Hach Sigma 900 Max Portable Samplers

SIGMA
A Hach Company Brand

The advanced technology and comprehensive customer service of Hach Sigma 900 Max Portable Samplers can be summarized in five key concepts: accuracy, simplicity, flexibility, reliability, and economy.

Features and Benefits

5 Goals for Effectiveness and Efficiency

Accuracy—highly accurate measurements keep systems in compliance at all times

Simplicity—easy to operate equipment saves valuable time and effort

Flexibility—extensive product options and features accommodate specific needs

Reliability—robust products with minimal downtime and outstanding customer support

Economy—affordably priced products for the best value for the money

Field Convertible for Compact or Discrete Sampling

Weighing only 28 pounds (12.7 kg)—with a three-gallon polyethylene bottle installed—the Hach Sigma 900 Max Portable Sampler is designed for accuracy and convenience. Quickly switch between composite to discrete sampling in the field using an interchangeable compact- or standard-sized base. Carrying is made easy with flip-up handles. Configurable for single or multiple bottle applications, it is specifically designed for use in 18-inch manholes.

Reliable Peristaltic Pump Technology

The Sigma 900 Max sampler uses a positive displacement peristaltic pump made of corrosion-resistant Delrin® material. Flow is induced by squeezing a flexible 3/8-in. tube (only the tubing is in contact with the liquid). While other peristaltic pumps fail to meet EPA1 criteria for representative intake velocity, Hach samplers produce a 3.3 ft./s velocity at 3 ft. lift in a 3/8-in. ID intake line. The liquid is under pumped-flow from the point of intake until it reaches the sample bottle.

Advanced Liquid Detection Techniques

The non-contact ultrasonic liquid sensing system guarantees volume accuracy and repeatability regardless of changes in head or composition of the waste stream or temperature variations in the sample liquid. Samples are compromised less often when the intake line is thoroughly purged before and after every sample collection. Reduce cross-contamination with a line rinse where the intake is preconditioned with the source liquid prior to collection. In the event that a plugged intake prevents collection, the unit detects the failed attempt and immediately repeats the cycle starting with a high-pressure purge.

Monitor and Manage

Easy, menu-type programming is made via a large 8-line by 40-character backlit display. Use the Sigma 900 Max sampler to monitor and log rainfall, level, flow, velocity, temperature, pH or ORP, conductivity, and dissolved oxygen with 12 data logging channels. Depending on model, up to seven external analog signals can also be logged. As many as 116,000 readings may be recorded. RAM memory is automatically allocated as necessary during operation. Flash memory is used to install software enhancements (available on the Internet), without returning the sampler to the factory.

Unique Constant Time/Variable Volume Sampling

The patented* Constant Time/Variable Volume sampling method varies sample size in proportion to flow rate—flow-weighted samples are captured on the first try. This method closely simulates manual grab samples. Limitations of conventional samplers, such as insufficient sample volumes during low flow periods or truncated sample time during high flow periods, make capturing short-lived, illicit discharges, or significant storm events difficult. The Constant Time/Variable Volume feature takes regularly timed, proportional samples depending on the flow rate—sample volume increases and decreases with the flow, ensuring that representative samples are taken at even intervals throughout the sampling period.

**Patent #5587926*

Continued on next page.

Features and Benefits *continued*

Customizable Set Points

Use the Sigma 900 Max sampler to collect samples in response to changing levels of selected parameters—set high and low trip points to immediately collect when a parameter exceeds preset limits. Samples may also be taken only when the parameter exceeds these settings. Out-of-limit sample can then be segregated from normal samples to help quickly identify problem sources.

Easy Data Management Software

Powerful and user-friendly software makes it easy to analyze the data and produce presentation-quality reports—report maximums, minimums, totals, and averages for any time period. Or generate customized reports integrating sample collections with flow, level, rainfall, other water quality parameters such as pH, ORP, temperature, conductivity, or dissolved oxygen.

Three Ways to Download Data

Sampler to DTU to PC—the palm-sized and waterproof Data Transfer Unit (DTU) is faster, easier, and more economical than a laptop computer to get data from up to 20 samplers to the office.

Sampler to Modem to PC—a built-in modem transmits data via cellular phone or telephone right to the office. Automatically "call" the sampler at predetermined times to retrieve data, or retrieve data on demand. Also, alarm conditions may be sent to up to three pagers or a central monitoring computer.

Sampler to PC—link directly to a PC using the standard built-in RS-232 serial port.

Applications

Hach Sigma 900 Max Portable Samplers are ideal for NPDES stormwater compliance, stormwater runoff monitoring, pretreatment compliance, CSO studies and monitoring, industrial wastewater discharge, and WWTP process control.

Specifications*

General

Sampler Housing
Impact resistant ABS plastic, 3-section construction

Double-walled base with 1 in. (2.54 cm) insulation, direct ice contact with bottles

Controller Housing
High-Impact, injection-molded ABS; submersible, watertight, dust-tight, corrosion, and ice resistant; NEMA 4X, 6

Temperature
General Use:
0 to 49 °C (32 to 120°F)

Liquid Crystal Display (LCD):
-10 to 70°C (-14 to 158°F)

Storage:
-40 to 80°C (-40 to 176°F)

Power Requirements
12 Vdc supplied by optional a/c power converter or battery

Average current with pump running:
2.25 amps dc

Average current without pump running:
4 mA dc

ac Power Backup (Pump Controller Only)
Rechargeable 6 amp-hour gel lead acid battery takes over automatically with ac line power failure

Integral trickle charger maintains battery as full charge (factory installed option)

Internal Battery
Two 1.5 V dc "C" cells; maintains program logic and real time clock for five years

Graphics Display
8 line x 40 character alphanumeric, back-lit liquid-crystal graphics display

Self prompting/menu driven program

User Interface
21 key membrane switch keypad with 4 multiple function soft keys

Data Logging
Records program start time and date, sample volume collected, sample volume remaining, stores up to 400 sample collection times/dates, all program entries, operational status including number of minutes or pulses to next sample, bottle number, number of samplers collected, number remaining, sample volume collected, volume remaining, sample identification, and all logged data

Up to 200 events logged, including alarm conditions, program run/stop events, etc.

Set Point Sample Trigger
When equipped with integral flow meter, pH/temperature/ORP meter, conductivity, and/or DO monitoring options, sampling can be triggered upon an upset condition when field selectable limits are exceeded

Sampling Modes
Multiple bottle time, multiple bottle flow, composite time, composite flow, composite multiple bottle time, composite multiple bottle flow, flow with time override, variable interval, start/stop, and level actuation

Overload Protection
5 amp dc line fuse for pump; 5 amp dc line fuse for ac power converter

Diagnostics
Tests keypad, RAM, ROM, pump, distributor, liquid sensor, and velocity signal

Program Languages
Czech, Danish, English, French, German, Swedish

Program Lock
Access code protection prevents tampering

Dimensions
Standard and 12 Bottle Base:
50.5 cm x 69.4 cm (10.9 x 27.3 in.)

Compact Base:
44.1 x 61 cm (17.4 x 24 in.)

Composite Base:
50.28 x 79.75 cm (19.8 x 31.4 in.)

Weight
Standard and 12 bottle base:
15 kg (35.6 lb.) with (24) 1-L polyethylene bottles

14.8 kg (32.6 lb.) with 3-gal polyethylene container

Compact Base:
12.2 kg (27 lb.) with (24) 575-mL polyethylene bottles

12.9 kg (28.3 lb.) with 3-gal polyethylene container

Composite Base:
15 kg (36 lb.) with (12) 950-mL glass bottles

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Specifications *continued*

Communications

EPROM Flash Memory
Via RS232; permits embedded software upgrades in the field; requires ac power

Serial Interface
RS-232 compatible; allows on-site collection of stored data

Modem
14,400 bps, V.32 bis, V.42, MNP2-4 error correction

V 0.42 bis MNP5 data compression

MNP10-EC Cellular Protocol, optional cell phone—FCC approved

Pager
Sends alarm codes to up to three separate pager telephone numbers or to a dc running data analysis software

Program Delay
1 to 9,999 minutes or external flow pulses in one unit increments

Sampler start time/date and time/day of week

Sampler start on external 12 Volt or contact closure input

Sample Bottle Capacity

Standard Base Capacity
- (24) 1 L polyethylene and/or 350-mL glass bottles
- (8) 2.3 L polyethylene and/or 1.9 L glass bottles
- (4) 3.8 L (1 gal) polyethylene and/or (4) 3.8 L (1 gal) glass bottles
- (2) 3.8 L (1 gal) polyethylene and/or (2) 3.8 L (1 gal) glass bottles
- 20.8 L (5.5 gal) polyethylene composite container or (1) 15.1 L (4 gal) polyethylene composite container or (1) 20 L (6 gal) polyethylene or (1) 10 L (3 gal) polyethylene or (1) 9.5 L (2.5 gal) glass

Compact Base Capacity
- (24) 575 mL polyethylene bottles
- (8) 950 mL glass bottles
- 11.4 L (3 gal) polyethylene bottle
- 9.5 L (2.5 gal) glass bottle

12 Bottle Base Capacity
- (12) 950 mL glass bottles
- 10 L (3 gal) polyethylene bottle
- 9.5 L (2.5 gal) glass bottle

Composite Base Capacity
(1) 22.7 L (6 gal) polyethylene bottle

Sampling Features

Multiple Programs
Stores up to five sampling programs

Cascade
Allows using two samplers in combination where the first sampler at the completion of the program initiates the second

Upset Sampling
When equipped with integral flow meter, pH/temperature/ORP, conductivity, and/or DO monitoring options, or triggered from an external control device, sampling can be triggered upon an upset condition when field selectable limits are exceeded; concurrent with normal sampling routine, sample liquid is deposited in designated “Trouble Bottle(s)”

Status Display
Alerts operator to low main battery, low memory battery, plugged intake, jammed distributor arm, sample collected, and purge failure

Automatic Shutdown
Multiple Bottle Mode: After complete revolution of distributor arm (unless Continuous Mode is selected)

Composite Mode: After preset number of samples have been delivered to composite container, from 1 to 999 samples, or upon full container.

Sample Volume
Programmed in one mL increments from 10 to 9,999 mL

Sample Volume Repeatability
±5% typical

Interval Between Samples
Selectable in single increments from 1 to 9,999 flow pulses (momentary contact closure 25 ms or 5 to 12 Vdc pulse; 4-20 mA interface optional), or 1 to 9,999 minutes in one minute increments

Multiplex (Multiple Bottle Mode)
Programming allows multiple samples per bottle and/or multiple bottles per sample collection

Continued on next page.

Specifications continued

Sample Pump and Strainer

Sample Pump
High-speed peristaltic, dual roller, with 0.95 ID x 0.16 OD cm (3/8 ID x 5/8 in. OD) pump tube

Pump Body
Impact/corrosion resistant, glass reinforced Delrin®

Vertical Lift
8.23 m (27 ft.) maximum

Note: Remote Pump Option recommended for lifts from 6.7 to 10.7 m (22 to 35 ft.)

Sample Transport Velocity
0.61 cm/s (2 ft./s) minimum, at 4.6 m (15 ft.) vertical lift in a 0.95 cm (3/8-in.) ID intake tube

Pump Flow Rate
60 mL/s at 0.91 m (3 ft.) vertical lift in a 0.95 cm (3/8-in.) ID intake line

Liquid Sensor
Non-wetted, non-contact, ultrasonic

Intake Purge
Air purged automatically before and after each sample; duration automatically compensates for varying intake line lengths

Pump/Controller Housing
High impact injection molded ABS; submersible, watertight, dust tight, corrosion and ice resistant; NEMA 4X, 6

Internal Clock
Indicates real time and date; 0.007% time base accuracy

Manual Sample
Initiates a sample collection independent of program in progress

Intake Rinse
Intake line automatically rinsed with source liquid prior to each sample, from 1 to 3 rinses

Intake Retries
Sample collection cycle automatically repeated from 1 to 3 times if sample not obtained on initial attempt

Intake Tubing
9.5 mm (3/8 in.) ID vinyl or 9.5 mm (3/8 in.) ID Teflon® lined polyethylene

Intake Strainers
Choice of Teflon® and 316 stainless steel construction, and all 316 stainless steel in standard size, high velocity, and low profile for shallow depth applications

Factory Installed Options

PH/TEMPERATURE/ORP METER

Control/Logging
Field selectable to log pH/temperature or ORP independent of sample operation or to control sample collection in response to exceeding low/high setpoints

pH/Temperature Sensor
Temperature compensated; impact resistant ABS plastic body

Combination electrode with porous Teflon® junction

Measurement Range
pH: 0 to 14 pH

Temperature: -10 to 105°C (-14 to 221°F)

Operating Temperature
-18 to 80°C (0 to 176°F)

Dimensions
1.9 x 15.2 cm (0.75 x 6 in.) with 1.9 cm (0.75 in.) MPT cable end

DISSOLVED OXYGEN METER

Control/Logging
Field selectable to log dissolved oxygen independent of sampler operation or to control sample collection in response to exceeding low/high setpoints

Measurement Method
Galvanic

Sensor
Temperature compensated; impact resistant polypropylene body

Measurement Range
0 to 20 mg/L

Resolution
0.01 mg/L

Accuracy
±3% of reading or 0.1 mg/L

Operating Temperature
0 to 50 °C (32 to 122 °F)

Dimensions
1.7 x 15.7 cm (0.65 x 6.25 in.) with 1.9 cm (0.75 in.) MPT cable end

CONDUCTIVITY METER

Control/Logging
Field selectable to log conductivity independent of sampler connection or to control sample collection in response to volume exceeding low/high setpoints

Sensor
Temperature compensated; impact resistant polypropylene body

Measurement Range
0 to 20 mS/cm

Resolution
0.01 mS/cm or 1 mS/cm

Accuracy
±2% of reading or 0.01 ms

Operating Temperature
0 to 50°C (32 to 122°F)

Dimensions
1.7 x 15.2 cm (0.67 x 6 in.) with 1.9 cm (0.75 in.) MPT cable end

SUBMERGED PRESSURE TRANSDUCER

Material
Epoxy body with stainless steel diaphragm

Cable
Polyurethane sensor cable with air vent

Length: 7.6 m (25 ft.) standard; 20 m (15.24 ft.) optional

Sensor Dimensions
2 x 3.8 x 12.7 cm (0.8 x 1.5 x 5 in.)

Maximum Range
5 psi, 0.063 to 3.5 mm (0.018 to 11.5 ft.)
15 psi, 0.063 m to 10.5 m (0.018 to 34.6 ft.)

Maximum Allowable Level
3x over pressure

Operating Temperature
0 to 71°C (32 to 160°F)

Continued on next page.

Specifications *continued*

Compensated Temperature Range
0 to 30°C (32 to 86°F)

Air Intake
Atmospheric pressure reference is desiccant protected

SUBMERGED AREA/VELOCITY PROBE

Method
Velocity: Doppler Principle

Level: Pressure Transducer

Material
Polymer body, 316 series stainless steel diaphragm

Cable
8-conductor urethane jacketed sensor cable with air vent

Length: 7.6 m (25 ft.) standard, 76.2 m (250 ft.) maximum

Sensor Dimension
12.7 x 3.8 x 2 cm (5 x 1.5 x 0.8 in.)

Velocity
Velocity Accuracy: 2% of reading

Zero Stability: <0.015 m/s (0.05 ft./s)

Response Time: 4.8 seconds

Profile Time: 4.8 seconds

Range: -1.52 to 6.1 m/s (-5 to 20 ft./s)

Resolution: 0.3 cm/s (0.01 ft./s)

Depth
Depth Accuracy:
±1.37 mm (0.054 in.) at 0 to 3.35 m (0 to 11 ft.)
±4.09 mm (0.161 in.) at 0 to10.06 m (0 to 33 ft.)

Maximum Allowable Level:
3x over pressure

Operating Temperature:
0 to 71 °C (32 to 160 °F)

Compensated Temperature Range:
0 to 30 °C (32 to 86 °F)

Temperature Error:
0.005 to 3.5 m ±0.0022 m/°C (0.018 to 11.5 ft. ±0.004 ft./°F)
0.005 to 10.5 m ±0.006 m/°C (0.018 to 34.6 ft. ±0.012 ft./°F)
Maximum error within compensated temperature range per degree of change.

Velocity Induced Error on Depth (patent pending):
0 to 3.05 m/s (0 to 10 ft./s) = 0.085% of reading

Air Intake:
Atmospheric pressure reference is desiccant protected

Rain Gauge Input
For use with Hach Sigma Tipping Bucket Rain Gauge

The Sampler Program can be initiated upon field selectable rate of rain

Sampler records rainfall data

Each tip = 0.25 mm (0.01in.) of rain

Analog Input Channels
Up to 3 additional data logging channels record data from external source(s)

Field assignable units:
-4.0 to +4.0 Vdc and 0 to 20 mA

4-20 mA Output
Up to 2 output signals available

User assignable

Maximum Resistive Load: 600 ohms

Output Voltage: 24 Vdc, no load

Isolation Voltage:
Between flow meter and 4-20 mA output, 2500 Vac
Between the two 4-20 mA outputs, 1 500 Vac

Alarm Relays
(4) 10 amp/120 Vac or 5 amp/220 Vac form C relays

±0.1% FS error

User assignable for any logged internal or external data channel or assignable event

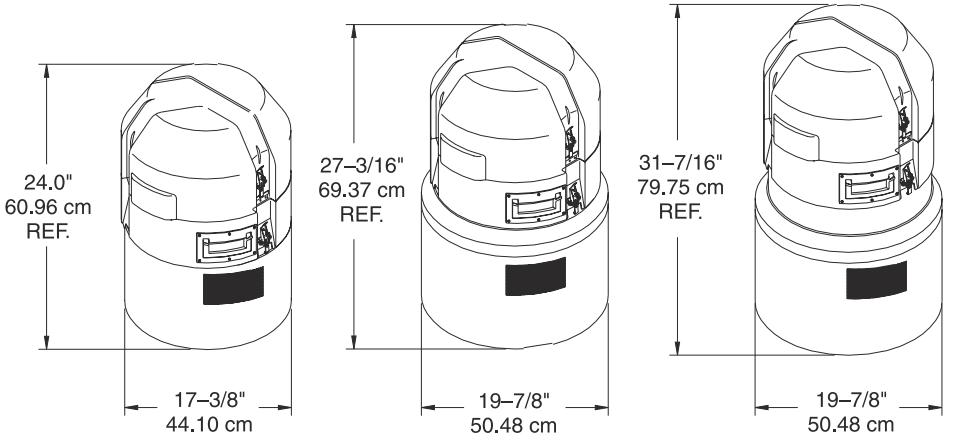
**Specifications subject to change without notice.*

Engineering Specifications

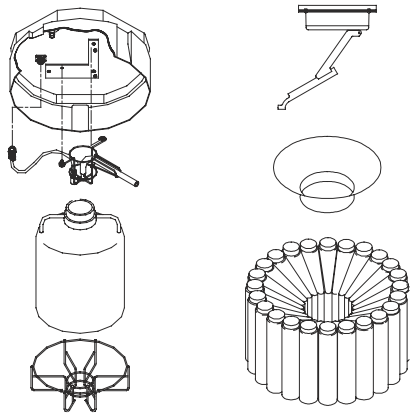
1. The sampler shall be suitable for the representative collection of toxic and conventional pollutants.
2. The sampler shall incorporate a high-speed peristaltic pump for collection of the sample liquid.
3. The sample pump shall produce a minimum intake velocity of 2 feet per second at 15 feet vertical lift in a 3/8-inch ID intake line.
4. All electromechanical components shall be protected within a totally sealed housing conforming to NEMA 4X and 6 standards for submersible, watertight, dust-tight, and corrosion resistant operation.
5. The unit shall have interchangeable compact and standard bases.
6. The sampler base shall be double wall insulated constructed of beige ABS plastic.
7. The sampler shall be convertible to discrete operation by installing a modular distribution assembly and bottle set.
8. The sampler shall be convertible to composite operation by installing a composite container
9. The controller shall have a hermetically sealed 19 key, multiple function keypad and self-prompting 8 line x 40 character back-lit liquid crystal graphics display.
10. The sampler shall allow for the following integral options: level meter, flow meter, pH-temperature/ORP meter, temperature meter, dissolved oxygen meter, conductivity meter, rain gauge input, and three (3) analog inputs.
11. The unit shall have the capability of retaining up to five complete sampling programs in memory.
12. The sampler shall be capable of operation in a timed or flow proportional mode.
13. The sampler shall be capable of rinsing the intake line with the source liquid immediately prior to sample collection.
14. In the event that sample liquid is not obtained on the initial attempt, the sampler shall automatically purge and repeat the collection cycle.
15. To permit sampling during work shifts or other specific periods, the sampler shall be programmable for up to twenty-four start/stop intervals.
16. The sampler case shall be of high impact vacuum-formed ABS plastic, 3-section construction.
17. The base(s) shall be insulated, double wall construction.
18. The base shall hold (select: standard base; 32 pounds of ice with the 350 mL glass bottles in place, compact base; 8.5 pounds of ice with the 575 mL polyethylene bottles in place).
19. The sampler shall be provided with a 4-20mA interface allowing flow proportional sampling from an external flow meter analog output.
20. The sampler shall be provided with a liquid level actuator for program initiation based on a rising liquid level.
21. The sampler shall be provided with a full bottle cut off switch.
22. The sampler shall be the Sigma Model 900 Max Portable Sampler, manufactured by Hach Company

Dimensions

The Hach Sigma 900 Max Portable Sampler is designed for indoor or outdoor use. No secondary enclosure is required when operated within the specified temperature range. The sampler consists of three main sections—the top cover, the center control system, and the bottle/base section held together by stainless steel latches which serve as the connection point for the optional suspension harness. The lockable top cover protects the controller from extreme weather and unauthorized use.



With Compact Base | With Standard Base | With Standard 6 gal Poly Container Base



Full Bottle Shut-off Installation | *Bottle Configuration*

Ordering Information

Controller and Base Options

8930	Sigma 900 Max Portable Sampler, with controller, center sections, and top cover (complete sampler requires adding a base option)
8975	Compact Insulated Base
8976	Standard Insulated Base
8958	12 Bottle Base
8561	Composite Insulated Base

Bottle Options

6559	2.5 Gallon Glass, with Teflon-lined cap
1918	3 Gallon Polyethylene, with cap
6494	6 Gallon Polyethylene, with cap
1502	Container Support
8996	Retainer/Full Container Shut-off
737	Set of (24) 1 Liter Polyethylene, with caps
1369	Set of (24) 575 mL Polyethylene, with caps
2348	Set of (8) 950 mL Glass, with Teflon lined caps
2217	Set of (4) 1 Gallon Polyethylene, with caps
2216	Set of (4) 1 Gallon Glass, with Teflon lined caps
2215	Set of (2) 1 Gallon Polyethylene, with caps
2214	Set of (2) 1 Gallon Glass, with Teflon lined caps

Bottle Retainers (for multiple bottles)

2620	Retainer for (12) 950 mL Glass Bottles
2189	Retainer for (24) 350 mL Glass Bottles
1422	Retainer for (8) Glass, (8) Poly, (24) 575 mL Poly, and (24) 1 Liter Poly Bottles
2347	Retainer for (8) 950 mL Glass Bottles
2190	Retainer for 1 Gallon Glass and 1 Gallon Polyethylene Bottles

Distributors

8582	Distributor with Arm for 24 Bottle, Standard Case and 12 Bottle Base
8580	Distributor with Arm for 24 Bottle Compact Base
8584	Distributor with Arm for 2, 4 and 8 Bottle Standard Base and 8 Bottle Compact Base
8583	Distributor Arm only for 24 Bottle Standard Base and 12 Bottle Base, requires distributor assembly
8581	Distributor Arm for 24 Bottle with Compact Base, requires distributor assembly
8585	Distributor Arm for 2, 4 and 8 Bottle with Standard Base, requires distributor assembly

Continued on next page.

Ordering Information *continued*

Intake Tubing and Strainers

922	25 ft. Teflon Lined Polyethylene Tubing, 3/8-in. ID (requires Prod. No. 2186 Connection Kit)
2186	Connector Kit, for Teflon lined polyethylene tubing
920	25 ft. Vinyl Intake Tubing, 3/8-in ID
2070	Strainer, all 316 stainless steel
2071	Strainer, for shallow depth applications, all 316 stainless steel
4652	Strainer, high velocity and shallow dept

Pump Tubing

4600-15	Pump Tubing, 15 ft.
8964	Pump Tube Insert

Integral Water Quality Parameters

8793	Integral pH-Temp/ORP Option, factory installed
3328	pH-Temperature Probe (grounded), with 25 ft. cable
3227	DO and Conductivity Receptacle, factory installed
3216	Kit, D.O. Probe, with 25 ft. Cable
3223	Conductivity Probe only, with 25 ft. cable

4-20 mA Input

8795	Three (3) Analog Input Data Logging Channels

4-20 mA Output

8797	First 4-20 mA Output
8798	Second 4-20 mA Output

Alarm Relays

8984	Four (4) Alarm Relays

Modem

1602	Modem, 14,400 baud

Rain Gauge

8800	Rain Gauge Receptacle, factory installed

Cables and Interfaces

1727	Sampler or Flow Meter to PC Cable
3358	RS-232 Extension Cable

Accessories

1355	Suspension Harness (suspends the sampler)
9542	Manhole Support Bracket/Spanner, 18 to 28 in.
9557	Manhole Support Bracket/Spanner, 28 to 48 in.
5713000	Manhole Support Bracket, 18 to 27 in.
943	Liquid Level Actuator, 25 ft. cable

Lit. No. 2565
XXX Printed in U.S.A.

At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

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