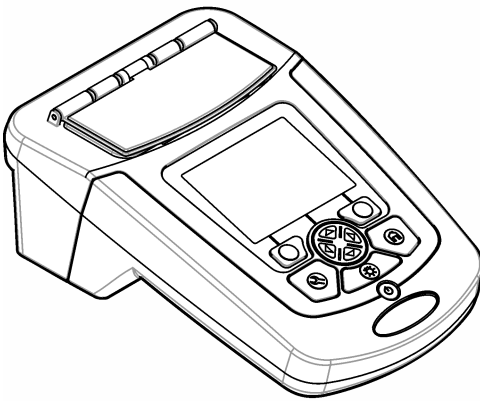




DOC022.97.80343

DR 1900

08/2017, Edition 2



Basic User Manual
Manuel d'utilisation de base
Manual básico del usuario
Manual Básico do Usuário
基本用户手册
基本取扱説明書
기본 사용 설명서
คู่มือผู้ใช้เบื้องต้น

Table of contents

[Specifications](#) on page 3

[General information](#) on page 4

[Installation](#) on page 6

[Startup](#) on page 10

[Standard operation](#) on page 11

[Maintenance](#) on page 14

[Troubleshooting](#) on page 15

Expanded manual version

For additional information, refer to the expanded version of this manual, which is available on the manufacturer's website.

Specifications

Specifications are subject to change without notice.

Specification	Details
Measurement mode	Transmittance (%), Absorbance (Abs) and Concentration (Conc)
Dimensions (W x D x H)	178 x 261 x 98 mm (7.0 x 10.3 x 3.8 in.)
Enclosure rating	IP67 (closed sample cell cover)
Weight	1.5 kg (3.3 lb)
Power requirements (internal)	AA size Alkaline (4x) or rechargeable Nickel Metal Hydride (NiMH) batteries (4x) (optional module necessary ¹)
Power requirements (external)	Power supply: 110–240 VAC; 50/60 Hz (optional module necessary ¹)
Interface	USB mini (optional module necessary ¹)
Operating temperature	10 to 40 °C (50 to 104 °F); maximum 80% relative humidity (non-condensing)
Storage temperature	–30 to 60 °C (–30 to 140 °F); maximum 80% relative humidity (non-condensing)
Lamp source	Xenon flash
Wavelength range	340–800 nm
Photometric measuring range	±3.0 Abs (wavelength range 340–800 nm)
Wavelength accuracy	±2 nm (wavelength range 340–800 nm)
Spectral bandwidth	5 nm
Photometric accuracy	3 mAbs at 0.0 to 0.5 Abs, 1% at 0.50 to 2.0 Abs
Photometric linearity	< 0.5% to 2 Abs ≤ 1% at > 2 Abs with neutral glass at 546 nm
Wavelength selection	Automatic, based on the method selection
Stray light	< 0.5% T at 340 nm with NaNO ₂
Repeatability	± 0.1 nm
Wavelength resolution	1 nm

¹ Additional information is available on the manufacturer's website.

Specification	Details
User programs (free programming)	50
Data logger	500 measured values (result, date, time, sample ID, user ID to GLP (Good Laboratory Practice))
Sample cells	10 x 10 mm, 1 inch rectangular, 13 mm/16 mm/1 inch round, 1 cm/10 mL, Flow-thru cell
Protection class	Power supply: Class II, instrument: Class III
Certifications	CE certified
Warranty	1 year (EU: 2 years)

General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

Use of hazard information

⚠ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION




Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

Certification

Canadian Radio Interference-Causing Equipment Regulation, IECS-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

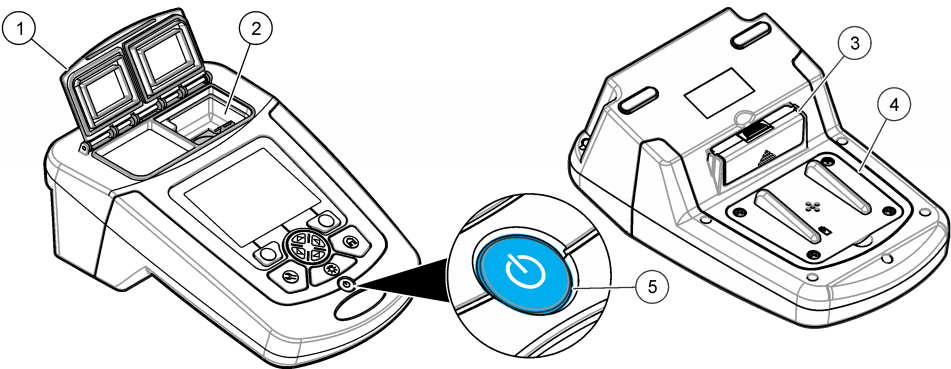
Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

Product overview

The DR 1900 is a portable VIS spectrophotometer that measures in the wavelength range of 340 to 800 nm. The instrument is used to measure various parameters in drinking water, wastewater and industrial applications. For field use, the instrument operates on four AA batteries. The instrument comes with a complete set of application programs: stored programs (pre-installed methods), LCK or TNTplus methods, user programs, favorite programs, single wavelength, multi-wavelength and time course modes. Refer to [Figure 1](#).

Figure 1 Instrument overview

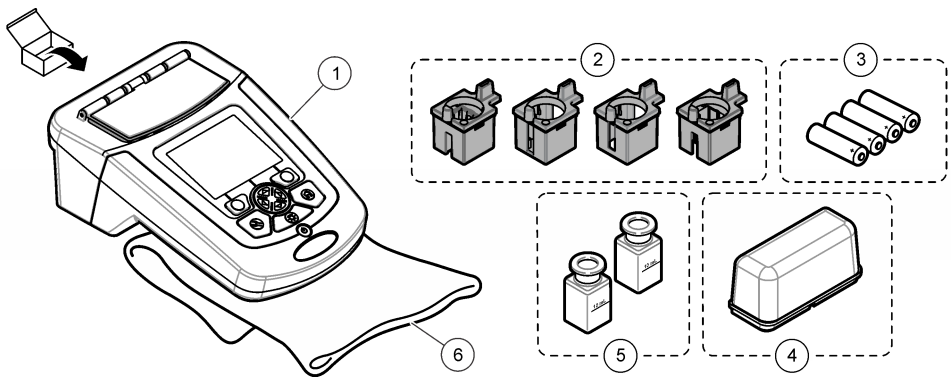


1 Sample cell cover	4 Battery compartment
2 Cell compartment	5 Power key
3 Blank module	

Product components

Make sure that all components have been received. Refer to [Figure 2](#). If any items are missing or damaged, contact the instrument supplier or a sales representative immediately.

Figure 2 Product components



1 DR 1900	4 Protective cover
2 Sample cell adapters (4x)	5 1-inch matched pair of rectangular sample cells (10 mL)
3 AA alkaline batteries (4x)	6 Dust cover

Installation

CAUTION

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Install the batteries

⚠ WARNING



Explosion hazard. Incorrect battery installation can cause the release of explosive gases. Be sure that the batteries are of the same approved chemical type and are inserted in the correct orientation. Do not mix new and used batteries.

⚠ WARNING



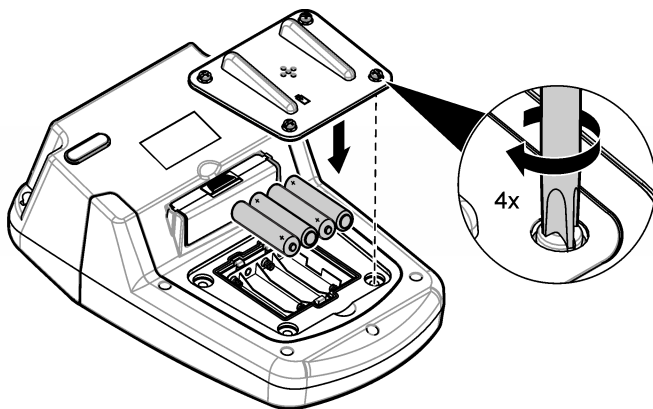
Fire hazard. Battery type substitution is not permitted.

NOTICE

Make sure to tighten the screws carefully for a correct seal fit. Do not over-tighten.

Use four AA alkaline or four rechargeable NiMH batteries to energize the instrument. Make sure that the batteries are installed in the correct orientation. Refer to [Figure 3](#) for the battery installation.

Figure 3 Battery installation



Install the sample cell adapters

The instrument has one cell compartment which uses adapters for different sample cell types. Refer to [Table 1](#). The arrow on top of the adapter and the arrow on the cell compartment show the direction of the cell orientation and the light beam path. Refer to [Figure 4](#) for the adapter installation.

Figure 4 Sample cell adapters installation

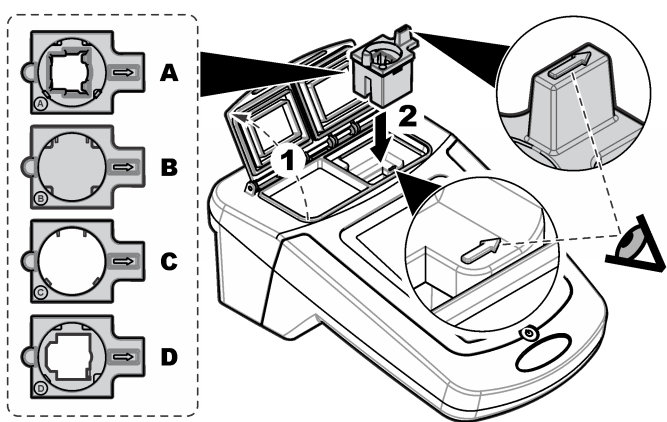


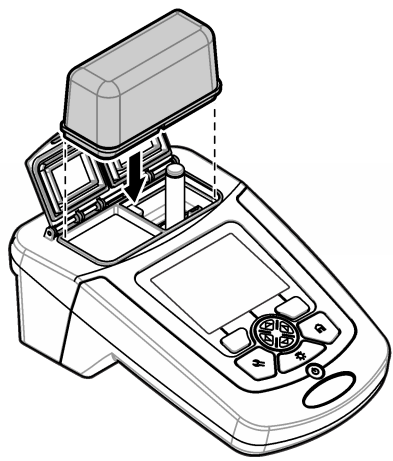
Table 1 Adapter descriptions

Adapter	Description
No adapter	1 inch square and flow-thru cell
Adapter A	13 mm round and 10 mm square
Adapter B	1 inch round double path
Adapter C	1 inch round and 1cm/10 mL cell
Adapter D	16 mm round

Install the protective cover

If the instrument operates around bright lights or in direct sunlight, install the protective cover when the sample cell cover cannot be closed. Refer to [Figure 5](#).

Figure 5 Protective cover installation

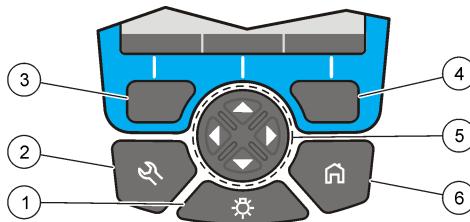


User interface and navigation

Keypad description

Refer to [Figure 6](#) for the keypad description and navigation information.

Figure 6 Keypad description



1 BACKLIGHT: set the display illumination to on or off	4 RIGHT selection key (contextual): read sample, selects or confirms options, opens sub-menus
2 SETTINGS: select program or setup options, data management ²	5 Navigation keys UP, DOWN, RIGHT, LEFT: scroll through menus, enter numbers and letters ³
3 LEFT selection key (contextual): access for options, cancels or exits the current menu screen to the previous one	6 HOME: go to the main reading screen ¹

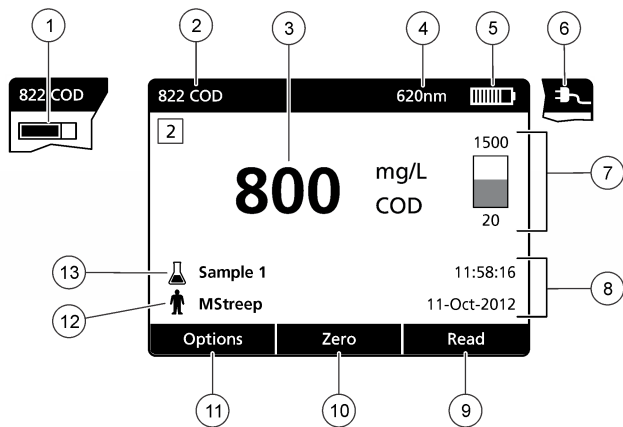
Display description

The reading screen shows the selected mode, wavelength, unit, date and time, operator ID and sample ID. Refer to [Figure 7](#).

² While in an edit mode, the key does not operate.

³ When an UP or DOWN key is held, it scrolls fast. When a LEFT or RIGHT key is pushed, it scrolls by page.

Figure 7 Single screen display



1 Progress bar	8 Time and date
2 Program name and number	9 Read (contextual: OK, select, start, edit)
3 Reading value and unit	10 Zero (contextual: navigation keys UP, DOWN, RIGHT and LEFT arrows)
4 Wavelength	11 Options (contextual: cancel, back, stop, exit, store, select, deselect)
5 Battery status	12 Operator identification
6 AC power icon	13 Sample identification
7 Control bar ⁴	

Navigation

The instrument contains menus to change various options. Use the navigation keys (**UP**, **DOWN**, **RIGHT** and **LEFT** arrows) to highlight different options. Push the **RIGHT** selection key to select an option. Enter an option value with the navigation keys. Push the navigation keys (**UP**, **DOWN**, **RIGHT** and **LEFT** arrows) to enter or change a value. Push the **RIGHT** arrow to advance to the next space. Push the **RIGHT** selection key under **Done** to accept the value. Push the **LEFT** selection key to exit the current menu screen to the previous one.

Startup

Set the instrument to on or off

Push the **POWER** key to set the instrument to on. If the instrument does not come on, make sure that the batteries are correctly installed. Hold the **POWER** key for 1 second to shut down the instrument.
Note: The Auto-Shutoff option is also used to turn off the instrument. Refer to the expanded manual on the manufacturer's website.

Set the language

There are two options to set the language:

- Set the display language when the instrument is set to on for the first time.

⁴ The control bar shows the relationship of the reading result with the reading range. The bar shows the reading result independently of any dilution factor that was entered.

- Set the language from the **SETTINGS** menu.

1. Push **SETTINGS>Setup>Language**.

2. Select a language from the list.

Set the date and time

There are two options to set the date and time:

- Set the date and time when the instrument is set to on for the first time.
- Set the date and time from the **Date & Time** menu.

1. Push **SETTINGS>Setup>Date & Time**.

2. Select **Set Date & Time Format**, then select a format for the date and time.

3. Select **Set Date & Time**.

4. Use the navigation keys to enter the current date and time, then push **OK**.

Standard operation

Liquid ingress precautions

NOTICE

Damage to the internal instrument components will occur if moisture gets into the instrument through the cell compartment. The instrument enclosure rating (IP67) is only applicable when the sample cell cover is closed.

Make sure to obey the precautions that follow to prevent damage to the instrument.

- Make sure that the sample and reagents do not spill into the cell compartment.
- Keep the sample cell cover closed when not in use.
- Only put the sample cells into the cell compartment after the sample cells are wiped dry. Do not add sample or reagents to the sample cell when the sample cell is in the cell compartment.
- Do not operate the instrument in condensing humidity conditions.

Program list

The instrument is delivered with a complete series of application programs. Refer to [Table 2](#) for the program descriptions.

Table 2 Program options

Program option	Description
Stored Programs/Methods and LCK or TNTplus Methods ⁵	Stored programs and LCK or TNTplus methods are pre-programmed methods. Refer to Select a stored program or LCK or TNTplus method on page 12.
User Programs	Methods can be developed and can be saved as a user program. Existing stored methods can be stored and modified as user programs to suit different requirements.
Favorites	Methods which are often used can be saved in the favorite list.
Single Wavelength	The single wavelength readings are taken at a specified wavelength.
Multi Wavelength	In the Multi Wavelength mode, absorbance values can be measured at up to four wavelengths. The results can be mathematically processed to get sums, differences and relationships.
Time Course	The time scan automatically records and shows the absorbance at a wavelength in a specified time period.

⁵ TNTplus vials are not available for the EU market.

Select a stored program or LCK or TNTplus method

1. Push **SETTINGS>All Programs/Methods**.
2. Select **Stored Programs/Methods** or **LCK** or **TNTplus methods**.
3. Select an option to find a method or to add it to favorites.

Option	Description
Select by number	Search by number for a specific method.
Select by letter	Search by letter for a specific method.
Add to Favorites	Add the selected method and add it to favorites for faster access.

4. Select the applicable method and push **Start**.

Select basic program options

When a program is selected, additional parameter options are available.


1. Push **Options** to access the option menu.
2. Select the applicable options.



Option	Description
Start Timer	Select a pre-set timer or set a manual timer to make sure that the steps of an analysis are correctly timed (e.g., reaction times or wait times can be exactly specified). When the timer is on, the timer icon is shown on the display. The instrument makes an audible sound when the time is over. Pre-set timer —Push Start to start the timer. If a stored program has more than one timed step, push Stop>Options>Select>Select to start the next timer. Timer Manual —Enter the applicable time with the navigation keys and push Done . Default = 03:00
Operator ID	The operator ID tag associates readings with an individual operator. Refer to Use an operator ID on page 14.
Sample ID	The sample ID tag is used to associate readings with a particular sample or with a location. Refer to Use a sample ID on page 14.
%T/Abs/Conc	Switch to % transmittance, absorbance or concentration readings. Transmittance reading (%) —Reads the percent of the original light that passes through the sample and reaches the detector. Absorbance readings —The light absorbed by the sample is read in absorbance units. Concentration readings —The measured absorbance values are converted into concentration values with the program-specific stored equation.
Advanced Options	Use the advanced options to specify more parameters. Refer to Select advanced program options on page 12.
Back	Go back to the previous menu.

Select advanced program options

Every program has various additional advanced options from which to select.

1. Push **Options** to access **Options>Advanced Options**.
2. Use the advanced options to specify more parameters.

Option	Description
Chemical Form	Select the alternate chemical form and the associated measuring range on some factory-installed methods.
Reagent Blank 	The Reagent Blank correction can be used with some of the factory-installed methods. Enter the result of a completed test using deionized water as the sample. The blank value is subtracted from every result to correct for any background color due to reagents. Enter the blank correction before the Standard Adjust option is used. Complete this correction for each new lot of test reagents.

Option	Description
Standard Adjust 	Change stored calibration. Complete a test on a known standard at a concentration near the top of the test range. Use this function to adjust the result to align the standard concentration.
Dilution Factor 	Enter a corrective dilution factor for specific characteristics. The entered number prompt will be multiplied by the result for the adjustment. For example, if the sample has been diluted by a factor of 2, set the dilution factor to on and enter 2. Note: When a dilution is in effect, the dilution icon is shown on the display.
Standard Additions	Examine the reading accuracy. Refer to the method procedure for more information.

Select the reading mode

Select Single Wavelength, Multi Wavelength or Time Course from the **SETTINGS>Photometer Functions** menu.

Select Single Wavelength options

1. Push **SETTINGS>Photometer Functions>Single Wavelength>Options>Advanced Options**.
2. Select the applicable options.

Option	Description
λ	Select a wavelength between 340 to 800 nm. Default: 560 nm
Concentration	Select the applicable unit and enter the factor. Defaults: mg/L and 1.000
Resolution	Select the resolution with the necessary number of decimal places. Default: 0.01
Save to User Programs	Save the selected parameter as an unique user program. Select the name, unit, wavelength, resolution, chemical formulas 1–4, calibration formula, upper and lower limit and the timer 1–4.

Select Multi Wavelength options

1. Push **SETTINGS>Photometer Functions>Multi Wavelength>Options>Advanced Options> $\lambda 1$ – $\lambda 4$** .
2. Select the applicable options.

Option	Description
Wavelength	Select two or more wavelengths. Defaults: 400, 500, 700 or 800 nm.
Abs Formula	Select the applicable absorbance formulas for the calculation of the multi-wavelength reading. The formula specifies the wavelength and the coefficients.
Factors	Select the multiplication factors for converting absorbance values into concentration values.

Select Time Course options

1. Push **SETTINGS>Photometer Functions>Time Course>Options**.
2. Select the applicable options.

Option	Description
Total Minutes	Enter the total time in minutes for the Time Course. Range: 1 to 60. Default: 10 minutes
Interval Seconds	Enter the interval in seconds for the Time Course. Range: 10 to 600. Default: 30 seconds
Wavelength	Select a wavelength between 340 and 800 nm. Default: 560 nm
Data Recall	Show the saved Time Course data.

Option	Description
Show Table	Show the saved Time Course data in a table.
Exit	Exit the current menu.

Use a sample ID

The sample ID tag is used to associate readings with a particular sample or with a location. If assigned, stored data will include this ID.

1. Push **Options>Sample ID** in the reading screen.
2. Select, create or delete a sample ID:

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with the sample data until a different ID is selected.
Create New Sample ID	Enter a name for a new sample ID. A maximum of 100 names can be entered. The samples are numbered in sequence for each measurement until a different ID is selected, e.g., Pond (001), Pond (002).
Delete Sample ID	Erase an existing sample ID.

Use an operator ID

The operator ID tag associates readings with an individual operator. All stored data will include this ID.

1. Push **Options>Operator ID** in the reading screen.
2. Select, create or delete an operator ID:

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with the sample data until a different ID is selected.
Create New Operator ID	Enter a name for a new operator ID. A maximum of 50 names can be entered.
Delete Operator ID	Erase an existing operator ID.

Maintenance

⚠ WARNING



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Clean the instrument

Clean the exterior of the instrument with a moist cloth and a mild soap solution and then wipe the instrument dry as necessary.

Clean the cell compartment

NOTICE

Make sure there is no sample cell or cell adapter in the cell compartment before this task is started.

Turn the instrument and use a rubber suction bulb to blow carefully air into the cell compartment.

Clean the sample cells

▲ CAUTION



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

▲ CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Most laboratory detergents are used at recommended concentrations. Neutral detergents, such as Liquinox, are safer to use when regular cleaning is necessary. To decrease the cleaning times, increase the temperature or use an ultrasonic bath. To complete the cleaning, rinse a few times with deionized water and then let the sample cell air dry.

Sample cells may also be cleaned with acid, followed by a thorough rinse with deionized water.

Note: Always use acid to clean sample cells that were used for low-level metal tests.

Special cleaning methods are necessary for individual procedures. When a brush is used to clean sample cells, take extra care to avoid scratches on the interior surfaces of the sample cells.

Replace the batteries

▲ WARNING



Explosion hazard. Expired batteries can cause hydrogen gas buildup inside the instrument. Replace the batteries before they expire and do not store the instrument for long periods with the batteries installed.

Refer to [Install the batteries](#) on page 7 for battery replacement.

Troubleshooting

Problem	Possible cause	Solution
Absorbance > 3.5!	The measured absorbance is more than 3.5.	Dilute the sample and repeat the reading.
Over range!	The concentration is more than the upper limit of the current method.	Dilute the sample and repeat the reading.
Under range!	The concentration is less than the lower limit of the current method.	Examine the sample.
Reading Failed!	There is an electronic or optical defect.	Contact technical support.
Initializing Failed!	While initializing, the instrument failed.	Set the instrument to off and then to on. Contact technical support.
Calibration Needed!	The calibration data is corrupt.	Contact technical support.
Air Scan Needed!	The calibration data is corrupt.	Contact technical support.
Please attach the module!	The module is not found when data is sent.	Insert a module.
Failed in sending data!		Make sure that the module is inserted and latched correctly.

**HACH COMPANY World Headquarters**

P.O. Box 389, Loveland, CO 80539-0389 U.S.A.

Tel. (970) 669-3050

(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, Germany

Tel. +49 (0) 2 11 52 88-320

Fax +49 (0) 2 11 52 88-210

info-de@hach.com

www.de.hach.com

HACH LANGE Sàrl

6, route de Compois

1222 Vézenaz

SWITZERLAND

Tel. +41 22 594 6400

Fax +41 22 594 6499