Thermo Scientific Multiskan Verification Plate

User Manual

Rev. 2.0, Cat. No. 1508470

Thermo SCIENTIFIC

About This User Manual

Warning and other markings used in the documentation

The following symbols and markings appear in this user manual.

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 This marks important information, a tip, or an item of interest that is useful in the optimum operation of the system. ▲

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Chapter 1
Introduction to the Multiskan Verification Plate

The Thermo Scientific™ Multiskan™ Verification Plate is used to verify correct measurement performance of any of the following microplate photometers:

1. Thermo Scientific Multiskan FC
2. Fisher Scientific™ accuSkan™ FC *
3. Thermo Scientific Multiskan Ascent™**
4. Thermo Scientific Multiskan EX**

* *For accuSkan FC, follow the same verification instructions as for Multiskan FC.*
** *Discontinued*

The Multiskan Verification Plate with 8 wavelengths (Cat. No. 24072800) and Multiskan Verification Plate with 16 wavelengths (Cat. No 24072805) include:

- NPL (National Physical Laboratory) traceable Multiskan Verification Plate
- *Certificate of Calibration* for the verification plate
- *Sessions and reference files* USB memory device (Cat. No. N08803) (USB stick)
- Carrying case for protecting the Multiskan Verification Plate

Multiskan Verification Plate

The Multiskan Verification Plate (Figure 1–1) comprises six glasses with the following nominal absorbances: 0.3, 0.6, 1.2, 2.0, 3.0, and 4.0 Abs. The glasses are calibrated for 8 or 16 wavelengths depending on the version. Multiskan Verification Plate with 8 wavelengths (Cat. No. 24072800) includes the eight standard wavelengths and Multiskan Verification Plate with 16 wavelengths (Cat. No 24072805) includes the eight extended wavelengths in addition to the eight standard wavelengths. The calibration is traceable to the National Physical laboratory and is valid in room temperature (approx. 22–28°C).

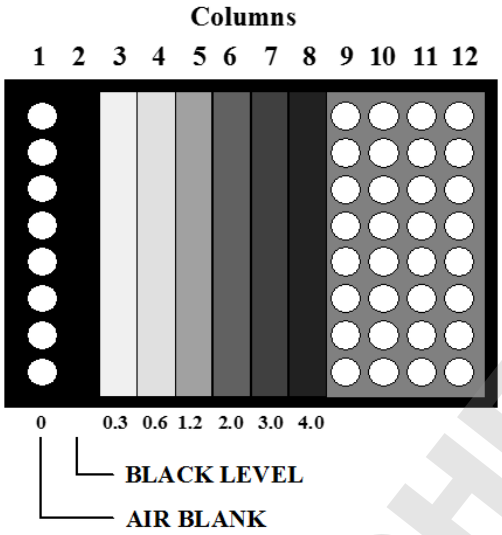


Figure 1–1. Multiskan Verification Plate with six glasses (0.3 Abs, 0.6 Abs, 1.2 Abs, 2.0 Abs, 3.0 Abs, and 4.0 Abs)

Note Always store the Multiskan Verification Plate in its own case when not in use to keep the glass surface free of dust. ▲

USB memory device

The *Sessions and reference files* USB memory device (Cat. No. N08803) includes the sessions, documents and reference folders needed in the verification procedure of the instrument. The files are located according to the following folder structure:

- The **DOCUMENTS** folder includes the instructions that may be needed during the verification.
- The **REFERENS** folder includes the reference values for the verification plate. The folder has two subfolders:
  - The **STANDARD** subfolder includes the reference values for the eight standard wavelengths: 340 nm, 405 nm, 414 nm, 450 nm, 492 nm, 540 nm, 620 nm, and 690 nm. The subfolder also contains the `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Standard.xltx` Excel template which contains the respective reference values.
  - The **EXTENDED** subfolder includes the reference values for the extended wavelengths: 550 nm, 560 nm, 570 nm, 580 nm, 595 nm, 630 nm, 650 nm, and 750 nm. The subfolder also contains the `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Extended.xltx` Excel template which contains the respective reference values.

Note Do not change the `STDxxx.TXT` filenames. The filenames must be in this format. ▲

- The **SESSIONS** folder includes the measurement sessions needed during the verification. The sessions are divided into three subfolders:
  - The **Multiskan FC SkanIt 4.0** subfolder includes the verification sessions for SkanIt™ Software 4.0 for Multiskan FC and accuSkan FC.
  - The **MultiAsc** subfolder includes the verification session for Multiskan Ascent.
  - The **MultiEX** subfolder includes the verification session for Multiskan EX.

Recalibration

It is recommended to recalibrate the Multiskan Verification Plate at first one year after the initial calibration and then every two years. Contact the Thermo Fisher Scientific technical service representative at least two months before the due date of your plate's calibration to obtain the return number (RGA) for the recalibration order form. The calibration due date is printed on the *Certificate of Calibration*.

Refer to *Fillable order form for recalibration* (Cat. No. 1508461) in the **DOCUMENTS** folder on the USB memory device.

Note After recalibration, always update the files according to the corresponding instrument software instructions. ▲

Chapter 2
Perform Multiskan FC verification with SkanIt Software 4.0

These instructions assist the user to automatically verify the photometric performance of the instruments. It is assumed that the user is familiar with Windows™ and Thermo Scientific SkanIt Software. For more details, refer to the software and instrument user manuals.

Before the verification

- Check that the serial number of the USB memory device is the same as that on the Multiskan Verification Plate
- Check that the temperature is ambient (approximately 22–28°C).
- Verify that the Multiskan Verification Plate is clean and in good physical condition. If not, refer to "Cleaning instructions" on page 27.
- Open SkanIt Software 4.0.
- Import the verification sessions from the *Sessions and reference files* USB memory device (Cat. No N08803) to SkanIt Software:
  1. On the application menu, click **Import > Browse**.
  2. On the USB memory device, open **SESSIONS** > **Multiskan FC SkanIt 4.0.**
  3. Select the `Multiskan FC SkanIt 4.0 PQ sessions 1_0.ska` verification session file.
  4. Click **Open > Next**.
  5. Make sure that all sessions are ticked (✓) and click **Finish**. The verification session files are automatically imported to **Thermo Scientific > Verification > Multiskan FC**. Software shows an 'Import succeeded' message.
- Depending on the wavelength you need to verify, copy the Excel template file from the *Sessions and reference files* USB memory device (Cat. No N08803) on your computer:
  - If you need the standard wavelengths, go to **REFERENS > STANDARD** and select `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Standard.xltx`.
  - If you need the extended wavelengths, go to **REFERENS > EXTENDED** and select `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Extended.xltx`.

  In SkanIt Software, always use the same folder to save the results. For more information, refer to "Performing the verification test" on page 10.

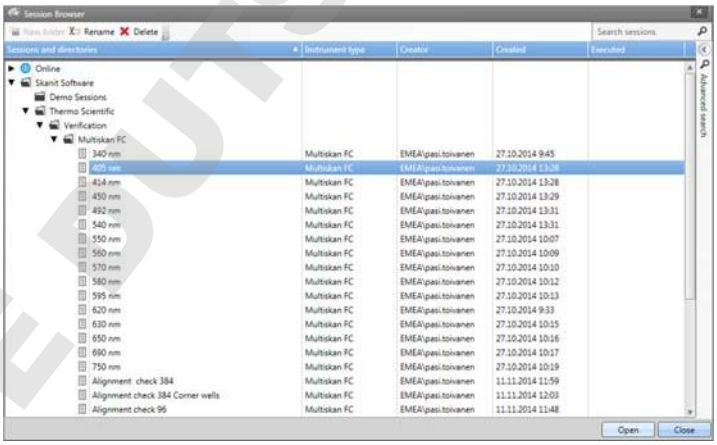
Note The following alignment check sessions are not needed for the verification: *Alignment check 384*, *Alignment check 384 Corner wells* and *Alignment check 96*. ▲

Note The Multiskan FC and accuSkan include the wavelengths of 405 nm, 450 nm, and 620 nm as standard. Before you perform any verification for other wavelengths, ensure that additional filters are installed to the instrument and added to SkanIt Software. For more information on filters, refer to *Multiskan FC User Manual* (Cat. No. N07710), *Multiskan FC User Manual for IVD Model* (Cat. No. N13579), *accuSkan FC User Manual* (Cat. No. N16612), *Thermo Scientific Multiskan FC Filter Installation Instructions* (Cat. No. N09055) or *SkanIt Software for Micropalte Readers Technical Manual* (Cat. No. N16046). ▲

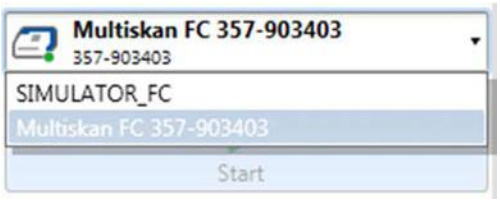
Note Always use the same Excel file in the **Report** node of SkanIt sessions. ▲

Performing the verification test

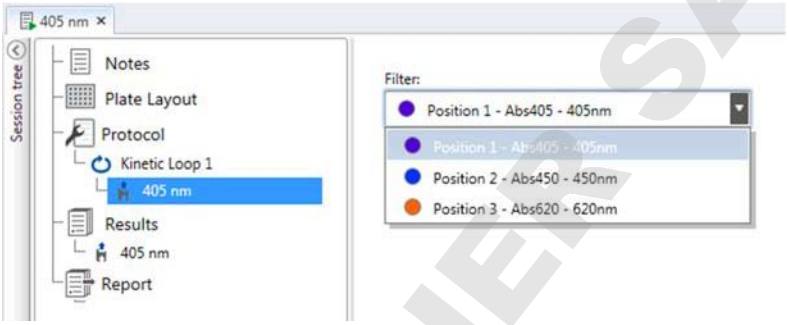
1. Start the first wavelength verification session from **Open > SkanIt** Software **> Thermo Scientific > Verification > Multiskan FC**.
2. Select the session that matches the verification wavelength and click **Open**.



Note Ensure that you have connected the instrument (the serial number begins with the numbers 357) and not the simulator to SkanIt. If SkanIt Software is connected to the simulator, switch to the instrument from the dropdown menu above the **Start** button. For more information, refer to "Instrument Operations" in *SkanIt Software for Microplate Readers Technical Manual* (Cat. No. N16046). ▲



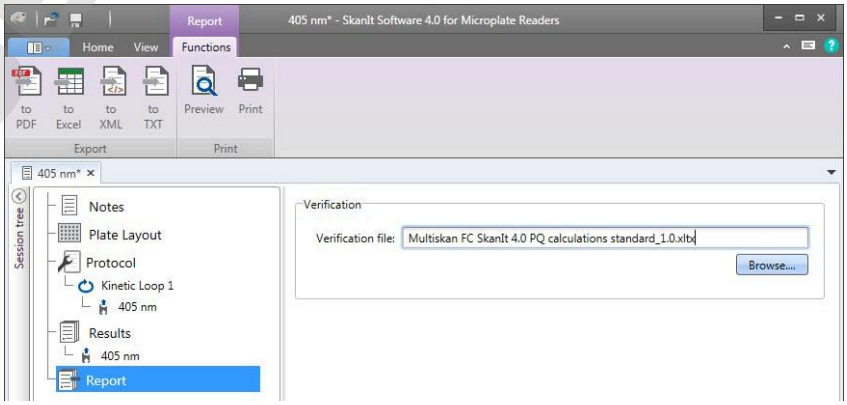
3. Select the corresponding filter for the wavelength verification by clicking the wavelength under the **Kinetic Loop** step and selecting the correct filter from the dropdown menu.



Note The filter must be selected separately every time a new instrument is connected to SkanIt Software and every time a new wavelength is validated for the first time with the instrument in question. ▲

Note Check from the Session tree, that the wavelengths under **Protocol > Kinetic Loop** and **Results** match. ▲

4. Select the Multiskan Verification Plate calculations Excel template from your PC by clicking **Report** > **Browse** > select `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Standard.xltx` or `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Extended.xltx` > **Open**.



Note You copied the Excel template from *Sessions and reference files* USB memory device (Cat No. N08803) to your computer in the previous chapter. ▲

Note For the first run, next to the **File name** field, select the Excel Template (`.xltx`) format instead of Excel Workbook. To save all the results to the same file, select the Excel workbook (`.xlsx`) with the measurement date added to the end of the file name for the following runs. ▲

5. Run the plate out by clicking the  icon.
6. Insert the Multiskan Verification Plate in the instrument plate carriage and click the  icon to run the plate back in.
7. Click **Start**.
8. After the first measurement, an Excel file opens with the **Summary** sheet open. Write the tester's name in **Tester** and save the file.
9. Check from the **Summary** sheet that the accuracy and precision of the measured wavelength are passed. The results of the wavelengths that have not been measured show as N/A. For more information on failed measurements, see "Troubleshooting" on page 24.
10. If you need to verify another wavelength, save and close the Excel file and start again at step 1.

Printing the test results

It is possible to print the performance results from the **Summary** sheet of the Excel file.

It is also possible to print the report on the default printer by clicking **Print**.

Chapter 3
Perform Multiskan FC verification with SkanIt Software 3.1

These instructions assist the user to automatically verify the photometric performance of the instruments. It is assumed that the user is familiar with Windows™ and Thermo Scientific SkanIt Software. For more details, refer to the software and instrument user manuals.

Before the verification

- Check that the serial number of the USB memory device is the same as that on the Multiskan Verification Plate.
- Check that the temperature is ambient (approximately 22–28°C).
- Verify that the Multiskan Verification Plate is clean and in good physical condition. If not, refer to “Cleaning instructions” on page 27.
- Open SkanIt Software 3.1.

Note The Multiskan FC and accuSkan F include the wavelengths of 405 nm, 450 nm, and 620 nm as standard. Before performing the verification for other wavelengths, ensure that additional filters have been installed to the instrument and added to SkanIt Software. For more information on filters, refer to *Multiskan FC User Manual* (Cat. No. N07710), *Multiskan FC User Manual for IVD Model* (Cat. No. N13579), *accuSkan FC User Manual* (Cat. No. N16612), *Thermo Scientific Multiskan FC Filter Installation Instructions* (Cat. No. N09055) or *SkanIt Software 3.0 for Multiskan FC User Manual* (Cat. No. N07713). ▲

Note Ensure that you have connected the instrument (the serial number begins with the numbers 357) and not the simulator to SkanIt. If SkanIt Software is connected to the simulator, click **Disconnect** next to the name of the simulator. Then select the correct instrument from the dropdown menu by the **Connect** button. For more information, refet to “Instrument Operations” in *SkanIt Software for Microplate Readers Technical Manual* (Cat. No. N16046) ▲

Performing the verification test

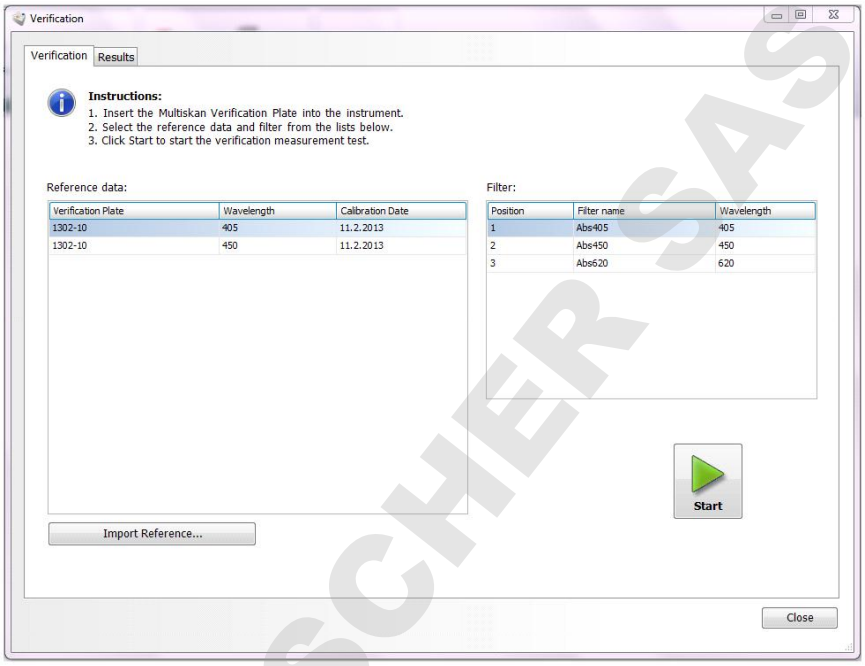
1. In the **Home** view of SkanIt Software, click Verification to open the *Verification* dialog.

2. In the *Verification* dialog, select the reference file from the list, or click **Import Reference** to search for the reference data that is used for verification. Reference data is supplied with the Multiskan Verification Plate in the *Sessions and reference files* USB memory device (Cat. No. N08803).
   - If you need the standard wavelengths, go to **REFERENS > STANDARD**.
   - If you need the extended wavelengths, go to **REFERENS > EXTENDED**.

3. Select the `STDxxx.TXT` reference wavelength file, where xxx corresponds to the wavelength, and click **Open**. Click **Yes** to confirm the import of the reference data.

4. Select a filter from the **Filter** list. The list shows all the filters you have added to the instrument in the **Settings > Filters** dialog. For more information, refer to "Adding a new filter" in the *Thermo Scientific SkanIt Software for Multiskan FC User Manual*.

Note The **Reference data** wavelength and **Filter** wavelengths must be the same. ▲



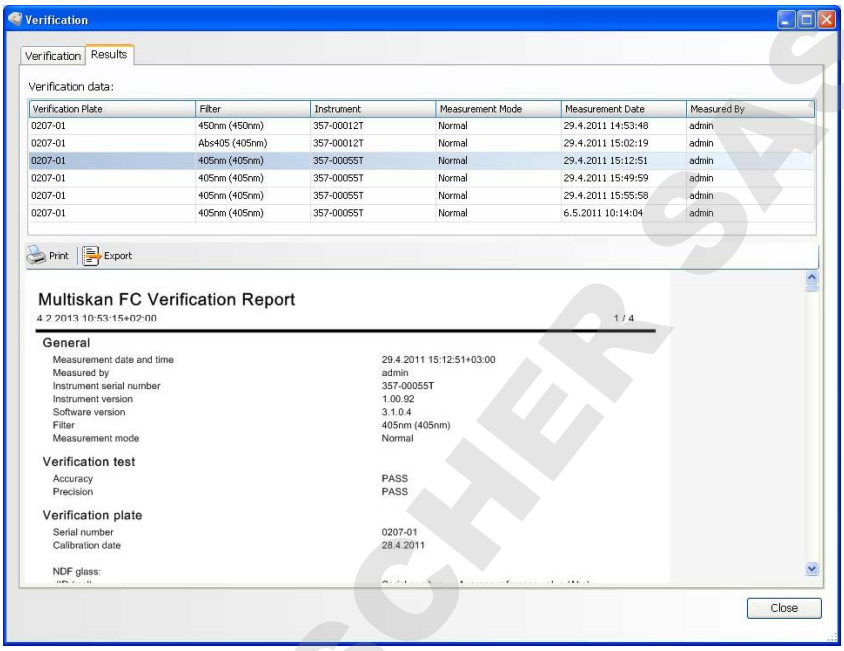
5. Insert the Multiskan Verification Plate into the instrument plate carriage.

6. Click **Start** to start the verification measurement test. View the progress of the measurement test at the bottom of the dialog. It is possible to stop the measurement at any stage by clicking **Abort**. After the test measurement has finished, the plate comes out of the instrument and the **Results** view is displayed showing the *Multiskan FC Verification Report*.

7. The results are automatically saved to the SkanIt database.

8. Open the Result tab and check that the verification tests accuracy and precision are passed.

Note Scroll the list on the screen to find the latest Verification data. ▲



9. If you need to verify another wavelength, open the **Verification** tab and start again from step 2.

10. Click **Close** to exit the **Verification** dialog. If the instrument verification accuracy or precision test fails, refer to "Troubleshooting" on page 24.

Printing the test results

Note that by default the reports are sorted according to the measurement date.

It is also possible to print the report on the default printer by clicking Print.

Exporting the test results

It is possible to save the report log as a Microsoft Excel (`*.xls`) file, an Adobe Acrobat Portable Document File (`*.pdf`) or a text file (`*.txt`) by clicking Export.

Chapter 4
Perform Multiskan EX and Multiskan Ascent verification with Ascent Software

These instructions assist the user to automatically verify the photometric performance of the instruments. It is assumed that the user is familiar with Windows and Thermo Scientific Ascent Software. For more details, refer to the software and instrument user manuals.

Before the verification

- Check that the serial number of the USB memory device is the same as that on the Multiskan Verification Plate.
- Check that the temperature is ambient (approximately 22–28°C).
- Verify that the Multiskan Verification Plate is clean and in good physical condition. If not, refer to “Cleaning instructions” on page 27.
- Before performing the verification, ensure that the filters are installed to the instrument and added to Ascent software. For more information on the installation, refer to *Multiskan EX optional filter installation instructions* (Cat. No. N03957) or *Multiskan Ascent Optional Filter Installation Instructions* (Cat. No. N04807) in the **DOCUMENTS** folder of the *Sessions and reference files* USB memory device (Cat. No. N08803).
- Open Ascent Software 2.6.

Note Ensure that you have connected the instrument and not the simulator to Ascent Software. For more information, refer to *Ascent Software for Multiskan Ascent* (Cat. No. 1507550), *Ascent Software for Multiskan* (Cat. No. 1507070), *Ascent Software note* (Cat. No. N05837) for Multiskan EX or Ascent Software (Cat. No. N05836) for Multiskan Ascent. ▲

The USB memory device contains the following session files (Table 4–1) – *always four per instrument* - and the reference absorbance files (`STDxxx.TXT`) for the eight wavelengths specified.

Table 4–1. PVT session files

PVT session files	Corresponding instrument
PVTEST.SED, PVTEST.VTB, PVTEST.VTG,	Multiskan Ascent in the MultiAsc

PVT session files	Corresponding instrument
PVTEST.LAY	folder under SESSIONS
PVTEST**M**.SEE, PVTEST**M**.VTB, PVTEST**M**.VTG, PVTEST**M**.LAY	Multiskan EX in the MultiEX folder under SESSIONS

Copy the verification files corresponding to the test instrument and all the eight `STDxxx.TXT` files to your PC. Copy the files to the same directory where Ascent Software is installed.

The **REFERENS** folder includes:

- The **STANDARD** subfolder with the standard wavelengths 340 nm, 405 nm, 414 nm, 450 nm, 492 nm, 540 nm, 620 nm, and 690 nm.
- The **EXTENDED** subfolder with the extended wavelengths 550 nm, 560 nm, 570 nm, 580 nm, 595 nm, 630 nm, 650 nm, and 750 nm.

Note Never use the original files directly from the USB memory device to run the test. Always save the files as backup to your PC. ▲

Note Do not change the filenames. The filename `STDxxx.TXT`, where xxx corresponds to the wavelength, must be in this format. ▲

Note In the Windows settings, the decimal separator must be a point (for example, 1.5) to ensure that the calculations are made correctly. ▲

Note After recalibration, always copy the new reference absorbance files to the directory indicated above. The Verification session files do not have to be copied unless a new version of the session is sent. ▲

When Ascent Software is started, select **Open** from the **Session** menu and load the session named `PVTEST.sed` (Multiskan Ascent) or `PVTEST`**`M`**`.see` (Multiskan EX) into your PC. On the left-hand side of the **Procedure desktop** (Figure 4–2) you can see the steps of the Verification session: General step; Load step (named '**Std-Load**'), and one or two measurement steps (named '**Measure1**' and '**Measure2**').

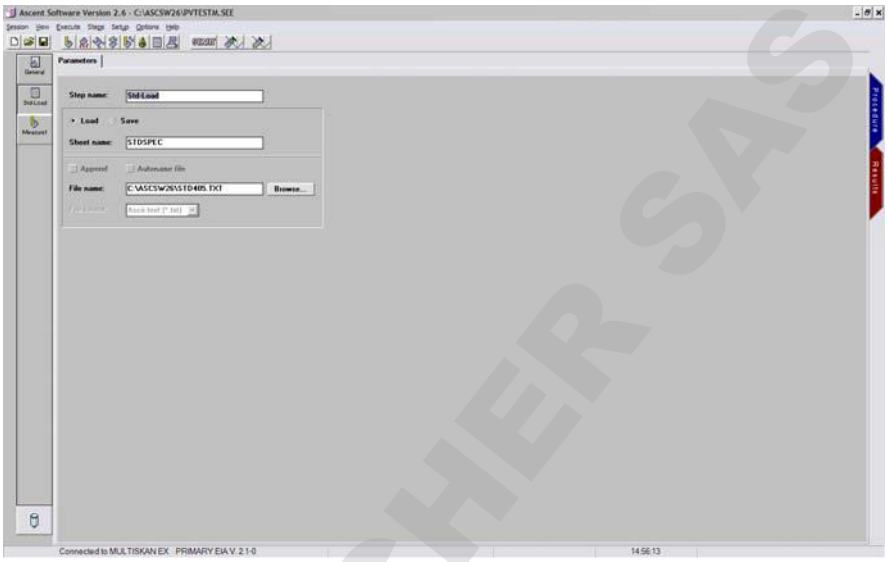


Figure 4–2. Ascent Software for Multiskan EX Procedure screen

- Use the **Browse** key select one of the `STDxxx.TXT` files from the **STANDARD** or **EXTENDED** folder depending on the wavelength, where xxx corresponds to the wavelength, for the **Std-Load** step. Refer to the dialog in the Procedure desktop above. This enables the session to load the absorbance values into the STDSPEC spreadsheet in the Results desktop.

Note Check that the wavelength in the **Measure** step(s) correspond(s) to the filename in the **Std-Load** step. ▲

- Place the Multiskan Verification Plate onto the plate carrier of the instrument and start the run. The session performs the verification test for one wavelength at a time. The instrument measures the Multiskan Verification Plate in a 20-point measurement either once (**Measure1**) or twice (**Measure1** and **Measure2**).
    - With Multiskan EX, note that the necessary The warm-up time of the instrument is 5 minutes.

When the measurement is ready, the Results desktop appears on the screen with the following spreadsheets accessible at the bottom, for example, FinalRes, AccStep, PrecStep, STDSPEC, Measure1, RunStatus and Steps (see Table 4–2 on page 21 about Results desktop spreadsheets).

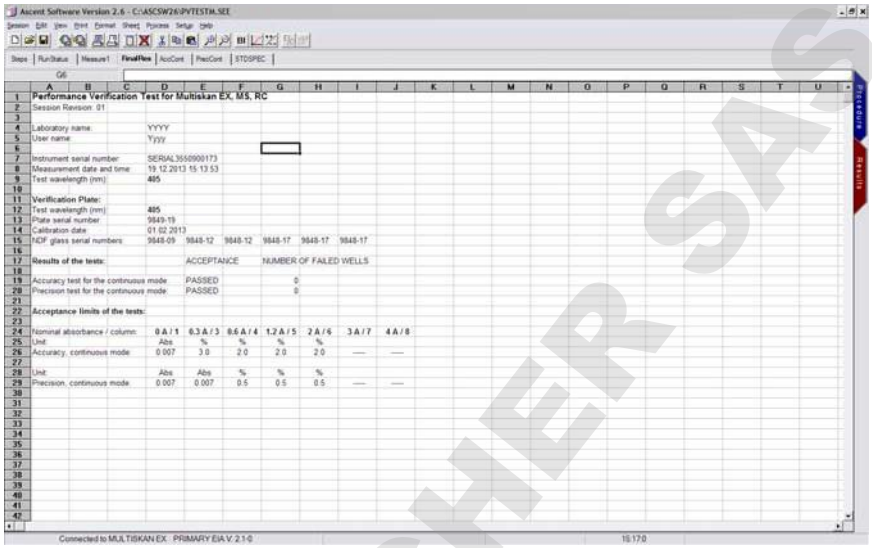


Figure 4–3. Ascent Software for Multiskan EX Results screen

The Measure1 sheet opens as default, but you can easily access the FinalRes sheet (see the FinalRes description below) by pressing the name of the sheet at the bottom of the screen.

Open the FinalRes sheet and check that the Results of the tests accuracy and precision are passed.

If the instrument verification fails, refer to “Troubleshooting”.

Table 4–2. Spreadsheets in Results desktop

Spreadsheet in Results	Description
FinalRes	**Final test report per tested wavelength** - Laboratory and user information - Identification of the instrument, Multiskan Verification Plate and glasses - Date of calibration - Final test results with PASS/FAIL information - Acceptance limits for accuracy and precision tests
STDSPEC	**Source of the reference absorbance data per tested wavelength at six absorbance levels** - Loaded into the **Std-Load** step before measurement - Eight values per each absorbance level to correspond to the eight well positions in a microplate row - Identification of the Multiskan Verification Plate and glasses
Measure1	**Raw measurement data** - 20-point kinetic measurement - Measurement with Stepping mode (Multiskan Ascent) - Measurement with Continuous mode (Multiskan EX) - Opens as default when the measurement is ready
Measure2	**Raw measurement data** - 20-point kinetic measurement - Measurement with Continuous mode (Multiskan Ascent)
AccStep	**Calculations for the accuracy tests when Stepping mode was used** - Percentage difference from the reference value (STDSPEC sheet) calculated for eight well positions at six absorbance values (the first reading of the 20-point kinetic measurement) - Acceptance for each well position (0 = PASS, 1 = FAIL); see equation 1 on page 23
AccCont	**Calculations for the accuracy tests when Continuous mode was used** - Percentage difference from the reference value (STDSPEC sheet) calculated for eight well positions at six absorbance values (the first reading of the 20-point kinetic measurement) - Acceptance for each well position (0 = PASS, 1 = FAIL); see equation 1 on page 23
PrecStep	**Calculations for the precision tests when Stepping mode was used** - All 20 measurements from one well position organized into one column - Standard deviation (SD), average (Mean) and CV% are calculated for each well position - Acceptance for six wells of the first row (0 = PASS, 1 = FAIL); see equation 1 on page 23
PrecCont	**Calculations for the precision tests when Continuous mode was used** - All 20 measurements from one well position organized into one column - Standard deviation (SD), average (Mean) and CV% are calculated for each well position - Acceptance for six wells of the first row (0 = PASS, 1 = FAIL); see equation 1 on page 23
RunStatus and Steps	Measurement information

Note Never edit those cells in the spreadsheets that contain formulas and constants for calculations, as this can invalidate the test results. ▲

Saving the test results

It is possible to save one sheet (for example, FinalRes) only, select **Save As** from the **Sheet** menu in the **Results** desktop and copy the sheet with a name of its own onto a separate file. It is possible to save the whole session, select **Save As** from the **Session** menu in the **Results** desktop and copy the session with a name of its own onto a separate file.

Printing the test results

Activate the area to be printed and select **Print Area > OK** from the **Print** menu in the **Results** desktop.

Chapter 5
Interpretation of the Results

Accuracy

Accuracy is determined for eight wavelengths at six absorbance levels, each of which covers eight well positions in a row. The average of the 20 measurements of the Multiskan Verification Plate is compared to the accuracy criteria as follows:

1. $\frac{\text{Test value} - \text{Reference absorbance value}}{\text{Reference absorbance value}} \times 100 <$ Accuracy criteria
2. Note that all readings must meet the accuracy criteria to pass the accuracy test.
3. Measurement uncertainty is a result of the number of related components used in the measurement: the calibration equipment, the NDF glasses of the Verification Plate, and the performance (and the filters) of the test instrument. The correct accuracy criteria corresponds to the combined uncertainty of all the above-mentioned factors. If the absorbance level is 0.3, even the smallest dust particles and scratches on the NDF glass surfaces are easily detected. Therefore the acceptance criteria at the 0.3 Abs level is 3%.

Precision

Precision, that is, the coefficient of variation (CV%), is determined for any well position after reading the Multiskan Verification Plate 20 times. The CV% is calculated as follows:

$$CV\% = \frac{SD}{MEAN} \times 100, \text{ where}$$

SD = the standard deviation of all measurements

MEAN = the average of all measurements

Chapter 6
Troubleshooting

Troubleshooting guidelines

If the results for both the accuracy and the precision tests are PASSED, the instrument has been verified to provide correct measurement data. In case of any problems, the reason may be a faulty or unclean instrument or Multiskan Verification Plate. Generally, if one or more of the precision tests have FAILED, the reason probably lies in the instrument. If one or more of the accuracy tests have FAILED, the reason may lie in the instrument or in the Multiskan Verification Plate. There are some factors below, which should then be checked:

- If all the results are considerably out of range:
    - Check that the Multiskan Verification Plate has been placed correctly onto the plate carrier and that the glasses are clean.
- If all the results are only slightly out of range:
    - Check that the wavelength of the reference data and the wavelength of the filter in SkanIt Software or the wavelength in the Measure step in Ascent Software are the same.
        - Check the wavelength of the reference data in SkanIt 4.0 from the `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Standard.xltx` or `Multiskan FC SkanIt 4.0 PQ calculations 1.0 Extended.xltx` file depending on the wavelength.
        - Check the wavelength of the reference data in SkanIt 3.1 from the `STDxxx.TXT` files, where xxx corresponds to the wavelength.
        - Check the wavelength in the **Measure** step in Ascent Software and the **Std-Load** step in the `STDxxx.TXT` files where xxx corresponds to the wavelength are the same.
    - Check that the filters in the instrument are in the correct order with regard to the filter wavelengths and that they are clean.
    - With regard to Multiskan EX and Multiskan Ascent Verification, check that the Filter Settings in Ascent

Software correspond to the filters in the internal software of Multiskan EX or Multiskan Ascent. For more information, refer to *Ascent Software note* (Cat. No. N05837) for Multiskan EX or *Ascent Software note* (Cat. No. N05836) for Multiskan Ascent.

- With regard to Multiskan FC or accuSkan FC check that the filters correspond to the filters in the instrument. For more information on filters, refer to *Multiskan FC User Manual (*Cat. No. N07710), *Multiskan FC User Manual for IVD-Model* (Cat. No. N13579) or *accuSkan FC User Manual* (Cat. No. N16612).

- If all the results of some glasses are out of range:
    - First dismantle the Multiskan Verification Plate as shown in Figure 8–4 on page 27 and check that the glass positioning and the order are correct.
- If the results are only randomly out of range:
    - Clean the optic lenses, filters (see the user manual of the instrument) and the glasses of the Multiskan Verification Plate (see “Cleaning” on page 27).
    - Check that the lamp works.
- If the fault does not disappear, contact the Thermo Fisher Scientific technical service representative.

Chapter 7
Storage

Storage conditions

Always store the Multiskan Verification Plate in its own case when not in use to keep the glass surface free of dust. In general, avoid sites of storage with excessive dust, dirt, moisture or large temperature fluctuations.

Chapter 8
Cleaning

Cleaning instructions

To ensure thorough cleaning, dismantle the Multiskan Verification Plate as shown in Figure 8–4. When assembling, be careful to place the glasses into the Multiskan Verification Plate with the absorbance value marking as indicated below (Figure 8–4).

If dust particles can visually be seen on the surface of glasses, remove the dust with pure compressed air. If any spillages can be seen, clean the glasses with a tissue moistened with ethanol (96%), rinse the glasses with distilled water and dry them well.

Note Handle the glasses with care. Never use an abrasive cleaning material that may scratch the glasses. ▲

Note Do not touch the glasses with your hands. ▲

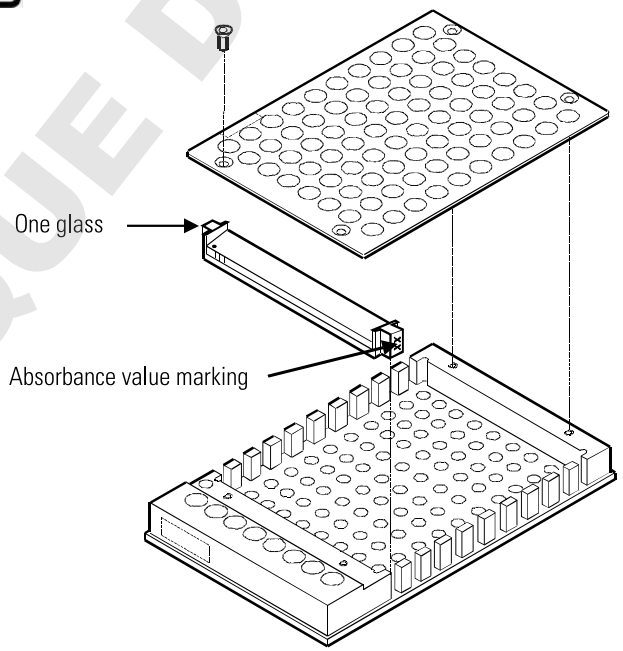


Figure 8–4. Assembly drawing of the Multiskan Verification Plate

Chapter 9
Repair

Repair conditions

Thermo Fisher Scientific does not deliver or accept any separate parts for recalibration or repair. Faulty glasses can only be replaced by Thermo Fisher Scientific. For repairs, contact your Thermo Fisher Scientific technical service representative.

Chapter 10
Recalibration

Recalibration procedure for Multiskan Verification Plate

The calibration procedure of the Multiskan Verification Plate is established according to the guidelines of the IS09001/13485 standard. The calibration is traceable through the National Physical Laboratory (NPL, UK). The traceability chain is shown in Figure 10–5.

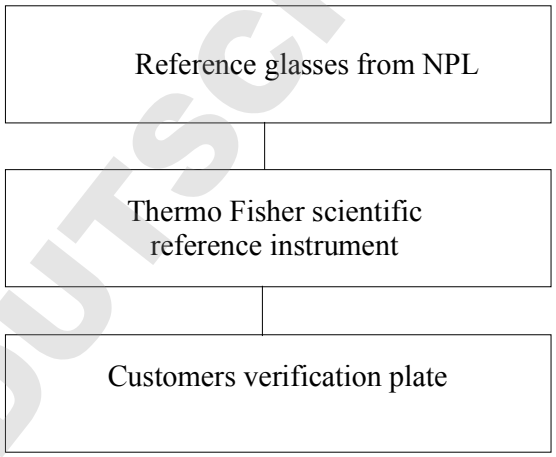


Figure 10–5. Traceability chain of the Multiskan Verification Plate

The absorbances of the reference glasses are calibrated at the intervals of five years at the NPL at several wavelengths between 340 nm – 690 nm.

The Thermo Fisher Scientific reference instrument is then calibrated annually by measuring the absorbances of the NPL reference glasses at each wavelength and comparing the measurement results with the reference values and the uncertainties of the glasses.

The Multiskan Verification Plates are then calibrated by measuring the absorbances of the glasses with the Thermo Fisher Scientific reference instrument.

The uncertainty of the calibration is calculated according to the publication EA-4/02 (*Expression of the Uncertainty of Measurement in Calibration*). The main uncertainty factors are the uncertainty of the calibration of the NPL reference glass and the repeatability of the measurements.

Sending the Multiskan Verification Plate for recalibration

It is recommended that the new Multiskan Verification Plate is sent for recalibration after one year of purchase, and then every two years.

Before sending the Multiskan Verifcation Plate for recalibration, read and complete the *Order form for calibration* (Cat. No.1508461) in full. The order form is located in the **DOCUMENTS** folder on the USB memory device.

Chapter 11
Glossary and abbreviations

absorbance Negative logarithm of one minus absorptance as measured on a uniform sample. Abbr. *Abs* or *A*

accuracy

1) Accuracy is a complex concept which defines the ability of the assay to measure the true value of the analyte. Accuracy means correctness; freedom from error. The accuracy of results can be measured by comparing them to results accepted as correct, or by comparing them with those from another laboratory (this is 'relative accuracy').

2) Deviation of the mean value from the nominal value.

coefficient of variation The measure of variability. CV is expressed as a percent and is calculated as:

$$CV\ (\%) = \frac{SD}{MEAN} \times 100, \text{ where}$$

SD = the standard deviation of all measurements
MEAN = the average of all measurements.

NPL National Physical Laboratory

objective evidence Information which can be proved true, based on facts obtained through observation, measurement, test or other means.

precision The measure of the closeness of the results obtained when analyzing the same sample more than once; the measure of agreement between replicate measurements.

In statistical quality control, the repeatability of a measurement, as measured by the variance of repeated measurements.

standard deviation (SD) A quantitative measure of how individual values are distributed about the mean. Standard deviation is calculated using the following formula:

$$\text{Standard Deviation (SD)} = \sqrt{\frac{\text{Sum of (Individual Value - Mean)}^2}{\text{Number of Values - 1}}}$$

validate

1) To prove to be valid; confirm the validity of.

2) To make binding under the law; give legal force to; declare legally valid.

3) To check that an input or data is correct according to a set of rules.

validation Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. In other words, a check performed to validate data. The process of evaluating the performance of a specific measuring procedure and checking that the performance meets certain preset criteria. Validation establishes and provides documented evidence that the measuring procedure is fit for a particular purpose.

verification Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled.