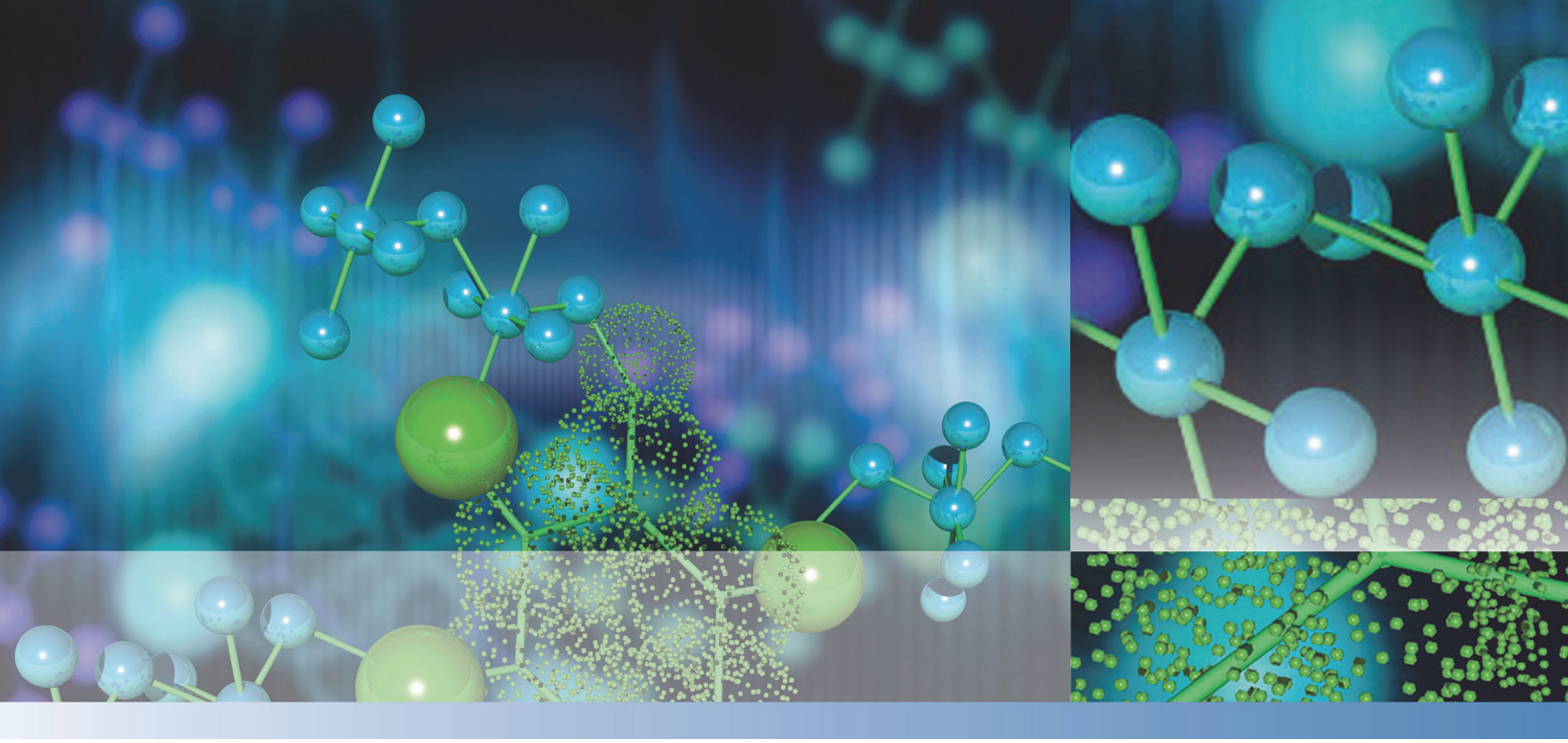

Thermo Scientific

µDrop and µDrop Duo Plates

User Manual

Cat. No. N12691 Rev 4.0 2020

thermo scientific

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Preface

About This Guide

This manual gives instructions on performing absorbance measurements using the Thermo Scientific™ µDrop™ and µDrop™ Duo Plates with the following instruments:

- Thermo Scientific™ Multiskan™ SkyHigh
- Thermo Scientific™ Multiskan™ Sky
- Thermo Scientific™ Multiskan™ GO
- Thermo Scientific™ Varioskan™ LUX

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

The following symbols and markings appear in this user manual:.

WARNING Biohazard risk.

WARNING Risk of injury to the user or users.

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

Note Highlights important information, a tip, or an item of interest that is useful in the optimum operation of the system

Contacting Us

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

www.thermofisher.com/platereaders

Contents

1

Introduction to the µDrop and µDrop Duo Plates

Introduction

Thermo Scientific™ µDrop™ and µDrop™ Duo Plates are tools designed for quick and easy absorbance measurement of low sample volumes (2–10 µl) and cuvettes with the following instruments:

- Thermo Scientific™ Multiskan™ SkyHigh
- Thermo Scientific™ Multiskan™ Sky
- Thermo Scientific™ Multiskan™ GO
- Thermo Scientific™ Varioskan™ LUX

The µDrop and µDrop Duo Plates are typically used for photometric DNA, RNA and protein quantitation and purity analysis.

The µDrop Plate consists of two separate measurement locations, one for measuring low-sample volumes and the other for cuvettes. The µDrop Duo Plate consist of three separate measurement locations, two for measuring low-sample volumes and one for cuvettes.

The low-volume area of the µDrop and µDrop Duo Plates is compatible with an 8-channel pipette to enable easy pipetting of the samples to the µDrop and µDrop Duo Plates. It can be used for endpoint and spectral measurements.

The cuvette slot is compatible with standard rectangular cuvettes with a stopper. It can be used for endpoint, spectral and kinetic measurements.

Intended use

The µDrop and µDrop Duo Plates enable quick and easy absorbance measurements with low sample volumes and standard rectangular cuvettes with a stopper. The main applications are photometric nucleic acid and protein analysis.

The µDrop and µDrop Duo Plates are intended to be used in research laboratories by professional personnel.

The µDrop and µDrop Duo Plates are designed to be a 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 Practice (GLP) during the analysis process.

General description

The µDrop Plate low-volume measurement area on the left-hand side consists of two quartz slides, the top clear quartz and the bottom Teflon-coated quartz slide (see Figure 2). The bottom slide contains 16 sample positions, arranged in a 2 x 8 matrix, where samples are to be pipetted. The nominal pathlength for the sample is fixed to 0.5 mm. The verified pathlength for each µDrop Plate is indicated on the *quality control measurement report* delivered with the µDrop Plate.

The µDrop Duo Plate has two low-volume measurement areas on the left-hand side (see Figure 4). The verified pathlengths for each µDrop Duo Plate are indicated on the *quality control measurement report* delivered with the µDrop Duo Plate.

On the right-hand side, the µDrop and µDrop Duo Plates have a slot for cuvette measurement (see Figure 1 and Figure 3).

Figure 1. A closed µDrop Plate showing the low-volume measurement area (1), adjustment screw (2), and the cuvette measurement point (3).

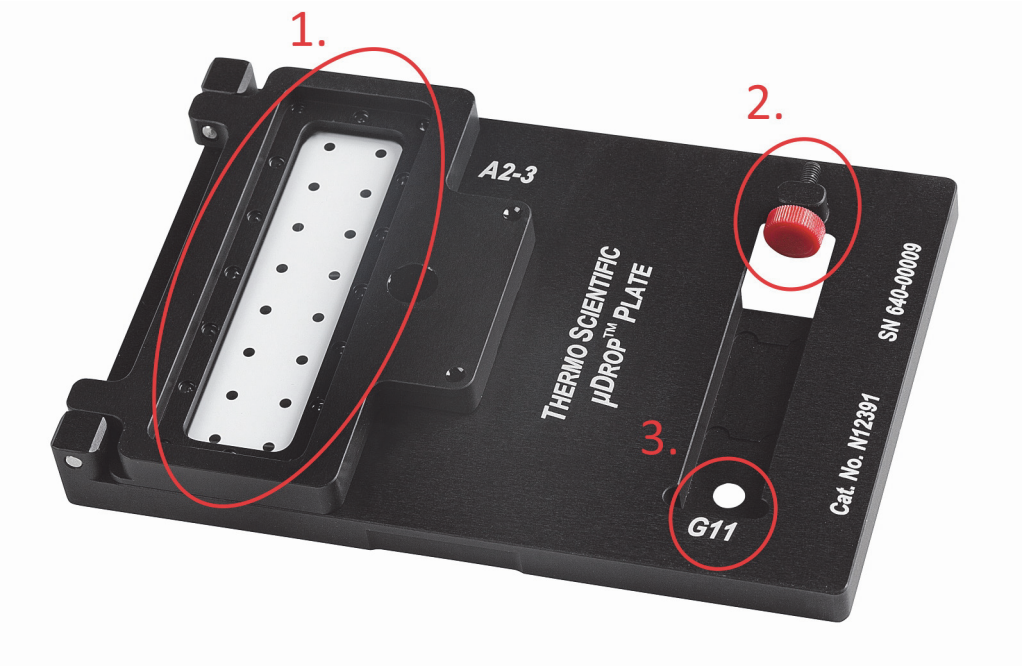


Figure 2. An open µDrop Plate showing the top slide (1), bottom slide (2), sample positions A2 - H3 (2 x 8 matrix) (3), low-volume area (4), and cuvette slot (5).

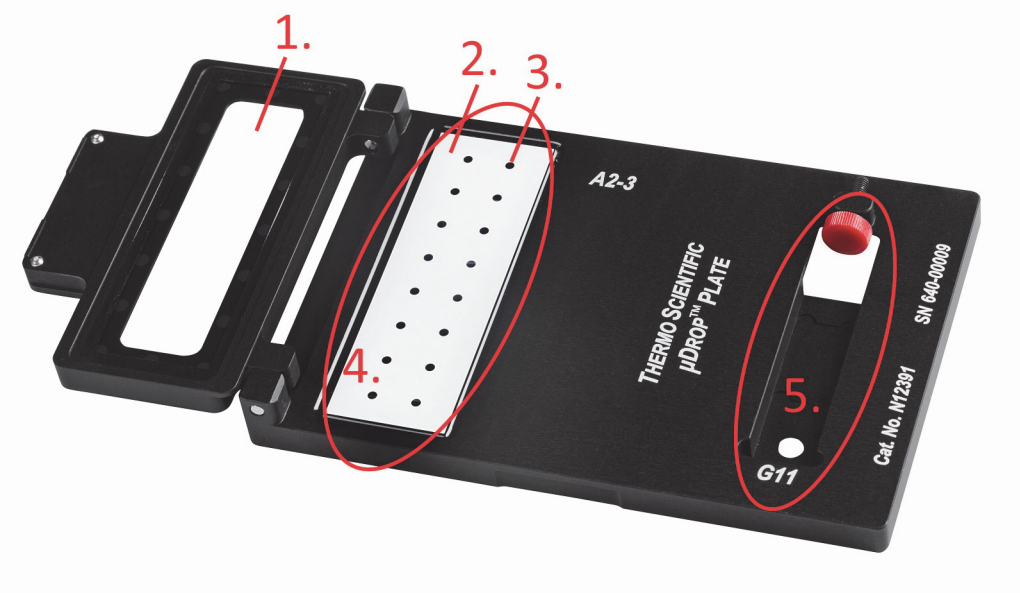


Figure 3. A closed µDrop Duo Plate showing the low-volume measurement area (1), adjustment screw (2), and cuvette measurement point (3).

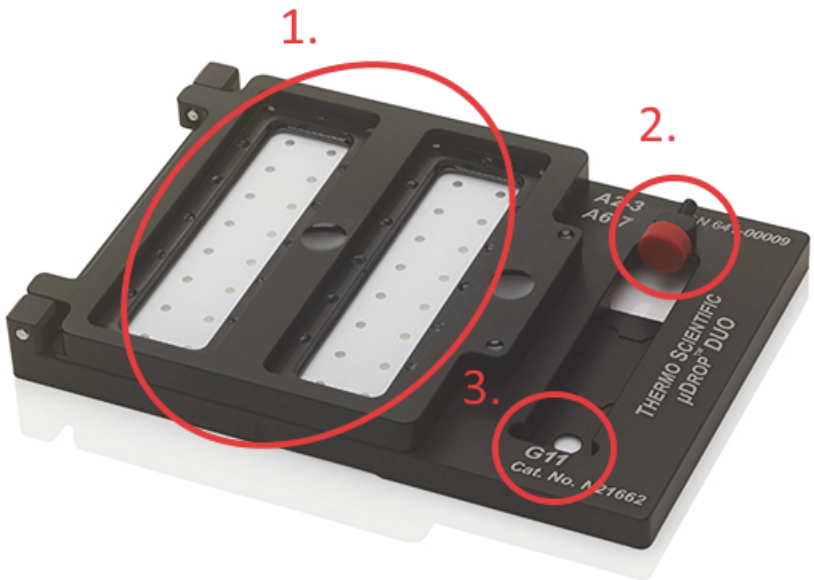
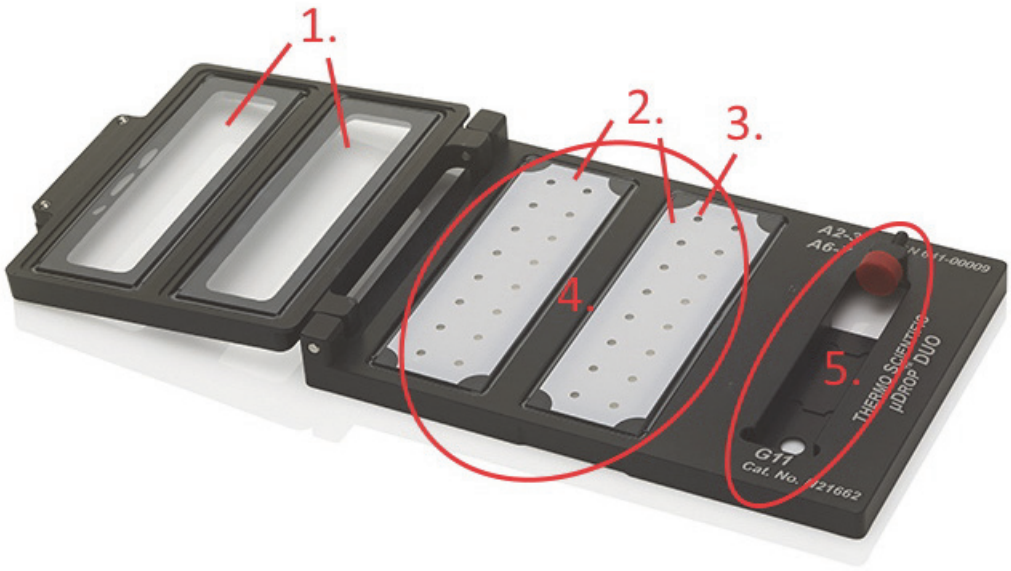


Figure 4. An open µDrop Duo Plate showing the top slides (1), bottom slides (2), sample positions (two 2 x 8 matrixes) (3), low-volume area (4), and cuvette slot (5).



The measurement sessions for Multiskan SkyHigh, Multiskan Sky, Multiskan GO and Varioskan LUX can be created using Thermo Scientific™ SkanIt™ Software. It is also possible to measure the µDrop and µDrop Duo Plates with Multiskan SkyHigh and Multiskan Sky internal software ready-made protocols.

2

Low-volume measurements with SkanIt Software

The µDrop and µDrop Duo Plates are used to perform photometric absorbance measurements from microliter volumes.

Creating a new measurement session

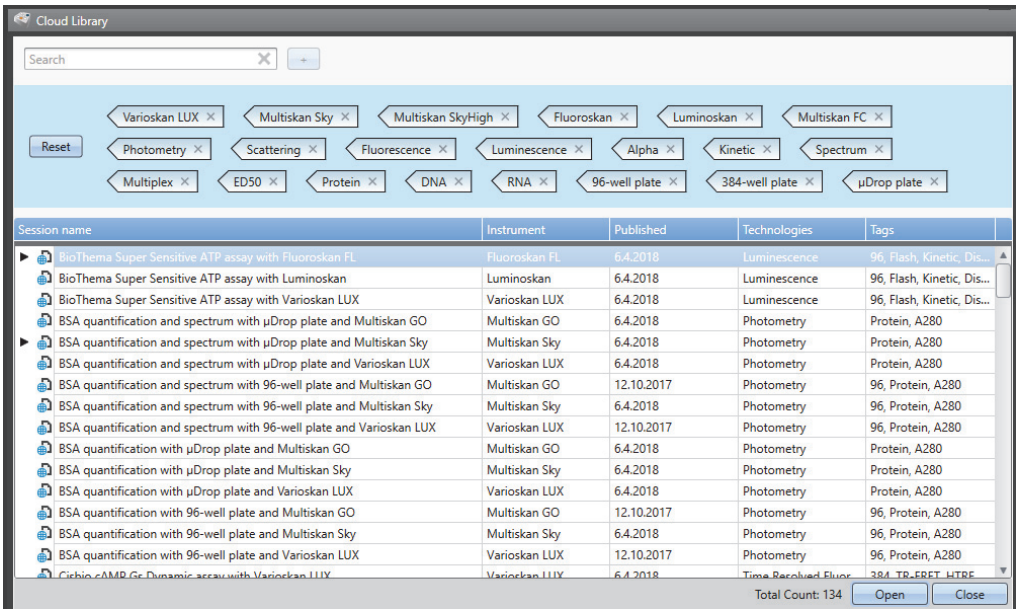
To create new measurement sessions using SkanIt Software:

- Open ready-made sessions.
- Create your own user-defined sessions.

Ready-made sessions

The ready-made sessions for commonly used assays can be downloaded from the SkanIt Cloud Library. You can access the Cloud Library sessions if you have an Internet connection.

Figure 5. SkanIt Cloud library



For more details about the SkanIt Cloud Library, refer to the *Thermo Scientific™ SkanIt™ Software for Microplate Readers Technical Manual* (Cat. No. N16046). It is recommended to visit the SkanIt Cloud Library to get the latest versions of the sessions, and also any possible new sessions.

The demo sessions contain different protocols for photometric quantification of nucleic acids and proteins with representative results. They also contain ready-made calculations for concentrations as well as purity values. For detailed descriptions and instructions for using a certain session, refer to the *Notes* field of the session in question. The sessions can be imported to SkanIt Software and taken into use either as they are or after modifications. For more details about SkanIt Software, refer to the *Thermo Scientific™ SkanIt™ Software for Microplate Readers Technical Manual* (Cat. No. N16046).

Note With Varioskan LUX, use the 96-well adapter for a plate without a lid (ID no. 2).

Pathlength

To be able to follow the Lambert-Beer's law for calculating the concentration of nucleic acids and proteins, the light pathlength of the sample has to be known and it has to be expressed in cm.

The µDrop Plate has a fixed nominal pathlength of 0.05 cm (0.5 mm).

In the case of the µDrop Plate, the pathlength provided in the certificate (in cm) has to be used in the Lambert-Beer's equation to calculate the concentration of the target molecules.

In the case of the µDrop Duo Plate, two pathlengths are provided (one for each 2x8 matrix), and these values need to be separately used in the calculations for the unknown samples located in each matrix.

In the provided sessions, example pathlengths (of, for instance, 0.049 or 0.051 cm) are used in the calculation step of SkanIt Software. For accurate calculations, replace those values with those given on the quality control measurement report of the individual µDrop or µDrop Duo Plate. After replacing the pathlength(s), save the modified session.

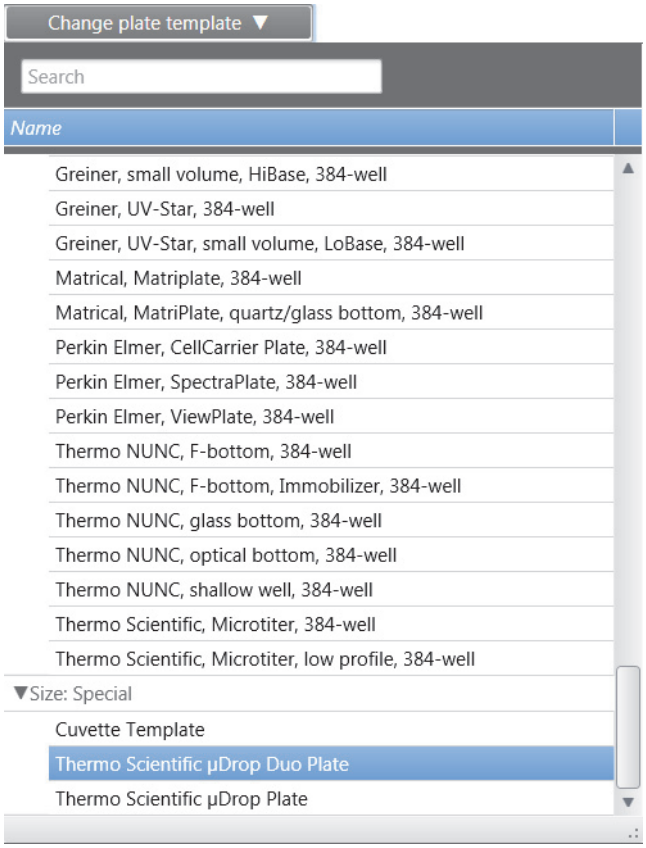
User-made sessions

To create measurement sessions for the µDrop and µDrop Duo Plates, follow the normal SkanIt Software procedure. However, there are certain special features to observe:

1. Plate Layout

   Use the *Thermo Scientific µDrop Plate* or *Thermo Scientific µDrop Duo Plate* plate template in SkanIt Software. Select the correct template from the **Change plate template** dropdown menu, see Figure 6.

Figure 6. Selecting the plate template



All existing sample types are available for the layout (see Figure 7 and Figure 8) and calculations.

Figure 7. Example layout of µDrop Plate containing only blanks

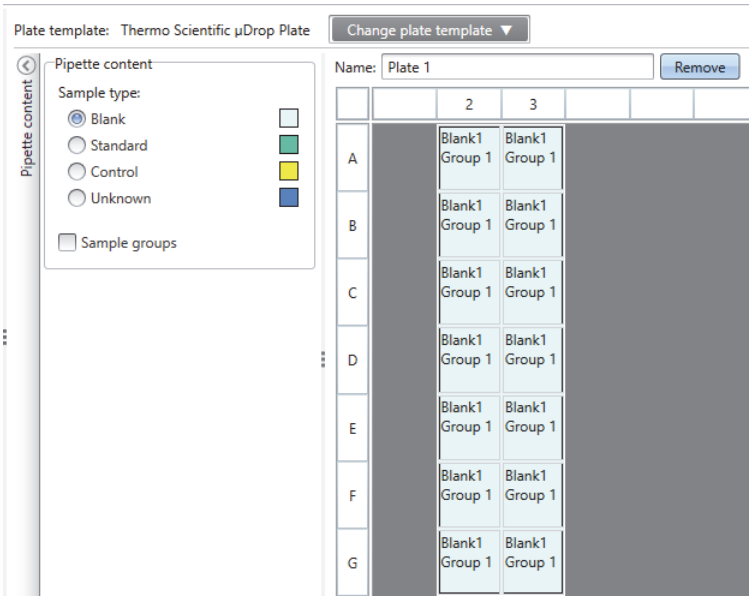
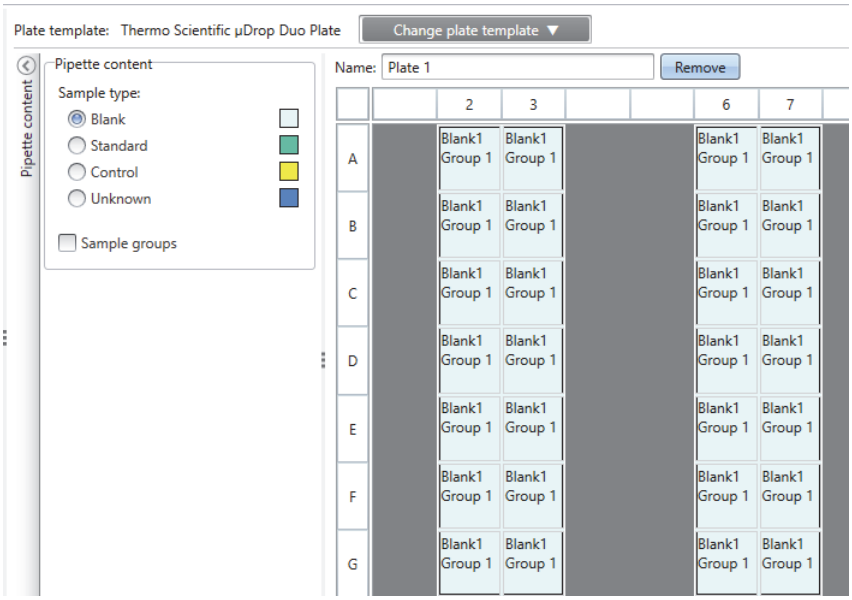


Figure 8. Example layout of µDrop Duo Plate containing only blanks

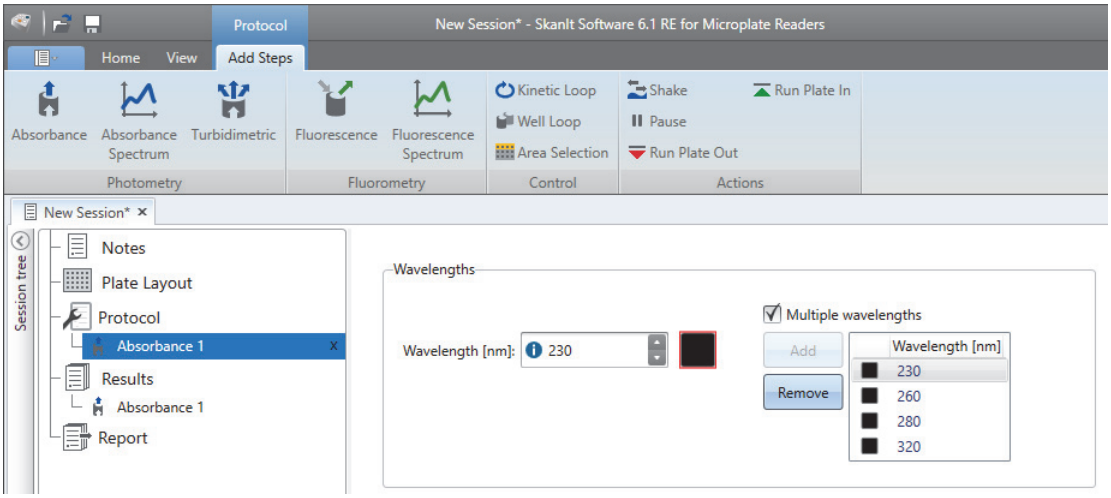


2. Protocol

All photometric measurement types can be used with the µDrop and µDrop Duo Plates. Note that long kinetic measurements or incubation are not recommended due to evaporation.

The µDrop and µDrop Duo Plates can be used in the whole wavelength range of the instrument in question.

Figure 9. Protocol example.



Note The µDrop and µDrop Duo Plates support only photometric measurements.

Note The µDrop and µDrop Duo Plates do not support dispensing.

Note Shaking the µDrop and µDrop Duo Plates is not recommended.

3. Results

   All available calculation methods can be used similarly to normal microplate measurements.

   For the µDrop Plate, the pathlength provided in the certificate (in cm) has to be used in the Lambert-Beer's equation to calculate the concentration of the target molecules.

   For the µDrop Duo Plate, two pathlengths are provided (one for each 2x8 matrix), and these values need to be separately used in the calculations for the unknown samples located in each matrix.

   For example, for calculations of the dsDNA concentrations (µg/mL), the following formula is used:

   c=(A260-A320)*((50 µg/ml)/PATHLENGTH_CM)

   where:

   c = dsDNA concentration in µg/mL

   A260 = absorbance value at 260 nm after blank subtraction

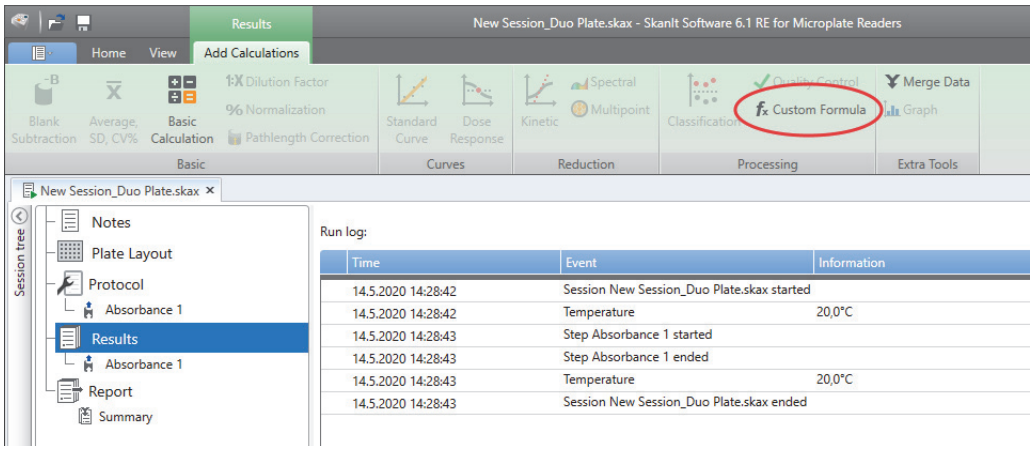
   A320 = absorbance value at 320 nm after blank subtraction

   PATHLENGTH_CM = pathlength value of the µDrop Plate in cm

   For the µDrop Duo Plate, if different pathlengths are reported for each 2 x 8 matrix, then two separate calculations of concentrations need to be carried out. To accomplish that, two different sample groups can be, for instance, created in SkanIt Software (one group for each 2 x 8 matrix). The calculation is then performed separately for each group (2 x 8 matrix side), with the corresponding pathlength value.

   To add the equation, click **Results > Custom Formula** (see Figure 10).

Figure 10. Custom Formula



For more details about SkanIt Software, refer to the *Thermo Scientific™ SkanIt™ Software for Microplate Readers Technical Manual* (Cat. no. N16046).

Blanks

Each measurement should contain a blank subtraction. It is recommended to use at least one blank sample in each measurement. There are different ways to perform the blank subtraction:

- Blanks on the same µDrop or µDrop Duo Plate

- Sample specific blanks
- Previously made blanks

Placing the samples

Before starting the measurement, make sure that the µDrop or µDrop Duo Plate is clean after the previous measurement. For instructions, refer to "Cleaning the µDrop and µDrop Duo Plates" on page 19.

The samples are pipetted to the sample area using either a single or a multichannel pipette. The sample volume must be between 2 and 10 µl, 4 µl recommended.

Possible air bubbles present in the liquid can cause severe errors to the results. It is particularly important to follow good pipetting practices. The use of an 8-channel pipette is recommended. The reverse pipetting technique is strongly recommended to avoid bubbles.

Because of the very small sample volumes, evaporation is an important issue concerning the reliability of the result. Therefore, it is important to pipette the samples into the small wells as fast as possible and perform the measurement as soon as possible after pipetting, especially when using a single pipette.

With smaller sample volumes, a larger evaporation effect can be observed due to changes in concentration.

1. Open the lid covering the dotted sample area (see Figure 2 on page 3 and Figure 4 on page 4).
2. Pipette the samples into the small wells. You can simultaneously measure a maximum of 16 or 32 samples when using the µDrop or µDrop Duo Plate, respectively.
3. Carefully close the lid.
4. Check that each well contains an evenly distributed sample and that there are no visible air bubbles or superfluous particles present.
5. Tilt the µDrop and µDrop Duo Plates shortly upwards to remove possibly remaining air bubbles.

Cleaning

Clean the low-volume area after each measurement. A dry silicon-free lens tissue or soft cloth can be used to wipe down the samples.

For cleaning instructions, refer to "Cleaning the µDrop and µDrop Duo Plates" on page 19.

Cleaning verification

The cleanliness of the µDrop or µDrop Duo Plate can be verified by a simple measurement using distilled deionized laboratory water.

1. Pipette at least 2 µl of distilled deionized laboratory water into each well. Check that there are no air bubbles in the sample.
2. Measure the absorbance in each well with the daily routine measurement wavelength.

3. The absorbance value of a well-cleaned sample position should be below 0.050 Abs with wavelengths above 260 nm. If the absorbance level is too high, clean the µDrop or µDrop Duo Plate thoroughly. For further instructions, refer to "Cleaning the µDrop and µDrop Duo Plates" on page 19.

A spectral measurement is also a suitable tool to verify, for example, traces of DNA in the sample positions.

Cuvette measurements with SkanIt Software

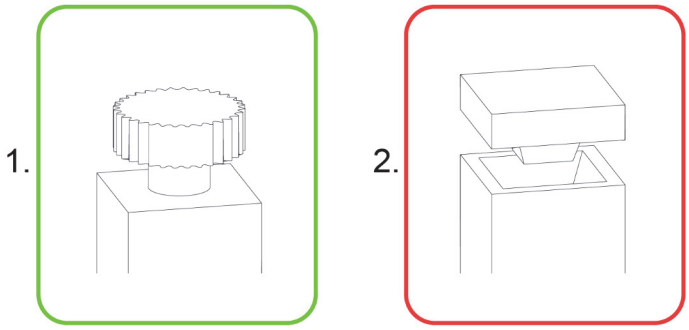
The cuvette slot of the µDrop or µDrop Duo Plate can be used to perform photometric measurements from standard cuvettes.

The µDrop and µDrop Duo Plates are compatible with standard rectangular cuvettes with stopper:

- Dimensions: 12.5 (W) x 12.5 (D) x 47–54 (H) mm
- Beam center height: 8.5 mm
- Beam window: ≥ 4 mm

Note Use only cuvettes with stoppers, for example, Hellma® cuvettes, Article No. 114B-10-40 or 115B-10-40.

Figure 11. Examples of an acceptable (1.) and unacceptable (2.) stopper.



Note Use only quartz cuvettes, black wall cuvettes are recommended for accuracy and precision.

Note Make sure that the cuvette is full. If there is air inside the cuvette, the air will move to the top when the cuvette is horizontal and distort the measurement results.

Placing the cuvette

The cuvette is placed into the cuvette slot with the stopper pointing towards the adjustment screw and the reading window facing upwards (see Figure 12).

Figure 12. Cuvette inserted (µDrop Plate), showing the adjustment screw (1).

The screw should be adjusted according to the length of the cuvette with stopper. You do not need to tighten the screw completely. This will allow convenient handling of the cuvettes in measurement series.

Because of the measurement direction, possible air bubbles present in the liquid can cause severe errors to the results. It is particularly important to follow good pipetting practices. The reverse pipetting technique is strongly recommended.

1. Pipette the sample into the cuvette in a sufficient volume.
2. Close the stopper and check that there are no visible air bubbles or superfluous particles present in the sample.
3. Place the cuvette into the cuvette slot and tighten the adjustment screw, see Figure 12. Ensure that there are no air bubbles in the measurement location (white spot, see Figure 1 on page 2).

Creating a new measurement session

User-made sessions

To create user-made measurement sessions for cuvette measurement, follow the normal SkanIt Software procedure. However, there are certain special features to observe:

1. Plate Layout

   Use the *Thermo Scientific µDrop Plate* or *Thermo Scientific µDrop Duo Plate* plate template in SkanIt Software. Select the correct template from the **Change plate template** dropdown menu.

   Conduct the cuvette measurement from position G11 of the µDrop or µDrop Duo Plate.

Each measurement or a series of measurements should contain at least one blank sample cuvette. The blank is added to the G11 well of the first plate in the layout (see Figure 13 and Figure 15). The unknown samples are added to the following plates, also to position G11 (see Figure 14 and Figure 16). Add plates by clicking **Add new** in the **Plate Layout** ribbon.

All existing sample types are available for the layout and calculations.

Figure 13. Cuvette layout of µDrop Plate with a blank sample cuvette,

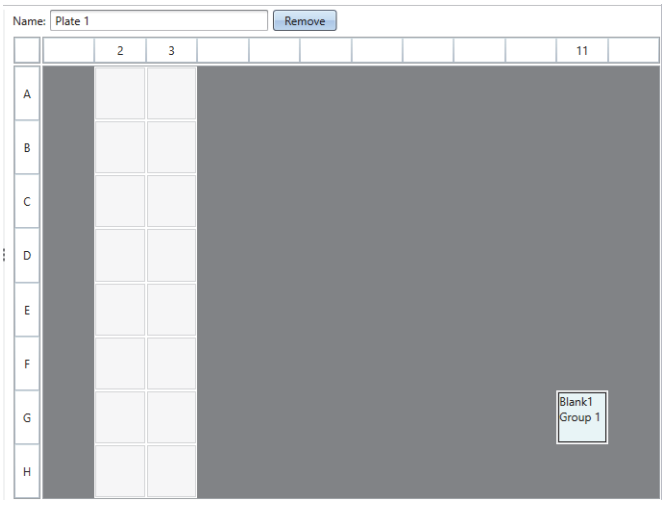


Figure 14. Cuvette layout of µDrop Plate with an unknown sample

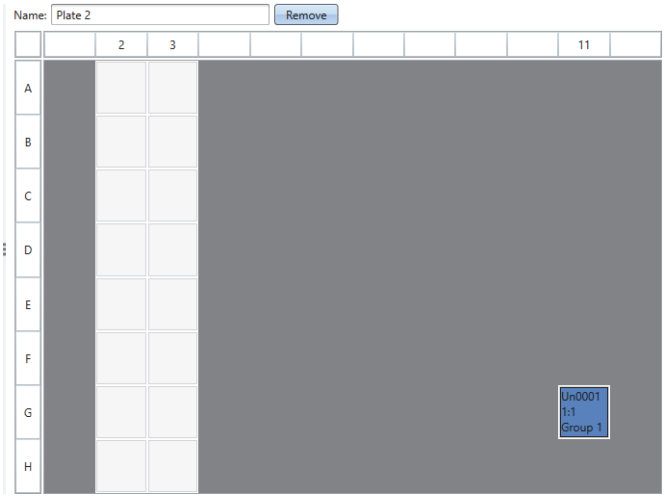


Figure 15. Cuvette layout of µDrop Duo Plate with a blank sample cuvette

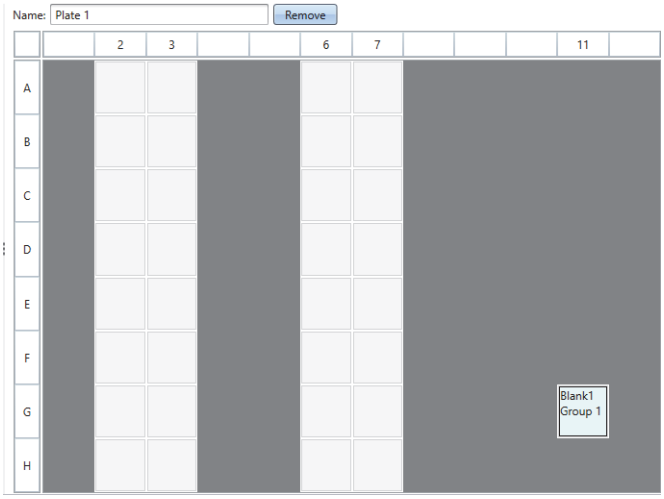
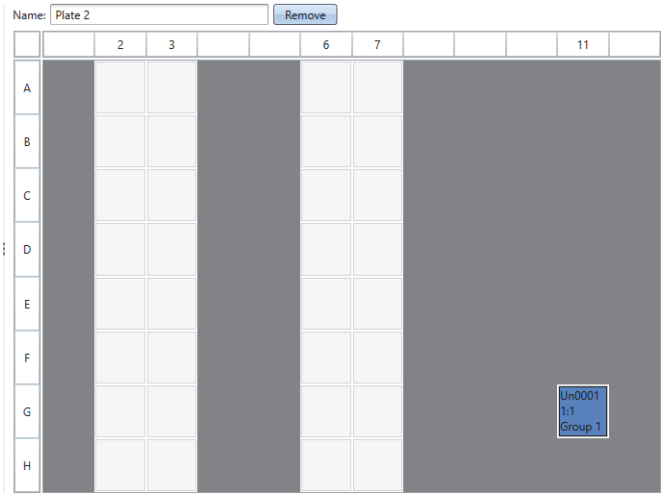


Figure 16. Cuvette layout of µDrop Duo Plate with an unknown sample



2. Protocol

   All photometric measurement types can be used with the cuvette on the µDrop and µDrop Duo Plates.

   - Settle delay (Varioskan LUX only):

     Use the settle delay with the µDrop and µDrop Duo Plates to let the liquid stabilize in the cuvette before measurement.

Note The µDrop and µDrop Duo Plates do not support shaking.

3. Results

   All available calculation methods may be used as with normal microplates.

   For more details about SkanIt Software, refer to the *Thermo Scientific™ SkanIt™ Software for Microplate Readers Technical Manual* (Cat. No. N16046).

4

Setting up a measurement from the instrument

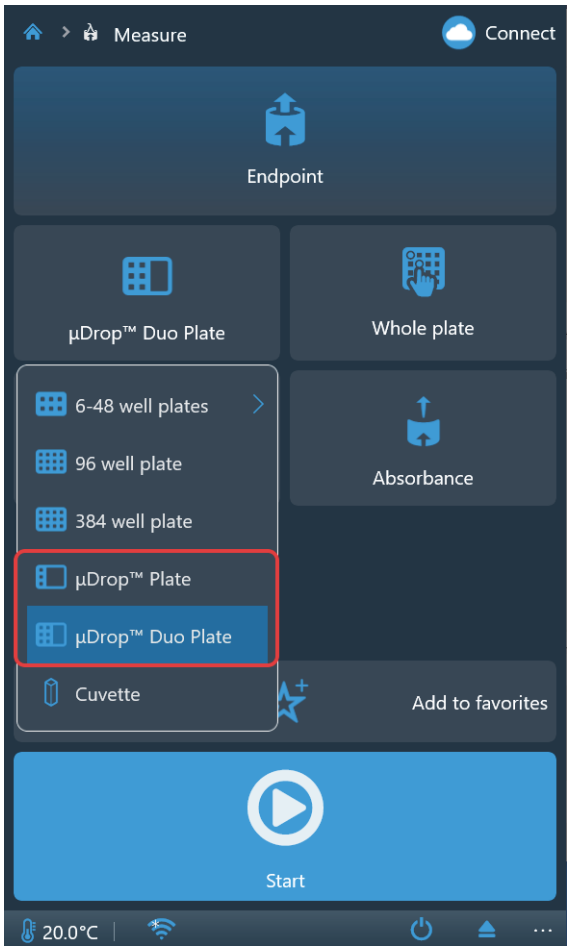
Multiskan Sky and Multiskan SkyHigh can be operated using the touch screen display of the instrument. For more details, refer to the *Thermo Scientific™ Multiskan™ Sky Technical Manual* (Cat. No. N18965) and *Thermo Scientific™ Multiskan™ SkyHigh Technical Manual* (Cat. No. N21872).

Note Before starting the measurement, make sure that the serial number and pathlength(s) of the µDrop or µDrop Duo Plate have been defined in the **Settings** of the instrument.

To measure the µDrop or µDrop Duo Plate:

1. Load the µDrop or µDrop Duo Plate to the instrument.
   - If the plate carrier is in, push the power button to drive it out.
   - When measuring a cuvette, place the cuvette into the cuvette slot. For instructions, see "Placing the cuvette" on page 13.
2. Access the measurement from the **Home** screen of the instrument.

3. Select the µDrop Plate or µDrop Duo Plate plate template.



4. Define the measurement parameters.
5. Tap **Start** to start the measurement.
6. View the results of the measurement.
7. Export the results if desired.

Maintenance

Regular and preventive maintenance

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

µDrop and µDrop Duo Plates care

Always store the µDrop or µDrop Duo Plate in its own case when not in use to keep the quartz surfaces free of dust. Remove any dust particles on the Teflon or quartz surfaces with compressed air.

Note Handle the Teflon and quartz surfaces with care. Do not use any cleaning materials that may scratch the surfaces.

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

WARNING If any surfaces are contaminated with biohazardous material, a mild sterilizing solution should be used.

Cleaning the µDrop and µDrop Duo Plates

Clean the µDrop or µDrop Duo Plate after each measurement as stated below.

1. Use disposable gloves.
2. Wipe the samples with a dry lens tissue or soft cloth. The lens tissue must not contain silicon.
3. Clean both surfaces in contact with the sample of the low-volume area with a lens tissue dampened with deionized distilled laboratory water.
4. If necessary, clean also both outside surfaces of the sample area with a dry lens tissue or a soft cloth dampened with deionized distilled laboratory water.
5. If necessary, clean the other parts of the µDrop and µDrop Duo Plates with a soft cloth dampened with distilled deionized laboratory water or a mild detergent.
6. Perform cleaning verification. For more information, refer to “Cleaning verification” on page 10.

WARNING If you have spilled infectious agents on the µDrop or µDrop Duo Plate, decontaminate the µDrop or µDrop Duo Plate. Refer to "Decontamination procedure" on page 20.

CAUTION Do not use any solutions containing high concentrations of oxidative chemicals, such as hypochlorites and peroxides or strong bases, on any of the anodized aluminum surfaces as this may cause permanent damage to the finish.

WARNING Ensure that the bottom of the µDrop or µDrop Duo Plate is dry. Fluid on the bottom of a µDrop or µDrop Duo Plate may present a contamination hazard. Use good laboratory practices (GLP) when handling any hazardous materials.

Troubleshooting

Bubbles or dirt on the sample may affect the measurements. In case of suspicious results:

1. Check that there are no air bubbles in the sample.
2. Check that all the quartz surfaces are clean. Clean the µDrop or µDrop Duo Plate, if necessary.

Disposal of materials

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

WARNING Samples may be infectious. Dispose of all used disposable cuvettes, disposable tips, and disposable gloves and so on as biohazardous waste. Exercise caution and always use disposable gloves.

Decontamination procedure

If you have spilled infectious agents, follow decontamination procedures.

WARNING Decontamination procedures should be performed by authorized trained personnel wearing disposable gloves, protective glasses and clothing in a well-ventilated room.

Perform decontamination in compliance with normal laboratory procedures. Follow any decontamination instructions provided with the reagents used.

It is strongly recommended to perform a complete decontamination procedure before relocating the µDrop or µDrop Duo Plate from one laboratory to another, or before sending it for service. The µDrop or µDrop Duo Plate should be placed in its own case. For shipping the µDrop or µDrop Duo Plate, the case must be put in a shipping box to prevent the µDrop or µDrop Duo Plate from breaking during shipping.

Examples of decontaminants:

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

CAUTION Autoclaving is not allowed because it can break the µDrop or µDrop Duo Plate.

To decontaminate the µDrop or µDrop Duo Plate:

1. Prepare the decontaminant.
2. Clean the low-volume area. Ensure that you are wearing disposable gloves. Refer to ""Cleaning the µDrop and µDrop Duo Plates" on page 19.
3. Disinfect the outside of the µDrop or µDrop Duo Plate or remove stains using a cloth dampened with the decontaminant solution.
4. Place the µDrop or µDrop Duo Plate in a plastic bag. Ensure that the lid is open.
5. Place a cloth soaked in a prepared decontaminant solution into the bag. Ensure that the cloth is not in constant contact with the µDrop or µDrop Duo Plate during the decontamination procedure.
6. Close the bag firmly and leave the µDrop or µDrop Duo Plate in the bag for at least 24 hours.
7. Remove the µDrop and µDrop Duo Plates from the bag.
8. After decontamination, clean the µDrop or µDrop Duo Plate using a mild detergent.

Disposal of the µDrop and µDrop Duo Plates

If the µDrop or µDrop Duo Plate has been exposed to potentially infectious chemical samples, toxic or corrosive chemicals, or radioactive chemicals, follow the waste management procedures on the µDrop or µDrop Duo Plate to ensure that there is no risk of contamination.

WARNING Decontaminate the µDrop or µDrop Duo Plate before disposal. Refer to "Decontamination procedure" on page 20.

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

Use the recycling operators familiar to you for the original packaging and packing materials.

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

Technical specifications

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

General specifications

Table 1. General specifications

Overall dimensions	127.8 mm (W) x 85.5 mm (D) x 14.5 mm (H) [5.0” (W) x 3.4” (D) x 0.57” (H)]
Weight	0.161 kg / 0.4 lbs
Low-volume function	µDrop Plate: 16 measurement positions in a 2 x 8 matrix µDrop Duo Plate: 2 x 16 measurement positions in two 2 x 8 matrixes Sample volume: 2 µl to 10 µl
Cuvette function	Cuvette with stopper: Dimensions: 12.5 (W) x 12.5 (D) x 47–54 (H) mm Beam center height: 8.5 mm Beam window: ≥ 4 mm
Wavelength range	200–1000 nm