

# Spectrophotometer SpectroDirect

For water and  
waste water testing  
330 - 900 nm

## Highlights

- 330 to 900 nm
- Interface RS232
- Large illuminated display
- Touch-sensitive film keypad with logical layout
- Use of round vials and rectangular cells of different sizes without adapter
- 35 user-specific methods
- Fast, easy lamp change
- Update via Internet



The SpectroDirect is a modern single-beam spectrophotometer with an excellent price/performance ratio that is specifically designed for water testing.

The instrument is equipped with a wide range of pre-programmed methods based on the proven range of Lovibond® tube tests, tablet reagents, liquid reagents and powder reagents (Vario Powder Packs).

## Optics

The SpectroDirect is a single-beam spectral photometer (see illustration).

The light source is a tungsten halogen lamp with flash function. The lamp is switched on only momentarily during of the measurement process<sup>1)</sup>, so there is no need for a warm-up period. The SpectroDirect is ready to perform a self-test as soon as it is switched on.

The light passes through an entry slot to the monochromator, where it is split into spectral ranges. The monochromator is a holographically produced, transparent grating. The movable mirror ensures that light of the desired wavelength is focused automatically so that it passes through the exit slot, into the sample chamber and therefore through the water sample. The light that is not absorbed

by the sample travels to the silicon photodiode detector. This signal is then evaluated by a microprocessor and shown as a result in the display.

1) (Exception: permanent light is used for a wavelength scan).

## Multifunctional sample chamber

Round vials measuring 16 mm and 24 mm in diameter and rectangular cells with pathlengths from 10 to 50 mm may be used without an adapter. Only the 10 mm cell will be fixed by a little holder that must be inserted into the sample chamber.

## New methods

Test methods are continuously updated to suit market requirements.

You can find updates for new methods and additional languages on our website at [www.lovibond.com](http://www.lovibond.com).

 Please see pages 78 onwards for reagents (order codes)

## Functions

- Pre-programmed Lovibond® methods
- Absorption
- Transmission
- Spectral data recording
- User calibration (polynomials)
- Concentration (linear)
- Kinetics

## Self-test

After it is switched on, the SpectroDirect automatically performs a self-test – beginning with a function test of the stepper motor and the halogen lamp, followed by an optics test. For this purpose, the unit has a built-in didymium glass filter. This filter checks the correct wavelength setting. If the wavelengths are incorrect, the optical system is automatically adjusted during the self-test.

## Maintenance

Thanks to the design of the SpectroDirect, the only maintenance that is required is replacement of the light source. The lamp is situated at the back of the photometer in an easily accessible position. Changing the lamp is fast and simple and does not require any tools. The positioning of the assembly ensures optimum focusing of the halogen lamp.

## Power supply

The required input voltage is 12 V. The SpectroDirect is connected to an external power pack as standard. Battery operation is also possible by using an external energy station (see accessories).

## Choice of language

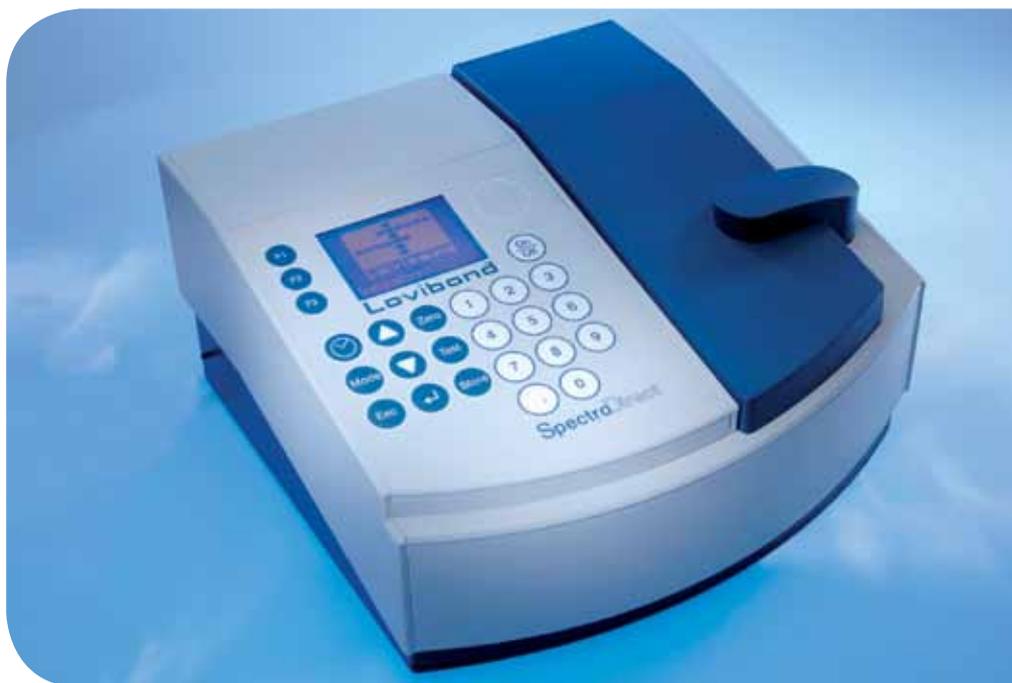
The user prompt in the display can be switched to German, English, French, Italian, Spanish or Portuguese. If further languages are available they can be updated via internet.

## N.I.S.T. Traceability

This spectrophotometer can be tested using a Secondary Standard Filter Set (order code 711160) which is N.I.S.T. traceable. Furthermore the instrument may be calibrated for each method in a "user calibration mode" with N.I.S.T. traceable standards.

## Applications

- Waste Water
- Drinking Water
- Industrial Process Water
- Science & Research
- Governmental and Private Laboratories





## User prompt

The user prompt is a convenient and easy to understand feature that guides the user step by step all the way through to the test result.

## Zero calibration and measurements

The user chooses the desired method either from the method list in alphabetical order or by entering a numerical code. If desired additional information like the required vial, the reagent type and the measuring range can be displayed using the functional keys. The date and time are shown in the display by pressing the "clock key". The SpectroDirect automatically selects the correct wavelength.

Zero calibration is performed with the water sample by pressing the ZERO key.

A characteristic coloration develops when you add the indicator to the water sample. Press the [Test] key to initiate the measurement (which starts either immediately or after the time required for colour development).

## Countdown function

With some methods, after adding the indicator to the water sample, the user has to wait for a predefined colour reaction time. This time interval is shown in the display. The remaining time is displayed continuously. An alarm sounds during the last 10 seconds of the time period. Measurement then starts automatically, and the result is shown in the display. The countdown function can be switched off to allow rapid processing of a series of samples.

## Differentiation of results

The SpectroDirect allows differentiated tests for certain methods. With the Chlorine method, for example, differentiated measurement is possible for free, combined and total chlorine.

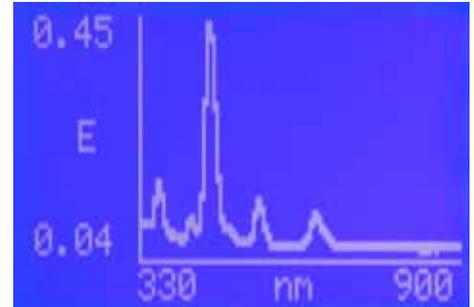
## Functions

The SpectroDirect is ideal for routine laboratory use and is equipped with additional functions for user-specific applications. One example is the creation of a user-defined method for a routine check.

## Spectral data

A wavelength scan is performed over the user-defined interval between 330 and 900 nm.

The display shows the graph of the spectrum; if the user presses a key, the display also shows a data list with the corresponding maximum and minimum absorption levels.



## Printer/PC connection

On the back of the SpectroDirect photometer, there is an RS232 interface with a 9-pin D-Sub connector for connection of a PC or a printer with serial interface (see accessories).

## Printing data

Every result is printed with date, time, reg. no, code no., measuring range and method number.

## Storing data

You can store results of programmed and user-specific methods (polynomials) in a memory with a capacity of 1000 data sets. Alongside the result, the data sets contain information on method, date and time of the test.



## Absorption/Transmission

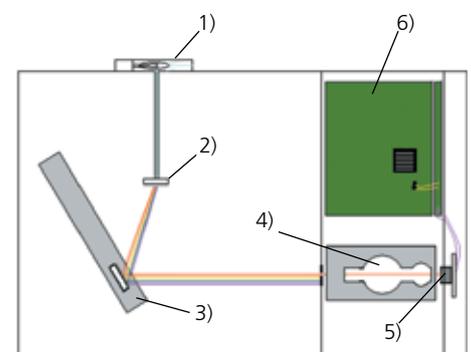
Using this function, the operator can, for example, carry out measurement of standards with different concentrations using the user-selected wavelength in order to obtain the data pairs required for a polynomial. Result output is in Abs and % Transmission.

## Polynomials

With the help of an external mathematical program, the corresponding polynomial is created from data pairs (concentration/absorption). A known polynomial may also be used. 25 order polynomials ( $y = A+Bx+Cx^2 + Dx^3 + Ex^4 + Fx^5$ ) can be stored together with user-specific parameters such as wavelength, measuring range, unit and number of decimals.

## Concentration

This function can be used to measure 2 to 14 known standards. On the basis of the concentrations/absorption pairs obtained, the photometer will calculate a linear interpolation between the measured points. Up to 10 methods can be stored for further sample measurements.



- 1) Tungsten halogen lamp
- 2) Monochromator
- 3) Movable mirror
- 4) Sample chamber
- 5) Silicon photodiode
- 6) Microprocessor unit

## Technical data

<b>Wavelength range:</b>	330 to 900 nm
<b>Photometric range:</b>	-0.3 to 2.5 Abs
<b>Spectral bandwidth:</b>	10 nm
<b>Wavelength accuracy:</b>	±2 nm
<b>Wavelength reproducibility:</b>	±1 nm
<b>Light source:</b>	Pre-adjusted tungsten halogen lamp
<b>Monochromator:</b>	Holographic grating
<b>Detector:</b>	Silicon photodiode
<b>Multifunctional sample chamber for:</b>	Round vials 24 and 16 mm Ø, Rectangular cells 10-50 mm
<b>Display:</b>	Backlit LCD graphic display
<b>Language options:</b>	German, English, French, Italian, Spanish, Portugese
<b>Storage capacity:</b>	1000 test data sets
<b>Serial interface:</b>	RS232
<b>Dimensions: (L x W x H)</b>	270 x 275 x 150 mm
<b>Weight:</b>	approx. 3.2 kg
<b>Power supply unit:</b>	Input: 100 - 240 V ~ 1.0 A 50 - 60 Hz Output: 12 V .... 30 W

## CE-Conformity



## Accessories

Item	Code
Replacement halogen lamp	71 10 00
Magnetical pin (for updates)	19 80 16 87
Connection cable to a PC	19 81 97
Connection to a 12 V plug	71 10 40
Case for transport	71 20 50
Universal adapter for sockets	19 20 65
Secondary standard set	71 11 60
Plastic funnel with handle	47 10 07
Cleaning cloth for vials	19 76 35
Power supply unit 100-240 V / 50-60 Hz	71 10 90
Power station, 230 V / 50 Hz with cable for connection	71 10 50
12 round vials with lid Height 48 mm, 24 mm Ø	19 76 20
5 round vials with lid Height 48 mm, 24 mm Ø	19 76 29
10 round vials with lid Height 90 mm, 16 mm Ø	19 76 65
Vial stand for 6 round vials Ø 24 mm, acrylic glass	41 89 51
Vial stand for 10 vials (Ø 16 mm or □ 13,5 mm), acrylic glass	41 89 57
W 100, rectangular cell optical glass OG, 10 mm path length	60 10 40
W 100, rectangular cell optical glass OG, 50 mm path length	60 10 70
W 110, rectangular cell Quartz-UV-glass, 10 mm path length	66 11 30
Paper printer DPN 2335 with power pack (230 V, 50 Hz) connection cable and one paper roll	19 80 75
<b>Arsenic glass apparatus</b>	37 05 00
delivery content:	
Erlenmeyer flask	37 05 01
Glass stopper	37 05 02
Absorption tube	37 05 03

additionally required (**not** included, please order separately):

W 100, cell, Optical-Glass-OG, 20 mm path length	60 10 50
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## Delivery Content

### SpectroDirect (standard equipment)

- SpectroDirect (basic unit)
- Power supply unit 100 - 240 V
- Serial cable for connection to a PC
- Magnetic pin
- 2 batteries (AA)
- Manufacturers test certificate M
- Guarantee sheet
- Instruction manual

**Order code: 71 20 00**

### SpectroDirect (advanced features)

- SpectroDirect in aluminium case
- Power supply unit 100 - 240 V
- Serial cable for connection to a PC
- Magnetic pin
- 2 batteries (AA)
- Energy station
- Replacement lamp
- 12 round vials with lids, 24 mm Ø
- 10 round vials with lids, 16 mm Ø
- 2 rectangular cells, 10 mm path length
- 2 rectangular cells, 50 mm path length
- Plastic stirring rod, 13 cm
- Manufacturers test certificate M
- Guarantee sheet
- Instruction manual

**Order code: 71 20 05**

We would be pleased to quote a ready to use spectrophotometer unit for the parameters and required accessories.

➔ **Please see pages 78 onwards for reagents (order codes)**