

Hach Sigma 900 MAX Refrigerated Samplers

Features and Benefits

Applications

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

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 (CT/VV) 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. (The factory-installed integral flow meter option is required for CT/VV sampling.)

*Patent #5587926

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.

Sealed Refrigeration Resists Corrosion

The Hach Sigma 900 MAX Refrigerated Sampler fixed-site sampler is designed to endure humid and highly corrosive environments. The controller is sealed for maximum protection from the elements and is available with an optional stainless steel refrigerator. The NEMA 4X, 6 housing isolates all electro-mechanical components while the keypad, switches, and display are covered by a waterproof, corrosion-resistant polyester membrane. Sealed connectors and pump shaft further guarantee environmental integrity.



Sampling

WW

C

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

Accurate Temperatures

The custom-designed air-sensing thermostat controls temperature in accordance with USEPA and international guidelines. A high efficiency compressor/condenser assembly, wraparound evaporator, and rigid foam insulation ensure optimum 39°F (4°C) sample temperature. A forced air blower and front ventilation provide the flexibility to position the sampler either against a wall or inside a sampler enclosure.

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).

Continued on next page.

DW = drinking water WW = wastewater municipal PW = pure water / power
IW = industrial water E = environmental C = collections FB = food and beverage



Be Right™

Features and Benefits *continued*

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.

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.

Specifications*

General

Sampler Housing

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

Refrigerator: 22 gauge steel (optional stainless steel) with vinyl laminate over-coating

Refrigeration Components and Copper Plumbing: corrosion protected with conformal coating

Sample Cooling

1/10 HP, 75 Watt, 400 BTU/hr compressor

120 CFM condenser fan

Three-sided wraparound plate type evaporator

Rigid foam insulation

Air sensing thermostat capable of maintaining sample liquid at 4°C (39°F) in ambient temperature to 49°C (120°F) maximum; accurate to ±0.8°C (1.5°F)

Magnetic door seal

Sample Containers

Glass: (1) 2-1/2 gal., (2) 1 gal., (4) 1 gal., (8) 950 mL, (8) 1.9 L, (12) 950 mL, (24) 350 mL

Polyethylene: (1) 3 gal., (1) 4 gal., (1) 5-1/2 gal., (2) 1 gal., (4) 1 gal., (8) 2.3 L, (24) 575 mL, (24) 1 L

Temperature

General Operating:
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

115 Vac, 60 Hz (230 Vac optional)

Compressor Current: 1.5 to 2.0 amps running

Locked Rotor Current: 12 amps

Overload Protection: 5 amp dc line fuse for pump, 1 amp dc line fuse (ac power converter)

Compressor: Thermal overload relay opens at 110 °C (230 °F)

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; internal battery draws less than 40 µA

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 (i.e. level, flow velocity, rainfall, stream temperature, pH or ORP, any logged external inputs)

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

Diagnostics

Tests keypad, display, ROM, pump, distributor

Program Languages

Czech, Danish, English, French, German, Italian, Swedish

Program Lock

Access code protection prevents tampering

Dimensions

61 x 61 x 112 cm (24 x 24 x 44 in.)

Weight

63 kg (140 lb.)

Continued on next page.

Specifications *continued*

Communications

EPROM Flash Memory

Via RS-232; permits embedded software upgrades in the field; requires ac power

Serial Interface

RS-232 compatible; 19,200 baud maximum, 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

Program Delay

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

Programmable start time/day and time/day/week

Pager

Alarm codes sent to up to three separate pager telephone numbers

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

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

Mode 1: Sampling can be triggered upon an upset condition when field selectable limits are exceeded

Mode 2: 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

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

Internal Clock

Indicates real time and date; 0.007% time base accuracy

Manual Sample

Initiates a sample collection independent of program in progress

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

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

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

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

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

Continued on next page.

Specifications *continued*

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

pH Measurement Range: 2 to 12

Operating Temperature:
0 to 80°C (32 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

Integral Flow Meter

Control/Logging: Field selectable to log flow/level independent of sampler operation or to pace sample collection in proportion to flow

Operating Temperature:
0 to 65.5°C (32 to 150°F)

Monitoring Intervals: 1, 2, 3, 5, 6, 10, 12, 15, 20, 30, and 60 minutes

Accuracy: 0.2% best straight line for combined nonlinearity, hysteresis, and repeatability

Time Based Accuracy:
±1 second per day

Units of Measurement

Level: in., m, cm, ft.

Flow: gps, gpm, gph, Lps, Lpm, Lph, mgd, cfs, cfm, cfh, cfd, m³s, m³m, m³h, m³d

Totalized Flow: gal., ft.³, acre-ft., L, m³

Totalizers: Resettable and non-resettable

Field Selectable Scaling Constant and Flow Units: gal., ft.³, acre-ft., m³, and L

Data Storage: Capacity: 402 days of level, velocity, and rainfall readings at 15 minute intervals plus 300 events.

Data Types: level, velocity, rainfall and water quality

Storage Mode: wrap or slate

Output Conditions: Set point on level, velocity, rainfall, flow, flow rate of change and water quality

Communications: Serial connection to IBM compatible computer with Hach Sigma data analysis software

Integral Temperature Meter

Measures and records ambient or sample stream temperature

Control/Logging: Field selectable to log temperature independent of sampler operation or to control sample collection in response to value exceeding low/high set points

Recording Intervals: 1, 2, 3, 5, 6, 10, 12, 15, 20, 30, and 60 minutes

Sensor: Platinum RTD with 316 stainless steel body

Range: 0 to 100°C (32 to 212°F)

Accuracy: ±1°C (1.8°F)

Operating Temperature:
0 to 80°C (32 to 176°F)

Dimensions:
0.3 x 20.3 x 1.9 cm (0.125 x 8 x 0.75 in.)

Cable Length: 4.6 m (15 ft.)

Submerged Pressure Transducer

Material: Epoxy body with stainless steel diaphragm

Cable: Polyurethane sensor cable with air vent; 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: 2.5 psi, 0 to 5.76 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)

Air Intake: Atmospheric pressure reference is desiccant protected

Continued on next page.

Specifications *continued*

Submerged Depth/Velocity Sensor Velocity Measurement

VELOCITY MEASUREMENT

Range

-1.52 to 6.10 m/s (-5 to 20 ft./s)

Zero Stability

0.015 m/s (<0.05 ft./s)

Accuracy

±2% of reading

Operating Temperature

0 to 60°C (32 to 140°F)

Typical Minimum Depth for Velocity

2 cm (0.8 in.)

Method

Doppler ultrasonic

Transducer Type

Twin 1 MHz piezoelectric crystals

LEVEL MEASUREMENT

Range

Standard: 0 to 3 m (0 to 10 ft.)

Extended: 0 to 9 m (0 to 30 ft.)

Accuracy

±0.16% full scale ±1.5% of reading at constant temp (±2.5°C)

±0.20% full scale ±1.75% of reading from 0 to 30 °C (32 to 86°F)

±0.25% full scale ±2.1% of reading from 0 to 70 °C (32 to 160°F)

Maximum Allowable Level

Standard: 10.5 m (34.5 ft.)

Extended: 31.5 m (103.5 ft.)

Air Intake

Atmospheric pressure reference is desiccant protected

Method

Pressure transducer with stainless steel diaphragm

GENERAL

Material

Noryl® plastic outer shell with epoxy potting

Power Consumption

~1.2 W at 12 Vdc

Cable

Urethane sensor cable with air vent

Connector

Hard anodized (satisfies Military Spec 5015)

Cable Length

Standard: 9, 15, 23, and 30.5 m (30, 50, 75 and 100 ft.)

Custom: greater than 30.5 m (100 ft.)

Maximum: 76 m (250 ft.)

Cable Diameter

0.91 cm (0.36 in.)

Sensor Dimensions

2.3 x 3.8 x 13.5 cm (0.9 x 1.5 x 5.3 in.)

Velocity Sensor and In-Pipe Ultrasonic Level (optional)

Nose Angle

20 degrees from horizontal

Cable Length

Standard: 7.6 m (25 ft.)

Custom: to 76 m (250 ft.)

Cable Diameter

0.57 cm (0.225 in.)

Materials

Sensor: polymer

Cable: urethane

Mounting hardware: stainless steel

Dimensions

1.12 x 3.81 x 6.86 cm
(0.44 x 1.5 x 2.7 in.)

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 (0.01 in.) 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

Optically isolated

600 ohm maximum load per output each

Expanded Memory

Increases memory from 18,432 data points to 116,736 points (512 K)

Alarm Relays

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

User assignable with settable trip points

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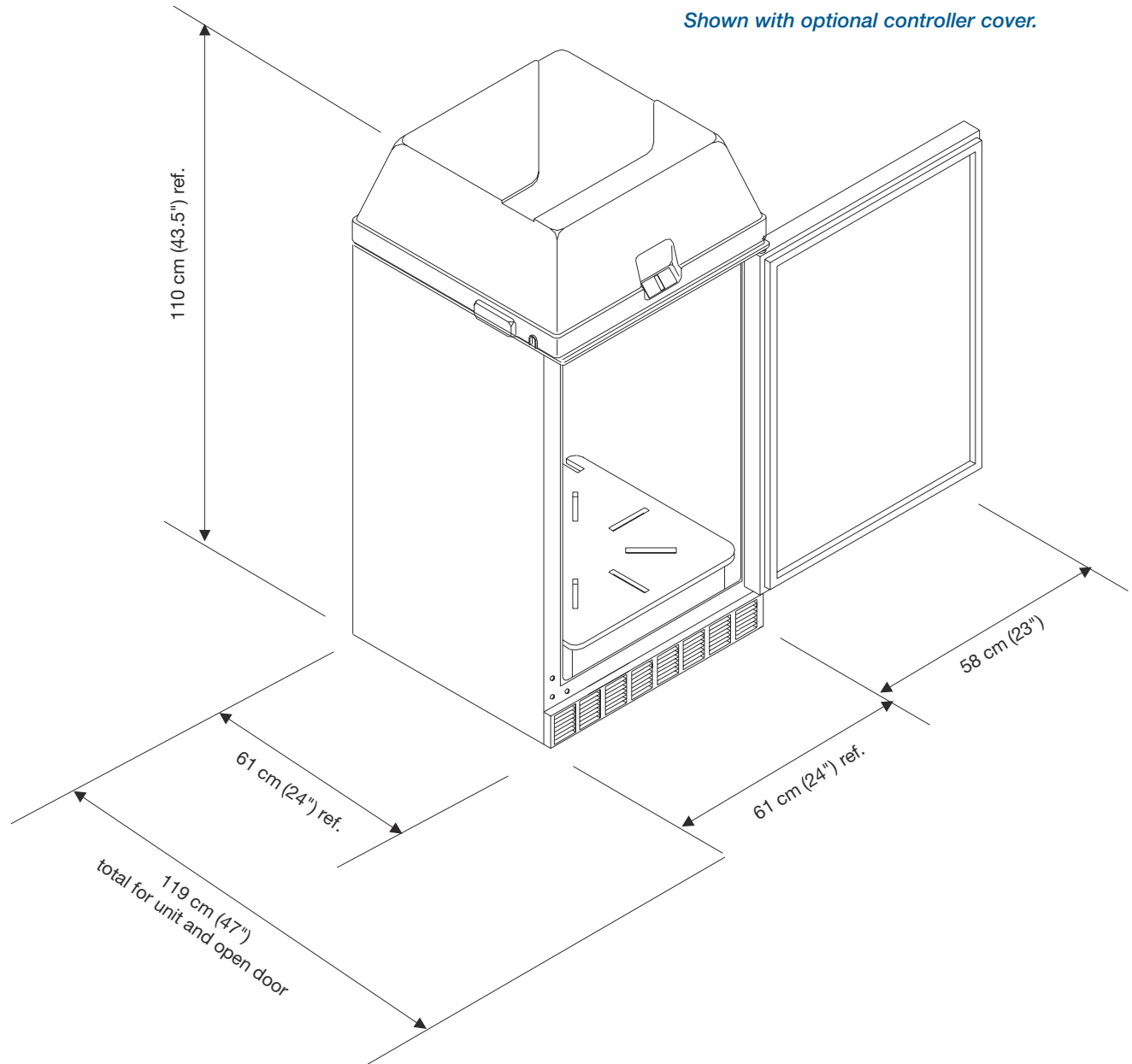
*Specifications subject to change without notice.

Engineering Specifications

1. The refrigerated wastewater sampler which will operate on AC power.
2. The sampler container(s) shall be located in a refrigerated compartment.
3. The refrigerator compartment shall be insulated with 1.5-inch rigid foam insulation.
4. The refrigeration system shall have a 120 CFM condenser fan and shall be controlled by an air sensing thermostat maintaining samples at 4°C in ambient temperature to 120°F.
5. 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.
6. The refrigerated sampler shall be suitable for the representative collection of toxic and conventional pollutants in a single composite bottle or multiple bottles.
7. The sampler shall incorporate a high-speed peristaltic pump for collection of the sample liquid.
8. The sampler pump body shall be constructed of corrosion resistant materials.
9. The sample liquid shall be under pumped flow and shall not pass through a metering chamber, valves or distribution plate.
10. 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.
11. The sampler 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.
12. The sampler pump shall purge the intake line before and after each sample. The duration of the purge shall be automatically adjusted for varying intake line lengths.
13. The sampler pump tubing shall be 3/8-inch ID and 5/8-inch OD medical grade silicone.
14. The sampler shall be provided with (select: 10 ft., 25 ft., or 100 ft.) of 3/8-inch ID (select: Teflon lined polyethylene or vinyl) intake tubing and a weighted strainer constructed of 316 stainless steel and Teflon.
15. The sampler controller shall be programmable for single bottle and multiple bottle operation. For multiple bottle operation, the controller shall be programmable for 2, 4, 8, and 24 bottle configurations.
16. The sampler shall be convertible to composite operation by removing the modular distribution assembly and replacing the discrete bottle set with a composite container.
17. The sampler shall be furnished with (1) 3-gallon polyethylene, (1) 2.5 gallon glass, or (1) 6-gallon polyethylene container.
18. The sampler shall have the capability of retaining up to five complete sampling programs in memory.
19. The sampler shall be capable of operation in a timed or flow proportional mode.
20. The sampler shall be capable of rinsing the intake line with the source liquid immediately prior to sample collection.
21. In the event that sample liquid is not obtained on the initial attempt, the sampler shall automatically purge and repeat the collection cycle.
22. To permit sampling during work shifts or other specific periods, the sampler shall be programmable for up to twenty-four start/stop intervals.
23. The sampler shall allow for the following integral options: level, flow, pH-Temperature/ORP, temperature, dissolved oxygen, conductivity, rain gauge input, and three (3) analog inputs.
24. The sampler shall be the Sigma Model 900 MAX Refrigerated Sampler, manufactured by Hach Company.

Dimensions

The Hach Sigma 900 MAX Refrigerated Sampler is designed for outdoor use. Allow complete drainage of the intake line and prevent cross-contamination between samples. Install the sampler as close to the sample source as site conditions permit to increase pump tube life and optimize overall sampler performance. Install the sampler above the sample source, with the intake tubing sloping downward to the sample. (This sampler is not designed for hazardous locations where combustible environments may exist.)



Ordering Information

Refrigerator/Controller Options

Controllers include pre-cut section of pump tube insert (Prod. No. 8957).

- 8933** Sigma 900 MAX Refrigerated Sampler; vinyl, with controller, 115 Vac
98933 Sigma 900 MAX Refrigerated Sampler; stainless steel, with controller, 115 Vac

Bottle/Sampling Options

Other container options are available. Please contact Hach or a local distributor for details.

Multiple Bottle Sampling

- 732** 350-mL Glass Bottles; set of 24, with Teflon-lined caps
1056 Retainer for above
737 1-liter Polyethylene Bottles; set of 24, with caps
1322 Retainer for above
1511 Bottle Tray
8562 Distributor Arm

Single Bottle Sampling

- 1918** 3-gallon Polyethylene Container; with cap
6494 6-gallon Polyethylene Container; with cap
6559 2.5-gallon Glass Container; with Teflon-lined cap
3527 Tubing Extension; for use with 2.5- and 3-gallon containers
8847 Full Container Shut off
8986 Tubing Support Assembly, with tubing insert

Intake Tubing and Strainers

- 920** Vinyl Tubing; 25 ft., 3/8-in. ID
922 Teflon-lined Polyethylene Tubing; 25 ft., 3/8-in. ID (requires Prod. No. 2186 connector kit)
926 Strainer; Teflon/stainless steel
2070 Strainer; stainless steel
2071 Strainer; for shallow depth applications, stainless steel
2186 Connector Kit; for Teflon-lined tubing

Pump Tube Replacement

- 4600-15** Pump Tubing; 15 ft.
4600-50 Pump Tubing; 50 ft.
8957 Pump Tube Insert

Integral Water Quality Parameters

- 2080** ORP Probe; with 25-ft. cable
3227 DO and Conductivity Receptacle; factory installed
3216 DO Probe Kit; with 25-ft. cable
3225 Conductivity Probe Kit; with 25-ft. cable
3328 pH-Temperature Probe; grounded, with 25-ft. cable
8793 Integral pH-Temp/ORP Option; factory installed

Analog Inputs

- 8795** Three (3) Analog Input Data Logging Channels

4-20 mA Output

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

Cables and Interfaces

- 1727** Sampler or Flow Meter to PC Cable, 10 ft.
2021 4-20 mA Interface
3358 RS-232 Extension Cable

Alarm Relays

- 8984** Alarm Relays; qty. 4, includes NEMA 4X relay box with 10-ft. cable

Weatherguard Enclosure

- 6994** Fiberglass Refrigerated Sampler Enclosure
6880 Heater; 120 Vac

Factory Installed Options for Constant Time/Variable Volume Sampling Application

- 4041** Integral Area x Velocity Flow Meter
8794 Integral Flow Meter
8851 Integral Ultrasonic Flow Meter

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.

For current price information, technical support, and ordering assistance, contact the Hach office or distributor serving your area.

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In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.



Be Right™