Sigma 930 and 930T
Area Velocity Flow Meters

Flow

Sigma 930 and Sigma 930T Flow Meters are the most advanced flow meters of their kind. They support three interchangeable sensors, have an exceptionally long battery life, increased data storage, and offer optional interfaces with samplers.

- *The Sigma 930 flow meter is designed for long-term/ permanent flow studies with approximately 365-day battery life and a rugged NEMA 6P PVC enclosure.*

- *The Sigma 930T flow meter has the added versatility of integrated modem technology.*

Both models provide a single supplier solution for the collection and integration of information throughout wastewater and collection system. Get continuous, real-time access to data in remote locations.

Features and Benefits

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Versatile Set-up

Use a single Sigma 930 Area Velocity Flow Meter or Sigma 930T Remote Communications Area Velocity Flow Meter for multi-point and/or redundant monitoring. Up to three depth and velocity sensors can be used with a single meter.

Long Battery Life

The meters will typically operate for 140 to 365 days based on model, sensor configuration, logging interval, and reporting interval.

Reliability and Wireless Operation with Multiple Communications Options

The Sigma 930T Remote Communications Flow Meter bundles all the advantages of the Sigma 930 Flow Meter with the added versatility of integrated modem technology for reliable, cost-effective wireless flow monitoring for long term/permanent flow studies or temporary installations in inaccessible locations. Choose from RS232, landline telephone, wireless CDMA, and 1XRTT communications to retrieve data. Web-based data retrieval and presentation lets users distribute data via the internet. For networked computer systems, data can be routed over the Internet.

Optional Interfaces for Rain Gauges, Samplers, and Modem

An optional rainfall-logging feature records and characterizes rain events—a true innovation in water monitoring. The optional sampler pacing capabilities are ideal for CSO and stormwater monitoring. Add an optional internal modem to the Sigma 930 Flow Meter to automate data retrieval, paging, and reporting.

Rugged Construction

The enclosure of both the Sigma 930 and 930T flow meters are NEMA 6P-sealed to withstand submergence and prolonged surcharge conditions.

Accurate Depth Measurement

These flow meters automatically correct the effects of temperature on depth measurement using Hach's patented* drawdown correction feature.

*Patent number 5691914

Superior Submersible Area Velocity Sensor for Open Channel Applications

Sigma 930 and 930T flow meters use advanced ultrasonic, twin one-MHz Doppler technology for flow measurements. This technology avoids signal dropouts and ensures high levels of accuracy in low-flow, full-pipe, or reversed-flow conditions. Installation is fast and single point atmospheric calibration is easy. The hydrodynamic body and side-mounted cable maintains accuracy by reducing turbulence.

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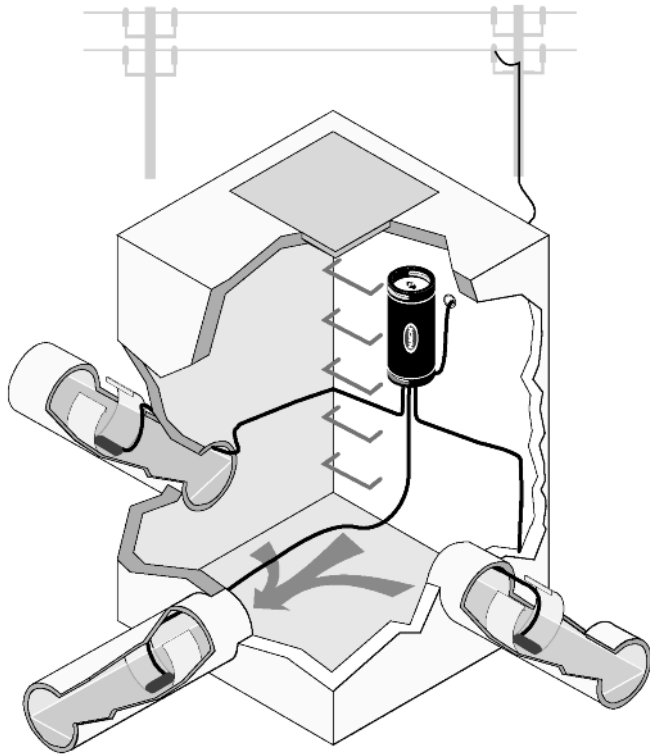
HACH®

Be Right™

Applications

Shown with landline modem.

**Sigma 930
Area Velocity Flow Meter**

Ideal for long-term flow monitoring, sanitary sewer evaluation studies, CSO studies and monitoring, NPDES stormwater compliance, and permanent collection system monitoring.

**Sigma 930T
Remote Communications Area Velocity Flow Meter**

Ideal for permanent collection system monitoring, long-term flow monitoring, sanitary sewer evaluation studies, and CSO and SSO studies and monitoring.
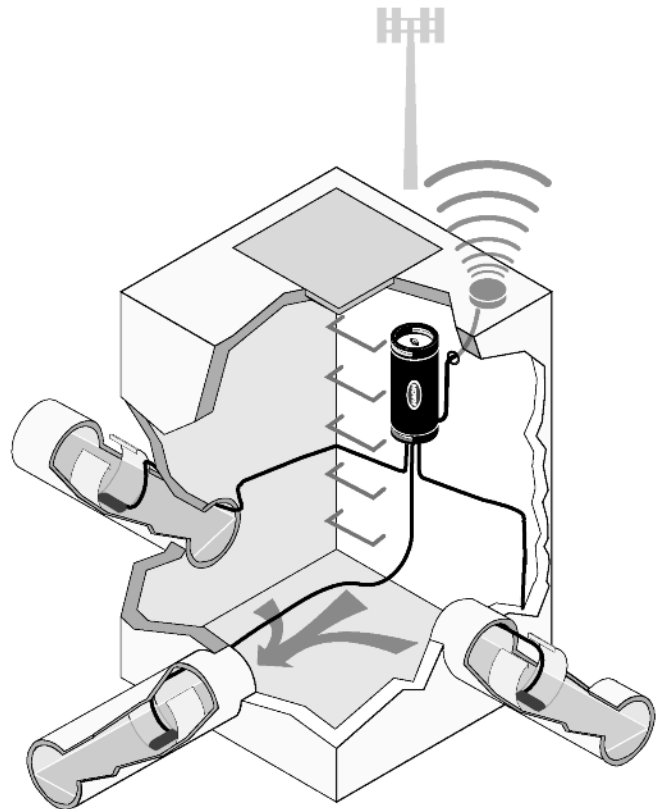
Shown with burial antenna.

Specifications*

Flow Meter

Units of Measurement
Depth: m, cm, ft., in.

Flow: gps, gpm, gph, lps, lpm, lph, mgd, afd, cfs, cfm, cfh, cfd, m^3s, m^3m, m^3h, m^3d

Totalized Flow: L, m^3, $ft.^3$, gal., acre-ft.,

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

Operating Temperature
-18 to 60°C (0 to 140°F)

Storage Temperature
-40 to 60°C (-40 to 140°F)

Time-Based Accuracy
±1 second per day

User Interface
9*30:* IBM-compatible PC; DTU
9*30T:* IBM-compatible PC

Program Memory
Non-volatile programmable flash, can be updated via RS232 port

Data Storage
Model 930
   Capacity: 175 days of 3 level readings, 3 velocity readings, and rain measurements at a 15-minute recording interval
   Data Types: Level, velocity, rainfall
   Storage Mode: Wrap or slate

Model 930T
   RAM memory: 128K or 256K total (in addition to the 930 standard memory)

Communications
Model 930
   RS232 serial connection to PC computer with Sigma data management software
   Optional Modem: 14400, V.32 bis, V.42, MNP2-4 error correction. V.42 bis, MNP5 data compression. MNP10EC Cellular Protocol
   Local Terminal: RS232 at 19.2 k baud

Model 930T
   RS232 serial connection with Sigma data management software or Telog Analysis Software (Teloger for Windows)
   Modem: AnyDATA 1XRTT/CDMA: circuit or packet switched IP protocol data over Verizon™ 800 MHz cellular network, 9600 baud or Telog M-324 dial-up telephone land terminal, 2400 baud, Local Terminal: RS232 at 19.2 k baud

Output Conditions
Set point on level, velocity, rainfall, flow, or flow rate of change

Sampler Output (optional)
6 to 12 Vdc pulse, 100 mA maximum at 500 ms duration

Enclosure
Material: PVC
Rating: NEMA 6P (IP67)

Power Source
Six Energizer 529 or EN529-CAN, alkaline 6 Vdc batteries

Battery Life
Model 930
   365 days typical with a 15-minute recording interval, 1 depth and 1 velocity data download once per week, at 10°C (50°F) (also affected by site conditions)

Model 930T
   140 to 250 days (typical) based on sensor configuration, logging interval, and reporting interval

Dimensions
21.9 D x 60.33 L cm (8.6 x 23.75 in.)

Weight
16.2 kg (35.7 lbs.) with batteries

Submerged Depth/Velocity Sensor

VELOCITY MEASUREMENT

Method
Doppler ultrasound Twin 1 MHz piezoelectric crystals

Accuracy
±2% of reading

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

Typical Minimum Depth
2 cm (0.8 in.)

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

DEPTH MEASUREMENT

Method
Pressure transducer with stainless steel diaphragm

Accuracy (static)[1]
±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 158°F)

Depth Range
Standard: 0 to 3 m (0 to 10 ft.)
Extended: 0 to 9 m (0 to 30 ft.)

Maximum Allowable Depth
Standard: 10.5 m (34.5 ft.)
Extended: 31.5 m (103.5 ft.)

Velocity-Induced Error on Depth (Drawdown Correction)
Compensated based on pipe geometry and flow velocity

Air Intake
Atmospheric pressure reference is desiccant protected

[1]*For temperatures above 40°C (104°F) add ±0.3 cm/°C (0.03 in./°F).*

Specifications continued

GENERAL

Material
Noryl® plastic outer shell with epoxy potting within

Power Consumption
≤ 1.2 W @ 12 Vdc

Cable
Material: Urethane sensor cable with air vent
Standard Length: 9, 15, 23 and 30.5 m (30, 50, 75 and 100 ft)
Custom Length: 0.75 m to 76 m (0 to 250 ft) maximum
Diameter: 0.91 cm (0.36 in)

Sensor Dimensions
2 H x 3.8 W x 13.5 L cm (0.8 x 1.5 x 5.3 in.)

Operating Temperature
0 to 70°C (32 to 158°F)

Depth Compensated Temperature
0 to 70°C (32 to 158°F)

Connector
Hard anodized: satisfies Military Spec 5015

Nose Angle
20 degrees from horizontal

75 kHz In-Pipe Ultrasonic Level Sensor

Accuracy
0.038 to 2.4 m ±0.003 m (0.125 to 8 ft. ±0.01 ft.) at 22°C
(72°F) still air and 40 to 70% relative humidity

Range
From sensor to liquid, 0 to 2.4 m (0 to 8 ft.)

Span
0.038 to 4.57 m (0.125 to 15 ft.)

Ambient Operating Temperature
-18 to 60°C (0 to 140°F)

Temperature Error
±0.00005 m/°C (±0.0001 ft./°F) maximum error within
compensated temperature range per degree of change

Resolution
0.019 cm (0.0075 in.)

Crystal Specification
7° beam angle

Material
Stat-Kon® A-E ABS Plastic

Cable
4 Conductor
Standard Length: 7.6 m (25 ft.)
Custom Length: Up to 305 m (1000 ft.) using RS485 two-wire
remote sensor option

Dimensions
4.44 D x 31.5 L cm (1.75 x 12.4 in.)

Connection
Bare lead connection via 3658 junction box or quick connect

Low Profile Velocity-Only Sensor and 75 kHz Ultrasonic
Downlooking Sensor also available with 930 and 930T
Flow Meters.

Noryl® is a registered trademark of the General Electric Company.

*Specifications subject to change without notice.

Engineering Specifications
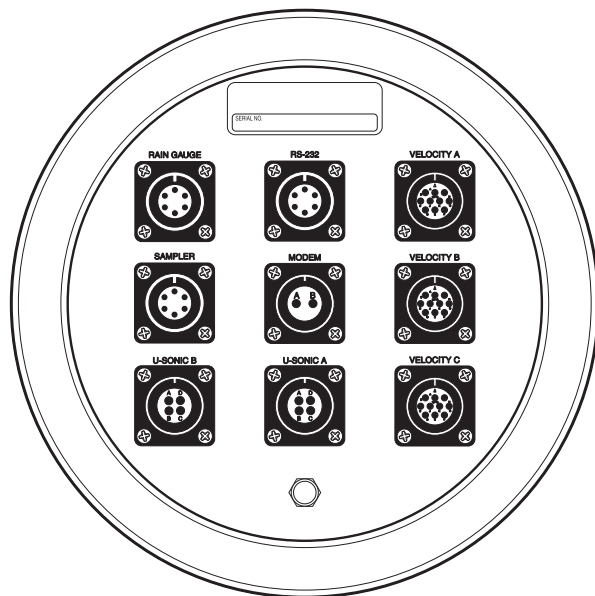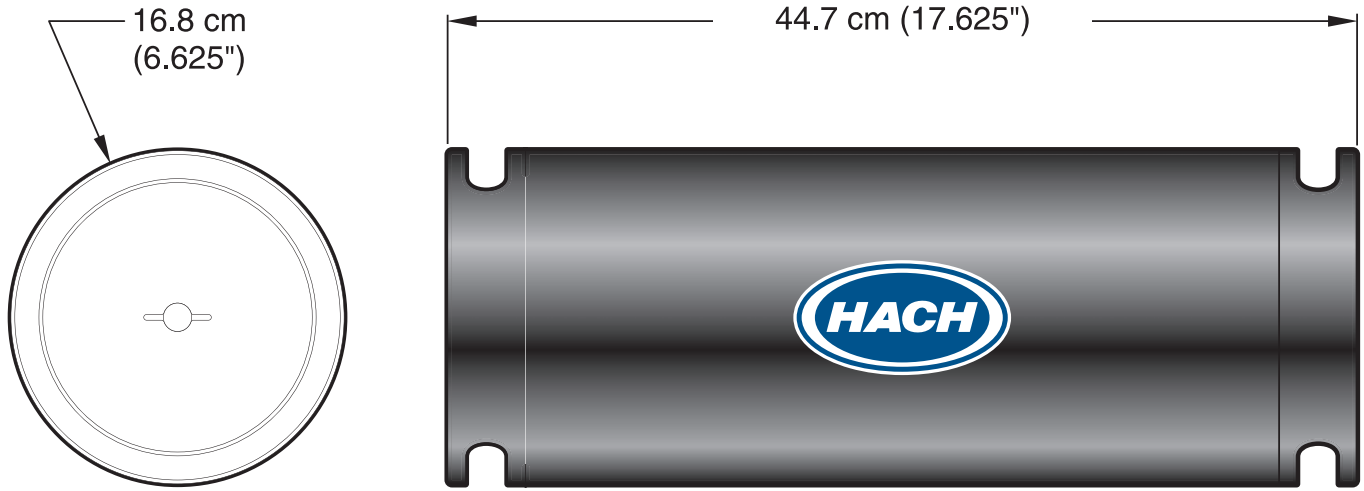
Flow Meter

1. The flow meter shall be capable of directly measuring average velocity.

2. The method of velocity measurement shall be Doppler ultrasonic.

3. The transducer type shall be twin 1-MHz piezoelectric crystal.

4. The range of velocity measurement shall be -1.52 to 6.10 m/s.

5. The flow meter shall be NEMA 6P sealed to withstand submergence and prolonged surcharge conditions.

6. The flow meter shall be capable of either:
   a. Storing at least 116,000 data points (240 days at 15 minute logging intervals of (3) level, (3) velocity and rainfall).
   OR
   b. Storing data in non-volatile, programmable flash memory that can be updated via RS232, landline telephone, wireless CDMA, and 1XRTT communications.

7. Exterior dimensions shall not exceed 8.625 inches diameter and 23.625 inches length.

8. The flow meter and sensor shall be the Sigma Model 930 Area Velocity Flow Meter OR Sigma Model 930T Remote Communications Flow Meter manufactured by Hach Company.

Submerged Depth/Velocity (AV) Sensor

1. The sensor shall be capable of directly measuring average velocity.

2. The method of velocity measurement shall employ transducer type that is twin 1-MHz piezoelectric crystals.

3. The method of depth measurement shall be pressure transducer with stainless steel diaphragm.

4. Velocity range shall be -1.52 to 6.10 m/s (-5 to 20 ft./s)

5. The range of depth measurement shall be 0 to 3 m (0 to 10 ft.), standard, and 0 to 9 m (0 to 30 ft.), extended.

6. The body material of the sensor shall be Noryl® plastic outer shell with epoxy potting.

7. The connector of the sensor shall be hard anodized and satisfy Military Spec 5015.

8. Power consumption of the sensor shall be less than or equal to 1.2 W at 12 Vdc.

9. The sensor shall be the Sigma AV Sensor Flow Sensor manufactured by Hach Company.

Dimensions

Sigma 930 and Sigma 930T Area Velocity Flow Meters should not be used in hazardous locations where combustible gases may be present. Mount the meter so that the connectors face down. When not in use, cover the connectors with their protective caps to prevent corrosion. Always use the appropriate manhole support bracket/spanner bar.

16.8 cm (6.625")

44.7 cm (17.625")
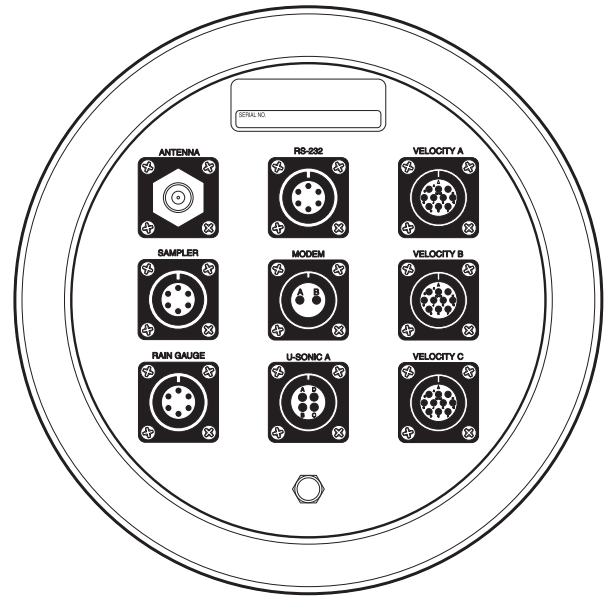
930 Connectors

930T Connectors

Ordering Information

Flow Meter Only

Accommodates two submersible area velocity (Sub-AV) sensors and two ultrasonic sensors. Each Sub-AV receptacle accommodates one Sub-AV sensor, or one wafer velocity sensor.

4800   Sigma 930 Area Velocity Flow Meter; includes six lantern batteries and expanded memory.

4800T   Sigma 930T Remote Communications Area Velocity Flow Meter; includes six lantern batteries and expanded memory.

Optional Flow Meter Sensor Configurations

4848   First additional input for second sensor; for submerged area velocity or velocity sensor

4849   Second additional input for third submerged area velocity or velocity Sensor

4869   Input for 75 kHz Ultrasonic Sensor; requires ultrasonic sensor

4882   Second Input for 75 kHz Ultrasonic Sensor; requires option 4869 and ultrasonic sensor

4869T   930T input for 75kHZ Ultrasonic sensor; requires ultrasonic sensor

Modem Selection for Sigma 930T Flow Meters Only

4872   Sigma Landline communication option (for 930 only)

6241600 Telog Landline communication option

6241700 Telog or Verizon communication option

6241701 Telog AT&T or T-Mobile modem option

6241702 Telog Sprint communication option

Antenna Options for Sigma 930T Flow Meters Only

6236100 Verizon 1XRTT or AT&T GPRS Half Wave

6246200 Verizon or AT&T Burial

5228400 Sprint 1XRTT or T-Mobile GPRS Half Wave

6683000 Sprint or T-Mobile Burial

5255400 Manhole lid antenna, all providers

6241804 Mini wing antenna, all providers - non stainless steel connector

5241000 Mounting bracket

Sensors

Non-oil Filled Standard Submerged Depth/Velocity (AV) Sensors (0 to 10 ft. range)

77065-030 Non-oil Filled Standard Sigma Submerged AV Sensor; 30 ft. cable with connector

77065-050 Non-oil Filled Standard Sigma Submerged AV Sensor; 50 ft. cable with connector

77065-075 Non-oil Filled Standard Sigma Submerged AV Sensor; 75 ft. cable with connector

77065-100 Non-oil Filled Standard Sigma Submerged AV Sensor; 100 ft. cable with connector

Oil Filled Standard Submerged Depth/Velocity (AV) Sensors (0 to 10 ft. range)

77064-030 Oil Filled Standard Sigma Submerged AV Sensor; 30 ft. cable with connector

77064-050 Oil Filled Standard Sigma Submerged AV Sensor; 50 ft. cable with connector

77064-075 Oil-Filled Standard Sigma Submerged AV Sensor; 75 ft. cable with connector

77064-100 Oil-Filled Standard Sigma Submerged AV Sensor; 100 ft. cable with connector

Down-looking 75 KHz Ultrasonic Depth Sensor

1176-01 Down-looking 75 kHz Ultrasonic Sensor with connector

1176-03 Down-looking 75 kHz Ultrasonic Sensor with bare leads

In-pipe 75 KHz Ultrasonic Depth Sensor

3702-01 In-pipe 75 kHz In Pipe Ultrasonic Sensor with connector

3702-02 In-pipe 75 kHz In Pipe Ultrasonic Sensor with bare leads

Ordering Information continued

Sensor Mounting Hardware

Spring Rings

1361   Spring Ring for 6-in. diameter pipe

1362   Spring Ring for 8-in. diameter pipe

1363   Spring Ring for 10-in. diameter pipe

1364   Spring Ring for 12-in. diameter pipe

Miscellaneous

3263   Sensor Mounting Clip; for 88000, wafer velocity, and bubbler level velocity sensors

3868   Portable Bracket; for in-pipe ultrasonic sensor mounting clip

3875   Permanent In-Pipe Ultrasonic Sensor Mounting Bracket

3305   Velocity Sensor Mounting Plate

9574   Insertion Tool for Non-confined Space Entry

2974   Permanent Wall Mount Bracket; for down-looking ultrasonic sensor.

2904   Floor or Wall Adjustable Mounting Bracket; for down-looking ultrasonic sensor

9538   Tripod Mounting Bracket; for down-looking ultrasonic sensor.

2883   Cable Straightener; for down-looking ultrasonic sensor

3183   Cable Grip; for down-looking ultrasonic sensor

Cables and Interfaces

6242500   Telogers™ for Windows Software

6242300   PC to Telog Modem Configuration Cable

1727   Sampler or Flow Meter to PC Cable

3358   RS232 Extension Cable

Accessories

5254   Insight Software (free of charge)

8764499   Flo-Center Sofware, Disk Only

8764500   Flo-Center Software, Disk with RS232

8764600   Flo-Center Sofware Disk with RS232 and USB

7724700   Silicon Oil; dual 50-mL pack (refills 100 sensors)

7724800   Silicon Oil Refill Kit; includes dispensing tool and oil packs.

7725600   Oil-Filled Sub-AV Sensor Kit

7730000   Retrofit Kit (converts non oil-filled to oil-filled); includes kit Silicon Oil Refill Kit

Complete CSO and stormwater monitoring solutions from Hach...

Sigma 900 Series Portable Samplers

(see Lit. 2565 900MAX and Lit. 2591 SD900)

Sigma 900 Portable Samplers are made with a molded ABS exterior and a tightly sealed controller that withstands humidity and hostile, corrosive environments. Even with a three-gallon polyethylene bottle installed, it weighs only 28 lbs.

Rain Gauge with Rain Logger

(see Lit. 2618)

Built to National Weather Service standards, the Rain Gauge accurately measures rainfall in 0.01-inch increments. The Rain Logger can be used for stand-alone, long-term rainfall recording or for portable use in storm water runoff monitoring.

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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