iris

HI801 iris **Spectrophotometer**

HANNA® instruments

HANNA instruments HI801 iris Spectrophotometer

HI801 Spectrophotometer

with advanced split beam optical system, customizable methods and rechargeable battery

iris portable spectrophotometer is unlike any of the products we have created in the past. It is different from our photometers as it allows for measurement in the spectrum of all wavelengths of visible light and not just pre-specified wavelengths. Spectrophotometers work by isolating light at specific wavelengths from white light. This compact meter incorporates a number of features that facilitate both fantastic performance and exceptional usability.

Supplied with 85 factory methods

Create up to 100 user methods

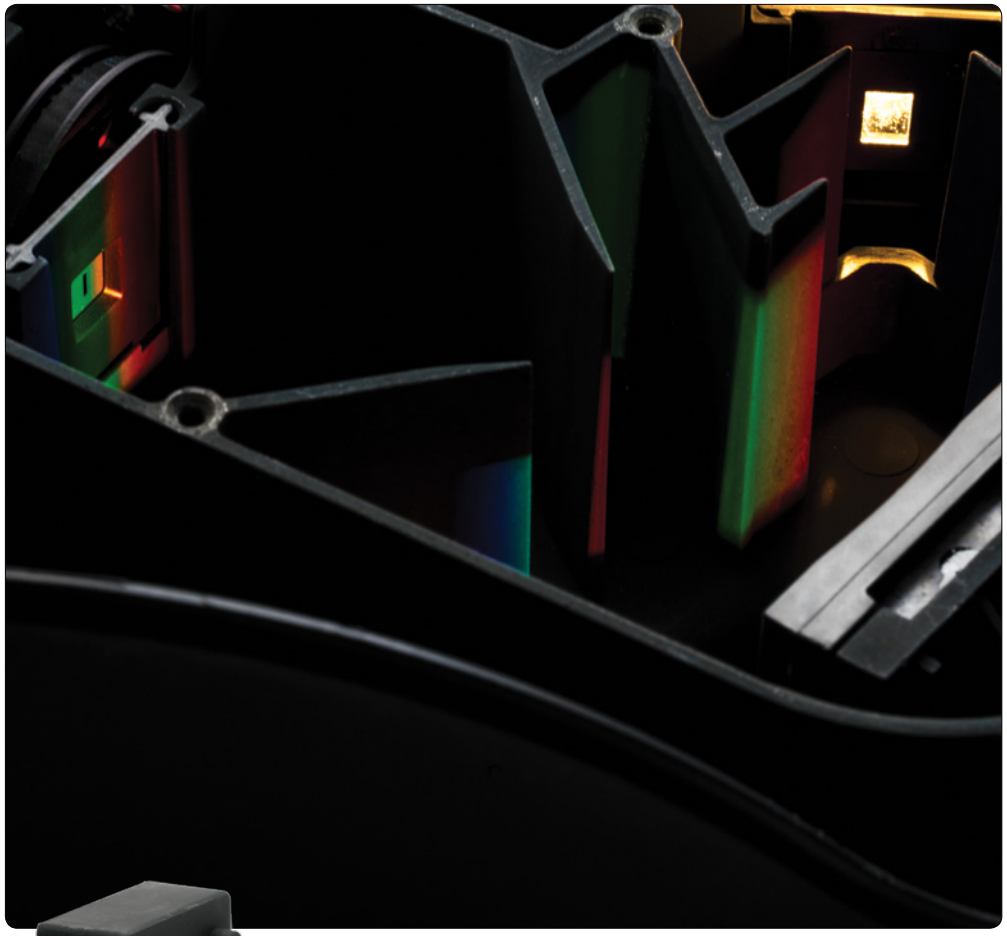
Field upgradeable firmware

5 cuvette types with automatic detection

Rechargeable li-ion battery

Data storage for 14000 measurements with ability to auto log results

Simplified data transfer to a PC or Mac



Advanced Split-beam Optical System

In a spectrophotometer the optical system is the heart of the instrument. Ensuring that the optical system is built with the best design and highest quality materials will guarantee accurate readings and a long life for the meter. When developing this meter our research and development team payed special attention to details and combined many small improvements to a typical spectrophotometer design to create a portable meter with unprecedented performance.

Replaceable tungsten-halogen lamp

To be able to measure in a wide variety of wavelengths a broadband light source is necessary. In the iris spectrophotometer this is accomplished by a tungsten-halogen lamp. As these lamps do not last indefinitely, it is necessary to change them throughout the life of the meter. The pre-alignment of the lighting fixture guarantees that the bulb is in the same position every time it is changed. This generates peace of mind as there is no need to worry about realigning the light source.

Narrow bandwidth and high resolution

Having a small bandwidth is necessary to accurately measure narrow peaks. The iris spectrophotometer maintains a narrow bandwidth of 5nm resulting in good spectral resolution. This leads to accurate measurement of sharp, narrow absorbance peaks. Additionally, the high resolution of 1nm generates greater sensitivity as the wavelength is closer to where the sample absorbs the most light.

Beam splitter

The beam splitter is added to the optical system for use with a reference detector to ensure that the measurement compensates for any drift in the light source. It works by splitting the light emitted by the tungsten lamp into two beams and sending one beam of light to the reference detector that measures intensity. If there are any fluctuations in the light source the meter detects this and compensates through a mathematical calculation. The reference detector also saves battery life and leads to improved speed of the meter as the lamp doesn't have to warm up prior to use.

Low stray light

A common problem in spectrophotometers is stray light. Stray light can be light which is outside the wavelength the meter is measuring or also light at the proper wavelength but from outside the meter. This leads to inaccurate readings as this light would not be absorbed by the sample but would still be detected by the meter. This is a problem that is typically hard to control. Due to the design of the optical system we are able to keep this potential issue to a minimum to improve the linearity and accuracy of readings.

Concave grating

This element of the optical system is what generates the spectrum of light. When the light from the tungsten lamp hits the grating it is met with interference coatings that turn the polychromatic white light into a rainbow. This rainbow contains dispersed light at all wavelengths in the visible spectrum. The rotation of this grating is what allows for a specific wavelength to be selected. This ability is one of the biggest differences between a spectrophotometer and a photometer. The concave grating which accomplishes this is superior to other types of diffraction, such as prisms, as it minimizes stray light generated and has constant bandwidth. It also combines elements of the optical system that would typically be separate, for example if a flat grating was used a concave mirror would need to be added in order to refocus the light. The combination of these two pieces creates greater efficiency and a smaller optical system to yield a more compact portable meter.

System check

Upon turning on the meter a performance check occurs to confirm that the light source is working properly and to calibrate the position of the grating. The grating calibration works by scanning for the "zero order" light reflecting off the grating. If any mechanical problems are present, the meter will display an alert. This feature establishes confidence in measurements knowing that the meter is always working properly without needing to run any additional tests.

Universal cuvette holder and auto-recognition

The cuvette holder built into the meter holds both 22 mm round cuvettes and rectangular cuvettes with a 5cm path length. Adapters for the cuvette holder are available to hold other 13 and 16mm round cuvettes, and 10mm square cuvettes. Rectangular cuvettes have longer path lengths which result in higher sensitivity in readings of low absorbance samples. Additionally, the meter permits the selection of the size of the cuvette used in custom user methods from the available sizes. For all methods, the programmed cuvette size is displayed on the screen to ensure the correct cuvette size is used, ensuring that the proper path length is being used by the meter when calculating measurements.

User Interface

No one likes to work with difficult equipment, which is why we have worked hard to create an interface that makes the meter's operation seamless. The intuitive menu design and large LCD screen all make working with the meter a breeze. Get ready for your new favorite piece of lab equipment.

Capacitive touchpad

Maneuvering the menus and using the meter is effortless with the capacitive touchpad. Featuring dedicated buttons specifically for setup, logging data, recalling data, and methods allows for quick and easy access to these functions. There is a key beep feature that can be enabled or disabled, for audible feedback that the key was pressed. Additionally, the meter also still recognizes key touches even through gloves.

Favorite methods

Always have your most frequently used methods readily available with the favorite methods feature. Directly from the home screen is access to user-programmed favorite methods, saving time.

Large high contrast custom LCD display

With a 6" display, the screen is large and easy to read. The high contrast makes every character on the display stand out even during outdoor use. The wide viewing angle allows for measurements to be seen from far away, so while working around the lab it is not necessary to hover over the meter to see the measurements.

Customized Methods

Creating a customized method is easy and intuitive. The HI801 guides you step-by-step through the process of creating your own custom method. The intuitive user interface will guide you through naming your method, setting the measurement wavelengths, creating reaction timers, and calibrating the method. Up to 10 points can be used to calibrate methods.

Step-by-step method creation

Up to 10 calibration points

Flexible calculations for multi wavelength methods

General Features

When choosing a piece of equipment making sure the product has all required features for the intended purposes is critical. When building the iris we included as many features as we could to aid in making this meter exceedingly versatile and convenient. From bare necessities such as long battery life and easy data logging and transfer, we have pushed the limits on seemingly basic features to make your life as easy as possible.

Pre-programmed methods

Programmed in the meter are more than 80 commonly used methods for chemical analysis. Methods can easily be updated by transferring the file from a computer to the meter or by a flash drive. Up to 150 factory methods can be saved in the meter and some chemical parameters have the option to switch between different chemical forms. Finding the product codes to order additional reagents is easy as the meter provides the appropriate reagent codes for each programmed method.

User methods

The ability to program up to 100 personal methods into the meter creates both versatility and customization. Methods can include up to 10 calibration points, 5 different wavelengths (which can be used simultaneously), and permits the use of 5 reaction timers. These features allow for many variations to be implemented into methods. Compared to a photometer there is no longer a limitation by factory methods. If a certain parameter is not offered or a modification to a pre-programmed method is required, the meter can be customized to suit your needs.

Spectral range

The meter features a spectral range of 340nm to 900nm allowing for a wide selection of analytical methods. The flexibility of this range permits compliance with many methods from regulatory organizations and associations for a variety of applications.

Data logging and transfer

Transferring data from a meter should always be simple and straightforward. Impressively the meter can store up to 14,000 measurements in memory. At any time data can be transferred to a PC or Mac as either a CSV or PDF file. No software is required, simply plug in a flash drive or plug it into a computer and export the data. The ability to save data as a PDF ensures higher integrity of the data as it cannot be easily changed. Additionally, a meter ID and a sample ID can be programmed to be saved along with logged measurements. iris features USB ports for both flash drive and a direct computer connection. Connectivity with a USB-A port to a flash drive can be used to transfer logged measurements from the meter and also to transfer method updates onto the meter. The USB-B port is used for a direct connection to a computer specifically for transferring logged data.

Battery operated

The meter features a rechargeable lithium ion battery that lasts for approximately 3,000 measurements. Lasting well over a day of use in the field there is no need to worry about the battery life while out working without a power supply. The meter can be quickly recharged with a dedicated fast charging adapter.

Cuvette Adapters

Specifications

General Specifications	HI801 iris
Wavelength Range	340-900 nm
Wavelength Resolution	1 nm
Wavelength Accuracy	±1.5 nm
Photometric Range	0.000-3.000 Abs
Photometric Accuracy	5 mAbs at 0.000-0.500 Abs; 1% at 0.500-3.000 Abs
Measurement Mode	transmittance (%), absorbance and concentration
Sample Cell	10 mm square, 50 mm rectangular, 16 mm round, 22 mm round, 13 mm round (vial)
Wavelength Selection	automatic, based on the selected method (editable for user methods only)
Light Source	tungsten halogen lamp
Optical System	split beam
Wavelength Calibration	internal, automatic at power-on with visual feedback
Stray Light	<0.1 % T at 340 nm with $NaNO_2$
Spectral Bandwidth	5 nm
Number of Methods	150 Factory / 100 User
Data Points Stored	9999 measured values
Export Capability	csv file format, pdf file format
Connectivity	1x USB A (mass storage host); 1x USB B (mass storage device)
Battery Life	3000 measurements or 8 hours
Power Supply	15 VDC power adapter; 10.8 VDC Li-Ion rechargeable battery
Environment	0 to 50 °C (32 to 122 °F); 0 to 95% RH
Dimensions	155 x 205 x 322 mm (6.1 x 8.0 x 12.6")
Weight	3 kg (6.6 lbs.)
Ordering Information	**HI801-01** (115V) and **HI801-02** (230V) is supplied with sample cuvettes and caps (22 mm, 4 pcs.), cloth for wiping cuvettes, scissors, USB cable, USB flash drive, 15 VDC power adapter, instruction manual and instrument quality certificate.

HI801 iris Spectrophotometer

Parameter Specifications

Parameter	Range	Accuracy (@25°C)	Method	λ (nm)	Reagent	Cuvette
Alkalinity	0-500 mg/L $CaCO_3$	±5 mg/L ±5% of reading	Bromocresol green	610	HI775-26	R-22
Alkalinity, Marine	0-300 mg/L $CaCO_3$	±5 mg/L ±5% of reading	Bromocresol green	610	HI755-26	R-22
Aluminum	0.00-1.00 mg/L Al3+	±0.02 mg/L ±4% of reading	Aluminon	530	HI93712-01	R-22
Ammonia LR	0.00-3.00 mg/L NH_3-N	±0.04 mg/L ±4% of reading	Nessler	425	HI93700-01	R-16
Ammonia LR	0.00-3.00 mg/L NH_3-N	±0.10 mg/L or 5% of reading	Nessler	425	HI93764A-25	R-13
Ammonia MR	0.00-10.00 mg/L NH_3-N	±0.05 mg/L ±5% of reading	Nessler	425	HI93715-01	R-16
Ammonia HR	0.0-100 mg/L NH_4+	±0.5 mg/L ±5% of reading	Nessler	425	HI93733-01	R-16
Ammonia HR	0.0-100 mg/L NH_3-N	±1 mg/L or 5% of reading	Nessler	430	HI93764B-25	R-13
Bromine	0.00-10.00 mg/L (mg/L)	±0.08 mg/L ±3% of reading	DPD	525	HI93716-01	R-22
Calcium	0-400 mg/L Ca^{2+}	±10 mg/L ±5% of reading	Oxalate	466	HI937521-01	R-22
Calcium, Marine	200-600 mg/L Ca^{2+}	±5% of reading	Zincon	610	HI758-26	R-16
Chloride	0.0-20.0 mg/L Cl^-	±0.5 mg/L ±5% of reading	Mercury thiocyanate	455	HI93753-01	R-22
Chlorine Dioxide	0.00-2.00 mg/L ClO_2	±0.10 mg/L ±5% of reading	Chlorophenol Red	575	HI93738-01	R-22
Chlorine Free ULR	0.000-0.500 mg/L Cl_2	±0.020 mg/L ±3% of reading	DPD	525	HI95762-01	R-22
Chlorine, Free LR (powder reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-01	R-22
Chlorine, Free LR (liquid reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-F	R-22
Chlorine, Free HR	0.00-10.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93734-01	R-22
Chlorine, Total ULR	0.000-0.500 mg/L Cl_2	±0.020 mg/L ±3% of reading	DPD	525	HI95761-01	R-22
Chlorine, Total LR (powder reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93711-01	R-22
Chlorine, Total LR (liquid reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-T	R-22
Chlorine, Total HR	0.00-10.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93734-01	R-22
Chlorine UHR	0-500 mg/L Cl_2	±3 mg/L ±3% of reading	DPD	525	HI95771-01	R-22
Chromium(VI) LR	0-300 µg/L Cr^{6+}	±2 µg/L ±4% of reading	Diphenylcarbohydrazide	535	HI93749-01	R-22
Chromium(VI) HR	0-1000 µg/L Cr^{6+}	±5 µg/L ±4% of reading	Diphenylcarbohydrazide	535	HI93723-01	R-22
COD LR EPA	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate EPA	420	HI93754A-25	R-13
COD LR Hg free	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate EPA	420	HI93754D-25	R-13
COD LR ISO	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate ISO	420	HI93754F-25	R-13
COD MR EPA	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate EPA	610	HI93754B-25	R-13
COD MR Hg free	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate EPA	610	HI93754E-25	R-13
COD MR ISO	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate ISO	610	HI93754G-25	R-13
COD HR EPA	0-15000 mg/L O_2	±150 mg/L or 2% of reading	Dichromate EPA	610	HI93754C-25	R-13
Color of Water	0-500 PCU	±10 PCU ±5% of reading	Platinum Cobalt	460		R-22
Copper LR	0-1500 µg/L Cu^{2+}	±10 µg/L ±5% of reading	Bicinchoninate	575	HI95747-01	R-22
Copper HR	0.00-5.00 mg/L Cu^{2+}	±0.02 mg/L or 4% of reading	Bicinchoninate	560	HI93702-01	R-22
Cyanide	0.000-0.200 mg/L CN^-	±0.005 mg/L ±3% of reading	Pyridine-Pyrazalone	610	HI93714-01	R-22
Cyanuric Acid	0-100 mg/L CYA	±1 mg/L ±15% of reading	SPADNS	525	HI93722-01	R-22
Fluoride LR	0.00-2.00 mg/L F^-	±0.03 mg/L ±3% of reading	SPADNS	575	HI93729-01	R-22
Fluoride HR	0.0-20.0 mg/L F^-	±0.5 mg/L ±3% of reading	SPADNS	575	HI93739-01	R-22
Hardness Calcium	0.00-2.70 mg/L $CaCO_3$	±0.08mg/L ±4% of reading	Calmagite	523	HI93720-01	R-22
Hardness Magnesium	0.00-2.00 mg/L $CaCO_3$	±0.11 mg/L ±5% of reading	EDTA	523	HI93719-01	R-22
Hardness Total LR	0-250 mg/L $CaCO_3$	±5 mg/L ±4% of reading	Calmagite	466	HI93735-00	R-22
Hardness Total MR	200-500 mg/L $CaCO_3$	±7 mg/L ±3% of reading	Calmagite	466	HI93735-01	R-22
Hardness Total HR	400-750 mg/L $CaCO_3$	±10 mg/L ±2% of reading	Calmagite	466	HI93735-02	R-22

Parameter	Range	Accuracy (@25°C)	Method	λ (nm)	Reagent	Cuvette
Hydrazine	0-400 µg/L N_2H_4	±3 µg/L ±3% of reading	Dimethylaminobenzaldehyde	466	HI93704-01	R-22
Iodine	0.0-12.5 mg/L I_2	±0.1 mg/L ±5% of reading	DPD	525	HI93718-01	R-22
Iron LR	0.00-1.60 mg/L Fe	±0.01 mg/L ±8% of reading	TPTZ	575	HI93746-01	R-22
Iron HR	0.00-5.00 mg/L Fe	±0.04 mg/L ±2% of reading	Phenanthroline	525	HI93721-01	R-22
Magnesium	0-150 mg/L Mg^{2+}	±3 mg/L ±3% of reading	Calmagite	466	HI937520-01	R-22
Manganese LR	0-300 µg/L Mn	±7 µg/L ±3% of reading	PAN	560	HI93748-01	R-22
Manganese HR	0.0-20.0 mg/L Mn	±0.2 mg/L ±3% of reading	Periodate	525	HI93709-01	R-22
Maple Syrup	0.0-100.0%T	±3% @75 %T	Direct measure	560	HI93703-57	S-10
Molybdenum	0.0-40.0 mg/L Mo^{6+}	±0.3 mg/L ±5% of reading	Mercaptoacetic acid	420	HI93730-01	R-22
Nickel LR	0.000-1.000 mg/L Ni	±0.010 mg/L ±7% of reading	PAN	565	HI93740-01	R-16
Nickel HR	0.00-7.00 ppt Ni	±0.07 ppt ±4% of reading	photometric	575	HI93726-01	R-22
Nitrate	0.0-30.0 mg/L N-NO_3	±0.5 mg/L ±10% of reading	Cadmium reduction	525	HI93728-01	R-22
Nitrate (Chromotropic acid)	0.0-30.0 mg/L N-NO_3	±1.0 mg/L ±3% of reading	Chromotropic acid	410	HI93766-50	R-13
Nitrite Marine ULR	0-200 µg/L N-NO_2	±8 µg/L ±4% of reading	Diazotization	480	HI764-25	R-22
Nitrite LR	0-600 µg/L N-NO_2	10 µg/L ±4% of reading	Diazotization	480	HI93707-01	R-22
Nitrite HR	0-150 mg/L N-NO_2	±4 mg/L ±4% of reading	Ferrous sulfate	575	HI93708-01	R-22
Nitrogen Total LR	0.0-25.0 mg/L N	±1 mg/L or 5% of reading	Chromotropic acid	420	HI93767A-50	R-13
Nitrogen Total HR	10-150 mg/L N	±3 mg/L or 4% of reading	Chromotropic acid	420	HI93767B-50	R-13
Oxygen Dissolved	0.0-10.0 mg/L O_2	±0.4 mg/L ±3% of reading	Winkler	466	HI93732-01	R-22
Oxygen Scavengers (Carbohydrazide)	0.00-1.50 mg/L	±0.02 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (DEHA)	0-1000 µg/L	±5 µg/L ±5% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (ISO-Ascorbic Acid)	0.00-4.50 mg/L	±0.03 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (Hydroquinone)	0.00-2.50 mg/L	±0.04 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Ozone	0.00-2.00 mg/L O_3	±0.02 mg/L ±3% of reading	DPD	525	HI93757-01	R-22
pH	6.5-8.5 pH	±0.1 pH	Phenol red	525	HI93710-01	R-22
Phosphorus Marine ULR	0-200 µg/L P	±5 µg/L ±5% of reading	Ascorbic acid	610	HI736-25	R-22
Phosphate LR	0.00-2.50 mg/L PO_4^{3-}	±0.04 mg/L ±4% of reading	Ascorbic Acid	610	HI93713-01	R-22
Phosphate HR	0.0-30.0 mg/L PO_4^{3-}	±1 mg/L ±4% of reading	Amino Acid	525	HI93717 -01	R-22
Phosphorus Acid Hydrolyzable	0.00-1.60 mg/L P	±0.05 mg/L or 5% of reading	Ascorbic acid	610	HI93758B-50	R-13
Phosphorus , Reactive LR	0.00-1.60 mg/L P	±0.05 mg/L or 4% of reading	Ascorbic acid	610	HI93758A-50	R-13
Phosphorus , Reactive HR	0.0-32.6 mg/L P	±0.5 mg/L or 4% of reading	Vanadomolybdophosphoric acid	420	HI93763A-50	R-13
Phosphorous, Total LR	0.00-1.60 mg/L P	±0.05 mg/L or 5% of reading	Adenosine 5'-monophosphate monohidrat	610	HI93758C-50	R-13
Phosphorous, Total HR	0.0-32.6 mg/L P	±0.5 mg/L or 5% of reading	Adenosine 5'-monophosphate monohidrat	420	HI93763B-50	R-13
Potassium LR	0.0-20.0 mg/L K	2 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Potassium MR	10-100 mg/L K	±10 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Potassium HR	20-200 mg/L K	±20 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Silica LR	0.00-2.00 mg/L SiO_2	±0.03 mg/L ±5% of reading	Heteropoly Blue	610	HI93705-01	R-22
Silica HR	0-200 mg/L SiO_2	±1 mg/L ±5% of reading	Molybdosilicate	466	HI96770-01	R-22
Silver	0.000-1.000 mg/L Ag	±0.02 mg/L ±5% of reading	PAN	570	HI93737-01	R-22
Sulfate	0-150 mg/L SO_4^{2-}	±5 mg/L ±3% of reading	Turbidimetric	466	HI93751-01	R-22
Surfactants Anionic	0.0-3.50 mg/L SDBS	±0.04 mg/L ±3% of reading	Methylene blue	610	HI96769-01	R-22
Zinc	0.00-3.00 mg/L Zn	±0.03 mg/L ±3% of reading	Zincon	620	HI93731-01	R-22

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Think sustainable

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