

Operating Manual

ScanDrop²

Nano-volume Spectrophotometer



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1 Basic information

1.1 User manual notes

Contents	The user manual informs about the design and function of the ScanDrop ² and provides the necessary know-how for the safe handling of the device and its components. Furthermore, the user manual includes information on the maintenance and servicing of the device as well as hints on potential causes for malfunctions and their correction.
Conventions	<p>Instructions for actions which occur in chronological order are numbered and combined in action units.</p> <p>Warnings are indicated by warning triangles and a signal word. The type, source and consequences of the danger are stated together with notes on preventing the danger.</p> <p>The elements of the control and analysis program are indicated as follows:</p> <ul style="list-style-type: none">▪ Program terms are indicated by small caps (e.g., FILE menu).▪ Buttons are shown by square brackets (e.g., [OK])▪ Menu items are separated by arrows (e.g., FILE ► OPEN).
User requirements	<p>These instructions are aimed at qualified specialist users with knowledge of UV/Vis analysis. The instructions are limited to describing the functionality of ScanDrop².</p> <p>For the safe operation of the ScanDrop², knowledge of the "FlashSoftPro²" or "FlashSoftPro² touch" operating instructions is also required. Basic knowledge of working with a computer are required.</p>
Symbols and signal words	The user manual uses the following symbols and signal words to indicate hazards or instructions. The warnings are always placed before an action.



WARNING

This signal word indicates medium risk hazards. If not avoided, they can lead to death or serious injuries.



CAUTION

This signal word indicates low risk hazards. If not avoided, they can lead to minor or moderate injuries.



ATTENTION

Provides information on potential material or environmental damage.

1.2 Intended use

The ScanDrop² is a UV/Vis spectrophotometer that was specially designed for the analysis of microliter samples with a minimum sample volume of 0.3 µL and a maximum of 2 mL. The ScanDrop² is a combined device that is capable of accepting different cell adapters for measuring of up to 16 samples. The device can optionally be delivered as a standalone system with an integrated control unit.

The ScanDrop² is intended for general laboratory operation. In the fields of medicine and diagnostics, its use is limited to research. The ScanDrop² including its original accessories may only be used for the applications described in this instruction manual. The manufacturer does not accept liability for any other use, including that of any individual modules or components.

1.3 Warranty and liability

The warranty duration and liability comply with the legal requirements and the provisions in the general terms and conditions of Analytik Jena.

Deviations from the intended use described in this user manual result in limitations of warranty and liability in the event of a damage. Damage to wearing parts is not included in the warranty.

Warranty and liability claims are excluded for personal injury and property damage due to one or several of the following causes:

- use of the ScanDrop² other than intended
- improper commissioning, operation and maintenance of the device
- modifications of the equipment without prior consultation with Analytik Jena
- unauthorized intervention in the equipment
- operation of the device with faulty safety equipment
- use of other than original spare parts, wearing parts or consumables
- improper repairs
- faults due to the non-observance of this user manual

2 Safety instructions

2.1 General notes

For your own safety and for a trouble-free operation carefully read this chapter before commissioning the ScanDrop².

Comply with all safety instructions in the manual and pay careful attention to all messages and notes which are displayed on the screen by the control software.

Also, observe the safety instructions for system components by other manufacturers supplied with this device (e.g. PC, printer). It is particularly important to comply with the safety instructions on the labels as well as the information on handling, storage and disposal of the reagents and cells.




Besides the safety instructions in this user manual and the local safety regulations that apply to the operation of the device the general applicable regulations regarding accident prevention, occupational health and safety and environmental protection of the respective country of use have to be observed and complied with. The operator must ascertain the latest version of these regulations.

References to potential dangers do not replace the work protection regulations which must be observed.

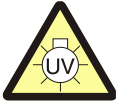

2.2 Safety labeling on the ScanDrop²

Warnings and information symbols have been attached to the ScanDrop² which must always be observed.

Damaged or missing warnings and information symbols can cause incorrect actions leading to personal injury or material damage! The symbol labels must not be removed! Damaged labels must be replaced without delay!

Icons	Meaning	Remark
	Warning against a hazard location	Warning text on equipment backplate: Vor Öffnen Netzstecker ziehen! Unlock power cable before opening!
	Before opening the device always disconnect the mains plug	Before opening the device: Switch off the device and disconnect the mains connector from the device!
	Observe the operating manual.	Prior to starting work read the operating manuals. (The information symbol is attached to the type plate.)

The two following warnings are affixed in the inside of the device. They are mainly directed to Customer Service personnel who open the device for maintenance.

Warning symbol	Meaning	Remark
	Warning of UV radiation	Do not look directly or indirectly via a mirror into the beams of the UV lamp. The lamp radiation can cause conjunctivitis! The device is designed in such a way as to prevent the customer from looking into the lamp radiation during measurements.
	Warning of electric voltage	Lethal voltages may occur in the device! Maintenance may only be done on the switched-off device, from which the mains plug has removed.

2.3 Requirements for the operating personnel

The ScanDrop² may only be commissioned, operated and serviced by trained personnel instructed in technical safety. The instruction must also include conveying the content of this user manual and the user manuals for the FlashSoftPro² (*touch*) software.

It must be ensured that only authorized personnel works at the device.

The operating personnel must be familiar with the dangers arising from samples to be analyzed and excipients used. The appropriate protective equipment must be used.

2.4 Safety instructions, transport and installation

Only transport the device in its original packaging! Ensure that the transport protections have been fitted and the sample compartment is completely empty.

The ScanDrop² weighs approx. 10 kg. Since it does not have carrying handles, the device must be gripped firmly with both hands at the lower end for carrying or lifting in order to move it.

The guide values and statutory limits for lifting and carrying loads without auxiliary equipment must be observed and adhered to.

2.5 Safety instructions - operation

2.5.1 General

- The operator of the ScanDrop² must make sure before each commissioning that the condition of the device is sound. This applies in particular after each modification or extension of the device or its repair.
- Free access to the device switch on the enclosure wall must be ensured during operation.
- There is a slight risk of crushing when closing either of the two cell compartments. The ScanDrop² senses if the operator's hand or fingers are positioned in the infeed area of the large cell compartment on the front. The motors then stop the closing movement. However, the operator should still keep a safety distance.

- Caution when handling glass components (e.g. cells). Risk of broken glass and therefore risk of injury!
- The ventilation equipment on the device must be in good working condition. Covered ventilation grilles or slits etc. may cause the device to break down or may cause damage to it.
- Ensure that no liquid can enter the ScanDrop². The device could be damaged.
- Do not place the ScanDrop² in the immediate vicinity of aggressive vapor, e.g. strongly corrosive acid, lye or solvents! The vapor can corrode the terminals, mechanical and optical components of the device. Avoid contamination of the sample chamber with strongly corrosive substances or highly volatile solvents!
- The sound level during graphite tube furnace operation may be up to 69 dB.

2.5.2 Safety instructions - Protection against explosion and fire

The ScanDrop² must not be operated in an explosive environment.

2.5.3 Safety instructions - electrical equipment

- Work on the electrical components of the ScanDrop² may only be performed by a qualified electrical technician according to applicable electro-technical regulations. Lethal voltages are present inside the device!
- The ScanDrop² and its system components (PC) must always be switched off before being connected to the mains.
- The mains plug must only be inserted into a shock-proof socket to guarantee protection class I (protective conductor connection) for the device. The protective effect must not be invalidated by the use of an extension line which does not have a protective conductor.
- Before connecting the ScanDrop² to the mains check that the operating voltage specified on the type plate at the rear of the device matches the mains voltage at the intended socket. Operation with a voltage other than the specified operating voltage can destroy the device.
- Before opening the device it must be switched off on the device switch and the mains connector must be disconnected from the mains outlet!
- The device must be switched off immediately at the device switch (on the enclosure wall) and the power supply disconnected from the mains if there is any interference with the electric components.

2.5.4 Handling hazardous substances

- The operator is responsible for the selection of substances used in the process as well as for their safe handling. This is particularly important for radioactive, infectious, poisonous, corrosive, combustible, explosive and otherwise dangerous substances. For your own safety, please observe the potential infectious qualities of the examined biological material.
- When handling dangerous substances local safety codes and guidelines must be observed. The notes in this user manual do not replace the specific local regulations

or the regulations in the EC safety data sheets of the manufacturers for the auxiliary and operating materials.

- The operator is responsible for carrying out suitable decontamination should the device be contaminated externally or internally with dangerous substances. For suitable disinfection agents and procedures see the chapter entitled "Maintenance and care". Other disinfection agents that are not included in the list may only be used after consultation with Analytik Jena GmbH.
- Use cells with lids for samples that are dissolved in flammable organic solvents. For measuring with CHIPCUVETTE and Butterfly Cuvette, there is no risk of fire since only small sample volumes of no more than 4 µL per measuring space are measured.
- Spots, drops or larger reagent spillages should be removed and cleaned using an absorbent material such as cotton wool, laboratory wipes or cellulose.

2.6 Behavior during emergencies

If there is no immediate risk of injury and if this is possible immediately switch the device switch of the ScanDrop² and the connected system components (PC) in the "0" position during dangerous situations or in case of accidents and disconnect the mains plugs from the mains outlets!

For the PC there is a risk of data loss and damage to the operating system!

2.7 Safety instructions: service and repair

- Maintenance of the ScanDrop² is generally done by the customer service department of Analytik Jena or its authorized and trained specialist personnel.
- Independent servicing can maladjust or damage the device. Therefore, the operator may generally only carry out the tasks listed in chapter "Maintenance and care".

3 Function and setup

3.1 The ScanDrop²

The spectrophotometer

The ScanDrop² is a robust UV/Vis spectrophotometer that was specially designed for the analysis of microliter samples with a minimum sample volume of 0.3 μL and a maximum of 2 mL. The ScanDrop² can be used to measure absorption, transmission and energy in the wavelength range from 190 nm to 1,000 nm. It takes only 1.6 s to 12.8 s to record a complete spectrum. In addition, the user can select for measuring individual wavelengths at 0.5 nm increments from the entire UV/Vis spectrum.

Offering a high resolution, the symmetrical Czerny-Turner layout ensures a high degree of measured value stability and reproducibility. The light source, a longlife Xenon flash lamp, is immediately ready for operation without warming up. Working without movable components, the polychromator system is permanently adjusted and insensitive to external influences. No calibration is required.

The cell compartments

The ScanDrop² can be used to process individual samples or serial analyses of up to 16 samples with 2 pathlengths. For individual samples, the ScanDrop² has an integrated measuring position for 10 mm cells ($V_{\text{max}} = 2.0 \text{ mL}$). In this measuring position it is also possible to use fiber optics micro measuring cells (e.g. TrayCell).

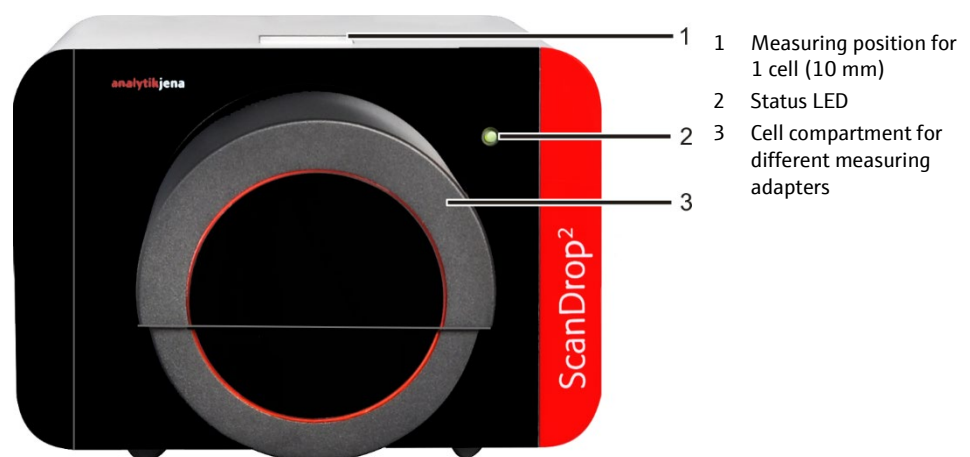


Fig. 1 Front view of the ScanDrop²

On the front of the ScanDrop², there is a cell compartment for diverse measuring adapters. Controlled by the software, the large door on the front opens in a 180° rotating movement. The direction of the opening mechanism can be selected depending on right or left-handed operation. The sensor system notices if the user unintentionally places his hand or fingers in the infeed area of the cell compartment and stops the rotating movement immediately. If the operator manually opens the cell compartment during an ongoing measurement, the ScanDrop² control electronics immediately stops the measurement and switches the Xenon flash lamp off. In this way there is no danger of being blinded by the UV radiation.

The magnetic carriage with 2 dowel pins positions the different adapters in a very precise manner. The layout of the magnet poles prevents inserting in the wrong direction. In addition, the software detects the presence of any incorrect adapters inside the device. The carriage moves the inserted adapter to the measuring position inside the device. The 2D scanning range of the ScanDrop² enables detection of samples at dif-

ferent center heights ranging from 8.5 to 15 mm. Thus the ScanDrop² is ideally suited for the use of different cells.

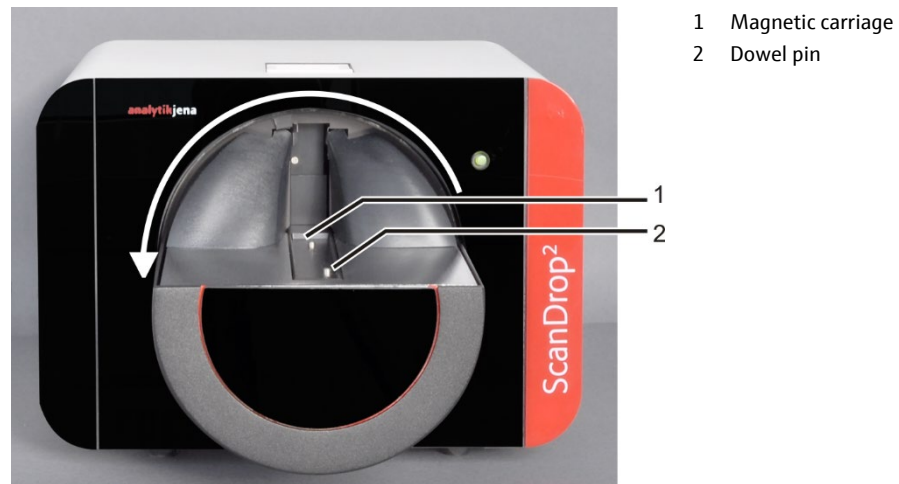


Fig. 2 ScanDrop² with opened cell compartment

The control unit

The ScanDrop² can optionally be supplied as a standalone system with an integrated control unit. Using a 10" Tablet, the ScanDrop² can be operated via the color touch display with FlashSoftPro² software. Alternatively, the ScanDrop² can be controlled via a PC or laptop. Switching at a later stage is also easily possible.



Fig. 3 ScanDrop² with integrated control unit

The FlashSoftPro² control and analysis software is available both as a standard PC version and as Touch Software for the tablet. The software includes a series of pre-installed methods for nucleic acid and protein analysis.

The software enables:

- Quantitative analyses with three calibration models
- Biochemical analyses
- Analyses with freely programmable formulas
- Cyclical or kinetic sample measurements
- User administration with 3 authorization levels
- Import and export of data via USB stick and bar code reader

3.2 Cells and adapters

In addition to the cell position for 1 standard cell (10 mm), the ScanDrop² can accommodate different cells (with adapters) for multiple sample measuring:

- CHIPCUVETTE
- Butterfly Cuvette (flip-top cuvette)
- 8-cell changer

CHIPCUVETTE

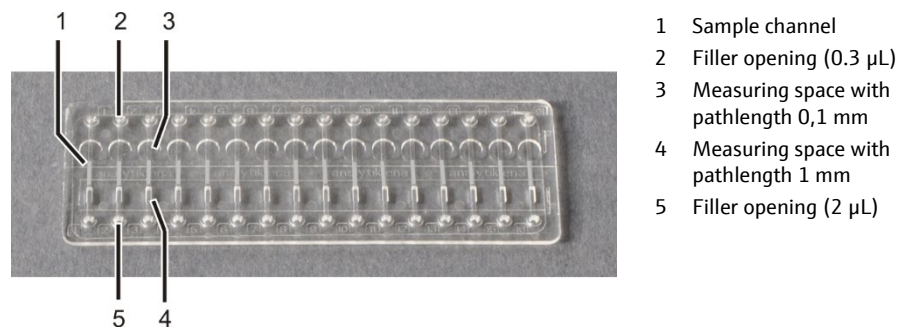


Fig. 4 CHIPCUVETTE

The patented CHIPCUVETTE can be used to measure minimal samples volumes ranging from 0.3 µL to 4 µL. The cell has 16 micro channels each of which has two different pathlengths of 0.1 mm and 1.0 mm. Since each sample can be measured at two pathlengths, it is not necessary to dilute it during preparation for the measurement. With the CHIPCUVETTE, a total of 32 measurements can be made per measurement run.

Channel depth	Filling quantity	Pipette tips
0.1 mm	0.3 µL	0.1-20 µL
1 mm	2 µL	up to 200 µL
both	4 µL	

Each channel has two measuring spaces: a shallow one (pathlength 0.1 mm) and a deeper one (pathlength 1 mm), each having its own filler opening. The sample channels are designed to have through-going openings so that they can be filled free of bubbles. Optionally, both measuring spaces can be filled or, in the case of very small sample quantities, only the shallow one or only the deep one.



Fig. 5 CHIPCUVETTE, inserted into the adapter

Analytik Jena offers a special measuring adapter for measuring with CHIPCUVETTE.

Butterfly Cuvette

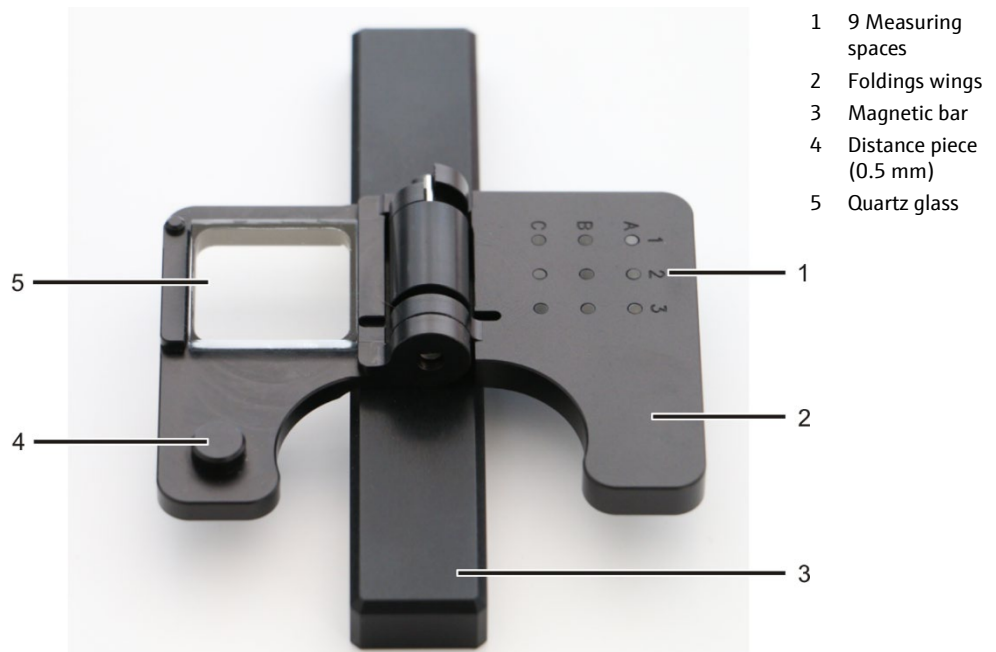


Fig. 6 Butterfly Cuvette

The Butterfly Cuvette was developed for measuring 6 samples with a volume of 2.0-4.0 μ L and 3 references (in column 1). Measurement preparation only consists of pipetting of the samples. After inserting into the ScanDrop², the Butterfly Cuvette is automatically folded closed for measuring. The sample is irradiated with a defined pathlength of 0.5 mm in the liquid bridge that is located between the quartz glass pane and the measuring space.

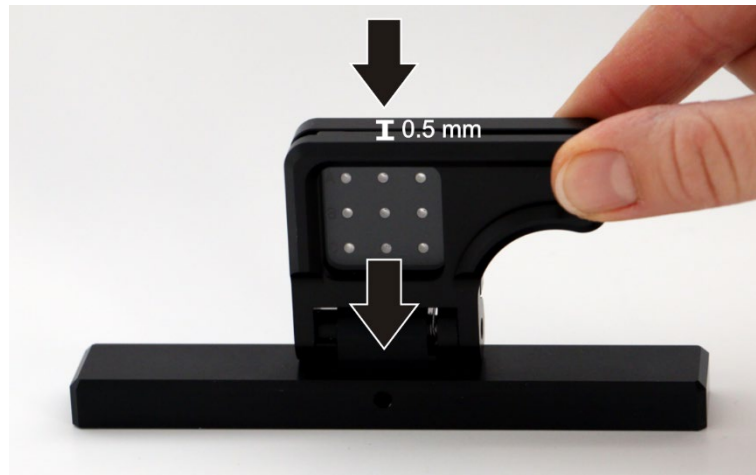


Fig. 7 Beam path through the Butterfly Cuvette

The cell is made of a composite of quartz glass and metal. It can be cleaned and re-used, rendering the measurement free of expendable materials.

8-cell changer

An 8-cell changer capable of accepting up to 8 cells (10 mm) is also available for the ScanDrop². The cells are automatically positioned in accordance with the center heights configured in the software, making it possible to use various cells with center heights of 8.5 mm, 12 mm and 15 mm.

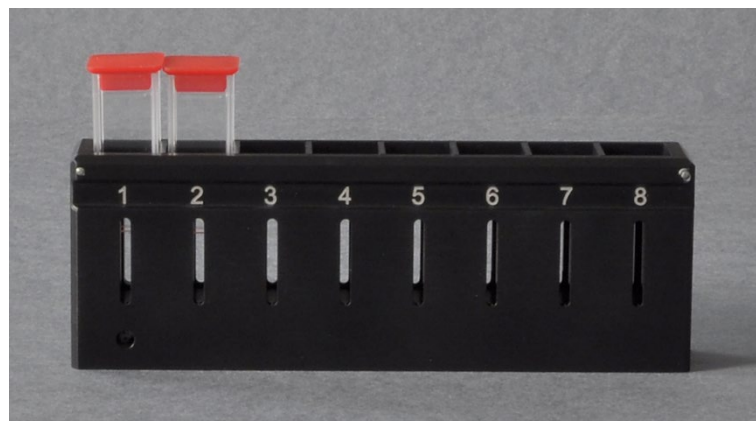


Fig. 8 8-cell changer

3.3 Connections and control elements

The connections and control elements of the ScanDrop² are easily accessible at the front face and on the rear of the device.

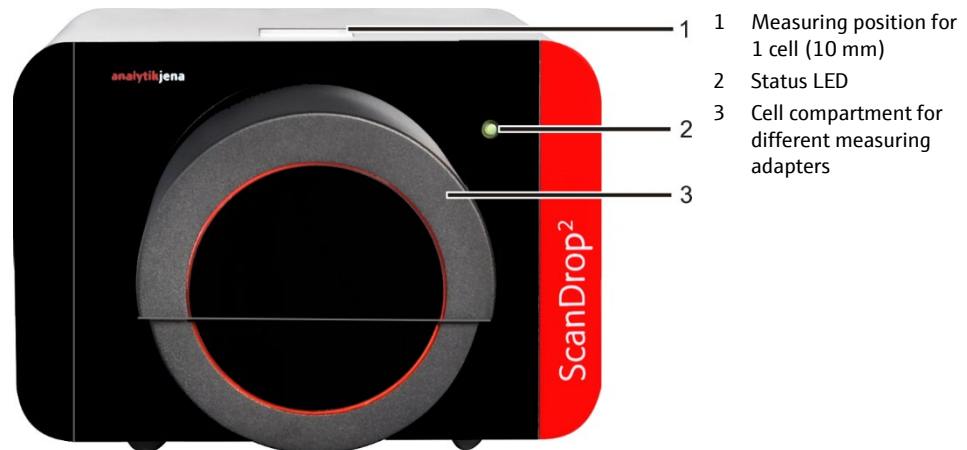


Fig. 9 Cell compartments

The cell compartment for 1 standard cell (10 mm) is positioned at the top of the ScanDrop². On the front, there is the large cell compartment, which accepts CHIPCU-VETTES, the Butterfly Cuvette and the 8-cell changer. Opening and closing of this cell compartment is controlled by the software.

The Status LED on the front of the device lights up green when the ScanDrop² is switched on and ready for operation. In the event of incorrect operation or device fault, the color of the LED changes to red.

The mains socket and the mains switch are located on the rear of the device. The USB connector for optional control of the ScanDrop² via PC or Laptop is also located here.

The optionally available tablet is connected to the ScanDrop² via a support bracket with an interface. The support bracket is fastened to the device by means of four hex-agon socket screws on the rear of the device.

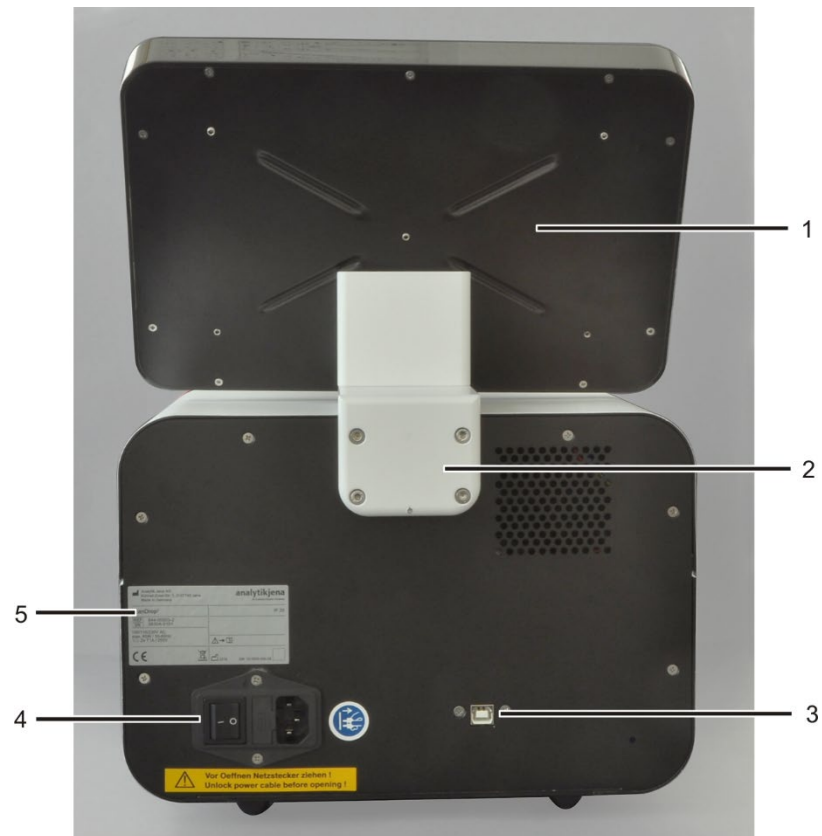
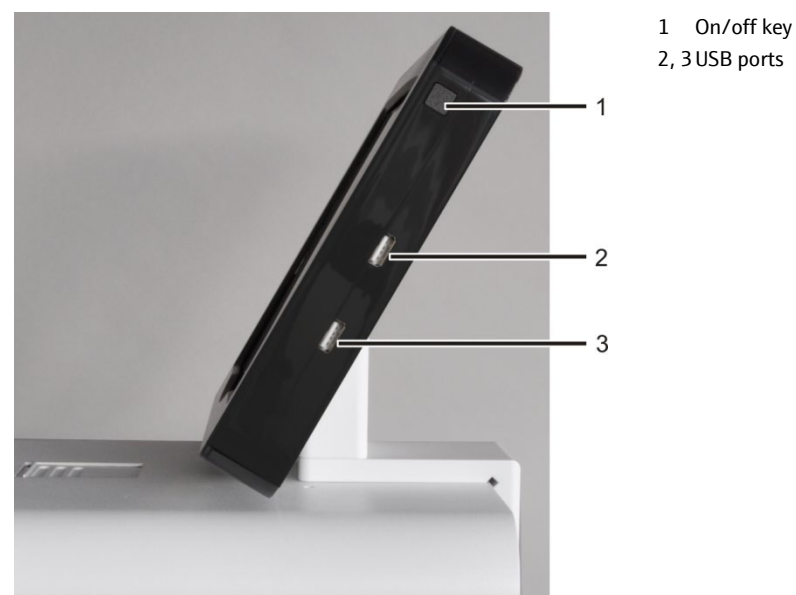


Fig. 10 Rear of the device with tablet

- | | |
|-------------------|-----------------------------------------------------|
| 1 Tablet | 4 Mains switch,
Fuse holder,
Mains connection |
| 2 Support bracket | |
| 3 USB port for PC | 5 Type plate |

The tablet

The tablet has its own on/off key. The two USB ports can be used for data transfer via USB stick or bar code reader.



- 1 On/off key
2, 3 USB ports

Fig. 11 Connections and control elements of the tablet

Type plate

The type plate, which contains, among other things, the serial number and the electrical connection data, can also be found on the rear of the device.

Overview 1	Information on the type plate
Manufacturer (with address)	Analytik Jena GmbH, Konrad Zuse Str. 1, 07745 Jena, Germany, Made in Germany
Device type and model	ScanDrop ²
Order number	REF 844-00503-2
Serial number	e.g. SN 3830A-0103
Voltage	110-230 V AC
Max. power consumption	max. 30 W
frequency	50-60 Hz
Internal device fuses	2 x T3,15 A / 250 V
CE marking	
Waste disposal symbol acc. to WEEE directive	Meaning: Do not dispose of as domestic waste!
Protection class of the housing	IP 20
Safety symbols	Attention! Observe accompanying documents!
Year of manufacture	e.g. 2017
Device number	GN 10-3830-500-26

4 Installation and commissioning

4.1 Site requirements

Installation conditions The following requirements are placed on the climatic conditions in the operating room of the ScanDrop²:

- Temperature range: +5 °C to +35 °C
- Max. humidity: 80 % at 30 °C

The operating room should have the characteristics of a biological-chemical laboratory. The atmosphere must be low in dust and free from draft and aggressive vapors.

Observe the following notes regarding the installation site of the device:

- The floor of the operating room must be stable, level, dry and vibration-free.
- Avoid dripping water, water accumulations and splashing water near the device.
- Do not install the device in the direct vicinity of doors, windows or heat sources nor near sources of electromagnetic interference.
- Avoid direct sunlight and radiation from heaters onto the ScanDrop²; if necessary ensure air conditioning.
- Always ensure free accessibility of the device and make sure that the ventilation slots are not obstructed by other equipment or installations.

Space requirement

The ScanDrop² has a minimum footprint of 290 x 260 mm. On the rear of the device (with electric connections and ventilation slots) allow a minimum distance of 100 mm from walls or other equipment. The space requirement of the ScanDrop² depends on the use of an integrated control unit (see overview below). Allow sufficient space for any accessories as well as for a computer, monitor and – if applicable – printer.

Mass	approx. 10 kg
Footprint (W x D)	approx. 290 x 260 mm
Dimensions (W x H x D)	without tablet: 290 x 210 x 370 mm with tablet: 290 x 390 x 370 mm

Energy supply



WARNING

If the grounding conductors are interrupted, there is risk of fatal injury due to electric shock!

Never connect the mains plug of the device to a mains socket without a protective earth contact! Ensure that the protection is not rendered ineffective by extension cords without grounding conductor or by the use of an adjustable transformer.

The ScanDrop² is operated with single-phase alternating current. The device works with voltages from 110-230 V AC and frequencies of 50-60 Hz. Make sure to observe the information on the type plate and do not connect the device to a supply voltage other than the one stated on the type plate.

Installing ScanDrop²**ATTENTION**

Before connecting the ScanDrop² and the PC to the mains verify that the operating voltage specified on the type plates of the devices matches the mains voltage. Operation with a voltage other than the specified operating voltage can destroy the devices.

1. Unpack the ScanDrop² and the accessories from the transport packaging (see also section "Packaging the device for transport" p. 34). Remove the protective sleeve from the device. Retain the transport packaging for subsequent transport.


Caution! Transport the ScanDrop² in upright position only, and do not tilt when unpacking. Observe the markings on the transport packaging.

2. Leave the ScanDrop² to acclimatize until it has reached ambient temperature.
3. Using the support bracket, mount the tablet to the ScanDrop² (see section "Mounting and dismounting the tablet" p. 29). Before that, remove the protective cap from the port on the ScanDrop² and store for later use.

Alternatively, connect a PC or laptop via the USB cable (supplied) to the port on the rear of the ScanDrop² (3 in Fig. 10 p. 17).

4. Connect the ScanDrop² via the mains plug to the mains.
 - ✓ The ScanDrop² is now installed.

4.2 Switching on and commissioning the ScanDrop²

1. Switch on the ScanDrop² using the mains switch on the rear of the device.
The status LED lights up green.
2. Switch on the tablet. To do so, press and hold down the on/off key for approx. 5 s.
The FlashSoftPro² *touch* software starts up automatically.
3. Alternatively, switch on the PC or the laptop. Start the FlashSoftPro² software by double-clicking on the program icon.
4. If user administration is configured, enter your user name and password.
5. Initialize ScanDrop² via the  button.
 - ✓ The ScanDrop² is ready for use.

Via EXTRAS ► OPTIONS ► GENERAL it is possible to configure the system so that the ScanDrop² is automatically initialized when the software is started.

4.3 Switching off the ScanDrop²



CAUTION

There is a slight risk of crushing when manually or automatically closing either of the two cell compartments!

The sensor system of the ScanDrop² notices if fingers or other objects are in the infeed area of the large cell compartment on the front. The motors then stop the closing movement. However, you should still keep a safety distance.

1. Open the large cell compartment via the [▲] button. Alternatively, choose the MEASUREMENT ► ADAPTER IN/OUT menu command.

If required, manually open the cover of the cell compartment for individual measurements.

2. Take out the cells (with adapter).

3. Close the large cell compartment via the [▲] button. Alternatively, choose the MEASUREMENT ► ADAPTER IN/OUT menu command.

Manually close the cover of the cell compartment for individual measurements.

4. Shut down the integrated tablet. To do so, press and hold down the on/off key for 5 s.

Alternatively, exit the software and shut down the PC / laptop.

5. Switch off the ScanDrop² by the mains switch.

✓ The ScanDrop² is now switched off.

4.4 Inserting cells and adapters



WARNING

Risk of infection! Take great care when working with potentially infectious samples. Wear suitable protective equipment, e.g. protective gloves.



CAUTION

There is a slight risk of crushing when manually or automatically closing either of the two cell compartments!

The sensor system of the ScanDrop² notices if fingers or other objects are in the infeed area of the large cell compartment. The motors then stop the closing movement. However, you should still keep a safety distance.



ATTENTION

Do not touch the optical surfaces of the cells. Contaminations can compromise the measured values. For example, touch the CHIPCUVETTE only by the rims on the sides.

Preparing for the measurement

In the FlashSoftPro² software, make preparations for an individual measurement or a measurement series.

1. Via MEASUREMENT ► MEASUREMENT PARAMETERS, open the MEASUREMENT PARAMETERS window.
2. On the TITLE tab, define the name and storage location for the results file. Optionally, enter additional information such as notes.
3. Change to the MODULE tab. In the SELECT MEASUREMENT POSITION section, select the appropriate cell or cell adapter:

Cell/adaptor	Selection in FlashSoftPro ²
CHIPCUVETTE	CHIPCUVETTE
1 Standard cell in the extra cell compartment	STANDARD MP
8-cell changer	CELL HOLDER
Butterfly Cuvette	BUTTERFLY-CUVETTE

Under SELECT MODULE, select the appropriate measuring module.

4. Change to the next tab. Its name is the same as the name of the cell or adapter selected in the previous step.
5. Perform the following configuration:

Option	
NUMBER	Number of occupied measuring positions
Name of the cell/adaptor	Number of the cells/adapters to be measured
SAMPLE SELECTION	Selection of the sample type: Reference, standard, sample or empty position (EMPTY)

If the standard cell (STANDARD MP) is selected, this tab can be used to prepare a serial measurement:

- Open the sample table by choosing the SERIAL MEASUREMENT option and define the number of samples.
 - For each sample, enter sample type, sample name as well as pathlength and center height of the corresponding cell.
6. For all other cells/adapters: Change to the TABLE tab.
For each sample, enter sample type, sample name as well as pathlength and center height of the cell.
 7. On the UVVIS tab, set further measurement parameters (see software instructions). Accept and save the settings using the corresponding buttons.
 - ✓ The cell/cell adapter has now been defined in the measuring parameters, and a measurement has been prepared.

To insert a cell/adaptor into the large cell compartment on the front, open the cell compartment via the [▲] button. Alternatively, choose the MEASUREMENT ► ADAPTER IN/OUT menu command. For measuring, use the same command to close the cell compartment again.

To insert a cell into the cell compartment for individual measurements, initialize ScanDrop² and then manually open the cover of the cell compartment. The cell compartment remains open during the measurement. After the measurement, manually close the cover.

- The cover of the measuring compartment for standard cells cannot be opened until after the ScanDrop² has been initialized. The cover is locked, if a different cell or a different cell adapter was selected in the measuring parameters. This prevents the cover from being opened while a measurement is underway in the other cell compartment.
- The sensors detect if the inserted cell/adapter does not match the settings made in the software. If this is the case, a corresponding error message appears on the screen.
- The FlashSoftPro² software also issues an error message if, while a cell adapter is being inserted, there is a cell left in the measuring compartment for standard cells that would interfere with the measurement.

Cell compartment for
1 standard cell



Fig. 12 Inserting a standard cell into the ScanDrop²

The integrated measuring position for one standard cell is located on the top of the ScanDrop². The cover of the compartment can be manually opened and closed after the ScanDrop² has been initialized.

- Fill the cell with sample (depending on the cell type, the filling quantity is between 70 μ L and 2 mL) and close it using the plastic lid.
- Place the cell in the measuring compartment. Orient the optical (polished) surfaces perpendicular to the beam (see the arrows).

Cell compartment for
different adapters

On the front of the ScanDrop², there is the cell compartment for different measuring adapters. Controlled by the software, the large door of the cell compartment can be opened in a 180° rotating movement.

The magnetic carriage with 2 dowel pins positions the different adapters in a very precise manner. The layout of the magnet poles prevents inserting in the wrong direction.



- 1 Magnetic carriage
- 2 Dowel pin

Fig. 13 ScanDrop² with opened cell compartment

The magnet carriage transports the cell adapters into the interior of the device for measuring.

Using the
CHIPCUVETTE



Fig. 14 Inserting the CHIPCUVETTE with the adapter

1. Using pipettes, fill up to 16 samples via the filler openings into the measuring spaces on the CHIPCUVETTE.

Channel depth	Filling quantity	Pipette tips
0.1 mm	0.3 µL	0.1-20 µL
1 mm	2 µL	up to 200 µL
both	4 µL	

2. Slide the CHIPCUVETTE into the adapter, aligning the side with the 0.1 mm channel and with the "1" numbering with position 0 on the adapter.
3. Open ScanDrop² and position the adapter on the magnet carriage.

Using the
Butterfly Cuvette



Fig. 15 Inserting the Butterfly Cuvette



ATTENTION

Only use the Butterfly Cuvette supplied with the device. The device and the Butterfly Cuvette are paired with each other for optimal measuring performance.

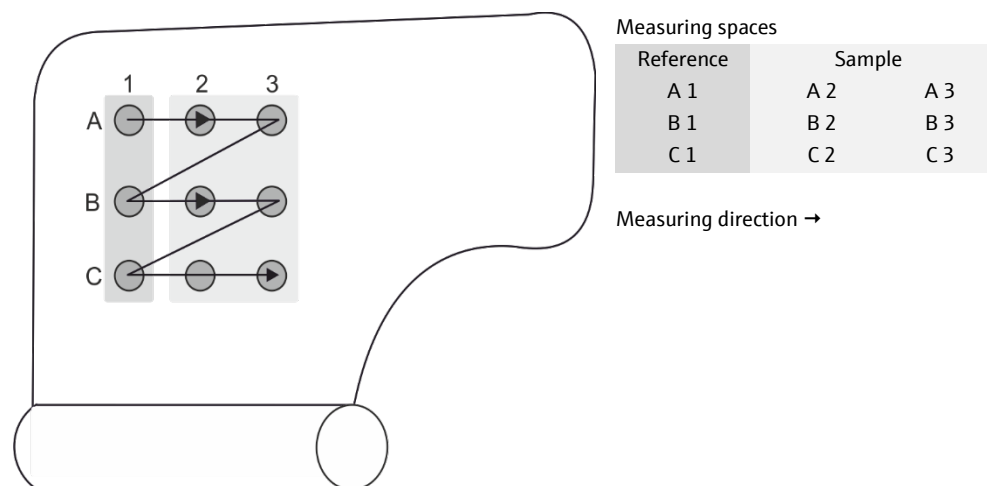


Fig. 16 Measuring spaces on the Butterfly Cuvette

For measurements with the Butterfly Cuvette, one reference (buffer) is required at each of the measuring spaces in column 1 (A1-C1). Up to 6 samples can be filled into the measuring spaces in columns 2 and 3.

- Using pipettes, fill 3 references into the measuring spaces A1, B1 and C1 on the Butterfly Cuvette. Fill up to 6 samples into the measuring spaces A2-C3. Fill the reference for samples in row A into measuring space A1. Filling quantity 2.0-4.0 μ L.
- Open ScanDrop² and position the adapter on the magnet carriage.

When the magnet carriage is moved into the interior of the device, the wings of the Butterfly Cuvette are folded upwards by the two ramps in the cell compartment (see the arrows). Owing to the high surface tension of the solvent (water) there is no risk of the drop-shaped samples running into one another.

Using 8-cell changers

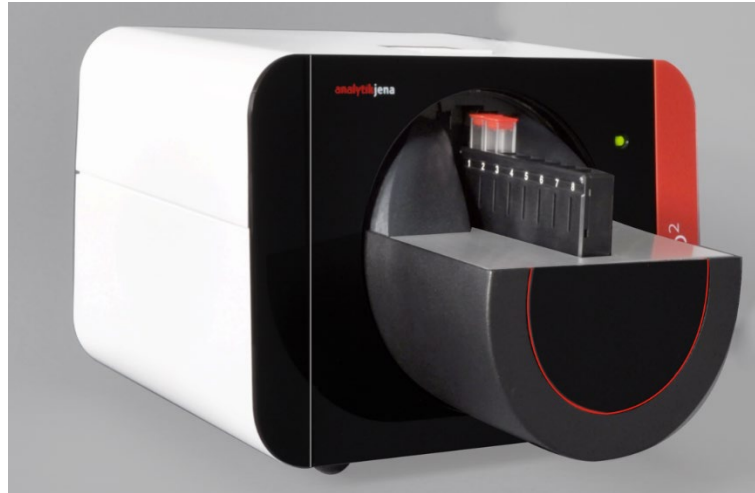


Fig. 17 Inserting the 8-cell changer

1. Fill up to 8 standard cells (filling quantity 70 μ L to 2 mL). If the samples are dissolved in flammable organic solvents, close the cells using plastic lids.
2. Position the cells in the cell changer in accordance with the software settings. Orient the optical (polished) surfaces perpendicular to the beam.
3. Open ScanDrop² and position the adapter on the magnet carriage.

5 Maintenance and care



WARNING

Risk of electric shock! Do not touch!

Before performing any cleaning work, switch off the ScanDrop² (and the tablet) and disconnect the mains plug. Do not recommission the ScanDrop² again until it is completely dry.

The following maintenance work can be performed by the customer:

- Cleaning of the sample chamber and casing
- Cleaning of the tablet (with touchscreen)
- Cleaning of the Butterfly Cuvette

In addition, (dis)mounting of the tablet is described in the following section.

All maintenance work and repairs beyond this scope may only be performed by service engineers from Analytik Jena or persons authorized by Analytik Jena. Any unauthorized intervention limits warranty entitlements. If the device exhibits any faults or details, please contact the Analytik Jena customer service immediately. The address is on the reverse of the title page.



ATTENTION

We offer you a maintenance agreement to protect your lab certification with device validation.

5.1 Cleaning of the sample chamber and casing

General

Observe all notices on the cleaning and maintenance of the ScanDrop²:

- Do not allow filled cells to remain in the sample chamber longer than necessary to avoid contamination of the spectrometer from acid, lye or solvent vapors. If volatile solvents are present, use vapor-proof cells with lids.
- Immediately wipe up spilled sample in the sample chamber or on accessories with blotting paper.
- Use a soft, clean cloth to wipe away any contaminations from the device. A commercially available neutral cleaning agent can be used for maintenance of the casing.
- Do not use dripping cloths. Do not allow liquids to enter into the device.



WARNING

Risk of infection!

When cleaning the ScanDrop² in a medical laboratory, wear suitable personal protective equipment, such as protective gloves.

Cleaning in the
medical laboratory

If the ScanDrop² is used for the analysis of infectious material, great care must be taken because the ScanDrop² cannot be decontaminated as a whole device.

We recommend the following disinfection agents for the device interior:

Decosept AF by Dr Schuhmacher GmbH
Meliseptol HBV cloths by B. Braun

- These disinfection agents are only to be used for wiping disinfection, since liquid might enter through the ventilation slots into the sensitive electronics. For this reason, disinfection agents must be applied to suitable cloths using a spray head.
- Only the use of ethanol or isopropanol-containing disinfection agents are approved for wiping disinfection. The use of disinfection agents with ingredients or concentrations that differ from the recommended disinfection agents invalidates all warranty claims regarding damage to the device or effectiveness.
- The adapter for accepting the CHIPCUVETTE and the 8-cell changer can be autoclaved and are also suitable for dip and spray disinfection.
- If the ScanDrop² has to be sent to Analytik Jena for service after infectious material has been processed with it, a decontamination must be carried out and documented first (see documents in the product folder).

5.2 Cleaning of the tablet

Before cleaning, switch the tablet off by the on/off switch. Wipe the touchscreen using a household cleaning agent.

The sensor must not come into contact with acetone or solvents. This could lead to discoloration or to opacification of the outer plastic layer.

5.3 Cleaning of the Butterfly Cuvette



ATTENTION

For protection of the sensitive quartz glass, observe the following notes:

- Do not clean the cell in an ultrasonic bath
- Do not use abrasive cleaners

Do not use caustic or corrosive cleaning agents, since they could corrode the metal components of the cell.

If it is cleaned and stored with care, the Butterfly Cuvette can be used over a long time. The analysis is free of expendable materials.

- Clean the Butterfly Cuvette using a lint-free cloth (optical cloth) or swab.
- Clean the cell using the concentrated cleaning agent Hellmanex III, which can be obtained through Analytik Jena
- Alternatively, use 60% isopropanol, ethanol or ultrapure water for cleaning, depending on the sample.

- After use and cleaning, put the cell back into the storage box (supplied) and close the box.

5.4 Mounting and dismounting the tablet

The ScanDrop² can easily be converted from control via PC or laptop to standalone operation via tablet, and vice versa. For this purpose, the tablet must be mounted, with support bracket, to the rear of the ScanDrop² or dismantled, respectively.

While the ScanDrop² is connected to a PC or laptop via the USB port, it cannot be controlled via the tablet.

Mounting the tablet

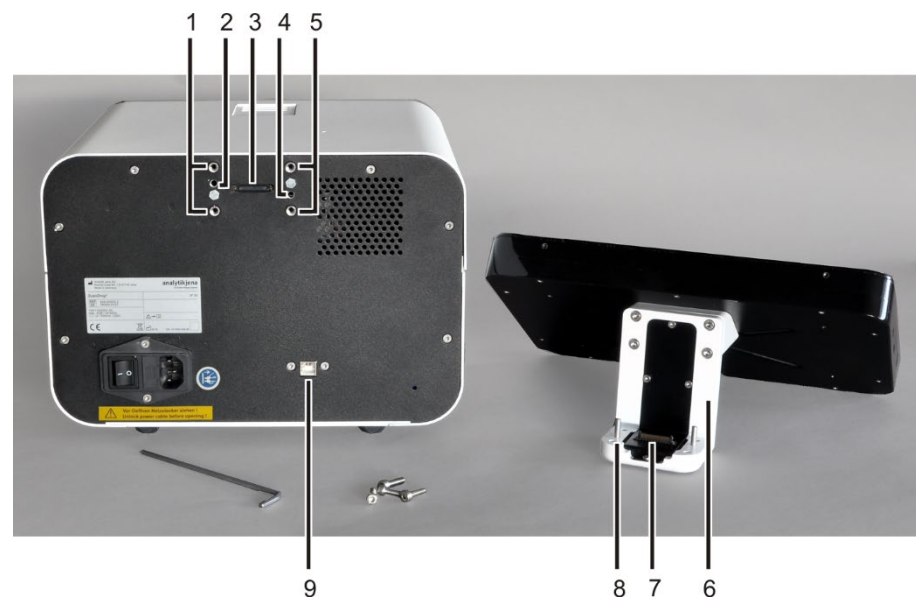


Fig. 18 Mounting the tablet to the ScanDrop²

- | | |
|------------------------------------------|-------------------------------|
| 1,5 Bore holes for hexagon socket screws | 6 Support bracket for tablet |
| 2,4 Round holes | 7 Port on the support bracket |
| 3 Port for the tablet | 8 Guide pin |
| | 9 USB port for PC/laptop |

1. Switch off both ScanDrop² and PC/laptop.
2. Detach the USB cable from the port on the rear of the ScanDrop² (9 in Fig. 18).
3. Remove the protective cap covering the port for the tablet (3). To do so, undo the four hexagon socket screws. Keep the protective cap for future use.
4. Place the tablet with support bracket (6) on top of the ScanDrop², inserting the two guide pins (8) into the round holes in the casing (2, 4). Push the support bracket towards the device until it is flush with the rear wall.

The port will automatically be connected.

5. Fasten the tablet using the four hexagon socket screws (1, 5).
6. Switch on the ScanDrop² and the tablet.

The FlashSoftPro² *touch* software starts up automatically.

7. Initialize the software.

- ✓ The connection between ScanDrop² and tablet will be established.

Dismounting the tablet



Fig. 19 Dismounting the tablet

1. Switch off both the ScanDrop² and the tablet.
2. Remove the tablet with support bracket from the ScanDrop². To do so, undo the four hexagon socket screws. Pull off the tablet and support bracket towards the rear.
3. Screw on the protective cap to cover the tablet port.
4. Connect the ScanDrop² with the PC/laptop using the USB cable.
5. Switch on both ScanDrop² and PC/laptop. Start the FlashSoftPro² software by double-clicking on the program icon.
6. Initialize the software.
 - ✓ The connection between ScanDrop² and PC/laptop will be established.

6 Fault removal

The following chapter describes a number of possible problems that the user can partially remedy independently.

Once the ScanDrop² and the control unit have been switched on, system monitoring takes place. In the event of operator error or device fault, the software displays both an error code and the corresponding error message. The status LED on the front of the devices changes its color from green to red.

Example of an error message

In many cases, the error messages consist of a firmware error that is connected to a software error.

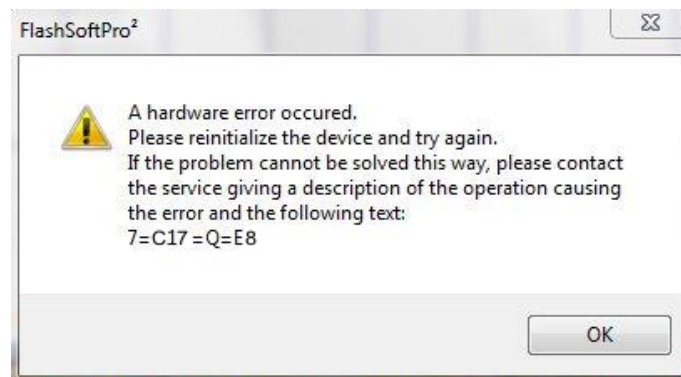


Fig. 20 Example of an error message

Meaning of 7=C17=Q=E8

- 7 – Aux Interface sends error, in this case E8
- C17 – last processed command C17, i.e. 17. Position on the CHIPCUVETTE
- Q – received response Q
- E8 – step error in X axis



ATTENTION

Risk of device damage!

If the errors below cannot be remedied using the corresponding troubleshooting notes, the operator must inform the service department at Analytik Jena. This also applies for the repeated occurrence of individual faults.

Firmware error

Error code	Error
Init()	1 No spectrometer module found
	2 At spectrometer module Open()
	3 Spectrometer module I ² C does not respond
	4 Lid not closed
	5 Motors cannot be initialized (I)
Send()	7 Aux sends error (Ex)
	8 Acknowledgment faulty
	9 Timeout

Software error

Error code	Error
E3	Lid open
Cause	Remedy
Lid of the measuring compartment for standard cells open	Remove cell, close the lid. Measurements in the large cell compartment on the front side cannot be started until the lid is closed.
mechanical fault when closing the lid	remove any obstacles from the compartment, re-start the closing process
Error code	Error
E4	X motor undefined
E6	Y motor undefined
Cause	Remedy
Drive blocked, e.g. by a jammed adapter or faultily inserted cell	<ul style="list-style-type: none"> ▪ Remove obstacle ▪ Position adapter and cell correctly ▪ Initialize the device ▪ Restart the device and the software
Motor defect	<ul style="list-style-type: none"> ▪ Inform service
Error code	Error
E5	X fork light barrier not found
E7	Y fork light barrier not found
E12	Z fork light barrier not found
Cause	Remedy
Drive blocked	<ul style="list-style-type: none"> ▪ Remove obstacle ▪ Position adapter and cell correctly ▪ Initialize the device ▪ Restart the device and the software
Fork light barrier defective	<ul style="list-style-type: none"> ▪ Inform service
Error code	Error
E8	Step error in X
E9	Step error in Y
E10	Step error in Z
Cause	Remedy
Drive blocked	<ul style="list-style-type: none"> ▪ Remove obstacle ▪ Position adapter and cell correctly ▪ Initialize the device ▪ Restart the device and the software
Step counter soiled	<ul style="list-style-type: none"> ▪ Inform service

Error code	Error
E13	Invalid sample adapter
Cause	Remedy
Cell and adapter do not match the software settings.	<ul style="list-style-type: none">▪ Insert suitable cell and adapter in ScanDrop²▪ Check software settings and change if required

Error code	Error
E14	Door open during running operation
Cause	Remedy
Active or manual manipulation of the door	<ul style="list-style-type: none">▪ Initialize the device▪ Restart the device and the software▪ If the problem persists, contact Service

7 Transport and storage

7.1 Packaging the device for transport



WARNING

Risk of damage to health due to improper decontamination!

Perform a professional and documented decontamination of the device before returning it to Analytik Jena (see documents in the project folder). Analytik Jena must refuse acceptance of contaminated devices. The sender may be liable for any damage caused by inadequate decontamination of the device.



ATTENTION

Risk of device damage! Only use the original Analytik Jena packaging for packaging. Only this provides optimum protection of the ScanDrop² against transport damage.

Observe the safety instructions in chapter "Safety instructions, transport and installation" p. 8. Avoid the following during transport:

- Impacts and vibrations
Risk of damage due to shock, impacts or vibrations!
- Major temperature fluctuations, risk of condensate build-up!



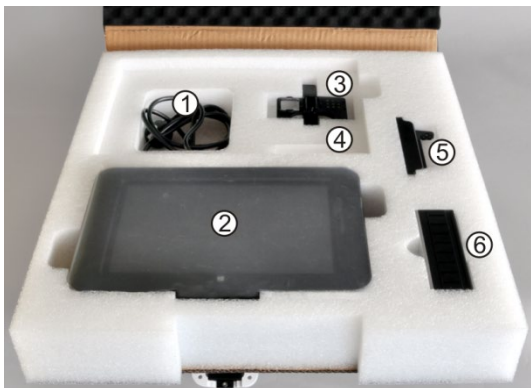
1. Remove all mold inserts except for the bottom one from the cardboard box.
2. Switch the ScanDrop² off. Remove the power cord and the USB cables. Remove cells and adapter from the device.
3. Switch the tablet off (if present) and remove it from the ScanDrop². To do so, undo the 4 hexagon socket screws on the rear of the device. Lift the tablet with support bracket, disconnecting it from the port.
4. Place the tablet inside a plastic bag and stow away safely.
5. Screw on the protective cap to cover the tablet port on the ScanDrop².



6. Place the ScanDrop² inside a plastic bag to protect it against humidity and scratches.
7. Place the ScanDrop² onto the mold insert in the cardboard box.



8. Insert the side mold inserts in the cardboard box.
Insert the front and rear pins into the recesses on the bottom mold insert (see arrow).



9. Insert the accessories into the dedicated spaces in the accessories box:

(1) Power cord and USB cable, (2) Tablet with support bracket

The support bracket sticks out from the bottom of the accessories box.

(3) Butterfly Cuvette, (4) consumable material (CHIPCUVETTE)

(5) Adapter for CHIPCUVETTE, (6) cell changer

The user instructions can be placed into the recess on top of the power cord and Butterfly Cuvette.

10. Close the accessories box and place it inside the transport box.

11. Close and seal the cardboard box.



7.2 Storage



ATTENTION

Risk of device damage due to environmental conditions and condensation water.

The device must only be stored in air-conditioned rooms. The atmosphere must be low in dust and free from aggressive vapors.

If the device is not installed immediately after delivery or not required for prolonged periods, it should be stored in its original packaging. A suitable desiccant should be added to the equipment to prevent damage from moisture.

The following storage conditions must be met:

- Temperature range: -10 – +50 °C
- Max. humidity: Max. 80 % (use desiccant)

8 Disposal

The operator of the ScanDrop² must dispose of the waste materials produced during measurements (sample materials) in accordance with the statutory and local regulations.

At the end of its service life, the ScanDrop² and all its electronic components must be disposed of as electronic waste in accordance with the applicable regulations.

9 Specification

9.1 Technical data

Electrical connection	Mains voltage	110-230 V AC
	frequency	50-60 Hz
	Power consumption	max. 30 W
	Mains fuses	2 x T3,15 A / 250 V
	Interfaces	PC connection: USB Tablet: USB for data transmission, bar code reader
Mass and space requirements	Mass	approx. 10 kg
	Footprint (W x D)	approx. 290 x 260 mm
	Dimensions (W x H x D)	without tablet: 290 x 210 x 370 mm with tablet: 290 x 390 x 370 mm
Operation	Control	optionally with PC or standalone operation with integrated
	Control and analysis software	FlashSoftPro ² or FlashSoftPro ² <i>touch</i>
	Operating system	Windows 7 (32 bit) or higher
	Minimum requirements for the PC	Pentium 4 or higher, 1 GB RAM, at least 500 MB free hard disk capacity, USB 2.0, VHA graphics adapter (1280 x 1024)
	Tablet (optional)	10" tablet with color touchscreen, Windows 8.1
	Export function	Excel, CSV
	Functionality of the software	pre-installed methods for quick access module for creating user-defined methods quantification by means of standards automatic evaluation of the measurement results extensive data analysis 2D scanning range for center heights ranging from 8.5 to 15 mm.
Sample parameters	Number of samples	1 to 16 samples
	Sample volume	0.3 µL to 2 mL
	Cells and adapters	Standard cell (10 mm) 8-cell changer for standard cells CHIPCUVETTE with adapter Butterfly Cuvette (without consumable material)

Cells	Cell	Pathlength	Volume	virtual dilution
	Standard cell	up to 10 mm	up to 2.0 mL	-
	Butterfly Cuvette	0.5 mm	2.0-4.0 μ L	1:20
	CHIPCUVETTE	0.1 mm	at least 0.3 μ L	1:100
		1.0 mm	at least 2.0 μ L	1:10
	both	at least 4.0 μ L	1:10 and 1:100	
Optics	Measurement principle		Polychromator system with symmetrical Czerny-Turner	
	Light source		Xenon flash lamp	
	Detector		Linear CCD detector optimized for the UV/Vis range	
	Measuring time (spectrum)		≥ 1.6 s for a complete absorption measurement	
	Wavelength range		190-1,000 nm (0.5 nm increments)	
	Measurement modes		Absorption, transmission, energy	
	Spectrometer data	Spectral resolution toluene - hexane: A@269nm/A@266nm		≥ 1.5 (+20-30 °C)
Baseline noise at 500 nm (RMS)		± 0.005 A		
Zero point of transmission		± 0.2 % (230 to 600 nm)		
Wavelength accuracy		± 1 nm		
Wavelength reproducibility (with holmium oxide filter)		± 0.05 nm (at 361 nm)		
30min-drift (500 nm)		± 0.005 A/h		
Stray light NaNO ₂ (220 and 340 nm)		≤ 0.5 %T		

Some spectrometer data such as the accuracy and reproducibility of measurements differ for the different cell adapters.

Standard cell	(Cell placed in cell compartment for individual measurements or 8-cell changer)	
	VIS photometry (correctness/accuracy)	± 0.025 A* (absolute error to nominal value determined at 546 nm, 1 A)
	VIS photometric reproducibility (F4 546 nm) (precision)	± 0.005 A (at 546 nm, 1 A)
	Photometric measuring range	0.005-2.5 A (10 mm pathlength)
	Baseline deviation	± 0.005 A (230 to 600 nm)
	UV photometric accuracy	± 0.015 A* (absolute error to nominal value determined at 257 nm, 0.3 A)
		± 0.025 A* (absolute error to nominal value determined at 257 nm, 0.9 A)
* including measurement uncertainty of the test equipment		
CHIPCUVETTE	VIS photometry (correctness/accuracy)	± 0.04 A* (absolute error to nominal value determined at 546 nm, 1 A)
	VIS photometric reproducibility (F4 546 nm) (precision)	± 0.005 A (at 546 nm, 1 A)
	Photometric measuring range	0.01-1.5 A (1 mm pathlength)
	Baseline deviation	± 0.01 A (230 to 600 nm)
	UV photometric accuracy (1 mm pathlength)	± 0.025 A* (absolute error to nominal value determined at 257 nm, 0.09 A)
		± 0.04 A* (absolute error to nominal value determined at 257 nm, 0.9 A)
	UV photometric precision within adapter (1 mm pathlength)	± 0.01 A* (at 257 nm, 0.09 A)
± 0.01 A* (at 257 nm, 0.9 A)		
* including measurement uncertainty of the test equipment		
Butterfly Cuvette	Photometric measuring range	0.01-1.5 A
	Baseline deviation	± 0.005 A (230 to 600 nm)
	UV photometric accuracy	± 0.04 A* (absolute error to nominal value determined at 257 nm, 0.5 A)
	UV photometric precision within adapter	± 0.04 A* (at 257 nm, 0.5 A)
	UV photometric reproducibility (UV600 257 nm) (precision)	± 0.005 A* (at 257 nm, 0.5 A)
* including measurement uncertainty of the test equipment		

9.2 Standards and directives

Protection class and type of protection	The ScanDrop ² is classified as protection class I. The casing is protection type IP 20.
Device safety	The ScanDrop ² complies with the safety standards <ul style="list-style-type: none"> ▪ DIN EN 61010-1 (VDE 0411-1; IEC 61010-1) ▪ DIN EN 61010-2-081 (VDE 0411-2-081, IEC 61010-2-081)
EMC compatibility	The ScanDrop ² has been tested for radio interference resistance and radio interference emissions in accordance with DIN EN 61326-1 and meets the requirements according to: <ul style="list-style-type: none"> ▪ Interference immunity according to table 1 (normal environment) with tablet control unit ▪ Interference immunity according to table 2 (industrial environment) with external PC control ▪ Interference emission according to class B for all operating variants
EU directives	The ScanDrop ² is designed and tested in accordance with standards meeting the requirements of EU directives 2014/35/EU and 2014/30/EU.
Federal Communications Commission Advisory (USA only)	The ScanDrop ² complies with Part 15 of the FCC regulations. The following two requirements obtain for operation: (1) The device does not cause interfering interference, and (2) the device is resistant to interference, including such interference as is liable to cause operational malfunction. The ScanDrop ² complies with Part 18 of the FCC regulations.
Guidelines for China	The device contains substances subject to regulation (according to regulation "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products"). Analytik Jena guarantees that the substances will not leak within the next 25 years and, therefore, will not cause any environmental danger or health risk within this period of time if the device is used as intended. <p>Each device leaves the factory in a sound condition with regard to technical safety. To maintain this condition and to ensure safe operation, the operator must strictly observe the safety and operating instructions contained in this operating manual. For accessories which have also been supplied, and system components from other manufacturers, their operating instructions should be referred to.</p>