

Hach Sigma 930 and 930T Area Velocity Flow Meters



Hach 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

Versatile Set-up

Use a single Hach 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 level 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 RS-232, 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 Level Measurement

These flow meters automatically correct the effects of temperature on level measurement. A patented* drawdown correction feature corrects the effects of velocity on accurate level measurement.

*Patent number 5691914

Superior Submersible Area Velocity Sensor for Open Channel Applications

Sigma 930 and 930T flow meters use advanced ultrasonic, 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



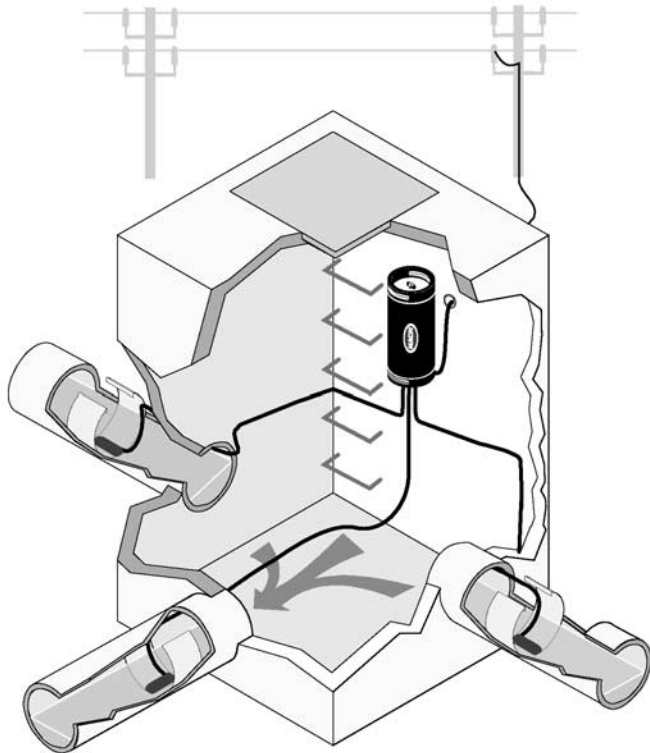
Be Right™

WW

IW

C

Applications



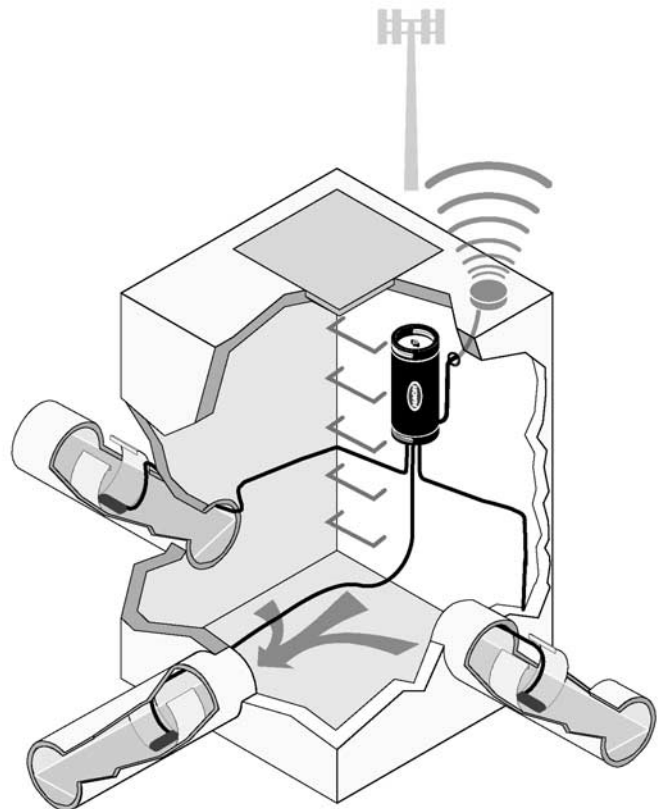
Shown with landline modem.

Hach 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.

Hach 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

Level: m, cm, ft., in.

Flow: gps, gpm, gph, lps, lpm, lph, mgd, afd, cfs, cfm, cfh, cfd, m³s, m³m, m³h, m³d

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

Monitoring 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

IBM-compatible PC

Program Memory

Non-volatile programmable flash, can be updated via RS-232 port

Data Storage (optional)

Model 930

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

Model 930T

RAM memory: 128 K or 256 K total

Communications

Model 930

RS-232 serial connection to IBM-compatible computer with Hach Sigma data management software
Optional Modem: V.32
Baud: 14400
Transfer Protocol: binary -OR- 14400, V.32 bis, V.42, MNP2-4 error correction. V.42 bis, MNP5 data compression. MNP10EC Cellular Protocol
Local Terminal: RS-232 at 19.2 k baud

Model 930T

RS-232 serial connection
Modem: M-324 dial-up telephone, 2400 baud
IXRTT/CDMA: circuit or packet switched IP protocol data over Verizon™ 800 MHz cellular network, 9600 baud

Sampler Output Conditions (optional)

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

Enclosure Rating

NEMA 6P (IP67)

Power Source

Six 6-V alkaline lantern batteries

Battery Life

Model 930

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

Model 930T

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

Dimensions

21.9 cm diameter x 60 cm (8.6 in. diameter x 23.6 in.)

Weight

16.2 kg (35.7 lbs.) with batteries

Submerged Depth/Velocity Sensor

LEVEL MEASUREMENT

Range (non-linearity and hysteresis)

Standard: 0.005 to 3.5 m, ±0.007 m (0.018 to 11.5 ft., ±0.023 ft.)

Extended: 0.005 to 10.5 m ±0.021 m (0.018 to 34.6 ft., ±0.07 ft.)

Maximum Allowable Level

3 times over pressure

Operating Temperature

0 to 71°C (32 to 160°F)

Compensated Temperature

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)

Maximum error within compensated temperature range per degree of change: 0.018 to 10.5 m, ±0.006 m/°C (0.018 to 34.6 ft., ±0.012 ft./°F)

Velocity-Induced Error on Depth (Drawdown Correction)

0 to 3.05 m/s (0 to 10 ft./s) or 0.085% of reading

Air Intake

Atmospheric pressure reference is desiccant protected

Method

Pressure transducer with stainless steel diaphragm

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

-18 to 60°C (0 to 140°F)

Typical Minimum Depth for Velocity

2 cm (0.8 in.)

Continued on next page.

Specifications *continued*

Method

Doppler ultrasonic

0.038 to 4.57 m ± 0.003 m (0.125 to 15 ft. ± 0.01 ft.) at 22°C (72°F) still air and 40 to 70% relative humidity

Transducer Type

Twin 1 MHz piezoelectric crystals

Span

0.038 to 4.57 m (0.125 to 15 ft.)

GENERAL

Material

Polymer body with stainless steel diaphragm

Resolution

0.019 cm (0.0075 ft.)

Cable

Urethane sensor cable with air vent

Operating Temperature

-18 to 60°C (0 to 140°F)

Cable Length

Standard: 7.6 m (25 ft.)

Maximum: 76 m (250 ft.)

Temperature Error

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

Crystal Specification

75 KHz, 7° beam angle

Nose Angle

20 degrees from horizontal

Material

Stainless steel housing with PVC acoustic window

Sensor Dimensions

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

Cable

4-conductor

In-Pipe Ultrasonic Level Sensor

Range

0 cm (0 in.) minimum distance from sensor to liquid
4.57 m (15 ft.) maximum distance from sensor to liquid

Cable Length

Standard: 7.6 m (25 ft.)

Two-wire remote sensor option using RS-485: 305 m (1,000 ft.)

Dimensions

3.8 cm diameter x 30 cm (1.5 in. diameter x 12 in.)

Accuracy

**Specifications subject to change without notice.*

Engineering Specifications

Flow Meter

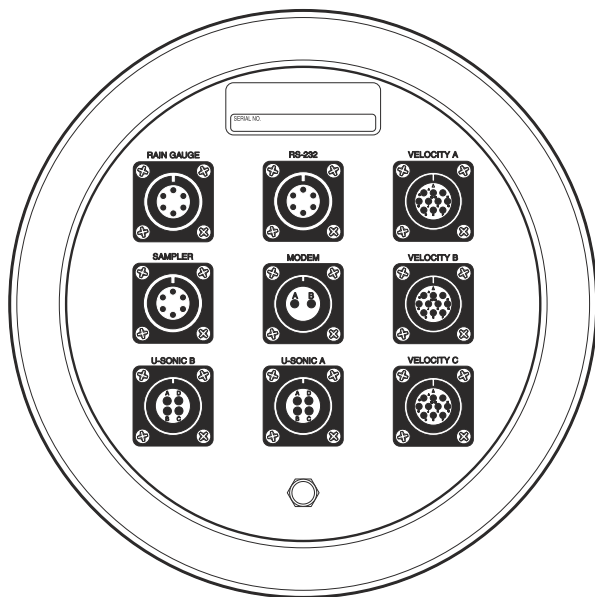
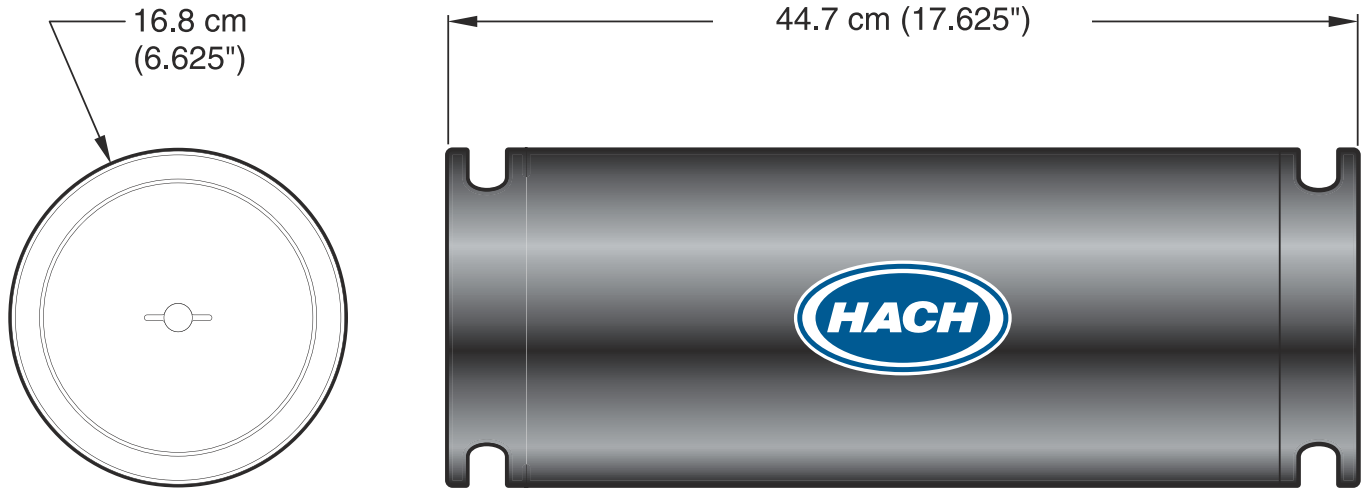
- The flow meter shall be capable of directly measuring average velocity.
- The method of velocity measurement shall be Doppler ultrasonic.
- The transducer type shall be twin 1-MHz piezoelectric crystal.
- The range of velocity measurement shall be -1.52 to 6.10 m/s.
- The flow meter shall be NEMA 6P sealed to withstand submergence and prolonged surcharge conditions.
- The flow meter shall be capable of either:
 - Storing at least 116,000 data points (240 days at 15 minute logging intervals of (3) level, (3) velocity and rainfall).
 - OR
 - Storing data in non-volatile, programmable flash memory that can be updated via RS232, landline telephone, wireless CDMA, and 1XRTT communications.
- Exterior dimensions shall not exceed 8.625 inches diameter and 23.625 inches length.
- The flow meter and sensor shall be the Sigma Model 930Area Velocity Flow Meter OR Sigma Model 930T Remote Communications Flow Meter manufactured by Hach Company.
- The range of level measurement shall be 0 to 3 m (0 to 10 ft.), standard, and 0 to 9 m (0 to 30 ft.), extended.
- The body material of the sensor shall be Noryl[®] plastic outer shell with epoxy potting.
- The connector of the sensor shall be hard anodized and satisfy Military Spec 5015.
- Power consumption of the sensor shall be less than or equal to 1.2 W at 12 Vdc.
- The sensor shall be the Sigma AV Sensor Flow Sensor manufactured by Hach Company.

Submerged Depth/Velocity (AV) Sensor

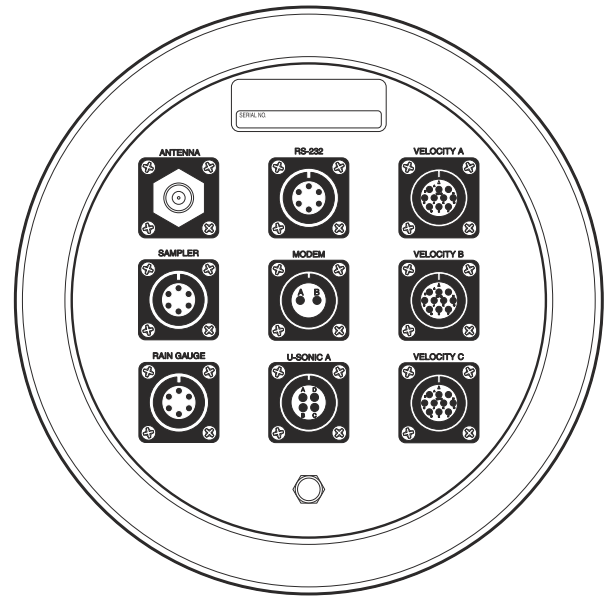
- The sensor shall be capable of directly measuring average velocity.
- The method of velocity measurement shall employ transducer type that is twin 1-MHz piezoelectric crystals.
- The method of level measurement shall be pressure transducer with stainless steel diaphragm.
- Velocity range shall be -1.52 to 6.10 m/s (-5 to 20 ft./s)

Dimensions

Hach 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.



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

Communication Options for Sigma 930T Flow Meters Only

- 6241600** M-324 Landline Option
- 6241700** 1xRTT or CDMA Cellular Option

Antenna Options for Sigma 930T Flow Meters Only

- 62408-00** Whip Antenna; above ground, trenching required
- 62361-00** 930T Halve Wave Antenna; above ground, mounted to top of meter
- 62462-00** Traffic Grade Burial Antenna; street level installation, traffic rated

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 Level 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 Level 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 Straightner; 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)
- 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. #3405)

Hach 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. #3423)

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.

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