OPERATOR'S MANUAL
V-3000 Photometer
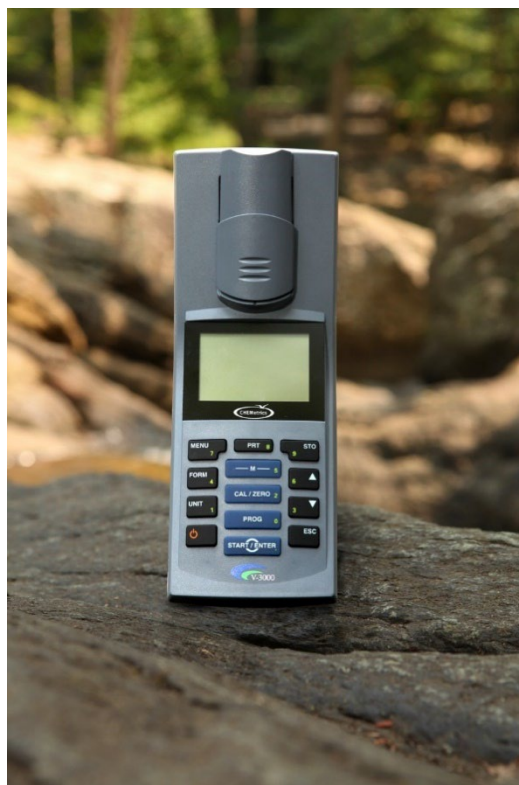
Table of Contents

1 Overview

1.1 Features and Specifications

Wavelengths (nm):	436, 517, 557, 594, 610, 690
Cell Sizes:	13 mm, 16 mm, 28 mm - Flat bottom vials only
Wavelength Accuracy:	∓ 2 nm
Light Source:	Light Emitting Diode with interference filters
Detector:	Photodiode
Photometric Range:	-0.200 to 2.000 absorbance units
Operating Temperature:	0°C to 50°C
Humidity:	75% Yearly Mean (up to 30 days at a maximum of 95%)
Waterproof:	IP67
Power Supply:	4 X 1.5 V AA - approximately 5000 measurements
Data Logging:	100 data sets
Download Capability:	Data to spreadsheet and printer, RS232 output
Upload Capability:	Web Based Methods Update
Custom User Programs:	Requires V-3000 Data Management Software (sold separately, Catalog Number A-0301)

1.2 Keypad

1.3 Key Functions

— M — 5	**Measuring MODE** key Toggle through concentration, absorbance, and % transmittance.
CAL / ZERO 2	**CAL/ZERO** key Reset Zero Adjustment Reset Blank Value Measurement
PROG 0	**PROGRAM** key Select a program for concentration (direct read) measurement.
START / ENTER	**START/ENTER** key Open Menus Confirm Selections Start Measurements
MENU 7	**Menu** key Open the Configuration Menu. All settings are made in the configuration mode.
FORM 4	**FORM** key In Photometry / Concentration (direct read) mode, toggle through available chemical forms for a particular analyte (example: NH3, NH3-N, NH4).
UNIT 1	**Unit** key In Photometry / Concentration (direct read) mode, toggle through available reporting units (example: ppm, mg/Liter, mmol/Liter).
⏻	**ON/OFF** key Turn the instrument **ON** and **OFF**.
PRT 8	**Print** key Print the display contents via an RS232 interface
STO 9	**Store** key Press once: open the Store Menu Press twice: quick store a measurement
▲ 6 ▼ 3	**▲ UP** key **▼ DOWN** key Move up and down in menu selections
ESC	**ESCAPE** key Go back to the previous menu level

NOTE: Keys with numbers printed on them can also be used to enter numbers in special menus.

1.4 Display

Photometry/Concentration	**Measuring mode**
1.29 mg/l	**Measured value (with unit)**
15: K1503 NH3-N	**Program no.: Catalog no. and Chemical form**
13 mm 0.00 – 7.00 mg/l	**Diameter of the cell and measuring range**
11.30.13 15:12	**Status line with date and time**

1.5 Socket Field
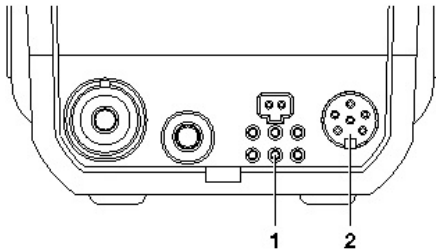
1. Contacts for Lab Station

2. RS232 serial interface

1.6 List of Direct Read Programs (factory calibrations)

Analyte	Prog. #	Kit Cat. #	Cell Size, mm	Blank Y/N	Wavelength, nm	Range, ppm	Method
Filming Amine	10	K-1013	13	N	557	0 – 6.00 (ODA or OLA)	Rose Bengal
Ammonia	12	K-1413	13	N	610	0 - 3.00 (as N)	Hydroxybenzyl Alcohol
Ammonia	13	K-1413	13	N	610	0 - 60.0 (as N)	Hydroxybenzyl Alcohol
Ammonia	15	K-1503	13	N	436	0 - 7.00 (as N)	Direct Nesslerization
Ammonia	17	K-1513	13	N	436	0 – 10.00 (as N)	Direct Nesslerization (extended shelf-life)
Ammonia	18	K-1513	13	N	436	0 – 150 (as N)	Direct Nesslerization (extended shelf-life)
Ammonia	16	K-1523	13	N	436	0 - 14.0 (as N)	Direct Nesslerization
Ammonia	16	K-1533	13	N	436	0 – 20.0 (as N)	Direct Nesslerization (extended shelf-life)
Chloride	26	K-2103	13	Y	436	0 - 40.0	Ferric Thiocyanate
Chlorine	32	K-2513	13	N	517	0 - 5.00	DPD
Chromate	42	K-2803	13	N	557	0 - 3.50 (as CrO_4)	Diphenylcarbazide
Copper	55	K-3503	13	N	436	0 - 12.00	Bathocuproine
Cyanide	60	K-3803	13	Y	594	0 - 0.400	Isonicotinic/Barbituric Acid
DEHA	64	K-3903	13	N	557	0 - 2.00	PDTS
Peroxide	95	K-5543	13	N	436	0 - 6.00	Ferric Thiocyanate
Iron	100	K-6003	13	N	517	0 - 6.00	Phenanthroline
Iron	103	K-6203	13	N	517	0 - 6.00	Phenanthroline
Manganese	110	K-6503	13	N	517	0 - 30.0	Periodate

Analyte	Prog. #	Kit Cat. #	Cell Size, mm	Blank Y/N	Wavelength, nm	Range, ppm	Method
Molybdate	115	K-6703	13	N	436	0 - 25.0 (as Mo)	Catechol
Monochloramine	117	K-6803	13	N	690	0 – 8.00 (as NH_2Cl-Cl_2)	Hydroxybenzyl Alcohol
Nitrate	119	K-6903	13	N	517	0 - 1.50 (as N)	Cadmium Reduction
Nitrate	122	K-6913	13	N	517	0 - 1.50 (as N)	Zinc Reduction
Nitrate	120	K-6923	13	N	517	0 - 7.50 (as N)	Cadmium Reduction
Nitrate	121	K-6933	13	N	517	0 - 50.0 (as NO_3)	Cadmium Reduction
Nitrite	125	K-7003	13	N	517	0 - 1.00 (as N)	Azo Dye Formation
Nitrite	130	K-7013	13	N	517	0 - 0.750 (as N)	Azo Dye Formation (NED)
Ozone	133	K-7423	13	N	517	0 - 5.00	DPD
Oxygen	141	K-7513	13	N	517	0 - 15.0	Indigo Carmine
Oxygen	142	K-7553	13	N	517	0 - 1.000	Rhodazine D™
Peracetic Acid	148	K-7913	13	N	517	0 - 5.00	DPD
Phenols	152	K-8003	13	N	517	0 - 8.00	4-Aminoantipyrine
Phenols	153	K-8023	13	N	517	0 - 20.0	4-Aminoantipyrine
Phosphate	158	K-8503	13	N	436	0 - 80.0 (as PO_4)	Vanadomolybdo-phosphoric Acid
Phosphate	160	K-8513	13	N	690	0 – 5.00 (as $P O_4$)	Stannous Chloride
Silica	168	K-9003	13	N	690	0 - 10.00 (as SiO_2)	Heteropoly Blue
Sulfate	174	K-9203	13	N	436	0 - 100.0	Turbidimetric
Sulfide	179	K-9503	13	N	690	0 - 3.00	Methylene Blue

Analyte	Prog. #	Kit Cat. #	Cell Size, mm	Blank Y/N	Wavelength, nm	Range, ppm	Method
Sulfide	180	K-9523	13	N	610	0 - 6.00	Methylene Blue
Zinc	187	K-9903	13	Y	610	0 - 3.00	Zincon
Zinc	188	K-9923	13	Y	610	0 - 15.0	Zincon

1.7 Power LabStation (sold separately, Catalog Number A-0302)

The Power LabStation includes: LabStation, Universal Power Cable with four plugs (US, Euro, UK, AUS), Rechargeable Battery Pack, PC Interface Cable (9 pin to 9 pin).

The Power LabStation provide the following features:
- When the photometer is placed in the Power LabStation (which is plugged into an electrical outlet), the photometer will always be fully charged and ready for use.
- For photometric measurements, when the photometer is in the Power LabStation, the zero measurement is retained even after turning the instrument off.
- Batteries are not needed when using the Power LabStation.
- The Power LabStation (when plugged into an electrical outlet) charges the re-chargeable battery pack, even when the instrument is turned off.

2 Getting Started

2.1 Scope of Delivery
- Handheld photometer
- four alkaline AA batteries, 1.5 V
- 13 mm cell adapter and light shield
- two empty 28 mm cells
- PC interface cable (6 pin to 9 pin)
- Operator's Manual

2.2 Power Supply
The V-3000 photometer can be operated with regular AA batteries, a rechargeable battery pack or a power cable. The rechargeable battery pack and the power cable are part of the Power LabStation package, which is sold separately. There is a LoBat display indicator that appears when the batteries are nearly discharged.

2.3 Battery Installation
The V-3000 photometer requires four AA alkaline or lithium batteries. Remove the batteries when the photometer is not in use.

To install batteries, carefully loosen the two screws on the battery compartment on the back of the instrument. Remove the battery compartment cover and insert the four batteries with correct orientation as illustrated in the battery compartment. Replace the battery compartment cover and secure it in place with the two screws.

2.4 Automatic Switch-off
The meter has a user chosen, automatic switch-off function (10 minutes to 24 hours) that is designed to save battery life. The automatic switch-off time is chosen in the Configuration/System/Continue menu.

2.5 Display Illumination
During operation with batteries, the display illumination automatically turns off if no key is pressed for 30 seconds. Display illumination is switched on with the next keystroke. Display illumination features can be adjusted Configuration/System/Display menu.

3 Setup

3.1 Turning the Photometer On
Press the **ON/OFF** key. For 30 seconds, the Start menu appears listing the measuring modes. The measuring mode last selected is highlighted. The status line indicates the meter name and the version number of the software. After about 30 seconds, the meter automatically switches to the measuring mode and measured parameter used last.

3.2 Inserting a Cell

Inserting a 28 mm cell
Remove the black 13 mm adapter if it is in the sample compartment. Make sure that the dust cover is pushed upward. Insert a 28 mm cell into the sample compartment using downward pressure to ensure that it is fully seated.
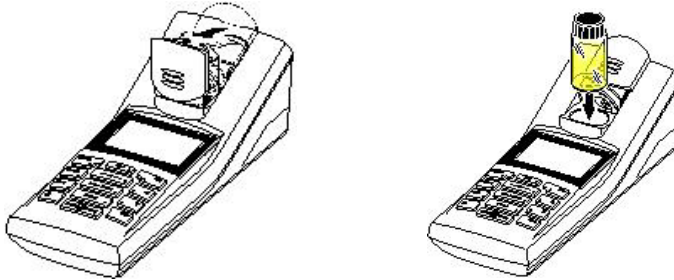
Inserting a Vacu-vials® Ampoule (13 mm) – Requires installation of an adapter

- **Installing the 13 mm Adapter**
  Make sure that the dust cover is pushed upward. Insert the black 13 mm adapter into the sample compartment with the proper orientation (silver ball plunger in the cell shaft goes to the right). Use downward pressure to ensure that the adapter is fully seated.
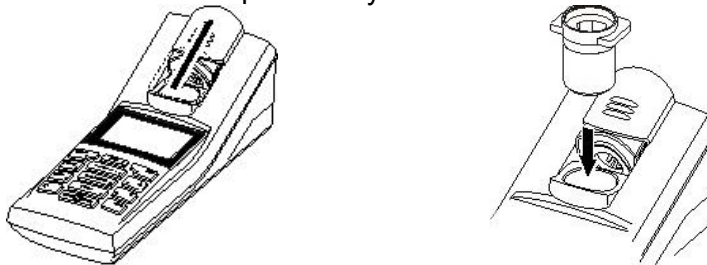
- **Inserting the 13 mm Vacu-vials® Ampoule**
  Insert the Vacu-vials ampoule into the sample compartment using downward pressure to ensure that it is fully seated. Place the light shield over the ampoule.
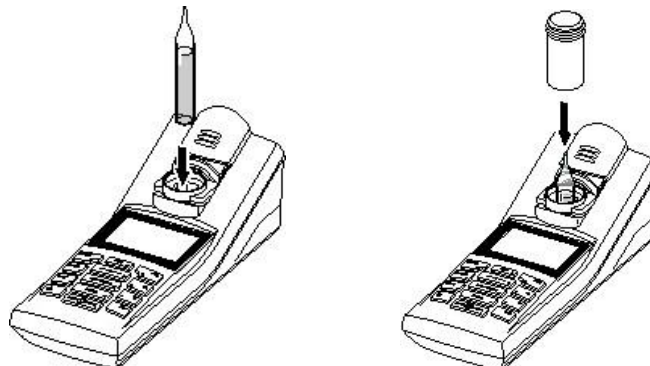
3.3 Operating Modes
The instrument has the following operating modes:
- **Measurement** - The display indicates measurement data in the measured value display.
- **Calibration** -   The display indicates a calibration process with calibration information, or a process to carry out a zero adjustment.
- **Data transmission** - The meter transmits data or calibration records to the serial interface.
- **Configuration** - The display indicates a menu with further menus, settings and functions.

3.4 Navigation – Menus, Settings and Messages
- **Menus**

Menus are opened by pressing the **START/ENTER** key. The name of the menu is displayed in the upper left corner of the screen.

- **Settings**

Settings represent choices that the user may make and are displayed as follows: Language: English

- **Messages**

Information or instructions are marked by the $\boxed{\imath}$ symbol. Messages can not be selected or altered. They do not initiate a process.

Navigation Example: Setting the date and time
The V-3000 photometer has a clock with a date function. The date and time are indicated in the status line of the display. There are choices for date format presentation: day, month, year (dd.mm.yy) or month, day, year (mm.dd.yy). When storing measured values and calibrating, the current date and time are automatically stored as well. The correct setting of the date and time and date format is important for the following functions and displays: current date and time, calibration date, and identification of stored measured values. Therefore, check the time at regular intervals. If power is interrupted (example: batteries die), the date and time will need to be reset.

Press the **MENU** key. The Configuration menu is opened.
Use the ▲ or ▼ key to highlight System. Press the **START/ENTER** key. System menu is opened.
Use the ▲ or ▼ key to highlight Continue. Press the **START/ENTER** key.
Use the ▲ or ▼ key to highlight Date/Time. Press the **START/ENTER** key. Date/Time menu is opened.
Use the ▲ or ▼ key to highlight Time or Date. Press the **START/ENTER** key.
Use the **START/ENTER** key to move curser to the right. The digit to be changed is underlined on the display.
Use the number keys to enter the correct Time or Date.
Press the **START/ENTER** key when the correct information is displayed.
Press the **ESC** key to go back to the previous menu.

3.5 Menu Overview
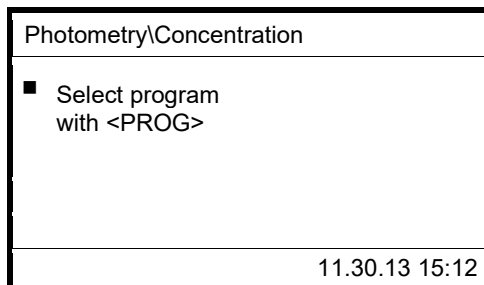
<table>
<tr><td rowspan="5">Photometry</td><td>Measured Parameter</td><td colspan="3">Concentration, % Transmittance, Absorbance</td></tr>
<tr><td>Programs</td><td colspan="3"></td></tr>
<tr><td>Dilution</td><td colspan="3"></td></tr>
<tr><td>Analysis Timer</td><td colspan="3">On, Off</td></tr>
<tr><td>Reset</td><td colspan="3"></td></tr>
<tr><td>Timer</td><td colspan="4"></td></tr>
<tr><td rowspan="15">System</td><td>Language</td><td colspan="3">German, English, French, Spanish</td></tr>
<tr><td>Info</td><td colspan="3">Displays Software version, Program version, Serial number, and main PC board identification</td></tr>
<tr><td rowspan="3">Display</td><td colspan="2">Illumination</td><td>Auto off, On, Off</td></tr>
<tr><td colspan="2">Contrast</td><td>0…100%</td></tr>
<tr><td colspan="2">Brightness</td><td>0…100%</td></tr>
<tr><td>Reset (Restore basic settings)</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Interface</td><td colspan="2">Baud Rate</td><td>1200, 2400, 4800, 9600, 19200</td></tr>
<tr><td colspan="2">Output Format</td><td>ASCII, CSV</td></tr>
<tr><td rowspan="3">Continue…/ Date/Time</td><td colspan="2">Time</td><td>hh:mm:ss</td></tr>
<tr><td colspan="2">Date</td><td></td></tr>
<tr><td>Date Format</td><td colspan="2">dd.mm.yy (default setting), mm.dd.yy, mm/dd/yy</td></tr>
<tr><td>Continue…/ Switchoff</td><td colspan="3">10, 20, 30, 40, 50 min; 1, 2, 3, 4, 5, 10, 15, 20, 24 hrs</td></tr>
<tr><td>Continue…/ Beep</td><td colspan="3">On, Off</td></tr>
<tr><td rowspan="6">Measured Value Memory (Store)</td><td colspan="4">Display</td></tr>
<tr><td colspan="4">RS232 Download</td></tr>
<tr><td colspan="2">Data Filter</td><td colspan="2">Filter, ID, Program, Date</td></tr>
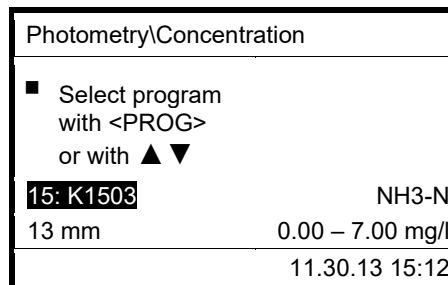<tr><td colspan="4">Delete</td></tr>
<tr><td colspan="4">λ # of 100 occupied</td></tr>
<tr><td colspan="4">λ Filter, No filter</td></tr>
</table>

4 Photometry

4.1 Measuring the Concentration

1. Prepare the meter to receive the cell size of choice (See Section 3.2).
2. Turn the meter on by pressing the **ON/OFF** key.
3. Press the **-M-** key until Photometry\Concentration is displayed on the top line of the display. After the first concentration measurement, the last program used is automatically displayed.

<div style="border:1px solid">

Photometry\Concentration

■ Select program
with \<PROG\>

11.30.13 15:12
</div>

First concentration measurement (#1)

<div style="border:1px solid">

Photometry\Concentration

■ Select program
with \<PROG\>
or with ▲ ▼

15: K1503   NH3-N
13 mm   0.00 – 7.00 mg/l
11.30.13 15:12
</div>

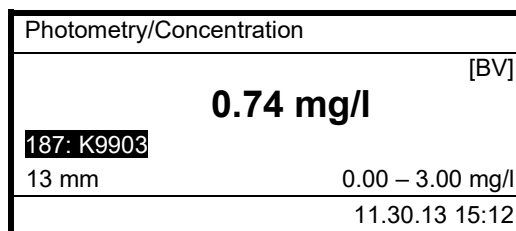All subsequent concentration Measurements (#2)

> **NOTE:** From display #2 above, use the **FORM** key to change the chemical form being reported for the program displayed and use the **UNITS** key to change the reporting unit. (See Section 1.3).

4. Use the ▲ or ▼ keys to toggle through the last ten programs used or press the **PROGRAM** key and enter the desired program number, then press **START/ENTER**.
5. Zero adjustment (zeroing the photometer at all wavelengths) is required each time the meter is turned on, unless the photometer is docked in a Power LabStation (See Section 1.7). Zero adjustment must employ the cell size for the test that is being run (See Section 1.6). If zeroing is necessary, the required cell size and the following message are displayed: " λ No valid zero adjustment is available". The user is prompted to perform the zero adjustment. The prompts are highlighted across the bottom of the display. To proceed to each next prompt, press **START/ENTER**.

> **NOTE:** A 13 mm sealed ampoule containing distilled water is supplied in each Vacu-vials Test Kit for use as a ZERO vial when the sample is colorless and not turbid. If the sample to be tested is colored or turbid, use a Sample Zeroing Accessory Pack (Cat. # A-0025, A-0503, A-0504) in place of the supplied ZERO vial. Kit specific Vacu-vials instructions define which Sample Zeroing Accessory Pack is applicable for each kit.

6. In addition to zero adjustment, some programs also require a reagent blank (indicated in the individual kit instructions):
   - If a blank measurement **has NOT** previously been made (stored) for a program, the menu prompts the user to measure a blank value. The prompts are highlighted across the bottom of the display. To proceed to each next prompt, press **START/ENTER**.
   - If a blank measurement **has** previously been made (stored) for a program, the previously stored blank value will automatically be applied to the new sample measurement unless the user deletes or changes the blank value. To delete the old blank value or generate a new blank value, press the **CAL/ZERO** key and follow the choices/prompts.

> **NOTE:** When a blank value has been applied to a test result, [BV] is displayed on the screen with the test result.

<div style="border:1px solid">

Photometry/Concentration
                                        [BV]
0.74 mg/l
187: K9903
13 mm   0.00 – 3.00 mg/l
11.30.13 15:12
</div>

7. Insert the clean, dry sample vial or ampoule as prompted and press START/ENTER. The test result is displayed.

   NOTE: If the measured test result is above the upper limit of the test range, the display will show > XX ppm. However, immediately above that in a smaller font, the actual test result will be displayed.

4.2 Analysis Timer
The analysis timer is programmed with program specific color development times for all factory calibrated programs. When the analysis timer is turned on (Configuration/Photometry/Analysis timer menu), it is active for all factory calibrated programs and can not be bypassed. When the analysis timer is turned on and a program is selected to run, the meter will show a prompt for starting the analysis timer. When **START/ENTER** is pushed, the analysis timer displays and counts down the required color development time and then beeps. When the meter beeps, **START/ENTER must be pressed twice** to obtain the concentration measurement.

4.3 Timer
There may be waiting periods in between the individual steps of a test method. The Timer function can be used to manually set these time intervals. The timer is set and started in the Configuration/Timer menu by entering a time interval. The timer is displayed in the lower left corner (status line) of the display. When the selected time expires, the meter beeps. Press **START/ENTER** to stop the beeping.

4.4 Measuring Diluted Samples
If the concentration of a sample exceeds the measuring range of a test method, it may be reasonable to dilute the sample with distilled water prior to analysis. The corresponding dilution factor (1....99) can be manually set on the photometer so that test results are automatically adjusted for the dilution factor. After selecting the program for which a sample dilution is to be employed, go to the Configuration/Photometry/Dilution menu to specify the appropriate dilution factor. Once the dilution factor is set, the meter applies the dilution factor and **displays the concentration of the undiluted sample**. The entered dilution factor is only valid for the selected program. If a dilution factor is active, it is indicated on the display during measurement as follows:

$$[x + 1]............with\ x = parts\ water\ and\ 1 = parts\ sample$$

The dilution factor is erased if:
- the photometer is turned off
- a different program number is selected
- the factor 0 is entered in the Dilution menu

Note: Sample dilution is not appropriate for all analytes.

5 Storing Data

The V-3000 photometer can store up to 100 measurements. A measurement is stored by pressing the **STO** key. This opens the Store menu. Each stored measurement includes the date, time and measurement ID number as well as the following:

Measuring Mode	Measurement Data
Photometry	Program Number
	Measured Value
	Chemcial Form Chosen for the Analyte Tested
	Use of a Blank Value (BV), if applicable
	Dilution (x +1), if applicable

5.1 Assigning Measurement ID Number
Use the ▲ or ▼ keys, the **START/ENTER** key and the number keys to assign an ID number from 0 to 99. The same ID number can be used multiple times to indicate a particular sampling location or a particular operator.

5.2 Managing Stored Measurement Values
The number of storage locations that are still free is displayed in parenthesis at the top of the Store menu display. The number of storage locations that are occupied is displayed in the Configuration/Measured value memory menu.

If the measured value memory capacity is full, the meter will offer the option to overwrite the oldest stored measurement with the new storing command. Another option is that all stored values can be deleted using the Configuration/Measured Value Memory menu. A security prompt appears before a dataset is overwritten or all of the measured values are deleted. It is not possible to selectively delete a single stored measurement.

5.3 Filtering Stored Measurement Values
The functions to display and download stored measurements refer to all stored measurements that correspond to the adjusted filter criteria. The filter criteria choices (listed below) are found in the Configuration/Measured value memory/Data filter menu.

Filter Criteria	Description
No filter	There is no filter set
ID	Select according to ID Number
PROG	Select according to Program Number
Date	Select according to a period of days
ID + PROG	Select according to ID Number **and** Program Number
ID + Date	Select according to ID Number **and** period of days
PROG + Date	Select according to Program Number **and** period of days
ID + PROG + Date	Select according to ID Number **and** Program Number **and** period of days
Meas. Param.	Select according to Measurement parameter concentration.

6 Use with Printers and Computers

The V-3000 photometer allows communication directly to a printer or bidirectional communication with a computer. Connecting to a printer or a computer requires the use of the supplied PC interface cable with RS-232 connector. This cable has a special 6-pin connector on one end for the V-3000. The 6-pin RS-232 port is on the back of the photometer. If your printer or computer does not have a 9 pin RS232 port, you will need to purchase the following USB adapter that will allow you to connect the V-3000 PC Interface cable to the USB port on your printer or computer: Catalog Number: A-0307, Description: RS232 (9 pin) to USB Cable Adapter.

6.1 Saved Data Output Format
When data is being downloaded from the V-3000 to a computer or printer, output format can be selected. ASCII output format downloads data sets with formatting. CSV output format downloads the data set information separated by semi-colons(;). CSV format is used for importing data into spreadsheets. The output format setting is set or changed in the Configuration/System/Interface/Output format menu.

Example of ASCII format:
V-3000 Ser. No. 12390625
3: 12/31/15 11:55:09
ID 0 / PROG 15
4.50 mg/l NH3-N

Example of CSV format:
2;12/31/15;11:55:06;0;15:NH3-N; ;4.50;mg/l;VALID; ; ;

Description of data separated by semi-colons in CSV format
Data storage number
Date of storing
Time of storing
User assigned ID
Program number, only for the concentration measurements
Citation form, only for the measured parameter
Blank value (BV) for concentration readings
Dilution factor, only for concentration measurements
Measured value
Unit of measured value (e.g. ppm, mg/L, Abs, etc,)
Measured value status-VALID, INVALID, UFL (below measuring range), OFL (above measuring range)
Secondary value for Absorbance/%Transmittance measurements:
   Wavelength
   Unit of secondary value (nm)
   Value status

6.2 Printing Date Directly to a Printer
1. With the V-3000 power off, connect the V-3000 to a printer using the supplied PC interface cable.
2. Turn the meter on by pressing the **ON/OFF** key.
3. Press the **MENU** key. The Configuration menu is opened.
4. Use the ▲ or ▼ keys to highlight System. Press **START/ENTER**. The System menu is opened.
5. Use the ▲ or ▼ keys to highlight Measured value memory. Press **START/ENTER**.
6. **To print individual readings**: Use the ▲ or ▼ keys to highlight Display. Press **START/ENTER**. Readings will display one at a time. Use ▲ or ▼ keys to scroll. Press **PRT** key to print individual readings in selected output format. (See Section 6.1)
7. **To print entire dataset**: Use the ▲ or ▼ keys to highlight RS232 download. Press **START/ENTER**. This will print entire dataset according to the filters criteria that has been set (See Section 5.3).

6.3 Downloading Data to a Computer

V-3000 Data Management Software for Data Exchange (Catalog Number A-0301) is available for easy data downloading and manipulation. However, without the additional software, data can also be sent to a terminal emulator program and then exported to a spreadsheet or database software application.

To download data with the V-3000 PC Software:

> **NOTE:** These instructions are specific to the terminal emulator program HyperTerminal.

1. Create and save a text file (*.txt) to receive the V-3000 logged data. Close this file.
2. With the V-3000 power off, connect the V-3000 to a computer using the supplied PC interface cable.
3. Turn the meter on by pressing the **ON/OFF** key.
4. Press the **MENU** key. The Configuration menu is opened.
5. Use the ▲ or ▼ keys to highlight System. Press **START/ENTER**. The System menu is opened.
6. Use the ▲ or ▼ keys to highlight Measured value memory. Press **START/ENTER**.
7. Open HyperTerminal by going to the Start button on your computer, then clicking on Programs/ Accessories/Communications/HyperTerminal.
8. A "New Connection" window will open. Enter a name for the terminal program, for example "V3000". Select an icon to represent the terminal program.
9. A "Connect To" window will open. Select the Com (serial) port to which V-3000 is connected.
10. Enter the port transmission settings:
    Baud Rate: 1200, 2400, 4800 or 9600
    Data Bits: 8
    Parity: None
    Stop Bit: 1
    Start Bit: 1
    Flow Control: Hardware

> **NOTE:** The baud rate selected in Hyper Terminal must match the V-3000 baud rate. V-3000 baud rate is set in the Configuration/System/Interface/Baud rate menu.

11. From the HyperTerminal menu, select Transfer. Click on Capture Text. Enter the path and name of the file created in Step 1. Click on Start.
12. Make sure that the desired V-3000 output format has been chosen (See Section 6.1).
13. **To download individual readings**: Use the ▲ or ▼ keys to highlight Display. Press **START/ENTER**. Readings will display one at a time. Use ▲ or ▼ keys to scroll. Press **PRT** key to download individual readings in selected output format.
    To download entire datasets: Use the ▲ or ▼ keys to highlight RS232 download. Press **START/ENTER**. This will download entire data sets in the selected output format according to the filter criteria that has been set (See Section 5.3)
14. Downloaded readings should appear in the Hyper Terminal window. Once transmission is complete, click on Transfer/Capture Text and select Stop. Exit the HyperTerminal program and disconnect the V-3000 from the computer.
15. The text file, which captured the V-3000 data, can now be opened in the appropriate software application. Data may be reformatted as needed for spreadsheet or database manipulation.

6.4 Uploading Program Revisions

The V-3000 program version can be updated by visiting the website and clicking on V-3000 Method Update under Support. The website will inform customers when new programs are available or existing programs have been updated. To ensure that the most current calibrations are being used, it is recommended that every V-3000 user check the website frequently.

To determine what firmware version is currently on your V-3000, turn the photometer on. Press the **Menu** key and select "System". Software version and Program version (as well as Serial number and main PC board identification) are displayed under "Info".

Equipment Needed to Upgrade your V-3000:
- PC with Windows XP, Windows Vista, Windows 7 or Windows 10.
- PC Serial interface cable (6 pin to 9 pin, supplied with instrument) and if necessary, USB Cable Adapter (sold separately, Cat. No. A-0307).
  OR
  Power LabStation (sold separately, Cat. No. A-0302) with its serial interface cable and if necessary, USB Cable Adapter (Cat No. A-0307).

Procedure for Firmware Revision Update:

Important Message! Before beginning the update:
- Ensure that the V-3000 has a stable uninterrupted power supply (i.e. fresh batteries or Power LabStation with power cord).
- Close all other applications on your PC.

NOTE: Updates do not delete user generated custom methods.

1. Click on the link provided on the website to open the update program.
2. Files have been compressed into a zip archive (*.zip). Unzip the files and save them to your PC. Open the folder on your PC called "V3000_update", then double click on the executable (*.exe) file. When the installation has occurred successfully, the executable icon (shortcut to the V-3000 upload program) will be saved to your desktop.

   NOTE: The step-by-step procedure for installing the program and unzipping the files varies among different operating systems and individual PCs. Consult with an IT Specialist for detailed instructions.

3. With the V-3000 power off, connect the V-3000 to the computer using the supplied PC interface serial cable. If only USB ports are available, connect the V-3000 using the supplied serial cable and USB Cable Adapter (sold separately, Cat. No. A-0307).
4. Turn the V-3000 on by pressing the ON/OFF key.

   NOTE: It does not matter which screen the instrument displays at the start of this update.

5. Double click on the V-3000 executable icon on your desktop. Click "OK" to initiate the V-3000 Firmware Update. The entire process will take approximately 10 minutes. The V-3000 screen will go through a series of programming tasks.

   NOTE: **Do NOT click Cancel, remove PC cable, interrupt power supply, or attempt to stop the update. This can result in meter malfunction requiring repair by the manufacturer**.

6. When the update is complete, the PC screen will display "Firmware update successfully completed!" as well as meter and revision information including the new Software and Program Version numbers. If the update fails, follow the prompts on the PC screen to re-initiate the upload. When prompted, carefully enter the V-3000 serial number.

   NOTE: If the update repeatedly fails, disconnect the V-3000 from the COM port and contact technical Services.

7. When the update is completed successfully, disconnect the V-3000 from the COM port.
8. Click File\Exit to close the program. Do NOT click "OK".

7 Troubleshooting

Issue/Error Message	Cause	Remedy
Zero Adjustment Error	Failure to perform zero at all six wavelengths. Debris in sample well Debris on zeroing ampoule Invalid zeroing ampoule	Only zero with valid 13 or 28 mm water blank. Clean zeroing ampoule. Clean sample well. Make sure it is free of debris and liquid.
LoBat	Battery power is insufficient.	Replace AA batteries immediately. Recharge "accumulator pack". Plug into 9V power supply cable.
Instrument does not react to keystroke or RS232 interface	Meter software needs to system reboot.	Perform processor reset by pressing <START/ENTER> and <PRT> key simultaneously.
Bootloader waiting	Error uploading method update.	Never press cancel during a method update. Contact Technical Services.
Program number invalid!	Program number not recognized.	Only use program appropriate program numbers. Make sure method software is up to date.
Obviously incorrect measured values	Measurement disturbed by light.	Use light shield.
	Cell not correctly inserted.	Insert cell to be positioned in the bottom of the sample compartment.
	Cell contaminated.	Clean the cell.
	Sample compartment contaminated.	Clean the sample compartment.
	Dilution set incorrectly.	Set the correct dilution factor.
	Selected program unsuitable.	Select appropriate program number.
	Zero measurement incorrect.	Perform zero adjustment.
	Blank value incorrect.	Re-measure the blank value for program in use.
Error message, Error 0, 8, 16, 16384	Instrument error.	Repeat measurement. Restart instrument.