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LZV925
DR 6000

02/2012, Edition 1

User Manual en

English 3

General information

Safety notes

Read the entire user manual carefully before you unpack, set up or operate the device. Observe all danger and warning notes. Non-observance could lead to serious injury of the operator or to damage to the device.

To ensure safety when using the instrument, the DR6000 may not be used in any manner that is not described in this user manual.

Danger notes in this user manual

DANGER

Indicates a potentially or imminently dangerous situation that, if it is not avoided, leads to death or to serious injuries.

WARNING

Indicates a potentially or imminently dangerous situation that, if it is not avoided, can lead to death or to serious injuries.

CAUTION

Indicates a possible dangerous situation that can have minor or moderate injuries as the result.

NOTICE

Indicates a situation that, if it is not avoided, can lead to damage to the device. Information that particularly should be emphasized.

Note: *Information that supplements aspects from the main text.*

Warning labels

Observe all marks and labels that are attached to the device. Non-observance may result in personal injury or damage to the device. For symbols attached to the instrument, corresponding warning notes are found in the user manual.

	This symbol may be attached to the device and references the operation- and/or safety notes in the user manual.
	Electrical equipment marked with this symbol may as of August 12, 2005 Europe-wide no longer be disposed of in unsorted house or industrial waste. According to valid provisions (EU Directive 2002/96/EC), from this point consumers in the EU must return old electrical devices to the manufacturer for disposal. This is free for the consumer. ***Note:*** *Contact the manufacturer or supplier to find out how you can return worn out devices, electrical accessories supplied by the manufacturer and all auxiliary articles for correct disposal or recycling.*

Installation notes

1. Select **SYSTEM CHECKS > INSTRUMENT UPDATE**.
2. Connect the USB stick with the additional software "Drinking Water Analysis LZV925" to a USB connection (type A) of the DR 6000.
3. Confirm with **OK**.

   The software is installed.
4. Switch the DR 6000 off after the complete installation at the power source and start it again.

   Note: *Wait at least **20 seconds** before restarting the instrument in order to avoid damaging its electronics.*

Chemical and biological safety

DANGER

Working with chemical samples, standards and reagents is linked with danger. It is recommended that the user of these products familiarize himself before the work with safe procedures and the correct use of the chemicals and to read all relevant safety data sheets carefully.

During the analysis of the samples, the use of toxic, highly flammable or corrosive chemicals can be required.

- Please observe safety information present on the packaging and material safety data sheets.
- All consumed solutions must be disposed of in accordance with local and national regulations and laws.

Introduction

The Drinking Water Analysis software LZV925 is a compilation of all spectrophotometric applications that are relevant for drinking water analysis. This software allows for individual parameters to be executed without reagent addition through self absorption at various wavelengths. For many analyses, the SIP 10 sipper offers the comfortable execution of the test with a pour-through cuvette.

Selection of a stored test

1. Select **STORED PROGRAMS**. An alphabetically arranged list of all available programs is shown. The methods of the Drinking Water Analysis software LZV925 are located at the end of the list.
2. Select a program by choosing the corresponding test.

   Note: *The programs of the Drinking Water Analysis have the numbers 2101 to 2107. Select* **SELECT BY NUMBER** *and confirm the entry with* **OK**.
3. Press **START** to start the program.

Work procedures

Nitrate (self-absorption)

Principle

Nitrate can be determined from a water sample through self-absorption, in other words without use of reagents. The nitrate ion is detected bichromatically on two wavelengths. The difference between the measured extinctions on these wavelengths is a measure for the nitrate concentration and can be evaluated correspondingly through reference to a standard concentration.

Application area

Drinking water

Measurement range

1–60 mg/L nitrate (3 mm rectangular cuvette)
0.3–15.0 mg/L nitrate (10 mm rectangular cuvette)

Accessories

- Spectrophotometer, 228 and 218 nm
- 3 mm or 10 mm rectangular cuvette QS
- Optional SIP 10 sipper: 3 mm or 10 mm pour-through cuvette QS

Reagents

- Standard 30 mg/L nitrate for 3 mm rectangular cuvette
- Standard 10 mg/L nitrate for 10 mm rectangular cuvette

Interferences

Organic substances can disrupt the determination. Nitrate concentrations of over 100 mg/L can lead to results within the measurement range.

Literature

E. Goldman, R. Jacobs:
Determination of Nitrates by Ultraviolet Absorption Amer. Water Works Assoc. 53, 187 – 191, (1961)

Procedure for nitrate self-absorption

1. Select **STORED PROGRAMS > SELECT BY NUMBER.**
2. Enter the number **2101** for the program "Nitrate 10 mm", measurement range 0.3–15.0 mg/L nitrate. Confirm with **OK**.

   Enter the number **2102** for the program "Nitrate 3 mm", measurement range 1–60 mg/L nitrate. Confirm with **OK**.
3. Press **START** to start the program.
4. Insert the zero cuvette (distilled water) and press **ZERO**.

   Z2 is shown in the display.
5. Insert the standard cuvette with the nitrate standard (program 2101: 10 mg/L, program 2102: 30 mg/L) and press **READ**.

   R2 is shown in the display.
6. Insert the analysis cuvette with the first sample and press **READ**.

   The result will be displayed on the screen.

   Note: *In order to analyze further samples, procedure from step 6.*

Organic load (SAC)

Principle

The organic load can be determined from a sample through self-absorption, in other words without use of reagents. The spectral absorption coefficient is determined in m^{-1}.

Application area

Drinking water, surface water, waste water

Measurement range

0–20 m^{-1}

Accessories

- Spectrophotometer, 254 nm
- 50 mm rectangular cuvette QS
- Optional SIP 10 sipper: 50 mm pour-through cuvette QS

Literature

DIN 38404 Part 3 (C3)

Procedure for organic load (SAC)

1. Select **STORED PROGRAMS > SELECT BY NUMBER.**
2. Enter the number **2103** for the program "UV-254 Organics". Confirm with **OK**.
3. Press **START** to start the program.
4. Insert the zero cuvette (distilled water) and press **ZERO**.
5. Insert the analysis cuvette with the first sample and press **READ**.

   The result will be displayed on the screen.

   Note: *In order to analyze further samples, repeat the procedure from step 5.*

Coloration / organic load (SAC)

Principle

The coloration and organic load parameters can be determined from a sample through self-absorption, in other words without use of reagents. The spectral absorption coefficients in m^{-1} (program "Coloration (m^{-1})/ SAC") or the units in comparison with the PtCo standard[1] (program "Coloration (PtCo)/SAC") are determined.

Typically the coloration of most yellow–brown colored natural waters and the coloration of the effluents of local sewage plants can be measured at 436 nm. For yellowish–brown colored waters the coloration can be detected through comparison with suitable PtCo standards.

Application area

Drinking water, surface water, waste water

Measurement range

0–20 m^{-1}
0–50 units PtCo

Accessories

- Spectrophotometer, 254 nm and 436 nm
- 50 mm rectangular cuvette QS
- Optional SIP 10 sipper: 50 mm pour-through cuvette QS

Interferences

Undissolved substances (turbidity) can cause a a high bias result for color. The interference can be resolved through membrane filtration (pore width 0.45 µm).

Literature

EN ISO 7887
DIN 38404 Part 3 (C3)

Procedure for coloration/organic load (SAC)

1. Select **STORED PROGRAMS > SELECT BY NUMBER.**
2. Enter the number **2104** for the program "Coloration (PtCo)/SAC". Confirm with **OK**.

   Enter the number **2105** for the program "Coloration (m^{-1})/SAC". Confirm with **OK**.
3. Press **START** to start the program.
4. Insert the zero cuvette (distilled water) and press **ZERO**.
5. Insert the analysis cuvette with the first sample and press **READ**.

   The result is shown on the display.

   Note: *In order to analyze further samples, repeat the procedure from step 5.*

Coloration

Principle

Coloration can be determined from a sample through self-absorption, in other words without use of reagents. The spectral absorption coefficient in m^{-1} (program "Coloration (m^{-1})") or the units in comparison with the PtCo standard (program "Coloration (PtCo)") are determined.

Typically the coloration of most yellowish–brown colored natural waters and the coloration of the effluents of local sewage plants can be measured at 436 nm. For yellowish–brown colored waters the coloration can be detected through comparison with suitable PtCo standards.

Application area

Drinking water, surface water, waste water

Measurement range

0–50 units (program "Coloration (PtCo)")
0–20 m^{-1} (program "Coloration (m^{-1})")

1. Platinum–cobalt color index

Accessories

- Spectrophotometer, 436 nm
- 50 mm rectangular cuvette OS
- Optional SIP 10 sipper: 50 mm pour-through cuvette OS

Interferences

Undissolved substances (turbidity) can lead to cause a high bias result for color. The interference can be resolved through membrane filtration (pore width 0.45 µm).

Literature

EN ISO 7887

Procedure for coloration

1. Select **STORED PROGRAMS > SELECT BY NUMBER.**
2. Enter the number **2106** for the program "Coloration (m^{-1})". Confirm with **OK**.

   Enter the number **2107** for the program "Coloration (PtCo)". Confirm with **OK**.
3. Press **START** to start the program.
4. Insert the zero cuvette (distilled water) and press **ZERO**.
5. Insert the analysis cuvette with the first sample and press **READ**.

   The result will be displayed on the screen.

   Note: *In order to analyze further samples, repeat the procedure from step 5.*

Using these programs with the SIP 10 sipper

Information on the installation, configuration, and sample insertion when using the SIP 10 sipper can be found in the *SIP 10 user manual*.

Accessories

Description	Order no.
Rectangular cuvettes set (standard deviation = 10 mm, aligned pair)	2095100
Rectangular cuvette QS, standard deviation = 10 mm (3.5 mL)	2624410
Rectangular cuvette QS, standard deviation = 50 mm (17.5 mL)	2624450
Pour-through cuvette QS, Standard deviation = 3 mm, center height = 10 mm, height = 40 mm	LZV638
Pour-through cuvette QS, Standard deviation = 50 mm, center height = 10 mm, height = 40 mm	LZV649
Pour-through cuvette QS, Standard deviation = 10 mm, center height = 10 mm, height = 40 mm	LZV510
SIP 10 sipper module set for DR 6000 complete with tray, tube set and 1 cm quartz glass pour-through cuvette, US	LQV157.99.30002
Tube set for DR 6000 "drinking water application," complete, including Pharmed tubes, pump tube (Lagoprene pre-installed with cover and connections), stainless steel tube adapter	LZQ100

HACH Company
World Headquarters

P.O. Box 389
Loveland, Colorado
80539-0389 U.S.A.
Tel (800) 227-HACH
(800) -227-4224
(U.S.A. only)
Fax (970) 669-2932
orders@hach.com
www.hach.com

HACH LANGE GMBH

Willstätterstraße 11
D-40549 Düsseldorf
Tel. +49 (0)2 11 52 88-320
Fax +49 (0)2 11 52 88-210
info@hach-lange.de
www.hach-lange.de



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