

UV Visible

# SPECTRONIC 200E

## User Guide

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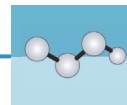
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# SPECTRONIC 200E USER GUIDE

## Introduction

This manual is a guide for operating and troubleshooting the SPECTRONIC 200. To get the most out of the manual, read all the chapters carefully and follow the procedures as closely as possible.

SPECTRONIC 200 has a complete on-board control set and may also be controlled from a remote computer using Thermo Scientific VISION<sup>lite</sup> 5 software. The eight key membrane keypad and a 320 x 240 pixel graphical LCD display give the user full control over all functions of the instrument. 1 nm data resolution over the wavelength range 340 nm to 1000 nm and optimized data integration times for each region of the spectrum give optimized photometric performance at all wavelengths.

## Conventions Used



**CAUTION** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**Note** Notes contain helpful supplementary information.

**NOTICE** Follow instructions labeled “Notice” to avoid damaging the system hardware or losing data.

## Features

Some of the features of the SPECTRONIC 200 spectrophotometer are:

- CCD polychromator based spectrophotometer
- Large, easily accessible sample compartment
- Removable sample compartment for easy cleaning
- Adjustable display angle
- 320 x 240 pixel color graphical TFT LCD display
- PCL 5E and PCL 6 printer compatibility
- Instrument can be stored on a shelf in a vertical position
- No moving parts to wear out or go out of alignment
- Convenient sample holders for cuvettes and test tubes
- Built-in cuvette rack wells

## Technical Specifications

- Spectral Bandwidth:  $\leq 4$  nm
- Light Source: Tungsten-halogen lamp
- Detector: CCD
- Display: Color Graphical LCD
- Scan Ordinate Modes: %T, Abs
- Wavelength range: 340-1000 nm
- Monochromator: 600 lines/mm holographic grating
- Wavelength readability: 1 nm on board, 0.5 nm under computer control
- Wavelength Accuracy:  $\pm 2$  nm
- Wavelength reproducibility:  $\pm 1$  nm
- Stray light:  $< 0.2$  %T (with SPECTRONIC standard SRM 400 filter)
- Photometric range: -0.3A to 2.5A
- Photometric Accuracy:  $\pm 0.01A$  at 0.3A  
 $\pm 0.05A$  at 1.0A  
(SPECTRONIC standard filter measured at 590 nm)

Figure 1. Connections and indications on back panel of the instrument

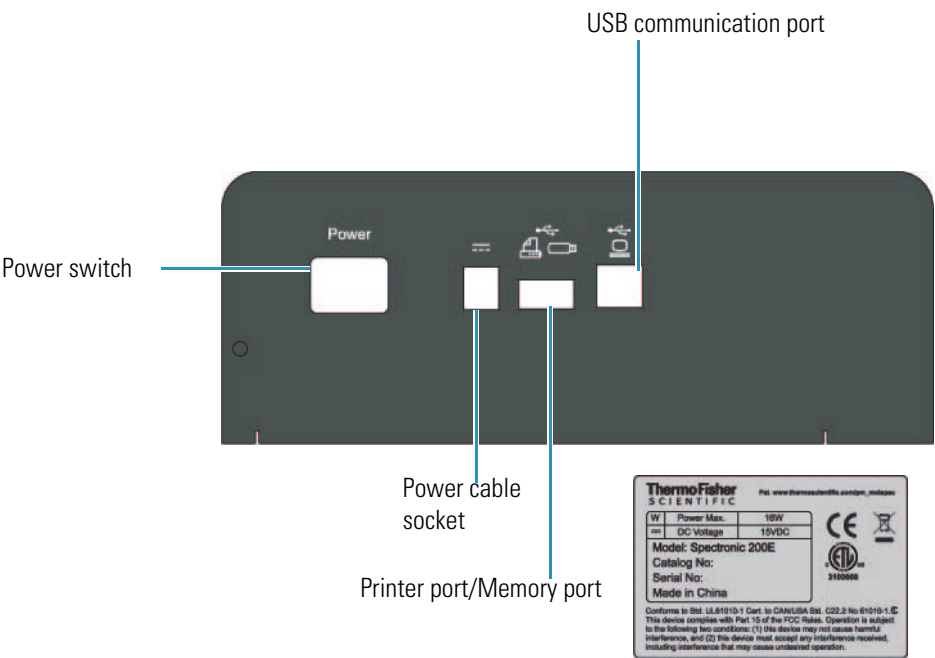
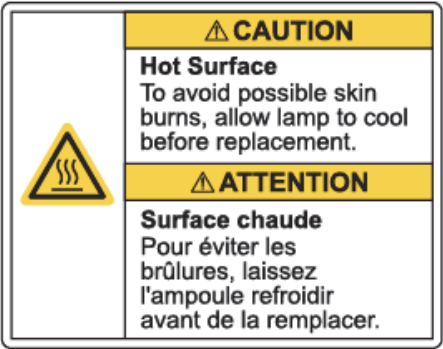


Figure 2. Safety warning label for lamp replacement



## Precautions for Safe Operation



**NOTICE** Be sure that all persons operating this system read the site and safety manual first.

## Site Preparation

Make sure that your laboratory meets the environmental and power requirements before installation of the spectrophotometer. The separate document Site and Safety Information for UV-Visible Spectrophotometers contains complete information on recommendations and requirements for locating and using your SPECTRONIC 200 safely.

## Before Operating

### Installation

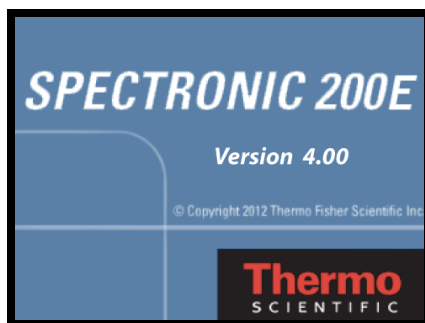
Plug the power line mains cord for the power brick into a properly earthed/grounded receptacle. Plug the DC cable from the power brick into the receptacle on the back of the instrument (next to the power switch).


### Switching On Power and Initialization

Switch ON the power to the spectrophotometer. The instrument performs a series of self tests on start-up. The sequence of initialization operations is given below:

Immediately after the instrument is switched ON a splash screen is displayed which indicates the model name and firmware version.

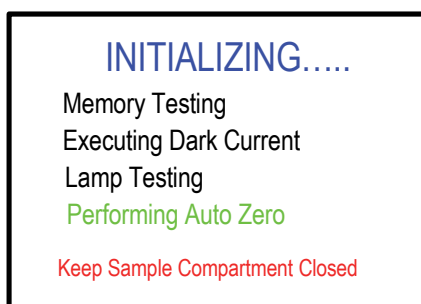
**Figure 3.** Splash screen



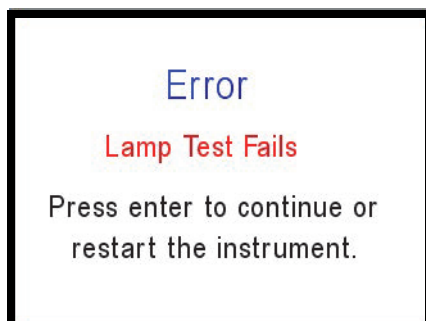
Following the splash screen the instrument will prompt the user to remove any cuvettes and close the sample compartment (Figure 4). Press  to continue.

**Figure 4.**

The self-diagnostics steps are displayed on the screen.

**Figure 5.**

If any abnormality occurs during self-diagnosis, an appropriate error message is displayed with prompts to continue or restart the instrument. For example, [Figure 6](#). See “[Initialization with Error Messages](#)” on [page 36](#) for more detailed information.

**Figure 6.**

After initialization is completed, the main menu is displayed and the system is ready for operation.

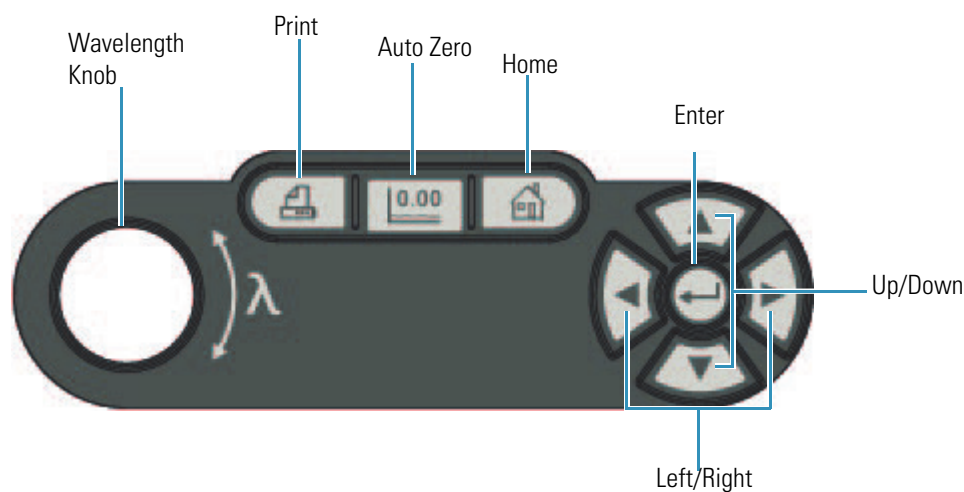
**Figure 7.**



## Keypad Operation and Mode Selection


### The Keypad

**Figure 8.**




The spectrophotometer has an 8 key membrane keypad and 320x240 pixel color graphics display.



Arrows and the central  key are used to select menus and sub-menus and to edit the numerical values.



**Auto Zero:** This key is live in all measurement screens. Any time you press , the instrument reads the current transmittance and sets the data as 100%T or 0.00A.

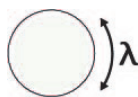




Home: Takes the user directly to the Home menu from any point in the software.



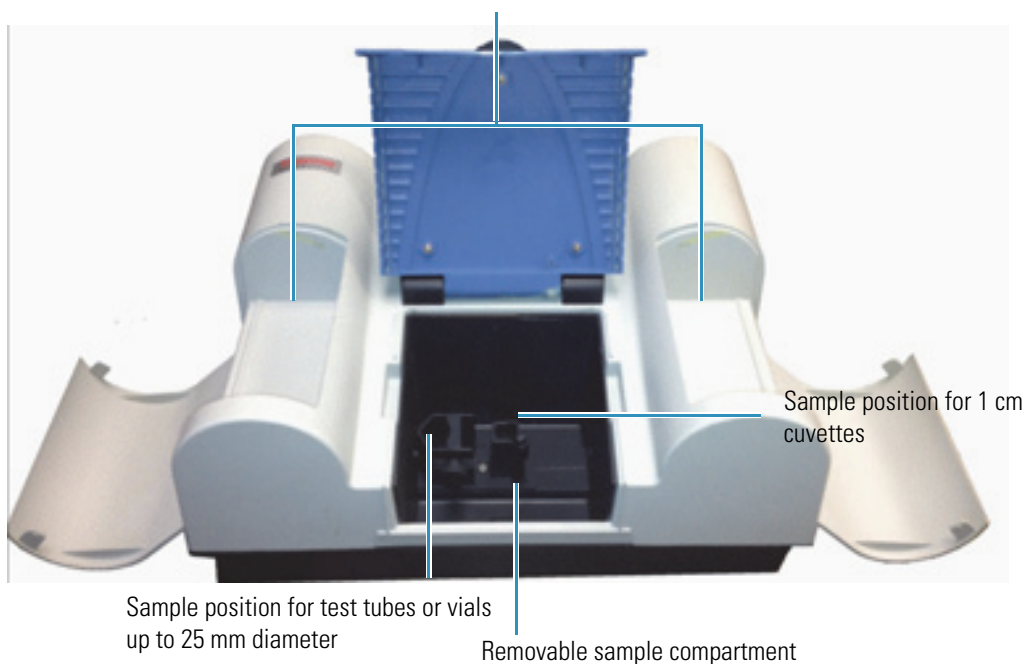
Print: Prints an exact copy of current screen.



Wavelength knob: Set the wavelength by rotating the wavelength knob.

Turning the knob without pressing down changes the wavelength in 10 nm increments. For fine wavelength control (1 nm increments) press the  $\lambda$  knob down and rotate.

Cuvette rack staging and storage



### ❖ Using the cuvette holders

**Square cuvettes** - simply slide the square cuvette into the square cuvette holder.

- If the cuvette has frosted sides these should face the front and rear of the instrument. The beam passes through the sample compartment from right to left so the clear faces of the cuvette must be on the right and left sides.

**Test-tube cuvettes** - The screw clamp only needs to be adjusted once for a particular size of test tube.

1. Loosen the thumb-screw and place the test tube cuvette in the holder.

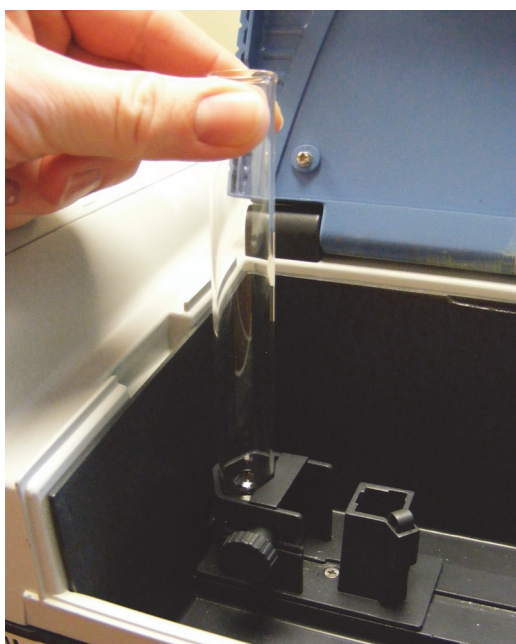
2. Slide the moving part up against the test tube so that it is held securely and tighten the thumb-screw.



Do not over-tighten.

3. Remove the test tube and re-insert it without adjusting the thumb screw.

The slide is locked down on only one side so it serves as a spring. If the tube is held securely and slides in and out with ease the tension is correct. If significant force is required to insert or remove the tube, or if the tube wobbles while in place, adjust the position of the slide component to decrease or increase the grip tension as required.



# SPECTRONIC 200 Modern Interface

## Introduction

This interface takes full advantage of all the capabilities of the SPECTRONIC 200 spectrophotometer. The modern interface gives access to experiment and display modes not found in earlier instruments.

Available experiment modes are:

- [Live Display](#)\*
- [Multi Wavelength](#)\*
- [Quantitative Analysis](#)
- [Analyzer](#) (not present in education models)
- [Scan](#)

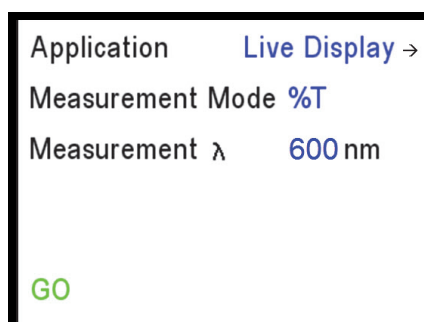
\*Education models show absorbance readout to two digits after the decimal point. Industry models show three digits after the decimal from 0.000A to 0.999A.

Select the mode using left and right keys (◀▶).

## Live Display

This application is used to measure and display absorption or transmission values in real time.

**Figure 9.**



1. Use ▲▼ to select (text turns green to show which option is selected) **Measurement Mode** and then the ◀▶ to toggle between %T or Abs.
2. Select **Measurement λ** and use ◀▶ or the λ knob to set your desired measurement wavelength.
3. Use the arrow keys to select **GO**. Press ⏏ to start the Live Display mode as shown in [Figure 10](#).

#### Note


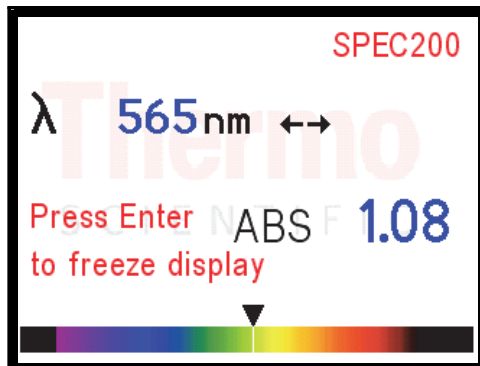
- Pressing  on the keypad while **Application** is selected takes you directly to the next screen.
- Place a blank solution cuvette in the sample holder and press **0.00** before measuring any sample cuvettes.



Figure 10.




The displayed %T/Abs value updates every 2 to 5 seconds (depending on wavelength).

4. Place a cuvette containing a blank solution in the sample stage, press **0.00** and wait until the screen displays the message **Performing Auto Zero**.

The instrument will restart live display readings as soon as the auto zero measurement is complete.

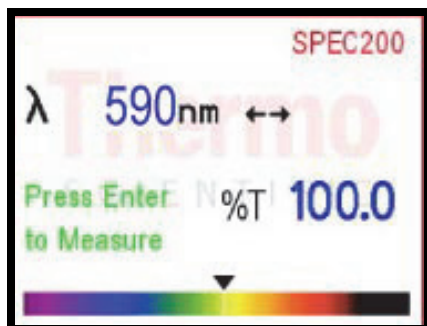
5. Change the wavelength using the  $\lambda$  knob or   if desired.

A triangle marker and white line on the spectrum at the bottom of the screen show the color of the light presently being measured.

6. Place a cuvette containing a blank solution in the sample measurement position, close the lid and press **0.00** before beginning measurements of your samples.
7. To freeze the display, press .

When the display is frozen (i.e., measurement values are not being updated), the display changes to that shown in [Figure 11](#).

**Figure 11.**



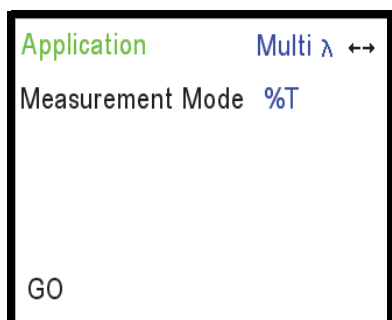
8. Press  to return to the Home menu.




**Note** You can replace or erase the watermark logo on the Live Display screen. This option is located on the Administration menu. See [“Administration” on page 32.](#)

## Multi Wavelength

Use this application to observe absorption or transmission values of the sample at up to four different wavelengths in a single measurement.

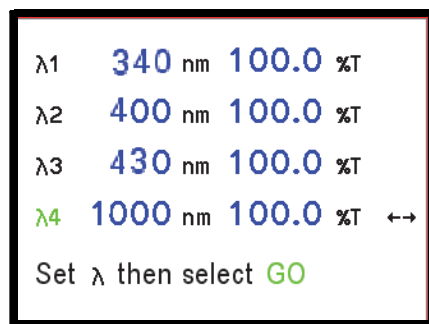
**Figure 12.**



1. Press  once to select **Measurement Mode**. Press  to select either ABS or %T.
2. Select **GO** and press .

The next screen is shown in [Figure 13](#).

**Figure 13.**



- Use ▲▼ to move between wavelength selections.
  - Set the measurement wavelengths with ◀▶ or the λ knob.
3. Select GO and press ← to begin live measurements.
  4. Place a cuvette containing a blank solution in the sample stage, press 0.00 and wait until the screen displays the message **Performing Auto Zero**.

The instrument will restart live display readings as soon as the auto zero measurement is complete.

5. Remove the blank cuvette and place your sample cuvette in the sample stage.

Each wavelength updates sequentially. Result values will flash when they update. ([Figure 14](#)).

**Figure 14.**



Pressing ← during measurement both freezes the displayed result values, and allows you to change the measurement wavelengths.

6. Use ▲▼ to select the wavelength you want to change.

7. Select **GO** and press  to restart the measurement.



**Note** If you change the measurement wavelength, it may be necessary to re-zero the instrument by placing a blank solution in the sample stage and pressing **0.00** until the screen displays the message **Performing Auto Zero**.

## Quantitative Analysis

The Quantitative Analysis (Quant) application supports both linear calibration curves with up to four standards and manual entry of a factor for determination of the concentration.

**Figure 15.**

Application	Quant
No. of STDs(F,1-4)	1
Measurement Mode	ABS
Measurement ?	340 nm
Unit	ppm
USB memory	Save
GO	


Use the arrow keys on the navigation pad to select the number of standards, Measurement Mode (ABS or %T) and the display unit. Set the Measurement wavelength using   or the  $\lambda$  knob.

The USB memory option allows you to select:

**Save** – to automatically enter the method save sequence

**No** – to go directly to sample measurement

**Load** – to automatically enter the method load sequence

Once the method parameters are complete, select **GO** and press .

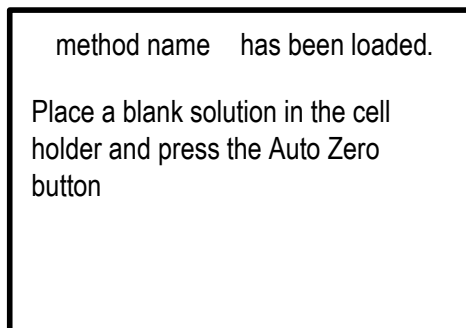
## Load Option

If you selected the **Load** option and a USB stick is connected to the instrument, all methods stored on the USB memory stick are displayed on the screen.

1. Use ▲▼ to select the method and press ← to load the method.

The instrument will confirm that the method has been loaded (Figure 16).

**Figure 16.**



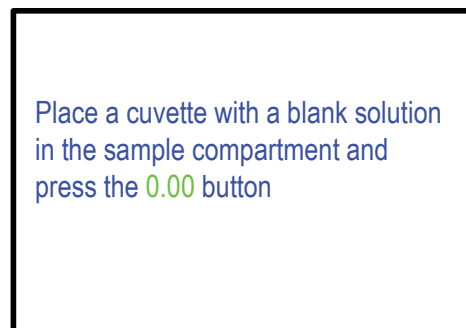
2. Follow the on-screen instructions to auto zero the instrument.

The instrument will then go to the sample measurement screen (Figure 25).

## Save and No Options

1. If you selected the **Save** or **No** option, the instrument will prompt you to place a blank solution in the sample compartment and press 0.00 to continue (Figure 17).

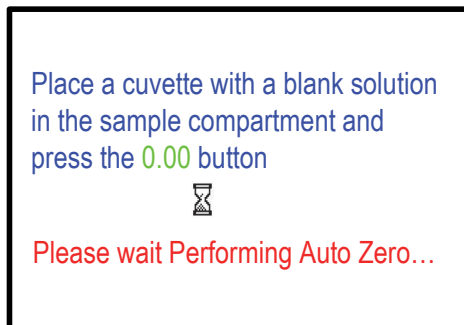
**Figure 17.**





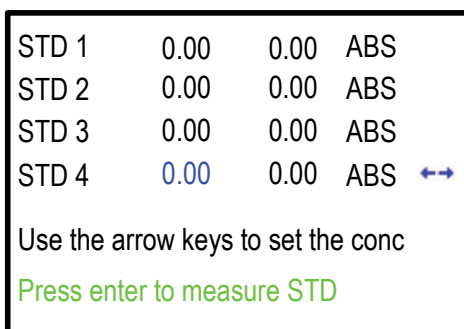
The instrument will confirm that it is recording the zero absorbance measurement, [Figure 18](#).

**Figure 18.**



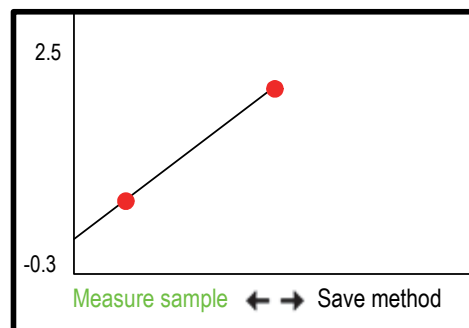
On completion of the zero measurement, the standard solution editing screen will appear, [Figure 19](#).


**Figure 19.**



2. Use ◀▶ to set the concentration of each standard.
3. Press ⏏ to measure the ABS or %T of that solution.
4. After all standards have been measured the instrument prompts you to press ⏏ to display the calibration graph.

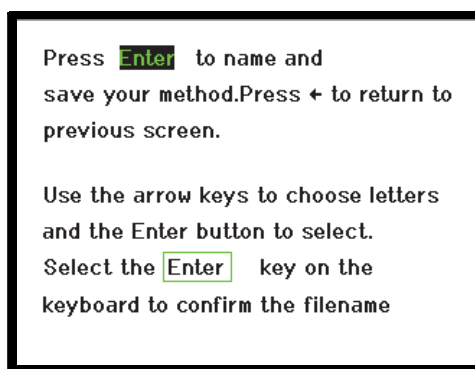
**Figure 20.**



Depending on whether you selected **Save** or **No**, under the USB memory option of the setup (Figure 15), either **Save method** or **Measure sample** will be highlighted in green. Pressing  will execute the highlighted option.

- If you select **Save method** the instrument will prompt to save the method or return to the standard graph screen.
- If you select the **Measure sample** option, the instrument goes directly to the screen in Figure 25.

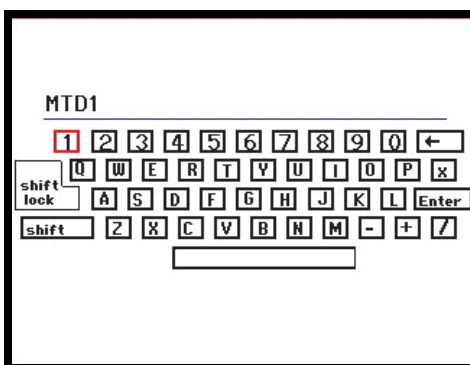
**Figure 21.**





An on-screen keyboard will be displayed (Figure 22).

**NOTICE** Insert a USB memory device that is formatted FAT32 into the USB-A port on the back of the instrument.

**Figure 22.**



5. Use the arrow keys to choose letters and press  to select the letter.

6. Select **Enter** on the on-screen keyboard and press the  key on the instrument to confirm the file name.

**Figure 23.**

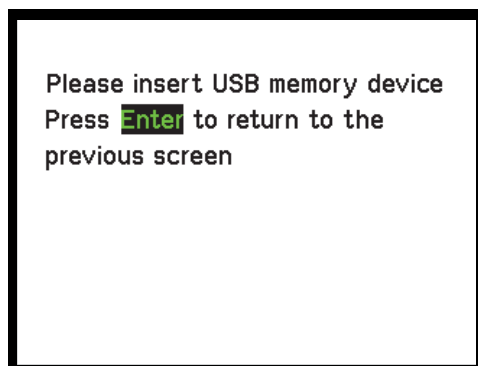


7. Follow the directions on the screen to continue. The standard graph will be displayed on the screen (Figure 25).

If no USB memory device is present, the instrument will prompt you to connect one.

**NOTICE** If the SPECTRONIC 200 does not recognize your USB memory device, check that it is formatted FAT32. Older USB sticks and sticks of less than 2GB may be formatted FAT16 (usually labeled simply as FAT).

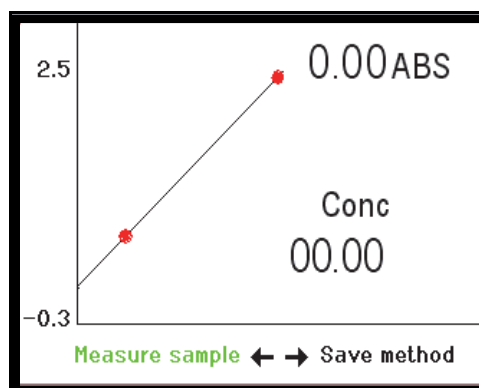
**Figure 24.**



8. To measure a sample, select **Measure sample** and press **↵**.

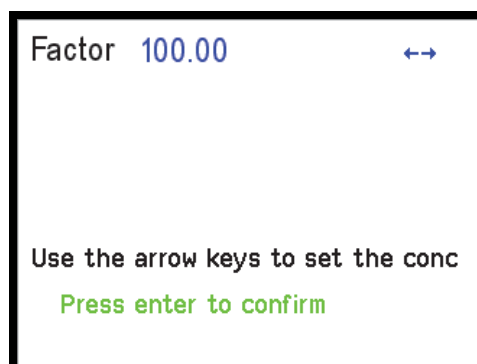
The screen will display both the concentration and measured ABS or %T value as shown in [Figure 25](#).

**Figure 25.**



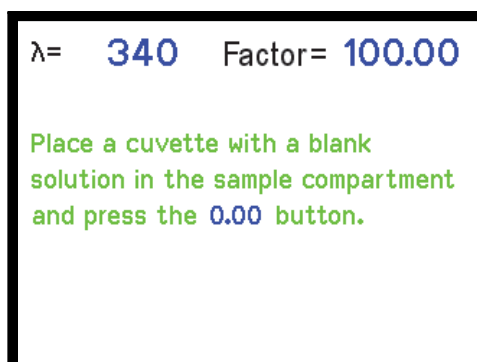
9. If you select **F** in the No. of STDs option, the instrument prompts you to enter the factor as shown in [Figure 26](#).
10. Follow the on-screen directions.

**Figure 26.**



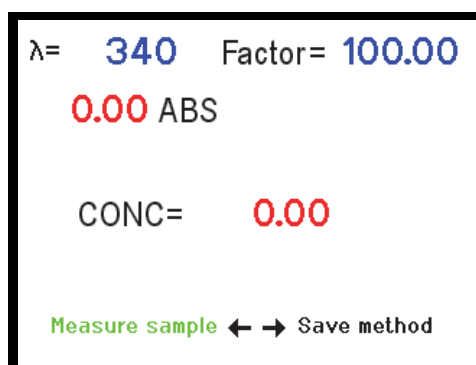
After confirmation of the factor, the instrument will ask for blank solution.

**Figure 27.**



After performing an Auto Zero measurement, the instrument shows the measurement screen (Figure 28).

**Figure 28.**



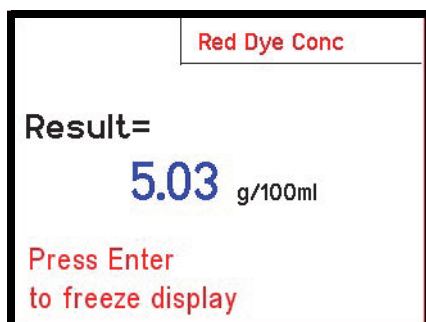
11. Select the **Measure sample** option and press  $\leftarrow$  to measure each sample.

## Analyzer

The SPECTRONIC 200 Industry model local control software contains a programmable analyzer mode in the SPECTRONIC 200 Modern software application.

The analyzer mode allows a laboratory manager to program sophisticated methods involving up to four wavelengths, four factors, and a user-entered mathematical equation. Analyzer methods, once programmed, must be saved to a USB memory device for later re-use. The working screen of an analyzer method shows only the name of the method and the result (e.g., Figure 29).

**Figure 29.**



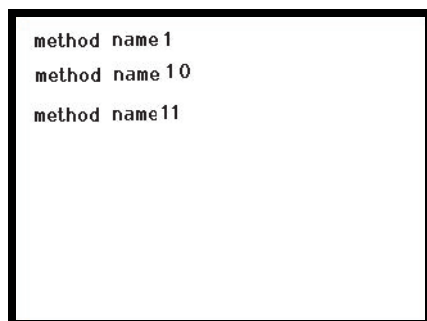
**NOTICE** Using the Analyzer mode requires that you store methods on a USB memory device that is formatted FAT32.

## Using the Analyzer Mode


### Loading a Saved Method


- If you select the **Load Method** option, the screen will display the names of all the methods saved on the attached USB memory device.
  - If no memory device is present, an error is returned.
1. Select the chosen method using the ▲▼ keys and press ↵ to load it into the instrument.

**Figure 30.**



2. After loading the method the instrument will prompt the user to place a blank solution in the sample compartment and press 0.00 .

3. After performing the zero measurement, the instrument prompts to place the first sample in the cell holder and press  to begin live measurements (Figure 37 and Figure 38).
4. Follow these directions and the calculated result for each sample is displayed on the screen.

Pressing  freezes the display to help with printing and/or data recording.

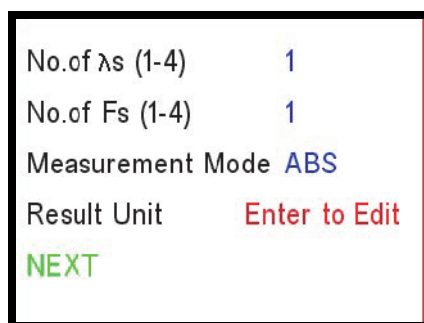
## Designing a New Method




If you select the new method option (Figure 31) the first screen in the method setup (Figure 32) is where you specify the number of wavelengths and factors.

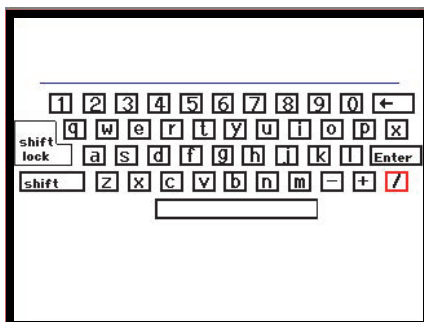
**Figure 31.**



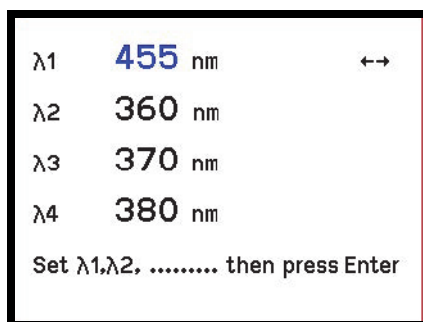
**Figure 32.**



Up to four wavelengths and four factors may be specified. Select **Measurement Mode** and use   to toggle between ABS and %T. You must specify a result unit, which may be anything you choose. The on-board software presents an on-screen keyboard (Figure 33). Select each character by using the arrow keys on the instrument and pressing  to add the character to the text line. Select **Enter** on the on-screen keyboard to confirm your unit selection.

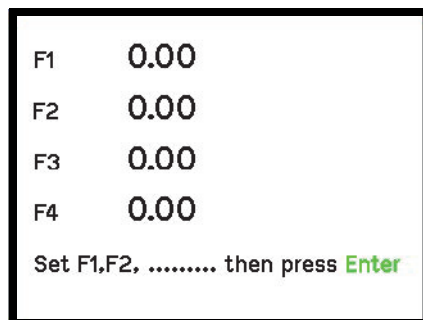
**Figure 33.**

Select **NEXT** at the bottom of the screen shown in [Figure 33](#) to proceed to the wavelength editing screen ([Figure 34](#)).

**Figure 34.**

The screen displays as many wavelengths as you specified in the previous menu. Use the ▲▼ keys to switch between measurement wavelengths. Use the λ knob or ◀▶ to set each wavelength.

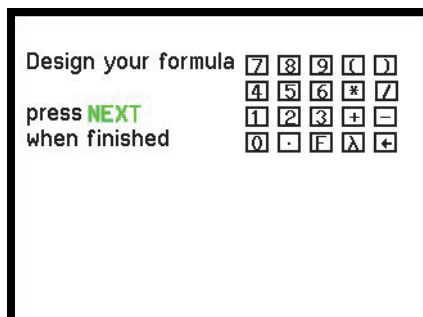
Select the word **Enter** at the bottom of this screen to advance to the factor entry screen.

**Figure 35.**



Use the arrow keys to select and set the value of each factor. Select **Enter** at the bottom of the screen to advance to the formula design screen.

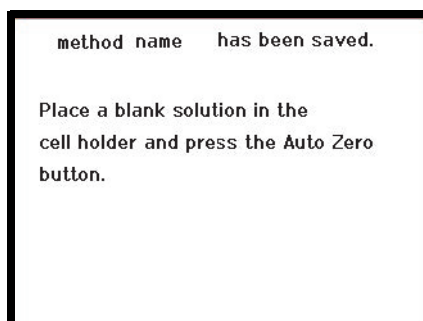
**Figure 36.**




Use the arrow keys to choose characters. Press **←** to select the character and enter it onto the formula line. Once the formula is complete, go to the **NEXT** option (navigate to the 7, press **←** and press **↵**). This completes the analyzer method setup and leads you into the method save sequence. An on-screen keyboard layout (Figure 33) is used to enter the file name for the method. After saving the method, the software prompts you as shown in Figure 37.

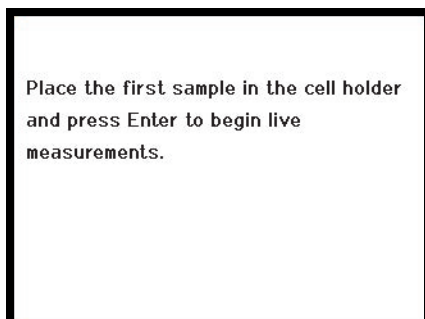
**NOTICE** If the SPECTRONIC 200 does not recognize your USB memory device, check that it is formatted FAT32. Older USB sticks and sticks of less than 2GB may be formatted FAT16 (usually labeled simply as FAT).

**Figure 37.**



Following the zero measurement, the software prompts you to insert the sample and press  to begin live measurements (Figure 38).

**Figure 38.**

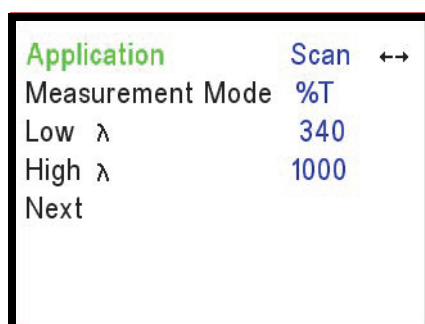








The instrument now reads continuously. The result displayed flashes each time it updates (Figure 29).

## Scan

Use this application to scan across a defined wavelength range.

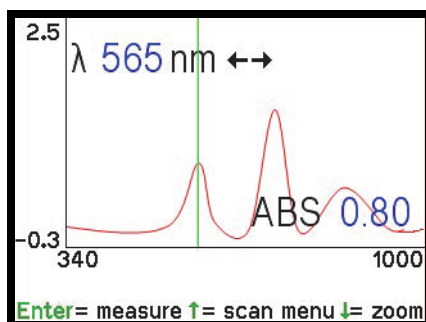
**Figure 39.**




1. Use the   arrow keys to select **Measurement Mode** and then   to toggle between %T or Abs.
2. Select **Low λ** and **High λ** and use   or λ knob to set your lower and higher wavelength limit for scan.
3. Use the arrow keys to select **Next**.






4. Press  to proceed to the Scan screen as shown in Figure 40.

**Figure 40.**



5. Place a cuvette containing a blank solution in the sample stage, press  and wait until the screen displays the message **Performing Auto Zero**.

Once the Auto Zero measurement is complete, remove the cuvette with the blank solution and place the cuvette with your sample in the sample stage.

6. Press  to scan across selected wavelength range.
7. Use the  $\lambda$  knob or   to move the green cursor line to identify individual peaks in the spectrum.
- Both the wavelength and the ABS or %T reading at the cursor position are displayed on the screen.
8. Press  to return to the scan menu.
9. Press  to zoom in.

The displayed spectral window will center on the cursor position and narrow further with successive presses of the down arrow key to a maximum full scale of 100 nm.

## SPEC 20 D+ Emulation

### Introduction

The SPECTRONIC 20D+ emulation mode is designed to mimic the operation of a Thermo Scientific SPECTRONIC 20D+ as closely as possible. This mode is intended for users who either:

- Have SOPs that refer to the SPEC20D+ and cannot be changed easily
- Have several SPEC20D+ instruments and wish to integrate SPEC200 instruments into the set without adding a new instruction set for instrument use.

The application modes are exactly those found in the SPECTRONIC20D+. Change mode by pressing the right arrow key as indicated on the screen ([Figure 41](#)). Use the  $\lambda$  knob to set the wavelength. This knob has a coarse/fine feature. Turn it normally to alter the wavelength in units of 10 nm. Press it down and turn to alter the wavelength in units of 1 nm.

## Important Differences Between SPECTRONIC 200 and SPECTRONIC 20D+

**Note** To perform an OD600 measurement for measurement of a cell culture with data that emulates the results from a SPECTRONIC 20 you should utilize the OD600 mode accessed from the Home menu. See [OD600 Mode for Cell Growth Measurements](#) for details.

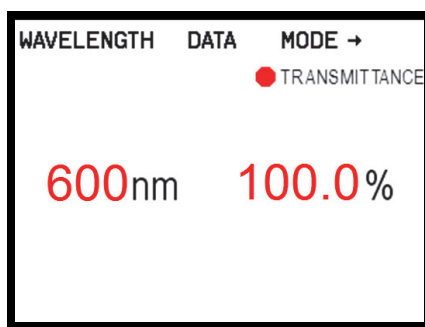
SPECTRONIC 200 performs a full spectrum 0%T measurement at startup and retains this information in internal memory. Similarly, when a user places a blank cuvette in the sample stage and presses 0.00 on the instrument keypad, the SPECTRONIC 200 measures the spectrum and records the 100%T value at all wavelengths. This means that it is never necessary for the user to manually set 0%T, and after measuring 100%T at one wavelength, it is not necessary to measure it again if the user changes measurement wavelength.

## Experimental Modes

### Transmittance and Absorbance

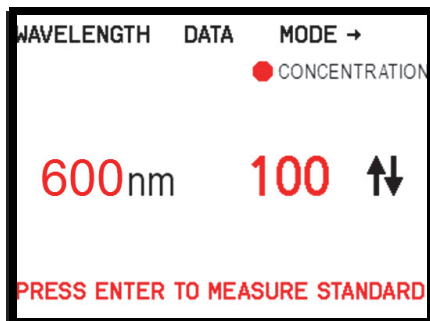
Simply place a blank solution in the sample stage and press 0.00. Once the Auto Zero (100%T) measurement completes, place your sample cuvette in the sample stage and the instrument will display the transmittance or absorbance, as selected ([Figure 41](#)). Press ◀▶ on the navigation pad to toggle between Absorbance and Transmittance modes.

**Figure 41.**



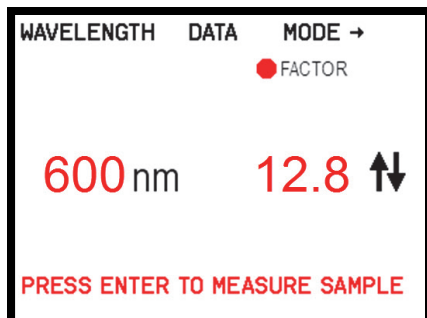
Select Concentration mode by pressing the right arrow key until **CONCENTRATION** displays on the instrument (Figure 42).

**Figure 42.**



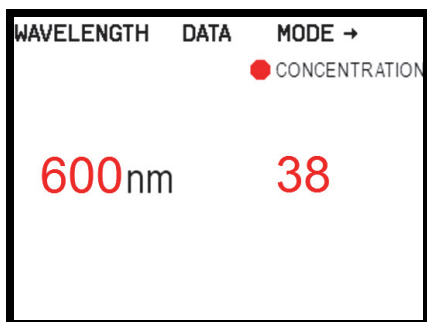
Use ▲▼ to set the concentration of your standard. After setting the concentration value, place your standard solution cuvette in the sample stage and press ←↵. After the standard measurement, the instrument will calculate the factor and display it on the screen (Figure 43). This factor can be used in the future to set up the method without need for a standard solution.

**Figure 43.**



Place a sample cuvette in the sample stage and press ←↵ to begin measuring the concentration of sample solutions. Figure 44.

**Figure 44.**

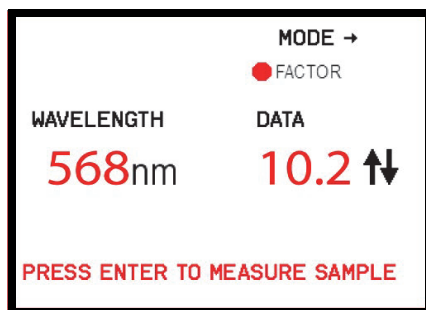


This is a live measurement mode. Readings will update as you present samples.

## Factor

Select **Factor Based Concentration** mode by pressing the right arrow key until **FACTOR** displays on the instrument (Figure 45).

**Figure 45.**



Use the ▲▼ keys to set the factor. Place a cuvette with your sample solution in the sample stage and press ← as indicated on the screen. Live measurements of your sample begin. The concentration is displayed on the screen.

## OD600 Mode for Cell Growth Measurements

Cell growth is often measured via an “OD600” measurement. This is a measure of the extent to which the spectrophotometer beam is attenuated by scattering caused by the cells suspended in the growth medium. OD600 stands for “Optical Density at 600 nm”. Optical Density is a synonym for Absorbance. In the SPECTRONIC 200E, OD 600 measurements are performed in absorbance mode at 600 nm.

The SPECTRONIC 200 replaces the SPECTRONIC 20, known as the SPEC 20, which has been used by life scientists to measure cell densities for over 50 years. The fact that OD600 measurements are a scatter measurement means that the amount of transmitted light that reaches the detector varies depending on the optical design of the spectrophotometer. Differences in the optical design of the SPECTRONIC 200E compared to the SPEC 20 mean that the SPECTRONIC 200E is roughly twice as sensitive to cell concentration.

## Direct Measurement Mode

If working only with SPECTRONIC 200E instruments, high sensitivity to scatter allows users to make more accurate measurements and to work with lower concentrations of cells than might be required in a SPECTRONIC 20.

## Corrected to SPEC 20 Measurement Mode

For users who have a mixture of older SPECTRONIC 20 and newer SPECTRONIC 200E instruments in their labs, or who wish to use protocols developed using a SPEC 20 and referring to absorbance values seen on that instrument, the SPEC 20 emulation mode scales the raw measurement to produce values comparable to what would be observed using a SPEC 20. The scaling factor was developed using e-coli bacteria. Bacteria of significantly different size or shape may require a different scaling factor.

## User Entered Factor Measurement Mode

If you wish to modify the raw absorbance measured by the SPECTRONIC 200E to match data recorded on another instrument with a different optical geometry, you can measure a culture in both the SPECTRONIC 200 using the Direct measurement mode and the other instrument. Calculate the multiplication factor required to scale the SPECTRONIC 200E data to match the other instrument's data and enter it in the User Entered Factor Measurement mode. Running the experiment in this mode will generate results scaled to match the other instrument. We recommend making a series of measurements of cell cultures with OD600 readings between 0.05A and 1A and calculating the average of the ratios determined for the individual measurements to use as the conversion factor.

1. To run the OD600 mode, select it from the Home menu using ▲▼ and press ↵.

**Figure 46.**



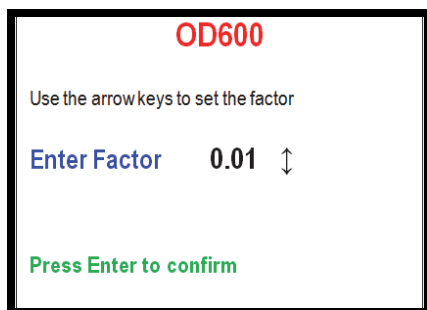
2. Use ◀▶ to select the desired measurement mode: Direct, Corrected to SPEC 20 or User Entered Factor.

See the introductory text above for an explanation of each of these modes.

3. Once you have selected the preferred measurement mode, press ▼ to highlight **GO** and press ↵.

**Figure 47.**

- If you select **Direct** or **Corrected to SPEC 20** measurement mode you will proceed directly to the blank measurement screen. (Figure 49)
- If you select **User Entered Factor** measurement mode, an intermediate screen (Figure 48) appears for you to enter the desired factor. Follow the on-screen directions.

**Figure 48.**

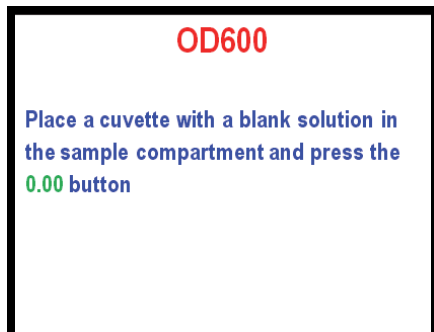
4. Use a clean test-tube or cuvette containing a solution of your broth/media without bacteria to record the blank measurement.
5. Use identical tubes or cuvettes to measure your samples.

The center of the light beam is 15 mm above the base of the test tube so you should have at least 20 mm of sample in the tube.

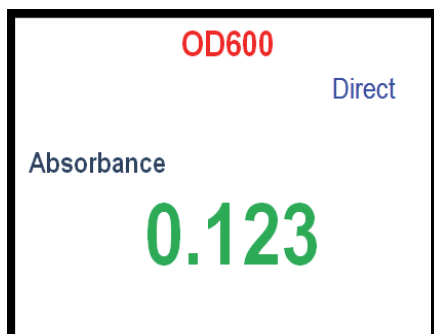


6. On exiting the setup screen above, the instrument will prompt you insert and measure the blank. See [Figure 49](#).

**Figure 49.**



Once the blank measurement has been recorded and saved the software moves immediately to a Live Display mode. There is no further need to press buttons. Simply insert your samples, wait a few seconds for the reading to update and stabilize, and record the value.

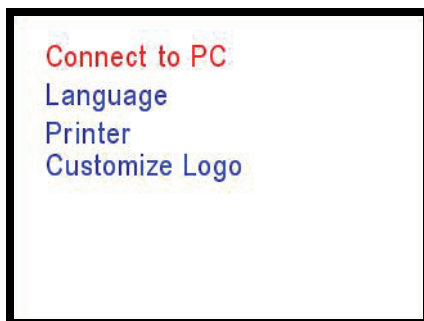


## Administration

### Introduction

This menu provides access to functions to change the display language of the instrument, select the printer type, customize the logo and to connect the instrument to a computer.

**Figure 50.**



Use ▲▼ to select the desired option and press ↵.

### Connect to a Computer

Your SPECTRONIC 200 spectrophotometer can be run remotely from a computer using Thermo Scientific VISION<sup>lite</sup> 5. VISION<sup>lite</sup> 5 software offers:

- More sophisticated options for scanning and manipulation of spectra
- Fixed wavelength measurements at up to thirty wavelengths
- Quantitative analysis with data tables and report printing
- Instrument performance validation options
- A kinetics package for measuring rates of reaction or other time-based phenomena

The SPECTRONIC 200 connects to a computer using a standard USB cable.

1. To initiate remote control of the instrument by a computer, select **Connect To PC** before starting the software on the attached computer.

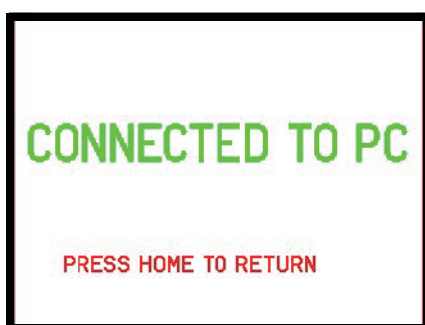
**Figure 51.**




2. Press  as instructed on the screen.

This causes the instrument to send a signal to the computer to let the computer know that it is there and ready to connect.

**Figure 52.**



3. When you are ready to disconnect the instrument from the computer, press .  
It will return to the Home menu.

## Language


Use  to select the desired instrument language and press  to confirm.


## Printer Selection

The SPECTRONIC 200 supports Epson™ TM-T88V Point of Service (POS) thermal printers and laser printers that use the PCL5e or PCL6 communication protocols.

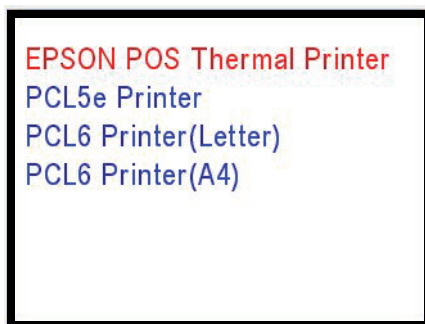
Before connecting a printer to your SPECTRONIC 200, read the specifications for the printer carefully to ensure that it supports one of these protocols. Many page printers, including ink-jet and very low cost laser printers, use proprietary communication protocols and are not supported by the SPECTRONIC 200.

**NOTICE** Only page printers that support PCL5e or PCL6 printer language will work with the SPECTRONIC 200.

When you press  on the SPECTRONIC 200, an exact copy of what is on the screen (without the watermark logo if printing from the Live Display mode) is sent to the printer. On the thermal printer, the output is monochrome and approximately 4 cm wide by 3 cm high. On laser printers, the output will be printed in color if the printer supports color. The screen image on a laser printer print-out is approximately 10 cm wide by 7 cm high.

Selecting the Printer option from the Administration menu displays the screen shown in [Figure 53](#). Make the appropriate selection for your printer and press  to confirm your choice.

**Figure 53.**



Note that printers which are multi-function devices (i.e., they incorporate a scanner, fax machine, copier or memory device reader), are not supported. Check the specification sheet provided by the manufacturer of your printer to verify that it supports PCL5e or PCL6 before attempting to print to it. Printers that do not support one of these protocols will not work with the SPECTRONIC 200.

## Customize Logo

The SPECTRONIC 200 provides the facility to customize the logo shown as a watermark in Live Display mode in the Modern Interface.

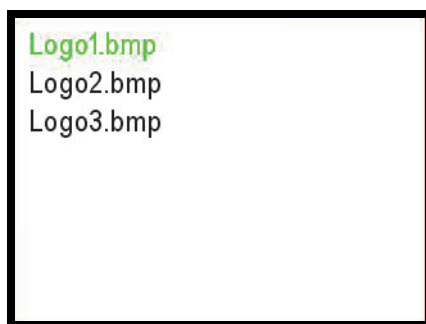
Logo images must be bitmap (.bmp extension) files that are 320 pixels wide and 195 pixels high. 24 bit color images are supported. Images should be at least 80% transparent in order not to interfere with the readability of the Live Display screen. Use an image editing program to produce your image or logo in a watermark format. If your image editing software does not support degrees of transparency, greatly increasing the brightness and decreasing the contrast will give much the same effect. The DVD that ships with your instrument contains a bitmap file of a blank, white screen that can be saved to a USB memory device and uploaded to erase the Thermo Scientific logo if customers find it to be undesirable.

**NOTICE** The SPECTRONIC 200 only recognizes USB memory devices that are formatted FAT32. If your USB memory device is not recognized by the instrument, reformat it using a computer, re-save your logo file and try again.

1. Insert a USB memory device containing your logo file(s).

The instrument will detect the memory stick and display a list of logo files that are available to load.

**Figure 54.**



2. Use the ▲▼ arrow keys to select the desired logo.

3. Press ← to confirm the selection.

The instrument will prompt the user to wait while the logo is updated. Be patient. This process can take up to two minutes.

4. Once the software reports that the logo has been loaded, press **Home** and navigate to the **Live Display** screen to view your new logo.

Some experimentation may be required to adapt your logo to the correct level of transparency and precise screen placement that gives the best viewing of both the logo and the data from your experiment.

## System Maintenance

### Routine Checks

Check the sample compartment floor daily. Remove it and wash it with water to remove spilled chemicals. Ethanol or methanol may also be used if necessary.

**NOTICE** DO NOT USE ACETONE as this solvent will soften the plastic of the sample compartment liner resulting in severe damage that may require replacement of the sample stage and sample compartment liner.

When using liquid samples, check the sample compartment floor for spilled liquid between measurements. Spilled chemicals may damage the sample compartment, or vapors may cloud the lenses at either side of the sample compartment, causing a measuring error. Remove the sample compartment and wash out any spilled solutions.

Check the lenses on the left side sample compartment once per week. Ensure that they are not contaminated with fingerprints or haze from dried sample vapors. If lenses are contaminated, wipe them with a clean, lint-free cloth.

## Initialization with Error Messages

The spectrophotometer performs various checks, including a lamp energy check, and sets many initialization parameter values during power up. The progress of the tests is displayed as a self-diagnosis window. If no abnormality is detected, the instrument progresses to the Home menu. However, if an abnormality is detected at any step, the instrument stops there and displays an error message. In such a case, identify the problem source, if possible, and correct it. If the problem source is not correctable, contact your nearest Customer Support Center indicating the error messages.

Note that when the lamp is operating, light can be seen shining out through the ventilation grille on the back of the instrument. If a lamp error is reported, verify that the lamp is lit before contacting Customer Support. Spare lamps are available from your Thermo dealer.

## Lamp Replacement

### Precautions



**CAUTION** The light source and light source housing become hot during operation. Be sure to turn off the power switch and allow the housing and lamp to cool sufficiently before handling.

Wear gloves when handling the lamps so as not to leave fingerprints. Leaving fingerprints on the glass of the lamp can lead to damage to the glass and/or reduce its transmittance.

Treat the lamp with extreme care during replacement. If the lamp glass is damaged leakage in the envelope vacuum may occur. The lamp will not function if an impact causes a loss of the vacuum seal. This can occur even when the glass appears undamaged.

1. Turn the instrument upside down and locate the lamp access door.



2. Loosen the brass thumb screw (do not remove it) until you can open the access door by pulling up on the screw.



3. Loosen the silver thumb screw (you may require a Phillips/cross screwdriver for this operation).



4. Once loose, lift up the screw to disengage the lamp base-plate from the lamp housing.



5. Gently pull the lamp base-plate towards the long edge of the instrument base-plate and turn it over.

You can withdraw approximately 4 cm of cable from the instrument to allow room to work.



6. Loosen the tall brass thumb screw to the point where the metal bracket that holds the top of the lamp can be turned to the side to allow the lamp to be removed.
7. Grasp the old lamp with your fingers and pull it straight up and away from the base.

Discard the old lamp.





**Note** Do not touch the new lamp with your bare fingers. Oils from your skin will stick to the glass and can cause damage to it when the lamp envelope reaches operating temperature.

8. Use a laboratory tissue to grasp the new lamp.
9. Press the pins of the new lamp straight down into the holes in the ceramic lamp base.



10. Turn the metal bracket that holds the top of the lamp back into position over the lamp and re-tighten the long brass thumb screw that holds it in place.

Take care not to touch the lamp glass with your bare fingers while performing this operation.



11. Turn the lamp base over, feed the cable back into the instrument, re-seat the black lamp base in the silver housing and re-tighten the silver thumb screw to hold it in place.



12. Close the lamp access door.



## Lamp Specifications

### Halogen Lamp

Thermo Scientific Part No. 335423-000 - package of two lamps

Mean Life 1000 Hours

Do not attempt to use any lamp other than the lamps sold **specifically** for this instrument. Correct voltage, wattage, and precise height of the filament are essential to proper operation of your SPECTRONIC 200 spectrophotometer.

**Note** Be sure to specify that you require a lamp for the SPECTRONIC 200E. Your SPECTRONIC 200E uses a different lamp than the original SPECTRONIC 200.

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