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We Enable Science

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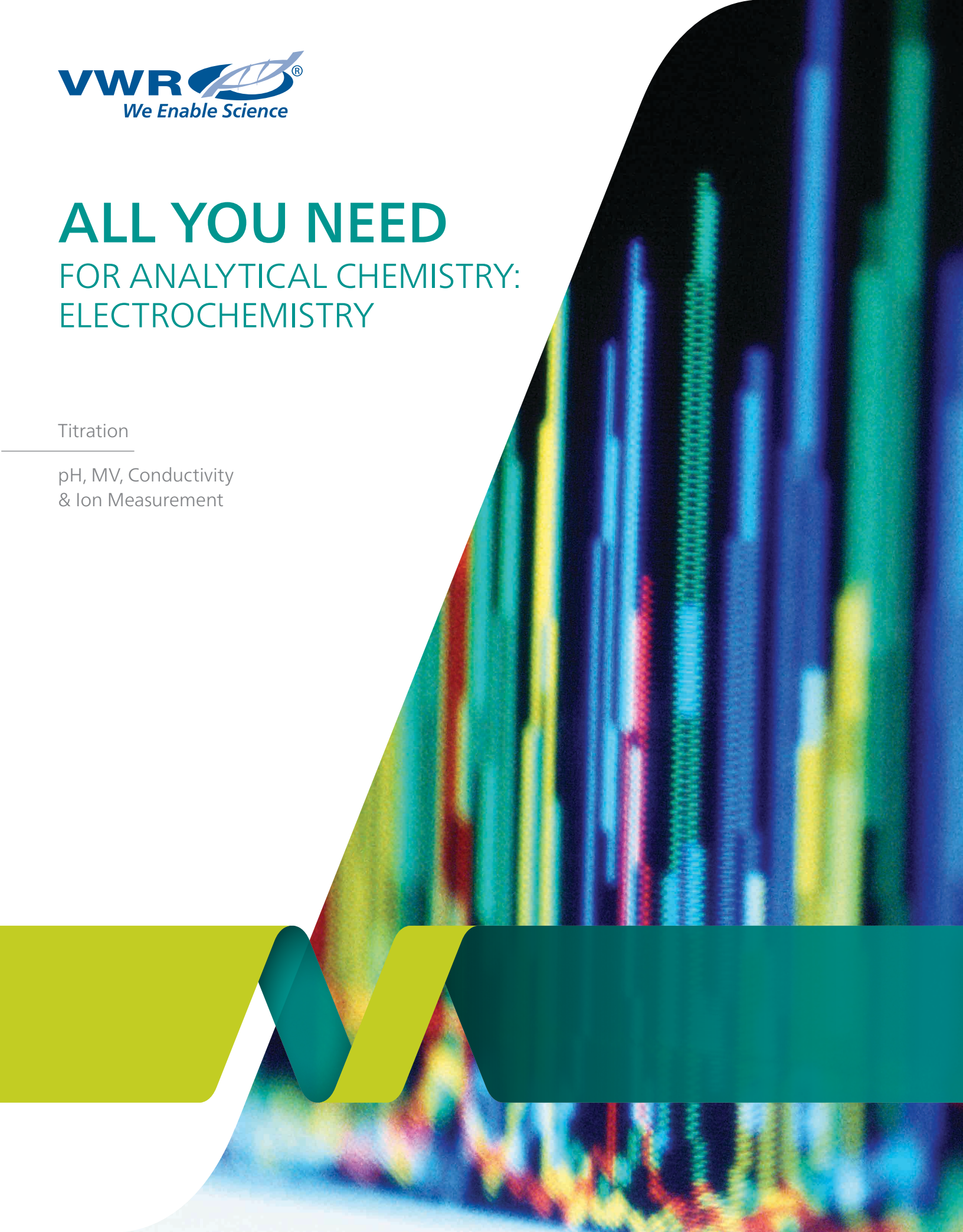
FOR ANALYTICAL CHEMISTRY: ELECTROCHEMISTRY

Titration

pH, MV, Conductivity
& Ion Measurement



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How to Use this Catalog

The New VWR All You Need for Analytical Chemistry: Electrochemistry Catalog lists hundreds of products from our comprehensive portfolio along with information on many services available through VWR. In this catalog you will find navigational aids to help you locate the products you need quickly and easily.

Product Organization

Sections are organized by type of analysis for easy identification.

Page Headings

Section and subsection listings appear as necessary for you to refine your browsing.

ALL YOU NEED
FOR ANALYTICAL CHEMISTRY: ELECTROCHEMISTRY

Electrochemistry provides powerful and versatile analytical techniques that feature high sensitivity, accuracy, and precision, utilizing relatively lower cost instrumentation than other methods of analysis.

Whether measuring pH, conductivity, or performing titrations, most analysts rely on electrochemical techniques in their daily work. VWR has all you need to outfit your lab with the necessary meters, probes, accessories, and chemicals for any of these applications.

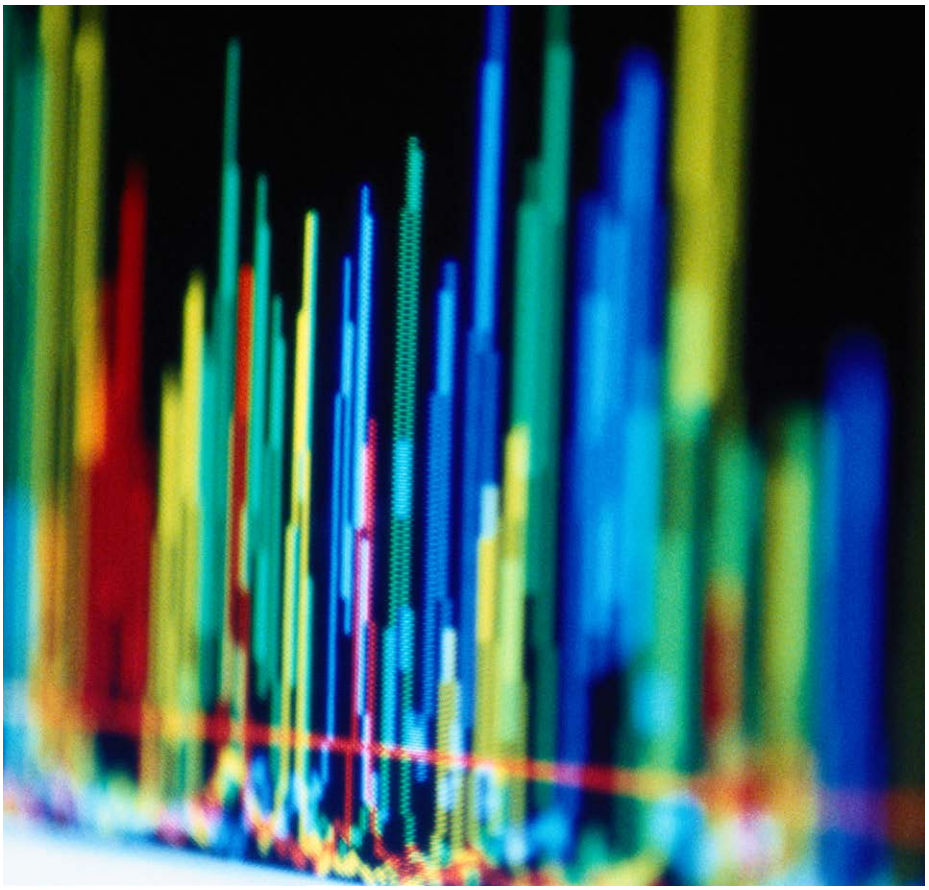


Table of Contents

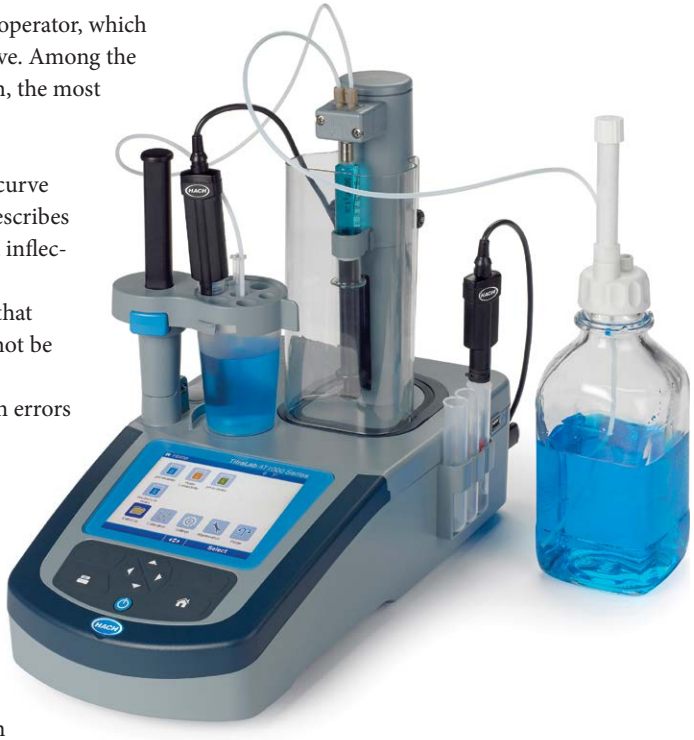
Titration Theory and Practice

In most manufacturing or processing industries, it is essential to know the exact concentration of a product, species or chemical function in order to ensure the efficiency of a process or the quality of a finished product. This is achieved by:

Finding a characteristic of the product directly related to its concentration. The analyst uses either physical (colorimetry, UV IR spectrophotometry, flame spectrophotometry, atomic absorption, etc.) or electrochemical methods like polarography. These methods are often long and costly, and require dedicated instruments and skilled operators.

Dissolving the analyte and making it react with another species in solution (titrant) of known concentration. This is what is known as titration and it can be performed manually or automatically. A titration made manually, even if using the possibilities of electrochemical methods to detect the equivalence points, poses a certain number of difficulties for the operator, which can be time consuming to solve. Among the limitations of manual titration, the most difficult to overcome are:

- Difficulty in interpreting a curve made point by point that describes one or more poorly defined inflection points
- Irreproducibility of results that depend on factors that cannot be controlled
- Risk of human transcription errors



An automated titrator is able to relieve the operator of all repetitive and fastidious tasks, in particular:

- Control of the titrant perfectly adapted to the requirements of the operator and of the reaction being used during the titration
- Correct measurement of the electrode signal regardless of the method employed
- Reliable and reproducible mathematical treatment of the titration curves, stored in the memory of the titrator as couples of potential or current measured against volume of titrant, leads to the security of the result
- Secure transmission of the final results and raw data for future follow up as required

A modern automated titrator is not just simply an instrument for realizing any titration. It is an indispensable tool for analytical laboratories concerned with the quality of traceability and recording of results that need to work according to the rules of Good Laboratory Practice (GLP).

To read the full article visit vwr.com/hach

TITRATION

KARL FISCHER

POTENTIOMETRIC

METTLER TOLEDO Titrators, METTLER TOLEDO®

Entry-Level Potentiometric Titrators

The G20 Compact titrator is especially designed for basic routine applications. It has One Click™ user interface, combining simplicity with dependability. One Click is optimized for direct access to all routine tasks and provides clear information to the user. The titrant and sensor are automatically detected upon connection to the titrator and all applicable data are saved on the burette or sensor chip making the G20 most dependable. Other features include: fast installation, simple automation, safe handling of chemicals, reliable sensor results and security with PC software, LabX® Light. The G20 comes equipped with the DGi115-SC Plug & Play sensor, integrated burette drive, compact rod stirrer and 20 mL burette.

Karl Fischer Compact Titrators

The C20 titrator is a routine coulometer that combines fast and precise water content determination with very simple operation. It is ideal for water contents in the range of 1 ppm up to 5%. The C20 features One Click Water Determination™. The touchscreen user interface is optimized for direct access to routine tasks and provides clear information to the user. The titration vessel is made completely from glass which ensures a uniquely low drift providing the most accurate and precise results possible. Enjoy other features such as four shortcuts per user, 120 samples per series and up to five different user methods. The C20D measurement cell has a diaphragm; the C20X measurement cell does not have a diaphragm.

The V20 titrator is a routine volumetric titrator that combines fast and precise water content determination with very simple operation. It is ideal for water contents in the range of 100 ppm up to 100%. The V20 features One Click Water Determination™. The touchscreen user interface is optimized for direct access to routine tasks and provides clear information to the user. The titration vessel is offers the possibility to determine the water content of liquid, solid and gaseous samples. Enjoy other features such as four shortcuts per user, 120 samples per series and up to five different user methods.

Display Name	Karl Fischer Compact Titrators	Entry-Level Potentiometric Titrators
Burette resolution	—	1/10,000 of burette volume (Models DL15 and DL22); 1/20,000 of burette volume (Model G20)
Model	Karl Fischer Compact Titrators	Entry-Level Potentiometric Titrators
Signal Resolution	—	±0.1 mV (Models DL15, DL22, and G20)
Voltage Range	—	±2000 mV (Models DL15, DL22, and G20)

Model	Cat. No.
V20 Karl Fischer Titrator	**97016-750**
C20X Karl Fischer Titrator	**97016-752**
C20D Karl Fischer Titrator	**97016-754**
G20 Compact Titrator	**97041-664**

For additional products, visit **vwr.com**.

TitroLine KF trace Titrators, SI Analytics

Coulometric Karl Fischer titrator is a dedicated instrument for determining even the smallest water content in samples, with applications in the pharamaceutical, chemical, and petroleum industries. Since the coulometric determination of water does not require standardization of a titrant, the handling is easier compared with the volumetric titration. Large display shows every working step in a dialog structure and pre-parameterized methods are easily recalled. Convenient pre-programmed methods include sample titration, titre water, titre liquid standard, titre tartate dihydrate, blank value ofen and blank value solvent, as well as commonly used parameters. Parameters may be changed if necessary. The live titration process is displayed as a real-time measuring curve. Two different methods may be used to calculate the results, and the correct formula is automatically selected and pre-assigned with the cooresponding values. An extensive statistical analysis can also be employed. Two RS-232C interfaces and one USB port allow connection to analytical balances, printers, PC, or KF drying oven.

Four different titrator versions are available: Module 1 includes a magnetic stirrer and diaphragmless electrode. Module 2 includes a pump stirrer and diaphragmless electrode. Module 3 includes a magnetic stirrer and electrode with diaphragm. Module 4 includes a pump stirrer and electrode with diaphragm.

Ambient Temperature	10 to 40°C (50 to 104°F)
Dimensions	20H x 26.5W x 20.5D cm ($7^{7}/_{8}$ x $10^{7}/_{16}$ x $8^{1}/_{16}$") with stand, 31H x 26.5W x 20.5D cm ($12^{3}/_{16}$ x $10^{7}/_{16}$ x $8^{1}/_{16}$") with vessel
Electrical	100–140V, 50/60Hz
Measurement range	10 ug–100 mg/1 ppm to 5% (recommended)
Weight	1.4 kg (3.1 lbs.) basic unit, 2.5 kg (5.5 lbs.) complete unit with stand

Description	Cat. No.
TitroLine KF trace Module 1	**97040-140**
TitroLine KF trace Module 3	**97040-144**
TitroLine KF trace Module 4	**97040-146**

For additional products, visit **vwr.com**.

TitroLine® 7500 KF Titrators, Lab Synergy

The TitroLine® 7500 KF offers additional performance capabilities and is the volumetric generalist for a wide range of use. It is designed for fast, easy and precise usage. It comes equipped with standard methods for different applications (titer determination, blank value…).

Its design includes a high visible full colors display that can be easily viewed from a distance and extreme angles. It is also capable of storing results via USB port with the capability of being exported as either a PDF or CSV format. This system is also equipped with intelligent interchangeable modules.

Description	Cat. No.
Volumetric KF-Titrator; Titrator Unit, Interchangeable Module (WA 05), TM 235 KF Titration Stand with Integrated Stirrer and Pump, Titration Vessel (TZ 1770), Micro-Dual Platinum Electrode (KF 1100) and Starter Kit, Power Supply (100-240V	**89429-392**
Volumetric KF-Titrator; Titrator Unit, Interchangeable Module (WA 10), TM 235 KF Titration Stand with Integrated Stirrer and Pump, Titration Vessel (TZ 1770), Micro-Dual Platinum Electrode (KF 1100) and Starter Kit, Power Supply (100-240V)	**89429-394**
Volumetric KF-Titrator; Titrator Unit, Interchangeable Module (WA 20), TM 235 KF Titration Stand with Integrated Stirrer and Pump, Titration Vessel (TZ 1770), Micro-Dual Platinum Electrode (KF 1100) and Starter Kit, Power Supply (100-240V	**89429-396**

For additional products, visit **vwr.com**.

TitraLab Automatic Karl Fischer Titrator for Moisture Content Determination, Hach®

- Fast titration results
- Ultimate analytical performance accuracy
- Push-button operation
- Minimal training required
- Compact setup

The Karl Fischer TitraLab automatic analyzer is specifically designed for fast volumetric moisture titration, providing the perfect solution to routine measurements. Automatic reagent addition; Solvent addition/waste disposal. Burette volumes available include 1x5mL glass syringe. Languages include Spanish, English, French, and Italian.

CE.WEEE.C-TICK.

Ordering Information: Karl Fischer titrator comes with 1x5ml glass syringe and 2 peristaltic pumps. Accessories: sensor holder with magnetic stirrer, electrode 52 64, cable for electrode and special KF vessel.

Burette resolution	40000 (motor)
Range	0.1 to 100 % (1,000 ppm to 10E6 ppm)

Description	Reagent	Titrant	Cat. No.
TitraLab Volumetric KF Moisture Analyzer, Lower Limit of Detection (LOD) 0.001% (10 ppm)	KF Solvent	KT Titrant 5	**89427-708**

For additional products, visit **vwr.com**.

AQUASTAR® Coulometric and Volumetric Reagents and Solvents, EMD Millipore

Since its invention by the German petroleum chemist, Karl Fischer, in the 1930's, the iodometric titration method that bears his name has become an increasingly popular analytical technique for quantifying water in a variety of industries. During this time, Karl Fischer titration has evolved from an esoteric novelty to a widely used instrumental method employed in Research & Development, Production, and Quality Control. Karl Fischer titration has been included in most key international Pharmacopeias, as well as in ISO, SOPs, and ASTM guidelines.

Since the 1980's, EMD Millipore has been marketing leading-edge, high performance reagents, quality water standards, and auxiliaries for Karl Fischer analysis under the Aquastar® brand name. During that time, the Aquastar® brand has become recognized for:

· Rapid titrations producing accurate reproducible results

· Innovative formulations for specialty applications

· Breadth of offerings

· Responsive customer service

· Knowledgeable technical support

Description	Size	Packaging	Cat. No.
One Component Volumetric Reagents			
CombiTitrant 1	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88001.1045**
CombiTitrant 2	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88002.1045**
CombiTitrant 5	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88005.1045**
CombiTitrant 5 XL	1 L	GL45 Poly-Coated Glass Bottle	**EM4.85050.1045**
Two Component Volumetric Reagents			
Titrant 5	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88010.1045**
Titrant 2	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88011.1045**
Volumetric Solvents			
CombiMethanol	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88009.1045**
Solvent (for Two-Component Titration)	1 L	GL45 Poly-Coated Glass Bottle	**EM1.88015.1045**
CombiSolvent Oils	1 L	GL45 Glass Bottle	**EM1.88020.1045**
CombiSolvent Crude Oils	1 L	GL45 Poly-Coated Glass Bottle	**EM4.85077.1045**
Coulometric Reagents			
CombiCoulomat Frit	500 mL	Glass Bottle	**EM1.09255.0500**
Apura® CombiCoulomat Fritless Reagent	500 mL	Glass Bottle	**EM1.09257.0500**
Coulomat AK (Anolyte)	500 mL	38-430 Poly-Coated Glass Bottle	**EM-AX1697E-1**
Coulomat CK (Catholyte)	25 mL	Glass Bottle	**EM-AX1697F-1**

For additional products, visit **vwr.com**.

AQUASTAR® Auxiliary Reagents and Standards, EMD Millipore

Reagents and standards include a lot-specific Certificate of Analysis. NIST water standards include a certificate to indicate traceability to standards provided by the National Institute of Standards and Technology.

Description	Size	Packaging	Cat. No.
Standards			
Sodium Tartrate Dihydrate	100 g	Poly Bottle	**EM1.06664.0100**
Water Standard, 0.01%, NIST	10 x 8 mL	Ampules	**EM1.88050.0010**
Water Standard, 0.1%, 1 g 1 mg, for Coulometric Karl Fischer Titration	10 x 8 mL	Ampoules	**EM1.88051.0010**
Water Standard, 1%, 1 g 10 mg, for Volumetric Karl Fischer Titration	10 x 8 mL	Ampoules	**EM1.88052.0010**

For additional products, visit **vwr.com**.

EasyPlus™ Titrators, METTLER TOLEDO®

The Swiss engineered EasyPlus™ Titrators from METTLER TOLEDO offer a complete package for your routine application. Operation does not get simpler or more intuitive as this, thanks to the smartphone like iTitrate™ user interface and iTitrate™ intelligence.

Description	Cat. No.
Easy pH Titrator	**89500-400**
Easy Ox Titrator	**89500-402**
Easy Cl Titrator	**89500-404**
Easy Pro Titrator	**89500-406**
Easy KFV Titrator	**89500-408**

For additional products, visit **vwr.com**.

TitraLab® AT1000 Series Potentiometric Titrator, 1 Burette, 1 Pump, Hach

Automatic titration without all the complications.

Simplify complex titration with the TitraLab® AT1000 from Hach. Straight from the box the AT1000 eliminates operator interpretation and manual processes you have come to expect with existing manual titration. The automatic system gives you more reliable results without complicated analysis. To make setup and titration simple, the AT1000 utilizes application specific kits to make it quick and easy for anyone to set up and operate a test.

Eliminates operator interpretation and manual processes with automatic titration to quickly deliver accurate and repeatable results. Pre-programmed titration methods detect end points and eliminate manual calculations to make results easier to achieve without advanced programming. Application-specific functions eliminate complex titration setup and analysis. Hach's unique application kits make it quick for anyone to set up and operate a test.

Recommended Application Packages include Water: Chlorides; Food & Beverage: pH & Total Acidity; Food & Beverage: Salt; Water: Ca & Mg Hardness (ISE).

Application Packages for use with TitraLab 1000 Series titrators from Hach contain all elements but reagents to make it quick and easy for anyone to set up and operate a test. Each Application Package is specifically designed for unique parameters to ensure accurate and reproducible measurements at glance. Packages include adapters, glass bottle, magnetic stirring bars, polypropylene beakers, bottle stopper with desiccant tube, electrode(s) (Digital IntelliCAL® or Analogue), high precision glass syringe (Hamilton) and USB key containing application notes and applications to automatically program titrators for selected parameters. Setting up your application has never been so simple.

Application kit and accessories are not included.

Safety IEC/EN 61010-1; EMC IEC/EN 61326-1

Description	For Use With	Cat. No.
Instruments		
TitraLab AT1000 Series Potentiometric Titrator		**10662-254**
Application Packages		
Titration Application Pack Water: Chlorides	AT1000 Series, Automatic Titrator Models AT1112/AT1122/AT1222	**10662-160**
Titration Application Pack Food & Beverage: Salt	AT1000 Series, Automatic Titrator Models AT1112/AT1122/AT1222	**10662-162**
Titration Application Pack Water: Ca & Mg Hardness (ISE)	AT1000 Series, Automatic Titrator Models AT1112/AT1122/AT1222	**10662-168**
Titration Application Pack Water: Total Hardness (Color)	AT1000 Series, Automatic Titrator Models AT1112/AT1122/AT1222	**10662-170**
Titration Application Pack Petrochemistry: R-SH (Thiol)	AT1000 Series, Automatic Titrator Models AT1112/AT1122/AT1222	**10662-240**

For additional products, visit **vwr.com**.

Hydrochloric Acid, Solution 0.10N

Meets AOAC 936.15 standard and ASTM E200-91 standard. Made with high purity acid and deionized water. Suitable as a titrant.

Appearance/color ..... Clear liquid
N.I.S.T. Traceable to SRM 723 ..... Yes
Normality ..... 0.0995 - 0.1005 N
Shelf-life ..... 2 years

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7200-4**

For additional products, visit **vwr.com**.

Hydrochloric Acid, Solution 1.0N

Meets AOAC 936.15 standard and ASTM E200-91 standard. Made with high purity acid and deionized water. Suitable as a titrant.

Appearance/color ..... Clear liquid
N.I.S.T. Traceable to SRM 723 ..... Yes
Normality ..... 0.998 - 1.002 N
Shelf-life ..... 2 years
Certified total organic carbon ..... 0.0 - 2 ppm

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7202-4**

For additional products, visit **vwr.com**.

Hydrochloric Acid, Solution 6.0N

Made with high purity acid and deionized water. Suitable as a titrant.

Appearance/color ..... Clear liquid
Color (APHA) ..... 0 - 10
Normality ..... 5.950 - 6.050 N
Shelf-life ..... 2 years
N.I.S.T. traceable to SRM 723 ..... Yes

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7204-4**

For additional products, visit **vwr.com**.

Iodine, Solution 0.1N

Made with iodine crystals, potassium iodide and de-ionized water.

Normality ..... 0.0995 - 0.1005 N
Appearance/color ..... Dark brown liquid

Size	Packaging	Cat. No.
4 L	Amber Glass Bottle	**BDH7207-4**

For additional products, visit **vwr.com**.

Perchloric Acid, Solution 0.1N in Acetic Acid

Made with high purity acetic acid, suitable as a titrant.

Appearance/color ..... Clear liquid
N.I.S.T. Traceable ..... Yes
Normality ..... 0.0995 - 0.1005 N
Shelf-life ..... 1 year

Size	Packaging	Cat. No.
4 L	Amber Glass Bottle	**BDH7210-4**

For additional products, visit **vwr.com**.

Potassium Hydroxide, Solution 0.1N in Methanol

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 84 ..... Yes
Normality ..... 0.0095 - 0.1005 N
Shelf-life ..... 1 year

Size	Packaging	Cat. No.
4 L	Amber Glass Bottle	**BDH7548-4**

For additional products, visit **vwr.com**.

Potassium Permanganate, Solution 0.1N

Appearance/color ..... Dark purple clear liquid
N.I.S.T. Traceable to SRM 8040 ..... Yes
Normality ..... 0.0995-0.1005 N
Shelf-life ..... 1 year

Size	Packaging	Cat. No.
4 L	Amber Glass Bottle	**BDH7213-4**

For additional products, visit **vwr.com**.

Silver Nitrate, Solution 0.1N

Suitable as a titrant. Made with deionized water.

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 919 ..... Yes
Normality ..... 0.0995 - 0.1005 N
Shelf-life ..... 2 years

Size	Packaging	Cat. No.
500 mL	Amber Glass Bottle	**BDH7214-2**
4 L	Amber Glass Bottle	**BDH7214-4**

For additional products, visit **vwr.com**.

Silver Nitrate, Solution, 0.171N

Made with deionized water.

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 919 ..... Yes
Normality ..... 0.1660 - 0.1760 N
Shelf-life ..... 18 months

Size	Packaging	Cat. No.
4 L	Amber Glass Bottle	**BDH7916-4**

For additional products, visit **vwr.com**.

Sodium Hydroxide, Solution 0.1N

AOAC, APHA, and ASTM. Suitable as titrant.

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 84 ..... Yes
Normality ..... 0.0995 - 0.1005 N
Shelf-life ..... 2 years

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7219-4**

For additional products, visit **vwr.com**.

Sodium Hydroxide, Solution 1.0N

Meets APHA standard, AOAC 936.16 standard, and ASTM E200-91 standard. Suitable as a titrant.

Appearance/color ..... Clear liquid
Traceable to NIST SRM 84 ..... Yes
Normality ..... 0.998 -1.002 N
Shelf-life ..... 2 years
Manufacture date ..... As reported
Expiration date ..... As reported

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7222-4**

For additional products, visit **vwr.com**.

Sodium Thiosulfate, Solution 0.10N

Suitable as a titrant. Made with deionized water.

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 136 ..... Yes
Normality ..... 0.0995 - 0.1005 N
Shelf-life ..... 6 months
pH ..... 6.0 Min.

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7228-4**

For additional products, visit **vwr.com**.

Sodium Hydroxide, Solution 5.000N

Made with deionized water. Suitable as a titrant.

Appearance/color ..... Clear liquid
N.I.S.T. traceable to SRM 84 ..... Yes
Normality ..... 4.990 - 5.010 N
Shelf-life ..... 2 years

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7225-4**

For additional products, visit **vwr.com**.

Sulfuric Acid, Solution 0.02N

Made with high purity acid and deionized water. Suitable as a titrant.

Appearance/color ..... Clear liquid
N.I.S.T. Traceable to SRM 723 ..... Yes
Normality ..... 0.0195 - 0.0205 N
Shelf-life ..... 1 year

Size	Packaging	Cat. No.
4 L	Poly Bottle	**BDH7229-4**

For additional products, visit **vwr.com**.

TitriPUR® Hydrochloric Acid, EMD Millipore

In North America 1.09060.1000 is identical to HX0603A-8 but in a larger pack size

In North America 1.09060.1000 is identical to HX0603A-6

In North America 109060.4000 is identical to HX0603A-3 but in a superior shelf life enhancing pack

In North America 1.09057.1000 is identical to HX0603D-8 but in a larger pack size

Description	Concentration	Density	pH	Cat. No.
Hydrochloric acid c(HCl) Reag. Ph Eur,Reag. USP	1.000 mol/l	1.02 g/cm³ (20 °C)	1 (H_2O, 20 °C)	**EM1.09057.1000**
Hydrochloric acid c(HCl) Reag. Ph Eur,Reag. USP	0.1000 mol/l	1.00 g/cm³ (20 °C)	1.2 (H_2O, 20 °C)	**EM1.09060.1000**

For additional products, visit **vwr.com**.

TitriPUR® Iodine Solutions, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Iodine solution c(I_2)	1 L	0.5000 mol/L	1.22 g/cm³ (20 °C)	6.8 (H_2O, 20 °C)	Glass Bottle	**EM1.09098.1000**
Iodine solution c(I_2) Reag. Ph Eur,Reag. USP	1 L	0.05000 mol/L	1.02 g/cm³ (20 °C)	3.5 (H_2O, 20 °C)	Glass Bottle	**EM1.09099.1000**

For additional products, visit **vwr.com**.

TitriPUR® Potassium Hydroxide Solutions, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Potassium hydroxide solution (max. 0.00004 % Ca) c(KOH)	1 L	1.000 mol/L	1.05 g/cm³ (20 °C)	14 (H_2O, 20 °C)	Plastic Bottle	**EM1.09107.1000**
Potassium hydroxide solution c(KOH) Reag. Ph Eur,Reag. USP	1 L	1.000 mol/L	1.05 g/cm³ (20 °C)	14 (H_2O, 20 °C)	Plastic Bottle	**EM1.09108.1000**
Potassium hydroxide solution, 100°C Boiling Point c(KOH) Reag. Ph Eur	1 L	0.1000 mol/L	1.00 g/cm³ (20 °C)	13 (H_2O, 20 °C)	Plastic Bottle	**EM1.09112.1000**

For additional products, visit **vwr.com**.

TitriPUR® Potassium Permanganate Solutions, Standardized Against Oxalate, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
TitriPUR® Potassium Permanganate Solution c($KMnO_4$) Reag. USP	1 L	0.0200 mol/L	1.06 g/cm3 (20 °C)	0.5 (H2O, 20 °C)	Glass Bottle	**EM1.09122.1000**

For additional products, visit **vwr.com**.

TitriPUR® Silver Nitrate Solutions, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Silver nitrate solution c($AgNO_3$)	1 L	1.000 mol/L	1.14 g/cm^3 (20 °C)	7 - 9 (H_2O, 20 °C)	Plastic Bottle	**EM1.09080.1000**
Silver nitrate solution c($AgNO_3$) Reag. Ph Eur,Reag. USP	1 L	0.1000 mol/L	1.01 g/cm^3 (20 °C)	4 - 5 (H_2O, 20 °C)	Plastic Receptacle In Fibreboard Box	**EM1.09081.1000**

For additional products, visit **vwr.com**.

TitriPUR® Sodium Hydroxide Solutions, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Sodium hydroxide solution c(NaOH) Reag. Ph Eur,Reag. USP	1 L	1.000 mol/L	1.04 g/cm^3 (20 °C)	13.7 (H_2O, 20 °C)	Plastic Receptacle In Fibreboard Box	**EM1.09137.1000**
Sodium hydroxide solution c(NaOH) Reag. Ph Eur,Reag. USP	1 L	0.1000 mol/L	1.00 g/cm^3 (20 °C)	12.7 (H_2O, 20 °C)	Plastic Receptacle In Fibreboard Box	**EM1.09141.1000**

For additional products, visit **vwr.com**.

TitriPUR® Sodium Thiosulfate Solutions, EMD Millipore

In North America 1.09147.1000 replaces and is identical to SX0821-8

In North America 1.09147.4000 replaces and is identical to SX0821-3 but in a superior shelf life enhancing pack

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Sodium thiosulfate solution c($Na_2S_2O_3$ 5 H_2O) Reag. Ph Eur,Reag. USP	1 L	0.1000 mol/L	1.01 g/cm^3 (20 °C)	9 - 10 (H_2O, 20 °C)	Plastic Receptacle In Fibreboard Box	**EM1.09147.1000**

For additional products, visit **vwr.com**.

TitriPUR® Sulfuric Acid, EMD Millipore

Description	Size	Concentration	Density	pH	Packaging	Cat. No.
Sulfuric acid c(H_2SO_4) Reag. Ph Eur,Reag. USP	1 L	0.5000 mol/L	1.03 g/cm^3 (20 °C)	0.6 (H_2O, 20 °C)	Plastic Receptacle In Fibreboard Box	**EM1.09072.1000**
Sulfuric acid c(H_2SO_4) Reag. Ph Eur	1 L	0.05000 mol/L	1.00 g/cm^3 (20 °C)	1.3 (H_2O, 20 °C)	Plastic Bottle	**EM1.09074.1000**

For additional products, visit **vwr.com**.

pH, MV, CONDUCTIVITY AND ION MEASUREMENT

METERS & ACCESSORIES

ELECTRODES

REFERENCE STANDARDS

PH STRIPS & PAPER

VWR® sympHony™ Benchtop Meters

Specially designed for use in the lab, these rugged and durable benchtop meters are versatile enough to fit your unique testing needs.

These meters are simple to operate and offer an intuitive user interface allowing for easy set up and use from day one. Step-by-step on screen prompts enable both new and seasoned users to operate the meter easily and effectively, resulting in consistently accurate measurements.

VWR® sympHony™ benchtop meters meet IP54 specifications for protection from water and are CE and cETLus marked.

Stand is not included with the meter kits. Each benchtop meter can be configured to fit your needs with the variety of optional electrodes, stands with stirrers, and accessories available.

Conductivity - accuracy	≤ 0.5% m.v. ± 1 digit
Conductivity - range	0.001 µS/cm to 1000 mS/cm
Conductivity - resolution	Variable, autorange
Dissolved Oxygen Range	0.00 to 60.0 mg/L
DO - accuracy	≤ 0.5% m.v. ± 1 digit
DO - resolution (mg/l)	0.01 mg/L in the range of 0.00 to 19.99 mg/L 0.1 mg/L in the range of 20.0 to 60.0 mg/L 0.1 % in the range of 0.0 to 19.9% 1% in the range of 20 to 600%
ISE - range	10-5 to 10-1 mol/L
ISE - units	mol/L, M, g/L, mg/L, µg/L, mmol/L, mM, µmol/L, or %
pH - accuracy	≤ 0.002 pH (± 1 digit)
pH - range	-2 to 19
pH - resolution	0.1/0.01/0.001
Resistivity - accuracy	≤ 0.5% m.v. ± 1 digit
Resistivity Range	0.0001 to 100 MΩ
Resistivity Resolution	Variable, autorange
Salinity - range	Automatic, with manual data entry (0-45 ppt)

Description	Includes	Cat. No.
Benchtop Meters		
B10P Benchtop Meter - pH		**89231-662**
B10C Benchtop Meter - Conductivity		**89231-676**
B40PCID Benchtop Multi Parameter Meter - pH, Conductivity, ISE, Dissolved Oxygen		**89231-684**
B20PI Benchtop Multi Parameter Meter - pH, ISE		**89231-692**
B30PCI Benctop Multi Parameter Meter - pH, Conductivity, ISE		**89231-696**
Benchtop Meter Kits		
B10P Benchtop pH Meter with pH Probe	B10P Meter (**89231-662**) and Refillable Glass pH Electrode (**89231-580**)	**89231-664**
B40PCID Benchtop Multimeter with DO Probe	B40PCID Meter (**89231-684**) and Dissolved Oxygen Probe (**89231-624**)	**89231-670**
B10C Benchtop Conductivity Meter with Conductivity Probe	B10C Meter (**89231-676**) and Conductivity Probe (**89231-614**)	**89231-678**
B40PCID Benchtop Multimeter with pH, Conductivity, and DO Probes	B40PCID Meter (**89231-684**), pH (**89231-586**), Conductivity (**89231-618**), and DO (**89231-624**) Probes	**89231-686**
B20PI Benchtop pH/ISE Meter with pH Probe	B20PI Meter (**89231-692**) and pH Probe (**89231-580**)	**89231-694**
B30PCI Benchtop pH/Conductivity/ISE Multimeter with pH and Conductivity Probes	B30PCI Meter (**89231-696**), pH Probe (**89231-580**), and Conductivity Probe (**89231-614**)	**89231-698**
B40PCID Multimeter with pH and DO Probes	B40PCID Meter (**89231-684**), pH Probe (**89231-580**), and DO Probe (**89231-624**)	**89231-704**

For additional products, visit **vwr.com**.

VWR® sympHony™ Handheld Meters

Specially designed for use in environmental field applications and in the lab, these rugged and durable hand-held meters are versatile enough to fit your unique testing needs.

These meters are simple to operate and offer an intuitive user interface allowing for easy set up and use from day one. Step-by-step on screen prompts enable both new and seasoned users to operate the meter easily and effectively resulting in consistently accurate measurements. Each handheld meter is waterproof and can be configured to fit your needs with the variety of electrodes and accessories available. Each meter features one single connector that can be used when testing for multiple parameters, and also allows for automatic or manual calibration and automatic buffer recognition.

VWR® sympHony™ handheld meters are IP67 certified and are CE and cETLus marked.

Conductivity - accuracy	≤ 0.5% m.v. ± 1 digit
Conductivity - range	0.001 µS/cm to 1000 mS/cm
Conductivity - resolution	Variable, autorange
Dissolved Oxygen Range	0.00 to 60.0 mg/L
DO - accuracy	0.5% m.v. ± 1 digit
DO - resolution (mg/l)	0.01 mg/L in the range of 0.00 to 19.99 mg/L 0.1 mg/L in the range of 20.0 to 60.0 mg/L 0.1 % in the range of 0.0 to 19.9% 1% in the range of 20 to 600%
ORP Accuracy	≤ 0.2 mV or ≤ 2 (±1 digit)(0.5 %)
ORP Range	± 2000 mV
ORP Resolution	0.1 mV in the range of ± 199.9 mV, 1 mV in the rest of the range
pH - accuracy	≤ 0.01 pH (± 1 digit)
pH - range	-2 to 19
pH - resolution	0.1/0.01
Resistivity - accuracy	≤ 0.5% m.v. ± 1 digit
Resistivity - range	0.0001 to 100 MΩ
Resistivity Resolution	Variable, autorange
Salinity - range	Automatic, with manual data entry (0-45 ppt)

Description	Includes	Cat. No.
Handheld Meters		
H10P Handheld Meter - pH		**89231-666**
H10D Handheld Meter - Dissolved Oxygen		**89231-672**
H10C Handheld Meter – Conductivity		**89231-680**
H30PCD Multi Parameter Handheld Meter - pH, Conductivity, Dissolved Oxygen		**89231-688**
H30PCO Multi Parameter Handheld Meter - pH, Conductivity, ORP		**89231-700**
Handheld Meter Kits		
H10P Handheld pH Meter with pH Probe	H10P Meter (**89231-666**) and Gel-Filled pH Electrode (**89231-608**)	**89231-668**
H10D Handheld Dissolved Oxygen Meter with DO Probe	H10D Meter (**89231-672**) and Portable DO Probe (**89231-626**)	**89231-674**
H10C Handheld Conductivity Meter with Conductivity Probe	H10C Meter (**89231-680**) and Portable Conductivity Probe (**89231-622**)	**89231-682**
H30PCD Handheld Multimeter with Multihandle Probe	H30PCD Meter (**89231-688**) and Portable Multiprobe for pH, Conductivity, and DO (**89231-660**)	**89231-690**
H30PCO Handheld Multimeter with Multiprobe	H30PCO Meter (**89231-700**) and Portable Multiprobe for pH, Conductivity, and ORP (**89231-656**)	**89231-702**

For additional products, visit **vwr.com**.

HQ411d Benchtop Meter Package with PHC201 Gel pH Probe, Hach®

- Intuitive user interface for simple operation and accurate results
- Trust your measurements - IntelliCAL™ smart probes store all calibrations in the probe
- Ultra-bright screen and large font size
- Internal USB ports
- Convenient kit includes everything you need to start testing

The Hach HQ411d benchtop meter is an advanced laboratory meter that takes the guesswork out of measurements. HQd meters connect with smart probes that automatically recognize the testing parameter, calibration history, and method settings to minimize errors and setup time. The advanced benchtop meter is designed to withstand years of continuous lab use. HQd meters feature a simple user interface that does not require manuals or training to operate. The sealed PHC201 pH electrode is an ideal general-purpose probe for use in multiple measurement applications.

Ordering information: Includes HQ411d Benchtop Meter, PHC201 gel pH probe with 1 m cable.

Description	Cat. No.
HQ411d Benchtop Meter Package	**89500-878**

For additional products, visit **vwr.com**.

Portable HQd Meter, Hach®

Lighten your load with a flexible meter to measure critical water quality parameters without carrying multiple instruments. The meter has either a single or dual input option for flexible measurement of pH, Conductivity, Dissolved Oxygen, BOD, ORP, Ammonia, Ammonium, Fluoride, Chloride, Sodium, and temperature – any IntelliCAL smart probe. An intuitive user interface allows for simple operation, and stabilization alerts and the visual measurement lock ensure accurate results.

IntelliCAL smart probes store all calibrations, while the calibration history allows quick and easy change out of probes without re-calibrating. Guided calibration and check standard routines additionally reduce calibration errors. The HQd smart system records serial numbers, current calibration data, user ID, sample ID, time, and date automatically in the data log for complete GLP traceability.

The durable portable meter and optional rugged probes are designed to withstand years of rugged portable and field use.

Data Memory	500 points
Power	4 AA batteries, USB/DC and AC/DC power connection
Water Resistance	IP67

Description	Cat. No.
HQ11d Portable pH Meter	**89174-000**
HQ14d Portable Conductivity Meter	**89174-002**
HQ30d Portable pH, Conductivity, Dissolved Oxygen, ORP, and ISE Multi-Parameter Meter	**89174-004**
HQ40d Portable pH, Conductivity, Dissolved Oxygen, ORP, and ISE Multi-Parameter Meter	**89174-006**
HQ30d Portable Meter Package with LDO101 Dissolved Oxygen Probe	**89174-050**
HQ14d Portable Starter Package with CDC401 Conductivity Cell	**89174-054**
HQ40d Portable Meter Package with PHC301 pH Electrode and CDC401 Conductivity Cell	**89174-056**
HQ40d Portable Water Quality Lab Package with pH, Dissolved Oxygen, and Conductivity Probes	**89174-058**
HQ40d BOD Measurement Package with LBOD101 Luminescent Dissolved Oxygen (LDO) Probe, with Bottles	**89174-068**
HQ30d Portable Meter Package with LDO101 Rugged Dissolved Oxygen Probe	**89174-070**
HQ40d Portable Meter Package with LDO101 Rugged Dissolved Oxygen Probe	**89174-072**
HQ40d Advanced Portable Meter Package with LDO101 Rugged Dissolved Oxygen, PHC101 Rugged pH, and CDC401 Rugged Conductivity Probes	**89174-074**
HQ40d Portable Meter Package with LDO101 Rugged Dissolved Oxygen and PHC101 Rugged pH Probes	**89174-076**
HQ40d Portable Meter Package with MTC101 Rugged ORP Probe	**89174-078**
HQ40d Portable Dissolved Oxygen & ORP Process Control Package	**89174-080**
HQ40d Portable Dissolved Oxygen & Conductivity Environmental Monitoring Package	**89174-082**

For additional products, visit **vwr.com**.

SevenExcellence pH/mV and Conductivity Meters, METTLER TOLEDO®

SevenExcellence stands for convenient, easy-to-understand operation combined with high measurement accuracy and outstanding reliability. The SevenExcellence pH/conductivity meter redefines flexibility allowing both pH and conductivity to be measured with one meter. SevenExcellence can cope with complex applications and stringent regulations in regulated markets, but also feels at ease with routine measurements in the laboratory. For special applications such as USP/EP and conductivity ash it guides you through the measurement steps and notifies you when you are out of range. Starting an analysis, changing the settings and accessing the results is easily achieved thanks to the cleverly designed touch screen menu.

USB-stick, LabX direct software data export.

Conductivity - accuracy	+/-0.5%
Conductivity - range	0.001 to 999999µS/cm
Conductivity - resolution	0.001 to 1
Data logging - capacity	20000 data points, 250 analyses
Display	TFT
Interfaces	RS232, USB-A, USB-B, LAN, Mini-LTW, Mini-DIN, BNC, Cinch/RCA
mV - accuracy	+/-0.1
mV - range	-2000.0 to 2000.0
mV - resolution	0.1/1
pH - accuracy	+/-0.002
pH - range	-2.000 to 20.000
pH - resolution	0.001/0.01/0.1
Temperature accuracy (°C)	+/-0.1 °C
Temperature range (°C)	-30.0 to 130.0 °C
Temperature resolution (°C)	0.1 °C

Model	Cat. No.
S470-Basic	**89261-052**
S470-Kit	**89261-054**
S470-UPS/EP	**89261-056**
S470-Bio	**89368-788**

For additional products, visit **vwr.com**.

Seven2Go™ S8 Pro Portable pH/Ion Meter, METTLER TOLEDO®

These robust meters provide durability and one-handed operation, suitable for mobile applications in the laboratory, at-line, or outdoors.

Ordering information: The S8 Pro meter only is supplied with LabX direct pH, USB cable, electrode clip, base accessory, operating instructions, quick guide, test certificate, declaration of conformity and batteries.

S8 Standard Kit: As S8 meter, but also with InLab Expert Pro-ISM-IP67, bottles for calibration and buffer sachets for pH 4.01, 7.00 and 9.21.

S8 Field Kit:As S8-Standard kit, but also with uGo™ carrying case.

S8 Biotech Kit: As S8-Field kit, but with InLab Routine Pro ISM (incl. cable) instead of InLab Expert Pro-ISM-IP67.

S8 Fluoride Kit: As S8 Field Kit, but with perfectION Fluoride instead of InLab Expert Pro-ISM-IP67.

Dimensions	222W x 70D x 35H mm ($8^{47}/_{64}$ x $2^{3}/_{4}$ x $1^{3}/_{8}$")
mV Accuracy	±0.1
mV Range	-2000.0 to 2000.0
mV Resolution	0.1/1
Outputs	Micro USB
pH Accuracy	±0.002
pH Range	–2.00 to 20.00
pH Resolution	0.001/0.01/0.1
Power supply	4 x 1.5V Alkaline Batteries or 1.3V Ni-MH Batteries
Temperature Accuracy	±0.2°C; ±0.5°C
Temperature Resolution	0.1°C
Temperature, Automatic Compensation	–5 to 130°C (23 to 266°F)
Temperature, Manual Compensation	30 to 130°C (86 to 266°F)
Weight	0.29 kg (0.63 lbs.)

Description	Cat. No.
Seven2Go™ S8 Pro Meter Only	**10218-844**
Seven2Go™ S8 Pro Standard Kit	**10218-846**
Seven2Go™ S8 Pro Field Kit	**10218-848**
Seven2Go™ S8 Pro Biotech Kit	**10218-850**
Seven2Go™ S8 Pro Fluoride Kit	**10218-852**

For additional products, visit **vwr.com**.

VWR® Electrodes

VWR COLLECTION

Description	Range	D x L	Internal Reference	Body Material	Connector	Junction	Temperature Range	Sensor Type	Cat. No.
pH Electrodes									
pH Electrode	0 to 14 pH	12 x 103 mm	Ag/AgCl	Epoxy Body	BNC	Porous Pin	0 to 80°C	Standard	**89231-572**
pH Electrode	0 to 14 pH	6.5 x 150 mm	Ag/AgCl	Glass Body	BNC	Porous Pin	0 to 80°C	Semi-Micro Diameter	**89231-574**
pH Electrode	0 to 14 pH	6.5 x 150 mm	Ag/AgCl	Epoxy Body	BNC	Porous Pin	0 to 80°C	Semi-Micro Diameter	**89231-576**
pH Electrode	0 to 14 pH	8 x 305 mm	Ag/AgCl	Epoxy Body	BNC	Porous Pin	0 to 80°C	Semi-Micro Diameter	**89231-578**
pH Electrode	0 to 14 pH	12 x 103 mm	Red Rod	Glass Body	BNC	Porous Pin	-10 to 100°C	Standard	**89231-580**
pH Electrode with Rugged Bulb	0 to 14 pH	12 x 103 mm	Red Rod	Glass Body	BNC	Porous Pin	-10 to 100°C	Thicker (Rugged) Bulb	**89231-582**
pH Electrode	0 to 14 pH	12 x 120 mm	Ag/AgCl	Epoxy Body	BNC	Wick	0 to 80°C	Flat Surface	**89231-584**
pH Electrode	0 to 14 pH	12 x 103 mm	Red Rod	Glass Body	BNC	Sleeve	-10 to 100°C	Standard	**89231-586**
pH Electrode	0 to 14 pH	12 x 120 mm	Ag/AgCl	Epoxy Body	BNC	High-Flow	0 to 80°C	Standard	**89231-588**
pH Electrode	0 to 14 pH	4.75 x 155 mm	DJ Ag/$AgCl_2$	Glass Body	BNC	Porous Pin	0 to 80°C	Micro Diameter	**89231-590**
pH Electrode	0 to 14 pH	6.5 x 155 mm	DJ Ag/$AgCl_2$	Glass Body	BNC	Porous Pin	0 to 80°C	Semi-Micro Diameter	**89231-592**
pH Electrode with Integrated Temperature Sensor	2 to 14 pH	12 x 120 mm	Ag/AgCl (sleeved)	Glass Body	BNC + Banana	Open	0 to 80°C	Standard	**89231-594**
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 120 mm	Ag/AgCl (cartridge w/ Ag^+ Barrier)	Glass Body	BNC + Banana	Porous Pin x 2	-10 to 100°C	Standard	**89231-596**
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 120 mm	Ag/AgCl (cartridge w/ Ag^+ Barrier)	Glass Body	BNC + Banana	Sleeve	0 to 60°C	Standard	**89231-598**
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 103 mm	Ag/AgCl	Epoxy Body	BNC + Banana	Porous Pin	0 to 80°C	Standard	**89231-600**

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Description	Range	D x L	Internal Reference	Body Material	Connector	Junction	Temperature Range	Sensor Type	Cat. No.
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 103 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC + Banana	Porous Pin	0 to 80°C	Standard	**89231-602**
pH Electrode	0 to 14 pH	12 x 103 mm	Ag/AgCl	Epoxy Body	BNC	Porous Pin	0 to 80°C	Standard	**89231-604**
pH Electrode	0 to 14 pH	12 x 103 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC	Porous Pin	0 to 80°C	Standard	**89231-606**
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 170 mm	Ag/AgCl	Polycarbonate Body	MP5[1]	Porous Pin	0 to 80°C	Standard	**89231-608**
pH Electrode with Integrated Temperature Sensor	2 to 14 pH	12 x 170 mm	Ag/AgCl (with Sleeve)	Glass Body	MP5[1]	Open	0 to 80°C	Standard	**89231-610**
pH Electrode with Integrated Temperature Sensor	0 to 14 pH	12 x 170 mm	Ag/AgCl (with Sleeve)	Glass Body	MP5[1]	Annular Porous Ring	0 to 100°C	Standard	**89231-612**
Conductivity Electrodes									
Conductivity Electrode with Integrated Temperature Sensor; 1.0 cm^{-1} Cell Constant; 2-pole Cell	up to 100 mS/cm	12 x 103 mm		Polypropylene and Epoxy Body	RJ45		-5 to 80°C	Platinum	**89231-614**
Conductivity Electrode with Integrated Temperature Sensor; 1.0 cm^{-1} Cell Constant; 2-pole Cell	10 µS to 200 mS	18 x 134 mm		Epoxy Body	RJ45		0 to 100°C	Graphite	**89231-616**
Conductivity Electrode with Integrated Temperature Sensor; 0.55 cm^{-1} Cell Constant; 3-pole Cell	up to 200 mS/cm	12 x 103 mm		Polypropylene and Epoxy Body	RJ45		-5 to 80°C	Platinum	**89231-618**
Conductivity Electrode with Integrated Temperature Sensor; 1.0 cm^{-1} Cell Constant; 3-pole Cell	0.2 to 200,000 µS/cm	12 x 170 mm		Polycarbonate Body	MP5[1]		-10 to 80° C	Platinum	**89231-620**
Conductivity Electrode with Integrated Temperature Sensor; 0.3 cm^{-1} Cell Constant; 2-pole Cell	5 to 50,000 µS/cm	12 x 170 mm		Titanium Body	MP5[1]		0 to 80°C	Titanium	**89231-622**
ISE Electrodes									
Refillable Ammonia ISE Electrode	0.06 to 17,000 mg/L NH_3	12 x 149 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC	Annular Porous Ring	0 to 50°C	Replaceable Gas-Sensing Membrane Module	**89231-628**
Refillable Sodium ISE Electrode	0.02 to 23,000 mg/L Na^+	12 x 103 mm	DJ Ag/$AgCl_2$	Glass Body	BNC	Porous Pin	0 to 50°C	Glass	**89231-630**
Chloride ISE Electrode	0.1 to 35,500 mg/L Cl^-	12 x 120 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC	Annular Porous Ring	5 to 50°C	Solid-State Crystalline	**89231-632**
Fluoride ISE Electrode	0.01 to 19,000 mg/L F^-	12 x 120 mm	Ag/AgCl	Epoxy Body	BNC	Annular Porous Ring	5 to 50°C	Solid-State Crystalline	**89231-634**
Nitrate ISE Electrode	0.1 to 14,000 mg/L NO_3^-	12 x 120 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC	Annular Porous Ring	0 to 50°C	Solid-State PVC Membrane	**89231-636**
Silver ISE Electrode	0.1 to 14,000 mg/L Ag^+	12 x 120 mm	DJ Ag/$AgCl_2$	Epoxy Body	BNC	Annular Porous Ring	0 to 50°C	Solid-State Crystalline	**89231-638**
DO Electrodes									
Refillable ABS Dissolved Oxygen Electrode with Integrated Thermistor	0.03 mg/L - saturation 0.3% to saturation	12 x 120 mm			BNC + Banana		0 to 50°C	Platinum Cathode, Silver Anode with Replaceable Membrane Module	**89231-624**
Polarographic Dissolved Oxygen Probe	0.03 mg/L - saturation 0.3% to saturation	12 x 120 mm			MP5[1]		0 to 50°C	Platinum Cathode, Silver Anode with Replaceable Membrane Module	**89231-626**
ORP/Redox Electrodes									
Refillable ORP/ REDOX Electrode	± 2000 mV	12 x 130 mm	Ag/AgCl	Glass Body	BNC	Porous Pin	0 to 80°C	Platinum	**89231-640**
ORP/REDOX Electrode	± 2000 mV	12 x 130 mm	Ag/AgCl	Glass Body	BNC	Porous Pin	0 to 80°C	Platinum	**89231-642**
ORP/REDOX Electrode	±2000 mV	12 x 170 mm	Ag/AgCl	Polycarbonate Body	MP5[1]	Porous Pin	0 to 80°C	Platinum	**89231-644**
Temperature Electrodes									
Temperature Electrode		7.5 x 103 mm		Glass Body	RJ9		-10 to 105°C	Glass	**89231-650**
Temperature Electrode		6 x 110 mm		Epoxy Body	RJ9		0 to 100°C	Steel	**89231-652**
Reference Electrodes									
Refillable Reference Electrode, Half Cell		7.5 x 103 mm	Red Rod	Glass Body	Banana	Porous Pin	-10 to 100°C		**89231-646**
Refillable Reference Electrode, Half Cell		12 x 103 mm	DJ Red Rod2	Glass Body	Banana	Porous Pin x2	-10 to 100°C		**89231-648**

For additional products, visit **vwr.com**.

InLab® Cool Combination pH Electrode, Sleeve Junction, METTLER TOLEDO®

Electrode uses FRISOCOLYT-B™ electrolyte for low temperature samples. Features firm ground joint sleeve junction and ARGENTHAL™ lead-off and silver ion trap for optimum silver ion-free accuracy at various sample temperatures. S7 screw head connects with different cables, so electrode may be used with a wide range of meters. Supplied with 25mL electrolyte vial.

Length	Internal Reference	Body Material	Fill Solution	Junction	pH Range	Temperature Range	Cat. No.
120 mm	ARGENTHAL™	Glass	FRISCOLYT-B™	Sleeve	1 to 11	–30 to 80°C	**97001-646**

For additional products, visit **vwr.com**.

IntelliCAL™ PHC201 Standard Gel Filled pH Electrode, 1 meter cable, Hach

IntelliCAL™ PHC201 is a digital, combination pH probe with a non-refillable, gel-filled double junction reference and built-in temperature sensor. It is available with a 1 or 3 meter cable and is intended for laboratory use. The PHC201 has a ceramic pin reference junction and is ideal for measuring pH in general water quality applications.

-IntelliCAL™ PHC201 provides fast, stable response in water quality applications.

-IntelliCAL™ digital probes provide ultimate traceability in measurement history.

-IntelliCAL™ digital probes alert the user when re-calibration is needed.

-IntelliCAL™ digital probes can be moved between meters without the need to re-calibrate or re-enter measurement settings.

Cable Length	1 m
Dimensions	0.47″ D x 7.87″ L (12 x 200 mm)
Junction Type	Ceramic pin
Probe type	Laboratory
Range	0 - 14 pH
Reference Type	Ag/AgCl
Sensor Body Material	Epoxy
Sensor type	Glass
Special Feature	General purpose. Clean water samples
Temperature Range	Continuous use: 0 to 80 °C
Thermistor	(ATC)

Description	Cat. No.
IntelliCAL™ PHC201 Standard Gel Filled pH Electrode	**89347-984**

For additional products, visit **vwr.com**.

Conductivity Standard Solution, 1000 µmhos/cm

Suitable as a calibration standard.

Size	Packaging	Cat. No.
500 mL	Poly Bottle	**BDH7921-2**
1 L	Poly Bottle	**BDH7921-1**

For additional products, visit **vwr.com**.

Potassium Chloride, Solution 0.01M, Conductivity Standard 1413 µmhos/cm

Conductivity standard: 1413µS/m

Appearance/color ..... Clear liquid
N.I.S.T. Traceable ..... Yes
Shelf-life ..... 1 year
Conductivity (25°C) ..... 1409 - 1417 µS/cm

Size	Packaging	Cat. No.
1 L	Poly Bottle	**BDH7349-1**

For additional products, visit **vwr.com**.

VWR® sympHony® Conductivity Standard (22.0 ppm as NaCl)

- Sodium Chloride standard solution
- For calibration and accuracy checks in conductivity measurements
- 500 mL bottle

Volume	Conductivity	Cat. No.
500 mL	100.0 µS/cm	**89236-540**
500 mL	146.9 µS/cm	**89236-542**
500 mL	1412 µS/cm	**89236-544**
500 mL	12890 µS/cm	**89236-546**

For additional products, visit **vwr.com**.

VWR® Traceable® Conductivity Calibration Standards (CRM)

- Traceable
- Available in Single-Use (100 mL) or 473 mL (16oz.) Sizes

These Certified Reference Materials (CRM) calibrate conductivity meters and probes for maximum accuracy. They are compatible with all makes of equipment, and can be used in lab or field. Accuracy at 25°C is ±0.25µmhos for 1, 5, and 10µmhos solutions, and 0.25% for all other solutions; or the uncertainty shown on the certificate, whichever is greater. Each container is labeled for calibrating conductivity in micromhos (microsiemens), resistivity in megohms, and dissolved solids in ppm. Available in 100mL (3.4oz.) single-use polyethylene bottles or 473mL (16oz.) bottles.

Single-use standards make it easy to calibrate with no external contamination. An extra large opening of 4.4cm (1 3/4") diameter and depth of 8.9cm (3 1/2") allow probe calibration to take place in the standard's polyethylene container. Ideal for lab/field conditions.

All solutions include a serial numbered Traceable certificate to indicate traceability to standards provided by the National Institute of Standards and Technology (NIST). Double A2LA accreditation accredited certification provides the highest achievable level of quality assurance, documentation, and accuracy. CRMs are produced by A2LA accredited ISO Guide 34 certified reference material producer and by an A2LA accredited ISO 17025 calibration laboratory. Additional accreditations include ISO 31 (certificate content), and ISO 35 (statistical analysis), plus ISO 9001 DNV (certified quality manufacturer).

Meet test requirements for Federal, State, and local agencies, CAP, CLSI, ACS, CLIA and complies with AOAC 973.40, EPA 120.1, Standard Method 2510 (APHA, AWWA, WEF), ISO 7888, DIN 38404, ASTM D1125, USGS I-1780, USP 645, OIML R56, IUPAC, and for A2LA/NVLAP accreditations/ISO 9000 certifications.

Ordering Information: Assortment **61161-356** includes one bottle each of the single-use standards, except the 5µmhos solution (**12777-832**). All containers supplied with individual temperature compensation chart, calibration instructions, traceability information and Traceable® certificate.

Bottle Size	Conductivity	Dissolved Solids	Resistivity	Cat. No.
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	10 µmhos (µS)	6.6 ppm	0.1 megohms	**23226-650**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	100 µmhos (µS)	66 ppm	0.01 megohms	**23226-651**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	1000 µmhos (µS)	666 ppm	0.001 megohms	**23226-652**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	10000 µmhos (µS)	6666 ppm	0.0001 megohms	**23226-653**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	100000 µmhos (µS)	66666 ppm	0.00001 megohms	**23226-654**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	200,000 µmhos (µS)	133333 ppm	0.000005 megohms	**89140-192**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	1413 µmhos (µS)	933 ppm	0.00071 megohms	**62344-938**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	150,000 µmhos (µS)	100000 ppm	0.000006 megohms	**89140-190**
Single-Use, 100 mL (3.4 oz.) Polyethylene Bottles (NIST/ISO 17025 Certificate)	5 µmhos (µS)	3.3 ppm	0.2 megohms	**12777-832**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	5 µmhos (µS)	3.3 ppm	0.2 megohms	**12777-828**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	10 µmhos (µS)	6.6 ppm	0.1 megohms	**23226-567**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	100 µmhos (µS)	66 ppm	0.01 megohms	**23226-589**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	1000 µmhos (µS)	666 ppm	0.001 megohms	**23226-603**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	10000 µmhos (µS)	6666 ppm	0.0001 megohms	**23226-625**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	100000 µmhos (µS)	66666 ppm	0.00001 megohms	**23226-647**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	1 µmhos (µS)	0.66 ppm	1 megohms	**36934-134**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	1 µmhos (µS)	0.66 ppm	1 megohms	**36934-136**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	10 µmhos (µS)	6.6 ppm	0.1 megohms	**46610-030**

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Bottle Size	Conductivity	Dissolved Solids	Resistivity	Cat. No.
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	100 µmhos (µS)	66 ppm	0.01 megohms	**46610-032**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	1000 µmhos (µS)	666 ppm	0.001 megohms	**46610-034**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	10000 µmhos (µS)	6666 ppm	0.0001 megohms	**46610-036**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	100000 µmhos (µS)	66666 ppm	0.00001 megohms	**46610-038**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	5 µmhos (µS)	3.3 ppm	0.2 megohms	**46610-040**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	1413 µmhos (µS)	933 ppm	0.00071 megohms	**46610-042**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	150000 µmhos (µS)	100000 ppm	0.000006 megohms	**89030-246**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	200000 µmhos (µS)	133333 ppm	0.000005 megohms	**89030-248**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	150000 µmhos (µS)	100000 ppm	0.000006 megohms	**89030-260**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate and Individually Tested)	200000 µmhos (µS)	133333 ppm	0.000005 megohms	**89030-262**
473 mL (16 oz.) Bottles (NIST/ISO 34, ISO 17025/A2LA Certificate)	1413 µmhos (µS)	933 ppm	0.00071 megohms	**62344-936**
Assortment	—	—	—	**61161-356**

For additional products, visit **vwr.com**.

BDH® pH Reference Standard Buffers

Buffers are available as either colorless or colored solutions. They are all calibrated in an ISO 17025 certified laboratory, and compared against and certified traceable to NIST Standard Reference Materials. Store at room temperature.

Ordering Information: Buffer set BDH5100-PK comes with two 500mL bottles each of the pH 4.00 red buffer, pH 7.00 yellow buffer, and pH 10.00 blue buffer.

Size	pH Value	Color	pH Accuracy	Packed	Traceable to N.I.S.T. Standard Reference Material (SRM) Number	Cat. No.
500 mL (16.9 oz.)	4.00	Red	±0.01	Poly Bottle	185, 186	**BDH5018-500ML**
500 mL (16.9 oz.)	7.00	Yellow	±0.01	Poly Bottle	186, 191, 192	**BDH5046-500ML**
500 mL (16.9 oz.)	10.00	Blue	±0.01	Poly Bottle	186, 191, 192	**BDH5072-500ML**
500 mL (16.9 oz.)	Buffer Set	Assorted	±0.01	Poly Bottle		**BDH5100-PK**

For additional products, visit **vwr.com**.

BDH® pH Test Strips

Used for rapid pH testing directly at the point of interest, strips are always ready for immediate use. They are also suitable for careful testing of dangerous, poisonous, or aggressive liquids as the long handle prevents fingers from coming into contact with the sample. The dye is chemically bound to the test strip and cannot bleed into the sample, protecting against contamination and enabling measurement in weakly buffered or strongly alkaline solutions. Included color chart has 4 different color blocks for each pH value, enabling highly precise pH determination. Strips are available in 13 different pH ranges with accuracy down to 0.2 pH units. Dimensions: 85Lx6Wmm.

Ordering Information: Strips are packaged 100 to a box.

pH Graduation	pH Range	Cat. No.
Universal Range		
1.0	0–14.0	**BDH35309.606**
Intermediate Ranges		
0.3/0.5	6.0–10.0	**BDH83931.601**
0.5	0–6.0	**BDH35310.601**
0.5	2.0–9.0	**BDH83930.601**
0.5	4.5–10.0	**BDH35311.604**
0.5	7.0–14.0	**BDH35312.607**
Narrow Ranges		
0.2/0.4	7.5–9.5	**BDH35318.607**
0.2/0.4	7.9–9.8	**BDH83933.601**
0.3	1.7–3.8	**BDH35315.607**
0.3	5.1–7.2	**BDH83932.601**
0.3/0.4	0.3–2.3	**BDH35314.604**
0.3/0.5	3.6–6.1	**BDH35316.601**
0.3/0.4	6.0–7.7	**BDH35317.604**

For additional products, visit **vwr.com**.

BDH® pH Indicator Paper DoubleZone

These indicator papers show two different colors for each pH value at intervals of 0.3–1 pH unit, increasing the accuracy of readings and allowing good estimation of intermediate values. Paper comes on a plastic reel that will protect from many environmental influences, ensuring that the paper is always ready to use. Width: 10mm. Length: 5m.

pH Graduation	pH Range	Cat. No.
1.0	1.0–12.0	**BDH35300.606**
0.3	1.0–4.3	**BDH35301.600**
0.3	3.5–6.8	**BDH35302.603**
0.3	5.0–8.0	**BDH35303.606**
0.3	7.0–10.0	**BDH70035.607**
0.5	9.5–14.0	**BDH70036.601**

For additional products, visit **vwr.com**.

Certipur® pH Buffer Solutions, EMD Millipore

Traceable to SRM from NIST and PTB.

Description	Size	pH Value	Color	Packed	pH Buffer Type	Reference Temperature	Cat. No.
Boric Acid/Potassium Chloride/Sodium Hydroxide	4 L	10.00	Yellow	Plastic Bottle	Borate	20 °C	**EM1.09400.4000**
Citric Acid/Sodium Hydroxide/Hydrogen Chloride	4 L	4.01	Red	Plastic Bottle	Citrate	20 °C	**EM1.09475.4000**
Di-Sodium Hydrogen Phosphate/Potassium Di-Hydrogen Phosphate	4 L	7.00	Green	Plastic Bottle	Phosphate	20 °C	**EM1.09477.4000**

For additional products, visit **vwr.com**.

mColorpHast™ pH Test Strips, EMD Millipore

These strips provide a convenient method for accurate colorimetric pH indication. The strips feature covalently bound indicator dyes so that they will not bleed even in strong alkaline solutions. Strips can be immersed in samples for extended periods, so that even weakly buffered solutions can be accurately tested without contaminating the sample. The universal strip tests the full 0–14 pH range with a sensitivity of 1 pH unit. Intermediate range indicators provide a sensitivity of 0.3–0.5 pH units and narrow range strips provide a sensitivity of 0.2–0.3 pH units.

EMD # 1.09531.0001 replaces and is identical to EMD # 9586-1.

EMD # 1.09532.0001 replaces and is identical to EMD # 9587-1.

EMD # 1.09533.0001 replaces and is identical to EMD # 9588-1.

EMD # 1.09535.0001 replaces and is identical to EMD # 9590-1.

EMD # 1.09540.0001 replaces and is identical to EMD # 9580-1.

EMD # 1.09541.0001 replaces and is identical to EMD # 9581-1.

EMD # 1.09542.0001 replaces and is identical to EMD # 9582-1.

EMD # 1.09543.0001 replaces and is identical to EMD # 9583-1.

EMD # 1.09545.0001 replaces and is identical to EMD # 9585-1.

EMD # 1.09584.0001 replaces and is identical to EMD # 9578-1.

Description	pH Range	Resolution	No. of Strips	Cat. No.
All-Universal Range	0 - 14	1.0	100	**EM1.09535.0001**
Intermediate Range	0 - 6	0.5	100	**EM1.09531.0001**
Intermediate Range	2.0 - 9.0	0.5	100	**EM1.09584.0001**
Intermediate Range	5.0 - 10.0	0.5	100	**EM1.09533.0001**
Intermediate Range	7.5 - 14	0.5	100	**EM1.09532.0001**
Narrow Range	0 - 2.5	0.3	100	**EM1.09540.0001**
Narrow Range	2.5 - 4.5	0.3	100	**EM1.09541.0001**
Narrow Range	4.0 - 7.0	0.3	100	**EM1.09542.0001**
Narrow Range	6.5 - 10.0	0.3	100	**EM1.09543.0001**
Narrow Range	11.0 - 13.0	0.3	100	**EM1.09545.0001**

For additional products, visit **vwr.com**.

Conductivity Standards, NIST, RICCA

Calibration standards are individually calibrated and certified directly traceable to National Institute of Standards and Technology Electrolytic Conductivity Standard Reference Materials. Each plastic container is labeled with the certified conductivity value, TDS concentration expressed as ppm sodium chloride (NaCl), and TDS expressed as equivalent "Fresh Water Ion" concentrations when appropriate.

Contact your VWR representative for custom-prepared conductivity standards.

Size	Conductivity	TDS	Cat. No.
473 mL (16 oz.)	10 µmhos/cm	4.7 ppm NaCl	**RC2236-16**
3.8 L (1 gal.)	10 µmhos/cm	4.7 ppm NaCl	**RC22361**

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Size	Conductivity	TDS	Cat. No.
946 mL (32 oz.)	10 µmhos/cm	4.7 ppm NaCl	**RC2236-32**
3.8 L (1 gal.)	4,000 µmhos/cm	3115 ppm NaCl	**RC2236651**
473 mL (16 oz.)	100 µmhos/cm	47.2 ppm NaCl	**RC223716**
3.8 L (1 gal.)	100 µmhos/cm	47.2 ppm NaCl	**RC22371**
946 mL (32 oz.)	100 µmhos/cm	47.2 ppm NaCl	**RC223732**
473 mL (16 oz.)	200 µmhos/cm	95 ppm NaCl	**RC223816**
3.8 L (1 gal.)	200 µmhos/cm	95 ppm NaCl	**RC22381**
946 mL (32 oz.)	200 µmhos/cm	95 ppm NaCl	**RC223832**
473 mL (16 oz.)	500 µmhos/cm	240 ppm NaCl	**RC224116**
3.8 L (1 gal.)	500 µmhos/cm	240 ppm NaCl	**RC22411**
946 mL (32 oz.)	500 µmhos/cm	240 ppm NaCl	**RC224132**
473 mL (16 oz.)	1000 µmhos/cm	495 ppm NaCl	**RC224316**
3.8 L (1 gal.)	1000 µmhos/cm	495 ppm NaCl	**RC22431**
946 mL (32 oz.)	1000 µmhos/cm	495 ppm NaCl	**RC224332**
473 mL (16 oz.)	5000 µmhos/cm	2620 ppm NaCl	**RC224516**
3.8 L (1 gal.)	5000 µmhos/cm	2620 ppm NaCl	**RC22451**
946 mL (32 oz.)	5000 µmhos/cm	2620 ppm NaCl	**RC224532**
473 mL (16 oz.)	10,000 µmhos/cm	5400 ppm NaCl	**RC224616**
3.8 L (1 gal.)	10,000 µmhos/cm	5400 ppm NaCl	**RC22461**
946 mL (32 oz.)	10,000 µmhos/cm	5400 ppm NaCl	**RC2246-32**

For additional products, visit **vwr.com**.

Precision pH Buffers, RICCA

This precision line of pH Buffers offers tolerances of ±0.005 pH unit or better. Specially selected containers and proprietary manufacturing processes help create some of the most accurate buffers on the market.

Compared against and certified traceable to NIST Standard Reference Materials.

Size	pH Value	Color	pH Accuracy	Packed	Reference Temperature	Cat. No.
500 mL	4.00	Red	±0.002	Poly Bottle	25 °C	**RC1502-16**
500 mL	7.000	Yellow	±0.002	Poly Bottle	25 °C	**RC1552-16**
500 mL	10.00	Blue	±0.005	Poly Bottle	25 °C	**RC160216**

For additional products, visit **vwr.com**.

Traceable® ISO Guide 34 Color-Coded pH Buffers (CRM), Control Company

100% compatible with all makes and instruments and electrodes

Accuracy at 25°C is ±0.010 pH

Meets all test requirements for Federal, State, and local agencies

Triple-layered proprietary packaging

Traceable pH Standards, Certified Reference Materials, are 100% compatible with all instruments and probes. Accuracy for the Traceable® Buffer at 25°C is ±0.010 pH—the most precise available.

Certified Reference Materials meet Federal/State/local agencies' strictest mandates and deliver exact calibration results for any pH meter.

Select values manufactured to IUPAC (International Union of Pure and Applied Chemistry) formulation—features long term buffer stability and buffer resistance to temperature changes during pH meter calibration.

Packaged in a triple later aluminum foil, PET and LDPE bag, which prevents contamination by permeable gases. Provides a two-year shelf life. Assorted color option includes red, yellow and blue.

Traceable to NIST for accuracy, ISO Guide 34 Certified Reference Material (CRM).

Ordering Information: Supplied with an individual temperature compensation chart, traceability information, Traceable® Certificate.

Size	pH Value	Color	Packed	Cat. No.
16 oz.	10.012	Blue	Bottle	**10769-110**
16 oz.	4.005	Red	Bottle	**10769-166**
16 oz.	7.000	Yellow	Bottle	**10769-112**
6 x 100 mL	10.012	Blue	One-Shot™ Bottle	**10769-168**
6 x 100 mL	4.005	Red	One-Shot™ Bottle	**10769-172**
6 x 100 mL	7.000	Yellow	One-Shot™ Bottle	**10769-174**
6 x 100 mL	4.005-10.012	Assorted	One-Shot™ Bottle	**10769-170**

For additional products, visit **vwr.com**.

Notes

Notes

Terms and Conditions

1. Acceptance – ALL SALES ARE SUBJECT TO AND EXPRESSLY CONDITIONED UPON THE TERMS AND CONDITIONS CONTAINED HEREIN, AND UPON CUSTOMER'S ASSENT THERETO. THE TERMS AND CONDITIONS CONTAINED HEREIN WILL BE CONTROLLING, AND ANY ADDITIONAL AND/OR INCONSISTENT TERMS AND CONDITIONS SET FORTH IN ANY ACKNOWLEDGMENT, PURCHASE ORDER, OR ACCEPTANCE DOCUMENTS REQUESTED FROM AND/OR PROVIDED BY CUSTOMER ARE EXPRESSLY REJECTED. NO VARIATION OF THESE TERMS AND CONDITIONS WILL BE BINDING UPON VWR UNLESS AGREED TO IN WRITING AND SIGNED BY AN OFFICER OR OTHER AUTHORIZED REPRESENTATIVE OF VWR.

2. Specifications – Product specifications are subject to change without prior notice.

3. Delivery – Delivery of all orders will be FCA (INCOTERMS 2000). Shipping and handling fees, special packaging materials (e.g., blue ice), carrier surcharges (including fuel surcharges) and hazardous material fees imposed by government regulation will be added separately to the invoice.

4. Damaged Shipments – Please inspect your VWR shipment upon receipt. If any external damage is noticed, accept the shipment only after the driver has noted the damage on both his and your copies of the delivery receipt and you have requested an inspection by the carrier. Keep all containers and packing material for inspection. If, upon opening a shipment, you find a shortage or damage, you must request inspection by the carrier within 15 days of delivery or you will relinquish your right to make a claim. VWR International reserves the right to repair a damaged product, where applicable, before replacement or credit is determined.

5. Payment Terms - Individual invoices, net thirty (30) days from date of invoice; summary invoices, if any, will be due as agreed. Payments are to be made in freely available United States dollars, including applicable taxes, and other charges such as government imposed surcharges which VWR may be required to pay or collect with respect to the sale or transportation of the Products, or the provision of Services. Payment is considered late when it is received into VWR's lockbox after the due date, which may result in an additional service charges as described further in this section. Any payments received no later than 2.00 PM Eastern Standard Time at VWR's lockbox will be credited to Customer's account as of the date received, while payments received after 2.00 PM Eastern Standard Time will be credited to Customer's account the following business day. Delinquent accounts will be subject to a service charge on past due amounts of one and one-half percent (1 1/2%) per month (or, if less, the maximum amount permitted by law). VWR recommends payments be made by ACH method to ensure timely receipt by VWR. Payment by credit card may only be used as a prepayment method when placing orders or for past due collections. When a credit card is used to pay monies to satisfy a past due account, Customer will be charged an additional processing fee of 2.5% on the amount charged to the credit card at time of processing. Customer will provide VWR, concurrent with each payment, with remittance information in sufficient detail (to the invoice level or line level as the case may be) to allow VWR to properly apply payments or credit memos to outstanding receivable(s) on VWR's accounts receivable sub-ledger for Customer. Customer shall also include its account number with any remittance. Failure to supply VWR with such remittance detail will result in additional processing delays and may affect the credit status of pending or future Customer purchase orders. When Customer wishes to apply one or more credit memos towards a payment amount owed VWR, Customer agrees to provide VWR, on a timely basis, the specific credit memo number(s) and amount(s) to be applied, in addition to the remittance information requirements above. If Customer does not provide such information on a timely basis, VWR shall apply any such credit memos to outstanding receivables, beginning with the most-aged receivables first. Customer agrees to complete, sign and submit a standard VWR credit application to VWR's Risk Management Department located at 1230 Kennestone Circle, Marietta, Georgia 30066. Customer will provide, or make available to VWR upon request, its latest audited financial statements (or unaudited financial statements, if audits are not performed). VWR agrees to keep such information confidential and to use it exclusively to evaluate and apply a credit score or rating to Customer for extension of credit purposes or pending transactions. Furthermore, Customer agrees to inform VWR of any material adverse change in its business that would reasonably be expected (by an independent 3rd party) to negatively impact its outstanding or future payment obligations and the terms or conditions contained herein. A change shall include, but not be limited to, any change in Customer's credit rating as determined by any single major rating agency, including Standard & Poor's, Moody's, Fitch or Dominion Bond Rating Service.

6. Sales Tax – Sales taxes where applicable (local, state or federal) will be added to the invoice price.

7. Product Return Policy

(a) All returns must be authorized by VWR in order to insure proper credit. NOTE: All returns are subject to 15% restocking charge. Where credits will be issued to the Customer for authorized returns under $100, the Customer is not required to return the Product to VWR except for Product(s) delivered but not ordered (picking errors). To ensure proper credit, each Product return must include the following information:

- Customer Name and Address
- Purchase Order Number
- VWR Shipping Order Number
- Date of Invoice
- Catalog Number of Returned Item(s)
- VWR Return Authorization Number
- Reason for Return

(b) Products not authorized for return include:

- Products not in completely resaleable condition (including Products with damaged, missing or defaced labeling or packaging)
- Chemicals, reagents, diagnostics, sterile or any controlled products (unless products do not meet specification)
- Laboratory apparatus or instruments that have been used or are without the original packaging, labeling
- and operating manuals.
- Refrigerated products or other perishables
- Products purchased on a Special Order Basis
- Products not purchased from VWR
- Products with an expired shelf life or an expiration date too short for resale
- Discontinued products

(c) Each return shipment of hazardous materials must be packed and labeled in accordance with DOT regulations applying to transportation of hazardous materials. Shipping documents must also meet DOT regulations. When necessary, Customer shall include with each return shipment of equipment, a certification from an authorized representative of the company that the equipment was properly decontaminated in accordance with current regulations and other recommended guidelines. The product should be shipped to the indicated service center and the transportation charges prepaid. To ensure prompt handling, the return authorization number should be placed on the outside of the package.

8. Product and Service Warranties and Limitation of Liability

(a) VWR warrants to the original Customer only that:

i. VWR VistaVision™ microscopes are guaranteed to be free of defects in material or workmanship for three (3 years from delivery, with the exception of the electrical system, which is guaranteed to be free of defects in material or workmanship for one (1) year from delivery; VWR® sympHony® meters are guaranteed to be free of defects in material or workmanship for three (3) years from delivery; and all VWR Private Label equipment is guaranteed to be free of defects in material or workmanship for two (2) years from delivery;

ii. all VWR Private Label laboratory casework will, under normal use, be free from defects in material or workmanship for one (1) year and corrosion for three (3) years from installation date and, if VWR installs the laboratory casework, the installation labor will be guaranteed for one (1) year;

iii. All software programs are warranted in accordance with the software vendor's license agreement; iv. all other Products, branded and private label, will meet the manufacturer's specifications for a term equal to the warranty period stated in the Product manufacturer's literature or sixty (60) days, whichever is longer; and v. Services provided, if any, will be of the kind and quality designated and will be performed by qualified personnel.

vi. VWR makes no claims or warranties concerning sustainable/green products. Any claims concerning sustainable/green products, including but not limited to, any of the following: green, recycled, recyclable, reusable, refillable, renewable, biodegradable, degradable, photodegradable, compostable, carbon footprint, renewable sources, source reduced, ozone safe, ozone friendly, environmentally friendly, no CFC's, CRC-Free, are the sole claims of the manufacturer and not those of VWR.

(b) VWR HEREBY DISCLAIMS ALL OTHER WARRANTIES OR GUARANTEES WITH RESPECT TO THE SUBJECT MATTER OF THIS AGREEMENT, WHETHER STATUTORY, WRITTEN, ORAL, EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(c) The liability of VWR under this limited warranty does not extend to any Products which are abused, altered or misused by the Customer or any other persons or entities or which become defective or non-conforming through the actions or inaction of the Customer or any other persons or entities. A defective or non-conforming Product is defined only as a Product which is outside of the manufacturer's defined Product specifications, and shall not include Products that fail to meet any fitness of use by Customer or any unique Customer operating conditions or applications.

(d) If any Product or Service warranted hereunder proves defective or non-conforming, VWR's sole liability and Customer's sole remedy hereunder shall be for VWR, to repair or, at VWR's option, (i) replace (or reperform the Service), at no cost to Customer, any such defective or non-conforming Product with a non-defective or conforming Product (as applicable) or (ii) credit Customer's account for all amounts paid with respect to the defective or non-conforming Product or Service upon VWR's receipt of the defective or non-conforming Product. In the event of replacement, the replacement Product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

(e) If a Product should require service, contact the VWR office nearest your location for instruction (for a complete list of offices, see your VWR catalog). When the return of the Product is necessary, a return authorization number will be assigned and the Product shipped, transportation charges prepaid, to the indicated service center. To insure prompt handling, the return authorization number should be placed on the outside of the package and a detailed explanation of the defect enclosed with the Product.

(f) IN NO EVENT SHALL VWR HAVE ANY OBLIGATION OR LIABILITY FOR ANY EXEMPLARY, PUNITIVE, INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS, USE OR GOODWILL), WHETHER BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR ANY OTHER THEORY OR FORM OF ACTION, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY THEREOF. THE TOTAL LIABILITY OF VWR (INCLUDING ITS SUBCONTRACTORS AND AGENTS), IF ANY, FOR DAMAGES RELATING TO ANY PRODUCTS SOLD UNDER THIS AGREEMENT SHALL BE LIMITED TO THE PRICE PAID FOR SUCH PRODUCT(S) AND THE TOTAL LIABILITY OF VWR (INCLUDING ITS SUBCONTRACTORS AND AGENTS), IF ANY, FOR DAMAGES RELATING TO ANY SERVICES PROVIDED UNDER THIS AGREEMENT SHALL BE LIMITED TO THE FEES PAID FOR THE SERVICE GIVING RISE TO SUCH CLAIM.

9. Export Controls – Products purchased or received under this Agreement are subject to export control laws, restrictions, regulations and orders of the United States. Customer agrees to comply with all applicable export laws, restrictions and regulations of the United States or foreign agencies or authorities, and shall not export, or transfer for the purpose of re-export, any Product to any prohibited or embargoed country or to any denied, blocked, or designated person or entity as mentioned in any such United States or foreign law or regulation. Customer represents and warrants that it is not on the Denied Persons, Specially Designated Nationals or Debarred Persons List and is not otherwise prohibited by law from purchasing the Products or services hereunder. Customer shall be responsible to obtain any license to export, re-export or import as may be required.

10. Proprietary Information – Each party (a "Recipient") shall maintain in confidence, not disclose to any third party, and not use, except for the specific purpose of performing under this Agreement, all proprietary information furnished to it by the other party (a "Discloser") or any Discloser Affiliate in connection with this Agreement, or derived from the Discloser or any Discloser Affiliate in performance of this Agreement, and shall return to the Discloser or a Discloser Affiliate, upon request, all copies (then in Recipient's possession) of documents and other tangible media furnished by or derived from Discloser or such Discloser Affiliate, respectively, in connection with the performance of this Agreement. The Recipient shall inform its employees, agents, and representatives of these obligations and shall require them to assume equivalent obligations.

11. Miscellaneous

(a) Termination - This Agreement may be terminated by either party for convenience at any time upon reasonable written notice delivered to the other party. In the event of any termination or expiration of this Agreement, Customer shall be billed immediately for Products shipped through the effective date of such termination or expiration and all custom Products purchased for Customer in VWR's inventories at such date, and Customer shall pay the invoiced amount immediately upon receipt of such invoice.

(b) Force Majeure - In the event either party is prevented in whole or in material part from performing its obligations under this Agreement solely as a result of force majeure, upon the prompt giving of notice to the other party detailing such force majeure event and its anticipated duration, the obligations of the party so prevented shall be excused during such period of delay, and such party shall take whatever reasonable steps are necessary to relieve the effect of such cause as rapidly as possible.

(c) Merger, Modification, Waiver - No amendment, modification or waiver of these terms shall be binding on either party unless reduced to writing and signed by an authorized officer of the party to be bound, and in the case of a waiver, shall be effective only in the specific instance and for the specific purpose for which given, and shall not be construed as a waiver of any subsequent breach. The failure of either party to enforce at any time or for any period of time any of the provisions of this Agreement shall not be construed as a waiver of such provisions or of the right of such party thereafter to enforce each and every such provision. No course of dealing, usage of trade or course of performance shall supplement, explain or amend any term, condition or instruction of this Agreement, or any shipment of Products hereunder.

(d) Applicable Law - This Agreement is made pursuant to, and shall be construed and enforced exclusively in accordance with, the internal laws of the Commonwealth of Pennsylvania (and United States federal law, to the extent applicable), without giving effect to otherwise applicable principles of conflicts of law.

(e) Authority to Enter Into Agreement – Each party represents and warrants that it is authorized to enter into this Agreement and that in so doing it is not in violation of the terms or conditions of any contract or other agreement to which it may be a party.

f) Assignment - This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and permitted assigns and designees; provided, however, neither party shall have the right to transfer, assign or delegate its rights or obligations under this Agreement or any portion thereof without the prior written consent of the other party (except that either party may assign this Agreement to a parent, subsidiary or successor corporation without such consent).

(g) Nature of Relationship - Neither party, its employees or permitted subcontractors or agents shall, under any circumstances, be considered to be an agent, partner, joint venturer or representative of the other party.

Trademarks

VWR, forms of VWR, and the VWR logo and/or design are either registered trademarks ®, trademarks ™, or service marks SM of VWR International, LLC. in the United States and/or other countries. All other marks referenced herein are registered trademarks, trademarks, or service marks of their respective owner(s). For a complete list of trademark owners, please visit www.vwr.com.

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VWR® CATALYST
We Enable Science Through Services

EQUIPMENT MANAGEMENT
Powered by VEM Technology

A Web-based Asset Management System from VWR

VWRCATALYST offers a wide range of laboratory support services designed to save our customers time and help to improve total operating costs. These services range from centralised laboratory services to research technician activities. They all share a central theme in allowing you to recover valuable research time and increase your lab's productivity.

We can provide support exactly where you need it most - and this includes solutions to optimise equipment in your laboratory.

The Equipment Management Process

In many organisations, equipment becomes a critical asset to any researcher's work. Equipment Management means managing and monitoring equipment across the entire organisation. An Equipment Management system is part of a quality system and as a result is a crucial factor for customers to meet their compliance requirements.

VWRCATALYST has developed new software to help with this challenge; **VEM - Equipment Management System**

VEM keeps track of all equipment, but goes beyond by managing maintenance with numerous service partners. It handles work orders, spare parts as well as related documentation, warranties and service contracts.

The VWR Equipment Management solution effectively manages maintenance, calibrations, repairs, equipment inventory and numerous other regular activities. It will help to maintain equipment accountability for all assets.

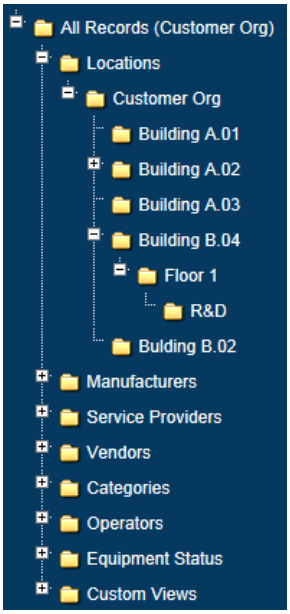
VEM is built around a centralized equipment repository which not only stores the inventory of assets but also spare part lists, consumable lists, documentation, images, SOP's, status of an asset, etc. It tracks equipment by serial number or other ID's and manages warranties, service provider and vendor information as well as service requests and work orders.

VEM constantly records service data and gives procurement managers better information to prepare for the next equipment purchase (down time, repair cost, total cost of ownership).

With a powerful built-in reporting tool, VEM keeps track of all equipment movement. Allows status tracking, documents service activities and allows vendor and service provider metrics.

Managers have **real time visibility** of equipment status and access to equipment related metrics including **total cost of ownership.**

The system features an activity-based notification and messaging system which informs users, managers and administrators about pending tasks such as due dates, pending approvals and other activities.

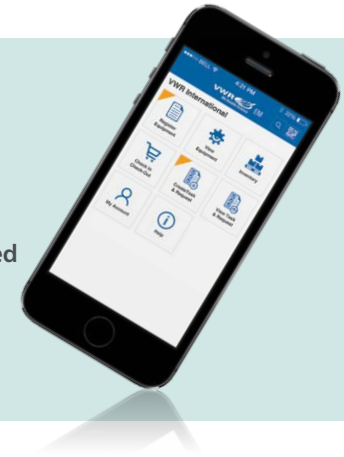


Hierarchical arrangement of equipment.

Widget-based user-interface.

Cloud-based Services

VEM delivers to the desktop. It is built using the latest and most powerful internet technologies to better support your requirements. VEM offers a modern **widget-based user-interface** that gives users access to all major functionality immediately.



Mobile Support

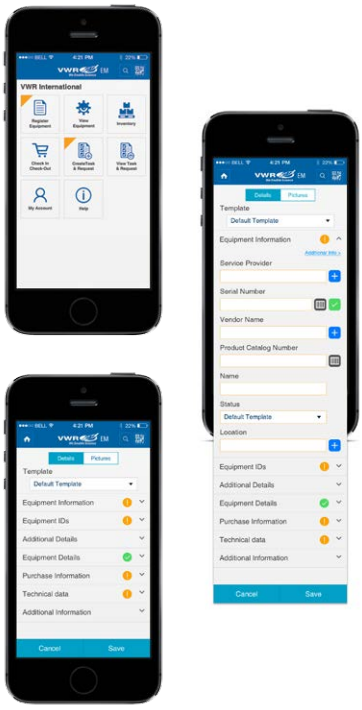
Extending VWR Equipment Management to mobile devices makes using the system even easier.

Registering new equipment (includes taking photos), inventory assessment, barcode scanning and creating service request directly at the equipment in the laboratory, are just a few of the many features.

Customizable to Your Needs...

A huge set of customisable features combined with numerous user-privileges will give you the right tools to address your needs.

You will benefit from one single cost effective solution to support your daily requirements, therefore minimizing training requirements.



Providing Personalized Support Based on Your Needs

At VWR, we believe that our key differentiator is our people who provide extensive process insight. Our team will work with you to get the Equipment Management process tailored to your needs. Our personalised approach allows us to provide support exactly where our customers need it the most... by providing onsite equipment management with a team of **VWR**CATALYST personnel.

Let us help you achieve your business goals through the experience we have built up through many years of complex system and process implementations. We can help you to implement and operate in the right way.

If you are interested, please contact your account manager or email **vwrcatalyst@vwr.com**. They will arrange an initial needs analysis for you.

We Enable Science Through Services

From research to production, **VWR**CATALYST can help you re-focus scientific time on initiatives that directly support the strategic mission of your company.

We Enable Science by:

- Powering productivity
- Improving quality, safety, and regulatory compliance
- Reducing total operating costs

Our services include:

- Procurement and Supply Management
- Laboratory and Production Support
- Scientific Support
- Equipment and Instrument Services
- Lean Six Sigma Process Consulting

VWR® CATALYST
We Enable Science Through Services

Warranty Services

VWRCATALYST offers a wide range of laboratory equipment and instruments with full manufacturer warranty.

If you purchased your equipment from VWR, we will facilitate your warranty.

VWR offers extended warranties on many of our products. Please contact your VWR Sales Representative for information.

To get started, call **1.800.268.4355** or e-mail **warranty@vwr.com**.

vwr.com
1.800.932.5000

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