature.



The temperature setting range is 10–45°C with a resolution of 1°C. When the heating is on and the temperature set, the target temperature is displayed on the info text bar (see below).



You can toggle the instrument incubator on and off with the F1 key. When you turn off the heating, the heating icon blinks for a few seconds.



Note The Plate incubation setting “Required temp” does not affect the real instrument temperature but is only used as a session-specific temperature reminder for the user. ▲

File menu

The **File** menu provides you with data management functions, such as exporting and printing results or storing session data.



Press the FILE key to open the **File** menu in the **Plate** or **Cuvette** menu. Use the arrow keys to highlight the desired menu function and press OK to select it.

In the **Plate** menu, you can open, save and delete sessions from instrument memory as well as export and print measurement results.

In the **Cuvette** menu, you can export and print results but not save session parameters or results in the internal memory.

Instrument help

The instrument Help feature presents information on the menu items in the current view.



Press the HELP key to open the help window and use the arrow keys to scroll the view if necessary.

Press the OK key to close the help window and return to the previous view.

Plate measurement

Microplate measurements are defined and performed in the **Plate** menu.



The **Plate** menu contains settings for the session name, plate format, measurement area, plate incubation and shaking, and the measurement type.

A detailed overview of the **Plate** menu is presented in Table 5–3.

Table 5–3. Plate menu parameters

Plate menu
<p>Session: Session name (* indicates unsaved results)</p> <ul style="list-style-type: none"> ↳ Select session to open
<p>Plate format: 96 or 384 wells</p> <ul style="list-style-type: none"> ↳ 96 wells ↳ 384 wells
<p>Area: All / One well (e.g. A1) / Area (e.g. A1–D4)</p> <ul style="list-style-type: none"> ↳ Selected area: All / One well (e.g. A1) / Area (e.g. A1–D4)
<p>Incubation: Duration, Shaking mode, Required temperature</p> <ul style="list-style-type: none"> ↳ Incubation parameters <ul style="list-style-type: none"> ↳ Duration: hh:mm:ss ↳ Shaking: No / Single / Double / Interval ↳ Speed: Low / Medium / High ↳ Required temp: No / Temp. (e.g. 30)
<p>Measurement: Measurement information</p> <ul style="list-style-type: none"> ↳ Measurement parameters <ul style="list-style-type: none"> ↳ Type: Single / Multiple / Spectrum ↳ Wavelength / Wavelength 1–3 / Start/End wavelength 200–1000 nm ↳ Step: 1–800 nm ↳ Mode: Fast / Precision

Session name

The **Session** row in the **Plate** menu shows the name of the active session. “Session1” is the default active session until the first Save As operation. A session name can be up to 15 characters long.

You can open a session by pressing the OK key on the **Session** row or by pressing the FILE key and selecting **Open** from the FILE menu.

The list of saved sessions shows the session names and the date and time of the last save. You can scroll the session list with the UP and DOWN arrow keys.

You can store at least one hundred (100) single wavelength 96-well measurement sessions in the instrument’s memory. There are two types of sessions: those that have not been run (sessions without measurement data) and those that have been run (sessions containing measurement data).



Note Session contains data of one measurement only. ▲

Press the F3 (Sort) key to sort the list of saved sessions by their name or by the date they were last saved.

- Save – Overwrites previous results from the same session.
- Save As – Creates a new session file including the results.

Plate format

You can select the utilized plate format (96 or 384 wells) with the **Plate format** setting.



The dimensions of the plates when using the instrument user interface are given in **Table 5-4** and **Table 5-5**.

Table 5–4. 96-well plate dimensions

96-well plate	Dimension (mm)
Plate length	85.48
Plate width	127.76
First well position X	14.38
First well location Y	11.24
Corner distance X	99
Corner distance Y	63

Table 5–5. 384-well plate dimensions

384-well plate	Dimension (mm)
Plate length	85.48
Plate width	127.76
First well position X	12.13
First well location Y	8.99
Corner distance X	103.5
Corner distance Y	67.5

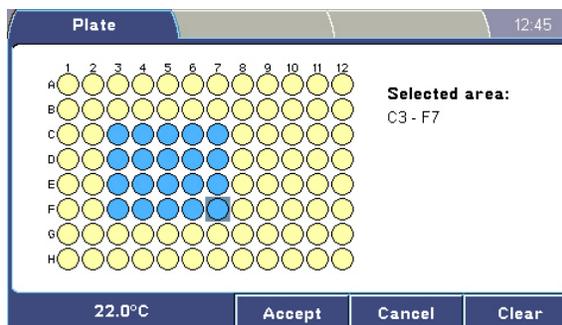
The maximum plate height with lid is 18.5 mm.

Measurement area

If you wish to measure only a certain part of the microplate, you can define a measurement area.

To select a single rectangular measurement area:

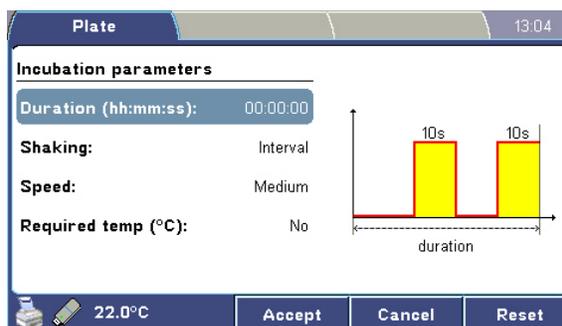
1. Select the starting point with the arrow keys and press the OK key. The OK key toggles between cursor movement and area selection. The first point can be any point on the layout.
2. Select the last point by highlighting the desired rectangular measurement area on the plate with the arrow keys.



3. Press the F1 (Accept) key to accept the area selection.
4. You can toggle between *All* and *None* with the F3 (Select all/Clear) key. Press *All* if you want the entire plate to be measured or *None* to clear the plate.

Incubation and shaking parameters

You can define the incubation and shaking parameters in the **Incubation parameters** submenu.

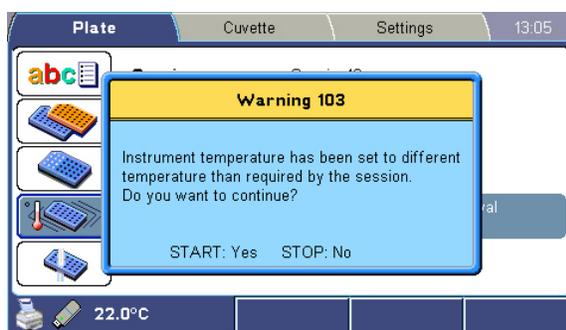


The **Incubation parameters** submenu contains the following parameters:

- **Duration (hh:mm:ss)** – The duration is the period between pressing the START/ON key to the beginning of the measurement. The shaking principle is visualized differently according to the shaking type.
- **Shaking** – You can specify the shaking mode.
 - No – Shaking is off.
 - Single – Shaking for 10 seconds before measurement.
 - Double – Two shaking periods: one at the beginning of the incubation period and one right before the measurement. Both shaking periods have a duration of 10 seconds.

- **Interval** – Shaking in intervals: the On time is 10 s and the Off time 10 s. The last period before measurement is always on. You can set the duration for interval shaking.
- **Speed** – You can define the shaking speed Low, Medium or High.
- **Required temp (°C)** – You can add a target temperature for the session, which is a temperature reminder for the user. The Required temp parameter works as a reminder to use a certain temperature for a specific session.

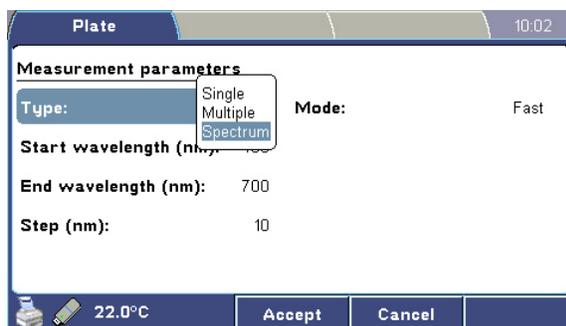
If the target instrument temperature is different from the Required temp or if it has not been reached yet, the instrument will give a warning to ensure whether the measurement shall be executed. The user can select to measure or cancel the session.



Note The Required temp parameter does not affect the instrument temperature. ▲

Measurement parameters

The **Measurement parameters** submenu allows you to define the measurement method, wavelengths and mode. The Multiskan GO provides three measurement methods: Single wavelength, Multiple wavelength and Spectral scanning measurements.



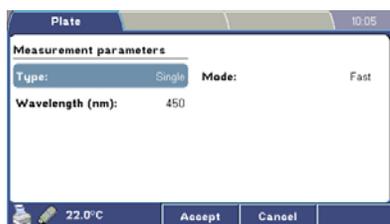
The **Measurement parameters** submenu contains the following parameters:

- **Type** – Select the measurement type: Single, Multiple or Spectrum.
- **Wavelength** – Enter the measurement wavelengths:

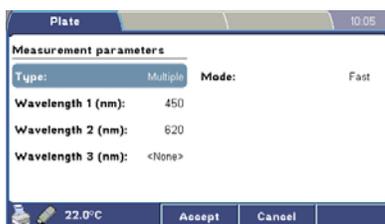
In a **Single** measurement, you can define one wavelength.

In a **Multiple** measurement, you can define up to three measurement wavelengths. <None> is selected by entering 0 (zero).

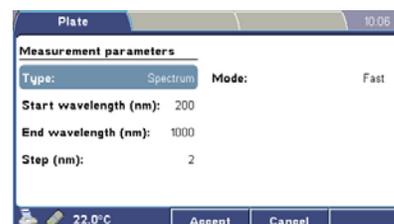
In a **Spectrum** measurement, you define the start and end wavelengths for a spectral scan. The end wavelength must be greater than the start wavelength. The start wavelength range is 200–999 nm and the end wavelength range is 201–1000 nm.



Single



Multiple



Spectrum

- **Step** – Only used in **Spectrum** measurements. The measurement step range is 1–800 nm in increments of 1 nm.
- **Mode** – Select the measurement mode: Fast or Precision.

The default Fast mode is a measurement speed-optimized mode that produces results that are sufficiently precise for most uses. The Precision mode takes more time to perform a measurement when the best possible measurement precision is required.

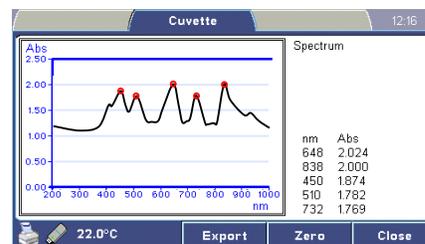
Plate results

After the instrument has completed a measurement, it automatically displays the results.

In single and multiple wavelength measurements, the results are displayed as a table while spectral scanning measurements are displayed as a graph.

	1	2	3	4	5	6	7	8	9	10	11	12
A	0.242	1.789	1.075	0.153	0.333	0.520	0.527	0.307	1.708	0.273	0.655	0.249
B	0.208	0.216	1.253	0.222	0.041	0.698	1.544	0.865	1.553	0.342	0.249	0.124
C	0.070	0.143	0.363	0.124	0.481	0.131	0.091	1.574	0.117	0.063	0.116	0.091
D	0.052	0.186	0.043	0.758	1.643	0.337	1.310	0.781	0.113	0.713	0.123	0.082
E	0.598	0.497	1.088	1.626	0.684	0.267	0.331	0.978	0.280	1.865	0.139	1.483
F	1.122	0.215	0.103	0.559	0.188	0.225	1.342	0.143	0.957	1.067	1.510	0.427
	1.875	0.127	0.237	0.039	0.960	0.761	0.284	0.052	0.343	0.043	0.919	0.425

Plate



Graph

If a result table does not fit the view, you can scroll the table with the arrow keys. The icon at the top-right of the view shows your current location in the table. In multiple wavelength measurements, the results are listed starting from the top for each well.

Spectral measurement results are displayed one well at a time. You can move between wells with the arrow keys. The identified measurement peaks for each well are marked on the graph and listed beside it. You can scale the graph between the well and plate maximum values with the F2 (Scale) key.

Press the F3 (Close) key to close the measurement results.

Press the F3 (Results) key to view the most recent measurement results, if present.



The asterisk (*) by the session name indicates unsaved results. These are retained until new results are generated. To store results for later use, you should save them in the instrument's memory, export them to a connected USB memory device or print them on a connected USB printer.

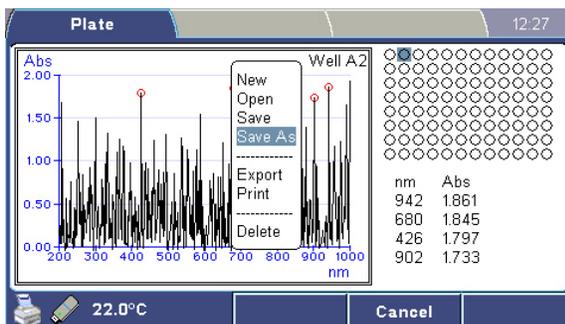
Saving results

To save results in the measurement results view, select the F2 (Save As) key

or

press the FILE key to open the File menu and select either the Save or Save As menu item.

- Save – Overwrites previous results from the same session. Session contains only data for one measurement.
- Save As – Creates a new session file with the results data for one measurement.



Exporting results

You can export measurement results to a connected USB memory device (Figure 5–15) by pressing the F1 (Export) key in the result view or use the File menu. Selecting Export in the Results view automatically exports the current session. By using Export in the File menu, you can export multiple sessions simultaneously.

You can also import plate measurement results into SkanIt Software.

For more information, refer to “Export file formats” on page 54.



Figure 5–15. Multiskan GO with a USB memory device connected

Printing results

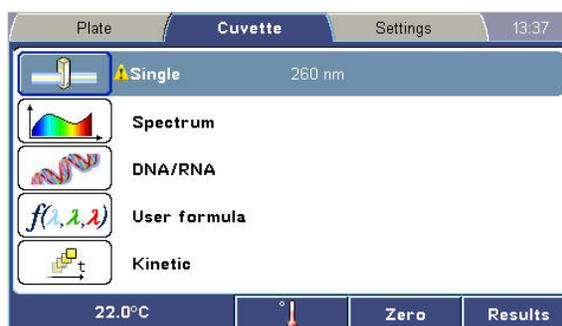
You can print measurement results directly to a connected USB printer.

In addition to session and run information, the printed report also includes the print header if it has been defined in the settings.

Cuvette measurement

Cuvette measurements are configured and performed in the **Cuvette** menu.

The **Cuvette** menu contains five predefined measurement sessions: **Single**, **Spectrum**, **DNA/RNA**, **User formula** and **Kinetic**.



Cuvette sessions or measurement results cannot be stored in the instrument’s memory. You should export or print measurement results if you wish to use them later. The instrument memorizes the most recent measurement parameters and results for each predefined session type.

Instrument User Interface

Cuvette measurement

The displayed instrument temperature indicates the cuvette incubator temperature.

A detailed overview of the **Cuvette** menu is shown in Table 5–6.

Table 5–6. Cuvette menu parameters

Cuvette menu
Single
↳ Wavelength: 200–1000 nm
↳ Pathlength correction: Yes/No
↳ Pathlength: 0.1–10.0 mm
Spectrum
↳ Start wavelength: 200–999 nm
↳ End wavelength: 201–1000 nm
↳ Step: 1–800 nm
↳ Pathlength correction: Yes/No
↳ Pathlength: 0.1–10.0 mm
↳ Mode: Fast/Precision
DNA/RNA
↳ Nucleotide: RNA/dsDNA/ssDNA
↳ Pathlength correction: Yes/No
↳ Pathlength: 0.1–10.0 mm
User formula
↳ Formula: $a\lambda_1 / a(\lambda_1 - \lambda_2) / a(\lambda_1/\lambda_2) / a(\lambda_1 - \lambda_3)/(\lambda_2 - \lambda_3)$
↳ a: 0.0001–1,000,000
↳ Wavelength: 200–1000 nm
↳ Pathlength correction: Yes/No
↳ Pathlength: 0.1–10.0 mm
Kinetic
↳ Wavelength: 200–1000 nm
↳ Number of readings: 1–100
↳ Interval: 0–5 min.
↳ Pathlength correction: Yes/No
↳ Pathlength: 0.1–10.0 mm

Zeroing for cuvettes

In order to perform measurements, the instrument needs to initialize/calibrate itself. This process is called zeroing. In microplate measurements, the Multiskan GO performs zeroing automatically.

In cuvette measurements, however, the user must perform zeroing manually. The instrument must be zeroed to determine the instrument zero absorbance level (0.000 Abs) before the first measurement of each cuvette measurement type. All measured sample absorbances will be measured in comparison to this baseline level.

The instrument's zeroing for cuvettes can be performed in several ways, each having some benefits and pitfalls:

- The recommended zeroing process is to run the zero measurement twice, first with an empty cuvette port and then with an assay blank cuvette.
 - First zero with the empty cuvette port to set the baseline level of the instrument to zero.

- o Then place the assay blank cuvette into the cuvette port and measure the absorbance of the blank sample with a normal measurement.

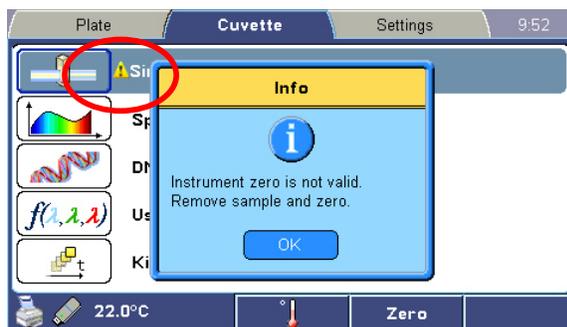
This reveals possible contaminations or other interferences in the assay blank samples.
- o When the assay blank level is considered to be suitable with regard to the assay chemistry, re-zero the instrument using the blank cuvette.
- Alternatively, perform the zeroing only with an empty instrument.
 - o First zero with the empty cuvette port to set the baseline level of the instrument to zero.
 - o Measure all samples, including the blank sample.

This will also record the blank sample absorbance together with the sample results.
 - o Subtract manually the blank sample absorbance from all the other samples.
- The third possible way is to directly zero the instrument with the blank sample cuvette.
 - o Zero with the blank cuvette in the port to set the level of the blank sample to zero.
 - o Note that with this method, possible contaminations in the blank sample are not recognized and this can therefore lead to incorrect subtraction of the blank levels.



Caution Do not perform zeroing with an empty cuvette. An empty cuvette has four optical boundary surfaces between air and the cuvette material whereas real sample cuvettes have only two, which leads to quite different beam behavior when the measurement beam is transmitted through the cuvette. This leads to incorrect zero levels. ▲

To zero the cuvette station, press the F2 (Zero) key. The yellow triangle alerts the user when the zero is not valid.



When Zero is pressed, the instrument measures the current absorbance level and sets it to 0.000 Abs.

The following applies for zeroing:

- It is not possible to start a cuvette measurement without a valid zero value.
- The user interface shows the status of the zeroing.
- There are separate zero values for each measurement type. The zeroing is valid only if it has been performed with the same parameters as during the session.
- The zeroing values are valid for ten hours or until the measurement mode or parameters are changed.
- The zeroing values are reset at shutdown.

Single wavelength

Use the **Single** session to perform a single wavelength measurement on a cuvette.

Single parameters	
Wavelength (nm):	260
Pathlength correction:	Yes
Pathlength (mm):	10.0

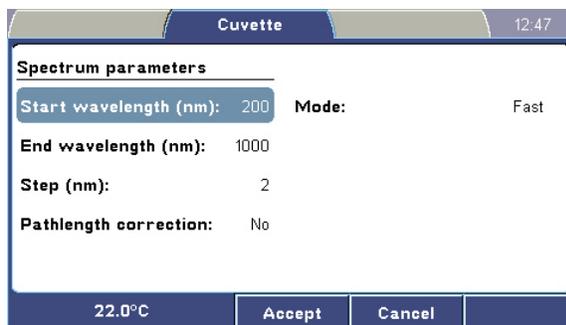
22.0°C Accept Cancel

The **Single** submenu contains the following parameters:

- **Wavelength** – Enter the measurement wavelength. The available range is 200–1000 nm.
- **Pathlength correction** – Enable or disable pathlength correction. Use this setting to normalize measurement results to correspond to a 10 mm pathlength.
- **Pathlength** – Enter the cuvette pathlength. The available range is 0.1–10.0 mm. Shown only when pathlength correction is enabled.

Spectrum

Use the **Spectrum** session to perform a spectral scanning measurement on a cuvette.



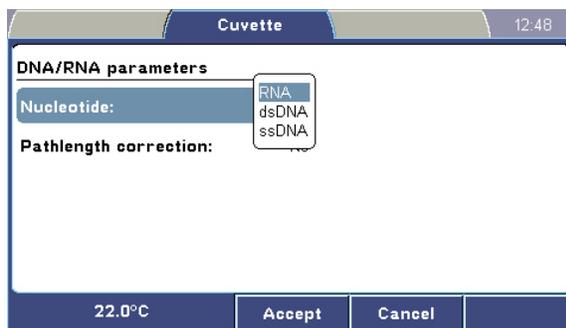
The Spectrum submenu contains the following parameters:

- **Start wavelength** – Enter the start wavelength for the spectral scanning measurement. The available range is 200–999 nm.
- **End wavelength** – Enter the end wavelength for the spectral scanning measurement. The available range is 201–1000 nm. The end wavelength must be greater than the start wavelength.
- **Step** – Enter the measurement step for the scan. The available range is 1–800 nm in increments of 1 nm. The default is the value used for the previous measurement. The last step wavelength will be the last possible wavelength that is smaller than or equal to the end wavelength.
- **Pathlength correction** – Enable or disable pathlength correction. Use this setting to normalize measurement results to correspond to a 10 mm pathlength.
- **Pathlength** – Enter the cuvette pathlength. The available range is 0.1–10.0 mm. Shown only when pathlength correction is enabled.
- **Mode** – Select the measurement mode: Fast or Precision.

The default fast mode is a measurement speed-optimized mode that produces results that are sufficiently accurate for most uses. The Precision mode takes more time to perform a measurement when the best possible measurement accuracy is required.

DNA/RNA

Use the **DNA/RNA** session to perform a RNA, dsDNA or ssDNA measurement on a cuvette.



The **DNA/RNA** submenu contains the following parameters:

- **Nucleotide** – Select the nucleotide to be measured:
 - RNA – Calculate the RNA concentration.
 - dsDNA – Calculate the double-stranded DNA concentration.
 - ssDNA – Calculate the single-stranded DNA concentration.
- **Pathlength correction** – Enable or disable pathlength correction. Use this setting to normalize measurement results to correspond to a 10 mm pathlength.
- **Pathlength** – Enter the cuvette pathlength. The available range is 0.1–10.0 mm. Shown only when pathlength correction is enabled.

User formula

Use the **User formula** session to perform a measurement using a user-defined calculation on a cuvette.

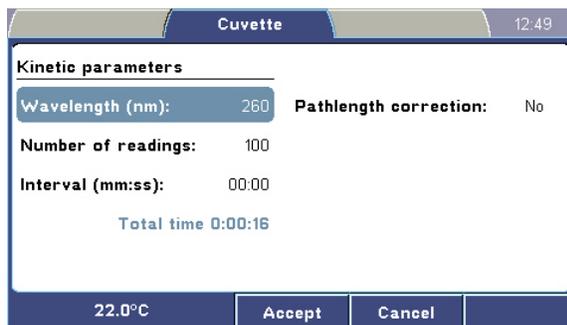
User formula parameters	
Formula:	$a \cdot (\lambda_1 - \lambda_3) / (\lambda_2 - \lambda_3)$
Pathlength correction:	No
a:	1.0000
λ_1 (nm):	260
λ_2 (nm):	280
λ_3 (nm):	320

22.0°C Accept Cancel

The **User formula** submenu contains the following parameters:

- **Formula** – Select the predefined formula.
- **a** – Enter the value for constant *a*. The available range is 0.0001–1,000,000.
- **Wavelength (1–3)** – Enter the measurement wavelength. The available range is 200–1000 nm.
- **Pathlength correction** – Enable or disable pathlength correction. Use this setting to normalize measurement results to correspond to a 10 mm pathlength.
- **Pathlength** – Enter the cuvette pathlength. The available range is 0.1–10.0 mm. Shown only when pathlength correction is enabled.

Kinetic Use the **Kinetic** session to perform a kinetic measurement on a cuvette.



The screenshot shows a dialog box titled "Cuvette" with a clock in the top right corner showing "12:49". The dialog is titled "Kinetic parameters" and contains the following fields and values:

Wavelength (nm):	260	Pathlength correction:	No
Number of readings:	100		
Interval (mm:ss):	00:00		

Below these fields, it displays "Total time 0:00:16". At the bottom of the dialog, there is a temperature display "22.0°C" and two buttons: "Accept" and "Cancel".

The **Kinetic** submenu contains the following parameters:

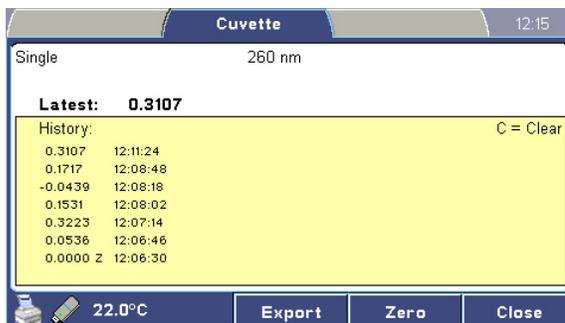
- **Wavelength** – Enter the measurement wavelength. The available range is 200–1000 nm.
- **Number of readings** – Enter the number of readings. The range is 1–100.
- **Interval** – If the Number of readings is greater than 1, the measurement is considered kinetic, and you have to set the time interval, 00:00–05:00. When selecting 00:00, the instrument measures as fast as possible. The total kinetic measurement time is calculated and displayed.
- **Pathlength correction** – Enable or disable pathlength correction. Use this setting to normalize measurement results to correspond to a 10 mm pathlength.
- **Pathlength** – Enter the cuvette pathlength. The available range is 0.1–10.0 mm. Shown only when pathlength correction is enabled.

Cuvette results The results of a cuvette measurement are displayed automatically after the measurement.

Note!: The user cannot save cuvette sessions or measurement results to the instrument's memory. The last result of all predefined cuvette sessions is automatically saved, until parameters are changed or a new cuvette measurement is run. If you want to save the cuvette results, transfer them immediately to a USB memory device after the measurement.

The presentation of the results depends on the session:

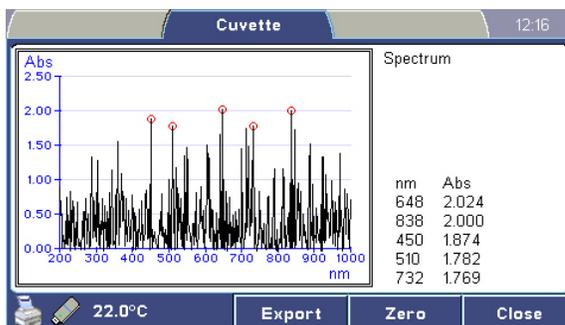
- **Single** wavelength sessions: the latest result is presented at the top and the measurement history is listed below it in three columns. An entry of “0.0000 Z” indicates instrument zeroing.



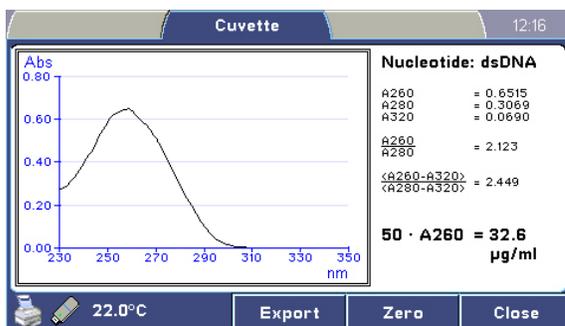
The measurement time is displayed to the right of each result. Up to 24 measurement results are simultaneously displayed on the screen. However, the instrument stores up to 100 latest measurements, which you can retrieve by exporting the single measurement to the USB memory device or by printing the results.

Press the C key to clear the result history list.

- **Spectrum** sessions: the measured spectrum is displayed with up to five identified peak values.



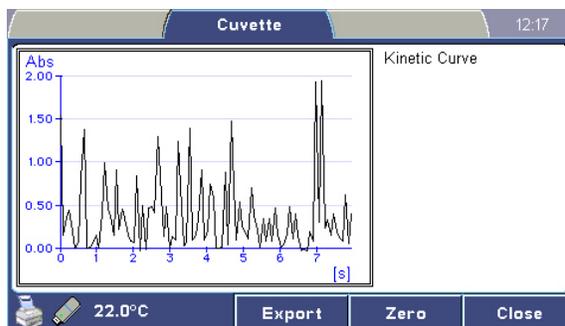
- **DNA/RNA** sessions: the measured spectrum is displayed along with measured and calculated results.



- **User formula** sessions: the result of the user formula calculation is shown with the measured results.



- **Kinetic** sessions: the result curve of the kinetic measurement is displayed.



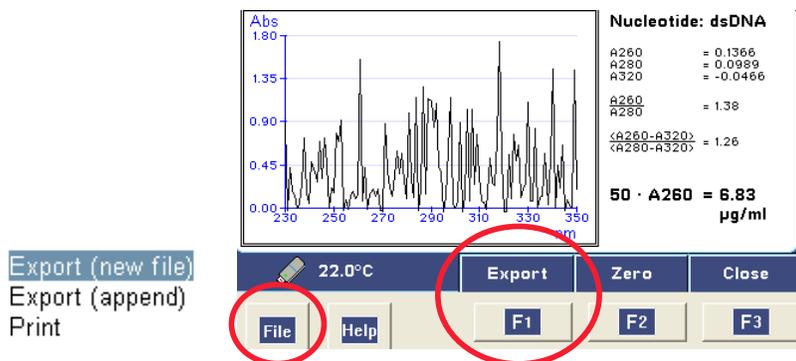
Exporting results

You can export measurement results to a connected USB memory device by pressing the F1 (Export) key in the result view.

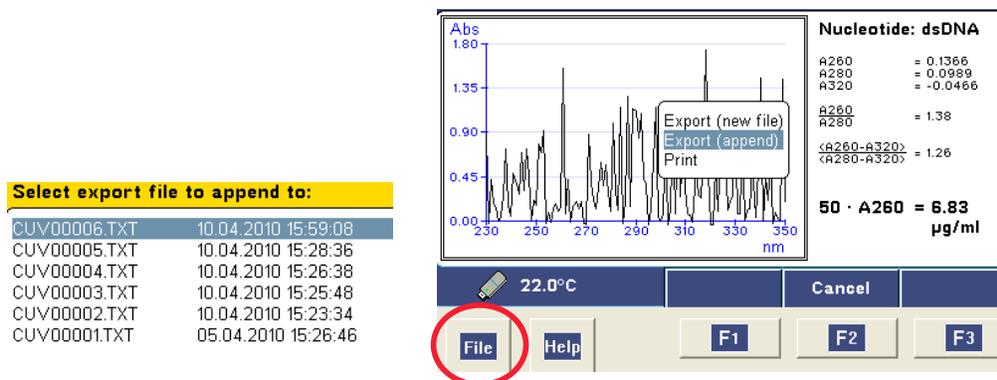
For more information, refer to “Export file formats” on page 54.

To export the cuvette session:

- Export the current selected cuvette session by pressing the F1 (Export) key or File > Export (new file) in the result view.



- Append the current cuvette session to the end of the selected session on the USB memory device by pressing File > Export (append). Press the UP and DOWN arrow keys and the F1 (Accept) or the OK key to select the session.



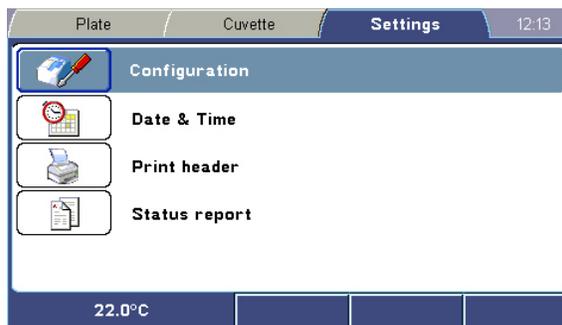
Printing results

You can print measurement results directly to a connected USB printer. In addition to session and run information, the printed report also includes the print header if it has been defined in the settings.

Settings menu

The **Settings** menu allows you to configure instrument operation. The settings are universal for the instrument and do not differ between plate and cuvette use.

The values shown in the **Settings** menu are stored in the instrument memory and are not session-specific.



The **Settings** menu contains the following parameters:

- **Configuration** – Select the user interface language, Power Save setting and export decimal delimiter, or reset the instrument to factory default values.
- **Date & Time** – Set the instrument date and time, and select the date and time formats.
- **Print header** – Enable or disable the header for printed reports and enter the header text.
- **Status report** – View, export and print the instrument status report.

A detailed overview of the **Settings** menu is shown in Table 5–7.

Table 5–7. Settings menu parameters

Settings menu
Configuration
↳ Language: English/Chinese/French/German/Japanese/Portuguese/Russian/Spanish
↳ Power save: No/5/15/30/60
↳ Export decimal delimiter: Dot/Comma
↳ Reset to factory defaults: Yes/No
Date & Time
↳ Time
↳ Date format: dd-mm-yyyy / dd/mm/yyyy / dd.mm.yyyy / yyyy-mm-dd / mm/dd/yyyy
↳ Time format: 12 hour / 24 hour
Print header
↳ Enable header: Yes/No
↳ Header text
Status report
↳ Print
↳ Export

Configuration

The **Configuration parameters** submenu allows you to select the user interface language, Power Save setting and the export decimal delimiter. You can also reset the instrument to its factory default values. The submenu also displays the instrument’s firmware version, serial number and whether it is equipped with a cuvette station.



The **Settings configuration** window contains the following parameters:

- **Language** – Select the user interface language: English, Chinese, French, German, Japanese, Portuguese, Russian or Spanish.

To change the user interface language, refer to “

Changing the language” on page 22.

- **Power Save** – Select the Power Save setting: No, 5 min, 15 min, 30 min or 60 min.

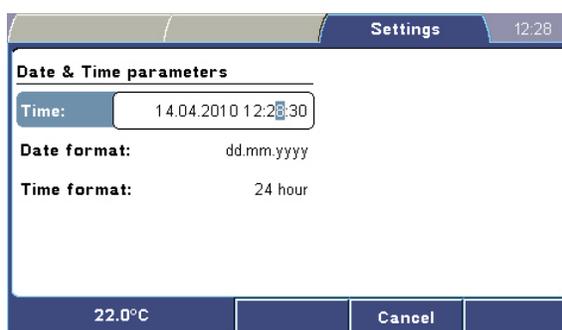
For more information on Power Save, refer to “Power Save feature” on page 24.

- **Export decimal delimiter** – Select the decimal separator: Dot (.) or Comma (,). This setting defines the decimal delimiter only for exported measurement results. It does not affect the displayed or printed results which always use the decimal point.
- **Reset to factory defaults** – Reset the instrument to its factory default values.

Date & Time

In the **Date & Time** parameters submenu, you can set the instrument date and time, and the date and time formats. You should set the correct time before you put the device into use. Once the time is set, the instrument clock will keep running even when the instrument power is switched off.

When you connect the Multiskan GO to SkanIt Software, the instrument date and time is set automatically.

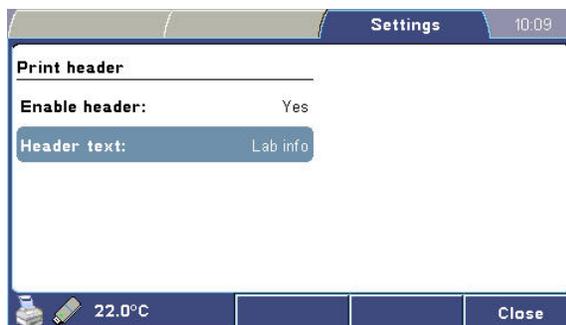


The **Date & Time** parameters submenu contains the following parameters:

- **Time** – Set the instrument date and time.
- **Date format** – Select the date format: dd-mm-yyyy, dd/mm/yyyy, dd.mm.yyyy, yyyy-mm-dd or mm/dd/yyyy.
- **Time format** – Select the 12-hour or 24-hour time format.

Print header

You can also include the print header in the printed report and export file if it has been defined in the settings.

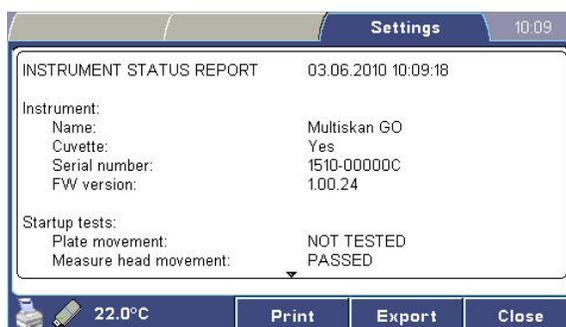


The **Print header** submenu contains the following parameters:

- **Enable header** – Enable or disable the print header. If activated, the header is used for all printouts and is displayed at the top of each page.
- **Header text** – Enter a header text. A customized print header can contain, for example, laboratory information. The maximum length of the header is approximately 50 characters.

Status report

You can view, export and print the instrument's status report.



The status report provides current information on the instrument status, including the instrument model and serial number, firmware version, current temperature and other parameters.

Export file formats

When exporting data to an external USB memory device, the Multiskan GO stores the files in a folder named GO. The folder is created automatically if it does not already exist.

The Multiskan GO can export three types of files:

- Plate measurement results: PLA#####.TXT
- Cuvette measurement results: CUV#####.TXT
- Instrument status reports: REP#####.TXT

All files of the same type are numbered sequentially: PLA00001.TXT, PLA00002.TXT, and so on.

The exported files are in ASCII format and can be opened with any text editor, such as Microsoft Notepad. Result files can be imported into Microsoft Excel.

The measurement results are exported using four decimal places.



Note Set the export decimal delimiter to the desired value in Settings > Configuration. ▲

Plate sessions saved in the instrument memory can be transferred to SkanIt Software. Cuvette data cannot be transferred to SkanIt Software. The checksum at the end of exported files is used by SkanIt Software when importing data.

Plate and cuvette export files contain the following information:

- Print header
- Measurement session information
- Instrument information
- Session start and stop times
- Temperatures at the beginning and end of the measurement
- Measurement results

```

PLA00011.TXT - Notepad
File Edit Format View Help
This is the header
Session13.PLA 1 2 10.05.2010 10:11:15
Session:
  Session: Session13
  Plate format: 96 wells
  Area: All
  Measurement type: 1 Multiple
  Measurement mode: 0 Fast
  wavelength 1 (nm): 450
  wavelength 2 (nm): 620
  wavelength 3 (nm): <none>
  Required temp (°C): 37
  Shaking: 3 Interval
  Duration (Hh:mm:ss): 00:00:00
  Speed: 1 Medium
Run:
  Instrument: Multiskan GO 1.00.17
  Serial number: 1510-00000C
  Start time: 10.05.2010 10:10:30
  Stop time: 10.05.2010 10:10:30
  Start temperature: 22,0
  Stop temperature: 22,0
Data: 450 nm
  1 2 3 4 5 6 7 8 9 10 11 12
A 0,3513 1,1510 0,0815 0,7862 0,0481 0,2128 0,0416 0,3006 0,2446 0,1793 0,7710 0,1526
B 0,8446 0,0227 1,2412 0,1323 0,8879 0,0445 0,3263 0,1424 0,6598 0,1993 0,4689 0,1756
C 0,1980 0,0657 0,1380 0,1867 0,7012 0,7681 0,4819 0,5749 0,2554 0,3260 0,6447 0,9162
D 0,4926 0,1226 0,3991 0,1045 0,2820 0,4636 0,0355 0,2733 0,1650 0,5020 1,0899 0,6798
  
```

The instrument status report contains the following information:

- Print header
- Instrument information: name, serial number and firmware version
- Startup test results
- Memory usage
- Operating statistics
- Temperature information
- Detailed technical instrument data
- Error log

Chapter 6

Maintenance

Regular and preventive maintenance

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

Maintenance checklist

This chapter contains an outline of the points mentioned in the checklist below (Table 6–8). Routine and service procedures must be performed by the user to prevent unnecessary wear or hazards and are described below at the frequency with which they should be applied.

Table 6–8. Maintenance checklist

Item	Daily	Weekly	Monthly	Yearly
Keep the instrument free of dust. See "Instrument care" on page 57.	✓			
Avoid disturbing any of the optical system components, including optical covers. See "Instrument care" on page 57.	✓			
Wipe away spilled saline solutions, solvents, acids or alkaline solutions from outer surfaces immediately to prevent damage, and wipe with deionized distilled water. See "Cleaning of the instrument" on page 57.	✓			
If any surfaces have been contaminated with biohazardous material, disinfect with a mild sterilizing solution. See "Instrument care" on page 57.	✓			
Clean the case of the instrument periodically. See "Cleaning of the instrument" on page 57.		✓		
Clean the plate carrier and cuvette port when necessary. See "Cleaning the sample holder" on page 58.		✓		
Perform verification with the Spectrophotometric Verification Plate. Cat. No. N03394.				✓
Decontaminate the instrument when relocating the instrument or sending it for service. See "Decontamination procedure" on page 59.				✓
Service the instrument regularly. See "Cleaning of the instrument" on page 57 and "Maintaining a system log" on page 63.				✓

✓ = depending on the laboratory conditions and the use and configuration of the instrument

Instrument care

Always ensure that the electricity supply in the laboratory conforms to that specified on the type label of the instrument.

To guarantee the continuous reliability and accuracy of the Multiskan GO, avoid disturbing any of the optical system components. A misalignment of the light path affects measurements.

- Prevent any liquid from entering the instrument.
- Keep the instrument free of dust and other foreign matter.

In the event of any damage, contact your local Thermo Fisher Scientific representative for service.

Abrasive cleaning agents are not recommended, because they are likely to damage the paint finish.

It is recommended that you clean the case of the instrument periodically to maintain its good appearance (see “Cleaning of the instrument” on page 57).

Clean the keypad surface with a mild laboratory detergent.

Plastic covers and surfaces can be cleaned with a mild laboratory detergent or alcohol.



Warning If any surfaces have been contaminated with biohazardous material, a mild sterilizing solution should be used. ▲



Caution Never use acetone as it will damage the covers. ▲



Caution Do not autoclave any part of this instrument. ▲

Cleaning of the instrument



Clean the instrument regularly as stated below.

Caution Although the Multiskan GO is constructed from high-quality materials, you must 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. Do not expose painted surfaces to concentrated acids or alcohols for prolonged periods of time as damage may occur. ▲

1. Turn the power off and unplug the instrument.
2. Use disposable gloves.

3. Clean the instrument outside and the plate carrier with a soft cloth dampened with water or mild detergent.



4. If you have spilt infectious agents on the instrument, decontaminate the instrument. Refer to “Decontamination procedure” on page 59.



Caution Do not use any solutions containing oxidative chemicals, such as hypochlorites and peroxides or strong bases, on any of the anodized aluminum surfaces (plate carrier, cuvette port), as this may cause permanent damage to the finish. ▲

Cleaning the sample holder

To clean the sample holder, follow the instructions below.

Plate carrier

To clean the plate carrier:



Caution Keep the instrument plate carrier clean to avoid dust and dirt from entering the measurement chamber (Figure 2–2). 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 alkalines. ▲



Caution Painted surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer. Do not expose painted surfaces to concentrated acids or alcohols for prolonged periods of time as damage may occur. ▲

1. Turn the power off and unplug the instrument.
2. Use disposable gloves.
3. Check that the plate clamp secures the plate when the plate is moving into the instrument.
4. Clean the plate carrier with a soft cloth dampened with water or mild detergent.



5. If you have spilt infectious agents on the plate carrier, decontaminate the instrument. Refer to “Decontamination procedure” on page 59.



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. ▲

Cuvette port

To clean the cuvette port, follow these instructions:

Clean the cuvette port with a Q-tip cotton swab moisturized with water, mild detergent or 70% ethanol.



Caution Do not clean the cuvette port (Figure 2–2) if a cuvette has broken. If the cuvette port becomes completely contaminated, contact authorized technical service. ▲

Instrument clock battery

The instrument electronics contains a battery for keeping the date and time information. The battery is only in use when the power supply is disconnected. The typical lifetime of the battery is 2–5 years.

If the instrument starts losing its date and time information, call service.

Disposal of materials

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



Warning The samples can be potentially infectious. Dispose of all used disposable plastic plates and cuvettes, syringes, disposable tips, disposable gloves, and so on as biohazardous waste. Be cautious and always use gloves. ▲

Decontamination procedure

If you have spilt infectious agents, carry out the decontamination procedure.



Warning The decontamination procedure should be performed by authorized and trained personnel 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.

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another.

Example of decontaminants:

- Ethanol 70%

Maintenance

Decontamination procedure

- Virkon solution 1–3%
- Glutaraldehyde solution 4%
- Chloramine T
- Microcide SQ 1:64
- Decon 90 min. 4%



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. ▲

To decontaminate the instrument:

1. Prepare the decontaminant.
2. Empty the plate carrier and cuvette port. Ensure that you are wearing disposable gloves.
3. Switch off the power and disconnect the power supply cable.
4. Disinfect the outside of the instrument or to remove stains using a cloth dampened with 70% ethanol.
5. Place the instrument in a large plastic bag. Ensure that the cuvette port and the measurement chamber door are open and the plate carrier is out.
6. Place a cloth soaked in the prepared decontaminant solution into the bag. Ensure that the cloth does not come into contact with the instrument.
7. Close the bag firmly and leave the instrument in the bag for at least 24 hours.
8. Remove the instrument from the bag.
9. After decontamination, clean the instrument using a mild detergent.
10. After performing this decontamination procedure, enclose a signed and dated Certificate of Decontamination both inside the transport package and attached to the outside of the package.

Refitting the transport lock

When you relocate the instrument or ship it for service, make sure that you refit the transport lock (Figure 6–16).



Figure 6–16. Transport lock bar with warning tag

To refit the transport lock:

1. Switch the instrument off by pressing and holding the STOP/OFF key for a few seconds. This drives the measurement head and plate carrier into the correct positions.
2. Disconnect the power supply and USB communication cable, and any connected peripheral devices.
3. Open the measurement chamber door by pushing it from the bottom edge and pulling it from the top edge.
4. Pull the plate carrier fully out of the instrument (Figure 6–17).



Figure 6–17. Plate carrier fully out of the instrument

5. Take the transport lock bar from the back of the instrument and locate it into the slot on the plate carrier, and then fasten the **red** fixing screw (Figure 6–18).

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Refitting the transport lock



Figure 6–18. Transport lock bar in place on plate carrier

6. Push the plate carrier fully into the measurement chamber with the transport lock bar and screw the rod into locked position.
7. Close the measurement chamber door and make sure that the end of the transport lock bar enters the corresponding recess in the door, and that the warning tag hangs out of the instrument (Figure 6–19).



Figure 6–19. Multiskan GO with the transport lock in place

Packing for service

To pack the Multiskan GO for service, follow the instructions presented below:

- Inform about the use of hazardous materials.
- Remove any microplate or cuvette before decontamination. Decontaminate the instrument.
- Refit the transport lock. Refer to “Refitting the transport lock” on page 61.
- Close the cuvette port and the measurement chamber door.
- Use the original packaging for shipping.
- Pack the instrument according to the packing instructions.
- Enclose a dated and signed “Certificate of Decontamination” (see Appendix B) both inside and attached to the outside of the package, in which you return your instrument (or other items).
- Enclose the return authorization number (RGA) given by your local Thermo Fisher Scientific representative.
- Indicate the fault after you have been in touch with your local Thermo Fisher Scientific representative or the Thermo Fisher Scientific technical service department.

Maintaining a system log

A system log, which includes a short summary of the use, maintenance procedures, error messages and other information about the use of the system can be very useful in properly maintaining the system. Refer to Appendix A: “*System Log*”. Copy the table as many times as necessary, but leave the blank original inside the user manual.

Disposal of the instrument

If the Multiskan GO 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.



Warning Decontaminate the instrument before disposal. Refer to “Decontamination procedure” on page 59. ▲

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



Warning A used lithium (Li) battery is regulated waste and must be disposed of according to local regulations. The Li battery must only be changed by an authorized service technician. Instructions for changing the Li battery are described in the service manual. ▲

Maintenance

Disposal of 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 “Safety specifications” on page 68)
Method of disposal	Electronic waste Contaminated waste (Infectious waste)

Regarding the original packaging and packing materials, use the recycling operators familiar to you.

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

Chapter 7

Technical Specifications

General specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program (Table 7–9 through Table 7–11).

Table 7–9. General specifications

General specifications	
Overall dimensions	285 mm (W) x 430 mm (D) x 260 mm (H) [11.2" (W) x 16.9" (D) x 10.2" (H)]
Weight	10.8 kg [23.8 lbs.]
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!
Transportation conditions	-40°C to +70°C, packed in transport packaging
Storage conditions	-25°C to +50°C, packed in transport packaging
Mains power supply	100–240 Vac, 50/60 Hz
Power consumption	Max. 110 W, typical operation < 22 W, Power Save < 2.5 W
Heat dissipation	375 BTU max.
User interfaces	Standalone use: 4.5-inch color display and keypad PC control: SkanIt Software
USB connections (2.0 compatible)	PC Memory device port for data export External printer (HP PCL5 compatible)
Light source	Xenon flash lamp Lamp lifetime typically 10 ⁹ flashes (10 million 96-well microplates measured in fast mode)
Detectors	Photodiodes for measurement and reference
Wavelength selection	Monochromator
Microplate shaker	Linear shaking with adjustable speeds. The cuvette option does not support shaking.
Plates	96- and 384-well formats Maximum plate height with lid 18.5 mm Maximum plate footprint: 128.4 x 86.1 mm
Cuvettes	Dimensions: 12.5 (W) x 12.5 (D) x 40–58 (H) mm Beam center height: 8.5 mm Beam window: ≥ 2 mm

Performance specifications

This section provides the performance specifications for the relevant measurement technique and other instrument capabilities.

Table 7–10. Photometry

Performance specifications / Photometry		
Wavelength range	200–1000 nm	
Wavelength resolution	1 nm	
Wavelength accuracy	2 nm	
Wavelength repeatability	0.2 nm	
Bandwidth	< 2.5 nm	
Read-out range	Up to 4 Abs	
	Plate*)	Cuvette**)
Linearity @ 450 nm	0–2.5 Abs, 2%	0–2.5 Abs, 2%
Accuracy @ 450 nm	1.0% + 0.003 Abs (0–2.0 Abs) 2.0% (2.0–2.5 Abs)	1.0% + 0.003 Abs (0–2.0 Abs) 2.0% (2.0–2.5 Abs)
Precision @ 450 nm	SD < 0.003 Abs or CV < 0.5% (Precision mode) SD < 0.003 Abs or CV < 1.0% (Fast mode)	SD < 0.003 Abs or CV < 0.5%
Stray light	0.05% @ 230 nm	
Measurement speed (from A1 back to A1)	96-well plate:	Fast mode: 6 s Precision mode: 27 s
	384-well plate:	Fast mode: 10 s Precision mode: 92 s
Spectral scanning speed	10 s from 200 to 1000 nm with 1 nm steps	

*) 96-well flat bottom plate

**) Quartz semimicro cuvette with 4 mm beam window

Table 7–11. Incubator

Performance specifications / Incubator	
Range	Ambient + 2°C to 45°C
Liquid warm-up time	Liquid warm-up time < 55 min from 25°C to 37°C, uncovered 96-well plate, 200 µl water/well
Performance at 37°C	Mean temperature of wells: ± 0.5°C Plate temperature uniformity: < 1.0°C with uncovered 96-well plate
Incubation with lid	Using a lid increases the liquid temperature approximately +0.5°C and improves temperature uniformity to < 0.5°C

Safety specifications In conformity with the requirements

This section describes the safety specifications for the Multiskan GO instrument.

Multiskan GO bears the following markings:

Type 1510

+24 VDC / 4 A

CE mark

cTÜVus monogram

Multiskan GO conforms to the following requirements:

2006/95/EC (Low Voltage Directive)

2004/108/EC (Electromagnetic Compatibility Directive, EMC)

FCC Part 15, Subpart B/Class B (July 2004)

2012/19/EU (WEEE Directive – Waste of Electrical and Electronic Equipment)

2011/65/EU (RoHS Directive – Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment)

2006/42/EC (Machinery Directive)

Safety performance:

IEC 61010-1:2001 (Ed. 2),

including US and CA National differences

IEC 61010-2-010:2003 (Ed. 2)

IEC 61010-2-101:2002 (Ed. 1) Particular Requirements for In Vitro Diagnostic (IVD) Medical Equipment

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

Altitude Up to 2000 m

Temperature +5°C to +40°C

Humidity Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C

Mains supply fluctuations ± 10% from nominal

Installation category (overvoltage category) II according to IEC 60664-1 (see **Note 1**)

Pollution degree 2 according to IEC 60664-1 (see **Note 2**)



Note 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. ▲

EMC performance:

EN 61000-6-3:2007	Generic standards – Emission standard for residential, commercial and light-industrial environments
EN 61000-6-1:2007	Generic standards – Immunity standard for residential, commercial and light-industrial environments
EN 61326-1:2006	Product family standard – Electrical equipment for measurement, control and laboratory use
EN 61326-2-6:2006	Product family standard – Electrical equipment for measurement, control and laboratory use; in vitro diagnostic (IVD) medical equipment

Test standards	Performance limits
EN 55011:2007	Class B, 150 kHz – 1 GHz
EN 61000-3-2:2006	Class A
EN 61000-3-3:1995 + A1:2001 + A2:2005	
ANSI C63.4:2003	Class B, 450 kHz – 1 GHz
EN 61000-4-2:1995 + A1:1998 + A2:2001	4 kV CD, 8 kV AD, Criteria B
EN 61000-4-3:2002 + A1:2002	3 V/m, 80 MHz – 2,7 GHz, Criteria A
EN 61000-4-4:2004	1 kV, Criteria B
EN 61000-4-5:2006	2 kV line to ground, 1 kV line to line, Criteria B
EN 61000-4-6:2007	3 V _{rms} , 150 kHz – 80 MHz, Criteria A
EN 61000-4-8:1993 + A1:2001	3 A/m, Criteria A
EN 61000-4-11:2004	30%/500 ms, Criteria B 60%/100 ms, Criteria B 100%/10 ms, Criteria C 100%/20 ms, Criteria C 100%/5000 ms, Criteria C

Chapter 8

Troubleshooting Guide



Note Do not use the instrument if it appears to malfunction. ▲

Handling abnormal situations

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

1. Switch off the instrument (Figure 2–3 on page 11).
2. Unplug the instrument immediately from the power supply (Figure 3–11 on page 20).
3. Carry out appropriate corrective measures. However, 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.

Error and warning codes

When an error is detected, the current operation is aborted. After an error, it is best to restart from the beginning after the problem has been fixed. When an error occurs, the error code and the suggested actions are presented.

Code	Explanation	Suggested action
2	The instrument received illegal command.	Please restart both instrument and PC. Contact the PC software vendor.
3	The instrument received illegal command parameter.	Please restart both instrument and PC. Contact the PC software vendor.
4	Plate carrier position error.	Check that there is nothing hindering plate movement and retry the operation. Contact service.
5	Measurement head position error.	Check that there is nothing preventing free measurement head movement. Please retry the operation. Contact service.
6	Grating position error.	Please retry the operation. Contact service.
7	Diffraction filter position error.	Please retry the operation. Contact service.
8	Diffraction filter home tolerance error.	Please retry the operation. Contact service.
9	A/D converter offset voltage is too high.	Please restart instrument. Contact service.
10	A/D converter noise level is too high.	Please restart instrument. Contact service.
11	Lamp or optics failure.	Please restart the instrument. Contact service.
12	Non-volatile parameters lost.	Contact service.
13	Attempt to set the instrument serial number when it already has been set.	Do not try to set the instrument serial number.

Troubleshooting Guide

Error and warning codes

14	Instrument user parameter memory full.	The internal memory is full. Take a backup by exporting the protocols/runs. Release space from the internal memory by deleting protocols/runs from the internal memory.
15	Startup initialization error.	Please restart the instrument. Contact service.
17	Well-to-well distance too short for fast measurement.	Ensure that the well distance in the PC software plate template is large enough or use precision measurement mode.
19	Too high background light level.	The instrument must be operated with all covers on and lids closed. Cuvette door might be slightly open. Please check that cuvette lid is closed. Please retry the operation. Contact service.
20	Too high measurement signal.	Please retry the operation. Contact service.
21	Measurement position check failed.	Please restart the instrument. Contact service.
22	The USB memory stick / printer error.	Please check the USB memory stick / printer. Contact service.
23	The USB memory stick / printer error.	Please check the USB memory stick / printer. Contact service.
24	The USB memory stick / printer error.	The device (memory stick, printer) connected to the USB port is not responding. Try with another device. Contact service.
25	Did not find position calibration hole centerpoint.	Contact service.
26	Command parser optimization failure.	Contact service.
27	Temperature reference is out of limits. Incubation is not available.	Contact service.
28	Instrument parameter memory error.	Contact service.
29	Parameters memory erase failure.	Contact service.
30	Parameters memory write failure.	Contact service.

31	Incubator unable to reach target temperature.	Check the temperature setting and/or restart the instrument. Do not request incubation temperatures below ambient + 2 degrees. Contact service.
32	Incubator not responding correctly.	Please restart the instrument. Contact service.
33	Diffraction filter not responding.	Contact service.
34	Did not find 0 nm reflection peak.	Contact service.
35	Did not find 882 nm calibration peak.	Contact service.
36	Grating constant calculated from the measured calibration peaks differs too much from the nominal value.	Contact service.
37	Lamp or AD converter gain setting error.	Please restart the instrument. Contact service.
38	Grating home position is too far from the 0 nm reflection angle.	Contact service.
39	Wavelength calibration is not done.	Contact service.
40	No cuvette blank.	Please measure blank first. Select cuvette zero from the user interface before measurement.
41	Detector operation failure.	Please restart the instrument. Contact service.
42	Cuvette hardware not detected.	Contact service.
43	Absorbance value below measurement range minimum.	Please check that cuvette zero has been correctly performed. Please retry the operation. Ensure that the sample you are measuring in the cuvette station has equal or higher absorbance than the blank you used for blanking the cuvette station. Use correct cuvette measurement orientation. Contact service.
44	Measure head (X) and plate (Y) axis are not perpendicular.	Contact service.

45	The instrument serial number does not match with the detected instrument configuration.	Contact service.
46	Did not find 261 nm calibration peak.	Contact service.

USB memory device

It is recommended to use FAT16 or FAT32 formatted USB memory devices.

It is not recommended to use multiple drive USB memory devices that contain virtual CD drives.

The multiple drive USB memory devices normally contain one or more removable disk-type memory spaces, but can also contain virtual CD drive-type memory spaces. The Multiskan GO does not support virtual CD drive-type memory spaces.

It is possible to check if there is a virtual CD drive present when inserting a multiple drive USB memory device into the PC USB port.

1. Select **My Computer** and note the new drives that appear in the list when the multiple drive USB memory device is inserted.
2. Check all the appearing items by using the right-click mouse menu and selecting **Properties**.
3. The item type "Removable Disk" is stated for the USB memory device in the **General** sheet. It is compatible with the Multiskan GO if the File system is FAT16 or FAT32.
4. If the item is a virtual CD drive, then the type will be "CD Drive". This may cause the USB memory device to be incompatible with the Multiskan GO.

Contacting service

Always attach the Multiskan GO Instrument Status Report when contacting service.

This can be generated by selecting Settings > **Status Report** from the Multiskan GO user interface or in the SkanIt Software Home > Settings > **Instruments** > Edit instrument parameters > **Report**.

Chapter 9

Ordering Information

Contact your local Thermo Fisher Scientific representative for ordering and service information (Table 9–12 and Table 9–13).

Multiskan GO

Table 9–12. Instrument catalog number

Code	Item
51119200	Multiskan GO w/o cuvette
51119250	Multiskan GO w/o cuvette (Japan)
51119300	Multiskan GO with cuvette
51119350	Multiskan GO with cuvette (Japan)

List of spare parts and accessories

Table 9–13. Codes for spare parts and accessories

Code	Item	Quantity
5187139	Skant Software for Microplate Readers, Research Edition CD	1
5187149	Skant Software for Microplate Readers, Drug Discovery Edition CD	1
N08217	Power supply	1
N09997	Transport lock bar	1
N04001	USB A-B device cable 1.8 m *	1

* longer USB cables available from PC stores

Ordering Information

List of spare parts and accessories

System Log

Appendix B

Certificate of Decontamination

Name: _____

Address: _____

Tel./Fax: _____

Instrument: _____ Serial no.: _____

A) I confirm that the returned items have not been contaminated by body fluids, toxic, carcinogenic or radioactive materials or any other hazardous materials.

B) I confirm that the returned items have been decontaminated and can be handled without exposing the personnel to health hazards.

Materials used in the unit: Chemicals + Biological • Radioactive *)

Specific information about contaminants:

Decontamination procedure¹:

Date and place: _____

Signature: _____

Name (block capitals): _____

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

This unit is certified by the undersigned to be free of radioactive contamination.

Date and place: _____

Signature: _____

Name (block capitals): _____

PHOTOCOPIABLE

¹ Please include decontaminating solution used.

Certificate of Decontamination

Appendix C

Example of Available Cuvettes

These cuvette lists are given only as an example (Table 9–14 and Table 9–15). There are many other cuvettes available that can also be used with the Multiskan GO. The Multiskan GO can be used with cuvettes that have external dimensions of 12.5 (W) x 12.5 (L) x 40–58 (H) mm and are compatible with a beam center height of 8.5 mm.

Table 9–14. Glass or quartz cuvettes

Manufacturer	Code(s)	Pathlength (mm)	Height (mm)	Width (mm)	Depth (mm)	Volume (µl)	Meas. position height (mm)
Hellma http://www.hellma-worldwide.com	105.810-UVS	1.00	53.00	12.50	12.50	3 - 5	8.5
	100-10-20	10.00	45.00	12.50	12.50	3500	2–40
	100-10-40						
	100-10-46						
	6030-10-10						
	6030-UV-10-531						
	110-10-20	10.00	46.00	12.50	12.50	3500	2–40
	110-10-40						
	110-10-46						
	6040-10-10	10.00	45.00	12.50	12.50	1400	4–40
	6040-UV-10-531						
	104-10-20						
	104-10-40						
	104-10-46						
	104B-10-20						
104B-10-40							
104F-10-40							
114-10-20	10.00	46.00	12.50	12.50	1400	4–40	
114-10-40							
114B-10-40							
104-002-10-20	10.00	45.00	12.50	12.50	700	4–40	
104-002-10-40							
104-002B-10-20							
104-002B-10-40							
104-002F-10-40							
115-10-40	10.00	40.00	12.50	12.50	400	2–35	
115B-10-40							
105-200-85-40	10.00	45.00	12.50	12.50	180	8.5	
105-201-85-40	10.00	45.00	12.50	12.50	120	8.5	
105-202-85-40	10.00	45.00	12.50	12.50	70	8.5	
105-203-1085-40							

Continued

Example of Available Cuvettes

Manufacturer	Code(s)	Pathlength (mm)	Height (mm)	Width (mm)	Depth (mm)	Volume (µl)	Meas. position height (mm)
Hellma Cont.	105-204-1085-40	10.00	45.00	12.50	12.50	40	8.5
	105210-585-40	5.00	40.00	12.50	12.50	5	8.5
	105210-1085-40	10.00	40.00	12.50	12.50	10	8.5
	107-100-10-40	10.00	56.00	12.50	12.50	3500	2–50
	107-104-10-40	10.00	56.00	12.50	12.50	1400	2–50
Spectrocell http://www.spectrocell.com	R-0010 R-2010 R-3010 R-4010	10.00	45.00	12.50	12.50	3500	2–40
	R-2010-T R-3010-T R-4010-T	10.00	55.50	12.50	12.50	3500	2–38
	R-0010-S R-2010-S R-3010-S R-4010-S	10.00	57.00	12.50	12.50	3500	2–40
	SM-0010 SM-2010 SM-3010 SM-4010 SM-3010-B SM-4010-B	10.00	45.00	12.50	12.50	1400	4–40
	ML-0010 ML-2010 ML-3010 ML-4010 ML-3010-B ML-4010-B	10.00	45.00	12.50	12.50	600	4–40
	80-2003-83 80-2002-54	1.00	45.00	12.50	12.50	200	NA
	80-2003-85 80-2002-57	5.00	45.00	12.50	12.50	1000	NA
	80-2003-87 80-2002-58 80-2099-89 80-2109-80 80-2109-81	10.00	45.00	12.50	12.50	2000	NA
	80-2002-77 80-2004-15 80-2100-13 80-2109-82	10.00	45.00	12.50	12.50	800	4–40
	80-2002-95 80-2100-25 80-2109-83	10.00	45.00	12.50	12.50	400	2–40
80-2002-70	10.00	48.00	12.50	12.50	2000	NA	

Continued

Manufacturer	Code(s)	Pathlength (mm)	Height (mm)	Width (mm)	Depth (mm)	Volume (µl)	Meas. position height (mm)
GE Healthcare Cont.	80-2003-98						
	80-2002-81 80-2100-22	10.00	48.00	12.50	12.50	800	4–40
	80-2002-99	10.00	48.00	12.50	12.50	400	2–40
Starna http://www.starna.com	1/G/10 1/I/10 1/Q/10 1/SOG/10	10.00	45.00	12.50	12.50	3500	4–40
	9/I/10 9/Q/10 9/SOG/10 9B/I/10 9B/Q/10 9B/SOG/10	10.00	45.00	12.50	12.50	2500	4–40
	29/I/10 29/Q/10 29/SOG/10	10.00	48.00	12.50	12.50	2500	4–43
	21/G/10 21/I/10 21/Q/10 21/SOG/10	10.00	48.00	12.50	12.50	3500	4–43
	29B/I/10 29B/Q/10 29B/SOG/10	10.00	48.00	12.50	12.50	1400	4–43
	16.10-Q-10/Z8.5 16-R.10-Q-10/Z8.5	10.00	45.00	12.50	12.50	15	8.5
	16.40-Q-10/8.5 16-R.40-Q-10/8.5	10.00	45.00	12.50	12.50	55	8.5
	16.50-Q-10/Z8.5	10.00	45.00	12.50	12.50	65	8.5
	16.100-Q-10/Z8.5	10.00	45.00	12.50	12.50	115	8.5
	16.160-Q-10/Z8.5	10.00	45.00	12.50	12.50	175	8.5
	18/I/10 18/Q/10 18/SOG/10 18B/I/10 18B/Q/10 18B/SOG/10 28/I/10 28/Q/10 28/SOG/10 28B/I/10 28B/Q/10 28B/SOG/10	10.00	45.00	12.50	12.50	700	4–40

Table 9–15. Disposable plastic cuvettes

Manufacturer	Code(s)	Pathlength (mm)	Height (mm)	Width (mm)	Depth (mm)	Volume (µl)	Meas. position height (mm)
Brand http://www.brandtech.com	759070D	10.00	45.00	12.50	12.50	4500	4–40
	759071D						
	759080D						
	759081D						
	759170						
	759075D	10.00	45.00	12.50	12.50	3000	4–20
	759076D						
	759085D						
	759086D						
	759165						
	759150						
	759152						
	759210	10.00	45.00	12.50	12.50	850	8.5
	759200						
	759215						
759218							
Kartell http://www.kartell.it/uk/labware/w_dispo.htm	1937	10.00	45.00	12.50	12.50	4500	4–40
	1938	10.00	45.00	12.50	12.50	1500	4–40
Sarstedt http://www.sarstedt.com/php/main.php	67.742	10.00	45.00	12.50	12.50	1500	4–40
	67.746						
	67.740						
	67.741	10.00	45.00	12.50	12.50	4500	4–40
	67.745						
	67.738						
GE Healthcare http://www.gehealthcare.com/worldwide.html	80-2004-53	10.00	45.00	12.50	12.50	4500	NA
	80-2084-11	10.00	45.00	12.50	12.50	2500	NA
	80-3000-77	10.00	45.00	12.50	12.50	800	NA

Glossary

absorbance (optical density) A logarithmic function of the transmission of a wavelength of light through a liquid. $\log(I/I_0)$ dimension [Abs]

decontamination Removal or neutralization of radiologic, bacteriological, chemical or other contamination.

disinfection The destruction of pathogenic bacteria, usually with an antiseptic chemical or disinfectant.

dynamic range The range of signals an instrument can read, from the minimum to the maximum detectable. For example, a dynamic range of three decades means that the difference between the lowest and highest signals that can be measured is 10^3 .

EIA Enzyme immunoassay. An immunoassay using a color-changing enzyme-substrate system for indicating results. A diagnostic test method to measure or detect a substance using antibody-antigen reactions.

ELISA Abbreviation for enzyme-linked immunosorbent assay.

kinetic measurement Measurement over a time period at certain intervals.

memory device A USB memory stick to store results for later reference. The results are saved in the instrument's memory and exported to the connected USB memory device.

monochromator Transmits certain wavelengths of the incoming light. Consists of a rotatable diffraction grating and entrance/exit slits.

optical density (absorbance) $\log(1/\text{transmittance}) = \log(I/I_0)$ dimension [O.D.]

photometer A device measuring absorbance or optical density.

photometry The measurement of the properties of light, particularly (luminous) intensity.

power saving mode The instrument has a Power Save feature which lowers power consumption while the instrument is idle. Refer to "Power Save feature" on page 24 and "Configuration" on page 52.

self diagnostics Initialization tests and adjustments that the instrument performs before operation as well as autocalibration.

single measurement Synonym to endpoint measurement/assay/method. The measurement is only done with a single reading.

transmittance The ratio of transmitted (I) and incident light (I_0), I/I_0 .

zeroing To perform measurements, the instrument needs to initialize/calibrate itself. The process is called zeroing and is automatically performed for microplate measurements but manually for cuvette measurements. Refer to "Zeroing for cuvettes" on page 43.

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