The 1720D Low Range Process Turbidimeter with AquaTrend® Interface

The 1720D Low Range Process Turbidimeter provides the sensitivity, stability and flexibility necessary to continuously track the low levels of turbidity found in high-quality filtered water. Equipped with the versatile AquaTrend® Interface, the 1720D is easy to operate, calibrate and requires very little maintenance. Operators can control as many as eight separate 1720D Turbidimeters with a single AquaTrend® Interface.

A basic system consists of at least one 1720D Turbidimeter, one AquaTrend® Interface and one PS1201 Power Supply. Operators can also incorporate additional output devices, creating a customized turbidity monitoring network suitable for a wide range of applications.

Instrument Features

- New design reduces stray light for more accurate readings.
- Meets USEPA method 180.1 design and performance criteria.
- Patent-pending bubble trap eliminates fluctuations in turbidity readings.
- Faster response to changes in turbidity due to lower sample volume.
- Remote monitoring capability up to 400 meters (1320 feet).
- Meets stringent safety and emissions standards.
- Datalogging capability allows user to graph, trend and display measurement data.
- Graphical display and menus guide user through calibration and set-up procedures.
- Modular system provides flexibility and expandability.
- No glass sample cells to clean or replace.
- Two-year warranty.

FIGURE 1. 1720D AquaTrend® Interface/SOM and power supply.

1720D Turbidimeter

Capable of measuring turbidity from 0.001 to 100.0 nephelometric turbidity units (NTU), the 1720D Turbidimeter (see Figure 1) consists of a turbidimeter body and a sensor head assembly containing optical and electronic components.

New Internal Bubble Trap. The 1720D Turbidimeter's redesigned bubble trap offers improved bubble rejection and eliminates fluctuations in turbidity readings. A series of internal baffles in the sample inlet flow path allow any entrained air bubbles to vent to the atmosphere, preventing false high turbidity indications. The patent-pending bubble trap can be removed for easy cleaning.

Advanced Design. The 1720D offers a number of design refinements over previous Hach turbidimeters. The new turbidimeter body reduces stray light, resulting in improved low-end performance and more accurate readings. The instrument also features an improved sensor head that increases reliability and protects electronic and optical components from corrosion.

Meets Worldwide Safety and Electronic Design Standards. The 1720D is Nationally Recognized Testing Laboratory (NRTL) listed to UL3101-1 and certified to CSA 22.2 No. 1010.1 and carries the European CE compliance mark.

Regulatory Reporting. The USEPA has established minimum instrument design and performance criteria for turbidity measurements as detailed in USEPA method 180.1. The 1720D Turbidimeter uses this method and is suitable for regulatory reporting.

Principle of Operation. Continuously-flowing sample enters the turbidimeter body and flows through a patent-pending bubble trap designed to vent any entrained air bubbles from the sample stream. After traveling through the bubble trap, sample enters the center column of the turbidimeter, rises into the measuring chamber and spills over the weir into the drain port. Turbidity is measured by directing an intense beam of light from the sensor head assembly down into the sample in the turbidimeter body. Light scattered at 90° by suspended particles in the sample is detected by the sensor's submerged photocell. The amount of light scattered is proportional to the amount of turbidity in the sample.

Calibration. Three methods of instrument calibration are offered for the 1720D Turbidimeter. Calibration for EPA-reporting purposes is based on StablCal® Stabilized Formazin Standards* or user-prepared dilutions of stock formazin suspension. Because StablCal® Stabilized Formazin Standards require no dilution, their use eliminates possible inaccuracy

and reduces calibration time. Prompting messages displayed on the AquaTrend® Interface screen guide users step by step through the calibration procedure. For instruments not intended for reporting purposes, the Hach 1720 Series ICE-PIC™ Calibration/Verification Module may be used for calibration. The ICE-PIC™ Module is factory set to a specified value and eliminates the need for consumables, requiring only a few seconds for calibration. Finally, comparative calibration to a laboratory turbidimeter is possible as a third method of calibration, and is acceptable for reporting purposes.

* StablCal® Stabilized Formazin Standards are cited in Hach Method 8195, an accepted version of EPA Method 180.1.

Instrument Verification. Using the ICE-PIC™ Calibration/Verification Module as a verification tool allows operators to determine proper instrument performance in just seconds. Because no consumables are required, verification can be performed at any time with no preparation. A second method of verification uses low-NTU values of StablCal® Stabilized Formazin Standards, and is recommended periodically for instruments where performance is critical to process quality.

ICE-PIC™ Calibration/Verification Module. The ICE-PIC™ Calibration/Verification Module was developed in response to the need for quick, simple calibration of instruments not intended for EPA-reporting purposes, and for fast, easy verification of proper performance of Hach 1720 Series Turbidimeters. This optomechanical device is compact and lightweight, and is calibrated at the factory using EPA-accepted formazin standard. Each device is provided with a Certificate of Accuracy. Because it eliminates the use of consumables and takes only seconds to use, calibration and verification can be accomplished quickly and inexpensively, at any time.

AquaTrend® Interface with Signal Output Module

The AquaTrend® Interface with Signal Output Module (SOM) (see Figure 2) is a microprocessor-based user interface designed to provide precise control of the 1720D system network. With the AquaTrend's menu-driven graphical interface, the operator can define, monitor, and record data from as many as eight 1720D Turbidimeters. On-screen prompting guides you step by step through all instrument set-up, calibration and operational procedures.

Alarms. Two fully independent set-point alarm systems can be set anywhere within the overall measuring range. Two high/low turbidity set-point alarms are each equipped with an SPDT relay with unpowered contacts rated for 5A resistive load at 230 Vac. Measurement values outside the preset limits will be signaled by a status indicator on the 1720D Sensor Head as well as the AquaTrend® display. An alarm log displays a history of instrument alarm information.

Recorders. Two selectable outputs of 0-20 mA or 4-20 mA can be programmed to cover any segment of the overall range to provide optimum resolution on a recorder chart.

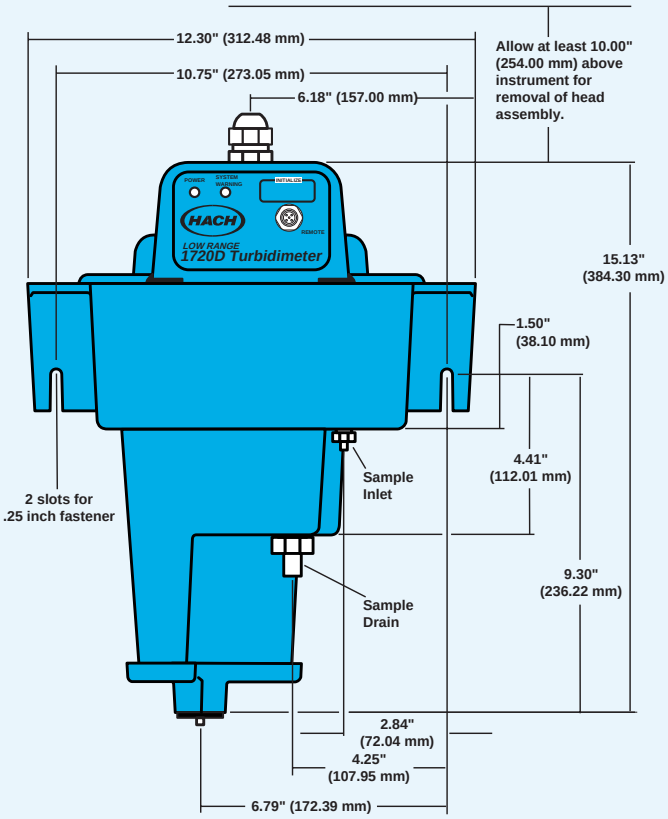
Self Test Diagnostics. The AquaTrend® with SOM automatically monitors key instrument and network functions. If an instrument or system malfunction is detected, the AquaTrend® will display an error code, and store the error in the alarm log.

FIGURE 2. AquaTrend® Interface/SOM

Security Lockout. A convenient lockout feature allows supervisors to partially restrict, totally restrict or allow complete access to programmable functions with a four-digit password.

Signal Averaging. To enhance stability and accuracy, signals are averaged over a 6-, 30-, 60- or 90-second period (user-selectable) to reduce the impact of intermittent bubbles or infrequent large particles.

Datalogging. Datalogging capability allows the user to graph, trend and display measurement data.



1720D Turbidimeter Body– Front View

FIGURE 3. AquaTrend® Serial I/O Module

FIGURE 4. AquaTrend® Digital Display Module

Additional AquaTrend® Interface Modules

Two additional AquaTrend® Interface models are available to increase application flexibility. The AquaTrend® Interface offers all the same features as the AquaTrend® Interface with integrated SOM, but does not include alarm and recorder outputs. The interface can be located up to 400 meters (1320') from the 1720D for remote monitoring. The Portable AquaTrend® Interface plugs directly into the 1720D sensor and allows operators to communicate with a single sensor for local display and easy calibration.

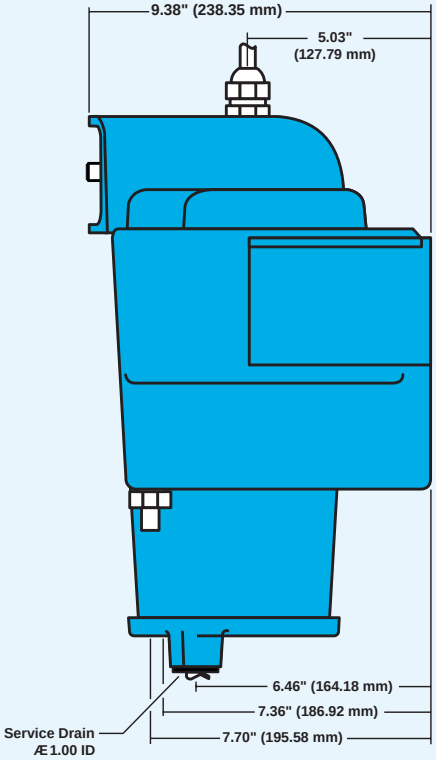
Network Accessories

Serial I/O Module. For detailed record keeping, select the Serial I/O Module (SIO). The SIO provides a direct link between the 1720D/AquaTrend® network and a computer or printer via RS232 communication (see Figure 3).

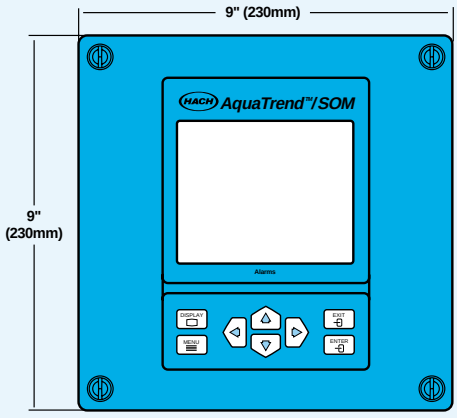
Digital Display Module. The Digital Display Module (DDM) is an eight-character remote display that can be used for continuous readout of measurement values. The display plugs directly into the 1720D sensor, or can be hardwired and mounted up to 400 meters (1320') from the sensor (see Figure 4).

Installation Details

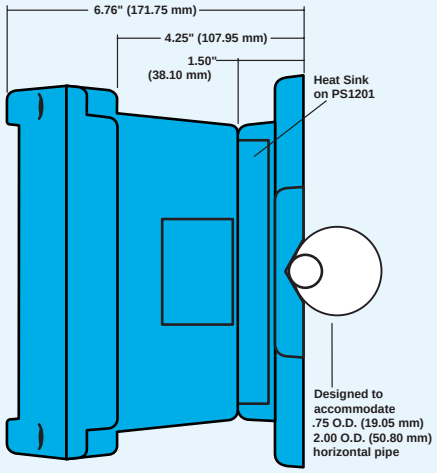
Dimensions in inches (mm)



1720D Turbidimeter Body–Side View



AquaTrend® Body–Front View



AquaTrend® Body–Side View

PS1201 Power Supply. One PS1201 Power Supply is required for each 1720D Turbidimeter in operation. Designed for pole, wall or panel mounting, the surge-protected power supply provides 25 watts to power the 1720D instrument and other network devices. The power supply can be located up to 6 meters (20') from the 1720D Turbidimeter. A cable for connecting the 1720D and PS1201 is supplied with the instrument.

Signal Output Module. An optional Signal Output Module (SOM) is available to increase alarm and recorder output capability. The module features two recorder outputs selectable for 0-20 mA or 4-20 mA. Output span is programmable over any portion of the 0 to 100 NTU range. Also included are two high/low turbidity set-point alarms, each equipped with an SPDT relay with unpowered contacts rated for 5A resistive load at 230 Vac.

AquaTrend® Repeater. The AquaTrend® Repeater extends the maximum length of the AquaTrend® Network by 500 meters. Up to three repeaters may be used, for a total network length of 2000 meters. The repeater mounts inside the PS1201 power supply.

Establishing Single and Multi-Device Networks

In a single-sensor application (see front cover), one 1720D sensor with power supply† and one AquaTrend® Interface are required. In multiple-sensor applications, a single AquaTrend® can serve as a network interface for as many as eight sensors, as well as additional devices. The AquaTrend® Network is a system where multiple devices—including 1720D Sensors, Digital Display Modules, Serial I/O Modules, Signal Output Modules, or even additional AquaTrend® Modules—are connected to an AquaTrend® Interface. The following table outlines the maximum number of devices that can be connected to an AquaTrend® Interface.

- Remote AquaTrend® Modules 8
- Signal Output Module 8
- Serial I/O Module 2
- Digital Display Module 8
- 1720D Sensors 8

A typical AquaTrend® Network installation is illustrated in Figure 5. If more than one AquaTrend® Interface is installed on the network, one AquaTrend® is designated as the Master AquaTrend®, and the additional interfaces are designated as remotes. The Master AquaTrend® serves as the network manager and allows operators to add or remove devices. Either the Master AquaTrend® or a Remote AquaTrend® can access any instrument's set-up menus to change settings and perform calibrations. A Portable AquaTrend® Module, which can access a single sensor, is also available for local display and calibration.

† One power supply is required for each 1720D Turbidimeter in multi-sensor applications.

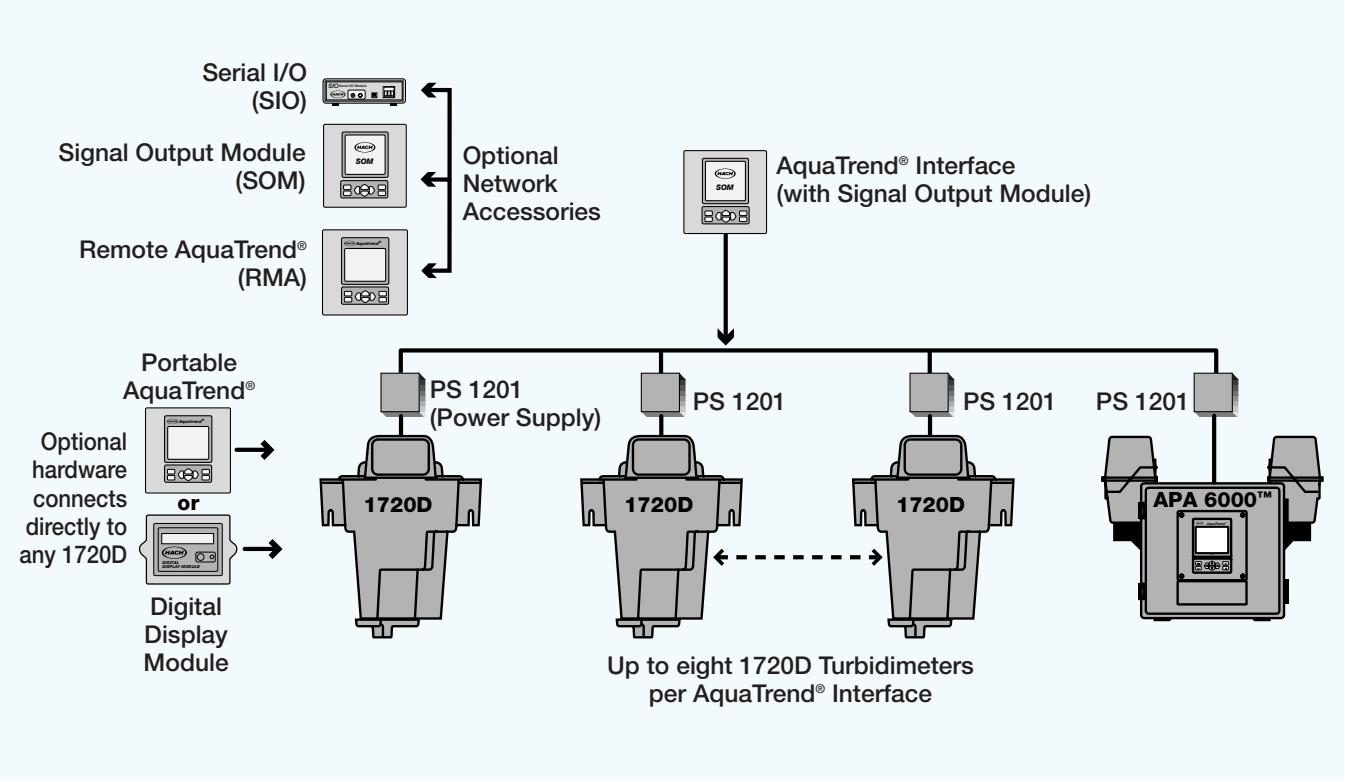


FIGURE 5. Typical networked installation. Sensors send readings and status information to the AquaTrend® Interface module, which provides datalogging and graphical display for up to eight sensors.

Specifications

Range	0 to 100 nephelometric turbidity units (NTU)
Accuracy	± 2% of reading or ± 0.020 NTU (whichever is greater) from 0 to 40 NTU; ± 5% of reading from 40 to 100 NTU
Resolution	0.001 NTU
Repeatability	Better than ± 1.0% of reading or ± 0.002 NTU, whichever is greater
Response Time	Initial response in 1 minute, 15 seconds with internal bubble trap. Response time varies with flow rate (see manual).
Sample Flow Required	250 to 750 mL/minute (4.0 to 11.9 gal/hour)
Storage Temperature	-20 to +60 °C (-4 to 140° F)
Operating Temperature	0 to 40 °C (32 to 104° F)
Operating Humidity	5 to 95% non-condensing
Sample Temperature	0 to 50 °C (32 to 122°F)
Recorder Output *(Requires Signal Output Module)*	Selectable for 0-20 mA or 4-20 mA. Output span programmable over any portion of the 0 to 100 NTU range. Maximum load of 500 ohms.
Alarms *(Requires Signal Output Module)*	Two high/low turbidity set-point alarms are each equipped with an SPDT relay with unpowered contacts rated for 5A resistive load at 230 Vac.
Power Requirements	95-240 Vac, 50/60 Hz, auto selecting; 40 VA (PS1201 Power Supply)
Surge Protection	Internal, PS1201 Power Supply, 1000 V line-to-line, 2000 V line-to chassis
Sample Inlet Fitting	1/4" NPT female, 1/4" compression fitting (provided)
Drain Fitting	1/2" NPT female, 1/2" hose barb (provided)
Communications Distance	Maximum node to node distance: 400 m (1312') Maximum total wire length: 500 m (1640')
Dimensions	AquaTrend®: 23 x 23 x 14 cm (9 x 9 x 7") Power Supply: 23 x 23 x 14 cm (9 x 9 x 7") Turbidimeter Body and Cap: 25 x 33 x 46 cm (10 x 13 x 18") Signal Output Module: 23 x 23 x 14 cm (9 x 9 x 7") Digital Display Module: 14 x 19 x 6 cm (5 x 8 x 2") Serial I/O Module: 13 x 13 x 4 cm (5 x 5 x 2")
Mounting	AquaTrend®: wall, pole, panel, and floor stand Power Supply: wall, pole, panel, and floor stand Turbidimeter Body and Head Assembly: wall and floor stand Signal Output Module: wall, pole, and floor stand Digital Display Module: wall and floor stand
Enclosures	NEMA-4X/IP66 (AquaTrend® Interface, SOM and PS1201 Power Supply. Turbidimeter body not rated.)
Certification:	
Safety	Listed by ETL to UL3101-1 Certified by ETL to CSA C22.2 No. 1010.1 CE Certified by Hach Company to EN 61010-1
Immunity	CE Certified by Hach Company to EN50081-2 and EN50082-2 (European Generic Emission Immunity Standards) per 89/336/EEC EMC
Emission	FCC Part 15, Class A Canadian Interference-Causing Equipment Regulation ICES-003, Class A

Specifications subject to change without notice.

Sample Specification

General. The turbidity monitoring system shall include at least one turbidimeter, one graphical interface unit and one power supply. The system shall be capable of functioning as a single sensor system and also be easily expanded into a networked system of up to eight turbidimeters, eight output devices, eight digital displays, eight additional remote interface units, and two serial I/O modules, using a single graphical interface unit.

Turbidimeter. The turbidimeter shall be a microprocessor-based, continuous-reading, on-line nephelometric instrument meeting all design and performance criteria specified by USEPA method 180.1. Light shall be directed through the surface of the sample and the detector shall be immersed in the sample, eliminating glass windows and flow cells. Optical components shall be mounted in a sealed head assembly that can be removed easily for calibration/service, without disturbing sample flow. The turbidimeter body shall be constructed of corrosion-resistant polystyrene, and shall include an internal bubble trap to vent entrained air from the sample stream. The turbidimeter shall offer the choice of formazin-based (20 or 1 NTU) or instrument comparison-based calibration methods. Accuracy shall be ± 2% of reading or ± 0.020 NTU (whichever is greater) from 0 to 40 NTU, and ± 5% of reading from 41 to 100 NTU. Resolution shall be 0.001 NTU and repeatability shall be better than ± 1.0% of reading or ± 0.002 NTU (whichever is greater). User selectable signal averaging, bubble rejection, alarm and recorder output hold, and self-test diagnostics shall be provided. All turbidimeters on the network shall have RS232 serial input/output capability for two-way communication to a computer or one way communication to a printer to record or print real-time turbidity data, calibration history and current set points.

Interface Module. The graphical interface unit shall be a microprocessor-based device capable of functioning in a single sensor, and as a digital interface link between turbidimeters and other communication devices through fieldbus communications, displaying data and operating up to eight turbidimeters at a maximum distance of 400 meters (1320'). The interface unit shall allow operators to control sensor and network functions with user-friendly, menu-driven software, and shall provide datalogging of measurement data from up to eight turbidimeters for 1 hour, 24 hours or 30 days, and the capability to transfer data to a computer or printer via an RS232 serial input/output device. The interface unit and separate DC power supply shall be housed in NEMA-4X (indoor) industrial plastic enclosures, and the power supply shall automatically accept input in the range of 95 to 240 Vac, 50/60 Hz.

Safety and Electrical Design Standards. All system components shall be NRTL listed to UL3101-1, certified to CSA C22.2 No. 1010.1, and CE certified by manufacturer to EN 61010-1. For immunity and emissions, system components shall be CE certified by manufacturer to EN50082-2 (European Generic Immunity Standard) per 89/336/EEC EMC, and EN50081-2 per 89/336/EEC EMC, and shall also meet FCC Part 15, Class A and Canadian Interference-Causing Equipment Regulation ICES-003, Class A standards.

How to Order

52001-00 1720D Turbidimeter with AquaTrend® Interface with SOM and PS1201 Power Supply
52000-00 1720D Turbidimeter with PS1201 Power Supply
51200-00 AquaTrend® Interface
51350-00 AquaTrend® with integral Signal Output Module
51400-00 Portable AquaTrend® Module
52010-00 PS1201 Power Supply Module
52074-00 Serial I/O Module, 115 Vac
52074-02 Serial I/O Module, 230 Vac
51250-00 Signal Output Module
52400-00 Digital Display Module
52200-00 AquaTrend® Repeater

Cables*

52157-00 22 gauge, 2 conductor, communication only, by the foot . Available in 100' to 1000' spool lengths: (-10: 100'; -25: 250'; -50: 500'; -51: 1000')
52158-00 20 gauge, 4 conductor, communication and power, by the foot. Available in 100' to 1000' spool lengths: (-10: 100'; -25: 250'; -50: 500'; -51: 1000')
46306-00 Power Cord Kit for PS1201 (125 Vac)
46308-00 Power Cord Kit for PS1201 (230 Vac), European Style Plug

*Note: Power and communication cables must be ordered separately.

Optional Accessories

1720 Series ICE-PIC™ Calibration/Verification Module
(For 1720D and 1720C Turbidimeters)
52250-00 20 NTU
52215-00 1 NTU
52225-00 0.5 NTU†
†Not intended for calibration purposes

StablCal® Stabilized Formazin Calibration Kits

27488-00 <0.1, 1 NTU, 1 L each
26596-00 <0.1, 20 NTU, 1 L each
27477-00 <0.1, 40 NTU, 1 L each

26598-53 StablCal® Stabilized Formazin Standard, 1.0 NTU, 1 L
44156-00 Formazin Calibration Kit. Includes 4000 NTU Formazin (500 mL), TenSette® Pipet, Calibration Cylinder
2461-49 Formazin Primary Standard, 4000 NTU, 500 mL
44153-00 Calibration Cylinder, 1 L
52160-00 Floor Stand for 1720D/PS1201
52159-00 Serial to Parallel Converter (for printer)
47122-00 Junction Box

In the United States, call 800-227-4224 toll-free for current prices or technical assistance.
Outside the United States, contact the Hach office or distributor serving you.

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