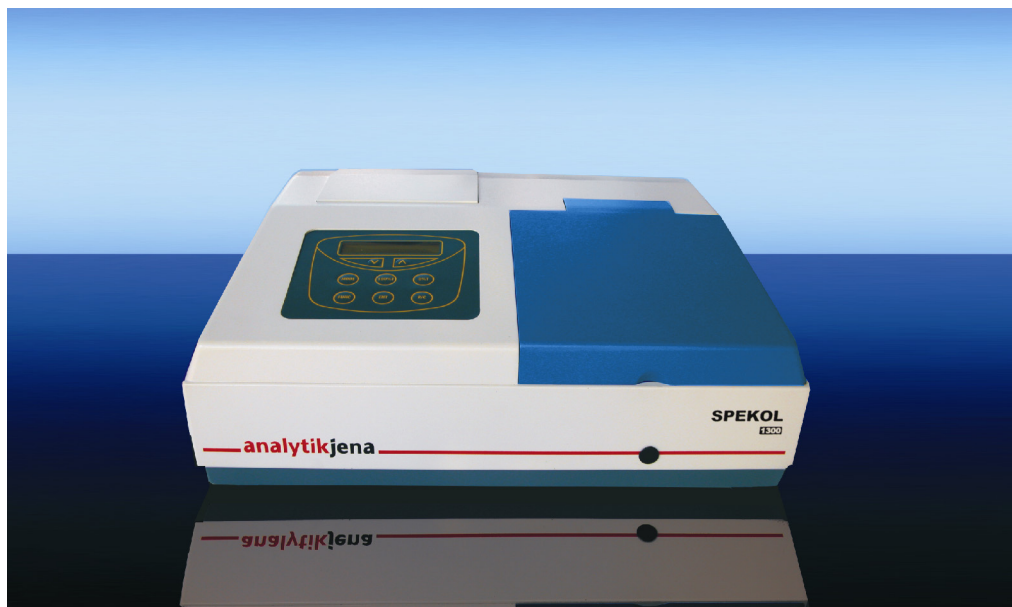


SPEKOL[®] 1300

UV VIS Spectrophotometer



analytikjena

Analytik Jena AG
Kundendienst
Konrad-Zuse-Str. 1
07745 Jena

Phone: Hotline: + 49 (3641) 77-7407
 Fax: + 49 (3641) 77-7449
e-mail: service@analytik-jena.de

General information about **Analytik Jena AG**
on the internet: <http://www.analytik-jena.de>

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Subject to change!

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1 Introduction

The SPEKOL[®] 1300 is a single beam spectrophotometer. The instrument is compact, easy-to-use, and ruggedness. The large sample compartment accept various accessories and cell from 10mm to 100mm path length. The built-in RS-232 serial interface enables the instrument to be connected to a printer.

The SPEKOL[®] 1300 is ideal to use in a clinical laboratory, biochemical laboratory, petrol chemical laboratory, environmental protection and various fields of quality control.

This user's manual provides the description of the SPEKOL[®] 1300, a list of main specifications and available accessories.

After carefully unpacking the content, check the materials against the packing list to ensure that you have received everything in good condition. If some parts are missing, damaged or have any other defects, please contact you dealer or the sales representative immediately.

1.1 Warning and safety labels on SPEKOL 1300

The following warning and safety labels are located on the SPEKOL[®] 1300:



Caution! Hazardous area. Do not remove this cover under any circumstances. Trained service peoples only. No serviceable components inside. Select the right voltage.

Disconnect the power cable before opening the device cover or replacing fuses!

1.2 Notes on the User's Manual

In this manual, the following symbols are used to refer you to warnings and notes:



Warning!

Warning messages alert you to a specific procedure or practice which, if not followed correctly, could cause personal injury.



Caution!

Caution messages refer you to procedures which, if not observed, could result in damage to the equipment.



Caution! Dangerous electric voltage!



Caution! Emission of UV radiation!



Disconnect power cable!



Note

This note must be followed to obtain correct measurement results.

For easier navigation within the manual, the manual uses the following system:

- Chapters and illustrations are numbered consecutively.
- Every illustration has its own caption.
- Steps of operation are numbered.
- Cross-references are marked by an arrow (e.g. →Notes on the User's Manual p.3)

2 Safety notes

For your personal safety and for a trouble-free operation, carefully read this chapter before starting up the SPEKOL[®] 1300.

Observe all safety notes given in this manual and all messages and notes displayed by the control software on the screen.

In addition, observe the safety notes for system components of other manufacturers (e.g. PC, printer) supplied together with the device.

In particular, you should also observe the safety notes given on the labels and the information on the use, storage and disposal of reagents, reaction cells and the notes on the package inserts of test kits.



Intended use!

The SPEKOL[®] 1300, including original accessories, may only be used for the applications described in this manual. The manufacturer cannot assume any liability for any other application, including that of individual modules or single parts. This also applies to all service or repair work that is not carried out by authorized service personnel. All warranty claims shall be forfeited.



Local safety regulations!

Observe the local safety regulations relevant to the operation of the device (e.g. labor-safety regulations, regulations for the prevention of and protection against accidents).

References to possible risks given in this manual do not replace the relevant labor-safety regulations that are to be followed.



Personnel!

The SPEKOL[®] 1300 may only be operated by appropriately qualified and trained personnel.

For that, the knowledge of the information provided by this manual is indispensable and taken for granted.



Emergency stop!

In the case of emergency, disconnect the SPEKOL[®] 1300 and its components from line power by removing the power plug from the power outlet.

Caution! This procedure involves the risk of data loss and damage to the operating system!



Electric shocks!

The SPEKOL[®] 1300 is electrically powered. At several parts inside the system, **extremely hazardous electrical** voltages are accessible!

To ensure Protection Class I (protective earth connection) of the device, connect the power plug of the device only to a power outlet with protective earth conductor. The protective effect must not be undone by the use of an extension cable without protective earth conductor.

Before opening the device or removing any device covers, disconnect the power cable!

Before connecting the SPEKOL[®] 1300 to the power outlet, make sure the line voltage supplied agrees with the operating voltage specified on the rating plate at the rear panel of the device. Operation of the device with any other operating voltage than that specified may result in the destruction of the device.

Only use fuses of the specified type.



Do not operate the device in explosion-risk rooms!



UV radiation!

Never look directly or indirectly, e.g. via a mirror, into the radiation emitted by the lamp to avoid the risk of getting conjunctivitis!
Therefore, switch off the lamp for lamp replacement!



Lamp damage!

Do not grasp functioning halogen and deuterium lamps on their glass bulbs. Contamination on the bulb affects the radiation properties of the lamps. Especially protect the beam-exit window of the deuterium lamp.



Accumulation of heat

Heat accumulation might result in overheating and faults on the device. Make sure not to cover the ventilation slots of the SPEKOL[®] 1300!
Before you switch on the SPEKOL[®] 1300, remove its dust cover!



Handling liquids

Take care to ensure that no liquids can enter the SPEKOL[®] 1300 to avoid any damage to the device.



Risk of corrosion

Do not set up the device in the vicinity of aggressive vapors, e.g. strongly corrosive acid or caustic vapors! The vapors might corrode the connections, mechanical and optical components of the device.

Avoid exposing the sample compartment to strongly corrosive substances! For the analysis of such samples, use vapor-tight stoppered cells.

After the measurement, do not leave the samples unnecessarily long in the sample compartment of the device!

3 Technical data

Model	SPEKOL® 1300
Optical System	Littrow type, single beam, grating system 1200 line/mm
Spectral Slit width	4 nm
Wavelength Range	190 to 1100 nm
Wavelength Accuracy	± 2 nm
Repeatability	1 nm
Stray Radiant Energy	≤ 0.3 %T at 220 nm and 340 nm
Photometric Range	0 %T to 125.0 %T -0.1 A to 3 A 0 C to 9999 C
Stability	± 0.002 A/hr (at 500 nm after 1 hour warm up)
Photometric Accuracy	± 0.01 A
Power Requirement	adjustable 115 / 230 VAC, ±10% 60/50 Hz
Line fuses	2 x T 4 AH
Temperature working range	15°C – 35°C
Humidity working range	85 %
Size (W x D x H)	465 mm (18.3') × 365 mm (14.3') × 175 mm (6.9')
Weight	11.5 kg

4 Design of the SPEKOL 1300



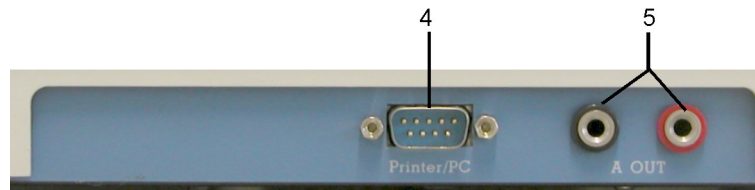
- 1 Display and Button display of data's and control buttons for use of the internal software function
- 2 Sample compartment to insert accessories and sample cells
- 3 Cell selector arm of the Cell changer to change the position of the manual cell changer

Fig. 1 SPEKOL® 1300 front side



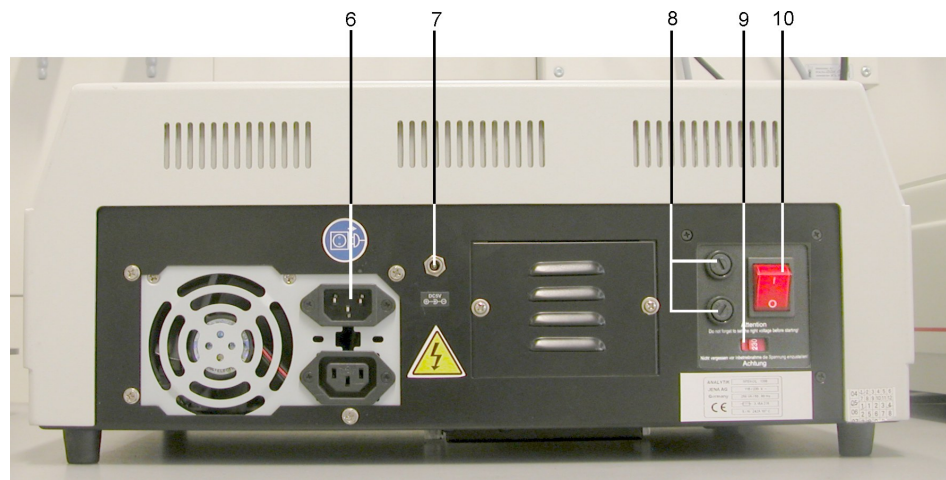
Note

Pay attention that the cover of the sample compartment must be closed during the measurements.



- 4 RS 232 Interface connection of printer
- 5 Analog output

Fig. 2 SPEKOL® 1300 right side



- 6 Power cable socket
- 7 Printer power connection power cable socket from the printer
- 8 Fuse holder
- 9 Voltage selection to select the voltage between 220 and 110 V
- 10 Power switch

Fig. 3 SPEKOL® 1300 back side

5 Unpacking instruction

5.1 Installation and transport conditions

Installation conditions

Considering the dimensions of the SPEKOL[®] and a clearance of approximately 100 mm to the sides and the front, the device needs a bench space of at least 665 x 565 mm.



Caution!

Do not cover the ventilation slots of the device!

Do not place any objects on the device!

Do not operate the device in explosion-risk rooms!

Keep aggressive vapors, e.g. strongly corrosive acid or caustic vapors away from the vicinity of the device.

The installation site of the SPECORD[®] must meet the following requirements:

- The place should be free of draft, dust, corrosive vapors as well as vibrations.
- Do not set up the SPECORD[®] near electromagnetic fields (e.g. of motors).
- Avoid dripping or splashing water near the instrument.
- Do not expose the device to direct sunlight or the radiation of heaters.
- Temperature range: + 15 ... + 35 °C
- Humidity: up to 85 % (at + 30 °C)

Conditions for storage and transport

For transport and storage, the following ambient conditions must be complied with:

- Temperature range in transport: -40...+70 °C
- Relative humidity in transport: up to 95 %

5.2 Installation and start-up



Observe correct position of device!

Move the SPECORD[®] only in upright position (observe label on transport case).

Do not turn the device upside down.



Electric shock

Before connecting the SPECORD[®] and the PC to line power, make sure the available line voltage agrees with the operating voltage specified on the type labels. Operation of the devices on line voltages other than the specified operating voltage may result in their destruction.

1. Unpack the contents carefully and check the materials.
2. Place the instruments in suitable location.

3. Remove any obstructions or materials that could hinder the flow of air under and around the instrument vibration.
4. Select the right voltage.
5. Plug the power cord into an outlet. Turn on the instrument and allow it to warm up for 20 minutes before taking any readings. A self test starts automatically.

Your spectrophotometer is now ready for operation.

5.3 Select light source

You may use the **[FUNC]** key to selecting an available lamp for measurements depending on your samples. The light sources can be exchanged between 325nm to 355nm.

1. Press the **[FUNC]** button until display shows "**LAMP EXCHANGE?**"
2. Press up **[^]** or **[v]** button to set the wavelength point of lamp exchanging (proposal at 325 nm).
3. Press **[ENT]** to store the parameter to be entered.

5.4 Turn the Lamps on/off

Depending on the analytical method you can switch the halogen lamp and the deuterium lamp on or off.

1. Press **[FUNC]** until display shows "VIS lamp on?" ("VIS lamp off?"), then press the **[ENT]** button to turn on or off the lamp.
2. Press **[FUNC]** until display shows "UV lamp on?" ("UV lamp off?"), then press the **[ENT]** button to turn on or off the lamps.

6 Maintenance

This SPEKOL® 1300 spectrophotometer has been designed to be durable and reliable. Therefore, the routine maintenance of the instrument is minimal.

However, you will need to replace the lamp or you may want check the wavelength calibration and photometric linearity to verify the instruments's performance.



The manufacturer recommends only authorized service representatives to perform procedures requiring removal of the instrument's cover and replacement of electrical component's. To protect both of yourself and your instrument, be sure to contact the authorized service representative to perform any service procedure, when you do not feel comfortable performing.

6.1 Cleaning

If sample substance was spilled in the sample compartment or accessory, instantly wipe it up using tissue paper.

For cleaning the device cover from dust or spillings, please use a soft cloth and a commercial neutral cleanser.

Do not expose SPEKOL® 1300 to corrosive atmosphere.

6.2 Replacing fuses

If the line fuses are defective, you can change them yourself.



Risk of electric shock!

Before changing the fuses, make sure to switch the SPEKOL® 1300 off with the power switch and disconnect the power cable from the power input connector of the device.

1. Remove the power cable from the SPEKOL® 1300.
2. Open the bayonet connections of the fuse holders (→Fig. 3 p.10) by turning to the left using a screwdriver. The fuseholder jumps up a little.
3. Replace the defective line fuses.
Make sure to use only the following fuse types:
 - T 4 AH.
4. Re-insert fuse holder and lock the bayonet connection.
5. Reconnect the power cable to the power input connector of the SPEKOL® 1300 and the power outlet.
6. Switch the SPEKOL® 1300 on again.

6.3 Replacing Halogen lamp



Electric shock!

Before changing the halogen lamp, make sure to switch the device off with the power switch.



Caution: Risk of burns!

Allow the halogen lamp to cool down to avoid the risk of burns!



Caution: Eye injury!

Never look into the lighting lamp as the radiation may cause eye injury!



Caution!

Do not touch the glass bulb of the lamp to avoid any contamination affecting its performance!

1. Turn the power off and unplug the instrument.
2. Put all samples and not fixed elements out of the sample compartment.
3. Place the SPEKOL 1300 carefully on a soft underlay on the top side of the device so that you can access the underside.

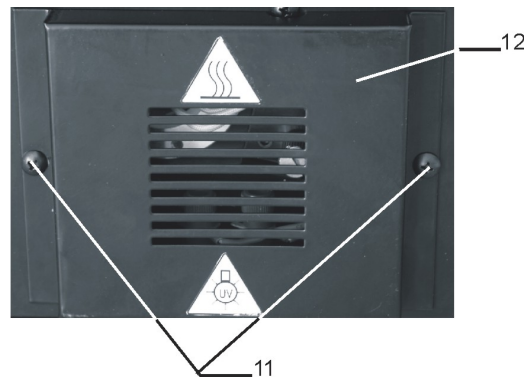


Fig. 4 Lamp house cover on the under side of SPEKOL[®]

4. Remove the two screws (11) and the lamp house cover (12) on the underside of the instrument.

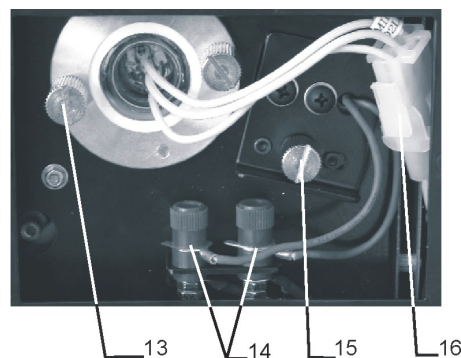


Fig. 5 Lamp compartment of SPEKOL[®], opened

5. Unscrew the holder of the halogen lamp (14) and take the holder with the halogen lamp out of the device.

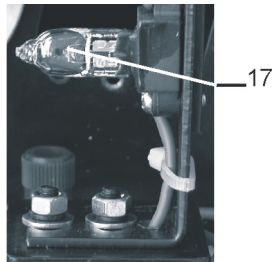


Fig. 6 SPEKOL® 1300holder of the halogen lamp

6. Remove the lamp (16) from lamp holder
7. Replace the new lamp carefully in the holder.



Caution

Do not handle Halogen lamp with bare fingers. Use a piece of tissue or cloth when handling the lamp. The oil from your fingers can cause the lamp to burn out prematurely!

8. Replace and fix the holder with the new halogen lamp in the device
9. Close the cover of the lamp house using the 2 screws.
10. Replace the device with the top side on top.

6.4 Replacing Deuterium lamp



Risk of electric shock!

Before changing the deuterium lamp, make sure to switch the device off with the power switch.



Caution: Risk of burns!

Allow the deuterium lamp to cool down to avoid the risk of burns!



Emitted UV radiation!

Never look directly or indirectly, e.g. via a mirror, into the radiation emitted by the lamp to avoid the risk of getting conjunctivitis!



Dirt on beam exit window!

Do not touch the glass bulb of the new deuterium lamp. Particularly avoid contamination on the quartz glass beam exit window! If you touched the glass bulb with your fingers, wipe the fingerprints off with a clean, lintfree cloth and pure alcohol. The performance of the lamp will deteriorate by contamination.

1. Turn off the power and unplug the instrument
 2. Put all samples and not fixed elements out of the sample compartment
 3. Place the SPEKOL 1300 carefully on a soft underlay on the top side of the device so that you can access the underside
 4. Remove the two screws (11) and the lamp house cover (12) on the underside of the instrument
 5. Unscrew the 2 screws of the deuterium lamp (13), disconnect the electronic plug connection (15) and take the deuterium lamp out of the device
-



Do not handle Deuterium lamp with bare fingers. Use a piece of tissue or cloth when handling the lamp. The oil from your fingers can cause the lamp to burn out prematurely!

6. Replace the new deuterium lamp and fix it with the screw
7. Close the cover of the lamp house using the 2 screws.
8. Replace the device with the top side on top.

7 Accessories

For the installation of accessory use the two screws on the bottom of the sample compartment.

7.1 Manual 4 cell changer

The standard configuration is a 4 cell changer for 1 cm cells. There are also 4 cell changer for 5 and 10 cm cell available. As an option there are also 4 cell changer for cells with 50 and 100 mm path length available.

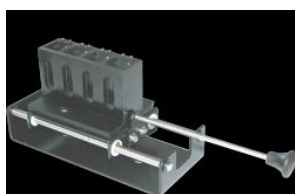


Fig. 7 Manual 4 cell changer

Use the cell selector arm (→ Fig. 1, p.9) of the manual cell changer to set the position of the manual cell changer.

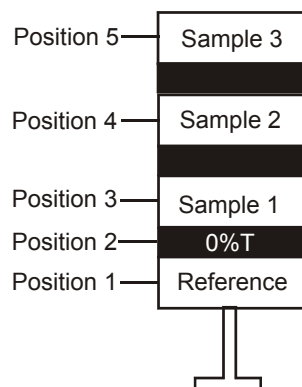


Fig. 8 Positions of the 4 cell changer

7.2 Adjustable cell holder

Micro cells and ultra micro cells have the standard outside width of 12.5 mm, but a reduced inside width or filling aperture of 1 to 4 mm. This requires accurate alignment of the cell in the light beam.

This adjustable cell holder can be used for cells with an aperture high of 8,5 mm.

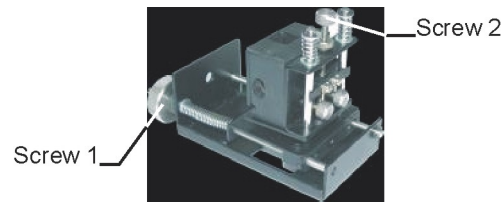


Fig. 9 SPEKOL® 1300 adjustable cell holder

1. Insert the adjustable cell holder in the sample compartment with screw 1 to the back site.
2. Use the screw 1 to adjust the cell horizontal to the light beam and screw 2 to adjust the cell vertical to the light beam.

The cell has the optimal position if the highest transmittance is reached.

7.3 Round cell holder

This special cell holder can be used for round cell of standard test kits. Cells with a diameter up to 16 mm and a high up to 11 cm can be used.

7.4 Extension of sample compartment

This extension is an attachment for tube openings that allows the use of thermostatted cell holders. It can easily be adapted to the SPEKOL® 1500 sample compartment.



Fig. 10 SPEKOL® 1500 extension of sample compartment

7.5 Flow-through unit

The flow-through unit requires the adjustable cell holder, the extension of sample compartment and a pump system.

1. Insert the adjustable cell holder into the sample compartment.
2. Mount the extension on the border of the sample compartment.
3. Slide the obliquely cut end of PTFE sipping hose over the hose stern on the cell body (marked with an arrow). Put the silicon sleeve of the sipping hose over the stern in order to make the connection leak proof.
Slide the other hose end through one of the tube opening.
4. Slide the pump hose through the second tube opening. Connect the second cell stern with the pump system.
5. Insert the flow-through cell in the cell holder and adjust the cell (→ section "**Fehler! Verweisquelle konnte nicht gefunden werden.**" on p.**Fehler! Textmarke nicht definiert.**).
6. Start the flow-through operation.
7. Stop the flow-through operation. Read the measurement values.

The carry-over from sample to sample can be kept low, if an ample portion of the sample is used for rinsing the cell before a measurement.

7.6 Thermostatted cell holder

The water- thermostatted cell holder can be used for temperature dependent measurement of samples. It is possible to connect the thermostatted cell holder to an external thermostat. This accessory is available for cells with 10mm or with 50 mm pathlength.

7.7 Thermostatted 3 cell manual changer

The 3 cell water jacketed manual changer is available for cell with 10mm pathlength. Use the cell selector arm (→ Fig. 1, p.9) of the manual cell changer to set the position of the manual cell changer.

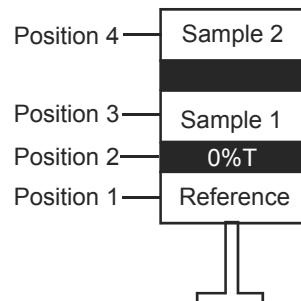


Fig. 11 Position of 3 cell changer

7.8 Printer

To install the printer to the SPEKOL[®] 1300 switch the device off, plug the electrical connections into the RS 232 at the right side (→Fig. 2, 4 p.9) and the printer power connection at the back side of the device (→Fig. 3, 6 p.10). Start the instrument new.

8 Display and Buttons of SPEKOL 1300



Fig. 12 Display and buttons

- Display** Digital readout: Display the data of transmittance, absorbance and concentration.
- [V] , [A]** WAVELENGTH SELECTION DOWN and UP button: Change of wavelengths / Selection of digits when changing numerical datas (factor of concentration analysis) / light source exchange selection / Lamp ON/OFF etc.
- [MODE]** MODE SELECTOR button: Select the transmittance, absorbance or concentration mode.
- [100%T]** This button is used to set the display to 100%t or 0Abs. It must be reset whenever the analytical wavelength has been changed.
- [0%T]** 0%T CONTROL button: Set the display to 0%T during block of the light beam.
- [FUNC]** FUNCTION SELECTOR button: Selection of functions as setting the parameter of standard concentration (concentration value or factor), light source exchange selection, Lamp ON/OFF, etc.
- [ENT]** ENTER button: Save the parameter of sample to the memory / Confirm the function that is selected.
- [P/C]** PRINT AND CLEAR button: Start the print out of the measurement results / Return you to the main menu.

9 Software function

9.1 Special function

Several methods are available with the button **[FUNC]**.

Select Mode	Choose the language between English and German
DNA/Protein Analytical	Methods for quantification of DNA and Protein as well as determination of the purity of DNA
Input Std. CONC	Input of a concentration for one standard to determine the concentration via one point calibration
Input Std. FACT	Input of a factor to determination the concentration
Input Lamp EXCH	Setting for lamp change
Input Sample Num	Choose the position of the automatic 6 cell changer
UV Lamp off (on)?	Switching the UV lamp on or off.
VIS Lamp off (on)?	Switching the VIS lamp on or off.
Create standard curve	Measurement of more than one standard to create a calibration curve
Load standard curve	Load a calibration curve
Delete standard curve	Delete a calibration curve
Time scan	Time cycle measurement

9.2 Select Language Mode

1. Press the **[FUNC]** button until "Select Mode: English" is displayed and confirm with **[ENT]**.
2. To change the language use the **[MODE]** button and confirm with **[ENT]**.

9.3 UV / VIS lamp on / off

→ Look at page 11, chapter 6.1 and 6.2

9.4 Absorbance / Transmittance Measurement

1. Set the wavelength with the up **[▲]** and down **[▼]** button.
2. Select the operating mode **TRAN** (Transmission) or **ABS** (Absorbance) by using the **[MODE]** button.
3. Place the cell with blank solution in the blank position (position 1) of the cell changer.
4. Place the samples or standards in the other positions of the cell changer.
5. Close the sample compartment cover. Pull the cell holder with the blank sample in the measurement beam. Measure the blank value by pressing the **[100%T]** button until display shows "100.0%T" or 0.000 Abs.
6. Pull the cell holder into the next sample position and read the %T or Abs value of the samples.



Note

Pay attention that the second step of the cell changer is only for reading 0%T. There are two steps between Position 1 and 2 of the manual cell changer.

Alternatively, if you use a single cell holder, at first put the blank solution in the light beam and set the value to 100%T or 0Abs by pressing the **[100%T]** button. Then put the sample or standard cell in the cell holder

7. When the printer is connected, you can print out the result with the **[P/C]** button.



Note

Choose cells with the same path length for all blanks, standards and samples of the analytical method you are using.

For measurements below 325 nm use quartz cells. Glass or plastic cells are only usable above 325 nm.

The liquid level must be at least 20 mm in a standard square cell.

9.5 Concentration mode



Note

This mode is only used when the linearity of the standard curve has been verified.

9.5.1 Determination of the concentration via one point calibration

The results are calculated with the following equations:

$$\text{CONC} = \text{ABS} * \text{CONC}_{\text{Standard}} / \text{ABS}_{\text{Standard}}$$

1. Press **[MODE]** button until the absorbance “**ABS**” is displayed.
2. Place the blank solution in the sample compartment and close the sample compartment cover.
3. Press the **[100%T]** button to measure the blank solution.
4. Remove the blank solution from the sample compartment.
5. Press **[MODE]** button until the concentration “**CONC**” is displayed.
6. Press the **[FUNC]** button until the “**Input Std. CONC**” is displayed.
7. Use the **[^]** or **[v]** button to set the concentration of the standard on the digital display and confirm with **[ENT]**. Use the **[^]** or **[v]** button to set the decimal point to the right position, confirm and measure with **[ENT]** button.
8. Insert the sample solution into the cell holder or cell changer. Close the sample compartment cover.
9. Read the results directly in concentration units on the digital display.
10. When the printer is connected, you can print out the result with the **[P/C]** button.

9.5.2 Determination of the concentration via factor

The results are calculated with the following equations:

$$\text{CONC} = \text{ABS} * \text{FACTOR}$$

1. Press **[MODE]** button until the absorbance “**ABS**” is displayed.
2. Place the blank solution in the sample compartment and close the sample compartment cover.
3. Press the **[100%T]** button to measure the blank solution.
4. Remove the blank solution from the sample compartment.
5. Press **[MODE]** button until the concentration “**CONC**” is displayed.
6. Press the **[FUNC]** button until “**Input Std. FACT.**” is displayed.
7. Use the **[^]** or **[v]** button to set the factor on the digital display and confirm with **[ENT]**. Use the **[^]** or **[v]** button to set the decimal point to the right position, confirm and measure with **[ENT]**.

8. Insert the sample solution into the cell holder or cell changer. Close the sample compartment cover:
9. Read the results directly in concentration units on the digital display.
10. When the printer is connected, you can print out the result with the **[P/C]** button.

9.5.3 Determination of the concentration via calibration curve

The results are calculated with the following equations:

$$\text{CONC} = \text{ABS} * \text{B} + \text{K}$$

1. Press **[MODE]** button until the absorbance “**ABS**” is displayed.
2. Place the blank solution in the sample compartment and close the sample compartment cover.
3. Press the **[100%T]** button to zero the blank solution.
4. Remove the blank solution from the sample compartment.
5. Press **[MODE]** button until the concentration “**CONC**” is displayed.

9.5.3.1 Create a new calibration curve

1. Press the **[FUNC]** button until “**Create Standard Curve**” is displayed and confirm with **[ENT]** button
2. Set the numbers of the standards with the **[^]** or **[v]** button and confirm with **[ENT]**.
3. Insert the first standard in the light beam.
4. Use the **[^]** or **[v]** button to set the concentration of the first standard on the digital display and confirm with **[ENT]**. Use the **[^]** or **[v]** button to set the decimal point to the right position, confirm and measure with **[ENT]**.
5. Insert the next standard in the light beam.
6. Use the **[^]** or **[v]** button to set the concentration of the next standard on the digital display and confirm with **[ENT]**. Use the **[^]** or **[v]** button to set the decimal point to the right position, confirm and measure with **[ENT]**.
7. Follow this principle to measure all standards for the calibration curve
8. If all standards are measured, you get the coefficient of the calibration K and B as well as the coefficient of determination R.
“**Display Curve?**” Press the **[ENT]** button to display the calibration curve or **press [P/C]** to abort.
9. You see the calibration curve. Press the **[ENT]** button to accept the calibration or **press [P/C]** to abort.
10. “**Print Curve?**” You can print out the calibration curve as well as the coefficients. Press the **[ENT]** button to start the print out or **press [P/C]** to abort.
11. “**Test Sample?**” Press the **[ENT]** button again to measure the sample.
12. “**Save Parameters?**” The calibration parameters are automatically saved under serial numbers. At least, 50 calibration curves can be stored. Press the **[ENT]** button to save the calibration or **press [P/C]** to abort.

13. Insert the sample solution into the cell holder or cell changer. Close the sample compartment cover.
14. Read the results directly in concentration units on the digital display.
15. When the printer is connected, you can print out the result with the **[P/C]** button.

9.5.3.2 Use an existing calibration curve

1. Press the **[FUNC]** button until “**Load Standard Curve**” is displayed, then press the **[ENT]** button.
2. Set the number of the calibration curve with the **[^]** or **[v]** button and press the **[ENT]** button.
3. Press the **[ENT]** button to load the calibration curve or press **[P/C]** to abort.
4. Insert the sample solution into the cell holder or cell changer. Close the sample compartment cover.
5. Read the results directly in concentration units on the digital display.
6. When the printer is connected, you can print out the result with the **[P/C]** button.

9.5.3.3 Delete an existing calibration curve

1. Press the **[FUNC]** button until “**Delete Standard Curve**” is displayed, then press the **[ENT]** button.
2. Choose the number of the calibration curve with the **[^]** or **[v]** button and press the **[ENT]** button.
3. Press the **[ENT]** button again to delete the calibration or **[P/C]** to abort.

9.6 DNA / Protein Analytics

This special method is used for bio-analytical determination of DNA / RNA and Proteins. Therefore the absorbance at 260 nm and 280 nm is measured. The results are calculated with the following equations:

$$\text{Purity of DNA / RNA} = \text{Abs}_{260\text{nm}} / \text{Abs}_{280\text{nm}}$$

$$\text{Concentration of DNA } [\mu\text{g/ml}] = (\text{Abs}_{260\text{nm}} * 62.9) - (\text{Abs}_{280\text{nm}} * 36)$$

$$\text{Concentration of Protein } [\mu\text{g/ml}] = (\text{Abs}_{280\text{nm}} * 1552) - (\text{Abs}_{260\text{nm}} * 757.3)$$

1. Press **[FUNC]** button until “**DNA / Protein Analysis**” is displayed and press the **[ENT]** button.
2. Factor1 = 62,9, confirm with **[ENT]** button.
3. Factor2 = 36, confirm with **[ENT]** button.
4. Factor3 = 1552, confirm with **[ENT]** button.
5. Factor4 = 757.3 , confirm with **[ENT]** button.
6. Insert the blank solution (Std Sample) and confirm with **[ENT]** button.
7. Insert the sample solution and confirm with **[ENT]** button.
8. Read the results on the digital display.
9. When the printer is connected, you can print out the result with the **[P/C]** button.
10. For performing the DNA/Protein test continuously please proceed as follows: strike **[P/C]** after readout of the first result. Insert another sample or move the arm of the cell changer to the next sample position and strike **[Ent]**.
11. If factors need to be changed, please strike **[P/C]** repeatedly until you get to the settings.

9.7 Time Scan



Note

The time scan mode is only possible, if a printer is connected.

1. Press **[MODE]** button until the absorbance “**ABS**” is displayed.
2. Place the blank solution in the sample compartment and close the sample compartment cover.
3. Press the **[100%T]** button to measure the blank solution.
4. Remove the blank solution from the sample compartment.
5. Press the **[FUNC]** button until “**TIME SCAN**” is displayed and confirm with **[ENT]**.
6. “**Input Total Time**”: Use the **[^]** or **[v]** button to set the total time between 1 and 300 minutes and confirm with **[ENT]**.
7. “**Input Interval Time**”: Use the **[^]** or **[v]** button to set the interval time between 0.5 and 300 seconds and confirm with **[ENT]**.
8. “**Input Delay Time**”: Use the **[^]** or **[v]** button to set the delay time between 0 and 300 seconds and confirm with **[ENT]**.
9. “**Input A Low Limit**”: Use the **[^]** or **[v]** button to set the low limit of the y-axis between – 0.097 and 3 Abs and confirm with **[ENT]**.
10. “**Input A High Limit**”: Use the **[^]** or **[v]** button to set the high limit of the y-axis between – 0.097 and 3 Abs and confirm with **[ENT]**.
11. “**Sampling and Print Curve?**”: Insert the sample solution and press the **[ENT]** button to start the measurement.

**Note**

The printer must be connected and ready for print out.

12. During the measurement the total scan time is on display. Press the **[ENT]** button to abort the measurement.
13. To print out the data points (absorbance value and time) press the **[ENT]** button or press **[P/C]** to abort.
14. Confirm the message “**Time Scan Over**” with **[ENT]**.

Software function

Time Scan

10 Disposal

The owner/operator of the SPEKOL® 1300 must ensure to dispose of the waste material (samples) cropping up in the analyses in accordance with the relevant legal and local regulations.

When the service life of the device is over, dispose of the device with its electronic components as electronic scrap observing the relevant regulations.