Flow Products

See Inside!

- **Flow experts ready to answer your questions!** *See page 470.*

- *NEW!* **Flow meter guide helps you select the best product for your needs!** *See pages 472-473.*

- *NEW!* **Flow meter packages contain all you need in one product number: meter, sensor(s), and accessories!** *See page 486.*

- *NEW!* **Data Delivery Services mean "hands-off" sewer flow monitoring!** *See page 490.*

MARSH McBIRNEY
A Hach Company Brand

HACH ®

Be Right™

- **Experienced flow professionals**
- **Accessible—talk to a flow expert, not voicemail**
- **Product recommendations based on your application**
- **Focused on excellent customer service**
- **Friendly and personable**

Our Customer Support Center located in Frederick, Maryland will provide you with the exceptional sales, technical, and field support that you have come to expect from us. Count on our experts for your next open channel flow monitoring application.

We invite you to take a look at our latest innovations that were designed with you in mind. Be sure to visit our website at www.marsh-mcbirney.com and sign up for our informative newsletter, Focus on Flow, published for flow professionals like yourself. We look forward to hearing from you.

Contact information for ordering and tech support:

Hach/Marsh-McBirney
4539 Metropolitan Ct.
Frederick, Maryland 21704
Telephone: U.S. and Canada 1-800-368-2723 Outside the U.S. 1-301-874-5599
Fax: 1-301-874-8459

MARSH McBIRNEY
A Hach Company Brand

What our customers have to say…

*"The meters have been working great!
We picked the sites they should be in and
they work perfect there."*

Brian Stapleton, Assistant Manager
Sewer System Maintenance and Operations Department (SSMO)
NEORSD (Northeast Ohio Regional Sewer District)

*"We've appreciated the Customer Service Group.
The access that we have to technical support has
been great. We can always pick up the phone and
talk to somebody if we need to. I have never had
any problems getting anything answered. I'm sure
it's the same with our field crews. We have more than
75 meters all over the County's service area and
having that open access to technical support
and advice is very helpful."*

Abraham Araya
Water Quality Planner and Flow Monitoring Data Analyst
King County, Washington

*"The fact that you don't have to touch anything
in the sewer is 'perfect.' I have been doing this
for 18 years so I've seen it all. It is easily understood
why anyone working in the sewer environment
would prefer the 'hands-off' approach and
freedom from entering monitoring sites that the
Flo-Dar meter affords. These meters are nice.
I also like the battery system."*

Gus Belmont
Sewer Department Superintendent
Whitpain Township

Flow Meter Guide

	Sigma Sub AV Sensor	Sigma Sub AV, Low Profile Velocity, and Ultrasonic Sensors				Sigma Sub AV Sensor	
	Sigma 910	Sigma 920	Sigma 930	Sigma 930T	Sigma 940	Sigma 911	
PRODUCT FEATURES							
Portable/Field	■	■	■	■	■	■	
Permanent		■	■	■			
Interface via PC	■	■	■	■	■	■	
User Interface: key pad + LCD							
Analog Outputs							
Digital Outputs (ModBus ASCII)		■	■	■	■		
Optional Sampler Output		■	■	■	■ (Included)	■ (US & Canada)	
Optional Rain Gauge Input		■	■	■			
Web enabled (Integral wireless modem)				■			
Optional External Power (AC, Solar, marine battery)		■	■	■			
Number of Sensor Inputs (Velocity or Level)	1	2	3	3	2	1	
Water Quality Parameters							
Data Storage Capacity*	90	240	175	175	175	300	
Battery Life (days)**	60	90	365	250	365	240	
Velocity Technology							
Ultrasonic Doppler	■	■	■	■	■	■	
Radar Doppler							
Electromagnetic							
Level Technology							
Ultrasonic***		Optional					
Pressure Transducer		Integral to Velocity Sensor					
Bubbler							
INSTALLATION							
Manhole Installation	■	■	■	■	■	■	
Open Channels/Pipes <6 in (150mm)	■	■	■	■	■	■	
Open Channels/Pipes 6 to 60 in. (150 to 1500mm)	■	■	■	■	■	■	
Open Channels/Pipes 6 to 96 in. (150 to 2400mm)					Contact Factory		
Open Channels/Pipes 6 to 224 in. (150 to 5600mm)					Contact Factory		
Weirs and Flumes							
Hazardous Area Installation					■	■	
Wastewater plant effluent (Primary Device)							
Natural Streams							
APPLICATIONS							
Low Velocity 0.2 to 0.8 ft/s (0.06 to 0.24 m/s)	■	■	■	■	■	■	
High Velocity 0.8 to 20 ft/s (0.24 to 6.1 m/s)	■	■	■	■	■	■	
Full Pipe, surcharge flow	■	■	■	■	■	■	
Reverse Flow	■	■	■	■	■	■	
Low Depth, <2 in (50mm)		X Using Low Profile Sensor					
Low Suspended Solids (0.1 to 20ppm)					Contact Factory		
Corrosive effluents (pH <4, > 10)					Contact Factory		
Silty sites					Good when using Submerged Area Velocity Sensor Oil Filled		
Persistent Foam					Use Submerged Area Velocity Sensor - Contact Factory		

* Typical with 15 minute recording interval
** Typical with 15 minute recording interval, 1 level and 1 velocity, data download once per week, at 10ºC (50ºF), can vary depending upon site conditions.
*** In-pipe and extended range sensors available. Contact factory for compatibility.

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Outside the United States, call 301-874-5599

Sigma Sub AV, Low Profile Velocity Submerged Depth, Bubbler, and Ultrasonic Sensors		Ultrasonic Sensor	Flo-Dar Sensor	Flo-Tote 3	Flo-Dar Sensor	Flo-Tote 3	Velocity Sensor
Sigma 950	Sigma 980	GLI U53	Marsh Flo-Logger		Marsh Flo-Station		Marsh Flo-Mate
■			■	■			■
■	■	■			■	■	
■	■		■	■	■	■	
■	■	■		LCD DISPLAY ONLY			■
■ (Optional)	■	■			■		
■	■	■					
■ (Included)	■ (Included)	■ (Included)	■	■	■	■	
	■ (Included)				■	■	
			■	■			
■	N/A	N/A	■	■	■	■	N/A
4 (Contact Factory for details)	2	1	2 (Optional Surcharge Velocity)	1	2 (Optional Surcharge Velocity)	1	1
pH, ORP, DO, Conductivity,	pH, ORP						
Contact Factory	N/A	N/A	60	120	120	120	30 hours
			120	120			
■	■						
			■		■		
				■		■	■
Optional	■	■	■		■		
Optional	Optional		Used with Surcharge Velocity Option	Integral to sensor	Used with Surcharge Velocity Option	Integral to sensor	
Bubbler only or Bubbler with velocity sensor							
■			■	■			Profiling
■	■		■	■	■	■	Profiling
■	■		■	■	■	■	Profiling
			Excellent		Excellent		Profiling
			Excellent		Excellent		Profiling
■	■	■					Profiling
			Sensor Only Use Safety Barrier		Sensor Only Use Safety Barrier		
	■	■	■				
							■
■	■			Excellent		Excellent	Excellent
■	■		Excellent	■	Excellent	■	■
■	■		Using Optional Surcharge Velocity Sensor	■	Using Optional Surcharge Velocity Sensor	■	
■	■			■		■	
X Using Low Profile Sensor			■		■		2 in (50mm) Possible at Low Velocities Only
		Excellent	Excellent	Excellent	Excellent	Excellent	
	■						
	Using Ultrasonic sensor in Primary Devices	In Primary Devices	Excellent		Excellent		
			Excellent		Excellent		
			Contact Factory				

The Sigma 910 Flow Meter's compact design and weight makes it one of the best choices for harsh environments.

The Hach Sigma 910 is the most popular meter for economical, short-term, single-channel collection system monitoring. (Sensor sold separately.)

The compact and lightweight 910 Flow Meter measures average velocity directly, without the need for time-consuming and costly flow profiling.

Ideal for Harsh Environments

The 910 Flow Meter is NEMA 6P sealed to withstand submergence and prolonged surcharge conditions. Its compact size makes it easily portable and provides for easy storage and fit in a variety of applications such as sewer and storm monitoring.

Advanced Technology for Accuracy

- *Automatically corrects for temperature effects*
- *Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement*
- *Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions*

Easy Installation and Maintenance

The 4.5 inch diameter means it can be installed almost anywhere. The sensor is detachable and interchangeable for flexibility. Single point calibration (atmospheric) makes calibration quick and accurate.

Note: Hach Data Management software is required to program this Flow Meter. See page 487 for details.

Ideal for:

- *Short Term Flow Studies*
- *Sanitary Sewer Evaluation Studies*

Specifications*

Units of Measurement
Level: 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.

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
Capacity: 90 days of 1 level and 1 velocity reading at 15-minute recording intervals
Data Types: Level and velocity
Storage Mode: Wrap or slate
RAM Memory: 128 K

Communications
Serial connection to IBM-compatible computer with Hach Data Management Software

Enclosure Material
PVC

Enclosure Rating
NEMA 6P (IP67)

Power Source
One Energizer EN-529 alkaline 6 Vdc battery

Battery Life
60 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
11.4 cm diameter x 44.8 cm (4.5 in. diameter x 17.625 in.)

Weight
3.54 kg (7.8 lbs.) with battery

Subject to change without notice. Specifications will vary depending on channel size, channel. See page 482 and 484 for sensor specs.

Prod. No.	Description
4900	Sigma 910 Flow Meter with 6-volt battery

This is for a Flow Meter Only. For a complete system, refer to packages on page 486.

For more information, call to request Literature #2545, or visit www.hach.com

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Provides the robust qualities of the 910 but with a longer battery life and up to two independent level/velocity channels.

Made for Submergence and Prolonged Surcharge Conditions

The rugged housing of the 920 Flow Meter is NEMA 6P sealed to withstand submergence and prolonged surcharge conditions. A low power draw creates an extended 90-day battery life.

Versatile Features and Options

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

Advanced Technology for Accuracy

- *Automatically corrects for temperature effects*
- *Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement*
- *Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions*
- *The only true In-Pipe ultrasonic sensor with zero dead band. Use our In-pipe sensor in combination with a Low Profile Area velocity sensor to monitor flow in pipes or channels with depths less than 2 in. Also combine an Ultrasonic In-Pipe sensor with a regular Submerged Area Velocity sensor for level measurement redundancy to avoid level data gaps.*

Easy Installation and Maintenance

Installs quickly and easily with no velocity calibration required.

Note: Hach Data Management software is required to program this Flow Meter. See page 487 for details.

Ideal for:

- *Short Term Flow Studies*
- *Sanitary Sewer Evaluation Studies*
- *CSO Studies and Monitoring*
- *NPDES Stormwater Compliance*

Prod. No.	Description
4850	Sigma 920 Flow Meter Includes two 3667 lantern batteries. The 920 Flow Meter can accommodate 1 additional AV sensor (1 submerged AV sensor OR 1 low profile velocity sensor) or 1 ultrasonic sensor.
4883	Input for additional submerged AV or low profile velocity sensor. Will give the 920 two AVs total. Requires AV sensor or low profile velocity sensor.
4869	Input for 75 kHz ultrasonic sensor. Will give the 920 one AV and one ultrasonic sensor. Requires ultrasonic sensor.

This is for a Flow Meter Only. For a complete system, refer to packages on page 486.

For more information, call to request Literature #2541, or visit www.hach.com

Measure level and velocity in two channels or velocity in one and level in another. (Sensors sold separately.)
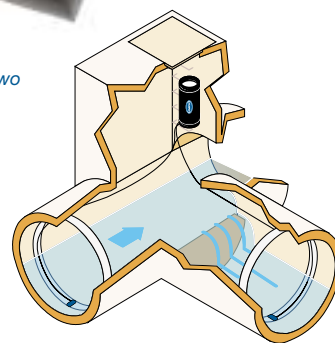
Specifications*

Units of Measurement
Level: 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.

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

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)
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

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 IBM-compatible computer with Hach Sigma Data Management 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 alkaline 6 Vdc lantern batteries

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

*Subject to change without notice. Specifications will vary depending on channel size, channel. See page 482 and 484 for sensor specs.

930T Remote Communications Flow Meter

The Hach Sigma 930T Remote Communications Flow Meter provides a reliable, cost-effective wireless flow monitoring solution. It is ideal for long-term/permanent flow studies or temporary installations in inaccessible locations.
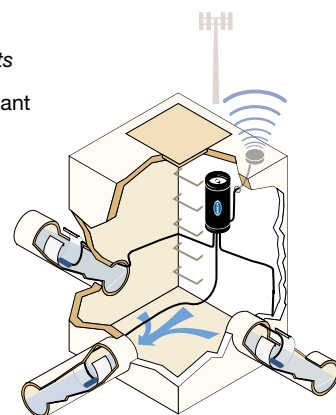
Advanced Technology for Accuracy

- *Automatically corrects for temperature effects*
- *Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement*
- *Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions*

See and Download Your Data from Anywhere, Anytime, Using the Internet

- *Continuously monitor data in real time or retrieve data automatically for later analysis*
- *Alarm notification and secure data transmission*
- *Schedule events*
- *Share information with associates, consultants and clients*

Use a single 930T flow meter for multi-point and/or redundant monitoring. Up to three level and velocity sensors can be used with a single meter. Optional rainfall-logging and sampler pacing capabilities are ideal for CSO and stormwater monitoring.

The Hach Sigma 930T Remote Communications Flow Meter is the most advanced flow meter of its kind. It provides 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. (Sensors sold separately.)

Ideal for:

- *Permanent Collection System Monitoring*
- *Long-term Flow Monitoring*
- *Sanitary Sewer Evaluation Studies*
- *CSO and SSO Studies and Monitoring*

Contact factory for pricing.

930 Long-Term Area Velocity Flow Meter

The Hach Sigma 930 is designed for long-term/permanent flow studies with approximately 365-day battery life and a strong NEMA 6P PVC enclosure. Permanent collection system monitoring can now be done confidently, within an affordable budget.

Advanced Technology for Accuracy

- *Automatically corrects for temperature effects*
- *Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement*
- *Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions*
- *Multiple sensors for redundancy and multiple pipe monitoring*
- *Up to three level and velocity sensors*
- *Low power draw creates an extended year-long battery life*
- *Optional rainfall logging feature records and characterizes rain events, a true innovation in water monitoring*
- *Multiple communications options*
- *Optional sampler pacing capabilities, ideal for CSO and stormwater*
- *NEMA 6P sealed to withstand submergence and prolonged surcharge conditions*

Ideal for:

- *Long-Term Flow Monitoring*
- *Sanitary Sewer Evaluation Studies*
- *CSO Studies and Monitoring*
- *NPDES Stormwater Compliance*
- *Permanent Collection System Monitoring*

Hach's most advanced Sigma flow meter—supports three interchangeable sensors, long battery life, increased data storage and offers optional interfaces with samplers, and modem capability. (Sensors sold separately.)

Contact factory for pricing.

For more information, call to request Literature #2540, or visit www.hach.com

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940 Intrinsically Safe Area Velocity Flow Meter

Its rugged design, low-profile probes, and one-year battery life significantly reduce site visits. Choose up to two area velocity sensors, or one area velocity and one level backup. Whether you require redundancy in a single pipe or level and velocity in separate pipes, you'll profit from new performance levels in a single meter.

Industry standard MODBUS ASCII protocol has been incorporated into the American Sigma 940 Flow Meter. The implementation of the MODBUS protocol allows your SCADA or DCS system to directly communicate with the 940 Flow Meter without the use (or additional cost) of a PLC.

Advanced Technology for Accuracy

- Automatically corrects for temperature effects
- Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement
- Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions
- CSA-NRTL/C certified for operation in Class I, Division I, Groups C and D hazardous locations
- Multiple communications options
- NEMA 6P sealed to withstand submergence and prolonged surcharge conditions
- Sampler pacing capabilities, to document the extent of overflow problems

Ideal for:

- Long Term Flow Monitoring in Hazardous or Potentially Hazardous Areas
- Sanitary Sewer Evaluation Studies
- CSO Studies and Monitoring

Contact factory for pricing.

The Hach Sigma 940 intrinsically-safe flow meter supports dual sensors, interfaces with samplers, has a long battery life, and offers increased data storage and optional modem capability. (Sensors sold separately.)

For more information, call to request Literature #2579, or visit www.hach.com

911 Intrinsically Safe Portable Area Velocity Flow Meter

With quick installation and minimum maintenance, the 911 is ideal for short-term flow studies in hazardous or potentially hazardous environments. Profiling to establish accurate average velocity is not needed.

Advanced Technology for Accuracy

- Automatically corrects for temperature effects
- Uses patented "drawdown correction" to correct the effects of velocity on accurate level measurement
- Advanced Doppler technology avoids signal dropouts and ensures accuracy in low-flow, full-pipe, or reversed-flow conditions
- CSA-NRTL/C certified for operation in Class I, Division I, Groups C and D hazardous locations
- Low profile, non-fouling probe reduces maintenance and is detachable/interchangeable for ultimate flexibility
- Easy installation with a slender 6.5 in. diameter, no profiling required
- NEMA 6P sealed to withstand submergence and prolonged surcharge conditions
- Sampler pacing capabilities, to document the extent of overflow problems

Ideal for:

- Short Term Flow Studies in Hazardous or Potentially Hazardous Areas
- Sanitary Sewer Evaluation Studies
- CSO Studies and Monitoring
- Industrial Discharge Monitoring

Contact factory for pricing.

Are there hazardous gasses at your monitoring site? Be sure you're safe with an affordable Sigma 911 intrinsically safe flow meter. (Sensors sold separately.)

For more information, call to request Literature #2578, or visit www.hach.com

Flow Products

The Sigma 950 Series Flow Meter offers maximum flexibility for multiple applications.

The Hach Sigma 950 Series Permanent/Portable Open Channel Flow Meters provide portable and/or permanent single-channel monitoring plus water quality testing, process control interface, and digital display. (Sensors sold separately.)

The 950 Flow and Quality Meter logs flow, level, pH, temperature, dissolved oxygen, and conductivity.

The 950AV provides maximum versatility with the choice of three depth measurement technologies and velocity. OptiFlo-AV offers all three in one meter.

Versatility and Customization

The Sigma 950 series are the meters of choice by flow professionals, consultants, and municipalities. Choose from any of the following technologies to fit your application.

- *Use the Submerged Area/Velocity flow meter to measure flow in collections systems for periods up to 40 days using our 6 amp-hr gel electrolyte battery*
- *Use any of our level technologies when primary devices (Weirs and Flumes) are available to measure level and calculate flow*
- *The bubbler level technology is ideal for applications with high winds, high temperature or when foam is present*
- *The combination of bubbler level technology and doppler velocity is the favorite of storm water professionals*
- *The ultrasonic level technology is ideal to monitor industrial dischargers for your pre-treatment program in combination of any of our Automatic Wastewater samplers*

Sampler Pacing and Equipment Control

The 950 Flow Meter is the perfect choice to do flow pacing sampling with portable samplers. Control samplers, pumps, or other equipment based on monitored flow or selected parameter(s). Sampler pacing provides the ability to document overflow problems.

Note: Hach Data Management software is required to program this Flow Meter. See page 487 for details.

Ideal for:

- *Long Term or Permanent Flow Studies*
- *Sanitary Sewer Evaluation Studies*
- *CSO Studies and Monitoring*
- *NPDES Stormwater Compliance*
- *Industrial Compliance Monitoring*

Battery life for our level technologies greatly depend on logging intervals and environmental conditions Contact us to determine the battery life for your application. Other power options are available, such as AC power converters and Solar Panels.

Hach Sigma 950 Factory Installed Options:

- *Integral pH-Temperature/ORP Meter*
- *Integral Dissolved Oxygen/Temperature Meter*
- *Integral Conductivity/Temperature Meter*
- *Rain Gauge Input*
- *Analog Input Data-logging Channels*
- *4 – 20 mA Outputs*
- *Mechanical Totalizer*
- *Alarm Relays*
- *Modem*
- *Expanded Memory*
- *AC Power Backup*

With solar power and radio communications, these 950AVs monitor three billing sites.

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Model 950 Flow Meters Provide Maximum Versatility

Model	Choice of Level Technology	Features
950 — Level Only*		
	Bubbler Submerged Pressure Ultrasonic (50 kHz downlook) Ultrasonic (75 kHz downlook) Ultrasonic (75 kHz In-pipe)	Each 950 meter contains electronics for only one sensing technology.
950 — AV (Area Velocity)		
	Bubbler Submerged Pressure Ultrasonic (50 kHz downlook) Ultrasonic (75 kHz downlook) Ultrasonic (75 kHz In-pipe	Measures velocity as well as level. No need for primary device.
950 OptiFlow — Level Only*	Up to three level sensors in <u>one</u> meter.	
	Bubbler Submerged Pressure Ultrasonic (50 kHz)	950 Optiflow meters have electronics for measuring level with three different technologies. Only one can be used at a time.
950 OptiFlow — AV	Up to three level sensors in <u>one</u> meter.	
	Bubbler Submerged Pressure Ultrasonic (75 kHz)	950 Optiflow meters have electronics for measuring level with three different technologies. In addition to measuring velocity. No need for primary device. Only one can be used at a time.

To measure flow, level-only meters also require a primary device such as a weir or flume.

Solar Power System for Flow Meters and Samplers

- *Uninterrupted operation; no recharging of power supply*
- *Accommodates varying size modules*
- *Handles wide range of battery options*

Sigma Smart Chargers

- *Compatible with Sigma Battery Pack Models 913US, 913EU, 913UK and 914US, 914EU, 914UK (12 Vdc, Gel Electrolyte and NiCad, 4 - 6 amp/hr)*
- *Fast Recharging time-typically less than one hour*
- *Two-Stage charging for Optimal Battery Life*
- *NiCad Charger for US Charger Prod. No. 6427500, Cord Prod. No. 1801000*
- *Gel-Electrolyte for US Charger Prod. No. 6247400, Cord Prod. No. 1801000*

Prod. No.	Description
2672	950 Bubbler Flow Meter with Graphics Display
2680	950 Submerged Pressure Flow Meter with Graphics Display
3286	950 75 kHz Ultrasonic Flow Meter with Graphics Display
3412	950 OptiFlo Flow Meter with Graphics Display
3248	950 AV Bubbler Flow Meter with Graphics Display
3522	950 AV Submerged Flow Meter with Graphics Display
3959	950 AV 75 kHz Ultrasonic Flow Meter with Graphics Display
3773	950 AV OptiFlo Flow Meter with Graphics Display

950 Flow Meters only—must order sensors and options separately. For a complete system refer to packages on page 486.
Also available: Solar modules with 40 W, 50 W, 60 W, and 75 W panels; batteries and accessories.

For more information, call to request Literature #2547, or visit www.hach.com

Specifications*

Units of Measurement
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.

Measurement Modes
Flumes: Parshall, Palmer, Bowlus, Leopold-Lagco, H, HL, HS, trapezoidal
Weirs: N-notch (15 to 120°) contracted/non-contracted rectangular, Thelmar, compound Cipolletti
Manning Equation: Round, U and rectangular trapezoidal channels
Flow Nozzles: Kennison, parabolic, California pipe
Head vs. Flow: Custom programmable curve (up to 99 points)

Operating Temperature
-10 to 65.5°C (14 to 150°F)

Storage Temperature
-40 to 80°C (-40 to 176°F)

Time Based Accuracy
±1 second per day (one level and one velocity, data download once per week, at 10°C (50°F), also affected by site conditions)

Totalizers
8-digit resettable and 8-digit non-resettable LCD software totalizer
Optional 6-digit non-resettable mechanical totalizer

Graphics Display
Back lit LCD; Auto-off when not in use
SCII Mode: 8 line x 40 character
Graphics Mode: 60 x 240 dot
Dimensions: 3.8 x 12.7 cm (1.5 x 5 in.)
Displays: level vs. time, flow vs. time
Optional Displays: rainfall, pH, ORP, temp., DO, conductivity, vs. time, sampler events, and alarm events

Keypad
21 position sealed membrane switch with blinking green LED to indicate power on. Four "soft keys", function defined by display

Data Storage
Capacity: Up to 512k bytes (402 days of level, velocity and rainfall readings at 15 minute intervals plus 300 events)
Monitoring Intervals: 1, 2, 3, 5, 15, 30 or 60-minute intervals

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

Sampler Output
12 to 17 Vdc pulse, 100 mA maximum at 500 ms duration

Communications
RS-232: Up to 19,200 baud SCADA MODBUS communication protocol via RS-232 or optional modem
Modem (optional): 14,400 baud
Cellular Communications (optional): 14,400 bps, MNP 10-EC Cellular Protocol
Pager Alarms

Enclosure Material
ABS, UV resistant

Enclosure Rating
NEMA 4X, 6

Power Source
12 Vdc

Power Options
6 amp-hr. gel electrolyte rechargeable battery
4 amp-hr. Ni-Cad rechargeable battery
115 Vac, 230 Vac or 100 Vac power converter with battery charger

Dimensions
34.3 x 25.4 x 24.1 cm (13.5 x 10.0 x 9.5 in.)

Weight
6.8 kg (15 lbs.) with batteries

Subject to change without notice. Specifications will vary depending on channel size, channel. See page 482 and 484 for sensor specs.

Versatility for a wide range of applications and site conditions.

The Hach Sigma 980 Permanent Open Channel Flow Meter is an AC powered, wall-mounted meter with three different level/flow sensing technologies and easy-to-read graphic display. (Sensors sold separately.)

Specifications*

Units of Measurement
Flow: gps, gpm, gph, lps, lpm, lph, mgd, afd, cfs, cfm, cfh, cfd, m^{3}s, m^{3}m, m^{3}h, m^{3}d
Totalized Flow: L, m^3, ft.^{3}, gal., acre-ft.

Primary Devices
Flumes: Parshall, Palmer, Bowlus, Leopold-Lagco, H, HL, HS, Trapezoidal
Weirs: Compound V-notch (15 to 120°) Contracted/non-contracted rectangular, Thelmar, Compound Cipolletti
Manning Equation: Round, U and rectangular trapezoidal channels
Head vs. Flow: Two independent user-entered, look-up tables (up to 100 points)
Level Only: in., ft., cm, m
Area Velocity: Level-area table, circular pipe, U-shaped channel, trapezoidal channel, rectangular channel

Operating Temperature
-20 to 50°C (-4 to 122°F)

Storage Temperature
-20 to 70°C (-4 to 158°F)

Humidity
0 to 90%, non-condensing

Time Based Accuracy
±6 seconds (0.007%) per day

Totalizers
8-digit resettable and 8-digit non-resettable software

Graphics Display
Back lit LCD; Auto-off when not in use
ASCII Mode: 8 line x 40 character
Graphics Mode: 60 x 240 dot
Dimensions: 3.8 x 12.7 cm (1.5 x 5 in.)
Displays: level vs. time, flow vs. time
Optional Displays: rainfall, pH, ORP, temp., DO, conductivity vs. time, sampler events, and alarm events

Keypad
19 position sealed membrane switch
Four "soft keys", functions defined by display

Data Storage
Capacity: Up to 456k bytes (402 days of three channels user selected readings at 15 minute intervals plus 300 events)
Data Points: 116,000
Daily Statistics: Available for up to 32 days
Monitoring Intervals: 1, 2, 3, 5, 15, 30 or 60-minute intervals
Memory Mode: Wrap-around

Sampler Output
15 Vdc, 100 mA at 500 ms duration

Enclosure Material
ABS, UV resistant

Enclosure Rating
NEMA 4X, IP66 with front cover closed

Mounting
Wall. Rail/pole

Power Source
Requirements: 100 to 230 Vac, 50/60 Hz, single phase, 15W maximum, 0.25 amp maximum
Installation Category: II
Connection: Seven 0.5-in. hubs, one 1.0-in. hub

Dimensions
37.1 x 30.2 x 21.0 cm (14.6 x 11.9 x 8.3 in.)

Weight
7.6 kg (16.8 lbs.)

*Subject to change without notice. Specifications will vary depending on channel size, channel. See page 482 and 484 for sensor specs.

Three Different Level/Flow Sensing Technologies

Designed to use three different sensing technologies to make it appropriate for most flow situations. Technologies include:

• *Non-contacting ultrasonic*
• *Submerged pressure*
• *Doppler velocity*

Advanced Monitoring and Control

Use the 980 flow meter to monitor rainfall, level, pH, temperature and more. Process measurement and control is bundled in one simple unit with available input/output controls—7 standard analog inputs and 4 user-assigned relays for setpoints and alarms.

Large, Easy to Use Interface

The large backlit display provides easy review of graphs and any logged channel for any time period up to one day or review minimum, maximum and total flow values of any logged channel in hourly, daily or other intervals. Features a sealed membrane switch keypad and audio signal confirmation of keystrokes. Generates charts, graphs and reports with Hach's software package.

Note: Hach Data Management software is required to program for this Sigma Flow Meter. See page 487 for details.

Ideal for:

• *Surcharge Flows*
• *Reversed Flow Conditions*
• *Weirs and Flumes*
• *Small to Large Channels*

Prod. No.	Description
9700400	980 Permanent Flow Meter Includes (2) 4-20 mA outputs, (4) internal 5 amp form C relays, (7) analog inputs, (1) RS232 data port, (1) sampler output and wall mounting hardware.
9700500	980 Permanent Flow Meter with 14,400 baud landline modem. Domestic sales only. Includes (2) 4-20 mA outputs, (4) internal 5 amp form C relays, (7) analog inputs, (1) RS232 data port (1) sampler output and wall mounting hardware.

This is for a Flow Meter Only. For a complete system, refer to packages on page 486.

For more information, call to request Literature #2546, or visit www.hach.com

Designed to give highly accurate flow and depth measurement using ultrasonic sensor technology.

- *Built-in gauging library for most flumes and weirs*
- *Pulse echo technology*
- *Automatic temperature compensation*
- *Requires no routine maintenance*
- *Multiple language capability*

The Model U53 level and flow monitor has a simple menu-driven system to guide the user through operation sequences and provides reliable and cost effective flow monitoring. A large range of pre-programmed flow structures or user-entered table for custom built structures makes the U53 an invaluable tool for non-intrusive monitoring of open channels.

Flow measurements can be viewed directly on the display or output to a chart recorder, data logger, or remote SCADA system via the two current outputs. Four user-configurable relays allow links to be made with external equipment for total site and process control. The U53 also has a choice of simple calibration routines for high levels of accuracy and ease of use.

The U53 can be used for flow and depth control in a variety of applications including monitoring of storm water, inlet flow, final effluent and activated sludge. It is also ideal for use in consent limit monitoring and works control.

Principal of Operation

The U53 can be operational in minutes—the user simply selects the primary gauging structure form from the library of flumes and weirs, and enters the setup parameters at the screen prompts. The instrument automatically calculates flow using specified formulae. Alternatively, the user can enter a flow curve for any non-standard structure.

The ultrasonic sensor associated with the U53 requires no maintenance and is designed to provide years of uninterrupted service. In order to minimize temperature effects, it has a short blocking distance of less than 10 inches (250 mm) that allows the sensor to be installed close to the water surface.

Reliable and cost-effective solution for measuring flow and level, using proven Ultrasonic pulse echo technology.

Prod. No.	Description
U53A4A1N	U53 Permanent Ultrasonic Flow Meter Includes 4 electromechanical relays and is housed in an 1/2 DIN, NEMA 4X enclosure with hardware for panel, surface or pipe mounting.
U53S010	Ultrasonic Sensor, 10 ft. cable
U53S030	Ultrasonic Sensor, 30 ft. cable
U53S100	Ultrasonic Sensor, 100 ft. cable
3004A0017-001	Sensor mounting hardware: Floor or wall adjustable mounting bracket to mount ultrasonic sensor in an open channel or flume without structures to mount the sensor
76A4010-001	NEMA 4X junction box
1W1127	Interconnect cable (per ft.)
1000G3088-001	Sun shield for U53 controller

For more information, call to request Literature #G507, or visit www.hach.com

Specifications*

Dimensions
14.62" H x 11.88" W x 8.26" D (37.1 cm x 30.2 cm x 21 cm)

Weight
16.8 lbs. (7.62 kg) including power source

Enclosure Material
ABS, UV resistant, stable from -40° to 176°F (-40°C to 80°C)

Enclosure Rating
NEMA 4X, IP66 with front cover closed, UV resistant

Mounting
Wall mount and Rail/Pole mount

Graphics Display
Backlit liquid crystal display (LCD). 8 line x 40 character in text mode, 64 x 240 pixels in graphics mode. Displays level vs. time, flow vs. time, rainfall vs. time, pH and temperature

Keypad
19 position sealed membrane switch including 4 "soft keys", functions defined by display

Totalizers
8-digit resettable and 8-digit non-resettable LCD software totalizer

Totalized Flow
gal., ft.3, acre-ft., lit., m^3

*Subject to change without notice.

The Sigma AV Flow Sensor provides reliable, accurate data with minimal maintenance and greater life expectancy.

The Hach Sigma AV Flow Sensor is a robust sensor specially developed to withstand harsh environments typical of collection systems.It provides reliable, accurate data with minimal maintenance and greater life expectancy.

Less Maintenance and Troubleshooting

Two interchangeable level sensor cover plates are available to adapt the sensor to a variety of site conditions.

- *Oil-filled Cover Plate—designed for sites susceptible to extreme fouling. The cavity is filled with a high-viscosity silicon oil that prevents fouling for as much as one year. The silicon oil is easily replenished, if needed, with a hand tool provided by Hach.*

- *Non oil-filled Cover Plate—designed to minimize fouling and can be used for most applications or in pipes that could run dry.*

Designed for Harsh Environments

- *Uses Noryl® plastic in the outer shell to protect the sensor against highly abrasive environments*
- *Cable is rigidly clamped inside the shell, then potted for strength*
- *Connectors are hard-anodized to the meter to prevent lost connection due to corrosion*

Easy to Install

A single point calibration can be performed on-site without the need of a bucket of water.

Superior Sensor

- *Stable and consistent*
- *Accurate and repeatable*
- *Versatile to meet many applications*

Ideal for:

- *Capacity Studies*
- *Infiltration and Inflow (I&I) Studies*
- *Sanitary Sewer Evaluation Studies (SSES)*
- *Billing or Custody Transfer*
- *CSO and SSO Monitoring*
- *Stormwater Monitoring and Compliance*
- *Industrial Wastewater Monitoring – Municipal Pretreatment*

Specifications*

AV SENSORS VELOCITY MEASUREMENT

Method
Doppler ultrasound; twin 1 MHz piezoelectric crystals

Operating Depth
2 cm (0.8 in.) minimum, typical
Recommended Range
-1.52 to 6.10 m/s (-5 to 20 ft./s)

For velocity performance specifications, please refer to individual Hach Sigma Flow Meter specifications.

AV SENSORS DEPTH MEASUREMENT

Method
Pressure transducer with stainless steel diaphragm

Accuracy
±0.16% full scale ±1.5% of reading at constant temp ±2.5°C (±36.5°F)
±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)

Velocity-Induced Depth Error
Compensated based on pipe geometry and flow velocity

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.)

AV SENSORS GENERAL ATTRIBUTES

Air Intake
Atmospheric pressure transducer is desiccant protected

Body Material
Noryl® plastic outer shell with epoxy potting

Power Consumption
Less than or equal to 1.2 W at 12 Vdc

Cable
Urethane cable with air vent

Connector
Hard anodized; satisfies Military Spec 5015

Cable Lengths
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.)

Dimensions
2.3 x 3.8 x 13.5 cm (0.9 x 1.5 x 5.31 in.)

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

*Subject to change without notice. Specifications will vary depending on channel size, channel. See pages 479-480 for flow meter specs.

For more information, call to request Literature #3469, or visit www.hach.com

HACH®
Be Right™

Submerged Area Velocity Sensors

Note: For Intrinsically Safe Sensors for use with 911 and 940 I.S. Flow Meters—Consult Factory.

Prod. No.	Description
	STANDARD (NON OIL-FILLED)
77065-030	Submerged AV Sensor 0-10 ft. range, 30 ft. cable, with connector
77065-050	Submerged AV Sensor 0-10 ft. range, 50 ft. cable, with connector
77065-075	Submerged AV Sensor 0-10 ft. range, 75 ft. cable, with connector
77065-100	Submerged AV Sensor 0-10 ft. range, 100 ft. cable, with connector
77065-XXX	Submerged AV Sensor 0-10 ft. range, custom cable, with connector Requires cable 77155-PRB.
77075-030	Submerged AV Sensor 0-30 ft. range, 30 ft. cable, with connector
77075-050	Submerged AV Sensor 0-30 ft. range, 50 ft. cable, with connector
77075-075	Submerged AV Sensor 0-30 ft. range, 75 ft. cable, with connector
77075-100	Submerged AV Sensor 0-30 ft. range, 100 ft. cable, with connector
77075-XXX	Submerged AV Sensor 0-30 ft. range, custom cable, with connector Requires cable 77155-PRB.
	OIL-FILLED SENSOR WITH CONNECTOR
77064-030	Oil-Filled, Submerged AV Sensor 0-10 ft. range, 30 ft. cable, with connector
77064-050	Oil-Filled, Submerged AV Sensor 0-10 ft. range, 50 ft. cable, with connector
77064-075	Oil-Filled, Submerged AV Sensor 0-10 ft. range, 75 ft. cable, with connector
77064-100	Oil-Filled, Submerged AV Sensor 0-10 ft. range, 100 ft. cable, with connector
77064-XXX	Oil-Filled, Submerged AV Sensor 0-10 ft. range, custom cable, with connector Requires cable 77155-PRB.
77074-030	Oil-Filled, Submerged AV Sensor 0-30 ft. range, 30 ft. cable, with connector
77074-050	Oil-Filled, Submerged AV Sensor 0-30 ft. range, 50 ft. cable, with connector
77074-075	Oil-Filled, Submerged AV Sensor 0-30 ft. range, 75 ft. cable, with connector
77074-100	Oil-Filled, Submerged AV Sensor 0-30 ft. range, 100 ft. cable, with connector
77074-XXX	Oil-Filled, Submerged AV Sensor 0-30 ft. range, custom cable, with connector Requires cable 77155-PRB.
	BARE WIRE—STANDARD (NON OIL-FILLED SENSOR)
77265-030	Submerged AV Sensor 0-10 ft. range, 30 ft. cable Requires Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
77265-XXX	Submerged AV Sensor 0-10 ft. range, custom cable Requires cable 77155-PRB, Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
77275-030	Submerged AV Sensor 0-30 ft. range, 30 ft. cable Requires Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
77275-XXX	Submerged AV Sensor 0-30 ft. range, custom cable Requires cable 77155-PRB, Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.

Prod. No.	Description
	BARE WIRE—OIL FILLED
77264-030	Oil-Filled, Submerged AV Sensor 0-10 ft. range, 30 ft. cable Requires Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
77264-XXX	Oil-Filled, Submerged AV Sensor 0-10 ft. range, custom cable Requires cable 77155-PRB, Junction Box 7725000, Hub Assembly 7722800, HUB Assembly Cable 77155-HUB.
77274-030	Oil-Filled, Submerged AV Sensor 0-30 ft. range, 30 ft. cable Requires Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
77274-XXX	Oil-Filled, Submerged AV Sensor 0-30 ft. range, custom cable Requires cable 77155-PRB, Junction Box 7725000, Hub Assembly 7722800, Hub Assembly Cable 77155-HUB.
	MISCELLANEOUS
77155-PRB	Sensor Cable (per ft.) Maximum length 247 ft., minimum length 1 ft.
7725000	Junction Box Silicone gel potting recommended for corrosive or wet environments; use Gel Fill Kit (7725600) and Dispensing Gun (7715300).
7722800	Hub assembly for bare wire sensors Requires Hub Assembly Cable 77155-HUB.
77155-HUB	Hub assembly cable (per ft.) Connects junction box to hub. Maximum length 3 ft., minimum length 1 ft.
7725600	Silicone gel potting kit for j-box Includes 3 tubes of gel fill (7729800) and 3 static mixers (5909900) for replacing/refilling junction box. A single dispensing gun (7715300) is required.
7715300	Silicone oil/gel dispensing gun for oil-filled sub AV sensor

Flow Products

	Submerged Area Velocity	Low Profile Velocity	75 KHz Ultrasonic Depth Downlooking	50 KHz Ultrasonic Depth Downlooking	75 KHz Ultrasonic Depth In-Pipe	Submerged Depth	Bubbler Area Velocity
Flow Meter Compatibility							
910	■						
920	■	■	■		■		
930	■	■	■		■		
930T	■	■	■		■		
950 Bubbler							
950 Sub Pressure						■	
950 75KHz US			■		■		
950 OptiFlo				■		■	
950 AV Optiflo	■	■	■		■		■
950 AV Bubbler							
950 AV Submerged	■						■
950 AV 75KHz US		■		■	■		
980	■	■	■		■		

Specifications*

SUBMERGED AREA VELOCITY SENSOR
(See page 482.)

LOW PROFILE VELOCITY SENSOR

Method
Doppler ultrasonic

Range
-1.52 to 6.1 ms
(-5 to +20 fps)

Accuracy
±2% of reading

Zero Stability
±1.52 cm (±0.05 fps)

Nose Angle
20° from horizontal

Cable
Length: 7.6 m (25 ft.) standard; up to 76 m (250 ft.) custom
Diameter: 0.57 cm (0.225 in.)

Materials
Sensor: Polymer
Cable: Urethane
Mounting Hardware: Stainless Steel

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

75 KHZ ULTRASONIC DEPTH DOWNLOOKING SENSOR

Range
23 cm to 3.3 m (14 in. to 10.8 ft.) sensor to liquid

Accuracy
±0.03 ft. over 2 ft. change in head with ideal target at 20°C, in still air, 50 ft. cable

Span
0 to 4.57 m (0 to 15 ft.)

Beam Angle
±12° (-10 dB)

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

Temperature Error
±0.000047 ft./F° max error within comp temp range per degree of change

Material
PVC housing
Acoustic window

Cable
4-conductor with integral stainless steel support cable
Length: 7.6 m (25 ft.)

Dimensions
12.7 x 5.7 cm
(5.0 x 2.25 in.)

50 KHZ ULTRASONIC DEPTH DOWNLOOKING SENSOR

Range
38.1 cm to 9.1 m (15 in. to 30 ft.) sensor to liquid

Accuracy
1 to 10 ft. ±0.01 ft. (±0.003 m) (at 22°C (72°F), still air, 40 to 70% relative humidity)

Span
0 to 8.84 m (0 to 29 ft.)

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

Temperature Error
±0.000047 ft./F° max error within comp temp range per degree of change

Resolution
0.0011 ft.

Material
PVC housing
Buna-N acoustic window

Cable
4-conductor with integral stainless steel support cable.
Length: 7.6 m (25 ft.)

Crystal Spec
11.5° included beam angle

Dimensions
9.5 x 7 cm
(3.75 x 2.75 in.)

75 KHZ ULTRASONIC DEPTH IN-PIPE SENSOR

Range
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.)

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

Temperature Error
±0.00005 m/C° (±0.0001 ft./F°) max error within comp temp range per degree of change

Resolution
0.019 cm (0.0075 in.)

Material
Stat-Kon A-E ABS Plastic

Cable
4-conductor Length: 7.6 m (25 ft.) std.

Crystal Spec
7° included beam angle

Dimensions
3.81 x 30 cm
(2.0 x 12 in.)

SUBMERGED DEPTH SENSOR

Range
2.5 psi: 0.01 to 1.75 m (0.04 to 5.75 ft.)

Accuracy
±10.1% full scale (non-linearity and hysteresis)

Max Allowable Level
6x over pressure

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

Compensated Temp
0 to 30°C(32 to 86°F)

Temperature Error
2.5 psi: 0.04 to 5.75 ft. ±0.006 ft./F° max error within comp temp range per degree of change

Air Intake
Atmospheric pressure reference is desiccant protected

Transducer Type
Twin 1 MHz piezoelectric crystals. Differential piezo resistive with balanced bridge

Material
316 stainless steel body with titanium diaphragm

Cable
4-conductor polyurethane sensor cable with air vent Length: 7.6 m (25 ft.) standard; 76 m (250 ft.) maximum

Dimensions
2.65 x 17.2 cm
(1 x 6.75 in.) Probe Frontal Area: 0.875 in. squared)

BUBBLER AREA VELOCITY SENSOR

Depth Measurement Method
Doppler ultrasonics /pressure transducer

Range
0.003 to 3.6 m (0.01 to 11.75 ft.)

Accuracy
0.01 to 11.75 ft. ±0.011 ft. (0.033 m) (linearity and hysteresis at 22°C (72°F)

Ambient Operating Temperature
-18 to 63°C (0 to 145°F)

Compensated Temp
0 to 59°C (32 to 136°F)

Temperature Error
±0.0003 ft./°F (max. error within comp temp range per degree of change)

Air Intakes
Bubble source and reference port desiccant protected. Fittings provided for remote intakes.

Filters
10 micron on bubble source intake

Line Purge
High pressure purged at programmed intervals, or in manual mode on demand

Velocity Measurement Method
Doppler ultrasonic

Transducer Type
Twin 1 MHz piezoelectric crystals

Range
-1.52 to 6.10 m/s
(-5 to 20 fps)

Zero Stability
< 0.015 m/s (0.05 fps)

Accuracy
±2% of reading

Depth for Velocity
2 cm (0.8 in.) min, typical.

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

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

Subject to change without notice. Specifications will vary depending on channel size, channel. See pages 479-480 for flow meter specs.

Low Profile Velocity Sensors-Non I.S.

Prod. No.	Description
88006	Velocity Sensor, with connector Requires 3722 cable.
88006-25	Velocity probe with connector with 25 ft. cable
88006-50	Velocity probe with connector with 50 ft. cable
88006-100	Velocity probe with connector with 100 ft. cable
88005	Velocity Sensor, bare leads Requires 3722 cable and 4924 junction box.
88005-25	Velocity probe with bare leads with 25 ft. cable Requires 4924 junction box.
88005-50	Velocity probe with bare leads with 50 ft. cable Requires 4924 junction box.
88005-100	Velocity probe with bare leads with 100 ft. cable Requires 4924 junction box.
9707800	Velocity sensor with connector bare leads For use with 980 flow meter. Requires 9708000 cable.

75 KHz Ultrasonic Level Sensors

Ultrasonic sensors approved for use in the USA –Class I, Zone 1, Groups A, B, C, D. Canada – Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G. For conduit installation use 1 inch or larger conduit and bare lead probe.

Prod. No.	Description
DOWNLOOKING	
1176-01	75 kHz ultrasonic sensor with connector Requires 2716 cable.
1176-03	75 kHz ultrasonic sensor with bare leads Requires 2716 cable and 3658 junction box.
5233-05	IS 75 kHz ultrasonic sensor without horn Requires 5245100 cable.
9701100	75 kHz ultrasonic sensor For use with 980 flow meter. Requires 9702300 cable.
IN-PIPE	
3702-01	75 kHz in-pipe ultrasonic sensor with connector. Requires 2716 cable.
3702-02	75 kHz in-pipe ultrasonic sensor with bare leads. Requires 2716 cable and 3658 junction box.
4741	IS 75 kHz in-pipe ultrasonic sensor with connector and 25 ft. cable
9707700	75 kHz in-pipe ultrasonic sensor For use with 980 flow meter. Requires 9702300 cable.

50 KHz Ultrasonic Level Sensors

Prod. No.	Description
DOWNLOOKING	
1177-01	50 kHz ultrasonic sensor with connector Requires 2716 cable.
1177-03	50 kHz in-pipe ultrasonic sensor with bare leads. Requires 2716 cable and 3658 junction box.

Submerged Depth Sensor

Prod. No.	Description
2963	General purpose depth sensor, 0 to 5.76 ft. with 25 ft. cable Depth sensor cable cannot be extended.

Bubbler AV Sensors

Prod. No.	Description
88007	Bubbler AV sensor, 6-pin connector Requires 3232 cable.
88008	Bubbler AV sensor, 10-pin connector Requires 3232 cable.
88007-25	Bubbler AV sensor, 6-pin connector with 25 ft. cable
88008-25	Bubbler AV sensor with connector with 25 ft. cable
88007-50	Bubbler AV sensor, 6-pin connector with 50 ft. cable
88008-50	Bubbler AV sensor with connector with 50 ft. cable
88007-100	Bubbler AV sensor, 6-pin connector with 100 ft. cable
88008-100	Bubbler AV sensor with connector with 100 ft. cable
88009	Bubbler AV sensor with bare leads Requires 3232 cable and 3366 junction box.
88009-25	Bubbler AV sensor with bare leads with 25 ft. cable Requires 3366 junction box.
88009-50	Bubbler AV sensor with bare leads with 50 ft. cable Requires 3366 junction box.
88009-100	Bubbler AV sensor with bare leads with 100 ft. cable Requires 3366 junction box.

Cable and Junctions Boxes

Prod. No.	Description
3722	Cable for velocity sensor (per ft.) Maximum length is 300 ft.
9708000	Velocity cable (per ft.) Minimum length is 10 ft., maximum is 100 ft.
2716	Ultrasonic sensor cable (per ft.) Maximum length 50 ft. Consult factory for greater distances.
5245100	Ultrasonic sensor cable (per ft.) For use with 5233-05 sensor. Maximum length is 100 ft.
9702300	Ultrasonic sensor cable (per ft.) Minimum length is 10 ft., max. length is 500 ft.
3232	Coax cable, 2 pair, AV (per ft.)
4924	Junction box for velocity probes with bare leads
3658	Junction box for ultrasonic sensor conduit installations
3366	Junction box for bubbler depth/velocity probes 6 pin

910 Bundle Prod. No. 4900910

920 Bundle Prod. No. 4850921

950 Bundle Prod. No. 3248950

950 Bundle Prod. No. 3959952

980 Bundle Prod. No. 9700200

910 Package

Prod. No.	Description
4900910	Includes: (1) Sigma 910 flow meter (Prod. No. 4900) (1) Submerged AV sensor with 30 ft. cable (Prod. No. 77065-030) (1) Suspension harness (Prod. No. 4920)

920 Packages

Prod. No.	Description
4850921	Includes: (1) Sigma 920 flow meter (Prod. No. 4850) (2) Submerged AV sensors with 30 ft. cables (Prod. No. 77065-030) (1) Input for additional submerged AV sensor (Prod. No. 4883)
4850922	Includes: (1) Sigma 920 flow meter (Prod. No. 4850) (1) Input for 75 kHz ultrasonic sensor (Prod. No. 4869) (1) Submerged AV sensor with 30 ft. cable (Prod. No. 77065-030) (1) 75 kHz in-pipe ultrasonic sensor (Prod. No. 3702-01) (25) Ft. cable (Prod. No. 2716)

950 Packages

Prod. No.	Description
3672950	Includes: (1) 950 bubbler flow meter (Prod. No. 2672) (1) 25 ft. tubing (Prod. No. 2929)
3680950	Includes: (1) 950 submerged pressure flow meter (Prod. No. 2680) (1) Submerged depth sensor with 25 ft. sensor cable (Prod. No. 2963)
3286951	Includes: (1) 950 75 kHz ultrasonic flow meter (Prod. No. 3286) (1) 75 kHz downlooking ultrasonic sensor (Prod. No. 1176-01) (25) Ft. cable (Prod. No. 2716)
3286952	Includes: (1) 950 75 kHz ultrasonic flow meter (Prod. No. 3286) (1) 75 kHz in-pipe ultrasonic sensor (Prod. No. 3702-01) (25) Ft. cable (Prod. No. 2716)
3248950	Includes: (1) 950 AV bubbler flow meter (Prod. No. 3248) (1) Bubbler AV sensor (Prod. No. 88007) (25) Ft. cable (Prod. No. 3232)
3522950	Includes: (1) 950 AV submerged flow meter (Prod. No. 3522) (1) Submerged AV sensor with 30 ft. cable (Prod. No. 77065-030)
3959951	Includes: (1) 950 AV 75 kHz ultrasonic flow meter (Prod. No. 3959) (1) 75 kHz downlooking ultrasonic sensor (Prod. No. 1176-01) (25) Ft. cable (Prod. No. 2716) (1) Low profile velocity sensor with connector (Prod. No. 88006) (1) 25 ft. cable (Prod. No. 3722)
3959952	Includes: (1) 950 AV 75 kHz ultrasonic flow meter (Prod. No. 3959) (1) 75 kHz in-pipe ultrasonic sensor (Prod. No. 3702-01) (25) Ft. cable (Prod. No. 2716) (1) Low profile velocity sensor with connector (Prod. No. 88006) (1) 25 ft. cable (Prod. No. 3722)

980 Packages

Prod. No.	Description
9700000	Includes: (1) 980 permanent flow meter (Prod. No. 9700400) (1) 75 kHz downlooking ultrasonic sensor (Prod. No. 9701100) (25) Ft. cable (Prod. No. 9702300)
9700200	Includes: (1) 980 permanent flow meter (Prod. No. 9700400) (1) Area velocity flow meter option (Prod. No. 9702000) (1) Submerged AV sensor with 30 ft. cable (Prod. No. 77065-030) (1) Quick connect hub (Prod. No. 9702700)

HACH
Be Right™

Flo-Center™ Data Management and Analysis Software for Sigma Series Flow Meters

- *One software solution that allows you to quickly analyze flow meter data*
- *Manage, merge, edit, and share data*
- *Create professional reports and graphs*
- *Multi-channel editing and recalculation in one easy step*
- *Advanced SQL data base design*
- *Windows-type wizards allow for simplified report and graphing configuration*

NEW!

The Hach Sigma Flo-Center analysis software lets you quickly and easily set up your Hach Sigma data logger, download data, and turn it into useful information.

- *Designed to minimize the time it takes to analyze flow data*
- *Pull-down menus and a quick-click toolbar allows even inexperienced users to quickly learn the program*
- *Import flow, rain, and water quality data from Hach InSight and Vision software as well as CSV files*
- *Installation wizard makes loading Flo-Center a snap*
- *Data editing enables you to correct for site or equipment anomalies*
- *Software support from flow specialists*

Prod. No.	Description
8764300	Flo-Center Data Management and Analysis Software
8764500	Flo-Center Data Management and Analysis Software with RS-232 Cable
8764600	Flo-Center Data Management and Analysis Software with RS-232 Cable and USB Flash Drive

Consult factory for Insight Software option.

Rain Gauge or Rain Gauge with Rain Logger

Built to National Weather Service standards, the Rain Gauge accurately measures rainfall in 0.01" increments. The rain gauge can be connected to a Hach Sigma Flow Meter, or the Rain Logger can be used for stand-alone or long-term rainfall recording, as well as for portable use in stormwater runoff monitoring.

Prod. No.	Description
2459	Rain Gauge with tipping bucket, bubble level, level adjust and base mounting plate
2390	Rainlogger, includes 9 Vdc battery
2391	Rain Reader, 115 Vac Includes power adapter and rain reader/logger cradle
4339	Rain Reader, 230 Vac Includes power adapter and rain reader/logger cradle
3638	Remote Rainlogger, requires 2149 Rain Gauge
2149	Rain Gauge with 25 ft. cable and mounting base plate, for use with 3638 Remote Rainlogger

Mounting Hardware—Sigma

Prod. No.	Description
MOUNTING BANDS	
9706100	For 15" pipe
9706200	For 18" pipe
9706300	For 21" pipe
9706400	For 24" pipe
9706500	For 27" pipe
9706600	For 30" pipe
9706700	For 33" pipe
9706800	For 36" pipe
9706900	For 42" pipe

Mounting bands require a sensor mounting clip. Choose from items below.

Prod. No.	Description
3868	For In-Pipe Ultrasonic Sensors
3263	For Low Profile Velocity Sensors (not required for Submerged AV Sensors)
2899	For Bubbler
1771	For Submerged Depth Sensor

Flo-Dar™ Radar Velocity Flowmeter

NEW! TO THIS CATALOG

The Flo-Dar Flow Meter offers accurate, non-contact flow monitoring.

Accurate Flow Measurement

Flo-Dar provides the user with highly accurate flow measurements under a wide range of flows and site conditions. By measuring the velocity of the fluid from above, Flo-Dar eliminates accuracy problems inherent with submerged sensors including sensor disturbances, high solids content and distribution of reflectors.

Non-Contact Sensor

Data is not prone to fouling errors as the sensor does not contact the fluid and does not accumulate any debris.

Easy Installation and Maintenance

As the sensor is mounted above the flow, personnel have no contact with the flow during installation, and maintenance caused by sensor fouling is eliminated. A sensor re-installation/retrieval tool is available for street-level work eliminating the risk and expense of confined space entry.

Available with Optional Surcharge Velocity Sensor

During "surcharge events," Flo-Dar's optional electromagnetic sensor will continue to provide uninterrupted and accurate flow monitoring through dry and wet weather flows without the need for routine cleaning or maintenance.

Note: Marsh-McBirney flow meters require Flo-Ware for Windows software-the user on-site set-up, data management, and report generation software.

Ideal for:

- Long Term or Permanent Flow Studies
- Sanitary Sewer Evaluation Studies
- CSO Studies and Monitoring
- NPDES Stormwater Compliance
- Industrial Compliance Monitoring

Contact factory for pricing.

The Marsh-McBirney Flo-Dar Open Channel Flow Meter provides a revolutionary approach to open channel flow monitoring

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Specifications*

FLO-DAR FLOW METER

Certification
FCC Rules Part 15; Industry Canada RS210 (no user license required)

Dimensions (without SVS)
17.5 cm W x 42.3 cm L x 29.7 cm D (6.9 in. x 16.65 in. x 11.7 in.)

Weight
4.8 kg (10.5 lb)

Enclosure Material
Polystyrene

Enclosure Rating
IP67 Nema 6P waterproof rating

Operating Temperature
–10 to 50°C (14 to 122°F)

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

Power Requirements
8–12 Vdc

Connectors
Waterproof (IP67) connector for quick disconnect from the interconnecting cable below waterproof line.

Interconnecting Cable
Polyurethane, 0.400 (±0.015) in. diameter
IP 67, NEMA 6P
Operating temperature: –4 to 221°F (–20 to 105°C)

Depth Measurement
Method: Ultrasonic
Standard operating range from sensor to liquid: 0.635 to 152.4 cm (0.25 to 60 in.)
Optional extended operating range: 0 to 5.7 m (0 to 224 in.) (with 40.64 cm (16 in.) deadband), temperature compensated
Accuracy: ±1% ±0.25 cm (±0.1 in.)

Surcharge Depth Measurement
Method: Piezo resistive pressure transducer
Maximum range: 3.5 m (138 in.)

Temperature Error
Stability: <0.02% per °C from 0 to 50 °C; long-term stability: 0.5 mV typical
Zero measurement: <0.025 mV per °C from 0 to 50 °C

Overpressure
2.5 x full scale

Velocity Measurement
Method: Radar
Range: 0.23 m/s to 6.10 m/s (0.75 to 20 ft/s)
Accuracy: ±0.5%; ±0.03 m/s (±0.1 ft/s)

FLOW MEASUREMENT

Method
Based on continuity equation

Accuracy
±5% of reading typical where flow is in a channel with uniform flow conditions and is not surcharged, ±1% full scale max.

SURCHARGE VELOCITY SENSOR (SVS) (OPTIONAL)

Velocity Measurement
Method: Electro-magnetic
Range: –1.5 to +6.1 m/s (–5 to +20 ft/s)

Subject to change without notice.

HACH® Be Right™

Flo-Mate™ Portable Flow Meter

Flo-Mate™ hand held, battery powered velocity flow meter!

Applications Include:
- *Streams & NSIP (National Streamflow Information Program)*
- *Rivers*
- *Irrigation Channels*
- *Weir/Flume Calibration*
- *Sewers*
- *Laboratories*

Features That Make a Difference:
- *Instantaneous readout of flow velocity*
- *Proven electromagnetic sensor—no moving parts*
- *Water resistant electronics*
- *Data Storage/Recall automates data collection*
- *Lightweight, battery powered, rugged field design*
- *Direct replacement for USGS type mechanical meters*
- *Optional disconnectable sensor available*

The Flo-Mate Model 2000 is a hand held, battery powered instantaneous velocity meter. Standard Model 2000 includes: water resistant electronics case; electromagnetic velocity sensor; 20 feet of sensor cable; shoulder strap; universal sensor mount; fabric carrying case; and instruction manual.

Prod. No.	Description
Model 2000-11	Hand held velocity meter with non-disconnectable sensor cable
75002	Standard Wading Rod Kit, English (consists of four 2-ft. long sections marked in tenth ft. increments, double end hanger and base plate

GSA pricing available.

NEW!
TO THIS CATALOG

Electromagnetic flow meter for long-term and temporary monitoring of sewers and other open channels.

Applications Include:
- *Wastewater/Storm Sewers*
- *Inflow/Infiltration Studies*
- *Modeling/Sewer System Evaluation*
- *EPA Permitting Requirements*
- *Combined Sewer Overflow (CSO Monitoring)*
- *Wastewater Treatment Plant Balancing*

The flow industry standard redesigned to include an array of customer requested features.

Customer Requested Features Include:
- *Disconnectable Electromagnetic Sensor*
- *Compact Size*
- *Increased Data Storage*
- *Long Battery Life*

Contact factory for pricing.
Consult factory for Insight Software option.

NEW!
TO THIS CATALOG

Flow Products

Access your flow data from anywhere, anytime!

Now you can get 24/7 access to your flow meter data via the web! We make it easy! Let Hach host your data and effortlessly manage your flow meters from anywhere.

Flo-Dar provides highly accurate flow measurements under a wide range of flows and site conditions for Inflow/Infiltration Studies, Billing/Custody Transfer, Combined Sewer Overflow Monitoring, Sewer System Evaluations and more

- *Above-the-flow sensor eliminates sensor fouling/maintenance*
- *Save thousands a year at each monitoring site*
- *Eliminates manhole entry/confined space entry concerns*

NEW!
TO THIS CATALOG

Data Delivery Service (DDS) with Flo-Dar™

NEW!

The ultimate "Hands-Off" approach to sewer flow monitoring.

This new approach to sewer flow metering utilizes the award-winning and highly accurate Flo-Dar flow meter without the capital expense of meter purchase. Whether you need data from one monitoring site or many more, DDS will change the way you think about sewer flow metering.

Guaranteed: **NO Manhole Visits!**

- *Pay only for sewer flow data, and you don't have to leave your office to get it*
- *24/7 access to your unedited sewer flow data via web browser*
- *Easily create professional reports for data analysis*
- *Free your personnel from flow meter maintenance and installs*

DDS
Data Delivery Services

- No flow meter purchase required
- Installed and maintained by our certified personnel
- Includes the award-winning, web-enabled Flo-Dar™ radar velocity flow meter

All installations, calibrations, and maintenance performed by factory certified professionals.

Flow data transmitted over commercial digital wireless networks and stored on a secure web server.

Event notification—alerts can be sent to a PDA, e-mail, mobile phone, or pager.

You get 24/7 access to your unedited flow data via web browser from anywhere.