

# Sigma 920 Area Velocity Flow Meter



The Sigma 920 Area Velocity Flow meter can be used in portable or permanent applications. Measure level and velocity independently in two channels or velocity in one and level in the other. Housed in rugged yet ergonomic watertight enclosure (NEMA 6P) measuring only 7 x 18 inches. Available with submerged pressure transducer/velocity sensor or in-pipe ultrasonic depth sensor combined with a "wafer-thin" velocity sensor that provides greater accuracy in shallow flows.

## Features and Benefits

### Made for Submergence and Prolonged Surge Conditions

The rugged housing of the Sigma 920 Area Velocity Flow Meter is NEMA 6P sealed to withstand submergence and prolonged surge conditions. A low power draw creates an extended 90-day battery life. Its size makes it portable and provides for easy storage and fit in a variety of applications such as sewer and storm water monitoring.

### Advanced Technology for Accuracy

The technology used in the Sigma 920 flow meter automatically corrects the effect of temperature on level measurement for a higher level of accuracy. With built in sampler pacing capabilities, it is ideal for CSO and storm water studies.

Advanced, ultrasonic one-MHz Doppler sensor technology avoids signal dropouts and ensures—without the need for on-site calibration—high levels of accuracy in low-flow, full-pipe, or reversed-flow conditions. The patented\* "Drawdown Correction" feature corrects the effects of velocity on accurate level measurement.

\*Patent U55691914

### Versatile Features and Options

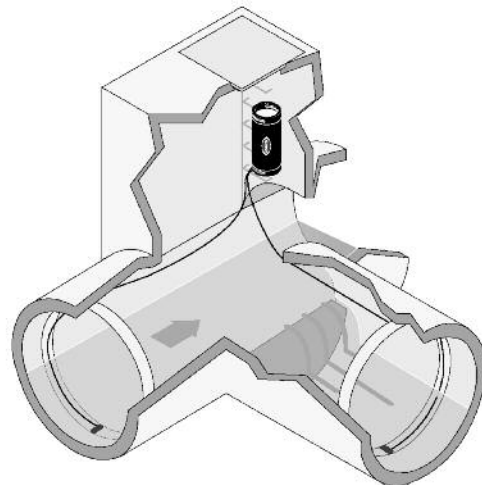
The optional rainfall logging feature of the Sigma 920 flow meter records and characterizes rain events—a true innovation in water monitoring. Use the optional internal modem to automate data retrieval, paging, and reporting. And with multiple sensor options, this meter can be used for redundancy, averaging, and multiple pipe monitoring.

### Simple and Reliable Velocity Sensor

The Submersible Area Velocity Sensor used with the Sigma 920 flow meter is accurate and reliable for maximum versatility for most open channel applications. It installs quickly and easily with no velocity calibration required. The hydrodynamic body and side-mounted cable also maintains accuracy by reducing turbulence along the sensor body. Noryl sensor housing dramatically improves sensor robustness and integrity. Single point calibration (atmospheric) makes calibration quick and accurate.

### Applications

The Sigma 920 Area Velocity Flow Meter is ideal for short-term flow studies, sanitary sewer evaluation studies, CSO studies and monitoring, and NPDES stormwater compliance.



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

## Specifications\*

### 920 Flow Meter

#### Units of Measurement

Level: m, cm, ft., in.

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

Totalized Flow: L, m<sup>3</sup>, ft.<sup>3</sup>, 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

PC

#### Program Memory

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

#### Data Storage (optional)

Capacity: 240 days of 2 level, 2 velocity readings, and rainfall at 15-minute recording intervals

Data Types: Level, velocity, and rainfall

Storage Mode: Wrap or slate

RAM Memory: 128K

#### Sampler Output Conditions (optional)

Set point on level, velocity, flow, or flow rate of change

#### Sampler Output (optional)

6 to 12 Vdc pulse, 100 mA maximum at 500 ms duration flow proportional

#### Communications

RS-232 serial connection to computer with Hach Analysis Software

Optional modem: Bell 212

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

#### Enclosure Material

PVC

#### Enclosure Rating

NEMA 6P (IP67)

#### Power Source

Two Energizer EN-529, alkaline 6 Vdc batteries or external AC power source

#### Battery Life

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

#### Dimensions

16.8 cm diameter x 44.7 cm (6.625 in. diameter x 17.625 in.)

#### Weight

7.5 kg (16.5 lbs.) with battery

### Submerged Depth/Velocity (AV) Sensor

#### 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.)

##### Method

Doppler ultrasonic

##### Transducer Type

Twin 1 MHz piezoelectric crystals

#### DEPTH 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 Depth

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<sup>®</sup> plastic outer shell with epoxy potting

##### Cable

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.)

### Optional Velocity Sensor Accuracy and In-Pipe Ultrasonic Depth

#### VELOCITY MEASUREMENT

##### 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.)

#### ULTRASONIC DEPTH MEASUREMENT (IN-PIPE)

##### Range

Distance from sensor to liquid: 0 to 3.35 m (0 to 11 ft.)

##### Accuracy

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

##### Span

0.038 to 4.57 m (0.125 to 15 ft.)

##### 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: .0075", (.019 cm)

##### Material

Stainless steel housing with PVC acoustic window

##### Cable

4 conductors

##### Cable Length

Standard: 7.6 m (25 ft.) 305 m (1,000 ft.) using RS-485 two-wire remote sensor option

##### Crystal Specification

75 KHz, 7° beam angle

##### Dimensions

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

## Engineering Specifications

### 920 Flow Meter

- The flow meter system shall consist of a flow meter and a submerged depth/velocity sensor.
- The flow meter shall be capable of storing at least 116,000 data points (240 days at 15-minute logging intervals of two level, two velocity, and rainfall).
- Slate and wrap-around data storage shall be field selectable. Once programmed, the meter with software shall display the total time available for data logging. For fast data retrieval, the flow meter shall have an RS232 serial interface port with data transfer via modem at 19,200 baud to any IBM compatible PC operating Hach software.
- Logging intervals shall be 1, 2, 3, 5, 6, 10, 12, 15, 20, 30 and 60-minute intervals. The meter shall log data at logical times automatically, i.e. 5 minute intervals at 0:00, 0:05, 0:10, etc. Battery voltage shall be logged as a separate parameter.
- The meter shall operate 90 days at 15-minute logging intervals of level/flow and velocity including weekly data download utilizing two 6-volt alkaline lantern batteries.
- The meter shall communicate with a computer using a serial connection and Modbus to allow integration to SCADA Systems or optional phone modem
- The meter shall include a rain gauge input to accept contact closures from a tipping bucket rain gauge with 0.01-in. increments.
- The meter shall include a sampler pacing output consisting of a 6-12V DC pulse, 10 mA maximum, 500 ms duration.
- The method of velocity measurement shall be Doppler ultrasonic.
- The sensor shall be equipped with level drawdown correction to compensate for the effects of velocity in depth measurement accuracy.
- The flow meter housing shall be made of NEMA 6P (IP67) PVC sealed to withstand submergence and prolonged surcharge conditions.
- The flow meter shall be capable of reporting in the following units:
  - Level; m, cm, ft., in.
  - Flow; gpm, gph, lps, lpm, lph, mgd, afd, cfs, cfm, cfh, cfd, m<sup>3</sup>s, m<sup>3</sup>m, m<sup>3</sup>h, m<sup>3</sup>d.
  - Totalized flow; L, m<sup>3</sup>, ft.<sup>3</sup>, gal., acre-ft.
- Exterior dimensions shall not exceed 6-5/8 inches diameter and 17-5/8 inches length. The meter shall not exceed 16.5 lbs.
- The flow meter shall be the Sigma Model 920 Area Velocity Flow Meter 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 depth 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)
- 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.
- 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.

## Dimensions

The Sigma 920 Area Velocity Flow Meter 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.



## Ordering Information

### Flow Meter

**4850** Sigma 920 Area Velocity Flow Meter with two 3667-lantern batteries. (The meter can accommodate one additional AV sensor or one ultrasonic sensor. Each AV receptacle accommodates one sensor or one low profile velocity sensor.)

### Complete Flow Meter Systems

**4850921** Sigma 920 Area Velocity Flow Meter Bundle; includes Sigma 920 flow meter, two submerged AV sensors, and 30-ft cable for each sensor

**4850922** Sigma 920 Area Velocity Flow Meter Bundle; includes Sigma 920 flow meter, one in-pipe ultrasonic sensor with 25-ft. cable, and one velocity only sensor with 25-ft. cable

### Optional Flow Meter Sensor Configurations

**4883** Input; for additional submerged AV or low profile velocity sensor

**4869** Input; for 75 kHz ultrasonic sensor

### Sensors

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

**77065-030** With 30 ft. cable & connector

**77065-050** With 50 ft. cable & connector

**77065-075** With 75 ft. cable & connector

**77065-100** With 100 ft. cable & connector

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

**77064-030** With 30 ft. cable & connector

**77064-050** With 50 ft. cable & connector

**77064-075** With 75 ft. cable & connector

**77064-100** With 100 ft. cable & connector

### Down-looking 75 KHz Ultrasonic Level Sensor

**1176-01** With connector

**1176-03** With bare leads

### In-pipe 75 KHz Ultrasonic Level Sensor

**3702-01** With connector

**3702-02** With bare leads

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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.

### Sensor Mounting Hardware

#### Spring Rings

**1361** For 6-in. diameter pipe

**1362** For 8-in. diameter pipe

**1363** For 10-in. diameter pipe

**1364** For 12-in. diameter pipe

#### Miscellaneous

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

**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

**3513** DTU-to-PC Cable; 115 Vac

**3580** DTU-to-PC Cable; 230 Vac

**1727** Sampler or Flow Meter to PC Cable

**3358** RS232 Extension Cable

### Accessories

**8764300** Flo-Center Software CD Only

**8764500** Flo-Center Software CD with RS232

**8764600** Flo-Center Software CD with RS232 and USB

**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.

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

**8713200** Solar Module; with 10-Watt panel and power regulator assembly

**8713300** Solar Module; with 20-Watt panel and power regulator assembly



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